

200G QSFP56-to-2×100G QSFP56 Breakout Active Optical Cable

Key Features

- ❑ Low latency DSP-free electronics-based CDR
- ❑ Multi-data rate up to 56.15 Gb/s per lane
- ❑ PAM4 modulation
- ❑ Single 3.3 V power supply
- ❑ Low power consumption : 3.6 W on 200G end,
2.3 W on 100G end with all CDRs enabled
- ❑ Up to 100 m length
- ❑ SFF-8665 compliant
- ❑ SFF-8636 compliant I2C management interface
- ❑ Commercial operating case temperature range:
0 to 70° C
- ❑ Hot pluggable
- ❑ RoHS/REACH compliant
- ❑ TUV-certified
- ❑ LSZH, LSZH/OFNR or OFNP-rated cable



Applications

- ❑ IEEE 802.3cd 200GBASE SR4
- ❑ IBTA InfiniBand HDR
- ❑ Datacenter: servers, switches, storages and NIC adapters
- ❑ Proprietary HPC interconnections

1. Absolute Maximum Ratings

| Parameters | Symbol | Min. | Typ. | Max. | Unit | Note |
|---------------------|--------------|------|------|------|------|---------|
| Supply Voltage | V_{IN} | 0 | - | 4.0 | V | |
| Input Swing | V_{IN-MAX} | | | 1500 | mVpp | |
| Storage Temperature | T_{STG} | -40 | - | 85 | °C | Ambient |
| Relative Humidity | RH | 5 | - | 85 | % | |

2. Operating Specifications

| Parameters | Symbol | Min. | Typ. | Max. | Unit | Note | |
|----------------------------|----------|----------|------|------|------|------|---|
| Operating Case Temperature | T_{OP} | 0 | - | 70 | °C | | |
| Power Supply Voltage | V_{CC} | 3.15 | 3.30 | 3.47 | V | | |
| Power Supply Current | 200G End | I_{CC} | - | 1100 | 1250 | mA | 1 |
| | 100G End | | - | 680 | 750 | mA | |
| Power Consumption | 200G End | P | - | 3.6 | 4.0 | W | 1 |
| | 100G End | | - | 2.3 | 2.5 | W | |

3. Electrical Characteristics

| Parameters | Symbol | Min. | Typ. | Max. | Unit | Note |
|----------------------------------|--------------|------|---------|----------------------|----------|------|
| Data Rate (Per Channel) | BR | - | 26.5625 | - | GBd | 2 |
| Transmitter | | | | | | |
| Input Differential Impedance | R_{IN} | 90 | 100 | 110 | Ω | |
| Differential Data Input Voltage | V_{INP-P} | 900 | | | mV | |
| Receiver | | | | | | |
| Output Differential Impedance | R_{OUT} | 90 | 100 | 110 | Ω | |
| Differential Data Output Voltage | V_{OUTP-P} | - | 800 | - | mV | |
| Bit Error Ratio (at 26.5625 GBd) | - | - | - | 2.4×10^{-4} | - | 3 |

Note:

- Per end, all channel CDRs are enabled.
- Dual data rate of 25.78125 and 28.07618 Gbaud are available upon request.
- Pre-FEC Bit Error Ratio with a PRBS $2^{31} - 1$ test pattern over a normal operating temperature range.

4. Pin Description

| Pin | Logic | Name | Description | Note |
|-----|-------------|---------|-------------------------------------|------|
| 1 | | GND | Ground | 1 |
| 2 | CML-I | Tx2n | Transmitter Inverted Data Input | |
| 3 | CML-I | Tx2p | Transmitter Non-Inverted Data Input | |
| 4 | | GND | Ground | 1 |
| 5 | CML-I | Tx4n | Transmitter Inverted Data Input | |
| 6 | CML-I | Tx4p | Transmitter Non-Inverted Data Input | |
| 7 | | GND | Ground | 1 |
| 8 | LVTTL-I | ModSelL | Module Select | |
| 9 | LVTTL-I | ResetL | Module Reset | |
| 10 | | Vcc Rx | +3.3V Power supply receiver | 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 | Ground | 1 |
| 14 | CML-O | Rx3p | Receiver Non-Inverted Data Output | |
| 15 | CML-O | Rx3n | Receiver Inverted Data Output | |
| 16 | | GND | Ground | 1 |
| 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output | |
| 18 | CML-O | Rx1n | Receiver Inverted Data Output | |
| 19 | | GND | Ground | 1 |
| 20 | | GND | Ground | 1 |
| 21 | CML-O | Rx2n | Receiver Inverted Data Output | |
| 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output | |
| 23 | | GND | Ground | 1 |
| 24 | CML-O | Rx4n | Receiver Inverted Data Output | |
| 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | | GND | Ground | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present | |
| 28 | LVTTL-O | IntL | Interrupt | |
| 29 | | Vcc Tx | +3.3V Power supply transmitter | 2 |
| 30 | | Vcc 1 | +3.3V Power Supply | 2 |
| 31 | LVTTL-I | LPMODE | Low Power Mode | |
| 32 | | GND | Ground | 1 |
| 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | CML-I | Tx3n | Transmitter Inverted Data Input | |
| 35 | | GND | Ground | 1 |
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Input | |
| 38 | | GND | 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.
- Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for a maximum current of 500 mA.

4. Pin Description

| | | |
|----|--------------|--|
| 38 | GND | |
| 37 | Tx1n | |
| 36 | Tx1p | |
| 35 | GND | |
| 34 | Tx3n | |
| 33 | Tx3p | |
| 32 | GND | |
| 31 | LPMode/TxDis | |
| 30 | Vcc1 | |
| 29 | VccTx | |
| 28 | IntL/RxLOSL | |
| 27 | ModPrsL | |
| 26 | GND | |
| 25 | Rx4p | |
| 24 | Rx4n | |
| 23 | GND | |
| 22 | Rx2p | |
| 21 | Rx2n | |
| 20 | GND | |

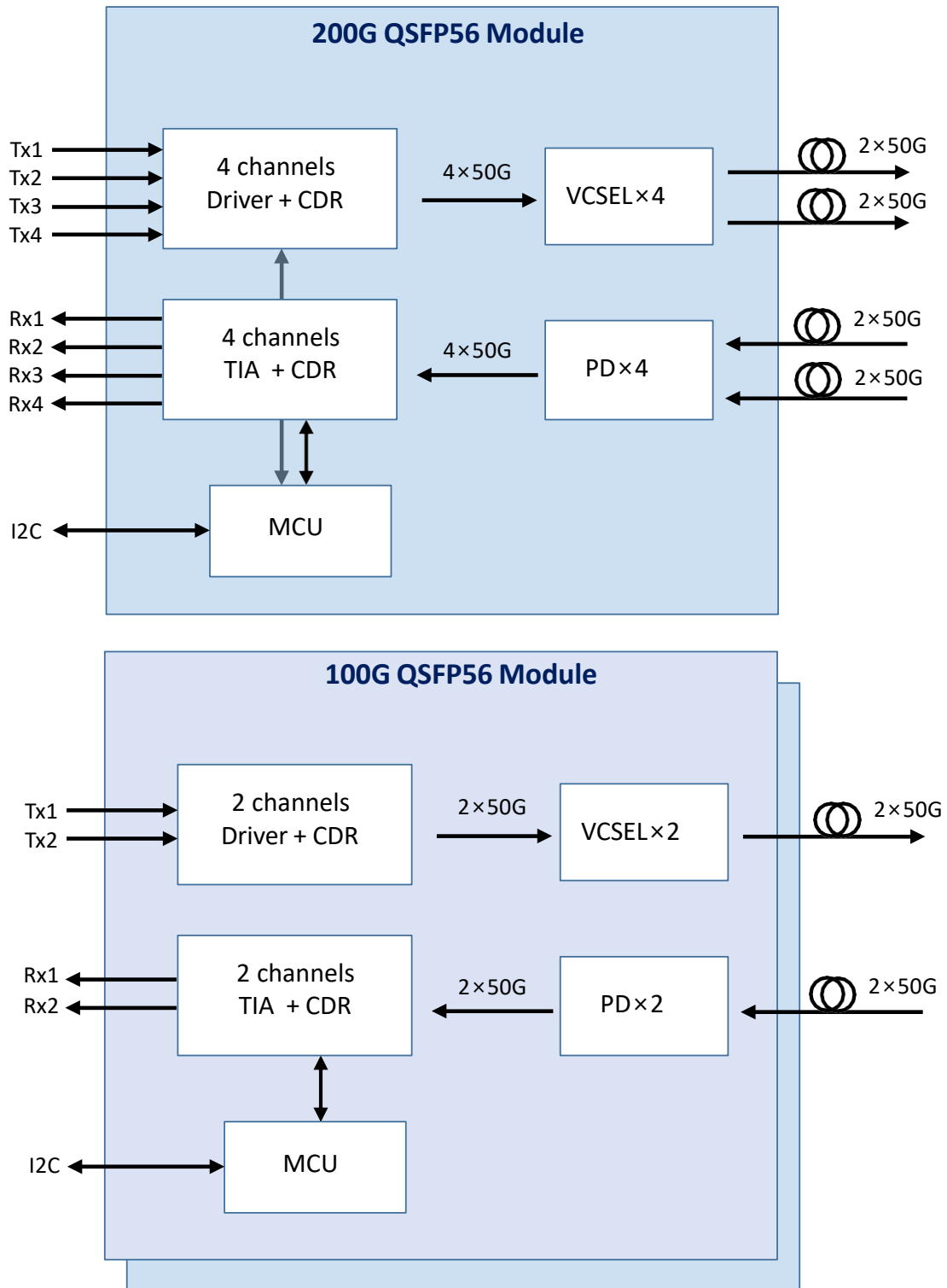
Top Side
Viewed From Top

Module Card Edge

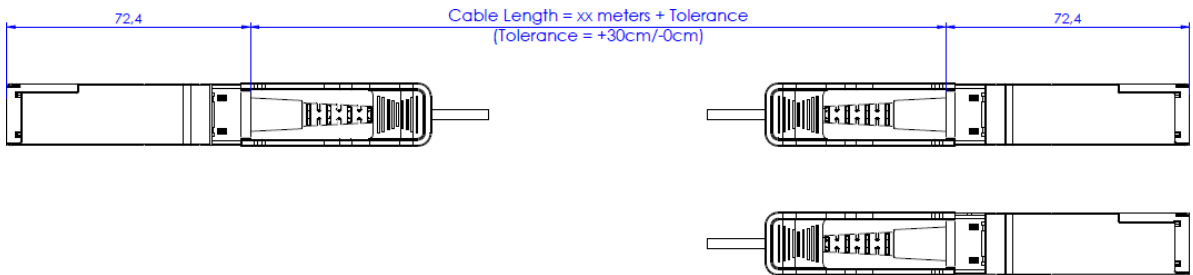
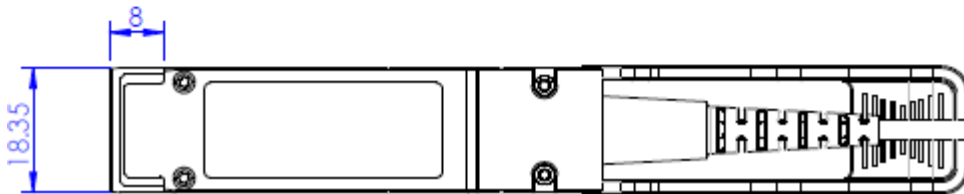
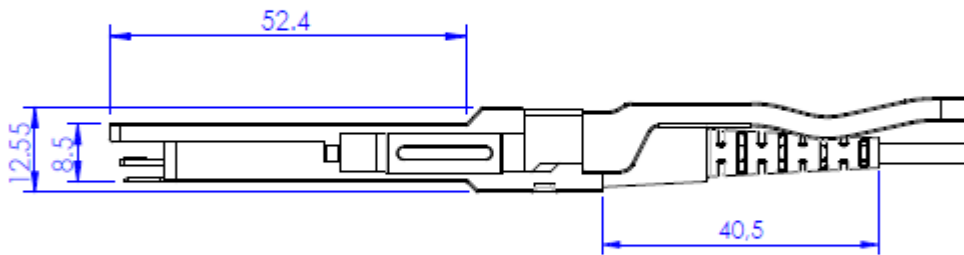
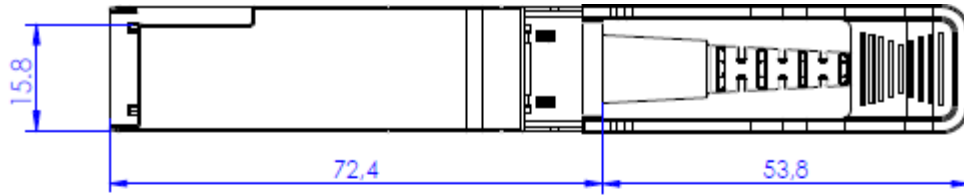
| | | |
|--|---------|----|
| | GND | 1 |
| | Tx2n | 2 |
| | Tx2p | 3 |
| | GND | 4 |
| | Tx4n | 5 |
| | Tx4p | 6 |
| | GND | 7 |
| | ModselL | 8 |
| | ResetL | 9 |
| | VccRx | 10 |
| | SCL | 11 |
| | SDA | 12 |
| | GND | 13 |
| | Rx3p | 14 |
| | Rx3n | 15 |
| | GND | 16 |
| | Rx1p | 17 |
| | Rx1n | 18 |
| | GND | 19 |

Bottom Side
Viewed From Bottom

5. Block Diagram



6. Mechanical Specifications



7. Active Optical Cable

| Parameters | Value | Unit | Note |
|---------------------|---|------|-----------------------|
| Cable Diameter | <ul style="list-style-type: none"> LSZH, LSZH/OFNR: $\varnothing 3.0 \pm 0.15$ OFNP: $\varnothing 3.0 \pm 0.20$ | mm | |
| Minimum Bend Radius | 30 | mm | Without tension |
| | 60 | mm | Under maximum tension |
| Length Tolerance | +300 / -0 | mm | |
| Cable Jacket | LSZH, LSZH/OFNR or OFNP-rated, Aqua | | |

8. Ordering Information

| Part Number | Description | Note |
|----------------|--|------|
| MD56FOEXXyyyZZ | QSFP56-to-2×QSFP56, AOC, Ethernet, yyy m, three-digit number yyy for length in meter | |
| MD56FOIXXyyyZZ | QSFP56-to-2×QSFP56, AOC, InfiniBand, yyy m, three-digit number yyy for length in meter | |

Note

- Length (yyy)
 - The maximum cable length is 70 m with OM3 or 100 m with OM4.
 - The first digit A, B or C of the three-digit number denotes 0.25 m, 0.50 m and 0.75 m, respectively.
 - The first digit A, B or C of the three-digit number can be used for the cable length no greater than 10 m.
- Cable jacket type (XX): GA (LSZH), GB (LSZH/OFNR), GC (OFNP)
- Customer ID (ZZ): To be assigned upon request.

Examples

| Part Number | Description |
|----------------|---|
| MD56FOEGAB00ZZ | 200G QSFP56-to-2×100G QSFP56, AOC, Ethernet, LSZH, <u>0.5</u> m |
| MD56FOIGBA09ZZ | 200G QSFP56-to-2×100G QSFP56, AOC, InfiniBand, LSZH/OFNR, <u>9.25</u> m |
| MD56FOEGCC01ZZ | 200G QSFP56-to-2×100G QSFP56, AOC, Ethernet, OFNP, <u>1.75</u> m |

9. Revision History

| Version | Date | Description |
|---------|---------------|---|
| 1.0 | Apr. 26, 2021 | Initial release |
| 1.01 | May 14, 2021 | Added aggregate data rate in the model name |
| 1.02 | Jun. 8, 2021 | Modified differential data input/output voltage values in Sec. 3 |
| 1.10 | Oct. 19, 2021 | Added detailed input/output differential impedance values in Sec. 3 Added a detailed minimum bend radius value in Sec. 7 |