Power Configurator

Lenovo ThinkStation P5

Table of Contents

Overview 3
Section 1 – Key Architecture Design 3
Section 2 – Power Ratings for Key System Components 6
Section 3 – P5 Power Configurations 10
Section 4 – PCIe Slot Layout 12
Section 5 – Configuration Notes 13
Appendix 14
Revision History 17

Overview

The purpose of this document is to provide ThinkStation P5 users with an overview of the power configurations available with the P5. Additionally, information provided here will cover the available combinations of PSU, CPU, and GPU to ensure users can build their maximum ideal system configuration while remaining within the approved power budget of the system.

Section 1 – Key Architecture Design

The ThinkStation P5 offers two PSU sizes. The 750W PSU is a more traditional PSU that attaches to the motherboard via cabling, while the 1000W PSU connects to the motherboard via a Power Distribution Board (PDB). The PSU and CPU combination will determine what GPUs can be supported.

Both power supplies mount to the inside of the chassis in the same location. Power for the GPUs comes from an 8-pin PCIE GPU power cable on the 750W PSU. When using a 1000W PSU the GPU power comes from up to two 12VHPWR power plugs on the PDB. See Figures 1 and 2 below for more detail on the 1000W PSU configuration and Figure 3 below for more information on the 750W PSU.

Figure 1 – 1000W Toolless PSU, PDB, and 12VHPWR connections

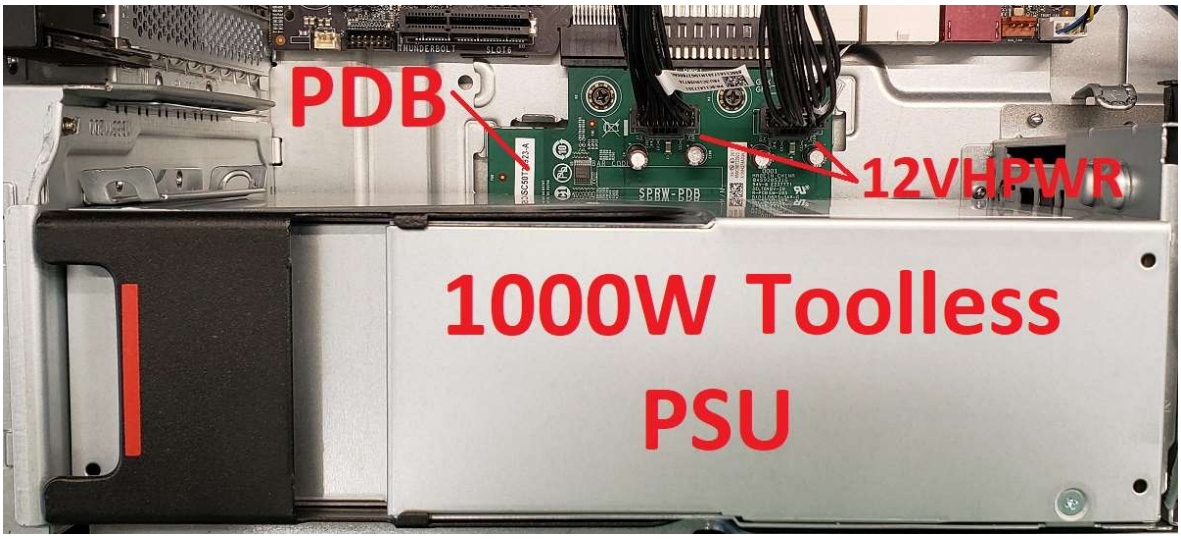


Figure 2 – 12VHPWR connections to dual GPUs

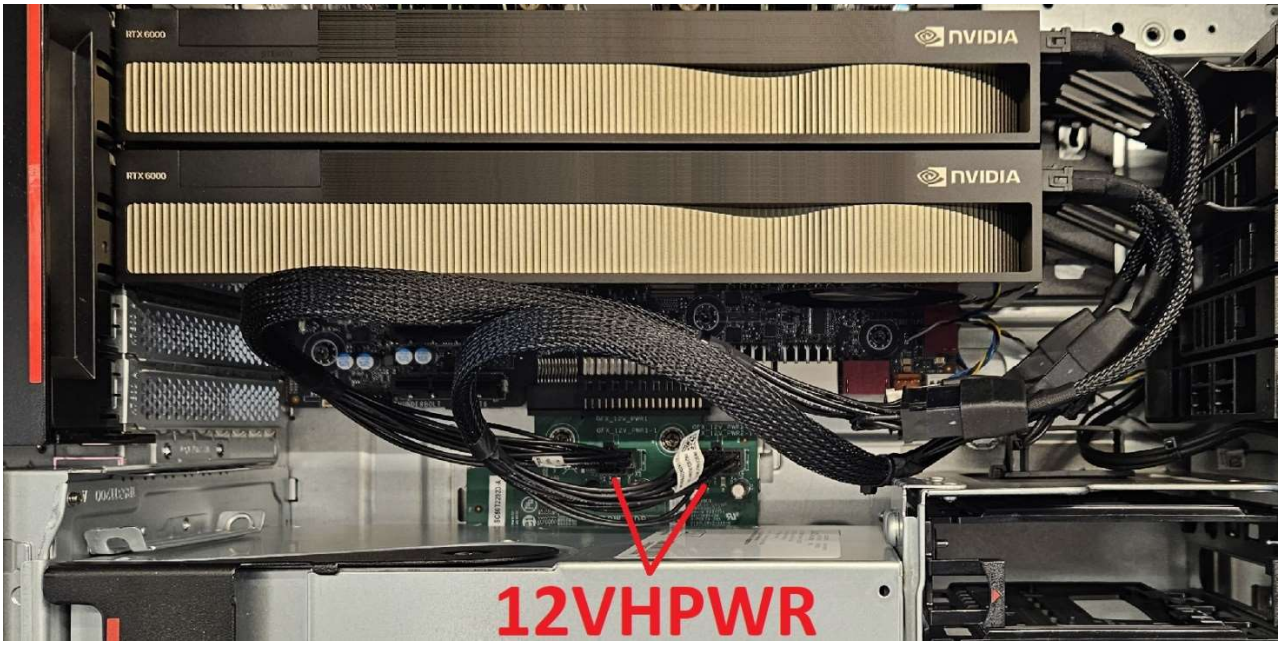
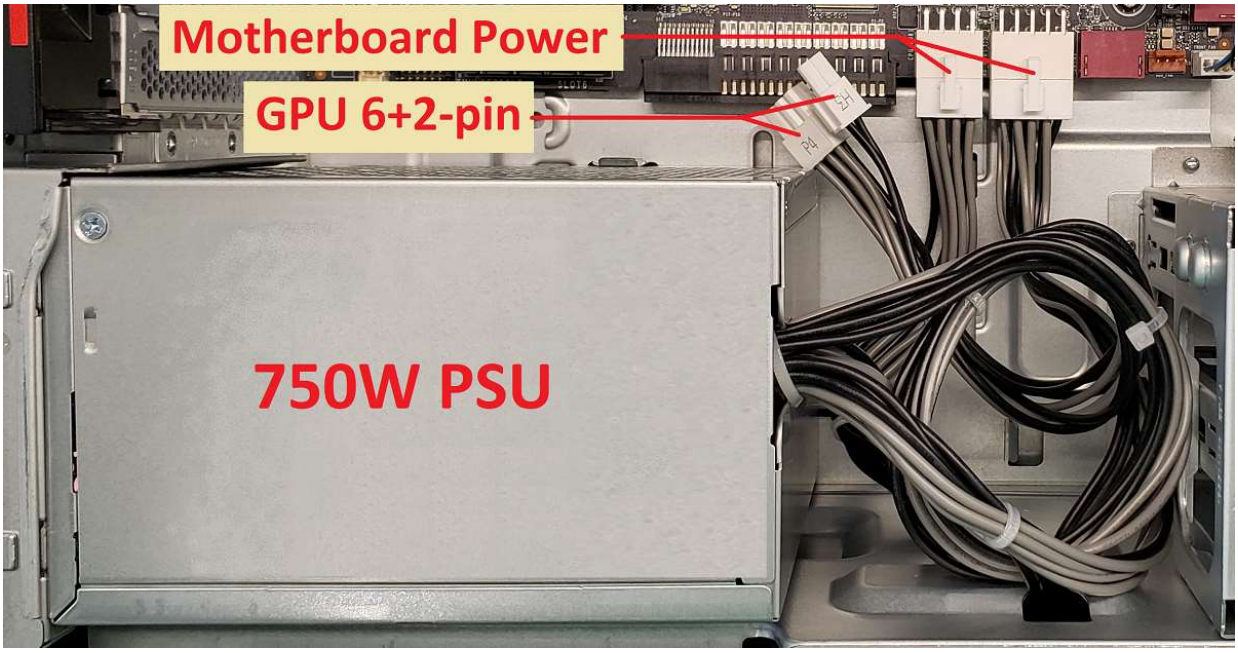


Figure 3 – 750W PSU, motherboard power connections and 6+2-pin PCIe GPU power plug



Note: See **Appendix** section for detailed drawings and additional information on the GPU cables and adapters.

Section 2 – Power Ratings for Key System Components

It is important to know the power ratings for various internal components used to fully understand the power capabilities within the ThinkStation P5 platform. See Tables 1a and 1b for CPU power ratings and Table 2 for PCIe add-in GPU ratings. All the GPUs listed in the following tables have been tested by Lenovo, but not all are available through Lenovo in all geographies.

Table 1a – CPU Power Ratings

Intel Xeon W-series Processors (Sapphire Rapids)

CPU Name	CPU Base Power	Additional CPU Information
W7-2495X	225W	2.5GHz, 24 cores, 45MB Cache, DDR5-4800, Turbo
W7-2475X	225W	2.6GHz, 20 cores, 37.5MB Cache, DDR5-4800, Turbo
W5-2465X	200W	3.1GHz, 16 cores, 33.75MB Cache, DDR5-4800, Turbo
W5-2455X	200W	3.2GHz, 12 cores, 30MB Cache, DDR5-4800, Turbo
W5-2445	175W	3.1GHz, 10 cores, 26.25MB Cache, DDR5-4800, Turbo
W3-2435	165W	3.1GHz, 8 cores, 22.5MB Cache, DDR5-4800, Turbo
W3-2425	130W	3.0GHz, 6 cores, 15MB Cache, DDR5-4400, Turbo
W3-2423	120W	2.1GHz, 6 cores, 15MB Cache, DDR5-4400, Turbo

Table 1b – CPU Power Ratings

Intel Xeon W-series Processor (Emerald Rapids)

CPU Name	CPU Base Power	Additional CPU Information
W7-2595X	250W	2.8GHz, 26 cores, 48.75MB Cache, DDR5-4800, Turbo
W7-2575X	250W	3.0GHz, 22 cores, 45MB Cache, DDR5-4800, Turbo
W5-2565X	240W	3.2GHz, 18 cores, 37.5MB Cache, DDR5-4800, Turbo
W5-2555X	210W	3.3GHz, 14 cores, 33.75MB Cache, DDR5-4800, Turbo
W5-2545	210W	3.5GHz, 12 cores, 30MB Cache, DDR5-4800, Turbo
W3-2535	185W	3.5GHz, 10 cores, 26.25MB Cache, DDR5-4800, Turbo
W3-2525	175W	3.5GHz, 8 cores, 22.5MB Cache, DDR5-4400, Turbo

Table 2 – Add-in Card Power Ratings

Max Power Rating[1]	Card Name	Card Type	Aux Power Connectors on GPU (if any)	Lenovo Aux Power Cables Required (if any)[4]
320W	GeForce RTX 4080 (16GB)	Graphics Card (Quadruple Slot)	12VHPWR	12VHPWR to Right Angled (RA) 12VHPWR
300W	RTX 6000 Ada (48GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to Right Angled (RA) 12VHPWR
300W	RTX A6000 (48GB)	Graphics Card (Dual Slot)	8-pin (EPS)	12VHPWR to EPS 8-pin
250W	RTX 5880 Ada (48GB) RTX 5000 Ada (24GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR OR PCIe 8-pin to 12VHPWR[2]
250W	RTX A5500 (24GB) RTX A5000 (24GB)	Graphics Card (Dual Slot)	8-pin (PCIe)	12VHPWR to Dual PCIe 8-pin
200W	RTX 4500 Ada (20GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR OR PCIe 8-pin to 12VHPWR[2]
200W	RTX A4500 (20GB)	Graphics Card (Dual Slot)	8-pin (PCIe)	12VHPWR to Dual PCIe 8-pin
200W	GeForce RTX 4070 (12GB) GeForce RTX 3060Ti (8GB)	Graphics Card (Triple Slot)	8-pin (PCIe)	12VHPWR to Dual PCIe 8-pin
140W	RTX 4000 Ada (20GB)	Graphics Card (Single Slot)	12VHPWR	12VHPWR to 12VHPWR OR PCIe 8-pin to 12VHPWR[2]
140W	RTX A4000 (16GB)	Graphics Card (Single Slot)	6-pin (PCIe)	12VHPWR to Dual PCIe 8-pin OR PCIe 8-pin to Dual 6-pin Splitter[2]
75W[3] Max	RTX A2000 Ada (16GB) RTX A2000 (12GB)	Graphics Card (Dual Slot)	None	None
	A1000 (8GB) A400 (4GB) T1000(8GB) T400(4GB) W6400 (4GB)	Graphics Cards (Single Slot)	None	None
	Quadro Sync II	Graphics Sync Card (Single Slot)	SATA Power	SATA power to 4-pin
	Other PCIe Cards	Other PCIe Cards	None	None
*** See Appendix section for detailed drawings and additional cabling information.**				

1: Stated Max Power Rating of GPUs may vary from specifications given by vendors or other online sources.

2: For 750W PSUs
When using dual RTX 4000 cards, an 8-pin PCIe to dual 6-pin PCIe splitter is required. When using 12VHPWR cards, an 8-pin to 12VHPWR adapter is required. See Appendix for examples.

3: GPUs and Other PCIe Cards that are ≤75W receive power from the PCIe slot and do not need Aux Power Cables. The Quadro Sync II card occupies a PCIe slot on the system board but only receives power from the SATA power to 4-pin Aux Power Cable. See Appendix for an example.

4: 3rd party GPUs may be designed with different power cable requirements.

With the varying power ratings of the GPUs there are a variety of power cables required for all of the supported cards. The 1000W PSU has two available GPU power cable ports. If there is no cable required in the shipping configuration a 12VHPWR 2x6+4pin to Dual PCIe 6+2pin, 270mm cable will be provided. If the selected GPU in the shipped configuration only requires one GPU power cable and the second power port is open or available, an extra 12VHPWR 2x6+4pin to Dual PCIe 6+2pin, 270mm will be provided in the system. The following tables list any cables that may be supplied with the system, based on the GPU(s) installed. Table 3 covers systems shipped with the 1000W PSU and Table 4 covers systems shipped with a 750W PSU.

Table 3 – Quantity of Cables with 1000W PSU

GPU	GPU Quantity	Lenovo Aux Power Cables Derived[1]			
		12VHPWR 2x6+4pin to Dual PCIe 6+2pin, 270mm	12VHPWR 2x6+4pin to CPU 8pin, 270mm	12VHPWR 2x6+4pin to12VHPWR 2x6+4pin, 650mm	12VHPWR 2x6+4pin to12VHPWR 2x6+4pin, 650mm Right Angle
None	0	1	0	0	0
GeForce RTX 4080 (16GB)	1	1	0	0	1
RTX A6000 (48GB)	1 2	1 0	1 2	0	0
RTX 6000 Ada (48GB) OR RTX 5880 Ada (48GB) OR RTX 5000 Ada (24GB) OR RTX 4500 Ada (20GB) OR RTX 4000 Ada (20GB)	1 2	1 0	0	1 2	0
RTX A5500 (24GB) OR RTX A5000 (24GB) OR RTX A4500 (20GB)	1 2	2 2	0	0	0
GeForce RTX 4070[2] (12GB) OR GeForce RTX 3060Ti[2] (8GB)	1	2	0	0	0
RTX A4000 (16GB)	1 2	2 2	0	0	0
Non-Aux GPUs	Up to 2	1	0	0	0

1: 3rd party GPUs may be designed with different power cable requirements.

2: Use of the GeForce RTX 4070 or RTX 3060Ti requires the use of an 80mm extender cable. See Appendix for an example.

Table 4 – Quantity of Cables with 750W PSU

GPU	GPU Quantity*	Lenovo Aux Power Cable Adapters Derived	
		PCIe 8-pin to Dual 6-pin Splitter 50mm	PCIe 8-pin to 12VHPWR 2x6+4pin 100mm
None	0	0	0
RTX 5880 Ada (48GB) OR RTX 5000 Ada (24GB) OR RTX 4500 Ada (20GB) OR RTX 4000 Ada (20GB)	1	0	1
RTX A5500 (24GB) OR RTX A5000 (24GB) OR RTX A4500 (20GB)	1	0	0
GeForce 4070 (12GB) OR GeForce RTX 3060Ti (8GB)	1	0	0
RTX A4000 (16GB)	1 2	0 1	0
Non-Aux GPUs	Up to 2	0	0
*** GPU Quantity varies by support based on CPU. See Table 6 for GPU support based on CPU selection with the 750W PSU.**			

Section 3 – P5 Power Configurations

The ThinkStation P5 platform can support either a 1000W power supply or a 750W power supply. Support of individual, as well as dual GPU configurations can be dependent upon which CPU and PSU combination is installed in the system. The following tables show general guidance for allowable GPU configurations based on the PSU and CPU in use.

Table 5 – GPU Availability with a 1000W PSU

1000W limit | 100-240VAC input		
GPU	**Processor Base Power (W)**	
	250W-210W	**200W-120W**
RTX 6000 Ada (300W) **RTX A6000 (300W)**	2	
RTX 5880 Ada (250W) **RTX A5500 (250W)** **RTX 5000Ada (250W)** **RTX A5000 (250W)**		
RTX 4500 Ada (200W) **RTX A4500 (200W)**		
RTX 4000 Ada (140W) **RTX A4000 (140W)**		
RTX 2000 Ada (≤75W) **RTX A2000 (≤75W)** **A1000/A400 (≤75W)** **T1000/T400 (≤75W)** **W6400 (≤75W)** **Non-aux GPU (≤75W)**		
GeForce RTX 4080 (320W) **GeForce RTX 4070 (200W)** **GeForce RTX 3060Ti (200W)**	1*	

***Note:** Due to the GeForce RTX GPUs occupying more than 2 slots, the system can only support 1 each of these GPUs

Table 6 – GPU Availability with a 750W PSU

750W limit | 100-240VAC input		
GPU	**Processor Base Power (W)**	
	250W-210W	**200W-120W**
GeForce RTX 4080 (320W)	**Not Supported**	
RTX 6000 Ada (300W) **RTX A6000 (300W)**		
RTX 5880 Ada (250W) **RTX 5000 Ada (250W)** **RTX A5500 (250W)** **RTX A5000 (250W)**	1	
RTX A4500 Ada (200W) **RTX 4500 (200W)** **GeForce RTX 4070 (200W)** **GeForce RTX 3060Ti (200W)**		
RTX 4000 Ada (140W)		
RTX A4000 (140W)		
RTX 2000 Ada (≤75W) **RTX A2000 (≤75W)** **A1000/A400 (≤75W)** **T1000/T400 (≤75W)** **W6400 (≤75W)** **Non-aux GPU (≤75W)**	2	

***Note:** The 750W PSU provides one line of 8-pin (6+2-pin) PCIe GPU power coming directly from the PSU

Section 4 – PCIe Slot Layout

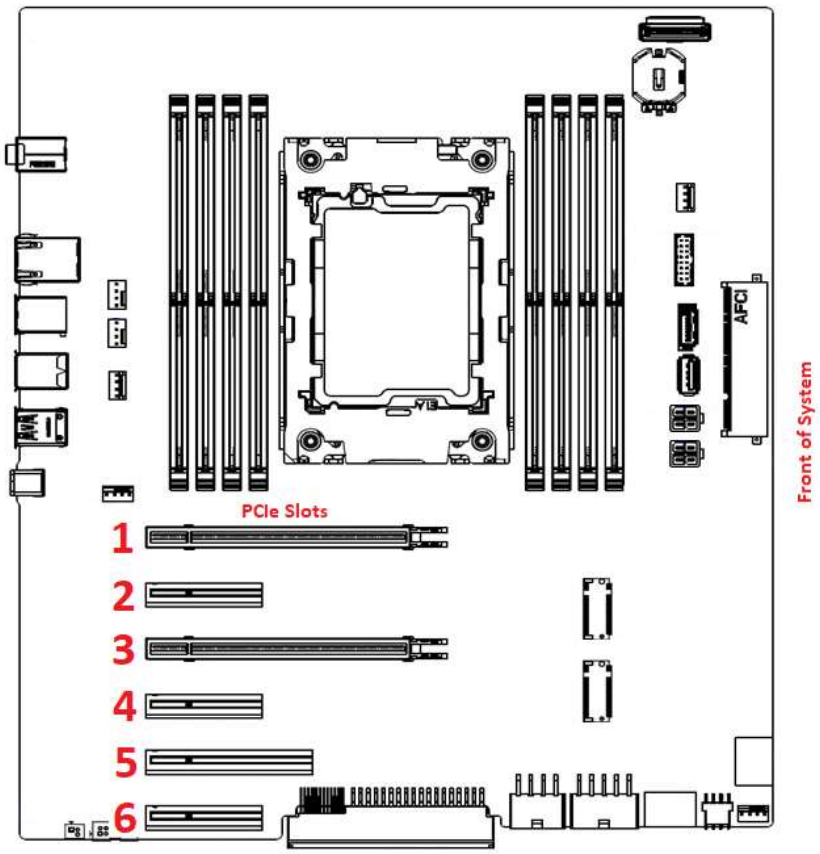
Since the ThinkStation P5 platform introduces PCIe Gen 5 support, it is important to note the capability of each of the PCIe slots within the system. Table 7 below provides information about the PCIe slots and priority of each slot in the P5 ThinkStation. Figure 4 below identifies the locations of the PCIe slots on the system board.

Table 7 – PCIe Slot Information

PCIe Slot Number	Slot Width	Generation	Installation Priority
PCIe Slot 1	x16	Gen 5	2nd
PCIe Slot 2	x4	Gen 4	4th
PCIe Slot 3	x16	Gen 5	1st
PCIe Slot 4	x4	Gen 4	5th
PCIe Slot 5	x8	Gen 4	3rd
PCIe Slot 6	x4	Gen 4	6th

***Note:** If using an RTX 4080 GPU, it must install into "PCIe Slot 1" 1st due to physical constraints

Figure 4 – Location of PCIe Slots on the P5 Motherboard



Section 5 – Configuration Notes

There are a few items to note about power considerations in the ThinkStation P5.

- Mixed graphics card configurations are not supported.
- The 1000W PSU includes support for the new 12VHPWR GPU power cables which, depending on the implementation, do not need any adapters for some of the latest GPUs.
- The 750W and 1000W PSUs connect to the system using different methods. If upgrading a 750W PSU to a 1000W PSU, it will be necessary to install the Power Distribution Board (PDB) into the bottom side of the motherboard first. The 1000W PSU will then insert into the PDB. Additionally, the GPU power cables are directly connected to the PDB and will need to be acquired separately.
- Officially supported configurations could still be limited by additional factors not defined within this document. Please work with the ***Customer Solutions Team*** on any configurations that do not appear to be covered in this document!

Appendix

Here are the auxiliary power cables used in the ThinkStation P5 platform. Unless otherwise noted, these are included in a system only when they are needed for a specific part.

1000W PSU Auxiliary Power Cables

12VHPWR to Dual PCIe 8-pin, 375mm (Available in Option Parts Kit # 4XF1M24242, or individually as FRU# 5C10U58716)

At least one of these cables is provided in every 1000W system, even if there is no GPU that requires it.

12VHPWR to 12VHPWR, 650mm (FRU# 5C10U58775)

12VHPWR to CPU 8-pin, 375mm (Available in Option Parts Kit # 4XF1M24242, or individually as FRU# 5C10U58715)

1000W PSU Auxiliary Power Cables - Continued

12VHPWR to 12VHPWR Right Angle (RA), 450mm (Available in Option Parts Kit # 4XF1M24242, or individually as FRU# 5C10U58774)

8-pin to 6+2-pin Extender, 80mm (FRU# 5C10U58706)

750W PSU Auxiliary Power Cables

8-pin to Dual 6-pin Adapter (FRU# 5C10U58552)

8-pin to 12VHPWR, 100mm (FRU# 5C10U58768)

PSU Independent Auxiliary Power Cable

SATA Power to 4-pin for Quadro Sync II Adapter (FRU# 5C10U58668)

Revision History

Version	Date	Author	Changes/Updates
1.0	4/19/2023	Scott C	Initial launch release
1.1	9/1/2023	Scott C	Update for parts
1.2	3/20/2024	Scott C	Update - new GPUs & related parts
1.3	10/15/2024	Scott C	Update - new CPUs & GPUs