

GSU-0SS2-20Dx XGS PON ONU Transceiver , SFP+, 20km Reach

Product Features

- Single Fiber Transceiver
 - 1270nm Burst-mode 9.953Gb/s DFB transmitter
 - 1577nm continuous-mode 9.953Gb/s APD receiver
- Complies with ITU-T G.9807.1 Class N2
- Digital Diagnostic Monitoring (DDM)
- SFP+ package with single mode SC/UPC receptacle connector
- LVTTTL for Tx disable input and Tx_fault output
- LVTTTL for burst signal input and signal LOS output
- Operating case temperature:
 - Standard: 0 to +70°C
 - Industrial: -40 to +85°C



Applications

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

Description

This is a high performance transceiver module for single fiber communications. It is designed to meet ITU-T G.9807.1 Class N2 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.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	+3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	90	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
		-40		+85	°C
Power Supply Voltage	Vcc	3.14	3.30	3.46	V
Power Supply Current	Icc			450	mA
I2C clock frequency			100	400	KHz
Power consumption Max				1.65	W
Data Rate	Tx		9.953		Gbps
	Rx		9.953		

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λ_c	1260	1270	1280	nm	1

Spectral Width (RMS)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Output Power	P_{out}	5		9	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 ON Time	T_{on}	-	-	30	ns	
Tx Burst OFF Time	T_{off}	-	-	30	ns	
Output Power with Transmitter Disabled	P_{off}			-45	dBm	
Output Eye Diagram	Compliant with ITU-T G.9807.1					
Receiver						
Centre Wavelength	λ_c	1575	1577	1580	nm	
Receiver Sensitivity	Sen			-29	dBm	2
				-24		3
Receiver Overload	Sat	-8			dBm	
LOS De-Assert	LOS_D			-29	dBm	
LOS Assert	LOS_A	-39			dBm	
LOS Hysteresis		1		5	dB	
Receiver Reflectance				-20	dB	$\lambda=1577nm$
1310nm Tx to 1577nm Rx Crosstalk				-47		
RX_LOS Assert time	TASSERT	-		100	us	
RX_LOS De-Assert time	TDE-ASSE RT	-		100	us	

Notes:

1: 9.953Gbps continuous-mode , PRBS $2^{31}-1$

2: Note2: Measured with 1577nm PRBS $2^{31}-1$ test pattern, @9.953Gbps and ER=6dB, BER $\leq 1*10^{-3}$

3: Note3: Measured with 1577nm PRBS $2^{31}-1$ test pattern, @9.953Gbps and ER=6dB, BER $\leq 1*10^{-12}$

Electrical Specification						
Transmitter						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Input Voltage	VIN-DIF	200		1000	mV	
Differential Input Impedance	zIN	85	100	115	Ω	
Tx Burst Input Voltage-Low	VIL	0		0.8	V	
Tx Burst Input Voltage-High	VIH	2.0		Vcc	V	
TX_FAULT Output Voltage	H	2.4		Vcc+0.3	V	
TX_FAULT Output Voltage	L	0		0.4	V	
TX_SD Output Voltage	H	2.4		Vcc+0.3	V	
TX_SD Output Voltage	L	0		0.4	V	
Receiver						
Differential output Voltage	VOUT-DIF	340		900	mV	
Differential output Impedance	ZOUT	80	100	120	Ω	
RX_LOS Output Voltage-Low	VSD-L	0		0.4	V	
RX_LOS Output Voltage-High	VSD-H	2.4	-	Vcc+0.3	V	
RX_LOS Assert time	TASSERT	-		100	us	
RX_LOS De-Assert time	TDE-ASSERT	-		100	us	

Diagnostics

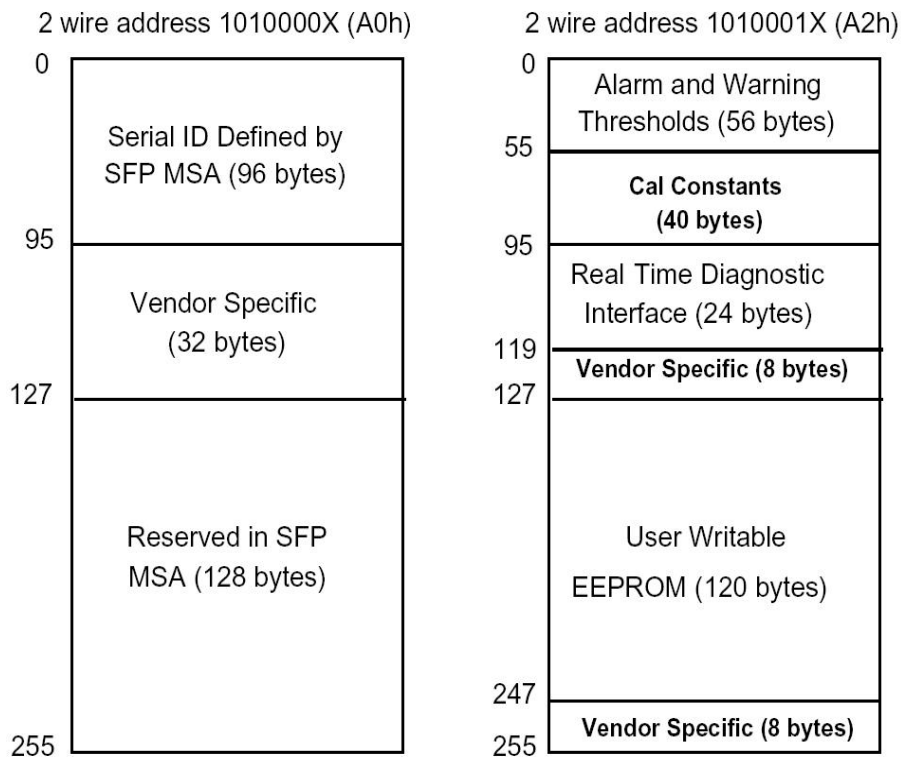
Parameter	Symbol	Range	Accuracy
Transceiver Case Temperature	T	Measured transceiver case temperature over specified operating range	±3°C
Supply Voltage	Vcc	Internally measured transceiver supply voltage ,3.0~3.6V	±3%
TX Bias Current	Id	Measured TX Bias current in uA	±10%
TX Output Power	Po	Measured TX Output Power in dBm Over the specified output power range	±2dB
Received Optical Power	Pi	Measured RX Received Power in dBm Over the specified input power range, -30~-7dBm,	±2dB

Digital Diagnostic Memory Map

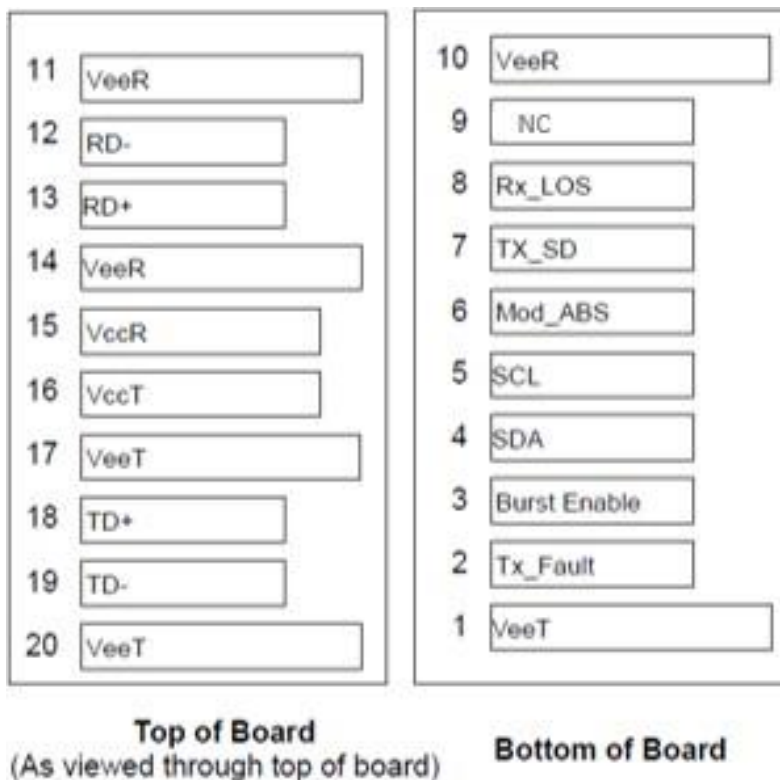
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Descriptions



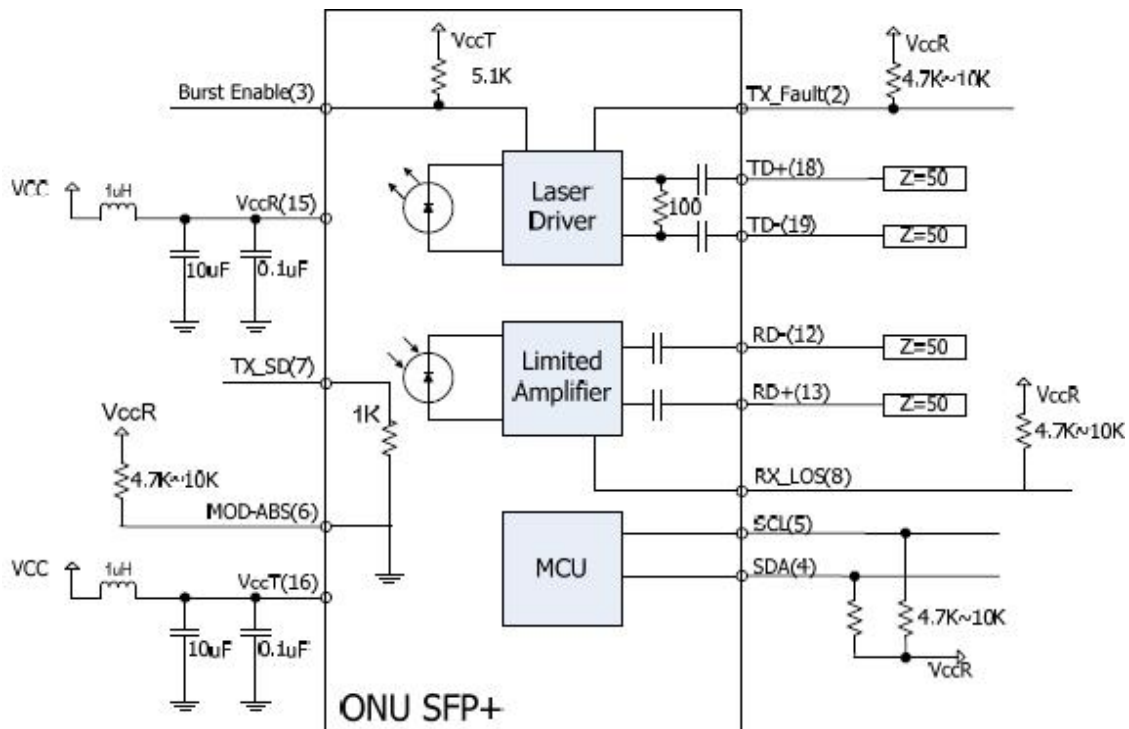
Pin	Logic	Signal Name	Description	Notes
1		VeeT	Transmitter Ground	Note 4
2	LVTTL	Tx Fault	Transmitter Fault Indication	Note 1
3	LVTTL	Burst Enable	Transmitter Burst Enable	Note 2
4		SDA	I2C Data	Note 3
5		SCL	I2C Clock	Note 3
6		MOD-ABS	Internally grounded	
7	LVTTL	TX-SD	Assert when transmitter is transmitting optical power	
8	LVTTL	RX-LOS	Receiver loss of signal indication, low indicates normal operation	
9		NC	Not connected	
10		VeeR	Receiver Ground	Note4
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

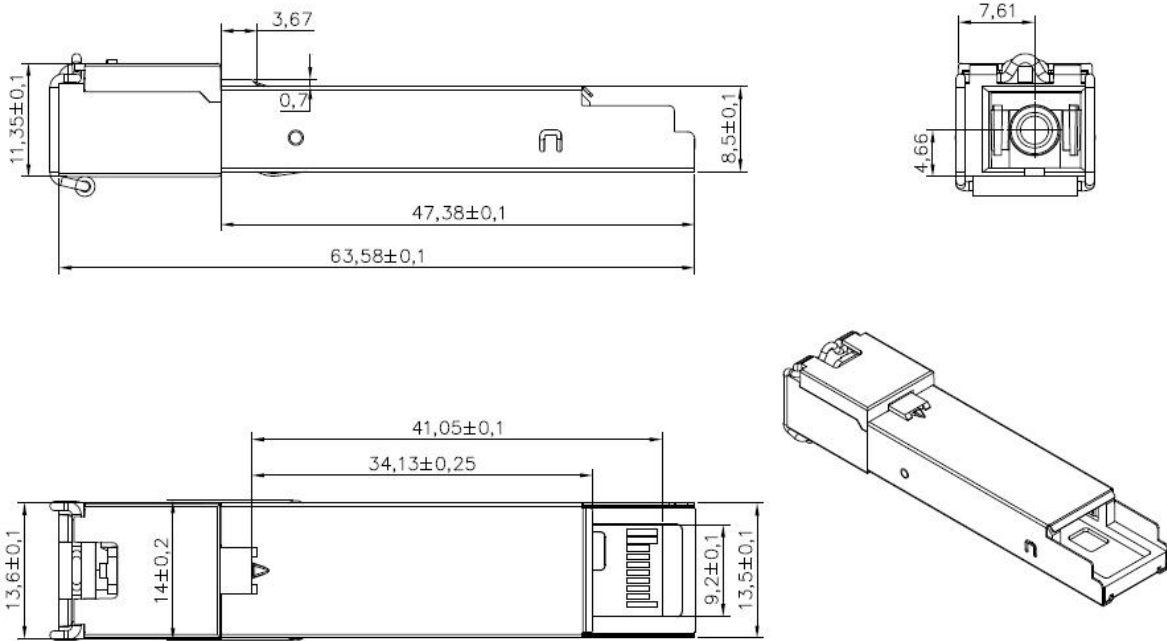
Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the hostboard to a voltage between 2.0V and Vcc+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 Burst is an input that is used to enable/disable the transmitter optical output. Burst Logic '0', Tx on
Open: Transmitter Disabled
3. SDA and SCL is communication interface for I2C . They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage should be Vcc.
4. Vee is connected inside the SFP transceiver..
5. RD- and RD+ are externally DC-coupled to 100Ω differential lines at the user host board
6. Vcc is the receiver and transmitter power supply, respectively. They are defined as $3.3V \pm 5\%$ at the SFP+ connector pin. Maximum supply current is 500mA. Inductors with DC resistance of less than 1Ω should be used 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 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board

Recommended Interface Circuit



Mechanical Dimensions



Ordering information

Part Number	Product Description
GSU-0SS2-20DC	1270T/1577R, 9.953Gbps, SC/UPC, 20km, 0°C~+70°C, with DDM, CLASS N2
GSU-0SS2-20DI	1270T/1577R, 9.953Gbps, SC/UPC, 20km, -40°C~+85°C, with DDM, CLASS N2

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