Data Sheet

40GBase QSFP+ PSM4 10km Optical Transceiver
P/N: WST-QSFP+PLR4b-x

Features:

- Transmission data rate up to 11.2Gbit/s per channel
- 1310nm DFB transmitter and PIN receiver
- Four-channel full-duplex transceiver modules
- Single MPO/APC optical connector
- Transmission distance up to 10km on SMF
- 3.3V power supply
- Low power consumption <2.5W meet class 3
- Hot Pluggable QSFP form factor
- Built-in digital diagnostic function
- Operating case temperature:
  - 0 ~ 70°C: WST-QSFP+PLR4b-C
  - -20 ~ 85°C: WST-QSFP+PLR4b-E

Applications:

- 40 Gigabit Ethernet
- Infiniband QDR and DDR interconnects
- Proprietary High Speed
- Interconnections
- Data center

Standard:

- RoHS compliant
- SFF-8636: Management Interface

Description

WST-QSFP+PLR4b-x is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP+ Transceiver for InfiniBand QDR/DDR/SDR,10G/8G/4G/2G fiber channel, PCIe and SAS Applications. The QSFP full-duplex optical module offers 4 independent transmit and receive channels, each capable of 10.3Gbps operation for an aggregate data rate of 40Gbps 10km using single mode fiber. These modules are designed to operate over single mode fiber systems using 1310nm DFB laser .An optical fiber ribbon cable with an MPO/MTPTM connector can be plugged into the QSFP module receptacle. QSFP+ PSM LR4 is one kind of parallel transceiver which provides increased port density and total system cost savings.

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	Max	Unit
Storage Temperature	Tst	-40	85	˚C
Operating Relative Humidity (non-condensation)	RH	0	85	%
Operating Case Temperature	Topc	0	70	˚C
	Top_I	-20	85	˚C
Supply Voltage	VCC	-0.3	3.6	V
Input Voltage	Vin	-0.3	Vcc+0.3	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Operating Case Temperature	Topc	0		70	˚C
	Top_I	-20		85	˚C
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Consumption			1.7	2.5	W
Data Rate	DR		10.3		Gbps
Data Speed Tolerance	ΔDR	-100		+100	ppm
Link Distance with G652	D			10	km

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Differential Input Impedance		90	100	110	Ω	
Differential input voltage amplitude		300		1100	mV	
BER with stressed input signal				$1x10^{-12}$		
Input Logic Level High		2.0		Vcc	V	
Input Logic Level Low		0		0.8	V	
Receiver						

Differential Output impedance	Z_d	90	100	110	Ω	
Differential output voltage amplitude		500		800	mV	
Output Logic Level High		Vcc-0.5		Vcc	V	
Output Logic Level Low		0		0.4		

Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λC	1270	1310	1350	nm	1
Average Launch Power, each lane	PAVG	-5.5	-0.5	+0.5	dBm	
Optical Modulation Amplitude (OMA)	POMA	-4.5	-0.5	+0.3	dBm	1
Difference in Launch Power between any two lanes	Ptx, diff			5.0	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each lane	OMA-TDP	-9.7			dBm	1
Rise/Fall Time	Tr/Tf			50	ps	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	Rin			-128	dB/Hz	
Optical return loss tolerance	ORL			12	dB	
Transmitter reflectance				-12	dB	
Transmitter Eye Mask Margin		10			%	2
Transmitter Eye Mask Definition (X1, X2, X3, Y1, Y2, Y3)		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Average Launch Power of OFF Transmitter	P_{off}			-30	dBm	
Receiver						
Signaling Speed (±100ppm, per Lane)	B		10.3125		Gb/s	
Lane Wavelengths	λ	1270	1310	1350	Nm	

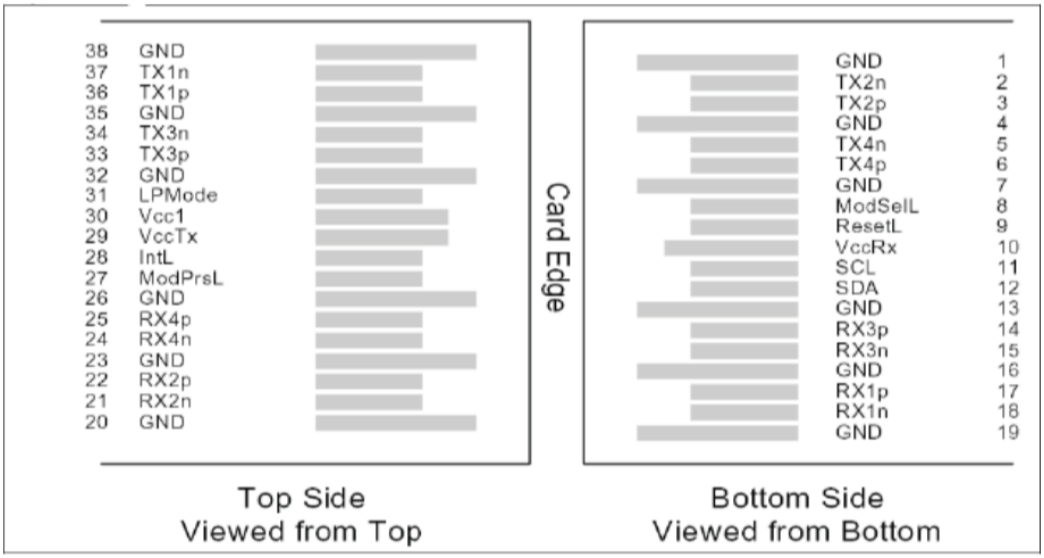
Damage Threshold			3			dBm	
Overload, each lane			2.3				
Receiver Sensitivity in OMA, each Lane		SEN			-11.5	dBm	
Difference in receiver power between any two lanes (OMA)					5	dB	
Optical Return Loss					-12	dBm	
Receive Electrical 3 dB upper Cutoff Frequency, each Lane					12	GHz	
Conditions of stressed receiver sensitivity test:							
LOS Hysteresis			0.5		6	dB	
LOS Thresholds	Increasing Light Input	P_{los+}			-15	dBm	4
	Decreasing Light Input	P_{los-}	-30			dBm	

Notes:

1.Transmitter wavelength, power need to meet the OMA minus TDP specs to guarantee link performance.

2.The eye diagram is tested with 1000 waveform

Pin Assignment and Pin Description



Pin Definitions

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

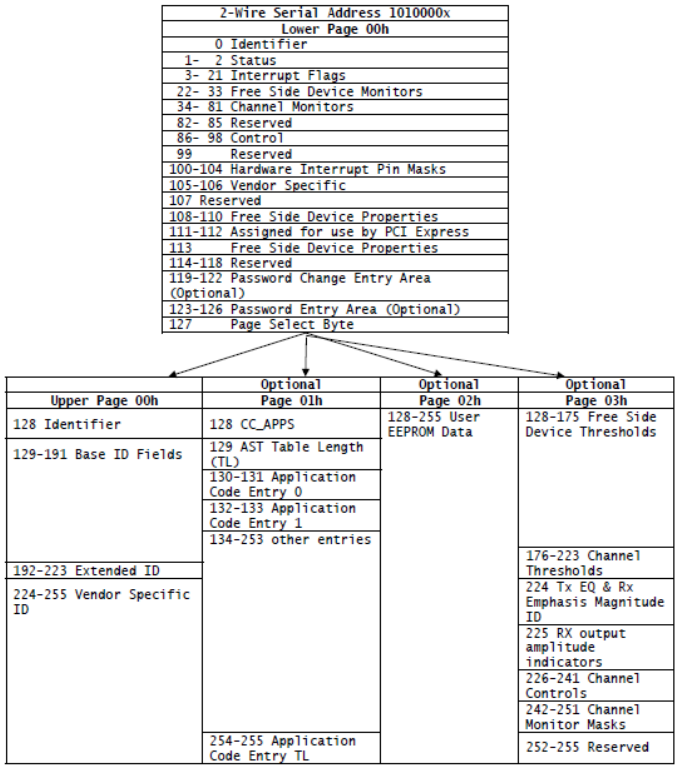
Notes:

1.GND is the symbol for signal and supply (power) common for QSFP modules. 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 receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, Vcc1 and VccTx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

EEPROM Serial ID Memory Contents

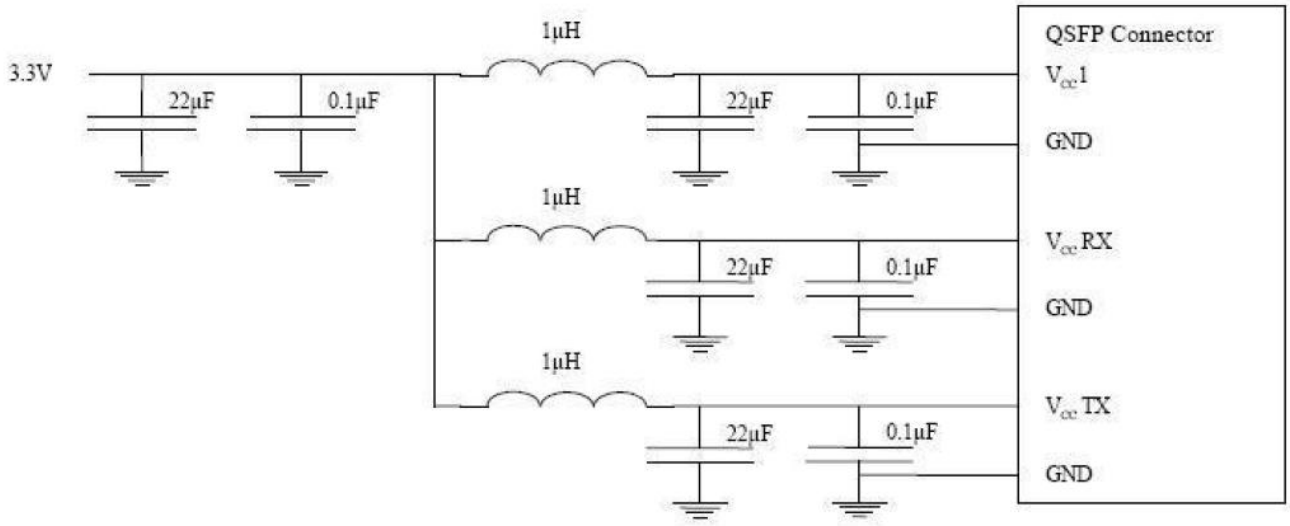
Accessing Serial ID Memory uses the 2 wire address 1010000X (A0H). Memory Contents of Serial ID are shown in Table as below.



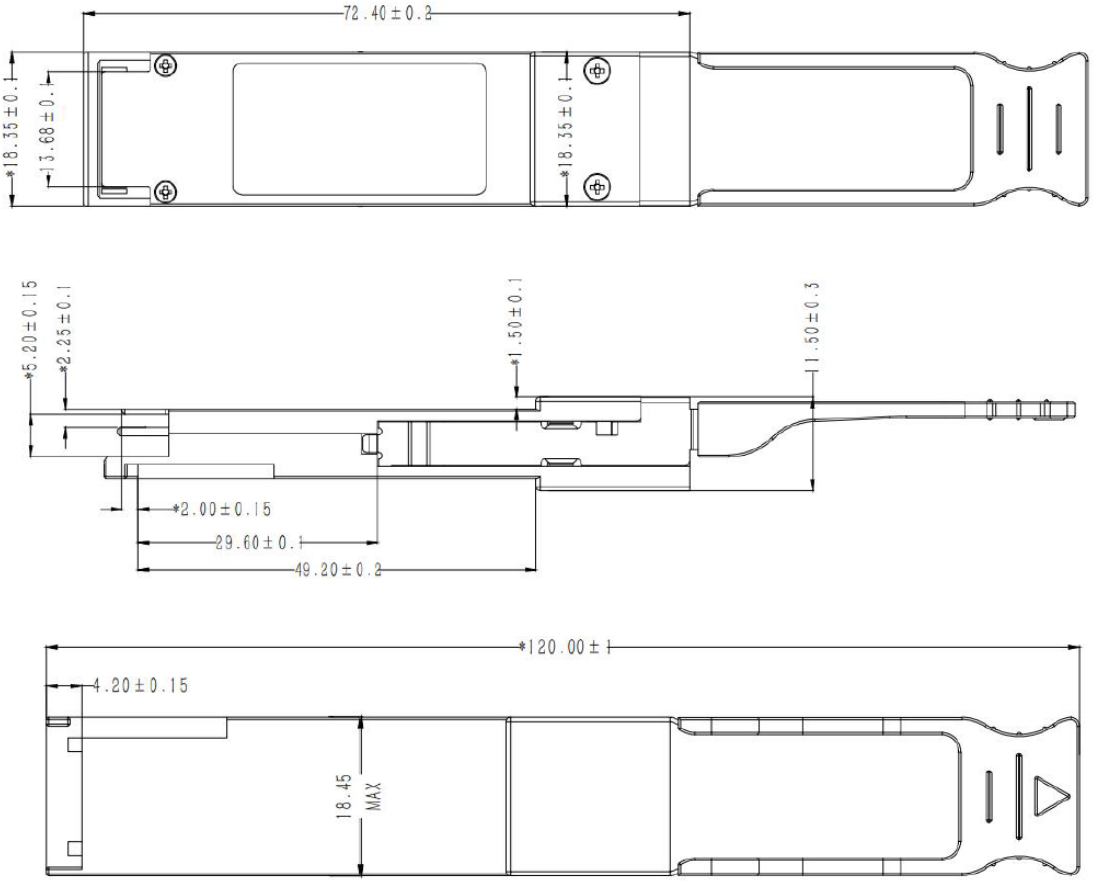
Digital Diagnostic Monitor Functions

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-3	3	dB	Ch1 ~ Ch4
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	Ch1 ~ Ch4
Channel TX power monitor absolute error	DMI_TX_Ch	-3	3	dB	Ch1 ~ Ch4

Recommended Power Supply Filter

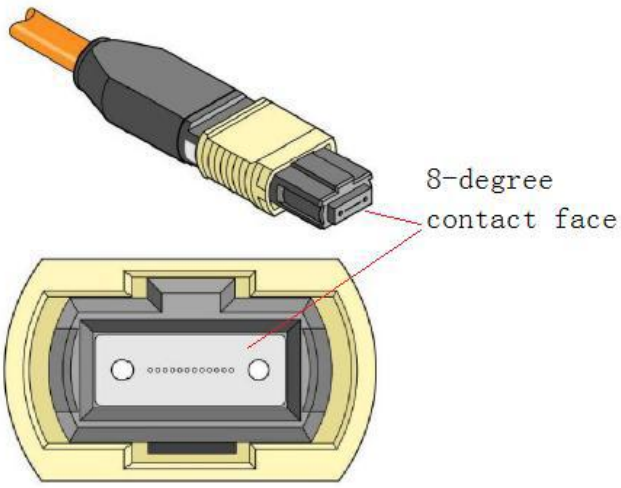


Mechanical Design Diagram



Unit: mm

Attention: To minimize MPO connection induced reflections, an MPO receptacle with 8-degree angled end-face is utilized for this product. A male MPO connector with 8-degree end-face should be used with this product as illustrated in below



Ordering Information

Part No	Specification									
	Package	Data rate per Lane	Laser	Optical Power in OMA	Detector	Receive Sensitivity (OMA)	Temp	Reach	Other	Application code
WST-QSFP+PLR4b-C	QSFP+	10.3 Gbps	1310nm DFB	-5.5 dBm~ +0.5dBm	PIN	-11.5dBm in OMA	0~70℃	10km for SMF	DDM RoHS	40GBASE-PLR4 4x10GBASE LR
WST-QSFP+PLR4b-E	QSFP+	10.3 Gbps	1310nm DFB	-5.5 dBm~ +0.5dBm	PIN	-11.5dBm in OMA	-20~85℃	10km for SMF	DDM RoHS	40GBASE-PLR4 4x10GBASE LR

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	26-Feb-2025	New Release	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/