Dell EMC PowerEdge R940xa

Technical Specifications

Regulatory Model: E54S Series
Regulatory Type: E54S001
November 2022
Rev. A15

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.

Contents

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Technical specifications

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

Topics:

System dimensions

This section describes the physical dimensions of the system.

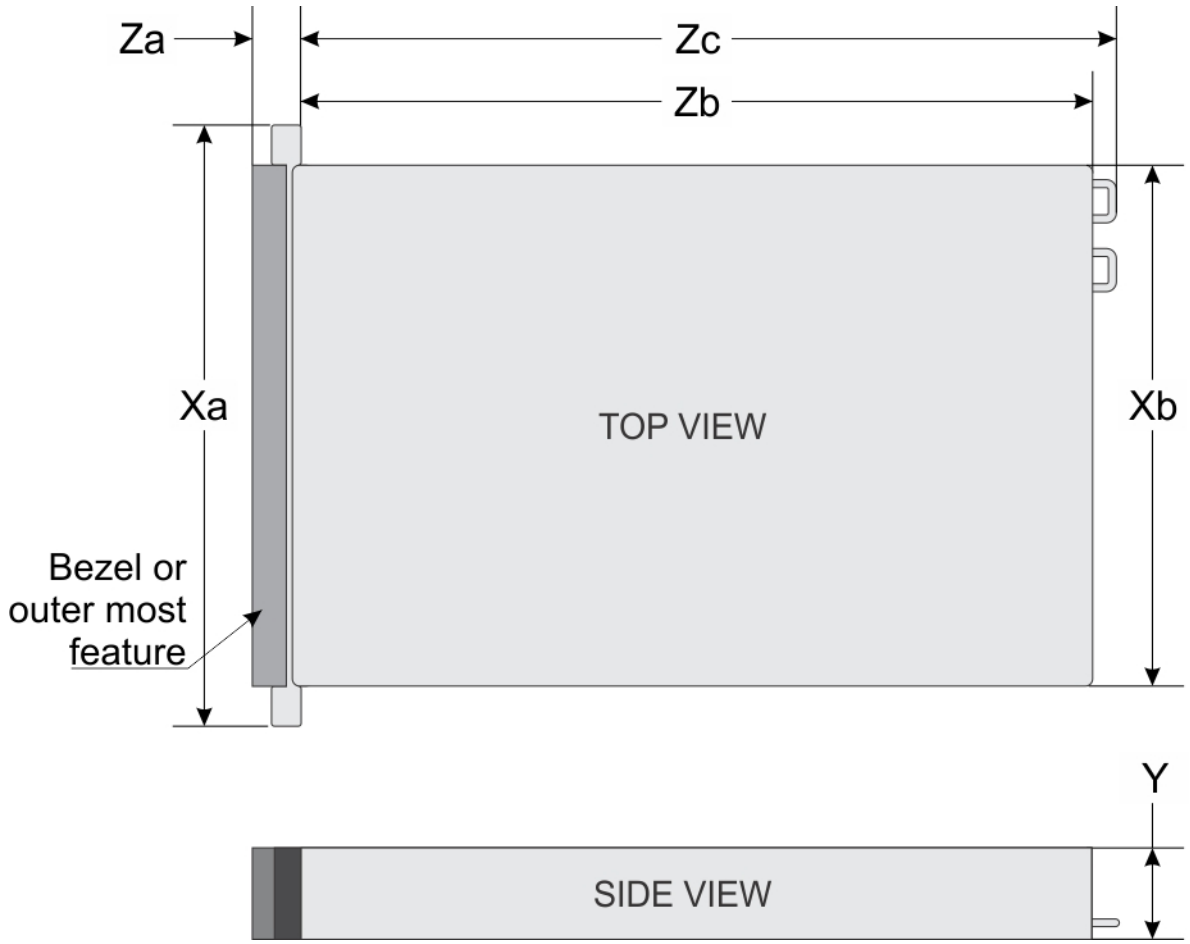

Figure 1. System dimensions of PowerEdge R940xa system

Table 1. Dimensions

System	Xa	Xb		Y	Za		Zb	Zc
		Upper	Bottom		(with bezel)	(without bezel)		
PowerEdge R940xa	482.0 mm (18.98 inches)	441.16 mm (17.37 inches)	422.5 mm (16.64 inches)	174.3 mm (6.87 inches)	35.84 mm (1.41 inches)	23.9 mm (0.94 inches)	812 mm (31.96 inches)	842 mm (33.14 inches)

Chassis weight

Table 2. Chassis weight

System	Maximum weight (with all drives)
PowerEdge R940xa (2.5 x 32 + X16 PCIe Riser 1/X16 PCIe Riser 2 riser with 4 DW GPU + 2 full height, half length PCIE cards)	56.0 Kg (111.75 lb)

Processor specifications

The PowerEdge R940xa system supports two or four Intel Xeon Processor Scalable Family (Skylake-EP) Gold and Platinum processors.

Supported operating systems

The supports the following operating systems:

RedHat Enterprise Linux
Novell SuSE Linux Enterprise Server
Microsoft Windows Server
Ubuntu
VMWare ESXi
Citrix Hypervisor

For more information, go to www.dell.com/ossupport.

PSU specifications

The PowerEdge R940xa system supports up to four AC or DC power supply units (PSUs).

Table 3. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	High line 200v240 V	Low line 100– 140 V	DC	Current
750 W Mixed Mode HVDC (for China only)	Platinum	2891 BTU/hr	50/60 Hz	100–240 V AC, autoranging	750 W	750 W	N/A	10 A–5 A
	N/A	2891 BTU/hr	N/A	240 V DC, autoranging	N/A	N/A	750 W	4.5 A
750 W Mixed Mode AC	Platinum	2891 BTU/hr	50/60 Hz	100–240 V AC	750 W	750 W	N/A	10 A-5 A
750 W Mixed Mode DC (for China only)	N/A	2891 BTU/hr	50/60 Hz	240 V DC	750 W	N/A	750 W	5 A
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100–240 V AC, autoranging	1100 W	1050 W	N/A	12 A–6.5 A
1100 W DC	N/A	4416 BTU/hr	N/A	–(48–60) V DC, autoranging	N/A	N/A	1100 W	32 A
1100 W Mixed Mode HVDC (for China and Japan only)	Platinum	4100 BTU/hr	50/60 Hz	100–240 V AC, autoranging	1100 W	1050 W	N/A	12 A–6.5 A
	N/A	4100 BTU/hr	N/A	200–380 V DC, autoranging	N/A	N/A	1100 W	6.4 A–3.2 A
1600 W HLAC	Titanium	5840 BTU/hr	50/60 Hz	200–240 V AC	1600 W	NA	NA	10 A

Table 3. PSU specifications (continued)

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	High line 200v240 V	Low line 100– 140 V	DC	Current
1600 W AC	Platinum	6000 BTU/hr	50/60 Hz	100–240 V AC, autoranging	1600 W	800 W	N/A	10 A
2000 W AC	Platinum	7500 BTU/hr	50/60 Hz	100–240 V AC, autoranging	2000 W	1000 W	N/A	11.5 A
2400 W AC	Platinum	9000 BTU/hr	50/60 Hz	100–240 V AC, autoranging	2400 W	1400 W	N/A	16 A
2600 W HLAC	Titanium	9500 BTU/hr	50/60 Hz	200–240 V AC	2600 W	NA	NA	15 A

NOTE: Heat dissipation is calculated using the PSU wattage rating.

NOTE: This system is also designed to connect to the IT power systems with a phase to phase voltage not exceeding 240 V.

NOTE: PSUs rated for 1100 W AC or 1100 W Mixed Mode HVDC and higher require high-line voltage (200–240 V AC) to supply their rated capacity.

System battery specifications

The PowerEdge R940xa system supports CR 2032 3.0-V lithium coin cell system battery.

PCIe riser and slots

The PowerEdge R940xa system supports up to twelve PCI express (PCIe) generation 3 expansion cards that can be installed on the system board and expansion card risers. The following table provides detailed information about the expansion card riser specifications:

Table 4. PCIe riser and slots specifications

Number of processors	NVMe	GPU	Riser size	Slot size	Slot quantity	Available slots	Height	Length
4	NA	GPU Ready/ Double wide accelerators capable	X16 PCIe Riser 1	X 16	2	2,4	FH	FL
				X 8	1	5	FH	HL
			X16 PCIe Riser 2	X 16	2	9,11	FH	FL
				X 8	1	12	FH	HL
	NA	Non-GPU/ Single wide FPGA	X8 PCIe Riser 1	X 8	5	1,2,3,4,5	FH	HL
			X8 PCIe Riser 2	X 8	5	8,9,10,11,12	FH	HL
	Front NVMe	GPU Ready/ Double wide accelerators capable	X16 PCIe Riser 1	X 16	2	2,4	FH	FL
			X16 PCIe Riser 2	X 16	2	9,11	FH	FL
	Front NVMe	Non-GPU/ Single wide FPGA	X8 PCIe Riser 1	X 8	4	1,2,3,4	FH	HL
			X8 PCIe Riser 2	X 8	4	8,9,10,11	FH	HL

Table 4. PCIe riser and slots specifications (continued)

Number of processors	NVMe	GPU	Riser size	Slot size	Slot quantity	Available slots	Height	Length
2	NA	GPU Ready/ Double wide accelerators capable	X16 PCIe Riser 1	X 16	1	4	FH	FL
			X16 PCIe Riser 2	X 16	1	11	FH	FL
	NA	Non-GPU/ Single wide FPGA	X8 PCIe Riser 1	X 8	2	3,4	FH	HL
			X8 PCIe Riser 2	X 8	2	10,11	FH	HL

NOTE: Use double-wide accelerator capable for installation or removal of Xilinx card.

Memory specifications

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Table 5. Memory specifications

Memory module sockets	DIMM type	DIMM rank	DIMM capacity	Dual processors		Quad processors	
				Minimum RAM	Maximum RAM	Minimum RAM	Maximum RAM
48 288-pins	LRDIMM	Octal rank	256 GB	512 GB	6144 GB	1024 GB	12.288 TB
	LRDIMM	Octal rank	128 GB	256 GB	3072 GB	512 GB	6144 GB
	LRDIMM	Quad rank	64 GB	128 GB	1536 GB	256 GB	3072 GB
	RDIMM	Dual rank	64 GB	128 GB	1536 GB	256 GB	3072 GB
	RDIMM	Dual rank	32 GB	64 GB	768 GB	128 GB	1536 GB
	RDIMM	Dual rank	16 GB	32 GB	384 GB	64 GB	768 GB
	RDIMM	Single rank	8 GB	16 GB	192 GB	32 GB	384 GB
	NVDIMM-N	Single rank	16 GB	RDIMM: 192 GB	RDIMM: 384 GB	RDIMM: 384 GB	RDIMM: 1152 GB
				NVDIMM-N: 16 GB	NVDIMM-N: 192 GB	NVDIMM-N: 16 GB	NVDIMM-N: 192 GB
	PMem	N/A	128 GB	RDIMM: 192 GB	LRDIMM: 1536 GB	RDIMM: 384 GB	LRDIMM: 3072 GB
				PMem: 1536 GB	PMem: 1536 GB	PMem: 248 GB	PMem: 3072 GB
		N/A	256 GB	RDIMM: 384 GB	LRDIMM: 1536 GB	RDIMM: 384 GB	LRDIMM: 3072 GB
				PMem: 2048 GB	PMem: 3072 GB	PMem: 4096 GB	PMem: 6144 GB
		N/A	512 GB	RDIMM: 384 GB	LRDIMM: 1536 GB	RDIMM: 768 GB	LRDIMM: 3072 GB
				PMem: 4096 GB	PMem: 6144 GB	PMem: 8192 GB	PMem: 12,288 GB

NOTE: Do not mix 8 GB RDIMMs and 16 GB NVDIMM-Ns.

NOTE: Do not mix 64 GB LRDIMMs, 128 GB LRDIMMs and 256 GB LRDIMMs.

NOTE: 256GB does not support GPU configuration.

Table 6. DIMM blank population rules

Processor configuration	Processor 1	Processor 2	Processor 3	Processor 4
Dual processor	Required	Required	Not required	Not required
Quad processor	Required	Required	Required	Required

PMem and 256GB LRDIMM Thermal Restrictions

Table 7. PMem Thermal Restrictions

PMem Support	V2 Air-shroud	V1 Air-shroud
8x 2.5-inch SAS/SATA	30C ambient temperature support, 25C ambient temperature with 256GB LRDIMMs	25C ambient temperature support, not supported with 256GB LRDIMM
24x 2.5-inch SAS/SATA	30C ambient temperature support, not supported with 256GB LRDIMM	25C ambient temperature support, not supported with 256GB LRDIMM
32x 2.5-inch SAS/SATA or mixed NVMe	30C ambient temperature support, not supported with 256GB LRDIMM	25C ambient temperature support, not supported with 256GB LRDIMM

NOTE: PMem does not support GPU configuration.

Storage controller specifications

The PowerEdge R940xa system supports:

- Internal storage controller cards: PowerEdge RAID Controller (PERC) H330, H350, PERC H730P, H830, H740P, H750, H840, HBA330, HBA350i, S140, and Boot Optimized Server Storage—BOSS-S1.
- External storage controller cards: 12 Gbps SAS HBA, including HBA355e.

Drive specifications

Storage

The Dell EMC PowerEdge R940xa provide scalable storage that allows you to adapt to your workload and operational demands. The Dell EMC PowerEdge R940xa offers storage expansion with the middle hard drive tray and rear hard drive cage. The hard drive bay supports up to 32 2.5-inch hard drives or SSDs.

Drive

The PowerEdge R940xa system supports SAS, SATA, Nearline SAS hard drives/SSDs, or NVMe drives.

The supported drive options for the PowerEdge R940xa system are:

- **8 drives system** - Up to eight 2.5-inch (SAS, SATA, or Nearline SAS) front accessible drives in slots 0 through 7.
- **32 drives system** - Up to 24 2.5-inch (SAS, SATA, or Nearline SAS) including 4 NVMe front accessible drives (slots 20 to 23) in slots 0 to 23 of upper drives bay, and up to eight 2.5-inch (SAS, SATA, or Nearline SAS) front accessible drives in slots 24 to 31 of lower drives bay.

Internal storage configuration matrix

Table 8. Internal storage configuration matrix

HDD/SDD (not BOSS)	NVMe Enabled/ Universal Slot	Internal Storage (Front)	Internal Storage (Rear)	PERC cards	Storage Controller(s)	Controller
8	0/0	8 x 2.5 inch SATA (passive)	N/A	1	SATA S140	N/A
8	0/0	8 x 2.5 inch SAS/SATA (passive)	N/A	1	PERC H330, H350	Adapter
8	0/0	8 x 2.5 inch SAS/SATA (passive)	N/A	1	PERC H730P, H750	Adapter
8	0/0	8 x 2.5 inch SAS/SATA (passive)	N/A	1	PERC H740P, H750	Adapter
8	0/0	8 x 2.5 inch SAS/SATA (passive)	N/A	1	HBA330, HBA350	Adapter
32	0/0	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H740P, H750	Adapter
32	0/0	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H730P, H750	Adapter
32	0/0	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H330, H350	Adapter
32	0/0	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	HBA330, HBA350	Adapter
32	4/4	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H730P, H750 S140 (NVMe enablement)	Adapter
32	4/4	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H740P, H750 S140 (NVMe enablement)	Adapter
32	4/4	24 x 2.5 inch SAS/SATA / NVMe (expander) 8 x 2.5 inch SAS/SATA (passive)	N/A	2	PERC H330, H350 S140 (NVMe enablement)	Adapter
32	4/4	24 x 2.5 inch SAS/SATA / NVMe (expander)	N/A	2	HBA330, HBA350 S140 (NVMe enablement)	Adapter

Table 8. Internal storage configuration matrix (continued)

HDD/SDD (not BOSS)	NVMe Enabled/ Universal Slot	Internal Storage (Front)	Internal Storage (Rear)	PERC cards	Storage Controller(s)	Controller
		8 x 2.5 inch SAS/SATA (passive)				

Boot Optimized Storage Subsystem

The Boot Optimized Storage Subsystem (BOSS) is offered as a means of booting PowerEdge systems to a full operating system mode when:

- Target operating system is a full operating system and not hypervisor that may be supported best by IDSDM
- You do not want to trade off standard hot plug drive slots for operating system install

The RAID controller on the BOSS card has limited set of features. This RAID controller presents the M.2 SATA SSDs as either a non-RAID volume or as a single RAID volume.

Figure 2. Boot Optimized Storage Subsystem (BOSS)

Table 9. BOSS features

Function or feature	Supported
Stripe size supported	64 K
Configuration (HII)	Yes
Full initialization	No
Fast initialization	Yes **NOTE:** By default, fast initialization is performed when you create a virtual drive.
Background initialization	No
RAID 0	No
RAID 1	Yes
Single non-RAID	Yes
Dual non-RAID	Yes
Degraded RAID1 and non-RAID	No
Foreign import	Yes

Table 9. BOSS features (continued)

Function or feature	Supported
Consistency check	No
Patrol read	No
Load balance	N/A
Rebuild	Yes **NOTE:** You must manually start the rebuild process using HII or using the Marvell CLI.
Auto-rebuild	Yes **NOTE:** Auto-rebuild is performed when the system is powered on only if there is a surviving native virtual drive and another hard drive is present.
Hot spare	No
Change rebuild priority/rate.	No
Virtual disks write back/read ahead cache.	No **NOTE:** BOSS controller does not support controller cache.
Battery support	N/A **NOTE:** BOSS controller does not support a battery.
Non-RAID disk cache policy	Yes **NOTE:** Operating system controlled/Device defaults.
SMART Info	Yes **NOTE:** Use the Marvell CLI to retrieve the SMART information from the drives.
Physical disk hot swap	No
Virtual disk expansion	No
Virtual disk slicing	No
Virtual disk migration	Yes **NOTE:** On new controller, virtual disk must be Imported from HII before presented to operating system.
Split mirror	No **NOTE:** System that is required to shutdown and migrate one hard drive to another system and continue rebuild.
Non-RAID migration	Yes
BIOS configuration utility (Ctrl-M)	No
Add on driver for data path (operating system device driver).	No **NOTE:** Console Windows driver or Linux library is required for management purposes only.
4K native drive support	No
TRIM and UNMAP virtual disk	No
TRIM and UNMAP Non-RAID hard drive	Yes
Self-encrypting drives(SED) support	No
Cryptographic erase (sanitize).	Yes **NOTE:** If drive supports SANITIZE Crypto Erase. No other encryption support from controller or drive.

Optical drives

The PowerEdge R940xa system supports one optional slim SATA DVD-ROM drive or DVD +/-RW drive.

NOTE: DVD devices support only data.

External storage

Table 10. External storage device types

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12Gb MD-series JBODs

Optical drives

The PowerEdge R940xa supports one of the following internal optical drive options:

- DVD-ROM
- DVD+RW

Tape drives

The PowerEdge R940xa does not support internal tape drives. However, external tape drives are supported. The supported external tape drives are as mentioned below:

- External RD1000 USB
- External LTO-5, LTO-6,LTO-7 and 6 Gb SAS tape drives
- 114X rack mount chassis with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL1000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL2000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL2000 with LTO-5, LTO-6, and LTO-7 8Gb FC tape drives
- TL4000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL4000 with LTO-5, LTO-6, and LTO-7 8Gb FC tape drives
- ML6000 with LTO-5, LTO-6, 6 Gb SAS tape drives
- ML6000 with LTO-5, LTO-6, LTO-7 8Gb FC tape drives

Ports and connectors specifications

USB ports

The PowerEdge R940xa system supports:

- Two USB 2.0-compliant ports on the front of the system
- One internal USB 3.0-compliant port
- One optional USB 3.0-compliant port on the front of the system

  NOTE: The USB 3.0 port is supported in the 8x2.5-inch configuration only.
- One micro USB 2.0-compliant port in the front of the system for iDRAC Direct

  NOTE: The micro USB 2.0 compliant port on the front of the system can only be used as an iDRAC Direct or a management port.
- Two USB 3.0-compliant ports on the back of the system

NIC ports

The PowerEdge R940xa system supports up to four Network Interface Controller (NIC) ports that are integrated on the network daughter card (NDC), and are available in the following configurations:

- Four RJ-45 ports that support 10, 100 and 1000 Mbps
- Four RJ-45 ports that support 100 M, 1 G and 10 Gbps
- Four RJ-45 ports, where two ports support maximum of 10 G and the other two ports maximum of 1 G
- Two RJ-45 ports that support up to 1 Gbps and 2 SFP+ ports that support up to 10 Gbps
- Four SFP+ ports that support up to 10 Gbps
- Two SFP28 ports that support up to 25 Gbps

VGA ports

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The PowerEdge R940xa system supports two 15-pin VGA ports on the front and back panels.

Serial connector

The PowerEdge R940xa system supports one serial connector on the back panel, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant.

IDSDM or vFlash module

The PowerEdge R940xa system supports optional Internal Dual SD module (IDSDM) or vFlash module. In 14th generation of PowerEdge servers, IDSDM or vFlash module are combined into a single card module, and are available in these configurations:

- vFlash or
- vFlash and IDSDM

The IDSDM or vFlash module sits in the back of the system, in a Dell-proprietary slot. IDSDM or vFlash module supports three micro SD cards (two cards for IDSDM and one card for vFlash). Micro SD cards capacity for IDSDM are 16, 32, 64 GB while for vFlash the microSD card capacity is 16 GB.

NOTE: There are two dip switches on the IDSDM or vFlash module for write-protection.

NOTE: One IDSDM card slot is dedicated for redundancy.

NOTE: It is recommended to use Dell branded MicroSD cards associated with the IDSDM or vFlash configured systems.

Video specifications

The PowerEdge R940xa system supports integrated Matrox G200eW3 graphics controller with 16 MB of video frame buffer.

Table 11. Supported video resolution options

Resolution	Refresh Rate	Color depth (bits)	Horizontal Freq.	Pixel Clock	Rear Panel	Front Panel	DVO DisplayPort
1024 x 768	60 Hz	8, 16, 32	48.4 kHz	65.0 MHz	Yes	Yes	Yes*
1280 x 800	60 Hz	8, 16, 32	49.7 kHz	83.5 MHz	Yes	Yes	Yes*
1280 x 1024	60 Hz	8, 16, 32	64.0 kHz	108.0 MHz	Yes	TBD	Yes*
1360 x 768	60 Hz	8, 16, 32	47.71 kHz	85.5 MHz	Yes	Yes	Yes*
1440 x 900	60 Hz	8, 16, 32	55.9 kHz	106.5 MHz	Yes	TBD	Yes*
1600 x 900	60 Hz (RB)	8, 16, 32	55.54 kHz	97.75 MHz	Yes	Yes	Yes*
1600 x 1200	60 Hz	8, 16, 32	75.0 kHz	162.0 MHz	TBD	TBD	Yes*

Table 11. Supported video resolution options (continued)

Resolution	Refresh Rate	Color depth (bits)	Horizontal Freq.	Pixel Clock	Rear Panel	Front Panel	DVO DisplayPort
1680 x 1050	60 Hz (RB)	8, 16, 32	64.7 kHz	119.0 MHz	Yes	TBD	Yes*
1920 x 1080	60 Hz	8, 16, 32	67.158 kHz	173.0 MHz	TBD	No	No
1920 x 1200	60 Hz	8, 16, 32	74.556 kHz	193.25 MHz	TBD	No	No

NOTE: 1920 x 1080 and 1920 x 1200 resolutions are only supported in reduced blanking mode.

Environmental specifications

NOTE: For additional information about environmental certifications, please refer to the Product Environmental Datasheet located with the Manuals & Documents on www.dell.com/poweredgemanuals.

Table 12. Temperature specifications

Temperature	Specifications
Storage	–40°C to 65°C (–40°F to 149°F)
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.
Maximum temperature gradient (operating and storage)	20°C/h (68°F/h)

Table 13. Relative humidity specifications

Relative humidity	Specifications
Storage	5% to 95% RH with 33°C (91°F) maximum dew point. Atmosphere must be non-condensing at all times.
Operating	10% to 80% relative humidity with 29°C (84.2°F) maximum dew point.

Table 14. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26 G_{rms} at 5 Hz to 350 Hz (all three axes).
Storage	1.88 G_{rms} at 10 Hz to 500 Hz for 15 min (all six sides tested).

Table 15. Maximum shock specifications

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

Table 16. Maximum altitude specifications

Maximum altitude	Specifications
Operating	3048 m (10,000 ft)
Storage	12,000 m (39,370 ft)

Table 17. Operating temperature de-rating specifications

Operating temperature de-rating	Specifications
Up to 35°C (95°F)	Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3,117 ft).
35°C to 40°C (95°F to 104°F)	Maximum temperature is reduced by 1°C/175 m (1°F/319 ft) above 950 m (3,117 ft).
40°C to 45°C (104°F to 113°F)	Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3,117 ft).

Standard operating temperature

Table 18. Standard operating temperature specifications

Standard operating temperature	Specifications
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.

Thermal and acoustics

The system's thermal management delivers high performance through optimized cooling of components at the lowest fan speeds across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges. These optimizations result in lower fan power consumption which translate to lower system power and data center power consumption.

Thermal design

The thermal design of the system reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design. System component placement and layout are designed to provide maximum airflow coverage to critical components with minimal expense of fan power.
- Comprehensive thermal management: The thermal control system regulates the system fan speeds based on feedback from system component temperature sensors, as well as for system inventory and subsystem power draw. Temperature monitoring includes components such as processors, DIMMs, chipset, system inlet air ambient, hard disk drives, NDC, and GPU.
- Open and closed loop fan speed control: Open loop fan control uses system configuration to determine fan speed based on system inlet air temperature. Closed loop thermal control uses temperature feedback to dynamically adjust fan speeds based on system activity and cooling requirements.
- User-configurable settings: With the understanding and realization that every customer has a unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user-configurable settings in the iDRAC9 BIOS setup screen. For more information, see the Dell EMC PowerEdge system Installation and Service Manual on Dell.com/Support/Manuals and “Advanced Thermal Control: Optimizing across Environments and Power Goals” on Dell.com.
- Cooling redundancy: The system allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the R940xa reliable under a wide range of operating environments.

Expanded operating temperature restrictions

- The operating temperature is for a maximum altitude of 950 m for fresh air cooling
- No cold start-ups below 5°C due to hard drive constraints
- Apache Pass DIMM, NVDIMM, PCIeSSD and NVME are not supported
- GPGPU configuration are not supported
- LRDIMM > 32 GB are not supported in x4 socket configurations
- DCPMMs are not supported.

- Redundant power supply units are required
- Non Dell qualified peripheral cards and /or peripheral cards greater than 25 W are not supported
- Intel FPGA is not supported
- Mellanox CX5 is not supported

Fresh air restrictions

Following table lists the configuration required for efficient cooling.

Table 19. Fresh air restriction matrix

Processors	Number of Processor/ GPUs	Number of drives	Ambient temperature	Fresh air support	Fan type	Processors		Shroud
						Up to 304W processor (CPU 1/2)	Up to 304W processor (CPU 3/4)	
All	GPU/2&4 CPU	32x2.5-inch, w/ NVMe	30	No AEP	Six standard	2U height HSK	4U height HSK (L-shape)	Remove the air shroud A
All	No GPU / 2&4 CPU	32x2.5-inch, w/ NVMe	35	No AEP	Six standard	2U height HSK	4U height HSK (L-shape)	Install the air shroud A
205W / 200W / 165W_12C / 150W_8C CPU	No GPU /4 CPU	32x2.5-inch, w/o NVMe	35	No AEP	Six standard	2U height HSK	4U height HSK (L-shape)	Install the air shroud A
Processor TDP <= 165W	No GPU /4 CPU	32x2.5-inch, w/o NVMe	C40E45	Non-support FA with GPU, AEP, NVDIMM, PCIeSSD, NVMe and INTEL FPGALRDIMM > 32G	Six standard	2U height HSK	4U height HSK (L-shape)	Install the air shroud A
All	No GPU /2 CPU	32x2.5-inch, w/o NVMe	C40E45	Non-support FA with GPU, AEP, NVDIMM, PCIeSSD, NVMe and INTEL FPGA	Six standard	2U height HSK	4U height HSK (L-shape)	Install the air shroud A
All	GPU/2&4 CPU	8x2.5-inch	30	No AEP	Six standard	2U height HSK	4U height HSK (L-shape)	Remove the air shroud A
All	No GPU / 2&4 CPU	8x2.5-inch	C40E45	Non-support FA with GPU, AEP, NVDIMM, PCIeSSD, NVMe and INTEL	Six standard	2U height HSK	4U height HSK (L-shape)	Install the air shroud A

Table 19. Fresh air restriction matrix (continued)

Processors	Number of Processor/ GPUs	Number of drives	Ambient temperature	Fresh air support	Fan type	Processors		Shroud
						Up to 304W processor (CPU 1/2)	Up to 304W processor (CPU 3/4)	
				FPGALRDIMM > 32G				

NOTE: C40E45 - Fresh air support for continuous 40C and extended 45C.

Thermal restrictions

Following table lists the configuration required for efficient cooling.

Table 20. Thermal restrictions support matrix

Number of hard drives	Risers	Number of processors	Number of GPUs	Heat sink		Fan type	Shroud	DIMM blank	Processor/ DIMM blank	Fan blank
				Up to 205W processor (CPU 1/2)	Up to 205W processor (CPU 3/4)					
24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	12 PCIe (X8 PCIe Riser 1/X8 PCIe Riser 2)	2	N/A	2U height HSK	N/A	Six standard	Standard	Yes (max 22x)	N/A	N/A
24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	12 PCIe (X8 PCIe Riser 1/X8 PCIe Riser 2)	4	N/A	2U height HSK	4U height HSK (L-shape)	Six standard	Standard	Yes (max 44x)	N/A	N/A
24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	2	2	2U height HSK	N/A	Six standard	Remove the GPU shroud	Yes (max 22x)	N/A	N/A
24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	4	2	2U height HSK	4U height HSK (L-shape)	Six standard	Remove the GPU shroud	Yes (max 44x)	N/A	N/A

Table 20. Thermal restrictions support matrix (continued)

Number of hard drives	Risers	Number of processors	Number of GPUs	Heat sink		Fan type	Shroud	DIMM blank	Processor/ DIMM blank	Fan blank
				Up to 205W processor (CPU 1/2)	Up to 205W processor (CPU 3/4)					
24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	4	4	2U height HSK	4U height HSK (L-shape)	Six standard	Remove the GPU shroud	Yes (max 44x)	N/A	N/A
8 x 2.5 inch SAS/ SATA	12 PCIe (X8 PCIe Riser 1/X8 PCIe Riser 2)	2	N/A	2U height HSK	N/A	Six standard	Standard	Yes (max 22x)	N/A	N/A
8 x 2.5 inch SAS/ SATA	12 PCIe (X8 PCIe Riser 1/X8 PCIe Riser 2)	4	N/A	2U height HSK	4U height HSK (L-shape)	Six standard	Standard	Yes (max 44x)	N/A	N/A
8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	2	2	2U height HSK	N/A	Six standard	Remove the GPU shroud	Yes (max 22x)	N/A	N/A
8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	4	2	2U height HSK	4U height HSK (L-shape)	Six standard	Remove the GPU shroud	Yes (max 44x)	N/A	N/A
8 x 2.5 inch SAS/ SATA	8 PCIe (X16 PCIe Riser 1/ X16 PCIe Riser 2)	4	4	2U height HSK	4U height HSK (L-shape)	Six standard	Remove the GPU shroud	Yes (max 44x)	N/A	N/A

Ambient temperature limitations

The following table lists configurations that require ambient temperature less than 30°C:

NOTE: The ambient temperature limit must be adhered to ensure proper cooling and to avoid excess CPU throttling, which may impact system performance.

Table 21. Configuration-based ambient temperature restrictions

System	Backplane	CPU Thermal Design Power (TDP)	CPU heat sink	Fan type	GPU	Ambient restriction
PowerEdge R940xa	24 x 2.5 inch SAS/ SATA + 8 x 2.5 inch SAS/ SATA	Up to 205 W	2U height HSK + 4U height HSK	Standard fan	≥1 double-width/ single-width	30°C

Table 21. Configuration-based ambient temperature restrictions (continued)

System	Backplane	CPU Thermal Design Power (TDP)	CPU heat sink	Fan type	GPU	Ambient restriction
	8 x 2.5 inch SAS/ SATA	Up to 205 W	2U height HSK + 4U height HSK	Standard fan	≥1 double-width/ single-width	30°C

Particulate and gaseous contamination specifications

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

Table 22. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. **NOTE:** The ISO Class 8 condition applies to data center environments only. This air filtration requirement does not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles. **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. **NOTE:** This condition applies to data center and non-data center environments.

Table 23. 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 ≤50% relative humidity.