Precision 3440 Small Form Factor

Technical Guidebook

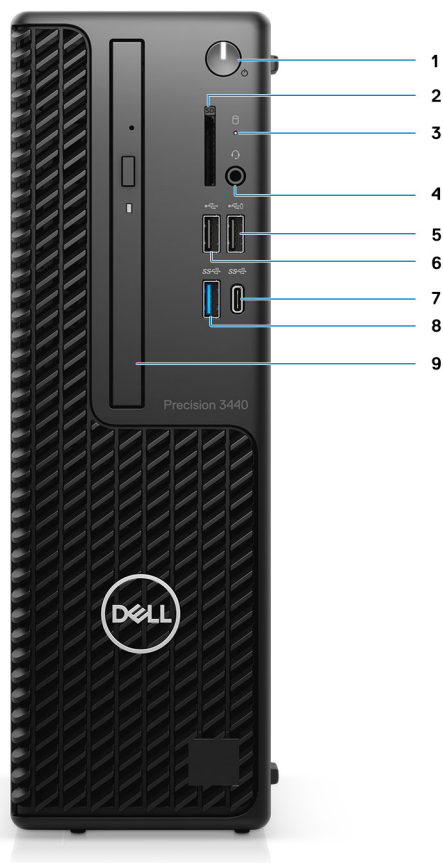# Contents

Views

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- Back view
- System board layout

Front view

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Back view
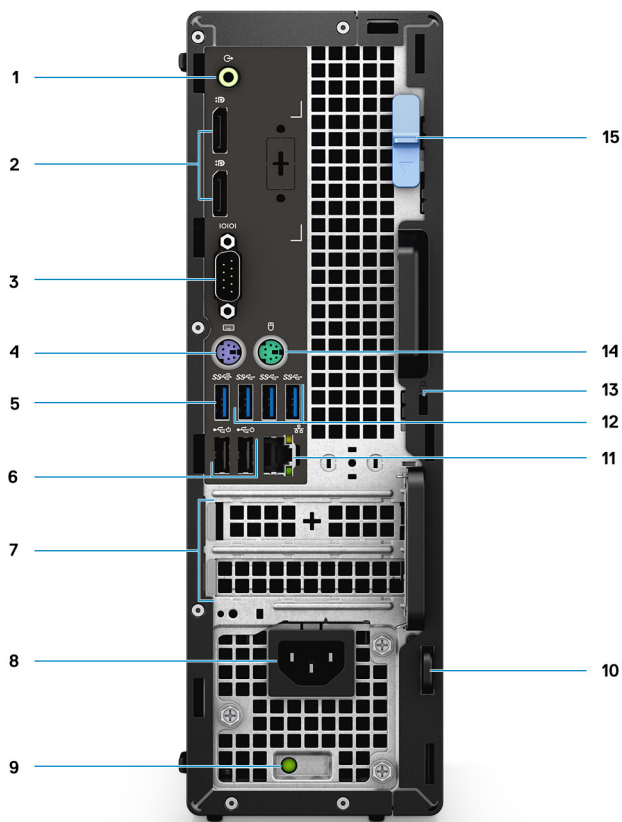
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System board layout
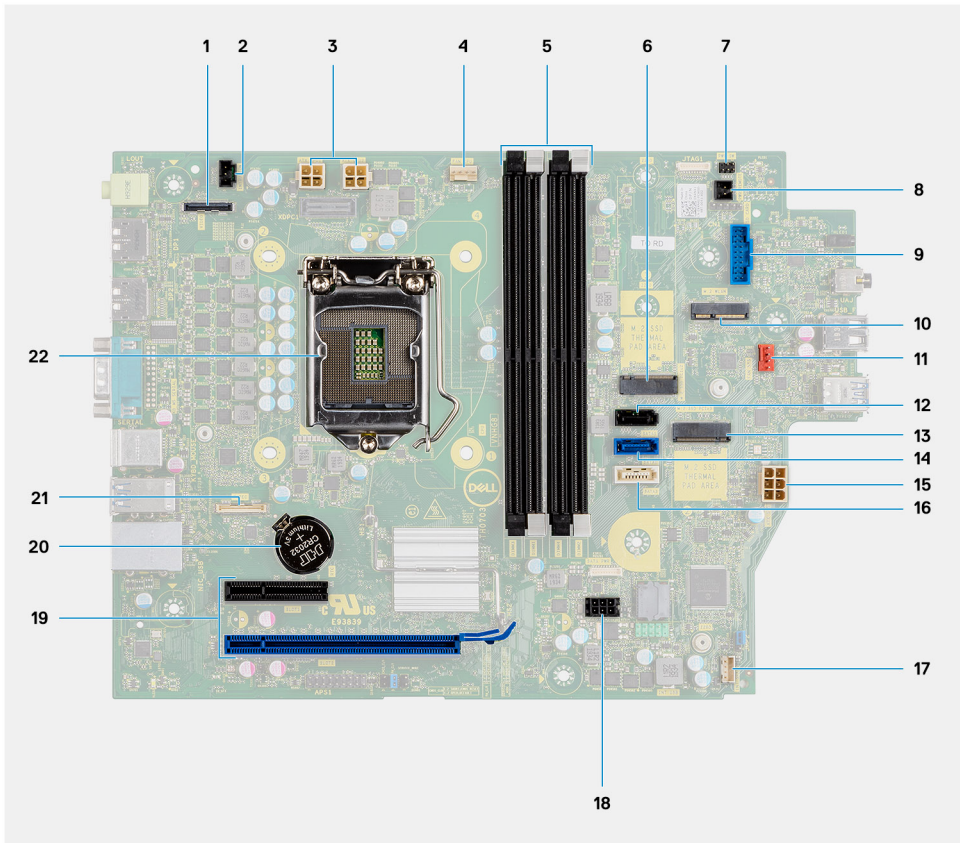
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Specifications of Precision 3440 Small Form Factor

Topics:

Dimensions and weight

Table 1. Dimensions and weight

Description	Values
Height:	
Front	290 mm (11.42 in.)
Rear	290 mm (11.42 in.)
Width	92.6 mm (3.65 in.)
Depth	292.8 mm (11.53 in.)
Weight (maximum)	5.59 kg (12.32 lb) ⓘ **NOTE:** The weight of your computer depends on the configuration ordered and the manufacturing variability.

Chipset

Table 2. Chipset

Description	Values
Chipset	Intel W480
Processor	10th Generation Intel Core i3/i5/i7/i9/Xeon
DRAM bus width	Two channels, 128-bit
Flash EPROM	32 MB
PCIe bus	Upto Gen 3
Non-volatile memory	Yes
BIOS Configuration Serial Peripheral Interface (SPI)	256 Mbit (32 MB) located at SPI_FLASH on chipset
Trusted Platform Module (Discrete TPM Enabled)	24 KB located at TPM 2.0 on chipset
Firmware TPM (Discrete TPM Disabled)	By default the Platform Trust Technology feature is visible to the OS
NIC EEPROM	LOM configuration contained within SPI flash ROM instead of LOM e-fuse

Processors

(i) **NOTE:** Global Standard Products (GSP) are a subset of Dell's relationship products that are managed for availability and synchronized transitions on a worldwide basis. They ensure the same platform is available for purchase globally. This allows customers to reduce the number of configurations managed on a worldwide basis, thereby reducing their costs. They also enable companies to implement global IT standards by locking in specific product configurations worldwide.

Device Guard (DG) and Credential Guard (CG) are the new security features that are only available on Windows 10 Enterprise today.

Device Guard is a combination of enterprise-related hardware and software security features that, when configured together, will lock a device down so that it can only run trusted applications. If it is not a trusted application, it cannot run.

Credential Guard uses virtualization-based security to isolate secrets (credentials) so that only privileged system software can access them. Unauthorized access to these secrets can lead to credential theft attacks. Credential Guard prevents these attacks by protecting NTLM password hashes and Kerberos Ticket Granting Tickets.

(i) **NOTE:** Processor numbers are not a measure of performance. Processor availability is subject to change and may vary by region/country.

Table 3. Processors

Processors	Wattage	Core count	Thread count	Speed	Cache	Integrated graphics	GSP	DG/CG Ready
10th Generation Intel Core i3-10100	65 W	4	8	3.6 GHz to 4.3 GHz	6 MB	Intel UHD Graphics 630	No	Yes
10th Generation Intel Core i5-10500	65 W	6	12	3.1 GHz to 4.5 GHz	12 MB	Intel UHD Graphics 630	Yes	Yes

Table 3. Processors (continued)

Processors	Wattage	Core count	Thread count	Speed	Cache	Integrated graphics	GSP	DG/CG Ready
10th Generation Intel Core i5-10600	65 W	6	12	3.3 GHz to 4.8 GHz	12 MB	Intel UHD Graphics 630	Yes	Yes
10th Generation Intel Core i7-10700	65 W	8	16	2.9 GHz to 4.7 GHz	16 MB	Intel UHD Graphics 630	Yes	Yes
10th Generation Intel Core i9-10900	65 W	10	20	2.8 GHz to 4.6 GHz	20 MB	Intel UHD Graphics 630	Yes	Yes
Intel Xeon W-1250	80 W	6	12	3.3 GHz to 4.4 GHz	12 MB	Intel UHD Graphics 630	Yes	Yes
Intel Xeon W-1270	80 W	8	16	3.2 GHz to 4.7 GHz	16 MB	Intel UHD Graphics 630	Yes	Yes
Intel Xeon W-1290	80 W	10	20	3.7 GHz to 4.9 GHz	20 MB	Intel UHD Graphics 630	Yes	Yes

Operating system

Your Precision 3440 Small Form Factor supports the following operating systems:

- Windows 11 Home, 64-bit
- Windows 11 Pro, 64-bit
- Windows 11 Pro National Academic, 64-bit
- Windows 11 Pro for Workstations, 64-bit
- Windows 10 Home, 64-bit
- Windows 10 Pro, 64-bit
- Windows 10 Pro Education, 64-bit
- Windows 10 IoT Enterprise 2019 LTSC (OEM only)
- Windows 10 Enterprise, 64-bit
- Ubuntu 18.04 LTS, 64-bit

Memory

Table 4. Memory specifications

Description	Values
Slots	4 DIMM slots
Type	DDR4
Speed	- 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors

Table 4. Memory specifications (continued)

Description	Values
Maximum memory	128 GB
Minimum memory	4 GB
Memory size per slot	4 GB, 8 GB, 16 GB, 32 GB
Configurations supported	4 GB, 1 x 4 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 8 GB, 2 x 4 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 8 GB, 1 x 8 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 16 GB, 2 x 8 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 32 GB, 4 x 8 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 32 GB, 2 x 16 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 64 GB, 4 x 16 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors 128 GB, 4 x 32 GB, DDR4, 2666 MHz for Intel Core i3/i5/Xeon W-1250 processors, 2933 MHz for Intel Core i7/i9/Xeon W-1270/W-1290 processors

Ports and connectors

Table 5. Ports and connectors

Description	Values
External:	
Network	1 RJ-45
USB	- One USB 2.0 Type-A port (front) - One USB 2.0 Type-A with PowerShare (front) - One USB 3.2 Gen 2 Type-A (front) - One USB 3.2 Gen 2 Type-C port with PowerDelivery (front) - Two USB 2.0 ports with Power On (rear) - One USB 2.0 header for Comon Access Card (CAC) - Three USB 3.2 Gen 1 Type-A ports (rear) - One USB 3.2 Gen 2 Type-A ports (rear)
Audio	- One Universal Audio Jack (front) - One Line -in/out retasking (rear)
Video	Two DisplayPort 1.4 port (rear)

Table 5. Ports and connectors (continued)

Description	Values
	- One HDMI 2.0 port (rear, optional) - One VGA port (rear, optional) - One Type-C w/DP-Alt mode (rear optional)
Memory card reader	One SD-card 4.0 slot
Power port	AC-in
Security	- One Wedge-shaped lock - One Padlock Loop - One Lockable Port Cover - One Intrusion switch
Internal:	
M.2	- One half-height Gen3 PCIe x16 slot (discrete graphics) - One half-height Gen3 PCIe x4 slot - Three SATA 3.0 for Hard-disk drive/Solid-state drive - One M.2 2230 slot for WiFi/Bluetooth card - One M.2 2280 slot for solid-state drive - One M.2 2280 slot for PCIe solid-state drive ⓘ **NOTE:** To learn more about the features of different types of M.2 cards, see the knowledge base article SLN301626.

Communications

Ethernet

Table 6. Ethernet specifications

Description	Values
Model number	Intel i219-LM
Transfer rate	10/100/1000 Mbps

Wireless module

Table 7. Wireless module specifications

Description	Values		
Model number	Qualcomm QCA61x4a (DW1820)	Intel AX201	
Transfer rate	Up to 867 Mbps	Up to 2400 Mbps	
Frequency bands supported	2.4 GHz/5 GHz	2.4 GHz/5 GHz	
Wireless standards	- WiFi 802.11a/b/g - Wi-Fi 4 (WiFi 802.11n) - Wi-Fi 5 (WiFi 802.11ac)	- Wi-Fi 802.11a/b/g - Wi-Fi 4 (Wi-Fi 802.11n)	

Table 7. Wireless module specifications (continued)

Description	Values		
		• Wi-Fi 5 (Wi-Fi 802.11ac) • Wi-Fi 6 (Wi-Fi 802.11ax)	
Encryption	• 64-bit/128-bit WEP • AES-CCMP • TKIP	• 64-bit/128-bit WEP • AES-CCMP • TKIP	
Bluetooth	Bluetooth 5.0	Bluetooth 5.1	

Graphics and Video controller

Table 8. Integrated graphics specifications

Controller	External display support	Memory size	Processor
Intel UHD Graphics 630	Two DisplayPort 1.4	Shared system memory	10th Generation Intel Core i3/i5/i7/i9

Table 9. Discrete graphics specifications

Controller	External display support	Memory size	Memory Type
AMD Radeon R5 430	• Two DisplayPort 1.2	2 GB	DDR3
AMD Radeon Pro WX 2100	• One DisplayPort 1.4 • Two Mini DisplayPort 1.4	2 GB	GDDR5
AMD Radeon Pro WX 3200	• Four Mini DisplayPort 1.4	4 GB	GDDR5
NVIDIA Quadro P400	• Three Mini DisplayPort 1.4	2 GB	GDDR5
NVIDIA Quadro P620	• Four Mini DisplayPort 1.4	2 GB	GDDR5
NVIDIA GeForce GT 730	• Two DP 1.2	2 GB	GDDR5
ⓘ **NOTE:** Tower supports Full height (FH) cards			

Audio and Speaker

Table 10. Audio and speaker specifications

Description	Values
Type	4 Channel High Definition Audio
Controller	Realtek ALC3246
Stereo conversion	Supported
Internal interface	High definition audio interface
External interface	Universal Audio Jack
Speakers	2

Table 10. Audio and speaker specifications (continued)

Description	Values
Internal speaker amplifier	Integrated in ALC3246 (Class-D 2 W)
External volume controls	Keyboard shortcut controls
Speaker output average	2 W
Speaker output peak	2.5 W
Subwoofer output	Not Supported
Microphone	Not Supported

Storage

Your computer supports one of the following configurations:
- One 2.5-inch hard-disk drive
- Two 2.5-inch hard-disk drives
- One 3.5-inch hard-disk drive
- One 2.5-inch hard-disk drive and one 3.5-inch hard-disk drive
- One 2280 solid-state drive (class 40)
- One M.2 2280 solid-state drive (class 40) and one 3.5-inch hard-disk drive
- One M.2 2280 solid-state drive (class 40) and one 2.5-inch hard-disk drive
- One M.2 2280 solid-state drive (class 40) and two 2.5-inch hard-disk drives

Table 11. Storage specifications

Storage type	Interface type	Capacity
2.5 in. hard-disk drive, 5400 RPM	SATA	Upto 2 TB
2.5 in. hard-disk drive, 7200 RPM	SATA	Upto 1 TB
2.5 in. hard-disk drive, 7200 RPM, FIPS Self Encrypting Opal 2.0	SATA	Upto 500 GB
3.5 in, hard-disk drive, 5400 RPM	SATA	Upto 4 TB
3.5 in, hard-disk drive, 7200 RPM	SATA	Upto 2 TB
M.2 2280 solid-state drive	Gen 3 PCIe x4 NVMe, Class 40	Upto 2 TB
M.2 2280 Opal Self-Encrypting solid-state drive	Gen 3 PCIe x4 NVMe, Class 40	Upto 1 TB

Power supply

Table 12. Power supply

Input voltage	100–240 VAC, 50–60 Hz
Wattage	- 200 W 100V-240V Full range - 260 W 100V-240V Full range

Security Software

Features	Description
Dell Endpoint Security Suite Enterprise	Optional
Dell Data Guardian	Optional
Dell Encryption (Enterprise or Personal)	Optional
Dell Threat Defense	Optional
RSA SecurID Access	Optional
RSA NetWitness Endpoint	Optional
MozyPro or MozyEnterprise	Optional
VMware Airwatch/WorkspaceONE	Optional
Absolute Data & Device Security	Optional

Add-in cards

Table 14. Add-in cards

Add-in cards
Additional VGA video port for Tower
Additional HDMI 2.0 video port Tower
USB 3.1 Gen 2 Type-C PCIe card
USB 3.1 Gen 2 Type-C Alt mode port for Tower
USB 3.1 Gen 2 PCIe card
Additional DisplayPort for Tower
Serial and parallel port PCIe card
Intel Gigabit NIC PCIe card
Aquantia AQtion AQN-108 5/2.5 GbE NIC adapter
Powered Serial card PCIe FH for Tower

CAC/PIV Module

Table 15. CAC/PIV Module

Features	Tower/Small Form Factor/Micro
Connector Type	ISO 7816 compliant contact smart card NFC forum 2.0
PCB	
Dimensions (W x L x T)	74.5 mm x 45.7 mm

Table 15. CAC/PIV Module (continued)

Features	Tower/Small Form Factor/Micro
Layer	6
Controller Details	
Controller bus architecture (example PCIe 1.0a x1)	USB 2.0
Data transfer mode (example Bus-Master DMA)	USB 2.0
Power consumption (full operation per data rate connection speed)	288.08 mA x 3.3 V
Power consumption (standby operation)	8.9 mA x 3.3 V
Standard compliance (example 802.1P)	NFC Forum 2.0, ISO7816
Hardware Certifications (example FCC, B, GS mark…)	FIPS201, FIPS140-2
Boot ROM Support	Integrated inside Lynx SoC
Processor/Chipset	
NFC	Broadcom Cortex-M3 BC58102
Card reader driver	NXP TDA8034HN/C2
USB 2.0 Hub	GENESYS GL850G-OHY50
PROM	WINBOND W25Q32JVSSIQ 32M/bit
Power IC	RICHTEK RT5796AHGJ5
Power LDO (NFC VBAT)	GMT G9141T11U
Environmental	
Operating System Driver Support	Dell ControlVault2 Driver
Manageability (examples WOL, PXE)	No, this is not a LAN controller chipset.
Management Capabilities Alerting (example ASF 2.0)	No, this is not a LAN controller chipset.
Add-in Slots	
Card reader connector	1 (10 PIN)
USB 2.0 header	1 (5 PIN)
NFC header	1 (6 PIN)

Environmental

Table 16. Environmental specifications

Feature	Precision 3440 Small Form Factor
Recyclable packaging	Yes

Table 16. Environmental specifications (continued)

Feature	Precision 3440 Small Form Factor
BFR/PVC—free chassis	No
MultiPack packaging	Yes (US only) (optional)
Energy-Efficient Power Supply	Standard
ENV0424 compliant	Yes

ⓘ **NOTE:** Wood-based fiber packaging contains a minimum of 35% recycled content by total weight of wood-based fiber. Packaging that contains without wood-based fiber can be claimed as Not Applicable.

Energy Star and Trusted Platform Module (TPM)

Table 17. Energy Star and TPM

Features	Specifications
Energy Star 8.0	Compliant configurations available
Trusted Platform Module (TPM) 2.0[1,2]	Integrated on system board
Firmware-TPM (Discrete TPM disabled)	Optional

ⓘ **NOTE:**

[1]TPM 2.0 is FIPS 140-2 certified.

[2]TPM is not available in all countries.

Out of Band Systems Management Intel Standard Manageability

Intel Standard Manageability (ISM) must be configured in our factory at the time of purchase, as it is NOT field upgradable. ISM offers out-of-band management and DASH compliance https://registry.dmtf.org/registry/results/ field_initiative_name%3A%22DASH%201.0%22. ISM offers a limited set of out-of-band features like remote power on/off, Serial-over-LAN redirect, Wake-on-LAN, etc. ISM leverages the same capabilities that were available with Intel's Active Management Technology (AMT) version 5.0.

To learn more about Intel ISM, visit Intel's website at: https://software.intel.com/en-us/blogs/2009/03/27/what-is-standard-manageability

Computer environment

Airborne contaminant level: G1 as defined by ISA-S71.04-1985

Table 18. Computer environment

Description	Operating	Storage
Temperature range	10°C–35°C (50°F–95°F)	-40°C-65°C (-40°F-149°F)
Relative humidity (maximum)	20% to 85% (non-condensing)	5% to 95% (non-condensing)
Vibration (maximum)*	0.52 GRMS random at 5 Hz to 350 Hz	2.0 GRMS random at 5 Hz to 350 Hz

Table 18. Computer environment (continued)

Description	Operating	Storage
Shock (maximum)	Bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 in./sec)	105G half-sine pulse with a change in velocity of 133 cm/sec (52.5 in./sec)
Altitude (maximum)	3048 m (10,000 ft)	10,668 m (35,000 ft)

* Measured using a random vibration spectrum that simulates user environment.

† Measured using a 2 ms half-sine pulse when the hard drive is in use.

Service and support

ⓘ **NOTE:** For more details on Dell Service Plans, see https://www.dell.com/learn/us/en/19/services/warranty-support-services.

Engineering specifications

Topics:

Physical system dimensions

ⓘ **NOTE:** System weight and shipping weight are based on a typical configuration and may vary based on your computer configuration. A typical configuration includes, integrated graphics, one hard drive, and one optical drive.

Table 19. Physical system dimensions

Feature	Values
Chassis volume (liters)	7.80
Chassis Weight (lb/kg)	Maximum: 12.32 lb (5.59 kg) Minimum: 11.57 lb (5.26 kg)
Chassis dimensions	
Height (in/mm)	11.42 in. (290.00 mm)
Width (in/mm)	3.65 in. (92.60 mm)
Depth (in/mm)	11.53 in. (292.80 mm)
Shipping Weight (lb/kg – includes packaging materials)	15.45 lb (7.014 kg)
Packaging dimensions	
Height (in/mm)	19.17 in. (487.00 mm)
Width (in/mm)	10.39 in. (264.00 mm)
Depth (in/mm)	15.51 in. (394.00 mm)

System board connector maximum add-in card allowable dimensions

Table 20. PCIe x4 Connector

Number of slots	1

Table 20. PCIe ×4 Connector (continued)

Voltage	3.30/12.0V
Height (inches / centimeters)	2.731/6.89
Length (inches / centimeters)	6.6/16.76
Maximum wattage	25W

Table 21. PCIe ×16 Connector

Number of slots	1
Voltage	3.30/12.0V
Height (inches / centimeters)	2.731/6.89
Length (inches / centimeters)	6.6/16.76
Maximum wattage	55 W

Table 22. M.2 slot for SSD drive 2280 D5

Number of slots	1
Voltage	3.30/12.0V
Height (inches / centimeters)	4.38/11.12
Length (inches / centimeters)	4.50/11.44
Maximum wattage	10 W

Table 23. M.2 slot for WiFi card 2230 D3

Number of slots	1
Voltage	3.30/12.0V
Height (inches / centimeters)	4.38/11.12
Length (inches / centimeters)	4.50/11.44
Maximum wattage	10 W

PCIe add-in cards

USB 3.1 Type-C PCIe add-in card

Table 24. USB 3.1 Type-C PCIe add-in card

Feature	Specifications
Bus	PCI Express spec 3.0, Single-Lane (x1)
Controller	PCI Express USB 3.1 Host Controller, Asmedia ASM1142
USB standard	eXtensible Host Controller Interface (xHCI) Rev 1.1
IRQ and IO	Assigned by system
USB communication	
Host interface	Universal Serial Bus 3.1/3.0/2.0/1.1
Speed	Super Speed+ (10 Gbps), Super Speed (5 Gbps), High Speed (480 Mbps), Full Speed (12 Mbps), and Low Speed (1.5 Mbps)
Number of ports	2 ports
USB connector	USB 3.1 Type-C port (downstream facing port)
Protection	+/-15KV IEC61000-4-2 Air Gap Discharge
	+/-8KV IEC61000-4-2 Contact Discharge
Video and audio	
Input interface	Standard DisplayPort Female, DisplayPort 1.2/1.1
Output interface	USB Type-C port
Resolution	Depends on the connected DisplayPort video source
	Supported maximum resolution is 4096 x 2160 (3840 x 2160) at 60 Hz
Audio	Yes—audio pass-through

Table 24. USB 3.1 Type-C PCIe add-in card (continued)

Feature	Specifications
Power	
Power source	PCI Express Bus Power
Output power capacity	USB Type-C Port—Power Delivery +5 VDC/1.5 A/each port ⓘ **NOTE:** Total power output capacity is limited by the system power supply.
Over current protection	USB Type-C port—+5 VDC/1.5 A/each port/power switch
Power consumption	3.0 W @ 3.3 V (board only without power output to USB device)
Operating system	
Supported operating system	Windows 7, Windows 8.1, and Windows 10
Environment	
Operating temperature	0°C–60°C (32°F–140°F)
Operating humidity	5–95% RH
Storage temperature	-20°C to 70°C (-4°F to 158°F)
Standards and certifications	
EMC	● EUROPE—CE, EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3 ● US—FCC Part 15 Class B ● TAIWAN—BSMI, CNS13438 ● JAPAN—VCCI ● AS/NZS—C-Tick (CISPR22)
Green	R0HS, CRoHS, and WEEE

Serial PCI express board
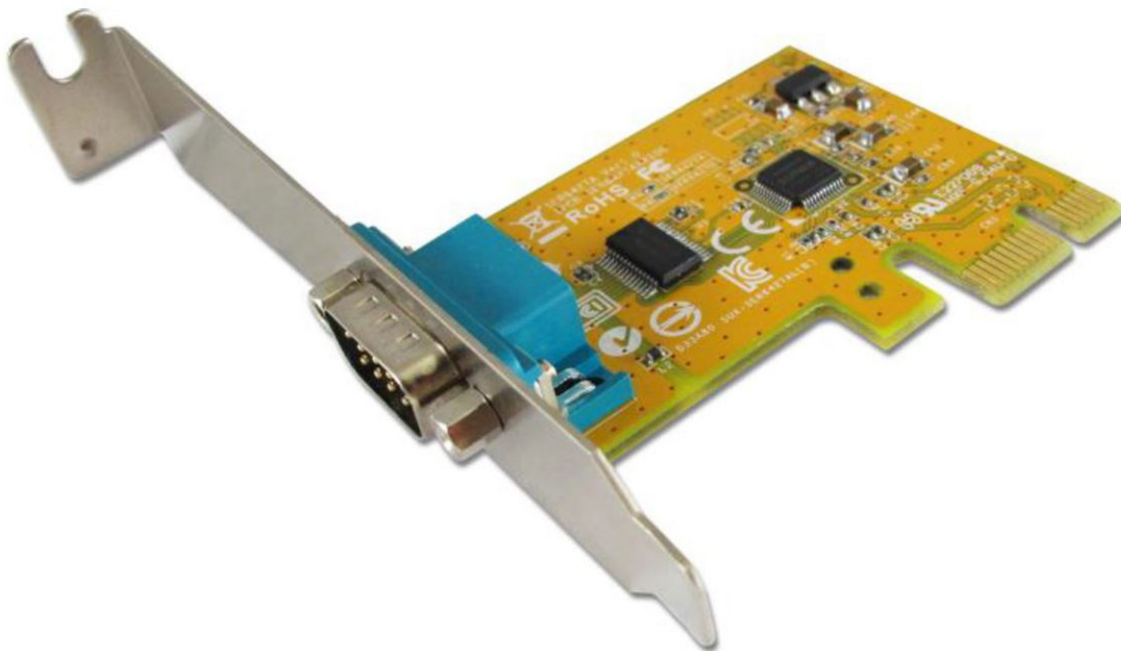
Table 25. Serial PCI express board

Feature	Specifications
Interface	RS-232
Bus	PCI Express spec 2.0, Single-Lane (x1)
Controller	SUNIX SUN2212 (16C950 UART compatible)
IRQ and IO	Assigned by system
Serial communication	
Interface	RS-232
Number of ports	1 port
FIFO	128-byte hardware
Signal	DCD, TxD, RxD, RTS, CTS, DTR, DSR, GND, RI
Baud rate	50 bps~115.2 Kb/s
Stop bit.	1, 1.5, 2
Parity	even, odd, none, mark, space
Flow control	None, Xon/Xoff, RTS/CTS
Protection	+/-15KV ESD protection for each signal Human Body Model (HBM) +/-15KV IEC1000-4-2 Air Gap Discharge +/-8KV IEC1000-4-2 Contact Discharge
Printed circuit board connector	DB9 male
Driver support	
Microsoft Client	Windows XP, Windows Vista. Windows 7, Windows 8 and Windows 10
Microsoft Server	2000, 2003, 2008 and 2008R2
Microsoft Embedded	Windows CE4.2/5.0/6.0/XP Embedded/POS ready 2009/ Embedded System 2009
Linux	Linux 2.4.x / 2.6.x /3.x
DOS	DOS
FreeBSD	FreeBSD 5.3~5.5 / 6.0~6.4
QNX	QNX 6.3.2/6.4.0
Regulatory approvals	
Hardware	● EUROPE—CE EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3 ● US—FCC Part 15 Class B ● TAIWAN—BSMI, CNS13438 ● JAPAN—VCCI Class B ● AS/NZS—C-Tick (CISPR22), ROHS
Software	Microsoft WHQL Windows Windows Client: XP/Vista/7/8/10 Microsoft Server: 2000/2003/2008
Environment	
Operation temperature	0°C-60°C (32°F-140°F)
Operation humidity	5-95% RH

Table 25. Serial PCI express board (continued)

Feature	Specifications
Storage temperature	-20°C-85°C (-4°F-185°F)
Dimensions	
Printed circuit board dimension	65 x 52 mm
Bracket	Standard 121 mm
Bracket space	1

Serial PCI express low profile board

Table 26. Serial PCI express low profile board

Feature	Specifications
Interface	RS-232
Bus	PCI Express spec 2.0, Single-Lane (x1)
Controller	SUNIX SUN2212 (16C950 UART compatible)
IRQ and IO	Assigned by system
Serial communication	
Interface	RS-232
Number of ports	1 port
FIFO	128-byte hardware
Signal	DCD, TxD, RxD, RTS, CTS, DTR, DSR, GND, RI
Baud rate	50 bps~115.2 Kb/s

Table 26. Serial PCI express low profile board (continued)

Feature	Specifications
Stop bit.	1, 1.5, 2
Parity	even, odd, none, mark, space
Flow control	None, Xon/Xoff, RTS/CTS
Protection	+/-15KV ESD protection for each signal Human Body Model (HBM) +/-15KV IEC1000-4-2 Air Gap Discharge +/-8KV IEC1000-4-2 Contact Discharge
Printed circuit board connector	DB9 male
Driver support	
Microsoft Client	Windows XP, Windows Vista Windows 7, Windows 8 and Windows 8.1
Microsoft Server	2000, 2003, 2008, 2008R2, 2012 and 2012 R2
Microsoft Embedded	Windows CE4.2/5.0/6.0/XP Embedded/POS ready 7/ Embedded System 2009/ Embedded Standard 7
Linux	Linux 2.4.x/2.6.x /3.x
DOS	DOS
FreeBSD	FreeBSD 5.3~5.5 / 6.0~6.4
QNX	QNX 6.3.2/6.4.0
Regulatory approvals	
Hardware	● EUROPE—CE EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3 ● US—FCC Part 15 Class B ● TAIWAN—BSMI, CNS13438 ● JAPAN—VCCI Class B ● AS/NZS—C-Tick (CISPR22), ROHS
Software	Microsoft WHQL Windows Windows Client: XP/Vista/7/8/8.1 Microsoft Server: 2000/2003/2008/2008 R2/2012/2012 R2
Environment	
Operation temperature	0°C-60°C (32°F-140°F)
Operation humidity	5-95% RH
Storage temperature	-20°C-85°C (-4°F-185°F)
Dimensions	
Printed circuit board dimension	65 x 52 mm
Bracket	Low profile 80 mm
Bracket space	1

Communications

Wireless communication

Qualcomm QCA61x4a 802.11ac dual band 2x2 + Bluetooth 5.0

Table 27. Qualcomm QCA61x4a 802.11ac dual band 2x2 + Bluetooth 5.0 specifications

Feature	Values
Host interface	M.2 2230 form factor: ● Wi-Fi: PCIe ● Bluetooth: USB
Network standard	IEEE 802.11a/b/g/n/ac/, MU-MIMO
Wi-Fi alliance certifications	● Wi-Fi Certified a/b/g/n/ac with wave 2 features ● WMM ● WPA2 ● Protected Management Frames ● Wi-Fi Direct (For Windows only)
Operating frequency bands	● 2.4 Ghz ● 5 Ghz
Data rate	● 2.4 GHz 40M - Up to 300 Mbps ● 5 GHz 80M - Up to 867 Mbps
Power consumption	Optimized power modes (sleep states) reduce power consumption during periods of inactivity
Authentication	WPA2 Personal and Enterprise
Authentication protocols	● 802.1X EAP-TLS ● EAP-TTLS/MSCHAPv2 ● PEAPv0 -MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA)
Encryption	● 64-bit and 128-bit WEP ● TKIP ● 128-bit AES-CCMP ● 256-bit AES-GCMP
Product safety	● UL ● C-UL ● CB(IEC60950-1)
Government compliance	● FIPS 140-2 ● FISMA
Antenna diversity	Supported
Radio On/Off	Supported
Roaming	Support seamless roaming between access points
Wake On wireless	Supported
Wireless display	Native Miracast support by Windows 10
Bluetooth version	Bluetooth 5.0

Table 27. Qualcomm QCA61x4a 802.11ac dual band 2x2 + Bluetooth 5.0 specifications (continued)

Feature	Values
Bluetooth data rates	Up to 2 Mbps
Bluetooth operating frequency bands	2.4 GHz
Bluetooth profiles supported	Support for Microsoft Inbox Bluetooth profiles in Windows 10
Bluetooth data encryption	128-bit encryption
Bluetooth output power	Power class 1
Temperature	• Operating temperature -10°C to + 65°C (Full performance at shield temperatures up to 85°C) • Storage temperature of -10°C to + 85°C
Humidity	Up to 90% RH non-condensing (at temperatures of 25°C to 35°C)

Intel AX201 160 MHz + Bluetooth

Table 28. Intel AX201 160 MHz + Bluetooth

Feature	Specifications
Model Number	Intel AX201
Data rate	2.4 GHz 40M: Up to 574 Mbps 5 GHz 80M: Up to 1.2 Gbps 5 GHz 160M: Up to 2.4 Gbps
Frequency bands supported:	
Frequency band1 (GHz)	2.4
Frequency band2 (GHz)	5
Network standards:	IEEE 802.11a/b/g/n/ac/ax, 160 MHz channel use, MU-MIMO
Wireless standards:	
Wireless standards option1	WiFi certified a/b/g/n/ac with wave 2 features
Wireless standards option2	WMM, WMM-PS,
Wireless standards option3	WPA, WPA2
Wireless standards option4	Wi-Fi 6 (WiFi 802.11ax)
Encryption:	
Encryption option1	64-bit and 128-bit WEP
Encryption option2	128-bit AES-CCMP
Encryption option3	TKIP
Encryption option4	256-bit AES-GCMP
Bluetooth	5.2

Graphics options

Intel UHD 630 Graphics

Table 29. Intel UHD 630 Graphics specifications

Intel UHD 630 Graphics	
Bus Type	Integrated
Memory Type	UMA
Graphics Level	
Overlay Planes	Yes
Operating Systems Graphics/ Video API Support	DirectX 12, OpenGL 4.5
Supports maximum resolution	- DP: 4096 x 2304 @60 Hz, 24 bpp - Option DP: 4096 x 2304 @60 Hz - Option VGA: 1920 x 1200 @60 Hz - Option HDMI2.0: 4096 x 2160 @60 Hz
Number of display supported	Up to three displays supported
Multiple Display Support	
External Connectors	

NVIDIA Quadro P1000

Table 30. NVIDIA Quadro P1000 specifications

Graphics memory	4 GB GDDR5
Bus type	PCIe x16 Gen3
Memory Interface	128-bit
Clock Speeds	1088 MHz graphics core (min. at P0) 2430 MHz memory
GPU base clock	3504 MHz (min. at P0)
Estimated Maximum Power	47 W
Display Support	eDP/mDP/HDMI/Type-C
Maximum Color Depth	Up to 10bit/color
Maximum Vertical Refresh Rate	Up to 395Hz at 1920x1080 Up to 118Hz at 3840x2160
Operating Systems Graphics/ Video API Support	DirectX 12, OpenGL 4.5
Supported Resolutions and Max Refresh Rates (Hz)	- Max Digital : Single DisplayPort 1.4 - 7680 x 4320 (8k) @ 30 Hz (mDP/type-c to DP) - Max Digital : Dual DisplayPort 1.4 - 7680 x 4320 (8k) @ 60 Hz (mDP/type-c to DP)
Numbers of Display Support	Up to four displays

NVIDIA Quadro P620

NVIDIA Quadro P620	
PCIe slot width	1
Memory (GDDR5)	2 GB
Open GL	4.5
Open CL	
DirectX	11.2
Vulcan	
PCIe support	x16 Gen 3
Max Resolution (# of DisplayPorts used)	5120 x 2880 24bpp @ 60 Hz
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	4
Maximum monitors (direct connection)	4
Max # of 4K x 2K displays @ 60 Hz	4
Max # of 5120 x 2880 pixel displays @ 60 Hz	2
Video connectors	mini-DisplayPort x 4; DisplayPort x 4
Included video adapters (with systems or customer kits)	
Aux power connectors needed	
Maximum power	40 W

NVIDIA Quadro P400

NVIDIA Quadro P400	
PCIe slot width	1
Memory (GDDR5)	2 GB
Open GL	4.6
Open CL	1.2
DirectX	11.2
PCIe support	x16 Gen2
Max Resolution (# of DisplayPorts used)	5120 x 2880 24bpp @ 60 Hz
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	3
Maximum monitors (direct connection)	3
Max # of 4K x 2K displays @ 60 Hz	3
Max # of 5120 x 2880 pixel displays @ 60 Hz	3
Video connectors	mini-DisplayPort x 3
Included video adapters (with systems or customer kits)	x3 mDP to DP
Aux power connectors needed	

Table 32. NVIDIA Quadro P400 (continued)

NVIDIA Quadro P400	
Maximum power	30 W

Radeon Pro WX 2100

Table 33. Radeon Pro WX 2100

Radeon Pro WX 2100	
PCIe slot width	1
Memory (GDDR5)	2 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	● 5120 x 3200, 24bpp, 60 Hz ● 3840 x 4320, 24bpp, 60 Hz (half 8K)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	5
Maximum monitors (direct connection)	3
Max # of 4K x 2K displays @ 60 Hz	4
Max # of 5120 x 2880 pixel displays @ 60 Hz	1
Video connectors	miniDP x 2 + DisplayPort x 1
Included video adapters (with systems or customer kits)	
Aux power connectors needed	
Maximum power	50 W

Radeon Pro WX 3100

Table 34. Radeon Pro WX 3100

Radeon Pro WX 3100	
PCIe slot width	1
Memory (GDDR5)	4 GB
Open GL	4.5
Open CL	2.0
DirectX	12.0
Vulcan	
PCIe support	x16 Gen3
Max Resolution (# of DisplayPorts used)	● 5120 x 3200, 24bpp, 60 Hz ● 3840 x 4320, 24bpp, 60 Hz (half 8K)
Maximum Monitors using DP Multi-Stream (monitor to monitor connections)	5

Radeon Pro WX 3100	
Maximum monitors (direct connection)	3
Max # of 4K x 2K displays @ 60 Hz	4
Max # of 5120 x 2880 pixel displays @ 60 Hz	1
Video connectors	miniDP x 2 +DisplayPort x 1
Included video adapters (with systems or customer kits)	
Aux power connectors needed	
Maximum power	50 W

NVIDIA GeForce GT 730

Table 35. NVIDIA GeForce GT 730 specifications

Feature	Values
GPU frequency	902 MHz
DirectX	12.0
Shader model	5.0
Open CL	1.1
Open GL	4.5
GPU memory interface	64 bit
PCIe bus	PCIe 3.0 x8
Display support	Two DisplayPort 1.2
Graphics memory configuration	2 GB, GDDR5
Graphics memory clock speed	2.5 GHz
Active fan sink	2-pin excluded fan controller
Slot number	Single slot
PCB form factor	Low profile
PCB layer	4 layer
PCB solder mask	Green
Bracket form factor	Low profile
Maximum resolution	3840 x 2160
Power consumption	● 20 W TDP 30 W TGP
3D mark performance	● 3DMark 11 (P): E4131 ● 3Dmark Vantage(P):

AMD Radeon R5 430

Table 36. AMD Radeon R5 430 specifications

Feature	Values
GPU frequency	780 MHz
DirectX	11.2
Shader model	5.0
Open CL	1.2
Open GL	4.2
GPU memory interface	64 bit
PCIe bus	PCIe 3.0 x8
Display support	Two DisplayPort 1.2
Graphics memory configuration	2 GB, GDDR5
Graphics memory clock speed	1.5 GHz
Active fan sink	2-pin excluded fan controller
Slot number	Single slot
PCB form factor	Low profile
PCB layer	6 layer
PCB solder mask	Green
Bracket form factor	● Full height ● Low profile
Maximum resolution	4096 x 2160
Power consumption	● 25 W TDP ● 35 W TGP
3D mark performance	● 3DMark 11 (P) ● 3Dmark Vantage(P)

Supported hard drives

Intel Rapid Storage Technology (Intel RST)

The following article provides an overview of the Intel Rapid Storage Technology application and its features:

Overview

Intel Rapid Storage Technology (IRST) is a hardware, firmware and, software-based RAID solution. IRST was previously known as Matrix RAID. IRST allows for creation of two RAID volumes on a single RAID array where both the volumes can be of the same or different type.

IRST encapsulates newer level of protection with better performance, and low power consumption. IRST user interface simplifies creation and management of storage assets.

The fault tolerance is averted using one of the following RAID levels:

1. **RAID 0 (Striping):**

   Multiple storage devices are combined to what appears to be a single virtual drive. Data is arranged as blocks that are spread across multiple storage devices using process called striping. RAID 0 uses Read/ Write capabilities of two or more storage devices in parallel, enhancing performance. There is no redundancy, hence if any of the storage devices fails, the RAID has to be re-created.

   RAID 0
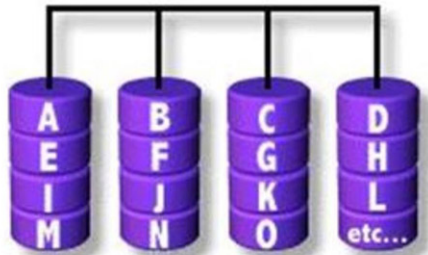
   Data Striping

2. **RAID 1 (Mirroring):**

   Two storage devices are mirrored or duplicated to achieve redundancy and hence enhance reliability in an event of single drive failure. The performance is that of a single drive.

   RAID 1
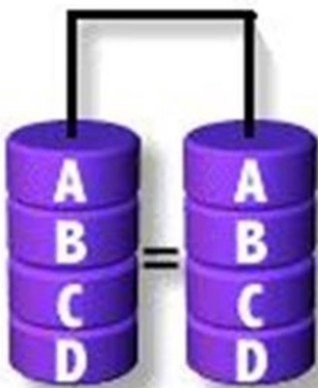
   Disk Mirroring

RAID-ready

A RAID-Ready configuration allows migration from one non-RAID SATA drive to a SATA RAID configuration.

(i) **NOTE:** A reinstall of the operating system is not required for the migration.

A RAID-Ready system must meet the following requirements:

- Supported Intel Chipsets
- One Serial ATA (SATA) hard drive
- RAID controller enabled in the system setup
- BIOS that includes the IRST option ROM
- IRST software
- Hard drive partition with at least 5 MB of free space

Features of RAID-enabled systems:

- **Intel Rapid Recover Technology** - This technology provides full data redundancy by copying data from a designated source drive (main disk) to a designated destination drive (recovery disk). Data updates of recovery volumes can be continuous or on request.
- **Intel Rapid RAID :** - This technology allows creation of RAID 0 and RAID 1 volumes on desktop and mobile platforms. Data is distributed across two or more disks to provide data redundancy or to enhance data storage performance.
- **Intel Matrix RAID Technology** - This technology allows two independent RAID volumes to be created on a single array. The first volume occupies part of the array, leaving space for the second volume. The array may consist of 2-6 SATA disks depending on the volume types.
- **Native command queuing** - A feature that allows SATA disks to accept more than one command at a time. With multiple disks that support NCQ, storage performance is increased on random workloads by allowing the disk to internally optimize the order of commands.
- **Disk capacity greater than 2 TB (Option ROM support)** - This feature supports hard disks and solid-state drives with a capacity greater than 2 TB that are reported as pass-through devices (available) or used in a RAID configuration. Besides booting from a system disk greater than 2 TB is allowed, if the version of the option ROM in your system supports this feature.
- **Password-protected disks** - This feature provides high-level security and protection for the data on your disks with a password, denying access from any unauthorized user.

2.5-inch 1 TB 5400 RPM SATA Hard-Disk Drive

Table 37. 2.5-inch 1 TB 5400 RPM SATA Hard Disk Drive

Features	Specifications
Capacity (TB)	1 TB HDD 5400 RPM
Dimensions (inches) (W x D x H)	Approximately (2.75 in. x 3.955 in. x 0.276 in.)
Interface type and Maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical Blocks	1,953,525,168
Power Source:	
Power Consumption (reference only)	Idle 0.7 W, Active 3.10 W
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	5 to 90%
Op Shock (@2 ms)	350G
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	5% to 95%

2.5-inch 500 GB 7200 RPM SATA Hard-Disk Drive

Table 38. 2.5-inch 500 GB 7200 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (GB)	500 GB HDD 7200 RPM
Dimensions (W x D x H)	2.75 in. x 3.955 in. x 0.276 in.

Table 38. 2.5-inch 500 GB 7200 RPM SATA Hard-Disk Drive (continued)

Features	Specifications
Interface type and Maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 0.7 W, Active 3.25 W
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	5 to 90%
Op Shock (@2 ms)	350G
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	5 to 95%

2.5-inch 1 TB 7200 RPM SATA Hard-Disk Drive

Table 39. 2.5-inch 1TB 7200 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (TB)	1 TB HDD 7200 RPM
Dimensions (W x D x H)	2.75 in. x 3.955 in. x 0.276 in.
Interface type and Maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical Blocks	1,953,525,168
Power Source	
Power Consumption (reference only)	Idle 0.7 W, Active 3.25 W
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	5 to 90%
Op Shock (@2 ms)	350G
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	5 to 95%

2.5-inch 500 GB SATA 7200 RPM Opal Self-Encrypting FIPS Hard-Disk Drive

Table 40. 2.5-inch 500 GB SATA 7200 RPM Opal Self-Encrypting FIPS Hard-Disk Drive

Features	Specifications
Capacity (GB)	500 GB HDD 7200 RPM OPAL SED FIPS

Features	Specifications
Dimensions (inches) (W x D x H)	2.75 x 3.955 x 0.276
Interface type and Maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical Blocks	976,773,168
Power Source	
Power Consumption (reference only)	Idle 0.7 W, Active 3.25 W
Environmental Operating Conditions (Non-Condensing):	
Temperature Range	5°C to 60°C
Relative Humidity Range	5 to 90%
Op Shock (@2 ms)	350G
Environmental Non-Operating Conditions (Non-Condensing):	
Temperature Range	-40°C to 65°C
Relative Humidity Range	5 to 95%

3.5-inch 4 TB 5400 RPM SATA Hard-Disk Drive

Table 41. 3.5-inch 4 TB 5400 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (GB)	4 TB HDD 5400 RPM
Dimensions (W x D x H)	Approximately (5.79 in. x 4.00 in. x 1.00 in.)
Interface type and maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical blocks	7,814,037,168
Power source	
Power consumption (reference only)	Idle 5W, Active 10 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	5°C to 60°C
Relative humidity range	5% to 90%
Op shock (@ 2ms)	65 G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 65°C
Relative humidity range	5% to 95%

3.5-inch 500 GB 7200 RPM SATA Hard-Disk Drive

Table 42. 3.5-inch 500 GB 7200 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (GB)	500 GB HDD 7200 RPM
Dimensions (W x D x H)	Approximately (5.79 in. x 4.00 in. x 1.00 in.)
Interface type and maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical blocks	7,814,037,168
Power source	
Power consumption (reference only)	Idle 5W, Active 10 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	5°C to 60°C
Relative humidity range	5% to 90%
Op shock (@ 2ms)	65 G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 65°C
Relative humidity range	5% to 95%

3.5-inch 1 TB 7200 RPM SATA Hard-Disk Drive

Table 43. 3.5-inch 1 TB 7200 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (GB)	1 TB HDD 7200 RPM
Dimensions (W x D x H)	Approximately (5.79 in. x 4.00 in. x 1.00 in.)
Interface type and maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical blocks	1,953,525,168
Power source	
Power consumption (reference only)	Idle 5 W, Active 10 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	5°C to 60°C
Relative humidity range	5% to 90%
Op shock (@ 2ms)	65 G

Features	Specifications
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 65°C
Relative humidity range	5% to 90%

3.5-inch 2 TB 7200 RPM SATA Hard-Disk Drive

Table 44. 3.5-inch 2 TB 7200 RPM SATA Hard-Disk Drive

Features	Specifications
Capacity (GB)	2 TB HDD 7200 RPM
Dimensions (W x D x H)	Approximately (5.79 in. x 4.00 in. x 1.00 in.)
Interface type and maximum speed	Up to 6 Gb/s (SATA 3.0)
MTBF	550,000 hours
Logical blocks	3,907,029,168
Power source	
Power consumption (reference only)	Idle 5W, Active 10 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	5°C to 60°C
Relative humidity range	5% to 90%
Op shock (@ 2ms)	65 G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 65°C
Relative humidity range	5% to 90%

M.2 2280 256 GB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive

Table 45. M.2 2280 256 GB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive

Features	Specifications
Capacity	256 GB
Dimensions	22.00 mm x 80.00 mm x 2.38 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s
MTTF	1.4 M hours
Logical blocks	500,118,192
Power Source	

Table 45. M.2 2280 256 GB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive (continued)

Features	Specifications
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

M.2 2280 512 GB PCIe NVMe Gen3 x4 Class 40 Solid-State Drive

Table 46. M.2 2280 512 GB PCIe NVMe Gen3 x4 Class 40 Solid-State Drive

Features	Specifications
Capacity	512 GB
Dimensions	22.00 mm x 80.00 mm x 2.38 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s
MTTF	1.4 M hours
Logical blocks	1000,215,216
Power Source	
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

M.2 2280 1 TB PCIe NVMe Gen3 x4 Class 40 Solid-State Drive

Table 47. M.2 2280 1 TB PCIe NVMe Gen3 x4 Class 40 Solid-State Drive

Features	Specifications
Capacity	1 TB
Dimensions	22.00 mm x 80.00 mm x 3.73 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s
MTTF	1.4 M hours
Logical blocks	2000,409,264
Power Source	
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

M.2 2280 2 TB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive

Table 48. M.2 2280 2 TB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive

Capacity	2 TB
Dimensions	22.00 mm x 80.00 mm x 3.73 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s
MTTF	1.4 M hours
Logical blocks	4000,797,360
Power Source	
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G

Table 48. M.2 2280 2 TB Gen 3 PCIe x4 NVMe Class 40 Solid-State Drive (continued)

Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

M.2 2280 256 GB Gen 3 PCIe x4 NVMe Opal Self-Encrypting Class 40 Solid-State Drive

Table 49. M.2 2280 256 GB Gen 3 PCIe x4 NVMe Opal Self-Encrypting Class 40 Solid-State Drive

Features	Specifications
Capacity	256 GB
Dimensions	22.00 mm x 80.00 mm x 2.38 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s (Up to 4 lanes)
MTTF	1.4 M hours
Logical blocks	500,118,192
Power Source	
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

M.2 2280 512 GB PCIe NVMe Gen3 x4 Opal Self-Encrypting Class 40 Solid-State Drive

Table 50. M.2 2280 512 GB PCIe NVMe Gen3 x4 Opal Self-Encrypting Class 40 Solid-State Drive

Features	Specifications
Capacity	512 GB
Dimensions	22.00 mm x 80.00 mm x 2.3 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s
MTTF	1.6 M hours

Table 50. M.2 2280 512 GB PCIe NVMe Gen3 x4 Opal Self-Encrypting Class 40 Solid-State Drive (continued)

Features	Specifications
Logical blocks	1000,215,216
Power Source	
Power consumption (reference only)	● Idle : 10 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	5% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-10°C to 85°C
Relative humidity range	5% to 95%

M.2 2280 1 TB PCIe NVMe Gen3 x4 Opal Self-Encrypting Class 40 Solid-State Drive

Table 51. M.2 2280 1 TB PCIe NVMe Gen3 x4Opal Self-Encrypting Class 40 Solid-State Drive

Capacity	1 TB
Dimensions	22.00 mm x 80.00 mm x 2.38 mm
Interface type and maximum speed	Gen 3 PCIe 32 Gb/s (Up to 4 lanes)
MTTF	1.4 M hours
Logical blocks	2000,409,264
Power Source	
Power consumption (reference only)	● Idle : 5 mW (PS4) ● Active : 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	10% to 90%
Non-op shock (@0.5 ms)	1500G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

512 GB M.2 2280 PCIe Gen3x4 NVMe Class 50 Solid State Drive

Table 52. 512 GB M.2 2280 PCIe Gen3x4 NVMe Class 50 Solid State Drive

Capacity (GB)	512 GB
Dimensions (W x D x H)	Approximately (22.00 in. x 80.00 in. x 2.38 in.)
Interface type and maximum speed	PCIe Gen3 32 Gb/s (up to 4 lanes)
MTBF	1.4 Million hours
Logical blocks	1,000,215,216
Power source	
Power consumption (reference only)	Idle 5 mW (PS4 – L1.2), Active 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	5% to 95%
Op shock (@ 2ms)	1500 G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C
Relative humidity range	5% to 95%

1 TB M.2 2280 PCIe Gen3x4 NVMe Class 50 Solid State Drive

Table 53. 1 TB M.2 2280 PCIe Gen3x4 NVMe Class 50 Solid State Drive

Capacity (GB)	1 TB
Dimensions (W x D x H)	Approximately (22.00 in. x 80.00 in. x 2.38 in.)
Interface type and maximum speed	PCIe Gen3 32 Gb/s (Up to 4 lanes)
MTBF	1.4 million hours
Logical blocks	2,000,409,264
Power source	
Power consumption (reference only)	Idle 5 mW (PS4 – L1.2), Active 4.5 W
Environmental Operating Conditions (Non-Condensing)	
Temperature range	0°C to 70°C
Relative humidity range	5% to 95%
Op shock (@ 2ms)	1500 G
Environmental Non-Operating Conditions (Non-Condensing)	
Temperature range	-40°C to 70°C

Relative humidity range	5% to 95%

Power

Table 54. Power specifications

	260 W Platinum	200 W Bronze or Platinum
Wattage	260 W	200 W
AC input voltage range	100 V AC-240 V AC	100 V AC-240 V AC
AC input current (low ac range / high ac range)	4.2 A/2.1 A	3.2 A/1.6 A
AC input frequency	50 Hz-60 Hz	50 Hz-60 Hz
AC holdup time (80% load)	16 ms	16 ms
Average efficiency (ESTAR 6.1 qualified)	EPA Platinum: 90-92-89% @ 20-50-100% load	EPA Platinum: 90-92-89% @ 20-50-100% load EPA Bronze: 82-85-82% @ 20-50-100% load
DC Parameters +12.0v output	12 V/16.5 A 12 V/18 A	12 V/16.5 A 12 V/14 A
+12.0v auxiliary output	2.5 A	2.5 A
Max total power	260 W	200 W
BTUs/h (based on PSU max WT)	888 BTU	683 BTU
Power Supply Fan	60 mm x 25 mm	60 mm x 25 mm
ErP Lot6 Tier 2 0.5watt requirement	Yes	Yes
Climate Savers/80Plus Compliant	Yes	Yes
FEMP Standby Power Compliant	Yes	Yes
Energy Star 8 Qualified	Yes	Yes

Accessories

Cables, Dongles, and Adapters

Table 55. Supported cables, dongles, and adapters

C2G 15 ft Cat6 Snagless Unshielded (UTP) Network Patch Ethernet Cable

External data storage

Table 56. External data storage

Dell Portable Thunderbolt 3 SSD, 1 TB
Dell Portable SSD, USB-C 250 GB

Table 56. External data storage (continued)

Dell Portable Thunderbolt 3 SSD, 500 GB
Apricorn 1 TB Aegis Padlock 256-bit AES Encrypted Hard-disk Drive

Input Devices

Table 57. Input Devices

Dell Wired Mouse with Fingerprint Reader MS819	Optional

Monitors

Table 58. Supported monitors

Dell 24 Monitor - P2418HZm
Dell UltraSharp 24 Ultrathin Monitor - U2419H
Dell UltraSharp 27 Ultrathin Monitor - U2719D

System level environmental and operating conditions

Table 59. System level environmental and operating conditions

	Small form factor
Temperature	
Operating	10° to 35°C (41° to 95°F)
Non-Operating (Storage)	-40° to 65°C (-40° to 149°F)
Relative Humidity	20% to 80% (non-condensing)
Maximum Vibration	
Operating	0.26Grms random at 5 to 350 Hz
Non-Operating	1.37Grms random at 5 to 500 Hz
Maximum Shock	
Operating	Bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 in/sec)
Non-Operating	105G half-sine pulse with a change in velocity of 133 cm/sec (52.5 in/sec)

Thermal Dissipation

Table 60. Thermal Dissipation

Form Factor	Power	Heat dissipation	Voltage
Small Form Factor	260 W	260 * 3.4125 = 888 BTU/hr	100 to 240 VAC, 50 to 60 Hz, 4.2 A/2.1 A
Small Form Factor	200 W	200 * 3.4125 = 683 BTU/hr	100 to 240 VAC, 50 to 60 Hz, 3.2 A/1.6 A

Security

Feature	Description
Trusted Platform Module (TPM) 2.0	Integrated on the system board
Firmware TPM	Optional
Windows Hello Support	Optional via security input device
Cable cover	Optional
Chassis intrusion switch	Standard
Dell Smartcard Keyboard	Optional
Chassis lock slot and loop support	Standard

Mil-SPEC

The Precision 3440 Small Form factor meets military specifications for the following MIL-STD 810G tests:

Table 62. Small Form Factor - Military specifications

Test Category	Test Method	Test Parameters
Non-operating altitude test Altitude chamber	Method 500.5 Procedure I	Test specification: ● Altitude: 15,000 ft ● Temperature: 21ºC ● Duration: 1 hour
Operating altitude test Altitude chamber	Method 500.5 Procedure II	Test specification: ● Altitude: 15,000 ft ● Temperature: 21ºC ● Duration: 1 hour
Non-operating high temperature test Programmable temperature and humidity chamber	Method 501.5 Procedure I	Test specification: ● Temperature: 71ºC ● Duration: 168 hours
Operating high temperature test Programmable temperature and humidity chamber	Method 501.5 Procedure II	Test specification: ● Temperature: 63ºC ● Duration: 120 hours
Non-operating low temperature test Programmable temperature and humidity chamber	Method 502.5 Procedure I	Test specification: ● Temperature: -51ºC ● Duration: 24 hours
Operating low temperature test Programmable temperature and humidity chamber	Method 502.5 Procedure II	Test specification: ● Temperature: -29ºC ● Duration: 24 hours
Humidity test Programmable temperature and humidity chamber	Method 507.6 Procedure I	Duration: Refer to MIL-spec Table 507.6-I Induced: Hot-humid.

Table 62. Small Form Factor - Military specifications (continued)

Test Category	Test Method	Test Parameters
		Duration: Refer to MIL-spec Table 507.6-II Induced: Non-hazardous items.
Mechanical shock test - I Non-operating	Method 516.6 Procedure VI	Test specification: ● Drop height: The lifted edge of the chassis has been raised 100 mm (4 in) above the horizontal bench top. ● Test face: Bottom down ● Test cycles: Total 4 drops ● 2 inch of plywood
Mechanical shock test - II Non-operating	Operating (execute "BurnIn test")	Test specification: ● Pulse shape: Half-sine ● Acceleration: 185 gms ● Pulse duration: 2 ms ● Shock direction: 6 faces (±X, ±Y, ±Z axes) ● No. of shock: 1 shock/ face (total 6 shocks)
Mechanical shock test - III Non-operating	Method 516.6 Procedure I	Test specification: ● Pulse shape: Trapezoidal ● Acceleration: 30 g ● Velocity change: 270 inch/second ● Shock direction: 6 faces (±X, ±Y, ±Z axes) ● No. of shock: 1 shock/ face (total 6 shocks)
Mechanical shock test - IV Non-operating	Operating (execute "BurnIn test")	Test specification: ● Pulse shape: Half-sine ● Acceleration: 185 gms ● Pulse duration: 2 ms ● Shock direction: 6 faces (±X, ±Y, ±Z axes) ● No. of shock: 1 shock/ face (total 6 shocks)

Operating vibration test	Method 514.6
	Procedure I,
	category 4
		Frequency: (10 - 500) Hz
		● Frequency: 10 Hz
		  ○ Left slope (dB/Oct.): -
		  ○ PSD (G²/Hz): 0.015
		  ○ Right slope (dB/Oct.): 0
		● Frequency: 40 Hz
		  ○ Left slope (dB/Oct.): 0
		  ○ PSD (G²/Hz): 0.015
		  ○ Right slope (dB/Oct.): -5.4
		● Frequency: 500 Hz
		  ○ Left slope (dB/Oct.): -5.4
		  ○ PSD (G²/Hz): 0.00015
		  ○ Right slope (dB/Oct.): -
		
		Direction: X, Y, Z axes
		
		Duration: 30 mins/ axis

Table 62. Small Form Factor - Military specifications (continued)

Test Category	Test Method	Test Parameters

Non-operating vibration test	Method 514.6 Procedure I, category 24	Frequency: (20 - 2000) Hz
		● Frequency: 20 Hz
		  ○ Left slope (dB/Oct.): -
		  ○ PSD (G²/Hz): 0.04
		  ○ Right slope (dB/Oct.): 0
		● Frequency: 1000 Hz
		  ○ Left slope (dB/Oct.): 0
		  ○ PSD (G²/Hz): 0.04
		  ○ Right slope (dB/Oct.): -6
		● Frequency: 2000 Hz
		  ○ Left slope (dB/Oct.): -6
		  ○ PSD (G²/Hz): 0.01
		  ○ Right slope (dB/Oct.): -
		
		Direction: X, Y, Z axes
		
		Duration: 30 mins/ axis

Blowing dust test:
● Non-operating: (25±2)°C
● Operating: (35±2)°C
	Method 510.5 Procedure I	Test specification:
		● Test temperature:
		  ○ Non-operating: (25±2)°C
		  ○ Operating: (60±2)°C
		● Dust concentration: (10.6±7) g/m³
		● Air flow velocity: 8.9 m/s (1750 ft/min). Approximately 20 mph
		● Test duration: 12 hours

Acoustic Noise Emission Information Tower

Table 63. Precision 3440 Small Form Factor

Component	Test Configuration
CPU	
Memory	
HDD (#, capacity)	
ODD	
Graphics Adapter	

Table 64. Declared Sound Power (LWAd)

Operating Mode	Declared Sound Power(LWAd)
Idle	3.5
HDD Operating	3.6
CPU Stressed	3.8
ODD Operating	4.0

Table 65. A-Weighted Sound Pressure Level (dB)

Declared Sound Pressure (LpA)		
	Tabletop System	Floor Standing System

Table 65. A-Weighted Sound Pressure Level (dB) (continued)

Declared Sound Pressure (LpA)				
Operating Mode	Operator Position	Bystander Position	Operator Position	Bystander Position
Idle	25.3	N/A	N/A	N/A
CPU Stressed	26.6	N/A	N/A	N/A

All tests are conducted according to ISO 7779 and declared according to ISO 9296 except CPU Stressed. This test mode is not specified in ISO 7779, but was measured using the same microphone distances and measurement techniques defined for the other reported operating modes.

Declared Sound Power rounded to nearest tenth of a bel per ISO 9296 section 4.4.2

Chassis enclosure and ventilation requirements

Enclosure ventilation

If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).

Enclosure minimum clearance

Leave a 10.2 cm (4 in.) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.

Recommended enclosure

Do not install your computer in an enclosure that does not allow airflow/dusty environment/temperate over 35ºC. Do not put any objects to directly block air-vent. This restricts the airflow and impacts your computer's performance, possibly causing it to overheat.

Open desk minimum clearance

If your computer is installed in a corner, on a desk, or under a desk, leave at least 5.1 cm (2 in.) clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.

Getting help and contacting Dell

Self-help resources

You can get information and help on Dell products and services using these self-help resources:

Table 66. Self-help resources

Self-help resources	Resource location
Information about Dell products and services	www.dell.com
My Dell	
Tips	
Contact Support	In Windows search, type `Contact Support`, and press Enter.
Online help for operating system	www.dell.com/support/windows www.dell.com/support/linux
Troubleshooting information, user manuals, setup instructions, product specifications, technical help blogs, drivers, software updates, and so on.	www.dell.com/support
Dell knowledge base articles for a variety of computer concerns.	1. Go to https://www.dell.com/support/home/?app=knowledgebase. 2. Type the subject or keyword in the **Search** box. 3. Click **Search** to retrieve the related articles.
Learn and know the following information about your product: ● Product specifications ● Operating system ● Setting up and using your product ● Data backup ● Troubleshooting and diagnostics ● Factory and system restore ● BIOS information	See *Me and My Dell* at www.dell.com/support/manuals. To locate the *Me and My Dell* relevant to your product, identify your product through one of the following: ● Select **Detect Product**. ● Locate your product through the drop-down menu under **View Products**. ● Enter the **Service Tag number** or **Product ID** in the search bar.

Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see www.dell.com/contactdell.

ⓘ **NOTE:** Availability varies by country and product, and some services may not be available in your country.

ⓘ **NOTE:** If you do not have an active internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.