

25G SFP28 10km Transceivers

CC-PMM221L-XD

Features

- Operating data rate up to 25.78Gbps
- Up to 10km transmission on SMF
- DFB Laser and PIN-TIA receiver
- Build-in dual CDR , for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP28 footprint
- Specifications compliant with SFF 8472
- Compliant with SFF-8402 with LC connector
- Single 3.3V power supply
- Power dissipation < 1.2W
- Operating temperature range:
 - Commercial: 0°C to +70°C
 - Industrial: -40°C to +85°C

Applications

- Data Center Backbone
- Ethernet Switches
- High-speed Servers
- High-performance Computing

Description

CC-PMM221L-XD is intended for 10km reach service from 24.33Gb/s to 25.78Gb/s BI-direction single mode high-speed communications equipment where low-cost, extraordinary performance and reliability are essential. It consumes low power, operates base on 3.3V DC power supply and is offered in the industrial temperature range. They are compliant with SFP28 MSA, SFF-8431 and SFF-8432

The low jitter and low bit error rate optical assembly features a DML laser transmitter and PIN/TIA receiver. It utilizes internal clock and data recovery (CDR) units on transmitter and the receiver chains for low jitter compliance. The differential AC coupled Tx and Rx data interfaces are CML compatible. The device is Class I laser safety compliant.

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Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	85
Relative Humidity	RH	%	0	85

Recommended Operating Conditions

Parameter	Sym- bol	Unit		Min	Typ	Max
Operating Case Temperature Range	Tc	°C	PMM221L-SD PMM221L-ID	0 -40		70 85
Power Supply Voltage	Vcc	V		3.14	3.3	3.46
Bit Rate	BR	Gb/s			25.78	
Bit Error Ratio	BER					5*10 ⁻⁵
Max Supported Link Length	L	Km				10

Transmitter characteristics

Parameter	Symbol	Unit	Min	Typ	Max
Center Wavelength	λ	nm	1290	1310	1330
Side-mode Suppression Ratio	SMSR	dB	30		
Spectral Width (-20dB)	σ	nm			1
Average Optical Power	P _{avg}	dBm	-4.5		3
Optical Modulation Amplitude	TxOMA	dBm	-3.5		
Extinction Ratio	ER	dB	3		
Transmitter and Dispersion Penalty	TDP	dB			2.7
Average Launch Power of OFF Transmitter	P _{off}	dBm			-30

Receiver characteristics

Parameter	Symbol	Unit	Min	Typ	Max
Center Wavelength	λ	nm	1260		1360
Damage Threshold		dBm	3		
Receive Power Overload(1E-12)		dBm	2		
Receiver Sensitivity(5E-5)		dBm			-12

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Parameter	Symbol	Unit	Min	Typ	Max
LOS Assert	LOSA	dBm	-30		
LOS De-Assert	LOSD	dBm			-17
LOS Hysteresis	LOSH	dB	0.5		

Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max
Transmitter					
Input Differential Impedance	R _{IN}	Ω		100	
Single-ended Data Input Swing	V _{IN}	mVp-p	90		450
Transmit Disable Voltage	V _{DIS}	V	2		V _{CCHOST}
Transmit Enable Voltage	V _{EN}	V	V _{EE}		V _{EE} +0.8
Transmit Fault Assert Voltage	V _{FA}	V	2		V _{CCHOST}
Transmit Fault De-Assert Voltage	V _{FDA}	V	V _{EE}		V _{EE} +0.4
Receiver					
Single-ended Data Output Swing	V _{OD}	mVp-p	200		450
LOS Fault	V _{LOSFT}	V	2		V _{CCHOST}
LOS Normal	V _{LOSNR}	V	V _{EE}		V _{EE} +0.4

PIN Assignment

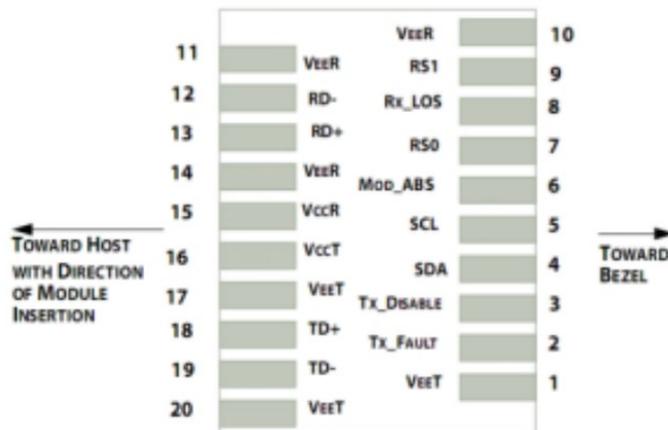


Figure 1.Pin function definitions

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Pin Number	Symbol	Name	Description
1,17,20	VeeT	Transmitter Signal Ground	Connected to signal ground on the host board.
2	TX Fault	Transmitter Fault Out (OC)	Module transmitter fault output.
3	TX Disable	Transmitter Disable In (LVTTL)	Module transmitter disable control.
4	SDA	Module Definition Identifiers	Serial ID with SFF 8472 Diagnostics Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors.
5	SCL		
6	MOD-ABS		
7	RS0	Receiver Rate Select (LVTTL) Transmitter Rate Select (LVTTL)	Rate select 0(Rx):Low=CDR Bypass ; High=CDR Select Rate select 1(Tx):Low=CDR Bypass ; High=CDR Select
9	RS1		
8	LOS	Loss of Signal Out (OC)	Receiver loss of signal.
10,11,14	VeeR	Receiver Signal Ground	Connected to signal ground on the host board.
12	RD-	Receiver Negative DATA Out (CML)	Receiver inverted data output, internally AC coupled and terminated
13	RD+	Receiver Positive DATA Out (CML)	Receiver non-inverted data output, internally AC coupled and terminated.
15	VccR	Receiver Power Supply	Receiver Power 3.3V Supply.
16	VccT	Transmitter Power Supply	Transmitter Power 3.3V Supply.
18	TD+	Transmitter Positive DATA In (CML)	Transmitter non-inverted data input, internally AC coupled and terminated.
19	TD-	Transmitter Negative DATA In (CML)	Transmitter inverted data Input, internally AC coupled and terminated.

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Recommended Interface Circuit

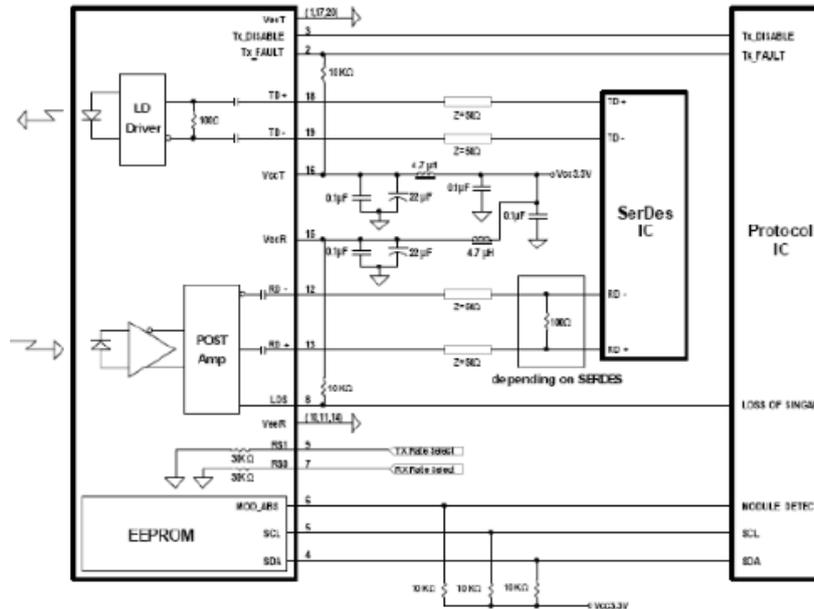
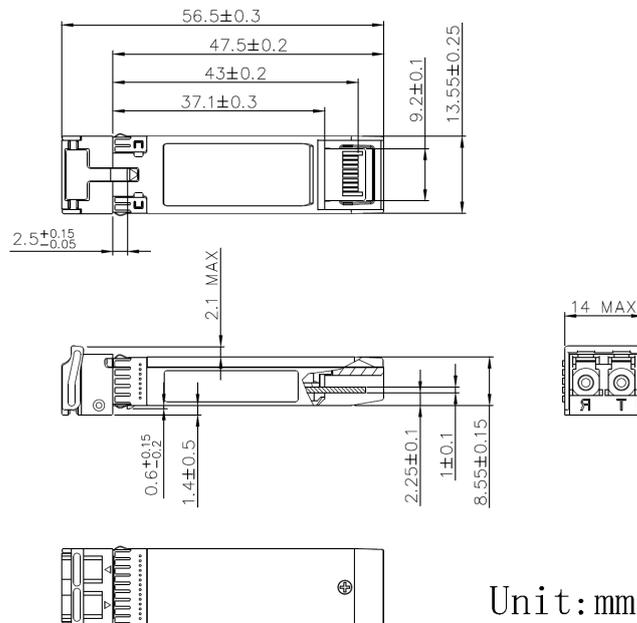


Figure 2. Typical application circuit

Mechanical Dimensions



Unit: mm

Figure 3. Module Mechanical Dimensions

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Digital Diagnostics Functions

As defined by the SFF-8472, Our SFP28 transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- .Transceiver temperature
- .Laser bias current
- .Transmitted optical power
- .Received optical power
- .Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 0x00h to the maximum address of the memory. For more detailed information, including memory map definitions, please refer the SFF-8472 documentation.

Digital Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	°C
Internally measured transceiver supply voltage	+/-3	%
Measured Tx bias current	+/-10	%
Measured Tx output power	+/-3	dB
Measured Rx received average optical power	+/-3	dB

Ordering information

Part Number	Product Description
CC-PMM221L-SD	SFP28, 25.78Gbps, 1310nm, SM, 10km, 0°C~+70°C, With DDM
CC-PMM221L-ID	SFP28, 25.78Gbps, 1310nm, SM, 10km, -40°C~+85°C, With DDM

Revision	Initials	Date	Description
1.0	Cong Zhang	04/14/2023	Initial specification release

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