

TITLE**100G QSFP28 LR4 Transceiver****1. SCOPE**

The transceiver consists of two sections: The transmitter section incorporates four LAN WDM DFB. And the receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8636 which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage.

2. PRODUCT DESCRIPTION

- Hot pluggable QSFP28 form factor
- Supports 103.1Gb/s aggregate bit rate
- Power dissipation < 3.5W
- RoHS-6 compliant
- Commercial case temperature range of 0°C to 70°C
- Single 3.3 V power Supply
- Maximum link length of 10Km on Single mode Fiber(SMF)
- 4X25Gb/s based LAN WDM transmitter
- 4X28G electrical interface
- I2C management interface
- 100BASE-LR4 100G Ethernet
- Duplex LC receptacles

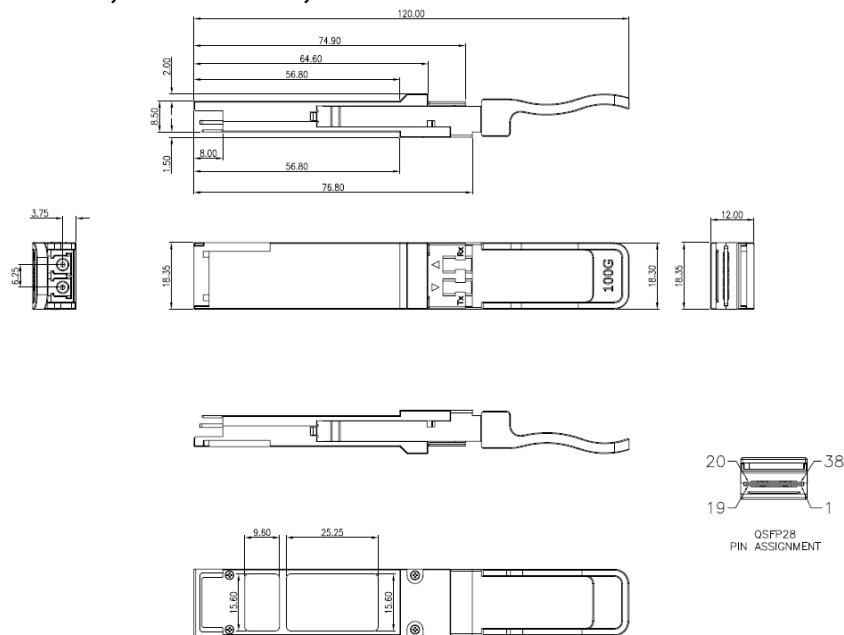
3. PRODUCT DESCRIPTION**3.1 PRODUCT NAME AND SERIES NUMBER(S)****100G QSFP28 LR4 Transceiver**

Part Number	Data Rate	Wavelength (nm)	Distance	Media	Power (dBm)	Sen. (dBm)	Connector	Tem.
ZFTFL4F1310A1ST	100G	LAN WDM DFB 4	10km	SMF	-4.3 ~ 4.5	-8.6	LC	C

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3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING



Unit is millimeter. All dimensions are ± 0.1 mm unless otherwise specified.

TITLE**100G QSFP28 LR4 Transceiver****4. APPLICABLE DOCUMENTS AND SPECIFICATIONS**

- Compliant with 103G Ethernet IEEE 802.3ba
- Electrical interface specifications per SFF-8636
- QSFP28 MSA package with duplex LC connector

5. QUALIFICATION

- Electrostatic Discharge (ESD) to the Electrical Pins
- Electrostatic Discharge (ESD) to the LC Connector
- RoHS compliance

6. Absolute Maximum Ratings & Recommended Operating Conditions

Absolute Maximum Ratings				
Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC3	-0.5	4	V
Relative Humidity(Non-condensing)	RH	5	95	%
Receiver Damage Threshold, per Lane	Prdmg	5.5		dBm

Recommended Operating Conditions					
Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T _C	0		70	°C
Power Supply Voltage	V _{CC3}	3.135	3.3	3.465	V
Power Supply Current	I _{CC3}			1066	mA
Data Rate			25.78		Gbps
Operating Distance	D		10		km
Module Total Power	P			3.5	W

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Transmitter Operating Characteristic-Optical, Electrical						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Optical Characteristic						
Bit Rate	BR		25.78125	-	Gbps	1
Center Wavelength	λ1	1294.53	1295.56	1296.59	nm	
	λ2	1299.02	1300.05	1301.09	nm	
	λ3	1303.54	1304.58	1305.63	nm	
	λ4	1308.09	1309.14	1310.19	nm	
Average Launch Power, each lane	P ₀	-4.3	-	+4.5	dBm	2,4
Average Launch power Tx_off	P _{off}	-	-	--30	dBm	
Total Average Launch Power	P _{out}		-	10.5	dBm	
Transmit OMA per Lane	TxOMA	-1.3	-	4.5	dBm	
Extinction Ratio	ER	4	-	-	dB	
Relative Intensity Noise	RIN _{12OMA}	-	-	-130	dB/Hz	
Side Mode Suppression Ratio	SMSR	30	-		dB	
Optical Return Loss Tolerance		-	-	20	dB	
Eye Mask {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				3
Electrical Characteristic						
Differential Data Input Swing per Lane	V _{in,P-P}	-	-	900	mVPP	
Differential Termination Mismatch	-	-	-	10	%	
Eye Width	-	-	0.46	-	UI	
Applied pk-pk Sinusoidal Jitter	-	Per IEEE 802.3bm Table 88-13				
Eye Height	-	-	95	-	mV	
DC common mode voltage	-	-350	-	2850	mV	

Notes:

1. Transmitter consists of 4 lasers operating at 25.78Gb/s each
2. Minimum value is informative.
3. Hit ratio 5x10⁻⁵.
4. Power value and power accuracy are with all channels on

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Receiver Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Optical Characteristic						
Center Wavelength	λ1	1294.53	1295.56	1296.59	nm	
	λ2	1299.02	1300.05	1301.09	nm	
	λ3	1303.54	1304.58	1305.63	nm	
	λ4	1308.09	1309.14	1310.19	nm	
Receiver Sensitivity	S	-	-	-8.6	dBm	
Receive Power (OMA) per Lane	RxOMA	-	-	4.5	dBm	
Average Launch Power per Lane	RXPx	-10.6	-	4.5	dBm	1,3
Stressed Receiver Sensitivity(OMA) per Lane	SRS			-6.8	dBm	2
LOS De-Assert	LOSD		-15		dBm	
LOS Assert	LOSA		-18		dBm	
LOS Hysteresis	-		1.2		dB	
Optical Return Loss	ORL	-26	-	-	dB	
Electrical Characteristic						
Signaling Rate per Lane		25.78125 ±100 ppm			GBd	
Differential Data Output Swing	V _{out}	100	-	400	mV	4
		300	-	600		
		400	-	800		
		600		1200		
Eye Width	-	0.57	-	-	UI	
Vertical Eye Closure	-	-	-	5.5	dB	
Differential Termination Mismatch	-	-	-	10	%	
Transition Time, 20% to 80%	tr.tf	12	-	-	ps	

Note:

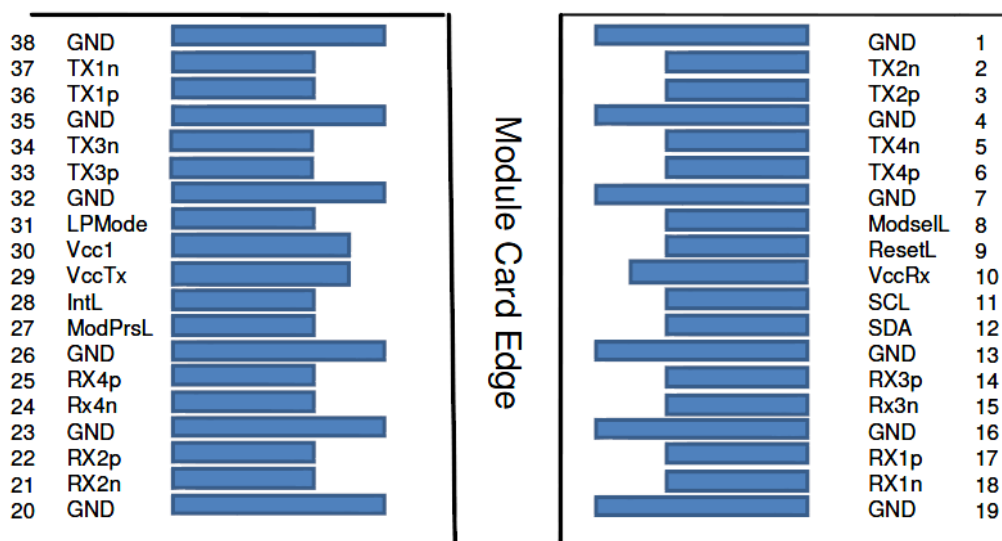
1. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss
2. SRS is measured with vertical eye closure penalty of 1.8 dB max, J2 of 0.30 UI, and J9 of 0.47 UI.
3. Power value and power accuracy are with all channels on.

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4. Output voltage is settable in 4 discrete ranges via I2C. Default range is 400 – 800 mV

7. 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
12	SDA	2-wire serial interface data	2
13	GND	Ground	1

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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:

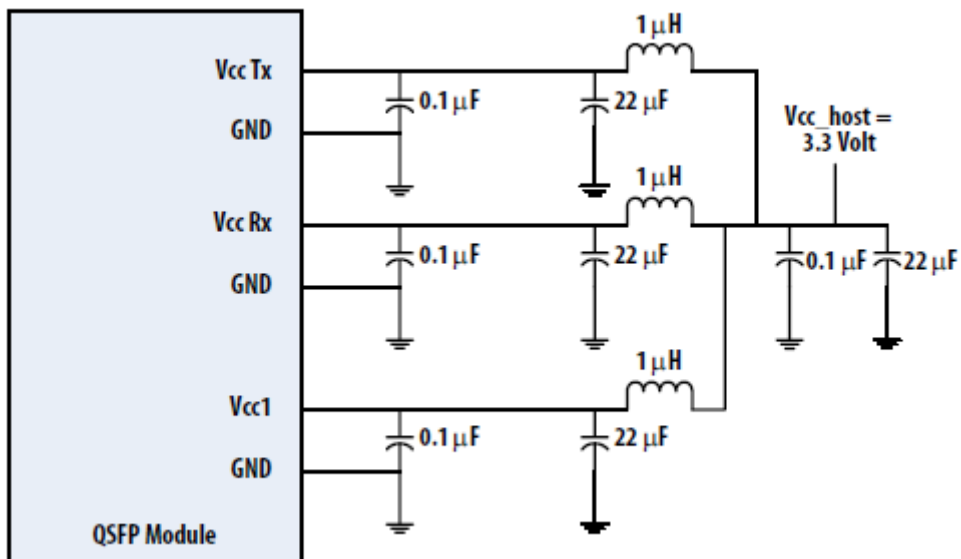
1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 Module in any combination. The connector pins are each rated for a maximum current of 500 mA.

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Digital Diagnostic Function

Parameters	Unit	Accuracy
Temperature	°C	±3
Voltage	V	±3%
Ibias	mA	±10%
Rx power	dB	±3
Tx power	dB	±3

Recommended Host Board Power Supply Filter Network



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Recommended Application Interface Block Diagram

