

LWO-QSFP28-ZR4

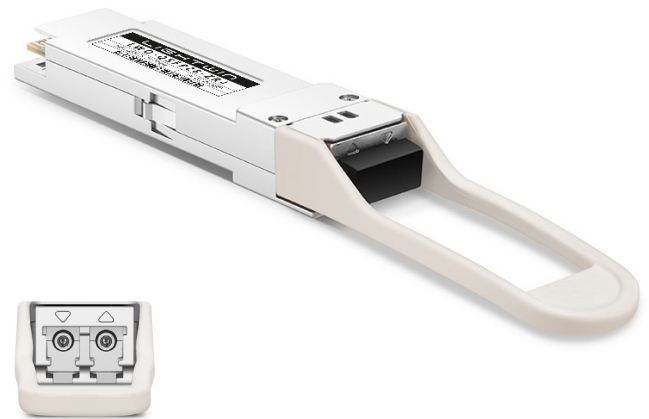
100Gbit QSFP28 ZR4, 80km OM4, LC-Duplex, Singlemode

Features

- Duplex LC receptacle optical interface
- Single +3.3V power supply
- Hot-pluggable QSFP28 MSA form factor
- 4x25G Electrical Serial Interface
- Compliant with 4x28G(CEI-28GVSR)
- Built in digital diagnostic function
- Transmitter: cooled 4x25Gb/s LAN WDM EML TOSA (1295.56, 1300.05, 1304.58, 1309.14nm)
- Receiver: 4x25Gb/s SOA+PIN ROSA
- Operating case temperature range: 0°C to 70°C
- Up to 80km reach for G.652 SMF with FEC
- Power dissipation < 5.5 W

Application

- 100G BASE-ZR4 Ethernet Links
- InfiniBand QDR and DDR interconnects
- 100G Datacom connections



Functional Description

The 100G QSFP28 ZR4 optical transceiver integrates the transmit and receive path onto one module. On the transmit side, four lanes of serial data streams are retimed and passed on to four laser drivers, which control four electric-absorption modulated lasers (EML) with 1295, 1300, 1305, and 1309 nm center wavelengths. The optical signals are then multiplexed into a single-mode fiber through an industry-standard LC connector. On the receive side, four lanes of optical data streams passed on to a Semiconductor Optical Amplifier(SOA) and are optically demultiplexed by an integrated optical demultiplexer. Each data stream is recovered by a PIN photodetector and transimpedance amplifier, retimed and passed on to an output driver. This module features a hot-pluggable electrical interface, low power consumption, and 2-wire serial interface.

Transceiver Block Diagram

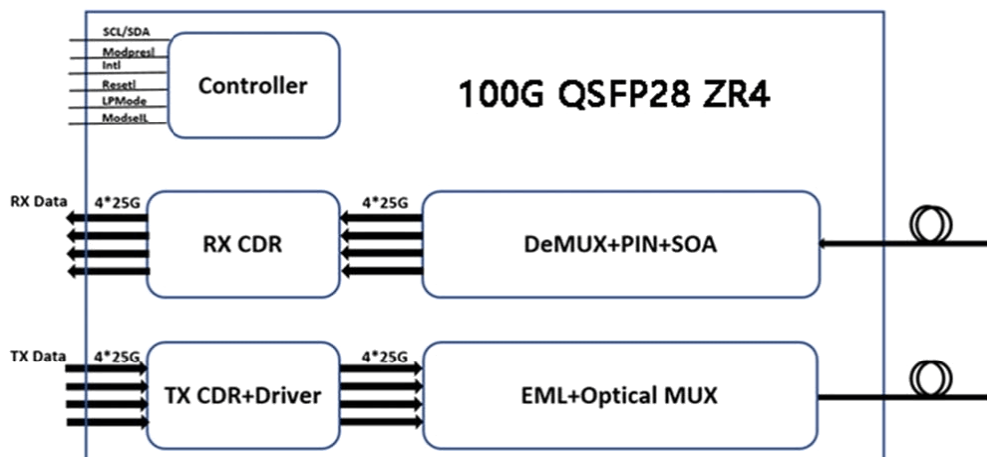


Figure 1. Transceiver Block Diagram

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Pin Assignment and Description

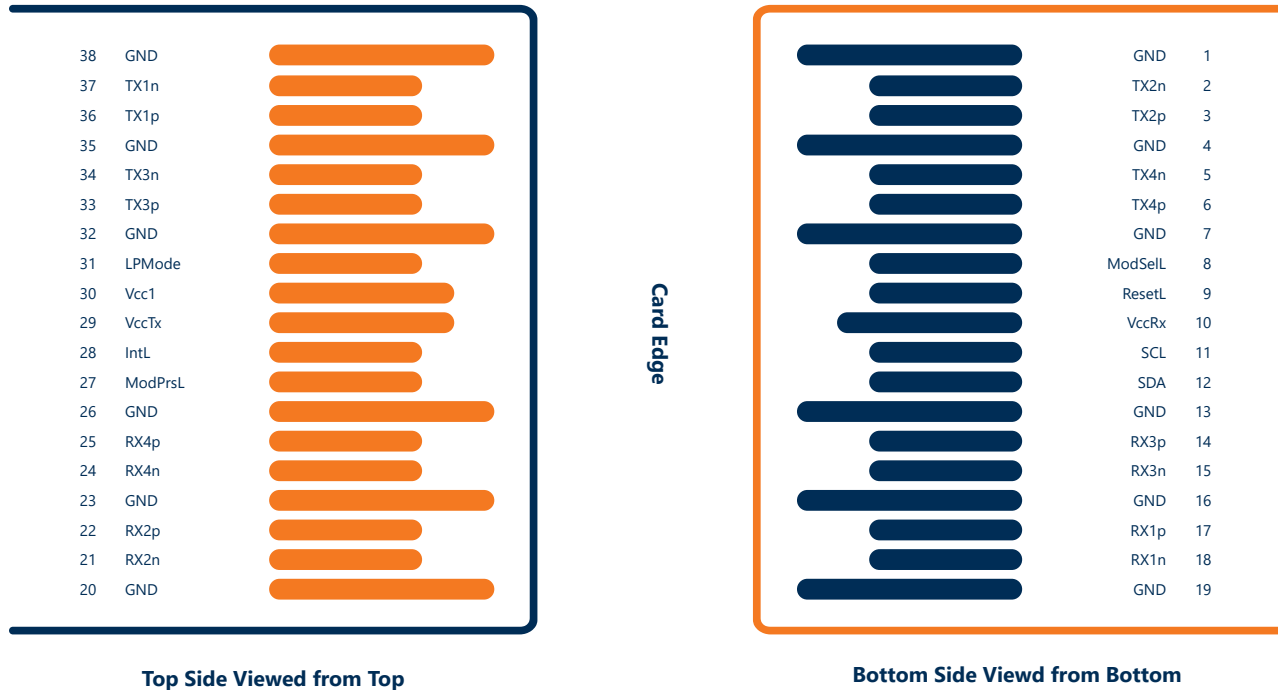


Figure 2. MSA Compliant Connector

PIN Definition 1/2

PIN	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Output	
7		GND	Ground	1
8	LVTTTL-I	ModSelL	Module Select	
9	LVTTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCNOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVCNOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1

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PIN Definition 2/2

20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	
27	LVTTTL-O	ModPrsL	Module Present	
28	LVTTTL-O	IntL/RxLOSL	Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636)	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTTL-I	LPMode/TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636)	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Input	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	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 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 module in any combination. The connector pins are each rated for a maximum current of 1000mA.

Recommended Power Supply Filter

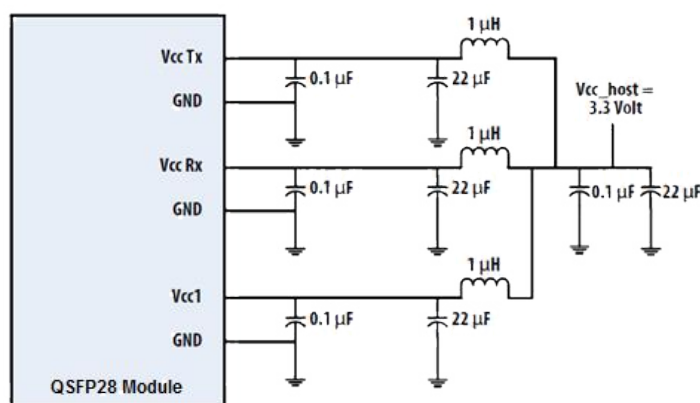


Figure 3. Recommended Power Supply Filter

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Electrical Characteristics

Tested under recommended operating conditions, unless otherwise noted

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Transceiver						
Input differential impedance	R_{in}		100		Ω	1
Differential data input swing	$V_{in, pp}$	180		1000	mV	
Transmit Disable Voltage	VD	$V_{CC}-1.3$		V_{CC}	V	
Transmit Enable Voltage	VEN	Vee		$V_{ee}+0.8$	V	2
Receiver						
Differential data output swing	$V_{out, pp}$	300		850	mV	3
LOS Fault	$V_{LOS_{fault}}$	$V_{CC}-1.3$		V_{CC_HOST}	V	4
LOS Normal	$V_{LOS_{norm}}$	V_{ee}		$V_{ee}+0.8$	V	4

Notes

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Optional for TX disable
3. Into 100 ohms differential termination
4. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics 1/2

Tested under recommended operating conditions, unless otherwise noted

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Transceiver						
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1301.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Total Launch Power, 100GE	P_{AVG}	7	-	12.5	dBm	1
Average Launch Power per Lane, 100GE	P_{lane}	1	-	6.5	dBm	1
Difference in launch power between lanes	P_{Δ}	-	-	3	dB	
Average Output Power (Laser OFF)	P_{off}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio, 100GE & OTU4	ER	8	-	-	dB	

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Optical Characteristics 2/2

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Receiver						
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1301.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Damage threshold	P_{DAM}	-	-	5.5	dBm	
Average receive power, each lane (max)	P_{SAT}	-	-	3.5	dBm	
Average receive power, each lane (min)	P_{RX_Lane}	-28	-		dBm	
Receiver sensitivity per Lane (OMA)				-26.4	dBm	2
LOS Assert	LOS_A	-40			dBm	
LOS De-assert	LOS_{DA}			-29	dBm	
LOS hysteresis	LOS_H	0.5			dB	

Notes

- The optical power is launched into SMF.
- Measured with a PRBS 2³¹-1 test pattern @25.78125 Gb/s, BER≤5E-5.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Storage Temperature	T_S	-40	85	degC		
Operating Case Temperature	T_{OP}	0	70	degC		
Power Supply Voltage	V_{CC}	-0.5	03. Jun	V		
Relative Humidity (non-condensation)	RH	5	85	%		
Rx Damage Threshold, per Lane	P_{Rdmg}	5.5		dBm		

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Operating Case Temperature	T_{OP}	0		70	degC	
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate, Each Lane			2.578.125		Gb/s	
Supply Current	I_{CC}			1.66	A	
Power Consumption	P			5.5	W	
Link Distance with G.652 (with FEC)	D			80	km	

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Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8436.

Parameter	Symbol	Min.	Max.	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temperature range
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2	2	dB	1
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	Ch1 ~ Ch4
Channel TX power monitor absolute error	DMI_TX_Ch	-2	2	dB	1

Notes

- Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

Mechanical Dimensions

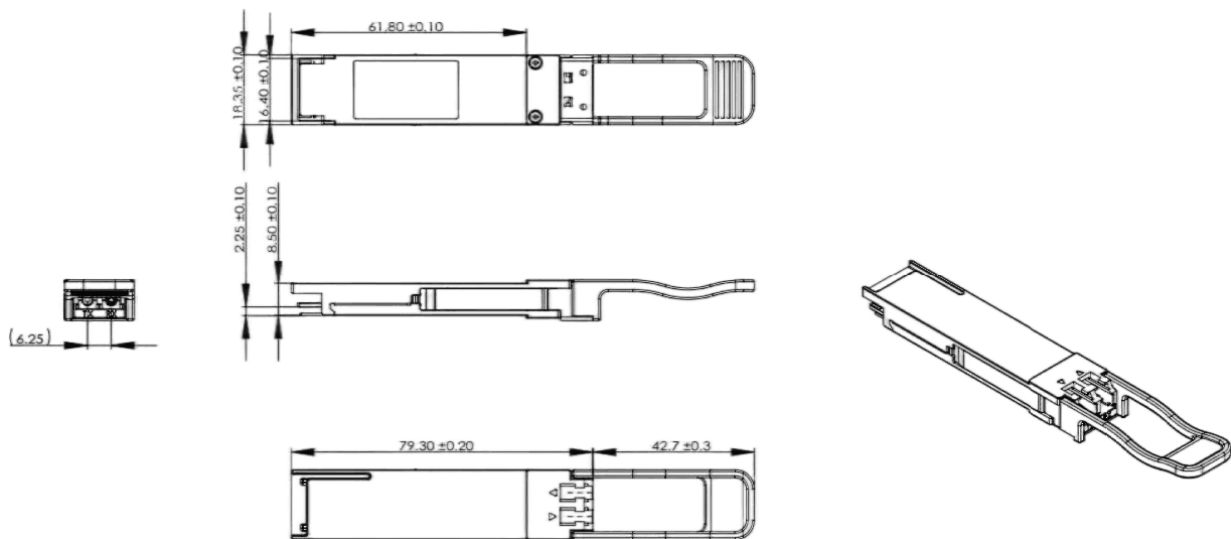


Figure 4. Mechanical Outline

ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 / JESD22- A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to EN 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.