PRODUCT SPECIFICATION

Part No.:	**QSFP-100G-ER4L**	
Description:	100G QSFP28 Transceiver, ER4 Lite 40km	
Release Date	**Rev.**	**Revision Change Description**
2019/06/07	A0	New Release
2020/12/28	A1	Template Update
2021/03/30	A2	BER Spec changed from BER<10^{-12} to BER<$5x10^{-5}$; Update the Part No from Q1 to Q3
2025/11/14	A3	1. Update the Transmitter: DFP/EML 2. SEN1 changed from -14.5 to -13.5; SEN2 changed from -18.5 to -16.5 3. Stressed Receiver Sensitivity changed from -16.65 to -14.65 4. Update the Package Outline Mechanical Drawing

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Features

- ✧ Supports 103.1Gb/s aggregate bit rate
- ✧ Digital Diagnostics Monitoring Interface
- ✧ Duplex LC optical receptacle
- ✧ Up to 30km reach over SMF without FEC on host side
- ✧ Up to 40km reach over SMF with FEC on Host side
- ✧ Hot pluggable QSFP28 MSA form factor
- ✧ Receiver: 4x25Gb/s APD ROSA
- ✧ Transmitter: cooled 4x25Gb/s LAN WDM DFP/EML TOSA
- ✧ Commercial operating case temperature range: 0~70ºC
- ✧ 4x25G electrical interface (OIF CEI-28G-VSR)
- ✧ RoHS-6 Compliant
- ✧ Power dissipation < 4.0 W

Application

- ✧ Ethernet 100GBASE-ER4 Lite
- ✧ Client-side 100G Telecom connections
- ✧ Data Center

Standard

- ✧ IEEE 802.3bm
- ✧ QSFP28 MSA
- ✧ SFF-8636

Specification:

Absolute Maximum Ratings				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
Storage Ambient Temperature	T_{STG}	-40	85	℃
Operating Humidity	H_O	5	95	%
Power Supply Voltage	Vcc	-0.5	3.6	V
Damage Threshold, each Lane	THd	-3		dBm

Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Operating Case Temperature	Tc	0		70	℃
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Supply Current	ICC			1360	mA
Data Rate,each Lane			25.78125		Gbps
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Data Rate Accuracy		-100		100	ppm
Link Distance with SMF (without FEC)	D1			30	km
Link Distance with SMF (with FEC)	D2			40	km

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Electrical transmitter Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Power Consumption				4.0	W	
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	
Differential Termination Resistance Mismatch	TP1			10	%	
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	TP1			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI-				

		28G-VSR Section 13.3.11.2.1				
Electrical receiver Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	
Differential Return Loss (SDD11)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	TP4			See CEI-28G-VSR Equation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10^{-15} probability (EW15)	tr	0.57			UI	
Eye Height at 10^{-15} probability (EH15)	tf	228			mV	
Optical transmitter Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Launched Power (avg.)	Pavg	-2.5		4.5	dBm	
Total Output. Power	Pout			10.5	dBm	
OMA, each Lane	POMA	0.1		4.5	dBm	
Difference in Launch Power between any Two Lanes (OMA)	Ptx,diff			3.6	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-0.65			dBm	
Wavelength Assignment	λ0	1294.53	1295.56	1296.59	nm	
	λ1	1299.02	1300.05	1301.09		
	λ2	1303.54	1304.58	1305.63		
	λ3	1308.09	1309.14	1310.19		
TDP, each Lane	TDP			2.5	dB	
Spectral Width(-20dB)	Δλ			1	nm	

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Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	7			dB	
Transmitter OFF Output Power	POff			-30	dBm	
RIN20 OMA	RIN			-130	Ohm	
Output Eye Mask definition {X1，X2，X3，Y1，Y2，Y3}	{0.25，0.4，0.45，0.25，0.28，0.4}					

Optical receiver Characteristics						
Parameter		**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Damage Threshold, each Lane		THd	-3			dBm	
Average Receive Power, each Lane			-16.9		-4.9	dBm	@30km
Average Receive Power, each Lane			-20.9		-4.9	dBm	@40km
Receive Power (OMA), each Lane					-1.9	dBm	
Receiver Sensitivity (OMA), each Lane		SEN1			-13.5	dBm	For BER = $1x10^{-12}$
Stressed Receiver Sensitivity (OMA), each Lane					-12.5	dBm	For BER = $1x10^{-12}$
Receiver Sensitivity (OMA), each Lane		SEN2			-16.5	dBm	For BER = $5x10^{-5}$
Stressed Receiver Sensitivity (OMA), each Lane					-14.65	dBm	For BER = $5x10^{-5}$
Receiver reflectance					-26	dB	
Difference in Receive Power between any Two Lanes (Average and OMA)		Ptx,diff			3.6	dB	
LOS Hysteresis		LOSH	0.5			dB	
LOS	Optical De-assert	Pd		-24		dBm	
	Optical Assert	Pa		-26			
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane		Fc			31	GHz	
Vertical Eye Closure Penalty, each Lane					1.5	dB	
Stressed Eye J2 Jitter, each Lane					0.3	UI	
Stressed Eye J9 Jitter, each Lane					0.47	UI	

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Notes:

1. Measured with a PRBS 2^{31}-1 test pattern, @25.78Gb/s, BER<5x10-^{5}

Pin Definition

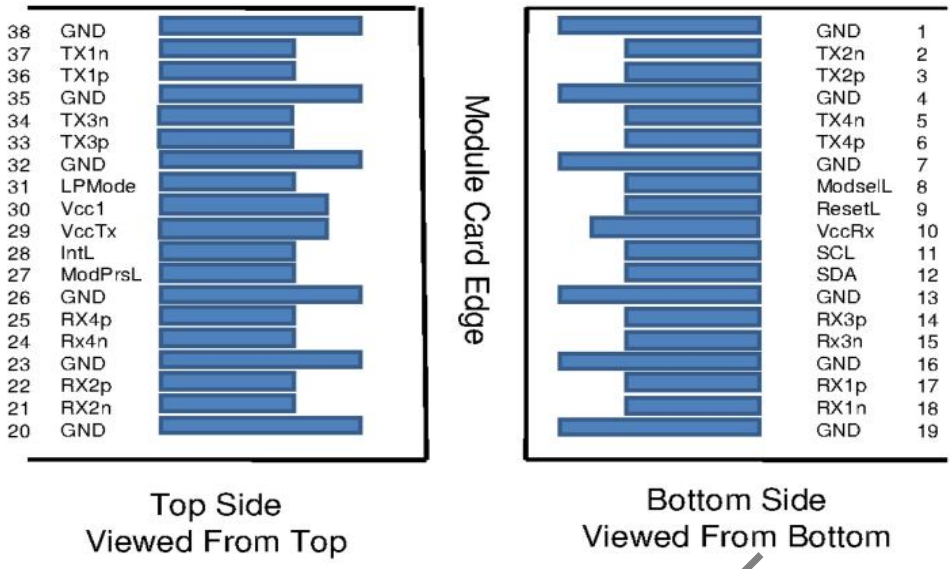


Figure1 QSFP MSA-compliant 38-pin connector

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Pin	Symbol	Name/Description	Notes
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	TX2N	Transmitter Inverted Data Input	
3	TX2P	Transmitter Non-Inverted Data Output	
4	GND	Ground	1
5	TX4N	Transmitter Inverted Data Input	
6	TX4P	Transmitter Non-Inverted Data Output	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3 V Power supply receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
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	
29	Vcc Tx	+3.3 V Power supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	TX3P	Transmitter Non-Inverted Data Input	
34	TX3N	Transmitter Inverted Data Output	
35	GND	Ground	1
36	TX1P	Transmitter Non-Inverted Data Input	
37	TX1N	Transmitter Inverted Data Output	
38	GND	Ground	1

Table 1: QSFP28 Module PIN Definition

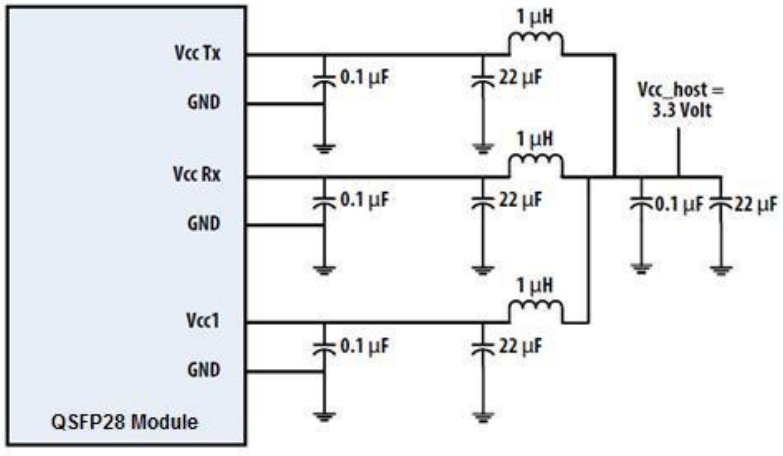
Notes：

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

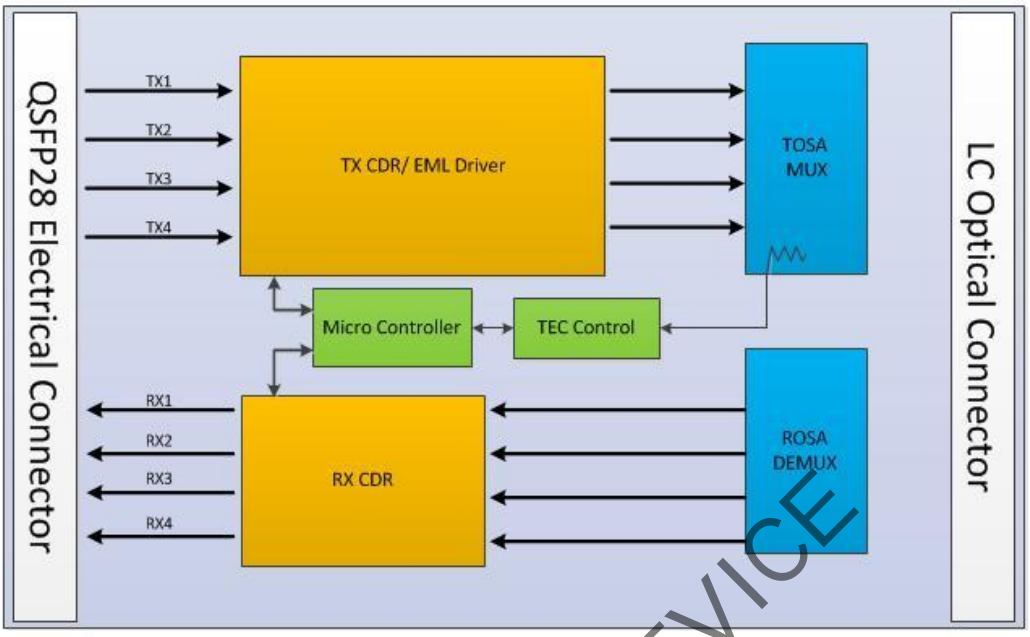
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

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Recommended Power Supply Filter



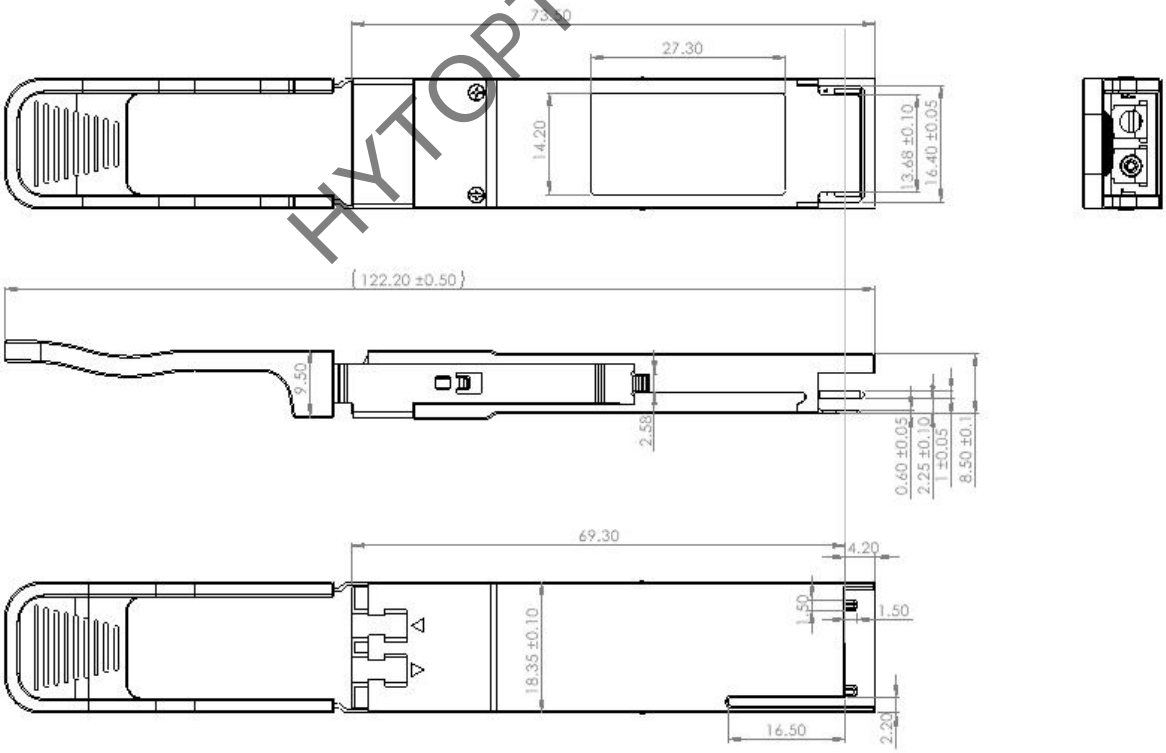
Transceiver Block Diagram



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Package Outline

Dimensions are in millimeters. All dimensions are ±0.2mm unless otherwise specified. (Unit: mm)



Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000Vfor other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product

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Ordering Information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (℃)	Reach (KM)	DDM
QSFP-100G-ER4L	QSFP28	100G	DFP/ EML LWDM	-2.5~4.5	APD	<-16.5	0~70	30/40	Y