

EOLP-1614G-14XRN

DWDM SFP+ single-Mode Transceiver, With Diagnostic Monitoring
Multi-rate 16x / 8x / 4x Fibre Channel
Duplex SFP+ Transceiver, RoHS 6 Compliant

Features

- ◆ Operating data rate up to 14.025Gbps
- ◆ 8-Wavelengths CWDM EML Transmitter from 1470nm to 1610nm, with step 20nm
- ◆ 14dB Power Budget
- ◆ Single 3.3V Power supply and TTL Logic Interface
- ◆ Duplex LC Connector Interface
- ◆ Hot Pluggable
- ◆ Power Dissipation < 1.8W
- ◆ Compliant with SFF-8431 MSA
- ◆ Compliant with SFF-8432 MSA
- ◆ Compliant with SFF-8472 MSA
- ◆ Compliant with 8G and 4G Fibre Channel
- ◆ Operating Case Temperature
Standard: 0°C~+70°C



Applications

- ◆ Multi-rate 16x / 8x / 4x Fibre Channel
- ◆ Other optical links

Ordering information

Part No.	Data Rate	Laser	Fiber Type	Power Budget	Optical Interface	Temp.	DDMI
EOLP-1614G-14XRN ^{*note1}	14.025 Gbps	CWDM EML	SMF	14dB	LC	Standard	YES

Note1: X refers to CWDM Wavelength range 1470nm to 1610nm, X=K~R means 1470nm to 1610nm

*The product image only for reference purpose.

CWDM^{*note2} Wavelength

Band	Nomenclature	Wavelength(nm)		
		Min.	Typ.	Max.
S-band Short Wavelength	K	1464	1470	1477.5
	L	1484	1490	1497.5
	M	1504	1510	1517.5
	N	1524	1530	1537.5
C-band Conventional	O	1544	1550	1557.5
L-band Long Wavelength	P	1564	1570	1577.5
	Q	1584	1590	1597.5
	R	1604	1610	1617.5

note2: 8 Wavelengths from 1470nm to 1610nm, each step 20nm.

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-1614G-14XRN series single mode transceiver is small form factor pluggable module for serial optical data communications such as such as 16x/8x/4x Fibre Channel. This module is designed for single mode fiber and operates at a nominal CWDM wavelength from 1470nm to 1610nm, with each step 20nm. A guaranteed optical link budget of 14 dB is offered.

It is with the SFP+ 20-pin connector to allow hot plug capability. The transmitter section uses a CWDM EML laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses a PIN detector and a limiting post-amplifier IC.

The EOLP-1614G-14XRN series are designed to be compliant with SFP+ Multi-Source Agreement (MSA) Specification SFF-8431.

Absolute Maximum Ratings^{*note2}

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

Note2: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T _c	0		+70	°C
Power Supply Voltage	V _{CC}	3.15	3.3	3.45	V
Power Supply Current	I _{CC}		430	545	mA
Surge Current	I _{Surge}			+30	mA
Baud Rate	EOLP-1614G-14XRN	4.25	14.025		Gbps

Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V _{in}	250		1000	mVpp	AC coupled inputs
Input Impedance (Differential)	Z _{in}	85	100	115	ohm	R _{in} > 100 kohms @ DC
Differential Input S-parameter	S _{DD11}	-	-	-10	dB	
Differential to Common Mode Conversion	S _{CD11}	-	-	-10	dB	
Tx_DISABLE Input Voltage – High		2		3.45	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		0.5	V	I _o = -4.0mA
Receiver						
CML Outputs (Differential)	V _{out}	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Z _{out}	85	100	115	ohm	
Differential Output S-parameter	S _{D22}	-	-	-10	dB	

Rx_LOS Output Voltage – High		2		V _{cc} +0.3	V	Io = 400μA; Host V _{cc}
Rx_LOS Output Voltage – Low		0		0.8	V	Io = -4.0mA
MOD_DEF (0:2)	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

Performance Specifications – Optical

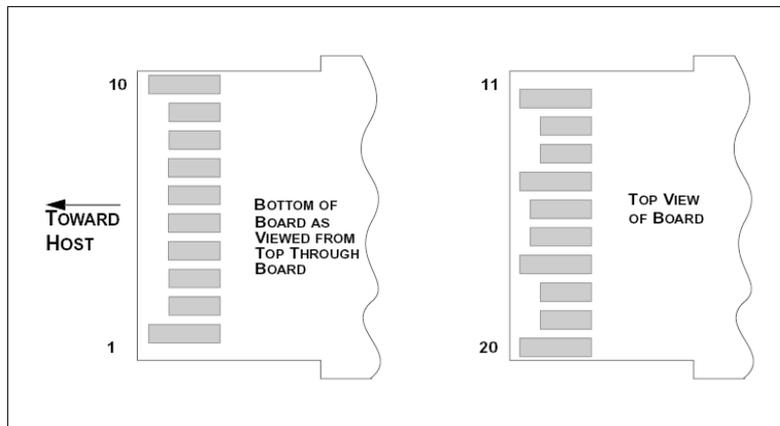
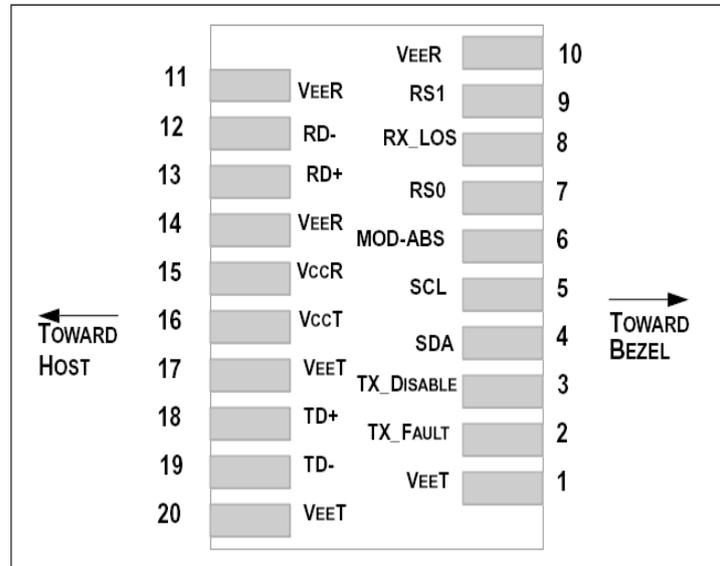
Parameter	Symbol	Min.	Typical	Max.	Unit
Power Budget			14		dB
Data Rate		4.25	14.025		Gbps
Transmitter					
Optical Wavelength* ^{Note3}	λ	λ_c-6	λ_c	$\lambda_c+7.5$	nm
-20dB Spectrum Width	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power* ^{Note4}	P _{out}	0		+4	dBm
Extinction Ratio	ER	8.2			dB
Average Power of OFF Transmitter	P _{off}			-30	dBm
Transmitter Dispersion Penalty	TDP			2.5	dB
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	1260		1620	nm
Sensitivity* ^{Note5}	P _{min}			-14	dBm
Receiver Overload	P _{max}	0			dBm
Optical Return Loss	ORL			-12	dB
LOS De-Assert	LOS _D			-16	dBm
LOS Assert	LOS _A	-26			dBm
LOS	High		2.0	V _{cc} +0.3	V
	Low		0	0.8	

Note3: ITU-T G.694.2 CWDM wavelength from 1470nm to 1610nm, each step 20nm.

Note4: Output is coupled into a 9/125um SMF.

Note5: Minimum average optical power measured at the BER less than 1E-12, back to back. The measure pattern is PRBS 2³¹-1.

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	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD-ABS	Module Definition 0	3	Note 3

7	RS0	RX Rate Select (LVTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor.
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	3.3V ± 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 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

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 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) The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.

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.

7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5%

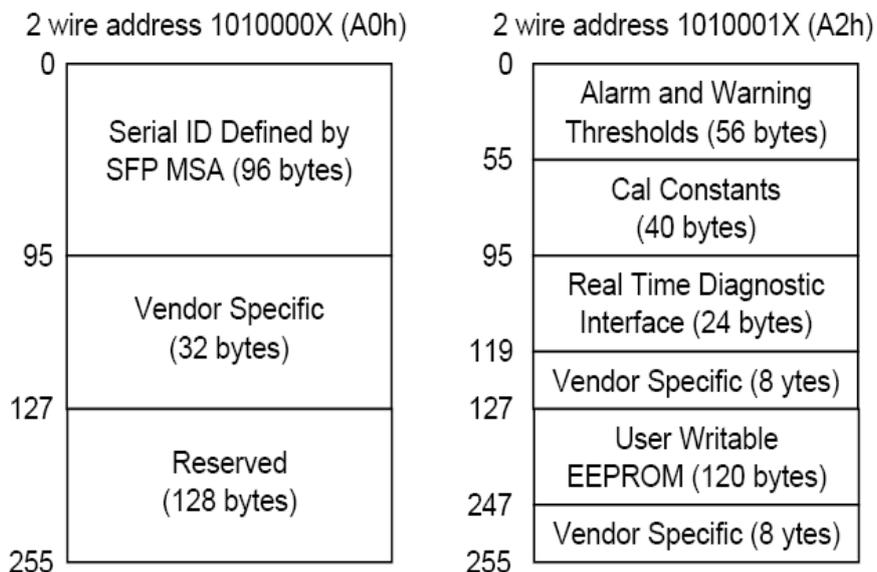
at the SFP+ connector pin. Maximum supply current is 545mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver 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.

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 written 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-10.2.



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 document.

Revision History

Revision	Initiated	Reviewed	Approved	Revision History	Release Date
V1.a	Neal	Kelly/Torres/Fing/Jasson/JP/Eason		Preliminary	Feb 17, 2017
V1.b	Neal	Kelly/Torres		Update PNs.	Mar 23, 2017
V1.c	Angela	Neal/Torres/Kelly		Update the case temperature, 2D drawing and contact.	April 12, 2018

Notice:

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