



# **MCA7J60-Nxxx 800Gb/s Twin-port OSFP to 2x400Gb/s OSFP ACC Splitter Product Specifications**

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# Introduction

NVIDIA® MCA7J60 is an 800Gb/s twin-port OSFP (Octal Small Form-factor Pluggable) to 2x400Gb/s OSFP passive Active Copper Cable (ACC) dual breakout (aka splitter) cable. The ACC uses 8-channels of 100G-PAM4 modulation and has lengths of 4 and 5-meters. It has identical design and internals as the QSFP112 version, only with different connector shells.

The ACC 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 two 400G ends support 4-channels of 100G-PAM4 (400G) use a flat top OSFP for use in ConnectX-7 adapters using riding heat sinks on the connector cage. For use in liquid-cooled systems, a twin-port OSFP version is available with a flat top (designated -FLT in the part number).


ACC cables are the second lowest-cost, low-latency, low-power consuming, high-speed links next to passive DACs 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 4 and 5-meters while maintaining low-latency and low-power at 1.5 Watts and 0.6 Watts.

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.

Main use is linking an 800Gb/s Quantum-2 switch or Spectrum-4 switch to OSFP-based 400Gb/s ConnectX-7 PCIe network adapter cards.

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

- Up to 800Gb/s split to two 400Gb/s data rates
- Based on 100G-PAM4 modulation
- OSFP switch end 1.5 Watts
- Single port OSFP ends 0.6 Watts
- 4 and 5-meter lengths
- 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](https://www.OSFPxmsa.org) compliant
- CMIS compliant I<sup>2</sup>C management interface

## Applications

- Quantum-2 InfiniBand or Spectrum-4 Ethernet switch-to-two 400Gb/s ConnectX-7 OSFP adapters

# Overview

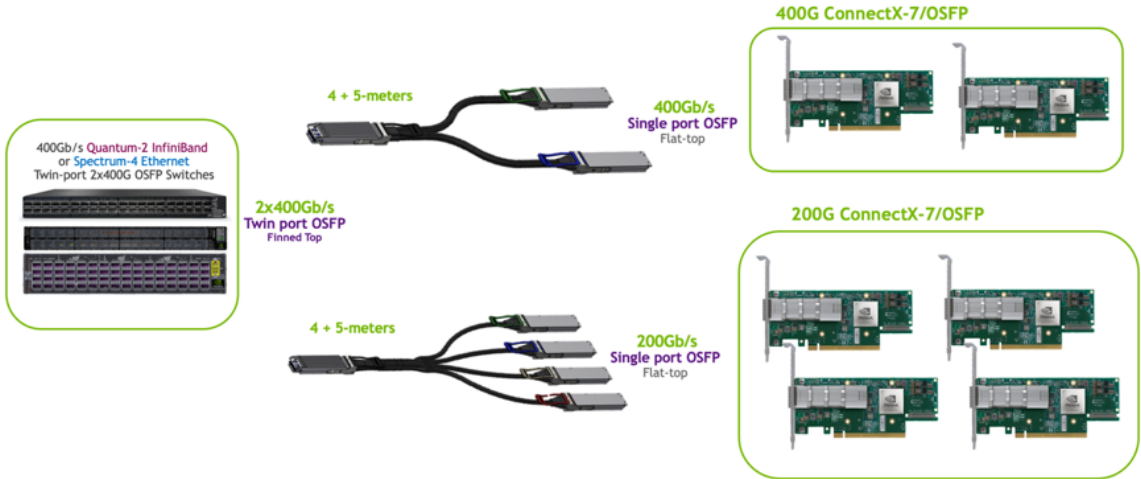
The single port OSFP is used only with ConnectX-7/OSFP network adapters.

BlueField-3/QSFP112 DPUs and ConnectX-7/QSFP112 adapters require QSFP112 ends found on the MCA7J65 and MCA7J75.

Use case illustration:

## ACC: 400G IB/EN SWITCH-TO- 2X AND 4X CONNECTX-7/OSFP

Twin port OSFP 2x400G to 2x 400G and 4x 200G single port OSFP  
ACC Cables



The splitter ACC cables are available in:

- 1:2 splits (2x 400G) MCA7J60 4-channels x 100G-PAM4
- 1:4 splits (4x 200G) MCA7J70 2-channels x 100G-PAM4.

# Pin Descriptions

The device is compliant with the Specification for OSFP (Octal Small Form Factor Pluggable) Modules.

The pin assignment for the interface is shown below.

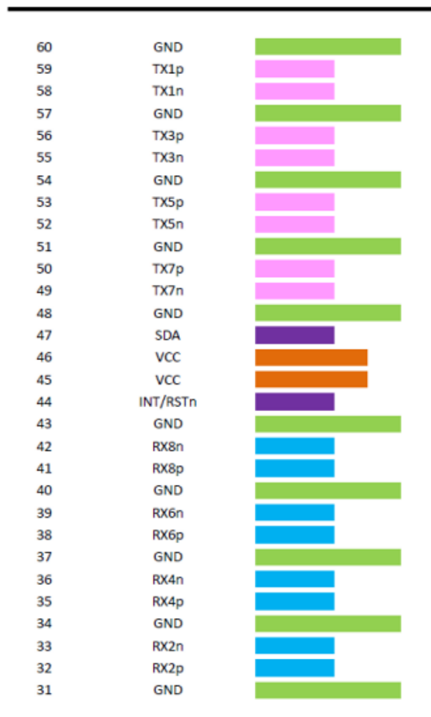
## OSFP Pin Description

| 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 |

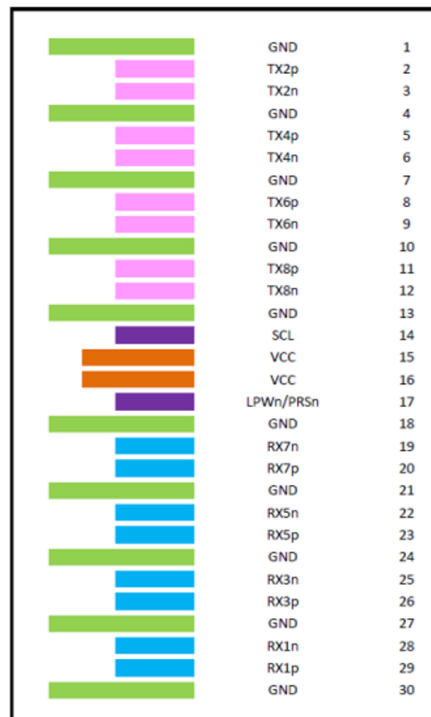
| Pin | Symbol | Description                       | Pin | Symbol | Description                         |
|-----|--------|-----------------------------------|-----|--------|-------------------------------------|
| 24  | GND    | Ground                            | 54  | GND    | Ground                              |
| 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

Top Side (viewed from top)



Bottom Side (viewed from bottom)



----- Module Card Edge -----

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# 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 (800G head end for the switch) | --    | --  | 1.5   | W     |
| Power Consumption (400G tails for the HCA)       | --    | --  | 0.6   | 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 |

## 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: Active Copper   |                   |                       |                      |
| 86 - 117      |                           | Application Descriptors (8 x 4 bytes) numbered 1...8                   |                   |                       |                      |
| Start Address | Application Descriptor    | Host IF  | Media IF          | Host/Media Lane cnt   | Host Lane Assignment |
| 86 - 89       | 1                         | 31h: 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                         | 1Ch: Eth 800GBASE-CR8 (8x one port)                                    | 01h               | 44h                   | 11h                  |
| 98 - 101      | 4                         | 1Bh: Eth 400GBASE-CR4 (4x two ports)                                   | 01h               | 22h                   | 55h                  |
| 102 - 105     | 5                         | 1Ah: 200GBASE-CR2 (four ports)   | 01h               | 44h                   | 11h                  |
| 106 - 109     | 6                         | 45h: 100GBASE-CR1 (eight ports)  | 01h               | 22h                   | 55h                  |
| 110 - 113     | 7                         | 18h: 400GBASE-CR8 (one port)   | 01h               | 11h                   | FFh                  |
| 114 - 117     | 8                         | 16h: 200GBASE-CR4 (two ports)  | 01h               | 11h                   | FFh                  |
| 118 - 121     | Password Chg Entry        |  |                   |                       |                      |
| 122 - 125     | Password Entry            |  |                   |                       |                      |
| 126           | Bank Select Byte          |  |                   |                       |                      |
| 127           | Page Select Byte          |  |                   |                       |                      |
| 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: 'MCA7J60-Nxxx'  |                   |                       |                      |
| 164 - 165     | VendorRev                 | Revision   |                   |                       |                      |
| 166 - 181     | VendorSN                  | Serial number  |                   |                       |                      |
| 182 - 189     | DateCode                  | Date code, (YYMMDD__)  |                   |                       |                      |
| 200           | Power Class               | 00h: Power Class 1, 07h: max power in units of 0.25 W                  |                   |                       |                      |
| 201           | Max power consumption     | 04/02 (multiplier x 0.25W)   |                   |                       |                      |



| Page 00 Addr. | Register Name       | Value and Description   |
|---------------|---------------------|---|
| 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.     | 03h: 2x applications with 4x lanes each (aaaa,eeee)   |
| 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   |

## Mechanical Specifications

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

## Minimum Bend Radius

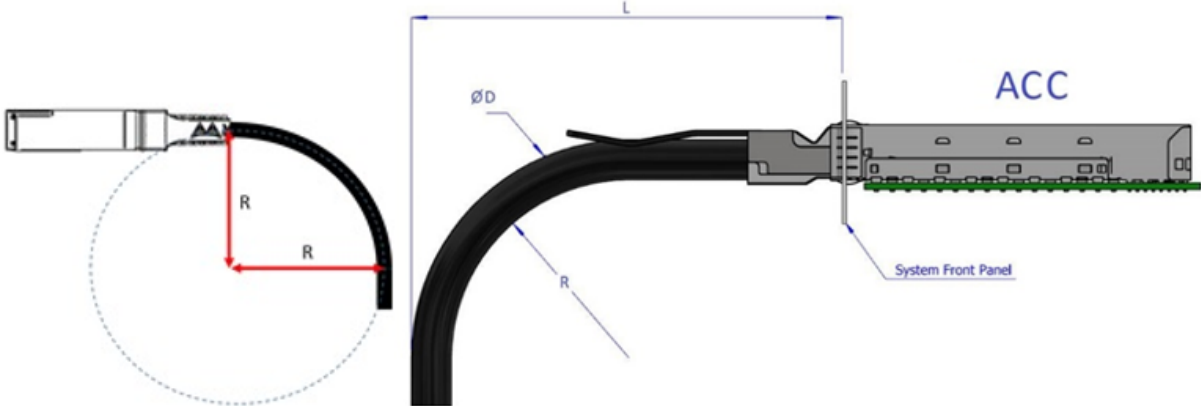
| OPN          | Length (m) | AWG (mm)           | Cable Diameter | Min bend radius R (mm) | Assembly Space L** Combined/Single End (mm) |
|--------------|------------|--------------------|----------------|------------------------|---|
| MCA7J60-N004 | 4.0        | 30AWG,<br>2x8pairs | 7.2            | 72                     | 135/128                                     |
| MCA7J60-N005 | 5.0        | 26AWG,<br>2x8pairs | 8.9            | 89                     | 156/147                                     |

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.

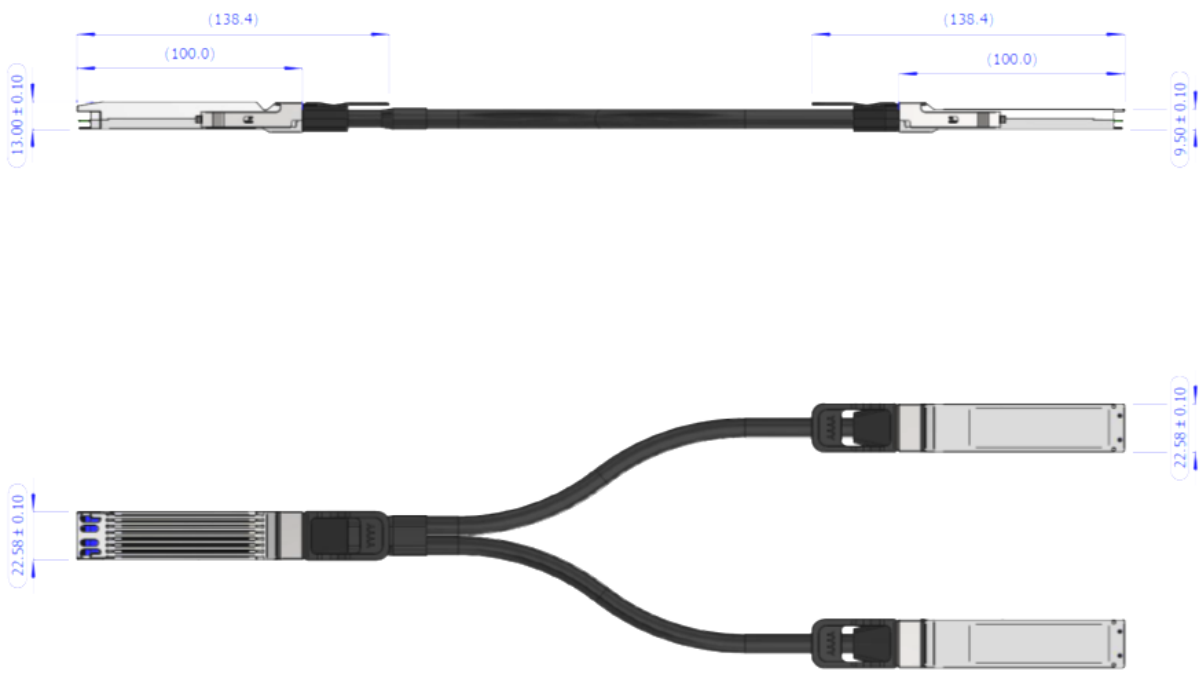
L = Assembly Space. Minimum value depends on the backshell (connector housing) dimensions = the space for the cable assembly behind the rack door.

### Assembly Bending Radius

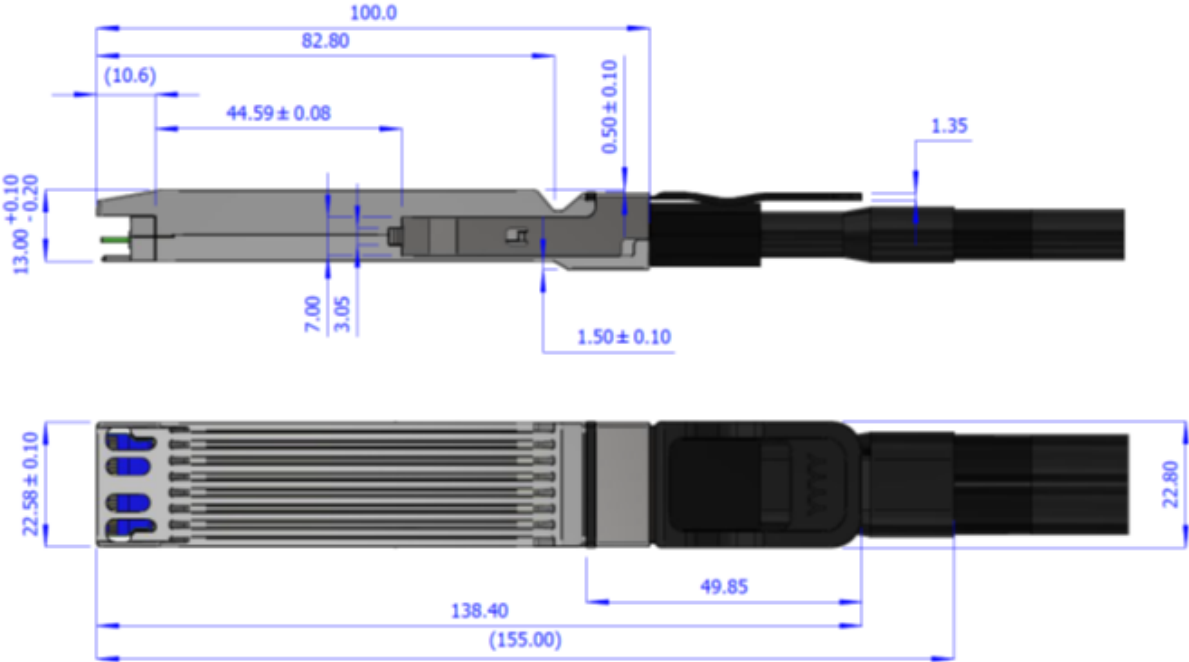


### Mechanical Drawings

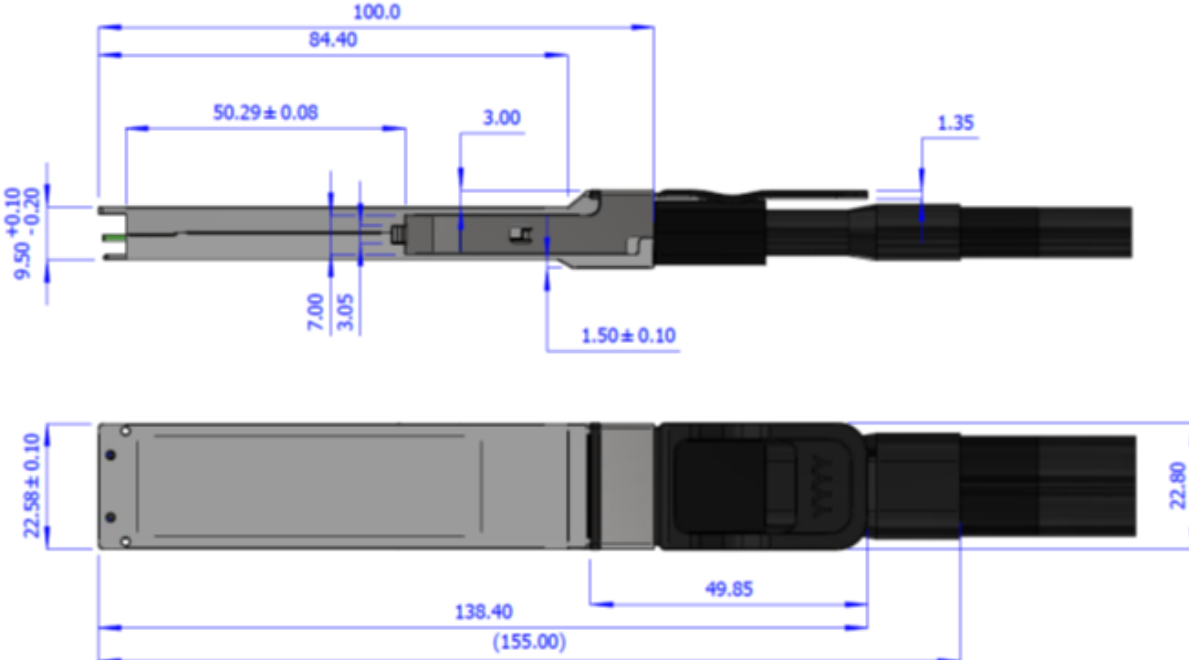
#### Cable Dimensions



### Finned Head Dimensions



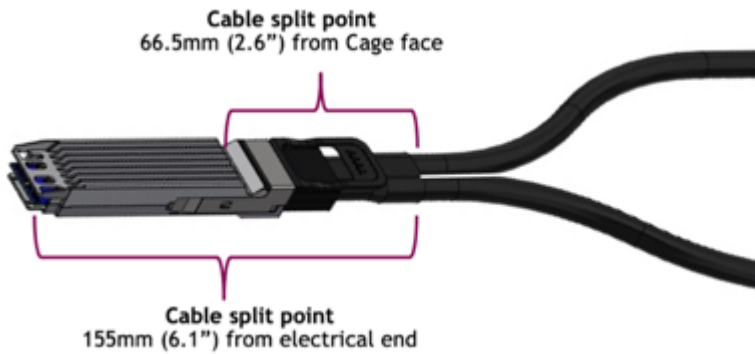
### Flat Ends Dimensions



## 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 switch end   | OSFP split ends  |
|---|--|
| <p>Model No: MCA7J60<br/>           PN: MCA7J60-N004<br/>           SN: MTYWWXSSSSS<br/>           Rev: A2 Xm XXAWG Active<br/>           YYYY-MM-DD 800Gb/s<br/>           Made In COO</p>  <p>NVIDIA</p> | <p>Model No: MCA7J60<br/>           PN: MCA7J60-N004<br/>           SN: MTYWWXSSSSS<br/>           Rev: A2 Xm XXAWG<br/>           YYYY-MM-DD 400Gb/s<br/>           Made In COO</p>  <p>NVIDIA</p> <p><i>(sample illustration)</i></p> |

 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. 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.

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# Ordering Information

| Ordering PN  | Description  |
|--------------|--|
| MCA7J60-N004 | NVIDIA active copper splitter cable, IB twin port NDR 800Gb/s to 2x400Gb/s, OSFP to 2xOSFP, 4m |
| MCA7J60-N005 | NVIDIA active copper splitter cable, IB twin port NDR 800Gb/s to 2x400Gb/s, OSFP to 2xOSFP, 5m |

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# Document Revision History

| Revision | Date      | Description of Changes  |
|----------|-----------|---|
| 1.3      | Jun. 2023 | Added Cable Length Definition to the Mechanical Specifications section. |
| 1.2      | Apr. 2023 | Formatted and published in HTML.  |
| 1.1      | Oct. 2022 | Updated the introduction.<br>Minor text edits.                          |
| 1.0      | Dec. 2022 | Initial release. Preliminary and subject to change.                     |



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