
100GBASE-ER4 QSFP28 1310nm 40km DDM SMF Transceiver
P/N: AE-QSFP28-ER4

Features

- QSFP28 MSA package with duplex LC receptacles
- Compliant with 100Gb/s QSFP28 ER4
- 100Gb/s transceiver module should support 103Gb/s
- EML LAN-WDM lasers on transmitter side
- SOA&PD on the receiver side
- Reaches up to 40km on SMF
- High speed I/O electrical interface
- Two Wire Serial Interface with Digital Diagnostic Monitoring
- Operating case temperature range 0°C to +70°C
- Maximum power consumption 4.5W
- 3.3V power supply voltage
- Compliant to RoHS
- Class 1 Laser

Applications

- 100G Datacom& Telecom connections
- 100Gbase-ER4

I. Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|----------------------------|--------|--|-----|------|
| Storage Temperature | TS | -40 | +85 | °C |
| Operating Case Temperature | Tcase | -5 | +75 | °C |
| Relative Humidity | RH | 5 | 85 | % |
| Supply Voltage | VCC | -0.3 | 3.6 | V |
| ESD Sensitivity | | ±500V for high speed lines; ±2kV for others | | V |

II. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------------|--------|-------|------------|-------|------|
| Operating Case Temperature | Tcase | 0 | - | 70 | °C |
| Supply Voltage | VCC | 3.135 | 3.3 | 3.465 | V |
| Relative Humidity | RH | 5 | - | 85 | % |
| Power Dissipation | PD | - | - | 4.5 | W |
| Data Rate (optical) | DRO | - | 4*25.78125 | - | Gbps |
| Data Rate (Electrical) | DRE | - | 4*25.78125 | - | Gbps |
| Operating Link Distance | LD | - | - | 40 | Km |

III. Optical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|--------|--|------------|---------|------|-------|
| Transmitter | | | | | | |
| Data Rate | DR | - | 4*25.78125 | - | GBd | |
| Data rate variation | DRV | -100 | - | +100 | ppm | |
| Modulation Format | | NRZ | | | | |
| Wavelength L0 | WL0 | 1294.53 | 1295.56 | 1296.59 | nm | |
| Wavelength L1 | WL1 | 1299.02 | 1300.05 | 1301.09 | nm | |
| Wavelength L2 | WL2 | 1303.54 | 1304.58 | 1305.63 | nm | |
| Wavelength L3 | WL3 | 1308.09 | 1309.14 | 1310.19 | nm | |
| Total Launch Power | Ptotal | - | - | 8.9 | dBm | |
| Average Optical Launch Power Per Lane | Pout | -2.9 | - | 4.5 | dBm | 1 |
| Power Optical modulation amplitude Per Lane | POMA | 0.1 | - | 4.5 | dBm | 2 |
| Extinction Ratio | ER | 4 | - | - | dB | |
| Side-mode suppression ratio | SMSR | 30 | - | - | dB | |
| Launch power of OFF Transmitter per lane | | - | - | -30 | dBm | |
| Eye mask | | IEEE 802.3 Clause 88 100Gbase-ER4, {0.25,0.4,0.45,0.25,0.28,0.4} | | | | |
| Optical Return Loss Tolerance | ORLT | - | - | 20 | dB | |
| Transmitter reflectance | TR | - | - | -12 | dB | 3 |

| Receiver | | | | | | | |
|--|---------|---------|------------|---------|-----|---|--|
| Data Rate | DR | - | 4*25.78125 | - | GBd | | |
| Data rate variation | DRV | -100 | - | +100 | ppm | | |
| Modulation Format | | NRZ | | | | | |
| Wavelength L0 | WL0 | 1294.53 | 1295.56 | 1296.59 | nm | | |
| Wavelength L1 | WL1 | 1299.02 | 1300.05 | 1301.09 | nm | | |
| Wavelength L2 | WL2 | 1303.54 | 1304.58 | 1305.63 | nm | | |
| Wavelength L3 | WL3 | 1308.09 | 1309.14 | 1310.19 | nm | | |
| Damage Threshold for Receiver per lane | Pdamage | 5.5 | | | dBm | 4 | |
| Average receiver power | Rpow | -20.9 | - | -3.5 | dBm | 5 | |
| Receiver sensitivity per lane (OMA) | | | | -18.9 | dBm | 5 | |
| Receiver Reflectance | RXR | - | - | -26 | dB | | |
| LOS assert per lane | LOSA | - | - | -27 | dBm | | |
| LOS de-assert per lane | LOSD | - | - | -24 | dBm | | |
| LOS Hysteresis | | 0.5 | - | 5 | dB | | |

Note1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.

Note2. Even if the TDP < 1dB, the OMA (min) must exceed this value.

Note3. Transmitter reflectance is defined looking into the transmitter.

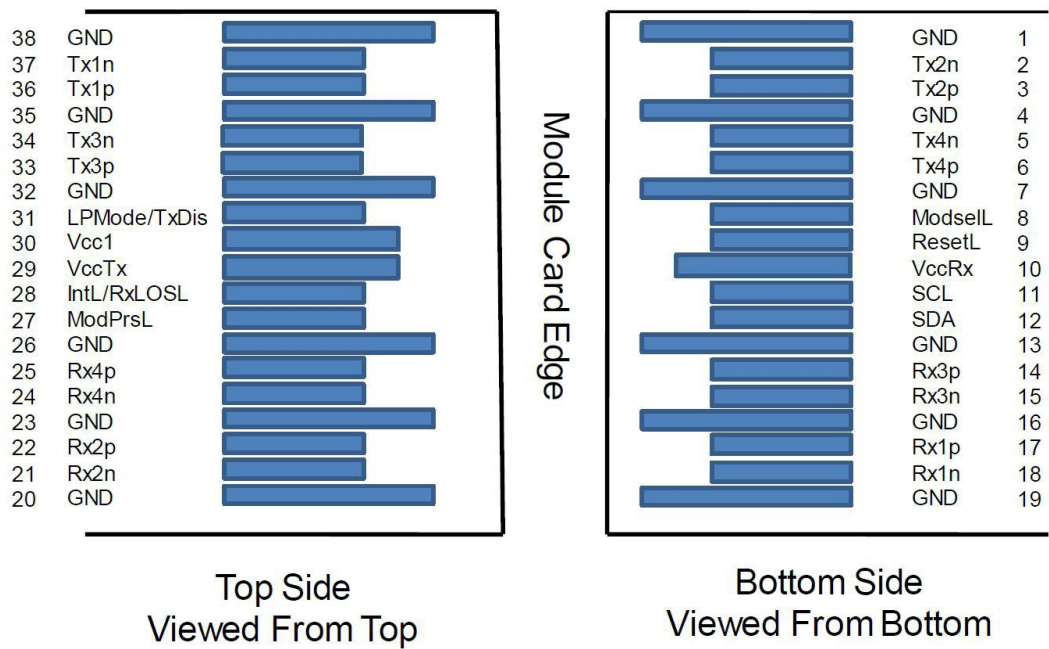
Note4. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.

Note5. Measured with conformance test signal for BER = 10E-12@25.78125Gb/s.

IV. Electrical Specifications

| Transmitter (Module Input) | | | | | |
|---|------------|---------|---------|---------|------|
| Parameter | Symbol | Min. | Typical | Max. | Unit |
| Input Differential Impedance | Rin | - | 100 | - | Ohm |
| Differential termination mismatch (max) | D-mismatch | - | - | 10 | % |
| Differential Data Input Amplitude | VIN,P-P | - | - | 900 | mVpp |
| LPMode, Reset and ModSelL | VIL | -0.3 | - | 0.8 | V |
| | VIH | 2.0 | - | VCC+0.3 | V |
| Receiver (Module Output) | | | | | |
| Output Differential Impedance | Rout | - | 100 | - | Ohm |
| Differential termination mismatch (max) | D-mismatch | - | - | 10 | % |
| Differential Data Output Amplitude | VOUT,P-P | - | - | 900 | mVpp |
| ModPrsL and IntL | VOL | 0 | - | 0.4 | V |
| | VOH | VCC-0.5 | - | VCC+0.3 | V |

V. QSFP+ Module Pad



VI. Pin Definitions

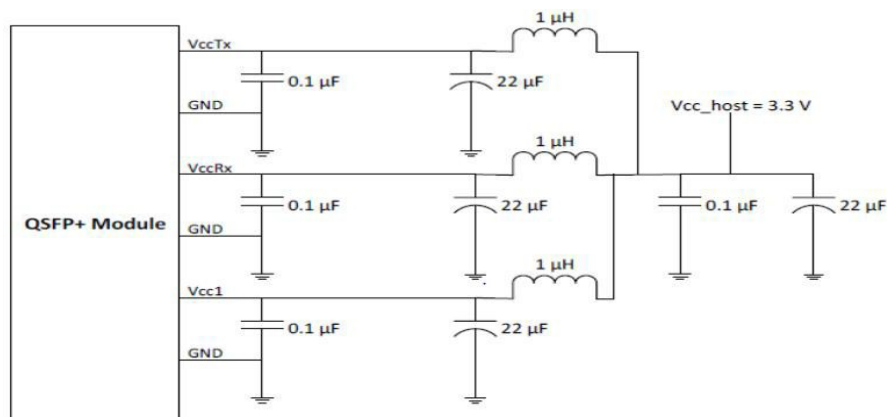
| PAD | Logic | Symbol | Description | Plug sequence | Note |
|-----|-------------|---------|-------------------------------------|---------------|------|
| 1 | | GND | Ground | 1 | 1 |
| 2 | CML-I | Tx2n | Transmitter Inverted Data Input | 3 | |
| 3 | CML-I | Tx2p | Transmitter Non-Inverted Data Input | 3 | |
| 4 | | GND | Ground | 1 | 1 |
| 5 | CML-I | Tx4n | Transmitter Inverted Data Input | 3 | |
| 6 | CML-I | Tx4p | Transmitter Non-Inverted Data Input | 3 | |
| 7 | | GND | Ground | 1 | 1 |
| 8 | LVTTL-I | ModSelL | Module Select | 3 | |
| 9 | LVTTL-I | ResetL | Module Reset | 3 | |
| 10 | | VccRx | +3.3V Power Supply Receiver | 2 | 2 |
| 11 | LVC MOS-I/O | SCL | 2-wire serial interface clock | 3 | |
| 12 | LVC MOS-I/O | SDA | 2-wire serial interface data | 3 | |
| 13 | | GND | Ground | 1 | 1 |
| 14 | CML-O | Rx3p | Receiver Non-Inverted Data Output | 3 | |
| 15 | CML-O | Rx3n | Receiver Inverted Data Output | 3 | |
| 16 | | GND | Ground | 1 | 1 |
| 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output | 3 | |
| 18 | CML-O | Rx1n | Receiver Inverted Data Output | 3 | |
| 19 | | GND | Ground | 1 | 1 |
| 20 | | GND | Ground | 1 | 1 |
| 21 | CML-O | Rx2n | Receiver Inverted Data Output | 3 | |

| | | | | | |
|----|---------|-----------------|---|---|---|
| 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output | 3 | |
| 23 | | GND | Ground | 1 | 1 |
| 24 | CML-O | Rx4n | Receiver Inverted Data Output | 3 | |
| 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output | 3 | |
| 26 | | GND | Ground | 1 | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present | | |
| 28 | LVTTL-O | IntL/RxL OSL | Interrupt. Optionally configurable as RxLOSL via the management interface | | |
| 29 | | VccTx | +3.3V Power supply transmitter | 2 | 2 |
| 30 | | Vcc1 | +3.3V Power supply | 2 | 2 |
| 31 | LVTTL-I | LPMODE | Low Power Mode. Optionally configurable as TxDis via the management interface | | |
| 32 | | GND | Ground | 1 | 1 |
| 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input | 3 | |
| 34 | CML-I | Tx3n | Transmitter Inverted Data Input | 3 | |
| 35 | | GND | Ground | 1 | 1 |
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3 | |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Input | 3 | |
| 38 | | GND | Ground | 1 | 1 |

Note1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

Note2. VccRx, Vcc1 and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1A.

VII. Host Board Power Supply Filtering



VIII. ESD and Reliability

The module meet ESD requirements given in EN61000-4-2, criterion B test specification when installed in a properly grounded cage and chassis. The units are subjected to 15kV air discharges during operation and 8kV direct contact discharges to the case. The module high speed signal contacts shall withstand electrostatic discharge based on Human Body Model per JEDEC JESD22-A114-B.

The module reliability test and ESD test comply with MIL-STD-883H and Telcordia GR-468-CORE (2004)

IX. Ordering information

| Part Number | Product Description |
|---------------|--|
| AE-QSFP28-ER4 | QSFP28, 100Gb/s, LAN WDM, DDM, LC Connector, 40km, 0°C~+70°C |