

Dell PowerEdge R650

Technical Specifications

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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Technical specifications

The technical and environmental specifications of your system are outlined in this section.

Topics:

- [Chassis dimensions](#)
- [Chassis weight](#)
- [Processor specifications](#)
- [PSU specifications](#)
- [Supported operating systems](#)
- [Cooling specifications](#)
- [System battery specifications](#)
- [Expansion card riser specifications](#)
- [Memory specifications](#)
- [Storage controller specifications](#)
- [Drives](#)
- [Ports and connectors specifications](#)
- [Environmental specifications](#)

Chassis dimensions

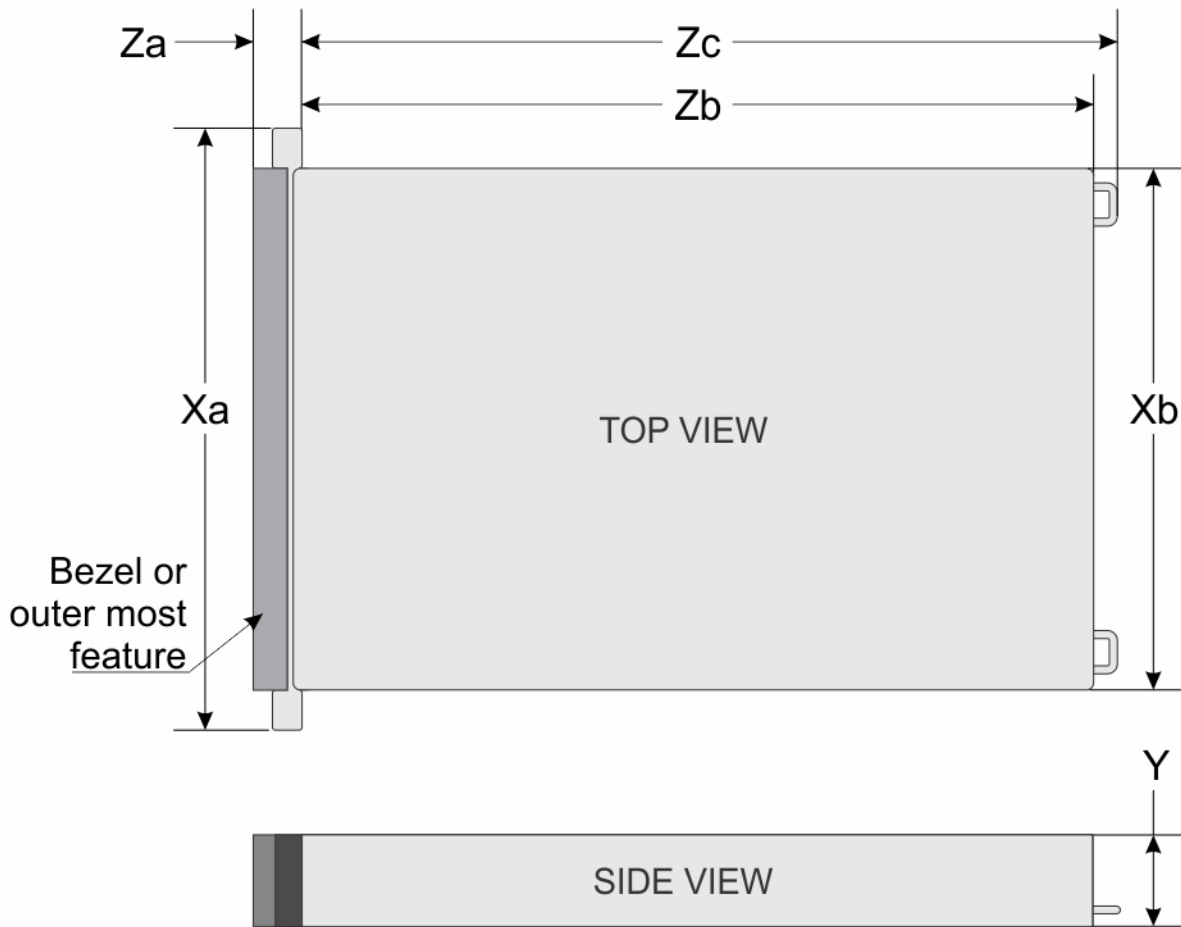


Figure 1. Chassis dimensions

Table 1. Chassis dimension for the system

Drives	Xa	Xb	Y	Za	Zb	Zc
4 drives, 10 drives	482 mm (18.97 inches)	434 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.4 inches) With bezel 22 mm (0.86 inches) Without bezel	751.48 mm (29.58 inches) Ear to rear wall	787.05 mm (31 inches) Ear to PSU handle
8 drives	482 mm (18.97 inches)	434 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.4 inches) With bezel 22 mm (0.86 inches) Without bezel	700.7 mm (27.5 inches) Ear to rear wall	736.27 mm (28.9 inches) Ear to PSU handle

NOTE: Zb is the nominal rear wall external surface where the system board I/O connectors reside.

Chassis weight

Table 2. Dell PowerEdge R650 chassis weight

System configuration	Maximum weight (with all drives/SSDs)
4 x 3.5-inch	21.2 kg (46.7 lbs)
8 x 2.5-inch	19.2 kg (42.3 lb)
10 x 2.5-inch	21.0 kg (46.2 lb)
0	17.2 kg (37.9 lb)

Processor specifications

Table 3. Processor specifications for the system

Supported processor	Number of processors supported
3 rd Generation Intel Xeon Scalable processors with up to 40 cores	Two

PSU specifications

The system supports up to two AC or DC power supply units (PSUs).

⚠ WARNING: Instructions for the qualified electricians only:

System using -(48-60) V DC or 240 V DC power supplies are intended for restricted access locations in accordance with Articles 110-5, 110-6, 110-11, 110-14, and 110-17 of the National Electrical Code, American National Standards Institute (ANSI)/National Fire Protection Association (NFPA) 70.

240 V DC power supplies shall be connected to the 240 V DC outlet from certified power distribution units if applicable in the country or region of use.

Power supply cords/jumper cords and the associated plugs/inlets/connectors shall have appropriate electrical ratings referencing the rating label on the system when used for connection.

Table 4. PSU specifications for the PowerEdge R650

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	AC		DC	Current
					High line 200–240 V	Low line 100–120 V		
800 W Mixed Mode	Platinum	3000 BTU/hr	50/60 Hz	100 - 240 V, autoranging	800 W	800 W	N/A	9.2 A - 4.7 A
	N/A	3000 BTU/hr	N/A	240 V DC	N/A	N/A	800 W	3.8 A
1100 W DC	N/A	4265 BTU/hr	N/A	-48 VDC - -60 VDC	N/A	N/A	1100 W	27 A
1100 W Mixed Mode	Titanium	4100 BTU/hr	50/60 Hz	100 - 240 V	1100 W	1050 W	N/A	12 A - 6.3 A

Table 4. PSU specifications for the PowerEdge R650 (continued)

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	AC		DC	Current
					High line 200–240 V	Low line 100–120 V		
	N/A	4100 BTU/hr	N/A	240 V DC	N/A	N/A	1100 W	5.2 A
1400 W Mixed Mode	Platinum	5250 BTU/hr	50/60 Hz	100 - 240 V	1400 W	1050 W	N/A	12 A - 8 A
	N/A	5250 BTU/hr	N/A	240 V DC	N/A	N/A	1400 W	6.6 A
1800 W Mixed Mode	Titanium	6610 BTU/hr	50/60	200—240 V AC	1800 W	N/A	N/A	10 A
	N/A		N/A	240 V DC	N/A	N/A	1800 W	8.2 A

NOTE: When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Enterprise Infrastructure Planning Tool available at Dell.com/calc.

Supported operating systems

The supports the following operating systems:

- Canonical Ubuntu Server LTS
- Citrix Hypervisor
- Microsoft Windows Server with Hyper-V
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi

Cooling specifications

Cooling options

The PowerEdge R650 requires various cooling components based on CPU TDP, storage modules and rear drives, GPU, persistent memory to maintain optimum thermal performance.

The PowerEdge R650 offers two types of cooling options:

- Air cooling
- Liquid cooling (optional)

The PowerEdge R650 system supports upto four standard (STD), high performance silver grade (HPR SLVR), or high performance gold grade (HPR (Gold)) dual cooling fan modules based on certain CPU TDP, drive configurations, GPU and BPS memory.

High performance SLVR and GOLD fans provide higher air flow rate through the system. For certain single CPU configurations only 3 set of fan modules are required and in such configurations a fan blank is required to block fan bay 1.

Cooling fan specifications

The R650 is adapting to dual fans module form factor. One set of fan module includes two fan body with one fan connector.

Table 5. Cooling fan specifications

Fan type	Abbreviation	Also known as	Label color	Label image
Standard fan	STD	STD	No label	 <p data-bbox="770 797 1042 824">Figure 2. Standard fan</p>
High performance (Silver grade) fan	HPR (SLVR)	HPR		<p data-bbox="770 882 1469 972">NOTE: New cooling fans comes with the High Performance Silver Grade label. While the older cooling fans has the High Performance label.</p>  <p data-bbox="770 1973 1147 2000">Figure 3. High performance fan</p>

Table 5. Cooling fan specifications (continued)

Fan type	Abbreviation	Also known as	Label color	Label image
				 <p data-bbox="770 1272 1326 1305">Figure 4. High performance (Silver grade) fan</p>
High performance (Gold grade) fan	HPR (Gold)	VHP - Very High Performance	Gold	<p data-bbox="770 1361 1469 1458">NOTE: New cooling fans comes with the High Performance Gold Grade label. While the older cooling fans has the High Performance label.</p>

Table 5. Cooling fan specifications (continued)

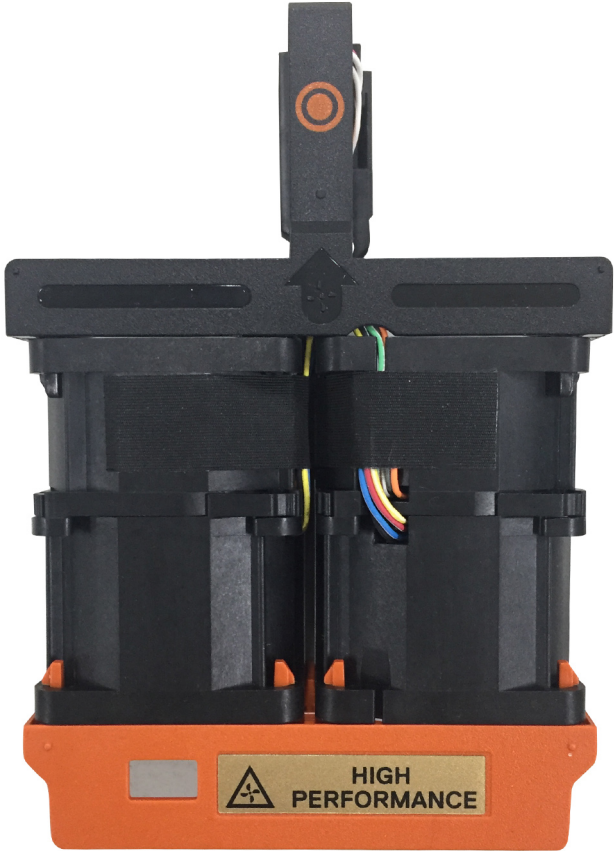
Fan type	Abbreviation	Also known as	Label color	Label image
				

Figure 5. High performance fan

Table 5. Cooling fan specifications (continued)

Fan type	Abbreviation	Also known as	Label color	Label image
				 <p data-bbox="770 1272 1310 1305">Figure 6. High performance (Gold grade) fan</p>

NOTE: The STD and HPR fans installation depends on the system configuration. For more information about the fan support configuration or matrix, see [Thermal restriction matrix](#).

System battery specifications

The system supports CR 2032 3.0-V lithium coin cell system battery.

Expansion card riser specifications

The PowerEdge R650 system supports up to three slots and all PCI express (PCIe) Gen 4 expansion cards.

Table 6. Expansion card slots supported on the system board

PCIe slot	With Regular shroud	R1a	R2a	R2b	R3a	R4c+R4d
Slot 1	Low profile- Half length	x16 (FH-3/4L)	x16	x16 (optional SNAPI support)	NA	NA

Table 6. Expansion card slots supported on the system board (continued)

PCIe slot	With Regular shroud	R1a	R2a	R2b	R3a	R4c+R4d
Slot 2	Low profile-Half length	NA	x16	x8	NA	x16 (FH-3/4L)
Slot 3	Low profile-Half length	NA	NA	NA	x16	NA

Memory specifications

The system supports the following memory specifications for optimized operation.

Table 7. Memory specifications

DIMM type	DIMM rank	DIMM capacity	Single processor		Dual processor	
			Minimum RAM	Maximum RAM	Minimum RAM	Maximum RAM
RDIMM	Single rank	8 GB	8 GB	128 GB	16 GB	256 GB
	Dual rank	16 GB	16 GB	256 GB	32 GB	512 GB
		32 GB	32 GB	512 GB	64 GB	1 TB
		64 GB	64 GB	1 TB	128 GB	2 TB
LRDIMM	Quad rank	128 GB	128 GB	2 TB	256 GB	4 TB
	Octa rank	256 GB	256 GB	4 TB	512 GB	8 TB
Intel Persistent Memory 200 series (BPS)	Single rank	512 GB	512 GB	4 TB	1 TB	8 TB

Table 8. Memory module sockets

Memory module sockets	Speed
32, 288-pin	3200 MT/s, 2933 MT/s, 2666 MT/s

Storage controller specifications

The system supports the following controller cards:

Table 9. Storage controller cards for the system

Internal controllers	External controllers
<ul style="list-style-type: none"> PERC H355 PERC H745 PERC H755 PERC H755N PERC H345 S150 HBA355I Boot Optimized Storage Subsystem (BOSS-S2): HW RAID 2 x M.2 SSDs 240 GB or 480 GB Boot Optimized Storage Subsystem (BOSS-S1 Adapter): HW RAID 2 x M.2 SSDs 240GB or 480GB 	<ul style="list-style-type: none"> PERC H840 HBA355E

NOTE: The software RAID S150 is supported on either SATA drives with chipset SATA only backplane or NVMe drives in universal slots with processor direct PCIe cable connected backplane.

NOTE: The system supports either BOSS-S1 or BOSS-S2.

NOTE: M.2 hotplug is not supported on BOSS-S1.

Drives

The PowerEdgeR650 system supports:

- 4 x 3.5-inch hot-swappable SAS, SATA drives.
- 8 x 2.5-inch hot-swappable SAS, SATA , or NVMe drives.
- 10 x 2.5-inch hot-swappable SAS, SATA , or NVMe drives.
- 2 x 2.5-inch rear SAS, SATA , or NVMe drives.
- 0 drive.

NOTE: For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at [Dell Support](#) page **Browse all Products > Data Center Infrastructure > Storage Adapters & Controllers > Dell PowerEdge Express Flash NVMe PCIe SSD > Documentation > Manuals and Documents.**

Ports and connectors specifications

USB ports specifications

Table 10. USB specifications

Front		Rear		Internal (Optional)	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	One	USB 2.0-compliant port	One	Internal USB 3.0-compliant port	One
Micro-USB, iDRAC Direct	One	USB 3.0-compliant port	One		

NOTE: The micro USB 2.0 compliant port can only be used as an iDRAC Direct or a management port.

NOTE: The USB 2.0 specifications provide a 5 V supply on a single wire to power connected USB devices. A unit load is defined as 100 mA in USB 2.0, and 150 mA in USB 3.0. A device may draw a maximum of 5 unit loads (500 mA) from a port in USB 2.0; 6 (900 mA) in USB 3.0.

NOTE: The USB 2.0 interface can provide power to low-power peripherals but must adhere to USB specification. An external power source is required for higher-power peripherals to function, such as external CD/DVD Drives.

NIC port specifications

The system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) and integrated on the optional OCP cards.

Table 11. NIC port specification for the system

Feature	Specifications
LOM card	1 GB x 2
OCP card (OCP 3.0)	1 GbE x 4, 10 GbE x 2, 25 GbE x 2, 25 GbE x 4, 50 GbE x 2, 100 GbE x 2

Serial connector specifications

The PowerEdgeR650 system supports one optional card type serial connector, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant .

The optional serial connector card is installed similar to an expansion card filler bracket.


IDSDM


The PowerEdgeR650 system supports Internal Dual SD module (IDSDM).

The IDSDM supports two SD cards and is available in the following configurations:

Table 12. Supported SD card storage capacity

IDSDM card
<ul style="list-style-type: none">• 16 GB• 32 GB• 64 GB

 **NOTE:** One IDSDM card slot is dedicated for redundancy.

 **NOTE:** Use Dell EMC branded SD cards that are associated with the IDSDM configured systems.

Video specifications

The PowerEdge R650 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 13. Supported video resolution options

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

Environmental specifications


 **NOTE:** For additional information about environmental certifications, refer to the **Product Environmental Datasheet** located with the Manuals & Documents on [Dell Support](#).

Table 14. Operational climatic range category A2

Temperature	Specifications
Allowable continuous operations	

Table 14. Operational climatic range category A2 (continued)

Temperature	Specifications
Temperature ranges for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent ranges (non-condensing at all times)	8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (33.8°F/984 Ft) above 900 m (2953 Ft)

Table 15. Operational climatic range category A3

Temperature	Specifications
Allowable continuous operations	
Temperature ranges for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment
Humidity percent ranges (non-condensing at all times)	8% RH with -12°C minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (33.8°F/574 Ft) above 900 m (2953 Ft)

Table 16. Operational climatic range category A4

Temperature	Specifications
Allowable continuous operations	
Temperature ranges for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment
Humidity percent ranges (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft)

Table 17. Shared requirements across all categories


Temperature	Specifications
Allowable continuous operations	
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape  NOTE: * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-104 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,048 meters (10,000 feet)

Table 18. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26 G _{rms} at 5 Hz to 350 Hz (all operation orientations)
Storage	1.88 G _{rms} at 10 Hz to 500 Hz for 15 minutes (all six sides tested)

Table 19. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms.
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axis (one pulse on each side of the system) of 71 G for up to 2 ms.

Thermal restriction for liquid cooling

Table 20. Label references

Label references	
STD	Standard
HPR	High Performance
HSK	Heat sink
LP	Low Profile (Riser)
FH	Full Height (Riser)
DW	Double Wide (Xilinx FPGA accelerator)

Table 21. Cooling fan matrix for liquid cooling

Configuration		4 x 3.5-inch			8 x 2.5-inch and No Backplane	10 x 2.5-inch SAS		10 x 2.5-inch NVMe	
Rear storage		3 LP/ 2 FH	Rear 2 x 2.5-inch	Rear 2 x 2.5-inch NVMe	3 LP/ 2 FH	3 LP/ 2 FH	Rear 2 x 2.5-inch SAS	3 LP/ 2 FH	Rear 2 x 2.5-inch NVMe
CPU TDP	105 W-270 W	HPR SLVR fan			HPR SLVR fan	HPR SLVR fan		HPR SLVR fan	
	64 GB RDIMM								
	128 GB LRDIMM								
	256 GB LRDIMM								
Memory	Optane Persistent Memory 200 series (Barlow Pass)	HPR SLVR fan			HPR SLVR fan	HPR SLVR fan		HPR SLVR fan	
	Without Barlow Pass								
	Barlow Pass + 64 GB RDIMM								
70 W T4 GPU	Barlow Pass + 128 GB LRDIMM or	HPR SLVR fan			HPR Gold fan	HPR Gold fan		HPR Gold fan	

Table 21. Cooling fan matrix for liquid cooling (continued)

Configuration		4 x 3.5-inch			8 x 2.5-inch and No Backplane	10 x 2.5-inch SAS		10 x 2.5-inch NVMe	
Rear storage		3 LP/ 2 FH	Rear 2 x 2.5-inch	Rear 2 x 2.5-inch NVMe	3 LP/ 2 FH	3 LP/ 2 FH	Rear 2 x 2.5-inch SAS	3 LP/ 2 FH	Rear 2 x 2.5-inch NVMe
	higher capacity LRDIMM								
	256 GB LRDIMM								

NOTE:

- Intel(R) Xeon(R) Platinum 8368Q_ICX XCC with 270W and 38 cores CPU (QWMQ) can only be supported in liquid cooling system
- HPR GOLD fan is required for NVDIMM support.
- Two FAN types HPR SLVR and GOLD are supported in R650 Liquid cooling configuration.
- Liquid cooling configurations do not support rear drive slots.
- PCIe/OCP cards \geq 25 Gb require 85°C active optic cable.
- Hard drive blanks are required.
- For 3.5-inch configuration with T4 GPU, Intel Persistent Memory 200 series (BPS) and 128 GB or higher capacity LRDIMM together support ambient temperature up to 30°C.
- For 3.5-inch configuration with T4 GPU, 256 GB LRDIMM support ambient temperature up to 30°C
- DIMM blank is not required in liquid cooling.
- 8 x 2.5-inch thermal restriction can cover No backplane configuration, this configuration increase 10 percent airflow without thermal impact.

ASHRAE A3 environment for liquid cooling

- Two PSUs are required in redundant mode, however PSU failure is not supported.
- 128 GB or greater capacity DIMMs are not supported.
- Intel Persistent Memory 200 series (BPS) and NVDIMM are not supported.
- NVMe drives are not supported.
- GPU and FPGA are not supported.
- Rear drives are not supported.
- BOSS 1.5 is not supported.
- Support OCP cooling tier \leq 5 and \geq 25 Gb OCP cards require 85°C active optic cable.
- Non-Dell qualified peripheral cards or peripheral cards greater than 25 W are not supported.
- PCIe cards \geq 25 Gb require 85°C active optic cable.

ASHRAE A4 environment for liquid cooling

- Two PSUs are required in redundant mode, however PSU failure is not supported.
- 128 GB or greater capacity DIMMs are not supported.
- NVMe drives are not supported.
- GPU and FPGA are not supported.
- Rear drives are not supported.
- BOSS 1.5 is not supported.
- Support OCP cooling tier \leq 4 and 85°C active optic cable is required.
- Non-Dell qualified peripheral cards and peripheral cards greater than 25 W are not supported.
- Intel Persistent Memory 200 series (BPS) and NVDIMM are not supported.

- Require 85°C active optic cable.

Thermal restrictions matrix for air cooling

Table 22. Label references

Label references	
STD	Standard
HPR	High Performance
HSK	Heat sink
LP	Low Profile (Riser)
FH	Full Height (Riser)
DW	Double Wide (Xilinx FPGA accelerator)
BPS	Intel Persistent Memory 200 series (BPS)

Table 23. Cooling fan matrix for air cooling

Configurati on	4 x 3.5-inch			8 x 2.5-inch and No Backplane	10 x 2.5-inch SAS		10 x 2.5-inch NVMe	
	3 LP/ 2 FH	Rear 2 x 2.5-inch	Rear 2 x 2.5-inch NVMe	3 LP/ 2 FH	3 LP/ 2 FH	Rear 2 x 2.5-inch SAS	3 LP/ 2 FH	Rear 2 x 2.5-inch NVMe
105 W / 120 W	STD fan	HPR SLVR fan		STD fan	HPR SLVR fan		HPR Gold fan	
135 W / 140 W								
150 W								
165 W								
185 W / 195 W	HPR SLVR fan			HPR SLVR fan	HPR Gold fan		HPR Gold fan	
205 W								
225 W / 230 W / 235 W								
240 W / 250 W	Not supported			HPR Gold fan	HPR Gold fan		HPR Gold fan	HPR Gold fan
265 W / 270 W				HPR Gold fan			Not supported	

Table 24. Processor and heat sink matrix

Heat sink	Processor TDP
STD HSK	≤ 165 W
T-type HSK	Processor 1 > 165 W
T-type HSK	Processor 2 > 165 W

Table 25. T4 GPU support restriction

Slots	2.5-inch x 10		2.5-inch x 8		3.5-inch x 4	
Rear Config	3 x LP	2 x FH	3 x LP	2 x FH	3 x LP	2 x FH
Slot 1	Supported	Supported	Supported	Supported	Supported	Supported
Slot 2	Supported	Supported	Supported	Supported	Supported	Supported
Slot 3	Supported	NA	Supported	NA	Supported	NA

Thermal restrictions for Non GPU/BPS configurations at 35°C environment:

- For 3.5-inch configuration:
 - No support for CPU > 225 W in 35°C environment.
- For 2.5-inch configuration:
 - No support for CPU > 250 W in rear NVMe configuration in 35°C environment.
 - No support for LRDIMM ≥ 128 GB if CPU ≥ 240 W for 10 x 2.5-inch HDD/NVMe in 35°C environment.

Thermal restrictions for T4 GPU at 35°C environment:

- For 3.5-inch configuration:
 - No support for LRDIMM ≥ 128 GB with T4 GPU.
 - T4 GPU not supported when CPU TDP > 205 W.
 - HPR SLVR fan is required.
- For 2.5-inch configuration:
 - No support for LRDIMM ≥ 128 GB with T4 GPU if CPU > 205 W.
 - HPR GOLD fan is required

Thermal restrictions for Optane Persistent Memory 200 series (BPS and 256 GB LRDIMM) at 35°C environment:

- For 3.5-inch configuration,
 - HPR SLVR fan is required.
 - BPS / 256 GB LRDIMM is not supported when:
 - CPU TDP > 165 W.
 - GPU is installed.
 - Rear drive is present.
- For 2.5-inch configuration:
 - HPR GOLD fan is required.
 - All NVMe 10 x 2.5-inch configuration is not supported if CPU TDP > 255 W.
 - 10 x 2.5-inch SAS/SATA with rear drive configuration is not supported if CPU TDP > 225 W.
 - No support for LRDIMM ≥ 128 GB along with BPS if CPU > 165 W
 - No support for 256 GB LRDIMM if CPU > 165 W

30°C configuration support for 2.5-inch storage module configuration

- For non GPU/BPS configuration
 - Up to 30°C ambient temperature support for CPU TDP 250 W - 270 W with 128 GB LRDIMM in rear drive configuration.
 - Up to 30°C ambient temperature support for CPU TDP 260 W - 270 W with 64 GB RDIMM in rear NVMe configuration.
- With GPU configuration
 - Up to 30°C ambient temperature support for CPU TDP 210 W - 270 W with GPU and 128 GB LRDIMM.
 - Up to 30°C ambient temperature support for CPU TDP 260 W - 270 W with GPU and 64 GB RDIMM in rear NVMe configuration.
- With BPS / 256 GB LRDIMM configuration
 - Up to 30°C ambient temperature support for CPU TDP 185 W - 270 W with BPS and 128 GB / 256 GB LRDIMM or 256 GB LRDIMM
 - Up to 30°C ambient temperature support for CPU TDP 230 W - 270 W with BPS and 64 GB RDIMM in rear drive configuration.
 - Up to 30°C ambient temperature support for CPU TDP 185 W - 270 W with GPU T4, BPS and 128 GB / 256 GB LRDIMM or GPU T4 and 256 GB LRDIMM
 - Up to 30°C ambient temperature support for CPU TDP 230 W - 270 W with GPU T4, BPS and 64 GB RDIMM in rear drive configuration.
 - Up to 30°C ambient temperature support for CPU TDP 260 W - 270 W with BPS and 64 GB RDIMM in NVMe configuration.
 - Up to 30°C ambient temperature support for CPU TDP 260 W - 270 W with GPU T4, BPS and 64 GB RDIMM in NVMe configuration.

NVMe Thermal Restrictions in Rear Slot for Air Cooling

- Check which config can support NVMe in the rear slot in terms of CPU/DIMM/GPU/Barlow PASS Memory/256GB LRDIMM restrictions.
- Based on the 1st step to check the exception of different NVMe drive support, drive-to-drive will have different support capacity along with different DIMM capacity.
- Intel P5500/5600:
 - Capacity ≤ 7.68TB: DIMM capacity support is up to 256GB LRDIMM.
 - Capacity ≤ 7.68TB: Barlow Pass Memory capacity support is up to 512 GB in 2.5" config.
- Intel P4800X: not supported.
- Samsung PM1735_V2:
 - Capacity ≤ 12.8TB: DIMM capacity support is up to 64GB RDIMM.
 - Capacity ≤ 6.4TB: DIMM capacity support is up to 256GB LRDIMM.
 - Barlow Pass Memory is not supported when NVMe capacity is more than 6.4TB.
- Samsung PM1733_V2, Capacity ≤ 15.36TB:
 - Capacity ≤ 15.36TB: DIMM capacity support is up to 64GB RDIMM.
 - Capacity ≤ 7.68TB: DIMM capacity support is up to 256GB LRDIMM.
 - Barlow Pass Memory is not supported when NVMe capacity is more than 7.68TB.
- Kioxia CM6, Capacity between 1.92TB to 15.36TB: not supported.
- Intel P5800X:
 - Capacity ≤ 1.6TB: DIMM capacity support is up to 256GB LRDIMM.
 - Capacity ≤ 1.6TB: Barlow Pass Memory capacity support is up to 512 GB in 2.5" config.
- Hynix PE8010:
 - Capacity between 3.84TB to 7.68TB: not supported.
 - Capacity ≤ 1.92TB: DIMM capacity support is up to 64GB RDIMM.
 - Not supported with Barlow pass memory.

Other restrictions for Air cooling

- HPR GOLD fan is required for NVDIMM support.
- PCIe/OCP cards ≥ 25 Gb require 85°C active optic cable.
- CPU/DIMM/HDD Blanks:
 - HDD blank is required if the slot doesn't install HDD.
 - DIMM blank is required, but partial configs with EXT HS (CPU > 165W) support to remove DIMM blanks.
 - Single CPU config: Fan modules #1 is not required, but CPU & DIMM blank are required.
- For 1 processor configuration, fan module 1 is not required but fan blank is required.
- Intel® Xeon® Platinum 8368Q_ICX XCC_ with 270 W and 38C processor is not supported in air cooling system.
- Exception of heatsink application rule: Intel® Xeon® Gold 6334_ICX HCC with 165 W and 8C CPU require T-type EXT HTSNK, not STD HTSNK.
- 8 x 2.5-inch thermal restriction can cover No backplane configuration, this configuration increase 10 percent airflow without thermal impact.

ASHRAE A3 and A4 thermal restrictions for air cooling

ASHRAE A3 environment

- Two PSUs are required in redundant mode, however PSU failure is not supported.
- PCIe SSD is not supported.
- NVMe drive are not supported.
- 128 GB or greater capacity DIMMs are not supported.
- Intel Persistent Memory 200 series (BPS) and NVDIMM are not supported.
- GPU and FPGA are not supported.
- CPU TDP >185 W are not supported.
- Rear drives are not supported.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- BOSS 1.5 is not supported.
- Supports OCP, cooling tier ≤ 5 and 85°C active optic cable is required.

ASHRAE A4 environment

- Two PSUs are required in redundant mode, however PSU failure is not supported.
- PCIe SSD is not supported.
- NVMe drives are not supported.
- 128 GB or greater capacity DIMMs are not supported.
- GPU and FPGA are not supported.
- CPU TDP > 105 W are not supported.
- Rear drives are not supported.
- BOSS 1.5 is not supported.
- Supports OCP, cooling tier ≤ 4 and 85°C active optic cable is required.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- Intel Persistent Memory 200 series (BPS) and NVDIMM are not supported.

Particulate and gaseous contamination specifications


The following table defines the limitations that help avoid any damages to the IT equipment and/or, or both failure from particulate and gaseous contamination. If the levels of particulate or gaseous pollution exceed the specified limitations and results in equipment damage or failure, you must rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 26. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	<p>Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.</p> <p>i NOTE: This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor.</p> <p>i NOTE: Air entering the data center must have MERV11 or MERV13 filtration.</p> <p>i NOTE: Air filtering can also be accomplished by filtering room air with MERV8 filter per ANSI/ASHRAE Standard 127</p>
Conductive dust	<p>Air must be free of conductive dust, zinc whiskers, or other conductive particles.</p> <p>i NOTE: This condition applies to data center and non-data center environments.</p> <p>i NOTE: Common sources of conductive dust include manufacturing processes, and zinc whiskers from the plating on the bottom of raised floor tiles</p>
Corrosive dust	<ul style="list-style-type: none"> • Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. <p>i NOTE: This condition applies to data center and non-data center environments.</p>

Table 27. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper Coupon Corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-2013
Silver Coupon Corrosion rate	<200 Å/month as defined by ANSI/ISA71.04-2013

 **NOTE:** Maximum corrosive contaminant levels measured at $\leq 50\%$ relative humidity.