MCA4J80-Nxxx 800Gb/s Twin-port OSFP to 2x400Gb/s OSFP InfiniBand ACC Product Specifications

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Introduction

NVIDIA® MCA4J80 is a 800Gb/s twin-port OSFP (Octal Small Formfactor Pluggable)-to-2x400Gb/s twin-port OSFP Active Copper Cable (ACC) for InfiniBand NDR networking.

ACC cables are the second lowest-cost, lowest-latency, very low-power consuming, high-speed links available due to their simplicity of design and minimal components. The “active” term refers to the passive copper cable with an equalizer integrated circuit to extend the length to 3, 4, and 5 meters while maintaining very low-latency and very low-power at 1.5 Watts per end. Thin 30AWG is used for 4m lengths and thicker 26AWG for 5m. Each end includes an EEPROM which provides product identification and characteristics to the host system. For lengths less than 3 meters, use passive DAC cables.

An ACC is a passive DAC with a pre-emphasis equalizer IC included in each end, enabling cable lengths of up to 5 meters while maintaining very low-latency and very low-power at 1.5 Watts a per end. Every cable length is tuned to reduce signal noise and back reflections. The ACC firmware supports both InfiniBand and Ethernet and is automatically enabled depending on the protocol of the switch attached to.

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.

Key Features

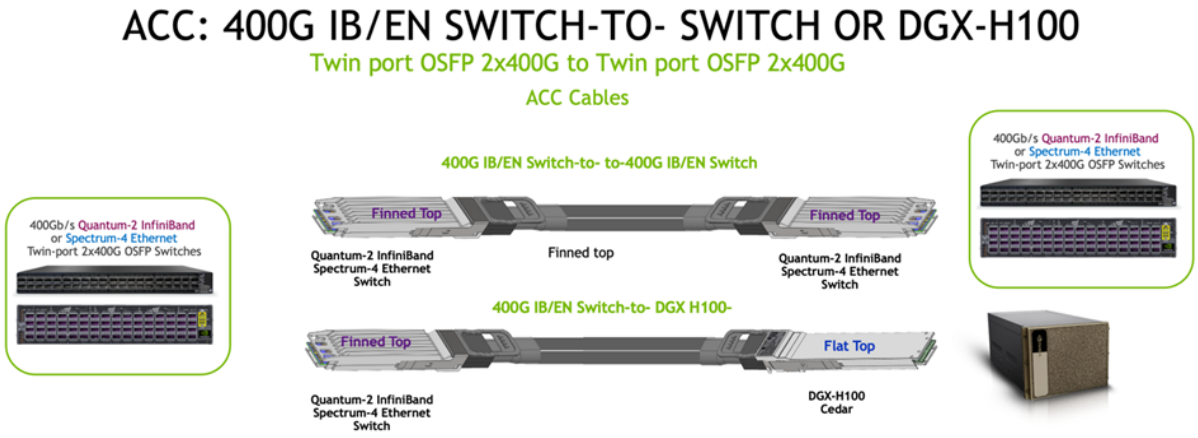
- 2x400Gb/s data rate
- Based on 8-channels of 100G-PAM4 modulation
- 5m max length
- 1.5 Watts max per end
- Operating case temperature 0°C to +70°C
- Single 3.3V supply voltage
- Hot pluggable
- RoHS compliant
- LSZH (Low Smoke Zero Halogen) jacket
- LF (Lead Free) HF (Halogen Free) PCB
- SFPmsa.org based
- SFF-8636 based I^2C management interface

Applications

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

Overview

The main use case for the MCA4J80 is to link two 800Gb/s Quantum-2 switches to each other (up to 5-meters). The 3-meter, flat and finned-top cable is for linking Quantum-2 switches to DGX-H100 Cedar systems.



Pin Description

The device is OSFP MSA Specification for OSFP Octal Small Form Factor Pluggable Module Rev. 1.12 compliant, see www.osfpmsa.org.

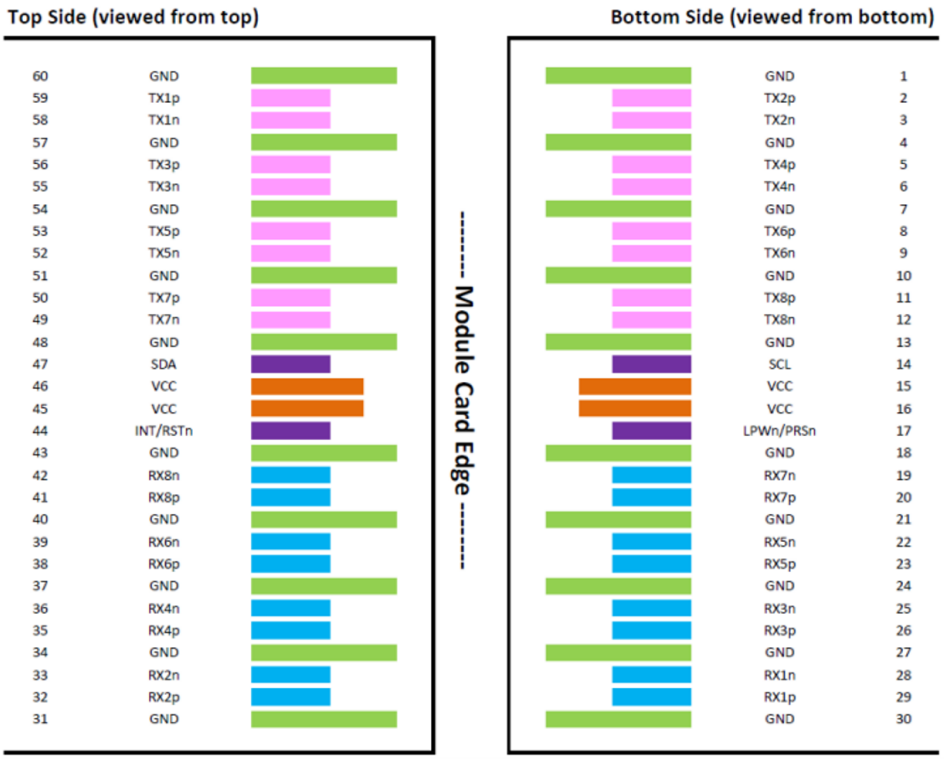
The pin assignment for the interface is shown below.

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
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

Pin	Symbol	Description	Pin	Symbol	Description
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



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	--	--	1.5	W
Operating Case Temperature	0		70	°C
Operating Relative Humidity	5		85	%

Electrical Specifications

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

Mechanical Specifications

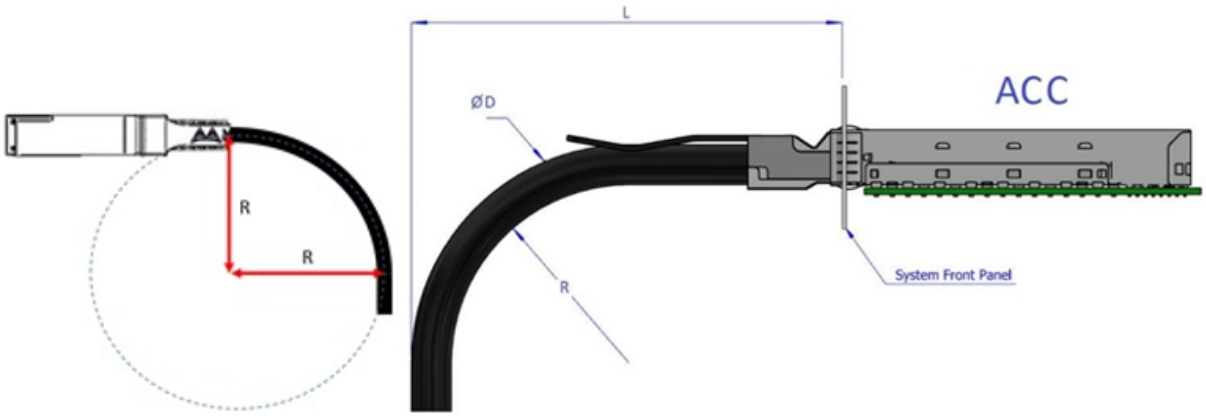
Parameter	Value		Units
Diameter	30AWG: 7.2 ±0.03 26AWG: 8.9 ±0.03		mm
Minimum bend radius	Single: 5x diameter Repeated: 10x diameter		mm
Length tolerance	length < 2 m	±25	mm
	length ≥ 2 m	±50	

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.

Minimum Bend Radius

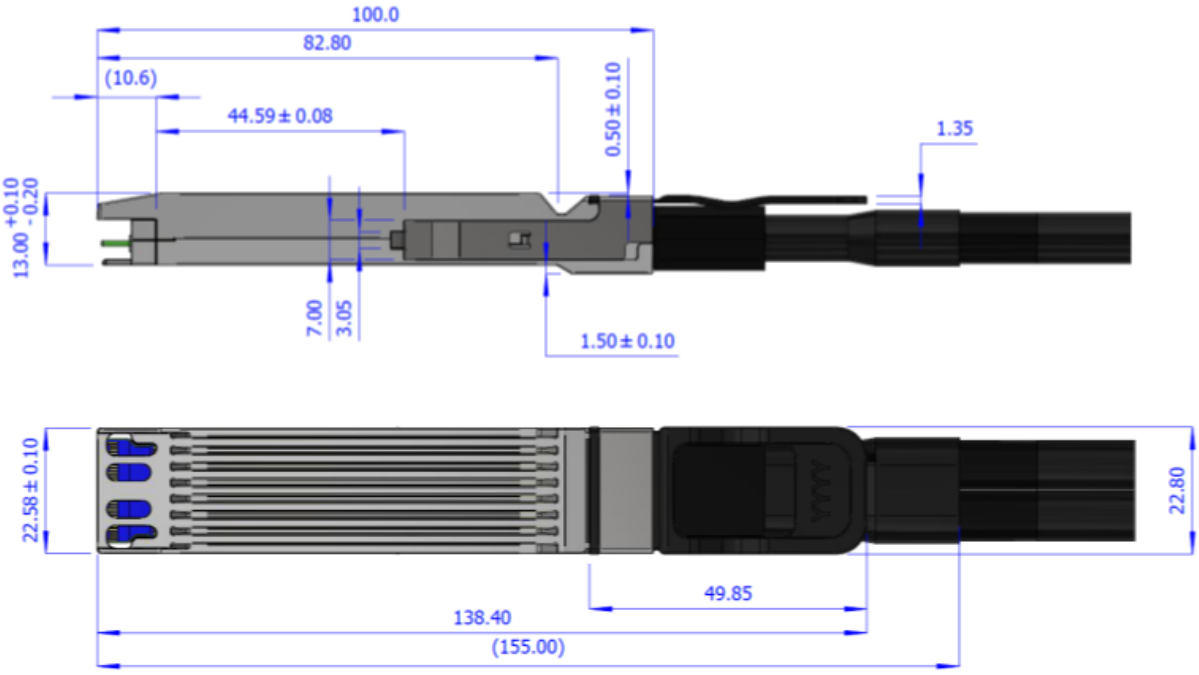
OPN	Length (m)	AWG (mm)	Cable Diameter	Min bend radius R (mm)	Assembly Space L** Combined/Single end (mm)
MCA4J80-N003	3.0	30AWG, 2x8pairs	7.2	72	135/128
MCA4J80-N004	4.0	30AWG, 2x8pairs	7.2	72	135/128
MCA4J80-N005	5.0	26AWG, 2x8pairs	8.9	89	156/147

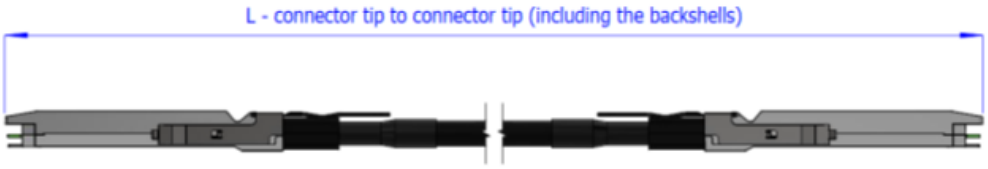
Assembly Bending Radius



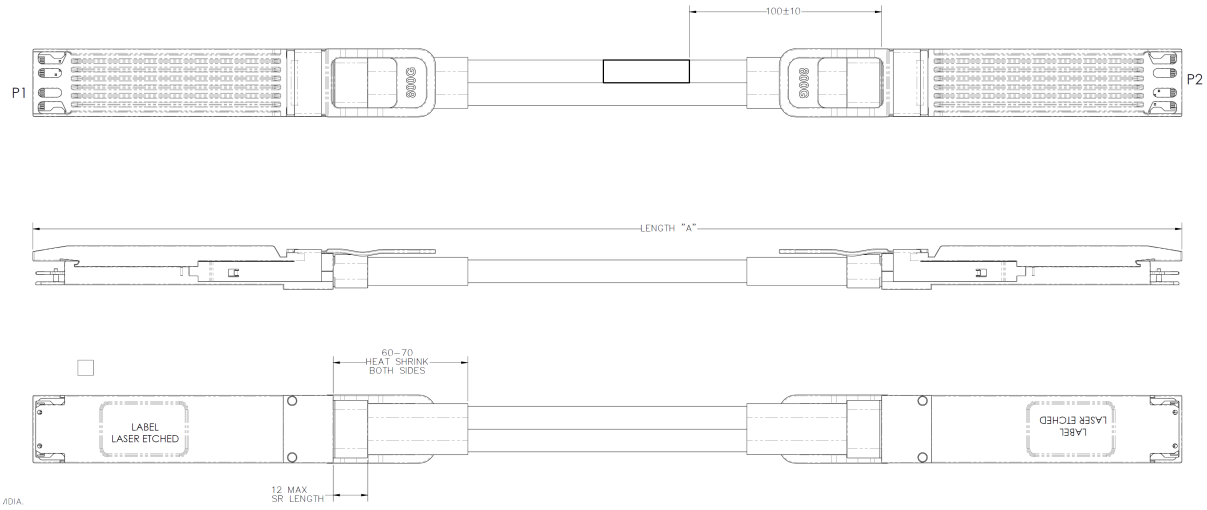
Mechanical Dimensions

Option 1:





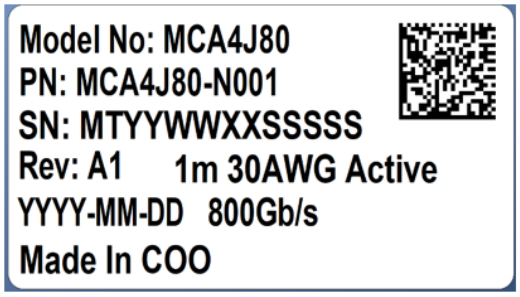
Option 2:



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.



(sample illustration)

> ⚠ 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

Symbol	Meaning	Notes
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. 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.

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
MCA4J80-N003	NVIDIA Active copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 3m
MCA4J80-N004	NVIDIA Active copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 4m
MCA4J80-N005	NVIDIA Active copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 5m
MCA4J80-N003-FLT	NVIDIA Active copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 3m, flat top
MCA4J80-N003-FTF	NVIDIA Active copper cable, IB twin port NDR, up to 800Gb/s, OSFP, 3m, flat to finned

Document Revision History

Revision	Date	Description of Changes
1.3	Jan. 2024	Added alternate mechanical drawings.
1.2	Apr. 2023	Formatted for html on-line.
1.1	Oct. 2022	Updated the introduction. Minor text edits.
1.0	Dec. 2022	Initial release. Preliminary and subject to change.

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