EOLS-BI1X03-2M Series

Multi-Mode 155Mbps
SC/LC Single-Fiber SFP Transceiver
RoHS6 Compliant

Features

- Operating data rate up to 155Mbps
- A type: 1310nm FP Tx/1550nm Rx
  B type: 1550nm FP Tx/1310nm Rx
- 2km with 50/125μm MMF（800Mhz*km）
- 1km with 62.5/125μm MMF（500Mhz*km）
- Single 3.3V Power supply and TTL Logic Interface
- Hot Pluggable
- Operation case temperature range:
  Standard: 0~+70℃
  Industrial:-40~+85℃
- Compliant with MSA SFP Specification
- Digital diagnostic monitor interface
- Compatible with SFF-8472

Applications

- WDM Fast Ethernet Links
- SONET/SDH Equipment Interconnect
- Fiber Channel Links
- Other Optical Transmission Systems

Ordering Information

Part No.	Data Rate	Fiber	Distance*(note2)	Temp.	Connector	DDM
EOLS-BI1303-2M*note1	155Mbps	MMF	1~2km	Standard	SC	NO
EOLS-BI1303-2M-D	155Mbps	MMF	1~2km	Standard	SC	YES
EOLS-BI1303-2M-I	155Mbps	MMF	1~2km	Industrial	SC	NO
EOLS-BI1303-2M-DI	155Mbps	MMF	1~2km	Industrial	SC	YES
EOLS-BI1503-2M *note1	155Mbps	MMF	1~2km	Standard	SC	NO
EOLS-BI1503-2M-D*note1	155Mbps	MMF	1~2km	Standard	SC	Yes
EOLS-BI1503-2M-I	155Mbps	MMF	1~2km	Industrial	SC	NO
EOLS-BI1503-2M-DI	155Mbps	MMF	1~2km	Industrial	SC	Yes
EOLS-BI1303-2M-L*note1	155Mbps	MMF	1~2km	Standard	LC	NO
EOLS-BI1303-2M-DL	155Mbps	MMF	1~2km	Standard	LC	YES
EOLS-BI1303-2M-IL	155Mbps	MMF	1~2km	Industrial	LC	NO

EOLS-BI1303-2M-DIL	155Mbps	MMF	1~2km	Industrial	LC	YES
EOLS-BI1503-2M-L*note1	155Mbps	MMF	1~2km	Standard	LC	NO
EOLS-BI1503-2M-DL	155Mbps	MMF	1~2km	Standard	LC	Yes
EOLS-BI1503-2M-IL	155Mbps	MMF	1~2km	Industrial	LC	NO
EOLS-BI1503-2M-DIL	155Mbps	MMF	1~2km	Industrial	LC	Yes

Note1: Standard version

Note2: 1km with 62.5/125um MMF (500Mhz.km).

2km with 50/125um MMF (800Mhz.km)

*The product image only for reference purpose.

Regulatory Compliance*

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12+A2
		EN 60825-1:2014
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
FCC	WTF14F0514417E	47 CFR PART 15 OCT., 2013
FDA	/	CDRH 1040.10
ROHS	/	2011/65/EU

*The above certificate number updated to June 2014, because some certificate will be updated every year, such as FDA and ROHS. For the latest certification information, please check with Eoptolink.

Product Description

The EOLS-BI1X03-2M-X series is small form factor pluggable module for IEEE 802.3ah 100BASE-BX10 and OC-3/STM-1 SONET/SDH single fiber communications by using 1310 nm/1550nm transmitter and 1550nm/1310nm receiver. It is with the SFP 20-pin connector to allow hot plug capability.

The transmitter section uses a multiple quantum well A type/ B type laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated A type/ B type detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

The EOLS-BI1X03-2M-XD series are designed to be compliant with SFF-8472 SFP.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Supply Voltage	Vcc	-0.5	3.6	V

Operating Relative Humidity	-	5	95	%

Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit
Operating Case Temperature	T_c	EOLS-BI1303-2M-X	0		+70	°C
		EOLS-BI1303-2M-X	-40		+85	
Power Supply Voltage	Vcc		3.15	3.3	3.45	V
Power Supply Current	Icc				360	mA
Date Rate				155		Mbps

Performance Specifications - Electrical

Parameter		Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter							
LVPECL Inputs(Differential)		Vin	400		2000	mVpp	AC coupled inputs*(Note3)
Input Impedance (Differential)		Zin	85	100	115	ohm	Rin > 100 kohm @ DC
TX_Dis	Disable		2		Vcc+0.3	V	
	Enable		0		0.8		
TX_FAULT	Fault		Vcc-0.5		Vcc+0.3	V	
	Normal		0		0.8		
Receiver							
LVPECL Outputs (Differential)		Vout	400	800	2000	mVpp	AC coupled outputs*(Note3)
Output Impedance (Differential)		Zout	85	100	115	ohm	
RX_LOS	LOS		2		Vcc+0.3	V	
	Normal		0		0.8	V	
MOD_DEF (0:2)		VoH	2.5			V	With Serial ID
		VoL	0		0.5	V	

Performance Specifications – Optical

(1310nm FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit
50μm Core Diameter MMF(800Mhz*km)	L			2	km
62.5 Core Diameter MMF(500Mhz*km)	L			1	km
Data Rate			155		Mbps
Transmitter					
Center Wavelength	λ_C	1260	1310	1360	nm
Spectral Width (RMS)	Δλ			4	nm
Average Output Power*(Note4)	Pout	-20		-14	dBm
Extinction Ratio*(Note5)	ER	9			dB

Rise/Fall Time(20%～80%)	tr/tf			2	ns
Total Jitter	TJ			1.0	ns
Output Optical Eye*(Note5)	IUT-T G.957 Compliant*(Note7)				
TX_Disable Assert Time	t_off			10	us
TX Disable Asserted	-			-45	dBm
Receiver					
Center Wavelength	λ	1500	1550	1580	nm
Receiver Sensitivity*(Note6)	Pmin			-30	dBm
Return Loss		12			dB
LOS De-Assert	LOSD			-31	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis*(Note8)		1		6	dB
Overload	Pmax	-8			dBm

(1550nm FP and PIN)

Parameter	Symbol	Min.	Typical	Max.	Unit
50μm Core Diameter MMF(800Mhz*km)	L			2	km
62.5 Core Diameter MMF(500Mhz*km)	L			1	km
Data Rate			125		Mbps
Transmitter					
Center Wavelength	λ_C	1500	1550	1580	nm
Spectral Width (RMS)	Δλ			4	nm
Average Output Power*(Note4)	Pout	-20		-14	dBm
Extinction Ratio*(Note5)	ER	9			dB
Rise/Fall Time(20%～80%)	tr/tf			2	ns
Total Jitter	TJ			1.0	ns
Output Optical Eye*(Note5)	IUT-T G.957 Compliant*(Note7)				
TX_Disable Assert Time	t_off			10	us
TX Disable Asserted	-			-45	dBm
Receiver					
Center Wavelength	λ	1260		1360	nm
Receiver Sensitivity*(Note6)	Pmin			-30	dBm
Return Loss		12			dB
LOS De-Assert	LOSD			-31	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis*(Note8)		1		6	dB
Overload	Pmax	-8			dBm

Note3: LVPECL logic, internally AC coupled.

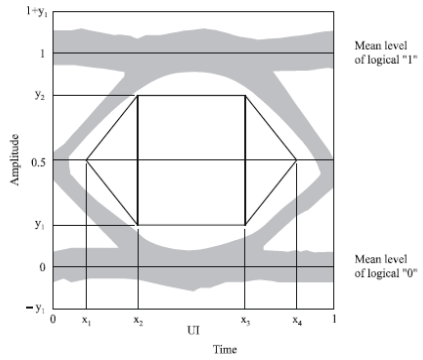
Note4: Output power is measured by coupling into a 62.5/125 um multi-mode fiber.

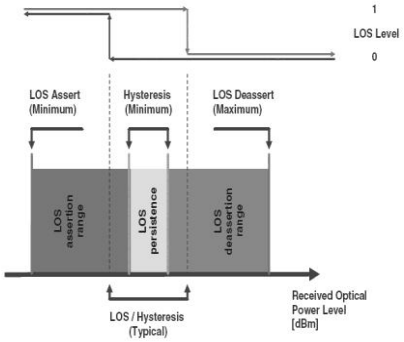
Note5: Filtered, measured with a PRBS 2^{23}-1 test pattern @155Mbps.

Note6: Minimum average optical power is measured by coupling into a 62.5/125 mm multi-mode fiber; the BER is less than 1E-10, measured with a 2^{23}-1 PRBS and ER=9 dB.

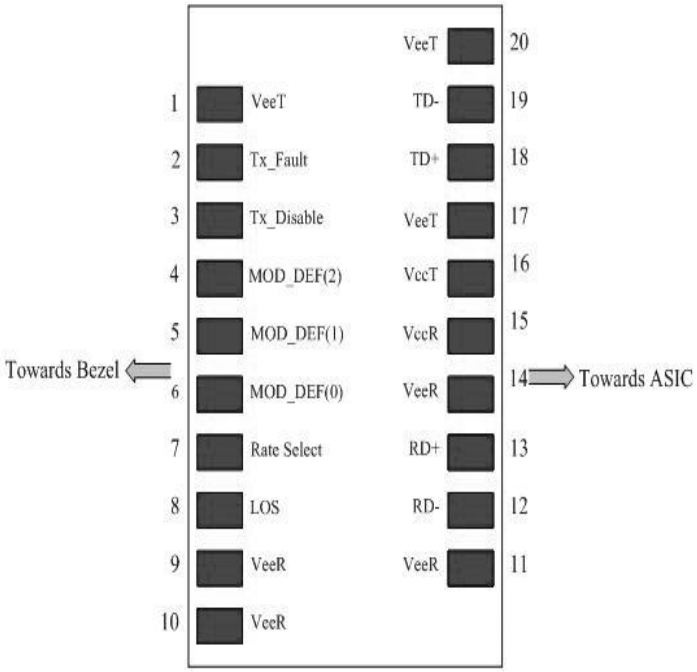
Note7: Eye Pattern Mask

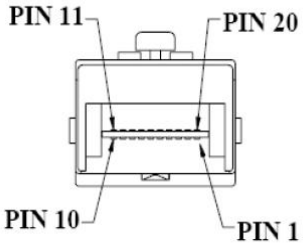
Note8: LOS Hysteresis





SFP Transceiver Electrical Pad Layout





Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open

4	MOD-DEF2	Module Definition 2	3	Note 3, Data line for Serial ID.
5	MOD-DEF1	Module Definition 1	3	Note 3, Clock line for Serial ID.
6	MOD-DEF0	Module Definition 0	3	Note 3, Grounded within the module.
7	Rate Select	Not Connect	3	Function not available
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 7
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3 ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K —10K2 resistor on the host board. Pull up voltage between 2.0V and VccT, 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.

2) 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 — 10K2 resistors. Its states are:
Low (0 — 0.8V): Transmitter on
(>0.8, < 2.0V): Undefined
High (2.0 — 3.465V): Transmitter Disabled
Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K — 10K2resistor on the host board. The pull-up voltage shall be VccT or VccR (see Section IV for further details). Mod-Def 0 is grounded by the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface for serial ID Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K — 10K2 resistor. Pull up voltage between 2.0V and VccT, 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.

5) VeeR and VeeT may be internally connected within the SEP module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 1002 differential lines which should be terminated with 1002 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

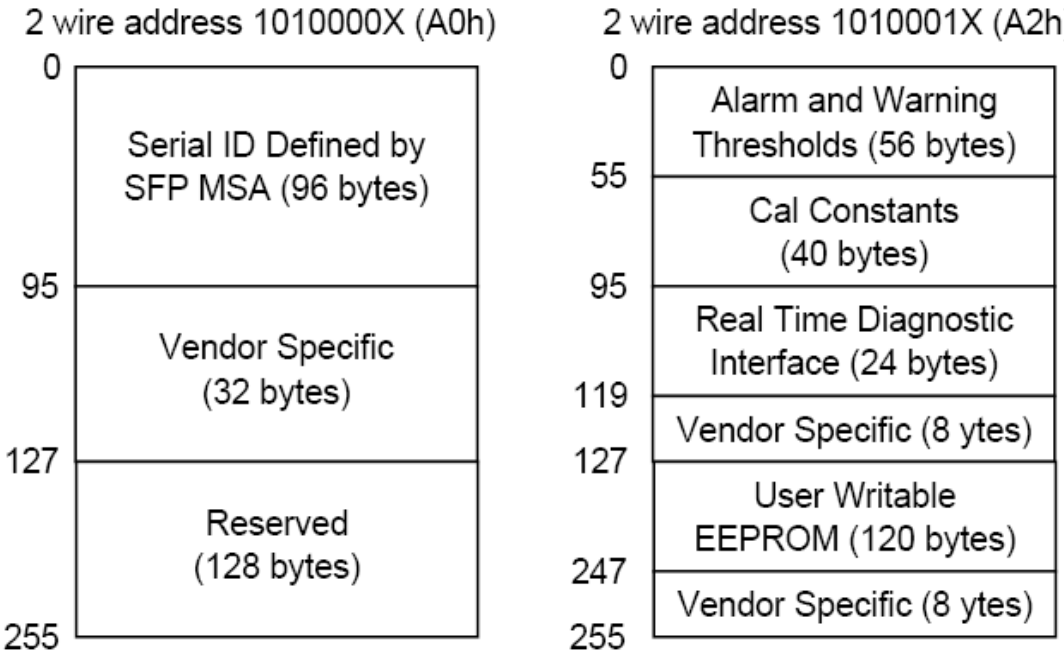
7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SEP connector pin. Maximum supply current is 300mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SEP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SEP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SEP transceiver module.

8) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 1002 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

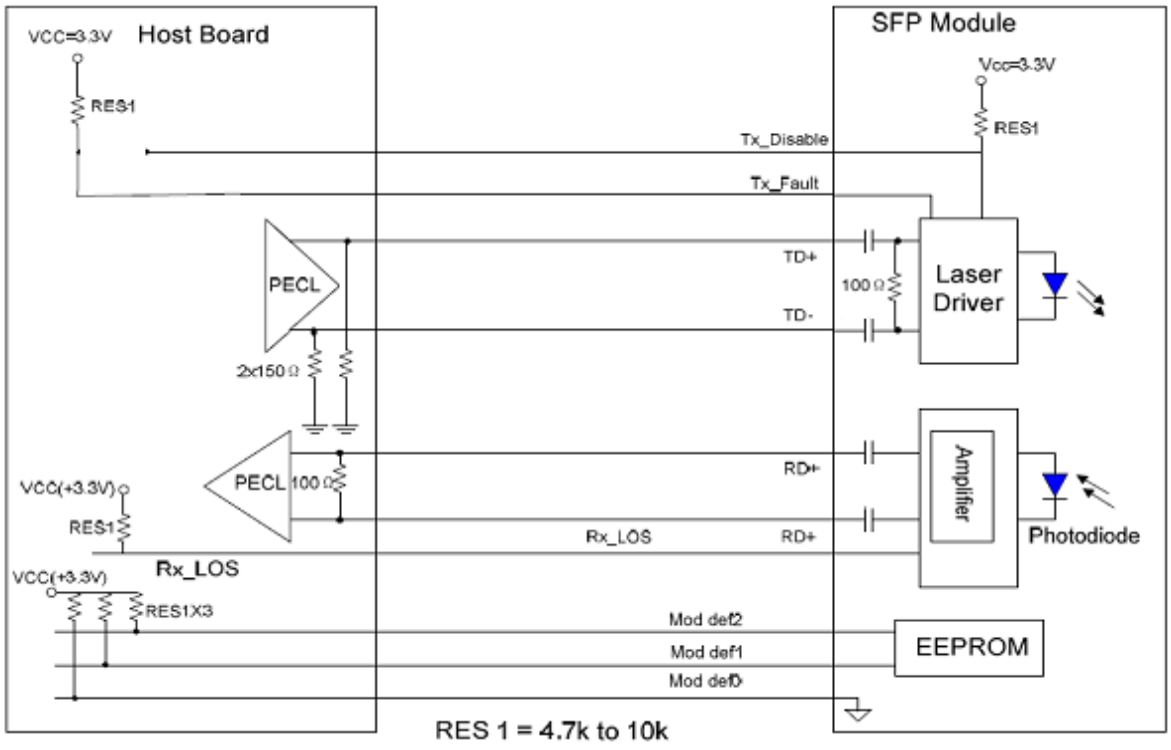
EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

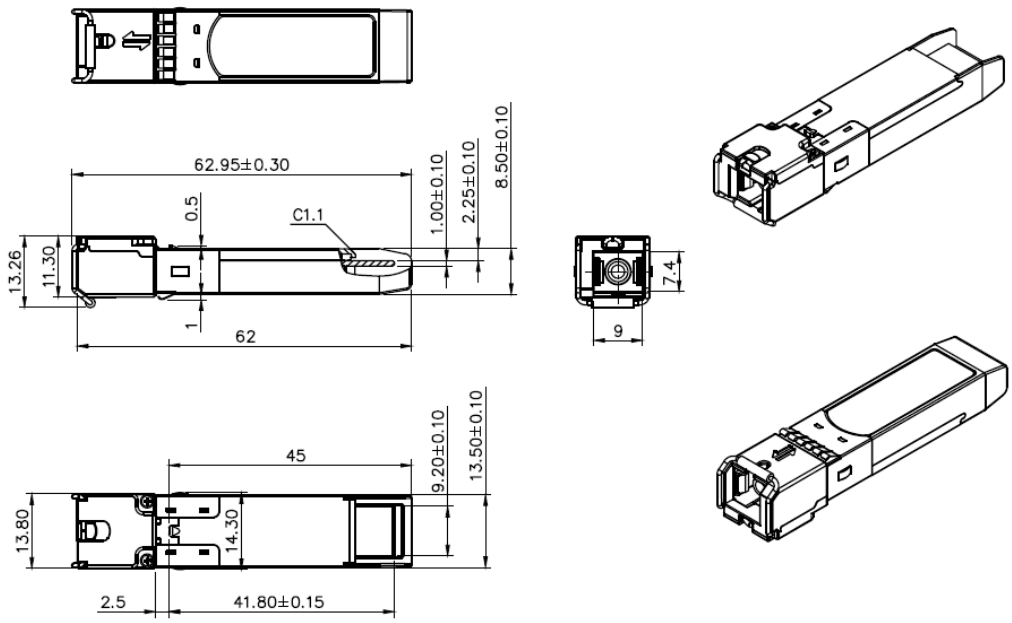
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.



Recommend Circuit Schematic

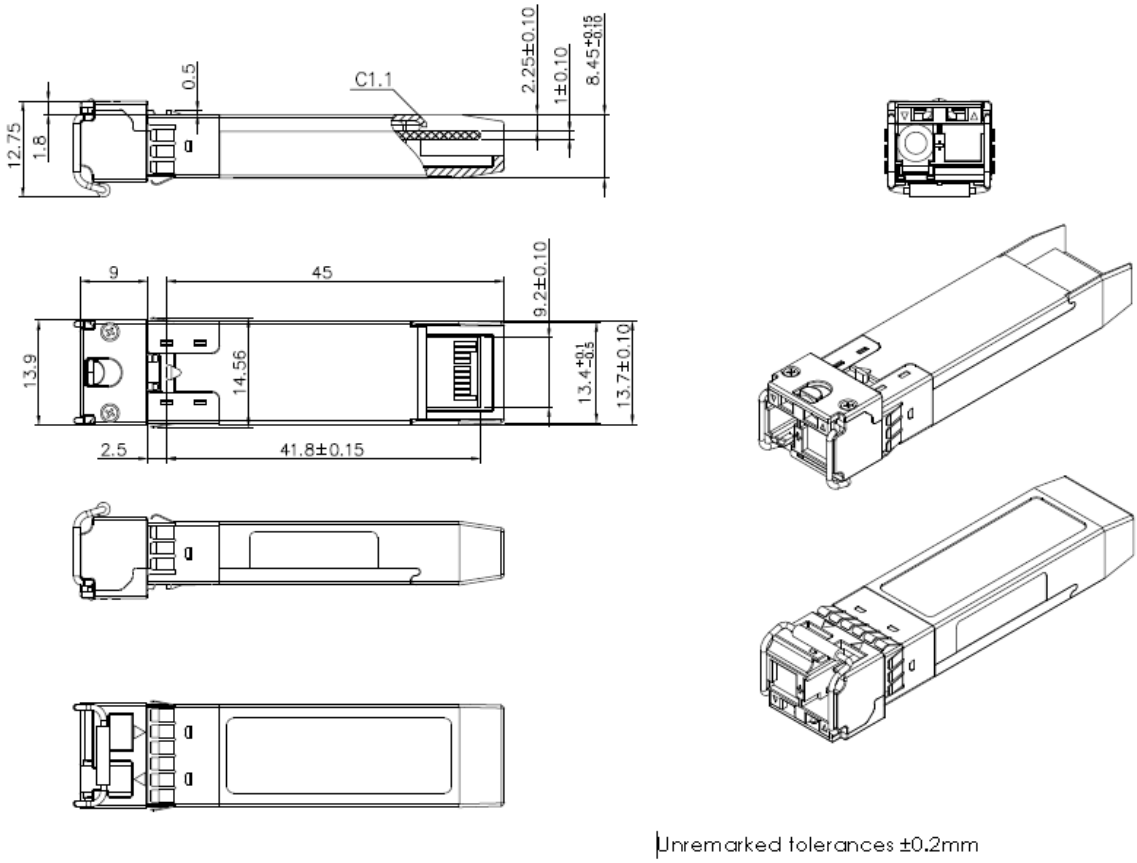


Mechanical Specifications



Unremarked tolerances ±0.2mm

SC Connector

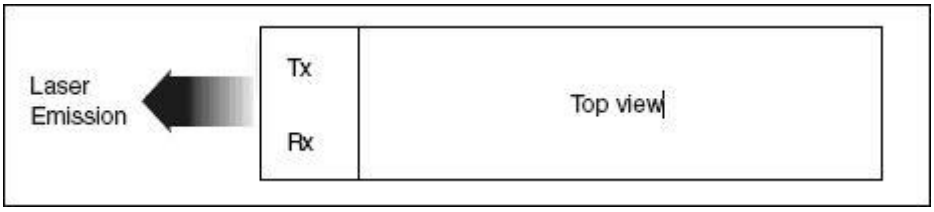


Unremarked tolerances ±0.2mm

LC Connector

*This 2D drawing only for reference, please check with Eoptolink before ordering.

Laser Emission



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Revision History

Revision	Initiated	Reviewed	Approved	Revision History	Release Date
V2.a	Jacky. Cheng	Philo.Chen		Released.	July 14, 2009
V2.b	Kelly			Update the mechanical spec.	Jan 23, 2010
V2.c	Kelly			Add LC ordering info.	Apr 26, 2010
V3.a	Phlio			Update logo Update Mechanical and Recommend Circuit.	Aug 10, 2011
V3.b	Phlio			Remove EEPROM Detail Information Change Power Link Budget	Aug 22, 2011
V3.c	Kelly			Update photo.	Nov 4, 2011
V3.d	Angela, Avrin,Jan s			Adjusted format and deleted Class 1 label &laser emission date	Feb 27,2013
V3.e	Angela/ Daquan, Dong	Kelly/lyn	Phlio	Update regulatory compliance and Max. Pout	Dec 2,2013
V3.f	Angela	Kelly/Vina/ Walt/Jason /Lyn	Phlio	Update the distance, regulatory compliance, LOSD&LOSA and mechanical spec.	Feb 11,2015
V3.g	Angela	Kelly/Vina		Update the tolerances of mechanical spec.	April 09,2015
V3.h	Angela	Kelly/Vina/ Dean		Update ordinary information, regulatory compliance and the tolerances of 2D drawing.	June 15,2016

Notice:

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