Dell EMC PowerEdge R650 Technical Specifications

Thermal restrictions matrix for air cooling

Table 1. Label references

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

Table 2. Cooling fan matrix for air cooling

CONFIGURATION	4 X 3.5-INCH			8 X 2.5-INCH AND NO BACKPLANE	10 X 2.5-INCH SAS		10 X 2.5-INCH NVME	
REAR STORAGE / CPU TDP	3 LP/ 2 FH	REAR 2 X 2.5–INCH	REAR 2 X 2.5–INCH NVME	3 LP/ 2 FH	3 LP/ 2 FH	REAR 2 X 2.5–INCH SAS	3 LP/ 2 FH	REAR 2 X 2.5– INCH NVME
105 W / 120 W	STD fan	HPR SLVR fan		STD fan	HPR SLVR fan		HPR Gold fan	
135 W / 140 W								
150 W								
165 W								
185 W / 195 W	HPR SLVR fan			HPR SLVR fan				
205 W								
225 W / 230 W / 235 W				HPR Gold fan	HPR Gold fan			
240 W / 250 W	Not supported						HPR Gold fan	HPR Gold fan
265 W / 270 W								Not supported

Table 3. Processor and heat sink matrix

HEAT SINK	PROCESSOR TDP
STD HSK	≤ 165 W
T-type HSK	Processor 1 > 165 W
T-type HSK	Processor 2 > 165 W

Table 4. T4 GPU support restriction

SLOTS	2.5-INCH X 10		2.5-INCH X 8		3.5-INCH X 4	
REAR CONFIG	3 X LP	2 X FH	3 X LP	2 X FH	3 X LP	2 X FH
Slot 1	Supported	Supported	Supported	Supported	Supported	Supported
Slot 2	Supported	Supported	Supported	Supported	Supported	Supported
Slot 3	Supported	NA	Supported	NA	Supported	NA

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

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

Thermal restrictions for T4 GPU at 35°C environment:

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

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

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

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

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

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

NVMe Thermal Restrictions in Rear Slot for Air Cooling

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

Other restrictions for Air cooling

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