

TITLE 100G QSFP28 PLR4 Transceiver	DOC No. RFD-20230814014-001	
	REVISION : 01	AUTHORIZED BY : Andy
	DATE : 2023.08.14	CLASSIFICATION : CONFIDENTIAL

1. Scope

The P59000EACB10-1 is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP28 Transceiver for 100G Ethernet Applications. The QSFP28 full-duplex optical module offers 4 independent transmit and receive channels, each capable of 26Gbps operation for an aggregate data rate of 104Gbps 10km using single mode fiber. These modules are designed to operate over single mode fiber systems using DFB laser array. An optical fiber ribbon cable with an MPO/MTPTM connector can be plugged into the QSFP28 module receptacle. QSFP28 PSM4 is one kind of parallel transceiver which provides increased port density and total system cost savings.

2. Product Features

- Four-channel full-duplex transceiver modules
- Transmission data rate up to 26Gbit/s per channel
- Up to 10km transmission of single mode fiber
- Low power consumption <3.5W
- Operating case temperature 0°C to 70°C
- 3.3V power supply voltage
- RoHS 6 compliant
- Hot Pluggable QSFP28 form factor
- Single MPO connector receptacle
- Built-in digital diagnostic function

3. Product Description

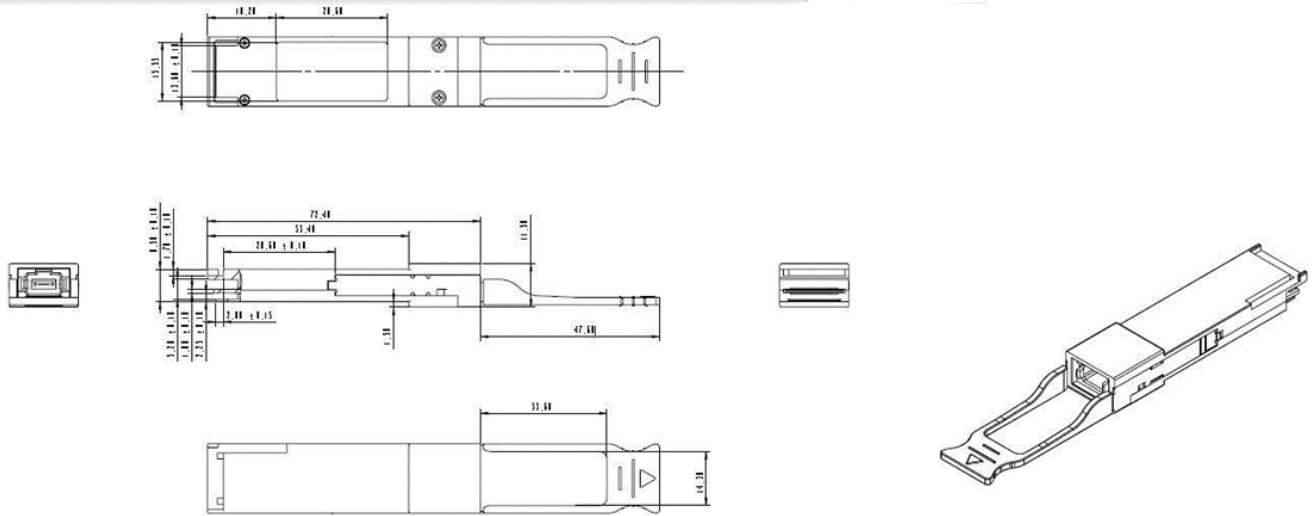
3.1 PRODUCT NAME AND SERIES NUMBER(S)

100G QSFP28 PLR4 Transceiver

Part Number	Data Rate	Wavelength (nm)	Distance	Media	Power (dBm)	Sen. (dBm)	Connect or	Tem.
P59000EACB10-1	100G	1310	10km	SMF	-6~2	-12	MPO	C

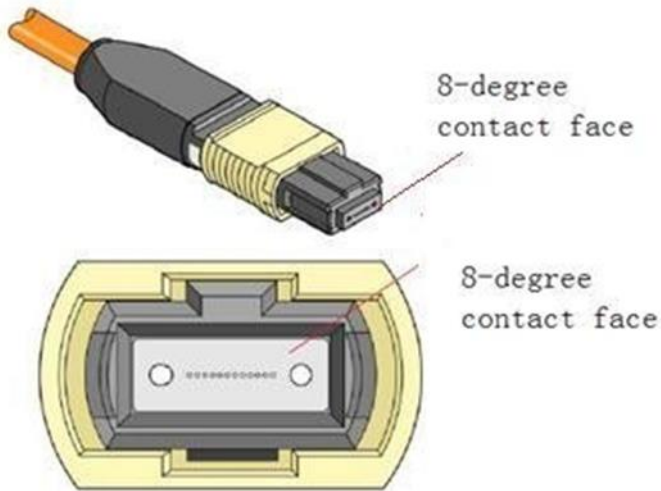
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3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING



Unit is millimeter. All dimensions are mm.

Attention: To minimize MPO connection induced reflections, an MPO receptacle with 8-degree angled end-face is utilized for this product. A male MPO connector with 8-degree end-face should be used with this product as illustrated in Figure 1.



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4. Absolute Maximum Ratings & Recommended Operating Conditions

Absolute Maximum Ratings					
Parameter	Symbol	Min.	Max.	Unit	Ref
Storage Temperature	T _s	-40	+85	°C	
Supply Voltage	V _{CC}	-0.3	3.6	V	
Relative Humidity(Non-condensing)	RH	0	85	%	
Input Voltage	V _{in}	-0.3	V _{cc} +0.3	V	

Recommended Operating Conditions						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Case Temperature	TC	0	25	70	°C	
Power Supply Voltage	V _{cc}	3.135		3.465	V	
Bit Rate(all wavelength combined)	BR	-	25.78125	-	Gbps	
Data Speed Tolerance	ΔDR	-100		+100	ppm	
Power Consumption	PD			3.5	W	
Link Distance with G.652	d	0		10	km	

Transmitter Operating Characteristic-Optical, Electrical						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Optical Characteristic						
Center Wavelength	λ _C	1295		1325	nm	1
Average Output Power per lane	PAVG	-6	-0.5	2	dBm	1
Optical Modulation Amplitude (OMA)	POMA	-5	-0.5	+2.2	dBm	1

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Extinction Ratio	ER	3.5				dB		
Difference in Launch Power between any two lanes	Ptx,diff				5.0	dB		
Transmitter and dispersion penalty (TDP), each lane (max)	TDP				2.9	dBm	1	
RMS Spectral Width	$\Delta\lambda$	-	-		3.5	nm		
Rise/Fall Time	Tr/Tf				30	ps		
Extinction Ratio	ER	3.5				dB		
Optical Return Loss Tolerance	TOL				20	dB		
Relative Intensity Noise	Rin				-128	dB/Hz		
Transmitter Reflectance	RT				-12	dB		
Transmitter Eye Mask Margin	EMM	10				%	2	
Average Launch power Tx_off	Poff	-			-30	dBm		
Eye Mask {X1, X2, X3, Y1, Y2, Y3}		{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}						
Electrical Characteristic								
Differential output impedance	Zout	90	100	110		Ω		
Differential output voltage amplitude	ΔV_{out}	300		800		mVp-p		

Notes:

1. Transmitter wavelength, RMS spectral width and power need to meet the OMA minus TDP specs to guarantee link performance.
2. The eye diagram is tested with 1000 waveform.

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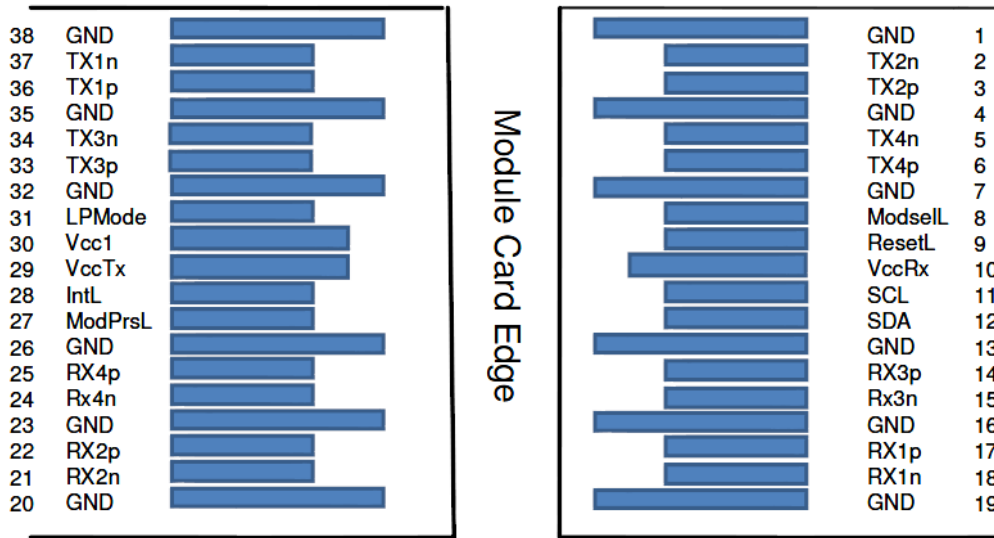
Receiver Operating Characteristic-Optical, Electrical						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Optical Characteristic						
Center Wavelength Range	λ_c	1295	-	1325	nm	
Damage Threshold	THd	+3			dBm	
Overload, each lane	OVL	+2.5			dBm	
Receiver Sensitivity in OMA, each Lane	SEN			-12	dBm	1
LOS Assert	LOSA	-30	-	-	dBm	
LOS De-Assert	LOSD	-	-	-12	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Optical Return Loss	ORL			-12	dBm	
Electrical Characteristic						
Differential input impedance	Zin	90	100	110	ohm	
Differential input voltage amplitude	ΔV_{in}	300		1100	mVp-p	

Note:

1. Measured with a PRBS 231 -1 test pattern, @25.78Gb/s, BER<5*10⁻⁵

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5. Applications Note :



Top Side
Viewed From Top

Bottom Side
Viewed From Bottom

Pin Definitions

Pin Assignment

Pin	Logic	Name/Description	Note
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	2
9	ResetL	Module Reset	2
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	2

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12	SDA	2-wire serial interface data	2
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	2
29	VccTx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMODE	Low Power Mode	2
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes:

[1] GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

[2] VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 Module in any combination.

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Digital Diagnostic Function

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min.	Max.	Unit	Ref
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over perating temp
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Channel RX power monitor absolute error	DMI_RX	-3	3	dB	Per channel
Channel Bias current monitor	DMI_Ibias	-10%	10%	mA	Per channel
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp

Power Supply Filtering

The host board should use the power supply filtering shown in Figure.2

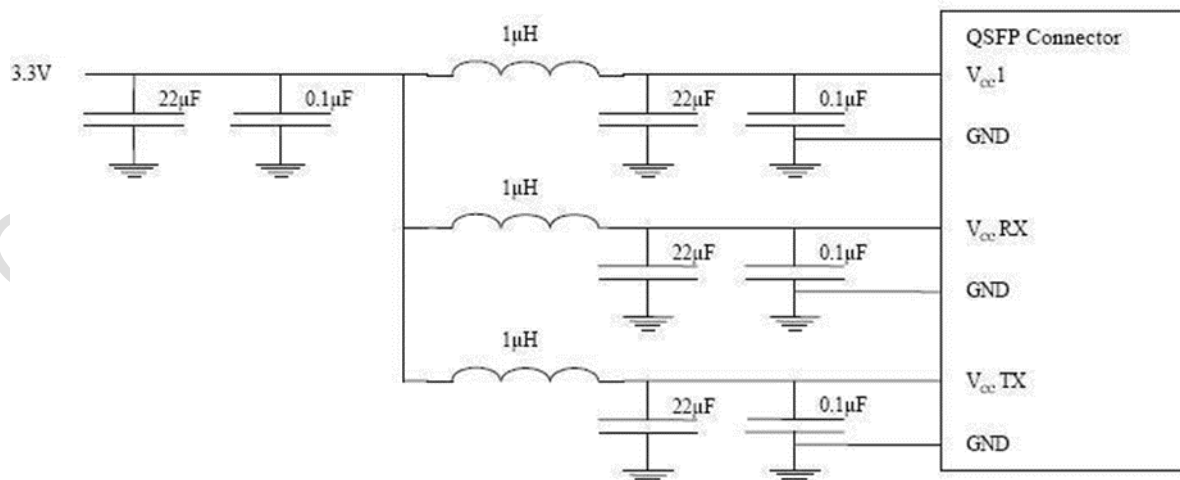
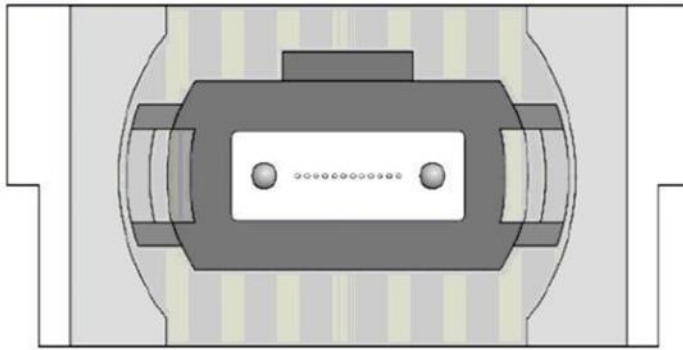


Figure2. Host Board Power Supply Filtering

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Optical Interface Lanes and Assignment

The optical interface port is a male MPO connector. The four fiber positions on the left as shown in Figure 3, with the key up, are used for the optical transmit signals (Channel 1 through 4). The fiber positions on the right are used for the optical receive signals (Channel 4 through 1). The central four fibers are physically present.



Transmit Channels: 1 2 3 4
 Unused positions: x x x x
 Receive Channels: 4 3 2 1

Figure 3. Optical Receptacle and Channel Orientation

6.Modification History

Rev.	Comments	Date	Originator	Approval
01	Preliminary Draft	2023.08.14	Andy Yang	Mike Sun

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