# Product Specification

800G OSFP to 2x400G QSFP112 Passive
Breakout Direct Attach Copper Cable

P/N: NDR-OSFP-2Q-CU

## Features

- Supporting 800Gbps to 2x400Gbps

- Wire AWG:30AWG,28AWG

- Available length range 0.5m~2.5m

- Data rates per channel 106.25Gbps

- Operating data rate 850Gbps

- Power supply：+3.3V

- Max power dissipation <0.1W

- Commercial temperature range 0°C to 70°C

## Compliance

- Compliant with OSFP MSA and QSFP112 MSA

- Compliant with CMIS 5.1

- IEEE 802.3db

- RoHS

## Applications

- Supports InfiniBand NDR Systems

- High Performance Computing (HPC)

- Data Center & Networking Equipment

# Description

The NDR-OSFP-2Q-CU is a passive direct attach copper (DAC) splitter cable engineered to facilitate InfiniBand NDR 800Gbps data transmission. Featuring an OSFP connector on one end and two QSFP112 connectors on the other, this cable enables efficient bifurcation of a single 800Gbps link into two 400Gbps connections. This design is particularly advantageous for data centers and high-performance computing environments requiring flexible and high-bandwidth interconnections. The passive nature of the cable ensures low latency and reduced power consumption, making it a cost-effective solution for short-distance deployments.

Ideal for connecting NVIDIA Quantum-2 InfiniBand switches, the NDR-OSFP-2Q-CU cable ensures seamless data flow with minimal latency. Its robust construction and compliance with industry standards make it suitable for dense network configurations, supporting the demanding requirements of artificial intelligence, scientific research, and large-scale cloud data centers. By leveraging this splitter cable, organizations can achieve high-bandwidth, low-latency connections essential for modern data-intensive applications.

# Product performance Specifications

## 1. Basic Product Characteristics

| Parameter | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Storage Temperature | Ts | -40 | - | +85 | °C |
| Supply Voltage | Vcc | -0.5 | 3.3 | 4.0 | V |
| Relative Humidity | RH | 5 | - | 85 | % |
| Operating Case Temperature | TC | 0 | - | 70 | °C |
| Power Supply Voltage | Vcc | 3.135 | 3.3 | 3.465 | V |
| Power Dissipation | PD | - | - | 0.1 | W |
| Data Rate | DR | - | 850 | - | Gbps |

## 2. High Speed Characteristics

| Parameter | Symbol | Min | Typ. | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Maximum insertion Loss at 26.56 GHz | SDD21 | 11 | | 19.75 | dB | |
| Differential to common-mode return loss | SCD11/22 | $RLcd(f) \geq \begin{cases} 22 - 10(f/26.56) & 0.05 \leq f < 26.56 \\ 15 - 3(f/26.56) & 26.56 \leq f \leq 40 \end{cases}$ | | | dB | 0.05 to 40GHz |
| Differential to common-mode conversion loss | SCD21-SDD21 | $Conversion\_loss(f) - IL(f) \geq \begin{cases} 10 & 0.05 \leq f < 12.89 \\ 14 - 0.3108f & 12.89 \leq f \leq 40 \end{cases}$ | | | dB | 0.05 to 40GHz |
| ERL | | Minimum cable assembly ERL (*) :≥8.25dB | | | dB | ±0.1 |

## 3. Product Optical and Electrical Characteristics

| Test Type | Test Item | 24AWG | 26AWG | 28AWG | 30AWG |
|---|---|---|---|---|---|
| **Electrical Characteristics** | Differential impedance | 100±5Ω at TDR | 100±5Ω | 100±5Ω | 100±5Ω at TDR |
| | Mutual capacitance | 14pF/ft nominal | 14pF/ft nominal | 14pF/ft nominal | 14pF/ft nominal |
| | Time delay | 1.31ns/ft nominal, (4.3ns/m) nominal | 1.35ns/ft nominal | 1.35ns/ft nominal | 1.35ns/ft nominal, (4.3ns/m) nominal |
| | Time delay skew (within pairs) | 80ps/10m maximum | 120ps/8.5m maximum | 120ps/7m maximum | 50ps/5.5m maximum |
| | Time delay skew (between pairs) | 350ps/10m maximum | 500ps/8.5m maximum | 500ps/7m maximum | 350ps/5.5m maximum |
| | Attenuation | 10dB/10m maximum at 1.25Ghz | 10dB/8.5m maximum at 1.25Ghz | 10dB/7m maximum at 1.25Ghz | 8.4dB/5.5m maximum at 1.25Ghz |
| | Conductor DC Resistance | 0.026Ω /ft maximum at 20°C | 0.04Ω /ft maximum at 20°C | 0.06Ω/ft maximum at 20°C | 0.01Ω/ft maximum at 20°C |
| **Physical Characteristics** | Conductors (two pair) | 24AWG Solid, Silver plated copper | 26AWG Solid, Silver plated copper | 28AWG Solid, Silver plated copper | 30AWG Solid, Silver plated copper |
| | Insulation | Foam polyolefin | Foam polyolefin | Foam polyolefin | Foam polyolefin |
| | Pair drain wire | 26AWG Solid, Silver plated copper | 28AWG Solid, Silver plated copper | 30AWG Solid, Silver plated copper | 30AWG Solid, Silver plated copper |
| | Overall cable shield | Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage | Aluminum/polyester tape, 125% coverage, Tin plated copper braid, 38AWG, 85% coverage | Aluminum/polyest er tape, 125% coverage,Tin plated copper braid, 38AWG, 85% coverage | Aluminum/polyester tape, 125% coverage,Tin plated copper braid, 38AWG, 85% coverage |
| | Outer diameter | 6.0mm | 5.2mm | 4.7mm | 4.2mm |

## Recommended Host Board Power Supply Circuit
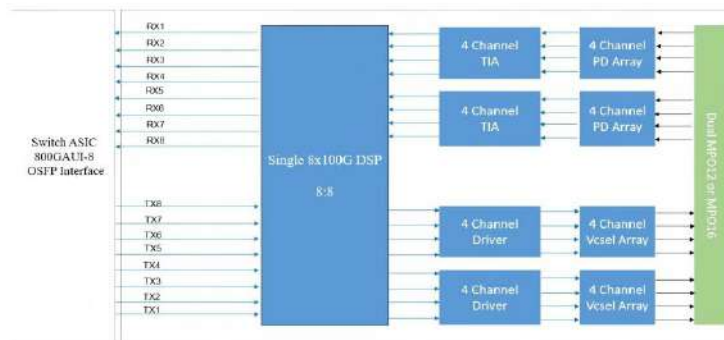


**Figure 1:**Module Block Diagram

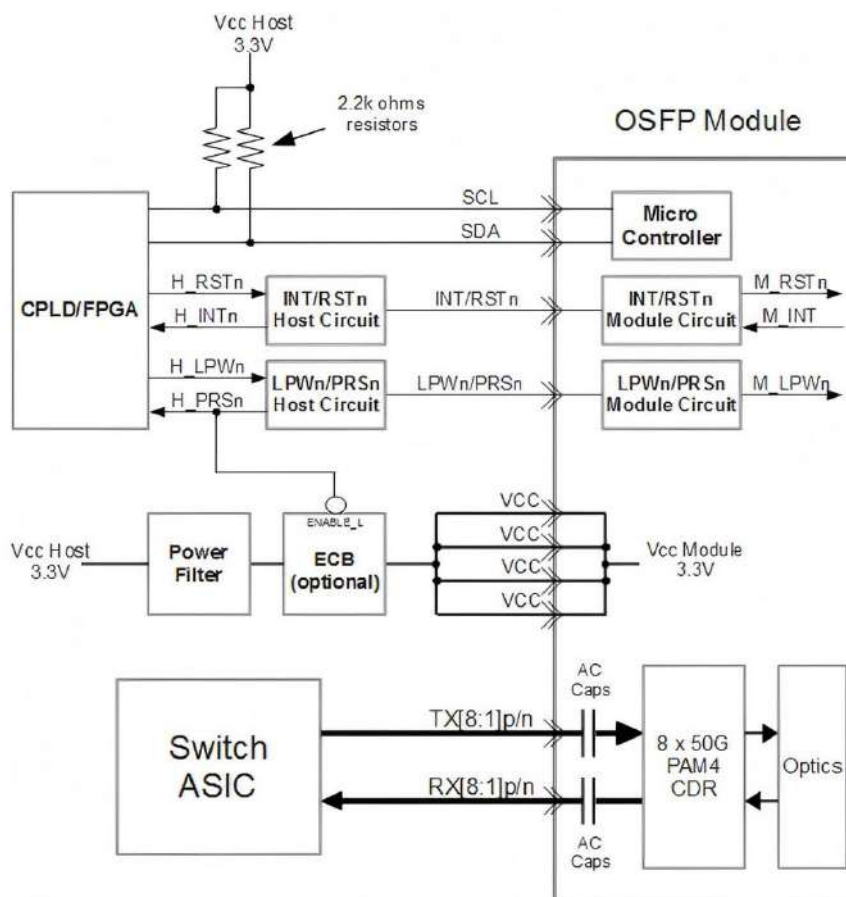## Recommended Interface Circuit



**Figure2:**Recommended Interface Circuit

## OSFP Pin-out Definition



**Figure3:**OSFP Pin view

## OSFP Pin Function Definitions

| Pin | Logic | Symbol | Description | Note |
|-----|-------|--------|-------------|------|
| 1 | | GND | Ground | |
| 2 | CML-I | TX2p | Transmitter Data Non-Inverted | |
| 3 | CML-I | TX2n | Transmitter Data Inverted | |
| 4 | | GND | Ground | |
| 5 | CML-I | TX4p | Transmitter Data Non-Inverted | |
| 6 | CML-I | TX4n | Transmitter Data Inverted | |
| 7 | | GND | Ground | |
| 8 | CML-I | TX6p | Transmitter Data Non-Inverted | |
| 9 | CML-I | TX6n | Transmitter Data Inverted | |
| 10 | | GND | Ground | |
| 11 | CML-I | TX8p | Transmitter Data Non-Inverted | |
| 12 | CML-I | TX8n | Transmitter Data Inverted | |
| 13 | | GND | Ground | |
| 14 | LVCMOS-I/O | SCL | 2-wire Serial interface clock | 1 |
| 15 | | VCC | +3.3V Power | |
| 16 | | VCC | +3.3V Power | |
| 17 | Multi-Level | LPWn/PRSn | Low-Power Mode / Module Present | 2 |
| 18 | | GND | Ground | |
| 19 | CML-O | RX7n | Receiver Data Inverted | |
| 20 | CML-O | RX7p | Receiver Data Non-Inverted | |

| 21 | | GND | Ground | |
|----|------------|---------|----------------------------------|---|
| 22 | CML-O | RX5n | Receiver Data Inverted | |
| 23 | CML-O | RX5p | Receiver Data Non-Inverted | |
| 24 | | GND | Ground | |
| 25 | CML-O | RX3n | Receiver Data Inverted | |
| 26 | CML-O | RX3p | Receiver Data Non-Inverted | |
| 27 | | GND | Ground | |
| 28 | CML-O | RX1n | Receiver Data Inverted | |
| 29 | CML-O | RX1p | Receiver Data Non-Inverted | |
| 30 | | GND | Ground | |
| 31 | | GND | Ground | |
| 32 | CML-O | RX2p | Receiver Data Non-Inverted | |
| 33 | CML-O | RX2n | Receiver Data Inverted | |
| 34 | | GND | Ground | |
| 35 | CML-O | RX4p | Receiver Data Non-Inverted | |
| 36 | CML-O | RX4n | Receiver Data Inverted | |
| 37 | | GND | Ground | |
| 38 | CML-O | RX6p | Receiver Data Non-Inverted | |
| 39 | CML-O | RX6n | Receiver Data Inverted | |
| 40 | | GND | Ground | |
| 41 | CML-O | RX8p | Receiver Data Non-Inverted | |
| 42 | CML-O | RX8n | Receiver Data Inverted | |
| 43 | | GND | Ground | |
| 44 | Multi-Level | INT/RSTn | Module Interrupt / Module Reset | 2 |
| 45 | | VCC | +3.3V Power | |
| 46 | | VCC | +3.3V Power | |
| 47 | LVCMOS-I/O | SDA | 2-wire Serial interface data | 1 |
| 48 | | GND | Ground | |
| 49 | CML-I | TX7n | Transmitter Data Inverted | |
| 50 | CML-I | TX7p | Transmitter Data Non-Inverted | |
| 51 | | GND | Ground | |
| 52 | CML-I | TX5n | Transmitter Data Inverted | |
| 53 | CML-I | TX5p | Transmitter Data Non-Inverted | |
| 54 | | GND | Ground | |
| 55 | CML-I | TX3n | Transmitter Data Inverted | |
| 56 | CML-I | TX3p | Transmitter Data Non-Inverted | |
| 57 | | GND | Ground | |
| 58 | CML-I | TX1n | Transmitter Data Inverted | |

| 59 | CML-I | TX1p | Transmitter Data Non-Inverted | |
| 60 | | GND | Ground | |

**Note1:** Open-Drain with pull up resistor on Host.

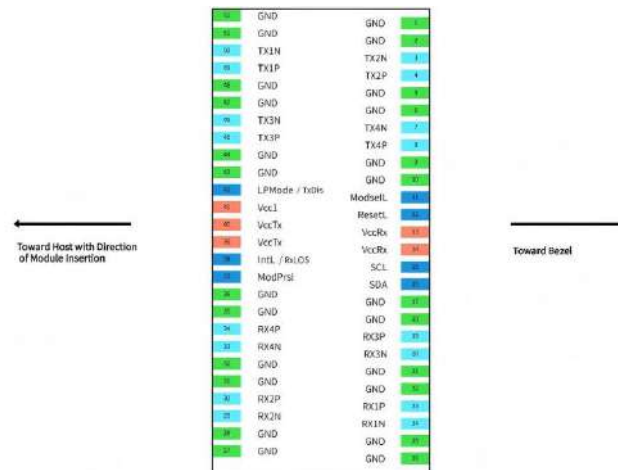**Note2:** See pin description for required circuit.

## QSFP112 Pin-out Definition



**Figure4:**QSFP112 Pin view

## QSFP112 Pin Function Definitions

| PIN | Module contact | Logic | Symbol | Description | Note |
|---|---|---|---|---|---|
| 1 | 1 | | GND | Ground | 1 |
| 2 | | | GND | Ground | 1 |
| 3 | 2 | CML-I | Tx2n | Transmitter Inverted Data Input | |
| 4 | 3 | CML-I | Tx2p | Transmitter Non-Inverted Data Input | |
| 5 | 4 | | GND | Ground | 1 |
| 6 | | | GND | Ground | 1 |
| 7 | 5 | CML-I | Tx4n | Transmitter Inverted Data Input | |
| 8 | 6 | CML-I | Tx4p | Transmitter Non-Inverted Data Input | |
| 9 | 7 | | GND | Ground | 1 |
| 10 | | | GND | Ground | 1 |
| 11 | 8 | LVTTL-I | ModSelL | Select | |
| 12 | 9 | LVTTL-1 | ResetL | Reset | |
| 13 | 10 | | Vcc Rx | +3.3V Power supply receiver | 2 |
| 14 | | | Vcc Rx | +3.3V Power supply receiver | 2 |
| 15 | 11 | LVCMOS-I/O | SCL | 2-wire serial interface clock | |
| 16 | 12 | LVCMOS-I/O | SDA | 2-wire serial interface data | |

| | | | | | |
|---|---|---|---|---|---|
| 17 | 13 | | GND | Ground | 1 |
| 18 | | | GND | Ground | 1 |
| 19 | 14 | CML-O | Rx3p | Receiver Non-Inverted Data Output | |
| 20 | 15 | CML-O | Rx3n | Receiver Inverted Data Output | |
| 21 | 16 | | GND | Ground | 1 |
| 22 | | | GND | Ground | 1 |
| 23 | 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output | |
| 24 | 18 | CML-O | Rx1n | Receiver Inverted Data Output | |
| 25 | 19 | | GND | Ground | 1 |
| 26 | | | GND | Ground | 1 |
| 27 | 20 | | GND | Ground | 1 |
| 28 | | | GND | Ground | 1 |
| 29 | 21 | CML-O | Rx2n | Receiver Inverted Data Output | |
| 30 | 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output | |
| 31 | 23 | | GND | Ground | 1 |
| 32 | | | GND | Ground | 1 |
| 33 | 24 | CML-O | Rx4n | Receiver Inverted Data Output | |
| 34 | 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output | |
| 35 | 26 | | GND | Ground | 1 |
| 36 | | | GND | Ground | 1 |
| 37 | 27 | LVTTL-O | ModPrsL | Present | |
| 38 | 28 | LVTTL-O | IntL/RxLOS | Interrupt/optional RxLOS | |
| 39 | 29 | | Vcc Tx | +3.3V Power supply transmitter | 2 |
| 40 | | | Vcc Tx | +3.3V Power supply transmitter | 2 |
| 41 | 30 | | $Vcc1_2$ | +3.3V Power Supply | 2 |
| 42 | 31 | LVTTL-I | LPMode/TxD is | Low Power Mode/optional TX Disable | |
| 43 | 32 | | GND | Ground | 1 |
| 44 | | | GND | Ground | 1 |
| 45 | 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input | |
| 46 | 34 | CML-I | Tx3n | Transmitter Inverted Data Input | |
| 47 | 35 | | GND | Ground | 1 |
| 48 | | | GND | Ground | 1 |
| 49 | 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | |
| 50 | 37 | CML-I | Tx1n | Transmitter Inverted Data Input | |
| 51 | 38 | | GND | Ground | 1 |
| 52 | | | GND | Ground | 1 |

**Note1:** GND is the symbol for signal and supply(power)common for the QSFP112module.Allare common within the QSFP112 module and all voltages are referenced to this potential unless otherwise noted.Connect these directly to the host board signal-common ground plane.

**Note2:** Vcc Rx,Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements,defined for the host side of the Host Edge Card Connector,are listed in Table 4.Recommended host board power supply fitering is shown in Figure 4.Vcc Rx,Vecc1and Vcc Tx may be intemally connected within the QSFP112 module in any combination.The connector pins are each rated for amaximum current of 1.5A(max.current of 2.0 Ais required for high module power of15-20W).
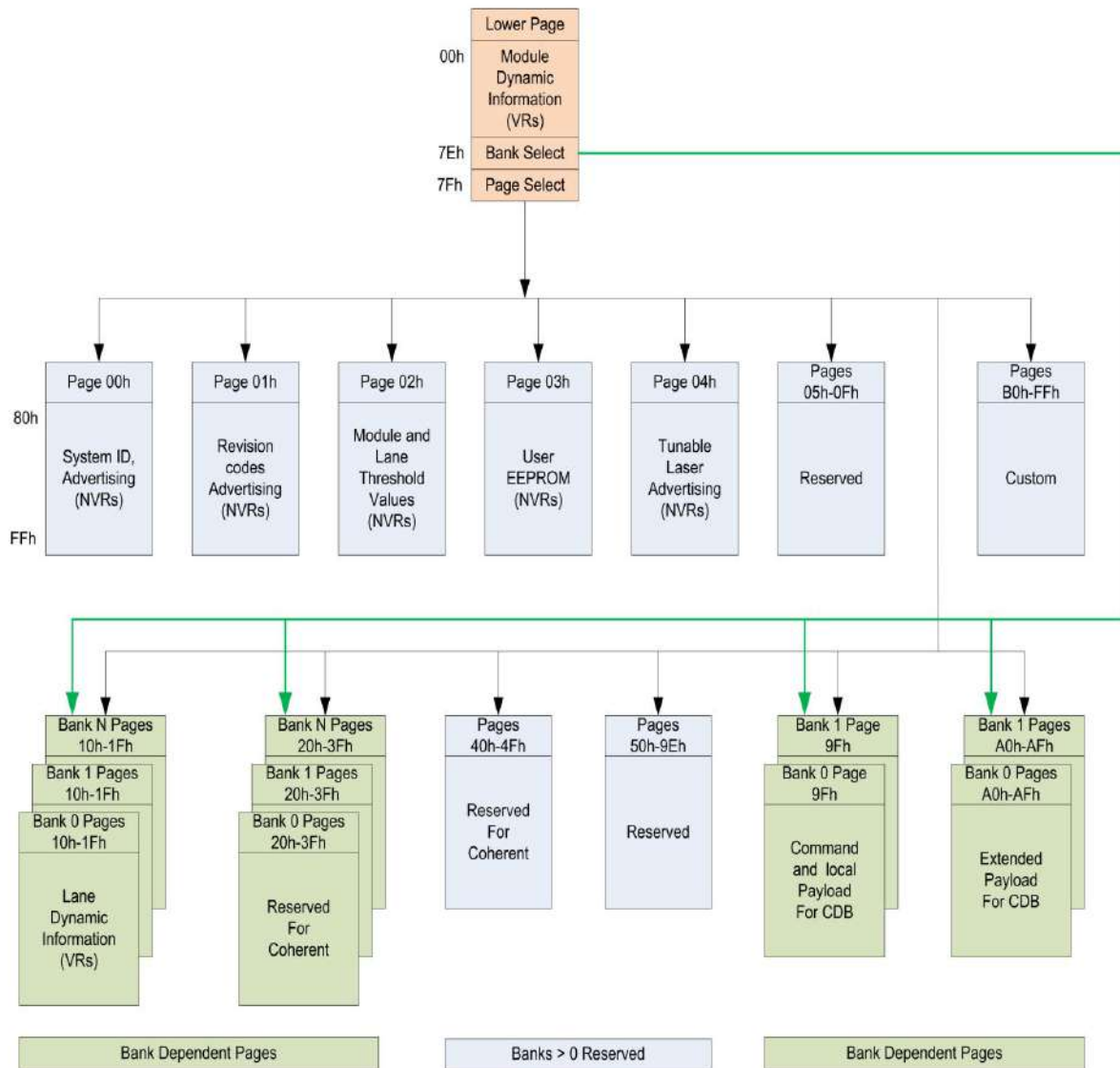
## Monitoring Specification



**Figure5:**Memory map

## Memory map Table

| Byte | Unit | Name | Description |
|---|---|---|---|
| **Lower Page 00h** | | | |
| 0 | 1 | Identifier | Identifier - Type of Serial Module - See SFF-8024. |
| 1 | 1 | Revision Compliance | Identifier – CMIS revision; the upper nibble is the whole number part and the lower nibble is the decimal part. Example: 01h indicates version 0.1, 21h indicates version 2.1. |
| 2-3 | 2 | ID and Status Area | Flat mem indication, CLEI present indicator, Maximum TWI speed, Current state of Module, Current state of the Interrupt signal. |
| 4-7 | 4 | Lane Flag Summary | Flag summary of all lane flags on pages 10h-1Fh. |
| 8-13 | 6 | Module-Level Flags | All flags that are not lane or data path specific. |
| 14-25 | 12 | Module-Level Monitors | Monitors that are not lane or data path specific. |
| 26-30 | 5 | Module Global Controls | Controls applicable to the module as a whole |
| 31-36 | 6 | Module-Level Flag Masks | Masking bits for the Module-Level flags |
| 37-38 | 2 | CDB Status Area | Status of most recent CDB command |
| 39-40 | 2 | Module Firmware Version | Module Firmware Version. |
| 41-63 | 23 | Reserved Area | Reserved for future standardization |
| 64-82 | 19 | Custom Area | Vendor or module type specific use |
| 83-84 | 2 | Inactive Firmware Version | Version Number of Inactive Firmware. Values of 00h indicates module supports only a single image. |
| 85-117 | 33 | Application Advertising | Combinations of host and media interfaces that are supported by module data path(s) |
| 118-125 | 8 | Password Entry and Change | Password Entry and Change |
| 126 | 1 | Bank Select Byte | Bank address of currently visible Page |
| 127 | 1 | Page Select Byte | Page address of currently visible Page |
| **Upper Page 00h** | | | |
| 128 | 1 | Identifier | Identifier - Type of Serial Module - See SFF-8024. |
| 129-144 | 16 | Vendor name | Vendor name (ASCII) |
| 145-147 | 2 | Vendor OUI | Vendor IEEE company ID |
| 148-163 | 16 | Vendor PN | Part number provided by vendor (ASCII) |
| 164-165 | 8 | Vendor rev | Revision level for part number provided by vendor (ASCII) |
| 166-181 | 10 | Vendor SN | Vendor Serial Number (ASCII) |
| 182-183 | 2 | Date code year | ASCII code, two low order digits of year (00=2000) |
| 184-185 | 2 | Date code month | ASCII code digits of month (01=Jan through 12=Dec) |
| 186-187 | 2 | Date code day of month | ASCII code day of month (01-31) |
| 188-189 | 2 | Lot code | ASCII code, custom lot code, may be blank |
| 190-199 | 10 | CLEI code | Common Language Equipment Identification code |

| 200-201 | 2 | Module power characteristics | Module power characteristics |
|---|---|---|---|
| 202 | 1 | Cable assembly length | Cable assembly length |
| 203 | 1 | Media Connector Type | Media Connector Type |
| 204 | 1 | 5 GHz attenuation | Passive copper cable attenuation at 5 GHz in 1 dB increments |
| 205 | 1 | 7 GHz attenuation | Passive copper cable attenuation at 7 GHz in 1 dB increments |
| 206 | 1 | 12.9 GHz attenuation | Passive copper cable attenuation at 12.9 GHz in 1 dB increments |
| 207 | 1 | 25.8 GHz attenuation | Passive copper cable attenuation at 25.8 GHz in 1 dB increments |
| 208-209 | 2 | Reserved | Reserved |
| 210-211 | 2 | Cable Assembly Lane Information | Cable Assembly Lane Information |
| 212 | 1 | Media Interface Technology | Media Interface Technology |
| 213-220 | 8 | Reserved | Reserved |
| 221 | 1 | Custom | Custom |
| 222 | 1 | Checksum | Includes bytes 128-221 |
| 223-255 | 33 | Custom Info NV | Custom Info NV |

# Mechanical Dimension
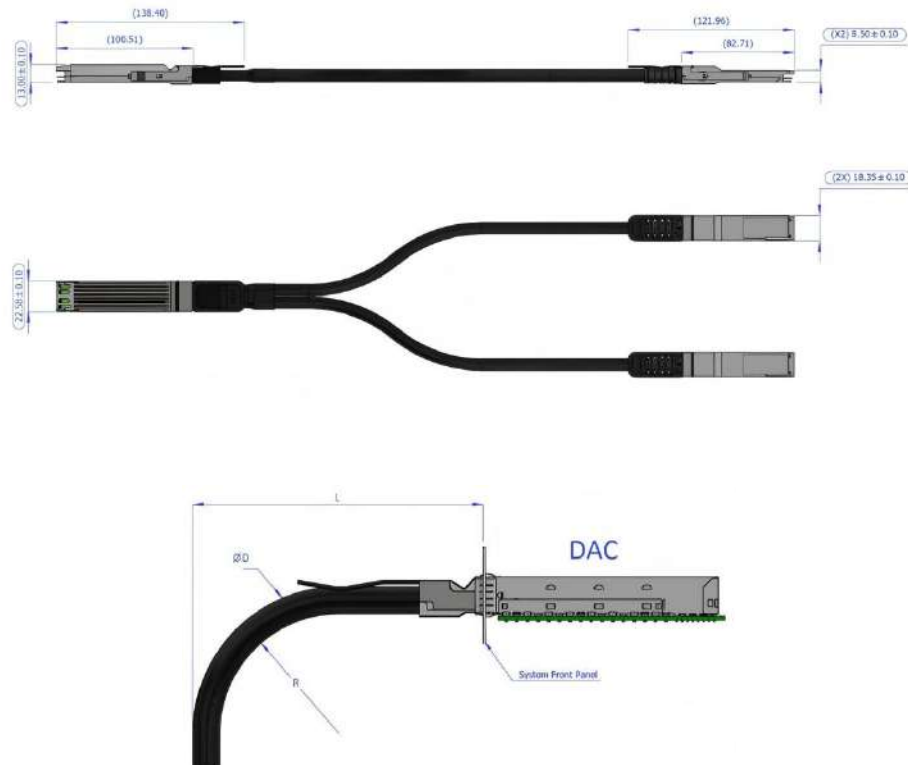


## Note：

- Unit: mm
- Tolerance: φ0.1mm if not shown
- Latch color: black
- When L≤2m, the tolerance is ±25mm, when L>2m, the tolerance is ±50mm

## Waring：

- The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles.It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.
- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

# Test Center

## 1. Performance Testing

Every fiber optic transceiver is thoroughly tested by the LSOLINK Assurance Program, which is equipped with the world's most advanced analytical equipment to ensure that our transceivers meet the industry's international public protocol standards while still functioning flawlessly in your facility.
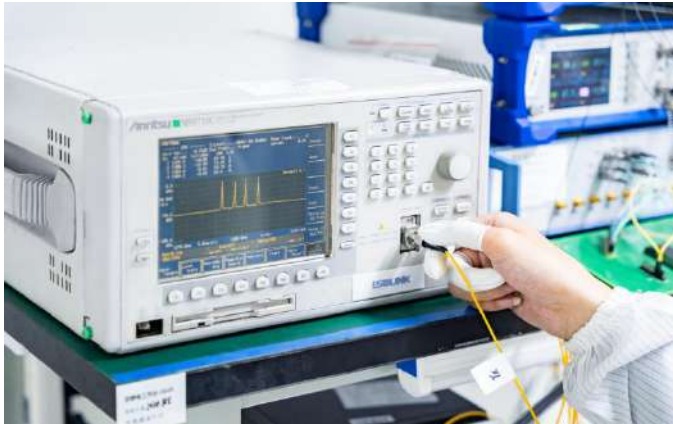
### Optical Spectrum Inspection

Using the industry's leading optical spectrum analyser to check in real time that the parameters of the optical transceiver's laser comply with industry standards.

➢ **Peak:** Peak wavelength and peak level
➢ **2nd Peak:** Side-mode wavelength and level
➢ **Mean WI:** Center wavelength
➢ **Total Power:** Total power of spectrum
➢ **SMSR:** Side-Mode Suppression Ratio

### Optical Signal Quality Inspection

Using highly efficient sampling oscilloscopes and BERT testers, equipped with an automated test platform to accurately test the signal quality of the transceiver, test records are kept for up to 5 years to ensure the traceability of each transceiver.

➢ **Eye Mask Margin(NRZ)**
➢ **TDECQ(PAM4):** transmitter dispersion eye closure
➢ **OMA:** Optical modulation amplitude
➢ **BER:** Bit error rate
➢ **ER:** Extinction Ratio

### Flow Pressure Test

Using multi-protocol network traffic analyser with various brands of switches to test the transceiver's ability to transmit at full speed.

➢ **Bandwidth:** Actual transceiver bandwidth on the port
➢ **Packet Loss**
➢ **Packet Errors:** CRC Errors/PCS Errors/Symbol Errors
➢ **LinkDown Counts**
➢ **latency**

Aboveis part of our test bed network equipment. For more information, Please click download for optical transceiver performance test report.

## 2. Quality Control

We adopt advanced quality management solutions. Each transceiver is self-inspected, including:20x microscope inspection, 200x microscope inspection, and QC process inspection.



**visual inspection**



**Microscopic inspection: 20X**



**Microscopic inspection: 200X**



**Reliability Verification**



**Optical endface inspection**



**OQC Inspection**

## Order Information

| Part Number | Length(m) | Wire Gauge(AWG) | Connector Type | Cable Type | Cable Jacket |
|---|---|---|---|---|---|
| NDR-OSFP-2Q-CU0.5 | 0.5 | 30 | OSFP to 2xQSFP112 | Passive Copper | PVC |
| NDR-OSFP-2Q-CU1 | 1 | 28 | OSFP to 2xQSFP112 | Passive Copper | PVC |
| NDR-OSFP-2Q-CU1.5 | 1.5 | 28 | OSFP to 2xQSFP112 | Passive Copper | PVC |
| NDR-OSFP-2Q-CU2 | 2 | 28 | OSFP to 2xQSFP112 | Passive Copper | PVC |
| NDR-OSFP-2Q-CU2.5 | 2.5 | 28 | OSFP to 2xQSFP112 | Passive Copper | PVC |

# Further Information

**LSOLINK** | Lighting the Path to Global Links

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✉ **Email** | For Sales@lsolink.com

# Disclaimer

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2. Nothing herein should be construed as constituting an additional warranty.

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