**16G-SFPP-ERD-1556-56-OPC**

Brocade® 16G-SFPP-ERD-1556-56 Compatible TAA 16GBase-DWDM FC SFP+ Transceiver C-Band 100GHz (SMF, 1556.56nm, 40km, LC, DOM)

**Features**

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free

**Applications:**

- Ethernet over DWDM
- Access, Metro and Enterprise

**Product Description**

This Brocade® 16G-SFPP-ERD-1556-56 compatible SFP+ transceiver provides 16GBase-DWDM Fibre Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1556.56nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Brocade®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows 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.

OptioConnect's transceivers are RoHS compliant and lead-free.

**Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

**ITU-T Grid Channel (100GHz Spacing)**

| Channel | THz | nm | Channel | THz | nm |
|---|---|---|---|---|---|
| **17*** | 191.7 | 1563.86 | **40** | 194 | 1545.32 |
| **18** | 191.8 | 1563.05 | **41** | 194.1 | 1544.53 |
| **19** | 191.9 | 1562.23 | **42** | 194.2 | 1543.73 |
| **20** | 192.0 | 1561.42 | **43** | 194.3 | 1542.94 |
| **21** | 192.1 | 1560.61 | **44** | 194.4 | 1542.14 |
| **22** | 192.2 | 1559.79 | **45** | 194.5 | 1541.35 |
| **23** | 192.3 | 1558.98 | **46** | 194.6 | 1540.56 |
| **24** | 192.4 | 1558.17 | **47** | 194.7 | 1539.77 |
| **25** | 192.5 | 1557.36 | **48** | 194.8 | 1538.98 |
| **26** | 192.6 | 1556.55 | **49** | 194.9 | 1538.19 |
| **27** | 192.7 | 1555.75 | **50** | 195.0 | 1537.40 |
| **28** | 192.8 | 1554.94 | **51** | 195.1 | 1536.61 |
| **29** | 192.9 | 1554.13 | **52** | 195.2 | 1535.82 |
| **30** | 193.0 | 1553.33 | **53** | 195.3 | 1535.04 |
| **31** | 193.1 | 1552.52 | **54** | 195.4 | 1534.25 |
| **32** | 193.2 | 1551.72 | **55** | 195.5 | 1533.47 |
| **33** | 193.3 | 1550.92 | **56** | 195.6 | 1532.68 |
| **34** | 193.4 | 1550.12 | **57** | 195.7 | 1531.90 |
| **35** | 193.5 | 1549.32 | **58** | 195.8 | 1531.12 |
| **36** | 193.6 | 1548.51 | **59** | 195.9 | 1530.33 |
| **37** | 193.7 | 1547.72 | **60** | 196.0 | 1529.55 |
| **38** | 193.8 | 1546.92 | **61*** | 196.1 | 1528.77 |
| **39** | 193.9 | 1546.12 | | | |

*This channel is supported with limited availability.

## Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Supply Voltage** | Vcc | -0.5 | | 3.6 | V | |
| **Storage Temperature** | TS | -40 | | 85 | °C | |
| **Operating Case Temperature** | Tc | 0 | | 70 | °C | |
| **Input Voltage** | Vin | -0.5 | | Vcc | V | |
| **Baud Rate** | | 4.25 | 14.025 | | Gbps | |

## Electrical Characteristics

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|---|
| **Module Supply Voltage** | | Vcc | +3.15 | 3.3 | 3.45 | V | |
| **Power Supply Current** | | ICC | | 430 | 610 | mA | |
| **Surge Current** | | Isurge | | | +30 | mA | |
| **Transmitter** | | | | | | | |
| **CML Inputs (Differential)** | | Vin | 250 | | 1000 | mVpp | AC coupled inputs |
| **Input Impedance (Differential)** | | Zin | 85 | 100 | 115 | ohm | Rin > 100 kohms @DC |
| **Differential Input S-parameter** | | SDD11 | | | -10 | dB | |
| **Differential to Common Mode Conversion** | | SCD11 | | | -10 | dB | |
| **Tx_DISABLE Input Voltage** | **High** | | 2 | | 3.45 | V | |
| | **Low** | | 0 | | 0.8 | V | |
| **Tx_Fault Output Voltage** | **High** | | 2 | | Vcc+0.3 | V | Io = 400µA; Host Vcc |
| | **Low** | | 0 | | 0.5 | V | Io = -4.0mA |
| **Receiver** | | | | | | | |
| **CML Outputs (Differential)** | | Vout | 350 | | 700 | mVpp | AC coupled outputs |
| **Output AC Common Mode Voltage** | | | 0 | | 15 | mV | RMS |
| **Output Impedance (Differential)** | | Zout | 85 | 100 | 115 | ohm | |
| **Differential Output S-parameter** | | SD22 | | | -10 | dB | |
| **Rx_LOS Output Voltage** | **High** | | 2 | | Vcc+0.3 | V | Io = 400µA; Host Vcc |
| | **Low** | | 0 | | 0.8 | V | Io = -4.0mA |
| **MOD_DEF (0:2)** | | VoH | 2.5 | | | V | With Serial ID |
| | | VoL | 0 | | 0.5 | V | |

**Optical Characteristics**

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|---|
| **9μm Core Diameter SMF** | | | | 40 | | Km | |
| **Data Rate** | | | 4.25 | 14.025 | | Gbps | |
| **Transmitter** | | | | | | | |
| **Center Wavelength Spacing** | | | | 50 | | GHz | |
| | | | | 0.4 | | nm | |
| **Side Mode Suppression Ratio** | | SMSR | 30 | | | dB | |
| **Average Output Power** | | Pout | 0 | | +4 | dBm | 1 |
| **Extinction Ratio** | | ER | 8.2 | | | dB | |
| **Average Power of OFF Transmitter** | | Poff | | | -30 | dBm | |
| **Transmitter Dispersion Penalty** | | TDP | | | 2 | dB | |
| **TX Disable Assert Time** | | t_off | | | -30 | dBm | |
| **TX_DISABLE Negate Time** | | t_on | | | 1 | ms | |
| **TX_DISABLE time to start reset** | | t_reset | 10 | | | us | |
| **Time to initialize, include reset of TX_FAULT** | | t_init | | | 300 | ms | |
| **TX_FAULT from fault to assertion** | | t_fault | | | 100 | us | |
| **Total Jitter** | | TJ | | | 0.28 | UI (p-p) | |
| **Data Dependent Jitter** | | DDJ | | | 0.1 | UI (p-p) | |
| **Uncorrelated Jitter** | | UJ | | | 0.023 | RMS | |
| **Receiver** | | | | | | | |
| **Center Wavelength** | | λ | 1260 | | 1565 | nm | |
| **Sensitivity** | | Pmin | | | -14 | dBm | 2 |
| **Receiver Overload** | | Pmax | 0 | | | dBm | |
| **Optical Return Loss** | | ORL | | | -12 | dBm | |
| **LOS De-Assert** | | LOSD | | | -16 | dBm | |
| **LOS Assert** | | LOSA | -26 | | | dBm | |
| **LOS** | **High** | | 2 | | Vcc+0.3 | V | |
| | **Low** | | 0 | | 0.8 | V | |

**Notes:**

1. Output is coupled into a 9/125um SMF
2. Minimum average optical power measured at the BER less than 1E-12, back to back. The measure pattern is PRBS $2^{31}$-1.

**Pin Descriptions**

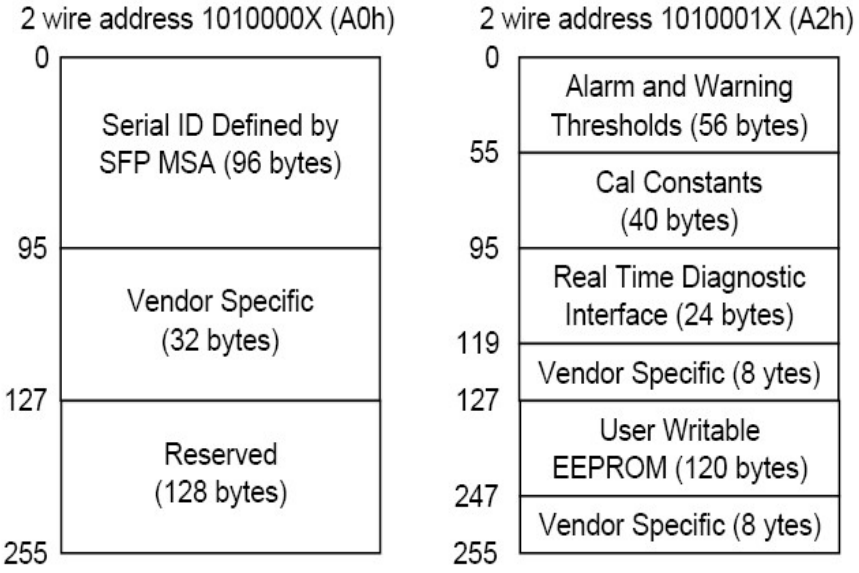
| Pin | Symbol | Descriptions | Sequence | Notes |
|---|---|---|---|---|
| **1** | VeeT | Transmitter Ground | 1 | Note 5 |
| **2** | TX Fault | Transmitter Fault Indication | 3 | Note 1 |
| **3** | TX Disable | Transmitter Disable | 3 | Note 2, Module disables on high or open |
| **4** | SDA | Module Definition 2 | 3 | 2-wire Serial Interface Data Line. |
| **5** | SCL | Module Definition 1 | 3 | 2-wire Serial Interface Clock. |
| **6** | MOD-ABS | Module Definition 0 | 3 | Note 3 |
| **7** | RS0 | RX Rate Select(LVTTL). | 3 | Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor. |
| **8** | LOS | Loss of Signal | 3 | Note 4 |
| **9** | RS1 | TX Rate Select(LVTTL). | 1 | Rate Select 1, optionally controls SFP+module transmitter. This pin is pulled low to VeeT with a >30K resistor. |
| **10** | VeeR | Receiver Ground | 1 | Note 5 |
| **11** | VeeR | Receiver Ground | 1 | Note 5 |
| **12** | RD- | Inv. Received Data Out | 3 | Note 6 |
| **13** | RD+ | Received Data Out | 3 | Note 7 |
| **14** | VeeR | Receiver Ground | 1 | Note 5 |
| **15** | VccR | Receiver Power | 2 | 3.3V ± 5%, Note 7 |
| **16** | VccT | Transmitter Power | 2 | 3.3V ± 5%, Note 7 |
| **17** | VeeT | Transmitter Ground | 1 | Note 5 |
| **18** | TD+ | Transmit Data In | 3 | Note 8 |
| **19** | TD- | Inv. Transmit Data In | 3 | Note 8 |
| **20** | VeeT | Transmitter Ground | 1 | Note 5 |

**Notes:**

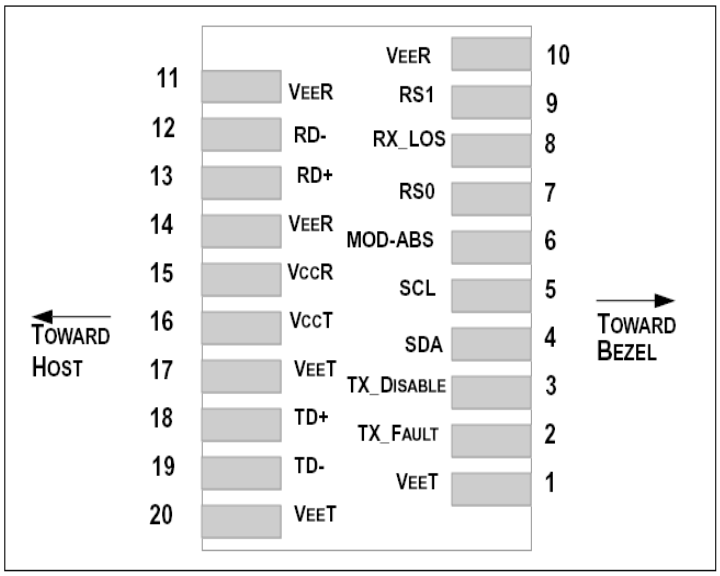
1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K – 10 KΩ resistor. Its states are:
   Low(0-0.8V): Transmitter on
   (>0.8, <2.0V): Undefined
   High (2.0-3.465V): Transmitter Disabled
   Open: Transmitter Disabled
3. Module Absent, connected to VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ

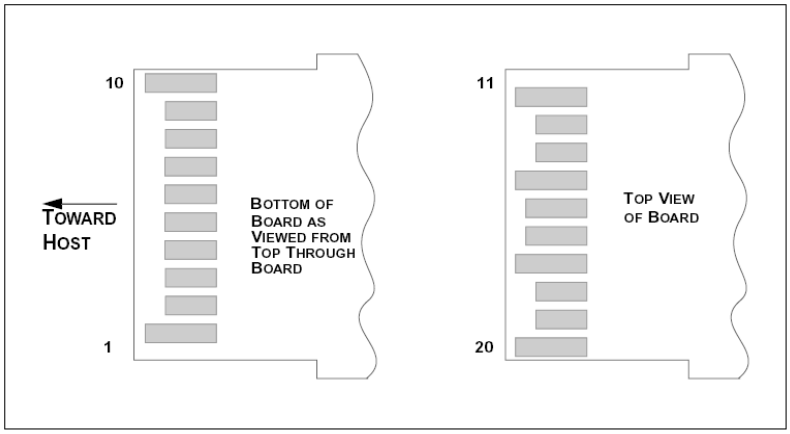
resistor. Pull up voltage between 2.0V and VccT/R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
6. RD-/+: These are the different receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is doneinside the module and is thus not required on the host board.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pinn. Maximum supply current is 610mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.
8. TD -/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

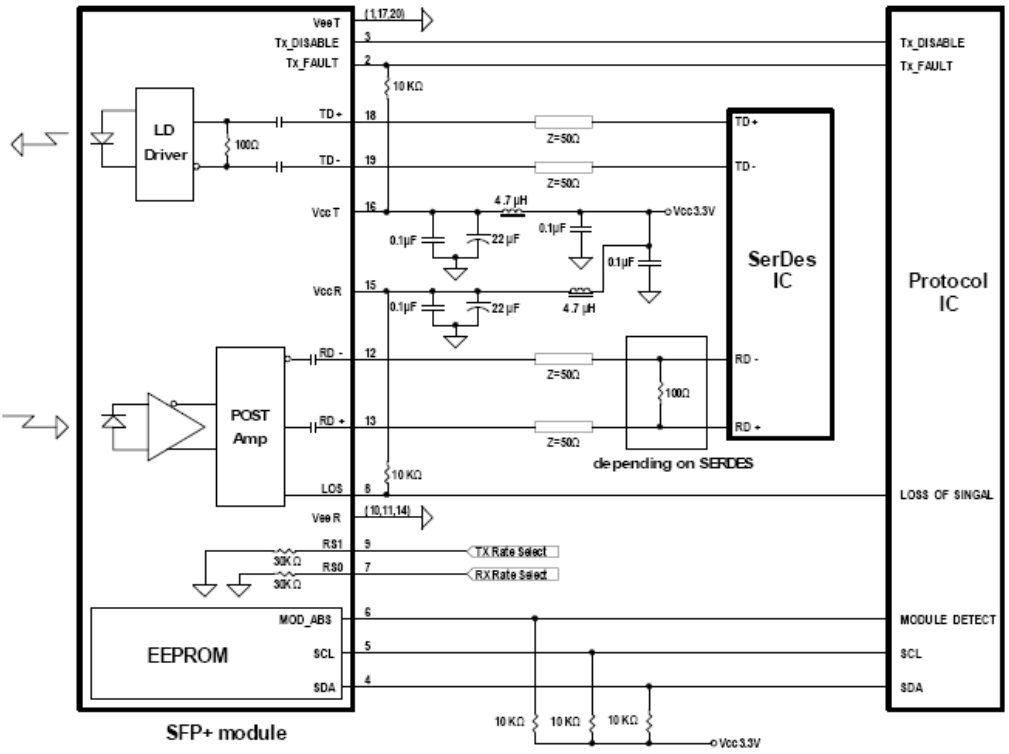


**SFP+ Transceiver Electrical Pad Layout**

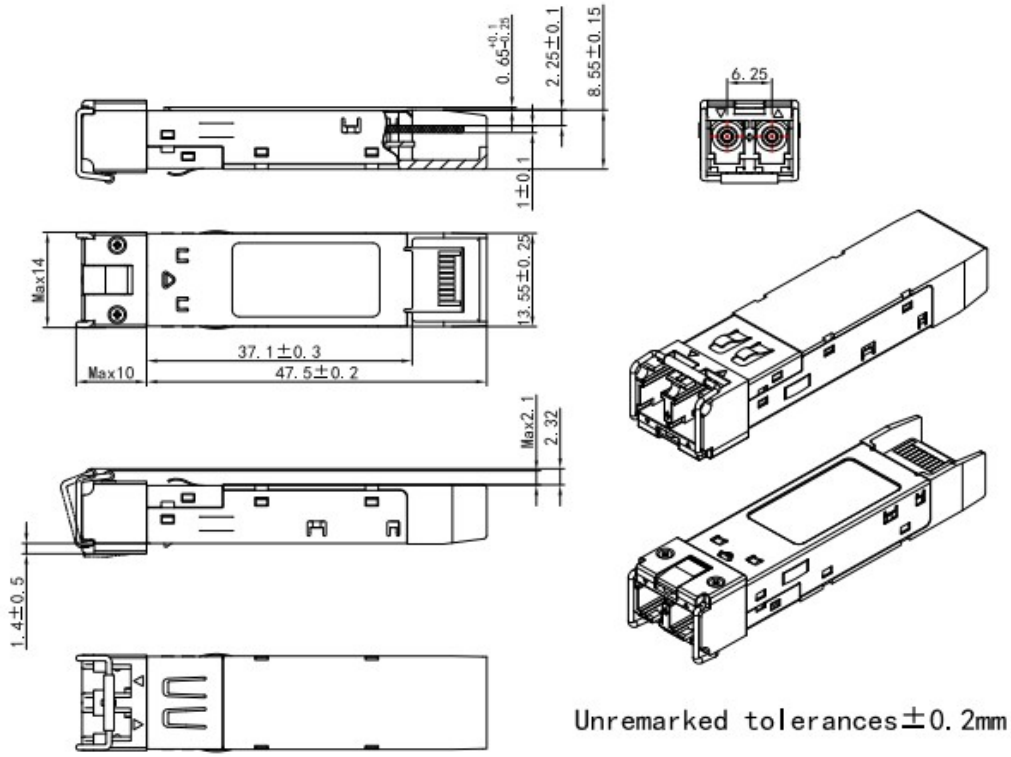


**Recommended Circuit Schematic**




**Mechanical Specifications**



**OptioConnect**
**Innovation for the Future of High-Speed Networking**

**Who We Are**
OptioConnect is reshaping the landscape of communication and high-speed networking through intelligent technology. With a core focus on cutting edge technology, we deliver smarter fiber optic solutions for enterprise networks, data centers, and next-gen telecom infrastructures.

**What We Do**
At OptioConnect, we fuse advanced engineering with intelligent automation to drive the future of networking. Our AI-integrated solutions are designed to optimize performance and streamline operations with:

- Superior Performance
- Network and traffic optimization
- Intelligent energy management
- Seamless OEM compatibility
- Scalable cost-efficiency

**Smarter Networks by Design**
Innovation isn't just a goal—it's our process. We embed AI and machine learning across our R&D and product lines, enabling adaptive performance, automated tuning, and faster deployment cycles. The result? Networks that don't just work—they learn, evolve, and outperform.

**Our Team**
Our engineers, data scientists, and network architects bring decades of experience and a future-focused mindset. We provide hands-on support with intelligent insights that turn complex challenges into simple solutions.

**Our Mission**
To deliver AI-enhanced connectivity that reduces cost, increases speed, and maximizes efficiency—empowering our partners to operate at the forefront of a rapidly evolving digital world.

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