

EOLP-8596-02-M series

850nm SFP+ Multi-Mode Transceiver, With Digital Diagnostic Monitoring
1000BASE-SX / 10G BASE-SW/SR
Duplex SFP+ Transceiver, RoHS 6 Compliant



Features

- ◆ Supporting rate selectable 1.25Gbps or 9.95~10.3Gbps
- ◆ 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
- ◆ Compliant with IEEE 802.3ae 10GBASE-SR/SW
- ◆ Power Dissipation < 1.0W
- ◆ Dispersion tolerance up to 40ps/nm over G.651
- ◆ Operating Case Temperature
 Standard: 0°C~+70°C
 Extended: -10°C~+85°C

Applications

- ◆ 10GBASE-SW at 9.953Gbps
- ◆ 10GBASE-SR at 10.3125Gbps
- ◆ 1000BASE-SX 1G Ethernet
- ◆ Other Optical Links

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Distance	Temp.	DDMI
EOLP-8596-02-M	1.25Gbps	850nm VCSEL	MMF	300m	Standard	YES
	9.95Gbps to 10.3Gbps					
EOLP-8596-02-MI	1.25Gbps	850nm VCSEL	MMF	300m	Extended	YES
	9.95Gbps to 10.3Gbps					

*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 EOLP-8596-02-M series multi-mode transceiver is SFP+ module with dual rate selectable for duplex optical data communications such as 1000BASE-SX, 10GBASE-SR and 10GBASE-SW and so on. 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 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-8596-02-M	0	70	°C
		EOLP-8596-02-MI	-10	85	

Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V
Power Supply Current	I _{CC}			300	mA
Surge Current	I _{Surge}			+30	mA
Baud Rate	10GBASE-SR		10.3		Gbps
	10GBASE-SW		9.95		
	1000BASE-SX		1.25		

Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V _{in}	180		700	mV _{pp}	AC coupled inputs
Input Impedance (Differential)	Z _{in}	85	100	115	ohms	R _{in} > 100 kohms @ DC
Tx_DISABLE Input Voltage – High		2		V _{CC} +0.3	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Tx_FAULT Output Voltage – High		2		V _{CC} +0.3	V	I _o = 400μA; Host V _{CC}
Tx_FAULT Output Voltage – Low		0		0.8	V	I _o = -4.0mA
Receiver						
CML Outputs (Differential)	V _{out}	300		850	mV _{pp}	AC coupled outputs
Output Impedance (Differential)	Z _{out}	85	100	115	ohms	
Rx_LOS Output Voltage – High		2		V _{CC} +0.3	V	I _o = 400μA; Host V _{CC}
Rx_LOS Output Voltage – Low		0		0.8	V	I _o = -4.0mA
MOD_DEF (2:0)	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

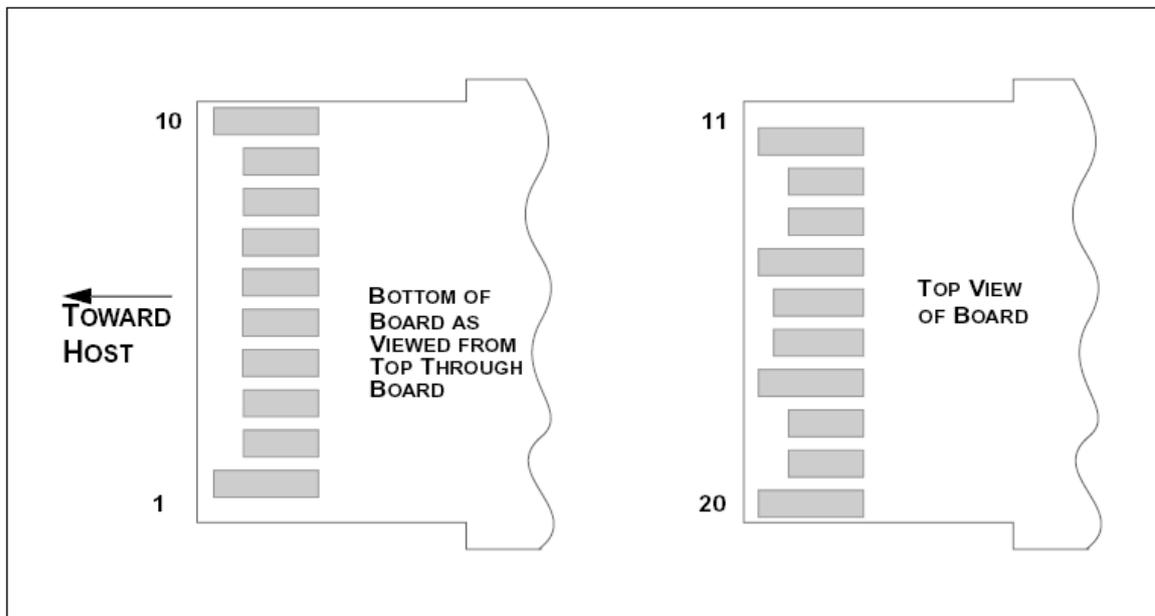
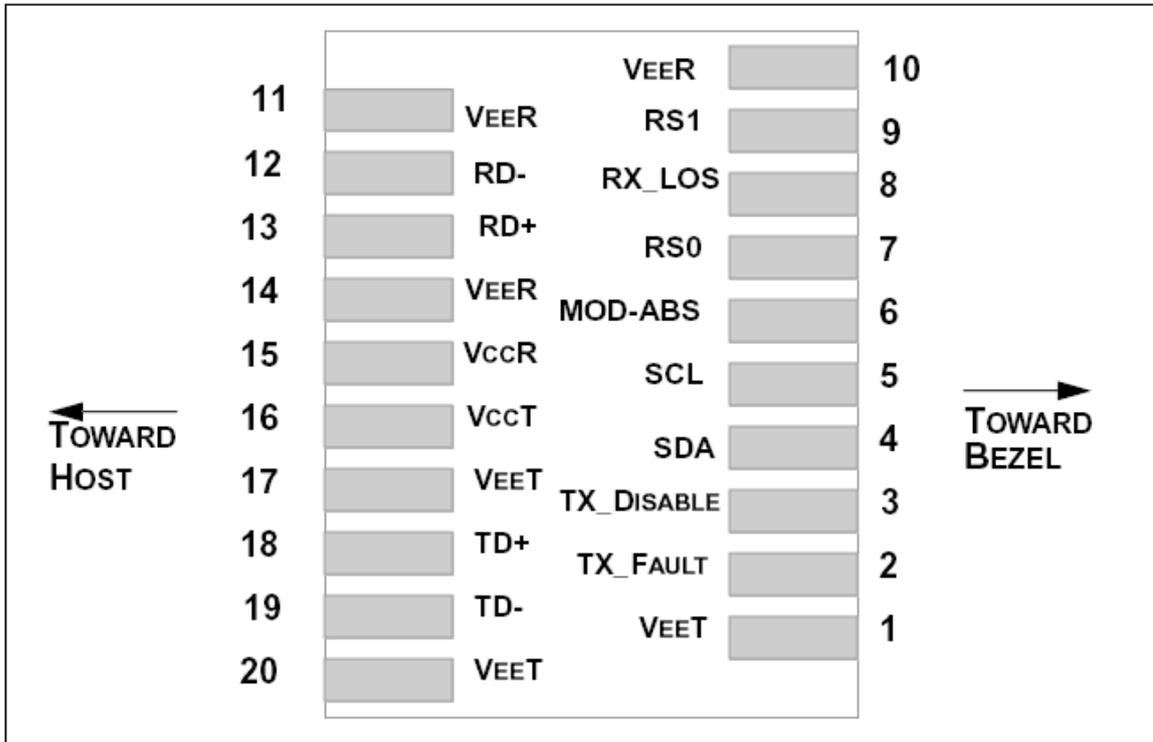
Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
50 / 125 um MMF			300		m
Data Rate	10GBASE-SW/ SR	9.953		10.3	Gbps
	1000BASE-SX		1.25		

Transmitter					
Centre Wavelength	λ_c	840	850	860	nm
Spectral Width (RMS)	$\Delta\lambda$			0.45	nm
Average Output Power	$P_{out@10.3Gbps}$	-6		-1	dBm
	$P_{out@1.25Gbps}$	-9.5		-1	
Extinction Ratio	$ER_{@10.3Gbps}$	3.0	5.0		dB
	$ER_{@1.25Gbps}$	9			
Output Optical Eye		IEEE 802.3-2005 Compliant			
Transmitter Dispersion Penalty	TDP			3.9	dB
Input Differential Impedance	Zin	85	100	115	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}	-	-	2	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
Receiver					
Centre Wavelength	λ_c	840		860	nm
Receiver Sensitivity ^{*note2}	$P_{min@10.3Gbps}$			-11.1	dBm
	$P_{min@1.25Gbps}$			-17	
Output Differential Impedance	Zout	85	100	115	Ω
Receiver Overload	Pmax	-1			dBm
Optical Return Loss	ORL			-12	dB
LOS De-Assert	$LOSD_{@10.3Gbps}$			-12.5	dBm
	$LOSD_{@1.25Gbps}$			-18	
LOS Assert	$LOSA_{@10.3Gbps}$	-25			dBm
	$LOSA_{@1.25Gbps}$	-30			
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 @ 10.3125Gbps, BER ≤ 10⁻¹², measured with a PRBS 2⁷ -1 test pattern @ 1.25Gbps, 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. See note 9 for details.
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	3	This pin has an internal 30k pull down to ground. See note 9 for details.
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 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 4.7K~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) 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 – 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 ±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.

9) This module provides two inputs RS0 and RS1 that can optionally be used for rate selection. RS0 controls the receive path signal rate capability, RS1 not used, as defined in Table1. This rate select functionality can also be controlled by software as defined by SFF-8472. The RX data rate is depend on hardware RS0 logical OR byte 110 bit [3]. And the TX data rate is depend on hardware RS1 logical OR byte 118 bit [3]. Just as the table below.

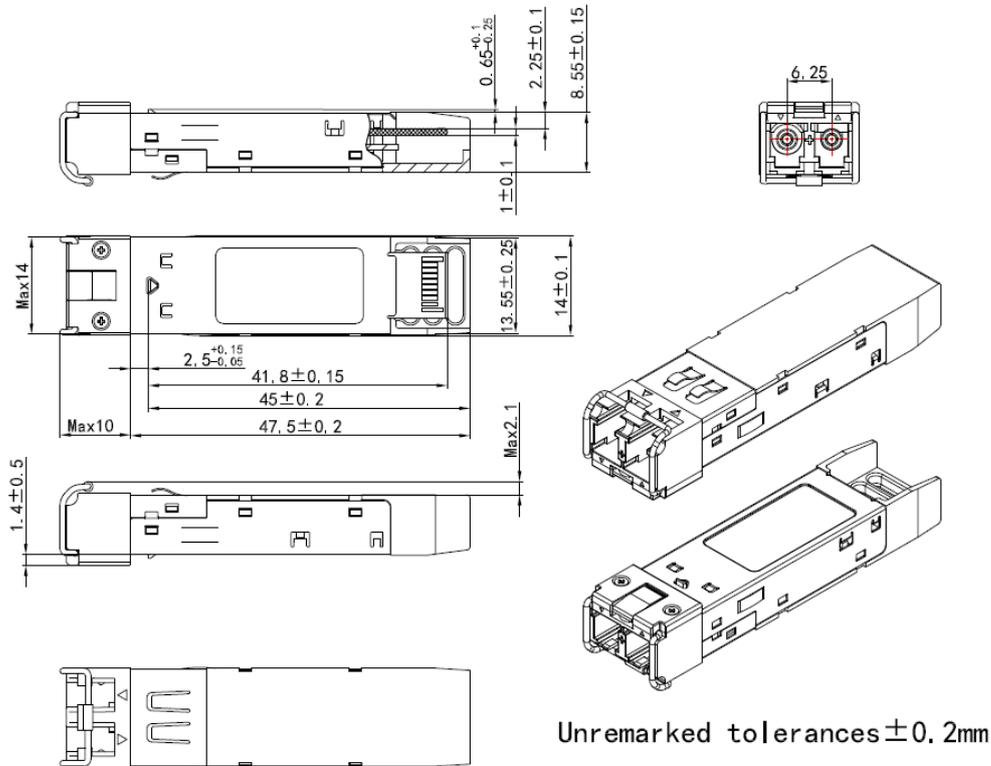
Parameter	State	Conditions
RS0 or byte 110 bit [3]	Low	RX data rate is selected as 1.25Gbps
	High	RX data rate is selected as 9.95~10.3Gbps
RS1 or byte 118 bit [3]	Low	TX data rate is selected as 1.25Gbps
	High	TX data rate is selected as 9.95~10.3Gbps

Table 1 Rate Select Hardware Control Contacts

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

Mechanical Specifications



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

Eye Safety

This multi-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

You can visit our website:

<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	Hunter	Kelly		New Part number released.	March 19,2012
V1.b	Angela	Kelly/ Vina/Fing/JP		Update the regulatory compliance and the	Feb 01,2016

		/Eason		2D drawing.	
V1.c	Marvin	Sky/Yi.Wan/ Kelly		Update data rate select, the product picture and the contact.	Jan 03, 2018
V1.d	Angela	Kelly/William /Chao.Wang		Update the picture and 2D drawing.	March 23, 2018

Notice:

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