

## **MCP1650-H02AE26-C**

Mellanox® MCP1650-H02AE26 Compatible 200GBase-CU HDR QSFP56 to QSFP56 Direct Attach Cable (Passive Twinax, 2.5m)

### **Features:**

- Compliant with SFF-8636
- Compliant with IEEE802.3bj & IEEE802.3cd
- Support I2C two line strong interface, easy to control
- Hot-pluggable
- Operating Temperature: 0 to 70 Celsius
- Low Crosstalk
- Low power
- RoHS Compliant and Lead-Free



### **Applications:**

- 10G/40G/100G/200G Ethernet
- Infiniband SDR, DDR, QDR, FDR, EDR, HDR
- Data Center, Cloud Server

### **Product Description**

This is a Mellanox® MCP1650-H02AE26 Compatible 200GBase-CU QSFP56 to QSFP56 direct attach cable that operates over passive copper with a maximum reach of 2.5m. 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.

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."



## Electrical Characteristics

| Parameter   |               | Requirement   |        |        |        |        | Test Condition  |                |
|---|---------------|---|--------|--------|--------|--------|---|----------------|
| Differential Impedance  |               |   |        |        |        |        |   |                |
| Cable Impedance   |               | 105+5/-10Ω  |        |        |        |        | Rise time of 25ps<br>(20% ~ 80%).   |                |
| Paddle Card Impedance   |               | 100±10Ω   |        |        |        |        |   |                |
| Cable Termination Impedance   |               | 100±15Ω   |        |        |        |        |   |                |
| Differential (Input/Output)<br>Return Loss SDD11/SDD22                                      |               | $\text{Return\_loss}(f) \geq \left\{ \begin{array}{ll} 16.5-2vf & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{array} \right\}$<br>Where f is the frequency in GHz<br>Return loss(f) is the return loss at frequency f   |        |        |        |        | 10MHz≤f ≤19GHz  |                |
| Differential to common mode<br>(Input/Output) Return loss<br>SCD11/SCD22                    |               | $\text{Return loss}(f) \geq \left\{ \begin{array}{ll} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15-(6/25.78)f & 12.89 \leq f \leq 19 \end{array} \right\}$<br>Where f is the frequency in GHz<br>Return loss(f) is the Differential to common-mode return loss at frequency f   |        |        |        |        | 10MHz≤f ≤19GHz  |                |
| Common mode to common-<br>mode (Input/Output) Return<br>loss SCC11/ SCD22                   |               | Return loss (f)≥ 2dB      0.2≤f≤19<br>Where f is the frequency in GHz Return loss (f) is the common-mode to common-mode return loss at frequency f  |        |        |        |        | 10MHz≤f ≤19GHz  |                |
| Low Level Contact Resistance  |               | 70 milliohms Max. From initial.   |        |        |        |        | EIA-634-23: Apply a maximum voltage of 20mV and current of 100 mA.  |                |
| Insulation Resistance   |               | 10 Mohm (Min)   |        |        |        |        | EIA364-21:AC 300V 1minute   |                |
| Dielectric Withstanding Voltage   |               | NO disruptive discharge   |        |        |        |        | EIA-364-20: Apply a voltage o f 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground |                |
| Differential Insertion Loss Max. For TPa to TPb Excluding Test fixture                      |               |   |        |        |        |        |   |                |
| Differential<br>Insertion Loss<br>(SDD21 Max)   | F AWG         | 1.25GHz   | 2.5GHz | 5.0GHz | 7.0GHz | 10Ghz  | 12.89Ghz  | 10MHz≤f ≤19GHz |
|   | 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 ≤ ILD ≤ 0.176* f + 0.7   |        |        |        |        | 50MHz≤f ≤19GHz  |                |
| Differential to common mode<br>conversion Loss-Differential<br>Insertion Loss (SCD21-SDD21) |               | $\text{Conversion loss}(f) - \text{IL}(f) \geq \left\{ \begin{array}{ll} 10 & 0.01 \leq f < 12.89 \\ 27-(29/22)f & 12.89 \leq f < 15.7 \\ 6.3 & 15.7 \leq f \leq 19 \end{array} \right\}$<br>Where f is the frequency in GHz Conversion_loss (f) is the cable assembly differential to common-mode conversion loss<br>IL (f) is the cable assembly insertion loss |        |        |        |        | 10MHz≤f ≤19GHz  |                |

|  |                 |                |
|--|-----------------|----------------|
| MDNEXT (multiple disturber near-end crosswalk) | ≥26dB @12.89GHz | 10MHz≤f ≤19GHz |
| Intra Skew                                     | 15ps/m          | 10MHz≤f ≤19GHz |

## Environment Performance

| Parameter                   | Requirement  | Test Condition  |
|-----------------------------|--|---|
| Operating Temperature Range | -20°C to +76°C   | Cable operating temperature range   |
| Storage Temperature Range   | -40°C to +80°C   | Cable storage temperature range in packed condition                             |
| Thermal Cycling Non-Powered | No evidence of physical damage                                     | EIA-364-32D, Method A, -25 to 90C, 100 cycles, 15 min, dwells                   |
| Salt Spraying               | 48 hours salt spraying after shell corrosive area less than 5%     | EIA-364-26  |
| Mixed Flowing Gas           | Pass electrical tests per 3.1 after stressing (Fpr connector only) | EIA-364-35 Class II, 14 days.   |
| Temp. Life                  | No evidence of physical damage                                     | EIA-364-17C w/RH, Damp heat 90°C at 85% RH for 500 hours then return to ambient |
| Cable Cold Bend             | 4H No evidence of physical damage                                  | Condition: -20°C ±2°C, mandrel diameter is 6 times the cable diameter.          |

## Mechanical and Physical Characteristics

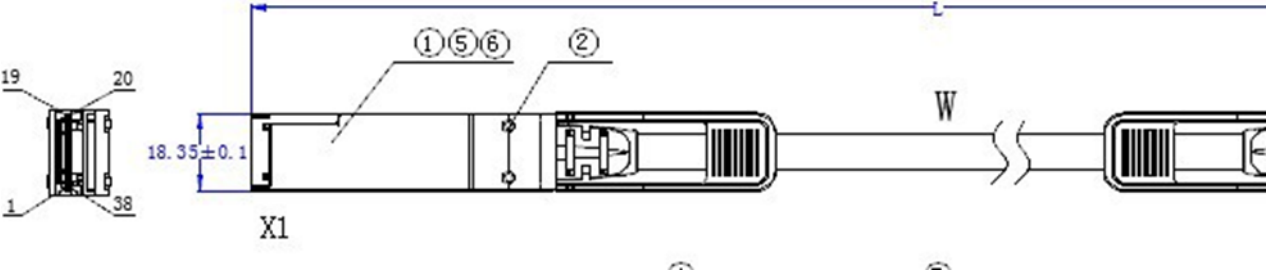
| Parameter                    | Requirement                                   | Test Condition   |
|------------------------------|---|--|
| Vibration                    | Pass electrical tests per 3.1 after stressing | Clamp & vibrate per EIA-364-28E, TC-VII, test condition letter – D, 15 minutes in X, Y & Z axis  |
| Cable Flex                   | No evidence of physical damage                | Flex cable 180° for 20 cycles (±90° 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 |
| Cable Plug Retention in Cage | 90N Min. 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 |
| Cable Retention in Plug      | 90N Min. 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  |
| Mechanical Shock             | Pass electrical tests Per 3.1 after stressing | Clamp and shock per EIA-364-27B, TC- G,3 times in 6 directions, 100g, 6ms.   |
| Cable Plug Insertion         | 40N Max (QSFP28)                              | Per SFF8661 Rev 2.1  |
| Cable plug Extraction        | 30N Max (QSFP28)                              | 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 &unplug cycles:Plug and receptacle mate rate: 250times/hour. 50times for QSFP28/SFP28 module (CONNECTOR TO PCB) |
|-------------------|---|--|

**Wiring Diagram**

| X1  | X2   | Remarks | X1                                   | X2                                   | Remarks                   |
|---|--|---------|--------------------------------------|--------------------------------------|---------------------------|
| 18 (RX1-)                                 | 37(TX1-)                                   | Pair    | 37(TX1-)                             | 18 (RX1-)                            | Pair                      |
| 17 (RX1+)                                 | 36 (TX1+)                                  |         | 36 (TX1+)                            | 17 (RX1+)                            |                           |
| 15 (RX3-)                                 | 34 (TX3-)                                  | Pair    | 34 (TX3-)                            | 15 (RX3-)                            | Pair                      |
| 14 (RX3+)                                 | 33 (TX3+)                                  |         | 33 (TX3+)                            | 14 (RX3+)                            |                           |
| 6 (TX4+)                                  | 25 (RX4+)                                  | Pair    | 25 (RX4+)                            | 6 (TX4+)                             | Pair                      |
| 5 (TX4-)                                  | 24 (RX4-)                                  |         | 24 (RX4-)                            | 5 (TX4-)                             |                           |
| 3 (TX2+)                                  | 22 (RX2+)                                  | Pair    | 22 (RX2+)                            | 3 (TX2+)                             | Pair                      |
| 2 (TX2-)                                  | 21 (RX2-)                                  |         | 21 (RX2-)                            | 2 (TX2-)                             |                           |
| 1, 4, 7, 13, 16, 19, 20, 23, 26, 32,35,38 | 1, 4, 7, 13, 16, 19,20, 23, 26, 32, 35, 38 | GND     | 8, 9, 10, 11, 12, 27, 28, 29, 30, 31 | 8, 9, 10, 11, 12, 27, 28, 29, 30, 31 | EEPROM point at both ends |

**Mechanical Specifications**



UNIT: mm

## 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: [salesupport@prolabs.com](mailto:salesupport@prolabs.com)

Telephone: +44 1285 719 600