

SFPP-10G-DW16-ZR-C

Juniper Networks® SFPP-10G-DW16-ZR Compatible TAA 10GBase-DWDM SFP+ Transceiver C-Band Channel DW16 100GHz (SMF, 1564.68nm, 80km, LC, DOM)

Features:

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



Applications:

- 10x Gigabit Ethernet over DWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise

Product Description

This Juniper Networks® SFPP-10G-DW16-ZR compatible SFP+ transceiver provides 10GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1564.68nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Juniper Networks® 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."



Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.7.
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3.
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B.
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2.
- RoHs compliant with 2002/95/EC 4.1&4.2 2005/747/EC.

Tunable SFP+ Channel Number and Wavelength

| ITU Channel | Frequency (THz) | Center Wavelength (nm) | ITU Channel | Frequency (THz) | Center Wavelength (nm) |
|-------------|-----------------|------------------------|-------------|-----------------|------------------------|
| 1 | 191.10 | 1568.77 | 52 | 193.65 | 1548.11 |
| 2 | 191.15 | 1568.36 | 53 | 193.70 | 1547.72 |
| 3 | 191.20 | 1567.95 | 54 | 193.75 | 1547.32 |
| 4 | 191.25 | 1567.54 | 55 | 193.80 | 1546.92 |
| 5 | 191.30 | 1567.13 | 56 | 193.85 | 1546.52 |
| 6 | 191.35 | 1566.72 | 57 | 193.90 | 1546.12 |
| 7 | 191.40 | 1566.31 | 58 | 193.95 | 1545.72 |
| 8 | 191.45 | 1565.90 | 59 | 194.00 | 1545.32 |
| 9 | 191.50 | 1565.50 | 60 | 194.05 | 1544.92 |
| 10 | 191.55 | 1565.09 | 61 | 194.10 | 1544.53 |
| 11 | 191.60 | 1564.68 | 62 | 194.15 | 1544.13 |
| 12 | 191.65 | 1564.27 | 63 | 194.20 | 1543.73 |
| 13 | 191.70 | 1563.86 | 64 | 194.25 | 1543.33 |
| 14 | 191.75 | 1563.45 | 65 | 194.30 | 1542.94 |
| 15 | 191.80 | 1563.05 | 66 | 194.35 | 1542.54 |
| 16 | 191.85 | 1562.64 | 67 | 194.40 | 1542.14 |
| 17 | 191.90 | 1562.23 | 68 | 194.45 | 1541.75 |
| 18 | 191.95 | 1561.83 | 69 | 194.50 | 1541.35 |
| 19 | 192.00 | 1561.42 | 70 | 194.55 | 1540.95 |
| 20 | 192.05 | 1561.01 | 71 | 194.60 | 1540.56 |
| 21 | 192.10 | 1560.61 | 72 | 194.65 | 1540.16 |
| 22 | 192.15 | 1560.20 | 73 | 194.70 | 1539.77 |
| 23 | 192.20 | 1559.79 | 74 | 194.75 | 1539.37 |
| 24 | 192.25 | 1559.39 | 75 | 194.80 | 1538.98 |
| 25 | 192.30 | 1558.98 | 76 | 194.85 | 1538.58 |
| 26 | 192.35 | 1558.58 | 77 | 194.90 | 1538.19 |
| 27 | 192.40 | 1558.17 | 78 | 194.95 | 1537.79 |
| 28 | 192.45 | 1557.77 | 79 | 195.00 | 1537.40 |
| 29 | 192.50 | 1557.36 | 80 | 195.05 | 1537.00 |
| 30 | 192.55 | 1556.96 | 81 | 195.10 | 1536.61 |
| 31 | 192.60 | 1556.55 | 82 | 195.15 | 1536.22 |
| 32 | 192.65 | 1556.15 | 83 | 195.20 | 1535.82 |
| 33 | 192.70 | 1555.75 | 84 | 195.25 | 1535.43 |
| 34 | 192.75 | 1555.34 | 85 | 195.30 | 1535.04 |
| 35 | 192.80 | 1554.94 | 86 | 195.35 | 1534.64 |
| 36 | 192.85 | 1554.54 | 87 | 195.40 | 1534.25 |

| | | | | | |
|----|--------|---------|-----|--------|---------|
| 37 | 192.90 | 1554.13 | 88 | 195.45 | 1533.86 |
| 38 | 192.95 | 1553.73 | 89 | 195.50 | 1533.47 |
| 39 | 193.00 | 1553.33 | 90 | 195.55 | 1533.07 |
| 40 | 193.05 | 1552.93 | 91 | 195.60 | 1532.68 |
| 41 | 193.10 | 1552.52 | 92 | 195.65 | 1532.29 |
| 42 | 193.15 | 1552.12 | 93 | 195.70 | 1531.90 |
| 43 | 193.20 | 1551.72 | 94 | 195.75 | 1531.51 |
| 44 | 193.25 | 1551.32 | 95 | 195.80 | 1531.12 |
| 45 | 193.30 | 1550.92 | 96 | 195.85 | 1530.72 |
| 46 | 193.35 | 1550.52 | 97 | 195.90 | 1530.33 |
| 47 | 193.40 | 1550.12 | 98 | 195.95 | 1529.94 |
| 48 | 193.45 | 1549.72 | 99 | 196.00 | 1529.55 |
| 49 | 193.50 | 1549.32 | 100 | 196.05 | 1529.16 |
| 50 | 193.55 | 1548.91 | 101 | 196.10 | 1528.77 |
| 51 | 193.60 | 1548.51 | 102 | 196.15 | 1528.38 |

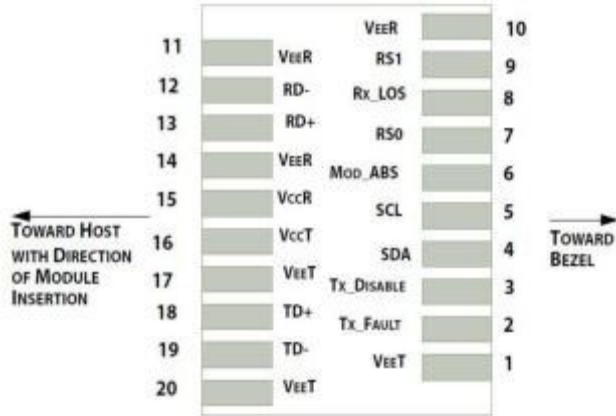
Pin Descriptions

| Pin | Symbol | Name/Descriptions | Ref. |
|-----|------------|--|------|
| 1 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| 2 | TX Fault | Transmitter Fault. | 2 |
| 3 | TX Disable | Transmitter Disable. Laser output disabled on high or open. LVTT-I. | 3 |
| 4 | SDA | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTLI/O. | |
| 5 | SCL | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i). LVTTL-I. | |
| 6 | MOD_ABS | Module Absent, Connect to VeeT or VeeR in Module. | 4 |
| 7 | RS0 | Rate Select 0, optionally controls SFP+ module receiver LVTTL-I. | 5 |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation. LVTTL-O. | 2 |
| 9 | RS1 | Rate Select 1, optionally controls SFP+ module transmitter. LVTTL-I. | 5 |
| 10 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 11 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O. | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O. | |
| 14 | VeeR | Receiver Ground (Common with Transmitter Ground). | 1 |
| 15 | VccR | Receiver Power Supply. | |
| 16 | VccT | Transmitter Power Supply. | |
| 17 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML-I. | |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML-O. | |
| 20 | VeeT | Transmitter Ground (Common with Receiver Ground). | 1 |

Notes:

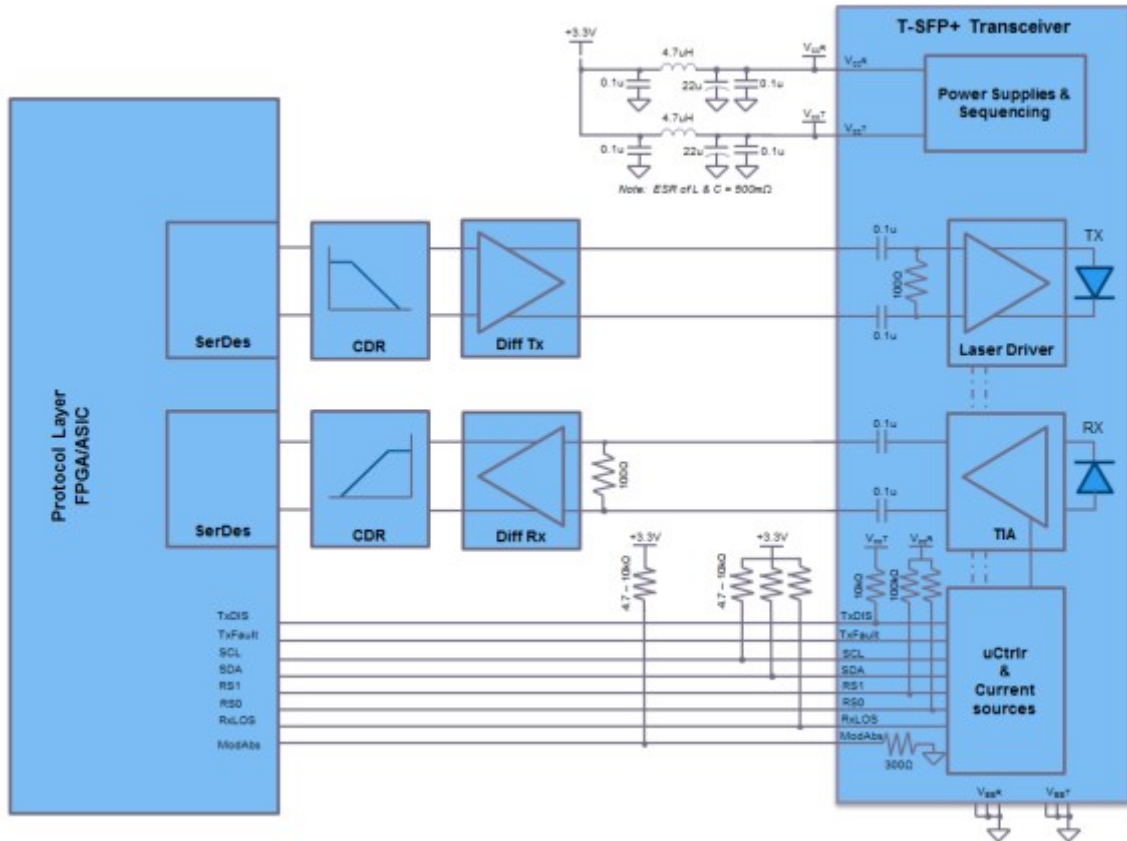
1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Vcc_Host with resistor in the range 4.7KΩ to 10KΩ. Pull ups can be connected to one or several power supplies, however the host board design shall ensure that no module contract has voltage exceeding module VccT/R +0.5.V.
3. Tx_Disable is an input contact with a 4.7KΩ to 10KΩ pull-up resistor to VccT inside module.
4. Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Vcc_Host with a resistor in the range from 4.7KΩ to 10KΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. RS0 and RS1 are module inputs and are pulled low to VeeT with >30K resistors in the module. RS0 optionally selects the optical receive signaling rate coverage. RS1 optionally selects the optical transmit signaling rate coverage.
6. These contacts can also be used for RS0 and RS1 if implementing SFF8079. See SFF8079 for details. RS1 is commonly connected to VeeT or VeeR in the classic SFP modules. The host needs to ensure that it will not be damaged if this contact is connected to VeeT or VeeR in the module.
7. The SFP+ module provides two inputs RS0 and RS1 that can optionally be used for rate selection. RS0 controls the receive path signaling rate compatibility, and RS1 controls the transmit path signaling rate compatibility. The host and module may choose to use either, both, or none of these functions. Because contact 9 in the classic SFP INF-8074i is connected to VeeR, and SFP+ host utilizing RS1 must provide short circuit protection.
8. This rate select functionality can also be controlled by software as defined by SFF-8472. Optionally the rate selects methods of Part 2 SFF-8079 may be used instead of the method described here by setting the management declaration bit (A0h byte 93 bit 2) to 1, see SFF-8472.

| Parameter | State | Conditions |
|-----------|-------|---|
| RS0 | Low | Rx signally rate less than or equal to 4.25GBd. |
| | High | Rx signally rate great than 4.25GBd. |
| RS1 | Low | Tx signally rate less than or equal to 4.25GBd. |
| | High | Tx signally rate great than 4.25GBd. |



Pin-out of connector Block on Host board

Recommended Circuit Schematic



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|--|--------|------|------|------|
| Storage Temperature | TS | -40 | 85 | °C |
| Supply Voltage | Vcc | -0.3 | 4.0 | V |
| Operating Humidity | RH | 5 | 85 | % |
| Receive input optical power (damage threshold) | Pdth | | +4 | dBm |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|--------|------|------|------|------|
| Power Supply Voltage | Vcc | 3.13 | 3.30 | 3.47 | V |
| Case Operating Temperature – Commercial | Tc | -5 | | 70 | °C |
| 9/125 μm SMF | Lmax | | | 80 | km |

Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|--------------------------------|----------|------|------|---------|------|-------|
| Transmitter | | | | | | |
| Differential data input swing | Vin, pp | 120 | 600 | 850 | mV | |
| Input differential impedance | Rin | 85 | 100 | 115 | Ω | 1 |
| TX Disable-High | | 2.0 | | Vcc+0.3 | V | |
| TX Disable-Low | | Vee | | Vee+0.8 | V | |
| TX Fault-High | | 2.0 | | Vcc+0.3 | V | |
| TX Fault-Low | | Vee | | Vee+0.8 | V | |
| Receiver | | | | | | |
| Single ended data output swing | Vout, pp | 350 | 400 | 700 | mV | |
| LOS-High | | 2.0 | | Vcc+0.3 | V | |
| LOS-Low | | Vee | | Vee+0.8 | V | |

Notes:

1. AC coupled.

Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-----------------------------|----------------|---------|------|---------|-------|-------|
| Transmitter | | | | | | |
| Output Opt. Power | PO | 0 | | 5 | dBm | |
| Optical Extinction Ratio | ER | 9 | | | dB | |
| Side Mode Suppression Ratio | SMSR | 35 | | | dB | |
| Center Wavelength Spacing | | | 50 | | GHZ | |
| Optical Wavelength | λ | 1528.38 | | 1568.77 | nm | |
| Frequency stability (BOL) | | fc -1.5 | | fc +1.5 | GHz | |
| Frequency stability (EOL) | | fc -2.5 | | fc +2.5 | GHz | |
| Channel tuning time | | | | 50 | ms | |
| Jitter Generation | 4MHz to 80MHz | | | 0.1 | | |
| | 20kHz to 80MHz | | | 0.3 | | |
| Spectral Width | | | | 200 | pm | |
| Relative Intensity Noise | RIN | | | -130 | dB/Hz | |
| Return Loss | | 24 | | | dB | |
| Receiver | | | | | | |
| Overload | PO | -8 | | | dBm | |
| Receiver Reflectance | Rrx | | | -23 | dB | |
| LOS De-Assert | LOSD | | | -26 | dBm | |
| LOS Assert | LOSA | -33.5 | | | dBm | |
| LOS Hysteresis | | 0.5 | | 5 | dB | |

Notes:

2. Measured at 9.9532GBs, PRBS³¹⁻¹, NRZ.
3. Measured at 10.3125Gbs, Non-framed PRBS^{2^31-1}, NRZ.
4. Non-FEC rate refers 9.9/10.3/10.5 Gbs, and FEC rate refers 10.7/11.1/11.3 Gbs, BER of 1E-12 for non-FEC rate, and 1E-4 for FEC rate.

Digital Diagnostic Monitoring Interface

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8-bit address 1010001X (A2h). The monitoring specification of this product is described in this table.

| Parameter | Range | Accuracy | Calibration |
|--------------|-----------------|----------|-------------|
| Temperature | 0°C to 70°C (C) | ±3°C | Internal |
| Voltage | 2.97V to 3.63V | ±3% | Internal |
| Bias Current | 0mA to 100mA | ±10% | Internal |
| TX Power | 0dBm to 4dBm | ±2dB | Internal |
| RX Power | -24dBm to -8dBm | ±2dB | Internal |

About ProLabs

Our experience comes as standard; for over 15 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 over 90 optical switching and transport platforms.

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 400G 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.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. 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.

Contact Information

ProLabs US

Email: sales@prolabs.com

Telephone: 952-852-0252

ProLabs UK

Email: salessupport@prolabs.com

Telephone: +44 1285 719 600