Preliminary Datasheet

SFPPXGP2-C+N2

XGSPON&GPON Combo OLT C+ SFP+





Features:

- Combination of XGS-PON OLT and GPON OLT optical transceiver in a SFP+ package
- Comply ITU-T G.984.5 (2014)/Amd.2 (10/2020) GPON & XGS-PON OPL Class C+
- Single fiber bi-directional data links with
  Tx1: 9.953Gbps, Rx1: 9.953Gbps/2.488Gbps
  Tx2: 2.488Gbps, Rx2: 1.244Gbps
- 1577nm continuous-mode transmitter with EML laser
- 1490nm continuous-mode transmitter with DFB laser
- 1270nm burst-mode receiver with APD-TIA 1310nm
- burst-mode receiver with APD-TIA 2-wire interface
- for integrated digital diagnostic Monitoring
  +3.3V power supply
- RoHS With Exemptions 7C(I)
- 20km Reach
- Operating temp: 0~70°C or -40~85°C
- Support Pin-out :
- 22 Pins : SPPS-ST-XS-CP-C(I)DFA
  20 Pins: SPPS-ST-XS-CP-C(I)DFB

Absolute Maximum RatingS

Table 1 - Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Storage Ambient Temperature	TS	-40	-	+85	°C	
Operating Case Temperature	Tc	0		70	°C	C-Temp
		-40		+85	°C	I-Temp
Supply Voltage	VCC	0	-	3.6	V	
Operating Relative Humidity	RH	5	-	+85	%	



Recommended Operating Conditions

Table 2 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Case Temperature	Tc	0		70	°C	C-Temp
		-40		85		I-Temp
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Consumption（C-Temp）			3		W	
Power Consumption（I-Temp）			3.5		W	
XGS Rx Optical Isolation (From external 1290-1650nm)	ISO	-30			dB	
Reflectance of XGS Rx (1260- 1280nm)				-12	dB	
GPON Rx Optical Isolation (From external 1260-1280nm)	ISO	-30			dB	
GPON Rx Optical Isolation (From external 1342-1650nm)	ISO	-30			dB	
Reflectance of GPON Rx (1290-1330 nm)				-20	dB	
Differential Power Range				20	dB	1

Notes:

1. Power differential between sequential ONU bursts

Optical Characteristics

Table 3 – Optical Characteristics

Transmitter (9.953G)						
Parameter	**Symbol**	**Min.**	**Typical**	**Max**	**Unit**	**Note**
Centre Wavelength	λC	1575	1577	1580	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power	Aop	5		8	dBm	
Average Launch Power-OFF	POFF			-39	dBm	
Extinction Ratio	ER	8.2			dB	
Transmitter tolerance to reflected power		-15			dB	
Eye Diagram		ITU-T G.9807.1 Compliant				
Transmitter (2.488G)						



Centre Wavelength	λC	1480	1490	1500	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power	Aop	3		7	dBm	
Average Launch Power-OFF	POFF			-40	dBm	
Extinction Ratio	ER	8.2			dB	
Transmitter tolerance to reflected power		-15			dB	
Eye Diagram		ITU-T G.984.2 Compliant				
Receiver (9.953G)						
Operating Wavelength	λC	1260	1270	1280	nm	
Sensitivity	PSEN			-29	dBm	1
Saturation	PSAT	-8			dBm	
Signal Detected De-assert Level	Psdd	-45			dBm	
Signal Detected Assert Level	Psda			-30	dBm	
Max Optical input	Pdamage			0	dBm	
Receiver (2.488G)						
Operating Wavelength	λC	1260	1270	1280	nm	
Sensitivity	PSEN			-30.5	dBm	2
Saturation	PSAT	-10			dBm	
Signal Detected De-assert Level	Psdd	-45			dBm	
Signal Detected Assert Level	Psda			-31	dBm	
Max Optical input	Pdamage			0	dBm	
Receiver (1.244G)						
Operating Wavelength	λC	1290	1310	1330	nm	
Sensitivity	PSEN			-32	dBm	3
Saturation	PSAT	-12			dBm	
Signal Detected De-assert Level	Psdd	-45			dBm	
Signal Detected Assert Level	Psda			-33	dBm	
Max Optical input	Pdamage			0	dBm	

Motes:

1 . Measured with PRBS 2^31-1 test pattern @9.953Gbps and ER=6dB BER =10^-3

2 . Measured with PRBS 2^23-1 test pattern @2.488Gbps and ER=8.2dB, BER =10^-4

3 . Measured with PRBS 2^23-1 test pattern @1.244Gbps and ER=8.2dB, BER =10^-4



Electrical Characteristics

Table 4 – Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (9.953G)						
Data Input Differential Swing	VIN	100	-	850	mVp-p	
Input Differential Impedance	ZIN		100		Ω	
Tx_Disable Voltage	VIL	0	-	0.8	V	
	VIH	2.4		3.3	V	
Transmitter Fault Voltage - Low	VTFI, L	0		0.4	V	
Transmitter Fault Voltage - High	VTFI, H	2.4		3.3	V	
Transmitter (2.488G)						
Data Input Differential Swing	VIN	100	-	850	mVp-p	
Input Differential Impedance	ZIN		100		Ω	
Tx_Disable Voltage	VIL	0	-	0.8	V	
	VIH	2.4		3.3	V	
Transmitter Fault Voltage - Low	VTFI, L	0		0.4	V	
Transmitter Fault Voltage - High	VTFI, H	2.4		3.3	V	
Receiver (9.953G)						
Data Output Differential Swing	VOUT	300		800	mVP-P	
Signal Detected Voltage_low	VSD, L	0		0.8	V	
Signal Detected Voltage_high	VSD, H	2.4		3.3	V	
Receiver (2.488G)						
Data Output Differential Swing	VOUT	300		800	mVP-P	
Signal Detected Voltage_low	VSD, L	0		0.8	V	
Signal Detected Voltage_high	VSD, H	2.4		3.3	V	
Receiver (1.244G)						
Data Output Differential Swing	VOUT	300		800	mVP-P	
Signal Detected Voltage_low	VSD, L	0		0.8	V	
Signal Detected Voltage_high	VSD, H	2.4		3.3	V	



RSSI Timing

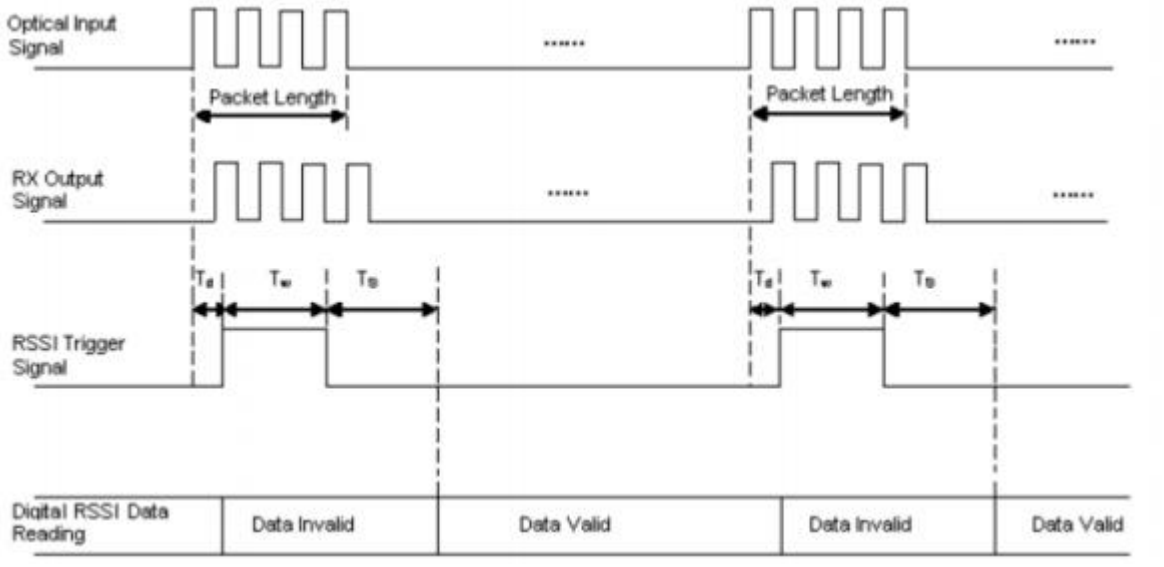


Figure 1, RSSI Timing Specification

Table 5 – RSSI Timing Spec

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Packet Length		575			ns	
RSSI Trigger Delay	T_d	100			ns	
RSSI Trigger Width	T_w	500			ns	
RSSI Sampling Time	T_{SAMPLE}	500			ns	
Delay before Read	T_s	500			us	



Recommended Host Boa

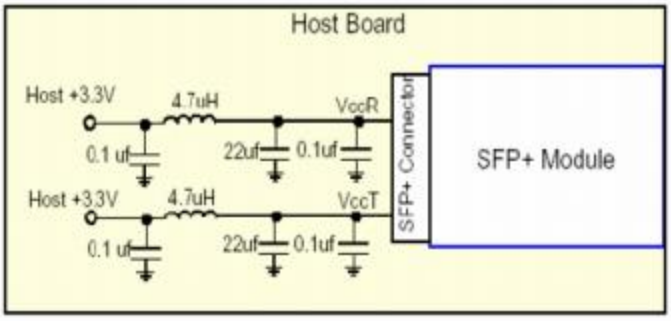


Figure 2, Recommended Host Board Power Supply Filtering

XGS

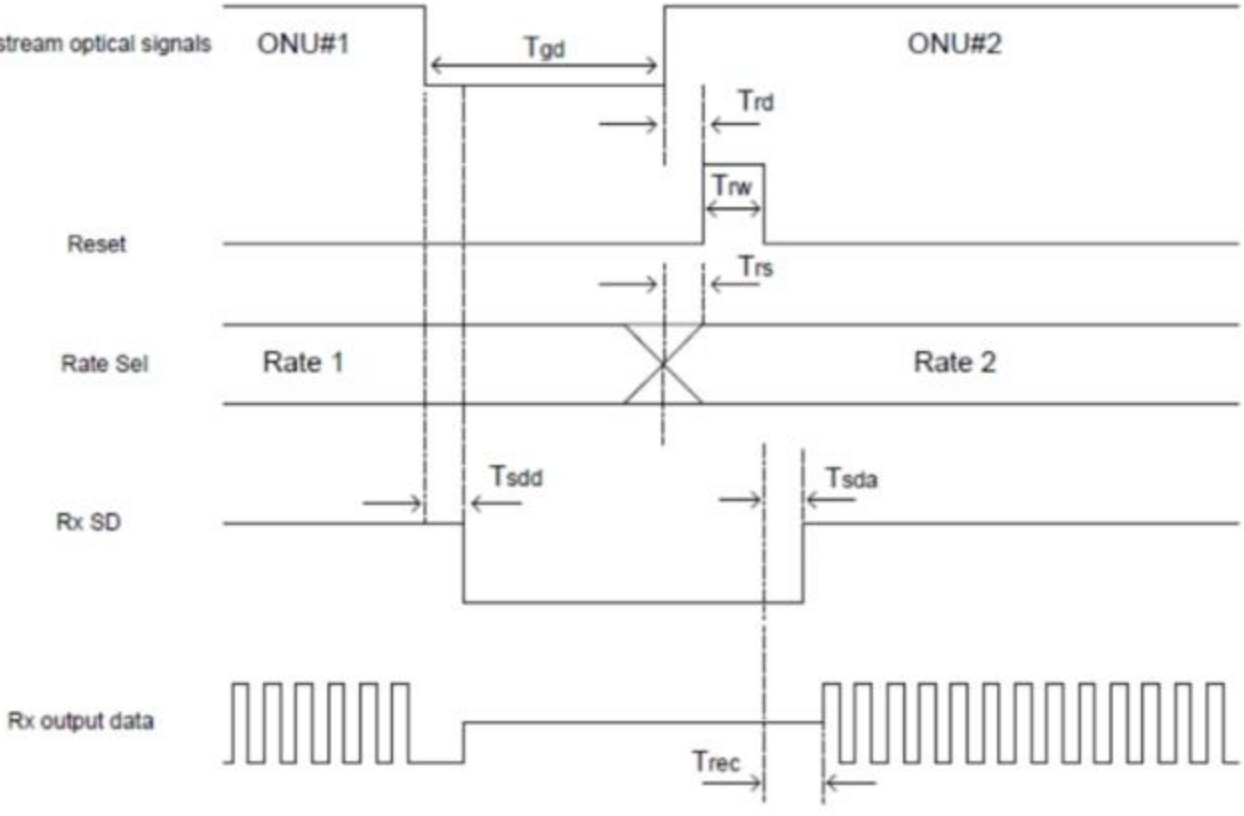


Figure 3, XGSPON RX Burst Timing(22pins)



Table 6 – XGSPON Rx Burst Timing(22pins)

Parameters	Symbol	Min	Typ	Max	Units	Notes
Guard Time	Tgd	51.2	-	-	ns	
Reset Delay	Trd	0	-	-	ns	1
Reset Width	Trw	25.6	-	-	ns	
RateSel Setup Time	Trs	5	-	-	ns	2
SD Assert Time	Tsda	0	-	51.2	ns	
SD De-assert Time	Tsdd	-	100	-	ns	3
Data Recovery Time	Trec	0	51.2	100	ns	

Notes:

1. Reset pulse is suggested to be fully inside the preamble.
2. The polarity of RateSel signal could be customized, high = 10G rate, low = 2.5G rate by default.
3. Signal detect auto reset function is applied. The signal detect de-assert time forced by auto reset is typically 100ns, and could short to about 12.8ns with additional reset pulse.

XGSPON Rx Burst Timing(20pins)

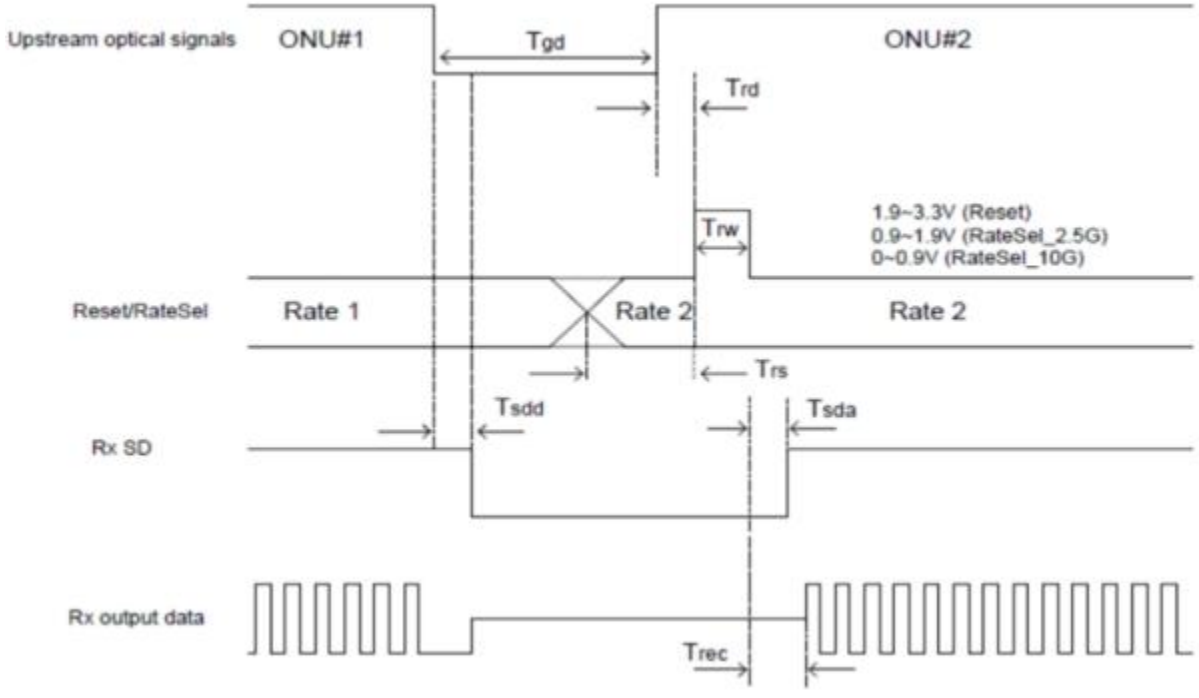


Figure 4, XGSPON Rx Burst Timing(20pins)



Table 7 – XGSPON Rx Burst Timing(20pins)

Parameters	Symbol	Min	Typ	Max	Units	Notes
Guard Time	Tgd	51.2	-	-	ns	
Reset Delay	Trd	0	-	-	ns	1
Reset Width	Trw	25.6	-	-	ns	
RateSel Setup Time	Trs	5	-	-	ns	2
SD Assert Time	Tsda	0	-	51.2	ns	
SD De-assert Time	Tsdd	-	100	-	ns	3
Data Recovery Time	Trec	0	51.2	100	ns	

Notes:

1. Reset pulse is suggested to be fully inside the preamble.
2. Middle voltage 0.9~1.9V = 2.5G rate, low voltage 0~0.9V = 10G rate by default.
3. Signal detect auto reset function is applied. The signal detect de-assert time forced by auto reset is typically 100ns, and could short to about 12.8ns with additional reset pulse.

GPON Rx Burst Timing(22pins or 20pins)

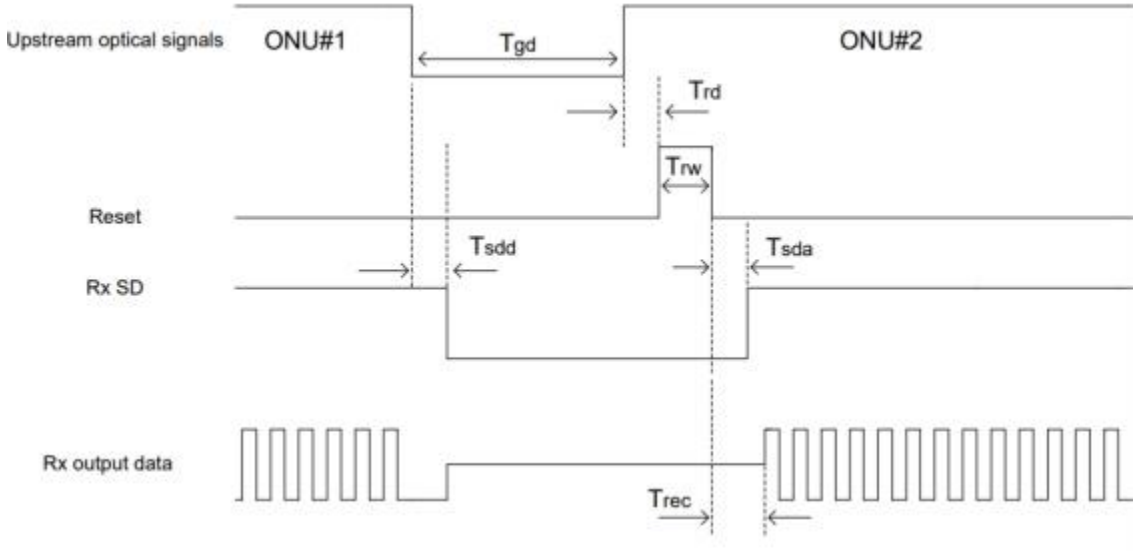


Figure 5, GPON Rx Burst Timing(22pins or 20pins)



Table 8 – GPON Rx Burst Timing(22pins or 20pins)

Parameters	Symbol	Min	Typ	Max	Units	Notes
Guard Time	Tgd	25.6	-	-	ns	
Reset Delay	Trd	0	-	-	ns	1
Reset Width	Trw	12.8	-	-	ns	
SD Assert Time	Tsda	0	25.6	51.2	ns	
SD De-assert Time	Tsdd	-	100	-	ns	2
Data Recovery Time	Trec	0	25.6	100	ns	

Notes:

1. Reset pulse is suggested to be fully inside the preamble.
2. Signal detect auto reset function is applied. The SD De-assert time forced by auto reset is typically 100ns, and could short to about 12.8ns with additional reset pulse.



Recommende

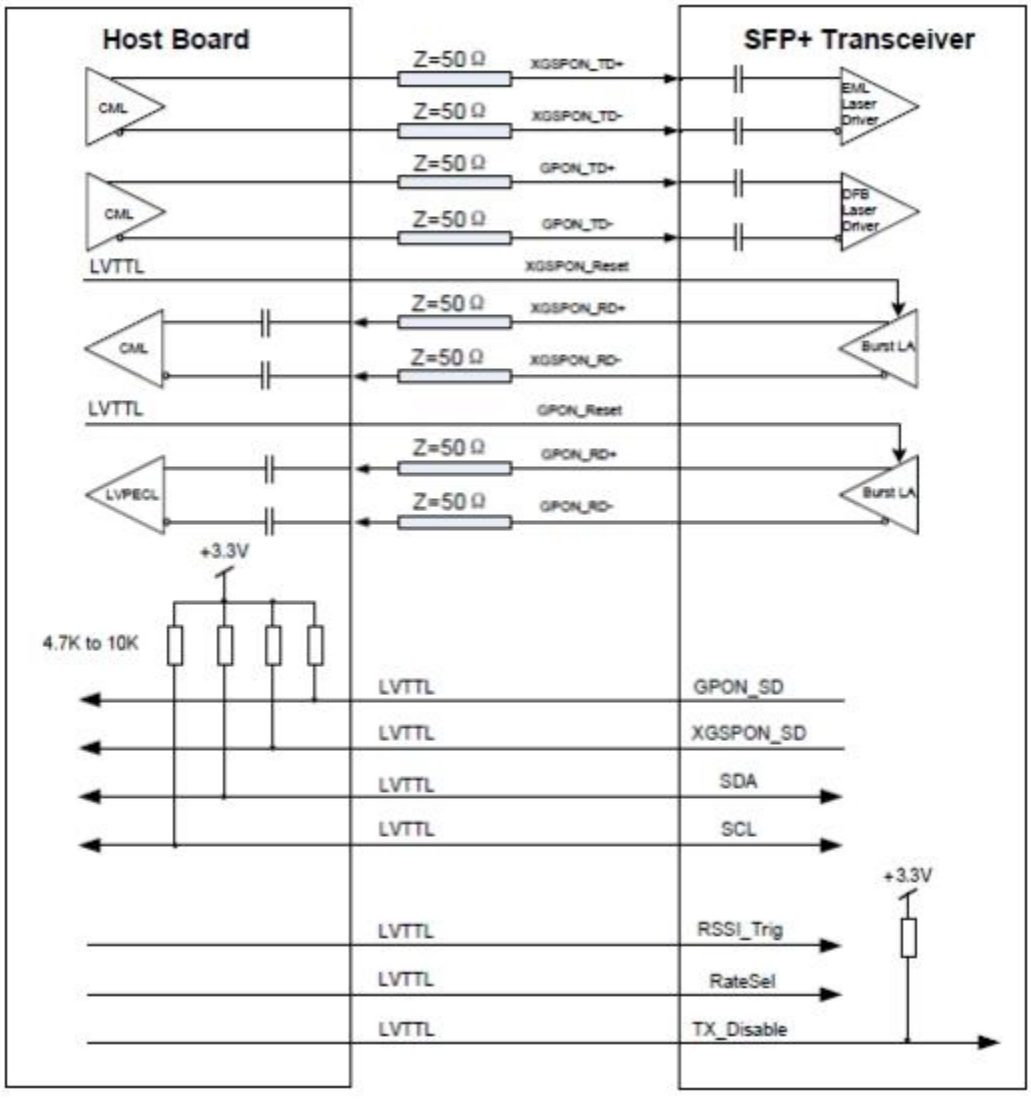


Figure 6, Recommended interface Circuit

Diagnostics

Table 9– Diagnostics

Parameter	Range	Accuracy	Unit	Notes	Calibration
Temperature	0 to 70	±3	ºC	LSB equal to 1/256c	Internal
Voltage	3.14 to 3.47	±3%	V	LSB equal to 100uV	Internal
Bias Current	0 to 130	±10%	mA	LSB equal to 4uA	Internal
Tx Power (9.953G)	5 to 8	±2dB	dBm	LSB equal to 0.2uW	Internal
Tx Power (2.488G)	3 to 7	±2dB	dBm	LSB equal to 0.2uW	Internal



Rx Power (9.953G)	-31 to -10	±3dB	dBm	LSB equal to 0.1uW	Internal
Rx Power (1.244G)	-32 to -12	±3dB	dBm	LSB equal to 0.1uW	Internal

Pin Function Definitions

Table 10– Pin Definitions (22 pins)

Pin	Logic	Name	Description	Notes
1	CML-I	GPON_TD+	GPON transmit data input, AC coupling	
2	CML-I	GPON_TD-	Inverted GPON transmit data input, AC coupling	
3		GND	Ground	
4	LVTTL-I	TX Disable	Active high, TX Disable control both XGS-PON and GPON transmitter, and can be separately disable GPON or XGS-PON by IIC programming.	
5	LVTTL-I/O	SDA	2-Wire serial interface SDA	
6	LVTTL-I	SCL	2-Wire serial interface SCL	
7	LVPECL-O	GPON_RD-	Inverted GPON received data output, DC coupling	
8	LVTTL-I	XGS-PON Reset	Reset for XGSPON LA, active high	
9	LVTTL-O	XGS-PON SD	XGS Receiver signal detect, logic 1 indicates normal operation	
10	LVTTL-I	RSSI_Trigger	RSSI trigger input, active high. RSSI trigger control both XGS-PON and GPON receiver, and select GPON or XGS-PON channel by IIC programming	
11	LVPECL-O	GPON_RD+	GPON received data output, DC coupling	
12	LVTTL-I	Rate_Sel	2.488G = Low, 9.953G = High	
13		GND	Ground	
14	CML-O	XGS-PON RD-	Inverted XGSPON received data output, DC coupling	
15	CML-O	XGS-PON RD+	XGSPON received data output, DC coupling	
16	LVTTL-O	GPON SD	GPON Receiver signal detect, logic 1 indicates normal operation	
17		VCC	+3.3V Power supply	
18		VCC	+3.3V Power supply	
19	LVTTL-I	GPON Reset	Reset for GPON LA, active high	
20	CML-I	XGS-PON TD+	XGS transmit data input, AC coupling	



21	CML-I	XGS-PON TD-	Inverted XGS transmit data input, AC coupling	
22		GND	Module Ground	

Table 11– Pin Definitions (20 pins)

Pin	Logic	Name	Description	Notes
1	CML-I	GPON_TD+	GPON transmit data input, AC coupling	
2	CML-I	GPON_TD-	Inverted GPON transmit data input, AC coupling	
3		GND	Ground	
4	LVTTL	SDA	2-Wire serial interface SDA	
5	LVTTL	SCL	2-Wire serial interface SCL	
6	LVPECL-O	GPON_RD-	Inverted GPON received data output, DC coupling	
7	LVTTL	XGSPON_Reset/Rate_select	High level (> 1.9V) for the RESET function, Low level (<0.9V) for 10G Rate selection signal, Intermediate level (0.9V ~1.9V) for 2.5g Rate select signal	
8	LVTTL-O	XGSPON _SD	XGS Receiver signal detect, logic 1 indicates normal operation	
9	LVTTL	Trig/Tx_disable	Signal pins are multiplexed through register, when use as Tx disable, active high.	
10	LVPECL-O	GPON_RD+	GPON received data output, DC coupling	
11		GND	Ground	
12	CML-O	XGS-PON RD-	Inverted XGSPON received data output, DC coupling	
13	CML-O	XGS-PON RD+	XGSPON received data output, DC coupling	
14	LVTTL-O	GPON SD	GPON Receiver signal detect, logic 1 indicates normal operation	
15		VCC Rx	+3.3V Power supply	
16		VCC Tx	+3.3V Power supply	
17	LVTTL-I	GPON Reset	Reset for GPON LA, active high	
18	CML-I	XGS-PON TD+	XGS transmit data input, AC coupling	
10	CML-I	XGS-PON TD-	Inverted XGS transmit data input, AC coupling	
20		GND	Module Ground	



Outline Drawing

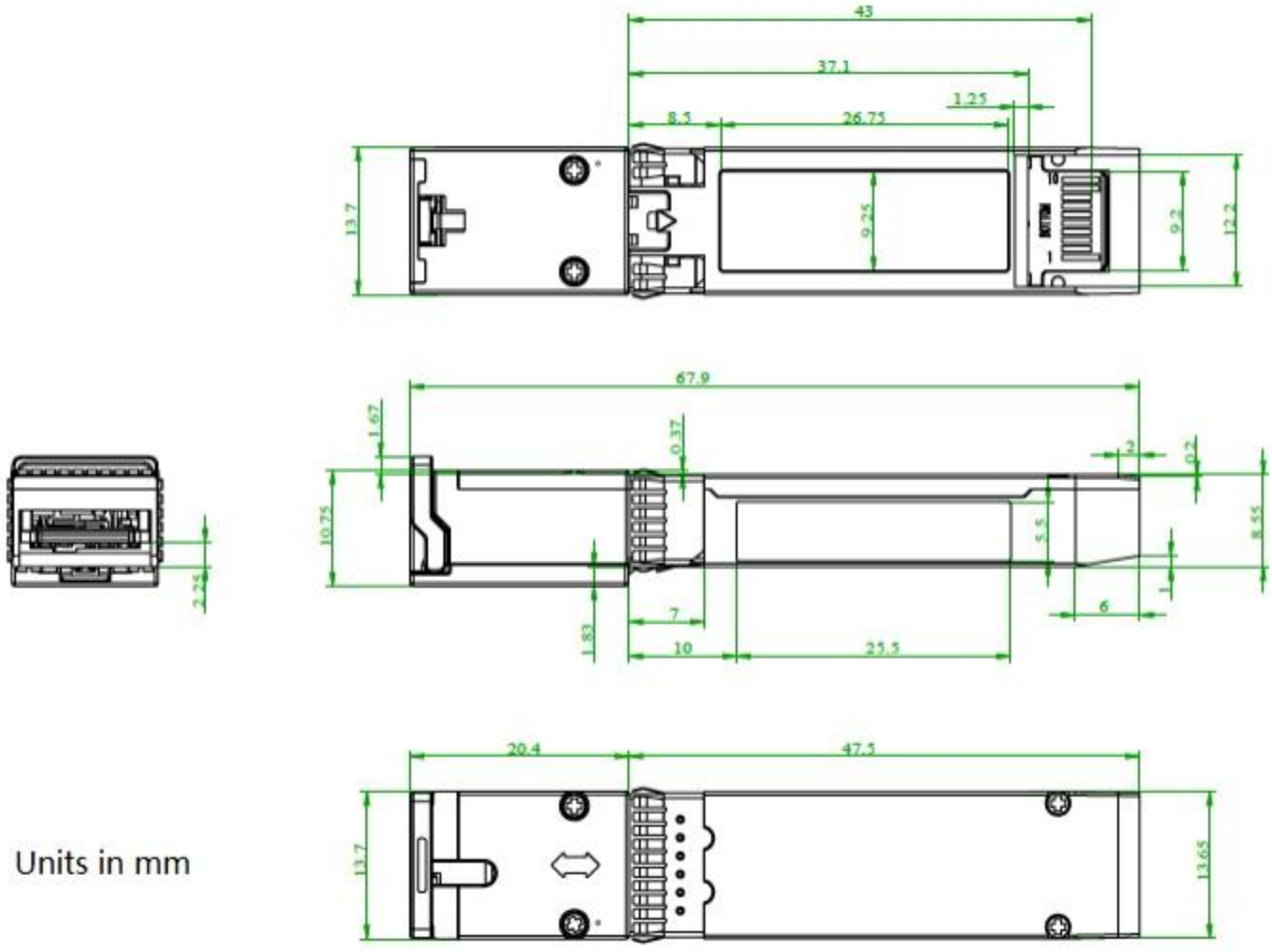


Figure 7, Outline Drawing

Ordering Information

Table 12 - Ordering Information

Part No.	Application	Data Rate	Laser Source	Fiber
SPPS-ST-XS-CP-CDFA	XGSPON&GPON Combo OLT C+, SFP+,22 Pins, 0~70°C	Tx1: 9.95328G Tx2: 2.488G Rx1: 9.95328G/2.488G Rx2: 1.244G	Tx1: 1577nm EML Tx2: 1490nm DFB	SMF
SPPS-ST-XS-CP-IDFA	XGSPON&GPON Combo OLT C+, SFP+,22 Pins, -40~85°C			
SPPS-ST-XS-CP-CDFB	XGSPON&GPON Combo OLT C+, SFP+,20 Pins, 0~70°C			
SPPS-ST-XS-CP-IDFB	XGSPON&GPON Combo OLT C+, SFP+,20 Pins, -40~85°C			

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SFPPXGP2-C+N2

XGSPON&GPON Combo OLT C+ SFP+



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.

Contacts