

## XSPT-P9T9R-E1C(I)

### SFP+ XGS-PON E1 Transceiver

#### Features

- Single fiber bi-directional data links TX 9.95Gbps, Burst Mode RX 9.95G/2.488Gbps application
- 0 to 70°C operating case temperature
- 3.3V power supply
- SFP+ package with SC Receptacle connector
- Hot-pluggable capability
- High power 1577nm EML LD
- High sensitivity 1270nm APD
- Support 20km transmission distance with SMF
- RX\_SD indication
- Low EMI and excellent ESD protection
- Digital diagnostic monitor interface
- RoHS6 compliance



#### Applications

- XGS-PON E1 OLT

#### Standards

- Complies with SFF-8472
- Complies with ITU G.987.2
- Complies with ITU G.9807.1
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11

## Absolute Maximum Ratings

**Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit	Notes
Storage Ambient Temperature	TSTG	-40	85	°C	
Operating Case Temperature	TA	0	70	°C	
Relative Storage Humidity	RHs	5	95	%	
VCC3 Power Supply Voltage	VCC3	0	3.6	V	

## Recommended Operating Environment

**Table 2 - Recommended Operating Environment**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	Tc	0		70	°C	
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Consumption	P			2.5	W	
TX Data Rate			9.95		Gbps	
RX Data Rate			9.95 2.488		Gbps Gbps	

## XGSPON Transmitter Optical Characteristics

**Table 3-XGSPON Transmitter Optical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Optical Center Wavelength	$\lambda_C$	1575		1580	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 20km SMF

Average Launch Optical Power (EOL)	AOP	+6		+9	dBm	Launched into SMF
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF
Extinction Ratio	ER	8.2			dB	PRBS2 <sup>31</sup> -1 @9.95Gbps
Optical Waveform Diagram	Compliant with ITU G.9807.1					Figure 1, Mask Margin>5%

## XGSPON Transmitter Electrical Characteristics

Table 4-XGSPON Transmitter Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Data Input Differential Swing			120		820	mV	CML input, AC coupled
Input Differential Impedance			90	100	110	$\Omega$	
TX Disable	Disable		2		VCC+0.3	V	
	Enable		-0.3		0.8	V	
Transmitter Disable Time		T <sub>off</sub>			100	$\mu$ S	
Transmitter Enable Time		T <sub>on</sub>			2	mS	

## XGS PON Transmitter Eye Mask Definitions And Test Procedures

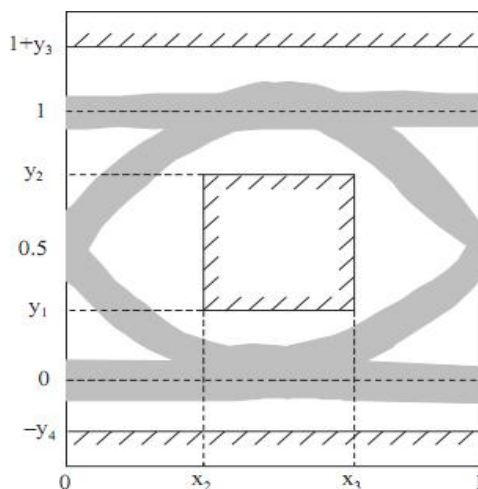


Figure 1 XGSPON Transmitter Eye Mask Definitions

X3-X2	Y1	Y2	Y3	Y4	Unit
0.2	0.25	0.75	0.25	0.25	UI

## XGS PON Receiver Optical Characteristics

Table 5-XGS PON Receiver Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Wavelength		1260		1280	nm	
Sensitivity	SEN			-30	dBm	PRBS <sup>231</sup> - 1@9.95Gbps BER ≤1×10 <sup>-3</sup>
Saturation Optical Power	SAT	-9			dBm	
Max Input power		-3			dBm	
SD Assert Level				-32	dBm	
SD De-Assert Level		-45	-43		dBm	
Hysteresis		0.5		6	dB	

## XGPON Receiver Optical Characteristics

Table 6-XGPON Receiver Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Wavelength		1260		1280	nm	
Sensitivity	SEN			-31.5	dBm	PRBS <sup>223</sup> - 1@2.488Gbps BER ≤1×10 <sup>-4</sup>
Saturation Optical Power	SAT	-11			dBm	
Max Input power		-3			dBm	
SD Assert Level				-32	dBm	
SD De-Assert Level		-45	-43		dBm	
Hysteresis		0.5		6	dB	

## Recommended XGS/XGPON Receiver Timing Characteristics

Table 7-Recommended XGS/XGPON Receiver Timing Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Guard time	Tg	25	50		ns	Figure 2
Reset Pulse Width	Tr		25.6		ns	
Data Recovery Time	Ts		50	100	ns	
Preamble time	Tp	100	150		ns	
SD De-Assert Time	TSDD			50	ns	
SD Assert Time	TSDA			50	ns	

## Timing Parameter Definitions In Burst Mode Sequence

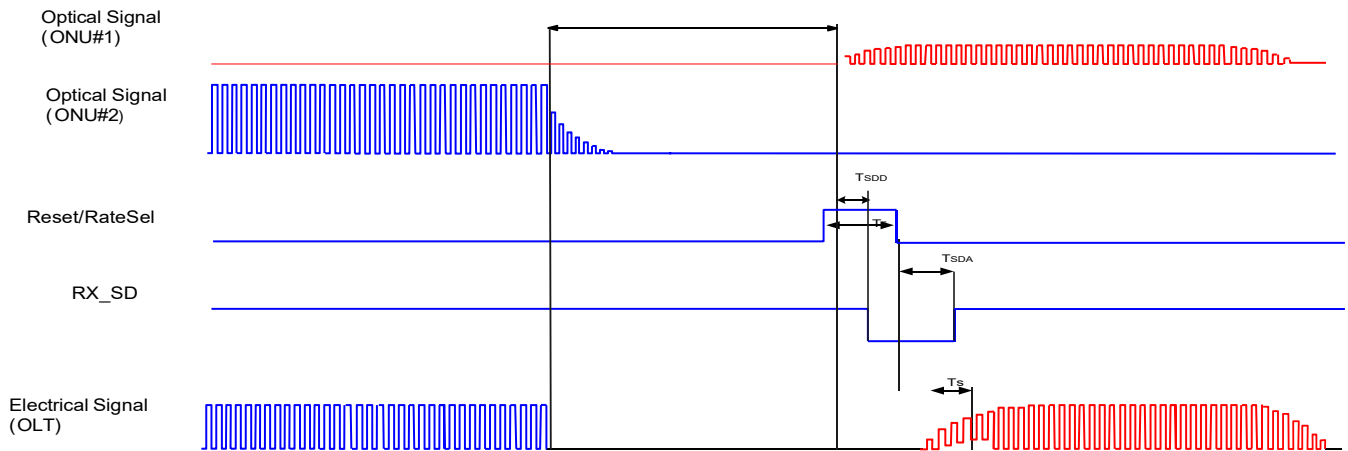


Figure 2 Timing Parameter Definitions in XGS PON Burst Mode Sequence

## RSSI Timing Sequence

Table 9-RSSI Timing Sequence

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Optical Signal During Time	$T_{opt}$	575			ns	
RSSI Trigger width	$T_w$		500		ns	
RSSI Trigger Delay	$T_D$	25			ns	
I <sup>2</sup> C Access Prohibited Time	$T_s$	500			$\mu$ s	
I <sup>2</sup> C Bus Frequency			100		KHz	

### Digital RSSI Sample/Hold Timing Specification

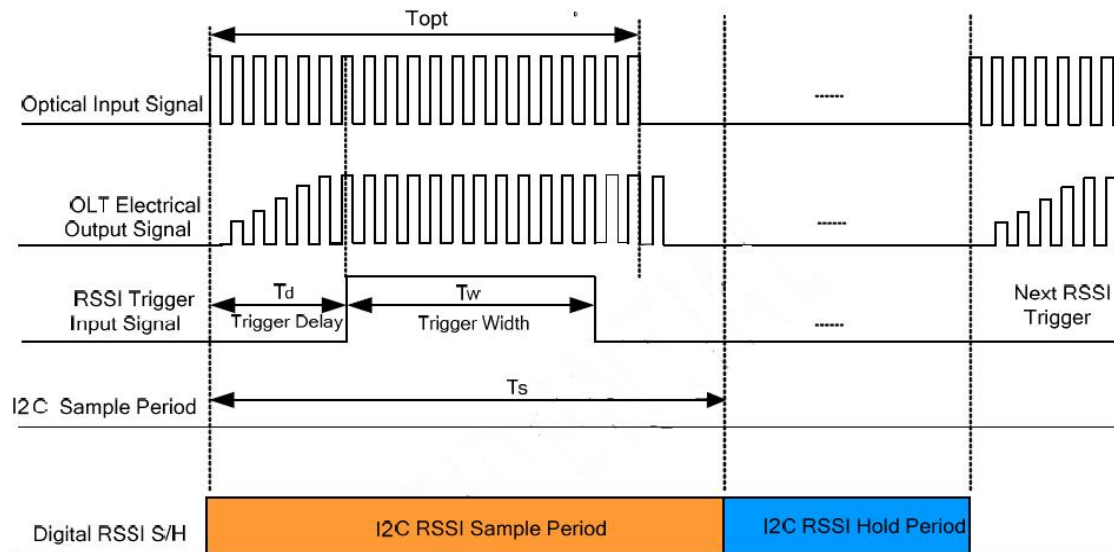
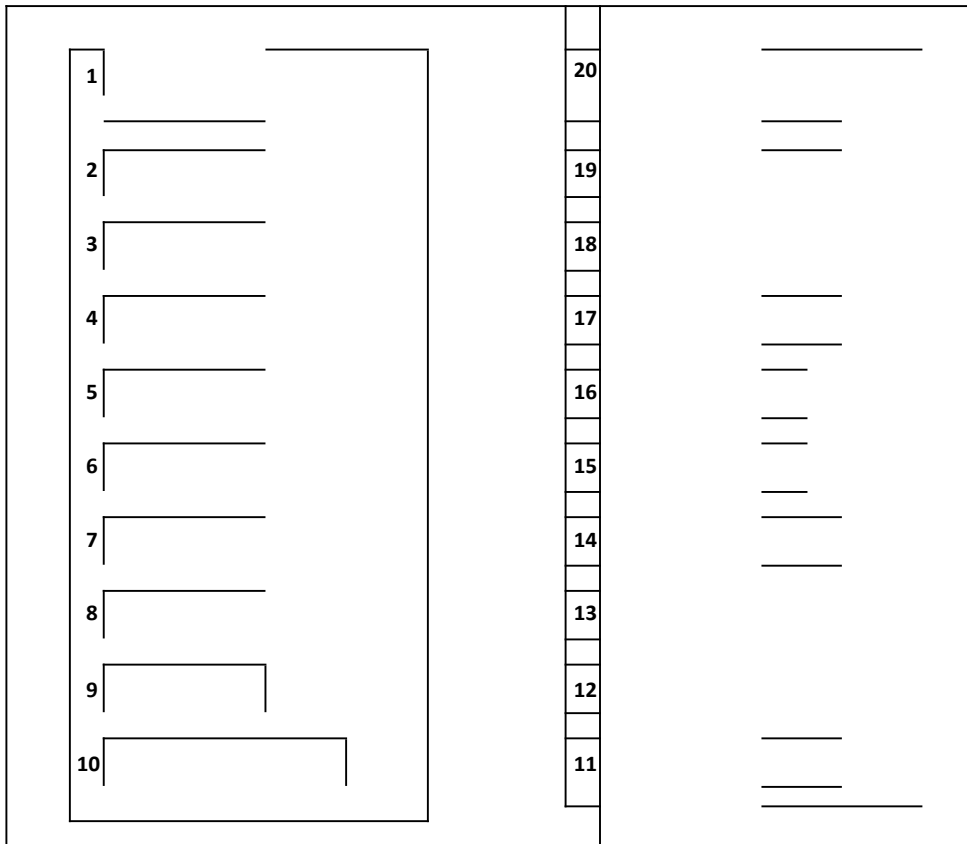


Figure 3 Timing Parameter Definitions in RSSI Trigger

## Pin Out Drawing



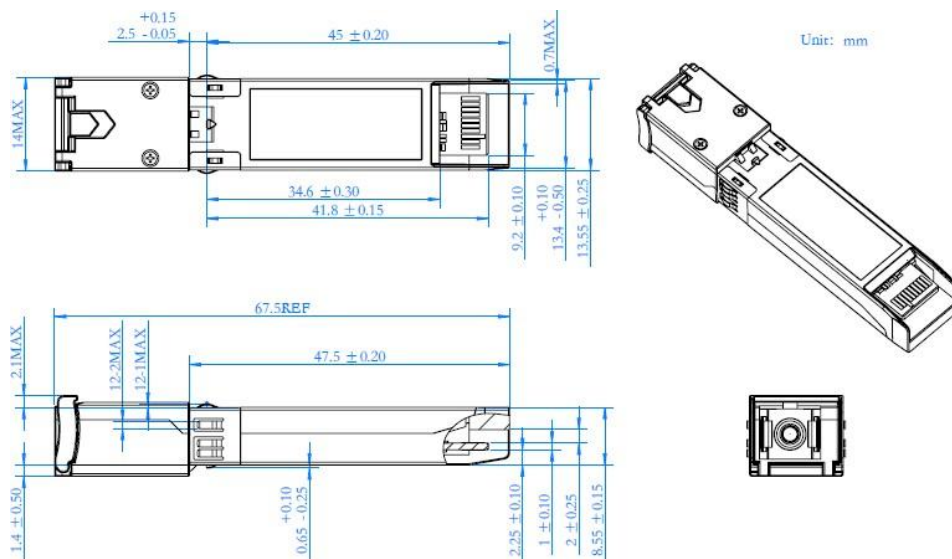
## Pin Descriptions

Table 10-Pin Descriptions

Pin	Name	Description	Notes
1	Rate_Select	Rate select	Low:2.488Gbps,High:9.953Gbps
2	TX_Fault	TX fault out	
3	TX_Disable	TX disable in	
4	SDA	I2C Data in/out	
5	SCL	I2C Clock in	
6	MOD_ABS	Module absent	
7	RX_Reset	Reset	Active High
8	RX_SD	Signal detect out	

9	RSSI_Trigger	RSSI trigger in	
10	GND	GND.	
11	GND	GND.	
12	XGS_RD-	XGSPON data out, CML	DC coupling
13	XGS_RD+	XGSPON data out, CML	DC coupling
14	GND	GND.	
15	VCCR	Module power	
16	VCCT	Module power	
17	GND	GND.	
18	XGS_TD+	XGSPON data in, CML	AC coupling
19	XGS_TD-	XGSPON data in, CML	AC coupling
20	GND	GND.	

## Package Outline



**Figure 4 Package Outline**

**Note: The SFP+ 10G OLT package is preliminary version.**



## EEPROM Information

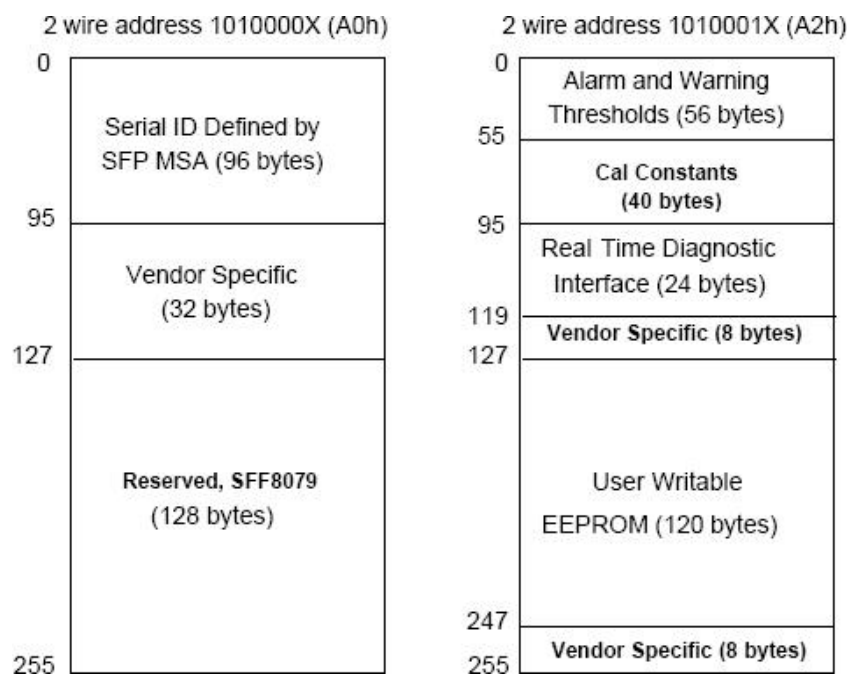


Figure 5 EEPROM Memory Map Specific Data Field Descriptions

## Digital Diagnostic Monitoring Interface

Table 11- Digital Diagnostic Monitoring Interface

Parameter	Range	Accuracy	Calibration	Notes
Temperature	0 to 70°C	±3°C	Internal	LSB: 1/256C
Voltage	3.17 to 3.47V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 262mA	±10%	Internal	LSB: 4uA
TX Power	6 to 9dBm	±3dB	Internal	LSB: 0.2uW
RX Power Monitor	-32 to -9dBm	±3dB	Internal	LSB: 0.1uW

**Ordering information****Table 12- Ordering information**

Part Number	Product Description
XSPT-P9T9R-E1C(I)	XGSPON OLT SFP+ E1, SC, E1, 1577T/1270R, 0 ~ +70°C, with DDM

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