



# **NVIDIA Quadro RTX 6000 PCIe Server Card**

## **Product Brief**

# Document History

PB-09762-001\_v02

Version	Date	Authors	Description of Change
01	December 13, 2019	DK, SM	Initial Release
02	March 13, 2020	SL, SM	Updated “Overview” section with Quadro RTX 6000 qualified servers’ statement

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# Overview

The NVIDIA® Quadro RTX™ 6000 Server Card is a dual-slot, 10.5-inch PCI Express Gen3 graphics solution based on the state-of-the-art NVIDIA Turing™ architecture. This server card version of the Quadro RTX 6000 is a passively cooled board capable of 250 W maximum board power.

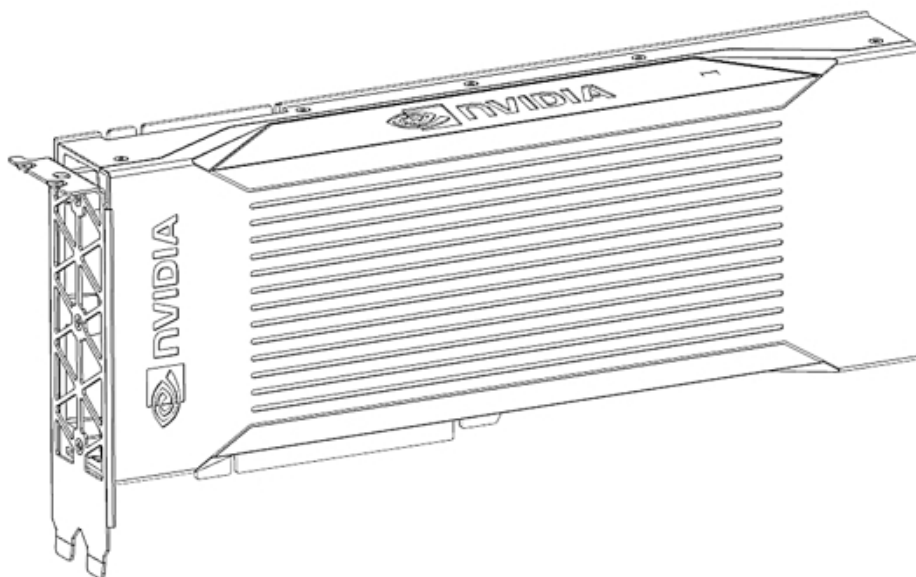
The Quadro RTX 6000 Server Card is the world's first server-specific graphics card delivering hardware-accelerated ray tracing, revolutionary AI features, advanced shading and powerful simulation capabilities to creative professionals. With 24 GB of GDDR6 memory (expandable to 48 GB with NVIDIA® NVLink®), even the most graphics-intensive applications run with the highest level of user experience, including those with very large data sets.

The Quadro RTX 6000 Server Card is intended for deployment in data center or edge servers.

For best performance with Quadro RTX 6000, make sure that you use a server that has been qualified for Quadro RTX 6000 that meets the thermal and airflow requirements for Quadro RTX 6000. Refer to the following website for the latest list of qualified Quadro RTX 6000 servers:

<https://www.nvidia.com/en-us/data-center/tesla/tesla-qualified-servers-catalog/>

Figure 1. NVIDIA Quadro RTX 6000 Server Card



## Airflow Direction Support

The NVIDIA Quadro RTX 6000 passively cooled server card supports bidirectional airflow. The following diagrams illustrate the airflow options supported.

Figure 2. Quadro RTX 6000 Server Card: Left-to-Right Airflow

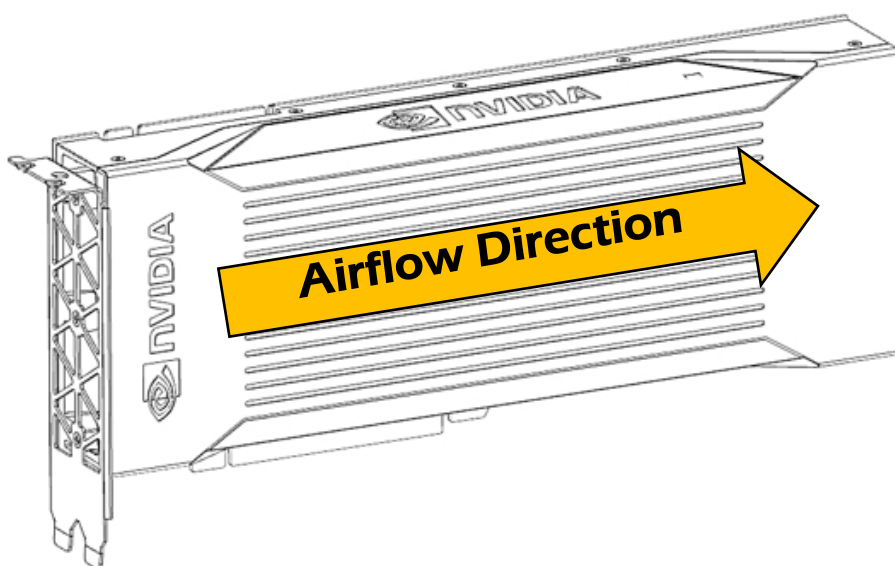
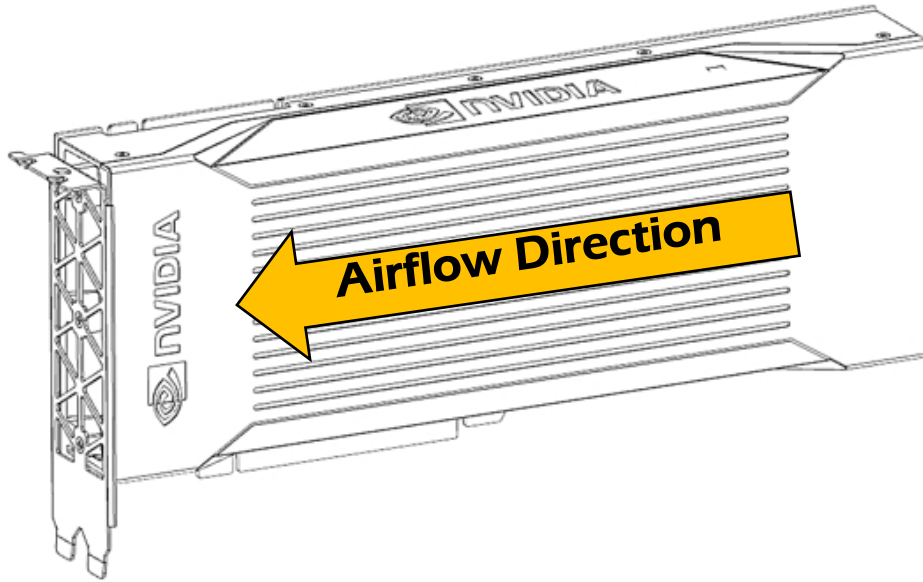


Figure 3. Quadro RTX 6000 Server Card: Right-to-Left Airflow



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# Specifications

## Product Specifications

Table 1 provides the product specifications for the NVIDIA Quadro RTX 6000 Server Card.

Table 1. Product Specifications

Specification	Description
Product SKU	PG150 SKU 230 NVPN: 699-2G150-0230-xxx
Total board power	250 W
Thermal solution	Passive
Mechanical form factor and dimensions	NVIDIA Form Factor 4.0 for PCIe Card Server Products 4.376" High × 10.5" Long, dual slot
GPU SKU	TU102-895-A1
PCI IDs	Device ID: 0x1E78 Vendor ID: 0x10DE Sub-Vendor ID: 0x10DE Sub-System ID: 0x13D9
NVIDIA® CUDA® cores	4608
GPU clocks	Base: 1275 MHz Boost: 1620 MHz
VBIOS	EEPROM size: 8 Mbit UEFI: Supported
PCI Express interface	PCI Express 3.0 ×16 Lane and polarity reversal supported
Power connectors and headers	One CPU 8-pin auxiliary power connector
Weight	Board: 1200 Grams (excluding bracket and extenders) Bracket with screws: 20 Grams Long offset extender: 64 Grams Straight extender: 39 Grams



Table 2 provides the memory specifications for the NVIDIA Quadro RTX 6000 Server Card.

**Table 2. Memory Specifications**

Specification	Description
Memory clocks	Performance: 6501 MHz Idle: 405 MHz
Memory size	24 GB
Memory bus width	384-bit
Peak memory bandwidth	Up to 624 GB/s

Table 3 provides the software specifications for the NVIDIA Quadro RTX 6000 Server Card.

**Table 3. Software Specifications**

Specification	Description
SR-IOV support	Supported -- 24 VF (virtual functions)
BAR address (physical function)	BAR0: 16 MB BAR1: 32 GB BAR3: 32 MB
BAR address (virtual function)	BAR0: 384 MB, 32-bit (24 VF x 16 MB) BAR1: 6 GB, 64-bit (24 VF x 256 MB) BAR3: 768 MB, 64-bit (24 VF x 32 MB)
Message signaled interrupts	MSI-X: Supported MSI: Not supported
PCI class code	0x03 – Display Controller
PCI sub-class code	0x02 – 3D Controller
ECC support	Enabled (by default). Can be disabled via software
SMBus (8-bit address)	0x9E (write), 0x9F (read)
SMBus direct access	Supported
SMBPBI SMBus Post-Box Interface]	Supported

# Environmental and Reliability Specifications

Table 4 provides the environment conditions specifications for the Quadro RTX 6000 Server Card.

**Table 4. Board Environmental and Reliability Specifications**

Specification	Description
Ambient operating temperature	0 °C to 50 °C
Storage temperature	-40 °C to 75 °C
Operating humidity	5% to 95% relative humidity
Storage humidity	5% to 95% relative humidity
Mean time between failures (MTBF)	Uncontrolled environment: <sup>1</sup> 703379.3 hours at 35 °C Controlled environment: <sup>2</sup> 913208.1 hours at 35 °C
<b>Notes:</b> <sup>1</sup> Some environmental stress with limited maintenance. <sup>2</sup> No environmental stress with optimum operation and maintenance.	

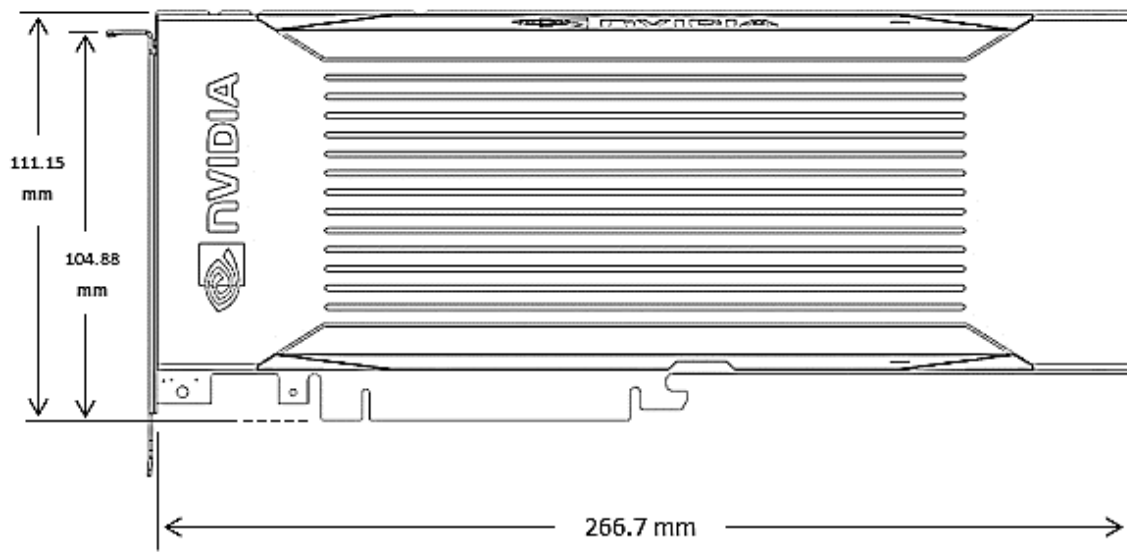
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# Product Features

## Form Factor

The NVIDIA Quadro RTX 6000 Server Card conforms to the *NVIDIA Form Factor 4.0 Specification for Server Products*.

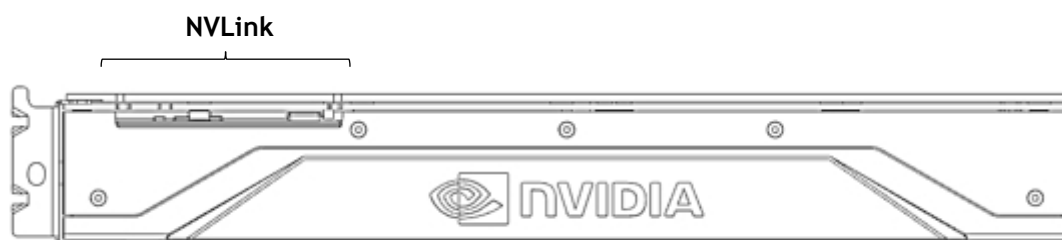
Figure 4. NVIDIA Quadro RTX 6000 Server Card Dimensions



## NVLink Connector Placement

Figure 5 shows the connectors for the NVLink bridge on the Quadro RTX 6000 Server Card.

Figure 5. NVLink Connector Placement – Top View



The Quadro RTX 6000 Server Card supports the following high bandwidth NVLink bridges:

- ▶ 2-slot span NVLink bridge
- ▶ 3-slot span NVLink bridge

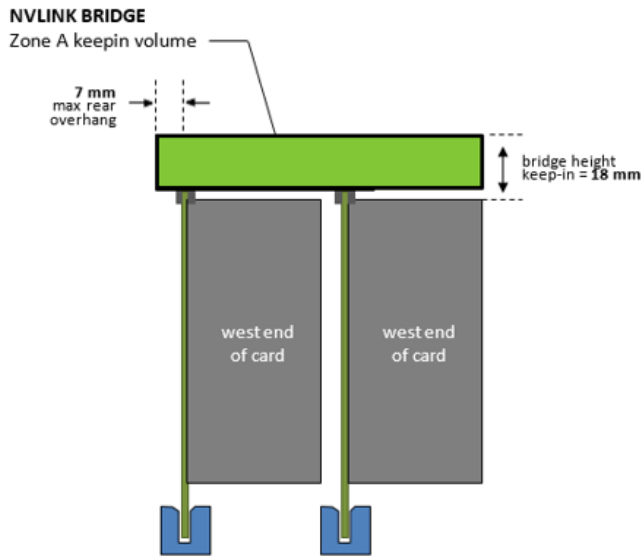
Table 5 presents the supported Sync configurations for the Quadro RTX 6000 Server Card.

Table 5. Supported Sync Configurations

Configuration	Supported
High-bandwidth NVIDIA NVLink bridge (2-slot span) on NVLink connector	Yes
High-bandwidth NVIDIA NVLink bridge (3-slot span) on NVLink connector	Yes

Sufficient clearance must be provided both above the north edge of the card and behind the backside of the card's PCB to accommodate an NVIDIA Quadro NVLink bridge. The clearance above the card's north edge should meet or exceed 18 mm. The backside clearance (from the PCB's rear surface) should meet or exceed 7 mm. Figure 6 illustrates the NVLink bridge clearance.

Figure 6. NVLink Bridge Clearance



## Power Connector Placement

The board provides a CPU 8-pin power connector on the east edge of the board.

Figure 7. CPU 8-Pin Power Connector

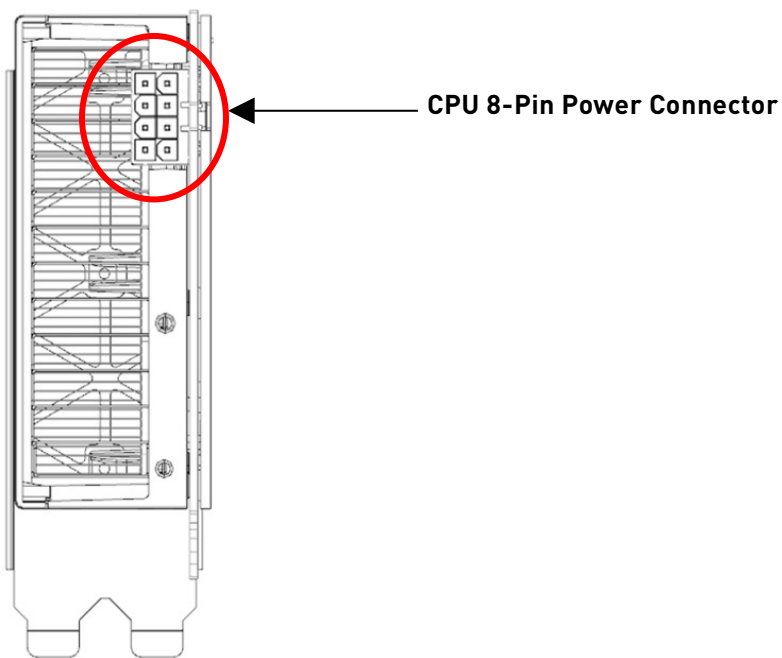


Table 6 lists supported auxiliary power connections for the NVIDIA Quadro RTX 6000 Server Card.

**Table 6. Supported Auxiliary Power Connections**

Board Connector	PSU Cable
CPU 8-pin	1× CPU 8-pin cable
CPU to PCIe 8-pin dongle	2× PCIe 8-pin cable 2× PCIe 6-pin cable <sup>1</sup> 1× PCIe 8-pin cable and 1× PCIe 6-pin cable <sup>1</sup>
<b>Note:</b> <sup>1</sup> Each PCIe 6-pin cable must be capable of carrying up to 50% of the average power and tolerate 50% of the peak currents	

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# Support Information

## Certifications

- ▶ Windows Hardware Quality Lab (WHQL):
  - Certified Windows 7, Windows 8.1, Windows 10
  - Certified Windows Server 2008 R2, Windows Server 2012 R2
- ▶ Ergonomic requirements for office work W/VDTs (ISO 9241)
- ▶ EU Reduction of Hazardous Substances (EU RoHS)
- ▶ Joint Industry guide (J-STD) / Registration, Evaluation, Authorization, and Restriction of Chemical Substance (EU) – (JIG / REACH)
- ▶ Halogen Free (HF)
- ▶ EU Waste Electrical and Electronic Equipment (WEEE)

## Agencies

- ▶ Australian Communications and Media Authority and New Zealand Radio Spectrum Management (RCM)
- ▶ Bureau of Standards, Metrology, and Inspection (BSMI)
- ▶ Conformité Européenne (CE)
- ▶ Federal Communications Commission (FCC)
- ▶ Industry Canada - Interference-Causing Equipment Standard (ICES)
- ▶ Korean Communications Commission (KCC)
- ▶ Underwriters Laboratories (cUL, UL)
- ▶ Voluntary Control Council for Interference (VCCI)

# Languages

Table 7. Languages Supported

Languages	Windows <sup>1</sup>	Linux
English (US)	Yes	Yes
English (UK)	Yes	Yes
Arabic	Yes	
Chinese, Simplified	Yes	
Chinese, Traditional	Yes	
Czech	Yes	
Danish	Yes	
Dutch	Yes	
Finnish	Yes	
French (European)	Yes	
German	Yes	
Greek	Yes	
Hebrew	Yes	
Hungarian	Yes	
Italian	Yes	
Japanese	Yes	
Korean	Yes	
Norwegian	Yes	
Polish	Yes	
Portuguese (Brazil)	Yes	
Portuguese (European/Iberian)	Yes	
Russian	Yes	
Slovak	Yes	
Slovenian	Yes	
Spanish (European)	Yes	
Spanish (Latin America)	Yes	
Swedish	Yes	
Thai	Yes	
Turkish	Yes	
<b>Note:</b> <sup>1</sup> Microsoft Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Server 2008 R2, Windows Server 2012 R2, and Windows 2016 are supported.		



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