

GPP-316G-02x 6.25Gbps SFP+ Transceiver

Features

- ◆ Support Multi Rate 1.25-6.25 Gbps
- ◆ Hot Pluggable SFP+ footprint
- ◆ 1310nm FP transmitter, PIN photo-detector
- ◆ Transmission distance up to 2km on 9/125 μ m SMF
- ◆ Digital Status monitoring Interface
- ◆ Duplex LC connector
- ◆ RoHS compliant and Lead Free
- ◆ Metal enclosure for lower EMI
- ◆ Single 3.3V power supply
- ◆ Power dissipation <1W
- ◆ Compliant with FC-PI-4 800-Mx-SN-I, SFF-8431 , SFF-8432 and SFF-8472
- ◆ Operating case temperature:
 - ◆ Standard : 0 to +70°C
 - ◆ Industrial : -40 to +85°C



Applications

- ◆ High-speed storage area networks
- ◆ Computer cluster cross-connect
- ◆ Custom high-speed data pipes
- ◆ LTE optical repeater application

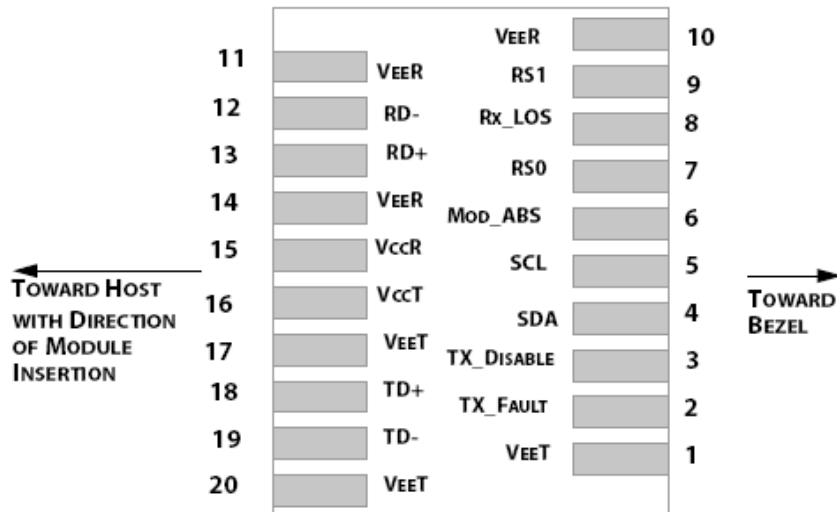
Product description

GPP-316G-02x is a high performance, cost effective modules, which is supporting Multi Rate 1.25-6.25Gbps, and transmission distance up to 2km on SM fiber. The transceiver consists of two sections: The transmitter section incorporates a 1310nm FP driver and re-timer. The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA). The module is hot pluggable into the 20-pin connector. The high-speed electrical interface is base on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module.

Pin definition

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in Table 2.

SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in Table 2.



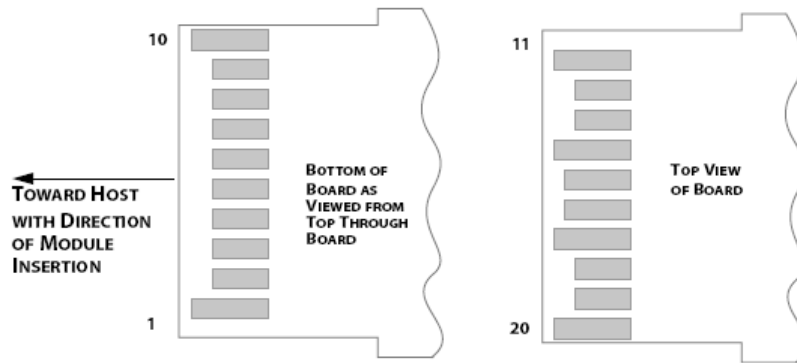


Figure 3: Module Contact Assignment

| <i>Contacts</i> | <i>logic</i> | <i>Symbol</i> | <i>Power Sequence Order</i> | <i>Name/Description</i> |
|-----------------|--------------|---------------|-----------------------------|--|
| 1 | | VeeT | 1st | Module Transmitter Ground |
| 2 | LVTTTL-O | TX_Fault | 3rd | Module Transmitter Fault |
| 3 | LVTTTL-I | TX_Disable | 3rd | Transmitter Disable; Turns off transmitter laser output |
| 4 | LVTTTL-I/O | SDA | 3rd | 2-wire Serial Interface Data Line (Same as MOD-DEF2 in the INF-8074i) |
| 5 | LVTTTL-I/O | SCL | 3rd | 2-wire Serial Interface Clock (Same as MOD-DEF1 in the INF-8074i) |
| 6 | | Mod_ABS | 3rd | Module Absent, connected to VeeT or VeeR in the module |
| 7 | LVTTTL-I | RS0 | 3rd | Rate Select 0, optionally controls SFP+ module receiver. When high input signaling rate > 4.25 GBd and when low input signaling rate ≤ 4.25 GBd. |
| 8 | LVTTTL-O | Rx_LOS | 3rd | Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as Signal Detect) |
| 9 | LVTTTL-I | RS1 | 3rd | Rate Select 1, optionally controls SFP+ transmitter. When high input signaling rate > 4.25 GBd and when low input signaling rate ≤ 4.25 GBd. |
| 10 | | VeeR | 1st | Module Receiver Ground |
| 11 | | VeeR | 1st | Module Receiver Ground |
| 12 | CML-O | RD- | 3rd | Receiver Inverted Data Output |
| 13 | CML-O | RD+ | 3rd | Receiver Non-Inverted Data Output |
| 14 | | VeeR | 1st | Module Receiver Ground |
| 15 | | VccR | 2nd | Module Receiver 3.3 V Supply |
| 16 | | VccT | 2nd | Module Transmitter 3.3 V Supply |
| 17 | | VeeT | 1st | Module Transmitter Ground |
| 18 | CML-I | TD+ | 3rd | Transmitter Non-Inverted Data Input |
| 19 | CML-I | TD- | 3rd | Transmitter Inverted Data Input |
| 20 | | VeeT | 1st | Module Transmitter Ground |

Table 2: SFP+ Module PIN Definition

Absolute maximum rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

| Parameters | Symbol | Min. | Max. | Unit |
|------------------------|------------------|------|------|------|
| Power Supply Voltage | V _{CC} | 0 | +3.6 | V |
| Storage Temperature | T _C | -40 | +85 | °C |
| Relative Humidity | RH | 5 | 95 | % |
| Rx Input Average Power | P _{max} | | 3 | dBm |

Table 3: Absolute Maximum Rating

Recommended operating environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameter | Symbol | Min. | Typical | Max | Unit |
|----------------------------|-----------------|-------|---------|-------|------|
| Power Supply Voltage | V _{CC} | 3.135 | 3.300 | 3.465 | V |
| | I _{CC} | | | 300 | mA |
| Operating Case Temperature | T _C | 0 | 25 | 70 | °C |
| | T _C | -40 | 25 | 85 | °C |
| Power Dissipation | P _D | | | 1 | W |
| Data Rate | | | | 6.25 | Gbps |
| Transmission Distance | | | | 2 | km |

Table 4: Recommended Operating Environment

LOW Speed Characteristics

| Parameter | Symbol | Min. | Typical | Max | Unit |
|-------------------|--------|--------------|---------|--------------|------|
| Power Consumption | | | | 1 | W |
| TX_Fault,RX_LOS | VOL | 0 | | 0.4 | V |
| | VOH | Host_Vcc-0.5 | | Host_Vcc+0.3 | V |
| TX_DIS | VIL | -0.3 | | 0.8 | V |
| | VIH | 2.0 | | VCCT+0.3 | V |
| RS0,RS1 | VIL | -0.3 | | 0.8 | V |
| | VIH | 2.0 | | VCCT+0.3 | V |

Optical characteristics

| Parameter | Symbol | Min. | Typical | Max | Unit | Notes |
|--|-----------------------------|------|---------|-------|-------|-------|
| Transmitter | | | | | | |
| Center Wavelength | λ_t | 1284 | 1310 | 1345 | nm | Note1 |
| RMS spectral width | Pm | - | - | 1 | nm | |
| Average Optical Power | Pavg | -6 | - | -0.5 | dBm | Note1 |
| Laser Off Power | Poff | | | -30 | dBm | |
| Extinction Ratio | ER | 3.5 | - | - | dB | |
| Relative Intensity Noise | Rin | | | -128 | dB/Hz | |
| Optical Eye Mask | Compliant with IEEE 802.3ae | | | | | Note2 |
| Single Ended Output Voltage Tolerance | | -0.3 | | 4 | V | |
| Common Mode Voltage Tolerance | | 15 | | | mV | |
| Tx Input Diff Voltage | VI | 180 | | 700 | mV | |
| Data Dependent Input Jitter | DDJ | | | 0.1 | UI | |
| Data Input Total Jitter | TJ | | | 0.28 | UI | |
| Receiver | | | | | | |
| Center Wavelength | λ_r | 1260 | 1310 | 1360 | nm | |
| Receiver Sensitivity | Psens | | | -14.4 | dBm | |
| Receiver Sensitivity in OMA | | | | -12.6 | dBm | Note3 |
| LOS Assert | LosA | -30 | | | dBm | |
| LOS De-assert | LosD | | | -16 | dBm | |
| Los Hysteresis | LosH | 0.5 | | | dBm | |
| Overload | Pin | 0.5 | | | dBm | |
| Stressed Eye Jitter | | 0.3 | | | Ulp-p | |
| Receiver electrical 3dB upper cutoff frequency | | | | 12.3 | GHz | |
| Vertical Eye Closure Penalty | | 2.2 | | | dB | |
| Single Ended Output Voltage Tolerance | | -0.3 | | 4 | V | |
| Rx Output Diff Voltage | Vo | 450 | | 850 | mV | |
| Rx Output Rise and Fall Time | Tr/Tf | 30 | | | ps | |
| Total Jitter | TJ | | | 0.7 | UI | |
| Deterministic Jitter | DJ | | | 0.42 | UI | |

| | | | | | | |
|--------------------------------------|--|---|---|-------|-----|-------|
| Stressed Receiver Sensitivity in OMA | | | | -10.3 | dBm | |
| Receiver Reflectance | | - | - | -12 | dB | Note3 |

Notes:

[1] Average optical power shall be measured using the methods specified in TIA/EIA-455-95.

[2] Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity. They are not the required characteristic of the receiver.

[3] Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER = 1×10^{-12} .

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev9.2 with internal calibration mode.

For external calibration mode please contact our sales staff.

| Parameter | Symbol | Min. | Max | Unit | Notes |
|-------------------------------|-----------|-------|-------|------|-----------------------|
| Accuracy | | | | | |
| Transceiver Temperature | DMI_Temp | -3 | +3 | degC | Over operating temp |
| TX Output optical power | DMI_TX | -3 | +3 | dB | |
| RX Input optical power | DMI_RX | -3 | +3 | dB | -3dBm to -12dBm range |
| Transceiver Supply voltage | DMI_VCC | -0.08 | +0.08 | V | Full operating range |
| Bias current monitor | DMI_Ibias | -10% | 10% | mA | |
| Dynamic Range Accuracy | | | | | |
| Transceiver Temperature | DMI_Temp | -5 | 70 | degC | |
| TX Output optical power | DMI_TX | -9 | -1 | dBm | |
| RX Input optical power | DMI_RX | -18 | 0 | dBm | |
| Transceiver Supply voltage | DMI_VCC | 3.0 | 3.6 | V | |
| Bias current monitor | DMI_Ibias | 0 | 16 | mA | |

Control and status I/O timing characteristics

Timing characteristics of control and status I/O are included in Table 8, which is also defined in SFF-8431.

| <i>Parameter</i> | <i>Symbol</i> | <i>Min.</i> | <i>Max.</i> | <i>Unit</i> | <i>Conditions</i> |
|-------------------------------------|--------------------|-------------|-------------|-------------|--|
| TX_Disable assert time | t_off | | 100 | μs | rising edge of TX_Disable to fall of output signal below 10% of nominal |
| TX_Disable negate time | t_on | | 2 | ms | Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery. |
| Time to initialize 2-wire interface | t_2w_start_up | | 300 | ms | From power on or hot plug after the supply meeting Table 8 . |
| Time to initialize | t_start_up | | 300 | ms | From power supplies meeting Table 8 or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational. |
| Time to initialize cooled module | t_start_up_cooled | | 90 | s | From power supplies meeting Table 8 or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. |
| Time to Power Up to Level II | t_power_level2 | | 300 | ms | From falling edge of stop bit enabling power level II until non-cooled module is fully operational |
| Time to Power Down from Level II | t_power_down | | 300 | ms | From falling edge of stop bit disabling power level II until module is within power level I requirements |
| TX_Fault assert | TX_Fault_on | | 1 | ms | From occurrence of fault to assertion of TX_Fault |
| TX_Fault assert for cooled module | TX_Fault_on_cooled | | 50 | ms | From occurrence of fault to assertion of TX_Fault |
| TX_Fault Reset | t_reset | 10 | | μs | Time TX_Disable must be held high to reset TX_Fault |
| RS0, RS1 rate select timing for FC | t_RS0_FC, RS1_FC | | 500 | μs | From assertion till stable output |
| RS0, RS1 rate select timing non FC | t_RS0, t_RS1 | | 10 | ms | From assertion till stable output |
| Rx_LOS assert delay | t_los_on | | 100 | μs | From occurrence of loss of signal to assertion of Rx_LOS |
| Rx_LOS negate delay | t_los_off | | 100 | μs | From occurrence of presence of signal to negation of Rx_LOS |

Table 8: Timing Characteristics

Mechanical

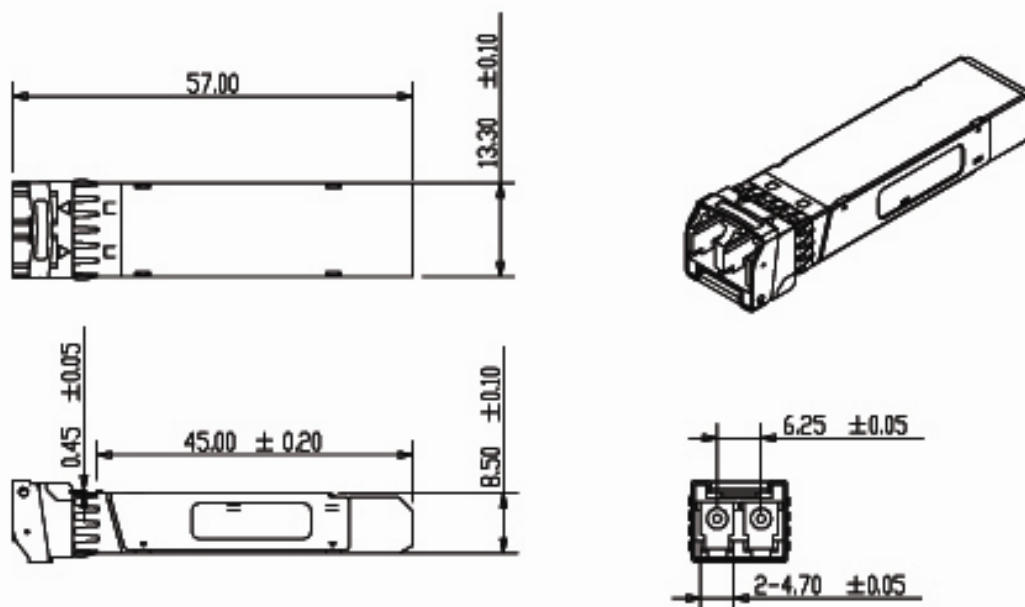


Table 9: Key Mechanical Dimensions

ESD

This transceiver is specified as ESD threshold 2kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

LASER SAFTY

This is a Class 1 Laser Product according to IEC 60825-1:1993+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

Ordering information

| Part Number | Product Description |
|--------------|--|
| GPP-316G-02C | 1310nm, 1.25~6.25Gbs, 2km, 0°C ~ +70°C |
| GPP-316G-02T | 1310nm, 1.25~6.25Gbs, 2km, -40°C ~ +85°C |

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