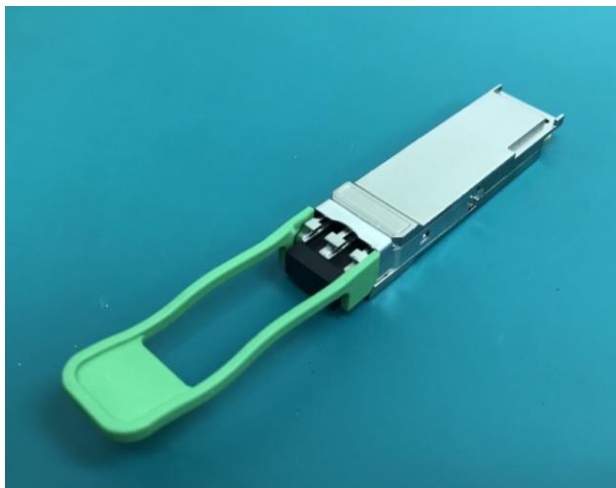


100Gb/s QSFP28 CWDM4 2km Optical Transceiver P/N: WST-QS28-CM4-C



Features:

- Hot-pluggable QSFP28 MSA form factor
- Duplex LC receptacle optical interface
- Transmitter: Uncooled 4x25Gb/s DFB laser
- Receiver: 4x25Gb/s PIN receiver
- Single +3.3V power supply
- Low power dissipation(Max:3.5W)
- Built in digital diagnostic function
- Operating case temperature range:0 to 70 °C

Applications:

- Data Center Interconnect
- 100G Ethernet
- Enterprise networking

Functional Description

WaveSplitter's WST-QS28-CM4-C transceivers 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 1271, 1291, 1311, and 1331 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 are optically demultiplexed by an integrated optical demultiplexer. Each data stream 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	Max	Units	Notes
Storage Temperature	T _s	-40	85	°C	
Power Supply Voltage	V _{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	0	85	%	
Damage Threshold, each Lane	TH _d	5.5		dBm	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units	Notes
Data Rate, each Lane			25.78125		Gb/s	
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Power Supply Current	I _{cc}			1.06	A	
Operating Case Temperature	T _{OP}	0		70	°C	

Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Units	Notes
Supply Voltage	V _{cc}	3.13	3.3	3.47	V	
Supply Current	I _{cc}			1060	mA	
Transmitter						
Input differential impedance	R _{in}		100		Ω	
Differential data input swing	V _{in,pp}	150	-	900	mV	
Receiver						
Input differential impedance	R _{out}		100		Ω	
Differential data input swing	V _{out,pp}	400	-	900	mV	

Optical Characteristics

(Tested under recommended operating conditions, unless otherwise noted)

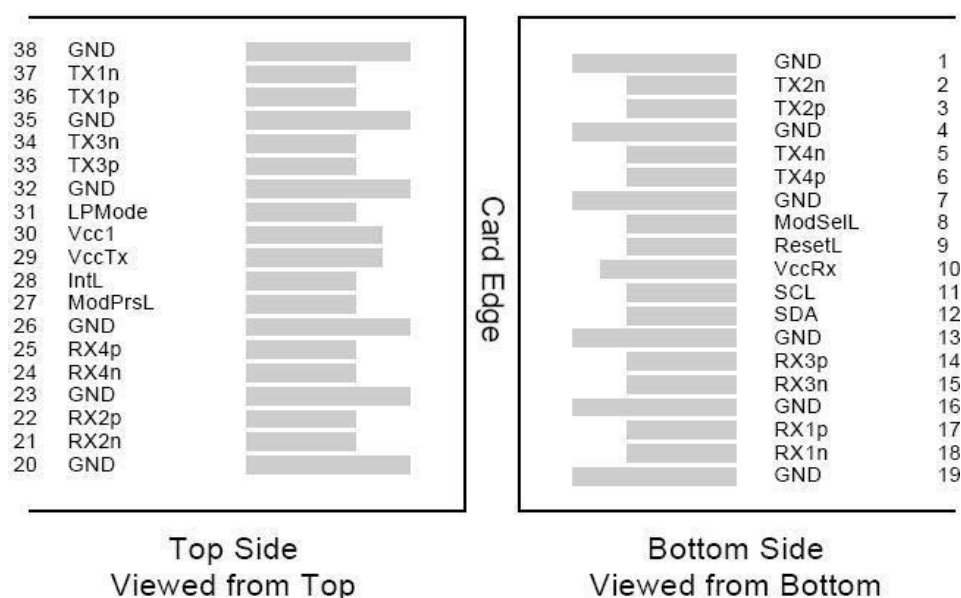
Parameter	Test Point	Min	Typical	Max	Units	Notes
Transmitter						
Four Lane Wavelength Range	λ_1	1264.5	1271	1277.5	nm	
	λ_2	1284.5	1291	1297.5		
	λ_3	1304.5	1311	1317.5		
	λ_4	1324.5	1331	1337.5		
Total launch power	P _{out}	-	-	8.5	dBm	
Average launch power, each lane	P _{avg}	-6.5	-	2.5	dBm	1
Optical modulation amplitude, each lane (OMA)	OMA	-4	-	2.5	dBm	
Extinction ratio	ER	3.5	-	-	dB	
Side-mode suppression ratio	SMSR	30	-	-	dB	
TPD, per lane	TPD			3	dB	
Average launch power of OFF transmitter, per lane	P _{OFF}	-	-	-30	dBm	
Relative Intensity Noise	RIN			-130	dB/Hz	
Optical return loss tolerance	ORLT	-	-	20	dB	
Transmitter reflectance	TR	-	-	-12	dB	
Transmitter eye mask {X1, X2, X3, Y1, Y2, Y3}	M _t	{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}				2
Receiver						
Four Lane Wavelength Range	λ_1	1264.5	1271	1277.5	nm	
	λ_2	1284.5	1291	1297.5		
	λ_3	1304.5	1311	1317.5		
	λ_4	1324.5	1331	1337.5		
Overload Input Optical Power for Each Lane	P _{max}	3.5	-	-	dBm	
Average Receive Power for Each Lane	P _{in}	-11.5	-	2.5	dBm	3
Receiver Sensitivity(OMA) per lane at 5x10 ⁻⁵ BER	P _{sens1}	-	-	-10	dBm	3
Return Loss	RL	-26	-	-	dB	

Los De-Assert	P_d	-	-	-12	dBm	
Los Assert	P_a	-20	-	-	dBm	
Loss Hysteresis	$P_d - P_a$	0.5		6	dBm	

Notes:

1. Minimum value is informative.
2. Hit ratio 5×10^{-5} .
3. Measured with a PRBS $2^{31}-1$ test pattern @25.78125 Gb/s, BER $\leq 5 \times 10^{-5}$.

Pin Assignment



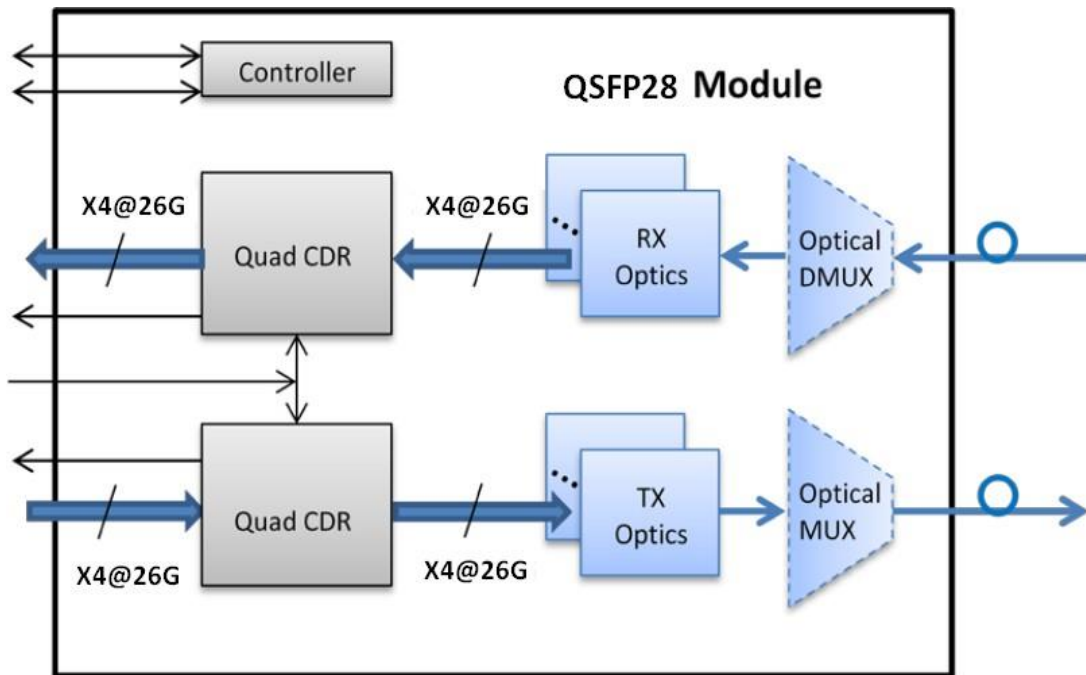
MSA compliant Connector

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	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	

12	LVC MOS-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
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	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMODE	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
38		GND	Ground	1

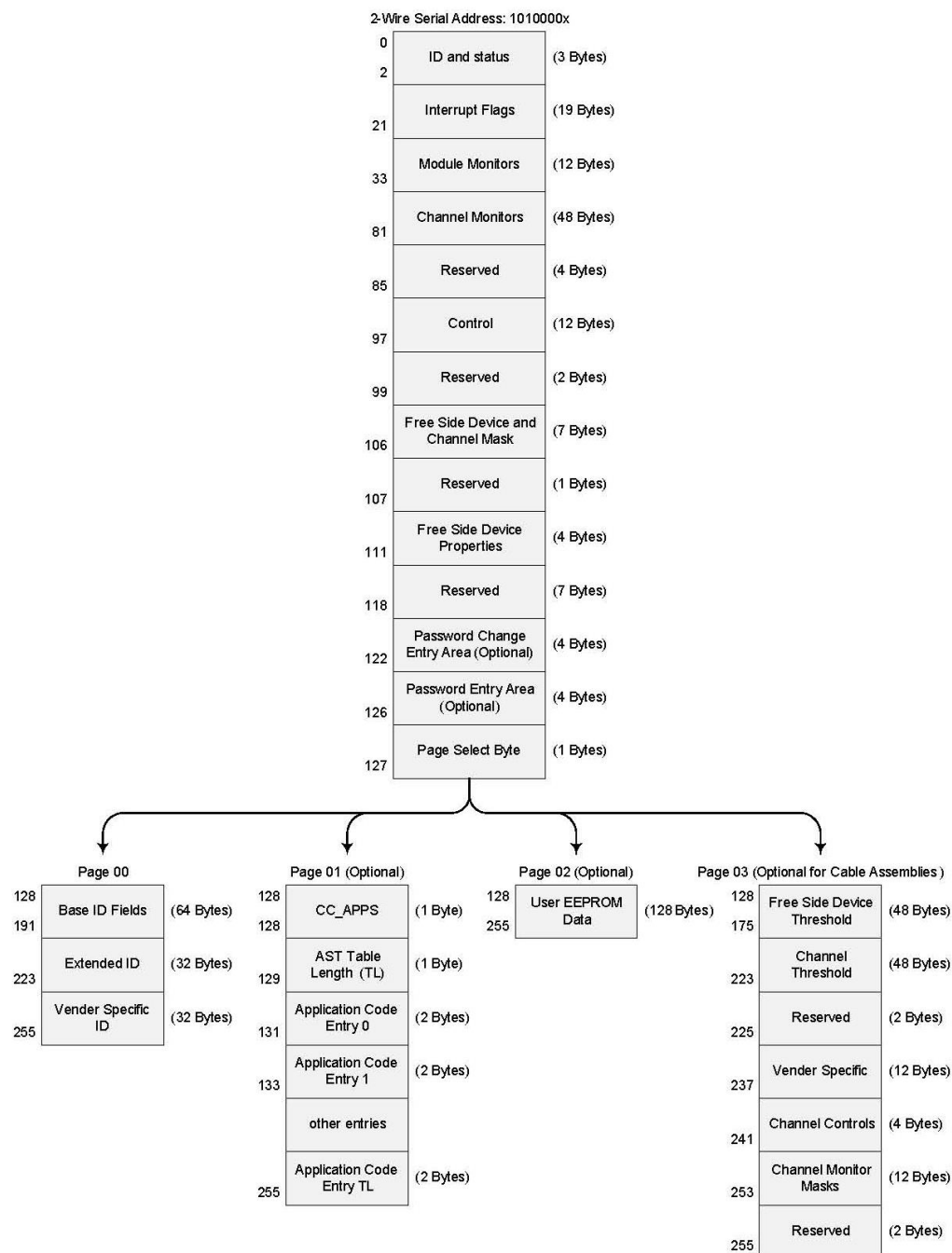
Notes:

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 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.

Functional Diagram

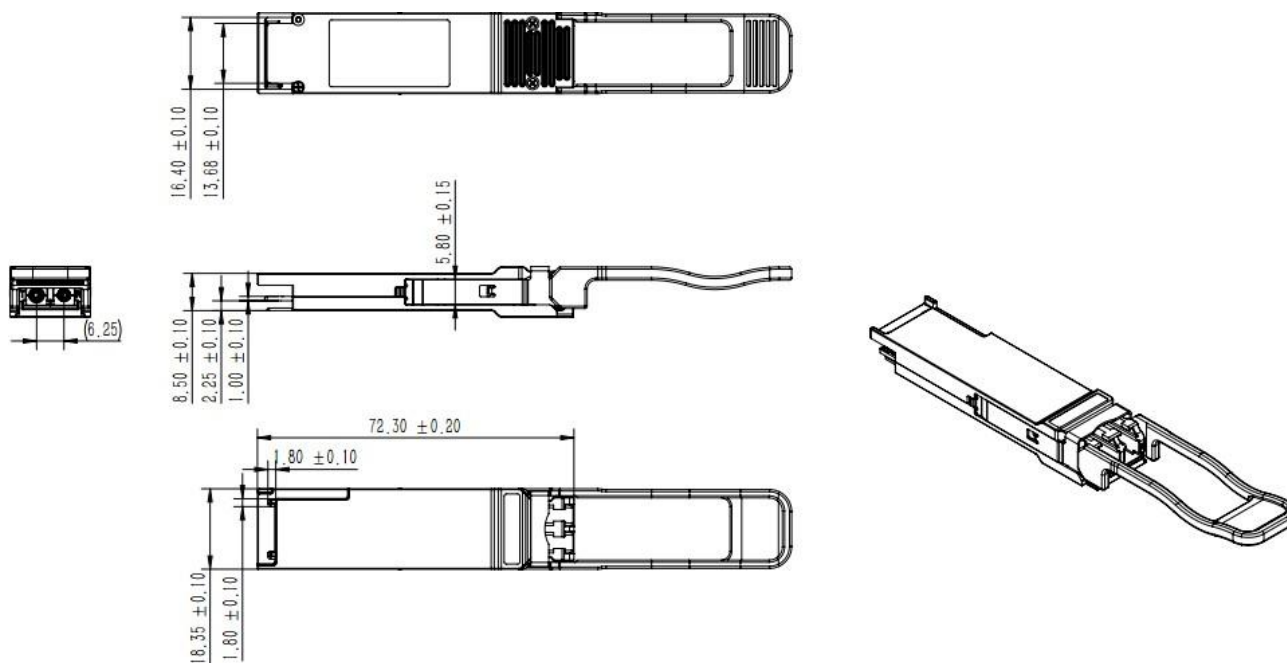
Memory Map

The memory map is structured as a single address and multiple page approaches, according to the QSFP SFF-8436 SNIA specification as shown in the below. For more detailed description of this memory map or lower pages, please see our Memory Map document with flexible customization settings.



Digital Diagnostic Monitor Characteristics

Parameter	Accuracy	Unit
Transceiver Internal Temperature	± 3.0	$^{\circ}\text{C}$
VCC3 Internal Supply Voltage	± 3.0	%
Laser Bias Current	± 10	%
Tx Output Power	± 3.0	dBm
Rx Input Power	$\pm 3.0^{*}$	dBm

Mechanical Drawing

Unit: mm

Ordering Information

Part No	Specification									
	Package	Data rate per Lane	Laser	Optical Power in OMA	Detector	Max. Receive Sensitivity (OMA)	Temp	Reach	Other	Application code
WST-QS28-CM4-C	QSFP28	25.78 Gbps each Channel	4-ch CWDM DML	-6 ~ +2.5 dBm each Channel	PIN	-10 dBm each Channel	0~70°C	2km	DDM RoHS	100G Ethernet

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	16-Jun-2020	New Issue	ShaoYu Lee	Wayne Liao	Wayne Liao
V1.1	28-Sep-2021	Update photo, pull tab material and Revision to 61	ShaoYu Lee	Wayne Liao	Wayne Liao
V2.0	02-Dec-2022	Change LD and Revision to 6A	ShaoYu Lee	Wayne Liao	Wayne Liao

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