

# SV-QSFP-40G-ER4

40GBase aggregating 4 x duplex CWDM (1270/ 1290/ 1310/ 1330nm) wavelengths SM (LC) with DDM, distance up to 40km, supporting 40GE, Infiniband QDR, DDR.



## 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)
- 18.5dB link insertion loss budget
- Operating case temperature: 0 to 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

Part number	Description
<b>SV-QSFP-40G-ER4</b>	Starview QSFP+ 40Gbps module 40GBase aggregating 4 x duplex CWDM (1270/ 1290/ 1310/ 1330nm) wavelengths SM (LC) with Digital Diagnostic Monitoring (DDM), distance up to 40km, supporting 40GE, Infiniband QDR, DDR.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40	85	°C
Operating Case Temperature	T <sub>OP</sub>	0	70	°C
Power Supply Voltage	V <sub>CC</sub>	-0.5	3.6	V
Relative Humidity (non-condensation)	RH	0	85	%
Damage Threshold, each Lane	TH <sub>d</sub>	3.8		dBm

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	T <sub>OP</sub>	0		70	degC	
Power Supply Voltage	V <sub>CC</sub>	3.135	3.3	3.465	V	
Data Rate, each Lane			10.3125	11.2	Gb/s	
Control Input Voltage High		2		V <sub>CC</sub>	V	
Control Input Voltage Low		0		0.8	V	
Link Distance with G652	D			40	km	

## Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Units	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	P <sub>T</sub>			10.5	dBm	
Average Launch Power, each Lane	P <sub>AVG</sub>	-2.7		4.5	dBm	
Optical Modulation Amplitude (OMA), each Lane	P <sub>OMA</sub>	0.3		5.0	dBm	1
Difference in Launch Power between any Two Lanes (OMA)	P <sub>Tx,diff</sub>			4.7	dB	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-0.5			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	R <sub>T</sub>		-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	P <sub>off</sub>		-30	dBm	
<b>Receiver</b>					
Damage Threshold, each Lane	TH <sub>d</sub>	3.8		dBm	2
Average Receive Power, each Lane		-21.2	-4.5	dBm	
Receiver Reflectance	R <sub>R</sub>		-26	dB	
Receive Power (OMA), each Lane			-4	dBm	
Receiver Sensitivity (OMA), each Lane	SEN		-19	dBm	
Stressed Receiver Sensitivity (OMA), each Lane			-16.8	dBm	3
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	F <sub>c</sub>		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.

## Digital Diagnostics Functions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Temperature monitor absolute error	DMI_Temp	-3		3	degC	Over operating temperature
Supply voltage monitor absolute error	DMI_VCC	-0.1		0.1	v	Full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2		2	dB	1
Channel Bias current monitor	DMI_Ibias_Ch	-10%		10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-2		2	dB	1

Note(1): Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Consumption				3.5	W	
Supply Current	Icc			1.1	A	
Transceiver Power-on Initialization Time				2000	ms	1
<b>Transmitter</b>						
Single-ended Input Voltage Tolerance (Note 2)		-0.3		4.0	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	Vin,pp	190		700	mVpp	
Differential Input Impedance	Zin	90	100	110	$\Omega$	
Differential Input Return Loss		See IEEE 802.3ba 86A.4.11			dB	10MHz-11.1GHz
J2 Jitter Tolerance	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	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		UI mV	Hit Ratio= 5x10-5
<b>Receiver(each lane)</b>						

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	Vout,pp	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		UI, mV	Hit Ratio = 5x10 <sup>-5</sup>

Note(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.

Note(2): The single ended input voltage tolerance is the allowable range of the instantaneous input signals