

ThinkSystem NVIDIA BlueField-3 QSFP112 2-Port 200Gb DPU Adapter

Product Guide

The ThinkSystem NVIDIA BlueField-3 QSFP112 2-Port 200Gb DPU Adapter is an advanced compute platform that enables software-defined, hardware-accelerated IT infrastructures. With 16 Arm cores, 32GB of DDR5 memory, and two ports of 200Gb/s Ethernet or NDR InfiniBand network connectivity, BlueField-3 data processing unit (DPU) offloads, accelerates, and isolates software-defined networking, storage, security, and management functions.

The BlueField-3 adapter is a full-height half-length (FHHL) adapter as shown in the following figure.

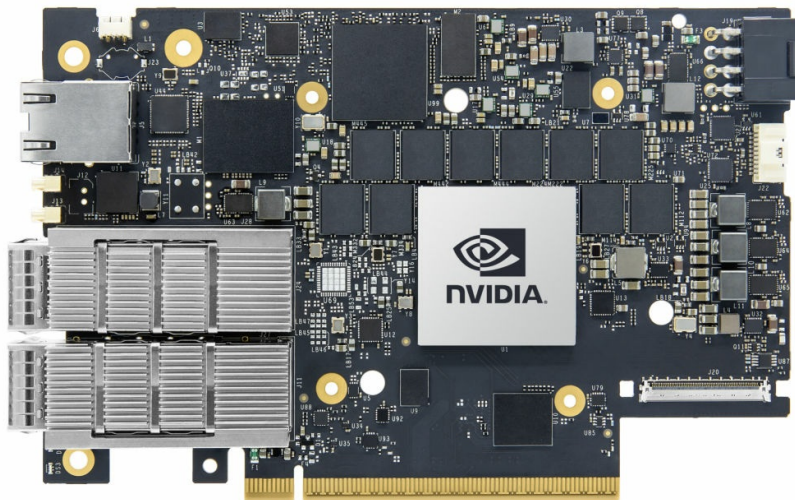


Figure 1. ThinkSystem NVIDIA BlueField-3 QSFP112 2-Port 200Gb DPU Adapter

Did you know?

Powered by NVIDIA DOCA™, BlueField-3 enables full data center programmability through open APIs and an optimized developer experience. Top ISV providers and server makers are using DOCA for accelerating innovation and achieving better business outcomes with BlueField DPUs. Paired with NVIDIA GPUs, BlueField-3 secures and accelerates cloud-native computing platforms.

Compared to the BlueField-2 adapter, the BlueField-3 provides 4X more compute power, up to 4X faster crypto acceleration, 2X faster storage processing, and 4X more memory bandwidth, all while delivering full backward compatibility through the NVIDIA DOCA™ software framework.

Part number information

The following table shows the part number for the adapter and auxiliary power cable. The power cable is required to provide the power needed by the adapter.

Table 1. Part number information

Part number	Feature code	Description	Vendor part number
BlueField-3 adapter			
4XC7A87752	BVBG	ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220	900-9D3B6-00CV-AA0 (model B3220)
Auxiliary power cable			
CTO only	BXB6	ThinkSystem SR675 V3 BlueField-3 Power Cable	Not applicable

The part number includes the following:

- One adapter with a full-height (3U) adapter bracket
- Documentation

Supported transceivers and cables

This section lists the supported transceivers and cables.

Table 2. Supported transceivers

Part number	Feature code	Description
100Gb transceivers		
7G17A03539	AV1D	Lenovo 100GBase-SR4 QSFP28 Transceiver
4M27A67042	BFH1	Lenovo 100Gb SR4 QSFP28 Ethernet Transceiver
200Gb transceivers		
4TC7A81831	BQJZ	ThinkSystem NDR/NDR200 QSFP112 IB Multi Mode Solo-Transceiver
Converters		
4G17A10853	B306	Mellanox QSA 100G to 25G Cable Adapter

The following table lists the supported fiber optic cables and Active Optical Cables.

Table 3. Optical cables

Part number	Feature code	Description
LC-LC OM3 Fiber Optic Cables (these cables require a 10 GbE SFP+ SR or 25 GbE SFP28 SR transceiver)		
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable

Part number	Feature code	Description
SFP+ 10Gb Active Optical Cables		
00YL634	ATYX	Lenovo 1m SFP+ to SFP+ Active Optical Cable
00YL637	ATYY	Lenovo 3m SFP+ to SFP+ Active Optical Cable
00YL640	ATYZ	Lenovo 5m SFP+ to SFP+ Active Optical Cable
00YL643	ATZ0	Lenovo 7m SFP+ to SFP+ Active Optical Cable
00YL646	ATZ1	Lenovo 15m SFP+ to SFP+ Active Optical Cable
00YL649	ATZ2	Lenovo 20m SFP+ to SFP+ Active Optical Cable
100G MPO OM4 MMF Cables (these cables require a transceiver)		
7Z57A03567	AV25	Lenovo 5m MPO-MPO OM4 MMF Cable
7Z57A03568	AV26	Lenovo 7m MPO-MPO OM4 MMF Cable
7Z57A03569	AV27	Lenovo 10m MPO-MPO OM4 MMF Cable
7Z57A03570	AV28	Lenovo 15m MPO-MPO OM4 MMF Cable
7Z57A03571	AV29	Lenovo 20m MPO-MPO OM4 MMF Cable
7Z57A03572	AV2A	Lenovo 30m MPO-MPO OM4 MMF Cable
QSFP28 100Gb Ethernet Breakout Active Optical Cables		
7Z57A03552	AV1S	Lenovo 5m 100G to 4x25G Breakout Active Optical Cable
7Z57A03554	AV1U	Lenovo 15m 100G to 4x25G Breakout Active Optical Cable
OM4 LC to LC Cables (these cables require a transceiver)		
4Z57A10845	B2P9	Lenovo 0.5m LC-LC OM4 MMF Cable
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable
QSFP56 HDR IB Optical Cables		
4Z57A14188	B4QW	3m Mellanox HDR IB Active Optical QSFP56 Cable
4Z57A14189	B4QX	5m Mellanox HDR IB Active Optical QSFP56 Cable
4Z57A14190	B4QY	10m Mellanox HDR IB Active Optical QSFP56 Cable
4Z57A14191	B4QZ	15m Mellanox HDR IB Active Optical QSFP56 Cable
4Z57A14192	B4R0	20m Mellanox HDR IB Active Optical QSFP56 Cable
QSFP56 HDR IB to 2x HDR100 Optical Splitter Cables		
4Z57A14196	B4R4	3m Mellanox HDR IB to 2x HDR100 Splitter Optical QSFP56 Cable
4Z57A14197	B4R5	5m Mellanox HDR IB to 2x HDR100 Splitter Optical QSFP56 Cable
4Z57A14198	B4R6	10m Mellanox HDR IB to 2x HDR100 Splitter Optical QSFP56 Cable
4Z57A14199	B4R7	15m Mellanox HDR IB to 2x HDR100 Splitter Optical QSFP56 Cable
4Z57A14214	B4R8	20m Mellanox HDR IB to 2x HDR100 Splitter Optical QSFP56 Cable
Mellanox NDR Multi Mode Fibre Cables		
4X97A81836	BQK4	Lenovo 3m NVIDIA NDR to 2x NDR200 Multi Mode Optical Cable
4X97A81837	BQK5	Lenovo 5m NVIDIA NDR to 2x NDR200 Multi Mode Optical Cable

Part number	Feature code	Description
4X97A81838	BQK6	Lenovo 7m NVIDIA NDR to 2x NDR200 Multi Mode MPO12 APC Optical Cable
4X97A81839	BQK7	Lenovo 10m NVIDIA NDR to 2x NDR200 Multi Mode Optical Cable
4X97A81840	BQK8	Lenovo 20m NVIDIA NDR to 2x NDR200 Multi Mode Optical Cable

The following table lists the supported direct-attach copper (DAC) cables.

Table 4. Copper cables

Part number	Feature code	Description
SFP+ 10Gb Passive DAC Cables		
00D6288	A3RG	0.5m Passive DAC SFP+ Cable
90Y9427	A1PH	1m Passive DAC SFP+ Cable
00AY764	A51N	1.5m Passive DAC SFP+ Cable
00AY765	A51P	2m Passive DAC SFP+ Cable
90Y9430	A1PJ	3m Passive DAC SFP+ Cable
90Y9433	A1PK	5m Passive DAC SFP+ Cable
00D6151	A3RH	7m Passive DAC SFP+ Cable
SFP28 25Gb Passive DAC Cables		
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable
7Z57A03559	AV1Y	Lenovo 5m Passive 25G SFP28 DAC Cable
QSFP28 100Gb Ethernet Passive DAC Cables		
7Z57A03561	AV1Z	Lenovo 1m Passive 100G QSFP28 DAC Cable
7Z57A03562	AV20	Lenovo 3m Passive 100G QSFP28 DAC Cable
7Z57A03563	AV21	Lenovo 5m Passive 100G QSFP28 DAC Cable
QSFP28 100G-to-4x25G Ethernet Breakout Cables		
7Z57A03564	AV22	Lenovo 1m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable
4Z57A85043	BS32	Lenovo 1.5m 100G to 4x25G Breakout SFP28 Breakout DAC Cable
4Z57A85044	BS33	Lenovo 2m 100G to 4x25G Breakout SFP28 Breakout DAC Cable
7Z57A03565	AV23	Lenovo 3m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable
7Z57A03566	AV24	Lenovo 5m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable
QSFP56 HDR InfiniBand Passive DAC Cables		
4Z57A14182	B4QQ	0.5m Mellanox HDR IB Passive Copper QSFP56 Cable
4Z57A14183	B4QR	1m Mellanox HDR IB Passive Copper QSFP56 Cable
4Z57A14184	B4QS	1.5m Mellanox HDR IB Passive Copper QSFP56 Cable
4Z57A14185	B4QT	2m Mellanox HDR IB Passive Copper QSFP56 Cable
QSFP56 HDR InfiniBand to 2x HDR100 Passive DAC Splitter Cables		
4Z57A14193	B4R1	1m Mellanox HDR IB to 2x HDR100 Splitter Passive Copper QSFP56 Cable
4Z57A14194	B4R2	1.5m Mellanox HDR IB to 2x HDR100 Splitter Passive Copper QSFP56 Cable
4Z57A11477	B68L	2m Mellanox HDR IB to 2x HDR100 Splitter Passive Copper QSFP56 Cable
QSFP56 200Gb Ethernet Passive DAC Cables		
4X97A12613	BF92	Lenovo 3m Passive 200G QSFP56 Ethernet DAC Cable

Part number	Feature code	Description
Mellanox NDRx2 OSFP800 to 4x NDR200 QSFP112 Splitter Copper Cables		
4X97A81832	BQK0	Lenovo 1m NVIDIA NDRx2 OSFP800 to 4x NDR200 QSFP112 Passive Copper Splitter Cable
4X97A81833	BQK1	Lenovo 1.5m NVIDIA NDRx2 OSFP800 to 4x NDR200 QSFP112 Passive Copper Splitter Cable
4X97A81834	BQK2	Lenovo 2m NVIDIA NDRx2 OSFP800 to 4x NDR200 QSFP112 Passive Copper Splitter Cable
4X97A81835	BQK3	Lenovo 3m NVIDIA NDRx2 OSFP800 to 4x NDR200 QSFP112 Passive Copper Splitter Cable

Workloads

The BlueField-3 adapter is suitable for the following workload types:

- Cloud Networking: Cloud overlay, SDN acceleration, NAT, load balancer, NFV, video streaming
- Storage: NVMe over Fabrics (NVMe-oF), NVMe/ TCP™, elastic storage, hyper converged infrastructure (HCI)
- Security: Distributed next- generation firewall, IDS/ IPS, root of trust, micro- segmentation, DDOS prevention
- HPC / AI: Cloud-native supercomputing, multi-tenancy and security, communication accelerations
- Telco and Edge: Cloud RAN, virtualized edge gateways, VNF acceleration, edge microservers

Technical specifications

The BlueField-3 adapter has the following technical specifications:

Adapter specifications

- 2 ports using 2x QSFP112 cages, each providing 200Gb/s Ethernet or NDR InfiniBand connectivity
- Based on a ConnectX-7 networking subsystem
- PCIe Gen5 x16 host interface
- Support for an Auxiliary Card which provides an additional x16 host connection for Sockets Direct (SharedIO) support
- 150W maximum power consumption

Compute and Memory

- Arm CPU cores
 - Up to 16 Arm v8.2+ A78 Hercules cores (64-bit)
 - 8MB L2 cache
 - 16MB LLC system cache
- Programmable Datapath Accelerator
 - 16 cores, 256 threads
 - Programmability through DOCA
 - Heavy multi-threading applications acceleration
- DDR DIMM support
 - Dual DDR5 5600MT/s DRAM controllers
 - 32GB on-board DDR5
 - ECC error protection support

Networking protocol support

- InfiniBand: IBTA v1.5(a) (Auto-Negotiation):
 - NDR200 (2 lanes x 100Gb/s per lane)
 - HDR (50Gb/s per lane)
 - HDR100 (2 lane x 50Gb/s per lane)
 - EDR (25Gb/s per lane)
 - FDR (14.0625Gb/s per lane)
 - 1X/2X/4X SDR (2.5Gb/s per lane).
- Ethernet:
 - 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

Hardware Accelerations

- Security
 - Platform security
 - Secure boot with hardware root-of-trust (RoT)
 - Secure firmware update
 - On-board flash encryption
 - Device attestation
 - Functional isolation layer
 - Regular expression (RegEx) matching processor
 - IPsec/TLS/MACSec 128/256-bit data-in-motion encryption
 - PSP security protocol (PSP)
 - AES-GCM 128/256bit key
 - AES-XTS 256/512bit data-at-rest encryption
 - Connection tracking for statefull firewall
 - Public key accelerator (PKA)
 - True random number generator (TRNG)
- Storage
 - BlueField SNAP - Elastic block storage - NVMe and VirtIO-blk
 - NVMe-oF and NVMe/TCP acceleration
 - Decompression engine
 - Erasure coding for RAID implementation
- Networking
 - RoCE, Zero Touch RoCE
 - ASAP² - Accelerated Switch and Packet Processing® for SDN and VNF acceleration
 - Single Root I/O Virtualization (SR-IOV)
 - VirtIO acceleration
 - Overlay network acceleration
 - VXLAN, Geneve, NVGRE
 - Programmable flexible parser: user-defined classification
 - Connection tracking (L4 firewall)
 - Flow mirroring, sampling and statistics
 - Header rewrite
 - Hierarchical QoS
 - Stateless TCP offloads
- HPC/AI Accelerations
 - HPC / AI All-to-All engine

- o NVIDIA GPUDirect
- o NVIDIA GPUDirect Storage (GDS)
- o HPC MPI Tag Matching

Additional features

- Advanced Timing and Synchronization
 - o IEEE 1588v2 (any profile)
 - o G.8273.2 Class C
 - o PTP hardware clock (PHC)
 - o Line rate hardware timestamp
 - o SyncE
 - o G.8262.1 (eEEEC)
 - o Configurable PPS In and PPS Out
 - o Time triggered scheduling
 - o Time-based SDN acceleration
- Boot Options
 - o Secure boot (RSA authenticated)
 - o Remote boot over Ethernet
 - o Remote boot over iSCSI
 - o PXE and UEFI
- Management
 - o 1GbE out-of-band management port via the RJ45 port (can be disabled)
 - o In-band management via the two network ports (can be disabled)
 - o NC-SI, MCTP over SMBus, and MCTP over PCIe
 - o IPMI management interface
 - o PLDM for Monitor and Control DSP0248
 - o PLDM for Firmware Update DSP026
 - o I2C interface for device control and configuration
 - o SPI interface to flash
 - o eMMC memory controller
 - o UART via the onboard 20-pin NCSI/UART connector
 - o USB via an onboard 4-pin connector

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 5. Server support (Part 1 of 4)

Part Number	Description	2S AMD V3		2S Intel V3		4S 8S Intel V3		Multi Node		GPU Rich		1S V3							
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST250 V3 (7DCF / 7DCE)
4XC7A87752	ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	N

Table 6. Server support (Part 2 of 4)

Part Number	Description	Edge					Super Computing					1S Intel V2		2S Intel V2		
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)
4XC7A87752	ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 7. Server support (Part 3 of 4)

Part Number	Description	AMD V1				Dense V2			4S V2	8S	4S V1	1S Intel V1								
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)
4XC7A87752	ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 8. Server support (Part 4 of 4)

Part Number	Description	2S Intel V1						Dense V1					
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XC7A87752	ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220	N	N	N	N	N	N	N	N	N	N	N	N

Operating system support

The adapter supports the operating systems listed in the following table.

Tip: This table is automatically generated based on data from [Lenovo ServerProven](#).

Table 9. Operating system support for ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16, 4XC7A87752

	SR675 V3
Operating systems	
Red Hat Enterprise Linux 8.6	Y
Red Hat Enterprise Linux 8.7	Y
Red Hat Enterprise Linux 9.0	Y
Red Hat Enterprise Linux 9.1	Y
Ubuntu 22.04 LTS	Y

Regulatory approvals

The BlueField-3 adapter has the following hardware certifications:

- Safety: CB / cTUVus / CE
- EMC: CE / FCC / VCCI / ICES / RCM
- RoHS compliant

Physical specifications

The BlueField-3 adapter has the following physical specifications:

- Length: 168 mm (6.6 inches)
- Height: 111 mm (4.4 inches)

Operating environment

The BlueField-3 adapter is supported in the following environment:

- Temperature:
 - Operating: 0°C to 55°C (32°F to 131°F)
 - Storage: -40°C to 70°C (-40°F to 158°F)
- Humidity:
 - Operating: 10% to 85%
 - Storage: 10% to 90%

Warranty

One year limited warranty. When installed in a Lenovo server, this adapter assumes the server's base warranty and any warranty upgrades.

Related information

For more information, refer to these documents:

- ServerProven compatibility
<https://serverproven.lenovo.com/>
- NVIDIA BlueField Data Processing Units product page
<https://www.nvidia.com/dpu>
- NVIDIA DOCA
<https://developer.nvidia.com/networking/doca>
- NVIDIA BlueField-3 User Guide:
<https://docs.nvidia.com/networking/display/BlueField3DPU>
- NVIDIA BlueField-3 Software User Guide
<https://docs.nvidia.com/networking/display/BlueFieldDPUOSLatest>

Related product families

Product families related to this document are the following:

- [25 Gb Ethernet Connectivity](#)
- [Ethernet Adapters](#)
- [InfiniBand & Omni-Path Adapters](#)

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