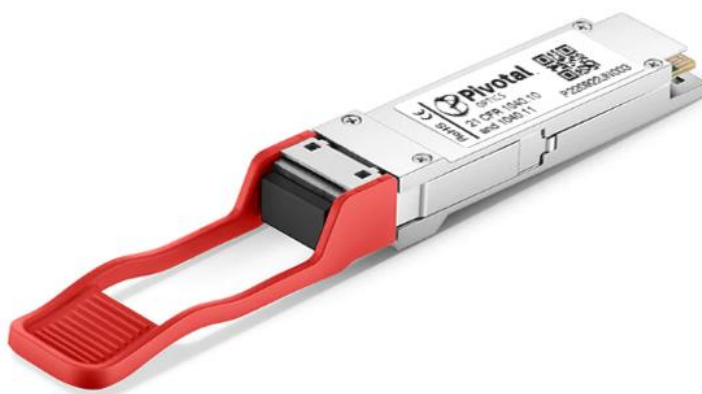


QSFP-40G-ER4

40GBase QSFP+ ER4 1271-1331nm 40km SMF Transceiver

Product Features

- Hot-pluggable QSFP+ form factor
- Supports 41.3 Gb/s aggregate bitrate
- Power dissipation < 3.5W
- 18.5 dB link insertion loss budget
- Single 3.3V power supply
- Maximum link length of 40km
- Uncooled 4x10Gb/s CWDM transmitter
- XLPP electrical interface
- Duplex LC receptacles
- Built-in digital diagnostic functions, including Tx/Rx power monitoring
- RoHS-6, MSA, IEEE 802.3ba compliant
- Case operating temperature:
 - Commercial: 0 ~ 70°C



Product Applications

- 40GBASE-ER
- 40G Ethernet

I. Maximum Ratings

Exceeding the limits below may damage the transceiver module permanently.

Parameter	Symbol	Min.	Max	Units	Notes
Storage Temperature	T _s	-40	+85	°C	
Maximum Supply Voltage	V _{cc1}	-0.5	3.6	V	
	V _{ccTx}				
	V _{ccRx}				
Relative Humidity (non-condensing)	RH	0		85	%
Damage Threshold, per Lane	DT	3.8			dBm

QSFP-40G-ER4

40GBASE, QSFP+ ER4, SMF TRANSCEIVER
1271-1331, 40km REACH, DUPLEX LC CONNECTOR

II. Operating Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Operating Case Temperature	Top	0		70	°C	Commercial
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Max Data Rate, each lane			10.3125		Gb/s	
Max Aggregate Data Rate			41.25		Gb/s	
Max Power Consumption	Pmax			3.5	w	
Bit Rate, per lane	BR		10.3125		Gb/s	1
Bit Error Ratio	BER			10 ⁻¹²		2
Link Distance	D	.0002		2	km	3

Notes:

1. ± 100 ppm , compliant with 40GBASE-ER4 and XLPP1 per IEEE 802.3bm.
2. Tested with a PRBS 231-1 test pattern.
3. Per 40GBASE-ER4, IEEE 802.3bm. Links longer than 30km are considered to be engineered links, with losses less than the worst case specified for the fiber type.

III. Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	V _{cc1}	3.1		3.47	V	
	V _{ccTx}					
	V _{ccRx}					
Supply Current	I _{cc}			1.13	A	
Link (turn-on) Time						
Transmit turn-on time				2000	ms	2
Transmitter						
Single ended input voltage tolerance	V _{inT}	-0.3		4.0	V	
Differential data input swing	V _{in,pp}	120		1200	mVpp	3
Differential input threshold			50		mV	
AC common mode input voltage tolerance (RMS)		15			mV	
Differential input return loss	Per IEEE P802.3ba, Section 86A.4.1.1				dB	4
J2 Jitter Tolerance	J _{t2}	0.17			UI	
J9 Jitter Tolerance	J _{t9}	0.29			UI	
Data Dependent Pulse Width Shrinkage	DDPWS	0.07			UI	
Eye mask coordinates {X1, X2, Y1, Y2}		{ 0.11, 0.31, 95, 350 }			UI/mV	5
Receiver						
Single-ended output voltage		-0.3		4.0	V	
Differential data output swing	V _{out,pp}	0		800	mVpp	6
AC common mode output voltage (RMS)				7.5	mV	
Termination mismatch at 1 MHz				5	%	
Differential output return loss	Per IEEE P802.3ba, Section 86A.4.2.1				dB	4
Common mode output return loss	Per IEEE P802.3ba, Section 86A.4.2.2				dB	4
Output transition time, 20% to 80%		28				
J2 Jitter output	J _{o2}			0.42		
J9 Jitter output	J _{o9}			0.65		
Eye mask coordinates #1 {X1, X2, Y1, Y2}		{ 0.29, 0.5, 150, 425 }				5
Power Supply Ripple Tolerance	PSR	50			mVpp	

Notes: see page 5

IV. Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	λC	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5		
		1304.5	1311	1317.5		
		1324.5	1331	1337.5		
Signaling Speed per Lane			10.3125		GBd	(note 1 - TX) (note 4 - RX)
Transmitter						
Total Average Launch Power	POUT			10.5	dBm	
Transmit OMA per Lane	TxOMA	0.3		5.0	dBm	
Average Launch Power per Lane	TXP _X	-2.7		4.5	dBm	2
Difference in launch power between any two lanes (OMA)				4.7	dB	
Transmitter Dispersion Penalty	TDP			2.6	dB	
Launch power (OMA) minus TDP per lane		-0.5			dBm	
Optical Extinction Ratio	ER	5.5			dB	
Sidemode Suppression ratio	SSR _{min}	30			dB	
Average launch power of OFF transmitter, per lane				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	3
Optical Return Loss Tolerance				20	dB	
Transmitter Eye Mask definition {X1, X2, X3, Y1, Y2, Y3}		{ 0.25,0.4,0.45,0.25,0.28,0.4 }				
Receiver						
Receive Power (OMA) per Lane	RxOMA			-4.0	dBm	
Average Receive Power per Lane	RXP _X	-21.2		-4.5	dBm	5, 6
Receiver Sensitivity (OMA) per Lane	Rxsens			-19	dBm	
Stressed Receiver Sensitivity (OMA)	SRS			-16.8	dBm	
per Lane	P _{MAX}			3.8	dBm	
Damage Threshold per Lane	RL			-26	dB	
Return Loss				2.2	dB	
Vertical eye closure penalty, per lane				12.3	GHz	

Notes: see page 5

V. Notes:

Electrical Characteristics: (see page 3)

1. Maximum total power value is specified across the full temperature and voltage range.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100 Ω differential input.
4. 10 MHz to 11.1 GHz range.
5. Hit ratio = $5 \times 10E-5$.
6. AC coupled with 100 Ω differential output impedance.

Optical Characteristics: (see page 4)

1. Transmitter consists of 4 lasers operating at up to 10.3 Gb/s each, ± 100 ppm
2. Minimum value is informative.
3. RIN is scaled by $10 \cdot \log(10/4)$ to maintain SNR outside of transmitter.
4. Receiver consists of 4 photodetectors operating at up to 10.3125 Gb/s each, ± 100 ppm
5. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
6. Maximum value is based on a min. of 9dB loss. Additional attenuation may be required when connected in loopback or short fiber link.

Warranty

All transceivers feature a limited lifetime warranty.

Disclaimer

External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.