

Features

- Hot-pluggable QSFP+ form factor
- 240m operation over duplex OM3 MMF (350m over OM4, 440m over OM5)
- Supports 41.2 Gb/s aggregate bit rates
- Uncooled 4x10Gb/s SWDM transmitter
- Built-in SWDM mux and demux
- Power dissipation < 2.5W
- Commercial case temperature range: 0°C to 70°C
- XLPPi electrical interface
- Duplex LC receptacles
- Built-in digital diagnostic functions, including Tx/Rx power monitoring
- RoHS-6 compliant



Applications

- 40G Ethernet over duplex MMF
- Allows upgrades from 10GBASE-SR without changing fiber plant

1. General Product Characteristics

| Parameter | Value | Unit | Notes |
|----------------------------------|--|-------|-------------------------------------|
| Module Form Factor | QSFP+ | | |
| Maximum Aggregate Data Rate | 41.2 | Gb/s | |
| Maximum Data Rate per Lane | 10.3 | Gb/s | |
| Protocols Supported | 40G Ethernet | | |
| Electrical Interface and Pin-out | 38-pin edge connector | | Pin-out as defined by the QSFP+ MSA |
| Maximum Power Consumption | 2.5 | Watts | |
| Management Interface | Serial, I2C-based, 400 kHz maximum frequency | | As defined by the QSFP+ MSA |

| Data Rate Specifications | Symbol | Min | Typ | Max | Units | Ref. |
|--------------------------|--------|-----|-----|-------------------|--------|------|
| Bit Rate per Lane | BR | | | 10.3125 | Mb/sec | 1 |
| Bit Error Ratio | BER | | | 10 ⁻¹² | | 2 |
| Link distance on OM3 | d | 0 | | 240 | meters | |
| Link distance on OM4 | d | 0 | | 350 | meters | |

Notes:

1. Compliant with XLPP1 per IEEE 802.3ba.
2. Tested with a PRBS 231-1 test pattern.

2. Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|----------------------------|--------------------------|------|-----|-----|------|------|
| Maximum Supply Voltage | Vcc1, VccTx, VccRx | -0.5 | | 3.6 | V | |
| Storage Temperature | TS | -40 | | 85 | °C | |
| Case Operating Temperature | TOP | 0 | | 70 | °C | |
| Relative Humidity | RH | 0 | | 85 | % | 1 |
| Damage Threshold, per Lane | DT | 4 | | | dBm | |

Note 1:

Non-condensing.

3. Electrical Characteristics

(TOP = 0 to 70 °C, VCC = 3.1 to 3.47 Volts)

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|--------------------------------------|--------------------------|------|-----|------|------|------|
| Supply Voltage | Vcc1, VccTx, VccRx | 3.1 | | 3.47 | V | |
| Supply Current | Icc | | | 0.9 | A | 1 |
| Link turn-on time | | | | | | |
| Transmit turn-on time | | | | 2000 | ms | 2 |
| Transmitter (Per Lane) | | | | | | |
| Single-ended input voltage tolerance | VinT | -0.3 | | 4.0 | V | |
| Differential data input swing | Vin,pp | 120 | | 1200 | mVpp | 3 |
| Differential input threshold | | | 50 | | mV | |

| | | | | | | |
|--|---------|--------------------------------------|--|------|-------|------|
| AC common mode input voltage tolerance (RMS) | | 15 | | | mV | |
| Differential input return loss | | Per IEEE P802.3ba, Section 86A.4.1.1 | | | dB | 4 |
| J2 Jitter Tolerance | Jt2 | 0.17 | | | UI | |
| J9 Jitter Tolerance | Jt9 | 0.29 | | | UI | |
| Data Dependent Pulse Width Shrinkage | DDPWS | 0.07 | | | UI | |
| Eye mask coordinates {X1, X2 Y1, Y2} | | 0.11, 0.31 95, 350 | | | UI mV | 5 |
| Receiver (Per Lane) | | | | | | |
| Single-ended output voltage | | -0.3 | | 4.0 | V | |
| Differential data output swing | Vout,pp | 200 | | 400 | | 6, 7 |
| | | 300 | | 600 | | |
| | | 400 | | 800 | | |
| | | 600 | | 1200 | | |
| AC common mode output voltage (RMS) | | | | 7.5 | mV | |
| Termination mismatch at 1 MHz | | | | 5 | % | |
| Differential output return loss | | Per IEEE P802.3ba, Section 86A.4.2.1 | | | dB | 4 |
| Common mode output return loss | | Per IEEE P802.3ba, Section 86A.4.2.2 | | | dB | 4 |
| Output transition time, 20% to 80% | | 28 | | | ps | |
| J2 Jitter output | Jo2 | | | 0.42 | UI | |
| J9 Jitter output | Jo9 | | | 0.65 | UI | |
| Eye mask coordinates #1 {X1, X2 Y1, Y2} | | 0.29, 0.5 150, 425 | | | UI mV | 5 |
| Power Supply Ripple Tolerance | PSR | 50 | | | mVpp | |

Notes:

1. Will be <2.5W in link established mode. If the input optical signal is without data, the CDR will keep searching and push the supply current over the maximum spec.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range.
5. Hit ratio = 5 x 10E-5.
6. AC coupled with 100Ω differential output impedance.
7. Output voltage is settable in 4 discrete steps via I2C.

4. Optical Characteristics

(TOP = 0 to 70°C, VCC = 3.1 to 3.47 Volts)

Per-channel optical characteristics vary over the 4 wavelengths. Below are the worst-case

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|--|--------|-----------------------------------|---------|------|-------|------|
| Transmitter | | | | | | |
| Signaling Speed per Lane | | | 10.3125 | | GBd | 1 |
| Lane center wavelengths | | | 850 | | nm | |
| | | | 880 | | | |
| | | | 910 | | | |
| | | | 940 | | | |
| Spectral width @ 850nm | SBW | | | 0.53 | | |
| Spectral width @ 880nm, 910nm, 940nm | SBW | | | 0.59 | nm | |
| Total Average Launch Power | POUT | -1.6 | | 9.0 | dBm | 3 |
| Average Launch Power per Lane | TXPx | -7.6 | | 3.0 | dBm | 2,3 |
| Transmit OMA per Lane | TxOMA | -5.3 | | 3 | dBm | 2 |
| Launch Power Tx OMA - TDP | | -6.6 | | | dBm | |
| Transmitter and Dispersion Penalty | TDP | | | 4.9 | dB | 2 |
| Optical Extinction Ratio | ER | 3.0 | | | dB | |
| Average launch power of OFF transmitter, per lane | | | | -30 | dBm | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | 4 |
| Optical Return Loss Tolerance | | 12 | | | dB | |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | 0.23, 0.34, 0.43, 0.27, 0.35, 0.4 | | | | |
| Receiver | | | | | | |
| Signaling Speed per Lane | | | 10.3125 | | GBd | 5 |
| Lane center wavelengths | | | 850 | | nm | |
| | | | 880 | | | |
| | | | 910 | | | |
| | | | 940 | | | |
| Average Receive Power per Lane | RXPx | -9.0 | | 3.0 | dBm | 2,6 |
| Receive Power (OMA) per Lane | RxOMA | | | 3 | dBm | 2 |
| Receiver Sensitivity (OMA) per Lane | Rxsens | | | -9.1 | dBm | 2,7 |

| | | | | | | |
|--|------|-----------------------------------|--|------|-------|---|
| Stressed Receiver Sensitivity (OMA) per Lane @ 850nm | SRS | | | -5.7 | dBm | 2 |
| Stressed Receiver Sensitivity (OMA) per Lane @ 880nm, 910nm, 940nm | SRS | | | -4.4 | dBm | 2 |
| Return Loss | RL | | | 12 | dB | |
| LOS De-Assert | LOSD | | | -13 | dBm | |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 4.9 | dB | 2 |
| Optical Extinction Ratio | ER | 3.0 | | | dB | |
| Average launch power of OFF transmitter, per lane | | | | -30 | dBm | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | 4 |
| Optical Return Loss Tolerance | | 12 | | | dB | |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | 0.23, 0.34, 0.43, 0.27, 0.35, 0.4 | | | | |

Notes:

1. Transmitter consists of 4 lasers operating at 10.3Gb/s each.
2. This value varies among the 4 channels. The value shown is for the worst-case channel.
3. Minimum value is informative.
4. Maximum value is informative. TDP guarantees Tx performance
5. Receiver consists of 4 photodetectors operating at 10.3 Gb/s each.
6. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
7. Maximum value is informative based on a theoretical perfect unstressed optical source

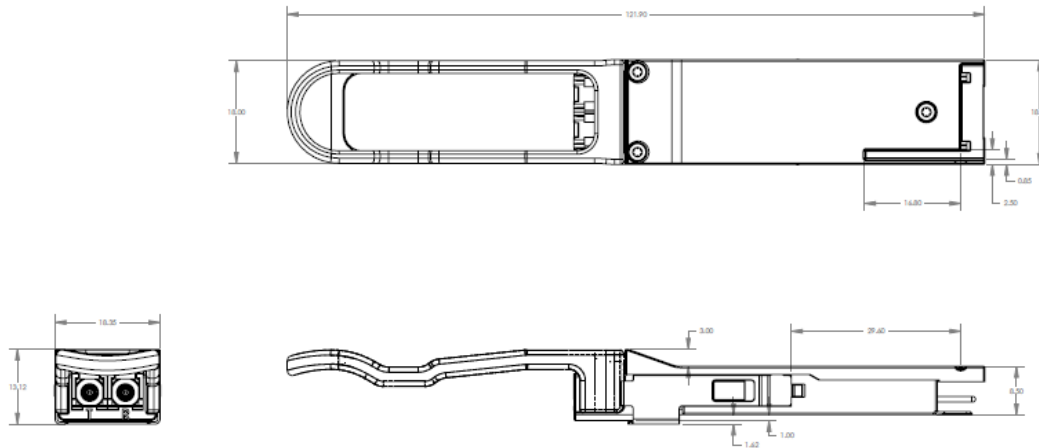
5. Environmental Specifications

Approved Networks QSFP-40G-SWDM4-A transceivers have an operating temperature range from 0°C to +70°C case temperature.

| Environmental Specifications | Symbol | Min | Typ | Max | Units |
|------------------------------|--------|-----|-----|-----|-------|
| Case Operating Temperature | Top | 0 | | 70 | °C |
| Storage Temperature | Tsto | -40 | | 85 | °C |

6. Mechanical Diagram

Mechanical specifications are compliant to the QSFP+ MSA transceiver module specifications.



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.

7. Ordering Information

| OEM | Part Number | OEM | Part Number |
|---------|-----------------------|-------------|--------------------------|
| Arista | QSFP-40G-SWDM4-AN-A | Palo Alto | PAN-QSFP-40GBASE-SWDM4-A |
| Cisco | QSFP-40G-SWDM4-A | Brocade | 40G-QSFP-SR4-SWDM4-A |
| Cisco | QSFP-40G-CSR-S-C1 | F5 Networks | F5-UPG-QSFP+SWDM4-A |
| Finisar | FTL4S1QE1C-A | Gigamon | QSF-502-SWDM4-A |
| Intel | E40GQSFP4SWDM4-A | Juniper | QFX-QSFP-40G-SWDM4-A |
| Juniper | JNP-QSFP-40GE-SWDM4-A | MSA | AN-QSFP-SWDM4 |

8. Contact Information

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