

# SFP+ XGS-PON ONU I-Temp Transceiver

## Product Features

- Single Fiber Transceiver with single mode APC/SC receptacle
- 1270nm Burst-mode 9.953Gb/s DFB transmitter
- 1577nm continuous-mode 9.953Gb/s APD receiver
- Complies with ITU-T G.9807.1
- Digital Diagnostic Monitoring (DDM)
- LVTTTL for Tx disable input and Tx\_fault output
- LVTTTL for burst signal input and signal detect output
- Complies with RoHS directive (2002/95/EC)
- Operating temperature range: -40°C to 85°C

This is a high performance transceiver module for single fiber communications. It is designed to meet ITU G.9807.1 requirements for optical line terminal applications.

The 1270nm DFB transmitter has automatic power control (APC) function and temperature compensation circuitry to ensure stable optical power and extinction ratio over all operating temperature range. The transmitter meets Class 1 eye safety per IEC60825 and CDRH standards.

The receiver has a hermetically packaged APD-TIA (trans-impedance amplifier) pre-amplifier and a limiting amplifier with CML compatible differential outputs.

The module provides digital diagnostic information of its operating conditions and status, including transmitting power, laser bias current, module temperature, and supply voltage.

## Ordering Information

Part Number	Description
AC-B-SFPPXSUA-I-xx	SFP+ XGS-PON ONU Industrial Temperature Transceiver

## Applications

- 10-Gigabit Symmetric Passive Optical Network (XGS-PON) ONU

### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	Tst	-40	+85	°C	Storage Temperature
Operating Case Temperature	TOP	-40	+85	°C	Operating Case Temperature
Operating relative humidity (Non- condensing)	RH	5	90	%	Operating relative humidity (Non- condensing)
Input Voltage		GND	Vcc	V	Input Voltage
Power Supply Voltage	Vcc	0	3.6	V	Power Supply Voltage

### Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Supply Voltage	Vcc	+3.14	+3.3	+3.46	V	
Power Supply Current	Icc		350	500	mA	
Operating relative humidity	RH	5		85	%	
I2C clock frequency			100	400	KHz	
Power consumption Max				1.65	W	

### Optical Characteristics

All parameters are specified under the recommended operating conditions unless otherwise specified..

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Support data rate			9.953		Gb/s	
Center Wavelength	λ	1260	1270	1280	nm	

Spectral Width (-20dB)	PRBS			1	nm	1
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Output Power (EOL)	Po	4		9	dBm	
Extinction Ratio	Er	6			dB	
Output Power with Transmitter Disabled	Poff			-45	dBm	
Output Eye Diagram	Compliant with ITU-T G.9807.1 Mask					
Differential Input Voltage	VID	190		800	mV	
Differential Input Impedance		80	100	120	Ω	
<b>Receiver</b>						
Support data rate			9.953		Gb/s	
Wavelength of Operation		1575	1577	1580	nm	
Receiver Sensitivity(EOL)	Sen.			-28	dBm	2
Saturation Optical Power	Sat	-8			dBm	2
LOS Assert Level				-30	dBm	
LOS De-assert Level		-45			dBm	
Hysteresis		0.4		6	dB	
Differential Output Voltage		300		850	mV	
Differential Output Impedance		80	100	120	Ω	

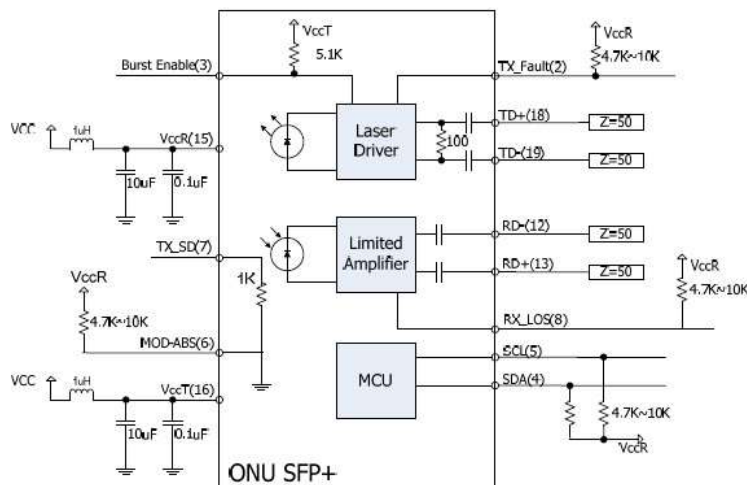
**Note:**

1. 9.953Gbps continuous-mode , PRBS2<sup>31</sup>-1
2. Measured with 1577nm, 9.953Gbps PRBS2<sup>31</sup>-1 BER=1x10<sup>-3</sup> continuous-mode optical input

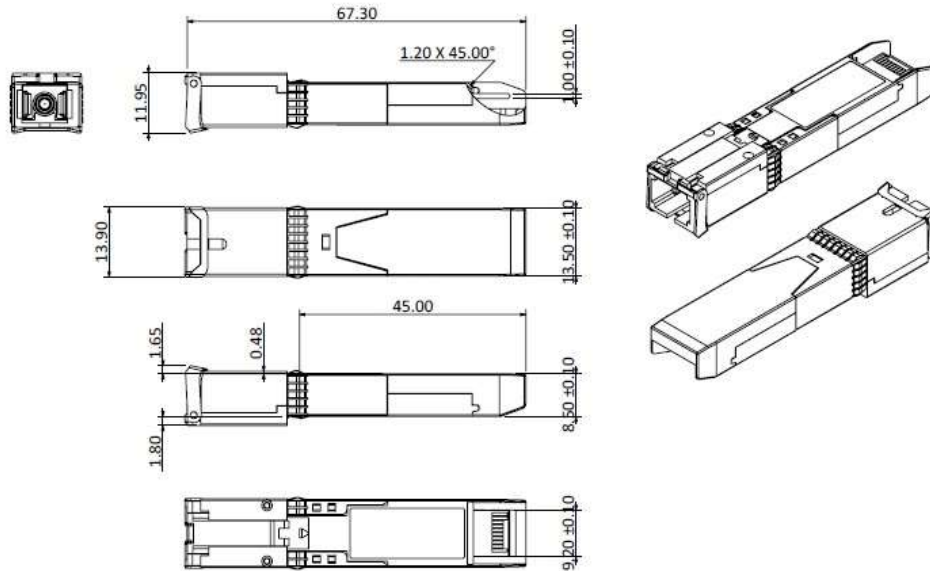
**Digital Diagnostic Functions**

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	°C	
Supply voltage monitor absolute error	DMI_VCC	-3%	+3%	V	
TX power monitor absolute error	DMI_RX	-3	+3	dB	
RX power monitor absolute error	DMI_RX	-3	+3	dB	
Bias current monitor	DMI_Ibias	-10%	+10%	mA	

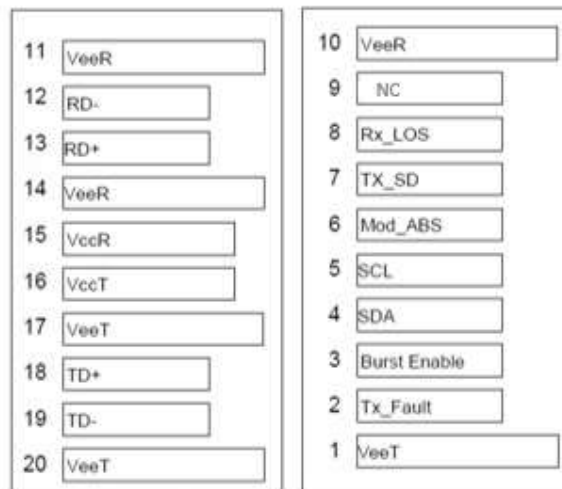
**Recommended Circuit**



**Mechanical Dimensions**



**Pin Assignment and Description**



**Top of Board**  
(As viewed through top of board)

**Bottom of Board**

**Pin Assignment**

PIN #	Symbol	Description	Notes
1	VeeT	Transmitter Ground	Note 4
2	TX_Fault	Transmitter Fault Indication	Note 1
3	Burst Enable	Transmitter Burst Enable	Note 2
4	SDA	I2C Data	Note 3
5	SCL	I2C Clock	Note 3
6	MOD-ABS	Internally grounded	
7	TX-SD	Assert when transmitter is transmitting optical power	
8	RX-LOS	Receiver loss of signal indication, low indicates normal operation	
9	NC	Not connected	
10	VeeR	Receiver Ground	Note 4
11	VeeR	Receiver Ground	Note 4
12	RD-	Inv. Received Data Out	Note 5
13	RD+	Received Data Out	Note 5
14	VeeR	Receiver Ground	Note 4
15	VccR	Receiver Power	Note 6
16	VccT	Transmitter Power	Note 6
17	VeeT	Transmitter Ground	Note 4
18	TD+	Transmit Data In	Note 7
19	TD-	Inv. Transmit Data In	Note 7
20	VeeT	Transmitter Ground	Note 4

**Notes:**

1. TX Fault is an open collector output, which should be pulled up with a  $4.7k \sim 10k \Omega$  resistor on the hostboard to a voltage between 2.0V and  $V_{cc}+0.3V$ . Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 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  $4.7 - 10 K \Omega$  resistor. It's states are:  
  
Low (0 - 0.8V): Transmitter on  
  
( $>0.8, < 2.0V$ ): Undefined  
  
High (2.0 - 3.465V): Transmitter Disabled  
  
Open: Transmitter Disabled .
3. SDA and SCL is communication interface for I2C . They should be pulled up with a  $4.7K - 10K \Omega$  resistor on the host board. The pull-up voltage should be  $V_{cc}$ .
4. Vee is connected inside the SFP transceiver.
5. RD- and RD+ are externally DC-coupled to  $100 \Omega$  differential lines at the user host board.
6.  $V_{cc}$  is the receiver and transmitter power supply, respectively. They are defined as 3.3V 5% at the SFP+ connector pin. Maximum supply current is 5 in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage.
7. TD- and TD+ are the differential transmitter inputs. They are AC coupled differential lines with  $100 \Omega$  differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.