

### **Q56-2Q56-200GB-AOC15M-C**

MSA and TAA 200GBase-AOC QSFP56 to 2xQSFP56 DSP Active Optical Cable (850nm, MMF, 15m)

#### **Features:**

- 200G QSFP56 Breakout to 2x 100G QSFP56 (Half-populated)
- Four-Channel Parallel Active Optical Cable
- Multi-rate capability: Up to 53.125Gbps PAM4 or 26.5625Gbps NRZ Per Channel
- Low Power Dissipation: 4.5W per Cable End
- Single 3.3V Power Supply
- 4x50G PAM4 Retimed 200GAUI-4 Electrical Interface (Half-populated on the 100G Ends)
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



#### **Applications:**

- 200GBase Ethernet
- InfiniBand HDR

#### **Product Description**

This is an MSA compliant 200GBase-AOC QSFP56 to 2xQSFP56 active optical cable that operates over multi-mode fiber with a maximum reach of 15.0m (49.2ft). At a wavelength of 850nm, it has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This active optical cable is TAA (Trade Agreements Act) compliant, and is built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

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



## General Specifications

| Parameter                          | Symbol | Min              | Typ.  | Max.             | Unit | Notes |
|------------------------------------|--------|------------------|-------|------------------|------|-------|
| Storage Temperature                | Tstg   | -40              |       | 85               | °C   | 1     |
| Operating Case Temperature         | Tc     | 0                |       | 70               | °C   |       |
| Supply Voltage                     | Vcc    | -0.5             |       | 4.0              | V    |       |
| Relative Humidity (Non-Condensing) |        | 15               |       | 85               | %    |       |
| Aggregate Data Rate                |        |                  | 212.5 |                  | Gbps |       |
| Pre-FEC Bit Error Ratio            | BER    |                  |       | 10 <sup>-6</sup> |      | 2     |
| Maximum Power Consumption per End  |        |                  |       | 5 (Retimed Tx)   | W    | 3     |
| Data Rate Per Lane                 | DR     | 26.5625 ± 100ppm |       |                  | Gbd  | 4     |

### Notes:

1. Assumes no mechanical load force on the unit. Ensuring no mechanical load force requires a cable bend radius of >70 mm on the rest of the cable.
2. Tested with a PRBS 2<sup>31</sup>-1 test pattern.
3. Maximum total power value is specified across the full temperature and voltage range.
4. Supports InfiniBand HDR.

## Electrical Specifications

| Parameter                                    | Symbol | Min               | Typ. | Max.  | Unit | Notes |
|----------------------------------------------|--------|-------------------|------|-------|------|-------|
| Supply Voltage                               | Vcc    | 3.135             | 3.3  | 3.465 | V    |       |
| Supply Current                               | Icc    |                   |      | 1.59  | A    |       |
| Power Consumption                            | P      |                   |      | 4.5   | W    | 1     |
| <b>Transmitter</b>                           |        |                   |      |       |      |       |
| AC Common Mode Input Voltage Tolerance (RMS) |        |                   |      | 20    | mV   |       |
| Differential Input Return Loss               |        | Equation 27 Below |      |       | dB   | 2     |
| Differential to Common Mode Reflection       |        | Equation 28 Below |      |       | dB   | 2     |
| Eye Hight Tolerance, with Tx CDR enabled     |        |                   |      | 32    | mV   | 3     |
| Eye Width Tolerance, with Tx CDR enabled     |        |                   |      | 0.2   | UI   | 3     |
| DC Common Mode Input Voltage Tolerance       |        | -350              |      | 2850  | mV   | 4     |
| <b>Receiver</b>                              |        |                   |      |       |      |       |
| Bit Error Rate                               |        |                   |      | 9E-6  |      |       |
| AC Common-mode Output Voltage (RMS)          |        |                   |      | 20    | mV   |       |
| Differential Unsigned Output Voltage         |        | 450               |      |       | mV   | 5     |
| Near-end Eye Symmetry Mask Width             |        | 0.265             |      |       | UI   | 6     |
| Near-end Differential Eye Height             |        | 70                |      |       | mV   |       |
| Far-end Eye Symmetry Mask Width              |        | 0.2               |      |       | UI   |       |

|                                        |  |                   |  |      |    |   |
|----------------------------------------|--|-------------------|--|------|----|---|
| Far-end Differential Eye Height        |  | 30                |  |      | mV |   |
| Far-end Pre-cursor ISI Ratio           |  | -7                |  | 4    | %  |   |
| Common Mode Output Return Loss         |  | -2                |  |      | dB |   |
| Differential Output Return Loss        |  | Equation 27 Below |  |      | dB |   |
| Common Mode to Differential Reflection |  | Equation 28 Below |  |      | dB |   |
| Differential Termination Mismatch      |  |                   |  | 10   | %  |   |
| Transition Time (20% to 80%)           |  | 9.5               |  |      | ps | 7 |
| DC Common Mode Voltage (minimum)       |  | -350              |  | 2850 | mV | 4 |

#### Notes:

1. Maximum total power value is specified across the full temperature and voltage range.
2. Ref: InfiniBand Architecture Specification Volume 2 Release 1.4.
3. Ref: CEI-04 16.3.10.3.1.2.
4. Referred to Signal Ground.
5. Hit Ratio=5E-5 with 100Ω load.
6. Ref: 802.3 120E.4.2.
7. PRBS13Q, see 120E.3.1.5 for positions in the pattern.

#### Equation 27

$$(S_{DDxx}(f)) \leq \begin{pmatrix} -11, 0.05 \leq f < 26.5625/7.5 \\ -6.0 + 9.2 \cdot \log_{10}\left(\frac{15 \cdot f}{7 \cdot 26.5625}\right), 26.5625/7.5 \leq f \leq 26.5 \end{pmatrix}$$

#### Equation 28

$$(S_{CD11}, S_{DC22}(f)) \leq \begin{pmatrix} -25 + 20\left(\frac{f}{26.5625}\right), 0.05 \leq f < 26.5625/2 \\ -18 + 6\left(\frac{f}{26.5625}\right), 26.5625/2 \leq f < 26.5 \end{pmatrix}$$

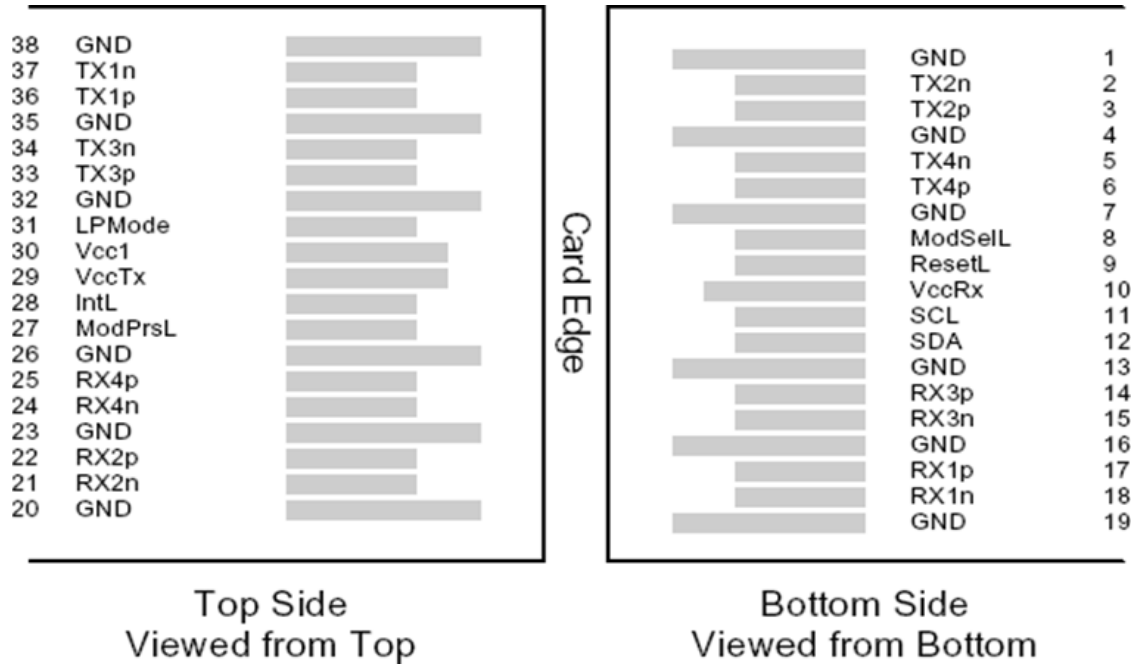
## Pin Descriptions

| Pin | Symbol  | Name/Description                     | Notes |
|-----|---------|--------------------------------------|-------|
| 1   | GND     | Module Ground.                       | 1     |
| 2   | Tx2-    | Transmitter Inverted Data Input.     |       |
| 3   | Tx2+    | Transmitter Non-Inverted Data Input. |       |
| 4   | GND     | Module Ground.                       | 1     |
| 5   | Tx4-    | Transmitter Inverted Data Input.     |       |
| 6   | Tx4+    | Transmitter Non-Inverted Data Input. |       |
| 7   | GND     | Module Ground.                       | 1     |
| 8   | ModSelL | Module Select.                       |       |
| 9   | ResetL  | Module Reset.                        |       |
| 10  | VccRx   | +3.3V Receiver Power Supply.         |       |
| 11  | SCL     | 2-Wire Serial Interface Clock.       |       |
| 12  | SDA     | 2-Wire Serial Interface Data.        |       |
| 13  | GND     | Module Ground.                       | 1     |
| 14  | Rx3+    | Receiver Non-Inverted Data Output.   |       |
| 15  | Rx3-    | Receiver Inverted Data Output.       |       |
| 16  | GND     | Module Ground.                       | 1     |
| 17  | Rx1+    | Receiver Non-Inverted Data Output.   |       |
| 18  | Rx1-    | Receiver Inverted Data Output.       |       |
| 19  | GND     | Module Ground.                       | 1     |
| 20  | GND     | Module Ground.                       | 1     |
| 21  | Rx2-    | Receiver Inverted Data Output.       |       |
| 22  | Rx2+    | Receiver Non-Inverted Data Output.   |       |
| 23  | GND     | Module Ground.                       | 1     |
| 24  | Rx4-    | Receiver Inverted Data Output.       |       |
| 25  | Rx4+    | Receiver Non-Inverted Data Output.   |       |
| 26  | GND     | Module Ground.                       | 1     |
| 27  | ModPrsL | Module Present.                      |       |
| 28  | IntL    | Interrupt.                           |       |
| 29  | VccTx   | +3.3V Transmitter Power Supply.      |       |
| 30  | Vcc1    | +3.3V Power Supply.                  |       |
| 31  | LPMODE  | Low-Power Mode.                      |       |
| 32  | GND     | Module Ground.                       | 1     |
| 33  | Tx3+    | Transmitter Non-Inverted Data Input. |       |
| 34  | Tx3-    | Transmitter Inverted Data Input.     |       |
| 35  | GND     | Module Ground.                       | 1     |

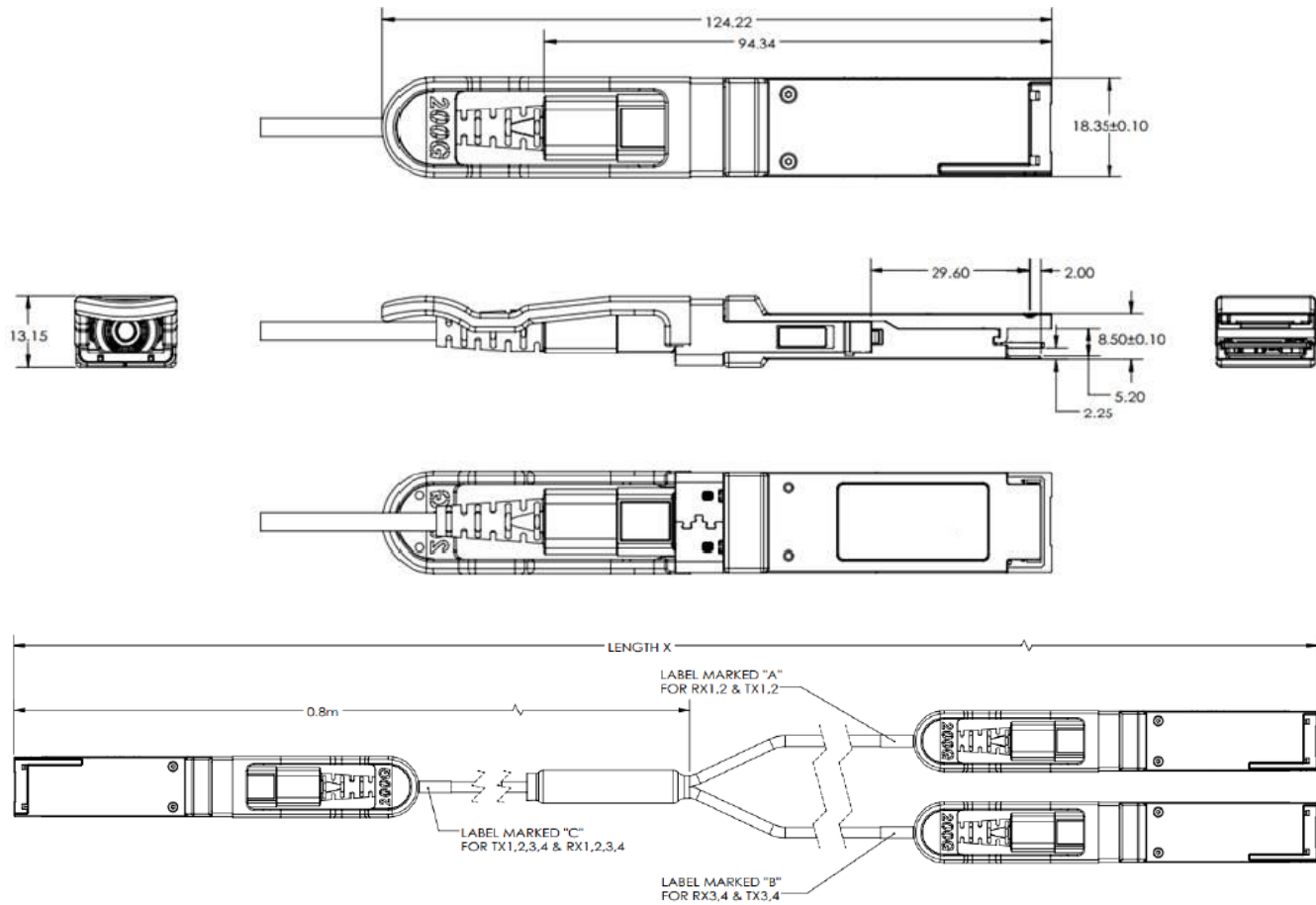
|           |      |                                      |   |
|-----------|------|--------------------------------------|---|
| <b>36</b> | Tx1+ | Transmitter Non-Inverted Data Input. |   |
| <b>37</b> | Tx1- | Transmitter Inverted Data Input.     |   |
| <b>38</b> | GND  | Module Ground.                       | 1 |

**Notes:**

1. Circuit ground is internally isolated from chassis ground.



Mechanical Specifications



Active Optical Cable Dimensions

| Mark "C" | Fiber      | Mark "A" | Mark "B" |
|----------|------------|----------|----------|
| RX1      | 8          | TX1      | TX3      |
| RX2      | 7          | TX2      | TX4      |
| RX3      | 6          | -        | -        |
| RX4      | 5          | -        | -        |
| -        | Fake Fiber | -        | -        |
| -        | Fake Fiber | -        | -        |
| -        | Fake Fiber | -        | -        |
| -        | Fake Fiber | -        | -        |
| TX4      | 4          | -        | -        |
| TX3      | 3          | -        | -        |
| TX2      | 2          | RX2      | RX4      |
| TX1      | 1          | RX1      | RX3      |

## About ProLabs

Our extensive experience comes as standard. For over 20 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 more than 100 optical switching and transport platforms.

## A 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 1.6T 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.

## The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. 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