MCP4Y10-Nxxx Twin-port 2x400Gb/s OSFP to 2x400Gb/s OSFP Passive DAC Product Specifications

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1 Introduction

NVIDIA® MCP4Y10 is an 2x400Gb/s twin-port OSFP (Octal Small Formfactor Pluggable) to 2x400Gb/s twin-port OSFP Direct Attached Copper cable (DAC).

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. Using the Octal Small Formfactor Plug (OSFP) and containing eight high-speed electrical copper pairs, each operating at data rates of up to 100Gb/s.

The DAC firmware supports both InfiniBand and Ethernet and is automatically enabled depending on the protocol of the switch attached to. EEPROMs provide product configuration information to be read by the host. Every cable length is tuned to reduce internal signal noise and back reflections.

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.

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

1.1 Key Features

- 2x400Gb/s data rate
- Based on 8-channels of 100G-PAM4 modulation
- 0.5, 1, 1.5, and 2-meter lengths
- SFF-8665 compliant
- Operating case temperature 0-70°C
- Single 3.3V supply voltage
- Hot pluggable
- RoHS compliant

- LSZH (Low Smoke Zero Halogen) jacket
- LF (Lead Free) HF (Halogen Free) PCB
- OSFPxmsa.org based
- SFF-8636 compliant I^2C management interface

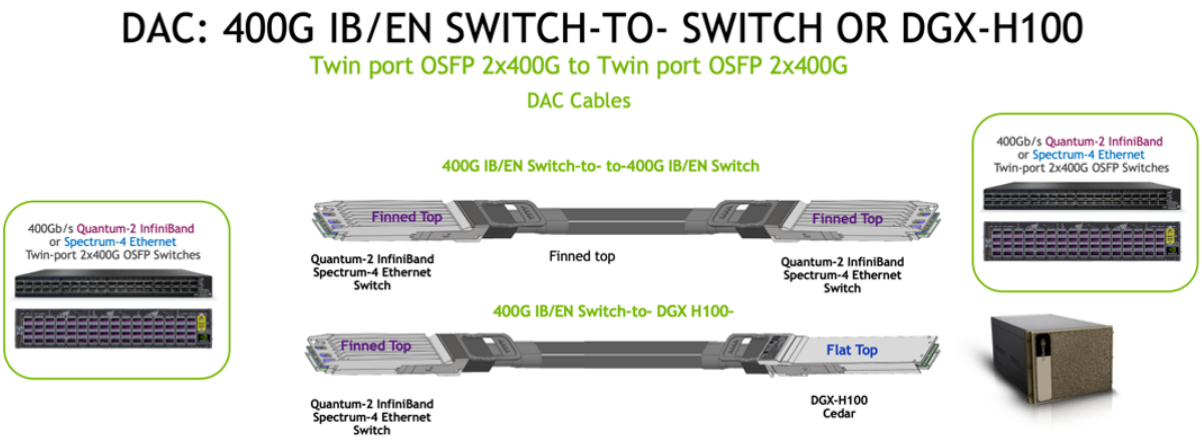
1.2 Applications

- 2x400Gb/s Quantum-2 InfiniBand or Spectrum-4 Ethernet switch-to-switch and switch-to-DGX-H100

2 Overview

The main use for the MCP4Y10 is to link together two twin-port, OSFP-based Quantum-2 InfiniBand or Spectrum-4 Ethernet switches to each other up to 2-meters with both ends being finned-top connectors. OSFP flat top (designated -FLT in the part number) cable ends are available for liquid-cooled switches and DGX H100 systems with a flat top for the DGX H100 and finned top connector for the InfiniBand or Ethernet switch. Thin 30AWG wire gauge is used for 0.5m to 2m for easy bending.

Use case illustration:



3 Pin Descriptions

The device is compliant with the Specification for OSFP (Octal Small Form Factor Pluggable) Modules, Rev. 1.12, see www.osfpmsa.org.

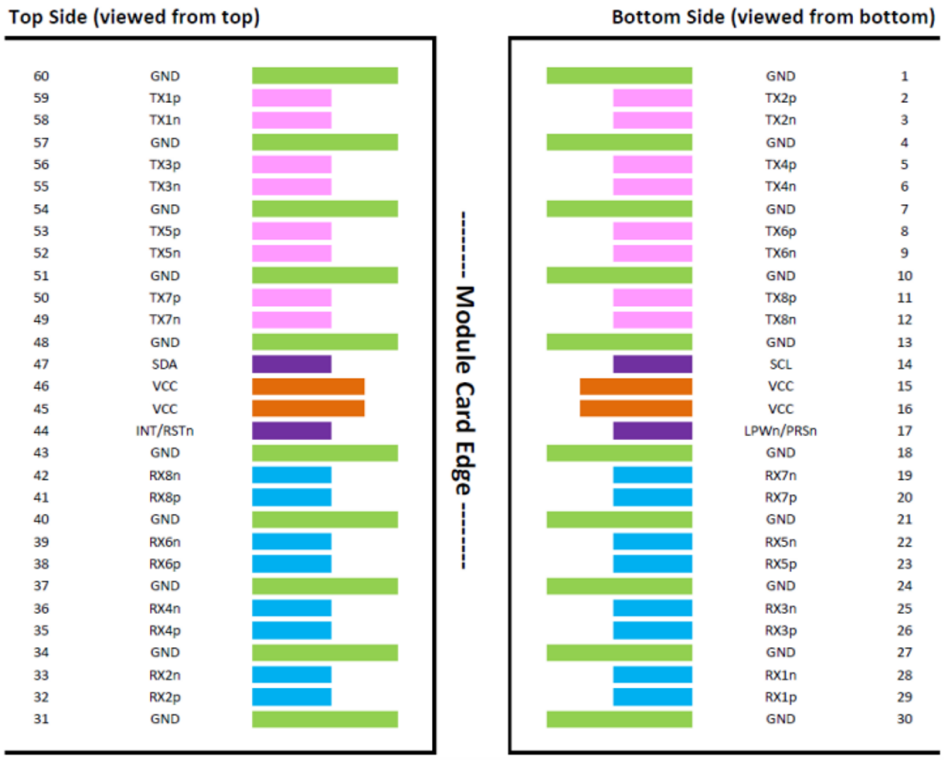
The pin assignment for the electrical (host) interface is shown below.

3.1 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
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

Pin	Symbol	Description	Pin	Symbol	Description
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

3.1.1 OSFP Module Pad Layout



4 Specifications

4.1 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

4.2 Environmental Specifications

This table shows the environmental specifications for the product.

Parameter	Min	Max	Units
Storage Temperature	-40	85	°C

4.3 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	%

4.4 Electrical Specifications

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

4.5 OSFP Memory Map

Page 00 Addr.	Register Name	Value and Description
0	SFF8024 Identifier	19h: OSFP form factor 8x pluggable transceiver
1	CMIS Revision Compliance	50h: CMIS Rev 5.0
2	Memory Model, MciMaxSpeed	80h: Flat memory (no paging), no CLEI, max 400 kHz TWI (I2C) frequency
3	Global status	07h: Module Ready, Interrupt not asserted
04 - 84	Lanes and flags	00h: No lane flags, no DDM flags
85	Media Type	03h: Passive Copper
86 - 117		Application Descriptors (8 x 4 bytes) numbered 1…8
86 - 89		Application Descriptor 1
86	Host IF	32h: InfiniBand NDR, 2 ports
87	Media IF	01h: Copper Cable
88	Host lane count	7-4 Host Lane count\ 3-0 Media Lane Count: 44h: 4 host lanes + 4 media lanes
89	Host Lane Assignment 0	01h: the Application is allowed on the host lane w bit = 1. Bits 0-7 correspond to host lanes 1-8.

Start Address	Application Descriptor	Host IF	Media IF	Host/Media Lane cnt	Host Lane Assignment
86 - 89	1	32h: InfiniBand NDR, 2 ports	01h: Copper Cable	44h: 4 host + 4 media	11h: Lane 1 and 5
90 - 93	2	2Ch: IB SDR (4x two ports)	01h	44h	11h
94 - 97	3	49h: Eth 800GBASE-CR8 (8x one port)	01h	88h	01h
98 - 101	4	48h: Eth 400GBASE-CR4 (4x two ports)	01h	44h	11h
102 -105	5	47h: 200GBASE-CR2 (four ports)	01h	22h	55h
106 - 109	6	46h: 100GBASE-CR1 (eight ports)	01h	11h	FFh
110 -113	7	1Dh: 400GBASE-CR8 (one port)	01h	88h	01h
114 - 117	8	1Ch: 200GBASE-CR4 (two ports)	01h	44h	11h

118 - 121	Password Chg Entry	New password value
122 - 125	Password Entry	Password value
126	Bank Select Byte	
127	Page Select Byte	

Page 00 Addr.	Register Name	Value and Description
128	SFF8024 Identifier	19h: OSFP form factor 8x pluggable transceiver (same as addr 00)
129 - 144	VendorName	Vendor name (ASCII), padded w spaces: 'NVIDIA '
145	VendorOUI	Nvidia OUI: 48h, B0h, 2Dh
148 - 163	VendorPN	Part number: 'MCP4Y10-N0xx-M '
164 - 165	VendorRev	Revision
166 - 181	VendorSN	Serial number
182 - 189	DateCode	Date code, (YYMMDD__)
200 - 201	Power Class	00h: Power Class 1, 07h: max power in units of 0.25 W
202	Link Length	Cable Length (m), 7-6: multiplier x value in bits 5-0 (00 = multiplier of .1 \ 01 = multiplier of 1\10 = multiplier of 10 \11 = multiplier of 100), e.g. 41h: 1 m
203	Connector Type	Connector Type (SFF-8024) 23h: No separable connector
204 - 207	Attenuation	Cable attenuation at 5, 7, 12.9, 25.8 GHz
210	Media Lane Info	00h: all near end lanes are implemented
211	Far End Config.	02h: all 8 lanes are lane group a.
212	Media IF Technology	0Ah: Copper cable, unequalized
222	PageChecksum	Checksum of bytes 128-221 (low order 8 bits)
223 - 255	Custom Info	Custom data including traceability info

4.6 Mechanical Specifications

Parameter	Value		Units
Diameter	30AWG: 7.2 ±0.03 26AWG: 8.9 ±0.03		mm
Length tolerance	length < 2 m	±25	mm
	length ≥ 2 m	±50	

4.6.1 Minimum Bend Radius

OPN	Length (m)	AWG (mm)	Cable Diameter	Min bend radius R (mm)	Assembly Space L** (mm)
MCP4Y10-N00A	0.50	30AWG, 2x8pairs	7.2	72	135
MCP4Y10-N00A	0.75	30AWG, 2x8pairs	7.2	72	135

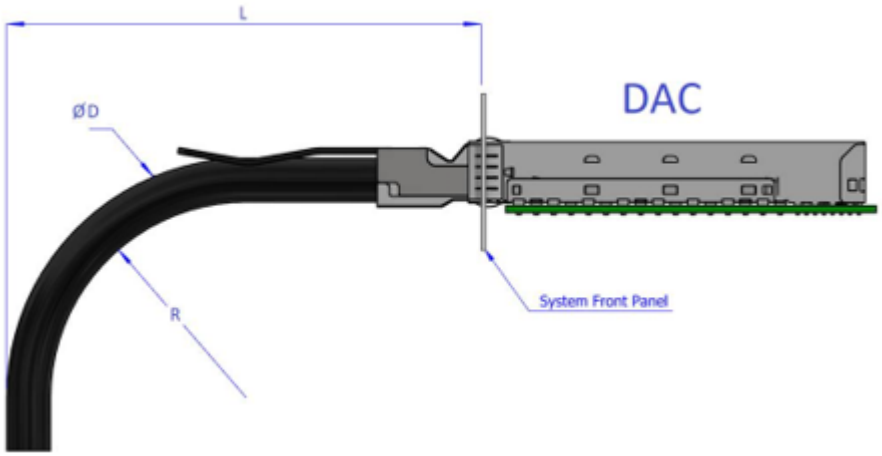
OPN	Length (m)	AWG (mm)	Cable Diameter	Min bend radius R (mm)	Assembly Space L** (mm)
MCP4Y10-N00A	1.0	30AWG, 2x8pairs	7.2	72	135
MCP4Y10-N00A	1.5	30AWG, 2x8pairs	7.2	72	135
MCP4Y10-N00A	2.0	26AWG, 2x8pairs	8.9	89	156

The 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.

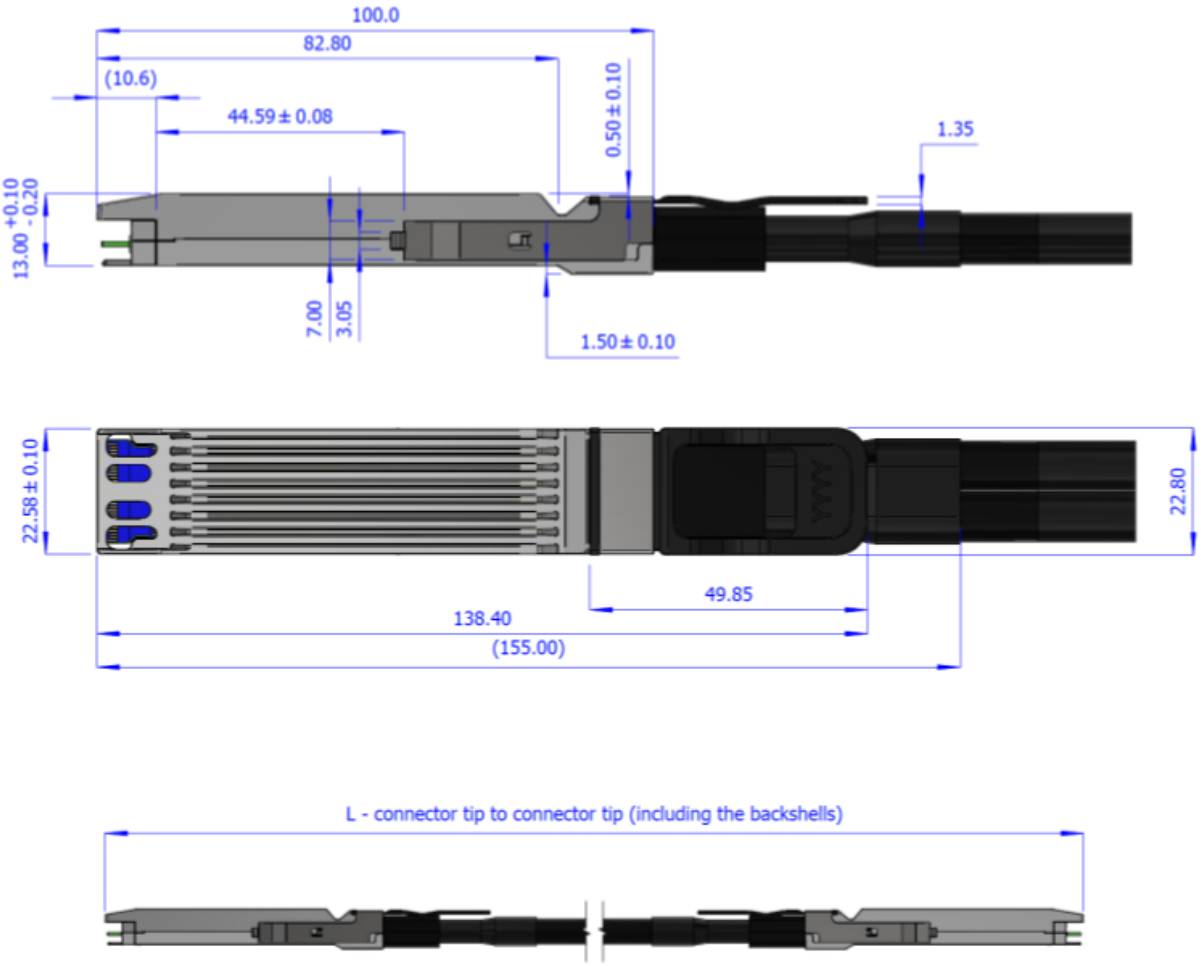
L = Assembly Space. Minimum value depends on the backshell (connector housing) dimensions = the space for the cable assembly behind the rack door.

4.6.2 Assembly Bending Radius

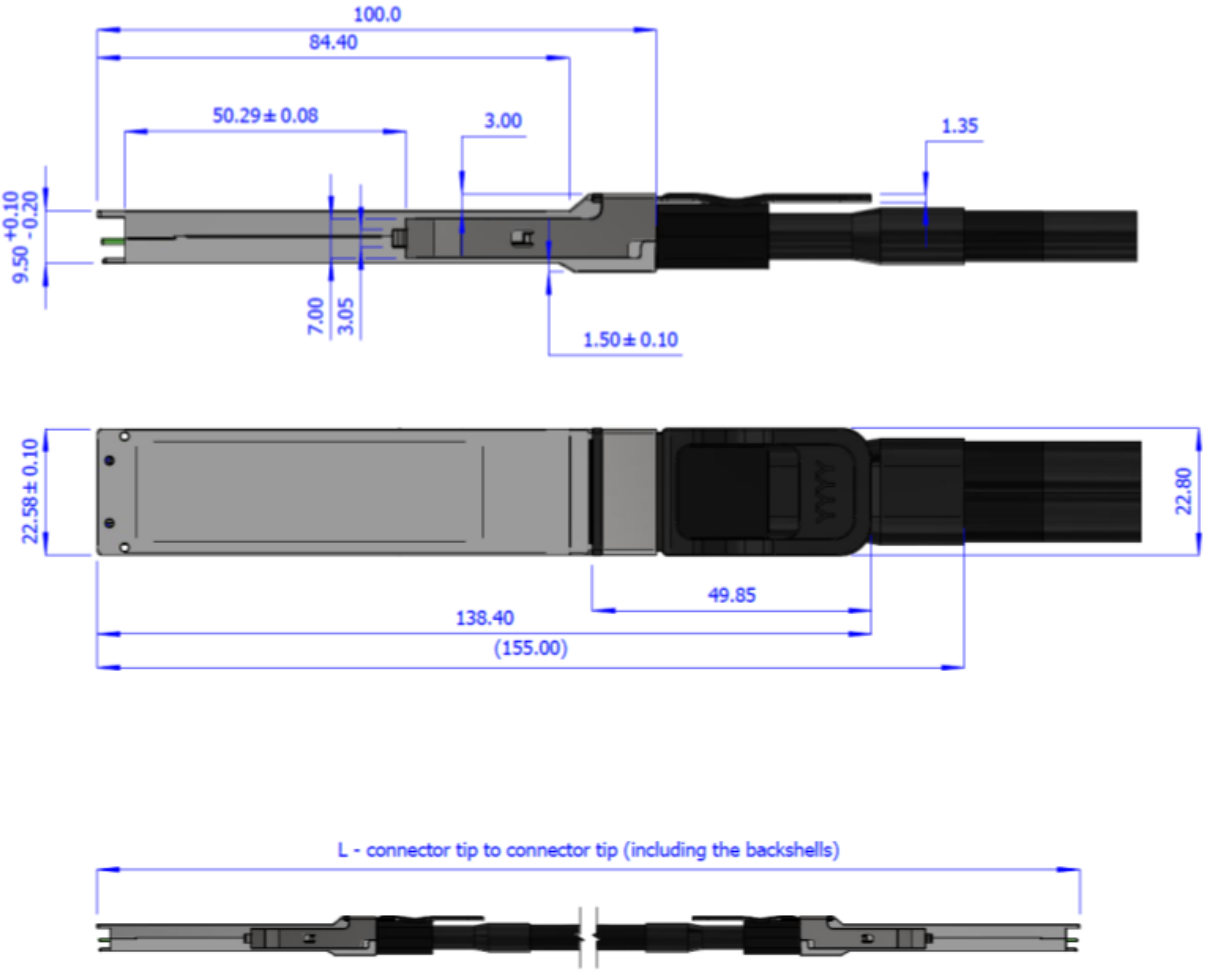


4.6.3 Mechanical Drawings

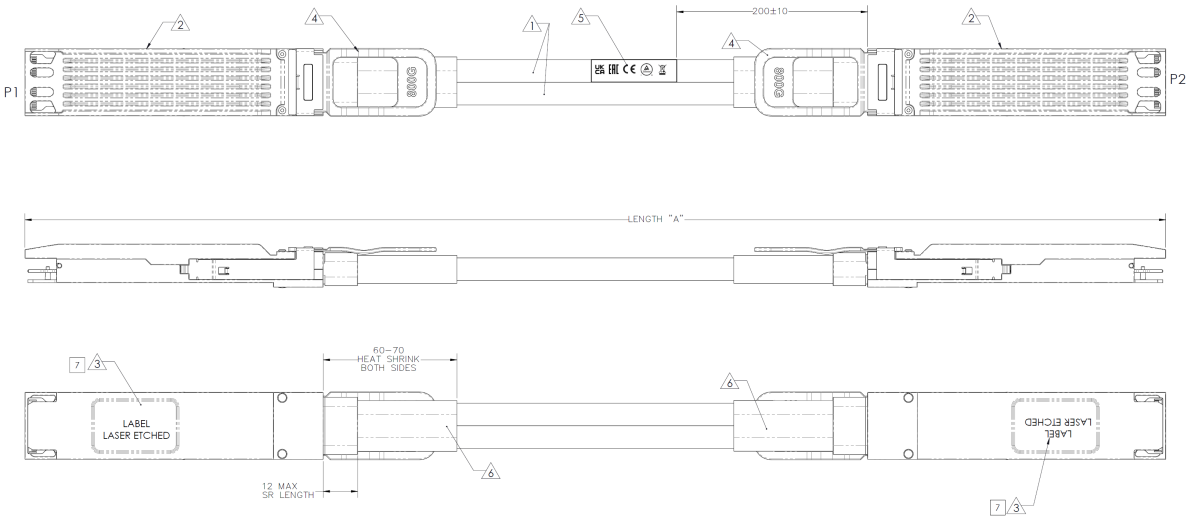
4.6.3.1 Option 1: Finned Top

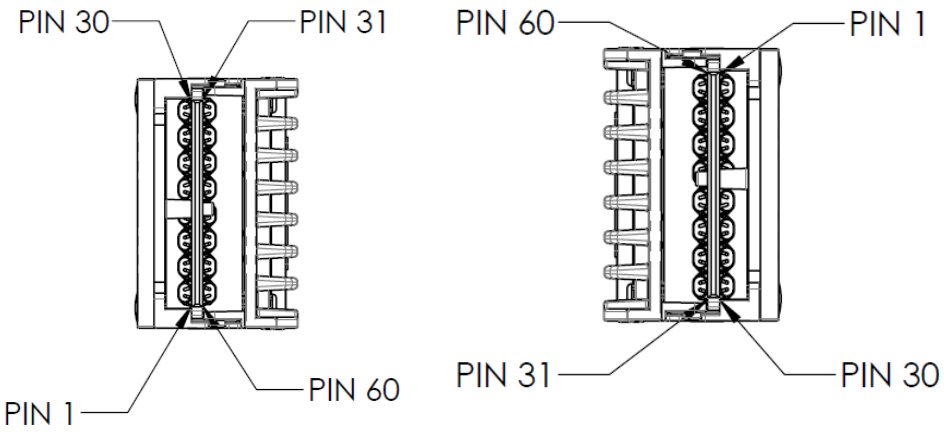


4.6.3.2 Option 2: Flat Top



4.6.3.3 Option 3: Finned Top

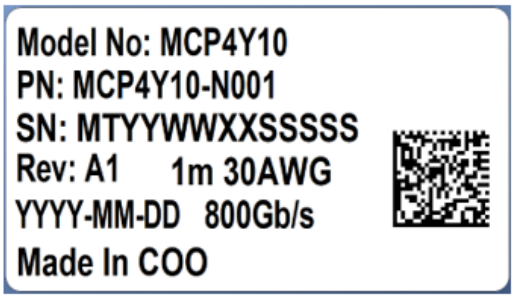




4.7 Labels

4.7.1 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.



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

4.7.1.1 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

4.7.2 Cable Jacket Label (Middle of Cable)

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

(sample illustration)

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

4.8 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.

4.9 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.

4.10 Cabling Information

4.10.1 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.

4.10.2 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.

5 Ordering Information

Legacy OPN	NVIDIA OPN	Description
MCP4Y10-N00A	980-9IA0K-00N00A	NVIDIA passive copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 0.5m
MCP4Y10-N001	980-9IA0F-00N001	NVIDIA passive copper cable, IB NDR, up to 800Gb/s, OSFP, 1m
MCP4Y10-N01A	980-9IA0Q-00N01A	NVIDIA passive copper cable, IB NDR, up to 800Gb/s, OSFP, 1.5m
MCP4Y10-N002	980-9IA0I-00N002	NVIDIA passive copper cable, IB NDR, up to 800Gb/s, OSFP, 2m
Flat Top OPNs		
MCP4Y10-N00A-FLT	980-9IA0L-00N00A	NVIDIA passive copper cable, IB NDR, up to 800Gb/s, OSFP, 0.5m, flat top
MCP4Y10-N001-FLT	980-9IA0G-00N001	NVIDIA passive copper cable, IB NDR, up to 800Gb/s, OSFP, 1m, flat top
MCP4Y10-N002-FLT	980-9IA0J-00N002	NVIDIA passive Copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 2m, flat top

6 Document Revision History

Revision	Date	Description
1.3	Jul. 2025	Updated the ordering information.
1.2	Sep. 2023	Updated the mechanical drawings.
1.1	Apr. 2023	Formatted for html on-line.
1.0	Dec. 2022	Initial release. Preliminary and subject to change.

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