MCP7Y40-Nxxx 800Gbps Twin-port OSFP to 4x200Gbps QSFP112 DAC Splitter Cable

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Introduction

NVIDIA® MCP7Y40 is an 800Gb/s twin-port OSFP (Octal Small Form-factor Pluggable) to 4x200Gb/s QSFP112 (Quad Small Form-factor Pluggable 112G) passive Direct Attach Copper (DAC) dual breakout (aka splitter) cable for 400Gb/s NVIDIA End-to-End Infiniband and Ethernet solutions. It has identical design and internals as the single-port OSFP version, only with different connector shells. The DAC firmware supports both InfiniBand and Ethernet and is automatically enabled depending on the protocol of the switch attached to.

The 8-channel twin-port OSFP end uses a finned top form-factor for use in Quantum-2 and Spectrum-4 switch cages. The four 200G ends support 2-channels of 100G-PAM4 (200G) and use a flat top QSFP112 for use in ConnectX-7 adapters and BlueField-3 DPUs using riding heat sinks on the connector cage.

DAC cables are the lowest-cost, lowest-latency, near zero power consuming, high-speed links available due to their simplicity of design and minimal components. The “passive” term refers to the copper cable containing no electronics in the data path. Each end includes an EEPROM which provides product identification and characteristics to the host system. Every cable length is tuned to reduce internal signal noise and back reflections. Thin 30AWG is used for 1 and 1.5-meter lengths and thicker 26AWG for 2 to 3-meters.

Main use is linking an 800Gb/s Quantum-2 switch or Spectrum-4 switch to QSFP112-based 200Gb/s ConnectX-7 PCIe network adapter cards and BlueField-3 DPUs.

NVIDIA’s cable solutions provide power-efficient connectivity enabling higher port bandwidth, density and configurability at a low cost and reduced power requirement in the data centers. Rigorous cable production testing ensures best out-of-the-box installation experience, performance, and durability.

Note

Images are for illustration purposes only. Product labels, colors, and lengths may vary.

Key Features

- 800Gb/s to four 200Gb/s data rates
- Based on 2-channel 100G-PAM4 modulation
- 1, 1.5, 2, 2.5, and 3-meter lengths
- OSFP and QSFP112 ends each consume 0.1 Watts
- Operating case temperature 0-70°C
- Hot pluggable
- RoHS compliant
- CMIS compliant
- LSZH (Low Smoke Zero Halogen) jacket

- LF (Lead Free) HF (Halogen Free) PCB

Applications

- 2x400G NDR InfiniBand Quantum-2 or Spectrum-4 Ethernet switch-to-four 200Gb/s QSFP112 BlueField-3 DPUs and/or 200Gb/s ConnectX-7

Pin Descriptions

The device is OSFP based (Octal Small Form Factor Pluggable, www.osfpmsa.org).

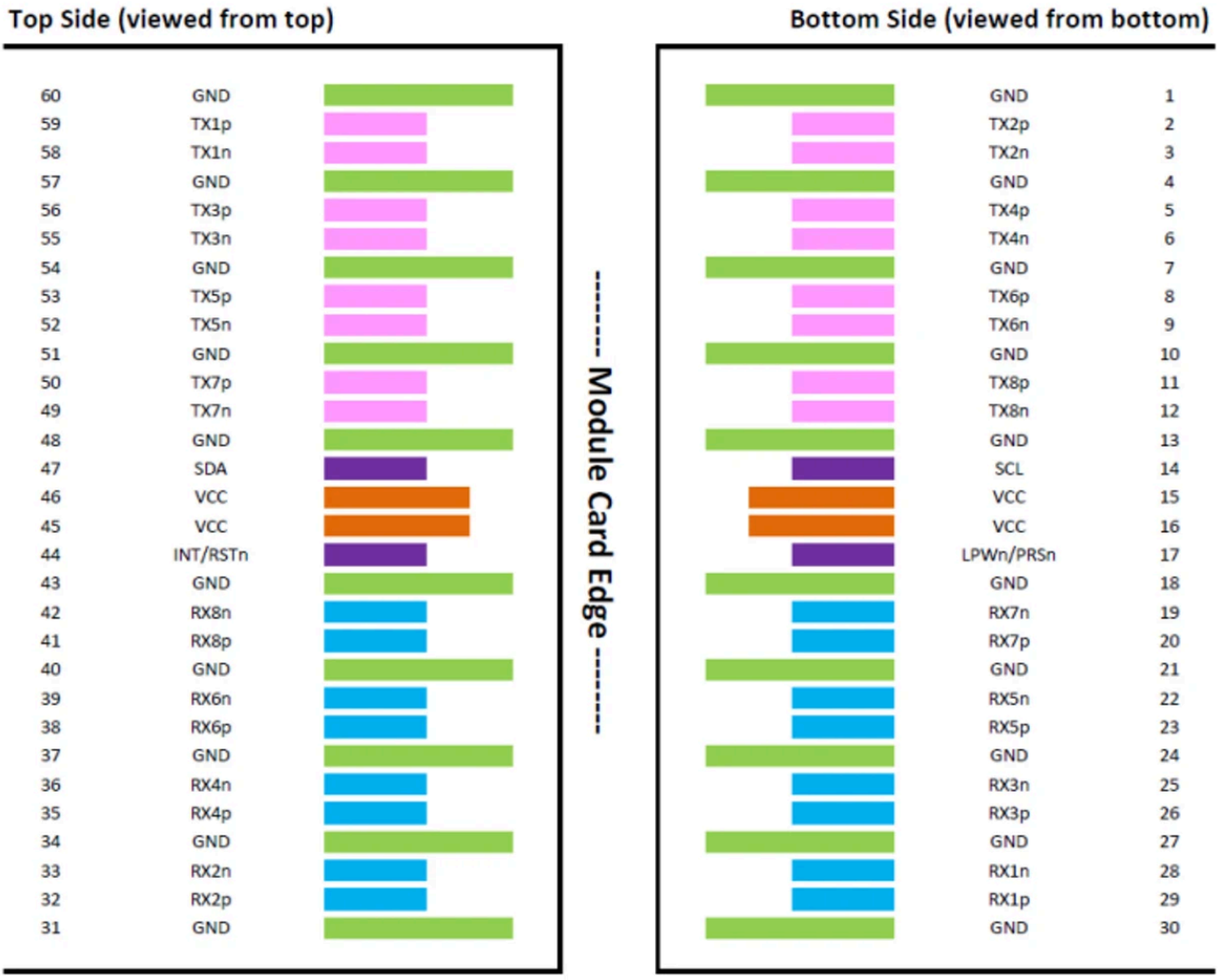
The pin assignment for the interface is shown below.

OSFP Pin Description

Pin	Symbol	Description	Pin	Symbol	Description
1	GND	Ground	31	GND	Ground
2	Tx2p	Transmitter Non-Inverted Data Input	32	Rx2p	Receiver Non-Inverted Data Output
3	Tx2n	Transmitter Inverted Data Input	33	Rx2n	Receiver Inverted Data Output
4	GND	Ground	34	GND	Grounds
5	Tx4p	Transmitter Non-Inverted Data Input	35	Rx4p	Receiver Non-Inverted Data Output
6	Tx4n	Transmitter Inverted Data Input	36	Rx4n	Receiver Inverted Data Output
7	GND	Ground	37	GND	Ground
8	Tx6p	Transmitter Non-Inverted Data Input	38	Rx6p	Receiver Non-Inverted Data Output
9	Tx6n	Transmitter Inverted Data Input	39	Rx6n	Receiver Inverted Data Output
10	GND	Ground	40	GND	Ground
11	Tx8p	Transmitter Non-Inverted Data Input	41	Rx8p	Receiver Non-Inverted Data Output
12	Tx8n	Transmitter Inverted Data Input	42	Rx8n	Receiver Inverted Data Output
13	GND	Ground	43	GND	Ground

Pin	Symbol	Description	Pin	Symbol	Description
14	SCL	2-wire serial interface clock	44	INT / RSTn	Module Interrupt / Module Reset
15	VCC	+3.3V Power	45	VCC	+3.3V Power
16	VCC	+3.3V Power	46	VCC	+3.3V Power
17	LPWn / PRSn	Low-Power Mode / Module Present	47	SDA	2-wire Serial interface data
18	GND	Ground	48	GND	Ground
19	Rx7n	Receiver Inverted Data Output	49	Tx7n	Transmitter Inverted Data Input
20	Rx7p	Receiver Non-Inverted Data Output	50	Tx7p	Transmitter Non-Inverted Data Input
21	GND	Ground	51	GND	Ground
22	Rx5n	Receiver Inverted Data Output	52	Tx5n	Transmitter Inverted Data Input
23	Rx5p	Receiver Non-Inverted Data Output	53	Tx5p	Transmitter Non-Inverted Data Input
24	GND	Ground	54	GND	Ground
25	Rx3n	Receiver Inverted Data Output	55	Tx3n	Transmitter Inverted Data Input
26	Rx3p	Receiver Non-Inverted Data Output	56	Tx3p	Transmitter Non-Inverted Data Input
27	GND	Ground	57	GND	Ground
28	Rx1n	Receiver Inverted Data Output	58	Tx1n	Transmitter Inverted Data Input
29	Rx1p	Receiver Non-Inverted Data Output	59	Tx1p	Transmitter Non-Inverted Data Input
30	GND	Ground	60	GND	Ground

OSFP Module Pad Layout

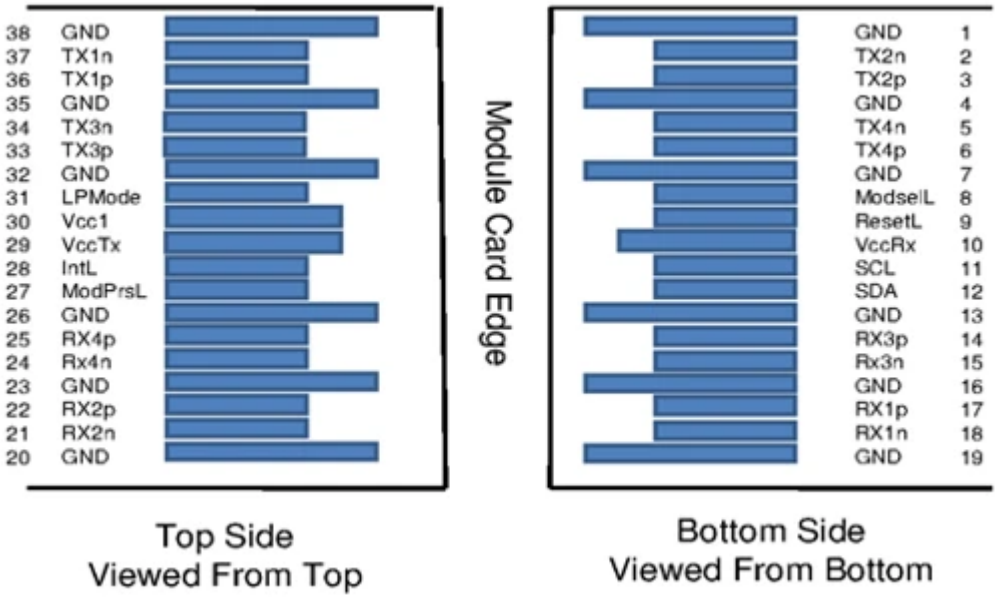


QSFP112 Pin Description 400Gb/s Ends

Pin	Symbol	Description	Pin	Symbol	Description
1	Ground	Ground	20	Ground	Ground
2	Tx2n	Connected to Port 1 lane Rx2 Inverted Data	21	Rx2n	Connected to Port 1 lane Tx2 Inverted Data
3	Tx2p	Connected to Port 1 lane Rx2 Non-Inverted Data	22	Rx2p	Connected to Port 1 lane Tx2 Non-Inverted Data
4	Ground	Ground	23	Ground	Grounds

Pin	Symbol	Description	Pin	Symbol	Description
5	Tx4n	Connected to Port 2 lane Rx2 Non-Inverted Data	24	Rx4n	Connected to Port 2 lane Tx2 Inverted Data
6	Tx4p	Connected to Port 2 lane Rx2 Inverted Data	25	Rx4p	Connected to Port 2 lane Tx2 Non-Inverted Data
7	Ground	Ground	26	Ground	Ground
8	ModSelL	Cable Select	27	ModPrsL	Cable Present
9	ResetL	Cable Reset	28	IntL	Interrupt
10	Vcc Rx	+3.3V Power supply receiver	29	Vcc Tx	+3.3V Power supply transmitter
11	SCL	2-wire serial interface clock	30	Vcc1	+3.3V Power Supply
12	SDA	2-wire serial interface data	31	LPMode	Low Power Mode
13	Ground	Ground	32	Ground	Ground
14	Rx3p	Connected to Port 2 lane Tx1 Non-Inverted Data	33	Tx3p	Connected to Port 2 lane Rx1 Non-Inverted Data
15	Rx3n	Connected to Port 2 lane Tx1 Inverted Data	34	Tx3n	Connected to Port 2 lane Rx1 Inverted Data
16	Ground	Ground	35	Ground	Ground
17	Rx1p	Connected to Port 1 lane Tx1 Non-Inverted Data	36	Tx1p	Connected to Port 1 lane Rx1 Non-Inverted Data
18	Rx1n	Connected to Port 1 lane Tx1 Inverted Data	37	Tx1n	Connected to Port 1 lane Rx1 Inverted Data
19	Ground	Ground	38	Ground	Ground

QSFP112 Module Pad Layout



Diagnostics and Other Features

The product complies with the CMIS 4.0 specifications for the management interfaces. These interfaces provide Digital Diagnostic Monitoring (DDM) functions including warning and alarms:

- Rx receive optical power monitor
- Tx transmit optical power monitor
- Tx bias current monitor
- Module supply voltage monitor
- Module case temperature monitor
- The AOC provides the following features and interrupt indications
- Tx & Rx LOS
- Tx & Rx LoL
- Tx fault
- Tx & Rx disable

Specifications

Absolute Maximum Specifications

Absolute maximum ratings are those beyond which damage to the device may occur.

Between the operational specifications and absolute maximum ratings, prolonged operation is not intended and permanent device degradation may occur.

Parameter	Min	Max	Max
Supply Voltage	-0.3	3.6	V
Data Input Voltage	-0.3	3.6	V
Control Input Voltage	-0.3	3.6	V

Environmental Specifications

This table shows the environmental specifications for the product.

Parameter	Min	Max	Units
Storage Temperature	-40	85	°C

Operational Specifications

This section shows the range of values for normal operation.

Parameter	Min	Typ	Max	Units
Supply Voltage (Vcc)	3.135	3.3	3.465	V
Power Consumption	--	--	0.1	W
Operating Case Temperature	0		70	°C
Operating Relative Humidity	5		85	%

Electrical Specifications

Parameter	Min	Typ	Max	Units	Note
Characteristic impedance	90	100	110	Ω	
Time propagation delay	--	--	4.5	ns/m	Informative

Mechanical Specifications

Parameter	Value		Units
Diameter	30AWG: 5.7 ±0.03 26AWG: 7.1 ±0.03		mm
Length tolerance	length < 2 m	±25	mm
	length ⩾ 2 m	±50	

Minimum Bend Radius

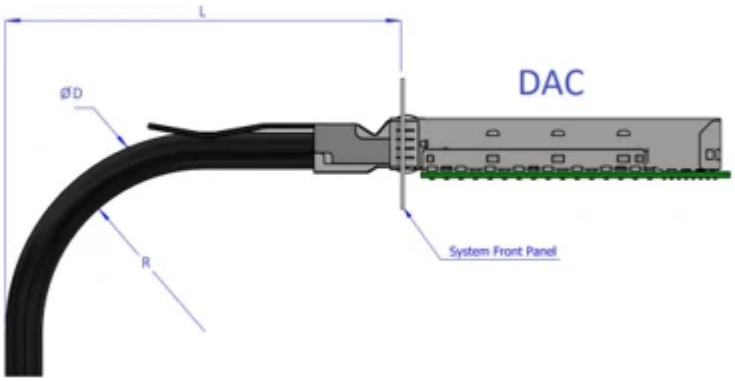
OPN	Length (m)	AWG (mm)	Cable Diameter	Min bend radius R (mm)	Assembly Space L** Combined/Single end (mm)
MCP7Y40 -N001	1.0	30AWG, 4x4pairs	5.7	57	117/111
MCP7Y40 -N01A	1.5	30AWG, 4x4pairs	5.7	57	117/111
MCP7Y40 -N002	2.0	26AWG, 4x4pairs	7.1	71	134/127
MCP7Y40 -N02A	2.5	26AWG, 4x4pairs	7.1	71	134/127
MCP7Y40 -N003	3.0	26AWG, 4x4pairs	7.1	71	134/127

Minimum assembly bending radius (close to the connector) is 10x the cable's outer diameter. The repeated bend (far from the connector) is also 10x the cable's outer diameter. The single bend (far from the connector) is 5x the cable's outer diameter.

**'Combined' end is the 'head' where the cables join together, inserted into the switch. 'Single' end is the 'tail' which plugs into the HCA/NIC in a server.

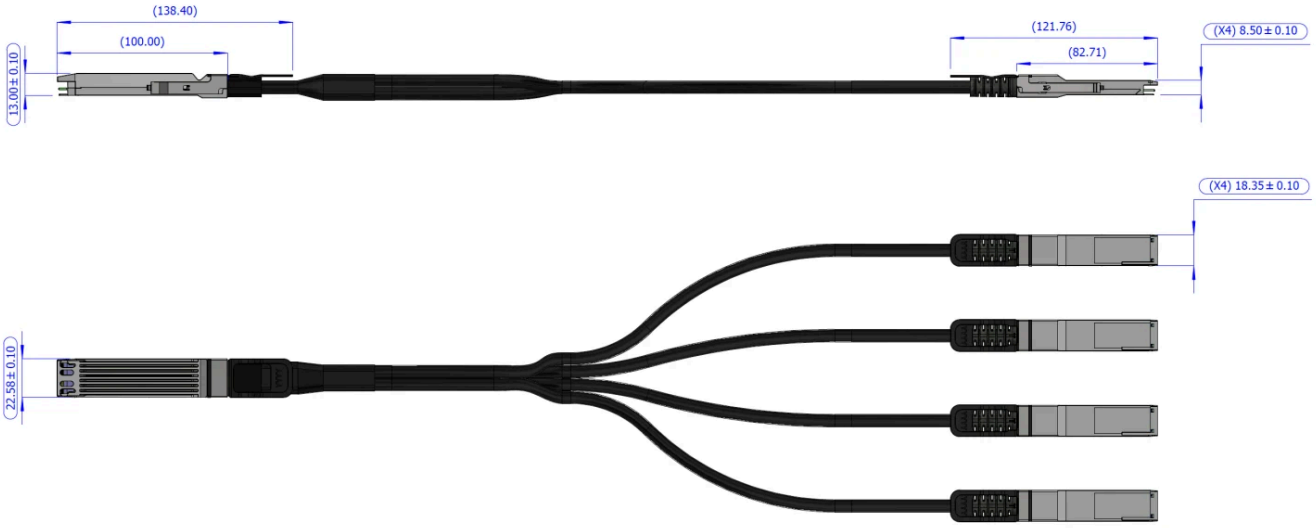
L = Assembly Space. Minimum value depends on the backshell (connector housing) dimensions = the space for the cable assembly behind the rack door.

Assembly Bending Radius



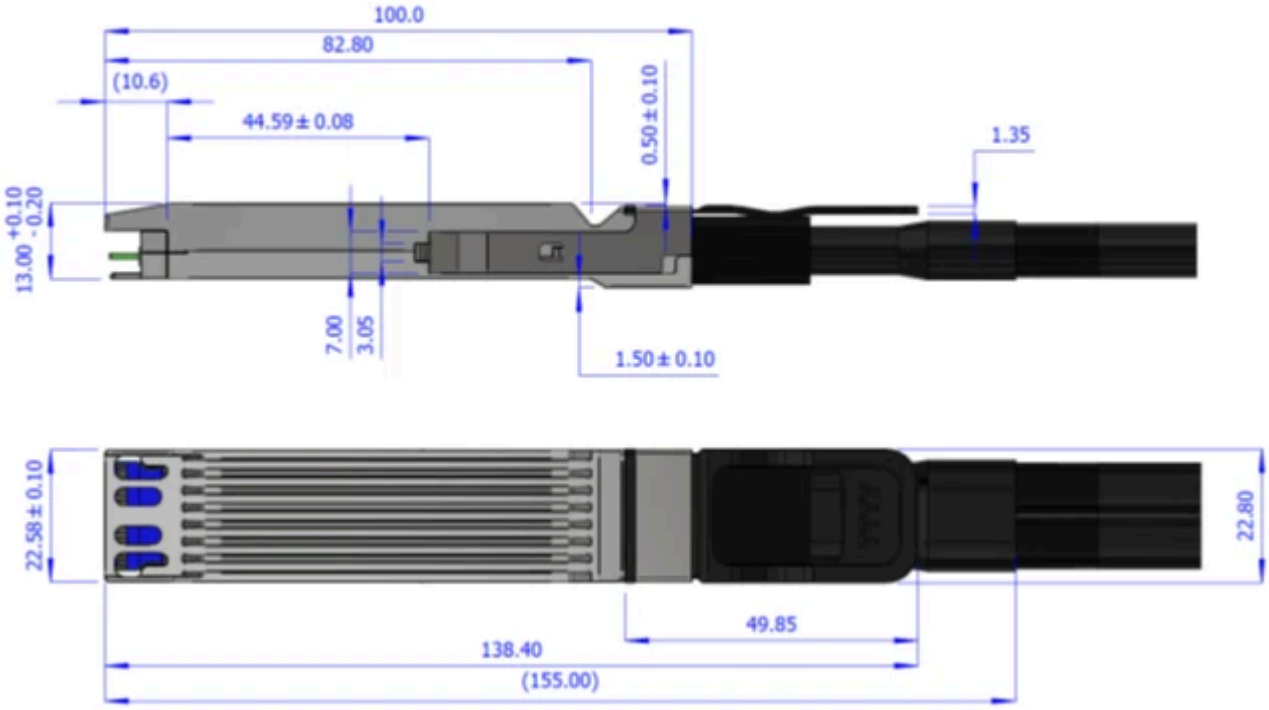
Mechanical Drawings

Cable Dimentions

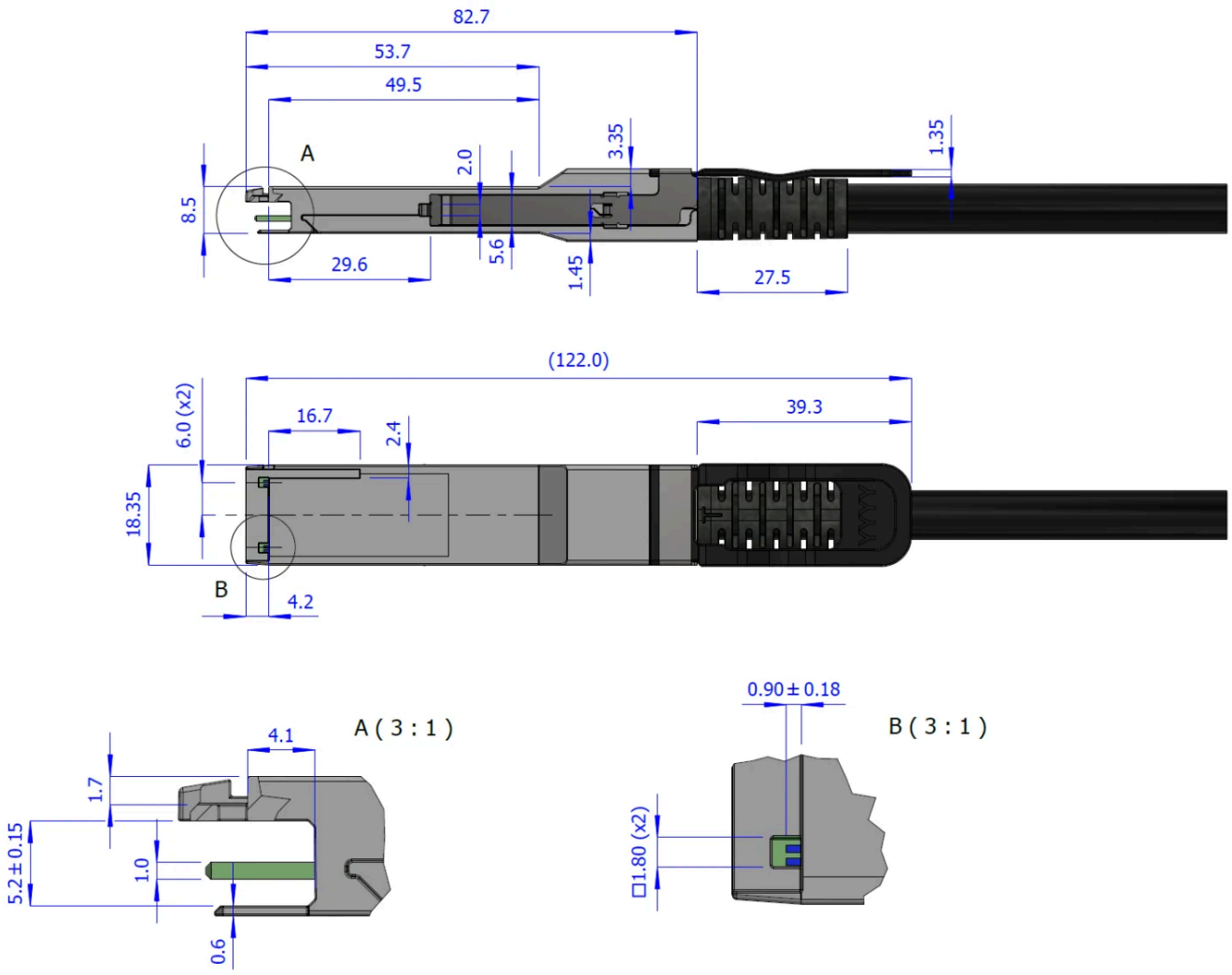


Head/End	Tab Color
OSFP (head)	Black
QSFP112 Port 1 (End)	Green
QSFP112 Port 2 (End)	Blue
QSFP112 Port 3 (End)	Yellow
QSFP112 Port 4 (End)	Red

Finned Head Dimensions

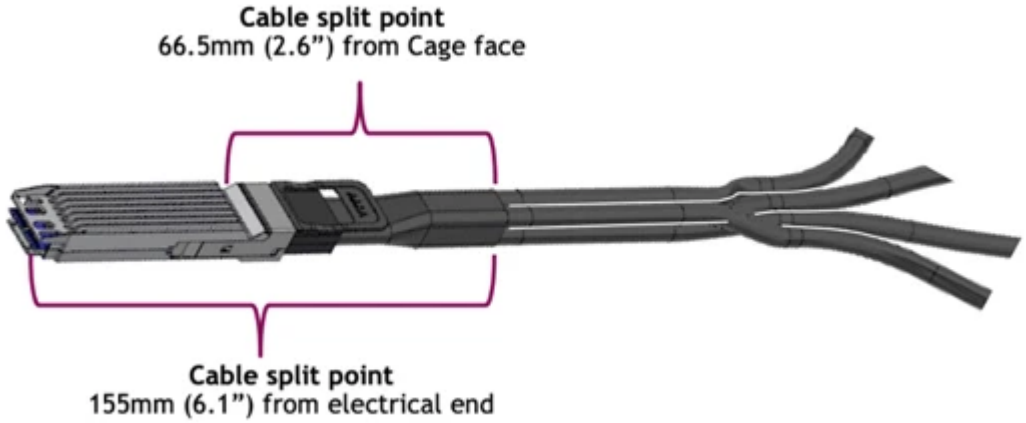


QSFP112 Flat Ends Dimensions



Cable Length Definition (specified in Ordering Information section)

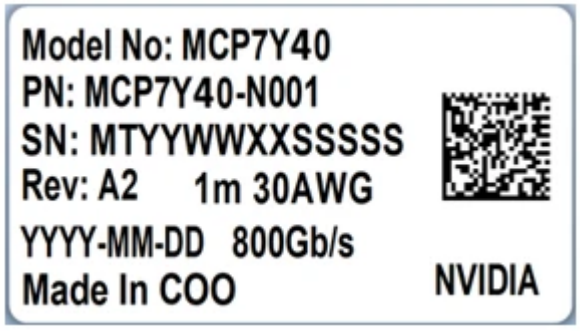
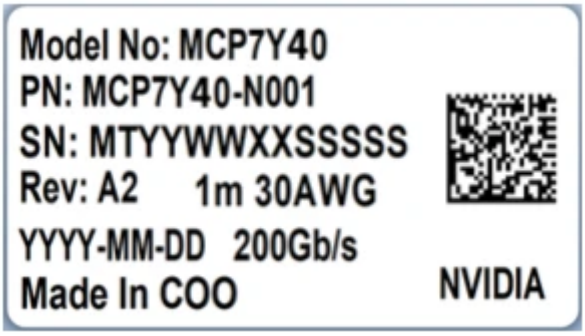
Cable Splitting Point



Labels

Backshell Label

The following label is applied on the cable’s backshell. Note that the images are for illustration purposes only. Labels look and placement may vary.

OSFP Head	QSFP112 Ends
	 *(sample illustration)*

> **Note**
>
> Images are for illustration purposes only. Product labels, colors, and form may vary.

Backshell Label Legend

Symbol	Meaning	Notes
PN – Part Number		
xx	Length	Meters
yy	Cable gauge	American wire gauge
SN – Serial Number		
MN	Manufacturer name	2 characters MT
YY	Year of manufacturing	2 digits
WW	Week of manufacturing	2 digits
MS	Manufacturer Site	2 characters
XXXXX	Serial number	5 digits for serial number. Reset at start of week to 00001.
Miscellaneous		
ZZ	HW and SW revision	2 alpha-numeric characters
Xm	Cable length	Meters
XXAWG	Cable gauge	American wire gauge
YYYY-MM-DD	Year-month-day	Year 4 digits, month 2 digits, day 2 digits
COO	Country of origin	E.g., China
	Quick response code	Serial number

Cable Jacket Label (Middle of Cable)

The following label is applied on the cable's jacket at each end. Note that the images are for illustration purposes only. Labels look and placement may vary.

(sample illustration)

> **Note**
>
> The serial number and barcode are for NVIDIA internal use only. Images are for illustration purposes only. Product labels, colors, and form may vary.

Regulatory Compliance and Classification

- Safety: CB, TUV, CE, EAC, UKCA
- EMC: CE, FCC, ICES, RCM, VCCI

Ask your NVIDIA FAE for a zip file of the certifications for this product.

FCC Class A Notice

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.

Cabling Information

Handling Precautions and Electrostatic Discharge (ESD)

The cable is compatible with ESD levels in typical data center operating environments and certified in accordance with the standards listed in the Regulatory Compliance Section. The product is shipped with protective caps on its connectors to protect it until the time of installation. In normal handling and operation of high-speed cables and optical transceivers, ESD is of concern during insertion into the QSFP cage of the server/switch. Hence, standard ESD handling precautions must be observed. These include use of grounded wrist/shoe straps and ESD floor wherever a cable/transceiver is extracted/inserted. Electrostatic discharges to the exterior of the host equipment chassis after installation are subject to system level ESD requirements.

Cable Management Guidelines

It is important to follow the instructions and information detailed NVIDIA Cable Management Guidelines and FAQ Application Note to insure proper and optimal installation of this cable and avoid physical damage.

Ordering Information

Ordering PN	Description
MCP7Y40-N001	NVIDIA passive copper splitter cable, IB twin port NDR 800Gb/s to 4x200Gb/s, OSFP to 4xQSFP112, 1m
MCP7Y40-N01A	NVIDIA passive copper splitter cable, IB twin port NDR 800Gb/s to 4x200Gb/s, OSFP to 4xQSFP112, 1.5m
MCP7Y40-N002	NVIDIA passive copper splitter cable, IB twin port NDR 800Gb/s to 4x200Gb/s, OSFP to 4xQSFP112, 2m
MCP7Y40-N02A	NVIDIA passive copper splitter cable, IB twin port NDR 800Gb/s to 4x200Gb/s, OSFP to 4xQSFP112, 2.5m
MCP7Y40-N003	NVIDIA passive copper splitter cable, IB twin port NDR 800Gb/s to 4x200Gb/s, OSFP to 4xQSFP112, 3m

Document Revision History

Revision	Date	Description
1.3	May. 2024	Updated Specifications and Introduction sections.
1.2	Jun. 2023	Added Cable Length Definition to the Mechanical Specifications section.
1.1	Apr. 2023	Formatted and published in HTML.
1.0	Dec. 2022	Initial release. Preliminary and subject to change.

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