EOLCS-BI1696-15-ADX Series

Single-Mode 1270nm TX/1330nm RX Up To 10.3125Gbps
2CH Compact BiDi SFP+ Transceiver
RoHS Compliant

Features

- Operation Data Rate Up To 10.3125Gbps
- 1270nm DFB TX/1330nm RX
- 15km with 9/125 μm SMF
- Single 3.3V Power supply and TTL Logic Interface
- 2XBi-directional transceivers in 1 SFP+ transceiver package
- Class 1 FDA and IEC60825-1 Laser Safety Compliant
- Operating Case Temperature

  Standard: 0℃~+70℃

  Industrial: -40℃~+85℃
- Compliant with CSFP MSA Option 2
- The Mechanical Dimensions Compliant With SFP MSA
- Compliant with Digital Diagnostic Monitor Interface SFF-8472
- Safety Certification: TUV/UL/FDA*Note1
- RoHS Compliant

Applications

- Fiber Channel Links
- 10GBASE-LR at 10.31Gbps
- Other optical links

Ordering Information

Part No.	Data Rate	Wavelength	Interface	Distance *(note2)	Temp.	DDMI
EOLCS-BI1696-15-AD (note*)	1.25G to 10.3Gbps	CH1 T27/R33 CH2 T27/R33	LC	15km	Standard	YES
EOLCS-BI1696-15-ADI	1.25G to 10.3Gbps	CH1 T27/R33 CH2 T27/R33	LC	15km	Industrial	YES

Note1: For the latest certification information, please check with Eoptolink.

Note*: Standard version

Note2: 15km with 9/125 μm SMF

*The product image only for reference purpose.

Product Description

The EOLCS-BI1696-15-AD series is compliant with the compact Small Form-Factor Pluggable (CSFP) MSA option 2 for 10GBASE-LR and Fiber Channel. Both channels have BOSA. In channel 1 and 2, 1270nm Tx/1330nm Rx BOSA are used,. It is with the 20-pin connector to allow hot plug capability. No damage to C-SFP+ and host board if C-SFP+ module is plugged into a conventional SFP socket

The EOLCS-BI1696-15-AD series are designed to be compliant with SFF-8472 Multi-source Agreement (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	Tc	Standard	0		+70	°C
		Industrial	-40		+85	
Power Supply Voltage	Vcc		3.135	3.3	3.465	V
Power Supply Current	Icc				600	mA
Data Rate			1.25		10.3125	Gbps

Performance Specifications - Electrical

Parameter		Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter							
CML Input(Differential)		Vin	180		700	mVpp	AC coupled inputs*(note5)
Input Impedance (Differential)		Zin	90	100	110	ohm	Rin > 100 kohm @ DC
TX_Dis	Disable		2		Vcc+0.3	V	
	Enable		0		0.8		
TX_FAULT	Fault		2.2		Vcc+0.3	V	
	Normal		0		0.5		
Receiver							
CML Outputs (Differential)		Vout	300		850	mVpp	AC coupled outputs*(note5)
Output Impedance (Differential)		Zout	90	100	110	ohm	
RX_LOS	LOS		2		Vcc+0.3	V	

	Normal		0		0.8	V	
MOD_DEF (0:2)		VoH	2.4			V	With Serial ID
		VoL	0		0.5	V	

Optical and Electrical Characteristics

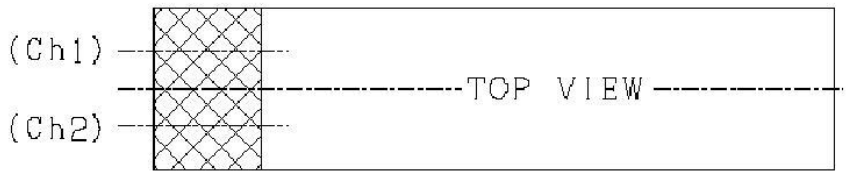
(EOLCS-BI1696-15-AD, 1270nm DFB and PIN, 15km)

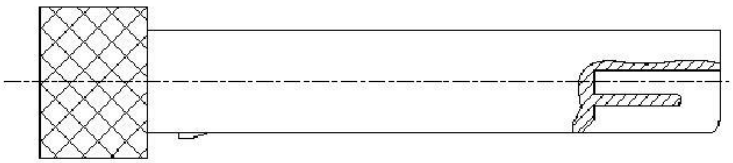
Parameter	Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	L		15		km
Data Rate		1.25	10.3		Gbps
Transmitter					
Center Wavelength	λ_C	1260	1270	1280	nm
Spectral Width (-20dB)	Δλ			1	nm
Average Output Power*(note3)	Pout	-5.2		0	dBm
Extinction Ratio @ 1250Mbps	ER	3.5			dB
Side Mode Suppression Ratio	SMSR	30			dB
Transmitter and Dispersion Penalty	TDP			2	dB
Average Power of OFF Transmitter				-30	dBm
Receiver					
Center Wavelength	λ_C	1320	1330	1340	nm
Receiver Sensitivity*(note4)	Pmin			-14.4	dBm
Receiver Overload	Pmax	0.5			dBm
Return Loss		12			dB
LOS De-Assert	LOSD			-16	dBm
LOS Assert	LOSA	-30			dBm

Note3: Output is coupled into a 9/125μm single-mode fiber.

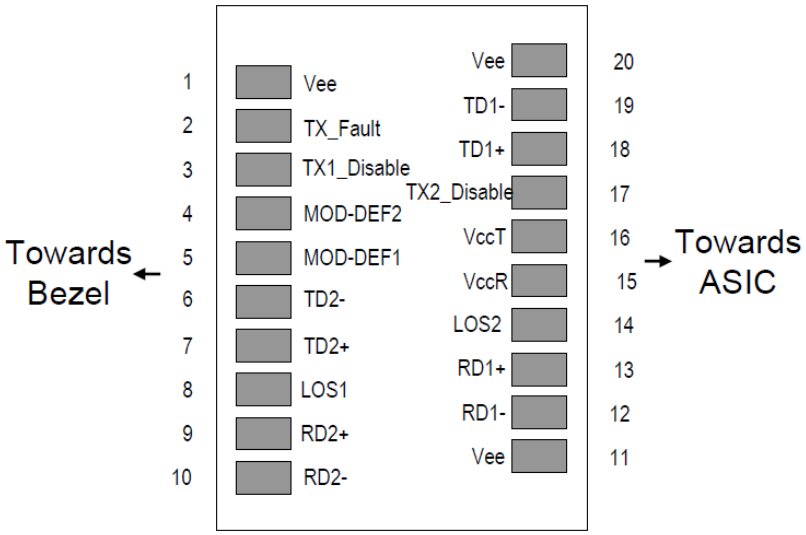
Note4: Measured with worst ER, BER less than 1E-12 and PRBS 2^{31}-1 at 10.3125Gbps.

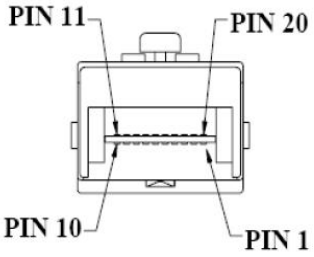
Channel Description of Transceiver





C-SFP+ Transceiver Electrical Pad Layout





Pin Function Definitions

Pin NO.	Name	Channel No.	Function	Notes
1	Vee	Common	Transceiver Ground	Note 3
2	TX Fault	Common	Transmitter Fault Indication	Note 8
3	TX1_ Disable	1	Transmitter Disable of Ch1	Note 1, Module disables on high or open
4	MOD-DEF2	Common	Two-Wires interface Data	Note 2, 2wire serial ID interface SDA
5	MOD-DEF1	Common	Two-Wires interface Clock	Note 2, 2wire serial ID interface SCL
6	TD2-	2	Inverted Transmit Data Input of Ch2	Note6
7	TD2+	2	Transmit Data Input of Ch2	Note6
8	LOS1	1	Loss of Signal of CH1	Note7
9	RD2+	2	Received Data output of Ch2	Note4
10	RD2-	2	Inverted Received Data output of Ch2	Note4

11	VEE	Common	Transceiver Ground	Note3
12	RD1-	1	Inverted Received Data output of Ch1	Note4
13	RD1+	1	Received Data output of Ch1	Note4
14	LOS2	2	Loss of Signal of CH2	Note7
15	VCCR	Common	Receiver power	Note 5, 3.3V± 5%
16	VCCT	Common	Transmitter Power	Note 5, 3.3V± 5%
17	TX2_ Disable	2	Transmitter Disable of Ch2	Note 1, Module disables on high or open
18	TD1+	1	Transmit Data Input of Ch1	Note6
19	TD1-	1	Inverted Transmit Data Input of Ch1	Note6
20	VEE	Common	Transceiver Ground	Note6

Notes:

1) TX_disable1, 2 are an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K–10K Ohm resistor. It's states are:

Low (0 – 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Transmitter Disabled

Open: Transmitter Disabled

2) Mod-Def 1, 2. These are the module definition pins. They should be pulled up with a 4.7K –10K Ohm resistor on the host board. The pull-up voltage shall be VccT or VccR.

Mod-Def 1 is the clock line of two wire serial interfaces for serial ID. Mod-Def 2 is the data line of two wire serial interface for serial ID

3) VEE may be internally connected within the C-SFP+ module.

4) RD1, 2-/+: These are the differential receiver outputs. They are AC coupled 100 Ohm differential lines which should be terminated with 100 Ohm (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

5) VccT,VccR are the power supplies. They are defined as 3.3V ±5% at the C-SFP+ connector pin. Maximum supply current is 600mA@3.3V. Vcc may be internally connected within the C-SFP+ transceiver module.

6) TD1, 2-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100_ differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

7) LOS1,2 (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K Ohm resistor. Pull up voltage between 2.4V 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 < 0.4V.

8) TX Fault report transceiver status as following:

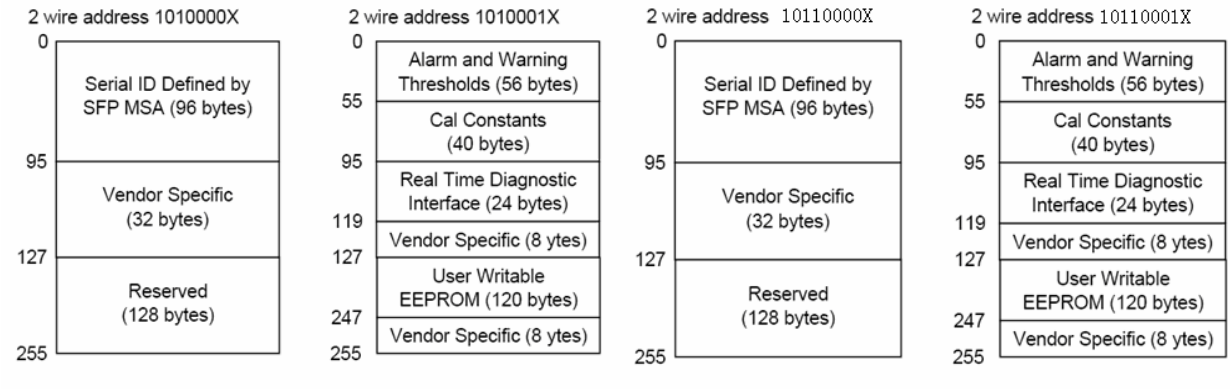
TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K Ohm resistor on the host board. Pull up voltage between 2.4V and VccT, R+0.3V. When high, output indicates a laser fault of some kind either in Channel 1 or Channel 2.

The Host shall read Channel 1/2: [A2H:110] for details: TX Fault from channel 1 if bit 2 is set in [A2H:110]; TX Fault from channel 2 if bit 2 is set in [B2H: 110]. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

EEPROM

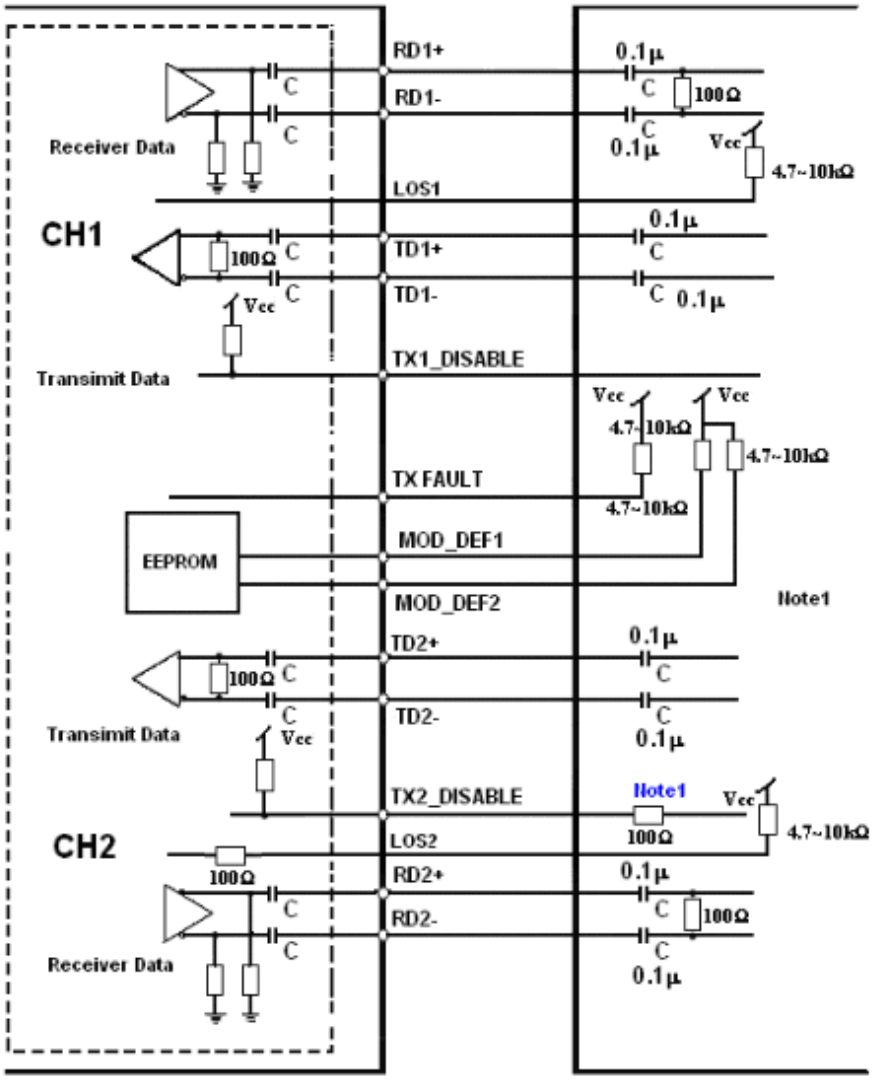
The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C04/08 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the C-SFP+ transceiver. The negative edge clocks data from the C-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/B2H. 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.



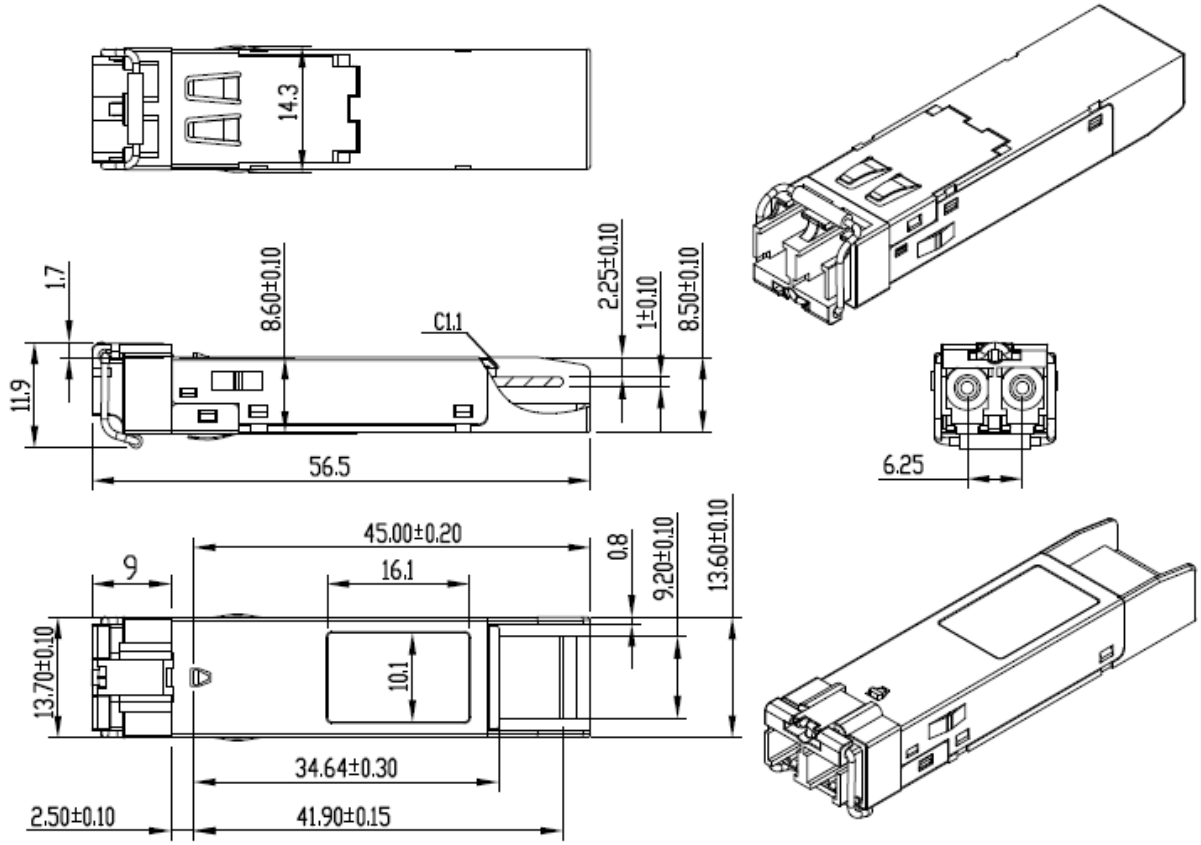
A0H (CH1) **A2H (CH1)** **B0H (CH2)** **B2H (CH2)**

Recommended Circuit Schematic



Note1：Recommendation 100Ω series resistance on host board.

Mechanical Specifications



LC

*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
V1.a	Oliver	Phlio		Preliminary Version	Jan 7, 2015
V1.b	Oliver			Update the rate and regulatory compliance.	Aug 2,2016
V1.c	Oliver	Lyn/Yi.Wan/ Fing/John		Update the wavelength and RoHs.	Jul 2, 2020

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