

# Dell EMC PowerEdge R250

## Technical Guide

## 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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# System overview

The Dell EMC™ PowerEdge™ R250 is Dell's latest 1U rack server that is designed to run complex workloads using highly scalable memory. The system features Intel® Xeon E-2300 series processor up to 4 DIMMs, PCI Express® (PCIe) 4.0 enabled expansion cards.

Key capabilities:

- One Intel Xeon E-2300 series processor with up to 8 cores per processor
- Four DDR4 DIMM slots, supports UDIMM 128 GB max, speeds up to 3200 MT/s
- Cabled AC power supply unit
- Up to 4 x 3.5-inch SAS/SATA HDD/SSD drives
- Internal boot: iDSDM or internal USB board
- On board LOM 1GbE x2
- BOSS-S1
- PCI Express® (PCIe) 4.0 expansion slots
- RAID: PERC 10.5 and PERC 11 SW and HW RAID
- iDRAC9 with lifecycle controller: Express, Enterprise, Datacenter, and OME advanced features

## Topics:

- [New technologies](#)
- [Key workloads](#)

## New technologies

**Table 1. New technologies**

| Technology                          | Detailed Description  |
|-------------------------------------|---|
| Intel® Xeon E-2300 series processor | <ul style="list-style-type: none"> <li>• Core count: Up to 8 cores per processor</li> </ul>   |
| Memory                              | <ul style="list-style-type: none"> <li>• 4 DDR4 DIMM slots, supports UDIMM 128 GB max, speeds up to 3200 MT/s</li> <li>• Supports unregistered ECC DDR4 DIMMs only</li> </ul>   |
| Flex IO                             | <ul style="list-style-type: none"> <li>• LOM board, Broadcom 5720 Dual port GbE x1</li> <li>• USB 3.0 x1, USB 2.0 x2 and VGA port</li> <li>• Serial port</li> </ul>   |
| PCIe                                | PCI Express® (PCIe)4.0 expansion slots  |
| Chipset (CHPST)                     | Intel C250 series   |
| Dedicated PERC                      | Internal controllers: <ul style="list-style-type: none"> <li>• PERC H345</li> <li>• PERC H355</li> <li>• HBA355i</li> <li>• H755</li> </ul> External controllers: <ul style="list-style-type: none"> <li>• HBA355e</li> </ul> |
| Power supplies                      | <ul style="list-style-type: none"> <li>• 450W Bronze 100-240 VAC, cabled</li> <li>• 450W Platinum 100-240 VAC, cabled</li> </ul>  |

## Key workloads

PowerEdge R250 is versatile enough to address many customer segments and workloads affordably, that includes:

- SMB and ROBO: Data consolidation, file/print services, mail/messaging services, other collaboration and productivity applications, point of sale and web serving.

## System features and generational comparison

The following table shows the comparison between the PowerEdge R250 with the PowerEdge R240.

**Table 2. Features comparison**

| Feature                      | PowerEdge R250   | PowerEdge R240   |
|------------------------------|--|--|
| Processor                    | One Intel® Xeon E-2300 series processor with up to 8 cores per processor   | Coffee Lake-S E3-1200 V6 series. Pentium and Celeron up to 95 W  |
| Memory                       | <ul style="list-style-type: none"> <li>4 DDR4 DIMM slots, supports UDIMM 128 GB max, speeds up to 3200 MT/s</li> <li><b>NOTE:</b> For Pentium processor, maximum memory supported is 2666 MT/s</li> <li>Supports unregistered ECC DDR4 DIMMs only</li> </ul>                   | <ul style="list-style-type: none"> <li>4 DDR4 DIMM slots, memory support 8,16 GB, DIMM speed up to 2666 MT/s</li> <li>Supports unregistered ECC DDR4 DIMMs only</li> </ul>   |
| Storage drives               | <ul style="list-style-type: none"> <li>Up to 4 x 3.5-inch SAS/SATA (HDD/SSD)</li> <li>Up to 4 x 3.5-inch SAS/SATA (HDD/SSD)</li> <li>2 x 3.5-inch cabled SAS/SATA drives</li> <li>Max 80TB for 4HDD configuration</li> </ul>   | <ul style="list-style-type: none"> <li>Up to 4 x 3.5-inch hot-plug SAS/SATA/SSD</li> <li>Up to 4 x 3.5-inch cabled SAS/SATA/SSD</li> <li>Up to 2 x 3.5-inch cabled SAS/SATA/SSD</li> <li>Max 56 TB for 4 HDD configuration</li> </ul>  |
| Storage controllers          | <p>Internal Controllers</p> <ul style="list-style-type: none"> <li>PERC H345, HBA355i, H755, H355</li> </ul> <p>External Controllers</p> <ul style="list-style-type: none"> <li>HBA355e</li> </ul> <p>Software RAID</p> <ul style="list-style-type: none"> <li>S150</li> </ul> | <p>Internal Controllers</p> <ul style="list-style-type: none"> <li>PERC H330, H730p, HBA330</li> </ul> <p>External Controllers</p> <ul style="list-style-type: none"> <li>12 Gbps SAS HBA</li> </ul> <p>Software RAID</p> <ul style="list-style-type: none"> <li>S140</li> </ul> |
| PCIe slots                   | PCI Express® (PCIe)4.0 expansion slots   | 2 x PCIe Gen 3 slots   |
| Embedded NIC (LOM)           | Onboard LOM 1GbE x2  | 2 x 1GbE LOM   |
| Networking options (OCP 3.0) | NA   | NA   |
| I/O ports                    | <p>Front Ports</p> <ul style="list-style-type: none"> <li>1 x iDRAC Direct (Micro-AB USB) port</li> <li>1 x USB 2.0</li> </ul> <p>Rear Ports</p> <ul style="list-style-type: none"> <li>1 x USB 2.0</li> <li>1 x USB 3.0</li> <li>1 x VGA</li> <li>1 x Serial</li> </ul>       | <p>Front Ports</p> <ul style="list-style-type: none"> <li>1 x Dedicated iDRAC direct micro-USB</li> <li>1 x USB 2.0</li> </ul> <p>Rear Ports</p> <ul style="list-style-type: none"> <li>1 x Serial</li> <li>2 x USB 3.0</li> <li>1 x VGA</li> </ul>                              |

**Table 2. Features comparison (continued)**

| Feature             | PowerEdge R250   | PowerEdge R240   |
|---------------------|--|--|
|                     | Internal Ports <ul style="list-style-type: none"> <li>● 1 x USB 3.0 (Optional)</li> </ul>  | Internal Ports <ul style="list-style-type: none"> <li>● 1 x USB 3.0</li> </ul>   |
| Form Factor         | 1U   | 1U   |
| Power supplies      | <ul style="list-style-type: none"> <li>● 450W Bronze 100-240 VAC, cabled</li> <li>● 450W Platinum 100-240 VAC, cabled</li> </ul>   | <ul style="list-style-type: none"> <li>● 250 W AC 1U cable (Bronze)</li> <li>● 450 W AC 1U cable (Platinum)</li> </ul>   |
| Embedded management | <ul style="list-style-type: none"> <li>● iDRAC9</li> <li>● iDRAC Direct</li> <li>● iDRAC Service Module</li> <li>● iDRAC RESTful API with Redfish</li> </ul>                               | <ul style="list-style-type: none"> <li>● iDRAC9</li> <li>● iDRAC RESTful API with Redfish</li> <li>● iDRAC Direct</li> </ul>   |
| Front IO            | <ul style="list-style-type: none"> <li>● Power button w/LED x1</li> <li>● ID button w/LED x1</li> <li>● USB 2.0 x1</li> <li>● iDRAC MGMT USB x1</li> <li>● System Status LED x1</li> </ul> | <ul style="list-style-type: none"> <li>● Power button w/LED x1</li> <li>● ID button w/LED x1</li> <li>● USB 2.0 x1</li> <li>● iDRAC MGMT USB x1</li> <li>● System Status LED x1</li> </ul> |



# Chassis views and features

## Topics:

- Chassis views

## Chassis views

### Front view of the system

Figure 1. Front view of 4 x 3.5-inch SAS/SATA cable drive system

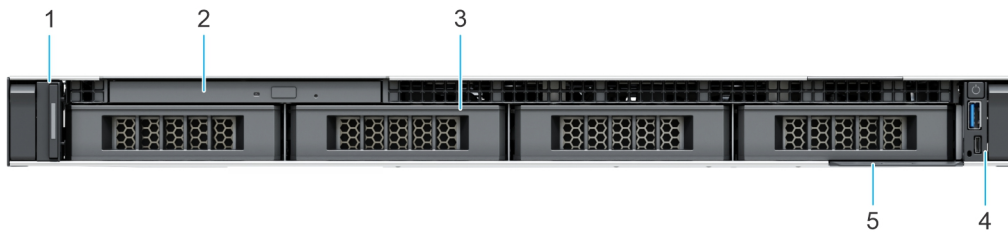


Figure 2. Front view of 4 x 3.5-inch SAS/SATA hot-swap drive system

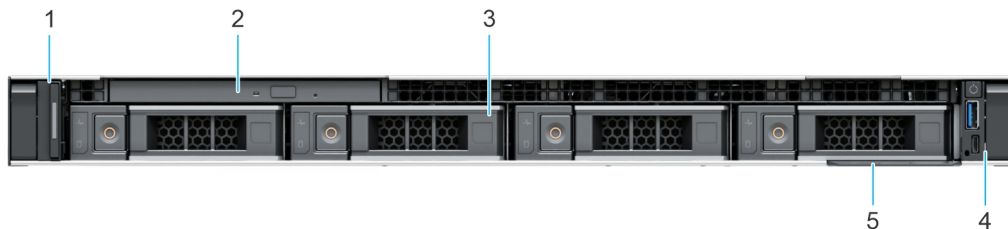


Figure 3. Front view of 2 x 3.5-inch SAS/SATA cable drive system

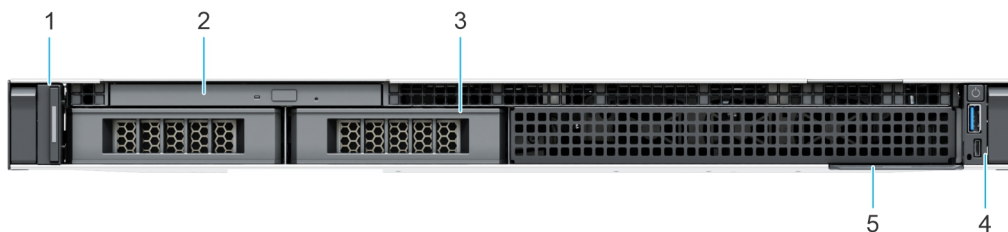


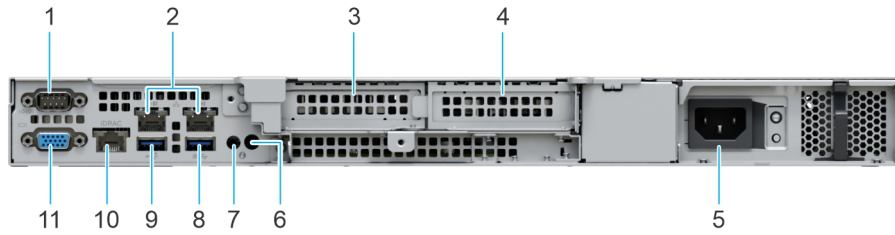
Table 3. Features available on the front of the system

| Item | Ports, panels, and slots |
|------|--------------------------|
| 1    | Left control panel       |
| 2    | Optical drive            |

**Table 3. Features available on the front of the system (continued)**

| Item | Ports, panels, and slots |
|------|--------------------------|
| 3    | Drive                    |
| 4    | Right control panel      |
| 5    | Information tag          |

## Rear view of the system

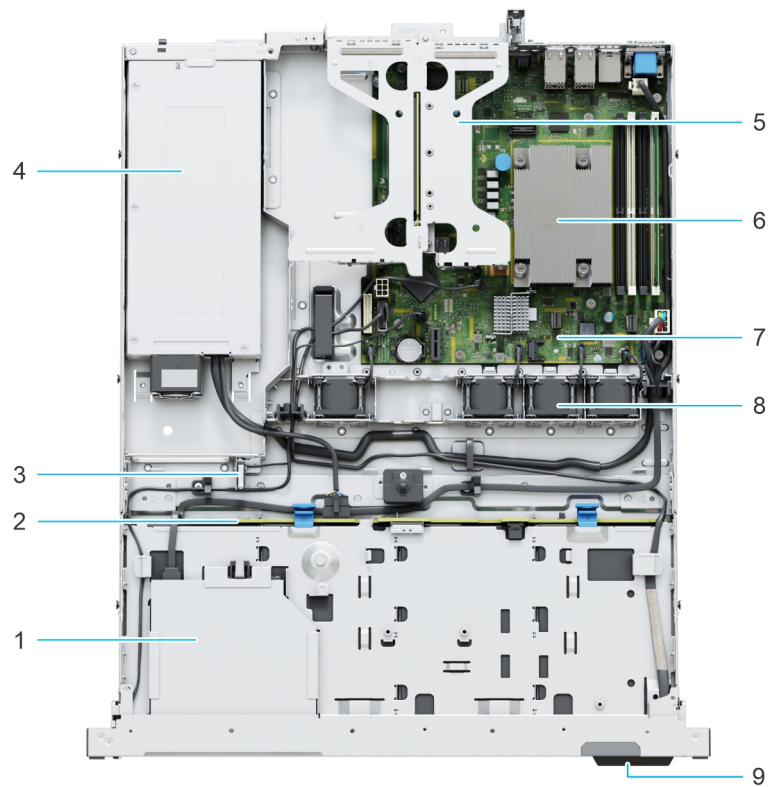


**Figure 4. Rear view of the system**

**Table 4. Rear view of the system ports**

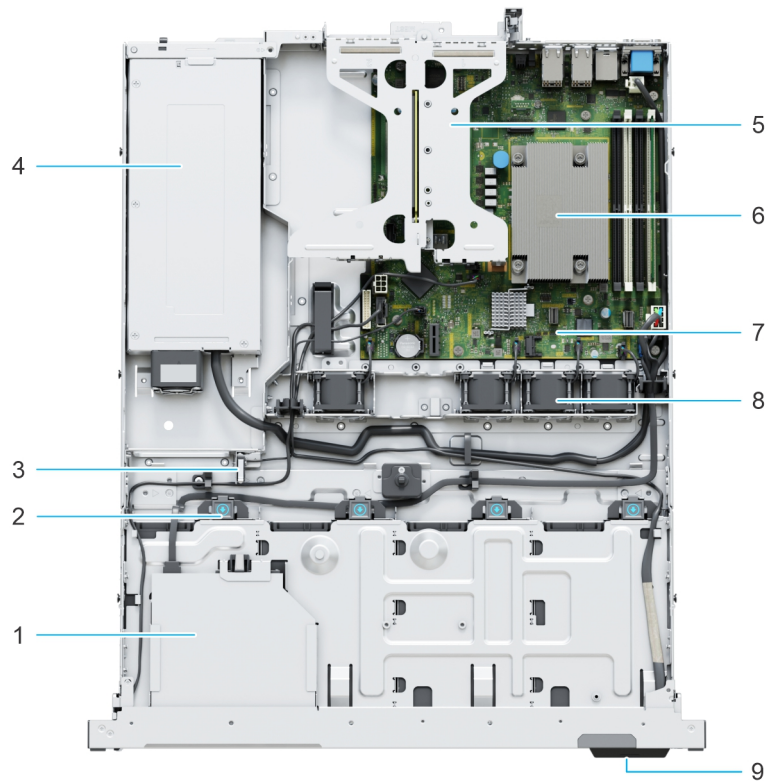
| Item | Ports, panels, or slots    |
|------|----------------------------|
| 1    | Serial connector           |
| 2    | Ethernet ports             |
| 3    | PCIe expansion card slot 1 |
| 4    | PCIe expansion card slot 2 |
| 5    | Power supply unit (PSU)    |
| 6    | System ID button           |
| 7    | CMA jack                   |
| 8    | USB 3.2 Gen 1 port         |
| 9    | USB 2.0 port               |
| 10   | iDRAC ethernet port        |
| 11   | VGA port                   |

## Inside the system



**Figure 5. Inside view of the system with backplane**

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Optical drive        | 2. Backplane                |
| 3. Intrusion switch     | 4. Cabled power supply unit |
| 5. Expansion card riser | 6. Processor heat sink      |
| 7. System board         | 8. Cooling fans             |
| 9. Information tag      |                             |



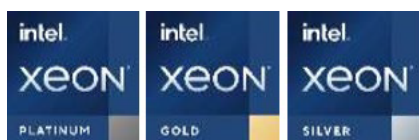
**Figure 6. Inside view of the cabled drive system**

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Optical drive        | 2. Cabled drive connector   |
| 3. Intrusion switch     | 4. Cabled power supply unit |
| 5. Expansion card riser | 6. Processor heat sink      |
| 7. System board         | 8. Cooling fans             |
| 9. Information tag      |                             |



Figure 7. Quick Resource Locator for R250

# Processor



## Topics:

- [Processor features](#)
- [Supported processors](#)

## Processor features

The 3<sup>rd</sup> Generation Xeon® Scalable Processors stack is the next generation data center processor offering with the latest features, increased performance, and incremental memory options. This latest generation Xeon Scalable processor supports usages from entry designs that are based on Intel Xeon Silver processors to advanced capabilities offered in new Intel Xeon Platinum processor.

The following lists the features and functions that are in the upcoming 3<sup>rd</sup> Generation Intel® Xeon Scalable Processor offering:

- More, faster I/O with PCI Express 4 and up to 64 lanes (per socket) at 16 GT/s
- Enhanced Memory Performance with support for up to 3200 MT/s DIMMs

## Supported processors

**Table 5. Processor BIN stack**

| Processor | Clock Speed (GHz) | Cache (M) | Cores | Threads | Turbo    | Memory Speed (MT/s) | Memory Capacity | TDP  |
|-----------|-------------------|-----------|-------|---------|----------|---------------------|-----------------|------|
| E-2378G   | 2.8               | 16        | 8     | 16      | Turbo    | 3200                | 128 GB          | 80 W |
| E-2378    | 2.6               | 16        | 8     | 16      | Turbo    | 3200                | 128 GB          | 65 W |
| E-2356G   | 3.2               | 12        | 6     | 12      | Turbo    | 3200                | 128 GB          | 80 W |
| E-2336    | 2.9               | 12        | 6     | 12      | Turbo    | 3200                | 128 GB          | 65 W |
| E-2334    | 3.4               | 8         | 4     | 8       | Turbo    | 3200                | 128 GB          | 65 W |
| E-2324G   | 3.1               | 8         | 4     | 4       | Turbo    | 3200                | 128 GB          | 65 W |
| E-2314    | 2.8               | 8         | 4     | 4       | Turbo    | 3200                | 128 GB          | 65 W |
| G6505     | 4.2               | 4         | 2     | 4       | No Turbo | 2666                | 128 GB          | 58 W |
| G6405T    | 3.5               | 4         | 2     | 4       | No Turbo | 2666                | 128 GB          | 35 W |

**NOTE:** Graphics is not supported with E2300 series processors and cannot be enabled on Dell servers due to restriction in the chipset.

**NOTE:** Hyper-Threading is enabled by default on all Intel Xeon E-2300 series processors.

# Memory subsystem

## Topics:

- Supported memory
- Memory speed

## Supported memory

**Table 6. Memory technology comparison**

| Feature        | PowerEdge R250 (DDR4)               |
|----------------|-------------------------------------|
| DIMM type      | UDIMM                               |
| Transfer speed | 2933 MT/s, 2666 MT/s, and 3200 MT/s |
| Voltage        | 1.2 V (DDR4)                        |

The following table lists the supported DIMMs for the R250 at launch. For the latest information on supported DIMMS, refer to the [Memory NDA Deck](#). For information on memory configuration, post RTS, see the Dell EMC PowerEdge R250 Installation and Service Manual at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

## Memory speed

The table below lists the performance details for R250 based on the quantity and type of DIMMs per memory channel.

**Table 7. DIMM performance**

| DIMM type | Rank | Capacity     | DIMM rated voltage and speed | DIMMs per Channel (DPC) |
|-----------|------|--------------|------------------------------|-------------------------|
| UDIMM     | 1R   | 8 GB / 16 GB | DDR4 (1.2 V), 3200 MT/s      | 3200 MT/s               |
|           | 2R   | 32 GB        | DDR4 (1.2 V), 3200 MT/s      | 3200 MT/s               |

# Storage

## Topics:

- Storage controllers
- Supported Drives
- External Storage

## Storage controllers

- PowerEdge Hardware RAID controllers (PERC) series 10, 11 are designed for:
  - Enhanced performance
  - Fault tolerance
  - Simplified management of RAID array drives
- PowerEdge controller series 10, 11 support older legacy SAS and SATA drive interfaces
- Dell S150 is software RAID solution for PowerEdge systems.

**Table 8. PERC Series controller offerings**

| Performance Level    | Controller and Description    |
|----------------------|-------------------------------|
| Entry                | S150                          |
| Value                | H355, H345, HBA355 (Internal) |
| Premium Performance  | H755                          |
| External Controllers | HBA355e                       |

**NOTE:** For more information on the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card, and on deploying the cards, see the storage controller documentation at [www.dell.com/storagecontrollermanuals](http://www.dell.com/storagecontrollermanuals).

**NOTE:** From December 2021, H355 will replace H345 as the entry raid controller. H345 will be deprecated in January 2022.

## Storage controller feature matrix

**Table 9. Storage controller feature matrix**

| Model and Form Factors  | Interface Support                                 | PCI Support | SAS Connection | Cache Memory Size | Write Back Cache   | RAID Levels           | Max Drive Support  | RAID Support |
|---|---|-------------|----------------|-------------------|--------------------|-----------------------|--|--------------|
| PowerEdge Server-Storage Controllers (PERC & SAS HBA) Series 11 |   |             |                |                   |                    |                       |  |              |
| H755 (SAS/SATA Only)  | 12 Gb/s SAS<br>6 Gb/s SAS/SATA<br>3 Gb/s SAS/SATA | PCIe Gen 4  | 2 x 8 Internal | 8 GB NV           | Flash-Backed Cache | 0,1, 5, 6, 10, 50, 60 | 16/controller<br>50 with SAS Expander<br>*Platform limit | Hardware     |



**Table 9. Storage controller feature matrix (continued)**

| Model and Form Factors  | Interface Support                                 | PCI Support     | SAS Connection           | Cache Memory Size | Write Back Cache | RAID Levels              | Max Drive Support  | RAID Support  |
|---|---|-----------------|--------------------------|-------------------|------------------|--------------------------|--|---|
| HBA355i Adapter   | 12 Gb/s SAS<br>6 Gb/s SAS/SATA<br>3 Gb/s SAS/SATA | PCIe Gen 4      | 2 x 8 Internal           | N/A               | N/A              | N/A                      | 16/controller<br>50 with SAS Expander<br>*Platform limit | N/A   |
| HBA355e Adapter   | 12 Gb/s SAS<br>6 Gb/s SAS/SATA<br>3 Gb/s SAS/SATA | PCIe Gen 4      | 2 x 8 Internal           | N/A               | N/A              | N/A                      | 240  | N/A   |
| H355 Adapter  | 12Gb/s SAS<br>6Gb/s SATA                          | PCIe Gen 4      | 16 ports- 2 x 8 Internal | No Cache          | No Cache         | 0,1,10 Note <sup>1</sup> | Maximum 32 RAID, or 32 Non-RAID                          | Hardware RAID                                       |
| PowerEdge Server-Storage Controllers (PERC & SAS HBA) Series 10 |   |                 |                          |                   |                  |                          |  |   |
| PERC H345   | 12 Gb/s SAS<br>6 Gb/s SATA                        | PCI-Express 3.1 | 16 ports- 2 x 8 Internal | No Cache          | No Cache         | 0,1,10 Note <sup>1</sup> | Maximum 32 RAID, or 32 Non-RAID                          | Hardware RAID                                       |
| PowerEdge Server-Storage Software RAID                          |   |                 |                          |                   |                  |                          |  |   |
| S150 Software RAID  | 6 Gb/s SATA                                       | N/A             | N/A                      | No Cache          | No Cache         | 0,1, 5, 10               | Maximum 12 SATA  | Software RAID - Windows & Linux (Limited)<br>Note 2 |

**NOTE:**

1. RAID 5/50 removed from entry RAID card
2. SWRAID support for Linux provides a pre-boot configuration utility to configure MDRAID and degraded boot capability. See User's Guide for details.

This document is updated as changes happen, so for the latest be sure to bookmark it rather than downloading an offline copy or see the [Storage Controller Matrix](#).

## Internal storage configuration

Please see the [Factory Configuration Matrix](#) on Sales Portal.

## Server storage controllers User Guide

- Server-Storage Controllers User's Guides, click [here](#)

## IDSDM

The intended use of IDSDM is to support hypervisor boot: a minimal OS that primarily resides in memory and does not depend on the IDSDM heavily for I/O. Writes, in particular, should be minimized as the SD media can wear out.

The IDSDM card provides the following functions:

- Dual SD interface is maintained in a mirrored configuration (primary and secondary SD).
- Provides full RAID1 functionality.
- Dual SD cards are not required; the module can operate with only one card but will provide no redundancy.
- Enables support for Secure Digital eXtended Capacity (SDXC) cards.
- USB interface to host system.
- I2C interface to host system and onboard EEPROM for out-of-band status reporting.
- Onboard LEDs show status of each SD card.
- A BIOS Setup Redundancy setting supports Mirror Mode or Disabled.

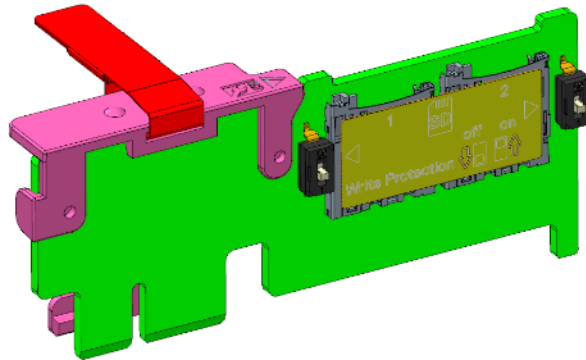


Figure 8. iSDSM card

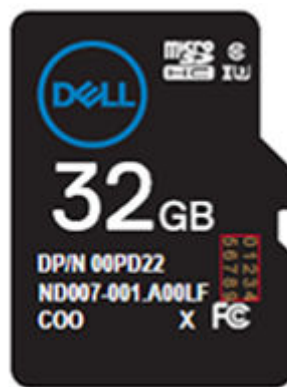


Figure 9. Artwork on uSD for iSDSM

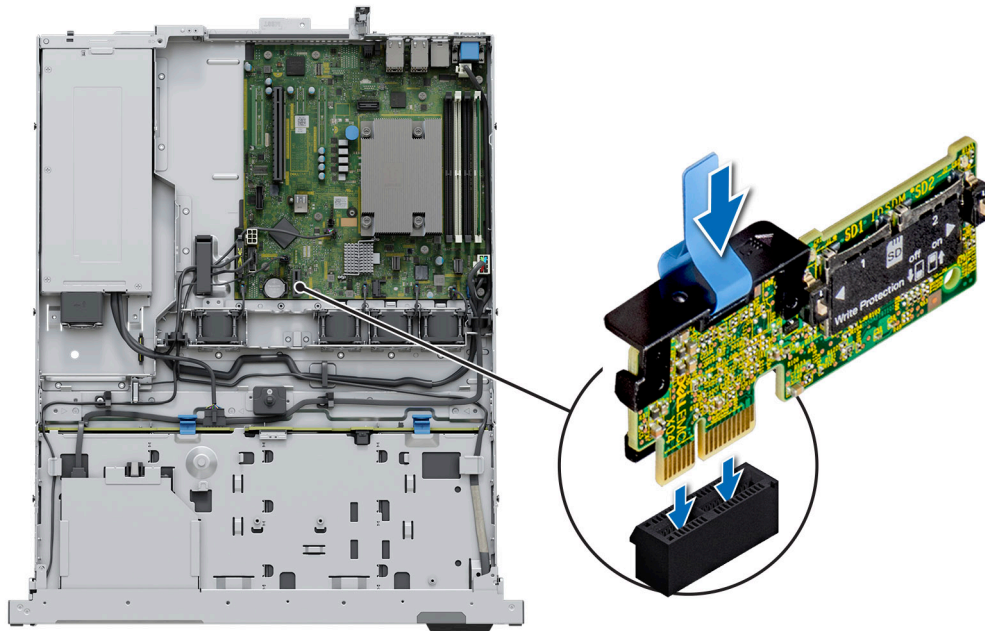


Figure 10. IDSDM

## Internal USB

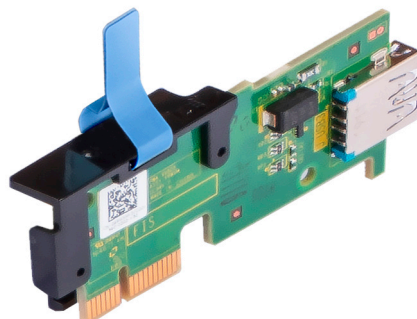


Figure 11. Internal USB

## RAID - Redundant Array of Independent Disks

- Link to Help Me Choose: RAID Configuration [here](#)

## Datasheets and PERC performance scaling decks

- Resource Page for Server-Storage (Sales Portal) click [here](#)
- PERC & SAS HBA Datasheets (To be updated)

## Boot Optimized Storage Solution

Boot Optimized Storage Solution (BOSS) is a RAID solution that is designed for boot optimization and provides a separate RAID/SSD solution allowing customers to maximize server disk slots for data.

Dell provides the following BOSS card for this platform:

- BOSS S1

## BOSS feature matrix

Table 10. BOSS feature matrix

| BOSS card       | Drive Size  | RAID levels | Stripe size                           | Virtual disk cache function | Maximum number of virtual disks | Maximum number of drives supported | Drive types          | PCIe support | Disk cache policy | Support for Non-RAIDp disks    | Cryptographic digital signature to verify firmware payload | Hot Plug |
|-----------------|---|-------------|---------------------------------------|-----------------------------|---------------------------------|------------------------------------|----------------------|--------------|-------------------|--------------------------------|--|----------|
| BOSS S1 Adapter | M.2 devices are read-intensive with 240 GB or 480 GB capacity | RAID 1      | Supports default 64K stripe size only | Write through               | 1                               | 2                                  | 6 Gbps M.2 SATA SSDs | Gen2         | Drive default     | Yes (supports up to two disks) | —  | —        |

## Datasheets

- [BOSS S1](#)

## BOSS User Guides

- [BOSS S1](#)

## Supported Drives

The table shown below lists the internal drives supported by the R250. Refer to Agile for the latest SDL.

Table 11. Supported drives

| Form Factor | Type | Speed | Rotational Speed | Capacities                       |
|-------------|------|-------|------------------|----------------------------------|
| 2.5-inch    | SATA | 6 GB  | SSD              | 480 GB, 960 GB, 1.92 TB, 3.84 TB |

**Table 11. Supported drives (continued)**

| Form Factor | Type     | Speed | Rotational Speed | Capacities  |
|-------------|----------|-------|------------------|---|
| 2.5-inch    | SAS/vSAS | 12 GB | SSD              | 400 GB, 800 GB, 960 GB, 1.92 TB, 3.84 TB, 7.68 TB |
| 2.5-inch    | SAS      | 12 GB | 10K              | 600 GB, 1.2 TB, 2.4 TB                            |
| 2.5-inch    | SAS      | 12 GB | 15K              | 900 GB  |
| 3.5-inch    | SAS      | 12 GB | 7.2K             | 2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB             |
| 3.5-inch    | SATA     | 6 GB  | 7.2K             | 2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB             |
| M.2         | SATA     | 6 GB  | SSD              | 240 GB, 480 GB                                    |

## Hard Disk Drives (HDDs)

Features:

- Two form factors – 2.5-inch and 3.5-inch
- Two interfaces – SAS and NLSAS and SATA
- Interface speeds – 6 GB and 12 GB
- Rotational speeds – 7.2k, 10k and 15k
- Multiple capacities – 600 GB to 18 TB
- Security (Self Encrypting Drive)
- Lower cost than SSDs
- Lower performance compared to SSD
- Formats – 512n and 512e; no 4Kn

### HDD facts

A HDD (Hard Disk Drive) is a storage media characterized by a set of spinning platters with arms to move recording heads over the surfaces to the right locations for reading and writing designated data.



**Figure 12. Hard disk drives**

The heads read or write the data and transfer it through the interface to the server. That interface for Dell standard enterprise HDDs can be either Serial Attached SCSI (SAS) or Serial ATA (SATA) and affects the speed at which data is transferred. Typically, SATA is 6 gigabits/sec. where SAS is 12 gigabits/sec so throughput for SAS can be twice that of SATA. Additionally, due to better signal to noise ratios, SAS can have longer cable lengths, allowing it to connect to external data storage. SAS is also considered a more robust protocol.

Enterprise HDDs are typically used with multiple-user servers running enterprise software. Examples are transaction processing databases, internet infrastructure (email, webserver, e-commerce), scientific computing software, and nearline storage management software. Enterprise drives commonly operate continuously ("24/7") in demanding environments while delivering the highest possible performance without sacrificing reliability.

The fastest enterprise HDDs spin at 10,000 and 15,000 rpm, and can achieve sequential media transfer speeds above 290 MB/s. Drives running at 10,000 or 15,000 rpm use smaller platters to mitigate increased power requirements and therefore generally have lower capacity than the highest capacity 7,200 RPM drives. 10K and 15K drives are labelled Mission Critical or Performance Optimized, while 7.2K are called Business Critical or Capacity Optimized. Since 7.2K drives spin slower they can have larger platters and space for more platters in an HDD case. That allows for higher capacity drives – 16TB, 18TB, ...

Random read/write task speeds are usually measured in IOPs (Input/Output operations per second) and for 15K drives can be up to 290. That may sound like a lot but is dwarfed by IOPS (in the hundreds of thousands) available on SSDs. Here is a link to a chart showing HDD performance characteristics: [HDD\\_Characteristic\\_and\\_Metrics](#).

Depending on workload type, storage device capabilities will be prioritized differently. Below is discussed several capabilities and the media you would select for each.

- Better performance measured in IOPS: Storage performance for random workloads is usually measured in IOPS. When ordered in terms of general IOPS performance, choose 15K, then 10K, then 7.2K and within those SAS HDDs, NL-SAS HDDs, and SATA HDDs.
- Better performance measured in throughput, or gigabytes per second (GB/s): Unless dealing with very heavy sequential workloads that would benefit from flash technology, HDDs are a good choice for most sequential workloads, such as media viewing or database logging. NAND caching can further boost the performance of HDD storage as necessary.
- Lower latency: For workloads sensitive to latency, internal storage on the server itself typically has less latency than storage on external arrays where longer fetch times over the network can greatly add to existing storage latency. It is important to note that SSDs present much lower latency than mechanical HDDs.
- Greater capacity: For capacity-driven workloads, such as email archives, disk-based backup, and object storage applications, high IOPS or throughput performance may be less of a priority as compared to capacity. In this case, choose cost-efficient HDDs, which can offer the greatest capacity at the lowest cost.

While HDDs generally provide lower performance and higher latency than SSDs, they are still an excellent option when used as part of a complete storage strategy that balances cost per GB, capacity, application needs, and performance.

# Solid State Drives (SSDs)

## SSD Facts

Unlike hard disk drives (HDDs) which use a spinning platter to store data, solid state drives (SSDs) use solid state memory NAND chips. HDDs have several different mechanical moving parts which make them susceptible to handling damage. Solid state drives, on the other hand have no moving parts and are therefore much less susceptible to handling damage even when impacted during use.

SSDs deliver ultra-high-performance input/output operations per second (IOPS), and very low latency for transaction-intensive server and storage applications. Properly used in systems with HDDs, they reduce total cost of ownership (TCO) through low power consumption and low operating temperature.

Dell offers different solid-state drive (SSD) solutions to meet different customer needs. Enterprise SSDs, as a class, are unique compared to client or consumer based SSD in terms of reliability, performance and architecture. While consumer-based SSDs, such as those utilized in notebooks are designed with a focus on consumer-based workloads, rigidity and battery life, enterprise-class SSDs are designed around enterprise application I/O (input/output) requirements with focus points of random I/O performance, reliability, and protection of data during a sudden power-down.

Understanding the basics of enterprise-class SSDs allow customers to make informed decisions when comparing solutions:

- **Over-provisioning:** The Achilles' heel of SSDs are their write characteristics. To rewrite an area of an SSD that has already been written, the data must be erased and then written. In order to overcome a portion of the write performance penalty, Dell enterprise SSDs found across Dell PowerEdge products, all employ a practice known as over-provisioning of Flash. This practice keeps native Flash capacity beyond the user-defined capacity and utilizes the additional space as a scratch pad of sorts to quickly put down application write data on areas of Flash that are already in an erased state. The SSDs perform cleanup functions of this over-provisioned Flash space during time periods typically not impacting application performance.
- **Write Endurance:** Write endurance is the number of program/erase (P/E or write cycles) that can be applied to a block of flash memory before the storage media becomes unreliable. Due to different data center workloads and read/write needs, Dell offers different enterprise SSDs with different endurance ratings so customers can design the right solution for their needs.

Below are the different categories (swim lanes) of enterprise SSDs Dell offers:

- **Write Intensive (WI):** 50/50 read/write workloads with highest endurance. HPC, Database logging, and caching are example workloads.
- **Mix Use (MU):** 70/30 read/write workloads with medium endurance. E-mail/messaging, OLTP, and E-commerce are example workloads.
- **Read Intensive (RI):** 90/10 read/write workloads with lower endurance. Database warehousing, media streaming, and VOD solutions are example workloads.
- **Boot Optimized (Boot):** Lowest cost/small capacity SSDs designed to be used as a boot device in servers. Low endurance.

Dell enterprise SSDs support four kinds of host interface options:

- **SATA SSD:** SATA SSDs are based on the industry standard SATA interface. SATA SSDs provide reasonable performance for enterprise servers.
- **Value SAS:** Value SAS is a new class of SAS SSD that leverages the PowerEdge SAS server infrastructure to deliver SAS like performance at a cost that is competitive with SATA.
- **SAS SSD:** SAS SSDs are based on the industry standard SAS interface. SAS SSDs combine superior reliability, data integrity, and data fail recovery making them suitable for enterprise applications.
- **PCIe SSD:** The Dell PowerEdge Express Flash PCIe SSD is a high-performance solid-state storage device that enables IOPS performance of up to 2000X more than conventional rotating hard drives.
  - SSD Help Me Choose click [here](#)
  - SSD Performance Spec Docs click [here](#)

## External Storage

The R250 support the external storage device types listed in the table below.

**Table 12. Support external storage devices**

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



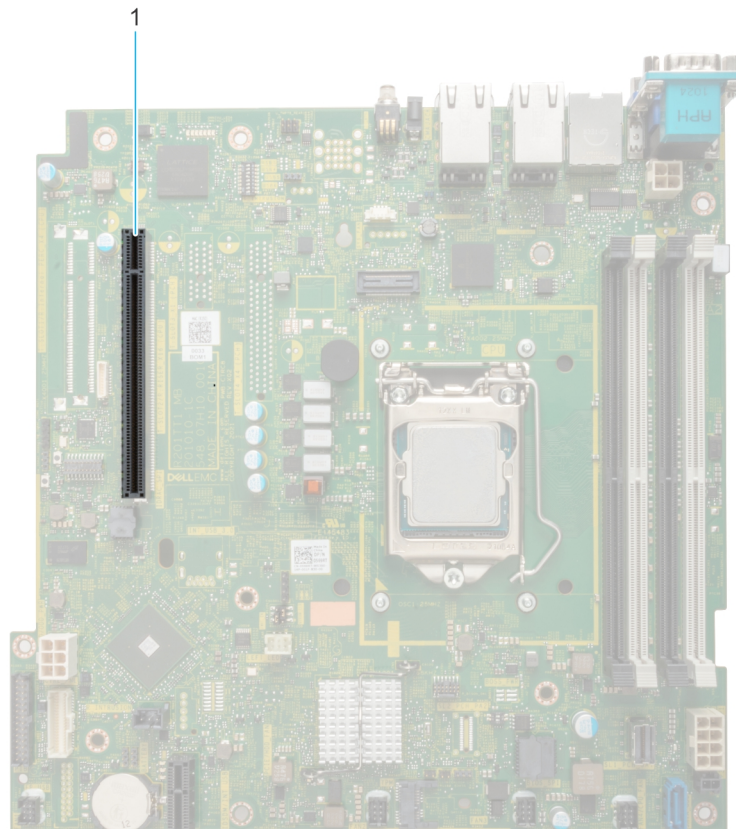
# Expansion cards and expansion card risers

**NOTE:** When an expansion card is not supported or missing, riser the iDRAC and Lifecycle Controller logs an event. This does not prevent your system from booting. However, if a F1/F2 pause occurs with an error message, see *Troubleshooting expansion cards* section in the *Dell EMC PowerEdge Servers Troubleshooting Guide* at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

## Topics:

- Expansion card installation guidelines

## Expansion card installation guidelines



**Figure 13. Expansion card slot connectors**

- Butterfly riser connector

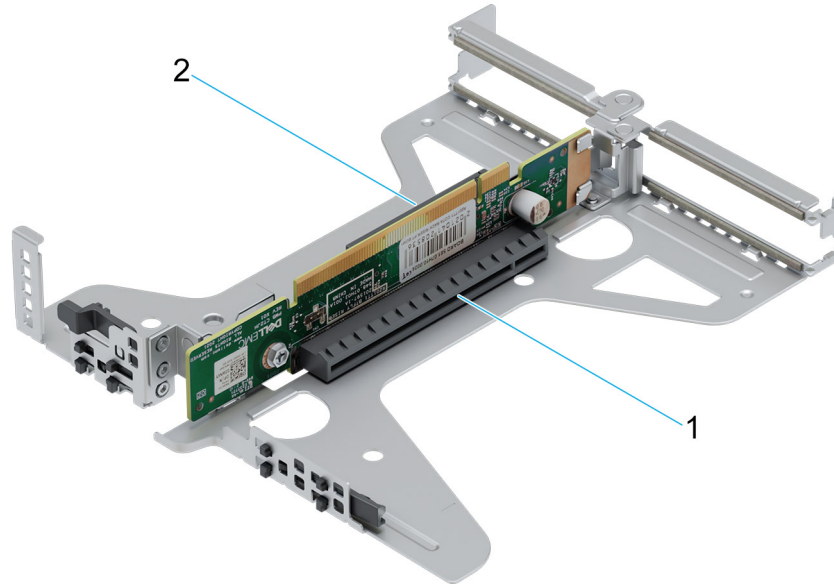
The following table describes the expansion card riser configurations:

**Table 13. Expansion card riser configurations**

| Configurations | Expansion card risers | PCIe Slots | Controlling processor | Height      | Length      | Slot width | Power |
|----------------|-----------------------|------------|-----------------------|-------------|-------------|------------|-------|
| Config 0       | Butterfly riser       | 1          | Processor 1           | Half height | Half length | x8         | 25 W  |
|                |                       | 2          | Processor 1           | Half height | Half length | x16        | 25 W  |

**Table 13. Expansion card riser configurations (continued)**

| Configurations | Expansion card risers | PCIe Slots | Controlling processor | Height | Length | Slot width | Power |
|----------------|-----------------------|------------|-----------------------|--------|--------|------------|-------|
| Config 1       | No riser              | N/a        | N/a                   | N/a    | N/a    | N/a        | N/a   |



**Figure 14. Butterfly riser**

1. Slot 2
2. Slot 1

**NOTE:** The expansion-card slots are not hot-swappable.

For a proper mechanical fit and proper cooling of expansion cards, follow the guidelines in the following table. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

**Table 14. Configuration 0: Butterfly riser**

| Card type             | Slot priority | Maximum number of cards |
|-----------------------|---------------|-------------------------|
| Internal PERC adapter | 2             | 1                       |
| Dell External Adapter | 1, 2          | 2                       |
| Broadcom (NIC: 1Gb)   | 1, 2          | 2                       |
| Intel (NIC: 1Gb)      | 1, 2          | 2                       |
| Dell BOSS S1 Module   | 1, 2          | 2                       |

**NOTE:** No expansion cards are supported in the "no riser" configuration.

## Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

### Topics:

- [Power](#)
- [Thermal](#)
- [Acoustics](#)

## Power

**Table 15. Power tools and technologies**

| Feature                           | Description   |
|-----------------------------------|---|
| Power Supply Units(PSU) portfolio | Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.  |
| Tools for right sizing            | Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at <a href="http://www.dell.com/calc">www.dell.com/calc</a> .   |
| Industry Compliance               | Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS, Climate Savers and ENERGY STAR.  |
| Power monitoring accuracy         | PSU power monitoring improvements include: <ul style="list-style-type: none"> <li>• Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5%</li> <li>• More accurate reporting of power</li> <li>• Better performance under a power cap</li> </ul>  |
| Power capping                     | Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.  |
| Systems Management                | iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level.<br><br>Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.  |
| Active power management           | Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.<br><br>Idle power enables Dell servers to run as efficiently when idle as when at full workload. |
| Fresh Air cooling                 | Refer to ASHRAE A3/A4 Thermal Restriction.  |

**Table 15. Power tools and technologies (continued)**

| Feature             | Description  |
|---------------------|--|
| Rack infrastructure | <p>Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:</p> <ul style="list-style-type: none"> <li>• <a href="#">Power distribution units (PDUs)</a></li> <li>• <a href="#">Uninterruptible power supplies (UPSs)</a></li> <li>• <a href="#">Energy Smart containment rack enclosures</a></li> </ul> <p>Find additional information at: <a href="https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm">https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm</a>.</p> |

## Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

## Acoustics

### Acoustical performance

Dell EMC PowerEdge R250 is a rack-mount server appropriate for attended data center environment. In fact, with typical loading condition in 23°C ± 2°C ambient temperature, R250 is suitable for office environment.

**Table 16. Acoustical configurations of R250**

| Configuration         | Entry                             | Economy                               | Volume                     | Feature Rich                 |
|-----------------------|-----------------------------------|---------------------------------------|----------------------------|------------------------------|
| Processor             | 1x Intel Rocket Lake, 65 W        | 1x Intel Rocket Lake, 65 W            | 1x Intel Rocket Lake, 65 W | Intel Rocket Lake, 80 W      |
| Processor Quantity    | 1                                 | 1                                     | 1                          | 1                            |
| Memory                | 8 GB UDIMM                        | 8 GB UDIMM                            | 16 GB UDIMM                | 32 GB UDIMM                  |
| Memory Quantity       | 1                                 | 1                                     | 2                          | 4                            |
| Apache Pass           | N/A                               | N/A                                   | N/A                        | N/A                          |
| NVDIMM                | N/A                               | N/A                                   | N/A                        | N/A                          |
| Storage               | 3.5-inch SATA 1-TB (Client drive) | 3.5-inch SATA 2-TB (Enterprise drive) | 3.5-inch SATA 2-TB         | 3.5-inch SATA 4-TB           |
| Storage Quantity      | 1                                 | 2                                     | 2                          | 4                            |
| Backplane             | 2x 3.5-inch Cabled                | 4x 3.5-inch Cabled                    | 4x 3.5-inch Hot-plug       | 4x 3.5-inch Hot-plug         |
| M.2                   | N/A                               | N/A                                   | N/A                        | N/A                          |
| Power Supply Unit     | 450 W (106 mm)                    | 450 W (106 mm)                        | 450 W (106 mm)             | 450 W (106 mm)               |
| Power Supply Quantity | 1                                 | 1                                     | 1                          | 1                            |
| PCI 1                 | None (Chipset SATA)               | None (Chipset SATA)                   | PERC H355                  | PERC H355, 2x 1 GbE Broadcom |
| Bezel                 | N/A                               | N/A                                   | Yes                        | N/A                          |
| Other                 | N/A                               | N/A                                   | N/A                        | ODD                          |

**Table 17. Acoustical performance of R250 acoustical configurations**

| Configuration   |  | Entry | Economy | Volume | Feature rich |
|---|--|-------|---------|--------|--------------|
| <b>Acoustical Performance: Idle/ Operating @ 25°C Ambient</b> |  |       |         |        |              |
| L <sub>wA,m</sub> (B)   | Idle                                     | 4.5   | 4.5     | 5.0    | 5.0          |
|   | Operating                                | 4.5   | 4.5     | 5.0    | 5.0          |
| K <sub>v</sub> (B)  | Idle                                     | 0.4   | 0.4     | 0.4    | 0.4          |
|   | Operating                                | 0.4   | 0.4     | 0.4    | 0.4          |
| L <sub>pA,m</sub> (dB)  | Idle                                     | 30    | 30      | 33     | 33           |
|   | Operating                                | 30    | 30      | 33     | 33           |
| Prominent tones   | No prominent tones in Idle and Operating |       |         |        |              |
| <b>Acoustical Performance: Idle @ 28°C Ambient</b>            |  |       |         |        |              |
| L <sub>wA,m</sub> (B)   |  | 4.5   | 4.5     | 5.0    | 5.0          |
| K <sub>v</sub> (B)  |  | 0.4   | 0.4     | 0.4    | 0.4          |
| L <sub>pA,m</sub> (dB)  |  | 30    | 30      | 33     | 33           |
| <b>Acoustical Performance: Max. Loading @ 35°C Ambient</b>    |  |       |         |        |              |
| L <sub>wA,m</sub> (B)   |  | 4.9   | 5.7     | 5.0    | 6.3          |
| K <sub>v</sub> (B)  |  | 0.4   | 0.4     | 0.4    | 0.4          |
| L <sub>pA,m</sub> (dB)  |  | 32    | 40      | 33     | 46           |

L<sub>wA,m</sub>: The declared mean A-weighted sound power level (L<sub>wA</sub>) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

L<sub>pA,m</sub>: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed in a 24U rack enclosure, 25 cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

Prominent tones: Criteria of D.6 and D.11 of ECMA-74 are followed to determine if discrete tones are prominent and to report them, if so.

Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

Operating mode: The maximum of the steady state acoustical output at 50% of Processor TDP or active HDDs per C.9.3.2 in ECMA-74 .

# Rack, rails, and cable management

Key factors in selecting the proper rails include, Identifying:

- Type of rack in which the rails will be installed
- Spacing between the front and rear mounting flanges of the rack
- Type and location of any equipment mounted on the rear of the rack such as power distribution units (PDUs), and the overall depth of the rack

Refer the [DellEMC Enterprise Systems Rail Sizing and Rack Compatibility Matrix](#) for the following information:

- Specific details about rail types and their functionalities
- Rail adjustability ranges for various rack mounting flange types
- Rail depth with and without cable management accessories
- Rack types supported for various rack mounting flange types

## Topics:

- [Rack Rails](#)

## Rack Rails

The ReadyRails™ static rail system for the Dell EMC PowerEdge R250 provides tool-less support for racks with square or unthreaded round mounting holes including all generations of Dell racks. The rails also offer tooled-mounting support for four-post threaded and two-post (Telco) racks for added versatility.

## Rails

The static rails for the R250 support tool-less mounting in 19-inch wide, EIA-310-E compliant square hole and unthreaded round hole racks through the ReadyRails mounting interface. The rails also support a generic mounting interface for tooled mounting in threaded hole and two-post (Telco) racks. Note that screws are not included in the kit due to the fact that threaded racks are offered with a variety of thread designations. Users must therefore provide their own screws when mounting the rails in threaded or two-post racks.

The adjustment range of the rails is a function of the type of rack in which they are being mounted. The Min/Max values listed below represent the allowable distance between the front and rear mounting flanges in the rack. Rail depth represents the minimum depth of the rail as measured from the rack front mounting flanges when the rail rear bracket is positioned all the way forward.

**Table 18. Supported rack types**

| Product | Rail ID | Mounting Interface  | Rail Type | Rack Types Supported |       |        |        |        |
|---------|---------|---------------------|-----------|----------------------|-------|--------|--------|--------|
|         |         |                     |           | 4-Post               |       |        | 2-Post |        |
|         |         |                     |           | Square               | Round | Thread | Flush  | Center |
| R250    | A4      | ReadyRails /Generic | Static    | √                    | √     | √      | √      | √      |

**Table 19. Rail adjustment range for supported racks**

| Adjustment Range |         |                        |           |                            |     |       |     |          |     |                 |          |
|------------------|---------|------------------------|-----------|----------------------------|-----|-------|-----|----------|-----|-----------------|----------|
| Product          | Rail ID | Mounting Interface     | Rail Type | Rail Adjustment Range (mm) |     |       |     |          |     | Rail Depth (mm) |          |
| R250             | A4      | ReadyRails/<br>Generic | Static    | Square                     |     | Round |     | Threaded |     | Without CMA     | With CMA |
|                  |         |                        |           | Min                        | Max | Min   | Max | Min      | Max |                 |          |
|                  |         |                        |           | 608                        | 879 | 594   | 872 | 604      | 890 | 622             | N/A      |

## Cable Management Arm

The static rails for the R250 support a wide variety of racks and mounting configurations, but do not support the ability to extend the system out of the rack for service. Thus, they do not provide support for a cable management arm (CMA).

## Rack View

The PowerEdge R250 rails are a “stab-in” design, meaning that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack.

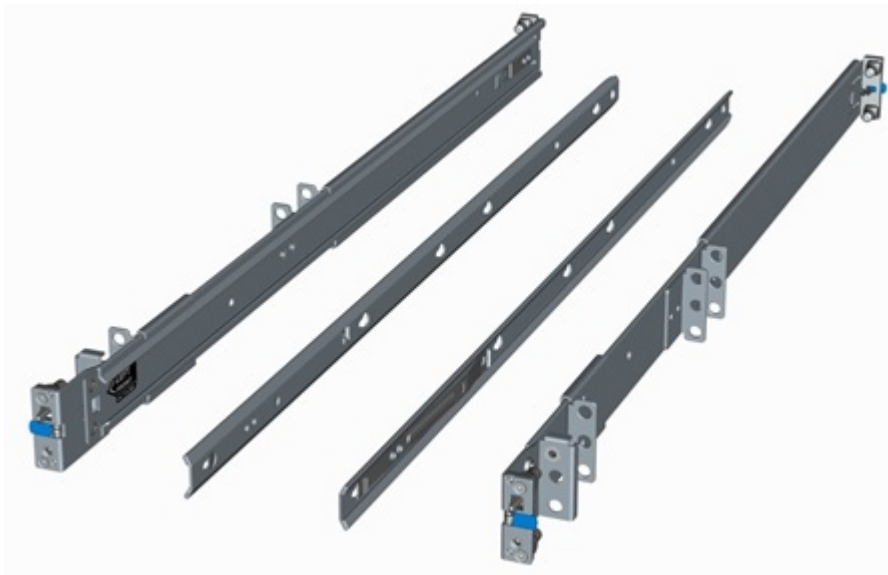




Figure 15. R250 mounted in the A4 Static Rails in 2-post Center Mount configuration

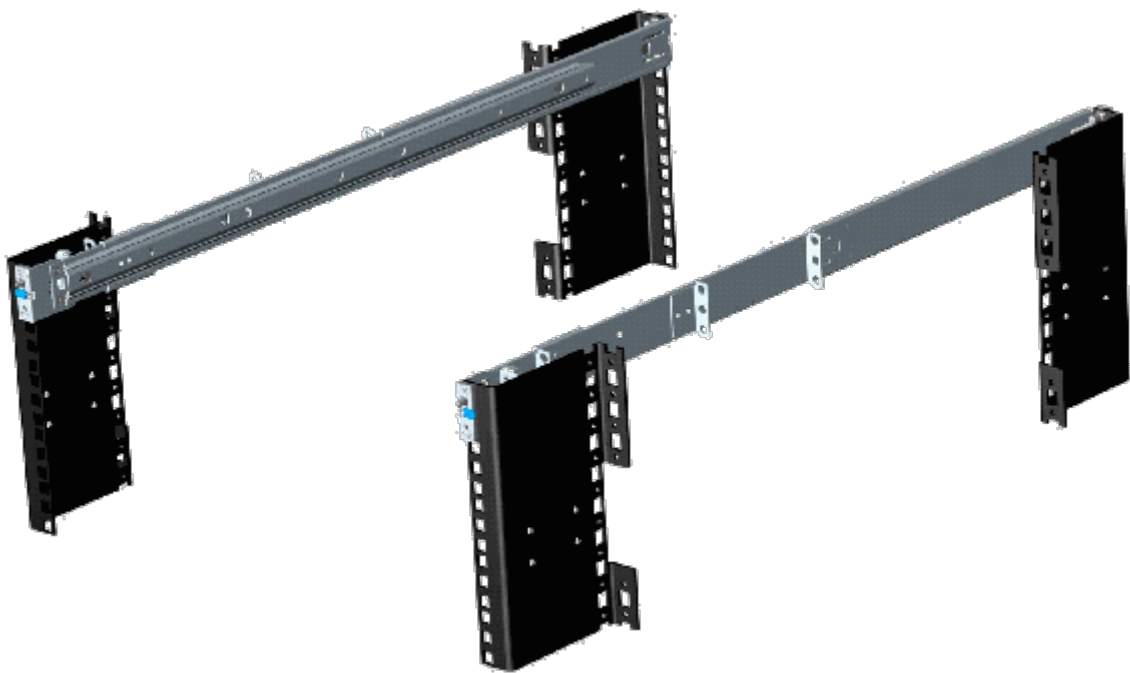


Figure 16. A4 static rails installed to 4-Post rack



# Supported operating systems

The PowerEdge R250 system supports the following operating systems:

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

For more information, go to [www.dell.com/ossupport](http://www.dell.com/ossupport).

# Dell EMC OpenManage systems management

## Dell EMC OpenManage Portfolio

Simplifying hardware management through ease of use and automation

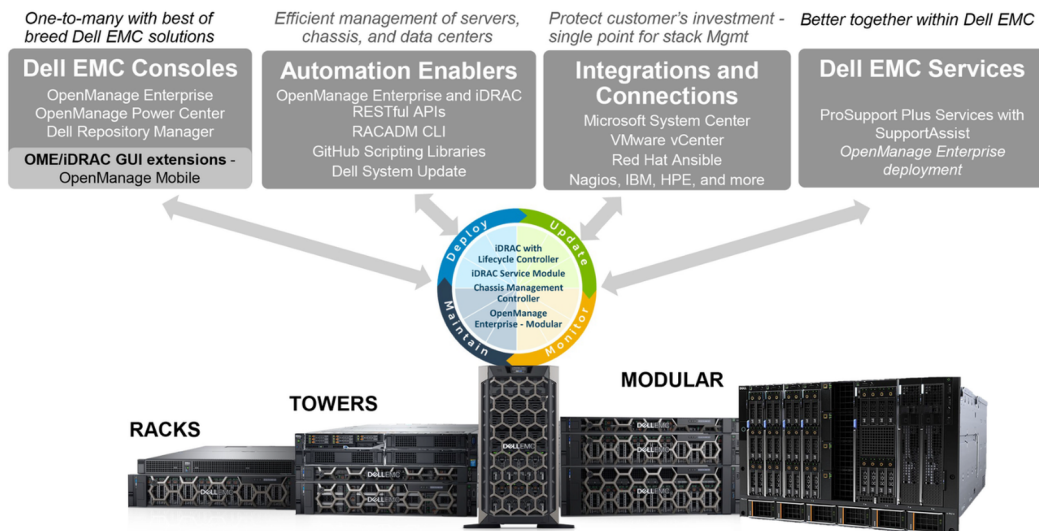


Figure 17. Dell EMC OpenManage Portfolio

Dell EMC delivers management solutions that help IT Administrators effectively deploy, update, monitor, and manage IT assets. OpenManage solutions and tools enable you to quickly respond to problems by helping them to manage Dell EMC servers effectively and efficiently; in physical, virtual, local, and remote environments, operating in-band, and out-of-band (agent-free). The OpenManage portfolio includes innovative embedded management tools such as the integrated Dell Remote Access Controller (iDRAC), Chassis Management Controller and Consoles like OpenManage Enterprise, OpenManage Power Manager plug in, and tools like Repository Manager.

Dell EMC has developed comprehensive systems management solutions based on open standards and has integrated with management consoles that can perform advanced management of Dell hardware. Dell EMC has connected or integrated the advanced management capabilities of Dell hardware into offerings from the industry's top systems management vendors and frameworks such as Ansible, thus making Dell EMC platforms easy to deploy, update, monitor, and manage.

The key tools for managing Dell EMC PowerEdge servers are iDRAC and the one-to-many OpenManage Enterprise console. OpenManage Enterprise helps the system administrators in complete lifecycle management of multiple generations of PowerEdge servers. Other tools such as Repository Manager, which enables simple yet comprehensive change management.

OpenManage tools integrate with systems management framework from other vendors such as VMware, Microsoft, Ansible, and ServiceNow. This enables you to use the skills of the IT staff to efficiently manage Dell EMC PowerEdge servers.

### Topics:

- [Server and Chassis Managers](#)
- [Dell EMC consoles](#)
- [Automation Enablers](#)
- [Integration with third-party consoles](#)
- [Connections for third-party consoles](#)
- [Dell EMC Update Utilities](#)
- [Dell resources](#)

## Server and Chassis Managers

- Integrated Dell Remote Access Controller (iDRAC)
- iDRAC Service Module (iSM)

## Dell EMC consoles

- Dell EMC OpenManage Enterprise
- Dell EMC Repository Manager (DRM)
- Dell EMC OpenManage Enterprise Power Manager plugin to OpenManage Enterprise
- Dell EMC OpenManage Mobile (OMM)

## Automation Enablers

- OpenManage Ansible Modules
- iDRAC RESTful APIs (Redfish)
- Standards-based APIs (Python, PowerShell)
- RACADM Command Line Interface (CLI)
- GitHub Scripting Libraries

## Integration with third-party consoles

- Dell EMC OpenManage Integrations with Microsoft System Center
- Dell EMC OpenManage Integration for VMware vCenter (OMIVV)
- Dell EMC OpenManage Ansible Modules
- Dell EMC OpenManage Integration with ServiceNow

## Connections for third-party consoles

- Micro Focus and other HPE tools
- OpenManage Connection for IBM Tivoli
- OpenManage Plug-in for Nagios Core and XI

## Dell EMC Update Utilities


- Dell System Update (DSU)
- Dell EMC Repository Manager (DRM)
- Dell EMC Update Packages (DUP)
- Dell EMC Server Update Utility (SUU)
- Dell EMC Platform Specific Bootable ISO (PSBI)

## Dell resources

For additional information about white papers, videos, blogs, forums, technical material, tools, usage examples, and other information, go to the OpenManage page at <https://www.dell.com/openmanagemanuals> or the following product pages:

**Table 20. Dell resources**

| <b>Resource</b>  | <b>Location</b>   |
|--|---|
| Integrated Dell Remote Access Controller (iDRAC)             | <a href="https://www.dell.com/idracmanuals">https://www.dell.com/idracmanuals</a>                         |
| iDRAC Service Module (iSM)                                   | <a href="https://www.dell.com/support/kbdoc/000178050/">https://www.dell.com/support/kbdoc/000178050/</a> |
| OpenManage Ansible Modules                                   | <a href="https://www.dell.com/support/kbdoc/000177308/">https://www.dell.com/support/kbdoc/000177308/</a> |
| OpenManage Essentials (OME)                                  | <a href="https://www.dell.com/support/kbdoc/000175879/">https://www.dell.com/support/kbdoc/000175879/</a> |
| OpenManage Mobile (OMM)                                      | <a href="https://www.dell.com/support/kbdoc/000176046">https://www.dell.com/support/kbdoc/000176046</a>   |
| OpenManage Integration for VMware vCenter (OMIVV)            | <a href="https://www.dell.com/support/kbdoc/000176981/">https://www.dell.com/support/kbdoc/000176981/</a> |
| OpenManage Integration for Microsoft System Center (OMIMSSC) | <a href="https://www.dell.com/support/kbdoc/000147399">https://www.dell.com/support/kbdoc/000147399</a>   |
| Dell EMC Repository Manager (DRM)                            | <a href="https://www.dell.com/support/kbdoc/000177083">https://www.dell.com/support/kbdoc/000177083</a>   |
| Dell EMC System Update (DSU)                                 | <a href="https://www.dell.com/support/kbdoc/000130590">https://www.dell.com/support/kbdoc/000130590</a>   |
| Dell EMC Platform Specific Bootable ISO (PSBI)               | <a href="https://Dell.com/support/article/sln296511">Dell.com/support/article/sln296511</a>               |
| Dell EMC Chassis Management Controller (CMC)                 | <a href="https://www.dell.com/support/article/sln311283">www.dell.com/support/article/sln311283</a>       |
| OpenManage Connections for Partner Consoles                  | <a href="https://www.dell.com/support/kbdoc/000146912">https://www.dell.com/support/kbdoc/000146912</a>   |
| OpenManage Enterprise Power Manager                          | <a href="https://www.dell.com/support/kbdoc/000176254">https://www.dell.com/support/kbdoc/000176254</a>   |
| OpenManage Integration with ServiceNow (OMISNOW)             | <a href="https://Dell.com/support/article/sln317784">Dell.com/support/article/sln317784</a>               |

 **NOTE:** Features may vary by server. Please refer to the product page on <https://www.dell.com/manuals> for details.

## Dell Technologies Services

Dell Technologies Services include a wide, customizable range of service choices to simplify the assessment, design, implementation, management and maintenance of IT environments and to help you transition from platform to platform. Depending on your current business requirements and the level of service right for you, we provide factory, on-site, remote, modular, and specialized services that fit your needs and budget. We'll help with a little or a lot—your choice—and provide access to our global resources.

For more information, see [DellEMC.com/Services](https://DellEMC.com/Services).

### Topics:

- [Dell EMC ProDeploy Enterprise Suite](#)
- [Dell EMC Remote Consulting Services](#)
- [Dell EMC Data Migration Service](#)
- [Dell EMC ProSupport Enterprise Suite](#)
- [Dell EMC ProSupport Plus for Enterprise](#)
- [Dell EMC ProSupport for Enterprise](#)
- [Dell EMC ProSupport One for Data Center](#)
- [ProSupport for HPC](#)
- [Support Technologies](#)
- [Dell Technologies Education Services](#)
- [Dell Technologies Consulting Services](#)
- [Dell EMC Managed Services](#)

## Dell EMC ProDeploy Enterprise Suite

ProDeploy Enterprise Suite gets your server out of the box and into optimized production—fast. Our elite deployment engineers with broad and deep experience utilizing best-in-class processes along with our established global scale can help you around the clock and around the globe. From simple to the most complex server installations and software integration, we take the guess work and risk out of deploying your new server technology.

|                        |  | Basic Deployment | ProDeploy        | ProDeploy Plus |
|------------------------|--|------------------|------------------|----------------|
| <b>Pre-deployment</b>  | Single point of contact for project management   | -                | ●                | In-region      |
|                        | Site readiness review  | -                | ●                | ●              |
|                        | Implementation planning  | -                | ●                | ●              |
|                        | SAM engagement for ProSupport Plus entitled devices  | -                | -                | ●              |
| <b>Deployment</b>      | Deployment service hours   | Business hours   | 24x7             | 24x7           |
|                        | Remote guidance for hardware installation or Onsite hardware installation and packaging material removal | Onsite           | Remote or Onsite | Onsite         |
|                        | Install and configure system software  | -                | Remote           | Onsite         |
|                        | Install support software and connect with Dell Technologies  | -                | ●                | ●              |
|                        | Project documentation with knowledge transfer  | -                | ●                | ●              |
| <b>Post-deployment</b> | Deployment verification  | -                | ●                | ●              |
|                        | Configuration data transfer to Dell EMC technical support  | -                | ●                | ●              |
|                        | 30-days of post-deployment configuration assistance  | -                | -                | ●              |
|                        | Training credits for Dell EMC Education Services   | -                | -                | ●              |

Figure 18. ProDeploy Enterprise Suite capabilities

**NOTE:** Hardware installation not applicable on selected software products.

## Dell EMC ProDeploy Plus

From beginning to end, ProDeploy Plus provides the skill and scale needed to successfully execute demanding deployments in today's complex IT environments. Certified Dell EMC experts start with extensive environmental assessments and detailed migration planning and recommendations. Software installation includes set up of most versions of Dell EMC SupportAssist and OpenManage system management utilities. Post-deployment configuration assistance, testing, and product orientation services are also available.

## Dell EMC ProDeploy

ProDeploy provides full service installation and configuration of both server hardware and system software by certified deployment engineers including set up of leading operating systems and hypervisors as well as most versions of Dell EMC SupportAssist and OpenManage system management utilities. To prepare for the deployment, we conduct a site readiness review and implementation planning exercise. System testing, validation, and full project documentation with knowledge transfer complete the process.

## Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians who know Dell EMC servers inside and out.

## Dell EMC Server Configuration Services

With Dell EMC Rack Integration and other Dell EMC PowerEdge Server Configuration Services, you save time by receiving your systems racked, cabled, tested, and ready to integrate into the data center. Dell EMC staff pre-configure RAID, BIOS and iDRAC settings, install system images, and even install third-party hardware and software.

For more information, see [Server Configuration Services](#).

## Dell EMC Residency Services

Residency Services helps customers transition to new capabilities quickly with the assistance of on-site or remote Dell EMC experts whose priorities and time you control. Residency experts can provide post implementation management and knowledge transfer related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

## Dell EMC Remote Consulting Services

When you are in the final stages of your PowerEdge server implementation, you can rely on Dell EMC Remote Consulting Services and our certified technical experts to help you optimize your configuration with best practices for your software, virtualization, server, storage, networking, and systems management.

## Dell EMC Data Migration Service

Protect your business and data with our single point of contact to manage your data migration project. Your project manager will work with our experienced team of experts to create a plan using industry-leading tools and proven processes based on global best practices to migrate your existing files and data so your business system get up and running quickly and smoothly.

## Dell EMC ProSupport Enterprise Suite

With the ProSupport Enterprise Suite, we help keep your IT systems running smoothly, so you can focus on running your business. We will help maintain peak performance and availability of your most essential workloads. ProSupport Enterprise Suite is a suite of support services that enable you to build the solution that is right for your organization.

Choose support models based on how you use technology and where you want to allocate resources. From the desktop to the data center, address everyday IT challenges, such as unplanned downtime, mission-critical needs, data and asset protection, support planning, resource allocation, software application management and more. Optimize IT resources by choosing the right support model.

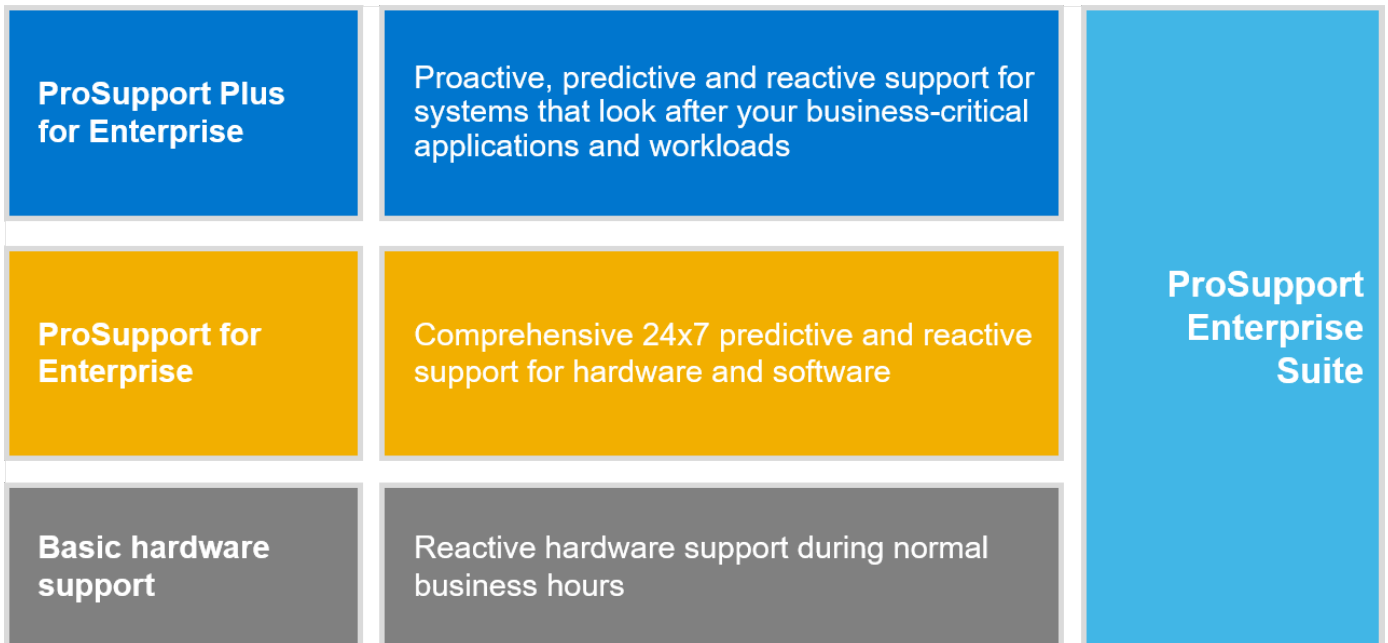


Figure 19. Dell EMC ProSupport Enterprise Suite

## Dell EMC ProSupport Plus for Enterprise

When you purchase your PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for your business-critical systems. ProSupport Plus provides you with all the benefits of ProSupport, plus the following:

- An assigned Services Account Manager who knows your business and your environment
- Immediate advanced troubleshooting from an engineer who understands your PowerEdge server
- Personalized, preventive recommendations based on analysis of support trends and best practices from across the Dell Technologies infrastructure solutions customer base to reduce support issues and improve performance
- Predictive analysis for issue prevention and optimization enabled by SupportAssist
- Proactive monitoring, issue detection, notification, and automated case creation for accelerated issue resolution enabled by SupportAssist
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect

## Dell EMC ProSupport for Enterprise

Our ProSupport service offers highly trained experts around the clock and around the globe to address your IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- Predictive, automated tools and innovative technology
- A central point of accountability for all hardware and software issues
- Collaborative 3rd party support
- Hypervisor, operating system and application support
- Consistent experience regardless of where you are located or what language you speak
- Optional onsite parts and labor response options including next business day or four-hour mission critical

**i** **NOTE:** Subject to service offer country availability.

## Enterprise Support Services Feature Comparison

|   | Basic             | ProSupport                                   | ProSupport Plus                               |
|---|-------------------|--|---|
| Remote technical support                            | 9x5               | 24x7   | 24x7  |
| Covered products                                    | Hardware          | Hardware<br>Software                         | Hardware<br>Software                          |
| Onsite hardware support                             | Next business day | Next business day or<br>4hr mission critical | Next business day or<br>4 hr mission critical |
| 3 <sup>rd</sup> party collaborative assistance      |                   | ●  | ●   |
| Automated issue detection & proactive case creation |                   | ●  | ●   |
| Self-service case initiation and management         |                   | ●  | ●   |
| Access to software updates                          |                   | ●  | ●   |
| Priority access to specialized support experts      |                   |  | ●   |
| 3 <sup>rd</sup> party software support              |                   |  | ●   |
| Assigned Services Account Manager                   |                   |  | ●   |
| Personalized assessments and recommendations        |                   |  | ●   |
| Semiannual systems maintenance                      |                   |  | ●   |

Availability and terms of Dell Technologies services vary by region and by product. For more information, please view our Service Descriptions available on Dell.com

Figure 20. Dell EMC Enterprise Support model

## Dell EMC ProSupport One for Data Center

ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets. This offering is built on standard ProSupport components that leverage our global scale but are tailored to your company's needs. While not for everyone, this service option offers a truly unique solution for Dell Technologies largest customers with the most complex environments.

- Team of assigned Services Account Managers with remote, on-site options
- Assigned ProSupport One technical and field engineers who are trained on your environment and configurations
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect
- Flexible on-site support and parts options that fit your operational model
- A tailored support plan and training for your operations staff

## ProSupport for HPC

The ProSupport for HPC provides solution-aware support including:

- Access to senior HPC experts
- Advanced HPC cluster assistance: performance, interoperability & configuration
- Enhanced HPC solution level end-to-end support
- Remote pre-support engagement with HPC Specialists during ProDeploy implementation

Learn more at [DellEMC.com/HPC-Services](http://DellEMC.com/HPC-Services).



# ProSupport Add-on for HPC

Delivering a true end-to-end support experience across your HPC environment

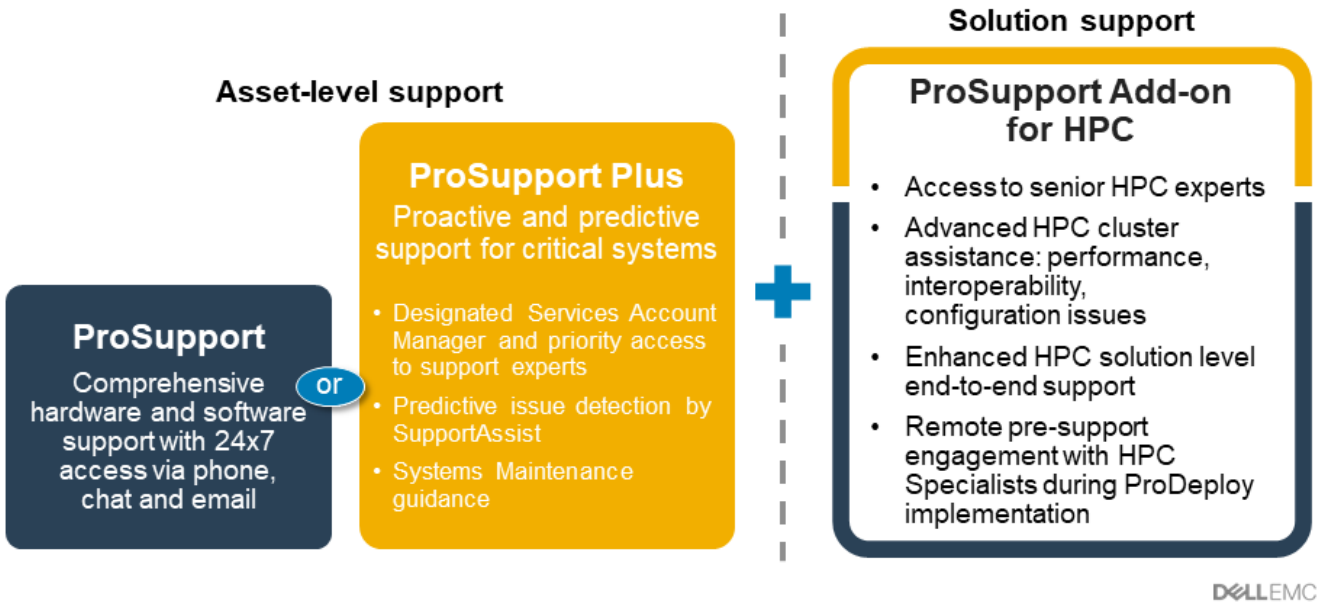


Figure 21. ProSupport for HPC

## Support Technologies

Powering your support experience with predictive, data-driven technologies.

### Dell EMC SupportAssist

The best time to solve a problem is before it happens. The automated proactive and predictive technology SupportAssist helps reduce steps and time to resolution, often detecting issues before they become a crisis. Benefits include:

- Value—SupportAssist is available to all customers at no additional charge
- Improve productivity—replace manual, high-effort routines with automated support
- Accelerate time to resolution—receive issue alerts, automatic case creation, and proactive contact from Dell EMC experts
- Gain insight and control—optimize enterprise devices with on-demand ProSupport Plus reporting in TechDirect, and get predictive issue detection before the problem starts

**NOTE:** SupportAssist is included with all support plans, but features vary based on service level agreement.

|   | Basic Hardware Warranty | ProSupport | ProSupport Plus |
|---|-------------------------|------------|-----------------|
| Automated issue detection and system state information collection | •                       | •          | •               |
| Proactive, automated case creation and notification               |                         | •          | •               |
| Predictive issue detection for failure prevention                 |                         |            | •               |
| Recommendation reporting available on-demand in TechDirect        |                         |            | •               |

Figure 22. SupportAssist model

Get started at [Dell.com/SupportAssist](https://Dell.com/SupportAssist)

## Dell EMC TechDirect

Boost IT team productivity when supporting Dell EMC systems. With over 1.4 million self-dispatches processed each year, TechDirect has proven its effectiveness as a support tool. You can:

- Self-dispatch replacement parts
- Request technical support
- Integrate APIs into your help desk

Or, access all your Dell EMC certification and authorization requirements. Train your staff on Dell EMC products, as TechDirect allows you to:

- Download study guides
- Schedule certification and authorization exams
- View transcripts of completed courses and exams

Register at [techdirect.dell](https://techdirect.dell).

## Dell Technologies Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and execute transformational strategy that drives competitive advantage. Leverage the training and certification required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications designed to help you achieve more from your hardware investment. The curriculum delivers the information and the practical, hands-on skills that you and your team need to confidently install, configure, manage, and troubleshoot your Dell EMC servers. To learn more or register for a class today, see [LearnDell.com/Server](https://LearnDell.com/Server).

## Dell Technologies Consulting Services

Our expert consultants help you transform faster, and quickly achieve business outcomes for the high value workloads Dell EMC PowerEdge systems can handle.

From strategy to full-scale implementation, Dell Technologies Consulting can help you determine how to execute your IT, workforce, or application transformation.

We use prescriptive approaches and proven methodologies combined with Dell Technologies' portfolio and partner ecosystem to help you achieve real business outcomes. From multi-cloud, applications, DevOps, and infrastructure transformations, to business resiliency, data center modernization, analytics, workforce collaboration, and user experiences—we're here to help.

## Dell EMC Managed Services

Reduce the cost, complexity, and risk of managing IT. Focus your resources on digital innovation and transformation while our experts help optimize your IT operations and investment with managed services backed by guaranteed service levels.

# Appendix A: Additional specifications

## Topics:

- Chassis dimension
- Chassis weight
- Video specifications
- NIC port specifications
- USB Ports
- Power Supply Units
- Environmental specifications

## Chassis dimension

The R250 has the following dimensions:

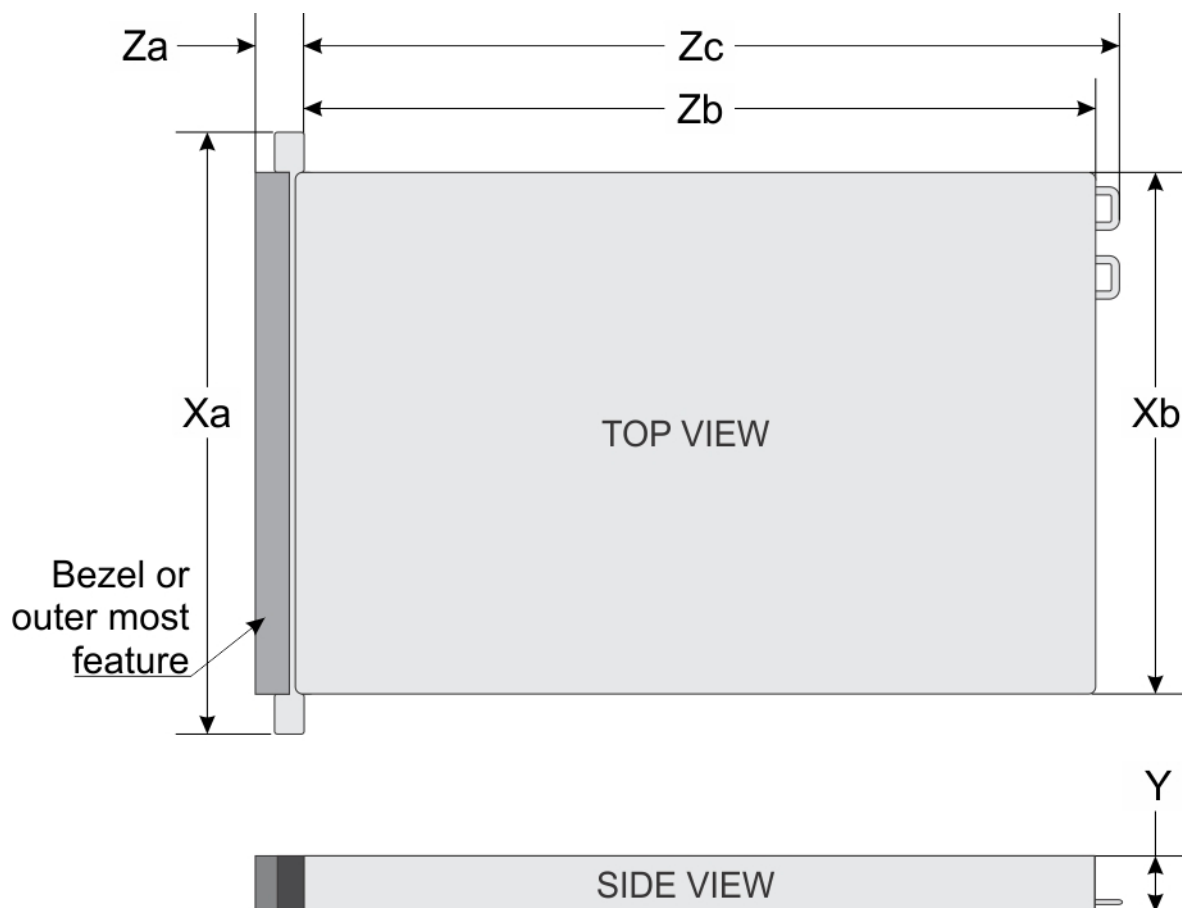


Figure 23. Chassis dimensions

**Table 21. Chassis dimensions**

| Drives                        | Xa                     | Xb                    | Y                      | Za  | Zb  | Zc                    |
|-------------------------------|------------------------|-----------------------|------------------------|---|---|-----------------------|
| 4 x 3.5-inch and 2 x 3.5-inch | 482 mm (18.976 inches) | 434 mm (17.08 inches) | 42.8 mm (1.685 inches) | 22 mm (0.866 inches) without bezel<br>35.64 mm (1.40 inches) with bezel | 534.59 mm (21.04 inches) (Ear to PSU surface) | 563 mm (22.16 inches) |

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

## Chassis weight

**Table 22. Chassis weight**

| System               | Maximum Weight        |
|----------------------|-----------------------|
| 4 x 3.5-inch chassis | 12.48 kg (27.51 lbs.) |
| 2 x 3.5-inch chassis |                       |

## Video specifications

The PowerEdge R250 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

**Table 23. Supported video resolution options for the system**

| Resolution  | Refresh rate (Hz)  | Color depth (bits) |
|-------------|--------------------|--------------------|
| 1024 x 768  | 60, 72, 75, 85     | 8, 16, 32          |
| 1280 x 800  | 60, 75             | 8, 16, 32          |
| 1280 x 1024 | 60, 75, 85         | 8, 16, 32          |
| 1360 x 768  | 60                 | 8, 16, 32          |
| 1440 x 900  | 60, 75, 85         | 8, 16, 32          |
| 1600 x 900  | 60                 | 8, 16, 32          |
| 1600 x 1200 | 60, 65, 70, 75, 85 | 8, 16, 32          |
| 1680 x 1050 | 60, 75, 85         | 8, 16, 32          |
| 1920 x 1080 | 60                 | 8, 16, 32          |
| 1920 x 1200 | 60, 75, 85         | 8, 16, 32          |

## NIC port specifications

The PowerEdge R250 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the Motherboard.

**Table 24. NIC port specification for the system**

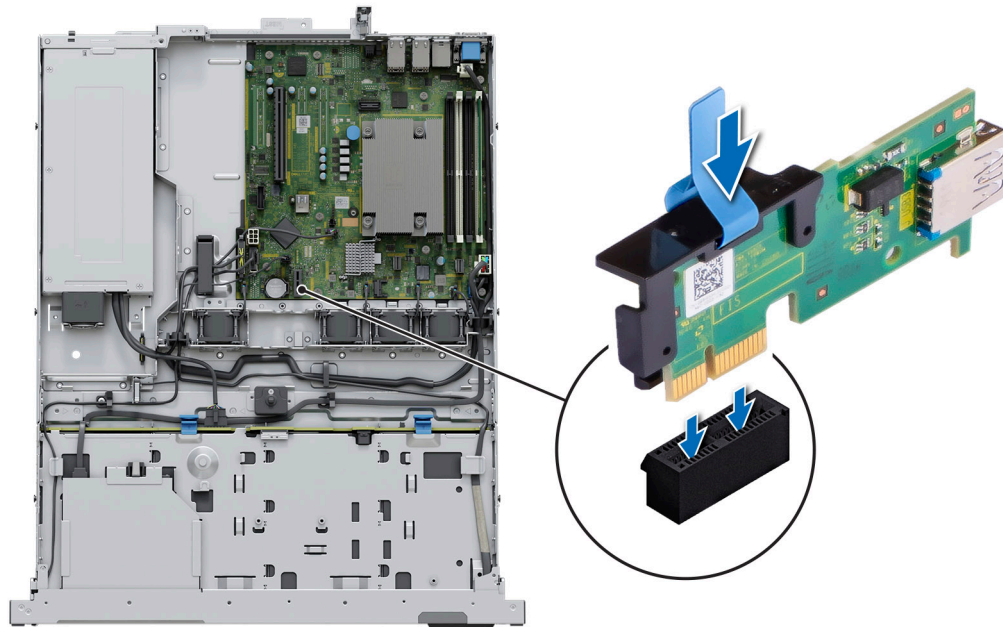
| Feature | Specifications       |
|---------|----------------------|
| LOM     | Onboard LOM 1GbE x 2 |

# USB Ports

**Table 25. PowerEdge R250 USB ports 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 3.0 port  | One          | Internal USB 3.0-compliant port | One          |
| iDRAC Direct port (Micro-AB USB 2.0-compliant port) | One          | USB 2.0 port  | One          |                                 |              |

## Internal usb



**Figure 24. Installing the internal USB card**

# Power Supply Units

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion and advanced thermal-management techniques, and embedded power-management features, including high-accuracy power monitoring. The table below shows the power supply unit options that are available for the R250.

**Table 26. Power supply unit options**

| PSU   | Class    | Heat dissipation (maximum) | Frequency | Voltage                   | AC                  |                    | DC | Current     |
|-------|----------|----------------------------|-----------|---------------------------|---------------------|--------------------|----|-------------|
|       |          |                            |           |                           | High line 200–240 V | Low line 100–120 V |    |             |
| 450 W | Bronze   | 1871 BTU/hr                | 50/60 Hz  | 100–240 V AC, autoranging | 450 W               | 450 W              | NA | 6.5 A-3.5 A |
| 450 W | Platinum | 1725 BTU/hr                | 50/60 Hz  | 100–240 V AC, autoranging | 450 W               | 450 W              | NA | 6.5 A-3.5 A |

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

**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](http://Dell.com/calc).

## Environmental specifications

**NOTE:** For additional information about environmental certifications, refer to the *Product Environmental Datasheet* located with the Documentation > Regulatory Information on [www.dell.com/support/home](http://www.dell.com/support/home).

**Table 27. Operational climatic range category A2**

| Temperature  | Specifications  |
|--|---|
| Allowable continuous operations                        |   |
| 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 (1.8°F/984 Ft) above 900 m (2953 Ft)  |

**Table 28. 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 (9°F in 15 minutes), 5°C in an hour* (9°F in an hour) for tape<br><b>NOTE:</b> * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change. |
| Non-operational temperature limits   | -40 to 65°C (-40 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 29. Maximum vibration specifications**

| Maximum vibration | Specifications   |
|-------------------|--|
| Operating         | 0.21 G <sub>rms</sub> at 5 Hz to 500 Hz for 10 minutes (all x, y, and z axis)  |
| Storage           | 1.88 G <sub>rms</sub> at 10 Hz to 500 Hz for 15 minutes (all six sides tested) |

**Table 30. 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. Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6G for up to 11ms. |
| 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   |

## Particulate and gaseous contamination specifications

The following table defines the limitations that prevent the damage 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 31. 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.<br><i>i</i> <b>NOTE:</b> 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.<br><i>i</i> <b>NOTE:</b> 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.<br><i>i</i> <b>NOTE:</b> This condition applies to data center and non-data center environments.  |
| Corrosive dust            | <ul style="list-style-type: none"> <li>Air must be free of corrosive dust.</li> <li>Residual dust present in the air must have a deliquescent point less than 60% relative humidity.</li> </ul> <i>i</i> <b>NOTE:</b> This condition applies to data center and non-data center environments.  |

**Table 32. 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              |

*i* **NOTE:** Maximum corrosive contaminant levels measured at ≤50% relative humidity.

## Thermal restrictions

### ASHRAE A3/A4 Thermal restriction

The following list is the restriction for supporting fresh air in all the platform.

- Four fans population is required.

- Non Dell qualified peripheral cards or peripheral cards greater than 25 W are not supported.

**Table 33. Fan population**

| <b>Chassis</b>       | <b>Configuration</b> | <b>Fan Q'ty</b> | <b>Fan Location</b>        |
|----------------------|----------------------|-----------------|----------------------------|
| 4x 3.5-inch hot plug | with Riser card      | 4x 4028         | Fan 1, Fan 2, Fan 3, Fan 4 |
| 4x 3.5-inch cabled   | w/o Riser card       | 3x 4028         | Fan 2, Fan 3, Fan 4        |
| 2x 3.5-inch cabled   | with Riser card      | 3x 4028         | Fan 1, Fan 2, Fan 3        |
|                      | w/o Riser card       | 2x 4028         | Fan 2, Fan 3               |



## Appendix B. Standards compliance

The system conforms to the following industry standards.

**Table 34. Industry standard documents**

| Standard   | URL for information and specifications  |
|--|---|
| <b>ACPI</b> Advance Configuration and Power Interface Specification, v2.0c | <a href="https://uefi.org/specsandtesttools">https://uefi.org/specsandtesttools</a>   |
| <b>Ethernet</b> IEEE 802.3-2005  | <a href="https://standards.ieee.org/">https://standards.ieee.org/</a>   |
| <b>HDG</b> Hardware Design Guide Version 3.0 for Microsoft Windows Server  | <a href="https://microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx">microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx</a>                           |
| <b>IPMI</b> Intelligent Platform Management Interface, v2.0                | <a href="https://intel.com/design/servers/ipmi">intel.com/design/servers/ipmi</a>   |
| <b>DDR4 Memory</b> DDR4 SDRAM Specification                                | <a href="https://jedec.org/standards-documents/docs/jesd79-4.pdf">jedec.org/standards-documents/docs/jesd79-4.pdf</a>   |
| <b>PCI Express</b> PCI Express Base Specification Rev. 2.0 and 3.0         | <a href="https://pcisig.com/specifications/pciexpress">pcisig.com/specifications/pciexpress</a>   |
| <b>PMBus</b> Power System Management Protocol Specification, v1.2          | <a href="http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_1_Rev_1-1_20070205.pdf">http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_1_Rev_1-1_20070205.pdf</a> |
| <b>SAS</b> Serial Attached SCSI, v1.1                                      | <a href="http://www.t10.org/">http://www.t10.org/</a>   |
| <b>SATA</b> Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2   | <a href="https://sata-io.org">sata-io.org</a>   |
| <b>SMBIOS</b> System Management BIOS Reference Specification, v2.7         | <a href="https://dmtf.org/standards/smbios">dmtf.org/standards/smbios</a>   |
| <b>TPM</b> Trusted Platform Module Specification, v1.2 and v2.0            | <a href="https://trustedcomputinggroup.org">trustedcomputinggroup.org</a>   |
| <b>UEFI</b> Unified Extensible Firmware Interface Specification, v2.1      | <a href="https://uefi.org/specifications">uefi.org/specifications</a>   |
| <b>USB</b> Universal Serial Bus Specification, Rev. 2.0                    | <a href="https://usb.org/developers/docs">usb.org/developers/docs</a>   |

## Appendix C Additional resources

**Table 35. Additional resources**

| Resource                                       | Description of contents   | Location   |
|--|---|--|
| Installation and Service Manual                | This manual, available in PDF format, provides the following information: <ul style="list-style-type: none"> <li>• Chassis features</li> <li>• System Setup program</li> <li>• System indicator codes</li> <li>• System BIOS</li> <li>• Remove and replace procedures</li> <li>• Diagnostics</li> <li>• Jumpers and connectors</li> </ul> | <a href="http://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a> |
| Getting Started Guide                          | This guide ships with the system, and is also available in PDF format. This guide provides the following information: <ul style="list-style-type: none"> <li>• Initial setup steps</li> </ul>   | <a href="http://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a> |
| Rack Installation Guide                        | This document ships with the rack kits, and provides instructions for installing a server in a rack.  | <a href="http://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a> |
| System Information Label                       | The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.  | Inside the system chassis cover  |
| Quick Resource Locator (QRL)                   | This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell EMC contact information.   | Inside the system chassis cover  |
| Enterprise Infrastructure Planning Tool (EIPT) | The Dell EMC online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.   | <a href="http://Dell.com/calc">Dell.com/calc</a>                       |