

GPON OLT SFP Transceiver Class B+ GPON-OLT-B

AscentOptics GPON-OLT-B bi-directional transceivers comply with the ITU-T GPON standard G984.2 Class B+ for operation at 2.488 Gbit/s downstream and 1.244 Gbit/s upstream. The diplexer function provides burst-mode APD receiver at 1310nm, and continuous DFB transmitter at 1490 nm. Digital



diagnostics functions are available via the 2-wire serial bus specified in the SFP MSA. Details to the EEPROM map for this module could be made available upon request. AscentOptics GPON-OLT-B SFP transceivers are compatible with the Small Form Factor Multi-Sourcing Agreement (MSA)..

Features

- Burst receive GPON OLT transceiver
- Small Form Factor Pluggable, Simple SC Connector
- “Fast Signal Detect” feature reduces ranging overhead
- Simplified OLT “reset” timing
- 1490 nm DFB Tx with isolator
- 1310 nm APD Rx
- 2488 Mbps downstream Tx/1244 Mbps upstream Rx
- Single 3.3 V supply
- ITU-T G.984.2 compliant
- 20 km reach; 28 dB link budget
- RoHS-5/6 compliant (lead exemption)

Applications

- Optical transceiver for Gigabit-capable Passive Optical Networks (GPON) Class B+ OLT side

Standards

- ITU-T G.984.2 Class B+

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Ordering information

Table 1 - Ordering information

Part No.	Tx/Rx Data Rate	Tx Laser	Rx Laser	Optical Interface	Standard	Temp	DDMI
GPON-OLT-B	2.488Gbps/ 1.25Gbps	1490nm	1310nm	SC	Class B+	0°C~+70°C	YES

Absolute Maximum Ratings

Table 2 - Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Operating Voltage, Vcc	Vcc	3.135	3.3	3.465	V	
Total Current, Icc	-	-	-	500	mA	
Storage Temperature	Ts	-40	-	85	°C	
Operating Relative Humidity	RH	+5	-	+95	%	
Case Operating		-5	-	70	°C	
Back Reflection at 1490 nm	-	-	-	-20	dB	
Back Reflection at 1310 nm				-20	dB	
1490 nm to 1310 nm Crosstalk				-45	dB	

Functional Characteristics

The following tables list the performance specifications for the various functional blocks of the integrated optical transceiver module.

Table 3 - Transmitter Specifications (Optical)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Average Optical Output Power,	Po	1.5	-	5	dBm	
Output Power at Transmit Off		-	-	-40	dBm	
Extinction Ratio	EX	10	-	-	dB	1
Transmitter Output Eye		G.984.2 Figure 2				
Optical Rise and Fall Time		-	-	160	ps	2
Center Wavelength, λ		1480	1490	1500	nm	
-20 dB Spectral Width		-	-	1	nm	
Side Mode Suppression Ratio (SMSR)		30	-	-	dB	
Bit Rate	-	-	2488	-	Mbps	
Tolerance to TX Back Reflectiona	-	-15	-	-	dB	3

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Notes:

1. PRBS 2²³-1, NRZ, 50% duty cycle
2. 20% to 80%
3. 1 dB degradation of Rx sensitivity

Table 4 - Transmitter Specifications (Electrical)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Single Ended Data Input Swing	V_{in}	300	-	1200	mV	
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
Tx_Disable	Disable	V_D	2.0	-	V_{CC}	V
	Enable	V_{EN}	0	-	0.8	V
TX_ Fault	High		2.4	-	V_{CC}	V
	Normal		0	-	0.4	V

Table 5 - Receiver Specifications (Optical)

Parameter	Symbol	Min	Type	Max	Unit	Notes
Centre Wavelength	λ_C	1260	1310	1360	nm	
Data Rate (burst mode)		-	1244	-	Mbps	
Receiver Burst-Mode Sensitivity		-	-	-28	dBm	4
Receiver Overload		-8	-	-	dBm	
Burst Detect Assert		-	-	-28	dBm	
Receiver Burst Mode Dynamic Range		15	20	-	dB	5
Damage Threshold for Receiver		+3	-	-	dBm	
Maximum Reflectance of Receiver		-	-	-20	dB	

notes

4. The optical power is launched into SMF.
5. Input power difference between two subsequent high and low burst data

Table 6- Receiver Specifications (Electrical)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
PECL Single Ended Data Output Swing(LVPECL)	V_{in}	200	-	800	mV	
Data Output Rise Time		-	250	-	ps	6
Data Output Fall Time		-	250	-	ps	6
Signal Detect Output HIGH		2.4	-	V_{CC}	V	
Signal Detect Output LOW		0	-	0.4	V	7
Signal Detect Response Time		-	-	6.4	ns	

Notes:

6. 20% to 80%

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7. Signal Detect assert low when module receive “reset” signal, assert high when incoming burst is detected and latch to high state until next “Reset” signal.

Table 7 -Digital RSSI Timing Specification

Parameter	Symbol	Min	Type	Max	Unit	Notes
RSSI Trigger Delay		25	-	-	ns	8
RSSI Sampling Time		300	-	-	ns	8
Internal I ² C Delay		-	-	500	us	8
Receiver Power DDM (RSSI) Error	-	-	-	+/-3	dB	11

Notes:

8. RSSI_ACQ 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_ACQ input again until RSSI data is valid in I2C from previous RSSI trigger.

9. RSSI DDM working range is between -8 to -30 dBm. RSSI DDM accuracy is better than +/- 3dB for input power levels between -10 to -30 dBm, the accuracy reduces to +/- 5 dB for input power level larger between -8 to 10dBm.

Pin arrangement

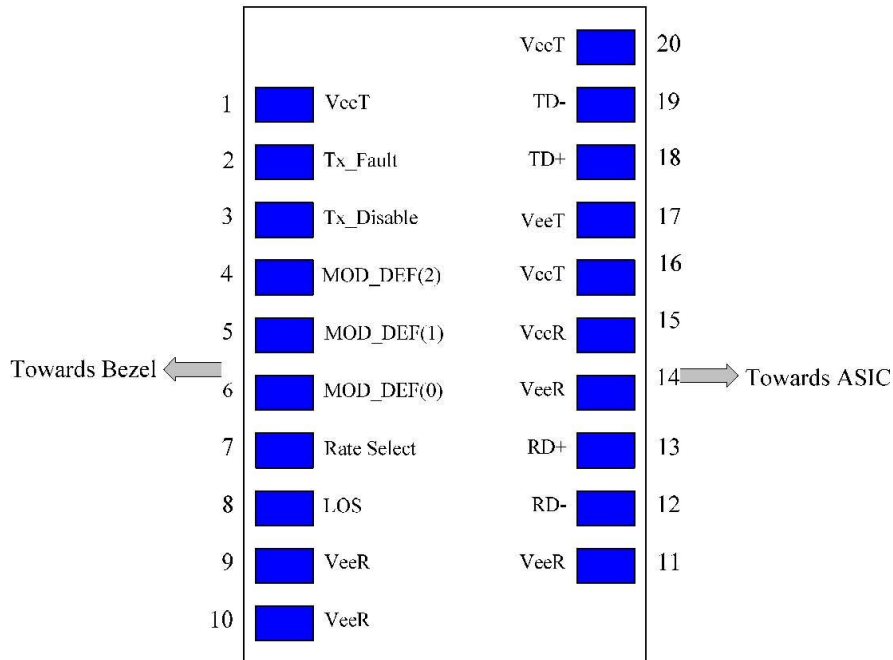


Figure 1, Pin View

Table 8- Electrical Characteristics

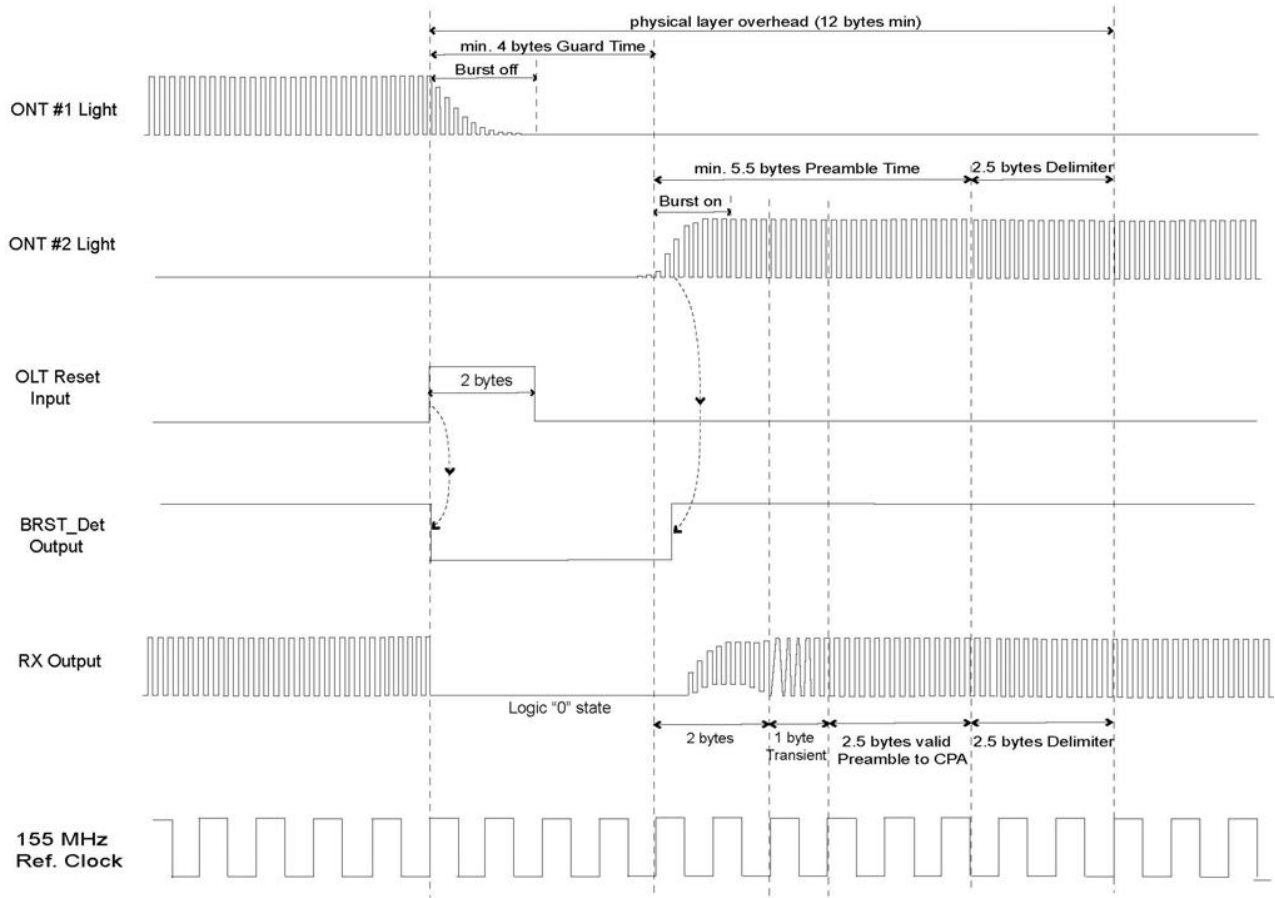
Pin	Name	FUNCTION
1	VeeT	Transmitter Ground
2	Tx_Fail	Tx Fail Alarm. LVTTTL Output Active High

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	(TX_Fault)	
3	TX Disable	Tx Disable. LVTTTL input. Laser output is disabled when this pin is asserted high or left unconnected. Laser output is enabled when this pin is asserted low.
4	MOD-DEF(2)	2-Wire Serial Data I/O Pin
5	MOD-DEF(1)	2-Wire Serial Clock Input.
6	MOD-DEF(0)	Internally Grounded
7	Reset	CMOS input. Assert "Reset" high at the end of previous burst, 2 bytes in duration
8	BRST_Det	LVTTTL output. BRST_Det assert low when module receives "reset" signal, assert high when incoming burst is present.
9	RSSI_ACQ	RSSI acquire/hold LVTTTL Input. Digital RSSI output through I ² C
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Negative Data Output, LVPECL; DC coupled
13	RD+	Positive Data Output, LVPECL; DC coupled
14	VeeR	Rx Ground
15	Vcc_Rx	Rx Vcc
16	Vcc_Tx	Tx Vcc
17	VeeT	TX Ground
18	TD+	Positive Data Input, LVPECL or CML (AC coupled; internally 100 ohms differential termination)
19	TD-	Negative Data Input, LVPECL or CML (AC coupled; internally 100 ohms differential termination)
20	VeeT	Transmitter Ground

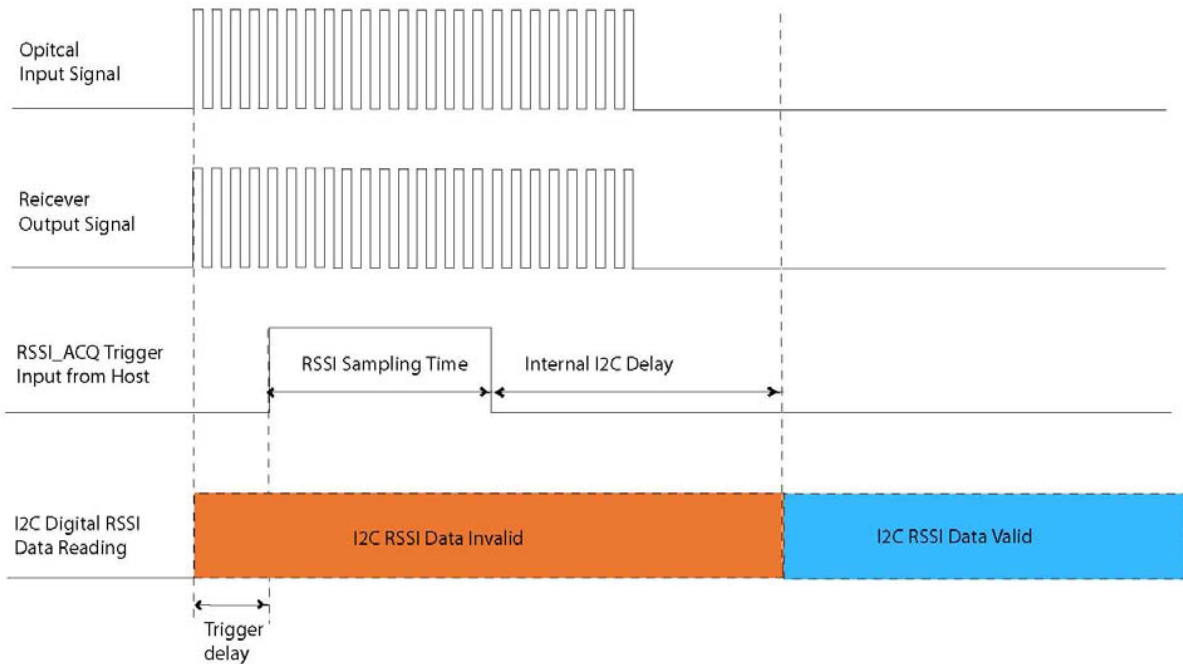
Timing Diagram

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Digital RSSI Acquire/Hold Timing Specification

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Monitoring Specification

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X (A2h). Please see Figure 4. For detail EEPROM information, please refer to the related document of SFF-8472 Rev 9.5. The monitoring specification of this product is described

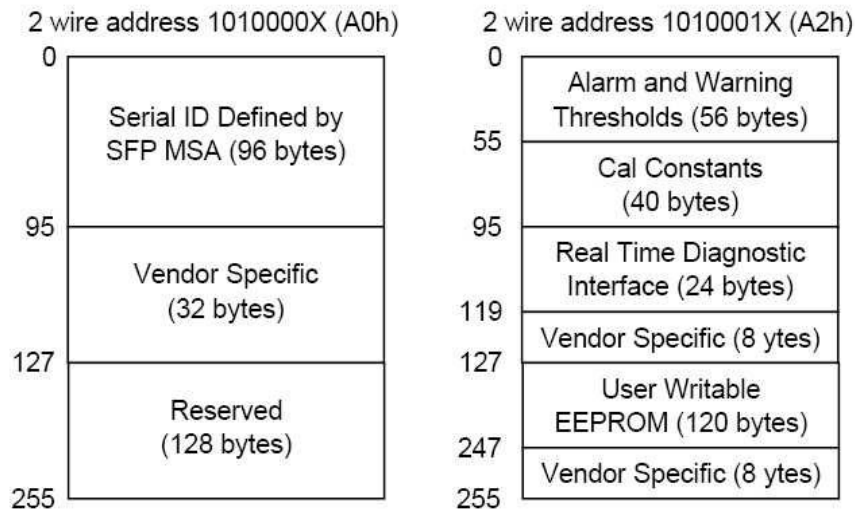


Figure 1, Recommended Interface Circuit

EEPROM Information

The SFP defines a 256-byte memory map in EEPROM describing the transceiver’s capabilities, standard interfaces, manufacturer, and other information, which is accessible over a 2 wire serial interface at the 8-bit address 1010000X (A0h). The memory contents refer to Table 7

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Table 9 - EEPROM Serial ID (A0h)

Data Addr	Field Size (Byte)	Name Of filed	Coded value	Hex
0	1	Identifier	SFP	03
1	1	Ext. Identifier	MOD4	04
2	1	Connector	SC	01
3	8	Transceiver	Transmitter Code	00 00 00 00 00 00 00 00
11	1	Encoding	NRZ	03
12	1	BR, Nominal	2488.32Mbps	19
13	1	Reserved	Reserved	00
14	1	Length (9µm)-km	20km	14
15	1	Length (9µm)	20km	C8
16	1	Length (50um)	Not Supported	XX
17	1	Length (62.5um)	Not Supported	XX
18	1	Length (Copper)	Not Supported	00
19	1	Reserved	Not Supported	00
20-35	16	Vendor name	AscentOptics ltd	47 69 67 61 63 20 4C 74 64 2E 20 20 20 20 20 20
36	1	Reserved		00
37-39	3	Vendor OUI	xx	
40-55	16	Vendor PN	part number	xx xx xx xx xx xx xx xx xx xx xx xx
56-59	4	Vendor rev	10	31 30 20 20
60-61	2	Wavelength	Transceiver wavelength	XX XX
62	1	Reserved		00
63	1	CC_BASE	Check sum of bytes 0 - 62	xx
EXTENDED ID FIELDS				
64-65	2	Options	TX_DISABLE, TX_FAULT, SD	00 1C
66	1	BR, max		00
67	1	BR, min		00
68-83	16	Vendor SN	<space>	20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
84-91	8	Date code	Year (2 bytes), Month (2 bytes), Day (2 bytes)	xx xx xx xx xx xx 20 20
92	1	Diagnostic Monitoring Type	Ext. Cal	58
93	1	Enhanced option	Optical Alarm/warning implemented Soft TX_DIS, TX_FAULT implemented	E0
94	1	SFF-8472	Diagnostics(SFF-8472 Rev 9.4)	02

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95	1	CC_EXT	Check sum of bytes 64 - 94	XX
96-255	160	Vendor specific		

Note: The "xx" byte should be filled in according to practical case. For more information, please refer to the related document of SFF-8472 Rev 9.5.

Recommended Interface Circuit

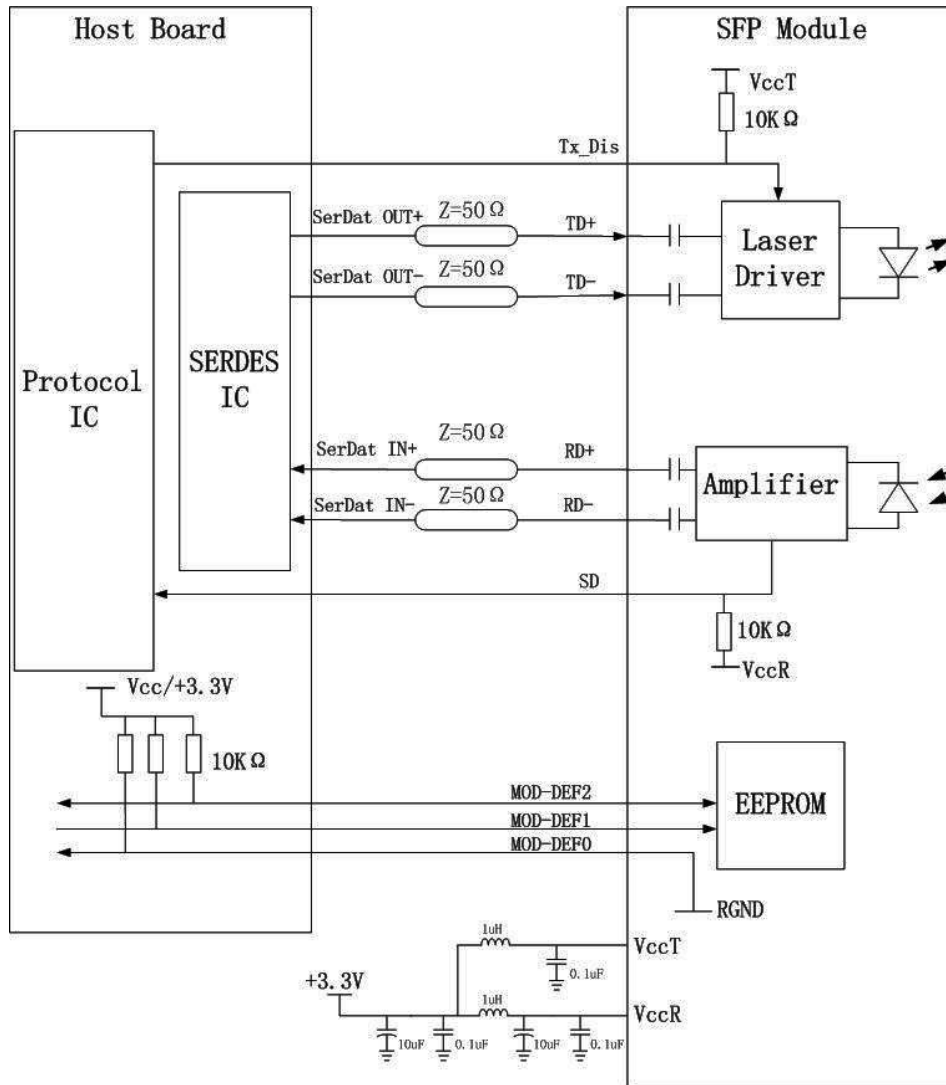
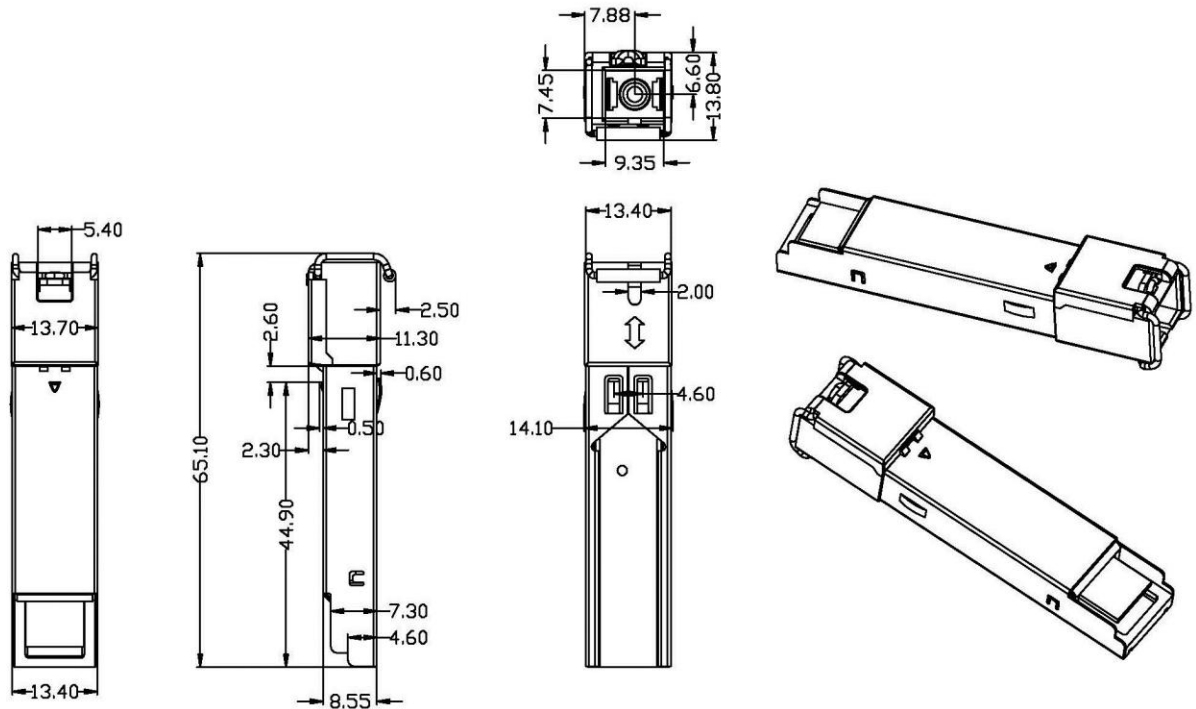


Figure 3, Recommended Interface Circuit

Package Outline

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Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compatible with standards

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Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards ^{*note2}