

100Gbps QSFP28 ZR4 80km Transceiver

Product Specification

Product Features

- Compliant with QSFP28 Standard:
- SFF-8661 Rev 2.5, SFF-8636 Rev 2.10a
- High speed I/O electrical interface (CAUI-4) compliant with IEEE 802.3bm-2015
- 100GBASE-ZR4 103.125G 80km point-to-point Ethernet links
- Rx sensitivity of -29dBm 5E-5 with enabled KR4 FEC in host for up to 80km SMF
- Single 3.3V Supply Voltage
- Power Dissipation 4.5W at 55°C ,6.5W at 70°C Case Operating Temperature
- 0 °C is environment temp; 70 °C is Case Operating Temperature
- LAN WDM EML cooled laser and SOA+PIN cooled Receiver
- Universal QSFP28 MSA package with duplex LC connector
- Two Wire Serial Interface with Digital Diagnostic Monitoring
- Complies with EU Directive 2011/65/EU (RoHS compliant)
- LPMODE, ModPrsL, ModSelL and ResetL are supported
- Telecom networking
- Class 1 Laser

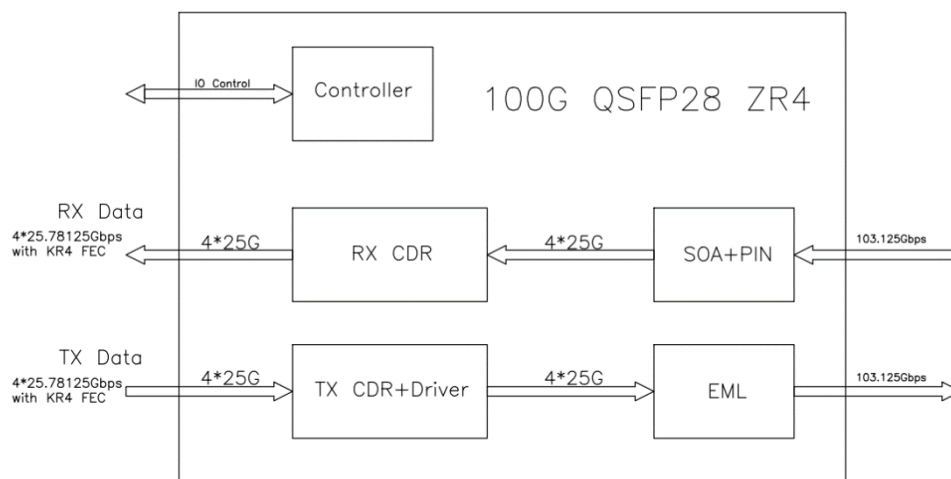


Applications

- Commercial 100GBASE-ZR4 100G Ethernet
- Telecom networking

Description

The QSFP28-100G-ZR4 is designed for commercial level 80km optical communication applications. This module contains 4-lane optical transmitter, 4-lane optical receiver and module management block including 2 wire serial I/O. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector. A block diagram is shown in following figure.



Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature	TS	-40	85	°C	
Supply Voltage	VCC	0	3.6	V	
Relative Humidity (non-condensing)	RH	5	85	%	
Data Input Voltage Differential	IVDIP-VDINI	-	1	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Temperature	TOPR	0	-	70	°C	1
Power Supply Voltage	VCC	3.1	3.3	3.47	V	
Maximum Power Dissipation	PD	-	4.5	7.5	W	2
Aggregate Bit Rate	ABR	-	103.125	-	Gb/s	
Data Rate per Lane	DRL	-	25.78	-	Gb/s	
Link Distance with G.652		40	80		km	
Two Wire Serial Interface Clock Rate	-	-	-	400	kHz	

Notes:

- 0°C is operating environment temperature, +70°C is case temperature
- Power dissipation 4.5W at 55 °C ,6.5W at 70 °C Case Operating Temperature

Transmitter Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	λC0	1294.53	1295.56	1296.59	nm	
Wavelength L1	λC1	1299.02	1300.05	1301.09	nm	

Wavelength L2	λ_{C2}	1303.54	1304.58	1305.63	nm	
Wavelength L3	λ_{C3}	1308.09	1309.14	1310.19	nm	
Side-mode suppression ratio	SMSR	30			dB	
Total Average Optical Launch Power	POUT	-	-	12.5	dBm	
Average Launch Power Tx_Off (Each Lane)	POUT_OFF	-	-	-30	dBm	
Average Optical Launch Power (Each Lane)	POUTL	2	-	6.5	dBm	
Extinction Ratio	ER	8	-	-	dB	
Spectral Width	$\Delta\lambda$	-	-	1	nm	
Optical Modulation Amplitude (Each Lane)	OMA	0	-	6.5	dBm	
Launch Power in OMA minus TDP (Each Lane)	OMA-TDP	0	-	-	dBm	
Difference in launch power between any two lanes (OMA)	DT_OMA	-	-	2.5	dB	
Optical Return Loss Tolerance	ORLT	-	-	20	dB	
RIN _{20OMA}	RIN	-	-	-130	dB/Hz	
Transmitter Reflectance	TR	-	-	-12	dB	
Transmitter Eye Mask Definition	-	IEEE 802.3bs-2010 {0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				

Receiver Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	λ_{C0}	1294.53	1295.56	1296.59	nm	
Wavelength L1	λ_{C1}	1299.02	1300.05	1301.09	nm	
Wavelength L2	λ_{C2}	1303.54	1304.58	1305.63	nm	
Wavelength L3	λ_{C3}	1308.09	1309.14	1310.19	nm	
Receiver Sensitivity (OMA) per Lane				-28	dBm	1
Stressed Receiver Sensitivity in OMA (Each Lane)	-	-	-	-27	dBm	1
Saturation Power, each lane	SP	-4.5			dBm	
Damage Threshold for Receiver	Pin, damage	0	-	-	dBm	
Average Receive Power (Each Lane)	-	-32	-	-4.5	dBm	
Receive Power in OMA (Each Lane), Overload	OMA	-	-	-4.5	dBm	
LOS Assert	LOSA	-40	-	-	dBm	
LOS De-assert	LOSD	-	-	-30	dBm	
LOS hysteresis	LOSH	0.5	-	-	dB	

Note:

1. Sensitivity is measured @ BER5E-5

Electrical Characteristics

High-Speed Signal: Compliant to IEEE802.3 CAUI-4 C2M

Low-Speed Signal: Compliant to SFF-8679

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Dissipation			4.5	7.5	W	
Supply Current	I _{cc}		1.4	2.3	A	
Receiver (Module Output)						
Differential Data Input Amplitude	V _{IN,P-P}	-	-	900	mV	
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T _R	12	-	-	ps	
LPMode, Reset and ModSelL	V _{IL}	-0.3	-	0.8	V	
	V _{IH}	2	-	V _{CC} +0.3	V	
Transmitter (Module Input)						
Differential Data Output Amplitude	V _{OUT,P-P}	-	-	900	mV	
Differential Termination Mismatch		-	-	10	%	
Output Rise/Fall Time, 20%~80%	T _R	12	-	-	ps	

Pin Definitions

Pinout definitions of QSFP28 module input/output

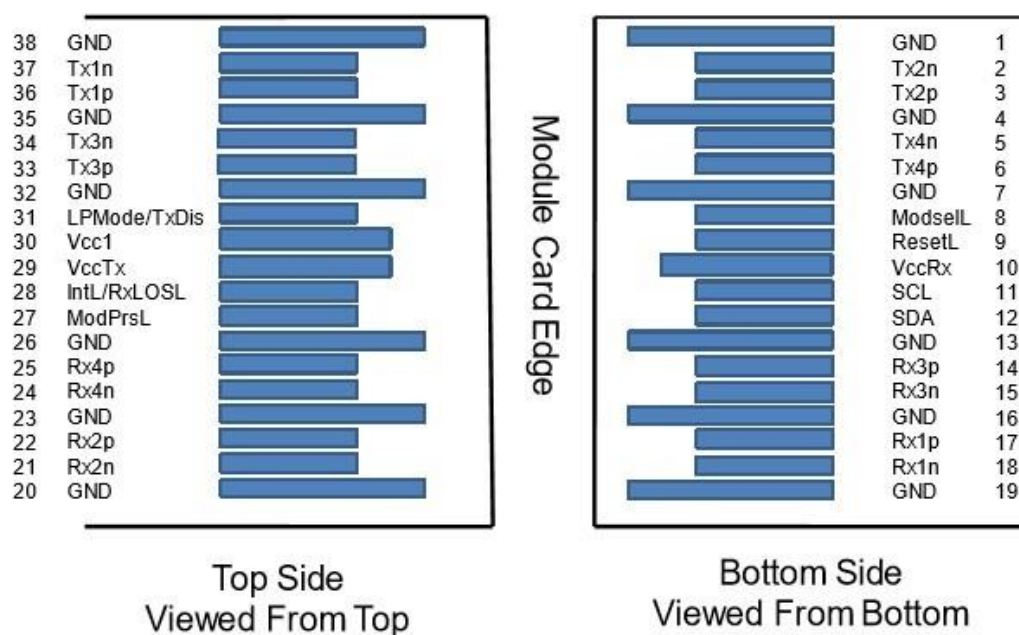


Figure 1 Pinout of Connector Block on Host Board

Table 1 PIN Definition

Pin	Logic	Symbol	Description	Plug Sequence	Note
1		GND	Ground	1	
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	

4		GND	Ground	1	
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	
8	LVTTL-I	ModselL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	
11	LVC MOS-I/O	SCL	2-wire serial interface clock	3	
12	LVC MOS-I/O	SDA	2-wire serial interface data	3	
13		GND	Ground	1	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	
20		GND	Ground	1	
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/RxLOS L	Interrupt. Optionally configurable as RxLOS L via the management interface (SFF-8636). Interrupt. Optionally configurable as RxLOS L via the management interface (SFF-8636).	3	
29		Vcc Tx	+3.3V Power supply transmitter	2	
30		Vcc1	+3.3V Power supply	2	
31	LVTTL-I	LPMode/ TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636).	3	
32		GND	Ground	1	
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	

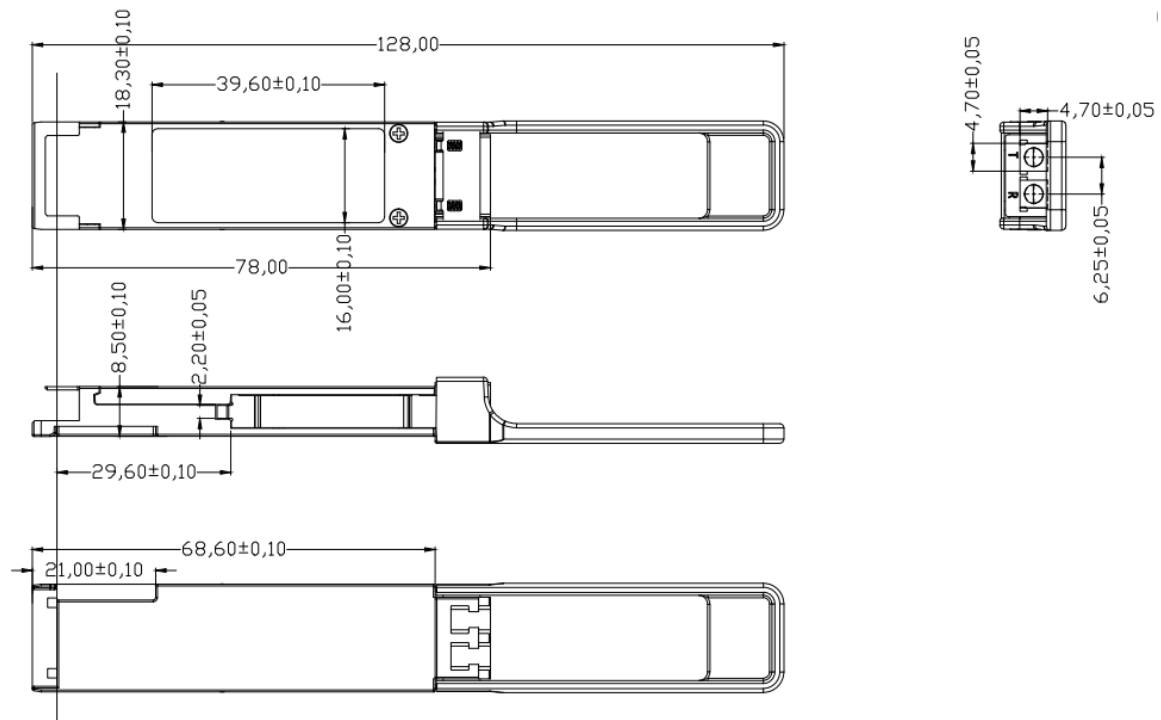
Threshold

Parameter	Alarm-H	Warn-H	Warn-L	Alarm-L
Temperature (°C)	75	70	0	-5
Voltage (V)	3.6	3.5	3.1	3
Tx Bias Current (mA)	110	100	30	20
Tx Output Power (dBm)	7.5	6.5	-3.5	-4.5
Rx Receive Power (dBm)	-4.5	-6	-32	-33

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	±3	°C	Internal
Voltage	0 to VCC	±3%	V	Internal
Tx Bias Current (Each Lane)	0 to 100	10%	mA	Internal
Tx Output Power (Each Lane)	2 to +6.5	±3	dB	Internal
Rx Receive Power (Each Lane)	-28 to -5	±3	dB	Internal

Mechanical Diagram



Ordering Information

Part No.	Data Rate	DDM	Wave	Fiber Type	Dist.	Temp.	Optical Interface
QSFP28-100G-ZR4	100Gbps	yes	1310nm	SMF	80Km	0~70°C	LC

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