Features

- Single fiber, integrated triplexer transceiver
- Support IEEE802.3-av 10/1G base PRX30 asymmetric EPON OLT
- Support IEEE802.3-2008 EPON OLT
- Integrated with micro-optics WDM filter for triplexer
- 1577nm continuous-mode transmitter with EML laser
- 1490nm continuous-mode transmitter with DFB laser
- 1310nm burst-mode receiver with APD-TIA
- Digital Diagnostic INF-8077i Compliant
- +3.3V and +5V power supplies
- Operating case temperature:-5-70℃
- RoHS Compliant

Regulatory Compliance

Table 1 – Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1 (>500V)
Electrostatic Discharge (ESD) at the Faceplate	IEC 61000-4-2	Compatible with Standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with Standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 Laser Product
RoHS Compliance	2011/65/EU	Compatible with Standards

Note:

In light of item 5 in Annex of 2011/65/EU, “Pb in the glass of cathode ray tubes, electronic components and fluorescent tubes.” and item 13 in Annex of 2005/747/EC, “Lead and cadmium in optical and filter glass.”, the two exemptions are being concerned for Source Photonics transceivers, because Source Photonics transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Absolute Maximum Ratings

Table 2 – Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T_s	-40	-	+85	ºC	
Supply Voltage	Vcc3	-0.5	-	+4.0	V	
	Vcc5	-0.5		+6.0		
Operating Relative Humidity	RH	-	-	85	%	

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V_{CC3}	3.14	3.3	3.46	V	
	V_{CC5}	4.75	5.0	5.25		
Supply Current	Icc3	-	-	650	mA	
	Icc5			380		
Operating Temperature (Case)	T_{opr}	-5	-	70	ºC	

Optical and Electrical Characteristics

Table 4 – Optical Characteristics

Transmitter						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
10G Transmitter						
Transmitter Signal Rate			10.3125G			
Centre Wavelength	λ_C	1575	1577	1580	nm	
Optical Spectrum Width (-20dB)	$\triangle\lambda$			1	nm	
Side Mode Suppression Mode	SMSR	30			dB	
Average Launch Power	P_{OUT}	2		5	dBm	1
Average Launch Power-OFF Transmitter	P_{OFF}			-39	dBm	
Extinction Ratio	EX	6			dB	2
Total Jitter	TJ			±0.23	UI	2
Rise/Fall Time (20%-80%)	T_R/T_F			50	ps	2,3
$RIN_{15}OMA$				-128	dB/Hz	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-10	dB	
Transmitter and dispersion Penalty	TDP			1.5	dB	

Optical Eye Mask	Compliant With IEEE Std 802.3av™-2009					2,4
1G Transmitter						
Transmitter Signal Rate			1.25G			
Centre Wavelength	λ_C	1480	1490	1500	nm	
Optical Spectrum Width (-20dB)	△λ			1	nm	
Side Mode Suppression Mode	SMSR	30			dB	
Average Launch Power	P_{OUT}	3		7	dBm	1
Average Launch Power-OFF Transmitter	P_{OFF}			-39	dBm	
Extinction Ratio	EX	9				5
Total Jitter	TJ			±0.43	UI	5
Rise/Fall Time (20%-80%)	T_R/T_F			260	ps	3,5
$RIN_{15}OMA$				-115	dB/Hz	
Optical Return Loss Tolerance				12	dB	
Transmitter Reflectance				-10	dB	
Transmitter and dispersion Penalty	TDP			2.3	dB	
Optical Eye Mask	Compliant With IEEE Std 802.3™-2008					5,6
Receiver						
Operating Wavelength	λ_C	1260	1310	1360	nm	
Sensitivity	P_{SEN}			-30	dBm	7
Saturation	P_{SAT}	-9			dBm	
Receiver Threshold Settling Time	$T_{setting}$			400	ns	7,8
Dynamic Range		-30		-9	dBm	7,9
Loss of Signal Deassert	P_{LOSD}		-	-33	dBm	
Loss of Signal Assert	P_{LOSA}	-45	-		dBm	
LOS Hysteresis	P_{LOSD}- P_{LOSA}	0.5	-	6	dB	
Receiver Reflectance				-12	dB	

Notes:

1. The optical power is launched into 9/125um SMF.
2. Measured with PRBS 2^{31}-1 test pattern @10.3125Gbps.
3. Measured with the Bessel-Thompson filter OFF.
4. Transmitter eye mask definition {0.25UI, 0.40UI, 0.45UI, 0.25UI, 0.28UI,0.40UI}.
5. Measured with PRBS 2^7-1 test pattern @1.25Gbps.
6. Transmitter eye mask definition {0.22UI, 0.375UI, 0.20UI, 0.20UI, 0.30UI}.
7. Measured with a PRBS 2^7-1 test pattern @1.25Gbps and ER=9dB, BER =10^{-12}
8. See Figure 1, 2. For multiple ONUs application, It isn't easy to test $T_{SETTLING}$ directly, but there is a relationship $T_{SETTLING}$ = T_{GAP}-T_{GUARD} when T_{ON}=T_{OFF}, then $T_{SETTLING}$ can be calculated by T_{GAP} and a certain guard time at ONU side.
9. See Figure 2. T_{GAP} be less than 250ns is guaranteed.

Table 5 – Electrical Specifications and Timing

Transmitter						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
10G Transmitter						
Data Input Differential Swing	V_{IN}	120		820	mVp-p	1
Input Differential Impedance	Z_{IN}	80	100	120	Ω	
Transmitter Disable Voltage - Low	$V_{TDIS, L}$	0		0.8	V	2
Transmitter Disable Voltage - High	$V_{TDIS, H}$	2.0		Vcc	V	
1G Transmitter						
Data Input Differential Swing	V_{IN}	200		1600	mVp-p	3
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
Transmitter Fault Indication Voltage - Low	VTFI, L	0		0.4	V	
Transmitter Fault Indication Voltage - High	VTFI, H	2.4		Vcc	V	
Receiver						
Data Output Differential Swing	V_{OUT}	400		1600	mV_{P-P}	4
Loss of Signal Voltage - Low	$V_{SD, L}$	0		0.4	V	5
Loss of Signal Voltage - High	$V_{SD, H}$	2.4		V_{CC3}	V	
Loss of Signal Assert Time	T_{LOSA}			512	ns	
Loss of Signal Deassert Time	T_{LOSD}			512	ns	
Output Differential Impedance	R_{out}	80	100	120	Ω	
Time to Initialize 2-Wire Interface	t_2w_start_up	-	-	300	ms	
Time to Initialize	T_start_up	-	-	300	ms	

Notes:

1. Compatible with CML input, AC coupled internally. (See Recommended Interface Circuit).
2. Tx_Diable (See Pin Function Definitions).
3. Compatible with LVPECL input, AC coupled internally. (See Recommended Interface Circuit).
4. Compatible with LVPECL Output, DC coupled internally. guaranteed in the full range of input optical power (See Recommended Interface Circuit)
5. LOS (See Recommended Interface Circuit).

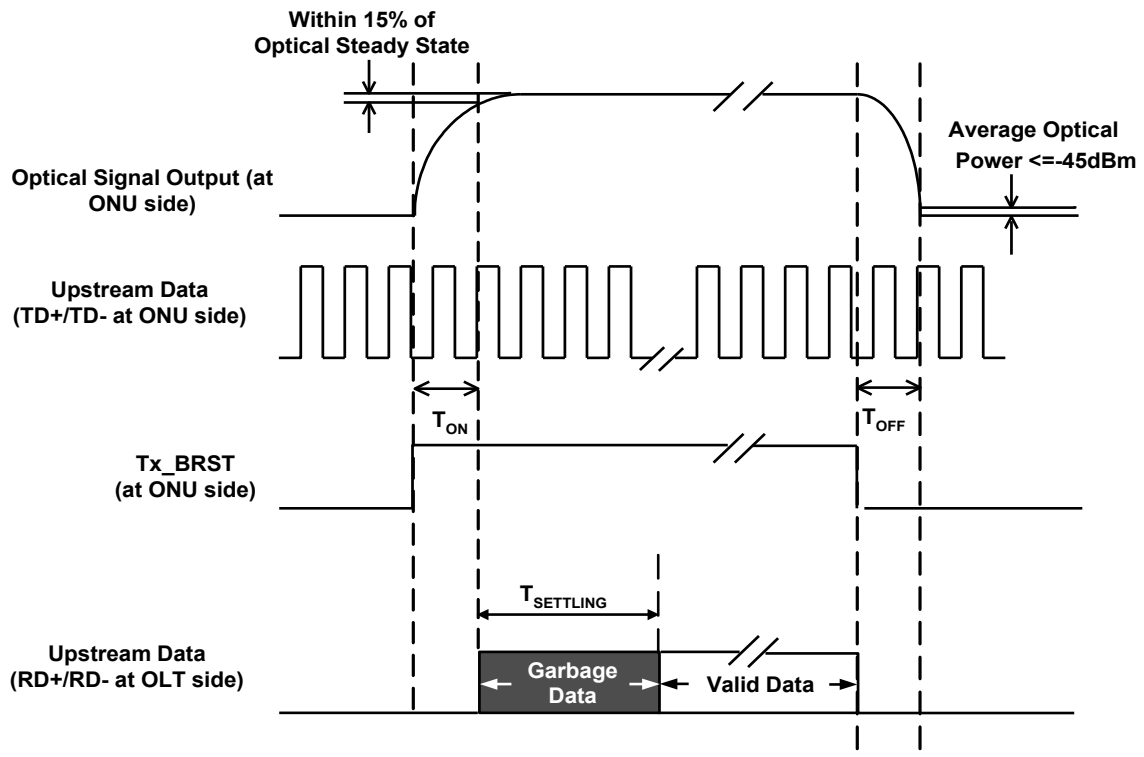


Figure 1, Timing Parameter Definition in Burst Mode Sequence (Sole ONU Application)

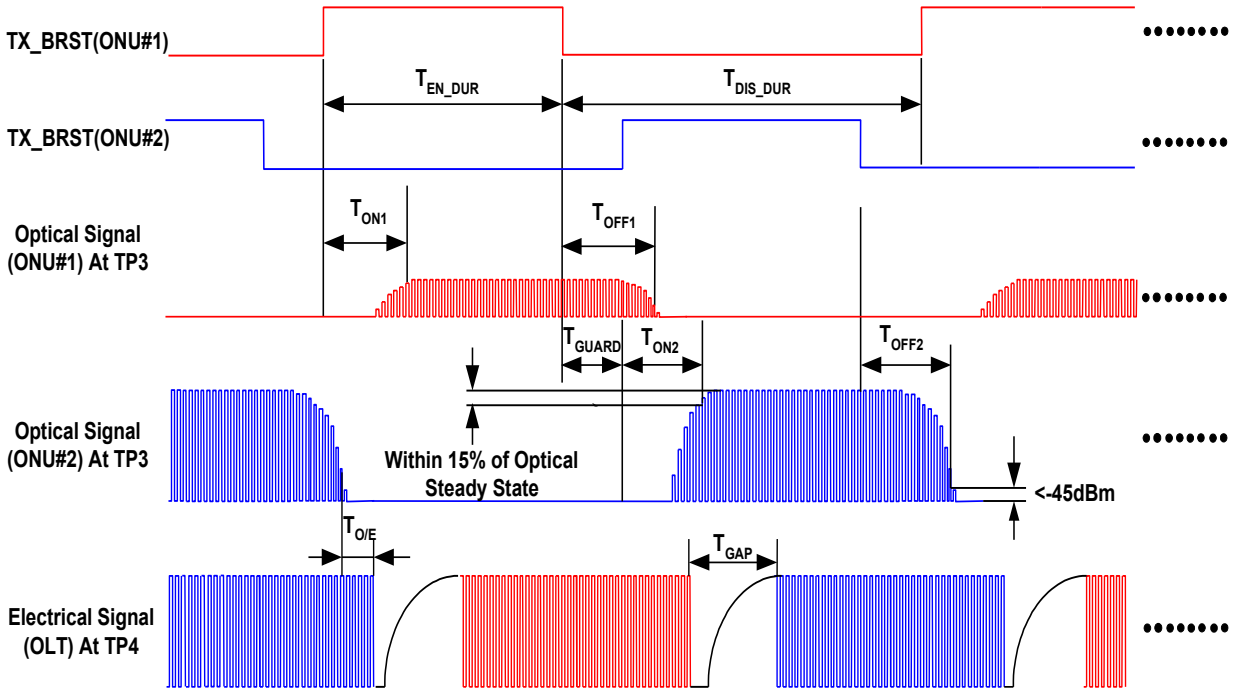


Figure 2, Timing Parameter Definition in Burst Mode Sequence (Dual ONUs Application)

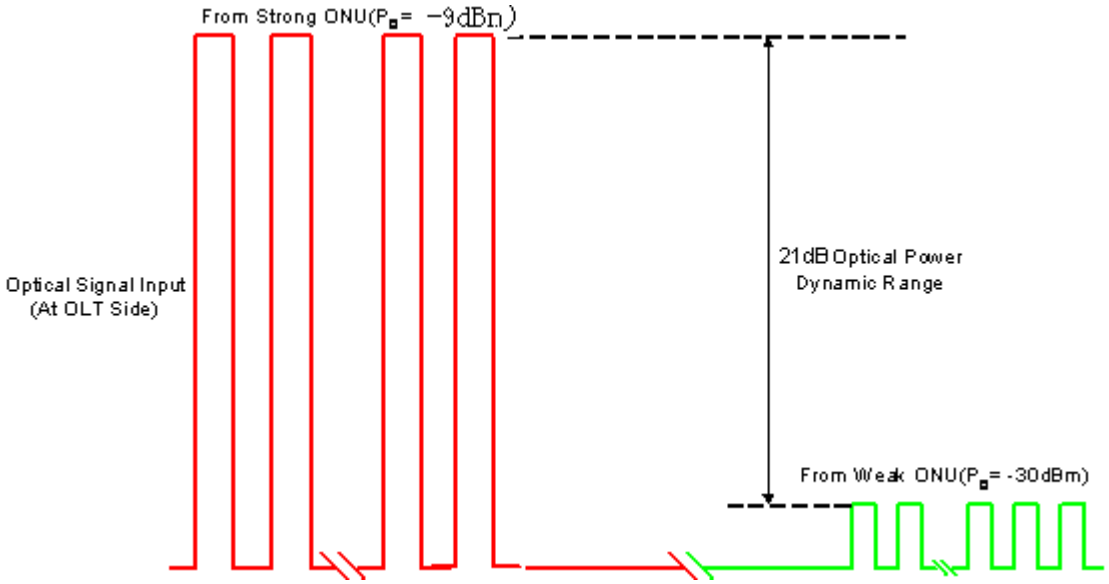


Figure 3, Burst Mode Receiver Dynamic Range

Diagnostics

Table 6 – Diagnostics(A0h)

Address	Parameter	Range	Accuracy	Unit	Calibration	Notes
96-97	Temperature	-10 to 80	±3	ºC	Internal	LSB equal to 1/256C
98-99	Voltage	0 to Vcc	±3%	V	Internal	LSB equal to 100uV
100-101	Bias Current	0 to140(10G)	10%	mA	Internal	LSB equal to 4uA
106-107		0 to 80(1G)				LSB equal to 4uA
102-103	Tx Power	0 to 6(10G)	±3	dB	Internal	LSB equal to 0.4uW
108-109		-1 to 8(1G)				LSB equal to 0.4uW
104-105	Rx Power	-30 to -9	±3	dB	External	LSB equal to 0.1uW

Table 7 – EEPROM Serial ID (01h)

Name of Field	Description of Field	Address	Hex	ASCII
Identifier	Type of transceiver	128	06	XFP
Ext. Identifier	Extended identifier of type of transceiver	129	B0	
Connector	Code for connector type	130	01	SC/UPC
Transceiver	Code for electronic compatibility or optical compatibility	131	00	
		132	00	
		133	00	
		134	80	BASE-PX
		135	00	
		136	00	

		137	00	
		138	00	
Encoding	Code for high speed serial encoding algorithm	139	80	64B/66B
BR_MIN	Minimum bit rate, units of 100 MBits/s.	140	67	10.3125Gbps
BR_MAX	Maximum bit rate, units of 100 MBits/s	141	67	
Length (SMF)_Km	Link length supported for single mode fiber, units of km	142	14	20km
Length (E-50um)	Link length supported for EBW 50/125 μm, units of 2 m	143	00	
Length (20μm)	Link length supported for 20 um OM2 fiber, units of 10 m	144	00	
Length (62.5μm)	Link length supported for 62.5 um OM1 fiber, units of 10 m	145	00	
Length (Copper)	Link length supported for copper, units of meters	146	00	
Device Tech		147	F6	EML Laser and APD
Vendor Name	Vendor name (ASCII)	148	53	S
		149	4F	O
		150	55	U
		151	52	R
		152	43	C
		153	45	E
		154	50	P
		155	48	H
		156	4F	O
		157	54	T
		158	4F	O
		159	4E	N
		160	49	I
		161	43	C
		162	53	S
		163	20	[Space]

Table 8 – EEPROM Serial ID (01h)

Name of Field	Description of Field	Address	Hex	ASCII
CDR support	CDR Rate Support	164	40	For 10.3 Gbps
Vendor OUI	XFP vendor IEEE company ID for	165	00	
		166	1F	

	Source Photonics Inc.	167	22	
Vendor PN	Part number in ASCII, e.g. XPPXEX3CDFB	168	58	X
		169	50	P
		170	50	P
		171	58	X
		172	45	E
		173	58	X
		174	33	3
		175	43	C
		176	44	D
		177	46	F
		178	42	B
		179	20	[Space]
		180	20	[Space]
		181	20	[Space]
		182	20	[Space]
		183	20	[Space]
Vendor Rev.	Revision level for part number provide by vendor (ASCII)	184	30	01version
		185	31	
Wavelength	Laser wavelength, nm	186	7B	1577nm
		187	3C	
Wavelength tolerance	Guaranteed range of laser wavelength (+/- value) from Nominal wave-length.	188	03	5nm
		189	E8	
Max Case Temp	Maximum Case Temperature	190	4B	75c
CC_BASE	Check code for Base ID Fields addresses (120-190)	191	xx	
Power Supply	Power supply current requirements and max power dissipation	192	AF	3.5W(max)
		193	00	
		194	8A	
		195	00	
Vendor SN	Serial number provided by vendor	196	xx xx xx xx	
Date Code	Vendor's manufacturing date code	212	xx xx xx xx xx xx xx xx	
Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented	220	08	Average power
Enhanced Option	Indicates which optional enhanced features are implemented	221	xx	

AUX monitoring	Defines quantities reported by Aux. A/D channels	222	27	+3.3v power supply
CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	223	xx	
Wavelength for 2.5G		224	xx xx	
Wavelength for 1.25G		226	74	1490nm
		227	68	
Vendor Spec.		228	xx xx xx xx xx xx xx xx	

Table 9 – Pin Definitions

Pin	Logic	Symbol	Name/Description	
1		GND	Module Ground	1
2	LVPECL-I	TX_1G+	Transmitter Non-Inverted Data Input(1G)	2
3	LVPECL-I	TX_1G-	Transmitter Inverted Data Input(1G)	
4		GND	Module Ground	
5	LVTTL-I	TX_DIS	Turn off Transmitter Laser Out, Control 10G and 1G Transmitter	3
6		V_{CC5}	+5V Power Supply(For TEC)	
7		GND	Module Ground	
8		V_{CC3}	+3.3V Power Supply(TX)	
9		V_{CC3}	+3.3V Power Supply(RX)	
10	LVTTL-I	SCL	2-Wire Serial Interface Clock	
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	
12	LVTTL-O	MOD_ABS	Module Absent Indication	
13		NC	Not Connect	
14	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication	4
15		GND	Module Ground	2
16		GND	Module Ground	
17		RX_10G-	Receiver Inverted Data Output(10G),default is NC	
18		RX_10G+	Receiver Non-Inverted Data Output(10G), default is NC	
19		GND	Module Ground	2
20	LVPECL-O	RD-	Receiver Inverted Data Output(1G)	5
21	LVPECL-O	RD+	Receiver Non-Inverted Data Output(1G)	
22		NC	Not Connect	
23	LVTTL-I	RX_RSSI_TRIG	RSSI Trigger Input	
24		NC	Not Connect	
25		NC	Not Connect	
26		NC	Not Connect	2

27		GND	Module Ground	
28	CML-I	TD-	Transmitter Inverted Data Input(10G)	6
29	CML-I	TD+	Transmitter Non-Inverted Data Input(10G)	
30		GND	Module Ground	2

Note

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Compatible with LVPECL/CML input, AC coupled internally. (See Recommended Interface Circuit)
3. Tx_Diable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7-10 KΩ resistor.
4. LOS is an open collector/drain output, which should be pulled up with a 4.7K-10KΩ resistor. Pull up voltage between 2.0V and V_{CCT}. (See Recommended Interface Circuit)
   These are the differential receiver outputs.
5. They are DC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. (See Recommended Interface Circuit)
6. These are the differential transmitter inputs. They are AC coupled differential lines with 100Ω differential termination inside the module. (See Recommended Interface Circuit)

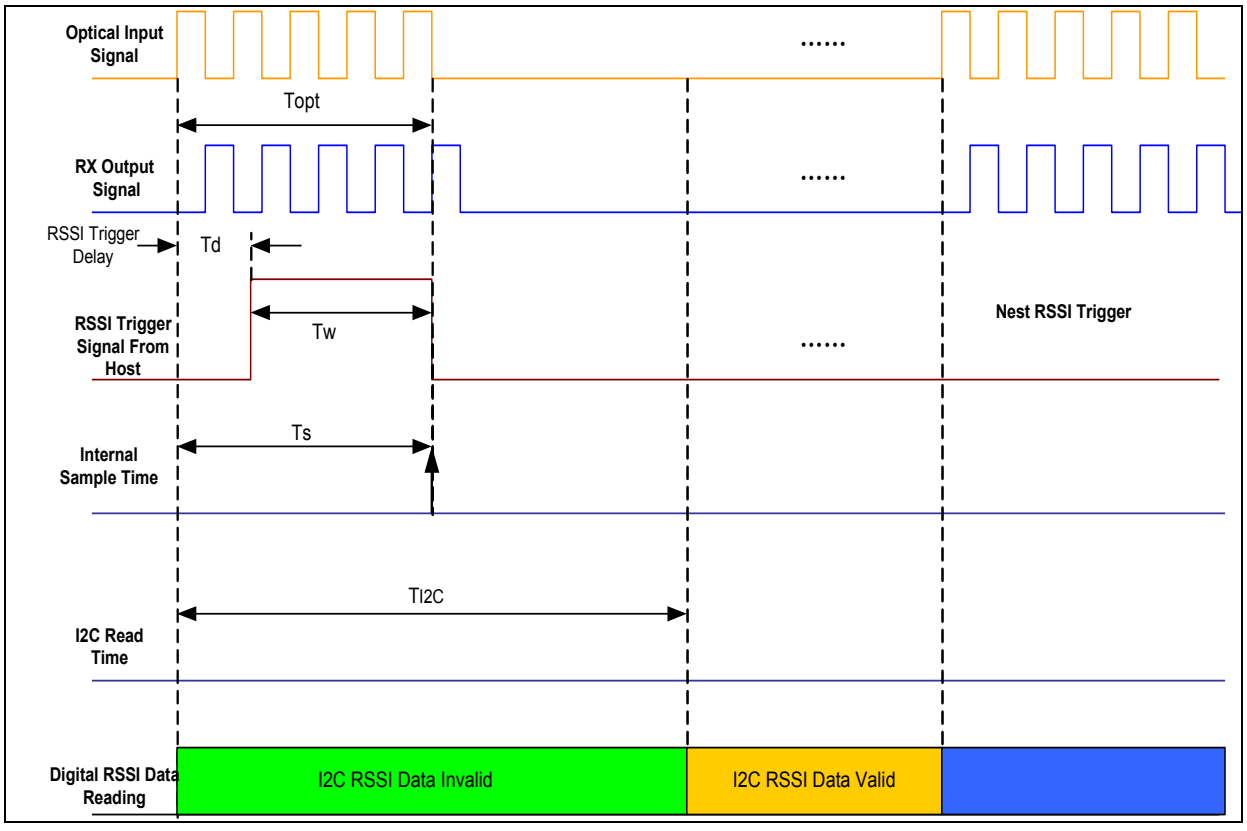


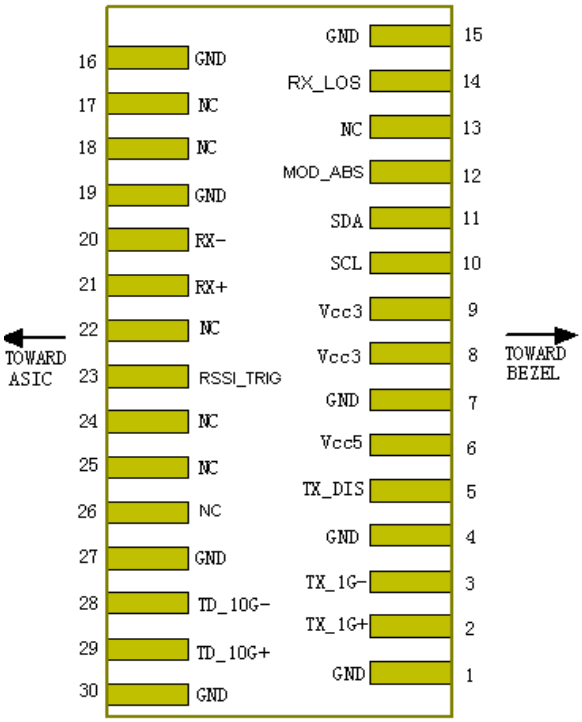
Figure 4, RSSI Timing Diagram

Table 10 – RSSI Parameter

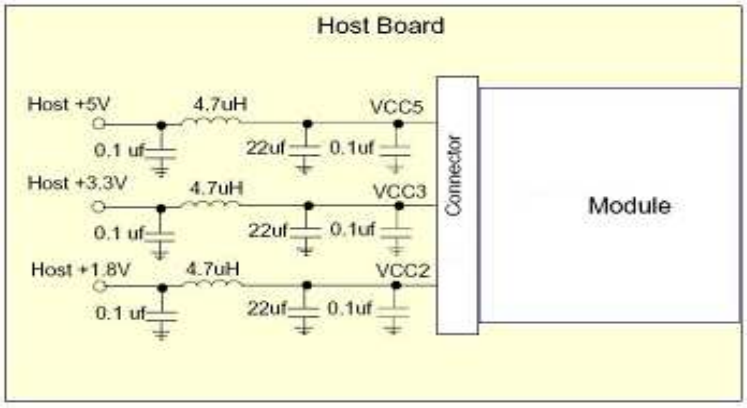
Item	Symbol	Min	Typ	Max	unit
Trigger width	T_w		600		ns

Trigger Delay	Td			600	ns
Package Length	T_{pk}	1000	1200		ns
Internal Sampling Time	Ts	1000			ns
I^2C response time	T_{i2c}	500			us

Module PCB Pin out



Recommended Host Board Power Supply Circuit



Recommended Interface Circuit

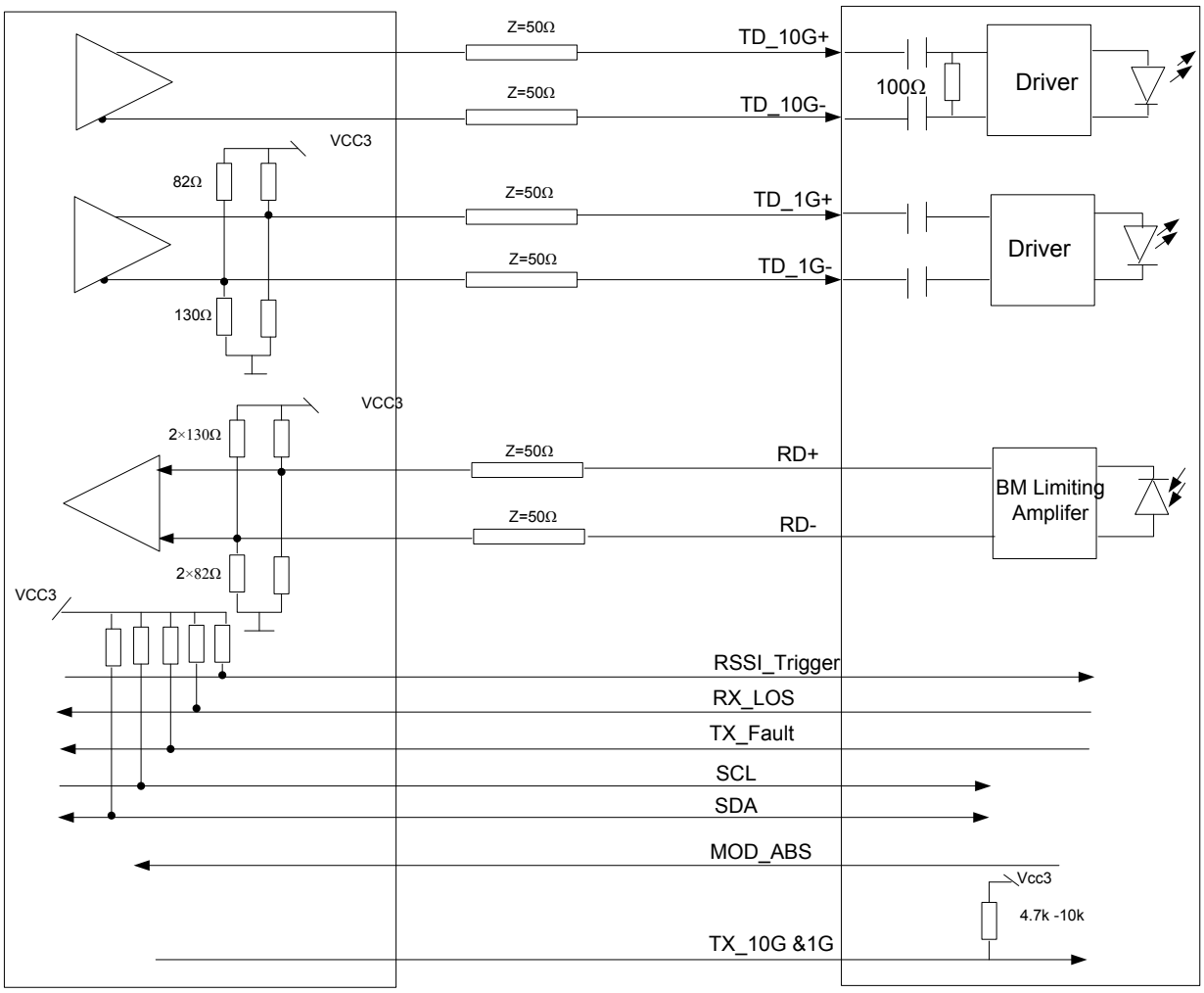


Figure 5, Recommended Interface Circuit

Mechanical Design

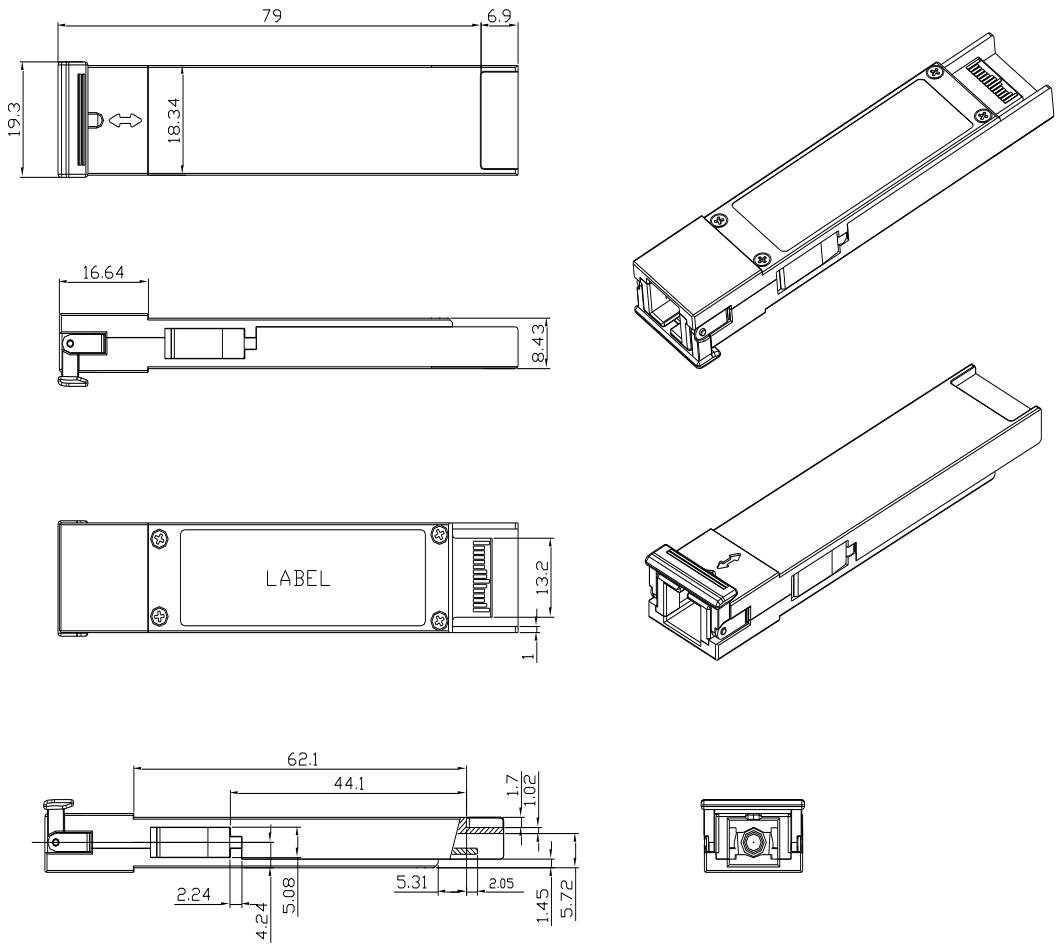


Figure 6, Mechanical Design

Order Information

Table 11– Order Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
XPP-XE- X3-CDFB	10/1G Base PRX30 OLT	Tx1 1.25Gb/s ,Tx2 10.3125G and Rx 1.25Gb/s asymmetric	1490 nm DFB 1577 nm EML	SMF

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.

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