TS-GP2512-OLT-C+

FEATURES

- Single fiber bi-directional data links asymmetric TX 2488Mbps/RX1244Mbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Small Form Factor Pluggable package with SC/UPC Connector
- Support Class C+ 17~32dB attenuation range application (With FEC)
- Reset burst-mode receiver design support more than 15dB dynamic range
- 0 to 70℃ 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
- LVTTL transmitter disable control
- LVTTL transmitter laser fault alarm
- LVTTL receiver Signal Detect (SD) indication response within 50ns.
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

APPLICATIONS

- Gigabit-capable Passive Optical Networks (GPON) Class C+ 20Km 17~32dB attenuation range

STANDARDS

- Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- Complies with SFF-8472 Rev 9.5
- Complies with ITU-T G.984.2 Amendment 2
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11

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ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Ambient Temperature	T_{STG}	-40	85	℃	
Operating Case Temperature	T_c	0	70	℃	
Operating Humidity	OH	5	95	%	
Power Supply Voltage	V_{CC}	0	4	V	
Receiver Damaged Threshold		+5		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	℃	
Operating Humidity Range	OH	5		95	%	
Nominal Data Rate			RX 1244.16		Mbit/s	

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	+4		+7	dBm	BOL, Normal Temperature
		+3		+7	dBm	BOL, 0~70 ℃
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF
Extinction Ratio	ER	8.2			dB	PRBS 2^{23}-1+72CID @2.488Gbit/s
Tolerance to Transmitter Incident Light		-15			dB	
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 20km SMF
Optical Waveform Diagram		ITU-T G.984.2				Figure 1

TRANSMITTER ELECTRICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Data Input Differential Swing		600		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		Vcc	V	

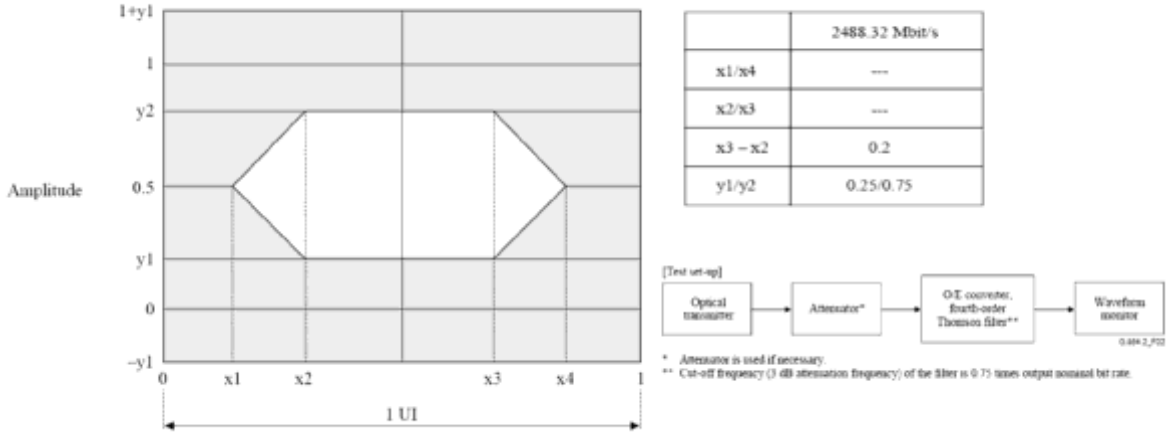

Figure 1 Transmitter Eye Mask Definitions and Test Procedure

RECEIVER OPTICAL CHARACTERISTICS						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Operating Wavelength		1290		1330	nm	
Sensitivity	SEN			-32	dBm	PRBS 2^{23}-1+72CID@1.244Gbps
Saturation Optical Power	SAT	-12			dBm	BER $\leq 1\times10^{-10}$
Dynamic Range		15			dB	Figure 2
Loss Of Signal De-assert Level				-33	dBm	
Loss Of Signal Assert Level		-45			dBm	
Loss Of Signal Hysteresis		0.5		6	dBm	
Receiver Reflectance				-12	dB	

BURST MODE RECEIVER DYNAMIC RANGE IN GPON SYSTEM

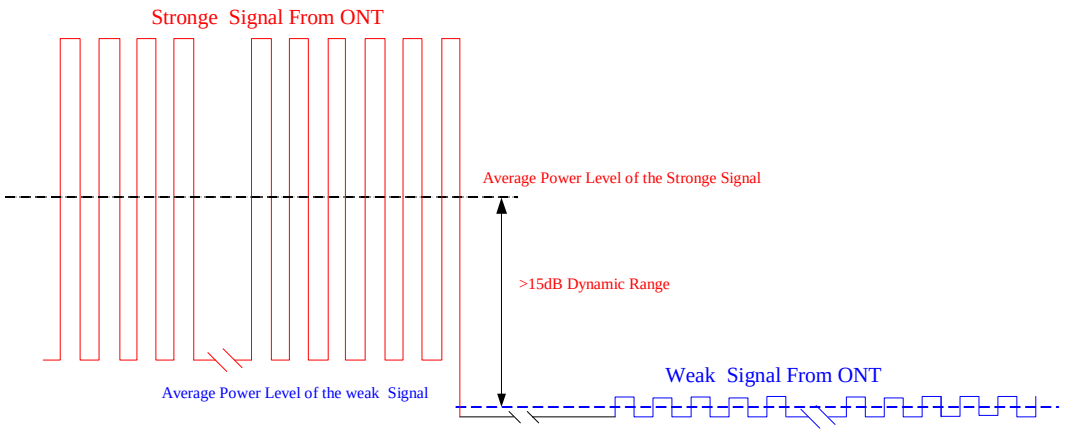

Figure 2 Burst Mode Receiver Dynamic Range in GPON System

RECEIVER ELECTRIAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Current				350	mA	Load free
Data Output Voltage – Low（-Vcc）		-1.81		-1.62	V	
Data Output Voltage – High（-Vcc）		-1.02		-0.88	V	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Reset width	T_{RESET}	16			bits	
Reset-Low		0		0.4	V	
Reset-High		2.4		Vcc	V	
Receiver Amplitude Recovery	$T_{RECOVERY}$			32	bits	Refer to the Reset signal falling edge
Signal Detect Assert Time				50	ns	
Signal Detect De-assert Time				12.8	ns	Refer to the Reset signal rising edge
Signal Detect Voltage-Low		0		0.4	V	
Signal Detect Voltage-High		2.4		Vcc	V	
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
Optical Signal During Time	Tont	300			ns	
RSSI Trigger width	T_W	300		Tont-T_D	ns	
RSSI Trigger Delay	T_D	0		3000	ns	
I^2C Access Prohibited Time				500	μs	

TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE

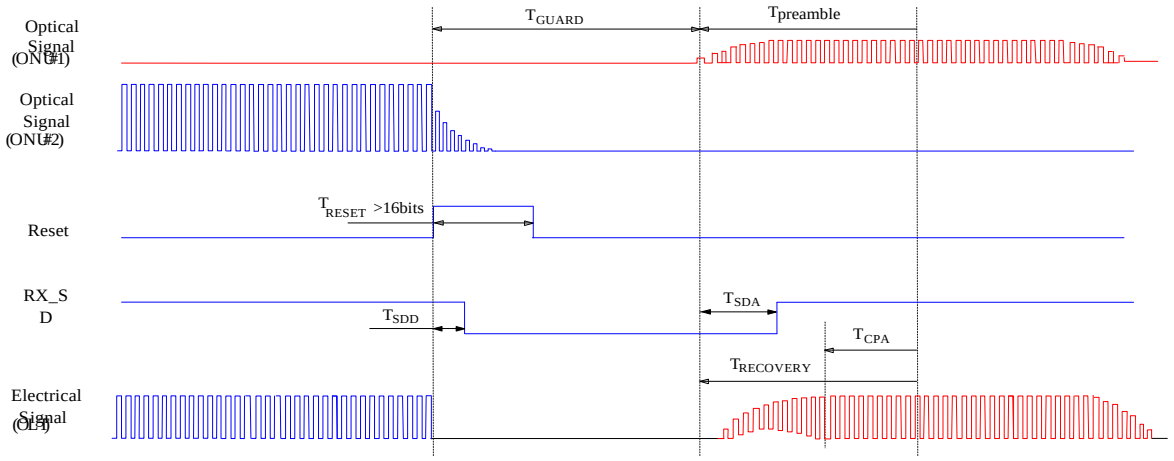

Figure 3 Burst Receiver Timing Sequence

RSSI TIMING SEQUENCE

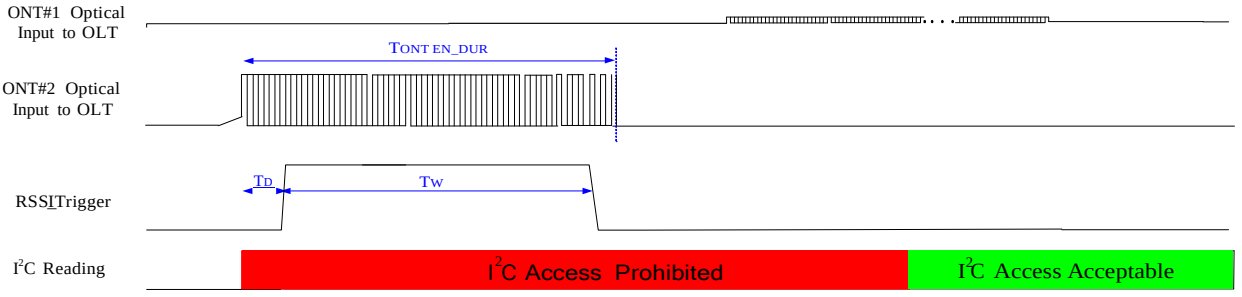

Figure 4 RSSI TIMING SEQUENCE

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	Reset	Receiver Reset	High: reset the receiver
8	SD	Signal Detect	High: signal detected; Low: loss of signal;
9	RSSI Trigger	RSSI Trigger for Transceiver A/D Conversion	High: enable RSSI A/D conversion
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

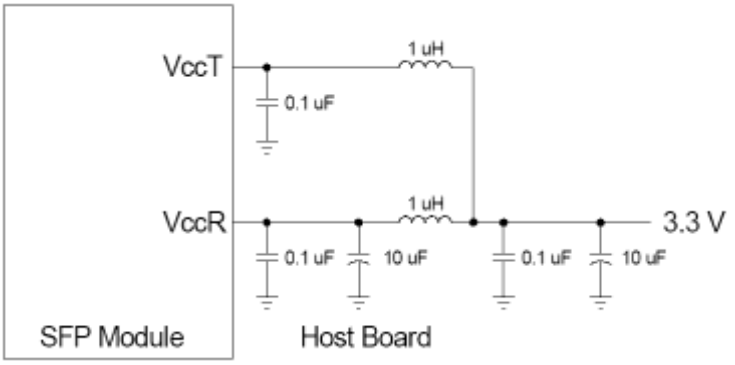

Figure 5 SFP Recommended Host Board Power Supply Filtering Network

SFP PIN (GOLDEN FINGER) DRAWING

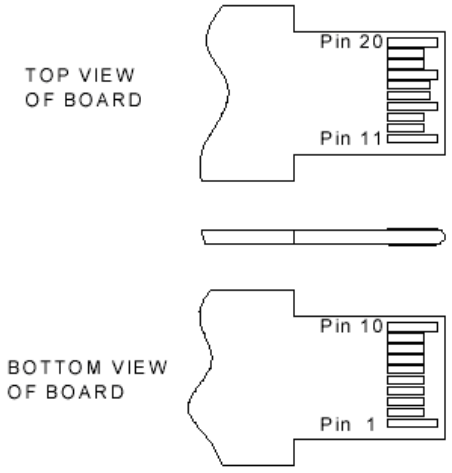

Figure 6 SFP Pin (Golden Finger) Drawing

TYPICAL INTERFACE CIRCUIT

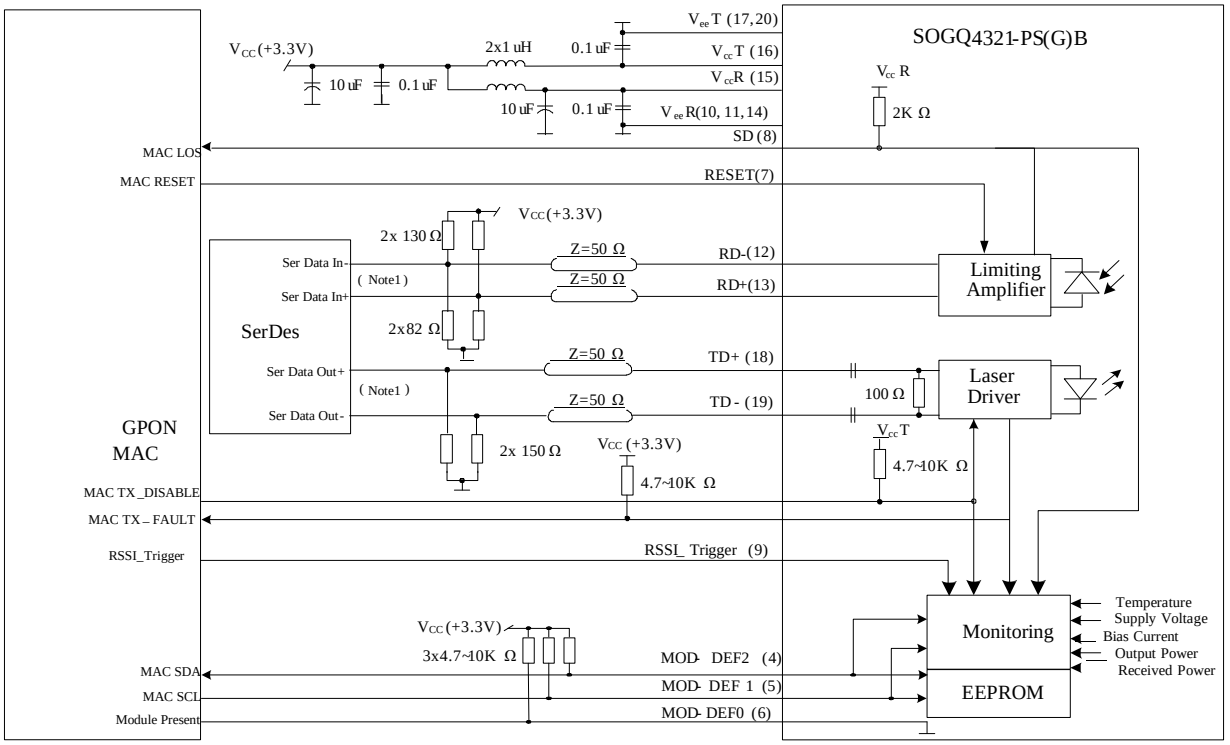

Figure 7 Typical Interface Circuit

PACKAGE OUTLINE

Unit: mm

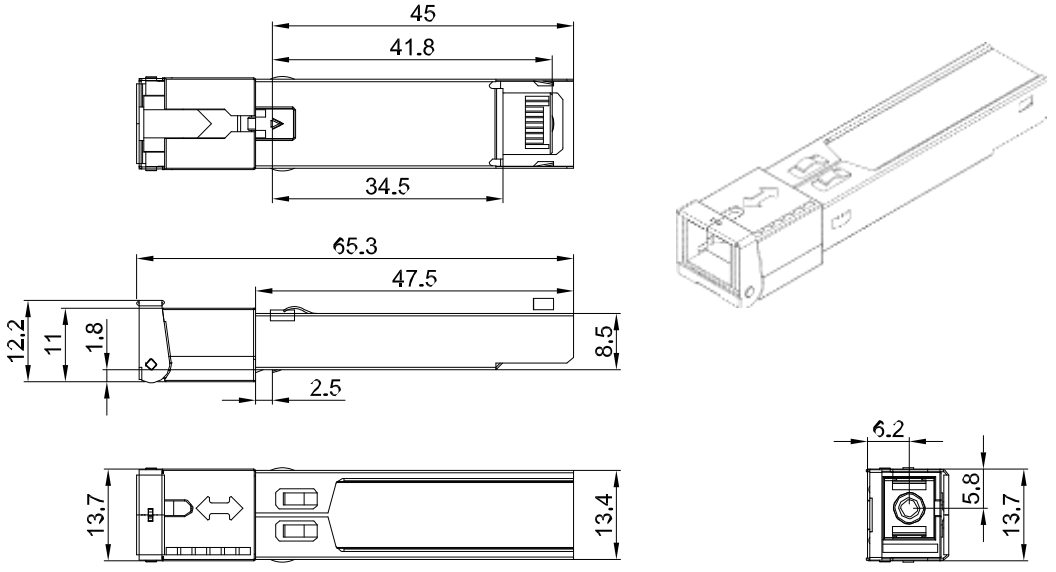

Figure 8 Package Outline

EEPROM INFORMATION

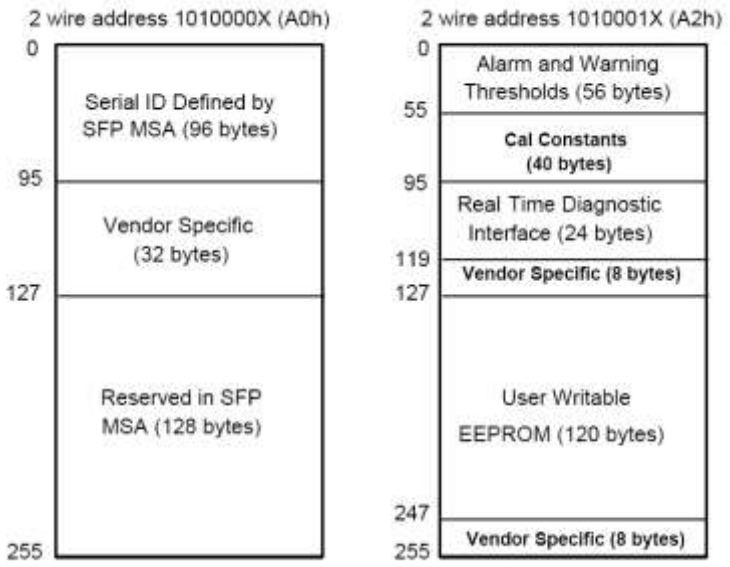

Figure 9 EEPROM Memory Map Specific Data Field Descriptions

DIGITAL DIAGNOSTIC MONITORING INTERFACE

Parameter	Range	Accuracy	Calibration
Temperature	0 to 70℃	±3℃	External
Voltage	3.0 to 3.7V	±3%	External
Bias Current	0 to 100mA	±10%	External
TX Power	0 to 8dBm	±3dB	External
RX Power Monitor	-32 to -12dBm	±3dB	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.