

## MCP7F60-W02AR26-C

Mellanox® MCP7F60-W02AR26 Compatible TAA Compliant 400GBase-CU QSFP-DD 400G to 4xQSFP56 100G PAM-4 Direct Attach Cable (Passive Twinax, 2.5m)

### Features

- Compliant with QSFP-DD MSA Specification Rev 3.4
- SFF-8679 electrical interface compliant
- SFF-8636 management interface support
- Compatible with IEEE 802.3bj, IEEE 802.3by, IEEE 802.3cd
- Supports aggregate data rates of 100 and 400Gbps
- I2C for EEPROM communication
- Pull-to-release slide latch design
- 28AWG wire gauge
- Excellent EMI/EMC performance 360-degree cable shield termination
- Advantage dual side pre-solder automated assembly technologies
- Low loss, stronger mechanical features, more flexible
- ROHS Compliant and lead-free



### Applications

- Switches, Servers and Routers
- Data Center Networks
- Storage Area Networks
- High Performance Computing
- Telecommunications and wireless infrastructure

### Product Description

This is a Mellanox® MCP7F60-W02AR26 compatible TAA compliant 400GBase-CU QSFP-DD 400G to 4xQSFP56 100G PAM-4 direct attach cable that operates over passive copper with a maximum reach of 2.5m (8.2ft). 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' direct attach cables 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."



## Mechanical Characteristics

| Length | Wire Gauge | Cable OD | Cable Jacket Material | Flammability Rating |
|--------|------------|----------|-----------------------|---------------------|
| 2.5m   | 28AWG      | 4.93mm   | PVC                   | VW-1                |

## Electrical Characteristics

| Parameter                         | Specification          |
|-----------------------------------|------------------------|
| Impedance                         | 100 ohm                |
| Data Rate                         | 56Gbps per lane (PAM4) |
| Voltage                           | 3.3V DC                |
| Current (signal application only) | 0.75A                  |
| Operating Temperature             | -10°C to 55°C          |
| Storage Temperature               | -10°C to 55°C          |
| High Speed Compliant              | IEEE 802.3cd           |

## QSFP-DD to 2xQSFP Wiring Schematic

| P3 QSFP-DD |           |   | P1 QSFP28 |          |
|------------|-----------|---|-----------|----------|
| GND        | 1         |   | 20        | GND      |
| TX2-       | <b>2</b>  | ↔ | <b>21</b> | RX2-     |
| TX2+       | <b>3</b>  | ↔ | <b>22</b> | RX2+     |
| GND        | 4         |   | 23        | GND      |
| TX4-       | <b>5</b>  | ↔ | <b>24</b> | RX4-     |
| TX4+       | <b>6</b>  | ↔ | <b>25</b> | RX4+     |
| GND        | 7         |   | 26        | GND      |
| ModseIL    | 8         |   | 27        | ModPrsL  |
| ResetL     | 9         |   | 28        | InHL     |
| VccRx      | 10        |   | 29        | VccTx    |
| SCL        | 11        |   | 30        | VccI     |
| SDA        | 12        |   | 31        | Reserved |
| GND        | 13        |   | 32        | GND      |
| RX3+       | <b>14</b> | ↔ | <b>33</b> | TX3+     |
| RX3-       | <b>15</b> | ↔ | <b>34</b> | TX3-     |
| GND        | 16        |   | 35        | GND      |
| RX1+       | <b>17</b> | ↔ | <b>36</b> | TX1+     |
| RX1-       | <b>18</b> | ↔ | <b>37</b> | TX1-     |
| GND        | 19        |   | 38        | GND      |
|            |           |   |           |          |
| GND        | 20        |   | 1         | GND      |
| RX2-       | <b>21</b> | ↔ | <b>2</b>  | TX2-     |
| RX2+       | <b>22</b> | ↔ | <b>3</b>  | TX2+     |
| GND        | 23        |   | 4         | GND      |
| RX4-       | <b>24</b> | ↔ | <b>5</b>  | TX4-     |
| RX4+       | <b>25</b> | ↔ | <b>6</b>  | TX4+     |
| GND        | 26        |   | 7         | GND      |
| ModPrsL    | 27        |   | 8         | ModseIL  |
| InHL       | 28        |   | 9         | ResetL   |
| VccTx      | 29        |   | 10        | VccRx    |
| VccI       | 30        |   | 11        | SCL      |
| InHLMode   | 31        |   | 12        | SDA      |
| GND        | 32        |   | 13        | GND      |
| TX3+       | <b>33</b> | ↔ | <b>14</b> | RX3+     |
| TX3-       | <b>34</b> | ↔ | <b>15</b> | RX3-     |
| GND        | 35        |   | 16        | GND      |
| TX1+       | <b>36</b> | ↔ | <b>17</b> | RX1+     |
| TX1-       | <b>37</b> | ↔ | <b>18</b> | RX1-     |
| GND        | 38        |   | 19        | GND      |

| P3 QSFP-DD |           |   | P2 QSFP28 |          |
|------------|-----------|---|-----------|----------|
| GND        | 39        |   | 20        | GND      |
| TX6-       | <b>40</b> | ↔ | <b>21</b> | RX2-     |
| TX6+       | <b>41</b> | ↔ | <b>22</b> | RX2+     |
| GND        | 42        |   | 23        | GND      |
| TX8-       | <b>43</b> | ↔ | <b>24</b> | RX4-     |
| TX8+       | <b>44</b> | ↔ | <b>25</b> | RX4+     |
| GND        | 45        |   | 26        | GND      |
| Reserved   | 46        |   | 27        | ModPrsL  |
| VS1        | 47        |   | 28        | InHL     |
| VccRx1     | 48        |   | 29        | VccTx    |
| VS2        | 49        |   | 30        | VccI     |
| VS3        | 50        |   | 31        | Reserved |
| GND        | 51        |   | 32        | GND      |
| RX7+       | <b>52</b> | ↔ | <b>33</b> | TX3+     |
| RX7-       | <b>53</b> | ↔ | <b>34</b> | TX3-     |
| GND        | 54        |   | 35        | GND      |
| RX5+       | <b>55</b> | ↔ | <b>36</b> | TX1+     |
| RX5-       | <b>56</b> | ↔ | <b>37</b> | TX1-     |
| GND        | 57        |   | 38        | GND      |
|            |           |   |           |          |
| GND        | 58        |   | 1         | GND      |
| RX6-       | <b>59</b> | ↔ | <b>2</b>  | TX2-     |
| RX6+       | <b>60</b> | ↔ | <b>3</b>  | TX2+     |
| GND        | 61        |   | 4         | GND      |
| RX8-       | <b>62</b> | ↔ | <b>5</b>  | TX4-     |
| RX8+       | <b>63</b> | ↔ | <b>6</b>  | TX4+     |
| GND        | 64        |   | 7         | GND      |
| NC         | 65        |   | 8         | ModseIL  |
| Reserved   | 66        |   | 9         | ResetL   |
| VccTx1     | 67        |   | 10        | VccRx    |
| Vcc2       | 68        |   | 11        | SCL      |
| Reserved   | 69        |   | 12        | SDA      |
| GND        | 70        |   | 13        | GND      |
| TX7+       | <b>71</b> | ↔ | <b>14</b> | RX3+     |
| TX7-       | <b>72</b> | ↔ | <b>15</b> | RX3-     |
| GND        | 73        |   | 16        | GND      |
| TX5+       | <b>74</b> | ↔ | <b>17</b> | RX1+     |
| TX5-       | <b>75</b> | ↔ | <b>18</b> | RX1-     |
| GND        | 76        |   | 19        | GND      |

## QSFP-DD Pin Descriptions

| PIN | Logic       | Symbol   | Description   | Notes |
|-----|-------------|----------|---|-------|
| 1   |             | GND      | Ground  | 1     |
| 2   | CML-I       | Tx2n     | Transmitter Inverted Data Input   |       |
| 3   | CML-I       | Tx2p     | Transmitter Non-Inverted Data Input   |       |
| 4   |             | GND      | Ground  | 1     |
| 5   | CML-I       | Tx4n     | Transmitter Inverted Data Input   |       |
| 6   | CML-I       | Tx4p     | Transmitter Non-Inverted Data Input   |       |
| 7   |             | GND      | Ground  | 1     |
| 8   | LVTTTL-I    | ModSelL  | Module Select   |       |
| 9   | LVTTTL-I    | ResetL   | Module Reset  |       |
| 10  |             | VccRx    | +3.3V Power Supply Receiver   | 2     |
| 11  | LVC MOS-I/O | SCL      | 2-wire serial interface clock   |       |
| 12  | LVC MOS-I/O | SDA      | 2-wire serial interface data  |       |
| 13  |             | GND      | Ground  | 1     |
| 14  | CML-O       | Rx3p     | Receiver Non-Inverted Data Output   |       |
| 15  | CML-O       | Rx3n     | Receiver Inverted Data Output   |       |
| 16  |             | GND      | Ground  | 1     |
| 17  | CML-O       | Rx1p     | Receiver Non-Inverted Data Output   |       |
| 18  | CML-O       | Rx1n     | Receiver Inverted Data Output   |       |
| 19  |             | GND      | Ground  | 1     |
| 20  |             | GND      | Ground  | 1     |
| 21  | CML-O       | Rx2n     | Receiver Inverted Data Output   |       |
| 22  | CML-O       | Rx2p     | Receiver Non-Inverted Data Output   |       |
| 23  |             | GND      | Ground  | 1     |
| 24  | CML-O       | Rx4n     | Receiver Inverted Data Output   |       |
| 25  | CML-O       | Rx4p     | Receiver Non-Inverted Data Output   |       |
| 26  |             | GND      | Ground  | 1     |
| 27  | LVTTTL-O    | ModPrsL  | Module Present  |       |
| 28  | LVTTTL-O    | IntL     | Interrupt   |       |
| 29  |             | VccTx    | +3.3V Power Supply Transmitter  | 2     |
| 30  |             | Vccl     | +3.3V Power Supply  | 2     |
| 31  | LVTTTL-I    | InitMode | Initialization mode; In legacy QSFP applications, the InitMode pad is called LPMODE |       |
| 32  |             | GND      | Ground  | 1     |
| 33  | CML-I       | Tx3p     | Transmitter Non-Inverted Data Input   |       |
| 34  | CML-I       | Tx3n     | Transmitter Inverted Data Input   |       |
| 35  |             | GND      | Ground  | 1     |
| 36  | CML-I       | Tx1p     | Transmitter Non-Inverted Data Input   |       |
| 37  | CML-I       | Tx1n     | Transmitter Inverted Data Input   |       |
| 38  |             | GND      | Ground  | 1     |

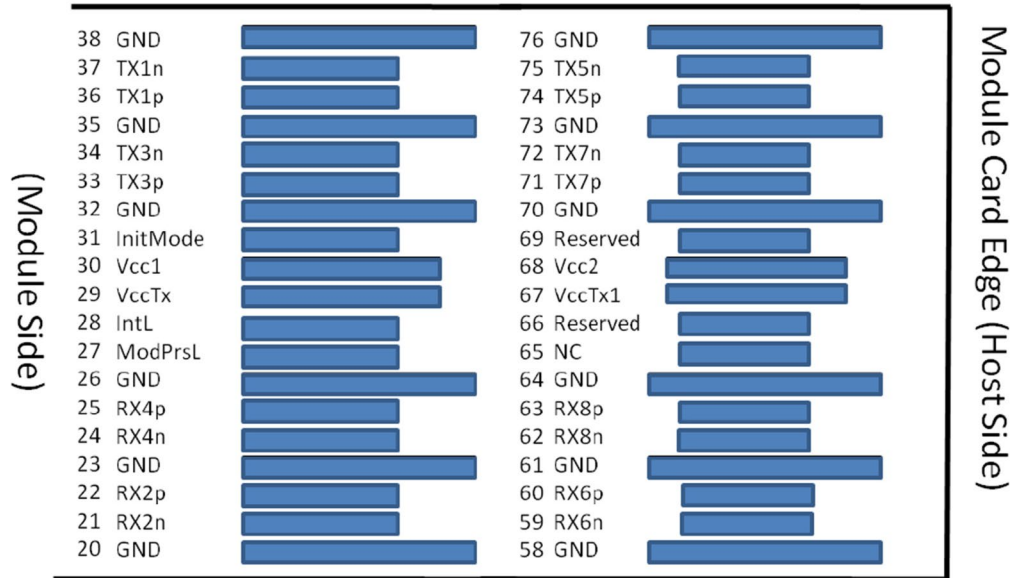
| PIN |       | Symbol   | Description                         | Notes |
|-----|-------|----------|-------------------------------------|-------|
| 39  |       | GND      | Ground                              | 1     |
| 40  | CML-I | Tx6n     | Transmitter Inverted Data Input     |       |
| 41  | CML-I | Tx6p     | Transmitter Non-Inverted Data Input |       |
| 42  |       | GND      | Ground                              | 1     |
| 43  | CML-I | Tx8n     | Transmitter Inverted Data Input     |       |
| 44  | CML-I | Tx8p     | Transmitter Non-Inverted Data Input |       |
| 45  |       | GND      | Ground                              | 1     |
| 46  |       | Reserved | For future use                      | 3     |
| 47  |       | VSI      | Module Vendor Specific 1            | 3     |
| 48  |       | VccRx1   | 3.3V Power Supply                   | 2     |
| 49  |       | VS2      | Module Vendor Specific 2            | 3     |
| 50  |       | VS3      | Module Vendor Specific 3            | 3     |
| 51  |       | GND      | Ground                              | 1     |
| 52  | CML-O | Rx7p     | Receiver Non-Inverted Data Output   |       |
| 53  | CML-O | Rx7n     | Receiver Inverted Data Output       |       |
| 54  |       | GND      | Ground                              | 1     |
| 55  | CML-O | Rx5p     | Receiver Non-Inverted Data Output   |       |
| 56  | CML-O | Rx5n     | Receiver Inverted Data Output       |       |
| 57  |       | GND      | Ground                              | 1     |
| 58  |       | GND      | Ground                              | 1     |
| 59  | CML-O | Rx6n     | Receiver Inverted Data Output       |       |
| 60  | CML-O | Rx6p     | Receiver Non-Inverted Data Output   |       |
| 61  |       | GND      | Ground                              | 1     |
| 62  | CML-O | Rx8n     | Receiver Inverted Data Output       |       |
| 63  | CML-O | Rx8p     | Receiver Non-Inverted Data Output   |       |
| 64  |       | GND      | Ground                              | 1     |
| 65  |       | NC       | No Connect                          | 3     |
| 66  |       | Reserved | For future use                      | 3     |
| 67  |       | VccTx1   | 3.3V Power Supply                   | 2     |
| 68  |       | Vcc2     | 3.3V Power Supply                   | 2     |
| 69  |       | Reserved | For future use                      | 3     |
| 70  |       | GND      | Ground                              | 1     |
| 71  | CML-I | Tx7p     | Transmitter Non-Inverted Data Input |       |
| 72  | CML-I | Tx7n     | Transmitter Inverted Data Input     |       |
| 73  |       | GND      | Ground                              | 1     |
| 74  | CML-I | Tx5p     | Transmitter Non-Inverted Data Input |       |
| 75  | CML-I | Tx5n     | Transmitter Inverted Data Input     |       |
| 76  |       | GND      | Ground                              | 1     |

**Notes:**

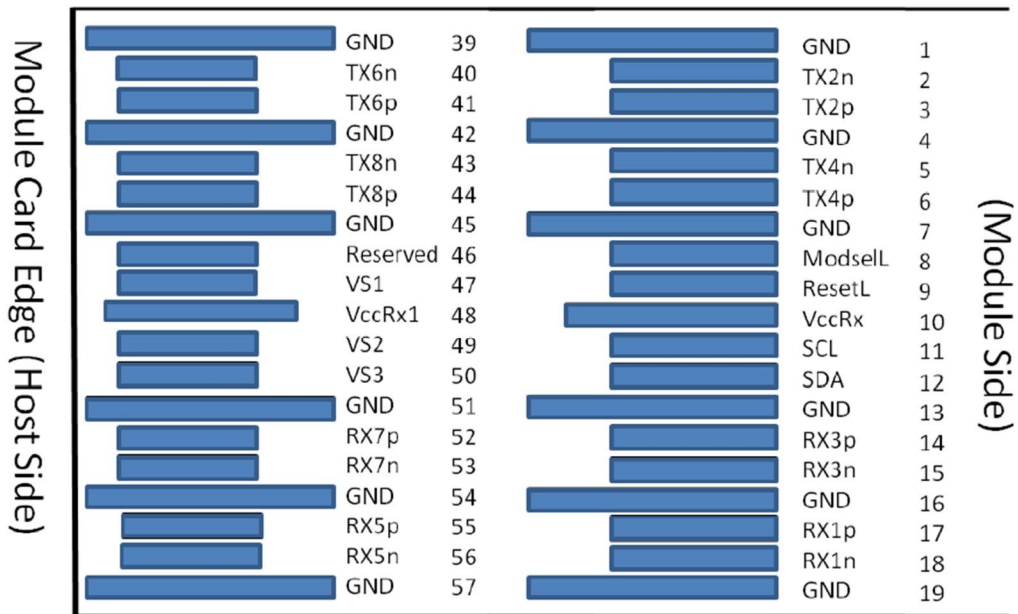
1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed in Table 6. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1000 mA.
3. All Vendor Specific, Reserved and No Connect pins may be terminated with 50 ohms to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module. Vendor specific and Reserved pads shall have an impedance to GND that is greater than 10 kOhms and less than 100 pF.
4. Plug Sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, 3B. (see Figure 2 for pad locations) Contact sequence A will make, then break contact with additional QSFP-DD pads. Sequence 1A, 1B will then occur simultaneously, followed by 2A, 2B, followed by 3A,3B.

## QSFP-DD Electrical Pin-out Details

Top side viewed from top



Bottom side viewed from bottom



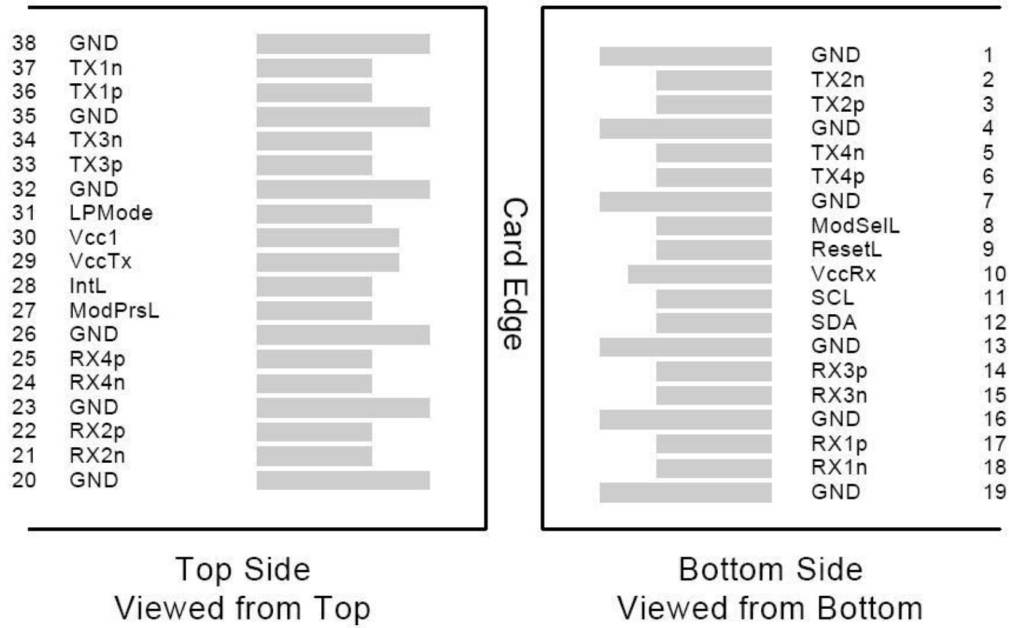
## QSFP56 Pin Definitions

| Pin | Logic      | Symbol  | Name/Descriptions                                  | Ref. |
|-----|------------|---------|--|------|
| 1   |            | GND     | Module Ground                                      | 1    |
| 2   | CML-I      | Tx2-    | Transmitter inverted data input                    |      |
| 3   | CML-I      | Tx2+    | Transmitter non-inverted data input                |      |
| 4   |            | GND     | Module Ground                                      | 1    |
| 5   | CML-I      | Tx4-    | Transmitter inverted data input                    |      |
| 6   | CML-I      | Tx4+    | Transmitter non-inverted data input                |      |
| 7   |            | GND     | Module Ground                                      | 1    |
| 8   | LVTTTL-I   | MODSEIL | Module Select                                      | 2    |
| 9   | LVTTTL-I   | ResetL  | Module Reset                                       | 2    |
| 10  |            | VCCRx   | +3.3v Receiver Power Supply                        |      |
| 11  | LVCNOS-I   | SCL     | 2-wire Serial interface clock                      | 2    |
| 12  | LVCNOS-I/O | SDA     | 2-wire Serial interface data                       | 2    |
| 13  |            | GND     | Module Ground                                      | 1    |
| 14  | CML-O      | RX3+    | Receiver non-inverted data output                  |      |
| 15  | CML-O      | RX3-    | Receiver inverted data output                      |      |
| 16  |            | GND     | Module Ground                                      | 1    |
| 17  | CML-O      | RX1+    | Receiver non-inverted data output                  |      |
| 18  | CML-O      | RX1-    | Receiver inverted data output                      |      |
| 19  |            | GND     | Module Ground                                      | 1    |
| 20  |            | GND     | Module Ground                                      | 1    |
| 21  | CML-O      | RX2-    | Receiver inverted data output                      |      |
| 22  | CML-O      | RX2+    | Receiver non-inverted data output                  |      |
| 23  |            | GND     | Module Ground                                      | 1    |
| 24  | CML-O      | RX4-    | Receiver inverted data output                      |      |
| 25  | CML-O      | RX4+    | Receiver non-inverted data output                  |      |
| 26  |            | GND     | Module Ground                                      | 1    |
| 27  | LVTTTL-O   | ModPrsL | Module Present, internal pulled down to GND        |      |
| 28  | LVTTTL-O   | IntL    | Interrupt output should be pulled up on host board | 2    |
| 29  |            | VCCTx   | +3.3v Transmitter Power Supply                     |      |
| 30  |            | VCC1    | +3.3v Power Supply                                 |      |
| 31  | LVTTTL-I   | LPMODE  | Low Power Mode                                     | 2    |
| 32  |            | GND     | Module Ground                                      | 1    |
| 33  | CML-I      | Tx3+    | Transmitter non-inverted data input                |      |
| 34  | CML-I      | Tx3-    | Transmitter inverted data input                    |      |
| 35  |            | GND     | Module Ground                                      | 1    |
| 36  | CML-I      | Tx1+    | Transmitter non-inverted data input                |      |
| 37  | CML-I      | Tx1-    | Transmitter inverted data input                    |      |
| 38  |            | GND     | Module Ground                                      | 1    |

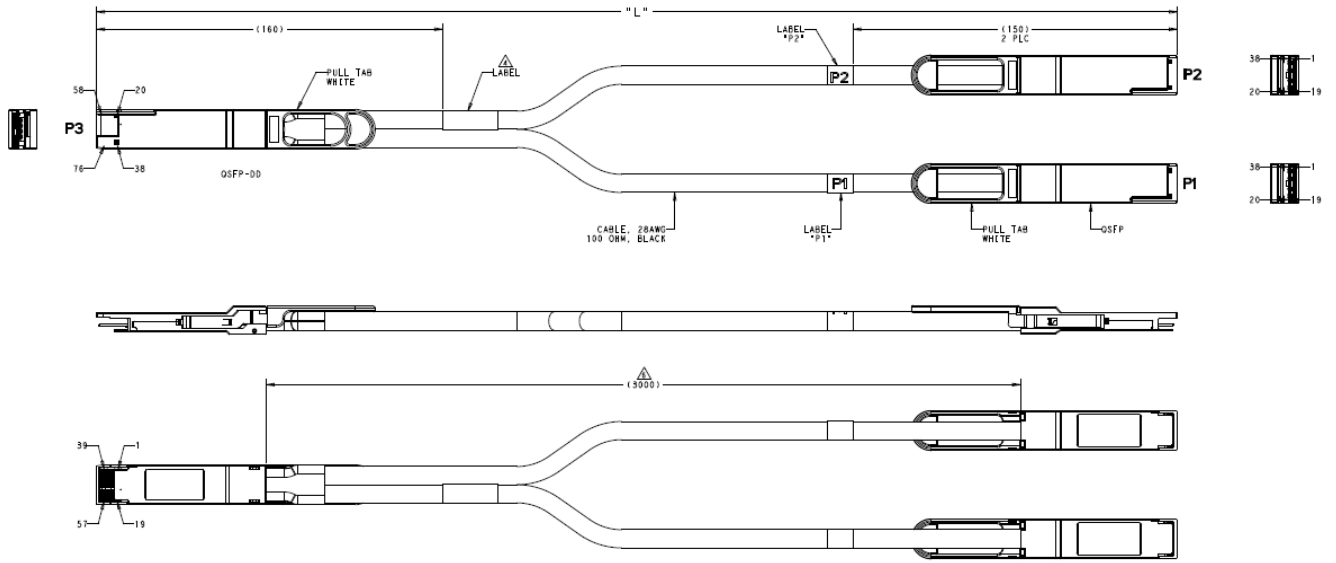
**Notes:**

1. Module circuit ground is isolated from module chassis ground with in the module.
2. Open collector; should be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.

**QSFP56 Electrical Pin-out Details**



# Mechanical Specifications



## 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.



## Contact Information

ProLabs US

Email: [sales@prolabs.com](mailto:sales@prolabs.com)

Telephone: 952-852-0252

ProLabs UK

Email: [salessupport@prolabs.com](mailto:salessupport@prolabs.com)

Telephone: +44 1285 719 600