

TS-EP12-OLT-P20++

GEPON SFP OLT Transceiver

FEATURES

- Single fiber bi-directional data links symmetric 1.25Gbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Reset-less burst-mode receiver simply the system design
- +5~+8dBm high Average Launch Optical Power
- More than 25dB wide dynamic range
- 0 to 70°C operating temperature
- Single 3.3V power supply
- Digital diagnostic monitoring interface
- Digital burst RSSI function to monitor the input optical power level
- LVPECL compatible data input/output interface
- LVTTTL transmitter disable control
- LVTTTL transmitter laser fault alarm
- LVTTTL receiver loss of signal indication
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- RoHS compliance for SOEB4366-PSGE

APPLICATIONS

- Gigabit Ethernet Passive Optical Networks (GEPON) 30Km 1:32 application or 10/20Km 1:64 application

STANDARDS

- Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- Complies with IEEE 802.3ah™-2004
- Complies with FCC 47 CFR Part 15, Class B
- Complies with SFF-8472 Rev 9.5
- Complies with FDA 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min.	Max.	Unit.	Notes
Storage Ambient Temperature	T _{STG}	-40	85	°C	
Operating Case Temperature	T _c	0	70	°C	
Operating Humidity	OH	5	95	%	
Power Supply Voltage	V _{CC}	0	4	V	
Receiver Damaged Threshold		+4		dBm	

RECOMMENDED OPERATING CONDITION

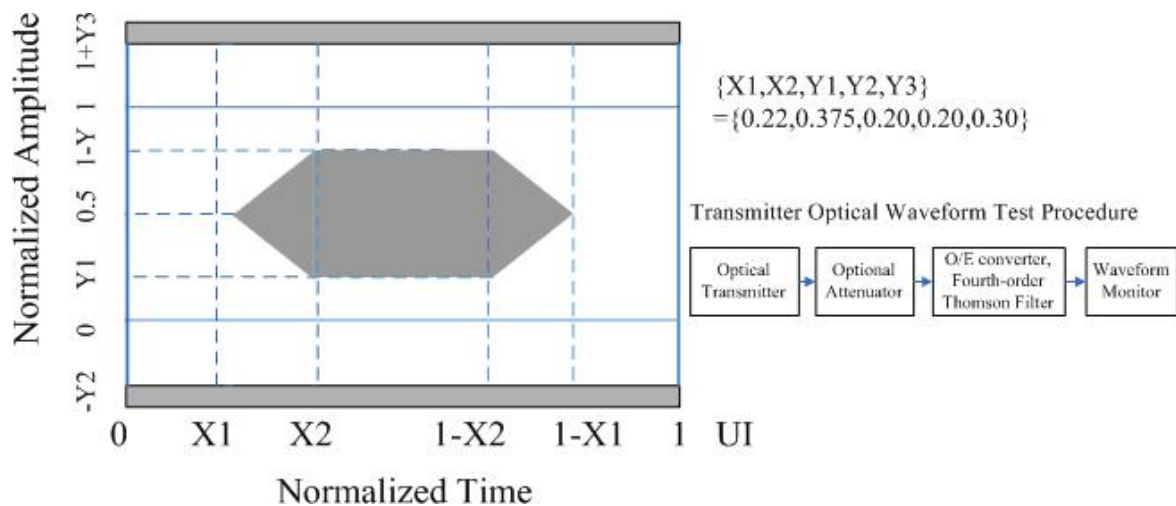
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Operating Case Temperature	T _c	0		70	°C	
Operating Humidity Range	OH	5		95	%	
Data Rate			1.25		Gbit/s	
Data Rate Drift		-100		+100	PPM	

TRANSMITTER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Optical Center Wavelength	λ_c	1480		1500	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	+5		+8	dBm	Launched into SMF
Power-OFF Transmitter Optical Power				-41	dBm	Launched into SMF
Extinction Ratio	ER	9			dB	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Total Jitter	TJ			0.43	UI	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Rise/Fall Time (20%-80%)	T _R /T _F			260	ps	Bessel-Thompson Filter OFF.
RIN ₁₅ OMA				-115	dB/Hz	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			2.3	dB	Transmit on 30km SMF
Optical Waveform Diagram	Compliant with IEEE Std 802.3ah™-2004					Figure 1

TRANSMITTER ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		200		1600	mV	LVPECL input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Power Supply Current				220	mA	Load free
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		V _{CC}	V	
Transmitter Fault Alarm Voltage - Low		0		0.4	V	
Transmitter Fault Alarm Voltage - High		2.4		V _{CC}	V	

TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE

Figure 1 Transmitter Eye Mask Definitions and Test Procedure
RECEIVER OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1260		1360	nm	
Sensitivity	SEN			-33	dBm	PRBS 2 ⁷ -1@1.25Gbps BER $\leq 1 \times 10^{-12}$
Saturation Optical Power	SAT	-6			dBm	PRBS 2 ⁷ -1@1.25Gbps BER $\leq 1 \times 10^{-12}$
Dynamic Range		25			dBm	Figure 3
Loss Of Signal De-assert Level				-34	dBm	
Loss Of Signal Assert Level		-45			dBm	
Loss Of Signal Hysteresis		0.5		6	dBm	
Receiver Reflectance				-12	dB	

RECEIVER ELECTRICAL CHARACTERISTICS						
Parameter	Symbol	Min.	Typ.	Max.	Unit.	Notes
Receiver Threshold Settling Time	$T_{SETTLING}$			250	ns	Figure 2
Power Supply Current				160	mA	Load free
Data Output Voltage – Low (-Vcc)		-1.81		-1.6	V	
Data Output Voltage – High (-Vcc)		-1.02		-0.8	V	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Loss Of Signal Assert Time			0.5		μ s	
Loss Of Signal Deassert Time			0.5		μ s	
Loss Of Signal Voltage - Low		0		0.4	V	
Loss Of Signal Voltage - High		2.4		VCC	V	
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger width	T_w	10			us	
RSSI Trigger Delay	T_D		950		μ s	
Optical Signal During Time	$TONU\ EN_DUR$	1000	1200		μ s	
I2C Access Prohibited Time		500			μ s	

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE

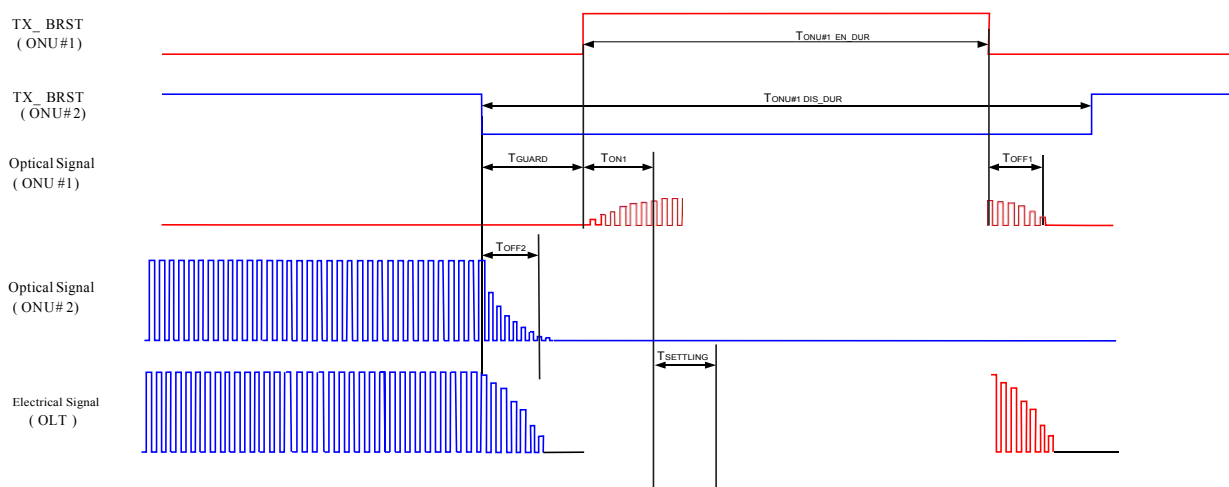


Figure 2 Timing Parameter Definitions in Burst Mode Sequence

RSSI TIMING SEQUENCE

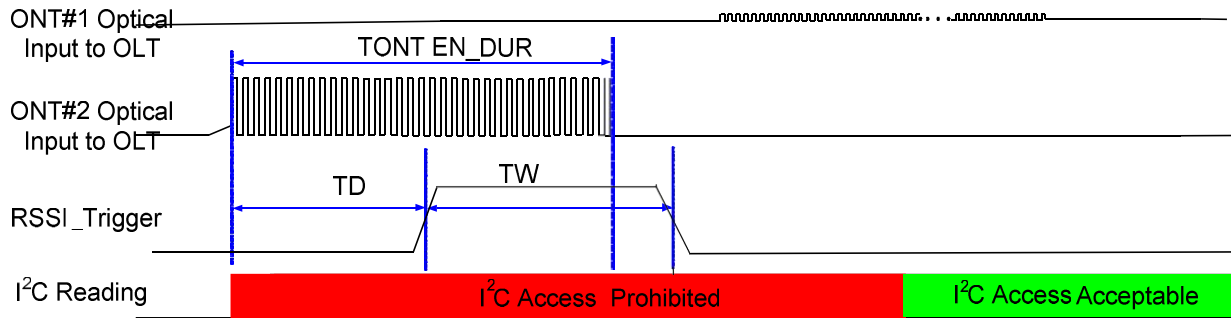


Figure 3 RSSI Timing Sequence

BURST MODE RECEIVER DYNAMIC RANGE IN GEPON SYSTEM

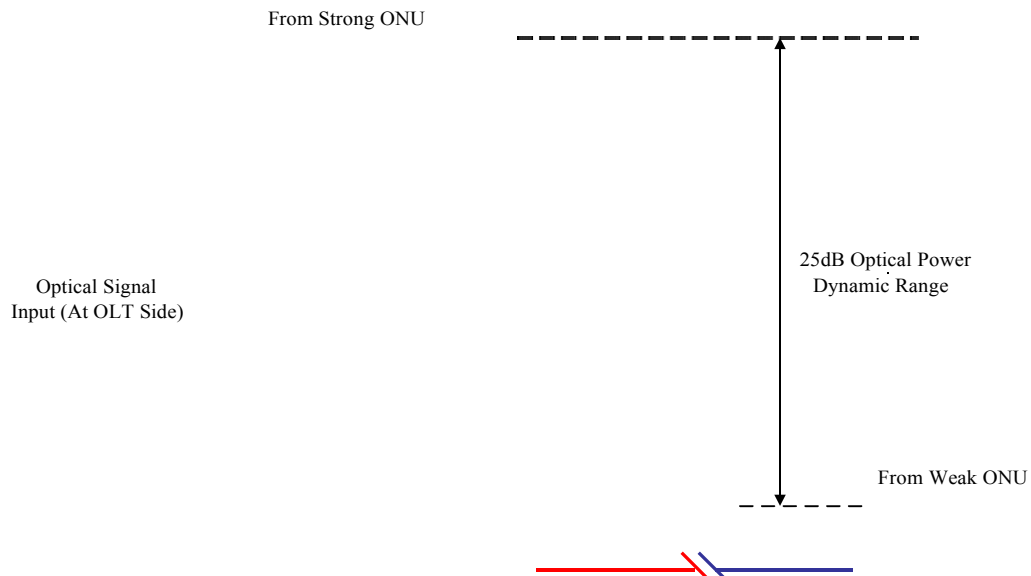


Figure 4 Burst Mode Receiver Dynamic Range in GEPON System

PIN DESCRIPTION			
PIN	Name	Description	Notes
1	V _{EE} T	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	High: abnormal; Low: normal
3	TX Disable	Transmitter Disable	High: transmitter disable; Low: transmitter enable
4	MOD-DEF2	Module Definition 2	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	Connected to Ground in the transceiver
7	RSSI Trigger	RSSI Trigger for Transceiver A/D Conversion	High: enable RSSI A/D conversion
8	LOS	Loss of Signal	High: 1 Loss Of Signal; Low: Signal Detect
9	V _{EE} R	Receiver Ground	
10	V _{EE} R	Receiver Ground	
11	V _{EE} R	Receiver Ground	
12	RD-	Inv. Receiver Data Out	LVPECL logic output, DC coupled
13	RD+	Receiver Data Out	LVPECL logic output, DC coupled
14	V _{EE} R	Received Ground	
15	V _{CC} R	Receiver Power	
16	V _{CC} T	Transmitter Power	
17	V _{EE} T	Transmitter Ground	
18	TD+	Transmit Data In	LVPECL logic input, AC coupled
19	TD-	Inv. Transmit Data In	LVPECL logic input, AC coupled
20	V _{EE} T	Transmitter Ground	

SFP RECOMMENDED HOST BOARD POWER SUPPLY FILTERING NETWORK

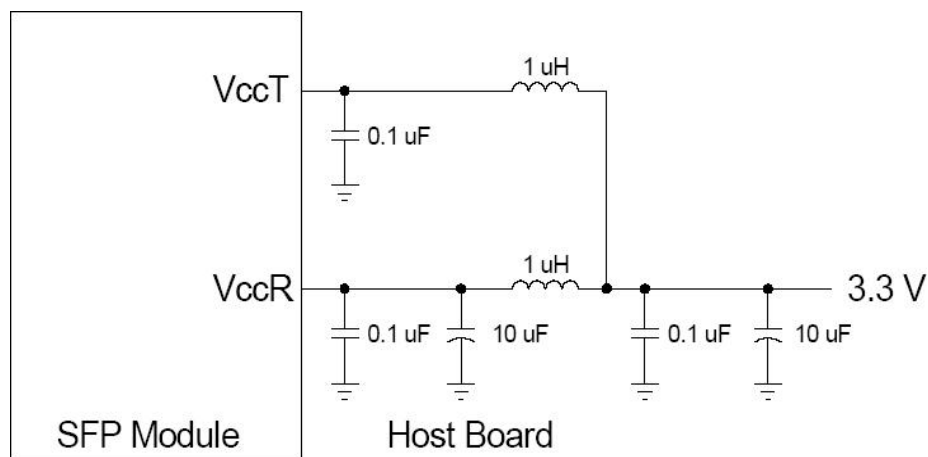
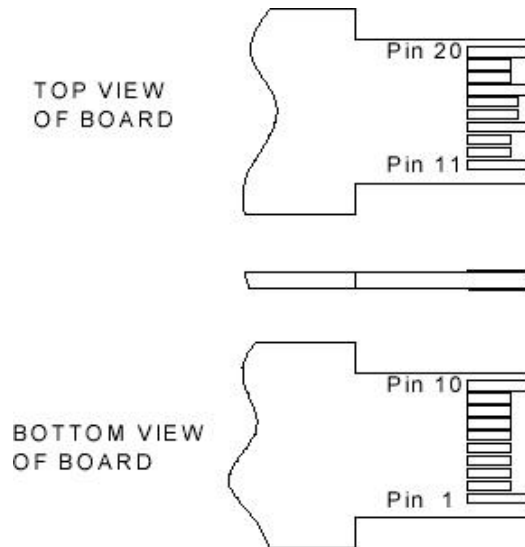
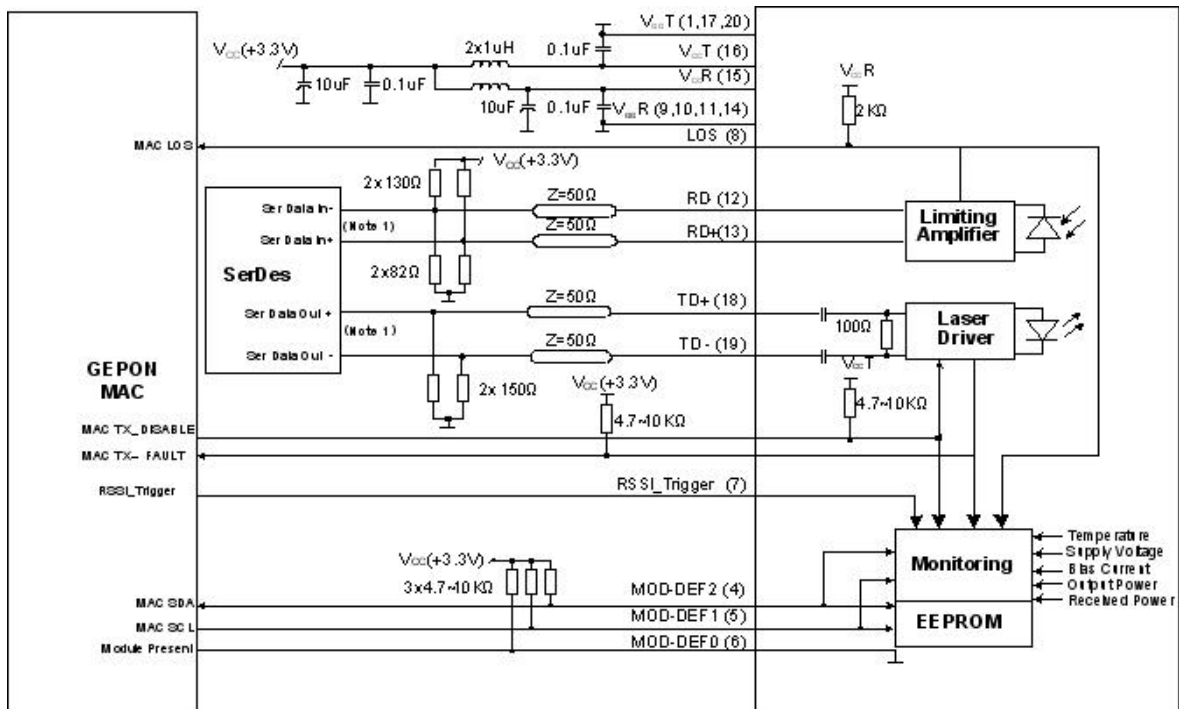


Figure 5 SFP Recommended Host Board Power Supply Filtering Network

SFP PIN (GOLDEN FINGER) DRAWING

Figure 6 SFP Pin (Golden Finger) Drawing
TYPICAL INTERFACE CIRCUIT
Figure 7 Typical Interface Circuit


PACKAGE OUTLINE

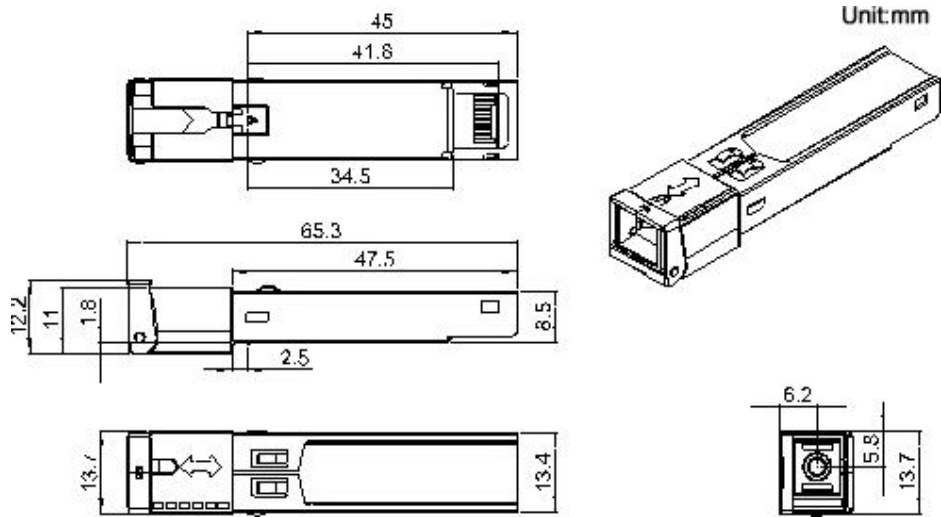


Figure 8 Package Outline

EEPROM INFORMATION

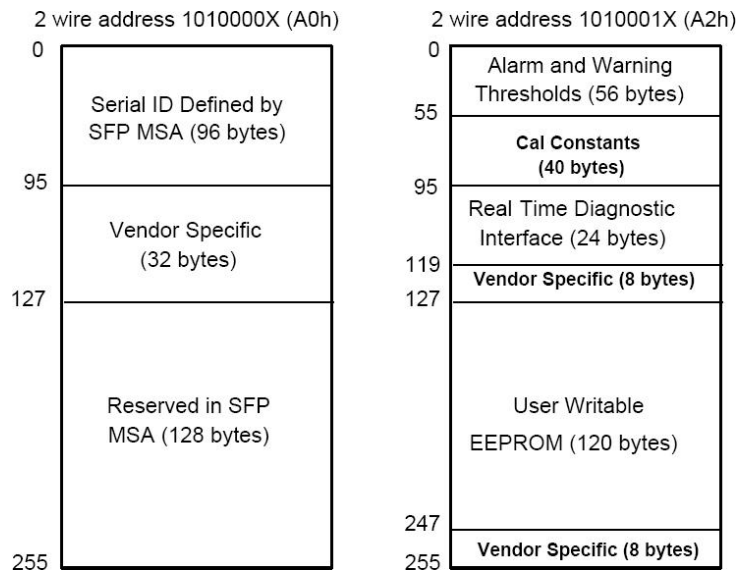


Figure 9 EEPROM Memory Map Specific Data Field Descriptions

DIGITAL DIAGNOSTIC MONITORING INTERFACE			
Parameter	Range	Accuracy	Calibration
Temperature	-20 to 85°C	±3°C	Internal
Voltage	3.0 to 3.7V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	0 to 8dBm	±3dB	Internal
RX Power monitor	-33 to -15dBm	±2dB(25°C) ±3dB(0~75°C)	External

Note 1: The digital diagnostic monitoring interface defines 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X(A2h). Please refer to the SFF-8472 Rev 9.5 for the detail information.

WARNINGS

- **Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- **Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.