DataSheet

100GBase QSFP28 LR4 Optical Transceivers
WST-QS28-LR4-C

Features:

- Hot-pluggable QSFP28 MSA form factor
- Duplex LC receptacle optical interface
- Transmitter: cooled 4x25Gb/s DML laser
- Receiver: 4x25Gb/s PIN receiver
- Compliant with CEI-28G-VSR
- Single +3.3V power supply
- Low power dissipation (Max:4.0W)
- Built in digital diagnostic function
- Operating case temperature range：0℃ to 70℃

Applications:

- 100GBASE-LR4
- InfiniBand QDR and DDR interconnects
- Client-side 100G Telecom connections

Standard:

- Compliant to IEEE 802.3ba 100G LR4
- Compliant to SFF-8436
- RoHS Compliant.

Description

The WST-QS28-LR4-C optical transceiver integrates the transmit and receive path onto one module. On the transmit side, four lanes of serial data streams are recovered, retimed, and passed on to four laser drivers, which control four lasers with 1295.5, 1300.0, 1304.5, and 1309.1nm 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 are optically demultiplexed by an integrated optical demultiplexer. Each data steam is recovered by a 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.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	ºC	
Relative Humidity	RH	0		85	%	
Power Supply Voltage	V_{CC}	-0.5		3.6	V	
Rx Damage Threshold, per Lane	P_{Rdmg}	5.5			dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	ºC	Without air flow
Power Supply Voltage	VCC	3.14	3.3	3.46	V	
Power Supply Current	ICC	-		1200	mA	
Data Rate	BR		25.78125		Gbps	Each channel
Transmission Distance	TD		-	10	KM	SMF

Specifications (tested under recommended operating conditions, unless otherwise noted)

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Transmitter						
Input differential impedance	Rin		100		Ω	1
Differential data input swing	Vin,pp	180		1000	mV	
Transmit Disable Voltage	VD	Vcc–1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	2
Receiver						
Differential data output swing	Vout,pp	300		850	mV	3
LOS Fault	VLOS fault	Vcc–1.3		VccHOST	V	4
LOS Normal	VLOS norm	Vee		Vee+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 LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Transmitter						
Wavelength Assignment	λ0	1294.53	1295.56	1296.59	nm	
	λ1	1299.02	1300.05	1301.09	nm	
	λ2	1303.54	1304.58	1305.63	nm	
	λ3	1308.09	1309.14	1310.19	nm	
Total Output. Power	POUT			10.5	dBm	
Average Launch Power Per lane	Pavg	-4.3		4.5	dBm	
Optical modulation amplitude, each lane (OMA)	OMA	-1.3		4.5	dBm	
SMSR		30			dB	
Optical Extinction Ratio	ER	4			dB	
Average launch Power off per lane	Poff			-30	dBm	
RIN	RIN			-130	dB/Hz	
Optical return loss tolerance	ORLT			20	dB	
Transmitter reflectance	TR			-12	dB	
Output Eye Mask definition {X1，X2，X3，Y1，Y2，Y3}	{0.25，0.4，0.45，0.25，0.28，0.4}					1
Receiver						
Rx Sensitivity (OMA) per lane	RSENS			-8.6	dBm	
Average Receive Power for per Lane	P_{in}	-10.6		4.5	dBm	
Overload Input Optical Power	P_{max}	5.5			dBm	
Return Loss	RL	-26			dB	
LOS Assert	LOSA			-11.6	dBm	
LOS De-Assert	LOSD	-23.6			dBm	
Loss Hysteresis	P_d-P_a	0.5		6	dBm	

Notes:

1. Hit ratio $5x10^{-5}$
2. Measured with a PRBS 231-1 test pattern, @25.78Gb/s, BER<10^{-12} .

Pin Definition

Pin out of Connector Block on Host Board

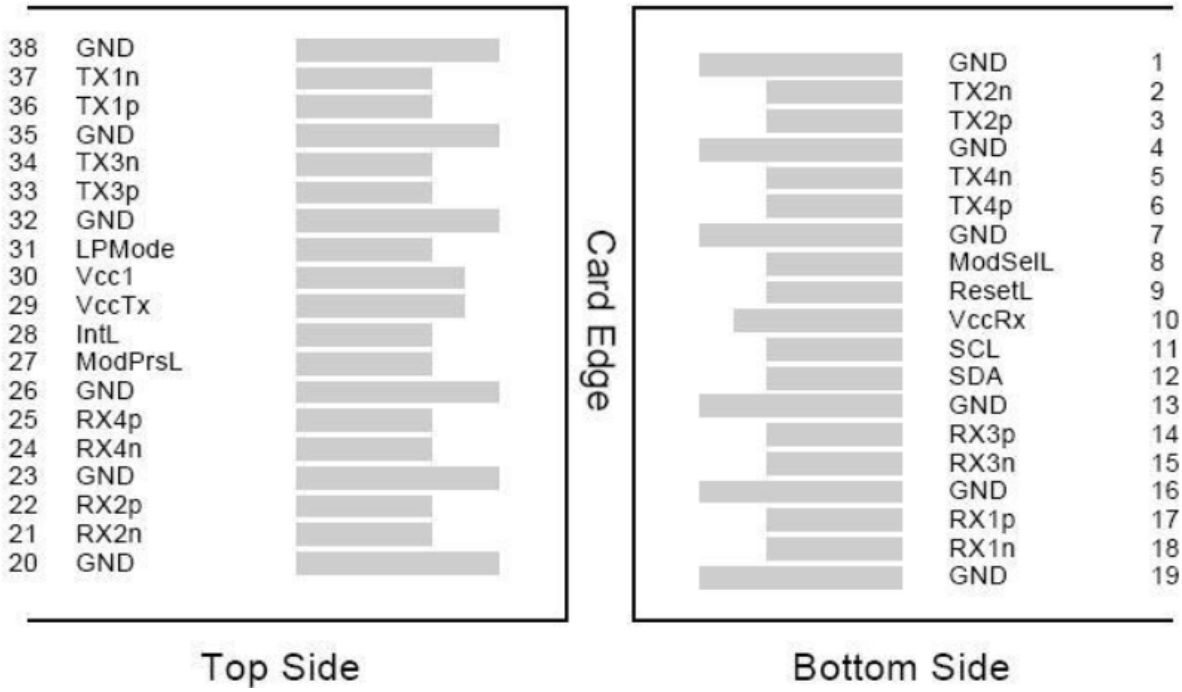


Figure 1---Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	NOTE
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver Ground)	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	3.3V Power Supply Receiver	2
11	SCL	2-Wire serial Interface Clock	
12	SDA	2-Wire serial Interface Data	
13	GND	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1

17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsl	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	LPMode	Low Power Mode，not connect	
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver Ground)	1

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 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 500mA.

Lower Memory Map

For more detailed information including memory map definitions, please see the QSFP28 MSA Specification.

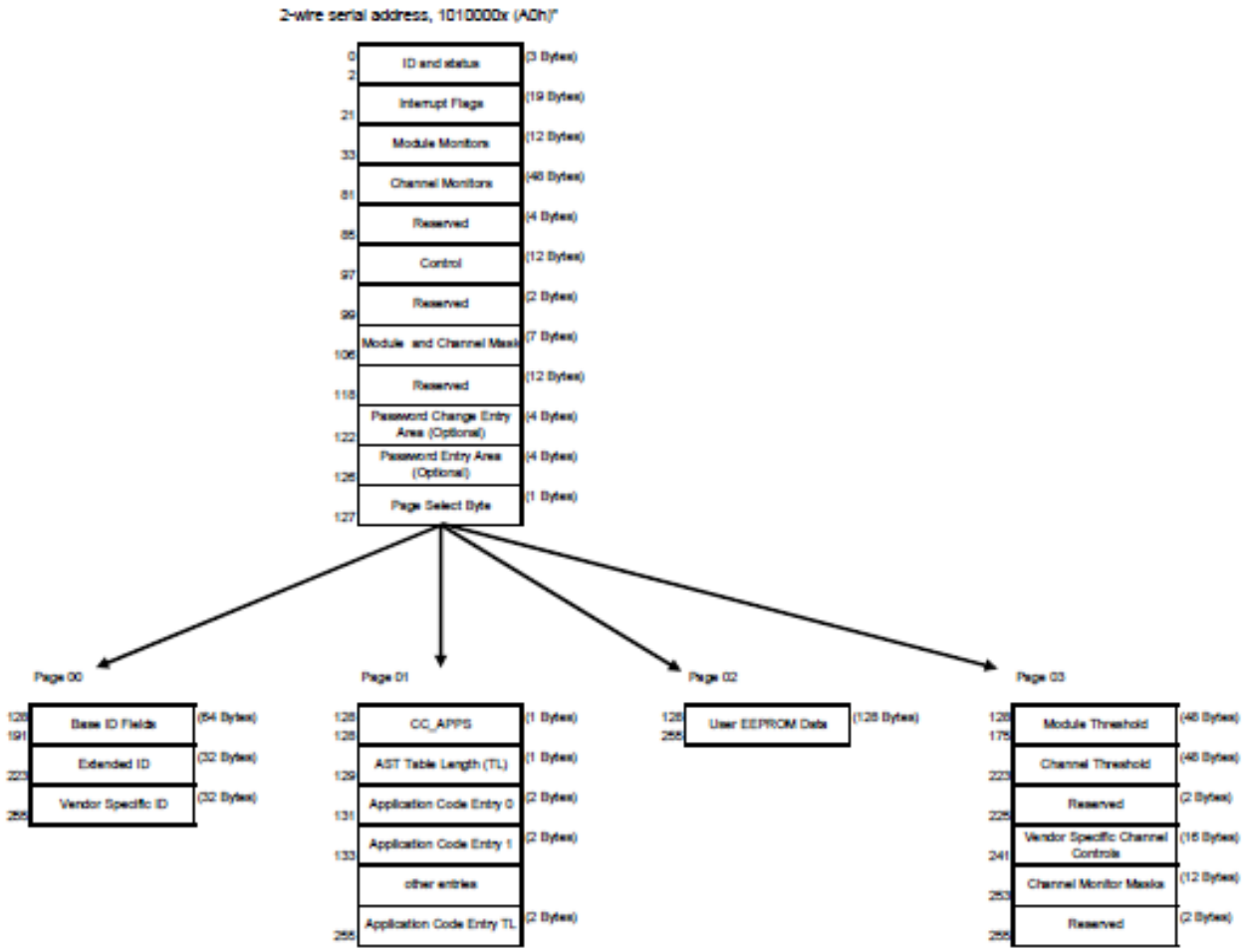
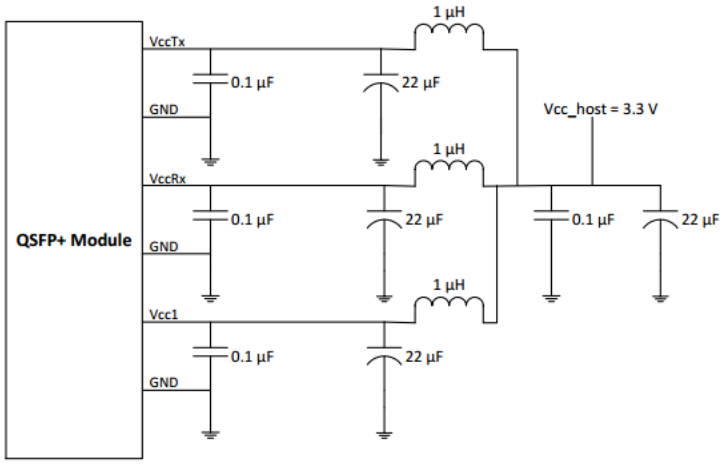
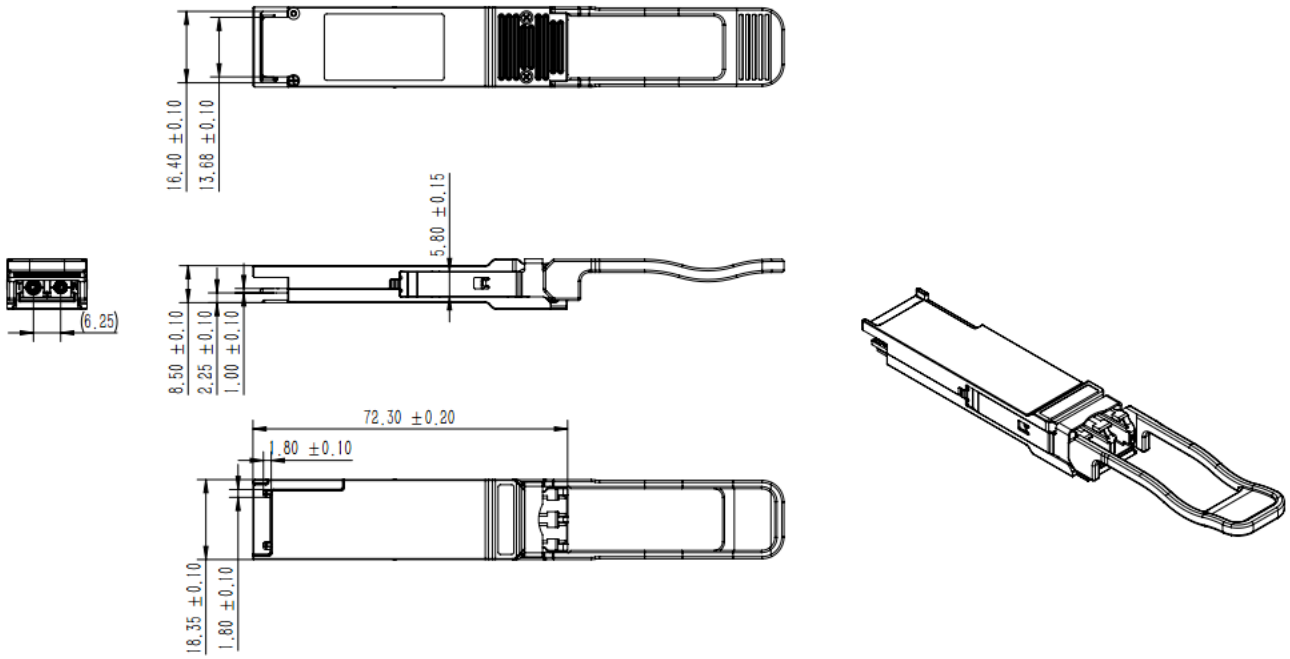


Figure 2 –QSFP28 Memory Map

Recommended Power Supply Filter



Package Outline



Ordering Information

Part No	Specification									
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity in OMA	Temp.	Reach	Other	Application code
WST-QS28-LR4-C	QSFP28	25.78 Gbps for each Channel	DML	-4.3 ~ 4.5 dBm per Channel	PIN	-8.6 dBm for each Channel	0~70°C	10KM	DDM RoHS	100G Ethernet

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	20-Nov-2024	Original P/N was WST-QS28-LR4c-C rev90	Joanne Ni	Ken Cheng	Wayne Liao

Headquarters
16F-5, No. 75, Sec. 1, Xintai 5th Rd., Xizhi Dist.,
New Taipei City 22101, Taiwan
Tel: +886-2-2698-7208
Fax: +886-2-2698-7210
Email: sales@wavesplitter.com
Website: https://wavesplitter.com/