Governo do Estado de São Paulo
Companhia de Processamento de Dados do Estado de São Paulo
Coordenadoria de Compras

ATA

Nº do Processo: 359.00008727/2024-51

ATA DE REGISTRO DE PREÇOS Nº 007/2025

PREGÃO ELETRÔNICO Nº 90042/2025

Aos 25 dias do mês de setembro de 2025, a **COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO - PRODESP**, **na qualidade de órgão gerenciador da presente Ata de Registro de Preços**, com sede no município de Taboão da Serra, Estado de São Paulo, à Rua Agueda Gonçalves nº 240, inscrita no CNPJ do M.F. sob nº 62.577.929/0001-35, doravante designada simplesmente **PRODESP**, nos termos do artigo 66 da Lei 13.303/2016 e das demais normas legais aplicáveis, por seus representantes legais ao final designados e assinados, em face da classificação das propostas apresentadas no Pregão Eletrônico nº 90042/2025 e deliberação do Pregoeiro homologada pela autoridade competente às fls. 1722 e 1723 do Processo Prodesp nº 359.00008727/2024-51, resolve neste ato, **REGISTRAR OS PREÇOS**, para a aquisição futura de desktops educacionais, com todos os seus componentes e acessórios, e respectivos manuais técnicos, garantia e assistência técnica especificados no **Anexo I** – Termo de Referência do Edital e desta Ata, tendo sido os referidos preços, oferecidos pela empresa cuja proposta foi habilitada conforme constante da Ata de Sessão Pública, doravante designada simplesmente **DETENTORA**, estando referida empresa representada por seus bastante procurador ao final designado e assinado, mediante as seguintes cláusulas e condições:

I – OBJETO E QUANTIDADE ESTIMADA

1.1. Constitui objeto da presente ATA DE REGISTRO DE PREÇOS a aquisição futura de desktops educacionais com todos os seus componentes e acessórios, e respectivos manuais técnicos, garantia e assistência técnica, nas quantidades abaixo estimadas e de acordo com as Especificações Técnicas do Termo de Referência – **Anexo I**, nas condições estabelecidas nesta ata.

Item	Descrição	Quantidade Estimada
1	Desktop Avançado Educacional	5.380
2	Desktop Plus Educacional	15.880

1.2. As quantidades estimadas por Órgãos são as previstas na Relação de Órgãos Participantes e Quantidades Estimadas por Órgão - **Anexo I-B**.

1.3. A presente Ata é decorrente do PREGÃO ELETRÔNICO PARA REGISTRO DE PREÇOS Nº 90042/2025 homologado pela autoridade competentes às fls. 1722 e 1723 do processo **PRODESP** nº 359.00008727/2024-51, autuado no órgão Gerenciador.

1.4. Quando das aquisições decorrentes da presente Ata de Registro de Preços a Prodesp e os Órgãos Participantes, emitirão instrumentos contratuais, conforme Minutas - **Anexos II e III**, partes integrantes desta Ata.

1.5. A assinatura da presente Ata de Registro de Preços não implica em reconhecimento prévio, compromisso ou obrigação de contratação pela **PRODESP ou Órgão Participante.**

1.6. Se o preço registrado na Ata de Registro de Preços tornar-se superior ao praticado no mercado, convocar-se-á o fornecedor do bem ou prestador do serviço visando a negociação para a redução de preços e sua adequação ao mercado; liberando-o do compromisso assumido, e cancelando seu registro, quando frustrada a negociação, e convocando os demais fornecedores ou prestadores de serviços, visando igual oportunidade de negociação. Frustradas todas as negociações, haverá o cancelamento do bem ou serviço objeto do preço negociado.

II – DA DETENTORA DO REGISTRO DE PREÇOS

2.1. Figura como **DETENTORA** desta Ata de Registro de Preços a empresa **LENOVO TECNOLOGIA (BRASIL) LIMITADA,** inscrita no **CNPJ sob o nº 07.275.920/0001-61,** estabelecida à Estrada Municipal José Costa de Mesquita, nº 200, Módulos 1 a 11, Chácara Alvorada, Indaiatuba-SP, Telefones (11) 2112-1327/ (11) 99654-6569 e e-mails govbr@lenovo.com, mmisumi@lenovo.com e lrizzardi@lenovo.com.

III – DO ÓRGÃO GERENCIADOR E PARTICIPANTE

3.1. Figura como **ÓRGÃO GERENCIADOR** da presente Ata de Registro de Preços a Cia. de Processamento de Dados do Estado de São Paulo – PRODESP, localizada na Rua Agueda Gonçalves, 240 – Jardim Pedro Gonçalves - Taboão da Serra - SP.

3.2. Figuram como **ÓRGÃOS PARTICIPANTES** desta Ata de Registro de Preços aquelas relacionadas no **Anexo I-B**.

IV – OBRIGAÇÕES DA DETENTORA

4.1. Como condição para assinatura da presente Ata de Registro de Preços/Contrato, caso a **DETENTORA**, esteja em situação de recuperação judicial, deverá apresentar declaração, relatório ou documento equivalente de seu administrador judicial, ou se o administrador judicial for pessoa jurídica, do profissional responsável pela condução do processo, de que está cumprindo o plano de recuperação judicial.

4.2. Cumprir todas as cláusulas estabelecidas no presente instrumento e celebrar todos os contratos que poderão advir durante a vigência da presente Ata de Registro de Preços.

4.3. Fornecer no caso de descontinuidade de fabricação dos materiais objeto desta Ata, os materiais que vierem substituí-los, mantidas as condições técnicas e comerciais ofertadas.

4.4. Substituir, sem ônus para a **PRODESP ou aos Órgãos Participantes**, os equipamentos que se apresentem com defeito ou impróprio para o uso a que se destina**,** salvo quando o defeito for comprovadamente provocado por uso inadequado.

4.5. Não emitir e/ou fazer circular duplicatas ou saque de letras de câmbio contra a **PRODESP ou Órgãos Participantes**, relativamente a todo e qualquer crédito decorrente desta Ata, exceto

em se tratando o fornecedor de microempresa ou empresa de pequeno porte.

4.6. Não transferir a terceiros as obrigações assumidas, sem prévia autorização por escrito, por parte da **PRODESP ou Órgão Participante.**

4.7. Manter, durante toda a execução desta Ata, em compatibilidade com as obrigações assumidas, todas as condições de habilitação e qualificação exigidas na licitação.

4.8. Assinar ao término da vigência da presente Ata, o Termo de Encerramento e Outras Avenças, conforme modelo **Anexo IV** desta Ata.

V - OBRIGAÇÕES DA PRODESP E ÓRGÃOS PARTICIPANTES

5.1. Indicar o gestor para acompanhar o futuro contrato.

5.2. Efetuar os pagamentos conforme disposto na cláusula **XIV – PREÇO E CONDIÇÕES DE PAGAMENTO** desta Ata.

5.3. Assinar ao término da vigência da presente Ata, o Termo de Encerramento e Outras Avenças, conforme modelo **Anexo IV** desta Ata.

VI – OBRIGAÇÕES ESPECÍFICAS DA PRODESP COMO ÓRGÃO GERENCIADOR

6.1. Indicar os fornecedores, sempre que solicitado, obedecendo a ordem de classificação e os quantitativos de contratação definidos pelos órgãos participantes do presente Sistema de Registro de Preços.

6.2. Conduzir os procedimentos relativos à revisão dos preços registrados e à aplicação de penalidades, conforme **item IX** da Presente Ata e/ou contratos decorrentes.

6.3. Publicar trimestralmente, no Diário Oficial do Estado, e divulgar por meios eletrônicos, os preços registrados para utilização dos órgãos participantes.

VII – OBRIGAÇÕES ESPECÍFICAS DOS ÓRGÃOS PARTICIPANTES

7.1. Manter-se informado sobre o andamento do Sistema de Registro de Preços, inclusive em relação às alterações porventura ocorridas, com o objetivo de dar correto cumprimento às suas disposições.

7.2. Consultar o **ÓRGÃO GERENCIADOR** quando da necessidade de contratação, a fim de obter a indicação do fornecedor, dos quantitativos a que este ainda se encontra obrigado e dos preços registrados.

7.3. Encaminhar ao **ÓRGÃO GERENCIADOR** as informações sobre a contratação efetivamente realizada.

7.4. Informar ao **ÓRGÃO GERENCIADOR** quando o fornecedor não atender as condições estabelecidas no edital ou recusar-se a firmar o contrato.

7.5. Conduzir os procedimentos relativos à aplicação de penalidades decorrentes do descumprimento de cláusulas contratuais, mantendo o Órgão Gerenciador informado a respeito, sobretudo quanto ao resultado dos referidos procedimentos.

VIII - CANCELAMENTO DO PREÇO REGISTRADO

8.1. Assegurados o contraditório e a ampla defesa, a **DETENTORA** terá seu Registro de Preços

cancelado quando:

8.1.1. Descumprir as condições da Ata de Registro de Preços;

8.1.2. Recusar-se a assinar o Contrato ou não retirar o instrumento equivalente, no prazo estabelecido, ou deixar de atender ao contrato, sem justificativa aceitável;

8.1.3. Não aceitar reduzir seu preço registrado, na hipótese deste se tornar superior àquele praticados no mercado;

8.1.4. For declarado inidôneo para licitar ou contratar com a Administração Pública;

8.1.5. For impedido de licitar e contratar com a Administração nos termos do item 10.1. desta Ata.

8.2. Independentemente das previsões retro indicadas, a DETENTORA poderá solicitar o cancelamento de seu Registro de Preço na ocorrência de fato superveniente que venha comprometer a perfeita execução contratual, decorrente de caso fortuito ou de força maior devidamente comprovado, desde que formulado antes do recebimento do contrato.

IX - SANÇÕES

9.1. Ficará suspensa de licitar e impedida de contratar com a PRODESP, pelo prazo de até 02 (dois) anos, o fornecedor que, convocado, recusar-se injustificadamente a assinar a Ata de Registro de Preços no prazo previsto, ou recusar-se a cumprir quaisquer de suas obrigações, em especial firmar os Contratos decorrentes.;

9.2. O descumprimento contratual será sancionado na forma de cada contrato decorrente.

X – DA CONTRATAÇÃO

10.1. A contratação aperfeiçoa-se com a assinatura da minuta de contrato, e abrange o fornecimento de desktops educacionais por parte da DETENTORA, especificados no Termo de Referência - **Anexo I** deste instrumento, não sendo aceitos equipamentos diferentes dos especificados.

10.2. Os equipamentos fornecidos deverão ser novos, sem uso, de fabricação recente e isentos de defeitos de fabricação ou acabamento.

10.3. A **PRODESP ou Órgãos Participantes,** reservam-se o direito de rejeitar todos e quaisquer equipamentos ou componentes destes que denotem uso anterior.

XI – LOCAIS DE ENTREGA

11.1. Os equipamentos serão entregues nos locais informados no **Anexo I-B** - Relação de Locais de entrega.

XII – PRAZO DE ENTREGA

12.1. É de responsabilidade da CONTRATADA a entrega dos equipamentos em 60 (sessenta) dias a contar da data da assinatura do contrato, conforme disposto no Termo de Referência – **Anexo I** desta Ata de Registro de Preços, não se eximindo da responsabilidade sobre a qualidade e o perfeito funcionamento dos mesmos.

XIII – GARANTIA E RECEBIMENTO DO OBJETO

13.1. As condições de GARANTIA e RECEBIMENTO DO OBJETO devem atender integralmente ao Termo de Referência **Anexo I** desta Ata de Registro de Preços.

XIV – PREÇO E CONDIÇÕES DE PAGAMENTO

14.1. O valor total da presente ata é de R$ 94.044.040,00 (Noventa e quatro milhões, quarenta e quatro mil e quarenta reais).

14.2. A PRODESP e/ou o Órgão Participante pagará à CONTRATADA, o(s) seguintes Preço(s) Unitário(s) registrado(s) para os PRODUTOS constantes do item 1.1. desta Ata:

ITEM	QUANT.	UNID.	DESCRIÇÃO	PREÇO UNITÁRIO
01	5.380	Unidade	Desktop Avançado Educacional	**R$ 3.268,00**
02	15.880	Unidade	Desktop Plus Educacional	**R$ 4.815,00**

14.3. Nos preços registrados, já estão inclusos todos os custos diretos e indiretos relativos ao fornecimento objeto desta Ata, inclusive despesas com materiais, transportes, fretes, mão de obra, encargos sociais e tributários e quaisquer outros custos decorrentes que venham a ser devidos em razão desta Ata.

14.4. Os valores contratados só serão pagos após a efetiva entrega e aceite dos produtos.

14.5. O pagamento ocorrerá conforme definido em cada um dos contratos decorrentes.

XV - VIGÊNCIA

15.1. A presente Ata vigorará pelo prazo de 12 (doze) meses, contado da data de sua publicação na imprensa oficial.

XVI - DISPOSIÇÕES FINAIS

16.1 A presente Ata obriga as partes por si e por seus sucessores e não pode ser cedida ou transferida, total ou parcialmente, a terceiros estranhos à contratação, sem o prévio e expresso consentimento da outra parte.

16.2. O disposto na presente ata não poderá ser alterado ou emendado pelas partes, a não ser por meio de Termo Aditivo.

16.3. Qualquer omissão ou tolerância das partes no exigir o estrito cumprimento das cláusulas e condições desta Ata ou no exercer uma prerrogativa dela decorrente, não constituirá, renúncia, e nem afetará o direito da parte contratante em exercê-lo a qualquer tempo.

16.4. Não se estabelece, por força desta Ata, nenhum tipo de sociedade, associação, consórcio, agência, mandato, representação ou responsabilidade solidária entre as partes.

16.5. As cláusulas desta Ata prevalecerão sempre em relação a qualquer acordo verbal ou escrito ajustado anterior ou posteriormente à data de sua assinatura, bem como em relação às disposições eventualmente conflitantes com o Edital da licitação que a originou, a menos que sejam expressamente revogadas pelas partes através de termo de retificação desta Ata.

16.6. A convalidação em falência da detentora/contratada em situação de recuperação judicial ensejará a imediata rescisão desta Ata, do Contrato, sem prejuízo da aplicação das demais cominações legais.

XVII - ANEXOS

17.1. Constituem partes integrantes desta ata:

ANEXO I - TERMO DE REFERÊNCIA

ANEXO I-A- DECLARAÇÃO DE PRODUTOS A SEREM FORNECIDOS

ANEXO I-B - RELAÇÃO DE ÓRGÃOS PARTICIPANTES E QUANTIDADES ESTIMADAS POR ÓRGÃO

ANEXO II - MINUTA DE CONTRATO

ANEXO III - MINUTA DE TERMO DE CONTRATO PARA ÓRGÃOS DA ADMINISTRAÇÃO DIRETA

XVIII - FORO

18.1. As partes elegem como foro competente o da Comarca de Taboão da Serra, Estado de São Paulo, como único competente para conhecer e dirimir quaisquer questões oriundas da execução desta Ata, com expressa renúncia de qualquer outro, por mais privilegiado que seja.

E, por estarem assim justas e contratadas, as partes firmam o presente instrumento em uma única via, na presença das duas testemunhas abaixo consignadas, para que surta os seus efeitos legais, obrigando-se por si e por seus sucessores.

Taboão da Serra, a data de assinatura deste instrumento corresponde à data da última assinatura digital dos representantes legais.

COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO - PRODESP

DETENTORA: LENOVO TECNOLOGIA (BRASIL) LIMITADA

TERMO DE CIÊNCIA E DE NOTIFICAÇÃO

CONTRATANTE: COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP

DETENTORA: LENOVO TECNOLOGIA (BRASIL) LIMITADA

ARP Nº 007/2025

OBJETO: Constituição de Sistema de Registro de Preços para a aquisição futura de desktops educacionais, com todos os seus componentes e acessórios, e respectivos manuais técnicos, garantia e assistência técnica.

Pelo presente TERMO, nós, abaixo identificados:

1. Estamos CIENTES de que:

a) o ajuste acima referido, seus aditamentos, bem como o acompanhamento de sua execução contratual, estarão sujeitos a análise e julgamento pelo Tribunal de Contas do Estado de São Paulo, cujo trâmite processual ocorrerá pelo sistema eletrônico;

b) poderemos ter acesso ao processo, tendo vista e extraindo cópias das manifestações de interesse, Despachos e Decisões, mediante regular cadastramento no Sistema de Processo Eletrônico, em consonância com o estabelecido na Resolução nº 01/2011 do TCESP;

c) além de disponíveis no processo eletrônico, todos os Despachos e Decisões que vierem a ser tomados, relativamente ao aludido processo, serão publicados no Diário Oficial do Estado, Caderno do Poder Legislativo, parte do Tribunal de Contas do Estado de São Paulo, em conformidade com o artigo 90 da Lei Complementar nº 709, de 14 de janeiro de 1993, iniciando-se, a partir de então, a contagem dos prazos processuais, conforme regras do Código de Processo Civil;

d) as informações pessoais dos responsáveis pela contratante e interessados estão cadastradas no módulo eletrônico do “Cadastro Corporativo TCESP – CadTCESP”, nos termos previstos no Artigo 2º das Instruções nº 01/2024, conforme “Declaração(ões) de Atualização Cadastral” anexa (s);

e) é de exclusiva responsabilidade do contratado manter seus dados sempre atualizados.

2. Damo-nos por NOTIFICADOS para:

a) O acompanhamento dos atos do processo até seu julgamento final e consequente publicação;

b) Se for o caso e de nosso interesse, nos prazos e nas formas legais e regimentais, exercer o direito de defesa, interpor recursos e o que mais couber.

Taboão da Serra, a data de assinatura deste instrumento corresponde à data da última assinatura digital dos(s) representante(s) legal(is).

AUTORIDADE MÁXIMA DO ÓRGÃO/ENTIDADE:

Nome: Gileno Gurjão Barreto

Cargo: Diretor Presidente

CPF: 315.099.595-72

RESPONSÁVEIS PELA HOMOLOGAÇÃO DO CERTAME:

Nome: Gileno Gurjão Barreto
Cargo: Diretor Presidente
CPF: 315.099.595-72
Assinatura: Ciente e notificado na RD 48.198/2025

Nome: Rafael Almeida Fernandez Soto
Cargo: Diretor de Desenvolvimento de Sistemas
CPF: 010.570.755-40
Assinatura: Ciente e notificado na RD 48.198/2025

Nome: Ricardo Cézar de Moura Jucá
Cargo: Diretor de Operações
CPF: 828.989.951-34
Assinatura: Ciente e notificado na RD 48.198/2025

Nome: Camilo Cogo Cavalcanti
Cargo: Diretor Administrativo Financeiro
CPF: 289.444.658-60
Assinatura: Ciente e notificado na RD 48.198/2025

Nome: Thiago Waltz Alves
Cargo: Diretor Comercial
CPF: 950.082.761-15
Assinatura: Ciente e notificado na RD 48.198/2025

RESPONSÁVEIS QUE ASSINARAM O AJUSTE:

Pela contratante:

Nome: Luiz Cássio Aguiar Becker Filho
Cargo: Superintendente de Operações do Data Center – SDO
CPF: 118.683.118-99

Nome: Ricardo Cézar de Moura Jucá
Cargo: Diretor de Operações - DOP
CPF: 828.989.951-34

Pela detentora: LENOVO TECNOLOGIA (BRASIL) LIMITADA
Nome: Valter Antonio Sgroi Artea

Cargo: Gerente de Vendas

CPF: 282.061.248-29

Nome: Ricardo Horácio Bloj

Cargo: Presidente

CPF: 088.503.398-10

ORDENADOR DE DESPESAS DA CONTRATANTE:

Nome: NÃO SE APLICA

Cargo:

CPF:

GESTOR(ES) DO CONTRATO:

Nome: Celia Regina Pires Soares Fernandes

Cargo: Analista Negócios e Tecnologia Informação

CPF: 256.009.998-52

Nome: Leandro Rocha Carvalho (Suplente)

Cargo: Gerente

CPF: 008.557.195-40

DEMAIS RESPONSÁVEIS:

Tipo de ato sob sua responsabilidade: Fiscal

Nome: Fernando Cassio Ferreira

Cargo: Assessor 5

CPF: 178.235.488-36

Nome: Roberta da Silva Pinheiro (Suplente)

Cargo: Assessor

CPF: 367.240.138-28

Nota: Modelo publicado no Diário Oficial Eletrônico do Tribunal de Contas do Estado de São Paulo, em 24/05/2024.

Documento assinado eletronicamente por **Sueli Sayuri Sato Filocromo**, **Técnico de Apoio Gestão e Operação**, em 26/09/2025, às 09:01, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Valter Antonio Sgroi Artea registrado(a) civilmente como VALTER ANTONIO SGROI ARTEA**, **Usuário Externo**, em 26/09/2025, às 09:16, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **RICARDO HORACIO BLOJ**, **Usuário Externo**, em 26/09/2025, às 09:42, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Leandro Rocha Carvalho**, **Gerente**, em 26/09/2025, às 16:29, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Celia Regina Pires Soares Fernandes**, **Analista Suporte Informática**, em 29/09/2025, às 11:02, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Roberta Da Silva Pinheiro**, **Assessor**, em 29/09/2025, às 15:20, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Ricardo Cezar de Moura Jucá**, **Diretor**, em 29/09/2025, às 23:31, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Fernando Cassio Ferreira**, **Coordenador**, em 02/10/2025, às 09:14, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Luiz Cassio Aguiar Becker Filho**, **Superintendente**, em 06/10/2025, às 09:19, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

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Governo do Estado de São Paulo
Companhia de Processamento de Dados do Estado de São Paulo
Coordenadoria Prodesp LAB

TERMO DE REFERÊNCIA

Nº do Processo: 359.00008727/2024-51

Interessado: Secretaria de Gestão e Governo Digital, Gerência de Serviços Digitais e Colaboração

Assunto: Aquisição de Equipamentos tipo Desktop Educacional

ANEXO I

TERMO DE REFERÊNCIA

(REL.CLBP 006 de 2024 v.1.2)

CONTRATAÇÃO FUTURA DE DESKTOP, EDUCACIONAL ATRAVÉS DO SISTEMA DE REGISTRO DE PREÇOS PARA A PRODESP.

PREÂMBULO

CONTEÚDO DO ANEXO I, I-A e I-B

ANEXO I – TERMO DE REFERÊNCIA: fornece as especificações técnicas mínimas necessárias às quais o produto ou serviço ofertado pela proponente deverá obrigatoriamente atender.

ANEXO I-A – DECLARAÇÃO DE PRODUTOS A SEREM FORNECIDOS: o Anexo I-A deverá ser entregue assinado pelo representante legal, conforme disposto no Contrato Social ou Estatuto, com carimbo ou identificação da assinatura, utilizando preferencialmente este Anexo. Qualquer observação de âmbito técnico deverá ser feita apenas no Anexo I-A.

ANEXO I-B – RELAÇÃO DE ÓRGÃOS PARTICIPANTES, LOCAIS DE ENTREGA E QUANTIDADES: fornece a relação de todos os órgãos participantes da Ata de Registro de Preços, locais de entrega, bem como distribuição da quantidade de cada lote por Órgão.

Lote	Modelo	Item CONTABILIZA	*Item CATMAT
1	**Desktop Avançado Educacional**	643656-0	*485858
2	**Desktop Plus Educacional**	643657-9	*460037

***Em caso de eventual divergência entre a descrição do item do catálogo do sistema Compras.gov.br e as disposições deste Termo de Referência, prevalecem as disposições deste Termo de Referência.**

1. DESKTOP AVANÇADO EDUCACIONAL

1.1. QUANTIDADE

a) A quantidade estimada de Desktops Avançado Educacional encontra-se no ANEXO I-B deste edital. Os Desktops Avançado deverão ser novos, idênticos e sem uso anterior. O modelo ofertado deverá estar em linha de produção, sem previsão de encerramento, na data de entrega da proposta.

1.2. PROCESSADOR

a) 01 (um) processador, padrão de arquitetura do processador x86 de 32 bits com suporte à extensão 64 bits, de no mínimo 06 núcleos físicos com no mínimo 12 threads, com tecnologia de fabricação de 10 nanômetros ou menor (AMD Ryzen 5 Série 8000 ou Intel Core i5 14ª Geração ou superiores);

b) O processador deverá estar em linha de produção pelo fabricante e ter sido lançado a partir de outubro de 2023, não sendo aceitos processadores descontinuados.

c) O processador deve implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e deverá possuir controle automático para evitar superaquecimento que possa danificá-lo.

1.3. MEMÓRIA RAM

a) Deverão ser fornecidos no mínimo 16 GBytes de memória RAM por computador.

b) Barramento de memória no mínimo do tipo DDR5 4800MHz ou superior, capaz de operar com dois canais simultâneos – "Dual Channel".

c) Mínimo 02 slots de memória.

d) O computador deverá suportar expansibilidade de memória de no mínimo 64GB.

1.4. CIRCUÍTOS INTEGRADOS DE CONTROLE AUXILIAR DO PROCESSADOR (CHIPSET)

a) O chipset deverá suportar e operar no mínimo memória RAM do tipo DDR5com frequência igual ou superior a 4800MHz e deverá ser capaz de operar com dois canais simultâneos (dual channel memory).

b) Deverá possuir controladora de disco, com no mínimo 1 conector SATA 3.0 e 1 conector PCIe NVMe de 32 Gbps ou superior.

c) Deverá implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.

1.5. BIOS E SEGURANÇA

a) O BIOS deverá ser do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.

b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).

c) Deverá possuir recursos de controle de permissão através de senhas, uma para inicializar o microcomputador e outra para acesso e alterações das configurações do BIOS.

d) Deverá possuir integrado ao hardware do microcomputador, subsistema de segurança TPM (Trusted Plataform Module) compatível com a norma TPM Specification Version 1.2 especificadas pelo TCG (Trusted Computing Group).

e) Para a implementação e uso dos recursos que o TPM, em conjunto com o sistema de segurança oferece, deverão ser fornecidos todos os programas de computador necessários para a utilização destas tecnologias com gerenciamento centralizado das políticas de criptografia de dados;

f) A BIOS deve estar em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.

g) Deverá ser entregue solução que seja capaz de apagar os dados contidos nas unidades de armazenamento como HDD, SSD e SSHD de maneira que as informações não possam ser recuperadas, mesmo quando utilizados recursos profissionais para essa finalidade, a solução deverá estar em conformidade com a NIST SP800-88r1 ou superior, ser do próprio fabricante do microcomputador ou de terceiros, porém homologada pelo fabricante do microcomputador;

h) A BIOS deverá ser desenvolvida pelo fabricante do equipamento ou esse deverá possuir direitos (copyright) sobre a BIOS. Serão aceitas soluções em regime de OEM. As atualizações, quando necessárias, deverão ser disponibilizadas no sítio do fabricante do equipamento;

i) Deverá possuir uma cópia de segurança no próprio hardware, capaz de se recuperar automaticamente em caso de falha ou desligamento do equipamento durante a atualização;

j) Deverá permitir salvar as configurações da BIOS em um arquivo e carregar em todos os outros equipamentos do mesmo modelo;

k) O equipamento deverá dispor de gerenciamento remoto através das tecnologias, dispondo de componentes (processador, placa-mãe, BIOS, placa de rede, etc.) que implementem essa funcionalidade, sendo AMD PRO ou Intel Vpro.

l) Deverá estar aderente às especificações do DASH 1.1 ou WS-Man, definidas pelo DMTF (Desktop Management Task Force).

m) Capacidade de acesso à BIOS através de outro computador conectado na rede no momento da inicialização do POST;

n) Capacidade de redirecionamento do boot do computador pela rede através do uso de CD-ROM, ou arquivo de imagem no formato ISO (CD e DVD ROM) localizados em outro computador, com acesso a interface remotamente.

o) Capacidade de permitir o acesso remoto ao computador, formatação de disco, mesmo com este desligado ou com o Sistema Operacional travado ou inacessível.

p) A placa-mãe deverá possuir memória não volátil, para gravação de informações de inventário de hardware (placa mãe, processador, memória e disco), que sejam acessíveis remotamente pela rede independente do estado do sistema operacional.

q) A máquina deverá suportar intervenção técnica do helpdesk via rede IP para atualização de BIOS, configuração de SETUP (CMOS) e boot remoto para execução de rotinas de diagnóstico, mesmo se o sistema operacional estiver inoperante.

r) As configurações das funcionalidades de gerenciamento presentes na placa-mãe deverão ser feitas sem a necessidade de intervenção presencial à máquina, mesmo com o sistema operacional inoperante.

s) O gerenciamento remoto deverá ser possível através da rede cabeada ou wifi;

t) Os dados do usuário devem estar protegidos em caso de acesso remoto, o acesso deve ser feito através de um outro usuário de administração ou usuário/cliente do microcomputador deverá ser consultado para autorizar/recusar acesso remoto através de segundo fator de autenticação, sendo registrado na BIOS logs de acesso para efeitos de auditoria.

1.6. SLOTS PCI

a) Padrão PCI-Express ou superior.

b) Deverá disponibilizar no mínimo 01 (um) slot PCI-Express Express x16 e 01 (um) slot PCI-Express x1 ou superior livre após o computador estar configurado com os dispositivos solicitados.

1.7. PORTAS DE COMUNICAÇÃO

a) Todos os conectores das portas de entrada/saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide, bem como pelos nomes ou símbolos.

b) No mínimo 04 (quatro) portas USB versão 2.0.

c) No mínimo 04(quatro) portas USB versão 3.0 ou superior, sendo que pelo menos 02 (duas) estejam livres e localizadas na parte frontal do computador.

d) No mínimo 02 (duas) portas para monitor de vídeo sendo 01(uma) padrão DB15 VGA ou superior e 01 (uma) digital Display Port ou HDMI, compatível com o monitor de vídeo ofertado neste lote.

e) 01 (uma) portas da interface de rede padrão RJ45.

1.8. INTERFACE DE REDE 1GE

a) No mínimo 01 (uma) interface de rede por computador.

b) Deverão possuir recursos de Wake on LAN (WOL) e Pré-boot Execution Enviroment (PXE).

c) Padrão PCI, on-board e/ou off board.

d) Interface de rede padrão Gigabit Ethernet com led de atividade.

e) Deverá operar automaticamente nas velocidades de comunicação de 10Mbps ou 100Mbps ou 1000Mbps, bem como no modo full-duplex.

f) Compatibilidade funcional e operacional com os padrões IEEE 802.3 para 10baseT (Ethernet), IEEE 802.3u para 100baseTX (Fast Ethernet) e IEEE 802.3ab para 1000baseT (Gigabit Ethernet).

1.9. CONTROLADORA DE VÍDEO

a) 01 (uma) controladora de vídeo por computador.

b) Padrão PCI Express ou superior.

c) Controladora onboard ou offboard com capacidade para controlar no mínimo 1 monitor de vídeo compatível com padrão VGA ou superior.

d) Tamanho de memória de vídeo de no mínimo 1,7GBytes, com mecanismo de alocação dinâmica ou não da memória RAM do sistema. Caso a alocação seja efetuada de forma dinâmica, o mesmo deverá permitir que parte da memória RAM do sistema seja alocada para vídeo, à medida que seja necessária e liberada quando não estiver sendo usada. Caso a alocação não seja efetuada de forma dinâmica, deverá ser acrescentada à memória RAM, a mesma quantidade de memória alocada exclusivamente para vídeo.

e) Suporte à resolução gráfica de 4096 x 2160 pixels;

f) Deverá ser compatível com DirectX 12.

1.10. CONTROLADORA DE DISCO

a) Deverá possuir controladora SATA, com no mínimo 1 conector SATA 3.0 6Gbps ou superior.

b) Deverá possuir 1 interface PCIe NVMe de 32 Gbps tipo M.2.

1.11. UNIDADE DE ARMAZENAMENTO INTERNO

a) Deverá ser fornecido com no mínimo 01 (uma) unidade de armazenamento.
b) Tipo interno ao gabinete.
c) Padrão SSD Sata ou NVMe.
d) Capacidade mínima de armazenamento de 512GB.
e) Com velocidade de leitura de no mínimo 2000 MB/s e de gravação de no mínimo 1000MB/s

1.12. KIT DE ÁUDIO

a) Deverá ser fornecido 01 (um) Kit de Áudio composto por 01 (uma) Controladora de som, 01 (um) Alto-falante por computador.
b) A controladora deverá possuir no mínimo 01 porta para áudio e 01 porta para microfone localizadas na parte frontal do computador, podendo ser do tipo combo.
c) Deverá ser fornecido Alto-falante interno com amplificador de sinal ou poderão ser fornecidas caixas de som externas que sejam alimentadas pela própria CPU, eliminando a necessidade em dedicar uma tomada de alimentação de energia às caixas de som.

1.13. TECLADO

a) Deverá ser fornecido 01 (um) teclado por computador.
b) Teclado com conjunto de no mínimo 104 teclas com teclado numérico e teclas de função.
c) Compatibilidade com o padrão ABNT Variant 2.
d) Conector do cabo de sinal padrão USB.
e) Deverá possuir o mesmo padrão de cor do gabinete.
f) Deverá ser resistente a derramamento de líquidos.

1.14. MOUSE

a) Deverá ser fornecido 01 (um) mouse por computador.
b) Mouse tipo óptico com 3 botões, sendo 2 para seleção de objetos e 1 tipo scroll para rolagem.
c) Resolução de no mínimo 1000dpi.
d) Conector do cabo de sinal padrão USB.
e) Deverá possuir o mesmo padrão de cor do gabinete.
f) Deverá acompanhar mouse pad.

1.15. MONITOR DE VÍDEO

a) Deverá ser fornecido 01 (um) monitor de vídeo por computador
b) Tipo TFT (Thin Film Transistor) de Matriz Ativa e tecnologia LED policromático de 23,8 polegadas.
c) Formato padrão widescreen.
d) Visibilidade diagonal de 23,8 polegadas.
e) Resolução gráfica mínima suportada de 1920x 1080 pixels a 60Hz.
f) Tempo de resposta no máximo de 8 milissegundos.
g) Tratamento de superfície antirreflexivo.
h) Brilho de no mínimo 250 cd/m2.
i) Relação de Contraste típico de no mínimo 1000:1.

j) Funções OSD (On Screen Display) para ajuste de brilho, contraste, posição horizontal-vertical, linguagem, regulagem de cor.

k) Base do monitor com ajuste de inclinação – 5° a + 20°, ajuste de altura da tela de 110mm +/- 10%, pivô de rotação de 90°.

l) Conectores do cabo de sinal 01 DB15 VGA e 01 Display Port ou HDMI.

m) Fonte de alimentação do monitor de vídeo com ajuste automático, suportando faixa de tensão de 100VAC a 240VAC, a 50 ou 60Hz.

n) Deverá ser fornecido cabo de alimentação elétrica padrão brasileiro NBR 14136:2002.

o) Deverá ser fornecido 01 cabo de vídeo compatível com a controladora do Desktop.

p) O gabinete deverá, externamente, possuir cor semelhante ao do gabinete da CPU, com botões para ligar/desligar e de controle digitais, bem como indicadores visuais para informar os estados de ligado, espera e desligado.

q) Em conformidade com a norma TCO'03 ou Energy Star 5.0 e/ou registrado no EPEAT (Eletronic Product Environmental Assessment Tool) como categoria Silver ou Superior comprovado no site www.epeat.net.

r) Deverá ser do mesmo fabricante da CPU, aceito em regime OEM e possuir o mesmo padrão de cor do gabinete.

1.16. GABINETE DA CPU

a) Gabinete tipo SFF-Small Form Factor ou desktop, permitindo a utilização na posição horizontal e vertical sem comprometer os componentes internos e o funcionamento do computador.

b) A arquitetura de construção do gabinete deverá estar projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não deverá haver partes cortantes interna ou externa do gabinete.

c) Deverá possuir no mínimo 01 (uma) baia interna para unidade de armazenamento.

d) Acabamento da chapa do gabinete em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.

e) O computador deve possuir botão liga/desliga e deve ser desligado por software mantendo pressionado o botão, o qual deve possuir dispositivo de proteção para prevenir o desligamento acidental do computador.

f) Deverá possuir display ou leds acoplados no painel frontal do computador para indicar e permitir monitorar as condições de funcionamento do mesmo.

g) O gabinete deve ter características "tool less", ou seja, não utiliza ferramentas para: abertura do gabinete e colocação/fixação e remoção de placas de expansão tipo PCI.

h) O gabinete deve possuir local apropriado, já desenvolvido no projeto do produto, para colocação de lacres ou cadeados mecânicos ou eletrônicos não sendo aceito adaptações.

i) Deverá ser gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.

j) Volume máximo 13.000cm^3.

k) O Gabinete Deverá possuir sensor de abertura da tampa para identificar aberturas sem autorização.

1.17. CADEADO DE SEGURANÇA

a) O computador deverá possuir slot para colocação de cadeado.

b) Caso o computador não possua a opção de instalação de cadeado conforme especificado nos subitens anteriores, o mesmo deverá possuir solução completa que obtenha o mesmo objetivo.

1.18. FONTE DE ALIMENTAÇÃO DA CPU

a) Deverá ser fornecida 01 (uma) fonte de alimentação necessária para o funcionamento do computador.

b) A potência da fonte de alimentação deverá ser de no máximo 450 Watts devendo suportar a configuração máxima do computador.

c) A fonte de alimentação ofertada deverá conter o recurso de fator de correção de energia ativa ou passiva - "PFC" (Power Factor Correction).

d) Faixa de tensão de entrada de 100VAC a 240VAC à 60Hz, com seleção automática de tensão, capaz de sustentar a configuração máxima do computador.

e) Deverá ser fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002.

f) A fonte de alimentação deverá possuir certificação 80PLUS Gold, que será comprovada através de publicação no site http://www.80plus.org em nome do fabricante da fonte ofertada ou do desktop.

1.19. SISTEMA OPERACIONAL

a) Deverá ser entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;

b) O computador e todos os seus periféricos deverão ser compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;

c) O computador ofertado deve estar certificado no HCL (Hardware Compatibility List) da Microsoft para o sistema operacional ofertado que será comprovado através do link https://sysdev.microsoft.com/en-US/Hardware/lpl/ ou apresentação do certificado;

d) A CONTRATADA deverá disponibilizar acesso automático às documentações e às versões de manutenção e atualizações de firmware e drivers para os componentes do microcomputador ofertado, via portal web do fabricante, sem ônus adicional à CONTRATANTE.

e) Após a homologação do equipamento, a CONTRATADA, mediante apresentação de necessidade da SEDUC/FDE deverá gerar uma imagem (Recovery) com os aplicativos a serem instalados. Portanto, caso seja necessário, esta geração deverá acontecer na FDE sob supervisão/acompanhamento da equipe de suporte técnico da FDE;

f) Deverá ser fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery deverá possuir o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do mesmo. Caso seja apresentada a necessidade de geração de imagem, este Recovery deverá possuir a mesma.

1.20. AGENTE PARA GERENCIAMENTO E INVENTÁRIO

a) Para o gerenciamento e inventário do computador, o equipamento deverá possuir suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em campo editável; modelo e frequência de clock do microprocessador; quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.

1.21. QUALIDADE DO EQUIPAMENTO

a) Deverá ser fornecido Certificado ou Relatório de Avaliação de Conformidade emitido por um órgão credenciado pelo INMETRO ou Certificado similar, comprovando que o COMPUTADOR e o MONITOR DE VíDEO estão em conformidade com a norma IEC 60950 (Safety of Information Technology Equipment Including Eletrical Business Equipment), para segurança do usuário contra incidentes elétricos e combustão dos materiais elétricos.

b) O produto ofertado deverá possuir registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não poderá ser realizada com etiquetas de fácil remoção ou danificação.

1.22. RESPONSABILIDADES COM O MEIO AMBIENTE

a) O modelo do equipamento ofertado deverá estar registrado no EPEAT (Electronic Product Environmental Assessment Tool) da Agência de Proteção Ambiental (EPA), na categoria Silver ou Superior, no site: http://www.epeat.net ou a certificação de Rotulagem Ambiental da ABNT, comprovando que o equipamento atinge as exigências para controle do impacto ambiental em seu processo de fabricação.

b) O modelo ofertado deve estar em conformidade com o padrão RoHS (Restriction of Hazardous Substances) ou com a certificação de Rotulagem Ambiental da ABNT, isto é, ser construído com substâncias que não agridem o meio ambiente tais como: cádmio (Cd), mercúrio (Hg), cromo hexavalente (Cr(VI)), bifenilos polibromados (PBBs), éteres difenilpolibromados (PBDEs) e chumbo (Pb).

1.23. ACESSÓRIOS

a) Deverão ser fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.

1.24. ACONDICIONAMENTO

a) Os computadores, os monitores e os acessórios devem estar acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.

1.25. DOCUMENTAÇÃO TÉCNICA

a) Deverão ser fornecidos manuais técnicos do usuário e de referência em língua portuguesa, contendo todas as informações sobre os produtos com as instruções para instalação, configuração, operação e administração.

b) Deverá ser fornecido junto com o Anexo I-A, planilha contendo informações quanto ao atendimento ponto a ponto de todas as especificações técnicas solicitadas no Termo de Referência, tais como nome do fabricante do equipamento e demais hardware, marca, modelo, quantidade, tipo, velocidade e quantidade de todos os equipamentos e componentes ofertados, bem como os demais acessórios do equipamento e componentes ofertados, informando links ou páginas do catálogo que comprovem o atendimento.

1.26. SOLUÇÃO DE BLOQUEIO, RASTREIO E SEGURANÇA

a) O equipamento deverá ser fornecido licença de uso de sistema de gestão de ativos pelo período de 5 anos, gerenciável através de console em nuvem, com as seguintes características e funcionalidades:

- Permitir inventário de hardware e software do equipamento e gerir suas alterações;
- Informar geolocalização e gerenciar perímetro de funcionamento do equipamento;

- Permitir o bloqueio e wipe remoto do equipamento;
- Permitir gerar relatórios customizados;

b) Deverá ser ativada em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega.

2. DESKTOP PLUS EDUCACIONAL

2.1. QUANTIDADE

a) A quantidade estimada de Desktops Plus Educacional encontra-se no ANEXO I-B deste edital. Os Desktops Plus deverão ser novos, idênticos e sem uso anterior. O modelo ofertado deverá estar em linha de produção, sem previsão de encerramento, na data de entrega da proposta.

2.2. PROCESSADOR

a) 01 (um) processador, padrão de arquitetura do processador x86 de 32 bits com suporte à extensão 64 bits, de no mínimo 08 núcleos físicos com no mínimo 16 threads, com tecnologia de fabricação de 10 nanômetros ou menor (AMD Ryzen 7 - Série 8000 ou Intel Core i7 - 14ª Geração ou superiores);

b) O processador deverá estar em linha de produção pelo fabricante e ter sido lançado a partir de outubro de 2023, não sendo aceitos processadores descontinuados.

c) O processador deve implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e deverá possuir controle automático para evitar superaquecimento que possa danificá-lo.

2.3. MEMÓRIA RAM

a) Deverão ser fornecidos no mínimo 32 GBytes de memória RAM por computador.

b) Barramento de memória no mínimo do tipo DDR5 4800MHz ou superior, capaz de operar com dois canais simultâneos – "Dual Channel".

c) Mínimo 02 slots de memória.

d) O computador deverá suportar expansibilidade de memória de no mínimo 64GB.

2.4. CIRCUÍTOS INTEGRADOS DE CONTROLE AUXILIAR DO PROCESSADOR (CHIPSET)

a) O chipset deverá suportar e operar no mínimo memória RAM do tipo DDR5com frequência igual ou superior a 4800MHz e deverá ser capaz de operar com dois canais simultâneos (dual channel memory).

b) Deverá possuir controladora de disco, com no mínimo 1 conector SATA 3.0 e 1 conector PCIe NVMe de 64 Gbps ou superior.

c) Deverá implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.

2.5. BIOS E SEGURANÇA

a) O BIOS deverá ser do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.

b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de

rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).

c) Deverá possuir recursos de controle de permissão através de senhas, uma para inicializar o microcomputador e outra para acesso e alterações das configurações do BIOS.

d) Deverá possuir integrado ao hardware do microcomputador, subsistema de segurança TPM (Trusted Plataform Module) compatível com a norma TPM Specification Version 1.2 especificadas pelo TCG (Trusted Computing Group).

e) Para a implementação e uso dos recursos que o TPM, em conjunto com o sistema de segurança oferece, deverão ser fornecidos todos os programas de computador necessários para a utilização destas tecnologias com gerenciamento centralizado das políticas de criptografia de dados;

f) A BIOS deve estar em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.

g) Deverá ser entregue solução que seja capaz de apagar os dados contidos nas unidades de armazenamento como HDD, SSD e SSHD de maneira que as informações não possam ser recuperadas, mesmo quando utilizados recursos profissionais para essa finalidade, a solução deverá estar em conformidade com a NIST SP800-88r1 ou superior, ser do próprio fabricante do microcomputador ou de terceiros, porém homologada pelo fabricante do microcomputador;

h) A BIOS deverá ser desenvolvida pelo fabricante do equipamento ou esse deverá possuir direitos (copyright) sobre a BIOS. Serão aceitas soluções em regime de OEM. As atualizações, quando necessárias, deverão ser disponibilizadas no sítio do fabricante do equipamento;

i) Deverá possuir uma cópia de segurança no próprio hardware, capaz de se recuperar automaticamente em caso de falha ou desligamento do equipamento durante a atualização;

j) Deverá permitir salvar as configurações da BIOS em um arquivo e carregar em todos os outros equipamentos do mesmo modelo;

k) O equipamento deverá dispor de gerenciamento remoto através das tecnologias, dispondo de componentes (processador, placa-mãe, BIOS, placa de rede, etc.) que implementem essa funcionalidade, sendo AMD PRO ou Intel Vpro.

l) Deverá estar aderente às especificações do DASH 1.1 ou WS-Man, definidas pelo DMTF (Desktop Management Task Force).

m) Capacidade de acesso à BIOS através de outro computador conectado na rede no momento da inicialização do POST;

n) Capacidade de redirecionamento do boot do computador pela rede através do uso de CD-ROM, ou arquivo de imagem no formato ISO (CD e DVD ROM) localizados em outro computador, com acesso a interface remotamente.

o) Capacidade de permitir o acesso remoto ao computador, formatação de disco, mesmo com este desligado ou com o Sistema Operacional travado ou inacessível.

p) A placa-mãe deverá possuir memória não volátil, para gravação de informações de inventário de hardware (placa mãe, processador, memória e disco), que sejam acessíveis remotamente pela rede independente do estado do sistema operacional.

q) A máquina deverá suportar intervenção técnica do helpdesk via rede IP para atualização de BIOS, configuração de SETUP (CMOS) e boot remoto para execução de rotinas de diagnóstico, mesmo se o sistema operacional estiver inoperante.

r) As configurações das funcionalidades de gerenciamento presentes na placa-mãe deverão ser feitas sem a necessidade de intervenção presencial à máquina, mesmo com o sistema operacional inoperante.

s) O gerenciamento remoto deverá ser possível através da rede cabeada ou wifi;

t) Os dados do usuário devem estar protegidos em caso de acesso remoto, o acesso deve ser feito através de um outro usuário de administração ou usuário/cliente do microcomputador deverá ser consultado para autorizar/recusar acesso remoto através de segundo fator de autenticação, sendo registrado na BIOS logs de acesso para efeitos de auditoria.

2.6. SLOTS PCI

a) Padrão PCI-Express ou superior.

b) Deverá disponibilizar no mínimo 01 (um) slot PCI-Express x1 ou superior livre após o computador estar configurado com os dispositivos solicitados.

2.7. PORTAS DE COMUNICAÇÃO

a) Todos os conectores das portas de entrada/saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide, bem como pelos nomes ou símbolos.

b) No mínimo 04 (quatro) portas USB versão 2.0.

c) No mínimo 04(quatro) portas USB versão 3.0 ou superior, sendo que pelo menos 02 (duas) estejam livres e localizadas na parte frontal do computador.

d) No mínimo 02 (duas) portas para monitor de vídeo sendo 01(uma) padrão DB15 VGA ou superior e 01 (uma) digital Display Port ou HDMI, compatível com o monitor de vídeo ofertado neste lote.

e) 01 (uma) portas da interface de rede padrão RJ45.

2.8. INTERFACE DE REDE 1GE

a) No mínimo 01 (uma) interface de rede por computador.

b) Deverão possuir recursos de Wake on LAN (WOL) e Pré-boot Execution Enviroment (PXE).

c) Padrão PCI, on-board e/ou off board.

d) Interface de rede padrão Gigabit Ethernet com led de atividade.

e) Deverá operar automaticamente nas velocidades de comunicação de 10Mbps ou 100Mbps ou 1000Mbps, bem como no modo full-duplex.

f) Compatibilidade funcional e operacional com os padrões IEEE 802.3 para 10baseT (Ethernet), IEEE 802.3u para 100baseTX (Fast Ethernet) e IEEE 802.3ab para 1000baseT (Gigabit Ethernet).

2.9. CONTROLADORA DE VÍDEO

a) 01 (uma) controladora de vídeo por computador.

b) Padrão PCI Express 3.0 x4 ou x8 ou x16.

c) Controladora off-board com capacidade para controlar no mínimo 2 monitores de vídeo

d) 02 conectores de sinal VGA e/ou DVI e/ou Display Port e/ou HDMI sendo aceita versões digitais mini com seus respectivos adaptadores, sendo pelo menos 01 dos conectores digital.

e) Tamanho de memória de vídeo de no mínimo 4GBytes GDDR6 dedicada.

f) Suportar a resolução gráfica de 5120 x 2880 pixels.

g) Deverá ser compatível com API's OpenGL 4.6, OpenCL, Vulcan 1.2 e DirectX 12.

h) Interface de memória mínima de 64 bit e largura de banda de 80GB/s.

2.10. CONTROLADORA DE DISCO

a) Deverá possuir controladora SATA, com no mínimo 1 conector SATA 3.0 6Gbps ou superior.

b) Deverá possuir 1 interface PCIe NVMe de 64 Gbps tipo M.2.

2.11. UNIDADE DE ARMAZENAMENTO INTERNO

a) Deverá ser fornecido com no mínimo 01 (uma) unidade de armazenamento.
b) Tipo interno ao gabinete.
c) Padrão SSD Sata ou NVMe.
d) Capacidade mínima de armazenamento de 512GB.

2.12. KIT DE ÁUDIO

a) Deverá ser fornecido 01 (um) Kit de Áudio composto por 01 (uma) Controladora de som, 01 (um) Alto-falante por computador.
b) A controladora deverá possuir no mínimo 01 porta para áudio e 01 porta para microfone localizadas na parte frontal do computador, podendo ser do tipo combo.
c) Deverá ser fornecido Alto-falante interno com amplificador de sinal ou poderão ser fornecidas caixas de som externas que sejam alimentadas pela própria CPU, eliminando a necessidade em dedicar uma tomada de alimentação de energia às caixas de som.

2.13. TECLADO

a) Deverá ser fornecido 01 (um) teclado por computador.
b) Teclado com conjunto de no mínimo 104 teclas com teclado numérico e teclas de função.
c) Compatibilidade com o padrão ABNT Variant 2.
d) Conector do cabo de sinal padrão USB.
e) Deverá possuir o mesmo padrão de cor do gabinete.
f) Deverá ser resistente a derramamento de líquidos.

2.14. MOUSE

a) Deverá ser fornecido 01 (um) mouse por computador.
b) Mouse tipo óptico com 3 botões, sendo 2 para seleção de objetos e 1 tipo scroll para rolagem.
c) Resolução de no mínimo 1000dpi.
d) Conector do cabo de sinal padrão USB.
e) Deverá possuir o mesmo padrão de cor do gabinete.
f) Deverá acompanhar mouse pad.

2.15. MONITOR DE VÍDEO

a) Deverá ser fornecido 01 (um) monitor de vídeo por computador
b) Tipo TFT (Thin Film Transistor) de Matriz Ativa e tecnologia LED policromático de 23,8 polegadas.
c) Formato padrão widescreen.
d) Visibilidade diagonal de 23,8 polegadas.
e) Resolução gráfica mínima suportada de 1920x 1080 pixels a 60Hz.
f) Tempo de resposta no máximo de 8 milissegundos.
g) Tratamento de superfície antirreflexivo.
h) Brilho de no mínimo 250 cd/m2.
i) Relação de Contraste típico de no mínimo 1000:1.
j) Funções OSD (On Screen Display) para ajuste de brilho, contraste, posição horizontal-vertical, linguagem, regulagem de cor.

k) Base do monitor com ajuste de inclinação – 5° a + 20°, ajuste de altura da tela de 110mm +/- 10%, pivô de rotação de 90°.

l) Conectores do cabo de sinal 01 DB15 VGA e 01 Display Port ou HDMI.

m) Fonte de alimentação do monitor de vídeo com ajuste automático, suportando faixa de tensão de 100VAC a 240VAC, a 50 ou 60Hz.

n) Deverá ser fornecido cabo de alimentação elétrica padrão brasileiro NBR 14136:2002.

o) Deverá ser fornecido 01 cabo de vídeo compatível com a controladora do Desktop.

p) O gabinete deverá, externamente, possuir cor semelhante ao do gabinete da CPU, com botões para ligar/desligar e de controle digitais, bem como indicadores visuais para informar os estados de ligado, espera e desligado.

q) Em conformidade com a norma TCO'03 ou Energy Star 5.0 e/ou registrado no EPEAT (Eletronic Product Environmental Assessment Tool) como categoria Silver ou Superior comprovado no site www.epeat.net.

r) Deverá ser do mesmo fabricante da CPU, aceito em regime OEM e possuir o mesmo padrão de cor do gabinete.

2.16. GABINETE DA CPU

a) Gabinete tipo SFF-Small Form Factor ou desktop, permitindo a utilização na posição horizontal e vertical sem comprometer os componentes internos e o funcionamento do computador.

b) A arquitetura de construção do gabinete deverá estar projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não deverá haver partes cortantes interna ou externa do gabinete.

c) Deverá possuir no mínimo 01 (uma) baia interna para unidade de armazenamento.

d) Acabamento da chapa do gabinete em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.

e) O computador deve possuir botão liga/desliga e deve ser desligado por software mantendo pressionado o botão, o qual deve possuir dispositivo de proteção para prevenir o desligamento acidental do computador.

f) Deverá possuir display ou leds acoplados no painel frontal do computador para indicar e permitir monitorar as condições de funcionamento do mesmo.

g) O gabinete deve ter características "tool less", ou seja, não utiliza ferramentas para: abertura do gabinete e colocação/fixação e remoção de placas de expansão tipo PCI.

h) O gabinete deve possuir local apropriado, já desenvolvido no projeto do produto, para colocação de lacres ou cadeados mecânicos ou eletrônicos não sendo aceito adaptações.

i) Deverá ser gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.

j) Volume máximo 13.000cm^3.

k) O Gabinete Deverá possuir sensor de abertura da tampa para identificar aberturas sem autorização.

2.17. CADEADO DE SEGURANÇA

a) O computador deverá possuir slot para colocação de cadeado.

b) Caso o computador não possua a opção de instalação de cadeado conforme especificado nos subitens anteriores, o mesmo deverá possuir solução completa que obtenha o mesmo objetivo.

2.18. FONTE DE ALIMENTAÇÃO DA CPU

a) Deverá ser fornecida 01 (uma) fonte de alimentação necessária para o funcionamento do computador.

b) A potência da fonte de alimentação deverá ser de no máximo 450 Watts devendo suportar a configuração máxima do computador.

c) A fonte de alimentação ofertada deverá conter o recurso de fator de correção de energia ativa ou passiva - "PFC" (Power Factor Correction).

d) Faixa de tensão de entrada de 100VAC a 240VAC à 60Hz, com seleção automática de tensão, capaz de sustentar a configuração máxima do computador.

e) Deverá ser fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002.

f) A fonte de alimentação deverá possuir certificação 80PLUS Gold, que será comprovada através de publicação no site http://www.80plus.org em nome do fabricante da fonte ofertada ou do desktop.

2.19. SISTEMA OPERACIONAL

a) Deverá ser entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;

b) O computador e todos os seus periféricos deverão ser compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;

c) O computador ofertado deve estar certificado no HCL (Hardware Compatibility List) da Microsoft para o sistema operacional ofertado que será comprovado através do link https://sysdev.microsoft.com/en-US/Hardware/lpl/ ou apresentação do certificado;

d) A CONTRATADA deverá disponibilizar acesso automático às documentações e às versões de manutenção e atualizações de firmware e drivers para os componentes do microcomputador ofertado, via portal web do fabricante, sem ônus adicional à CONTRATANTE.

e) Após a homologação do equipamento, a CONTRATADA, mediante apresentação de necessidade da SEDUC/FDE deverá gerar uma imagem (Recovery) com os aplicativos a serem instalados. Portanto, caso seja necessário, esta geração deverá acontecer na FDE sob supervisão/acompanhamento da equipe de suporte técnico da FDE;

f) Deverá ser fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery deverá possuir o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do mesmo. Caso seja apresentada a necessidade de geração de imagem, este Recovery deverá possuir a mesma.

2.20. AGENTE PARA GERENCIAMENTO E INVENTÁRIO

a) Para o gerenciamento e inventário do computador, o equipamento deverá possuir suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em campo editável; modelo e frequência de clock do microprocessador; quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.

2.21. QUALIDADE DO EQUIPAMENTO

a) Deverá ser fornecido Certificado ou Relatório de Avaliação de Conformidade emitido por um órgão credenciado pelo INMETRO ou Certificado similar, comprovando que o COMPUTADOR e o MONITOR DE VíDEO estão em conformidade com a norma IEC 60950 (Safety of Information Technology Equipment Including Eletrical Business Equipment), para segurança do usuário contra incidentes elétricos e combustão dos materiais elétricos.

b) O produto ofertado deverá possuir registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não poderá ser realizada com etiquetas de fácil remoção ou danificação.

2.22. RESPONSABILIDADES COM O MEIO AMBIENTE

a) O modelo do equipamento ofertado deverá estar registrado no EPEAT (Electronic Product Environmental Assessment Tool) da Agência de Proteção Ambiental (EPA), na categoria Silver ou Superior, no site: http://www.epeat.net ou a certificação de Rotulagem Ambiental da ABNT, comprovando que o equipamento atinge as exigências para controle do impacto ambiental em seu processo de fabricação.

b) O modelo ofertado deve estar em conformidade com o padrão RoHS (Restriction of Hazardous Substances) ou com a certificação de Rotulagem Ambiental da ABNT, isto é, ser construído com substâncias que não agridem o meio ambiente tais como: cádmio (Cd), mercúrio (Hg), cromo hexavalente (Cr(VI)), bifenilos polibromados (PBBs), éteres difenilpolibromados (PBDEs) e chumbo (Pb).

2.23. ACESSÓRIOS

a) Deverão ser fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.

2.24. ACONDICIONAMENTO

a) Os computadores, os monitores e os acessórios devem estar acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.

2.25. DOCUMENTAÇÃO TÉCNICA

a) Deverão ser fornecidos manuais técnicos do usuário e de referência em língua portuguesa, contendo todas as informações sobre os produtos com as instruções para instalação, configuração, operação e administração.

b) Deverá ser fornecido junto com o Anexo I-A, planilha contendo informações quanto ao atendimento ponto a ponto de todas as especificações técnicas solicitadas no Termo de Referência, tais como nome do fabricante do equipamento e demais hardware, marca, modelo, quantidade, tipo, velocidade e quantidade de todos os equipamentos e componentes ofertados, bem como os demais acessórios do equipamento e componentes ofertados, informando links ou páginas do catálogo que comprovem o atendimento.

2.26. SOLUÇÃO DE BLOQUEIO, RASTREIO E SEGURANÇA

a) O equipamento deverá ser fornecido licença de uso de sistema de gestão de ativos pelo período de 5 anos, gerenciável através de console em nuvem, com as seguintes características e funcionalidades:

- Permitir inventário de hardware e software do equipamento e gerir suas alterações;
- Informar geolocalização e gerenciar perímetro de funcionamento do equipamento;
- Permitir o bloqueio e wipe remoto do equipamento;
- Permitir gerar relatórios customizados;

b) Deverá ser ativada em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega.

3. CRITÉRIO DE SELEÇÃO DO FORNECEDOR

3.1. TIPO E MODALIDADE DA LICITAÇÃO

a) A contratação do objeto pretendido se refere a bens e serviços comuns, sem fornecimento de mão de obra, na modalidade pregão, na forma eletrônica, com julgamento pelo critério de Menor Preços Unitário por Lote, nos termos da Lei vigente e demais normas da legislação aplicável e, ainda, de acordo com as condições estabelecidas neste Edital.

3.2. DIVISÃO DA SOLUÇÃO EM LOTES

a) Segmentar a contratação em lotes é uma estratégia que visa aumentar a ampla participação de empresas de diferentes portes e especialidades, atuantes no setor de tecnologia da informação e comunicação, resultando em propostas mais competitivas e, possivelmente, em preços mais vantajosos para a administração pública estadual.

b) Essa estratégia exclui a dependência de uma única empresa, possibilitando uma gestão de riscos mais eficaz. Caso surjam problemas com o fornecedor de um lote específico, as demais partes do projeto podem prosseguir com menores impactos em comparação com um único fornecedor, garantindo a continuidade e a conclusão bem-sucedida do projeto.

3.3. PARTICIPAÇÃO DE CONSÓRCIOS

a)A presente aquisição não prevê a participação de empresas reunidas em consórcio, uma vez que o objeto licitado não contempla a prestação de serviços/fornecimento de bens de ramos de conhecimentos distintos especializados, sendo os produtos e serviços de um único fabricante, ou seja, uma única revenda detém em seu portfólio condições de atender as demandas previstas nesse Termo de Referência, sem a necessidade de se consorciar com outra empresa para o atendimento do objeto na sua completude. Desse modo, considerando as características do objeto, não será admitida a participação de consórcios.

3.4. SUBCONTRATAÇÃO

a)Não será admitida a subcontratação neste Termo de Referência.

4. CONDIÇÕES CONTRATUAIS

4.1. ENTREGA

a) Os equipamentos e manuais técnicos especificados no(s) lote(s) 1 a 2 deste anexo, deverá(ao) ser entregue(s) conforme **ANEXO I-B – RELAÇÃO DE ÓRGÃOS PARTICIPANTES, LOCAIS DE ENTREGA E QUANTIDADES**.

b) A CONTRATADA deverá fornecer relatórios de entregas por nota fiscal contendo os números de série de cada equipamento;

c) O prazo máximo de entrega dos produtos e manuais técnicos especificados no(s) lote(s) 1 a 2, deste anexo é de 60 dias a contar da data de assinatura do Contrato/Pedido de Compra.

4.2. INSTALAÇÃO

a) É de responsabilidade da CONTRATANTE a instalação dos produtos especificados neste anexo;

b) A CONTRATADA obriga-se, caso solicitado pela CONTRATANTE, a prestar suporte técnico na instalação dos produtos especificados neste anexo;

c) Os produtos especificados neste anexo serão instalados no âmbito do Estado de São Paulo.

4.3. RECEBIMENTO PROVISÓRIO E ACEITE DEFINITIVO

a) A CONTRATANTE realizará o recebimento provisório dos produtos, no ato da entrega, nos locais e endereços indicados e acompanhados da sua respectiva nota fiscal/fatura.

b) A CONTRATANTE emitirá o termo de aceite definitivo após a constatação de que os nomes e modelos dos produtos fornecidos correspondem aos propostos e que estes atendem às especificações técnicas básicas requeridas na aquisição;

c) O prazo máximo para emissão do termo de aceite definitivo dos produtos especificados neste anexo é de 15 dias a contar da data de entrega destes. Caso os produtos apresentem defeito ou não atendam às especificações técnicas básicas requeridas, o prazo de aceite será reiniciado após a solução dos problemas detectados;

d) O prazo máximo para a CONTRATADA solucionar os problemas reportados é de 05 (cinco) dias a contar do comunicado da CONTRATANTE;

e) Caso haja reincidência dos problemas reportados o aceite será novamente interrompido e a CONTRATADA será comunicada para substituir os produtos com defeito por outros novos, no prazo máximo de 05 (cinco) dias.

4.4. GARANTIA E ASSISTÊNCIA TÉCNICA

a) O prazo mínimo de garantia dos equipamentos especificados no(s) lote(s) 1 a 2 deste anexo, é de 60 meses a contar da data de aceite destes.

b) Durante o prazo de garantia deverá ser substituída sem ônus para a CONTRATANTE, a parte ou peça defeituosa, exceto quando o defeito for provocado por uso inadequado dos equipamentos.

c) Os serviços de reparo dos equipamentos especificados no(s) lote(s) 1 a 2 deste anexo, deverão ser executados por empresa autorizada pelo fabricante dos equipamentos no local de uso dos equipamentos (ON-SITE) ou na impossibilidade, no centro de manutenção da rede autorizada do fabricante.

d) Caso seja solicitado pela CONTRATANTE, a CONTRATADA deverá fornecer relatório com informações de fechamento ou andamento dos chamados em aberto.

e) O prazo máximo para atendimento e reparo/solução do(s) problema(s) que ocasionou(aram) o chamado dos equipamentos especificados no(s) lotes(s) 1 a 2 deste anexo, contado a partir da abertura do chamado e dentro do período de disponibilidade é de 16 horas úteis para os equipamentos instalados em todo o Estado de São Paulo – Capital, Grande São Paulo.

f) O prazo máximo para atendimento e reparo/solução do(s) problema(s) que ocasionou(aram) o chamado dos equipamentos especificados no(s) lote(s) 1 a 2 deste anexo, contado a partir da abertura do chamado e dentro do período de disponibilidade é de 24 horas úteis para os equipamentos instalados em todo o Estado de São Paulo – Interior.

g) Caso o reparo/solução dos equipamentos especificados no(s) lote(s) 1 a 2 não sejam solucionados no prazo máximo estipulado, a Contratada deverá colocar à disposição um equipamento idêntico ou no mínimo equivalente. Se o problema não for solucionado no prazo máximo de 30 (trinta) dias corridos, o EQUIPAMENTO deverá ser substituído definitivamente por um novo, abrindo-se, para isso, novo período de garantia, a partir da data do seu recebimento definitivo.

h) O período de disponibilidade para chamada dos serviços de manutenção dos equipamentos especificados no(s) lote(s) 1 a 2 deste anexo, é Segunda a Sexta das 8:00 as 18:00 horas, exceto feriados.

i) Para os itens 1 a 2 a empresa fabricante do equipamento deverá dispor de um número telefônico para suporte técnico e abertura de chamados técnicos;

j) Todos os drivers para os sistemas operacionais suportados devem estar disponíveis para download na web-site do fabricante do equipamento;

k) A garantia do equipamento e todos seus periféricos deverá ser prestada pela mesma empresa.

ANEXO I-A

DECLARAÇÃO DOS PRODUTOS A SEREM FORNECIDOS

....., ... de ..... de 2.025

À Cia de Processamento de Dados do Estado de São Paulo – **PRODESP**

Ref.: Pregão Eletrônico Nº. _____/2025

Declaro (amos), sob as penas da lei, que, o(s) equipamento(s)/produto(s)/modelo(s) ofertado(s) a seguir, para participação nesta licitação, são novos, sem utilização anterior e atende(m) a todas e a cada uma das especificações do Anexo I – **REL.CLBP 006 de 2024 v.1.2**; declaro(amos) também que estou(amos) ciente(s) e concordo(amos) que, a falta de veracidade e a inconformidade do(s) bem(ns) ora ofertado(s) neste Anexo I-A com o bem licitado, detalhadamente, especificado no Anexo I, acarretará a aplicação das penalidades cabíveis, previstas neste Edital/Contrato/Pedido de Compra em especial, multa prevista e suspensão da minha empresa que ficará proibida de participar de licitações/contratações da PRODESP, pelo prazo da lei.

DESKTOP AVANÇADO EDUCACIONAL

1

1.1 Desktop proposto em atendimento ao lote 1 do Anexo I, informar:

a) Nome do fabricante _____

b) Modelo _____

c) Nº de referência (Part Number) _____

1.2 Placa-mãe e padrão da Memória RAM propostas no Desktop do lote 1 do Anexo I, informar:

a) Nome do fabricante _____

b) Modelo _____

c) Padrão da Memória RAM _____

1.3 Processador proposto em atendimento ao item 1.2 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo, freqüência e cache _____

1.4 Interface de Rede 1GE do Desktop proposto em atendimento ao item 1.8 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

1.5 Unidade de armazenamento interno proposto em atendimento ao item .1.11 do Anexo I, informar:

a) Nome do fabricante_____

b) Tecnologia, Modelo e Capacidade_____

c) Nº de referência (Part Number) _____

1.6 Monitor de Vídeo proposto em atendimento ao item 1.15 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

1.7 Gabinete da CPU proposto em atendimento ao item 1.16 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

1.8 Fonte de alimentação da CPU do Desktop proposto em atendimento ao item 1.18 do Anexo I

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

1.9 Sistema Operacional proposto em atendimento ao item 1.19 do Anexo I

a) Nome do fabricante_____

b) Modelo_____

_____

Obs.

_____

_____

EMPRESA LICITANTE

_____

CNPJ/MF

_____

NOME, CARIMBO E ASSINATURA DO REPRESENTANTE(S) LEGAL(IS)
(CONFORME DISPOSTO NO ESTATUTO OU CONTRATO SOCIAL)

2 DESKTOP PLUS EDUCACIONAL

2.1 Desktop proposto em atendimento ao lote 2 do Anexo I, informar:

a) Nome do fabricante _____

b) Modelo _____

c) Nº de referência (Part Number) _____

2.2 Placa-mãe e padrão da Memória RAM propostas no Desktop do lote 2 do Anexo I, informar:

a) Nome do fabricante _____

b) Modelo _____

c) Padrão da Memória RAM _____

2.3 Processador proposto em atendimento ao item 2.2 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo, freqüência e cache _____

2.4 Interface de Rede 1GE do Desktop proposto em atendimento ao item 2.8 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

2.5 Unidade de armazenamento interno em atendimento ao item 2.11 do Anexo I, informar:

a) Nome do fabricante_____

b) Tecnologia, Modelo e Capacidade_____

c) Nº de referência (Part Number) _____

2.6 Monitor de Vídeo proposto em atendimento ao item 2.15 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

2.7 Gabinete da CPU proposto em atendimento ao item 2.16 do Anexo I, informar:

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

2.8 Fonte de alimentação da CPU do Desktop proposto em atendimento ao item 2.18 do Anexo I

a) Nome do fabricante_____

b) Modelo_____

c) Nº de referência (Part Number) _____

2.9 Sistema Operacional proposto em atendimento ao item 2.19 do Anexo I

a) Nome do fabricante_____

_____

Obs.

_____

_____

EMPRESA LICITANTE

_____

CNPJ/MF

_____

NOME, CARIMBO E ASSINATURA DO REPRESENTANTE(S) LEGAL(IS)

(CONFORME DISPOSTO NO ESTATUTO OU CONTRATO SOCIAL)

ISMAEL MARTIN BONKE

Analista Gestão Organizacional

SUELI YOSHIKO KUROIVA SIQUEIRA

Coordenadora Prodesp LAB

Documento assinado eletronicamente por **Ismael Martin Bonke**, **Analista de Gestão Organizacional**, em 19/03/2025, às 10:04, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Sueli Yoshiko Kuroiva Siqueira**, **Coordenador**, em 19/03/2025, às 10:05, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

A autenticidade deste documento pode ser conferida no site https://sei.sp.gov.br/sei/controlador_externo.php?acao=documento_conferir&id_orgao_acesso_externo=0 , informando o código verificador **0060301952** e o código CRC **54F5FDF5**.

ANEXO I-A

DECLARAÇÃO DOS PRODUTOS A SEREM FORNECIDOS

São Paulo, 24 de julho de 2.025.

À Cia de Processamento de Dados do Estado de São Paulo – **PRODESP**

Ref.: Pregão Eletrônico Nº. **90042** / 2025

Declaro (amos), sob as penas da lei, que, o(s) equipamento(s)/produto(s)/modelo(s) ofertado(s) a seguir, para participação nesta licitação, são novos, sem utilização anterior e atende(m) a todas e a cada uma das especificações do Anexo I – **REL.CLBP 006 de 2024 v.1.2**; declaro(amos) também que estou(amos) ciente(s) e concordo(amos) que, a falta de veracidade e a inconformidade do(s) bem(ns) ora ofertado(s) neste Anexo I-A com o bem licitado, detalhadamente, especificado no Anexo I, acarretará a aplicação das penalidades cabíveis, previstas neste Edital/Contrato/Pedido de Compra em especial, multa prevista e suspensão da minha empresa que ficará proibida de participar de licitações/contratações da PRODESP, pelo prazo da lei.

DESKTOP AVANÇADO EDUCACIONAL

1

1.1 Desktop proposto em atendimento ao lote 1 do Anexo I, informar:

a) Nome do fabricante: _Lenovo

b) Modelo: _M75S Gen 5 - SFF Small Form Factory

c) Nº de referência (Part Number): _13DYCTO1WW

1.2 Placa-mãe e padrão da Memória RAM propostas no Desktop do lote 1 do Anexo I, informar:

a) Nome do fabricante: _Samsung

b) Modelo: _M323R2GA3PB0-CWM

c) Padrão da Memória: RAM DDR5 16GB UDIMM 56000 Mbps

1.3 Processador proposto em atendimento ao item 1.2 do Anexo I, informar:

a) Nome do fabricante:_AMD

b) Modelo, freqüência e cache: Rayzen 5 PRO 8500G Cores 6 - Threads 12, Base 3.5 Ghz - Max 5.0 Ghz, 6MB L2 / 16MB L3

1.4 Interface de Rede 1GE do Desktop proposto em atendimento ao item 1.8 do Anexo I, informar:

a) Nome do fabricante: Realtek

b) Modelo:_ Gigabit Ethernet, Realtek® RTL8111FP, 1x RJ-45, supports DASH and Wake-on-LAN

c) Nº de referência (Part Number): _J600EC

1.5 Unidade de armazenamento interno proposto em atendimento ao item .1.11 do Anexo I, informar:

a) Nome do fabricante: Samsung

b) Tecnologia, Modelo e Capacidade: SSD M.2 2280 PM9C1A 512GB

c) Nº de referência (Part Number): SSS0Y86513

1.6 Monitor de Vídeo proposto em atendimento ao item 1.15 do Anexo I, informar:

a) Nome do fabricante: Lenovo

b) Modelo: ThinkVision E24-40

c) Nº de referência (Part Number): 64BAMAR1BR

1.7 Gabinete da CPU proposto em atendimento ao item 1.16 do Anexo I, informar:

a) Nome do fabricante: Lenovo

b) Modelo: M75S SFF Small form Factory

c) Nº de referência (Part Number): S860A33047 - M75s Gen 5(Dayton_SFF

1.8 Fonte de alimentação da CPU do Desktop proposto em atendimento ao item 1.18 do Anexo I

a) Nome do fabricante: Lenovo

b) Modelo: PCJ007

c) Nº de referência (Part Number): P50H29667

1.9 Sistema Operacional proposto em atendimento ao item 1.19 do Anexo I

a) Nome do fabricante: Microsoft

b) Modelo: MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico (STF)

2 DESKTOP PLUS EDUCACIONAL

2.1 Desktop proposto em atendimento ao lote 2 do Anexo I, informar:

a) Nome do fabricante: Lenovo

b) Modelo: M75S Gen 5 - SFF Small Form Factory

c) Nº de referência (Part Number): 13DYCTO1WW

2.2 Placa-mãe e padrão da Memória RAM propostas no Desktop do lote 2 do Anexo I, informar:

a) Nome do fabricante: Samsung

b) Modelo: M323R2GA3PB0-CWM

c) Padrão da Memória: RAM DDR5 - 2 X 16GB UDIMM 56000 Mbps

2.3 Processador proposto em atendimento ao item 2.2 do Anexo I, informar:

a) Nome do fabricante: AMD

b) Modelo, freqüência e cache: Rayzen 7 PRO 8700G Cores 8 - Threads 16, Base 4.2 Ghz - Max 5.1 Ghz, 8MB L2 / 16MB L3

2.4 Interface de Rede 1GE do Desktop proposto em atendimento ao item 2.8 do Anexo I, informar:

a) Nome do fabricante: Realtek

b) Modelo: Gigabit Ethernet, Realtek® RTL8111FP, 1x RJ-45, supports DASH and Wake-on-LAN

c) Nº de referência (Part Number) J600EC

2.5 Unidade de armazenamento interno em atendimento ao item 2.11 do Anexo I, informar:

a) Nome do fabricante: Samsung

b) Tecnologia, Modelo e Capacidade: SSD M.2 2280 PM9C1A 512GB

c) Nº de referência (Part Number): SSS0Y86513

2.6 Monitor de Vídeo proposto em atendimento ao item 2.15 do Anexo I, informar:

a) Nome do fabricante: Lenovo

b) Modelo: ThinkVision E24-40

c) Nº de referência (Part Number): 64BAMAR1BR

2.7 Gabinete da CPU proposto em atendimento ao item 2.16 do Anexo I, informar:

a) Nome do fabricante: Lenovo

b) Modelo: M75S SFF Small Form Factory

c) Nº de referência (Part Number): S860A33047 - M75s Gen 5(Dayton SFF

2.8 Fonte de alimentação da CPU do Desktop proposto em atendimento ao item 2.18 do Anexo I

a) Nome do fabricante: Lenovo

b) Modelo: PCJ007

c) Nº de referência (Part Number): P50H29667

2.9 Sistema Operacional proposto em atendimento ao item 2.19 do Anexo I

a) Nome do fabricante: Microsoft

b) Modelo: MS-Windows 11 Professional 64bits na versão e release mais recente

MAURICIO KIOSHY MISUMI:27967601890

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Date: 2025.07.24 17:01:52 -03'00'

Mauricio K. Misumi
Lenovo Tecnologia (Brasil) Ltda
07.275.920/0001-61

Docusign Envelope ID: 65D6A82F-7ED3-4276-B3BB-C7A141E732B8

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Processo n° 359.00008727/2024-51

ANEXO II

PLANILHA DE PROPOSTA

À

CIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP

Ref: PREGÃO ELETRÔNICO PRODESP N° 90042/2025 - Processo n° 359.00008727/2024-51

OBJETO: Constituição de Sistema de Registro de Preços para a aquisição futura de desktops educacionais, com todos os seus componentes e acessórios, e respectivos manuais técnicos, garantia e assistência técnica, em conformidade com as especificações técnicas estabelecidas no Termo de Referência “Anexo I”, e visando contratações futuras pelo Órgão Gerenciador e pelos Órgãos Participantes.

Para cumprimento do objeto deste Pregão, ofertamos o preço conforme quadro a seguir:

ITEM	QUANT.	UNID.	DESCRIÇÃO	PREÇO UNITÁRIO
01	5.380	Unidade	Desktop Avançado Educacional	R$ 3.268,00
02	15.880	Unidade	Desktop Plus Educacional	R$ 4.815,00

Estamos cientes de que os códigos dos itens utilizados nesta licitação serviram tão somente para fins de processamento do Pregão Eletrônico no portal de compras (www.gov.br/compras), não se prestando para identificar o objeto licitado, conforme disposto no item 1.2. deste Edital.

Declaramos termos examinado todas as especificações contidas no Edital e Anexos, não havendo quaisquer discrepâncias entre o preço final de nossa proposta e as exigências para o cumprimento do objeto licitado, sendo certo que assumimos total responsabilidade por erros ou omissões existentes em nossa proposta, assim como toda despesa relativa à realização integral do objeto.

O prazo de validade desta proposta é de 60 (sessenta) dias, a partir da data de sua apresentação.

São Paulo, 23 de Setembro de 2025

LENOVO TECNOLOGIA (BRASIL) LIMITADA
CNPJ/MF: 07.275.920/0001-61
Mauricio Kioshy Misumi
Telefone: 11 996 546 569
E-mail: mmisumi@lenovo.com

DocuSigned by
Mauricio Misumi
Assinado por: MAURICIO KIOSHY MISUMI:27967601890
CPF: 27967601890
Data/Hora da Assinatura: 9/23/2025 12:26:57 PM BRT
O: ICP-Brasil, OU: Certificado Digital
C: BR
Emissor: AC Certisign RFB G5
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Processo n° 359.00008727/2024-51

Proposta Comercial

A
CIA. DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP

A proposta encontra-se em conformidade com as informações previstas no edital e seus anexos.

Dados da proponente

Lenovo Tecnologia (Brasil) Ltda.
CNPJ: 07.275.920/0001-61
Inscrição Estadual no 353.299.174.110
Estrada Municipal Jose Costa De Mesquita, Nº 200 – Complemento: Módulos 1 a 11
CEP: 13.337 – 200 - Bairro: Chácara Alvorada
Indaiatuba - SP
e-mail: **mmisumi@lenovo.com ; Lrizzardi@lenovo.com**
11 996 546 569

Dados Bancário para Pagamento

BANCO: Banco do Brasil – 001
AGÊNCIA: 3400-2
CONTA CORRENTE: 105554-2

Validade da Proposta

O prazo de validade desta proposta é de 60 (SESSENTA) dias, a contar da data da apresentação;

Garantia dos Itens

Declaramos que os itens cotados nessa proposta possuem 60 meses de garantia onsite para os itens ofertados, sendo do fabricante bem como cumprimento dos termos de garantia solicitados no edital;

Sede Social: *Estrada Municipal José Costa de Mesquita, 200 - Módulos 1 A 11 – Bairro Sapezal - CEP 13337-200 Indaiatuba -SP*
Escritório Administrativo: *E-Business Park, R. Werner Von Siemens, 111 - Torre A - 3° / 4° Andar - CEP 05069-010 São Paulo - SP*

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Processo n° 359.00008727/2024-51

Tabela de produtos ofertados

Observar anexo Detalhamento do subItem 6.5.6.

Item	Especificação TR	Item CONTABILIZA	**Item CATMAT	QTD Estimada	Valor Unit	Valor Total
1	Desktop Avançado Educacional	643656-0	485858	5.380	R$ 3.268,00	R$ 17.581.840,00
2	Desktop Plus Educacional	643657-9	460037	15.880	R$ 4.815,00	R$ 76.462.200,00

Valor Global: R$ 94.044.040,00 (noventa e quatro milhões, quarenta e quatro mil e quarenta reais)

Declaramos

- Todos os itens apresentados nesta especificação são mínimos, podendo a empresa concorrente indicar configurações superiores dos componentes;
- Que atendemos todos os requisitos técnicos do edital;
- Que o equipamento é novo sem uso anterior nem recondicionado;
- Que o equipamento pertence a linha corporativa;
- Que o modelo ofertado não está em final de linha, nem previsão de encerramento do ciclo de vida pelos próximos 90 dias, sendo produzidos em série até a entrega;
- Que o atendimento da garantia será pelo Fabricante e suas credenciadas;
- Os produtos ofertados (gabinete, monitor de vídeo, teclado e mouse), deverão ser do mesmo fabricante do equipamento
- Que estamos cientes e de pleno acordo com todas as condições estabelecidas no Edital e seus anexos, bem como aceitamos todas as obrigações e responsabilidades especificadas no Termo de Referência.
- Que no preço cotado estão inclusas todas as despesas, tais como fretes, seguros, tributos e outros gravames que possam incidir sobre o objeto licitado, bem como que o produto será entregue no local estabelecido sem ônus.
- No caso de nossa proposta ser classificada como a mais vantajosa para aquisição do objeto da licitação, comprometemo-nos a assinar o Contrato no prazo determinado no documento de convocação;
- Declaramos que em atendimento às diretrizes da Lei nº 12.305/2010, que institui a Política Nacional de Resíduos Sólidos, nos responsabilizamos e possuímos sistema que efetue um mecanismo de logística reversa e na modalidade on-site, sem custo à Contratante. O procedimento possui amplitude nacional e possui certificação quando a conformidade ao padrão de Gestão Ambiental.
- Os equipamentos possuem garantia por um período mínimo de 60 (sessenta) meses;
- A contratada possui central de atendimento tipo (0800) para abertura dos chamados de garantia, comprometendo-se a manter registros dos mesmos constando a descrição do problema, com atendimento disponível 9 horas por dia, 5 dias por semana. O chamado remoto consistirá na realização do diagnóstico para identificação do problema apresentado, em conjunto com a contratante. Na necessidade de substituição de uma peça com problema, o fabricante deverá abrir o chamado para atendimento on-site e o devido reparo do equipamento, com a substituição da peça;

Sede Social: *Estrada Municipal José Costa de Mesquita, 200 - Módulos 1 A 11 – Bairro Sapezal - CEP 13337-200 Indaiatuba -SP*
Escritório Administrativo: *E-Business Park, R. Werner Von Siemens, 111 - Torre A -3° / 4° Andar - CEP 05069-010 São Paulo - SP*

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- O equipamento ofertado possui código de identificação único para a abertura dos chamados;
- Durante o prazo de garantia, será substituída sem ônus para a contratante, a parte ou peça defeituosa, salvo quando o defeito for provocado por uso inadequado dos equipamentos;
- A garantia contempla defeitos de hardware e de todos os softwares vendidos junto com a solução;
- Declaramos termos examinado todas as especificações contidas no Edital e Anexos, não havendo quaisquer discrepâncias entre o preço final de nossa proposta e as exigências para o cumprimento do objeto licitado, sendo certo que assumimos total responsabilidade por erros ou omissões existentes em nossa proposta, assim como toda despesa relativa à realização integral do objeto.
- Assistência Técnica:

SEDE TECNICA	ENDEREÇO	UF	Telefone	GERENTE REGIONAL	e-mail
ARACATUBA	Rua Marechal Deodoro, 64	SP	14 98136 0984	MARCOS ANTONIO	marcant1@br.ibm.com
BAURU	Rua Waldemar Pereira da Silveira, 340, quadra 3, lote 2, CEP: 17034-280, Bauru, São Paulo	SP	14 98136 0984	MARCOS ANTONIO	marcant1@br.ibm.com
CAMPINAS	Rua Ambrogio Bisogni,709 - Parque Rural Fazenda Santa Candida - Campinas - SP	SP	19 98187 1385	AUGUSTO JOSE LEONESSA	augustoj@br.ibm.com
LAPA	Av. Kenkiti Simomoto, 448 - Jaguaré, São Paulo/SP - CEP 053477-010	SP	11 98481 8695	REGINALDO FERNANDES DOS SANTOS	rfsantos@br.ibm.com
ARARAQUARA	Rua São Bento nº 975 - 1º andar	SP	17 99622 7064	ALBANY CLEBER GODOI	albanypx@br.ibm.com
CATANDUVA	Praça da República, 52	SP	17 99622 7064	ALBANY CLEBER GODOI	albanypx@br.ibm.com
RIBEIRAO PRETO	Rua Octavio Machado Filh0, No 395 Lote BP Quadra 37, Parque Cidade Industrial Lagoinha. Ribeirão Preto - SP	SP	17 99622 7064	ALBANY CLEBER GODOI	albanypx@br.ibm.com
SAO JOSE DO RIO PRETO	R João Clemente, 550 - Conj. Hab. São Deocleciano, São José do Rio Preto/SP - CEP 15057-440	SP	17 99622 7064	ALBANY CLEBER GODOI	albanypx@br.ibm.com
SAO JOSE DOS CAMPOS	Av. Benedito Friggi, 3330 Fundos - Bairro Vista Verde – SJC, São Jose dos Campos - SP	SP	11 94444 8449	ALEXANDRE NOVAK LORENA	alenovak@br.ibm.com
SANTOS	Rua Batista Pereira, 137 - Macuco, Santos/SP - CEP 11015-100	SP	19 99726 1784	EDUARDO PONSONI	eponsopx@br.ibm.com

Sede Social: *Estrada Municipal José Costa de Mesquita, 200 - Módulos 1 A 11 – Bairro Sapezal - CEP 13337-200 Indaiatuba -SP*
Escritório Administrativo: *E-Business Park, R. Werner Von Siemens, 111 - Torre A -3° / 4° Andar - CEP 05069-010 São Paulo - SP*

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Processo n° 359.00008727/2024-51

SOROCABA	Rua São Bento, 233 2 andar, Sorocaba- SP	SP	19 99726 1784	EDUARDO PONSONI	eponsopx@br.ibm.com

Dados do Representante da Empresa que assinarão O Contrato de Fornecimento, conforme consta no Contrato Social ou Procuração.

RICARDO HORÁCIO BLOJ RG. 75.421-19 - SSP-SP CPF. 088.503.398-10	Valter Antonio Sgroi Artea RG. 27.837.009-3 – SSP-SP CPF. 282.061.248-29

São Paulo, 24 de julho de 2025

MAURICIO KIOSHY MISUMI:27967601890

Digitally signed by MAURICIO KIOSHY MISUMI:27967601890
Date: 2025.07.24 17:33:13 -03'00'

Mauricio Kioshy Misumi
Telefone: 11 996 546 569
E-mail: mmisumi@lenovo.com

Sede Social: *Estrada Municipal José Costa de Mesquita, 200 - Módulos 1 A 11 – Bairro Sapezal - CEP 13337-200 Indaiatuba -SP*
Escritório Administrativo: *E-Business Park, R. Werner Von Siemens, 111 - Torre A -3° / 4° Andar - CEP 05069-010 São Paulo - SP*

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Processo n° 359.00008727/2024-51

Item 1

1. DESKTOP AVANÇADO EDUCACIONAL	
1.1. QUANTIDADE	
a) A quantidade estimada de Desktops Avançado Educacional encontra-se no ANEXO I-B deste edital. Os Desktops Avançado deverão ser novos, idênticos e sem uso anterior. O modelo ofertado deverá estar em linha de produção, sem previsão de encerramento, na data de entrega da proposta.	
1.2. PROCESSADOR	
a) 01 (um) processador, padrão de arquitetura do processador x86 de 32 bits com suporte à extensão 64 bits, de no mínimo 06 núcleos físicos com no mínimo 12 threads, com tecnologia de fabricação de 10 nanômetros ou menor (AMD Ryzen 5 Série 8000 ou Intel Core i5 14ª Geração ou superiores);	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
b) O processador deverá estar em linha de produção pelo fabricante e ter sido lançado a partir de outubro de 2023, não sendo aceitos processadores descontinuados.	https://www.amd.com/en/products/processors/desktops/ryzen-pro/8000-series/amd-ryzen-5-pro-8500g.html
c) O processador deve implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e deverá possuir controle automático para evitar superaquecimento que possa danificá-lo.	Declaramos que o processador implementa mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e possui controle automático para evitar superaquecimento que possa danificá-lo.
1.3. MEMÓRIA RAM	
a) Deverão ser fornecidos no mínimo 16 GBytes de memória RAM por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 Declaramos que serão entregues 16GB de memória;
b) Barramento de memória no mínimo do tipo DDR5 4800MHz ou superior, capaz de operar com dois canais simultâneos – “Dual Channel”.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) Mínimo 02 slots de memória.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) O computador deverá suportar expansibilidade de memória de no mínimo 64GB.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
1.4. CIRCUÍTOS INTEGRADOS DE CONTROLE AUXILIAR DO PROCESSADOR (CHIPSET)	
a) O chipset deverá suportar e operar no mínimo memória RAM do tipo DDR5 com frequência igual ou superior a 4800MHz e deverá ser capaz de operar com dois canais simultâneos (dual channel memory).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 https://www.amd.com/en/products/processors/desktops/ryzen-pro/8000-series/amd-ryzen-5-pro-8500g.html
b) Deverá possuir controladora de disco, com no mínimo 1 conector SATA 3.0 e 1 conector PCIe NVMe de 32 Gbps ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03

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c) Deverá implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.	Declaramos que possui recursos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.
1.5. BIOS E SEGURANÇA	
a) O BIOS deverá ser do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.	Declaramos que a BIOS é do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.
b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).	Anexo_01_Comprovacao_Tecnica Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
c) Deverá possuir recursos de controle de permissão através de senhas, uma para inicializar o microcomputador e outra para acesso e alterações das configurações do BIOS.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06
d) Deverá possuir integrado ao hardware do microcomputador, subsistema de segurança TPM (Trusted Plataform Module) compatível com a norma TPM Specification Version 1.2 especificadas pelo TCG (Trusted Computing Group).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
e) Para a implementação e uso dos recursos que o TPM, em conjunto com o sistema de segurança oferece, deverão ser fornecidos todos os programas de computador necessários para a utilização destas tecnologias com gerenciamento centralizado das políticas de criptografia de dados;	Anexo_09_Proposta_Win_BitLocker Anexo_09_Proposta_Win_BitLocker_Pswd Anexo_09_Proposta_Win_BitLocker_Virtual_Card
f) A BIOS deve estar em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.	Declaramos que a BIOS está em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.
g) Deverá ser entregue solução que seja capaz de apagar os dados contidos nas unidades de armazenamento como HDD, SSD e SSHD de maneira que as informações não possam ser recuperadas, mesmo quando utilizados recursos profissionais para essa finalidade, a solução deverá estar em conformidade com a NIST SP800-88r1 ou superior, ser do próprio fabricante do microcomputador ou de terceiros, porém homologada pelo fabricante do microcomputador;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06

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h) A BIOS deverá ser desenvolvida pelo fabricante do equipamento ou esse deverá possuir direitos (copyright) sobre a BIOS. Serão aceitas soluções em regime de OEM. As atualizações, quando necessárias, deverão ser disponibilizadas no sítio do fabricante do equipamento;	Declaramos que a BIOS é do fabricante do equipamento, sendo a LENOVO; https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads/driver-list
i) Deverá possuir uma cópia de segurança no próprio hardware, capaz de se recuperar automaticamente em caso de falha ou desligamento do equipamento durante a atualização;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06 Declaramos que possui cópia de segurança no próprio Hardware;
j) Deverá permitir salvar as configurações da BIOS em um arquivo e carregar em todos os outros equipamentos do mesmo modelo;	Anexo_04_Think_BIOS https://www.lenovo.com/us/en/software/think-bios-config-tool/?srsltid=AfmBOop5VxdFsRYecg9OueBM5m7KuEwGk6uRkbrfHSKgJWc9zjZ1g-26
k) O equipamento deverá dispor de gerenciamento remoto através das tecnologias, dispondo de componentes (processador, placa-mãe, BIOS, placa de rede, etc.) que implementem essa funcionalidade, sendo AMD PRO ou Intel Vpro.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 e 06
l) Deverá estar aderente às especificações do DASH 1.1 ou WS-Man, definidas pelo DMTF (Desktop Management Task Force).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06
m) Capacidade de acesso à BIOS através de outro computador conectado na rede no momento da inicialização do POST;	Anexo 20_AMD - pág. 12 - DSP1061 - Pág. 13 DSP1076 e DSP1108
n) Capacidade de redirecionamento do boot do computador pela rede através do uso de CD-ROM, ou arquivo de imagem no formato ISO (CD e DVD ROM) localizados em outro computador, com acesso a interface remotamente.	Anexo 20_AMD - pág. 12 e 13
o) Capacidade de permitir o acesso remoto ao computador, formatação de disco, mesmo com este desligado ou com o Sistema Operacional travado ou inacessível.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036
p) A placa-mãe deverá possuir memória não volátil, para gravação de informações de inventário de hardware (placa mãe, processador, memória e disco), que sejam acessíveis remotamente pela rede independente do estado do sistema operacional.	Declaramos que a placa mãe possui memória não volátil para gravação de informações de inventário de hardware(placa mãe, processador, memória e disco), que são acessíveis remotamente pela rede independente do estado do sistema operacional;
q) A máquina deverá suportar intervenção técnica do helpdesk via rede IP para atualização de BIOS, configuração de SETUP (CMOS) e boot remoto para execução de rotinas de diagnóstico, mesmo se o sistema operacional estiver inoperante.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036

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r) As configurações das funcionalidades de gerenciamento presentes na placa-mãe deverão ser feitas sem a necessidade de intervenção presencial à máquina, mesmo com o sistema operacional inoperante.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036 Declaramos ainda que todo acesso pode ser realizado sem a necessidade de intervenção presencial à máquina, mesm ocom o sistema operacional inoperante;
s) O gerenciamento remoto deverá ser possível através da rede cabeada ou wifi;	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036; 1017
t) Os dados do usuário devem estar protegidos em caso de acesso remoto, o acesso deve ser feito através de um outro usuário de administração ou usuário/cliente do microcomputador deverá ser consultado para autorizar/recusar acesso remoto através de segundo fator de autenticação, sendo registrado na BIOS logs de acesso para efeitos de auditoria.	Anexo 20_AMD - pág. 12 e 12 - DSP1039; 1034; 1039
1.6. SLOTS PCI	
a) Padrão PCI-Express ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
b) Deverá disponibilizar no mínimo 01 (um) slot PCI-Express Express x16 e 01 (um) slot PCI-Express x1 ou superior livre após o computador estar configurado com os dispositivos solicitados.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
1.7. PORTAS DE COMUNICAÇÃO	
a) Todos os conectores das portas de entrada/saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide, bem como pelos nomes ou símbolos.	Declaramos que todos os conectores das portas de entrada/ saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide
b) No mínimo 04 (quatro) portas USB versão 2.0.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
c) No mínimo 04(quatro) portas USB versão 3.0 ou superior, sendo que pelo menos 02 (duas) estejam livres e localizadas na parte frontal do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
d) No mínimo 02 (duas) portas para monitor de vídeo sendo 01(uma) padrão DB15 VGA ou superior e 01 (uma) digital Display Port ou HDMI, compatível com o monitor de vídeo ofertado neste lote.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Anexo_06_ThinkVision_E24
e) 01 (uma) portas da interface de rede padrão RJ45.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
1.8. INTERFACE DE REDE 1GE	
a) No mínimo 01 (uma) interface de rede por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
b) Deverão possuir recursos de Wake on LAN (WOL) e Pré-boot Execution Enviroment (PXE).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Anexo_01_Comprovacao_Tecnica
c) Padrão PCI, on-board e/ou off board.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05

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d) Interface de rede padrão Gigabit Ethernet com led de atividade.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Declaramos que a placa de rede ofertada possui led de atividade
e) Deverá operar automaticamente nas velocidades de comunicação de 10Mbps ou 100Mbps ou 1000Mbps, bem como no modo full-duplex.	Anexo_21_RTL8111FP_Spec
f) Compatibilidade funcional e operacional com os padrões IEEE 802.3 para 10baseT (Ethernet), IEEE 802.3u para 100baseTX (Fast Ethernet) e IEEE 802.3ab para 1000baseT (Gigabit Ethernet).	Anexo_21_RTL8111FP_Spec
1.9. CONTROLADORA DE VÍDEO	
a) 01 (uma) controladora de vídeo por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
b) Padrão PCI Express ou superior.	Anexo_22_iGPU_AMD
c) Controladora onboard ou offboard com capacidade para controlar no mínimo 1 monitor de vídeo compatível com padrão VGA ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
d) Tamanho de memória de vídeo de no mínimo 1,7GBytes, com mecanismo de alocação dinâmica ou não da memória RAM do sistema. Caso a alocação seja efetuada de forma dinâmica, o mesmo deverá permitir que parte da memória RAM do sistema seja alocada para vídeo, à medida que seja necessária e liberada quando não estiver sendo usada. Caso a alocação não seja efetuada de forma dinâmica, deverá ser acrescentada à memória RAM, a mesma quantidade de memória alocada exclusivamente para vídeo.	Declaramos que a controla de vídeo ofertada possui tamanho de memória de vídeo de no mínimo 1,7GBytes, com mecanismo de alocação dinâmica do sistema. O mesmo permite que parte da memória RAM do sistema seja alocada para vídeo, à medida que seja necessária e liberada quando não estiver sendo usada.
e) Suporte à resolução gráfica de 4096 x 2160 pixels;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
f) Deverá ser compatível com DirectX 12.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
1.10. CONTROLADORA DE DISCO	
a) Deverá possuir controladora SATA, com no mínimo 1 conector SATA 3.0 6Gbps ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) Deverá possuir 1 interface PCIe NVMe de 32 Gbps tipo M.2.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
1.11. UNIDADE DE ARMAZENAMENTO INTERNO	
a) Deverá ser fornecido com no mínimo 01 (uma) unidade de armazenamento.	Anexo_02_SSD_PM9C1a
b) Tipo interno ao gabinete.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) Padrão SSD Sata ou NVMe.	Anexo_02_SSD_PM9C1a
d) Capacidade mínima de armazenamento de 512GB.	Anexo_02_SSD_PM9C1a
e) Com velocidade de leitura de no mínimo 2000 MB/s e de gravação de no mínimo 1000MB/s	Anexo_02_SSD_PM9C1a
1.12. KIT DE ÁUDIO	

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a) Deverá ser fornecido 01 (um) Kit de Áudio composto por 01 (uma) Controladora de som, 01 (um) Alto- falante por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) A controladora deverá possuir no mínimo 01 porta para áudio e 01 porta para microfone localizadas na parte frontal do computador, podendo ser do tipo combo.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 e 05
c) Deverá ser fornecido Alto-falante interno com amplificador de sinal ou poderão ser fornecidas caixas de som externas que sejam alimentadas pela própria CPU, eliminando a necessidade em dedicar uma tomada de alimentação de energia às caixas de som.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
1.13. TECLADO	
a) Deverá ser fornecido 01 (um) teclado por computador.	Anexo_11_TECLADO
b) Teclado com conjunto de no mínimo 104 teclas com teclado numérico e teclas de função.	Anexo_11_TECLADO
c) Compatibilidade com o padrão ABNT Variant 2.	Anexo_11_TECLADO
d) Conector do cabo de sinal padrão USB.	Anexo_11_TECLADO
e) Deverá possuir o mesmo padrão de cor do gabinete.	Anexo_11_TECLADO
f) Deverá ser resistente a derramamento de líquidos.	Anexo_11_TECLADO
1.14. MOUSE	
a) Deverá ser fornecido 01 (um) mouse por computador.	Anexo_10_MOUSE_Lenovo
b) Mouse tipo óptico com 3 botões, sendo 2 para seleção de objetos e 1 tipo scroll para rolagem.	Anexo_10_MOUSE_Lenovo
c) Resolução de no mínimo 1000dpi.	Anexo_10_MOUSE_Lenovo
d) Conector do cabo de sinal padrão USB.	Anexo_10_MOUSE_Lenovo
e) Deverá possuir o mesmo padrão de cor do gabinete.	Anexo_10_MOUSE_Lenovo
f) Deverá acompanhar mouse pad.	Declaramos que acompanhará Mouse Pad
1.15. MONITOR DE VÍDEO	
a) Deverá ser fornecido 01 (um) monitor de vídeo por computador	Anexo_06_ThinkVision_E24
b) Tipo TFT (Thin Film Transistor) de Matriz Ativa e tecnologia LED policromático de 23,8 polegadas.	Anexo_06_ThinkVision_E24 - Pág. 02
c) Formato padrão widescreen.	Anexo_06_ThinkVision_E24 - Pág. 02
d) Visibilidade diagonal de 23,8 polegadas.	Anexo_06_ThinkVision_E24 - Pág. 02
e) Resolução gráfica mínima suportada de 1920x 1080 pixels a 60Hz.	Anexo_06_ThinkVision_E24 - Pág. 02
f) Tempo de resposta no máximo de 8 milissegundos.	Anexo_06_ThinkVision_E24 - Pág. 02
g) Tratamento de superfície antirreflexivo.	Anexo_06_ThinkVision_E24 - Pág. 02
h) Brilho de no mínimo 250 cd/m2.	Anexo_06_ThinkVision_E24 - Pág. 02

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i) Relação de Contraste típico de no mínimo 1000:1.	Anexo_06_ThinkVision_E24 - Pág. 02
j) Funções OSD (On Screen Display) para ajuste de brilho, contraste, posição horizontal-vertical, linguagem, regulagem de cor.	Anexo_03_Monitor_Datasheet - Pág. 18 and 19;
k) Base do monitor com ajuste de inclinação – 5° a + 20°, ajuste de altura da tela de 110mm +/- 10%, pivô de rotação de 90°.	Anexo_06_ThinkVision_E24 - Pág. 03
l) Conectores do cabo de sinal 01 DB15 VGA e 01 Display Port ou HDMI.	Anexo_06_ThinkVision_E24 - Pág. 04
m) Fonte de alimentação do monitor de vídeo com ajuste automático, suportando faixa de tensão de 100VAC a 240VAC, a 50 ou 60Hz.	Anexo_06_ThinkVision_E24 - Pág. 03
n) Deverá ser fornecido cabo de alimentação elétrica padrão brasileiro NBR 14136:2002.	Declaramos que o cabo de alimentação elétrica é do padrão Brasileiro ABNT 14136:2002
o) Deverá ser fornecido 01 cabo de vídeo compatível com a controladora do Desktop.	Anexo_06_ThinkVision_E24 - Pág. 03
p) O gabinete deverá, externamente, possuir cor semelhante ao do gabinete da CPU, com botões para ligar/desligar e de controle digitais, bem como indicadores visuais para informar os estados de ligado, espera e desligado.	Anexo_06_ThinkVision_E24 - Pág. 03 Anexo_03_Monitor_Datasheet - Pág. 09, 18 and 19;
q) Em conformidade com a norma TCO'03 ou Energy Star 5.0 e/ou registrado no EPEAT (Eletronic Product Environmental Assessment Tool) como categoria Silver ou Superior comprovado no site www.epeat.net.	Anexo_12_EPEAT_ThinkVision_E24_40 Anexo_13_EPEAT_ThinkCentre_M75s_gen_5
r) Deverá ser do mesmo fabricante da CPU, aceito em regime OEM e possuir o mesmo padrão de cor do gabinete.	Anexo_06_ThinkVision_E24
1.16. GABINETE DA CPU	
a) Gabinete tipo SFF-Small Form Factor ou desktop, permitindo a utilização na posição horizontal e vertical sem comprometer os componentes internos e o funcionamento do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
b) A arquitetura de construção do gabinete deverá estar projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não deverá haver partes cortantes interna ou externa do gabinete.	Declaramos que a arquitetura de construção do gabinete é projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não há partes cortantes interna ou externa do gabinete.
c) Deverá possuir no mínimo 01 (uma) baia interna para unidade de armazenamento.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) Acabamento da chapa do gabinete em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.	Declaramos que o acabamento da chapa do gabinete é em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.

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e) O computador deve possuir botão liga/desliga e deve ser desligado por software mantendo pressionado o botão, o qual deve possuir dispositivo de proteção para prevenir o desligamento acidental do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 01 Declaramos que possui recurso de segurança para prevenir desligamento acidental do computador;
f) Deverá possuir display ou leds acoplados no painel frontal do computador para indicar e permitir monitorar as condições de funcionamento do mesmo.	Anexo_18_Manual_M75s_Gen_5 - Pág. 35 https://download.lenovo.com/pccbbs/thinkcentre_pdf/m75s_gen5_hmm.pdf - Pág. 35
g) O gabinete deve ter características "tool less", ou seja, não utiliza ferramentas para: abertura do gabinete e colocação/fixação e remoção de placas de expansão tipo PCI.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
h) O gabinete deve possuir local apropriado, já desenvolvido no projeto do produto, para colocação de lacres ou cadeados mecânicos ou eletrônicos não sendo aceito adaptações.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
i) Deverá ser gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.	Declaramos que será gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.
j) Volume máximo 13.000cms.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
k) O Gabinete Deverá possuir sensor de abertura da tampa para identificar aberturas sem autorização.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
1.17. CADEADO DE SEGURANÇA	
a) O computador deverá possuir slot para colocação de cadeado.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
b) Caso o computador não possua a opção de instalação de cadeado conforme especificado nos subitens anteriores, o mesmo deverá possuir solução completa que obtenha o mesmo objetivo.	N/A
1.18. FONTE DE ALIMENTAÇÃO DA CPU	
a) Deverá ser fornecida 01 (uma) fonte de alimentação necessária para o funcionamento do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) A potência da fonte de alimentação deverá ser de no máximo 450 Watts devendo suportar a configuração máxima do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) A fonte de alimentação ofertada deverá conter o recurso de fator de correção de energia ativa ou passiva - “PFC” (Power Factor Correction).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) Faixa de tensão de entrada de 100VAC a 240VAC à 60Hz, com seleção automática de tensão, capaz de sustentar a configuração máxima do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03

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e) Deverá ser fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002.	Declaramos que será fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002
f) A fonte de alimentação deverá possuir certificação 80PLUS Gold, que será comprovada através de publicação no site http://www.80plus.org em nome do fabricante da fonte ofertada ou do desktop.	Anexo_08_Fonte_310W_Platinum https://www.clearesult.com/80plus/certified-psus/Lenovo/Lenovo-PCJ007-115V-Internal-19671
1.19. SISTEMA OPERACIONAL	
a) Deverá ser entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02 Declaramos que será entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;
b) O computador e todos os seus periféricos deverão ser compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;	Declaramos que o computador e todos os seus periféricos são compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;
c) O computador ofertado deve estar certificado no HCL (Hardware Compatibility List) da Microsoft para o sistema operacional ofertado que será comprovado através do link https://sysdev.microsoft.com/en-US/Hardware/lpl/ ou apresentação do certificado;	Anexo_15_HCL_DT_ThinkCentre_M75s_gen_5 Anexo_16_HCL_ThinkVision_E24_40
d) A CONTRATADA deverá disponibilizar acesso automático às documentações e às versões de manutenção e atualizações de firmware e drivers para os componentes do microcomputador ofertado, via portal web do fabricante, sem ônus adicional à CONTRATANTE.	https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads
e) Após a homologação do equipamento, a CONTRATADA, mediante apresentação de necessidade da SEDUC/FDE deverá gerar uma imagem (Recovery) com os aplicativos a serem instalados. Portanto, caso seja necessário, esta geração deverá acontecer na FDE sob supervisão/acompanhamento da equipe de suporte técnico da FDE;	Estamos de acordo com o Edital
f) Deverá ser fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery deverá possuir o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do mesmo. Caso	Declaramos que será fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery possui o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do

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seja apresentada a necessidade de geração de imagem, este Recovery deverá possuir a mesma.	mesmo. Caso seja apresentada a necessidade de geração de imagem, este Recovery possuirá a mesma.
1.20. AGENTE PARA GERENCIAMENTO E INVENTÁRIO	
a) Para o gerenciamento e inventário do computador, o equipamento deverá possuir suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em campo editável; modelo e frequência de clock do microprocessador; quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.	Declaramos que será instalado no equipamento agente para o gerenciamento e inventário do computador, o equipamento possui suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em campo editável; modelo e frequência de clock do microprocessador; quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.
1.21. QUALIDADE DO EQUIPAMENTO	
a) Deverá ser fornecido Certificado ou Relatório de Avaliação de Conformidade emitido por um órgão credenciado pelo INMETRO ou Certificado similar, comprovando que o COMPUTADOR e o MONITOR DE VíDEO estão em conformidade com a norma IEC 60950 (Safety of Information Technology Equipment Including Eletrical Business Equipment), para segurança do usuário contra incidentes elétricos e combustão dos materiais elétricos.	Anexo_14_Portaria_304_Desktop Anexo_17_IEC_62368_E24_40
b) O produto ofertado deverá possuir registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não poderá ser realizada com etiquetas de fácil remoção ou danificação.	Declaramos que o produto ofertado possui registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não é realizada com etiquetas de fácil remoção ou danificação.
1.22. RESPONSABILIDADES COM O MEIO AMBIENTE	
a) O modelo do equipamento ofertado deverá estar registrado no EPEAT (Electronic Product Environmental Assessment Tool) da Agência de Proteção Ambiental (EPA), na categoria Silver ou Superior, no site: http://www.epeat.net ou a certificação de Rotulagem Ambiental da ABNT, comprovando que o equipamento atinge as exigências para controle do impacto ambiental em seu processo de fabricação.	Anexo_12_EPEAT_ThinkVision_E24_40 Anexo_13_EPEAT_ThinkCentre_M75s_gen_5
b) O modelo ofertado deve estar em conformidade com o padrão RoHS (Restriction of Hazardous Substances) ou com a certificação de Rotulagem Ambiental da ABNT, isto é, ser construído com substâncias que não agridem o meio ambiente tais como: cádmio (Cd), mercúrio (Hg), cromo hexavalente (Cr(VI)), bifenilos polibromados (PBBs), éteres difenilpolibromados (PBDEs) e chumbo (Pb).	Anexo_07_ABNT Anexo_19_EcoDeclaration_RoHS_E24_40 - Pág. 02

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1.23. ACESSÓRIOS	
a) Deverão ser fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.	Declaramos que serão fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.
1.24. ACONDICIONAMENTO	
a) Os computadores, os monitores e os acessórios devem estar acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.	Declaramos que os computadores, os monitores e os acessórios estarão acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.
1.25. DOCUMENTAÇÃO TÉCNICA	
a) Deverão ser fornecidos manuais técnicos do usuário e de referência em língua portuguesa, contendo todas as informações sobre os produtos com as instruções para instalação, configuração, operação e administração.	https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads
b) Deverá ser fornecido junto com o Anexo I-A, planilha contendo informações quanto ao atendimento ponto a ponto de todas as especificações técnicas solicitadas no Termo de Referência, tais como nome do fabricante do equipamento e demais hardware, marca, modelo, quantidade, tipo, velocidade e quantidade de todos os equipamentos e componentes ofertados, bem como os demais acessórios do equipamento e componentes ofertados, informando links ou páginas do catálogo que comprovem o atendimento.	Estamos de acordo com o solicitado no edital;
1.26. SOLUÇÃO DE BLOQUEIO, RASTREIO E SEGURANÇA	
a) O equipamento deverá ser fornecido licença de uso de sistema de gestão de ativos pelo período de 5 anos, gerenciável através de console em nuvem, com as seguintes características e funcionalidades:	Declaramos que o SW será fornecido com licença de uso para 5 (cinco) anos, gerenciável através de console em nuvem, com todas as funcionalidades solicitadas.
- Permitir inventário de hardware e software do equipamento e gerir suas alterações;	Anexo_23_SW_Gerenciamento - Pág. 03
- Informar geolocalização e gerenciar perímetro de funcionamento do equipamento;	Anexo_23_SW_Gerenciamento - Pág. 03
- Permitir o bloqueio e wipe remoto do equipamento;	Anexo_23_SW_Gerenciamento - Pág. 03
- Permitir gerar relatórios customizados;	Anexo_23_SW_Gerenciamento - Pág. 03
b) Deverá ser ativada em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega.	Declaramos que o SW será ativado em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega

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Item 02

2. DESKTOP PLUS EDUCACIONAL	
2.1. QUANTIDADE	
a) A quantidade estimada de Desktops Plus Educacional encontra-se no ANEXO I-B deste edital. Os Desktops Plus deverão ser novos, idênticos e sem uso anterior. O modelo ofertado deverá estar em linha de produção, sem previsão de encerramento, na data de entrega da proposta.	
2.2. PROCESSADOR	
a) 01 (um) processador, padrão de arquitetura do processador x86 de 32 bits com suporte à extensão 64 bits, de no mínimo 08 núcleos físicos com no mínimo 16 threads, com tecnologia de fabricação de 10 nanômetros ou menor (AMD Ryzen 7 - Série 8000 ou Intel Core i7 - 14ª Geração ou superiores);	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
b) O processador deverá estar em linha de produção pelo fabricante e ter sido lançado a partir de outubro de 2023, não sendo aceitos processadores descontinuados.	https://www.amd.com/en/products/processors/desktops/ryzen-pro/8000-series/amd-ryzen-7-pro-8700g.html
c) O processador deve implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e deverá possuir controle automático para evitar superaquecimento que possa danificá-lo.	Declaramos que o processador implementa mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior e possui controle automático para evitar superaquecimento que possa danificá-lo.
2.3. MEMÓRIA RAM	
a) Deverão ser fornecidos no mínimo 32 GBytes de memória RAM por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 Declaramos que serão entregues 32GB de memória;
b) Barramento de memória no mínimo do tipo DDR5 4800MHz ou superior, capaz de operar com dois canais simultâneos – "Dual Channel".	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) Mínimo 02 slots de memória.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) O computador deverá suportar expansibilidade de memória de no mínimo 64GB.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
2.4. CIRCUÍTOS INTEGRADOS DE CONTROLE AUXILIAR DO PROCESSADOR (CHIPSET)	
a) O chipset deverá suportar e operar no mínimo memória RAM do tipo DDR5com frequência igual ou superior a 4800MHz e deverá ser capaz de operar com dois canais simultâneos (dual channel memory).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 https://www.amd.com/en/products/processors/desktops/ryzen-pro/8000-series/amd-ryzen-5-pro-8500g.html
b) Deverá possuir controladora de disco, com no mínimo 1 conector SATA 3.0 e 1 conector PCIe NVMe de 64 Gbps ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03

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c) Deverá implementar mecanismos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.	Declaramos que possui recursos de redução de consumo de energia compatível com o padrão ACPI versão 2.0 ou superior.
2.5. BIOS E SEGURANÇA	
a) O BIOS deverá ser do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.	Declaramos que a BIOS é do tipo Flash Memory, utilizando memória não volátil e eletricamente reprogramável.
b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).	Anexo_01_Comprovacao_Tecnica Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
c) Deverá possuir recursos de controle de permissão através de senhas, uma para inicializar o microcomputador e outra para acesso e alterações das configurações do BIOS.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06
d) Deverá possuir integrado ao hardware do microcomputador, subsistema de segurança TPM (Trusted Plataform Module) compatível com a norma TPM Specification Version 1.2 especificadas pelo TCG (Trusted Computing Group).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
e) Para a implementação e uso dos recursos que o TPM, em conjunto com o sistema de segurança oferece, deverão ser fornecidos todos os programas de computador necessários para a utilização destas tecnologias com gerenciamento centralizado das políticas de criptografia de dados;	Anexo_09_Proposta_Win_BitLocker Anexo_09_Proposta_Win_BitLocker_Pswd Anexo_09_Proposta_Win_BitLocker_Virtual_Card
f) A BIOS deve estar em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.	Declaramos que a BIOS está em conformidade com a normativa NIST 800-193 ou ISO/IEC 19678, baseado nos padrões de mercado de maneira a usar métodos de criptografia robusta para verificar a integridade da BIOS antes de passar o controle de execução a mesma.
g) Deverá ser entregue solução que seja capaz de apagar os dados contidos nas unidades de armazenamento como HDD, SSD e SSHD de maneira que as informações não possam ser recuperadas, mesmo quando utilizados recursos profissionais para essa finalidade, a solução deverá estar em conformidade com a NIST SP800-88r1 ou superior, ser do próprio fabricante do microcomputador ou de terceiros, porém homologada pelo fabricante do microcomputador;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06

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h) A BIOS deverá ser desenvolvida pelo fabricante do equipamento ou esse deverá possuir direitos (copyright) sobre a BIOS. Serão aceitas soluções em regime de OEM. As atualizações, quando necessárias, deverão ser disponibilizadas no sítio do fabricante do equipamento;	Declaramos que a BIOS é do fabricante do equipamento, sendo a LENOVO; https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads/driver-list
i) Deverá possuir uma cópia de segurança no próprio hardware, capaz de se recuperar automaticamente em caso de falha ou desligamento do equipamento durante a atualização;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06 Declaramos que possui cópia de segurança no próprio Hardware;
j) Deverá permitir salvar as configurações da BIOS em um arquivo e carregar em todos os outros equipamentos do mesmo modelo;	Anexo_04_Think_BIOS https://www.lenovo.com/us/en/software/think-bios-config-tool/?srsltid=AfmBOop5VxdFsRYecg9OueBM5m7KuEwGk6uRkbrfHSKgJWc9zjZ1g-26
k) O equipamento deverá dispor de gerenciamento remoto através das tecnologias, dispondo de componentes (processador, placa-mãe, BIOS, placa de rede, etc.) que implementem essa funcionalidade, sendo AMD PRO ou Intel Vpro.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 e 06
l) Deverá estar aderente às especificações do DASH 1.1 ou WS-Man, definidas pelo DMTF (Desktop Management Task Force).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 06
m) Capacidade de acesso à BIOS através de outro computador conectado na rede no momento da inicialização do POST;	Anexo 20_AMD - pág. 12 - DSP1061 - Pág. 13 DSP1076 e DSP1108
n) Capacidade de redirecionamento do boot do computador pela rede através do uso de CD-ROM, ou arquivo de imagem no formato ISO (CD e DVD ROM) localizados em outro computador, com acesso a interface remotamente.	Anexo 20_AMD - pág. 12 e 13
o) Capacidade de permitir o acesso remoto ao computador, formatação de disco, mesmo com este desligado ou com o Sistema Operacional travado ou inacessível.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036
p) A placa-mãe deverá possuir memória não volátil, para gravação de informações de inventário de hardware (placa mãe, processador, memória e disco), que sejam acessíveis remotamente pela rede independente do estado do sistema operacional.	Declaramos que a placa mãe possui memória não volátil para gravação de informações de inventário de hardware(placa mãe, processador, memória e disco), que são acessíveis remotamente pela rede independente do estado do sistema operacional;
q) A máquina deverá suportar intervenção técnica do helpdesk via rede IP para atualização de BIOS, configuração de SETUP (CMOS) e boot remoto para execução de rotinas de diagnóstico, mesmo se o sistema operacional estiver inoperante.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036

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r) As configurações das funcionalidades de gerenciamento presentes na placa-mãe deverão ser feitas sem a necessidade de intervenção presencial à máquina, mesmo com o sistema operacional inoperante.	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036 Declaramos ainda que todo acesso pode ser realizado sem a necessidade de intervenção presencial à máquina, mesm ocom o sistema operacional inoperante;
s) O gerenciamento remoto deverá ser possível através da rede cabeada ou wifi;	Anexo 20_AMD - pág. 12 DSP1014; 1037; 1038; 1035; 1036; 1017
t) Os dados do usuário devem estar protegidos em caso de acesso remoto, o acesso deve ser feito através de um outro usuário de administração ou usuário/cliente do microcomputador deverá ser consultado para autorizar/recusar acesso remoto através de segundo fator de autenticação, sendo registrado na BIOS logs de acesso para efeitos de auditoria.	Anexo 20_AMD - pág. 12 e 12 - DSP1039; 1034; 1039
2.6. SLOTS PCI	
a) Padrão PCI-Express ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
b) Deverá disponibilizar no mínimo 01 (um) slot PCI-Express x1 ou superior livre após o computador estar configurado com os dispositivos solicitados.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
2.7. PORTAS DE COMUNICAÇÃO	
a) Todos os conectores das portas de entrada/saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide, bem como pelos nomes ou símbolos.	Declaramos que todos os conectores das portas de entrada/ saída de sinal devem ser identificados no padrão de cores PC-99 System Design Guide
b) No mínimo 04 (quatro) portas USB versão 2.0.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
c) No mínimo 04(quatro) portas USB versão 3.0 ou superior, sendo que pelo menos 02 (duas) estejam livres e localizadas na parte frontal do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
d) No mínimo 02 (duas) portas para monitor de vídeo sendo 01(uma) padrão DB15 VGA ou superior e 01 (uma) digital Display Port ou HDMI, compatível com o monitor de vídeo ofertado neste lote.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Anexo_05_Anexo_05_RX_6400 Anexo_06_ThinkVision_E24
e) 01 (uma) portas da interface de rede padrão RJ45.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
2.8. INTERFACE DE REDE 1GE	
a) No mínimo 01 (uma) interface de rede por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
b) Deverão possuir recursos de Wake on LAN (WOL) e Pré-boot Execution Enviroment (PXE).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Anexo_01_Comprovacao_Tecnica
c) Padrão PCI, on-board e/ou off board.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
d) Interface de rede padrão Gigabit Ethernet com led de atividade.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05 Declaramos que a placa de rede ofertada possui led de atividade

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e) Deverá operar automaticamente nas velocidades de comunicação de 10Mbps ou 100Mbps ou 1000Mbps, bem como no modo full-duplex.	Anexo_21_RTL8111FP_Spec
f) Compatibilidade funcional e operacional com os padrões IEEE 802.3 para 10baseT (Ethernet), IEEE 802.3u para 100baseTX (Fast Ethernet) e IEEE 802.3ab para 1000baseT (Gigabit Ethernet).	Anexo_21_RTL8111FP_Spec
2.9. CONTROLADORA DE VÍDEO	
a) 01 (uma) controladora de vídeo por computador.	
b) Padrão PCI Express 3.0 x4 ou x8 ou x16.	Anexo_05_RX_6400 - Pág. 02
c) Controladora off-board com capacidade para controlar no mínimo 2 monitores de vídeo	Anexo_05_RX_6400 - Pág. 02
d) 02 conectores de sinal VGA e/ou DVI e/ou Display Port e/ou HDMI sendo aceita versões digitais mini com seus respectivos adaptadores, sendo pelo menos 01 dos conectores digital.	Anexo_05_RX_6400 - Pág. 02
e) Tamanho de memória de vídeo de no mínimo 4GBytes GDDR6 dedicada.	Anexo_05_RX_6400
f) Suportar a resolução gráfica de 5120 x 2880 pixels.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02
g) Deverá ser compatível com API's OpenGL 4.6, OpenCL, Vulcan 1.2 e DirectX 12.	Anexo_05_RX_6400 - Pág. 02
h) Interface de memória mínima de 64 bit e largura de banda de 80GB/s.	Anexo_05_RX_6400
2.10. CONTROLADORA DE DISCO	
a) Deverá possuir controladora SATA, com no mínimo 1 conector SATA 3.0 6Gbps ou superior.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) Deverá possuir 1 interface PCIe NVMe de 64 Gbps tipo M.2.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
2.11. UNIDADE DE ARMAZENAMENTO INTERNO	
a) Deverá ser fornecido com no mínimo 01 (uma) unidade de armazenamento.	Anexo_02_SSD_PM9C1a
b) Tipo interno ao gabinete.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) Padrão SSD Sata ou NVMe.	Anexo_02_SSD_PM9C1a
d) Capacidade mínima de armazenamento de 512GB.	Anexo_02_SSD_PM9C1a
2.12. KIT DE ÁUDIO	
a) Deverá ser fornecido 01 (um) Kit de Áudio composto por 01 (uma) Controladora de som, 01 (um) Alto- falante por computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) A controladora deverá possuir no mínimo 01 porta para áudio e 01 porta para microfone localizadas na parte frontal do computador, podendo ser do tipo combo.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03 e 05

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c) Deverá ser fornecido Alto-falante interno com amplificador de sinal ou poderão ser fornecidas caixas de som externas que sejam alimentadas pela própria CPU, eliminando a necessidade em dedicar uma tomada de alimentação de energia às caixas de som.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
2.13. TECLADO	
a) Deverá ser fornecido 01 (um) teclado por computador.	Anexo_11_TECLADO
b) Teclado com conjunto de no mínimo 104 teclas com teclado numérico e teclas de função.	Anexo_11_TECLADO
c) Compatibilidade com o padrão ABNT Variant 2.	Anexo_11_TECLADO
d) Conector do cabo de sinal padrão USB.	Anexo_11_TECLADO
e) Deverá possuir o mesmo padrão de cor do gabinete.	Anexo_11_TECLADO
f) Deverá ser resistente a derramamento de líquidos.	Anexo_11_TECLADO
2.14. MOUSE	
a) Deverá ser fornecido 01 (um) mouse por computador.	Anexo_10_MOUSE_Lenovo
b) Mouse tipo óptico com 3 botões, sendo 2 para seleção de objetos e 1 tipo scroll para rolagem.	Anexo_10_MOUSE_Lenovo
c) Resolução de no mínimo 1000dpi.	Anexo_10_MOUSE_Lenovo
d) Conector do cabo de sinal padrão USB.	Anexo_10_MOUSE_Lenovo
e) Deverá possuir o mesmo padrão de cor do gabinete.	Anexo_10_MOUSE_Lenovo
f) Deverá acompanhar mouse pad.	Declaramos que acompanhará Mouse Pad
2.15. MONITOR DE VÍDEO	
a) Deverá ser fornecido 01 (um) monitor de vídeo por computador	Anexo_06_ThinkVision_E24
b) Tipo TFT (Thin Film Transistor) de Matriz Ativa e tecnologia LED policromático de 23,8 polegadas.	Anexo_06_ThinkVision_E24 - Pág. 02
c) Formato padrão widescreen.	Anexo_06_ThinkVision_E24 - Pág. 02
d) Visibilidade diagonal de 23,8 polegadas.	Anexo_06_ThinkVision_E24 - Pág. 02
e) Resolução gráfica mínima suportada de 1920x 1080 pixels a 60Hz.	Anexo_06_ThinkVision_E24 - Pág. 02
f) Tempo de resposta no máximo de 8 milissegundos.	Anexo_06_ThinkVision_E24 - Pág. 02
g) Tratamento de superfície antirreflexivo.	Anexo_06_ThinkVision_E24 - Pág. 02
h) Brilho de no mínimo 250 cd/m2.	Anexo_06_ThinkVision_E24 - Pág. 02
i) Relação de Contraste típico de no mínimo 1000:1.	Anexo_06_ThinkVision_E24 - Pág. 02
j) Funções OSD (On Screen Display) para ajuste de brilho, contraste, posição horizontal-vertical, linguagem, regulagem de cor.	Anexo_03_Monitor_Datasheet - Pág. 18 and 19;
k) Base do monitor com ajuste de inclinação – 5° a + 20°, ajuste de altura da tela de 110mm +/- 10%, pivô de rotação de 90°.	Anexo_06_ThinkVision_E24 - Pág. 03

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l) Conectores do cabo de sinal 01 DB15 VGA e 01 Display Port ou HDMI.	Anexo_06_ThinkVision_E24 - Pág. 04
m) Fonte de alimentação do monitor de vídeo com ajuste automático, suportando faixa de tensão de 100VAC a 240VAC, a 50 ou 60Hz.	Anexo_06_ThinkVision_E24 - Pág. 03
n) Deverá ser fornecido cabo de alimentação elétrica padrão brasileiro NBR 14136:2002.	Declaramos que o cabo de alimentação elétrica é do padrão Brasileiro ABNT 14136:2002
o) Deverá ser fornecido 01 cabo de vídeo compatível com a controladora do Desktop.	Anexo_06_ThinkVision_E24 - Pág. 03
p) O gabinete deverá, externamente, possuir cor semelhante ao do gabinete da CPU, com botões para ligar/desligar e de controle digitais, bem como indicadores visuais para informar os estados de ligado, espera e desligado.	Anexo_06_ThinkVision_E24 - Pág. 03 Anexo_03_Monitor_Datasheet - Pág. 09, 18 and 19;
q) Em conformidade com a norma TCO'03 ou Energy Star 5.0 e/ou registrado no EPEAT (Eletronic Product Environmental Assessment Tool) como categoria Silver ou Superior comprovado no site www.epeat.net.	Anexo_12_EPEAT_ThinkVision_E24_40 Anexo_13_EPEAT_ThinkCentre_M75s_gen_5
r) Deverá ser do mesmo fabricante da CPU, aceito em regime OEM e possuir o mesmo padrão de cor do gabinete.	Anexo_06_ThinkVision_E24
2.16. GABINETE DA CPU	
a) Gabinete tipo SFF-Small Form Factor ou desktop, permitindo a utilização na posição horizontal e vertical sem comprometer os componentes internos e o funcionamento do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
b) A arquitetura de construção do gabinete deverá estar projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não deverá haver partes cortantes interna ou externa do gabinete.	Declaramos que a arquitetura de construção do gabinete é projetada para otimização do fluxo de ar interno e melhor refrigeração dos componentes internos bem como para a diminuição dos níveis de ruído, compatível com a placa mãe ofertada, não há partes cortantes interna ou externa do gabinete.
c) Deverá possuir no mínimo 01 (uma) baia interna para unidade de armazenamento.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) Acabamento da chapa do gabinete em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.	Declaramos que o acabamento da chapa do gabinete é em microtextura fosca com proteção contra cargas eletrostáticas e corrosão.
e) O computador deve possuir botão liga/desliga e deve ser desligado por software mantendo pressionado o botão, o qual deve possuir dispositivo de proteção para prevenir o desligamento acidental do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 01 Declaramos que possui recurso de segurança para prevenir desligamento acidental do computador;
f) Deverá possuir display ou leds acoplados no painel frontal do computador para indicar e permitir monitorar as condições de funcionamento do mesmo.	Anexo_18_Manual_M75s_Gen_5 - Pág. 35 https://download.lenovo.com/pccbbs/thinkcentre_pdf/m75s_gen5_hmm.pdf - Pág. 35

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g) O gabinete deve ter características "tool less", ou seja, não utiliza ferramentas para: abertura do gabinete e colocação/fixação e remoção de placas de expansão tipo PCI.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
h) O gabinete deve possuir local apropriado, já desenvolvido no projeto do produto, para colocação de lacres ou cadeados mecânicos ou eletrônicos não sendo aceito adaptações.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
i) Deverá ser gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.	Declaramos que será gravado no chassi do equipamento em local a ser indicado, o Logo da Governo do Estado de São Paulo, por intermédio de serigrafia com tinta na cor branca e de fixação definitiva ou através de queima por Laser. Logo com dimensões de 5cm x 4cm.
j) Volume máximo 13.000cms.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 04
k) O Gabinete Deverá possuir sensor de abertura da tampa para identificar aberturas sem autorização.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
2.17. CADEADO DE SEGURANÇA	
a) O computador deverá possuir slot para colocação de cadeado.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 05
b) Caso o computador não possua a opção de instalação de cadeado conforme especificado nos subitens anteriores, o mesmo deverá possuir solução completa que obtenha o mesmo objetivo.	N/A
2.18. FONTE DE ALIMENTAÇÃO DA CPU	
a) Deverá ser fornecida 01 (uma) fonte de alimentação necessária para o funcionamento do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
b) A potência da fonte de alimentação deverá ser de no máximo 450 Watts devendo suportar a configuração máxima do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
c) A fonte de alimentação ofertada deverá conter o recurso de fator de correção de energia ativa ou passiva - "PFC" (Power Factor Correction).	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
d) Faixa de tensão de entrada de 100VAC a 240VAC à 60Hz, com seleção automática de tensão, capaz de sustentar a configuração máxima do computador.	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 03
e) Deverá ser fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002.	Declaramos que será fornecido cabo de alimentação Tipo "Y" para CPU e Monitor para ligação em 01 (um) ponto da rede elétrica, padrão brasileiro NBR 14136:2002
f) A fonte de alimentação deverá possuir certificação 80PLUS Gold, que será comprovada através de publicação no site http://www.80plus.org em nome do fabricante da fonte ofertada ou do desktop.	Anexo_08_Fonte_310W_Platinum https://www.clearesult.com/80plus/certified-psus/Lenovo/Lenovo-PCJ007-115V-Internal-19671
2.19. SISTEMA OPERACIONAL	

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a) Deverá ser entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;	Anexo_00_ThinkCentre_M75s_Gen_5 - Pág. 02 Declaramos que será entregue com 01 (uma) licença do sistema operacional corporativo MS-Windows 11 Professional 64bits na versão e release mais recente para uso Acadêmico, em idioma em português, caso seja aplicado. O recovery do sistema operacional ofertado deverá ser disponibilizado em uma partição do disco rígido do equipamento ou através da BIOS com o equipamento conectado à Internet;
b) O computador e todos os seus periféricos deverão ser compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;	Declaramos que o computador e todos os seus periféricos são compatíveis com o sistema operacional, Windows 11 Professional 64bits e versões superiores;
c) O computador ofertado deve estar certificado no HCL (Hardware Compatibility List) da Microsoft para o sistema operacional ofertado que será comprovado através do link https://sysdev.microsoft.com/en-US/Hardware/lpl/ ou apresentação do certificado;	Anexo_15_HCL_DT_ThinkCentre_M75s_gen_5 Anexo_16_HCL_ThinkVision_E24_40
d) A CONTRATADA deverá disponibilizar acesso automático às documentações e às versões de manutenção e atualizações de firmware e drivers para os componentes do microcomputador ofertado, via portal web do fabricante, sem ônus adicional à CONTRATANTE.	https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads
e) Após a homologação do equipamento, a CONTRATADA, mediante apresentação de necessidade da SEDUC/FDE deverá gerar uma imagem (Recovery) com os aplicativos a serem instalados. Portanto, caso seja necessário, esta geração deverá acontecer na FDE sob supervisão/acompanhamento da equipe de suporte técnico da FDE;	Estamos de acordo com o Edital
f) Deverá ser fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery deverá possuir o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do mesmo. Caso seja apresentada a necessidade de geração de imagem, este Recovery deverá possuir a mesma.	Declaramos que será fornecido Recovery, que possibilite a restauração total da instalação do microcomputador. Este Recovery possui o sistema operacional de acordo com o que fora homologado pela FDE, contendo todos os drivers, aplicativos e interfaces para o completo funcionamento do mesmo. Caso seja apresentada a necessidade de geração de imagem, este Recovery possuirá a mesma.
2.20. AGENTE PARA GERENCIAMENTO E INVENTÁRIO	
a) Para o gerenciamento e inventário do computador, o equipamento deverá possuir suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em campo editável; modelo e frequência de clock do microprocessador;	Declaramos que será instalado no equipamento agente para o gerenciamento e inventário do computador, o equipamento possui suporte para um agente DMI ou WMI, o qual deverá informar, no mínimo, o número de série, fabricante e número do ativo fixo do equipamento em

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quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.	campo editável; modelo e frequência de clock do microprocessador; quantidade de memória RAM instalada; tamanho total da unidade de armazenamento; versão da BIOS e do sistema operacional instalado.
2.21. QUALIDADE DO EQUIPAMENTO	
a) Deverá ser fornecido Certificado ou Relatório de Avaliação de Conformidade emitido por um órgão credenciado pelo INMETRO ou Certificado similar, comprovando que o COMPUTADOR e o MONITOR DE VíDEO estão em conformidade com a norma IEC 60950 (Safety of Information Technology Equipment Including Eletrical Business Equipment), para segurança do usuário contra incidentes elétricos e combustão dos materiais elétricos.	Anexo_14_Portaria_304_Desktop Anexo_17_IEC_62368_E24_40
b) O produto ofertado deverá possuir registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não poderá ser realizada com etiquetas de fácil remoção ou danificação.	Declaramos que o produto ofertado possui registrado na BIOS e identificação impressa com o nome do fabricante, modelo e número de série único e não editável. Tal identificação não é realizada com etiquetas de fácil remoção ou danificação.
2.22. RESPONSABILIDADES COM O MEIO AMBIENTE	
a) O modelo do equipamento ofertado deverá estar registrado no EPEAT (Electronic Product Environmental Assessment Tool) da Agência de Proteção Ambiental (EPA), na categoria Silver ou Superior, no site: http://www.epeat.net ou a certificação de Rotulagem Ambiental da ABNT, comprovando que o equipamento atinge as exigências para controle do impacto ambiental em seu processo de fabricação.	Anexo_12_EPEAT_ThinkVision_E24_40 Anexo_13_EPEAT_ThinkCentre_M75s_gen_5
b) O modelo ofertado deve estar em conformidade com o padrão RoHS (Restriction of Hazardous Substances) ou com a certificação de Rotulagem Ambiental da ABNT, isto é, ser construído com substâncias que não agridem o meio ambiente tais como: cádmio (Cd), mercúrio (Hg), cromo hexavalente (Cr(VI)), bifenilos polibromados (PBBs), éteres difenilpolibromados (PBDEs) e chumbo (Pb).	Anexo_07_ABNT Anexo_19_EcoDeclaration_RoHS_E24_40 - Pág. 02
2.23. ACESSÓRIOS	
a) Deverão ser fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.	Declaramos que serão fornecidos junto com o computador, todos os acessórios e cabos para o pleno funcionamento do mesmo.
2.24. ACONDICIONAMENTO	

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a) Os computadores, os monitores e os acessórios devem estar acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.	Declaramos que os computadores, os monitores e os acessórios estarão acondicionados em embalagens com caixa e calços de proteção especialmente desenvolvidos para suportar o empilhamento e as vibrações.
2.25. DOCUMENTAÇÃO TÉCNICA	
a) Deverão ser fornecidos manuais técnicos do usuário e de referência em língua portuguesa, contendo todas as informações sobre os produtos com as instruções para instalação, configuração, operação e administração.	https://pcsupport.lenovo.com/br/pt/products/desktops-and-all-in-ones/thinkcentre-m-series-desktops/thinkcentre-m75s-gen-5/downloads
b) Deverá ser fornecido junto com o Anexo I-A, planilha contendo informações quanto ao atendimento ponto a ponto de todas as especificações técnicas solicitadas no Termo de Referência, tais como nome do fabricante do equipamento e demais hardware, marca, modelo, quantidade, tipo, velocidade e quantidade de todos os equipamentos e componentes ofertados, bem como os demais acessórios do equipamento e componentes ofertados, informando links ou páginas do catálogo que comprovem o atendimento.	Estamos de acordo com o solicitado no edital;
2.26. SOLUÇÃO DE BLOQUEIO, RASTREIO E SEGURANÇA	
a) O equipamento deverá ser fornecido licença de uso de sistema de gestão de ativos pelo período de 5 anos, gerenciável através de console em nuvem, com as seguintes características e funcionalidades:	Declaramos que o SW será fornecido com licença de uso para 5 (cinco) anos, gerenciável através de console em nuvem, com todas as funcionalidades solicitadas.
· Permitir inventário de hardware e software do equipamento e gerir suas alterações;	Anexo_23_SW_Gerenciamento - Pág. 03
· Informar geolocalização e gerenciar perímetro de funcionamento do equipamento;	Anexo_23_SW_Gerenciamento - Pág. 03
· Permitir o bloqueio e wipe remoto do equipamento;	Anexo_23_SW_Gerenciamento - Pág. 03
· Permitir gerar relatórios customizados;	Anexo_23_SW_Gerenciamento - Pág. 03
b) Deverá ser ativada em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega.	Declaramos que o SW será ativado em fábrica, permitindo o rastreio do equipamento sem necessidade de nenhuma ação adicional após a sua entrega

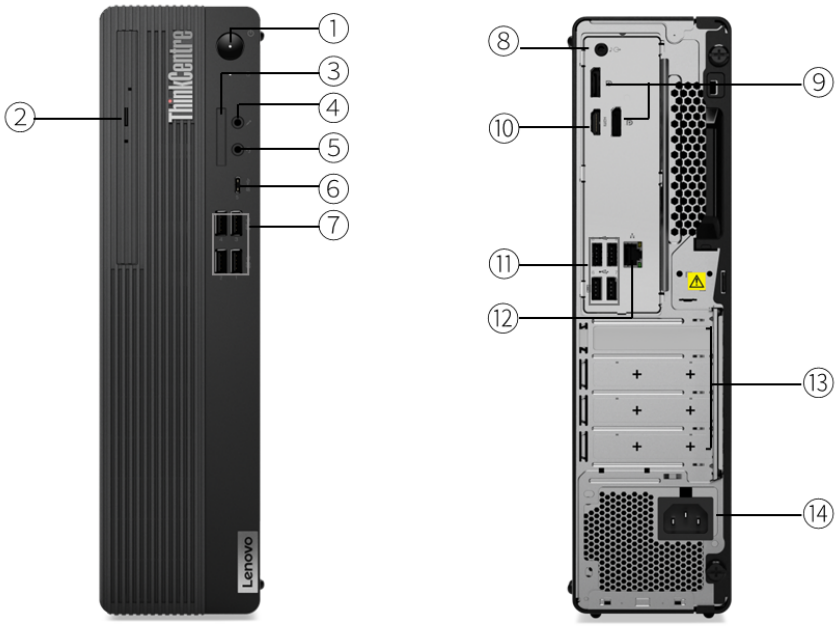
São Paulo, 24 de julho de 2025

MAURICIO KIOSHY MISUMI:27967601890

Digitally signed by MAURICIO KIOSHY MISUMI:27967601890
Date: 2025.07.24 17:33:51 -03'00'

Mauricio Kioshy Misumi
Telefone: 11 996 546 569
E-mail: mmisumi@lenovo.com

OVERVIEW



1. Power button	8. Line-out (3.5mm)
2. Optical drive *	9. 2x DisplayPort 1.4a (HBR2, DSC)
3. Card reader *	10. HDMI 2.1 TMDS
4. Microphone jack (3.5mm)	11. 4x USB-A (Hi-Speed USB)
5. Headphone / microphone combo jack (3.5mm)	12. Ethernet (RJ-45)
6. USB-C (USB 5Gbps), with 15W charging	13. Optional ports on expansion cards *
7. 4x USB-A (USB 5Gbps)	14. Power connector

Notes:

- Items with * are only available on selected models
- More ports are available through the optional expansion cards (not shown on the sample product above)

PERFORMANCE

Processor

Processor Family

AMD Ryzen™ 3 / 5 / 7 8000 or Ryzen™ 3 / 5 / 7 PRO 8000 Series Processor

Processor**

Processor Name	Cores	Threads	Base Frequency	Max Frequency	Cache	Processor Graphics	NPU
AMD Ryzen™ 3 8300G	4	8	3.4GHz	4.9GHz	4MB L2 / 8MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 3 PRO 8300G	4	8	3.4GHz	4.9GHz	4MB L2 / 8MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 8500G	6	12	3.5GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 8600G	6	12	4.3GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 760M	AMD Ryzen™ AI
AMD Ryzen™ 5 PRO 8500G	6	12	3.5GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 PRO 8600G	6	12	4.3GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 760M	AMD Ryzen™ AI
AMD Ryzen™ 7 8700G	8	16	4.2GHz	5.1GHz	8MB L2 / 16MB L3	AMD Radeon™ 780M	AMD Ryzen™ AI
AMD Ryzen™ 7 PRO 8700G	8	16	4.2GHz	5.1GHz	8MB L2 / 16MB L3	AMD Radeon™ 780M	AMD Ryzen™ AI

Operating System

Operating System**

- Windows® 11 Pro
- Windows® 11 Home
- Windows® 11 Home Single Language
- Windows® 11 IoT Enterprise LTSC 2024
- Windows® 11 DG Windows® 10 Pro 64
- Ubuntu Linux
- No preload operating system

Graphics

Graphics***

Graphics	Type	Memory	Max Resolution	Connector	Key Features
AMD Radeon™ 740M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ 760M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ 780M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ RX 6400	Discrete	4GB GDDR6	7680x4320@60Hz(HDMI®), 7680x4320@60Hz(DP)	1x HDMI® 2.1 FRL, 1x DP 1.4a	DirectX® 12, OpenGL 4.6

Monitor Support

Monitor Support

Supports up to 3 independent displays via onboard ports (2x DisplayPort™ and 1x HDMI®), more displays support via discrete graphics

Chipset

Chipset

AMD PRO665 Chipset

Memory

Max Memory[1]

Up to 64GB DDR5-5200

Memory Slots

Two DDR5 UDIMM slots, dual-channel capable

Memory Type[2]

DDR5-5200

Notes:

[1] The max memory is based on the test results with current Lenovo® memory offerings.

[2] Installed memory is actually DDR5-5600 but may run as DDR5-5200 due to the memory support capability of processor.

Storage

Max Storage Support[1]

Up to three drives, 1x 3.5" HDD + 2x M.2 SSD
- 3.5" HDD up to 2TB
- M.2 SSD up to 2TB each

Storage Type***

Disk Type	Interface	RPM	Security
3.5" SATA HDD	SATA 6Gb/s	7.2K	-
M.2 2280 SSD	PCIe® NVMe®, PCIe® 4.0 x4	-	Opal 2.0

RAID

RAID 0/1 support for M.2 SSDs (RAID preset only available via special bid models)

Notes:

[1] The max capacity of each disk type is based on the test results with current Lenovo® storage offerings.

Removable Storage

Optical

- DVD burner (DVD±RW), SATA connector, slim (9.0mm)
- None

Card Reader

- 3-in-1 card reader (SD, SDHC, SDXC)
- No card reader

Multi-Media

Audio Chip

High Definition (HD) Audio, Realtek® ALC623-CG codec

Speakers

- No speakers
- Single speaker, 1W x1

Power Supply

Power Supply**

Power	Type	Efficiency	Key Features
180W	Fixed	85%	100-240V, 50-60Hz
260W	Fixed	90%	100-240V, 50-60Hz
310W	Fixed	92%	100-240V, 50-60Hz

DESIGN

Input Device

Keyboard**

- Lenovo® Calliope Keyboard (USB connector), black
- Lenovo® Traditional Keyboard (USB connector), black
- No keyboard

Mouse

- Lenovo® Calliope Mouse (USB connector), black
- No mouse

Mechanical

Form Factor

SFF (8.2L)

Dimensions (WxDxH)[1]

92.5 x 297.7 x 339.5 mm (3.6 x 11.7 x 13.4 inches)

Packaging Dimensions (WxDxH)

195 x 395 x 530 mm (7.68 x 15.55 x 20.87 inches)

Weight[2]

Around 4.6 kg (10.1 lbs)

Packaging Weight

Around 7.5 kg (16.5 lbs)

Case Color

Black

Bays

- 1x 3.5" disk bay
- 1x slim ODD bay

Expansion Slots

- One PCIe® 3.0 x16, low-profile, length ≤ 155mm, height ≤ 70mm
- One PCIe® 3.0 x1, low-profile, length ≤ 155mm, height ≤ 70mm
- Three M.2 slots (one for WLAN, two for SSD)[3]

EOU

Toolless cover, memory, disk, optical, extension card assembly / removal[4]

Stand

- Vertical stand
- No stand

Others

- (Optional) Dust filter
- Supports Smart Power On

Notes:

[1] The system dimensions may vary depending on configurations.

[2] The system weight is approximate and based on results in Lenovo® lab, which varies depending on the source of component, variance of the distribution of each component, and manufacturing process. It may not be the exact weight for each specific model.

[3] M.2 slot for SSD is M.2 PCIe® 4.0 x4 slot, supports up to 64Gbps on NVMe® drives

[4] To comply with UL 4200A, the toolless features are not available for the following countries:
Argentina, Belize, Bolivia, Canada, Caribbean Group, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, TAA, Uruguay, USA, Venezuela.

CONNECTIVITY

Network

WLAN + Bluetooth®**

- Realtek® Wi-Fi® 6 RTL8852BE, 802.11ax Dual Band 2x2 Wi-Fi® + Bluetooth® 5.3, M.2 card

- AMD Wi-Fi® 6E RZ616, 802.11ax 2x2 Wi-Fi® + Bluetooth® 5.3, M.2 Card
- No WLAN and Bluetooth®

Onboard Ethernet

Gigabit Ethernet, Realtek® RTL8111FP, 1x RJ-45, supports DASH and Wake-on-LAN

Optional Ethernet

- 2.5 Gigabit Ethernet, Realtek® RTL8125BGS, 1x RJ-45, PCIe® x1
- No optional Ethernet

Ports[1]

Front Ports

- 1x USB-C® (USB 5Gbps / USB 3.2 Gen 1), with 15W charging
- 4x USB-A (USB 5Gbps / USB 3.2 Gen 1)
- 1x headphone / microphone combo jack (3.5mm)
- 1x microphone (3.5mm)

Optional Front Ports

1x card reader

Rear Ports[2]

- 4x USB-A (Hi-Speed USB / USB 2.0)
- 1x HDMI® 2.1 TMDS
- 2x DisplayPort™ 1.4a (HBR2, DSC)
- 1x Ethernet (RJ-45)
- 1x line-out (3.5mm)

Optional Rear Ports***

- 1x USB-C® (USB 20Gbps / USB 3.2 Gen 2x2), support data transfer, via PCIe® x4 card
- 2x USB-C® (USB 10Gbps / USB 3.2 Gen 2), support data transfer, via PCIe® x4 card
- 2x USB-A (Hi-Speed USB / USB 2.0), via 2-port adapter
- 2x USB-A (USB 5Gbps / USB 3.2 Gen 1), via 2-port USB expansion card, PCIe® x1
- 1x parallel
- 1x serial

Notes:

[1] The transfer speed of following ports will vary and, depending on many factors, such as the processing speed of the host device, file attributes and other factors related to system configuration and your operating environment, will be slower than theoretical speed.
USB 2.0: 480 Mbit/s;
USB 3.2 Gen 1 (SuperSpeed USB 5Gbps, formerly USB 3.0 / USB 3.1 Gen 1): 5 Gbit/s;
USB 3.2 Gen 2 (SuperSpeed USB 10Gbps, formerly USB 3.1 Gen 2): 10 Gbit/s;
USB4® 20Gbps / USB 3.2 Gen 2x2 (SuperSpeed USB 20Gbps): 20 Gbit/s;
USB4® 40Gbps (USB 40Gbps): 40 Gbit/s;
Thunderbolt™ 3/4: 40 Gbit/s.

[2] For video ports on discrete graphics, please see graphics section.

SECURITY & PRIVACY

Security

Security Chip

Discrete TPM 2.0, TCG certified, FIPS 140-2 certified

Physical Locks

- (Optional) E-lock
- (Optional) Smart Cable Clip
- Kensington® Security Slot™, 3 x 7 mm
- Padlock Loop

Chassis Intrusion Switch

- Chassis intrusion switch
- No chassis intrusion switch

Fingerprint Reader

No fingerprint reader

Other Security

Pluton security processor

BIOS Security

- Administrator password
- Hard disk password
- Power-on password
- Absolute persistence module
- Boot sequence control
- Boot without keyboard and mouse
- Cover tamper detected[1]
- Certificate-based BIOS authentication
- Configuration change detection
- Individual USB port disablement
- Secure wipe
- Secure boot
- Self-healing BIOS[2]
- Smart USB protection (allows keyboard / mouse only, blocks all storage devices)
- More BIOS security features, please visit BIOS Simulator[3]

Notes:

[1] Only available for the models with Chassis Intrusion Switch

[2] Self-healing BIOS is only available via Special Bids

[3] The BIOS simulator is just for reference. Default settings and some options may vary depending on the hardware, operating system and BIOS version.

MANAGEABILITY

System Management

System Management

- DASH 1.1 / 1.2
- Non-DASH

SERVICE

Warranty[1]

Base Warranty**

- 1-year courier or carry-in service
- 1-year limited onsite service
- 3-year limited onsite service
- No base warranty

Notes:

[1] The warranty upgrades may be bundled with some models, please check the "Included upgrade" column in the specific model's configurations. For more service extensions, please go to https://smartfind.lenovo.com/. To learn more details of warranty policy, please access https://support.lenovo.com/warrantylookup/warrantypolicy.

ACCESSORIES

Bundled Accessories

Bundled Accessories***

- DP to DVI dongle
- DP to HDMI® dongle
- DP to VGA dongle
- HDMI® to VGA dongle
- Smart Cable (USB-A to USB-C®)
- None

OPERATING REQUIREMENTS

Operating Environment

Temperature

- Operating: 5°C (41°F) to 35°C (95°F)
- Storage: -40°C (-40°F) to 60°C (140°F)

Relative Humidity

- Operating: 20% to 80%
- Storage: 10% to 90%

Altitude

- Operating: 0 m (0 ft) to 3048 m (10,000 ft)
- Storage: 0 m (0 ft) to 12192 m (40,000 ft)

ENVIRONMENTAL

Sustainability

Material

85% PCC ABS bezel
95% PCC ABS wired USB keyboard/mouse top/bottom cover
95% PCC thermal shell with OBP
90% PIC recycled plastic EPE cushion
30% OBP used in bag
FSC certified paper in packaging

CERTIFICATIONS

Green Certifications[1]

Green Certifications

- (Optional) ENERGY STAR® 8.0
- (Optional) EPEAT™ Silver Registered[2]
- (Optional) EPEAT™ Gold Registered[3]
- ErP Lot 3
- GREENGUARD®
- RoHS compliant
- TCO Certified 9.0

Notes:

[1] The items listed under the "Green Certifications" section may not only refer to certification but also registration or self-declaration. For ESG & regulatory compliance documents, please visit https://compliance.lenovo.com.
[2], [3] EPEAT™ is registered where applicable, please visit epeat.net for registration status by country.

Other Certifications

Other Certifications

(Optional) TÜV Rheinland® Ultra Low Noise

Mil-Spec Test

MIL-STD-810H military test passed (Low Pressure [Altitude], High Temperature, Low Temperature, Temperature Shock, Humidity, Sand and Dust, Vibration, Shock, Solar Radiation, Contamination by Fluids, Salt Fog)

- Feature with ** means that only one option listed under the feature can be configured on selected models. Please refer to the model configuration for specific information.
- Feature with *** means that one or more options listed under the feature can be configured on selected models. Please refer to the model configuration for specific information.
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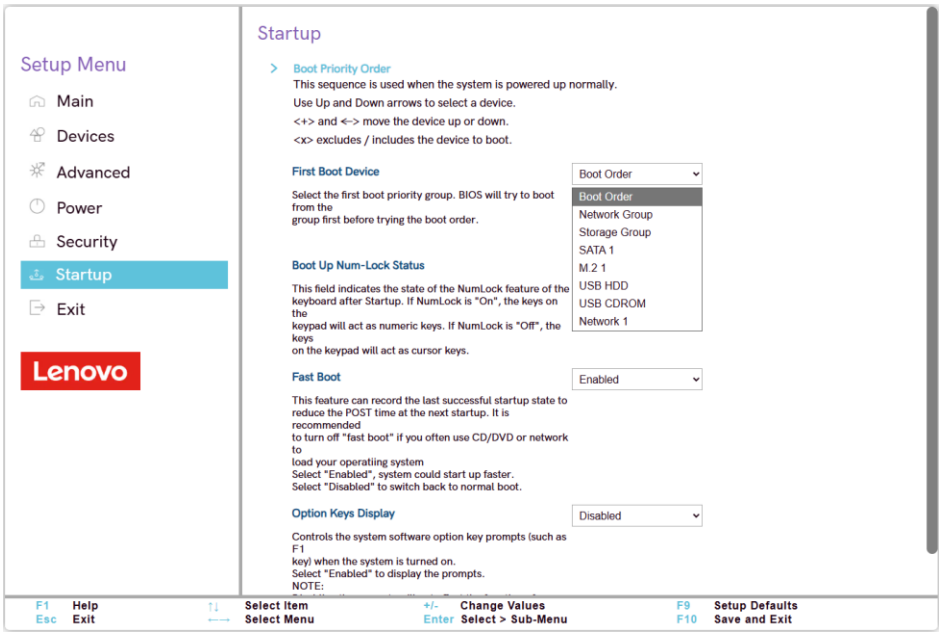
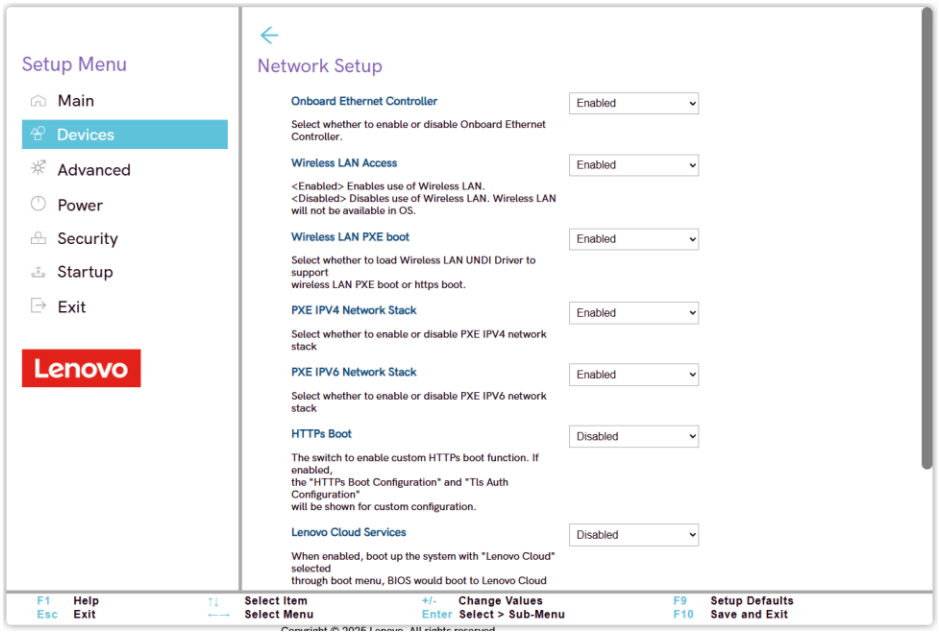
you.

- The specifications on this page may not be available in all regions, and may be changed or updated without notice.

1.5. BIOS E SEGURANÇA e 2.5. BIOS E SEGURANÇA

b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).





LENOVO TECNOLOGIA (BRASIL) LIMITADA
CNPJ/MF: 07.275.920/0001-61

Especificações Técnicas
SSD M.2 SAMSUNG para LENOVO

Part Number	Capacity[1)]	LBA Count [2)]
MZAL8256HDJD-00BLL MZVL8256HDJD-00BLL	256GB	500,118,192
MZAL8512HDLU-00BLL MZVL8512HDLU-00BLL	512GB	1,000,215,216
MZAL81T0HDLB-00BLL MZVL81T0HDLB-00BLL	1024GB	2,000,409,264

Features

- PCIe® Gen.4 16Gb/s Interface, up to 4 Lanes
- PCI Express® Base Specification Rev. 4.0
- PCI Express® M.2 Specification Rev. 4.0
- NVM Express™ specification Rev. 2.0(Mandatory Only)
- Power Saving Modes:
  - Supporting APST
  - Supporting L1.2 Mode
- Support Admin & NVM Command Set
- RoHS Compliant

Environmental Specifications

· Temperature[4)]	
- Operating	0°C to 70°C
- Non-operating	-40°C to 85°C
· Humidity (non-condensing)	
- Non-operating	5 ~ 95%
· Linear Shock	
- Non-operating (3ms duration with half sine wave)	230 Gpeak
· Vibration	
- operating (2ms duration with half sine wave/ 1ms duration with half sine wave)	200 / 1000 Gpeak

Drive Configuration

· Capacity	256/512/1024GB
· From Factor	M.2
· Interface	PCI Express® Gen.4 x4
· Bytes per Sector	512 Bytes

Performance Specifications [3)]

· Data Transfer Rate (128KB)	
· Sequential Read	(256GB) Up to 5,700 MB/s
	(512/1024GB) Up to 6,000 MB/s
· Sequential Write	(256GB) Up to 3,000 MB/s
	(512GB) Up to 5,200 MB/s
	(1024GB) Up to 5,300 MB/s
· Data I/O Speed (4KB)	
· Random Read	(256GB) Up to 480K IOPS
	(512GB) Up to 800K IOPS
	(1024GB) Up to 850K IOPS

Power Specifications

· Supply Voltage / Tolerance	3.3V ± 5%
· Voltage Ripple/Noise (max.)	100mV p-p
· Active[5)] (Typ, RMS)	
- Read (3.3V)	4.7 W
- Write (3.3V)	4.6 W
· Idle[6)7)] (Typ.)	60 mW
· Sleep[6)] (Typ)	5 mW

Physical DimensionZ

· Width	22.00 ± 0.15 mm
· Length	(M.2 22x42) 42.00 ± 0.15 mm
	(M.2 22x80) 80.00 ± 0.15 mm
· Height	Max. 2.38 mm
· Weight	(M.2 22x42) Max. 4.0 g
	(M.2 22x80) Max. 9.0 g

Lenovo

ThinkVision

ThinkVision E24-40
User Guide

Machine Types: 64BA

Product numbers

A25238FE0
64BAMAR1WW

First Edition (May 2025)
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Safety information

General Safety guidelines

For tips to help you use your computer safely, go to:
http://www.lenovo.com/safety

Before installing this product, read the Safety Information.

Before installing this product, read the Safety Information.

الرجاء قراءة معلومات السلامة قبل تركيب هذا المنتج.

Преди инсталиране на продукта, прочетете Информация за безопасност.

Před instalací tohoto produktu si přečtěte bezpečnostní informace.

Før du dette tages i brug produkt, skal du læse sikkerhedsoplysningerne.

Lesen Sie die Sicherheitshinweise, bevor Sie das Gerät installieren.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε τις Πληροφορίες για την ασφάλεια.

Antes de instalar este producto, lea la Información de seguridad.

Ennen kuin asennat tämän tuotteen, lue Turvallisuustiedot.

Avant d'installer ce produit, lisez les Informations de sécurité.

לפני התקנת המוצר, חשוב לקרוא את המידע בנושא בטיחות.

Prije ugradnje proizvoda pročitajte obavijesti o sigurnosti.

A termék használatba vétele előtt olvassa el a biztonsági tudnivalókat.

Sebelum memasang produk ini, baca Informasi Keselamatan.

Prima di installare il prodotto, leggere le informazioni sulla sicurezza.

本製品を設置する前に、安全に関する情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 숙지하십시오.

Lees de veiligheidsinformatie voorafgaand aan het installeren van dit product.

Les sikkerhetsinformasjonen før du installerer produktet.

Przed instalacją tego produktu należy przeczytać Informacje dotyczące bezpieczeństwa.

Antes de instalar este produto, leia as Informações de segurança.

Antes de instalar este produto, leia as Informações de Segurança.

Înainte de a instala acest produs, citiţi informaţiile privind siguranţa.

Перед установкой продукта прочтите раздел "Информация о безопасности".

Pred inštaláciou tohto výrobku si prečítajte bezpečnostné informácie.

Pred namestitvijo tega izdelka preberite varnostne informacije.

Pre instaliranja ovog proizvoda, pročitajte Bezbednosne informacije.

Läs säkerhetsinformation innan du installerar den här produkten.

โปรดอ่านข้อมูลด้านความปลอดภัยก่อนที่จะติดตั้งผลิตภัณฑ์นี้

Bu ürünü kurmadan önce Güvenlik Bilgilerini okuyun.

Перш ніж встановлювати пристрій, прочитайте інформацію з техніки безпеки.

在安装本产品之前，请阅读“安全事项”。

安裝本產品前，請閱讀安全資訊。

The unit weight 4.5 Kg

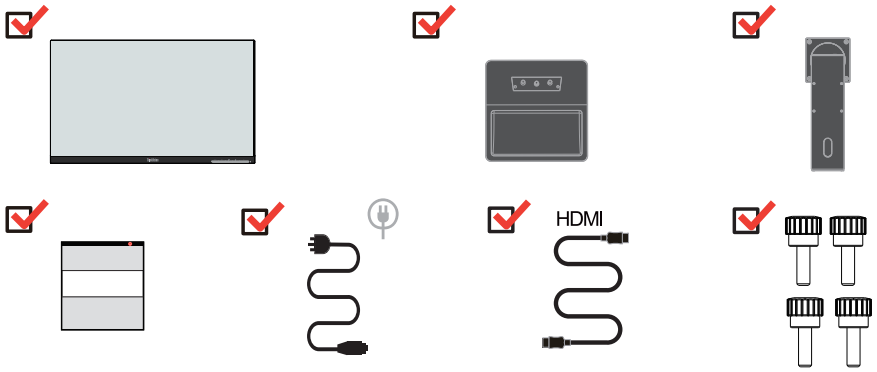
Chapter 1.Getting started

This User's Guide provides detailed operation instructions for the user. For quick instruction overview, please see the Setup Poster for brief information.

Shipping contents

The product package should include the following items:

- Information Flyer
- Flat Panel Monitor
- Power Cord
- HDMI Cable
- Base
- Stand
- Screw x 4



Notice for use

To set up your monitor, please see the illustrations below.

Note: Do not touch the monitor within the screen area. The screen area is glass and can be damaged by rough handling or excessive pressure.

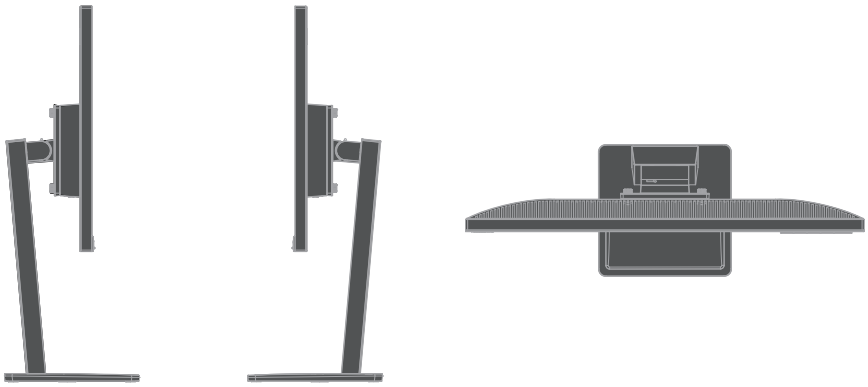
1. Take out the Top cushion and accessories.
2. Mounting the stand to monitor's recess and tighten the screws.
3. Insert the base towards the stand and tighten the thumbscrew.
4. Stand up the monitor with both hands carefully.

Note: To install a VESA mount, please see "Wall Mounting (Optional)"on page 2-8**.**

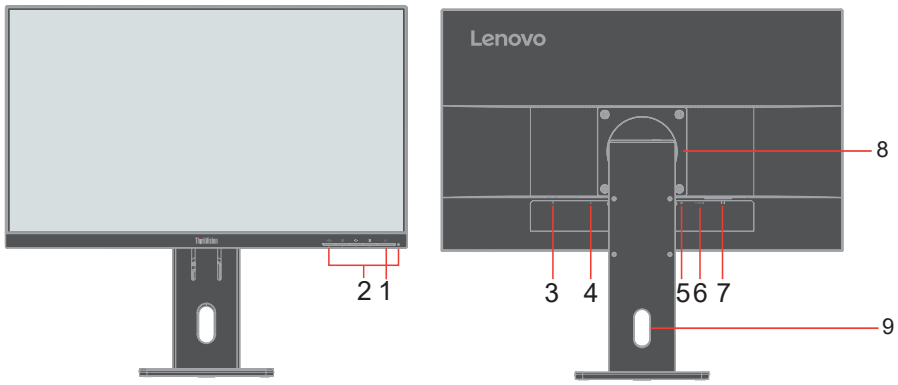
Product overview

This section will provide information on adjusting monitor positions, setting user controls, and using the cable lock slot.

Side and top view



Front&Back View

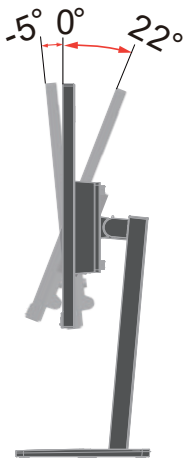


No.	Name	Description
1	Power On/Off button	To turn the monitor on or off.
2	Function buttons	To use the OSD controls. (For information on how to utilize these keypad controls, please see “Adjusting your monitor image”on page 2-3.)
3	Cable lock slot	Equipped with a cable lock slot located on the rear of monitor.
4	Power connector	Connect the power cable.
5	DP 1.2 port	Connect to your computer using an DP cable.
6	HDMI 1.4 port	Connect to your computer using a HDMI cable.
7	Analog port	Connect to your computer with Analog Signal Cable
8	VESA mounting holes (100 mm x 100 mm)	Used for wall-mounting the monitor through a VESA-compatible wall-mount kit.
9	Cable management slot	Used to organize cables by routing them through the slot.

Types of adjustments

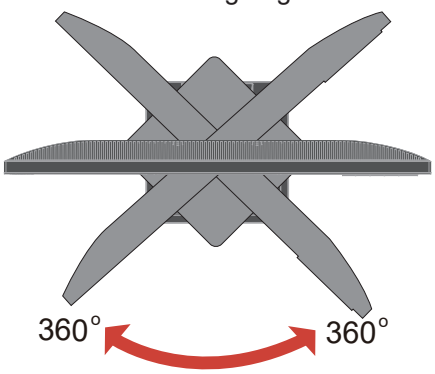
Tilt

Please see the illustration below for an example of the tilt range.



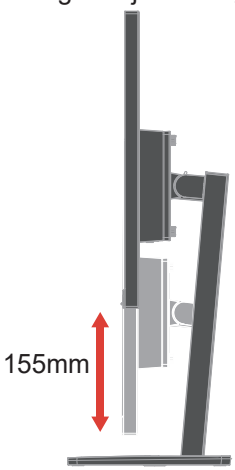
Swivel

With the built-in pedestal, you can tilt and swivel the monitor for the most comfortable viewing angle.



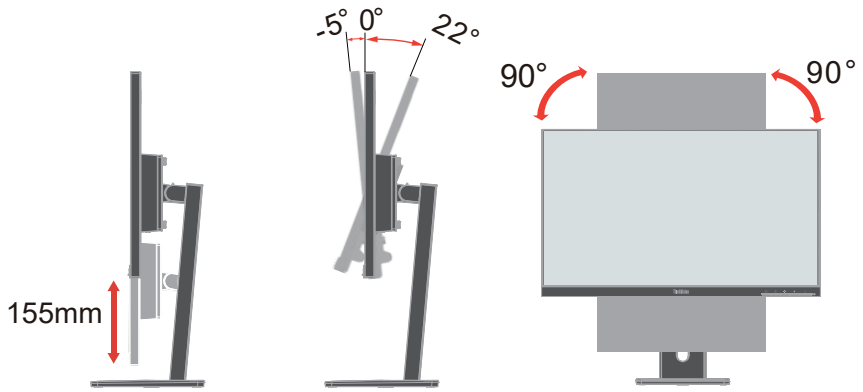
Height Adjustment

For height adjustment, user needs to press down or lift up the monitor.



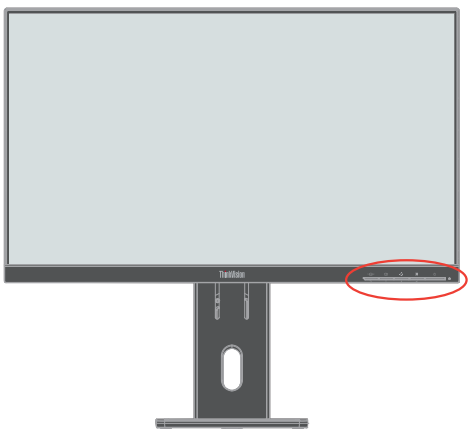
Monitor pivot

- Adjust the screen position before rotating the monitor screen. (Make sure that the monitor screen ascent to its highest point, and it inclines backward at 22°.)
- then rotate clockwise /counterclockwise until the monitor stops at 90°.



Monitor controls

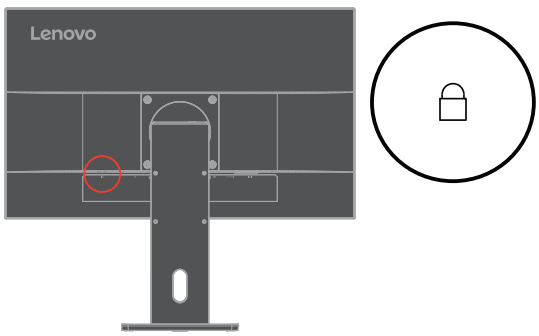
The keypad controls on the front cover are accesses to various functions.



For information on how to utilize these keypad controls, please see “Adjusting your monitor image”on page 2-3.

Cable lock slot

Your monitor is equipped with a cable lock slot located on the rear of your monitor



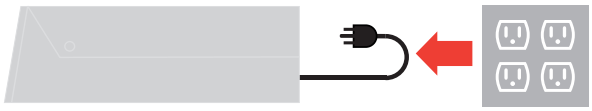
Setting up your monitor

This section provides information on how to set up your monitor.

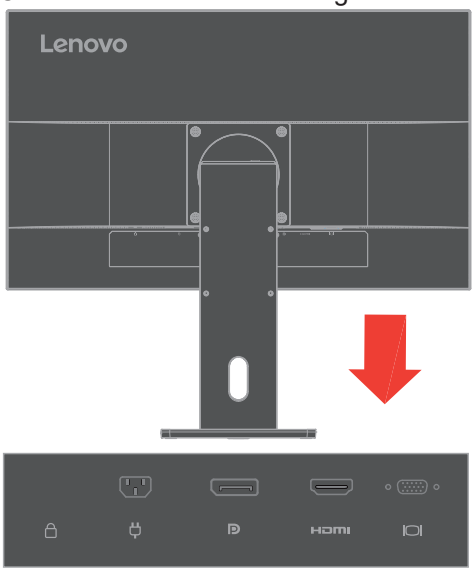
Connecting and turning on your monitor

Note: Be sure to read the Safety information on page iv before carrying out this procedure.

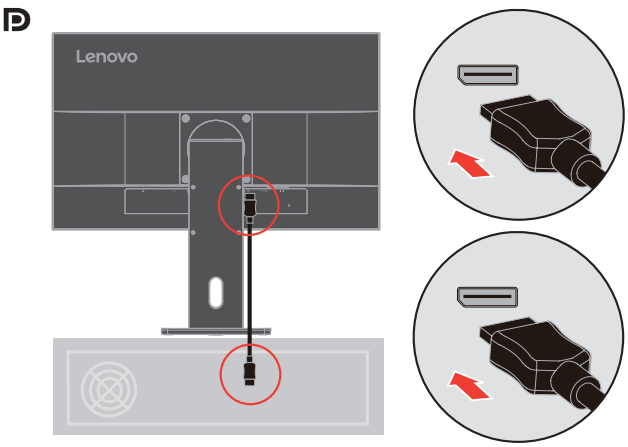
1. Power off your computer and all attached devices, and unplug the computer power cord.
   Note: The type of plug & Socket shown here are for illustration only.



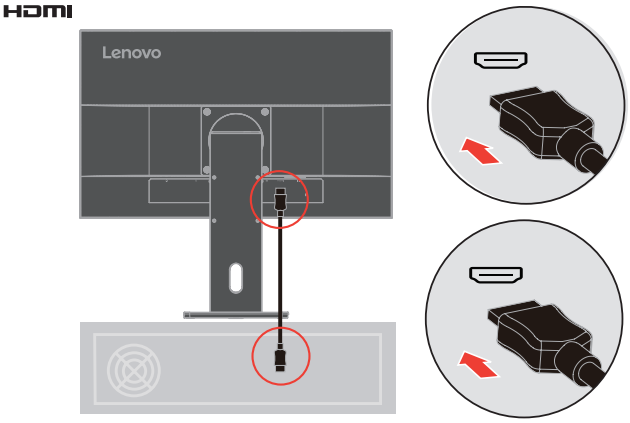
2. Connect the cables according to below icon indication.



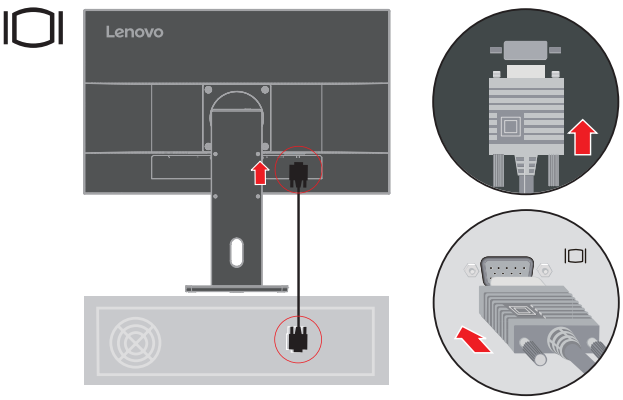
3. For computer in DisplayPort connecting.
   Note 1: Monitors sold in NA include an DP cable.
   Note 2: For other regions Lenovo recommends that customers who require to use the DP Cable on their monitor purchase the "Lenovo DisplayPort to DisplayPort Cable 0A36537" www.lenovo.com/support/monitoraccessories.



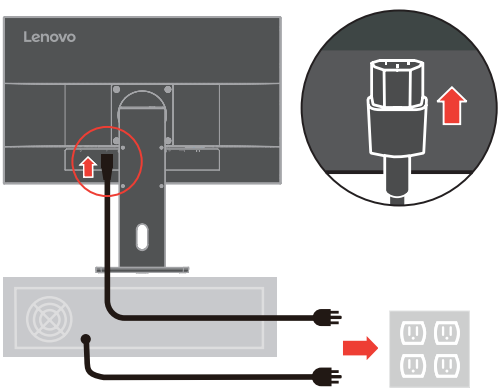
4. For computer in HDMI connecting.
   Lenovo recommends that customers who require to use the HDMI input on their monitor purchase the "Lenovo HDMI to HDMI cable OB47070" www.lenovo.com/support/monitor accessories.



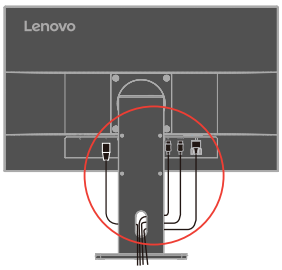
5. For computer in Analog Signal Cable connecting.

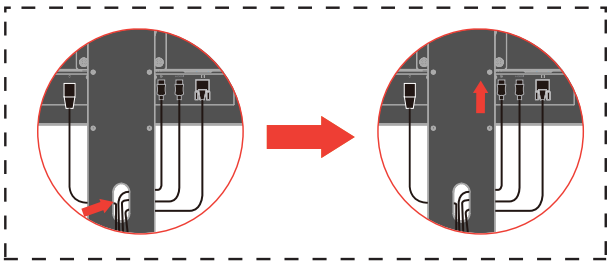


6. Insert the power cord into the monitor, then plug the monitor power cord and the computer cord into grounded electrical outlets.
   Note: A certified power supply cord has to be used with this equipment. The relevant national installation and or equipment regulations shall be considered. A certified power supply cord not lighter than ordinary polyvinyl chloride flexible cord according to IEC 60227 (designation H05VV-F 3G 0.75mm^2 or H05VVH2-F2 3G 0.75mm^2) shall be used. Alternative a flexible cord be of synthetic rubber according to IEC 60245 (designation H05RR-F 3G 0.75mm^2) shall be used.

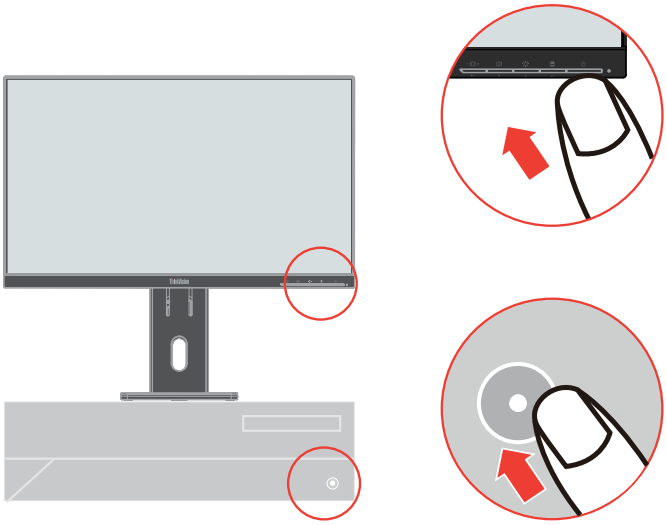


7. Connect the cables.





8. Power on the monitor and the computer.



9. When you install the monitor driver, download the driver that corresponds to your monitor model from the Lenovo website https://pcsupport.lenovo.com/solutions/e24_40. Refer to the “Manually installing the monitor driver”on page 3-4 section to install the driver.

Registering your option

Thank you for purchasing this Lenovo product. Please take a few moments to register your Product and provide us with information that will help Lenovo to better serve you in the future. Your feedback is valuable to us in developing product and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the following Web site:
http://www.lenovo.com/register
Lenovo will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Chapter 2.Adjusting and using your monitor

This section will give you information on adjusting and using your monitor.

Comfort and accessibility

Good ergonomic practice is important to get the most from your personal computer and to avoid discomfort. Arrange your workplace and the equipment you use to suit your individual needs and the kind of work that you perform. In addition, use healthy work habits to maximize your performance and comfort while using your computer. For more detailed information on any of these topics, visit the Healthy Computing Web site at:
http://www.lenovo.com/healthycomputing/.

Arranging your work area

Use a work surface of appropriate height and available working area to allow you to work in comfort.
Organize you work area to match the way you use materials and equipment. Keep your work area clean and clear for the materials that you typically use and place the items that you use most frequently, such as the computer mouse or telephone, within the easiest reach.
Equipment layout and setup play a large role in your working posture. The following topics describe how to optimize equipment setup to achieve and maintain good working posture.

Positioning and viewing your monitor

Position and adjust your computer monitor for comfortable viewing by considering the following items:

- **Viewing distance:** Recommended viewing distance between the eye and the monitor screen is 1.5 x the diagonal of the screen. Solutions in meeting this required distance in cramped office situations include pulling desk away from wall or divider to make room for monitor, using flat panel or compact displays placing the monitor in the desk corner, or placing the keyboard in an adjustable drawer to create a deeper working surface.
- **Monitor height:** Position the monitor so your head and neck are in a comfortable and neutral (vertical, or upright) position. If your monitor does not have height adjustments, you might have to place books or other sturdy objects under the base of the monitor to achieve the desired height. A general guideline is to position the monitor such that the top of the screen is at or slightly below your eye-height when you are comfortably seated. However, be sure to optimize your monitor height so the line of site between your eyes and the center the monitor suits your preferences for visual distance and comfortable viewing when your eye muscles are in a relaxed state.
- **Tilt:** Adjust the tilt of your monitor to optimize the appearance of the screen content and to accommodate your preferred head and neck posture.
- **General location:** Position your monitor to avoid glare or reflections on the screen from overhead lighting or nearby windows.

The following are some other tips for comfortable viewing of your monitor:

- Use adequate lighting for the type of work you are performing.
- Use the monitor brightness, contrast, and image adjustment controls, if equipped, to optimize the image on your screen to meet your visual preferences.
- Keep your monitor screen clean so you can focus on the screen's contents.

Any concentrated and sustained visual activity can be tiring for your eyes. Be sure to periodically look away from your monitor screen and focus on a far object to allow your eye muscles to relax. If you have questions on eye fatigue or visual discomfort, consult a vision care specialist for advice.

Quick tips for healthy work habits

The following information is a summary of some important factors to consider to help you remain comfortable and productive while you use your computer.

- **Good posture starts with equipment setup:** The layout of your work area and the setup of your computer equipment have a large effect on your posture while using your computer. Be sure to optimize the position and orientation of your equipment by following the tips outlined in "Arranging your work area"on page 2-1so you can maintain a comfortable and productive posture. Also, be sure to use the adjustment capabilities of your computer components and office furniture to best suit your preferences now and as your preferences change over time.
- **Minor changes in posture can help avoid discomfort:** The longer you sit and work in front of your computer, the more important it is to observe your working posture. Avoid as summing any one posture for an extended period of time. Periodically make minor modifications in your posture to help deter any discomforts that might arise. Make use of any adjustments that your office furniture or equipment provide to accommodate changes in posture
- **Short, periodic breaks help ensure healthy computing:** Because computing is primarily a static activity, it is particularly important to take short breaks from your work. Periodically, stand up in front of your work area, stretch, walk for a drink of water, or otherwise take a short break from using your computer. A short break from work gives your body a welcome change in posture and helps to ensure you remain comfortable and productive while you do work.

Accessibility information

Lenovo is committed to providing greater access to information and technology to people with disabilities. With assistive technologies, users can access information in the way most appropriate to their disability. Some of these technologies are already provided in your operating system; others can be purchased through vendors or accessed at:
https://lenovo.ssbbartgroup.com/lenovo/request_vpat.php

Adjusting your monitor image

This section describes the user control features used to adjust your monitor image.

Using the direct access controls

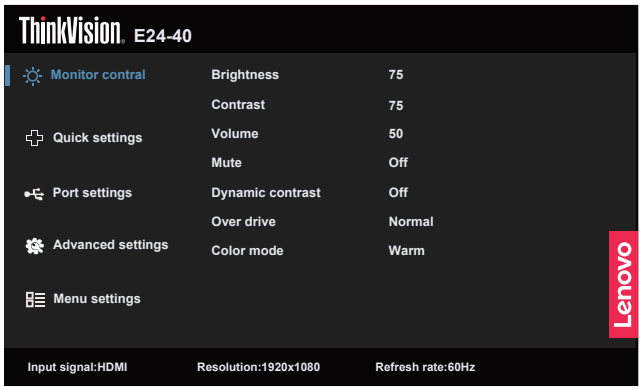
The direct access controls can be used when the On Screen Display (OSD) is not displayed.

Table 2-1. Direct access controls

Icon	Name	Description
	Menu/OK	・Press to open main menu while there is no any OSD on the screen. ・Press to enter next level on main menu or sub menu , or move backwards through the sub menus. ・Press and hold for 10 seconds to Lock/un-Lock all menu.
	Brightness/ Down Key	・It is a shortcut for adjusting Brightness while there is no OSD on the screen. ・Press to move lighting-indicator on main menu down to next one. ・Press to decrease current values on adjustment bar
	Auto adjustment/ Up Key	・It is a shortcut for auto adjustment while there is no OSD on the screen. ・Press to move lighting-indicator on main menu up to last one. ・Press to increase current values on adjustment bar.
	Input Source	It is a shortcut for changing input signal while there is no OSD on the screen or on power-saving mode.
	DDC-CI	Press and hold for 10 seconds to Enable/Disable the "DDC/CI".
	Power button	Turns the monitor on/off. White indicates power on. Orange indicates standby/power saving mode.

Using the On-Screen Display(OSD) controls

To adjust the settings, the user controls can be viewed through the OSD.



To use the controls:

1. Press ☰ to open the main OSD menu.
2. Use ↑ or ↓ to move among the icons. Select an icon and press ↵ to access the selected function. If there is a sub-menu, you can move between options using ↑ or ↓, then press ↵ to select that function. Use ↑ or ↓ to make adjustments then press ↵ to save.
3. Press ⮌ to move backwards through the sub-menus and exit from the OSD.
4. Press and hold ↵ for 10 seconds to lock the OSD. This will prevent accidental adjustments to the OSD. Press and hold ↵ for 10 seconds to unlock the OSD and allow adjustments to the OSD.
5. Enables DDC/CI by default. Use OSD Exit Key, Press and hold 1⇄2 for 10 seconds to disable/enable DDC/CI function. A message "DDC/CI disable" is shown on the screen.
6. The ENERGY STAR option resets all user settings to default values so that the monitor can meet the requirements of Energy Star.

   Energy Star is an energy saving program for consumer electronics led by the U.S. government. It was launched in 1992 by EPA and DOE to reduce energy consumption and greenhouse gas emissions. Energy Star logo is a symbol of energy conservation and environmental protection. It improves the concept of energy efficiency of consumers and manufacturers, and effectively guides the market.

   The regulation of Energy Star improves energy efficiency and reduces air pollution by using more energy-efficient equipment in homes, offices and factories. One way to achieve this goal is to use management to reduce energy consumption when products are not in use. The default settings for monitors conform to Energy Star certification. Any changes by users for more features and functionalities may increase power consumption, which will exceed the limitation of Energy Star's standard. If the user changes the options related to energy efficiency when using, such as brightness, color mode, etc., select All Reset Factory or choose the Energy Star option, the power consumption will be restored to the energy efficiency with Energy Star standard.

   For more information, please refer to (www.energystar.gov/products).

   All products of Energy Star will be posted online and can be accessed

directly by governments, public institutions and consumers.

Table 2-2. OSD functions

OSD Icon on Main Menu	Sub menu	Description	Controls and Adjustments
Monitor control	Brightness	Adjusts overall screen brightness.	All input ports
	Contrast	Adjusts difference between light and dark areas.	
	Volume	Adjust the volume.	
	Mute	• On • Off	
	Dynamic contrast	• On • Off	
	Over drive	• Off • Normal • Extreme	
	Color mode	• sRGB • Neutral • Warm • Cool • Custom R: Increases or decreases the saturation of 'red' in the image. G: Increases or decreases the saturation of 'green' in the image. B: Increases or decreases the saturation of 'blue' in the image.	
Quick settings	Up key	• Brightness • Contrast • Color Mode • Language • Automatic	
	Down key		
Port settings	Input signal	• Auto • DisplayPort • HDMI • VGA	
	Video range	• Auto • Full Range 0-255 • Limited Range16-235 **Note:** Refers to RGB range of HDMI input.	Only for HDMI port
Advanced settings	Image Position	• H. Position • V. Position	Only for VGA ports
	Image setup	• Automatic • Manual	
	Button repeat rate	• Default • Slow • Off	All input ports
	Aspect ratio	• Full screen • Original AR	
	LED indicator	• On • Off **Note**: When the LED indicator is on, the LED is on; when the LED indicator is off, the LED is always off.	
	Power button lock	• On • Off	

OSD Icon on Main Menu	Sub menu	Description	Controls and Adjustments
Menu settings	Information	• Model name • Refresh rate • Firmware • Serial number	All input ports
	Language	Select OSD Languages. Note: The language chosen only affects the language of the OSD. It has no effect on any software running on the computer.	
	OSD Time Out	Adjust bar 5~60	
	OSD position	Adjust bar 0~100 (H,V)	
	OSD rotation	• Normal • 90 • 270	
	Transparency	Adjust bar 0 ~100	
	Factory Reset	• Reset • No	

*The use of Extreme Mode (response time) may result in reduced display quality when fast moving video graphics are displayed.
Users should check Extreme Mode (response time) to verify if it is compatible with any applications they would like to use it with.
*Low Blue Light: The display uses the low blue light panel. It complies with TÜV Rheinland Low Blue Light Hardware Solution certification under factory reset/default setting (Low Blue Light=Standard, Brightness:75%,Contrast: 75%, CCT: Warm).

Selecting a supported display mode

The display mode of the monitor uses is controlled by the computer. Therefore, refer to your computer documentation on how to change display modes.
The image size, position and shape might be changed when the display mode changes. This is normal and the image can be re-adjusted using automatic image setup and the image controls. Unlike CRT monitors, which require a high refresh rate to minimize flicker, LCD or Flat Panel technology is inherently flicker-free.
Note: If your system has previously been used with a CRT monitor and is currently configured to a display mode outside the range of this monitor, you may need to reattach the CRT monitor temporarily until you have re-configured the system; preferably to 1920 x 1080 at 60 Hz, which is a common display mode.
The display modes shown below have been optimized at the factory.

Note: According to the VESA standard, there may be a certain error (+/-1Hz) when calculating the refresh rate (field frequency) of different operating systems and graphics cards. In order to improve compatibility, the nominal refresh rate of this product has been rounded off. Please refer to the actual product.

Table 2-3 Factory set display modes

Address ability	**Refresh rate(Hz)**
640x480	60 Hz, 67 Hz,72 Hz, 75 Hz
720x400	70Hz
800x600	60 Hz, 72 Hz, 75 Hz
1024x768	60Hz, 70Hz, 75Hz
1280x800	60Hz
832x624	75Hz
1280x1024	60Hz, 75 Hz
1440x900	60Hz
1600x900	60Hz
1680x1050	60Hz
1920x1080	60Hz, 75 Hz (VGA no support), 100 Hz (VGA no support)

Understanding power management

Power management is invoked when the computer recognizes that you have not using your mouse or keyboard for a user-definable period. There are several states as described in the table below.
For optimal performance, switch off your monitor at the end of each working day, or whenever you expect to leave it unused for long periods during the day.

Table 2-4. Power indicator

State	Power Indicator	Screen	Restoring Operation	Compliance
On	White	Normal		
Standby/ Suspend	Amber	Blank	Press a key or move the mouse. There may be a slight delay reappears. **Note:** Standby also occurs if there is no image output to the monitor.	ENERGY STAR
Off	Off	Blank	Press power key to switch on There may be a slight delay before the image reappears.	ENERGY STAR

Power Management Modes

VESA Modes	Horizontal Sync	Vertical Sync	Video	Power Indicator	Power Consumption
Normal operation	Active	Active	Active	White	24 W (maximum)* 13 W (typical)
Active-off mode	Inactive	Inactive	Off	Amber	Less than 0.5 W
Switch off	-	-	-	Off	Less than 0.3 W

Energy Star	Power Consumption
P_{ON}	11.8 W
E_{TEC}	40.48 kWh

**** Maximum power consumption with max luminance.**
This document is informational only and reflects laboratory performance. Your product may perform differently, depending on the software, components and peripherals you ordered and shall have no obligation to update such information. Accordingly, the customer should not rely upon this information in making decisions about electrical tolerances or otherwise. No warranty as to accuracy or completeness is expressed or implied.

Caring for your monitor

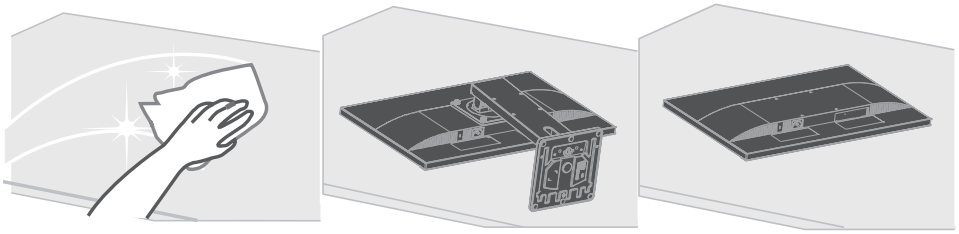
Be sure to turn off the power before you perform any maintenance on the monitor.

Do not:
- Apply water or liquid directly to your monitor.
- Use solvents or abrasives.
- Use flammable cleaning materials to clean your monitor or any other electrical equipment.
- Touch the screen area of your monitor with sharp or abrasive items. This type of contact may cause permanent damage to your screen.
- Use any cleaner which contains an anti-static solution or similar additives. This may harm the coating of the screen area.

Do:
- Lightly dampen a soft cloth with water and use this to gently wipe the covers and the screen.
- Remove grease or finger marks with a damp cloth and a little mild detergent.

Detaching the monitor base and stand

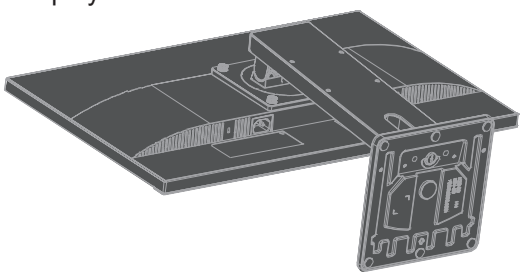
After placing the monitor face down on box with caution protected, remove the screws and lift the stand up to remove it from the monitor.



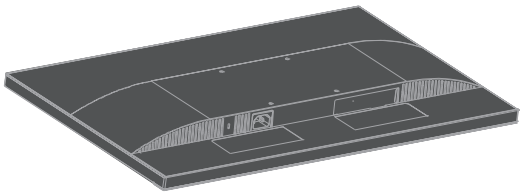
Wall Mounting (Optional)

Refer to the instructions that come with the base mounting kit. To convert your LCD display from a desk-mounted to a wall-mounted display, do the following:

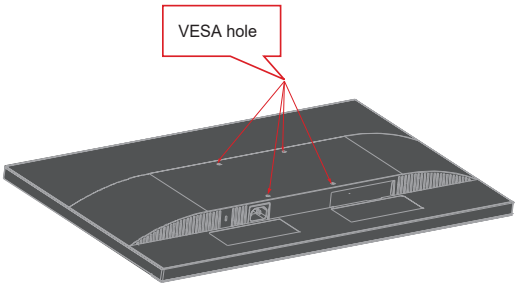
Step 1: Verify that the Power button is turned Off, then disconnect the power cord.
Step 2: Lay the LCD display face down on a towel or blanket.



Step 3: Remove the base from the monitor, refer to “Detaching the monitor base and stand”.



Step 4: Attach the mounting bracket from the VESA compatible wall mounting kit (100mm x100mm distance), VESA Mounting Screw M4 x 10 mm.



Step 5: Attach the LCD display to the wall, and follow the instructions in the wall-mounting kit.
For use only with UL Listed Wall Mount Bracket with minimum weight/load: 8kg

Chapter 3.Reference information

This section contains monitor specifications, instructions to manually install the monitor driver, troubleshooting information.

Monitor specifications

Table 3-1. Monitor specifications for type-model E24-40/64BAMAR1WW

Dimensions	Depth	178.6 mm (7.03 in.)
	Height	498.4 mm (19.62 in.)
	Width	539.8 mm (21.25 in.)
Stand	Lift	155 mm
	Tilt	-5° to 22°
	Swivel	0° to 360°
	Pivot	-90° to 90°
VESA mount	Supported	100 mm x 100 mm (3.94 in. x 3.94 in.)
Image	Viewable image size	604.5 mm (23.8 in.)
	Maximum height	296.46 mm (11.67 in.)
	Maximum width	527.04 mm (20.74 in.)
	Pixel pitch	0.2745 mm × 0.2745 mm (0.01 in.)
Power input	Supply voltage Max supply current	100-240V AC 1.5A
Power consumption **Note:** Power consumption figures are for the monitor and the power supply combined. **Note:** Typical power consumption is tested under OSD default setting.	Normal operation	<24 W (Max) <13 W (Typical)
	Standby/Suspend	<0.5 W
	Off	<0.3 W at 100VAC and 240VAC
Video input (Analog)	Interface	VGA
	Input signal	Analog Direct Drive, 75 ohm 0.7V
	Horizontal addressability	1920 pixels (Max)
	Vertical addressability	1080 lines (Max)
	Clock frequency	210 MHz (Max)

HDMI/DP	Interface	HDMI/DP
	Input signal	VESA TMDS (Panel Link™)
	Horizontal addressability	1920 pixels (Max)
	Vertical addressability	1080 lines (Max)
	Clock frequency	240 MHz (Max)
Communications	VESA DDC/CI	
Supported Display Modes	Horizontal frequency	30 kHz – 83 kHz (VGA) 30 kHz – 115 kHz (HDMI/DP)
	Vertical frequency	48 Hz – 60 Hz (VGA) 48 Hz – 100 Hz (HDMI/DP)
	Native Resolution	1920 x 1080 @ 60 Hz
Temperature	Operating	0° to 40°C (32°F to 104° F)
	Storage	-20° to 60°C (-4°F to 140° F)
	Shipping	-20° to 60°C (-4° F to 140° F)
Humidity	Operating	10% to 80% non-condensing
	Storage	5% to 95% non-condensing
	Shipping	5% to 95% non-condensing

Troubleshooting

If you have a problem setting up or using your monitor, you might be able to solve it yourself. Before calling your dealer or Lenovo, try the suggested actions that are appropriate to your problem.

Table 3-2. Troubleshooting

Problem	Possible cause	Suggested action	Reference
The words “Input not supported” are shown on the screen, and the power indicator is flashing white.	The system is set to a display mode which is not supported by the monitor	• If you are replacing an old monitor, reconnect it and adjust the display mode to within the specified range for your new monitor. • If using a Windows system, restart the system in safe mode, then select a supported display mode for your computer. • If these options do not work, contact the Customer Support Center.	“Selecting a supported display mode”on page 2-6
The image quality is unacceptable	The video signal cable is not connected with the monitor or system completely.	Be sure the signal cable is firmly plugged into the system and monitor.	“Connecting and turning on your monitor”on page 1-7
	The color settings may be incorrect.	Select another color setting from the OSD menu.	“Adjusting your monitor image”on page 2-3
	The automatic image setup function was not performed.	Perform automatic image setup.	“Adjusting your monitor image”on page 2-3
The power indicator is not lit and there is no image.	• The monitor’s power switch is not switched on. • The power cord is loose or disconnected. • There is no power at the outlet.	• Be sure the power cord is connected properly. • Be sure the outlet has power. • Power on the monitor. • Try using another power cord. • Try using another electrical outlet.	“Connecting and turning on your monitor”on page 1-7
Screen is blank and power indicator is amber.	The monitor is in Standby / Suspend mode	• Press any key on the keyboard or move the mouse to restore operation. • Check the Power options settings on your computer.	“Understanding power management” on page 2-7
The power indicator is amber, but there is no image	The video signal cable is loose or disconnected from the system or monitor	Be sure the video cable is connected with the system properly	“Connecting and turning on your monitor”on page 1-7
	The monitor brightness and contrast are at the lowest setting.	Adjust the brightness and contrast setting on the OSD menu.	“Adjusting your monitor image”on page 2-3
One or more of the pixels appear discolored	This is a characteristic of the LCD technology and is not an LCD defect	If there are more than five pixels missing, contact the Support Center	“Appendix A. Service and Support”on page A-1

Problem	Possible cause	Suggested action	Reference
• Fuzzy lines in text or a blurry image • Horizontal or vertical lines through the image.	• Image setup has not been optimized • Your system DisplayProperties setting have not been optimized.	Adjust the resolution settings on your system to match the native resolution for this monitor: 1920 x 1080 at 60 Hz.	“Adjusting your monitor image”on page 2-3
		Perform automatic image setup. If automatic image setup does not help, perform manual image setup.	“Selecting a supported display mode”on page 2-6
		When working in the native resolution, you may find additional improvements by adjusting the Dots Per Inch (DPI) setting on your system.	See the Advanced section of your system’s display properties.

Manually installing the monitor driver

Below are steps for manually installing the monitor driver in Microsoft Windows 10, Microsoft Windows 11.

1. Turn off the computer, all attached devices.
2. Ensure that the monitor is connected correctly.
3. Turn on the monitor and then the system unit. Allow your computer to start the Windows operating system.
4. From the Lenovo website https://pcsupport.lenovo.com/solutions/e24_40, find the corresponding monitor driver and download it to a PC to which this monitor is connected (such as a desktop).
5. Right-click the Windows **Start** button on the desktop, then click **Device Manager**, and double click **Monitor**.
6. Double-click **Generic Monitor**.
7. Click the **Driver** tab.
8. Click **Update Driver**, and then click **Browse Computer to find the driver**.
9. Click **Let me pick from a list of available divers on my computer**.
10. Click the **Have Disk...** button. By clicking the **Browse** button, browse and point to the following path: **X:\Monitor Drivers\Windows** (where X indicates “the folder in which the downloaded driver is located” (such as a desktop)).
11. Select **e24-40.inf** file, Click **Open** button. Click **OK** button.
12. In the new window, select **E24-40** and click **Next**.
13. After the installation is complete, delete all downloaded files and close all Windows.
14. Restart the system. The system will automatically select the refresh rate and the corresponding color matching profile.

Note: On LCD monitors, unlike CRTs, a faster refresh rate does not improve display quality. Lenovo recommends using either 1920 x 1080 at a refresh rate of 60 Hz, or 640 x 480 at a refresh rate of 60 Hz.

Getting further help
If you still can’t solve your problem, please contact the Lenovo Support Center. For more information on contacting the Support Center, please see “Appendix A. Service and Support”on page A-1

Service information

Customer responsibilities

The warranty does not apply to a product which has been damaged due to accident, misuse, abuse, improper installation, usage not in accordance with product specifications and instructions, natural or personal disaster, or unauthorized alterations, repairs or modifications.
The following are examples of misuse or abuse and not covered by warranty:

- Images burned on to the screen of a CRT monitor. Burned image is preventable by utilizing a moving screen saver or power management.
- Physical damage to covers, bezel, base and cables.
- Scratches or punctures on monitor screens.

Service parts

The following parts are for use by Lenovo service, or Lenovo aurthorized dealers, to support the customer warranty. Parts are for service use only. The table below shows information for model E24-40/64BAMAR1WW.

Table 3-3. Repair parts list

FRU (FIELD REPLACEABLE UNIT) PART NUMBER	Description	Machine Type/ Model (MTM)	Color
5C11J07491	HDMI2.0 cable 1.8m FRU--TPV	64BA	Raven Black
5CF1P41519	E24-40 FRU Carton	64BA	Yellow
5D11P36232	E24-40 - 23.8 inch FRU Monitor	64BA	Raven Black
5SE1P38239	E24-40 - FRU Stand and Base	64BA	Raven Black

Appendix A. Service and Support

The following information describes the technical support that is available for your product, during the warranty period or throughout the life of the product. Refer to the Lenovo Limited Warranty for a full explanation of Lenovo warranty terms.

Registering your option

Register to receive product service and support updates, as well as free and discounted computer accessories and content. Go to: http://www.lenovo.com/register

Online technical support

Online technical support is available during the lifetime of a product at: http://www.lenovo.com/support

Product replacement assistance or exchange of defective components also is available during the warranty period. In addition, if your option is installed in a Lenovo computer, you might be entitled to service at your location. A Lenovo technical support representative can help you determine the best alternative.

Telephone technical support

Installation and configuration support through the Customer Support Center will be available until 90 days after the option has been withdrawn from marketing. After that time, the support is cancelled, or made available for a fee, at Lenovo's discretion. Additional support is also available for a nominal fee.

Before contacting a Lenovo technical support representative, please have the following
information available: option name and number, proof of purchase, computer manufacturer, model, serial number and manual, the exact wording of any error message, description of the problem, and the hardware and software configuration information for your system.

Your technical support representative might want to walk you through the problem while you are at your computer during the call.

Telephone numbers are subject to change without notice. The most up-to-date telephone list for Lenovo Support is always available at: http://consumersupport.lenovo.com

Country or Region	Telephone Number
Argentina	0800-666-0011 (Spanish, English)
Australia	1-800-041-267 (English)
Austria	0810-100-654 (local phone) (German)
Belgium	Warrant service and support: 02-339-36-11 (Dutch, French)
Bolivia	0800-10-0189 (Spanish)

Country or Region	Telephone Number
Brazil	Calls made from within the Sao Paulo region: 11-3889-8986 Calls made from outside the Sao Paulo region: 0800-701-4815 (Portuguese)
Brunei Darussalam	800-1111 (English)
Canada	1-800-565-3344 (English, French)
Chile	800-361-213(Spanish)
China	Technical Support Line: 400-990-8888 (Mandarin)
China (Hong Kong S.A.R.)	(852) 3516-8977 (Cantonese, English, Mandarin)
China (Macau S.A.R.)	0800-807 / (852) 3071-3559 (Cantonese, English, Mandarin)
Colombia	1-800-912-3021 (Spanish)
Costa Rica	0-800-011-1029(Spanish)
Croatia	385-1-3033-120(Croatian)
Cyprus	800-92537(Greek)
Czech Republic	800-353-637(Czech)
Denmark	Warranty service and support: 7010-5150 (Danish)
Dominican Republic	1-866-434-2080(Spanish)
Ecuador	1-800-426911 (OPCION 4) (Spanish)
Egypt	Primary: 0800-0000-850 Secondary:0800-0000-744 (Arabic, English)
El Salvador	800-6264 (Spanish)
Estonia	372-66-0-800 (Estonian, Russian, English)
Finland	Warranty service and support: +358-800-1-4260(Finnish)
France	Warranty service and support (hardware): 0810-631-213(French)
Germany	Warranty service and support: 0800-500-4618 (toll-free)(German)
Greece	Lenovo Business Partner (Greek)
Guatemala	Dial 999-9190, wait for operator, and request to reach 877-404-9661 (Spanish)
Honduras	Dial 800-0123(Spanish)
Hungary	+36-13-825-716 (English, Hungarian)
India	Primary: 1800-419-4666 (Tata) Secondary: 1800-3000-8465 (Reliance) Email: commercialts@lenovo.com (English and Hindi)

Country or Region	Telephone Number
Indonesia	1-803-442-425 62 213-002-1090 (Standard Charges Apply) (English, Bahasa Indonesia)
Ireland	Warranty service and support: 01-881-1444 (English)
Israel	Givat Shmuel Service and Center: +972-3-531-3900 (Hebrew, English)
Italy	Warranty service and support: +39-800-820094 (Italian)
Japan	0120-000-817 (Japanese, English)
Kazakhstan	77-273-231-427(Standard charges Apply) (Russian , English)
Korea	1670-0088 (Collect Call) 02-3483-2829 (Toll Call) (Korean)
Latvia	371-6707-360(Latvian, Russian, English)
Lithuania	370 5278 6602(Italian, Russian, English)
Luxembourg	ThinkServer and ThinkStation: 352-360-385-343 ThinkCentre and ThinkPad: 352-360-385-222 (French)
Malaysia	1-800-88-0013 03-7724-8023 (Standard Charges Apply) (English)
Malta	356-21-445-566(English, Italian, Maltese Arabic)
Mexico	001-866-434-2080(Spanish)
Netherlands	020-513-3939 (Dutch)
New Zealand	0508-770-506 (English)
Nicaragua	001-800-220-2282 (Spanish)
Norway	8152-1550(Norwegian)
Panama	Lenovo Customer Support Center: 001-866-434(Toll-Free) (Spanish)
Peru	0-800-50-866 (OPCION 2) (Spanish)
Philippines	1-800-8908-6454 (GLOBE subscribers) 1-800-1441-0719 (PLDT subscribers) (Tagalog, English)
Poland	Laptops and tablets branded with logo Think: 48-22-273-9777 ThinkStation and ThinkServer: 48-22-878-6999 (Polish, English)
Portugal	808-225-115 (Standard Charges Apply) (Portuguese)
Romania	4-021-224-4015(Romanian)
Russia	+7-499-705-6204 +7-495-240-8558 (Standard Charges Apply)(Russian)
Singapore	1-800-415-5529 6818-5315 (Standard Charges Apply) (English, Mandarin, Bahasa Malaysia)
Slovakia	ThinkStation and ThinkServer: 421-2-4954-5555

Country or Region	Telephone Number
Slovenia	386-1-2005-60 (Slovenian)
Spain	34-917-147-833(Spanish)
Sri Lanka	+9477-7357-123 (Sumathi Information systems) (English)
Sweden	Warranty service and support: 077-117-1040 (Swedish)
Switzerland	Warranty service and support: 0800-55-54-54 (German, French, Italian)
Taiwan	0800-000-702 (Mandarin)
Thailand	001-800-4415-734 (+662) 787-3067 (Standard Charges Apply)(Thai, English)
Turkiye	444-04-26 (Turkish)
United Kingdom	Standard warranty support: 03705-500-900 (local rate) Standard warranty support: 08705-500-900(English)
United States	1-800-426-7378 (English)
Uruguay	000-411-005-6649 (Spanish)
Venezuela	0-800-100-2011 (Spanish)
Vietnam	120-11072 (Toll Free) 84-8-4458-1042 (Standard Charges Apply) (Vietnamese, English)

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to:

http://www.lenovo.com/recycling

環境配慮に関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機器が使用済みとなり廃棄される場合は、資源有効利用促進法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細は、
https://www.lenovo.com/jp/ja/services_warranty/recycle/pcrecycle/
をご参照ください。

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が 2003 年 10 月 1 日よりスタートしました。詳細は、
https://www.lenovo.com/jp/ja/services_warranty/recycle/pcrecycle/
をご参照ください。

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属（鉛など）が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

Collecting and recycling a disused Lenovo computer or monitor

If you are a company employee and need to dispose of a Lenovo computer or monitor that is the property of the company, you must do so in accordance with the Law for Promotion of Effective Utilization of Resources. Computers and monitors are categorized as industrial waste and should be properly disposed of by an industrial waste disposal contractor certified by a local government. In accordance with the Law for Promotion of Effective Utilization of Resources, Lenovo Japan provides, through its PC Collecting and Recycling Services, for the collecting, reuse, and recycling of disused computers and monitors. For details, visit the Lenovo Web site at https://www.lenovo.com/jp/ja/services_warranty/recycle/pcrecycle/. Pursuant to the Law for Promotion of Effective Utilization of Resources, the collecting and recycling of home-used computers and monitors by the manufacturer was begun on October 1, 2003. This service is provided free of charge for home-used computers sold after October 1, 2003. For details, visit the Lenovo Web site at https://www.lenovo.com/jp/ja/services_warranty/recycle/personal/.

Disposing of Lenovo computer components

Some Lenovo computer products sold in Japan may have components that contain heavy metals or other environmental sensitive substances. To properly dispose of disused components, such as a printed circuit board or drive, use the methods described above for collecting and recycling a disused computer or monitor.

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ThinkCentre
ThinkPad
ThinkVision

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Power cords and power adapters

Use only the power cords and power adapters supplied by the product manufacturer. Do not use the AC power cord for other devices.

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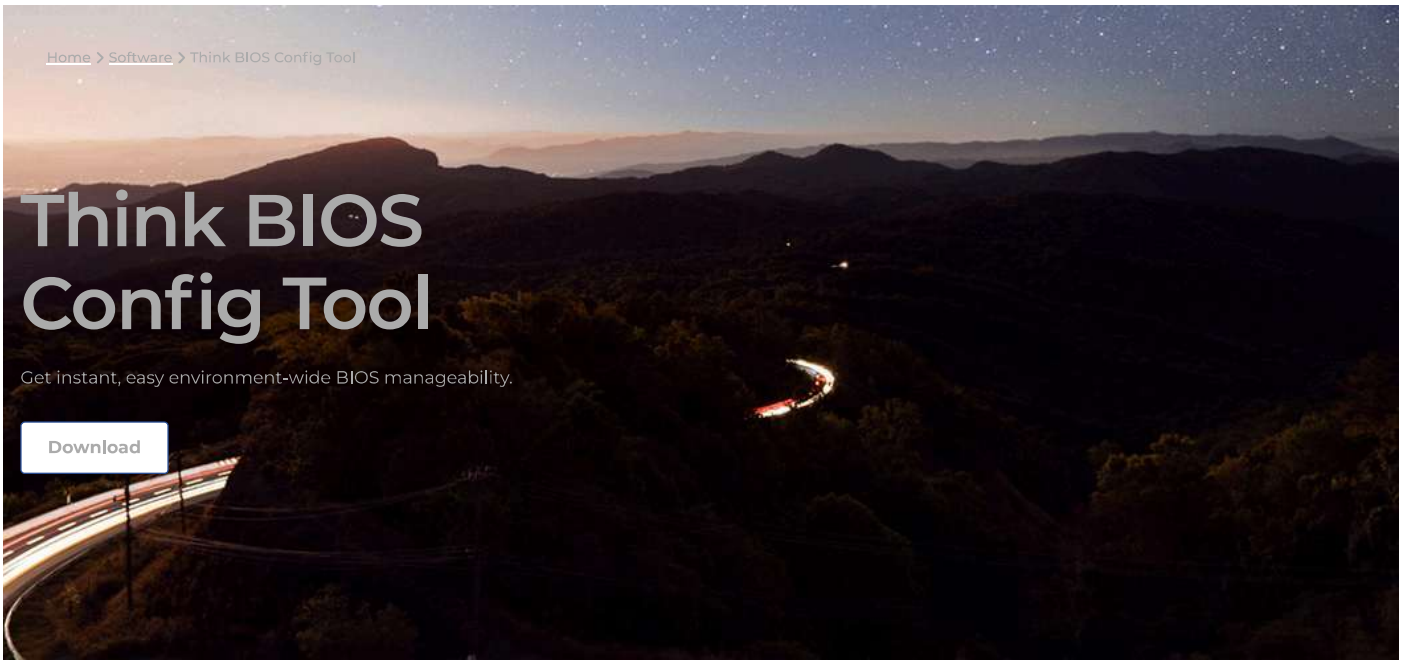

The fastest way to move your new PC

Drive consistency in your BIOS configurations without any extra work

Reduce the risk of poorly managed endpoints

Speed management of diverse deployments of Lenovo PCs

Think BIOS Config Tool from Lenovo is a free, lightweight HTML Application (HTA) tool designed to let IT view and update BIOS settings directly or remotely from a simple Graphic User Interface (GUI), allowing for the automation of BIOS configurations with a simple initialization file (INI).

Download

Why Think BIOS Config Tool?

- Build a consistent BIOS configuration across a diverse hardware environment.
- Reduce time required to ensure systems are deployed with the correct initial BIOS configuration.
- Consolidate control by centralizing visibility and management of the device BIOS.
- Eliminate the need for time-consuming, machine-by-machine BIOS configuration.
- Give IT a common GUI tool to consolidate configuration of any ThinkPad®, ThinkCentre®, or ThinkStation® PC

What makes Think BIOS Config Tool unique?

There is no other tool that gives you a simple graphical interface to configure BIOS across the Think portfolio. Think BIOS Config Tool can even simplify the deployment of many devices with consistent configurations. It is offered at no cost.

It's so easy to get started

- Think BIOS Config Tool can be launched on a local machine. BIOS settings can be seen and updated.
- These changes can be saved to an .INI file.
- This .INI can then be passed by command line parameter to Think BIOS Config Tool by leveraging common industry solutions for software deployment such as SCCM.
- Works in both standard and Unified Extensible Firmware Interface (UEFI) mode.

Get started with Think BIOS Config Tool now

Directly or remotely configure BIOS settings with an easy graphical interface.

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OVERVIEW

1. DisplayPort 1.2	3. VGA
2. HDMI 1.4	

PERFORMANCE

Panel

Panel

3-side NearEdgeless, In-Plane Switching

Backlight

WLED

Display Size

23.8 inches

Max View Area

- Active Area: 527.0 x 296.5 mm
- Screen Dimension: 535 x 313 mm

Resolution

1920 x 1080

Aspect Ratio

16:9

Pixel Pitch

0.2745 x 0.2745 mm

Dot / Pixel Per Inch

92 dpi

Brightness

250 cd/m²

Contrast Ratio

- Contrast Ratio: 1300:1
- Dynamic Contrast Ratio (Typical): 3000000:1

View Angle (H / V)

Horizontal: 178°, Vertical: 178°

Response Time

- Extreme Mode: 4 ms
- Normal Mode: 6 ms

Refresh Rate

100Hz

Color Gamut

Coverage Ratio: 99% sRGB (CIE 1931)

Color Support

16.7 Million

Color Depth

8-bit (6-bit+FRC)

Screen Surface Treatment

Anti-glare

Curvature

Flat Panel

Operating System

Operating System

- Windows® 11 Support
- Windows® 10 Support

Multi-Media

Speakers

Integrated Speakers, 2W x2

Power Supply

Power Consumption

- Typical / Max: 13W / 24W
- Sleep / Off mode: <0.5W
- Switch-off Mode: <0.3W
- Energy Star Power On: 11.8W
- Energy Star TEC: 40.5kWh
- Internal Power Supply

Voltage Required

AC 100 to 240 V (50-60Hz)

Special Features

Special Features

Natural Low Blue Light

DESIGN

Mechanical

ThinkCentre® M Series Support

To support Tiny devices, an additional ThinkCentre® Tiny VESA Mount (PN:4XF0N03161) is required (sold separately).

Bezel Width

- Side: 2.0mm
- Top: 2.0mm
- Bottom: 21.4mm

Cable Management

Support

Case Color

Raven black

Dimensions (WxDxH)[1]

Models	Dimensions
Lowest Position	539.8 x 178.6 x 343.4 mm (21.25 x 7.03 x 13.52 inches)
Highest Position	539.8 x 178.6 x 498.4 mm (21.25 x 7.03 x 19.62 inches)
Head Only	539.8 x 44.0 x 325.7 mm (21.25 x 1.73 x 12.82 inches)

Packaging Dimensions (WxDxH)

710.0 x 111.0 x 421.0 mm (27.95 x 4.37 x 16.57 inches)

Weight[2]

Models	Weight
Monitor With Stand	4.5 kg (9.9 lbs)
Monitor Head Only	2.9 kg (6.4 lbs)

Packaging Weight

6.4 kg (14.1 lbs)

Mounting

Supports VESA mount 100 x 100 mm

Stand

Supports -5° to +22° tilt, left & right 360° swivel, -90° to +90° pivot, up to 155mm lift

In the Box

- Monitor with stand
- 1x HDMI® 1.4 cable (1.8m)
- 1x Power cable (1.8m)
- 4x Screws
- Quick setup guide

Notes:

[1] The system dimensions may vary depending on configurations.

[2] The system weight is approximate and based on results in Lenovo® lab, which varies depending on the source of component, variance of the distribution of each component, and manufacturing process. It may not be the exact weight for each specific model.

CONNECTIVITY

Ports[1]

Rear Ports

- 1x HDMI® 1.4, supports 1920x1080@100Hz
- 1x DisplayPort™ 1.2
- 1x VGA

Notes:

[1] The transfer speed of following ports will vary and, depending on many factors, such as the processing speed of the host device, file attributes and other factors related to system configuration and your operating environment, will be slower than theoretical speed.
USB 2.0: 480 Mbit/s;
USB 3.2 Gen 1 (SuperSpeed USB 5Gbps, formerly USB 3.0 / USB 3.1 Gen 1): 5 Gbit/s;
USB 3.2 Gen 2 (SuperSpeed USB 10Gbps, formerly USB 3.1 Gen 2): 10 Gbit/s;
USB4® 20Gbps / USB 3.2 Gen 2x2 (SuperSpeed USB 20Gbps): 20 Gbit/s;
USB4® 40Gbps (USB 40Gbps): 40 Gbit/s;
Thunderbolt™ 3/4: 40 Gbit/s.

SECURITY & PRIVACY

Security

Physical Locks

Kensington® Nano Security Slot™ (2.5 mm x 6 mm)

SERVICE

Warranty

Base Warranty

3-year limited warranty

CERTIFICATIONS

Green Certifications[1]

Green Certifications

- ENERGY STAR® Certified
- EPEAT™ Gold Registered
- EU Energy Label (C-class)
- TCO Certified 10.0
- TCO Edge 2.1

Notes:

[1] The items listed under the "Green Certifications" section may not only refer to certification but also registration or self-declaration. For ESG & regulatory compliance documents, please visit https://compliance.lenovo.com.

Other Certifications

Other Certifications

- TÜV Rheinland® Flicker Free
- TÜV Rheinland® Low Blue Light (Hardware Solution)

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CERTIFICADO DE CONFORMIDADE
Conformity Certificate

Nº 437.001/22

A ABNT concede a Licença para uso da Marca ABNT de Qualidade Ambiental – Rotulagem ambiental tipo I ABNT – para a Empresa: Lenovo Tecnologia Brasil Ltda.
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Lenovo Tecnologia Brasil Ltda.
CNPJ: 07.275.920/0001-61

Para o(s) produto(s):
To the following product(s):

(Descritos na página 2)

Produzido(s) na unidade localizada em:
Produced in the unit located at:

Estrada Municipal José Costa de Mesquita, 200
MOD 1 à 11 – Chácara Alvorada
13337-200 - Indaiatuba – SP

Atendendo aos requisitos do Documento:
Meeting the requirements of the Document:

PE-351 - Rótulo Ecológico para bens de Informática.

Desenvolvidos em conformidade com as Normas:
Developed according to the Standards:

ABNT NBR ISO 14020:2002
ABNT NBR ISO 14024:2022

Sistema de Certificação: Sistema 5
Certification System: System 5

Primeira concessão: 20/06/2022
First concession:

Período de validade:
Validity period:

20/06/2025 a 20/06/2028

Rio de Janeiro, 14 de julho de 2025.

Guy Ladvocat
Gerente de Certificação de Sistemas
Systems Certification Manager

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CERTIFICADO DE CONFORMIDADE
Conformity Certificate

Nº 437.001/22

Para o(s) produto(s):
To the following product(s):

Produto	Família	Modelo
Desktop	ThinkCentre	Neo 50s Gen4 SFF
		Neo 50q Gen4 Tiny
		Neo 50s Gen 5 Intel IRL-R
		N30s Gen 5 Intel SFF
		N50q Gen 5 Intel Tiny
		M70q Gen4 Tiny
		M70q Gen 5 Intel IRL-R
		M70q Gen 6 Intel Tiny
		M70s Gen 5 Intel IRL-R
		M70s Gen 6 Intel SFF
		M75q gen2 Tiny
		M75s gen2 SFF
		M75q Gen 5 AMD APH
		M75s Gen 5 AMD APH
		M80q gen3 Tiny
		M90q Gen 5 Intel IRL-R
		M90q Gen 6 Intel Tiny
Workstation	ThinkStation	P2 Gen 2 TWR
		P3 Gen 2 TWR
Desktop		P3 TWR
Notebook	ThinkPad	100e Chromebook Gen 3 Intel IJP
		E14 Gen4
		E14 Gen5 AMD
		E14 Gen 6 Intel IMH
		E14 Gen 6 AMD AHU
		E14 Gen 7 AMD
		E14 Gen 7 Intel
		T14 Gen4 Intel
		T14 Gen 5 Intel IML
		T14 Gen 6 Intel
		P16v Gen 2 Intel IMH.
Notebook	-	P16v Gen 3 Intel ARL

Revisão	
Nº	Justificativa
5	**Inclusão no escopo: Notebook** ThinkPad E14 Gen 7 Intel ARL; Notebook ThinkPad T14 Gen 6 Intel ARL; Notebook ThinkPad E14 Gen 7 AMD AHP; Notebook P16v Gen 3 Intel ARL; Workstation ThinkStation P2 TWR Gen 2; Workstation ThinkStation P3 TWR Gen 2; Desktop ThinkCentre M70s Gen 6; Desktop ThinkCentre N30s Gen 5; Desktop ThinkCentre M90q Gen 6; Desktop ThinkCentre M70q Gen 6; Desktop ThinkCentre N50q Gen 5. **Exclusão dos escopo:** Notebook: ThinkPad 14 Gen 6 Intel IRL; ThinkPad 16 Gen 6 Intel IRL; L14 gen2 Intel; E14 gen3 AMD; T14 gen2 Intel; T14 Gen 3; L14 Gen3; ThinkPad E15 Gen4 Intel; K14(AMD); Desktop: M70q gen3 Tiny; M80q gen3 Tiny; M80s gen3 SFF; M80q Gen4 Tiny; M90s Gen4 SFF; Workstation: P360 TWR; P348 TWR;

Este certificado cancela e substitui a versão anterior.

Rio de Janeiro, 14 de julho de 2025.

Este certificado está sujeito ao contínuo atendimento ao Procedimento Geral da Marca ABNT Qualidade Ambiental bem como aos requisitos das Normas acima, sendo válido somente em original e com o timbre da ABNT em alto-relevo seco, assinado pelo Gerente de Certificação de Sistemas. Sua validade pode ser confirmada no seguinte endereço eletrônico: www.abnt.org.br. CNPJ: 33.402.892/0001-06 – Tel.: (21) 3974-2300
This certificate is subject to the continuous fulfillment of the requirements of the General Procedure for Conformity Assessment and to the Specific Procedure of the ABNT Conformity Mark, as well as to the Standard referred above and will be valid only in its original form, with the ABNT stamp in dry high-relief, duly signed by the Systems Certification Manager. Its validity may be confirmed at the following eletronic address: www.abnt.org.br. CNPJ: 33.402.892/0001-06 – Tel.: (21) 3974-2300

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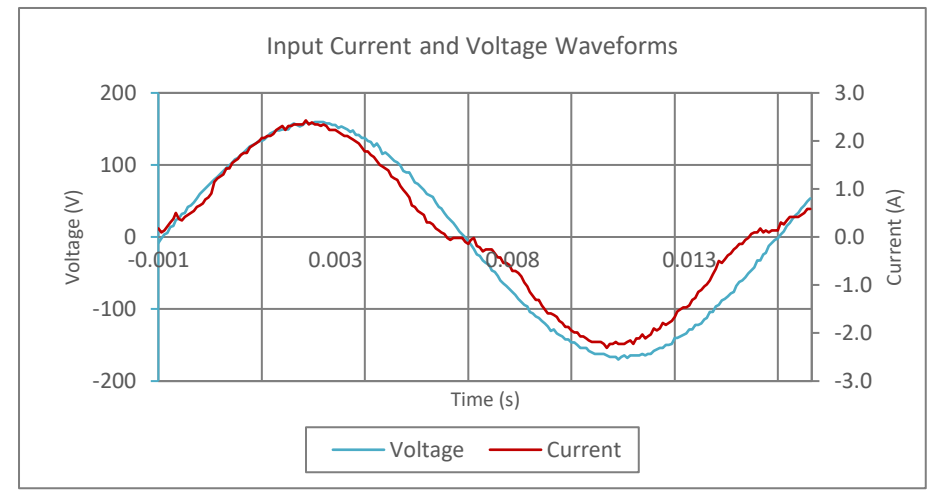
80 PLUS Verification and Testing Report

TYPICAL EFFICIENCY (50% Load):	**92.74%**
AVERAGE EFFICIENCY :	**91.28%**
80 PLUS COMPLIANT:	**YES**

ID Number	5426
Manufacturer	Lenovo (United States),Inc.
Model Number	Lenovo (PCJ007)
Serial Number	N/A
Year	2018
Type	SFX
Test Date	11/20/18

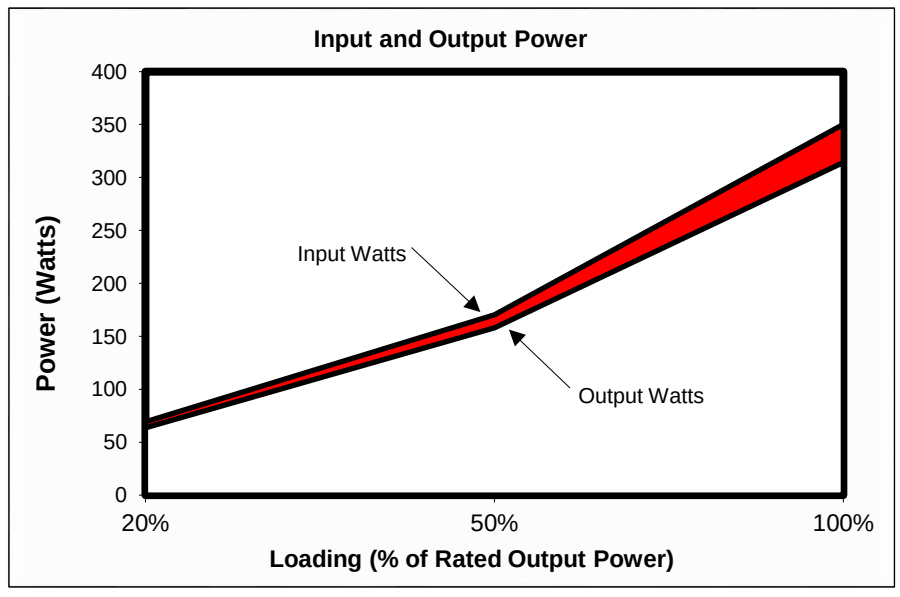
Rated Specifications	Value	Units
Input Voltage	100-240	Volts
Input Current	4	Amps
Input Frequency	50/60	Hz
Rated Output Power	**310**	**Watts**

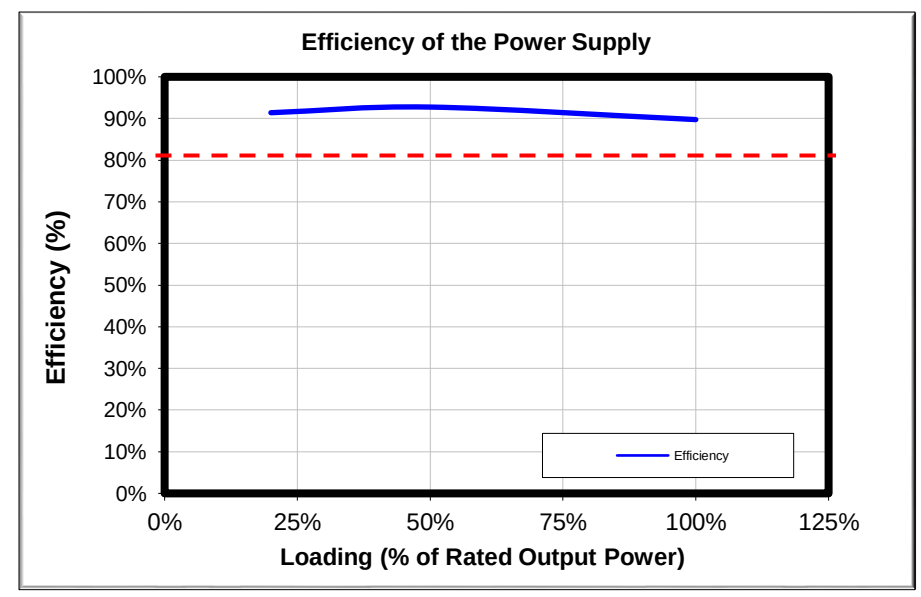
Note: All measurements were taken with input voltage at 115 V nominal at 60 Hz.



Input AC Current Waveform (ITHD = 14.35%, 50% Load)

I_{RMS}	PF	I_{THD}	Load	Input Watts	DC Terminal Voltage (V)/ DC Load Current (A)		Output Watts	Efficiency
					12V (cumulative of 12V1, 12V2, etc.)	-12V		
0.32	0.95	22.47%	10%	35.32	12.22/2.56	11.86/0.02	31.50	**89.17%**
0.62	0.96	22.23%	20%	69.29	12.21/5.15	11.9/0.04	63.32	**91.38%**
1.50	0.99	14.35%	50%	170.34	12.17/12.88	11.93/0.1	157.97	**92.74%**
3.07	0.99	7.87%	100%	350.20	12.11/25.74	12.2/0.2	314.24	**89.73%**





PLUG LOAD solutions

These tests were conducted by a third party independent testing firm on behalf of the 80 PLUS Program. 80 PLUS is a certification program to promote highly-efficient power supplies (greater than 80% efficiency in the active mode) in technology applications. *http://www.80plus.org/*

80 PLUS®

Visão geral do BitLocker

Artigo • 11/11/2023 •

Aplica-se a: ✅ Windows 11, ✅ Windows 10, ✅ Windows Server 2022, ✅ Windows Server 2019, ✅ Windows Server 2016

O BitLocker é um recurso de segurança do Windows que fornece criptografia para volumes inteiros, abordando as ameaças de roubo ou exposição de dispositivos perdidos, roubados ou desativados inadequadamente.

Aplicações práticas

Os dados em um dispositivo perdido ou roubado são vulneráveis ao acesso não autorizado, seja executando uma ferramenta de ataque de software contra ele ou transferindo o disco rígido do dispositivo para um dispositivo diferente. O BitLocker ajuda a mitigar o acesso não autorizado a dados, aprimorando as proteções de arquivos e do sistema, tornando os dados inacessíveis quando dispositivos protegidos pelo BitLocker são desativados ou reciclados.

BitLocker e TPM

O BitLocker fornece proteção máxima quando usado com um TPM (Trusted Platform Module), que é um componente de hardware comum instalado em dispositivos Windows. O TPM funciona com o BitLocker para garantir que um dispositivo não tenha sido adulterado enquanto o sistema estiver offline.

Além do TPM, o BitLocker pode bloquear o processo normal de inicialização até que o usuário forneça um PIN (número de identificação pessoal) ou insira um dispositivo removível que contenha uma *chave de inicialização*. Essas medidas de segurança fornecem autenticação multifator e garantia de que o dispositivo não pode iniciar ou retomar da hibernação até que o PIN ou a chave de inicialização corretos sejam apresentados.

Em dispositivos que não têm um TPM, o BitLocker ainda pode ser usado para criptografar a unidade do sistema operacional. Essa implementação requer que o usuário:

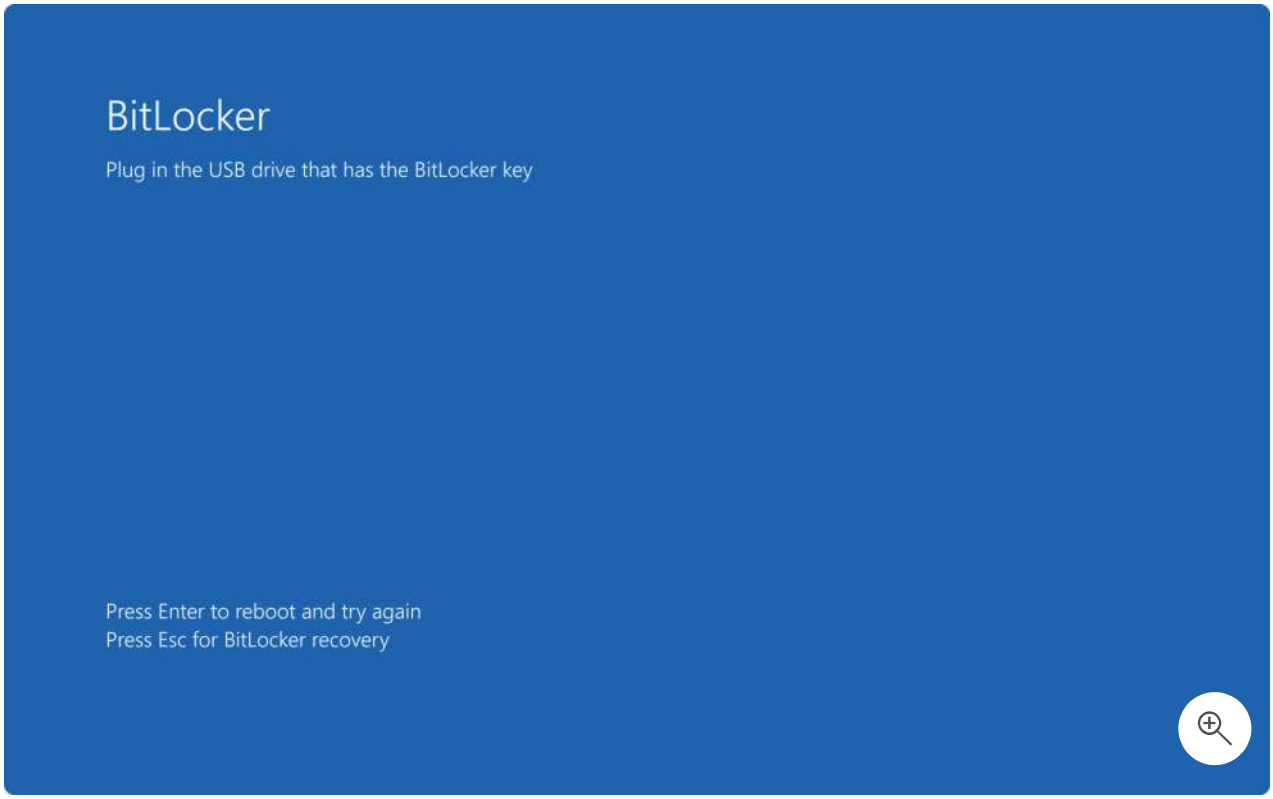
- use uma chave de inicialização, que é um arquivo armazenado em uma unidade removível que é usada para iniciar o dispositivo ou ao retomar da hibernação
- use uma senha. Essa opção não é segura, pois está sujeita a ataques de força bruta, pois não há uma lógica de bloqueio de senha. Como tal, a opção de senha é desencorajada e desabilitada por padrão

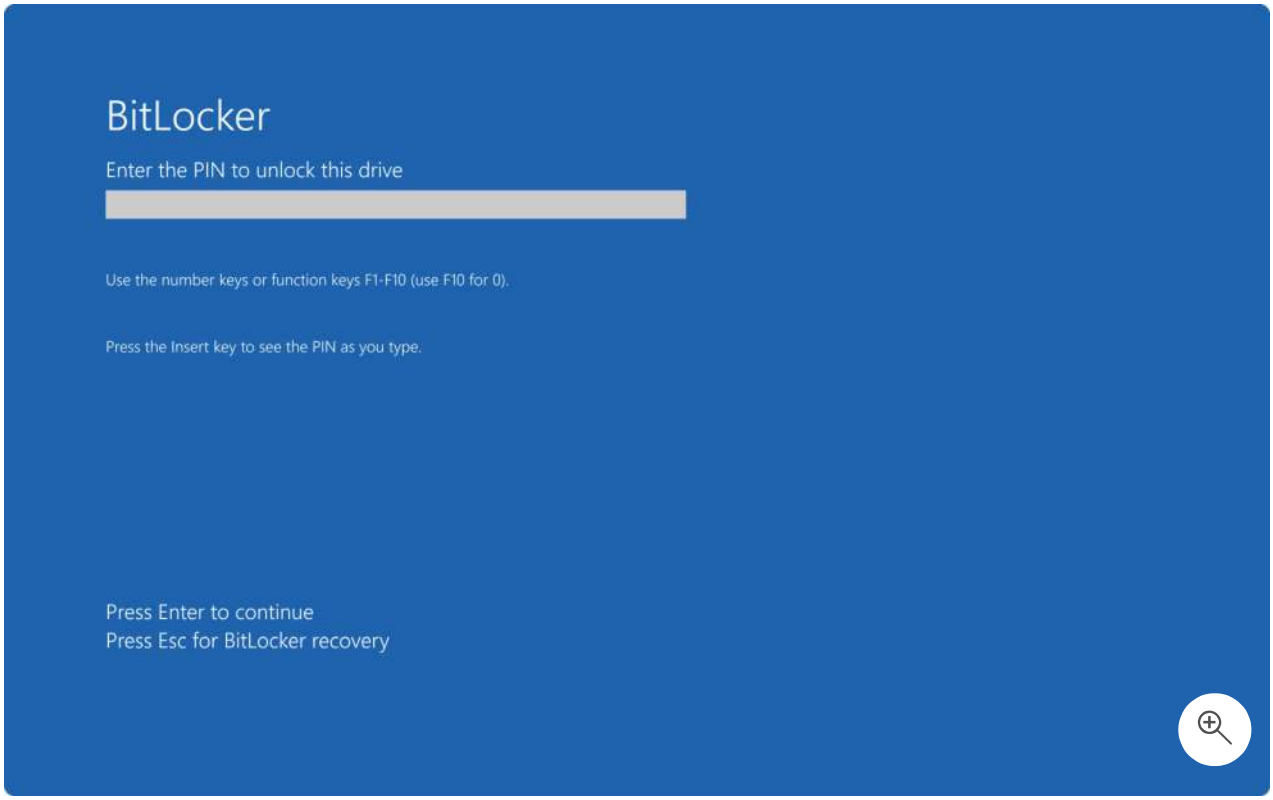
Ambas as opções não fornecem a verificação de integridade do sistema de pré-inicialização oferecida pelo BitLocker com um TPM.

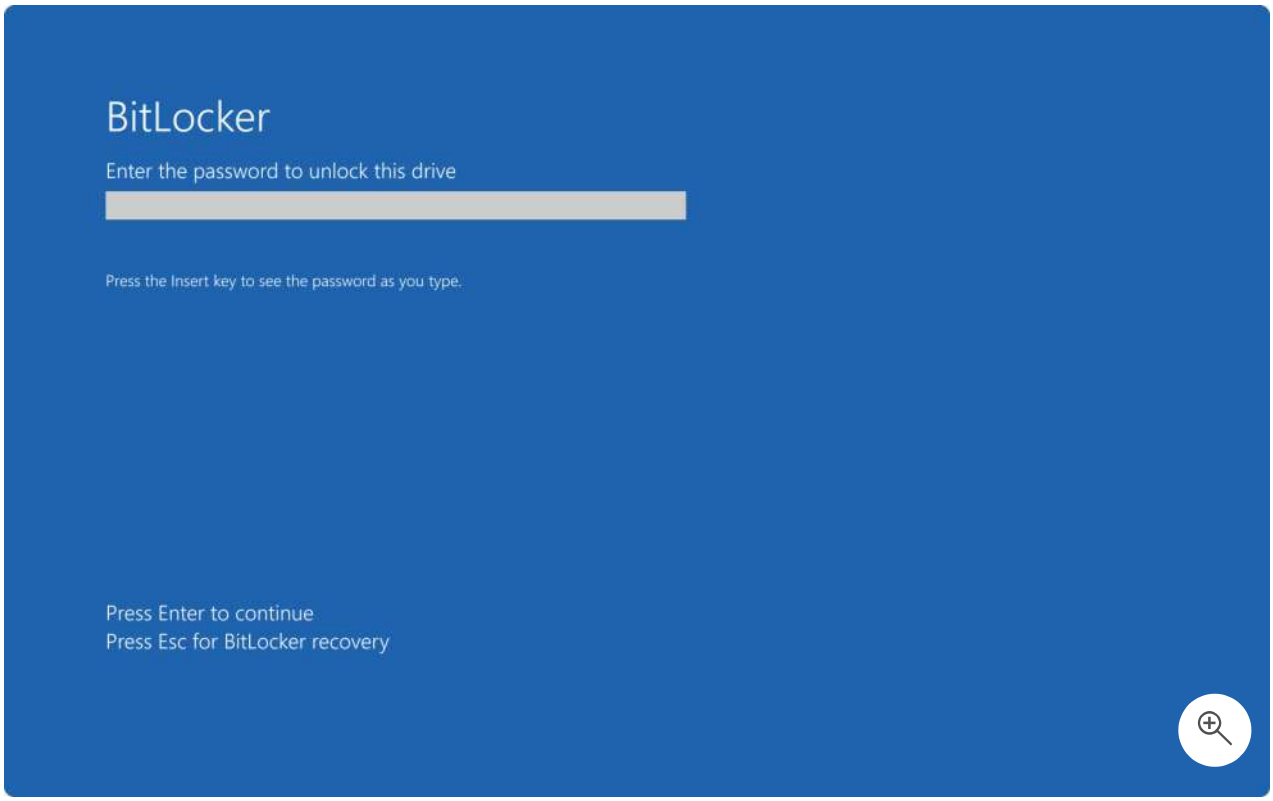
Tela de pré-inicialização do BitLocker com a chave de inicialização:

Tela de pré-inicialização do BitLocker com PIN:

Tela de pré-inicialização do BitLocker com senha:







Requisitos de sistema

O BitLocker tem os seguintes requisitos:

- Para que o BitLocker use a integridade do sistema marcar fornecida por um TPM, o dispositivo deve ter versões TPM 1.2 ou posteriores. Se um dispositivo não tiver um TPM, salvar uma chave de inicialização em uma unidade removível será obrigatório ao habilitar o BitLocker
- Um dispositivo com um TPM também deve ter um firmware BIOS ou UEFI compatível com o Grupo de *Computação Confiável* (TCG). O firmware BIOS ou UEFI estabelece uma cadeia de confiança para a inicialização de pré-inicialização e deve incluir suporte para *a Medida de Confiança estática especificada pelo TCG*. Um computador sem um TPM não requer firmware compatível com TCG
- O firmware BIOS ou UEFI do sistema (para dispositivos TPM e não TPM) deve dar suporte à classe de dispositivo de armazenamento em massa USB e ler arquivos em uma unidade USB no ambiente de pré-inicialização

> **Observação**
>
> O TPM 2.0 não tem suporte nos modos *CSM (Legacy and Compatibility Support Module)* do BIOS. Os dispositivos com TPM 2.0 devem ter o modo BIOS configurado apenas como UEFI nativo. As opções Herdada e CSM devem ser desabilitadas. Para obter mais segurança, habilite o recurso *de inicialização segura* .

O sistema operacional instalado no hardware no modo Herdado impede que o sistema operacional inicialize quando o modo BIOS é alterado para UEFI. Use a ferramenta mbr2gpt.exe antes de alterar o modo BIOS, que prepara o sistema operacional e o disco para dar suporte à UEFI.

- O disco rígido deve ser particionado com pelo menos duas unidades:
  - A *unidade do sistema operacional* (ou unidade de inicialização) contém o sistema operacional e seus arquivos de suporte. Ele deve ser formatado com o sistema de arquivos NTFS
  - A *unidade do sistema* contém arquivos necessários para inicializar, descriptografar e carregar o sistema operacional. O BitLocker não está habilitado nesta unidade. Para que o BitLocker funcione, a unidade do sistema:
    - não deve ser criptografado
    - deve ser diferente da unidade do sistema operacional
    - deve ser formatado com o sistema de arquivos FAT32 em computadores que usam firmware baseado em UEFI ou com o sistema de arquivos NTFS em computadores que usam firmware BIOS
    - É recomendável que seja de aproximadamente 350 MB de tamanho. Depois que o BitLocker estiver ativado, ele deverá ter aproximadamente 250 MB de espaço livre

    Importante

    Quando instalado em um novo dispositivo, o Windows cria automaticamente as partições necessárias para o BitLocker.

    Se a unidade foi preparada como um único espaço contíguo, o BitLocker exigirá um novo volume para manter os arquivos de inicialização. `BdeHdCfg.exe` pode criar o volume. Para obter mais informações sobre como usar a ferramenta, consulte Bdehdcfg na Referência de Command-Line.

Observação

Ao instalar o componente opcional BitLocker em um servidor, o recurso *de Armazenamento Aprimorado* deve ser instalado. O recurso é usado para dar suporte a unidades criptografadas por hardware.

Edição do Windows e requisitos de licenciamento

A tabela a seguir lista as edições do Windows que dão suporte à habilitação do BitLocker:

Expandir a tabela

Windows Pro	Windows Enterprise	Windows Pro Education/SE	Windows Education
Sim	Sim	Sim	Sim

Os direitos de licença de habilitação do BitLocker são concedidos pelas seguintes licenças:

Expandir a tabela

Windows Pro/Pro Education/SE	Windows Enterprise E3	Windows Enterprise E5	Windows Education A3	Windows Education A5
Sim	Sim	Sim	Sim	Sim

Para obter mais informações sobre o licenciamento do Windows, consulte Visão geral do licenciamento do Windows.

> **Observação**
>
> Os requisitos de licenciamento para habilitação do BitLocker são diferentes dos requisitos de licenciamento para o *gerenciamento* do BitLocker. Para saber mais, examine o guia de instruções: **configurar o BitLocker**.

Criptografia do dispositivo

A criptografia do dispositivo é um recurso do Windows que fornece uma maneira simples para alguns dispositivos habilitar a criptografia BitLocker automaticamente. A criptografia de dispositivo está disponível em todas as versões do Windows e requer que um dispositivo atenda aos requisitos de segurança de Espera Moderna ou HSTI. A criptografia de dispositivo não pode ter portas acessíveis externamente que permitem o acesso ao DMA.

> **Importante**
>
> A criptografia do dispositivo criptografa apenas a unidade do sistema operacional e as unidades fixas, ela não criptografa unidades externas/USB.

Ao contrário de uma implementação padrão do BitLocker, a criptografia de dispositivo é habilitada automaticamente para que o dispositivo sempre esteja protegido. Quando uma instalação limpo do Windows é concluída e a experiência fora de caixa é concluída, o dispositivo é preparado para o primeiro uso. Como parte dessa preparação, a criptografia do dispositivo é inicializada na unidade do sistema operacional e unidades de dados fixas no computador com uma chave clara que é equivalente ao estado suspenso padrão do BitLocker. Nesse estado, a unidade é mostrada com um ícone de aviso no Windows Explorer. O ícone de aviso amarelo é removido depois que o protetor TPM é criado e a chave de recuperação é apoiada.

- Se o dispositivo estiver Microsoft Entra ingressado ou o domínio do Active Directory for ingressado, a chave clara será removida depois que a chave de recuperação fizer backup com êxito em Microsoft Entra ID ou Active Directory Domain Services (AD DS). As seguintes configurações de política devem ser habilitadas para que a chave de recuperação seja apoiada: escolha como as unidades do sistema operacional protegidas pelo BitLocker podem ser recuperadas
  - Para Microsoft Entra dispositivos ingressados: a senha de recuperação é criada automaticamente quando o usuário se autentica para Microsoft Entra ID, em seguida, a chave de recuperação é apoiada para Microsoft Entra ID, o protetor TPM é criado e a chave clara é removida
  - Para dispositivos ingressados no AD DS: a senha de recuperação é criada automaticamente quando o computador entra no domínio. A chave de recuperação é então apoiada no AD DS, o protetor TPM é criado e a chave clara é removida
- Se o dispositivo não estiver Microsoft Entra ingressado ou o domínio do Active Directory ingressado, será necessária uma conta microsoft com privilégios administrativos no dispositivo. Quando o administrador usa uma conta da Microsoft para entrar, a chave limpa é removida, uma chave de recuperação é carregada para a conta da Microsoft online e um protetor TPM é criado. Se um dispositivo exigir a chave de recuperação, o usuário será guiado a usar um dispositivo alternativo e navegar até uma URL de acesso de chave de recuperação para recuperar a chave de recuperação usando suas credenciais de conta Microsoft
- Se um dispositivo usa apenas contas locais, ele permanecerá desprotegido, mesmo que os dados sejam criptografados

> **ⓘ Importante**
>
> A criptografia do dispositivo usa o `XTS-AES 128-bit` método de criptografia, por padrão. Caso configure uma configuração de política para usar um método de criptografia diferente, você pode usar a Página de Status de Registro para evitar que o dispositivo inicie a criptografia com o método padrão. O BitLocker tem uma lógica que não começa a criptografar até o final do OOBE, depois que a fase de configuração do dispositivo da Página de Status de Registro for concluída. Essa lógica dá a um dispositivo tempo suficiente para receber as configurações de política do BitLocker antes de iniciar a criptografia.
>
> Se um método de criptografia diferente e/ou força de codificação for necessário, mas o dispositivo já estiver criptografado, ele deverá primeiro ser descriptografado antes que o novo método de criptografia e/ou a força da criptografia possam ser aplicados. Depois que o dispositivo for descriptografado, você poderá aplicar diferentes configurações do BitLocker.

Se um dispositivo não se qualificar inicialmente para criptografia de dispositivo, mas uma alteração for feita que faça com que o dispositivo se qualifique (por exemplo, ativando *a Inicialização Segura*), a criptografia do dispositivo habilita o BitLocker automaticamente assim que ele o detecta.

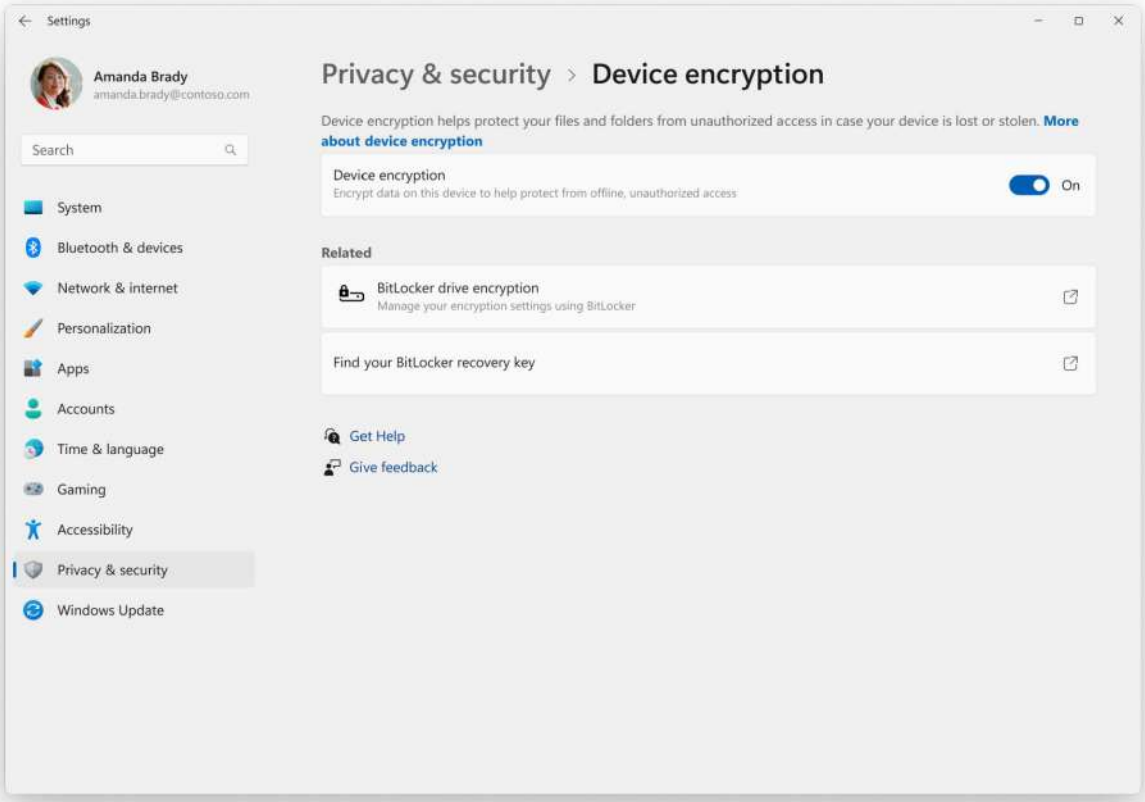
Você pode marcar se um dispositivo atende aos requisitos de criptografia de dispositivo no aplicativo Informações do Sistema (`msinfo32.exe`). Se o dispositivo atender aos requisitos, as Informações do Sistema mostrarão uma linha que diz:

Expandir a tabela

Item	Valor
Suporte à criptografia de dispositivo	Atende aos pré-requisitos

Diferença entre o BitLocker e a criptografia do dispositivo

- A criptografia do dispositivo ativa o BitLocker automaticamente em dispositivos qualificados para criptografia de dispositivo, com a chave de recuperação automaticamente em backup até Microsoft Entra ID, AD DS ou a conta Microsoft do usuário
- A criptografia do dispositivo adiciona uma configuração de criptografia de dispositivo no aplicativo Configurações, que pode ser usada para ativar ou desativar a criptografia do dispositivo
  - A interface do usuário de configurações não mostra a criptografia do dispositivo habilitada até que a criptografia seja concluída



> **Observação**

Se a criptografia do dispositivo estiver desativada, ela não se habilitará automaticamente no futuro. O usuário deve habilitá-lo manualmente em Configurações

Desabilitar a criptografia do dispositivo

É recomendável manter a criptografia do dispositivo ativada para todos os sistemas que o dão suporte. No entanto, você pode impedir o processo de criptografia automática do dispositivo alterando a seguinte configuração de registro:

Expandir a tabela

Caminho	Nome	Tipo	Valor
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\BitLocker	PreventDeviceEncryption	REG_DWORD	0x1

Para obter mais informações sobre criptografia de dispositivo, consulte Requisitos de hardware de criptografia de dispositivo BitLocker.

Próximas etapas

Saiba mais sobre tecnologias e recursos para proteger contra ataques na chave de criptografia BitLocker:

Contramedidas do BitLocker >

Comentários

Esta página foi útil? Yes No

Fornecer comentários sobre o produto

Security policy settings

Artigo • 19/04/2017

Applies to

- Windows 10
- Windows 11

This reference topic describes the common scenarios, architecture, and processes for security settings.

Security policy settings are rules that administrators configure on a computer or multiple devices for protecting resources on a device or network. The Security Settings extension of the Local Group Policy Editor snap-in allows you to define security configurations as part of a Group Policy Object (GPO). The GPOs are linked to Active Directory containers such as sites, domains, or organizational units, and they enable you to manage security settings for multiple devices from any device joined to the domain. Security settings policies are used as part of your overall security implementation to help secure domain controllers, servers, clients, and other resources in your organization.

Security settings can control:

- User authentication to a network or device.
- The resources that users are permitted to access.
- Whether to record a user's or group's actions in the event log.
- Membership in a group.

To manage security configurations for multiple devices, you can use one of the following options:

- Edit specific security settings in a GPO.
- Use the Security Templates snap-in to create a security template that contains the security policies you want to apply, and then import the security template into a Group Policy Object. A security template is a file that represents a security configuration, and it can be imported to a GPO, applied to a local device, or used to analyze security.

For more info about managing security configurations, see Administer security policy settings.

The Security Settings extension of the Local Group Policy Editor includes the following types of security policies:

- **Account Policies.** These policies are defined on devices; they affect how user accounts can interact with the computer or domain. Account policies include the following types of policies:
  - **Password Policy.** These policies determine settings for passwords, such as enforcement and lifetimes. Password policies are used for domain accounts.
  - **Account Lockout Policy.** These policies determine the conditions and length of time that an account will be locked out of the system. Account lockout policies are used for domain or local user accounts.
  - **Kerberos Policy.** These policies are used for domain user accounts; they determine Kerberos-related settings, such as ticket lifetimes and enforcement.

- **Local Policies.** These policies apply to a computer and include the following types of policy settings:

  - **Audit Policy.** Specify security settings that control the logging of security events into the Security log on the computer, and specifies what types of security events to log (success, failure, or both).

    > ⓘ **Observação**
    >
    > For devices running Windows 7 and later, we recommend to use the settings under Advanced Audit Policy Configuration rather than the Audit Policy settings under Local Policies.

  - **User Rights Assignment.** Specify the users or groups that have sign-in rights or privileges on a device

  - **Security Options.** Specify security settings for the computer, such as Administrator and Guest Account names; access to floppy disk drives and CD-ROM drives; installation of drivers; sign-in prompts; and so on.

- **Windows Firewall with Advanced Security.** Specify settings to protect the device on your network by using a stateful firewall that allows you to determine which network traffic is permitted to pass between your device and the network.

- **Network List Manager Policies.** Specify settings that you can use to configure different aspects of how networks are listed and displayed on one device or on many devices.

- **Public Key Policies.** Specify settings to control Encrypting File System, Data Protection, and BitLocker Drive Encryption in addition to certain certificate paths and services settings.

- **Software Restriction Policies.** Specify settings to identify software and to control its ability to run on your local device, organizational unit, domain, or site.
- **Application Control Policies.** Specify settings to control which users or groups can run particular applications in your organization based on unique identities of files.
- **IP Security Policies on Local Computer.** Specify settings to ensure private, secure communications over IP networks by using cryptographic security services. IPsec establishes trust and security from a source IP address to a destination IP address.
- **Advanced Audit Policy Configuration.** Specify settings that control the logging of security events into the security log on the device. The settings under Advanced Audit Policy Configuration provide finer control over which activities to monitor as opposed to the Audit Policy settings under Local Policies.

Windows edition and licensing requirements

The following table lists the Windows editions that support Windows security policy settings and auditing:

Expandir a tabela

Windows Pro	Windows Enterprise	Windows Pro Education/SE	Windows Education
Yes	Yes	Yes	Yes

Windows security policy settings and auditing license entitlements are granted by the following licenses:

Expandir a tabela

Windows Pro/Pro Education/SE	Windows Enterprise E3	Windows Enterprise E5	Windows Education A3	Windows Education A5
Yes	Yes	Yes	Yes	Yes

For more information about Windows licensing, see Windows licensing overview.

Policy-based security settings management

The Security Settings extension to Group Policy provides an integrated policy-based management infrastructure to help you manage and enforce your security policies.

You can define and apply security settings policies to users, groups, and network servers and clients through Group Policy and Active Directory Domain Services (AD DS). A group of servers with the same functionality can be created (for example, a Microsoft Web (IIS) server), and then Group Policy Objects can be used to apply common security settings to the group. If more servers are added to this group later, many of the common security settings are automatically applied, reducing deployment and administrative labor.

Common scenarios for using security settings policies

Security settings policies are used to manage the following aspects of security: accounts policy, local policy, user rights assignment, registry values, file and registry Access Control Lists (ACLs), service startup modes, and more.

As part of your security strategy, you can create GPOs with security settings policies configured specifically for the various roles in your organization, such as domain controllers, file servers, member servers, clients, and so on.

You can create an organizational unit (OU) structure that groups devices according to their roles. Using OUs is the best method for separating specific security requirements for the different roles in your network. This approach also allows you to apply customized security templates to each class of server or computer. After creating the security templates, you create a new GPO for each of the OUs, and then import the security template (.inf file) into the new GPO.

Importing a security template to a GPO ensures that any accounts to which the GPO is applied automatically receive the template's security settings when the Group Policy settings are refreshed. On a workstation or server, the security settings are refreshed at regular intervals (with a random offset of at most 30 minutes), and, on a domain controller, this process occurs every few minutes if changes have occurred in any of the GPO settings that apply. The settings are also refreshed every 16 hours, whether or not any changes have occurred.

> ⓘ **Observação**
>
> These refresh settings vary between versions of the operating system and can be configured.

By using Group Policy–based security configurations in conjunction with the delegation of administration, you can ensure that specific security settings, rights, and behavior are

applied to all servers and computers within an OU. This approach makes it simple to update many servers with any other changes required in the future.

Dependencies on other operating system technologies

For devices that are members of a Windows Server 2008 or later domain, security settings policies depend on the following technologies:

- **Active Directory Domain Services (AD DS)**

  The Windows-based directory service, AD DS, stores information about objects on a network and makes this information available to administrators and users. By using AD DS, you can view and manage network objects on the network from a single location, and users can access permitted network resources by using a single sign in.

- **Group Policy**

  The infrastructure within AD DS that enables directory-based configuration management of user and computer settings on devices running Windows Server. By using Group Policy, you can define configurations for groups of users and computers, including policy settings, registry-based policies, software installation, scripts, folder redirection, Remote Installation Services, Internet Explorer maintenance, and security.

- **Domain Name System (DNS)**

  A hierarchical naming system used for locating domain names on the Internet and on private TCP/IP networks. DNS provides a service for mapping DNS domain names to IP addresses, and IP addresses to domain names. This service allows users, computers, and applications to query DNS to specify remote systems by fully qualified domain names rather than by IP addresses.

- **Winlogon**

  A part of the Windows operating system that provides interactive logon support. Winlogon is designed around an interactive logon model that consists of three components: the Winlogon executable, a credential provider, and any number of network providers.

- **Setup**

  Security configuration interacts with the operating system setup process during a clean installation or upgrade from earlier versions of Windows Server.

- **Security Accounts Manager (SAM)**

  A Windows service used during the sign-in process. SAM maintains user account information, including groups to which a user belongs.

- **Local Security Authority (LSA)**

  A protected subsystem that authenticates and signs in users to the local system. LSA also maintains information about all aspects of local security on a system, collectively known as the Local Security Policy of the system.

- **Windows Management Instrumentation (WMI)**

  A feature of the Microsoft Windows operating system, WMI is the Microsoft implementation of Web-Based Enterprise Management (WBEM), which is an industry initiative to develop a standard technology for accessing management information in an enterprise environment. WMI provides access to information about objects in a managed environment. Through WMI and the WMI application programming interface (API), applications can query for and make changes to static information in the Common Information Model (CIM) repository and dynamic information maintained by the various types of providers.

- **Resultant Set of Policy (RSoP)**

  An enhanced Group Policy infrastructure that uses WMI in order to make it easier to plan and debug policy settings. RSoP provides public methods that expose what an extension to Group Policy would do in a what-if situation, and what the extension has done in an actual situation. These public methods allow administrators to easily determine the combination of policy settings that apply to, or will apply to, a user or device.

- **Service Control Manager (SCM)**

  Used for configuration of service startup modes and security.

- **Registry**

  Used for configuration of registry values and security.

- **File system**

  Used for configuration of security.

- **File system conversions**

  Security is set when an administrator converts a file system from FAT to NTFS.

- **Microsoft Management Console (MMC)**

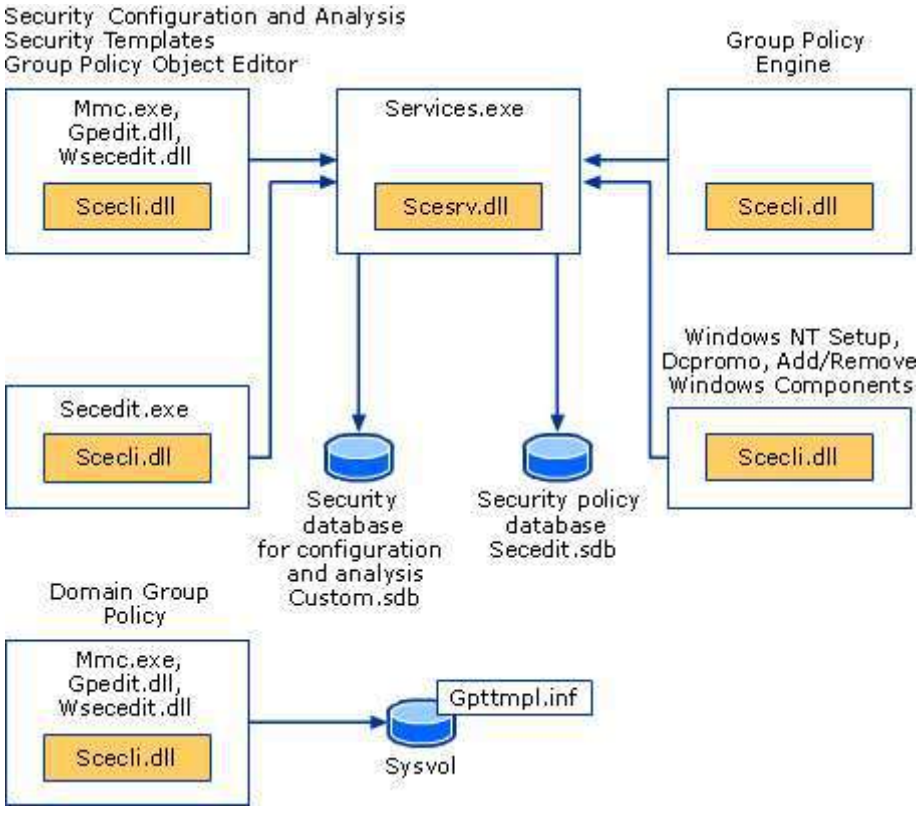
  The user interface for the Security Settings tool is an extension of the Local Group Policy Editor MMC snap-in.

Security settings policies and Group Policy

The Security Settings extension of the Local Group Policy Editor is part of the Security Configuration Manager tool set. The following components are associated with Security Settings: a configuration engine; an analysis engine; a template and database interface layer; setup integration logic; and the secedit.exe command-line tool. The security configuration engine is responsible for handling security configuration editor-related security requests for the system on which it runs. The analysis engine analyzes system security for a given configuration and saves the result. The template and database interface layer handles reading and writing requests from and to the template or database (for internal storage). The Security Settings extension of the Local Group Policy Editor handles Group Policy from a domain-based or local device. The security configuration logic integrates with setup and manages system security for a clean installation or upgrade to a more recent Windows operating system. Security information is stored in templates (.inf files) or in the Secedit.sdb database.

The following diagram shows Security Settings and related features.

Security Settings Policies and Related Features



- **Scesrv.dll**

  Provides the core security engine functionality.

- **Scecli.dll**

  Provides the client-side interfaces to the security configuration engine and provides data to Resultant Set of Policy (RSoP).

- **Wsecedit.dll**

  The Security Settings extension of Local Group Policy Editor. scecli.dll is loaded into wsecedit.dll to support the Security Settings user interface.

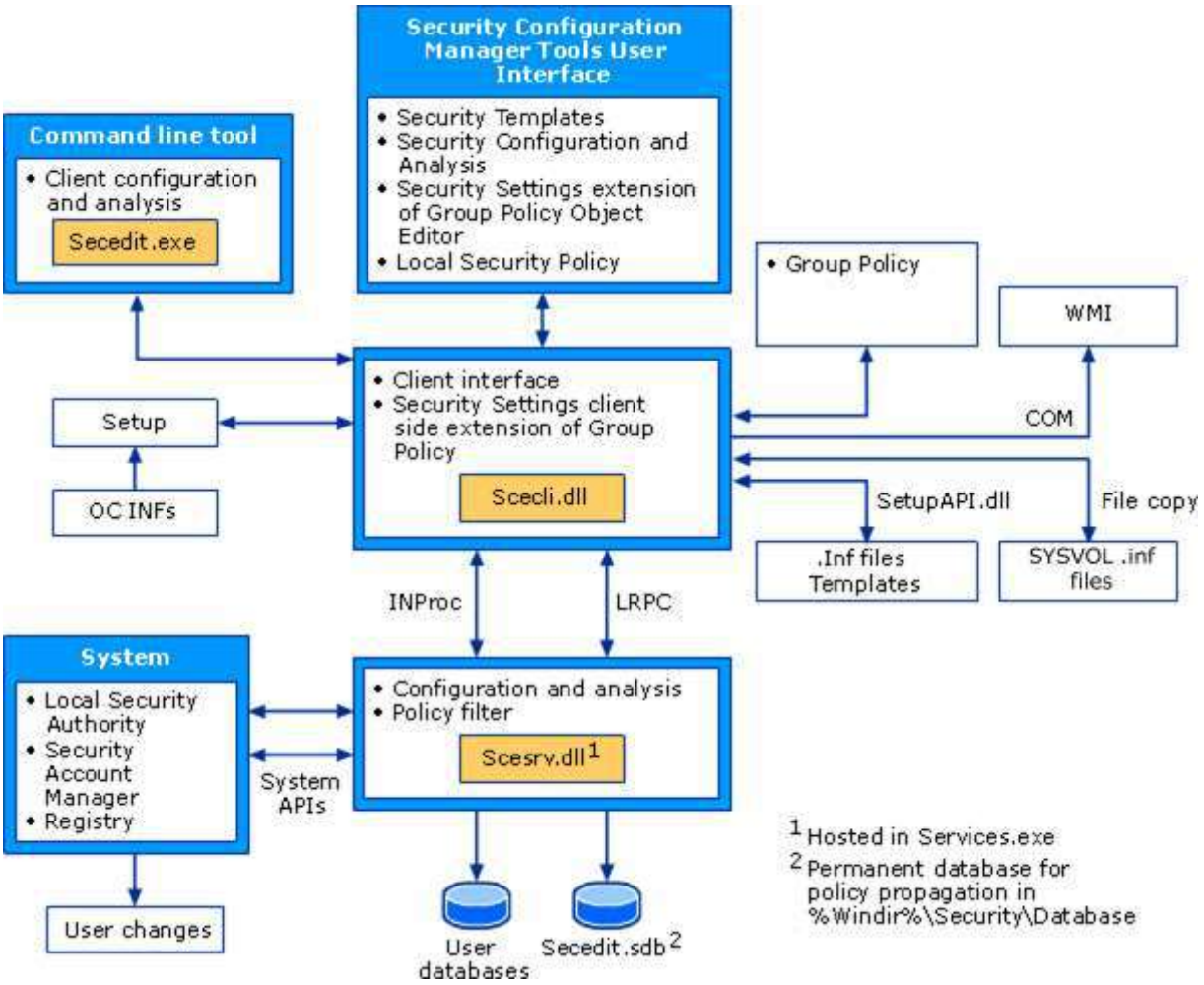
- **Gpedit.dll**

  The Local Group Policy Editor MMC snap-in.

Security Settings extension architecture

The Security Settings extension of the Local Group Policy Editor is part of the Security Configuration Manager tools, as shown in the following diagram.

Security Settings Architecture



The security settings configuration and analysis tools include a security configuration engine, which provides local computer (non-domain member) and Group Policy–based configuration and analysis of security settings policies. The security configuration engine also supports the creation of security policy files. The primary features of the security configuration engine are scecli.dll and scesrv.dll.

The following list describes these primary features of the security configuration engine and other Security Settings–related features.

- **scesrv.dll**

  This .dll file is hosted in services.exe and runs under local system context. scesrv.dll provides core Security Configuration Manager functionality, such as import, configure, analyze, and policy propagation.

  Scesrv.dll performs configuration and analysis of various security-related system parameters by calling corresponding system APIs, including LSA, SAM, and the registry.

  Scesrv.dll exposes APIs such as import, export, configure, and analyze. It checks that the request is made over LRPC (Windows XP) and fails the call if it isn't.

Communication between parts of the Security Settings extension occurs by using the following methods:

- Component Object Model (COM) calls
- Local Remote Procedure Call (LRPC)
- Lightweight Directory Access Protocol (LDAP)
- Active Directory Service Interfaces (ADSI)
- Server Message Block (SMB)
- Win32 APIs
- Windows Management Instrumentation (WMI) calls

On domain controllers, scesrv.dll receives notifications of changes made to SAM and the LSA that need to be synchronized across domain controllers. Scesrv.dll incorporates those changes into the Default Domain Controller Policy GPO by using in-process scecli.dll template modification APIs. Scesrv.dll also performs configuration and analysis operations.

- **Scecli.dll**

  This Scecli.dll is the client-side interface or wrapper to scesrv.dll. scecli.dll is loaded into Wsecedit.dll to support MMC snap-ins. It's used by Setup to configure default system security and security of files, registry keys, and services installed by the Setup API .inf files.

  The command-line version of the security configuration and analysis user interfaces, secedit.exe, uses scecli.dll.

  Scecli.dll implements the client-side extension for Group Policy.

  Scesrv.dll uses scecli.dll to download applicable Group Policy files from SYSVOL in order to apply Group Policy security settings to the local device.

  Scecli.dll logs application of security policy into WMI (RSoP).

  Scesrv.dll policy filter uses scecli.dll to update Default Domain Controller Policy GPO when changes are made to SAM and LSA.

- **Wsecedit.dll**

  The Security Settings extension of the Group Policy Object Editor snap-in. You use this tool to configure security settings in a Group Policy Object for a site, domain, or organizational unit. You can also use Security Settings to import security templates to a GPO.

- **Secedit.sdb**

This Secedit.sdb is a permanent system database used for policy propagation including a table of persistent settings for rollback purposes.

- **User databases**

  A user database is any database other than the system database created by administrators for the purposes of configuration or analysis of security.

- **.Inf Templates**

  These templates are text files that contain declarative security settings. They're loaded into a database before configuration or analysis. Group Policy security policies are stored in .inf files on the SYSVOL folder of domain controllers, where they're downloaded (by using file copy) and merged into the system database during policy propagation.

Security settings policy processes and interactions

For a domain-joined device, where Group Policy is administered, security settings are processed in conjunction with Group Policy. Not all settings are configurable.

Group Policy processing

When a computer starts and a user signs in, computer policy and user policy are applied according to the following sequence:

1. The network starts. Remote Procedure Call System Service (RPCSS) and Multiple Universal Naming Convention Provider (MUP) start.

2. An ordered list of Group Policy Objects is obtained for the device. The list might depend on these factors:

   - Whether the device is part of a domain and, therefore, subject to Group Policy through Active Directory.
   - The location of the device in Active Directory.
   - Whether the list of Group Policy Objects has changed. If the list of Group Policy Objects hasn't changed, no processing is done.

3. Computer policy is applied. These settings are the ones under Computer Configuration from the gathered list. This process is a synchronous one by default and occurs in the following order: local, site, domain, organizational unit, child

organizational unit, and so on. No user interface appears while computer policies are processed.

4. Startup scripts run. These scripts are hidden and synchronous by default; each script must complete or time out before the next one starts. The default time-out is 600 seconds. You can use several policy settings to modify this behavior.

5. The user presses CTRL+ALT+DEL to sign in.

6. After the user is validated, the user profile loads; it's governed by the policy settings that are in effect.

7. An ordered list of Group Policy Objects is obtained for the user. The list might depend on these factors:

    - Whether the user is part of a domain and, therefore, subject to Group Policy through Active Directory.
    - Whether loopback policy processing is enabled, and if so, the state (Merge or Replace) of the loopback policy setting.
    - The location of the user in Active Directory.
    - Whether the list of Group Policy Objects has changed. If the list of Group Policy Objects hasn't changed, no processing is done.

8. User policy is applied. These settings are the ones under User Configuration from the gathered list. These settings are synchronous by default and in the following order: local, site, domain, organizational unit, child organizational unit, and so on. No user interface appears while user policies are processed.

9. Logon scripts run. Group Policy–based logon scripts are hidden and asynchronous by default. The user object script runs last.

10. The operating system user interface that is prescribed by Group Policy appears.

Group Policy Objects storage

A Group Policy Object (GPO) is a virtual object that is identified by a Globally Unique Identifier (GUID) and stored at the domain level. The policy setting information of a GPO is stored in the following two locations:

- **Group Policy containers in Active Directory.**

  The Group Policy container is an Active Directory container that contains GPO properties, such as version information, GPO status, plus a list of other component settings.

- **Group Policy templates in a domain's system volume folder (SYSVOL).**

  The Group Policy template is a file system folder that includes policy data specified by .admx files, security settings, script files, and information about applications that are available for installation. The Group Policy template is located in the SYSVOL folder in the <domain>\Policies subfolder.

The **GROUP_POLICY_OBJECT** structure provides information about a GPO in a GPO list, including the version number of the GPO, a pointer to a string that indicates the Active Directory portion of the GPO, and a pointer to a string that specifies the path to the file system portion of the GPO.

Group Policy processing order

Group Policy settings are processed in the following order:

1. **Local Group Policy Object.**

   Each device running a Windows operating system beginning with Windows XP has exactly one Group Policy Object that is stored locally.

2. **Site.**

   Any Group Policy Objects that have been linked to the site are processed next. Processing is synchronous and in an order that you specify.

3. **Domain.**

   Processing of multiple domain-linked Group Policy Objects is synchronous and in an order you specify.

4. **Organizational units.**

   Group Policy Objects that are linked to the organizational unit that is highest in the Active Directory hierarchy are processed first, then Group Policy Objects that are linked to its child organizational unit, and so on. Finally, the Group Policy Objects that are linked to the organizational unit that contains the user or device are processed.

At the level of each organizational unit in the Active Directory hierarchy, one, many, or no Group Policy Objects can be linked. If several Group Policy Objects are linked to an organizational unit, their processing is synchronous and in an order that you specify.

This order means that the local Group Policy Object is processed first, and Group Policy Objects that are linked to the organizational unit of which the computer or user is a

direct member are processed last, which overwrites the earlier Group Policy Objects.

This order is the default processing order and administrators can specify exceptions to this order. A Group Policy Object that is linked to a site, domain, or organizational unit (not a local Group Policy Object) can be set to **Enforced** with respect to that site, domain, or organizational unit, so that none of its policy settings can be overridden. At any site, domain, or organizational unit, you can mark Group Policy inheritance selectively as **Block Inheritance**. Group Policy Object links that are set to **Enforced** are always applied, however, and they can't be blocked. For more information, see Group Policy Basics – Part 2: Understanding Which GPOs to Apply.

Security settings policy processing

In the context of Group Policy processing, security settings policy is processed in the following order.

1. During Group Policy processing, the Group Policy engine determines which security settings policies to apply.

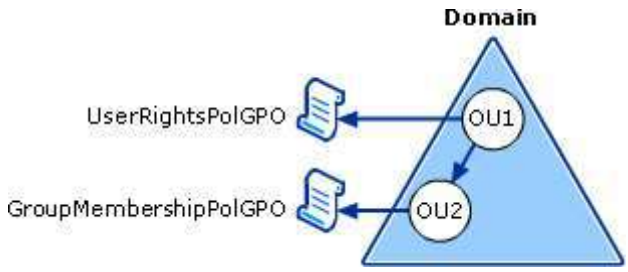
2. If security settings policies exist in a GPO, Group Policy invokes the Security Settings client-side extension.

3. The Security Settings extension downloads the policy from the appropriate location such as a specific domain controller.

4. The Security Settings extension merges all security settings policies according to precedence rules. The processing is according to the Group Policy processing order of local, site, domain, and organizational unit (OU), as described earlier in the "Group Policy processing order" section. If multiple GPOs are in effect for a given device and there are no conflicting policies, then the policies are cumulative and are merged.

   This example uses the Active Directory structure shown in the following figure. A given computer is a member of OU2, to which the **GroupMembershipPolGPO** GPO is linked. This computer is also subject to the **UserRightsPolGPO** GPO, which is linked to OU1, higher in the hierarchy. In this case, no conflicting policies exist so the device receives all of the policies contained in both the **UserRightsPolGPO** and the **GroupMembershipPolGPO** GPOs.

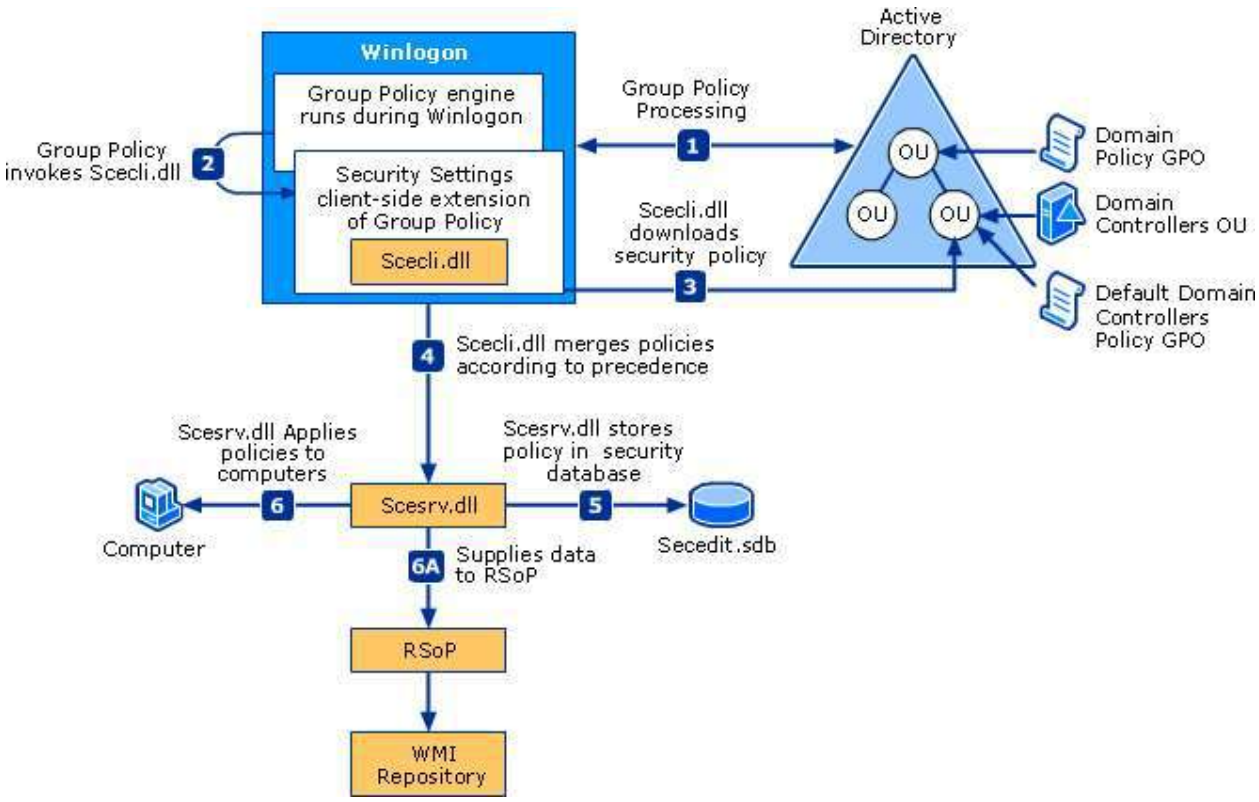
   Multiple GPOs and Merging of Security Policy



5. The resultant security policies are stored in secedit.sdb, the security settings database. The security engine gets the security template files and imports them to secedit.sdb.

6. The security settings policies are applied to devices. The following figure illustrates the security settings policy processing.

Security Settings Policy Processing



Merging of security policies on domain controllers

Password policies, Kerberos, and some security options are only merged from GPOs that are linked at the root level on the domain. This merging is done to keep those settings synchronized across all domain controllers in the domain. The following security options are merged:

- Network Security: Force sign out when sign-in hours expire
- Accounts: Administrator account status
- Accounts: Guest account status

- Accounts: Rename administrator account
- Accounts: Rename guest account

Another mechanism exists that allows security policy changes made by administrators by using net accounts to be merged into the Default Domain Policy GPO. User rights changes that are made by using Local Security Authority (LSA) APIs are filtered into the Default Domain Controllers Policy GPO.

Special considerations for domain controllers

If an application is installed on a primary domain controller (PDC) with operations master role (also known as flexible single master operations or FSMO) and the application makes changes to user rights or password policy, these changes must be communicated to ensure that synchronization across domain controllers occurs. Scesrv.dll receives a notification of any changes made to the security account manager (SAM) and LSA that need to be synchronized across domain controllers and then incorporates the changes into the Default Domain Controller Policy GPO by using scecli.dll template modification APIs.

When security settings are applied

After you've edited the security settings policies, the settings are refreshed on the computers in the organizational unit linked to your Group Policy Object in the following instances:

- When a device is restarted.
- Every 90 minutes on a workstation or server and every 5 minutes on a domain controller. This refresh interval is configurable.
- By default, Security policy settings delivered by Group Policy are also applied every 16 hours (960 minutes) even if a GPO hasn't changed.

Persistence of security settings policy

Security settings can persist even if a setting is no longer defined in the policy that originally applied it.

Security settings might persist in the following cases:

- The setting hasn't been previously defined for the device.
- The setting is for a registry security object.
- The settings are for a file system security object.

All settings applied through local policy or through a Group Policy Object are stored in a local database on your computer. Whenever a security setting is modified, the computer saves the security setting value to the local database, which retains a history of all the settings that have been applied to the computer. If a policy first defines a security setting and then no longer defines that setting, then the setting takes on the previous value in the database. If a previous value doesn't exist in the database, then the setting doesn't revert to anything and remains defined as is. This behavior is sometimes referred to as "tattooing".

Registry and file security settings will maintain the values applied through Group Policy until that setting is set to other values.

Permissions required for policy to apply

Both Apply Group Policy and Read permissions are required to have the settings from a Group Policy Object apply to users or groups, and computers.

Filtering security policy

By default, all GPOs have Read and Apply Group Policy both Allowed for the Authenticated Users group. The Authenticated Users group includes both users and computers. Security settings policies are computer-based. To specify which client computers will or won't have a Group Policy Object applied to them, you can deny them either the Apply Group Policy or Read permission on that Group Policy Object. Changing these permissions allows you to limit the scope of the GPO to a specific set of computers within a site, domain, or OU.

> ⓘ **Observação**
>
> Do not use security policy filtering on a domain controller as this would prevent security policy from applying to it.

Migration of GPOs containing security settings

In some situations, you might want to migrate GPOs from one domain environment to another environment. The two most common scenarios are test-to-production migration, and production-to-production migration. The GPO copying process has implications for some types of security settings.

Data for a single GPO is stored in multiple locations and in various formats; some data is contained in Active Directory and other data is stored on the SYSVOL share on the domain controllers. Certain policy data might be valid in one domain but might be invalid in the domain to which the GPO is being copied. For example, Security Identifiers (SIDs) stored in security policy settings are often domain-specific. So copying GPOs isn't as simple as taking a folder and copying it from one device to another.

The following security policies can contain security principals and might require some more work to successfully move them from one domain to another.

- User rights assignment
- Restricted groups
- Services
- File system
- Registry
- The GPO DACL, if you choose to preserve it during a copy operation

To ensure that data is copied correctly, you can use Group Policy Management Console (GPMC). When there's a migration of a GPO from one domain to another, GPMC ensures that all relevant data is properly copied. GPMC also offers migration tables, which can be used to update domain-specific data to new values as part of the migration process. GPMC hides much of the complexity involved in the migrating GPO operations, and it provides simple and reliable mechanisms for performing operations such as copy and backup of GPOs.

In this section

Expandir a tabela

Topic	Description
Administer security policy settings	This article discusses different methods to administer security policy settings on a local device or throughout a small- or medium-sized organization.
Configure security policy settings	Describes steps to configure a security policy setting on the local device, on a domain-joined device, and on a domain controller.
Security policy settings reference	This reference of security settings provides information about how to implement and manage security policies, including setting options and security considerations.

Visão geral do Cartão Inteligente Virtual

Artigo • 08/11/2023 •

Aplica-se a: ✅ Windows 11, ✅ Windows 10, ✅ Windows Server 2022, ✅ Windows Server 2019, ✅ Windows Server 2016

> ⚠ **Aviso**
>
> Windows Hello para Empresas e as chaves de segurança FIDO2 são métodos modernos de autenticação de dois fatores para Windows. Os clientes que usam cartões inteligentes virtuais são incentivados a migrar para Windows Hello para Empresas ou FIDO2. Para novas instalações do Windows, recomendamos Windows Hello para Empresas ou chaves de segurança FIDO2.

Este artigo fornece uma visão geral da tecnologia de cartão inteligente virtual.

Descrição do recurso

A tecnologia de cartão inteligente virtual oferece benefícios de segurança comparáveis aos cartões inteligentes físicos usando autenticação de dois fatores. Cartões inteligentes virtuais emulam a funcionalidade de cartões inteligentes físicos, mas usam o chip TPM (Trusted Platform Module) disponível em dispositivos. Cartões inteligentes virtuais não exigem o uso de um cartão físico inteligente e leitor separado. Você cria cartões inteligentes virtuais no TPM, onde as chaves usadas para autenticação são armazenadas em hardware protegido por criptografia.

Ao utilizar dispositivos TPM que fornecem os mesmos recursos criptográficos que os cartões inteligentes físicos, os cartões inteligentes virtuais realizam as três principais propriedades desejadas para cartões inteligentes: não exportabilidade, criptografia isolada e anti-martelada.

Aplicações práticas

Os cartões inteligentes virtuais são funcionalmente semelhantes aos cartões inteligentes físicos, aparecendo no Windows como cartões inteligentes que são sempre inseridos. Os cartões inteligentes virtuais podem ser usados para autenticação para recursos externos, proteção de dados por criptografia e integridade por meio da assinatura. Você pode implantar cartões inteligentes virtuais usando métodos internos ou uma solução comprada e eles podem ser um substituto para outros métodos de autenticação forte em uma configuração corporativa de qualquer escala.

Casos de uso de autenticação

Autenticação de dois fatores\acesso remoto de dois fatores\u2012based

Depois que um usuário tem uma cartão inteligente virtual TPM totalmente funcional, provisionada com um certificado de entrada, o certificado é usado para obter acesso autenticado aos recursos corporativos. Quando o certificado apropriado é provisionado para o cartão virtual, o usuário só precisa fornecer o PIN para o cartão inteligente virtual, como se fosse uma cartão inteligente física, para entrar no domínio.

Na prática, isso é tão fácil quanto inserir uma senha para acessar o sistema. Tecnicamente, é muito mais seguro. Usar a cartão inteligente virtual para acessar o sistema prova para o domínio que o usuário que está solicitando autenticação tem a posse do computador pessoal no qual o cartão foi provisionado e conhece o PIN de cartão inteligente virtual. Como essa solicitação não poderia ter se originado de um sistema diferente do sistema certificado pelo domínio para o acesso desse usuário, e o usuário não poderia ter iniciado a solicitação sem conhecer o PIN, uma autenticação forte de dois fatores é estabelecida.

Autenticação do cliente

Cartões inteligentes virtuais também podem ser usados para autenticação do cliente usando TLS/SSL ou uma tecnologia semelhante. Semelhante ao acesso ao domínio com um cartão inteligente virtual, um certificado de autenticação pode ser provisionado para o cartão inteligente virtual, fornecido a um serviço remoto, conforme solicitado no processo de autenticação do cliente. Isso adere aos princípios da autenticação de dois fatores porque o certificado só é acessível do computador que hospeda o cartão virtual inteligente e o usuário é obrigado a inserir o PIN para acesso inicial ao cartão.

Redirecionamento de cartão inteligente virtual para conexões de área de trabalho remota

O conceito de autenticação de dois fatores associado a cartões inteligentes virtuais depende da proximidade dos usuários com os dispositivos que eles usam para acessar o domínio. Quando você se conecta a um dispositivo que está hospedando cartões inteligentes virtuais, não é possível usar os cartões inteligentes virtuais localizados no dispositivo remoto durante a sessão remota. No entanto, você pode acessar os cartões inteligentes virtuais no dispositivo de conexão (que está sob seu controle físico), que são carregados no dispositivo remoto. Você pode usar os cartões inteligentes virtuais

como se fossem instalados usando o TPM dos dispositivos remotos, estendendo seus privilégios para o dispositivo remoto, mantendo os princípios da autenticação de dois fatores.

Casos de uso de confidencialidade

Criptografia de email S/MIME

Cartões inteligentes físicos são projetados para conter chaves privadas. Você pode usar as chaves privadas para criptografia de email e descriptografia. A mesma funcionalidade existe em cartões inteligentes virtuais. Usando s/MIME com a chave pública de um usuário para criptografar email, o remetente de um email tem certeza de que apenas a pessoa com a chave privada correspondente pode descriptografar o email. Essa garantia é resultado da não exportabilidade da chave privada. Ele nunca existe ao alcance de software mal-intencionado e permanece protegido pelo TPM , mesmo durante a descriptografia.

BitLocker para volumes de dados

A tecnologia de criptografia de unidade do BitLocker usa criptografia de chave simétrica para proteger o conteúdo do disco rígido de um usuário. O BitLocker garante que, se a propriedade física de um disco rígido estiver comprometida, um adversário não poderá ler dados da unidade. A chave usada para criptografar a unidade pode ser armazenada em uma cartão virtual inteligente, que requer conhecimento do PIN de cartão inteligente virtual para acessar a unidade e a posse do dispositivo que está hospedando o cartão inteligente virtual TPM. Se a unidade for obtida sem acesso ao TPM que hospeda o cartão inteligente virtual, qualquer ataque de força bruta será difícil.

Você pode usar o BitLocker para criptografar unidades portáteis, armazenando chaves em cartões inteligentes virtuais. Nesse cenário, ao contrário de usar o BitLocker com uma cartão inteligente física, a unidade criptografada só pode ser usada quando está conectada ao dispositivo para o cartão virtual inteligente que é usado para criptografar a unidade, pois a chave BitLocker só é acessível do dispositivo. Esse método pode ser útil para garantir que a segurança das unidades de backup e do armazenamento pessoal também seja usada fora do disco rígido main.

Caso de uso de integridade de dados

Assinar dados

Para verificar a autoria dos dados, um usuário pode assiná-los usando uma chave privada armazenada na cartão virtual inteligente. As assinaturas digitais confirmam a integridade e a origem dos dados.

- Armazenar a chave em um sistema operacional acessível, usuários mal-intencionados poderiam acessá-la e usá-la para modificar dados já assinados ou falsificar a identidade do proprietário da chave
- Armazenar a chave em um cartão virtual inteligente significa que você só pode usá-la para assinar dados no dispositivo host. Você não pode exportar a chave para outros sistemas (intencionalmente ou não, como com o roubo de malware), tornando as assinaturas digitais mais seguras do que outros métodos para armazenamento de chaves privadas

Requisitos de hardware

Para usar a tecnologia de cartão inteligente virtual, o TPM 1.2 é o mínimo necessário para dispositivos que executam um sistema operacional com suporte.

Comentários

Esta página foi útil? Yes No

Fornecer comentários sobre o produto

Mouse Lenovo

PN: MOUSE00

- Interface USB – Plug & Play
- Ambidestro
- Sensor Optico
- Resolução de 1600 dpi
- 3 Botões (Esquerdo, Direito e Central)
- Botão Central para rolar a tela para cima e para baixo
- Cor predominante Preto
- Cabo com tamanho mínimo de 1,8m
- Compatível com Windows e Linux

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Imagens meramente ilustrativas.

Teclado Lenovo

PN: TECLA00

*

- Interface USB mínimo 107 Teclas incluindo Ç
- Padrão ABNT II Plug and Play
- Teclas NumLock e CapsLock Independentes com LED indicativo
- Compatível com toda linha Lenovo
- Conexão USB cabo 1.8m.
- Ajuste de Inclinação até 3 níveis
- Teclas com Gravação Permanente
- Resistente a derramamento de liquidos
- Compatível com Windows e Linux

*Imagem meramente ilustrativa. O formato pode variar de acordo com o idioma a ser atendido.

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RETURN TO SEARCH

ThinkVision E24-40

Product Summary:

Product Type:	Monitors
Registered In:	United States
Manufacturer:	Lenovo
EPEAT Tier:	Gold
Registration Date:	2025-07-08
Product Status:	Active
Manufacturer Part Number(s):	64BA

COMPUTERS & DISPLAYS

All unique product identifiers existing for this product may not be listed here. If the unique product identifier you are looking for is not listed, please contact EPEAT at EPEAT@GEC.org.

EXPORT PRODUCT SUMMARY

EPEAT Tier Score Detail

For a product to be listed on the EPEAT Registry, it must, at a minimum, meet the applicable "required" criteria. Click here to see a list of the required criteria for this product category.

This product has met the necessary required criteria.

Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

Products that meet all required criteria and achieve **less than 50%** of the optional points are rated at **EPEAT Bronze**	Products that meet all required criteria and achieve **50 - 74%** of the optional points are rated at **EPEAT Silver**	Products that meet all required criteria and achieve **75 - 100%** of the optional points are rated at **EPEAT Gold**

The optional criteria for this product category and optional points achieved by this product are listed below.

Optional Criteria	Scores
4.1 Substance Management	13 / 16
4.2 Materials Selection	3 / 3
4.4 Product longevity/life-cycle extension	1 / 2
4.5 Energy Conservation	2 / 2
4.7 Packaging	1 / 2
4.8 Life cycle assessment and carbon footprint	6 / 6
4.9 Corporate Environmental Performance	9 / 9
4.10 Corporate social responsibility	2 / 6

TOTAL OPTIONAL CRITERIA SCORE: 37 / 46

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

For any questions, comments, or feedback regarding the EPEAT Registry, please contact us.

Contact Us

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RETURN TO SEARCH

ThinkCentre M75s Gen 5 (CTO EPEAT Gold Model)

COMPUTERS & DISPLAYS

Product Summary:

Product Type:	Desktop
Registered In:	United States
Manufacturer:	Lenovo
EPEAT Tier:	Gold
Registration Date:	2024-07-11
Product Status:	Active
EPEAT Climate+:	Achieved 2024-07-11
Exceptions:	180 Watt Power Supply

Manufacturer Part Number(s):	**12T9, 12TA, 13DY, 13EX**

All unique product identifiers existing for this product may not be listed here. If the unique product identifier you are looking for is not listed, please contact EPEAT at EPEAT@GEC.org.

EXPORT PRODUCT SUMMARY

EPEAT Tier Score Detail

For a product to be listed on the EPEAT Registry, it must, at a minimum, meet the applicable "required" criteria. Click here to see a list of the required criteria for this product category.

This product has met the necessary required criteria.

Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

Products that meet all required criteria and achieve **less than 50%** of the optional points are	Products that meet all required criteria and achieve **50 - 74%** of the optional points are	Products that meet all required criteria and achieve **75 - 100%** of the optional points are rated

rated at	rated at	at
EPEAT Bronze	**EPEAT Silver**	**EPEAT Gold**

The optional criteria for this product category and optional points achieved by this product are listed below.

Optional Criteria	Scores
4.1 Substance Management	**11 / 16**
4.2 Materials Selection	**2 / 3**
4.4 Product longevity/life-cycle extension	**2 / 2**
4.5 Energy Conservation	**2 / 4**
4.7 Packaging	**2 / 2**
4.8 Life cycle assessment and carbon footprint	**6 / 6**

4.9 Corporate Environmental Performance	**9 / 9**
4.10 Corporate social responsibility	**2 / 6**
TOTAL OPTIONAL CRITERIA SCORE:	**36 / 48**

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

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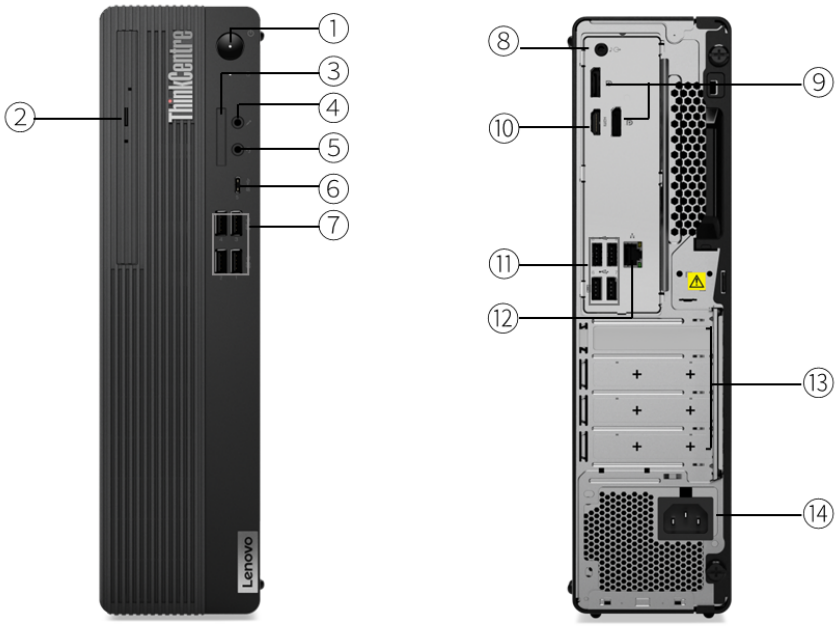
OVERVIEW



1. Power button	8. Line-out (3.5mm)
2. Optical drive *	9. 2x DisplayPort 1.4a (HBR2, DSC)
3. Card reader *	10. HDMI 2.1 TMDS
4. Microphone jack (3.5mm)	11. 4x USB-A (Hi-Speed USB)
5. Headphone / microphone combo jack (3.5mm)	12. Ethernet (RJ-45)
6. USB-C (USB 5Gbps), with 15W charging	13. Optional ports on expansion cards *
7. 4x USB-A (USB 5Gbps)	14. Power connector

Notes:

- Items with * are only available on selected models
- More ports are available through the optional expansion cards (not shown on the sample product above)

PERFORMANCE

Processor

Processor Family

AMD Ryzen™ 3 / 5 / 7 8000 or Ryzen™ 3 / 5 / 7 PRO 8000 Series Processor

Processor**

Processor Name	Cores	Threads	Base Frequency	Max Frequency	Cache	Processor Graphics	NPU
AMD Ryzen™ 3 8300G	4	8	3.4GHz	4.9GHz	4MB L2 / 8MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 3 PRO 8300G	4	8	3.4GHz	4.9GHz	4MB L2 / 8MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 8500G	6	12	3.5GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 8600G	6	12	4.3GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 760M	AMD Ryzen™ AI
AMD Ryzen™ 5 PRO 8500G	6	12	3.5GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 740M	-
AMD Ryzen™ 5 PRO 8600G	6	12	4.3GHz	5.0GHz	6MB L2 / 16MB L3	AMD Radeon™ 760M	AMD Ryzen™ AI
AMD Ryzen™ 7 8700G	8	16	4.2GHz	5.1GHz	8MB L2 / 16MB L3	AMD Radeon™ 780M	AMD Ryzen™ AI
AMD Ryzen™ 7 PRO 8700G	8	16	4.2GHz	5.1GHz	8MB L2 / 16MB L3	AMD Radeon™ 780M	AMD Ryzen™ AI

Operating System

Operating System**

- Windows® 11 Pro
- Windows® 11 Home
- Windows® 11 Home Single Language
- Windows® 11 IoT Enterprise LTSC 2024
- Windows® 11 DG Windows® 10 Pro 64
- Ubuntu Linux
- No preload operating system

Graphics

Graphics***

Graphics	Type	Memory	Max Resolution	Connector	Key Features
AMD Radeon™ 740M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ 760M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ 780M	Integrated	Shared	4096x2160@60Hz(HDMI®), 4096x2160@60Hz(DP)	2x DP 1.4a (HBR2, DSC), 1x HDMI® 2.1 TMDS	DirectX® 12
AMD Radeon™ RX 6400	Discrete	4GB GDDR6	7680x4320@60Hz(HDMI®), 7680x4320@60Hz(DP)	1x HDMI® 2.1 FRL, 1x DP 1.4a	DirectX® 12, OpenGL 4.6

Monitor Support

Monitor Support

Supports up to 3 independent displays via onboard ports (2x DisplayPort™ and 1x HDMI®), more displays support via discrete graphics

Chipset

Chipset

AMD PRO665 Chipset

Memory

Max Memory[1]

Up to 64GB DDR5-5200

Memory Slots

Two DDR5 UDIMM slots, dual-channel capable

Memory Type[2]

DDR5-5200

Notes:

[1] The max memory is based on the test results with current Lenovo® memory offerings.

[2] Installed memory is actually DDR5-5600 but may run as DDR5-5200 due to the memory support capability of processor.

Storage

Max Storage Support[1]

Up to three drives, 1x 3.5" HDD + 2x M.2 SSD
- 3.5" HDD up to 2TB
- M.2 SSD up to 2TB each

Storage Type***

Disk Type	Interface	RPM	Security
3.5" SATA HDD	SATA 6Gb/s	7.2K	-
M.2 2280 SSD	PCIe® NVMe®, PCIe® 4.0 x4	-	Opal 2.0

RAID

RAID 0/1 support for M.2 SSDs (RAID preset only available via special bid models)

Notes:

[1] The max capacity of each disk type is based on the test results with current Lenovo® storage offerings.

Removable Storage

Optical

- DVD burner (DVD±RW), SATA connector, slim (9.0mm)
- None

Card Reader

- 3-in-1 card reader (SD, SDHC, SDXC)
- No card reader

Multi-Media

Audio Chip

High Definition (HD) Audio, Realtek® ALC623-CG codec

Speakers

- No speakers
- Single speaker, 1W x1

Power Supply

Power Supply**

Power	Type	Efficiency	Key Features
180W	Fixed	85%	100-240V, 50-60Hz
260W	Fixed	90%	100-240V, 50-60Hz
310W	Fixed	92%	100-240V, 50-60Hz

DESIGN

Input Device

Keyboard**

- Lenovo® Calliope Keyboard (USB connector), black
- Lenovo® Traditional Keyboard (USB connector), black
- No keyboard

Mouse

- Lenovo® Calliope Mouse (USB connector), black
- No mouse

Mechanical

Form Factor

SFF (8.2L)

Dimensions (WxDxH)[1]

92.5 x 297.7 x 339.5 mm (3.6 x 11.7 x 13.4 inches)

Packaging Dimensions (WxDxH)

195 x 395 x 530 mm (7.68 x 15.55 x 20.87 inches)

Weight[2]

Around 4.6 kg (10.1 lbs)

Packaging Weight

Around 7.5 kg (16.5 lbs)

Case Color

Black

Bays

- 1x 3.5" disk bay
- 1x slim ODD bay

Expansion Slots

- One PCIe® 3.0 x16, low-profile, length ≤ 155mm, height ≤ 70mm
- One PCIe® 3.0 x1, low-profile, length ≤ 155mm, height ≤ 70mm
- Three M.2 slots (one for WLAN, two for SSD)[3]

EOU

Toolless cover, memory, disk, optical, extension card assembly / removal[4]

Stand

- Vertical stand
- No stand

Others

- (Optional) Dust filter
- Supports Smart Power On

Notes:

[1] The system dimensions may vary depending on configurations.

[2] The system weight is approximate and based on results in Lenovo® lab, which varies depending on the source of component, variance of the distribution of each component, and manufacturing process. It may not be the exact weight for each specific model.

[3] M.2 slot for SSD is M.2 PCIe® 4.0 x4 slot, supports up to 64Gbps on NVMe® drives

[4] To comply with UL 4200A, the toolless features are not available for the following countries:
Argentina, Belize, Bolivia, Canada, Caribbean Group, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, TAA, Uruguay, USA, Venezuela.

CONNECTIVITY

Network

WLAN + Bluetooth®**

- Realtek® Wi-Fi® 6 RTL8852BE, 802.11ax Dual Band 2x2 Wi-Fi® + Bluetooth® 5.3, M.2 card

- AMD Wi-Fi® 6E RZ616, 802.11ax 2x2 Wi-Fi® + Bluetooth® 5.3, M.2 Card
- No WLAN and Bluetooth®

Onboard Ethernet

Gigabit Ethernet, Realtek® RTL8111FP, 1x RJ-45, supports DASH and Wake-on-LAN

Optional Ethernet

- 2.5 Gigabit Ethernet, Realtek® RTL8125BGS, 1x RJ-45, PCIe® x1
- No optional Ethernet

Ports[1]

Front Ports

- 1x USB-C® (USB 5Gbps / USB 3.2 Gen 1), with 15W charging
- 4x USB-A (USB 5Gbps / USB 3.2 Gen 1)
- 1x headphone / microphone combo jack (3.5mm)
- 1x microphone (3.5mm)

Optional Front Ports

1x card reader

Rear Ports[2]

- 4x USB-A (Hi-Speed USB / USB 2.0)
- 1x HDMI® 2.1 TMDS
- 2x DisplayPort™ 1.4a (HBR2, DSC)
- 1x Ethernet (RJ-45)
- 1x line-out (3.5mm)

Optional Rear Ports***

- 1x USB-C® (USB 20Gbps / USB 3.2 Gen 2x2), support data transfer, via PCIe® x4 card
- 2x USB-C® (USB 10Gbps / USB 3.2 Gen 2), support data transfer, via PCIe® x4 card
- 2x USB-A (Hi-Speed USB / USB 2.0), via 2-port adapter
- 2x USB-A (USB 5Gbps / USB 3.2 Gen 1), via 2-port USB expansion card, PCIe® x1
- 1x parallel
- 1x serial

Notes:

[1] The transfer speed of following ports will vary and, depending on many factors, such as the processing speed of the host device, file attributes and other factors related to system configuration and your operating environment, will be slower than theoretical speed.
USB 2.0: 480 Mbit/s;
USB 3.2 Gen 1 (SuperSpeed USB 5Gbps, formerly USB 3.0 / USB 3.1 Gen 1): 5 Gbit/s;
USB 3.2 Gen 2 (SuperSpeed USB 10Gbps, formerly USB 3.1 Gen 2): 10 Gbit/s;
USB4® 20Gbps / USB 3.2 Gen 2x2 (SuperSpeed USB 20Gbps): 20 Gbit/s;
USB4® 40Gbps (USB 40Gbps): 40 Gbit/s;
Thunderbolt™ 3/4: 40 Gbit/s.

[2] For video ports on discrete graphics, please see graphics section.

SECURITY & PRIVACY

Security

Security Chip

Discrete TPM 2.0, TCG certified, FIPS 140-2 certified

Physical Locks

- (Optional) E-lock
- (Optional) Smart Cable Clip
- Kensington® Security Slot™, 3 x 7 mm
- Padlock Loop

Chassis Intrusion Switch

- Chassis intrusion switch
- No chassis intrusion switch

Fingerprint Reader

No fingerprint reader

Other Security

Pluton security processor

BIOS Security

- Administrator password
- Hard disk password
- Power-on password
- Absolute persistence module
- Boot sequence control
- Boot without keyboard and mouse
- Cover tamper detected[1]
- Certificate-based BIOS authentication
- Configuration change detection
- Individual USB port disablement
- Secure wipe
- Secure boot
- Self-healing BIOS[2]
- Smart USB protection (allows keyboard / mouse only, blocks all storage devices)
- More BIOS security features, please visit BIOS Simulator[3]

Notes:

[1] Only available for the models with Chassis Intrusion Switch

[2] Self-healing BIOS is only available via Special Bids

[3] The BIOS simulator is just for reference. Default settings and some options may vary depending on the hardware, operating system and BIOS version.

MANAGEABILITY

System Management

System Management

- DASH 1.1 / 1.2
- Non-DASH

SERVICE

Warranty[1]

Base Warranty**

- 1-year courier or carry-in service
- 1-year limited onsite service
- 3-year limited onsite service
- No base warranty

Notes:

[1] The warranty upgrades may be bundled with some models, please check the "Included upgrade" column in the specific model's configurations. For more service extensions, please go to https://smartfind.lenovo.com/. To learn more details of warranty policy, please access https://support.lenovo.com/warrantylookup/warrantypolicy.

ACCESSORIES

Bundled Accessories

Bundled Accessories***

- DP to DVI dongle
- DP to HDMI® dongle
- DP to VGA dongle
- HDMI® to VGA dongle
- Smart Cable (USB-A to USB-C®)
- None

OPERATING REQUIREMENTS

Operating Environment

Temperature

- Operating: 5°C (41°F) to 35°C (95°F)
- Storage: -40°C (-40°F) to 60°C (140°F)

Relative Humidity

- Operating: 20% to 80%
- Storage: 10% to 90%

Altitude

- Operating: 0 m (0 ft) to 3048 m (10,000 ft)
- Storage: 0 m (0 ft) to 12192 m (40,000 ft)

ENVIRONMENTAL

Sustainability

Material

85% PCC ABS bezel
95% PCC ABS wired USB keyboard/mouse top/bottom cover
95% PCC thermal shell with OBP
90% PIC recycled plastic EPE cushion
30% OBP used in bag
FSC certified paper in packaging

CERTIFICATIONS

Green Certifications[1]

Green Certifications

- (Optional) ENERGY STAR® 8.0
- (Optional) EPEAT™ Silver Registered[2]
- (Optional) EPEAT™ Gold Registered[3]
- ErP Lot 3
- GREENGUARD®
- RoHS compliant
- TCO Certified 9.0

Notes:

[1] The items listed under the "Green Certifications" section may not only refer to certification but also registration or self-declaration. For ESG & regulatory compliance documents, please visit https://compliance.lenovo.com.
[2], [3] EPEAT™ is registered where applicable, please visit epeat.net for registration status by country.

Other Certifications

Other Certifications

(Optional) TÜV Rheinland® Ultra Low Noise

Mil-Spec Test

MIL-STD-810H military test passed (Low Pressure [Altitude], High Temperature, Low Temperature, Temperature Shock, Humidity, Sand and Dust, Vibration, Shock, Solar Radiation, Contamination by Fluids, Salt Fog)

- Feature with ** means that only one option listed under the feature can be configured on selected models. Please refer to the model configuration for specific information.
- Feature with *** means that one or more options listed under the feature can be configured on selected models. Please refer to the model configuration for specific information.
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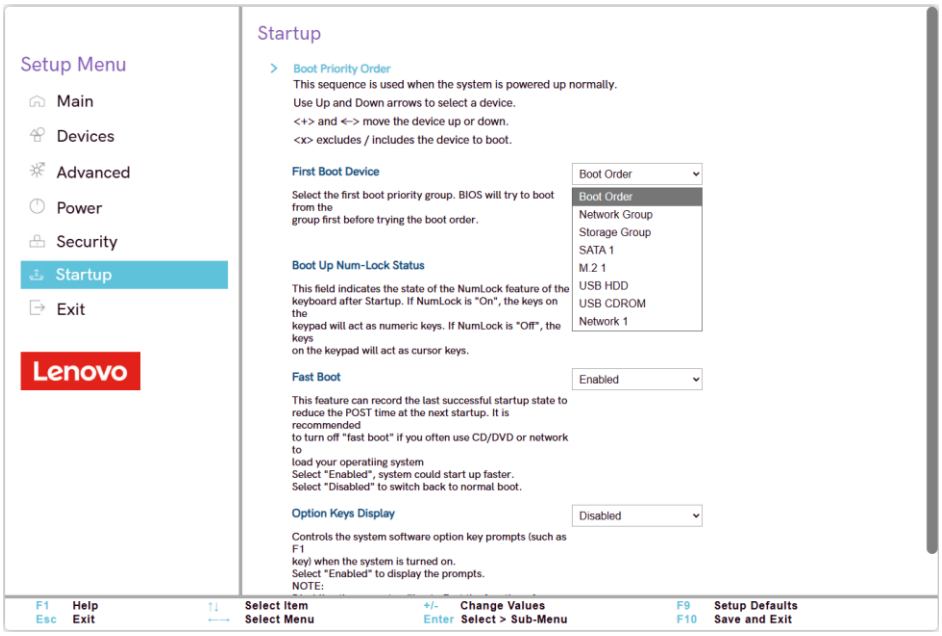
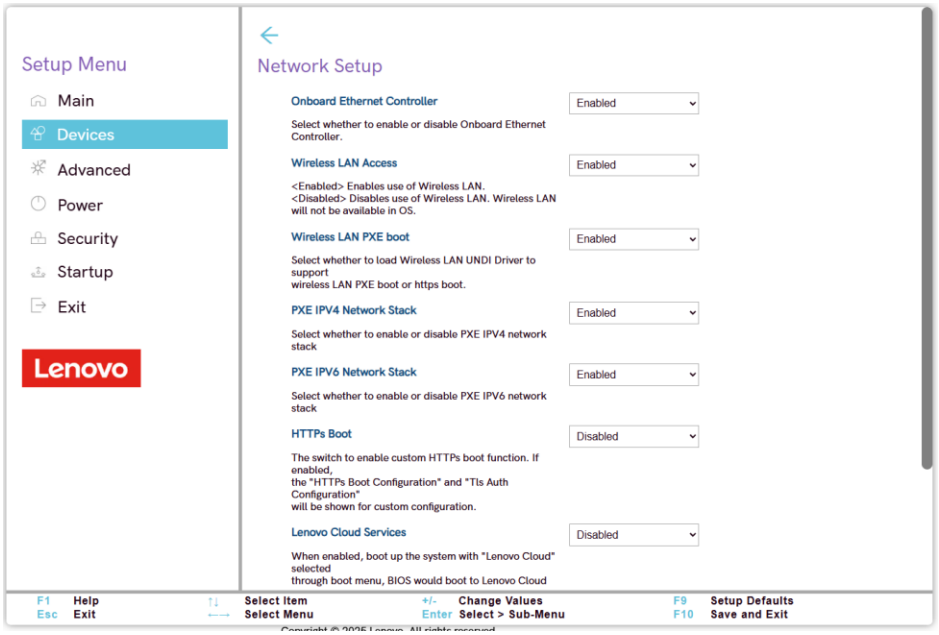
you.

- The specifications on this page may not be available in all regions, and may be changed or updated without notice.

1.5. BIOS E SEGURANÇA e 2.5. BIOS E SEGURANÇA

b) A inicialização do microcomputador deverá ser realizada na seqüência definida pelo usuário, via dispositivos pela porta USB e/ou CDROM e/ou unidade de armazenamento, bem como pela placa de rede através do recurso WOL (Wake on LAN) compatível com o padrão PXE (Pré-boot Execution Enviroment).





LENOVO TECNOLOGIA (BRASIL) LIMITADA
CNPJ/MF: 07.275.920/0001-61

Especificações Técnicas
SSD M.2 SAMSUNG para LENOVO

Part Number	Capacity[1)]	LBA Count [2)]
MZAL8256HDJD-00BLL MZVL8256HDJD-00BLL	256GB	500,118,192
MZAL8512HDLU-00BLL MZVL8512HDLU-00BLL	512GB	1,000,215,216
MZAL81T0HDLB-00BLL MZVL81T0HDLB-00BLL	1024GB	2,000,409,264

Features

- PCIe® Gen.4 16Gb/s Interface, up to 4 Lanes
- PCI Express® Base Specification Rev. 4.0
- PCI Express® M.2 Specification Rev. 4.0
- NVM Express™ specification Rev. 2.0(Mandatory Only)
- Power Saving Modes:
  - Supporting APST
  - Supporting L1.2 Mode
- Support Admin & NVM Command Set
- RoHS Compliant

Environmental Specifications

· Temperature[4)]	
- Operating	0°C to 70°C
- Non-operating	-40°C to 85°C
· Humidity (non-condensing)	
- Non-operating	5 ~ 95%
· Linear Shock	
- Non-operating (3ms duration with half sine wave)	230 Gpeak
· Vibration	
- operating (2ms duration with half sine wave/ 1ms duration with half sine wave)	200 / 1000 Gpeak

Drive Configuration

· Capacity	256/512/1024GB
· From Factor	M.2
· Interface	PCI Express® Gen.4 x4
· Bytes per Sector	512 Bytes

Performance Specifications [3)]

· Data Transfer Rate (128KB)	
· Sequential Read	(256GB) Up to 5,700 MB/s
	(512/1024GB) Up to 6,000 MB/s
· Sequential Write	(256GB) Up to 3,000 MB/s
	(512GB) Up to 5,200 MB/s
	(1024GB) Up to 5,300 MB/s
· Data I/O Speed (4KB)	
· Random Read	(256GB) Up to 480K IOPS
	(512GB) Up to 800K IOPS
	(1024GB) Up to 850K IOPS

Power Specifications

· Supply Voltage / Tolerance	3.3V ± 5%
· Voltage Ripple/Noise (max.)	100mV p-p
· Active[5)] (Typ, RMS)	
- Read (3.3V)	4.7 W
- Write (3.3V)	4.6 W
· Idle[6)7)] (Typ.)	60 mW
· Sleep[6)] (Typ)	5 mW

Physical DimensionZ

· Width	22.00 ± 0.15 mm
· Length	(M.2 22x42) 42.00 ± 0.15 mm
	(M.2 22x80) 80.00 ± 0.15 mm
· Height	Max. 2.38 mm
· Weight	(M.2 22x42) Max. 4.0 g
	(M.2 22x80) Max. 9.0 g

Lenovo

ThinkVision

ThinkVision E24-40
User Guide

Machine Types: 64BA

Product numbers

A25238FE0
64BAMAR1WW

First Edition (May 2025)
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Safety information

General Safety guidelines

For tips to help you use your computer safely, go to:
http://www.lenovo.com/safety

Before installing this product, read the Safety Information.

Before installing this product, read the Safety Information.

الرجاء قراءة معلومات السلامة قبل تركيب هذا المنتج.

Преди инсталиране на продукта, прочетете Информация за безопасност.

Před instalací tohoto produktu si přečtěte bezpečnostní informace.

Før du dette tages i brug produkt, skal du læse sikkerhedsoplysningerne.

Lesen Sie die Sicherheitshinweise, bevor Sie das Gerät installieren.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε τις Πληροφορίες για την ασφάλεια.

Antes de instalar este producto, lea la Información de seguridad.

Ennen kuin asennat tämän tuotteen, lue Turvallisuustiedot.

Avant d'installer ce produit, lisez les Informations de sécurité.

לפני התקנת המוצר, חשוב לקרוא את המידע בנושא בטיחות.

Prije ugradnje proizvoda pročitajte obavijesti o sigurnosti.

A termék használatba vétele előtt olvassa el a biztonsági tudnivalókat.

Sebelum memasang produk ini, baca Informasi Keselamatan.

Prima di installare il prodotto, leggere le informazioni sulla sicurezza.

本製品を設置する前に、安全に関する情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 숙지하십시오.

Lees de veiligheidsinformatie voorafgaand aan het installeren van dit product.

Les sikkerhetsinformasjonen før du installerer produktet.

Przed instalacją tego produktu należy przeczytać Informacje dotyczące bezpieczeństwa.

Antes de instalar este produto, leia as Informações de segurança.

Antes de instalar este produto, leia as Informações de Segurança.

Înainte de a instala acest produs, citiţi informaţiile privind siguranţa.

Перед установкой продукта прочтите раздел "Информация о безопасности".

Pred inštaláciou tohto výrobku si prečítajte bezpečnostné informácie.

Pred namestitvijo tega izdelka preberite varnostne informacije.

Pre instaliranja ovog proizvoda, pročitajte Bezbednosne informacije.

Läs säkerhetsinformation innan du installerar den här produkten.

โปรดอ่านข้อมูลด้านความปลอดภัยก่อนที่จะติดตั้งผลิตภัณฑ์นี้

Bu ürünü kurmadan önce Güvenlik Bilgilerini okuyun.

Перш ніж встановлювати пристрій, прочитайте інформацію з техніки безпеки.

在安装本产品之前，请阅读“安全事项”。

安裝本產品前，請閱讀安全資訊。

The unit weight 4.5 Kg

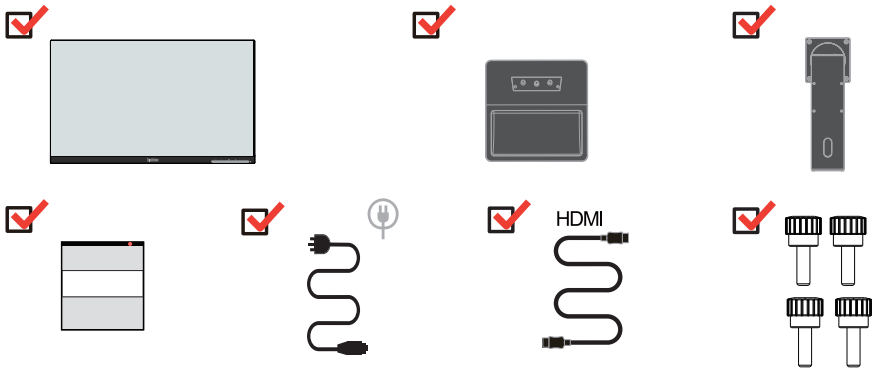
Chapter 1.Getting started

This User's Guide provides detailed operation instructions for the user. For quick instruction overview, please see the Setup Poster for brief information.

Shipping contents

The product package should include the following items:

- Information Flyer
- Flat Panel Monitor
- Power Cord
- HDMI Cable
- Base
- Stand
- Screw x 4



Notice for use

To set up your monitor, please see the illustrations below.

Note: Do not touch the monitor within the screen area. The screen area is glass and can be damaged by rough handling or excessive pressure.

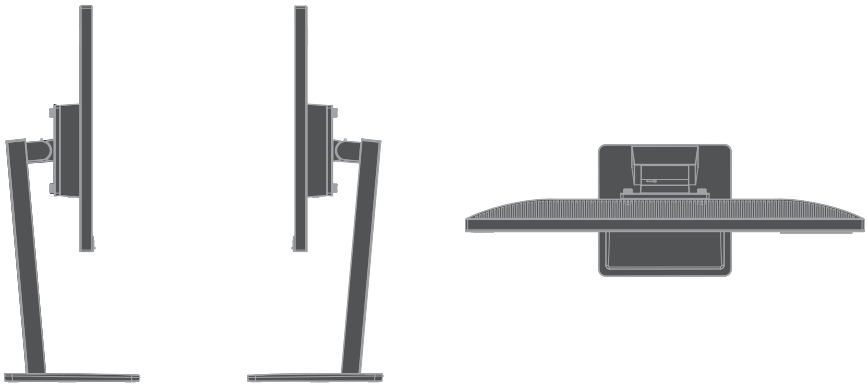
1. Take out the Top cushion and accessories.
2. Mounting the stand to monitor's recess and tighten the screws.
3. Insert the base towards the stand and tighten the thumbscrew.
4. Stand up the monitor with both hands carefully.

Note: To install a VESA mount, please see "Wall Mounting (Optional)"on page 2-8**.**

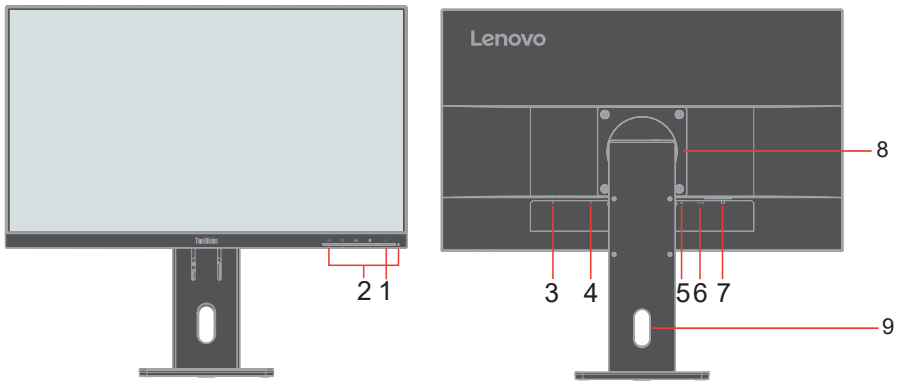
Product overview

This section will provide information on adjusting monitor positions, setting user controls, and using the cable lock slot.

Side and top view



Front&Back View

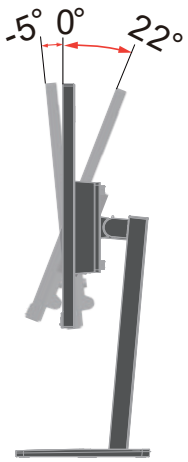


No.	Name	Description
1	Power On/Off button	To turn the monitor on or off.
2	Function buttons	To use the OSD controls. (For information on how to utilize these keypad controls, please see “Adjusting your monitor image”on page 2-3.)
3	Cable lock slot	Equipped with a cable lock slot located on the rear of monitor.
4	Power connector	Connect the power cable.
5	DP 1.2 port	Connect to your computer using an DP cable.
6	HDMI 1.4 port	Connect to your computer using a HDMI cable.
7	Analog port	Connect to your computer with Analog Signal Cable
8	VESA mounting holes (100 mm x 100 mm)	Used for wall-mounting the monitor through a VESA-compatible wall-mount kit.
9	Cable management slot	Used to organize cables by routing them through the slot.

Types of adjustments

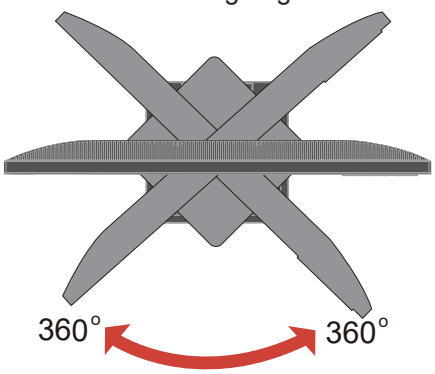
Tilt

Please see the illustration below for an example of the tilt range.



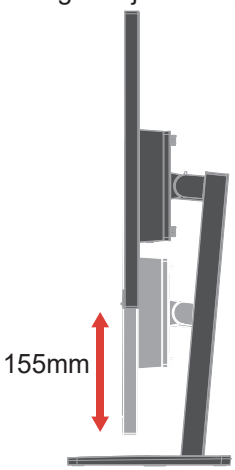
Swivel

With the built-in pedestal, you can tilt and swivel the monitor for the most comfortable viewing angle.



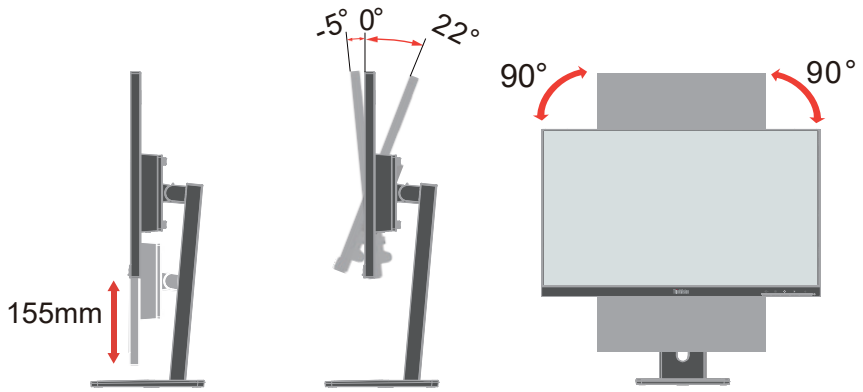
Height Adjustment

For height adjustment, user needs to press down or lift up the monitor.



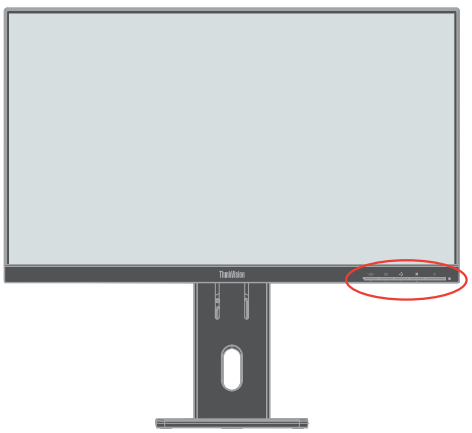
Monitor pivot

- Adjust the screen position before rotating the monitor screen. (Make sure that the monitor screen ascent to its highest point, and it inclines backward at 22°.)
- then rotate clockwise /counterclockwise until the monitor stops at 90°.



Monitor controls

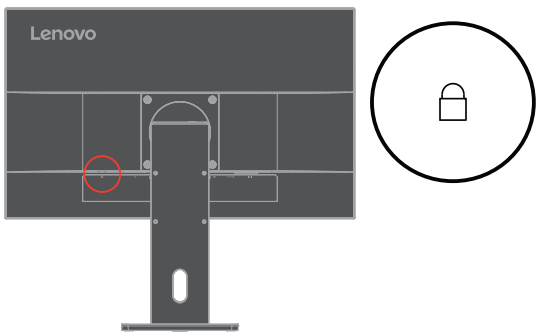
The keypad controls on the front cover are accesses to various functions.



For information on how to utilize these keypad controls, please see “Adjusting your monitor image”on page 2-3.

Cable lock slot

Your monitor is equipped with a cable lock slot located on the rear of your monitor



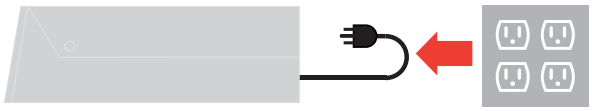
Setting up your monitor

This section provides information on how to set up your monitor.

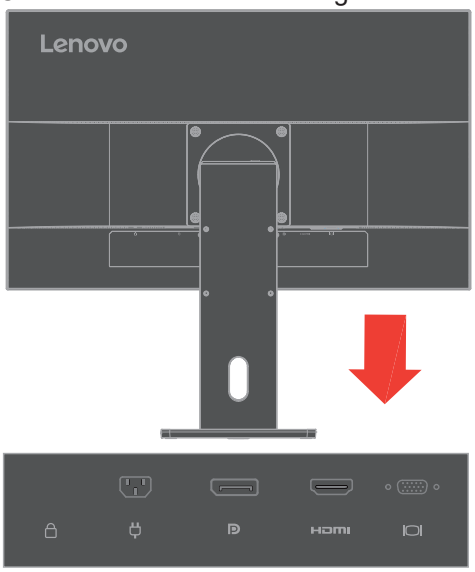
Connecting and turning on your monitor

Note: Be sure to read the Safety information on page iv before carrying out this procedure.

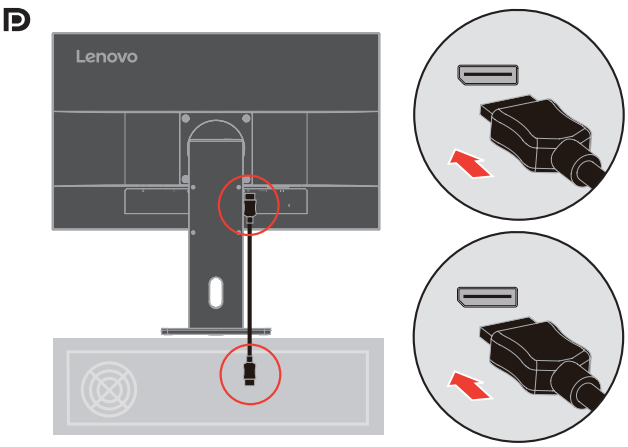
1. Power off your computer and all attached devices, and unplug the computer power cord.
   Note: The type of plug & Socket shown here are for illustration only.



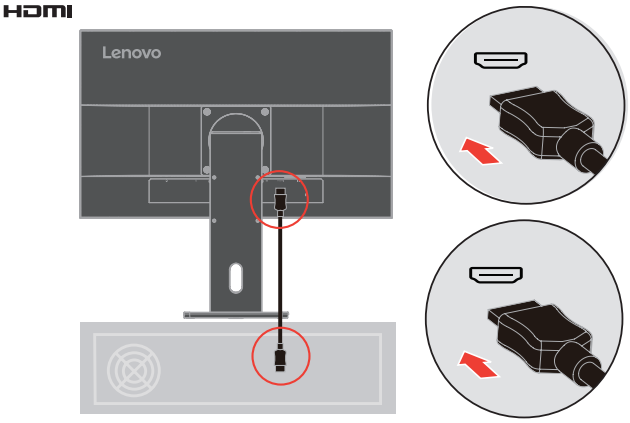
2. Connect the cables according to below icon indication.



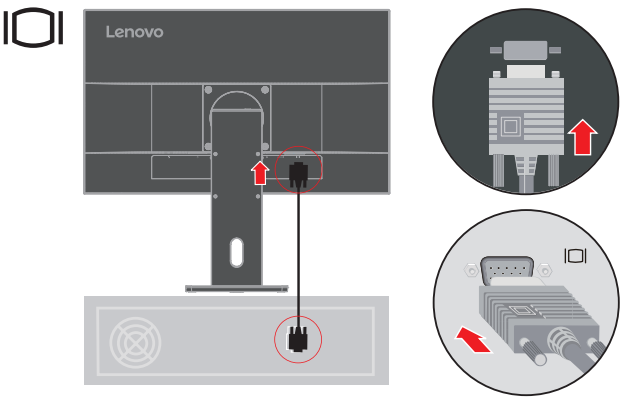
3. For computer in DisplayPort connecting.
   Note 1: Monitors sold in NA include an DP cable.
   Note 2: For other regions Lenovo recommends that customers who require to use the DP Cable on their monitor purchase the "Lenovo DisplayPort to DisplayPort Cable 0A36537" www.lenovo.com/support/monitoraccessories.



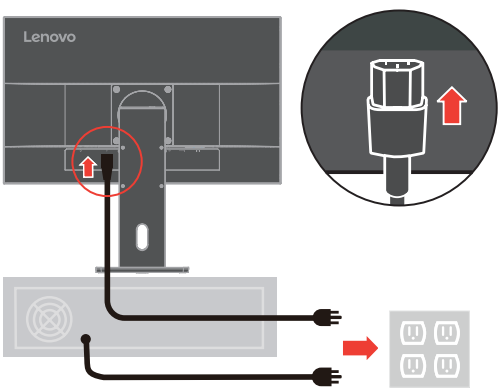
4. For computer in HDMI connecting.
   Lenovo recommends that customers who require to use the HDMI input on their monitor purchase the "Lenovo HDMI to HDMI cable OB47070" www.lenovo.com/support/monitor accessories.



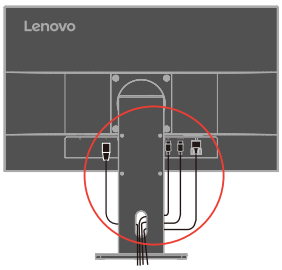
5. For computer in Analog Signal Cable connecting.

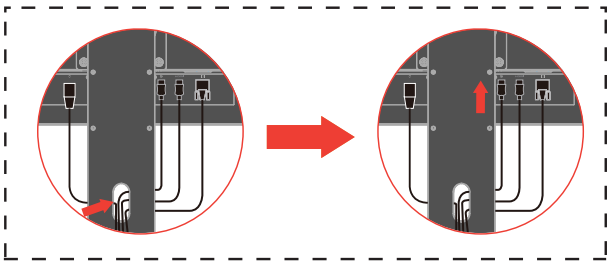


6. Insert the power cord into the monitor, then plug the monitor power cord and the computer cord into grounded electrical outlets.
   Note: A certified power supply cord has to be used with this equipment. The relevant national installation and or equipment regulations shall be considered. A certified power supply cord not lighter than ordinary polyvinyl chloride flexible cord according to IEC 60227 (designation H05VV-F 3G 0.75mm^2 or H05VVH2-F2 3G 0.75mm^2) shall be used. Alternative a flexible cord be of synthetic rubber according to IEC 60245 (designation H05RR-F 3G 0.75mm^2) shall be used.

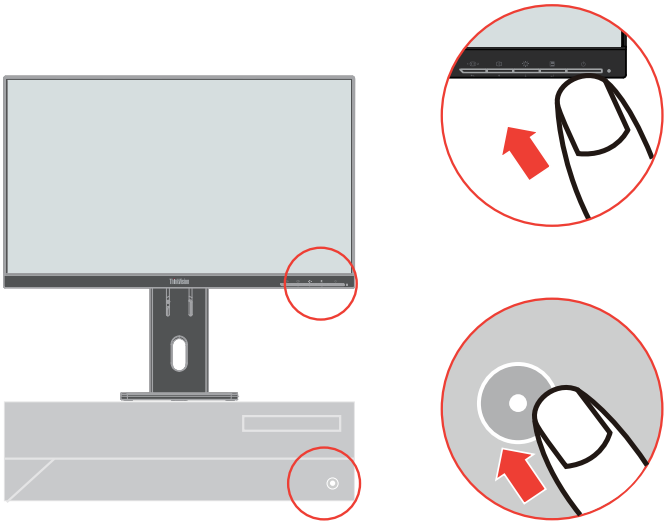


7. Connect the cables.





8. Power on the monitor and the computer.



9. When you install the monitor driver, download the driver that corresponds to your monitor model from the Lenovo website https://pcsupport.lenovo.com/solutions/e24_40. Refer to the “Manually installing the monitor driver”on page 3-4 section to install the driver.

Registering your option

Thank you for purchasing this Lenovo product. Please take a few moments to register your Product and provide us with information that will help Lenovo to better serve you in the future. Your feedback is valuable to us in developing product and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the following Web site:
http://www.lenovo.com/register
Lenovo will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Chapter 2.Adjusting and using your monitor

This section will give you information on adjusting and using your monitor.

Comfort and accessibility

Good ergonomic practice is important to get the most from your personal computer and to avoid discomfort. Arrange your workplace and the equipment you use to suit your individual needs and the kind of work that you perform. In addition, use healthy work habits to maximize your performance and comfort while using your computer. For more detailed information on any of these topics, visit the Healthy Computing Web site at:
http://www.lenovo.com/healthycomputing/.

Arranging your work area

Use a work surface of appropriate height and available working area to allow you to work in comfort.
Organize you work area to match the way you use materials and equipment. Keep your work area clean and clear for the materials that you typically use and place the items that you use most frequently, such as the computer mouse or telephone, within the easiest reach.
Equipment layout and setup play a large role in your working posture. The following topics describe how to optimize equipment setup to achieve and maintain good working posture.

Positioning and viewing your monitor

Position and adjust your computer monitor for comfortable viewing by considering the following items:

- **Viewing distance:** Recommended viewing distance between the eye and the monitor screen is 1.5 x the diagonal of the screen. Solutions in meeting this required distance in cramped office situations include pulling desk away from wall or divider to make room for monitor, using flat panel or compact displays placing the monitor in the desk corner, or placing the keyboard in an adjustable drawer to create a deeper working surface.
- **Monitor height:** Position the monitor so your head and neck are in a comfortable and neutral (vertical, or upright) position. If your monitor does not have height adjustments, you might have to place books or other sturdy objects under the base of the monitor to achieve the desired height. A general guideline is to position the monitor such that the top of the screen is at or slightly below your eye-height when you are comfortably seated. However, be sure to optimize your monitor height so the line of site between your eyes and the center the monitor suits your preferences for visual distance and comfortable viewing when your eye muscles are in a relaxed state.
- **Tilt:** Adjust the tilt of your monitor to optimize the appearance of the screen content and to accommodate your preferred head and neck posture.
- **General location:** Position your monitor to avoid glare or reflections on the screen from overhead lighting or nearby windows.

The following are some other tips for comfortable viewing of your monitor:

- Use adequate lighting for the type of work you are performing.
- Use the monitor brightness, contrast, and image adjustment controls, if equipped, to optimize the image on your screen to meet your visual preferences.
- Keep your monitor screen clean so you can focus on the screen's contents.

Any concentrated and sustained visual activity can be tiring for your eyes. Be sure to periodically look away from your monitor screen and focus on a far object to allow your eye muscles to relax. If you have questions on eye fatigue or visual discomfort, consult a vision care specialist for advice.

Quick tips for healthy work habits

The following information is a summary of some important factors to consider to help you remain comfortable and productive while you use your computer.

- **Good posture starts with equipment setup:** The layout of your work area and the setup of your computer equipment have a large effect on your posture while using your computer. Be sure to optimize the position and orientation of your equipment by following the tips outlined in "Arranging your work area"on page 2-1so you can maintain a comfortable and productive posture. Also, be sure to use the adjustment capabilities of your computer components and office furniture to best suit your preferences now and as your preferences change over time.
- **Minor changes in posture can help avoid discomfort:** The longer you sit and work in front of your computer, the more important it is to observe your working posture. Avoid as summing any one posture for an extended period of time. Periodically make minor modifications in your posture to help deter any discomforts that might arise. Make use of any adjustments that your office furniture or equipment provide to accommodate changes in posture
- **Short, periodic breaks help ensure healthy computing:** Because computing is primarily a static activity, it is particularly important to take short breaks from your work. Periodically, stand up in front of your work area, stretch, walk for a drink of water, or otherwise take a short break from using your computer. A short break from work gives your body a welcome change in posture and helps to ensure you remain comfortable and productive while you do work.

Accessibility information

Lenovo is committed to providing greater access to information and technology to people with disabilities. With assistive technologies, users can access information in the way most appropriate to their disability. Some of these technologies are already provided in your operating system; others can be purchased through vendors or accessed at:
https://lenovo.ssbbartgroup.com/lenovo/request_vpat.php

Adjusting your monitor image

This section describes the user control features used to adjust your monitor image.

Using the direct access controls

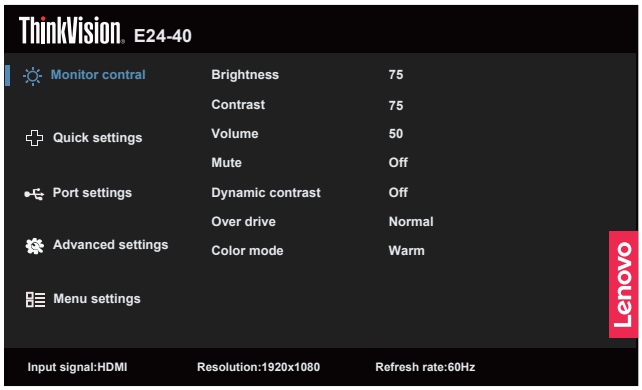
The direct access controls can be used when the On Screen Display (OSD) is not displayed.

Table 2-1. Direct access controls

Icon	Name	Description
	Menu/OK	・Press to open main menu while there is no any OSD on the screen. ・Press to enter next level on main menu or sub menu , or move backwards through the sub menus. ・Press and hold for 10 seconds to Lock/un-Lock all menu.
	Brightness/ Down Key	・It is a shortcut for adjusting Brightness while there is no OSD on the screen. ・Press to move lighting-indicator on main menu down to next one. ・Press to decrease current values on adjustment bar
	Auto adjustment/ Up Key	・It is a shortcut for auto adjustment while there is no OSD on the screen. ・Press to move lighting-indicator on main menu up to last one. ・Press to increase current values on adjustment bar.
	Input Source	It is a shortcut for changing input signal while there is no OSD on the screen or on power-saving mode.
	DDC-CI	Press and hold for 10 seconds to Enable/Disable the "DDC/CI".
	Power button	Turns the monitor on/off. White indicates power on. Orange indicates standby/power saving mode.

Using the On-Screen Display(OSD) controls

To adjust the settings, the user controls can be viewed through the OSD.



To use the controls:

1. Press ☰ to open the main OSD menu.
2. Use ↑ or ↓ to move among the icons. Select an icon and press ↵ to access the selected function. If there is a sub-menu, you can move between options using ↑ or ↓, then press ↵ to select that function. Use ↑ or ↓ to make adjustments then press ↵ to save.
3. Press ⮌ to move backwards through the sub-menus and exit from the OSD.
4. Press and hold ↵ for 10 seconds to lock the OSD. This will prevent accidental adjustments to the OSD. Press and hold ↵ for 10 seconds to unlock the OSD and allow adjustments to the OSD.
5. Enables DDC/CI by default. Use OSD Exit Key, Press and hold 1⇄2 for 10 seconds to disable/enable DDC/CI function. A message "DDC/CI disable" is shown on the screen.
6. The ENERGY STAR option resets all user settings to default values so that the monitor can meet the requirements of Energy Star.

   Energy Star is an energy saving program for consumer electronics led by the U.S. government. It was launched in 1992 by EPA and DOE to reduce energy consumption and greenhouse gas emissions. Energy Star logo is a symbol of energy conservation and environmental protection. It improves the concept of energy efficiency of consumers and manufacturers, and effectively guides the market.

   The regulation of Energy Star improves energy efficiency and reduces air pollution by using more energy-efficient equipment in homes, offices and factories. One way to achieve this goal is to use management to reduce energy consumption when products are not in use. The default settings for monitors conform to Energy Star certification. Any changes by users for more features and functionalities may increase power consumption, which will exceed the limitation of Energy Star's standard. If the user changes the options related to energy efficiency when using, such as brightness, color mode, etc., select All Reset Factory or choose the Energy Star option, the power consumption will be restored to the energy efficiency with Energy Star standard.

   For more information, please refer to (www.energystar.gov/products).

   All products of Energy Star will be posted online and can be accessed

directly by governments, public institutions and consumers.

Table 2-2. OSD functions

OSD Icon on Main Menu	Sub menu	Description	Controls and Adjustments
Monitor control	Brightness	Adjusts overall screen brightness.	All input ports
	Contrast	Adjusts difference between light and dark areas.	
	Volume	Adjust the volume.	
	Mute	• On • Off	
	Dynamic contrast	• On • Off	
	Over drive	• Off • Normal • Extreme	
	Color mode	• sRGB • Neutral • Warm • Cool • Custom R: Increases or decreases the saturation of 'red' in the image. G: Increases or decreases the saturation of 'green' in the image. B: Increases or decreases the saturation of 'blue' in the image.	
Quick settings	Up key	• Brightness • Contrast • Color Mode • Language • Automatic	
	Down key		
Port settings	Input signal	• Auto • DisplayPort • HDMI • VGA	
	Video range	• Auto • Full Range 0-255 • Limited Range16-235 **Note:** Refers to RGB range of HDMI input.	Only for HDMI port
Advanced settings	Image Position	• H. Position • V. Position	Only for VGA ports
	Image setup	• Automatic • Manual	
	Button repeat rate	• Default • Slow • Off	All input ports
	Aspect ratio	• Full screen • Original AR	
	LED indicator	• On • Off **Note**: When the LED indicator is on, the LED is on; when the LED indicator is off, the LED is always off.	
	Power button lock	• On • Off	

OSD Icon on Main Menu	Sub menu	Description	Controls and Adjustments
Menu settings	Information	• Model name • Refresh rate • Firmware • Serial number	All input ports
	Language	Select OSD Languages. Note: The language chosen only affects the language of the OSD. It has no effect on any software running on the computer.	
	OSD Time Out	Adjust bar 5~60	
	OSD position	Adjust bar 0~100 (H,V)	
	OSD rotation	• Normal • 90 • 270	
	Transparency	Adjust bar 0 ~100	
	Factory Reset	• Reset • No	

*The use of Extreme Mode (response time) may result in reduced display quality when fast moving video graphics are displayed.
Users should check Extreme Mode (response time) to verify if it is compatible with any applications they would like to use it with.
*Low Blue Light: The display uses the low blue light panel. It complies with TÜV Rheinland Low Blue Light Hardware Solution certification under factory reset/default setting (Low Blue Light=Standard, Brightness:75%,Contrast: 75%, CCT: Warm).

Selecting a supported display mode

The display mode of the monitor uses is controlled by the computer. Therefore, refer to your computer documentation on how to change display modes.
The image size, position and shape might be changed when the display mode changes. This is normal and the image can be re-adjusted using automatic image setup and the image controls. Unlike CRT monitors, which require a high refresh rate to minimize flicker, LCD or Flat Panel technology is inherently flicker-free.
Note: If your system has previously been used with a CRT monitor and is currently configured to a display mode outside the range of this monitor, you may need to reattach the CRT monitor temporarily until you have re-configured the system; preferably to 1920 x 1080 at 60 Hz, which is a common display mode.
The display modes shown below have been optimized at the factory.

Note: According to the VESA standard, there may be a certain error (+/-1Hz) when calculating the refresh rate (field frequency) of different operating systems and graphics cards. In order to improve compatibility, the nominal refresh rate of this product has been rounded off. Please refer to the actual product.

Table 2-3 Factory set display modes

Address ability	**Refresh rate(Hz)**
640x480	60 Hz, 67 Hz,72 Hz, 75 Hz
720x400	70Hz
800x600	60 Hz, 72 Hz, 75 Hz
1024x768	60Hz, 70Hz, 75Hz
1280x800	60Hz
832x624	75Hz
1280x1024	60Hz, 75 Hz
1440x900	60Hz
1600x900	60Hz
1680x1050	60Hz
1920x1080	60Hz, 75 Hz (VGA no support), 100 Hz (VGA no support)

Understanding power management

Power management is invoked when the computer recognizes that you have not using your mouse or keyboard for a user-definable period. There are several states as described in the table below.
For optimal performance, switch off your monitor at the end of each working day, or whenever you expect to leave it unused for long periods during the day.

Table 2-4. Power indicator

State	Power Indicator	Screen	Restoring Operation	Compliance
On	White	Normal		
Standby/ Suspend	Amber	Blank	Press a key or move the mouse. There may be a slight delay reappears. **Note:** Standby also occurs if there is no image output to the monitor.	ENERGY STAR
Off	Off	Blank	Press power key to switch on There may be a slight delay before the image reappears.	ENERGY STAR

Power Management Modes

VESA Modes	Horizontal Sync	Vertical Sync	Video	Power Indicator	Power Consumption
Normal operation	Active	Active	Active	White	24 W (maximum)* 13 W (typical)
Active-off mode	Inactive	Inactive	Off	Amber	Less than 0.5 W
Switch off	-	-	-	Off	Less than 0.3 W

Energy Star	Power Consumption
P_{ON}	11.8 W
E_{TEC}	40.48 kWh

**** Maximum power consumption with max luminance.**
This document is informational only and reflects laboratory performance. Your product may perform differently, depending on the software, components and peripherals you ordered and shall have no obligation to update such information. Accordingly, the customer should not rely upon this information in making decisions about electrical tolerances or otherwise. No warranty as to accuracy or completeness is expressed or implied.

Caring for your monitor

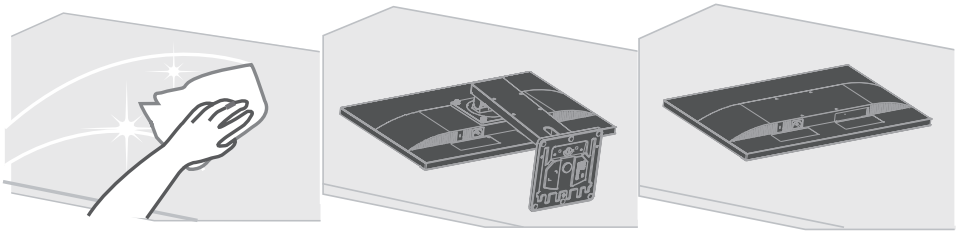
Be sure to turn off the power before you perform any maintenance on the monitor.

Do not:
- Apply water or liquid directly to your monitor.
- Use solvents or abrasives.
- Use flammable cleaning materials to clean your monitor or any other electrical equipment.
- Touch the screen area of your monitor with sharp or abrasive items. This type of contact may cause permanent damage to your screen.
- Use any cleaner which contains an anti-static solution or similar additives. This may harm the coating of the screen area.

Do:
- Lightly dampen a soft cloth with water and use this to gently wipe the covers and the screen.
- Remove grease or finger marks with a damp cloth and a little mild detergent.

Detaching the monitor base and stand

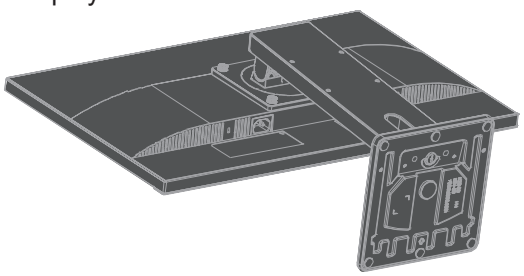
After placing the monitor face down on box with caution protected, remove the screws and lift the stand up to remove it from the monitor.



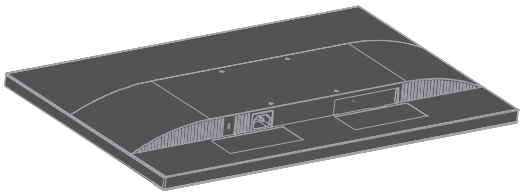
Wall Mounting (Optional)

Refer to the instructions that come with the base mounting kit. To convert your LCD display from a desk-mounted to a wall-mounted display, do the following:

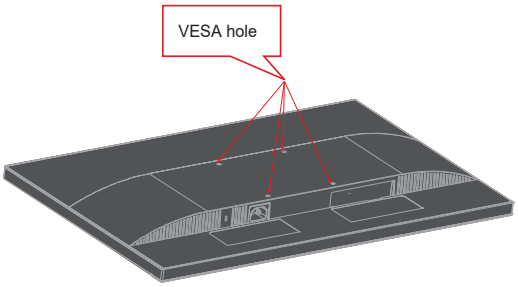
Step 1: Verify that the Power button is turned Off, then disconnect the power cord.
Step 2: Lay the LCD display face down on a towel or blanket.



Step 3: Remove the base from the monitor, refer to “Detaching the monitor base and stand”.



Step 4: Attach the mounting bracket from the VESA compatible wall mounting kit (100mm x100mm distance), VESA Mounting Screw M4 x 10 mm.



Step 5: Attach the LCD display to the wall, and follow the instructions in the wall-mounting kit.
For use only with UL Listed Wall Mount Bracket with minimum weight/load: 8kg

Chapter 3.Reference information

This section contains monitor specifications, instructions to manually install the monitor driver, troubleshooting information.

Monitor specifications

Table 3-1. Monitor specifications for type-model E24-40/64BAMAR1WW

Dimensions	Depth	178.6 mm (7.03 in.)
	Height	498.4 mm (19.62 in.)
	Width	539.8 mm (21.25 in.)
Stand	Lift	155 mm
	Tilt	-5° to 22°
	Swivel	0° to 360°
	Pivot	-90° to 90°
VESA mount	Supported	100 mm x 100 mm (3.94 in. x 3.94 in.)
Image	Viewable image size	604.5 mm (23.8 in.)
	Maximum height	296.46 mm (11.67 in.)
	Maximum width	527.04 mm (20.74 in.)
	Pixel pitch	0.2745 mm × 0.2745 mm (0.01 in.)
Power input	Supply voltage Max supply current	100-240V AC 1.5A
Power consumption **Note:** Power consumption figures are for the monitor and the power supply combined. **Note:** Typical power consumption is tested under OSD default setting.	Normal operation	<24 W (Max) <13 W (Typical)
	Standby/Suspend	<0.5 W
	Off	<0.3 W at 100VAC and 240VAC
Video input (Analog)	Interface	VGA
	Input signal	Analog Direct Drive, 75 ohm 0.7V
	Horizontal addressability	1920 pixels (Max)
	Vertical addressability	1080 lines (Max)
	Clock frequency	210 MHz (Max)

HDMI/DP	Interface	HDMI/DP
	Input signal	VESA TMDS (Panel Link™)
	Horizontal addressability	1920 pixels (Max)
	Vertical addressability	1080 lines (Max)
	Clock frequency	240 MHz (Max)
Communications	VESA DDC/CI	
Supported Display Modes	Horizontal frequency	30 kHz – 83 kHz (VGA) 30 kHz – 115 kHz (HDMI/DP)
	Vertical frequency	48 Hz – 60 Hz (VGA) 48 Hz – 100 Hz (HDMI/DP)
	Native Resolution	1920 x 1080 @ 60 Hz
Temperature	Operating	0° to 40°C (32°F to 104° F)
	Storage	-20° to 60°C (-4°F to 140° F)
	Shipping	-20° to 60°C (-4° F to 140° F)
Humidity	Operating	10% to 80% non-condensing
	Storage	5% to 95% non-condensing
	Shipping	5% to 95% non-condensing

Troubleshooting

If you have a problem setting up or using your monitor, you might be able to solve it yourself. Before calling your dealer or Lenovo, try the suggested actions that are appropriate to your problem.

Table 3-2. Troubleshooting

Problem	Possible cause	Suggested action	Reference
The words “Input not supported” are shown on the screen, and the power indicator is flashing white.	The system is set to a display mode which is not supported by the monitor	• If you are replacing an old monitor, reconnect it and adjust the display mode to within the specified range for your new monitor. • If using a Windows system, restart the system in safe mode, then select a supported display mode for your computer. • If these options do not work, contact the Customer Support Center.	“Selecting a supported display mode”on page 2-6
The image quality is unacceptable	The video signal cable is not connected with the monitor or system completely.	Be sure the signal cable is firmly plugged into the system and monitor.	“Connecting and turning on your monitor”on page 1-7
	The color settings may be incorrect.	Select another color setting from the OSD menu.	“Adjusting your monitor image”on page 2-3
	The automatic image setup function was not performed.	Perform automatic image setup.	“Adjusting your monitor image”on page 2-3
The power indicator is not lit and there is no image.	• The monitor’s power switch is not switched on. • The power cord is loose or disconnected. • There is no power at the outlet.	• Be sure the power cord is connected properly. • Be sure the outlet has power. • Power on the monitor. • Try using another power cord. • Try using another electrical outlet.	“Connecting and turning on your monitor”on page 1-7
Screen is blank and power indicator is amber.	The monitor is in Standby / Suspend mode	• Press any key on the keyboard or move the mouse to restore operation. • Check the Power options settings on your computer.	“Understanding power management” on page 2-7
The power indicator is amber, but there is no image	The video signal cable is loose or disconnected from the system or monitor	Be sure the video cable is connected with the system properly	“Connecting and turning on your monitor”on page 1-7
	The monitor brightness and contrast are at the lowest setting.	Adjust the brightness and contrast setting on the OSD menu.	“Adjusting your monitor image”on page 2-3
One or more of the pixels appear discolored	This is a characteristic of the LCD technology and is not an LCD defect	If there are more than five pixels missing, contact the Support Center	“Appendix A. Service and Support”on page A-1

Problem	Possible cause	Suggested action	Reference
• Fuzzy lines in text or a blurry image • Horizontal or vertical lines through the image.	• Image setup has not been optimized • Your system DisplayProperties setting have not been optimized.	Adjust the resolution settings on your system to match the native resolution for this monitor: 1920 x 1080 at 60 Hz.	“Adjusting your monitor image”on page 2-3
		Perform automatic image setup. If automatic image setup does not help, perform manual image setup.	“Selecting a supported display mode”on page 2-6
		When working in the native resolution, you may find additional improvements by adjusting the Dots Per Inch (DPI) setting on your system.	See the Advanced section of your system’s display properties.

Manually installing the monitor driver

Below are steps for manually installing the monitor driver in Microsoft Windows 10, Microsoft Windows 11.

1. Turn off the computer, all attached devices.
2. Ensure that the monitor is connected correctly.
3. Turn on the monitor and then the system unit. Allow your computer to start the Windows operating system.
4. From the Lenovo website https://pcsupport.lenovo.com/solutions/e24_40, find the corresponding monitor driver and download it to a PC to which this monitor is connected (such as a desktop).
5. Right-click the Windows **Start** button on the desktop, then click **Device Manager**, and double click **Monitor**.
6. Double-click **Generic Monitor**.
7. Click the **Driver** tab.
8. Click **Update Driver**, and then click **Browse Computer to find the driver**.
9. Click **Let me pick from a list of available divers on my computer**.
10. Click the **Have Disk...** button. By clicking the **Browse** button, browse and point to the following path: **X:\Monitor Drivers\Windows** (where X indicates “the folder in which the downloaded driver is located” (such as a desktop)).
11. Select **e24-40.inf** file, Click **Open** button. Click **OK** button.
12. In the new window, select **E24-40** and click **Next**.
13. After the installation is complete, delete all downloaded files and close all Windows.
14. Restart the system. The system will automatically select the refresh rate and the corresponding color matching profile.

Note: On LCD monitors, unlike CRTs, a faster refresh rate does not improve display quality. Lenovo recommends using either 1920 x 1080 at a refresh rate of 60 Hz, or 640 x 480 at a refresh rate of 60 Hz.

Getting further help
If you still can’t solve your problem, please contact the Lenovo Support Center. For more information on contacting the Support Center, please see “Appendix A. Service and Support”on page A-1

Service information

Customer responsibilities

The warranty does not apply to a product which has been damaged due to accident, misuse, abuse, improper installation, usage not in accordance with product specifications and instructions, natural or personal disaster, or unauthorized alterations, repairs or modifications.
The following are examples of misuse or abuse and not covered by warranty:

- Images burned on to the screen of a CRT monitor. Burned image is preventable by utilizing a moving screen saver or power management.
- Physical damage to covers, bezel, base and cables.
- Scratches or punctures on monitor screens.

Service parts

The following parts are for use by Lenovo service, or Lenovo aurthorized dealers, to support the customer warranty. Parts are for service use only. The table below shows information for model E24-40/64BAMAR1WW.

Table 3-3. Repair parts list

FRU (FIELD REPLACEABLE UNIT) PART NUMBER	Description	Machine Type/ Model (MTM)	Color
5C11J07491	HDMI2.0 cable 1.8m FRU--TPV	64BA	Raven Black
5CF1P41519	E24-40 FRU Carton	64BA	Yellow
5D11P36232	E24-40 - 23.8 inch FRU Monitor	64BA	Raven Black
5SE1P38239	E24-40 - FRU Stand and Base	64BA	Raven Black

Appendix A. Service and Support

The following information describes the technical support that is available for your product, during the warranty period or throughout the life of the product. Refer to the Lenovo Limited Warranty for a full explanation of Lenovo warranty terms.

Registering your option

Register to receive product service and support updates, as well as free and discounted computer accessories and content. Go to: http://www.lenovo.com/register

Online technical support

Online technical support is available during the lifetime of a product at: http://www.lenovo.com/support

Product replacement assistance or exchange of defective components also is available during the warranty period. In addition, if your option is installed in a Lenovo computer, you might be entitled to service at your location. A Lenovo technical support representative can help you determine the best alternative.

Telephone technical support

Installation and configuration support through the Customer Support Center will be available until 90 days after the option has been withdrawn from marketing. After that time, the support is cancelled, or made available for a fee, at Lenovo's discretion. Additional support is also available for a nominal fee.

Before contacting a Lenovo technical support representative, please have the following
information available: option name and number, proof of purchase, computer manufacturer, model, serial number and manual, the exact wording of any error message, description of the problem, and the hardware and software configuration information for your system.

Your technical support representative might want to walk you through the problem while you are at your computer during the call.

Telephone numbers are subject to change without notice. The most up-to-date telephone list for Lenovo Support is always available at: http://consumersupport.lenovo.com

Country or Region	Telephone Number
Argentina	0800-666-0011 (Spanish, English)
Australia	1-800-041-267 (English)
Austria	0810-100-654 (local phone) (German)
Belgium	Warrant service and support: 02-339-36-11 (Dutch, French)
Bolivia	0800-10-0189 (Spanish)

Country or Region	Telephone Number
Brazil	Calls made from within the Sao Paulo region: 11-3889-8986 Calls made from outside the Sao Paulo region: 0800-701-4815 (Portuguese)
Brunei Darussalam	800-1111 (English)
Canada	1-800-565-3344 (English, French)
Chile	800-361-213(Spanish)
China	Technical Support Line: 400-990-8888 (Mandarin)
China (Hong Kong S.A.R.)	(852) 3516-8977 (Cantonese, English, Mandarin)
China (Macau S.A.R.)	0800-807 / (852) 3071-3559 (Cantonese, English, Mandarin)
Colombia	1-800-912-3021 (Spanish)
Costa Rica	0-800-011-1029(Spanish)
Croatia	385-1-3033-120(Croatian)
Cyprus	800-92537(Greek)
Czech Republic	800-353-637(Czech)
Denmark	Warranty service and support: 7010-5150 (Danish)
Dominican Republic	1-866-434-2080(Spanish)
Ecuador	1-800-426911 (OPCION 4) (Spanish)
Egypt	Primary: 0800-0000-850 Secondary:0800-0000-744 (Arabic, English)
El Salvador	800-6264 (Spanish)
Estonia	372-66-0-800 (Estonian, Russian, English)
Finland	Warranty service and support: +358-800-1-4260(Finnish)
France	Warranty service and support (hardware): 0810-631-213(French)
Germany	Warranty service and support: 0800-500-4618 (toll-free)(German)
Greece	Lenovo Business Partner (Greek)
Guatemala	Dial 999-9190, wait for operator, and request to reach 877-404-9661 (Spanish)
Honduras	Dial 800-0123(Spanish)
Hungary	+36-13-825-716 (English, Hungarian)
India	Primary: 1800-419-4666 (Tata) Secondary: 1800-3000-8465 (Reliance) Email: commercialts@lenovo.com (English and Hindi)

Country or Region	Telephone Number
Indonesia	1-803-442-425 62 213-002-1090 (Standard Charges Apply) (English, Bahasa Indonesia)
Ireland	Warranty service and support: 01-881-1444 (English)
Israel	Givat Shmuel Service and Center: +972-3-531-3900 (Hebrew, English)
Italy	Warranty service and support: +39-800-820094 (Italian)
Japan	0120-000-817 (Japanese, English)
Kazakhstan	77-273-231-427(Standard charges Apply) (Russian , English)
Korea	1670-0088 (Collect Call) 02-3483-2829 (Toll Call) (Korean)
Latvia	371-6707-360(Latvian, Russian, English)
Lithuania	370 5278 6602(Italian, Russian, English)
Luxembourg	ThinkServer and ThinkStation: 352-360-385-343 ThinkCentre and ThinkPad: 352-360-385-222 (French)
Malaysia	1-800-88-0013 03-7724-8023 (Standard Charges Apply) (English)
Malta	356-21-445-566(English, Italian, Maltese Arabic)
Mexico	001-866-434-2080(Spanish)
Netherlands	020-513-3939 (Dutch)
New Zealand	0508-770-506 (English)
Nicaragua	001-800-220-2282 (Spanish)
Norway	8152-1550(Norwegian)
Panama	Lenovo Customer Support Center: 001-866-434(Toll-Free) (Spanish)
Peru	0-800-50-866 (OPCION 2) (Spanish)
Philippines	1-800-8908-6454 (GLOBE subscribers) 1-800-1441-0719 (PLDT subscribers) (Tagalog, English)
Poland	Laptops and tablets branded with logo Think: 48-22-273-9777 ThinkStation and ThinkServer: 48-22-878-6999 (Polish, English)
Portugal	808-225-115 (Standard Charges Apply) (Portuguese)
Romania	4-021-224-4015(Romanian)
Russia	+7-499-705-6204 +7-495-240-8558 (Standard Charges Apply)(Russian)
Singapore	1-800-415-5529 6818-5315 (Standard Charges Apply) (English, Mandarin, Bahasa Malaysia)
Slovakia	ThinkStation and ThinkServer: 421-2-4954-5555

Country or Region	Telephone Number
Slovenia	386-1-2005-60 (Slovenian)
Spain	34-917-147-833(Spanish)
Sri Lanka	+9477-7357-123 (Sumathi Information systems) (English)
Sweden	Warranty service and support: 077-117-1040 (Swedish)
Switzerland	Warranty service and support: 0800-55-54-54 (German, French, Italian)
Taiwan	0800-000-702 (Mandarin)
Thailand	001-800-4415-734 (+662) 787-3067 (Standard Charges Apply)(Thai, English)
Turkiye	444-04-26 (Turkish)
United Kingdom	Standard warranty support: 03705-500-900 (local rate) Standard warranty support: 08705-500-900(English)
United States	1-800-426-7378 (English)
Uruguay	000-411-005-6649 (Spanish)
Venezuela	0-800-100-2011 (Spanish)
Vietnam	120-11072 (Toll Free) 84-8-4458-1042 (Standard Charges Apply) (Vietnamese, English)

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Recycling information

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http://www.lenovo.com/recycling

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https://www.lenovo.com/jp/ja/services_warranty/recycle/pcrecycle/
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If you are a company employee and need to dispose of a Lenovo computer or monitor that is the property of the company, you must do so in accordance with the Law for Promotion of Effective Utilization of Resources. Computers and monitors are categorized as industrial waste and should be properly disposed of by an industrial waste disposal contractor certified by a local government. In accordance with the Law for Promotion of Effective Utilization of Resources, Lenovo Japan provides, through its PC Collecting and Recycling Services, for the collecting, reuse, and recycling of disused computers and monitors. For details, visit the Lenovo Web site at https://www.lenovo.com/jp/ja/services_warranty/recycle/pcrecycle/. Pursuant to the Law for Promotion of Effective Utilization of Resources, the collecting and recycling of home-used computers and monitors by the manufacturer was begun on October 1, 2003. This service is provided free of charge for home-used computers sold after October 1, 2003. For details, visit the Lenovo Web site at https://www.lenovo.com/jp/ja/services_warranty/recycle/personal/.

Disposing of Lenovo computer components

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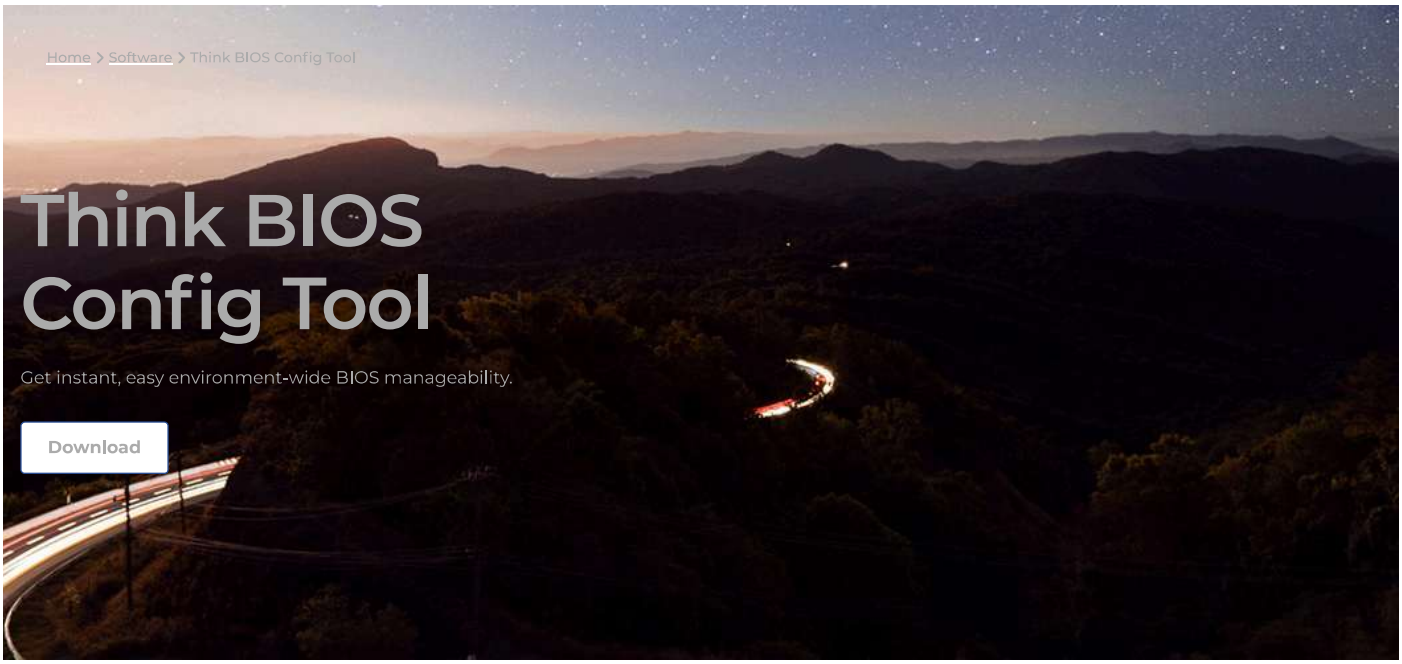

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Think BIOS Config Tool from Lenovo is a free, lightweight HTML Application (HTA) tool designed to let IT view and update BIOS settings directly or remotely from a simple Graphic User Interface (GUI), allowing for the automation of BIOS configurations with a simple initialization file (INI).

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- Affinity Program
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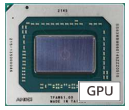
PowerColor RX 6400 Low Profile

AXRX 6400 LP 4GBD6-DH

Report an Error

Navi 24	768	48	32	4 GB	GDDR6	64 bit
GRAPHICS PROCESSOR	CORES	TMUS	ROPS	MEMORY SIZE	MEMORY TYPE	BUS WIDTH



Graphics Processor

GPU Name:	Navi 24
GPU Variant:	Navi 24 XL (215-135000046)
Architecture:	RDNA 2.0
Foundry:	TSMC
Process Size:	6 nm

Graphics Card

Release Date:	Jan 19th, 2022
Availability:	Apr 20th, 2022
Generation:	Navi II (RX 6000)
Predecessor:	Navi
Successor:	Navi III

Clock Speeds

Base Clock:	1923 MHz
Game Clock:	2039 MHz
Boost Clock:	2321 MHz
Memory Clock:	2000 MHz 16 Gbps effective

Memory

Memory Size:	4 GB
Memory Type:	GDDR6
Memory Bus:	64 bit
Bandwidth:	128.0 GB/s

Theoretical Performance

Render Config

Jul 14th, 2025 15:01 -03 change timezone

Search TechPowerUp

Sign in / Register

Latest GPU Drivers

NVIDIA GeForce 576.88 WHQL
AMD Radeon 25.6.3 Beta
Intel Arc & iGPU 101.6913 WHQL

New Forum Posts

14:58 by Frick
AMD 7Ghz? This keeps popping up on my feeds! (4)

14:55 by lexluthermiester
What's your latest tech purchase? (24264)

14:54 by lexluthermiester
i7 2860QM how to raise power limit? (19)

14:42 by Yukikaze
Stupid things one has done with hardware (42)

14:33 by LastDudeALive
What is the latest game you finished or 100% (38)

14:27 by lilhasselhoffer
No offense, here are some things that bother me about your understanding of fans. (102)

14:25 by freeagent
Free Games Thread (4800)

14:24 by freeagent
9800x3D - 6400 CL32 1:1 not stable (23)

Transistors:	5,400 million
Density:	50.5M / mm²
Die Size:	107 mm²

Graphics Features

DirectX:	12 Ultimate (12_2)
OpenGL:	4.6
OpenCL:	2.2
Vulkan:	1.3
Shader Model:	6.8

Production:	Active
Bus Interface:	PCIe 4.0 x4

Board Design

Slot Width:	Single-slot
Length:	155 mm 6.1 inches
Width:	120 mm 4.7 inches
Height:	18 mm 0.7 inches
TDP:	53 W
Suggested PSU:	250 W
Outputs:	1x HDMI 2.1 1x DisplayPort 1.4a
Power Connectors:	None
Board Number:	D634

Pixel Rate:	74.27 GPixel/s
Texture Rate:	111.4 GTexel/s
FP16 (half):	7.130 TFLOPS (2:1)
FP32 (float):	3.565 TFLOPS
FP64 (double):	222.8 GFLOPS (1:16)

Shading Units:	768
TMUs:	48
ROPs:	32
Compute Units:	12
RT Cores:	12
L0 Cache:	32 KB per WGP
L1 Cache:	128 KB per Array
L2 Cache:	1024 KB
L3 Cache:	16 MB

Navi 24 GPU Notes

```
Generation: Navi II
Codename: Beige Goby
Ray Tracing Cores: 1st Gen
Infinity Cache: 1st Gen
Graphics/Compute: 10.3.5
Shader ISA: GFX10.3 (gfx1034)
Display Core Next: 3.0.3
Video Core Next: 3.0.33
System DMA: 5.2.5
Platform Security Processor: 11.0.13

Per SIMD32:
- 10 KB Scalar Register File

Per CU:
- 16 KB Vector Data Cache
- 64 KB Local Data Share (GCN-Mode)

Per WGP:
- 16 KB Scalar Data Cache / K Cache
- 32 KB Instruction Cache
- 128 KB Local Data Share

Latest Drivers:
Windows 7:
64-bit: AMD Software: Adrenalin Edition 22.6.1

Windows 10 / 11:
64-bit: AMD Software: Adrenalin Edition: Latest
64-bit: AMD Software: PRO Edition 22.Q4
```

Other retail boards based on this design (15)

14:15 by Iexluthermiester
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14:12 by VuurVOS
5700 to xt vbios flashing issue (14)

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Intel's Core Ultra 7 265K and 265KF CPUs Dip Below $250 (288)

Some Intel Nova Lake CPUs Rumored to Challenge AMD's 3D V-Cache in Desktop

Name	GPU Clock	Boost Clock	Memory Clock	Other Changes
ASRock RX 6400 Challenger ITX	1923 MHz	2321 MHz	2000 MHz	162 mm/6.4 inches, Dual-slot
ASRock RX 6400 Low Profile	1923 MHz	2321 MHz	2000 MHz	150 mm/5.9 inches
ASUS DUAL RX 6400	1923 MHz	2321 MHz	2000 MHz	201 mm/7.9 inches, Dual-slot
ASUS PHOENIX RX 6400	1923 MHz	2321 MHz	2000 MHz	196 mm/7.7 inches, Dual-slot
BIOSTAR RX 6400	1923 MHz	2321 MHz	2000 MHz	185 mm/7.3 inches
GIGABYTE RX 6400 EAGLE	1923 MHz	2321 MHz	2000 MHz	192 mm/7.6 inches, Dual-slot
GIGABYTE RX 6400 Low Profile	1923 MHz	2321 MHz	2000 MHz	182 mm/7.2 inches, Dual-slot
KUROUTOSHIKOU RX 6400 Low Profile	1923 MHz	2321 MHz	2000 MHz	155 mm/6.1 inches
MSI RX 6400 AERO ITX	1923 MHz	2321 MHz	2000 MHz	172 mm/6.8 inches, Dual-slot
PowerColor RX 6400 ITX	1923 MHz	2321 MHz	2000 MHz	165 mm/6.5 inches, Dual-slot
PowerColor RX 6400 Low Profile	1923 MHz	2321 MHz	2000 MHz	155 mm/6.1 inches
Sapphire PULSE RX 6400	1923 MHz	2321 MHz	2000 MHz	170 mm/6.7 inches, 55 W
VASTARMOR RX 6400 EXPLORER	1923 MHz	2321 MHz	2000 MHz	155 mm/6.1 inches
XFX Speedster SWFT105 RX 6400	1923 MHz	2321 MHz	2000 MHz	155 mm/6.1 inches

Gaming (140)
AMD Radeon RX 9070 XT Gains 9% Performance at 1440p with Latest Driver, Beats RTX 5070 Ti (131)
NVIDIA Launches GeForce RTX 5050 for Desktops and Laptops, Starts at $249 (122)
NVIDIA GeForce RTX 5080 SUPER Could Feature 24 GB Memory, Increased Power Limits (115)
Microsoft Partners with AMD for Next-gen Xbox Hardware (105)
Intel "Nova Lake-S" Series: Seven SKUs, Up to 52 Cores and 150 W TDP (100)
NVIDIA DLSS Transformer Cuts VRAM Usage by 20% (97)

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OVERVIEW

1. DisplayPort 1.2	3. VGA
2. HDMI 1.4	

PERFORMANCE

Panel

Panel

3-side NearEdgeless, In-Plane Switching

Backlight

WLED

Display Size

23.8 inches

Max View Area

- Active Area: 527.0 x 296.5 mm
- Screen Dimension: 535 x 313 mm

Resolution

1920 x 1080

Aspect Ratio

16:9

Pixel Pitch

0.2745 x 0.2745 mm

Dot / Pixel Per Inch

92 dpi

Brightness

250 cd/m²

Contrast Ratio

- Contrast Ratio: 1300:1
- Dynamic Contrast Ratio (Typical): 3000000:1

View Angle (H / V)

Horizontal: 178°, Vertical: 178°

Response Time

- Extreme Mode: 4 ms
- Normal Mode: 6 ms

Refresh Rate

100Hz

Color Gamut

Coverage Ratio: 99% sRGB (CIE 1931)

Color Support

16.7 Million

Color Depth

8-bit (6-bit+FRC)

Screen Surface Treatment

Anti-glare

Curvature

Flat Panel

Operating System

Operating System

- Windows® 11 Support
- Windows® 10 Support

Multi-Media

Speakers

Integrated Speakers, 2W x2

Power Supply

Power Consumption

- Typical / Max: 13W / 24W
- Sleep / Off mode: <0.5W
- Switch-off Mode: <0.3W
- Energy Star Power On: 11.8W
- Energy Star TEC: 40.5kWh
- Internal Power Supply

Voltage Required

AC 100 to 240 V (50-60Hz)

Special Features

Special Features

Natural Low Blue Light

DESIGN

Mechanical

ThinkCentre® M Series Support

To support Tiny devices, an additional ThinkCentre® Tiny VESA Mount (PN:4XF0N03161) is required (sold separately).

Bezel Width

- Side: 2.0mm
- Top: 2.0mm
- Bottom: 21.4mm

Cable Management

Support

Case Color

Raven black

Dimensions (WxDxH)[1]

Models	Dimensions
Lowest Position	539.8 x 178.6 x 343.4 mm (21.25 x 7.03 x 13.52 inches)
Highest Position	539.8 x 178.6 x 498.4 mm (21.25 x 7.03 x 19.62 inches)
Head Only	539.8 x 44.0 x 325.7 mm (21.25 x 1.73 x 12.82 inches)

Packaging Dimensions (WxDxH)

710.0 x 111.0 x 421.0 mm (27.95 x 4.37 x 16.57 inches)

Weight[2]

Models	Weight
Monitor With Stand	4.5 kg (9.9 lbs)
Monitor Head Only	2.9 kg (6.4 lbs)

Packaging Weight

6.4 kg (14.1 lbs)

Mounting

Supports VESA mount 100 x 100 mm

Stand

Supports -5° to +22° tilt, left & right 360° swivel, -90° to +90° pivot, up to 155mm lift

In the Box

- Monitor with stand
- 1x HDMI® 1.4 cable (1.8m)
- 1x Power cable (1.8m)
- 4x Screws
- Quick setup guide

Notes:

[1] The system dimensions may vary depending on configurations.

[2] The system weight is approximate and based on results in Lenovo® lab, which varies depending on the source of component, variance of the distribution of each component, and manufacturing process. It may not be the exact weight for each specific model.

CONNECTIVITY

Ports[1]

Rear Ports

- 1x HDMI® 1.4, supports 1920x1080@100Hz
- 1x DisplayPort™ 1.2
- 1x VGA

Notes:

[1] The transfer speed of following ports will vary and, depending on many factors, such as the processing speed of the host device, file attributes and other factors related to system configuration and your operating environment, will be slower than theoretical speed.
USB 2.0: 480 Mbit/s;
USB 3.2 Gen 1 (SuperSpeed USB 5Gbps, formerly USB 3.0 / USB 3.1 Gen 1): 5 Gbit/s;
USB 3.2 Gen 2 (SuperSpeed USB 10Gbps, formerly USB 3.1 Gen 2): 10 Gbit/s;
USB4® 20Gbps / USB 3.2 Gen 2x2 (SuperSpeed USB 20Gbps): 20 Gbit/s;
USB4® 40Gbps (USB 40Gbps): 40 Gbit/s;
Thunderbolt™ 3/4: 40 Gbit/s.

SECURITY & PRIVACY

Security

Physical Locks

Kensington® Nano Security Slot™ (2.5 mm x 6 mm)

SERVICE

Warranty

Base Warranty

3-year limited warranty

CERTIFICATIONS

Green Certifications[1]

Green Certifications

- ENERGY STAR® Certified
- EPEAT™ Gold Registered
- EU Energy Label (C-class)
- TCO Certified 10.0
- TCO Edge 2.1

Notes:

[1] The items listed under the "Green Certifications" section may not only refer to certification but also registration or self-declaration. For ESG & regulatory compliance documents, please visit https://compliance.lenovo.com.

Other Certifications

Other Certifications

- TÜV Rheinland® Flicker Free
- TÜV Rheinland® Low Blue Light (Hardware Solution)

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Amplify.

01
Amplify.

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Conformity Certificate

Nº 437.001/22

A ABNT concede a Licença para uso da Marca ABNT de Qualidade Ambiental – Rotulagem ambiental tipo I ABNT – para a Empresa: Lenovo Tecnologia Brasil Ltda.
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Lenovo Tecnologia Brasil Ltda.
CNPJ: 07.275.920/0001-61

Para o(s) produto(s):
To the following product(s):

(Descritos na página 2)

Produzido(s) na unidade localizada em:
Produced in the unit located at:

Estrada Municipal José Costa de Mesquita, 200
MOD 1 à 11 – Chácara Alvorada
13337-200 - Indaiatuba – SP

Atendendo aos requisitos do Documento:
Meeting the requirements of the Document:

PE-351 - Rótulo Ecológico para bens de Informática.

Desenvolvidos em conformidade com as Normas:
Developed according to the Standards:

ABNT NBR ISO 14020:2002
ABNT NBR ISO 14024:2022

Sistema de Certificação: Sistema 5
Certification System: System 5

Primeira concessão: 20/06/2022
First concession:

Período de validade:
Validity period:

20/06/2025 a 20/06/2028

Rio de Janeiro, 14 de julho de 2025.

Guy Ladvocat
Gerente de Certificação de Sistemas
Systems Certification Manager

Este certificado está sujeito ao contínuo atendimento ao Procedimento Geral da Marca ABNT Qualidade Ambiental bem como aos requisitos das Normas acima, sendo válido somente em original e com o timbre da ABNT em alto-relevo seco, assinado pelo Gerente de Certificação de Sistemas. Sua validade pode ser confirmada no seguinte endereço eletrônico: www.abnt.org.br. CNPJ: 33.402.892/0001-06 – Tel.: (21) 3974-2300.
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Rua Conselheiro Nebias, 1131- Campos Elíseos - São Paulo - SP - CEP 01203-002

CERTIFICADO DE CONFORMIDADE
Conformity Certificate

Nº 437.001/22

Para o(s) produto(s):
To the following product(s):

Produto	Família	Modelo
Desktop	ThinkCentre	Neo 50s Gen4 SFF
		Neo 50q Gen4 Tiny
		Neo 50s Gen 5 Intel IRL-R
		N30s Gen 5 Intel SFF
		N50q Gen 5 Intel Tiny
		M70q Gen4 Tiny
		M70q Gen 5 Intel IRL-R
		M70q Gen 6 Intel Tiny
		M70s Gen 5 Intel IRL-R
		M70s Gen 6 Intel SFF
		M75q gen2 Tiny
		M75s gen2 SFF
		M75q Gen 5 AMD APH
		M75s Gen 5 AMD APH
		M80q gen3 Tiny
		M90q Gen 5 Intel IRL-R
		M90q Gen 6 Intel Tiny
Workstation	ThinkStation	P2 Gen 2 TWR
		P3 Gen 2 TWR
Desktop		P3 TWR
Notebook	ThinkPad	100e Chromebook Gen 3 Intel IJP
		E14 Gen4
		E14 Gen5 AMD
		E14 Gen 6 Intel IMH
		E14 Gen 6 AMD AHU
		E14 Gen 7 AMD
		E14 Gen 7 Intel
		T14 Gen4 Intel
		T14 Gen 5 Intel IML
		T14 Gen 6 Intel
		P16v Gen 2 Intel IMH.
Notebook	-	P16v Gen 3 Intel ARL

Revisão	
Nº	Justificativa
5	**Inclusão no escopo: Notebook** ThinkPad E14 Gen 7 Intel ARL; Notebook ThinkPad T14 Gen 6 Intel ARL; Notebook ThinkPad E14 Gen 7 AMD AHP; Notebook P16v Gen 3 Intel ARL; Workstation ThinkStation P2 TWR Gen 2; Workstation ThinkStation P3 TWR Gen 2; Desktop ThinkCentre M70s Gen 6; Desktop ThinkCentre N30s Gen 5; Desktop ThinkCentre M90q Gen 6; Desktop ThinkCentre M70q Gen 6; Desktop ThinkCentre N50q Gen 5. **Exclusão dos escopo:** Notebook: ThinkPad 14 Gen 6 Intel IRL; ThinkPad 16 Gen 6 Intel IRL; L14 gen2 Intel; E14 gen3 AMD; T14 gen2 Intel; T14 Gen 3; L14 Gen3; ThinkPad E15 Gen4 Intel; K14(AMD); Desktop: M70q gen3 Tiny; M80q gen3 Tiny; M80s gen3 SFF; M80q Gen4 Tiny; M90s Gen4 SFF; Workstation: P360 TWR; P348 TWR;

Este certificado cancela e substitui a versão anterior.

Rio de Janeiro, 14 de julho de 2025.

Este certificado está sujeito ao contínuo atendimento ao Procedimento Geral da Marca ABNT Qualidade Ambiental bem como aos requisitos das Normas acima, sendo válido somente em original e com o timbre da ABNT em alto-relevo seco, assinado pelo Gerente de Certificação de Sistemas. Sua validade pode ser confirmada no seguinte endereço eletrônico: www.abnt.org.br. CNPJ: 33.402.892/0001-06 – Tel.: (21) 3974-2300
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Rua Conselheiro Nebias, 1131- Campos Elíseos - **São Paulo** - SP - CEP 01203-002

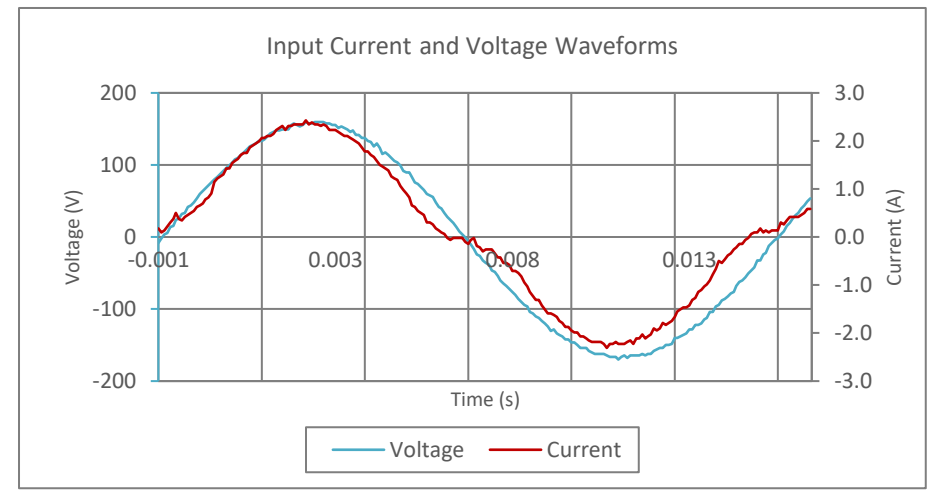
80 PLUS Verification and Testing Report

TYPICAL EFFICIENCY (50% Load):	**92.74%**
AVERAGE EFFICIENCY :	**91.28%**
80 PLUS COMPLIANT:	**YES**

ID Number	5426
Manufacturer	Lenovo (United States),Inc.
Model Number	Lenovo (PCJ007)
Serial Number	N/A
Year	2018
Type	SFX
Test Date	11/20/18

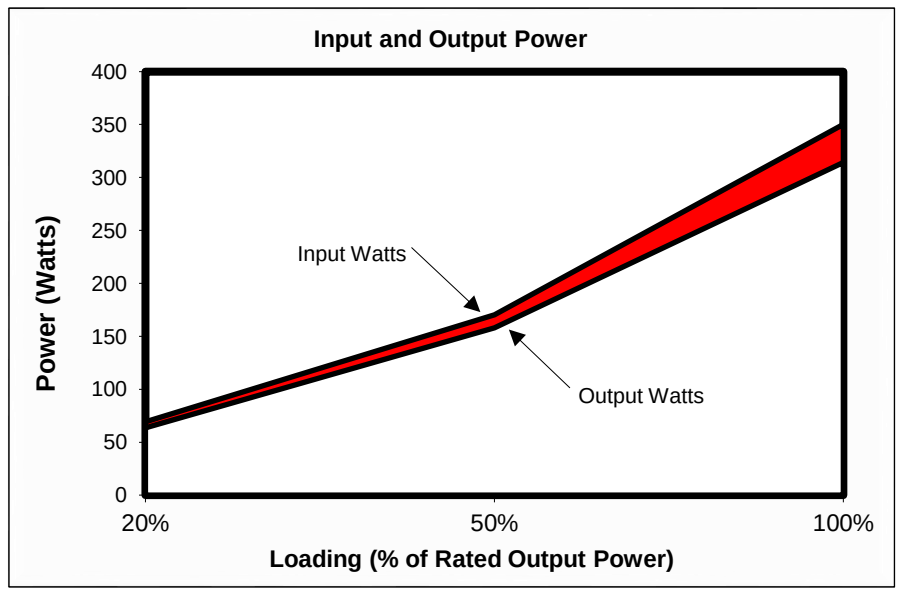
Rated Specifications	Value	Units
Input Voltage	100-240	Volts
Input Current	4	Amps
Input Frequency	50/60	Hz
Rated Output Power	**310**	**Watts**

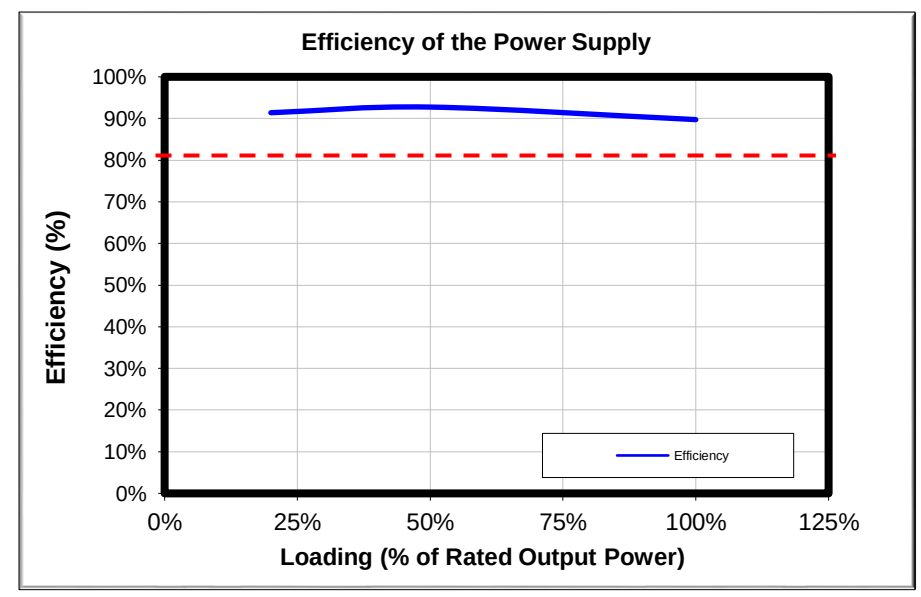
Note: All measurements were taken with input voltage at 115 V nominal at 60 Hz.



Input AC Current Waveform (ITHD = 14.35%, 50% Load)

I_{RMS}	PF	I_{THD}	Load	Input Watts	DC Terminal Voltage (V)/ DC Load Current (A)		Output Watts	Efficiency
					12V (cumulative of 12V1, 12V2, etc.)	-12V		
0.32	0.95	22.47%	10%	35.32	12.22/2.56	11.86/0.02	31.50	**89.17%**
0.62	0.96	22.23%	20%	69.29	12.21/5.15	11.9/0.04	63.32	**91.38%**
1.50	0.99	14.35%	50%	170.34	12.17/12.88	11.93/0.1	157.97	**92.74%**
3.07	0.99	7.87%	100%	350.20	12.11/25.74	12.2/0.2	314.24	**89.73%**





PLUG LOAD solutions

These tests were conducted by a third party independent testing firm on behalf of the 80 PLUS Program. 80 PLUS is a certification program to promote highly-efficient power supplies (greater than 80% efficiency in the active mode) in technology applications. *http://www.80plus.org/*

80 PLUS®

Visão geral do BitLocker

Artigo • 11/11/2023 •

Aplica-se a: ✅ Windows 11, ✅ Windows 10, ✅ Windows Server 2022, ✅ Windows Server 2019, ✅ Windows Server 2016

O BitLocker é um recurso de segurança do Windows que fornece criptografia para volumes inteiros, abordando as ameaças de roubo ou exposição de dispositivos perdidos, roubados ou desativados inadequadamente.

Aplicações práticas

Os dados em um dispositivo perdido ou roubado são vulneráveis ao acesso não autorizado, seja executando uma ferramenta de ataque de software contra ele ou transferindo o disco rígido do dispositivo para um dispositivo diferente. O BitLocker ajuda a mitigar o acesso não autorizado a dados, aprimorando as proteções de arquivos e do sistema, tornando os dados inacessíveis quando dispositivos protegidos pelo BitLocker são desativados ou reciclados.

BitLocker e TPM

O BitLocker fornece proteção máxima quando usado com um TPM (Trusted Platform Module), que é um componente de hardware comum instalado em dispositivos Windows. O TPM funciona com o BitLocker para garantir que um dispositivo não tenha sido adulterado enquanto o sistema estiver offline.

Além do TPM, o BitLocker pode bloquear o processo normal de inicialização até que o usuário forneça um PIN (número de identificação pessoal) ou insira um dispositivo removível que contenha uma *chave de inicialização*. Essas medidas de segurança fornecem autenticação multifator e garantia de que o dispositivo não pode iniciar ou retomar da hibernação até que o PIN ou a chave de inicialização corretos sejam apresentados.

Em dispositivos que não têm um TPM, o BitLocker ainda pode ser usado para criptografar a unidade do sistema operacional. Essa implementação requer que o usuário:

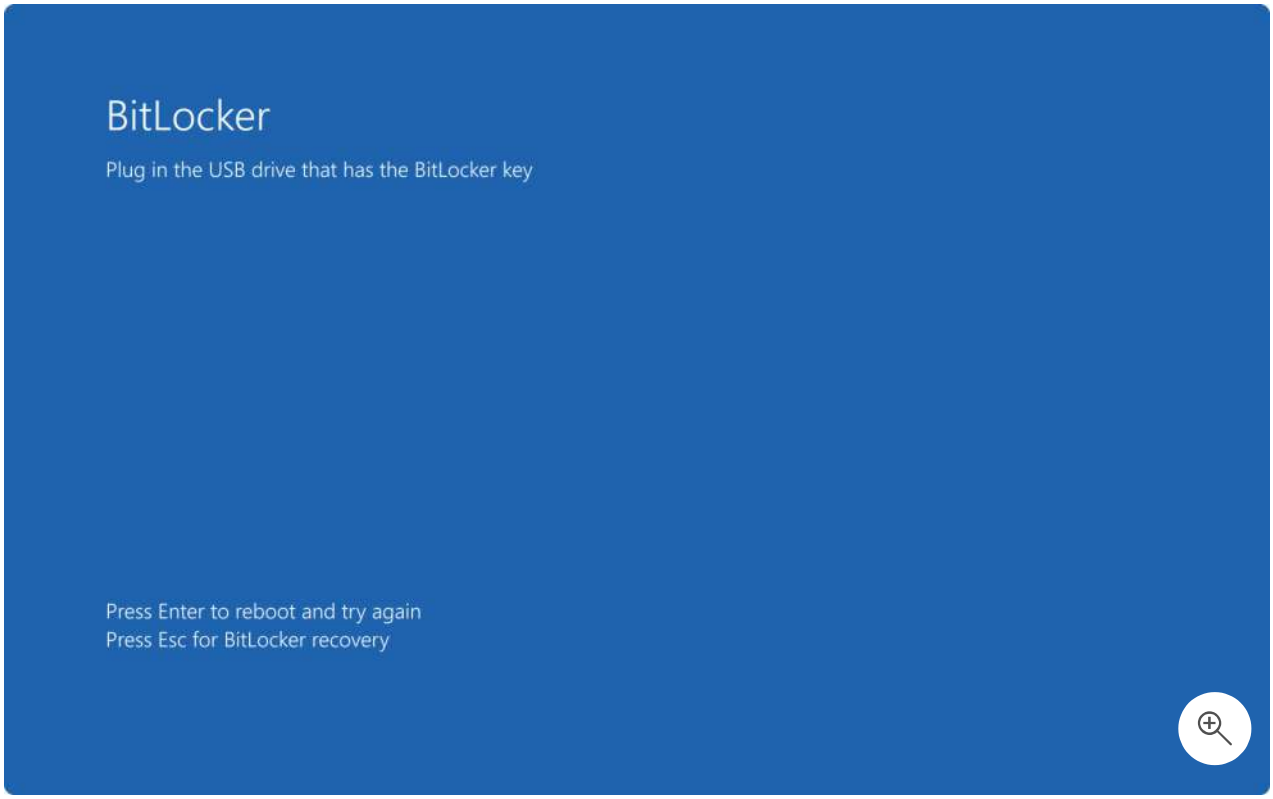
- use uma chave de inicialização, que é um arquivo armazenado em uma unidade removível que é usada para iniciar o dispositivo ou ao retomar da hibernação
- use uma senha. Essa opção não é segura, pois está sujeita a ataques de força bruta, pois não há uma lógica de bloqueio de senha. Como tal, a opção de senha é desencorajada e desabilitada por padrão

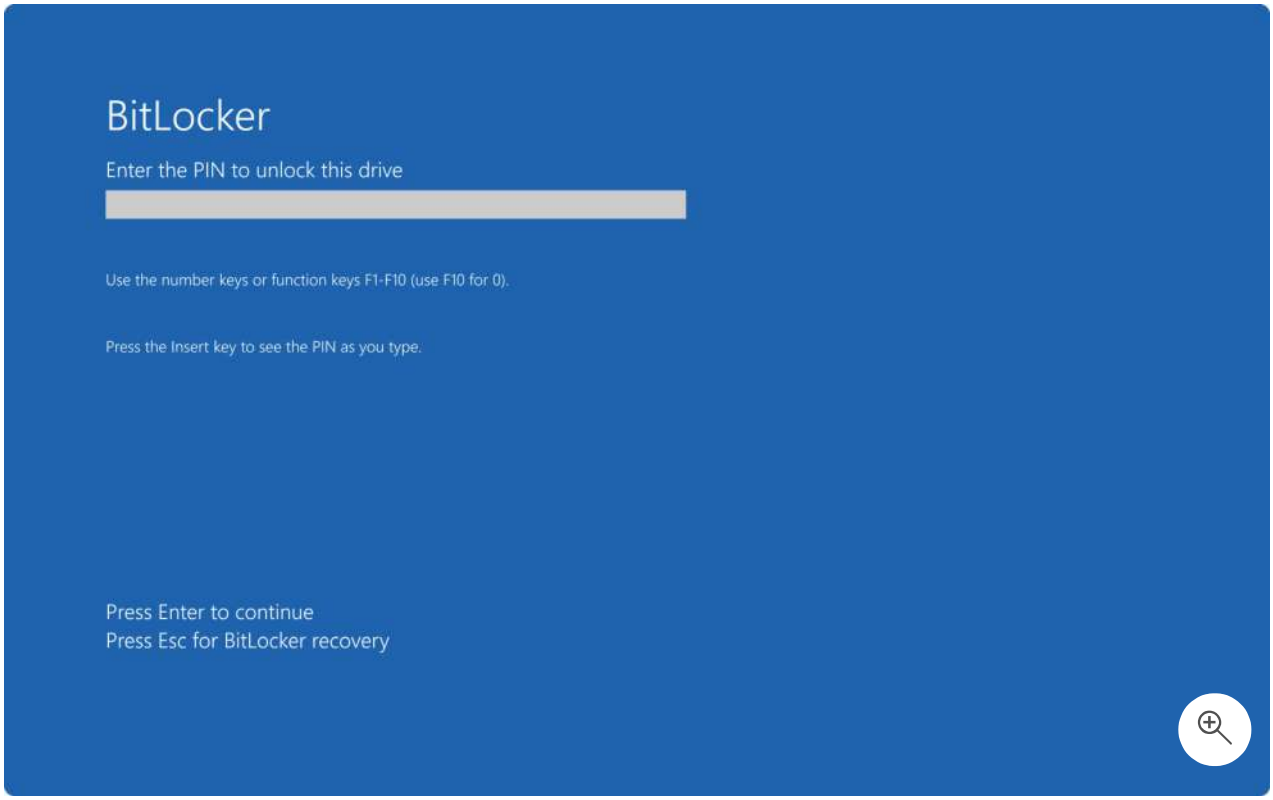
Ambas as opções não fornecem a verificação de integridade do sistema de pré-inicialização oferecida pelo BitLocker com um TPM.

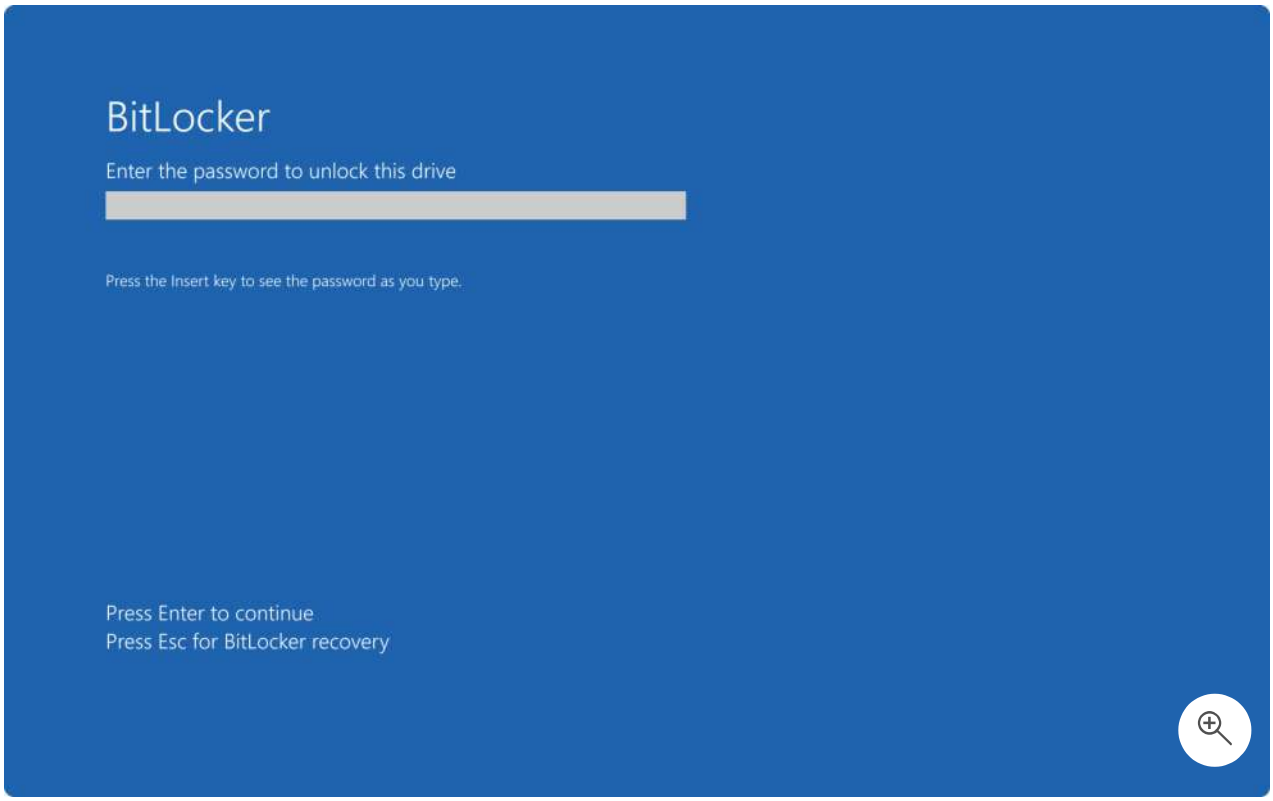
Tela de pré-inicialização do BitLocker com a chave de inicialização:

Tela de pré-inicialização do BitLocker com PIN:

Tela de pré-inicialização do BitLocker com senha:







Requisitos de sistema

O BitLocker tem os seguintes requisitos:

- Para que o BitLocker use a integridade do sistema marcar fornecida por um TPM, o dispositivo deve ter versões TPM 1.2 ou posteriores. Se um dispositivo não tiver um TPM, salvar uma chave de inicialização em uma unidade removível será obrigatório ao habilitar o BitLocker
- Um dispositivo com um TPM também deve ter um firmware BIOS ou UEFI compatível com o Grupo de *Computação Confiável* (TCG). O firmware BIOS ou UEFI estabelece uma cadeia de confiança para a inicialização de pré-inicialização e deve incluir suporte para *a Medida de Confiança estática especificada pelo TCG*. Um computador sem um TPM não requer firmware compatível com TCG
- O firmware BIOS ou UEFI do sistema (para dispositivos TPM e não TPM) deve dar suporte à classe de dispositivo de armazenamento em massa USB e ler arquivos em uma unidade USB no ambiente de pré-inicialização

> **Observação**
>
> O TPM 2.0 não tem suporte nos modos *CSM (Legacy and Compatibility Support Module)* do BIOS. Os dispositivos com TPM 2.0 devem ter o modo BIOS configurado apenas como UEFI nativo. As opções Herdada e CSM devem ser desabilitadas. Para obter mais segurança, habilite o recurso *de inicialização segura* .

O sistema operacional instalado no hardware no modo Herdado impede que o sistema operacional inicialize quando o modo BIOS é alterado para UEFI. Use a ferramenta mbr2gpt.exe antes de alterar o modo BIOS, que prepara o sistema operacional e o disco para dar suporte à UEFI.

- O disco rígido deve ser particionado com pelo menos duas unidades:
  - A *unidade do sistema operacional* (ou unidade de inicialização) contém o sistema operacional e seus arquivos de suporte. Ele deve ser formatado com o sistema de arquivos NTFS
  - A *unidade do sistema* contém arquivos necessários para inicializar, descriptografar e carregar o sistema operacional. O BitLocker não está habilitado nesta unidade. Para que o BitLocker funcione, a unidade do sistema:
    - não deve ser criptografado
    - deve ser diferente da unidade do sistema operacional
    - deve ser formatado com o sistema de arquivos FAT32 em computadores que usam firmware baseado em UEFI ou com o sistema de arquivos NTFS em computadores que usam firmware BIOS
    - É recomendável que seja de aproximadamente 350 MB de tamanho. Depois que o BitLocker estiver ativado, ele deverá ter aproximadamente 250 MB de espaço livre

    Importante

    Quando instalado em um novo dispositivo, o Windows cria automaticamente as partições necessárias para o BitLocker.

    Se a unidade foi preparada como um único espaço contíguo, o BitLocker exigirá um novo volume para manter os arquivos de inicialização. `BdeHdCfg.exe` pode criar o volume. Para obter mais informações sobre como usar a ferramenta, consulte Bdehdcfg na Referência de Command-Line.

Observação

Ao instalar o componente opcional BitLocker em um servidor, o recurso *de Armazenamento Aprimorado* deve ser instalado. O recurso é usado para dar suporte a unidades criptografadas por hardware.

Edição do Windows e requisitos de licenciamento

A tabela a seguir lista as edições do Windows que dão suporte à habilitação do BitLocker:

Expandir a tabela

Windows Pro	Windows Enterprise	Windows Pro Education/SE	Windows Education
Sim	Sim	Sim	Sim

Os direitos de licença de habilitação do BitLocker são concedidos pelas seguintes licenças:

Expandir a tabela

Windows Pro/Pro Education/SE	Windows Enterprise E3	Windows Enterprise E5	Windows Education A3	Windows Education A5
Sim	Sim	Sim	Sim	Sim

Para obter mais informações sobre o licenciamento do Windows, consulte Visão geral do licenciamento do Windows.

> **Observação**
>
> Os requisitos de licenciamento para habilitação do BitLocker são diferentes dos requisitos de licenciamento para o *gerenciamento* do BitLocker. Para saber mais, examine o guia de instruções: **configurar o BitLocker**.

Criptografia do dispositivo

A criptografia do dispositivo é um recurso do Windows que fornece uma maneira simples para alguns dispositivos habilitar a criptografia BitLocker automaticamente. A criptografia de dispositivo está disponível em todas as versões do Windows e requer que um dispositivo atenda aos requisitos de segurança de Espera Moderna ou HSTI. A criptografia de dispositivo não pode ter portas acessíveis externamente que permitem o acesso ao DMA.

> **Importante**
>
> A criptografia do dispositivo criptografa apenas a unidade do sistema operacional e as unidades fixas, ela não criptografa unidades externas/USB.

Ao contrário de uma implementação padrão do BitLocker, a criptografia de dispositivo é habilitada automaticamente para que o dispositivo sempre esteja protegido. Quando uma instalação limpo do Windows é concluída e a experiência fora de caixa é concluída, o dispositivo é preparado para o primeiro uso. Como parte dessa preparação, a criptografia do dispositivo é inicializada na unidade do sistema operacional e unidades de dados fixas no computador com uma chave clara que é equivalente ao estado suspenso padrão do BitLocker. Nesse estado, a unidade é mostrada com um ícone de aviso no Windows Explorer. O ícone de aviso amarelo é removido depois que o protetor TPM é criado e a chave de recuperação é apoiada.

- Se o dispositivo estiver Microsoft Entra ingressado ou o domínio do Active Directory for ingressado, a chave clara será removida depois que a chave de recuperação fizer backup com êxito em Microsoft Entra ID ou Active Directory Domain Services (AD DS). As seguintes configurações de política devem ser habilitadas para que a chave de recuperação seja apoiada: escolha como as unidades do sistema operacional protegidas pelo BitLocker podem ser recuperadas
  - Para Microsoft Entra dispositivos ingressados: a senha de recuperação é criada automaticamente quando o usuário se autentica para Microsoft Entra ID, em seguida, a chave de recuperação é apoiada para Microsoft Entra ID, o protetor TPM é criado e a chave clara é removida
  - Para dispositivos ingressados no AD DS: a senha de recuperação é criada automaticamente quando o computador entra no domínio. A chave de recuperação é então apoiada no AD DS, o protetor TPM é criado e a chave clara é removida
- Se o dispositivo não estiver Microsoft Entra ingressado ou o domínio do Active Directory ingressado, será necessária uma conta microsoft com privilégios administrativos no dispositivo. Quando o administrador usa uma conta da Microsoft para entrar, a chave limpa é removida, uma chave de recuperação é carregada para a conta da Microsoft online e um protetor TPM é criado. Se um dispositivo exigir a chave de recuperação, o usuário será guiado a usar um dispositivo alternativo e navegar até uma URL de acesso de chave de recuperação para recuperar a chave de recuperação usando suas credenciais de conta Microsoft
- Se um dispositivo usa apenas contas locais, ele permanecerá desprotegido, mesmo que os dados sejam criptografados

> **ⓘ Importante**
>
> A criptografia do dispositivo usa o `XTS-AES 128-bit` método de criptografia, por padrão. Caso configure uma configuração de política para usar um método de criptografia diferente, você pode usar a Página de Status de Registro para evitar que o dispositivo inicie a criptografia com o método padrão. O BitLocker tem uma lógica que não começa a criptografar até o final do OOBE, depois que a fase de configuração do dispositivo da Página de Status de Registro for concluída. Essa lógica dá a um dispositivo tempo suficiente para receber as configurações de política do BitLocker antes de iniciar a criptografia.
>
> Se um método de criptografia diferente e/ou força de codificação for necessário, mas o dispositivo já estiver criptografado, ele deverá primeiro ser descriptografado antes que o novo método de criptografia e/ou a força da criptografia possam ser aplicados. Depois que o dispositivo for descriptografado, você poderá aplicar diferentes configurações do BitLocker.

Se um dispositivo não se qualificar inicialmente para criptografia de dispositivo, mas uma alteração for feita que faça com que o dispositivo se qualifique (por exemplo, ativando *a Inicialização Segura*), a criptografia do dispositivo habilita o BitLocker automaticamente assim que ele o detecta.

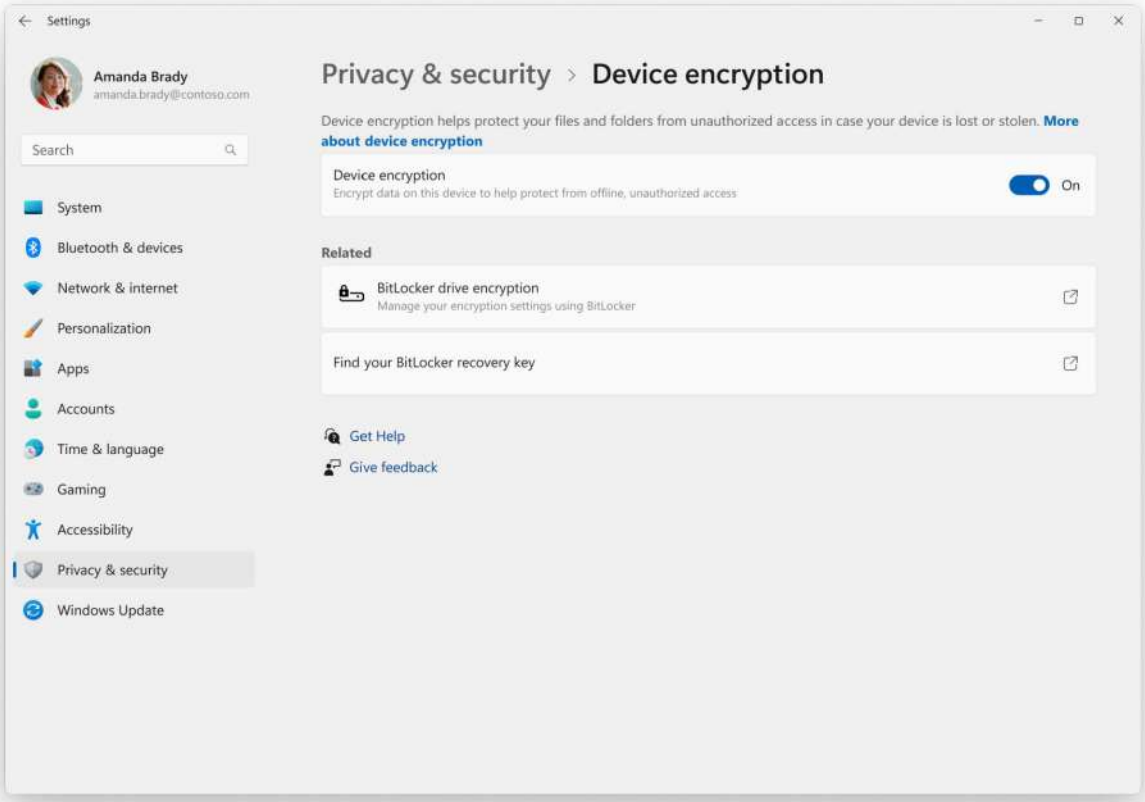
Você pode marcar se um dispositivo atende aos requisitos de criptografia de dispositivo no aplicativo Informações do Sistema (`msinfo32.exe`). Se o dispositivo atender aos requisitos, as Informações do Sistema mostrarão uma linha que diz:

Expandir a tabela

Item	Valor
Suporte à criptografia de dispositivo	Atende aos pré-requisitos

Diferença entre o BitLocker e a criptografia do dispositivo

- A criptografia do dispositivo ativa o BitLocker automaticamente em dispositivos qualificados para criptografia de dispositivo, com a chave de recuperação automaticamente em backup até Microsoft Entra ID, AD DS ou a conta Microsoft do usuário
- A criptografia do dispositivo adiciona uma configuração de criptografia de dispositivo no aplicativo Configurações, que pode ser usada para ativar ou desativar a criptografia do dispositivo
  - A interface do usuário de configurações não mostra a criptografia do dispositivo habilitada até que a criptografia seja concluída



> **Observação**

Se a criptografia do dispositivo estiver desativada, ela não se habilitará automaticamente no futuro. O usuário deve habilitá-lo manualmente em Configurações

Desabilitar a criptografia do dispositivo

É recomendável manter a criptografia do dispositivo ativada para todos os sistemas que o dão suporte. No entanto, você pode impedir o processo de criptografia automática do dispositivo alterando a seguinte configuração de registro:

Expandir a tabela

Caminho	Nome	Tipo	Valor
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\BitLocker	PreventDeviceEncryption	REG_DWORD	0x1

Para obter mais informações sobre criptografia de dispositivo, consulte Requisitos de hardware de criptografia de dispositivo BitLocker.

Próximas etapas

Saiba mais sobre tecnologias e recursos para proteger contra ataques na chave de criptografia BitLocker:

Contramedidas do BitLocker >

Comentários

Esta página foi útil? Yes No

Fornecer comentários sobre o produto

Security policy settings

Artigo • 19/04/2017

Applies to

- Windows 10
- Windows 11

This reference topic describes the common scenarios, architecture, and processes for security settings.

Security policy settings are rules that administrators configure on a computer or multiple devices for protecting resources on a device or network. The Security Settings extension of the Local Group Policy Editor snap-in allows you to define security configurations as part of a Group Policy Object (GPO). The GPOs are linked to Active Directory containers such as sites, domains, or organizational units, and they enable you to manage security settings for multiple devices from any device joined to the domain. Security settings policies are used as part of your overall security implementation to help secure domain controllers, servers, clients, and other resources in your organization.

Security settings can control:

- User authentication to a network or device.
- The resources that users are permitted to access.
- Whether to record a user's or group's actions in the event log.
- Membership in a group.

To manage security configurations for multiple devices, you can use one of the following options:

- Edit specific security settings in a GPO.
- Use the Security Templates snap-in to create a security template that contains the security policies you want to apply, and then import the security template into a Group Policy Object. A security template is a file that represents a security configuration, and it can be imported to a GPO, applied to a local device, or used to analyze security.

For more info about managing security configurations, see Administer security policy settings.

The Security Settings extension of the Local Group Policy Editor includes the following types of security policies:

- **Account Policies.** These policies are defined on devices; they affect how user accounts can interact with the computer or domain. Account policies include the following types of policies:
  - **Password Policy.** These policies determine settings for passwords, such as enforcement and lifetimes. Password policies are used for domain accounts.
  - **Account Lockout Policy.** These policies determine the conditions and length of time that an account will be locked out of the system. Account lockout policies are used for domain or local user accounts.
  - **Kerberos Policy.** These policies are used for domain user accounts; they determine Kerberos-related settings, such as ticket lifetimes and enforcement.

- **Local Policies.** These policies apply to a computer and include the following types of policy settings:

  - **Audit Policy.** Specify security settings that control the logging of security events into the Security log on the computer, and specifies what types of security events to log (success, failure, or both).

    > ⓘ **Observação**
    >
    > For devices running Windows 7 and later, we recommend to use the settings under Advanced Audit Policy Configuration rather than the Audit Policy settings under Local Policies.

  - **User Rights Assignment.** Specify the users or groups that have sign-in rights or privileges on a device

  - **Security Options.** Specify security settings for the computer, such as Administrator and Guest Account names; access to floppy disk drives and CD-ROM drives; installation of drivers; sign-in prompts; and so on.

- **Windows Firewall with Advanced Security.** Specify settings to protect the device on your network by using a stateful firewall that allows you to determine which network traffic is permitted to pass between your device and the network.

- **Network List Manager Policies.** Specify settings that you can use to configure different aspects of how networks are listed and displayed on one device or on many devices.

- **Public Key Policies.** Specify settings to control Encrypting File System, Data Protection, and BitLocker Drive Encryption in addition to certain certificate paths and services settings.

- **Software Restriction Policies.** Specify settings to identify software and to control its ability to run on your local device, organizational unit, domain, or site.
- **Application Control Policies.** Specify settings to control which users or groups can run particular applications in your organization based on unique identities of files.
- **IP Security Policies on Local Computer.** Specify settings to ensure private, secure communications over IP networks by using cryptographic security services. IPsec establishes trust and security from a source IP address to a destination IP address.
- **Advanced Audit Policy Configuration.** Specify settings that control the logging of security events into the security log on the device. The settings under Advanced Audit Policy Configuration provide finer control over which activities to monitor as opposed to the Audit Policy settings under Local Policies.

Windows edition and licensing requirements

The following table lists the Windows editions that support Windows security policy settings and auditing:

Expandir a tabela

Windows Pro	Windows Enterprise	Windows Pro Education/SE	Windows Education
Yes	Yes	Yes	Yes

Windows security policy settings and auditing license entitlements are granted by the following licenses:

Expandir a tabela

Windows Pro/Pro Education/SE	Windows Enterprise E3	Windows Enterprise E5	Windows Education A3	Windows Education A5
Yes	Yes	Yes	Yes	Yes

For more information about Windows licensing, see Windows licensing overview.

Policy-based security settings management

The Security Settings extension to Group Policy provides an integrated policy-based management infrastructure to help you manage and enforce your security policies.

You can define and apply security settings policies to users, groups, and network servers and clients through Group Policy and Active Directory Domain Services (AD DS). A group of servers with the same functionality can be created (for example, a Microsoft Web (IIS) server), and then Group Policy Objects can be used to apply common security settings to the group. If more servers are added to this group later, many of the common security settings are automatically applied, reducing deployment and administrative labor.

Common scenarios for using security settings policies

Security settings policies are used to manage the following aspects of security: accounts policy, local policy, user rights assignment, registry values, file and registry Access Control Lists (ACLs), service startup modes, and more.

As part of your security strategy, you can create GPOs with security settings policies configured specifically for the various roles in your organization, such as domain controllers, file servers, member servers, clients, and so on.

You can create an organizational unit (OU) structure that groups devices according to their roles. Using OUs is the best method for separating specific security requirements for the different roles in your network. This approach also allows you to apply customized security templates to each class of server or computer. After creating the security templates, you create a new GPO for each of the OUs, and then import the security template (.inf file) into the new GPO.

Importing a security template to a GPO ensures that any accounts to which the GPO is applied automatically receive the template's security settings when the Group Policy settings are refreshed. On a workstation or server, the security settings are refreshed at regular intervals (with a random offset of at most 30 minutes), and, on a domain controller, this process occurs every few minutes if changes have occurred in any of the GPO settings that apply. The settings are also refreshed every 16 hours, whether or not any changes have occurred.

> ⓘ **Observação**
>
> These refresh settings vary between versions of the operating system and can be configured.

By using Group Policy–based security configurations in conjunction with the delegation of administration, you can ensure that specific security settings, rights, and behavior are

applied to all servers and computers within an OU. This approach makes it simple to update many servers with any other changes required in the future.

Dependencies on other operating system technologies

For devices that are members of a Windows Server 2008 or later domain, security settings policies depend on the following technologies:

- **Active Directory Domain Services (AD DS)**

  The Windows-based directory service, AD DS, stores information about objects on a network and makes this information available to administrators and users. By using AD DS, you can view and manage network objects on the network from a single location, and users can access permitted network resources by using a single sign in.

- **Group Policy**

  The infrastructure within AD DS that enables directory-based configuration management of user and computer settings on devices running Windows Server. By using Group Policy, you can define configurations for groups of users and computers, including policy settings, registry-based policies, software installation, scripts, folder redirection, Remote Installation Services, Internet Explorer maintenance, and security.

- **Domain Name System (DNS)**

  A hierarchical naming system used for locating domain names on the Internet and on private TCP/IP networks. DNS provides a service for mapping DNS domain names to IP addresses, and IP addresses to domain names. This service allows users, computers, and applications to query DNS to specify remote systems by fully qualified domain names rather than by IP addresses.

- **Winlogon**

  A part of the Windows operating system that provides interactive logon support. Winlogon is designed around an interactive logon model that consists of three components: the Winlogon executable, a credential provider, and any number of network providers.

- **Setup**

  Security configuration interacts with the operating system setup process during a clean installation or upgrade from earlier versions of Windows Server.

- **Security Accounts Manager (SAM)**

  A Windows service used during the sign-in process. SAM maintains user account information, including groups to which a user belongs.

- **Local Security Authority (LSA)**

  A protected subsystem that authenticates and signs in users to the local system. LSA also maintains information about all aspects of local security on a system, collectively known as the Local Security Policy of the system.

- **Windows Management Instrumentation (WMI)**

  A feature of the Microsoft Windows operating system, WMI is the Microsoft implementation of Web-Based Enterprise Management (WBEM), which is an industry initiative to develop a standard technology for accessing management information in an enterprise environment. WMI provides access to information about objects in a managed environment. Through WMI and the WMI application programming interface (API), applications can query for and make changes to static information in the Common Information Model (CIM) repository and dynamic information maintained by the various types of providers.

- **Resultant Set of Policy (RSoP)**

  An enhanced Group Policy infrastructure that uses WMI in order to make it easier to plan and debug policy settings. RSoP provides public methods that expose what an extension to Group Policy would do in a what-if situation, and what the extension has done in an actual situation. These public methods allow administrators to easily determine the combination of policy settings that apply to, or will apply to, a user or device.

- **Service Control Manager (SCM)**

  Used for configuration of service startup modes and security.

- **Registry**

  Used for configuration of registry values and security.

- **File system**

  Used for configuration of security.

- **File system conversions**

  Security is set when an administrator converts a file system from FAT to NTFS.

- **Microsoft Management Console (MMC)**

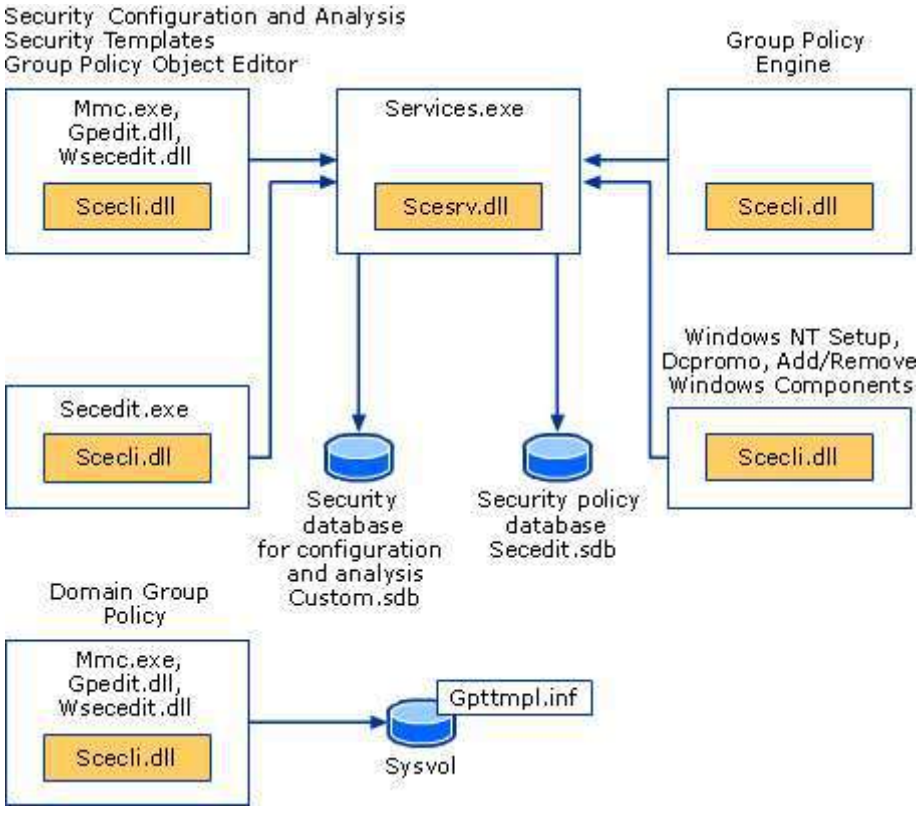
  The user interface for the Security Settings tool is an extension of the Local Group Policy Editor MMC snap-in.

Security settings policies and Group Policy

The Security Settings extension of the Local Group Policy Editor is part of the Security Configuration Manager tool set. The following components are associated with Security Settings: a configuration engine; an analysis engine; a template and database interface layer; setup integration logic; and the secedit.exe command-line tool. The security configuration engine is responsible for handling security configuration editor-related security requests for the system on which it runs. The analysis engine analyzes system security for a given configuration and saves the result. The template and database interface layer handles reading and writing requests from and to the template or database (for internal storage). The Security Settings extension of the Local Group Policy Editor handles Group Policy from a domain-based or local device. The security configuration logic integrates with setup and manages system security for a clean installation or upgrade to a more recent Windows operating system. Security information is stored in templates (.inf files) or in the Secedit.sdb database.

The following diagram shows Security Settings and related features.

Security Settings Policies and Related Features



- **Scesrv.dll**

  Provides the core security engine functionality.

- **Scecli.dll**

  Provides the client-side interfaces to the security configuration engine and provides data to Resultant Set of Policy (RSoP).

- **Wsecedit.dll**

  The Security Settings extension of Local Group Policy Editor. scecli.dll is loaded into wsecedit.dll to support the Security Settings user interface.

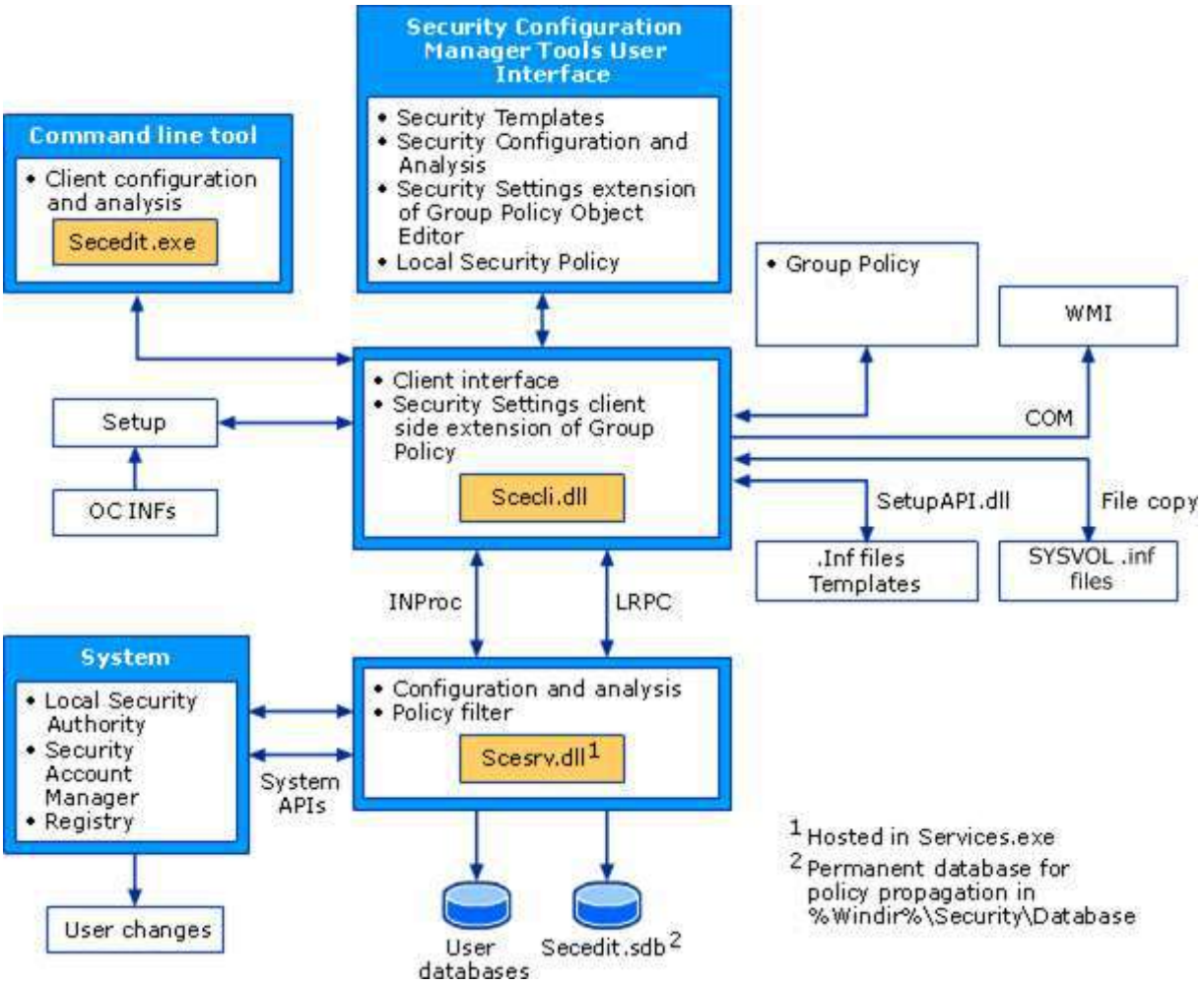
- **Gpedit.dll**

  The Local Group Policy Editor MMC snap-in.

Security Settings extension architecture

The Security Settings extension of the Local Group Policy Editor is part of the Security Configuration Manager tools, as shown in the following diagram.

Security Settings Architecture



The security settings configuration and analysis tools include a security configuration engine, which provides local computer (non-domain member) and Group Policy–based configuration and analysis of security settings policies. The security configuration engine also supports the creation of security policy files. The primary features of the security configuration engine are scecli.dll and scesrv.dll.

The following list describes these primary features of the security configuration engine and other Security Settings–related features.

- **scesrv.dll**

  This .dll file is hosted in services.exe and runs under local system context. scesrv.dll provides core Security Configuration Manager functionality, such as import, configure, analyze, and policy propagation.

  Scesrv.dll performs configuration and analysis of various security-related system parameters by calling corresponding system APIs, including LSA, SAM, and the registry.

  Scesrv.dll exposes APIs such as import, export, configure, and analyze. It checks that the request is made over LRPC (Windows XP) and fails the call if it isn't.

Communication between parts of the Security Settings extension occurs by using the following methods:

- Component Object Model (COM) calls
- Local Remote Procedure Call (LRPC)
- Lightweight Directory Access Protocol (LDAP)
- Active Directory Service Interfaces (ADSI)
- Server Message Block (SMB)
- Win32 APIs
- Windows Management Instrumentation (WMI) calls

On domain controllers, scesrv.dll receives notifications of changes made to SAM and the LSA that need to be synchronized across domain controllers. Scesrv.dll incorporates those changes into the Default Domain Controller Policy GPO by using in-process scecli.dll template modification APIs. Scesrv.dll also performs configuration and analysis operations.

- **Scecli.dll**

  This Scecli.dll is the client-side interface or wrapper to scesrv.dll. scecli.dll is loaded into Wsecedit.dll to support MMC snap-ins. It's used by Setup to configure default system security and security of files, registry keys, and services installed by the Setup API .inf files.

  The command-line version of the security configuration and analysis user interfaces, secedit.exe, uses scecli.dll.

  Scecli.dll implements the client-side extension for Group Policy.

  Scesrv.dll uses scecli.dll to download applicable Group Policy files from SYSVOL in order to apply Group Policy security settings to the local device.

  Scecli.dll logs application of security policy into WMI (RSoP).

  Scesrv.dll policy filter uses scecli.dll to update Default Domain Controller Policy GPO when changes are made to SAM and LSA.

- **Wsecedit.dll**

  The Security Settings extension of the Group Policy Object Editor snap-in. You use this tool to configure security settings in a Group Policy Object for a site, domain, or organizational unit. You can also use Security Settings to import security templates to a GPO.

- **Secedit.sdb**

This Secedit.sdb is a permanent system database used for policy propagation including a table of persistent settings for rollback purposes.

- **User databases**

  A user database is any database other than the system database created by administrators for the purposes of configuration or analysis of security.

- **.Inf Templates**

  These templates are text files that contain declarative security settings. They're loaded into a database before configuration or analysis. Group Policy security policies are stored in .inf files on the SYSVOL folder of domain controllers, where they're downloaded (by using file copy) and merged into the system database during policy propagation.

Security settings policy processes and interactions

For a domain-joined device, where Group Policy is administered, security settings are processed in conjunction with Group Policy. Not all settings are configurable.

Group Policy processing

When a computer starts and a user signs in, computer policy and user policy are applied according to the following sequence:

1. The network starts. Remote Procedure Call System Service (RPCSS) and Multiple Universal Naming Convention Provider (MUP) start.

2. An ordered list of Group Policy Objects is obtained for the device. The list might depend on these factors:

   - Whether the device is part of a domain and, therefore, subject to Group Policy through Active Directory.
   - The location of the device in Active Directory.
   - Whether the list of Group Policy Objects has changed. If the list of Group Policy Objects hasn't changed, no processing is done.

3. Computer policy is applied. These settings are the ones under Computer Configuration from the gathered list. This process is a synchronous one by default and occurs in the following order: local, site, domain, organizational unit, child

organizational unit, and so on. No user interface appears while computer policies are processed.

4. Startup scripts run. These scripts are hidden and synchronous by default; each script must complete or time out before the next one starts. The default time-out is 600 seconds. You can use several policy settings to modify this behavior.

5. The user presses CTRL+ALT+DEL to sign in.

6. After the user is validated, the user profile loads; it's governed by the policy settings that are in effect.

7. An ordered list of Group Policy Objects is obtained for the user. The list might depend on these factors:

    - Whether the user is part of a domain and, therefore, subject to Group Policy through Active Directory.
    - Whether loopback policy processing is enabled, and if so, the state (Merge or Replace) of the loopback policy setting.
    - The location of the user in Active Directory.
    - Whether the list of Group Policy Objects has changed. If the list of Group Policy Objects hasn't changed, no processing is done.

8. User policy is applied. These settings are the ones under User Configuration from the gathered list. These settings are synchronous by default and in the following order: local, site, domain, organizational unit, child organizational unit, and so on. No user interface appears while user policies are processed.

9. Logon scripts run. Group Policy–based logon scripts are hidden and asynchronous by default. The user object script runs last.

10. The operating system user interface that is prescribed by Group Policy appears.

Group Policy Objects storage

A Group Policy Object (GPO) is a virtual object that is identified by a Globally Unique Identifier (GUID) and stored at the domain level. The policy setting information of a GPO is stored in the following two locations:

- **Group Policy containers in Active Directory.**

  The Group Policy container is an Active Directory container that contains GPO properties, such as version information, GPO status, plus a list of other component settings.

- **Group Policy templates in a domain's system volume folder (SYSVOL).**

  The Group Policy template is a file system folder that includes policy data specified by .admx files, security settings, script files, and information about applications that are available for installation. The Group Policy template is located in the SYSVOL folder in the <domain>\Policies subfolder.

The **GROUP_POLICY_OBJECT** structure provides information about a GPO in a GPO list, including the version number of the GPO, a pointer to a string that indicates the Active Directory portion of the GPO, and a pointer to a string that specifies the path to the file system portion of the GPO.

Group Policy processing order

Group Policy settings are processed in the following order:

1. **Local Group Policy Object.**

   Each device running a Windows operating system beginning with Windows XP has exactly one Group Policy Object that is stored locally.

2. **Site.**

   Any Group Policy Objects that have been linked to the site are processed next. Processing is synchronous and in an order that you specify.

3. **Domain.**

   Processing of multiple domain-linked Group Policy Objects is synchronous and in an order you specify.

4. **Organizational units.**

   Group Policy Objects that are linked to the organizational unit that is highest in the Active Directory hierarchy are processed first, then Group Policy Objects that are linked to its child organizational unit, and so on. Finally, the Group Policy Objects that are linked to the organizational unit that contains the user or device are processed.

At the level of each organizational unit in the Active Directory hierarchy, one, many, or no Group Policy Objects can be linked. If several Group Policy Objects are linked to an organizational unit, their processing is synchronous and in an order that you specify.

This order means that the local Group Policy Object is processed first, and Group Policy Objects that are linked to the organizational unit of which the computer or user is a

direct member are processed last, which overwrites the earlier Group Policy Objects.

This order is the default processing order and administrators can specify exceptions to this order. A Group Policy Object that is linked to a site, domain, or organizational unit (not a local Group Policy Object) can be set to **Enforced** with respect to that site, domain, or organizational unit, so that none of its policy settings can be overridden. At any site, domain, or organizational unit, you can mark Group Policy inheritance selectively as **Block Inheritance**. Group Policy Object links that are set to **Enforced** are always applied, however, and they can't be blocked. For more information, see Group Policy Basics – Part 2: Understanding Which GPOs to Apply.

Security settings policy processing

In the context of Group Policy processing, security settings policy is processed in the following order.

1. During Group Policy processing, the Group Policy engine determines which security settings policies to apply.

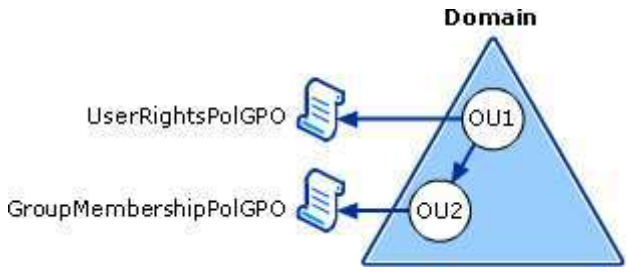
2. If security settings policies exist in a GPO, Group Policy invokes the Security Settings client-side extension.

3. The Security Settings extension downloads the policy from the appropriate location such as a specific domain controller.

4. The Security Settings extension merges all security settings policies according to precedence rules. The processing is according to the Group Policy processing order of local, site, domain, and organizational unit (OU), as described earlier in the "Group Policy processing order" section. If multiple GPOs are in effect for a given device and there are no conflicting policies, then the policies are cumulative and are merged.

   This example uses the Active Directory structure shown in the following figure. A given computer is a member of OU2, to which the **GroupMembershipPolGPO** GPO is linked. This computer is also subject to the **UserRightsPolGPO** GPO, which is linked to OU1, higher in the hierarchy. In this case, no conflicting policies exist so the device receives all of the policies contained in both the **UserRightsPolGPO** and the **GroupMembershipPolGPO** GPOs.

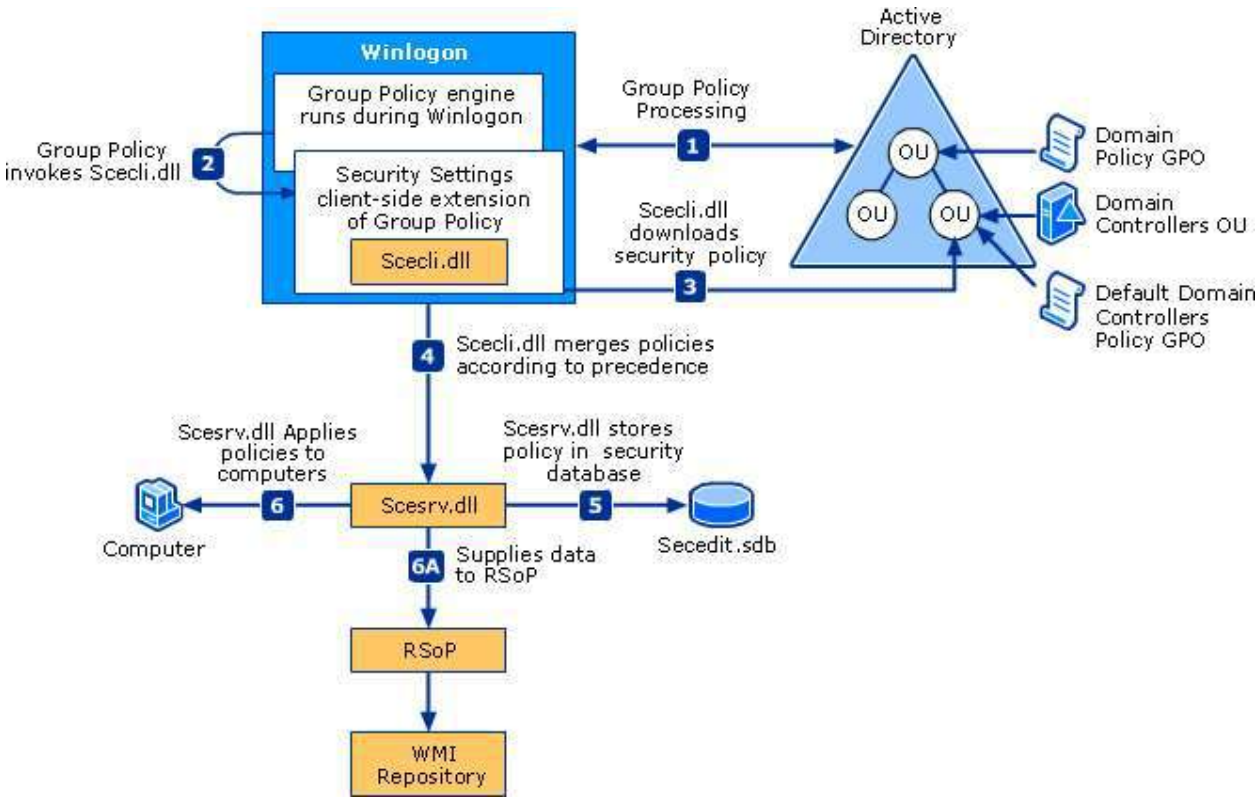
   Multiple GPOs and Merging of Security Policy



5. The resultant security policies are stored in secedit.sdb, the security settings database. The security engine gets the security template files and imports them to secedit.sdb.

6. The security settings policies are applied to devices. The following figure illustrates the security settings policy processing.

Security Settings Policy Processing



Merging of security policies on domain controllers

Password policies, Kerberos, and some security options are only merged from GPOs that are linked at the root level on the domain. This merging is done to keep those settings synchronized across all domain controllers in the domain. The following security options are merged:

- Network Security: Force sign out when sign-in hours expire
- Accounts: Administrator account status
- Accounts: Guest account status

- Accounts: Rename administrator account
- Accounts: Rename guest account

Another mechanism exists that allows security policy changes made by administrators by using net accounts to be merged into the Default Domain Policy GPO. User rights changes that are made by using Local Security Authority (LSA) APIs are filtered into the Default Domain Controllers Policy GPO.

Special considerations for domain controllers

If an application is installed on a primary domain controller (PDC) with operations master role (also known as flexible single master operations or FSMO) and the application makes changes to user rights or password policy, these changes must be communicated to ensure that synchronization across domain controllers occurs. Scesrv.dll receives a notification of any changes made to the security account manager (SAM) and LSA that need to be synchronized across domain controllers and then incorporates the changes into the Default Domain Controller Policy GPO by using scecli.dll template modification APIs.

When security settings are applied

After you've edited the security settings policies, the settings are refreshed on the computers in the organizational unit linked to your Group Policy Object in the following instances:

- When a device is restarted.
- Every 90 minutes on a workstation or server and every 5 minutes on a domain controller. This refresh interval is configurable.
- By default, Security policy settings delivered by Group Policy are also applied every 16 hours (960 minutes) even if a GPO hasn't changed.

Persistence of security settings policy

Security settings can persist even if a setting is no longer defined in the policy that originally applied it.

Security settings might persist in the following cases:

- The setting hasn't been previously defined for the device.
- The setting is for a registry security object.
- The settings are for a file system security object.

All settings applied through local policy or through a Group Policy Object are stored in a local database on your computer. Whenever a security setting is modified, the computer saves the security setting value to the local database, which retains a history of all the settings that have been applied to the computer. If a policy first defines a security setting and then no longer defines that setting, then the setting takes on the previous value in the database. If a previous value doesn't exist in the database, then the setting doesn't revert to anything and remains defined as is. This behavior is sometimes referred to as "tattooing".

Registry and file security settings will maintain the values applied through Group Policy until that setting is set to other values.

Permissions required for policy to apply

Both Apply Group Policy and Read permissions are required to have the settings from a Group Policy Object apply to users or groups, and computers.

Filtering security policy

By default, all GPOs have Read and Apply Group Policy both Allowed for the Authenticated Users group. The Authenticated Users group includes both users and computers. Security settings policies are computer-based. To specify which client computers will or won't have a Group Policy Object applied to them, you can deny them either the Apply Group Policy or Read permission on that Group Policy Object. Changing these permissions allows you to limit the scope of the GPO to a specific set of computers within a site, domain, or OU.

> ⓘ **Observação**
>
> Do not use security policy filtering on a domain controller as this would prevent security policy from applying to it.

Migration of GPOs containing security settings

In some situations, you might want to migrate GPOs from one domain environment to another environment. The two most common scenarios are test-to-production migration, and production-to-production migration. The GPO copying process has implications for some types of security settings.

Data for a single GPO is stored in multiple locations and in various formats; some data is contained in Active Directory and other data is stored on the SYSVOL share on the domain controllers. Certain policy data might be valid in one domain but might be invalid in the domain to which the GPO is being copied. For example, Security Identifiers (SIDs) stored in security policy settings are often domain-specific. So copying GPOs isn't as simple as taking a folder and copying it from one device to another.

The following security policies can contain security principals and might require some more work to successfully move them from one domain to another.

- User rights assignment
- Restricted groups
- Services
- File system
- Registry
- The GPO DACL, if you choose to preserve it during a copy operation

To ensure that data is copied correctly, you can use Group Policy Management Console (GPMC). When there's a migration of a GPO from one domain to another, GPMC ensures that all relevant data is properly copied. GPMC also offers migration tables, which can be used to update domain-specific data to new values as part of the migration process. GPMC hides much of the complexity involved in the migrating GPO operations, and it provides simple and reliable mechanisms for performing operations such as copy and backup of GPOs.

In this section

Expandir a tabela

Topic	Description
Administer security policy settings	This article discusses different methods to administer security policy settings on a local device or throughout a small- or medium-sized organization.
Configure security policy settings	Describes steps to configure a security policy setting on the local device, on a domain-joined device, and on a domain controller.
Security policy settings reference	This reference of security settings provides information about how to implement and manage security policies, including setting options and security considerations.

Visão geral do Cartão Inteligente Virtual

Artigo • 08/11/2023 •

Aplica-se a: ✅ Windows 11, ✅ Windows 10, ✅ Windows Server 2022, ✅ Windows Server 2019, ✅ Windows Server 2016

> ⚠ **Aviso**
>
> Windows Hello para Empresas e as chaves de segurança FIDO2 são métodos modernos de autenticação de dois fatores para Windows. Os clientes que usam cartões inteligentes virtuais são incentivados a migrar para Windows Hello para Empresas ou FIDO2. Para novas instalações do Windows, recomendamos Windows Hello para Empresas ou chaves de segurança FIDO2.

Este artigo fornece uma visão geral da tecnologia de cartão inteligente virtual.

Descrição do recurso

A tecnologia de cartão inteligente virtual oferece benefícios de segurança comparáveis aos cartões inteligentes físicos usando autenticação de dois fatores. Cartões inteligentes virtuais emulam a funcionalidade de cartões inteligentes físicos, mas usam o chip TPM (Trusted Platform Module) disponível em dispositivos. Cartões inteligentes virtuais não exigem o uso de um cartão físico inteligente e leitor separado. Você cria cartões inteligentes virtuais no TPM, onde as chaves usadas para autenticação são armazenadas em hardware protegido por criptografia.

Ao utilizar dispositivos TPM que fornecem os mesmos recursos criptográficos que os cartões inteligentes físicos, os cartões inteligentes virtuais realizam as três principais propriedades desejadas para cartões inteligentes: não exportabilidade, criptografia isolada e anti-martelada.

Aplicações práticas

Os cartões inteligentes virtuais são funcionalmente semelhantes aos cartões inteligentes físicos, aparecendo no Windows como cartões inteligentes que são sempre inseridos. Os cartões inteligentes virtuais podem ser usados para autenticação para recursos externos, proteção de dados por criptografia e integridade por meio da assinatura. Você pode implantar cartões inteligentes virtuais usando métodos internos ou uma solução comprada e eles podem ser um substituto para outros métodos de autenticação forte em uma configuração corporativa de qualquer escala.

Casos de uso de autenticação

Autenticação de dois fatores\acesso remoto de dois fatores\u2012based

Depois que um usuário tem uma cartão inteligente virtual TPM totalmente funcional, provisionada com um certificado de entrada, o certificado é usado para obter acesso autenticado aos recursos corporativos. Quando o certificado apropriado é provisionado para o cartão virtual, o usuário só precisa fornecer o PIN para o cartão inteligente virtual, como se fosse uma cartão inteligente física, para entrar no domínio.

Na prática, isso é tão fácil quanto inserir uma senha para acessar o sistema. Tecnicamente, é muito mais seguro. Usar a cartão inteligente virtual para acessar o sistema prova para o domínio que o usuário que está solicitando autenticação tem a posse do computador pessoal no qual o cartão foi provisionado e conhece o PIN de cartão inteligente virtual. Como essa solicitação não poderia ter se originado de um sistema diferente do sistema certificado pelo domínio para o acesso desse usuário, e o usuário não poderia ter iniciado a solicitação sem conhecer o PIN, uma autenticação forte de dois fatores é estabelecida.

Autenticação do cliente

Cartões inteligentes virtuais também podem ser usados para autenticação do cliente usando TLS/SSL ou uma tecnologia semelhante. Semelhante ao acesso ao domínio com um cartão inteligente virtual, um certificado de autenticação pode ser provisionado para o cartão inteligente virtual, fornecido a um serviço remoto, conforme solicitado no processo de autenticação do cliente. Isso adere aos princípios da autenticação de dois fatores porque o certificado só é acessível do computador que hospeda o cartão virtual inteligente e o usuário é obrigado a inserir o PIN para acesso inicial ao cartão.

Redirecionamento de cartão inteligente virtual para conexões de área de trabalho remota

O conceito de autenticação de dois fatores associado a cartões inteligentes virtuais depende da proximidade dos usuários com os dispositivos que eles usam para acessar o domínio. Quando você se conecta a um dispositivo que está hospedando cartões inteligentes virtuais, não é possível usar os cartões inteligentes virtuais localizados no dispositivo remoto durante a sessão remota. No entanto, você pode acessar os cartões inteligentes virtuais no dispositivo de conexão (que está sob seu controle físico), que são carregados no dispositivo remoto. Você pode usar os cartões inteligentes virtuais

como se fossem instalados usando o TPM dos dispositivos remotos, estendendo seus privilégios para o dispositivo remoto, mantendo os princípios da autenticação de dois fatores.

Casos de uso de confidencialidade

Criptografia de email S/MIME

Cartões inteligentes físicos são projetados para conter chaves privadas. Você pode usar as chaves privadas para criptografia de email e descriptografia. A mesma funcionalidade existe em cartões inteligentes virtuais. Usando s/MIME com a chave pública de um usuário para criptografar email, o remetente de um email tem certeza de que apenas a pessoa com a chave privada correspondente pode descriptografar o email. Essa garantia é resultado da não exportabilidade da chave privada. Ele nunca existe ao alcance de software mal-intencionado e permanece protegido pelo TPM , mesmo durante a descriptografia.

BitLocker para volumes de dados

A tecnologia de criptografia de unidade do BitLocker usa criptografia de chave simétrica para proteger o conteúdo do disco rígido de um usuário. O BitLocker garante que, se a propriedade física de um disco rígido estiver comprometida, um adversário não poderá ler dados da unidade. A chave usada para criptografar a unidade pode ser armazenada em uma cartão virtual inteligente, que requer conhecimento do PIN de cartão inteligente virtual para acessar a unidade e a posse do dispositivo que está hospedando o cartão inteligente virtual TPM. Se a unidade for obtida sem acesso ao TPM que hospeda o cartão inteligente virtual, qualquer ataque de força bruta será difícil.

Você pode usar o BitLocker para criptografar unidades portáteis, armazenando chaves em cartões inteligentes virtuais. Nesse cenário, ao contrário de usar o BitLocker com uma cartão inteligente física, a unidade criptografada só pode ser usada quando está conectada ao dispositivo para o cartão virtual inteligente que é usado para criptografar a unidade, pois a chave BitLocker só é acessível do dispositivo. Esse método pode ser útil para garantir que a segurança das unidades de backup e do armazenamento pessoal também seja usada fora do disco rígido main.

Caso de uso de integridade de dados

Assinar dados

Para verificar a autoria dos dados, um usuário pode assiná-los usando uma chave privada armazenada na cartão virtual inteligente. As assinaturas digitais confirmam a integridade e a origem dos dados.

- Armazenar a chave em um sistema operacional acessível, usuários mal-intencionados poderiam acessá-la e usá-la para modificar dados já assinados ou falsificar a identidade do proprietário da chave
- Armazenar a chave em um cartão virtual inteligente significa que você só pode usá-la para assinar dados no dispositivo host. Você não pode exportar a chave para outros sistemas (intencionalmente ou não, como com o roubo de malware), tornando as assinaturas digitais mais seguras do que outros métodos para armazenamento de chaves privadas

Requisitos de hardware

Para usar a tecnologia de cartão inteligente virtual, o TPM 1.2 é o mínimo necessário para dispositivos que executam um sistema operacional com suporte.

Comentários

Esta página foi útil? Yes No

Fornecer comentários sobre o produto

Mouse Lenovo

PN: MOUSE00

- Interface USB – Plug & Play
- Ambidestro
- Sensor Optico
- Resolução de 1600 dpi
- 3 Botões (Esquerdo, Direito e Central)
- Botão Central para rolar a tela para cima e para baixo
- Cor predominante Preto
- Cabo com tamanho mínimo de 1,8m
- Compatível com Windows e Linux

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Imagens meramente ilustrativas.

Teclado Lenovo

PN: TECLA00

*

- Interface USB mínimo 107 Teclas incluindo Ç
- Padrão ABNT II Plug and Play
- Teclas NumLock e CapsLock Independentes com LED indicativo
- Compatível com toda linha Lenovo
- Conexão USB cabo 1.8m.
- Ajuste de Inclinação até 3 níveis
- Teclas com Gravação Permanente
- Resistente a derramamento de liquidos
- Compatível com Windows e Linux

*Imagem meramente ilustrativa. O formato pode variar de acordo com o idioma a ser atendido.

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RETURN TO SEARCH

ThinkVision E24-40

Product Summary:

Product Type:	Monitors
Registered In:	United States
Manufacturer:	Lenovo
EPEAT Tier:	Gold
Registration Date:	2025-07-08
Product Status:	Active
Manufacturer Part Number(s):	64BA

COMPUTERS & DISPLAYS

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EPEAT Tier Score Detail

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This product has met the necessary required criteria.

Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

Products that meet all required criteria and achieve **less than 50%** of the optional points are rated at **EPEAT Bronze**	Products that meet all required criteria and achieve **50 - 74%** of the optional points are rated at **EPEAT Silver**	Products that meet all required criteria and achieve **75 - 100%** of the optional points are rated at **EPEAT Gold**

The optional criteria for this product category and optional points achieved by this product are listed below.

Optional Criteria	Scores
4.1 Substance Management	13 / 16
4.2 Materials Selection	3 / 3
4.4 Product longevity/life-cycle extension	1 / 2
4.5 Energy Conservation	2 / 2
4.7 Packaging	1 / 2
4.8 Life cycle assessment and carbon footprint	6 / 6
4.9 Corporate Environmental Performance	9 / 9
4.10 Corporate social responsibility	2 / 6

TOTAL OPTIONAL CRITERIA SCORE: 37 / 46

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

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ThinkCentre M75s Gen 5 (CTO EPEAT Gold Model)

COMPUTERS & DISPLAYS

Product Summary:

Product Type:	Desktop
Registered In:	United States
Manufacturer:	Lenovo
EPEAT Tier:	Gold
Registration Date:	2024-07-11
Product Status:	Active
EPEAT Climate+:	Achieved 2024-07-11
Exceptions:	180 Watt Power Supply

Manufacturer Part Number(s):	**12T9, 12TA, 13DY, 13EX**

All unique product identifiers existing for this product may not be listed here. If the unique product identifier you are looking for is not listed, please contact EPEAT at EPEAT@GEC.org.

EXPORT PRODUCT SUMMARY

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Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

Products that meet all required criteria and achieve **less than 50%** of the optional points are	Products that meet all required criteria and achieve **50 - 74%** of the optional points are	Products that meet all required criteria and achieve **75 - 100%** of the optional points are rated

rated at	rated at	at
EPEAT Bronze	**EPEAT Silver**	**EPEAT Gold**

The optional criteria for this product category and optional points achieved by this product are listed below.

Optional Criteria	Scores
4.1 Substance Management	**11 / 16**
4.2 Materials Selection	**2 / 3**
4.4 Product longevity/life-cycle extension	**2 / 2**
4.5 Energy Conservation	**2 / 4**
4.7 Packaging	**2 / 2**
4.8 Life cycle assessment and carbon footprint	**6 / 6**

4.9 Corporate Environmental Performance	**9 / 9**
4.10 Corporate social responsibility	**2 / 6**
TOTAL OPTIONAL CRITERIA SCORE:	**36 / 48**

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

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ThinkCentre M75s Gen 5 (CTO EPEAT Gold Model)

COMPUTERS & DISPLAYS

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Product Type:	Desktop
Registered In:	United States
Manufacturer:	Lenovo
EPEAT Tier:	Gold
Registration Date:	2024-07-11
Product Status:	Active
EPEAT Climate+:	Achieved 2024-07-11
Exceptions:	180 Watt Power Supply

Manufacturer Part Number(s):	**12T9, 12TA, 13DY, 13EX**

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rated at	rated at	at
EPEAT Bronze	**EPEAT Silver**	**EPEAT Gold**

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Optional Criteria	Scores
4.1 Substance Management	**11 / 16**
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4.4 Product longevity/life-cycle extension	**2 / 2**
4.5 Energy Conservation	**2 / 4**
4.7 Packaging	**2 / 2**
4.8 Life cycle assessment and carbon footprint	**6 / 6**

4.9 Corporate Environmental Performance	**9 / 9**
4.10 Corporate social responsibility	**2 / 6**
TOTAL OPTIONAL CRITERIA SCORE:	**36 / 48**

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

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Certificado de Conformidade

Certificate of Conformity

Certificado/*Certificate*
UL-BR 25.0614

Revisão / Review
0

Emissão / *Issue*
20 de maio de 2025
May 20, 2025

Validade / *Expiration*
08 de Abril de 2028
April 08, 2028

Reconhecer que o Solicitante / *Acknowledge that the Certificate Holder*

Lenovo Tecnologia (Brasil) Ltda.

avaliou o produto / *has had*

Computador pessoal / *Personal computer*

ao qual atende aos requisitos do Programa de Certificação ou Portaria / *evaluated and meets the requirements of the Certification Program or Decree*

PORTARIA NO. 304/2023
DECREE NO. 304/2023

e pode ostentar o Selo de Identificação da Conformidade do Sistema Brasileiro de Avaliação da Conformidade (SBAC) sobre o(s) produto(s) relacionado(s) neste certificado.
and can display the Conformity Identification Seal of the Brazilian Conformity Assessment System (SBAC) on the product(s) listed in this certificate.

Rafael Parada
Program Owner

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Certificado de conformidade válido somente acompanhado das páginas de 1 a 155
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Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***	**Revisão /** *Review*: 0	**Validade /** ***Expiration***
20 de Maio de 2025 *May 20, 2025*		08 de Abril de 2028 *April 08, 2028*

Solicitante / *Certificate Holder*
102358

Lenovo Tecnologia (Brasil) Ltda.
Estrada Municipal José Costa de Mesquita, 200, Galpão 1 a 11, Chacara 13337-200, Chácara Alvorada, Indaiatuba, SP
CNPJ: 07.275.920/0001-61

Fabricante / *Manufacturer*
102358

Lenovo Tecnologia (Brasil) Ltda.
Estrada Municipal José Costa de Mesquita, 200, Galpão 1 a 11, Chacara 13337-200, Chácara Alvorada, Indaiatuba, SP
CNPJ: 07.275.920/0001-61

Modelo de Certificação / *Certification Model*: 5

Norma(s) Aplicável(is) / *Applicable standards*: IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013, IEC 62368-1: 2018, CISPR 22:2008, CISPR 32:2012, CISPR 32:2015/COR:2016, CISPR 24:2010+A1:2015, IEC 61000-3-2:2014, IEC 61000-3-3:2013, IEC 61000-4-2:2008, IEC 61000-4-3:2006 +A1:2007 +A2:2010, IEC 61000-4-4:2012, IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004 e Anexo D – Portaria 304:2023 (Eficiência Energética).

Identificação UL / *UL Identification*: BR2334 / Vol.1 / Sec.45

Lote ou No. de Série / *Lot or Serial Number*: N/A

Identificação da Família/Modelo/Lote de Produto(s) Certificado(s):
Identification of the Family/Model/Lot of Certified Product(s):

Marca / *Brand Name*	**Modelo /** *Model*	**Descrição /** *Description*
LENOVO	ThinkCentre neo 50s Gen 4, ThinkCentre neo 50q Gen 4, 11JA, 11JB, 11JC, 11JD, 11JJ, 11JK, 11MQ, 11MR, 11MS, 11MT, 11MU, 11MV, 11MW,11MX, 11R7, 11R8, 11R9, 11RA, 11SW, 11SX, 11SY,11T0, 11W1, 11W2, 11W3, 11W4, 12JE, 12JF, 12LM, 12LN, 12LQ, 12LR, 12LW, 12LX, 12LY, 12M0, 12M1, 12M2, 12M3, 12M4, 12LH, 12LJ, 12LK, 12LL, 12M5, 12JG, 12JH, ThinkCentre M70q Gen 5 (12TD*,12TE*,12TF*,12TG*,12TN*,12TQ*, 12TR*,12TS*, 13E2), ThinkCentre M70s Gen 5 (12U2*, 12U3**, 12U7*, 12U8*, 13E3),ThinkCentre M75q Gen 5 (12RQ*, 12RR*, 12RS*, 12RT*, 12VG*, 12RU*, 12RV*, 12RW*, 12RX*, 12VH*, 13E1), ThinkCentre M75s Gen 5 (12T9*,12TA*,12TB*,12TC*, 13DY), ThinkCentre M90q Gen 5 (12TH*, 12TJ*, 12TK*, 12TL*, 12TT*, 12TU*, 12TV*, 12TW*, 13E6), ThinkCentre neo 50s Gen 5, 13EJ	

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Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

	12XG,12XF, 12XE, 12XD, ThinkCentre M75s Gen 2 (13DX, 13EU, 13EV,13EW) (X" can be any alphanumeric character or blank)	

Informações de Ensaios / *Test Information:*

Laboratório de Ensaio / Testing Laboratory	**Relatório de Ensaio /** Test Report	**Data de Emissão /** Issue Date
UL-CCIC Company Limited	OFF-4786852502-A-1	2015-09-15
QuieTek Corporation - Suzhou Testing Laboratory	1570347R-IT-CE-P01V01	2015-08-19
QuieTek Corporation - Suzhou Testing Laboratory	1570347R-ITUSP01V02	2015-08-19
Underwriters Laboratories Taiwan Co., Ltd.	4787133880	2015-08-20
Intertek Testing Services Shanghai	150601410SHA-001	2015-08-17
QuieTek Corporation - Suzhou Testing Laboratory	1570349R-IT-CE-P01V01	2015-08-21
QuieTek Corporation - Suzhou Testing Laboratory	1570347R-ITUSP01V02	2015-08-24
Underwriters Laboratories Taiwan Co., Ltd.	4787062985	2015-08-25
TÜV Rheinland (China) Ltd.	16804576 001	2015-10-21
QuieTek Corporation - Suzhou Testing Laboratory	1570341R-IT-CE-P01V01	2015-10-30
QuieTek Corporation - Suzhou Testing Laboratory	1570341R-ITUSP01V02	2015--10-30
Underwriters Laboratories Taiwan Co., Ltd.	4787141290	2015-10-20
UL-CCIC Company Limited	OFF-4787141342-A-1	2015-12-28
EMTEK (Shenzhen) Co., Ltd.	ES151012034E	2016-02-01
EMTEK (Shenzhen) Co., Ltd.	ES151012034E-2	2016-08-11
International Standards Laboratory	ISL-16LE042FB	2016-01-22
Underwriters Laboratories Taiwan Co., Ltd.	4787307591	2016-02-01
TUV Rheiland Japan Ltd.	JPTUV-076934	2016-12-01
EMTEK (Shenzhen) Co., Ltd.	ES160830026E	2016-11-25
Dekra Testing and Certification Co. Ltd.	16C2005E-ITUSP01V02	2017-01-11
TUV Rheiland Japan Ltd.	JPTUV-076935	2016-11-29
QuieTek Corporation - Suzhou EMC Laboratory	1692061E-MME-CE-P01V01	2016-11-23
TÜV Rheinland (China) Ltd	50063530 002	2017-09-27
Intertek Testing Services Limited, Shanghai	180701932SHA-003	2018-08-02
EMTEK (Shenzhen) Co., Ltd.	ES171031992E	2018-04-04
EMTEK (Shenzhen) Co., Ltd.	ES171031998E	2018-04-04
UL-CCIC Company Limited	E307995-A422-CB-1	2018-04-11
Intertek Testing Services Limited, Shanghai	180701932SHA-004	2018-08-01
UL (Demko),	ACSCBIT18014	2018-04-17
EMTEK (Shenzhen) Co., LTD.	ES180327004E	2018-04-11
EMTEK (Shenzhen) Co., LTD.	ES180327005E	2018-04-11
UL-CCIC Company Limited	E307995-A421-CB-1	2018-04-13
DEKRA Testing & Certification (Suzhou) Co., Ltd.	1832081E-MME-CE-P01V01	2018-04-18
Intertek Testing Services Ltd., Shanghai	180701932SHA-005	2018-08-03
TÜV Rheinland (China) Ltd.	50132451 001	2018-04-04
DEKRA Testing & Certification (Suzhou) Co., Ltd.	1832062E-MME-CE-P01V01	2018-03-28

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Certificado / *Certificate:* UL-BR 25.0614

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20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

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DEKRA Testing & Certification (Suzhou) Co., Ltd.	1832062E-IT-US-P01V01	2018-03-28
Intertek Testing Services Ltd., Shanghai	181000122SHA-001	2018-10-22
IBEC	R190726	2019-04-01
IBEC	R190727	2019-04-08
FIT	V19-020-SERV-02	2019-03-22
Testing Services Limited, Shanghai	190601416SHA-001	2019-06-26
EMTEK (Shenzhen) Co., Ltd.	ES180223004E	2018-03-07
EMTEK (Shenzhen) Co., Ltd.	ES180223006E	2018-03-08
TÜV Rheinland (China) Ltd	50051080 003	2018-02-13
Testing Services Limited, Shanghai	190802163SHA-001	2019-08-29
Audix Technology (Shenzhen) CO., Ltd.	ACSCBIT18014-01	2019-07-09
Relatório de ensaio emitido por / Test report issued by EMTEK (Shenzhen) Co., Ltd.	ES190619035E	2019-07-12
TÜV Rheinland (China) Ltd.	50252832 001	2019-06-18
EMTEK (Shenzhen) Co., Ltd.	ES190429964E	2019-05-20
Intertek Testing Services Limited, Shanghai	200100437-SHA-001	2020-06-01
TÜV Rheinland (China) Ltd.	50284823 001	2019-12-03
DEKRA Testing & Certification (Suzhou) Co., Ltd.	19A2118E-MME-CE-P01V01	2019-11-15
Intertek Testing Services Limited, Shanghai	200200014SHA-001	2020-02-12
Intertek Testing Services Limited, Shanghai	191001463SHA-001	2019-12-09
DEKRA Testing & Certification (Suzhou) Co., Ltd.	19A2128E-MME-CE-P01V01	2019-11-15
Intertek Testing Services Limited, Shanghai	200200015SHA-001	2020-02-12
IBEC	R194729	2020-04-08
IBEC	R194730	2020-04-16
FIT	V19-151-SERV-01	2020-03-24
Intertek Testing Services Limited, Shanghai	191102130SHA-001	2019-12-15
EMTEK (Shenzhen) Co., Ltd.	ES191106013E	2019-11-18
FIT	S20-078-SERV-01	2020-09-01
Intertek Testing Services Limited, Shanghai	191201884SHA-001	2019-12-16
EMTEK (Shenzhen) Co., Ltd.	ES191106009E	2019-11-18
FIT	S20-078-SERV-02	2020-09-01
TÜV Rheinland (China) Ltd.	50235116 001	2019-04-23
EMTEK (Shenzhen) Co., Ltd.	ES190422977E	2019-05-11
Intertek Testing Services Limited, Shanghai	200501942SHA-001	2020-06-04
Intertek Testing Services Limited, Shanghai	200700259SHA-001	2020-07-17
Laboratory Name UL-CCIC Company Limited	E307995-A6041-CB-1	2020-01-06
Dekra	2050156R-IT-JP-P01V01	2020-06-02
Dekra	2050156R-MME-CE-P01V01	2020-05-29
Dekra	2050156R-RF-CE-P01V01	2020-06-02
Intertek	200702652SHA-001	2020-08-19
TUV Rheinland	60376965 002	2020-06-16
TUV Rheinland	60376965 001	2020-06-03
Intertek Testing Services Limited, Shanghai	200500269SHA-001	2020-07-20

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EMTEK (Shenzhen) Co., Ltd.	ES200427033E	2020-05-20
Intertek Testing Services Limited, Shanghai	200401737SHA-001	2020-05-25
Instituto de Pesquisas Eldorado	LET-ENE-RE 2395-8971-01-C - 01.00 (Pt)	2021-06-30
IBEC	IBEC210328	2021-07-30
IBEC	IBEC210329	2021-08-06
EMTEK (Shenzhen) Co., LTD.	ES200928008E	2021-01-07
TUV Rheinland (China) Ltd.	CN2011VA 001	2020-12-08
TUV Rheinland (China) Ltd.	CN206NJZ 001	2020-12-16
Intertek Testing Services Limited, Shanghai	200201344SHA-001	2021-03-16
TUV Rheinland	60376965 003	2021-03-01
UL-CIC Company Limited	E307995-A6127-CB-1	2021-10-20
UL-CIC Company Limited	E307995-A6122-CB-1	2021-10-11
Intertek Testing Services Limited, Shanghai	210901777SHA-001	2021-11-02
EMTEK (Shenzhen) Co., LTD.	ES210525010E	2021-09-15
EMTEK (Shenzhen) Co., LTD.	ES210425011E	2021-10-23
Intertek Testing Services Limited, Shanghai	220101813SHA-001	2022-02-10
Intertek Testing Services Limited, Shanghai	210902598SHA-002	2021-10-21
DEKRA Testing & Certification (Suzhou) Co., Ltd.	21A0829R-MME-CE-P01V01	2021-11-22
SGS-CSTC Standars Technical Services (Shanghai) Co., Ltd.	SHES211102367851	2021-12-17
TUV Rheinland (China) Ltd.	CN21CWMG 001	2021-09-01
EMTEK (Shenzhen) Co., LTD.	ES210425021E	2021-12-25
Intertek Testing Services Limited, Shanghai	211200841SHA-001	2021-12-09
Intertek Testing Services Limited, Shanghai	210500481SHA-002	2021-08-11
TUV Rheinland	60376965 004	2021-06-09
TUV Rheinland	60376965 005	2022-04-11
Instituto Brasileiro de Ensaios de Conformidade Ltda	IBEC231003	2023-06-02
Instituto Brasileiro de Ensaios de Conformidade Ltda	IBEC231004	2023-06-14
EMTEK (Shenzhen) Co., LTD.	ENS2205200148W001	2022-10-21
Intertek	221102642SHA-001	2022-11-29
UL-CCIC Company Limited	E307995-A6126-CB-1	2021-10-20
UL-CCIC Company Limited	E307995-A6127-CB-1	2022-09-27
SGS Taiwan Ltd.	TM-2212000443P	2023-02-06
Intertek	230100898SHA-001	2023-02-06
Wendell Electrical Testing Lab	WL-O44-23A410-A0	2023-02-14
EMTEK (Shenzhen) Co., LTD.	ENS2205310330W00101R	2022-10-28
Intertek	221202267SHA-001	2022-12-30
Intertek	220901877SHA-003	2022-10-31
Intertek	221101222SHA-002	2022-11-22
Intertek	221101222SHA-001	2022-11-22
EMTEK (Shenzhen) Co., LTD.	ENS2211100055w00101R	2022-12-12
Intertek	2301011065SHA-001	2023-02-03
UL-CCIC Company Limited	E307995-A6192-CB-1	2023-03-27
Intertek Testing Services Limited, Shanghai	230101106SHA	2023-02-03
Dekra	2330071R-MME-CE-P01V01	2023-03-31
Instituto de Pesquisas Eldorado	LET-EMC-RE 2395-14458-01-C - 01_00 Pt	2024-06-10

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Instituto de Pesquisas Eldorado	LET-ENE-RE 2395-14458-01-C [CE] - 01.00 (Pt)	2024-06-06
Instituto de Pesquisas Eldorado	LET-ID 2395-14458-01 - 01_00 Pt	2024-05-27
Instituto de Pesquisas Eldorado	LET-SEG-RE 2395-14458-01-C - 01.00 (Pt)	2024-06-06
EMTEK (Shenzhen) CO., Ltd.	ENS2312150172W00501R	2024-03-05
Intertek Testing Services Limited, Shanghai	231200945SHA-001	2024-03-20
Intertek Testing Services Limited, Shanghai	231200795SHA-001	2024-04-03
Intertek Testing Services Limited, Shanghai	231200793SHA-001	2024-02-01
TÜV Rheinland (China) Ltd.	CN23LVN6 001	2024-03-21
Dekra	23A0344R-MME-CE-P01V01	2023-12-15
Intertek Testing Services Limited, Shanghai	240200262SHS-001	2024-02-18
Dekra	2410020R-MME-CE-P01V01	2024-02-05
Intertek Testing Services Limited, Shanghai	231200946SHA-001	2024-03-20
TÜV Rheinland (China) Ltd.	CN232XEC 001	2024-01-05
TÜV Rheinland (China) Ltd.	CN23CTIJ 001	2023-12-27
UL-CCIC Company Limited	E307995-A62227-CB-1	2024-03-19
UL-CCIC Company Limited	E307995-A6227-CB-1	2023-12-18
Intertek Testing Services Limited, Shanghai	231200365SHA-001	2024-02-21
EMTEK (Shenzhen) CO., Ltd.	ENS2309200245W00101R	2023-12-26
Intertek Testing Services Limited, Shanghai	231200947SHA-001	2024-03-20
EMTEK (Shenzhen) CO., Ltd.	ENS2312150172W000101R	2024-01-23
Intertek Testing Services Limited, Shanghai	231200786SHA-003	2024-01-18
Intertek Testing Services Limited, Shanghai	240700030SHA-001	2024-07-18
UL-CCIC Company Limited	E307995-A6243-CB-1	2024-07-29
UL-CCIC Company Limited	E307995-A6242-CB-1	2024-07-28
EMTEK (Shenzhen) CO., Ltd.	ENS2404120202W00301R	2024-06-24
Instituto de Pesquisas Eldorado	LET-ID 2395-16700-01 - 01_00 Pt	2025-05-09
Instituto de Pesquisas Eldorado	LET-EMC-RE 2395-16700-01-C - 01_00 Pt	2025-05-07
Instituto de Pesquisas Eldorado	LET-SEG-RE 2395-16700-01-C - 01_00 Pt	2025-04-06

Informações de Auditoria / *Audit Information:*

Local da Auditoria / *Audit Location*	**Data de Realização /** *Perform Date*
Tratamento de Reclamações *Complaint Handling*	01/04/2025
Fabricante *Manufacturer*	

Informações Adicionais / *Additional Information:*

100-240 Vac, 3 A, 50/60 Hz, Class I
100-240 Vac, 4 A, 50/60 Hz
100-240 Vac, 3,6 A, 50/60 Hz
100-240 Vac, 5 A, 50/60 Hz
3.25A, 4.5A,6,75 A, 8,5 A, 20 Vdc, Class III
20Vdc/3.25A or 20Vdc/4.5A or 20Vdc/6.75A,

Observações / *Observations:*

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1. A validade deste Certificado de Conformidade está atrelada à realização das avaliações de manutenção e tratamento de possíveis não conformidades de acordo com as orientações da UL do Brasil Certificações previstas no RAC específico. Para verificação da condição atualizada de regularidade deste Certificado de Conformidade deve ser consultado o banco de dados de produtos e serviços certificados do Inmetro.
   The validity of this Certificate of Conformity is linked to the performance of maintenance assessments and treatment of possible non-conformities in accordance with the guidelines of UL do Brasil Certifications provided for in the specific Conformity Assessment Regulation. To check the updated condition of regularity of this Certificate of Conformity, the Inmetro database of certified products and services must be consulted.

2. Este certificado aplica-se aos equipamentos (produtos) idênticos ao protótipo avaliado e certificado, manufaturados na(s) unidade(s) fabril(is) mencionada (s) acima.
   This certificate applies to the products that are identical to the prototype investigated, certified and manufactured at the production site mentioned in this certificate.

3. Qualquer alteração no produto, incluindo a marcação, invalidará o presente certificado, salvo se o solicitante informar por escrito à UL do Brasil Certificações sobre esta modificação, a qual procederá à avaliação e decidirá quanto à continuidade da validade do certificado.
   Any non-authorized changes performed in the product, including marking, will invalidate this certificate. UL do Brasil Certificações must be notified about any desired change. This notification will be analyzed by UL do Brasil Certificações that will decide about certificate force.

4. Esta autorização está vinculada a um contrato e para o escopo acima citado.
   This license is related to a commercial proposal and to the scope above cited.

Histórico de Revisões / *Revisions History:*

Revisão / *Review*	**Data /** *Date*	**Descrição da Revisão /** *Revision Description*
00	20 de maio de 2025 / May 20, 2025	Emissão inicial com recertificação do certificado UL-BR 22.1054/ Initial Issue with renewall of certificate UL-BR 22.1054 – Exclusão dos modelos ThinkCentre M75q Gen 2, ThinkCentre M80q Gen 3, ThinkCentre M80s Gen 3, ThinkCentre M70q Gen 3, ThinkCentre M70q Gen 4, ThinkCentre M80q Gen 4 e ThinkCentre M90s Gen 4.
A última revisão substitui e cancela as anteriores / *The last review replaces and cancels the previous ones*		

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Anexo I / *Attachment I:*

Componente / Component	Manufacturer/ trademark	Type/model	Technical data	Norma/ Standard	
Adapter	Acbel Polytech Inc.	ADLX45YAC2D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 20Vdc, 2.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO105856), (NO105995)
Adapter (Alternate)	Acbel Polytech Inc.	ADLX45YAC3D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P:20Vdc, 2.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO105842), (NO105937)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX45YCC2D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102327/A2/ M1), CB by Demko (DK- 73341-M2-UL)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX45YCC3D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102328/A1/ M1), CB by Demko (DK- 73342-M1-UL)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX45YCC3G	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class I (with class II construction throughout), Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102328/A1/ M1),CB by Demko (DK-73342-M1-UL)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX45YDC3D, ADP-45EG B, ADLX45YDC2D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 20Vdc, 2.25A, Class II with functional earth for model: ADLX45YDC3D, ADP-45EG B; Class II for model: ADLX45YDC2D, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-088399), (JPTUV-088525)
Adapter (Alternate)	Lite-On Technology Corp	ADLX45YLC2D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A,	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-74396-UL), (DK-74550-UL)

			Class II, Ambient: 40°C, Altitude: 5000m		
Adapter (Alternate)	Lite-On Technology Corp	ADLX45YLC3D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-73964-UL), (DK-73960-UL)
Adapter (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 2.25A Tma: 35 °C min. Altitude: 5000m	UL 60950-1 2nd; UL 62368-1, 2nd Edition, IEC 60950-1/ A2:2013, IEC 62368-1:2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB
Adapter (Alternate)	Acbel Polytech Inc.	ADLX65YAC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO106299), (NO106292)
Adapter (Alternate)	Acbel Polytech Inc.	ADLX65YAC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO106182), (NO106181)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YCC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102312), CB by Demko (DK- 73335-UL)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YCC3E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1:2005, AMD1:2009, AMD2:2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	CB by UL (Demko) (DK-131850-UL), (DK-131825-UL)
Adapter (Alternate)	Lite-On Technology Corporation	ADLX65YLC3E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017, BS EN 62368-1: 2014+A11: 2017,	CB by TUVRh (JPTUV-140101), (JPTUV-140255), (JPTUV-139969)

				IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	
Adapter (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC3E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020	CB by Nemko (NO123886), (NO123885)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC3E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-139978)
Adapter (Alternate)	Lite-On Technology Corporation	ADLX65YLC2E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017, BS EN 62368-1: 2014+A11: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-140637), (JPTUV-140640), (JPTUV-140756)
Adapter (Alternate)	CHICONY POWER TECHNOLOGY CO LTD	ADLX65YCC2E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1:2005, AMD1:2009, AMD2:2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	CB by UL Solutions (Demko) (DK-131855-UL), (DK-131831-UL)
Adapter (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC2E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020	CB by Nemko (NO123867), (NO123794)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC2E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-139994)
Adapter (Alternate)	Lite-On Technology Corporation	ADLX65YLC3E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017, BS EN 62368-1: 2014+A11: 2017, IEC 62368-1: 2018, EN IEC 62368-1:	CB by TUVRh (JPTUV-140101), (JPTUV-140255), (JPTUV-139969)

				2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	
Adapter (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC3E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020	CB by Nemko (NO123886), (NO123885)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC3E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-139978)
Adapter (Alternate)	Lite-On Technology Corporation	ADLX65YLC2E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017, BS EN 62368-1: 2014+A11: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-140637), (JPTUV-140640), (JPTUV-140756)
Adapter (Alternate)	CHICONY POWER TECHNOLOGY CO LTD	ADLX65YCC2E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1:2005, AMD1:2009, AMD2:2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	CB by UL Solutions (Demko) (DK-131855-UL), (DK-131831-UL)
Adapter (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC2E	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020	CB by Nemko (NO123867), (NO123794)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC2E	I/P: AC 100-240V; 50-60Hz; 1.8A O/P: 15Vdc, 3A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, BS EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh (JPTUV-139994)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YSCC2 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A,	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-096409), (JPTUV-096534)

			Class II, Ambient: 40°C, Altitude: 5000m		
Adapter (Alternate)	Chicony Power Technology Co.,Ltd.	ADLX65YSCC3 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-096407), (JPTUV-096521)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC3D, ADP-65XD B, ADLX65YDC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-088370), (JPTUV-088549)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YSDC2 A, ADLX65YSDC3 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-097420), (JPTUV-097518)
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YLC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-73622-UL), (DK-73627-UL)
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YLC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-73466-M1-UL), (DK-73473-M1-UL)
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YSLC2A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-096377), (JPTUV-096374)
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YSLC3A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A,	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2),	CB by TUVRH (JPTUV-096300), (JPTUV-096303)

			Class I, Ambient: 40°C, Altitude: 5000m	EN 62368-1: 2014/A11:2017	
Adapter (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 3.25A Tma: 35 °C min. Altitude: 5000m	UL 60950-1 2nd; UL 62368-1, 2nd Edition, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB
Enclosure Material for top cover and bottom case	Covestro Deutschland AG[PC Resins]	FR3021 + (+ - Material designations may be followedby a six digit numerical code denoting color.)	V-0, thickness 1.5 mm minimum, 85ºC	UL 94, UL 746	UL
Enclosure Material for top cover and bottom case (Alternate)	NINGBO LG YONGXING CHEMICAL COLTD	LUPOY GN-5151RF(#) (#) May or may not be followed by suffix letter from A-Z inclusive,except F, and except Grades HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X	V-0, thickness 1.0mm min., 60ºC	UL 94, UL 746	UL
Enclosure Material for LCDbezel	LOTTE CHEMICAL CORPORATION	NH-1024(+) (+) - May be replaced by one,two, or three numbers and/or letter(s)	V-0, thickness 0.75mm min.,60ºC	UL 94, UL 746	UL
Enclosure Material for LCD bezel (Alternate)	MITSUBISHI ENGINEERING-PLASTICS CORP	MB1700+ (+ Suffix optional, exceptions: The following cannot be used as optional suffixes: "NF" for grade NXG5050, "N" for grade NXG5030, "N" for grade MB2112+, "S1" for grade F20-54, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1), the last letter "L" for grade CFH2520+.)	V-0, thickness 0.75mm min.,60ºC	UL 94, UL 746	UL
Enclosure Material for top side around keyboard	LOTTE CHEMICAL CORPORATION	NH-1021(+) (+) - May be replaced by one,two, or three	V-0, thickness 1.0mm min., 60ºC	UL 94, UL 746	UL

		numbers and/or letter(s)			
Enclosure Material for top side around keyboard (Alternate)	NINGBO LG YONGXING CHEMICAL COLTD	LUPOY GN-5001RFD	V-0, thickness 1.0mm min., 60°C	UL 94, UL 746	UL
LCD Panel	AUO	B140HAK03.2	14.0 inch, TFTtype (LED Backlight)	--	Tested in theequip.
LCD Panel(Alternate)	Interchangeable	Interchangeable	14.0 inch, TFTtype (LED Backlight)	--	--
HDD (Optional)	Western Digital Technologies Inc.	WYYXXXXYYY Y-YYXXXYY, UYXYYYXXX, HYYXXXXXXXY YYYY, DYXYYYXXX (X, Y=0-9, A-Z, blank; not safety-relevant)	5/12 Vdc, 1.5/1.0 A Max.	EN 62368-1:2014	TUV, UL
HDD (Optional)(Alternate)	Interchangeable	Interchangeable	5/12 Vdc, 1.5/1.0 A Max.	EN 62368-1:2014	UL, TUV, VDE, Nemko
Solid State Drives (Optional) (Alternate)	SK hynix Inc.	HFSabcG32MN B-defgh, HFSabcG32MN D-defgh, HFSabcG32MN C-defgh, HFSabcG32ME D-defgh, HFSabcG32EE D-defgh (The suffix "abc" denoting memory capacity, "defgh" denoting buyer can be any, letter (A to Z) or number (0-9))	5Vdc, 2.0A max.	IEC 60950-1/A2:2013	CB by TUV (SG- OF-14375)
Solid State Drives (Optional) (Alternate)	Samsung Electronics Co.,Ltd.	MZ-5********** (* can be 0-9, A-Z, blank, slash ordash)	12Vdc, 0.5A	UL 60950-1, 2nd, IEC 60950-1: 2005 +A1+A2	UL, TUV, VDE, Nemko
Solid State Drives (Optional) (Alternate)	Samsung Electronics Co.,Ltd.	MZ-C********** (* can be 0-9, A-Z, blank, slash or dash)	3.3 Vdc, 3.5 Amax.	IEC 60950-1: 2005+A1+A2	CB by TUVRh (JPTUV-086923)
Solid State Drives (Optional) (Alternate)	Interchangeable	Interchangeable	5Vdc, 2.0 A max.or 3.3 Vdc, 3.5 Amax. or 12Vdc, 0.5A	UL 60950-1, 2nd, IEC 60950-1:2005 +A1+A2	UL, TUV, VDE, Nemko
SSHD (Optional)(Alternate)	Seagate Technology Inc.	ST9 with additional suffix, 2.5 Series	5Vdc, 1.5 A max.	IEC 60950-1: 2005+A1+A2	CB by UL (US- 24632-UL)
SSHD (Optional)(Alternate)	Interchangeable	Interchangeable	5Vdc, 1.5 A max.	UL 60950-1, 2nd, IEC 60950-1: 2005 +A1+A2	UL, TUV, VDE, Nemko
Rechargeable Li- ion Battery Pack	CELXPERT ENERGY CORP	L17C3P52	11.1Vdc, 45Wh, 4120mAh	UL 60950-1, 2nd Edition,	UL, CB by Demko (DK- 65913-

				IEC 60950-1/ A2:2013, IEC 62133:2012 (2nd Edition) , UL 2054, UL 62368-1, 2nd Edition IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	M1-UL), (DK-65753-M1-UL), (DK-64785-M1-UL)
Rechargeable Li- ion Battery Pack (Alternate)	LG CHEM, LTD. **(*)**	L17L3P52	11.1Vdc, 45Wh or 4050mAh (Nom.) or 3880mAh (Min.)	UL 60950-1, 2nd Edition, IEC 60950-1/ A2:2013, IEC 62133:2012 (2nd Edition) , UL 2054, UL 62368-1, 2nd Edition IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 64954-A1-UL), (DK-53297-A5-UL), (DK-65534-A1-UL)
Rechargeable Li- ion Battery Pack (Alternate)	SIMPLO TECHNOLOGY CO LTD	L17M3P53, L17M3P54	11.1Vdc, 4.08Ah or 4.12Ah or45Wh	UL 60950-1, 2nd Edition, IEC 60950-1/ A2:2013, IEC 62133:2012 (2nd Edition) , UL 2054, UL 62368-1, 2nd Edition IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 64478-A1-UL), (DK-64480-A1-UL), (DK-65142-A1-UL)
DC Fan (for MB1, MB2)	Asia Vital ComponentsCo.,Ltd.	BAPA0705R5HY008	5Vdc, 0.5A, 3.45 CFM min	UL507, EN 62368-1: 2014/A11: 2017	UL, TUV
DC Fan (for MB1, MB2) (Alternate)	Toshiba Home Technology Corp.	C-267C-2	5Vdc, 0.35A, 2.8 CFM min	UL507, EN 62368-1: 2014/A11: 2017	UL, TUV
DC Fan (for MB3)	Asia Vital ComponentsCo.,Ltd.	BAPA0705R5HY020	5Vdc, 0.5A, 3.17 CFM min	UL507, EN 62368-1: 2014/A11: 2017	UL, TUV
DC Fan (for MB3) (Alternate)	Toshiba Home Technology Corp.	M-269C-4	5Vdc, 0.29A, 2.5 CFM min	UL507, EN 62368-1: 2014/A11: 2017	UL, TUV
Motherboard	Interchangeable	Interchangeable	See below	--	Tested in theequip.
- RTC battery (Lithium type)	PANASONIC CORPORATION , PANASONIC CORPORATION OF NORTH AMERICA	CR2032* (* - Cell model numbers may be followed by an optional slash (/)and single or multiple	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH12210)

		alphanumeric characters (i.e. letters and/or numbers), which denote optional features such as various mounting tabs, connecting leads or plugs, packaging, etc.)			
- RTC battery (Lithium type)	Maxell, Ltd	CR2032, CR2032* (* - These cells and batteries may come with an optional single or multiple alphanumeric denoting various pin, tab, cap or wire termination types.)	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH12568)
- RTC battery (Lithium type) (Alternate)	FDK CORPORATION	CR2032 (l)* (l) - The cells or batteries may come with an optional single or multiple alphanumeric suffixes denoting various pin, tab, cap, or wire termination types. For model CR17450ES, Suffix “K” shall not be used. * - These cells may have various insulating tube,ring or tape.	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH13421)
- RTC battery (Lithium type) (Alternate)	VARTA MICROBATTER Y GMBH	CR2032	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH13654)
- RTC battery (Lithium type) (Alternate)	MITSUBISHI ELECTRIC CORP	CR2032+ (+ - The cells may have various insulating tube, ring, or tape.)	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH15370)
- RTC battery (Lithium type) (Alternate)	VIC-DAWN ENTERPRISE CO LTD (Trademark:KTS)	CR2032	3.0Vdc,Maximu m abnormal charging current10mA	UL 1642	UL (MH20550)
- RTC battery(Lithium type)(Alternate)	Interchangeable	CR2032 or CR2032* orCR2032+ orCR2032 (l)*	3Vdc, Maximum abnormal charging current 10mA, against charging current by multiple components D2002 and R2001 (for (MB1,	UL 1642	UL

			MB2) rated 1k ohm; D4402 and R4401 (for MB3) rated 10k ohm.		
- Power Distribution Switch (U5401) provided for HDMI port use	DIODES INC	AP2552, AP2553 maybe followed by A, maybe followedby additional letters and/or numbers.	Input Voltage: 2.7 - 5.5 Vdc Output Continuous Rating: 0 - 2.1 A Output Current Limit: 104 - 3020 mA	UL 2367, IEC 60950-1/ A2:2013	UL, CB by UL (US-24721-UL)
- Power Distribution Switch (U5401) provided for HDMI port use(Alternate)	DIODES INC	AP2552, AP2552A, AP2553, and AP2553A, may be followed by additional letters, numbers, and/ora '-'	Input Voltage: 2.7 - 5.5 Vdc Output Continuous Rating: 0 - 2.1 A Output Current Limit: 104 - 3020 mA	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-34481-UL)
- Power Distribution Switch (U5401) provided for HDMI port use(Alternate)	Global Mixed- mode Technology Inc.	G517ALX1X2X3X4 X1=1 or 2, X2=TP, TB, RB or U5, X3=1, 2 or 3,X4=U or D	Input Voltage Range: 2.7-5.5 Vdc Operational Current Rating per output: 0.1A-2.15A Overcurrent Protection Current Rating per output: 0.2A-2.75A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 080887), (JPTUV-099276)
- Power Distribution Switch (U5401) provided for HDMI port use(Alternate)	TEXAS INSTRUMENTSINC	TPS2552, TPS2552-1, TPS2553, TPS2553-1	Input Voltage: 2.5 Vdc to 6.5 Vdc Output Continuous Rating: 1.5 A Output Current Limit: 1.7 A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-24603-UL), (US-34989-UL)
- Power Distribution Switch (U6901) provided for USB ports use	DIODES INC	PI5USB25wwxyyyEz Series, where ww is 44 or 46; x is blank,A or H; yyy is ZHor ZHD for the packaging type; E is Pb-free; andz is blank or X.	Input Voltage: 4.5 - 5.5 Vdc Continuous Rating: 30 mA to 2.5 A Current Limit: 100 mA to 3.18 A	UL 2367, IEC 60950-1/ A2:2013	UL, CB by UL (US- 24707-M2-UL)
- Power Distribution Switch (U6901) provided for USB ports use (Alternate)	TEXAS INSTRUMENTSINC	SN1408009RTE, SN1702001, TPS2543, TPS2544, TPS2545, TPS2546, and TPS2547, may be followed by additional characters thatdo not impact the	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 2.5 A Output Current Limit: 3.1 A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-29689-M1-UL), (US-35117-UL)

		safety features of the device.			
- Power Distribution Switch (U5901) provided for USB Type-C ports and Docking- station connectoruse	TEXAS INSTRUMENTS INCORPORATED	SN1810003, SN1810004, SN1905001, SN1905002, SN1905003, SN1905004, SN1905005, SN1905006, SN1905007, SN1905008, SN1908005, SN2001023, SN2001024, SN2001025, SN2001026, SN2001027, SN2001028, SN2001029, TPS65993, and TPS65994, may be followed by additional characters that do not affect the safety features of the device	Input Voltage: 4.9 - 5.5 Vdc Output Continuous Rating: PA_VBUS, PB_VBUS: 0.9 to 3.0A PA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315A Output Current Limit: PA_VBUS, PB_VBUS: 1.36A to 3.78A PA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to0.66A	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-34737-M2-UL)
- Power Distribution Switch (U5901) provided for Docking-stationconnector use	TEXAS INSTRUMENTS INCORPORATED	SN1701012, SN1702027, SN1702030, SN1702033, SN1702036, SN1708021, SN1710007, SN1711019, SN1802028, SN1805041, SN1805042, SN1805043, SN1805050, SN1806026, SN1809012, SN1809013, SN1809014, SN1809015, SN1809016, SN1809017, SN1809018, SN1809019, SN1809020, SN1809021, SN1809022, SN1809023, SN1809024, SN1809025, SN1809026, SN1809027, SN1809028, and TPS65988	Input Voltage: 1. PPHV1: 4.5 to 22 Vdc, 1 to 4 A 2. PPHV2: 4.5 to 22 Vdc, 1 to 4 A 3. PPCABLE1: 2.95 to 5.5 Vdc, 0.6 A 4. PPCABLE2: 2.95 to 5.5 Vdc, 0.6 A 5. VIN_3V3: 3.3 Vdc Output Continuous Rating: 1. VBUS1: 4.5 to 22 Vdc, 1 to 4 A with PPHV1 input 2. VBUS2: 4.5 to 22 Vdc, 1 to 4 A with PPHV2 input 3. C1CC1/C1CC2: 2.95 to 5.5 Vdc, 0.6 A with PPCABLE1 input 4. C2CC1/C2CC2:	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by UL (US-30473-A3-UL), (US-34617-UL)

		Models may be followed by other characters that do not impact the safety feature of the device.	2.95 to 5.5 Vdc, 0.6 A with PPCABLE2 input Output Current Limit: 1. VBUS1: 4.5 to 22 Vdc, 1.39 to 4.91 A with PPHV1 input 2. VBUS2: 4.5 to 22 Vdc, 1.39 to 4.91 A with PPHV2 input 3. C1CC1/C1CC2: 2.95 to 5.5 Vdc, 0.9 A with PPCABLE1 input 4. C2CC1/C2CC2: 2.95 to 5.5 Vdc, 0.9 A with PPCABLE2 input Ambient: -40 to 75°C		
- PTC Polyswitch (F6201) provided for Docking Connector use	Littelfuse Inc.	0603L035	6Vdc, 0.35A	UL 1434, EN 60738-1-1, EN 60738-1, EN 60730-1	UL, TUV
- Fuse for Micro SD Card reader port (F7701) and smart card reader port (F7201) use	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	ERBRD1R00X	32Vdc, 1A	UL 248-1	UL
I/O board	Interchangeable	Interchangeable	See below.	--	--
- Power Distribution Switch (U2) for USB port use	SILERGY TECHNOLOGY (TAIWAN) INC	SY6288Cyyyyy, SY6288Dyyyyy (yyyyy = 0-9, A-Z or blank)	I/P: DC 2.5Vdc to DC 5.5Vdc (for all models) O/P: Continuous Rating: max. 2.5 A Output Current Limit: max., 4.4A max.	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 058243-M1), CB by Demko (DK- 86482-UL)
- Power Distribution Switch (U2) for USB port use (Alternate)	SILERGY TECHNOLOGY (TAIWAN) INC	SY6288C20AAC , SY6288D20AAC	Input Voltage: 2.5 to 5.5Vdc Output Continuous Rating: Max. 2.0A Current Limit Rating: 3.5A forCB; 3.8A for UL	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK-86482-UL)

All PCBs	Interchangeable	Interchangeable	V-1 min, 105 ºC min.	UL 796	UL
Speaker (Two provided) (Optional)	Interchangeable	Interchangeable	Generic, 3.6 ± 15% ohm min., 2.5 Watts max.	--	Tested in theequip.
Dummy forsmart card reader (Optional)	MITSUBISHI ENGINEERING-PLASTICS CORP	MB1700+ (+ Suffix optional, exceptions: The following cannot be used as optional suffixes: "NF" for grade NXG5050, "N" for grade NXG5030, "N" for grade MB2112+, "S1" for grade F20-54, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1), the last letter "L" for grade CFH2520+.)	V-0, thickness 0.75mm min.,60ºC	UL 94, UL 746	UL
Mesh for speaker opening	CHENGDU KANGLONGXIN PLASTICS CO LTD	KLX FRPC-1860B	VTM-0, thickness 0.125-0.193 mm, 80 ºC	UL 94, UL 746	UL
- Adhesive for speaker mesh	Jiangsu SIDIKENew Materials Science & Technology CoLtd	DS-5	--	--	Tested in theequip.
Mylar for docking opening	CHENGDU KANGLONGXIN PLASTICS CO LTD	H KLX FRPC-1860B	VTM-0, thickness 0.05-0.11 mm, 80 ºC	UL 94, UL 746	UL
- Adhesive fordocking Mylar	SUZHOU JIANYI TECHCO. , LTD	JY-W001	--	--	Tested in theequip.
Rubber Stand	--	--	See below for details.	--	--
- Hard rubber(internal part)	Covestro Deutschland AG[PC Resins]	FR3021 + (+ - Material designations may be followedby a six digit numerical code denoting color.)	V-0, thickness 1.5 mm minimum, 85ºC, fixed by hot melted.	UL 94, UL 746	UL
- Other rubber (external part)	Interchangeable	Interchangeable	Min. HB, located outside of enclosure.	--	--
- Other rubber (external part) (Alternate)	Interchangeable	Interchangeable	Flammability level is ignored, when small parts(4g max. or 1750mm^3max.) located outside of enclosure.	--	--
IR LED module	Liteon OPTO Technology (CZ)Ltd.	LTE-R28206S-NE8, LTE-R28206S-NE8-XX (“XX” means different customer numbers)	Comply IEC 62471 exemptgroup	IEC 62471:2006	CB by SGS (BE-34640)

IR LED module (Alternate)	Interchangeable	Interchangeable	Comply IEC 62471 exemptgroup	IEC 62471:2006 (First Edition)	CB
Adapter	ACBEL POLYTECH INC.	ADLX65YAC3D	I/P: 1.8A 100-240V~ 50-60Hz O/P: 20Vdc, 3.25A Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11:2017	UL, CB by Nemko (NO106182) , (NO106181)
Adapter (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC2D	I/P: 1.8A 100-240V~ 50-60Hz O/P: 20Vdc, 3.25A Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11:2017	UL, CB by Nemko (NO106299), (NO106292)
Adapter (Alternate)	CHICONY POWER TECHNOLOGY CO LTD	ADLX65YCC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Nemko (NO102312) , CB by Demko (DK-73335-UL)
Adapter (Alternate)	CHICONY POWER TECHNOLOGY CO LTD	ADLX65YCC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I (with class II construction throughout), Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Nemko (NO102313), CB by Demko (DK- 73338-UL)
Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YSCC2A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV-096409), (JPTUV-096534)

Adapter (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YSCC3A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 096407), (JPTUV- 096521)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YDC3D, ADP-65XD B, ADLX65YDC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 088370), (JPTUV- 088549)
Adapter (Alternate)	Delta Electronics, Inc.	ADLX65YSDC2A, ADLX65YSDC3A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II (Class II with functional earth: ADLX65YSDC3A , Class II: ADLX65YSDC2A), Ambient: 40°C, Altitude: 5000m	UL 60950-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 097420), (JPTUV- 097518)
Adapter (Alternate)	LITE-ON TECHNOLOGY CORP	ADLX65YLC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK-73622-UL), (DK-73627- UL)
Adapter (Alternate)	LITE-ON TECHNOLOGY CORP	ADLX65YLC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK-73466-M1-UL), (DK- 73473-M1-UL)
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YSLC2A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P:	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2),	UL, CB by TUVRH (JPTUV- 096377), (JPTUV- 096374)

			20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	EN 62368-1: 2014/A11:2017	
Adapter (Alternate)	Lite-On Technology Corp	ADLX65YSLC3A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 096300), (JPTUV- 096303)
Adapter (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 3.25A, Tma: 35°C min., Altitude: 5000m	IEC 60950-1 (ed.2);am1,am2, IEC 62368-1 (ed.2), EN 62368-1: 2014/A11:2017, UL 60950-1, UL 62368-1	CB, UL
Enclosure for LCD cover and top side around keyboard	LG CHEM LTD	LUPOY GN-5151RF(#) (#) - May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404- G, XR404-P and LUMILOY GN2108FI.	V-0, thickness 1.0 mm min., 60 oC	UL 94, UL 746	UL
Enclosure for LCD cover and top side around keyboard (Alternate)	NINGBO LG YONGXING CHEMICAL CO LTD	LUPOY GN-5151RF(#) (#) - May or may not be followed by suffix letter from A- Z inclusive, except F, and except Grades HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X	V-0, thickness 1.0 mm min., 60 oC	UL 94, UL 746	UL
Enclosure for LCD cover and top side around keyboard (Alternate)	LOTTE CHEMICAL CORPORATION	NH-1150(+) (+) - May be replaced by one, two, or three numbers and/or letter(s)	V-0, thickness 1.2 mm min., 60oC	UL 94, UL 746	UL

Enclosure for LCD bezel	LG CHEM LTD	GN-5001RFD	V-0, thickness 0.9 mm min., 60 oC	UL 94, UL 746	UL
Enclosure for LCD bezel (Alternate)	NINGBO LG YONGXING CHEMICAL CO LTD	GN-5001RFD	V-0, thickness 0.9 mm min., 60 oC	UL 94, UL 746	UL
Enclosure for LCD bezel (Alternate)	LOTTE CHEMICAL CORPORATION	NH-1024(+) (+) - May be replaced by one, two, or three numbers and/or letter(s)	V-0, thickness 0.75 mm min., 60oC	UL 94, UL 746	UL
Enclosure for LCD bezel (Alternate)	Covestro Deutschland AG [PC Resins]	FR3002 + + - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 0.9 mm min., 70oC	UL 94, UL 746	UL
Enclosure for bottom case	Covestro Deutschland AG [PC Resins]	FR3021 + (+ - Material designations may be followed by a six digit numerical code denoting color.)	V-0, thickness 1.2 mm min., 85 oC	UL 94, UL 746	UL
Enclosure for bottom case (Alternate)	LG CHEM LTD	LUPOY GN-5151RF(#) (#) - May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, LI912W, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404- G, XR404-P and LUMILOY GN2108FI.	V-0, thickness 1.0 mm min., 60oC	UL 94, UL 746	UL
Sponge for thermal opening	CENTURY CREATION INTERNATIONAL CO LTD	CR-2030B	V-0, thickness 1.0 mm min.	UL 94	UL
- Adhesive for sponge	DEXERIALS CORP	G9000	--	--	Tested in the equip.
- Adhesive for sponge (Alternate)	3M CHINA CO LTD	9448A	--	--	Tested in the equip.
LCD Panel	BOE	NV140FHM-N4V V8.0	14.0 inch, TFT type (LED Backlight)	--	Tested in the equip.
LCD Panel (Alternate)	Interchangeable	Interchangeable	14.0 inch, TFT type (LED Backlight)	--	--
HDD (Optional)	HGST Japan, Ltd	HDS series	5/12 Vdc, 1.5/2.0 A Max.	IEC 60950-1: 2005/AMD2:	CB by TUVRh

				2013, IEC 62368-1: 2014	
HDD (Optional)	Western Digital Technologies Inc.	WYYXXXXYYYY-YYXXXYY, UYXYYYXXX, HYYXXXXXXXYYYYY, DYXYYYXXX (X, Y=0-9, A-Z, blank; not safety-relevant)	5/12 Vdc, 1.5/1.0 A Max.	EN 62368-1: 2014, UL 62368-1	TUV, UL
HDD (Optional) (Alternate)	Interchangeable	Interchangeable	5/12 Vdc, 1.5/2.0 A Max.	IEC 60950-1: 2005/AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11: 2017, UL 60950-1, UL 62368-1	UL, TUV, VDE, Nemko, CB
Solid State Drives (Optional) (Alternate)	SK hynux Inc.	HFSabcG32MNB-defgh, HFSabcG32MND-defgh, HFSabcG32MNC-defgh, HFSabcG32MED-defgh, HFSabcG32EED-defgh (The suffix "abc" denoting memory capacity, "defgh" denoting buyer can be any, letter (A to Z) or number (0-9))	5Vdc, 2.0A max.	IEC 60950-1/ A2:2013	CB by TUV
Solid State Drives (Optional) (Alternate)	Samsung Electronics Co., Ltd.	MZ-5********** (* can be 0-9, A-Z, blank, slash or dash)	12Vdc, 0.5A	UL 60950-1, 2nd, IEC 60950-1: 2005 +A1+A2	UL, CB by TUVRh
Solid State Drives (Optional) (Alternate)	Samsung Electronics Co., Ltd.	MZ-C********** (* can be 0-9, A-Z, blank, slash or dash)	3.3 Vdc, 3.5 A max.	IEC 60950-1: 2005+A1+A2	CB by TUVRh
Solid State Drives (Optional) (Alternate)	Interchangeable	Interchangeable	5Vdc, 2.0 A max. or 3.3 Vdc, 3.5 A max. or 12Vdc, 0.5A max.	IEC 60950-1: 2005/AMD2: 2013, IEC 62368-1: 2014,	UL, TUV, VDE, Nemko, CB

				EN 62368-1: 2014/A11: 2017, UL 60950-1, UL 62368-1	
SSHD (Optional)	Seagate Technology Inc.	ST3 with additional suffix, 3.5 Series	5/12Vdc, 1.5 A max.	IEC 60950-1: 2005+A1+A2	CB by UL
SSHD (Optional) (Alternate)	Seagate Technology Inc.	ST9 with additional suffix, 2.5 Series	5Vdc, 1.5 A max.	IEC 60950-1: 2005+A1+A2	CB by UL
SSHD (Optional) (Alternate)	Interchangeable	Interchangeable	5/12Vdc, 1.5 A max. or 5Vdc, 1.5 A max.	IEC 60950-1: 2005/AMD2: 2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11: 2017, UL 60950-1, UL 62368-1	UL, TUV, VDE, Nemko, CB
DC Fan	Asia Vital Components Co.,Ltd.	BAPB0707R5HV (“V” can be ABCD where A, B, C, D may be A-Z, 0-9, “- ” or blank)	5Vdc, 0.5A, 5.17 CFM min.	UL 507, EN 62368-1: 2014/A11: 2017	UL, TUV
DC Fan (Alternate)	Forcecon Tech. Co., Ltd.	DFS5K22B15673(Y) (Y) stands for 0-9, A-Z, “-” or blank.	5Vdc, 0.5A, 5 CFM min.	UL 507, EN 62368-1: 2014	UL, TUV
Rechargeable Li- ion Battery (2S1P)	Shanghai BYD Company Limited	L20B2PF0	7.68Vdc, Rated Capacity 4786mAh / 36.7Wh	UL 2054, UL 60950-1, UL 62368-1, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62133-2: 2017, EN 62133-2: 2017	UL, CB by Demko (DK- 105172-UL), (DK-105198- M1-UL), (DK-103870- UL)
Battery Pack (2S1P) (Alternate)	CELXPERT ENERGY CORP	L20C2PF0	7.68Vdc, 4947mAh / 38Wh, 4786mAh / 36.7Wh	UL 2054, UL 62368-1, IEC 62368-1: 2014 (Second	UL, CB by Demko (DK- 105227-UL), (DK-104211- UL), (DK- 104481-UL)

				Edition), EN 62368-1: 2014+A11: 2017, IEC 62133:2012, IEC 62133-2: 2017, EN 62133-2: 2017	
Battery Pack (2S1P) (Alternate)	LG ENERGY SOLUTION, LTD. LG CHEM, LTD (*)	L20L2PF0	7.68Vdc, Typ.: 4947mAh/38Wh, Rated: 4786mAh/36.7Wh	UL 2054, UL 60950-1, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62133:2012	UL, CB by Demko (DK- 103896-M1- UL), (DK- 103612-M1- UL) (DK-103805- UL)
Battery Pack (2S1P) (Alternate)	SIMPLO TECHNOLOGY CO LTD	L20M2PF0	7.68Vdc, 4947mAh/38Wh or 4786mAh/36.7Wh	UL 2054, UL 60950-1, UL 62368-1, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62133:2012, IEC 62133-2: 2017, EN 62133-2: 2017	UL, CB by Demko (DK- 104074-UL), (DK-104071- UL), (DK- 103197-UL), (DK-103212- UL)
Battery Pack (3S1P)	CELXPERT ENERGY CORP	L20C3PF0	11.1Vdc, 4054mAh / 45Wh, 3964mAh / 44Wh	UL 2054, UL 62368-1, IEC 62368-1: 2014 (Second Edition), EN 62368-1:	UL, CB by Demko (DK- 104103-UL), (DK-103873- UL), (DK- 104091-UL)

				2014+A11: 2017, IEC 62133:2012, IEC 62133-2: 2017, EN 62133-2: 2017	
Battery Pack (3S1P) (Alternate)	LG ENERGY SOLUTION, LTD. LG CHEM, LTD (*)	L20L3PF0	11.1Vdc, Typical: 4054mAh/45Wh, Rated Capacity: 3928mAh/43.6 Wh	UL 2054, UL 60950-1, UL 62368-1, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62133:2012	UL, CB by Demko (DK- 103877-M1- UL), (DK- 102982-M1- UL), (DK-102948- UL)
Battery Pack (3S1P) (Alternate)	SIMPLO TECHNOLOGY CO LTD	L20M3PF0	11.1Vdc, 4054mAh/45Wh, 3964mAh/44Wh	UL 2054, UL 60950-1, UL 62368-1, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62133:2012, IEC 62133-2: 2017, EN 62133-2: 2017	UL, CB by Demko (DK- 104324-UL), (DK-103771- UL), (DK- 104068-UL), (DK-104081- UL)
Motherboard (MB1)	Interchangeable	Interchangeable	See below	--	--
- RTC battery (Lithium type)	MITSUBISHI ELECTRIC CORP	CR2032+ (+ - The cells may have various insulating tube, ring, or tape.)	3.0Vdc, Maximum abnormal charging current 10mA	UL 1642	UL (MH15370)
- RTC Battery (Lithium type) (Alternate)	Interchangeable	CR2032 series	3Vdc, maximum abnormal charging current 10mA min,	UL 1642	UL

			against charging current by multiple components PD102, PR107 (rated 1K ohm)		
- PTC Polyswitch (FV501) provided for HDMI port use	Littelfuse Inc.	1206L110THXXYYYYY (X stands for A to Z, 0 to 9, or blank. Y stands for A to Z, 0 to 9, or blank.)	8Vdc, 1.1A	UL 1434, IEC/EN 60738-1: 2006, IEC/EN 60738-1-1: 2008 IEC/EN 60730-1	UL, TUV
- PTC Polyswitch (FV501) provided for HDMI port use (Alternate)	Dongguan TLC Electronic Technology Co., Ltd.	TLC-NSMD100 (x)	6Vdc, 1A	UL 1434, EN 60738-1-1:2008 EN 60738-1:2006+A1, EN 60730-1:2011	UL, TUV
- PTC Polyswitch (FV501) provided for HDMI port use (Alternate)	Bourns Inc.	MF-NSMF110	6Vdc, 1.1A	UL 1434, IEC/EN 62319-1-1:2005, IEC/EN 62319-1:2005, IEC/EN 60738-1:2006+A1, IEC/EN 60738-1-1:2008, EN 60730-1:2011, EN 60730-1:2010	UL, TUV
- Power Distribution Switch (U5701) for USB 3.0 port use	DIODES INC	PI5USB25wwxyyy Ez Series, where ww is 44 or 46 x is blank, A, AQ, H, J, or Q yyy is ZH or ZHD for packaging type E is Pb-free z is blank or X Cat. Nos. PI5USB2544ZHE, PI5USB2544ZHEX , PI5USB2544AZHE, , PI5USB2544AZHEX, PI5USB2544ZHDE, PI5USB2544ZHDEX, PI5USB2544AZHDE, PI5USB2544AZHDEX,	Input Voltage: 4.5 - 5.5 Vdc Continuous Rating: 30 mA to 2.5 A Current Limit: 100 mA to 3.18 A	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-38136-UL)

		PI5USB2546ZHE, PI5USB2546ZHEX, PI5USB2546AZHE, PI5USB2546HZH E, PI5USB2546AZHE X, PI5USB2546ZHD E, PI5USB2546ZHD EX, PI5USB2546AZH DE, PI5USB2546AZH DEX, PI5USB2546HZH EX, PI5USB2546HZH DE, PI5USB2546HZH DEX, PI5USB2546QZH E, PI5USB2546QZH EX, PI5USB2546AQZ HE, PI5USB2546AQZ HEX, PI5USB2546JZHE , PI5USB2546JZHE X, PI5USB2546JZHD E, and PI5USB2546JZHD EX			
- Power Distribution Switch (U5701) for USB 3.0 port use (Alternate)	TEXAS INSTRUMENTS INC	SN1408009RTE, SN1702001, TPS2543, TPS2544, TPS2547, TPS2546, TPS2545 (Additional suffixes after the model number designate the type of integrated circuit package, integrated circuit lead types or other features that are considered not to affect the functionality of the device.)	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 2.5 A Output Current Limit: 3.1 A	UL 2367, IEC 60950-1/ A2:2013 IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-29689-M1- UL), (US-35117-UL)
- Power Distribution Switch (U5701) for USB 3.0 port use (Alternate)	Guangdong Cellwise Microelectronics Co., Ltd.	CW3042AAAD, CW3042AAAE, HP3048BAAQ, CW3048AAAQ,	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: Maximum	UL 2367, IEC 62368-1: 2014	UL, CB by Demko (DK- 108822-UL)

		CW3048BAAQ, CW3046AAAQ	2.8 A Current Limit Rating: Maximum 3.17 A		
- Power Distribution Switch (U5701) for USB 3.0 port use (Alternate)	Fortune Advanced Technology Co	FA3200NTB, FA3200NTR, FA3210NTB, FA3210NTR	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 2.0 A Current Limit Rating: 2.7 A	UL 2367, IEC 62368-1: 2014 (Second Edition)	UL, CB by Demko (DK- 74299-UL)
- Power Distribution Switch (U6001) for USB Type-C port use	SILERGY TECHNOLOGY (TAIWAN) INC	SY6861B, followed by 1 or 2, followed by AB or AD, followed by C; SY6863B, followed by 1, 2, 3, 4, 5 or 6, followed by AB or AD, followed by C	Input Voltage: VIN = 2.5 to 5.5 Vdc Output Continuous Rating: 0.1 to 3 A Current Limit Rating: 0.3 to 5 A	UL 2367, IEC 60950-1/ A2:2013 IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 64454-A1-UL), (DK- 87012-UL)
- Power Distribution Switch (U6001) for USB Type-C port use (Alternate)	DIODES INC	AP22615AWU-7, AP22615BWU-7, AP22815AWT-7, AP22815BWT-7	Input Voltage/Output Continuous Rating: 3.0 - 4.0 Vdc; Iout = 1A - 1.5A 4.0 - 5.5 Vdc; Iout = 1A - 3A Output Current Limit: 3.0 - 5.5 Vdc; at 1.35A to 3.6A	UL 2367, IEC 60950-1/ A2:2013 IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-32144-A1- UL), (US-32145-A1- UL)
- Power Distribution Switch (U6001) for USB Type-C port use (Alternate)	Fortune Advanced Technology Co Ltd	FA7615, FA7616, FA7626 f/b A, B, C, D, E, F, G, H, I or J, f/b A, f/b 5 or 6, f/b R	Input Voltage: 2.5 to 5.5 Vdc Output Continuous Rating: 3.0 A Current Limit Rating: 3.4 A	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 81343-M2-UL)
- Power Distribution Switch (U6001) for USB Type-C port use (Alternate)	NXP Semiconductor Taiwan Ltd.	NX5P3290UK/S90 0, NX5P3290UK	Input Voltage Range: 4.0 Vdc to 5.5Vdc Current Limit Rating: 3.3 A	UL 62368-1, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014	UL, CB by Demko (DK- 57975-A1-UL)
- Power Distribution Switch (UU2) for USB Type-C port use	REALTEK SEMICONDUCTOR CORP	RTS5441x (x = S to Z), RTS5444, RTS5444y (y = E to Z), RTS5467z (z= A to H)	Input Voltage: 4.75 to 5.5 Vdc Output Continuous Rating: VBUS_SW_OUT = 0.9 to 3.0A CC1/CC2 = 300mA Current Limit Rating:	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 81786-M1-UL)

			VBUS_SW_OUT = 0.968 – 3.194A CC1/CC2 = 570mA		
Motherboard (MB2) (Alternate)	Interchangeable	Interchangeable	See below	--	--
- RTC battery (Lithium type)	MITSUBISHI ELECTRIC CORP	CR2032+ (+ - The cells may have various insulating tube, ring, or tape.)	3.0Vdc, Maximum abnormal charging current 10mA	UL 1642	UL (MH15370)
- RTC Battery (Lithium type) (Alternate)	Interchangeable	CR2032 series	3Vdc, maximum abnormal charging current 10mA min, against charging current by multiple components PD102, PR107 (rated 1K ohm)	UL 1642	UL
- PTC Polyswitch (FV501) provided for HDMI port use	Littelfuse Inc.	1206L110THXXY YYYY (X stands for A to Z, 0 to 9, or blank. Y stands for A to Z, 0 to 9, or blank.)	8Vdc, 1.1A	UL 1434, IEC/EN 60738-1: 2006, IEC/EN 60738-1-1: 2008 IEC/EN 60730-1	UL, TUV
- PTC Polyswitch (FV501) provided for HDMI port use (Alternate)	Dongguan TLC Electronic Technology Co., Ltd.	TLC-NSMD100 (x)	6Vdc, 1A	UL 1434, EN 60738-1-1:2008 EN 60738-1:2006+A1, EN 60730-1:2011	UL, TUV
- PTC Polyswitch (FV501) provided for HDMI port use (Alternate)	Bourns Inc.	MF-NSMF110	6Vdc, 1.1A	UL 1434, IEC/EN 62319-1-1:2005, IEC/EN 62319-1:2005, IEC/EN 60738-1:2006+A1, IEC/EN 60738-1-1:2008, EN 60730-1:2011, EN 60730-1:2010	UL, TUV
- Power Distribution Switch (U6701) for USB 3.0 port use	TEXAS INSTRUMENTS INC	SN1408009RTE, SN1702001, TPS2543, TPS2544, TPS2547, TPS2546, TPS2545	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 2.5 A Output Current	UL 2367, IEC 60950-1/ A2:2013 IEC 62368-1: 2014, EN 62368-1:	UL, CB by UL (US-29689-M1- UL), (US-35117-UL)

		(Additional suffixes after the model number designate the type of integrated circuit package, integrated circuit lead types or other features that are considered not to affect the functionality of the device.)	Limit: 3.1 A	2014/A11:2017	
- Power Distribution Switch (U6701) for USB 3.0 port use (Alternate)	Guangdong Cellwise Microelectronics Co., Ltd.	CW3042AAAD, CW3042AAAE, HP3048BAAQ, CW3048AAAQ, CW3048BAAQ, CW3046AAAQ	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: Maximum 2.8 A Current Limit Rating: Maximum 3.17 A	UL 2367, IEC 62368-1: 2014	UL, CB by Demko (DK- 108822-UL)
- Power Distribution Switch (U6701) for USB 3.0 port use (Alternate)	Fortune Advanced Technology Co	FA3200NTB, FA3200NTR, FA3210NTB, FA3210NTR	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 2.0 A Current Limit Rating: 2.7 A	UL 2367, IEC 62368-1: 2014 (Second Edition)	UL, CB by Demko (DK- 74299-UL)
- Power Distribution Switch (U5601) for USB Type-C port use	NXP Semiconductor Taiwan Ltd.	NX5P3290UK/S90 0, NX5P3290UK	Input Voltage Range: 4.0 Vdc to 5.5Vdc Current Limit Rating: 3.3 A	UL 62368-1, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014	UL, CB by Demko (DK- 57975-A1-UL)
- Power Distribution Switch (UU1) for USB Type-C port use	Global Mixed- mode Technology Inc.	G517GX1X2X3X4, X1=1, 2, 3, or 4, X2=T1, TB, TO, TP or P8, X3=1,2 or 3, X4=U or D	Input Voltage Range: 2.7- 5.5Vdc Operational Current Rating per output: 3.0A at TA = 25oC / 2.5A at TA = 70oC Overcurrent Protection Current Rating per output: 3.1A- 4.0A / 2.6A-4.0A	UL 2367, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+ A11: 2017	UL, CB by TUVRh (JPTUV- 099276)
I/O Board	Interchangeable	Interchangeable	See below	--	--
- Power Distribution Switch (UU401) for USB 2.0 port use	SILERGY CORP.	SY6288Dyyyyy (yyyyy = 0-9, A-Z or blank)	I/P: 2.5Vdc to 5.5Vdc O/P: 5.5Vdc max.,	UL 2367, IEC 60950-1: 2005+Am1: 2009+Am2:	UL, CB by TUVRh (JPTUV- 058243-M1)

			4.4A max.	2013	
- Power Distribution Switch (UU401) for USB 2.0 port use (Alternate)	SILERGY TECHNOLOGY (TAIWAN) INC	SY6288D20AAC	Input Voltage: 2.5 to 5.5 Vdc Output Continuous Rating: Max. 2.0 A Current Limit Rating: 3.5 A	UL 2367, IEC 62368-1: 2014 (Second Edition)	UL, CB by Demko (DK- 86482-UL)
- Power Distribution Switch (UU401) for USB 2.0 port use (Alternate)	Global Mixed- mode Technology Inc.	G517FX1X2X3X4, X1=1, 2, 3, or 4, X2=T1, TB, TO,TP, U5, P8 or TM, X3=1,2 or 3, X4=U or D	Input Voltage Range: 2.7- 5.5Vdc Operational Current Rating per output: 2.1A Overcurrent Protection Current Rating per output: 2.2A- 3.0A	UL 2367, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+ A11: 2017	UL, CB by TUVRh (JPTUV- 099276)
- Power Distribution Switch (UU401) for USB 2.0 port use (Alternate)	DIODES INC	AP22811AM8-13, AP22811AW5-7, AP22811BM8-13, AP22811BW5-7	Input Voltage: 2.7 - 5.5Vdc Output Continuous Rating: 2.0A Output Current Limit: 3.2A	UL 2367, IEC 60950-1: 2005+Am1: 2009+Am2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+ A11: 2017	UL, CB by UL (US-26790-A1- UL), (US-34018-UL)
All PCBs	Interchangeable	Interchangeable	V-1 min, 105 oC min.	UL 796	UL
Speaker (Optional)	Interchangeable	Interchangeable	Generic, 4 ohm ± 15 % min., 2.0 Watts max.	--	--
Decorative Part or rubber stand	Interchangeable	Interchangeable	Min. HB, located outside of enclosure.	UL 94	UL
Decorative Part or rubber stand (Alternate)	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (4g max. or 1750 mm^3 max.) located outside of enclosure.	--	--
01. Internal Plastic PartMaterials	Interchangeable	Interchangeabe	V-2 minimum or min.HF-2	UL 94, UL746C	UL , --
02. Flexible Printed Wiring	Interchangeable	Interchangeabe	V-2 or VTM-2 minimum when no components mounted on surface.	UL 94, UL746C	UL , --

02a. Flexible Printed Wiring(Alternate)	Interchangeable	Interchangeabe	V-2 or VTM-2 minimum when no components mounted on surface.	UL 94, UL746E	UL , --
02b. Flexible Printed Wiring(Alternate)	Interchangeable	Interchangeabe	Rated V-2 or VTM-2minimum, when no components mounted on surface;If components mounted on surface,it should be V-1 or VTM-1.	UL 796, UL796F	UL , --
03. Keycaps,plungers and housing, keyboard assembly	Interchangeable	Interchangeabe	Min. HB	UL 94	UL , --
04. Adapter(optional)	Interchangeable	Interchangeabe	O/P: 20Vdc, min. 3.25A, Tma = min 35 degree C. Altitude 3048m min.	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by NCB
04a. Adapter (optional) (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC2D	I/P: 1.8A 100-240Vac, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A,40 degree C Altitude: 5000m	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by Nemko (NO106299 forIEC 60950-1); CB by Nemko (NO106292/A1/ M1 for IEC62368-1)
04b. Adapter (optional) (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC3D	I/P: 1.8A 100-240Vac, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A,40 degree C Altitude: 5000m	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by Nemko (NO106182/A1/ M1 for IEC 60950-1); CB by Nemko(NO1061 81/A1/M1 for IEC 62368-1)
04c. Adapter (optional) (Alternate)	Chicony Power Technology Co Ltd.	ADLX65YCC2D	I/P: 100-240Vac, 1.8A,	IEC 60950-1: 2005/AMD2:	UL , CB by Nemko (NO102312/A2/

			50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A, 40 degree C Altitude: 5000m	2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	M2 for IEC 60950-1); CB by UL Demko (DK- 73335- M2-UL forIEC 62368-1)
04d. Adapter (optional) (Alternate)	Chicony Power Technology Co Ltd.	ADLX65YCC3D	I/P: 100-240Vac, 1.8A, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A, 40 degree C Altitude:5000m	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by Nemko (NO102313/A2/ M1 for IEC 60950-1); CB by UL Demko (DK- 110807-UL for IEC 62368-1)
04g. Adapter (optional) (Alternate)	Delta Electronics, Inc.	ADLX65YDC3 D, ADLX65YDC2D	I/P: 100-240Vac, 1.8A, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A ClassII with functional earth for model: ADLX65YDC3D, Class II for model: ADLX65YDC2D, 40 degree C Altitude:5000m	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by TUVRH (JPTUV-088370-M3 for IEC 60950-1); CB by TUVRH (JPTUV-088549- M3 for IEC62368-1)
04i.Adapter (optional) (Alternate)	Lite-On Technology Corporation	ADLX65YLC2D	I/P: 100-240Vac, 1.8A, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A, 40 degree C Altitude:5000m	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC 62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950- 1,UL 62368-1	UL , CB by UL Demko (DK- 73622- M3-UL for IEC 60950-1); CB by UL Demko (DK- 73627-M3-UL forIEC 62368-1)
04j. Adapter(optional) (Alternate)	Lite-On Technology Corporation	ADLX65YLC3D	I/P: 100-240Vac, 1.8A, 50-60Hz;O/P: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A, 40	IEC 60950-1: 2005/AMD2: 2013,EN 60950-1: 2006+A11+A1 +A12+A2,IEC	UL , CB by UL Demko (DK- 73466- M3-UL forIEC 60950-1); CB by UL Demko (DK- 73473-M3-UL forIEC

			degree C. Altitude:5000m	62368-1 (ed.2),EN 62368-1: 2014/A11:2017 ,UL 60950-1,UL 62368-1	62368-1)
04k. Adapter (optional) (Alternate)	ACBEL POLYTECH INC.	ADLX65UAGU 2A, ADLX65UAGC 2A, ADLX65UAGE 2A, ADLX65UAGK2A	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 20.0Vdc, 3.25A Max. 65.0W, ClassII, Tma: 40°C, altitude: 5000m	IEC 62368-1: 2014 (Second Edition), UL 62368-1	UL , CB by Nemko (NO113168/M1 for IEC 62368-1)
04l. Adapter(optional) (Alternate)	Chicony Power Technology Co.,Ltd	ADLX65UCGU 2A, ADLX65UCGE 2A, ADLX65UCGC 2A, ADLX65UCGK 2A, ADLX65UCGG 2A, ADLX65UCGA 2A, ADLX65UCGB 2A, ADLX65UCGR 2A, ADLX65UCGI2A	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 20.0Vdc, 3.25A Max. 65.0W, ClassII, Tma: 40°C, altitude: 5000m	IEC 62368-1: 2014 (Second Edition), IEC 62368-1: 2018 (Third Edition), UL 62368-1	UL , CB by TUVRh (JPTUV-109472-M3 for IEC62368-1:2014), (JPTUV-109395-M3 for IEC60950-1) CB by Demko (DK-115729-M1- UL for IEC62368-1:2018)
04m. Adapter (optional) (Alternate)	Delta Electronics, Inc.	ADLX65UDGC2A, ADLX65UDGE2A, ADLX65UDGU2A, ADLX65UDGK2A	I/P: 100-240V~, 1.8A, 50-60Hz O/P: 20.0Vdc, 3.25A, 65.0W, Class II, Tma: 40°C, altitude: 5000m	IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 60950-1: 2005, AM1: 2009, AM2: 2013	UL , CB by TUVRh (JPTUV-109368-M3 for IEC62368-1:2014, JPTUV-109392-M3 for IEC60950-1)
04n. Adapter (optional) (Alternate)	Lite-On Technology Corporation	ADLX65ULGC2A, ADLX65ULGU2A, ADLX65ULGE2A, ADLX65ULGK2A, ADLX65ULGG2A, ADLX65ULGB2A, ADLX65ULGR2A ADLX65ULGI2A	Input : AC 100-240V; 50-60Hz; 1.8A; Class II, Output: DC 5.0V; 3.0A; 15.0W, 9.0V; 3.0A, 15.0V; 3.0A, ,DC 20.0V; 3.25A; 65.0W Tma: 40°C, altitude:5000m	IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020, IEC 60950-1: 2005, AM1: 2009, AM2: 2013	UL , CB by TUVRh (JPTUV-109477-M3 for IEC62368- 1:2014, JPTUV-109148-M3 for IEC60950-1)

05. Enclosure Material	--	--	See below for details	--	-- , --
05-01. Enclosure Material for top cover	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3021++ - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 1.2mm min., 85 degree C	UL 94UL 746C	UL , --
05-01a. Enclosure Material for top cover (Alternate)	LG Chem, Ltd	LUPOY GN-5151RF(#)--(#)May be followed by optional suffix letter from A-Z incl., except F,and except Grades HT700B, LI912A, LI912W, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	V-0, thickness 1.0mm min., 60 degree C	UL 94UL 746C	UL , --
05-01b. Enclosure Material for top cover (Alternate)	NINGBO LG YONGXING CHEMICAL COLTD	LUPOY GN-5151RF(#)--(#) May or may not be followed by suffix letter from A-Z inclusive, except F, and except Grades HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0,thickness 1.0mm min., 60 degree C	UL 94UL 746C	UL , --
05-01c. Enclosure Material for top cover (Alternate)	--	--	Aluminium , thickness 0.8mmmin.	--	-- , --
05-02. Enclosure Material for LCD bezel	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3002++ - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 1.0mm min., 70 degree C	UL 94UL 746C	UL , --

05-02a. Enclosure Material for LCD bezel (Alternate)	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3040++ - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 0.75mm min., 80 degree C	UL 94UL 746C	UL , --
05-03. Enclosure Material for top side around keyboard	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3021++ - Material designations may be followed by asix digit numerical code denoting color.	V-0, thickness 1.2mm min., 60 degree C	UL 94UL 746C	UL , --
05-04. Enclosure Material for bottom case	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3021++ - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 1.5mm min., 85 degree C	UL 94UL 746C	UL , --
05-04a. Enclosure Material for bottom case (Alternate)	LG CHEM LTD	LUPOY GN-5151RF(#) (#) - May be followed by optional suffixletter from A-Z incl., except F,and except Grades HT700B, LI912A, LI912W, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI	V-0,thickness 1.5mm min., 85 degree C	UL 94UL 746C	UL , --
05-04b. Enclosure Material for bottom case (Alternate)	NINGBO LG YONGXING CHEMICAL COLTD	LUPOY GN-5151RF(#)--(#) May or may not be followed by suffix letter from A-Z inclusive, except F, and except Grades HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0,thickness 1.5mm min., 60 degree C	UL 94UL 746C	UL , --
05-04c. Enclosure Material for bottom case(Alternate)	--	--	Aluminium, thickness 0.8mmmin.	--	-- , --

05-05. Metalized coating (Optional)	Interchangeable	Interchangeable	For bottom case material "NINGBO LG YONGXING CHEMICAL CO LTD", type "LUPOYGN-5151RF(#)" or "COVESTRO DEUTSCHLAND AG [PC RESINS]", type "FR3021 +" or"LG CHEM LTD", type "LUPOYGN-5151RF(#)" .	UL746C	UL , --
05-06. Openingsfor plastic enclosure	--	--	See Enclosure 4-01for detailed dimension.	--	-- , --
05-07. Openingsfor metal enclosure	--	--	See Enclosure 4-07for detailed dimension.	--	-- , --
06. LCD Panel	Interchangeable	Interchangeable	14 inch, TFT Type (with LED backlight)	IEC/ EN/ UL 60950-1, IEC/ EN/ UL 62368-1	UL , --
06a. LCD Panel (Alternate)	Interchangeable	Interchangeable	14 inch TFT Type(LED backlight)	--	-- , --
06a-1. Internal plastic materials	Interchangeable	Interchangeable	Min V-2	UL 94UL 746C	UL , --
06a-2. PWB	Interchangeable	Interchangeable	Min V-1, 105 degreeC	UL 796	UL , --

07. DC Fan for Config A and config B	ASIA VITAL COMPONENTS CO LTD	BAPC0806Z5H V(“Z” can be A,B,C,G,R,S,T or Y; “V” can be ABCD where A,B,C,Dmay be A-Z,0-9,or "-" or blank)	5Vdc, 0.5A, 2.3CFM min.	EN 62368-1: 2014/A11:2017	-- , TUV (B 025730 0892 Rev. 06)
07a. DC Fan for Config A (Alternate)	Toshiba Home Technology Corp.	C-271C-XX (XX: Rev. No. for modificationnot related to safety aspects, blank or any numbers(up to2 digits)	5Vdc, 0.38A, 3.1CFM min.	UL 507, EN 62368-1: 2014/A11:2017	UL , TUV(B 025909 0087 Rev.01)
07b. DC Fan for Config B (Alternate)	Toshiba Home Technology Corp.	M-282C-XX (XX: Rev. No. for modification not related to safety aspects, blank or any numbers(up to2 digits)	5Vdc, 0.38A, 2.3CFM min.	UL 507, EN 62368-1: 2014/A11:2017	UL , TUV(B 025909 0086 Rev.11
08. Battery pack	CELXPERT ENERGY CORP	L19C3PD5	11.34 Vdc, 4000mAh / 45Wh,3900mAh / 43Wh	UL 60950-1, UL 2054, IEC 62368-1, IEC 62133	UL , CB by UL: (DK-90509-UL for IEC 60950- 1)(DK-90735-ULfor IEC 62368-1:2014) (DK-90363-UL forIEC 62133: 2012)
08a. Battery Pack (Alternate)	SIMPLO TECHNOLOGY CO LTD	L19M3PD5	11.1Vdc, 4120mAh / 45Wh, 3980mA / 44Wh	UL 60950-1, UL 2054, IEC 62368-1, IEC 62133	UL , CB by UL: (DK-91800-UL for IEC 60950-1)(DK-91809-UL for IEC 62368-1:2014) (DK-91607-UL forIEC 62133: 2012)
08b. Battery Pack (Alternate)	LG Chem, Ltd.(*)	L19L3PD5	11.1Vdc, 4050mAh /45Wh or 3920mAh / 43Wh	UL 60950-1, UL 2054, IEC 62368-1:2014, IEC 62133:2012, IEC 62133-2: 2017	UL , CB by UL:(DK-91796-M1-UL for IEC 62368-1:2014)(DK-90969-ULfor IEC 62133: 2012); DK-91975-M1-UL forIEC 62133-2:2017
08c.Battery pack(Alternate)	SUNWODA ELECTRONIC CO.,LTD.	L19D3PD5	11.1Vdc, Typical Capacity 4055mAh/45Wh, Rated Capacity 3874mAh/43Wh	UL 60950-1, UL 2054, IEC 62368-1, IEC 62133	UL , CB by UL:(DK-90844-M1-UL for IEC 60950-1)(DK-90816-M1-UL forIEC 62368-1:2014) (DK-90436-UL forIEC

					62133: 2012)
08d.Battery pack(Alternate)	CELXPERT ENERGY CORP	L20C3PD4	11.52Vdc, 4948mAh / 57Wh, 4861mAh /56Wh	IEC 62368-1:2014, IEC 62133-2:2017, UL2054, UL62368-1	UL , CB by UL: (DK-109842 -UL for IEC 62368-1:2014; DK-109536-UL forIEC 62133)
08e.Battery pack(Alternate)	SUNWODA ELECTRONIC CO.,LTD.	L20D3PD4	11.52Vdc, Typical Capacity 4948mAh/57 Wh, Rated Capacity 4861mAh/56Wh	IEC 60950-1, IEC 62368-1:2014, IEC 62133-2:2017, UL 62368-1, UL 2054,	UL , CB by TUV RH(JPTUV- 119801) for IEC 62368-1; (JPTUV-119799)for IEC 60950-1;JPTUV-119461-A1 for IEC 62133-2:2017
08f.Battery pack(Alternate)	SIMPLO TECHNOLOGY CO LTD	L20M3PD4	11.52Vdc, 4948mAh / 57Wh, 4861mAh / 56Wh	UL 62368-1, UL 2054, IEC 62368-1, IEC 62133-2:2017	UL , CB by UL: (DK-109437 -ULfor IEC 62368-1:2014; DK-109218-UL forIEC 62133)
08g. Battery Pack (Alternate	LG Energy Solution LTD	L19L3PD5	11.1Vdc, 4050mAh /45Wh or 3920mAh / 43Wh	UL 2054, IEC 62368-1:2018, , IEC 62133-2: 2017	UL , CB by UL:(DK-111981-ULfor IEC 62368-1:2018) (DK-91975-M1-UL forIEC 62133-2)
08h. Battery Pack (Alternate	LG Energy Solution LTD	L20L3PD4	11.52Vdc, Typ.: 4948mAh/57Wh, Rated: 4861mAh/56Wh	UL 2054, IEC 62368-1:2018, , IEC 62133-2: 2017	UL , CB by UL:(DK-118292-ULfor IEC 62368-1:2018) (DK-118271-UL forIEC 62133-2)
09. Mainboard	--	--	See below	--	-- , --
09-01. Heat sink (Thermal module)	--	--	Cooper and aluminum. See the Enclosure ID 4-02 and 4-06	--	-- , --
09-02. RTC Battery (Lithium type)	Interchangeable	CR2032 or CR2032* or CR2032+ or CR2032 (l)* or CR2032 (j)(k)	3Vdc, Maximum abnormal chargin g	UL 1642	UL , --

			current 10mA		
09-03. ProtectorIC provided for HDMI port use	TEXAS INSTRUMENTSINC	TPS2552, TPS2552-1, TPS2553, TPS2553-1	Input Voltage: 2.5Vdc to 6.5Vdc Output Continuous Rating: 1.5A. Output Current : 1.7A	UL 2367,IEC 60950-1:2005/AMD1: 2009, IEC 60950-1:2005/AMD2: 2013, IEC 60950-1:2005	UL , CB by UL(US-24603-A1-UL)
09-03a. ProtectorIC provided for HDMI port use (Alternate)	TEXAS INSTRUMENTSINC	AP2553, AP2552-maybe followed by A, maybe followedby additional letters and/or numbers., AP2553A, AP2552A-may be followed by additional letters, numbers, and/or a '-'	Input Voltage: 2.7 - 5.5 Vdc Output Continuous Rating: 0 - 2.1 A Output Current Limit: 104 - 3020 mA Ambient: -40 to 85°C	IEC 62368-1:2014, UL 2367	UL , CB by UL(US-34481-UL)
09-04. ProtectorIC for Type C USB port use	TEXAS INSTRUMENTSINC	Models SN1701012, SN1702027, SN1702030, SN1702033, SN1702036, and TPS65988 may be followed by other characters that do not impact the safety feature of the device.	Input Voltage: 1. PPHV1: 4.5 to 22 Vdc, 1 to 4 A 2. PPHV2: 4.5 to 22 Vdc, 1 to 4 A 3. PPCABLE1: 2.95 to 5.5 Vdc, 0.6 A 4. PPCABLE2: 2.95 to 5.5 Vdc, 0.6 A 5. VIN_3V3: 3.3 Vdc Output Continuous Rating: 1. VBUS1: 4.5 to 22 Vdc, 1 to 4A with PPHV1 input2. VBUS2: 4.5 to 22 Vdc, 1 to 4 A with PPHV2	IEC 60950-1 (ed.2);am2,EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by UL(US-30473-A3-UL)

			input 3. C1CC1/C1CC2: 2.95 to 5.5 Vdc, 0.6A with PPCABLE1 input 4. C2CC1/C2CC2: 2.95 to 5.5 Vdc, 0.6A with PPCABLE2 input Output Current Limit: 1. VBUS1: 4.5to 22 Vdc, 1.39 to 4.91 A with PPHV1 input 2. VBUS2: 4.5to 22 Vdc, 1.39 to 4.91 A with PPHV2input 3. C1CC1/C1CC2: 2.95 to 5.5 Vdc, 0.9A with PPCABLE1 input 4. C2CC1/C2CC2: 2.95 to 5.5 Vdc, 0.9A with PPCABLE2 input		
09-04a. ProtectorIC for Type C USB port use(Alternate)	Global Mixed-mode Technology Inc.	G3712X1X2X3 X4X1 = A,B,C,D or null;X2 = B6;X3 = 1 or 2;X4 =U or D	DC 4.0V-5.5V, Operational current:0.4A-3.0A, overcurrent protection current: 1A-4A.	IEC 60950-1 :2005+A1+A2; EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by TUV(JPTUV-094198-A1)
09-04b. ProtectorIC for Type C USB port use(Alternate)	NXP Semiconductor Taiwan Ltd.	NX5P3290UK	Input Voltage Range:4.0Vdc to 5.5Vdc Current LimitRating: 3.3A	IEC 62368-1(ED.2),EN 62368-1:2014,UL 62368-1	UL , CB by UL Demko (DK-57975-UL)
09-04c. ProtectorIC for Type C USB port use(Alternate)	TEXAS INSTRUMENTS INCORPORATED	SN2001024, TPS65994 may be followed by additional characters thatdo not affect the	(Optional) Input Voltage: 4.9 - 5.5 Vdc Output Continuous Rating: PA_VBUS, PB_VBUS: 0.9	UL 2367,IEC 62368-1:2014	UL , CB by UL US (US-34737-M3-UL)

		safety features of thedevice.	to 3.0A PA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315A Output Current Limit: PA_VBUS, PB_VBUS: 1.36A to3.78A PA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to 0.66A		
09-04d. ProtectorIC for Type C USB port use(Alternate)	DIODES INC	AP22615AWU-7	Input Voltage/Output Continuous Rating: 3.0 - 4.0 Vdc; Iout =1A - 1.5A 4.0 - 5.5 Vdc; Iout = 1A - 3A Output Current Limit: 3.0 - 5.5 Vdc;at 1.35A to 3.6A	UL 2367,IEC 62368-1:2014	UL , CB by UL US (US-32145-A1-UL)
09-04e. ProtectorIC for Type C USB port use(Alternate)	SILERGY TECHNOLOGY (TAIWAN) INC	SY6863B followed by 1, 2, 3, 4, 5 or 6, followed by ABor AD, followedby C	Input Voltage: VIN = 2.5 to 5.5 Vdc Output Continuous Rating: 0.1 to 3 A Current Limit Rating: 0.3 to 5 A	IEC 60950-1 :2005+A1+A2; EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by UL Demko (DK- 64454-A1-UL)
09-04f. ProtectorIC for Type C USB port use(Alternate)	TEXAS INSTRUMENTS INCORPORATED	SN2011060 may be followed by additional characters thatdo not affect the safety features of the device	(Optional) Input Voltage: 4.9 - 5.5 Vdc, Output Continuous Rating: PA_VBUS, PB_VBUS: 0.9 to 3.0APA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315AOutput Current Limit: PA_VBUS, PB_VBUS: 1.36A to 3.78APA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to 0.66A*Only 1 path within a pair are	IEC 62368-1:2014, UL 2367	UL , CB by UL(US-38687-UL

			active at one time		
09-05. ProtectorIC for USB portuse	SILERGY CORP	SY6288xyyyyy(x = A, B, C, D or E; yyyyy = 0-9, A-Z or blank)	I/P: 2.5Vdc to 5.5Vdc (for all models)O/P: SY6288A, SY6288B: 5.5Vdc max., 1.6A max.SY6288C, SY6288D: 5.5Vdc max., 4.4A max.SY628 8E: 5.5Vdc, 4.43A max.	IEC 60950-1:2005+A1+A2 ,EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by TUV(JPTUV-058243-M1)
09-05a. ProtectorIC for USB portuse (Alternate)	Global Mixed-mode Technology Inc.	G517FX1X2X3 X4X1 = 1, 2, 3or 4X2 = T1, TB, TO, TP, U5, P8 or TMX3 = 1, 2 or3X4 =U or D	Input Voltage: 2.7- 5.5Vdc Output Continuous Rating: 2.1A,Output CurrentLimit: 2.2-3.0A	IEC 60950-1:2005+A1+A2 ,EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by TUV (JPTUV-080887)
09-05b. ProtectorIC for USB portuse (Alternate)	Global Mixed-mode Technology Inc.	G517EX1X2X3 X4X1 = 1, 2, 3 or 4X2 = T7,T1, TB, TO,TP, KF,U5 or TMX3 = 1, 2 or 3X4 =U or D	Input Voltage: 2.7- 5.5Vdc Output Continuous Rating: 1.5A,Output CurrentLimit: 1.6-2.0A	IEC 60950-1:2005+A1+A2 ,EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013, UL2367	UL , CB by TUV (JPTUV-080887)
09-05c. ProtectorIC for USB port use (Alternate	TEXAS INSTRUMENTS INC	SN1408009R T E, SN1702001, TPS2547, TPS2544, TPS2546, TPS2545, TPS2543Additional suffixes after the modelnumber designate the type of integrated circuit package,integrated circuit lead types or other features that are considerednot to affect the functionality of the device.	Input Voltage: 4.5Vdc to 5.5Vdc Output Continuous Rating: 2.5A. Output Current Limit:3.1A	IEC 60950-1 (ed.2);am2,EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2: 2013, UL 2367	UL , CB by UL (US-29689-M1-UL)

09-05d. ProtectorIC for USB port use (Alternate)	DIODES PERICOM TECHNOLOGY(SHANGHAI) CO LTD	PI5USB25wwx yyyEz Series, where ww is 44or 46; x is blank, A or H; yyy is ZH or ZHD for the packaging type; E is Pb- free; and z is blank or X.	Input Voltage:4.5Vdc to 5.5Vdc Continuous Rating: 30mA to 2.5A. Current Limit:100mA to 3.18A	IEC 60950-1(ed.2);am2,EN 60950-1:2006 / A11:2009 / A1:2010 / A12:2011 / A2:2013, UL 2367	UL , CB by UL (US-24707-M2-UL)
09-05e. ProtectorIC for USB port use (Alternate)	DIODES INC	PI5USB25wwx yyyEz Series, where ww is 44or 46 x is blank, A, AQ, H, J, or Q yyy is ZH or ZHD for packaging type E is Pb- free z is blank or X	Input Voltage:4.5Vdc to 5.5Vdc Continuous Rating: 30mA to 2.5A. Current Limit:100mA to 3.18A	IEC 62368-1:2014, UL 2367	UL , CB by UL(US-38136-UL)
09-05f. ProtectorIC for USB portuse (Alternate)	Guangdong Cellwise Microelectronics Co., Ltd.	CW3042AAAD, CW3042AAAE, HP3048BAAQ, CW3048AAAQ , CW3048BAAQ , CW3046AAAQ	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: Maximum 2.8 A Current Limit Rating: Maximum 3.17 A	IEC 62368-1:2014, UL 2367	UL , CB by UL (DK-108822-UL)
09-05g. ProtectorIC for USB port use (Alternate)	WILL SEMICONDUCTOR	1) WS4612EBx-5/TR, 2) WS4612ECx-5/TR, 3) WS4612EDx-5/TR, 4) WS4612EEx-5/TR (x can beA, B, C or D, A for EN high enable & Discharge, Bfor EN low enable & Discharge, Cfor EN high enable & no Discharge, Dfor EN low enable & no Discharge.)	Input Voltage: 2.5 to 5.5 Vdc, Current Limit Rating:1) 1.2-1.6A; 2) 1.8-2.4A; 3) 2.1-2.7A; 4) 2.7-3.3A	IEC 62368-1:2014, UL 2367	UL , CB by UL (DK-88459-M1-UL)
09-05h. ProtectorIC for USB port use (Alternate)	DIODES INC	AP22804BW5-7 may be followed by additional letters and/ornumbers	Input Voltage: 2.7 - 5.5Vdc Output Continuous Rating: 2.5A Output Current Limit: 3.3A	IEC 62368-1:2014, UL 2367	UL , CB by UL US (US-34018-UL)

10. Mylar for Aluminium bottom opening	SICHUAN DONGFANG INSULATING MATERIAL COLTD	DFR117,DFR1 17ECOA,DFR1 17ECOB,DFR1 17ECOC	VTM-0, 0.05mm-0.23mm thickness,80 degree C. See Enclosure 4-08 for detailed dimension.	UL94, UL746C	UL , --
10-01. Adhesivefor Aluminium bottom opening gmylar	JIANGSU SIDIKE NEW MATERIALS SCIENCE & TECHNOLOGY COLTD	DS-5	--	--	-- , --
10a. Mylar for Aluminium bottom opening(Alternate)	CHENGDU KANGLONGXIN PLASTICS CO LTD	KLX FRPC-1860B, KLXFRPC-1860	VTM-0,thickness 0.125-0.193 mm,80 degree C, See Enclosure 4-08 for detailed dimension.	UL94, UL746C	UL , --
10a-01. Adhesive for Aluminium bottom opening mylar(Alternate)	JIANGSU SIDIKE NEW MATERIALS SCIENCE & TECHNOLOGY COLTD	DS-5	--	--	-- , --
11. Mesh for speaker opening	CHENGDU KANGLONGXIN PLASTICS CO LTD	KLX FRPC- 1860, KLX FRPC-1860B	VTM-0, thickness 0.125-0.193 mm, 80 degree C. See Enclosure 4-06 for detailed dimension.	UL94, UL746C	UL , --
11-01. Adhesivefor speaker mesh	JIANGSU SIDIKE NEW MATERIALS SCIENCE & TECHNOLOGY COLTD	DS-5	--	--	-- , --
11a. Mesh for speaker opening(Alternate)	SICHUAN DONGFANG INSULATING MATERIAL COLTD	DFR117,DFR1 17ECOA,DFR1 17ECOB,DFR1 17ECOC	VTM-0, 0.05mm-0.23mm thickness,80 degree C. See Enclosure 4-06 for detailed dimension.	UL94, UL746C	UL , --
11a-01. Adhesive for speaker mesh(Alternate)	JIANGSU SIDIKE NEW MATERIALS SCIENCE & TECHNOLOGY COLTD	DS-5	--	--	-- , --

12. Rubber Standfor Aluminium bottom	--	--	See below for details;	--	-- , --
12-01. Hard rubber for Aluminium bottom (internalpart)	COVESTRO DEUTSCHLAND AG [PC RESINS]	FR3021++ - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 1.2mm min., 60 degree C	UL 94UL 746C	UL , --
12-01a. Hard rubber for Aluminium bottom (internalpart) (Alternate)	LG CHEM LTD	LUPOY GN-5151RF(#)--(#)May be followed by optional suffix letter from A-Z incl., except F,and except Grades HT700B, LI912A, LI912W, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	V-0, thickness 1.2mm min., 85 degree C	UL 94UL 746C	UL , --
12-01b. Hard rubber for Aluminium bottom (internalpart) (Alternate)	NINGBO LG YONGXING CHEMICAL CO LTD	LUPOY GN-5151RF(#)--(#) May or may not be followed by suffix letter from A-Z inclusive, except F, and except Grades HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0,thickness 1.2mm min., 60 degree C	UL 94UL 746C	UL , --
13. IR LEDmodule (Optional)	Liteon OPTO Technology (CZ) Ltd.	LTE-R28206S-NE8, LTE-R28206S-NE8-XX , LTE- R28206S-YE8 , LTE- R28206S-YE8-XX ("XX" means different customer numbers)	Comply IEC 62471exempt group	IEC 62471:2006	-- , CB by SGS (Certificate No.:BE-34640)
13a. IR LED module of camera (Optional)(Alternate)	Liteon OPTO Technology (CZ) Ltd.	LTE- R28206AS-Q , LTE-R28206AS-Y , LTE-R28206AS-Q-XX,	Comply IEC 62471exempt group	IEC 62471:2006	-- , CB by SGS (Certificate No.:BE-33598/M1)

		LTE- R28206AS-Y-XX("XX" means different customer numbers)			
13b. IR LED module of camera (Optional)(Alternate)	Liteon OPTO Technology (CZ) Ltd.	LTE-R28206S-ME8-XX, LTE-R28206S-ME8, LTE-R28206S-KE8-XX, LTE-R28206S-KE8, LTE-R28206S, LTE-10L470- M6-XX, LTE- 10L370-M5- XX, LTE- R273090X-M5-XX(“XX” means different customers)	Comply IEC 62471exempt group	IEC 62471:2006	-- , CB by SGS (Certificate No.:BE-36784/M1)
14. Solid State Drive (Optional)	Interchangeable	Interchangeable	3.3V,3.5A max.	IEC/UL 60950-1, IEC/UL 62368-1	UL , CB by NCB
14a. Solid State Drive(Optional)(Alternate)	Samsung Electronics Co., Ltd.	MZ-V**********	3.3Vdc, 3.5A	IEC/UL 62368-1	UL , TUV（JPTUV-097719-M1)
15. Speaker (two provided)	--	--	Each Rated 4 ohm,2 Watts max.	--	-- , --
16. Label	Interchangeable	Interchangeable	60 degree C min, suitable to rear plastic enclosure.	UL969	UL , --
16a. Label (Alternate)	--	--	Molded as part of enclosure, Hot stamping, laser etching or silk screened.	--	-- , --
17. Wiring, (Internal, Secondary)	Interchangeable	Interchangeable	Minimum 30V, 80 degree C, VW-1.	UL 758	UL , --

18. Connectors and Receptacles(SELV Circuits)	Interchangeable	Interchangeable	Copper alloy pins housed in bodies ofplastic rated V-2 minimum.	UL 94, UL746C	UL , --
18a. Connectors and Receptacles (SELV Circuits) (Alternate)	Interchangeable	Interchangeable	--	UL 1977	UL , --
19. Interconnecting Cable (Optional)	Interchangeable	Interchangeable	Minimum 60 degreeC, 30V minimum, maximum 3.05m long, suitable for external use. Marked VW-1 or FT-1 or better.	UL 758	UL , --
19a. Interconnecting Cable (Optional) (Alternate)	Interchangeable	Interchangeable	Suitable for external use. Type CMP, CMR, CMG, or CM. For type CMX, orCMUC, maximum3.05m long.	UL 444	UL , --
20. PCB fortouch pad	Interchangeable	Interchangeable	V-0 min. 105 degreeC min.	UL796	UL , --
21. Internal metal	--	--	Metallic	--	-- , --
22. All other PCB	Interchangeable	Interchangeable	V-1 min. 105 degreeC min.	UL796	UL , --
Adapter (Optional)	Acbel Polytech Inc.	ADLX45YAC2D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 20Vdc, 2.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO105856), (NO105995)

Adapter (Optional) (Alternate)	Acbel Polytech Inc.	ADLX45YAC3D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 20Vdc, 2.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO105842), (NO105937)
Adapter (Optional) (Alternate)	Chicony Power Technology Co., Ltd.	ADLX45YCC2G	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102327/A2/ M1), CB by Demko (DK-73341-M2-UL)
Adapter (Optional) (Alternate)	Chicony Power Technology Co., Ltd.	ADLX45YCC3G	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class I (with class II construction throughout), Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Nemko (NO102328/A1/ M1),CB by Demko (DK-73342-M1-UL)
Adapter (Optional) (Alternate)	Delta Electronics, Inc.	ADLX45YDC3D, ADLX45YDC2D	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 20Vdc, 2.25A, Class II with functional earth for model: ADLX45YDC3D, ADP-45EG B; Class II for model: ADLX45YDC2D, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by TUVRH (JPTUV-088399), (JPTUV-088525)
Adapter (Optional) (Alternate)	Lite-On TechnologyCorp	ADLX45YLC2D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class II, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-74396-UL), (DK-74550-UL)
Adapter (Optional) (Alternate)	Lite-On TechnologyCorp	ADLX45YLC3D	I/P: 100-240Vac, 50-60Hz, 1.3A; O/P: 20Vdc, 2.25A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	CB by Demko (DK-73964-UL), (DK-73960-UL)

Adapter (Optional) (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 2.25A Tma: 35°C min. Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB
Adapter (Optional) (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC2D	I/P: 1.8A 100-240V~ 50-60Hz O/P: 20Vdc, 3.25A Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11:2017	UL, CB by Nemko (NO106299), (NO106292)
Adapter (Optional) (Alternate)	ACBEL POLYTECH INC.	ADLX65YAC3D	I/P: 1.8A 100-240V~ 50-60Hz O/P: 20Vdc, 3.25A Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11:2017	UL, CB by Nemko (NO106182), (NO106181)
Adapter (Optional) (Alternate)	CHICONY POWER TECHNOLOGYCO LTD	ADLX65YCC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Nemko (NO102312), CB by Demko (DK-73335-UL)
Adapter (Optional) (Alternate)	CHICONY POWER TECHNOLOGYCO LTD	ADLX65YCC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I (with class II construction throughout), Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Nemko (NO102313), CB by Demko (DK-73338-UL)
Adapter (Optional) (Alternate)	Delta Electronics, Inc.	ADLX65YDC3D , ADLX65YDC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A,	UL 60950-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2),	UL, CB byTUVRH (JPTUV- 088370), (JPTUV- 088549)

			Class II, Ambient: 40°C, Altitude: 5000m	EN 62368-1: 2014/A11:2017	
Adapter (Optional) (Alternate)	LITE-ON TECHNOLOGY CORP	ADLX65YLC2D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 73622-UL), (DK-73627-UL)
Adapter (Optional) (Alternate)	LITE-ON TECHNOLOGY CORP	ADLX65YLC3D	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by Demko (DK- 73466-M1-UL), (DK-73473-M1-UL)
Adapter (Optional) (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YSCC2 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB byTUVRH (JPTUV- 096409), (JPTUV- 096534)
Adapter (Optional) (Alternate)	Chicony Power Technology Co., Ltd.	ADLX65YSCC3 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB byTUVRH (JPTUV- 096407), (JPTUV- 096521)
Adapter (Optional) (Alternate)	Delta Electronics, Inc.	ADLX65YSDC2 A, ADLX65YSDC3 A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class II (Class II with functional earth: ADLX65YSDC3 A, Class II: ADLX65YSDC2 A), Ambient: 40°C, Altitude: 5000m	UL 60950-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB byTUVRH (JPTUV- 097420), (JPTUV- 097518)
Adapter (Optional) (Alternate)	Lite-On TechnologyCorp	ADLX65YSLC2A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A,	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2),	UL, CB byTUVRH (JPTUV- 096377), (JPTUV- 096374)

			Class II, Ambient: 40°C, Altitude: 5000m	EN 62368-1: 2014/A11:2017	
Adapter (Optional) (Alternate)	Lite-On TechnologyCorp	ADLX65YSLC3A	I/P: 100-240Vac, 50-60Hz, 1.8A; O/P: 20Vdc, 3.25A, Class I, Ambient: 40°C, Altitude: 5000m	UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017	UL, CB by TUVRH (JPTUV- 096300-A1), (JPTUV- 096303-A1)
Adapter (Optional) (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 3.25A, Tma: 35°C min., Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB
Adapter (Optional) (Alternate)	Lite-On Technology Corporation	ADL100YLC3A	I/P: 100-240Vac, 50-60Hz, 1.6A O/P: 20.0Vdc, 5.0A, 100.0W, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017	CB by TUVRh (JPTUV-128232), (JPTUV-128376)
Adapter (Optional) (Alternate)	CHICONY POWER TECHNOLOGYCO LTD	ADL100YCC3A	I/P: 100-240Vac, 1.6A, 50-60Hz O/P: 20.0V, 5.0A 100.0W, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	CB by Demko(DK-120447- UL), (DK-120464-UL)
Adapter (Optional) (Alternate)	ACBEL POLYTECH INC.	ADL100YAC3A	I/P: 100-240Vac, 1.6A, 50-60Hz O/P: 20.0Vdc 5.0A, Max.100W, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), IEC 62368-1: 2018	CB by NEMKO (NO119957), (NO119934), (NO119956)

Adapter (Optional) (Alternate)	Delta Electronics, Inc.	ADL100YDC3A	I/P : AC 100-240V; 50-60Hz; 1.5A; O/P: DC 20.0V, 5.0A, Class I, Ambient: 40°C, Altitude: 5000m	IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020+A11: 2020	CB by TUVRh(JPTUV-129198), (JPTUV-129197), (JPTUV-129097)
Adapter (Optional) (Alternate)	Interchangeable	Interchangeable	O/P: 20Vdc, 5A, Tma: 35°C min., Altitude: 5000m	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB
Enclosure Material for LCDtop cover (AL type, main area)	Interchangeable	Interchangeable	Aluminium Alloy, thickness 1.0mm min.	--	--
Enclosure Material for LCDtop cover (AL type, frame area)	LOTTE CHEMICAL CORPORATION	NH-1024(+) (+) - May be replaced by one, two, or three numbers and/or letter(s)	V-0, thickness 0.75mm min., 60°C	UL 94, UL 746	UL
Alt. Enclosure Material for LCDtop cover (Plastic type, main area)	SABIC JAPAN LLC	DC0051	V-0, thickness 0.8mm min., 80°C	UL 94, UL 746	UL
Alt. Enclosure Material for LCDtop cover (Plastic type, uparea)	SABIC JAPAN LLC	DF00A1I	V-0, thickness 1.0mm min., 80°C	UL 94, UL 746	UL
Enclosure Material for LCDbezel, internal plastic frame of AL type bottom case	MITSUBISHI ENGINEERING-PLASTICS CORP	MB1700+ (+ - Suffix optional, exceptions: The following cannot be used as optional suffixes:"NF" for grade NXG5050,	V-0, thickness 0.75mm min., 60ºC	UL 94, UL 746	UL

		"N" for grade NXG5030, "N" for grade MB2112+, "S1" for grade F20-54, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1), the last letter "L" for grade CFH2520+, "W" for ELV2010 included in Grade ELV20(a5)+.)			
- Adhesive for internal plastic frame of AL type bottom case	Devcon	14167	--	--	--
Enclosure Material for topside around keyboard	SABIC JAPAN LLC	DF00A1I	V-0, thickness 1.0mm min., 80°C	UL 94, UL 746	UL
Enclosure Material for topside around keyboard (frame area)	Interchangeable	AZ91D	Al-Mg alloy, thickness 0.8mm min.	--	--
Enclosure Material for smart card slot, SIM card tray	Covestro Deutschland AG [PC Resins]	FR3002 + (+ - Material designations may be followedby a six digit numerical code denoting color.)	V-0, thickness 1.0mm min., 70°C	UL 94, UL 746	UL
Enclosure Material for bottom case(AL type)	Interchangeable	Interchangeable	Aluminium, thickness 0.6mm min.	--	--
Alt. Enclosure Material for bottom case (Plastic type)	TORAY INDUSTRIESINC	A695H	V-0, thickness 0.8mm min., 130°C	UL 94, UL 746	UL
MetallizedCoating (Optional)	JIECHENG INDUSTRY (HUI ZHOU) CO LTD	PVD	Minimum 0.2mmand maximum 2.0mm coating thickness suitable for	UL 746C	UL

			bottom case (Plastic type) material		
MetallizedCoating (Optional) (Alternate)	SUZHOU CHUNQIU ELECTRONIC TECHNOLOGYCO LTD	Sputtering	Minimum 0.2mmand maximum 2.0mm coating thickness suitable for bottom case (Plastic type) material	UL 746C	UL
MetallizedCoating (Optional) (Alternate)	Interchangeable	Interchangeable	Minimum 0.2mmand maximum 2.0mm coating thickness suitable for bottom case (Plastic type) material	UL 746C	UL
Sponge for thermal opening	CENTURY CREATION INTERNATIONAL CO LTD	CR-2030B	V-0, thickness 1.0mm min.	UL 94, UL 746	UL
- Adhesive for sponge on AVC, Delta fan	DEXERIALS CORP (SONY)	G9000R, G9000-SY	--	--	--
- Adhesive for sponge on Toshiba fan	NITTO DENKO	No.5000NS	--	--	--
- Adhesive for sponge on Toshiba fan (Alternate)	NITTO DENKO	V-100S	--	--	--
LCD Panel	AUO	B140QAN05.0	14.0 inch, TFT type (LED Backlight)	--	Tested in theequip.

LCD Panel (Alternate)	Interchangeable	Interchangeable	14.0 inch, TFT type (LED Backlight)	--	--
Solid State Drive (Optional)	SK hynix Inc.	HFS001TDE9X080N, HFS001TDE9X073N, HFS001TDE9X084N, HFS001TDE9X081N, HFS512GDE9X080N, HFS512GDE9X073N, HFS512GDE9X084N, HFS512GDE9X081N, HFS256GDE9X080N, HFS256GDE9X073N, HFS256GDE9X084N, HFS256GDE9X081N	3.3Vdc, 2.5A	UL 62368-1, IEC 62368-1: 2018	UL, CB by TUVSUD (SG PSB-IV-02155)
Solid State Drive (Optional) (Alternate)	Interchangeable	Interchangeable	Generic, 3.3Vdc,2.5A max.	UL 60950-1, UL 62368-1, IEC 60950-1/ A2:2013, IEC 62368-1: 2014 (ed.2), EN 62368-1: 2014/A11:2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB
RechargeableLi-ion Battery (3S1P)	CELXPERT ENERGY CORP	L21C3P71	11.58 Vdc, Typical Capacity 3400mAh / 39.3Wh, Rated Capacity 3304mAh / 38.2Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK- 119323-UL), (DK-119583-UL)

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

RechargeableLi-ion Battery (3S1P) (Alternate)	LG ENERGY SOLUTION, LTD.	L21L3P71	11.58Vdc, Typ.: 3400mAh / 39.3Wh, Rated: 3304mAh / 38.2Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK- 118944-UL), (DK-119248-UL)
RechargeableLi-ion Battery (3S1P) (Alternate)	SIMPLO TECHNOLOGYCO LTD	L21M3P71	11.61Vdc, 3392mAh / 39.3Wh or 3295mAh / 38.2Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK-118297-UL),(DK-118369-UL), (DK- 118423-UL)
RechargeableLi-ion Battery (4S1P)	CELXPERT ENERGY CORP	L21C4P71	15.44Vdc, 3400mAh / 52.5Wh, 3304mAh / 51Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK- 119336-UL), (DK-119662-UL)
RechargeableLi-ion Battery (4S1P) (Alternate)	LG ENERGY SOLUTION, LTD.	L21L4P71	15.44Vdc, Typ.: 3400mAh / 52.5Wh, Rated: 3304mAh / 51Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK- 118989-UL), (DK-119091-UL)

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

RechargeableLi-ion Battery (4S1P) (Alternate)	SIMPLO TECHNOLOGY CO., LTD.	L21M4P71	15.48Vdc, Typical Capacity 3392mAh/ 52.5Wh, Rated Capacity 3295mAh/ 51Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, EN 62133-2: 2017, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK-118960-UL),(DK-119209-UL), (DK- 119206-UL)
RechargeableLi-ion Battery (4S1P) (Alternate)	SIMPLO TECHNOLOGYCO LTD	L21M4P72	15.48Vdc, 3392mAh / 52.5Wh, 3295mAh / 51Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017, IEC 60950-1: 2005, AMD1: 2009, AMD2: 2013, IEC 62368-1: 2018, EN IEC 62368-1: 2020, EN IEC 62368-1: 2020/A11: 2020	UL, CB by Demko (DK-119215-UL),(DK-119293-UL), (DK- 119505-UL)
RechargeableLi-ion Battery (4S1P) (Alternate)	Zhejiang Sunwoda Electronic Co.,Ltd.	L21D4P71	15.48V, Rated: 3295mAh, 51Wh/ Typical: 3392mAh, 52.5Wh	UL 2054, UL 62368-1, IEC 62133-2: 2017+A1, IEC 60950-1: 2005+A1+A2, IEC 62368-1: 2014, EN 62368-1: 2014+A11: 2017	UL, CB by TUVRh (JPTUV-128620), (JPTUV- 128786), (JPTUV- 128783)
DC Fan for UMA Motherboard	Delta Electronics, Inc.	ND85C45XXXX XXXXXXX (X stands for A-Z, 0-9, - or blank, for marketing purpose only)	5Vdc, 0.5A, 2.0 CFM min.	UL 507, EN 62368-1: 2014, IEC 62368-1: 2014	UL, TUVRh
DC Fan for UMA Motherboard (Alternate)	Toshiba Home Technology Corp.	M-280C-XX (XX: Rev. No. for modification not related to safety aspects, blank or any numbers (1 or 2 digits))	5Vdc, 0.38A, 2.5 CFM min.	UL 507, EN 62368-1: 2014/A11: 2017	UL, TUVSUD

DC Fan for UMA Motherboard (Alternate)	Asia Vital Components Co.,Ltd.	BAPA0906R5HV (V" can be ABCD where A,B, C, D may beA-Z, 0-9, "- " or blank)	5Vdc, 0.5A, 4.41 CFM min.	UL 507, EN 62368-1: 2014/A11: 2017	UL, TUVSUD
DC Fan for DIS Motherboard	Toshiba Home Technology Corp.	M-279C-XX (XX: Rev. No. for modification not related to safety aspects, blank or any numbers (1 or 2 digits))	5Vdc, 0.38A, 3.1 CFM min.	UL 507, EN 62368-1: 2014/A11: 2017	UL, TUVSUD
DC Fan for DIS Motherboard (Alternate)	Delta Electronics, Inc.	ND85C35XXXX XXXXXXX (X stands for A- Z, 0-9, - or blank, for marketing purpose only)	5Vdc, 0.5A, 5.3 CFM min.	UL 507, EN 62368-1: 2014, IEC 62368-1: 2014	UL, TUVRh
DC Fan for DIS Motherboard (Alternate)	Asia Vital Components Co.,Ltd.	BAPA0907R5HV ("V" can be ABCD where A,B, C, D may beA-Z, 0-9, "- " or blank)	5Vdc, 0.5A, 5.35 CFM min.	UL 507, EN 62368-1: 2014/A11: 2017	UL, TUVSUD
Motherboard	Interchangeable	Interchangeable	See below	--	--
- RTC battery (Lithium type)	MITSUBISHI ELECTRIC CORP	CR2016+ (+ - The cells may have various insulating tube,ring, or tape.)	3.0Vdc, Maximum abnormal charging current10mA	UL 1642	UL (MH15370)
- RTC battery (Lithium type) (Alternate)	MITSUBISHI ELECTRIC HOME APPLIANCE CO LTD	CR2016	3.0Vdc, Maximum abnormal charging current10mA	UL 1642	UL (MH21249)
- RTC battery (Lithium type) (Alternate)	PANASONIC CORPORATION , PANASONIC CORPORATION OF NORTH AMERICA	CR2016*, CR-2016*; * - Cell model numbers may be followed by an optional slash (/) and single or multiple alphanumeric characters (i.e. letters and/or numbers), which denote optional features such as various mounting	3.0Vdc,Maximum abnormal charging current10mA	UL 1642	UL (MH12210)

		tabs, connecting leads or plugs, packaging, etc.			
- RTC battery (Lithium type) (Alternate)	TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORPORATION	CR2016* * - Cells may have various pin, tab, insulating tube, ring and tape.	3.0Vdc, Maximum abnormal charging current10mA	UL 1642	UL (MH12828)
- RTC battery (Lithium type) (Alternate)	Interchangeable	CR2016 or CR2016+ or CR2016* or CR-2016*	3Vdc, Maximum abnormal charging current10mA, against charging currentby multiple components R2301 (1k ohm resistor), D2301 (diode)	UL 1642	UL
- Power Distribution Switch (U5302) provided for HDMI port use	TEXAS INSTRUMENTS INC	TPS2552, TPS2552-1, TPS2553, TPS2553-1, may be followed by additional characters thatdo not impact the safety features of thedevice.	Input Voltage: 2.5 Vdc to 6.5 Vdc Output Continuous Rating: 1.5 A Output Current Limit: 1.7 A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-24603-UL), (US-34989-UL)
- Power Distribution Switch (U5302) provided for HDMI port use(Alternate)	Global Mixed-mode Technology Inc.	G517ALX1X2X3X4, X1=1 or 2, X2=TP, TB, RB or U5, X3=1, 2 or 3,X4=U or D	Input Voltage: 2.7 Vdc to 5.5 Vdc Output Operational Current Rating per output: 0.1A-2.15A Overcurrent Protection Current Rating per output: 0.2A-2.75A	UL 2367, IEC 60950-1: 2005+Am1: 2009+Am2: 2013, IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014+A11: 2017	UL, CB by TUVRh (JPTUV-080887), (JPTUV-099276)
- Power Distribution Switch (U5901) provided for USB Type-C port use	TEXAS INSTRUMENTS INCORPORATED	SN2011035, SN2011058, SN2011062, SN2011063, SN2101026, SN2101027, SN2103033, SN2101014, SN2101015, SN2101023, SN2101019, SN2101013, SN2101012, SN2101011,	Input Voltage: 4.9 - 5.5 Vdc Output Continuous Rating: PA_VBUS, PB_VBUS: 0.9 to 3.0A PA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315A	UL 2367, IEC 62368-1: 2014, EN 62368-1: 2014/A11: 2017, EN 62368-1: 2014	UL, CB by UL (US-38687-UL)

		SN2010021, SN2011034, SN2011052, SN2011059, SN2011060, SN2011061, SN1810003, SN1810004, SN1905001, SN1905002, SN1905003, SN1905004, SN1905005, SN1905006, SN1905007, SN1905008, SN1908005, SN2001021, SN2001022, SN2001023, SN2001024, SN2001025, SN2001026, SN2001027, SN2001028, SN2001029, SN2006001, SN2006002, SN2006003, TPS65993, and TPS65994, may be followed by additional characters that do not affect thesafety features of the device	Output Current Limit: PA_VBUS, PB_VBUS: 1.36A to 3.78A PA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to 0.66A *Only 1 path within a pair are active at one time		
- Power Distribution Switch (U6701) provided for USB port use	TEXAS INSTRUMENTS INC	SN1408009RTE, SN1702001, TPS2543, TPS2544, TPS2545, TPS2546, and TPS2547, may be followed by additional characters that do not impact the safety features of the device.	Input Voltage: 4.5 to 5.5Vdc Output Continuous Rating: 2.5 A Output Current Limit: 3.1 A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-29689-M1- UL), (US-35117-UL)
- Power Distribution Switch (U6701) provided for USB port use (Alternate)	DIODES INC	PI5USB25wwxy yyEz Series, where ww is 44 or 46; x is blank,A, AQ, H, J, or Q; yyy is ZH or ZHD for packaging type; E is Pb-free;	Input Voltage: 4.5 - 5.5 Vdc Continuous Rating: 30 mA to 2.5 A Current Limit: 100 mA to 3.18A	UL 2367, IEC 60950-1/ A2:2013, IEC 62368-1: 2014, EN 62368-1: 2014/A11:2017	UL, CB by UL (US-24707-M2- UL), (US-37272-UL)

		andz is blank or X, Cat. Nos. PI5USB2544ZHE, PI5USB2544ZHEX, PI5USB2544AZHE, PI5USB2544AZHEX, PI5USB2544ZHDE, PI5USB2544ZHDEX, PI5USB2544AZHDE, PI5USB2544AZHDEX, PI5USB2546ZHE, PI5USB2546ZHEX, PI5USB2546AZHE, PI5USB2546HZHE, PI5USB2546AZHEX, PI5USB2546ZHDE, PI5USB2546ZHDEX, PI5USB2546AZHDE, PI5USB2546AZHDEX, PI5USB2546HZHEX, PI5USB2546HZHDE, PI5USB2546HZHDEX, PI5USB2546QZHE, PI5USB2546QZHEX, PI5USB2546AQZHE, PI5USB2546AQZHEX, PI5USB2546JZHE, PI5USB2546JZHEX, PI5USB2546JZHDE, and PI5USB2546JZHDEX			
- Power Distribution Switch (U6701) provided for USB port use (Alternate)	Guangdong Cellwise Microelectronics Co., Ltd.	CW3042AAAD, CW3042AAAE, HP3048BAAQ,	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating:	UL 2367, IEC 62368-1: 2014	UL, CB by Demko (DK-108822-UL)

		CW3048AAAQ, CW3048BAAQ, CW3046AAAQ	Maximum 2.8 A Current Limit Rating: Maximum 3.17 A		
- Fuse for smartcard reader port(F9307) use	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	ERBRD* (* - Followed bysuffixes.)	32Vdc, 1A	UL 248-1	UL (E194052)
- Fuse for smartcard reader port(F9307) use (Alternate)	LITTELFUSEINC	497* (* - With or without one prefix character and with or without additional suffix characters that signify options that do not affect the electrical characteristics.)	32Vdc, 1A	UL 248-1	UL (E10480)
- Fuse for smartcard reader port(F9307) use (Alternate)	AEM COMPONENTS (SUZHOU) CO LTD	T0402FF1000, followed by T or B, maybe followed by M, maybe followed by any five digit of letter, number, symbol or blank. (Note - Microfuses are defined as fuses with all principle dimensions less then 10 mm.)	35Vdc, 1A	UL 248-1	UL (E232989)
I/O Board	Interchangeable	Interchangeable	See below	--	--
- Power Distribution Switch (U101) provided for USB port use	TEXAS INSTRUMENTS INCORPORATED	TPS2069x (Where 'x' is C or D. May be followed by other characters that do not impact the safety feature	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 1.5A Output Current Limit: 2.7A	UL 2367, IEC 62368-1: 2014	UL, CB by UL (US-34988-UL)

		of the device.)			
- Power Distribution Switch (U101) provided for USB port use (Alternate)	ROHM CO LTD	BD82032FVJ, BD82033FVJ designate the type of integrated circuit package, integrated circuit lead types or other features that are considered notto affect the functionality of the device.	Input Voltage - 4.5 to 5.5Vdc Output Continuous Current Rating: 1.5A Output Current Limit: 2.3A	UL 2367, IEC 60950-1: 2005+Am1: 2009+Am2: 2013, IEC 62368-1: 2014	UL, CB by UL (JP-12176-UL), (JP-21381-UL)
All PCBs	Interchangeable	Interchangeable	V-1 min, 105ºC min.	UL 796	UL
Speaker (Two provided) (Optional)	Interchangeable	Interchangeable	Generic, 4.0 +/- 20% ohm min., 2.5 Watts max.	--	--
Rubber Stand	Interchangeable	Interchangeable	See below for details.	--	--
- Hard rubber (internal part)	Covestro Deutschland AG [PC Resins]	FR3006 HF + + - Material designations may be followed by a six digit numerical code denoting color.	V-0, thickness 1.8 mm min., 60ºC, fixed byhot-melted.	UL 94, UL 746	UL
- Other rubber (external part)	Interchangeable	Interchangeable	Min. HB, located outside of enclosure.	UL 94	UL
- Other rubber (external part) (Alternate)	Interchangeable	Interchangeable	Flammability level is ignored, when small parts(4g max. or 1750mm^3max.) located outside of enclosure.	--	--

IR LED module	Liteon OPTO Technology (CZ) Ltd.	LTE-R28206S-ME8-XX; LTE-R28206S-ME8; LTE-R28206S-KE8-XX; LTE-R28206S-KE8; LTE-R28206S (“XX” means different customers)	Comply IEC 62471 exempt group	IEC 62471:2006	CB by SGS (BE-36784)
IR LED module (Alternate)	Interchangeable	Interchangeable	Comply IEC 62471 exempt group	IEC 62471:2006 (First Edition)	CB
Dongle - Lenovo HDMI to VGA Monitor Adapter (Optional)	Lenovo (Beijing) limited / trademark: Lenovo	CH7101B-02, LT8511	Rating is not necessary	IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014/A11:2017	CB by Demko (DK-106336-UL)
Dongle - Lenovo USB C to Ethernet Adapter(Optional)	Lenovo (Beijing) limited / trademark: Lenovo	RTL8153-04	Rating is not necessary	IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014/A11:2017	CB by Demko (DK-106480-UL)
Dongle - Lenovo USB-C to DisplayPortAdapter (Optional)	Lenovo (Beijing) limited / trademark: Lenovo	CYPD2119-01	Rating is not necessary	IEC 62368-1: 2014 (Second Edition), EN 62368-1: 2014/A11:2017	CB by Demko (DK-106516-UL)
Dongle - USB-Cto VGA Adapter (Optional)	Luxshare Precision Industry Co., Ltd. / trademark: Lenovo	RTD2166-CG3	5Vdc	IEC 60950-1: 2005 (Second Edition) + Am 1: 2009 + Am 2: 2013	CB by TUVRh (JPTUV-088901)
S01. Label	Interchangeable	Interchangeable	Maximum 60 degree C, suitable for surface applied.	UL 969:2018	UL , --
S01a. Label (Alternate)	--	--	Molded as part of enclosure, Hot stamping, laser etching or silk screened.	--	-- , --
S01b. Label (Alternate)	--	--	Rating was engraved on the enclosure directly.	--	-- , --

S01c. Label (Alternate)	--	--	Laser carved on enclosure directly.	--	-- , --
01. Adapter (Optional) (Alternate)	Delta Electronics, Inc. (Lenovo)	ADLX65YDC3D, ADLX65YDC2D, ADP-65XDB	Input: 100-240V~, 1.8A, 50-60Hz; Output: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014	UL , CB by TUV
01a. Adapter (Optional) (Alternate)	Delta Electronics, Inc. (Lenovo)	ADLX65YSDC3A, ADLX65YSDC2A	Input: 100-240V~, 1.8A, 50-60Hz; Output: 20Vdc, 3.25A / 15Vdc, 3A / 9Vdc, 3A / 5Vdc, 3A	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014, IEC 62368-1:2018	UL , CB by TUV
01b. Adapter (Optional) (Alternate)	Chicony Power Technology Co., Ltd. (Lenovo)	ADLX65YSCC3A	Input : AC 100-240V; 50-60Hz; 1.8A; Class I, Output: 3A/5V or 3A/9V or 3A/15V or 3.25A/20V	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014, IEC 62368-1:2018	UL , UL , CB by TUV, CB by UL
01c. Adapter (Optional) (Alternate)	Interchangeable	Interchangeable	Output: DC 5V/2A or 3A, 9V/2A or 3A, 15V/3A, 20V/3.25A	UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014, IEC 62368-1:2018	UL , CB b NCB
01d. Adapter (Optional) (Alternate)	LITE-ON TECHNOLOGY CORP	ADLX45YLC3D, 4X20M26256, PA-1450-30XX (where X = A-Z, 0-9, or - or blank)	Input: 100-240Vac, 50-60Hz, 1.3A Output: 20Vdc, 2.25A / 15Vdc, 3A / 9Vdc, 2A / 5Vdc, 2A	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014, IEC 62368-1:2018	UL , UL , CB by Nemko, CB by UL
01e. Adapter (Optional) (Alternate)	Interchangeable	Interchangeable	Output: DC 5V/2A or 3A, 9V/2A or 3A, or 15V/3.0A or 20V/2.25A	UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014, IEC 62368-1:2018	UL , CB by NCB

02. Enclosure	--	--	See Enclosure 4-01 for detailed dimension, and see below for detailed materials.	--	-- , --
02-01. Enclosure Material for Top Cover	LG CHEM LTD	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-01a. Enclosure Material for Top Cover (Alternate)	LG CHEM (TIANJIN) ENGINEERING PLASTICS CO LTD	GN-5001RFD, LUPOY GN-5151RF(#)(#) – May be followed by optional suffiz letter from A-Z, except F.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-01b. Enclosure Material for Top Cover (Alternate)	LG CHEM POLAND SP Z OO	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades AF302G, HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --

02-01c. Enclosure Material for Top Cover (Alternate)	MITSUBISHI ENGINEERING-PLASTICS CORP	TMB1615++ - Suffix optional, exceptions: The following cannot be used as optional suffixes: "A" for 1501, 1502, 1511, 1521 & 2502, "N" for NXG5050, NXG5030, NXG5501, & CGF-(v)(u),"S1" for F20-54, "R" for grade MB2211, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1).	Minimum V-0, thickness 1.0mm minimum, RTI 85 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-01d. Enclosure Material for Top Cover (Alternate)	LG CHEM LTD	LUPOY GN-2403F(#) (#) - May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, LI912W, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	Minimum V-0, thickness 0.8mm minimum, RTI 80 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-01e. Enclosure Material for Top Cover (Alternate)	LG Chem (Guangzhou) Engineering Plastics Co Ltd	LUPOY GN-2403F(#) (#) - May be followed by optional suffix letter from A-Z incl., except F, and except Grades AF302G, HT700B, XR401B, LI912A,	Minimum V-0, thickness 0.8mm minimum, RTI 80 degree C	UL 94: 2013 UL 746C: 2018	UL , --

		AF303G, AF303S.			
02-01f. Enclosure Material for Top Cover (Alternate)	--	--	Aluminum, Alloy of Aluminum, thickness 0.8mm minimum	--	-- , --
02-02. Enclosure Material for LCD Bezel	MITSUBISHI ENGINEERING-PLASTICS CORP	TMB1615++ - Suffix optional, exceptions: The following cannot be used as optional suffixes: "A" for 1501, 1502, 1511, 1521 & 2502, "N" for NXG5050, NXG5030, NXG5501, & CGF-(v)(u),"S1" for F20-54, "R" for grade MB2211, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1).	Minimum V-0, thickness 1.0mm minimum, RTI 85 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-02a. Enclosure Material for LCD Bezel (Alternate)	MITSUBISHI ENGINEERING-PLASTICS CORP	MB1700+; + - Suffix optional, exceptions: The following cannot be used as optional suffixes: "A" for 1501, 1502, 1511, 1521 & 2502, "N" for NXG5050, NXG5030, NXG5501, & CGF-(v)(u),"S1" for F20-54, "R" for grade MB2211, "V" for grades S-2000+(f1), S-2001+(f1), S-	Minimum V-0, thickness 0.75mm minimum, 60 degree C.	UL 94: 2013 UL 746C: 2018	UL , --

		2003+(f1).			
02-03. Enclosure Material Top Side around Keyboard	LG CHEM LTD	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-03a. Enclosure Material Top Side around Keyboard (Alternate)	LG CHEM (TIANJIN) ENGINEERING PLASTICS CO LTD	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffiz letter from A-Z, except F.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-03b. Enclosure Material Top Side around Keyboard (Alternate)	LG CHEM POLAND SP Z OO	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades AF302G, HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --

02-03c. Enclosure Material Top Side around Keyboard (Alternate)	MITSUBISHI ENGINEERING-PLASTICS CORP	TMB1615++ - Suffix optional, exceptions: The following cannot be used as optional suffixes: "A" for 1501, 1502, 1511, 1521 & 2502, "N" for NXG5050, NXG5030, NXG5501, & CGF-(v)(u),"S1" for F20-54, "R" for grade MB2211, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1).	Minimum V-0, thickness 1.0mm minimum, RTI 85 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-04a. Enclosure Material for Bottom Case (Alternate)	LG CHEM (TIANJIN) ENGINEERING PLASTICS CO LTD	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffiz letter from A-Z, except F.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-04b. Enclosure Material for Bottom Case (Alternate)	LG CHEM POLAND SP Z OO	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades AF302G, HT700B, XR401B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-04c. Enclosure Material for Bottom Case (Alternate)	MITSUBISHI ENGINEERING-PLASTICS CORP The following cannot be used as optional suffixes: "A" for 1501, 1502,	TMB1615++ - Suffix optional, exceptions: degree C	Minimum V-0, thickness 1.0mm minimum, RTI 85	UL 94: 2013 UL 746C: 2018	UL , --

	1511, 1521 & 2502, "N" for NXG5050, NXG5030, NXG5501, & CGF-(v)(u),"S1" for F20-54, "R" for grade MB2211, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1).				
02-04. Enclosure Material for Bottom Case (Alternate)	LG CHEM LTD	GN-5001RFD, LUPOY GN-5151RF(#) (#) – May be followed by optional suffix letter from A-Z incl., except F, and except Grades HT700B, LI912A, AF303G, AF303S, XR404T, XR407D, XR407E, HF380X, XR404E, XR404-G, XR404-P and LUMILOY GN2108FI.	V-0, min.1.0 mm thick, RTI 60 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-04d. Enclosure Material for Bottom Case (Alternate)	SABIC JAPAN L L C	DC0041PD(B5), ER010459(B5) (B5) – Represents color code 7M1D145 NOTE – Material designation may be followed by a color nomenclature consisting of either an alpha/numeric or numeric/alpha combination.	Minimum V-0, thickness 0.8mm minimum, RTI 80 degree C	UL 94: 2013 UL 746C: 2018	UL , --

02-04e. Enclosure Material for Bottom Case (Alternate)	SABIC INNOVATIVE PLASTICS US L L C	DC0041PQ(B 7) (B7) – May be replaced by the color code 7M1A9220 or 7M1D145 denoting a BK pigment. NOTE – Material designation may be followed by a color nomenclature consisting of either an alpha/numeric or numeric/alpha combination.	Minimum V-0, thickness 0.8mm minimum, RTI 80 degree C	UL 94: 2013 UL 746C: 2018	UL , --
02-06. Metallized Coating	Interchangeable	Interchangeab l e	Applied for bottom case material, see item 02 above.	UL 746C: 2018	UL , --
02-07. Mesh for Bottom Openings	CHENGDU KANGLONGXIN PLASTICS CO LTD	KLX FRPC-1860, KLX FRPC-1860B, KLX FRPC-1860-83, KLX FRPC-1860-83B, KLX FRPC-1860-1, KLX FRPC-1860-NTC, KLX FRPC-1860B-NTC, KLX FRPC-1860B-3, KLX FRPC-1870B-K, KLX FRPC-1860B-HY, KLX FRPC-1860-HY, KLX FRPC-1860B-K, KLX FRPC-1860-K, KLX FRPC-1860W	VTM-0 minimum, 0.125mm thickness minimum.	UL 94: 2013 UL 746C: 2018	UL , --
02-07a. Mesh for Bottom Openings (Alternate)	SICHUAN DONGFANG INSULATING MATERIAL CO LTD	DFR117, DFR117ECO A, DFR117ECO B, DFR117ECO C	VTM-0 minimum, 0.05mm thickness minimum.	UL 94: 2013 UL 746C: 2018	UL , --

02-08. Adhesive for Bottom Mesh	SDK	DST-5	100 degree C	--	-- , Tested in appliance
02-09. Mylar for Keyboard	SHENZHEN TEESUN TECHNOLOGY CO LTD	TS-FR1365, TS-FR1363, TS-FR1360, TS-FR1362, TS-FR160Y, TS-FR1370F, TS-FR1370, TS-FR1383, TS-FR1370-32, TS-FR1383-13	VTM-0 minimum, 0.05mm thickness minimum.	UL 94: 2013 UL 746C: 2018	UL , --
02-09a. Mylar for Keyboard (Alternate)	Interchangeable	Interchangeable	Min. VTM-0 or V-0.	UL 94: 2013 UL 746C: 2018	UL , --
03. LCD Panel	CHONGQING BOE OPTOELECTRONICS TECHNOLOGY CO LTD (BOE)	**140***-*** where "*" could be any letter of "0" to "9" or "A" to "Z" or blank, denotes only non-safety related parts or name difference.	14.0 inch, TFT Type (LED backlight).	UL 60950-1:2014, UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL
03a. LCD Panel (Alternate)	HEFEI BOE OPTOELECTRONICS TECHNOLOGY CO LTD (BOE)	**140***-*** (where * could be any letter of “0" to “9" or “A" to “Z" or blank, denotes only non-safety related parts or name difference.)	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL
03b. LCD Panel (Alternate)	INFOVISION ELECTRONICS (KUNSHAN) CO LTD (IVO)	X140NVyy, M140NWxx, P140NWxx, R140NWxx, M140NVxxyy, R140NVxx (where x can be 0-9, A-Z, blank or symbol “-“; y can be 0-9, A-Z, blank or symbol “-“ for	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL

		marketing purpose and no impact any critical safety components and constructions)			
03c. LCD Panel (Alternate)	AU OPTRONICS CORP	B140HATZZZ Z , B140HAKZZZ Z , B140HABZZZ Z (Where Z may be any alphanumeric character or a dot or blank)	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL
03d. LCD Panel (Alternate)	AU OPTRONICS CORP	B140HANZZZ Z B140HTNZZZ Z B140HTTZZZ Z B140HTVZZZ Z B140XTBZZZ Z B140XTKZZZ Z B140XTNZZZ Z B140XTTZZZ Z (Where Z may be any alphanumeric character or a dot or blank)	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL
03e. LCD Panel (Alternate)	Innolux Corp	N140FGE-LXX, N140FGE-EXX, N140HGE-EXX, N140HCE-EXX, N140HCA-EXX, N140HCN-EXX, N140HCE-GXX, N140HCA-GXX, N140HGA-EXX, N140HCG-	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 62368-1:2014	UL , CB by UL

		GXX, N140HCN-GXX, N140HCR-GXX, P140ZKA-BXX, N140HCP-EXX, N140HCG-EXX, N140JCN-GXX, N140HCQ-GXX (X=0-9, A-Z or blank, X for marketing purpose and no impact safety related critical components and constructions)			
03f. LCD Panel (Alternate)	LG DISPLAY CO LTD	LP140WF9, LP140WFA	14.0 inch, TFT Type (LED backlight).	UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014	UL , CB by TUV
03g. LCD Panel (Alternate)	Interchangeable	Interchangeable	14.0 inch, TFT Type (LED backlight).	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1:2014	UL , CB by NCB
04. DC Fan	DELTA ELECTRONICS INC	ND75C94-21G08, ND75C94 XXXXXXXXX X X, X stands for A-Z, 0-9, - or blank	5Vdc, 0.5A, 3.8CFM minimum.	UL 507:2020, EN 62368-1:2014/A11:2017	UL , TUV RH
04a. DC Fan (Alternate)	Asia Vital Components Co.,Ltd.	BAPA0906R5H Y007, BAPA0906Z5H V, “Z” can be A, B, C, G, R, S, or T; “V” can be ABCD where A, B, C, D may be A-Z, 0-9, “-“ or blank	5Vdc, 0.5A, 4.93CFM minimum.	UL 507:2020, EN 62368-1:2014/A11:2017	UL , TUV SUD

04c. DC Fan (Alternate)	Interchangeable	Interchangeable	5Vdc, Max. 0.5A, 3.80CFM minimum.	UL 507:2020, EN 62368-1:2014/A11:2017	UL , UV, VDE or CB by National Certification Body
05. Battery Pack	SIMPLO TECHNOLOGY CO LTD (Lenovo)	L21M3PG1	11.25Vdc, 3735mAh / 42Wh, 3635mAh / 40.9Wh	UL 62368-1:2019, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020	UL , CB by UL
05a. Battery Pack (Alternate)	CELXPERT ENERGY CORP (Lenovo)	L21C3PG1	11.25Vdc, Typical 3735mAh / 42Wh, Rated 3635mAh / 40.9Wh	UL 62368-1:2019, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020	UL , CB by UL
05b. Battery Pack (Alternate)	Zhejiang Sunwoda Electronic Co., Ltd. (Lenovo)	L21D3PG1	DC 11.25V, Rated:3635mAh, 40.9Wh/ Typical: 3735mAh, 42Wh	UL 62368-1:2014, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1: 2014, EN 62368-1:2014 / A11: 2017	UL , CB by TUV-Rh
05c. Battery Pack (Alternate)	LG ENERGY SOLUTION, LTD. (Lenovo)	L21L3PG1	11.4Vdc, Typ.: 3685mAh/42Wh, Rated: 3590mAh/40.9Wh	UL 62368-1:2019, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020	UL , CB by UL
05d. Battery Pack (Alternate)	SIMPLO TECHNOLOGY CO LTD (Lenovo)	L21M3PG2	11.52Vdc, 4948mAh or 57Wh, 4862mAh or 56Wh	UL 62368-1:2019, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020	UL , CB by UL
05e. Battery Pack (Alternate)	CELXPERT ENERGY CORP (Lenovo)	L21C3PG2	11.52Vdc, 4948mAh / 57Wh, 4862mAh / 56Wh	UL 62368-1:2019, UL 2054:2011, IEC 62133-2:2017, IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020	UL , CB by UL

06. Mother Board	--	--	See below	--	-- , --
06-01. Thermal Module	--	--	Copper or Aluminum or Alloy of Copper or Steel or Alloy of Aluminum or Alloy of metal. See Enclosure ID 4-04 for detailed dimension.	--	-- , --
06-02. Protector IC for USB Type C Port	TEXAS INSTRUMENTS INCORPORATED	TPS66021, TPS66020- may be preceded by 'P', may be followed by additional characters that do not affect the safety features of the device	Input Voltage: 4.9 - 5.5 Vdc Output Continuous Rating: 1.5 - 3.0 A Output Current Limit: 1.87 - 3.7 A	UL 2367:2021, IEC 62368-1: 2014	UL , CB by UL (US-34369-UL)
06-02a. Protector IC for USB Type C Port (Alternate)	TEXAS INSTRUMENTS INCORPORATED	SN1810003, SN1810004, SN1905001, SN1905002, SN1905003, SN1905004, SN1905005, SN1905006, SN1905007, SN1905008, SN1908005, SN2001021, SN2001022, SN2001023, SN2001024, SN2001025, SN2001026, SN2001027, SN2001028, SN2001029, SN2006001, SN2006002, SN2006003, TPS65993, and TPS65994, may be followed by additional characters that do not affect the safety features of the device	Input Voltage: 4.9 to 5.5 Vdc;Output Continuous Rating:PA_VBUS, PB_VBUS: 0.9 to 3.0 A;PA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315 A;*Only 1 path within a pair are active at one timeOutput Current Limit:PA_VBUS, PB_VBUS: 1.36A to 3.78 A;PA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to 0.66 A;Maximum Ambient: 65 degree C;SN2001025, SN2006001, SN2006002, SN2006003 and TPS65994 with alternate Insulated Housing:Maximum Ambient: 85	UL 2367:2021, IEC 62368-1: 2014	UL , CB by UL US-38687-UL)

			degree C		
06-02b. Protector IC for USB Type C Port (Alternate)	TEXAS INSTRUMENTS INCORPORATED	SN1810003, SN1810004, SN1905001, SN1905002, SN1905003, SN1905004, SN1905005, SN1905006, SN1905007, SN1905008, SN1908005, SN2001021, SN2001022, SN2001023, SN2001024, SN2001025, SN2001026, SN2001027, SN2001028, SN2001029, TPS65993, and TPS65994, may be followed by additional characters that do not affect the safety features of the device	Input Voltage: 4.9 - 5.5 Vdc Output Continuous Rating: PA_VBUS, PB_VBUS: 0.9 to 3.0A PA_CC1, PA_CC2, PB_CC1, PB_CC2*: 0.315A Output Current Limit: PA_VBUS, PB_VBUS: 1.36A to 3.78A PA_CC1, PA_CC2, PB_CC1, PB_CC2: 0.47 to 0.66A	UL 2367:2021, IEC 62368-1: 2014	UL , CB by UL US-38687-UL)
06-03. Protector IC for USB 3.0 and HDMI Ports	Global Mixed-mode Technology Inc.	G517FX1X2X3 X4,X1=1, 2, 3, or 4,X2=T1, TB, TO,TP, U5, P8 or TM,X3=1,2 or 3,X4=U or D	Input Voltage: 2.7 to 5.5 Vdc;Output Continuous Rating: 2.1 A;Output Current Limit: 2.2 to 3.0 A;Maximum Ambient: 70 degree C	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013	UL , CB by TUV (JPTUV-077390)
06-03a. Protector IC for USB 3.0 and HDMI Ports (Alternate)	SILERGY CORP	SY6288- followed by E1, E2, E3, E4, E5 or E6, followed by AAC followed by F1, F2, F3 or F4, followed by ABC	Input voltage: 2.5-5.5Vdc, Continuous current: 3.0A for Models SY6288; followed by E1; E2; E3 or E4; followed by AAC; 2.5 A for Models SY6288; followed by E5 or E6; followed by AAC; 0.3 to 3.0 A for Models SY6288;	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (DK-86927-A1- UL, DK-67571- M1-UL)

			followed by F1; F2; F3; or F4; followed by ABC		
06-03b. Protector IC for USB 3.0 and HDMI Ports (Alternate)	Silergy Technology (Taiwan) Inc	SYV687ZDEC , SY6288-follow by G or H, follow by AB, follow by C, SY6287-follow by B, B1, C, C1, E, F, Y or Z, follow by AB, DE or CA, follow by C;, SYVL27, SY20807- follow by B, B1, C or C1, follow by AB, DE or CA, follow by C	Models SY6287, follow by B, B1, C, C1, E or F, follow by AB, DE or CA, follow by C; SYVL27, follow by B, B1, C or C1, follow by AB, DE or CA, follow by C; SY20807, follow by B, B1, C or C1, follow by AB, DE or CA, follow by C; SY6288, follow by G or H, follow by AB, follow by C; SYV687ZDEC: Input Voltage: 2.5 to 5.5 Vdc Output Continuous Rating: Max. 2.0 A Current Limit Rating: 0.575A to 4.43 A. Models SY6287, follow by Y or Z, follow by AB, DE or CA, follow by C; Input Voltage: 2.5 to 5.5 Vdc Output Continuous Rating: Max. 2.2 A Current Limit Rating: 0.575A to 4.43 A.	UL 2367:2021, IEC 62368-1: 2014	UL , CB by UL (DK-73538-A2- UL)
06-03c. Protector IC for USB 3.0 and HDMI Ports (Alternate)	ANPEC ELECTRONICS CORP	APL3553- followed by A, B, C, D, E, F, G, H, I or J followed by B, C or X, followed by I, followed by -, followed by TR, followed by G, APL3555- followed by A, B, C or D, followed by B, followed by I, followed by -, followed by	Input Voltage: 2.7 to 5.5 Vdc Output Continuous Rating: 2.0 A for Models APL3555 followed by A or B, followed by B, followed by I, followed by -, followed by TR, followed by G; Models APL3553 followed by A, B, E, F, I or J, followed by B, C or X, followed by	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (DK-87208-M2- UL, DK-59231- A2-UL)

		TR, followed by G	I, followed by -, followed by TR, followed by G. 1.0 A for Models APL3555 followed by C or D, followed by B, followed by I, followed by -, followed by TR, followed by G; Models APL3553 followed by C, D, G or H, followed by B, C or X, followed by I, followed by -, followed by TR, followed by G;		
06-03d. Protector IC for USB 3.0 and HDMI Ports (Alternate)	Richtek Technology Corp.	RT9742..G., The first dot "." can be A to Z represent output current/ enable function. The second dot "." can be N or blank represent discharge function. The third dot "." can be J5F/ J5/ V represent package type.	2.7V to 6V, 3A/2A/1.5A/1A/0.5A, 70mΩ/55mΩ (typ.) N-MOSFET Switch; SELV Class III	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by Nemko (NO109777, NO87949)
06-03e. Protector IC for USB 3.0 and HDMI Ports (Alternate)	DIODES INCORPORATED	PI5USB25ww x yyyEz Series(where ww is 44 or 46; x is blank, A or H; yyy is ZH or ZHD for the packaging type; E is Pb-free; and z is blank or X;Cat. Nos. PI5USB2544ZHE, PI5USB2544ZHEX, PI5USB2544AZHE, PI5USB2544AZHEX, PI5USB2544ZHDE, PI5USB2544Z	Input Voltage: 4.5 to 5.5 Vdc;Output Continuous Rating: 0.03 to 2.5 A;Current Limit Rating: 0.1 to 3.18 A;Maximum Ambient: 85 degree C	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (US-38136-UL, US-24707-M2- UL)

		HDEX, PI5USB2544AZHDE, PI5USB2544AZHDEX, PI5USB2546ZHE, PI5USB2546ZHEX, PI5USB2546AZHE, PI5USB2546HZHE, PI5USB2546AZHEX, PI5USB2546ZHDE, PI5USB2546ZHDEX, PI5USB2546AZHDE, PI5USB2546AZHDEX, PI5USB2546HZHEX, PI5USB2546HZHDE, PI5USB2546HZHDEX.			
06-03f. Protector IC for USB 3.0 and HDMI Ports (Alternate)	TEXAS INSTRUMENTS INCORPORATED	SN1408009RT E, SN1702001, TPS2543, TPS2544, TPS2547, TPS2546, TPS2545- Additional suffixes after the model number designate the type of integrated circuit package, integrated circuit lead types or other features that are considered not to affect the functionality of the device	Input Voltage: 4.5 to 5.5Vdc; Output Continuous Rating: 2.5A; Output Current Limit: 3.1A	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (US-35117-UL, US-29689-M1- UL)
06-03g. Protector IC for USB 3.0 and HDMI Ports (Alternate)	TEXAS INSTRUMENTS INCORPORATED	TPD3S014, TPD3S044, TPS2000, TPS2001, TPS2065-2, TPS2061,	Input Voltage - 4.5 Vdc to 5.5 Vdc Output Continuous Current Rating: TPS2041 - 0.5 A	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (US-34988-UL, US-30345-UL)

		TPS2041, TPS2051, TPS2069, TPS2068, TPS2065, TPS2069-2- May be followed by other characters that do not impact the safety feature of the device.	TPS2051 - 0.5 A TPS2061 - 1.0 A TPS2065 - 1.0 A TPS2065-2 - 1.0 A TPS2068 - 1.5 A TPS2069 - 1.5 A TPS2069-2 - 1.5 A TPS2000 - 2.0 A TPS2001 - 2.0 A TPD3S014 - 0.5 A TPD3S044 - 1.5 A Output Current Limit: TPS2041 - 1.05 A TPS2051 - 1.05 A TPS2061 - 1.9 A TPS2065 - 1.9 A TPS2065-2 - 1.96 A TPS2068 - 2.7 A TPS2069 - 2.7 A TPS2069-2 - 2.86 A TPS2000 - 3.6 A TPS2001 - 3.6 A TPD3S014 - 1.05 A TPD3S044 - 2.7 A Ambient = -40 to +85°C		
06-03h. Protector IC for USB 3.0 and HDMI Ports (Alternate)	ROHM CO LTD	BD82028FVJ, BD82029FVJ, BD82030FVJ, BD82031FVJ, BD82032FVJ, BD82033FVJ, BD82034FVJ, and BD82035FVJ designate the type of integrated circuit package, integrated circuit lead types or other features that are considered not to affect the functionality of the device. Suffix FVJ denotes device Package Type TSSOP-B8J.	Input Voltage: -4.5 Vdc to 5.5 Vdc; Model BD82028FVJ: 0.5 A Model BD82029FVJ: 0.5 A Model BD82030FVJ: 1.0 A Model BD82031FVJ: 1.0 A Model BD82032FVJ: 1.5 A Model BD82033FVJ: 1.5 A Model BD82034FVJ: 2.0 A Model BD82035FVJ: 2.0 A Model BD82028FVJ: 1.2 A Model BD82029FVJ: 1.2 A Model	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (JP-21381-UL, JP-12176-UL)

			BD82030FVJ: 1.8 A Model BD82031FVJ: 1.8 A Model BD82032FVJ: 2.3 A Model BD82033FVJ: 2.3 A Model BD82034FVJ: 2.8 A Model BD82035FVJ: 2.8 A Ambient: -40 °C to 85 °C		
06-03l. Protector IC for USB 3.0 and HDMI Ports (Alternate)	TEXAS INSTRUMENTS INCORPORATED	TPS2552-1, TPS2553, TPS2553-1, TPS2552	Input Voltage: 2.5 to 6.5 Vdc Output Continuous Rating: 1.5A Output Current Limit: 1.7A Maximum Operational Ambient: 60°C	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (US-34989-UL, US-24603-A1- UL)
06-03j. Protector IC for USB 3.0 and HDMI Ports (Alternate)	Global Mixed-mode Technology Inc.	G517ALX1X2 X 3X4,X1=1 or 2,X2=TP, TB, RB or U5,X3=1, 2 or 3,X4=U or D	Input Voltage: 2.7 to 5.5 Vdc;Output Continuous Rating: 0.1 to 2.15 A;Output Current Limit: 0.2 to 2.75 A;Maximum Ambient: 70 degree C	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013	UL , CB by TUV (JPTUV-077390)

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Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

06-03k. Protector IC for USB 3.0 and HDMI Ports (Alternate)	Guangdong Cellwise Microelectronics Co., Ltd. (CellWise)	CW3042AAAD, CW3042AAAE, HP3048BAAQ, CW3048AAAQ , CW3048BAAQ , CW3046AAAQ	Input Voltage: 4.5 to 5.5 Vdc, Output Continuous Rating: Maximum 2.8 A, Current Limit Rating: Maximum 3.17 A	UL 2367:2011, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL (DK-108822-UL, DK-63696-M1- UL)

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Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
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06-03l. Protector IC for USB 3.0 and HDMI Ports (Alternate	DIODES INC	AP2553, AP2552-maybefollowed by A, maybe followedby additional letters and/or numbers., AP2553A, AP2552A-may be followed by additional letters, numbers, and/or a '-'	Input Voltage: 2.7 to 5.5Vdc, Output Continuous Rating: Maximum 2.1 A, Current Limit Rating:Maximum 3.02 A	UL 2367:2021, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , UL , CB by UL (US-24721-UL, US-34481-UL)

06-03m. Protector IC for USB 3.0 and HDMI Ports (Alternate)	ON SEMICONDUCTO R	NCP380- followed by H or L; followed by MU or SN; followed by 05, 10, 15, 20, 21 or AJ. Additional suffixes after the model number designate the type of integrated circuit package, integrated circuit lead types or other features that are considered not to affect the functionality of the device.	Input Voltage: - 2.5 Vdc to 5.5 Vdc Output Continuous Rating (unit: A): NCP380xSN05AA T 1G 0.5 NCP380xSN10AA T 1G 1.0 NCP380xSNAJAA T 1G 0.5 - 1.0 NCP380xMU05AA T BG 0.5 NCP380xMU10AA T BG 1.0 NCP380xMU15AA T BG 1.5 NCP380xMU20AA T BG 2.0 NCP380xMU21AA T BG 2.1 NCP380xMUAJAA T BG 0.5 - 2.1 Output Current Limit: NCP380xSN05AA T 1G 0.7 NCP380xSN10AA T 1G 1.4 NCP380xSNAJAA T 1G 0.7 - 1.8 NCP380xMU05AA T BG 0.7 NCP380xMU10AA T BG 1.4 NCP380xMU15AA T BG 2.0 NCP380xMU20AA T BG 2.1 NCP380xMU21AA T BG 2.5 NCP380xMUAJAA T BG 0.7 - 2.5 Where x = L or H	UL 2367:2021, IEC 62368-1: 2014	UL , CB by UL (DK-103788-UL)

07. PWBs	Interchangeable	Interchangeabl e	V-1 minimum, 105 degree C minimum.	UL 796:2016	UL , --

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08. Solid State Drive(Optional)	INTEL CORP	MEM*,SSD* where * can be optional letters or numbers used to identify features such as memory type, size (thickness, width) and identify details not critical to the compliance of the drive.	3.3 Vdc, 5 Vdc, and/or 12 Vdc	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by UL

08a. Solid State Drive (Alternate) (Optional)	Interchangeable	Interchangeabl e	3.3 Vdc, 5 Vdc, and/or 12 Vdc	UL 60950-1:2014, UL 62368-1:2014, IEC 60950-1:2005 + A1:2009 + A2:2013, IEC 62368-1: 2014	UL , CB by NCB

09. Speaker (Two provided)	Interchangeable	Interchangeabl e	Each rated 4 ohm, 2.5 Watts maximum.	Test with equipment	-- , --

10. LED Chip (in IR Camera) (Optional)	Liteon OPTP Technology (CZ) Ltd.	LTE-R28206S-NE8, LTE-R28206S-NE8- XX, LTE- R28206S-YE8, LTE-R28206S- YE8-XX (“XX” means different customer numbers)	0.5A, 3Vdc (exempt group)	IEC 62471:2006	-- , IEC 62471:2006 (BE-34640)

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Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

10a. LED Chip (in IR Camera) (Optional) (Alternate)	Liteon OPTP Technology (CZ) Ltd.	LTE-R28206S-ME8-XX; LTE-R28206S-ME8; LTE-R28206S-KE8-XX; LTE-R28206S-KE8; LTE-R28206S (“XX” means different customers)	0.5A, 3Vdc (exempt group)	IEC 62471:2006	-- , IEC 62471:2006 (BE-36784)

12. RTC battery	VIC-DAWN ENTERPRISE COLTD	CR2016 (CR2016 Cellsmay be provided with alphanumeric suffix (j) or (k), (j) may come with an optionalsingle or multiple alphanumeric suffix denoting various insulating tube,ring, or tape. may come with an optionalsingle or multiple alphanumeric suffix denoting various pin, tab, cap or wire termination types)	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL

12a. RTC battery (Alternate)	JHIH HONG TECHNOLOGY CO LTD	CR2016	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL

12b. RTC battery (Alternate)	DOUBLE BEST CO LTD	CR2016 (j)(k), (j) - These cells may have various insulating tube, ring, or tape, (k) - These cells and batteries may come with an optional single or multiple alphanumeric suffix denoting various pin, tab, cap or wire termination types	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL
12c. RTC battery (Alternate)	MITSUBISHI ELECTRIC HOME APPLIANCE CO LTD	CR2016	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL

12d. RTC battery (Alternate)	MITSUBISHI ELECTRIC HOME APPLIANCE COLTD	CR2016N	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL
12e. RTC battery (Alternate)	MITSUBISHI ELECTRIC CORP	CR2016+, + - The cells may have various insulating tube, ring, or tape.	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL

12f. RTC battery (Alternate)	Panasonic Corporation, Panasonic Corporation Of North America	CR2016*, CR-2016*, * - Cell model numbers may be followed by an optional slash (/) and single or multiple alphanumeric characters (i.e. letters and/or numbers), which denote optional features such as various mounting tabs, connecting leads or plugs, packaging, etc.	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL
12g. RTC battery (Alternate)	TOHOKU MURATA MANUFACTURING CO., LTD	CR2016A, CR2016*, * - These celles may have various pin, tab, insulating tube, ring and tape.	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL
12h. RTC battery (Alternate)	SONY ELECTRONICS INC	CR2016	3Vdc; max. abnormal charging current 10 mA	UL 1642:2020	UL , UL
12i. RTC battery (Alternate)	Interchangeable	CR2016	3Vdc; max. abnormal charging current 10 mA.	UL 1642:2020	UL , UL
1. Label	Interchangeable	Interchangeable	Min 55 degree C, suitable for the surface applied.	UL969	UL
Cord set	Interchangeable	Interchangeable	----	NBR 14136, NBR NM 60884-1	INMETRO

2. Metal Chassis	-	-	Consists of 4 pieces, secured together by physical fit, wedged, overall 361.7 mm X 88.0 mm X 338.0 mm, min 0.6mm thick for top and bottom, min 0.8mm thick for sides,. Overall 179mm×178.7mm×34.5mm, Min.0.6 mm thickness	-	-
Metal Chassis	Interchangeable	Interchangeable	min. 0.6 mm thickness	-	Test with equipment
Metal enclosure	Interchangeable	Interchangeable	Overall 257mm x 89mm x 340mm, min 0.6 mm trickness	IEC/EN 60950-1	Test with equipment
Plastic Front Panel and battery box plastic enclosure	LG CHEM LTD	HI121	HB, min. 1.5 mm thickness. Min. 95°C	UL94, IEC/EN 60950-1	UL & tested in Appliance
3. Plastic Front Panel	Interchangeable	Interchangeable	HB or better, min. 1.5 mm thickness. Min. 95°C	UL94, UL746C	UL
Plastic Front Panel	STYROLUTION GROUP GMBH	GP-22	HB, min. 0.8 mm thickness	Applicable parts of IEC/EN 60950-1	UL E108538 & tested in appliance
Plastic Front Panel	CHI MEI CORPORATION	PA-757(+)	HB, 80°C, min. 1.5mm thickness	UL746C, UL94	UL E56070
Plastic Front Panel (Alternative)	COVESTRO DEUTSCHLANDAG [PC RESINS]	2865 + (z), 2867 + (z)	V-2, 115°C, min. 1.5mm thickness.	UL 746C, UL 94	UL E41613a
Plastic Front Panel (Alternative)	SABIC INNOVATIVE PLASTICS B V	C6600(GG)(X) (VS)	V-2, 60°C, min. 1.0mm thickness.	UL 746C, UL 94	UL E45329

Plastic Front Panel (Alternative)	DONGGUAN HINGLONG PLASTIC TECHNOLOGY CO LTD	HL-ABSPCR35/ 65/85	HB, 60°C, min. 1.6mm thickness.	UL 746C, UL 94	UL E345434
Plastic Front Panel (Alternative)	Interchangeable	Interchangeable	HB or better, min. 1.5 mm thickness.	UL 746C, UL 94	UL certified
Plastic Front Panel (Dust Cover) (Optional)	Interchangeable	Interchangeable	HB or better, min. 0.80 mm thickness.	UL 746C, UL 94	UL certified
Plastic Stand (Optional)	Interchangeable	Interchangeable	HB or better, min. 0.80 mm thickness.	UL 746C, UL 94	UL certified
Plastic Front Panel and battery box plastic Enclosure (Alternative)	Interchangeable	Interchangeable	HB or better, min. 1.5 mm thickness. Min. 95°C	UL94:2013	UL approved
4. PWB	Interchangeable	Interchangeable	Min V-1, min 105 degree C	UL796	UL
5. Built-in Power Supply	FSP Group Inc.	FSP180-20TGBAA	I/P: 100-240Vac, 3.0A, 50/60Hz; O/P: +12V/15.0A, -12V/0.2 A, 180W	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV-062658
5a. Built-in Power Supply (alternate)	Shenzhen Huntkey Electric Co., Ltd.	HK280-72PP, HK280-72PP xy (x=A-Z or blank, y=0-9 or blank)	I/P: 100-240Vac, 3.0A, 50/60Hz; O/P: +12V/15A, -12V/0.2 A, max. 180W; +12V: max. 180W; -12V: max. 2.4W.	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. SG-OF-12495
5b. Built-in Power Supply (alternate)	FSP Group Inc.	FSP210-20TGBAA FSP180-20TGBAB FSP210-20TGBAB	I/P: 100-240Vac, 3.0A, 50/60Hz; O/P: +12V/17.5A, -12V/0.2 A, 210W Altitude: up to 5000m	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV - 062658 No.: JPTUV 067200 M1
5c. Built-in Power Supply (alternate)	Acbel Polytech Inc.	PCE025	I/P: 100- 240Vac, 3.0A, 50/60Hz; O/P: +12V/17.5A, -12V/0.2 A; Total power 210W max.	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV-062130

5d. Built-in Power Supply (alternate)	Shenzhen Huntkey Electric Co., Ltd.	HK310-71PP, HK310-71PP xy (x=A-Z or blank, y=0-9 or blank)	I/P: 100-240Vac, 3.0A, 50/60Hz; O/P: +12V/17.5A, -12V/0.2 A; Max 210W; +12V: max. 210W; - 12V: Max. 2.4W	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. SG-OF-12494
5e. Built-in Power Supply (alternate)	Lite-On Technology Corporation	PA-2221-3XX (X can be any character or blank)	I/P: 100-240Vac, 3A, 50/60Hz; O/P: +12V/17.5A, -12V/0.2 A, continuous total DC output power 210W max.	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV-062750
Built-in Power Supply	Lite-On Technology Corporation	PA-1650-72	Input: AC 100-240V;50-60Hz;1.8A; Class I Output: DC 20V;3.25A	IEC/EN 60950-1	CB Cert. No.: JPTUV-044694 GS Cert. No.: S 50233068 0001
Built-in Power Supply	Lite-On Technology Corporation	PA-1900-72	Input: AC 100-240V;50-60Hz;1.5A; Class I Output: DC 20V;4.5A	IEC/EN 60950-1	TUV CB Cert. No. JPTUV-044681 GS Cert. No.: S 50232721 0001
Built-in Power Supply	DELTA ELECTRONICS INC	ADP-90XD B ADP-65FD B	Input: AC 100-240V;50-60Hz;1.5A; Class I Output: DC 20V;4.5A Input: AC 100-240V, 1.5A, 50-60Hz; Output: DC 20V, 3.25A; Altitude: up to 5000m	IEC/EN 60950-1	UL CB Cert. No.DK-27369-A1- UL GS Cert. DK-39157- UL,No.:S1 50234916 UL E131881
6. DC Fan (For CPU)	DELTA ELECTRONICS INC	AFB0812SH-9N07	12Vdc, 0.51A, 64.5CFM	UL507, IEC60950-1	VDE
DC Fan (For CPU)	SUNONWEALTH ELECTRIC MACHINE INDUSTRY CO LTD	EF90151BXC01C-S9A	DC 12V, 0.771A, 19.0CFM	UL 507, IEC/EM 60950-1	UL E77551 TUV R 50275749

6a. DC Fan (For CPU) (alternate)	Foxconn Technology Co., Ltd.	PVA080G12Q -P01-AD	12Vdc, 0.65A, 66.09CFM	UL507, IEC60950-1	TUV
6b. DC Fan (For CPU) (alternate)	ASIA VITAL COMPONENTS CO LTD	DS08025T12 UP199DS08025R1 2 UP227 DS08025R12UP24 1 DS08025R12UP24 2	12Vdc, 0.7A, 64.44CFM	UL507, IEC60950-1	TUV UL E158191 & tested in appliance
6c. DC Fan (For CPU) (alternate)	SHENZHEN DONGWEIFENG ELECTRONIC TECHNOLOGY CO LTD	EF(X)- 08E12(Y)(Z), where (X) may be S, H, B, C or F, (Y) may be W, (Z) may be blank, may be – WWWW, W can be 0 to 9 or A to Z EFH 08E12WGP01	12Vdc, 0.7A, 64.9CFM	UL507, IEC60950-1	TUV
6d. DC Fan (For CPU) (alternate)	Interchangeable	Interchangeable	12Vdc, 0.7A max., 64.44CFM min. 12Vdc, max 1.0A, min. 18CFM 12Vdc, 0.7A, 64.4CFM	UL507, IEC60950-1 UL 507:1999& IEC 60950-1: 2005+A1:2009 EN 60950 1:2006+A11:200 9+ A1:2010+A12:20 11	TUV UL, S & other EU certification Marks
DC Fan (For CPU) (Alternative)	ASIA VITAL COMPONENTS CO LTD	BAZA0814B2U P001	12Vdc, 1.0A, 18CFM	UL 507 IEC/EN 60950-1	UL E231557 & tested in appliance
7. DC Fan (For System)	Foxconn Technology Co., Ltd.	PVA080G12Q -(X)YY-YY, Where (X) may be F, R or X, X may be from 0 to 9, from A to Z or blank; Y may be from 0 to 9, from A to Z or blank	12Vdc, 0.65A, 65CFM	UL507, IEC60950-1	TUV

7a. DC Fan (For System) (alternate)	DELTA ELECTRONICS INC	AFB0812SHAA38	12Vdc, 0.6A, 64CFM	UL507, IEC60950-1	TUV
7b. DC Fan (For System) (alternate)	Interchangeable	Interchangeable	12Vdc, 0.65A max., 64CFMmin. 12V dc, 0.60A, 64.5CFM	UL507, IEC60950-1	TUV UL, EU Certification Approved
8. DC Fan (For HDD) (Optional)	Asia Vital Components Co., Ltd.	DS04010R12 (W)(V), where (Z) may be A, B, C, G, S, T, R or P, (W) may be S, U, H, M or L, (V) may be XXXX, where X maybe A through Z, 0 through 9, "-" or blank.	12Vdc, 0.14A, 7.59 CFM	UL507, IEC60950-1	TUV UL E158191 & tested in appliance
8a. DC Fan (For HDD) (Optional) (alternate)	Interchangeable	Interchangeable	12Vdc, 0.14A max., 7.59 CFM min.	UL507, IEC60950-1	TUV UL, EU Certification Approved
DC Fan (For CPU)	DELTA ELECTRONICS INC	BFB0712HBA9H	12Vdc,1.0A, 18.5CFM	UL 507 IEC/EN 60950-1	UL E132003 & tested in appliance
DC Fan (For CPU)	AVC	Z8UA0D4001-1 (DS08025R12UP227)	DC 12V, 0.7A, 64.4CFM	UL507	UL E158191
DC Fan (For System Rear) (optional)	AVC	DS08025R12UP241 -1	DC 12V, 0.45A/0.7A max., 64.4CFM min.	UL507	UL E158191
DC Fan (For System Front) (optional)	AVC	DS08025R12UP242 -1	DC 12V, 0.7A max., 64.4CFM min.	UL507	UL E158191
9. Lithium Battery Protection Circuit (for Motherboard, P/N: IQ1X0MS)	-	-	Reverse current protection accomplished by Diode (D2) and 1 kohm resistor (R195).	-	-
10. Optical Device Drive (Optional)	Samsung Electronics Co., Ltd.	TS-H353C	Class 1(I), 5V/12 V dc, 1.5 A or 1.6 A/1.5A or 1.6 A	UL60950-1	UL

Optical Device Drive (Optional)	Philips & Lite- On Digital Solutions Corp	DS-8A8SH	Class 1 laser, 5/12 V dc, 3.0A/1.5 A.	IEC/EN 60825-1& IEC 60950-1	TUV CB Cert. No. JPTUV- 052989
10a. Optical Device Drive (Optional) (alternate)	Interchangeable	Interchangeable	Class 1(I), 5/12 V dc, 3.0/3.0 A max.	UL60950-1; IEC/EN 60950-1	TUV, VDE, Nemko S, CB, UL& other EU certificationmarks
Optical Device Drive (Optional)	Hitachi-LG Data Storage inc.,	CH20N	BD Combo, Class 1 laser, 5/12 V dc, 1.5/1.5 A.	IEC/EN 60825-1	Intertek S Certificate: 911330
Optical Device Drive (Optional)	Sony Optiarc Inc.	DDU1681Sxxx (x can be any alphanumeric or blank or hyhen)	Class 1 laser, DC 5/12 V, 1.5/1.5 A	IEC/EN 608251:2014& IEC 60950-1	CB Certificate: JPTUV 026113
Optical Device Drive (Optional) (Alternative)	Interchangeable	Interchangeable	Class 1 laser, DC 5/12 V, 3.0/3.0 A max. Class III	UL60950-1, IEC/EN 60950-1, IEC/EN 60825-1	UL,S & other EU certification marks
11. Hard Disk (Optional)	Seagate Technology Inc.	ST1000DM003	12 V/5 V dc, 1.5A max	UL60950-1	UL
Hard Disk Drive (Optional)	Western Digital Technologie Inc	WD5000AAKX	5 V/12 V dc, 1.0A/0.95 A max.	Applicable parts of IEC/EN 60950-1	UL E101559 & tested in appliance
Hard Disk (Optional)	Seagate Technology, Incorporated	ST3 series	5 V/12 V dc, 0.72 A/0.52 A max. DC 5 V/12 V, 1.5 A/ 1.5 A max.	UL 60950- 1& IEC/EN 60950-1	UL E106814 & tested in appliance
Hard Disk (Optional)	Seagate Technology, Incorporated	ST500DM002	12 V/5 V dc, 1.5A max	UL60950-1	--
Hard Disk (Optional)	Seagate Technology, Incorporated	ST3500413AS	12 V/5 V dc, 1.5A max	UL60950-1	--
11a. Hard Disk(Optional) (alternate)	Interchangeable	Interchangeable	5 V/12 V dc, 3.0 A/3.0 A max.	UL60950-1; IEC/EN 60950-1 IEC 60950-1: 2005+A1:2009 EN 60950-1: 2006+A11:2009+A1	TUV, VDE, Nemko S & other EU certification marks

				:2010+A12:2011	
12. Lithium Battery for RTC	Sony Energy Devices Corp. VIC-DAWN ENTERPRISE CO LTD	CR2032	3 VDC, maximum abnormal charging current10 mA (Lithium Type) 3.0V/220mAh max continue discharge current: 4mA	UL1642	UL MH20550 & tested in appliance
Lithium Battery for RTC (Alternative)	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	CR2032	3V/225mAh max continue discharge current: 0.2mA	Applicable parts of IEC/EN 60950-1	UL MH12210 & tested in appliance
Lithium Battery for RTC (Alternative)	VIC-DAWN ENTERPRISE CO LTD	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642 IEC/EN 60950- 1	UL MH20550 & tested with equipment
Lithium Battery for RTC (Alternative)	Shun Wo New Power Battery Technology Ltd.	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642	--
Lithium Battery for RTC (Alternative)	Hitachi Maxell Ltd	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642	--
Lithium Battery for RTC (Alternative)	Toshiba Home Appliances Corp	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642	--
Lithium Battery for RTC (Alternative)	Wuhan Lixing (Torch) Power Source Co Ltd	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642	--
Lithium Battery for RTC (Alternative)	Jhih Hong Technology Co Ltd	CR2032	DC 3 V, Max. abnormal charging current 10 mA	UL 1642	--
12a. Lithium Battery for RTC (alternate)	Interchangeable	Interchangeable	3 V dc, maximum abnormal charging current10 mA (Lithium Type)	UL1642	UL

13. Poly Switch	BOURNS	MF-USMF110	PTC, rated 6Vdc, holding current: 1.1 A,	UL1434	UL
(F3,F4,F6,F7,F8, F12)	ELECTRONICS	MF-NSMF200	trip current: 2.2A 6Vdc, holding current:		UL E174545 &
	(TAIWAN) LTD	MF-MSMF260	2.6A, trip current: 5.2A		tested in
		MF-PSML260	PTC, rated 6V dc, holding current: 2.6 A,		appliance
			trip current: 5.0 A		
13a. Poly Switch (F3,F4,F6,F7,F8, F12) (alternate)	TYCO ELECTRONICS CORP	microSMD110 F-2	PTC, rated 6V dc, holding current: 1.1 A, trip current: 2.2 A	UL1434	UL E74889 & tested in appliance
Poly Switch (F1,SF2,SF8)	TYCO ELECTRONICS CORP	nanoSMDC110 F	PTC, 6V dc, 1.1A, tripping current:2.2A	UL 1434& IEC/EN 60950-1	UL E74889 & tested in appliance
13b. Poly Switch (F3,F4,F6,F7,F8, F12) (alternate)	POLYTRONICS TECHNOLOGY CORP	SMD1210P110TFT SMD1812P260T SPR-P260T SMD1206P110TFT	PTC, rated 8V dc, holding current: 1.1 A, trip current: 2.2 A 8Vdc, holding current: 2.6A, trip current: 5A PTC, rated 6Vdc, holding current: 2.6A, trip current: 5.2A DC 6V, holding current: 1.1A, trip current: 2.2A	UL1434	UL E201431 & tested in appliance
14. Poly Switch (F1, F2, F5, SF2,SF8, SF3,SF5)	BOURNS ELECTRONICS (TAIWAN) LTD	MF-NSML300 MF-NSMF110 MF-NSMF110-2	PTC, 6 V dc, holding current: 3A, tripping current: 6A PTC, 6V dc, 1.1A,	UL1434& IEC/EN 60950-1	UL E174545 & tested in appliance

			tripping current:1.8A DC 6V, holding current: 1.1A, trip current: 2.2A		
Poly Switch F1,F2,F3 (Alternative)	LITTELFUSE	1206L110THYR	DC 8V, holding current: 1.1A, trip current: 2.2A	UL1434	UL E183209
14a. Poly Switch (F1,F5, F7,SF2,SF8) (alternate)	LITTLEFUSE INC.	1206L300SL WR 1206L110 1812L260TH 0805L260ULTHYR 1206L200, 1206L200PR	PTC, 6 V dc, holding current: 3 A, tripping current: 6 A PTC, 6V dc, 1.1A, tripping current:2.2A 8VDC, holding current 2.6A, trip current 5A	UL1434& IEC/EN 60950-1	UL E183209 & tested in appliance
Poly Switch (F4, F5, F8) (alternate)	LITTELFUSE INC	1210L110THYR	PTC, rated 8V dc, holding current: 1.1 A, trip current: 2.2 A	UL1434	UL
Poly Switch F7 (Alternative)	LITTELFUSE	MF-MSMF260-2	DC 6V, holding current: 2.6A, trip current: 5.2A	UL1434	UL E174545
Poly Switch (U36 U37 U69 U71 for USB) (Alternative)	ANPEC	APL3518ABITRG	DC 5.5V, Holding Current : 2A, trip - Current: 3.6A	UL Subject 2367	UL E328191
15. IC Switch (U36, U37,U51, U52,U57, U59, U69, U71, U88)	UPI SEMICONDUCTOR CORP	UP7549TMA5 -25	2.7 to 5.5Vdc, Cont. current: 2A; 6 Vdc, holding current: 2A trip current: 3.1~5A	UL1434	UL E316940 & tested in appliance
15a. IC Switch (U51, U52, U57, U59) (alternate)	NIKO SEMICONDUCTOR CO LTD	GS7612S5MN GS7612S5MNR	2.0-5.5Vdc, Cont. current: 2A; Prot. current: 5A 5.5 Vdc, holding current : 3.2A, trip current: 5.0A	UL2367	UL E360303 & tested in appliance
IC Switch (U3 on optional USB type C module)	Global Mixedmode Technology Inc	G517AL	2.7-5.5Vdc, Cont. Current: 0.1A- 2.15A; Prot. current: 0.2A-2.75A	IEC/EN 60950-1	TUV CB Cert. No. JPTUV- 071444
16.Heat sink (above CPU)	-	-	Consist of Aluminum part, overall	-	-

17. Heat sink (above South Bridge chipset)	-	-	Consist of Aluminum part, overall	-	-
18. Insulating tubing/Sleeving	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1; 105 degree C, 300 V.	UL224	UL
19. Wiring, Internal secondary ELV/SELV Circuits	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1; min 30 V, 60 or 80 degree C.	UL758	UL
20. Interconnectin g Cable (Optional)	Interchangeable	Interchangeable	60 degree C min., 60 V min., 3.05 m long max, VW-1 or FT-1	UL758	UL
21. Internal Plastic Part Materials	Interchangeable	Interchangeable	V-2 min.	UL94, UL746C	UL
22. Connectors And Receptacles (Secondary ELV/SELV circuits)	Interchangeable	Interchangeable	Copper alloy pins housed in bodies of plastic rated V-2 min.	UL94, UL746C	UL
22a. Connectors And Receptacles (Secondary ELV/SELV circuits) (alternate)	Interchangeable	Interchangeable	plastic rated V-2 min.	UL498,UL1977	UL
23. Power Supply Cord	Interchangeable	Interchangeable	----	NBR 14136, NBR NM 60884-1	INMETRO
Power Supply Cord (Optional)	Interchangeable	Interchangeable	Type SVT or SPT-2, minimum 18 AWG, min 250 V, 6 A. One end with NEMA 5-15P. Other end in appliance coupler	UL62+ UL498, UL817,IEC60799	--
24. Graphics card	Shenzhen Bitland Information Technology Co., Ltd.	BD3E56 BD3F09 BD3G10 (P/N: GT 730) BD3E32(Marketing Name: GTX 750Ti)	DC 12V, 5.5Amax; and DC 3.3V, 3A max; Class III DC 12V; 3.3V;	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV-059969 and JPTUV-063517-M1 JPTUV-076247

		BD3F86 (P/N: GT 730)	Class III DC 3.3V,3A; 12V,5.5A max(optional); Class III		
24a. Graphics card (Alternate)	Micro-Star Int'l Co., Ltd.	V313 V338 (P/N: GT 730)	DC 3.3V; 12V(optional); Class III	UL 60950-1, IEC/EN 60950-1	TUV CB Cert. No. JPTUV-059127 TUV CB Cert. No.JPTUV-068607
24b. Graphics card (Alternate)	Interchangeable	Interchangeable	DC 3.3V; 12V(optional); Class III DC 12V, 5.5A max. or DC 3.3V, 3A max., Class III, 41W	UL 60950-1, IEC/EN 60950-1	TUV, VDE, Nemko UL, EU Certification Approved
24c. Graphics Card	NVIDIA CORP	P2012 (P/N: K420)	PCI-E interface, DVI and DISPLAY output ports.	-	-
Graphics Card	NVIDIA CORP	Quadro420	DC 12V, 5.5A max. or DC 3.3V, 3A max., Class III, 41W	IEC/EN 60950-1	Tested in appliance
24c-1. PWB	Interchangeable	Interchangeable	V-1 or better, min. 105 degree C	UL796	UL
24c-2. DC Fan	Interchangeable	Interchangeable	min. 3.03 CFM	UL507, IEC60335, , IEC60950-1	UL, TUV
24c-3. IC switch (U506) for DISPLAY	ANPEC ELECTRONICS CORP	APL3516AKITRG	Rated 2.9 to 3.7 V dc, holding current: 0,9A, tripping current:1.7A	UL2367	UL
25. Plastic Base	Interchangeable	Interchangeable	min. HB	UL94, UL746C	UL
USB Power Switch SF3,SF5）(Alternate)	POLYTRONICS TECHNOLOGY CORP	SMD1206P300 SLR($)	PTC, 6 V dc, 3A, tripping current:6A	UL 2367& IEC/EN 60950-1	UL E201431 & tested in appliance

USB Power Switch SU1,SU34）	Nuvoton Technology Corp	NCT3955Y	Input Voltage Range, V dc 4.5 V - 5.5 V Continuous Output Rating, A per output 2.5 A Protective Current Rating, A +3.5 A	IEC/EN 60950-1	TUV CB Cert SG-OF-12624
USB Power Switch (SU1,SU34） (Alternate)	PERICOM TECHNOLOGY (SHANGHAI)CO LTD	PI5USB2546ZH E	Input Voltage: 4.5 - 5.5 Vdc; Continuous Rating: 30 mA to 2.5 A Current Limit:100 mA to 3.18 A	IEC/EN 60950-1	UL CB Cert. No.US-24707-UL
USB power switch (SU69)	TEXAS INSTRUMENTS INC	TPS2546	Rated: DC 4.5-5.5V, holding current: 2.5A, trip current: 3.1A	UL 1434 & IEC/EN 60950-1	UL E169910 & tested with equipment
	Interchangeable	Interchangeable			
PCB for motherboard	GOLDEN ELITE TECHNOLOGY (SHEN ZHEN) LTD	GE-1	V-0, min. 1.5mm, 130 °C	UL796 & IEC/EN 60950-1	UL E307069 & tested in appliance
PCB for motherboard (Alternative)	Interchangeable	Interchangeable	V-1 or better, min. 1.5mm, min. 105 °C	UL796 :2010	UL approved
PCB for battery box	TRUSTECH ELECTRONICS (SHENZHEN) CO LTD	CL-2	V-0, min. 1.5mm, 130 °C	UL796, IEC/EN 60950-1	UL E241819 & tested in appliance
PCB for battery box (Alternative)	Interchangeable	Interchangeable	V-1 or better, min. 1.5mm, min. 130 °C/ 105º C	UL796:2010	UL approved
PCB	CHUAN YICOMPUTER (SHENZHEN) CO LTD	CM-4	V-0, min. 1.5mm, 130 °C	Applicable parts of IEC/EN 60950-1	UL E162264 & tested in appliance
PCB	HANNSTAR BOARD CORP	MV-4	V-0, min. 1.5mm, max. 130°C	UL 94, UL 796	UL E89382

PCB (Alternative)	PALWONN ELECTRONICS (SHENZHEN) CO LTD	M3	V-0, min. 1.5mm, 130 °C	Applicable parts of IEC/EN 60950-1	UL E230435 & tested in appliance
PCB (Alternative)	HANNSTAR BOARD CORP	MV-1	V-0, min. 1.5mm, 130 °C	UL 796	UL E89382
Li-ion Battery Pack (Optional)	SONY TAIWAN LTD	45N1040	10.8 Vdc, 2.9 Ah / 32 Wh	IEC/EN 60950-1	UL CB report.No. E236872- A131-CB-2
Rubber	Interchangeable	Interchangeable	Min V-1, Min 1.0mm thick, filled in the metal enclosure bottom openings as part of fire enclosure.	UL94, UL746C	UL
01. Cord set (Optional)	Interchangable	Interchangable	---	NBR 14136, NBR NM 60884-1	INMETRO
02. Interconnecting Cable (optional)	Interchangeable	Interchangeable	Max. 3.05m long, rated VW-1 or FT-1 or better.	UL758, UL1675, UL444	UL, --
02a. Interconnecting Cable (optional) - alternate	Interchangeable	Interchangeable	Maximum 3.05m long, type CMP, CMR, CMG, CM.	UL444	--, UL
02b. Interconnecting Cable (optional) - alternate	Interchangeable	Interchangeable	With RJ-45 type connector.	UL1863	--, UL
03. Label	Interchangeable	Interchangeable	Min. 60 degree C, suitable for the surface supplied.	UL969	UL, --
03a. Label - alternate	Interchangeable	Interchangeable	Molded as part of enclosure, Hot stamping, laser etching or silk screened.	--	--, --

04. Wiring, Internal (Secondary SELV circuits)	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1; 80 degree C, Min. 30Vdc.	UL758	UL, --
05. Connectors and Receptacles (Secondary ELV/SELV circuits)	Interchangeable	Interchangeable	Metal/ Coper alloy pins housed in bodies of plastic rated Min. V-2.	UL94	UL, --
05a. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	--	UL1977, UL498	UL, --
05b. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are mounted on V-1 class material.	--	--, --
05c. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	--	--, --
06. Internal Plastic Parts Materials	Interchangeable	Interchangeable	Min. V-2, or Min. HF-2.	UL94	UL, --
06a. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Min. HB or HBF, when foamed plastic parts are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	UL94	UL, --

06b. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	The combination, when one or more layers of thin insulating material used on the surface application, comply with V-2 class material within the fire enclosure.	--	--, --
06c. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are mounted on V-1 class material.	--	--, --
06d. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	--	--, --
07. Insulating Tubing/ Sleeving	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1.	UL224	UL, --
08. Printed Wiring Board (PWB)	Interchangeable	Interchangeable	Min. V-1, Min. 105 degree C.	UL796	UL, --
09. Enclosure	--	--	Metal, Min. 0.6mm thick. See enclosure 4- 01 for detail.	--	--, --
09-01. Enclosure (Front Bezel & Rear side)	Interchangeable	Interchangeable	HB or better.	UL94	UL, --
10. Foot Rubber (filled in metal enclosure)	Interchangeable	Interchangeable	V-1 or better, min. 1.0mm thickness, filled in the metal enclosure bottom openings as part of fire enclosure.	UL94, UL746C	UL, --

11. Power supply (for unit with rating 3.25A)	DELTA ELECTRONICS INC	ADP-65FD B	Input: 100-240Vac, 1.5A, 50-60Hz; Output: 20Vdc, 3.25A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E131881), CB by UL (DK-39157-UL)
11a. Power supply (for unit with rating 3.25A) - alternate	LITE-ON TECHNOLOGY CORP	PA-1650-72	AC Input: 100-240Vac, 50-60Hz, 1.8A; DC Output: 20Vdc/ 3.25A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-057469)
11b. Power supply (for unit with rating 3.25A) - alternate	CHICONY POWER TECHNOLOGY CO LTD	A17-065N2A	Input: 1.8A 100-240V~ 50-60Hz; Output: 3.25A, 20V; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E143709), CB by Nemko (NO99354)
11c. Power supply (for unit with rating 3.25A) - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 3.25A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
11d. Power supply (for unit with rating 3.25A or 4.5A) - alternate	DELTA ELECTRONICS INC	ADP-90XD B	Input: AC 100-240V, 1.5A, 50-60Hz; Output: 20Vdc/4.5A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E131881), CB by UL (DK-39163-UL)
11e. Power supply (for unit with rating 3.25A or 4.5A) - alternate	LITE-ON TECHNOLOGY CORP	PA-1900-72	I/P: 100-240Vac, 50-60Hz, 1.5A O/P: 20Vdc, 4.5A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-044681- M2)
11f. Power supply (for unit with rating 3.25A or 4.5A) - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 4.5A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
11g. Power supply - alternate	DELTA ELECTRONICS INC	ADL135NDC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC62368-1	UL (E131881), CB by UL (DK-63818-UL)

11h. Power supply - alternate	LITE-ON TECHNOLOGY CORP	ADL135NLC3A	Input: 100-240Vac, 50-60Hz, 2.5A; Output: 20Vdc, 6.75A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-062043)
11i. Power supply - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 6.75A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
12. Hard Disk (optional)	SEAGATE TECHNOLOGY L L C	ST3	12Vdc, 1.5A maximum, 5Vdc, 1.5A maximum.	UL60950-1, IEC60950-1	UL (E106814), --
12a. Hard Disk (optional) - alternate	Interchangeable	Interchangeable	5/12 V dc, 3.0/3.0A max.	UL60950-1, IEC60950-1	UL , --
13. Optical Disk Drive (optional)	LG ELECTRONICS INC	GUAx#, GUCx#, GUEx# DUCx#, DUEx#	DC 5V, 1.5A, Class III, CLASS 1 LASER PRODUCT.	UL60950-1	UL (E119002), --
13a. Optical Device Drive (optional) - alternate	Interchangeable	Interchangeable	Class 1 laser, 5/12Vdc, 3.0/3.0A max. Class III.	UL60950-1	UL, --
14. CPU Fan	FOXCONN TECHNOLOGY CO LTD	PVB070E12H-P01	12V, 0.95A, 17.5CFM.	UL507	UL (E231557), --
14-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-04 for details.	--	--, --
14a. CPU Fan - alternate	ASIA VITAL COMPONENTS CO LTD	BAZA0817R2UP003	12V, 0.80A, 20.3CFM.	UL507	UL (E158191), --
14a-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-02 for details.	--	--, --

14b. CPU Fan - alternate	DELTA ELECTRONICS INC	BUC0812VD-02	12V, 1.60A, 20.25CFM.	UL507, IEC60950-1	UL (E132003), TUV RH
14b-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-03 for details.	--	--, --
14c. CPU Fan - alternate	Interchangeable	Interchangeable	Max. 12Vdc, 1.60A max., min. 17.5CFM.	UL507	UL, --
15. Mother Board	Interchangeable	IQ3X0IL	--	--	--, --
15-01. RTC Battery	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	CR2032*	3Vdc, maximum abnormal charging current 10mA, user replaceable against charging current by multiple components PD203 and PR224 rated 1Kohm.	UL1642	UL (MH12210), --
15-01a. RTC Battery - alternate	VIC-DAWN ENTERPRISE CO LTD	CR2032	3Vdc, maximum abnormal charging current 10mA, user replaceable against charging current by multiple components PD203 and PR224 rated 1Kohm.	UL1642	UL (MH20550), --
15-02. Polyswitch (F2, F10)	BOURNS ELECTRONICS (TAIWAN) LTD	MF-USMF110	6Vdc, Ih=1.1A, It=2.2A, CA=1 (max. 110), 2, 3, 4. Tmoa=85 degree, C2.	UL1434, UL60730-1	UL (E174545), --
15-02a. Polyswitch (F2, F10) - alternate	LITTELFUSE INC	MICROSMD110F-2	6Vdc, Ih=1.1A, It=2.2A, CA=1 (max. 125), 2, 3, 4. Tmoa=85 degree, C1.	UL1434, UL60730-1	UL (E74889), --
15-03. USB Polyswitch (U27, U28, U29, U30)	UPI SEMICONDUCTOR CORP	Series uP7549, following by P, Q, R, S, T or U, then following by S8, SA8, M5, MA5, MC5, RA8 or RU8, then following by 25	2.7 to 5.5VDC, Cont.current:2.0A, Prot.current:5.0A, Temp range:-30 degree C to 70 degree C, TNC:1.	UL2367	UL (E316940), --

15-03a. USB Polyswitch (U27, U28, U29, U30) - alternate	POLYTRONICS TECHNOLOGY CORP	AX87, followed by 13, 23, followed by S, B, U8, may be followed by A	2.5 to 5.5VDC, Cont.current:2.0A, Prot.current:3.8A, Temp range:-30 degree C to 70 degree C.	UL2367	UL (E353665) , --
15-04. USB Polyswitch (U59)	TEXAS INSTRUMENTS INC	SN1702001, may be followed by additional suffixes.	Range: 4.5V-5.5V, Cont.current:2.5A, Prot.current:3.1A, Temp Range:-40 to 85 degree C, TNC 1.	UL2367	UL (E169910), --
15-04a. USB Polyswitch (U59) - alternate	ANPEC ELECTRONICSCORP	APL3524QBI-TRG	Range: 4.5V-5.5V, Cont.current:0.15-2.5A, Prot.current:0.275-3.17A, Temp Range:-30 to 70 degree C, TNC 1.	UL2367	UL (E328191), --
15-04b. USB Polyswitch (U59) - alternate	PERICOM SEMICONDUCTOR CORP	PI5USB2546HZHDE	Range: 4.5V-5.5V, Cont.current:0.03-2.5A, Prot.current:0.1-3.18A, Temp Range:-30 to 70 degree C, TNC 1.	UL2367	UL (E340734), --
15-05. USB Polyswitch (U45)	LITTELFUSE INC	AX8714, followed by FL, FH, followed by BTA, BA, SA, or U8A	Range: 2.9V-5.5V, Cont.current:3A, Prot.current:4.2A, Temp Range:-30 to 70 degree C.	UL2367	UL (E353665), --
01. Power Supply Cord (optional)	Interchangeable	Interchangeable	Detachable, Min. 1.5m, Max. 4.5m long, 16 AWG Min. Type SVT or SJT or SPT-2 or NISPT-2 flexible cord, rated Min. 125V, if one end terminated in NEMA 5-15P; rated Min. 250V, if one end terminated in NEMA 6-15P, the other end in an appliance coupler.	UL817, UL62, UL498	UL, --
02. Interconnecting Cable (optional)	Interchangeable	Interchangeable	Max. 3.05m long, rated VW-1 or FT-1 or better.	UL758, UL1675, UL444	UL, --
02a. Interconnecting Cable (optional) - alternate	Interchangeable	Interchangeable	Maximum 3.05m long, type CMP, CMR, CMG, CM.	UL444	--, UL

02b. Interconnecting Cable (optional) - alternate	Interchangeable	Interchangeable	With RJ-45 type connector.	UL1863	--, UL
03. Label	Interchangeable	Interchangeable	Min. 60 degree C, suitable for the surface supplied.	UL969	UL, --
03a. Label - alternate	Interchangeable	Interchangeable	Molded as part of enclosure, Hot stamping, laser etching or silk screened.	--	--, --
04. Wiring, Internal (Secondary SELV circuits)	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1; 80 degree C, Min. 30Vdc.	UL758	UL, --
05. Connectors and Receptacles (Secondary ELV/SELV circuits)	Interchangeable	Interchangeable	Metal/ Coper alloy pins housed in bodies of plastic rated Min. V-2.	UL94	UL, --
05a. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	--	UL1977, UL498	UL, --
05b. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are mounted on V-1 class material.	--	--, --
05c. Connectors and Receptacles (Secondary ELV/SELV circuits) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	--	--, --
06. Internal Plastic Parts Materials	Interchangeable	Interchangeable	Min. V-2, or Min. HF-2.	UL94	UL, --

06a. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Min. HB or HBF, when foamed plastic parts are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	UL94	UL, --
06b. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	The combination, when one or more layers of thin insulating material used on the surface application, comply with V-2 class material within the fire enclosure.	--	--, --
06c. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are mounted on V-1 class material.	--	--, --
06d. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	--	--, --
07. Insulating Tubing/ Sleeving	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1.	UL224	UL, --
08. Printed Wiring Board (PWB)	Interchangeable	Interchangeable	Min. V-1, Min. 105 degree C.	UL796	UL, --
09. Enclosure	--	--	Metal, Min. 0.6mm thick. See enclosure 4- 01 for detail.	--	--, --

09-01. Enclosure (Front Bezel & Rear side)	Interchangeable	Interchangeable	HB or better.	UL94	UL, --
10. Foot Rubber (filled in metal enclosure)	Interchangeable	Interchangeable	V-1 or better, min. 1.0mm thickness, filled in the metal enclosure bottom openings as part of fire enclosure.	UL94, UL746C	UL, --
11. Power supply (for unit with rating 3.25A)	DELTA ELECTRONICS INC	ADP-65FD B	Input: 100-240Vac, 1.5A, 50-60Hz; Output: 20Vdc, 3.25A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E131881), CB by UL (DK-39157-UL)
11a. Power supply (for unit with rating 3.25A) - alternate	LITE-ON TECHNOLOGY CORP	PA-1650-72	AC Input: 100-240Vac, 50-60Hz, 1.8A; DC Output: 20Vdc/ 3.25A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-057469)
11b. Power supply (for unit with rating 3.25A) - alternate	CHICONY POWER TECHNOLOGY CO LTD	A17-065N2A	Input: 1.8A 100-240V~ 50-60Hz; Output: 3.25A, 20V; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E143709), CB by Nemko (NO99354)
11c. Power supply (for unit with rating 3.25A) - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 3.25A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
11d. Power supply (for unit with rating 3.25A or 4.5A) - alternate	DELTA ELECTRONICS INC	ADP-90XD B	Input: AC 100-240V, 1.5A, 50-60Hz; Output: 20Vdc/4.5A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E131881), CB by UL (DK-39163-UL)
11e. Power supply (for unit with rating 3.25A or 4.5A) - alternate	LITE-ON TECHNOLOGY CORP	PA-1900-72	I/P: 100-240Vac, 50-60Hz, 1.5A O/P: 20Vdc, 4.5A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-044681- M2)

11f. Power supply (for unit with rating 3.25A or 4.5A) - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 4.5A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
11g. Power supply - alternate	DELTA ELECTRONICS INC	ADL135NDC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A; 40 degree C, LPS, Altitude of operation Up to 5000m.	UL60950-1, IEC62368-1	UL (E131881), CB by UL (DK-63818-UL)
11h. Power supply - alternate	LITE-ON TECHNOLOGY CORP	ADL135NLC3A	Input: 100-240Vac, 50-60Hz, 2.5A; Output: 20Vdc, 6.75A; 40 degree C, Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL (E132068), CB by TUV RH (JPTUV-062043)
11i. Power supply - alternate	Interchangeable	Interchangeable	Output: 20Vdc, min. 6.75A; 35 degree C min., Altitude of operation Up to 5000m.	UL60950-1, IEC60950-1	UL, CB
12. Hard Disk (optional)	SEAGATE TECHNOLOGY L L C	ST3	12Vdc, 1.5A maximum, 5Vdc, 1.5A maximum.	UL60950-1, IEC60950-1	UL (E106814), --
12a. Hard Disk (optional) - alternate	Interchangeable	Interchangeable	5/12 V dc, 3.0/3.0A max.	UL60950-1, IEC60950-1	UL , --
13. Optical Disk Drive (optional)	LG ELECTRONICS INC	GUAx#, GUCx#, GUEx# DUCx#, DUEx#	DC 5V, 1.5A, Class III, CLASS 1 LASER PRODUCT.	UL60950-1	UL (E119002), --
13a. Optical Device Drive (optional) - alternate	Interchangeable	Interchangeable	Class 1 laser, 5/12Vdc, 3.0/3.0A max. Class III.	UL60950-1	UL, --
14. CPU Fan	FOXCONN TECHNOLOGY CO LTD	PVB070E12H-P01	12V, 0.95A, 17.5CFM.	UL507	UL (E231557), --
14-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-04 for details.	--	--, --

14a. CPU Fan - alternate	ASIA VITAL COMPONENTS CO LTD	BAZA0817R2UP003	12V, 0.80A, 20.3CFM.	UL507	UL (E158191), --
14a-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-02 for details.	--	--, --
14b. CPU Fan - alternate	DELTA ELECTRONICS INC	BUC0812VD-02	12V, 1.60A, 20.25CFM.	UL507, IEC60950-1	UL (E132003), TUV RH
14b-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-03 for details.	--	--, --
14c. CPU Fan - alternate	Interchangeable	Interchangeable	Max. 12Vdc, 1.60A max., min. 17.5CFM.	UL507	UL, --
15. Mother Board	Interchangeable	IQ3X0IL	--	--	--, --
15-01. RTC Battery	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	CR2032*	3Vdc, maximum abnormal charging current 10mA, user replaceable against charging current by multiple components PD203 and PR224 rated 1Kohm.	UL1642	UL (MH12210), --
15-01a. RTC Battery - alternate	VIC-DAWN ENTERPRISE CO LTD	CR2032	3Vdc, maximum abnormal charging current 10mA, user replaceable against charging current by multiple components PD203 and PR224 rated 1Kohm.	UL1642	UL (MH20550), --
15-02. Polyswitch (F2, F10)	BOURNS ELECTRONICS (TAIWAN) LTD	MF-USMF110	6Vdc, Ih=1.1A, It=2.2A, CA=1 (max. 110), 2, 3, 4. Tmoa=85 degree, C2.	UL1434, UL60730-1	UL (E174545), --

15-02a. Polyswitch (F2, F10) - alternate	LITTELFUSE INC	MICROSMD110F-2	6Vdc, Ih=1.1A, It=2.2A, CA=1 (max. 125), 2, 3, 4. Tmoa=85 degree, C1.	UL1434, UL60730-1	UL (E74889), --
15-03. USB Polyswitch (U27, U28, U29, U30)	UPI SEMICONDUCTOR CORP	Series uP7549, following by P, Q, R, S, T or U, then following by S8, SA8, M5, MA5, MC5, RA8 or RU8, then following by 25	2.7 to 5.5VDC, Cont.current:2.0A, Prot.current:5.0A, Temp range:-30 degree C to 70 degree C, TNC:1.	UL2367	UL (E316940), --
15-03a. USB Polyswitch (U27, U28, U29, U30) - alternate	POLYTRONICS TECHNOLOGY CORP	AX87, followed by 13, 23, followed by S, B, U8, may be followed by A	2.5 to 5.5VDC, Cont.current:2.0A, Prot.current:3.8A, Temp range:-30 degree C to 70 degree C.	UL2367	UL (E353665) , --
15-04. USB Polyswitch (U59)	TEXAS INSTRUMENTS INC	SN1702001, may be followed by additional suffixes.	Range: 4.5V-5.5V, Cont.current:2.5A, Prot.current:3.1A, Temp Range:-40 to 85 degree C, TNC 1.	UL2367	UL (E169910), --
15-04a. USB Polyswitch (U59) - alternate	ANPEC ELECTRONICS CORP	APL3524QBI-TRG	Range: 4.5V-5.5V, Cont.current:0.15-2.5A, Prot.current:0.275-3.17A, Temp Range:-30 to 70 degree C, TNC 1.	UL2367	UL (E328191), --
15-04b. USB Polyswitch (U59) - alternate	PERICOM SEMICONDUCTOR CORP	PI5USB2546HZHDE	Range: 4.5V-5.5V, Cont.current:0.03-2.5A, Prot.current:0.1-3.18A, Temp Range:-30 to 70 degree C, TNC 1.	UL2367	UL (E340734), --
15-05. USB Polyswitch (U45)	LITTELFUSE INC	AX8714, followed by FL, FH, followed by BTA, BA, SA, or U8A	Range: 2.9V-5.5V, Cont.current:3A, Prot.current:4.2A, Temp Range:-30 to 70 degree C.	UL2367	UL (E353665), --
Cord set (Optional)	Interchangable	Interchangable	---	NBR 14136, NBR NM 60884-1	INMETRO
Metal enclosure	Interchangable	Interchangable	Overall 89mm × 257mm × 340mm, min. 0.6mm thickness	IEC/EN 60950-1, UL 60950-1	Test with equipment

Plastic Front Panel	KINGFA SCI & TECH CO LTD	GAR-011	HB, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Alternative)	BASF SE	GP-22	HB, min 0.80mm thick.	UL94, UL746C	UL E41871
Plastic Front Panel (Alternative)	KINGFA SCI & TECH CO LTD	FLEXBOND-10(n), KFLEX-2(n) (n:two digits to denote 1-50% Mineral Filler Content)	HB, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Alternative)	KINGFA SCI & TECH CO LTD	JH960 6(M), JH960 6(M) (ccc) (##), JH960-6(M) (ccc) (##) (M: three digits to represent customer reference number; ccc: any combinations of any letters excluding a letter "X" and/or any numerals for their special application may or may not follow; ##:ten digits maximum by a combination of letters and/or numbers as color code.)	HB, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Alternative)	Interchangeable	Interchangeable	HB or better, min. 0.8 mm thickness.	UL 94, UL 764C	UL approved
Plastic Front Panel (Dust Cover) (Optional)	KINGFA SCI & TECH CO LTD	GAR-011	HB, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Dust Cover) (Optional) (Alternative)	BASF SE	GP-22	HB, min 0.80mm thick.	UL94, UL746C	UL E41871

Plastic Front Panel (Dust Cover) (Optional) (Alternative)	KINGFA SCI & TECH CO LTD	FLEXBOND-10(n), KFLEX-2(n) (n:two digits to denote 1-50% Mineral Filler Content)	HB, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Dust Cover) (Optional) (Alternative)	KINGFA SCI & TECH CO LTD	JH960 6(M), JH960 6(M) (ccc) (##), JH960-6(M) (ccc) (##) (M: three digits to represent customer reference number; ccc: any combinations of any lettersexcluding a letter "X" and/or any numerals for their special application may or may not follow; ##:ten digits maximum by a combination of letters and/or numbers as color code.)	V-0, min 0.80mm thick.	UL94, UL746C	UL E171666
Plastic Front Panel (Dust Cover) (Optional) (Alternative)	Interchangeable	Interchangeable	HB or better, min. 0.8 mm thickness.	UL 94, UL 764C	UL approved
PCB	CHUAN YI COMPUTER (SHENZHEN)CO LTD	CM-4	V-0, 130 °C	UL796, UL94, UL764A	UL E162264
PCB (Alternative)	PALWONN ELECTRONICS (SHENZHEN)CO LTD	M3	V-0, 130 °C	UL796, UL94, UL764A	UL E230435
PCB (Alternative)	Interchangeable	Interchangeable	V-1 or better, min.105 °C	UL796, UL94, UL764A	UL approved
PCB for PCI USB Card	CHUAN YI COMPUTER (SHENZHEN)CO LTD	CM-4	V-0, 130 °C	UL796, UL94, UL764A	UL E162264

PCB for PCI USB Card (Alternative)	PALWONN ELECTRONICS (SHENZHEN)CO LTD	M3	V-0, 130 °C	UL796, UL94, UL764A	UL E230435
PCB for PCI USB Card (Alternative)	Interchangeable	Interchangeable	V-1 or better, min.105 °C	UL796, UL94, UL764A	UL approved
Built-in Power Supply	FSP Group Inc.	FSP180-20TGBAB	Input: AC100-240V, 50/60Hz, 3A Output: DC+12V/15A; -12V/0.2A, 180W; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-067200-M1, UL E190414, cUL E190414
Built-in Power Supply (Alternative)	Shenzhen Huntkey Electric Co., Ltd.	HK280-72PP, HK280-72PP xy (x=A-Z or blank, y=0-9 or blank)	Input: AC100-240V, 50/60Hz, 3.0A Output: DC+12V/15A; DC -12V/0.2A; Max.180W; +12V:Max.180W; -12V:Max.2.4W; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: SG-OF-12495, UL E181356, cUL E181356
Built-in Power Supply (Alternative)	Lite-On Technology Corporation	PA-2181-2XX (where X=0-9, A-Z, or – or blank, for marketing purpose only no safety impact)	Input: AC100-240V, 50/60Hz, 4A, class I Output: DC+12V, 15A max., DC-12V, 0.2A max.; Total Power: 180W max.; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: DK-61888-UL, UL E132068, cUL E132068
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCG010	Input: AC100-240V, 50/60Hz, 3.0A; Output: DC+12V, 17.5A, DC-12V, 0.2A, 210W; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-078492, UL E131875, cUL E131875
Built-in Power Supply (Alternative)	FSP Group Inc.	FSP210-20TGBAB	Input: AC100-240V, 50/60Hz, 3A Output: DC+12V/17.5A, -12V/0.2A, 210W; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-067200-M1, UL E151113, cUL E151113

Built-in Power Supply (Alternative)	Shenzhen Huntkey Electric Co., Ltd.	HK310-71PP, HK310-71PP xy ("x" =A to Z or blank, "y" = 0 to 9 or blank, for marketing Purpose only)	Input: AC100-240V, 50/60Hz, 3.0A Output: +12V1/17.5A; -12V/0.2A; Max.210W; +12V:Max.210W; -12V:Max.2.4W; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: SG-OF-12495, UL E181356, cUL E181356
Built-in Power Supply (Alternative)	Lite-On Technology Corporation	PA-2221-3XX (X can be any character or blank)	Input: AC100-240V, 50/60Hz, 3.0A; Output: DC+12V, 17.5A; DC-12V, 0.2A; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-062750, UL E132068, cUL E132068
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCE025	Input: AC 100-240V, 3.0A,50/60 Hz; Output: DC +12V/17.5A, -12.0V/0.2A; Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-062130- M1, UL E131875, cUL E131875
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCH015	I/P: 100-240Vac, 4.0A, 50/60Hz; O/P: +12V1/18.0A, +12V2/18.0A, -12V/0.2 A; total 260W max Altitude: up to 5000m	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, CAN/CSA-C22.2 No. 60950-22	CB Cert. No.: JPTUV-082436- M1, UL E131875, cUL E131875
DC Fan (For CPU)	DELTA ELECTRONICS INC	BUC1012VJ-00DHA	DC 12V, 1.0A, 20.98CFM	UL 507, CSA-C22.2 No. 113	UL E132003, cUL E132003
DC Fan (For CPU) (Alternative)	ASIA VITAL COMPONENTS CO LTD	BAZC0925R2UP006	DC 12V, 0.9A, 24.39CFM	UL 507, CSA-C22.2 No. 113	UL E158191, cUL E158191
DC Fan (For CPU) (Alternative)	Interchangeable	Interchangeable	DC 12V, 1.0A max., 20.98CFM min.	UL 507, CSA-C22.2 No. 113	UL and CSA approved
Optical Device Drive (Optional)	Hitachi-LG Data Storage inc.	CH20N	Class 1 laser, DC 5/12 V, 1.5/1.5 A.	IEC/EN 60825-1	ntertek S Certificate: 911330

Optical Device Drive (Optional) (Alternative)	Interchangeable	Interchangeable	Class 1(I), 5V/12Vdc, 3.0A/3.0A max.	IEC/EN 60825-1	TUV, VDE, Nemko approved
Hard Disk Drive (Optional)	SEAGATE TECHNOLOGY L L C	ST2000DM001	5 V/12 Vdc, 1.5A max	UL 60950-1, CAN/CSA C22.2 No. 60950-1	UL E106814, cUL E106814
Hard Disk Drive (Optional) (Alternative)	Interchangeable	Interchangeable	5 V/12 Vdc, 3.0A/3.0 A max.	UL 60950-1, CAN/CSA C22.2 No. 60950-1, IEC/EN 60950-1	UL and CSA approved , TUV, VDE, Nemko approved
Solid State Drive (Optional)	Samsung Eletronics Co., Ltd.	MZ-W********** (* is 0-9, A-Z or blank or slash or dash. 1st * means Line-up 2nd* means SSD controller 3rd, 4th, 5th * means SSD capacity 6th * means customized design 7th~10th * means customer list reference)	DC 12V, 1.85A or 2.5A	IEC/EN 60950-1, UL 60950-1, CAN/CSA C22.2 No. 60950-1	UL CB Cert. No.: DK-57680-UL, UL E149091, cUL E149091
Solid State Drive (Optional) (Alternative)	Interchangeable	Interchangeable	DC 12V, 2.5A max.	UL 60950-1, CAN/CSA C22.2 No. 60950-1	UL and CSA approved
Lithium Battery for RTC	VIC-DAWN ENTERPRISE CO LTD	CR2032	3 Vdc, maximum abnormal charging current 10 mA (Lithium Type)	UL 1642	UL MH20550
Lithium Battery for RTC (Alternative)	PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA	CR2032	3 Vdc, maximum abnormal charging current 10 mA (Lithium Type)	UL 1642	UL MH12210
Lithium Battery for RTC (Alternative)	MAXELL, LTD	CR2032	3 Vdc, maximum abnormal charging current 10 mA (Lithium Type)	UL 1642	UL MH12568
Poly Switch (F1, F2, F3)	BOURNS ELECTRONICS (TAIWAN) LTD	MF-USMF110	PTC, rated 6Vdc, holding current: 1.1 A, trip current: 2.2 A	UL 1434, CSA-C22.2 No. 72	UL E174545, cUL E174545

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

Poly Switch (F1, F2, F3) (Alternative)	TYCO ELECTRONICS CORP	microSMD110, microSMD110(11)F	PTC, rated 6V dc, holding current: 1.1 A, trip current: 2.2A	UL 1434, CSA-C22.2 No. 72	UL E74889, cUL E74889
Poly Switch (F1, F2, F3) (Alternative)	POLYTRONICS TECHNOLOGY CORP	SMD1210P110TFT	PTC, rated 8Vdc, holding current: 1.1 A, trip current: 2.2 A	UL 1434, CSA-C22.2 No. 72	UL E201431, cUL E201431
Poly Switch (F1, F2, F3) (Alternative)	LITTELFUSE INC	1210L110THYR, 1210L110TH	PTC, rated 8Vdc, holding current: 1.1 A, trip current: 2.2A	UL 1434, CSA-C22.2 No. 72	UL E183209, cUL E183209
IC Switch (U10, U23, U30, U33, U57, U59 U71, U74)	UPI SEMICONDUCTOR CORP	UP7549TMA5-25	2.7 to 5.5Vdc, Cont. current: 2.0A; Prot. current: 5.0A	UL 2367	UL E316940
IC Switch (U10, U23, U30, U33, U57, U59 U71, U74) (Alternative)	NIKO SEMICONDUCTOR CO LTD	GS7612S5MN, GS7632S5MN, GS7632S5MNR	2.0-5.5Vdc, Cont. current: 2.0A; Prot. current: 5.0A	UL 2367	UL E360303
IC Switch (U10, U23, U30, U33, U57, U59 U71, U74) (Alternative)	TEXAS INSTRUMENTS INC	TPS2001DDBVR, TPS2001	4.5-5.5Vdc, Cont. current: 2.0A; Prot. current: 3.6A	UL 2367	UL E169910
Heat Sink (above CPU)	--	--	Consist of Aluminum part	--	--
Graphics Card (Optional)	Shenzhen Bitland Information Technology Co., Ltd.	BD3G10 (P/N: GT 730)	DC 12V, 5.5A max; and DC 3.3V, 3A max; Class III	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1	TUVR CB Cert. No.:JPTUV- 076247, UL E356357, cUL E356357
Graphics Card (Optional) (Alternative)	Interchangeable	Interchangeable	DC 3.3V, DC12V (optional); Class III	UL 60950-1, CAN/CSA-C22.2 No. 60950-1	UL and CSA approved
Power Distribution Switch F5 for VGA&COM1 port (CN4)	Bourns Inc.	MF-NSMF110	Input: 6 Vdc, hold current: 1.10 A	-	TUV, UL
Power Distribution Switch F6 for DP port (J20)	Bourns Inc.	MF-NSMF110	Input: 6 Vdc, hold current: 1.10 A	-	TUV, UL

Power Distribution Switch F8 for HDMI port (J18)	Bourns Inc.	MF-NSMF110	Input: 6 Vdc, hold current: 1.10 A	-	TUV, UL
Power Distribution witch U52 for USB 3.0 port (P152)	Texas Instruments Inc.	TPS2061C	Input Voltage: 4.5 to 5.5 Vdc Output Continuous Rating: 1.0A Output Current Limit: 1,9 A	-	TUV, UL
Motherboard	Interchangeable	Interchangeable	-	-	-
Graphics card	Shenzhen Bitland Information Technology Co Ltd	BD3I69	DC 3.3 A, 12 V, Class III	-	TUV, UL
Dust Cover, Stand (Optional) (Alternative)	DONGGUAN HINGLONG PLASTIC TECHNOLOGY CO LTD	HL-ABS-PCR35/65/85, HL-HIPS-PCR35/65/85, HL-ABS-PCR65	HB, 60°C, min. 1.6mm thickness.	UL 746C, UL 94, CSA-C22.2 No. 0.17	UL E345434, cUL E345434
Poly Switch (SF1, SF2) (Alternative)	POLYTRONICS TECHNOLOGY CORP	SMD1206P200TFT	Rated: 6.0V dc, holding current: 2.0A, trip current: 3.5A	IEC/EN 60738-1, UL 1434, CSA-C22.2 No.72	TUV R 50099121, UL E201431, cUL E201431
Plastic Front Panel	SABIC INNOVATIVE PLASTICS US LLC	925A	HB or better, min. 1.0 mm thickness.	UL 94, UL 764C	UL E121562
Plastic Front Panel (Alternative)	KINGFA SCI & TECH CO LTD	HP-126	HB or better, min. 1.0 mm thickness.	UL 94, UL 764C	UL E171666
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCJ010	Input: AC100-240V, 50/60Hz, 3.0A Output: DC+12V/15A; DC -12V/0.2A; Max.180W; +12V:Max.180W; -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-101485, UL E131875, cUL E131875
Built-in Power Supply (Alternative)	FSP GROUP INC.	FSP180-20TLA	Input: AC100-240V, 50/60Hz, 3A, class I Output: DC+12V, 15A max.,	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: DK-88801-UL , UL E190414, cUL E190414

			DC-12V, 0.2A max.; Total Power: 180W max.; Altitude: up to 5000m		
Built-in Power Supply (Alternative)	SHENZHEN HUNTKEY ELECTRIC CO LTD	HK360-71PP xy (x=A-Z or blank, y=0-9 or blank, for different market)	Input: AC100-240V, 50/60Hz, 5A, class I Output: DC+12V, 21.5A , DC-12V, 0.2A ; Total Power: 260W max.;-12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: DK-89030-UL , UL E181356, cUL E181356
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCK012	Input: AC100-240V, 50/60Hz, 4A, class Output: DC+12V, 21.5A, DC-12V, 0.2A ; Total Power: 260W;+12V:Max .260W; -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-101667, UL E131875, UL E131875
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCK014	Input: AC100-240V, 50/60Hz, 5A, class I Output: DC+12V1, 30A , DC+12V2, 18A , DC-12V, 0.2A ; Total Power: 380W max.;+12V:Max. 380W. -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.:JPTUV-101675, UL E131875, cUL E131875
Built-in Power Supply (Alternative)	Acbel Polytech Inc.	PCJ007	Input: AC100-240V, 50/60Hz, 4A, class I Output: DC+12V1, 18A, DC+12V2, 18A , DC+12V2, 18A , DC-12V, 0.2A ; Total Power: 310W max.; -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-092384, UL E131875, UL E131875

DC Fan (For System Rear) (Optional)	SHENZHEN DONGWEIFENG ELECTRONIC TECHNOLOGY CO LTD	EFH-08E12W-GP01	DC 12V, 0.7A, 64.9CFM	UL 507, CSA-C22.2 No. 113	UL E305197, UL E305197
Alt.	FSP Group Inc.	FSP260-20TLA	Input: AC 100-240V, 3.0A, 50/60Hz Output: DC +12V, 21.5A; -12V,0.2A.	IEC/EN 60950-1	CB Cert. No. DK-88801-UL
Alt.	Shenzhen Huntkey Electric Co., Ltd.	HK280-73PP xy ("x" =A to Z or blank, "y" = 0 to 9 or blank, for marketing purpose only)	Input: AC 100-240V, 3.0A, 50/60Hz Output: DC +12V, 15A; -12V,0.2A.	IEC/EN 60950-1	CB Cert. No. DK-89075-UL
Optical Device Drive (Optional)	Philips & Lite-On Digital Solutions Corp	DA8AESH	Class 1 laser, 5/12 V dc, 3.0A/1.5 A.	IEC/EN 60825-1& IEC 60950-1 UL 60950-1	TUV CB Cert. No. JPTUV-052989
Adapter (Optional)	Delta Electronics Inc	ADP-65ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV- 101691 UL E131881 cUL E131881
Adapter (Optional) (Alternative)	Lite-On Technology Corporation	PA-1650-74XX (X can be any character or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV- 101957 UL E132068 UL E132068
Adapter (Optional) (Alternative)	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1, CSA-C22.2 No. 60950, or IEC/EN 62368-1 UL 62368-1, CAN/CSA-C22.2 No. 62368-1	UL, CSA, TUV certified
Adapter (Optional) (Alternative)	DELTA ELECTRONICS INC	ADP-90ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV-101791 UL E131881 UL E131881
Adapter (Optional) (Alternative)	Lite-On Technology Corporation	PA-1900-74XX (X can be A-Z,0-9, or hyphen or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV-102060 UL E132068 UL E132068

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Adapter (Optional) (Alternative)	CHICONY POWER TECHNOLOGY CO LTD	A19-090P3A	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV-101835 UL E143709 UL E143709
Adapter (Optional) (Alternative)	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1, CSA-C22.2 No. 60950, or IEC/EN 62368-1 UL 62368-1, CAN/CSA-C22.2 No. 62368-1	UL, CSA, TUV certified
Adapter (Optional) (Alternative)	DELTA ELECTRONICS INC	ADL170SDC3A	Input: 100-240V~, 50-60Hz, 2.5A Output: 20Vdc, 8.5A Altitude: 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV-095706, JPTUV-095864, UL(E131881) UL(E131881)
Adapter (Optional) (Alternative)	DELTA ELECTRONICS INC	ADP-170CB B	Input: 100-240V~, 50-60Hz, 2.5A Output: 20Vdc, 8.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	UL CB Cert. No.: DK-87663-UL UL(E131881) UL(E131881)
Adapter (Optional) (Alternative)	LITE-ON TECHNOLOGY CORP	ADL170SLC3A	Input: 100-240V~, 50-60Hz, 2.5A Output: 20Vdc, 8.5A Altitude: 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1 CAN/CSA-C22.2 No. 60950-1	UL CB Cert. No.: DK 81072-A1-UL, DK-81011-UL UL(E132068) UL(E132068)
Adapter (Optional) (Alternative)	Chicony Power Technology Co., Ltd.	ADL170SCC3A	Input: 100-240V~, 50-60Hz, 2.5A Output: 20Vdc, 8.5A Altitude: 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: JPTUV-095168, JPTUV-095261 UL(E143709) UL(E143709)
Adapter (Optional) (Alternative)	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 2.5A Output: 20Vdc, 8.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1, CSA-C22.2 No. 60950, or IEC/EN 62368-1 UL 62368-1, CAN/CSA-C22.2 No. 62368-1	UL, CSA, TUV certified
Adapter (Optional) (Alternative)	Lite-On Technology Corporatio	ADL230NLC3* (* can be any character or blank)	Input: 100-240V~, 50-60 Hz, 3.5A; Output: 20Vdc, 11.5A Altitude: 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: (JPTUV- 079376-M1), UL CB Cert. No.: (DK-65243- UL) UL(E132068) cUL(E132068)

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Adapter (Optional) (Alternative)	CHICONY POWER TECHNOLOGY CO LTD	A18-230P1A	A18-230P1A Input: 100-240V~, 50-60 Hz, 3.5A; Output: 20Vdc, 11.5A Altitude: 5000m	IEC/EN 60950-1 UL 60950-1 CAN/CSA-C22.2 No. 60950-1	TUV CB Cert. No.: (JPTUV- 090385) UL(E132068) cUL(E132068)
Plastic Front Panel (Alternative)	COVESTRO DEUTSCHLAND AG [PC RESINS]	2407 + (z)(f1) ; 2407 DC (k) ; RW2407 + (z) (f1)	HB, 60°C, min. 1.0mm thickness.	UL 746C, UL 94	UL E41613
PCB (Alternative)	VICTORY GIANT TECHNOLOGY (HUIZHOU) CO LTD	SH	V-0, 130°C	UL 796	UL E248779
PCB (Alternative)	HANNSTAR BOARD CORP	MV-4, MV-6	V-0, 130°C	UL 796	UL E89382
PCB (Alternative)	Interchangeable	Interchangeable	V-1 or better, min. 130°C	UL 796	UL certified
DC Fan (For CPU) (Alternative)	ASIA VITAL COMPONENTS CO LTD	BAZB0817R2UP 006	12Vdc, 1.1A, 19.17CFM.	IEC/EN 60950-1, UL 507, CSA-C22.2 No. 113	TUV B 15 02 25730 895, UL E158191, cUL E158191
DC Fan (For CPU) (Alternative)	DELTA ELECTRONICS INC	BUB0812HD-01FSG	12Vdc, max. 1.5A, 20.3CFM	UL 507, IEC/EN 60950-1	UL E132003 TUV R 50387001
Optical Device Drive (Optional)	Hitachi-LG Data Storage inc.,	GUAx**, GUC**, GUE**, DUC**, DUE** (the first symbol * can be any number 0-9, the second symbol * can be any alphanumeric character, denoting non safety related differences)	Class 1 laser, 5Vdc, 1.5A	IEC/EN 60950-1, IEC/EN 60825-1, UL 60950-1, CSA-C22.2 No. 60950, Code of Federal Regulations (CFR), Title 21, Part 1040	Intertek CB Cert. No.:SE- 85321M1, UL E119002, cUL E119002, FDA Registration No.: 1830330-001
1. Label	Interchangeable	Interchangeable	Min. 55 degree C, suitable for the surface applied.	UL969	UL , --

2. Metal Chassis	--	--	Ferrite alloy,Consists of 4 pieces, secured together by physical fit, wedged, and screws. Min. 1.0mm, see Enclosure 4-01 for openings dimension.	--	-- , --
3. Foot Rubber (filled in metal enclosure)	Interchangeable	Interchangeable	V-1 or better, min. 1.0mm thickness, filled in the metal enclosure bottom openings as part of fire enclosure.	UL94, UL746C	UL , --
4. Plastic Front Panel	Interchangeable	Interchangeable	HB or better	UL94, UL746C	UL , --
5. PWB	CHUAN YI COMPUTER (SHENZHEN) CO LTD	CM-1	V-0, 130 degree C.	UL796	UL , --
5a. PWB	Interchangeable	Interchangeable	V-1 or better, min. 105 degree C.	UL796	UL , --
6. Built-in Power Supply	ACBEL POLYTECH INC	PCH018	I/P: 100-240V~, 50/60Hz , 3.6A O/P: +12V1/15A TOTAL POWER 180W MAX. Tma 50 degree C. Altitude 5000m	UL 60950-1,IEC 60950-1, IEC 62368-1:2014, UL62368-1	UL , CB by TUV RH, (Cert. No. JPTUV-078492-A1/M3.) for IEC 60950-1; CB by TUV RH, (Cert. No. JPTUV-078411-M2.) for IEC 60950-1
6a. Built-in Power Supply - alternate	Lite-On Technology Corporation	PA-1181-7YXXX (Y=A-Z or "-" or blank ; X=0-9, A-Z or "-" or blank)	I/P: 100-240V~, 50-60Hz, 3.6AO/P: +12Vdc, 15A MAX, 180W MAX, Class I, Altitude of operation up to 5000 m, Tma 50 degree C.	UL60950-1, UL62368-1, IEC62368-1:2014	UL , CB by TUV (JPTUV-074489- M3 for IEC 62368- 1)
6b. Built-in Power Supply - alternate	ACBEL POLYTECH INC	PCK027	I/P: 100-240 V~, 50/60Hz, 4.0A; O/P: +12V/21.7A, TOTAL POWER 260W MAX.; Class I, Altitude of operation up to	IEC60950-1, UL62368-1, IEC62368-1:2014	UL , CB by TUV (JPTUV-102727 for IEC 62368-1, JPTUV-102592 for IEC 60950-1)

			5000 m, Tma 50 degree C.		
6c. Built-in Power Supply - alternate	Lite-On Technology Corporation	PA-1261-7YXXX(Y=A-Z or "-" or blank ; X=0-9, A-Z or "-" or blank)	Input: 100-240Vac, 4A, 50/60Hz; Output: +12V/ 21.7A Max. total power 260W; Class I, Altitude of operation up to 5000 m, Tma 50 degree C.	IEC60950-1, UL62368-1,IEC 62368-1:2014	UL , CB by TUV (JPTUV-103321-A1 for IEC 62368-1, CB by TUV (JPTUV-10335- A1/M2 for IEC 60950-1)
07. Power Supply Cord (optional)	Interchangeable	Interchangeable	Type SVT, SJT or SPT-2, minimum 18 AWG, min 250V, 6A. One end with NEMA 5- 15P, other end in appliance coupler.	UL62+ UL498, UL817	UL , --
08. CPU fan	DELTA ELECTRONICS INC	BUC1012VJ-00XXXXXX (X can be A-Z, 0-9, - or blank) (For marketing purpose only)	12Vdc, 1.0A max, 20.98(min 18.88)CFM.	EN 62368-1:2014	-- , TUV RH(R 50387001)
07. Power Supply Cord (optional)	Interchangeable	Interchangeable	Type SVT, SJT or SPT-2, minimum 18 AWG, min 250V, 6A. One end with NEMA 5- 15P, other end in appliance coupler.	UL62+ UL498, UL817	UL , --
08. CPU fan	DELTA ELECTRONICS INC	BUC1012VJ-00XXXXXX (X can be A-Z, 0-9, - or blank) (For marketing purpose only)	12Vdc, 1.0A max, 20.98(min 18.88)CFM.	EN 62368-1:2014	-- , TUV RH(R 50387001)
08a. CPU fan	Foxconn Technology Co., Ltd.	PVB120G12Q-P01	12Vdc, 1.2A max, 22.8(min 20.52)CFM.	UL507, EN 62368-1: 2014+A11	UL , --
08a. CPU fan	Interchangeable	Interchangeable	12Vdc, 1.0A max, 20.98(min 18.88)CFM. MS1 or a) degree.	UL507, EN 62368-1: 2014+A11 or latest version	UL , --
08-01. Heat sink for CPU fan	--	--	Consist of Aluminum part, overall see enclosure 4-02 for details.	--	-- , --

09. Optical Device Drive (optional)	Hitachi-LG Data Storage, Inc.	GUA**, GUC**, GUE**, DUE**, DUC** (Where first "*" can be any number 0-9 and second "*" can be anyalphanumeric character, denoting non safety related differences)	DC 5V, 1.5A, CLASS 1 LASER PRODUCT.	UL60950-1, IEC 62368-1:2018	UL , CB by Intertek (SG ITS-20219)
09a. Optical Device Drive (optional) - alternate	Interchangeable	Interchangeable	CLASS 1 LASER, 5Vdc, 1.5A max.	UL 60950-1, UL 62368-1,IEC 62368-1	UL , TUV, VDE, Nemko
10. Solid State Drive/ Hard Disk (optional)	SAMSUNG ELECTRONICS CO LTD	MZ-W **********	DC +12 V ; 1.85 A or 2.5 A	UL60950-1, IEC/EN 60950-1, IEC 62368-1:2018	UL , CB by TUV RH (JPTUV- 109126-M2)
10a. Solid State Drive/ Hard Disk (optional) - alternate	Interchangeable	Interchangeable	Generic, 3.3Vdc, 3.5A max. or 5Vdc, 2.0A max. or 12Vdc, 2.5A max.	UL 60950-1, UL 62368-1,IEC 62368-1	UL , TUV, VDE, Nemko
11. Mother Board	--	--	--	Test with equipment	-- , --
11-01. RTC battery	PANASONIC CORPORATION OF NORTH AMERICA	CR2032	3Vdc, Max Abnormal Charging Current 10mA.	UL1642	UL , --
11-01a. RTC battery- Alternate	DOUBLE BEST CO LTD	CR2032	3Vdc, Max Abnormal Charging Current 10mA.	UL1642	UL , --
11-01b. RTC battery - Alternate	Interchangeable	CR2032	3Vdc, Max Abnormal Charging Current 10mA.	UL1642	UL , --
11-02. Polyswitch (VF400,F7, F2, VF500) (For VGA, HDMI, DP)	POLYTRONICS TECHNOLOGY CORP	SPR-P110	PTC, Rated 6V, Ih=1.1A, It=1.8A, CA= 1(86.8), 2, 3, 4.Tmoa=85 degree C	UL1434, EN60730-1:2016, IEC 60730-1:2013+A1	UL , TUV RH R 50099121
11-02a. Polyswitch (VF400,F7, F2, VF500) (For VGA, HDMI, DP)- Alternate	LITTELFUSE INC	0805L110ULYR	PTC, Rated 6V, Ih=1.0A, It=1.8A, CA= 1(86.8), 2, 3, 4,Tmoa=85 degreeC S4, S5,	UL1434, EN60730-1:2016, IEC 60730-1:2013+A1	UL , TUV RH

			S6, S7 or ST, followed by A,B,C,D,E,G,H,J,K, M,N or P, followed by H or J		
11-02b. Polyswitch (VF400,F7, F2, VF500) (For VGA, HDMI, DP)- Alternate	CYG WAYON CIRCUIT PROTECTION	LP-ISML110	PTC, Rated 8V, Ih=1.1A, It=2.2A, CA= 1(103), 2, 3, 4 .Tmoa=85 degreeC	UL1434, EN60730-1:2016, IEC 60730-1:2013+A1	UL , TUV RH
11-03. Overcurrent Protector (U50, U54, U105) for (USB 3.2, USB_LAN)	ANPEC ELECTRONICS CORP	APL3553 followed by A, B, E, F, I or J, followed by B, C or X, followed by I, followed by -, followed by TR, followed by G	2.7-5.5Vdc; Maximum Continuous Current: 2.0 A; Protective Current: 2.9 A	UL 2367, IEC 60950-1,IEC 62368-1:2014	UL , CB by UL (DK-59231-A2-UL) for IEC 60950-1; DK-87208-M2-UL for IEC 62368-1
11-05. Overcurrent Protector (U18) for USB type C (Alternate)	REALTEK SEMICONDUCTOR CORP	RTS5444, RTS5444y (y = E to Z)	Input Voltage: 4.75 to 5.5 Vdc Output Continuous Rating: VBUS_SW_OUT = 0.9 to 3.0A CC1/CC2 = 300mA Current Limit Rating: VBUS_SW_OUT = 0.968 – 3.194A CC1/CC2 = 570mA Ambient: -40 to 85°C	UL 2367, IEC 62368-1:2014	-- , CB by UL (DK-81786-M1-UL)
12. Insulating tubing/ Sleeving	Interchangeable	Interchangeable	Marked VW-1; 105 degree C, 300V.	UL224	UL , --
13. Wiring, internal ES1 circuits	Interchangeable	Interchangeable	Marked VW-1; min 30V, 60 or 80 degree C.	UL758	UL , --
14. Interconnecting Cable (optional)	Interchangeable	Interchangeable	60 degree C min., 60V min., 3.05m long max., VW-1.	UL758	UL , --
14a. Interconnecting Cable (optional) - alternate	Interchangeable	Interchangeable	Type CMP, CMR, CMG, CM	UL444	-- , UL
15. Internal Plastic Part Materials	Interchangeable	Interchangeable	V-2 min or HF-2 min.	UL94, UL746C	UL , --

16a. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are mounted on V-1 class material.	--	-- , --
16b. Internal Plastic Parts Materials (optional) - alternate	Interchangeable	Interchangeable	Flammability level is ignored, when small parts (Max. 4g or Max. 1750mm^3) are separated from electrical parts (other than insulated wires and cables) by at least 13mm of air or by a solid barrier of V-1 class material.	--	-- , --
16. Connectors and Receptacles (ES1 circuits)	Interchangeable	Metal/Plastic	Copper alloy pins housed in bodies of plastic rated V-2 min.	UL94, UL746C	UL , --
16a. Connectors and Receptacles (ES1 circuits) - alternate	Interchangeable	Interchangeable	--	L1977	UL , --
17. Graphics card (optional)	SHENZHEN BITLAND INFORMATION TECHNOLOGY CO LTD	BD3I69	DC 12V, 5.5A max; and 3.3V, 3A max.	UL60950-1, IEC60950-1, UL62368-1, IEC62368-1	UL , CB by UL (DK-81079-UL for IEC 60950-1,DK-81083-UL for IEC 62368-1)
17. Graphics card (optional) - alternate	Interchangeable	Interchangeable	DC 12V, 5.5A max; and 3.3V, 3A max.	UL60950-1, IEC60950-1, UL62368-1, IEC62368-1	UL , CB by NCB
18. pluggable connector	Interchangeable	Interchangeable	V-1 or better	UL94, UL746C	UL , --
19. Speaker	--	--	8ohm, 1W	--	-- , --
Plastic Front Panel	KINGFA SCI & TECH CO LTD	GAR-011	HB, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E171666 & tested in appliance

Alt.	ZHE JIANG CHI MEI CHEMICAL CO LTD	PC-550K(+)	V-0, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E194560 & tested in appliance
Alt.	BAYER MATERIAL SCIENCE AG	2407 + (z)(f1)	V-2, 115°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E41613 & tested in appliance
Alt.	DONGGUAN HINGLONG PLASTIC TECHNOLOGY CO LTD	HL-ABS-PCR35/65/85	HB, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E345434& tested in appliance
Alt.	Interchangeable	Interchangeable	HB or better, min. 1.6 mm thickness.	UL94:2018 IEC 60695-11-10:2013	S, ETL, UL &other EU certification marks
PCB for motherboard	VICTORY GIANT TECHNOLOGY (HUIZHOU) CO LTD	SH, SH10	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E248779& tested in appliance
Alt.	HANNSTAR BOARD CORP	MV-4, MV-6	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E89382& tested in appliance
Alt.	CHUAN YI COMPUTER (SHENZHEN) CO LTD	CM-4	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E162264& tested in appliance
Alt.	Interchangeable	Interchangeable	V-1 or better, min. 105 °C	UL796 :2016 IEC 60695-11-10:2013	S, ETL, UL &other EU certification marks
Adaptor 1 (Optional)	DELTA ELECTRONICS INC	ADP-65ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-101777
Alt.	Lite-On Technology Corporation	PA-1650-74XX (X can be any character or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-102152
Alt.	CHICONY POWER TECHNOLOGY CO LTD	A19-065N2A	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: DK-64002-A2-UL

Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB & other EU certification marks
Adaptor 2 (Optional)	DELTA ELECTRONICS INC	ADP-90ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-101914
Alt.	Lite-On Technology Corporation	PA-1900-74XX (X can be A-Z,0-9, or hyphen or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-102137
Alt.	CHICONY POWER TECHNOLOGY CO LTD	A19-090P3A	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-101636
Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB & other EU certification marks
Adaptor 3 (Optional)	DELTA ELECTRONICS INC	ADL135NDC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. DK-63818-UL
Alt.	Chicony Power Technology Co., Ltd.	ADL135SCC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. NO101867
Alt.	DELTA ELECTRONICS INC	ADL135SDC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-086470
Alt.	Lite-On Technology Corporation	ADL135SLC3A	Input: 100-240Vac, 50-60Hz, 2.5A; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-108256
Alt.	Lite-On Technology Corporation	ADL135NLC3A, PA- 1131-72FS	Input: 100-240Vac, 50-60Hz, 2.5A; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-062043
Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB & other EU certification marks

DC Fan	FOXCONN TECHNOLOGY CO LTD	PVB070E12HP01-08	12Vdc, max 0.95A, 20.25CFM.	UL 507& IEC/EN 60950-1	UL E231557& tested in appliance
Alt.	ASIA VITAL COMPONENTS CO LTD	BAZA0817R2UP003	12Vdc, max. 1.1A, 19.17CFM.	UL 507& IEC/EN 60950-1	UL E158191& tested in appliance
Alt.	DELTA ELECTRONICS INC	BUB0812HD-01FSG	12Vdc, max. 1.5A, 20.3CFM	UL 507& IEC/EN 60950-1	UL E132003& tested in appliance
Alt.	Interchangeable	Interchangeable	12Vdc, Max.1.5A Min. 19.17CFM	IEC/EN 60950-1:2005	CB, S & other EU certification marks
Optical Device Drive (Optional)	LG ELECTRONICS INC	GUAx#, GUCx#, GUEx# DUCx#, DUEx#	Class 1 laser, 5V, 1.5A	IEC/EN 60825-1& IEC/EN/UL 60950-1	UL E119002& tested in appliance
Alt.	Interchangeable	Interchangeable	Class 1 laser, 5/12 V dc, 3.0/3.0 A max.	IEC/EN 60825-1:2014& IEC/EN 60950-1:2005	CB, S & other EU certification marks
Hard Disk (Optional)	SEAGATE TECHNOLOGY L L C	ST3	5 V/12 V dc, 1.5 A/1.5 A max.	UL 60950-1& IEC/EN 60950-1	UL E106814 & tested in appliance
Alt.	Interchangeable	Interchangeable	5 V/12 V dc, 3.0 A/3.0 A max.	IEC/EN 60950-1:2005 IEC/EN 62368-1:2014	CB, S & other EU certification marks
Lithium Battery for RTC	Panasonic Corporation, Panasonic Corporation Of North America	CR2032	3 V dc, Maximum abnormal charging current 10 mA	UL1642& IEC/EN 60950-1	UL MH12210 & tested in appliance
Alt.	Double Best Co LTD	CR2032	3 V dc, Maximum abnormal charging current 10 mA	UL1642& IEC/EN 60950-1	UL MH46388 & tested in appliance
Alt.	Interchangeable	Interchangeable	3 V dc, Max abnormal charging current 10 mA	IEC/EN 60950-1:2005	CB, S & other EU certification marks

USB Power Switch (UUS2,UUS3, UUS4,UUS5)	Silergy Technology (Taiwan) Inc	SY6288E1AAC	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E491480 & tested in appliance
Alt.	UPI SEMICONDUCTOR CORP	UP7566PMA5-25	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E316940 & tested in appliance
Alt.	ANPEC ELECTRONICS CORP	APL3553IBI-TRG	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E328191 & tested in appliance
USB Power Switch (UUS6)	PERICOM SEMICONDUCTOR CORP	PI5USB2546HZHEX	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E340734 & tested in appliance
Alt.	ANPEC ELECTRONICS CORP	APL3524QBI-TRG	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E328191 & tested in appliance
Alt.	TEXAS INSTRUMENTS INC	SN1702001RTER	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E169910 & tested in appliance
USB Power Switch (UTC1)	TEXAS INSTRUMENTS INC	TPS25820DSSR	Rated: 5V dc, holding current: 1.5A, trip current: 1.6A-1.84A	IEC/EN 60950-1	UL E169910 & tested in appliance
Alt.	REALTEK SEMICONDUCTOR CORP	RTS5444E-GR	Rated: 5V dc, holding current: 1.5A, trip current: 1.6A-1.85A	UL 2367& IEC/EN 60950-1	UL E506340 & tested in appliance
Metal enclosure	Interchangeable	Interchangeable	Hot dip steel plate, Min. 0.6mm	IEC/EN 60950-1:2005	None
Metal enclosure	Interchangeable	Interchangeable	Overall 256.8mm x 336mm x 89mm, Min 0.6 mm thickness	IEC/EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1	Test with equipment

Plastic Front Panel	NINGBO LG YONGXING CHEMICAL CO LTD	HI-121 H	HB or better, min. 1.0 mm thickness.	UL 94, UL 764C	UL E203955
(Alternative)	JIANGSU TOP POLYMER ENTERPRISE LTD	5000s(+)	V-0, min. 1.5 mm thickness.	UL 94, UL 764C	UL E362750
(Alternative)	HONGFUJIN PRECISION INDUSTRY (SZ) CO LTD	C2400E	V-0, min. 1.6 mm thickness.	UL 94, UL 764C	UL 323548
(Alternative)	KINGFA SCI & TECH CO LTD	GAR-011	HB or better, min. 1.0 mm thickness.	UL 94, UL 764C	UL E171666
(Alternative)	BAYER MATERIAL SCIENCE LTD	2405+	HB or better, min. 2.7 mm thickness.	UL 94, UL 764C	UL E178485
(Alternative)	GE PLASTICS GLOBAL PRODUCTS FOR WORLDWIDE PROCUREMENT	C6200	HB or better, min. 0.7 mm thickness.	UL 94, UL 764C	UL E161759
(Alternative)	HUIZHOU WOTE ADVANCED MATERIAL CO LTD	2100	HB or better, min. 1.5 mm thickness.	UL 94, UL 764C	UL E310240
(Alternative)	Interchangeable	Interchangeable	HB or better, min. 1.0 mm thickness.	UL94, UL746C	UL approved
PCB	CHUAN YI COMPUTER (SHENZHEN) CO LTD	CM-4	V-0, 130 °C	UL 796, UL94	UL E162264
(Alternative)	PALWONN ELECTRONICS (SHENZHEN) CO LTD	M3	V-0, 130 °C	UL 796, UL94	UL E230435
(Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 796, UL94	UL approved

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

Built-in Power Supply	Lite-On Technology Corporation	PA-2181-3VA-ROHS	Input: AC100-240V, 50/60Hz, 3.0A; Output: DC+12V, 15A max., DC-12V, 0.2A max., 180W max. Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1	CB Cert. No.: JPTUV-102271, CB Cert. No.: JPTUV-102347, UL E132068, cUL E132068
(Alternative)	Acbel Polytech Inc.	PCJ010	Input: AC100-240V, 50/60Hz, 3.0A Output: DC+12V/15A; DC -12V/0.2A; Max.180W; +12V:Max.180W; -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-101485, CB Cert. No.: JPTUV-101683 UL E131875, UL E131875
(Alternative)	SHENZHEN HUNTKEY ELECTRIC CO LTD	HK280-73PP	Input: AC100-240V, 50/60Hz, 3A Output: DC+12V/15A; -12V/0.2A, 180W; +12V:Max.180W; -12V:Max.2.4W Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: DK-89075-UL, CB Cert. No.: DK-89081-UL, UL E181356; cUL E181356
(Alternative)	FSP GROUP INC.	FSP180-20TLA	Input: AC100-240V, 50/60Hz, 3A, class I Output: DC+12V, 15A max., DC-12V, 0.2A max.; Total Power: 180W max.; Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: DK-88801-UL, CB Cert. No.: DK-88812-UL, UL E190414, cUL E190414
(Alternative)	SHENZHEN HUNTKEY ELECTRIC CO LTD	HK360-72PP	Input: AC100-240V, 50/60Hz, 4A, Output: DC+12V, 21.5A, DC-12V, 0.2A ; Total Power: 260W max.; Class I, Altitude: up to 5000m	IEC/EN 62368-1, EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: SG PSB-IV-04740, TUV SUD Cert. No.: B 068954 1396, UL E181356, cUL E181356

(Alternative)	Acbel Polytech Inc.	PCL015	Input: AC100-240V, 50/60Hz, 4.0A, Output: DC+12V, 21.5A, DC-12V, 0.2A ; Total Power: 260W max.; Class I, Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-125343, CB Cert. No.: JPTUV-125612, TUV Cert. No.: R 50513102, UL E131875, UL E131875
(Alternative)	Lite-On Technology Corporation	PA-2261-1	Input: AC100-240V, 50/60Hz, 4A, Output: DC+12V, 21.5A, DC-12V, 0.2A ; Total Power: 260W max.; Class I, Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-125477, CB Cert. No.: JPTUV-125875, TUV Cert. No.: R 50513677, UL E132068, UL E132068
(Alternative)	FSP GROUP INC.	FSP260-21TLA	Input: AC100-240V, 50/60Hz, 4A, class I Output: DC+12V, 21.5A , DC-12V, 0.2A max.; Total Power: 260W max. Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: DK-114605-UL, CB Cert. No.: DK-114607-UL, TUV Cert. No.: R 50510109, UL E190414, UL E190414
(Alternative)	Acbel Polytech Inc.	PCJ007	Input: AC100-240V, 50/60Hz, 4.0A, class I Output: DC+12V1, 18A, DC+12V2, 18A, DC+12V3, 18A, DC-12V, 0.2A (output not exceed 2.4W); Total Power: 310W Altitude: up to 5000m	IEC/EN 60950-1, IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-092384, CB Cert. No.: JPTUV-092700, UL E131875, UL E131875
(Alternative)	Acbel Polytech Inc.	PCK014	Input: AC100-240V, 50/60Hz, 5.0A, class I Output: DC+12V1, 30A, DC+12V2, 18A,	IEC/EN 60950-1, IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	CB Cert. No.: JPTUV-101675, CB Cert. No.: JPTUV-101909, UL E131875, cUL E131875

			(+12V1&+12V2 combined output not exceed 380W) DC-12V, 0.2A (output not exceed 2.4W); Total Power: 380W Altitude: up to 5000m		
Optical Device Drive (Optional)	Hitachi-LG Data Storage inc.,	GUE1N	Class 1 laser, DC 5V, 1.5A	IEC/EN 60825-1, Code of Federal Regulations (CFR), Title 21, Part 1040	Intertek Cert. No.: SG ITS-20219, FDA registration No.: 1830330-001
(Alternative)	Interchangeable	Interchangeable	Class 1 laser, DC 5V, 1.5A max.	IEC/EN 60825-1, Code of Federal Regulations (CFR), Title 21, Part 1040	EU Certification approved, FDA registered
Hard Disk Drive (Optional)	TOSHIBA	MQ01ACF050	DC 5 V, 1.1A	IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	Cert. No.: R 50237505, UL E145163, cUL E145163
Hard Disk Drive (Optional) (Alternative)	Interchangeable	Interchangeable	DC 5 V, 1.1A max.	IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	TUV, UL and CSA approved
Solid State Drive (Optional) (Alternative)	Interchangeable	Interchangeable	DC 5 V/12 V, 1.1A max.	IEC/EN 62368-1, UL 62368-1, CAN/CSA-C22.2 No. 62368-1	U TUV, UL and CSA approved
DC Fan (For CPU)	Delta electronics, inc.	BUC1012VJ-00	DC 12V, 1A, 20.98CFM	IEC/EN 62368-1, UL 507, CSA-C22.2 No. 113	TUVR Cert. No.: R 50387001, UL E132003, cUL E132003
(Alternative)	Interchangeable	Interchangeable	DC 12V, 1A max., 20.98CFM min.	IEC/EN 62368-1, UL 507, CSA-C22.2 No. 113	TUV,UL and CSA approved
Poly Switch (F1, F2, F3, F4)	BOURNS ELECTRONICS (TAIWAN) LTD	MF-USMF110	DC 6V, holding current: 1.1A, trip current : 2.2A	EN 60730-1, UL 1434, CSA-C22.2 No. 72	TUVR Cert. No.: R 02057213, UL E174545, cUL E174545
(Alternative)	LITTELFUSE	1210L110THYR	DC 6V, holding current: 1.1A, trip current : 2.2A	EN 60730-1, UL 1434, CSA-C22.2 No. 72	TUVR Cert. No.: R 50119118, UL E183209, cUL E183209

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

(Alternative)	POLYTRONICS	SMD1210P110TF T	DC 6V, holding current: 1.1A, trip current : 2.2A	EN 60730-1, UL 1434, CSA-C22.2 No. 72	TUVR Cert. No.: R 50099121, UL E201431, cUL E201431
Poly Switch for USB (U23, U30, U33, U57, U59, U71, U74)	UPI SEMICONDUCTOR CORP	uP7566PMA5-25	DC 2.7 to 5.5V , holding current: Typical 3.3A trip current: 5.0A	IEC/EN 62368-1, UL Subject 2367	CB Cert. No.: R JPTUV-105535-A1/M1, UL E316940
(Alternative)	Green Solution Technology CO, LTD	GS7632S5MN-R	DC 2.0 to 5.5V, holding current: Typical 4.0A trip current: 5.0A:	IEC/EN 62368-1, UL Subject 2367	CB Cert. No.: R JPTUV-105620, UL E360303
(Alternative)	TEXAS INSTRUMENTS INCORPORATED	TPS2001DDBVR	DC 2.5 to 5.5V, holding current:2.0A, trip current: 3.6A	IEC/EN 62368-1, UL Subject 2367	CB Cert. No.:US-34988-UL, UL E353665
Lithium Battery for RTC	PANASONIC	CR-2032L/BE	DC 3V, max. abnormal charging current 10 mA	UL 1642	UL MH12210
(Alternative)	DOUBLE BEST CO LTD	CR2032, BR2032	DC 5V, max. abnormal charging current 10 mA	UL 1642	UL MH46388
Graphics Card	BITLAND	BD3K65	Class III (50W)	IEC/EN 62368-1, UL 62368-1	UL CB Cert. No.:DK-106544- UL, UL E307995
(alternative)	Interchangeable	Interchangeable	Class III (50W max.)	IEC/EN 60950-1, IEC/EN 62368-1, UL 60950-1, UL 62368-1	TUV,UL and CSA approved
Plastic Front Panel	KINGFA SCI & TECH CO LTD	GAR-011	HB, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E171666 & tested in appliance
Alt.	ZHE JIANG CHI MEI CHEMICAL CO LTD	PC-550K(+)	V-0, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E194560 & tested in appliance
Alt.	BAYER MATERIAL SCIENCE AG	2407 + (z)(f1)	V-2, 115°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E41613 & tested in appliance

Alt.	DONGGUAN HINGLONG PLASTIC TECHNOLOGY CO LTD	HL-ABS-PCR35/65/85	HB, 60°C, min. 1.6mm thickness.	UL94 & IEC/EN 60950-1	UL E345434& tested in appliance
Alt.	Interchangeable	Interchangeable	HB or better, min. 1.6 mm thickness.	UL94:2018 IEC 60695-11-10:2013	S, ETL, UL &other EU certification marks
PCB for motherboard	VICTORY GIANT TECHNOLOGY (HUIZHOU) CO LTD	SH, SH10	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E248779& tested in appliance
Alt.	HANNSTAR BOARD CORP	MV-4, MV-6	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E89382& tested in appliance
Alt.	CHUAN YI COMPUTER (SHENZHEN) CO LTD	CM-4	V-0, min. 1.5mm, 130°C	UL796 & IEC/EN 60950-1	UL E162264& tested in appliance
Alt.	Interchangeable	Interchangeable	V-1 or better, min. 105 °C	UL796 :2016 IEC 60695-11-10:2013	S, ETL, UL &other EU certification marks
Adaptor 1 (Optional)	DELTA ELECTRONICS INC	ADP-65ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-101777
Alt.	Lite-On Technology Corporation	PA-1650-74XX (X can be any character or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-102152
Alt.	CHICONY POWER TECHNOLOGY CO LTD	A19-065N2A	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: DK-64002-A2-UL
Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 3.25A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB, UL& other EU certification marks
Adaptor 2 (Optional)	DELTA ELECTRONICS INC	ADP-90ME B	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-101914

Certificado de Conformidade

Certificate of Conformity

Certificado / *Certificate:* UL-BR 25.0614

Emissão / ***Issue***
20 de Maio de 2025
May 20, 2025

Revisão / *Review*: 0

Validade / ***Expiration***
08 de Abril de 2028
April 08, 2028

Alt.	Lite-On Technology Corporation	PA-1900-74XX (X can be A-Z,0-9, or hyphen or blank)	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No.: JPTUV-102137
Alt.	CHICONY POWER TECHNOLOGY CO LTD	A19-090P3A	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-101636
Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 50-60Hz, 1.5A; Output: 20Vdc, 4.5A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB, UL& other EU certification marks
Adaptor 3 (Optional)	DELTA ELECTRONICS INC	ADL135NDC3A	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. DK-63818-UL
Alt.	Lite-On Technology Corporation	ADL135NLC3A	Input: 100-240Vac, 50-60Hz, 2.5A; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	CB Cert. No. JPTUV-062043
Alt.	Interchangeable	Interchangeable	Input: 100-240V~, 1.5A, 50-60Hz; Output: 20Vdc, 6.75A	IEC/EN 60950-1 IEC/EN 62368-1	S, CB, UL& other EU certification marks
DC Fan	FOXCONN TECHNOLOGY CO LTD	PVB070E12HP01-08	12Vdc, max 0.95A, 20.25CFM.	UL 507& IEC/EN 60950-1	UL E231557& tested in appliance
Alt.	ASIA VITAL COMPONENTS CO LTD	BAZA0817R2UP003	12Vdc, max. 1.1A, 19.17CFM.	UL 507& IEC/EN 60950-1	UL E158191& tested in appliance
Alt.	DELTA ELECTRONICS INC	BUB0812HD-01FSG	12Vdc, max. 1.5A, 20.3CFM	UL 507& IEC/EN 60950-1	UL E132003& tested in appliance
Alt.	Interchangeable	Interchangeable	12Vdc, Max.1.5A Min. 19.17CFM	IEC/EN 60950-1:2005	CB, S & other EU certification marks
Optical Device Drive (Optional)	LG ELECTRONICS INC	GUAx#, GUCx#, GUEx# DUCx#, DUEx#	Class 1 laser, 5V, 1.5A	IEC/EN 60825-1& IEC/EN/UL 60950-1	UL E119002& tested in appliance

Alt.	Interchangeable	Interchangeable	Class 1 laser, 5/12 V dc, 3.0/3.0 A max.	IEC/EN 60825-1:2014& IEC/EN 60950-1:2005	CB, S & other EU certification marks
Hard Disk (Optional)	SEAGATE TECHNOLOGY L L C	ST3	5 V/12 V dc, 1.5 A/1.5 A max.	UL 60950-1& IEC/EN 60950-1	UL E106814 & tested in appliance
Alt.	Interchangeable	Interchangeable	5 V/12 V dc, 3.0 A/3.0 A max.	IEC/EN 60950-1:2005 IEC/EN 62368-1:2014	CB, S & other EU certification marks
Lithium Battery for RTC	Panasonic Corporation, Panasonic Corporation Of North America	CR2032	3 V dc, Maximum abnormal charging current 10 mA	UL1642& IEC/EN 60950-1	UL MH12210 & tested in appliance
Alt.	Double Best Co LTD	CR2032	3 V dc, Maximum abnormal charging current 10 mA	UL1642& IEC/EN 60950-1	UL MH46388 & tested in appliance
Alt.	Interchangeable	Interchangeable	3 V dc, Max abnormal charging current 10 mA	IEC/EN 60950-1:2005	CB,S & other EU certification marks
USB Power Switch (UUS2,UUS3, UUS4,UUS5)	Silergy Technology (Taiwan) Inc	SY6288E1AAC	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E491480 & tested in appliance
Alt.	UPI SEMICONDUCTOR CORP	UP7566PMA5-25	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E316940 & tested in appliance
Alt.	ANPEC ELECTRONICS CORP	APL3553IBI-TRG	Rated: 5Vdc, holding current: 0.9-2.6A, trip current: 3.1-3.9A	UL 2367& IEC/EN 60950-1	UL E328191 & tested in appliance
USB Power Switch (UUS6)	PERICOM SEMICONDUCTOR CORP	PI5USB2546HZHEX	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E340734 & tested in appliance
Alt.	ANPEC ELECTRONICS CORP	APL3524QBI-TRG	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E328191 & tested in appliance

Alt.	TEXAS INSTRUMENTS INC	SN1702001RTER	Rated: 5V dc, holding current: 2.1A, trip current: 2.45A	UL 2367& IEC/EN 60950-1	UL E169910 & tested in appliance
USB Power Switch (UTC1)	TEXAS INSTRUMENTS INC	TPS25820DSSR	Rated: 5V dc, holding current: 1.5A, trip current: 1.6A-1.84A	IEC/EN 60950-1	UL E169910& tested in appliance
Alt.	REALTEK SEMICONDUCTOR CORP	RTS5444E-GR	Rated: 5V dc, holding current: 1.5A, trip current: 1.6A-1.85A	UL 2367& IEC/EN 60950-1	UL E506340 & tested in appliance
Metal enclosure	Interchangeable	Interchangeable	Hot dip steel plate, Min. 0.6mm	IEC/EN 60950-1:2005	None

Microsoft

Hardware certification report **Approved**

Private product ID:	**14462735904634948**
Shared product ID:	**402091167**
Submission ID:	**1152921505698807873**
Submission date:	**1/24/2025**
Completion date:	**1/24/2025**
Company:	**Lenovo**
Product name:	**ThinkCentre M75s/M75t Gen 5 Win11 24H2**
Category:	**System**
Product type:	**Desktop**
Qualification level:	**Certified for Microsoft Windows 11 Client family version 24H2, x64**
Marketing name:	**ThinkCentre M75s/M75t Gen 5 12T9** **ThinkCentre M75s/M75t Gen 5 12TA** **ThinkCentre M75s/M75t Gen 5 12TB** **ThinkCentre M75s/M75t Gen 5 12TC** **ThinkCentre M75s Gen5 13DY**

Microsoft Certified

Microsoft

Hardware certification report **Approved**

Private product ID:	**14421531735821105**
Shared product ID:	**402215994**
Submission ID:	**1152921505699262184**
Submission date:	**5/13/2025**
Completion date:	**5/13/2025**
Company:	**Lenovo**
Product name:	**Lenovo LCD E24-40**
Category:	**Device**
Product type:	**LCD**
Qualification level:	**Certified for Microsoft Windows 11 Client family version 24H2, x64** **Certified for Microsoft Windows 10 Client family version 2004, x86** **Certified for Microsoft Windows 10 Client family version 2004, x64** **Certified as Declarative INF**
Marketing name:	**N/A**

Microsoft Certified

Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number ..... :	CN25AFW2 002
Date of issue ..... :	Mar.25.2025
Total number of pages ..... :	16
Name of Testing Laboratory preparing the Report ..... :	**TÜV Rheinland (Shenzhen) Co., Ltd.**
Applicant's name ..... :	**TPV Electronics (Fujian) Co., Ltd.**
Address ..... :	Rongqiao Economic and Technological Development Zone, Fuqing City, Fujian, P.R. China
Test specification:	
Standard ..... :	IEC 62368-1:2014
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No. ..... :	IEC62368_1D
Test Report Form(s) Originator .. :	UL(US)
Master TRF ..... :	Dated 2022-04-14

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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test Item description .....:	LCD Monitor	
Trade Mark(s) .....:	Lenovo	
Manufacturer.....:	**LENOVO (BEIJING) LIMITED** 201-H2-6, Floor 2, Building 2, No.6 Shangdi West Road, Haidian District, Beijing 100085, P. R. China	
Model/Type reference .....:	A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)	
Ratings .....:	I/P: 100-240V~, 50/60Hz, 1.5A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ **CB Testing Laboratory:**	TÜV Rheinland (Shenzhen) Co., Ltd.	
Testing location/ address.....:	1-5F, Block 5, No. 1100, Huanli Road, Yungu Community, Xinhu Street, Guangming District Shenzhen, China	
Tested by (name, function, signature) .....:	Crystal Xu Project Handler	
Approved by (name, function, signature).....:	Solina Zhao Authorizer	
☐ **Testing procedure: CTF Stage 1:**		
Testing location/ address.....:		
Tested by (name, function, signature) .....:		
Approved by (name, function, signature).....:		
☐ **Testing procedure: CTF Stage 2:**		
Testing location/ address.....:		
Tested by (name, function, signature) .....:		
Witnessed by (name, function, signature).....:		
Approved by (name, function, signature).....:		
☐ **Testing procedure: CTF Stage 3 :**		
☐ **Testing procedure: CTF Stage 4:**		
Testing location/ address.....:		
Tested by (name, function, signature) .....:		
Witnessed by (name, function, signature).....:		
Approved by (name, function, signature).....:		
Supervised by (name, function, signature) ...:		

List of Attachments (including a total number of pages in each attachment):

- Measurement Section (1 page)
- Photo documentation (9 pages)

Summary of testing:

Tests performed (name of test and test clause):

name of test	test clause number
Classification of electrical energy sources	5.2
Maximum operating temperature test (Heating test)	5.4.1.4, 9.3, B.1.5, B.2.6
Top Openings in Fire Enclosure	6.4.8.3.3
Bottom Openings in Fire Enclosure	6.4.8.3.4
Input test	Annex B.2.5
Limited power source test (LPS)	Annex Q.1

Testing location:

All tests as described in Test Case and Measurement Sections were performed at the laboratory described on page 2.

Summary of compliance with National Differences:

List of countries addressed:

EU Group Differences, EU Special National Conditions, AU, CA, DK, IT, JP, NZ, US

Explanation of used codes: AU = Australia, CA=Canada, DK=Demark, IT=Italy, JP=Japan, NZ=New Zealand, US=United States of America

☒ **The product fulfils the requirements of EN 62368-1:2014+ A11:2017;**
☒ **The product fulfils the requirements of DS/EN 62368-1:2014;**
☒ **The product fulfils the requirements of CSA/UL 62368-1:2014;**
☒ **The product fulfils the requirements of CEI EN 62368-1:2016;**
☒ **The product fulfils the requirements of J62368-1 (2020);**
☒ **The product fulfils the requirements of AS/NZS 62368.1:2018**

For National Differences see corresponding Attachment of original report CN25AFW2 001.

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty (“simple acceptance” decision rule, previously known as “accuracy method”).

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

See original report CN25AFW2 001 for original labels.

TEST ITEM PARTICULARS:	
Classification of use by ..... :	☒ Ordinary person ☐ Instructed person ☐ Skilled person ☒ Children likely to be present
Supply Connection ..... :	☒ AC Mains ☐ DC Mains ☐ External Circuit - not Mains connected - ☐ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ..... :	☒ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☐ None
Supply Connection – Type ..... :	☒ pluggable equipment type A - ☐ non-detachable supply cord ☒ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☐ other:_____
Considered current rating of protective device as part of building or equipment installation ..... :	20 A; Installation location: ☒ building; ☐ equipment
Equipment mobility ..... :	☒ movable ☐ hand-held ☐ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☒ wall-mounted
Over voltage category (OVC) ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV ☐ other: _____
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III ☐ Class II with functional earthing ☐ Not classifed
Access location ..... :	☐ restricted access area ☒ N/A
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient ..... :	40 °C
IP protection class ..... :	☒ IPX0 ☐ IP___
Power Systems ..... :	☒ TN ☐ TT ☐ IT - ____ $V_{L-L;}$ ☐ dc mains ☐ N/A
Altitude during operation (m) ..... :	☐ 2000 m or less ☒ 5000 m
Altitude of test laboratory (m) ..... :	☒ 2000 m or less ☐ _____ m
Mass of equipment (kg) ..... :	☒ Whole unit with base type A: 2.97kg; Base type A: 0.26kg. **Base type B: 1.56kg**

Possible test case verdicts:	
- test case does not apply to the test object .....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing .....:	
Date of receipt of test item.....:	Mar.13. 2025
Date (s) of performance of tests .....:	Mar.14. 2025 - Mar.21. 2025

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	☒ **Yes** ☐ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....:	See original report CN25AFW2 001 for the details.

General product information and other remarks:

Product Description –

Description of change(s):

1. Add new model names **E24**-****, **TS24**-****, **XiaoXin24****, which are identical to original models except for type designation.
2. Add new alternative main board **715GF305**;
3. Add metal enclosure type B used with new main board 715GF305, meanwhile original base stand defined as type A in original report CN25AFW2 001. Type B is similar with type A except for openings on rear and right sides
4. Add base stand type B used with new main board 715GF305, meanwhile original base stand defined as type A in original report CN25AFW2 001. Base stand type B can be rotated with 90° clockwise/anti-clockwise.
5. Correct test mode from DP mode to HDIM mode in **TABLE: Temperature measurements** in original report CN25AFW2 001 due to typing error.
6. Correct model name of main board from 715GE292 to 715GF292 in Photo documentation of original report CN25AFW2 001 due to typing error.

For the above described change(s) the following was considered to be necessary:

Change	Testing	Comments
1.	N/A	See Page 2 for the details.
2.-4.	See summary of testing on Page 3 for details.	See following pages for the details.
5.	N/A	See Page 9 for the details.
6.	N/A	See photo documentation for the details.

See below table for construction details

Power supply board	Main board	Metal enclosure	Base stand
715GF318	715GF292	Type A	Type A
	715GF305	**Type B**	**Type B**

History of amendments and modifications:

Ref. No. CN25AFW2 001, dated Jan.22,2025 (original report)
Ref. No. CN25AFW2 002, dated Mar.25, 2025 (modification)

Model Differences –

All models are identical expert for type designation.

Additional application considerations –

1. Other Country Differences
The product fulfils the requirements of BS EN 62368-1:2014+ A11:2017
Special national conditions for J3000 (H25)
Per client's request, supplement the special national conditions for J3000 (H25) to present test report.

2. All data ports on main board are optional use.

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.2	**Table: Classification of electrical energy sources**	P

5.2.2.2 – Steady State Voltage and Current conditions

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	264V, 60Hz	LED backlight output of main board 715GF305 to "-" /GND	Normal	49.0Vdc	--	--	ES1
			Abnormal – (see table B.3 for details, maximum result recorded)	49.0Vdc	--	--	
			Single fault – (see table B.4 for details, maximum result recorded)	49.0Vdc	--	--	

5.2.2.3 - Capacitance Limits

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				Capacitance, nF	Upk (V)	
1	264V, 60Hz	L&N pin of AC inlet	Normal	(See table 4.1.2)	373	ES3
			Abnormal	--	--	
			Single fault – SC/OC	--	--	

5.2.2.4 - Single Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

5.2.2.5 - Repetitive Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Test Conditions:

Normal –

Abnormal -

Supplementary information: SC=Short Circuit, OC=Short Circuit

5.4.1.4, 6.3.2, 9.0, B.2.6	**TABLE: Temperature measurements**					P
	Supply voltage (V) ..... :	90V/ 60Hz	264V/ 60Hz	--	--	—
	Ambient T_{min} (°C) ..... :	See below	See below	--	--	—
	Ambient T_{max} (°C) ..... :	See below	See below	--	--	—
	Tma (°C) ..... :	40.0	40.0	--	--	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T_{max} (°C)
Tested with main board 715GF292, HDMI mode		Horizontal		--	--	--
AC inlet near "L" (on power board)		65.2	58.4	--	--	70
X-cap C901 (on power board)		73.8	65.2	--	--	100
Y-cap C902 (on power board)		65.9	61.1	--	--	125
Y-cap C903 (on power board)		65.1	58.4	--	--	125
Y-cap C913 (on power board)		90.4	85.6	--	--	125
E-cap C907 (on power board)		89.3	74.3	--	--	105
L901 Coil (on power board)		98.2	71.5	--	--	130
T901 Coil (on power board)		109.7	104.8	--	--	110
T901 Core (on power board)		108.5	104.9	--	--	110
PCB near BD901 (on power board)		88.6	69.1	--	--	130
PCB near TH901 (on power board)		85.7	67.4	--	--	130
PCB near D901 (on power board)		104.9	102.0	--	--	130
PCB near main IC (on main board)		74.1	25.4	--	--	130
Mylar between panel & power board		71.9	68.4	--	--	80
Plastic enclosure inside near T901		59.8	56.9	--	--	Ref.
Ambient		40.0	40.0	--	--	--

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Touch temperature for accessible part under normal condition					
Metal enclosure	44.8	41.9	--	--	70
Plastic enclosure outside near T901	43.8	41.2	--	--	94
Panel surface	36.5	33.9	--	--	94
Button	34.2	34.9	--	--	77
Ambient	25.0	25.0	--	--	--

Supplementary information:

1. The temperatures were measured under worst case normal mode defined in B.2.5 and at voltages as described above.
2. The instruction installation manual defines the Tma at 40 °C.
   Winding components (providing safety isolation):
   - Class 130 material (B) Tmax = 120 °C – 10 °C = 110 °C
   Components with maximum absolute temperature of others:
   Tmax = Tmax of component
3. All values for T (°C) are re-calculated from actual ambient.

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

Supplementary information:

Note 1: Tma should be considered as directed by appliable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.4.1.4, 6.3.2, 9.0, B.2.6	**TABLE: Temperature measurements**					P
	Supply voltage (V) ..... :	90V/ 60Hz	264V/ 60Hz	90V/ 60Hz	90V/ 60Hz	—
	Ambient T_{min} (°C) ..... :	See below	See below	See below	See below	—
	Ambient T_{max} (°C) ..... :	See below	See below	See below	See below	—
	Tma (°C) ..... :	40.0	40.0	40.0	40.0	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T_{max} (°C)
Tested with main board 715GF305, HDMI mode		Horizontal		Vertical (Power board on Top)	Vertical (Power board on Down)	--
AC inlet near "L" (on power board)		57.2	54.3	61.1	50.4	70
X-cap C901 (on power board)		63.9	60.0	68.8	55.1	100
Y-cap C902 (on power board)		58.4	57.3	64.1	55.0	125
Y-cap C903 (on power board)		59.8	55.4	62.0	52.7	125
Y-cap C913 (on power board)		76.0	75.9	70.9	70.1	125
E-cap C907 (on power board)		81.3	70.7	72.7	60.4	105
L901 Coil (on power board)		86.7	69.0	74.3	60.1	130
T901 Coil (on power board)		99.9	99.5	96.6	90.1	110
T901 Core (on power board)		98.5	100.6	94.9	93.0	110
PCB near BD901 (on power board)		81.3	69.2	72.7	61.1	130
PCB near TH901 (on power board)		77.1	63.9	71.9	58.0	130
PCB near D901 (on power board)		85.4	87.1	86.9	87.7	130
PCB near main IC (on main board)		60.9	61.7	66.9	67.0	130
Mylar between panel & power board		75.7	75.0	74.3	68.6	80
Plastic enclosure inside near T901		55.1	54.5	52.7	48.6	Ref.
Ambient		40.0	40.0	40.0	40.0	--
Touch temperature for accessible part under normal condition						
Metal enclosure		40.1	39.5	38.6	33.9	70
Plastic enclosure outside near T901		35.9	35.9	39.7	35.2	94
Panel surface		31.1	31.7	32.7	30.9	94
Button		27.5	28.3	31.5	29.4	77

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Ambient	25.0	25.0	25.5	25.5	--

Supplementary information:

4. The temperatures were measured under worst case normal mode defined in B.2.5 and at voltages as described above.
5. The instruction installation manual defines the Tma at 40 °C.
   Winding components (providing safety isolation):
   - Class 130 material (B) Tmax = 120 °C – 10 °C = 110 °C
   Components with maximum absolute temperature of others:
   Tmax = Tmax of component
6. All values for T (°C) are re-calculated from actual ambient.

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

Supplementary information:

Note 1: Tma should be considered as directed by appliable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

B.2.5	**TABLE: Input test**							P
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
Test with main board 715GF305								
HDMI mode								
90	50	0.371	--	21.0	--	F901	0.371	Maximum normal load[1]
90	60	0.376	--	21.0	--	F901	0.376	Maximum normal load[1]
100	50	0.343	1.5	20.6	--	F901	0.343	Maximum normal load[1]
100	60	0.347	1.5	20.6	--	F901	0.347	Maximum normal load[1]
240	50	0.194	1.5	20.0	--	F901	0.194	Maximum normal load[1]
240	60	0.194	1.5	20.0	--	F901	0.194	Maximum normal load[1]
264	50	0.182	--	20.1	--	F901	0.182	Maximum normal load[1]
264	60	0.182	--	20.1	--	F901	0.182	Maximum normal load[1]
DP mode								
90	50	0.371	--	20.4	--	F901	0.371	Maximum normal load[1]
90	60	0.376	--	20.4	--	F901	0.376	Maximum normal load[1]
100	50	0.343	1.5	20.1	--	F901	0.343	Maximum normal load[1]

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

100	60	0.347	1.5	20.1	--	F901	0.347	Maximum normal load[1.]
240	50	0.194	1.5	19.6	--	F901	0.194	Maximum normal load[1.]
240	60	0.194	1.5	19.6	--	F901	0.194	Maximum normal load[1.]
264	50	0.182	--	19.7	--	F901	0.182	Maximum normal load[1.]
264	60	0.182	--	19.7	--	F901	0.182	Maximum normal load[1.]
VGA mode								
90	50	0.280	--	14.8	--	F901	0.280	Maximum normal load[2.]
90	60	0.285	--	14.8	--	F901	0.285	Maximum normal load[2.]
100	50	0.263	1.5	14.7	--	F901	0.263	Maximum normal load[2.]
100	60	0.267	1.5	14.7	--	F901	0.267	Maximum normal load[2.]
240	50	0.150	1.5	14.8	--	F901	0.150	Maximum normal load[2.]
240	60	0.150	1.5	14.8	--	F901	0.150	Maximum normal load[2.]
264	50	0.141	--	14.9	--	F901	0.141	Maximum normal load[2.]
264	60	0.141	--	14.9	--	F901	0.141	Maximum normal load[2.]

Supplementary information:

1. Maximum normal load: maximum brightness, maximum contrast, full white screen, (Test with full white screen and three bar screen by client's request, and the worst condition has been recorded). speakers (two sets) loaded with 1KHz sinusoidal signal and turned to maximum volume.
2. Maximum normal load: maximum brightness, maximum contrast, full white screen, (Test with full white screen and three bar screen by client's request, and the worst condition has been recorded).
3. Test have been performed with all LCD panels, and worst test result was recorded in this table.

Annex Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**					P
Note: Measured UOC (V) with all load circuits disconnected:						
Output Circuit	Components	U_{oc} (V)	I_{sc} (A)		S (VA)	
			Meas.	Limit	Meas.	Limit
Circuit output tested: Accessible output connector on main board 715GF305 *3)*						
Note: Measured Uoc (V) with all load circuits disconnected:						
DP (CN102) pin 20 to GND	Normal operation	3.3	0.7	8	2.6	100
DP (CN102) other pins to GND	Normal operation	0	--	8	--	100

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

HDMI (CN152) pin 15,16 to GND	Normal operation	4.8	0 (Can't be loaded)	8	0 (Can't be loaded)	100
HDMI (CN152) pin 10, 11, 13, 14 to GND	Normal operation	3.3	0 (Can't be loaded)	8	0 (Can't be loaded)	100
HDMI (CN152) other pins to GND	Normal operation	0	--	8	--	100
VGA (CN101) pin 12,15 to GND	Normal operation	4.5	0 (Can't be loaded)	8	0 (Can't be loaded)	100
VGA (CN101) pin 1 to GND	Normal operation	3.2	0 (Can't be loaded)	8	0 (Can't be loaded)	100
VGA (CN101) other pins to GND	Normal operation	0	--	8	--	100

Supplementary information:

1) Input Voltage is 264Vac, 60Hz. SC=short circuit, OC=open circuit.
2) Unit shut down.
3) Test performed with data ports of main board is according to client's request.

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Customer's Testing Facility according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date

Disclaimer: This document is controlled and has been released electronically.
Only the version on the IECEE Website is the current document version

Statement of Measurement Uncertainty

The Test Report shall include a statement concerning the uncertainty of the measurement systems used for the tests conducted when it is required by the standard, client or other authorities.
In such cases, the table below is to be used for reporting U of M.

This page may be removed from the final Test Report when not required. See also clause 4.8 in OD 2020 for more details.

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*

*Note: Calculations leading to the reported value are on file with the NCB

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.8.3.3, 6.4.8.3.4 & P.2.2	**Table: enclosure openings**	**P**

Location	Size (mm)	Comments
Internal metal chassis type B: a) at horizontal orientation, b) at vertical orientation (power board on bottom), c) at vertical orientation (power board on top)		
a) Top b) Right c) Left	1) Numerous circle openings: ∅1.8mm	1) Openings do not exceed 3mm in any dimension. No hazards.
a) / b) / c) Rear	1) Three circle openings near main board: ∅2.8mm 2) One rectangle opening near main board: 25.6mm x 5.5mm	1)-2) Mylar sheet is located between power board and main board. No opening was fall in Volume of PS3 component shown as Figure 41 and 42 of this standard. No hazards.
a) Left b) Top c) Bottom	1) One rectangle opening near main board: 25.6mm x 20.1mm	1) Mylar sheet is located between power board and main board. No opening was fall in Volume of PS3 component shown as Figure 41 and 42 of this standard. No hazards.
a) Right b) Bottom c) Top	No openings.	--
a) Bottom b) Left c) Right	No openings.	--
Supplementary information:		

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

Figure 1. Overview with base stand type B

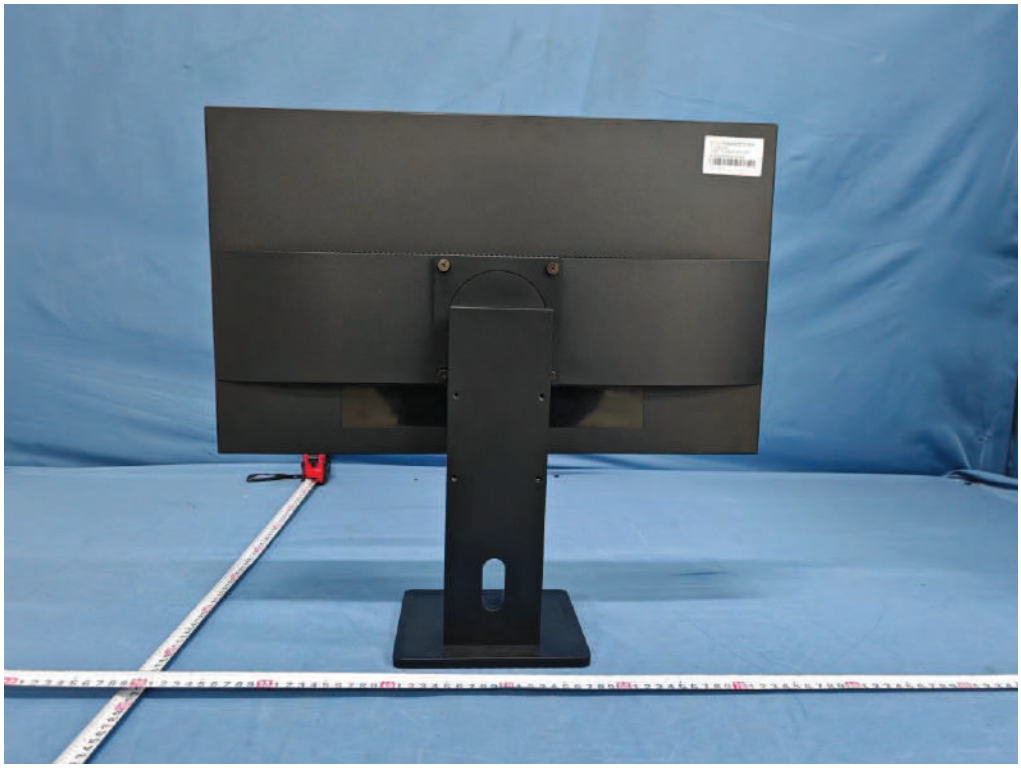

Figure 2. Overview with base stand type B

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

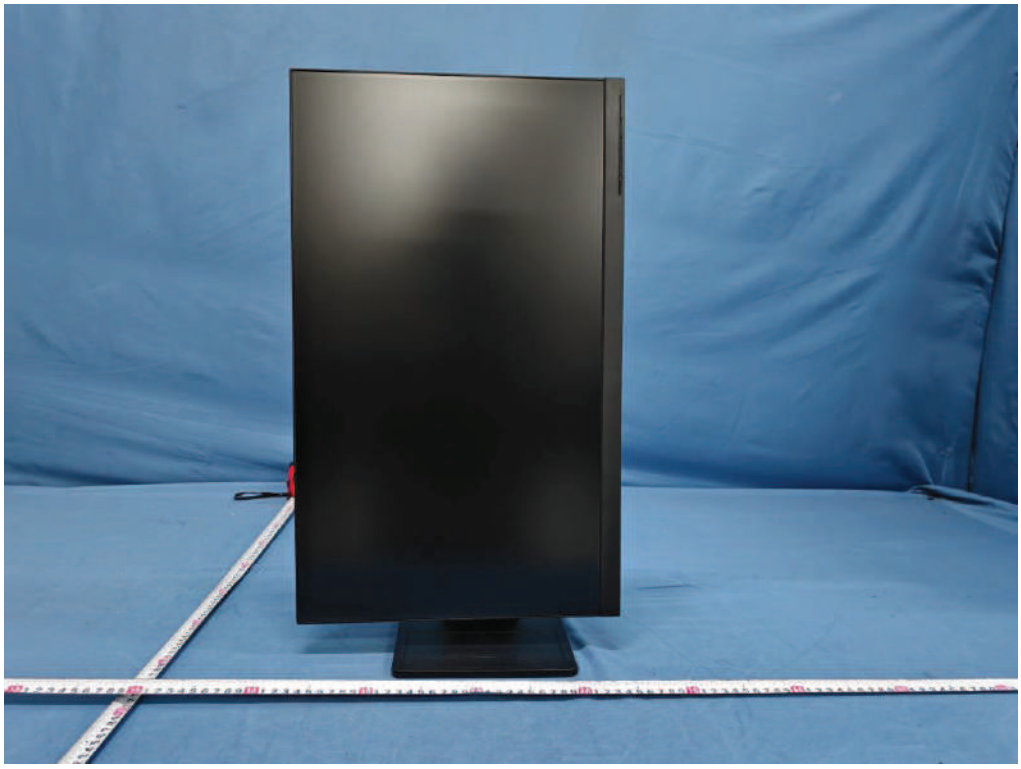

Figure 3. Overview with base stand type B

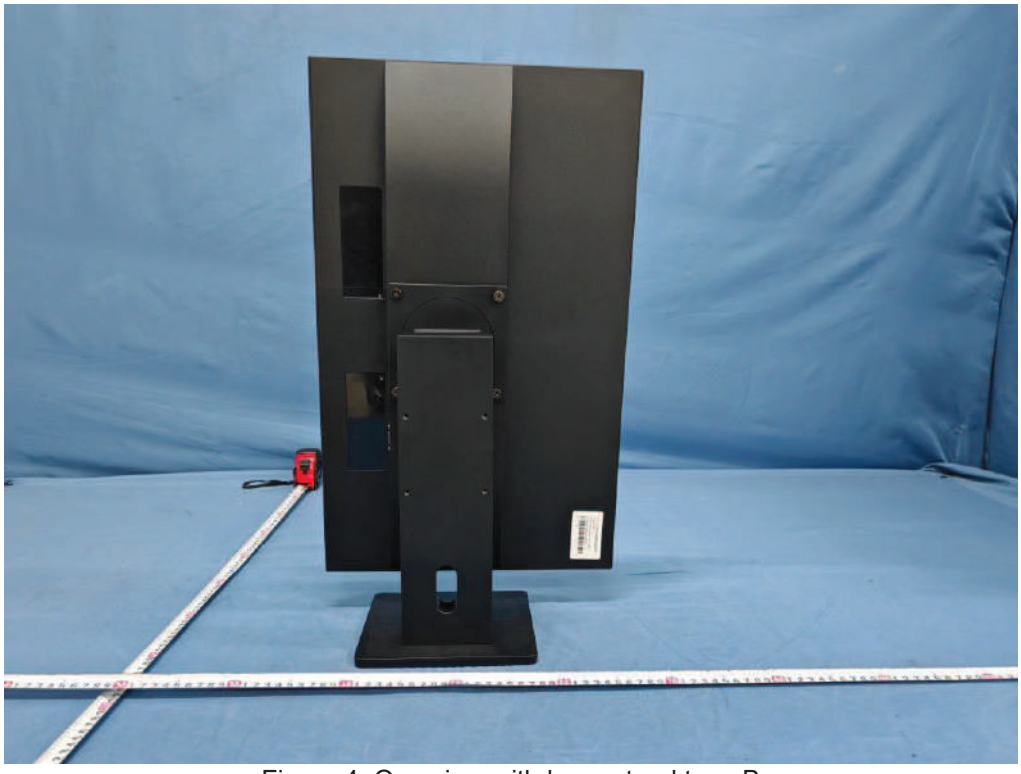

Figure 4. Overview with base stand type B

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

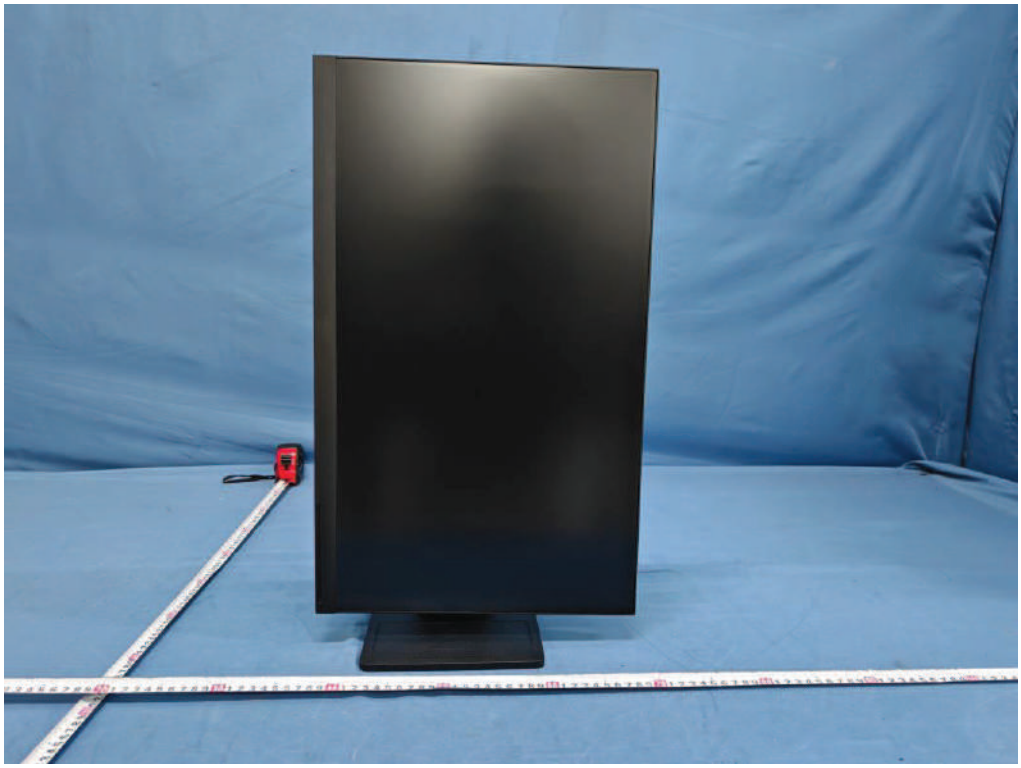

Figure 5. Overview with base stand type B

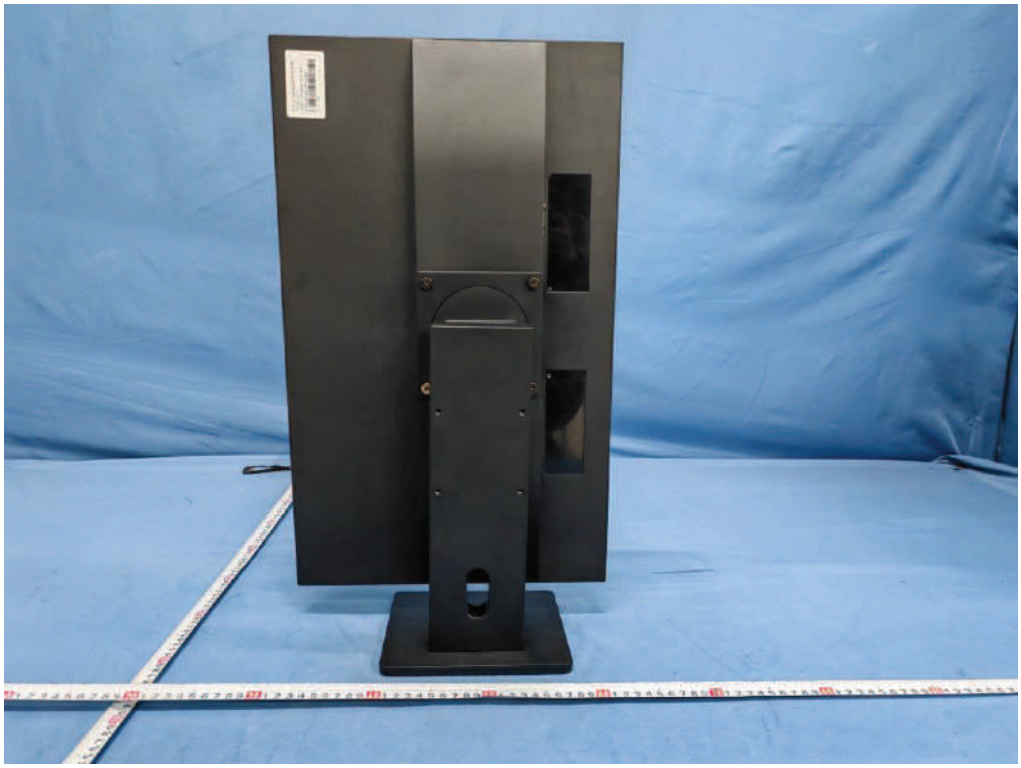

Figure 6. Overview with base stand type B

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

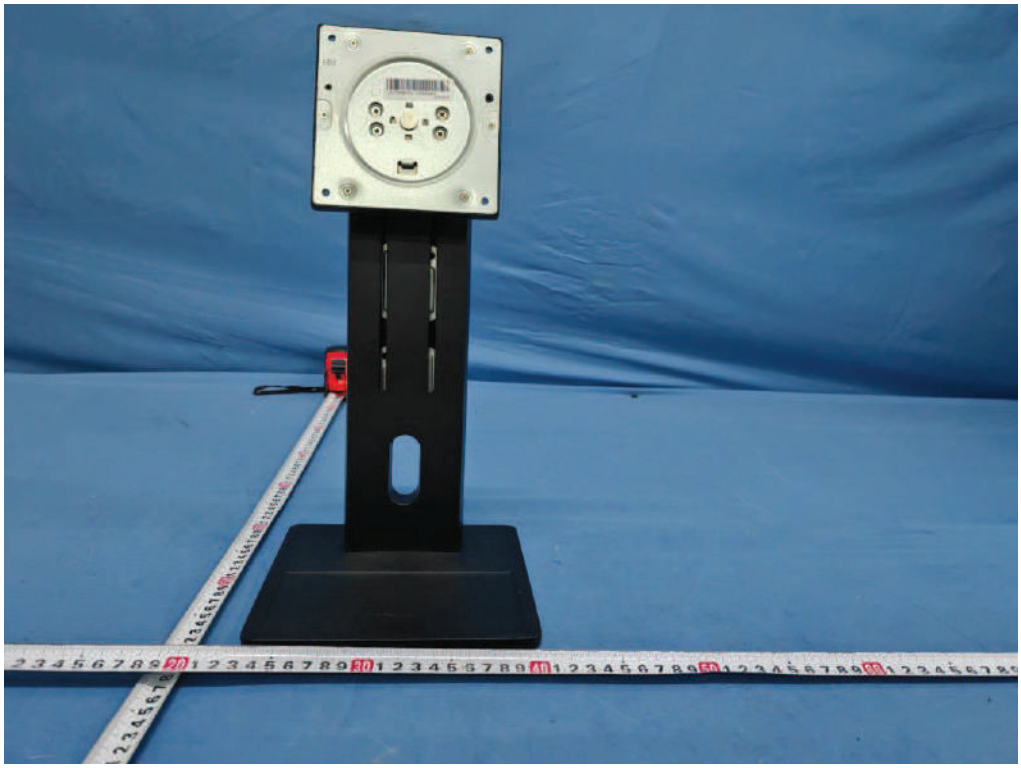

Figure 7. Base stand type B

Figure 8. Data ports on main board 715GF305

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

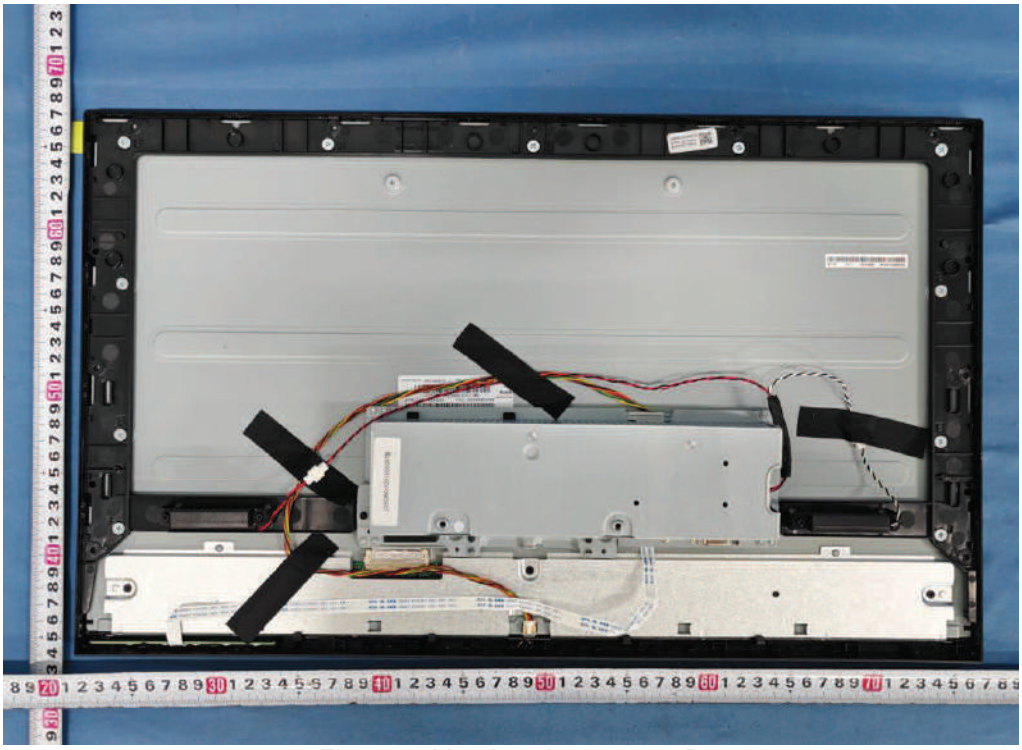

Figure 9. Metal enclosure type B

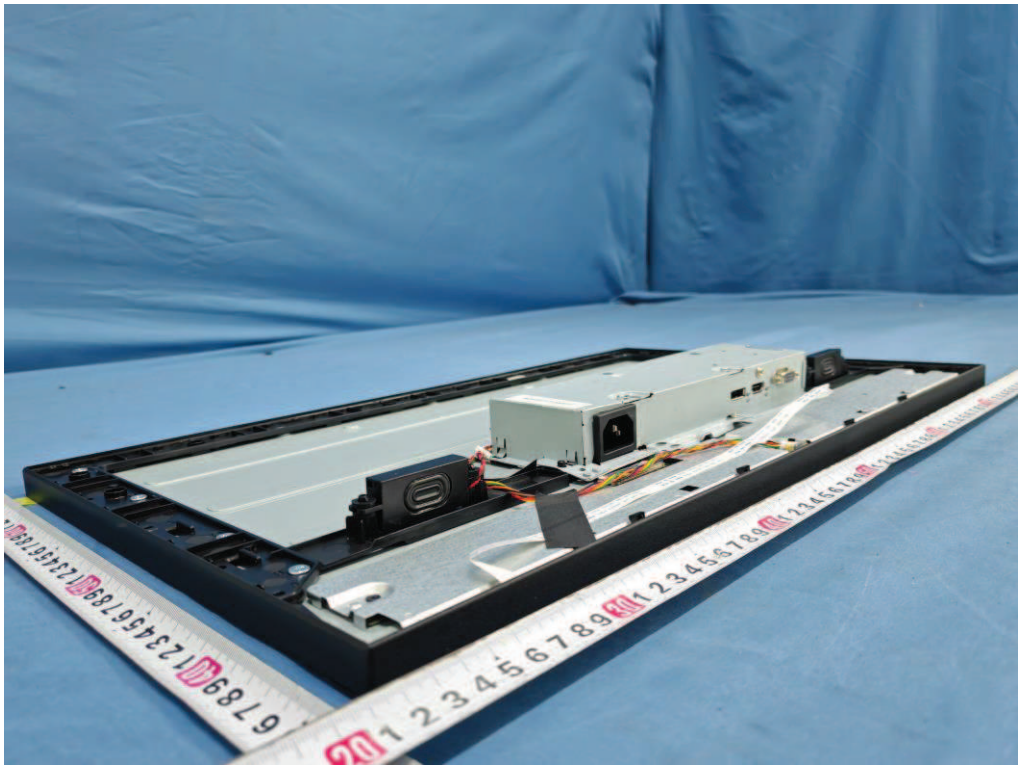

Figure 10. Metal enclosure type B

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

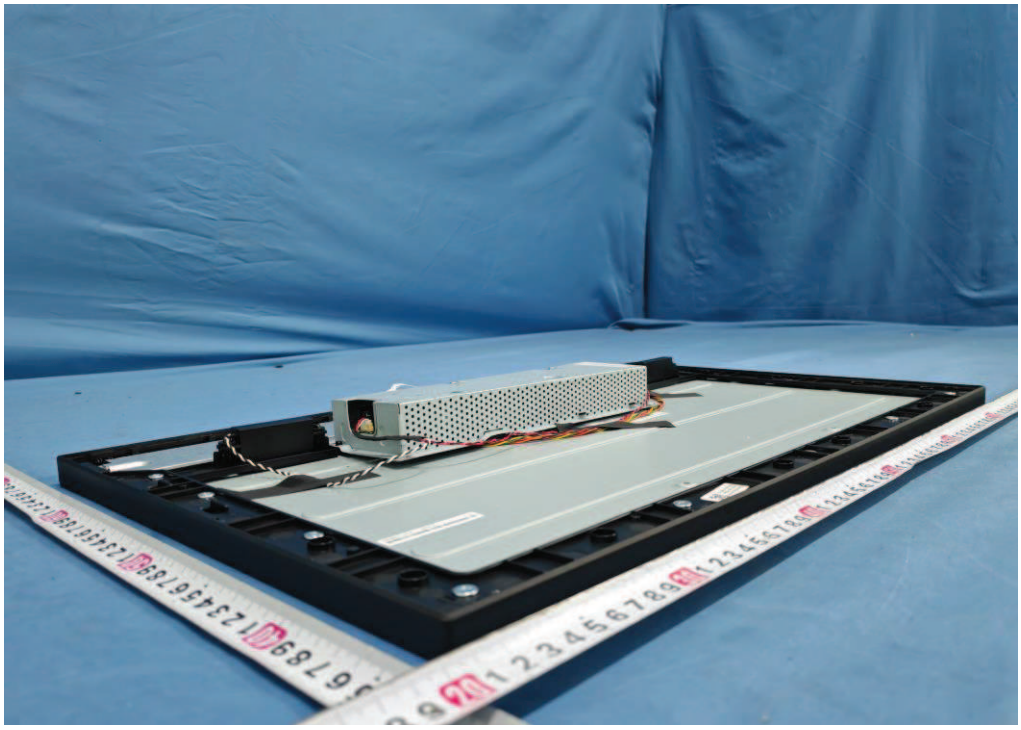

Figure 11. Metal enclosure type B

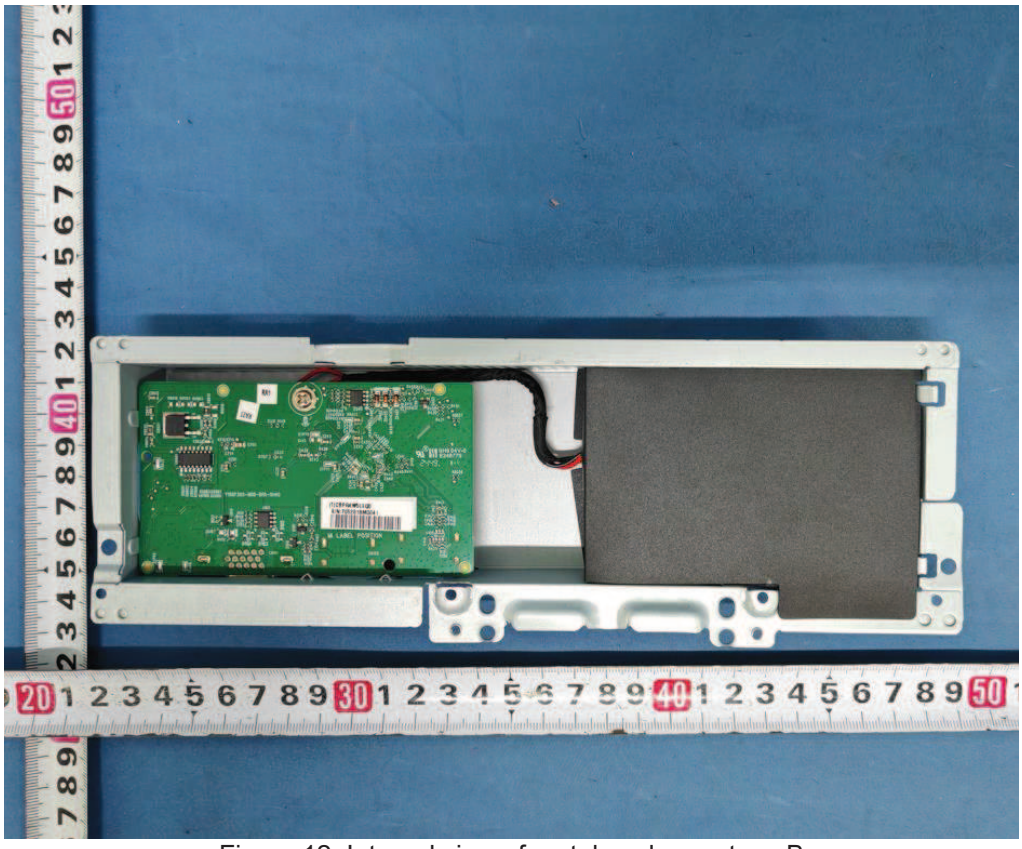

Figure 12. Internal view of metal enclosure type B

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

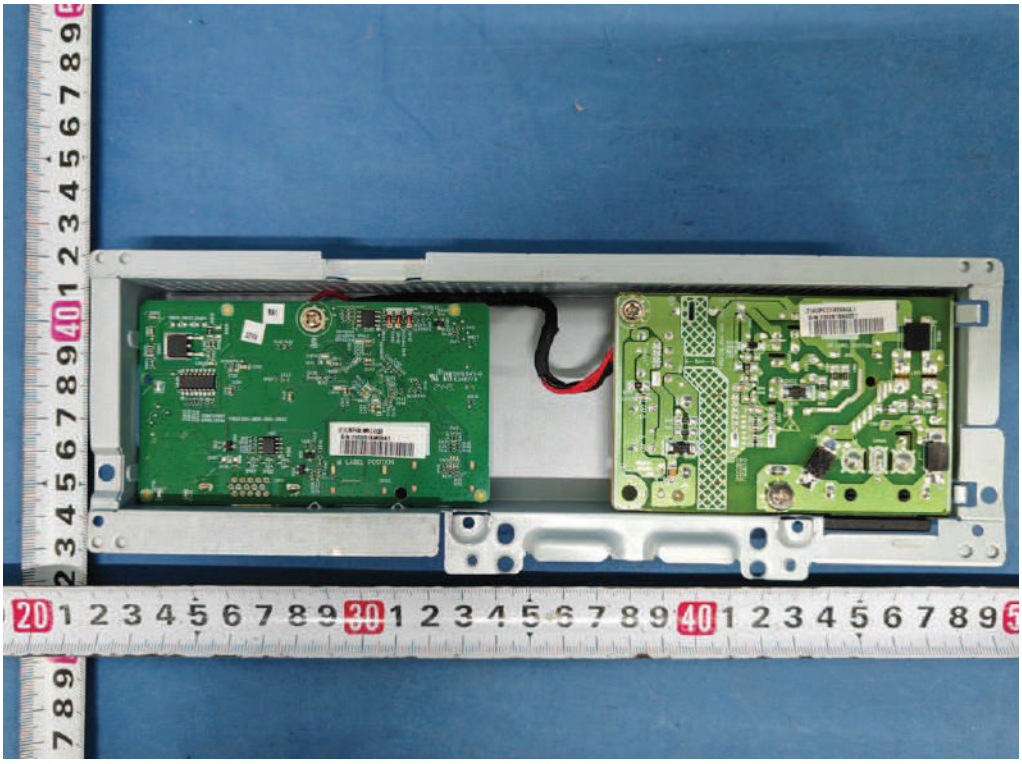

Figure 13. Internal view of metal enclosure type B

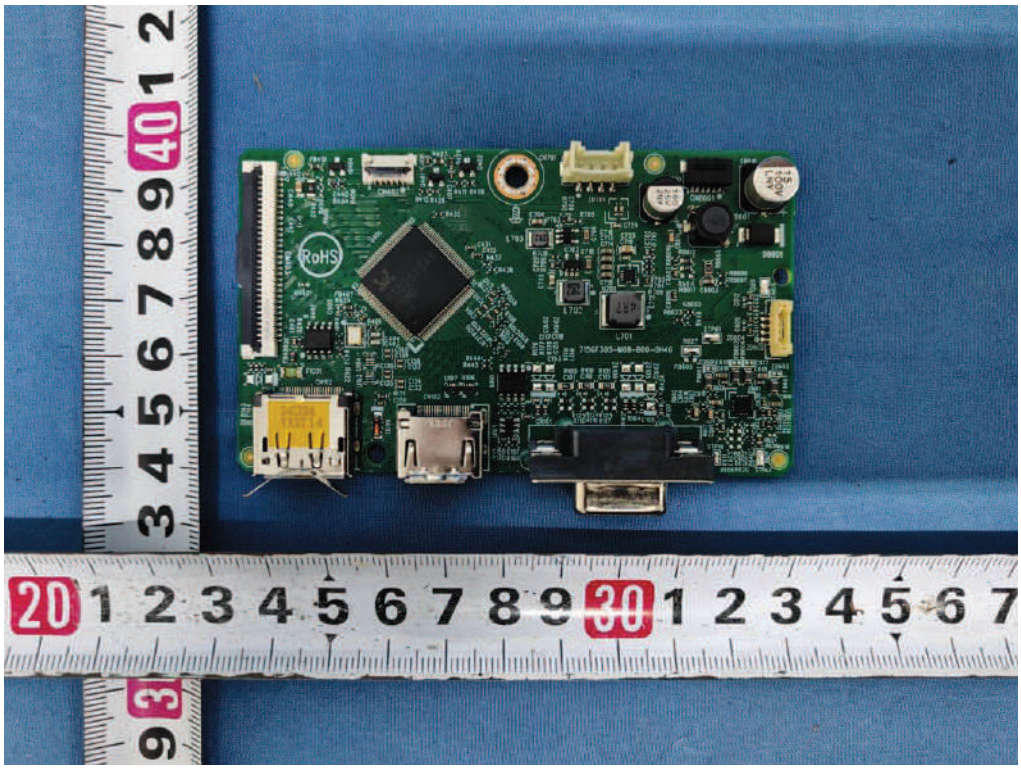

Figure 14. Main board 715GF305

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

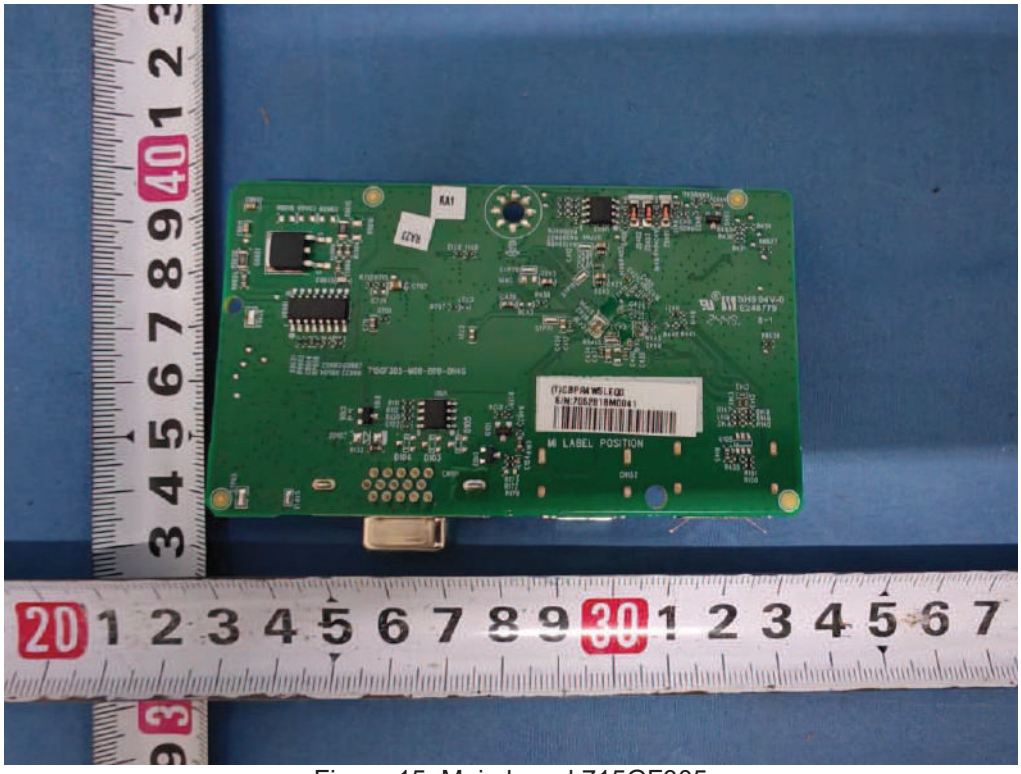

Figure 15. Main board 715GF305

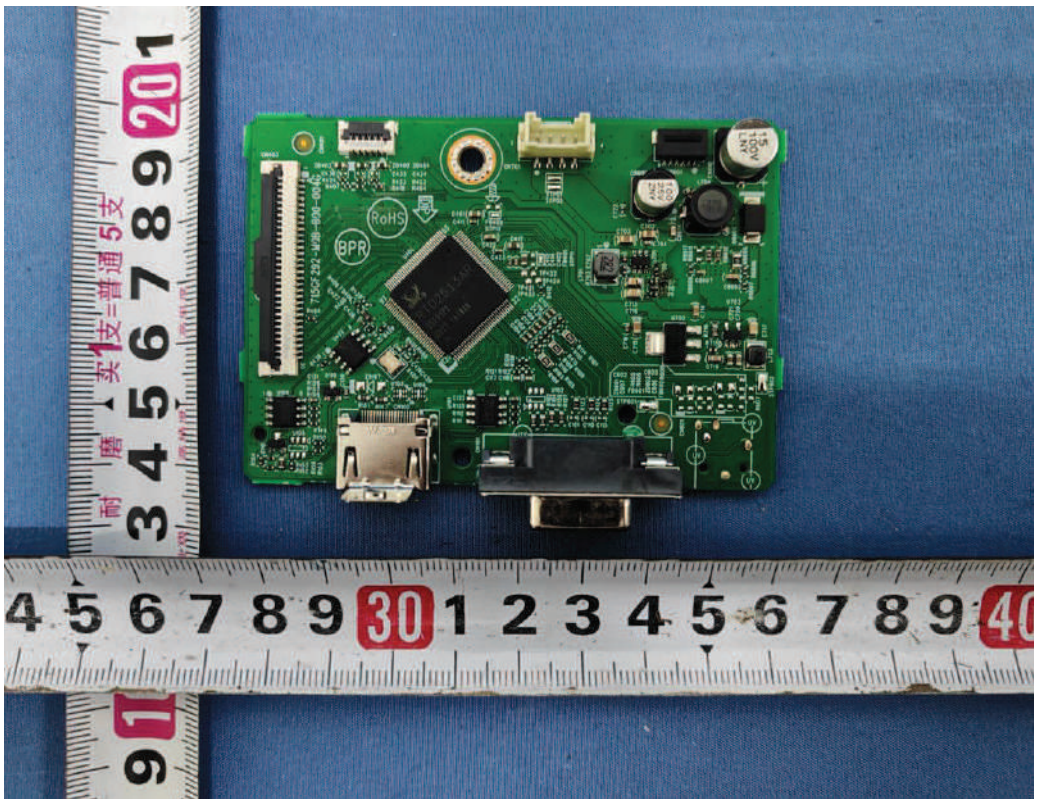

Figure 16. Main board **715GF292**

Product: LCD Monitor

Type Designation: A25238***, S24**-**, L24**-**, **E24**-****, **TS24**-****, **XiaoXin24**** (* can be A-Z, a-z, 0-9, +, -, /, \ or blank, for marketing use only; No constructional differences.)

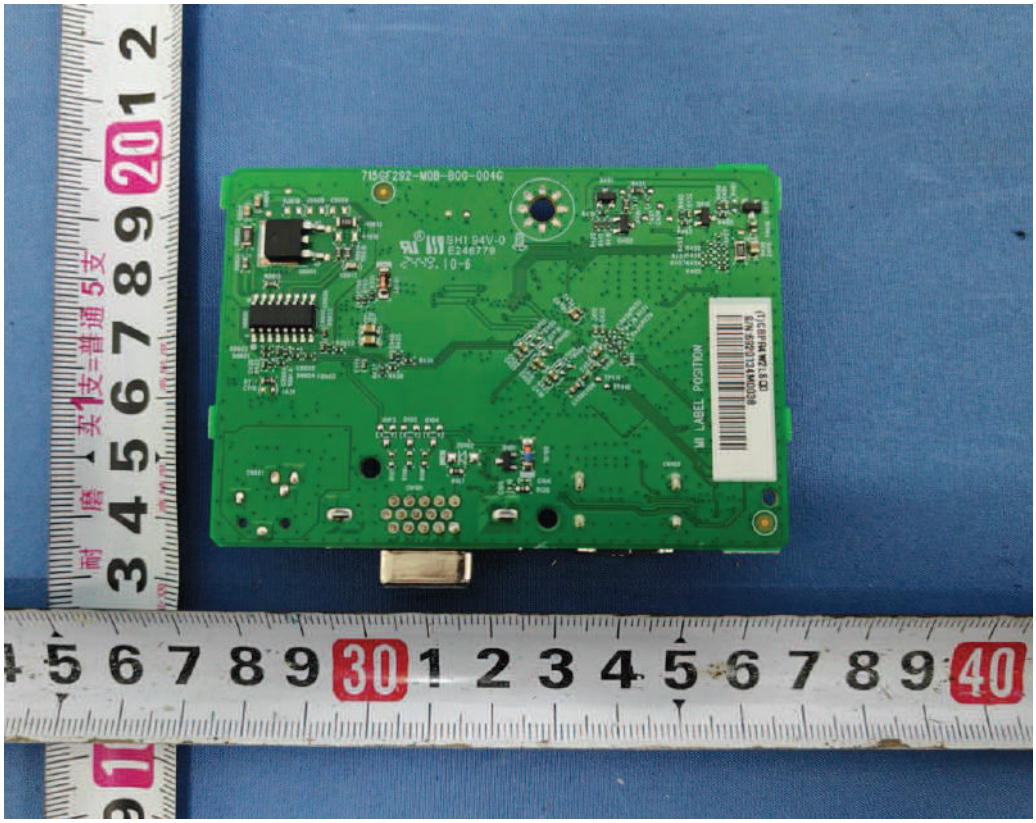

Figure 17. Main board **715GF292**

ThinkCentre M75s Gen 5
Hardware Maintenance Manual

Second Edition (February 2025)

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About this manual

This manual provides service and reference information for ThinkCentre® computers listed on the front cover.

Illustrations in this manual might look different from your product.

Use this manual along with the advanced diagnostic tests to troubleshoot problems.

Important: It is recommended that these products be repaired by trained service technicians. For customers electing to repair their own ThinkCentre products, please follow all instructions carefully. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively. Before servicing a ThinkCentre computer, be sure to read and understand Chapter 1 “Important safety information” on page 1.

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Chapter 1. Important safety information

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back.

     Attention: Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other people are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  Remember: Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

CAUTION:

Keep fingers and other parts of your body away from hazardous, moving parts. If you suffer an injury, seek medical care immediately.

CAUTION:

Avoid contact with hot components inside the computer. During operation, some components become hot enough to burn the skin. Before you open the computer cover, turn off the computer, disconnect power, and wait approximately 10 minutes for the components to cool.

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Electrical safety

CAUTION:
Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the computer covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents. Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing Field Replaceable Units (FRUs)
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.
    Remember: Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.
    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:

  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious alterations. Use good judgment as to the safety of any alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people while handling the part.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

  Note: The use of a grounding system is desirable but not required to protect against ESD damage.

  – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  – Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
  – Use the round ground-prong of the ac plug on ac-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices (multi-lingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English
- Arabic
- Brazilian/Portuguese
- Chinese (simplified)
- Chinese (traditional)
- French
- German
- Hebrew
- Italian
- Korean

- Spanish

DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following tables when installing, moving, or opening covers on this product or attached devices.**

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

CAUTION:
When replacing the lithium battery, use only Part Number 45C1566 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. *Do not:*

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

CAUTION:

When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following: Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

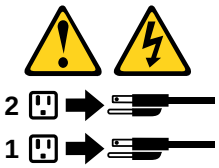
≥18 kg (37 lb)

≥32 kg (70.5 lb)

≥55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



خـــطر

التيـار الكـهربـي المـوجـود بمصـدر الطـاقـة أو أجـهزة التليفـون أو أسـلاك الإتـصالات يشـكل خـطورة.

لـتفادي مخـاطـر الصـدمـات الكـهربـائـية:

لا تحاول توصيل أو فصل أي أسـلاك أو القـيام بعـمليات تـركيب أو صـيانـة أوإعـادة توصـيف لـهذا المنتج أثـناء وجـود عاصـفة كـهربـائـية.

يجـب تـوصـيل كـل أسـلاك الكـهربـاء فـي مخـارج كـهربـاء ذات تـوصـيلات أسـلاك وتـوصـيلات أرضـية صحيـحة
يجـب تـوصـيل أي جـهاز سـيتم الحـاقه بـهذا المـنتج فـي مخارج كـهربـاء ذات تـوصـيلات أسـلاك صحيحة.

وإن أمـكن يـجب اسـتخدام يـد واحـدة فـقط فـي تـوصـيل أو فصـل أسلاك الإشـارة.

لا تحـاول تشغـيل أي جـهاز إذا كـان هنـاك أثـر لحـرق أو مـياه أو تـلف بالمكـونـات
يجـب فصـل أسـلاك الكـهربـاء وأنـظمة الاتصـالات وشـبكات الاتصـال وأجـهزة المـودم الملحـقة قـبل فـتح أغطية الجهاز، مـالـم يـتم طـلب خـلاف ذلك فـي التـعليـمات الخـاصة بالتـركيب والتـوصـيف.
قم بتوصيل وفصل الأسلاك كما هو موضح في الجدول التالي وذلك عند القيام بعمليات التركيب أو النقل أو فتح أغطية هذا المنتج أو الأجهزة الملحقة.

للتوصيل:	للفصل:
قم بإيقاف كل شيء.	قم بإيقاف كل شيء.
أولا، قم بتوصيل كل الأسلاك بالأجهزة.	أولا، قم بفصل كل أسلاك الكهرباء من المخرج.
قم بتوصيل أسلاك الإشارة في لموصلات.	قم بفصل أسلاك الإشارة من الموصلات.
قم بتوصيل أسلاك الكهرباء في المخارج.	قم بفصل كل الأسلاك من الأجهزة.
قم بتشغيل الجهاز.	

تنبيـــه :
عند استبدال البطارية الليثيوم، استخدم فقط رقم الجزء الخاص Part Number 45C1566
أو نوع أخر يكون على نفس مستوى الكفاءة يحدده لك المصنع.
اذا كان النظام الخاص يستخدم معه بطارية ليثيوم قم باستبدالها بنفس النوع الذي تم صناعته من خلال نفس المصنع. تحتوي البطارية على مادة الليثيوم ويمكن أن تنفجرفي حالة عدم استخدامها أو التعامل معها بطريقة صحيحة أو عند التخلص منها بطريقة خطأ.

لا تقم بـــ:
- القاء البطارية أو غمرها في الماء
- تسخينها أعلى من ١٠٠ درجة مئوية°و(٢١٢ ° فهرنـهيت)
- بتصليحها أو فكها

تخلص من البطارية طبقا للقانون أو النظام المحلي .

تنبيـــه :
أثناء تركيب منتجات ليزر (مثل CD-ROMsأو وحدة تشغيل DVDأو أجهزة Fiber Optic أو وحدات الارسال) يجب مراعاة الآتي:

لا تنزع الأغطية. قد ينتج عن نزع أغطية منتج الليزر انفجار أشعة الليزر شديدة الخطورة.
لا يوجد أجزاء يمكن تغييرها داخل الجهاز. قد ينتج عن استخدام تحكمات أو تعديلات أو عمل أي تصرفات أخرى تخالف ما هو محددا هنا الى انفجار أشعة شديدة الخطورة.

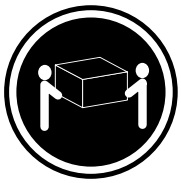
خطـــر

تحتوى بعض منتجات الليزر على الفئة دايود ليزر مدمج من الفئة Class 3Aأو Class 3B. يجب مراعاة الآتي .

أشعة الليزر عند الفتح. لا تحدق الى الاشعاع و لا تنظر اليه مباشرة بواسطة أي أجهزة مرئية وتجنب التعرض المباشر للاشعاع .

≥55 kg (121.2 lb)

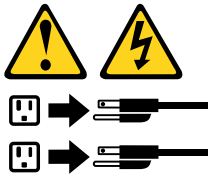
≥32 kg (70.5 lb)



≥18 kg (37 lb)

تنبيه :
يجب استخدام ممارسات آمنة عند الرفع

تنبيـــه :
لا يقم زر التحكم في التشغيل الموجود على الجهاز والمفتاح الكهربائي الموجود على لوحة التحكم بايقاف التيار الكهربائي المار بالجهاز. قد يكون للجهاز أكثر من سلك كهربائي واحد. لايقاف التيار الكهربائي المار بالجهاز، تأكد من فصل جميع أسلاك الكهرباء من مصدر الكهرباء .



PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque elétrico:

- Não conecte nem desconecte nenhum cabo ou execute instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Todo equipamento que for conectado a este produto deve ser conectado a tomadas corretamente instaladas.
- Quando possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue nenhum equipamento quando houver evidência de fogo, água ou danos estruturais.
- Antes de abrir tampas de dispositivos, desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems conectados, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte os cabos conforme descrito na tabela apresentada a seguir ao instalar, mover ou abrir tampas deste produto ou de dispositivos conectados.

Para Conectar:	**Para Desconectar:**
1. DESLIGUE Tudo. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos.	1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos dispositivos.

CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria com Número de Peça 45C1566 ou um tipo de bateria equivalente recomendado pelo Se o seu sistema possui um módulo com uma bateria de lítio, substitua-o apenas por um módulo do mesmo tipo e do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada ou descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Descarte a bateria conforme requerido pelas leis ou regulamentos locais.

PRECAUCIÓN:

Quando produtos a laser (como unidades de CD-ROMs, unidades de DVD-ROM, dispositivos de fibra ótica ou transmissores) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Não existem peças que podem ser consertadas no interior do dispositivo.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

Alguns produtos a laser contêm diodo de laser integrado da Classe 3A ou da Classe 3B. Observe o seguinte:

Radiação a laser quando aberto. Não olhe diretamente para o feixe a olho nu ou com instrumentos ópticos e evite exposição direta ao feixe.

≥18 kg (37 lb)

≥32 kg (70.5 lb)

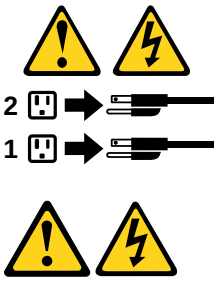
≥55 kg (121.2 lb)

CUIDADO:

Utilize procedimentos de segurança para levantar equipamentos.

CUIDADO:

O botão de controle de alimentação do dispositivo e o botão para ligar/desligar da fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de alimentação.



危险

电源、电话和通信电缆中的电流是危险的。

为避免电击危险：

- 请勿在雷电期间连接或断开任何电缆的连接，或者对本产品进行安装、维护或重新配置。
- 将所有电源线连接到正确连线和妥善接地的电源插座。
- 将所有要连接到该产品的设备连接到正确连线的插座。
- 如果可能，请仅使用一只手来连接或断开信号电缆的连接。
- 切勿在有火、水、结构损坏迹象的情况下开启任何设备。
- 在打开设备外盖之前请断开已连接的电源线、远程通信系统、网络和调制解调器，除非在安装和配置过程中另有说明。
- 当安装、移动或打开该产品或连接设备的外盖时，请按照下表所述来连接或断开电缆的连接。

要连接	要断开连接
1. 切断所有电源。 2. 首先将所有电缆连接到设备。 3. 将信号电缆连接到接口。 4. 将电源线连接到插座。 5. 开启设备。	1. 切断所有电源。 2. 首先从插座上拔出电源线。 3. 从接口上拔出信号电缆。 4. 从设备上拔出所有电缆。

警告：
更换锂电池时，请仅使用部件号为 45C1566 的电池或制造商推荐的同类电池。如果您的系统有包含锂电池的模块，请仅使用同一制造商生产的相同模块类型来替换该模块。该电池中含有锂，如果使用、操作或处理不当，可能会发生爆炸。

切勿：

- 投入或浸入水中
- 加热到 100℃（212℉）以上
- 维修或拆卸

请按照当地法令或条例的要求处理电池。

警告：
安装激光产品（例如 CD-ROM、DVD-ROM 驱动器、光纤设备或发射设备）时，请注意以下声明：

- 请勿卸下外盖。卸下激光产品的外盖可能导致遭受激光辐射的危险。该设备内没有可维修的部件。
- 如果不按照此处指定的过程进行控制、调整或操作，则有可能导致遭受辐射的危险。

危险

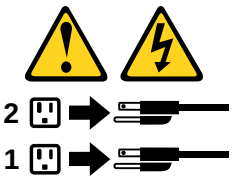
某些激光产品包含嵌入式 3A 类或 3B 类激光二极管。请注意以下声明：

打开后有激光辐射。请勿注视光束，请勿直接用光学仪器查看，并请避免直接暴露在光束中。

≥18 千克（37 磅） ≥32 千克（70.5 磅） ≥55 千克（121.2 磅）

警告：
抬起时请采取安全措施。

警告：
设备上的电源控制按钮和电源上的电源开关不会切断供给该设备的电流。该设备还可能有多条电源线。要切断该设备的所有电流，请确保所有电源线都与电源断开连接。



危險

電源、電話及通訊纜線上的電流都具有危險性。
若要避免觸電危險：
- 請勿在雷雨期間，連接或拔除纜線、執行安裝、維護或重新配置本產品。
- 將所有電源線連接到正確配線及接地的電源插座。
- 任何與本產品連接的設備都必須連接到配線妥當的電源插座。
- 請盡可能用單手連接或拔除信號線。
- 發生火災、水災或結構損害時，絕對不要開啟任何設備。
- 除非在安裝及配置程序中另有指示，否則在開啟裝置機蓋之前，請拔掉連接的電源線、電信系統、網路及數據機。
- 安裝、移動或開啟本產品或附屬裝置的機蓋時，請遵循下列說明連接及拔掉纜線。

連線	切斷連線
1. 關閉所有開關。 2. 首先，連接所有接線到裝置。 3. 連接信號線到接頭。 4. 連接電源線到插座。 5. 開啟裝置。	1. 關閉所有開關。 2. 首先，拔掉插座上的電源線。 3. 拔掉接頭上的信號線。 4. 拔掉裝置上所有接線。

警告：
更換鋰電池時，請僅使用產品編號 **45C1566** 或製造商所建議的同類型電池。
如果您的系統中含有鋰電池模組，請僅使用同一家製造商所生產的相同模組進行更換。
如果未以正確方式使用、處理或棄置含鋰的電池，會有爆炸的危險。
請勿：

- 沾溼或浸入水中
- 置於 **100°C (212°F)** 以上的高溫環境
- 修理或拆開

請按照各地區有關廢棄電池的法令和規定處理舊電池。

警告：
- 請勿移除機蓋。移除雷射產品的機蓋，可能會導致暴露在危險的雷射輻射中。裝置內部並無可自行維修的零件。
- 利用或執行非本文中所指定的控制、調整及執行程序，可能會導致危險的輻射外洩。

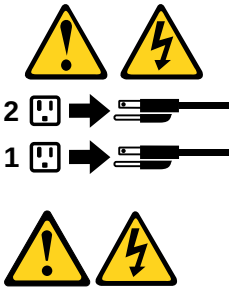
危險

部分雷射產品含有內嵌式 **Class 3A** 或 **Class 3B** 雷射二極體。請注意下列事項：
在開啟光碟機時，會發生雷射輻射。請勿直視光束或用光學儀器直接檢視，並避免直接暴露在光束中。

≥ 18 公斤（37 磅） ≥ 32 公斤（70.5 磅） ≥ 55 公斤（121.2 磅）

警告：
搬運時請注意安全。

警告：
裝置上的電源控制按鈕及電源供應器上的電源開關，無法關閉裝置所產生的電流。
該裝置可能有多條電源線。若要除去裝置流出的所有電流，請確認已切斷所有電源線的電源。



DANGER

Le courant électrique provenant de l'alimentation, du téléphone et des câbles de transmission peut présenter un danger.

Pour éviter tout risque de choc électrique :

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez, que vous déplacez, ou que vous manipulez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités HORS TENSION. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités SOUS TENSION.	1. Mettez les unités HORS TENSION. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.

ATTENTION:

Remplacer la pile au lithium usagée par une pile de référence identique exclusivement, (référence 45C1566), ou suivre les instructions du fabricant qui en définit les équivalences. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- **la jeter à l'eau,**
- **l'exposer à des températures supérieures à 100°C,**
- **chercher à la réparer ou à la démonter.**

Ne pas mettre la pile à la poubelle. Pour la mise au rebut, se reporter à la réglementation en vigueur.

ATTENTION:

Si des produits à laser (tels que des unités de CD-ROM, de DVD-ROM, des unités à fibres optiques, ou des émetteurs) sont installés, prenez connaissance des informations suivantes :

- **Ne retirez pas le carter. En ouvrant l'unité de CD-ROM ou de DVD-ROM, vous vous exposez au rayonnement dangereux du laser. Aucune pièce de l'unité n'est réparable.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent manuel.**

DANGER

Certains produits à laser contiennent une diode à laser intégrée de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. Evitez toute expositiondirecte au rayon laser. Evitez de regarder fixement le faisceau ou del'observer à l'aide d'instruments optiques.

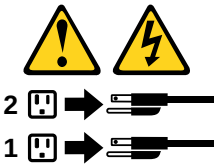
≥18 kg (37 lb) ≥32 kg (70.5 lb) ≥55 kg (121.2 lb)

ATTENTION:

Soulevez la machine avec précaution.

ATTENTION:

L'interrupteur de contrôle d'alimentation de l'unité et l'interrupteur dubloc d'alimentation ne coupent pas le courant électrique alimentantl'unité. En outre, le système peut être équipé de plusieurs cordonsd'alimentation. Pour mettre l'unité hors tension, vous devez déconnectertous les cordons de la source d'alimentation.



VORSICHT

An Netz-, Telefon- und Datenleitungen können gefährliche Spannungen anliegen.

Aus Sicherheitsgründen:

- **Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.**
- **Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**
- **Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**
- **Die Signalkabel nach Möglichkeit einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potenzial zu vermeiden.**

- **Geräte niemals einschalten, wenn Hinweise auf Feuer, Wasser oder Gebäudeschäden vorliegen.**
- **Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem Öffnen des Gehäuses zu unterbrechen, sofern in den Installations- und Konfigurationsprozeduren keine anders lautenden Anweisungen enthalten sind.**
- **Zum Installieren, Transportieren und Öffnen der Abdeckungen des Computers oder der angeschlossenen Einheiten die Kabel gemäß der folgenden Tabelle anschließen und abziehen.**

Zum Anschließen der Kabel gehen Sie wie folgt vor	Zum Abziehen der Kabel gehen Sie wie folgt vor
1. Schalten Sie alle Einheiten AUS. 2. Schließen Sie erst alle Kabel an die Einheiten an. 3. Schließen Sie die Signalkabel an die Buchsen an. 4. Schließen Sie die Netzkabel an die Steckdose an. 5. Schalten Sie die Einheit EIN.	1. Schalten Sie alle Einheiten AUS. 2. Ziehen Sie zuerst alle Netzkabel aus den Netzsteckdosen. 3. Ziehen Sie die Signalkabel aus den Buchsen. 4. Ziehen Sie alle Kabel von den Einheiten ab.

CAUTION:

Eine verbrauchte Lithiumbatterie nur durch eine Batterie mit der Teilenummer 45C1566 oder eine gleichwertige, vom Hersteller empfohlene Batterie ersetzen. Enthält das System ein Modul mit einer Lithiumbatterie, dieses nur durch ein Modul desselben Typs und von demselben Hersteller ersetzen. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

ACHTUNG:

Bei der Installation von Lasergeräten (wie CD-ROM-Laufwerken, DVD- aufwerken, Einheiten mit Lichtwellenleitertechnik oder Sendern) Folgendes beachten:

- **Die Abdeckungen nicht entfernen. Durch Entfernen der Abdeckungen des Lasergeräts können gefährliche Laserstrahlungen freigesetzt werden. Das Gerät enthält keine zu wartenden Teile.**
- **Werden Steuerelemente, Einstellungen oder Durchführungen von Prozeduren anders als hier angegeben verwendet, kann gefährliche Laserstrahlung auftreten.**

VORSICHT

Einige Lasergeräte enthalten eine Laserdiode der Klasse 3A oder 3B. Beachten Sie Folgendes:

Laserstrahlung bei geöffneter Verkleidung. Nicht in den Strahl blicken. Keine Lupen oder Spiegel verwenden. Strahlungsbereich meiden.

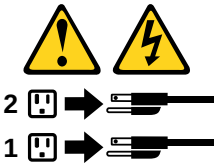
≥18 kg ≥32 kg ≥55 kg

ACHTUNG:

Arbeitsschutzrichtlinien beim Anheben der Maschine beachten.

ACHTUNG:

Mit dem Netzschalter an der Einheit und am Netzteil wird die Stromversorgung für die Einheit nicht unterbrochen. Die Einheit kann auch mit mehreren Netzkabeln ausgestattet sein. Um die Stromversorgung für die Einheit vollständig zu unterbrechen, müssen alle zum Gerät führenden Netzkabel vom Netz getrennt werden.



סכנה

זרם חשמלי המועבר בכבלי חשמל, טלפון ותקשורת הוא מסוכן.

כדי להימנע מסכנת התחשמלות:

- אל תחברו או תנתקו כבלים, ואל תבצעו פעולת התקנה, תחזוקה או שינוי תצורה במוצר זה במהלך סופת ברקים.
- חברו את כל כבלי החשמל לשקע חשמל מחווט ומוארק כהלכה.
- חברו כל ציוד שיחובר למוצר זה לשקעי חשמל מחווטים כהלכה.
- במידת האפשר, השתמשו ביד אחת בלבד לחיבור או לניתוק של כבלי אותות.
- לעולם אל תפעילו ציוד כלשהו כאשר יש עדות לנזק מבני או לנזק כתוצאה מאש או ממים.
- נתקו את כבלי החשמל, מערכות התקשורת, התקני הרשת והמודמים המחוברים לפני פתיחת כיסויי ההתקן, אלא אם הליכי ההתקנה וקביעת התצורה מורים אחרת.
- בעת התקנה, העברה או פתיחת כיסויים במוצר זה או בהתקנים המחוברים, חברו ונתקו את הכבלים כמתואר בטבלה שלהלן.

כדי לחבר	כדי לנתק
1. כבו הכל. 2. ראשית, חברו את כל הכבלים להתקנים. 3. חברו את כבלי האותות למחברים. 4. חברו את כבלי החשמל לשקעים. 5. הפעילו את ההתקן.	1. כבו הכל. 2. ראשית, נתקו את כבלי החשמל מהשקעים. 3. נתקו את כבלי האותות מהמחברים. 4. הסירו את כל הכבלים מההתקנים.

זהירות:
בעת החלפת סוללת הליתיום, השתמשו רק בסוללה בעלת מק"ט 45C1566 או בסוג תואם שהומלץ על ידי היצרן. אם המערכת כוללת מודול המכיל סוללת ליתיום, החליפו אותו רק במודול מאותו סוג ומתוצרת אותו יצרן. הסוללה מכילה ליתיום, ועלולה להתפוצץ אם לא משתמשים ומטפלים בה או משליכים אותה כיאות.

לעולם:

- אל תטבלו במים
- אל תחממו לטמפרטורה הגבוהה מ-100°C (212°F)
- אל תתקנו או תפרקו

השליכו את הסוללה כנדרש לפי התקנות והחוקים המקומיים.

זהירות:
בעת התקנת מוצרי לייזר (כגון כונני תקליטורים ו-DVD, התקני סיב אופטי או משדרים), שימו לב לאזהרות הבאות:

- אל תסירו את הכיסויים. הסרת הכיסויים של מוצר הלייזר עלולה לגרום לחשיפה לקרינת לייזר מסוכנת. אין חלקים ברי טיפול בתוך ההתקן.
- שינויים, שימוש בבקרות או ביצוע הליכים אחרים מאלה המתוארים כאן, עלולים לגרום לחשיפה לקרינה מסוכנת.

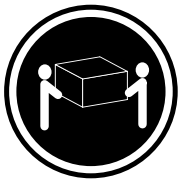
סכנה

מוצרי לייזר מסוימים מכילים דיודת לייזר מסוג Class 3A או Class 3B. שימו לב לאזהרה הבאה:

כאשר הוא פתוח, המוצר פולט קרינת לייזר. אל תביטו ישירות בקרן, אל תביטו ישירות בעזרת ציוד אופטי, והימנעו מחשיפה לקרן.

≥ 55 ק"ג (121.2 ליב')

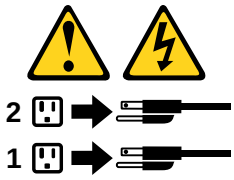
≥ 32 ק"ג (70.5 ליב')



≥ 18 ק"ג (37 ליב')

זהירות:
השתמשו בהליכים
הנאותים בעת
הרמת הציוד.

זהירות:
לחצן ההפעלה של ההתקן ומתג ההפעלה של ספק החשמל אינם מפסיקים את זרם החשמל המסופק להתקן. בנוסף, ההתקן עשוי לכלול יותר מכבל חשמל אחד. כדי לסלק את כל הזרם החשמלי מההתקן, ודאו שכל כבלי החשמל מנותקים ממקור החשמל.



PERICOLO

La corrente elettrica proveniente dai cavi di alimentazione, del telefono e di comunicazione può essere pericolosa.

Per evitare il rischio di scosse elettriche:

- **Non collegare o scollegare qualsiasi cavo oppure effettuare l'installazione, la manutenzione o la riconfigurazione del prodotto durante un temporale.**
- **Collegare tutti i fili elettrici a una presa di alimentazione correttamente cablata e dotata di messa a terra.**
- **Collegare alle prese elettriche appropriate tutte le apparecchiature che verranno utilizzate per questo prodotto.**
- **Se possibile, utilizzare solo una mano per collegare o scollegare i cavi di segnale.**
- **Non accendere assolutamente apparecchiature in presenza di incendi, perdite d'acqua o danno strutturale.**
- **Scollegare i cavi di alimentazione, i sistemi di telecomunicazione, le reti e il modem prima di aprire i coperchi del dispositivo, salvo istruzioni contrarie relative alle procedure di installazione e configurazione.**
- **Collegare e scollegare i cavi come descritto nella seguente tabella quando vengono effettuate operazioni di installazione, spostamento o apertura dei coperchi di questo prodotto o delle unità collegate.**

Per collegarsi	Per scollegarsi
1. SPEGNERE le apparecchiature. 2. Innanzitutto, collegare tutti i cavi alle unità. 3. Collegare i cavi di segnale ai connettori. 4. Collegare i cavi di alimentazione alla presa. 5. Accendere l'unità.	1. SPEGNERE le apparecchiature. 2. Innanzitutto, rimuovere i cavi di alimentazione dalla presa. 3. Rimuovere i cavi di segnale dai connettori. 4. Rimuovere tutti i cavi dalle unità.

ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo il Numero parte 45C1566 o un tipo di batteria equivalente consigliato dal produttore. Se sul sistema è presente un modulo che contiene una batteria al litio, sostituirlo solo con un tipo di modulo dello stesso tipo della stessa casa di produzione. La batteria contiene litio e può esplodere se usata, maneggiata o smaltita in modo non corretto.

Non:

- **Gettare o immergere la batteria nell'acqua**
- **Riscaldarla ad una temperatura superiore ai 100 gradi C (212 gradi F)**
- **Smontarla, ricaricarla o tentare di ripararla**

Le batterie usate vanno smaltite in accordo alla normativa in vigore (DPR 915/82 e successive disposizioni e disposizioni locali).

ATTENZIONE:

Quando vengono installati prodotti laser (quali CD-ROM, unità DVD-ROM, unità a fibre ottiche o trasmittenti), tener presente quanto segue:

- **Non rimuovere gli sportelli. L'apertura di un'unità laser può determinare l'esposizione a radiazioni laser pericolose. All'interno dell'unità non vi sono parti su cui effettuare l'assistenza tecnica.**
- **L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.**

PERICOLO

Alcune unità laser contengono un diodo laser di Classe 3A o Classe 3B. Tener presente quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione al fascio.

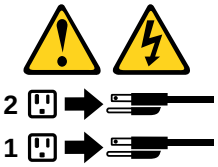
≥18 kg ≥32 kg ≥55 kg

ATTENZIONE:

Prestare attenzione nel sollevare l'apparecchiatura.

ATTENZIONE:

Il pulsante di controllo dell'alimentazione presente sull'unità e l'interruttore dell'alimentatore non disattivano l'alimentazione corrente fornita all'unità. E' possibile che l'unità disponga di più cavi di alimentazione. Per disattivare l'alimentazione dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla fonte di alimentazione.



위험

전원, 전화, 통신 케이블의 전류는 위험합니다.

감전의 위험을 피하려면 다음과 같이 하십시오.

- 번개가 치는 날에는 케이블을 연결 또는 분리하거나 본 제품을 설치, 보수, 재구성하지 마십시오.

- 모든 전원 코드는 올바르게 접지된 전기 콘센트에 연결하십시오.

- 본 제품에 연결될 장치는 올바르게 배선된 콘센트에 연결하십시오.

- 신호 케이블을 연결 또는 분리할 때 가능하면 한 손만을 사용하십시오.

- 불 또는 물로 인한 손상이나 구조적인 손상이 있을 경우 장치의 전원을 절대 켜지 마십시오.

- 설치 및 구성 과정에 별도의 지시 사항이 없는 경우, 장치의 덮개를 열기 전에 연결된 전원 코드, 원격 통신 시스템, 네트워크, 모뎀을 분리하십시오.

- 본 제품이나 연결된 장치를 설치, 이동하거나 덮개를 열 때 다음 표와 같은 순서로 케이블을 연결하거나 분리하십시오.

연결할 때:	분리할 때:
1. 모든 장치의 전원을 끄십시오. 2. 먼저 모든 케이블을 장치에 연결하십시오. 3. 커넥터에 신호 케이블을 연결하십시오. 4. 콘센트에 전원 코드를 연결하십시오. 5. 장치의 전원을 켜십시오.	1. 모든 장치의 전원을 끄십시오. 2. 먼저 콘센트에서 전원 코드를 분리하십시오. 3. 커넥터에서 신호 케이블을 분리하십시오. 4. 장치에서 모든 케이블을 분리하십시오.

주의:
배터리를 교환할 때는 Part Number 45C1566 또는 제조업체에서 지정한 동일한 종류의 제품을 사용하십시오. 사용자의 시스템이 리튬 배터리를 포함하는 모듈일 경우, 동일한 제조업체에서 동일한 모듈 유형으로 생산된 제품으로 교체하십시오. 배터리에는 리튬이 함유되어 있어 잘못 사용, 취급 또는 폐기할 경우 폭발의 위험이 있습니다.

사고를 방지하려면 다음 사항을 준수하십시오.

- 배터리를 물 속에 던지거나 침수시키지 마십시오.

- 100℃(212°F) 이상 가열하지 마십시오.

- 수리하거나 분해하지 마십시오.

배터리를 폐기할 때는 법령 또는 회사의 안전 수칙에 따라 폐기하십시오.

주의:
CD-ROM, DVD-ROM 장치, 광섬유 장치 또는 송신 장치와 같은 레이저 제품을 설치할 때, 다음과 같은 취급 주의사항을 참고하십시오.

- 덮개를 열지 마십시오. 덮개를 열면 레이저 복사 에너지에 노출될 위험이 있습니다. 장치 내부에는 사용자가 조정하거나 수리할 수 있는 부품이 없습니다.

- 규정된 것 이외의 절차 수행, 제어 조정 등의 행위로 인해 해로운 레이저 복사에 노출될 수 있습니다.

위험

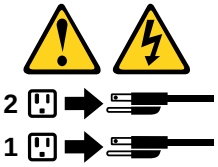
일부 장비에는 임베디드 클래스 3A 또는 클래스 3B 레이저 다이오드가 있습니다. 다음 주의사항에 유의하십시오.

드라이브가 열리면 레이저 복사 에너지가 방출됩니다. 광선이 눈에 직접 쏘이지 않도록 하십시오. 나안 또는 광학 기구를 착용한 상태에서 광선을 직접 바라보지 않도록 하십시오.

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

주의:
제품을 들어 올릴 때
안전 규제를 따르십시오.

주의:
장치의 전원 제어 버튼 및 전원 공급 장치의 전원 스위치를 사용하여 장치에 공급되는 전기를 차단하지 마십시오. 장치는 둘 이상의 코드를 가지고 있을 수 있습니다. 장치에서 모든 전원을 차단하려면 콘센트에서 코드가 모두 분리되어 있는지 확인하십시오.



PELIGRO

La corriente eléctrica procedente de cables de alimentación, teléfonos y cables de comunicación puede ser peligrosa.

Para evitar el riesgo de descarga eléctrica:

- **No conecte ni desconecte los cables ni realice ninguna tarea de instalación, mantenimiento o reconfiguración de este producto durante una tormenta eléctrica.**
- **Conecte todos los cables de alimentación a tomas de corriente debidamente cableadas y conectadas a tierra.**

- **Cualquier equipo que se conecte a este producto también debe conectarse a tomas de corriente debidamente cableadas.**
- **Siempre que sea posible, utilice una sola mano para conectar o desconectar los cables de señal.**
- **No encienda nunca un equipo cuando hay señales de fuego, agua o daños estructurales.**
- **Desconecte los cables de alimentación, los sistemas de telecomunicaciones, las redes y los módems conectados antes de abrir las cubiertas de los dispositivos, a menos que se indique lo contrario en los procedimientos de instalación y configuración.**
- **Conecte y desconecte los cables, como se describe en la tabla siguiente, cuando instale, mueva o abra las cubiertas de este producto o de los dispositivos conectados.**

Para conectar	Para desconectar
1. APÁGUELO todo. 2. En primer lugar, conecte todos los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Enchufe los cables de alimentación a las tomas de corriente. 5. Encienda el dispositivo.	1. APÁGUELO todo. 2. En primer lugar, desenchufe los cables de alimentación de las tomas de corriente. 3. Desconecte los cables de señal de los conectores. 4. Desconecte todos los cables de los dispositivos.

PRECAUCIÓN:

Cuando sustituya una batería de litio, utilice solamente una batería número de pieza 45C1566 u otra de tipo equivalente recomendada por el fabricante. Si su sistema dispone de un módulo que contiene una batería de litio, reemplácelo sólo con el mismo tipo de módulo, del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

No debe:

- **Arrojarla al agua o sumergirla en ella**
- **Exponerla a temperaturas superiores a 100°C (212°F)**
- **Repararla o desmontarla**

Deshágase de la batería según especifiquen las leyes o normas locales.

PRECAUCIÓN:

Cuando haya productos láser (como unidades de CD-ROM, unidades de DVD, dispositivos de fibra óptica o transmisores) instalados, tenga en cuenta lo siguiente:

- **No quite las cubiertas. Si quita las cubiertas del producto láser, podría quedar expuesto a radiación láser peligrosa. Dentro del dispositivo no existe ninguna pieza que requiera servicio técnico.**
- **Si usa controles o ajustes o realiza procedimientos que no sean los especificados aquí, podría exponerse a radiaciones peligrosas.**

PELIGRO

Algunos productos láser tienen incorporado un diodo láser de clase 3A o clase 3B. Tenga en cuenta lo siguiente:

Cuando se abre, queda expuesto a radiación láser. No mire directamente al rayo láser, ni siquiera con instrumentos ópticos, y evite exponerse directamente al rayo láser.

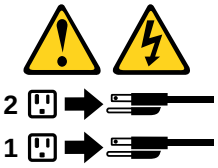
≥18 kg ≥32 kg ≥55 kg

PRECAUCIÓN:

Adopte procedimientos seguros al levantar el equipo.

PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no desconectan la corriente eléctrica suministrada al dispositivo. Además, el dispositivo podría tener más de un cable de alimentación. Para suprimir toda la corriente eléctrica del dispositivo, asegúrese de que todos los cables de alimentación estén desconectados de la toma de corriente.



Chapter 2. Important service information

Strategy for replacing FRUs

Before replacing parts:

Ensure that all software fixes, drivers, and UEFI BIOS downloads are installed before you replace any FRUs listed in this manual.

After a system board is replaced, ensure that the latest UEFI BIOS is loaded to the system board before you complete the service action.

To download and install software fixes, drivers, and UEFI BIOS, go to https://pcsupport.lenovo.com and follow the instructions on the screen.

Use the following strategy to prevent unnecessary expense for replacing and servicing FRUs:

- If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or a device consists of more than one FRU, any of the FRUs might be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Strategy for replacing a hard disk drive or a solid-state drive

Always try to run a low-level format operation before replacing a hard disk drive or a solid-state drive. This will cause all customer data on the drive to be lost. Ensure that the customer has a current backup of the data before you perform this task.

Attention: The drive startup sequence in the computer you are servicing might have been changed. Be extremely careful during write operations such as copying, saving, or formatting. If you select an incorrect drive, data or programs can be overwritten.

Important notice for replacing a system board

Some components mounted on a system board are very sensitive. Improper handling of a system board can cause damage to those components, and may cause a system malfunction.

After replacing the system board, use the Golden Key U1 tool to bind the model type, serial number, and Brand ID of the computer with the new system board. Refer to https://support.lenovo.com/us/en/solutions/ht102004 for instructions.

Attention: When handling a system board:

- Do not drop a system board or apply any excessive force to it.
- Avoid rough handling of any kind.
- Avoid bending a system board and hard pushing to prevent cracking at each Ball Grid Array (BGA) chipset.

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How to use error codes

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code might also cause false error codes. If no error code is displayed, see whether the error symptom is listed in the “Symptom-to-FRU Index” section.

Strategy for replacing FRUs for CTO, special-bid, and standard models

This topic provides information about the model types and FRU identification.

Product definition

This topic introduces different model types and how to identify each type.

Dynamic Configure To Order (CTO) model

This model provides the ability for a customer to configure a Lenovo solution from a Web site, and have this configuration sent to fulfillment, where it is built and shipped directly to the customer. The machine label and eSupport will load these products as the 4-character MT, 4-character model, and 2-character country code. The model is “CTO1” and the default country code is “WW” (example: 20AACTO1WW).

Special-bid model

This model is a unique configuration that has been negotiated between Lenovo and the customer. A unique MTM consists of a 4-character MT, a 4-character model, and a numeric 2-character country code is provided to the customer to place orders (example: 20AA000955). The country code assigned is numeric and does not designate a specific country or region. The custom model factsheet for the MTM indicates which country the special-bid MTM is set up for. Special-bid offering is not generally announced.

Standard model

Standard models (fixed configuration) are announced and offered to all customers. The MTM portion of the machine label consists of a 4-character MT, a 4-character model, and an alphabetic 2-character country code. The country code assigned is alphabetic and represents a designated country or region (example: 20AA0009UK).

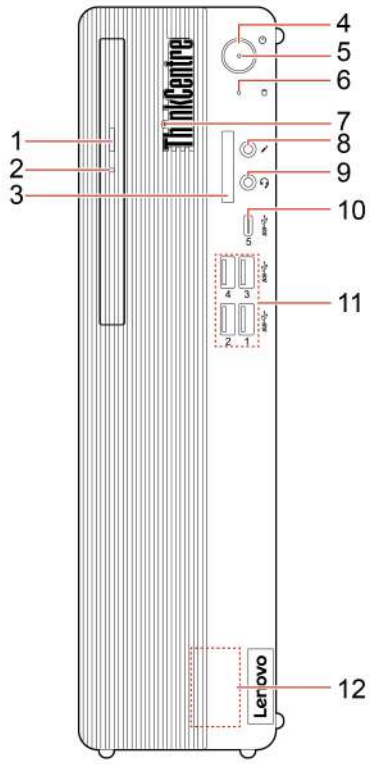
FRU identification

To identify FRUs for a product, do the following:

1. Go to: https://support.lenovo.com/partslookup.
2. Type the Machine Type in the corresponding field to get a general FRU list, or type the Serial Number for more detailed FRU information.

Chapter 3. Product overview

Front



Item	Description	Item	Description
1	Optical drive eject button*	2	Optical drive activity indicator*
3	SD-card slot*	4	Power button
5	Power indicator	6	Storage drive activity indicator
7	ThinkCentre® LED	8	Microphone connector
9	Headset connector	10	USB-C® connector (USB 5Gbps)
11	USB-A connectors (USB 5Gbps)	12	Internal speaker*

* for selected models

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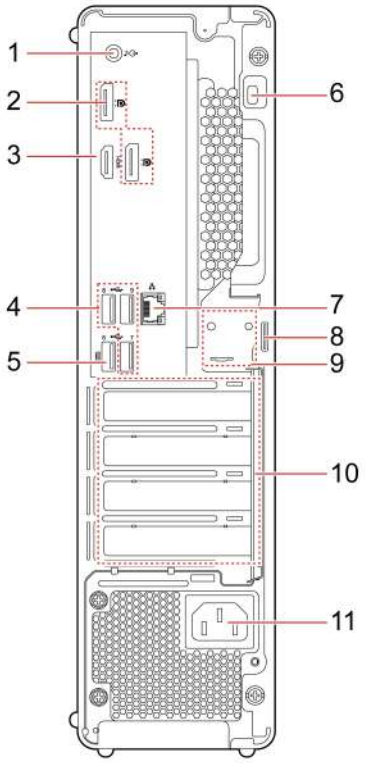
Rear



Item	Description	Item	Description
1	Audio line-out connector	2	DisplayPort™ out connectors
3	HDMI™ out connector	4	USB-A connectors (Hi-Speed USB)
5	USB-A connector (Hi-Speed USB) with smart power-on feature	6	Security-lock slot
7	Ethernet connector	8	Padlock loop
9	E-lock slots	10	PCI-Express card area
11	Power cord connector		

* for selected models

Chapter 4. Service checkout and symptom-to-FRU index

This chapter provides information about general service checkout and symptom-to-FRU index.

Service checkout

Attention: The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive.

General error messages appear if a problem or conflict is found by a program, the operating system, or both. For an explanation of these messages, refer to the information supplied with that software package.

Use the following procedure to help determine the cause of the problem:

1. Turn off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Turn on all external devices.
5. Turn on the computer.
   - Look for displayed error codes.
   - Listen for beep codes.
   - Look for readable instructions or a main menu on the display.

   If you *did not* receive the correct response, proceed to step 6 on page 31.

   If you *do* receive the correct response, proceed to step 7 on page 31.
6. Look at the following conditions and follow the instructions:
   - If you hear beep codes during POST, go to “Beep symptoms” on page 33.
   - If the computer displays a POST error, go to “POST error codes” on page 34.
   - If the computer hangs and no error is displayed, continue at step 7 on page 31.
7. Run the Diagnostic programs. See Chapter 5 “Diagnostics” on page 39.
   - If you receive an error, replace the part that the diagnostic program calls out.
   - If the test stops and you cannot continue, replace the last device tested.

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk drive upgrades
- Failure symptom
  - Do diagnostics indicate a failure?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?

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  - If it has been working, what changes were made prior to its failing?
  - Is this the original reported failure?
- Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Notes: To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same Diagnostic Diskettes (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operating system control files

Comparing the configuration and software set-up between “working and non-working” systems will often lead to problem resolution.

Symptom-to-FRU index

The Symptom-to-FRU index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with “Service checkout” on page 31. This index can also be used to help you decide which FRUs to have available when servicing a computer. If you are unable to correct the problem using this index, go to “Undetermined problems” on page 37.

Notes:

- The Symptom-to-FRU index is not specific to any machine type and are applicable to all computers.
- If you have both an error message and an incorrect audio response, diagnose the error message first.
- If you cannot run the diagnostic tests or you get a diagnostic error code when running a test, but did receive a POST error message, diagnose the POST error message first.
- If you did not receive any error message, look for a description of your error symptoms in the first part of this index.

Hard disk drive boot error

A hard disk drive boot error can have the following causes.

Error	FRU/Action
The start-up drive is not in the boot sequence in configuration.	Check the configuration and ensure that the start-up drive is in the boot sequence.
No operating system installed on the boot drive.	Install an operating system on the boot drive.

Error	FRU/Action
The boot sector on the startup drive is corrupted.	The drive must be formatted. Do the following: 1. Attempt to back up the data on the failing hard disk drive. 2. Using the operating system programs, format the hard disk drive.
The drive is defective.	Replace the hard disk drive.

Power supply problems

If you suspect a power problem, use the following procedures.

Check/Verify	FRU/Action
Check the following for proper installation. • Power cord • On/Off switch connector • On/Off switch power supply connector • System board power supply connectors • Microprocessor connection	Reseat connectors
Check the power cord for continuity.	Power cord
Check the power-on switch for continuity.	Power-on switch

Beep symptoms

Beep symptoms are tones or a series of tones separated by pauses (intervals without sound) during POST.

The following table describes the beep symptoms.

Beep symptom	FRU/Action
2 short beeps: common POST error	Common POST error code. See the detailed failure information in “POST error codes” on page 34.
3 short and 1 long beeps: DRAM memory error	Perform the following actions in order: 1. Make sure that the memory modules are properly seated in the memory slots. 2. Replace the memory modules. 3. Replace the system board.
4 long beeps: insufficient shadow RAM resources for option ROM (error code: 8998) or PCIe/PCI MMIO (memory mappedinput/output) resources (error code: 8999)	See the detailed failure information in “POST error codes” on page 34.
2 long and 3 short beeps: graphics card error	Perform the following actions in order: 1. Make sure that the graphics cards are properly seated in the slots. 2. Replace the graphics cards. 3. Replace the system board.

POST error codes

Each time you turn on the system, it performs a series of tests that check the operation of the system and some options. This series of tests are called the *Power-On Self-Test*, or *POST*. POST checks the following operations:

- Some basic system-board operations
- Memory operation
- Video operation
- Whether the boot drive is working

If the POST detects a problem, an error message appears on the screen. A single problem might cause several error messages to appear. When you correct the cause of the first error message, the other error messages probably will not appear on the screen the next time.

Error code	POST error message	Description/Action
0135	CPU fan failure System fan failure Power fan failure Front fan failure Rear fan failure Auxiliary fan failure ODD fan failure	This error message is displayed when a fan fails and the system might be overheating. Press F10 to exit.
0162	Setup data integrity check failure	This error indicates the checksum of BIOS Setup data in NVRAM is bad. In BIOS Setup, the “Save Changes and Exit” operation is needed in order to clear this error.
0164	Memory configuration change has occurred	This error message is displayed when the memory size is changed. Press F10 to exit.
1762	Storage device configuration change has occurred	This error message is displayed when a hard disk drive change or an optical drive change has been made. Press F10 to exit.

Error code	POST error message	Description/Action
8998	Not enough shadow RAM resources for OPTION ROM, not all devices initialized. Suggest to remove some add-on cards, or change to UEFI mode in BIOS setup.	This error message is displayed when the shadow RAM resources for option ROM are insufficient. If the legacy option ROM is insufficient, remove some add-in cards. For the system that supports UEFI, set UEFI as the first priority.
8999	Not enough PCIe/PCI MMIO resources. Currently only one video card is enabled. Remove some PCIe cards.	This error message is displayed when the PCIe/PCI MMIO (memory mapped input/output) resources are insufficient. Remove some add-in cards.

Miscellaneous error conditions

Message/Symptom	FRU/Action
Changing display colors	**Display/Monitor**
Computer will *not* power-off. See “Hard disk drive boot error” on page 32.	1. Power Switch 2. System Board 3. Riser card, if installed.
Computer will *not* RPL from server	1. Ensure that the network is in startup sequence as the first device or the first device after diskette. 2. Ensure that the network adapter is enabled for RPL. 3. Network adapter (Advise network administrator of new MAC address)
Computer will *not* perform a Wake On LAN® (if applicable)	1. Check the power supply and signal cable connections to the network adapter. 2. Ensure that the operating system settings are set to enable Wake on LAN. 3. Ensure that the Wake On LAN feature is enabled in Setup/Configuration. 4. Ensure that the network administrator is using the correct MAC address. 5. Ensure no interrupt or I/O address conflicts. 6. Network adapter (advise network administrator of new MAC address)
Dead computer. See “Hard disk drive boot error” on page 32.	1. Power Supply 2. System Board
Diskette drive in-use light remains on or does not light when drive is active.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable

Message/Symptom	FRU/Action
Blank screen except for flashing cursor.	1. System Board 2. Primary Hard Disk Drive 3. Hard Disk Drive Cable
Incorrect memory size during POST	1. Run the Memory tests. 2. Memory Module 3. System Board
"Insert a Diskette" icon appears with a known-good diagnostics diskette in the first 3.5-inch diskette drive.	1. System Board 2. Diskette Drive Cable 3. Network Adapter
Intensity or color varies from left to right of characters and color bars	1. Display 2. Video adapter (if present) 3. System Board
No power or fan not running	1. See “Hard disk drive boot error” on page 32.
Non-system disk or disk error-type message with a known-good diagnostic diskette.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable
Other display symptoms not listed above (including blank or illegible display)	1. Display 2. System Board
Power-on indicator or hard disk drive in-use light not on, but computer works correctly	1. Power switch/LED assembly 2. System Board
Printer problems	1. Printer 2. System Board
Program loads from the hard disk with a known-good diagnostics diskette in the first 3.5-inch diskette drive	1. Run the Setup Utility program and check the Startup sequence. 2. Diskette Drive 3. Diskette Drive Cable 4. System Board 5. Power Supply
RPL computer cannot access programs from its own hard disk.	1. If the network administrator is using LCCM Hybrid RPL, check the startup sequence: a. **First device - network** b. **Second device - hard disk** 2. Hard disk drive
RPL computer does not RPL from server	1. Check the startup sequence. 2. Check the network adapter LED status.

Message/Symptom	FRU/Action
Serial or parallel connector device failure (system board connector)	1. External Device Self-Test OK? 2. External Device 3. Cable 4. System Board
Serial or parallel connector device failure (adapter connector)	1. External Device Self-Test OK? 2. External Device 3. Cable 4. Alternate Adapter 5. System Board
Some or all keys on the keyboard do not work	1. Keyboard 2. Keyboard Cable 3. System Board

Undetermined problems

This section provides instructions on how to find out the failing devices or adapters.

1. Turn off the computer.
2. Remove or disconnect the following components (if installed) one at a time.
   a. External devices (modem, printer, or mouse)
   b. Any adapters
   c. Memory modules
   d. Extended video memory
   e. External Cache
   f. External Cache RAM
   g. Hard disk drive
   h. Diskette drive
3. Turn on the computer to retest the system.
4. Repeat steps 1 through 3 until you find the failing device or adapter.

If all devices and adapters have been removed, and the problem continues, replace the system board. See Chapter 6 “Hardware removal and installation” on page 43.

Recover from a BIOS update failure

1. Remove all media from the drives and turn off all connected devices.
2. Insert the BIOS update disc into the optical drive, and then turn off the computer.
3. Disconnect all power cords from electrical outlets. Then, remove any parts that impede access to the CLR1 button.
4. Reconnect the power cords for the computer and the monitor to electrical outlets.
5. Press and hold the CLR1 button, and then turn on the computer and the monitor.
6. Release the CLR1 button when the computer beeps. The recovery process begins.
7. After the recovery process is completed, the computer will be turned off automatically.

Note: Depending on the computer model, the recovery process will take two to three minutes.

8. Disconnect all power cords from electrical outlets.
9. Reinstall all the parts that have been removed. Then, reconnect the power cords for the computer and the monitor to electrical outlets.
10. Turn on the computer and the monitor. When the logo screen is displayed, press F1 or Fn+F1.
11. To prevent data loss, ensure that BIOS settings are restored to an earlier point.

Clear CMOS

1. Remove all media from the drives and turn off all connected devices and the computer.
2. Disconnect all power cords from electrical outlets. Then, remove any parts that impede access to the CLR1 button.
3. Reconnect the power cords for the computer and the monitor to electrical outlets.
4. Press and hold the CLR1 button, and then turn on the computer and the monitor.
5. Release the CLR1 button when the computer beeps. Wait for approximately 10 seconds.
6. Turn off the computer by holding the power button for approximately four seconds.
7. Disconnect all power cords from electrical outlets.
8. Reinstall all the parts that have been removed. Then, reconnect the power cords for the computer and the monitor to electrical outlets.
9. Turn on the computer and the monitor. When the logo screen is displayed, press F1 or Fn+F1.
10. To prevent data loss, ensure that BIOS settings are restored to an earlier point.

Chapter 5. Diagnostics

Use diagnostic solutions to test hardware components and report operating-system-controlled settings that interfere with the correct operation of your computer.

Basic procedure for resolving computer problems

Prerequisite

Before you start, read Chapter 1 “Important safety information” on page 1 and print the following instructions.

1. Check that:
   a. The cables for all connected devices are connected correctly and securely.
   b. All components have been reassembled correctly.
   c. All connected devices that require ac power are connected to properly grounded and working electrical outlets.
   d. All connected devices are enabled in UEFI BIOS.
2. Use an antivirus program to see if the computer has been infected by a virus. If the program detects a virus, remove the virus.
3. Go to “Self-help resources” on page 40 and follow the instructions for the type of problem you are experiencing.
4. Run the diagnostic program.
5. Recover your operating system.
6. If the problem persists, contact Lenovo.

UEFI diagnostic program

A UEFI diagnostic program is preinstalled on the computer. It enables you to test memory modules and internal storage devices, view system information, and check and recover bad sectors on internal storage devices.

To run the UEFI diagnostic program, do the following:

1. Turn on the computer. If the computer cannot be turned on, go to “Basic procedure for resolving computer problems” on page 39. If an error code is displayed, go to “Symptom-to-FRU index” on page 32 for error code descriptions and troubleshooting hints.
2. Repeatedly press and release the F10 key when turning on the computer. The main screen of the UEFI diagnostic program is displayed.
3. Follow the instructions on the screen to use the diagnostic program.

The options on the main screen are as follows:

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Table 1. Options on the main screen of the UEFI diagnostic program

DIAGNOSTICS	TOOLS
• **CPU [U]** • **DISPLAY [D]** • **MEMORY [E]** • **MOTHERBOARD [H]** • **PCI EXPRESS [P]** • **STORAGE [S]** • **AUDIO [Z]** • **OPTICAL [O]** • **RUN ALL [R]**	• **SYSTEM INFORMATION [F1]** • **BAD BLOCK RECOVERY [F3]** • **SMART INFORMATION [F5]**

Note: The options on the main screen might vary, depending on the hardware configuration and the UEFI diagnostic program version preinstalled on the computer.

Lenovo diagnostic tools

For information about Lenovo diagnostic tools, go to:
https://pcsupport.lenovo.com/lenovodiagnosticsolutions

Self-help resources

Use the following self-help resources to learn more about the computer and troubleshoot problems.

Resources	How to access?
Troubleshooting and frequently asked questions	• https://www.lenovo.com/tips • https://forums.lenovo.com
Accessibility information	https://www.lenovo.com/accessibility
Reset or restore Windows	• Use Lenovo recovery options. 1. Go to https://support.lenovo.com/HowToCreateLenovoRecovery. 2. Follow the on-screen instructions. • Use Windows recovery options. 1. Go to https://pcsupport.lenovo.com. 2. Detect your computer or manually select your computer model. 3. Navigate to the troubleshooting menu to diagnose the operating system for recovery instructions.

Resources	How to access?
Use the Vantage app to: • Configure device settings. • Download and install UEFI BIOS, drivers and firmware updates. • Secure you computer from outside threats. • Diagnose hardware problems. • Check the computer warranty status. • Access *User Guide* and helpful articles. **Note:** The available features vary depending on the computer model.	Type `Vantage` in the Windows search box.
Product documentation: • *Safety and Warranty Guide* • *Generic Safety and Compliance Notices* • *Setup Guide* • This *User Guide* • *Regulatory Notice*	Go to https://pcsupport.lenovo.com. Then, follow the on-screen instructions to filter out the documentation you want.
Lenovo Support Web site with the latest support information of the following: • Drivers and software • Diagnostic solutions • Product and service warranty • Product and parts details • Knowledge base and frequently asked questions	https://pcsupport.lenovo.com
Windows help information	• Type `Get Help` or `Tips` in the Windows search box. • Use Windows Search or the Cortana® personal assistant. • Microsoft support Web site: https://support.microsoft.com

Chapter 6. Hardware removal and installation

This chapter provides instructions on how to remove and install hardware for your computer.

Handling static-sensitive devices

Do not open the static-protective package containing the new part until the defective part has been removed and you are ready to install the new part. Static electricity, although harmless to you, can seriously damage computer components and options.

When you handle options and other computer components, take these precautions to avoid static-electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle options and other computer components carefully. Handle PCI/PCIe cards, memory modules, system boards, and microprocessors by the edges. Never touch any exposed circuitry.
- Prevent others from touching the options and other computer components.
- Touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity from the package and your body before you install or replace a new part.
- When possible, remove the new part from the static-protective package, and install it directly in the computer without setting the part down. When this is not possible, place the static-protective package on a smooth, level surface and place the part on the package.
- Do not place the part on the computer cover or other metal surface.

Service tool kit

Ensure that the following common service tool kit is prepared before you service the computer.

No.	Tool name	Specific	Product scope	Tool type
1	Screw driver: Phillips Head 0	PH0	All	Common tool
2	Screw driver: Phillips Head 00	PH00	All	Common tool
3	Screw driver: Phillips Head 01	1	All	Common tool
4	Screw driver: Phillips Head 01	1, Shank length greater than 6 inches	ThinkStation/DT	Common tool
5	Screw driver: Phillips Head 02	2, Shank length greater than 6 inches	ThinkStation/SC/DT	Common tool
6	Screw driver: Torx Head T5	T5	IdeaPad	Common tool

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No.	Tool name	Specific	Product scope	Tool type
7	Screw driver: Torx Head T15	T15, for Chassis outside	ThinkStation	Common tool
8	Screw driver: Torx Head T20	T20, Shank length greater than 6 inches, for heatsink and CPU	ThinkStation	Common tool
9	Screw driver: Torx Head T30	T30, Shank length greater than 6 inches, for heatsink and CPU	ThinkStation	Common tool
10	Pry tools 1	N/A	All	Common tool
11	Tweezers (conductive)	N/A	All	Common tool
12	Tweezers (isolated)	N/A	All	Common tool
13	Suction cup	N/A	All	Common tool
14	Hexagonal socket (for VGA)	H5 mm or 4.8 mm	ThinkCentre/Tiny	Common tool
15	Hexagonal socket (for Tinyantenna)	H8 mm	ThinkCentre/Tiny	Common tool
16	Ajustable Torque Screwdriver	0.2 Nm to 4.0 Nm, Threadripper CPU, CAMM, etc	All	Common tool
17	ESD Mat	ESD Mat	All	Common tool
18	USB Flash Drives	For Golden Key, Chrome Reloads, AutoPilot, etc	All	Common tool
19	USB-C to USB-A Converter	For USB-C only systems	All	Common tool
20	SSD/WWAN/IC Thermal pad	Variety of thickness, most common 0.5mm thickness pad under the component	All	Consumable
21	Silicone grease for CPU or heatsink repairing	N/A	All	Consumable
22	Polyamide tape	N/A	All	Consumable
23	Mylar tape	N/A	All	Consumable

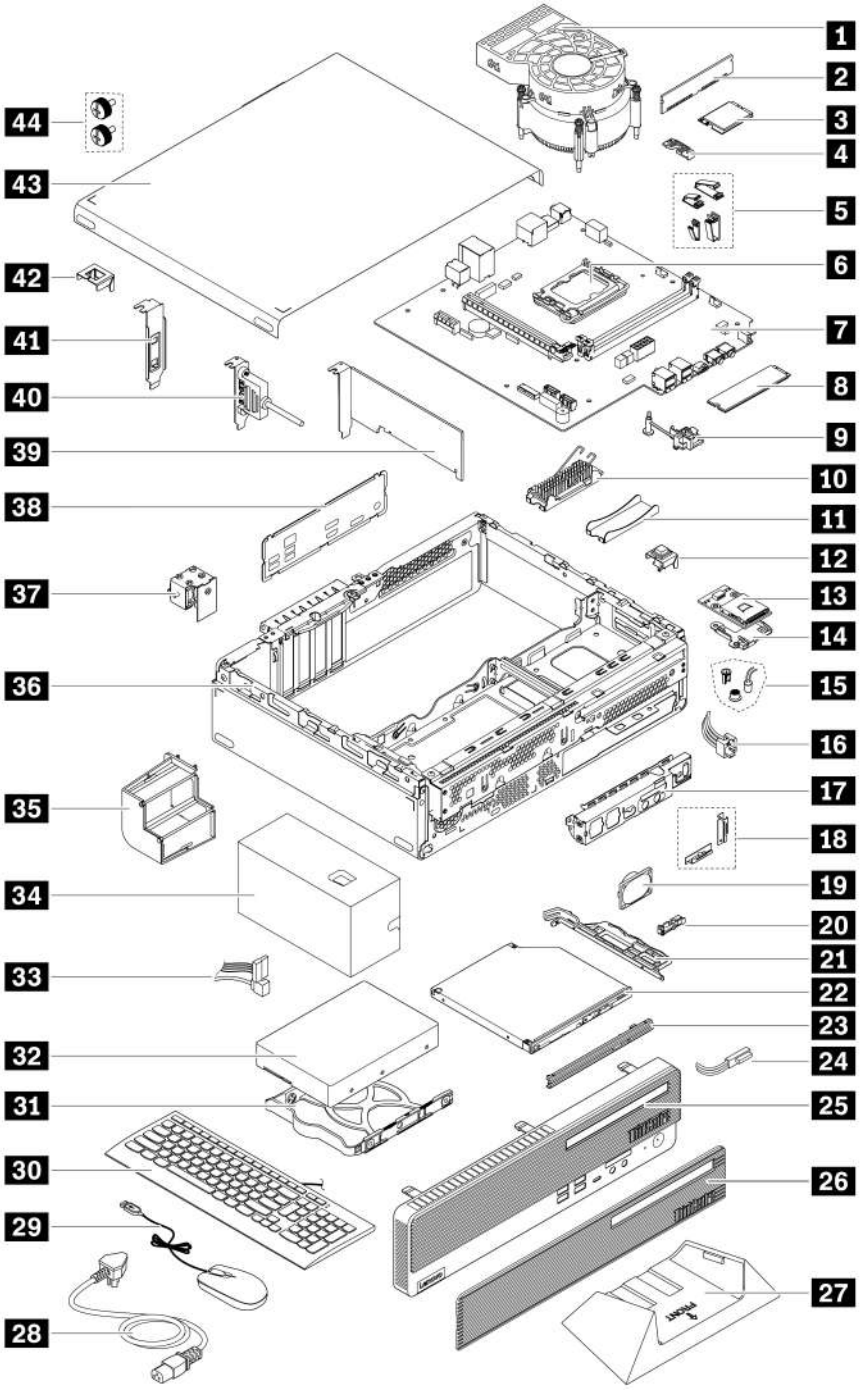
No.	Tool name	Specific	Product scope	Tool type
24	Eraser	N/A	All	Consumable
25	Electrical tape	N/A	All	Consumable
26	Double sided tape	N/A	All	Consumable
27	Conductive tape	N/A	All	Consumable
28	Cleaning pads/wipes	N/A	All	Consumable
29	Heat gun	N/A	All	Special Tool (Depot only)
30	Brown brush	25 mm to 35 mm wide	All	Special tool
31	Contact Cleaner Spray	WD-40 Contact Cleaner for battery connector	ThinkPad X1 Carbon	Special tool
32	Hexagonal socket	17 mm	Yoga AIO 7 27ACH6/ Yoga AIO 7 27ARH6	Special tool

Note: The silicone grease can be applied to the surfaces of the microprocessor and heat sink to eliminate air gaps. For parts with silicone grease applied, it is suggested that you apply new grease during the installation.

Major FRUs and CRUs

Your computer contains the following types of CRUs and FRUs:

- **Self-service CRUs:** Refer to parts that can be replaced easily by customer themselves or by trained service technicians at an additional cost.
- **Optional-service CRUs:** Refer to parts that can be replaced by customers with a greater skill level. Trained service technicians can also provide service to replace the parts under the type of warranty designated for the customer's machine.
- **FRUs:** Refer to parts that are more complicated to replace and it is recommended that these should be replaced by trained service technicians. If customers elect to replace the FRU by themselves, we recommend that you ensure the correct instructions provided by Lenovo are carefully followed.



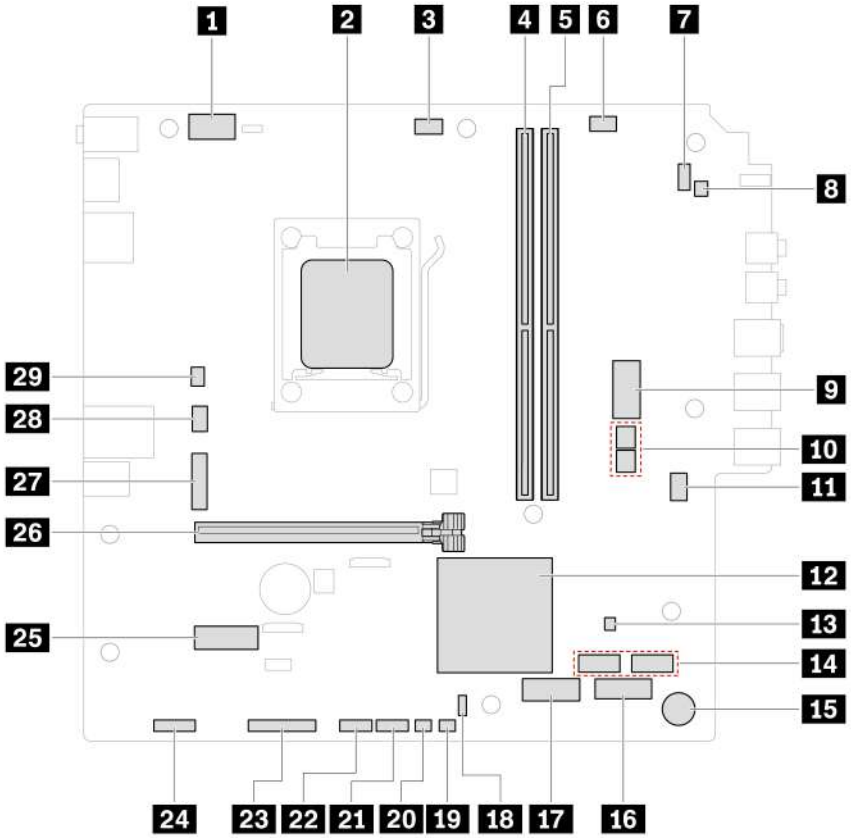
Number	Description	Self-service CRU	Optional-service CRU
1	Heat sink and fan assembly	No	No
2	Memory module	Yes	No
3	Wi-Fi card*	No	No
4	Wi-Fi card shield*	No	No
5	Smart cable clip*	Yes	No
6	Microprocessor	No	No

Number	Description	Self-service CRU	Optional-service CRU
7	System board	No	No
8	M.2 solid-state drive*	Yes	No
9	M.2 solid-state drive bracket*	Yes	No
10	Heat sink for M.2 solid-state drive (Type 1)*	Yes	No
11	Heat sink for M.2 solid-state drive (Type 2)*	Yes	No
12	Cover presence switch (intrusion switch)	No	No
13	Card reader*	No	No
14	Card reader bracket*	No	No
15	ThinkCentre® LED cable	No	No
16	Power button cable	No	No
17	Front I/O bracket	No	No
18	Wi-Fi antennas*	No	No
19	Internal speaker*	No	No
20	Thermal sensor	No	No
21	Optical drive bracket*	Yes	No
22	Optical drive*	Yes	No
23	Optical drive bezel*	No	No
24	Optical drive cable*	No	No
25	Front bezel	Yes	No
26	Dust shield	Yes	No
27	Vertical stand*	Yes	No
28	Power cord	Yes	No
29	Mouse*	Yes	No
30	Keyboard*	Yes	No
31	3.5-inch hard disk drive bracket*	Yes	No
32	3.5-inch hard disk drive*	Yes	No
33	3.5-inch hard disk drive cable*	No	No
34	Power supply assembly	No	Yes
35	Air deflector*	Yes	No
36	Chassis	No	No
37	E-lock*	No	Yes
38	Rear I/O shielding	No	No
39	PCI-Express card*	Yes	No
40	PCI-Express connector cable*	No	No
41	PCI-Express bracket*	No	No
42	C2 bracket	No	No

Number	Description	Self-service CRU	Optional-service CRU
43	Computer cover	Yes	No
44	Thumb screws	No	No

For detailed FRU and CRU information, such as the FRU part numbers and supported computer models, go to:
http://www.lenovo.com/serviceparts-lookup

System board illustration



Item	Description	Item	Description
1	8-pin power connector	2	Microprocessor socket
3	Microprocessor fan connector	4	Memory slot (DIMM1)
5	Memory slot (DIMM2)	6	Auxiliary fan connector 2
7	Power button connector	8	Internal speaker connector
9	10-pin power connector	10	SATA power connectors
11	Auxiliary fan connector 1	12	FCH
13	ThinkCentre LED connector	14	SATA 3.0 connectors (2)
15	Buzzer	16	M.2 solid-state drive slot
17	M.2 Wi-Fi card slot	18	Clear CMOS (Complementary Metal Oxide Semiconductor)/Recovery jumper
19	Thermal sensor connector	20	Cover presence switch connector (intrusion switch connector)
21	Front USB connector 2	22	Front USB connector 1
23	Parallel connector	24	Serial (COM1) connector
25	PCI-Express x1 card slot	26	PCI-Express x16 graphics card slot

Item	Description	Item	Description
27	M.2 solid-state drive slot	28	System fan connector
29	E-lock connector		

Removing and installing hardware

This section provides instructions on how to remove and install hardware for your computer.

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 “Important safety information” on page 1.

External options

You can connect external options to your computer, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When installing an external option, see Chapter 3 “Product overview” on page 29 to identify the required connector. Then, use the instructions that come with the option to help you make the connection and install any required software or device drivers.

Vertical stand

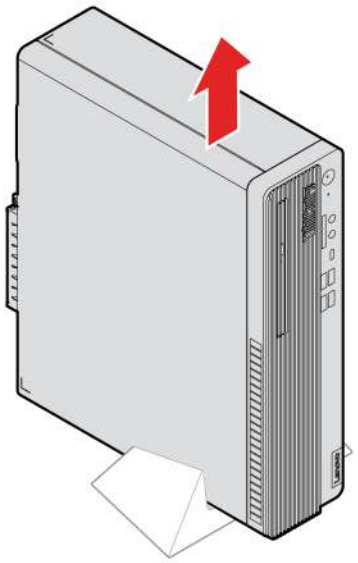
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Turn off the computer and remove all connected devices and cables.
2. Disconnect the computer from ac power and all connected cables.

Removal step



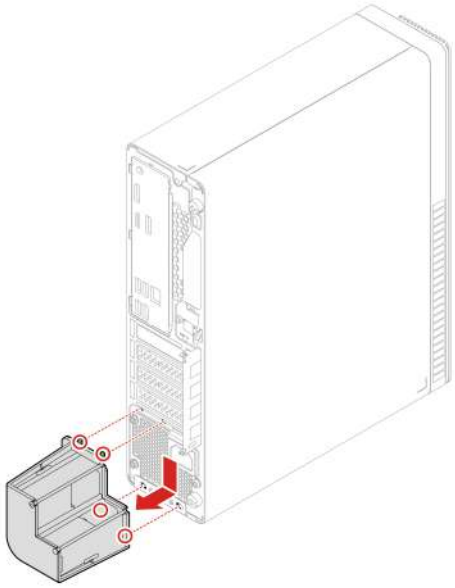
Air deflector

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the vertical stand. See “Vertical stand” on page 50.

Removal step



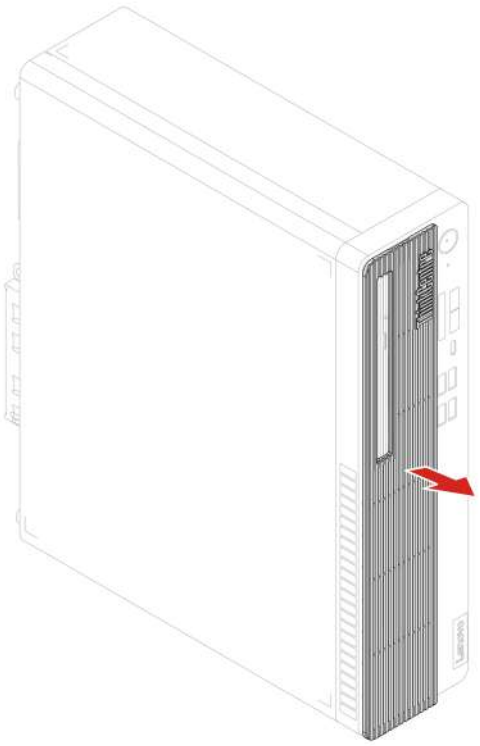
Dust shield

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the vertical stand. See “Vertical stand” on page 50.

Removal step



Computer cover

Prerequisite

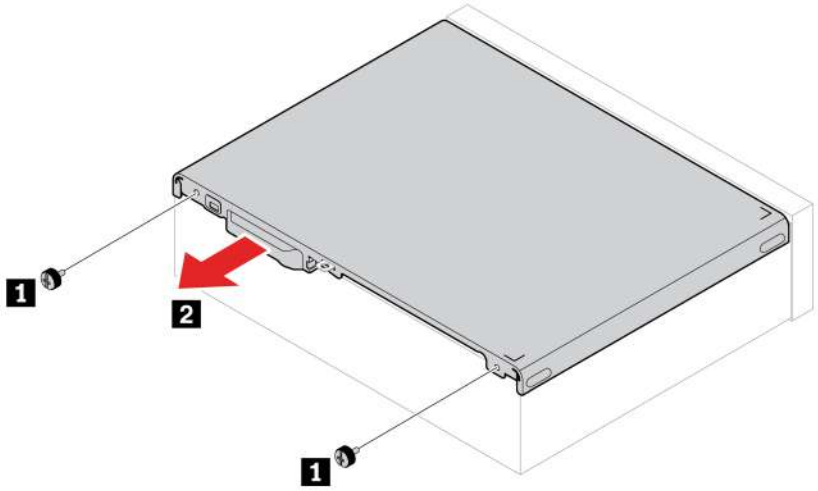
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

For access, do the following:

1. Turn off the computer and remove all connected devices and cables.
2. Disconnect all power cords from electrical outlets and disconnect all cables from the computer.
3. Unlock any locking device that secures the computer cover.
4. Remove the vertical stand. See “Vertical stand” on page 50.

Removal steps



No.	Screw (quantity)	Color	Torque
1	6–32 x 7.5 mm, Nickel coated (2)	Sliver	3 ± 0.3 lb/in

Note: If a locking device is available, use it to lock the computer after installing the computer cover.

Front bezel

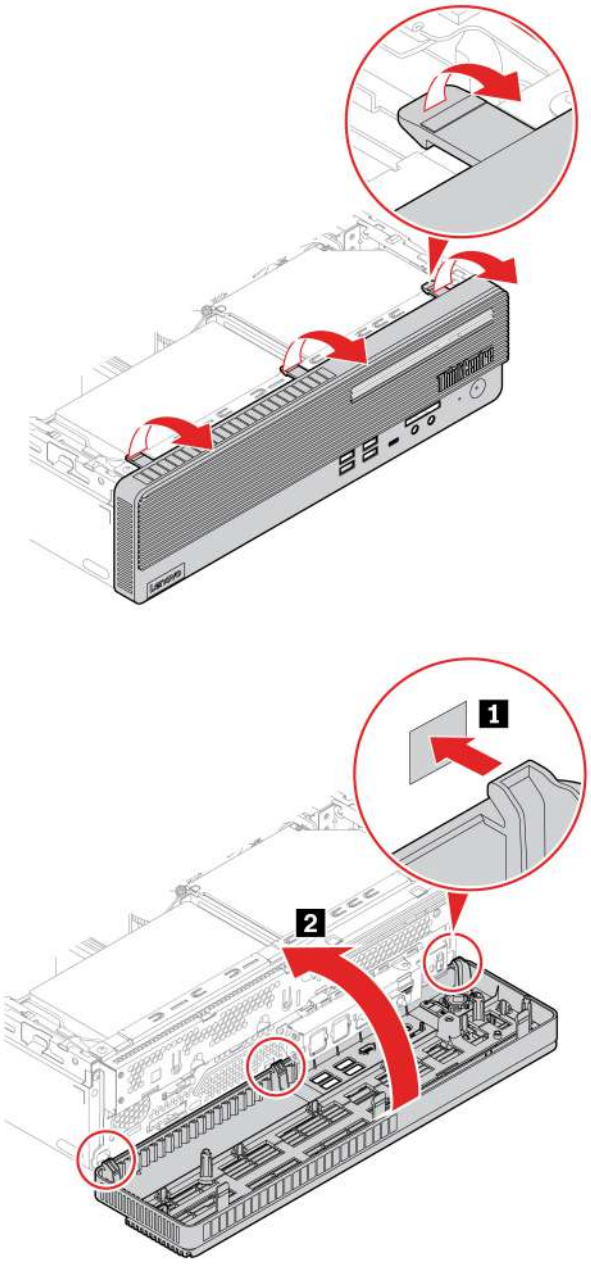
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.

Replacement procedure



Optical drive

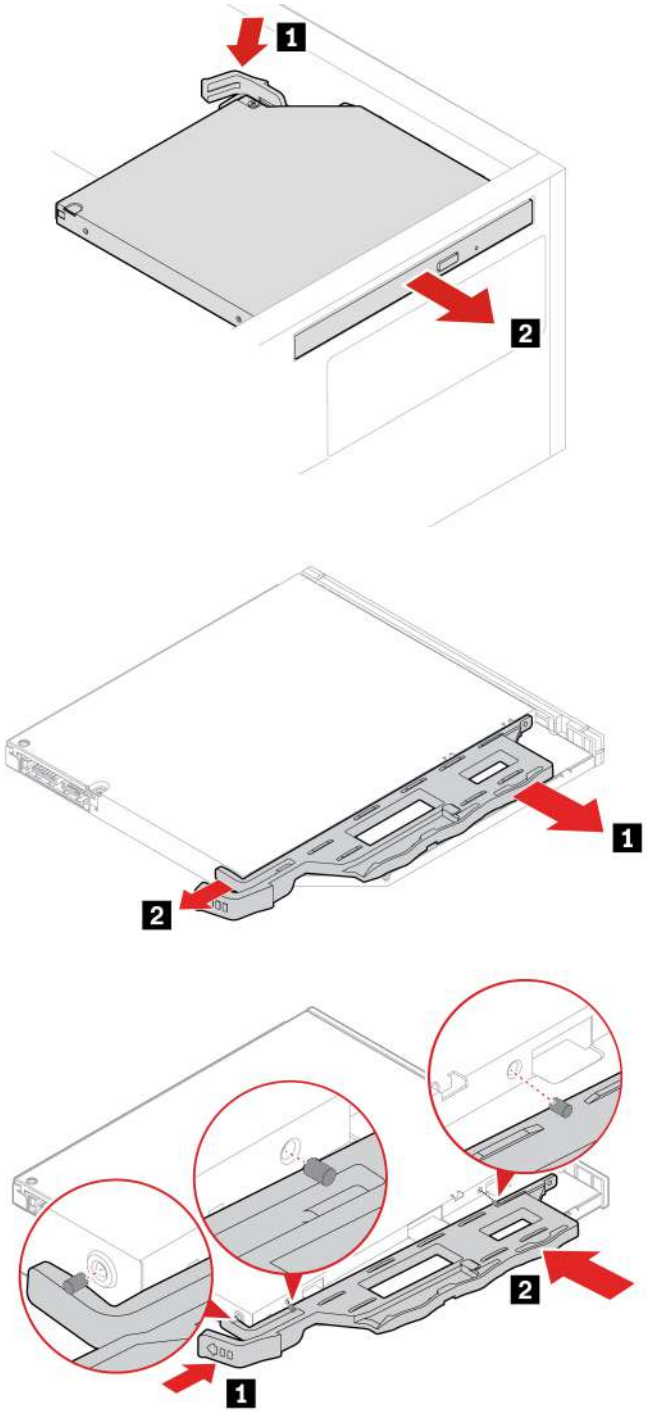
Prerequisite

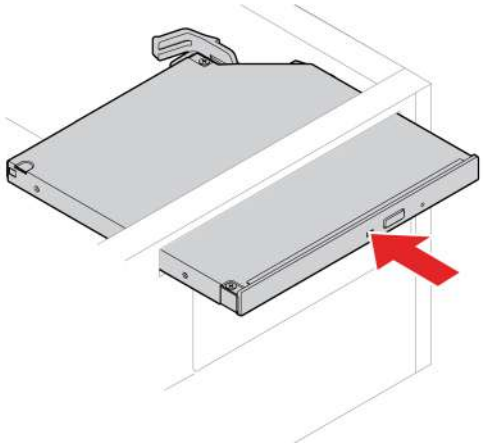
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the vertical stand. See “Vertical stand” on page 50.
2. Remove the computer cover. See “Computer cover” on page 52.
3. Disconnect the signal and power cable from the optical drive.

Replacement procedure





Optical drive bezel

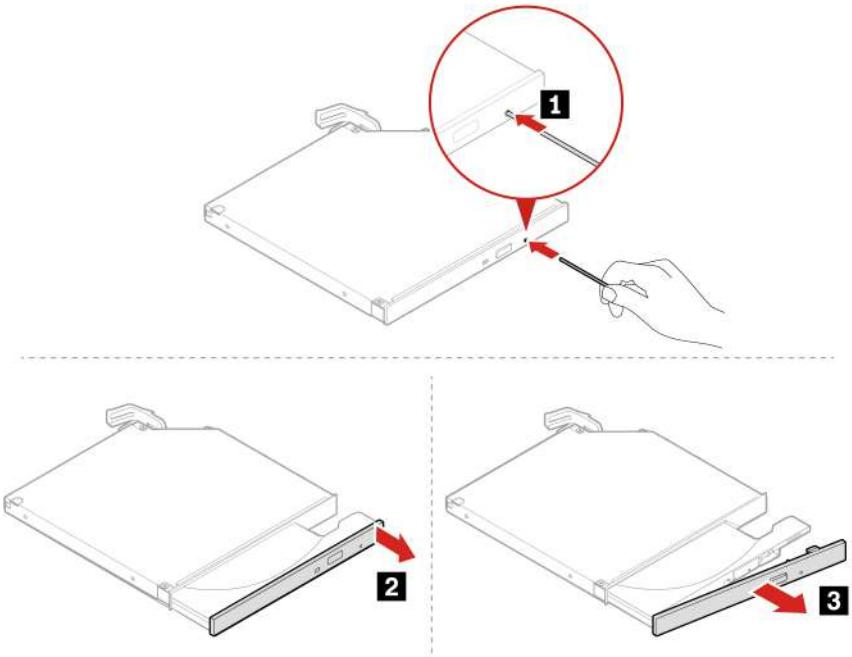
Prerequisite

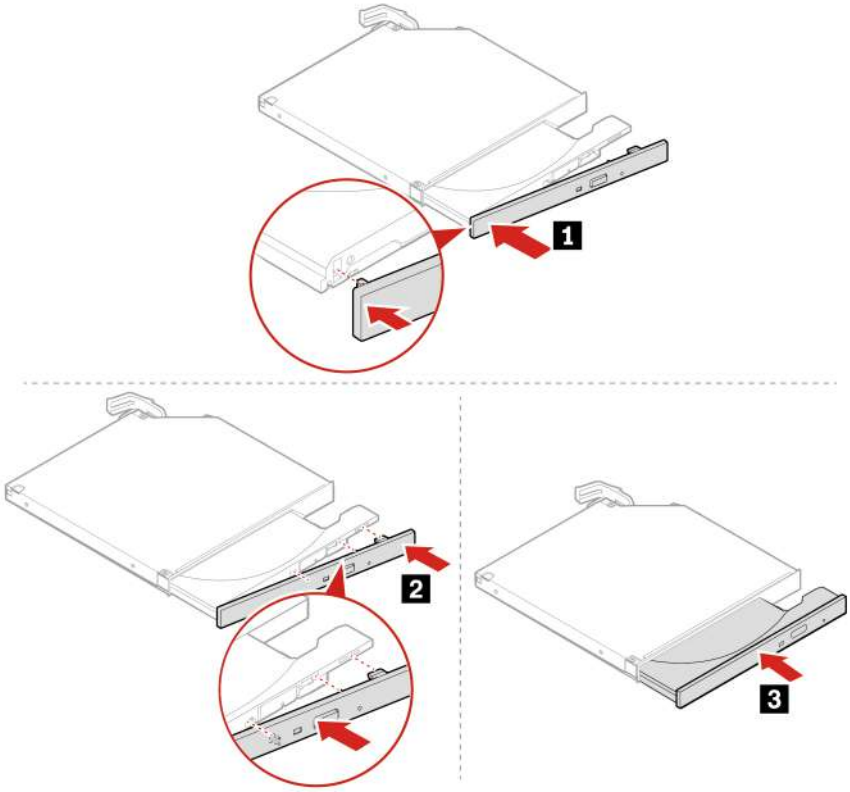
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Optical drive” on page 54.

Replacement procedure





Drive bay assembly

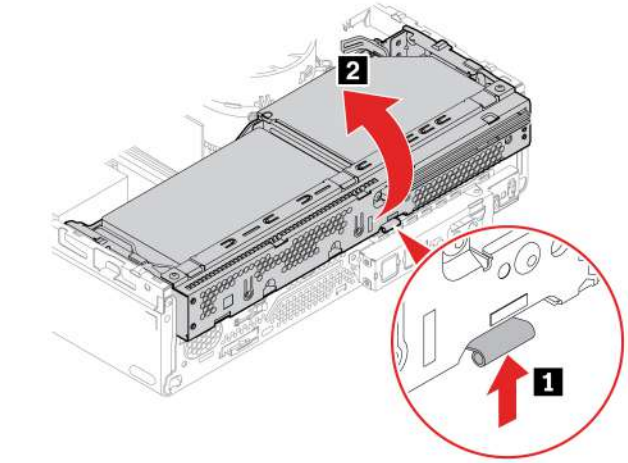
Prerequisite

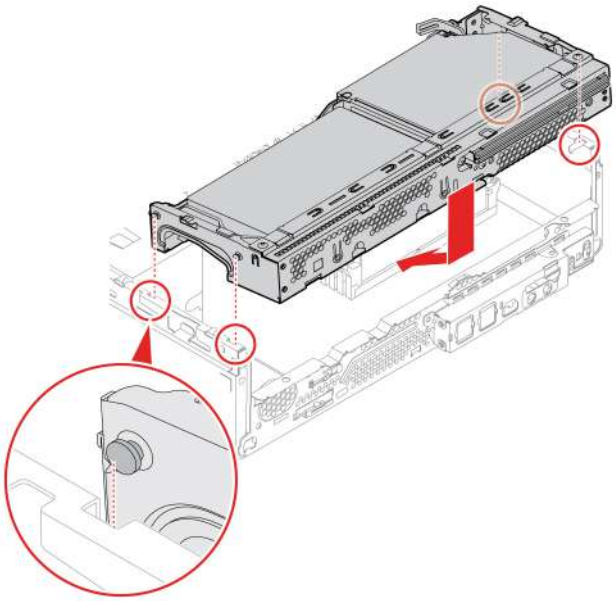
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Front bezel” on page 53.

Replacement procedure





3.5-inch hard disk drive

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

Attention: The internal storage drive is sensitive. Inappropriate handling might cause damage and permanent loss of data. When handling the internal storage drive, observe the following guidelines:

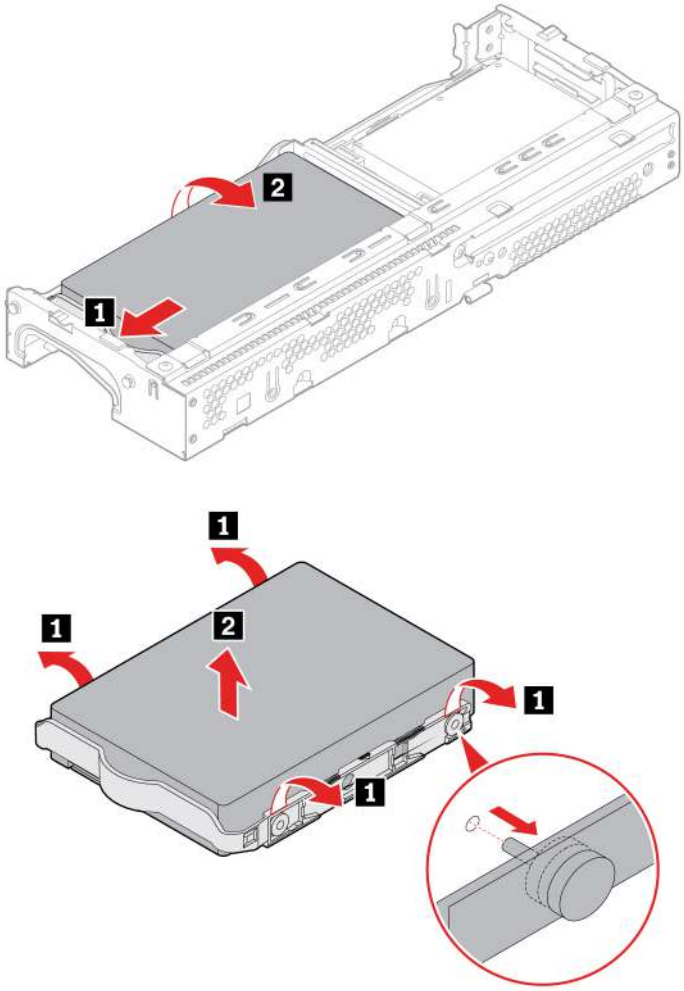
- Replace the internal storage drive only for repair. The internal storage drive is not designed for frequent changes or replacement.
- Before replacing the internal storage drive, make a backup copy of all the data that you want to keep.
- Do not touch the contact edge of the internal storage drive. Otherwise, the internal storage drive might get damaged.
- Do not apply pressure to the internal storage drive.

- Do not make the internal storage drive subject to physical shocks or vibration. Put the internal storage drive on a soft material, such as cloth, to absorb physical shocks.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. On the bottom of the drive bay assembly, disconnect the signal cable and the power cable from the 3.5-inch hard disk drive.

Removal steps



M.2 solid-state drive and heat sink

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

The heat sink might be very hot. Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

Attention: The internal storage drive is sensitive. Inappropriate handling might cause damage and permanent loss of data. When handling the internal storage drive, observe the following guidelines:

- Replace the internal storage drive only for repair. The internal storage drive is not designed for frequent changes or replacement.
- Before replacing the internal storage drive, make a backup copy of all the data that you want to keep.
- Do not touch the contact edge of the internal storage drive. Otherwise, the internal storage drive might get damaged.
- Do not apply pressure to the internal storage drive.
- Do not make the internal storage drive subject to physical shocks or vibration. Put the internal storage drive on a soft material, such as cloth, to absorb physical shocks.

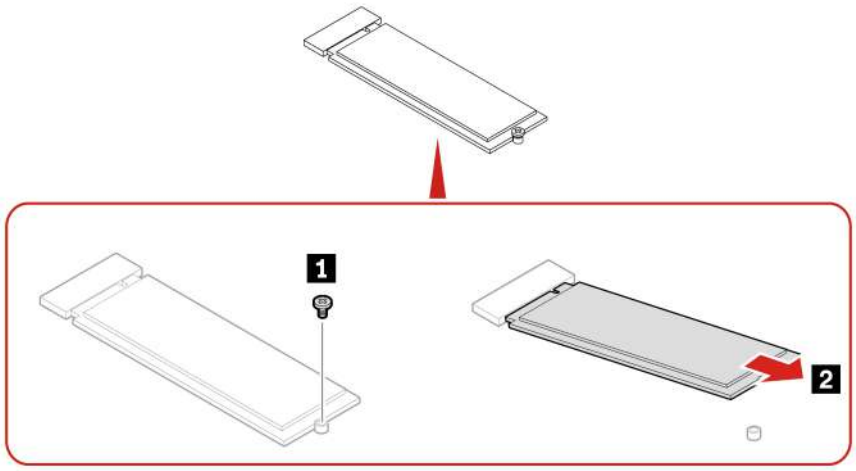
For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Front bezel” on page 53.
- “Drive bay assembly” on page 57.

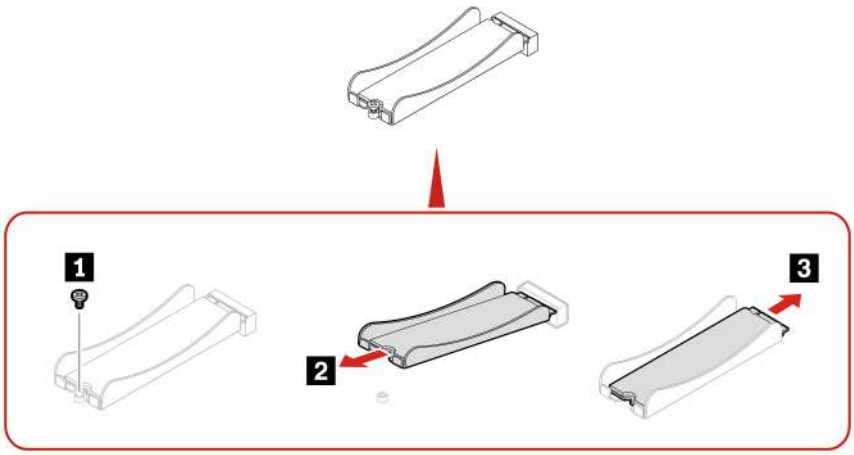
Removal steps

Replace the M.2 solid-state drive depending on the model:

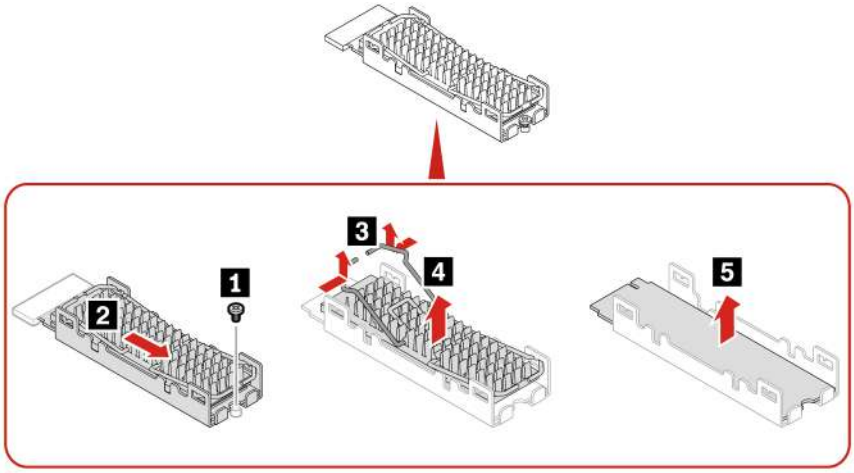
- For M.2 solid-state drive without the M.2 solid-state drive bracket, do one of the following depending on the M.2 solid-state drive model:
  - Type 1



  - Type 2



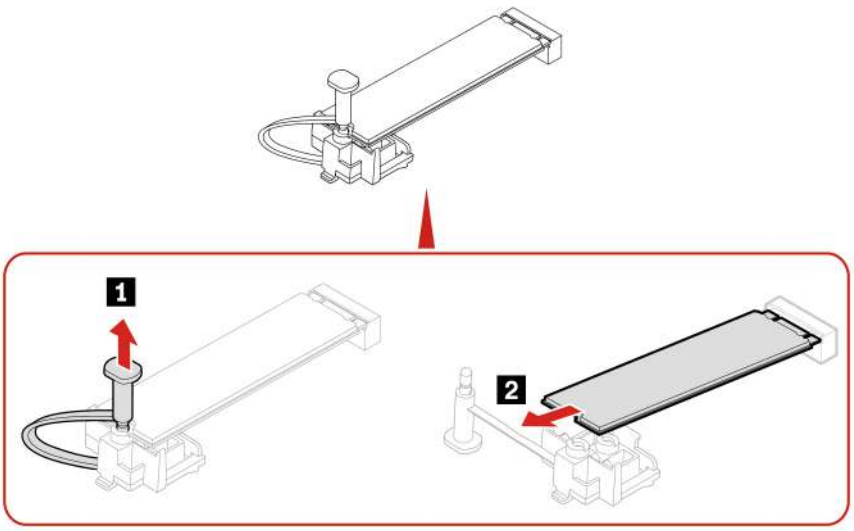
– Type 3



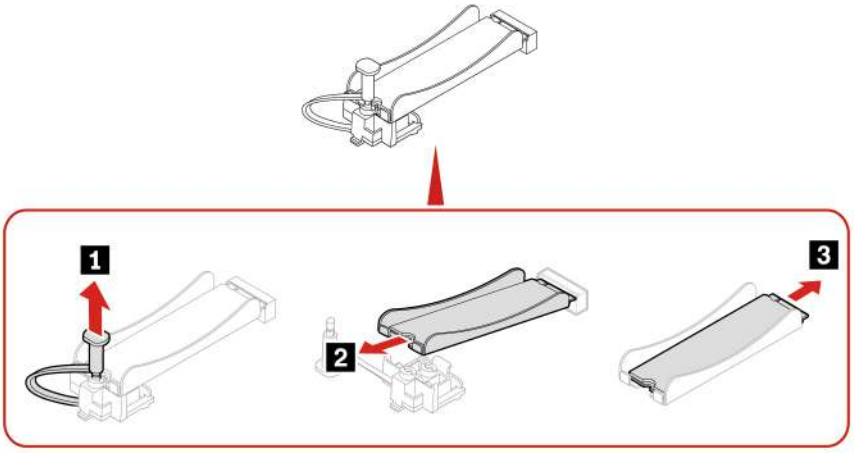
No.	Screw (quantity)	Color	Torque
1	M2 x 4 mm (1)	Brown	1.5 ± 0.5 lb/in

Note: Remove the film that covers the thermal pad (if any) when installing the M.2 solid-state drive and the heat sink.

- For M.2 solid-state drive with the M.2 solid-state drive bracket, do one of the following depending on the M.2 solid-state drive model:
  – Type 1

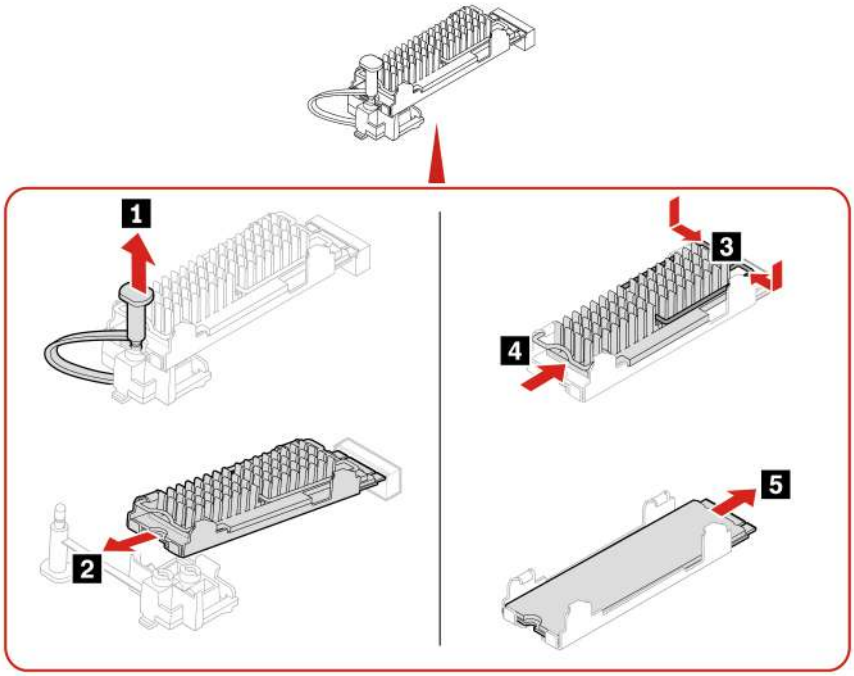


– Type 2



Note: Remove the film that covers the thermal pad (if any) when installing the M.2 solid-state drive and the heat sink.

– Type 3



Note: Remove the film that covers the thermal pad (if any) when installing the M.2 solid-state drive and the heat sink.

M.2 solid-state drive bracket

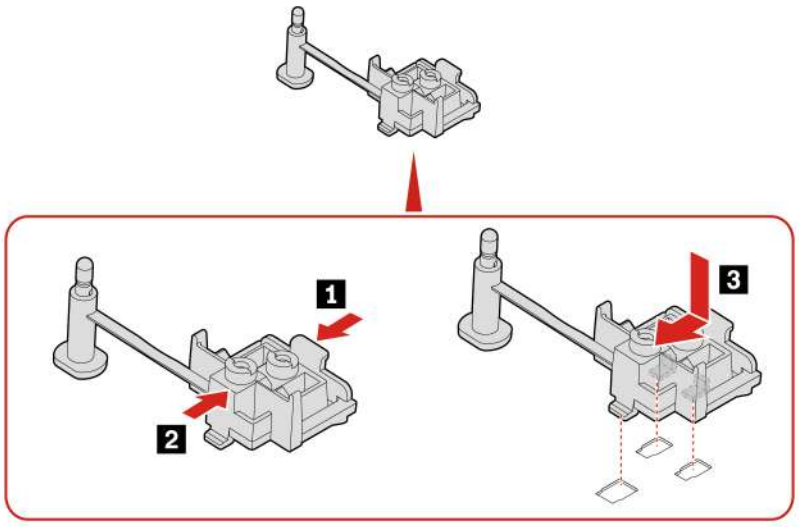
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Front bezel” on page 53.
- “Drive bay assembly” on page 57.
- “M.2 solid-state drive and heat sink” on page 59.

Replacement procedure



Wi-Fi card

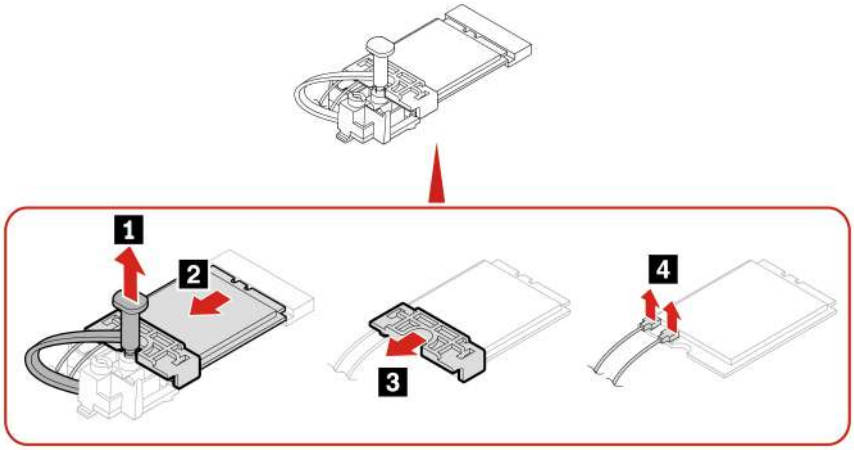
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Front bezel” on page 53.
- “Drive bay assembly” on page 57.

Removal steps



Note: During installation, ensure that you connect the gray cable to the connector labeled AUX on the card, and the black cable to the connector labeled MAIN.

Front Wi-Fi antenna

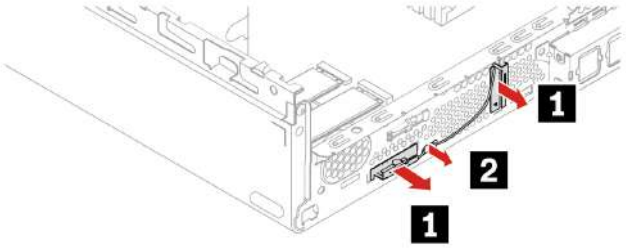
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. Disconnect the Wi-Fi antenna cables from the Wi-Fi card. See “Wi-Fi card” on page 64.

Removal steps

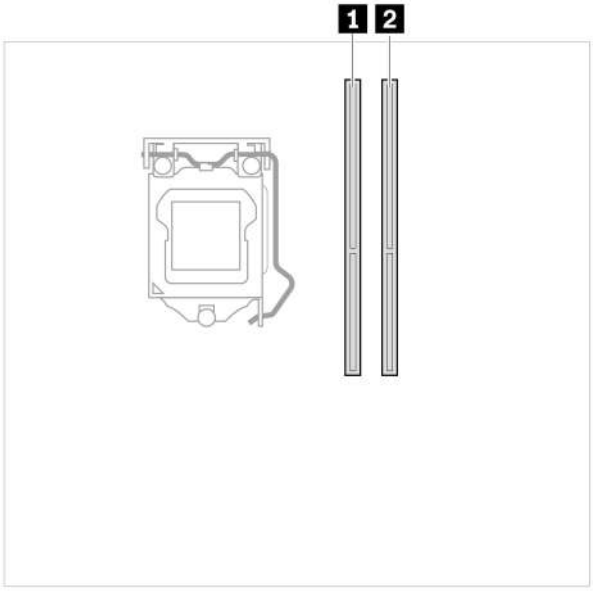


Memory module

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

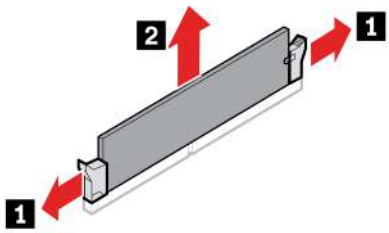
Ensure that you follow the installation order for memory modules shown in the following illustration.

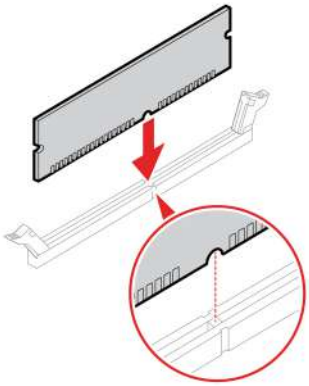


For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Front bezel” on page 53.
- “Drive bay assembly” on page 57.

Replacement procedure





Note: During the installation, ensure that you align the memory module to the slot and press down on both ends until the latches are fully engaged with a click.

PCI-Express card

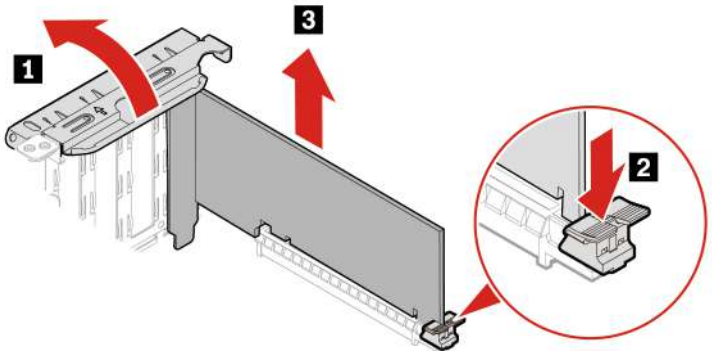
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, remove the following parts in order, if any:

- “Vertical stand” on page 50.
- “Computer cover” on page 52.

Removal steps



Note: Remove any PCI-Express connector cables that impede the installation of PCI-Express cards.

Power supply assembly

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

Although there are no moving parts in the computer after the power cord has been disconnected, the following warnings are required for your safety.

Keep fingers and other parts of your body away from hazardous, moving parts. If you suffer an injury, seek medical care immediately. Never remove the cover on a power supply or any part that has the following label attached.

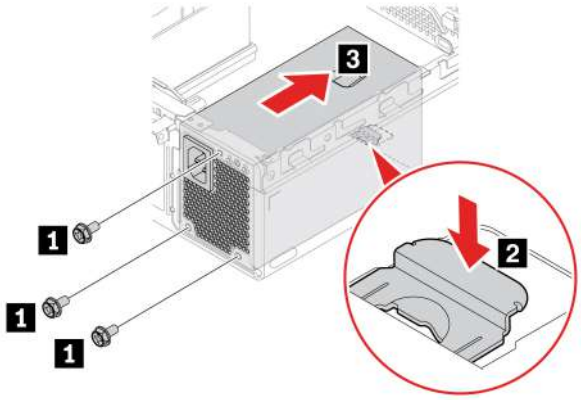
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

For access, do the following:

1. Remove the vertical stand. See “Vertical stand” on page 50.
2. Remove the computer cover. See “Computer cover” on page 52.
3. Remove the air deflector. See “Air deflector” on page 51.

4. Remove the front bezel. See “Front bezel” on page 53.
5. Remove the drive bay assembly. See “Drive bay assembly” on page 57.
6. Disconnect the power supply assembly cables from the system board.

Removal steps



No.	Screw (quantity)	Color	Torque
1	6–32 x 5 mm, Nickel coated (3)	Sliver	5 ± 0.5 lb/in

E-lock

Prerequisite

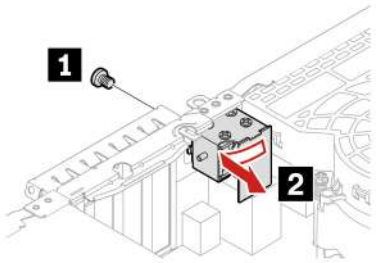
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the vertical stand. See “Vertical stand” on page 50.
2. Remove the computer cover. See “Computer cover” on page 52.
3. Remove the PCI-Express card. See “PCI-Express card” on page 67.
4. Disconnect the E-lock cable from the system board.

Note: To remove the screws, you need a special tool (T15 star wrench).

Removal steps



No.	Screw (quantity)	Torque
1	M3 x 5–T15–SCREW (1)	5 ± 0.5 lb/in

Internal speaker

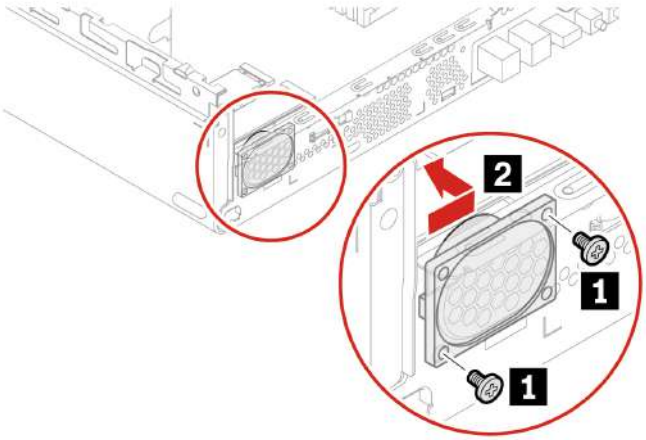
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. Disconnect the internal speaker cable from the system board.

Removal steps



No.	Screw (quantity)	Color	Torque
1	M3 x 5 mm, Zn coated (2)	Blue	5 ± 0.5 lb/in

ThinkCentre LED cable

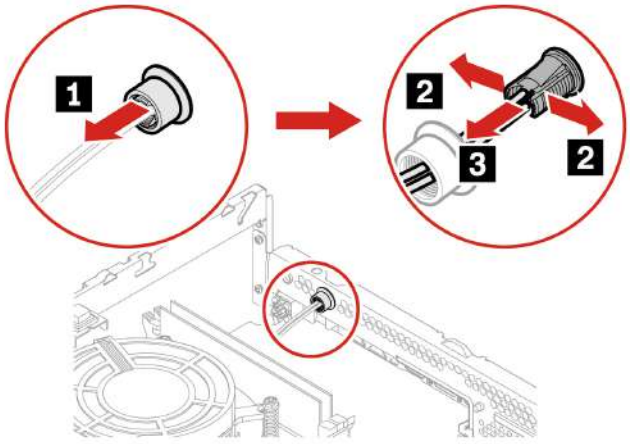
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. Disconnect the ThinkCentre LED cable from the system board.

Removal steps



Thermal sensor

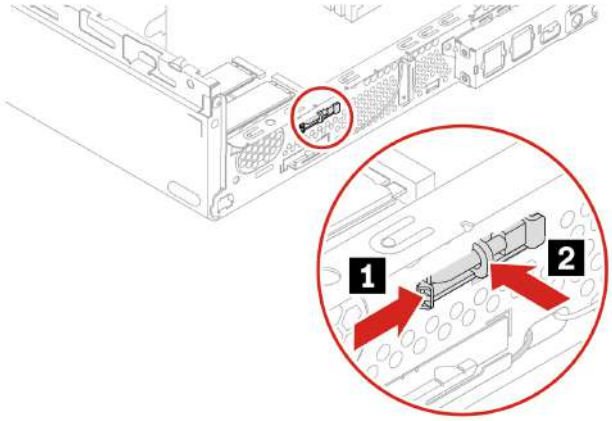
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. Disconnect the thermal sensor cable from the system board.

Removal steps



Front I/O bracket and power button

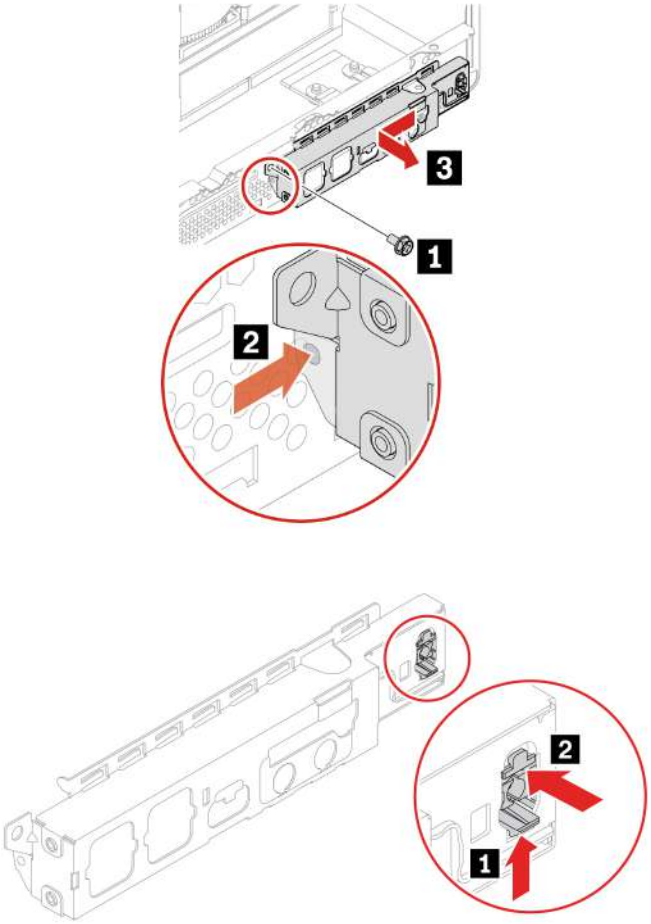
Prerequisite

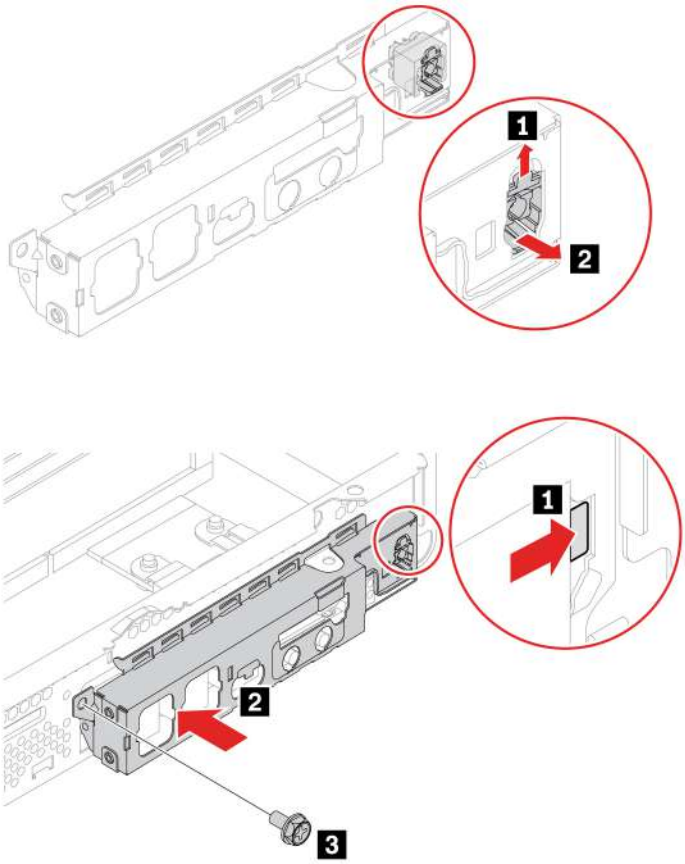
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
2. Disconnect the power button cable from the system board.

Replacement procedure





No.	Screw (quantity)	Color	Torque
1	6–32 x 5 mm, Nickel coated (1)	Sliver	5 ± 0.5 lb/in

Card reader and card reader bracket

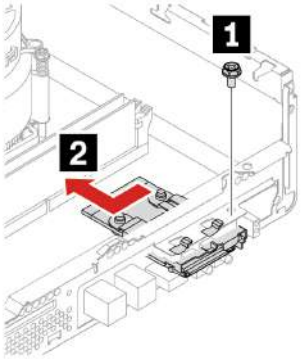
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

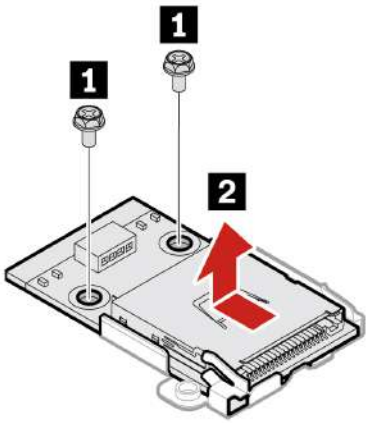
For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
   - “Front I/O bracket and power button” on page 71
2. Disconnect the card reader cable from the system board.

Removal steps



No.	Screw (quantity)	Color	Torque
1	6–32 x 5 mm, Nickel coated (1)	Sliver	5 ± 0.5 lb/in



No.	Screw (quantity)	Color	Torque
1	M3 x 5 mm, Zn coated (2)	Blue	5 ± 0.5 lb/in

Heat sink and fan assembly

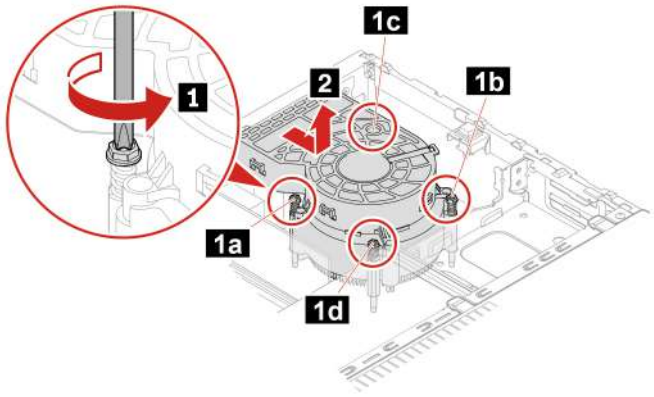
Prerequisite

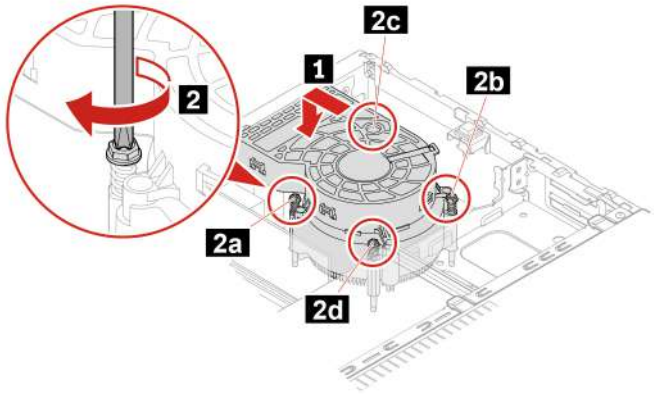
Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Computer cover” on page 52.
   - “Optical drive” on page 54.
2. Disconnect the microprocessor fan cable from the system board.

Replacement procedure





Microprocessor

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

CAUTION:

The heat sink and microprocessor might be very hot. Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

For access, remove the following parts in order, if any:

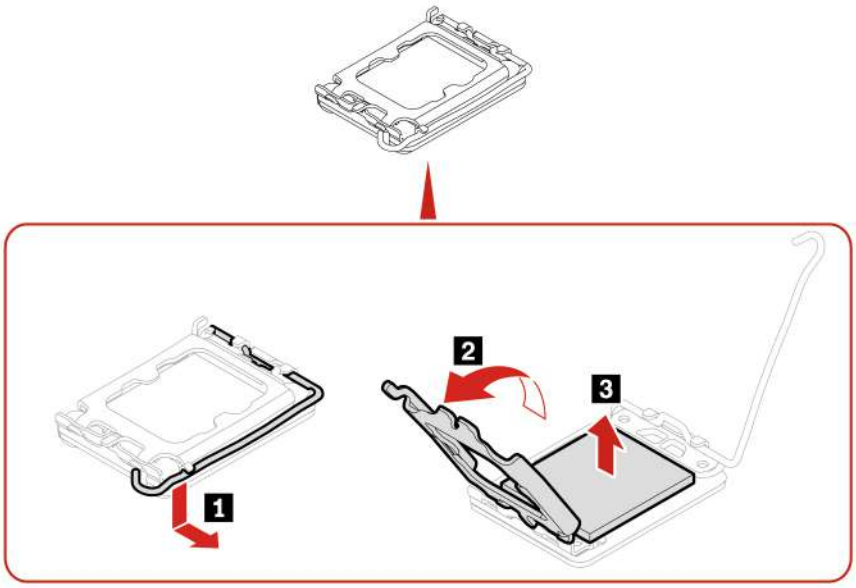
- “Vertical stand” on page 50.
- “Computer cover” on page 52.
- “Optical drive” on page 54

- “Heat sink and fan assembly” on page 73

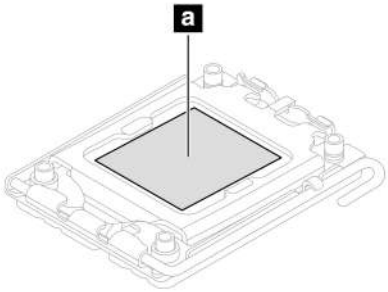
Notes:

- Touch only the edges of the microprocessor. Do not touch the gold contacts on the bottom.
- Do not drop anything onto the microprocessor socket while it is exposed. The socket pins must be kept as clean as possible.

Removal steps



Note: Before you attach the CPU to the computer, clean all thermal grease that has been used and then apply new thermal grease. Apply new thermal grease at an amount of 0.35 grams, on the parts marked a as shown in the following illustrations. Either too much or too less application of grease can cause a thermal problem due to imperfect contact with a component.



Cover presence switch

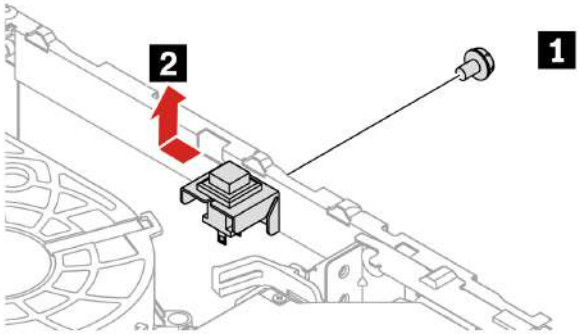
Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

1. Remove the computer cover. See “Computer cover” on page 52.
2. Disconnect the cover presence switch cable from the system board.

Removal steps



No.	Screw (quantity)	Color	Torque
1	6–32 x 5 mm, Nickel coated (1)	Sliver	5 ± 0.5 lb/in

System board

Prerequisite

Before you start, read *Generic Safety and Compliance Notices*, and print the following instructions.

For access, do the following:

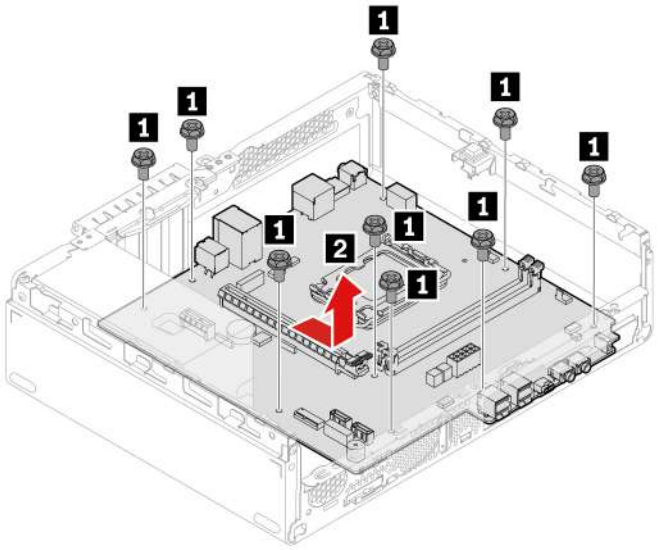
1. Remove the following parts in order, if any:
   - “Vertical stand” on page 50.
   - “Air deflector” on page 51.
   - “Computer cover” on page 52.
   - “Front bezel” on page 53.
   - “Drive bay assembly” on page 57.
   - “M.2 solid-state drive and heat sink” on page 59.
   - “M.2 solid-state drive bracket” on page 63.
   - “Wi-Fi card” on page 64.
   - “Memory module” on page 65.
   - “PCI-Express card” on page 67.
   - “Front I/O bracket and power button” on page 71.
   - “Card reader and card reader bracket” on page 72.
   - “Heat sink and fan assembly” on page 73.
   - “Microprocessor” on page 74.
2. Record the cable routing and cable connections, and then disconnect all cables from the system board. See “System board illustration” on page 49.

Notes:

- Carefully handle the system board by its edges.

- Do not touch the pins on the microprocessor socket or the gold contacts on the microprocessor.

Removal steps



Note: The failing system board must be returned with a microprocessor socket cover to protect the pins during shipping and handling.

No.	Screw (quantity)	Color	Torque
1	M3 x 5 mm, Zn coated (9)	Blue	5 ± 0.5 lb/in

Appendix A. Notices and trademarks

Notices

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Lenovo

Annex B2 - Product environmental attributes
Computer Display and Professional Display

The declaration may be published only when all rows and/or fields marked with * are filled-in (N/A for not applicable). Additional information regarding each item may be found under P15.

Brand *	***Lenovo***	Logo
Company name *	***Lenovo***	
Contact information * e-mail address	***Lenovo Environmental Social and Governance*** ***environment@lenovo.com***	
Internet site *	***https://www.lenovo.com/us/en/sustainability-resources/***	
Additional information	***The latest version of this document can be found at:*** ***http://www.lenovo.com/ecodeclaration***	

The company declares (based on product specification or test results based obtained from sample testing), that the product conforms to the statements given in this declaration.	
Type of product *	***Computer Display***
Commercial name *	***ThinkVision E24-40/TS24-40***
Model number *	***64BA,64BB***
Issue date *	***2025-04-23***
Intended market *	☒ **Global** ☐ **Europe** ☐ **Asia, Pacific & Japan** ☐ **Americas** ☐ **Other**
Additional information	***Energy Star 8.0、EPEAT*** **SCIP submission number for this product** ***fc91dc94-dc7e-4b10-800a-307f7497b53d***

This is an uncontrolled copy when in printed form. Please refer to the contact information for the latest version.

About Annex B2
Annex B2 reflects Product environmental attributes relevant for Computers and Computer Monitors. The following items from the ECMA-370 Main body are not shown in the template:
P4.1 – P4.3 Consumable materials
P9.1 TEC and Print speed
P10.2 - P10.3 Chemical emissions from printing products
P11.1 - P11.3 Consumable materials for printing products.

Model number *	***64BA,64BB***	**Logo**	Lenovo
Issue date *	***2025-04-23***		

Product environmental attributes - Legal requirements		**Requirement met**		
Item		Yes	No	N/A
P1	**Hazardous substances and preparations**			
P1.1*	Products comply with current European RoHS Directive. (See legal reference and NOTE B1)	☒	☐	
P1.2*	Products do not contain Asbestos (See legal reference) Comment: Legal reference has no maximum concentration value.	☒	☐	
P1.3*	Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorcarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide (See legal reference). Comment: Legal reference has no maximum concentration values	☒	☐	
P1.4*	Products do not contain more than; 0,005% polychlorinated biphenyl (PCB), 0,005% polychlorinated terphenyl (PCT) in preparations (See legal reference)	☒	☐	
P1.5*	Products do not contain more than 0,1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP (See legal reference)	☒	☐	
P1.6*	Parts with direct and prolonged skin contact do not release nickel in concentrations above 0,5 □g/cm^2/week (See legal reference) Comment: Max limit in legal reference when tested according to EN1811:2011-5	☒	☐	☐
P1.7*	REACH Article 33 information about substances in articles is available at (add URL or mail contact): ***https://www.lenovo.com/us/en/Lenovo-REACH-SVHC-Disclosure***	☒	☐	☐
P2	**Batteries**			
P2.1*	If the product contains a battery or an accumulator, the battery/accumulator is labeled with the disposal symbol. Information on proper disposal is provided in user manual. (See legal reference)	☐	☐	☒
P2.2*	Batteries or accumulators do not contain more than 0,0005% of mercury or 0,002% of cadmium. (See legal reference)	☐	☐	☒
P2.3*	Batteries and accumulators are readily removable. (See legal reference)	☐	☐	☒
P2.4*	Documentation includes the number of cycles the (secondary) battery can withstand. (See legal reference)	☐	☐	☒
P2.5*	When internal batteries of a notebook computer cannot be “accessed and replaced by a nonprofessional user”, the related text is present and legible on the external packaging (See legal reference)	☐	☐	☒
P3	**Conformity verification & Eco design (ErP)**			
P3.1*	The product is CE-marked to show conformance with applicable legal requirements (see legal reference). The Declaration of Conformity can be requested at (add link or e-mail address): ***https://www.lenovo.com/us/en/compliance/eu-doc for EU*** ***https://www.lenovo.com/us/en/compliance/uk-doc for UK***	☒	☐	☐
P3.2*	The product complies with the applicable Eco design requirements for energy-related products, (See legal reference)	☒	☐	☐
	Required information is; ☐ given in item P15 or added to this document, ☒ available at (add URL): ***http://www.lenovo.com/ecodeclaration***	☒	☐	☐
P5	**Product packaging**			
P5.1*	Packaging and packaging components do not contain more than 0,01% lead, mercury, cadmium and hexavalent chromium by weight of these together	☒	☐	
P5.2*	The packaging materials are marked with abbreviations and numbers indicating the nature of the material(s) used (See legal reference)	☒	☐	☐
P5.3*	The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol (See legal reference) Comment: Legal reference has no maximum concentration values	☒	☐	☐
P6	**Treatment information**			
P6.1*	Information for recyclers/treatment facilities is available (***https://lenovo.com/recycling***).	☒	☐	☐

NOTE B1 Restriction applies to the homogeneous material, unless other specified and expressed in weight %. Stating “Yes” means that the product is compliant with the mandatory requirements.

Model number *	***64BA,64BB***	**Logo**	Lenovo
Issue date *	***2025-04-23***		

Product environmental attributes - Market requirements (See General NOTE GN below) **- Environmental conscious design**		**Requirement met**		
Item	*=mandatory to fill in. Additional information regarding each item may be found under P14.	Yes	No	N/A
P7	**Design** **Disassembly, recycling**			
P7.1*	Parts that have to be treated separately are easily separable	☒	☐	☐
P7.2*	Plastic materials in covers/housing have no surface coating	☒	☐	☐
P7.3*	Plastic parts > 100 g consist of one material or of easily separable materials	☒	☐	☐
P7.4*	Plastic parts > 25 g have material codes according to ISO 11469 referring ISO 1043-4	☒	☐	☐
P7.5	Plastic parts are free from metal inlays or have inlays that can be removed with commonly available tools	☒	☐	☐
P7.6*	Labels are easily separable (This requirement does not apply to safety/regulatory labels)	☒	☐	☐
	Product lifetime			
P7.7*	Upgrading can be done e.g. with processor, memory, cards or drives	☒	☐	☐
P7.8*	Upgrading can be done using commonly available tools	☒	☐	☐
P7.9	Spare parts are available after end of production for: ***7*** years			☐
P7.10	Service is available after end of production for: ***7*** years			☐
	Material and substance requirements			
P7.11*	Product cover/housing material type (e.g. plastics, metal, aluminum): Material type: ***ABS*** Material type: ***Steel(SGCC)*** Material type: ***POM***			
P7.12	Insulation materials of external electrical cables are PVC free	☐	☒	☐
P7.13	Insulation materials of internal electrical cables are PVC free	☐	☒	☐
P7.14	External plastic casing/cover parts > 25 g contain no more than 0,1% weight (1000 ppm) bromine and 0,1% weight (1000 ppm) chlorine attributable to brominated flame retardants, chlorinated flame retardants, and polyvinyl chloride or 0,3% weight (3000 ppm) bromine and 0,3% weight (3000 ppm) chlorine in parts containing more than 25% post-consumer recycled content	☒	☐	☐
P7.15	Printed circuit boards, PCBs (without components) are low halogen as defined in IEC 61249-2-21. (See NOTE B2): Only PCBs > 25g ☐ or All PCBs ☒	☒	☐	☐
P7.16	Flame retarded plastic parts > 25 g in covers / housings are marked according to ISO 1043-4: Marking:	☐	☒	☐
P7.17	Alt. 1: Chemical specifications of flame retardants in printed circuit boards > 25 g (without components): TBBPA (additive) ☐, TBBPA (reactive) ☐ (See NOTE B3), Other; chemical name: ***Bisphenol A diphosphate***, CAS #: ***181028-79-5***	☒	☐	☐
	Alt. 2: Chemical specifications of flame retardants in printed circuit boards (without components) > 25 g according to ISO 1043-4:	☐	☐	☐
P7.18	Alt. 1: Flame retarded plastic parts > 25 g contain the following flame retardant substances/preparations in concentrations above 0,1%: 1. Chemical name: , CAS #: (See NOTE B4) 2. Chemical name: , CAS #: " 3. Chemical name: , CAS #: "	☐	☒	☐
	Alt. 2: Chemical specifications of flame retardants in plastic parts > 25 g according to ISO 1043-4:	☐	☒	☐
P7.19	In plastic parts > 25 g, flame retardant substances/preparations above 0,1% are used which have been assigned the following Risk phrases; and Hazard statements: The source(s) for these classifications is/are found at (add URL(s)): , (See NOTE B5)	☐	☐	☒

GENERAL NOTE Standard references should direct to the latest version of a standard. If an older version of a standard is used, section P15 shall be used for explanation.

NOTE B2 IEC 61249-2-21 defines maximum limits of 900 ppm for each of the substances chlorine and bromine and a maximum limit of 1500ppm of these substances combined. The standard does not address fluorine, iodine and astatine which are included in the group of halogens.

NOTE B3 and B4 A Guidance document on Chemical substances is available; see http://www.ecma-international.org/publications/standards/Ecma-370.htm.

NOTE B5 If a certain substance has been assigned a certain risk phrases / hazard statement in the referenced source, this does not necessarily mean the substance has been tested for all of the hazards referred to by a certain customer.

Model number *	*64BA,64BB*	Logo	Lenovo
Issue date *	*2025-04-23*		

Product environmental attributes - Market requirements (continued)			Requirement met		
Item			Yes	No	N/A
	Material and substance requirements (continued)				
P7.20*	Postconsumer recycled plastic material content is used in the product (See NOTE B6): If YES; at least one of the two alternatives below shall be answered; a) Of total plastic parts' weight > 25 g, the postconsumer recycled plastic material content (calculated as a percentage of total plastic by weight) is ***80.6*****%**. or b) The weight of recycled material is ***645.4*** g		☒	☐	☐
P7.21*	Biobased plastic material content is used in the product (See NOTE B7): If YES; at least one of the two alternatives below shall be answered; a) Of total plastic parts' weight > 25 g, the biobased plastic material content (calculated as a percentage of total plastic by weight) is %. or b) The weight of the biobased plastic material is g		☐	☒	☐
P7.22*	Light sources are free from mercury, i.e. less than 0,1 mg/lamp If mercury is used specify: Number of lamps: and maximum mercury content per lamp: mg		☒	☐	☐
P7.23*	If product includes an integral display, the total mercury content in the integrated display: ***0.0*** mg		☐	☒	☐
P8	**Batteries**				
P8.1*	Battery chemical composition:				☒
P9	**Energy consumption (See NOTE B8)**				
P9.1	For the product the following power levels or energy consumptions are reported:				

Energy mode *		Power level at **100** V AC	Power level at **115** V AC	Power level at **230** V AC	Reference/Standard for energy modes and test method *	
Peak (On-Max)		***24*** W	***24*** W	***24*** W	***Full Load***	
Device Category						
On Mode Power(P_{On})		***11.52*** W	***11.8*** W	***11.73*** W	***ENERGY STAR Displays V8.0***	
Sleep Mode Power(P_{Sleep})		***0.31*** W	***0.31*** W	***0.33*** W	***ENERGY STAR Displays V8.0***	
Off Mode (S5) – (P_{off})		***0.21*** W	***0.21*** W	***0.23*** W	***ENERGY STAR Displays V8.0***	
EPS No-load (External power supply / charger plugged in the wall outlet but disconnected from the product.)		W	W	W		☒
TEC * Annual Energy Consumption	Cat 1:	***37.09*** kWh/year	***37.94*** kWh/year	***37.84*** kWh/year	Mode Weighting ***ETEC = 8.76 × (0.35 × P_{On} + 0.65 × P_{Sleep})***	☐
External Power Supply Efficiency Level (International Efficiency Marking Protocol) * :					***International Efficiency Marking Protocol* (IEMP) for *External Power Supplies***	☒
Display resolution * : ***1920*1080*** megapixels						☐
Default time to enter energy save mode: minutes					***ENERGY STAR Displays V8.0***	☐

P9.2*	Information about the energy save function is provided with the product		☒	☐	☐
P9.3	Energy efficiency class (monitors only): ***C***	***(EU) 2019/2013***			☐

NOTE B6 Applies to a product containing plastic parts whose combined weight exceeds 100 g with the exception of printed circuit boards, cables, connectors and electronic components and bio-based plastic material.

NOTE B7 The following is to be excluded from the calculation of percentage: printed circuit boards, labels, cables, connectors and electronic components and postconsumer recycled plastic

NOTE B8 A Guidance document on Energy Efficiency is available;

see http://www.ecma-international.org/publications/standards/Ecma-370.htm.

Model number *	64BA,64BB	Logo	Lenovo
Issue date *	2025-04-23		

Product environmental attributes - Market requirements (continued)				Requirement met		
Item				Yes	No	N/A
P10	**Emissions**					
	Noise emission – Declared according to ISO 9296 (See NOTE **B9**)					
P10.1	Mode	Mode description	Statistical upper limit A-weighted sound power level, $L_{WA,c}$ (B)			
	Idle	* ***Idle Mode***	*			☒
	Operation	* ***Operating (SSD/HDD)*** * ***Operating (CPU)***	* *			☒
	Other Mode	***Declared A-weighted sound pressure level (dB)***	***NA (operator position desktop – idle)***			
	Other mode	***Declared A-weighted sound pressure level (dB)***	***NA (operator position desktop – operating-HDD/SSD)*** ***NA (operator position desktop – operating-CPU)***			
	Measured according to: ☐ ISO 7779 ☐ ECMA-74 ☐ Other (only if not covered by ECMA-74)					
	Electromagnetic emissions					
P10.4	Computer display meets the requirement for low frequency electromagnetic fields of the following voluntary program(s):			☐	☒	☐
P12	**Ergonomics for computing products**					
P12.1*	The display meets the ergonomic requirements of ISO 9241-307 for visual display technologies			☒	☐	☐
P12.2*	The physical input device meets the requirements of ISO 9995 and ISO 9241-410			☒	☐	☐
P13	**Packaging and documentation**					
P13.1*	Product packaging material type(s): ***Paper - Molded pulp(Cushion)*** weight (kg): ***0.82*** Product packaging material type(s): ***Plastic - Solid EPE_Bag*** weight (kg): ***0.035*** Product packaging material type(s): ***Paper - Corrugated Double wall(Box)*** weight (kg): ***0.69*** Product packaging material type(s): weight (kg): Product packaging material type(s): weight (kg): Product packaging material type(s): weight (kg): Product packaging material type(s): weight (kg):					
P13.2*	Product plastic primary packaging is free from PVC			☒	☐	☐
P13.3*	For product primary corrugated fiberboard packaging, specify the contained percentage of minimum post-consumer recovered fiber content: ***90*** %					☐
P13.4*	Specify media for user and product documentation (tick box): Electronic ☒, Paper ☒, Other ☐					☐
P13.5	(Please only complete this item if paper documentation used) User and product documentation on paper media is chlorine-free: If Yes, please specify: Totally chlorine-free Elemental chlorine-free Processed chlorine-free			☒ ☐ ☒ ☐	☐	
P14	**Voluntary programs**					
P14.1	The product meets the requirements of the following voluntary program(s): ENERGY STAR® Criteria version: ***8.0*** Date: ***2025/4/24*** Product category: ***Display*** Eco-label: Criteria version: Date: Product category: Eco-label: Criteria version: Date: Product category:					
P15	**Additional information (See NOTE B10)**					
P9	***Energy consumption of computer products; description of the tested product configuration:***					
	NOTE: Supplier makes no representations, guarantees, assurances or warranties whether express or implied, regarding the information contained in this document. All information provided by supplier in this document is provided based on supplier's knowledge available at the time of completion, and supplier shall have no obligation to update such information. The information provided here is approximate and provided for informational purposes only. See a Lenovo Account Representative for more information.					

NOTE B9 A Guidance document on Acoustic Noise is available; see http://www.ecma-international.org/publications/standards/Ecma-370.htm.

NOTE B10 Additional lines may be inserted to declare further items, by positioning the cursor at the far right of the row and hitting the <Enter> key.

Legal references Europe Annex B2

Reference	Declaration item
Directive 2011/65/EU (RoHS Directive)* * Specific exemptions apply for certain products and applications.	P1.1, P3.1
Regulation (EC) 1907/2006 (REACH Regulation), annex XVII	P1.2, P1.4, P1.6, P1.7
Regulation (EC) 2037/2000, 2038/2000, 2039/2000 (Marketing and use of Ozone layer depleting substances)	P1.3, P5.3
Norwegian regulation relating to restrictions on the use of certain dangerous chemicals 20.12.2002	P1.5
Directive 2006/66/EC (Battery and accumulators Directive), as amended.* * These provisions shall not apply where, for safety, performance, medical or data integrity reasons, continuity of power supply is necessary and requires a permanent connection between the appliance and the battery or accumulator.	P2.1, P2.2, P2.3, P8.1
Directive 2014/35/EU (Low Voltage Directive)	P3.1
Directive 2014/30/EU (EMC Directive)	P3.1
Directive 2014/53/EU (RE Directive)	P3.1
Regulation (EC) 801/2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment, and amending Regulation (EC) No 642/2009 with regard to ecodesign requirements for televisions	P3.1, P3.2
Regulation (EU) 2019/1782 of 1 October 2019 laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council and	P3.1, P3.2, P9.1
Regulation (EU) No 2019/2021 of 1 October 2019 laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008 and repealing Commission Regulation (EC) No 642/2009	P9.1, P9.3
Regulation（EC）No 1272/2008 (CLP Regulation)	P7.19
Directive 2004/12/EC (Packaging Directive)	P5.1
Decision 97/129/EC (Secondary packaging legislation)	P5.2
Directive 2012/19/EU (WEEE directive) Implementing Regulation (EU) 2019/290 establishing the format for registration and reporting of producers of electrical and electronic equipment to the register. Commission Implementing Regulation 2017/699 establishing a common methodology for the calculation of the weight of electrical and electronic equipment (EEE) placed on the national market in each Member State and a common methodology for the calculation of the quantity of waste electrical and electronic equipment (WEEE) generated by weight in each Member State.	P6.1

AIM-T User Guide - Windows

Publication #	**57880** Revision: **4.5**
Issue Date:	**June 2025**

Advanced Micro Devices

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Revision History

Date	Revision	Description
June 2025	4.5	Update Download Link for Tools Update Appendix J.2 ACMS Installation. Added section 5.1.3. Updated section 3.1 Documented AIM-T 4.5 features.
April 2024	3.1	Added information about adding Wi-Fi access point profile.
February 2024	3.0	A few general edits and updates.
September 2023	2.2	Added a note in Appendix E.
April 2023	2.1	One minor edit in Chapter 1.
March 2023	2.0	• Updated figures in Appendix A. • Added Appendix I. • Incorporated changes from the technical review.
September 2022	1.0	Initial version.

Acronyms and Abbreviations

Table 1. Acronyms and Abbreviations

Term	Definition
ACMS	AMD Cloud Manageability Service
AIM-T	AMD Integrated Management Technology
AMD	Advanced Micro Devices
AMS	AIM-T Manageability Service
AP	Access Point
APC	AMD Provisioning Console
BIOS	Basic Input/Output System
DASH	Desktop and Mobile Architecture for System Hardware
DMTF	Distributed Management Task Force
IP	Internet Protocol
IT	Information Technology
KVM	Keyboard Video and Mouse
LAN	Local Area Network (aka Ethernet)
NIC	Network Interface Controller
OEM	Original Equipment Manufacturer
OS	Operating System (such as Microsoft® Windows® and Linux®)
SoC	System on a Chip
UI	User Interface
WLAN	Wireless Local Area Network (aka Wi-Fi)
VNC	Virtual Network Computing

Chapter 1 Introduction

This document specifies how users (typically, an IT administrator) manage systems remotely in an enterprise environment using AMD's AIM-T solution on both wired and wireless networks. AIM-T is a hardware and software solution that enables AMD-based commercial platforms to provide secure and remote management capability. This is achieved by integrating a dedicated core in AMD's Client SoC (starting from AMD Ryzen™ PRO 6000 Series Processors) along with all the supporting SoC/platform level hardware, firmware, software applications and interfaces. With the help of special WLAN and LAN modules, AIM-T can manage a remote system through a Wi-Fi or ethernet connection.

For support, contact *dashsupport@amd.com*.

Chapter 2 AIM-T Capabilities and Features

2.1 Supported DASH Profiles

AMD's Manageability solution is continuously evolving technology, adding new features with every release. AIM-T 4.5 is our latest release. This section lists supported DASH profiles and describes other manageability features.

Table 2. List of Supported Profiles

No	Release	Profile Specification	Profile Description
1	AIM-T1.0	DSP1058	Base Desktop and Mobile Profile
2		DSP1033	Profile Registration Profile
3		DSP0226	WS-Management Specification
4		DSP0227	WS-Management CIM Binding Specification
5		DSP0230	WS-CIM Mapping Specification
6		DSP1029	OS Status Profile
7		DSP1011	Physical Asset Profile
8		DSP1022	CPU Profile
9		DSP1026	System Memory Profile
10		DSP1014	Ethernet Port Profile
11		DSP1037	DHCP Client Profile
12		DSP1038	DNS Client Profile
13		DSP1035	Host LAN Network Port Profile
14		DSP1036	IP Interface Profile
15		DSP1027	Power State Management Profile
16		DSP1075	PCI Device Profile
17		DSP1034	Simple Identity Management Profile
18		DSP1116	IP Configuration Profile
19		DSP1018	Service Processor Profile
20		DSP1023	Software Inventory Profile
21		DSP1017	SSH Service Profile
22		DSP1039	Role Based Authorization Profile
23		DSP1061	BIOS Management Profile
24		DSP1012	Boot Control Profile
25		DSP1013	Fan Profile

No	Release	Profile Specification	Profile Description
26		DSP1009	Sensors Profile
27		DSP1010	Record Log Profile
28		DSP1054	Indications Profile
29		DSP1076	KVM Redirection
30		DSP1030	Battery Profile
31		DSP1025	Software Update Profile
32	AIM-T2.0	DSP1024	Text Console Redirection Profile
33		DSP1108	Physical Computer and System View Profile
		DSP1012	Enhancement to Boot Control Profile - Boot Devices support, Boot Order Change/Set Next
		DSP1034	User Add/Delete support, Role Change/Assign (Enhancement to Simple Identity Management Profile).
34	AIM-T3.0	DSP1015	Power Supply Profile
35	AIM-T4.0	Custom Feature	Office/Home network Detection
		Custom Feature	KVM Consent (user consent for allowing KVM)
		DSP0226	Mutual Authentication
		Custom Feature	Wi-Fi Sync
36	AIM-T4.5	DSP1070	Opaque Management Data Profile
		Custom Feature	Web UI for MPM
		Custom Feature	Disk Profile (Disk Info)
		Custom Feature	Active Directory based authentication

2.2 Custom Profile and Features

2.2.1 Mutual Authentication (MA)

MA is a 2-way authentication, where-in both the target (AIMT system) and DASH CLI host identify and verify themselves using TLS Certificate. DMTF (Distributed Management Task Force) supports multiple authentication mechanisms, one such mechanism is to support mutual TLS (Mutual Authentication) used as below:

Sample DASHCLI command:

Dashcli.exe -h <hostname> -u <username> -P <password> -cert "<Mutual_Authentication_Certificate_File_ >" enumerate computersystem.

***Note*:**

- *MA feature needs to be enabled, and TLS certification generated during provisioning package creation using APC tool.*
- *Client Certificate and Private Key should be available while sending DASH command. Both can be appended to the same file and sent as part of –cert DASHCLI command.*
- *For addition details, see:* https://www.dmtf.org/sites/default/files/standards/documents/DSP0226_1.2.0.pdf, *Section: C.3.7)*

2.2.2 KVM Consent

KVM consent, aka ensuring user consent for allowing KVM when in OS, gives users of managed system the option to allow or deny KVM access to their systems when a remote IT-admin initiates a KVM session.

Note*: *KVM consent feature must be enabled in the provisioning package (with APC tool). If not enabled, consent is deemed to be given. Active Directory (AD) based authentication.

2.2.3 Active Directory (AD) Based Authentication

AD uses Kerberos, a network authentication protocol to provide user login and authentication services (credential validation username/password) to Organize and Manage user accounts, User Groups, and enables only authorized users access to managed systems.

With AD, DASH commands can use Active Directory credentials to authenticate and manage remote systems.

Note*: *AD feature needs to be enabled in provisioning package, for more details refer APC user Guide.

2.2.4 Web User Interface

This functionality enables IT admins to view supported dash profiles and manage a single node system via a web interface. WEBUI feature must be enabled in the provisioning package and can be launched in compatible browsers by typing: *https:\\HostName_OR_IP:664*

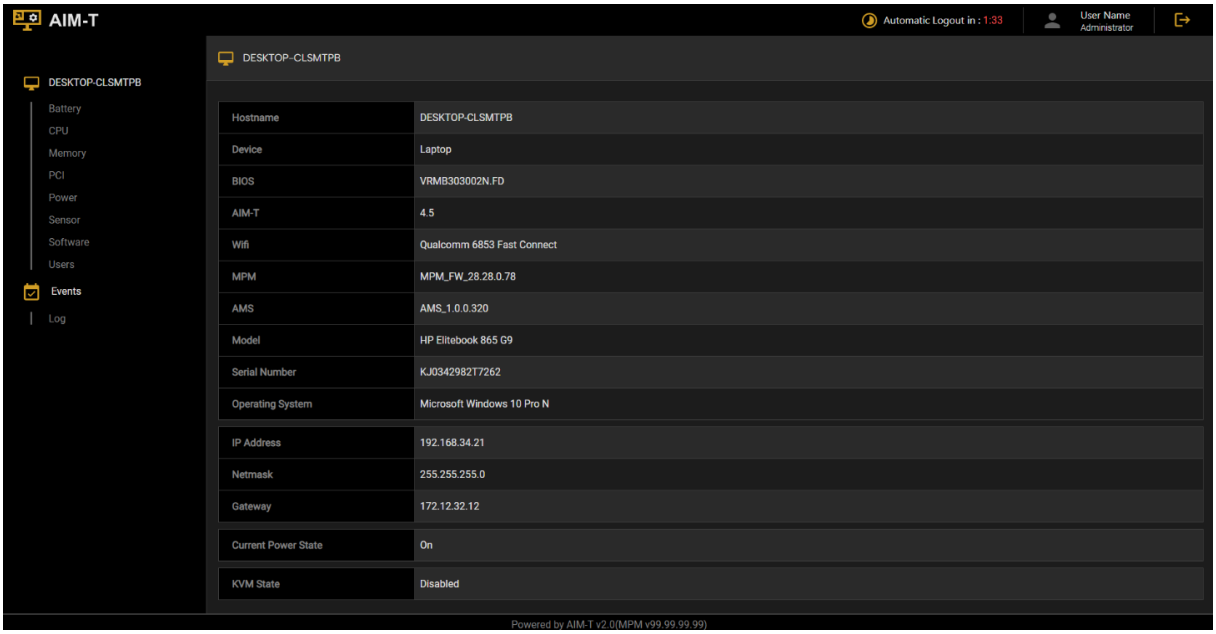


Figure 1. AIM-T WebUI Landing Page

***Note*:** *We recommend Chrome and Microsoft Edge web browsers.*

2.2.5 Cloud Manageability

IT administrators can use this feature to manage enterprise systems even when those systems are outside the enterprise network thus overcoming any requirements for the host and managed systems to be a part of the same network or domain.

***Note*:** *This feature must be enabled and configured during provisioning package creation using the APC tool and the ACMS software deployed. For more information see Appendix I.*

2.2.6 Wi-Fi Sync and Office/Home Network Detection

This is a smart feature which auto detects network changes of managed systems and allows IT admins to continue to manage systems when they move outside the enterprise network and connect to home or public access points even if these networks were not provisioned.

***Note*:**

This feature requires cloud Manageability to be enabled during provisioning package creation using the APC tool and the ACMS software deployed. For more information see Appendix I.

Enterprise network access details must be configured in the provisioning package. Up to eight additional most-recently connected (public, non-enterprise) access points' details are auto saved, if not provisioned.

Chapter 3 Enabling AIM-T on Wireless and Wired Systems

3.1 Prerequisites

A laptop or desktop system with OEM's brand which supports AIM-T and Wired DASH functions. AIM-T requires the following compatible hardware modules:

- Wireless Network: Qualcomm WCN6856, Wi-Fi 6E NFA725A, Wi-Fi 7 NCM825, NCM835, MediaTek RZ616 and RZ717/MT 7925.
- Wired Network: Realtek, RTK8111EPP, RTK8111EPV, RTL8111FP, RTL8125AP, RTL8125BP

Note*: *WLAN Adapter Drivers should be enabled for AMS service to start.

Table 3. Software Requirement for Wireless AIM-T

Application	Min. Version	Description
DASHCLI	5.0	A Command Line Interface tool to be installed on host (IT's system) for sending DASH commands to the target-client (AIM-T enabled system). This tool is available for both Windows and Linux OS Host systems.
AMD Provisioning Console (APC)	2.0	A windows application, can be installed on any host (WIN OS based system) or even on target client (AIM-T system), This tool's User Interface allows us to configure and generate a package with "provisioning data". This package/data should then be provisioned on target-client. Refer APC guide for detailed information. Add appendix section A
AMS (AIM-T Manageability Service)	4.0	A windows application running as a service on client systems. By default, this is pre-installed by OEMs on client systems before shipment. If not installed by default, It can also be downloaded from Microsoft Store (). The complete AMS package is also available under downloads section of the AMD portal (***www.amd.com/DASH***). For detailed instructions refer APC guide

Table 4. Software Requirement for Wired DASH

In Addition to above:

Application	Min. Version	Description
Realtek Ethernet Controller All-In-One Windows Driver	1.0.11.1	You should install on AIM-T system for receiving DASH commands.

You can download:

- DASH CLI, Provisioning Console, and AMS from the AMD portal (*www.amd.com/DASH*).
- Realtek AIO package from Realtek or OEM support websites.

3.2 BIOS Menu Settings

To enable AIM-T on intended systems, we have to select and enable appropriate options in BIOS Setup Page which are typically disabled by default on a fresh BIOS flash.

The following is an example showing AMD's standard UI for enabling AIM-T and wired DASH in BIOS-Setup Menu:

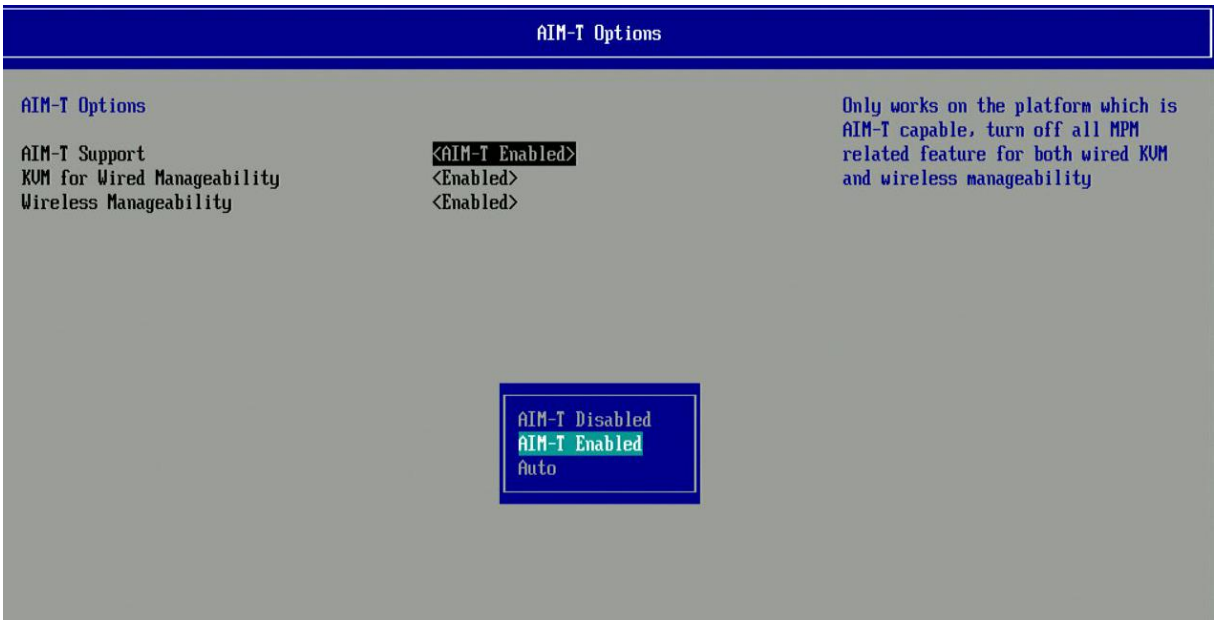


Figure 1. AIM-T Options

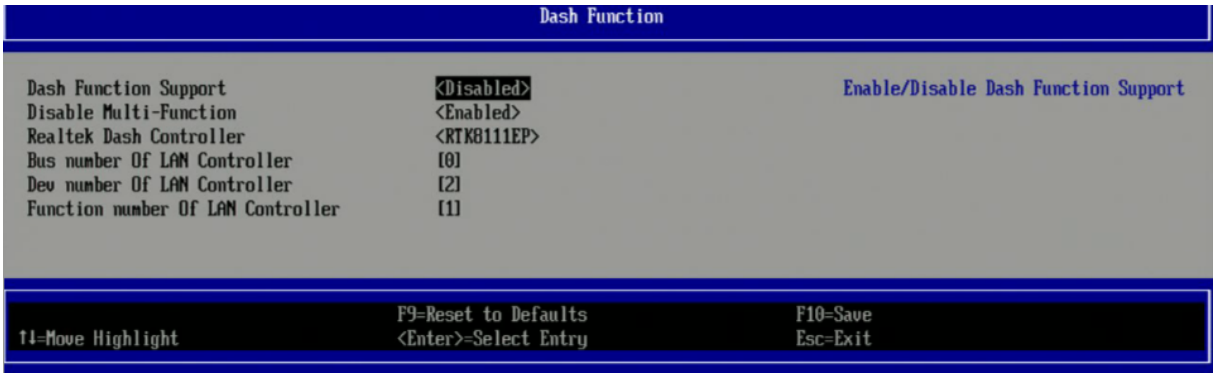


Figure 2. AIM-T Advanced Options

Note: *OEMs having their own BIOSes will usually find AIM-T Enable/Disable options under different sub-menus in the BIOS setup page; you can find this information from the OEM's BIOS manual.*

3.3 Provisioning Console for Wireless AIM-T

Download link: *www.amd.com/DASH*

- AMD Provisioning Console (on the website)
- *AMD_DASH_CLI_Setup_x.y.z.wwww* (for DASH CLI build 4.0.0.1632, the setup file will be *AMD_DASH_CLI_Setup_4.0.0.1632*).

3.3.1 Provisioning

For security purposes, most of the DASH commands require username/password. These usernames and passwords must be provisioned on the client (AIM-T system). When a client receives a DASH command, the AIM-T solution checks whether the username/password with DASH command match the provisioned settings. Only authorized DASH commands will be processed.

For configuring provisioning data and to provision it on the AIM-T system, refer to Appendix A.

Note: *Backup the crypto key folders in the following location for re-provisioning: C:\Users\XXX\Documents\AMD Provisioning Console\Cryptostore*

3.3.2 Re-Provisioning

AMD supports re-provisioning and un-provisioning capabilities. Re-provisioning can be used when a user (IT administrator) wants to change the provisioned username/password or Wi-Fi AP's setting. The user can create a new package with the original crypto key and perform provisioning process again to overwrite the original settings on the AIM-T system. For steps to create a provisioning package and re-provision an AIM-T system, refer to Appendix D.

Note: *It is important that you back-up the crypto key safely as it cannot be retrieved if it is lost.*

3.3.3 Un-Provisioning

Un-provisioning can be used when a user (IT administrator) wants to wipe out the provisioning data in the AIM-T system. The user can trigger un-provisioning by sending a special DASH command with the username/password provisioned on the AIM-T system. In a case where a user has lost the original crypto key but wants to change username/password or Wi-Fi AP's setting, the user can un-provision the old provisioning data and follow section 3.3.1 to create a new crypto key and provision a new configuration. For steps to un-provision an AIM-T system, refer to Appendix C.

Note: *The un-provisioning process will wipe out the provisioned username/password. User must redo the provisioning to make DASH functional again.*

3.4 DASHCLI

Download link: *www.amd.com/DASH*

DASHCLI is a command line tool running on host (IT's system) for sending DASH commands to client (AIM-T system). For security purpose, most of the DASH commands require username/password OR MA based After launching DASHCLI, you can enter DASH commands such as the following:

```
dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate
computersystem
```

Here is a screenshot of the DASHCLI:

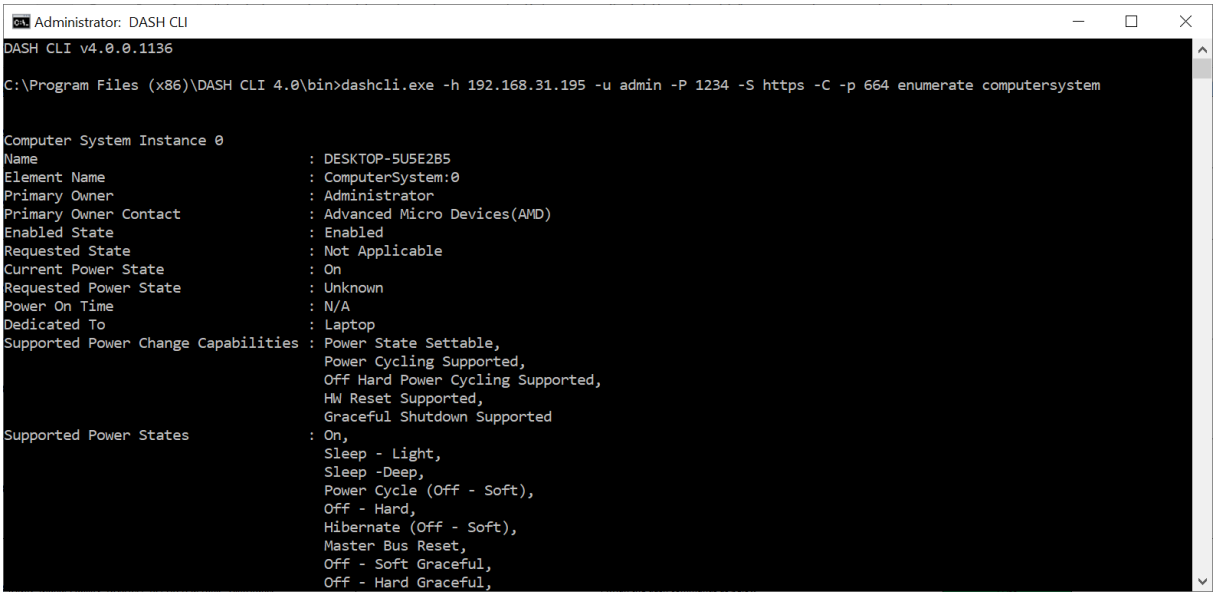


Figure 3. DASHCLI

For more DASH commands, see Appendix F.

3.5 AIM-T Manageability Service (AMS)

If an OEM enables the AIM-T feature from the factory, AMS should already be installed. For AIM-T capable systems not having AIM-T enabled from the factory, you can download and install AMS from Microsoft Store (*https://apps.microsoft.com/store/detail/9PM4WBSLVZTG*):

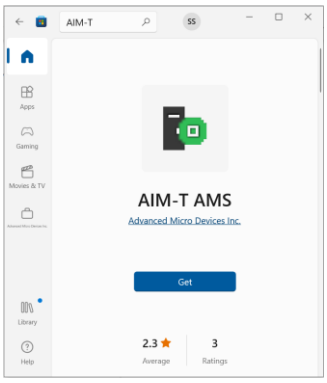


Figure 4. Installing AMS

By default, AMS should be installed on OEM's AIM-T capable products. AMS is auto launched when system boots to OS with Wi-Fi connection. AMS is available in hidden icons; you can double-click the icon to launch it:

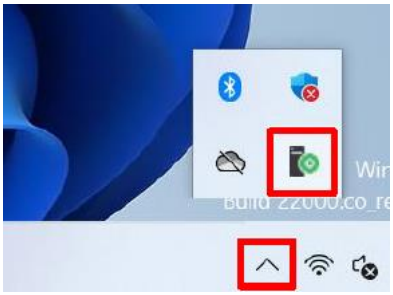


Figure 5. AMS Icon

You can check the AIM-T status in the AMS UI. If AIM-T is enabled in BIOS, the system is provisioned, and Wi-Fi is connected to Wi-Fi AP; the AMS should look as follows:

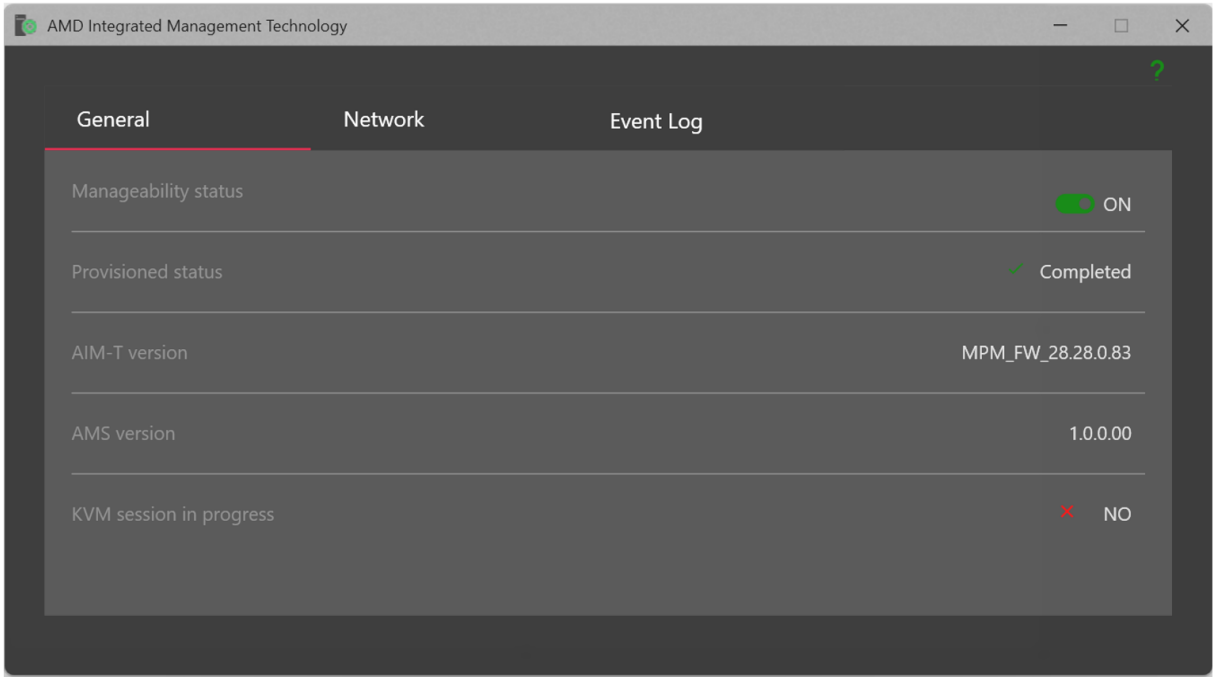


Figure 6. AIM-T Status

AMS UI will be hidden if you log in to Windows with a standard user account. AMS may not be visible in **Apps & features** for a standard user, but it will not affect the DASH commands. The AIM-T system with a standard user account can still receive DASH commands from host. Contrarily, if a client user logs in with an administrator account, he/she can see AMS UI and AIM-T status.

3.5.1 Wake from Sleep

AMS can wake up from sleep to respond to DASH queries with the help of S0i3 filter driver which is packaged along with AMS standalone installer. For MS Store based installer, the supporting filter driver should be installed via Chipset installer corresponding to the platform on which the driver is required to be installed.

Note: *In AIM-T 4.0, wake from sleep is not supported in the S0i3 filter driver over cloud. So, a DASH packet coming over ACMS does not respond back to the client over cloud.*

3.6 Realtek Ethernet Controller All-in-One Windows Driver

Contact OEM to get the installation package and detailed information.

You should install Realtek Ethernet Controller All-in-One Windows Driver on client (AIM-T system) to make the system ready for DASH commands. Once the package is installed, you can check the DASH status and firmware version of NIC with Realtek service UI as follows:

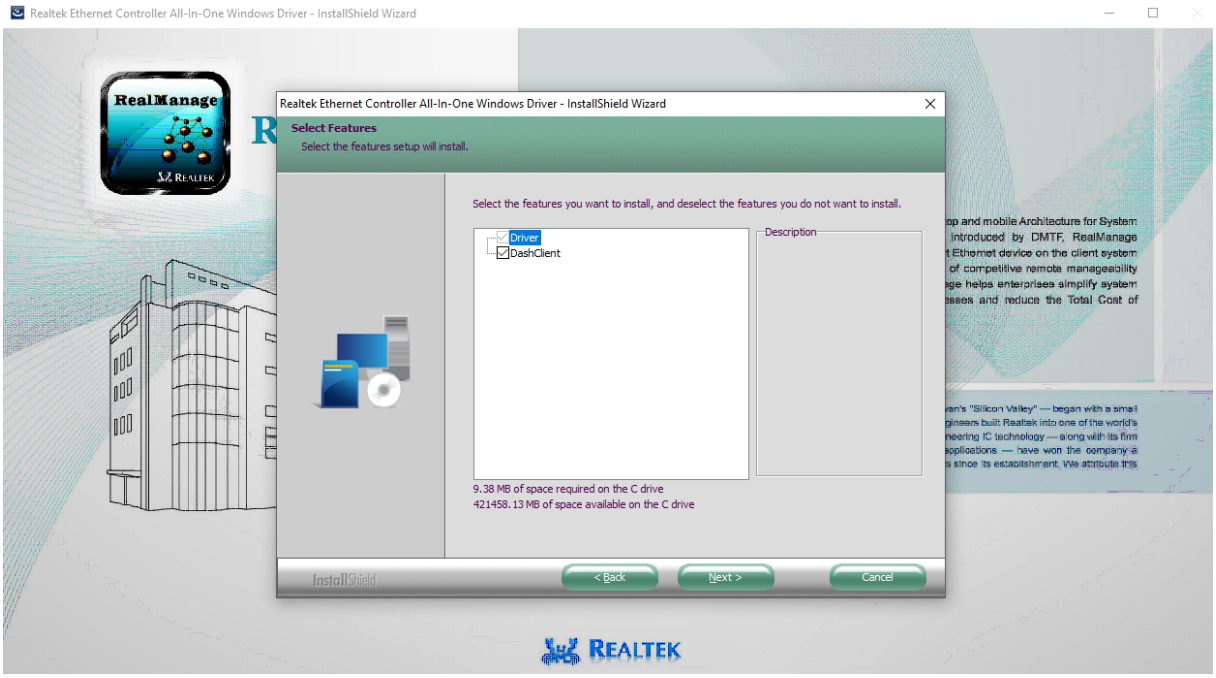


Figure 7. Realtek UI

You can find the execution file and launch Realtek UI in the default directory:

C:\Program Files (x86)\Realtek\Realtek Windows NIC Driver\RtDashService\RtDashUI

DASH client shows the current DASH status and FW version on the AIM-T system:

Figure 8. DASH Client

After the driver installation is complete, you can trigger DASH commands to retrieve information from the AIM-T system. The following is an example showing how to send a DASH command to get AIM-T system's processor info:

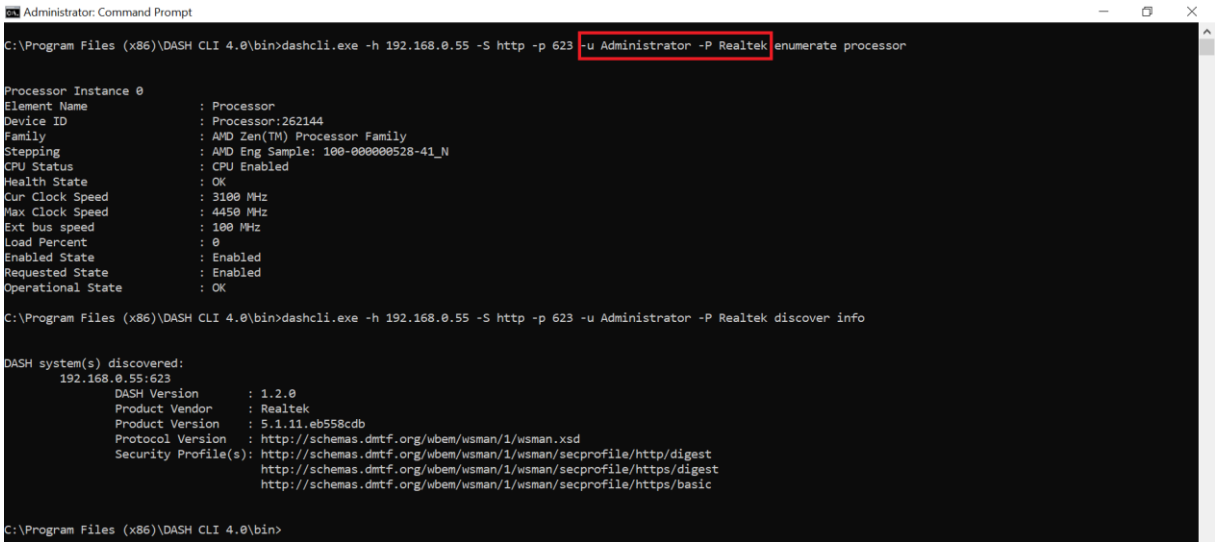


Figure 9. AIM-T System Processor Info

Note: *The default credential for Realtek NIC is* ***Administrator*** *and* ***Realtek****. To learn how to change username and password for wired DASH by flashing Realtek NIC firmware, refer to Appendix F.*

Chapter 4 User Scenario

4.1 AIM-T in OS

4.1.1 Prerequisites

- Client (AIM-T system) has AMS installed and provisioned
- Host (IT admin's console system) has DASHCLI installed
- Host can ping client's IP

4.1.2 Expected Behavior

When a client user is working on an AIM-T system, an enterprise IT can send DASH commands (Appendix D) to the client and fetch system's software and hardware information back silently. Some DASH commands can force the AIM-T system to shut down or reboot. In that case, the client user will observe system graceful shutdown, hard shutdown, or reboot without any notification. Also, the enterprise IT can force an AIM-T system to do BIOS capsule update with a special DASH command and process (Appendix I).

Moreover, the IT can request the client to establish a KVM (0) session. In OS, IT can start an OS KVM in which a VNC viewer will pop-up immediately and show AIM-T system's screen. The other option is that IT sends a BIOS KVM command through DASH to request the AIM-T system restart and enter BIOS setup menu. When the client enters BIOS menu, the VNC viewer on host system should display the same screen.

Note: *A user can terminate KVM session by closing VNC viewer. The safe way to shut down an AIM-T system is to close the VNC viewer and send a DASH command to shut the AIM-T system down (Appendix D).*

4.1.3 Graceful Shutdown

After a user triggers graceful shutdown in OS power menu on a AIM-T system having a power adaptor attached, the system will shut down and restart AIM-T. Thirty seconds later, the system will have AIM-T capability to process DASH commands and KVM session request. For more information, refer to section 4.2.

4.2 AIM-T in Shutdown Mode

4.2.1 Prerequisites

- AIM-T function needs to be enabled in BIOS setup menu on the AIM-T system
- The AIM-T system must be AIM-T provisioned
- Power adaptor must be attached

4.2.2 Expected Behavior

When AIM-T is working in shutdown mode on a AIM-T system, there is no display. However, the power LED may blink and fan spin occasionally depending on the OEM's design and Wi-Fi AP's behavior. Normally, when a client user shuts the system down through OS, the power LED and fan should turn off for 3~6 seconds and automatically turn on for 30~40 seconds. Then, the power LED and fan turn off again. After that, a host (IT's system) can send DASH commands (Appendix D) to the AIM-T system which will wake up with power LED on, fan spinning, and it will take 60 seconds to be prepared for the incoming DASH commands. Some DASH commands can force the AIM-T systems boot to OS. When there is no more DASH command in the queue for 3 minutes, the system will shutdown. Same as AIM-T in OS mode, AIM-T supports KVM function in shutdown mode. The KVM (0) session request sent from IT will trigger the system restart and establish a KVM connection.

4.2.3 Pressing Power Button

In the shutdown mode, regardless of power LED is on or off, a client user can boot the system to OS by pressing a power button.

Note: *When the power LED turns on, an AIM-T system may not be ready for handling the power button event for the first 30 seconds. User should press the power button after 30 seconds of power LED turning on.*

4.2.4 Detaching Power Adaptor

Power adaptor attachment is one of the requirements for AIM-T in shutdown mode. Removing power adaptor will force the system turn AIM-T off during shutdown mode.

Chapter 5 Troubleshooting

5.1 On AIM-T DASH System

5.1.1 AMS Status is Off

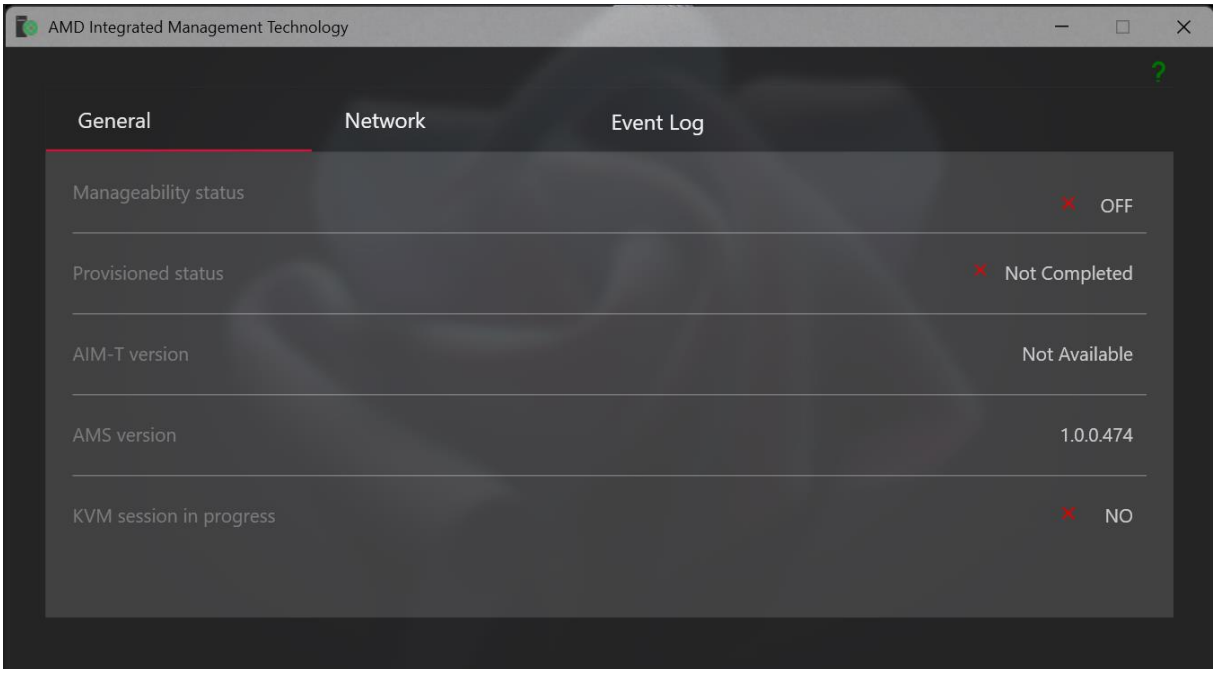


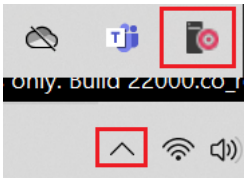
Figure 10. AMS Status is Off

If the **Manageability status** is OFF in the AMS UI tray, user can check the following to recover it:

- AIM-T is ON in the BIOS menu
- Device Manager > System > AMS-MailboxDrv works properly
- Launch services to ensure that AMS is running

5.1.2 Red AMS UI Tray

In some cases, the AMS tray icon will turn red as AMS may not start:



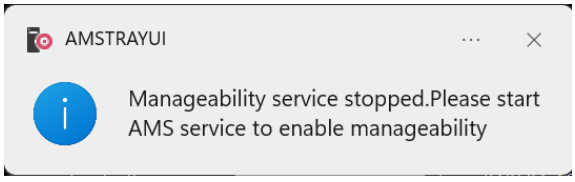
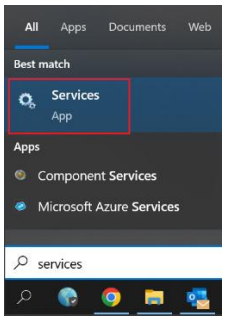


Figure 11. AMS UI Tray Issues

You can re-launch AMS to recover it.

Also, you can search for **Services** and start the service as follows:



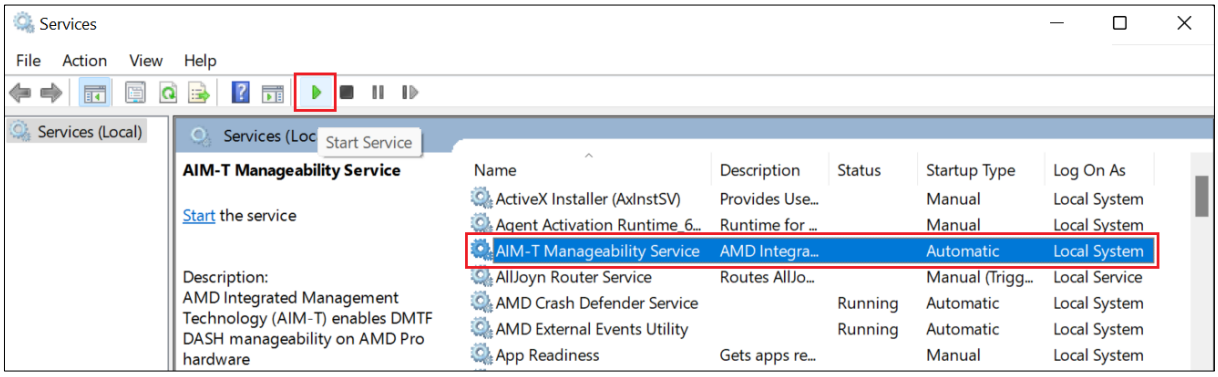


Figure 12. Start AMS Service

5.1.3 KVM Consent After Target Wakes Up from S0i3

Upon resuming from the S0i3 state, the KVM session with KVM consent will function only if the target system was either already in a "locked-screen" state or returned directly to the desktop without requiring a sign-in (with the sign-in option set to "never").

5.2 On Console (DASH CLI) System

5.2.1 KVM Command Response

Both OS KVM and BIOS KVM require a KVMSSHKey which is in a provisioning package generated by the user (refer to Appendix A) and should be saved in:

C:\Program Files (x86)\DASH CLI x.y\certs

For example: For DASH CLI 4.0, the path is C:\Program Files (x86)\DASH CLI 4.0\certs

The folder *certs* is set as an administrator folder which may be controlled by an enterprise IT policy.

```
C:\Program Files (x86)\DASH CLI 4.2\bin>dashcli -h 10.138.154.120 -C -u Administrator -P Realtek -t kvmredirection[1] startoskvm

[1/4] Enabling KVM Engine ... done
[2/4] Rebooting the system ...done
[3/4] Waiting for the system to boot .......done
[4/4] Launching KVM-VNC viewer ...
127.0.0.1:59612 disconnected!
waiting for KVM viewer to close
```

Figure 13. DASH CLI – KVM Output

5.2.2 Unresponsive AIM-T System

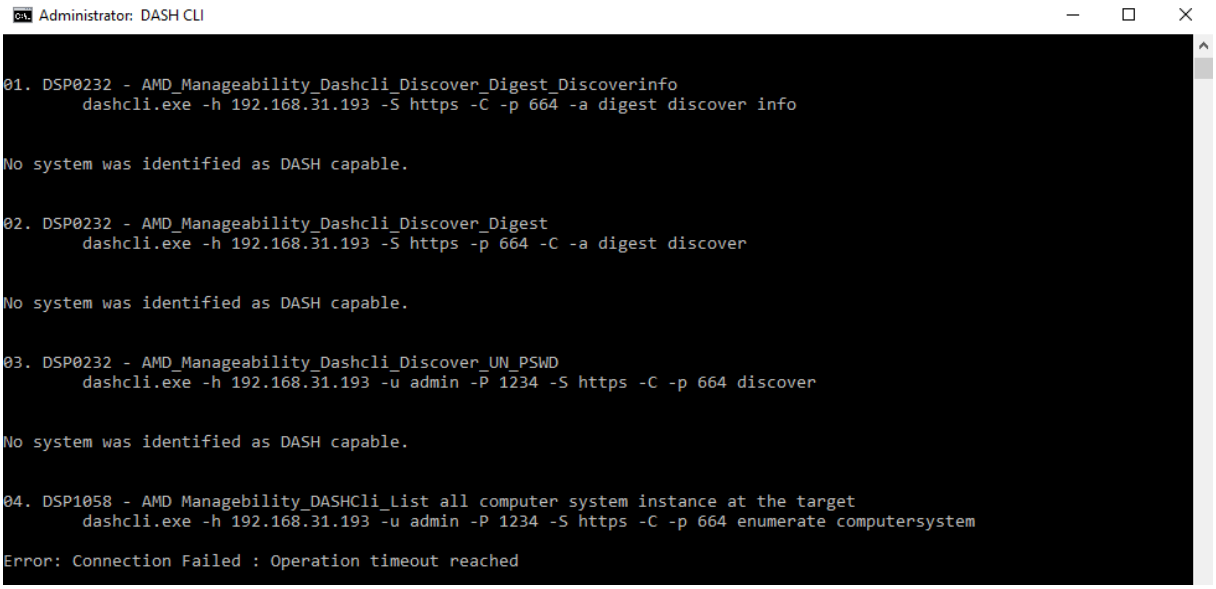


Figure 14. Unresponsive AIM-T System

When an AIM-T system is in the shutdown mode, the console cannot get any DASH response immediately. You should wake the AIM-T system up by sending a DASH command. Then, the AIM-T system will take 1~1.5 minute to be ready for handling DASH commands. You can keep sending DASH commands to ensure that the AIM-T system is ready.

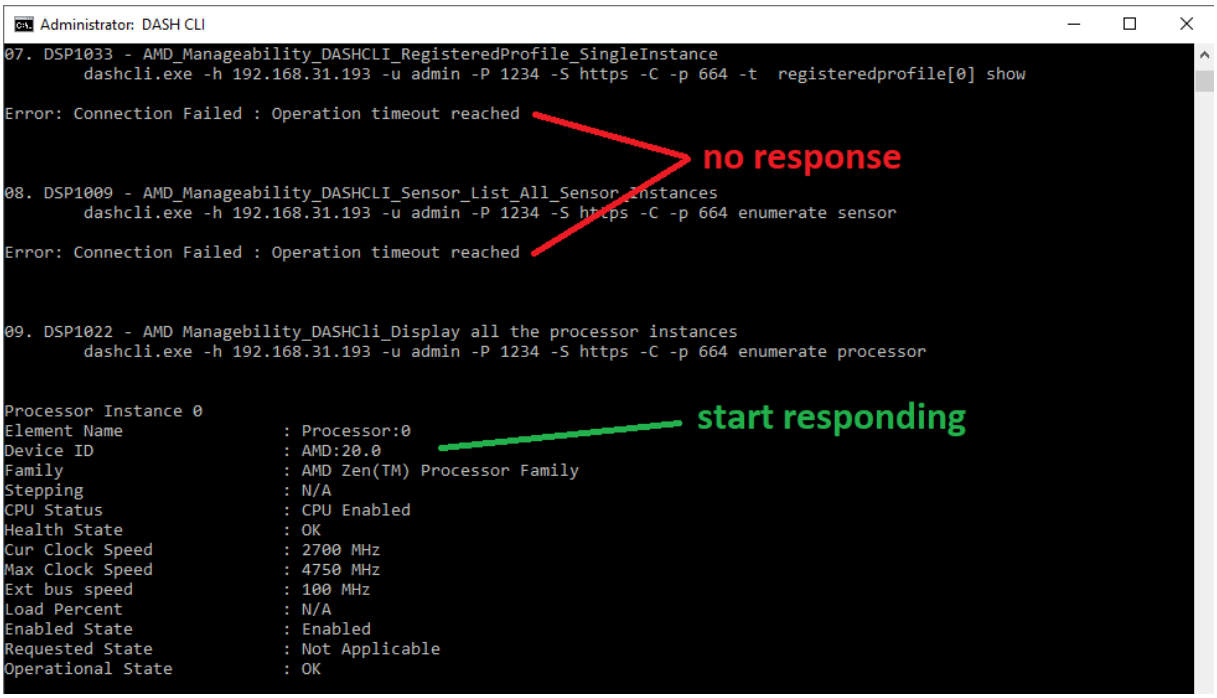


Figure 15. Responsive AIM-T system

Other reasons for an AIM-T system being unresponsive can be the AIM-T system is not connected to the same network domain or it is not configured properly. To fix the AIM-T system, refer to section 5.1.

5.2.3 Distorted Display or Black Screen While Connecting KVM

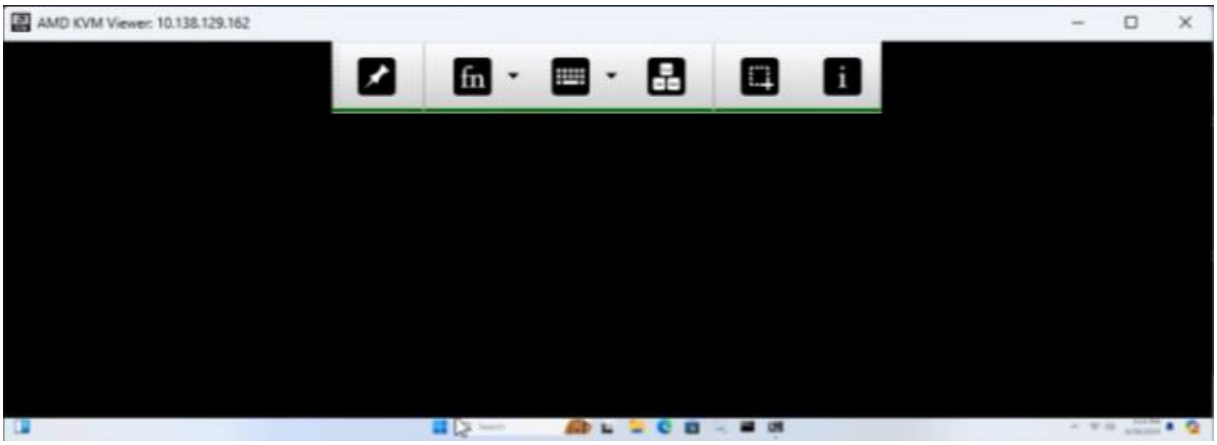


Figure 16. Distorted Display or Black Screen While Connecting KVM

When a host system initiates a KVM session with an AIM-T system, the host user (enterprise IT admin) may witness a distorted VNC viewer. Most of the time, this problem happens when the client was in the shutdown mode and was woken up by a KVM request. This problem can be recovered by rebooting the AIM-T system. When a host user witnesses the issue, he/she can

launch a new DASHCLI console (do not close the old one) and send a power cycle DASH command to the client:

dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t computersystem[0] power cycle

This command can reboot the AIM-T system. Then, the host user will see the client's BIOS menu with a clear display on the VNC viewer in a few minutes.

Appendix A Configuring Provisioning Data

Complete the following steps to configure the provisioning data:

1. On host (IT's system), install AMD Provisioning Console tool using the executable file (for example, *Provisioning_Console_setup-1.0.0.xxx-AMD.exe*).
2. Launch AMD Provisioning Console.
3. Fill in the organization information.
4. Select the location where you want to store the profiles:

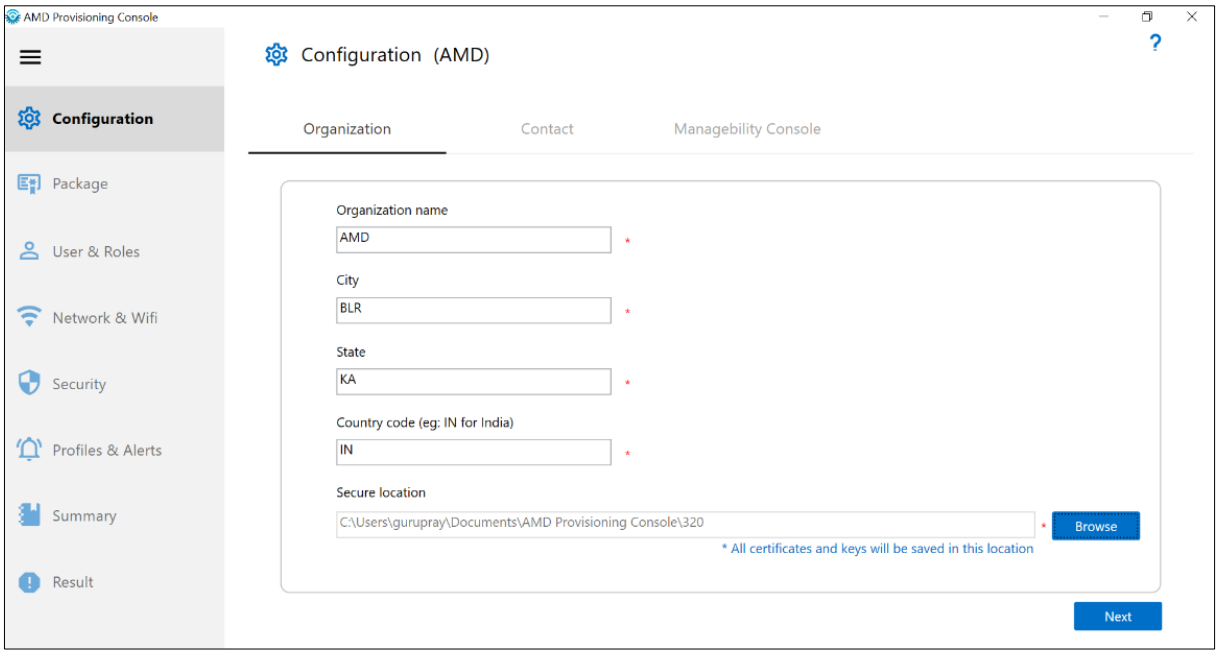


Figure 17. Profile Location

5. Fill in the contact information:

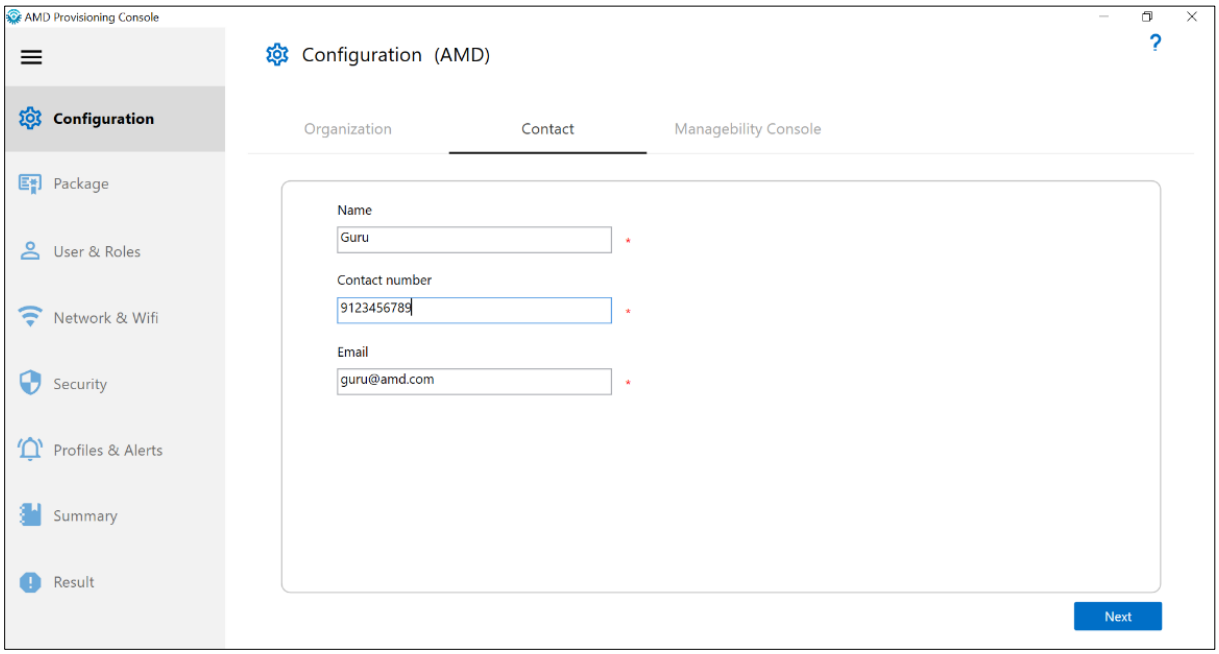


Figure 18. Contact Information

6. Provide a **Package name**.
   It will be a part of the provisioning package's folder name.
7. Create a new Crypto and select it from the **Crypto store** drop-down:

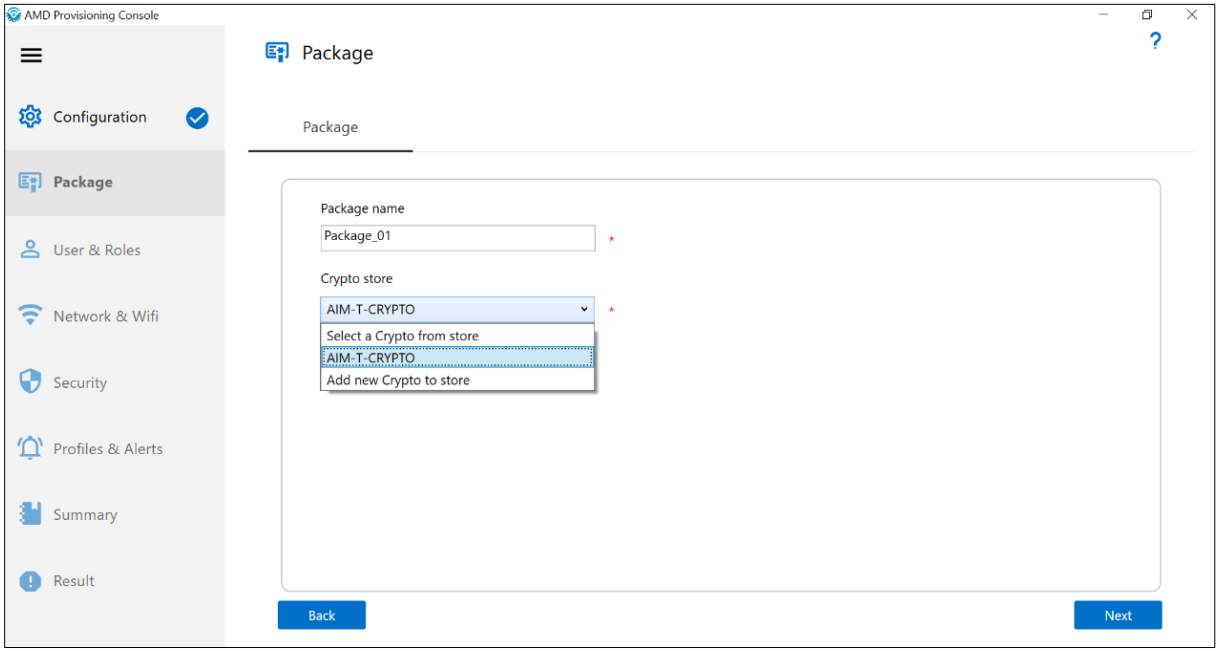


Figure 19. Crypto store

8. Add two users (one standard and one admin) without changing the **Roles** configuration:

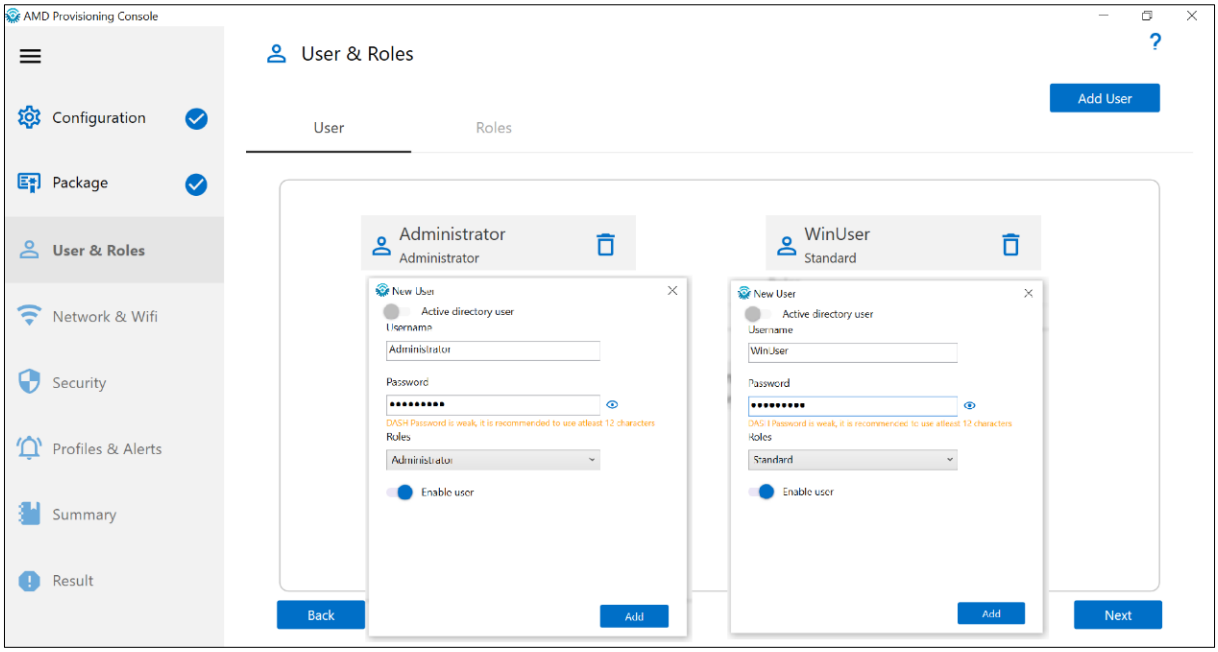


Figure 20. Adding Users

9. Add one or up to 5 Wi-Fi access point profiles. This setting is required for AIM-T in the System Shutdown mode. See Appendix J for details.

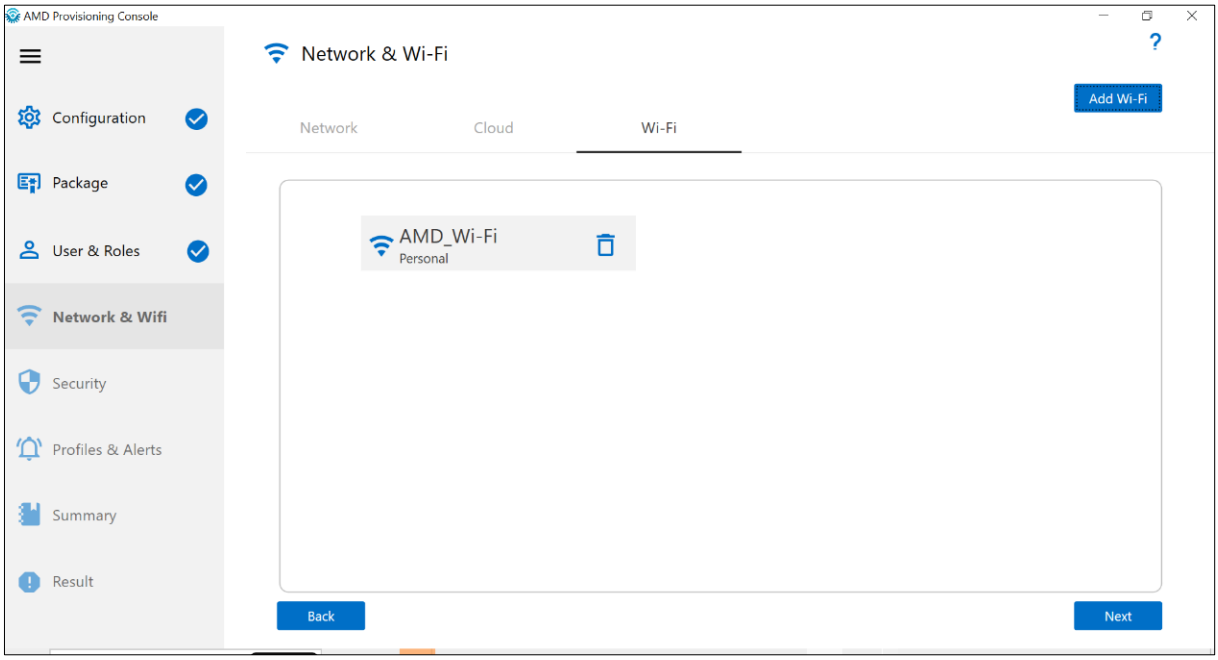


Figure 21. Adding Wi-Fi Access Point

10. Use the default port number (664) for **Secure port**:

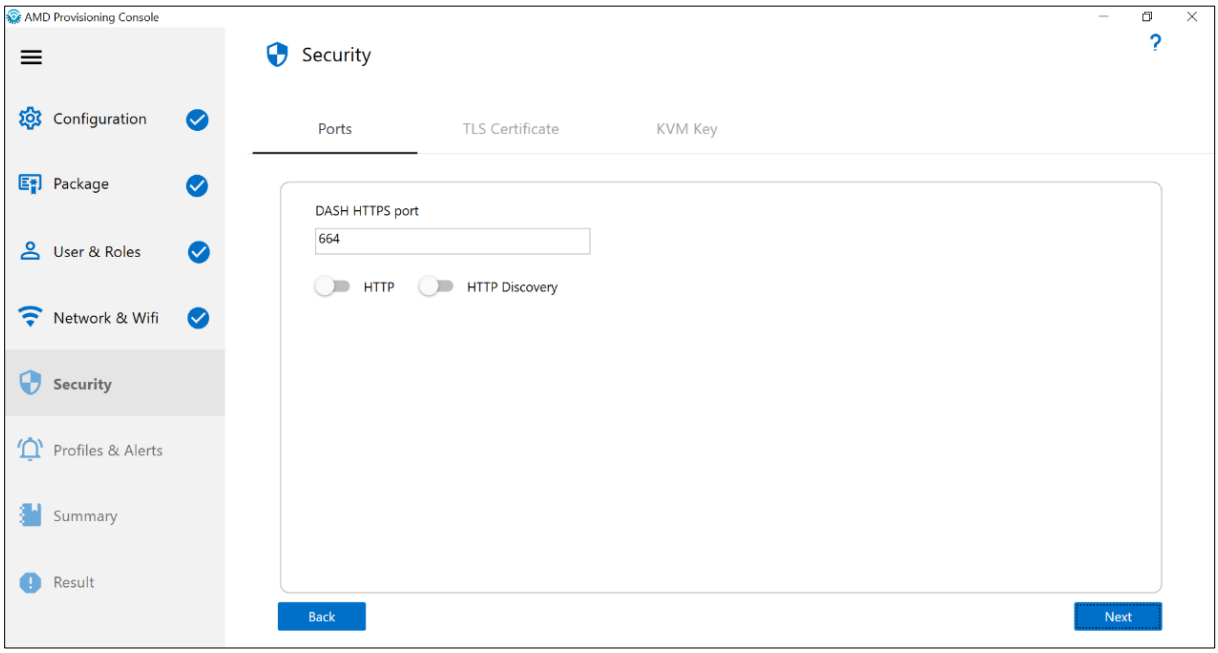


Figure 22. Secure Port

11. Generate a TLS certificate:

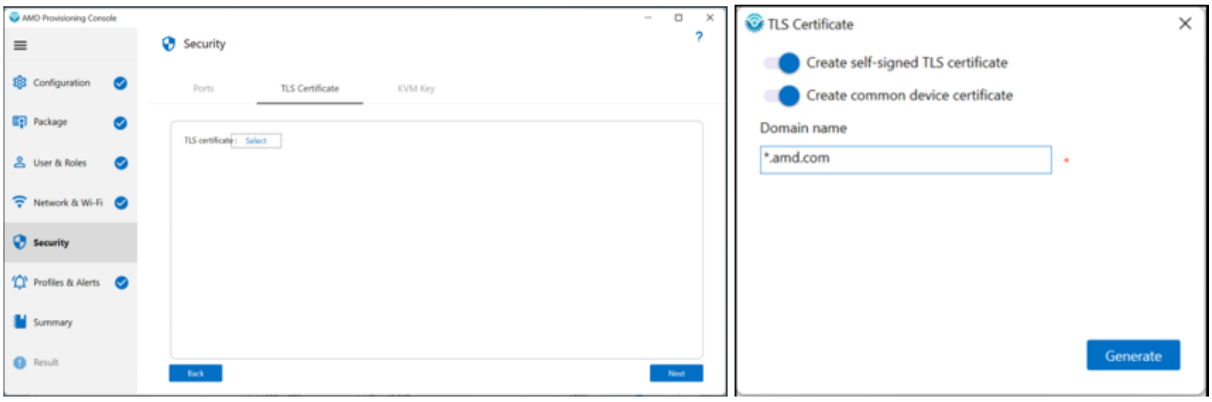


Figure 23. TLS Certificate

12. Generate a KVM key:

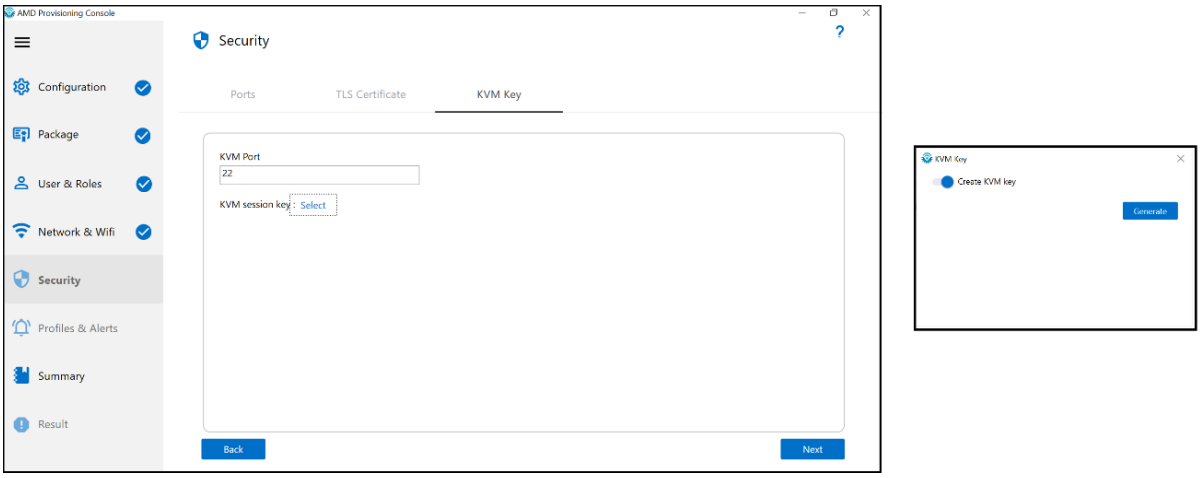


Figure 24. KVM Key

13. All supported DASH profiles enabled by default. You can disable profiles that are not required.

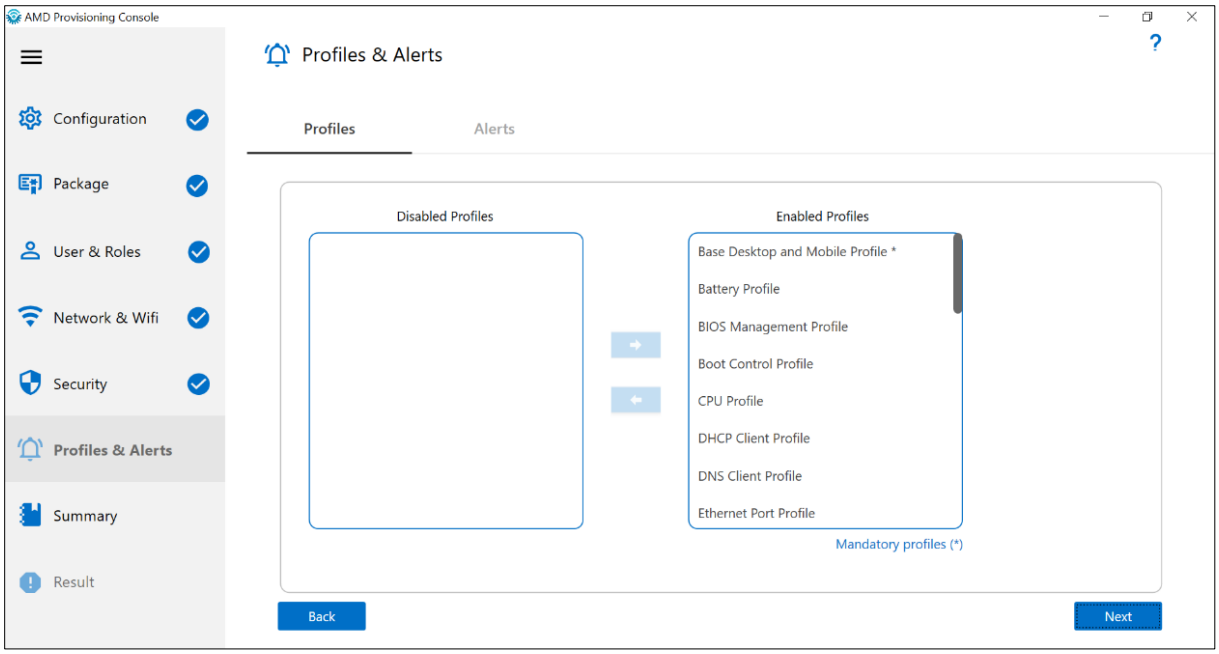


Figure 25. DASH Profiles

14. Alerts are not required. You can skip this step.

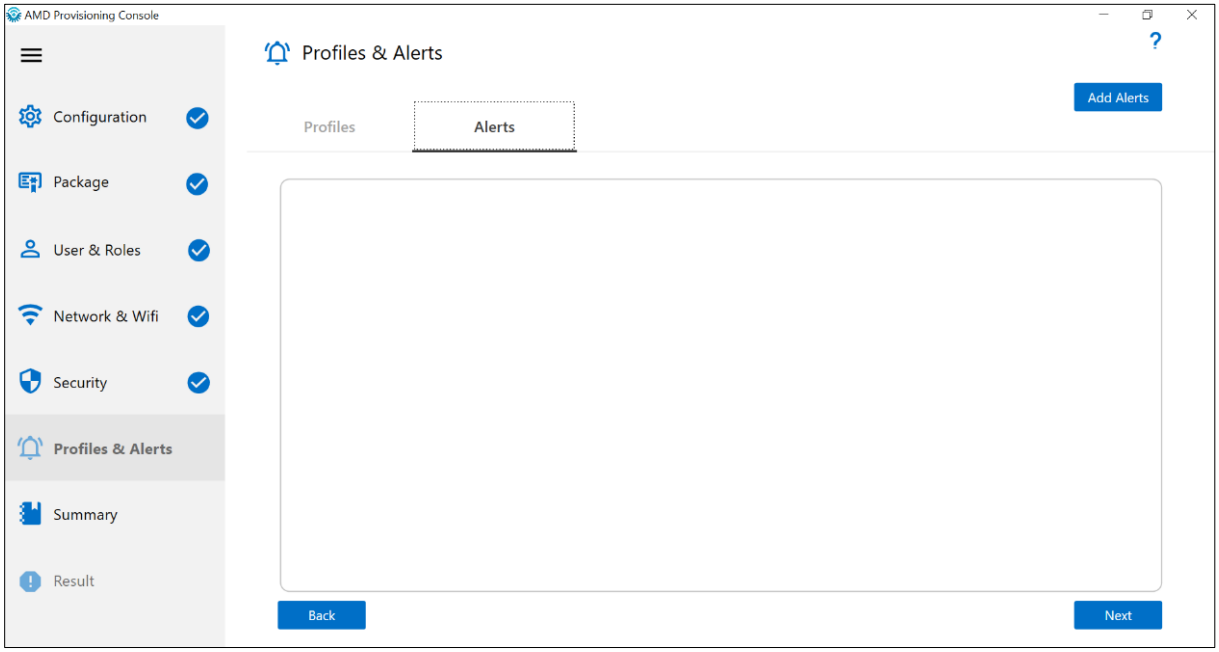


Figure 26. Alerts

15. Click the **Submit** button:

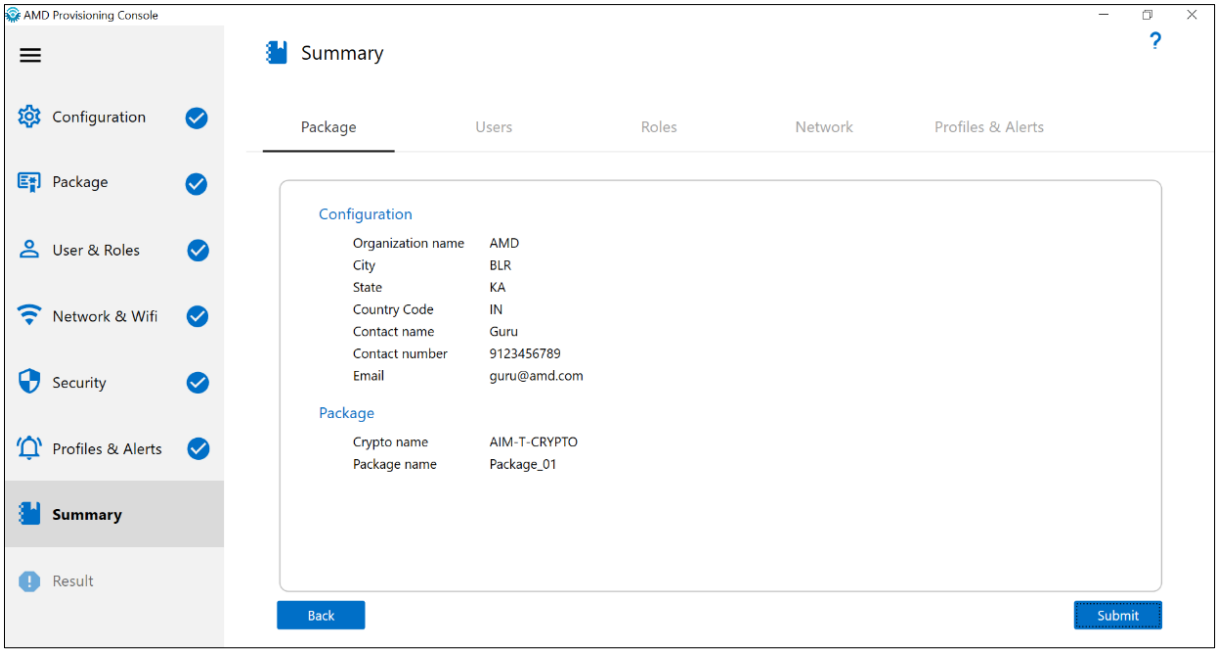


Figure 27. Summary

The *Result* pane is displayed:

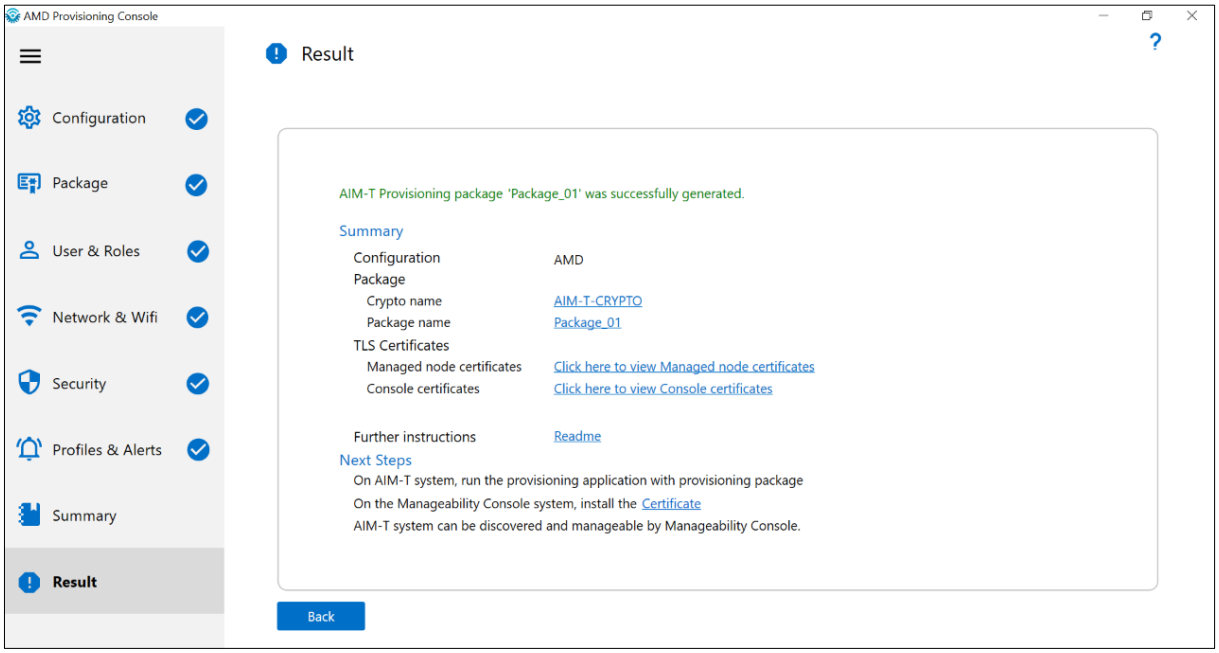


Figure 28. Result

The provisioning package is generated.

16. Copy the provisioning package (saved in the directory set in Step 4) to client (AIM-T system).
17. On the client, launch a prompt command as an administrator and go to the package location.

18. Type the command `AIM-TProvisioningApp.exe -i XXXX_oMt`:

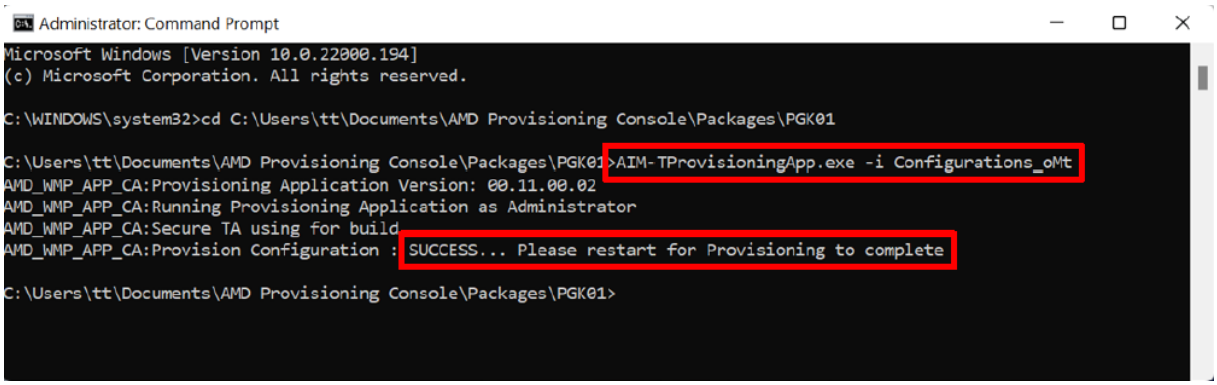


Figure 29. Provisioning Command

19. If you generated a KVM key in Step12, copy the KVMSSHKey from the provisioning package (*<package path>\consolecertificates\KVMSSHKey*) to *C:\Program Files (x86)\DASH CLI x.y\certs* on host.

Appendix B Re-Provisioning

Complete the following steps to re-provision:

1. Ensure that provisioning is done on the AIM-T system.
2. Launch *AMD Provisioning Console*.
3. Select the crypto key provisioned on the AIM-T system:

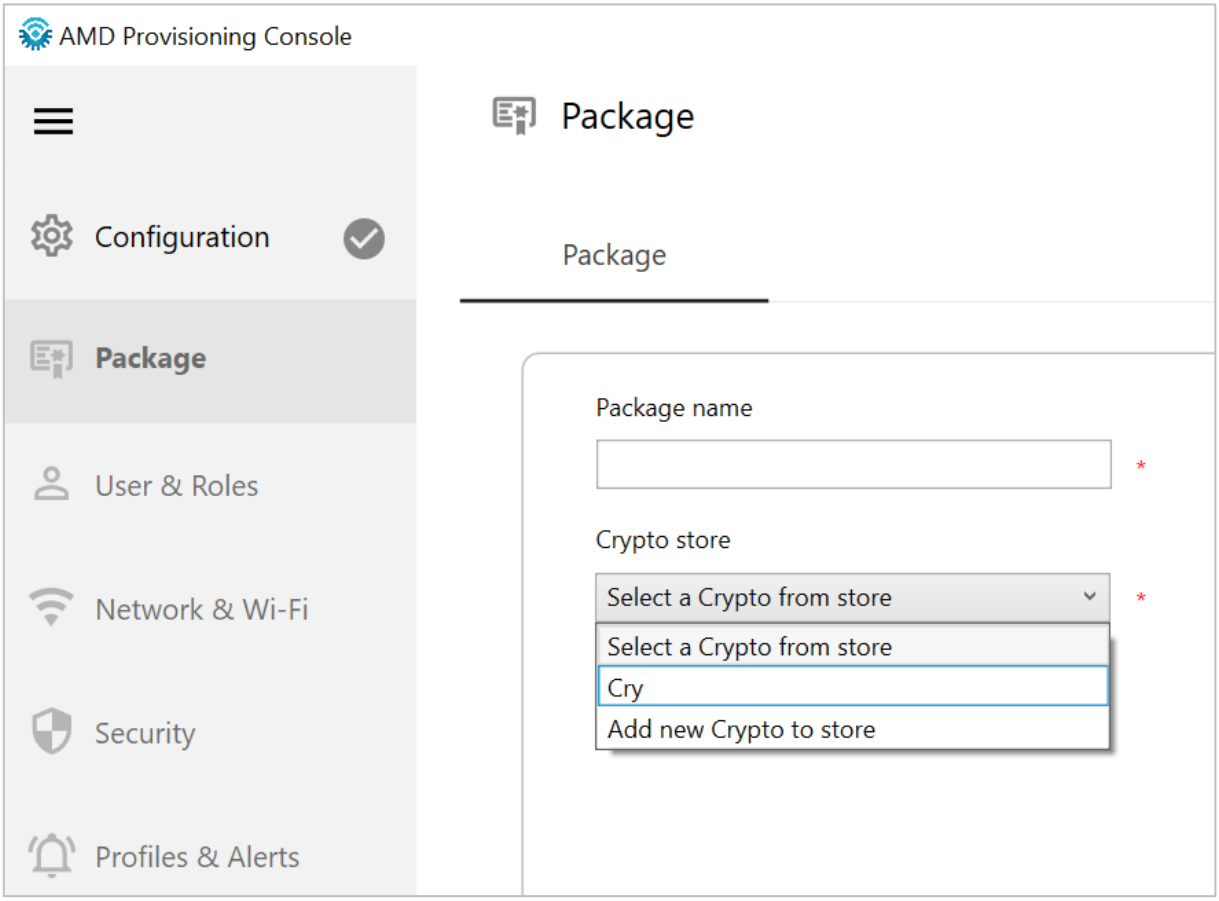


Figure 30. Select Crypto Key

4. If you cannot see the original crypto key in Step 3 but you do have a copy of the key, copy it to *Documents\AMD Provisioning Console\Cryptostore*.

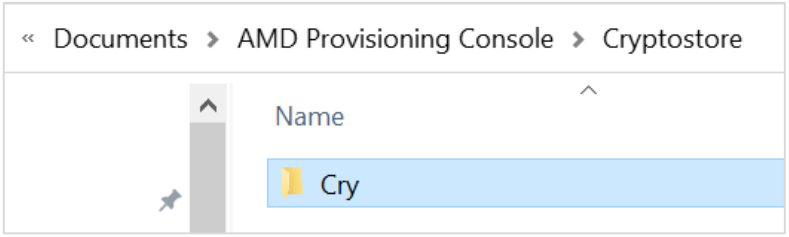


Figure 31. Copy Crypto Key

5. Repeat steps 2 and 3.
6. Refer to Appendix A and generate a provisioning package with a new username/password or new Wi-Fi AP's setting.
7. Execute the command:

```
AIM-TProvisioningApp.exe -i XXXX_M
```

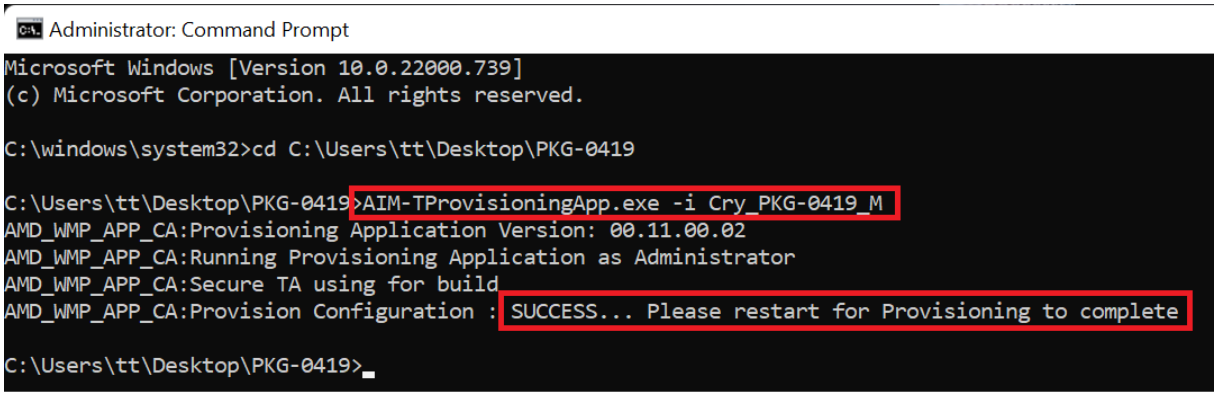


Figure 32. Re-provisioning Command

8. If you re-generate a new KVM key, complete step 19 in Appendix A to copy the KVMSSHKey to DASHCLI's *cert* folder.

Appendix C Un-Provisioning

Complete the following steps to un-provision:

1. Ensure that the AIM-T system has enabled AIM-T and is provisioned. You can send some DASH commands in Appendix D to ensure that DASH is working with its username/password.
2. Execute the following command:

```
dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -p 664 unown
```

Appendix D Supported DASH Commands

Some of the supported commands for a DASH capable system are as follows:

Note: *Adding -v 1 option will provide detailed logs.*

Table 5. Common DASH Commands

Commands	Description
`dashcli.exe -h <ipaddress> -S https -C -p 664 -a digest discover info`	Display discovery information with Digest authentication
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate computersystem`	Enumerate all the computer system profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate registeredprofile`	Enumerate all the registered profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate sensor`	Enumerate sensor details
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate processor`	Enumerate all the processor profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate dhcpclient`	Enumerate all the DHCP client profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate dnsclient`	Enumerate all the DNS client profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate ethernetport`	Enumerate all the ethernet port profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate networkport`	Enumerate all the network port profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate ipinterface`	Enumerate all the IP interface profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate ipconfiguration`	Enumerate all the IP configuration profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate operatingsystem`	Enumerate all the OS profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate asset`	Enumerate all the asset profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate memory`	Enumerate all the memory profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate pcidevice`	Enumerate all the PCI device instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate ssh`	Enumerate all the SSH profile instances
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate recordlog`	Enumerate all the records information

Commands	Description
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 enumerate battery`	Enumerate the battery info
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t computersystem[#instance] power status`	Display current power status of the AIM-T system
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t computersystem[#instance] power shutdown`	Power shutdown the AIM-T system
`dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t computersystem[#instance] power cycle`	Power cycle the AIM-T system
`dashcli -h dash-system -p 664 -S https -C -u <username> -P <password> software[0] install <URL for Capsule>` `Example: dashcli -h 192.168.0.176 -S https -C -p 664 -u admin -P amd@123 -t software[0] install http://192.168.0.211:3274/Capsule.zip`	Update the Software BIOS through Capsule update

Note: *For a full list of supported DASH commands please refer DASH CLI user guide packaged with DASH CLI installation.*

Appendix E Using KVM

When an OEM device supports KVM function, a host (IT's system) can use DASHCLI `startkvm` command to initiate a KVM session to the AIM-T system:

```
dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t
kvmredirection[0] startkvm
```

Complete the following steps to establish a KVM session:

1. Enable AIM-T and KVM function on AIM-T system's BIOS setup menu.
2. Ensure that the AIM-T system has been AIM-T provisioned (Appendix A).
3. Place a copy of KVMSSHKey in *C:\Program Files (x86)\DASH CLI 4.0\certs*, where you execute DASHCLI commands on host (Appendix A).
4. Boot AIM-T system to OS.
5. Run one of the following DASH commands on the host:

   ```
   dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t
   kvmredirection[0] startkvm
   ```

   or

   ```
   dashcli.exe -h <ipaddress> -u <username> -P <password> -S https -C -p 664 -t
   kvmredirection[0] startoskvm
   ```

   For more information, refer to Figure 13. DASH CLI – KVM Output.
6. If the step 3 was executed correctly, a VNC viewer will be launched on host.
7. If the graphics driver installed on the AIM-T system supports instant KVM, go to step 8 for OS KVM. Otherwise, the system will auto-reboot and go to step 10 for BIOS KVM.

Note: *Ctrl + Alt + Del combination requires DASH CLI 7.0 or higher. Otherwise, Ctrl key is known to cause issues.*

8. Host can see the client's screen on VNC viewer called OS KVM:

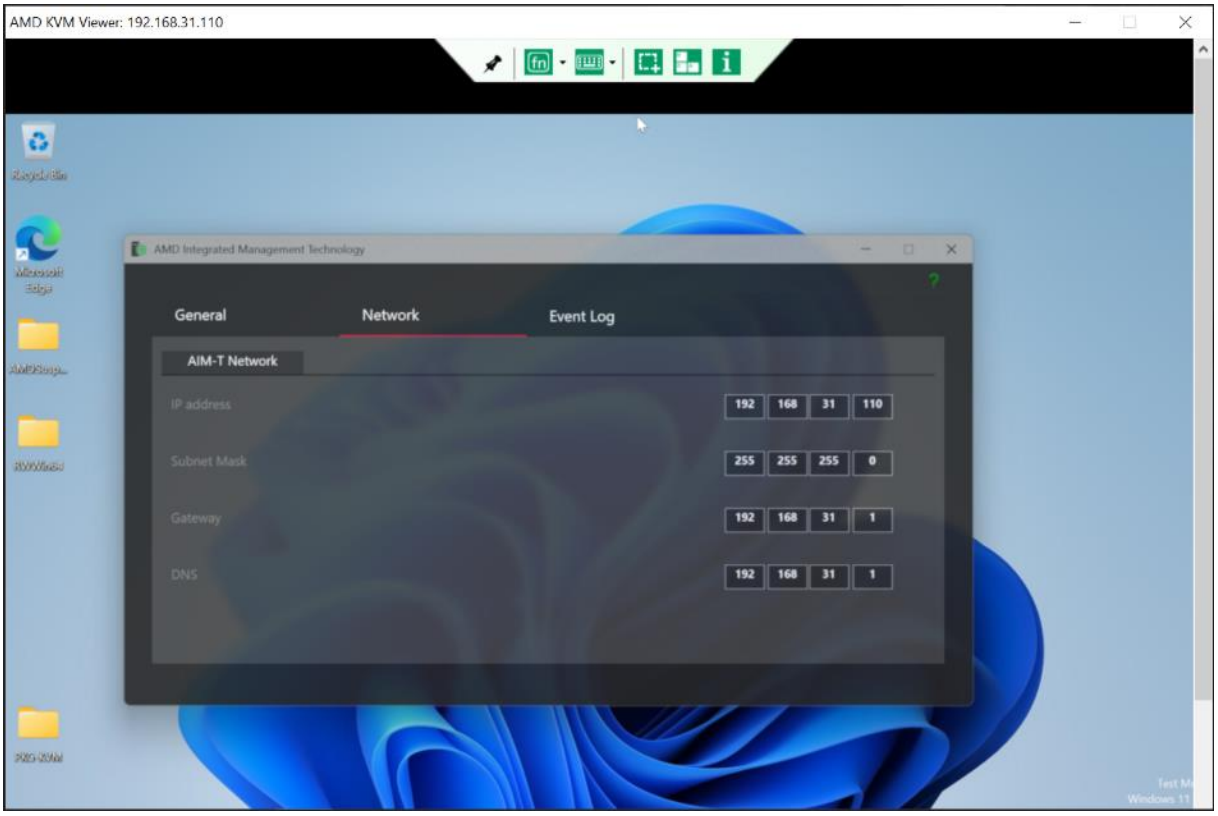


Figure 33. AMD KVM Viewer

9. To trigger the BIOS KVM, configure the VNC viewer to restart the client in Windows power option.
10. After reboot, the AIM-T system will stop at F1/F2 window. The same screen is displayed on the VNC viewer. F1 is selected by default; it is to continue to OS and F2 is to boot to BIOS.

    Note: *OEM may change the definition of F1/F2 or replace it with other keys.*

11. Based on the F1/F2 configuration in the previous step, press F1 on the VNC Viewer. The AIM-T system will boot to OS and OS KVM will be established.
    If you press F2, the client will boot to BIOS setup menu (BIOS KVM).
12. Ensure that BIOS menu navigation is possible using keyboard and mouse from the VNC viewer.
13. If required, modify the BIOS settings using VNC viewer and save them.
14. The AIM-T system should auto-reboot while exiting the BIOS setup menu. Check if the changes made in the previous step are reflected correctly.
15. Close the VNC viewer to finish the KVM session and select **Yes** to reboot the AIM-T system again.

    Note: *If you select* ***No****, the AIM-T system will not restart.*

Appendix F Flashing RTK NIC Firmware

Contact OEM for more information on getting the flash tool with the bin file.

You can use the command line interface with the related bin file (68EPSPIB.bin) to flash Realtek NIC's firmware and Config file (68EPSPI.CFG) to run *WINPG64.bat*. The following figure shows the firmware flashed successfully:

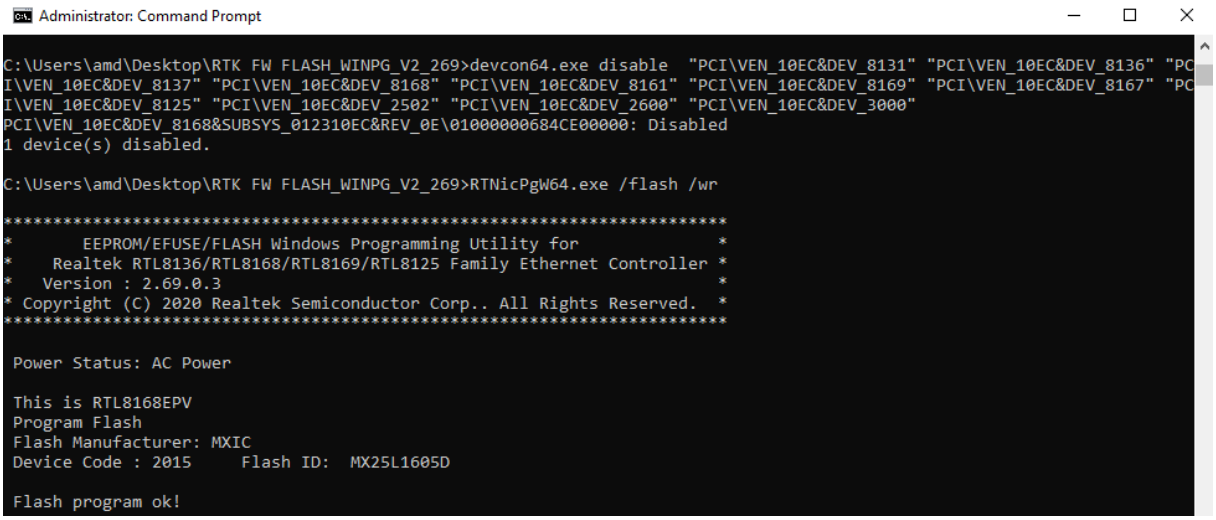


Figure 34. Firmware Flash Status

Appendix G Supported Wired DASH Profiles

Table 6. Supported Wired DASH Profiles

Profiles	Requirement
Base Desktop and Mobile	Mandatory
Profile Registration	Mandatory
Role Based Authorization	Mandatory
Simple Identity Management	Mandatory
BIOS Management	Optional
Boot Control	Optional
CPU	Optional
DHCP	Optional
Fan	Optional
Indications	Optional
IP Interface	Optional
KVM Redirection	Optional
OS Status	Optional
Physical Asset	Optional
Power State Management	Optional
Power Supply	Optional
Record Log	Optional
Sensor	Optional
Battery	Optional
Software Inventory	Optional
Software Update	Optional
System Memory	Optional
Text Console redirection	Optional
USB Redirection	Optional

Appendix H Supported DASH Profiles in AIM-T

DMTF DASH Specification - *https://www.dmtf.org/standards/dash*

See 2.1 Supported DASH Profiles for a list of all supported DASH profiles release-wise.

AMD PRO Manageability Features	Corresponding Profiles
Asset Inventory - HW/SW	DSP1011 DSP1022 DSP1013 DSP1075 DSP1030 DSP1029 DSP1026 DSP1015 DSP1009 DSP1061 DSP1023
Remote Power Control / DASH Power Control	DSP1027
Boot Control	DSP1012
Platform Alerts	DSP1010 DSP1054
HTTPS Secure Transport & WS-Management	DSP0226 DSP0232
Standardized Discovery	DSP0232
User Administration	DSP1034 DSP1039 We do support DASH user and not host OS credentials.
IPv4 (out-of-band)	Supported
Text Console Redirection	DSP1024 DSP1017

AMD PRO Manageability Features	Corresponding Profiles
BIOS Management	DSP1061
PLDM/MCTP interfaces for Health monitoring (fan speed, temp, etc.)	DSP0240 We do use PLDM. We do not need MCTP as MPM also as part of platform and we are using custom PLDM.
OS Status (Out of band)	DSP1029
“Graceful”"/ “Soft” Shutdown	DSP1027
Management Firmware Update - Remotely	DSP1025
AMD KVM Redirection	DSP1076 DSP1017
Network Information	DSP1088 DSP1014 DSP1035 DSP1036 DSP1037 DSP1038 DSP1116

AMD PRO Manageability Features	Corresponding Profiles	AIM-T Version
Asset Inventory - HW/SW	DSP1011 DSP1022 DSP1013 DSP1075 DSP1030 DSP1029 DSP1026 DSP1015 DSP1009 DSP1061 DSP1023	
Remote Power Control / DASH Power Control	DSP1027	
Boot Control	DSP1012	
Platform Alerts	DSP1010 DSP1054	
HTTPS Secure Transport & WS-Management	DSP0226 DSP0232	
Standardized Discovery	DSP0232	
User Administration	DSP1034 DSP1039 We do support DASH user and not host OS credentials.	
IPv4 (out-of-band)	Supported	
Text Console Redirection	DSP1024 DSP1017	
BIOS Management	DSP1061	

AMD PRO Manageability Features	Corresponding Profiles	AIM-T Version
PLDM/MCTP interfaces for Health monitoring (fan speed, temp, etc.)	DSP0240 We do use PLDM. We do not need MCTP as MPM also as part of platform and we are using custom PLDM.	
OS Status (Out of band)	DSP1029	
“Graceful”/“Soft” Shutdown	DSP1027	
Management Firmware Update - Remotely	DSP1025	
AMD KVM Redirection	DSP1076 DSP1017	
Network Information	DSP1088 DSP1014 DSP1035 DSP1036 DSP1037 DSP1038 DSP1116	

Appendix I Updating BIOS Capsule

An enterprise IT admin is allowed to force a AIM-T system for performing a BIOS capsule update with DASH commands. However, the IT must setup a download server for AIM-T systems to download the latest valid capsule that can be recognized and installed by Windows OS. The AMS installed on AIM-T systems utilizes an inbox app *PnPutil.exe* in OS to install a BIOS capsule. DASH commands can ask a AIM-T system to download the capsule and then AMS will run *PnPutil.exe* to install the capsule.

I.1 Setting up a Download Server

AMD provides the tool AMD Management Console (*www.amd.com/DASH*) to send DASH commands with a user-friendly interface. When installing AMC, the installer will simulate a virtual webserver with the network port 3274 (by default) and create a folder "*C:\AMC-ISO*" to act as the download space.

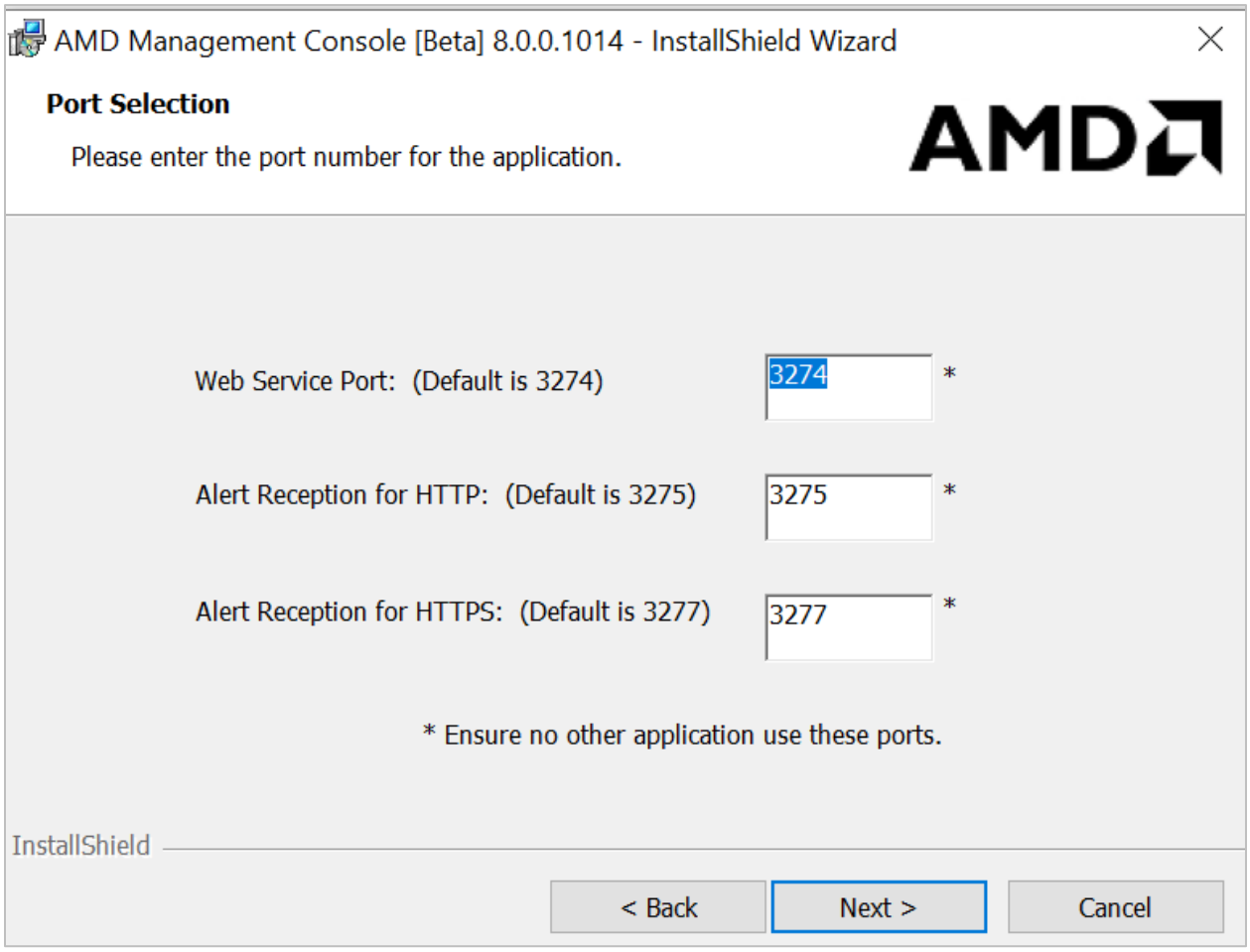


Figure 35. AMC - Port Selection

After AMC is installed, you can place any file in the folder *C:\AMC-ISO* and type-in: http:<ip of AMC console machine>:3274 in the web browser to test it:

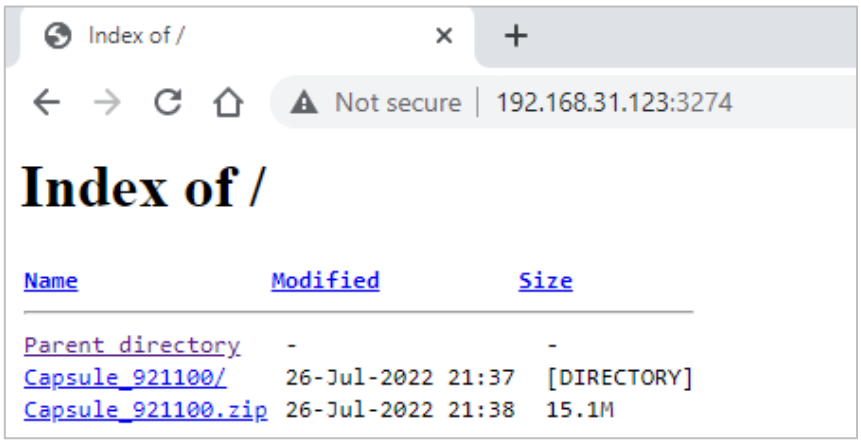


Figure 36. Testing AMC

Note: *The network port 3274 may be blocked by the firewall, an IT admin must give permission to allow the traffic through this port.*

I.2 Preparing a Valid Capsule

An enterprise IT should be able to download a BIOS capsule from the OEM's website (or other channels). A valid capsule includes:

- *.bin* or *.cap* file – the new firmware
- *.cer* file – the certificate
- *.cat* file – the driver catalog
- *.inf* file – the driver information

You can launch a command prompt as admin and execute the following command to trigger the capsule installation:

```
PnPutil.exe /add-driver xxx.inf /install
```

If the installation is successful, it means the capsule is valid:

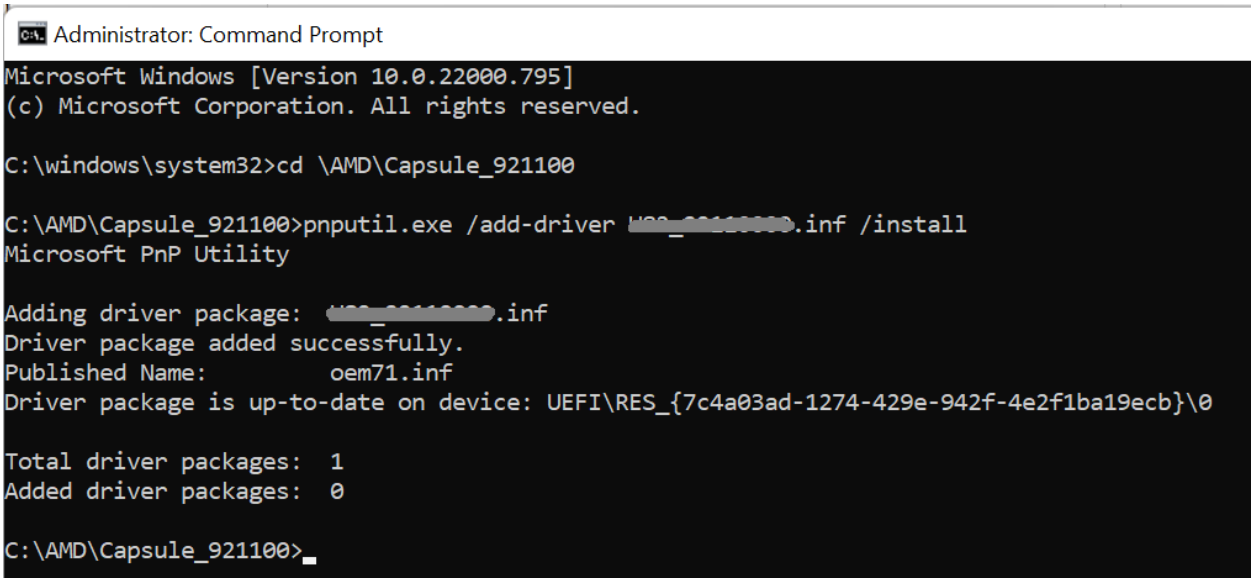


Figure 37. Valid Capsule

I.3 Reforming the Capsule

After verifying the content of a BIOS capsule, reform the capsule to an AMS readable format as follows:

1. Create a folder **Capsule**.
2. Copy all the files from the valid capsule and paste them to the new folder *\Capsule*.
3. Zip *\Capsule* into *capsule.zip.*
4. Put *capsule.zip* in *C:\AMC-ISO.*

I.4 DASH Command for Capsule Update

```
dashcli -h <ipaddress> -p 664 -S https -C -u <username> -P <password> software[0] install
<URL for Capsule>
```

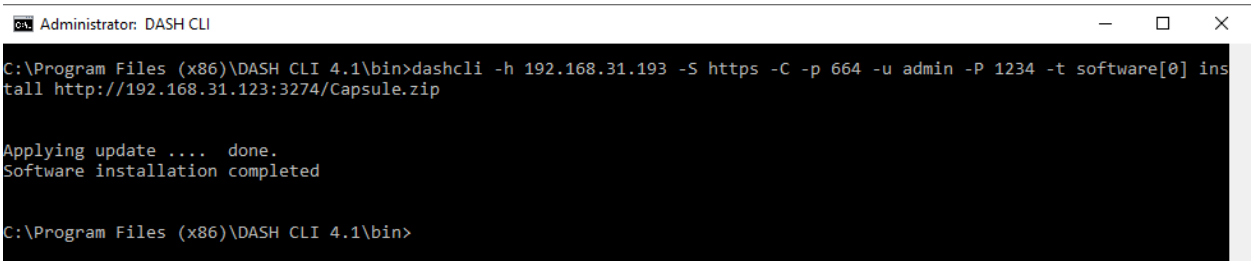


Figure 38. Capsule Update

Appendix J AMD Cloud Manageability Service

AMD Manageability solution enables the IT administrators to effectively manage enterprise systems when the system is powered on/off.

AMD Cloud Manageability Service (ACMS) is a software product within AMD Manageability that enables the IT administrators to manage enterprise systems even when those systems are outside the enterprise network. A limitation in current DASH implementation is that both IT admin and DASH node must be on the same network or routable domain. ACMS circumvents this limitation by introducing a publicly running daemon that will facilitate IT admins to manage a DASH node from their homes (public network).

J.1 Requirements

You can get the ACMS software from the downloads section of the AMD portal (*https://www.amd.com/DASH*).

- To run ACMS, it should be deployed on:
  - Linux® system capable of running Ubuntu® 20.04 LTS
  - Public IP
- On public clouds, it can be achieved by spawning Ubuntu 20.04 Virtual Machine (VM) in public subnet. The recommended configuration for all the systems is 4-core x64 with at least 4 GB of RAM.
- AIM-T 2.0 and later supports AMD Cloud Manageability. Ensure that AMS 2.0 or later is installed on Windows®. AIM-T system must be provisioned with cloud option enabled using AMD Provisioning Console.
- You can use DASH CLI to issue the manageability commands over cloud. DASH CLI 4.5 and later support AMD Cloud Manageability.
- AMD Provisioning Console (APC) is used to generate TLS certificates and to configure ACMS server hostname in managed systems. APC 2.0 and later have the cloud option.

J.2 Installation and Setup

Before installing the ACMS, create a provisioning package using APC to generate the required certificates.

APC is used to generate certificate, key and certificate authority for ACMS, DASH CLI, and AIM-T.

The following figure shows various options of the APC page:

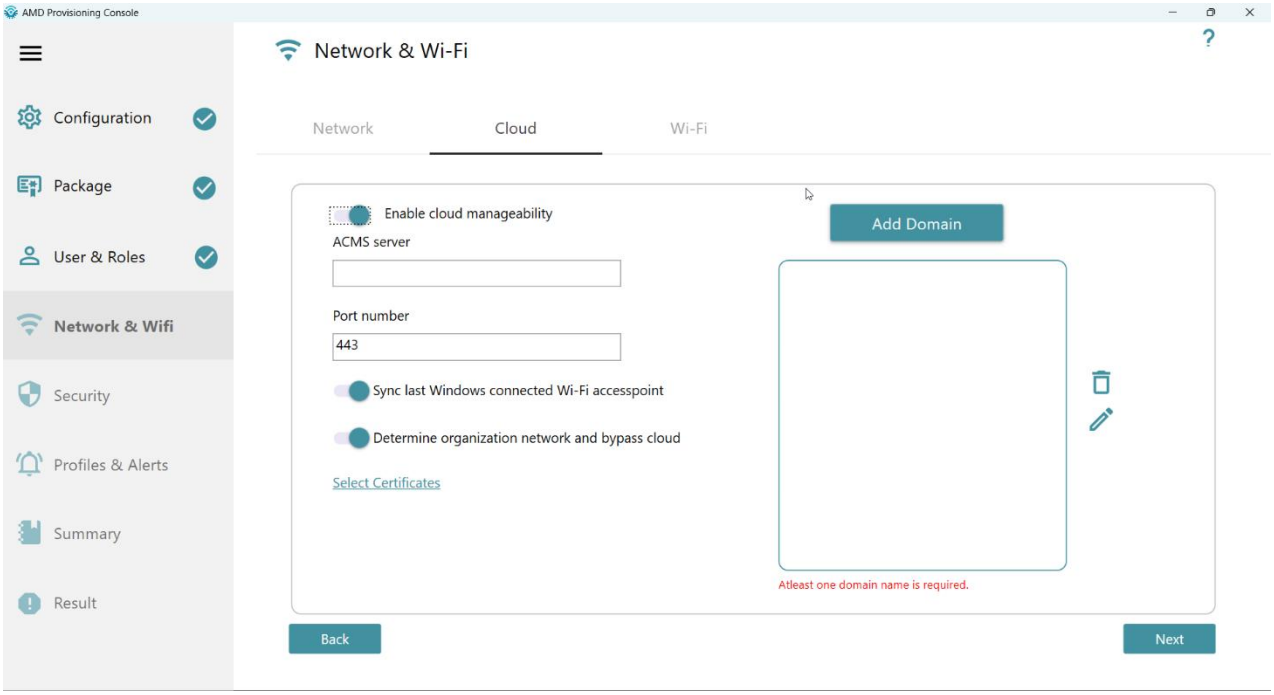


Figure 39. APC Page

The generated files are present at the following path:

$(SecurePath)\AMD Provisioning Console\Packages\$(PackageName)\AIM-T\ACMS

$(SecurePath) is the path provided to the APC tool, $(PackageName) is the package name provided by the user. The following two folders are present at this location:

- Cloud
  - *acmscert.pem*
  - *acmskey.pem*
  - *trustedclients.pem*
- DASHCLI
  - *acmscert.pem*
  - *consolecert.pem*

J.2.1 Installation

Complete the following steps to install ACMS:

1. On Ubuntu 20.04, install the package as follows:

```
$ sudo apt install ./acms_1.0.0.1099_amd64.deb
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'acms' instead of './acms_1.0.0.1099_amd64.deb'
The following NEW packages will be installed:
  acms
0 upgraded, 1 newly installed, 0 to remove and 62 not upgraded.
After this operation, 1,474 kB of additional disk space will be used.
Get:1 /home/amd/certs-work/acms_1.0.0.1099_amd64.deb acms amd64 1.0.0.1099 [417 kB]
Selecting previously unselected package acms.
(Reading database ... 254233 files and directories currently installed.)
Preparing to unpack .../acms_1.0.0.1099_amd64.deb ...
Unpacking acms (1.0.0.1099) ...
Setting up acms (1.0.0.1099) ...
```

2. Start ACMS:

```
$ sudo systemctl start acms
```

3. Verify that it is running on port 443:

```
$ systemctl status amcs
● acms.service - AMD Cloud Manageability Service
     Loaded: loaded (/lib/systemd/system/acms.service; enabled; vendor preset:
enabled)
     Active: active (running) since Tue 2023-01-31 13:51:22 IST; 2s ago
   Main PID: 485996 (acms)
      Tasks: 1 (limit: 9375)
     Memory: 756.0K
     CGroup: /system.slice/acms.service
             └─485996 /bin/acms --bind 0.0.0.0:443 --poll 60 --cert
/etc/acms/acmscert.pem --key /etc/acms/acmskey.pem --ca /etc/acms/trustedclients.pem

Jan 31 13:51:22 acms-host systemd[1]: Started AMD Cloud Manageability Service.
```

4. (Optional) Enable it to start automatically at boot time:

```
$ sudo systemctl enable acms
Created symlink /etc/systemd/system/multi-user.target.wants/acms.service →
/lib/systemd/system/acms.service.
```

5. Use `journalctl` to view the logs from ACMS and `-f` option for the live logs:

```
$ journalctl -fu acms
```

J.2.2 Configuration

ACMS implements 2-way-TLS for securing itself against unauthorized access. Hence, only the clients with trusted certificates will be able to connect. The certificates, private key, and certificate authority files in PEM format respectively are expected at the following locations:

```
/etc/acms/amcscert.pem
/etc/acms/acmskey.pem
/etc/acms/trustedclients.pem
```

Copy them from the *Cloud\ACMS* folder in the APC package.

J.2.3 DASH CLI Configuration

DASH CLI uses the following certificates for authentication with ACMS:

```
%ProgramFiles(x86)%\DASH CLI 4.0\certs\consolecert.pem
%ProgramFiles(x86)%\DASH CLI 4.0\certs\acmscert.pem
```

Copy them from the *Cloud\Console* folder in the APC package.

J.2.4 AIM-T Managed System Configuration

Run the provisioning package on the system. Ensure that AIM-T provisioning package is generated with cloud option enabled.

J.3 Testing the Setup

Test the local setup without ACMS. ACMS must be first to start followed by AIM-T. On *dash-cli-win10* execute *dashcli.exe* as follows:

```
dashcli.exe -C -h aimt-host -u admin -P adminpass enumerate commputersystem
```

The output might resemble as follows:

```
Error: Connection Failed : Could not resolve host
```

The equivalent command using `-r` option is as follows:

```
dashcli.exe -r acms-host -C -h aimt-host -u admin -P adminpass enumerate computersystem
```

Observe the output, it will be identical to output displayed when connected directly:

```
Computer System Instance 0
Name                                : MS-WIN10
Element Name                        : Computer System:0
Primary Owner                       : AMD
Primary Owner Contact               : N/A
Enabled State                       : Enabled
Requested State                     : Not Applicable
Current Power State                 : On
Requested Power State               : Unknown
Power On Time                       : 2021/12/15 17:56:28
Dedicated To                        : Desktop
Supported Power Change Capabilities : Power State Settable,
                                      Power Cycling Supported,
                                      HW Reset Supported,
                                      Graceful Shutdown Supported
Supported Power States              : Sleep -Deep,
                                      Power Cycle (Off - Soft),
                                      Hibernate (Off - Soft),
                                      Off - Soft,
                                      Master Bus Reset,
                                      Off - Soft Graceful,
                                      Master Bus Reset Graceful,
                                      Power Cycle (Off - Soft Graceful)
Request Supported Power States      : Sleep -Deep,
                                      Power Cycle (Off - Soft),
                                      Hibernate (Off - Soft),
                                      Off - Soft,
                                      Master Bus Reset,
                                      Off - Soft Graceful,
                                      Master Bus Reset Graceful,
                                      Power Cycle (Off - Soft Graceful)
Available Requested Power States    : On,
                                      Off - Hard,
                                      Hibernate (Off - Soft),
                                      Off - Soft,
                                      Master Bus Reset
```

Observe the command above; the certificates and key PEM files paths were not specified. By default, DASH CLI reads the certificates and key from the *certs* folder in the installation location.

Appendix K Adding Wi-Fi Access Point Profile

An enterprise-based wireless profile can only contain credentials required for one EAP method.

Although Radius servers can support multiple EAP methods at the same time, to optimize on flash size and simplify implementations, AIM-T only supports one EAP method per profile.

However, if IT Admins want the solution to attempt multiple EAP methods, one profile must be used for each EAP method. The wireless connections on AIM-T supports only two enterprise profiles and three personal profiles.

The wireless profiles support WPA2 PSK, WPA2 Enterprise, and WPA3 SAE.

WPA PSK, WPA Enterprise, Open networks, and WPA3 OWE are not supported due to security concerns.

The wireless profiles support up to 4K certificates. 8K certificates maybe supported in the future if sufficient CPU processing capability and storage are available.

Certificates are supported in PEM format only.

IT Admins must only use decrypted key for provisioning.

This following section provides instructions to add a Wi-fi profile to create a provisioning package.

To add a wi-fi profile:

1. On the AMD Provisioning Console, click **Network & Wi-Fi** from the left navigation pane.
2. Click the **Wi-Fi** tab and click the **Add Wi-Fi** button.
3. In the Add Wi-Fi window provide the following information:
    a. SSID: Enter the wireless network name configured in the access point.
    b. From the Security Type list, select one of four security methods:
        i. WPA2-Personal (Default)
        ii. WPA2-Enterprise
        iii. WPA3-SAE
        iv. WPA3-Enterprise

c. Enter the passphrase that is already shared with you to connect to the wireless network if you have chosen **WPA2-Personal** or **WPA3-SAE** options. Go to *step 10 – providing default port number for Secure port*.

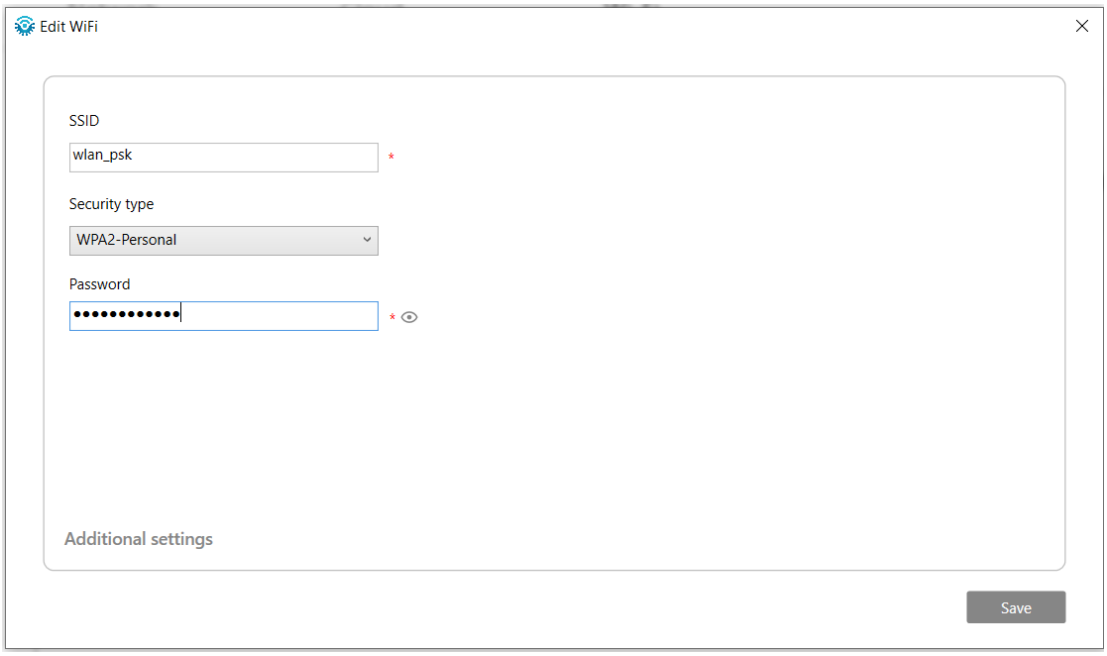


Figure 40. WPA2-PSK Security

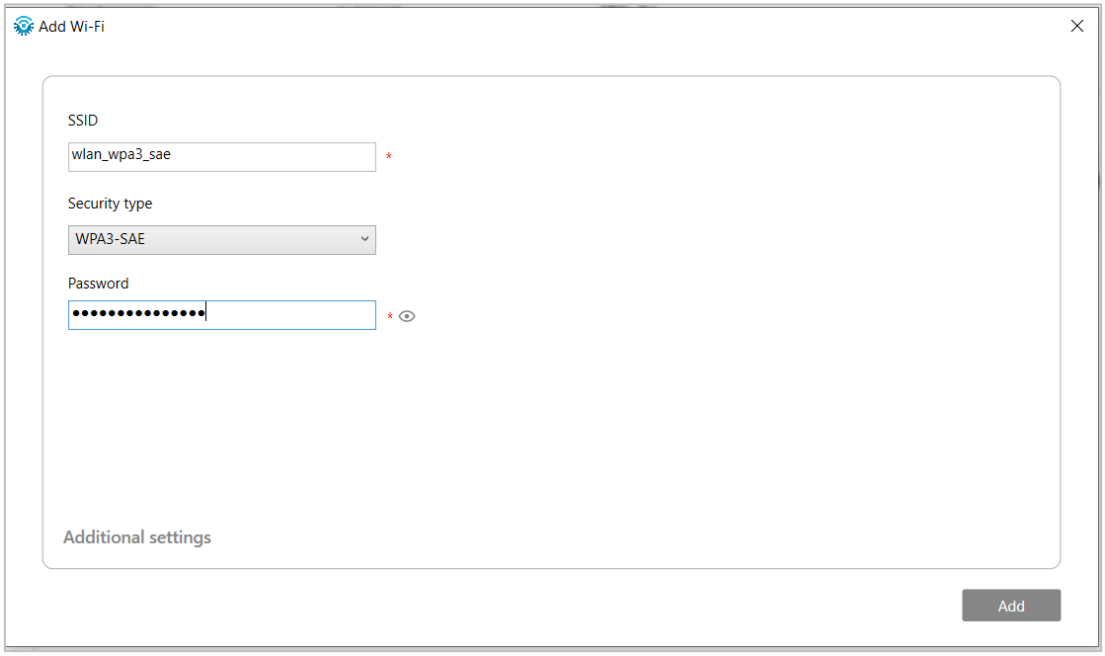


Figure 41. WPA3-SAE Security

d. If you have chosen the 8021x enterprise security options (WPA2-Enterprise or WPA3-Enterprise):

   i. Enter the **Username** and **Password**. The user identity and secret key will be used for user identification with the Radius server.

   ii. Select an EAP method to be used to authenticate with the Radius server. You have the following options to choose from:

   - TLS
   - TTLS
   - PEAP

e. Browse for and choose the Client private key. You must upload the decrypted Client private key (**client_decrypted.key**). The size of the Client private key must be less than 4K.

f. Browse for and choose the Root CA certificate (**ca.pem**). The Root CA certificate must be in the .pem format and its size must be less than 4K.

g. Browse for and choose the Client certificate (**client.pem**). The Client certificate must be in the .pem format and its size must be less than 4K.

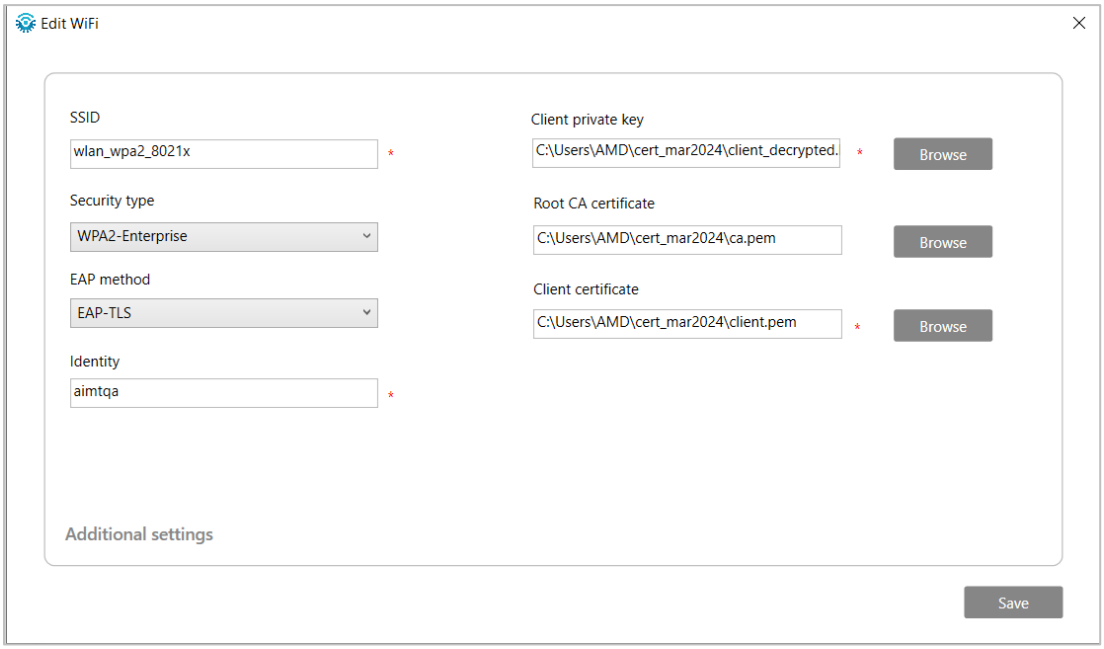


Figure 42. WPA2 Enterprise security: EAP TLS

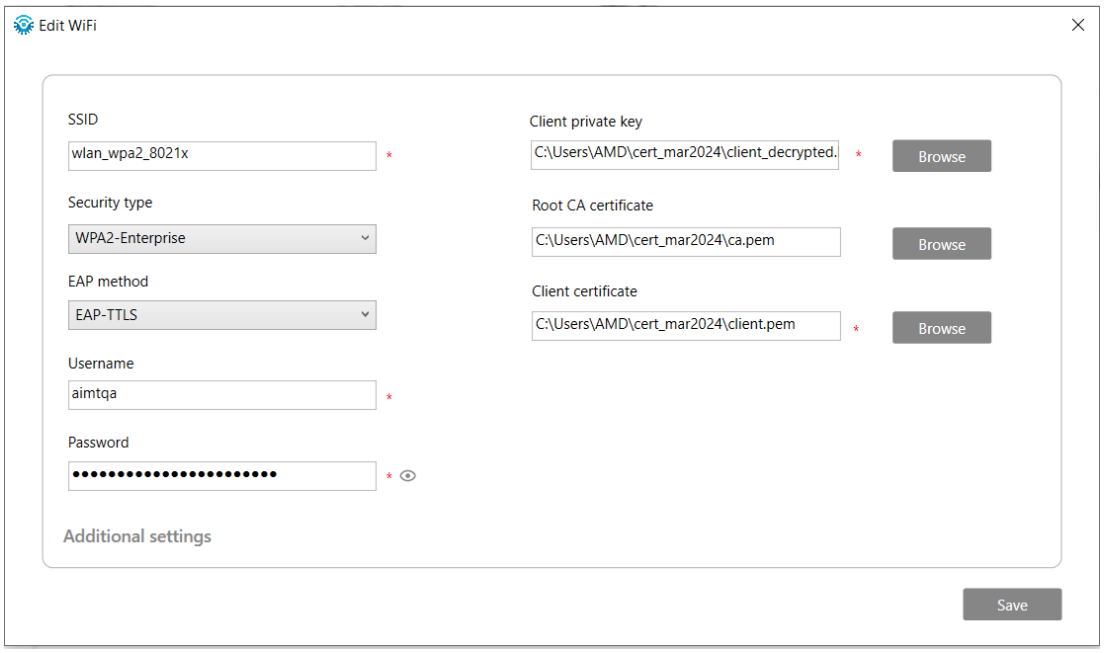


Figure 43. WPA2 Enterprise security: EAP TTLS

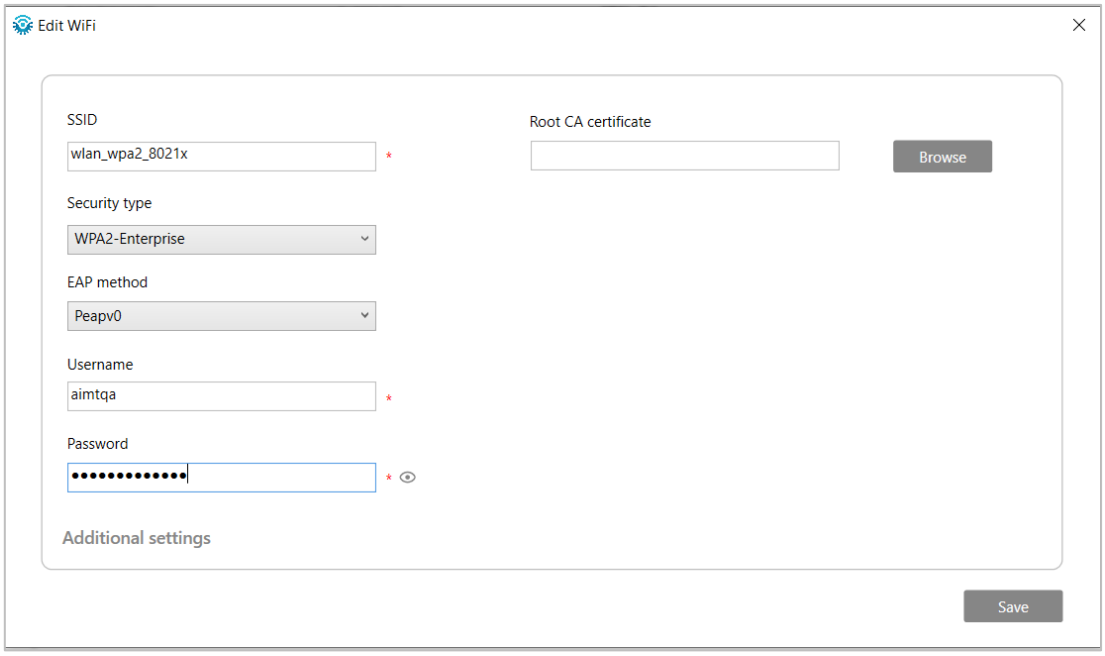


Figure 44. WPA2 Enterprise security: EAP PEAP

h. Go to *step 10 – providing default port number for Secure port*.

i. If you have chosen the WPA3-Enterprise option, select the:

   i. **Pairwise** and **Groupwise** options as **GCMP_256** for connecting to access point configured with WPA3 enterprise security (GCMP).

ii. **Pairwise** and **Groupwise** options as **GCMP_CCMP** for connecting to access point configured with WPA3 enterprise security (CCMP).

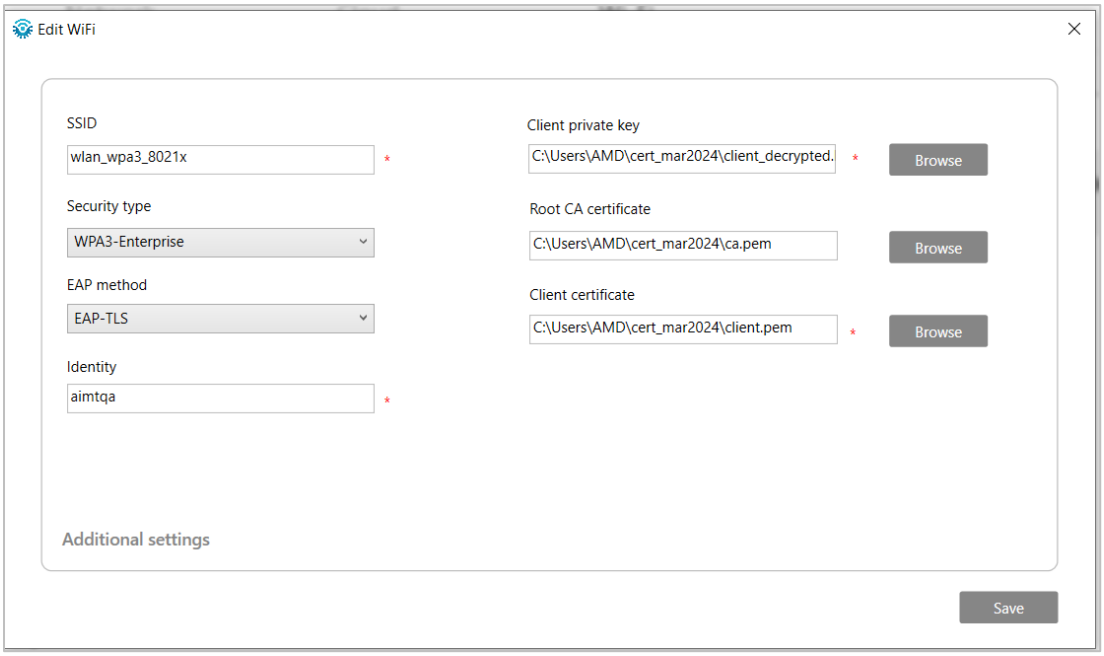


Figure 45. WPA3 Enterprise security: EAP TLS

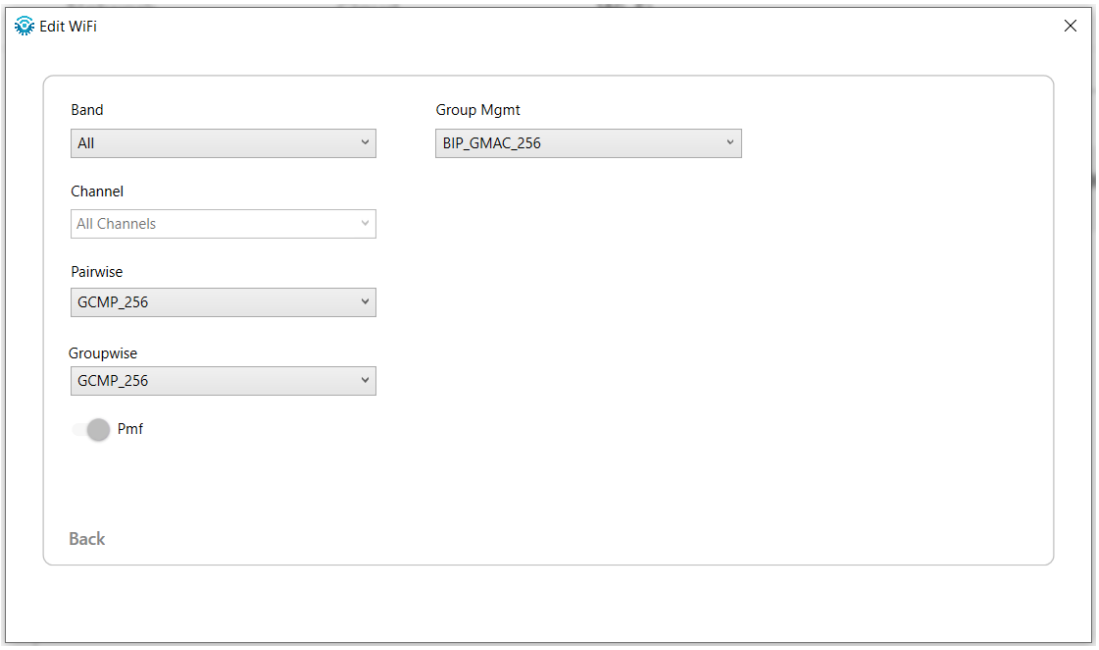


Figure 46. WPA3 Enterprise security: EAP TLS Additional Settings

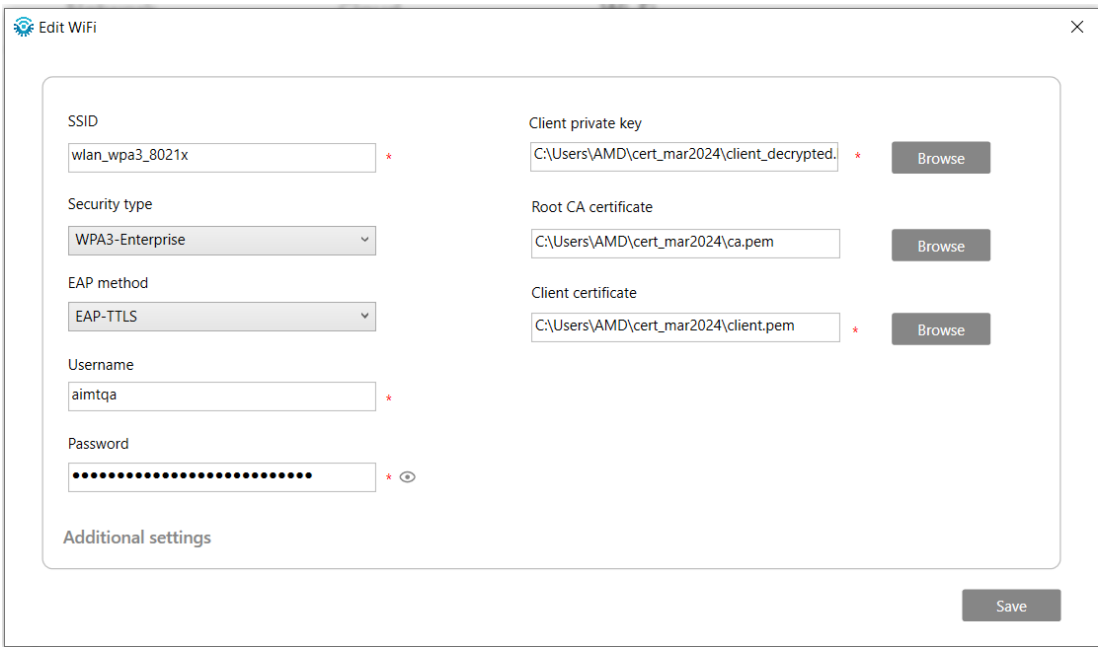


Figure 47. WPA3 Enterprise security: EAP TTLS

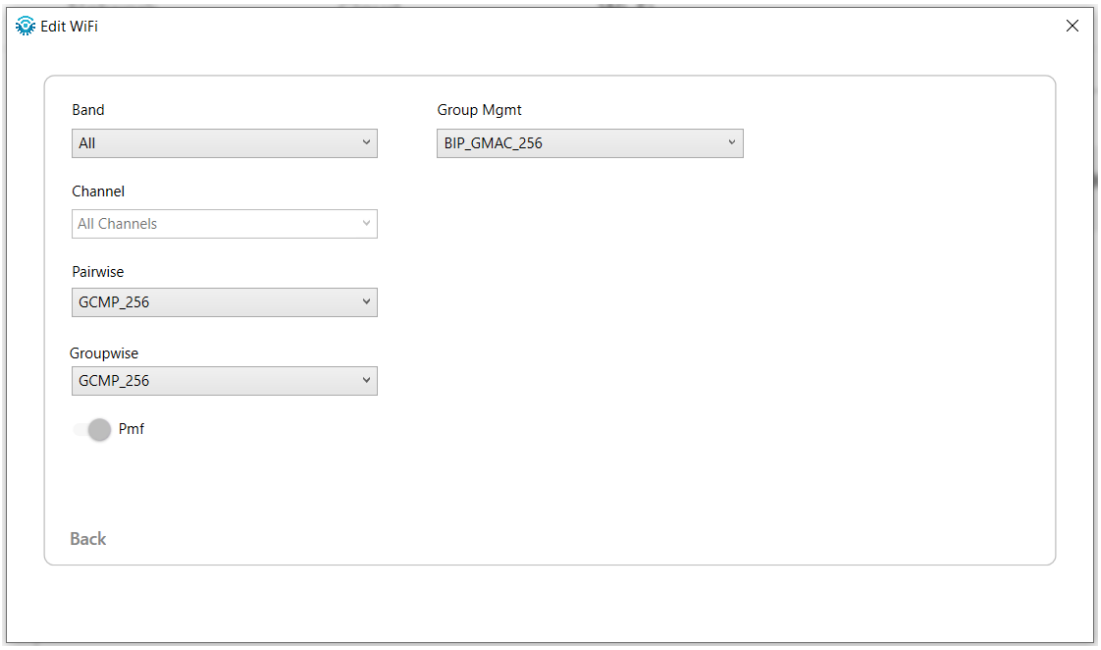


Figure 48. WPA3 Enterprise security: EAP TTLS Additional Settings

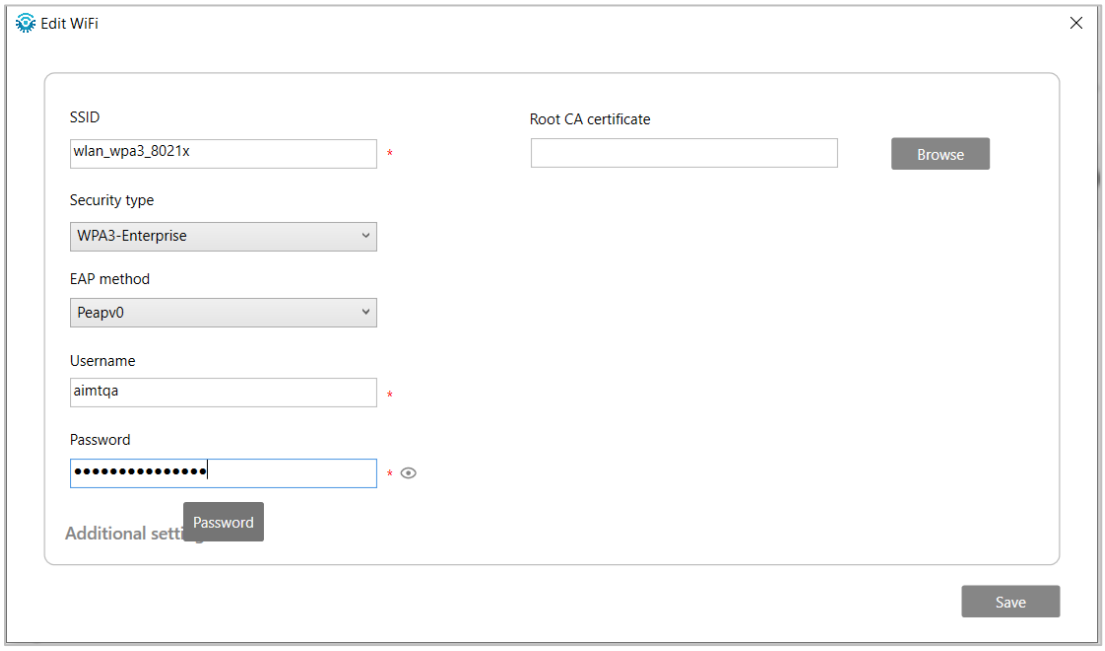


Figure 49. WPA3 Enterprise security: EAP PEAP Settings

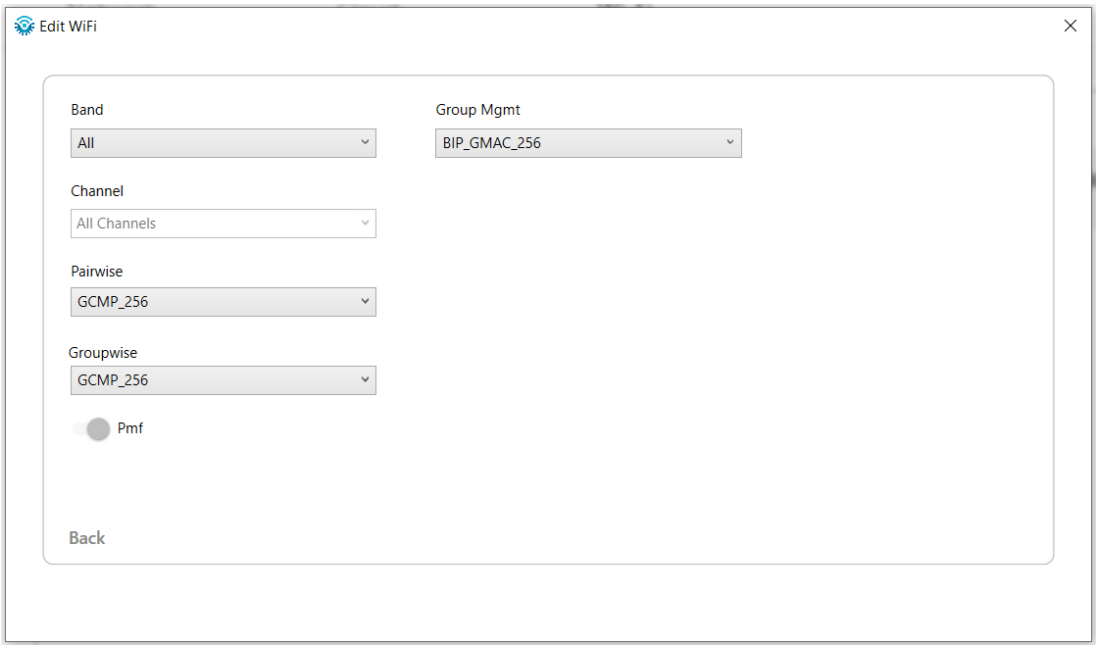


Figure 50. WPA3 Enterprise security: EAP PEAP Additional Settings

j. Go to *step 10 – providing default port number for Secure port*.

K.1 Radius Server and Certificates

This section explains how to bring up FreeRadius server and generate server and client certificates.

K.1.1 Bring up FreeRadius Server

To bring up FreeRadius Server.

1. Bring up the Linux server with Ubuntu OS installed.
2. Install FreeRadius Server using the following commands.

```
apt update

apt-get install freeradius
```

K.1.2 Generate Certificates

Use the following openssl commands to generate server and client certificates:

 # Generate self-signed root CA cert

```
openssl req -nodes -x509 -newkey rsa:4096 -keyout ca.key -out ca.crt -subj
"/C=IN/ST=KAR/L=BNLR/O=test/CN=`hostname -f`/emailAddress=test-root@test.com" -days
365
```

 # Generate server cert to be signed

```
openssl req -nodes -newkey rsa:4096 -keyout server.key -out server.csr -subj
"/C=IN/ST=KAR/L=BNLR/O=test/CN=`hostname -f`/emailAddress=test-server@test.com" -days
365
```

 # Sign the server cert

```
openssl x509 -req -in server.csr -CA ca.crt -CAkey ca.key -CAcreateserial -out
server.crt
```

 # Create server PEM file

```
cat server.crt > server.pem

openssl rsa -in server.key   -out  server_decrypted.key
```

 # Generate client cert to be signed

```
openssl req -nodes -newkey rsa:4096 -keyout client.key -out client.csr -subj
"/C=IN/ST=KAR/L=BNLR/O=test/CN=`hostname -f`/emailAddress=test-client@test.com" -days
365
```

 # Sign the client cert

```
openssl x509 -req -in client.csr -CA ca.crt -CAkey ca.key -CAserial ca.srl -out
client.crt
```

 # Create client PEM file

```
cat client.crt > client.pem

openssl rsa -in client.key   -out  client_decrypted.key

openssl x509 -in ca.crt -out ca.pem
```

K.1.3 Copy Server Certificates

Copy the server certificates to the FreeRadius Server certs path as mentioned here:

```
cp ca.pem /etc/freeradius/3.0/certs/ca.pem

cp server.pem /etc/freeradius/3.0/certs/server.pem

cp server_decrypted.key /etc/freeradius/3.0/certs/server_decrypted.key
```

K.1.4 Start FreeRadius Server

To start the FreeRadius Server on the Linux terminal, use the following command:

```
freeradius -XX // for debugging purpose.
```

OR

```
Service freeradius start
```

Upload the Client private key, CA certificates and Client certificates in the AMD Provisioning Console while *creating the Wi-Fi access point*.

1. General Description

The Realtek RTL8111FP-CG 10/100/1000M Ethernet controller combines a triple-speed IEEE 802.3 compliant Media Access Controller (MAC) with a triple-speed Ethernet transceiver, PCI Express bus controller, and embedded memory. For the RTL8111FP, the USB redirection feature is implemented by virtual USB over PCIe as defined in the EHCI Specification.

With state-of-the-art DSP technology and mixed-mode signal technology, the RTL8111FP offers high-speed transmission over CAT 5 UTP cable or CAT 3 UTP (10Mbps only) cable. Functions such as Crossover Detection and Auto-Correction, polarity correction, adaptive equalization, cross-talk cancellation, echo cancellation, timing recovery, and error correction are implemented to provide robust transmission and reception capability at high speeds.

The RTL8111FP complies with the IEEE 802.3u specification for 10/100Mbps Ethernet and the IEEE 802.3ab specification for 1000Mbps Ethernet. It also supports an auxiliary power auto-detect function, and will auto-configure related bits of the PCI power management registers in PCI configuration space.

Advanced Configuration Power management Interface (ACPI) power management for modern operating systems that are capable of Operating System-directed Power Management (OSPM) is supported to achieve the most efficient power management possible. To further reduce power consumption, the RTL8111FP supports PCIe L1.Off and L1.Snooze. PCI MSI (Message Signaled Interrupt) and MSI-X are also supported.

In addition to the ACPI feature, remote wakeup (including AMD Magic Packet and Microsoft Wake-Up Frame) is supported in both ACPI and APM (Advanced Power Management) environments. To support WOL from a deep power down state (e.g., D3cold, i.e., main power is off and only auxiliary exists), the auxiliary power source must be able to provide the needed power for the RTL8111FP.

The RTL8111FP supports Microsoft Wake Packet Detection (WPD) to provide Wake-Up Frame information to the OS, e.g., PatternID, OriginalPacketSize, SavedPacketSize, SavedPacketOffset, etc. WPD helps prevent unwanted/unauthorized wake-up of a sleeping computer.

The RTL8111FP is fully compliant with Microsoft NDIS5, NDIS6 checksum offload (IPv4, IPv4/UDP, IPv4/TCP, IPv6/TCP, IPv6/UDP) and Segmentation Task-offload (Large send and Giant send) features, and supports IEEE 802 IP Layer 2 priority encoding and IEEE 802.1Q Virtual bridged Local Area Network (VLAN). The above features contribute to lowering CPU utilization, especially benefiting performance when in operation on a network server.

The RTL8111FP supports four Receive Side Scaling (RSS) queues to hash incoming TCP connections and load-balance received data processing across multiple CPUs. RSS improves the number of

transactions/connections per second, for increased network throughput.

The RTL8111FP also supports Virtual Machine Queue (VMQ) which is a hardware virtualization technology for the efficient transferring of network traffic to a virtualized host OS. The VMQ technology uses hardware packet filter to deliver packets from an external virtual machine network directly to virtual machines, which reduces the overhead of routing packets and copying from the management operating system to the virtual machine.

Note: RTL8111FP Virtual Machine Queue (VMQ) is only functional in computers running Windows Server 2008 R2 with the Hyper-V server role installed.

The RTL8111FP supports Protocol offload. It offloads some of the most common protocols to NIC hardware in order to prevent spurious wake-up and further reduce power consumption. It can offload ARP (IPv4) and NS (IPv6) protocols while in the D3 power saving state.

The RTL8111FP supports the ECMA (European Computer Manufacturers Association) proxy for sleeping hosts standard. The standard specifies maintenance of network connectivity and presence via proxies in order to extend the sleep duration of higher-powered hosts. It handles some network tasks on behalf of the host, allowing the host to remain in sleep mode for longer periods. Required and optional behavior of an operating proxy includes generating reply packets, ignoring packets, and waking the host.

The RTL8111FP supports IEEE 802.3az-2010, also known as Energy Efficient Ethernet (EEE). IEEE 802.3az-2010 operates with the IEEE 802.3 Media Access Control (MAC) Sublayer to support operation in Low Power Idle mode. When the Ethernet network is in low link utilization, EEE allows systems on both sides of the link to save power.

Alert Specification Format (ASF 2.0) is supported to provide system manageability in OS-absent environments. The ASF defines remote control and alerting interfaces that serve managed PCs in OS-absent states. With the ASF capability, we are able to minimize on-site IT maintenance, to improve system availability, and also to control power management remotely.

The Desktop and mobile Architecture for System Hardware (DASH) initiative is a suite of specifications that takes full advantage of the DMTF's Web Services for Management (WS-Management) specification – delivering standards-based Web services management for desktop and mobile client systems.

In contrast with normal DASH function communication via Ethernet, the RTL8111FP provides communication via Wi-Fi DASH, which complies with the Wireless Local Area Networks (WLAN) communication protocols.

Through the DASH initiative, the RTL8111FP provides the next generation of standards for secure out-of-band and remote management of desktop and mobile systems.

The RTL8111FP also features inter-connect PCI Express technology. PCI Express is a high-bandwidth, low-pin-count, serial, interconnect technology that offers significant improvements in performance over conventional PCI and also maintains software compatibility with existing PCI infrastructure. The device embeds an adaptive equalizer in the PCIe PHY for ease of system integration and excellent link quality. The equalizer enables the length of the PCB traces to reach 40 inches.

The RTL8111FP supports PCIe 3.0 LTR (Latency Tolerance Reporting). The LTR mechanism enables Endpoints to report the service latency requirements for Memory Reads/Writes and CPU will enter appropriate sleep state (Cx) based on the LTR value.

The RTL8111FP supports TLP Processing Hints (TPH). For Posted Requests and Non-Posted Requests that target Memory Space, a bit in the first DWORD of the TLP header is used to indicate the presence of TPH. This reduces access delay of PCIE devices and makes maximum use of the data buffer in PCIE.

The RTL8111FP supports VGA KVM (Keyboard, Video, Mouse) functions. A KVM switch is a hardware device that allows a user to control multiple computers from one or more sets of keyboards, video monitors, and mice. The VGA KVM function uses the BIOS and OS to write a frame buffer to the RTL8111FP, and then the RTL8111FP sends the VGA frame buffer to the console. The VGA frame buffer via Ethernet uses the RFB protocol, which can make the client stateless.

The RTL8111FP is suitable for multiple market segments and emerging applications, such as desktop, mobile, workstation, server, communications platforms, and embedded applications.

2. Features

- Integrated 10/100/1000M transceiver
- Auto-Negotiation with Next Page capability
- Supports PCI Express 2.1
- Supports pair swap/polarity/skew correction
- Crossover Detection & Auto-Correction
- Wake-On-
  Technology (remote wake-up) support
- Supports 32-set 128-byte Wake-Up Frame pattern exact matching
- Supports Microsoft WPD (Wake Packet Detection)
- Supports Magic Packet Wake-Up
- Microsoft NDIS5, NDIS6 Checksum Offload (IPv4, IPv4/UDP, IPv4/TCP, IPv6/TCP, IPv6/UDP) and Segmentation Task-offload (Large send v1 and Large send v2) support
- Supports ECMA-393 ProxZzzy Standard for sleeping hosts
- Supports Full Duplex Flow Control (IEEE 802.3x)
- Supports jumbo frame to 15K bytes
- Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
- Supports IEEE 802.1P Layer 2 Priority Encoding
- Supports IEEE 802.1Q VLAN tagging
- Supports IEEE 802.3az-2010 (EEE)
- Embedded OTP memory to replace external EEPROM
- Supports 25MHz or 48MHz Oscillator
- Supports 32Mbytes External Serial Peripheral Interface (SPI) Flash
- Supports 16Mbytes Internal DDR2
- Transmit/Receive on-chip buffer support
- Supports power down/link down power saving/PHY disable mode
- Supports PCI MSI (Message Signaled Interrupt) and MSI-X

  Supports Virtual Machine Queue (VMQ)

  Supports Receive-Side Scaling (RSS)

  Supports Protocol Offload (ARP & NS)

  Supports Customized LEDs (includes blinking frequency and duty cycle)

  Supports 1-Lane 5Gbps PCI Express Bus

  Supports LTR (Latency Tolerance Reporting)
- Supports PCIe L1.Off and L1.Snooze

  Supports hardware ECC (Error Correction Code) function

  Supports hardware CRC (Cyclic Redundancy Check) function
- Supports Alert Specification Format 2.0 (ASF 2.0)

  Supports Realtek RealManage Remote Management Technology (DASH 1.2 Compliant)
- Single/Dual MAC/IP support for DASH

  Supports USB redirection over PCIe

  88-pin QFN Green package

  Supports SNMP MIB 2, Ethernet-like MIB, and Ethernet MIB
- Supports remote KVM
- Supports Wi-Fi device function
- Supports Wi-Fi DASH

CATÁLOGO BLUEDU

Gestão de Dispositivos

bluedu

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SOBRE A SOLUÇÃO

A **BLUEDU** contempla em seu portfólio uma solução de gestão de ativos de TI que fornece visibilidade, controle, rastreio e bloqueio de uma forma centralizada e descomplicada, inclusive para parques tecnológicos de larga escala envolvendo centenas de milhares de dispositivos. Para isso, apresentamos dois produtos que se complementam:

BLUEMANAGER: Gerenciar os ativos de TI de qualquer hora e lugar nunca foi tão fácil. Por meio de uma Central de Gestão Web, é possível ter acesso aos dados dos dispositivos coletados por meio de mecanismos de software locais automáticos, transparentes e ativados em fábrica. É possível obter o inventário de hardware e de software com controle de todas as alterações, diagnóstico de integridade e monitoramento do uso. Além de rastrear e manter o histórico da geolocalização dos dispositivos, é possível definir os perímetros de funcionamento desejados. Ações de bloqueio, criptografia de disco e *wipe* (limpeza de disco) também podem ser ativadas, garantindo a proteção e segurança necessárias.

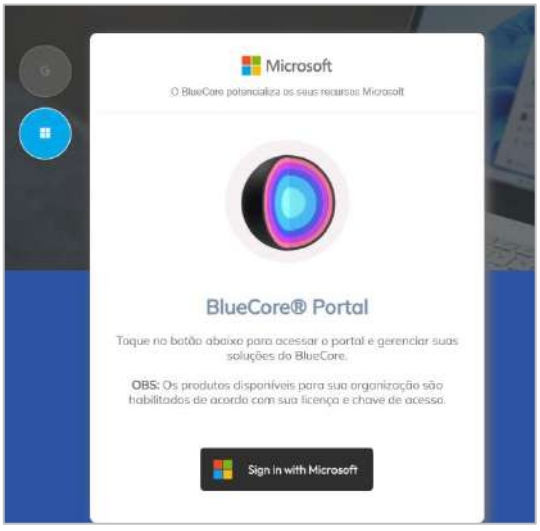
BLUEDASH: visualizar milhões de dados coletados dos ativos de TI de uma forma consolidada, organizada e simples é essencial, em especial para parques tecnológicos em larga escala. O BLUEDASH tem esse objetivo. Ele traz as principais informações dos ativos de TI por meio de relatórios analíticos, mapas, gráficos gerenciais e dashboards, permitindo acompanhar o seu parque de dispositivos distribuídos em diversas localidades como se tivessem ao alcance de suas mãos.

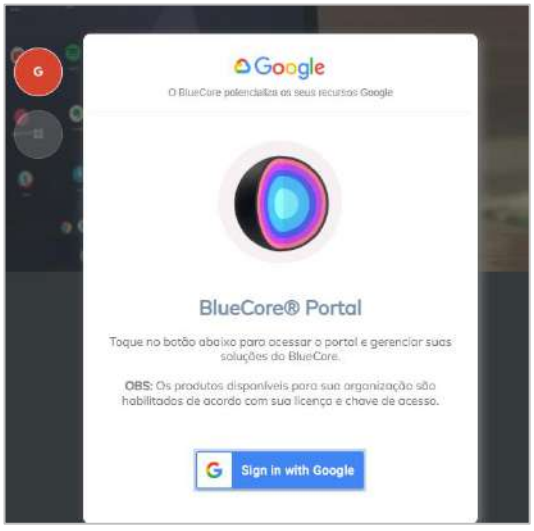
SOBRE O BLUEMANAGER

Vamos conhecer os principais recursos da solução de gestão de ativos de TI da **BLUEDU** que fornece visibilidade, controle, rastreio e bloqueio de uma forma centralizada e descomplicada para parques tecnológicos distribuídos em diversas localidades.

1. Central de Gestão Web

É possível gerenciar os dispositivos de seu parque por meio de uma Central de Gestão Web acessível com login e senha integrados a contas Microsoft e Google de sua instituição, protegendo sua Central de Gestão Web contra acesso não autorizado.





2. Busca de dispositivos

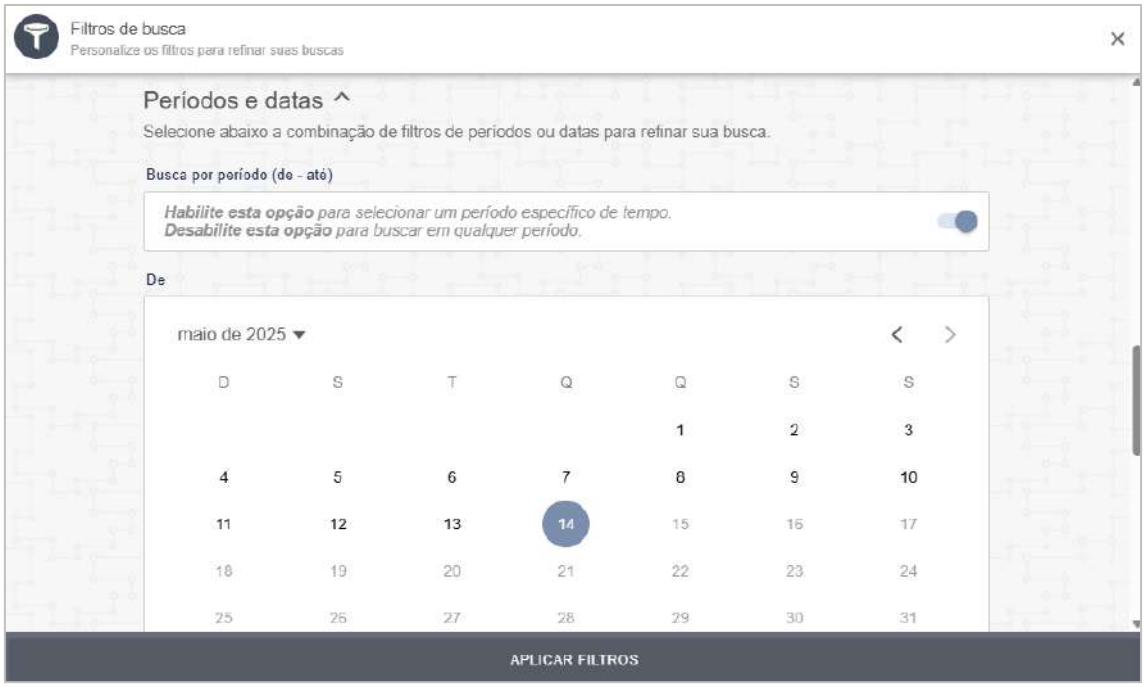
Por meio de uma busca simples, é possível localizar rapidamente qualquer dispositivo do seu parque pelo serial, modelo, *tag* de busca associada, unidade vinculada ou cidade.

3. Busca avançada de dispositivos

Para visualizar e localizar dispositivos mais facilmente, uma busca avançada pode ser utilizada para filtrar por status (ativo, extraviado, removido / desativado) .

Adicionalmente, é possível ordenar os dispositivos priorizando aqueles com alertas de extraviado ou fora do perímetro, de alteração de hardware e software, de integridade (problema nos componentes), e sem inventário há muito tempo (mais de um mês, por exemplo).

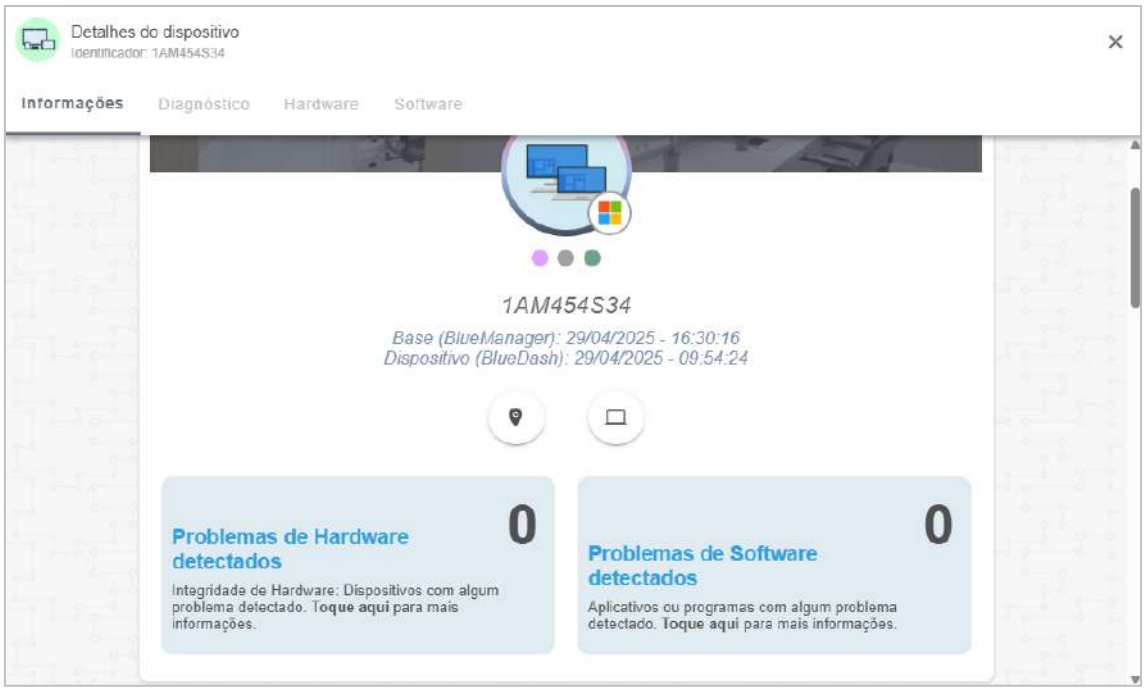
Também é possível saber os dispositivos cuja última sincronização ocorreu em um dado período, selecionando as datas “De” e “Até”.



4. Configurações e detalhes do dispositivo

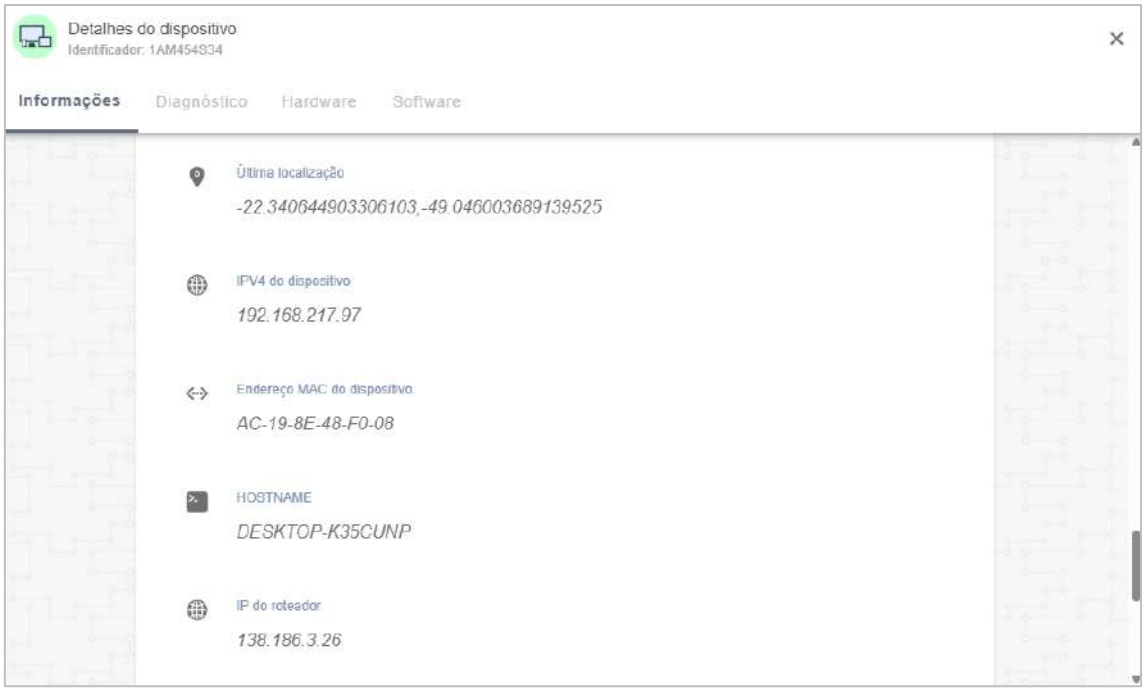
Você pode selecionar qualquer dispositivo de seu parque para poder identificá-lo, visualizar todos os seus detalhes, bem como realizar configurações adicionais.

Ao entrar nos detalhes de um dispositivo, inicialmente já é possível identificar o dispositivo pelo seu número de série e visualizar sua última geolocalização. Perceba também que, na parte superior é possível navegar para visualizar as informações gerais, o diagnóstico de desempenho e integridade, o inventário de hardware e o inventário de software.



Adicionalmente, é possível abrir opções de informações base para poder configurar o status, o patrimônio / número do ativo, incluir uma *tag* de busca e demais campos personalizados criados.

Em seguida, é possível visualizar as principais informações sobre o dispositivo automaticamente coletadas como serial, último usuário, nome do dispositivo, IP, MAC, IP do roteador que ele foi conectado, fabricante, modelo, sistema operacional e versão, entre outros dados de identificação.



5. Inventário de hardware

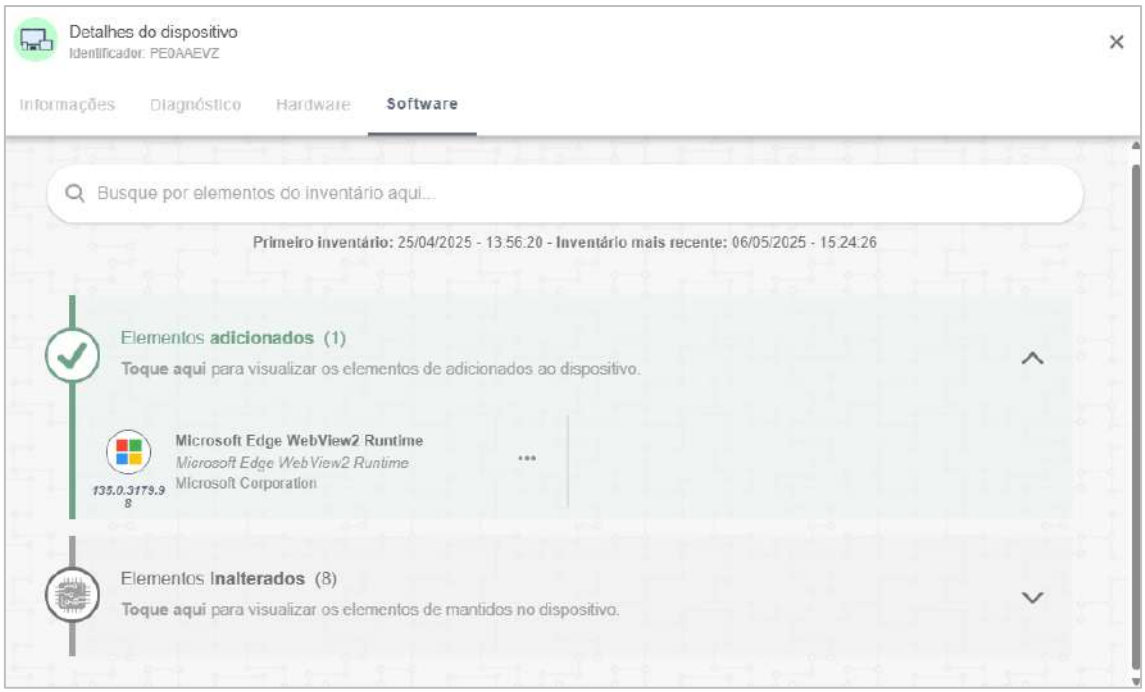
É possível visualizar a data do primeiro inventário, a data do inventário mais recente e visualizar todos os seus elementos. Por meio da busca, é possível também filtrar por um componente específico para visualizá-lo rapidamente.

A solução também sinaliza qualquer alteração de hardware no dispositivo. Dessa forma, é possível identificar facilmente a diferença entre o primeiro e último inventário em relação aos elementos de hardware adicionados, removidos e inalterados.

6. Inventário de software

É possível visualizar a data do primeiro inventário de software, a data do inventário mais recente e visualizar todas as aplicações e programas instalados. Por meio de uma busca, você pode também filtrar por algum aplicativo específico rapidamente.

Adicionalmente, como todas as mudanças no inventário de software são registradas, é possível identificar facilmente a diferença entre o primeiro e último inventário em relação aos aplicativos adicionados, removidos e inalterados.

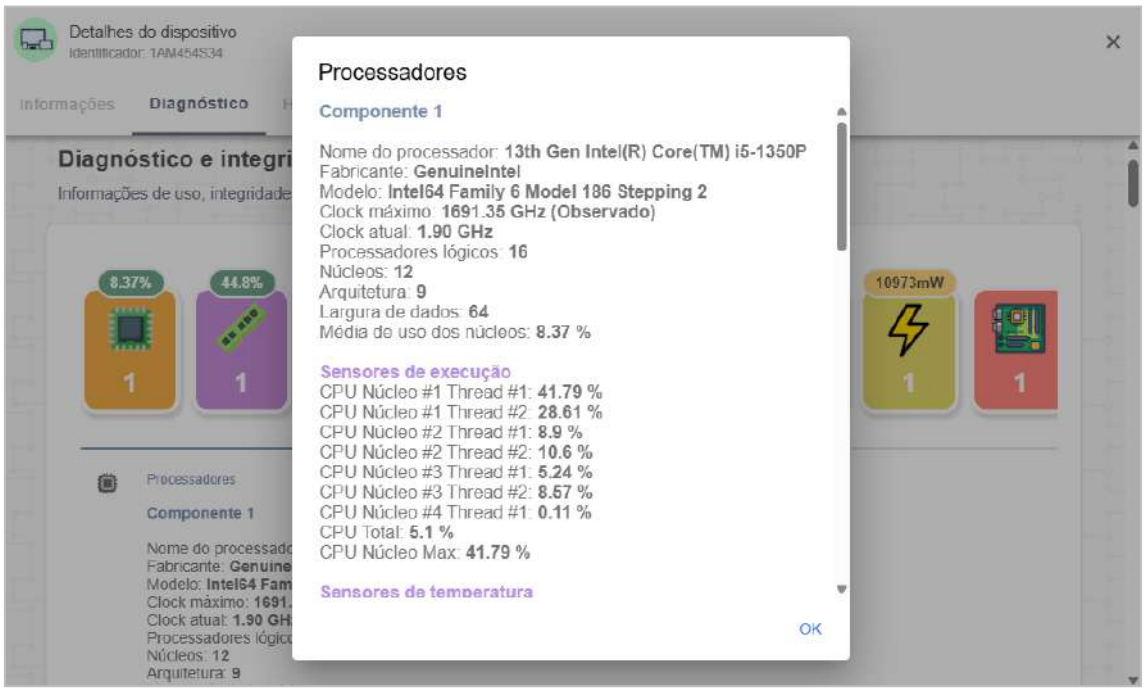


7. Diagnóstico e monitoramento do dispositivo

É possível ter acesso ao monitoramento detalhado com um diagnóstico de desempenho, saúde e integridade dos componentes de *hardware*.

Perceba que para alguns componentes, é possível facilmente identificar o principal indicador do seu diagnóstico antes de visualizar por completo seus detalhes. Como por exemplo, no ícone do processador é possível visualizar a médio de uso dos núcleos logo acima do mesmo. Para a memória, é apresentado o percentual de utilização, e o mesmo ocorre com o status da saúde da bateria, com o consumo de energia, com a saúde da unidade de armazenamento, com o sinal da conexão *wifi* ativa etc.

No entanto, ao clicar sobre o ícone de cada componente, é aberta uma tela com dados detalhados sobre este componente. Como por exemplo, ao clicar sobre o ícone do processador, é possível visualizar dados do nome, fabricante, modelo, quantidade de núcleos, média de uso dos núcleos, entre outras informações.



É possível ainda visualizar os detalhes de todos os componentes de uma vez ao rolar a barra de rolagem.

A seguir apresentamos as principais informações sobre os componentes que são atualizadas periodicamente no envio do inventário, podendo ser consultadas a partir da solução:

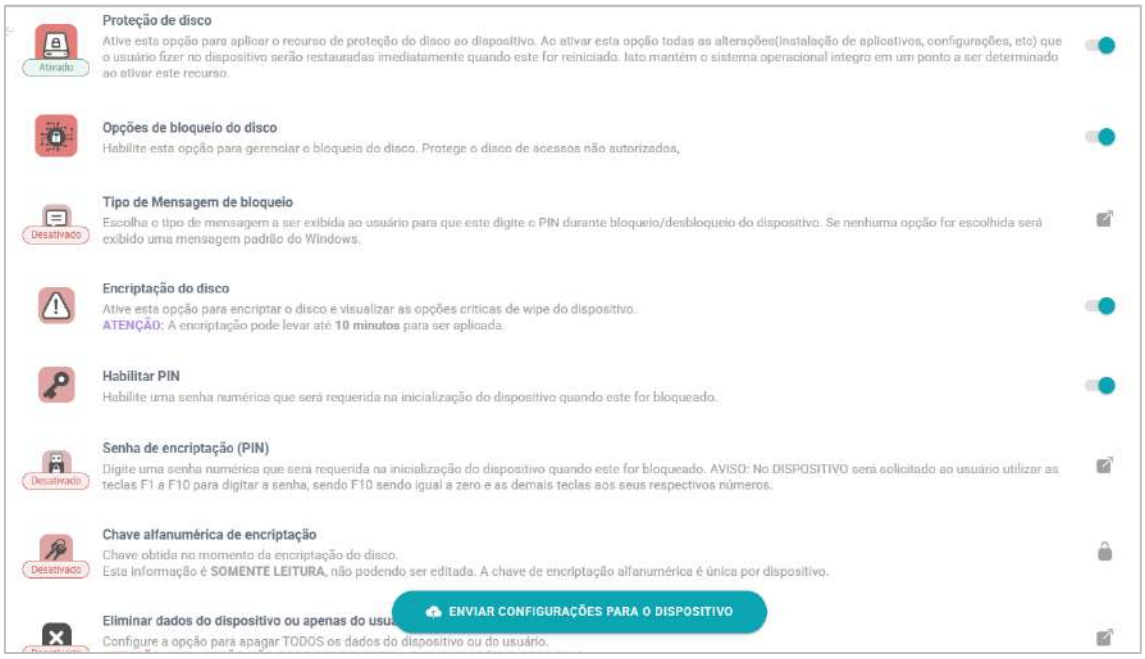
- Placa-mãe: serial, fabricante, modelo, versão, versão da BIOS, ano de fabricação;
- Memória RAM: memória física total, memória disponível, memória em uso em GB, percentual de memória em uso.
- Módulos / Chips de Memória instalados: fabricante, velocidade, serial, capacidade e *clock*;
- Processadores: nome, fabricante, modelo, *clock* máximo em GHz e *clock* atual em GHz, número de processadores lógicos, número de núcleos, média de uso dos núcleos, e dados dos sensores de execução, dos

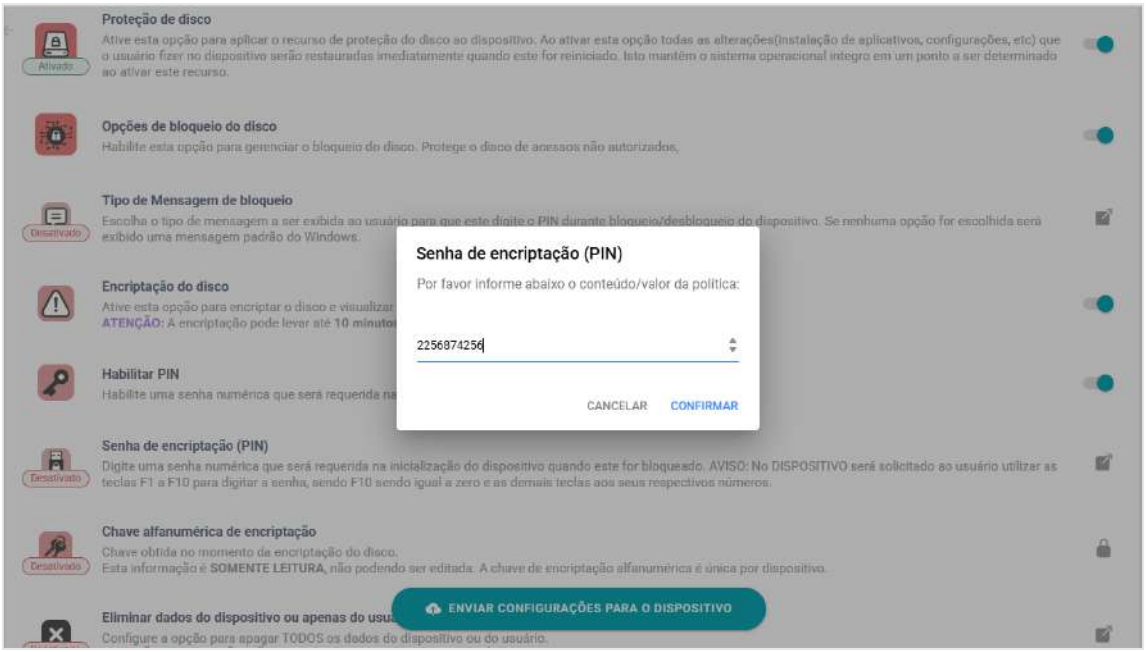
sensores de temperatura com temperatura máxima e média, dados dos sensores de *clock* com velocidade do barramento, dos sensores de carga e dos sensores de voltagem;

- Adaptadores de rede: fabricante, modelo, endereço MAC, situação (conectado, desconectado), velocidade do link. Adicionalmente é possível visualizar os detalhes da conexão *wifi* ativa como nome da rede, banda, tipo de autenticação, MAC e IP da interface em uso.
- Unidades de armazenamento: fabricante, modelo, tamanho / capacidade de armazenamento, percentual de utilização, saúde da unidade de armazenamento; além de dados dos sensores de temperatura, de nível de dados e de execução.
- Monitores e telas: fabricante / marca, modelo, serial, resolução máxima, tipos de tela suportados;
- Placas de vídeo: nome, processador de vídeo (GPU) e especificação (memória do adaptador, *bits* por pixel, taxa de atualização e resolução atual);
- Bateria: nome, carga restante estimada, tempo de uso estimado e saúde da bateria, além dos dados de sensores de nível, de voltagem, de energia, de carga e de tempo.
- Consumo de energia quando a bateria está sendo utilizada: leitura atual para dispositivos do tipo notebook;
- Integridade do Chassi: informação se o chassi está íntegro (se o dispositivo contemplar sensor para isso);
- Ventoinha: situação do funcionamento e resfriamento (se for o caso).

8. Bloqueio remoto e políticas de criptografia do dispositivo

Por meio da implementação e uso dos recursos que o TPM oferece, permite o gerenciamento centralizado das políticas de criptografia de dados. É possível bloquear o dispositivo, habilitando a criptografia do disco e definindo um PIN (senha de encriptação) para desbloqueá-lo. Dessa forma, você bloqueia a utilização do dispositivo para todos os usuários.

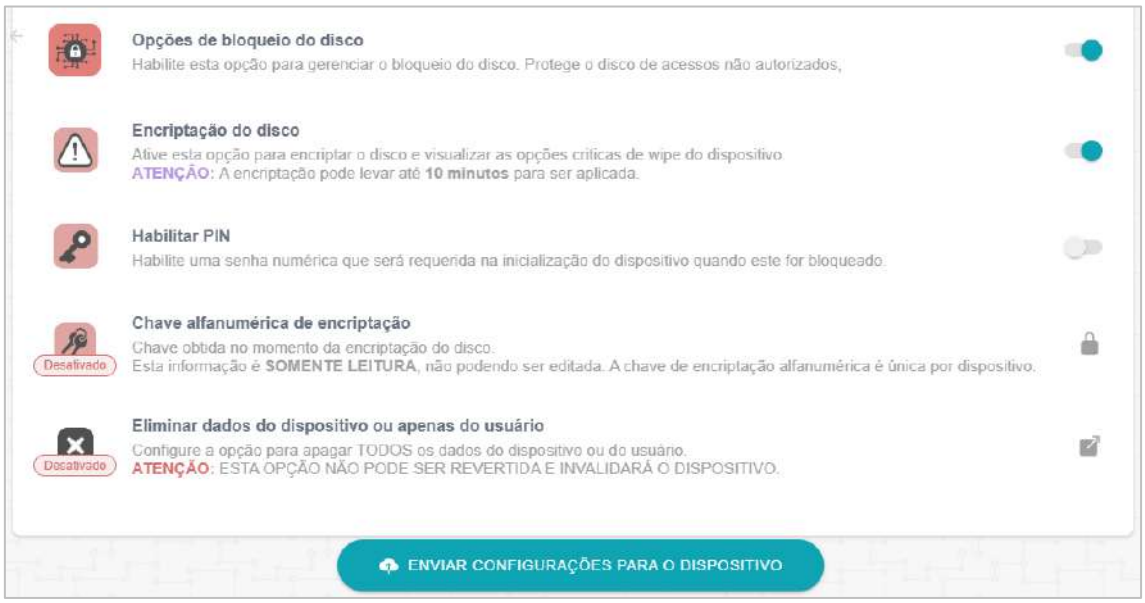


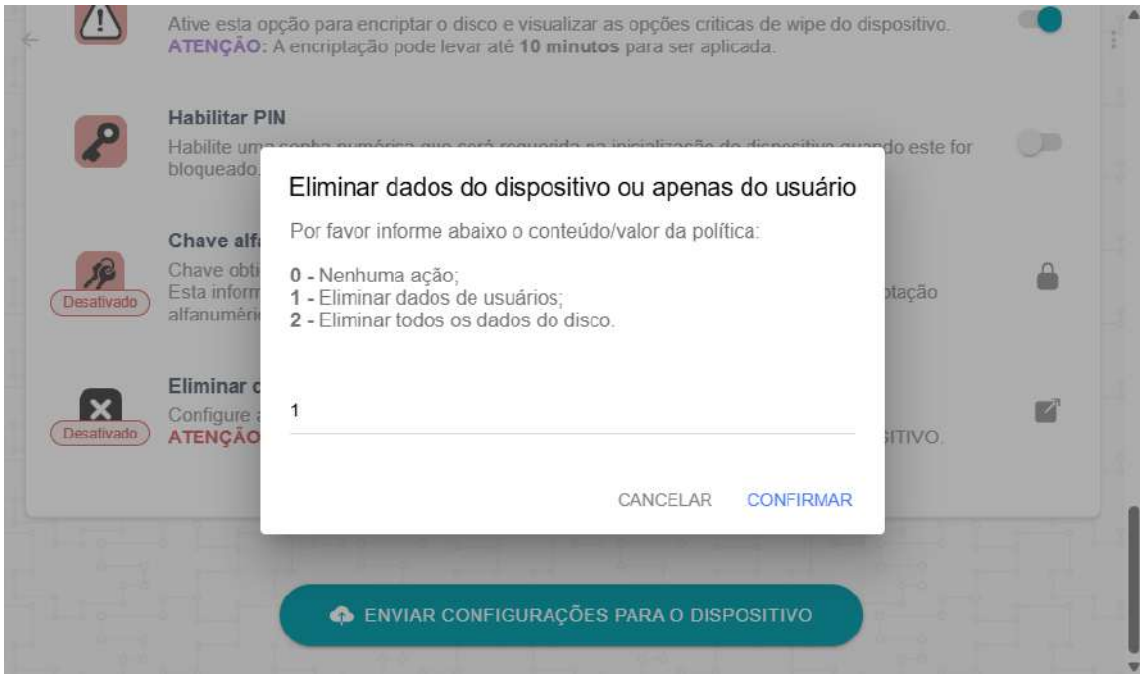


9. *Wipe* remoto do dispositivo

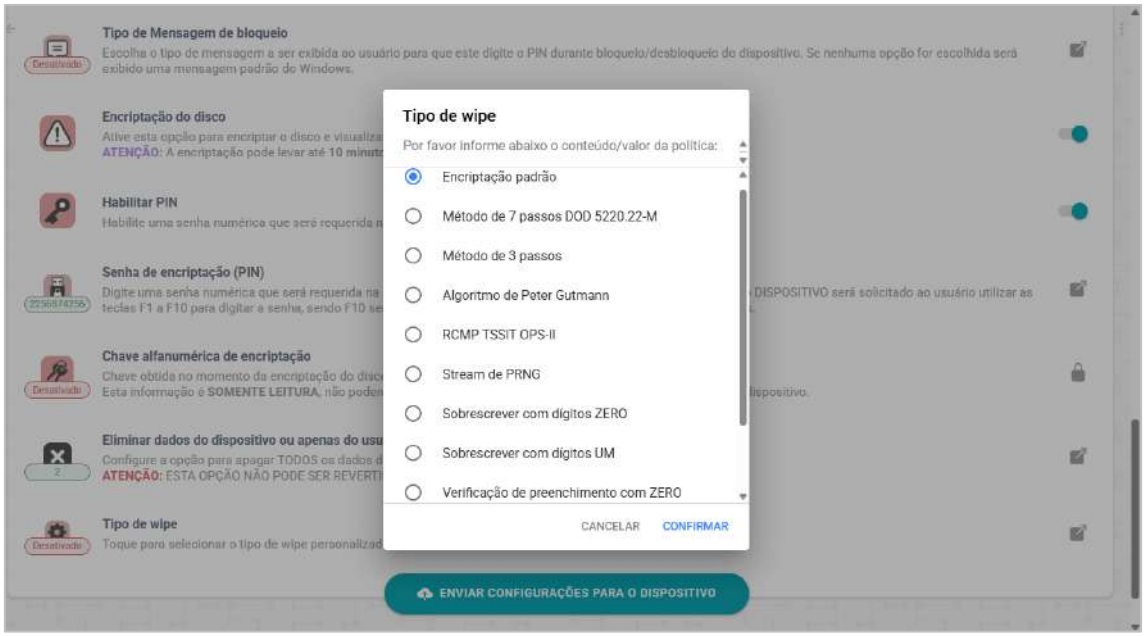
Existem várias opções para redefinir e apagar os dados dos dispositivos, que podem ser aplicados individualmente (a um dispositivo específico), por grupo (unidade, modelo, cidade etc.) ou em massa no parque todo.

É possível realizar a limpeza de dados dos usuários remotamente, por meio da opção eliminar dados do dispositivo ou apenas do usuário.





Adicionalmente, existe a opção de apagar todos os dados do disco, processo conhecido como *wipe*. Ao acionar essa opção, é possível escolher o tipo de *wipe* que será realizado.

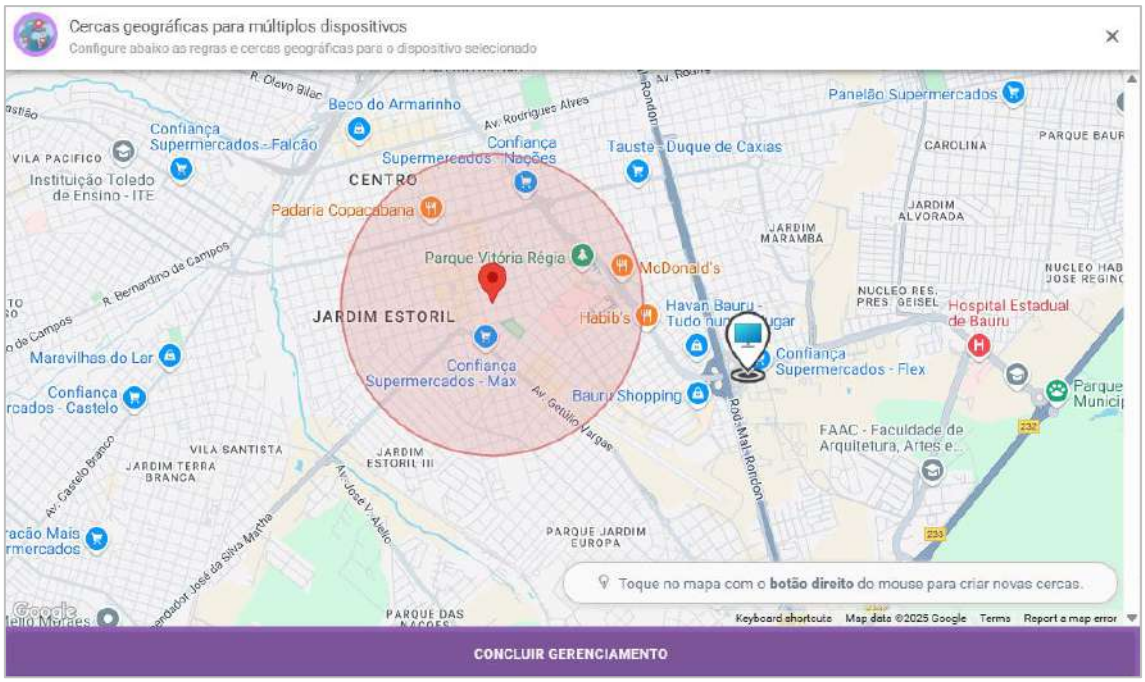


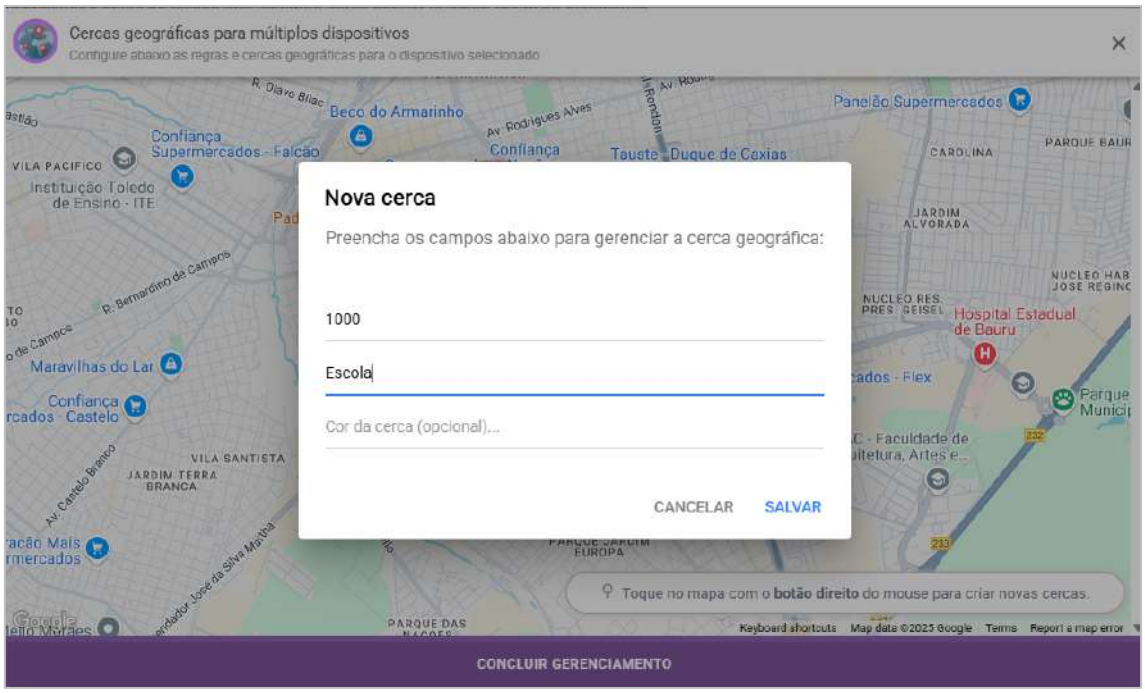
Para realizar essa opção de *wipe*, no entanto, é solicitada uma confirmação uma vez que esta ação não poderá ser revertida.

10. Geolocalização e perímetro de funcionamento

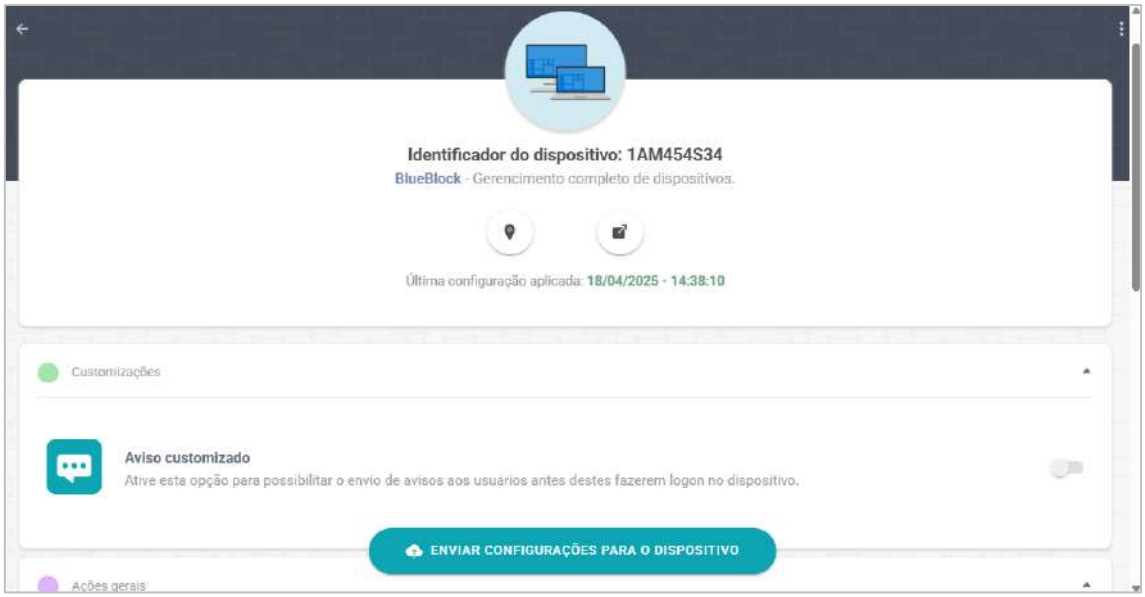
Por meio de um mecanismo local automático baseado no IP, a geolocalização dos dispositivos é automaticamente coletada. Adicionalmente, é possível definir, pela Central Web, pontos de geolocalização e indicar um raio a partir deles para estabelecer o perímetro de funcionamento do dispositivo ou de um conjunto de dispositivos.

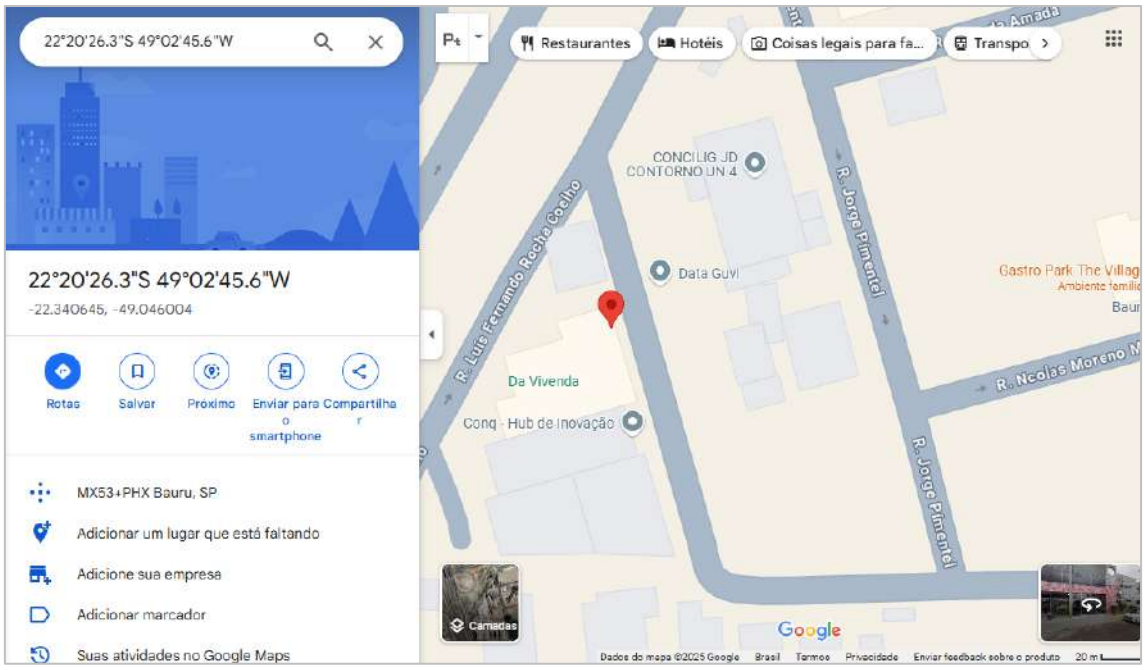
Por meio dessas regras definidas, será possível identificar todos os dispositivos que saíram dos perímetros definidos e a distância deles.





É possível também acessar facilmente a última geolocalização do dispositivo para visualizar o local que cada dispositivo se encontra em um mapa. No entanto, por meio do **blueDash**, todo o histórico de geolocalizações enviadas também pode ser consultado!

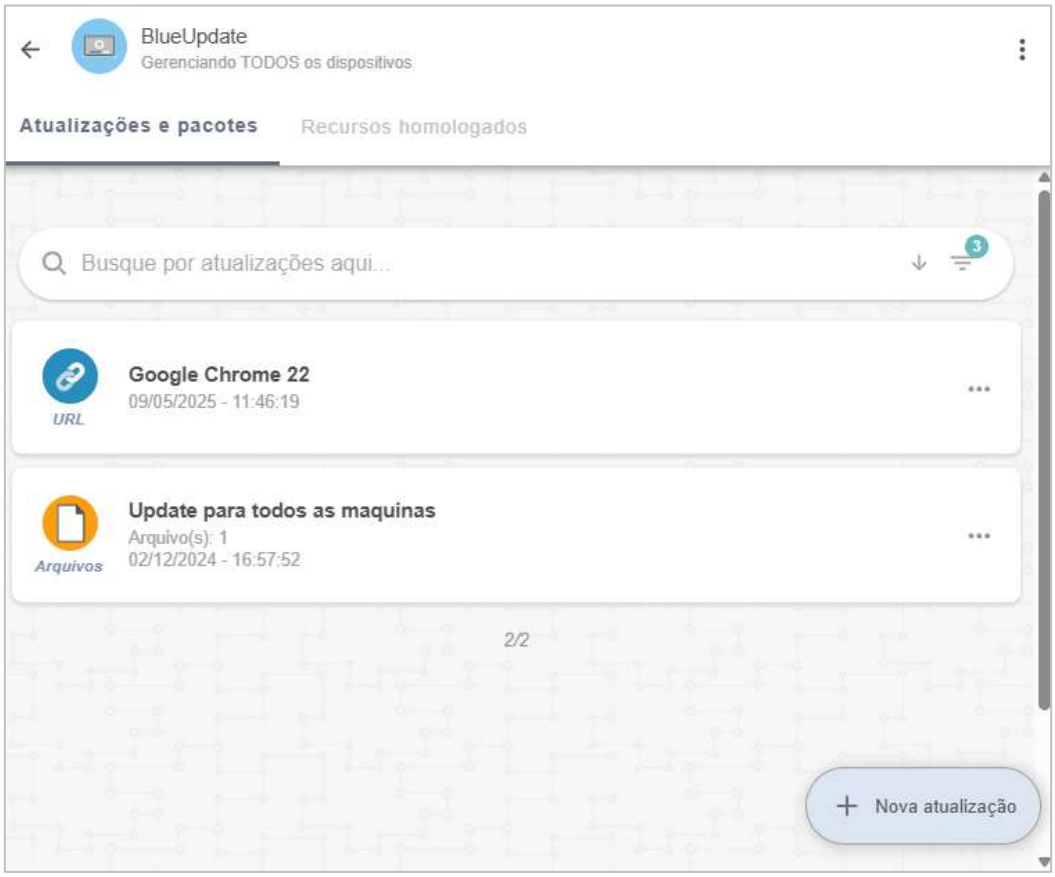


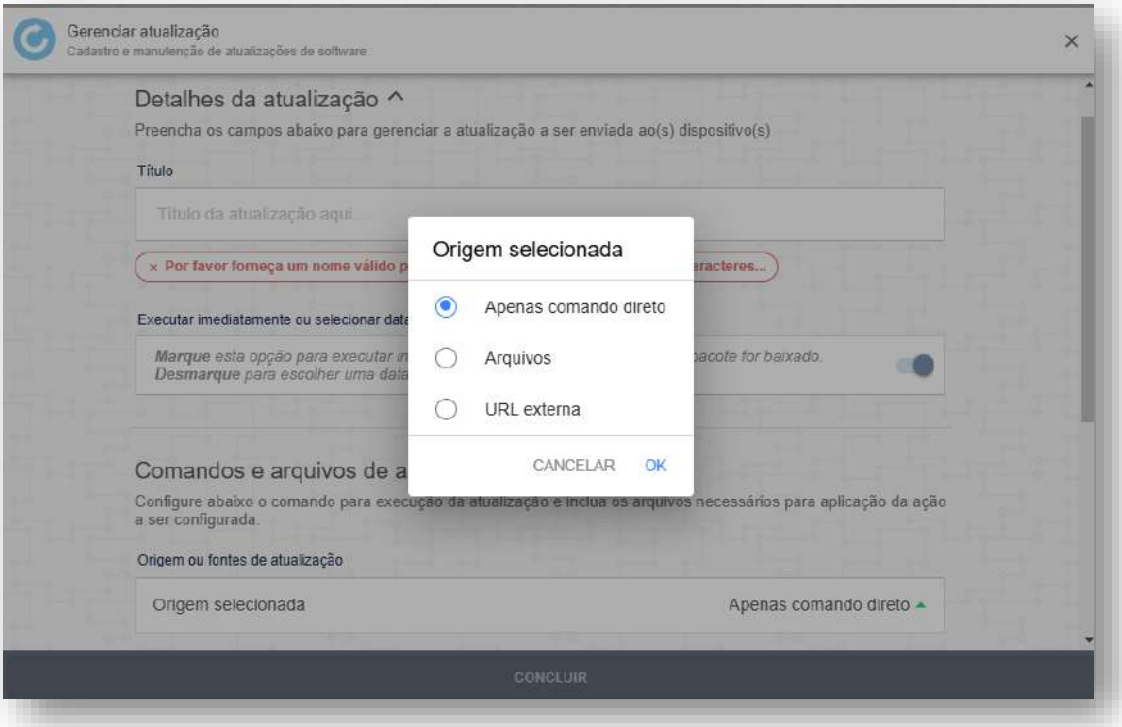


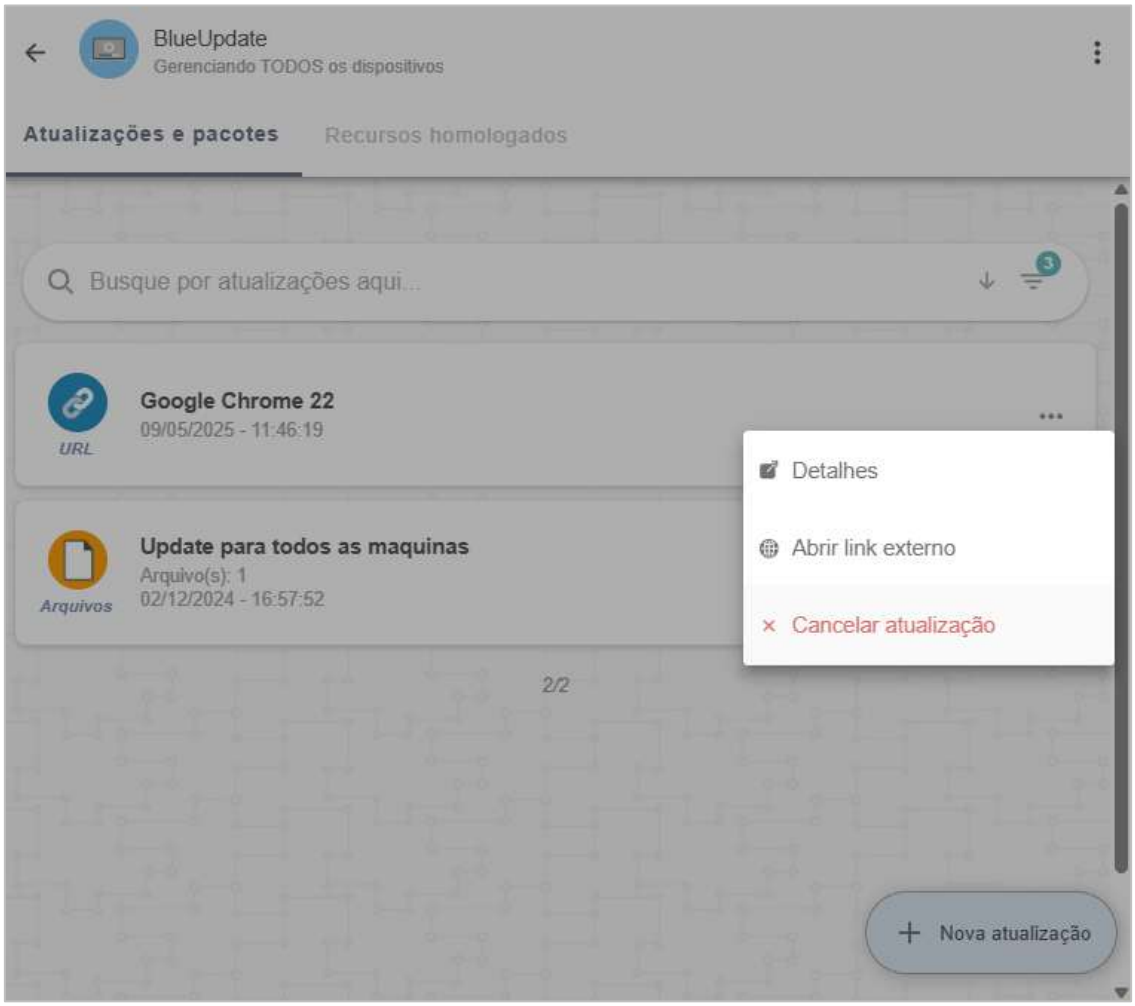
11. Atualizações e comandos remotos

É possível distribuir atualizações remotas por meio de arquivos e/ou linhas de comandos, sendo possível aplicar para um dispositivo específico, para um grupo de dispositivos selecionados (por modelo / tipo, unidade, cidade, região) ou ainda em massa para todo parque.

Uma vez escolhido o contexto de aplicação, é possível visualizar as atualizações e comandos já distribuídos, sendo possível visualizar os detalhes e cancelar essa atualização.




Gerenciar atualização
Cadastro e manutenção de atualizações de software
Detalhes da atualização
Preencha os campos abaixo para gerenciar a atualização a ser enviada ao(s) dispositivo(s)
Título
Título da atualização aqui...
Origem selecionada
Apenas comando direto
Arquivos
URL externa
CANCELAR
OK
Comandos e arquivos de a
Configure abaixo o comando para execução da atualização e inclua os arquivos necessários para aplicação da ação a ser configurada.
Origem ou fontes de atualização
Origem selecionada
Apenas comando direto
CONCLUIR


BlueUpdate
Gerenciando TODOS os dispositivos
Atualizações e pacotes
Recursos homologados
Busque por atualizações aqui...
Google Chrome 22
09/05/2025 - 11:46:19
URL
Update para todos as maquinas
Arquivo(s): 1
02/12/2024 - 16:57:52
Arquivos
Detalhes
Abrir link externo
Cancelar atualização
2/2
Nova atualização

É importante ressaltar que o retorno da execução da atualização (como sucesso, falha, resposta do comando) é armazenado para posteriormente poder ser consultado pelo **blueDash**.

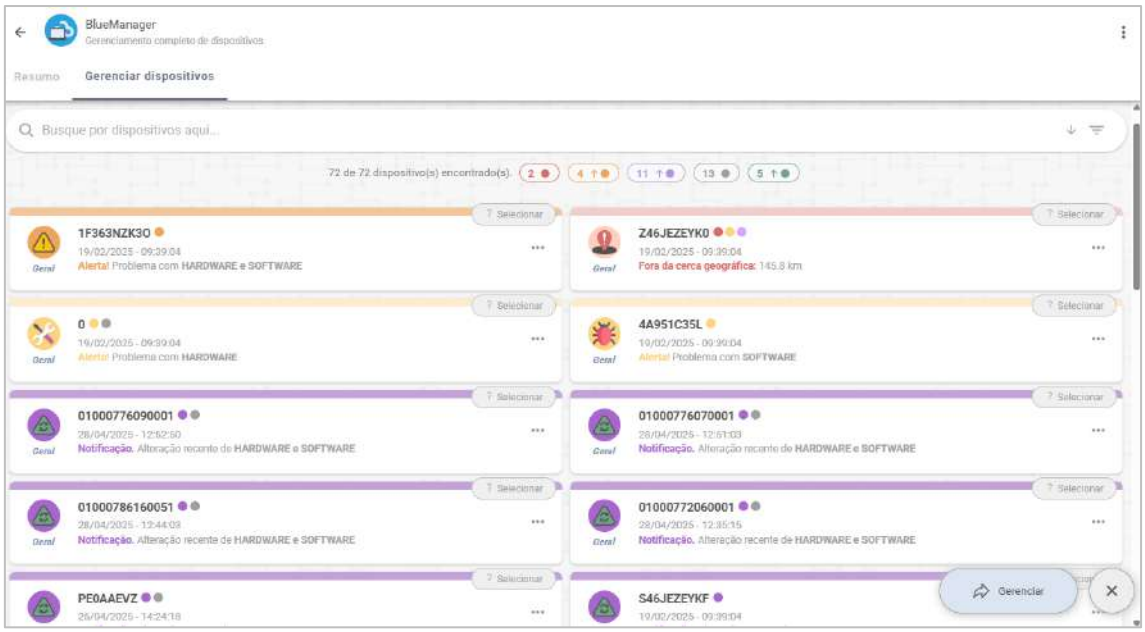
Dessa forma, a instalação, remoção e atualização de aplicativos, drivers, configurações, *patches* de segurança, e intervenções de envio de comandos para seu parque é totalmente gerenciada pela Central Web e executado sem intervenção presencial.

12. Alertas com notificações automáticas

A ferramenta contempla um sistema de alerta com notificações para situações mais importantes de um parque de dispositivos. Com mecanismos automáticos que permitem que você identifique rapidamente e visualmente tanto a quantidade de dispositivos em cada situação, como quais são esses dispositivos.

Para isso, basta ativar os alertas clicando sobre as notificações de cada situação logo abaixo do campo busca. Dessa forma, a listagem de dispositivos é reordenada priorizando a apresentação dos dispositivos conforme cada situação de alerta é selecionada, sendo elas:

1. **Alerta de dispositivos extraviados ou fora da cerca geográfica**;
2. **Alerta de dispositivos com problemas de hardware / software;**
3. **Alerta de dispositivos com alterações de hardware / software;**
4. **Alerta de dispositivos que não são inventariados há muito tempo (inativos)**, conforme padronização nas configurações.
5. **Dispositivos em produção (com patrimônio e unidade associada);**



É importante ressaltar ainda, que mesmo que um dispositivo se encontre em mais de uma situação de alerta (como por exemplo, com problema de software e sem inventário há mais de uma semana), você consegue rapidamente identificar todas essas situações por meio das cores que aparecem ao lado do número de série dos dispositivos.

13. Alertas de alteração de hardware e software

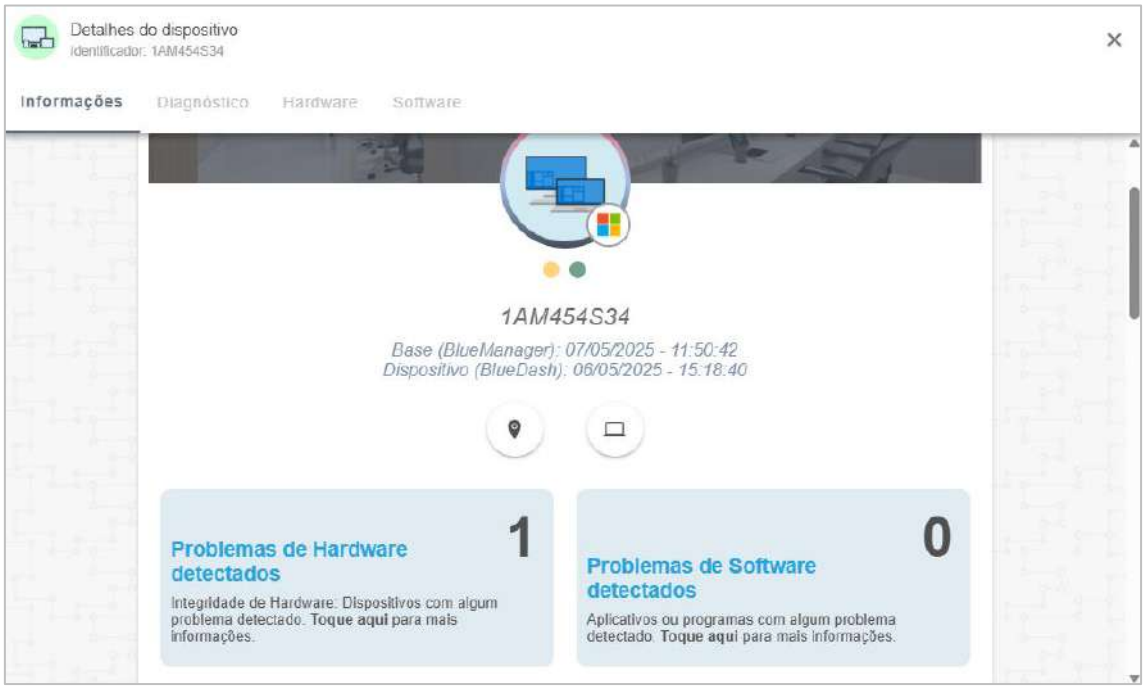
Para os alertas de alterações de hardware e software, além do texto da notificação que aparece no *card* de cada dispositivo, temos ainda uma identificação visual adicional. Para alteração apenas de software, aparece o ícone que representa um aplicativo, para alteração de hardware aparece um ícone de

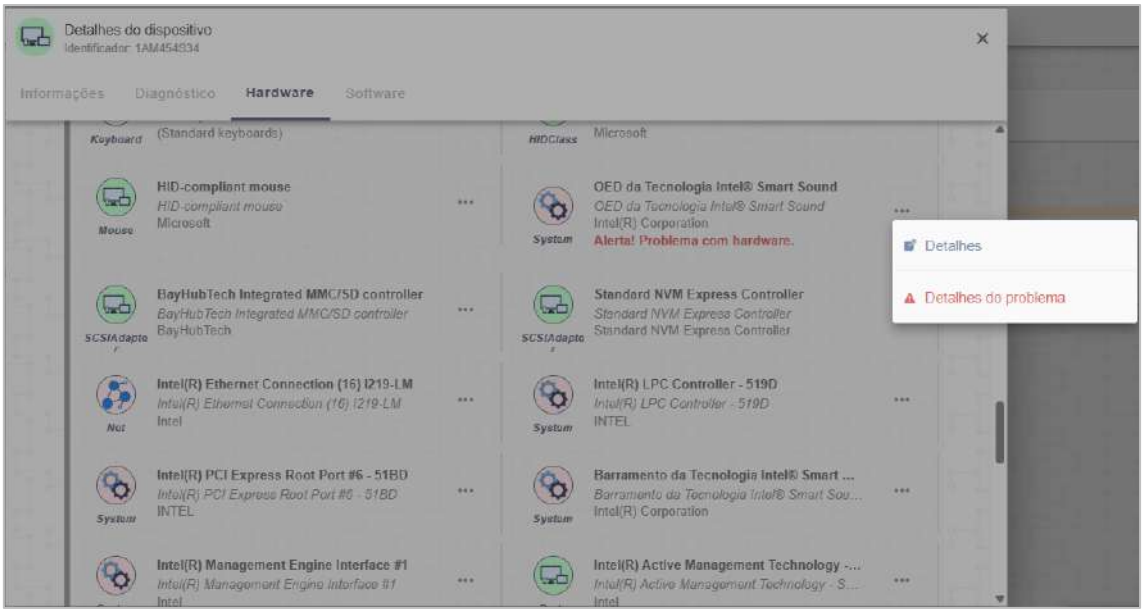
componente de hardware e para ambos os problemas no mesmo dispositivo, um sinal de atenção e a cor roxa mais escura!

14. Alertas de problemas de hardware e software detectados (integridade)

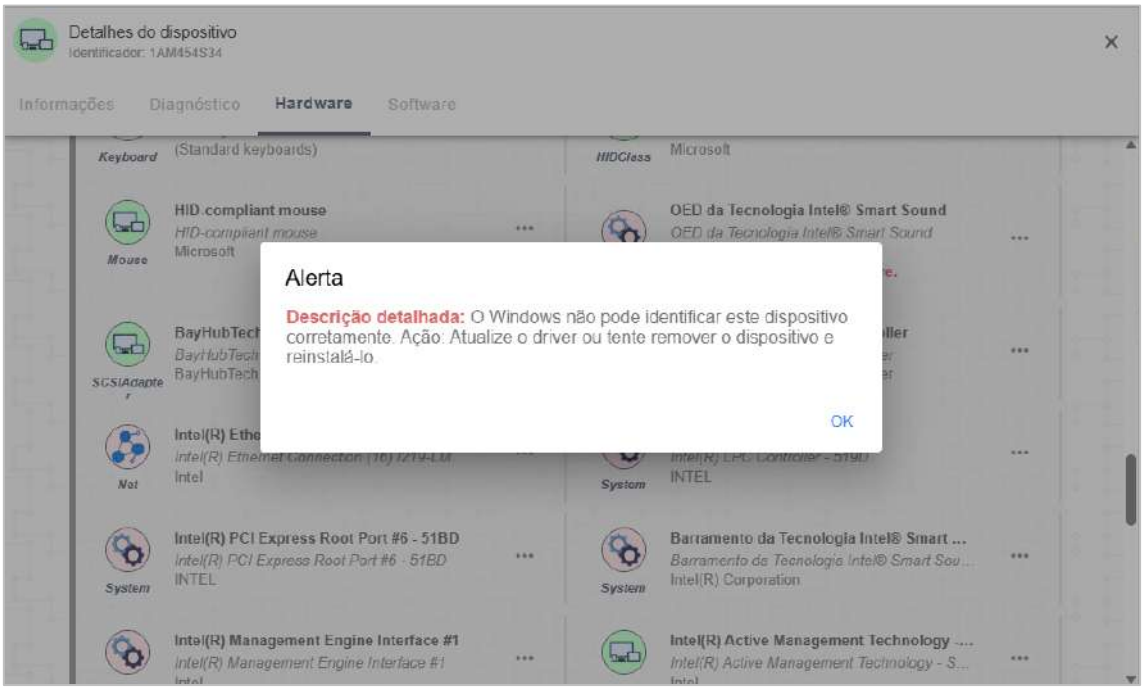
Os alertas de problema de hardware e software também são facilmente identificados pela cor laranja. No entanto, com os ícones e as tonalidades diferentes dos *cards* dos dispositivos, é possível saber se o problema é só de hardware, só de software ou de ambos.

Ao clicar, você é direcionado para os detalhes do dispositivo com o inventário que permite identificar qual o componente com problema, e ainda ter mais detalhes sobre o mesmo.



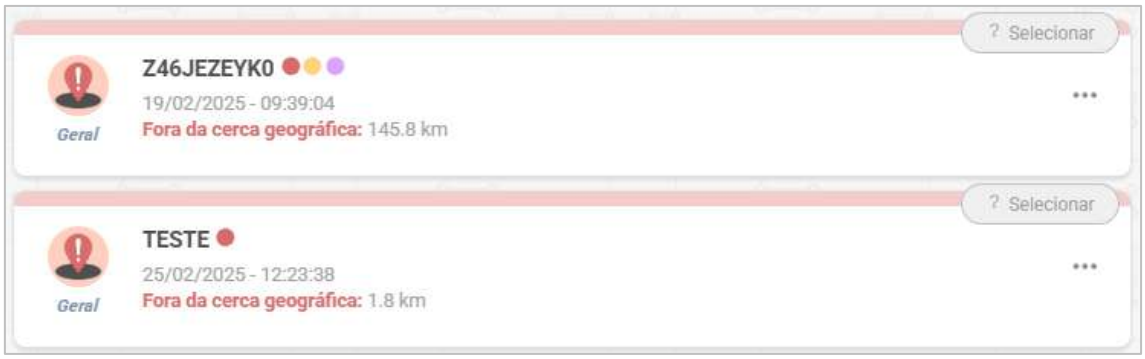


Verificando os detalhes é possível ainda visualizar a ação recomendada pelo Windows para correção. Dessa forma, é possível identificar os erros de integridade e as ações recomendadas.



15. Alertas de evasão da cerca geográfica

Ao acionar a visualização dos alertas de evasão da cerca geográfica, os dispositivos com esse status aparecem prioritariamente na visualização, seu *card* e ícone são apresentados na cor vermelha, bem como é mostrada a distância (em quilômetros) fora da cerca geográfica.



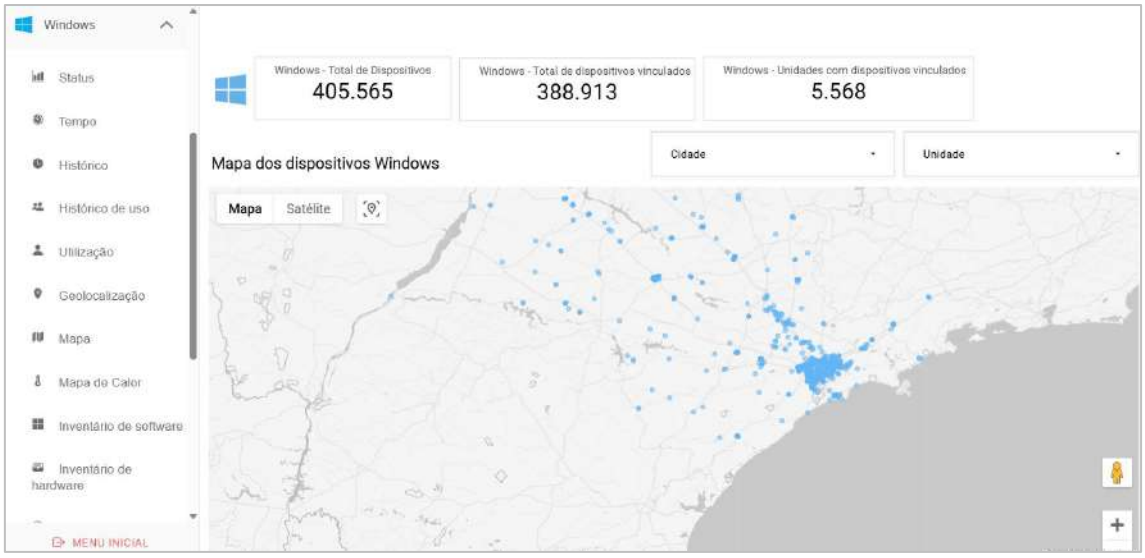
Uma vez identificados os dispositivos fora da cerca geográfica, você pode selecioná-lo para visualizar seus detalhes, incluindo sua última geolocalização. No entanto, você também pode visualizar todo o histórico de geolocalização pelo **blueDash**, ferramenta apresentada mais adiante!

BLUEDASH

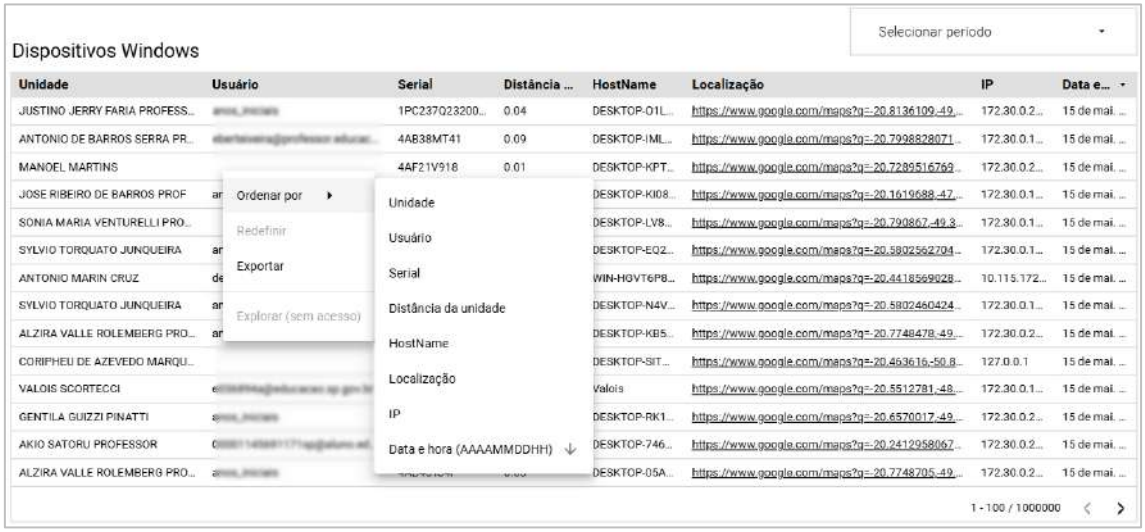
Vamos conhecer os principais recursos da solução de gestão visual e centralizada de parques de dispositivos da **BLUEDU** que fornece relatórios analíticos, gráficos gerenciais e dashboards para uma visibilidade completa de seus ativos de TI.

1. Visão Geral dos dispositivos

É possível visualizar o quantitativo de dispositivos e um mapa com a geolocalização dos mesmos, permitindo filtrar por cidade e unidade.



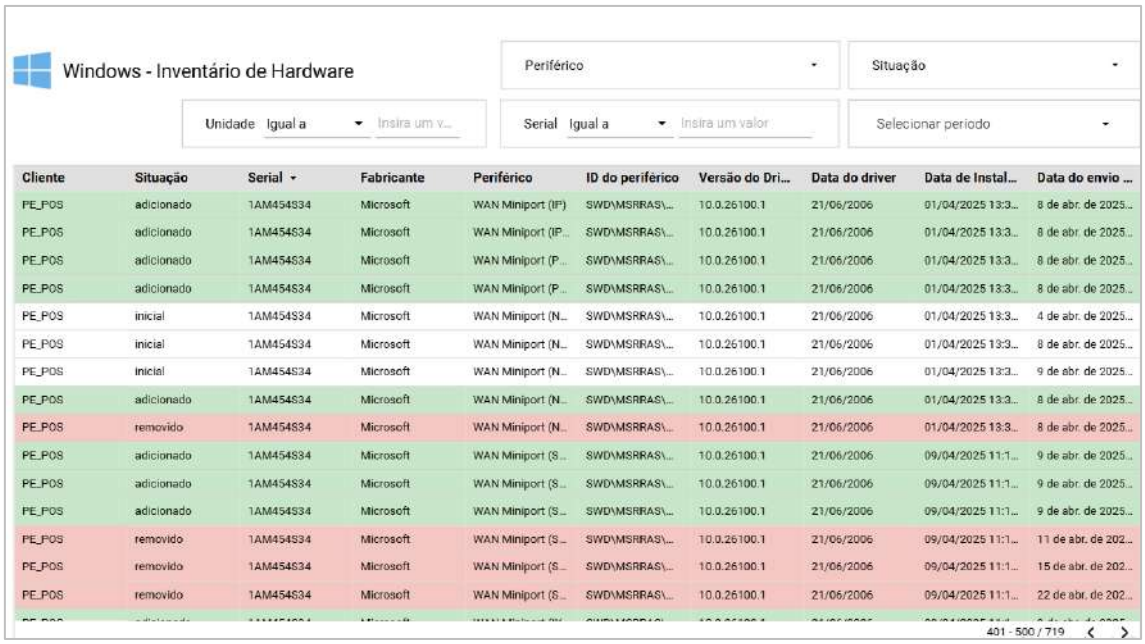
É possível também obter um relatório analítico com seus principais dados, e exportá-lo para uma planilha.



2. Inventário de hardware (histórico completo)

Neste relatório, é possível consultar de forma analítica o inventário inicial e todas as alterações dos componentes de hardware, podendo filtrar por serial, periférico e período. Dessa forma, é possível obter as alterações ocorridas na última semana ou no último mês, por exemplo.

Além das cores diferentes sinalizarem as remoções (vermelho) e adições (verde) de componentes, também é possível segmentar o relatório de alterações, filtrando pela situação adicionados, removidos ou inicial (primeiro inventário enviado).



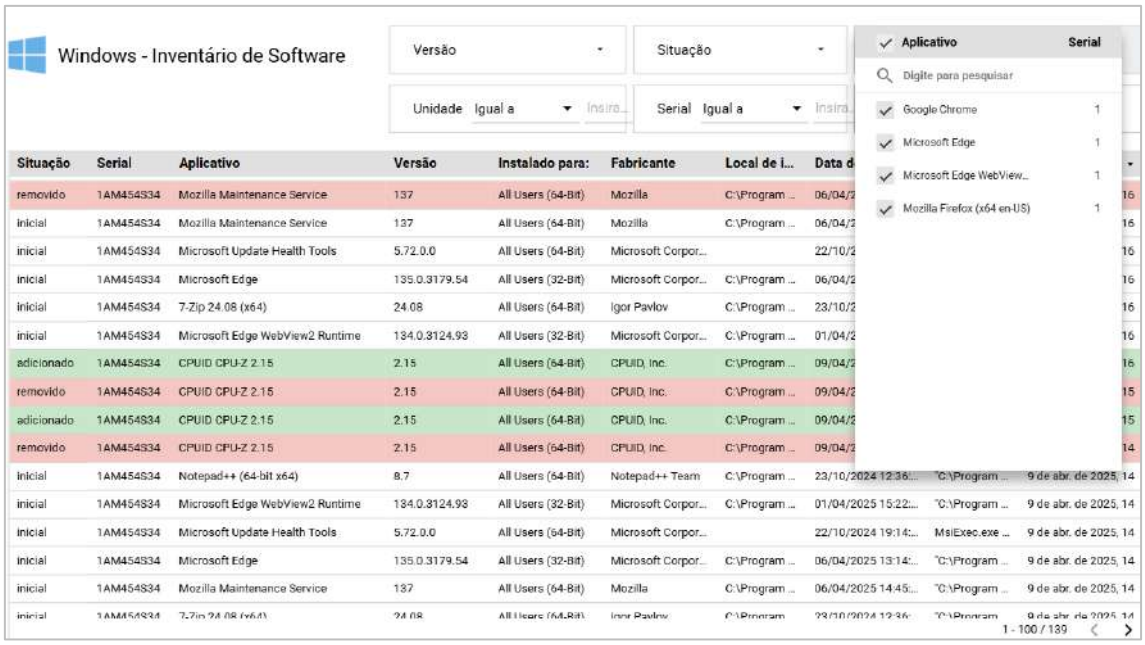
Cliente	Situação	Serial	Fabricante	Periférico	ID do periférico	Versão do Dri...	Data do driver	Data de Instal...	Data do envio ...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (IP)	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (IP...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (P...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (P...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	inicial	1AM454834	Microsoft	WAN Miniport (N...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	4 de abr. de 2025...
PE_POS	inicial	1AM454834	Microsoft	WAN Miniport (N...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	inicial	1AM454834	Microsoft	WAN Miniport (N...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	9 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (N...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	removido	1AM454834	Microsoft	WAN Miniport (N...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	01/04/2025 13:3...	8 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	9 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	9 de abr. de 2025...
PE_POS	adicionado	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	9 de abr. de 2025...
PE_POS	removido	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	11 de abr. de 202...
PE_POS	removido	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	15 de abr. de 202...
PE_POS	removido	1AM454834	Microsoft	WAN Miniport (S...	SWD\MSRRAS\...	10.0.26100.1	21/06/2006	09/04/2025 11:1...	22 de abr. de 202...

3. Inventário de software (histórico completo)

Neste relatório, é possível consultar de forma analítica todas as alterações de software do dispositivo, podendo filtrar aplicativo, versão, por serial, unidade e período.

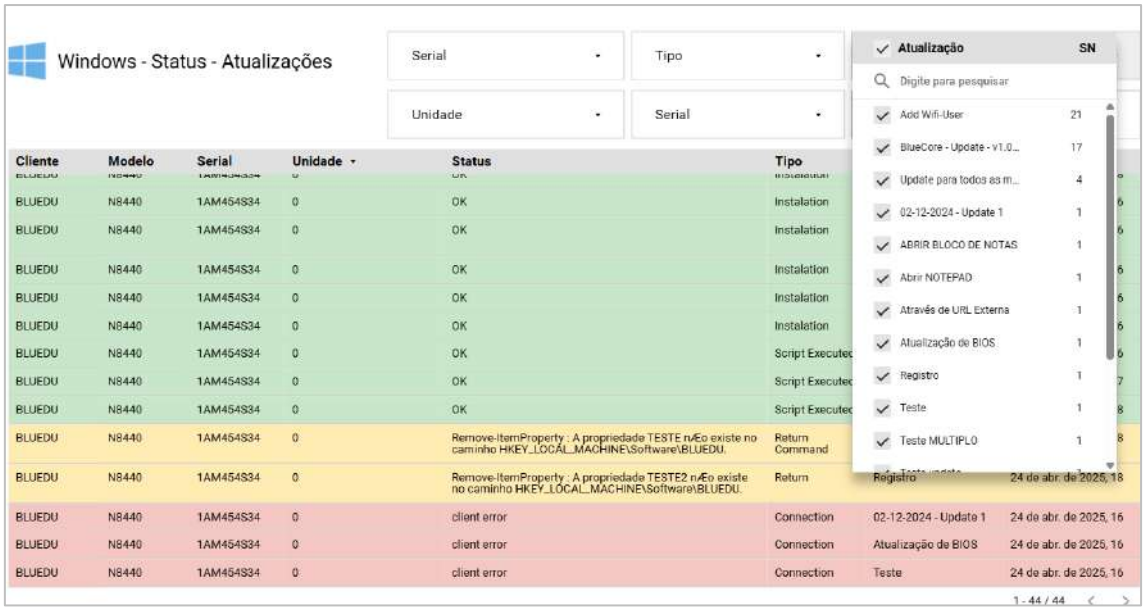
Além das cores diferentes sinalizarem as remoções (vermelho) e adições (verde) de aplicativos, também é possível segmentar o relatório de alterações, filtrando

os aplicativos adicionados, removidos ou inicial (primeiro inventário enviado).



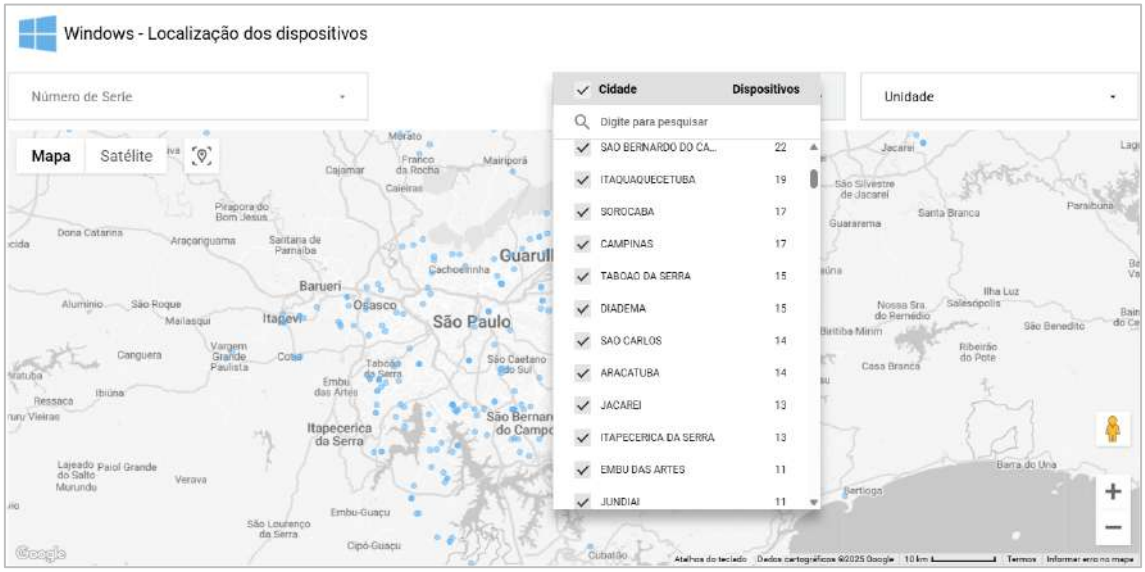
4. Retorno das atualizações e comandos

É possível analisar o retorno das atualizações e comandos remotos aplicados, podendo ainda filtrar por serial, unidade e período.



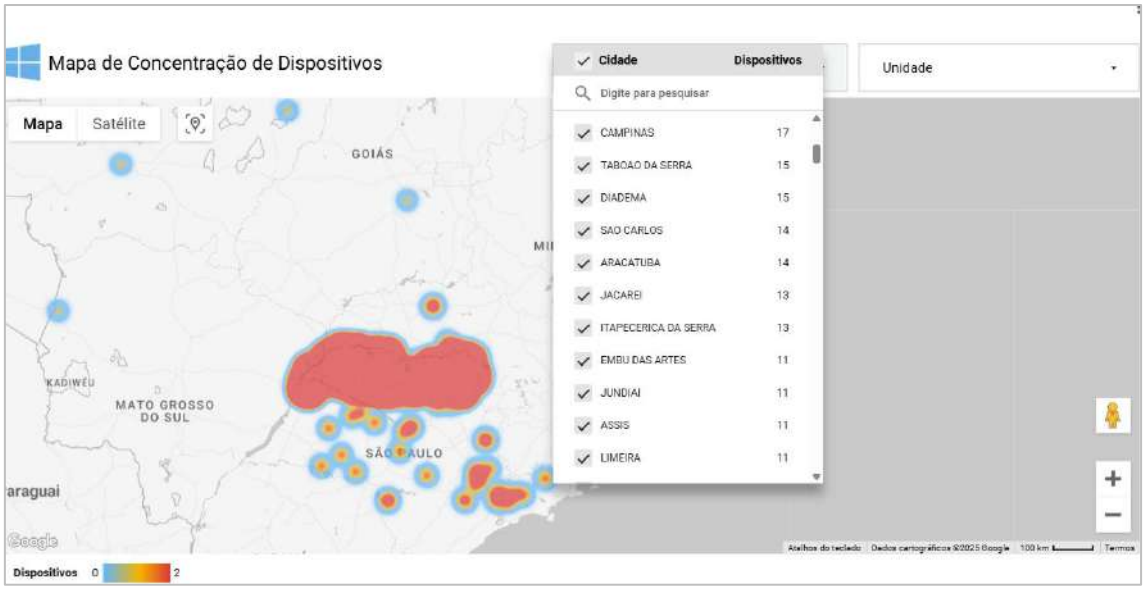
5. Mapa dos dispositivos baseado na geolocalização

É possível visualizar um mapa dos dispositivos baseados em sua geolocalização, permitindo ainda filtrar por unidade, cidade e número de série.



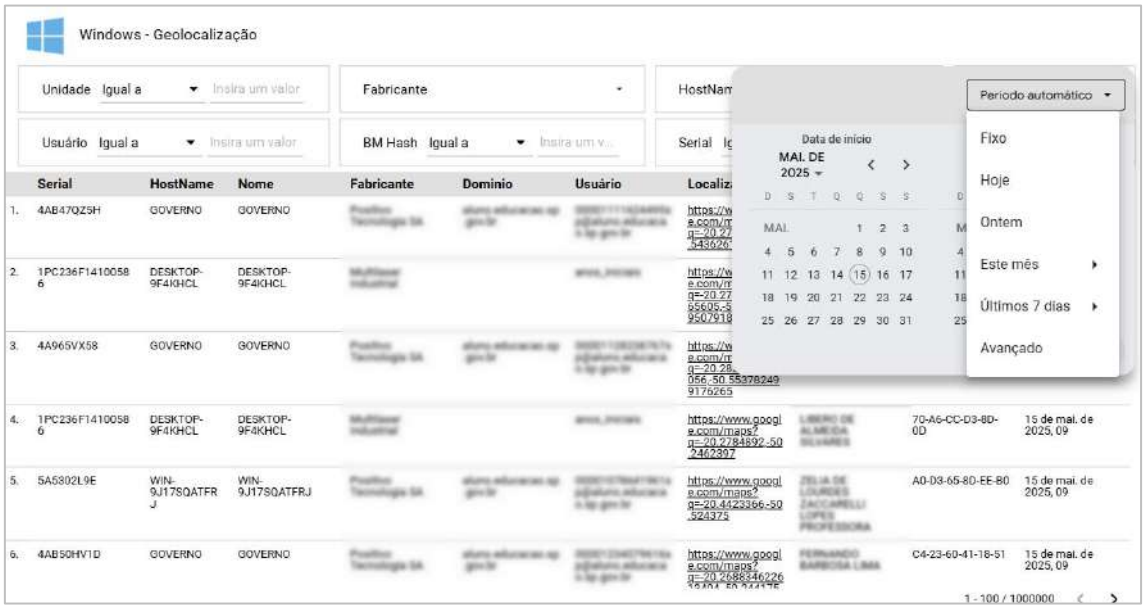
6. Mapa de calor baseado na geolocalização

Para identificar visualmente os locais com maior concentração de dispositivos, é exibido um mapa de calor dos dispositivos baseados em sua geolocalização, com filtro por cidade e unidade.



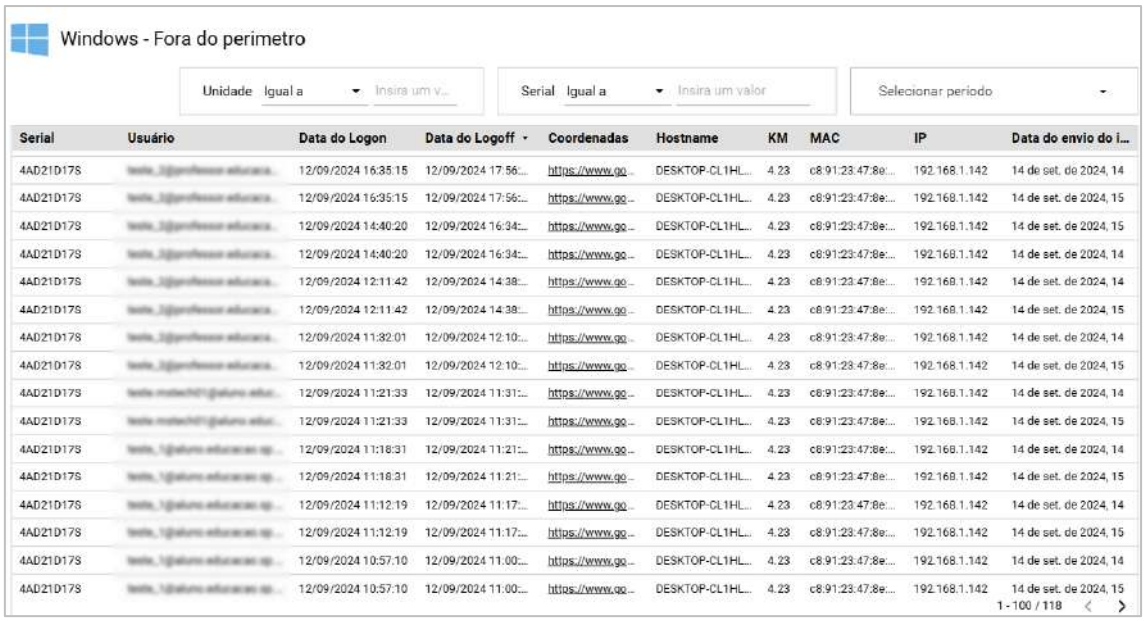
7. Geolocalizações enviadas

É possível obter todo o histórico de geolocalização enviada pelos dispositivos, com opção de filtro por período, serial e unidade.



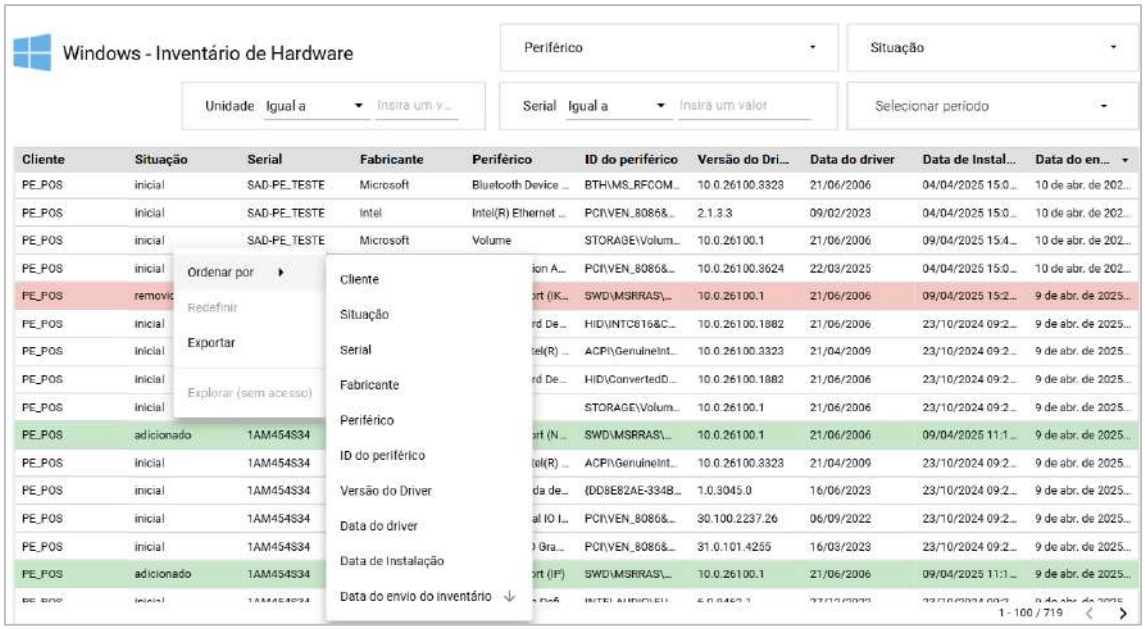
8. Dispositivos fora do perímetro

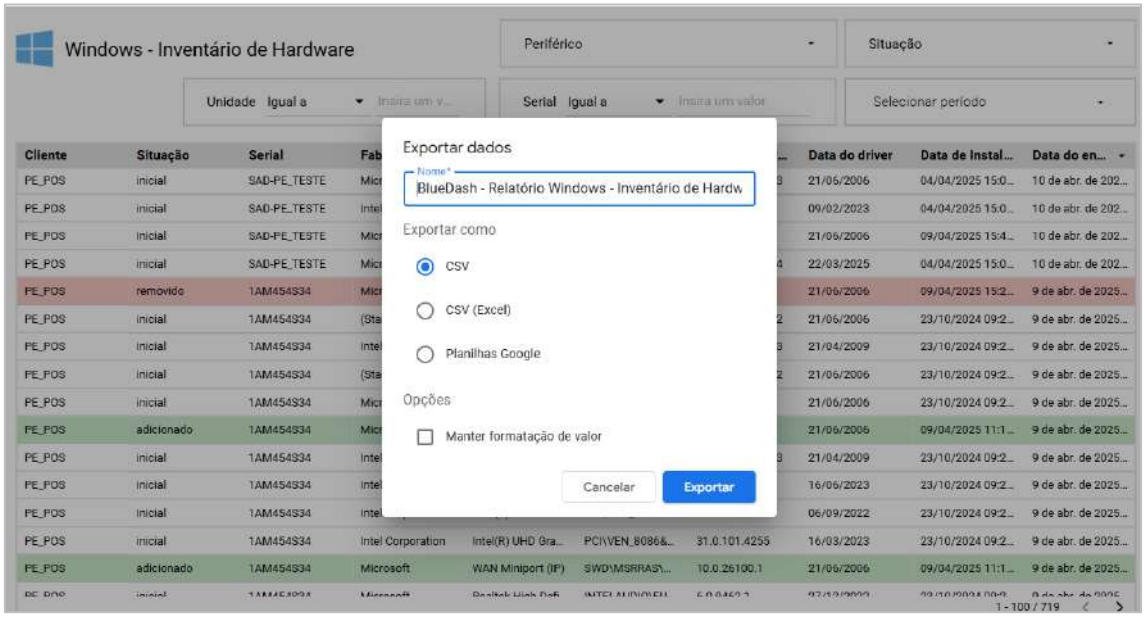
É possível visualizar a relação de todos os dispositivos que saíram do perímetro de funcionamento definido, com sua geolocalização, podendo ainda filtrar por período, serial e unidade.

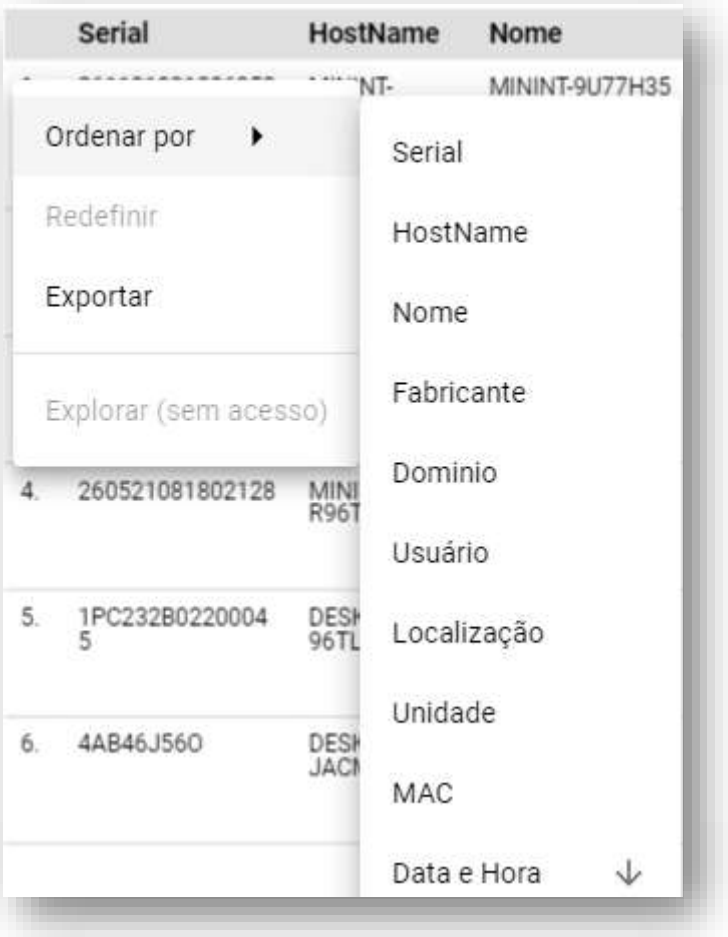


9. Relatórios Customizados

É possível customizar todos os relatórios apresentados utilizando os filtros, as opções de ordenação e a exportação para extração de dados em formato de planilhas, clicando com o botão direito do mouse.







CARACTERÍSTICAS TÉCNICAS

A seguir descrevemos as principais características técnicas da solução:

1. **Marca / Fabricante da solução:** BLUEDU.
2. **Solução integrada baseada nos produtos blueManager e blueDash.**
3. **Sistema Operacional:** Microsoft Windows 11.
4. **Espaço em disco do dispositivo**: recomendado 64 GB ou superior.
5. **Processamento:** os dispositivos utilizem a capacidade de processamento local. Não é necessário ter um servidor na unidade administrativa / escolar para processamento centralizado.
6. **Modo on-line e off-line:** os mecanismos locais de coleta de dados dos dispositivos utilizam tecnologias padrões de mercado e compatíveis com o

Sistema Operacional (como o WMI e métodos de powershell para Windows) e funcionam mesmo em momentos de intermitência de conectividade dos dispositivos (on-line e off-line), sendo sincronizados automaticamente posteriormente.

7. **Autenticação:** credenciais de acesso ao dispositivo e à Central Web de Gestão integradas ao Microsoft Entra ID (Active Directory) ou Google Workspace.
8. **BLUEMANAGER e BLUEDASH:** solução acessada via Web por meio de conexões seguras e criptografadas (certificados SSL) e disponibilizada com toda a infraestrutura de hospedagem / nuvem necessária para seu funcionamento.
9. **BLUEDASH:** Os *dashboards*, relatórios e gráficos consolidados apresentados são baseados em dados do dia anterior (D-1).
10. **Solução ativada em fábrica**, a partir de imagem gerada junto ao fabricante dos dispositivos, fazendo com que nenhuma ação seja necessária para iniciar a sincronização dos dados coletados.

Prodesp

Governo do Estado de São Paulo
Companhia de Processamento de Dados do Estado de São Paulo
Coordenadoria Prodesp LAB

TERMO DE REFERÊNCIA

Nº do Processo: 359.00008727/2024-51

Interessado: Secretaria de Gestão e Governo Digital, Gerência de Serviços Digitais e Colaboração

Assunto: Aquisição de Equipamentos tipo Desktop Educacional

ANEXO I-B

Relação de Participantes e Quantidades

(REL.CLBP.006/2024 v.1.2)

Lote 01 - Desktop Avançado Educacional

UASG	Município/UF de Entrega	Quantidade
81101 - ESP-FDE-FUND P/ DESENV. DA EDUCACAO	São Paulo/SP	700
102401 - ESP-CTO. EST. EDUC. TECNOL. P. SOUZA - CEETEP	São Paulo/SP	4500
533201 - ESP-CIA. PROCESSAMENTO DE DADOS ESTADO SP	Taboão da Serra/SP	180
TOTAL LOTE 01		**5380**

Lote 02 - Desktop Plus Educacional

UASG	Município/UF de Entrega	Quantidade
81101 - ESP-FDE-FUND P/ DESENV. DA EDUCACAO	São Paulo/SP	700
102401 - ESP-CTO. EST. EDUC. TECNOL. P. SOUZA - CEETEP	São Paulo/SP	15000
533201 - ESP-CIA. PROCESSAMENTO DE DADOS ESTADO SP	Taboão da Serra/SP	180
TOTAL LOTE 2		**15880**

ISMAEL MARTIN BONKE
Analista Gestão Organizacional

SUELI YOSHIKO KUROIVA SIQUEIRA
Coordenadora Prodesp LAB

Documento assinado eletronicamente por **Ismael Martin Bonke**, **Analista de Gestão Organizacional**, em 19/03/2025, às 10:04, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

Documento assinado eletronicamente por **Sueli Yoshiko Kuroiva Siqueira**, **Coordenador**, em 19/03/2025, às 10:06, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

A autenticidade deste documento pode ser conferida no site https://sei.sp.gov.br/sei/controlador_externo.php?acao=documento_conferir&id_orgao_acesso_externo=0 , informando o código verificador **0060302698** e o código CRC **20DCC4C4**.

Governo do Estado de São Paulo
Companhia de Processamento de Dados do Estado de São Paulo
Coordenadoria de Contratos

MINUTA

Processo SEI n.º 359.00008727/2024-51

CONTRATO DE AQUISIÇÃO DE EQUIPAMENTOS, FIRMADO ENTRE A COMPANHIADE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP E .....

PRO.00.MINUTA

Pelo presente contrato, de um lado, a **COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO - PRODESP**, com sede na cidade de Taboão da Serra, estado de São Paulo, na Rua Agueda Gonçalves, n.º 240, inscrita no CNPJ/MF sob o n° 62.577.929/0001-35, doravante designada simplesmente **PRODESP** e, de outro, a **.....**, com sede na ....., inscrita no CNPJ sob n° ....., doravante designada simplesmente **CONTRATADA**, representadas neste ato por seus representantes legais ao final designados e assinados, têm entre si justo e acertado o contrato de aquisição de equipamentos, mediante as seguintes cláusulas e condições:

I – OBJETO

1.1. Constitui objeto do presente contrato a aquisição e entrega de Desktop Educacional, com todos os seus componentes e acessórios, e respectivos manuais técnicos, garantia e assistência técnica, de acordo com as especificações contidas no Termo de Referência - Anexo I do Edital e demais condições estabelecidas neste contrato.

1.2. A forma de fornecimento é integral por local.

1.3. A presente contratação, decorrente de licitação na modalidade **Pregão Eletrônico n.º .....**, através da Ata de Registro de Preços nº **...../.....**, foi homologada, assim como autorizada a previsão de despesa orçamentária no Documento de Comprovação Orçamentária – DCO n.º **...../.....**, nos termos do Decreto Estadual n.º 33.144, de 20/03/91, conforme documentos anexados no Processo SEI n.º **359.00008727/2024-51**.

II – EQUIPAMENTOS

2.1. A **CONTRATADA** deverá fornecer os equipamentos especificados no(s) quadro(s) a seguir, atendendo as especificações técnicas estabelecidas no Termo de Referência - Anexo I:

2.1.1. Lote 1 do Termo de Referência – Anexo I – Desktop Avançado Educacional:

DESCRIÇÃO	UNID	QTDE
Desktop Avançado Educacional	Unidade	

2.1.2. Lote 2 do Termo de Referência – Anexo I – Desktop Plus Educacional:

DESCRIÇÃO	UNID	QTDE
Desktop Plus Educacional	Unidade	

III – ENTREGA

3.1. Os equipamentos especificados nos subitens**,** deverão ser entregues no endereço da **CONTRATANTE**, de acordo com os locais de entrega previstos no Anexo I-B do Termo de Referência - Anexo I, na Rua ....., de segunda-feira a sexta-feira, das .... às .....

3.2. O prazo máximo para entrega é de 60 (sessenta) dias, contado da data de assinatura deste contrato.

3.3. Deverão ser entregues, juntamente com os equipamentos, os manuais técnicos, e relatórios de entregas por nota fiscal contendo os números de série de cada equipamento.

IV – INSTALAÇÃO

4.1. É de responsabilidade da **PRODESP** a instalação dos equipamentos especificados neste contrato, de acordo com o previsto no item 4.2. do Termo de Referência – Anexo I;

4.1.1. Deverá a **CONTRATADA** prestar suporte técnico na instalação, caso solicitado pela **PRODESP.**

V – GARANTIA E ASSISTÊNCIA TÉCNICA

5.1. O prazo mínimo de garantia dos equipamentos, especificados neste contrato, incluindo acessórios e periféricos, é de 60 (sessenta) meses, devendo ser prestado pela mesma empresa.

5.2. Os serviços de reparo deverão ser executados por empresa autorizada pelo fabricante, no local de uso dos equipamentos (ON-SITE) ou na impossibilidade, no centro de manutenção da rede autorizada do fabricante.

5.3. A empresa fabricante do equipamento deverá dispor de um número telefônico para suporte técnico e abertura de chamados técnicos.

5.4. A **CONTRATADA** deverá atender rigorosamente as demais condições e prazos, detalhados e estabelecidos no item 4.4. do Termo de Referência – Anexo I

VI – ACEITES

6.1. A **PRODESP** realizará o recebimento provisório dos equipamentos, no ato da entrega, no local e endereço indicados, e acompanhados da sua respectiva nota fiscal/fatura.

6.2. A **PRODESP** emitirá o Termo de Aceite Definitivo após a constatação de que os equipamentos entregues correspondam ao proposto, e que atendam as especificações técnicas estabelecidas no Termo de Referência - Anexo I, e que se encontrem em perfeitas condições de funcionamento.

6.3. O prazo máximo para emissão do Termo de Aceite Definitivo é de 15 (quinze.) dias a contar da data de entrega dos equipamentos.

6.4. Caso os equipamentos apresentem defeito ou não atendam às especificações técnicas requeridas no Termo de Referência - Anexo I, o prazo de aceite será reiniciado após a solução dos problemas detectados.

6.5. O prazo máximo para a **CONTRATADA** solucionar os problemas reportados é de 05 (cinco) dias a contar do comunicado da **PRODESP**.

6.6. Caso haja reincidência dos problemas reportados o aceite será novamente interrompido e a **CONTRATADA** será comunicada para substituir os equipamentos com defeito por outros novos, no prazo máximo de 05 (cinco) dias.

VII – PREÇO

7.1. O valor total estimado do presente contrato é de **R$.....** (.....) - Base: **__/__/____**.

7.2. Como contraprestação pelo fornecimento, a **PRODESP** pagará à **CONTRATADA**, os seguintes preços unitários, fixos e irreajustáveis:

LOTE	DESCRIÇÃO	UNID	QTDE	PREÇO UNITÁRIO (R$)	SUBTOTAL (R$)
1	Desktop Avançado Educacional	Unidade			
2	Desktop Plus Educacional	Unidade			

7.3. Nos preços ora contratados estão incluídos, além do lucro, todas as despesas e custos diretos e indiretos relacionados ao seu objeto, tais como tributos, remunerações, despesas financeiras e quaisquer outras necessárias ao cumprimento do objeto, inclusive gastos com transporte.

7.4. Caso a **CONTRATADA** seja optante pelo Simples Nacional e, por causa superveniente à contratação, perca as condições de enquadramento como microempresa ou empresa de pequeno

porte ou, ainda, torne-se impedida de beneficiar-se desse regime tributário diferenciado por incorrer em alguma das vedações previstas na Lei Complementar Federal n.º 123/2006, não poderá deixar de cumprir as obrigações avençadas perante a Administração, tampouco requerer o reequilíbrio econômico-financeiro, com base na alegação de que a sua proposta levou em consideração as vantagens daquele regime tributário diferenciado.

7.4.1. No caso de tornar-se impedida de beneficiar-se do Simples Nacional, a **CONTRATADA** deverá requerer ao órgão competente a sua exclusão do Simples Nacional **até o último dia útil do mês subsequente àquele em que for celebrado o contrato** , nos termos do artigo 30, caput, inciso II, e §1º, inciso II, da Lei Complementar Federal nº 123/2006, apresentando à **PRODESP** a comprovação da exclusão ou o seu respectivo protocolo.

VIII - FATURAMENTO E PAGAMENTO

8.1. O faturamento do objeto do presente contrato deverá ser feito no CNPJ da **PRODESP**, correspondente ao local de entrega e/ou da prestação dos serviços. Para tanto, a **CONTRATADA** deverá consultar os dados cadastrais correspondentes, no endereço eletrônico: www.prodesp.sp.gov.br/fornecedores/filiais-prodesp/
Para demais órgãos e entidades, o faturamento, a emissão e apresentação das Notas Fiscais/Faturas deverão seguir a instrução da **CONTRATANTE.**

8.2. As Notas Fiscais/Faturas representativas dos pagamentos deverão ser emitidas pela **CONTRATADA** contra a **PRODESP** e enviadas eletronicamente em formato e nomenclatura padrão, estabelecida no manual de instruções disponível no site da **PRODESP**, na seção “Fornecedores” opção “Entrega de Notas Fiscais e Faturas”.

8.2.1. O endereço eletrônico informado no item acima, destina-se exclusivamente ao recebimento de Nota Fiscal Eletrônica e não será aceito o envio por e-mail. A entrega de quaisquer outros documentos exigidos deverá seguir o estabelecido com a **PRODESP;**

8.2.2. Na hipótese de divergência entre os valores constantes na nota fiscal/fatura emitida pela **CONTRATADA** e os estipulados no contrato, a **PRODESP** poderá glosar os valores apontados como indevidos.

8.3. O pagamento dos valores, apurados em conformidade com os preços estabelecidos no item 7.2. deste contrato, será efetuado pela **PRODESP**, após a emissão do Aceite Definitivo previsto na Cláusula VI - ACEITES, mediante a entrega das Notas Fiscais/Faturas pela **CONTRATADA** e devida atestação pela **PRODESP**.

8.4. A **PRODESP** realizará os pagamentos nos dias 5 e 20 do mês, sendo prorrogados para o dia útil subsequente, no caso de dias não úteis.

8.4.1. As Notas Fiscais/Faturas entregues pela **CONTRATADA** entre os dias 1 e 5, serão pagas no dia 5 do mês subsequente à entrega. As Notas Fiscais/Faturas entregues após o dia 5, serão pagas no dia 20 do mês subsequente à entrega. As Notas Fiscais/Faturas entregues após o dia 21, serão pagas no dia 5 do mês subsequente, fora o mês de sua entrega;

8.4.2. No caso de devolução da Nota Fiscal/Fatura por qualquer motivo, a reapresentação será considerada como nova solicitação para efeito de contagem do prazo de seu pagamento;

8.4.3. Havendo atraso no pagamento, incidirá correção monetária sobre o valor devido na

forma da legislação aplicável, bem como juros moratórios, a razão de 0,5 % (meio por cento) ao mês, calculados pro rata temporis, em relação ao atraso verificado;

8.4.4. A **PRODESP** tem a obrigação de assegurar que todos os aspectos fiscais e tributários estejam em conformidade com a legislação vigente. Caso haja alguma inconsistência ou dúvida quanto ao enquadramento tributário do documento fiscal emitido, a **PRODESP** poderá reter o pagamento até que a situação seja esclarecida ou regularizada.

8.5. As importâncias a serem pagas pela **PRODESP** serão depositadas em conta corrente da **CONTRATADA** no Banco do Brasil S.A.

8.5.1. Para tanto, a **CONTRATADA** deverá informar à **PRODESP**, dentro do prazo de 15 (quinze) dias corridos a contar da assinatura do presente contrato, o número de sua conta corrente e o da agência do referido estabelecimento bancário.

8.6. Constitui condição para a realização dos pagamentos a inexistência de registros em nome da **CONTRATADA** no "Cadastro Informativo dos Créditos não Quitados de Órgãos e Entidades Estaduais — CADIN ESTADUAL", o qual deverá ser consultado por ocasião da realização de cada pagamento. O cumprimento desta condição poderá se dar pela comprovação, pela **CONTRATADA**, de que os registros estão suspensos, nos termos do artigo 8° da Lei Estadual n° 12.799/2008.

8.7. Todos os tributos sejam eles federais, estaduais ou municipais sob qualquer título, inclusive o I.S.S. (Imposto sobre Serviços) que incidam ou venham a incidir sobre este contrato são de exclusiva responsabilidade da **CONTRATADA**.

8.8. A **PRODESP** efetuará a retenção/recolhimento referente ao INSS, conforme previsto na Lei Federal nº 9.711/1998 de 20/11/1998 e do percentual relativo ao ISSQN nos termos da Lei Complementar nº 116/2003, se aplicáveis.

8.9. A **CONTRATADA**, optante pelo Sistema Integrado de Pagamento de Impostos e Contribuições (SIMPLES) junto à Secretaria da Receita Federal (SRF), nos termos da Lei Complementar nº 123, de 14 de dezembro de 2006, deverá apresentar a cada pagamento, nos termos do artigo 3º da Instrução Normativa n.º 791 de 10 de dezembro de 2007 da Secretaria da Receita Federal (SRF), DECLARAÇÃO, emitida em duas vias e devidamente assinadas pelo representante legal da **CONTRATADA**. A não apresentação da respectiva declaração ensejará a retenção na fonte dos tributos e contribuições devidos.

8.9.1. A **PRODESP** arquivará a primeira via da declaração a que se refere o item acima, que ficará à disposição da Secretaria da Receita Federal (SRF), devendo a segunda via ser devolvida à **CONTRATADA**, como recibo.

8.10. A **PRODESP** poderá efetuar, nos termos do artigo 70 do seu Regulamento Interno de Licitações e Contratos, a retenção ou glosa no pagamento, sem prejuízo das sanções cabíveis, quando a **CONTRATADA**:

a) não produzir os resultados, deixar de executar, ou não executar com a qualidade mínima exigida as atividades contratadas;

b) deixar de utilizar materiais e recursos humanos exigidos para a execução do serviço, ou utilizá-los com qualidade ou quantidade inferior à demandada;

c) estiver sendo processado judicialmente pelo descumprimento de obrigações trabalhistas e

previdenciárias dos seus empregados, decorrentes da execução do contrato, em tendo sido a PRODESP incluída no polo passivo da ação.

8.11. Quando da emissão da nota fiscal, caso a **CONTRATADA** esteja em situação de recuperação judicial, deverá apresentar declaração, relatório ou documento equivalente de seu administrador judicial, ou se o administrador judicial for pessoa jurídica, do profissional responsável pela condução do processo, de que está cumprindo o plano de recuperação judicial.

8.11.1. A não apresentação do documento requerido no item 8.11. acarretará a aplicação de multa prevista na Cláusula XII - RESCISÃO E PENALIDADE.

IX – VIGÊNCIA

9.1. A vigência do presente contrato é de 04 (quatro) meses a contar da data de sua assinatura.

X – OBRIGAÇÕES DA CONTRATADA

10.1. Deverá fornecer relatórios de entregas por nota fiscal contendo os números de série de cada equipamento.

10.2. Cumprir rigorosamente todas as condições estabelecidas no Termo de Referência – Anexo I e demais condições estabelecidas neste contrato.

10.3. Manter, durante a execução do contrato, em compatibilidade com as obrigações assumidas, todas as condições de habilitação e qualificação exigidas na licitação.

10.4. Providenciar, concomitantemente à assinatura do contrato, seu cadastro na Unidade Cadastradora do SICAF, caso não esteja cadastrada ou sua renovação, caso esteja com o cadastro vencido, bem como mantê-lo válido durante toda vigência contratual.

10.5. Responsabilizar-se, sem qualquer espécie de solidariedade por parte da **PRODESP**, pelas obrigações de natureza fiscal, previdenciária, trabalhista, acidentária e civil, em relação ao pessoal alocado para a prestação dos serviços objeto do presente contrato.

10.6. Obedecer na execução e desenvolvimento do seu trabalho, as determinações da Lei nº 6.514, de 22 de dezembro de 1977, regulamentada pela Portaria nº 3.214, de 08 de junho de 1978, do Ministério do Trabalho e Emprego e suas alterações, além de outra legislação técnica vigente e as normas de procedimentos internos da **PRODESP**, de engenharia de segurança, medicina e meio ambiente do trabalho, que sejam aplicáveis à execução específica da atividade.

10.7. Obriga-se, por seus administradores, sócios e gerentes, por seus funcionários ou terceiros contratados e/ou subcontratados, credenciados e representantes, a manter e guardar o mais expresso, estrito e absoluto sigilo sobre dados, informações, conteúdo, especificações técnicas, características de ambientes, relações ou informações de caráter comercial com clientes da **PRODESP**, a que tenham acesso ou conhecimento, sob qualquer forma, em decorrência da prestação dos serviços e/ou fornecimento de bem, objeto deste contrato, no decorrer da sua execução ou cumprimento, sob pena de responder civil ou criminalmente pelo seu descumprimento, ficando responsável pela reparação por prejuízos materiais, morais, perdas e lucros cessantes decorrentes.

10.7.1. A obrigação de sigilo prevista no item 10.5. aplica-se não só pelo prazo de vigência ou de execução dos serviços/fornecimento previstos neste contrato como se estende também após seu encerramento pelo prazo de 10 (dez) anos.

10.8. Não emitir e/ou fazer circular duplicatas ou saque de letras de câmbio contra a **PRODESP**, relativamente a todo e qualquer crédito decorrente deste contrato, exceto em se tratando a **CONTRATADA** de microempresa ou empresa de pequeno porte.

10.9. Observada a natureza do objeto contratado, responsabilizar-se exclusivamente, pela retirada e descarte do material até o destino final, sempre que solicitado pela **PRODESP**, obrigando-se a apresentar a documentação comprobatória de sua qualificação para tanto, de conformidade com a legislação pertinente, sob pena de rescisão do ajuste, bem como da imposição das penalidades nele previstas.

10.10. Conhecer e cumprir, naquilo que lhe couber, o Programa de Integridade e o Código de Conduta e Integridade da **PRODESP**, disponíveis no site da **PRODESP** – endereço eletrônico: https://www.prodesp.sp.gov.br/institucional/codigo-de-conduta-e-integridade

10.11. Assinar o "Termo de Ciência e de Notificação - Tribunal de Contas do Estado de São Paulo ", Anexo II deste contrato, dando ciência da remessa da documentação do procedimento licitatório ao Tribunal de Contas do Estado de São Paulo.

10.11.1. Providenciar o cadastro de seus representantes legais responsáveis pela assinatura do "Termo de Ciência e de Notificação" no Cadastro Corporativo TCESP – CadTCESP e mantê-lo atualizado, para fins de cadastramento em processo eletrônico, nos termos das Instruções nº 01 de 2024, do Tribunal de Contas do Estado de São Paulo;

10.11.2. Ficará a critério da **CONTRATADA** o acompanhamento do processo junto àquela corte, cabendo-lhe as diligências para juntada da procuração nomeando seus representantes legais/procuradores e demais atos que se fizerem necessários.

10.12. Assinar, ao término da vigência do presente contrato, o Termo de Encerramento e Outras Avenças, conforme modelo Anexo III deste instrumento.

XI - OBRIGAÇÕES DA PRODESP

11.1. Indicar o responsável pela gestão do contrato, a quem competirá a fiscalização de sua execução, a qualquer instante, solicitando à **CONTRATADA**, sempre que achar conveniente, informações do seu andamento.

11.2. Emitir Termos de Aceite, conforme disposto na cláusula VI - ACEITES.

11.3. Efetuar os pagamentos devidos, conforme estipulado na Cláusula VIII- FATURAMENTO E PAGAMENTO.

11.4. Assinar ao término da vigência do presente contrato, o Termo de Encerramento e de Outras Avenças, conforme modelo Anexo III deste instrumento.

XII - RESCISÃO E PENALIDADES

12.1. O contrato poderá ser rescindido na forma, com as consequências e pelos motivos previstos no artigo 81 do Regulamento Interno de Licitações e Contratos da **PRODESP**, sujeitando-se a **CONTRATADA** às penalidades previstas neste contrato.

12.2. No caso de a **CONTRATADA** estar em situação de recuperação judicial, a convalidação em

falência ensejará a imediata rescisão deste contrato, sem prejuízo da aplicação das demais cominações legais.

12.3. O presente contrato poderá ser rescindido por qualquer das partes, pelo não cumprimento de qualquer condição ou cláusula estabelecida neste instrumento, ficando a parte infratora sujeita, a favor da parte inocente, às perdas e danos correspondentes.

12.4. Os casos fortuitos e/ou motivos de força maior serão excludentes da responsabilidade das partes contratantes de acordo com o disposto no artigo 393 do Código Civil Brasileiro.

12.5. Pela inexecução total ou parcial de qualquer cláusula e/ou condição do contrato a **PRODESP** poderá, garantida a prévia defesa, aplicar à **CONTRATADA** as seguintes sanções:

12.5.1. Advertência;

12.5.2. Multa equivalente a 10% (dez por cento) calculada sobre o valor total do contrato, no caso de rescisão, por culpa ou requerimento da **CONTRATADA**, sem motivo justificado ou amparo legal, a critério da **PRODESP**;

12.5.3. Em caso de atraso na entrega, a **PRODESP** poderá aplicar multa sobre o valor total dos equipamentos em atraso, considerando-se os seguintes critérios:

a) Atraso de até 30 (trinta) dias, multa de 0,3% (zero vírgula três por cento) por dia;

b) Atraso superior a 30 (trinta) dias, multa de 10% (dez por cento) desconsiderando o previsto no inciso anterior;

c) Atraso superior a 60 (sessenta) dias, multa de 15%, cumulativa com o previsto no inciso b, sem prejuízo das demais sanções administrativas cabíveis.

12.5.4. Em caso de atraso nos prazos de atendimento relativos à garantia dos **EQUIPAMENTOS**, a **PRODESP** poderá aplicar multa sobre o valor do equipamento que deu causa ao atraso, considerando-se os seguintes critérios:

a) Atraso de até 24 (vinte e quatro) horas, multa de **0,1%** (zero vírgula um por cento) por hora de atraso;

b) Da 25ª (vigésima quinta) até a 48ª (quadragésima oitava) hora de atraso, multa de **0,3%** (zero vírgula três por cento) por hora de atraso, cumulada com o previsto no inciso anterior;

c) Após 48 (quarenta e oito) horas de atraso, a **CONTRATADA** ficará sujeita unicamente à multa de 10% (dez por cento) sobre o valor do equipamento

12.5.4.1. Caso o reparo/solução do(s) equipamento(s), não seja(m) solucionado(s) no prazo máximo estipulado, a **CONTRATADA** deverá colocar à disposição um equipamento idêntico ou no mínimo equivalente. Se o problema não for solucionado no prazo máximo de 30 (trinta) dias corridos, o equipamento deverá ser substituído definitivamente por um novo, abrindo-se, para isso, novo período de garantia, a partir da data do seu recebimento definitivo, sem prejuízo de aplicação das penalidades cabíveis.

12.5.5. Multa equivalente a 5% (cinco por cento) calculada sobre o valor do faturamento do mês da ocorrência, por infringência de qualquer cláusula, condições ou obrigações

pactuadas neste contrato e não abrangidas pelas alíneas anteriores. Não havendo faturamento no mês da ocorrência, a multa será de 0,4% (zero vírgula quatro por cento) calculada sobre o valor total do contrato.

12.5.5.1. Em caso de reincidência do descumprimento contratual, a multa estabelecida terá seu percentual acrescido em 50% (cinquenta por cento).

12.5.6. Suspensão temporária de participação em licitação e impedimento de contratar com a **PRODESP**, por prazo não superior a 2 (dois) anos.

12.6. Ficará a critério da **PRODESP** a aplicação cumulativa ou não das sanções acima.

12.7. As penalidades serão aplicadas sem prejuízo das multas previstas no ato convocatório, após ter sido garantido o exercício do direito de defesa e registradas na plataforma e-Sanções da Bolsa Eletrônica de Compras-BEC.

12.8. As multas previstas neste contrato poderão ser descontadas dos pagamentos devidos ou cobrados da **CONTRATADA**, através de cobrança direta e autônoma, pela via administrativa ou judicial.

12.9. No caso de não existirem pagamentos pendentes, a **CONTRATADA** deverá efetuar a quitação da multa em até 48 (quarenta e oito) horas contadas do recebimento do documento de cobrança respectivo, por meio de depósito bancário, sob pena de, em não o fazendo, sujeitar-se aos procedimentos judiciais cabíveis.

12.10. Os valores referentes às multas, indenizações e demais importâncias quando não ressarcidos pela **CONTRATADA**, serão atualizados pelo IPC-FIPE, calculado pro rata dia e acrescido de juros de mora de 12% (doze por cento) ao ano.

12.11. Sem prejuízo da aplicação de penalidades, a **CONTRATADA** é responsável pelos danos causados à **PRODESP** ou a terceiros, na forma disposta no artigo 76 da Lei federal nº 13.303/2016, não excluindo ou reduzindo essa responsabilidade, a fiscalização ou acompanhamento pelo órgão interessado.

12.12. As partes poderão rescindir o presente contrato, mediante acordo.

XIII – DISPOSIÇÕES FINAIS

13.1. O presente contrato é regido pelas suas cláusulas, pelo disposto na Lei Federal nº 13.303/2016 e Regulamento Interno de Licitações e Contratos da **PRODESP,** além dos preceitos de direito privado.

13.2. O presente contrato, a execução de seu objeto, produtos e/ou serviços não poderão ser cedidos ou transferidos total ou parcialmente, pela **CONTRATADA**, a terceiros estranhos a esta contratação.

13.3. O cumprimento, durante a execução do objeto contratual, das leis federais, estaduais e municipais vigentes correrão por conta da **CONTRATADA**, única e exclusiva responsável pelas infrações que houver.

13.4. Qualquer omissão ou tolerância das partes no exigir o estrito cumprimento dos termos e condições deste contrato, ou no exercício de uma prerrogativa dele decorrente, não constituirá renúncia e nem afetará o direito da parte em exercê-lo a qualquer tempo.

13.5. Qualquer divergência entre as condições estabelecidas neste contrato e nos anexos prevalecerá a do contrato.

13.6. As cláusulas deste contrato prevalecerão sempre em relação a qualquer acordo, verbal ou escrito, ajustado anterior ou posteriormente à data de sua assinatura, exceto se devidamente demonstrada a divergência entre a vontade das partes e o registrado no contrato, ocasião que se providenciará o devido aditamento para a retificação do contrato.

13.7. A **CONTRATADA** ficará sujeita à instauração de processo administrativo de responsabilização, nos termos da Lei federal nº 12.846/2013 e do Decreto estadual nº 67.301/2022, sem prejuízo das sanções administrativas previstas nos artigos 83 e 84 da Lei federal nº 13.303/2016, caso incorra na prática de atos que atentem contra o patrimônio público nacional ou estrangeiro, contra princípios da administração pública ou que de qualquer forma venham a constituir fraude ou corrupção ao longo da execução deste contrato.

13.8. O disposto neste contrato não poderá ser alterado ou emendado pelas partes, salvo por meio de Termo Aditivo.

XIV – ANEXOS

14.1. Integram este contrato, os seguintes anexos:

Anexo I - Termo de Referência – (Anexo I do Edital) e seus Anexos I-A e I-B;

Anexo II - Termo de Ciência e de Notificação – Tribunal de Contas do Estado de São Paulo;

Anexo III - Termo de Encerramento e Outras Avenças – MODELO.

XV – FORO

15.1. As partes elegem o Foro da Comarca de Taboão da Serra, Estado de São Paulo, como único competente para conhecer e dirimir quaisquer questões oriundas do presente contrato, com expressa renúncia de qualquer outro, por mais privilegiado que seja.

E, por estarem assim justas e acertadas, as Partes assinam o presente instrumento.

Taboão da Serra, a data de assinatura deste instrumento corresponde a data da última assinatura digital do(s) representante(s) legal(is).

Pela COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP

Pela CONTRATADA

ANEXO I

TERMO DE REFERÊNCIA

(ANEXO I DO EDITAL E SEUS ANEXOS I-A E e I-B), como se aqui estivessem – (docs. SEI nºs 0060301952 e 0060302698)

ANEXO II
TERMO DE CIÊNCIA E DE NOTIFICAÇÃO
(CONTRATOS)

CONTRATANTE:_CONTRATADO:_CONTRATO Nº (DE ORIGEM):_OBJETO:

Pelo presente TERMO, nós, abaixo identificados:

1. Estamos CIENTES de que:

ajuste acima referido, seus aditamentos, bem como o acompanhamento de sua execução contratual, estarão sujeitos a análise e julgamento pelo Tribunal de Contas do Estado de São Paulo, cujo trâmite processual ocorrerá pelo sistema eletrônico;

oderemos ter acesso ao processo, tendo vista e extraindo cópias das manifestações de interesse, Despachos e Decisões, mediante regular cadastramento no Sistema de Processo Eletrônico, em consonância com o estabelecido na Resolução nº 01/2011 do TCESP;

lém de disponíveis no processo eletrônico, todos os Despachos e Decisões que vierem a ser tomados, relativamente ao aludido processo, serão publicados no Diário Oficial Eletrônico do Tribunal de Contas do Estado de São Paulo (https://doe.tce.sp.gov.br/), em conformidade com o artigo 90 da Lei Complementar nº 709, de 14 de janeiro de 1993, iniciando-se, a partir de então, a contagem dos prazos processuais, conforme regras do Código de Processo Civil;

s informações pessoais dos responsáveis pela contratante e interessados estão cadastradas no módulo eletrônico do "Cadastro Corporativo TCESP – CadTCESP", nos termos previstos no Artigo 2º das Instruções nº01/2024, conforme "Declaração(ões) de Atualização Cadastral" anexa (s);

de exclusiva responsabilidade do contratado manter seus dados sempre atualizados.

2. Damo-nos por NOTIFICADOS para:

acompanhamento dos atos do processo até seu julgamento final e consequente publicação;

e for o caso e de nosso interesse, nos prazos e nas formas legais e regimentais, exercer o direito de defesa, interpor recursos e o que mais couber.

Taboão da Serra, a data de assinatura deste instrumento corresponde a data da última assinatura digital do(s) representante(s) legal(is).

AUTORIDADE MÁXIMA DO ÓRGÃO/ENTIDADE:
Nome:
Cargo:
CPF:

RESPONSÁVEIS PELA HOMOLOGAÇÃO DO CERTAME OU RATIFICAÇÃO DA DISPENSA/INEXIGIBILIDADE DE LICITAÇÃO:
Nome:
Cargo:
CPF:

RESPONSÁVEIS QUE ASSINARAM O AJUSTE:

Pelo contratante:

Nome:

Cargo:

CPF:

Pela contratada:

Nome:

Cargo:

CPF:

ORDENADOR DE DESPESAS DA CONTRATANTE:

Nome:

Cargo:

CPF:

GESTOR(A) DO CONTRATO:

Nome:

Cargo:

CPF:

FISCAL DO CONTRATO:

Nome:

Cargo:

CPF:

Nota: Modelo publicado no Diário Oficial Eletrônico do Tribunal de Contas do Estado de São Paulo, em 24/05/2024.

ANEXO III – MODELO

TERMO DE ENCERRAMENTO E OUTRAS AVENÇAS DO CONTRATO DE AQUISIÇÃO DE EQUIPAMENTOS, QUE FAZEM A COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP E A _____

PRO._____

Pelo presente termo, de um lado, a **COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO - PRODESP**, com sede no município de Taboão da Serra, estado de São Paulo, na Rua Agueda Gonçalves nº 240, inscrita no CNPJ/MF sob nº 62.577.929/0001-35, doravante designada simplesmente **PRODESP**, e, de outro, a empresa _____, com sede na _____, inscrita no

CNPJ/MF sob nº _____, doravante designada simplesmente **CONTRATADA**, neste ato representados por seus representantes legais ao final assinados, resolvem encerrar o contrato de aquisição de equipamentos, mediante a seguinte cláusula e condições:

I - ENCERRAMENTO E OUTRAS AVENÇAS

1.1. As Partes, de comum acordo, consideram concluído o objeto do contrato PRO. _____ em ___ de _____ de 20__, permanecendo as obrigações eventualmente remanescentes, considerando o Termo de Recebimento Definitivo emitido em...../...../.....

1.2. Em decorrência do encerramento do contrato mencionado no item 1.1., as Partes dão-se plena, rasa, mútua, recíproca, irrestrita, irrevogável e irretratável quitação dos serviços e valores referentes ao objeto do contrato PRO._____, para nada mais reclamar a qualquer título.

E, por estarem assim justas e contratadas, as Partes assinam o presente instrumento.

Taboão da Serra, a data de assinatura deste instrumento corresponde a data da última assinatura digital do(s) representante(s) legal(is).

COMPANHIA DE PROCESSAMENTO DE DADOS DO ESTADO DE SÃO PAULO – PRODESP

CONTRATADA

Documento assinado eletronicamente por **Sandra Alcantara de Oliveira**, **Técnico de Apoio Gestão e Operação**, em 03/06/2025, às 16:25, conforme horário oficial de Brasília, com fundamento no Decreto Estadual nº 67.641, de 10 de abril de 2023.

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ÓRGÃO OU ENTIDADE PÚBLICA

(Processo Administrativo n°.....)

CONTRATO ADMINISTRATIVO Nº ...../...., CELEBRADO ENTRE O(A) ....., POR INTERMÉDIO DO(A) ..... E .....

O Estado de São Paulo / [Entidade com personalidade jurídica] ....., por intermédio do(a) ..... (*órgão contratante*), com sede no(a) ....., na cidade de ..... /Estado de São Paulo, inscrito(a) no CNPJ sob o nº ....., neste ato representado(a) pelo(a) ..... *(cargo e nome)*, nomeado(a) pel*o(a) [Portaria/_____]* nº ....., de ..... de ..... de 20..., publicado(a) no *DOE* de ..... de ..... de ....., *[portador(a) da identificação funcional_____ nº ...../inscrito(a) no CPF sob o nº ..... (se ausente identificação funcional individualizada)]*, no uso da competência conferida pela legislação aplicável, doravante denominado(a) CONTRATANTE, e o(a) ....., inscrito(a) no CNPJ/MF sob o nº ....., sediado(a) na ....., doravante designado(a) CONTRATADO, neste ato representado(a) por ..... (nome e função no Contratado), inscrito(a) no CPF sob o nº ....., conforme atos constitutivos da fornecedora **OU** procuração apresentada nos autos, tendo em vista o que consta no Processo nº ..... e em observância às disposições da Lei nº 14.133, de 1º de abril de 2021, e demais normas da legislação aplicável, resolvem celebrar o presente Termo de Contrato, decorrente *do Pregão Eletrônico nº .../...**OU** da Concorrência Eletrônica nº .../...*, mediante as condições a seguir enunciadas, de acordo com as subdivisões subsequentes na forma de cláusulas e respectivos itens que compõem este instrumento.

CLÁUSULA PRIMEIRA – OBJETO (art. 92, I e II)

1.1. O objeto do presente instrumento é a contratação de ....., conforme detalhamento e especificações técnicas deste instrumento, do Termo de Referência, da proposta do Contratado e demais documentos da contratação constantes do processo administrativo em epígrafe.

1.2. Objeto da contratação:

ITEM	***ESPECIFICAÇÃO***	***CATMAT***	***UNIDADE DE MEDIDA***	***QUANTIDADE TOTAL***	**VALOR UNITÁRIO**	**VALOR TOTAL**
1						
2						
3						
...						

1.3. O presente Termo de Contrato vincula-se à seguinte documentação, que se considera parte integrante deste instrumento, independentemente de transcrição:

1.3.1. O Termo de Referência;

1.3.2. O Edital da Licitação;

1.3.3. A Proposta do Contratado; e

1.3.4. Eventuais anexos dos documentos supracitados.

1.4. O fornecimento do objeto será *[com entrega imediata] / [com entrega parcelada] / [contínuo]*

CLÁUSULA SEGUNDA – VIGÊNCIA E PRORROGAÇÃO

2.1. *O prazo de vigência da contratação é de XX (XXX) ....., contados do(a) ....., na forma do artigo 105 da Lei n° 14.133, de 2021.*

2.1.1. *O prazo de vigência será automaticamente prorrogado, independentemente de termo aditivo, quando o objeto não for concluído no período firmado acima, desde que justificadamente, pelo prazo necessário à conclusão do objeto, caso em que deverá a Administração providenciar a readequação do cronograma fixado para o contrato.*

2.1.2. *Quando a não conclusão do objeto da contratação decorrer de culpa do Contratado:*

2.1.2.1. *O Contratado será constituído em mora, aplicáveis a ele as respectivas sanções administrativas;*

2.1.2.2. *O Contratante poderá optar pela extinção do contrato e, nesse caso, adotará as medidas admitidas em lei para a continuidade da execução contratual, nos termos do parágrafo único do artigo 111 da Lei nº 14.133, de 2021.*

2.1.3. *Não obstante o prazo estipulado nesta cláusula, quando ultrapassado o exercício, a vigência nos exercícios subsequentes ao da celebração do contrato estará sujeita a condição resolutiva, consubstanciada esta na inexistência de recursos aprovados nas respectivas Leis Orçamentárias de cada exercício para atender as respectivas despesas. Ocorrendo a resolução do contrato, com base na condição estipulada nesta subdivisão, o Contratado não terá direito a qualquer espécie de indenização.*

OU

[segunda alternativa de redação para as subdivisões da cláusula segunda]

2.2. *O prazo de vigência da contratação é de XX (XXX) ....., contados do(a) ....., prorrogável por até 10 (dez) anos, a critério do Contratante, na forma dos artigos 106 e 107 da Lei n° 14.133, de 2021.*

2.2.1. *O Contratado poderá se opor à prorrogação de que trata a subdivisão acima, desde que o faça mediante documento escrito, recepcionado pelo Contratante em até 90 (noventa) dias antes do vencimento do contrato ou de cada uma das prorrogações do prazo de vigência.*

2.2.2. *Dentre outras exigências, a prorrogação de que trata a subdivisão acima é condicionada ao ateste, pela autoridade competente, de que as condições e os preços permanecem vantajosos para a Administração e em harmonia com os preços do mercado, conforme pesquisa a ser realizada à época do aditamento pretendido, permitida a negociação com o Contratado.*

2.2.3. *O Contratado não tem direito subjetivo à prorrogação contratual, e não poderá pleitear qualquer espécie de indenização em razão da não prorrogação do prazo de vigência contratual por conveniência do Contratante.*

2.2.4. *Eventuais prorrogações de contrato serão formalizadas mediante celebração de termo aditivo, respeitadas as condições prescritas na Lei nº 14.133, de 2021.*

2.2.5. *O contrato não poderá ser prorrogado quando o Contratado tiver sido penalizado com as sanções de declaração de inidoneidade ou impedimento de licitar e contratar com poder público, observadas as abrangências de aplicação.*

2.2.6. *Não obstante o prazo estipulado nesta cláusula, a vigência nos exercícios subsequentes ao da celebração do contrato estará sujeita a condições resolutivas consubstanciadas:*

I - na inexistência de recursos aprovados nas respectivas Leis Orçamentárias de cada exercício para atender as respectivas despesas, acarretando a extinção do contrato a partir de sua ocorrência; ou

II - na ausência de vantagem para o Contratante na manutenção do contrato, desde que o Contratante comunique ao Contratado a opção pela extinção do contrato com ao menos 2 (dois) meses de antecedência em relação à próxima data de aniversário do contrato, acarretando a extinção do contrato a partir da referida data de aniversário contratual.

2.2.7. *Ocorrendo a resolução do contrato, com base em uma das condições resolutivas estipuladas na subdivisão acima desta cláusula, o Contratado não terá direito a qualquer espécie de indenização.*

CLÁUSULA TERCEIRA – MODELOS DE EXECUÇÃO E GESTÃO CONTRATUAIS (art. 92, IV, VII e XVIII)

3.1. A forma de fornecimento, os modelos de gestão e de execução, assim como os prazos e condições de início, conclusão, entrega, observação e recebimento do objeto, e critérios de medição, constam no Termo de Referência, que constitui parte integrante deste Contrato.

CLÁUSULA QUARTA – SUBCONTRATAÇÃO

4.1. *Não será admitida a subcontratação, cessão ou transferência, total ou parcial, do objeto contratual.*

OU

[segunda alternativa de redação para subdivisão(ões) da cláusula quarta]

4.2. *Não é admitida a cessão ou transferência, total ou parcial, do objeto contratual, mas é permitida a subcontratação parcial do objeto, até o limite de .....% (..... por cento) do valor total do contrato, observadas as seguintes condições:*

4.2.1. *É vedada a subcontratação completa ou da parcela principal do objeto, abaixo discriminada:*

4.2.1.1. ...

4.2.1.2. ...

4.2.2. *Poderá(ão) ser subcontratada(s) a(s) seguinte(s) parcela(s) do objeto:*

4.2.2.1. ....

4.2.2.2. ....

4.2.3. *Em qualquer hipótese de subcontratação, permanece a responsabilidade integral do Contratado pela perfeita execução contratual, cabendo-lhe realizar a supervisão e coordenação das atividades do subcontratado, bem como responder direta e solidariamente perante o Contratante pelo rigoroso cumprimento das obrigações contratuais correspondentes ao objeto da subcontratação.*

4.2.4. *A subcontratação será formalizada de acordo com o seguinte procedimento:*

4.2.4.1. Submissão, pelo Contratado, de pedido por escrito e fundamentado de subcontratação parcial, contendo descrição da parcela do objeto que se pretende subcontratar, acompanhado de planilha detalhada demonstrando a quantidade e o valor da parcela a ser subcontratada;

4.2.4.2. Autorização prévia do Contratante, por escrito, para a subcontratação parcial, desde que seja verificado o cumprimento dos requisitos necessários para a subcontratação;

4.2.4.3. Apresentação pelo Contratado dos documentos do subcontratado de regularidade jurídica, fiscal, social e trabalhista exigidos na habilitação do certame, bem como de documentação que comprove a capacidade técnica do subcontratado, nos termos do art. 122, § 1º, da Lei nº 14.133, de 2021;

4.2.4.4. Análise e autorização da subcontratação parcial pelo Contratante, por escrito, desde que verificado o preenchimento dos requisitos após exame da documentação do subcontratado apresentada pelo Contratado. O Contratado poderá substituir o subcontratado cuja regularidade e capacidade técnica não sejam demonstradas conforme a documentação exigida na subdivisão anterior, mantido o mesmo objeto, no prazo que lhe for assinalado pelo Contratante;

4.2.4.5. Apresentação pelo Contratado de cópia do Termo de Subcontratação ou ajuste equivalente celebrado entre o Contratado e o subcontratado, o qual será juntado aos autos do processo administrativo;

4.2.4.6. *Este procedimento é aplicável às hipóteses de substituição do subcontratado.*

4.2.5. *Os pagamentos serão realizados exclusivamente ao Contratado.*

4.2.6. *É vedada a subcontratação de pessoa física ou jurídica, se aquela ou os dirigentes desta mantiverem vínculo de natureza técnica, comercial, econômica, financeira, trabalhista ou civil com dirigente do órgão ou entidade contratante ou com agente público que desempenhe função na licitação ou atue na fiscalização ou na gestão do contrato, ou se deles forem cônjuge, companheiro ou parente em linha reta, colateral, ou por afinidade, até o terceiro grau*.

CLÁUSULA QUINTA – PREÇO (art. 92, V)

5.1. *O valor mensal da contratação é de R$ ..... (.....), perfazendo o valor total de R$ ..... (....).*

OU
[segunda alternativa de redação para o item 5.1 (conforme item 5.2)]

5.2. *O valor total da contratação é de R$..... (.....)*

5.3. No valor acima estão incluídos, além do lucro, todas as despesas diretas e indiretas decorrentes da execução do objeto, inclusive tributos e/ou impostos, encargos sociais, trabalhistas, previdenciários, fiscais e comerciais incidentes, taxa de administração, frete, seguro e outros necessários ao cumprimento integral do objeto da contratação.

5.4. *O valor indicado nesta cláusula é meramente estimativo, de forma que os pagamentos devidos ao Contratado dependerão dos quantitativos efetivamente demandados, medidos e fornecidos.*

5.5. *Caso o Contratado seja optante pelo Simples Nacional e, por causa superveniente à contratação, perca as condições de enquadramento como microempresa ou empresa de pequeno porte ou, ainda, torne-se impedido de beneficiar-se desse regime tributário diferenciado por incorrer em alguma das vedações previstas na Lei Complementar nº 123, de 2006, não poderá deixar de cumprir as obrigações avençadas perante a Administração, tampouco requerer o reequilíbrio econômico-financeiro, com base na alegação de que a sua proposta levou em consideração as vantagens daquele regime tributário diferenciado.*

CLÁUSULA SEXTA - PAGAMENTO (art. 92, V e VI)

6.1. O prazo para pagamento ao Contratado e demais condições a ele referentes encontram-se definidos no Termo de Referência, que constitui parte integrante deste Contrato.

CLÁUSULA SÉTIMA - REAJUSTE (art. 92, V)

7.1. Os preços inicialmente ajustados são fixos e irreajustáveis pelo prazo de 1 (um) ano contado da data do orçamento estimado, que corresponde a __/__/__ *(DD/MM/AAAA)*.

7.2. É previsto reajuste anual dos preços inicialmente ajustados, de modo que, caso o prazo de execução do objeto contratual ultrapasse a data em que se configure 1 (um) ano a contar da data do orçamento estimado, e independentemente de pedido do Contratado, os preços iniciais serão reajustados, mediante a aplicação, pelo Contratante, do índice _____ *(indicar o índice a ser adotado)*, exclusivamente para as obrigações iniciadas e concluídas após a ocorrência da anualidade.

7.3. No caso de reajuste(s) subsequente(s) ao primeiro, o interregno mínimo de 1 (um) ano será contado a partir dos efeitos financeiros do último reajuste.

7.4. No caso de atraso ou não divulgação do(s) índice(s) de reajustamento, o Contratante pagará ao Contratado a importância calculada pela última variação conhecida, liquidando a diferença correspondente tão logo seja(m) divulgado(s) o(s) índice(s) definitivo(s).

7.5. Nas aferições finais, o(s) índice(s) utilizado(s) para reajuste será(ão), obrigatoriamente, o(s) definitivo(s).

7.6. Caso o(s) índice(s) estabelecido(s) para reajustamento venha(m) a ser extinto(s) ou de qualquer forma não possa(m) mais ser utilizado(s), será(ão) adotado(s), em substituição, o(s) que vier(em) a ser determinado(s) pela legislação então em vigor.

7.7. Na ausência de previsão legal quanto ao índice substituto, as partes elegerão novo índice oficial, para reajustamento do preço do valor remanescente, por meio de termo aditivo.

7.8. O reajuste será realizado por apostilamento.

CLÁUSULA OITAVA - OBRIGAÇÕES DO CONTRATANTE (art. 92, X, XI e XIV)

8.1. São obrigações do Contratante:

8.1.1. Exigir o cumprimento de todas as obrigações assumidas pelo Contratado, de acordo com o contrato e a documentação que o integra;

8.1.2. Receber o objeto no prazo e condições estabelecidas no Termo de Referência;

8.1.3. Notificar o Contratado, por escrito, sobre vícios, defeitos ou incorreções verificadas no objeto fornecido, para que seja por ele substituído, reparado ou corrigido, no total ou em parte, a expensas do Contratado;

8.1.4. Acompanhar e fiscalizar a execução do contrato e o cumprimento das obrigações pelo Contratado;

8.1.5. Efetuar o pagamento ao Contratado do valor correspondente ao fornecimento do objeto, no prazo, forma e condições estabelecidos no presente Contrato e no Termo de Referência;

8.1.6. Aplicar ao Contratado as sanções previstas na lei e neste Contrato;

8.1.7. Cientificar o órgão de representação judicial da Procuradoria Geral do Estado para adoção das medidas cabíveis quando necessária medida judicial diante do descumprimento de obrigações pelo Contratado;

8.1.8. Explicitamente emitir decisão sobre todas as solicitações e reclamações relacionadas à execução do presente Contrato, ressalvados os requerimentos manifestamente impertinentes, meramente protelatórios ou de nenhum interesse para a boa execução do ajuste, observado o prazo de *XX (XXX)* para decisão, a contar da conclusão da instrução do requerimento, admitida a prorrogação motivada, por igual período, e excepcionada a hipótese de disposição legal ou cláusula contratual que estabeleça prazo específico;

8.1.9. Responder eventuais pedidos de reestabelecimento do equilíbrio econômico-financeiro feitos pelo Contratado no prazo máximo de *XX (XXX)* , contado a partir da conclusão da instrução do requerimento, sendo admitida a prorrogação motivada desse prazo por igual período, e observado o disposto no parágrafo único do artigo 131 da Lei nº 14.133, de 2021;

8.1.10. *Notificar os emitentes das garantias quanto ao início de processo administrativo para apuração de descumprimento de cláusulas contratuais;*

8.1.11. Observar, no tratamento de dados pessoais de profissionais, empregados, prepostos, administradores e/ou sócios do Contratado, a que tenha acesso durante a execução do objeto a que se

refere a cláusula primeira deste contrato, as normas legais e regulamentares aplicáveis, em especial, a Lei nº 13.709, de 14 de agosto de 2018, com suas alterações subsequentes.

8.2. O prazo para resposta ao pedido de restabelecimento do equilíbrio econômico-financeiro não se iniciará enquanto o Contratado não cumprir os atos ou apresentar a documentação solicitada pelo Contratante para adequada instrução do requerimento.

8.3. A Administração não responderá por quaisquer compromissos assumidos pelo Contratado com terceiros, ainda que vinculados à execução do contrato, bem como por qualquer dano causado a terceiros em decorrência de ato do Contratado, de seus profissionais, prepostos ou subordinados.

CLÁUSULA NONA - OBRIGAÇÕES DO CONTRATADO (art. 92, XIV, XVI e XVII)

9.1. O Contratado deve cumprir todas as obrigações estabelecidas em lei, e aquelas constantes deste Contrato e da documentação que o integra, assumindo como exclusivamente seus os riscos e as despesas decorrentes da boa e perfeita execução do objeto, observando, ainda, as obrigações a seguir dispostas:

9.1.1. *Entregar o objeto acompanhado do manual do usuário, com uma versão em português, e da relação da rede de assistência técnica autorizada;*

9.1.2. Designar o responsável pelo acompanhamento da execução das atividades e pelos contatos com o Contratante;

9.1.3. Responsabilizar-se pelos vícios e danos decorrentes do objeto, de acordo com o Código de Defesa do Consumidor (Lei nº 8.078, de 1990);

9.1.4. Comunicar ao Contratante, assim que possível e com a devida antecedência em relação à data da entrega, os motivos que impossibilitem o cumprimento do prazo previsto, com a devida comprovação, caso ocorrida tal circunstância;

9.1.5. Atender às determinações regulares emitidas pelo fiscal ou gestor do contrato ou autoridade superior (art. 137, II, da Lei nº 14.133, de 2021) e prestar todo esclarecimento ou informação por eles solicitados;

9.1.6. Reparar, corrigir, remover, reconstruir ou substituir, às suas expensas, no total ou em parte, no prazo fixado pelo fiscal do contrato, os bens nos quais se verificarem vícios, defeitos ou incorreções resultantes da execução ou dos materiais empregados;

9.1.7. Responsabilizar-se pelos vícios e danos decorrentes da execução do objeto, bem como por todo e qualquer dano causado diretamente à Administração ou a terceiros em razão da execução do contrato, não excluindo nem reduzindo essa responsabilidade a fiscalização ou o acompanhamento da execução contratual pelo Contratante, que ficará autorizado a descontar dos pagamentos devidos ou da garantia, caso exigida na documentação que integra este instrumento, o valor correspondente aos danos sofridos;

9.1.8. Quando não for possível a verificação da regularidade no Sistema de Cadastramento Unificado de Fornecedores – Sicaf ou em outros meios eletrônicos hábeis de informações, o Contratado deverá atender a notificação para entregar ao setor responsável pela fiscalização do contrato, no prazo de 5 (cinco) dias úteis, os seguintes documentos: 1) certidão conjunta relativa aos tributos federais e à Dívida Ativa da União; 2) certidões que comprovem regularidade fiscal perante as Fazendas Estadual/Distrital e/ou Municipal/Distrital do domicílio ou sede do Contratado que tenham sido exigidas para fins de habilitação na documentação que integra este instrumento; 3) Certidão de Regularidade do FGTS – CRF; e 4) Certidão Negativa, ou positiva com efeitos de negativa, de Débitos Trabalhistas;

9.1.9. Responsabilizar-se pelo cumprimento de todas as obrigações e encargos trabalhistas, previdenciários, fiscais, comerciais e os demais previstos em legislação específica, cuja inadimplência não transfere a responsabilidade ao Contratante e não poderá onerar o objeto do contrato, nos termos do artigo 121 da Lei nº 14.133, de 2021;

9.1.10. Comunicar ao Fiscal do contrato, assim que possível, qualquer ocorrência anormal ou acidente que se verifique no local da execução do objeto contratual;

9.1.11. Paralisar, por determinação do Contratante, qualquer atividade que não esteja sendo executada de acordo com a boa técnica ou que ponha em risco a segurança de pessoas ou bens de terceiros;

9.1.12. Manter, durante toda a execução do contrato, em compatibilidade com as obrigações assumidas, todas as condições de habilitação e qualificação exigidas na licitação;

9.1.13. Cumprir, durante todo o período de execução do contrato, a reserva de cargos prevista em lei para pessoa com deficiência, para reabilitado da Previdência Social ou para aprendiz, bem como as reservas de cargos previstas em outras normas específicas (art. 116, da Lei n.º 14.133, de 2021);

9.1.14. Comprovar o cumprimento da reserva de cargos a que se refere a subdivisão acima, no prazo fixado pelo fiscal do contrato, com a indicação dos empregados que preencheram as referidas vagas (art. 116, parágrafo único, da Lei n.º 14.133, de 2021);

9.1.15. Guardar sigilo sobre todas as informações obtidas em decorrência do cumprimento do contrato, respondendo, administrativa, civil e criminalmente por sua indevida divulgação e incorreta ou inadequada utilização;

9.1.16. Arcar com o ônus decorrente de eventual equívoco no dimensionamento de sua proposta, inclusive quanto aos custos variáveis decorrentes de fatores futuros, mas que sejam previsíveis em seu ramo de atividade;

9.1.17. Cumprir as disposições legais e regulamentares federais, estaduais e municipais que interfiram na execução do objeto, bem como as normas de segurança do Contratante;

9.1.18. *Alocar os profissionais necessários, com habilitação e conhecimento adequados, ao perfeito cumprimento das cláusulas deste contrato, empregando os materiais, equipamentos, ferramentas e utensílios demandados, cuja quantidade, qualidade e tecnologia deverão atender às recomendações de boa técnica e à legislação de regência;*

9.1.19. *Orientar e treinar seus profissionais sobre os deveres previstos na Lei nº 13.709, de 14 de agosto de 2018, adotando medidas eficazes para proteção de dados pessoais a que tenha acesso por força da execução deste contrato;*

9.1.20. *Conduzir os trabalhos com estrita observância às normas da legislação pertinente, cumprindo as determinações dos Poderes Públicos, mantendo sempre limpo o local de execução do objeto e nas melhores condições de segurança, higiene e disciplina;*

9.1.21. *Submeter previamente, por escrito, ao Contratante, para análise e aprovação, quaisquer mudanças nos métodos executivos que fujam às especificações do Termo de Referência, observando-se o disposto no Capítulo VII do Título III da Lei nº 14.133, de 2021;*

9.1.22. *Não permitir a utilização de qualquer trabalho do menor de 16 (dezesseis) anos, exceto na condição de aprendiz para os maiores de 14 (quatorze) anos, nem permitir a utilização do trabalho do menor de 18 (dezoito) anos em trabalho noturno, perigoso ou insalubre.*

9.2. Em atendimento à Lei nº 12.846, de 2013, e ao Decreto estadual nº 67.301, de 2022, o Contratado se compromete a conduzir os seus negócios de forma a coibir fraudes, corrupção e quaisquer outros atos lesivos à Administração Pública, nacional ou estrangeira, de modo que o Contratado não poderá oferecer, dar ou se comprometer a dar a quem quer que seja, tampouco aceitar ou se comprometer a aceitar de quem quer que seja, por conta própria ou por intermédio de outrem, qualquer pagamento, doação, compensação, vantagens financeiras ou benefícios de qualquer espécie relacionados de forma direta ou indireta ao objeto deste contrato, o que deve ser observado, ainda, pelos seus prepostos, colaboradores e eventuais subcontratados, caso permitida a subcontratação.

9.2.1. O descumprimento das obrigações previstas na subdivisão acima poderá submeter o Contratado à extinção unilateral do contrato, a critério do Contratante, sem prejuízo da aplicação das sanções penais e administrativas cabíveis e, também, da instauração do processo administrativo de responsabilização de que tratam a Lei nº 12.846, de 2013, e o Decreto estadual nº 67.301, de 2022.

9.3. O Contratado obriga-se a não admitir a participação, na execução deste contrato, de:

9.3.1. agente público de órgão ou entidade licitante ou contratante, ou terceiro que auxilie a condução da contratação na qualidade de integrante de equipe de apoio, profissional especializado ou funcionário ou representante de empresa que preste assessoria técnica, nos termos dos §§ 1º e 2º do artigo 9º da Lei nº 14.133, de 2021;

9.3.2. pessoa que mantenha vínculo de natureza técnica, comercial, econômica, financeira, trabalhista ou civil com dirigente do órgão ou entidade contratante ou com agente público que tenha desempenhado função na licitação ou atue na fiscalização ou na gestão do contrato, ou que deles seja cônjuge, companheiro ou parente em linha reta, colateral ou por afinidade, até o terceiro grau, nos termos do inciso IV do artigo 14 e/ou parágrafo único do artigo 48 da Lei nº 14.133, de 2021;

9.3.3. pessoas que se enquadrem nas demais vedações previstas no artigo 14 da Lei nº 14.133, de 2021.

9.4. O Contratado deverá observar a vedação constante do Decreto estadual nº 68.829, de 4 de setembro de 2024.

CLÁUSULA DÉCIMA– GARANTIA DE EXECUÇÃO (art. 92, XII)

10.1. *Não haverá exigência de garantia contratual da execução.*

OU

[segunda alternativa de redação para esta cláusula contendo diversas subdivisões, com 2 opções de redação para a primeira subdivisão]

10.2. *A contratação conta com garantia de execução prestada pelo Contratado, nos moldes do art. 96 da Lei nº 14.133, de 2021, na modalidade XXXXXX, no valor de R$_____, correspondente a X% (XXXX por cento) do valor inicial do contrato, observando-se para a definição e aplicação desse percentual, quando o caso, o disposto no parágrafo único do artigo 98 do referido diploma legal.*

OU

[segunda opção de redação para a primeira subdivisão da segunda alternativa de redação, em caso de o Contratado ficar depositário de bem(ns)]

10.3. *A contratação conta com garantia de execução prestada pelo Contratado, nos moldes do art. 96, combinado com art. 101, ambos da Lei nº 14.133, de 2021, na modalidade XXXXXX, no valor de R$_____, correspondente a X% (XXXX por cento) do valor inicial do contrato, observando-se para a definição e aplicação desse percentual, quando o caso, o disposto no parágrafo único do artigo 98 do referido diploma legal, acrescido do valor dos bens abaixo arrolados, dos quais o Contratado será depositário:*

10.3.1. *BEM 1:....., de Valor:*

10.3.2. *BEM 2:....., de Valor:*

10.3.3. *...*

10.3.4. *Valor total dos bens acima indicados:*

10.4. *A validade da garantia, qualquer que seja a modalidade escolhida, deverá abranger o período de vigência contratual.*

10.5. *Caso seja feita opção pela modalidade de seguro-garantia:*

10.5.1. *A apólice deverá ter validade durante a vigência do contrato, permanecendo em vigor mesmo que o Contratado não pague o prêmio nas datas convencionadas;*

10.5.2. *O prazo de vigência da apólice do seguro-garantia deverá acompanhar as modificações referentes à vigência do contrato principal mediante a emissão do respectivo endosso pela seguradora, observando-se, quando for o caso, o disposto no § 2º do artigo 96 e no parágrafo único do artigo 97 da Lei nº 14.133, de 2021;*

10.5.3. *Será permitida a substituição da apólice de seguro-garantia na data de renovação ou de aniversário, desde que mantidas as condições e coberturas da apólice vigente e desde que nenhum período fique descoberto, nas condições estabelecidas pelo parágrafo único do artigo 97, c/c o § 2º do artigo 96 da Lei nº 14.133, de 2021.*

10.6. *Na hipótese de suspensão do contrato por ordem ou inadimplemento da Administração, o Contratado ficará desobrigado de renovar a garantia ou de endossar a apólice de seguro até a ordem de reinício da execução ou o adimplemento pela Administração.*

10.7. *A garantia assegurará, qualquer que seja a modalidade escolhida, o pagamento de:*

10.7.1. *Prejuízos advindos do inadimplemento total ou parcial do objeto do contrato;*

10.7.2. *Multas moratórias e compensatórias aplicadas pelo Contratante ao Contratado; e*

10.7.3. *Obrigações trabalhistas, previdenciárias e para com o FGTS relacionadas à contratação, não adimplidas pelo Contratado, quando couber.*

10.8. *Não serão aceitas garantias que incluam outras isenções de responsabilidade que não as seguintes:*

10.8.1. *Caso fortuito ou força maior;*

10.8.2. *Descumprimento das obrigações pelo Contratado decorrentes de atos ou fatos imputáveis exclusivamente ao Contratante;*

10.8.3. *Hipóteses de isenção de responsabilidade decorrentes de exigência legal ou regulamentar.*

10.9. *No caso de alteração do valor do contrato, ou prorrogação de sua vigência, a garantia deverá ser ajustada ou renovada seguindo os mesmos parâmetros.*

10.10. *Se o valor da garantia for utilizado total ou parcialmente para o pagamento de qualquer obrigação, o Contratado deverá efetuar a respectiva reposição no prazo máximo de XX (XXX) dias úteis, contados da data em que for notificado pelo Contratante para fazê-lo.*

10.11. *O Contratante executará a garantia na forma prevista na legislação que rege a matéria.*

10.11.1. *O emitente da garantia ofertada pelo Contratado deverá ser notificado pelo Contratante quanto ao início de processo administrativo para apuração de descumprimento de cláusulas contratuais (art. 137, § 4º, da Lei n.º 14.133, de 2021).*

10.11.2. *Caso se trate da modalidade seguro-garantia, ocorrido o sinistro durante a vigência da apólice, sua caracterização e comunicação poderão ocorrer fora desta vigência, não caracterizando fato que justifique a negativa do sinistro, desde que respeitados os prazos prescricionais aplicados ao contrato de seguro, nos termos do art. 20 da Circular Susep n° 662, de 11 de abril de 2022.*

10.12. *A garantia deve assegurar a cobertura de todos os eventos ocorridos durante a sua validade, ainda que a notificação quanto ao início de processo administrativo para apuração de descumprimento de cláusulas contratuais (§ 4º do artigo 137 da Lei nº 14.133, de 2021) ou a comunicação do sinistro pelo Contratante ocorra após expirada a vigência da contratação ou a validade da garantia.*

10.13. *Extinguir-se-á a garantia com a restituição da apólice, carta-fiança ou autorização para a liberação de importâncias depositadas em dinheiro a título de garantia, acompanhada de declaração do Contratante, mediante termo circunstanciado, de que o Contratado cumpriu todas as cláusulas do contrato.*

10.14. *A garantia somente será liberada ou restituída após a fiel execução do contrato ou após a sua extinção por culpa exclusiva da Administração e, quando em dinheiro, será atualizada monetariamente.*

10.15. *O garantidor não é parte para figurar em processo administrativo instaurado pelo Contratante com o objetivo de apurar prejuízos e/ou aplicar sanções ao Contratado.*

10.16. *O Contratado autoriza o Contratante a reter, a qualquer tempo, a garantia, na forma prevista neste Contrato.*

10.17. *[Além da garantia de que tratam os arts. 96 e seguintes da Lei nº 14.133, de 2021, a presente contratação possui previsão de garantia contratual do bem a ser fornecido, incluindo manutenção e assistência técnica, conforme condições estabelecidas no Termo de Referência.]* ***OU*** *[A garantia de execução é independente de eventual garantia do produto prevista especificamente no Termo de Referência.]*

CLÁUSULA DÉCIMA PRIMEIRA – INFRAÇÕES E SANÇÕES ADMINISTRATIVAS (art. 92, XIV)

11.1. Comete infração administrativa, nos termos da Lei nº 14.133, de 2021, o Contratado que:

a) der causa à inexecução parcial do contrato;

b) der causa à inexecução parcial do contrato que cause grave dano à Administração ou ao funcionamento dos serviços públicos ou ao interesse coletivo;

c) der causa à inexecução total do contrato;

d) ensejar o retardamento da execução ou da entrega do objeto da contratação sem motivo justificado;

e) apresentar documentação falsa ou prestar declaração falsa durante a execução do contrato;

f) praticar ato fraudulento na execução do contrato;

g) comportar-se de modo inidôneo ou cometer fraude de qualquer natureza;

h) praticar ato lesivo previsto no art. 5º da Lei nº 12.846, de 1º de agosto de 2013.

11.2. Garantida a prévia defesa, serão aplicadas ao Contratado que incorrer nas infrações acima descritas as seguintes sanções:

i. **Advertência**, se o Contratado der causa à inexecução parcial do contrato, quando não se justificar a imposição de penalidade mais grave (art. 156, § 2º, da Lei nº 14.133, de 2021);

ii. **Impedimento de licitar e contratar**, se praticadas as condutas descritas nas alíneas “b”, “c” e “d” da subdivisão anterior desta cláusula, quando não se justificar a imposição de penalidade mais grave (art. 156, § 4º, da Lei nº 14.133, de 2021);

iii. **Declaração de inidoneidade para licitar ou contratar**, quando praticadas as condutas descritas nas alíneas “e”, “f”, “g” e “h” da subdivisão anterior desta cláusula, bem como nas alíneas “b”, “c” e “d” da referida subdivisão, que justifiquem a imposição de penalidade mais grave (art. 156, § 5º, da Lei nº 14.133, de 2021);

iv. **Multa:**

Calculada em conformidade com a documentação que integra este instrumento.

OU
[segunda alternativa de redação para subdivisões do inciso "iv"]

1. Moratória de .....% (..... por cento) por dia de atraso injustificado sobre o valor da parcela inadimplida, até o limite de XX (XXX) dias;
2. Moratória de .....% (..... por cento) por dia de atraso injustificado sobre o valor total do contrato, até o máximo de .....% (.... por cento), pela inobservância do prazo fixado para suplementação ou reposição da garantia;

i. O atraso superior a XX (XXX) dias autoriza a Administração a promover a extinção do contrato por descumprimento ou cumprimento irregular de suas cláusulas, conforme dispõe o inciso I do caput do art. 137 da Lei nº 14.133, de 2021;

3. Compensatória, para as infrações descritas nas alíneas "e" a "h" do item 11.1, de ....% a ...% do valor do Contrato;

4. Compensatória, para a inexecução total do contrato prevista na alínea "c" do item 11.1, de ....% a ...% do valor do Contrato;

5. Para infração descrita na alínea "b" do item 11.1, a multa será de ....% a ...% do valor do Contrato;

6. Para infrações descritas na alínea "d" do item 11.1, a multa será de ....% a ...% do valor do Contrato;

7. Para a infração descrita na alínea "a" do item 11.1, a multa será de ....% a ...% do valor do Contrato, ressalvadas as seguintes infrações:

[INDICAR DISPOSIÇÕES ESPECÍFICAS SOBRE INEXECUÇÃO PARCIAL QUE JUSTIFIQUEM PENA DIVERSA]

11.3. A aplicação das sanções previstas neste Contrato não exclui, em hipótese alguma, a obrigação de reparação integral do dano causado ao Contratante (art. 156, § 9º, da Lei nº 14.133, de 2021).

11.4. A multa poderá ser aplicada cumulativamente com as demais as sanções previstas neste Contrato (art. 156, § 7º, da Lei nº 14.133, de 2021).

11.4.1. Antes da aplicação da multa será facultada a defesa do interessado no prazo de 15 (quinze) dias úteis, contado da data de sua intimação (art. 157, da Lei nº 14.133, de 2021).

11.4.2. Se a multa aplicada e as indenizações cabíveis forem superiores ao valor do pagamento eventualmente devido pelo Contratante ao Contratado, além da perda desse valor, a diferença será descontada da garantia prestada, caso exigida na documentação que integra este instrumento, ou, quando for o caso, será cobrada judicialmente (art. 156, § 8º, da Lei nº 14.133, de 2021).

11.5. A aplicação das sanções realizar-se-á em processo administrativo que assegure o contraditório e a ampla defesa ao Contratado, observando-se o procedimento previsto no *caput* e parágrafos do art. 158 da Lei nº 14.133, de 2021, para as penalidades de impedimento de licitar e contratar e de declaração de inidoneidade para licitar ou contratar.

11.6. Na aplicação das sanções serão considerados (art. 156, § 1º, da Lei nº 14.133, de 2021):

a) a natureza e a gravidade da infração cometida;

b) as peculiaridades do caso concreto;

c) as circunstâncias agravantes ou atenuantes;

d) os danos que dela provierem para o Contratante;

e) a implantação ou o aperfeiçoamento de programa de integridade, conforme normas e orientações dos órgãos de controle.

11.7. As sanções são autônomas e a aplicação de uma não exclui a de outra.

11.8. Os atos previstos como infrações administrativas na Lei nº 14.133, de 2021, ou em outras leis de licitações e contratos da Administração Pública que também sejam tipificados como atos lesivos na Lei nº 12.846, de 2013, serão apurados e julgados conjuntamente, nos mesmos autos, observados o rito procedimental e autoridade competente definidos na referida Lei (art. 159 da Lei nº 14.133, de 2021).

11.9. A personalidade jurídica do Contratado poderá ser desconsiderada sempre que utilizada com abuso do direito para facilitar, encobrir ou dissimular a prática dos atos ilícitos previstos na Lei nº 14.133, de 2021, ou para provocar confusão patrimonial, e, nesse caso, todos os efeitos das sanções aplicadas à pessoa jurídica serão estendidos aos seus administradores e sócios com poderes de administração, a pessoa jurídica

sucessora ou a empresa do mesmo ramo com relação de coligação ou controle, de fato ou de direito, com o sancionado, observados, em todos os casos, o contraditório, a ampla defesa e a obrigatoriedade de análise jurídica prévia (art. 160 da Lei nº 14.133, de 2021).

11.10. O Contratante deverá, no prazo máximo de 15 (quinze) dias úteis, contado da data de aplicação da sanção, informar e manter atualizados os dados relativos às sanções por ele aplicadas, para fins de publicidade no Cadastro Nacional de Empresas Inidôneas e Suspensas (Ceis) e no Cadastro Nacional de Empresas Punidas (Cnep), instituídos no âmbito do Poder Executivo Federal (Art. 161 da Lei nº 14.133, de 2021).

11.11. As sanções de impedimento de licitar e contratar e declaração de inidoneidade para licitar ou contratar são passíveis de reabilitação na forma do art. 163 da Lei nº 14.133, de 2021.

CLÁUSULA DÉCIMA SEGUNDA– DA EXTINÇÃO CONTRATUAL (art. 92, XIX)

12.1. O contrato poderá ser extinto na forma, pelos motivos e com as consequências previstos nos artigos 137 a 139 e 155 a 163 da Lei nº 14.133, de 2021.

12.1.1. O Contratado reconhece desde já os direitos do Contratante nos casos de extinção por ato unilateral da Administração, prevista no artigo 138 da Lei nº 14.133, de 2021.

12.1.2. O contrato poderá ser extinto por algum dos motivos previstos no artigo 137 da Lei nº 14.133, de 2021, devendo a extinção ser formalmente motivada nos autos do processo, assegurados o contraditório e a ampla defesa.

12.1.3. A alteração social ou modificação da finalidade ou da estrutura da empresa não ensejará a extinção contratual se não restringir sua capacidade de concluir o contrato.

12.1.3.1. Se a operação societária de que trata a subdivisão acima implicar mudança em pessoa jurídica contratada, deverá ser formalizada alteração subjetiva por termo aditivo.

12.2. O termo de extinção, sempre que possível, será precedido da indicação de:

12.2.1. Balanço dos eventos contratuais já cumpridos ou parcialmente cumpridos;

12.2.2. Relação dos pagamentos já efetuados e ainda devidos;

12.2.3. Indenizações e multas.

12.3. A extinção do contrato não configura óbice para o reconhecimento de eventual desequilíbrio econômico-financeiro, hipótese em que será concedida indenização por meio de termo indenizatório (art. 131, *caput,* da Lei n.º 14.133, de 2021).

12.4. Se for constatada irregularidade no procedimento licitatório ou na execução contratual, caso não seja possível o saneamento, a decisão pelo Contratante sobre a suspensão da execução ou sobre a declaração de nulidade do contrato somente será adotada na hipótese em que se revelar medida de interesse público, observado o disposto nos artigos 147 a 149 da Lei nº 14.133, de 2021, conferindo-se ao Contratado oportunidade para prévia manifestação e participação na instrução.

CLÁUSULA DÉCIMA TERCEIRA – DOTAÇÃO ORÇAMENTÁRIA (art. 92, VIII)

13.1. No presente exercício, as despesas decorrentes desta contratação correrão à conta de recursos específicos consignados no respectivo Orçamento do Estado, na dotação abaixo discriminada:

I. Gestão/Unidade:

II. Fonte de Recursos:

III. Programa de Trabalho:

IV. Elemento de Despesa:

V. Plano Interno:

VI. Nota de Empenho:

13.2. *Quando a execução do contrato ultrapassar o presente exercício, a dotação relativa ao(s) exercício(s) financeiro(s) subsequente(s) será indicada após aprovação da Lei Orçamentária respectiva e liberação dos créditos correspondentes, mediante apostilamento.*

CLÁUSULA DÉCIMA QUARTA – DOS CASOS OMISSOS (art. 92, III)

14.1. Aplicam-se aos casos omissos as disposições contidas na Lei nº 14.133, de 2021, e disposições regulamentares pertinentes, e, subsidiariamente, as disposições contidas na Lei nº 8.078, de 1990 – Código de Defesa do Consumidor – e princípios gerais dos contratos.

CLÁUSULA DÉCIMA QUINTA – ALTERAÇÕES

15.1. Eventuais alterações contratuais reger-se-ão pela disciplina dos arts. 124 e seguintes da Lei nº 14.133, de 2021.

15.2. O Contratado é obrigado a aceitar, nas mesmas condições contratuais, os acréscimos ou supressões que se fizerem necessários no objeto, a critério exclusivo do Contratante, até o limite de 25% (vinte e cinco por cento) do valor inicial atualizado do contrato.

15.3. Eventuais alterações contratuais deverão ser promovidas mediante celebração de termo aditivo, respeitadas as disposições da Lei nº 14.133, de 2021, admitindo-se que, nos casos de justificada necessidade de antecipação de seus efeitos, a formalização do aditivo ocorra no prazo máximo de 1 (um) mês (art. 132 da Lei nº 14.133, de 2021).

15.4. Caso haja alteração unilateral do contrato que aumente ou diminua os encargos do Contratado, o equilíbrio econômico-financeiro inicial será restabelecido no mesmo termo aditivo.

15.5. Registros que não caracterizam alteração do contrato podem ser realizados por simples apostila, dispensada a celebração de termo aditivo, na forma do art. 136 da Lei nº 14.133, de 2021.

CLÁUSULA DÉCIMA SEXTA – PUBLICAÇÃO

16.1. Incumbirá ao Contratante divulgar o presente instrumento no Portal Nacional de Contratações Públicas (PNCP), na forma prevista no art. 94 da Lei 14.133, de 2021, bem como no respectivo sítio oficial na Internet, em atenção ao art. 91, *caput,* da Lei nº 14.133, de 2021, e ao art. 8º, § 2º, da Lei nº 12.527, de 2011, c/c art. 22 do Decreto estadual nº 68.155, de 2023.

CLÁUSULA DÉCIMA SÉTIMA– FORO (art. 92, §1º)

17.1. Fica eleito o Foro da Comarca da Capital do Estado de São Paulo para dirimir quaisquer questões que decorrerem deste Termo de Contrato, que não puderem ser resolvidas na esfera administrativa, conforme art. 92, § 1º, da Lei nº 14.133, de 2021.

E assim, por estarem as partes justas e contratadas, foi lavrado o presente instrumento em *01 (uma) via*, que, lido e achado conforme pelo Contratado e pelo Contratante, vai por eles assinado para que produza todos os efeitos de Direito, sendo assinado também pelas testemunhas abaixo identificadas.

[Local], [dia] de [mês] de [ano]. OU [Local], data da última assinatura eletrônica das partes.

_____

Representante legal do CONTRATANTE

_____

Representante legal do CONTRATADO

TESTEMUNHAS:

1-

2-