

Data Sheet

100G QSFP28 LR1 BIDI 20km Transceiver

P/N: WST-QS28-BL2-xC



Features:

- Lane signaling rate 53.125 GBd with PAM4
- Up to 20km on 9/125um SMF
- Maximum power consumption 4.5 W
- EML laser and PIN receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- High speed I/O electrical interface
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with simplex LC connector
- Single +3.3V power supply
- Operating case temperature: 0 to +70 °C
- Compliant with RoHS

Applications:

- Data Center
- 100 Gigabit Ethernet, telecom

Standard:

- Compliant with industry standards 100G-LR1-20 lambda MSA
- Compliant with SFF-8679 MSA hardware specification
- Compliant with SFF-8636 · SFF-8661

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Storage Temperature	TS	-40	85	oC
Relative Humidity	RH	15	85	%
Supply Voltage	VCC	0	3.6	V
Data input voltage		-0.3	3.6	V
Control input voltage		-0.3	4	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units	Notes
Perating Case Temperature (Commercial)	TC	0		70	°C	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Operating relative humidity	RH	15		85	%	
Data Rate	BR	53.125±100ppm		GBd		
Bit Error Rate	BER			2.4E-4		1
Supported Link Length on 9/125um SMF, 53.125 GBd	L		20		km	2

Notes:

1. Tested with a PRBS31Q test pattern for 53.125 GBd operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards, with FEC.

Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Units
Transmitter					
Module Supply Current	Icc			1437	mA
Power Dissipation	PD			4.5	W
Input Differential Impedance	Zin	90	100	110	Ω
Differential Data Input Swing	Vin, p-p	180		900	mVP-P
Receiver					
Output Differential Impedance	Zo	90	100	110	Ω
Differential Data Output Swing	Vout, p-p	300		900	mVP-P

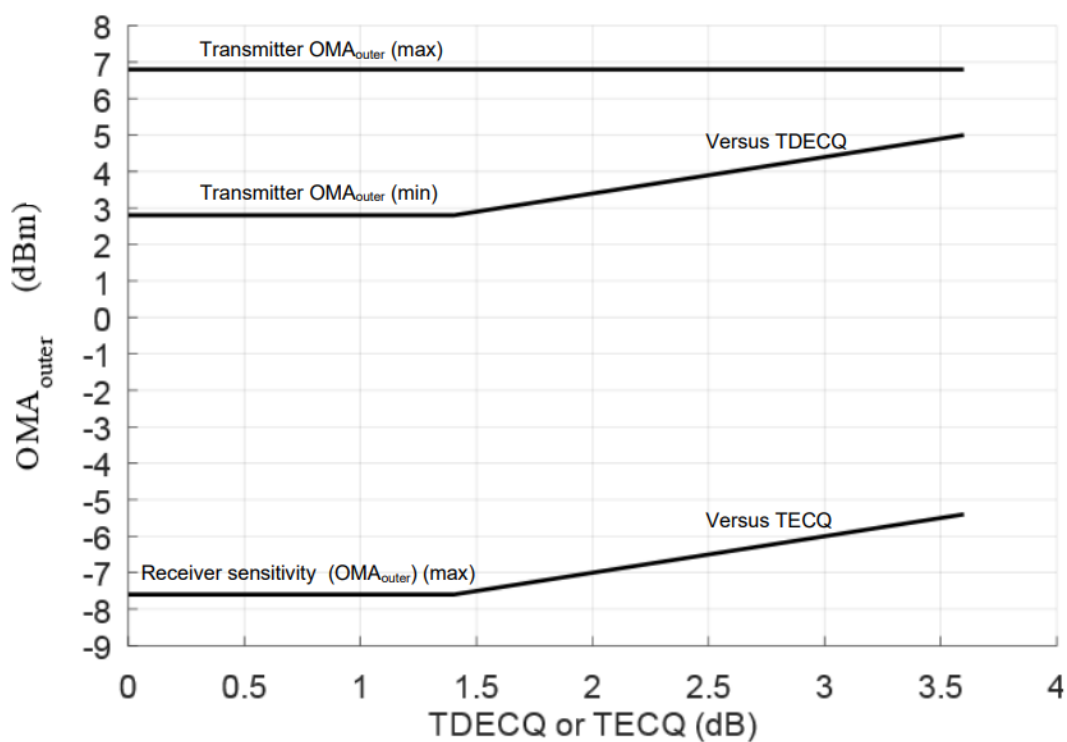
Optical Characteristics

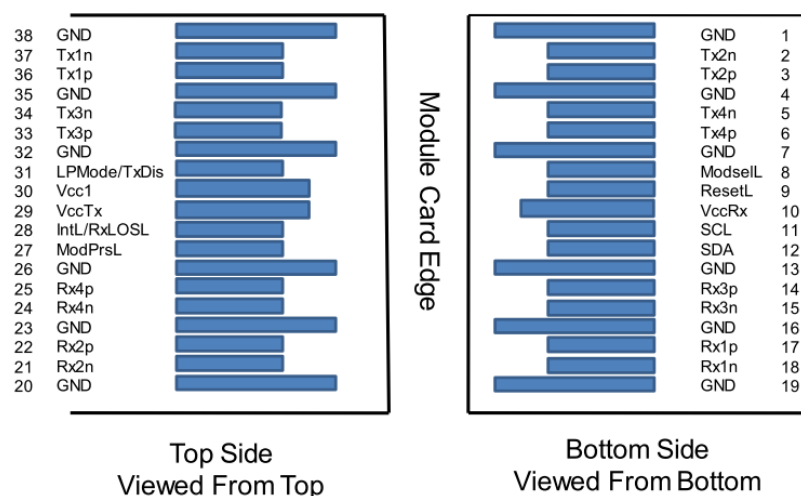
Parameter	Symbol	Min	Typical	Max	Units	Notes
Transmitter						
Launch Optical Power(Average)	Po	-0.2		6.6	dBm	1
Launch Optical Power(OMA)	Poma	2.8		6.8	dB	TDECQ < 1.4 dB
		1.4+TDECQ-				1.4 dB ≤ TDECQ ≤ TDECQ(max)
Extinction Ratio	ER	3.5			dB	
Center Wavelength Range	λc	1324.5	1331	1337.5	nm	
		1264.5	1271	1277.5		
Transmitter and dispersion	TDECQ			3.6	dB	

penalty eye closure for PAM4						
Transmitter eye closure for PAM4	TECQ			3.4	dB	
RIN17.1OMA (max)	RIN			-136	dB/Hz	
Optical Return Loss Tolerance	ORLT			15.6	dB	
Pout @TX-Disable Asserted	Poff			-15	dBm	
Receiver						
Center Wavelength	λ_c	1264.5	1271	1277.5	nm	
		1324.5	1331	1337.5		
Receiver Sensitivity (OMA)	RxSENS			-7.6	dBm	2 ; TECQ <1.4dB
				-9+TECQ		1.4≤TECQ≤ 3.6 dB
Receiver reflectance				-26	dB	
LOS De-Assert	LOSD		-12	dBm		
LOS Assert LOS Hysteresis	LOSA	-18		dBm		
		0.5		dB		

Notes:

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. Measured with PRBS31Q test pattern, 53.125GBd, BER < 2.4x10⁻⁴.



Pin Assignment**MSA compliant Connector**

PIN	Logic	Symbol	Name/Description	Note
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	2
9	LVTLL-I	ResetL	Module Reset	2
10		VccRx	+ 3.3V Power Supply Receiver	
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	2
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	2
13		GND	Ground	1
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

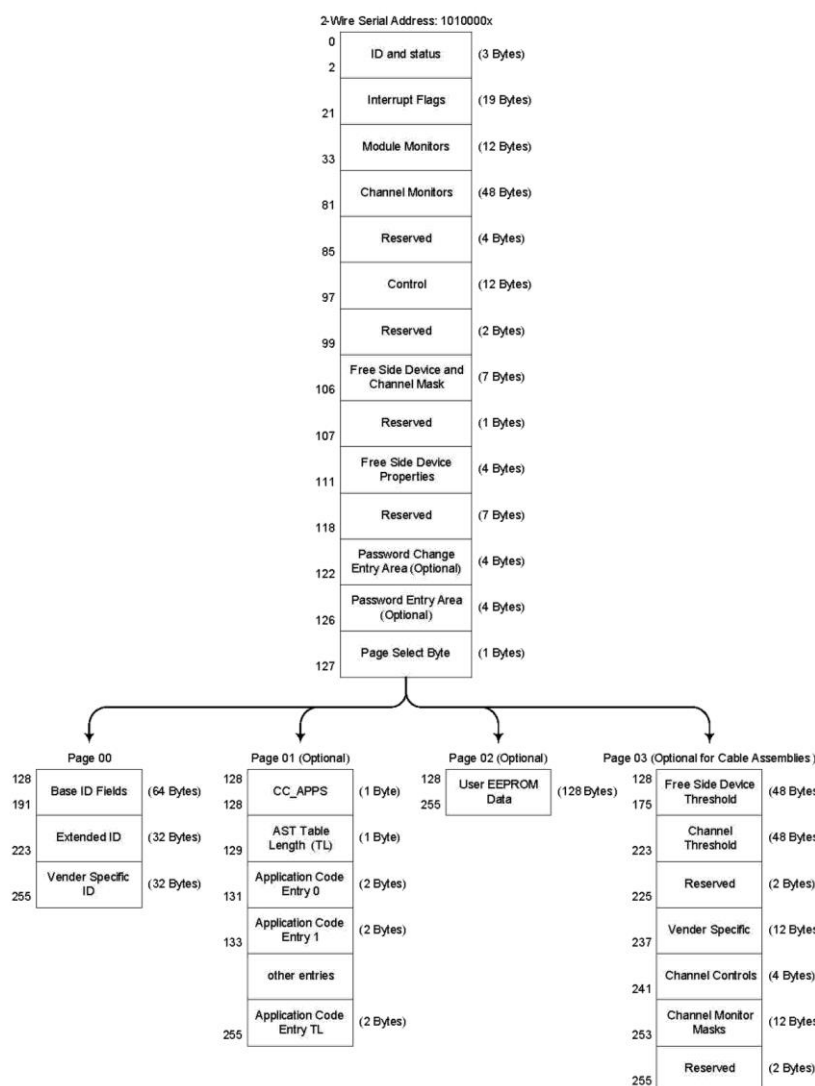
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL/RxLOSL	Interrupt Optionally configurable as RxLOSL via the management interface(SFF-8636).	2
29		VccTx	+3.3 V Power Supply transmitter	
30		Vcc1	+3.3 V Power Supply	
31	LVTTL-I	LPMode/ TxDis	Low Power Mode Optionally configurable as TxDis via the management interface(SFF-8636).	2
32		GND	Ground	1
33	CML-I	Tx3n	Transmitter Inverted Data Input	
34	CML-I	Tx3p	Transmitter Non-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 the 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 applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1 A.

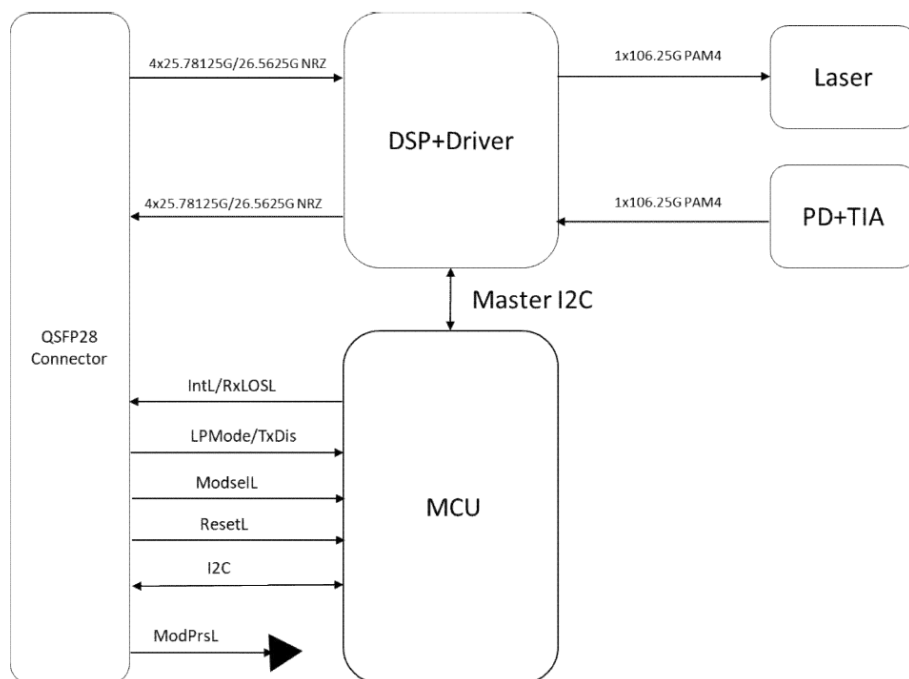
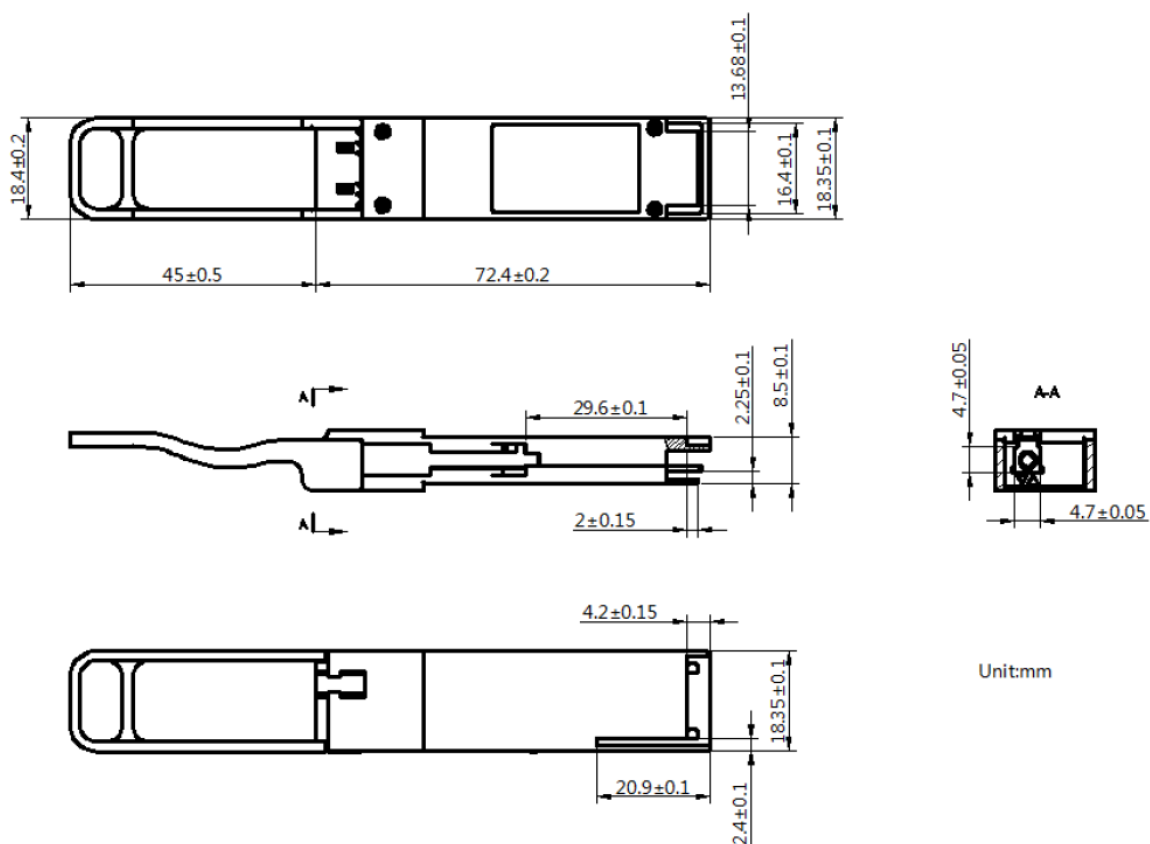
Memory Map

The memory map is structured as a single address and multiple page approaches, according to the QSFP SFF-8636 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	°C
Vcc Internal Supply Voltage	±10.0	%
Laser Bias Current	±10	%
Tx Output Power	±3.0	dBm
Rx Input Power	±3.0	dBm

Block Diagram**Mechanical Drawing**

Ordering Information

P/No.	Package	Bit Rate (Gb/s)	Laser	Optical Power (OMA)	Detector	Sensitivity (OMA) (dBm)	Case Temp (°C)	Distance (km)	Application	Pull Ring color
WST-QS28-BL2-UC	QSFP28	106.25	1271 nm EML	2.8~6.8 dBm	PIN	-7.6	0 to 70	20	100GBASE-LR1-20 BIDI	Purple
WST-QS28-BL2-DC	QSFP28	106.25	1331 nm EML	2.8~6.8 dBm	PIN	-7.6	0 to 70	20	100GBASE-LR1-20 BIDI	Red

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	05-Jul-2023	New Issue	Ken Cheng	ShaoYu Lee	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/>