

### **CAB-D-4Q-200G-2M-C**

Arista Networks® CAB-D-4Q-200G-2M Compatible TAA Compliant 200GBase-CU QSFP-DD 200G to 4xQSFP28 50G NRZ Direct Attach Cable (Passive Twinax, 2m)

#### **Features:**

- QSFP-DD MSA Compliant
- QSFP Module Compliant to SFF-8661
- Transmission Data Rate Up to 25.78Gbps per Channel
- Enable 200Gbps to 4x50Gbps Transmission
- Built-in EEPROM Functions
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



#### **Applications:**

- 200GBase Ethernet

#### **Product Description**

This is an Arista Networks® CAB-D-4Q-200G-2M compatible TAA compliant 200GBase-CU QSFP-DD 200G to 4xQSFP28 50G NRZ direct attach cable that operates over passive copper with a maximum reach of 2.0m (6.6ft). It has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This direct attach cable is TAA (Trade Agreements Act) compliant, and is built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



## Absolute Maximum Ratings

| Parameter                  | Symbol | Min. | Typ. | Max. | Unit |
|----------------------------|--------|------|------|------|------|
| Supply Voltage             | Vcc    | 3.13 | 3.3  | 3.47 | V    |
| Storage Temperature        | Tstg   | -40  |      | 85   | °C   |
| Operating Case Temperature | Tc     | 0    |      | 70   | °C   |
| Relative Humidity          | RH     | 5    |      | 85   | %    |
| Data Rate                  |        |      | 200  |      | Gbps |

## Physical Characteristics

| Parameter       | Symbol | Min.       | Typ. | Max. | Unit | Notes |
|-----------------|--------|------------|------|------|------|-------|
| Length          | L      |            |      | 2    | M    |       |
| AWG             |        |            | 30   |      | AWG  |       |
| Jacket Material |        | PVC, Black |      |      |      |       |

## Electrical Specifications

| Parameter                                   | Symbol      | Min.                                                                                                                                                                  | Typ. | Max.  | Unit | Notes |
|---------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|-------|
| Resistance                                  | Rcon        |                                                                                                                                                                       |      | 3     | Ω    |       |
| Insulation Resistance                       | Rins        |                                                                                                                                                                       |      | 10    | MΩ   |       |
| Raw Cable Impedance                         | Zca         | 95                                                                                                                                                                    | 100  | 105   | Ω    |       |
| Mated Connector Impedance                   | Zmated      | 85                                                                                                                                                                    | 100  | 115   | Ω    |       |
| Insertion Loss @12.89GHz                    | SDD21       | 8                                                                                                                                                                     |      | 22.48 | dB   |       |
| Return Loss                                 | SDD11/22    | $\text{Return\_loss}(f) \geq \begin{cases} 16.5-2vf & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1/7.5 \leq f \leq 19 \end{cases}$                             |      |       | dB   | 1     |
| Differential to Common-Mode Return Loss     | SCD11/22    | $\text{Return\_loss}(f) \geq \begin{cases} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15+(6/25.78)f & 12.89 \leq f \leq 19 \end{cases}$                                  |      |       | dB   | 1     |
| Differential to Common-Mode Conversion Loss | SCD21-SDD21 | $\text{Conversion\_loss}(f) - \text{IL}(f) \geq \begin{cases} 10 & 0.01 \leq f < 12.89 \\ 27-(29/22)f & 12.89 \leq f < 15.7 \\ 6.3 & 15.7 \leq f \leq 19 \end{cases}$ |      |       | dB   | 1     |
| Minimum COM                                 | COM         | 3                                                                                                                                                                     |      |       | dB   |       |

### Notes:

1. For  $0.05 \leq f \leq \text{GHz}$ , where f is the frequency on GHz.

## Pin Descriptions- QSFP-DD End

| Pin | Logic       | Symbol       | Name/Description                     | Plug Sequence | Notes |
|-----|-------------|--------------|--------------------------------------|---------------|-------|
| 1   |             | GND          | Module Ground.                       | 1B            | 1     |
| 2   | CML-I       | Tx2-         | Transmitter Inverted Data Input.     | 3B            |       |
| 3   | CML-I       | Tx2+         | Transmitter Non-Inverted Data Input. | 3B            |       |
| 4   |             | GND          | Module Ground.                       | 1B            | 1     |
| 5   | CML-I       | Tx4-         | Transmitter Inverted Data Input.     | 3B            |       |
| 6   | CML-I       | Tx4+         | Transmitter Non-Inverted Data Input. | 3B            |       |
| 7   |             | GND          | Module Ground.                       | 1B            | 1     |
| 8   | LVTTL-I     | ModSelL      | Module Select.                       | 3B            |       |
| 9   | LVTTL-I     | ResetL       | Module Reset.                        | 3B            |       |
| 10  |             | VccRx        | +3.3V Receiver Power Supply.         | 2B            | 2     |
| 11  | LVC MOS-I/O | SCL          | 2-Wire Serial Interface Clock.       | 3B            |       |
| 12  | LVC MOS-I/O | SDA          | 2-Wire Serial Interface Data.        | 3B            |       |
| 13  |             | GND          | Module Ground.                       | 1B            | 1     |
| 14  | CML-O       | Rx3+         | Receiver Non-Inverted Data Output.   | 3B            |       |
| 15  | CML-O       | Rx3-         | Receiver Inverted Data Output.       | 3B            |       |
| 16  |             | GND          | Module Ground.                       | 1B            | 1     |
| 17  | CML-O       | Rx1+         | Receiver Non-Inverted Data Output.   | 3B            |       |
| 18  | CML-O       | Rx1-         | Receiver Inverted Data Output.       | 3B            |       |
| 19  |             | GND          | Module Ground.                       | 1B            | 1     |
| 20  |             | GND          | Module Ground.                       | 1B            | 1     |
| 21  | CML-O       | Rx2-         | Receiver Inverted Data Output.       | 3B            |       |
| 22  | CML-O       | Rx2+         | Receiver Non-Inverted Data Output.   | 3B            |       |
| 23  |             | GND          | Module Ground.                       | 1B            | 1     |
| 24  | CML-O       | Rx4-         | Receiver Inverted Data Output.       | 3B            |       |
| 25  | CML-O       | Rx4+         | Receiver Non-Inverted Data Output.   | 3B            |       |
| 26  |             | GND          | Module Ground.                       | 1B            | 1     |
| 27  | LVTTL-O     | ModPrsL      | Module Present.                      | 3B            |       |
| 28  | LVTTL-O     | IntL/RxLOS   | Interrupt. Optio0na RxLOS.           | 3B            |       |
| 29  |             | VccTx        | +3.3V Transmitter Power Supply.      | 2B            | 2     |
| 30  |             | Vcc1         | +3.3V Power Supply.                  | 2B            | 2     |
| 31  | LVTTL-I     | LPMode/TxDis | Low Power Mode. Optional Tx Disable. | 3B            |       |
| 32  |             | GND          | Module Ground.                       | 1B            | 1     |
| 33  | CML-I       | Tx3+         | Transmitter Non-Inverted Data Input. | 3B            |       |
| 34  | CML-I       | Tx3-         | Transmitter Inverted Data Input.     | 3B            |       |
| 35  |             | GND          | Module Ground.                       | 1B            | 1     |
| 36  | CML-I       | Tx1+         | Transmitter Non-Inverted Data Input. | 3B            |       |
| 37  | CML-I       | Tx1-         | Transmitter Inverted Data Input.     | 3B            |       |
| 38  |             | GND          | Module Ground.                       | 1B            | 1     |
| 39  |             | GND          | Module Ground.                       | 1A            | 1     |
| 40  | CML-I       | Tx6-         | Transmitter Inverted Data Input.     | 3A            |       |
| 41  | CML-I       | Tx6+         | Transmitter Non-Inverted Data Input. | 3A            |       |

|    |               |            |                                          |    |   |
|----|---------------|------------|------------------------------------------|----|---|
| 42 |               | GND        | Module Ground.                           | 1A |   |
| 43 | CML-I         | Tx8-       | Transmitter Inverted Data Input.         | 3A |   |
| 44 | CML-I         | Tx8+       | Transmitter Non-Inverted Data Input.     | 3A |   |
| 45 |               | GND        | Module Ground.                           | 1A |   |
| 46 | LVC MOS/CML-I | P/VS4      | Programmable. Module Vendor-Specific 4.  | 3A | 5 |
| 47 | LVC MOS/CML-I | P/VS1      | Programmable. Module Vendor-Specific 1.  | 3A | 5 |
| 48 |               | VccRx1     | +3.3V Receiver Power Supply.             | 2A | 2 |
| 49 | LVC MOS/CML-O | P/VS2      | Programmable. Module Vendor-Specific 2.  | 3A | 5 |
| 50 | LVC MOS/CML-O | P/VS3      | Programmable. Module Vendor-Specific 3.  | 3A | 5 |
| 51 |               | GND        | Module Ground.                           | 1A | 1 |
| 52 | CML-O         | Rx7+       | Receiver Non-Inverted Data Output.       | 3A |   |
| 53 | CML-O         | Rx7-       | Receiver Inverted Data Output.           | 3A |   |
| 54 |               | GND        | Module Ground.                           | 1A | 1 |
| 55 | CML-O         | Rx5+       | Receiver Non-Inverted Data Output.       | 3A |   |
| 56 | CML-O         | Rx5-       | Receiver Inverted Data Output.           | 3A |   |
| 57 |               | GND        | Module Ground.                           | 1A | 1 |
| 58 |               | GND        | Module Ground.                           | 1A | 1 |
| 59 | CML-O         | Rx6-       | Receiver Inverted Data Output.           | 3A |   |
| 60 | CML-O         | Rx6+       | Receiver Non-Inverted Data Output.       | 3A |   |
| 61 |               | GND        | Module Ground.                           | 1A | 1 |
| 62 | CML-O         | Rx8-       | Receiver Inverted Data Output.           | 3A |   |
| 63 | CML-O         | Rx8+       | Receiver Non-Inverted Data Output.       | 3A |   |
| 64 |               | GND        | Module Ground.                           | 1A | 1 |
| 65 |               | NC         | Not Connected.                           | 3A | 3 |
| 66 |               | Reserved   | For Future Use.                          | 3A | 3 |
| 67 |               | VccTx1     | +3.3V Power Supply.                      | 2A | 2 |
| 68 |               | Vcc2       | +3.3V Power Supply.                      | 2A | 2 |
| 69 | LVC MOS-I     | ePPS/Clock | 1PPS PTP Clock or Reference Clock Input. | 3A | 6 |
| 70 |               | GND        | Module Ground.                           | 1A | 1 |
| 71 | CML-I         | Tx7+       | Transmitter Non-Inverted Data Input.     | 3A |   |
| 72 | CML-I         | Tx7-       | Transmitter Inverted Data Input.         | 3A |   |
| 73 |               | GND        | Module Ground.                           | 1A | 1 |
| 74 | CML-I         | Tx5+       | Transmitter Non-Inverted Data Input.     | 3A |   |
| 75 | CML-I         | Tx5-       | Transmitter Inverted Data Input.         | 3A |   |
| 76 |               | GND        | Module Ground.                           | 1A | 1 |

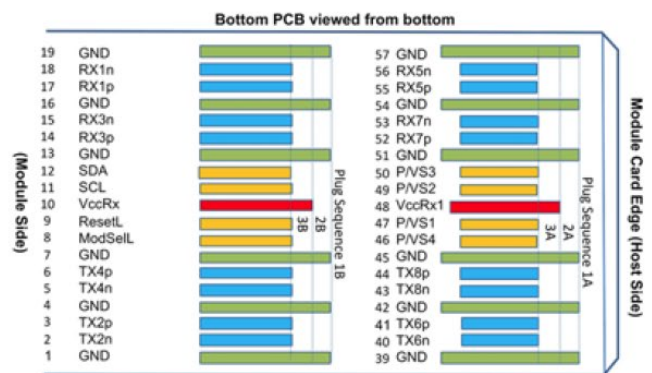
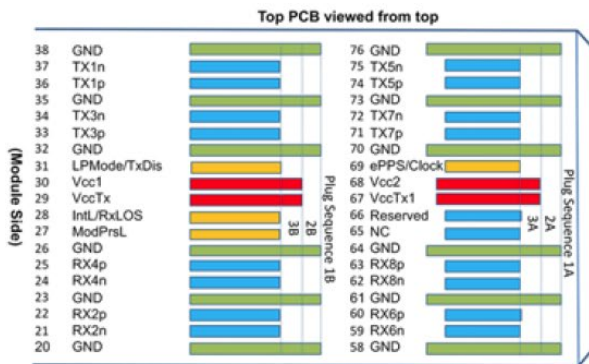
#### Notes:

1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane. Each connector GND contact is rated for maximum current of 500mA.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed below. For power classes 4 and above, the

module differential loading of input voltage pads must not result in exceeding contact current limits. Each connector Vcc contact is rated for a maximum current of 1500mA.

3. Reserved and no Connect pads recommended to be terminated with 10k $\Omega$  to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module.
4. Plug sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, and 3B. Contact sequence A will make, then break contact with additional QSFP-DD pads. Sequence 1A and 1B will then occur simultaneously, followed by 2A and 2B, followed by 3A and 3B.
5. Full definitions of P/VSx signals currently under development. On new designs not used P/VSx signals are recommended to be terminated on the host with 10k $\Omega$ .
6. ePPS/Clock if not used recommended to be terminated with 50 $\Omega$  to ground on the host.

### Pin-Out Detail QSFP-DD End



## Pin Descriptions- QSFP End

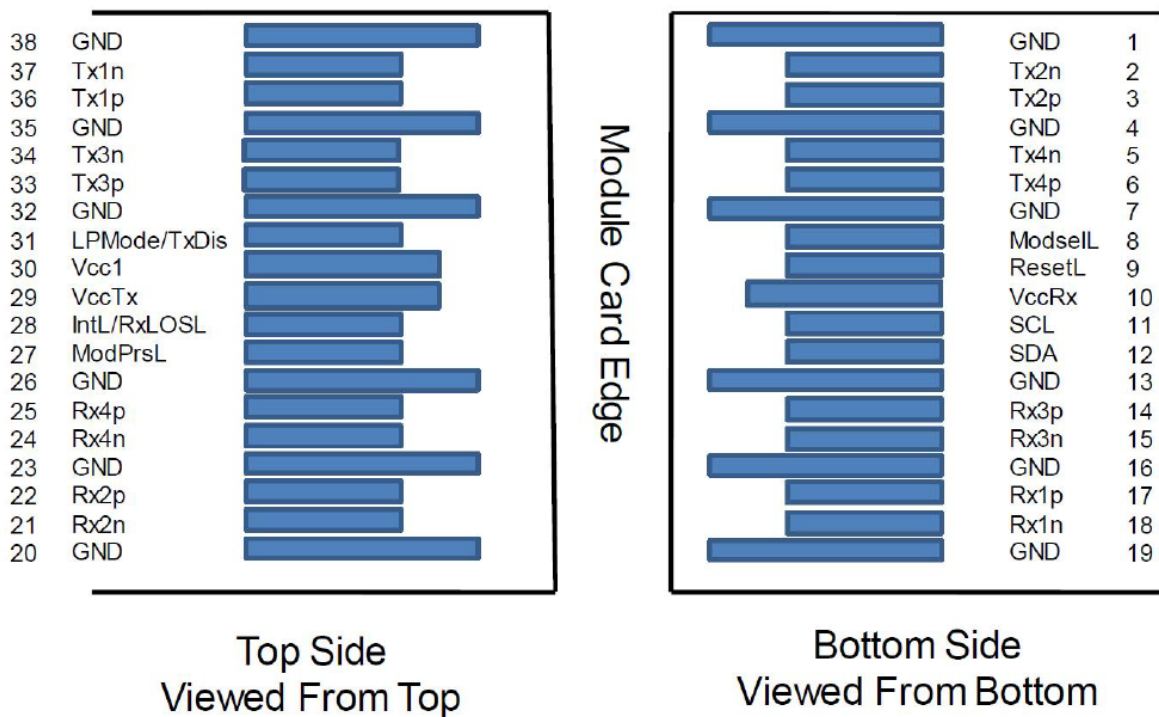
| Pin | Logic       | Symbol  | Name/Description                     | Plug Sequence | Notes |
|-----|-------------|---------|--------------------------------------|---------------|-------|
| 1   |             | GND     | Module Ground.                       | 1             | 1     |
| 2   | CML-I       | Tx2-    | Transmitter Inverted Data Input.     | 3             |       |
| 3   | CML-I       | Tx2+    | Transmitter Non-Inverted Data Input. | 3             |       |
| 4   |             | GND     | Module Ground.                       | 1             | 1     |
| 5   | CML-I       | Tx4-    | Transmitter Inverted Data Input.     | 3             |       |
| 6   | CML-I       | Tx4+    | Transmitter Non-Inverted Data Input. | 3             |       |
| 7   |             | GND     | Module Ground.                       | 1             | 1     |
| 8   | LVTTL-I     | ModSelL | Module Select.                       | 3             |       |
| 9   | LVTTL-I     | ResetL  | Module Reset.                        | 3             |       |
| 10  |             | VccRx   | +3.3V Receiver Power Supply.         | 2             | 2     |
| 11  | LVC MOS-I/O | SCL     | 2-Wire Serial Interface Clock.       | 3             |       |
| 12  | LVC MOS-I/O | SDA     | 2-Wire Serial Interface Data.        | 3             |       |
| 13  |             | GND     | Module Ground.                       | 1             | 1     |
| 14  | CML-O       | Rx3+    | Receiver Non-Inverted Data Output.   | 3             |       |
| 15  | CML-O       | Rx3-    | Receiver Inverted Data Output.       | 3             |       |
| 16  |             | GND     | Module Ground.                       | 1             | 1     |
| 17  | CML-O       | Rx1+    | Receiver Non-Inverted Data Output.   | 3             |       |
| 18  | CML-O       | Rx1-    | Receiver Inverted Data Output.       | 3             |       |
| 19  |             | GND     | Module Ground.                       | 1             | 1     |
| 20  |             | GND     | Module Ground.                       | 1             | 1     |
| 21  | CML-O       | Rx2-    | Receiver Inverted Data Output.       | 3             |       |
| 22  | CML-O       | Rx2+    | Receiver Non-Inverted Data Output.   | 3             |       |
| 23  |             | GND     | Module Ground.                       | 1             | 1     |
| 24  | CML-O       | Rx4-    | Receiver Inverted Data Output.       | 3             |       |
| 25  | CML-O       | Rx4+    | Receiver Non-Inverted Data Output.   | 3             |       |
| 26  |             | GND     | Module Ground.                       | 1             | 1     |
| 27  | LVTTL-O     | ModPrsL | Module Present.                      | 3             |       |
| 28  | LVTTL-O     | IntL    | Interrupt.                           | 3             |       |
| 29  |             | VccTx   | +3.3V Transmitter Power Supply.      | 2             | 2     |
| 30  |             | Vcc1    | +3.3V Power Supply.                  | 2             | 2     |
| 31  | LVTTL-I     | LPMODE  | Low-Power Mode.                      | 3             |       |
| 32  |             | GND     | Module Ground.                       | 1             | 1     |
| 33  | CML-I       | Tx3+    | Transmitter Non-Inverted Data Input. | 3             |       |
| 34  | CML-I       | Tx3-    | Transmitter Inverted Data Input.     | 3             |       |

|    |       |      |                                      |   |   |
|----|-------|------|--------------------------------------|---|---|
| 35 |       | GND  | Module Ground.                       | 1 | 1 |
| 36 | CML-I | Tx1+ | Transmitter Non-Inverted Data Input. | 3 |   |
| 37 | CML-I | Tx1- | Transmitter Inverted Data Input.     | 3 |   |
| 38 |       | GND  | Module Ground.                       | 1 | 1 |

#### Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1, and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. VccRx, Vcc1, and VccTx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

#### Electrical Pin-Out Details - QSFP



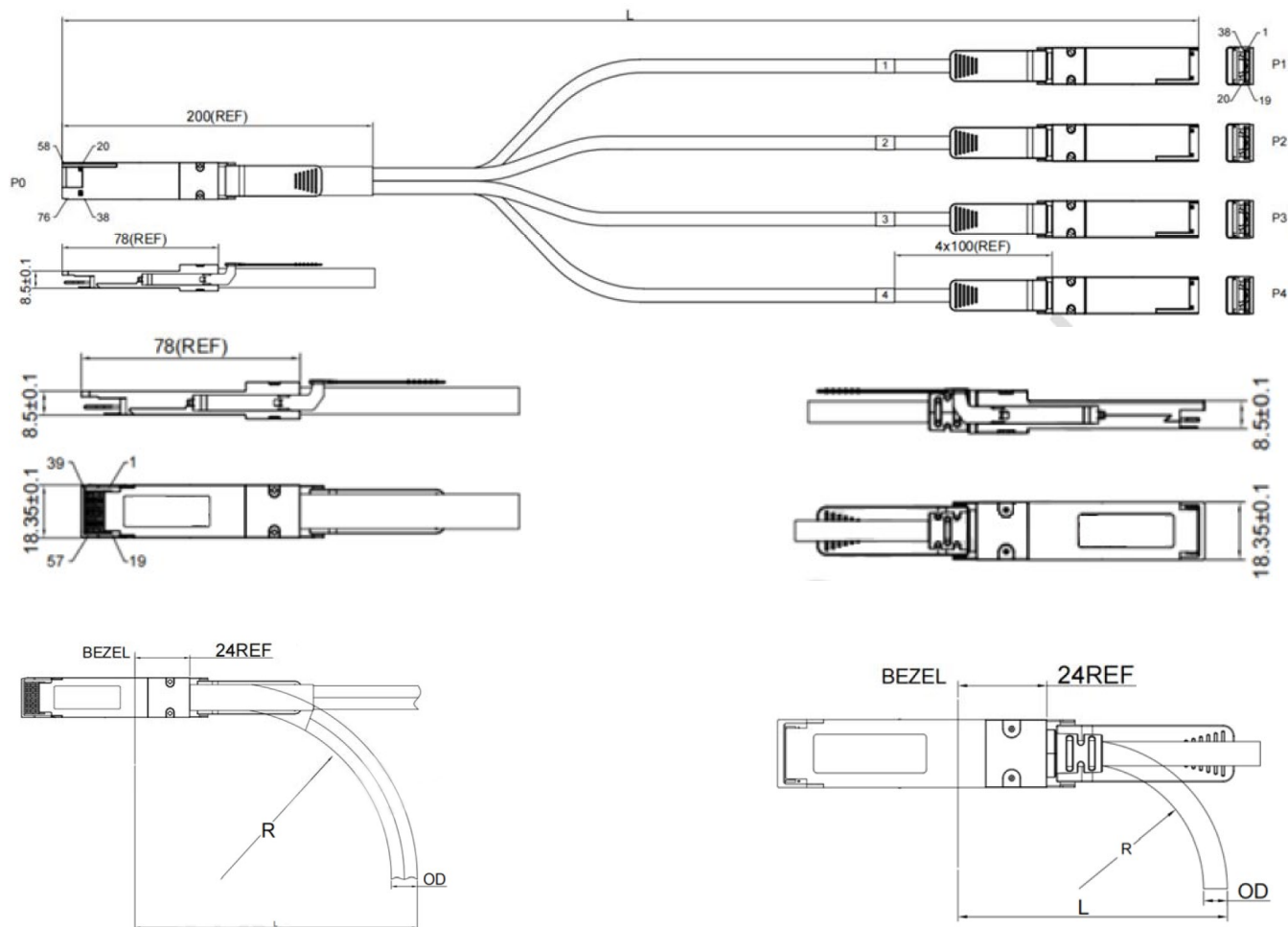
Wiring Table

| WIRING DIAGRAM |        |      |           |        |  |
|----------------|--------|------|-----------|--------|--|
| P0 END         |        |      | P1&P2 END |        |  |
| Pad            | Signal | Px   | Pad       | Signal |  |
| 1              | GND    | —    | 20        | GND    |  |
| 2              | TX2n   | → P1 | 21        | RX2n   |  |
| 3              | TX2p   | →    | 22        | RX2p   |  |
| 4              | GND    | —    | 20        | GND    |  |
| 5              | TX4n   | →    | 21        | RX2n   |  |
| 6              | TX4p   | →    | 22        | RX2p   |  |
| 7              | GND    | —    | 23        | GND    |  |
| 13             | GND    | —    | 35        | GND    |  |
| 14             | RX3p   | ←    | 36        | TX1p   |  |
| 15             | RX3n   | ←    | 37        | TX1n   |  |
| 16             | GND    | —    | 38        | GND    |  |
| 17             | RX1p   | ←    | 36        | TX1p   |  |
| 18             | RX1n   | ←    | 37        | TX1n   |  |
| 19             | GND    | —    | 38        | GND    |  |
| 20             | GND    | —    | 1         | GND    |  |
| 21             | RX2n   | ←    | 2         | TX2n   |  |
| 22             | RX2p   | ←    | 3         | TX2p   |  |
| 23             | GND    | —    | 1         | GND    |  |
| 24             | RX4n   | ←    | 2         | TX2n   |  |
| 25             | RX4p   | ←    | 3         | TX2p   |  |
| 26             | GND    | —    | 4         | GND    |  |
| 32             | GND    | —    | 16        | GND    |  |
| 33             | TX3p   | →    | 17        | RX1p   |  |
| 34             | TX3n   | →    | 18        | RX1n   |  |
| 35             | GND    | —    | 19        | GND    |  |
| 36             | TX1p   | →    | 17        | RX1p   |  |
| 37             | TX1n   | → P1 | 18        | RX1n   |  |
| 38             | GND    | —    | 19        | GND    |  |

| WIRING DIAGRAM |        |      |           |        |  |
|----------------|--------|------|-----------|--------|--|
| P0 END         |        |      | P3&P4 END |        |  |
| Pad            | Signal | Px   | Pad       | Signal |  |
| 39             | GND    | —    | 20        | GND    |  |
| 40             | TX6n   | → P3 | 21        | RX2n   |  |
| 41             | TX6p   | →    | 22        | RX2p   |  |
| 42             | GND    | —    | 20        | GND    |  |
| 43             | TX8n   | →    | 21        | RX2n   |  |
| 44             | TX8p   | →    | 22        | RX2p   |  |
| 45             | GND    | —    | 23        | GND    |  |
| 51             | GND    | —    | 35        | GND    |  |
| 52             | RX7p   | ←    | 36        | TX1p   |  |
| 53             | RX7n   | ←    | 37        | TX1n   |  |
| 54             | GND    | —    | 38        | GND    |  |
| 55             | RX5p   | ←    | 36        | TX1p   |  |
| 56             | RX5n   | ←    | 37        | TX1n   |  |
| 57             | GND    | —    | 38        | GND    |  |
| 58             | GND    | —    | 1         | GND    |  |
| 59             | RX6n   | ←    | 2         | TX2n   |  |
| 60             | RX6p   | ←    | 3         | TX2p   |  |
| 61             | GND    | —    | 1         | GND    |  |
| 62             | RX8n   | ←    | 2         | TX2n   |  |
| 63             | RX8p   | ←    | 3         | TX2p   |  |
| 64             | GND    | —    | 4         | GND    |  |
| 70             | GND    | —    | 16        | GND    |  |
| 71             | TX7p   | →    | 17        | RX1p   |  |
| 72             | TX7n   | →    | 18        | RX1n   |  |
| 73             | GND    | —    | 19        | GND    |  |
| 74             | TX5p   | →    | 17        | RX1p   |  |
| 75             | TX5n   | → P3 | 18        | RX1n   |  |
| 76             | GND    | —    | 19        | GND    |  |



Mechanical Specifications



| QSFP-DD |      |                 |                      | QSFP  |       |                 |                      |
|---------|------|-----------------|----------------------|-------|-------|-----------------|----------------------|
| Gauge   | OD   | Bend Radius "R" | Min. Bend Radius "L" | Gauge | OD    | Bend Radius "R" | Min. Bend Radius "L" |
| 30AWG   | 12MM | 60MM            | 155MM                | 30AWG | 6.0MM | 30MM            | 68MM                 |

## About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

## Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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