

DATA SHEET

MODULETEK:AOC-QSFP10-4SFP10-OM3-aaa.aaM-C0C0C

40Gb/s QSFP+ to 4xSFP+ Active Optical Cable Transceiver

AOC-QSFP10-4SFP10-OM3-aaa.aaM-C0C0C Overview

ModuleTek's AOC-QSFP10-4SFP10-OM3-aaa.aaM-C0C0C QSFP+ to 4xSFP+ active optical cable are suitable for 1 to 300 meters MMF OM3 distances to connect QSFP+ and SFP+ equipments. This interconnect system is fully compliant with QSFP+ MSA and SFP+ MSA.

Product Features

- QSFP+ End: Compliant with QSFP+ MSA specifications
- SFP+ End: Compliant with SFP+ MSA specifications
- 4 independent duplex channels operating at 10Gbps
- Cable length up to 300 meters
- Hot-pluggable SFP footprint
- Reliable VCSEL array technology
- Small bend radius for easy installation and fiber management
- Single power supply 3.3V
- RoHS Compliant
- Operating temperature range: 0°C to70°C

Applications

- 4x10G Ethernet

Ordering Information

| Part Number | Description | Color on Clasp |
|---|--|----------------|
| AOC-QSFP10-4SFP10-OM3-aaa.aaM-C0C0C | 40G QSFP+ to 4xSFP+ Breakout Active Optical Cable up to 300m | Blue |
| For More Information: ModuleTek Limited Web: www.moduletek.com Email: sales@moduletek.com | | |

General Specifications

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-----------------------|------------------|------|-----|------------|------|---------|
| Bit Error Rate | BER | | | 10^{-12} | | |
| Operating Temperature | T _C | 0 | | 70 | °C | 1 |
| Storage Temperature | T _{STO} | -10 | | 75 | °C | 2 |
| Input Voltage | V _{CC} | 3.14 | 3.3 | 3.46 | V | |
| Maximum Voltage | V _{MAX} | -0.5 | | 3.6 | V | 3 |

Notes:

1. Case temperature
2. Ambient temperature
3. For electrical power interface

AOC Electrical Input Requirements

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit | Remarks |
|------------------------------|--------------|------------|-----|---------|------------|------|---------|
| Data Rate Per Channel | DR | | | 10.3125 | 10.5 | Gb/s | |
| Differential Input Amplitude | V_{IN_PP} | | 180 | | 1200(QSFP) | mV | |
| | | | 180 | | 700(SFP+) | mV | |
| Input AC Common Mode Voltage | V_{CM} | | | | 25 | mV | 1 |
| Eye Mask Coordinates | X1, X2 | 0.29, 0.5 | | | | UI | 2 |
| | Y1, Y2 | 150, 425 | | | | mV | 2 |

Notes:

1. RMS
2. Hit ratio 5×10^{-5} . See Figure 1 for transmitter input eye mask definitions.

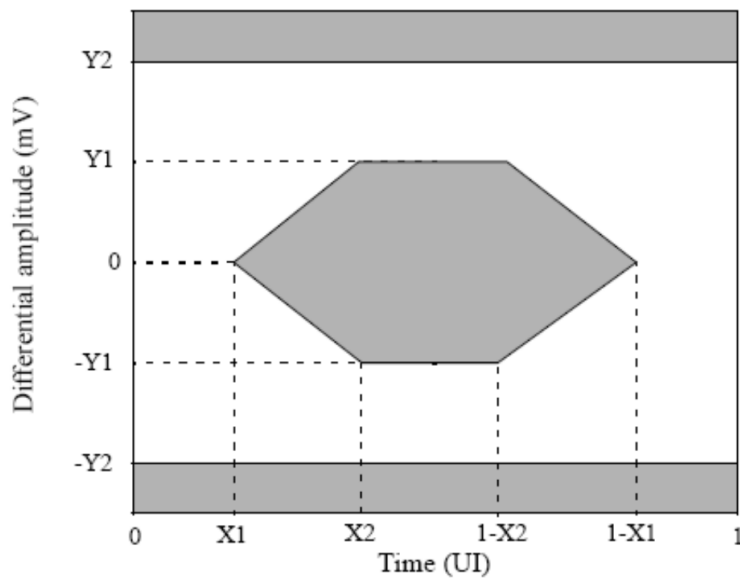


Figure 1

AOC Electrical Output Requirements

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit | Remarks |
|-------------------------------------|---------------|------------|-----|---------|------|------|---------|
| Data Rate Per Channel | DR | | | 10.3125 | 10.5 | Gb/s | |
| Differential Output Amplitude | V_{OUT_PP} | | 0 | | 850 | mV | |
| Output AC Common Mode Voltage | V_{CM} | | | | 15 | mV | 1 |
| Data output Rise/Fall Time(20%-80%) | t_r / t_f | | 24 | | | ps | |
| Total Jitter (p-p) | TJ | | | | 0.7 | UI | |
| Deterministic Jitter (p-p) | DJ | | | | 0.4 | UI | |
| Eye Mask Coordinates | X1, X2 | 0.29, 0.5 | | | | UI | 2 |
| | Y1, Y2 | 150, 425 | | | | mV | 2 |

Note:

1. RMS
2. Hit ratio 5×10^{-5} . See Figure 2 for receiver output eye mask definitions.

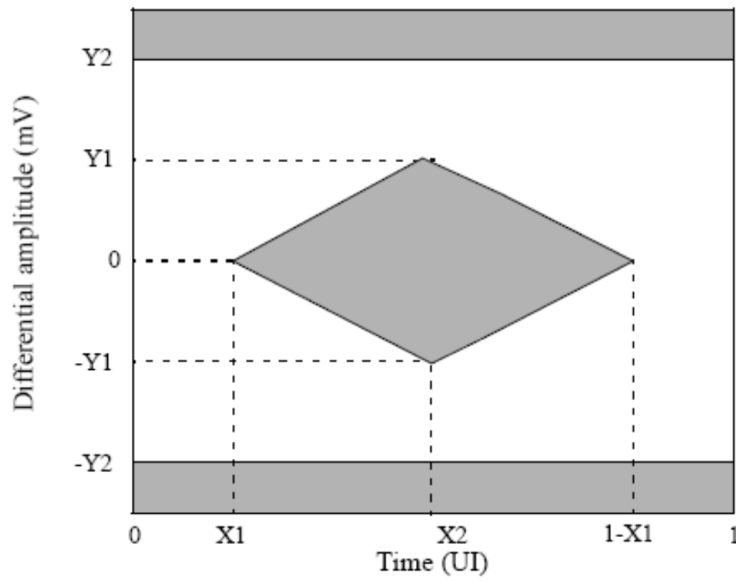
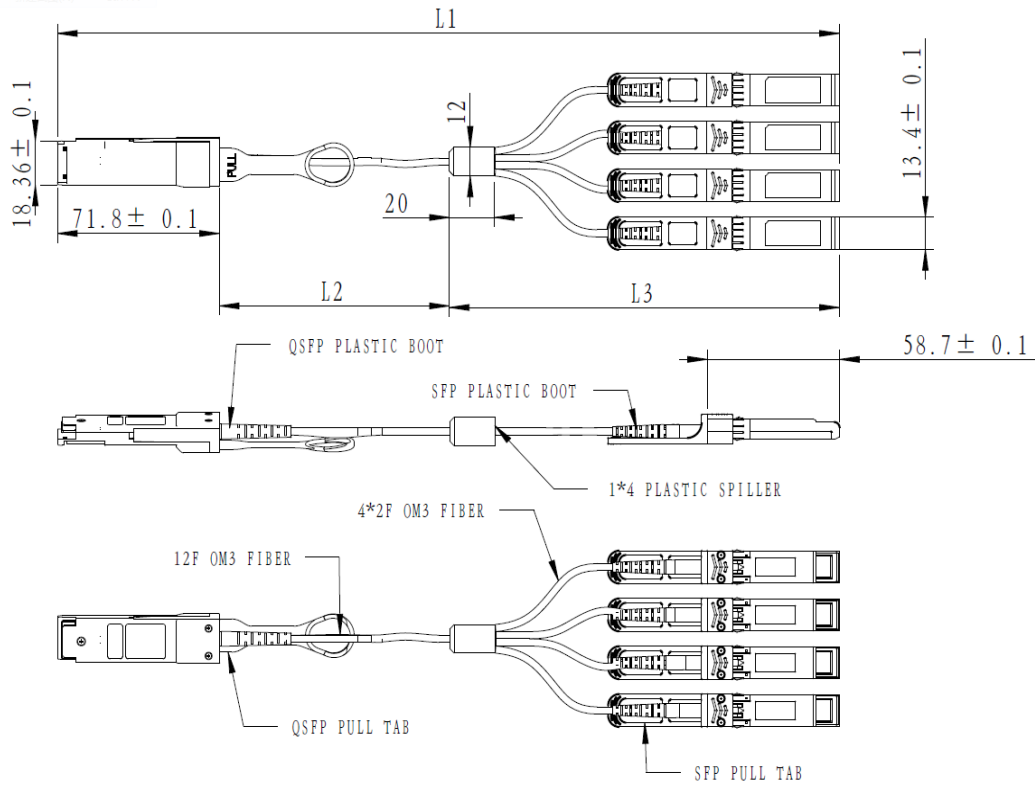


Figure 2

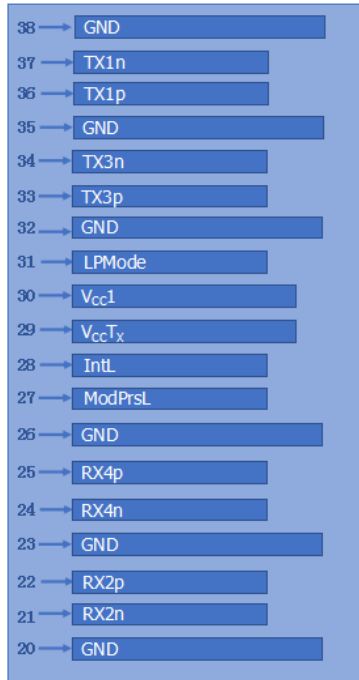
Dimensions



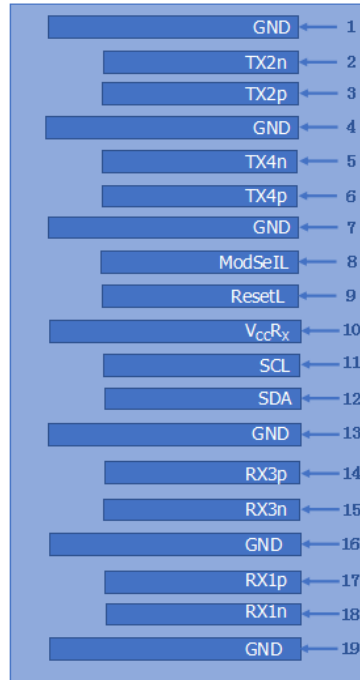
| Length(L1) | Length(L2) | Length(L3) |
|------------|------------|------------|
| 1M | 0.33M | 0.67M |
| 2M | 0.67M | 1.33M |
| 3M | 1M | 2M |
| 5M | 2M | 3M |
| $\cong 5M$ | L1-L3 | 3M |

ALL DIMENSIONS ARE ± 0.2 mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

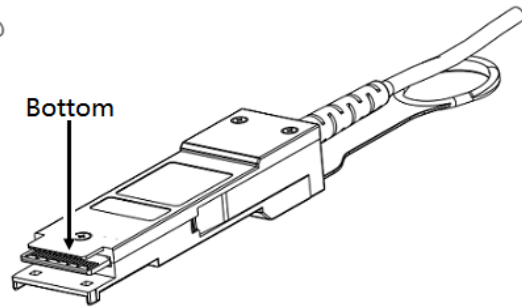
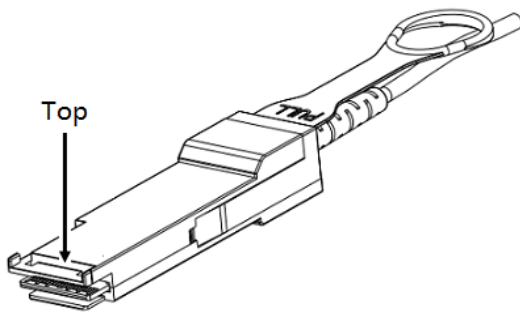
Electrical Pad Layout for QSFP+



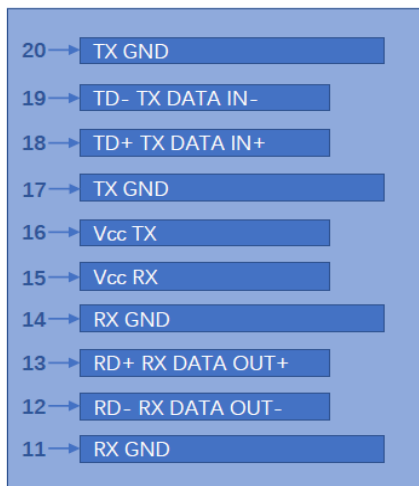
Top Board



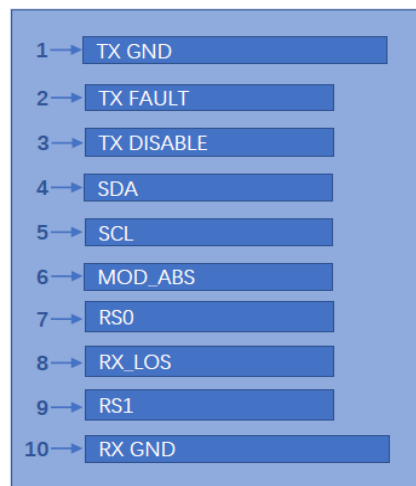
Bottom Board



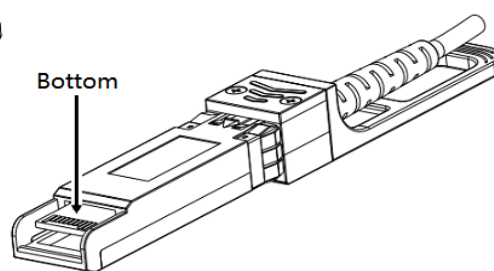
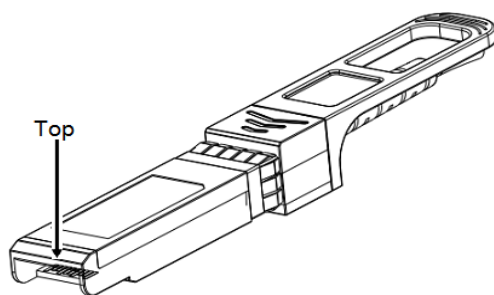
Electrical Pad Layout for SFP+



Top Board



Bottom Board



Pin Assignment for QSFP+

| PIN # | Symbol | Description | Remarks |
|-------|--------------------------------|-------------------------------------|---------|
| 1 | GND | Ground | 5 |
| 2 | TX2n | Transmitter Inverted Data Input | |
| 3 | TX2p | Transmitter Non-Inverted Data Input | |
| 4 | GND | Ground | 5 |
| 5 | TX4n | Transmitter Inverted Data Input | |
| 6 | TX4p | Transmitter Non-Inverted Data Input | |
| 7 | GND | Ground | 5 |
| 8 | ModSelL | Module Select | 1 |
| 9 | ResetL | Module Reset | 2 |
| 10 | V _{CC} R _X | +3.3V Power Supply Receiver | |
| 11 | SCL | 2-wire serial interface clock | |
| 12 | SDA | 2-wire serial interface data | |
| 13 | GND | Ground | 5 |
| 14 | RX3P | Ground | |
| 15 | RX3n | Receiver Inverted Data Output | |
| 16 | GND | Ground | 5 |
| 17 | RX1P | Receiver Non-Inverted Data Output | |
| 18 | RX1n | Receiver Inverted Data Output | |
| 19 | GND | Ground | 5 |
| 20 | GND | Ground | 5 |
| 21 | Rx2n | Receiver Inverted Data Output | |
| 22 | Rx2p | Receiver Non-Inverted Data Output | |
| 23 | GND | Ground | 5 |
| 24 | Rx4n | Receiver Inverted Data Output | |
| 25 | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | GND | Ground | 5 |
| 27 | ModPrsL | Module Present | 3 |
| 28 | IntL | Interrupt | 4 |
| 29 | V _{CC} T _X | + +3.3V Power Supply transmitter | |
| 30 | V _{CC} 1 | + +3.3V Power Supply | |
| 31 | LPMMode | Low Power Mode | 5 |
| 32 | GND | Ground | 5 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | Tx3n | Transmitter Inverted Data Input | |

| | | | |
|----|------|-------------------------------------|---|
| 35 | GND | Ground | 5 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | |
| 37 | Tx1n | Transmitter Inverted Data Input | |
| 38 | GND | Ground | 5 |

Notes:

1. ModSelL is the input pin. The module responds to 2-wire serial communication commands when it is held low by the host. ModSelL allows multiple QSFP modules to be used on a single 2-wire interface bus. If ModSelL is High, the module will not respond to any 2-wire interface communication from the host. ModSelL has internal pull-up resistors in the module
2. The module restart pin, when the low level on the ResetL pin lasts longer than the minimum pulse length, resets the module and restores all user modules to their default state. When performing reset device, the host should ignore all status bits. Until the module reset interrupt is completed, please note that during hot plugging, the module will issue this information to complete the reset interrupt without resetting
3. This pin is active high, indicating that the module is running under a low power module.
4. IntL is the output pin, which is the open collector output and must be pulled up to Vcc on the motherboard. When it is low, it indicates that the module may malfunction. The host uses a 2-wire serial interface to identify the interrupt source
5. Circuit ground is internally isolated from chassis ground.

Pin Assignment for SFP+

| PIN # | Symbol | Description | Remarks |
|-------|------------------|---|---------|
| 1 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |
| 2 | TX_FAULT | Transmitter Fault | |
| 3 | TX_DISABLE | Transmitter Disable. Laser output disable on high or open | 2 |
| 4 | SDA | Data line for serial ID | 3 |
| 5 | SCL | Clock line for serial ID | 3 |
| 6 | MOD_ABS | Module Absent. Grounded within the module | 3 |
| 7 | RS0 | No connection required | |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation | 4 |
| 9 | RS1 | No connection required | 1 |
| 10 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 11 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC coupled | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC coupled | |
| 14 | V _{EER} | Receiver ground (common with transmitter ground) | 1 |
| 15 | V _{CCR} | Receiver power supply | |
| 16 | V _{CCT} | Transmitter power supply | |
| 17 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC coupled | |
| 19 | TD- | Transmitter Inverted DATA in. AC coupled | |
| 20 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |

Notes:

1. Circuit ground is isolated from chassis ground
2. Disabled: T_{DIS}>2V or open, Enabled: T_{DIS}<0.8V
3. Should Be pulled up with 4.7k –10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

References

1. IEEE standard 802.3ba. IEEE Standard Department, 2010.
2. QSFP+ 10Gbs 4X PLUGGABLE TRANSCEIVER –SFF-8436
3. Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module “SFP+” –SFF-8431
4. Digital Diagnostics Monitoring Interface for Optical Transceivers –SFF-8472.