10Gb/s 80km SFP+ Bidirectional Optical Transceiver Module

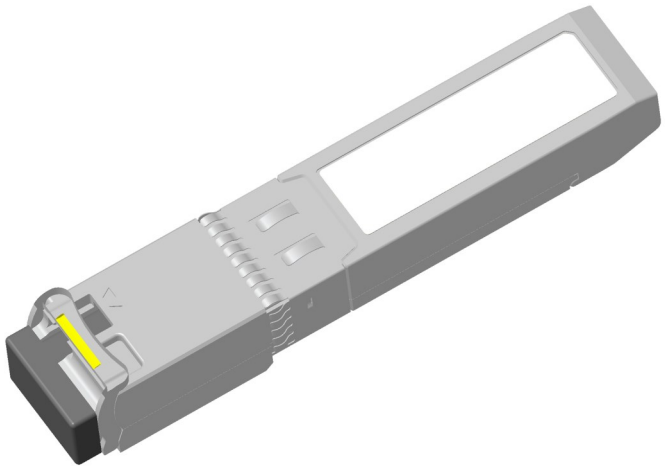
CC-PII348L-xD/CC-PII438L-xD

Features

- Hot Pluggable
- Single LC interface, Duplex operation
- 1490nm/1550nm EML transmitter, APD receiver
- Power consumption <2W
- Applicable for 80km SMF connection
- Single +3.3V power supply
- All-metal housing for superior EMI performance
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- Operating case temperature:

  Commercial: 0 to 70 °C

  Industrial:-40 to 85 °C
- RoHS compliant (lead free)



Applications

- 10G Ethernet
- 10G SONET/SDH, OTU2/2e

Standards

- SFF-8431/SFF-8472
- SFF-8432

Description

This EML 10Gbps SFP+ Bidirectional transceiver is designed to transmit and receive optical data in 10G Ethernet links over single mode optical fiber up to 80km.

The SFP+ Bidirectional 80km module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI.

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Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	Vcc	-0.5		4	V
Storage Temperature Range	Ts	-40		85	°C
Relative Humidity - Storage	RH_S	0		95	%
Relative Humidity - Operating	RH_O	0		85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	Tc	0	-	70	°C
		-40	-	85	
Power Supply Voltage	V_{cc}	3.14	3.3	3.47	V
Supply Current	$I_{(C\text{-}Temp)}$	-	-	450	mA
	$I_{(I\text{-}Temp)}$	-	-	550	mA
Data Rate	BR	-	10.3125	11.3	Gbps

Electrical Characteristics

Transmitter Electrical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Differential Input Voltage Swing	V_{IN}	180	-	700	mV
Tx Differential Input Impendence	Z_{IN}	-	100	-	Ω
Transmitter Disable Voltage	V_{DIS}	2.0	-	V_{CC}+0.3	V
Transmitter Enable Voltage	V_{EN}	0	-	0.8	V
T_{FAULT} Logic High	V_{TFH}	2.4	-	V_{CC}	V
T_{FAULT} Logic Low	V_{TFL}	V_{EE}	-	V_{EE}+0.4	V
Receiver Electrical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Differential output Voltage Swing	V_{OUT}	300	-	850	mV
Rx Differential Output Impendence	Z_{OUT}	-	100	-	Ω
LOS Assert Voltage	V_{LOSA}	2.4	-	V_{CC}	V
LOS De-assert Voltage	V_{LOSD}	V_{EE}	-	V_{EE}+0.4	V

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Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter Characteristics						
Laser Type			EML			
Center Wavelength Range	λ	λ-10	λ	λ+10	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Launch Optical Power	Pout	-1	-	5	dBm	
Average launch power of OFF transmitter	P_{OFF}	-	-	-30	dBm	
Extinction Ratio	ER	8.2	-	-	dB	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Receiver Characteristics						
Receiver Type			APD			
Operating Central Wavelength	λ	1540	1550	1560	nm	CC-PII348L-xD
		1480	1490	1500		CC-PII438L-xD
Receiver Sensitivity	Sen	-	-	-24	dBm	1
Receiver Overload	P_{SAT}	-7	-	-	dBm	
Receiver Reflectance	RFL	-	-	-27	dB	
LOS Assert	LOSA	-38	-	-	dBm	
LOS De-Assert	LOSD	-	-	-25	dBm	
LOS Hysteresis	LOSH	0.5	-	5	dB	
Notes						
1. Measured with 2^{31}-1 PRBS@10.3125Gbps, BER<10^{-12}, with worst ER, BtB						

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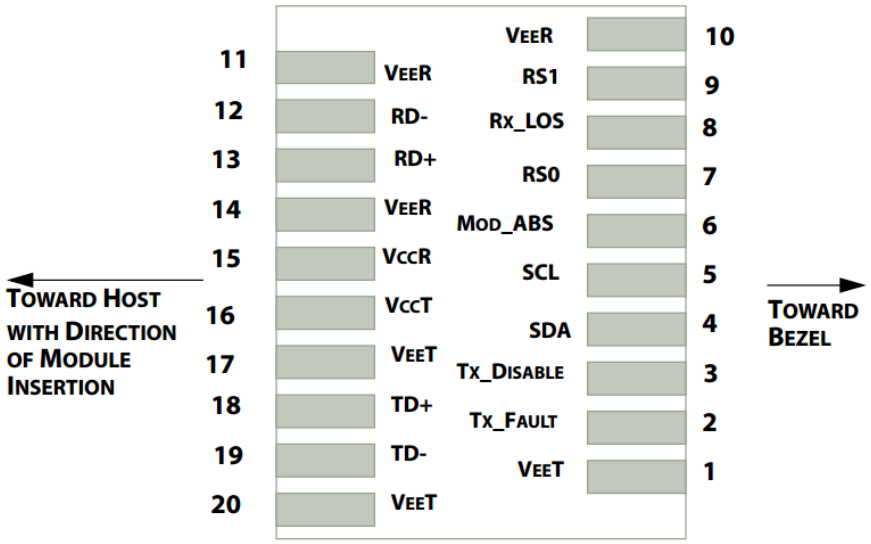
Pin Definitions



Pin	Symbol	Description	Notes
1	V_{EET}	Transmitter Ground	1
2	T_{FAULT}	Transmitter Fault	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	
7	RS0	Rate Select 0. Not Used.	4
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	2
9	RS1	Rate Select 1. Not Used.	4
10	V_{EER}	Receiver Ground	1
11	V_{EER}	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled.	
13	RD+	Receiver Non-inverted DATA out. AC Coupled.	
14	V_{EER}	Receiver Ground	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground	1

Notes

1. Circuit ground is internally isolated from chassis ground.
2. Shall be pulled up with 4.7k-10k Ohms to a voltage between 3.15V and 3.6V on the host board.
3. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
4. Internally pulled down per SFF-8431 Rev 4.1.

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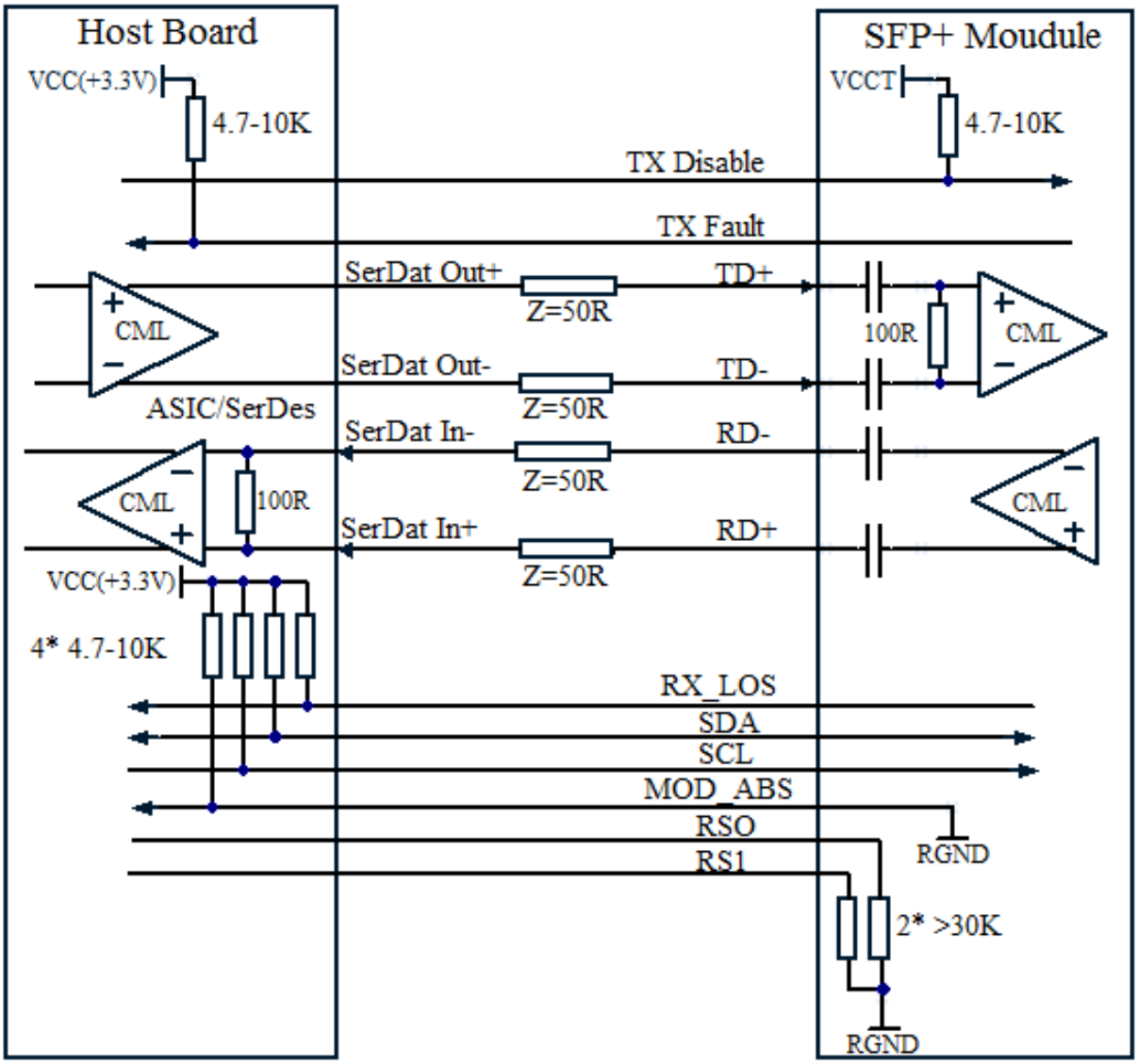
Recommended Interface Circuit



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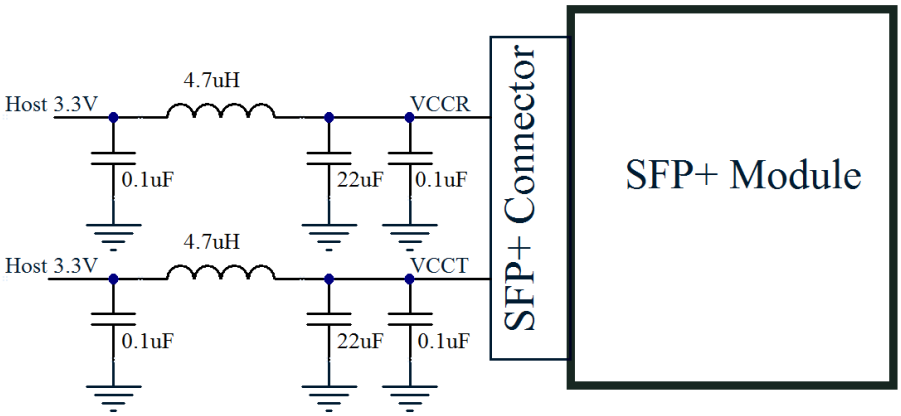
Recommended Host Board Supply Filtering Circuit

The Transceiver includes internal circuit components to filter power supply noise. Under some conditions of EMI and power supply noise, external power supply filtering may be necessary. If receiver sensitivity is found to be degraded by power supply noise, the filter network illustrated in the following figure may be used to improve performance. The values of the filter components are general recommendations and may be changed to suit a particular system environment. Shielded inductors are recommended.



Ordering information

Part Number	Product Description
CC-PII348L-SD	SFP+ BIDI Tx1490/Rx1550nm, 10.3125Gbps, SM, 80km, 0ºC~+70ºC, With DDM
CC-PII348L-ID	SFP+ BIDI Tx1490/Rx1550nm, 10.3125Gbps, SM, 80km, -40ºC~+85ºC, With DDM
CC-PII438L-SD	SFP+ BIDI Tx1550/Rx1490nm, 10.3125Gbps, SM, 80km, 0ºC~+70ºC, With DDM
CC-PII438L-ID	SFP+ BIDI Tx1550/Rx1490nm, 10.3125Gbps, SM, 80km, -40ºC~+85ºC, With DDM

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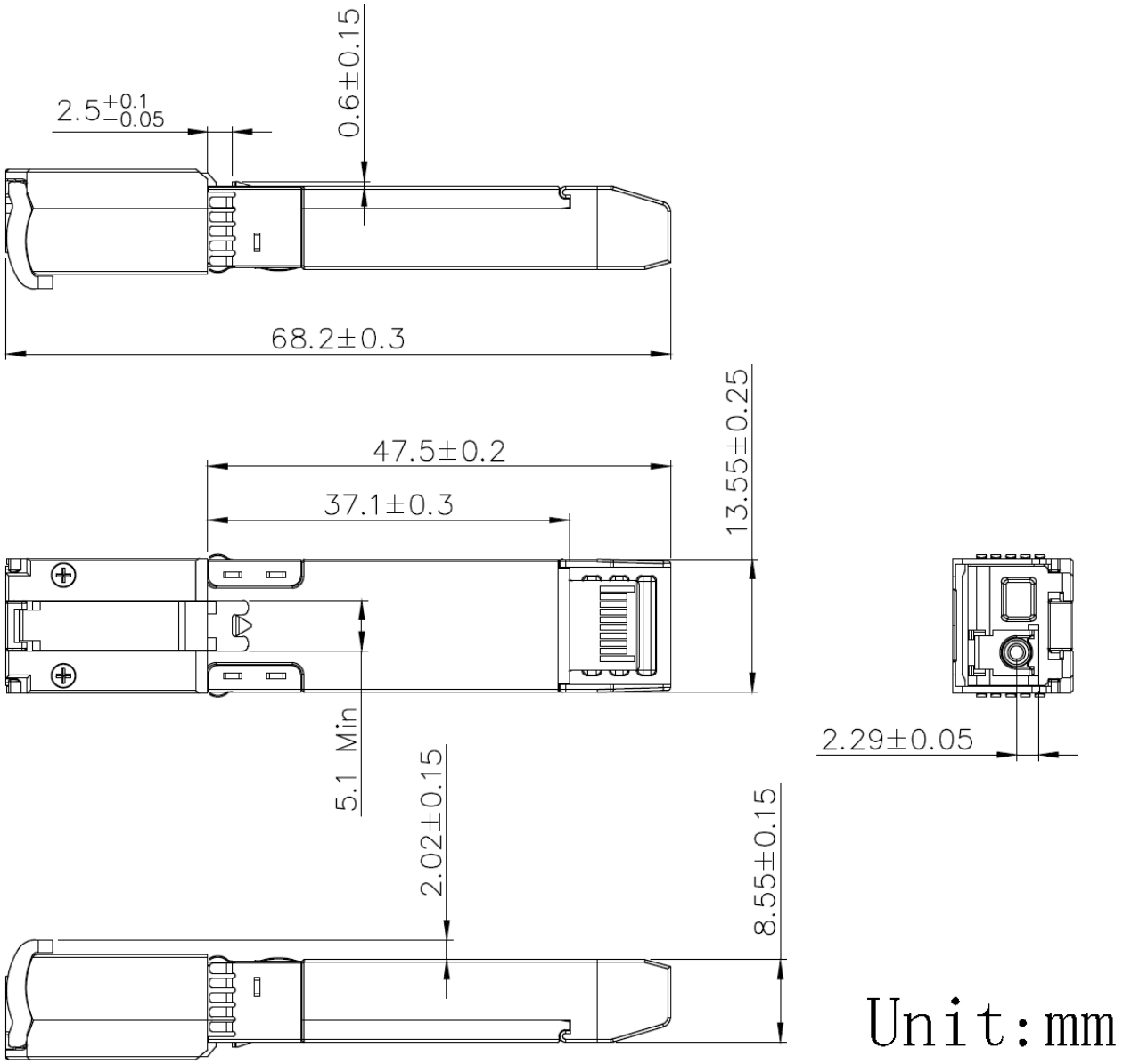
Mechanical Dimensions



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Regulatory Compliance

Ccloud's transceiver is designed to be Class 1 Laser safety compliant and is certified per the following standards.

Agency	Standard	Certificate /Comments
ISO9001	GB/T 19001-2016/ISO 9001:2015	SW18Q20678R0S
ISO14001	ISO 14001:2015	01 104 1532944
UL	UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07	20170123-E489408
TUV-MARK	EN 60950-1:2006+A11+A1+A12+A2	R 50251968
CE-EMC	EN 55032: 2015	17706703 003
	EN 55024: 2010+A1	
REACH	REACH SVHC 197	68.420.19.0344.01
FCC	FCC Rules and Regulations Part 15 Subpart B Class B	MTi190422E141C
RoHS	2011/65/EU and amendment (EU) 2015/863	68.420.17.1030.01

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ERRATA			
Date	**Rev No**	**Page**	**Description**
10 Apr 18	1.0	All	Initial Release.
12 Jun 18	1.1	All	Change to publisher version
01 Agu 18	1.2	8	Updated REACH version to SVHC 191,Update the ISO9001 version
01 Jan 19	1.3	All	Updated the Logo
04 Apr 19	1.4	7	Updated REACH version to SVHC 197,Updated FCC version to MTi190422E141C

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