

Features

- Hot-pluggable QSFP+ form factor
- 300m operation over duplex OM3 MMF 400m over duplex OM4 MMF, and 500m over duplex OM5 MMF
- Supports 41.2 Gb/s aggregate bit rate
- Uncooled 4x10Gb/s SWDM transmitter
- Built-in SWDM mux and demux
- Power dissipation < 3.5W
- Commercial case temperature range 0°C to 70°C
- XLPP1 electrical interface
- Duplex LC receptacles



Applications

- 40G Ethernet over duplex MMF
- Allows upgrades from 10GBASE-SR without changing fiber plant

1. General Product Characteristics

Parameter	Value	Unit	Notes
Module Form Factor	QSFP+		
Maximum Aggregate Data Rate	41.2	Gb/s	
Maximum Data Rate per Lane	10.3	Gb/s	
Protocols Supported	40G Ethernet		
Electrical Interface and Pin-out	38-pin edge connector		Pin-out as defined by the QSFP+ MSA
Maximum Power Consumption	3.5	Watts	
Management Interface	Serial, I2C-based, 400 kHz maximum frequency		As defined by the QSFP+ MSA

Data Rate Specifications	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate per Lane	BR			10.3125	Mb/sec	1
Bit Error Ratio	BER			10 ⁻¹²		2
Link distance on OM3	d	0		300	meters	
Link distance on OM4	d	0		400	meters	

Notes:

1. Compliant with XLPP1 per IEEE 802.3ba.
2. Tested with a PRBS 231-1 test pattern.

2. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc1, VccTx, VccRx	-0.5		3.6	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	TOP	0		70	°C	
Relative Humidity	RH	0		85	%	1
Damage Threshold, per Lane	DT	4			dBm	

Note 1:

Non-condensing.

3. Electrical Characteristics

(TOP = 0 to 70 °C, VCC = 3.1 to 3.47 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc1, VccTx, VccRx	3.1		3.47	V	
Supply Current	Icc			0.9	A	1
Link turn-on time						
Transmit turn-on time				2000	ms	2
Transmitter (Per Lane)						
Single-ended input voltage tolerance	VinT	-0.3		4.0	V	
Differential data input swing	Vin,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	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	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 (Per Lane)						
Single-ended output voltage		-0.3		4.0	V	
Differential data output swing	Vout,pp	200		400		6, 7
		300		600		
		400		800		
		600		1200		
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			ps	
J2 Jitter output	Jo2			0.42	UI	
J9 Jitter output	Jo9			0.65	UI	
Eye mask coordinates #1 {X1, X2 Y1, Y2}		0.29, 0.5 150, 425			UI mV	5
Power Supply Ripple Tolerance	PSR	50			mVpp	

Notes:

1. Will be <2.5W in link established mode. If the input optical signal is without data, the CDR will keep searching and push the supply current over the maximum spec.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range.
5. Hit ratio = 5 x 10E-5.
6. AC coupled with 100Ω differential output impedance.
7. Output voltage is settable in 4 discrete steps via I2C.

4. Optical Characteristics

(TOP = 0 to 70°C, VCC = 3.1 to 3.47 Volts)

Per-channel optical characteristics vary over the 4 wavelengths. Below are the worst-case

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Signaling Speed per Lane			10.3125		GBd	1
Lane center wavelengths			850		nm	
			880			
			910			
			940			
Spectral width @ 850nm	SBW			0.53		
Spectral width @ 880nm, 910nm, 940nm	SBW			0.59	nm	
Total Average Launch Power	POUT	-1.5		9.0	dBm	3
Average Launch Power per Lane	TXPx	-7.5		3.0	dBm	2,3
Transmit OMA per Lane	TxOMA	-5.5		3	dBm	2
Difference in Launch Power between any 2 lanes (OMA)	TxOMA DIFF					
Launch Power Tx OMA - TDP		-7.6			dBm	
Transmitter and Dispersion Eye Closure @ 850nm	TDEC			3.7	dB	
Transmitter and Dispersion Eye Closure @ 880nm	TDEC			4.0	dB	2
Transmitter and Dispersion Eye Closure @ 910nm	TDEC			4.5	dB	
Transmitter and Dispersion Eye Closure @ 940nm	TDEC			5.0	dB	
Optical Extinction Ratio	ER	2.0			dB	
Average launch power of OFF transmitter, per lane				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	4
Optical Return Loss Tolerance		12			dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		0.23, 0.34, 0.43, 0.27, 0.35, 0.4				
Receiver						
Signaling Speed per Lane			10.3125		GBd	5

Lane center wavelengths			850		nm	
			880			
			910			
			940			
Average Receive Power per Lane	RXPx	-9.0		3.0	dBm	2,6
Receive Power (OMA) per Lane	RxOMA			3	dBm	2
Receiver Sensitivity (OMA) per Lane	Rxsens			-9.1	dBm	2,7
Stressed Receiver Sensitivity (OMA) per Lane @ 850nm	SRS			-5.7	dBm	2
Stressed Receiver Sensitivity (OMA) per Lane @ 880nm, 910nm, 940nm	SRS			-4.4	dBm	2
Return Loss	RL			12	dB	
LOS De-Assert	LOS _D			-13	dBm	
LOS Assert	LOS _A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Transmitter consists of 4 lasers operating at 10.3Gb/s each.
2. This value varies among the 4 channels. The value shown is for the worst-case channel.
3. Minimum value is informative.
4. Maximum value is informative. TDP guarantees Tx performance
5. Receiver consists of 4 photodetectors operating at 10.3 Gb/s each.
6. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
7. Maximum value is informative based on a theoretical perfect unstressed optical source

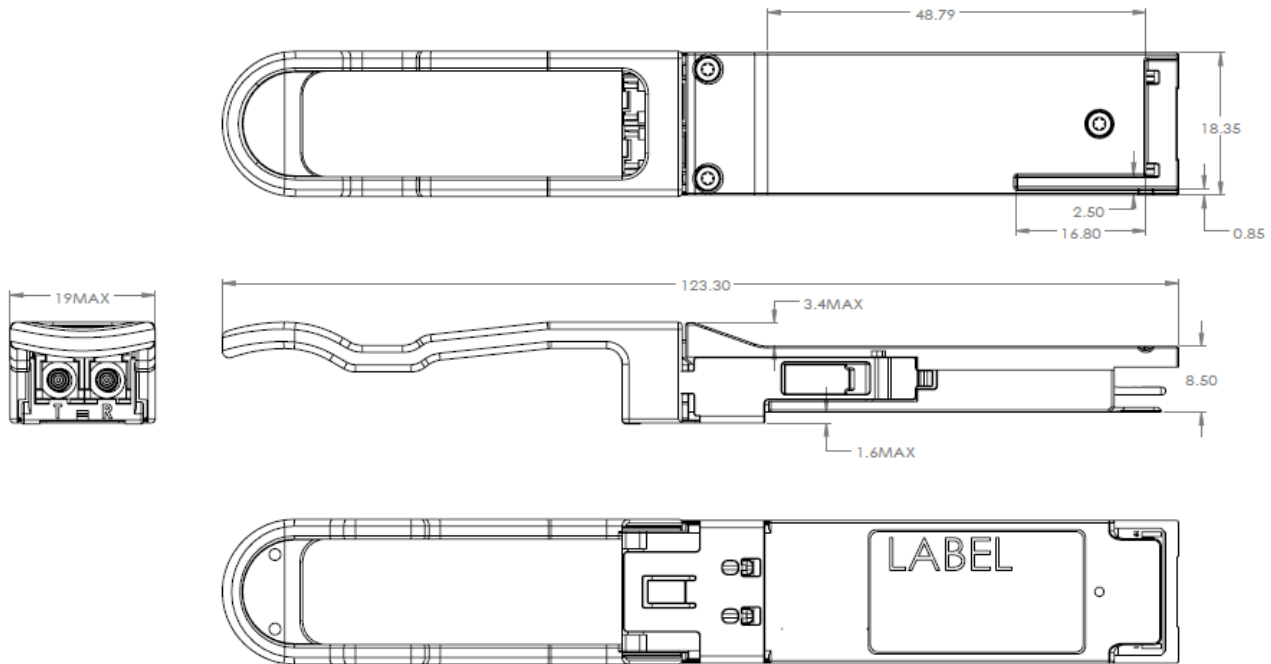
5. Environmental Specifications

Approved Networks QSFP-40G-SWDM4-A transceivers have an operating temperature range from 0°C to +70°C case temperature.

Environmental Specifications	Symbol	Min	Typ	Max	Units
Case Operating Temperature	Top	0		70	°C
Storage Temperature	Tsto	-40		85	°C

6. Mechanical Diagram

Mechanical specifications are compliant to the QSFP+ MSA transceiver module specifications.



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.

7. Ordering Information

OEM	Part Number	OEM	Part Number
Arista	QSFP-40G-SWDM4-AN-A	Brocade	40G-QSFP-SR4-SWDM4-A
Cisco	QSFP-40G-SWDM4-A	F5 Networks	F5-UPG-QSFP+SWDM4-A
Finisar	FTL4S1QE2C-A	Gigamon	QSF-502-SWDM4-A
Intel	E40GQSFP4SWDM4-A	Juniper	QFX-QSFP-40G-SWDM4-A
Juniper	JNP-QSFP-40GE-SWDM4-A	MSA	AN-QSFP-SWDM4
Palo Alto	PAN-QSFP-40GBASE-SWDM4-A		

8. Contact Information

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Web: <http://www.approvednetworks.com>