
Module Product Specification

100Gb/s 10Km QSFP28 LR4 Transceivers

QSFP28-100G-LR4



Features

- Up to 10km reach for G.652 SMF
- Cooled 4x25Gb/s LAN WDM DML TOSA with optical MUX
- 4x25G Electrical Interface
- Single +3.3V power supply
- DDM function implemented
- 2 Wire Serial Interface for module management
- Maximum power dissipation < 4.5W
- Operating temperature range: 0°C ~ 70°C
- Compliant with RoHS6

Applications

- Compliant with QSFP28 MSA(SFF-8665 v1.9)
- Compliant with IEEE 802.3ba
- 100GBASE-LR4 Ethernet

QSFP28 transceiver modules are designed for use in 100 Gigabit Ethernet links over single mode fiber.

They are compliant with SFF-8665, INF-8438i and IEEE 802.3ba 100GBASE-LR4. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP28 MSA.

Specifications

Part No.	Specifications									Application
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp	Reach	Other	
QSFP28-100G-LR4	QSFP28	Up to 103.1G	DFB	-4.3 ~ 4.5dBm	PIN	-11dBm	0~70°C	10km	DDM	100GBASE-LR4

Pin function definitions

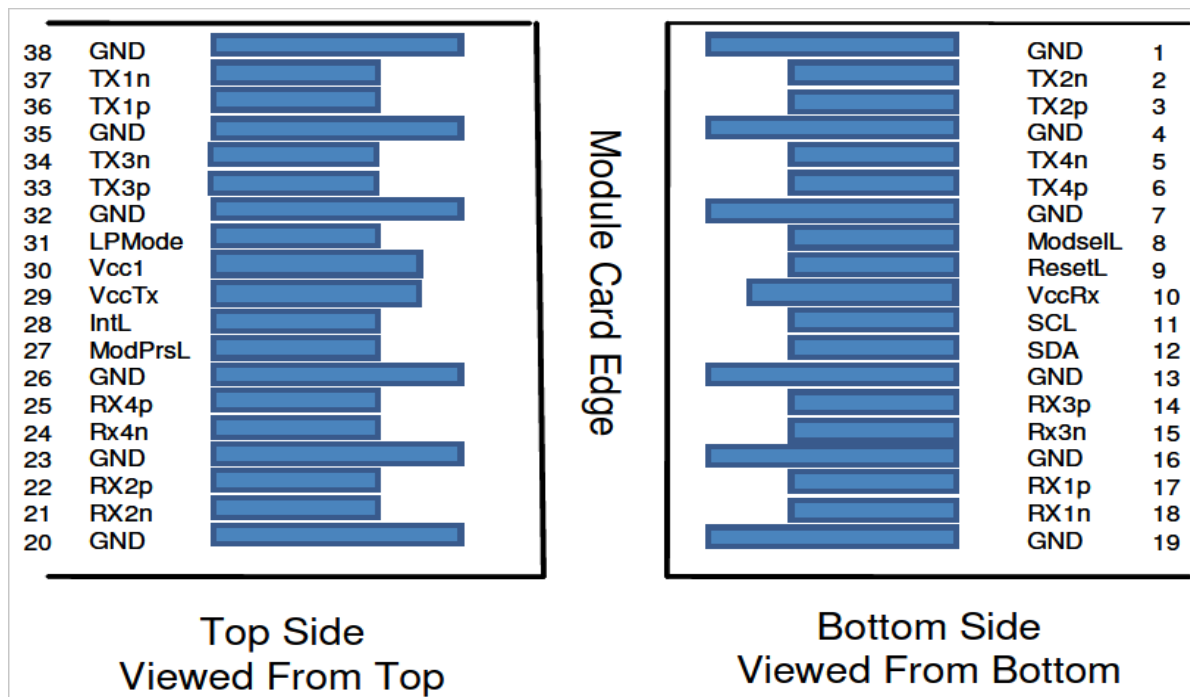


Figure 1. Pin function definitions

Table 1: Transceiver pin descriptions

Pin	Name	Description	Plug Sequence	Notes
1	GND	Ground	1	
2	Tx2n	Transmitter Inverted Data Input	3	
3	Tx2p	Transmitter Non-Inverted Data Input	3	
4	GND	Ground	1	
5	Tx4n	Transmitter Inverted Data Input	3	
6	Tx4p	Transmitter Non-Inverted Data Input	3	
7	GND	Ground	1	
8	ModSelL	Module Select	3	
9	ResetL	Module Reset	3	
10	Vcc Rx	+3.3 V Power supply receiver	2	
11	SCL	2-wire serial interface clock	3	
12	SDA	2-wire serial interface data	3	
13	GND	Ground	1	
14	Rx3p	Receiver Non-Inverted Data Output	3	
15	Rx3n	Receiver Inverted Data Output	3	
16	GND	Ground	1	
17	Rx1p	Receiver Non-Inverted Data Output	3	
18	Rx1n	Receiver Inverted Data Output	3	
19	GND	Ground	1	
20	GND	Ground	1	

21	Rx2n	Receiver Inverted Data Output	3	
22	Rx2p	Receiver Non-Inverted Data Output	3	
23	GND	Ground	1	
24	Rx4n	Receiver Inverted Data Output	3	
25	Rx4p	Receiver Non-Inverted Data Output	3	
26	GND	Ground	1	
27	ModPrsL	Module Present	3	
28	IntL	Interrupt	3	
29	Vcc Tx	+3.3 V Power supply transmitter	2	
30	Vcc1	+3.3 V Power Supply	2	
31	LPMODE	Low Power Mode	3	
32	GND	Ground	1	
33	Tx3p	Transmitter Non-Inverted Data Input	3	
34	Tx3n	Transmitter Inverted Data Input	3	
35	GND	Ground	1	
36	Tx1p	Transmitter Non-Inverted Data Input	3	
37	Tx1n	Transmitter Inverted Data Input	3	
38	GND	Ground	1	

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	85
Relative Humidity	RH	%	0	95
Maximum Supply Voltage	Vcc3	V	-0.5	4.0

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	°C	0		70
Power Supply Voltage	Vcc	V	3.14	3.3	3.46
Bit Rate	BR	Gb/s			103.1
Bit Error Ratio	BER				10 ⁻¹²
Max Supported Link Length	L	Km			10

Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Supply Voltage	V _{CC}	V	3.14	3.3	3.46	
Module Power		mW			4500	
Transmitter						
Input Differential Impedance	R _{IN}	Ω	80	100	120	

Differential Data Input	VIN	mVp-p	150		1200	
J2 Jitter Tolerance	Jt2	UI	0.17			
J9 Jitter Tolerance	Jt9	UI	0.29			
Data Dependent Pulse Width Shrinkage	DDPWS	UI	0.07			
Eye mask coordinates{X1,X2, Y1,Y2}		UI mV	0.11,0.31 95,350			
Receiver						
Differential Data Output	VOD	mVp-p	300		800	
AC common mode output voltage (RMS)		mV			7.5	
Termination mismatch at 1MHz		%			5	
Differential output return loss		dB	Per IEEE P802.3ba, Section 86A.4.2.1			
Common mode output return loss		dB	Per IEEE P802.3ba, Section 86A.4.2.2			
Output transition time,20% to80%		ps	28			
J2 Jitter output	Jo2	UI			0.42	
J9 Jitter output	Jo9	UI			0.65	
Eye mask coordinates{X1,X2, Y1,Y2}		UI mV	0.29,0.5 150,425			

Optical Characteristics *(Tc=0 °C to 75 °C and Vcc= 3.14 to 3.46)*

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter(per Lane)						
Signaling Speed per Lane		GBd	25.78125 ± 100 ppm			
Lane Wavelength (range): L0 L1 L2 L3		nm	1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19			
Total Average Launch Power	Pout	dBm			10.5	
Transmit OMA per Lane	TxOMA	dBm	-1.3		4.5	
Average Launch Power per Lane	TXPx	dBm	-4.3		4.5	
Optical Extinction Ratio	ER	dB	4			
Side-Mode Suppression Ratio (SMSR)	SMSR	dB	30			
Average launch power of OFF transmitter, per lane		dBm			-30	
Relative Intensity Noise	RIN	dB/Hz			-128	
Optical Return Loss Tolerance		dB			20	
Transmitter Reflectance		dB			-12	
Transmitter Eye mask definition {X1,X2,X3, Y1,Y2,Y3}			{0.25,0.4,0.45,0.25,0.28,0.4}			

Receiver(per Lane)						
Signaling Speed per Lane		GBd	25.78125 ± 100 ppm			
Lane Wavelength (range): L0 L1 L2 L3		nm	1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19			
Receiver Sensitivity (OMA) per Lane	Rxsens	dBm			-8.6	dBm
Average Received Power per Lane	RXPx	dBm	-10.6		4.5	
Damage Threshold Per Lane	Pmax	dBm			3.4	
Return Loss	RL				-26	
Vertical eye closure penalty, per lane		dB			1.9	
Receiver electrical 3dB upper cutoff frequency,per lane		GHz			31	
LOS De-Assert	LOSD	dBm			-11.6	
LOS Assert	LOSA	dBm	-24			
LOS Hysteresis		dB		1.5		

Typical Application Circuit

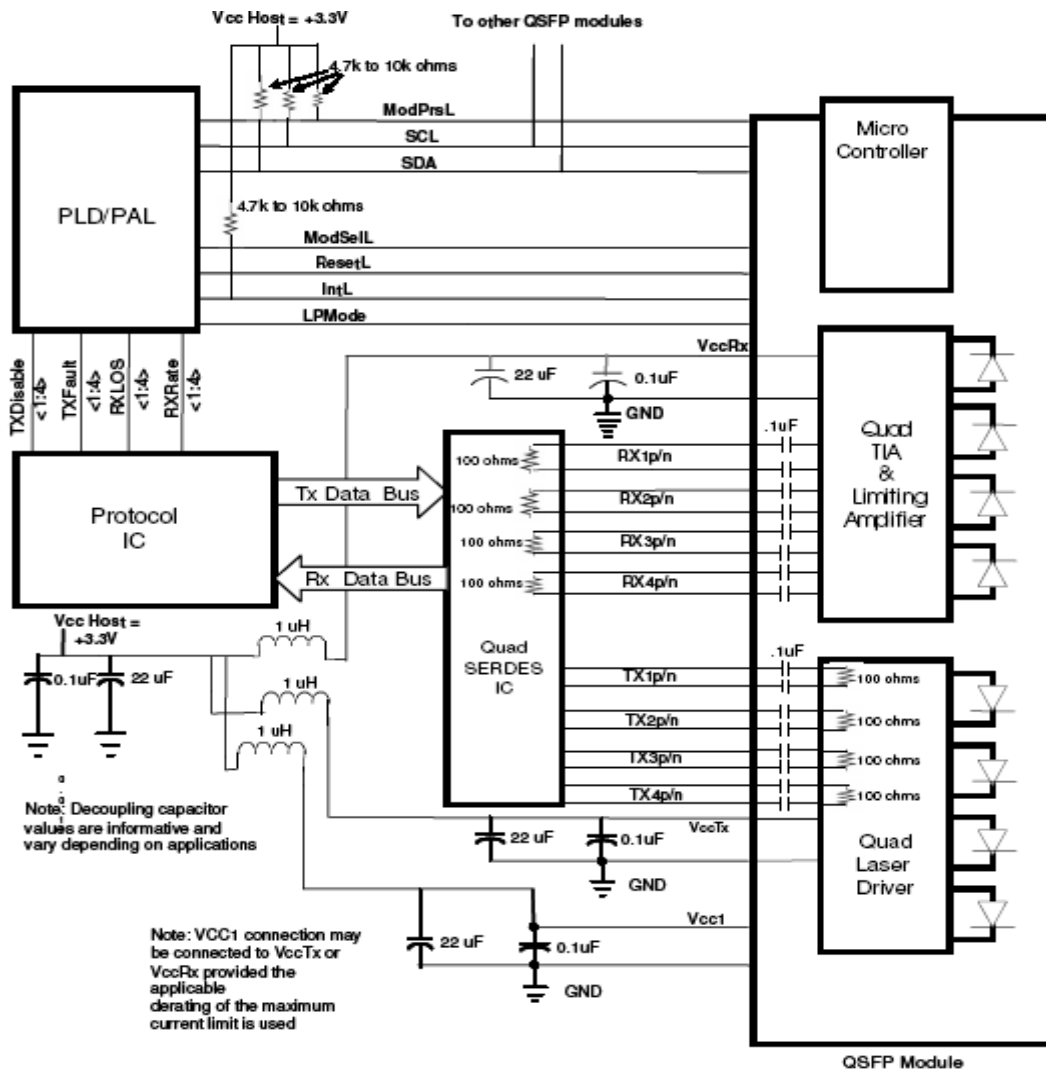


Figure 2. Typical application circuit

Mechanical Dimensions

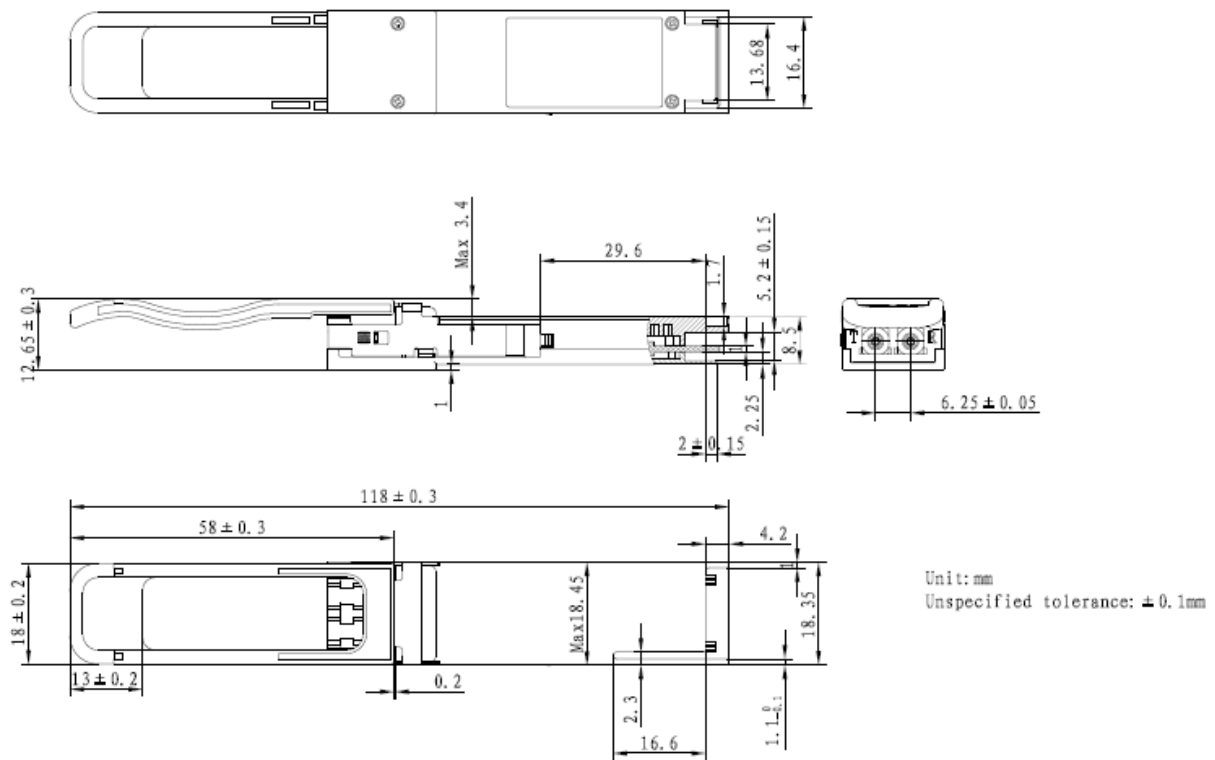


Figure 3. Module Mechanical Dimensions

Digital Diagnostics Functions

As defined by the SFF-8665 – Specification for QSFP28 Copper and Optical Transceiver, Our QSFP28 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. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host.