

Fortinet FG-TRAN-QSFP28-SR4 Quick Spec:

| | |
|-----------------------|--------------------|
| Part Number: | FG-TRAN-QSFP28-SR4 |
| Form Factor: | QSFP28 |
| TX Wavelength: | 850nm |
| Reach: | 100m |
| Cable Type: | MMF |
| Rate Category: | 100GBase |
| Interface Type: | SR4 |
| DDM: | Yes |
| Connector Type: | MPO |
| Optical Power Budget: | 2.3 dB |
| TX Power Min/Max: | -8.0 to +2.4 dBm |
| RX Power Min/Max: | -10.3 to +2.4 dBm |



Fortinet FG-TRAN-QSFP28-SR4 Features:

- 4 independent full-duplex channels
- Up to 28Gbps data rate per channel
- QSFP28 MSA compliant
- Up to 100m over OM4 MMF transmission
- Up to 70m over OM3 MMF transmission
- Single 3.3V power supply
- Maximum power consumption 3.5W
- MTP/MPO optical connector
- RoHS-6 compliant
- Operating Case Temperature
 - Standard 0 to +70 °C
 - Industrial -40 to +85 °C

Fortinet FG-TRAN-QSFP28-SR4 Applications:

- Data Center, Rack to rack
- Infiniband QDR, DDR and SDR
- 100G Ethernet

Fortinet FG-TRAN-QSFP28-SR4 Overview

The [FG-TRAN-QSFP28-SR4](#) is a parallel 100 Gbps Quad Small Form-factor Pluggable (QSFP28) optical module. It provides increased port density and total system cost savings. The QSFP28 full-duplex optical module offers 4 independent transmit and receive channels, each capable of 25 Gbps operation for an aggregate data rate of 100 Gbps on 100 meters of OM4 multi-mode fiber. An optical fiber ribbon cable with an MTP/MPO connector can be plugged into the QSFP28 module receptacle. Proper alignment is ensured by the guide pins inside the receptacle. The cable usually cannot be twisted for proper channel to channel alignment. The module operates by a single +3.3V power supply. The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface

Fortinet FG-TRAN-QSFP28-SR4 Specifications

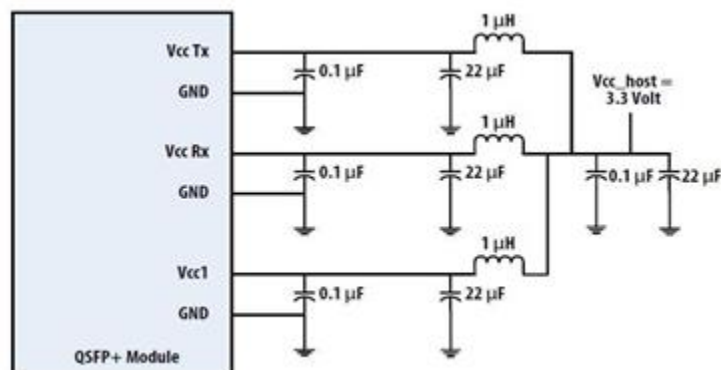
Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|--------------------------------------|--------|------|-----|------|
| Storage Temperature | T_s | -40 | +85 | °C |
| Operating Case Temp (Standard) | TOP | 0 | 70 | °C |
| Operating Case Temp (Industrial) | TOP | -40 | 85 | °C |
| Power Supply Voltage | Vcc | -0.5 | 3.6 | V |
| Relative Humidity (non-condensation) | RH | 5 | 85 | % |
| Damage Threshold, each lane | THd | 3.4 | | dBm |

Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Unit |
|------------------------------|--------|-------|----------|-------|------|
| Power Supply Voltage | Vcc | 3.135 | 3.3 | 3.465 | V |
| Data Rate, each Lane | | | 25.78125 | | Gb/s |
| Control Input Voltage (High) | | 2 | | Vcc | V |
| Control Input Voltage Low | | 0 | | 0.8 | V |
| Link Distance with G.652 | D | | | 100 | m |

Recommended Power Supply Filter



Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|--|----------|-----|-----|------|------|
| Power Consumption, each Terminal | | | | 3.5 | W |
| Supply Current, each Terminal | I_{cc} | | | 1060 | mA |
| Transceiver Power-on Initialization Time | | | | 2000 | ms |

Electrical Characteristics-Transmitter (each lane)

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|----------------------------------|-------------|-----|-----|------|------|-------|
| Differential Input Voltage Swing | $V_{in,pp}$ | 150 | | 1050 | mVpp | |
| Differential Input Impedance | Z_{in} | 85 | 105 | 110 | Ohm | |

Electrical Characteristics-Receiver (each lane)

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|-----------------------------------|--------------|-----|-----|------|------|-------|
| Differential Output Voltage Swing | $V_{out,pp}$ | 200 | | 1100 | mVpp | |
| Differential Output Impedance | A_{out} | 85 | 100 | 115 | Ohm | |

Optical Characteristics-Transmitter

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|-----------------------|---------------------------|-------|-----|------|-------|
| Signalling Speed per Lane | | | 25.78 | | Gbps | |
| Centre Wavelength | λ_0 | 840 | 850 | 860 | nm | |
| RMS Spectral Width | $\Delta\lambda_{rms}$ | | | 0.6 | nm | |
| Average Launch Power (each Lane) | $PAVG$ | -9.1 | | 2.4 | dBm | |
| Optical Modulation Amplitude (OMA) (each Lane) | $POMA$ | | | +4 | dBm | |
| Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane | | -8.0 | | | dBm | |
| Extinction Ratio | ER | 3.0 | | | dB | |
| Optical Return Loss Tolerance | TOL | | | 12 | dB | |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} | | IEEE 802.3bm 100Gbase-SR4 | | | | |
| Average Launch Power OFF (each Lane) | P_{off} | | | -30 | dBm | |

Note: Transmitter optical characteristics are measured with a multimode fiber

Optical Characteristics-Receiver

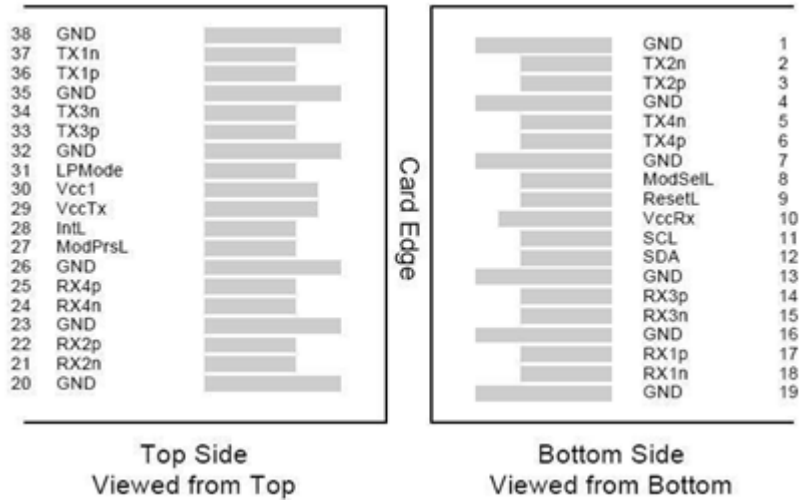
| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|--|-------------|-------|-------|------|------|-------|
| Signaling Speed per Lane | | | 25.78 | | Gbps | |
| Centre Wavelength | λ_0 | 840 | 850 | 860 | nm | |
| Damage Threshold (each Lane) | <i>Thd</i> | 3.4 | | | dBm | 3 |
| Average Receive Power (each Lane) | | -10.3 | | +2.4 | dBm | |
| Receiver Reflectance | <i>RR</i> | | | -12 | dB | |
| Stressed Receiver Sensitivity (OMA), each Lane | | | | -5.2 | dBm | 4 |
| LOS Assert | <i>LOSA</i> | -20 | | | dBm | |
| LOS Deassert | <i>LOSD</i> | | | -12 | dBm | |
| LOS Hysteresis | <i>LOSH</i> | 0.5 | | | dB | |

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|--------------------|------|-----|-----|--------|----------------------------------|
| Temperature monitor absolute error | <i>DMITEMP</i> | -3 | | 3 | deg. C | Over operating temperature range |
| Supply voltage monitor absolute error | <i>DMIVCC</i> | -0.1 | | 0.1 | V | Over Full operating range |
| Channel RX power monitor absolute error | <i>DMIRX_CH</i> | -2 | | 2 | dB | 1 |
| Channel Bias current monitor | <i>DMIIbias_CH</i> | -10% | | 10% | mA | |
| Channel TX power monitor absolute error | <i>DMITX_CH</i> | -2 | | 2 | dB | 1 |

PIN Assignment and Function Definitions



PIN Definition

| PIN | Signal Name | Description |
|-----|-------------|---|
| 1 | GND | Ground (1) |
| 2 | Tx2n | CML-I Transmitter 2 Inverted Data Input |
| 3 | Tx2p | CML-I Transmitter 2 Non-Inverted Data Input |
| 4 | GND | Ground (1) |
| 5 | Tx4n | CML-I Transmitter 4 Inverted Data Input |
| 6 | Tx4p | CML-I Transmitter 4 Non-Inverted Data Input |
| 7 | GND | Ground (1) |
| 8 | ModSelL | LVTTLL-I Module Select |
| 9 | ResetL | LVTTLL-I Module Reset |
| 10 | VCCRx | +3.3V Power Supply Receiver (2) |
| 11 | SCL | LVCMOS-I/O 2-Wire Serial Interface Clock |
| 12 | SDA | LVCMOS-I/O 2-Wire Serial Interface Data |
| 13 | GND | Ground (1) |
| 14 | Rx3p | CML-O Receiver 3 Non-Inverted Data Output |
| 15 | Rx3n | CML-O Receiver 3 Inverted Data Output |
| 16 | GND | Ground (1) |
| 17 | Rx1p | CML-O Receiver 1 Non-Inverted Data Output |
| 18 | Rx1n | CML-O Receiver 1 Inverted Data Output |
| 19 | GND | Ground (1) |
| 20 | GND | Ground (1) |
| 21 | Rx2n | CML-O Receiver 2 Inverted Data Output |
| 22 | Rx2p | CML-O Receiver 2 Non-Inverted Data Output |
| 23 | GND | Ground (1) |
| 24 | Rx4n | CML-O Receiver 4 Inverted Data Output |
| 25 | Rx4p | CML-O Receiver 4 Non-Inverted Data Output |
| 26 | GND | Ground (1) |
| 27 | ModPrsL | Module Present |
| 28 | IntL | Interrupt |
| 29 | VCCTx | +3.3V Power Supply Transmitter (2) |
| 30 | VCC1 | +3.3V Power Supply |
| 31 | LPMODE | LVTTLL-I Low Power Mode |
| 32 | GND | Ground (1) |
| 33 | Tx3p | CML-I Transmitter 3 Non-Inverted Data Input |
| 34 | Tx3n | CML-I Transmitter 3 Inverted Data Input |
| 35 | GND | Ground (1) |
| 36 | Tx1p | CML-I Transmitter 1 Non-Inverted Data Input |
| 37 | Tx1n | CML-I Transmitter 1 Inverted Data Input |
| 38 | GND | Ground (1) |

Notes:

1. All Ground (GND) are common within the QSFP+ module and all module voltages are referenced to this potential unless noted otherwise. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. The connector pins are each rated for a maximum current of 500mA.

