

EOLP-8580-02-X

**850nm SFP+ Multi-Mode Transceiver, With Diagnostic Monitoring
Fiber Channel 8.5G, 4.25G, 2.125G, 1.0625G
Duplex SFP+ Transceiver, RoHS 6 Compliant**

Features

- ◆ Operating data rate up to 8.5Gbps
- ◆ 850nm VCSEL Transmitter
- ◆ Distance up to 300m @50 / 125 um MMF
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Duplex LC Connector Interface, Hot Pluggable
- ◆ Compliant with MSA SFP+ Specification SFF-8431
- ◆ Power Dissipation < 1.0W
- ◆ Dispersion tolerance up to 40ps/nm over G.651
- ◆ Operating Case Temperature

Standard: 0°C~+70°C

Industrial: -40°C~+85°C



Applications

- ◆ 1000 Base-LX Ethernet
- ◆ 8XFC at 8.5Gbps
- ◆ 4XFC at 4.25Gbps
- ◆ 2XFC at 2.125Gbps
- ◆ 1xFC at 1.0625Gbps
- ◆ OBSAI rates 6.144 Gb/s, 3.072 Gb/s, 1.536 Gb/s, 0.768Gb/s
- ◆ CPRI rates 7.373Gb/s, 6.144 Gb/s, 4.915 Gb/s, 2.458 Gb/s, 1.229 Gb/s, 0.614Gb/s
- ◆ Other optical links

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Temp.	DDMI
EOLP-8580-02	0.614Gbps to 8.5Gbps	850nm VCSEL	MMF	300m	Standard	YES
EOLP-8580-02-I	0.614Gbps to 8.5Gbps	850nm VCSEL	MMF	300m	Industrial	YES

Regulatory Compliance ^{*Note2}

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12
		EN 60825-1:2007
		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
CB	JPTUV-049251	IEC 60825-1
		IEC 60950-1
FCC	WTF14F0514437E	47 CFR PART 15 OCT., 2013
FDA	1331340-000	CDRH 1040.10
ROHS	RHS01G006464	2011/65/EU

Note2: The above certificate number updated to June 2014, because some certificate will be updated every year, such as FCC, FDA and ROHS. For the latest certification information, please check with Eoptolink.

Product Description

The EOLP-8580-02-X series single mode transceiver is small form factor pluggable module for serial optical data communications such as X1/X2/X4/X8 Fiber Channel. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C. This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm.

The transmitter section uses a Vertical Cavity Surface Emitted Laser (VCSEL) and is a Class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _S	-40	+85	°C
Supply Voltage	V _{CC}	-0.5	3.6	V
Input Voltage	V _{in}	-0.5	V _{CC}	V
Output Current	I _o	-	50	mA

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T _c	EOLP-8580-02	0	70	°C
		EOLP-8580-02-I	-40	85	
Power Supply Voltage	V _{CC}	3.15	3.3	3.45	V
Power Supply Current	I _{CC}			300	mA

Surge Current	I_{Surge}			+30	mA
Baud Rate	8XFC	0.614		8.5	Gbps

Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V_{in}	150		1200	mVpp	AC coupled inputs
Input Impedance (Differential)	Z_{in}	85	100	115	ohms	$R_{\text{in}} > 100 \text{ kohms}$ @ DC
Tx_DISABLE Input Voltage – High		2		$V_{\text{cc}}+0.3$	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Tx_FAULT Output Voltage – High		2		$V_{\text{cc}}+0.3$	V	$I_{\text{o}} = 400\mu\text{A}$; Host V_{cc}
Tx_FAULT Output Voltage – Low		0		0.8	V	$I_{\text{o}} = -4.0\text{mA}$
Receiver						
CML Outputs (Differential)	V_{out}	350		700	mVpp	AC coupled outputs
Output Impedance (Differential)	Z_{out}	85	100	115	ohms	
Rx_LOS Output Voltage – High		2		$V_{\text{cc}}+0.3$	V	$I_{\text{o}} = 400\mu\text{A}$; Host V_{cc}
Rx_LOS Output Voltage – Low		0		0.8	V	$I_{\text{o}} = -4.0\text{mA}$
MOD_DEF (2:0)	V_{oH}	2.5			V	With Serial ID
	V_{oL}	0		0.5	V	

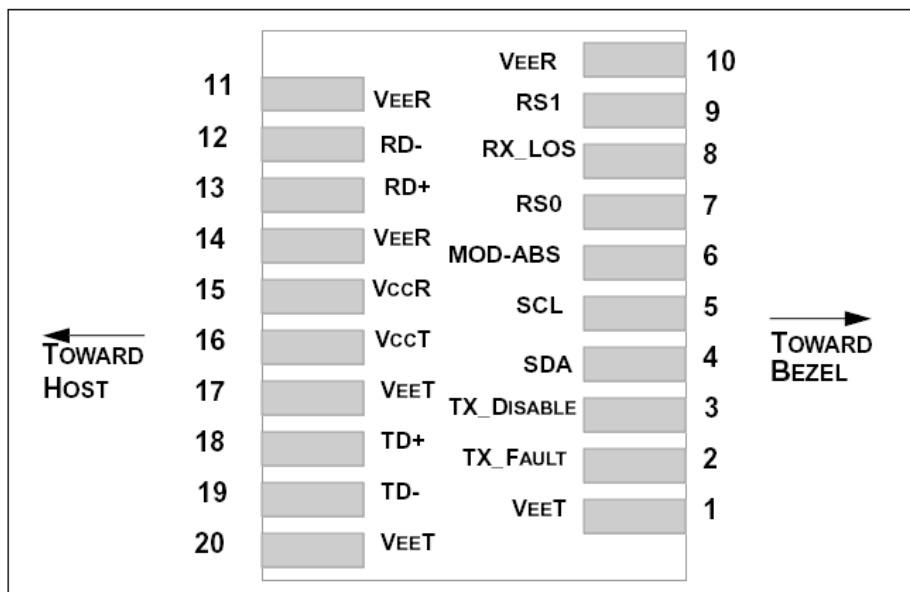
Optical and Electrical Characteristics

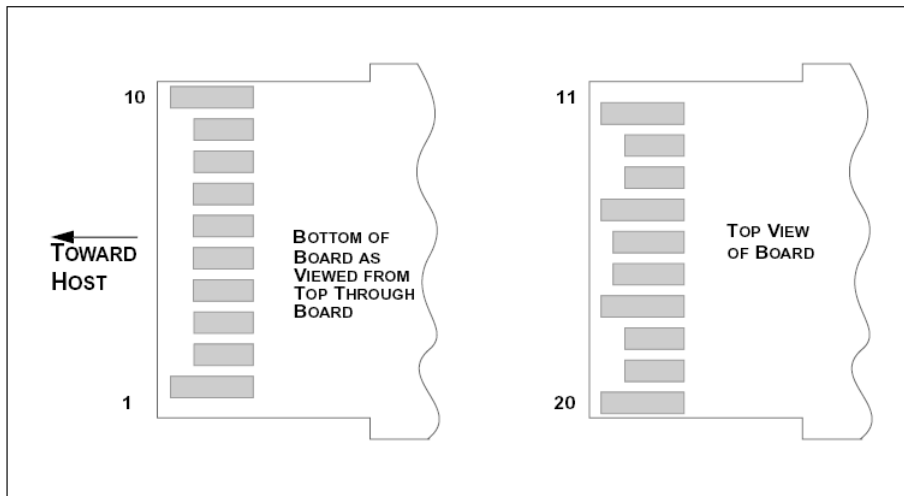
Parameter	Symbol	Min.	Typical	Max.	Unit
50 / 125 um MMF			300		m
Data Rate		0.614		8.5	Gbps
Transmitter					
Centre Wavelength	λ_{c}	840	850	860	nm
Spectral Width (RMS)	$\Delta\lambda$			0.45	nm
Average Output Power	P_{out}	-6		-1	dBm
Extinction Ratio	ER	3.0	5.0		dB
Output Optical Eye		IEEE 802.3-2005 Compliant			
Transmitter Dispersion Penalty	TDP			3.9	dB
Input Differential Impedance	Z_{IN}	90	100	110	Ω

TX Disable	Disable		2.0		V _{CC} +0.3	V
	Enable		0		0.8	
TX_Fault	Fault		2.0		V _{CC} +0.3	V
	Normal		0		0.8	
TX_Disable Assert Time		t _{off}			10	us
TX_DISABLE Negate Time		t _{on}	-	-	1	ms
TX_BISABLE time to start reset		t _{reset}	10	-	-	us
Time to initialize, include reset of TX_FAULT		t _{init}	-	-	300	ms
TX_FAULT from fault to assertion		t _{fault}	-	-	100	us
Total Jitter		TJ	-	-	0.28	UI(p-p)
Data Dependant Jitter		DDJ	-	-	0.1	UI(p-p)
Uncorrelated Jitter		UJ	-	-	0.023	RMS
Receiver						
Centre Wavelength		λ _C	840	850	860	nm
Receiver Sensitivity		P _{min}			-11.1	dBm
Output Differential Impedance		R _{IN}	90	100	110	Ω
Receiver Overload ²		P _{max}	0			dBm
Optical Return Loss		ORL			-12	dB
LOS De-Assert		LOS _D			-12.5	dBm
LOS Assert		LOS _A	-25			dBm
LOS Hysteresis			0.5			dB
LOS	High		2.0		V _{CC} +0.3	V
	Low		0		0.8	

Note 2: Measured with a PRBS 2³¹ -1 test pattern @ 8.5Gbps, BER ≤ 10⁻¹²

SFP+ Transceiver Electrical Pad Layout





Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	Data line for Serial ID.
5	SCL	Module Definition 1	3	Clock line for Serial ID.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL).	3	This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance.
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	1	This pin has an internal 30k pull down to ground. A signal on this pin will not affect module performance.
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 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 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

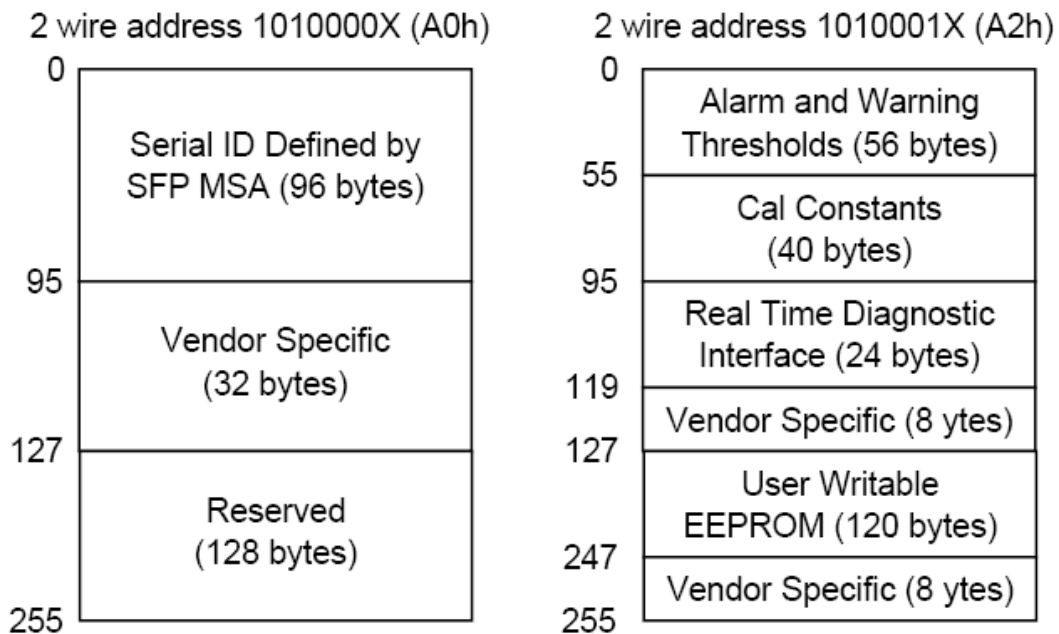
Notes:

- 1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. 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 4.7K~10 K Ω 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) Module 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 – 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 $< 0.8V$.
- 5) VeeR and VeeT may be internally connected within the SFP+ module.
- 6) RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 700 mV differential (185 –350 mV single ended) when properly terminated.
- 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. Inductors with DC resistance of less than 1 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 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 150 – 1200 mV (75 – 600mV single-ended), though it is recommended that values between 150 and 1200 mV differential (75 – 600mV single-ended) be used for best EMI performance.

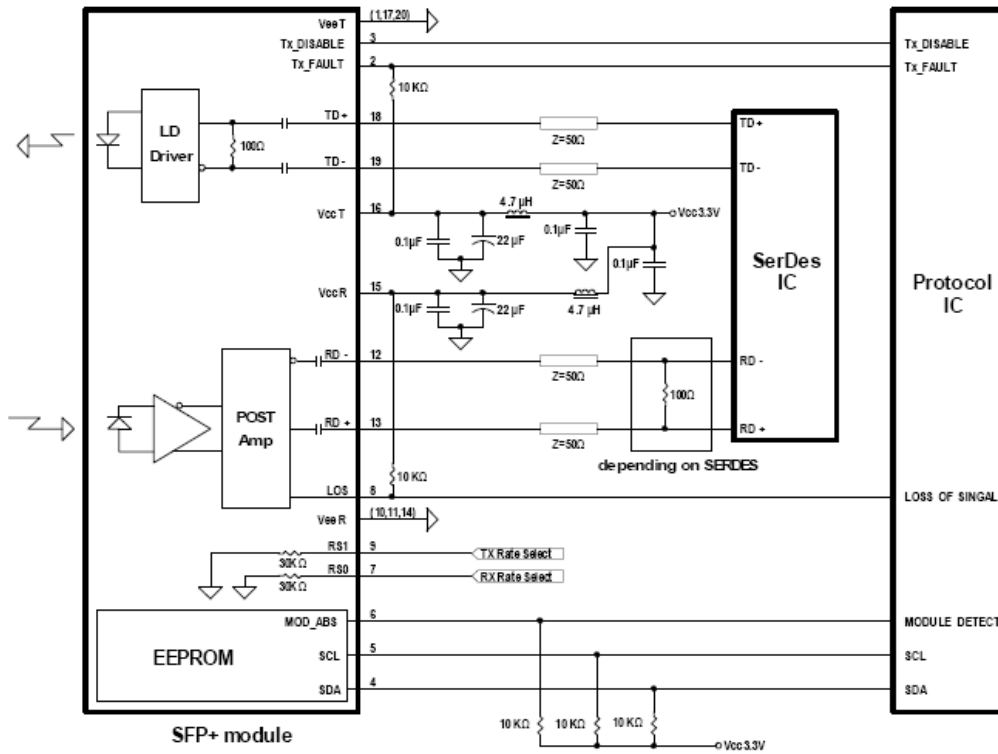
EEPROM

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 writing 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.

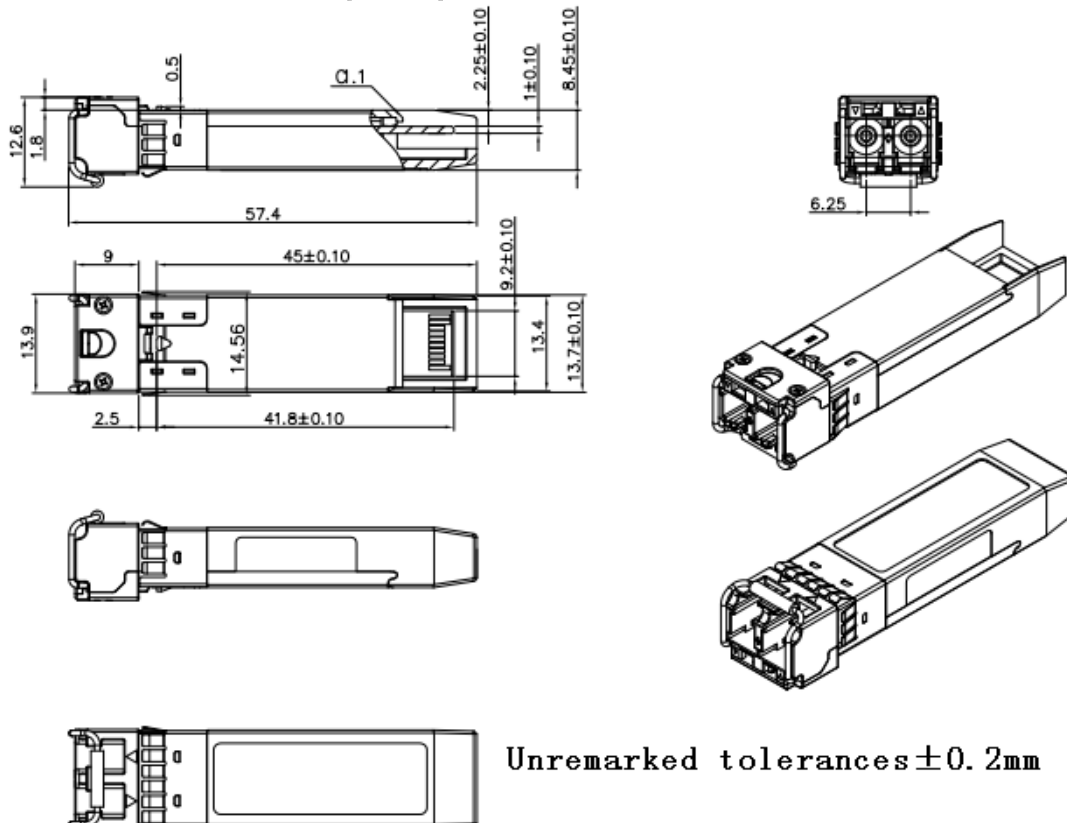
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power 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 10.3.



Recommend Circuit Schematic



Mechanical Specifications



Unremarked tolerances ±0.2mm

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.

Obtaining Document

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<http://www.eoptolink.com>

Or contact Eoptolink Technology Inc., Ltd. Listed at the end of the documentation to get the latest documents.

Revision History

Revision	Initiate	Review	Approve	Revision History	Release Date
V1.a	Kelly			Released	2012-1-31
V1.b	Angela	Kelly/Vina/Jp		Add CPRI/OBSAI application. Update temperature range, regulatory compliance and the tolerances of 2D drawing.	July 8,2015

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