



NVIDIA ConnectX-7 Adapter Cards User Manual

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About This Manual

This User Manual describes NVIDIA® ConnectX®-7 InfiniBand and Ethernet adapter cards. It provides details as to the interfaces of the board, specifications, required software and firmware for operating the board, and relevant documentation.

Intended Audience

This manual is intended for the installer and user of these cards. The manual assumes basic familiarity with InfiniBand and Ethernet network and architecture specifications.

Ordering Part Numbers

The table below lists the ordering part numbers (OPNs) for the available ConnectX-7 stand-up cards. For the Open Compute Project (OCP 3.0) cards, please refer to [NVIDIA ConnectX-7 Adapter Cards for OCP 3.0 User Manual](#).

ConnectX-7 PCIe x16 Stand-up Adapter Cards

NVIDIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Secure Boot	Crypto	Bracket Type	Lifecycle
900-9X7 66-003 N-SQ0 ¹	MCX75 310AA S-NEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR 400Gb/s (Default speed) Ethernet: 400GbE	Single-port OSFP	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/ 32GT/s	✓	-	Tall Bracket	Mass Production
900-9X7 66-003 N-SR0	MCX75 310AA C-NEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR 400Gb/s (Default speed) Ethernet: 400GbE	Single-port OSFP	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/ 32GT/s	✓	✓	Tall Bracket	Mass Production
900-9X7 66-003 N-ST0 ²	MCX75 310AA S-HEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR200 200Gb/s (Default speed) Ethernet: 200GbE	Single-port OSFP	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/ 32GT/s	✓	-	Tall Bracket	Mass Production
900-9X7 AO-00C 3-STZ	MCX71 3104A C-ADAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet: 50/25GbE	Quad-port SFP56	PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	✓	Tall Bracket	Mass Production
900-9X7 AO-000 3-STO	MCX71 3104A S-ADAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet: 50/25GbE	Quad-port SFP56	PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	-	Tall Bracket	Mass Production

NVIDIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Secure Boot	Crypto	Bracket Type	Lifecycle
Notes: ¹ The MCX75310AAS-NEAT card supports InfiniBand and Ethernet protocols from hardware version AA and higher. ² The MCX75310AAS-HEAT card supports InfiniBand and Ethernet protocols from hardware version A7 and higher.									

ConnectX-7 for Telecommunication Applications

NVIDIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Secure Boot	Crypto	Timing Capabilities	Bracket Type	Lifecycle
900-9X7AH-004N-CTO	MCX713114TC-GEAT	PCIe Full Height, Half Length 4.53 in. x 6.6 in. (115.15 mm x 167.65 mm)	Ethernet: 50/25GbE	Quad-port SFP56	PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	✓	PPS In / Out, SMAs, SyncE	Tall Bracket	Mass Production

NVIDIA Socket Direct Ready Cards for Dual-Slot Servers

NVIDIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Socket Direct Ready - PCIe Extension Option	Secure Boot	Crypto	Bracket Type	Lifecycle
900-9X7AH-0039-STZ ¹	MCX715105AS-WEAT ¹	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR 400Gb/s Ethernet: 400GbE (Default Speed)	Port Split Capable: Single-port QSFP112	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	Optional: PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	-	Tall Bracket	Mass Production
900-9X7AH-0078-DTZ	MCX75106AS-HEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR200 200Gb/s Ethernet: 200GbE (Default Speed)	Dual-port QSFP112	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	Optional: PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	-	Tall Bracket	Mass Production

NVI DIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Socket Direct Ready - PCIe Extension Option	Secure Boot	Crypto	Bracket Type	Lifecycle
900-9 X7AH-0079-DTZ	MCX75 5106AC-HEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR200 200Gb/s Ethernet: 200GbE (Default Speed)	Dual-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	Optional: PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	✓	Tall Bracket	Mass Production

Note¹: The supported speed listed here is the default configuration. For the complete list of supported port configurations and instructions on how to change to the desired configuration, refer to [Port Splitting Configurations](#).

Legacy (EOL) Ordering Part Numbers

NVI DIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Secure Boot	Crypto	Timing Capabilities	Bracket Type	Lifecycle
900-9 X7AH-0088-ST0	MCX713 106AC-VEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet : 200GbE	Dual-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	✓	✓	-	Tall Bracket	End of Life
900-9 X7AH-0078-ST0	MCX713 106AS-VEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet : 200GbE	Dual-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	✓	-	-	Tall Bracket	End of Life
900-9 X721-003N-DT0	MCX755 10AAS-NEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR 400Gb/s	Single-port OSFP	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	Optional : PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	-	Tall Bracket	End of Life

NVIDIA SKU	Legacy OPN	Form Factor	Data Transmission Rate	No. of Ports and Type	PCIe Support	Secure Boot	Crypto	Timing Capabilities	Bracket Type	Lifecycle
900-9 X7AH-0039-ST1	MCX713 105AS-WEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet : 400GbE	Single-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	✓	-	-	Tall Bracket	End of Life
900-9 X721-003N-DT1	MCX755 10AAS-HEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	InfiniBand: NDR200 200Gb/s	Single-port OSFP	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	Optional : PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	-	Tall Bracket	End of Life
900-9 X7AH-0076-ST0	MCX713 106AS-CEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet : 100GbE	Dual-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	✓	-	-	Tall Bracket	End of Life
900-9 X7AH-0086-SQ0	MCX713 106AC-CEAT	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	Ethernet : 100GbE	Dual-port QSFP12	PCIe x16 Gen 4.0/5.0 @ SERDES 16GT/s/32GT/s	✓	✓	-	Tall Bracket	End of Life
900-9 X7AH-004N-GT0	MCX713 114GC-GEAT	PCIe Full Height, Half Length 4.53 in. x 6.6 in. (115.15 mm x 167.65 mm)	Ethernet : 50/25GbE	Quad-port SFP56	PCIe x16 Gen 4.0 @ SERDES 16GT/s	✓	✓	Enhanced-SyncE & PTP Grand Master support and GNSS/PPS Out	Tall Bracket	End of Life

For more information, please refer to [PCIe Auxiliary Card Kit](#).

Technical Support

Customers who purchased NVIDIA products directly from NVIDIA are invited to contact us through the following methods:

- URL: <https://www.nvidia.com> > Support

- E-mail: enterprisesupport@nvidia.com

Customers who purchased NVIDIA Global Support Services, please see your contract for details regarding Technical Support.

Customers who purchased NVIDIA products through an NVIDIA-approved reseller should first seek assistance through their reseller.

Related Documentation

<i>MLNX_OFED for Linux User Manual and Release Notes</i>	User Manual describing OFED features, performance, band diagnostic, tools content and configuration. See MLNX_OFED for Linux Documentation .
<i>WinOF-2 for Windows User Manual and Release Notes</i>	User Manual describing WinOF-2 features, performance, Ethernet diagnostic, tools content and configuration. See WinOF-2 for Windows Documentation .
<i>NVIDIA VMware for Ethernet User Manual</i>	User Manual and release notes describing the various components of the NVIDIA ConnectX® NATIVE ESXi stack. See VMware® ESXi Drivers Documentation .
<i>NVIDIA Firmware Utility (mlxup) User Manual and Release Notes</i>	NVIDIA firmware update and query utility used to update the firmware. Refer to Firmware Utility (mlxup) Documentation .
<i>NVIDIA Firmware Tools (MFT) User Manual</i>	User Manual describing the set of MFT firmware management tools for a single node. See MFT User Manual .
InfiniBand Architecture Specification Release 1.2.1, Vol 2 - Release 1.4, and Vol 2 - Release 1.5	InfiniBand Specifications
<i>IEEE Std 802.3 Specification</i>	IEEE Ethernet Specifications
<i>PCI Express 5.0 Specifications</i>	Industry Standard PCI Express Base and Card Electromechanical Specifications. Refer to PCI-SIG Specifications .
LinkX Interconnect Solutions	LinkX cables and transceivers are designed to maximize the performance of High-Performance Computing networks, requiring high-bandwidth, low-latency connections between compute nodes and switch nodes. NVIDIA offers one of the industry's most complete line of 10, 25, 40, 50, 100, 200, and 400GbE in Ethernet and EDR, HDR, and NDR, including Direct Attach Copper cables (DACs), copper splitter cables, Active Optical Cables (AOCs) and transceivers in a wide range of lengths from 0.5m to 10km. In addition to meeting Ethernet and IBTA standards, NVIDIA tests every product in an end-to-end environment ensuring a Bit Error Rate of less than 1E-15. Read more at LinkX Cables and Transceivers .
NVIDIA ConnectX-7 Electrical and Thermal Specifications	You can access the "NVIDIA ConnectX-7 Electrical and Thermal Specifications" document either by logging into NVOnline or by contacting your NVIDIA representative.

When discussing memory sizes, MB and MBytes are used in this document to mean size in MegaBytes. The use of Mb or Mbits (small b) indicates size in MegaBits. IB is used in this document to mean InfiniBand. In this document, PCIe is used to mean PCI Express.

Revision History

A list of the changes made to this document is provided in [Document Revision History](#).

1 Introduction

1.1 Product Overview

The NVIDIA ConnectX-7 family of network adapters supports both the InfiniBand and Ethernet protocols. It enables a wide range of smart, scalable, and feature-rich networking solutions that address traditional enterprise needs up to the world's most demanding AI, scientific computing, and hyperscale cloud data center workloads.

ConnectX-7 network adapters are offered in two form factors and various flavors: stand-up PCIe and Open Compute Project (OCP) Spec 3.0 cards. This user manual covers the PCIe stand-up cards, for the OCP 3.0 cards, please refer to [NVIDIA ConnectX-7 Cards for OCP Spec 3.0 User Manual](#).



Make sure to use a PCIe slot capable of supplying the required power and airflow to the ConnectX-7, as stated in the [Specifications](#) chapter.

1.1.1 Port Splitting

ConnectX-7 SuperNICs offer a variety of network port configurations designed to meet the demands of different environments and deployments.

The Port Splitting feature allows a single physical networking module to be split into multiple network ports. This provides flexibility in optimizing port configurations for various network topology use cases. For the supported OPNs and configurations, refer to [Port Splitting Configurations](#).

1.1.2 PCIe x16 Stand-up Adapter Cards

ConnectX-7 HCAs are available in various configurations; Single-port 400Gb/s or 200Gb/s, with octal small form-factor pluggable (OSFP) connectors or Dual-port 100 or 200Gb/s with quad small form-factor pluggable (QSFP112) connectors on PCIe standup half-height, half-length (HHHL) form factor, with options for NVIDIA Socket Direct. Also available, Dual-port 50/25 GbE with quad small form-factor pluggable (SFP56) connectors on PCIe standup full-height, half-length (FHHL) form factor, with timing capabilities.

ConnectX-7 cards can either support both InfiniBand and Ethernet, or Ethernet only, as described in the below table. The inclusive list of OPNs is available [here](#).



ConnectX-7 adapter cards with OSFP form factor only support RHS (Riding Heat Sink) cage.

Supported Protocols	Port Type	Supported Speed
Ethernet Only Card	Dual-port QSFP112	• 400/200/100GbE
	Quad-port SFP56	• 50/25GbE
InfiniBand and Ethernet Cards	Single-port OSFP	• NDR 400Gb/s and 400GbE • NDR200 200Gb/s and 200GbE

1.1.3 NVIDIA Socket Direct Ready Cards

The Socket Direct technology offers improved performance to dual-socket servers by enabling direct access from each CPU in a dual-socket server to the network through its dedicated PCIe interface.

NVIDIA offers ConnectX-7 Socket Direct adapter cards, which enable 400Gb/s or 200Gb/s connectivity, and also for servers with PCIe Gen 4.0 capability. The adapter's 32-lane PCIe bus is split into two 16-lane buses, with one bus accessible through a PCIe x16 edge connector and the other bus through an x16 Auxiliary PCIe Connection card. The two cards should be installed into two PCIe x16 slots and connected using two Cabline SA-II Plus harnesses.

To use this card in the Socket-Direct configuration, please order the additional PCIe Auxiliary Card kit according to the desired harness length. Cards that support socket direct can function as separate x16 PCIe cards.

Socket Direct cards can support both InfiniBand and Ethernet, or InfiniBand only, as described below.

Supported Protocols	Port Type	Supported Speed
InfiniBand Only	Single-port OSFP	• NDR 400Gb/s • NDR200 200Gb/s
InfiniBand and Ethernet	Dual-port QSFP112	• NDR200 200Gb/s and 200GbE
	Single-port QSFP112	• NDR 400Gb/s and 400GbE • NDR200 200Gb/s

For more information on the passive PCIe Auxiliary kit, please refer to [PCIe Auxiliary Card Kit](#).

1.2 System Requirements

Item	Description
PCI Express slot	In PCIe x16 Configuration PCIe Gen 5.0 (32GT/s) through x16 edge connector. In Socket Direct Configuration (2x PCIe x16) • PCIe Gen 4.0/5.0 SERDES @16/32GT/s through edge connector • PCIe Gen 4.0 SERDES @16GT/s through PCIe Auxiliary Connection Card
System Power Supply	Refer to Specifications
Operating System	• In-box drivers for major operating systems: • Linux: RHEL, Ubuntu • Windows • Virtualization and containers • VMware ESXi (SR-IOV) • Kubernetes • OpenFabrics Enterprise Distribution (OFED) • OpenFabrics Windows Distribution (WinOF-2)
Connectivity	• Interoperable with 1/10/25/40/50/100/200/400 Gb/s Ethernet switches and SDR/DDR/EDR/HDR100/HDR/NDR200/NDR InfiniBand switches • Passive copper cable with ESD protection • Powered connectors for optical and active cable support

1.3 Package Contents

Category	Qty	Item
Cards	1	ConnectX-7 adapter card
Accessories	1	Adapter card short bracket
	1	Adapter card tall bracket (shipped assembled on the card)

1.4 Features and Benefits



Make sure to use a PCIe slot capable of supplying the required power and airflow to the ConnectX-7 cards as stated in the [Specifications](#) chapter.



This section describes hardware features and capabilities. Please refer to the relevant driver and firmware release notes for feature availability.

PCI Express (PCIe) InfiniBand Architecture Specification v1.5 compliant	According to the OPN you have purchased, the card uses the following PCIe express interfaces: • PCIe x16 configurations: PCIe Gen 4.0/5.0 (16GT/s / 32GT/s) through x16 edge connector. • 2x PCIe x16 configurations (Socket-Direct): PCIe Gen 4.0/5.0 (SERDES @ 16GT/s / 32GT/s) through x16 edge connector PCIe Gen 4.0 SERDES @ 16GT/s through PCIe Auxiliary Connection Card																													
	ConnectX-7 delivers low latency, high bandwidth, and computing efficiency for high-performance computing (HPC), artificial intelligence (AI), and hyperscale cloud data center applications. ConnectX-7 is InfiniBand Architecture Specification v1.5 compliant. InfiniBand Network Protocols and Rates: <table> <tr> <th rowspan="2">Protocol</th><th rowspan="2">Standard</th><th colspan="2">Rate (Gb/s)</th><th rowspan="2">Comments</th></tr> <tr> <th>4x Port (4 Lanes)</th><th>2x Ports (2 Lanes)</th></tr> <tr> <td>NDR/NDR200</td><td>IBTA Vol2 1.5</td><td>425</td><td>212.5</td><td>PAM4 256b/257b encoding and RS-FEC</td></tr> <tr> <td>HDR/HDR100</td><td>IBTA Vol2 1.4</td><td>212.5</td><td>106.25</td><td>PAM4 256b/257b encoding and RS-FEC</td></tr> <tr> <td>EDR</td><td>IBTA Vol2 1.3.1</td><td>103.125</td><td>51.5625</td><td>NRZ 64b/66b encoding</td></tr> <tr> <td>FDR</td><td>IBTA Vol2 1.2</td><td>56.25</td><td>N/A</td><td>NRZ 64b/66b encoding</td></tr> </table>				Protocol	Standard	Rate (Gb/s)		Comments	4x Port (4 Lanes)	2x Ports (2 Lanes)	NDR/NDR200	IBTA Vol2 1.5	425	212.5	PAM4 256b/257b encoding and RS-FEC	HDR/HDR100	IBTA Vol2 1.4	212.5	106.25	PAM4 256b/257b encoding and RS-FEC	EDR	IBTA Vol2 1.3.1	103.125	51.5625	NRZ 64b/66b encoding	FDR	IBTA Vol2 1.2	56.25	N/A
Protocol	Standard	Rate (Gb/s)		Comments																										
		4x Port (4 Lanes)	2x Ports (2 Lanes)																											
NDR/NDR200	IBTA Vol2 1.5	425	212.5	PAM4 256b/257b encoding and RS-FEC																										
HDR/HDR100	IBTA Vol2 1.4	212.5	106.25	PAM4 256b/257b encoding and RS-FEC																										
EDR	IBTA Vol2 1.3.1	103.125	51.5625	NRZ 64b/66b encoding																										
FDR	IBTA Vol2 1.2	56.25	N/A	NRZ 64b/66b encoding																										

Up to 400 Gigabit Ethernet	ConnectX-7 adapter cards comply with the following IEEE 802.3 standards: 400GbE / 200GbE / 100GbE / 50GbE / 40GbE / 25GbE / 10GbE	
	Protocol	MAC Rate
	IEEE802.3ck	100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)
	IEEE802.3cd IEEE802.3bs IEEE802.3cm IEEE802.3cn IEEE802.3cu	50/100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)
	IEEE 802.3bj IEEE 802.3bm	100 Gigabit Ethernet
	IEEE 802.3by Ethernet Technology Consortium	25/50 Gigabit Ethernet
	IEEE 802.3ba	40 Gigabit Ethernet
	IEEE 802.3ae	10 Gigabit Ethernet
	IEEE 802.3cb	2.5/5 Gigabit Ethernet (For 2.5: support only 2.5 x1000BASE-X)
	IEEE 802.3ap	Based on auto-negotiation and KR startup
	IEEE 802.3ad IEEE 802.1AX	Link Aggregation
	IEEE 802.1Q IEEE 802.1P VLAN tags and priority	
	IEEE 802.1Qau (QCN) Congestion Notification IEEE 802.1Qaz (ETS) EEE 802.1Qbb (PFC) IEEE 802.1Qbg IEEE 1588v2 IEEE 802.1AE (MACSec) Jumbo frame support (9.6KB)	
Memory Components	- SPI - includes 256Mbit SPI Quad Flash device. - FRU EEPROM - Stores the parameters and personality of the card. The EEPROM capacity is 128Kbit. FRU I2C address is (0x50) and is accessible through the PCIe SMBus. (Note: Address 0x58 is reserved.)	
Overlay Networks	In order to better scale their networks, datacenter operators often create overlay networks that carry traffic from individual virtual machines over logical tunnels in encapsulated formats such as NVGRE and VXLAN. While this solves network scalability issues, it hides the TCP packet from the hardware offloading engines, placing higher loads on the host CPU. ConnectX-7 effectively addresses this by providing advanced NVGRE and VXLAN hardware offloading engines that encapsulate and de-capsulate the overlay protocol.	
Quality of Service (QoS)	Support for port-based Quality of Service enabling various application requirements for latency and SLA.	

Hardware-based I/O Virtualization	ConnectX-7 provides dedicated adapter resources and guaranteed isolation and protection for virtual machines within the server.
Storage Acceleration	A consolidated compute and storage network achieves significant cost-performance advantages over multi-fabric networks. Standard block and file access protocols can leverage: • RDMA for high-performance storage access • NVMe over Fabric offloads for the target machine • NVMe over TCP acceleration
SR-IOV	ConnectX-7 SR-IOV technology provides dedicated adapter resources and guaranteed isolation and protection for virtual machines (VM) within the server.
High-Performance Accelerations	• Collective operations offloads • Vector collective operations offloads • MPI_Alltoall offloads • Rendezvous protocol offload
RDMA Message Rate	330-370 million messages per second.
Secure Boot	The secure boot process assures booting of authentic firmware/software that is intended to run on ConnectX-7. This is achieved using cryptographic primitives using asymmetric cryptography. ConnectX-7 supports several cryptographic functions in its HW Root-of-Trust (RoT) that has its key stored in on-chip FUSES.
Secure Firmware Update	The Secure firmware update feature enables a device to verify digital signatures of new firmware binaries to ensure that only officially approved versions can be installed from the host, the network, or a Board Management Controller (BMC). The firmware of devices with "secure firmware update" functionality (secure FW), restricts access to specific commands and registers that can be used to modify the firmware binary image on the flash, as well as commands that can jeopardize security in general. For further information, refer to the MFT User Manual.
Advanced storage capabilities	Block-level encryption and checksum offloads.
Host Management	ConnectX-7 technology maintains support for host manageability through a BMC. ConnectX-7 PCIe stand-up adapter can be connected to a BMC using MCTP over SMBus or MCTP over PCIe protocols as if it is a standard NVIDIA PCIe stand-up adapter card. For configuring the adapter for the specific manageability solution in use by the server, please contact NVIDIA Support. • Protocols: PLDM, NCSI • Transport layer – RBT, MCTP over SMBus and MCTP over PCIe • Physical layer: SMBus 2.0 / I2C interface for device control and configuration, PCIe • PLDM for Monitor and Control DSP0248 • PLDM for Firmware Update DSP026 • IEEE 1149.6 • Secured FW update • FW Recovery • NIC reset • Monitoring and control • Network port settings • Boot setting

Accurate timing	NVIDIA offers a full IEEE 1588v2 PTP software solution, as well as time-sensitive related features called “5T”. NVIDIA PTP and 5T software solutions are designed to meet the most demanding PTP profiles. ConnectX-7 incorporates an integrated Hardware Clock (PHC) that allows ConnectX-7 to achieve sub 20u Sec accuracy and also offers many timing-related functions such as time-triggered scheduling or time-based SND accelerations (time-based ASAP²). Furthermore, 5T technology enables the software application to transmit fronthaul (ORAN) compatible in high bandwidth. The PTP part supports the subordinate clock, master clock, and boundary clock. ConnectX-7 PTP solution allows you to run any PTP stack on your host. With respect to testing and measurements, selected NVIDIA adapters allow you to use the PPS-out signal from the onboard SMA connector, ConnectX-7 also allows measuring PTP in scale, with a PPS-In signal. The PTP HW clock on the Network adapter will be sampled on each PPS-In signal, and the timestamp will be sent to the SW.
RDMA and RDMA over Converged Ethernet (RoCE)	ConnectX-7, utilizing IBTA RDMA (Remote Data Memory Access) and RoCE (RDMA over Converged Ethernet) technology, delivers low-latency and high-performance over InfiniBand and Ethernet networks. Leveraging datacenter bridging (DCB) capabilities as well as ConnectX-7 advanced congestion control hardware mechanisms, RoCE provides efficient low-latency RDMA services over Layer 2 and Layer 3 networks.
NVIDIA PeerDirect™	PeerDirect™ communication provides high-efficiency RDMA access by eliminating unnecessary internal data copies between components on the PCIe bus (for example, from GPU to CPU), and therefore significantly reduces application run time. ConnectX-7 advanced acceleration technology enables higher cluster efficiency and scalability to tens of thousands of nodes.
CPU Offload	Adapter functionality enables reduced CPU overhead allowing more available CPU for computation tasks. • Flexible match-action flow tables • Open VSwitch (OVS) offload using ASAP²® • Tunneling encapsulation/decapsulation
PPS In/Out SMAs	Applies to MCX713114TC-GEAT only: NVIDIA offers a full IEEE 1588v2 PTP software solution, as well as time-sensitive related features called “5T”. NVIDIA PTP and 5T software solutions are designed to meet the most demanding PTP profiles. ConnectX-6 Dx incorporates an integrated Hardware Clock (PHC) that allows ConnectX-7 to achieve sub 20u Sec accuracy and also offers many timing-related functions such as time-triggered scheduling or time-based SND accelerations (time-based ASAP²). Furthermore, 5T technology enables the software application to transmit fronthaul (ORAN) compatible in high bandwidth. The PTP part supports the subordinate clock, master clock, and boundary clock. ConnectX-7 PTP solution allows you to run any PTP stack on your host. With respect to testing and measurements, selected NVIDIA adapters allow you to use the PPS-out signal from the onboard SMA connector, ConnectX-7 also allows measuring PTP in scale, with PPS-In signal. The PTP HW clock on the Network adapter will be sampled on each PPS-In signal, and the timestamp will be sent to the SW. The SyncE cards also includes an improved holdover to meet ITU-T G.8273.2 class C.

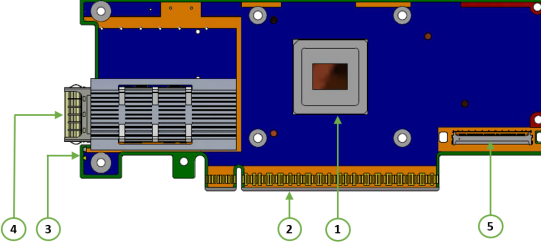
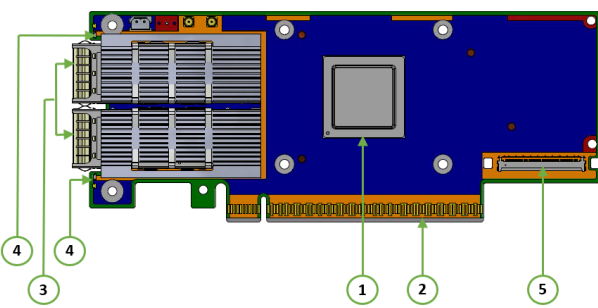
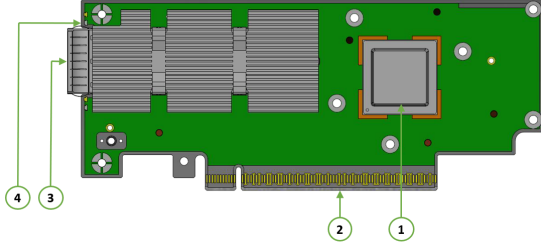
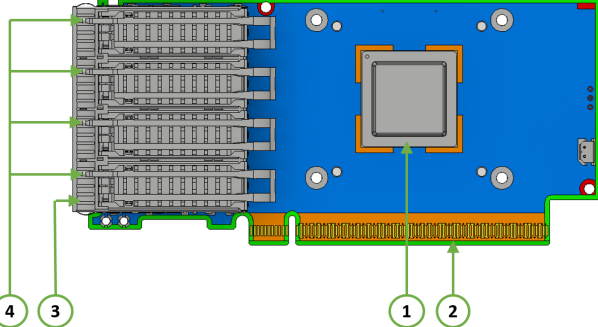
2 Supported Interfaces

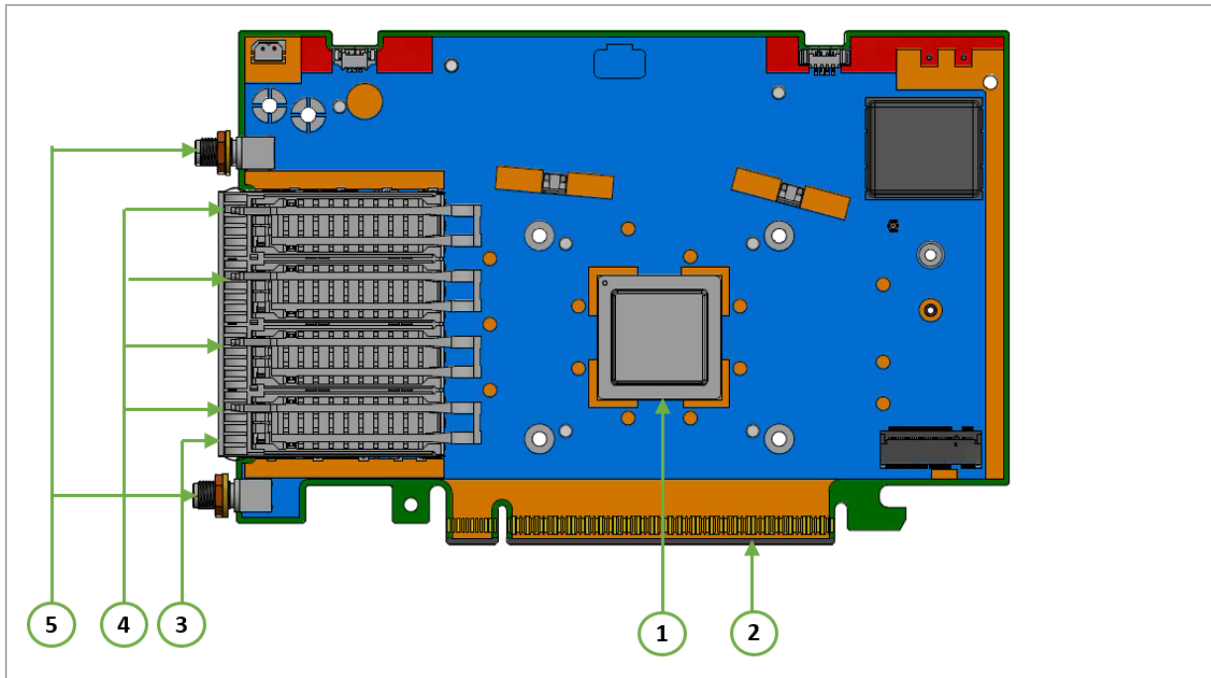
This section describes the ConnectX-7 supported interfaces. Each numbered interface that is referenced in the figures is described in the following table with a link to detailed information.



The below figures are for illustration purposes only and might not reflect the current revision of the adapter card.

2.1 ConnectX-7 Layout and Interface Information

Single-Port QSFP112 Adapter Cards OPNs: MCX715105AS-WEAT	Dual-Port QSFP112 Adapter Cards OPNs: MCX755106AS-HEAT, MCX755106AC-HEAT, MCX713106AC-CEAT, MCX713106AS-CEAT, MCX713106AC-VEAT, MCX713106AS-VEAT
	
Single-Port OSFP Adapter Cards OPNs: MCX75310AAS-NEAT, MCX75310AAC-NEAT, MCX75310AAS-HEAT, MCX75510AAS-NEAT, MCX75510AAS-HEAT	Quad-Port SFP56 Cards OPNs: MCX713104AC-ADAT, MCX713104AS-ADAT
	
Quad-port SFP56 Cards with PPS IN/OUT OPN: MCX713114TC-GEAT	



Item	Interface	Description
1	ConnectX-7 IC	ConnectX-7 Integrated Circuit
2	PCI Express Interface	PCIe Gen 4.0/5.0 through x16 edge connector
3	Networking Interfaces	Network traffic is transmitted through the adapter card networking connectors. The networking connectors allow for the use of modules, optical and passive cable interconnect solutions
4	Networking Ports LEDs	Two I/O LEDs per port to indicate speed and link status
5	Cabline CA-II Plus Connectors	In Socket-Direct ready cards, two Cabline CA-II plus connectors are populated to allow connectivity to an additional PCIe x16 Auxiliary card. Applicable to OPNs: MCX715105AS-WEAT, MCX75510AAS-NEAT, MCX75510AAS-HEAT, MCX755106AS-HEAT and MCX755106AC-HEAT.
6	PPS IN/OUT Interface	Allows PPS IN/OUT Applies to OPN: MCX713114TC-GEAT only.

2.2 Interfaces Detailed Description

2.2.1 ConnectX-7 IC

The ConnectX-7 family of adapter IC devices delivers InfiniBand and Ethernet connectivity paired with best-in-class hardware capabilities that accelerate and secure cloud and data-center workloads.

2.2.2 PCI Express Interface

ConnectX-7 adapter cards support PCI Express Gen 5.0 (4.0 and 3.0 compatible) through x16 edge connector. The following lists PCIe interface features:

- PCIe Gen 5.0 compliant, 4.0, 3.0, 2.0 and 1.1 compatible
- 2.5, 5.0, 8.0, 16.0 and 32GT/s link rate x16/x32 (Socket-Direct configuration)
- Support for PCIe bifurcation: Auto-negotiates to x32, x16, x8, x4, x2, or x1
- NVIDIA Multi-Host™ supports connection of up to 4x hosts
- Transaction layer packet (TLP) processing hints (TPH)
- PCIe switch Downstream Port Containment (DPC)
- Advanced error reporting (AER)
- Access Control Service (ACS) for peer-to-peer secure communication
- Process Address Space ID (PASID)
- Address translation services (ATS)
- Support for MSI/MSI-X mechanisms
- Support for SR-IOV

2.2.3 Networking Interfaces



The adapter card includes special circuits to protect from ESD shocks to the card/server when plugging copper cables.

Proto col	Specifications
Ethernet	The network ports comply with the IEEE 802.3 Ethernet standards listed in Features and Benefits . Ethernet traffic is transmitted through the networking connectors on the adapter card.
InfiniBand	The network ports are compliant with the <i>InfiniBand Architecture Specification, Release 1.5</i> . InfiniBand traffic is transmitted through the cards' networking connectors.

2.2.4 Networking Ports LEDs Specifications

For the networking ports LEDs description, follow the below table depending on the ConnectX-7 SKU you have purchased.

SKU	LEDs Scheme
900-9X7AO-0003-ST0 900-9X7AO-00C3-STZ	Scheme 1: One Bi-Color LED
All cards	Scheme 2: Two LEDs

2.2.4.1 Scheme 1: One Bi-Color LED

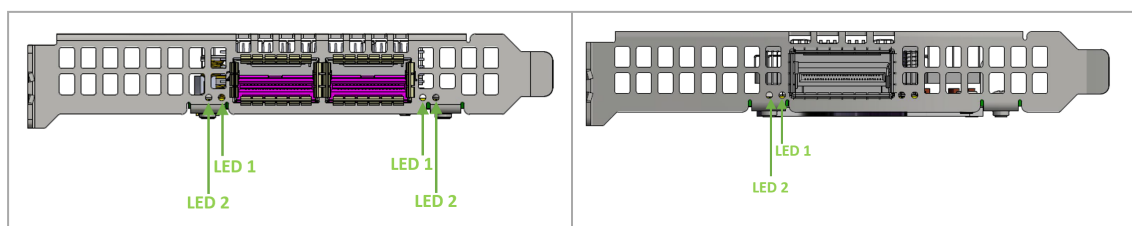
There is one bi-color (Yellow and Green) I/O LED per port to indicate port speed and link status.

State	Bi-Color LED (Yellow/Green)		
Beacon command for locating the adapter card	1Hz blinking Yellow		
Error	4Hz blinking Yellow Indicates an error with the link. The error can be one of the following:		
	Error Type	Description	LED Behavior
	I ² C	I ² C access to the networking ports fails	Blinks until error is fixed
	Over-current	Over-current condition of the networking ports	Blinks until error is fixed
Physical Activity	Green LED is blinking		
Link Up	Green LED is solid		
Physical Up (IB Only)	Yellow LED is solid		

2.2.4.2 Scheme 2: Two LEDs

There are two I/O LEDs per port to indicate port speed and link status.

- LED1 is a bi-color LED (Yellow and Green)
- LED2 is a single-color LED (Green)



State	Bi-Color LED (Yellow/Green)	Single Color LED (Green)									
Beacon command for locating the adapter card	1Hz blinking In full port speed: Green LED is blinking In less than full port speed: Yellow LED is blinking	OFF									
Error	4Hz blinking Yellow Indicates an error with the link. The error can be one of the following: <table> <tr> <th>Error Type</th><th>Description</th><th>LED Behavior</th></tr> <tr> <td>I²C</td><td>I²C access to the networking ports fails</td><td>Blinks until error is fixed</td></tr> <tr> <td>Over-current</td><td>Over-current condition of the networking ports</td><td>Blinks until error is fixed</td></tr> </table>	Error Type	Description	LED Behavior	I ² C	I ² C access to the networking ports fails	Blinks until error is fixed	Over-current	Over-current condition of the networking ports	Blinks until error is fixed	ON
Error Type	Description	LED Behavior									
I ² C	I ² C access to the networking ports fails	Blinks until error is fixed									
Over-current	Over-current condition of the networking ports	Blinks until error is fixed									
Physical Activity	In full port speed: the Green LED is solid In less than full port speed: the Yellow LED is solid	Blinking									
Link Up	In full port speed: the Green LED is solid In less than full port speed: the Yellow LED is solid	ON									
Physical Up (IB Only)	Yellow LED is solid	OFF									

2.2.5 Cabline CA-II Plus Connectors



Socket-Direct is currently not supported.



Applies to OPNs: MCX755106AC-HEAT, MCX755106AS-HEAT, MCX75510AAS-HEAT, MCX75510AAS-NEAT.

The Cabline CA-II connectors on the Socket-Direct ready cards enable connectivity to an additional Auxiliary PCIe x16 Connection card through the Cabline CA-II harnesses.

2.2.6 PPS IN/OUT Interface



Applicable to MCX713114TC-GEAT only.

Pulse Per Second (PPS) is an out-of-band signal used in synchronized systems. 5T technology support PPS-in and PPS-out on selected devices.

Selected ConnectX-7 adapter cards incorporate an integrated Hardware Clock (PHC) that allows the adapter to achieve sub-20u Sec accuracy and also offers many timing-related functions such as time-triggered scheduling or time-based SND accelerations (time-based ASAP²). Furthermore, 5T technology enables the software application to transmit fronthaul (ORAN) at high bandwidth. The PTP part supports the subordinate clock, master clock, and boundary clock. The PTP solution allows you to run any PTP stack on your host.

With respect to testing and measurements, selected ConnectX-7 adapters allow you to use the PPS-out signal from the onboard MMCX RA connector. The adapter also allows measuring PTP in scale with the PPS-In signal. The PTP HW clock on the Network adapter is sampled on each PPS-In signal, and the timestamp is sent to the SW.

After the DPU installation, use two standard SMA plug 50Ohm cables to connect to the SMA connectors on the board. The cables are not included in the package. See the below example:



2.2.7 Clock IN/OUT Interface



Applicable to MCX713114TC-GEAT only.

After the adapter card installation, use two standard MMCX 50Ohm, right angled, plugs to connect to the MMCX connectors on the board. The cables are not included in the package. See the below example:



2.2.8 SMBus Interface

ConnectX-7 technology maintains support for manageability through a BMC. ConnectX-7 PCIe stand-up adapter can be connected to a BMC using MCTP over SMBus or MCTP over PCIe protocols as if it is a standard NVIDIA PCIe stand-up adapter. For configuring the adapter for the specific manageability solution in use by the server, please contact NVIDIA Support.

2.2.9 Voltage Regulators

The voltage regulator power is derived from the PCI Express edge connector 12V supply pins. These voltage supply pins feed on-board regulators that provide the necessary power to the various components on the card.

3 Hardware Installation

Installation and initialization of ConnectX-7 adapter cards require attention to the mechanical attributes, power specification, and precautions for electronic equipment.

3.1 Safety Warnings



Safety warnings are provided here in the English language. For safety warnings in other languages, refer to the [Adapter Installation Safety Instructions](#).

Please observe all safety warnings to avoid injury and prevent damage to system components. Note that not all warnings are relevant to all models.

Note that not all warnings are relevant to all models.

	General Installation Instructions Read all installation instructions before connecting the equipment to the power source.
	Jewelry Removal Warning Before you install or remove equipment that is connected to power lines, remove jewelry such as bracelets, necklaces, rings, watches, and so on. Metal objects heat up when connected to power and ground and can meltdown, causing serious burns and/or welding the metal object to the terminals.
	Over-temperature This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 55°C (131°F). An airflow of 200LFM at this maximum ambient temperature is required for HCA cards and NICs. To guarantee proper airflow, allow at least 8cm (3 inches) of clearance around the ventilation openings.
	During Lightning - Electrical Hazard During periods of lightning activity, do not work on the equipment or connect or disconnect cables.
	Copper Cable Connecting/Disconnecting Some copper cables are heavy and not flexible, as such, they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.
	Equipment Installation This equipment should be installed, replaced, or serviced only by trained and qualified personnel.
	Equipment Disposal The disposal of this equipment should be in accordance to all national laws and regulations.
	Local and National Electrical Codes This equipment should be installed in compliance with local and national electrical codes.
	Hazardous Radiation Exposure • Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure. For products with optical ports. • CLASS 1 LASER PRODUCT and reference to the most recent laser standards: IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:20

3.2 Installation Procedure Overview

The installation procedure of ConnectX-7 adapter cards involves the following steps:

Step	Procedure	Direct Link
1	Check the system's hardware and software requirements.	System Requirements
2	Pay attention to the airflow consideration within the host system	Airflow Requirements
3	Follow the safety precautions	Safety Precautions
4	Unpack the package	Unpack the package
5	Follow the pre-installation checklist	Pre-Installation Checklist
6	(Optional) Replace the full-height mounting bracket with the supplied short bracket	Bracket Replacement Instructions
7	Install the ConnectX-7 PCIe x16 adapter card in the system	ConnectX-7 PCIe x16 Adapter Cards Installation Instructions
	Install the ConnectX-7 2x PCIe x16 Socket Direct adapter card in the system	NVIDIA Socket Direct (2x PCIe x16) Installation Instructions
8	Connect cables or modules to the card	Cables and Modules
9	Identify ConnectX-7 in the system	Identifying Your Card

3.3 System Requirements

3.3.1 Hardware Requirements



Unless otherwise specified, NVIDIA products are designed to work in an environmentally controlled data center with low levels of gaseous and dust (particulate) contamination. The operating environment should meet severity level G1 as per ISA 71.04 for gaseous contamination and ISO 14644-1 class 8 for cleanliness level.



For proper operation and performance, please make sure to use a PCIe slot with a corresponding bus width that can supply sufficient power to your card. Refer to the [Specifications](#) section of the manual for more power requirements.



Please make sure to install the ConnectX-7 cards in a PCIe slot that is capable of supplying the required power as stated in [Specifications](#).

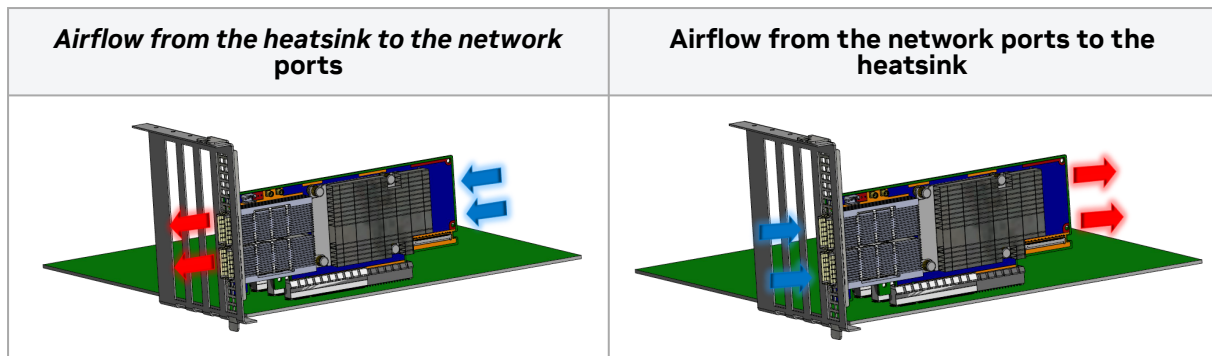
ConnectX-7 Configuration	Hardware Requirements
PCIe x16	A system with a PCI Express x16 slot is required for installing the card.

ConnectX-7 Configuration	Hardware Requirements
Socket Direct 2x PCIe x16 (dual-slot server)	A system with two PCIe x16 slots is required for installing the cards.

3.3.2 Airflow Requirements

ConnectX-7 adapter cards are offered with two airflow patterns: from the heatsink to the network ports, and vice versa, as shown below.

Please refer to the [Specifications](#) section for airflow numbers for each specific card model.



All cards in the system should be planned with the same airflow direction.

3.3.3 Software Requirements

- See [System Requirements](#) section under the Introduction section.
- Software Stacks - NVIDIA® OpenFabrics Enterprise Distribution for Linux (MLNX_OFED), WinOF-2 for Windows, and VMware. See the [Driver Installation](#) section.

3.4 Safety Precautions

The adapter is being installed in a system that operates with voltages that can be lethal. Before opening the case of the system, observe the following precautions to avoid injury and prevent damage to system components.

- Remove any metallic objects from your hands and wrists.
- Make sure to use only insulated tools.
- Verify that the system is powered off and is unplugged.
- It is strongly recommended to use an ESD strap or other antistatic devices.

3.5 Pre-Installation Checklist

- Unpack the ConnectX-7 Card; Unpack and remove the ConnectX-7 card. Check against the package contents list that all the parts have been sent. Check the parts for visible damage

that may have occurred during shipping. Please note that the cards must be placed on an antistatic surface. For package contents please refer to [Package Contents](#).

✗ Please note that if the card is removed hastily from the antistatic bag, the plastic ziplock may harm the EMI fingers on the networking connector. Carefully remove the card from the antistatic bag to avoid damaging the EMI fingers.

- Shut down your system if active; Turn off the power to the system, and disconnect the power cord. Refer to the system documentation for instructions. Before you install the ConnectX-7 card, make sure that the system is disconnected from power.
- (Optional) Check the mounting bracket on the ConnectX-7 or PCIe Auxiliary Connection Card; If required for your system, replace the full-height mounting bracket that is shipped mounted on the card with the supplied low-profile bracket. Refer to [Bracket Replacement Instructions](#).

3.6 Bracket Replacement Instructions

The ConnectX-7 card and PCIe Auxiliary Connection card are usually shipped with an assembled high-profile bracket. If this form factor is suitable for your requirements, you can skip the remainder of this section and move to [Installation Instructions](#). If you need to replace the high-profile bracket with the short bracket that is included in the shipping box, please follow the instructions in this section.

✗ During the bracket replacement procedure, do not pull, bend, or damage the EMI fingers cage. It is recommended to limit bracket replacements to three times.

To replace the bracket you will need the following parts:

- The new brackets of the proper height
- The 2 screws saved from the removal of the bracket

Removing the Existing Bracket

1. Using a torque driver, remove the two screws holding the bracket in place.
2. Separate the bracket from the ConnectX-7 card.

✗ Be careful not to put stress on the LEDs on the adapter card.

3. Save the two screws.

Installing the New Bracket

1. Place the bracket onto the card until the screw holes line up.

✗ Do not force the bracket onto the adapter card.

2. Screw on the bracket using the screws saved from the bracket removal procedure above.



Use a torque driver to apply up to 2 lbs-in torque on the screws.

3.7 Installation Instructions

This section provides detailed instructions on how to install your adapter card in a system.

Choose the installation instructions according to the ConnectX-7 configuration you would like to use.

OPNs	Installation Instructions
All ConnectX-7 cards	ConnectX-7 (PCIe x16) Adapter Card
MCX755106AC-HEAT MCX755106AS-HEAT MCX75510AAS-HEAT MCX75510AAS-NEAT	ConnectX-7 Socket Direct (2x PCIe x16) Adapter Card

3.7.1 Cables and Modules

Cable Installation

Before connecting a cable to the adapter card, ensure that the bracket is fastened to the server chassis using a screw to prevent movement or unplugging of the card when the cable is inserted or extracted.

1. All cables can be inserted or removed with the unit powered on.
2. To insert a cable, press the connector into the port receptacle until the connector is firmly seated.
 - a. Support the weight of the cable before connecting the cable to the adapter card. Do this by using a cable holder or tying the cable to the rack.
 - b. Determine the correct orientation of the connector to the card before inserting the connector. Do not try and insert the connector upside down. This may damage the adapter card.
 - c. Insert the connector into the adapter card. Be careful to insert the connector straight into the cage. Do not apply any torque, up or down, to the connector cage in the adapter card.
 - d. Make sure that the connector locks in place.



When installing cables make sure that the latches engage.



Always install and remove cables by pushing or pulling the cable and connector in a straight line with the card.

3. After inserting a cable into a port, the Green LED indicator will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into

the port with the other end of the connector plugged into a functioning port). See [LED Interface](#) under the Interfaces section.

4. After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When data is being transferred the Green LED will blink. See [LED Interface](#) under the Interfaces section.
5. Care should be taken so as not to impede the air exhaust flow through the ventilation holes. Use cable lengths that allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.
6. To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator will turn off when the cable is unseated.

3.8 Identifying the Card in Your System

On Linux

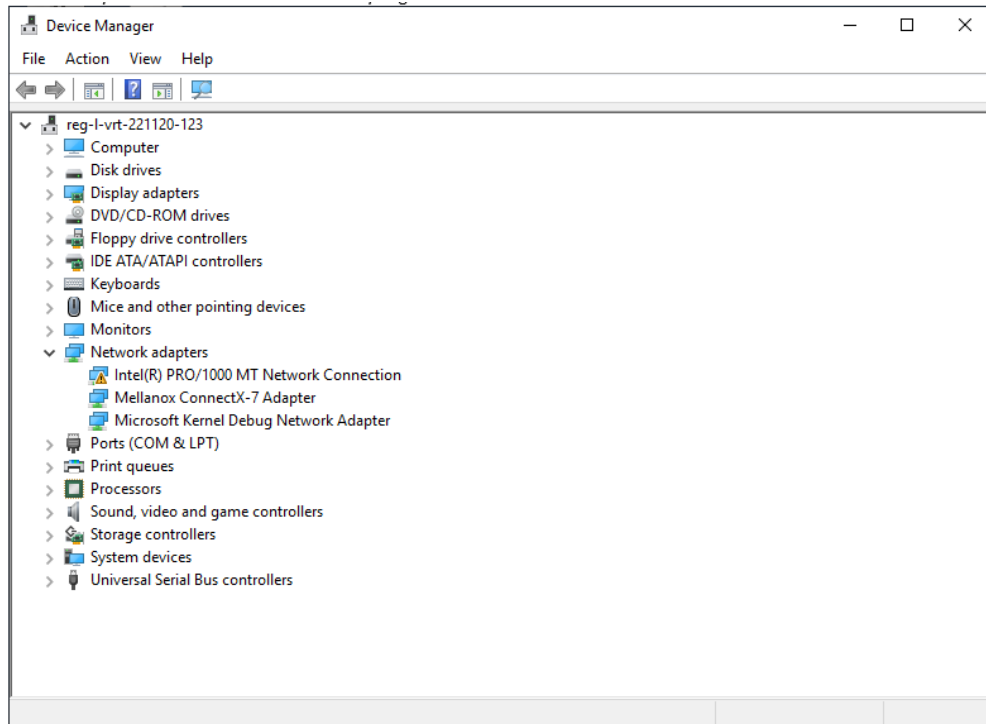
Get the device location on the PCI bus by running `lspci` and locating lines with the string “Mellanox Technologies”:

ConnectX-7 Card Configuration	Output Example
Single-port Socket Direct Card (2x PCIe x16)	<pre>[root@mftqa-009 ~]# lspci grep mellanox -i a3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] e3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>
Dual-port Socket Direct Card (2x PCIe x16)	<pre>[root@mftqa-009 ~]# lspci grep mellanox -i 05:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 05:00.1 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 82:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 82:00.1 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre> In the output example above, the first two rows indicate that one card is installed in a PCI slot with PCI Bus address 05 (hexadecimal), PCI Device number 00, and PCI Function numbers 0 and 1. The other card is installed in a PCI slot with PCI Bus address 82 (hexadecimal), PCI Device number 00, and PCI Function numbers 0 and 1. Since the two PCIe cards are installed in two PCIe slots, each card gets a unique PCI Bus and Device number. Each of the PCIe x16 busses sees two network ports; in effect, the two physical ports of the ConnectX-7 Socket Direct adapter are viewed as four net devices by the system.
Single-port PCIe x16 Card	<pre>[root@mftqa-009 ~]# lspci grep mellanox -ia 3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>

On Windows

1. Open Device Manager on the server. Click **Start => Run**, and then enter `devmgmt.msc`.
2. Expand **System Devices** and locate your ConnectX-7 adapter card.
3. Right-click the mouse on your adapter's row and select **Properties** to display the adapter card properties window.
4. Click the **Details** tab and select **Hardware Ids** (Windows 2022/2019/2016/2012 R2) from the **Property** pull-down menu.

PCI Device (Example)



5. In the Value display box, check the fields VEN and DEV (fields are separated by '&'). In the display example above, notice the sub-string "PCI\VEN_15B3&DEV_1021": VEN is equal to 0x15B3 – this is the Vendor ID of Mellanox Technologies, and DEV is equal to 1021 (for ConnectX-7) – this is a valid NVIDIA PCI Device ID.



If the PCI device does not have an NVIDIA adapter ID, return to Step 2 to check another device.



The list of NVIDIA PCI Device IDs can be found at the [PCI ID repository](#).

3.9 ConnectX-7 PCIe x16 Installation Instructions

3.9.1 Installing the Card



This section applies to all cards.

In case you would like to use the Socket Direct configuration (PCIe x32) that is available in MCX75510AAS-HEAT, MCX75510AAS-NEAT and MCX755106AS-HEAT, please refer to [NVIDIA Socket Direct \(2x PCIe x16\) Installation Instructions](#).



Please make sure to install the ConnectX-7 cards in a PCIe slot that is capable of supplying the required power and airflow as stated in [Specifications](#).

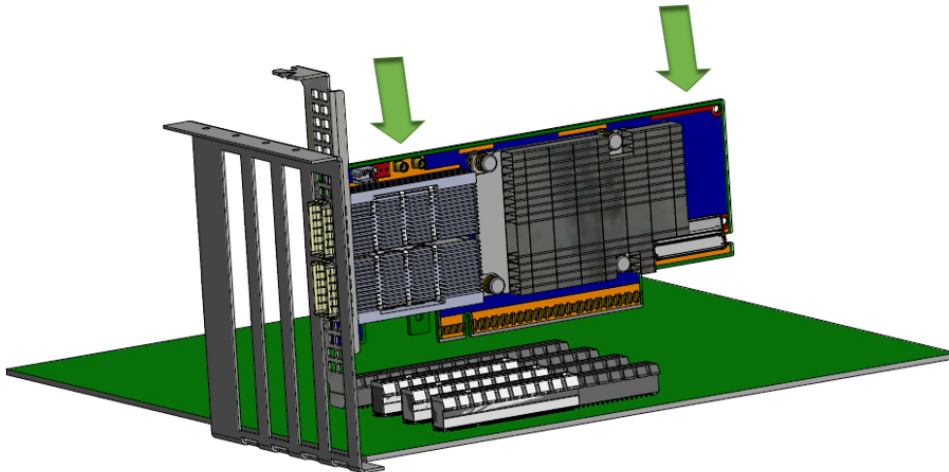


The below images are for illustration purposes only.



Connect the adapter Card in an available PCI Express x16 slot in the chassis.

Step 1: Locate an available PCI Express x16 slot and insert the adapter card to the chassis.



Step 2: Applying even pressure at both corners of the card, insert the adapter card in a PCI Express slot until firmly seated.

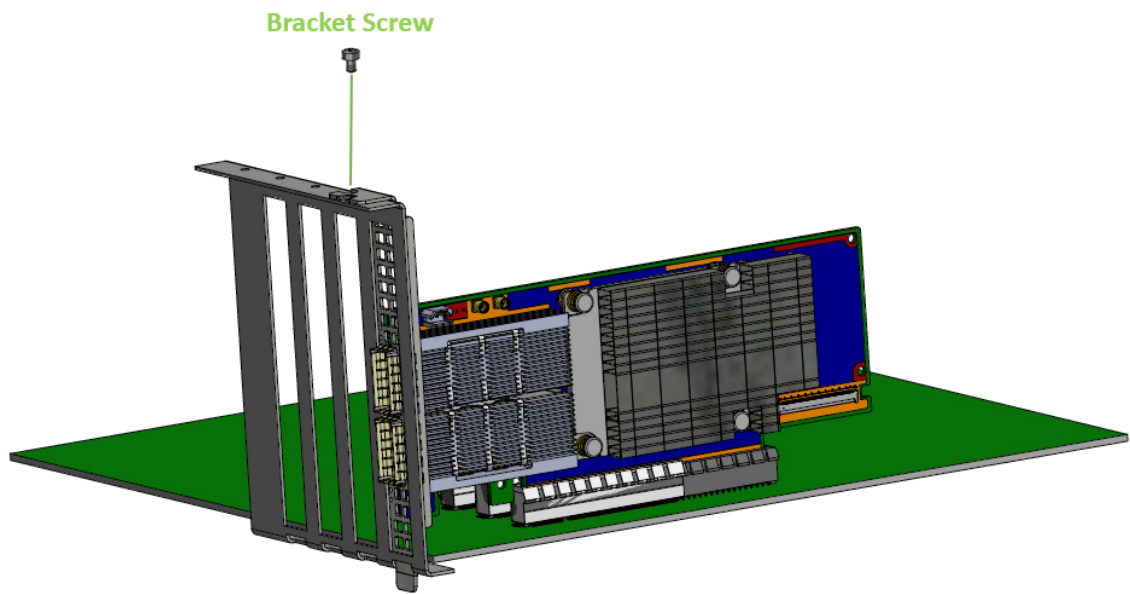


Do not use excessive force when seating the card, as this may damage the chassis.



Secure the adapter card to the chassis.

Secure the bracket to the chassis with the bracket screw.



3.9.2 Uninstalling the Card

Safety Precautions

The adapter is installed in a system that operates with voltages that can be lethal. Before uninstalling the adapter card, please observe the following precautions to avoid injury and prevent damage to system components.

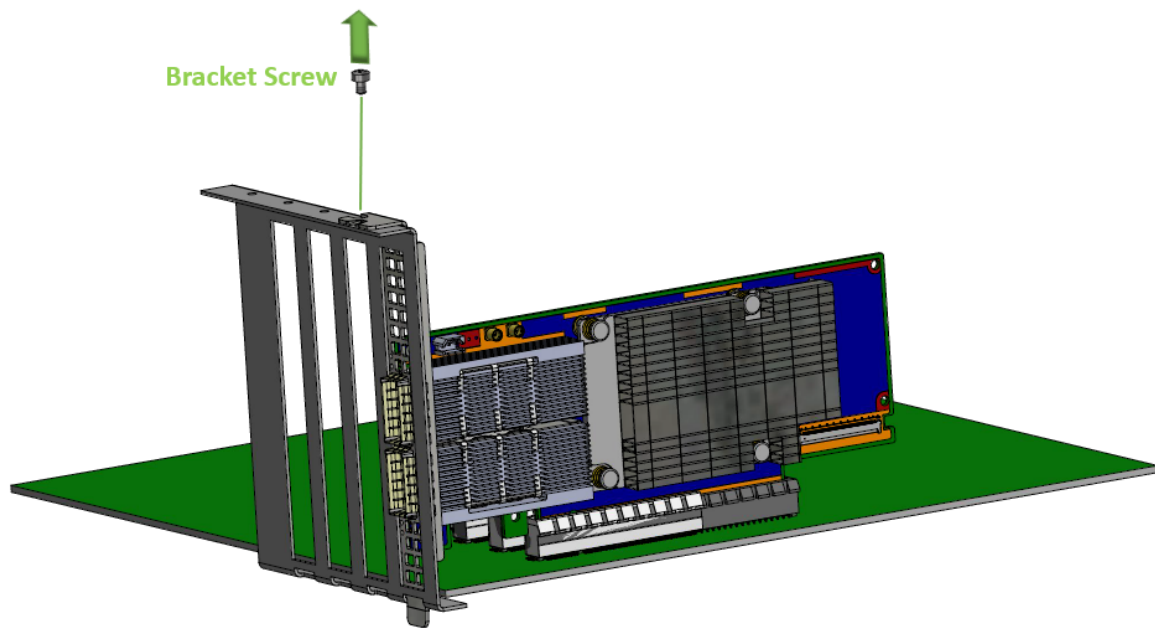
1. Remove any metallic objects from your hands and wrists.
2. It is strongly recommended to use an ESD strap or other antistatic devices.
3. Turn off the system and disconnect the power cord from the server.

Card Removal

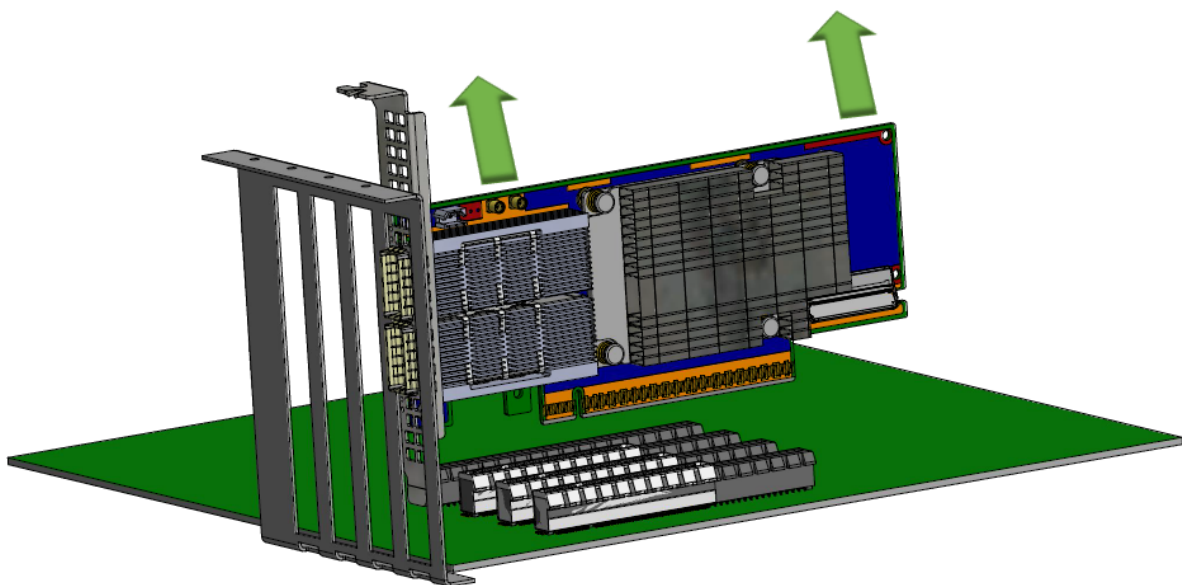


Please note that the following images are for illustration purposes only.

1. Verify that the system is powered off and unplugged.
2. Wait 30 seconds.
3. To remove the card, disengage the retention mechanisms on the bracket (clips or screws).



4. Holding the adapter card from its center, gently pull the ConnectX-7 card out of the PCI Express slot.



3.10 NVIDIA Socket Direct (2x PCIe x16) Installation Instructions



This section applies to the following adapter cards when used as NVIDIA Socket Direct cards in dual-socket servers.

- MCX755106AS-HEAT
- MCX755106AC-HEAT
- MCX75510AAS-NEAT
- MCX75510AAS-HEAT
- MCX715105AS-WEAT



The below images are for illustration purposes only.

The hardware installation section uses the terminology of white and black harnesses to differentiate between the two supplied cables. Due to supply chain variations, some cards may be provided with two black harnesses instead. To clarify the difference between these two harnesses, one black harness was marked with a “WHITE” label and the other with a “BLACK” label.

The Cabline harness marked with the “WHITE” label should be connected to the connector on the ConnectX-7 and PCIe card engraved with “White Cable,” while the one marked with the “BLACK” label should be connected to the connector on the ConnectX-7 and PCIe card engraved with “Black Cable”.



The harnesses' minimal bending radius is 10[mm].

3.10.1 Installing the Cards



The installation instructions include steps that involve a retention clip to be used while connecting the Cabline harnesses to the cards. Please note that this is an optional accessory.



Please make sure to install the ConnectX-7 cards in a PCIe slot capable of supplying the required power and airflow as stated in the [Specifications](#).

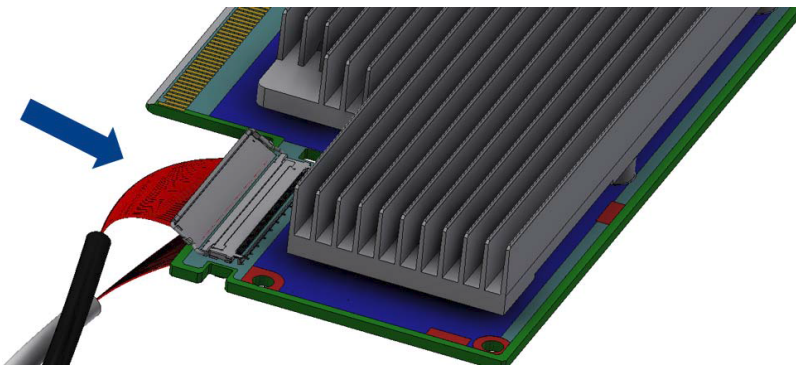


Connect the adapter card with the Auxiliary connection card using the supplied Cabline CA-II Plus harnesses.

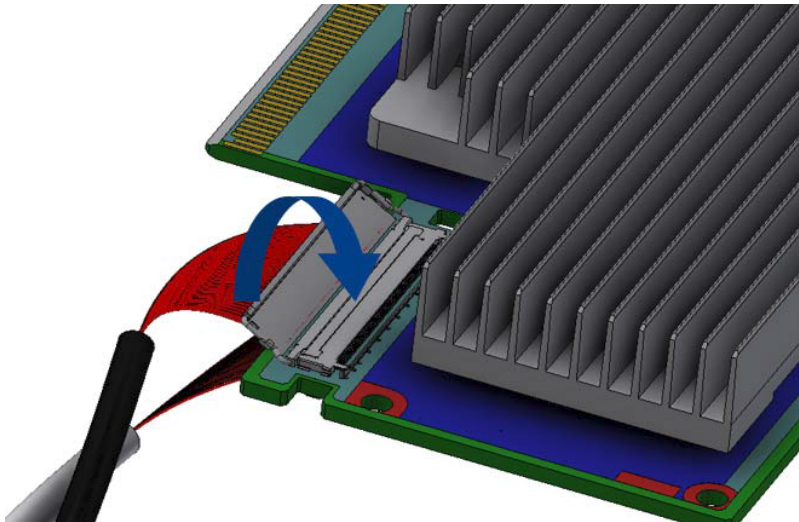
Step 1: Slide the black and white Cabline CA-II Plus harnesses through the retention clip while ensuring the clip opening is facing the plugs.



Step 2: Plug the Cabline CA-II Plus harnesses into the ConnectX-7 adapter card while paying attention to the color coding. As indicated on both sides of the card, plug the black harness into the component side and the white harness into the print side.



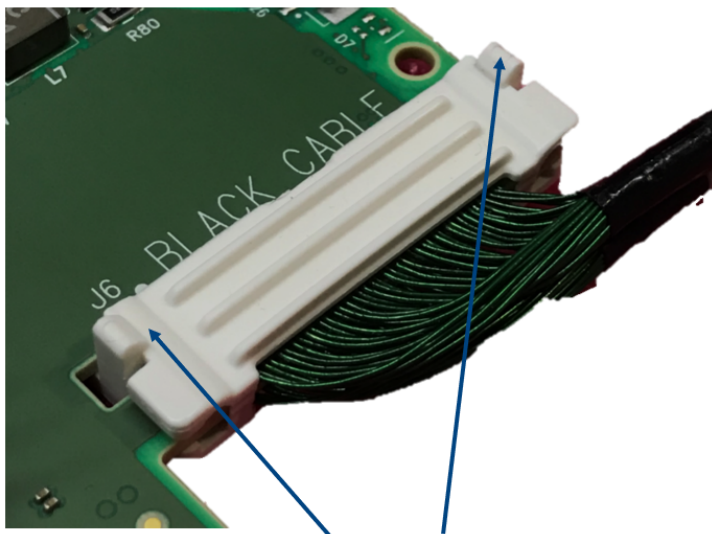
Step 2: Verify the plugs are locked.



Step 3: Slide the retention clip latches through the cutouts on the PCB. The latches should face the annotation on the PCB.



Step 4: Clamp the retention clip. Verify both latches are firmly locked.



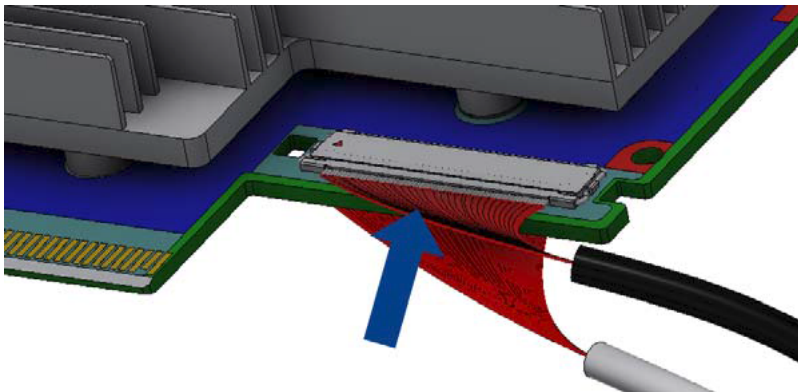
Verify that both latches are firmly snapped



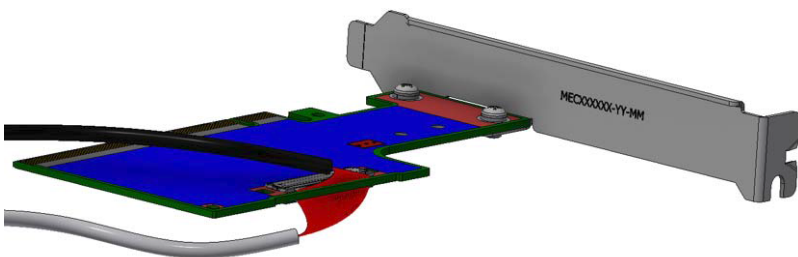
Step 5: Slide the Cabline CA-II Plus harnesses through the retention clip. Make sure that the clip opening is facing the plugs.



Step 6: Plug the Cabline CA-II Plus harnesses into the PCIe Auxiliary Card. As indicated on both sides of the Auxiliary connection card, plug the black harness into the component side and the white harness into the print side.



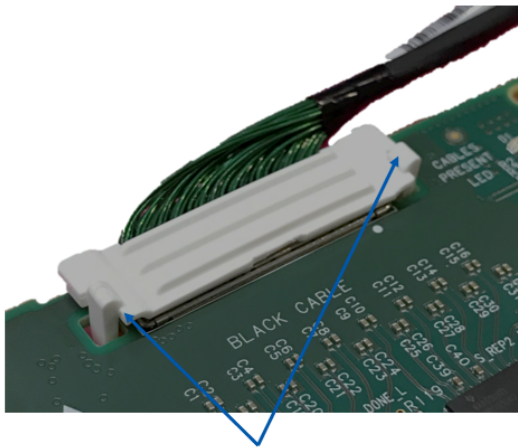
Step 7: Verify the plugs are locked.



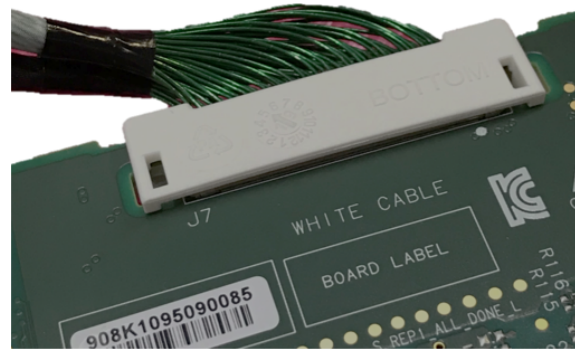
Step 8: Slide the retention clip through the cutouts on the PCB. Ensure latches are facing "Blthe ack Cable" annotation, as seen in the picture below.



Step 9: Clamp the retention clip. Verify both latches are firmly locked.



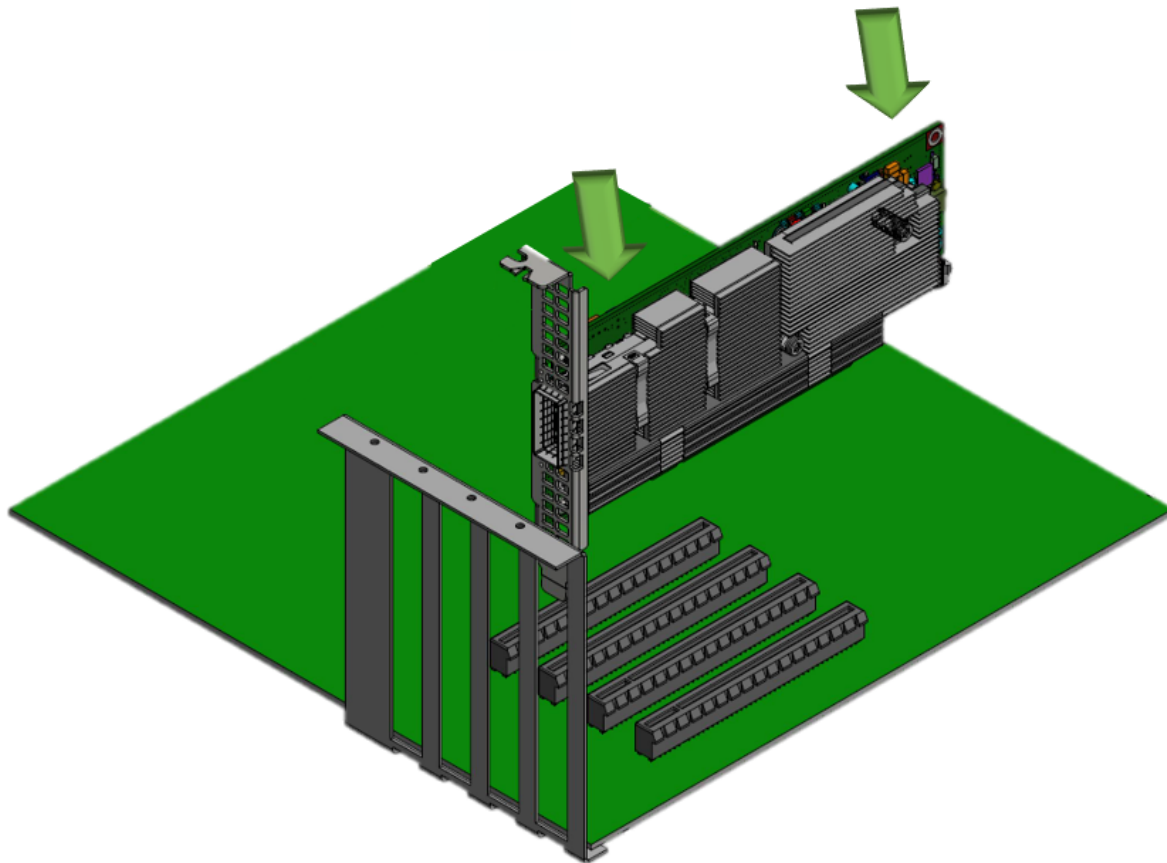
Verify that both latches are firmly snapped



Connect the ConnectX-7 adapter and PCIe Auxiliary Connection cards in available PCI Express x16 slots in the chassis.

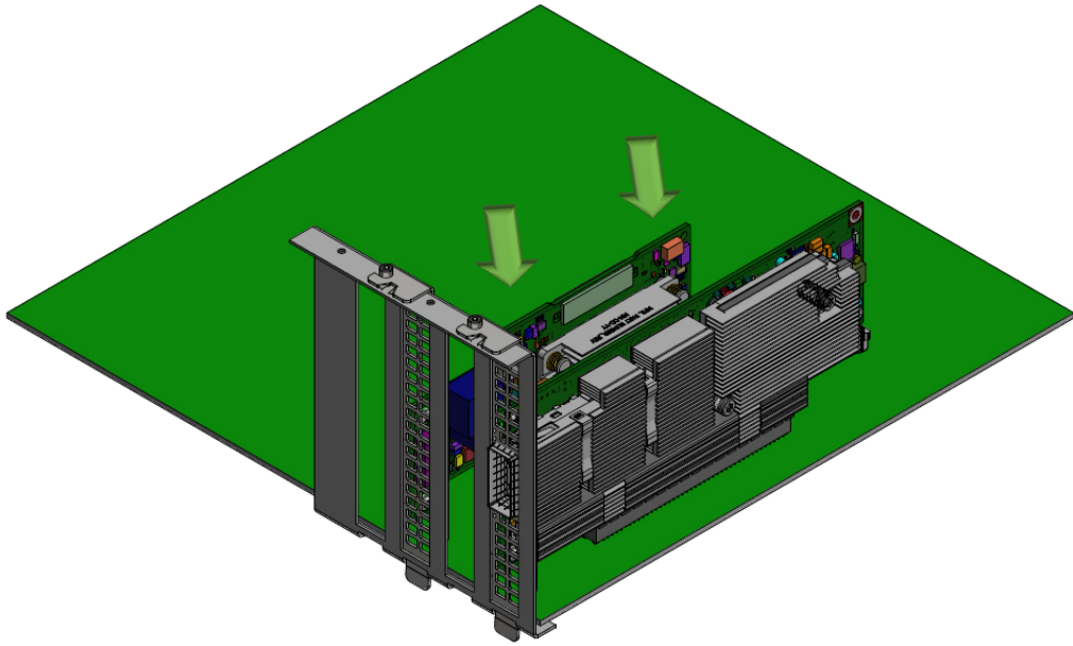
Step 1: Locate two available PCI Express x16 slots.

Step 2: Applying even pressure at both corners of the cards, insert the adapter card in the PCI Express slots until firmly seated.



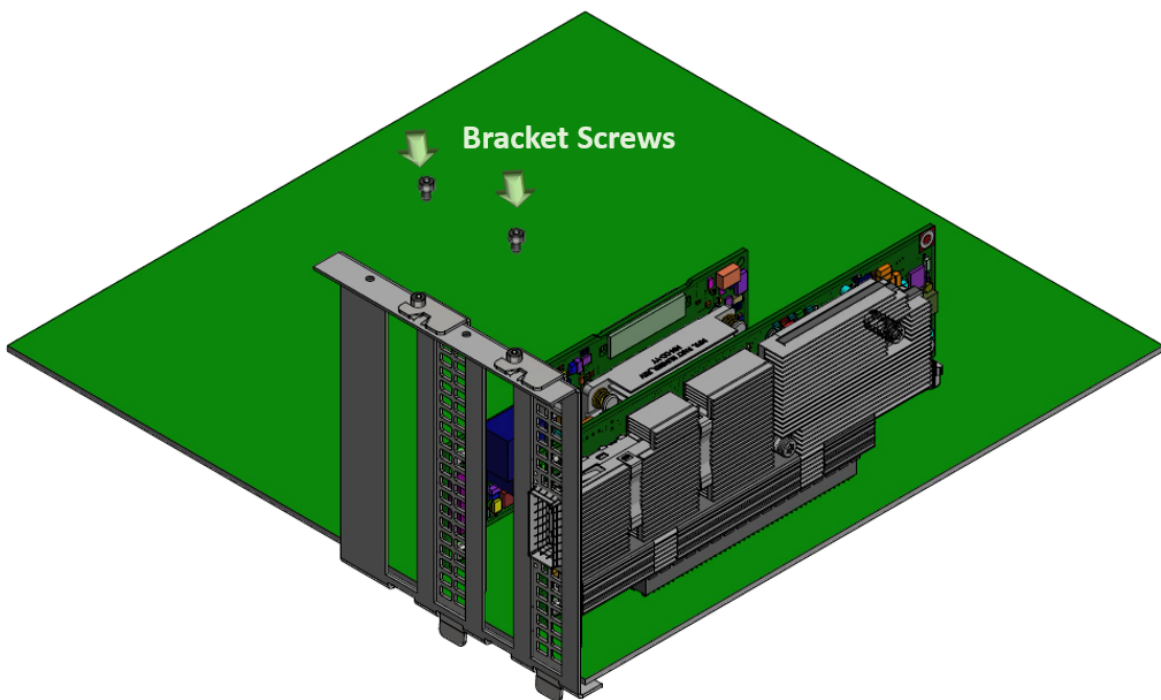
Do not use excessive force when seating the cards, as this may damage the system or the cards.

Step 3: Applying even pressure at both corners of the cards, insert the Auxiliary Connection card in the PCI Express slots until firmly seated.



Secure the ConnectX-7 adapter and PCIe Auxiliary Connection Cards to the chassis.

Step 1: Secure the brackets to the chassis with the bracket screws.



3.10.2 Uninstalling the Cards

Safety Precautions

The adapter is installed in a system that operates with voltages that can be lethal. Before uninstalling the adapter card, please observe the following precautions to avoid injury and prevent damage to system components.

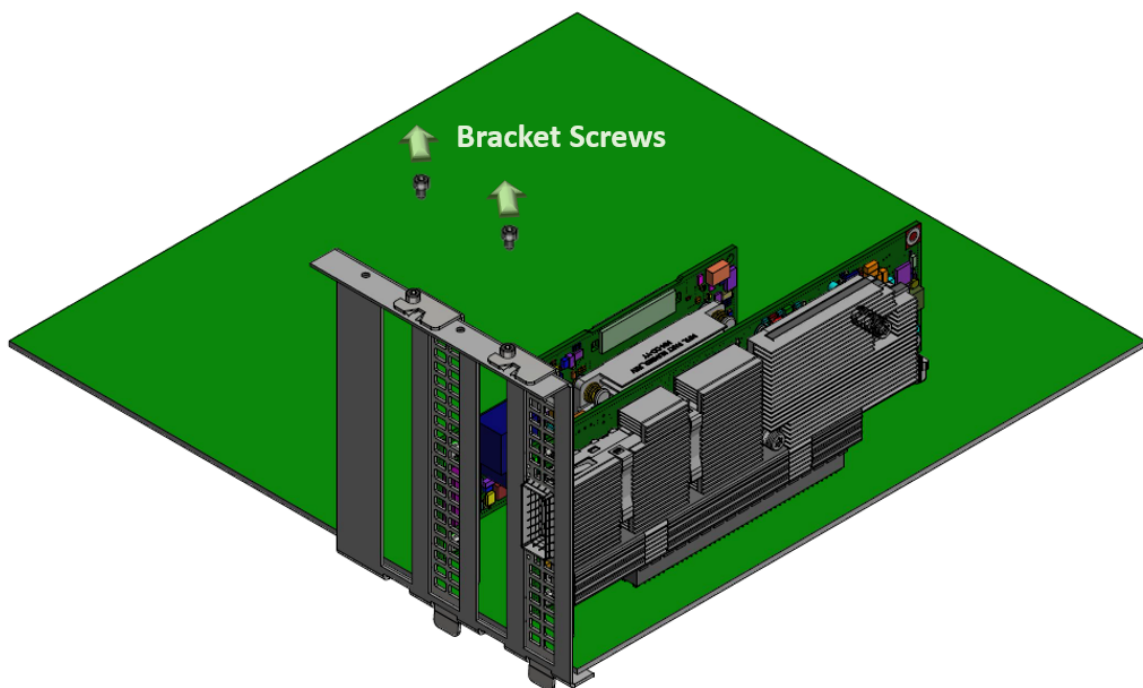
1. Remove any metallic objects from your hands and wrists.
2. Using an ESD strap or other antistatic devices is strongly recommended.
3. Turn off the system and disconnect the power cord from the server.

Card Removal

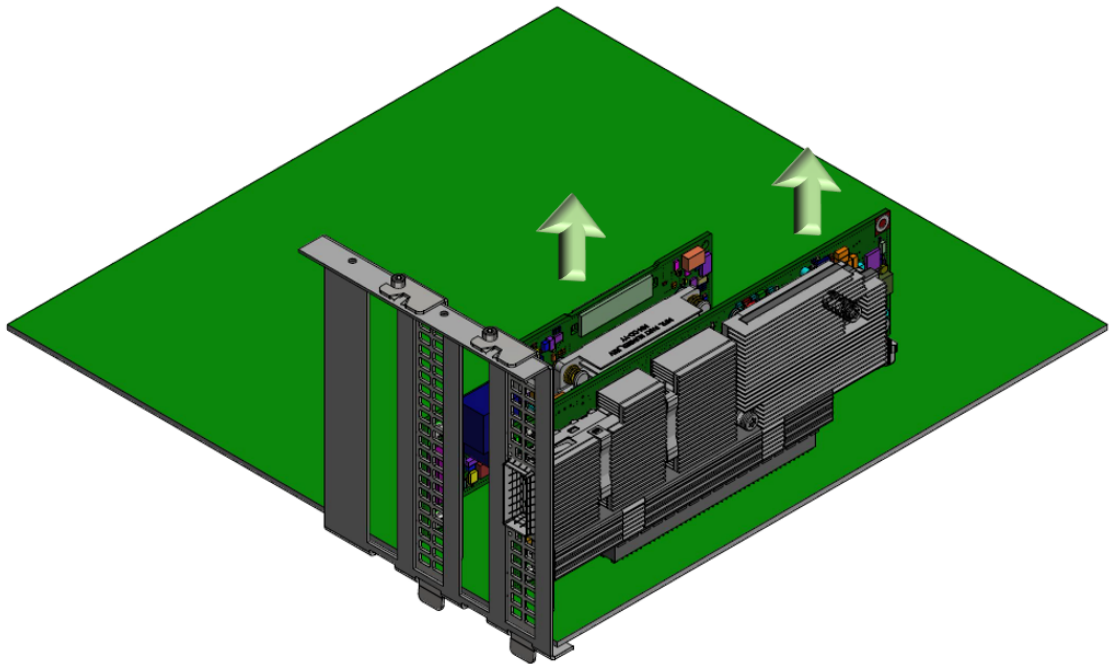


Please note that the following images are for illustration purposes only.

1. Verify that the system is powered off and unplugged.
2. Wait 30 seconds.
3. To remove the card, disengage the retention mechanisms on the brackets (clips or screws).



4. Holding the adapter card from its center, gently pull the ConnectX-7 and Auxiliary Connections cards out of the PCI Express slot.



4 Driver Installation

Please refer to the relevant driver installation section.

- [Linux Driver Installation](#)
- [Windows Driver Installation](#)
- [VMware Driver Installation](#)

4.1 Linux Driver Installation

This section describes how to install and test the MLNX_OFED for Linux package on a single server with a ConnectX-7 adapter card installed.

4.1.1 Prerequisites

Requirements	Description
Platforms	A server platform with a ConnectX-7 InfiniBand/Ethernet adapter card installed.
Required Disk Space for Installation	1GB
Operating System	Linux operating system. For the list of supported operating system distributions and kernels, please refer to the <i>MLNX_OFED Release Notes</i> .
Installer Privileges	The installation requires administrator (root) privileges on the target machine.

4.1.2 Downloading MLNX_OFED

1. Verify that the system has a network adapter installed by running lspci command. The below table provides output examples per ConnectX-7 card configuration.

ConnectX-7 Card Configuration	Output Examples
Single-port Socket Direct Card (2x PCIe x16)	<pre>[root@mftqa-009 ~]# lspci grep mellanox -i a3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] e3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>

ConnectX-7 Card Configuration	Output Examples
Dual-port Socket Direct Card (2x PCIe x16)	<pre>[root@mftga-009 ~]# lspci grep mellanox -i 05:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 05:00.1 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 82:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7] 82:00.1 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre> In the output example above, the first two rows indicate that one card is installed in a PCI slot with PCI Bus address 05 (hexadecimal), PCI Device number 00 and PCI Function number 0 and 1. The other card is installed in a PCI slot with PCI Bus address 82 (hexadecimal), PCI Device number 00 and PCI Function number 0 and 1. Since the two PCIe cards are installed in two PCIe slots, each card gets a unique PCI Bus and Device number. Each of the PCIe x16 busses sees two network ports; in effect, the two physical ports of the ConnectX-7 Socket Direct adapter are viewed as four net devices by the system.
Single-port PCIe x16 Card	<pre>[root@mftga-009 ~]# lspci grep mellanox -ia 3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>
Dual-port PCIe x16 Card	<pre>[root@mftga-009 ~]# lspci grep mellanox -ia 86:00.0 Network controller: Mellanox Technologies MT2910 Family [ConnectX-7] 86:00.1 Network controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>

For Linux driver installation, please refer to [NVIDIA DOCA Installation Guide for Linux](#).

4.2 Windows Driver Installation

For Windows, download and install the latest WinOF-2 for Windows software package available via the NVIDIA website at: [WinOF-2 webpage](#). Follow the installation instructions included in the download package (also available from the download page).

The snapshots in the following sections are presented for illustration purposes only. The installation interface may slightly vary, depending on the operating system in use.

4.2.1 Software Requirements

For the full list of supported operating systems, please refer to the [WinOF-2 Documentation](#) -> Release Notes.

4.2.2 Downloading WinOF-2 Driver



To download the .exe file according to your Operating System, please follow the steps below:

1. Obtain the machine architecture.

- a. To go to the Start menu, position your mouse in the bottom-right corner of the Remote Desktop of your screen.
- b. Open a CMD console (Click Task Manager-->File --> Run new task and enter CMD).
- c. Enter the following command.

```
echo %PROCESSOR_ARCHITECTURE%
```



On an x64 (64-bit) machine, the output will be "AMD64".

2. Go to the WinOF-2 web page at: <https://www.nvidia.com/en-us/networking/> > Products > Software > InfiniBand Drivers (Learn More) > Nvidia WinOF-2.
3. Download the .exe image according to the architecture of your machine (see [Step 1](#)). The name of the .exe is in the following format: MLNX_WinOF2-<version>_<arch>.exe.



Installing the incorrect .exe file is prohibited. If you do so, an error message will be displayed.

For example, if you install a 64-bit .exe on a 32-bit machine, the wizard will display the following (or a similar) error message: "The installation package is not supported by this processor type. Contact your vendor"

4.2.3 Installing WinOF-2 Driver

The snapshots in the following sections are for illustration purposes only. The installation interface may slightly vary, depending on the used operating system.

This section provides instructions for two types of installation procedures, and both require administrator privileges:

- [Attended Installation](#)
An installation procedure that requires frequent user intervention.
- [Unattended Installation](#)
An automated installation procedure that requires no user intervention.

4.2.3.1 Attended Installation

The following is an example of an installation session.

1. Double click the .exe and follow the GUI instructions to install MLNX_WinOF2.
2. [Optional] Manually configure your setup to contain the logs option (replace "LogFile" with the relevant directory).

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v"/1*v* [LogFile]"
```

3. [Optional] If you do not want to upgrade your firmware version (i.e., MT_SKIPFWUPGRD default value is False).

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" MT_SKIPFWUPGRD=1"
```

4. [Optional] If you do not want to install the Rshim driver, run.

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" MT_DISABLE_RSHIM_INSTALL=1"
```



The Rshim driver installation will fail if a prior Rshim driver is already installed. The following fail message will be displayed in the log:

"ERROR!!! Installation failed due to following errors: MlxRshim drivers installation disabled and MlxRshim drivers Installed, Please remove the following oem inf files from driver store: <oem inf list>"

5. [Optional] If you want to skip the check for unsupported devices, run.

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" SKIPUNSUPPORTEDDEVCHECK=1"
```

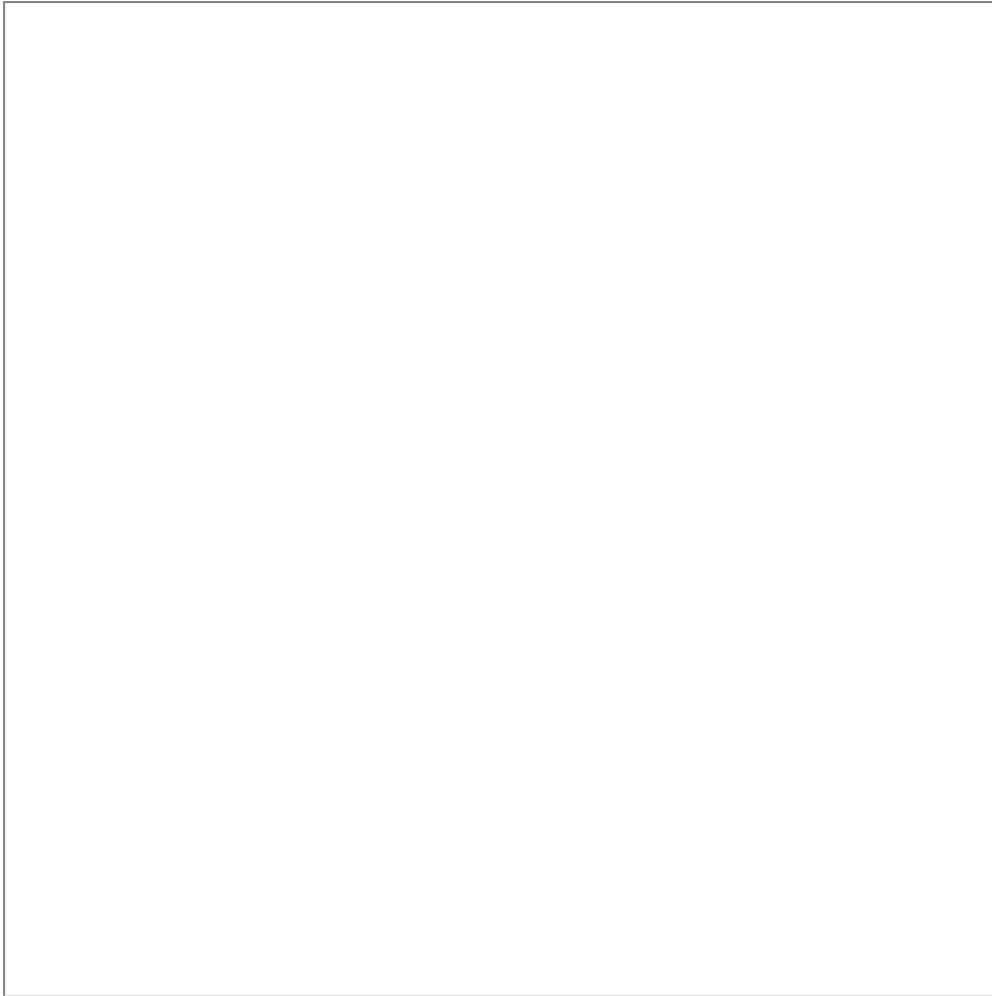
6. Click Next in the Welcome screen.



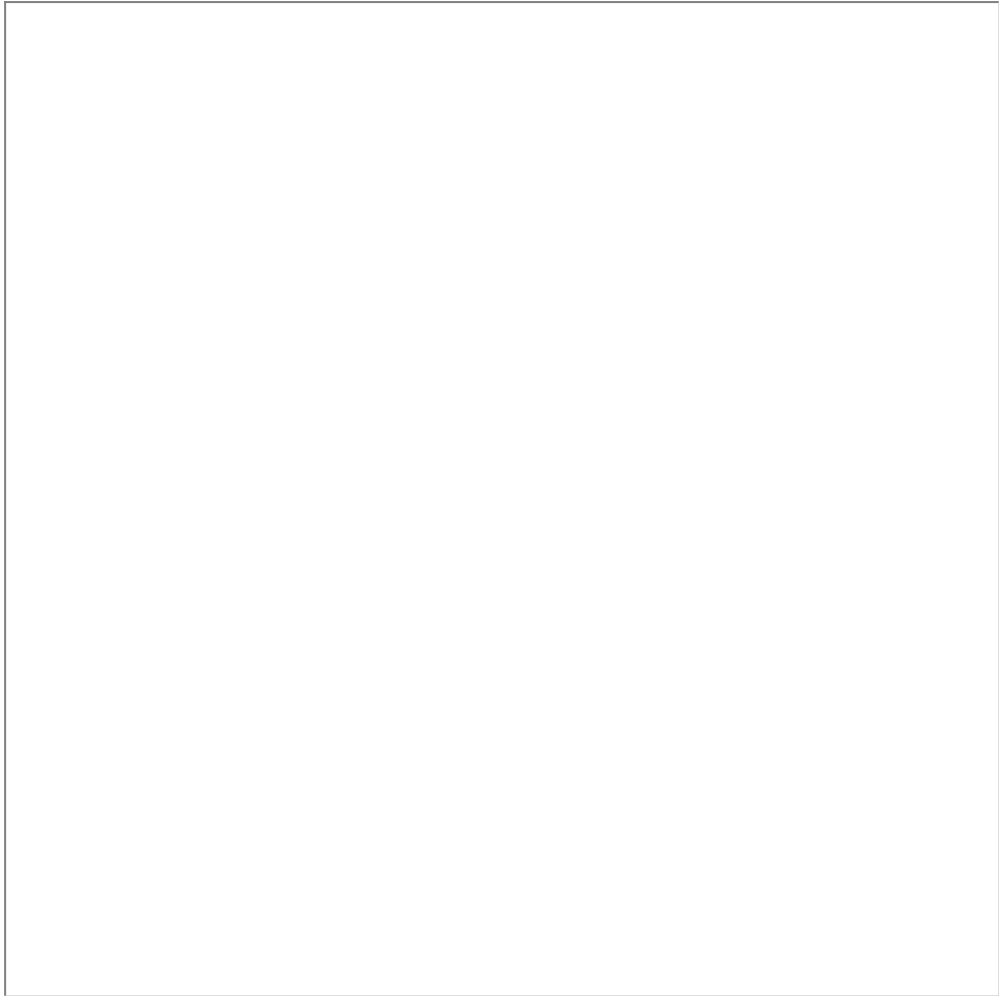
7. Read and accept the license agreement and click Next.



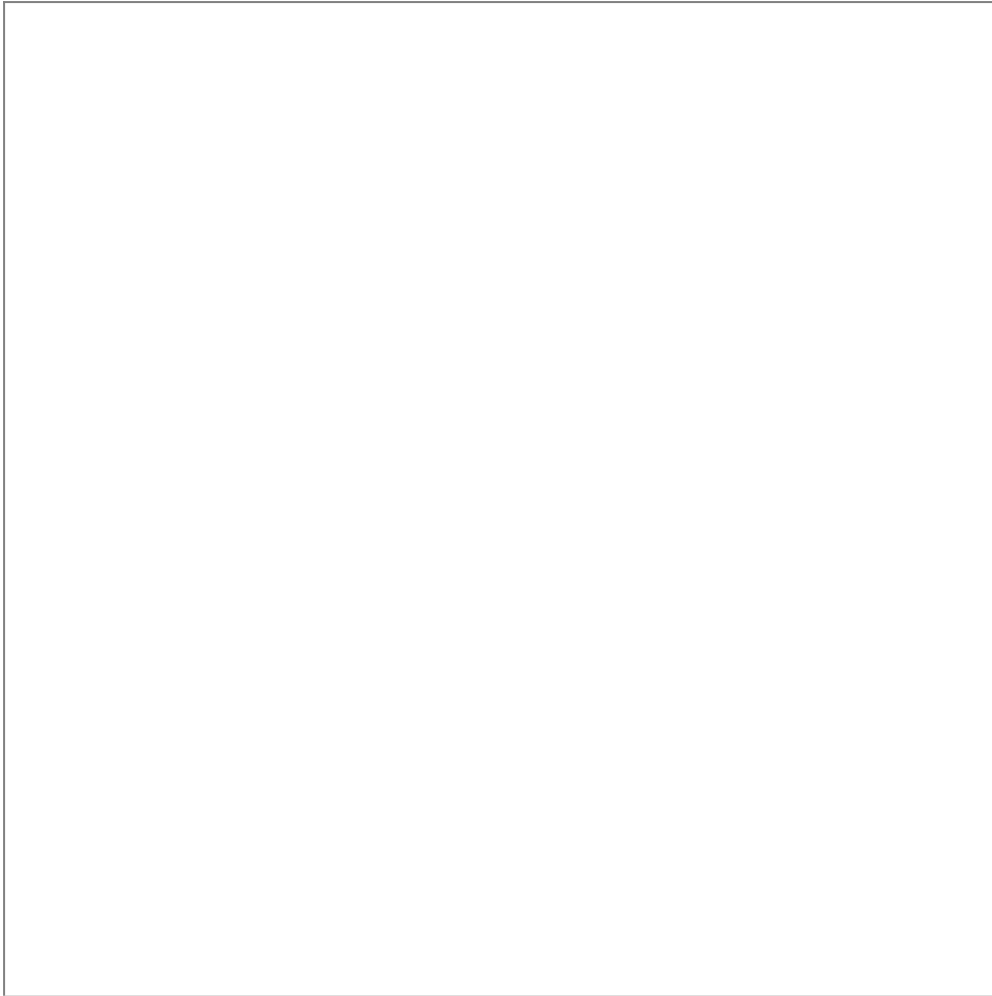
8. Select the target folder for the installation.



9. The firmware upgrade screen will be displayed in the following cases:
- If the user has an OEM card. In this case, the firmware will not be displayed.
 - If the user has a standard NVIDIA® card with an older firmware version, the firmware will be updated accordingly. However, if the user has both an OEM card and a NVIDIA® card, only the NVIDIA® card will be updated.

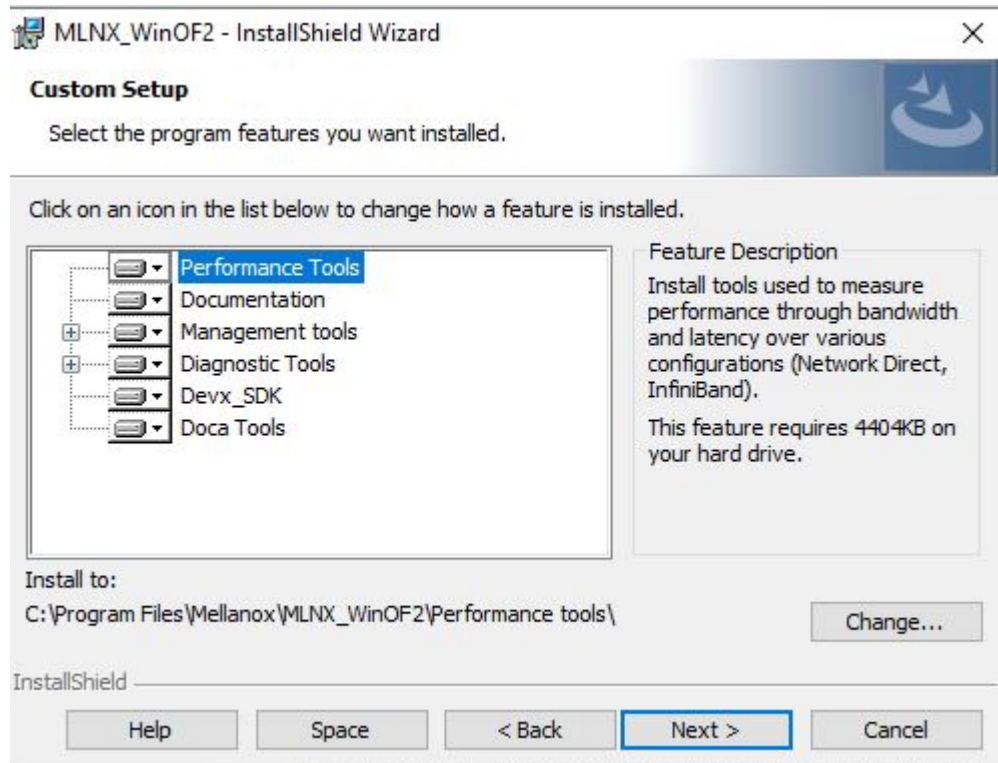


10. Select a Complete or Custom installation, follow [Step a](#) onward.



- a. Select the desired feature to install:
- Performances tools - install the performance tools that are used to measure performance in user environment
 - Documentation - contains the User Manual and Release Notes
 - Management tools - installation tools used for management, such as mlxstat
 - Diagnostic Tools - installation tools used for diagnostics, such as mlx5cmd

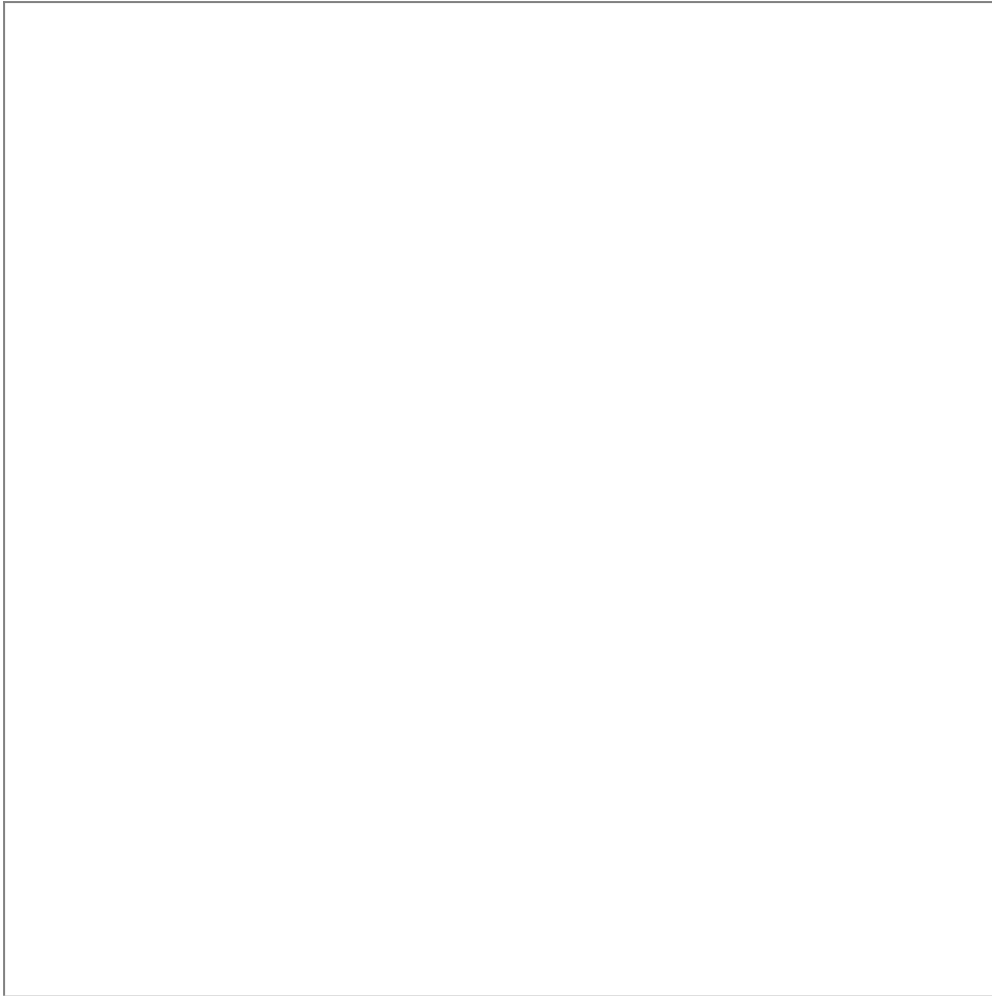
- b. Click Next to install the desired tools.



11. Click Install to start the installation.



12. In case firmware upgrade option was checked in [Step 7](#), you will be notified if a firmware upgrade is required (see ☐).



13. Click Finish to complete the installation.



4.2.3.2 Unattended Installation



If no reboot options are specified, the installer restarts the computer whenever necessary without displaying any prompt or warning to the user.
To control the reboots, use the */norestart* or */forcerestart* standard command-line options.

The following is an example of an unattended installation session.

1. Open a CMD console-> Click Start-> Task Manager File-> Run new task-> and enter CMD.
2. Install the driver. Run:

```
MLNX_WinOF2-[Driver/Version]_<revision_version>_All_-Arch.exe /S /v/qn
```

3. [Optional] Manually configure your setup to contain the logs option:

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /S /v/qn /v"/l*vx [LogFile]"
```

4. [Optional] If you wish to control whether to install ND provider or not (i.e., *MT_NDPROPERTY* default value is *True*).

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /vMT_NDPROPERTY=1
```

5. [Optional] If you do not wish to upgrade your firmware version (i.e., *MT_SKIPFWUPGRD* default value is *False*).

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /vMT_SKIPFWUPGRD=1
```

6. [Optional] If you do not want to install the Rshim driver, run.

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v" MT_DISABLE_RSHIM_INSTALL=1"
```



The Rshim driver installation will fail if a prior Rshim driver is already installed. The following fail message will be displayed in the log:

"ERROR!!! Installation failed due to following errors: MlxRshim drivers installation disabled and MlxRshim drivers Installed, Please remove the following oem inf files from driver store: <oem inf list>"

7. [Optional] If you want to enable the default configuration for Rivermax, run.

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v"MT_RIVERMAX=1 /l*vx C:\Users\<user>\log.txt "
```

8. [Optional] If you want to skip the check for unsupported devices, run/

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v" SKIPUNSUPPORTEDDEVCHECK=1"
```

4.2.4 Firmware Upgrade

If the machine has a standard NVIDIA® card with an older firmware version, the firmware will be automatically updated as part of the NVIDIA® WinOF-2 package installation. For information on how to upgrade firmware manually, please refer to [MFT User Manual](#).

If the machine has a DDA (pass through) facility, firmware update is supported only in the Host. Therefore, to update the firmware, the following must be performed:

1. Return the network adapters to the Host.
2. Update the firmware according to the steps in the [MFT User Manual](#).
3. Attach the adapters back to VM with the DDA tools.

4.3 VMware Driver Installation

This section describes VMware Driver Installation.

4.3.1 Hardware and Software Requirements

Requirement	Description
Platforms	A server platform with an adapter card based on NVIDIA devices: ConnectX®-7 (InfiniBand/Ethernet) (firmware: fw-ConnectX7)
Operating System	For the complete list of VMware supported operating systems, refer to VMware ESXi async Drivers
Installer Privileges	The installation requires administrator privileges on the target machine.

4.3.2 Installing NATIVE ESXi Driver for VMware vSphere



Please uninstall all previous driver packages prior to installing the new version.

To install the driver:

1. Log into the ESXi server with root permissions.
2. Install the driver.

```
#> esxcli software vib install -d <path>/<bundle_file>
```

Example:

```
#> esxcli software vib install -d /tmp/MLNX-NATIVE-ESX-ConnectX-4-5_4.16.8.8-10EM-650.0.0.4240417.zipesxcli
```

3. Reboot the machine.
4. Verify the driver was installed successfully.

```
esxcli software vib list | grep nmlx
nmlx5-core      4.16.8.8-10EM.650.0.0.4240417  MEL  PartnerSupported 2017-01-31
nmlx5-rdma      4.16.8.8-10EM.650.0.0.4240417  MEL  PartnerSupported 2017-01-31
```



After the installation process, all kernel modules are loaded automatically upon boot.

4.3.3 Removing Earlier NVIDIA Drivers



Please unload the previously installed drivers before removing them.

To remove all the drivers:

1. Log into the ESXi server with root permissions.
2. List all the existing NATIVE ESXi driver modules. (See Step 4 in [Installing NATIVE ESXi Driver for VMware vSphere.](#))
3. Remove each module:

```
#> esxcli software vib remove -n nmlx5-rdma
```

```
#> esxcli software vib remove -n nmlx5-core
```



To remove the modules, you must run the command in the same order as shown in the example above.

4. Reboot the server.

4.3.4 Firmware Programming

1. Download the VMware bootable binary images v4.6.0 from the [Firmware Tools \(MFT\) site](#).
 - a. ESXi 6.5 File: mft-4.6.0.48-10EM-650.0.0.4598673.x86_64.vib
 - b. MD5SUM: 0804cffe30913a7b4017445a0f0adbe1
2. Install the image according to the steps described in the [MFT User Manual](#).



The following procedure requires custom boot image downloading, mounting and booting from a USB device.

5 Updating Adapter Firmware

Each adapter card is shipped with the latest version of qualified firmware at the time of manufacturing. However, NVIDIA issues firmware updates occasionally that provide new features and bug fixes. To check that your card is programmed with the latest available firmware version, download the mlxup firmware update and query utility. The utility can query for available Mellanox adapters and indicate which adapters require a firmware update. If the user confirms, mlxup upgrades the firmware using embedded images. The latest mlxup executable and documentation are available in [mlxup - Update and Query Utility](#).

Firmware Update Example

```
[server1]# ./mlxup
Querying Mellanox devices firmware ...
Device Type:      ConnectX-7
Part Number:      MCX75310AAS-HEAT
Description:      NVIDIA ConnectX-7 adapter card, 200Gb/s NDR200 IB, Single-port OSFP, PCIe 5.0 x16, Secure boot, No
Crypto, Tall Bracket
PCI Device Name:  0b:00.0
Base MAC:         0000e41d2d5cf810
Versions:         Current      Available
FW               28.33.0800    28.33.1000
Status:           Update required

Device Type:      ConnectX-7
Part Number:      MCX75310AAS-HEAT
Description:      NVIDIA ConnectX-7 adapter card, 200Gb/s NDR200 IB, Single-port OSFP, PCIe 5.0 x16, Secure boot, No
Crypto, Tall Bracket
PCI Device Name:  0b:00.0
Base MAC:         0000e41d2d5cf810
Versions:         Current      Available
FW               28.33.0800    28.33.1000
Status:           Up to date

Perform FW update? [y/N]: y
Device #1: Up to date
Device #2: Updating FW ... Done

Restart needed for updates to take effect.
Log File: /var/log/mlxup/mlxup-yyyymmdd.log
```

6 Setting High-Speed-Port Link Type



This section applies to ConnectX-7 cards supporting both Ethernet and InfiniBand protocols - see the relevant OPNs in the following table.

The following table lists the ConnectX-7 cards supporting both Ethernet and InfiniBand protocols, the supported speeds and the default networking port link type.

OPN	Data Transmission Rate	Default Protocol and Rate
MCX75310AAS-HEAT	NDR200 / 200GbE	InfiniBand NDR200
MCX75310AAS-NEAT	NDR / 400GbE	InfiniBand NDR
MCX75310AAC-NEAT	NDR / 400GbE	InfiniBand NDR
MCX755106AS-HEAT	NDR200 / 200GbE	Ethernet 200GbE
MCX755106AC-HEAT	NDR200 / 200GbE	Ethernet 200GbE
MCX715105AS-WEAT	NDR / 400GbE	Ethernet 400GbE

To configure the networking high-speed ports mode, you can either use the [mlxconfig](#) or the [UEFI](#) tools.

UEFI can configure the adapter card device before the operating system is up, while [mlxconfig](#) configures the card once the operating system is up. According to your preference, use one of the below tools:

6.1 mlxconfig

The [mlxconfig](#) tool allows users to change device configurations without burning the firmware. The configuration is also kept after reset. By default, [mlxconfig](#) shows the configurations that will be loaded in the next boot. For more information and instructions, refer to [Using mlxconfig to Set IB/ETH Parameters](#).

6.2 UEFI

PreBoot drivers initialize the adapter device, check the port protocol type – Ethernet or InfiniBand - and bring up the port. Then it connects to a DHCP server to obtain its assigned IP address and network parameters and obtain the source location of the kernel/OS to boot from. The DHCP server instructs the PreBoot drivers to access the kernel/OS through a TFTP server, an iSCSI target, or some other service. For more information and instructions, refer to [UEFI](#).

7 Port Splitting Configurations



This section applies to the following OPN only:

MCX715105AS-WEAT: NVIDIA ConnectX-7 HHHH Adapter Card, 400GbE (default mode) / NDR IB, Single-port QSFP112, Port Split Capable, PCIe 5.0 x16 with x16 PCIe extension option, Crypto Disabled, Secure Boot Enabled, Tall bracket

ConnectX-7 SuperNICs offer a variety of network port configurations designed to meet the demands of different environments and deployments. This section outlines the available connectivity options for network ports per product model. While the configurations listed here are not exhaustive, they represent the tested and verified options. Customers seeking to support unlisted configurations should contact NVIDIA Support.

The Port Splitting feature allows a single physical networking module (QSFP112) to be split into multiple network ports. This provides flexibility in optimizing port configurations for various network topology use cases.

Key Features

- **Flexibility and Improved Traffic Segmentation:** Port splitting enables network administrators to align device ports with their network infrastructure, enabling traffic segmentation and isolation.
- **Increased Network Efficiency:** By optimizing traffic flow and reducing congestion, port splitting improves overall network efficiency. Specific physical ports can be assigned to handle certain traffic types or applications, allowing control and performance tuning.
- **Better Utilization of Resources:** Instead of needing separate SuperNICs for each logical connection or network interface, port splitting allows a single physical SuperNIC to handle multiple functions. This reduces hardware costs while maintaining high network flexibility.

Use Cases

- **Load Balancing:** Distributing traffic across multiple physical ports can improve network load distribution and balance.
- **Resiliency:** Multiple physical ports can be used for redundancy, ensuring stable network connections even if one port encounters an issue.

Each configuration in this section includes a diagram and instructions on splitting the network port using the [mlxconfig](#) or the [UEFI](#) tools. The UEFI tool configures the device before the operating system is up, while [mlxconfig](#) configures the device once the operating system is up. Select the tool based on your preference; the configuration is saved across reboots.

mlxconfig: The [mlxconfig](#) tool allows users to change configurations without burning the firmware. The configuration is also kept after reset. By default, [mlxconfig](#) shows the configurations that will be loaded in the next boot. For more information and instructions, refer to [mlxconfig](#).

UEFI: PreBoot drivers initialize the adapter device, check the port protocol type – Ethernet or InfiniBand - and bring up the port. Then it connects to a DHCP server to obtain its assigned IP address and network parameters and obtain the source location of the kernel/OS to boot from.

The DHCP server instructs the PreBoot drivers to access the kernel/OS through a TFTP server, an iSCSI target, or some other service. For more information and instructions, refer to [UEFI](#).



Before setting the desired configuration, take note of the following warnings:

- Any new configuration set by the customer overwrites the previous configuration.
- Misconfiguration can potentially damage the system.
- It is recommended to establish out-of-band connectivity to the ConnectX-7 SuperNIC before setting any configuration for the first time. This allows resetting the NVConfig parameters to their default values in case of misconfiguration.
- When switching from one configuration to another (default or non-default), it is advised to first reset the device to its default configuration. This action deletes all current NVConfig settings. For the reset command and further details, refer to the [mlxconfig – Changing Device Configuration Tool](#).



Reboot or power-cycle the SuperNIC for the new configuration to take effect.

The following table summarizes the available port-splitting configurations.

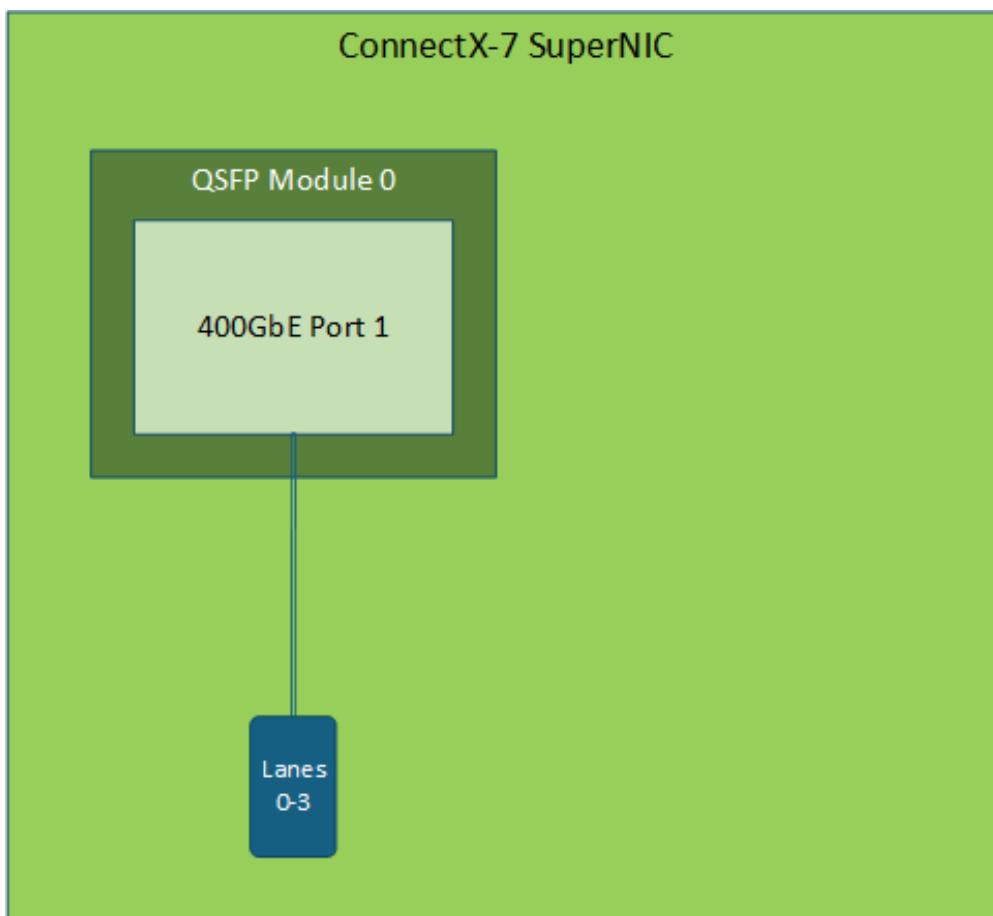
OPNs	Configuration	Configuration Description
MCX715105AS-WEAT	Configuration #1 (Default)	One Ethernet port supporting 400GbE
	Configuration #2	Four Ethernet ports, each supporting 100GbE

7.1 Port-Splitting Configurations

The MCX715105AS-WEAT ConnectX-7 SuperNIC, featuring a dual-port QSFP112 module, supports up to 200Gb/s. For the reconfiguration to take effect, please perform power cycle.

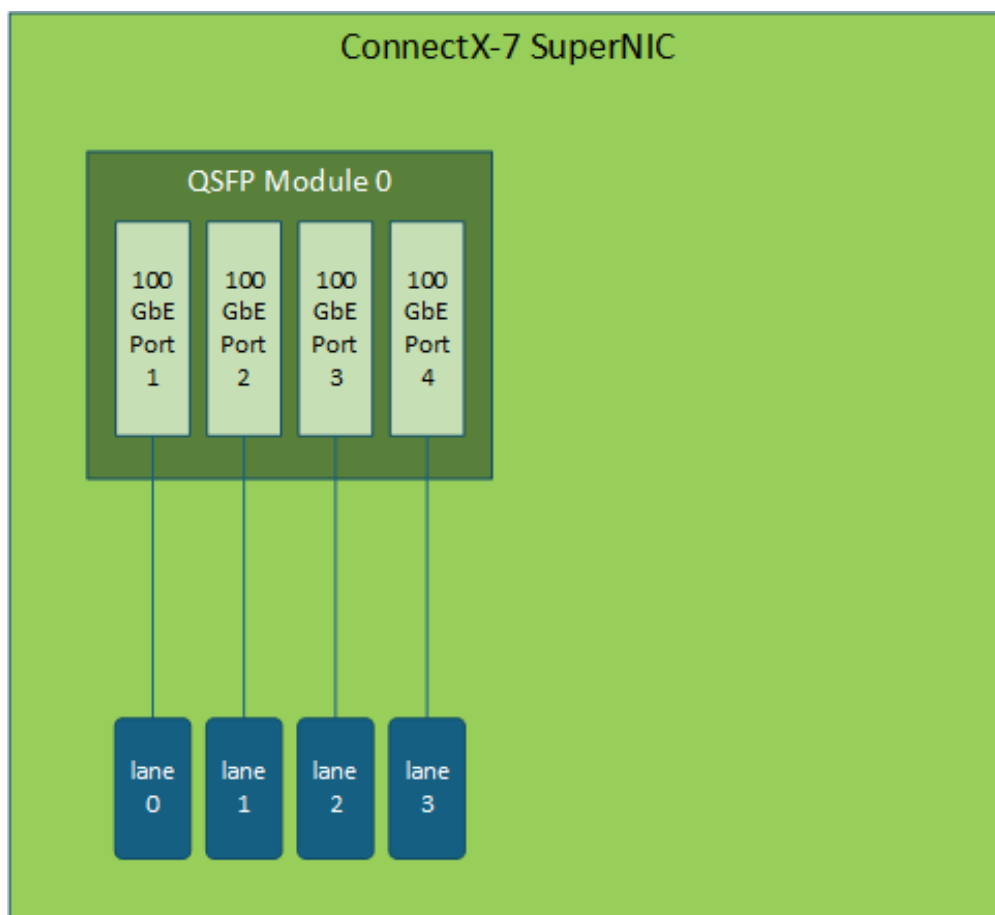
7.1.1 Configuration #1 (Default): One Ethernet Port Supporting 400GbE

As the default configuration, the device is configured with one Ethernet port, providing an Ethernet rate of 400Gb/s. The configuration is illustrated in the diagram below.



7.1.2 Configuration #2: Four Ethernet Ports, Each Supporting 100GbE

In this configuration, the device can be reconfigured to support four 100GbE Ethernet ports. The configuration is illustrated in the diagram below.



To apply this configuration, use the following mlxconfig commands:

```
mlxconfig -d <device> set MODULE_SPLIT_M0[0]=1 MODULE_SPLIT_M0[1]=2 MODULE_SPLIT_M0[2]=3 MODULE_SPLIT_M0[3]=4  
MODULE_SPLIT_M0[4..15]=FF
```

8 Troubleshooting

8.1 General Troubleshooting

Server unable to find the adapter	• Ensure that the adapter is placed correctly • Make sure the adapter slot and the adapter are compatible Install the adapter in a different PCI Express slot • Use the drivers that came with the adapter or download the latest • Make sure your motherboard has the latest BIOS • Try to reboot the server
The adapter no longer works	• Reseat the adapter in its slot or a different slot, if necessary • Try using another cable • Reinstall the drivers for the network driver files may be damaged or deleted • Reboot the server
Adapters stopped working after installing another adapter	• Try removing and re-installing all adapters • Check that cables are connected properly • Make sure your motherboard has the latest BIOS
Link indicator light is off	• Try another port on the switch • Make sure the cable is securely attached • Check you are using the proper cables that do not exceed the recommended lengths • Verify that your switch and adapter port are compatible
Link light is on, but with no communication established	• Check that the latest driver is loaded • Check that both the adapter and its link are set to the same speed and duplex settings

8.2 Linux Troubleshooting

Environment Information	<pre>cat /etc/issue uname -a cat /proc/cupinfo grep 'model name' uniq ofed_info -s ifconfig -a ip link show ethtool <interface> ethtool -i <interface_of_Mellanox_port_num> ibdev2netdev</pre>
Card Detection	<pre>lspci grep -i Mellanox</pre>
Mellanox Firmware Tool (MFT)	Download and install MFT: MFT Documentation Refer to the User Manual for installation instructions. Once installed, run: <pre>mst start mst status flint -d <mst_device> q</pre>
Ports Information	<pre>ibstat ibv_devinfo</pre>
Firmware Version Upgrade	To download the latest firmware version, refer to the NVIDIA Update and Query Utility .

Collect Log File	<pre>cat /var/log/messages dmesg >> system.log journalctl (Applicable on new operating systems) cat /var/log/syslog</pre>
------------------	---

8.3 Windows Troubleshooting

Environment Information	From the Windows desktop choose the Start menu and run: msinfo32 To export system information to a text file, choose the Export option from the File menu. Assign a file name and save.
Mellanox Firmware Tool (MFT)	Download and install MFT: MFT Documentation Refer to the User Manual for installation instructions. Once installed, open a CMD window and run: <pre>WinMFT mst start mst status flint -d <mst_device> q</pre>
Ports Information	vstat
Firmware Version Upgrade	Download the latest firmware version using the PSID/board ID from here. <pre>flint -d <mst_device> -i <firmware_bin_file> b</pre>
Collect Log File	• Event log viewer • MST device logs: • mst start • mst status • <code>flint -d <mst_device> dc > dump_configuration.log</code> • <code>mstdump <mst_device> dc > mstdump.log</code>

9 Specifications



The ConnectX-7 adapter card is designed and validated for operation in data-center servers and other large environments that guarantee proper power supply and airflow conditions.

The adapter card is not intended for installation on a desktop or a workstation. Moreover, installing the adapter card in any system without proper power and airflow levels can impact the adapter card's functionality and potentially damage it. Failure to meet the environmental requirements listed in this user manual may void the warranty.



Please make sure to install the ConnectX-7 card in a PCIe slot that is capable of supplying the required power and airflow as stated in the below table.

9.1 MCX75310AAC-NEAT / MCX75310AAS-NEAT Specifications



ConnectX-7 adapter cards with OSFP form factor support RHS (Riding Heatsink) cage only.

Physical	Adapter Card Size: PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	
Interfaces	See Supported Interfaces	
	PCI Express Gen 4.0/5.0: SERDES @ 16/32GT/s, x16 lanes (Gen 3.0 compatible)	
	Networking Port: Single OSFP InfiniBand and Ethernet	
Data Rate	InfiniBand (Default)	NDR/NDR200/HDR/HDR100/EDR/FDR/SDR
	Ethernet	400/200/100/50/40/10/1 Gb/s Ethernet
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR (4 lanes x 100Gb/s per lane) port, NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane).	
	Ethernet Protocols supported by the electrical interface ^b 400GBASE-CR8, 400GAUI-4 C2M, 400GBASE-CR4, 200GAUI-2 C2M, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2, 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M, XLPPI, SFI	
Capabilities	MCX75310AAC-NEAT	Secure Boot Enabled, Crypto Enabled
	MCX75310AAS-NEAT	Secure Boot Enabled, Crypto Disabled

Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	MCX75310AAC-NEAT	25.9W
		MCX75310AAS-NEAT	24.9W
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Adapter Card Product Specifications" document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		

Notes:
a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.
b. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4.
c. The non-operational storage temperature specifications apply to the product without its package.

9.2 MCX75310AAS-HEAT Specifications



ConnectX-7 adapter cards with OSFP form factor support RHS (Riding Heat Sink) cage only.

Physical	Adapter Card Size: PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)		
Interfaces	See Supported Interfaces		
	PCI Express Interface: Gen 4.0/5.0: SERDES @ 16/32GT/s, x16 lanes (Gen 3.0 compatible)		
	Networking Port: Single OSFP InfiniBand and Ethernet		
Data Rate	InfiniBand (Default)	NDR200/HDR/HDR100/EDR/FDR/SDR	
	Ethernet	200/100/50/40/10/1 Gb/s Ethernet	
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane).		

	Ethernet Protocols supported by the electrical interface ^b 200GAUI-2 C2M, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI		
Capabilities	MCX75310AAS-HEAT	Secure Boot Enabled, Crypto Disabled	
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	16.7W	
	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes:			
a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.			
b. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4.			
c. The non-operational storage temperature specifications apply to the product without its package.			

9.3 MCX755106AC-HEAT / MCX755106AS-HEAT Specifications



The Socket-Direct ready cards kit does not include the PCIe passive auxiliary connection card and two Cabline SA-II Plus harnesses. For more information, please refer to [PCIe Auxiliary Card Kit](#).



ConnectX-7 adapter cards with OSFP form factor support RHS (Riding Heat Sink) cage only.

Physical	Adapter Card Size	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)
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	Auxiliary PCIe Connection Card Size	5.09 in. x 2.32 in. (129.30mm x 59.00mm) Two Cabline CA-II Plus harnesses (white and black)	
Interfaces	See Supported Interfaces		
	PCI Express Interface	Gen 5.0/4.0: SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)	
		Optional: Additional PCIe x16 Gen 4.0 @ SERDES 18GT/s through the PCIe auxiliary passive card and Cabline SA-II Plus harnesses	
	Networking Ports	Dual QSFP112 InfiniBand and Ethernet	
Data Rate	InfiniBand	NDR200/HDR/HDR100/EDR/FDR/SDR	
	Ethernet (Default Mode)	200/100/50/25/10 Gb/s	
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
	Ethernet Protocols supported by the electrical interface ^b	200GAUI-2 C2M, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI	
Capabilities	MCX755106AC-HEAT	Secure Boot Enabled, Crypto Enabled	
	MCX755106AS-HEAT	Secure Boot Enabled, Crypto Disabled	
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	MCX755106AC-HEAT	25.9W
		MCX755106AS-HEAT	24.9W
	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		

Notes:

a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.

b. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4.

c. The non-operational storage temperature specifications apply to the product without its package.

9.4 MCX715105AS-WEAT Specifications



The Socket-Direct ready cards kit does not include the PCIe passive auxiliary connection card and two Cabline SA-II Plus harnesses. For more information, please refer to [PCIe Auxiliary Card Kit](#).

Physical	Adapter Card Size	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	
	Auxiliary PCIe Connection Card Size	5.09 in. x 2.32 in. (129.30mm x 59.00mm) Two Cabline CA-II Plus harnesses (white and black)	
Interfaces	See Supported Interfaces		
	PCI Express Interface	Gen 5.0/4.0: SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)	
		Optional: Additional PCIe x16 Gen 4.0 @ SERDES 18GT/s through the PCIe auxiliary passive card and Cabline SA-II Plus harnesses	
	Networking Ports	Single QSFP112 InfiniBand and Ethernet, port split capable	
Data Rate	InfiniBand	NDR/NDR200/HDR/HDR100/EDR/FDR/SDR	
	Ethernet (Default Mode)	400/200/100/50/25/10 Gb/s	
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR (4 lanes x 100Gb/s per lane) port, NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
	Ethernet Protocols supported by the electrical interface ^b	400GBASE-CR8, 400GAUI-4 C2M, 400GBASE-CR4, 200GAUI-2 C2M, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI	
Capabilities	Secure Boot Enabled, Crypto Disabled		
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	24.9W	
	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	

Regulatory	Safety: CB / cTUVus / CE
	EMC: CE / FCC / VCCI / ICES / RCM / KC
	RoHS: RoHS Compliant
Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product. b. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4. c. The non-operational storage temperature specifications apply to the product without its package.	

9.5 MCX75510AAS-HEAT Specifications



The Socket-Direct ready cards kit does not include the PCIe passive auxiliary connection card and two Cabline SA-II Plus harnesses. For more information, please refer to [PCIe Auxiliary Card Kit](#).

Physical	Adapter Card Size	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)	
	Auxiliary PCIe Connection Card Size	5.09 in. x 2.32 in. (129.30mm x 59.00mm) Two Cabline CA-II Plus harnesses (white and black)	
Interfaces	See Supported Interfaces		
	PCI Express Interface	Gen 5.0/4.0: SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)	
		Optional: Additional PCIe x16 Gen 4.0 @ SERDES 16GT/s through the PCIe auxiliary passive card and Cabline SA-II Plus harnesses	
	Networking Ports	Single OSFP InfiniBand	
Data Rate	InfiniBand	NDR200/HDR/HDR100/EDR/FDR/SDR	
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
Capabilities	Secure Boot Enabled, Crypto Disabled		
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	19.6W	
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Adapter Card Product Specifications" document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^b

	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product. b. The non-operational storage temperature specifications apply to the product without its package.			

9.6 MCX75510AAS-NEAT Specifications



The Socket-Direct ready cards kit does not include the PCIe passive auxiliary connection card and two Cabline SA-II Plus harnesses. For more information, please refer to [PCIe Auxiliary Card Kit](#).

Physical	Adapter Card Size	PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)
	Auxiliary PCIe Connection Card Size	5.09 in. x 2.32 in. (129.30mm x 59.00mm) Two Cabline CA-II Plus harnesses (white and black)
Interfaces	See Supported Interfaces	
	PCI Express Interface	Gen 5.0/4.0: SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)
		Optional: Additional PCIe x16 Gen 4.0 @ SERDES 16GT/s through the PCIe auxiliary passive card and Cabline SA-II Plus harnesses
	Networking Ports	Single OSFP InfiniBand
Data Rate	InfiniBand	NDR/NDR200/HDR/HDR100/EDR/FDR/SDR
Protocol Support	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR (4 lanes x 100Gb/s per lane) port, NDR200 (2 lanes x 100Gb/s per lane) port, HDR (50Gb/s per lane) port, HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane) port, FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)	
Capabilities	Secure Boot Enabled, Crypto Disabled	
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA	
	Typical power with passive cables in PCIe Gen 5.0 x16	24.9W

	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Adapter Card Product Specifications" document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^b
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product. b. The non-operational storage temperature specifications apply to the product without its package.			

9.7 MCX713106AC-CEAT and MCX713106AS-CEAT Specifications

Physical	Adapter Card Size: PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)		
Interfaces	See Supported Interfaces		
	PCI Express Gen 4.0/5.0: SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)		
	Networking Ports: Dual-port QSFP112 Ethernet (copper and optical)		
Capabilities	MCX713106AC-CEAT	Secure Boot Enabled, Crypto Enabled	
	MCX713106AS-CEAT	Secure Boot Enabled, Crypto Disabled	
Protocol Support	Data Rate	Ethernet	100/50/40/25/10/1GbE
	Ethernet Protocols supported by the electrical interface ^b 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2, 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M, XLPPI, SFI		
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 5.0 x16	MCX713106AC-CEAT	17.5W
		MCX713106AS-CEAT	16.8W
	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		

Physical	Adapter Card Size: PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^b
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes:			
a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.			
b. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4.			
c. The non-operational storage temperature specifications apply to the product without its package.			

9.8 MCX713106AC-VEAT and MCX713106AS-VEAT Specifications

Physical	Adapter Card Size: PCIe Half Height, Half Length 2.71 in. x 6.6 in. (68.90mm x 167.65 mm)		
Interfaces	See Supported Interfaces		
	Gen5.0: SERDES @ 16.0GT/s/32GT/s, x16 lanes (4.0, 3.0, 2.0 and 1.1 compatible)		
	Networking Ports: Dual-port QSFP112 Ethernet (copper and optical)		
Protocol Support	Data Rate	Ethernet	200/100/50/40/25/10/1 GbE
	Ethernet Protocols supported by the electrical interface ^b 200GAUI-2 C2M, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GAUI-1 C2M, 100GBASE-CR4, 100GBASE-CR2, 100GBASE-CR1, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI		
Capabilities	MCX713106AC-CEAT	Secure Boot Enabled, Crypto Enabled	
	MCX713106AS-CEAT	Secure Boot Enabled, Crypto Disabled	
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Maximum power available through QSFP112 cage	11W per port (Not thermally supported), 5.1W per port (Thermally supported)	
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Adapter Card Product Specifications" document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		

Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^C
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes:			
a. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4.			
b. The non-operational storage temperature specifications apply to the product without its package.			

9.9 MCX713104AC-ADAT and MCX713104AS-ADAT Specifications



The physical board dimensions are compliant with PCI Express Card Electromechanical Specification Revision 4.0 except for minor differences with the edge finger alignment, bracket mounting scheme, and low-profile bracket opening. These differ slightly from the PCI CEM specification due to the mechanical constraint of the single quad-port SFP56 cage. It is recommended to use the 3D stp file. Please contact your NVIDIA sales representative to get the mechanical simulation.

Physical	PCIe Half Height, Half Length 2.71 in. x 5.64 in. (68.90mm x 143.50 mm)		
Interfaces	See Supported Interfaces		
	PCI Express Gen 4.0: SERDES @ 16GT/s, x16 lanes (4.0 and 3.0 compatible)		
	Networking Port: Quad-port SFP56 Ethernet (copper and optical)		
Protocol Support	Data Rate	Ethernet	50/25GbE
	Ethernet Protocols supported by the electrical interface ^b 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI		
Capabilities	MCX713104AC-ADAT: Secure Boot Enabled, Crypto Enabled MCX713104AS-ADAT: Secure Boot Enabled, Crypto Disabled		
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 4.0 x16	MCX713104AC-ADAT	15.8W
		MCX713104AS-ADAT	15.1W

	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes: a. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4. b. The non-operational storage temperature specifications apply to the product without its package.			

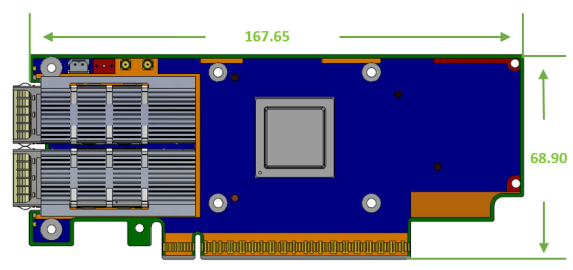
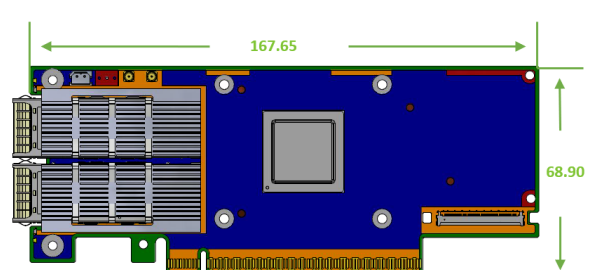
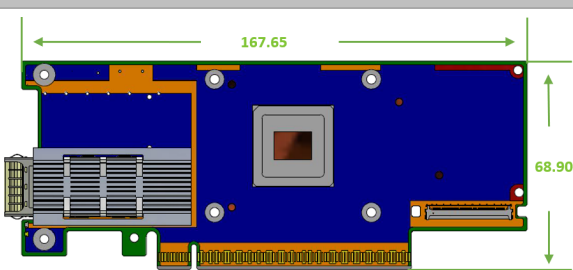
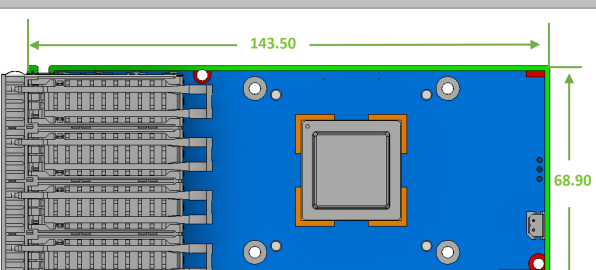
9.10 MCX713114TC-GEAT Specifications

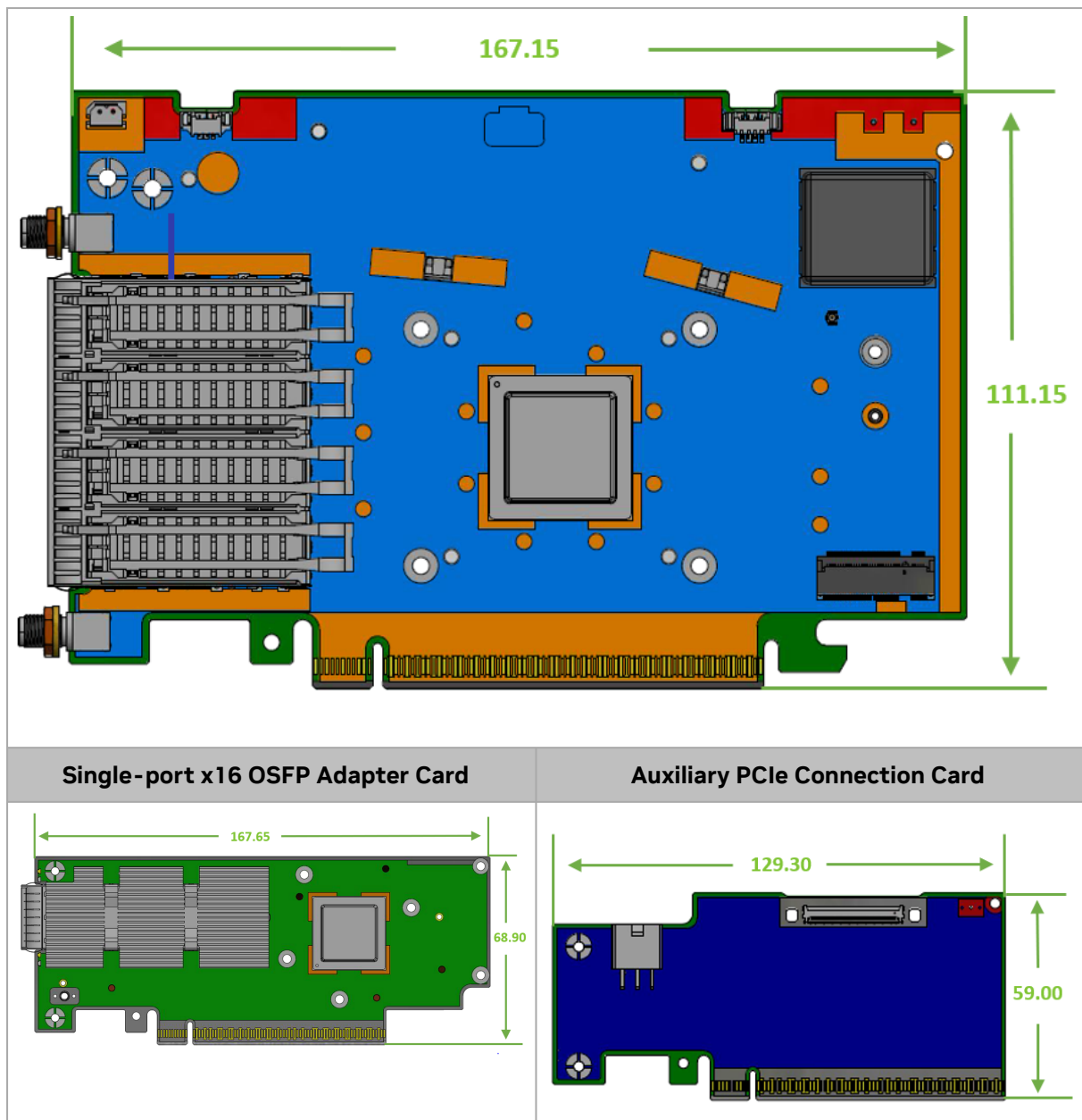
Physical	Adapter Card Size: PCIe Full Height, Half Length 4.37 in. x 6.6 in. (111.15mm x 167.65 mm)		
Interfaces	See Supported Interfaces		
	PCI Express Gen 4.0: SERDES @ 16GT/s, x16 lanes (4.0 and 3.0 compatible)		
	Networking Port: Quad-port SFP56 Ethernet (copper and optical)		
Protocol Support	Data Rate	Ethernet	50/25 GbE
	Ethernet Protocols supported by the electrical interface ^b 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 50GBASE-R2 , 40GBASE-CR4, 40GBASE-R2, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M , XLPPI, SFI		
Capabilities	MCX713114TC-GEAT	Enhanced-SyncE & PTP, PPS In/Out, Secure Boot, Crypto Enabled	
Electrical and Thermal Specifications	Voltage: 12V, 3.3VAUX Maximum current: 100mA		
	Typical power with passive cables in PCIe Gen 4.0 x16	15.8W	
	The complete electrical and thermal specifications are provided in " <i>NVIDIA ConnectX-7 Adapter Card Product Specifications</i> " document. You can access the document either by logging into NVOnline or by contacting your NVIDIA representative.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^c
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	

Regulatory	Safety: CB / cTUVus / CE
	EMC: CE / FCC / VCCI / ICES / RCM / KC
	RoHS: RoHS Compliant
Notes: a. This table lists the electrical protocols. A wide range of optical protocols are delivered through the C2M interfaces listed in this table and optical modules. Examples are 100GBASE-SR4 and 400GBASE-DR4. b. The non-operational storage temperature specifications apply to the product without its package.	

9.11 Cards Mechanical Drawings and Dimensions

 All dimensions are in millimeters. The PCB mechanical tolerance is +/- 0.13mm.

Dual-port x16 QSFP112 Adapter Card 	Dual-port x16 QSFP112 Socket-Direct Ready Adapter Card 
Single-port x16 QSFP112 Adapter Card 	HHHL Quad-port SFP56 Adapter Card 
HHHL Quad-port SFP56 with PPS IN/OUT Adapter Card	



9.12 Brackets Mechanical Drawings and Dimensions



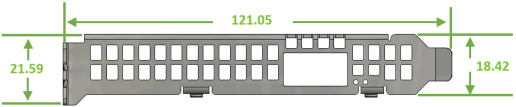
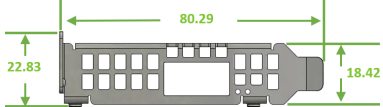
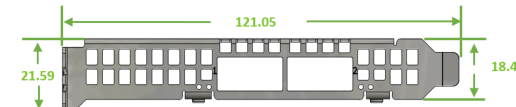
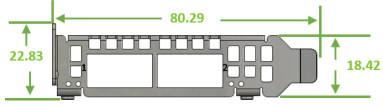
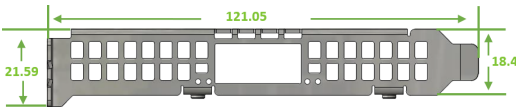
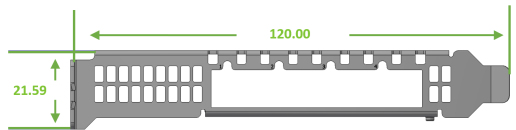
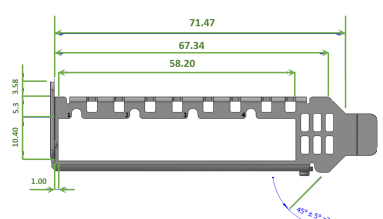
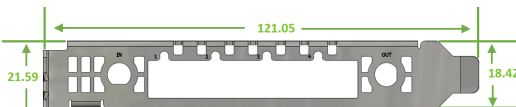
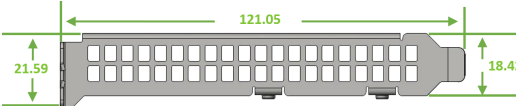
Applicable to MCX713114TC-GEAT, MCX713114GC-GEAT, MCX713104AC-ADAT and MCX713104AS-ADAT only:

The physical board dimensions are compliant with PCI Express Card Electromechanical Specification Revision 4.0 except for minor differences with the edge finger alignment, bracket mounting scheme, and low-profile bracket opening. These differ slightly from the

PCI CEM specification due to the mechanical constraint of the single quad-port SFP56 cage. It is recommended to use the associated 3D step file. Please contact your NVIDIA sales representative to get the mechanical simulation.



All dimensions are in millimeters. The PCB mechanical tolerance is +/- 0.13mm.

OPNs	Tall Bracket	Short Bracket
Single-port QSFP112 MCX715105AS-WEAT		
Dual-port QSFP112 MCX755106AS-HEAT, MCX755106AC-HEAT, MCX713106AC-CEAT, MCX713106AS-CEAT, MCX713106AC-VEAT, MCX713106AS-VEAT		
Single-port OSFP MCX75310AAS-NEAT, MCX75310AAC-NEAT, MCX75310AAS-HEAT, MCX75510AAS-NEAT, MCX75510AAS-HEAT		
Quad-port SFP56 MCX713104AC-ADAT, MCX713104AS-ADAT		
Quad-port SFP56 with PPS IN/OUT MCX713114TC-GEAT		N/A
Auxiliary PCIe Connection Card		

10 Monitoring

10.1 Thermal Sensors

The adapter card incorporates the ConnectX IC, which operates in the range of temperatures between 0°C and 105°C.

Three thermal threshold definitions impact the overall system operation state and are designed to ensure timely application of server-level corrective actions, such as increased cooling, to keep the device temperature in the working range:

- **Warning** – 97°C (default) When the device crosses this threshold, an Over-Temperature Warning message is issued by the management SW. This may be used to increase the cooling of the system (e.g. - by increased Fans RPM). Note that this temperature threshold does not require nor lead to any action by hardware (such as adapter card shutdown).
- **Critical** – 102°C (default): When the device crosses this threshold, an Over-Temperature Critical message is issued by the management SW.
- **Fatal** – 110°C: Upon reaching this temperature, an Over-temperature Fatal message is issued. If the device continues to heat-up, the FW will automatically shut down upon reaching 110°C threshold. Specification functionality is no longer guaranteed, though there is no risk of permanent damage.

10.2 Adapter Card Heatsink

The heatsink is attached to the ConnectX-7 IC to dissipate the heat from the ConnectX-7 IC. It is attached by spring-loaded screws.

ConnectX-7 IC has a thermal shutdown safety mechanism that automatically shuts down the ConnectX-7 card in cases of high-temperature events, improper thermal coupling, or heatsink removal.

For the required airflow (LFM) per OPN, please refer to the [Specifications](#) chapter.

11 Finding the GUID/MAC on the Adapter Card

Each adapter card has a different identifier printed on the label: serial number and the card MAC for the Ethernet protocol and the card GUID for the InfiniBand protocol. InfiniBand/Ethernet cards have both a GUID and a MAC (derived from the GUID). IB only cards have GUID for the InfiniBand protocol.



The product revisions indicated on the labels in the following figures do not necessarily represent the latest revisions of the cards.

Board Label Example



12 PCIe Auxiliary Card Kit



This section applies to the following adapter cards when used as Socket Direct cards in dual-socket servers.

- MCX755106AS-HEAT
- MCX755106AC-HEAT
- MCX75510AAS-NEAT
- MCX75510AAS-HEAT
- MCX715105AS-WEAT

Socket Direct network cards, which cost-effectively integrate a single network adapter silicon on a primary board, and an auxiliary PCIe connection card and Slim Line SAS harnesses connecting the two. Socket Direct enables direct access from each CPU to the network through its dedicated PCIe interface as the card's 32-lane PCIe bus is split into two 16-lane buses, with one bus accessible through a PCIe x16 edge connector and the other bus through an x16 Auxiliary PCIe Connection card. The two cards should be installed into two PCIe x16 slots and connected using two Cabline SA-II Plus harnesses.

The PCIe auxiliary kit can be purchased separately to operate in a dual-socket server. The below table lists the available PCIe auxiliary kit ordering part numbers, depending on the desired length of the Cabline SA-II Plus harnesses.

Ordering Part Number	Passive Auxiliary Connection	Cabline SA-II Plus Harnesses Length
MTMK9100-T15	PCIe Gen 4.0/5.0 x16 connection card	2x 150mm harnesses
MTMK9100-T25	PCIe Gen 4.0 x16 connection card	2x 250mm harnesses
MTMK9100-T35	PCIe Gen 4.0 x16 connection card	2x 350mm harnesses

The two Cabline SA-II Plus harnesses in the PCIe auxiliary kit have different routings. To distinguish between these two harnesses, one black harness is marked with a "WHITE" label while the harness is marked with a "BLACK" label.

The Cabline harness marked with the "WHITE" label should be connected to the connector on the networking card and PCIe Auxiliary card engraved with "White Cable" while the one marked with the "BLACK" label should be connected to the connector on the networking card and the PCIe Auxiliary card engraved with "Black Cable". The Cabline SA-II Plus harness mates with two 60-pin IPEX connectors (P/N 20790-060E-01), on both sides. The black Cabline SA-II Plus harness mates with the connector on the component side (top side) of the network card, while the White Cabline SA-II Plus harnesses mates with the pint side (bottom side) of the main network card. For hardware installation, please refer to [NVIDIA Socket Direct \(2x PCIe x16\) Installation Instructions](#).

12.1 PCIe Auxiliary Card Package Contents

Category	Qty	Item
Cards	1	MTMK9100-T15: PCIe x16 Gen 5.0/4.0 Auxiliary Connection Card
		MTMK9100-T25 and MTMK9100-T35: PCIe x16 Gen 4.0 Auxiliary Connection Card
Harnesses	1	Cabline CA-II Plus harness (white) - Length according to kit OPN (15, 25 or 35cm)
	1	Cabline CA-II Plus harness (black) - Length according to kit OPN (15, 25 or 35cm)
Accessories	2	Retention Clip for Cabeline harness (shipped assembled on the harnesses - optional)
	1	PCIe Auxiliary card short bracket
	1	PCIe Auxiliary card tall bracket (shipped assembled on the Auxiliary card)

12.2 Channel Insertion Loss

To be updated in a future version of this document.

12.3 Cabline CA-II Plus Harness Pinouts

12.3.1 Component Side

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
1	GND	GND BAR			1
2	PCIE_REFCLK1_P	Micro coax	Primary PCIe clock from the motherboard to the Network Adapter Main card, to be used for the x16 Cabline harness PCIe interface. This clock must meet all the PCIe SIG spec requirements. It should be driven from the motherboard side.	38	2

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
3	PCIE_REFCLK1_N	Micro coax	Primary PCIe clock from the motherboard to the Network Adapter Main card, to be used for the x16 Cabline harness PCIe interface. This clock must meet all the PCIe SIG spec requirements. It should be driven from the motherboard side.	38	3
4	GND	GND BAR			4
5	PCIE_CPU_CX_15N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	5
6	PCIE_CPU_CX_15P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	6
7	GND	GND BAR			7
8	PCIE_CPU_CX_14N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	8
9	PCIE_CPU_CX_14P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	9
10	GND	GND BAR			10
11	PCIE_CPU_CX_13N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	11

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
12	PCIE_CPU_CX_13P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	12
13	GND	GND BAR			13
14	PCIE_CPU_CX_12N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	14
15	PCIE_CPU_CX_12P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	15
16	GND	GND BAR			16
17	PCIE_CPU_CX_11N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	17
18	PCIE_CPU_CX_11P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	18
19	GND	GND BAR			19
20	PCIE_CPU_CX_10N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	20
21	PCIE_CPU_CX_10P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	21

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
22	GND	GND BAR			22
23	PCIE_CPU_CX_9N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	23
24	PCIE_CPU_CX_9P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	24
25	GND	GND BAR			25
26	PCIE_CPU_CX_8N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	26
27	PCIE_CPU_CX_8P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	27
28	GND	GND BAR			28
29	PCIE_CPU_CX_7N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	29
30	PCIE_CPU_CX_7P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	30
31	GND	GND BAR			31

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
32	PCIE_CPU_CX_6N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	32
33	PCIE_CPU_CX_6P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	33
34	GND	GND BAR			34
35	PCIE_CPU_CX_5N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	35
36	PCIE_CPU_CX_5P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	36
37	GND	GND BAR			37
38	PCIE_CPU_CX_4N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	38
39	PCIE_CPU_CX_4P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	39
40	GND	GND BAR			40
41	PCIE_CPU_CX_3N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	41

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
42	PCIE_CPU_CX_3P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	42
43	GND	GND BAR			43
44	PCIE_CPU_CX_2N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	44
45	PCIE_CPU_CX_2P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	45
46	GND	GND BAR			46
47	PCIE_CPU_CX_1N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	47
48	PCIE_CPU_CX_1P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	48
49	GND	GND BAR			49
50	PCIE_CPU_CX_0N	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	50
51	PCIE_CPU_CX_0P	Micro coax	Connect from the Black Cabline CA-II Plus cable through 220nF capacitors to the x16 PCIe Tx lanes of the CPU/ GPU/End-Point	38	51

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
52	GND	GND BAR			52
53	I2C_SMDAT	Micro coax	PCIe compliant SMBus interface to the network adapter. The Network adapter silicon may be accessed through this SMBus interface after the Power-On sequence of the network adapter is completed. The motherboard side serves as the bus master on the SMBus interface. (Please note on AUX board implementation, an I2C EEPROM at address 0x50 is also present on this interface, to allow the server management entity to read the identity of the auxiliary card. For a direct motherboard interface to the Cabline CA-II Plus cables, mounting such FRU EEPROM on the motherboard should be considered – for motherboard management purposes of the Cabline CA-II Plus interface to the network adapter).	38	53

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
54	I2C_SMCLK	Micro coax	PCIe compliant SMBus interface to the network adapter. The Network adapter silicon may be accessed through this SMBus interface after the Power-On sequence of the network adapter is completed. The motherboard side serves as the bus master on the SMBus interface. (Please note on AUX board implementation, an I2C EEPROM at address 0x50 is also present on this interface, to allow the server management entity to read the identity of the auxiliary card. For a direct motherboard interface to the Cabline CA-II Plus cables, mounting such FRU EEPROM on the motherboard should be considered – for motherboard management purposes of the Cabline CA-II Plus interface to the network adapter).	38	54
55	Reserved_01	Micro coax		38	55

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
56	S_WAKE1_CONN_L	Micro coax	In setups that support operation of the network adapter card during standby operating mode, this optional PCIe compliant Wake signal, may be used for the network adapter silicon to indicate to the motherboard when wake from standby power mode, for example after a magic packet was received. Please consult NVIDIA in case of intention to use this signal, as it has not been populated or used in designs so far.	38	56
57	I2C_AUX_SCL	Micro coax	The ConnectX-7 silicon serves as the I2C bus master on this bus. An I2C EEPROM at I2C address 0x57 needs to be mounted on the motherboard side to report to the Cabline CA-II Plus interface parameters to the main-card network adapter silicon, like Cabline CA-II Plus cables length (contact NVIDIA for the format of this EEPROM). If additional optional I2C slave devices need to be managed by the main-card network adapter silicon, they need to be included on this I2C bus as well.	38	57

Pin#	Signal Name	Wire Type	Detailed Description	AWG#	Pin# on the other end
58	I2C_AUX_SDA	Micro coax	The ConnectX-7 silicon serves as the I2C bus master on this bus. An I2C EEPROM at I2C address 0x57 needs to be mounted on the motherboard side to report to the Cabline CA-II Plus interface parameters to the main-card network adapter silicon, like Cabline CA-II Plus cables length (contact NVIDIA for the format of this EEPROM). If additional optional I2C slave devices need to be managed by the main-card network adapter silicon, they need to be included on this I2C bus as well.	38	58
59	S_PRSENT1_L	Micro coax	Connect this pin to GND No wires are connected to these pins to ensure they do not interfere with the operation of S_PRSENT2_L for the detection when the two Cabline harnesses are installed.	38	59
60		No Wire			60

12.3.2 Print Side

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
1	SER_CLK	Micro coax	38		1
2	SER_CAPTURE	Micro coax	38		2
3	SER_DO	Micro coax	38		3
4	Reserved_04	Micro coax	38		4

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
5	SER_DI	Micro coax	38		5
6	S_BIFFURCATE_AUX_BR D	Micro coax	38	In specific Network Card Assemblies which support bifurcation of the PCIe x16 IPEX interface to two x8 PCIe interfaces, this pin is used for either the motherboard or the network adapter silicon to signal whether the IPEX interface should or should not be bifurcated. This signal has been reserved and hasn't been used in the past, and as a result it's direction has not been fixed yet, to provide for additional options in the future. (pin is marked as Reserved 06 in the generic White IPEX Cable pinout)	6
7	Reserved_07	Micro coax	38	Reserved for future expansion	7
8	Reserved_08	Micro coax	38	Reserved for future expansion	8
9	GND	GND BAR			9
10	PCIE_CX_CPU_OP	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	10
11	PCIE_CX_CPU_ON	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	11

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
12	GND	GND BAR			12
13	PCIE_CX_CPU_1P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	13
14	PCIE_CX_CPU_1N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	14
15	GND	GND BAR			15
16	PCIE_CX_CPU_2P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	16
17	PCIE_CX_CPU_2N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	17
18	GND	GND BAR			18
19	PCIE_CX_CPU_3P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	19

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
20	PCIE_CX_CPU_3N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	20
21	GND	GND BAR			21
22	PCIE_CX_CPU_4P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	22
23	PCIE_CX_CPU_4N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	23
24	GND	GND BAR			24
25	PCIE_CX_CPU_5P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	25
26	PCIE_CX_CPU_5N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	26
27	GND	GND BAR			27

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
28	PCIE_CX_CPU_6P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	28
29	PCIE_CX_CPU_6N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	29
30	GND	GND BAR			30
31	PCIE_X_CPU_7P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	31
32	PCIE_CX_CPU_7N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	32
33	GND	GND BAR			33
34	PCIE_CX_CPU_8P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	34

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
35	PCIE_CX_CPU_8N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	35
36	GND	GND BAR			36
37	PCIE_CX_CPU_9P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	37
38	PCIE_CX_CPU_9N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	38
39	GND	GND BAR			39
40	PCIE_CX_CPU_10P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	40
41	PCIE_CX_CPU_10N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	41
42	GND	GND BAR			42

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
43	PCIE_CX_CPU_11P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	43
44	PCIE_CX_CPU_11N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	44
45	GND	GND BAR			45
46	PCIE_CX_CPU_12P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	46
47	PCIE_CX_CPU_12N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	47
48	GND	GND BAR			48
49	PCIE_CX_CPU_13P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	49

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
50	PCIE_CX_CPU_13N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	50
51	GND	GND BAR			51
52	PCIE_CX_CPU_14P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	52
53	PCIE_CX_CPU_14N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	53
54	GND	GND BAR			54
55	PCIE_CX_CPU_15P	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	55
56	PCIE_CX_CPU_15N	Micro coax	38	Connect from the White Cabline CA-II Plus harness to the PCIe x16 Rx lanes of the CPU/GPU/End-Point. 220nF caps are required on this signal on the ConnectX-7 card.	56
57	GND	GND BAR			57

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
58	S_PERST1_CONN_L	Micro coax	38	PCIe compliant PERST_L (active low PCI Reset) signal for the PCIe Cabline CA-II Plus Connectors. The direction of this PERST_L signal depends on the implementation: When connecting a CPU root complex to the PCIe Cabline CA-II Plus interface, this signal is driven from the motherboard side (from the CPU), to the network adapter. When connecting a GPU or an end point to the PCIe Cabline CA-II Plus interface, this signal is driven from the network adapter side (which operates as a PCIe switch in this case), to the GPU or end-point on the motherboard side.	58
59		No Wire			59

Pin#	Signal Name	Wire Type	AWG#	Detailed Description	Pin# on the other end
60	S_PRSNT2_L	Micro coax	38	Connect to a 4.7K pull-up resistor to 3.3V on the motherboard side, to detect if both the Cabline harnesses are connected or not. This signal is connected to S_PRSNT1_L on the network adapter main card. In the motherboard side, read logic low if both Cabline harnesses are connected. Read logic 1 (3.3V) if one or both the Cabline harnesses are not connected. No wires are connected to these pins to ensure they do not interfere with the operation of S_PRSNT1_L for the detection when the two Cabline harnesses are installed.	60

12.4 PCIe Auxiliary Kit Technical Specifications

12.4.1 Technical Specifications

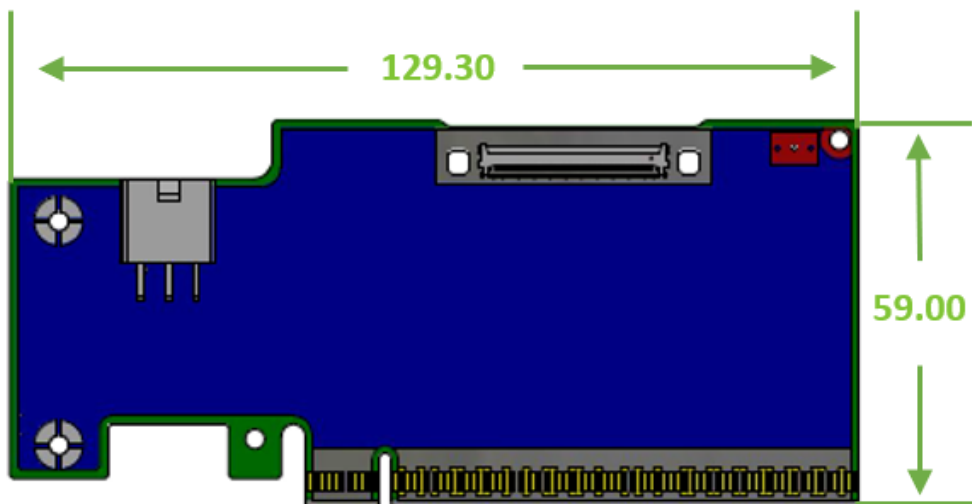
Physical	PCIe Auxiliary Card Size: 5.09 in. x 2.32 in. (129.30mm x 59.00mm) Two Cabline CA-II Plus harnesses (white and black) Length: 15, 25 or 35cm		
PCIe Connectivity	MTMK9100-T15	PCI Express Gen 5.0/4.0: SERDES @ 16/32 GT/s, x16 lanes (Gen 3.0 compatible)	
	MTMK9100-T25 / MTKM9100-T35	PCI Express Gen 4.0: SERDES @ 16GT/s, x16 lanes (Gen 3.0 compatible)	
Power Consumption	Voltage: 12V, 3.3V_AUX Maximum current: 100mA		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C
	Humidity	Operational	10% to 85% relative humidity

Regulatory		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
	Safety:	CB / cTUVus / CE	
	EMC:	CE / FCC / VCCI / ICES / RCM / KC	
	RoHS:	RoHS Compliant	

12.4.2 PCIe Auxiliary Card Mechanical Drawings and Dimensions



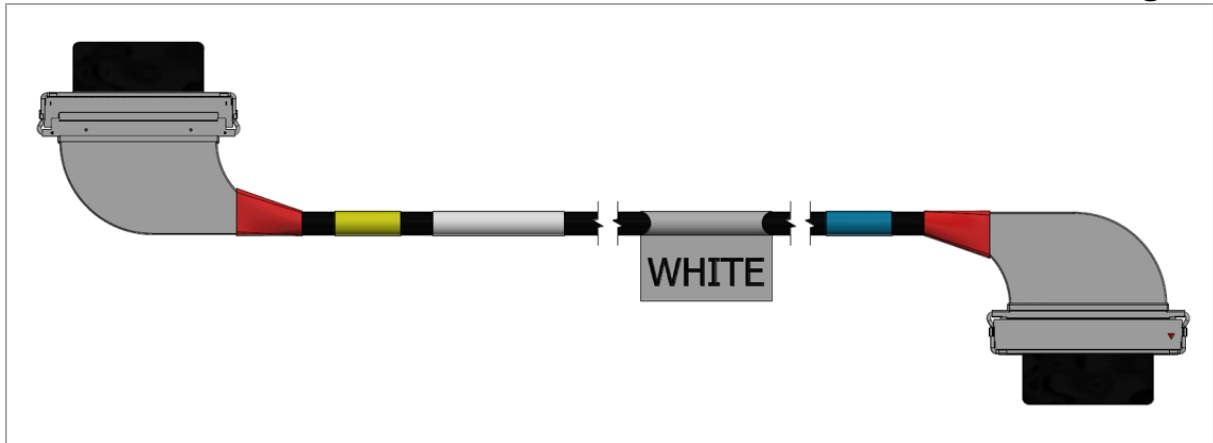
All dimensions are in millimeters. The PCB mechanical tolerance is $\pm 0.13\text{mm}$.



12.4.3 Bracket Mechanical Drawings and Dimensions

Auxiliary PCIe Connection Card Tall Bracket	Auxiliary PCIe Connection Card Short Bracket

12.4.4 Cabline CA-II Plus Harnesses Mechanical Drawing



13 Compliance

The NVIDIA ConnectX is compliant with the regulations listed in this section.

Co un try	Compliance	Compliance Mark
Unit ed Stat es	Federal Communications Commission (FCC) FCC Marking (Class A) This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including any interference that may cause undesired operation of the device. NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. California Department of Toxic Substances Control: Perchlorate Material - special handling may apply. Refer to www.dtsc.ca.gov/perchlorate.	
Unit ed Stat es/ Cana da	TÜV Rheinland of North America is accredited as a Nationally Recognized Testing Laboratory (NRTL), by OSHA (The Occupational Safety and Health Administration) in the United States, and as a Product Certification Body by SCC (Standards Council of Canada) in Canada. Refer to https://www.tuv.com/usa/en/ctuvus-certification.html	
Cana da	Innovation, Science and Economic Development Canada (ISED) CAN ICES-3(A)/NMB-3(A) The Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulation. Cet appareil numérique de la class A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.	

Co un try	Compliance	Compliance Mark
C E	European Conformity; Conformité Européenne (CE) This is a Class A product. In a domestic environment this product may cause radio frequency interference in which case the user may be required to take adequate measures. This device bears the CE mark in accordance with Directive 2014/53/EU. This device complies with the following Directives: • EMC Directive A, I.T.E Equipment. • Low Voltage Directive for electrical safety. • RoHS Directive for hazardous substances. • Energy-related Products Directive (ErP). The full text of EU declaration of conformity is available at the following URL: http://www.nvidia.com/support A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA GmbH (Bavaria Towers – Blue Tower, Einsteinstrasse 172, D-81677 Munich, Germany).	
Aust ralia and New Zeal and	Australian Communications and Media Authority This product meets the applicable EMC requirements for Class A, I.T.E equipment.	
Brazi l	INMETRO	
Japa n	Voluntary Control Council for Interference (VCCI) This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take corrective actions. VCCI-A. 2008年、日本における製品含有表示方法、JISC0950が公示されました。製造事業者は、2006年7月1日以降に販売される電気・電子機器の特定化学物質の含有に付きまして情報提供を義務付けられました。 製品の部材表示に付きましては、以下をご覧ください。 A Japanese regulatory requirement, defined by specification JIS C 0950, 2008, mandates that manufacturers provide Material Content Declarations for certain categories of electronic products offered for sale after July 1, 2006.	 この装置は、クラスA機器です。 この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Country	Compliance	Compliance Mark																																																																																																																																					
Japan	Japan RoHS Material Content Declaration 日本工業規格 JIS C 0950:2008により、2006年 7月 1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。 機器名称：リバ <table><tr><th>主な分類</th><th>Pb</th><th>Hg</th><th>Cd</th><th>Cr(VI)</th><th>PBB</th><th>PBDE</th></tr><tr><td>筐体</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>プリント基板</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>プロセッサ</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>マザーボード</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>電源</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>システムメモリ</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>ハードディスクドライブ</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>機械部品（ファン、ヒートシンク、ベゼル..）</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>ケーブル / コネクター</td><td>除外項目</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>はんだ付け材料</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>フラックス、クリームはんだ、ラベル、その他消耗品</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> 1. 0」は、特定化学物質の含有率が日本工業規格 JIS C 0950:2008 に記載されている含有率基準値より低いことを示します。 2. 「除外項目」は、特定化学物質が含有マークの除外項目に該当するため、特定化学物質について、日本工業規格 JIS C 0950:2008 に基づく含有マークの表示が不要であることを示します。 3. 「0.1wt%超」または「0.01wt%超」は、特定化学物質の含有率が日本工業規格 JIS C 0950:2008 に記載されている含有率基準値を超えていることを示します。	主な分類	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	筐体	除外項目	0	0	0	0	0	プリント基板	除外項目	0	0	0	0	0	プロセッサ	除外項目	0	0	0	0	0	マザーボード	除外項目	0	0	0	0	0	電源	除外項目	0	0	0	0	0	システムメモリ	除外項目	0	0	0	0	0	ハードディスクドライブ	除外項目	0	0	0	0	0	機械部品（ファン、ヒートシンク、ベゼル..）	除外項目	0	0	0	0	0	ケーブル / コネクター	除外項目	0	0	0	0	0	はんだ付け材料	0	0	0	0	0	0	フラックス、クリームはんだ、ラベル、その他消耗品	0	0	0	0	0	0	Material Content Declaration (JIS C 0950:2008) A Japanese regulatory requirement, defined by specification JIS C 0950: 2008, mandates that manufacturers provide Material Content Declarations for certain categories of electronic products offered for sale after July 1, 2006. Product Model Number: P3687 Server <table><tr><th>Major Classification</th><th>Pb</th><th>Hg</th><th>Cd</th><th>Cr(VI)</th><th>PBB</th><th>PBDE</th></tr><tr><td>Chassis</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>PCA</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Processor</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Motherboard</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Power supply</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>System Memory</td><td>Exempt</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	Major Classification	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	Chassis	Exempt	0	0	0	0	0	PCA	Exempt	0	0	0	0	0	Processor	Exempt	0	0	0	0	0	Motherboard	Exempt	0	0	0	0	0	Power supply	Exempt	0	0	0	0	0	System Memory	Exempt	0	0	0	0	0
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Motherboard	Exempt	0	0	0	0	0																																																																																																																																	
Power supply	Exempt	0	0	0	0	0																																																																																																																																	
System Memory	Exempt	0	0	0	0	0																																																																																																																																	

Co un try	Compliance	Compliance Mark						
		Major Classi ficati on	Pb	H g	C d	Cr (V I)	P B B	P B D E
		Hard Disk Drive	Ex e m pt	0	0	0	0	0
		Mech anical Parts (Fans, Heats inks, Bezels ..)	Ex e m pt	0	0	0	0	0
		Cable s / Conne ctors	Ex e m pt	0	0	0	0	0
		Solder ing Mater ial	0	0	0	0	0	0
		Flux, Solder Paste, Labels , Consu mable s	0	0	0	0	0	0

Co un try	Compliance	Compliance Mark						
		Major Classi ficati on	Pb	Hg	Cd	Cr (VI)	Pb	Pb DE
		Notes: • "0" indicates that the level of the specified chemical substance is less than the threshold level specified in the standard, JIS C 0950: 2008. • "Exempt" indicates that the specified chemical substance is exempt from marking and it is not required to display the marking for that specified chemical substance per the standard, JIS C 0950: 2008. • "Exceeding 0.1wt%" or "Exceeding 0.01wt%" is entered in the table if the level of the specified chemical substance exceeds the threshold level specified in the standard, JIS C 0950: 2008.						

Country	Compliance	Compliance Mark																																																																				
South Korea	Korean Agency for Technology and Standards (KATS) Class A Equipment (Industrial Broadcasting & Communication Equipment). This equipment Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home. Korea RoHS Material Content Declaration 확인 및 평가 양식은 제품에 포함 된 유해 물질의 허용 기준의 준수에 관한 <table border="1"> <tr> <td rowspan="3">문준비</td> <td>상호:</td> <td>엔비디아 홍콩 홀딩스 리미티드(영입소)</td> <td>법인등록번호</td> <td>110181-0036373</td> </tr> <tr> <td>대표자성명</td> <td>카렌테레사번즈</td> <td>사업자등록번호:</td> <td>120-84-06711</td> </tr> <tr> <td>주소</td> <td colspan="3">서울특별시 강남구 영동대로 511, 2101호 (삼성동,</td> </tr> <tr> <td colspan="5">제품 내용</td> </tr> <tr> <td>제품의 종류</td> <td>해당없음</td> <td>제품명(규격)</td> <td colspan="2">해당없음</td> </tr> <tr> <td>세부모델명(번호):</td> <td>해당없음</td> <td>제품출시일</td> <td colspan="2">해당없음</td> </tr> <tr> <td>제품의 종량</td> <td>해당없음</td> <td>제조, 수입업자</td> <td colspan="2">엔비디아</td> </tr> </table> 엔비디아의 그래픽 카드 제품은 전기 전자 제품 및 자동차의 자원순환에 관한 법률 시행령 제 11조 제 1항에 의거한 법 시행령규칙 제 3조에 따른 유해물질 함유 기준을 확인 및 평가한 결과, 이를 준수하였음을 공표합니다. 구비서류: 없음 작성방법 ① 제품의 종류는 "전기·전자제품 및 자동차의 자원순환에 관한 법률 시행령" 제 8조 제 1항 및 제 2항에 따른 품목별로 구분하여 기재합니다. ② 전기 전자 제품의 경우 모델명 (번호), 자동차의 경우, 제원관리번호를 기재합니다. ③ 해당제품의 제조업자 또는 수입업자를 기재합니다. Confirmation and Evaluation Form Concerning the Adherence to Acceptable Standards of Hazardous Materials Contained in Products <table border="1"> <tr> <td rowspan="3">Statement Prepared by</td> <td>Company Name:</td> <td>Nvidia HongKong Holding Ltd.Korea branch</td> <td>Corporate Identification Number:</td> <td>110181-0036373</td> </tr> <tr> <td>Name of Company Representative:</td> <td>Karen Theresa Burns</td> <td>Business Registration Number:</td> <td>120-84-06711</td> </tr> <tr> <td colspan="4">Address: 2788 San Tomas Expressway, Santa Clara, CA 95051</td> </tr> <tr> <td colspan="5">Product Information</td> </tr> <tr> <td>Product Category:</td> <td>N/A</td> <td>Name of Product:</td> <td colspan="2">N/A</td> </tr> <tr> <td>Detailed Product Model Name (Number):</td> <td>N/A</td> <td>Date of first market release:</td> <td colspan="2">N/A</td> </tr> <tr> <td>Weight of Product:</td> <td>N/A</td> <td>Manufacturer and/or Importer:</td> <td colspan="2">NVIDIA Corporation</td> </tr> </table> This for is publicly certify That NVIDIA Company has undergone the confirmation and evaluation procedures for the acceptable amounts of hazardous materials contained in graphic card according to the regulations stipulated in Article 3 of the "Status on the Recycling of Electrical and Electronic Products, and Automobiles" and that company has graphic card adhered to the Enforcement Regulations of Article 11, Item 1 of the statute. Attachment: None * Preparing the Form ① Please indicate the product category according to the categories listed in Article 8, Items 1 and 2 of the " Enforcement Ordinance of the Statute on the Recycling of Electrical, Electronic and Automobile Materials" ② For electrical and electronic products, please indicate the Model Name (and number). For automobiles, please indicate the Vehicle Identification Number ③ Please indicate the name of manufacturer and/or importer of the product.	문준비	상호:	엔비디아 홍콩 홀딩스 리미티드(영입소)	법인등록번호	110181-0036373	대표자성명	카렌테레사번즈	사업자등록번호:	120-84-06711	주소	서울특별시 강남구 영동대로 511, 2101호 (삼성동,			제품 내용					제품의 종류	해당없음	제품명(규격)	해당없음		세부모델명(번호):	해당없음	제품출시일	해당없음		제품의 종량	해당없음	제조, 수입업자	엔비디아		Statement Prepared by	Company Name:	Nvidia HongKong Holding Ltd.Korea branch	Corporate Identification Number:	110181-0036373	Name of Company Representative:	Karen Theresa Burns	Business Registration Number:	120-84-06711	Address: 2788 San Tomas Expressway, Santa Clara, CA 95051				Product Information					Product Category:	N/A	Name of Product:	N/A		Detailed Product Model Name (Number):	N/A	Date of first market release:	N/A		Weight of Product:	N/A	Manufacturer and/or Importer:	NVIDIA Corporation		 R-R-WT1-P3687 <table border="1"> <tr> <td style="vertical-align: top;"> A급 기기 (업무용 방송통신기자재) </td> <td style="vertical-align: top;"> 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다. </td> </tr> </table>	A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
문준비	상호:		엔비디아 홍콩 홀딩스 리미티드(영입소)	법인등록번호	110181-0036373																																																																	
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China	China Compulsory Certificate No certification is needed for China. The NVIDIA DGX H100/H200 system is a server with power consumption greater than 1.3 kW. China RoHS Material Content Declaration   产品中有害物质的名称及含量 The Table of Hazardous Substances and their Content 根据中国《电器电子产品有害物质限制使用管理办法》 as required by China's Management Methods for Restricted of Hazardous Substances Used in Electrical and Electronic Products <table><tr><th rowspan="2">部件名称 Parts</th><th colspan="6">有害物质 Hazardous Substances</th></tr><tr><th>铅 [Pb]</th><th>汞 [Hg]</th><th>镉 [Cd]</th><th>六价铬 [Cr(VI)]</th><th>多溴联苯 [PBB]</th><th>多溴联苯醚 [PBDE]</th></tr><tr><td>机箱 Chassis</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>印刷电路部件 PCA</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>处理器 Processor</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>主板 Motherboard</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>电源设备 Power supply</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>存储设备 System memory</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>硬盘驱动器 Hard drive</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>机械部件 (风扇、散热器、面板等) Mechanical parts (fan, heat sink, bezel...)</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>线材/连接器 Cables/Connectors</td><td>X</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	部件名称 Parts	有害物质 Hazardous Substances						铅 [Pb]	汞 [Hg]	镉 [Cd]	六价铬 [Cr(VI)]	多溴联苯 [PBB]	多溴联苯醚 [PBDE]	机箱 Chassis	X	0	0	0	0	0	印刷电路部件 PCA	X	0	0	0	0	0	处理器 Processor	X	0	0	0	0	0	主板 Motherboard	X	0	0	0	0	0	电源设备 Power supply	X	0	0	0	0	0	存储设备 System memory	X	0	0	0	0	0	硬盘驱动器 Hard drive	X	0	0	0	0	0	机械部件 (风扇、散热器、面板等) Mechanical parts (fan, heat sink, bezel...)	X	0	0	0	0	0	线材/连接器 Cables/Connectors	X	0	0	0	0	0	<table><tr><td>焊接金属 Soldering material</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>助焊剂、锡膏、标签及其他耗材 Flux, Solder Paste, label and other consumable materials</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> 本表格依据SJ/T 11364-2014 的规定编制 The table according to SJ/T 11364-2014 0：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572-2011 标准规定的限量要求以下。 0: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572-2011. X：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572-2011 标准规定的限量要求。 X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572-2011. 此表中所有名称中含“X”的部件均符合欧盟 RoHS 立法。 All parts named in this table with an “X” are in compliance with the European Union’s RoHS Legislation. Note: The referenced Environmental Protection Use Period Marking was determined according to normal operating use conditions of the product such as temperature and humidity.	焊接金属 Soldering material	0	0	0	0	0	0	助焊剂、锡膏、标签及其他耗材 Flux, Solder Paste, label and other consumable materials	0	0	0	0	0	0
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Taiwan	Bureau of Standards, Metrology & Inspection (BSMI)	 R3308 RoHS 警告使用者： 此為平穩測試結果，於產品使用後，可能會造成破壞，在此情況下，應注意產品是否出現異常現象。 報驗義務人： 香港商輝達香港控股有限公司台灣分公司 · 統一編號：80022300 臺北市內湖區基湖路8號。																																																																																										

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	Taiwan RoHS Material Content Declaration	<table><tr><th colspan="7">限制物質含量自我聲明書 Declaration of the presence condition of the Restricted Substances Marking</th></tr><tr><th colspan="7">設備名稱: DSI 伺服器 Equipment Name: DSI Server</th></tr><tr><th>部 件 Parts</th><th>鉛 (Pb)</th><th>汞 (Hg)</th><th>鎘 (Cd)</th><th>六價鉻 (Cr(VI))</th><th>多環芳烴 (PAHs)</th><th>多環芳烴 (PAHs)</th></tr><tr><td>機殼 Chassis</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>主機板/系統板 PCA</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>處理器 Processor</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>記憶體 Memory</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>電源供應器 Power supply</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>系統機殼 System recovery</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>散熱風扇 Heat sink</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>機械零件 (螺絲、螺絲帽、螺絲釘) Mechanical parts (Screws, nuts, bolts, ...)</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>線材/電纜 Cables/Connectors</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>其他零件 Other parts</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>說明書、維修、保養及消耗品 Man., Service, Repair, and other consumable materials</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> 備註: 0: 表示該物質含量未超過限制值。 Note: 0: Indicates that the substance content of the restricted substance does not exceed the percentage of reference value of presence. 備註: -: 表示該物質含量未超過限制值。 Note: -: Indicates that the restricted substance corresponds to the exemption. 此表格係根據歐盟指令 2002/95/EC (RoHS 指令) 制定。 This form is based on the European Union's RoHS Directive.	限制物質含量自我聲明書 Declaration of the presence condition of the Restricted Substances Marking							設備名稱: DSI 伺服器 Equipment Name: DSI Server							部 件 Parts	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr(VI))	多環芳烴 (PAHs)	多環芳烴 (PAHs)	機殼 Chassis	-	0	0	0	0	0	主機板/系統板 PCA	-	0	0	0	0	0	處理器 Processor	-	0	0	0	0	0	記憶體 Memory	-	0	0	0	0	0	電源供應器 Power supply	-	0	0	0	0	0	系統機殼 System recovery	-	0	0	0	0	0	散熱風扇 Heat sink	-	0	0	0	0	0	機械零件 (螺絲、螺絲帽、螺絲釘) Mechanical parts (Screws, nuts, bolts, ...)	-	0	0	0	0	0	線材/電纜 Cables/Connectors	-	0	0	0	0	0	其他零件 Other parts	0	0	0	0	0	0	說明書、維修、保養及消耗品 Man., Service, Repair, and other consumable materials	0	0	0	0	0	0
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說明書、維修、保養及消耗品 Man., Service, Repair, and other consumable materials	0	0	0	0	0	0																																																																																														
Russ ia/ Kaza khst an/ Belar us	Customs Union Technical Regulations (CU TR) This device complies with the technical regulations of the Customs Union (CU TR) ТЕХНИЧЕСКИЙ РЕГЛАМЕНТ ТАМОЖЕННОГО СОЮЗА О безопасности низковольтного оборудования (ТР ТС 004/2011) ТЕХНИЧЕСКИЙ РЕГЛАМЕНТ ТАМОЖЕННОГО СОЮЗА Электромагнитная совместимость технических средств (ТР ТС 020/2011) Технический регламент Евразийского экономического союза “Об ограничении применения опасных веществ в изделиях электротехники и радиоэлектроники” (ТР ЕАЭС 037/2016) Federal Agency of communication (FAC) This device complies with the rules set forth by Federal Agency of Communications and the Ministry of Communications and Mass Media. Federal Security Service notification has been filed.																																																																																																			
Israe l	ודא שלמות ותקינות כבל החשמל והתקע אין להכניס או להוציא את התקע מרשת החשמל בדיים רטובות . אין לפתוח את המכשיר , במקרה של בעיה כלשהי יש לפנות למעבדת השירות הקרובה. יש להרחיק את המכשיר מנוזלים . במקרה של ריח חריש , רעש , שמקורם במכשיר , יש לנתק מיידי מרשת החשמל ולפנות למעבדת שירות המכשיר מידע לשימוש בתוך המבנה , ולא לשימוש חיצוני ולא לשימוש בסביבה לוחה. אין לתת, לשבור, ולקדם את הכבל החשמל. אין להניח חפצים על הכבל החשמל או להניח לו להתחמם יותר על המידה , שכן עלול לגרום לנזק , דליקה או התחשמלות . יש להקפיד לחזק את התקן הניתוק במצב תפעול מוכן לשימוש. אזהרה: אין להחליף את כבל הזינה בתחליפים לא מקוריים, חיבור לקוי עלול לגרום להתחשמלות המשתמש. בשימוש על כבל מאריך יש לוודא תקינות מוליך הארקה שבכבל .																																																																																																			
India	Bureau of India Standards (BIS) Authenticity may be verified by visiting the Bureau of Indian Standards website at http://www.bis.gov.in . India RoHS Compliance Statement This product, as well as its related consumables and spares, complies with the reduction in hazardous substances provisions of the “India E-waste (Management and Handling) Rule 2016”. It does not contain lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in concentrations exceeding 0.1 weight % and 0.01 weight % for cadmium, except for where allowed pursuant to the exemptions set in Schedule 2 of the Rule.																																																																																																			
Sout h Afric a	South African Bureau of Standards (SABS) This device complies with the following SABS Standards: SANS 2332: 2017/CISPR 32:2015 SANS 2335:2018/ CISPR 35:2016 National Regulator of Compulsory Specification (NRCS) This device complies with following standard under VC 8055: SANS IEC 60950-1																																																																																																			

Co un try	Compliance	Compliance Mark
Grea t Brita in (Engl and, Wale s, and Scotl and)	UK Conformity Assessed This device complies with the following Regulations: • SI 2016/1091: Electromagnetic Compatibility (EMC) • SI 2016/1101: The Low Voltage Electrical Equipment (Safety) • SI 2012/3032: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (As Amended) A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA Ltd. (100 Brook Drive, 3rd Floor Green Park, Reading RG2 6UJ, United Kingdom)	

14 Document Revision History

Date	Comments/Changes
Feb. 2026	Added Compliance
Jan. 2026	Added 400GBASE-8CR support for relevant products in Specifications .
Dec. 2025	Added Port Splitting Configurations
Nov. 2024	- Updated the Networking port LED specifications - Added MCX713106AS-CEAT and MCX713106AC-CEAT to the EOL'ed OPNs table
Aug. 2023	Updated typo in Brackets Mechanical Drawings and Dimensions
Jul. 2023	- Updated MCX713104A cards lifecycle to "Mass Production" - Added MCX713105AS-WEAT to the EOL'ed OPNs table - Added a note about InfiniBand and Ethernet support for MCX75310AAS-HEAT and MCX75310AAS-NEAT card in Ordering Part Numbers
Jun. 2023	Added typical power numbers for all adapter cards in Specifications .
May. 2023	- Updated Specifications - added non-operational storage temperature specifications and updated mechanical drawings. - Updated board label in Finding the GUID/MAC on the Adapter Card. - Added board mechanical drawings in Supported Interfaces. - Updated bracket mechanical drawings in Specifications. - Added a note about OSFP boards.
Apr. 2023	Updated Setting High-Speed-Port Link Type .
Feb. 2023	Updated VMware Driver Installation .
Jan. 2023	- Added support for OPN MCX715105AS-WEAT . - Updated 400Gb/s Ethernet protocols in Specifications.
Dec. 2022	- Modified ordering part numbers and product descriptions in NVIDIA ConnectX-7 Adapter Cards User Manual. - Added PCIe Auxiliary Card Kit. - Updated Monitoring.
Nov. 2022	First release of the consolidated user manual for all ConnectX-7 adapter cards.

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