



Features

- IEEE 802.3-2008 1000BASE-PX20 GE PON ONU side application
- Bi-directional transmission with symmetric 1.25Gbps upstream/downstream
- Up to 32 subscribers within 20km radius
- 1310nm burst-mode transmitter with FP laser
- 1490nm continuous-mode receiver with IN-TIA
- Digital diagnostic interface compliant with SFF-8472 Rev 9.5
- Spring-latch SFP(Small Form –factor Pluggable) package with SC receptacle optical interface
- Signal 3.3V power supply
- Operating case temperature: 0~75°C
- RoHS compliance

Regulatory Compliance

Table 1 - Absolute Maximum Ratings

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V)
Electrostatic Discharge (ESD) to the SC Receptacle	IEC 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B)	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 Class 1 laser product.
Component Recognition	UL and CSA	Compliant with standards
RoHS	2002/95/EC 4.1&4.2 2005/747/EC	Compliant with standards ^{note}

Note:

In light of item 5 in Annex of 2002/95/EC, "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 Ambient Temperature	T_S	-40	-	85	°C	
Operating Case Temperature	T_C	0		75	°C	1
Operating Relative Humidity	RH	5		95	%	
Power Supply Voltage	V_{CC}	0		4	V	
Input Voltage		GND		V_{CC}	V	
Receiver Damaged Threshold		7			dBm	

Note 1: When ambient temperature is above 60°C, airflow at rate higher than 1m/sec is required.

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Operating Case Temperature	T_C	0		75	°C	
Operating Relative Humidity	RH	5		95	%	
Data Rate			1.25		Gbit/s	
Data Rate Drift		-100		+100	PPM	

Optical Characteristics

Table 4 – Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	λ_C	1276		1356	nm	
RMS Spectral Width	$\Delta\lambda$			2.8	nm	
Average Launch Power	P_{OUT}	0		4	dBm	1
Average Launch Power-OFF Transmitter	P_{OFF}			-45	dBm	
Extinction Ratio	EX	9			dB	2
Total Jitter	TJ			0.35	UI	2
Rise/Fall Time (20%-80%)	T_R/T_F			260	ps	2,3
RIN ₁₅ OMA				-115	dB/Hz	
Burst Turn on Time	T_{BURST_ON}			30	ns	

Burst Turn off Time	T _{BURST_OFF}			30	ns	
Burst Enable Duration	T _{EN_DUR}	600			ns	4
Burst Disable Duration	T _{DIS_DUR}	100			ns	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-10	dB	
Optical Eye Mask	Compliant With IEEE Std 802.3-2008					2,5
Receiver						
Operating Wavelength	λ_c	1480	1490	1500	nm	
Sensitivity	P _{SEN}			-26.5	dBm	6
Saturation	P _{SAT}	-3			dBm	
LOS of Signal Assert Level	P _{LOSA}	-39			dBm	7
LOS of Signal Deassert Level	P _{LOSD}			-27	dBm	8
Signal-Detected Hysteresis	P _{LOSD} - P _{LOSA}	0.5		6	dBm	
Receiver Reflectance				-12	dB	
WDM Filter Isolation	ISO(1550)	38			dB	1550nm
	ISO(1650)	35				1650nm

Notes:

1. The optical power is launched into 9/125um SMF.
2. Measured with PRBS 2⁷⁻¹ test pattern @1.25Gbps.
3. Measured with the Bessel-Thompson filter OFF.
4. Refer to [Timing Parameter Definition in Burst Mode Sequence](#)
5. Transmitter eye mask definition {0.22UI, 0.375UI, 0.20UI, 0.20UI, 0.30UI}.
6. Measured with a PRBS 2⁷⁻¹ test pattern @1.25Gbit/s and ER=9dB, BER =10⁻¹²
7. An increase in optical power above the specified level will cause the Signal Detect output to switch from a high state to a low state.
8. A decrease in optical power below the specified level will cause the Signal Detect output to switch from a low state to a high state.

Electrical Characteristics

Table 5 – Electrical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Current	I _{CC}			200	mA	
Data Input Differential Swing	V _{IN}	200		1600	mVp-p	1
Disable Voltage - Low	V _{TDIS, L}	0		0.8	V	2
Disable Voltage - High	V _{TDIS, H}	2.0		V _{CC}	V	
Input Differential Impedance	Z _{IN}	90	100	110	Ω	

Receiver						
Power Supply Current	I_{CC_RX}			150	mA	
Data Output Differential Swing	V_{OUT}	400		1600	mV _{p-p}	3
Loss of Signal Voltage - Low	$V_{LOS,L}$	0		0.8	V	4
Loss of Signal Voltage - High	$V_{LOS,H}$	2		V_{CC}	V	
Loss of Signal Deassert Time	T_{LOS-D}			100	us	
Loss of Signal Assert Time	T_{LOS-A}			100	us	

Notes:

1. Compatible with LVPECL input, DC coupled internally.
2. TX_Burst (See [Pin Function Definitions](#)).
3. LVPECL output, AC coupled internally, guaranteed in the full range of input optical power (-3dBm to -26dBm).
4. LOS (See [Pin Function Definitions](#)).

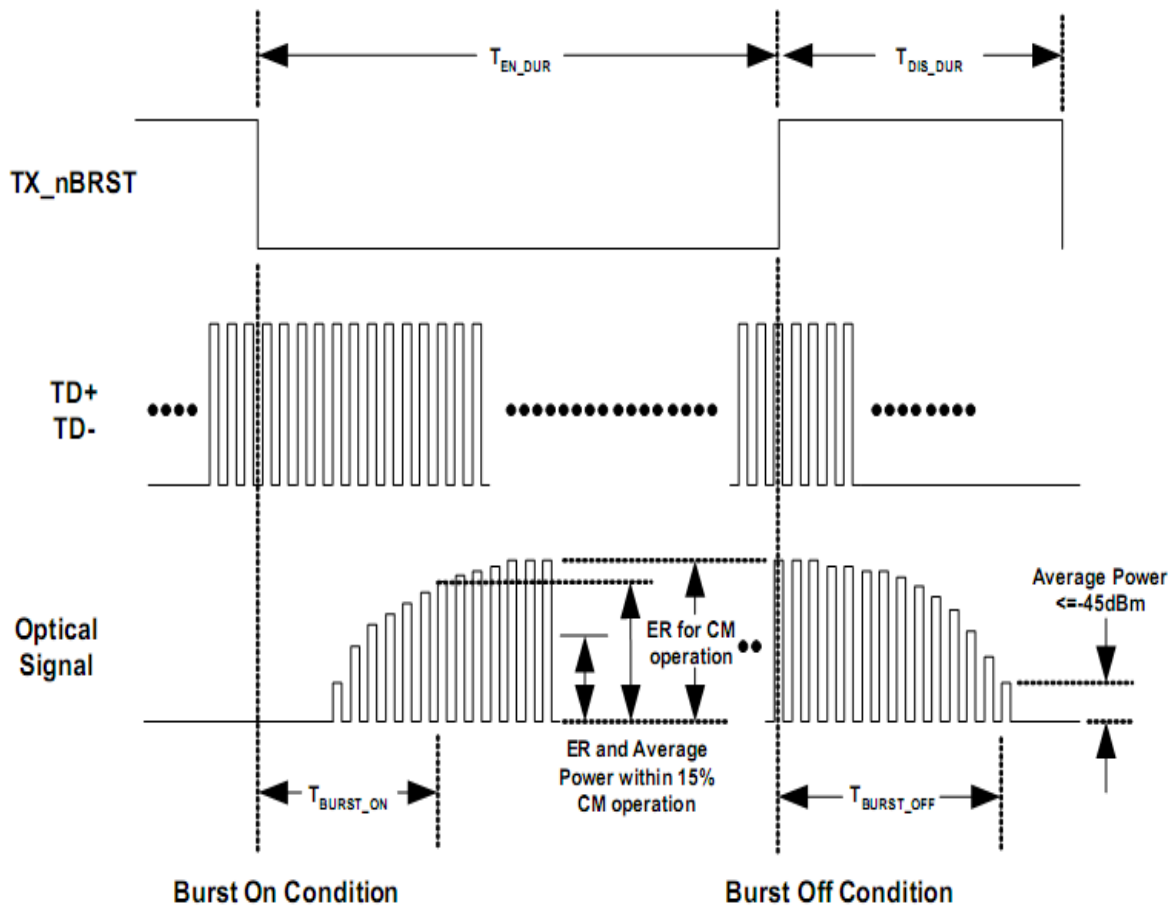


Figure 1, Timing Parameter Definition in Burst Mode Sequence

Recommended Host Board Power Supply Circuit

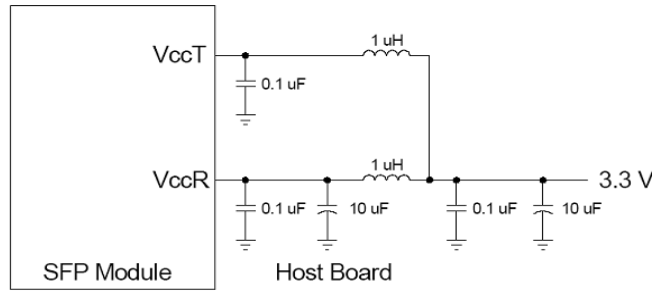


Figure2, Recommended Host Board Power Supply Filtering Network

Recommended Interface Circuit

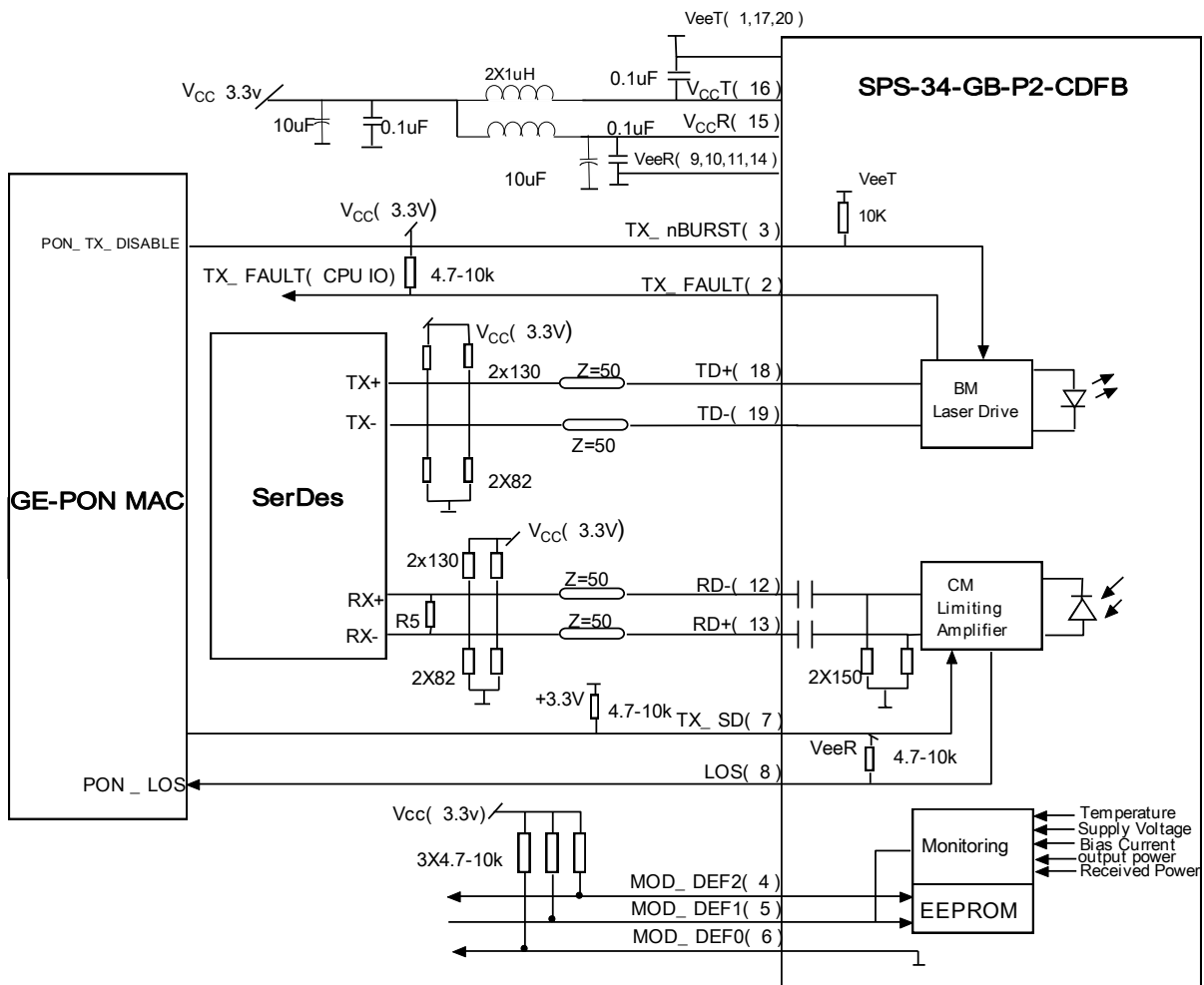


Figure 3, Recommended Interface Circuit

Pin Definitions

Figure 4 below shows the pin numbering of SFP electrical interface (Golden Finger). The pin functions

are described in Table 6 and the accompanying notes.

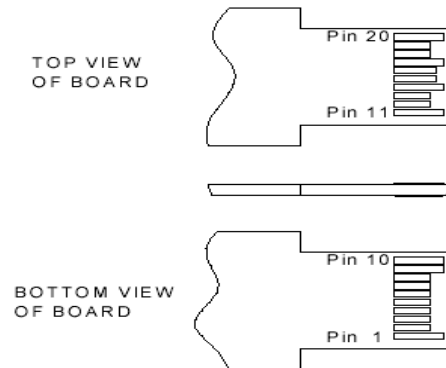


Figure 4, SFP Pin View (Golden Finger)

Table 6 –Pin Function Definitions

Pin	Name	Description	Notes
1	V _{ee} T	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	1
3	TX_Burst	Transmitter Burst control	2
4	MOD-DEF2	Module Definition 2 (I2C SDA)	3
5	MOD-DEF1	Module Definition 1 (I2C SCL)	3
6	MOD-DEF0	Module Definition 0	3
7	TX_SD	Transmitter Signal Detect	4
8	LOS	Loss of Signal	5
9	V _{ee} R	Receiver Ground	
10	V _{ee} R	Receiver Ground	
11	V _{ee} R	Receiver Ground	
12	RD-	Inv. Receiver Data Out	6
13	RD+	Receiver Data Out	
14	V _{ee} R	Received Ground	
15	V _{cc} R	Receiver Power	7
16	V _{cc} T	Transmitter Power	
17	V _{ee} T	Transmitter Ground	
18	TD+	Transmit Data In	8
19	TD-	Inv. Transmit Data In	
20	V _{ee} T	Transmitter Ground	

Notes:

1. 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.
- 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. Its states are:
 Low (0-0.8V): Transmitter on
 (>0.8, < 2.0V): Undefined
 High (2.0-3.465V): Transmitter Disabled
 Open: Transmitter Disabled
 - MOD-DEF0,1,2. These are the module definition pins. They should be pulled up with a 4.7K-10KΩ resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR} .
 MOD-DEF0 is grounded by the module to indicate that the module is present
 MOD-DEF1 is the clock line of two-wire serial interface for serial ID
 MOD-DEF2 is the data line of two-wire serial interface for serial ID
 - Tx Signal Detect, Tx Active State: High.
 - LOS (Loss of Signal) 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} , R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
 - These are the differential receiver outputs. They are AC coupled internally, Compatible with LVPECL.
 - V_{ccR} and V_{ccT} are the receiver and transmitter power supplies. They are defined as $3.3V \pm 5\%$ at the SFP connector pin. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.
 - These are the differential transmitter inputs. The DC coupling is done inside the module.

EEPROM Information

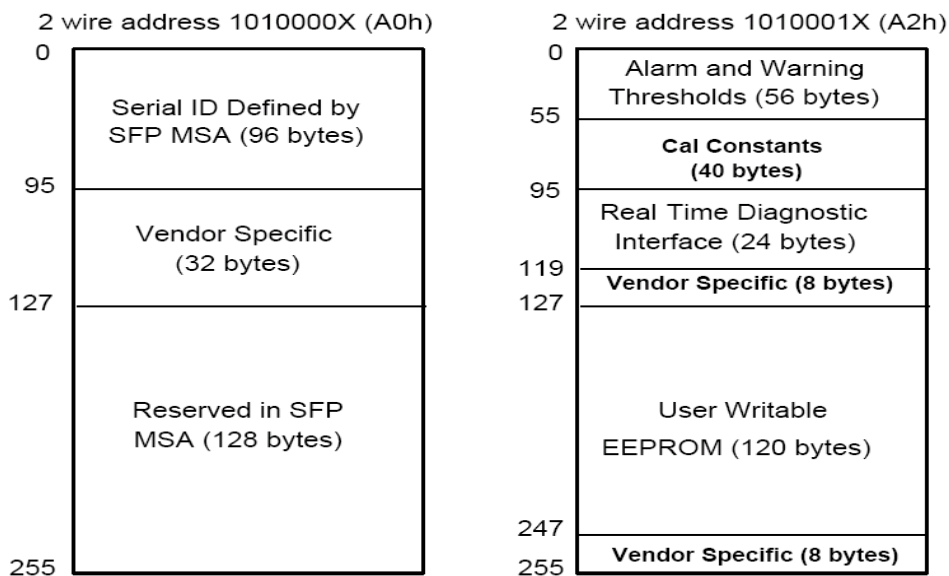


Figure 5, 2-wire Serial Digital Diagnostic Memory Map

Table 7 –EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	03	SFP transceiver
1	1	Ext. Identifier	04	MOD4
2	1	Connector	01	SC
3-10	8	Transceiver	00 00 00 80 00 00 00 00	BASE-PX
11	1	Encoding	01	8B10B
12	1	BR, Nominal	0D	1.25Gbps
13	1	Reserved	00	
14	1	Length (9um)-km	14	20(km)
15	1	Length (9um)	C8	200(100m)
16	1	Length (50um)	00	Not Support MMF
17	1	Length (62.5um)	00	Not Support MMF
18	1	Length (Copper)	00	Not Support Copper
19	1	Reserved	00	
20-35	16	Vendor name	53 4F 55 52 43 45 50 48 4F 54 4F 4E 49 43 53 20	“SOURCEPHOTONICS”(ASCII)
36	1	Reserved	00	
37-39	3	Vendor OUI	00 1F 22	
40-55	16	Vendor PN	53 50 53 33 34 47 42 50 32 43 44 46 42 20 20 20	“SPS34GBP2CDFB”(ASCII)
56-59	4	Vendor Rev	xx xx 20 20	ASCII(“31 30 20 20” means 1.0 Revision)
60-61	2	Wavelength	05 1E	1310nm Laser Wavelength
62	1	Reserved	00	
63	1	CC_BASE	xx	Check sum of byte 0-62
64-65	2	Options	00 1A	LOS and TX_FAULT, TX_Disable
66	1	BR, max	00	
67	1	BR, min	00	
68-83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASCII
84-91	8	Date code	xx xx xx xx xx xx 20 20	Year(2 bytes),Month(2 bytes), Day(2 bytes)
92	1	Diagnostic Monitoring Type	68	Compliant with SFF-8472 V9.5 Internally Calibrated Received power measurement type -Average Power
93	1	Enhanced Options	F0	Diagnostics (Optional Alarm/warning flags) Soft TX_FAULT monitoring

				implemented Soft TX_Disable monitoring implemented Soft RX_LOS monitoring implemented
94	1	SFF-8472 Compliance	02	Diagnostics Compliance(SFF-8472 V9.5)
95	1	CC_EXT	xx	Check sum of byte 64-94
96-255	64	Vendor Specification	X	

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.

Table 8 – Digital Diagnostic Specification (A2h)

Data Address	Parameter	Range	Accuracy
96-97	Temperature	0 to 80°C	±3°C
98-99	Vcc Voltage	2.8V to 3.8V	±3%
100-101	Bias Current	0 to 60mA(Note)	±10%
102-103	TX Power	-2 to 4dBm	±3dB
104-105	RX Power	-27 to -2dBm	±2dB

Note: Only for continuous mode

Mechanical Diagram

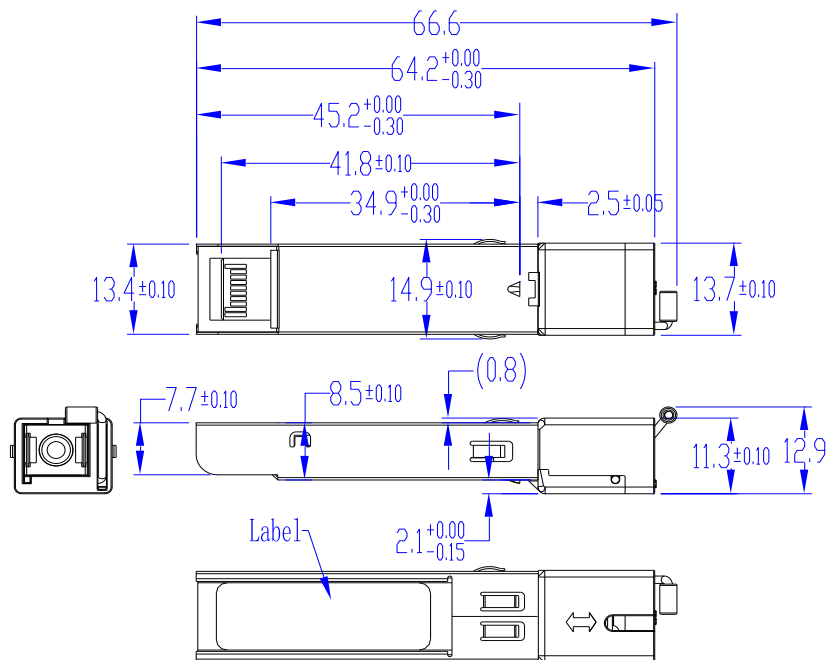


Figure 6, Mechanical diagram

Order Information**Table 9 – Order Information**

Part No.	Application	Data Rate	Fiber Type
SPS-34-GB-P2-CDFB	1000BASE-PX20 ONU	1.25Gb/s symmetric	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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