



## MCP1650-V002E26-SKY

Mellanox® MCP1650-V002E26 Compatible 200GBase-CU HDR QSFP56 to QSFP56 Direct Attach Cable (Passive Twinax, 2.0m)

### Product Description

This is a Mellanox® MCP1650-V002E26 compatible 200GBase-CU HDR QSFP56 to QSFP56 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 built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

### Features:

- Compliant with SFF-8636
- Support I2C two line strong interface, easy to control
- Compliant with IEEE802.3bj & IEEE802.3cd
- Operating Temperature: -20 to 75 Celsius
- Low Crosstalk
- Hot-pluggable
- RoHS Compliant and Lead-Free
- Low power



### Applications:

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

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*For your product safety, please read the following information carefully before any manipulation of the transceiver:*



#### **ESD**

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 / JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



#### **LASER SAFETY**

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

*The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.*

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## 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                                      |               | $\text{Return\_loss}(f) \geq \left\{ \begin{array}{ll} 16.5-2\sqrt{f} & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{array} \right\}$<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 of 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 disturbers 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 +75°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 (For 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

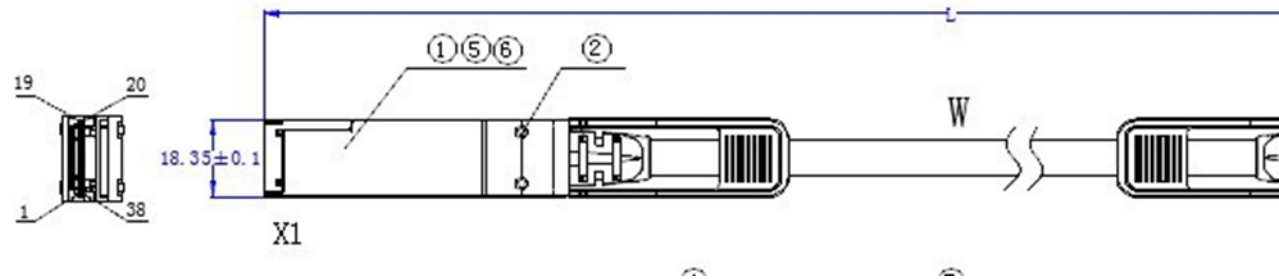
| Parameter                    | Requirement                                   | Test Condition                                                                                                                                                                                               |
|------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.

