



Features

- Support ITU-T G.9807.1 XGS-PON OLT N1 Application
- Single fiber bi-directional data links with 9.953Gbps downstream and 9.953Gbps/2.488Gbps(compatible) upstream
- 1577nm continuous-mode transmitter with EML laser
- 1270nm burst-mode receiver with APD-TIA
- 2-wire interface for integrated digital diagnostic Monitoring
- Digital receiving signal strength indication (RSSI)
- XFP MSA package with SC/UPC receptacle optical interface
- +3.3V power supplies
- Operating case temperature: 0~70°C
- RoHS With Exemptions

Regulatory Compliance

Table 1 - Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V)
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Immunity	IEC 61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class1 laser product.
Component Recognition	UL and CSA	Compliant with standards
RoHS	2011/65/EU	Compliant with exemptions(7C)

Absolute Maximum Ratings

Table 2 - Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Storage Ambient Temperature	T _s	-40	-	+85	° C	
Operating Case Temperature	T _c	0		70	° C	
Supply Voltage	V _{CC3}	0	-	3.6	V	
Supply Voltage	V _{CC5}	0	-	5.25	V	
Operating Relative Humidity	RH	5	-	+95	%	

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Case Temperature	T _c	0	-	70	° C	
Power Supply Voltage	V _{CC3}	3.13	3.3	3.47	V	
Power Supply Voltage	V _{CC5}	4.75	5.0	5.25	V	
Power Supply Current	I _{CC3}			1000	mA	
Power Supply Current	I _{CC5}	-	-	500	mA	
Power Consumption				3.5	w	

Optical Characteristics

Table 4 – Optical Characteristics

Transmitter(9.953G)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Centre Wavelength	λ_c	1575	1577	1580	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power	P _{OUT}	2		5	dBm	1
Average Launch Power-OFF	P _{OFF}			-39	dBm	
Extinction Ratio	EX	8.2			dB	2

Receiver(9.953G)						
Operating Wavelength	λ_c	1260	1270	1280	nm	
Sensitivity	P_{SEN}			-26	dBm	3
Saturation	P_{SAT}	-5			dBm	
Signal Detected De-assert Level	P_{sdd}	-42			dBm	4
Signal Detected Assert Level	P_{sda}			-28	dBm	5
Reflection of Rx	1260-1280nm			-12	dB	6
Receiver(2.488G)						
Operating Wavelength	λ_c	1260	1270	1280	nm	
Sensitivity	P_{SEN}			-27.5	dBm	3
Saturation	P_{SAT}	-7			dBm	
Signal Detected De-assert Level	P_{sdd}	-42			dBm	4
Signal Detected Assert Level	P_{sda}			-28	dBm	5
Reflection of Rx	1260-1280nm			-12	dB	6

Notes:

1. The optical power is launched into 9/125um SMF.
2. Measured with PRBS $2^{31}-1$ test pattern @9.953Gbps.
3. Measured with a PRBS $2^{31}-1$ test pattern @9.953Gbps and ER=6dB BER = 10^{-3} , and PRBS $2^{23}-1$ test pattern @2.488Gbps and ER=8.2dB, BER = 10^{-4}
4. Decreases in optical power below the specified level will cause signal detected assert output to switch from a high state to a low state.
5. Increases in optical power below the specified level will cause signal detected De-assert output to switch from a low state to a high state.
6. Maximum reflectance of receiver module measured at receiver wavelength. Reflections from module back to the cable plant.

Electrical Characteristics

Table 5 – Electrical Characteristics

Transmitter(9.953G)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Data Input Differential Swing	V_{IN}		700		mVp-p	1
Input Differential Impedance	Z_{IN}		100		Ω	

Tx_Disable Voltage	V _{IL}	0	-	0.8	V	2
	V _{IH}	2.0		V _{CC3}	V	
Receiver(9.953G)						
Data Output Differential Swing	V _{OUT}	300		800	mVP-P	3
Signal Detected Voltage_low	V _{SD, L}	0		0.8	V	4
Signal Detected Voltage_high	V _{SD, H}	2.4		V _{CC3}	V	
Signal Detected Assert Time	T _{SDA}			400	ns	5
Signal Detected Deassert Time	T _{SDD}			900	ns	
Data Recovery Time	T _{rec}			400	ns	
Burst size		8000		1244000	Bits	
RSSI Trigger Delay	T _{trigger}	1400			ns	6
RSSI Sampling Time	T _{sampling}	600			ns	7
Internal I ² C Delay	T _{I2C}	500			us	
Receiver(2.488G)						
Data Output Differential Swing	V _{OUT}	300		800	mVP-P	3
Signal Detected Voltage_low	V _{SD, L}	0		0.8	V	4
Signal Detected Voltage_high	V _{SD, H}	2.4		V _{CC3}	V	
Signal Detected Assert Time	T _{SDA}			400	ns	5
Signal Detected Deassert Time	T _{SDD}			900	ns	
Data Recovery Time	T _{rec}			400	ns	
Burst size	Bits	2000		311000	Bits	
RSSI Trigger Delay	T _{trigger}	1400			ns	6
RSSI Sampling Time	T _{sampling}	600			ns	7
Internal I ² C Delay	T _{I2C}	500			us	

Notes:

1. Compatible with CML input, AC coupled internally. (See [Recommended Interface Circuit](#))
2. TX Disable (See [Pin Function Definitions](#)).
3. CML output, DC coupled internally, guaranteed in the full range of input optical power (-7dBm to -27.5dBm) (See [Recommended Interface Circuit](#)).
4. SD (See [Pin Function Definitions](#)).
5. Amount time is from the reset signal is coming to the bust signal reaches a appropriate value
6. Falling edge of reset signal should be after the rising edge of the first preamble bit, test@1010 pattern
7. RSSI Input signal rising edge will trigger RSSI sampling, and falling edge will trigger internal digital RSSI information written to I2C. It is recommended that host shall not trigger RSSI input again until RSSI data is valid in I2C from previous RSSI trigger.

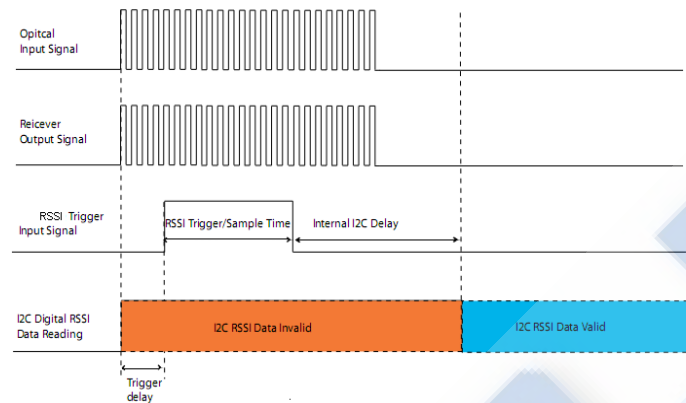


Figure 1, RSSI Timing Specification

Recommended Host Board Power Supply Circuit

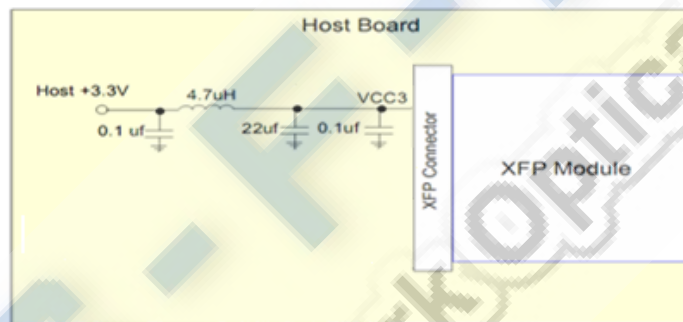


Figure 2, Recommended Host Board Power Supply Filtering Network

Recommended Interface Circuit

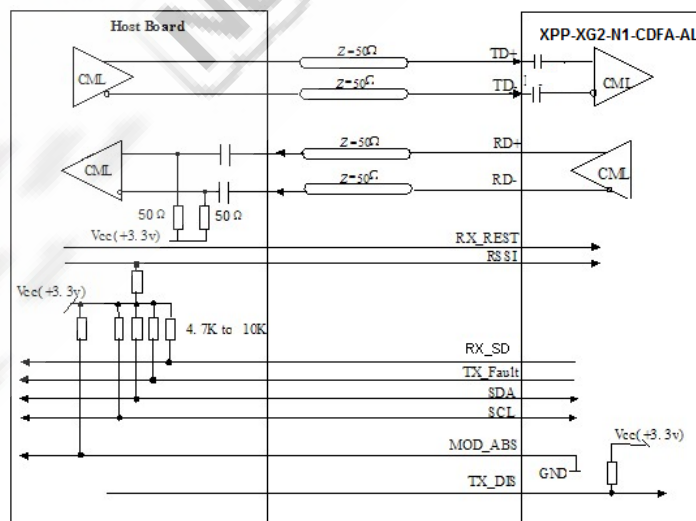


Figure 3, Recommended Interface Circuit

Pin Definitions

Figure 5 below shows the pin numbering of XFP electrical interface (Golden Finger). The pin functions are described in Table 6 and the accompanying notes.

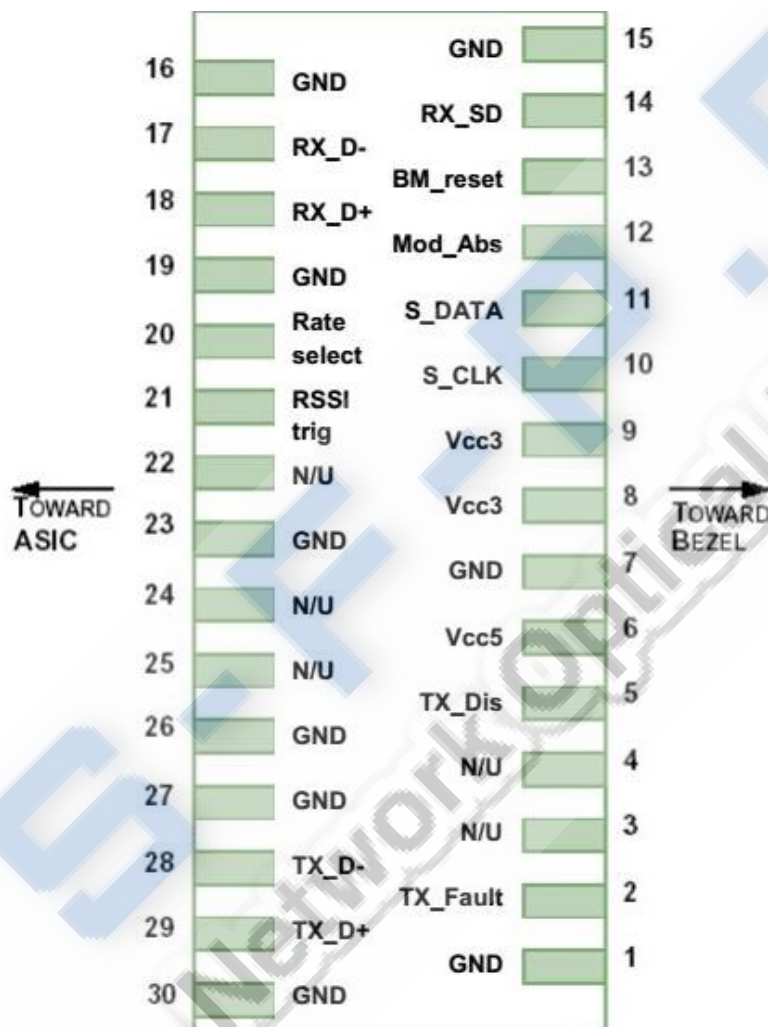


Figure 4, XFP Pin View (Golden Finger)

Table 6 –Pin Function Definitions

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2	LVTTL-O	TX_Fault	Not Connect	2
3	LVTTL-I	NC	Not Connect	
4		NC	Not Connect	
5	LVTTL-I	TX_DIS	Turns off transmitter laser output	3
6		Vcc5	+5V Power Supply	
7		GND	Module Ground	1
8		Vcc3	+3.3V Power Supply	

9		V _{CC3}	+3.3V Power Supply	
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	High Indicates module absent.	
13	LVTTL-I	RX_Reset	Burst Module Reset Signal, High Indicates Burst Start	
14	LVTTL-O	RX_SD	Signal Detected Indication.	4
15		GND	Module Ground	1
16		GND	Module Ground	1
17	LVPECL-O	RD-	Receiver Inverted Data Output	5
18	LVPECL-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		Rate select	Low=10G Rx,High=2.5G Rx	
21	LVTTL-I	RSSI_TRIG	High value indicates ready for RSSI measurement	
22		NC	Not connect	1
23		GND	Module Ground	1
24		NC	Not connect	
25		NC	Not connect	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	LVCML-I	TD-	Transmitter Inverted Data Input	6
29	LVCML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

Notes:

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. TX_Fault is an open collector/drain output, which should be pulled up with a 4.7K-10KΩ resistor on the host board. Pull up voltage between 2.0V and V_{CC}T, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
3. TX_Disable 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. It's states are:
Low (0-0.8V): Transmitter on
(>0.8, < 2.0V): Undefined
High (2.0-3.465V): Transmitter Disabled
Open: Transmitter Disabled
4. Signal detected 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_{CC}T, R+0.3V. When low, this output indicates the received optical power is below the worst-case receiver sensitivity. High indicates normal operation.
5. These are the differential receiver outputs. They are DC coupled is done inside the module (See [Recommended Interface Circuit](#))
6. These are the differential transmitter inputs. They are AC coupled differential lines. (See [Recommended Interface Circuit](#))

Diagnostics

Table 7– Diagnostics

Address	Parameter	Range	Accuracy	Unit	Notes	Calibration
96	Temperature	0 to 70	± 3	°C	LSB equal to 1/256c	Internal
98	Voltage	3.15 to 3.45	$\pm 3\%$	V	LSB equal to 100uv	Internal
100	Bias Current	0 to 250	$\pm 10\%$	mA	LSB equal to 4uA	Internal
102	Tx Power	-15 to 20	± 2	dB	LSB equal to 0.2uW	Internal
104	Rx Power	-29.5 to -7	± 3	dB	LSB equal to 0.1uW	External

Table 8– EEPROM Serial ID (table 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	E8	>3.5W max power dissipation; with CDR
Connector	Code for connector type	130	01	SC
Transceiver	Code for electronic compatibility or optical compatibility	131	00	
		132	10	
		133	00	
		134	00	
		135	00	
		136	00	
		137	00	
		138	00	
Encoding	Code for high speed serial encoding algorithm	139	10	NRZ
BR_MIN	Minimum bit rate, units of 100 Mbits/s.	140	63	9.95Gbps
BR_MAX	Maximum bit rate, units of 100 Mbits/s	141	82	13 Gbps
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 μ m, units of 2 m	143	00	
Length (20 μ m)	Link length supported for 20 μ m 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	76 OR 7F	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 9 – EEPROM Serial ID (table 01h)

Name of Field	Description of Field	Address	Hex	ASCII
CDR support	CDR Rate Support	164	F8	9.95Gbps
Vendor OUI	XFP vendor IEEE company ID for Source Photonics Inc.	165	00	
		166	1F	
		167	22	
Vendor PN	Part number in ASCII	168	58	X
		169	50	P
		170	50	P
		171	58	X
		172	47	G
		173	32	2
		174	4E	N
		175	31	1
		176	43	C
		177	44	D
		178	46	F
		179	41	A

		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	34	
Wavelength tolerance	Guaranteed range of laser wavelength (+/- value) from Nominal wave-length.	188	03	Unites:5nm
		189	E8	
Max Case Temp	Maximum Case Temperature	190	4B	75℃
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	
		193	00	
		194	0A	
		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	40	Optional soft TX_Disable
AUX monitoring	Defines quantities reported by Aux. A/D channels	222	00	
CC_EXT	Check code for the Extended ID Fields (addresses 192 to 222)	223	xx	
Wavelength for 2.5G		224	xx xx	1270nm
Wavelength for 1.25G		226	xx xx	
Vendor Spec.		228		

Mechanical Diagram

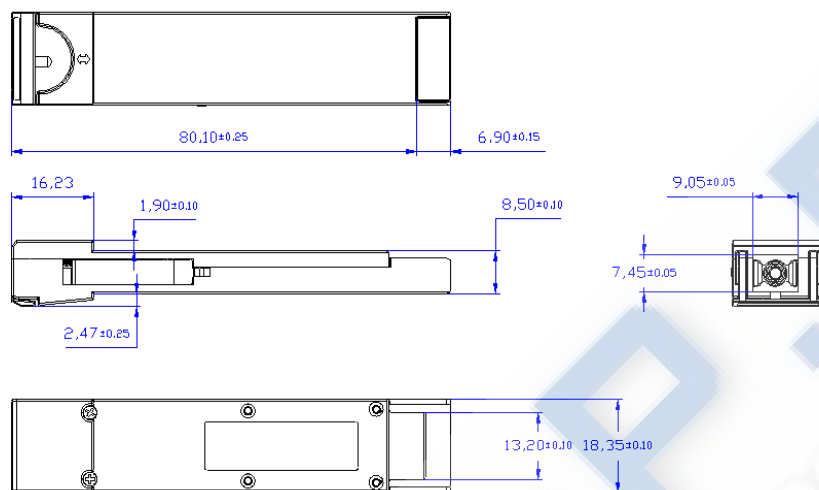


Figure 6, Mechanical Diagram

Order Information

Table 12– Order Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
XPP-XG2-N1-CDFA	XGS-PON N1 Class	Tx:9.95328G Rx:9.95328/ 2.44832G	1577nm 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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Contact

U.S.A. Headquarters

8521 Fallbrook Avenue Suite
200, West Hills, CA 91304,
USA
Tel: +1-818-773-9044
Fax: +1-818-773-0261

Taiwan

9F, No 81, Shui Lee Rd.
Hsinchu, Taiwan, R.O.C.
Tel: +886-3-5169222
Fax: +886-3-5169213

China

Building #2&5, West Export Processing Zone
No. 8 Kexin Road, Hi-Tech Zone
Chengdu, 611731, China
Tel: +86-28-8795-8788
Fax: +86-28-8795-8789

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