

Features:

- QSFP-DD MSA compliant
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Up to 70/100/150m over OM3/OM4/OM5 MMF transmission
- Operating case temperature: 0 to 70°C
- Single 3.3V power supply
- Maximum power consumption 12W
- MPO-12 optical connector
- RoHS-6 compliant



Applications:

- Data Center
- Infiniband HDR, EDR

1. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

| Parameter | Symbol | Min | Max | Units | Note |
|--------------------------------------|--------|------|-----|-------|------|
| Storage Temperature | TS | -40 | 85 | degC | |
| Operating Case Temperature | TOP | 0 | 70 | degC | |
| Power Supply Voltage | VCC | -0.5 | 3.6 | V | |
| Relative Humidity (non-condensation) | RH | 0 | 85 | % | |
| Damage Threshold, each Lane | THd | 3.4 | | dBm | |

2. Recommended Operating Conditions and Power Supply Requirements

| Parameter | Symbol | Min | Typical | Max | Units | Notes |
|----------------------------|--------|-------|---------|----------------------|-------|-------|
| Operating Case Temperature | TOP | 0 | | 70 | degC | |
| Power Supply Voltage | VCC | 3.135 | 3.3 | 3.465 | V | |
| Data Rate, each Lane | | | 26.5625 | | GBd | PAM4 |
| Data Rate Accuracy | | -100 | | 100 | ppm | |
| Pre-FEC Bit Error Ratio | | | | 2.4x10 ⁻⁴ | | |
| Post-FEC Bit Error Ratio | | | | 1x10 ⁻¹² | | 1 |

| | | | | | | |
|------------------------|---|-----|--|----|---|---|
| Link Distance with OM3 | D | 0.5 | | 70 | m | 2 |
|------------------------|---|-----|--|----|---|---|

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.

3. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter | Test Point | Min | Typical | Max | Units | Note |
|---|-----------------|----------------------------------|---------|------|-------|------|
| Power Consumption | | | | 12 | W | |
| Supply Current | I _{cc} | | | 3.63 | A | |
| Transmitter (each Lane) | | | | | | |
| Signaling Rate, each Lane | TP1 | 26.5625 ± 100 ppm | | | GBd | |
| Differential pk-pk Input Voltage Tolerance | TP1a | 900 | | | mVpp | 1 |
| Differential Termination Mismatch | TP1 | | | 10 | % | |
| Differential Input Return Loss | TP1 | IEEE 802.3-2015 Equation (83E-5) | | | dB | |
| Differential to Common Mode Input Return Loss | TP1 | IEEE 802.3-2015 Equation (83E-6) | | | dB | |
| Module Stressed Input Test | TP1a | See IEEE 802.3bs 120E.3.4.1 | | | | 2 |
| Single-ended Voltage Tolerance Range (Min) | TP1a | -0.4 to 3.3 | | | V | |
| DC Common Mode Input Voltage | TP1 | -350 | | 2850 | mV | 3 |
| Receiver (each Lane) | | | | | | |
| Signaling Rate, each lane | TP4 | 26.5625 ± 100 ppm | | | GBd | |
| Differential Peak-to-Peak Output Voltage | TP4 | | | 900 | mVpp | |
| AC Common Mode Output Voltage, RMS | TP4 | | | 17.5 | mV | |

| | | | | | | |
|--|-----|----------------------------------|-------|------|----|---|
| Differential Termination Mismatch | TP4 | | | 10 | % | |
| Differential Output Return Loss | TP4 | IEEE 802.3-2015 Equation (83E-2) | | | | |
| Common to Differential Mode Conversion Return Loss | TP4 | IEEE 802.3-2015 Equation (83E-3) | | | | |
| Transition Time, 20% to 80% | TP4 | 9.5 | | | ps | |
| Near-end Eye Symmetry Mask Width (ESMW) | TP4 | | 0.265 | | UI | |
| Near-end Eye Height, Differential | TP4 | 70 | | | mV | |
| Far-end Eye Symmetry Mask Width (ESMW) | TP4 | | 0.2 | | UI | |
| Far-end Eye Height, Differential | TP4 | 30 | | | mV | |
| Far-end Pre-cursor ISI Ratio | TP4 | -4.5 | | 2.5 | % | |
| Common Mode Output Voltage (Vcm) | TP4 | -350 | | 2850 | mV | 3 |

1. With the exception to IEEE 802.3bs 120E.3.1.2 that the pattern is PRBS31Q or scrambled idle.
2. Meets BER specified in IEEE 802.3bs 120E.1.1.
3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

4. Optical Characteristics

| Parameter | Symbol | Min | Typical | Max | Units | Notes |
|---|------------------------|---|---------|---------------------------------------|-------|-------|
| Transmitter | | | | | | |
| Center Wavelength | $\lambda 1$ | 844 | | 863 | nm | |
| Center Wavelength | $\lambda 2$ | 900 | | 918 | nm | |
| RMS Spectral Width | $\Delta \lambda_{rms}$ | | | $\lambda 1: 0.6$ $\lambda 2: 0.65$ | nm | |
| Average Launch Power, each Lane | PAVG | -6.5 | | 4 | dBm | 1 |
| Optical Modulation Amplitude (OMA), each Lane | POMA | -4.5 | | 3 | dBm | 2 |
| Launch power in OMA minus TDECQ, each lane | | -5.9 | | | dBm | |
| Transmitter Dispersion Penalty, each lane | TDECQ | | | 4.5 | dB | 3 |
| TDECQ - $10\log_{10}(C_{eq})$, each lane | | | | 4.5 | | 4 |
| Extinction Ratio | ER | 3.0 | | | dB | |
| RIN12 OMA | | | | -128 | dB/Hz | |
| Optical Return Loss Tolerance | TOL | 12 | | | dB | |
| Average Launch Power OFF Transmitter, each Lane | Poff | | | -30 | dBm | |
| Encircled Flux | | $\geq 86\%$ at $19 \mu m$ $\leq 30\%$ at $4.5 \mu m$ | | | 5 | |
| Receiver | | | | | | |
| Signaling rate, each lane | | $26.5625 \pm 100ppm$ | | | Gbps | |
| Center Wavelength Lane 0 | $\lambda 1$ | 844 | | 863 | nm | |
| Center Wavelength Lane 1 | $\lambda 2$ | 900 | | 918 | nm | |

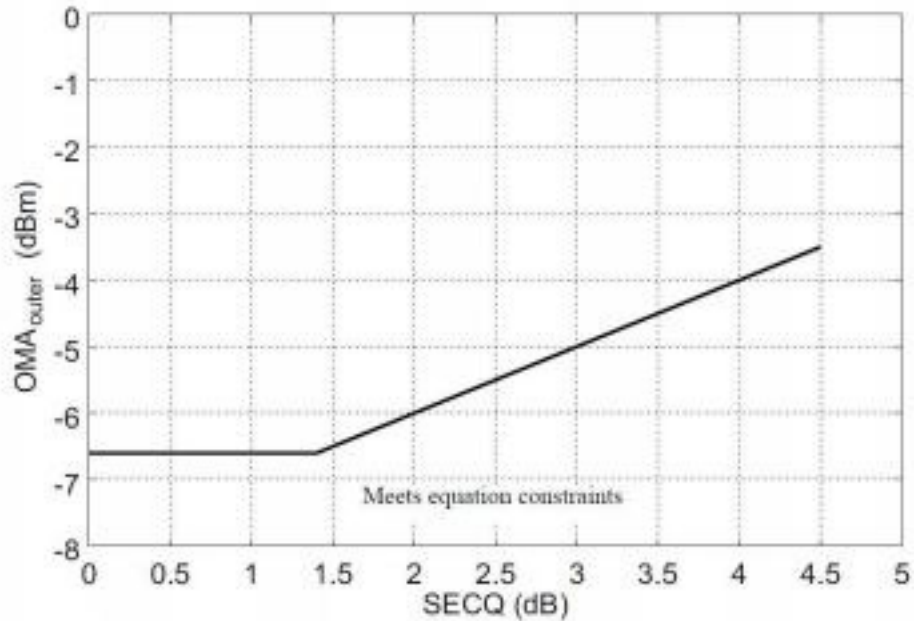
| | | | | | | |
|---|-----|------|--|--|-----|---|
| Damage Threshold, each Lane | THd | 5 | | | dBm | 6 |
| Average Receive Power, each Lane | | -8.5 | | 4 | dBm | 7 |
| Receive Power (OMA), each Lane | | | | 3.0 | dBm | |
| Receiver Sensitivity (OMA), each Lane | SEN | | | Max (-6.6, SECQ -8) Refer to Figure 5 | dBm | 9 |
| Receiver Reflectance | RR | | | -12 | dB | |
| Stressed receiver sensitivity in OMA, each lane | | | | -3.5 | dBm | 8 |

1. 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.
2. Even if the TDECQ < 1.4 dB, the OMA_{outer} (min) must exceed this value.
3. TDEC_q is specified and measured as per IEEE802.3.cm Clause 150.8.5.
4. Ceq is a coefficient defined in IEEE 802.3-2018 Clause 121.8.5.8, which accounts for the reference equalizer noise enhancement.
5. If measured into type A1a.2, or type A1a.3, or type A1a.4, 50 um fibers in accordance with IEC 61280- 1-4.
6. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.
7. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
8. Measured with a conformance test signal at TP3 (see IEEE 80 2 . 3 Cl 15 0) for the BER specified. They are not characteristics of the receiver. The conditions for measuring stressed receiver sensitivity are the following:

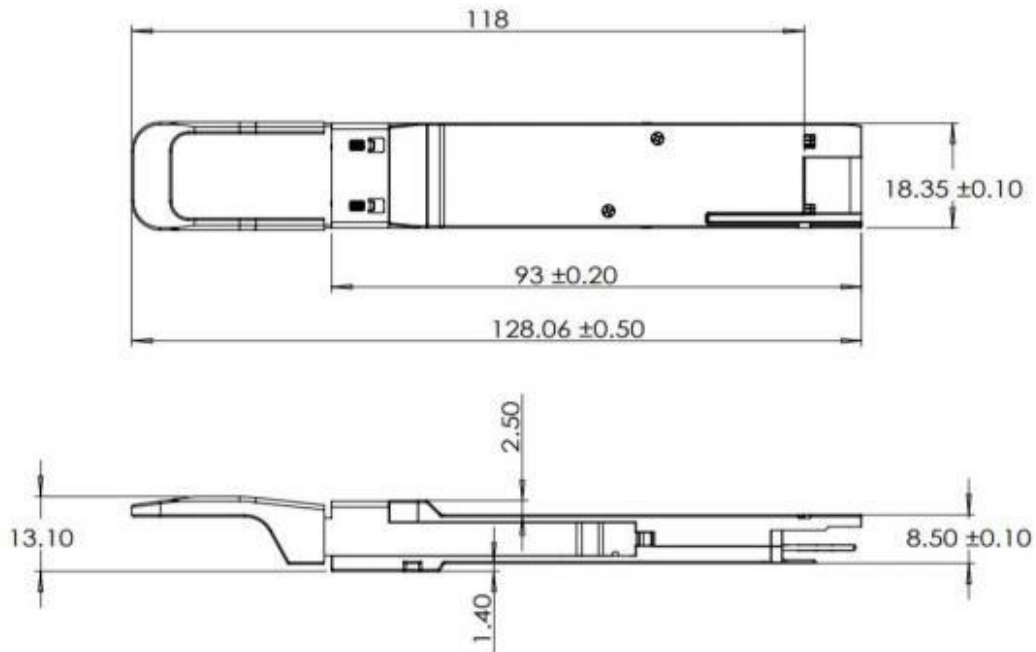
| | | |
|--|-----|-----|
| Stressed eye closure (SECQ), lane under test | 4.5 | dB |
| SECQ - 10log ₁₀ (Ceq) lane under test (max) | 4.5 | dBm |
| OMA _{outer} of each aggressor lane | 3.0 | dBm |

These test conditions are for measuring stressed receiver sensitivity.

9. Receiver sensitivity is considered a normative requirement. RX sensitivity is defined for a transmitter with a value of SECQ up to 4.5dB. For transmitter with SECQ different from 4.5dB, limit is reported as per figure 5



5. Mechanical Diagram



Note: External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.

6. Ordering Information

| OEM | Part Number | OEM | Part Number |
|--------|---------------------|-------------|------------------|
| Arista | QDD-400G-SR4.2-A | MSA Generic | AN-QSFPDD-SR4D2B |
| Cisco | QDD-400G-SR4.2-BD-A | | |

7. Contact Information

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