

### Features

- Compliant with 40G Ethernet IEEE802.3ba and 40GBASE-ER4 Standard
- QSFP+ MSA compliant
- Compliant with QDR/DDR Infiniband data rates
- Up to 11.2Gb/s data rate per wavelength
- 4 CWDM lanes MUX/DEMUX design
- Up to 40km transmission on single mode fiber (SMF)
- Operating case temperature: 0°C~70°C
- Maximum power consumption 3.5W
- LC duplex connector
- RoHS compliant



### Applications

- 40GBASE-ER4 Ethernet Links
- Infiniband QDR and DDR interconnects
- Client-side 40G Telecom connections

### 1. Absolute Maximum Ratings

The operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature	Ts	-40	85	°C	-
Operating Case Temperature	Top	0	70	°C	-
Power supply Voltage	Vcc	-0.5	3.6	V	-
Relative Humidity	RH	0	85	%	-
Maximum Optical Input Power	Pin	3.8		dBm	-

### 2. Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Case Temperature	TOP	0		+70	°C
Power Supply Voltage	Vcc	3.135	3.3	3.465	V

Data Rate, Each Lane			10.3125	11.2	Gb/s
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Link Distance with G625	D			40	Km

### 3. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min	Typ.	Max	Unit	Notes
Power Consumption				3.5	W	
Supply Current	I <sub>cc</sub>			1.1	A	
Transceiver Power-on Initialization Time				2000	ms	1
Transmitter (Each Lane)						
Single-ended Input Voltage Tolerance (Note 2)		-0.3		4.0	V	V Referred to TP1 signal common
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing Threshold		50			mVpp	LOSA Threshold
Differential Input Voltage Swing	V <sub>in,pp</sub>	190		700	mVpp	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	Ω	
Differential Input Return Loss		See IEEE 802.3ba 86A.4.11			dB	10MHz-11.1GHz
J2 Jitter Tolerance	J <sub>t2</sub>	0.17			UI	
J9 Jitter Tolerance	J <sub>t9</sub>	0.29			UI	
Data Dependent Pulse Width Shrinkage (DDPWS) Tolerance		0.07			UI	
Eye Mask Coordinates {X1, X2 Y1, Y2}		0.11, 0.31 95, 350			UImV	Hit Ratio = 5x10 <sup>-5</sup>
Receiver (Each Lane)						
Single-ended Output Voltage		-0.3		4.0	V	Referred to signal common
AC Common Mode Output Voltage (RMS)				7.5	mV	
Differential Output Voltage Swing	V <sub>out,pp</sub>	300		850	mVpp	

Differential Output Impedance	Zout	90	100	110	ohm	
Termination Mismatch at 1MHz				5	%	
Differential Output Return Loss		See IEEE 802.3ba 86A.4.2.1			dB	10MHz-11.1GHz
Common Mode Output Return Loss		See IEEE 802.3ba 86A.4.2.2			dB	10MHz-11.1GHz
Output Transition Time		28			ps	20% to 80%
J2 Jitter Output	Jo2			0.42	UI	
J9 Jitter Output	Jo9			0.65	UI	
Eye Mask Coordinates {X1, X2 Y1, Y2}		0.29, 0.5 150, 425			UImV	Hit Ratio = 5x10 <sup>-5</sup>

### Notes:

1. Power-on Initialization Time is the time from when the power supply voltages reach and remain above the minimum recommended operating supply voltages to the time when the module is fully functional.
2. The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

## 4. Optical Characteristics

All parameters are specified under the recommended operating conditions with PRBS31 data pattern unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Wavelength Assignment	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
<b>Transmitter</b>						
Side Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	PT			10.5	dBm	
Average Launch Power, each Lane	PAVG	-3.7		4.5	dBm	
Optical Modulation Amplitude (OMA), each Lane	POMA	-0.7		5	dBm	1
Difference in Launch Power between any Two Lanes (OMA)	Ptx,diff			4.7	dB	

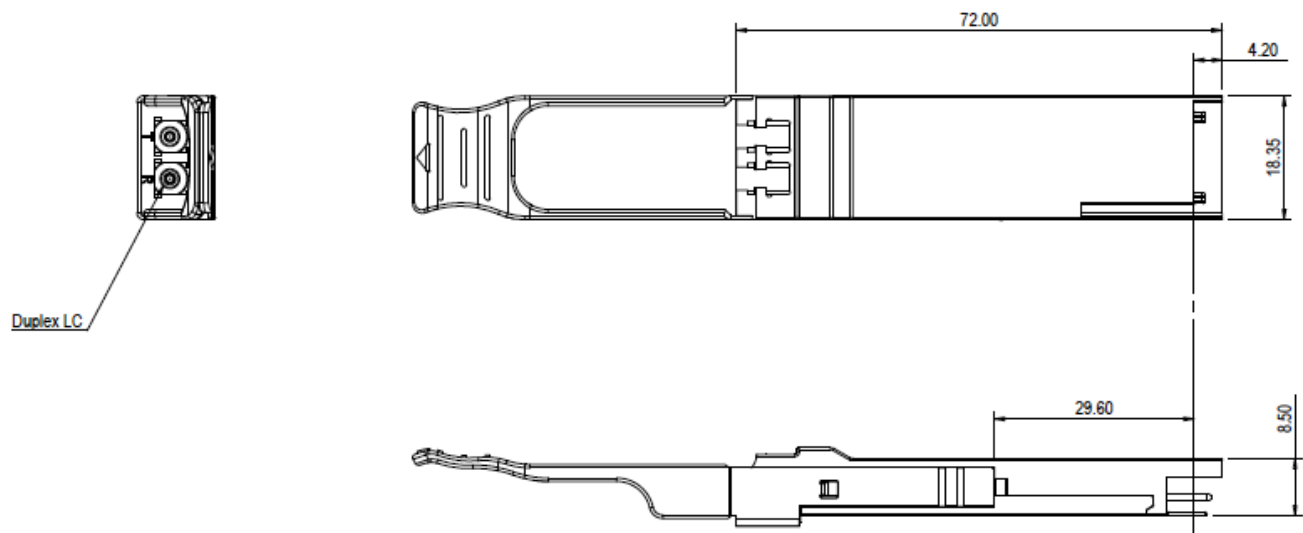
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane	OMA-TDP	-1.5			dBm	
TDP, each Lane	TDP			2.6	dB	
Extinction Ratio	ER	5.5			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	RT			-12	dB	
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25,0.4,0.45,0.25,0.28,0.4}				
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
<b>Receiver</b>						
Damage Threshold, each Lane	THd	3.8			dBm	2
Average Power at Receiver Input, each Lane		-18.5		-1.5	dBm	
Receiver Reflectance	RR			-26	dB	
Receive Power (OMA), each Lane				-1	dBm	
Stressed Receiver Sensitivity (OMA), each Lane				-15.8	dBm	3
Receiver Sensitivity (OMA), each Lane	SEN			-18	dBm	
Difference in Receive Power between any Two Lanes (OMA)	Prx,diff			7	dB	
LOS Assert	LOSA	-35			dBm	
LOS Deassert	LOSD			-20	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane	Fc			12.3	GHz	
<b>Conditions of Stress Receiver Sensitivity Test (Note 4)</b>						
Vertical Eye Closure Penalty, each Lane			2.2		dB	
Stressed Eye J2 Jitter, Each Lane			0.3		UI	
Stressed Eye J9 Jitter, Each Lane			0.47		UI	

### Notes:

1. Even if the TDP < 0.8 dB, the OMA min must exceed the minimum value specified here.

2. 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.
3. Measured with conformance test signal at receiver input for BER =  $1 \times 10^{-12}$ .
4. Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

## 5. Mechanical Diagram



**Note:** 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.

### 6. Ordering Information

OEM	Part Number	OEM	Part Number
Arista	QSFP-40G-ER4-AN-A	Juniper	QSFP-40GBASE-ER4-A
Avaya	AA1404003-E6-A	Juniper	JNP-QSFP-40GE-ER4-A
Brocade-Foundry	40G-QSFP-ER4-A	Juniper	QFX-QSFP-40G-ER4-A
Brocade-Foundry	40G-QSFP-ER4-C1	Juniper	JNP-QSFP-40GE-ER4-C1
Cisco	QSFP-40G-ER4-A	MSA	AN-QSFP-ER4
Cisco	QSFP-40G-ER4-C1	MSA Champion ONE	40GQSFP+E-ER4
Cisco	40GEQ-ER4-CSC	MSA OnePort	OP-QSFP-ER4
Extreme	10335-A	NoviFlow	400000514-A
Force10	GP-QSFP-40GE-1ER-A	Palo Alto	PAN-QSFP-40GBASE-ER4-A
HP	JL306A-A		

### 7. Contact Information

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