
POS22-LD6I-T1

Features

- u Single Fiber XGS-PON ONU Transceiver
 - 1270nm burst-mode 9.953 Gb/s transmitter with DFB laser
 - 1577nm continuous-mode 9.953Gb/s APD/TIA receiver
- u Digital diagnostic monitoring (DDM)with internal calibration
- u SFP+ package with SC UPC receptacle connector
- u +3.3V separated power supply, low power dissipation
- u LVPECL interface logic level for data input
- u CML interface logic level for data output
- u LVTTTL for burst signal input
- u LVTTTL for receiver loss of signal detect indication
- u Compliant with ITU-T G.9807
- u SFF-8472 compliant
- u Telcordia GR-468-CORE and MIL-STD-883 compliant
- u RoHS-6/6 compliant
- ◆ Operating temperature range: -40°C ~ +85°C
- ◆ IEC 60825-1 compliant
- ◆ FCC Part 15 Class B /EN55022 Class B (CISPR 22B)/ VCCI Class B compliant

Applications

- u 10-Gigabit-capable passive optical networks

Description

The POS22-LD6I-T1 10/10G XGS-PON ONU transceiver is designed for single mode fiber and operates at wavelength of 1270nm. The transceiver module uses a DFB laser diode and fully compliant with IEC60825 and CDRH class 1 eye safety. It contains APC functions, a temperature compensation circuit to ensure compliance with ITU-T G.9807requirements at operating temperature.

The receiver section uses a hermetic packaged APD-TIA (APD with trans-impedance amplifier) and a limiting amplifier. The APD converts optical power into electrical current and the current is transformed to voltage by the trans-impedance amplifier. The differential DATA and /DATA CML data signals are produced by the limiting amplifier. The APD-TIA is AC coupled to the limiting amplifier through a low pass filter.

Specification

| Absolute Maximum Ratings | | | | | |
|-----------------------------|------------------|------|------|------|------|
| Parameter | Symbol | Min. | Max. | Unit | Note |
| Storage Ambient Temperature | T _{STG} | -40 | +85 | °C | |
| Case Operating Temperature | T _c | -40 | +85 | °C | |
| Relative Humidity | RH | 5 | 95 | % | |
| Input Voltage | V _{CC} | -0.5 | 4 | V | |
| Receiver Damaged Threshold | Pin | 5 | | dBm | |

| Recommended Operating Conditions | | | | | | |
|--|-------------------|------|------|------|------|------|
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
| Power Supply Voltage | V _{CC} | 2.97 | 3.3 | 3.63 | V | 1 |
| Power Supply Current | I _{CC} | | | 550 | mA | |
| power dissipation | P _W | | | 2 | W | 2 |
| Operating case Temperature | T _{case} | -40 | | +85 | °C | |
| Power Supply Noise Rejection (peak – peak) | PSNR | 100 | | | mV | |

Note 1: When the Power Supply Voltage between $3.3V \pm 5\%$, must ensure that all modules characteristics meet the requirements; within 3~3.6V, the module should be able to work, shall not be shut off, but the characteristics are allowed a certain degree to reduce characteristics.

Note 2: Measured with upstream /downstream 9.953G, PRBS2³¹-1, 85°C.

| Transmitter Optical and Electrical Characteristics | | | | | | |
|--|-----------------------------|------|-------|------|------|-------|
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
| Transmitter type | DFB | | | | | |
| Data Rate | BR | | 9.953 | | Gb/s | |
| Optical Transmitter Power | P _{OUT} | 5 | | 9 | dBm | 1,BOL |
| | | 4 | | 9 | dBm | 1,EOL |
| Output Center Wavelength | λ _C | 1260 | 1270 | 1280 | nm | |
| Output Spectrum Width (-20dB) | Δλ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Output Power At Transmit Off | P _{OFF} | | | -45 | dBm | |
| Extinction Ratio | ER | 6.5 | | | dB | |
| Tolerance to Tx Back Reflection | RL | | | 12 | dB | |
| Transmitter Reflectance | | | | -10 | dB | |
| Transmitter and Dispersion penalty | TDP | | | 1.5 | dB | |
| Tx_Burst Enable Time | T _{on} | | | 30 | ns | |
| Tx_Burst Disable Time | T _{off} | | | 30 | ns | |
| Optical Eye Diagram | Compliant With ITU-T G.9807 | | | | | 2,3 |
| Initial Time | T _{ini} | | | 800 | ns | |
| Data Input Differential Swing | V _{IN} | 200 | | 1600 | mV | |
| Input Differential Impedance | Z _{IN} | | 100 | | Ω | |

| | | | | | | |
|---|-----------------------|-----|--|----------------------|----|--|
| TX_burst - Enable | | 0 | | 0.8 | V | |
| TX_burst - Disable | | 2.0 | | V _{cc} +0.3 | V | |
| Tx_Fault - Fault | | 2.4 | | VCC | V | |
| Tx_Fault - Normal | | 0 | | 0.4 | V | |
| Tx_SD - High | | 2.4 | | VCC | V | |
| Tx_SD - Low | | 0 | | 0.4 | V | |
| TX Transmitter State Indication Turn ON Time | T _{INDL_ON} | | | 200 | ns | |
| TX Transmitter State Indication Turn OFF Time | T _{INDL_OFF} | | | 200 | ns | |

Note 1: Launched into 9/125um SMF.

Note 2: Measured with PRBS 2³¹-1 @9.953Gbit/s, and the 4thBessel-Thompson filter is turned on.

Note 3: Transmitter eye mask definition inITU-T G.9807

Note 4: Included Tx_Burst,(See Pin Function Definitions).

Note 5: Included Tx_SD, Tx_Fault,LOS (See Pin Function Definitions).

| Receiver Optical and Electrical Characteristics | | | | | | |
|---|--------------------------------------|------|-------|-----------------|------|-------------------|
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
| Receiver type | APD/TIA | | | | | |
| Data rate | BR | | 9.953 | | Gb/s | |
| Operating Wavelength | λ_C | 1575 | 1577 | 1580 | nm | |
| Receiver Sensitivity | P _{SEN} | | | -29 | dBm | 1,BOL |
| Receiver Sensitivity | P _{SEN} | | | -28.5 | dBm | 1,EOL |
| Receiver Sensitivity | P _{SEN} | | | -24 | dBm | 2,EOL |
| Overload Input Optical Power | P _{SAT} | -8 | | | dBm | |
| Maximum Input Optical Power | P _{MAX} | +5 | | | dBm | |
| LOS Assert | P _{LOSA} | -39 | | | dBm | 3 |
| LOS De-Assert | P _{LOSD} | | | -29 | dBm | 4 |
| LOS Hysteresis | P _{LOSD} -P _{LOSA} | 1 | | 5 | dBm | $\lambda=1577nm$ |
| Receiver Reflectance | | | | -20 | dB | $\lambda=1577nm$ |
| 1310nm Tx to 1577nm Rx Crosstalk | | | | -47 | dB | |
| Optical Isolation From External Source | ISO ₁ | 35 | | | dB | $\lambda =1560nm$ |
| Optical Isolation From External Source | ISO ₂ | 35 | | | dB | $\lambda =1600nm$ |
| Data Output Differential Swing | V _{OUT} | 340 | | 850 | mV | 5 |
| RX_LOS - Low | | 0 | | 0.4 | V | |
| RX_LOS - High | | 2.4 | | V _{cc} | V | |
| LOS Assert Time | T _{ASS} | | | 100 | us | |
| LOS De-Assert Time | T _{DAS} | | | 100 | us | |

Note 1: P_{SEN} Measured with a PRBS $2^{31}-1$ test pattern @9.953 Gbit/s, BER = 10^{-3} .

Note 2: P_{SEN} Measured with a PRBS $2^{31}-1$ test pattern @9.953 Gbit/s, BER = 10^{-12} .

Note 3: A decrease in optical power below the specified level will cause the Loss of Signal output to switch from a low state to a high state.

Note 4: An increase in optical power above the specified level will cause the Loss of Signal output to switch from a high state to a low state.

Note 5: CML output, AC coupled internally, guaranteed in the full range of input optical power.

Digital Diagnostic Memory Map

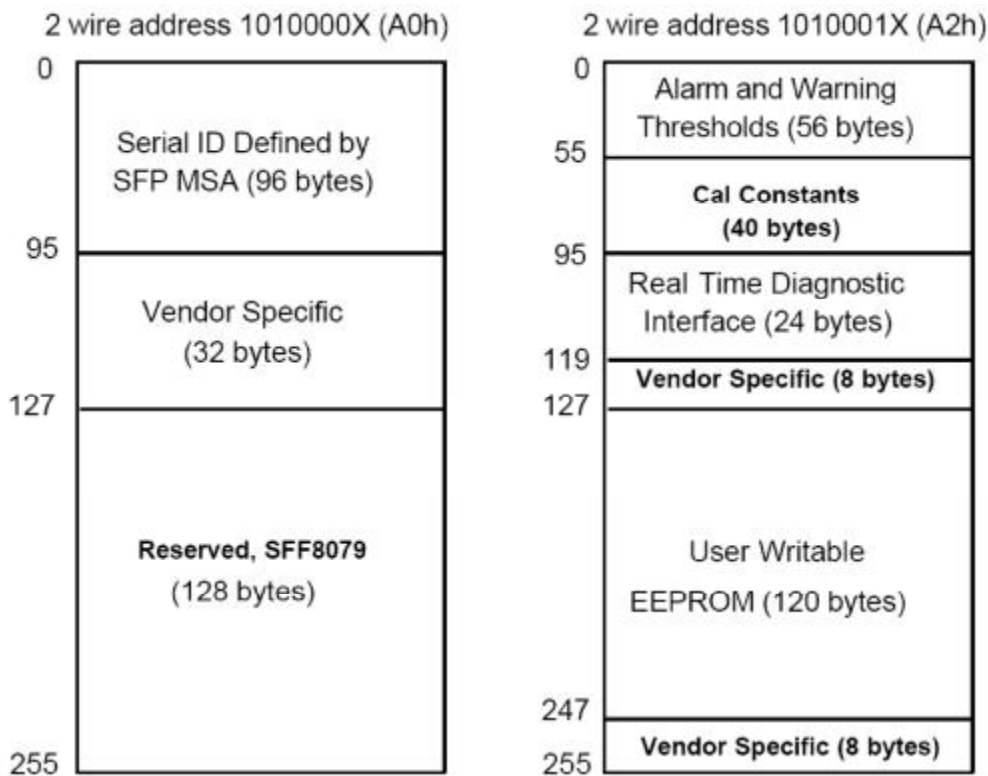


Figure1

EEPROM Serial ID Memory Contents

The module provides digital diagnostic information of its operating conditions and status, including transmitting power, received power, laser bias current, module temperature, and supply voltage. Calibration and alarm/warning threshold data are written and stored in internal memory. The memory map is compatible with SFF-8472

Digital Diagnostic Monitoring Information

| Parameter | Range | Resolution | Accuracy | Repeatability | Typical response time | Notes |
|--------------|--------------|------------|----------|---------------|-----------------------|-------|
| Temperature | -45 to 90°C | 0.25°C | ±3°C | ±1°C | 1S | |
| Voltage | 2.97to 3.63V | 0.5% | ±3% | ±1% | 1S | |
| TX Power | 2~11dBm | 0.1dB | ±2.0dB | ±0.5dB | 300nS | 1 |
| Bias Current | 1~100mA | 1% | ±10% | ±5% | 1S | |
| RX Power | -30~-7dBm | 0.1dB | ±2.0dB | ±0.5dB | 300nS | |

Note 1:For the TX Power DDM and TX Power alarm& warning thresholds, the LSB is 0.2 μ w.

Pin Description

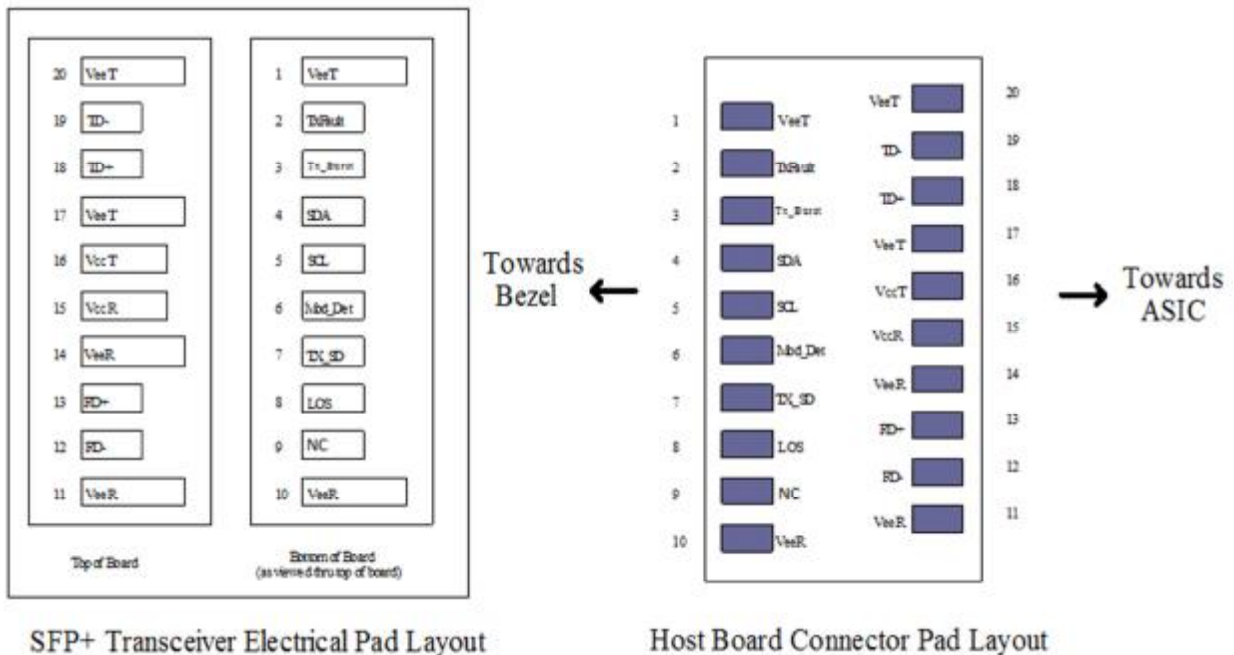


Figure2

| Pin Num. | Name | Function | Note |
|----------|----------|---|------|
| 1 | VeeT | Transmitter Ground | 1 |
| 2 | Tx Fault | LVTTL, Transmitter Fault indication, Low=Normal operation, High= TX Fault | 2 |
| 3 | Tx_Burst | LVTTL ,Transmitter Burst control,logic "0" to burst on | 3 |
| 4 | SDA | Module Definition 2, SDA Serial Data Signal | 4 |
| 5 | SCL | Module Definition 1, SCL Serial Clock Signal | 4 |
| 6 | MOD_Det | Connected to the ground internal | 4 |
| 7 | TX_SD | LVLTL, Transmitter signal detect | |

| | | | |
|----|------|--|---|
| 8 | LOS | LVTTL, Loss of Signal, need external 4.7k~10k pull up resistor | 5 |
| 9 | NC | NC | 8 |
| 10 | VeeR | Receiver Ground | 1 |
| 11 | VeeR | Receiver Ground | 1 |
| 12 | RD- | Inv. Received Data Out,AC/CML | |
| 13 | RD+ | Received Data Out,AC/CML | |
| 14 | VeeR | Receiver Ground | 1 |
| 15 | VccR | Receiver Power | |
| 16 | VccT | Transmitter Power | |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmit Data In,AC/ LVPECL | 6 |
| 19 | TD- | Inv. Transmit Data In,AC/ LVPECL | 6 |
| 20 | VeeT | Transmitter Ground | 1 |

Note 1: VeeR and VeeT internally connected within the PON module.

Note 2: TX Fault indicates the status of module with pull up resistor of 10 KΩ externally. In the low state, the output will be pulled to < 0.4V.

Note 3:TX_burst is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 10 KΩ resistor.

Note 4: These are the module definition pins.

SDA is serial data signal with 10 KΩ pull up resistor externally.

SCL is serial clock signal with 10 KΩ pull up resistor externally.

MOD_Det is grounded internally and need 10 KΩ pull up resistor externally to indicate that the module is present.

Note 5: LOS (Loss of Signal) indicates the status of received optical power with 10 KΩ pull up resistor externally.

Note 6: 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.

Function Description

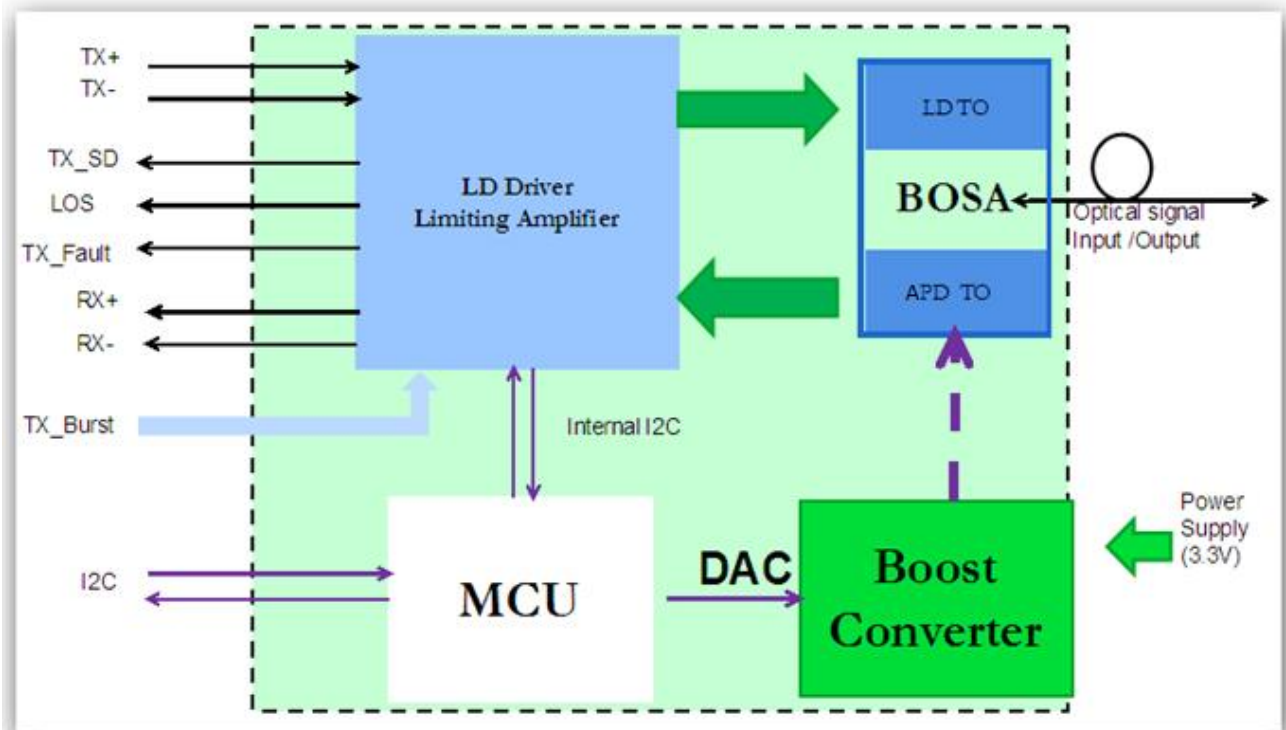


Figure3 Block diagram

The burst-mode transmitter part has a 1270nm DFB laser. It features AC-coupled differential data inputs. Tx_Burst is a LVTTTL input for TX shut down control. Logic "1" disables the LD driver.

The 1577nm continuous-mode receiver part has a high performance detector. The preamplifier (TIA) and limiting amplifier amplify the incoming optical signal into the stable range and convert the signal to differential AC-coupled CML outputs. LOS is LVTTTL output, which logic "1" indicates the input power is lower than the threshold, logic "0" indicates the input power is above the threshold.

Interface Circuit

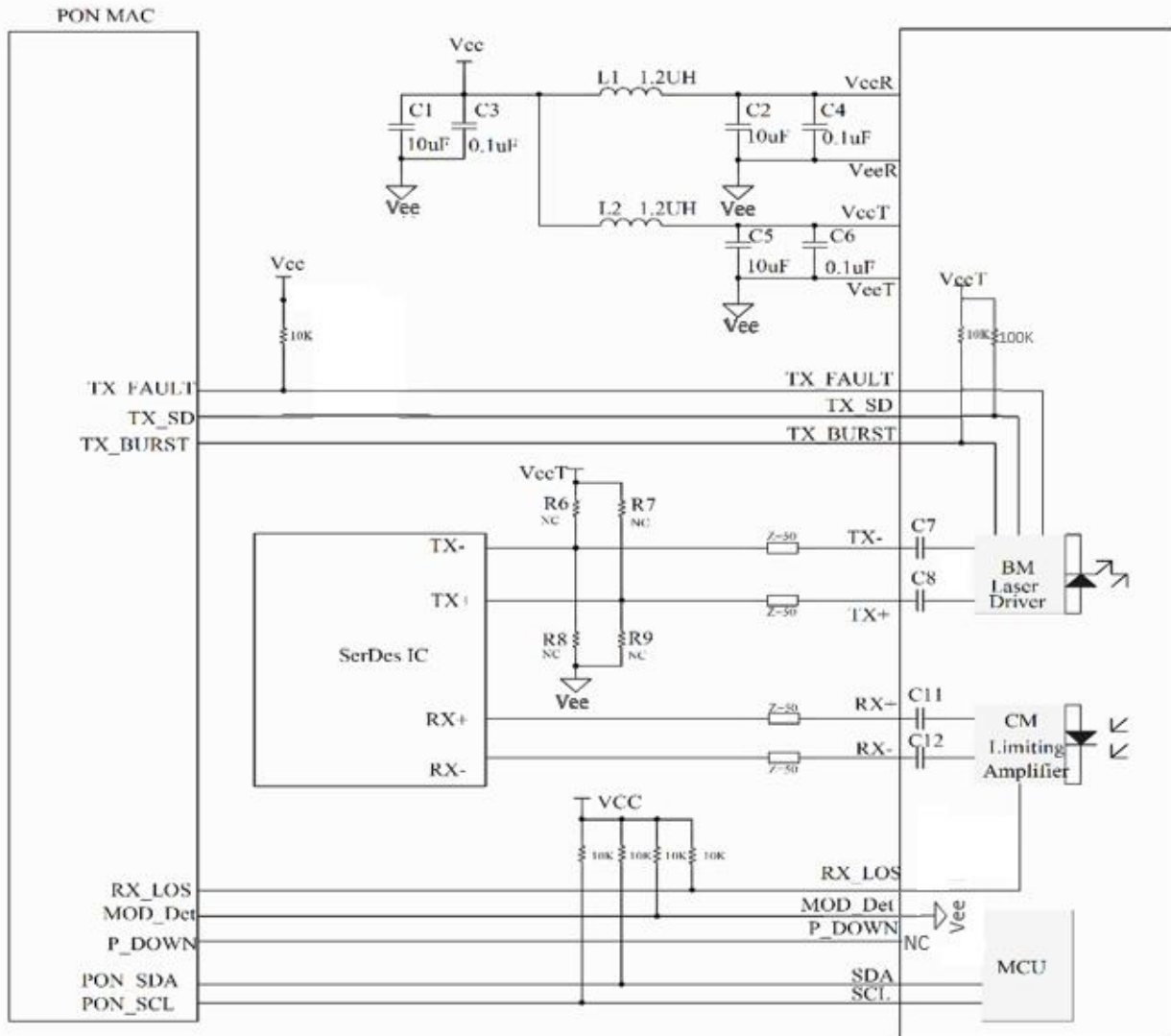


Figure4

Package Outline

(Unit: mm)

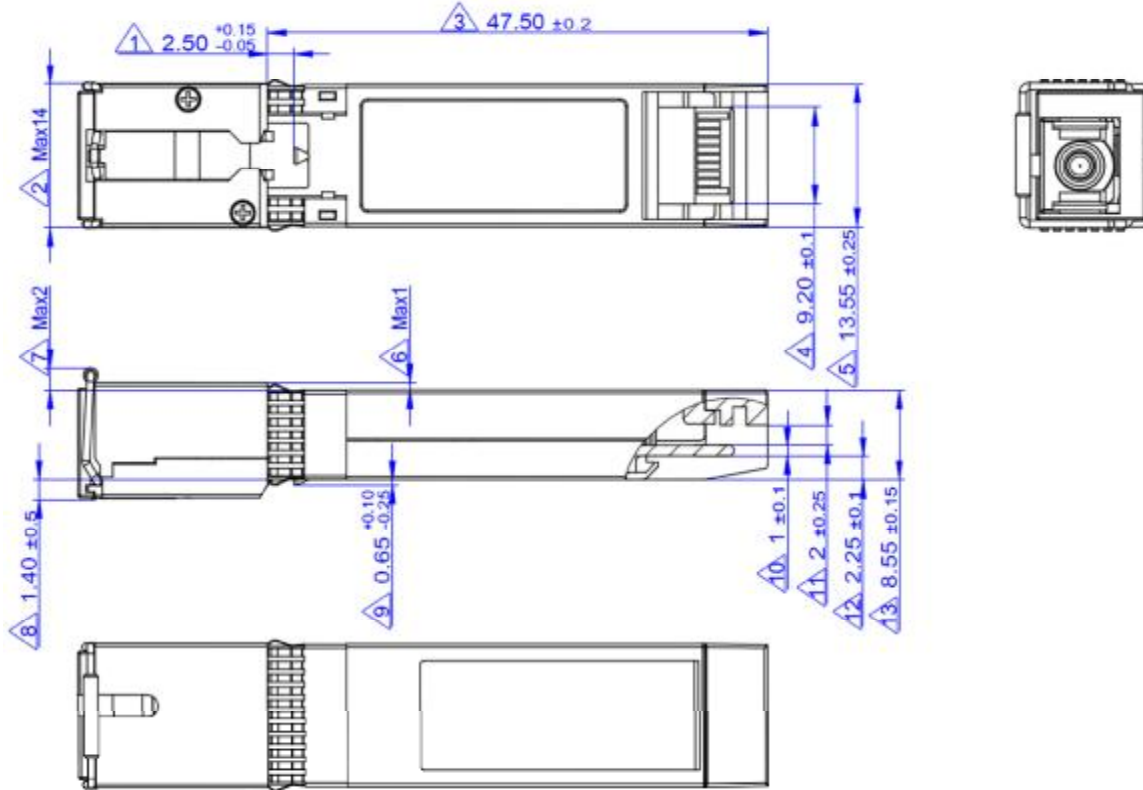


Figure5

Ordering information

| PART NO. | Specifications | | | | | | | | |
|---------------|----------------|------------|----------|----------|----------|-----------|-----------|-----|--|
| | Type | Rate Tx/Rx | Tx (nm) | Po (dBm) | Rx (nm) | Sen (dBm) | Temp (°C) | DDM | Others |
| POS22-LD6I-T1 | SFP+ | 10G/10G | 1270/DFB | 5~9 | 1577/APD | <-29 | -40~85 | Y | SC UPC Receptacle BIDI, Low-Burst On |