

FTL4S1QE2C-C

Finisar® FTL4S1QE2C Compatible TAA 40GBase-SWDM4 QSFP+ Transceiver (MMF, 850nm, 300m, LC, DOM)

Features:

- SFF-8436 Compliance
- Duplex LC Connector
- Multi-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 40GBase Ethernet
- Access and Enterprise

Product Description

This Finisar® FTL4S1QE2C compatible QSFP+ transceiver provides 40GBase-SWDM4 throughput up to 350m over multi-mode fiber (MMF) using a wavelength of 850nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Finisar® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products."



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 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

| Parameter | Symbol | Min | Typ | Max | Units | Notes |
|----------------------|--------|-----|-----|---------|--------|-------|
| 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 $2^{31}-1$ test pattern.

Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|------------------------------------|--------------------------|------|-----|-----|------|-------|
| Maximum Supply Voltage | Vcc1, VccTx, VccRx | -0.5 | | 3.6 | V | |
| Storage Temperature | T _s | -40 | | 85 | °C | |
| Case Operating Temperature | TOP | 0 | | 70 | °C | |
| Relative Humidity (non-condensing) | RH | 0 | | 85 | % | |
| Damage Threshold, per Lane | DT | 4 | | | dBm | |

Electrical Characteristics ($T_{OP} = 0$ to 70°C , $V_{CC} = 3.1$ to 3.47 Volts)

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|--|--------------------|--------------------------------------|-----|------|----------|-------|
| 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 | mVpp | 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 = 5×10^{-5} .
6. AC coupled with 100Ω differential output impedance.
7. Output voltage is settable in 4 discrete steps via I2C.

Optical Characteristics ($T_{OP} = 0$ to $70^{\circ}C$, $V_{CC} = 3.1$ to 3.47 Volts)

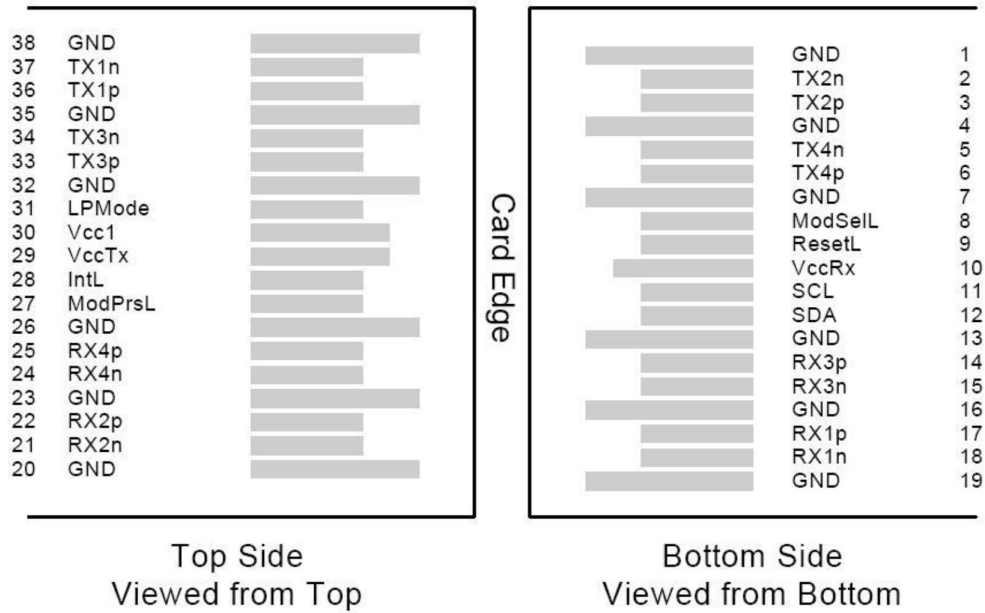
Per-channel optical characteristics vary over the 4 wavelengths. Below are the worst-case.

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|--|--------|-----------------------------------|--------------------------|------|-------|-------|
| Transmitter (each lane) | | | | | | |
| Signaling Speed per Lane | | | 10.3125 | | GBd | 1 |
| Lane center wavelengths | | | 850 880 910 940 | | nm | |
| 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 | | | | |
| Receive (each lane) | | | | | | |
| Signaling Speed per Lane | | | 10.3125 | | GBd | 5 |
| Lane center wavelengths | | | 850 880 910 940 | | nm | |
| 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 | |

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

Electrical Pin-out Details



Pin Descriptions

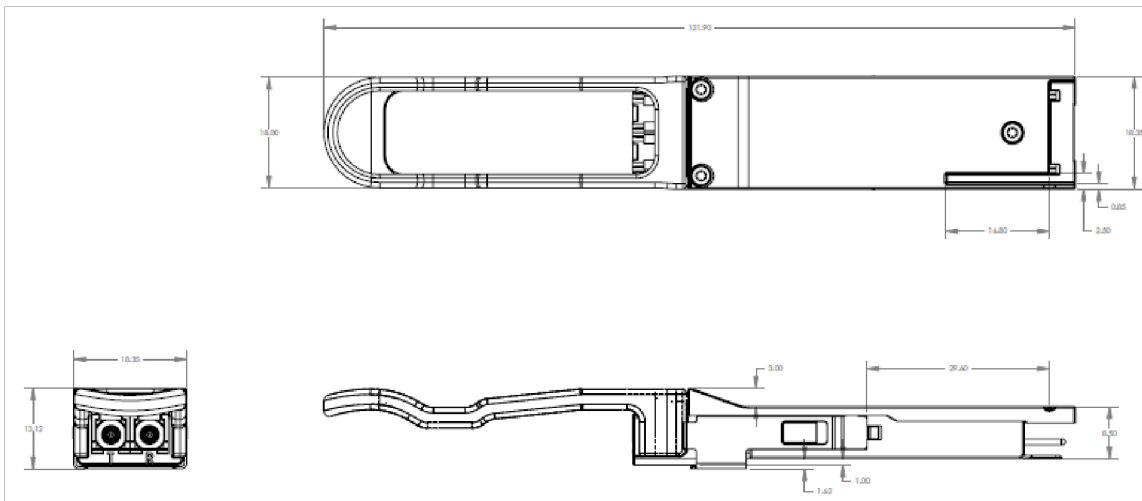
| Pin | Logic | Symbol | Name/Descriptions | Ref. |
|-----|-------------|---------|---|------|
| 1 | | GND | Module Ground | 1 |
| 2 | CML-I | Tx2- | Transmitter inverted data input | |
| 3 | CML-I | Tx2+ | Transmitter non-inverted data input | |
| 4 | | GND | Module Ground | 1 |
| 5 | CML-I | Tx4- | Transmitter inverted data input | |
| 6 | CML-I | Tx4+ | Transmitter non-inverted data input | |
| 7 | | GND | Module Ground | 1 |
| 8 | LVTTL-I | MODSEIL | Module Select | 2 |
| 9 | LVTTL-I | ResetL | Module Reset | 2 |
| 10 | | VCCRx | +3.3v Receiver Power Supply | |
| 11 | LVC MOS-I | SCL | 2-wire Serial interface clock | 2 |
| 12 | LVC MOS-I/O | SDA | 2-wire Serial interface data | 2 |
| 13 | | GND | Module Ground | 1 |
| 14 | CML-O | RX3+ | Receiver non-inverted data output | |
| 15 | CML-O | RX3- | Receiver inverted data output | |
| 16 | | GND | Module Ground | 1 |
| 17 | CML-O | RX1+ | Receiver non-inverted data output | |
| 18 | CML-O | RX1- | Receiver inverted data output | |
| 19 | | GND | Module Ground | 1 |
| 20 | | GND | Module Ground | 1 |
| 21 | CML-O | RX2- | Receiver inverted data output | |
| 22 | CML-O | RX2+ | Receiver non-inverted data output | |
| 23 | | GND | Module Ground | 1 |
| 24 | CML-O | RX4- | Receiver inverted data output | |
| 25 | CML-O | RX4+ | Receiver non-inverted data output | |
| 26 | | GND | Module Ground | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present, internal pulled down to GND | |
| 28 | LVTTL-O | IntL | Interrupt output, should be pulled up on host board | 2 |
| 29 | | VCCTx | +3.3v Transmitter Power Supply | |
| 30 | | VCC1 | +3.3v Power Supply | |
| 31 | LVTTL-I | LPMode | Low Power Mode | 2 |
| 32 | | GND | Module Ground | 1 |
| 33 | CML-I | Tx3+ | Transmitter non-inverted data input | |
| 34 | CML-I | Tx3- | Transmitter inverted data input | |
| 35 | | GND | Module Ground | 1 |
| 36 | CML-I | Tx1+ | Transmitter non-inverted data input | |
| 37 | CML-I | Tx1- | Transmitter inverted data input | |
| 38 | | GND | Module Ground | 1 |

Notes:

- 1. Module circuit ground is isolated from module chassis ground with in the module.
- 2. Open collector; should be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.

Mechanical Specifications

The mechanical specifications are compliant to the QSFP+ MSA transceiver module specifications.



About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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