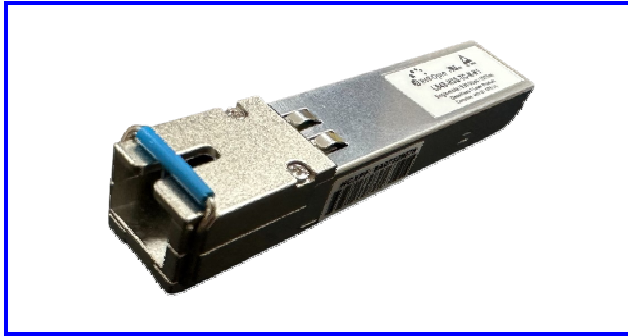




**RoHS Compliant**  
**XGS-PON OLT SFP+ Transceiver**  
**9.953Gbps Continuous Mode EML Transmitter**  
**9.953Gbps/2.488Gbps Dual Rate Burst Mode APD Receiver**



### Features

- Compliant with ITU-T G.9807.1 XGPON-OLT
- Compliant with ITU-T G.9807.1 XGSPON-OLT
- SC/UPC Simplex Receptacle Optical Interface
- 2x10 SFP+ Housing
- Compliant with SFP+ MSA SFF-8431
- TTL signal detect indicator
- Hot Pluggable
- Power consumption < 2W

### Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
LS48-H3L-TC-N-N1	AC/DC	TTL	3.3V	0°C to 70°C
LS48-H3L-TC-N-N2	AC/DC	TTL	3.3V	0°C to 70°C

### Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	$T_s$	-40	85	°C	
Supply Voltage	$V_{cc3}$	-0.3	3.6	V	



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**Recommended Operating Conditions**

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTE
Case operating Temperature	$T_c$	0		70	°C	
Supply Voltage	$V_{cc3}$	3.13	3.3	3.47	V	
Supply Current	$I_{cc3}$	---	~	606	mA	

**Diagnostics**

PARAMETER	RANGE	ACCURACY	UNIT	CALIBRATION
Temperature	-40 to 85	± 3	°C	
Voltage	3.13 to 3.47	± 0.1	V	
Bias Current	0 to 120	± 10%	mA	Internal
TX Power	+2 to +7	± 3	dB	
RX average Power	-5 to -30	± 3	dB	



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**Transmitter Electro-optical Characteristics**

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Transmission Data Rate	$DR$		9.95		Gb/s	
Output Power	$P_{OUT}$	+2	---	+5	dBm	N1
		+4		+7	dBm	N2
Extinction Ratio	$ER$	8.2	---	---	dB	
Center Wavelength	$\lambda_c$	1575	1577	1580	nm	
Average Launch Power @ Tx OFF	$P_{OFF}$			-45	dBm	
Side mode Suppression ratio	$SSR_{min}$	30	---	---	dB	
Spectrum Width(-20dB)	$\sigma$			1	nm	
Output Eye		Compliant ITU-T G.9807.1				
Differential Input Voltage	$V_{DIFF}$	120	---	820	mV	
Transmit Disable Input-Low	$TX\_FAULT_L$	0.0	---	0.8	V	
Transmit Disable Input-High	$TX\_FAULT_H$	2.0	---	$V_{CC}$	V	
Transmit Fault Output-Low	$TX\_FAULT_L$	0.0	---	0.5	V	
Transmit Fault Output-High	$TX\_FAULT_H$	2.4	---	$V_{CC}$	V	



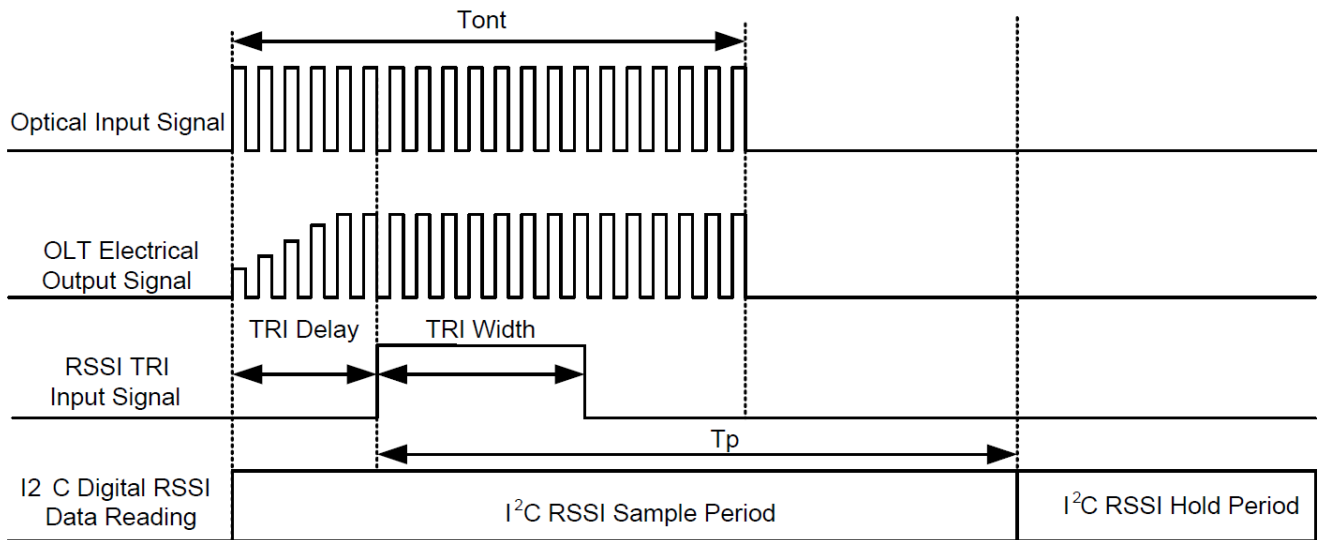
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**Receiver Electro-optical Characteristics**

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	$P_{IN}$	-5			dBm	N1
		-7			dBm	N2
		---	---	-26	dBm	@9.95Gbps,N1
Receiver Sensitivity	$P_{IN}$			-28	dBm	@9.95Gbps,N2
				-27.5	dBm	@2.488Gbps,N1
				-29.5	dBm	@2.488Gbps,N2
Operating Center Wavelength	$\lambda_C$	1260	---	1280	nm	
Optical Return Loss	$ORL$	---	---	-20	dB	
Dynamic Range	$DR$	15			dB	
Immunity from Continuous Identical Digits	$CID$	72			Bits	
Receiver Settling Time	$R_C$			100	ns	
Loss of Signal-Asserted	$P_A$	-38	---	---	dBm	
Loss of Signal-Deasserted	$P_D$	---	---	-30	dBm	
Differential Output Voltage	$V_{DIFF}$	400		800	mV	



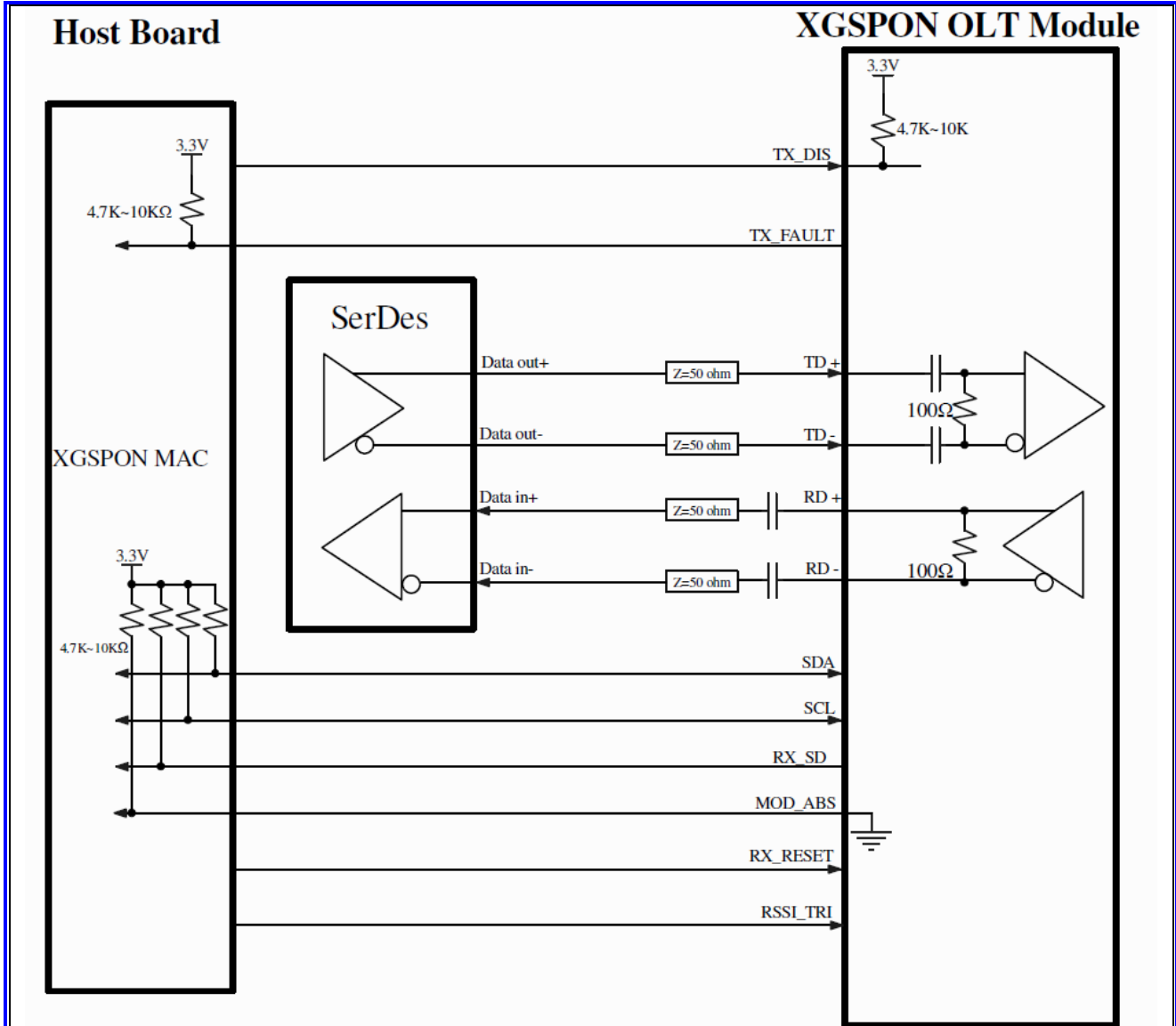
**Digital RSSI Sample/Hold Timing**



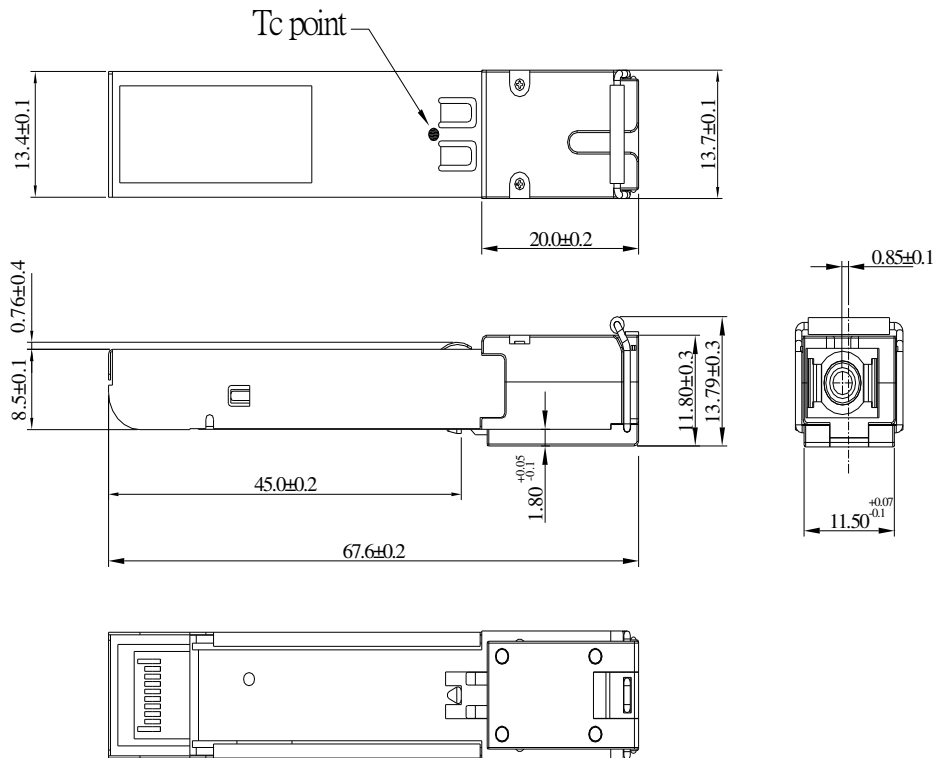
PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Signal Width	$T_{ont}$	300	---	---	ns	
RSSI Trigger Delay	$T_{tri}$	0	300	---	ns	
RSSI Trigger Width	$T_{I2C}$	500			ns	
I2C Read Time	$T_p$	500			$\mu$ s	
RSSI Monitor Range	$P_{mon}$	-30		-7	dBm	
RSSI Precision	$P_{rssi}$	-3		+3	dB	

Note:  $T_{tri} + T_{I2C} < T_{ont}$

Block Diagram of Transceiver



**Dimensions**



DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED

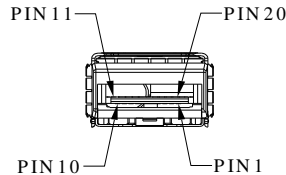
Latch color is Blue



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**Pin Assignment**

Pin-Out



Pin	Signal Name	I/O	Description	Note
1	GND		Module Ground	
2	TX_FAULT	O	Transmit Fault	
3	TX_DIS	I	Transmit Burst Control	
4	SDA	I/O	2-wire Serial Interface Data Line	
5	SCL	I/O	2-wire Serial Interface Clock	
6	MOD_ABS		Module Absent, Grounded inside the module	
7	RX_RESET	I	RX Reset Pulse Input	
8	RX_SD	O	Receiver Signal Detect, Assert High when burst packet coming	
9	RSSI_TRI	I	Receiver Signal Strength Indication Trigger Input	
10	GND		Module Ground	
11	GND		Module Ground	
12	RD-	O	Receive Data out Bar, DC coupled inside the module	
13	RD+	O	Receive Data out, DC coupled inside the module	
14	GND		Module Ground	
15	V <sub>CC3</sub>		3.3V Power Supply Input	
16	V <sub>CC3</sub>		3.3V Power Supply Input	
17	GND		Module Ground	
18	TD+	I	Transmit Data in, AC coupled inside the module	
19	TD-	I	Transmit Data in Bar, AC coupled inside the module	
20	GND		Module Ground	





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**Eye Safety Mark**

<p>The LS4 series single-mode transceiver is a class 1 laser product. It complies with EN 60825-1 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.</p> <p><b><u>Caution</u></b> <b>All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.</b></p>	<p><b><u>Required Mark</u></b></p> <div data-bbox="798 562 1169 680" style="border: 1px solid black; padding: 5px; text-align: center;"><p><b>Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11</b></p></div>
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Note : All information contained in this document is subject to change without notice.