

## EOLS-BI1348-10 20 30 40 Series

## EOLS-BI1548-10 20 30 40 Series

Single-Mode for 4X/2X/1 FC and GBE application  
 SC/LC Single-Fiber SFP Transceiver  
 RoHS6 Compliant



### Features

- ◆ Up to 4.25Gbps Data Links
- ◆ A type: 1310nm DFB TX /1550nm RX  
 B type: 1550nm DFB TX /1310nm RX
- ◆ 10km with 9/125 μm SMF for EOLS-BI1X48-10 Series  
 20km with 9/125 μm SMF for EOLS-BI1X48-20 Series  
 30km with 9/125 μm SMF for EOLS-BI1X48-30 Series  
 40km with 9/125 μm SMF for EOLS-BI1X48-40 Series
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Hot-Pluggable SFP Footprint Simplex SC/LC Connector Interface
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant
- ◆ Operating Case Temperature  
 Standard: 0°C ~+70°C  
 Industrial: -40°C ~+85°C
- ◆ Compliant with SFP MSA Specification
- ◆ Compliant with Digital Diagnostic Monitor Interface SFF-8472
- ◆ Compliant with Fiber Channel FC-PI 400/200/100
- ◆ Compliant with IEEE 802.3ah-2004 1000BASE-BX

### Applications

- ◆ Fiber Channel Links
- ◆ WDM Gigabit Ethernet Links
- ◆ Other Optical Links

### Ordering Information

Part No.	Data Rate	Wavelength	Interface	Temp.	DDMI
EOLS-BI1348-10*(note1)	Up to 4.25Gbps	1310nm	SC	Standard	NO
EOLS-BI1548-10*(note1)	Up to 4.25Gbps	1550nm	SC	Standard	NO
EOLS-BI1348-10-I	Up to 4.25Gbps	1310nm	SC	Industrial	NO

EOLS-BI1548-10-I	Up to 4.25Gbps	1550nm	SC	Industrial	NO
EOLS-BI1348-10-D	Up to 4.25Gbps	1310nm	SC	Standard	YES
EOLS-BI1548-10-D	Up to 4.25Gbps	1550nm	SC	Standard	YES
EOLS-BI1348-10-DI	Up to 4.25Gbps	1310nm	SC	Industrial	YES
EOLS-BI1548-10-DI	Up to 4.25Gbps	1550nm	SC	Industrial	YES
EOLS-BI1348-10-L	Up to 4.25Gbps	1310nm	LC	Standard	NO
EOLS-BI1548-10-L	Up to 4.25Gbps	1550nm	LC	Standard	NO
EOLS-BI1348-10-IL	Up to 4.25Gbps	1310nm	LC	Industrial	NO
EOLS-BI1548-10-IL	Up to 4.25Gbps	1550nm	LC	Industrial	NO
EOLS-BI1348-10-DL	Up to 4.25Gbps	1310nm	LC	Standard	YES
EOLS-BI1548-10-DL	Up to 4.25Gbps	1550nm	LC	Standard	YES
EOLS-BI1348-10-DIL	Up to 4.25Gbps	1310nm	LC	Industrial	YES
EOLS-BI1548-10-DIL	Up to 4.25Gbps	1550nm	LC	Industrial	YES
EOLS-BI1348-20 <sup>*(note1)</sup>	Up to 4.25Gbps	1310nm	SC	Standard	NO
EOLS-BI1548-20 <sup>*(note1)</sup>	Up to 4.25Gbps	1550nm	SC	Standard	NO
EOLS-BI1348-20-I	Up to 4.25Gbps	1310nm	SC	Industrial	NO
EOLS-BI1548-20-I	Up to 4.25Gbps	1550nm	SC	Industrial	NO
EOLS-BI1348-20-D	Up to 4.25Gbps	1310nm	SC	Standard	YES
EOLS-BI1548-20-D	Up to 4.25Gbps	1550nm	SC	Standard	YES
EOLS-BI1348-20-DI	Up to 4.25Gbps	1310nm	SC	Industrial	YES
EOLS-BI1548-20-DI	Up to 4.25Gbps	1550nm	SC	Industrial	YES
EOLS-BI1348-20-L	Up to 4.25Gbps	1310nm	LC	Standard	NO
EOLS-BI1548-20-L	Up to 4.25Gbps	1550nm	LC	Standard	NO
EOLS-BI1348-20-IL	Up to 4.25Gbps	1310nm	LC	Industrial	NO
EOLS-BI1548-20-IL	Up to 4.25Gbps	1550nm	LC	Industrial	NO
EOLS-BI1348-20-DL	Up to 4.25Gbps	1310nm	LC	Standard	YES
EOLS-BI1548-20-DL	Up to 4.25Gbps	1550nm	LC	Standard	YES
EOLS-BI1348-20-DIL	Up to 4.25Gbps	1310nm	LC	Industrial	YES
EOLS-BI1548-20-DIL	Up to 4.25Gbps	1550nm	LC	Industrial	YES
EOLS-BI1348-30 <sup>*(note1)</sup>	Up to 4.25Gbps	1310nm	SC	Standard	NO
EOLS-BI1548-30 <sup>*(note1)</sup>	Up to 4.25Gbps	1550nm	SC	Standard	NO
EOLS-BI1348-30-I	Up to 4.25Gbps	1310nm	SC	Industrial	NO
EOLS-BI1548-30-I	Up to 4.25Gbps	1550nm	SC	Industrial	NO
EOLS-BI1348-30-D	Up to 4.25Gbps	1310nm	SC	Standard	YES
EOLS-BI1548-30-D	Up to 4.25Gbps	1550nm	SC	Standard	YES
EOLS-BI1348-30-DI	Up to 4.25Gbps	1310nm	SC	Industrial	YES
EOLS-BI1548-30-DI	Up to 4.25Gbps	1550nm	SC	Industrial	YES
EOLS-BI1348-30-L	Up to 4.25Gbps	1310nm	LC	Standard	NO
EOLS-BI1548-30-L	Up to 4.25Gbps	1550nm	LC	Standard	NO
EOLS-BI1348-30-IL	Up to 4.25Gbps	1310nm	LC	Industrial	NO
EOLS-BI1548-30-IL	Up to 4.25Gbps	1550nm	LC	Industrial	NO
EOLS-BI1348-30-DL	Up to 4.25Gbps	1310nm	LC	Standard	YES

EOLS-BI1548-30-DL	Up to 4.25Gbps	1550nm	LC	Standard	YES
EOLS-BI1348-30-DIL	Up to 4.25Gbps	1310nm	LC	Industrial	YES
EOLS-BI1548-30-DIL	Up to 4.25Gbps	1550nm	LC	Industrial	YES
EOLS-BI1348-40 <sup>*(note1)</sup>	Up to 4.25Gbps	1310nm	SC	Standard	NO
EOLS-BI1548-40 <sup>*(note1)</sup>	Up to 4.25Gbps	1550nm	SC	Standard	NO
EOLS-BI1348-40-I	Up to 4.25Gbps	1310nm	SC	Industrial	NO
EOLS-BI1548-40-I	Up to 4.25Gbps	1550nm	SC	Industrial	NO
EOLS-BI1348-40-D	Up to 4.25Gbps	1310nm	SC	Standard	YES
EOLS-BI1548-40-D	Up to 4.25Gbps	1550nm	SC	Standard	YES
EOLS-BI1348-40-DI	Up to 4.25Gbps	1310nm	SC	Industrial	YES
EOLS-BI1548-40-DI	Up to 4.25Gbps	1550nm	SC	Industrial	YES
EOLS-BI1348-40-L	Up to 4.25Gbps	1310nm	LC	Standard	NO
EOLS-BI1548-40-L	Up to 4.25Gbps	1550nm	LC	Standard	NO
EOLS-BI1348-40-IL	Up to 4.25Gbps	1310nm	LC	Industrial	NO
EOLS-BI1548-40-IL	Up to 4.25Gbps	1550nm	LC	Industrial	NO
EOLS-BI1348-40-DL	Up to 4.25Gbps	1310nm	LC	Standard	YES
EOLS-BI1548-40-DL	Up to 4.25Gbps	1550nm	LC	Standard	YES
EOLS-BI1348-40-DIL	Up to 4.25Gbps	1310nm	LC	Industrial	YES
EOLS-BI1548-40-DIL	Up to 4.25Gbps	1550nm	LC	Industrial	YES

Note1: Standard version

\*The product image only for reference purpose.

## Regulatory Compliance<sup>\*Note2</sup>

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

Note2: 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-BI1X48-X series is small form factor pluggable module for 1XFC/2XFC/4XFC single fiber applications by using 1310nm / 1550nm transmitter and 1550nm / 1310nm receiver. It is with the SFP 20-pin connector to allow hot plug capability.

The transmitter section uses a distributed feedback laser and is a class 1 laser compliant according

to International Safety Standard IEC 60825. The receiver section uses an integrated B type / A type detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

The EOLS-BI1X48-X-D series are designed to be compliant with SFF-8472 MSA.

## 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		-	95	%

\*Exceeding any one of these values may destroy the device immediately.

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Case Temperature	T <sub>c</sub>	EOLS-BI1X48-X	0		+70	°C
		EOLS-BI1X48-X-I	-40		+85	
Power Supply Voltage	Vcc	3.15	3.3	3.45	V	
Power Supply Current	Icc		200	300	mA	
Date Rate		1	4.25		Gbps	

## Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
<b>Transmitter</b>						
LVPECL Compatible Inputs(Differential)	Vin	400		2000	mVpp	AC coupled inputs <sup>*(note5)</sup>
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	2		Vcc+0.3	V	
	Normal	0		0.5		
<b>Receiver</b>						
CML Outputs (Differential)	Vout	400	800	2000	mVpp	AC coupled outputs <sup>*(note5)</sup>
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	

**Optical and Electrical Characteristics**
**(EOLS-BI1348-10, 1310nm DFB and PIN, 10km)**

Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		10		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1290	1310	1330	nm
Spectral Width (-20dBm)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	P <sub>out</sub>	-8		-1	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	0.16			mW
Rise/Fall Time(20%~80%)	tr/tf			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3z <sup>*(note7)</sup>				
TX_Disable Assert Time	t <sub>off</sub>			10	us
P <sub>out</sub> @TX Disable Asserted	P <sub>out</sub>			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1500	1550	1600	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	P <sub>min</sub>			-16	dBm
Receiver Overload	P <sub>max</sub>	0			dBm
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

**(EOLS-BI1548-10, 1550nm DFB and PIN, 10km)**

Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		10		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1530	1550	1570	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	P <sub>out</sub>	-8		-1	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	0.16			mW
Rise/Fall Time(20%~80%)	t <sub>r</sub> /t <sub>f</sub>			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3ah-2004 <sup>*(note7)</sup>				
TX_Disable Assert Time	t <sub>off</sub>			10	us

$P_{out@TX}$ Disable Asserted	$P_{out}$			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1260		1360	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	$P_{min}$			-16	dBm
Receiver Overload	$P_{max}$	0			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-BI1348-20, 1310nm DFB and PIN, 20km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9 $\mu$ m Core Diameter SMF	L		20		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1290	1310	1330	nm
Spectral Width (-20dBm)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	$P_{out}$	-5		0	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	0.32			mW
Rise/Fall Time(20%~80%)	tr/tf			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3z <sup>*(note7)</sup>				
TX_Disable Assert Time	$t_{off}$			10	us
$P_{out@TX}$ Disable Asserted	$P_{out}$			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1500	1550	1600	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	$P_{min}$			-16	dBm
Receiver Overload	$P_{max}$	0			dBm
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-BI1548-20, 1550nm DFB and PIN, 20km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9 $\mu$ m Core Diameter SMF	L		20		km
Data Rate				4250	Mbps

Transmitter					
Center Wavelength	$\lambda_c$	1530	1550	1570	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	P <sub>out</sub>	-5		0	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	0.32			mW
Rise/Fall Time(20%~80%)	t <sub>r</sub> /t <sub>f</sub>			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3ah-2004 <sup>*(note7)</sup>				
TX_Disable Assert Time	t <sub>off</sub>			10	us
P <sub>out</sub> @TX Disable Asserted	P <sub>out</sub>			-45	dBm
Receiver					
Center Wavelength	$\lambda_c$	1260		1360	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	P <sub>min</sub>			-16	dBm
Receiver Overload	P <sub>max</sub>	0			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-B11348-30, 1310nm DFB and PIN, 30km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		30		km
Data Rate				4250	Mbps
Transmitter					
Center Wavelength	$\lambda_c$	1290	1310	1330	nm
Spectral Width (-20dBm)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	P <sub>out</sub>	0		+5	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	1			mW
Rise/Fall Time(20%~80%)	t <sub>r</sub> /t <sub>f</sub>			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3z <sup>*(note7)</sup>				
TX_Disable Assert Time	t <sub>off</sub>			10	us
P <sub>out</sub> @TX Disable Asserted	P <sub>out</sub>			-45	dBm
Receiver					
Center Wavelength	$\lambda_c$	1500	1550	1600	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	P <sub>min</sub>			-16	dBm

Receiver Overload	Pmax	0			dBm
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-BI1548-30, 1550nm DFB and PIN-TIA, 30km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF	L		30		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1530	1550	1570	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	Pout	0		+5	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	1			mW
Rise/Fall Time(20%~80%)	$t_r/t_f$			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3ah-2004 <sup>*(note7)</sup>				
TX_Disable Assert Time	t_off			10	us
P <sub>out</sub> @TX Disable Asserted	Pout			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1260		1360	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	Pmin			-16	dBm
Receiver Overload	Pmax	0			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-BI1348-40, 1310nm DFB and PIN, 40km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF	L		40		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1290	1310	1330	nm
Spectral Width (-20dBm)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	Pout	0		+5	dBm
Optical Modulation Amplitude	OMA	1			mW

@ 4250Mbps					
Rise/Fall Time(20%~80%)	tr/tf			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3z <sup>*(note7)</sup>				
TX_Disable Assert Time	t_off			10	us
P <sub>out</sub> @TX Disable Asserted	P <sub>out</sub>			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1500	1550	1600	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	P <sub>min</sub>			-16	dBm
Receiver Overload	P <sub>max</sub>	0			dBm
LOS De-Assert@4250Mbps	LOSD			-17	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

### (EOLS-BI1548-40, 1550nm DFB and APD-TIA, 40km)

Parameter	Symbol	Min.	Typical	Max.	Unit
9 $\mu$ m Core Diameter SMF	L		40		km
Data Rate				4250	Mbps
<b>Transmitter</b>					
Center Wavelength	$\lambda_c$	1530	1550	1570	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power <sup>*(note3)</sup>	P <sub>out</sub>	0		+5	dBm
Optical Modulation Amplitude @ 4250Mbps	OMA	1			mW
Rise/Fall Time(20%~80%)	t <sub>r</sub> /t <sub>f</sub>			175	ps
Total Jitter	TJ			61.2	ps
Output Optical Eye <sup>*(note4)</sup>	Compliant with IEEE 802.3ah-2004 <sup>*(note7)</sup>				
TX_Disable Assert Time	t_off			10	us
P <sub>out</sub> @TX Disable Asserted	P <sub>out</sub>			-45	dBm
<b>Receiver</b>					
Center Wavelength	$\lambda_c$	1260		1360	nm
Receiver Sensitivity <sup>*(note6)</sup> @4250Mbps	P <sub>min</sub>			-24	dBm
Receiver Overload	P <sub>max</sub>	-8			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert@4250Mbps	LOSD			-25	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis <sup>*(note8)</sup>		1.0			dB

Note3: Output is coupled into a 9/125 $\mu$ m single-mode fiber.

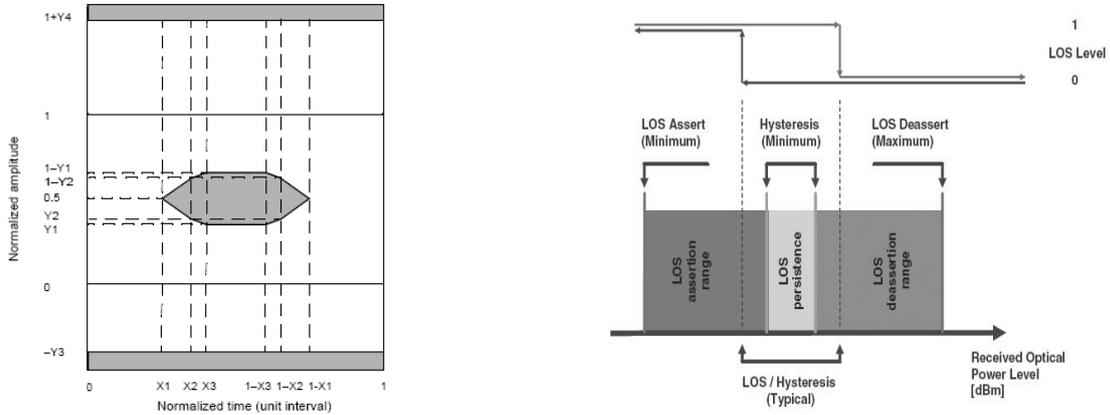
Note4: Filtered, measured with a PRBS  $2^7-1$ .

Note5: CML logic, internally AC coupled.

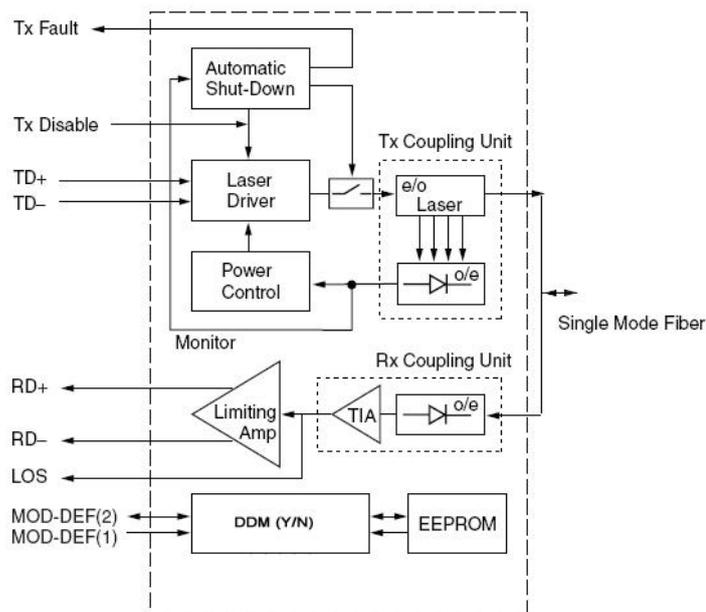
Note6: Measured at all data rates specified in Data Rate table with  $2^7-1$  PRBS data pattern, ER>5dB, BER <1E-12.

Note7: Eye Pattern Mask

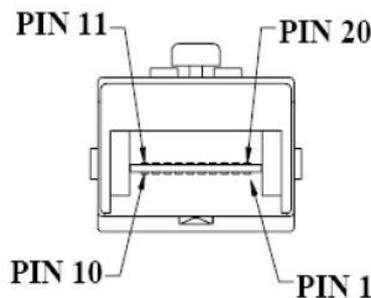
Note8: LOS Hysteresis

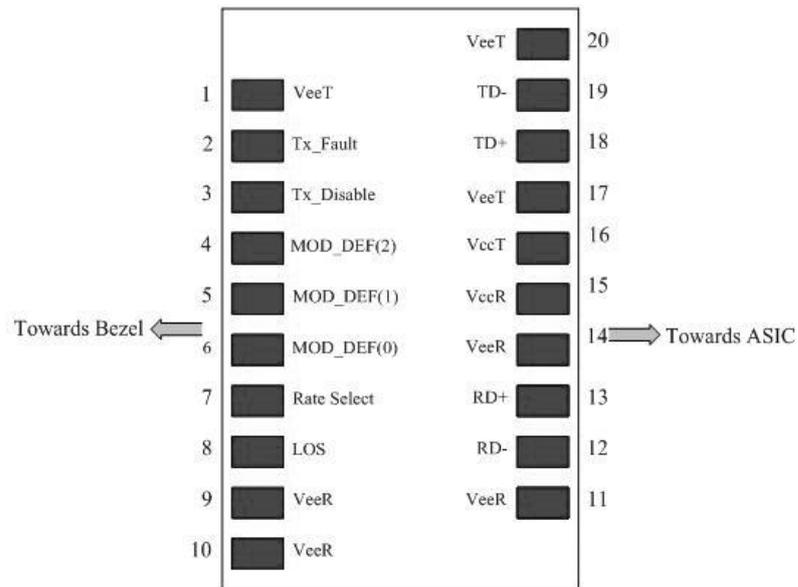


### Functional Description of Transceiver



### SFP Transceiver Electrical Pad Layout





## Pin Function Definitions

Pin NO.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	5)
2	TX Fault	Transmitter Fault Indication	3	1)
3	TX Disable	Transmitter Disable	3	2) Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	3) Data line for Serial ID.
5	MOD-DEF1	Module Definition 1	3	3) Clock line for Serial ID.
6	MOD-DEF0	Module Definition 0	3	3) Grounded within the module.
7	Rate Select	Not Connect	3	Function not available
8	LOS	Loss of Signal	3	4)
9	VeeR	Receiver Ground	1	5)
10	VeeR	Receiver Ground	1	5)
11	VeeR	Receiver Ground	1	5)
12	RD-	Inv. Received Data Out	3	6)
13	RD+	Received Data Out	3	6)
14	VeeR	Receiver Ground	1	5)
15	VccR	Receiver Power	2	7) 3.3 ± 5%
16	VccT	Transmitter Power	2	7) 3.3 ± 5%
17	VeeT	Transmitter Ground	1	5)
18	TD+	Transmit Data In	3	8)
19	TD-	Inv. Transmit Data In	3	8)
20	VeeT	Transmitter Ground	1	5)

### 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 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  $4.7 - 10 K\Omega$  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

3) Modulation Absent, connected to VEET or VEER in the module.

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a  $4.7K - 10K\Omega$  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  $< 0.8V$ .

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

6) RD-/+ : These are the differential receiver outputs. They are AC coupled  $100\Omega$  differential lines which should be terminated with  $100\Omega$  (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  $3.3V \pm 5\%$  at the SFP connector pin. Maximum supply current is  $300mA$ . Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than  $1 \text{ ohm}$  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  $30mA$  greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

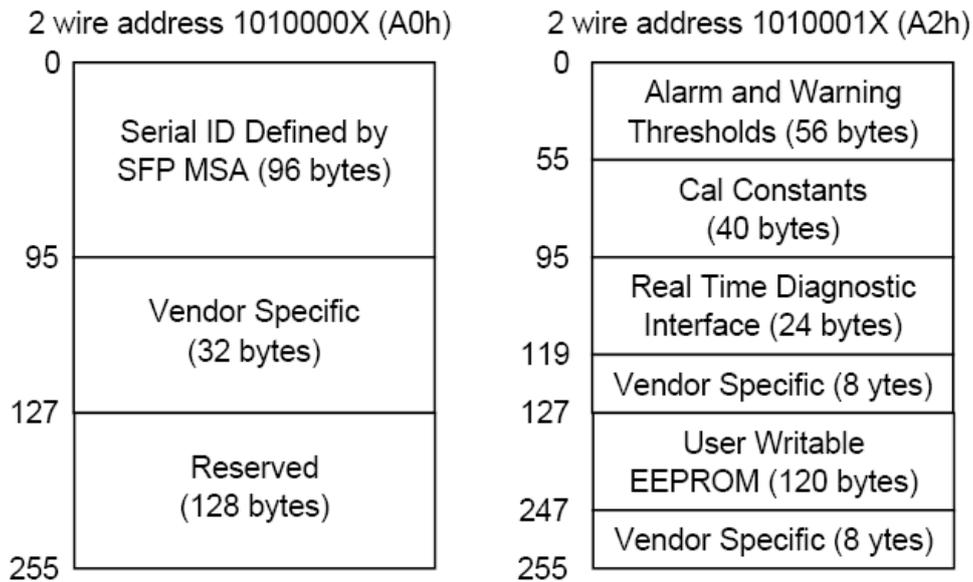
8) TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with  $100\Omega$  differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

### EEPROM

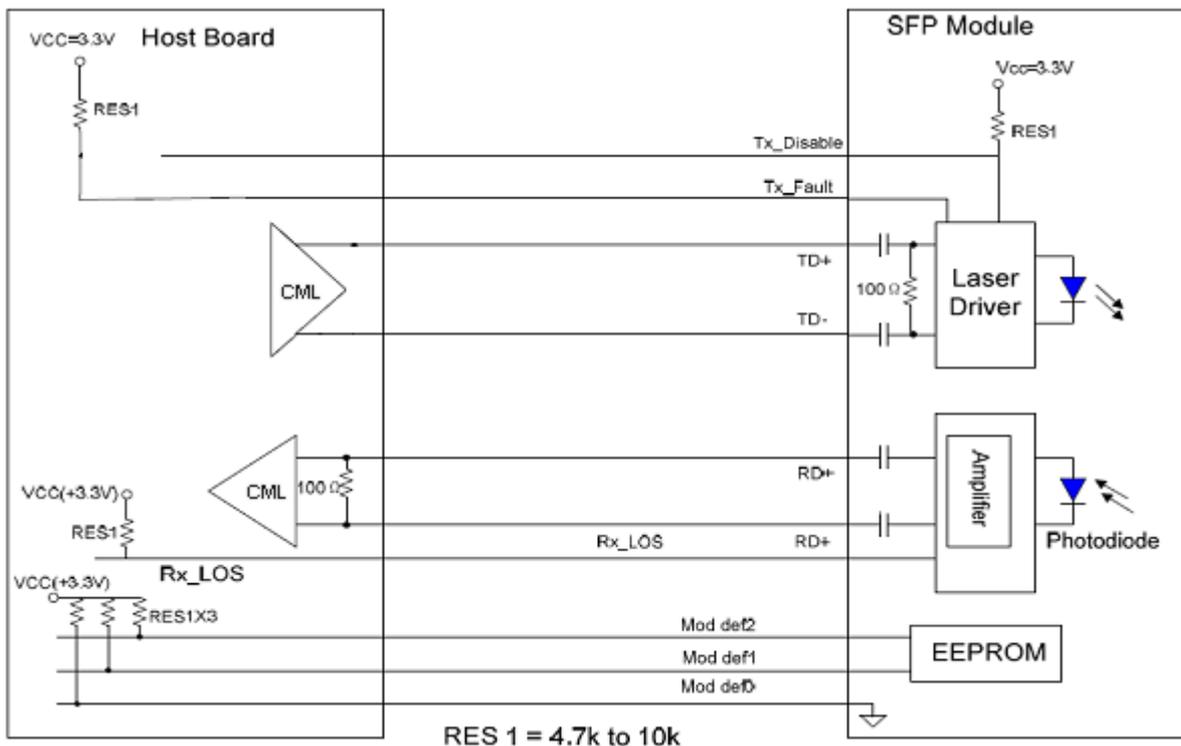
The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected 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

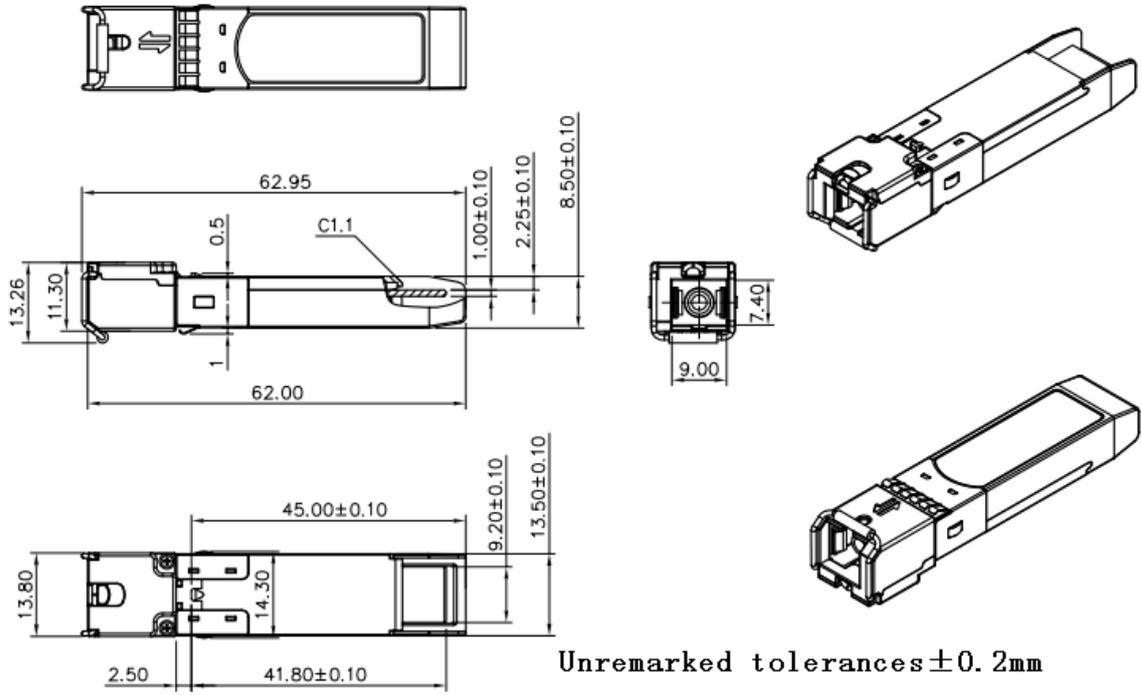
monitoring all are implemented. If the module is defined as external calibrated, the diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2H. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.



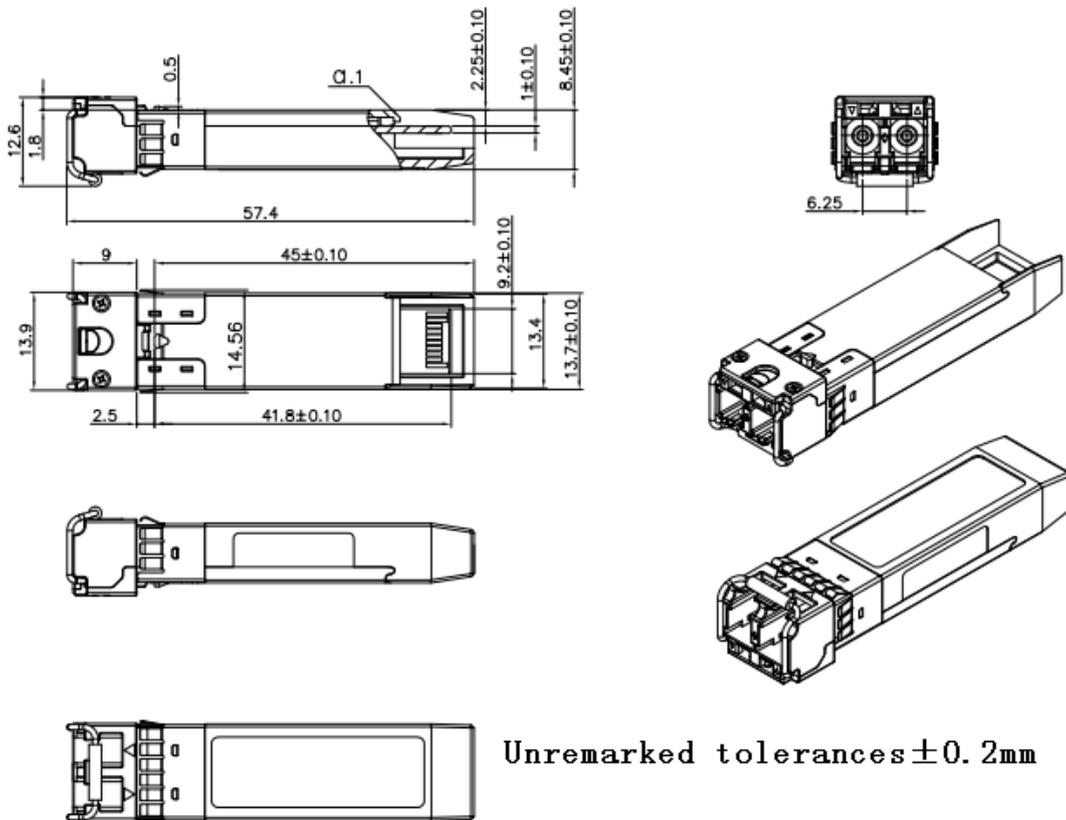
## Recommended Circuit Schematic



Mechanical Specifications



SC



LC

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

## Laser Emission Data

Wavelength	1310nm
Total output power (as defined by FDA: 7mm aperture at 20cm distance)	<0.195Mw
Total output power (as defined by IEC: 7mm aperture at 10cm distance)	<15.6Mw
Beam divergence	12.5°
Wavelength	1550nm
Total output power (as defined by FDA: 7mm aperture at 20cm distance)	<0.79Mw
Total output power (as defined by IEC: 7mm aperture at 10cm distance)	<10Mw
Beam divergence	12.5°

## Laser Emission



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## Revision History

Revision	Initiated	Reviewed	Approved	Revision History	Release Date
V2.a	Cathy	Kelly		Release	Mar 29, 2010
V3.a	Phlio			Update Recommend Circuit Update Link Budget	Aug 10, 2011
V3.b	Phlio	kelly		Integrate 20km and 40 km series	Aug 22, 2011
V3.c	Phlio	Kelly		Correct OMA.	Sep 9, 2011
V3.d	Kelly			Update photo	Nov 4, 2011
V4.a	Arvin	Kelly/Phlio		Update the Sensitivity	2012-05-09
V4.b	Angela/Vina	Kelly		Update the regulatory compliance, LOSA and 2d drawing.	Mar 23,2016

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