

## MCP7H50-V001R30-AO

Mellanox® MCP7H50-V001R30 Compatible TAA 200GBase-CU QSFP56 to 2xQSFP56 Infiniband HDR Direct Attach Cable (Passive Twinax, 1m, LSZH)

### Features

- PAM4 modulation
- Meet IEEE802.3bj & IEEE802.3cd
- Meet SFF-8636
- Low crosstalk
- Low power
- Support I2C two - line string interface, easy to control
- Hot pluggable
- Operating case temperature: -20 to 75 Celsius
- RoHS Compliant and Lead-Free



### Applications

- Infiniband SDR, DDR, QDR, FDR, EDR, HDR SWITCH
- 10G/40G/100G/200GBase Ethernet
- Data center, cloud server

### Product Description

This is a Mellanox® MCP7H50-V001R30 Compatible 200GBase-CU QSFP56 to 2xQSFP56 Infiniband HDR LSZH direct attach cable that operates over passive copper with a maximum reach of 1m. It has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. We stand behind the quality of our products and proudly offer a limited lifetime warranty. This cable is TAA (Trade Agreements Act) compliant and is built to comply with MSA (Multi-Source Agreement) standards.

AddOn's 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."



## Environment Performance

| Parameter                                              | Requirement                                                        | Test Condition                                                                                                           |
|--------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Operating Temperature Range</b>                     | -20°C to +75°C                                                     | Cable operating temperature range                                                                                        |
| <b>Storage Temperature Range (In Packed Condition)</b> | -40°C to +80°C                                                     | Cable storage temperature range in packed condition                                                                      |
| <b>Thermal Cycling Non-Powered</b>                     | No evidence of physical damage                                     | EIA-364-32D, method A, -25 to 90C, 100 cycles, 15 min. dwells                                                            |
| <b>Salt Spraying</b>                                   | 48 hours salt spraying after shell corrosive area less than 5%     | EIA-364-26                                                                                                               |
| <b>Mixed Flowing Gas</b>                               | Pass electrical tests per 3.1 after stressing (for connector only) | EIA-364-35 Class II, 14 days                                                                                             |
| <b>Temperature Life</b>                                | No evidence of physical damage                                     | EIA-364-17C w/RH, damp heat 90°C at 85% RH for 500 hours then return to ambient                                          |
| <b>Cable Cold Bend</b>                                 | 4H, no evidence of physical damage                                 | Condition: -20°C±2°C, mandrel diameter is 6 times the cable diameter                                                     |
| <b>Low-Level Contact Resistance</b>                    | 70milliΩ maximum from initial                                      | EIA-364-23: apply a maximum voltage of 20mV and a current of 100mA                                                       |
| <b>Insulation Resistance</b>                           | 10MΩ (minimum)                                                     | EIA364-21: AC 300V 1 minute                                                                                              |
| <b>Dielectric Withstanding Voltage</b>                 | No disruptive discharge                                            | EIA-364-20: apply a voltage of 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground |

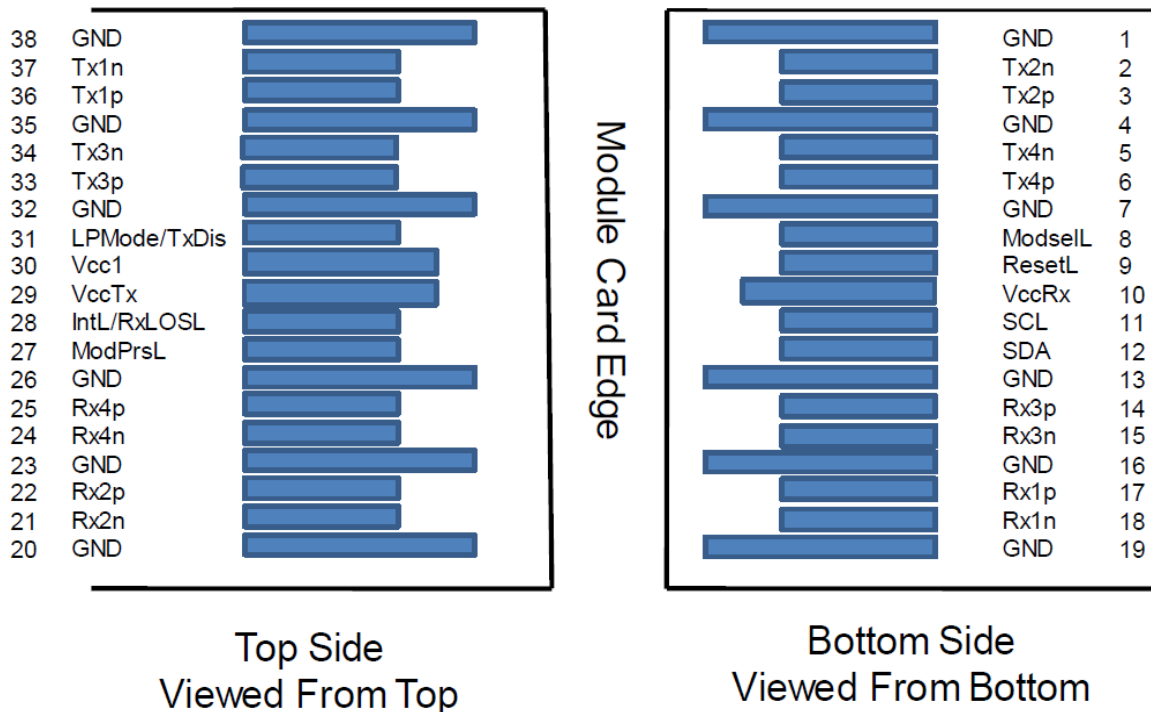
## Electrical Performance

| Parameter                                                                             |                             | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Test Condition             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
|---------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------|--------|----------|--------|-------|----------|--------------|-------|-------|-------|-------|-------|--------|-----------------|-------|-------|--------|--------|--------|--------|--------------|-------|-------|--------|--------|--------|--------|-----------------|-------|--------|--------|--------|--------|--------|----------------|
| Differential Impedance                                                                | Cable Impedance             | 105+5/-10Ω                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Rise time of 25ps (20-80%) |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
|                                                                                       | Paddle Card Impedance       | 100±10Ω                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Rise time of 25ps (20-80%) |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
|                                                                                       | Cable Termination Impedance | 100±15Ω                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Rise time of 25ps (20-80%) |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Differential (Input/Output) Return Loss SDD11/SDD22                                   |                             | $\text{Return\_loss}(f) \geq \begin{cases} 16.5-2\sqrt{f} & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{cases}$ <p>Where f is the frequency in GHz<br/>Return_loss(f) is the return loss at frequency f</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Differential to Common-Mode (Input/Output) Return Loss SCD11/SCD22                    |                             | $\text{Return\_loss}(f) \geq \begin{cases} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15-(6/25.78)f & 12.89 \leq f \leq 19 \end{cases}$ <p>Where f is the frequency in GHz<br/>Return_loss(f) is the Differential to common-mode return loss at frequency f</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Common-Mode to Common-Mode (Input/Output) Return Loss SCC11/SCC22                     |                             | $\text{Return\_loss}(f) \geq 2\text{dB} \quad 0.2 \leq f \leq 19$ <p>Where f is the frequency in GHz<br/>Return_loss(f) is the common-mode to common-mode return loss at frequency f</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Differential Insertion Loss (SDD21 Maximum)                                           |                             | (Differential Insertion Loss Maximum for TPa to TPb Excluding Test Fixture) <table border="1" style="width:100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th>F AWG</th> <th>1.25GHz</th> <th>2.5GHz</th> <th>5.0GHz</th> <th>7.0GHz</th> <th>10GHz</th> <th>12.89GHz</th> </tr> </thead> <tbody> <tr> <td>30 (1m) Max.</td> <td>4.5dB</td> <td>5.4dB</td> <td>6.3dB</td> <td>7.5dB</td> <td>8.5dB</td> <td>10.5dB</td> </tr> <tr> <td>30/28 (3m) Max.</td> <td>7.5dB</td> <td>9.5dB</td> <td>12.2dB</td> <td>14.8dB</td> <td>18.0dB</td> <td>21.5dB</td> </tr> <tr> <td>26 (3m) Max.</td> <td>5.7dB</td> <td>7.2dB</td> <td>9.9 dB</td> <td>11.9dB</td> <td>14.1dB</td> <td>16.5dB</td> </tr> <tr> <td>26/25 (5m) Max.</td> <td>7.8dB</td> <td>10.0dB</td> <td>13.5dB</td> <td>16.0dB</td> <td>19.0dB</td> <td>22.0dB</td> </tr> </tbody> </table> | F AWG                      | 1.25GHz | 2.5GHz | 5.0GHz   | 7.0GHz | 10GHz | 12.89GHz | 30 (1m) Max. | 4.5dB | 5.4dB | 6.3dB | 7.5dB | 8.5dB | 10.5dB | 30/28 (3m) Max. | 7.5dB | 9.5dB | 12.2dB | 14.8dB | 18.0dB | 21.5dB | 26 (3m) Max. | 5.7dB | 7.2dB | 9.9 dB | 11.9dB | 14.1dB | 16.5dB | 26/25 (5m) Max. | 7.8dB | 10.0dB | 13.5dB | 16.0dB | 19.0dB | 22.0dB | 10MHz≤f ≤19GHz |
| F AWG                                                                                 | 1.25GHz                     | 2.5GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5.0GHz                     | 7.0GHz  | 10GHz  | 12.89GHz |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| 30 (1m) Max.                                                                          | 4.5dB                       | 5.4dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6.3dB                      | 7.5dB   | 8.5dB  | 10.5dB   |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| 30/28 (3m) Max.                                                                       | 7.5dB                       | 9.5dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12.2dB                     | 14.8dB  | 18.0dB | 21.5dB   |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| 26 (3m) Max.                                                                          | 5.7dB                       | 7.2dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 9.9 dB                     | 11.9dB  | 14.1dB | 16.5dB   |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| 26/25 (5m) Max.                                                                       | 7.8dB                       | 10.0dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 13.5dB                     | 16.0dB  | 19.0dB | 22.0dB   |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Insertion Loss Deviation                                                              |                             | $-0.176*f - 0.7 \leq \text{ILD} \leq 0.176*f + 0.7$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Differential to Common-Mode Conversion Loss-Differential Insertion Loss (SCD21-SDD21) |                             | $\text{Conversion\_loss}(f) - \text{IL}(f) \geq \begin{cases} 10 & 0.01 \leq f < 12.89 \\ \{ 27-(29/22)f & 12.89 \leq f < 15.7 \} \\ 6.3 & 15.7 \leq f \leq 19 \end{cases}$ <p>Where f is the frequency in GHz<br/>Conversion_loss(f) is the cable assembly differential to common-mode conversion loss<br/>IL(f) is the cable assembly insertion loss</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| MDNEXT (Multiple Disturber Near-End Crosstalk)                                        |                             | ≥26dB @12.89GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |
| Intra Skew                                                                            |                             | 15ps/m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10MHz≤f ≤19GHz             |         |        |          |        |       |          |              |       |       |       |       |       |        |                 |       |       |        |        |        |        |              |       |       |        |        |        |        |                 |       |        |        |        |        |        |                |

## Mechanical and Physical Characteristics

| Parameter                           | Requirement                                   | Test Condition                                                                                                                                                                                                           |
|-------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Vibration</b>                    | Pass electrical tests per 3.1 after stressing | Clamp & vibrate per EIA-364-28E, TC-VII, test condition letter – D, 15 minutes in X, Y & Z axis.                                                                                                                         |
| <b>Cable Flex</b>                   | No evidence of physical damage                | Flex cable 180° for 20 cycles ( $\pm 90^\circ$ from nominal position) at 12 cycles per minute with a 1.0kg load applied to the cable jacket. Flex in the boot area 90° in each direction from vertical. Per EIA-364-41C. |
| <b>Cable Plug Retention in Cage</b> | 90N Minimum<br>No evidence of physical damage | Force to be applied axially with no damage to cage. Per SFF-8661 Rev. 2.1.<br>Pull on cable jacket approximately 1 ft behind cable plug. No functional damage to cable plug below 90N.<br>Per SFF-8432 Rev. 5.0.         |
| <b>Cable Retention in Plug</b>      | 90N Minimum<br>No evidence of physical damage | Cable plug is fixtured with the bulk cable hanging vertically. A 90N axial load is applied (gradually) to the cable jacket and held for 1 minute. Per EIA-364-38B.                                                       |
| <b>Mechanical Shock</b>             | Pass electrical tests per 3.1 after stressing | Clamp and shock per EIA-364-27B, TC-G, 3 times in 6 directions, 100g, 6ms.                                                                                                                                               |
| <b>Cable Plug Insertion</b>         | 40N Maximum (QSFP56)                          | Per SFF-8661 Rev. 2.1.                                                                                                                                                                                                   |
| <b>Cable plug Extraction</b>        | 30N Maximum (QSFP56)                          | Place axial load on de-latch to de-latch plug. Per SFF8661 Rev. 2.1.                                                                                                                                                     |
| <b>Durability</b>                   | 50 cycles, no evidence of physical damage     | EIA-364-09, perform plug & un-plug cycles: plug and receptacle mate rate: 250 times/hour. 50 times for QSFP28/SFP28 module (connector to PCB).                                                                           |

## Electrical Pin-Out Details



## Pin Descriptions

| Pin | Logic       | Symbol  | Name/Description                     | Notes |
|-----|-------------|---------|--------------------------------------|-------|
| 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    | ModSelL | Module Select.                       |       |
| 9   | LVTTTL-I    | ResetL  | Module Reset.                        |       |
| 10  |             | VccRx   | +3.3V Receiver Power Supply.         | 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     | 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.                      |       |
| 28  | LVTTTL-O    | IntL    | Interrupt.                           |       |
| 29  |             | VccTx   | +3.3V Transmitter Power Supply.      | 2     |
| 30  |             | Vcc1    | +3.3V Power Supply.                  | 2     |
| 31  | LVTTTL-I    | LPMode  | Low-Power Mode.                      |       |
| 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 |

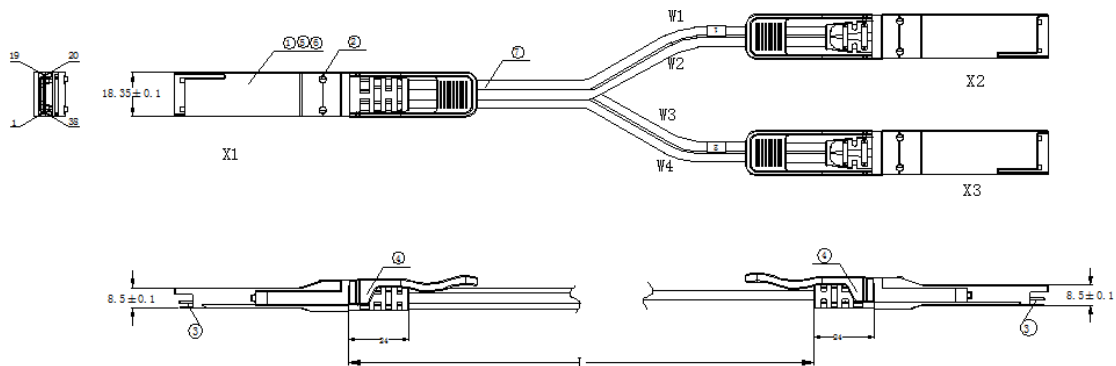
**Note:**

- 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.
- 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.

**Wiring Diagram**

| wire | Starting signal | Starting | End   | End signal |
|------|-----------------|----------|-------|------------|
| W1   | RX1+            | X1.17    | X2.36 | TX1+       |
|      | RX1-            | X1.18    | X2.37 | TX1-       |
|      | GND             | X1.19    | X2.38 | GND        |
|      | TX1+            | X1.36    | X2.17 | RX1+       |
|      | TX1-            | X1.37    | X2.18 | RX1-       |
|      | GND             | X1.38    | X2.19 | GND        |
| W2   | GND             | X1.20    | X2.1  | GND        |
|      | RX2-            | X1.21    | X2.2  | TX2-       |
|      | RX2+            | X1.22    | X2.3  | TX2+       |
|      | GND             | X1.1     | X2.20 | GND        |
|      | TX2-            | X1.2     | X2.21 | RX2-       |
|      | TX2+            | X1.3     | X2.22 | RX2+       |
| W3   | RX3+            | X1.14    | X3.36 | TX1+       |
|      | RX3-            | X1.15    | X3.37 | TX1-       |
|      | GND             | X1.16    | X3.38 | GND        |
|      | TX3+            | X1.33    | X3.17 | RX1+       |
|      | TX3-            | X1.34    | X3.18 | RX1-       |
|      | GND             | X1.35    | X3.19 | GND        |
| W4   | GND             | X1.23    | X3.1  | GND        |
|      | RX4-            | X1.24    | X3.2  | TX2-       |
|      | RX4+            | X1.25    | X3.3  | TX2+       |
|      | GND             | X1.4     | X3.20 | GND        |
|      | TX4-            | X1.5     | X3.21 | RX2-       |
|      | TX4+            | X1.6     | X3.22 | RX2+       |

**Mechanical Specifications**



## About AddOn Networks

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is engrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.



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