

40GBase QSFP+ Parallel LR4 10km Optical Transceiver with isolators

P/N: WST-QSFP+PLR4-C



Features:

- Compliant to QSFP+ MSA (SFF-8436)
- Up to 11.2Gbps data rate per channel.
- MPO optical connector (IEC61754-7-1)
- Transmission length up to 10Km
- Transmitter : 4 channel 1310nm DFB laser
- Receiver : 4 channel PIN photo detector
- Operating case temperature: 0 ~ 70°C
- Low power consumption : 2 W max
- I2C interface for management signal.
- RoHS 6 Compliant

Applications:

- Switch Router and HBA's.
- 40G Ethernet.
- Infiniband QDR, DDR and SDR.
- High-performance Backplane.
- Datacenter and Enterprise networking

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	degC
Relative Humidity (non-condensation)	RH	0	85	%
Operating Case Temperature	Topc	0	70	degC
Supply Voltage	VCC	0	3.8	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Operating Case Temperature	TOPC	0		70	degC
Power Supply Voltage	Vcc	3.15	3.30	3.45	V
Power Consumption				2	W
Data Rate	DR		10.3		Gbps
Data Speed Tolerance	Δ DR	-100		+100	ppm
Link Distance with G652	D			10	km

Transmitter Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Center Wavelength	λ C	1260	1310	1360	nm	1
Side-Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power, each lane	PAVG	-8.2	-2.5	+0.5	dBm	
Optical Modulation Amplitude (OMA)	POMA	-5.2	-2.5	+2.0	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
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	Rin			-128	dB/Hz	
Optical Return Loss Tolerance	TOL			12	dB	
Transmitter Eye Mask Margin	EMM	5			%	2
Average Launch Power OFF Transmitter, each lane	Poff			-30	dBm	
Transmitter Eye Mask Definition (X1, X2, X3, Y1, Y2, Y3)		(0.25, 0.4, 0.45, 0.25, 0.28, 0.4)				

Notes:

1. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power. Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Receiver Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Center Wavelength	λ_C	1260	1310	1360	nm	
Damage Threshold	THd	+3			dBm	
Overload, each lane	OVL	+0.5			dBm	
Receiver Sensitivity in OMA, each lane	SEN			-12.6	dBm	
Signal Loss Assert Threshold	LOSA	-30			dBm	
Signal Loss Dessert Threshold	LOSD			-15	dBm	
LOS Hysteresis	LOSH	0.5		6	dBm	

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Differential Input Impedance		90	100	110	Ω	
Differential Input Swing		200		800	mV	
TP1/TP1a Interface	Compliant to IEEE 802.3ba XLPP1					
Receiver						
Differential Output Impedance		90	100	110	Ω	
Differential Output Swing		400	600	850	mV	
TP4 Interface	Compliant to IEEE 802.3ba XLPP1					

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

Transceiver Block Diagram

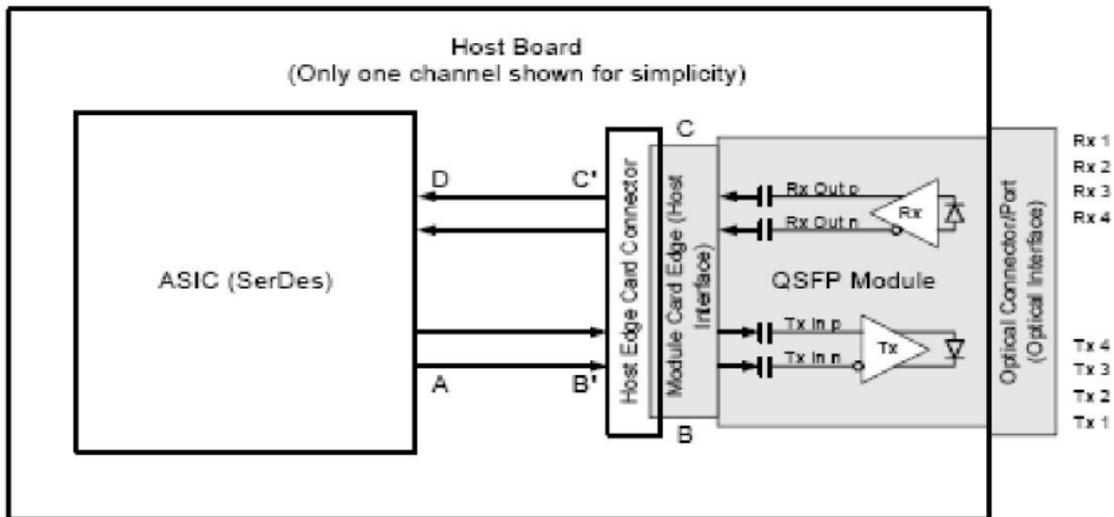


Figure 1 - Application Reference Model

Pin Assignment and Pin Description

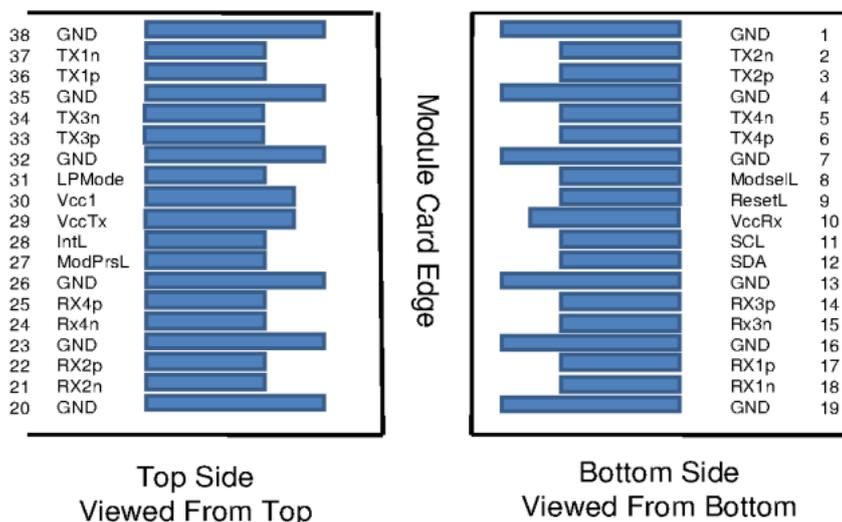


Figure 2 QSFP+ Module Pad Layout

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	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

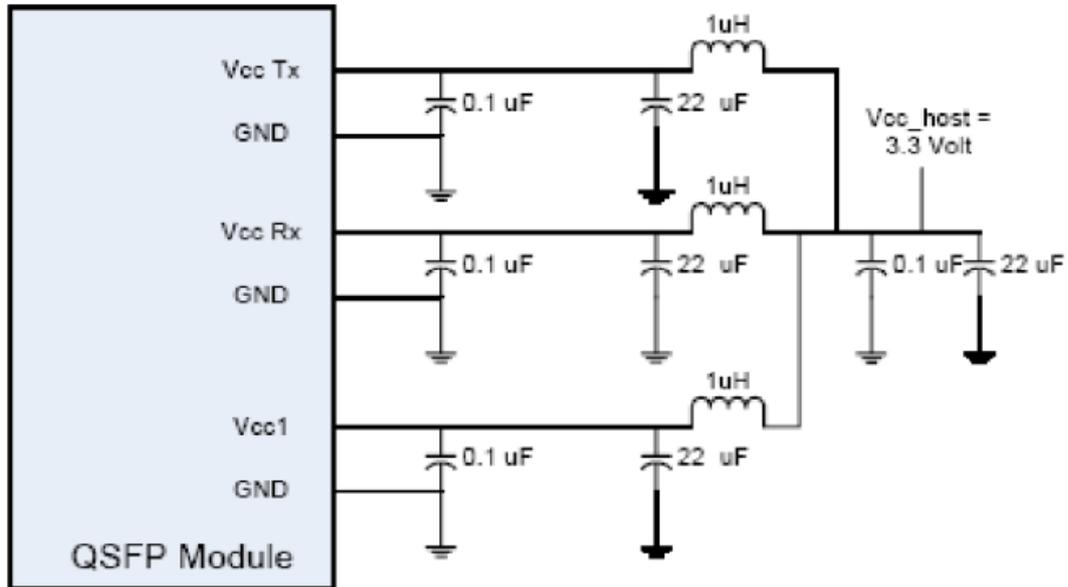
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver 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 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.

Recommended Power Supply Filter



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.

Serial ID Memory Contents

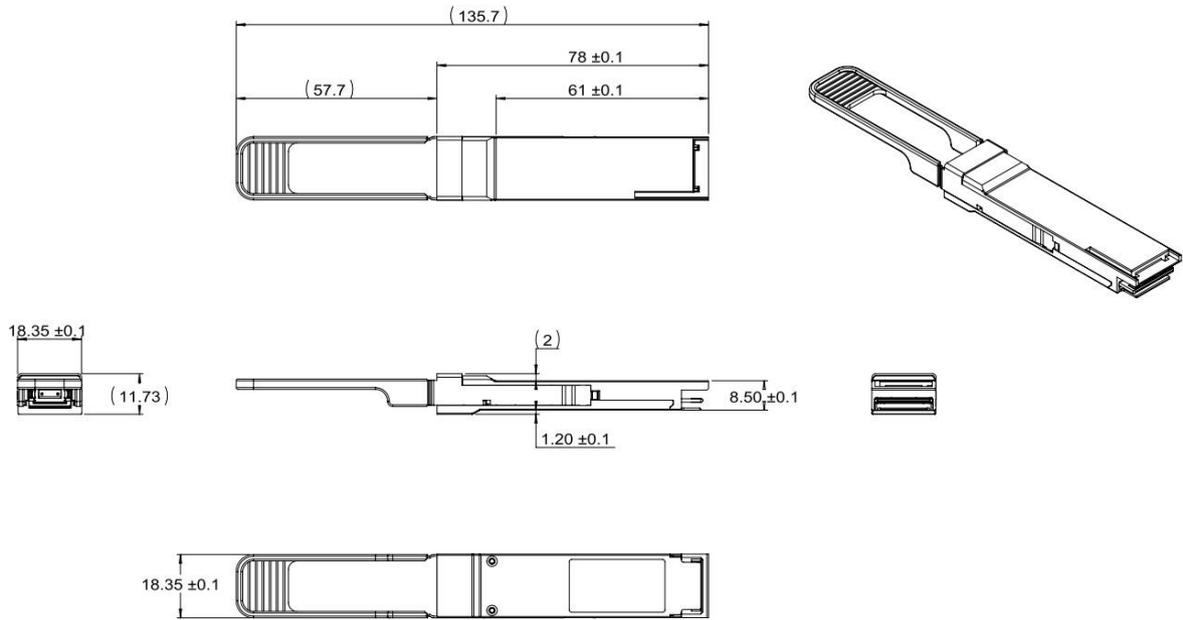
Data Address	Size (Bytes)	Name of Field	Contents(Hex)	Description
BASE ID FIELDS				
0	1	Identifier	0D	QSFP
1-2	2	Status Indicator	00 00	
3-21	19	Interrupt Flags	All 00	
22-33	12	Module Monitors	All 00	
34-81	48	Channel Monitors	All 00	
82-85	4	Reserved	00 00 00 00	
86-97	12	Control	All 00	
98-99	2	Reserved	00 00	
100-106	7	Module & Channel Masks	00 00 00 00 00 00 00	
107-118	12	Reserved	All 00	
119-122	4	Password Change Entry	00 00 00 00	
123-126	4	Password Entry	00 00 00 00	
127	1	Page Select	00	
128	1	Identifier	0D	QSFP+
129	1	Ext. Identifier	80	
130	1	Connector	0C	MPO Connector
131-138	8	Specification Compliance	80 00 00 00 00 00 00 00	
139	1	Encoding	05	64B/66B
140	1	BR-Normal	67	10.3Gbps
141	1	Extended Rate Select	00	Not compliant
142	1	Length SM-km	0A	10km
143	Length(OM3 50 um)	Length, OM3-2m	00	Not compliant
144		Length, OM2-1m	00	Not compliant
145	Length(OM2 50 um)	Length, OM1-1m	00	Not compliant
146		Length, Cu-1m	00	Not compliant

147	Length(OM1 62.5 um) Length(Copper) Device tech	Device technology	40	1310nm DFB
148-163	16	Vendor name	57 41 56 45 53 50 4C 49 54 54 45 52 20 20 20 20	WAVESPLITTER
164	1	Extended Module Codes	00	
165-167	3	Vendor OUI	00 0F 0E	
168-183	16	Vendor Part Number	57 53 54 2D 51 53 46 50 2B 50 4C 52 34 2D 43 20	WST-QSFP+PLR4-C
184-185	2	Vendor rev	30 35	05
186-187	2	Wavelength	66 58	1310nm
188-189	2	Wavelength Tolerance	27 10	±50nm
190	1	Max case temp	46	70°C
191	1	Check code for [128-190]	Xx	
192-195	4	Options	12 00 00 00	40G PSM4 parallel SM
196-211	16	Vendor SN	CC CM YY MM ID SN SN SN SN 20 20 20 20 20 20 20	CC: Country code CM: CM code YY: Year MM: Month ID: Product ID SN: Sequence
212-219	8	Date code	YY YY MM MM DD DD LL LL	YY: Year MM: Month DD: Day of month LL: Lot number
220	1	DOM type	08	For average power
221	1	Enhanced Options	00	Not compliant
222	1	Reserved	00	
223	CC_EXT	Check sum of byte 192 ~ 222		
224-255	33	Vendor specified	Xx	

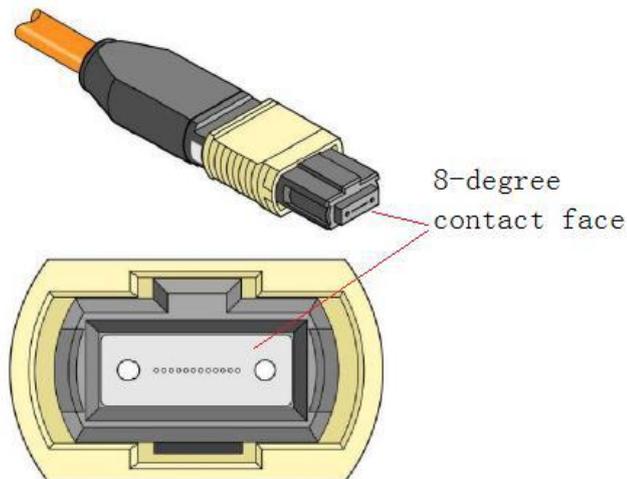
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Address	Description	Hex	Real Value
128-129	Temp high alarm	50,00	80°C
130-131	Temp low alarm	F6,00	-10°C
132-133	Temp high warning	4B,00	75°C
134-135	Temp low warning	FB,00	-5°C
144-145	Vcc high alarm	90,88	3.7V
146-147	Vcc low alarm	71,70	2.9V
148-149	Vcc high warning	8C,70	3.6V
150-151	Vcc low warning	75,48	3.0V
176-177	Rx power high alarm	6E,18	4.5dBm
178-179	Rx power low alarm	00,E5	-16.4dBm
180-181	Rx power high warning	45,77	2.5dBm
182-183	Rx power low warning	01,6B	-14.4dBm
184-185	Tx bias high alarm	92,7C	75mA
186-187	Tx bias low alarm	13,88	10mA
188-189	Tx bias high warning	88,B8	70mA
190-191	Tx bias low warning	1D,4C	15mA

Mechanical Design Diagram



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.



Unit: mm

Ordering Information

Part No	Specification									
	Package	Data rate per Lane	Laser	Optical Power in OMA	Detector	Max. Receive Sensitivity	Temp	Reach	Other	Application code
WST-QSFP+PLR4-C	QSFP+	10.3 Gbps	1310nm DFB with isolators	-5.2 dBm~+1.5 dBm	High performance PIN	-12.6 dBm in OMA	0~70°C	10km for SMF	DDM RoHS	40GBASE-PLR4 4x10GBASE LR

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	17-Jul-2014	New Issue	Min Liu	Wayne Liao	Wayne Liao
V 2.0	24-Nov-14	Modify EEPROM to meet Rev 03 & Tx/Rx data	Ivy Chen	Wayne Liao	Wayne Liao
V2.1	06-Feb-15	Add high performance PD and update Tx/Rx spec according to 10G-LR spec Update product picture	Ivy Chen	Wayne Liao	Wayne Liao
V3.0	01-Apr-16	Update data and mechanical drawing	Ivy Chen	Wayne Liao	Wayne Liao
V3.1	07-Nov-16	Update photo and EEPROM	Ivy Chen	Wayne Liao	Wayne Liao
V3.2	05-DEC-16	EEPROM update	Ivy Chen	Wayne Liao	Wayne Liao



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