



Opticonnect

## QSFP+ Series *Preliminary*

### QSFP-LR4-10

Single-Mode 40GBASE-LR4  
QSFP+ Transceiver  
RoHS6 Compliant



#### Features

- ◆ Compliant to the IEEE 802.3ba(40GBASE-LR4)
- ◆ Compliant to the QSFP+ MSA SFF-8436 Specification
- ◆ Up to 10km over SMF
- ◆ DFBs and PIN monitor photodiodes array for transmitter section
- ◆ PIN detectors and TIAs array for receiver section
- ◆ Four 10Gbps CWDM channels in the 1300nm band
- ◆ I<sup>2</sup>C interface with integrated Digital Diagnostic Monitoring
- ◆ Utilizes two standard LC optical connector
- ◆ Operating Case Temperature: -10°C~+70°C

#### Applications

- ◆ 40GBASE-LR4 Ethernet links
- ◆ Infiniband QDR and DDR interconnects Client-side
- ◆ 40G Telecom connections

#### Ordering Information

Part No.	Data Rate	Fiber	Distance <sup>*(note2)</sup>	Interface	Temp.	DDMI
QSFP-LR4-10	40Gbps	SMF	10km	LC	-10°C~+70°C	Yes

Note1: Standard version

Note2: Over SMF



## Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme )
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards <sup>*note3</sup>

Note3: For update of the equipments and strict control of raw materials, OPTICONNECT has the ability to supply the customized products since Jan 1, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Opticonnect's transceivers, because Opticonnect's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40	+75	°C
Supply Voltage	V <sub>cc</sub>	-0.5	3.6	V
Operating Relative Humidity	RH	5	85	%

\*Exceeding any one of these values may destroy the device immediately.

## Recommended Operating Conditions

Parameter	Symbol		Min.	Typical	Max.	Unit
Operating Case Temperature	T <sub>c</sub>	QSFP-LR4-10	-10		70	°C
Power Supply Voltage	V <sub>cc</sub>		3.15	3.3	3.45	V
Power Supply Current	I <sub>cc</sub>				1000	mA
Power Dissipation	P <sub>D</sub>				3.5	W
Aggregate Bit Rate	BR <sub>AVE</sub>			41.25		Gbps
Lane Bit Rate	BR <sub>LANE</sub>			10.3125		Gbps

## Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
<b>Transmitter</b>						
Single ended input voltage tolerance		-0.3		4	V	Referred to TP1 signal common
AC common mode input voltage tolerance		15			mV	RMS
Input Impedance (Differential)	Z <sub>in</sub>	85	100	115	ohms	R <sub>in</sub> > 100 kohms @ DC
TX Disable	Disable	V <sub>IH</sub>	2	V <sub>cc</sub> +0.3	V	
	Enable	V <sub>IL</sub>	0	0.8		
TX FAULT	Fault	V <sub>OH</sub>	2.4	V <sub>cc</sub> +0.3	V	
	Normal	V <sub>OL</sub>	0	0.8		
<b>Receiver</b>						
Single ended output voltage		-0.3		4	V	Referred to signal common
AC common mode voltage				7.5	mV	RMS
Termination mismatch				5	%	



at 1MHz						
Output Impedance (Differential)	Zout	85	100	115	ohms	
Output Rise/Fall Time	t <sub>r</sub> /t <sub>f</sub>	30			ps	10%~90%
RX_LOS	LOS	V <sub>OH</sub>	2.4		V <sub>CC</sub> +0.3	V
	Normal	V <sub>OL</sub>	0		0.8	V

**Optical and Electrical Characteristics**

Parameter	Symbol	Min.	Typical	Max.	Unit
SMF	L	-	10	-	km
Aggregate Bit Rate	BR <sub>AVE</sub>	-	41.25	-	Gbps
Per Lane Bit Rate	BR <sub>LANE</sub>	-	10.3125	-	Gbps
<b>Transmitter</b>					
Channels wavelength	$\lambda_c$	1264.5	1271	1277.5	nm
		1284.5	1291	1297.5	
		1304.5	1311	1317.5	
		1324.5	1331	1337.5	
-20dB spectral width	$\Delta\lambda$	-	-	1	nm
Average Launch Power, Each Lane <sup>*(note3)</sup>	P <sub>out/lane</sub>	-7	-	2.3	dBm
Transmit OMA, per Lane	TX_OMA/lane	-4	-	3.5	dBm
Extinction Ratio	Er	3.5	-	-	dB
Output Optical Eye <sup>*(note4)</sup>	IEEE 802.3ba-2010 Compliant				
<b>Receiver</b>					
Channels wavelength	$\lambda_c$	1264.5	1271	1277.5	nm
		1284.5	1291	1297.5	
		1304.5	1311	1317.5	
		1324.5	1331	1337.5	
Damage Threshold		3.3	-	-	dBm
Receiver sensitivity in OMA, each lane	P <sub>mins</sub>	-	-	-11.5	dBm
Maximum Receive Power, each lane	P <sub>max</sub>	2.3	-	-	dBm
Receiver reflectance	R <sub>r</sub>	-	-	-26	dB
LOS De-Assert	LOS <sub>D</sub>			-11.5	dBm
LOS Assert	LOS <sub>A</sub>	-20			dBm

Note3: Output is coupled into a 9/125µm Single-Mode fiber.

Note4: Filtered, measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps