

# SV-QSFP-400G-ER4

Starview QSFP56-DD 400Gbps module  
400G-ER4 LWDM SM (LC) with DDM,  
distance up to 40km



## Features

- QSFP-DD MSA compliant
- 4 LWDM lanes MUX/DEMUX design
- Up to 40km transmission on single mode fiber (SMF) with built-in PFEC
- Operating case temperature: 0 to 70°C
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Data Rate 106.25Gbps (PAM4) per channel.
- Maximum power consumption 12W
- Duplex LC connector
- RoHS compliant

## Applications

- Data Center Interconnect
- 400G Ethernet
- Infiniband interconnects
- Enterprise networking

Part number	Description
<b>SV-QSFP-400G-ER4</b>	Starview QSFP56-DD 400Gbps module 400G-ER4 aggregating 4 x 100Gbps LWDM (1295.6 nm, 1300.1 nm, 1304.6 nm, and 1309.1nm) SM (LC) with Digital Diagnostic Monitoring (DDM), distance up to 30/40km

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	TS	-40	85	degC	
Operating Case Temperature	TOP	0	70	degC	
Power Supply Voltage	VCC	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	0	85	%	
Damage Threshold, each Lane	THd	-5.0		dBm	

## Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Units	Notes
Operating Case Temperature	TOP	0		70	degC	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate, each Lane			26.5625		GBd	PAM4
Data Rate Accuracy		-100		100	ppm	
Pre-FEC Bit Error Ratio				2.4x10 <sup>-4</sup>		
Post-FEC Bit Error Ratio				1x10 <sup>-13</sup>		1
Link Distance	D	0.002		30	km	2
Link Distance	D	0.002		40	Km	3

Notes:

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.
3. Built-in PFEC is required to support up to 40km

## Electrical Characteristics

Parameter	Test Point	Min	Typical	Max	Units	Notes
Power Consumption				12	W	
Supply Current	Icc			3.64	A	
Transmitter (each Lane)						
Signaling Rate, each Lane	TP1		26.5625 ± 100 ppm		GBd	
Differential pk-pk Input Voltage Tolerance	TP1a	900			mVpp	1

Differential Termination Mismatch	TP1		10	%	
Differential Input Return Loss	TP1	IEEE 802.3-2015 Equation (83E-5)		dB	
Differential to Common Mode Input Return Loss	TP1	IEEE 802.3-2015 Equation (83E-6)		dB	
Module Stressed Input Test	TP1a	See IEEE 802.3bs 120E.3.4.1			2
Single-ended Voltage Tolerance Range (Min)	TP1a	-0.4 to 3.3		V	
DC Common Mode Input Voltage	TP1	-350	2850	mV	3
Receiver (each Lane)					
Signaling Rate, each lane	TP4	26.5625 ± 100 ppm		GBd	
Differential Peak-to-Peak Output Voltage	TP4		900	mVpp	
AC Common Mode Output Voltage, RMS	TP4		17.5	mV	
Differential Termination Mismatch	TP4		10	%	
Differential Output Return Loss	TP4	IEEE 802.3-2015 Equation (83E-2)			
Common to Differential Mode Conversion Return Loss	TP4	IEEE 802.3-2015 Equation (83E-3)			
Transition Time, 20% to 80%	TP4	9.5		ps	
Near-end Eye Symmetry Mask Width (ESMW)	TP4		0.265	UI	
Near-end Eye Height, Differential	TP4	70		mV	
Far-end Eye Symmetry Mask Width (ESMW)	TP4		0.2	UI	
Far-end Eye Height, Differential	TP4	30		mV	
Far-end Pre-cursor ISI Ratio	TP4	-4.5	2.5	%	

Common Mode Output Voltage (Vcm)	TP4	-350	2850	mV	3
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Notes:

1. With the exception to IEEE 802.3bs 120E.3.1.2 that the pattern is PRBS31Qor scrambled idle.
2. Meets BER specified in IEEE 802.3bs 120E.1.1.
3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

## Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Units	Notes
Wavelength Assignment	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09	nm	
	L2	1303.54	1304.58	1305.63	nm	
	L3	1308.09	1309.14	1310.19	nm	
<b>Transmitter</b>						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	PT			14.7	dBm	
Average Launch Power, each Lane	PAVG	0.4		6.5	dBm	
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each Lane	POMA	3.4		9	dBm	
Launch Power in OMA <sub>outer</sub> minus TDECQ, each Lane		2			dB	
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.9	dB	
Extinction Ratio	ER	6			dB	
Difference in Launch Power between any Two Lanes (OMA <sub>outer</sub> )				4	dB	
RIN <sub>15,1OMA</sub>	RIN	-132			dB/Hz	
Optical Return Loss Tolerance	TOL			15.6	dB	
Transmitter Reflectance	RT			-26	dB	
Average Launch Power of OFF Transmitter, each Lane	Poff			-30	dBm	
<b>Receiver</b>						

Data Rate, each Lane		53.125 ± 100 ppm		GBd
Modulation Format		PAM4		
Damage receiver power, each lane		-2.4		dBm
Receiver Saturation, each lane	overload	-3.4		
Sensitivity, each lane	Sen1	Max(-12.1, SECQ-13.5)	dBm	For 30km
Sensitivity, each lane	Sen2	Max(-15.1, SECQ-16.5)	dBm	For 40km
Stressed Conditions for Stress Receiver Sensitivity (Note 8)				
Stressed Eye Closure for PAM4 (SECQ), Lane under Test		3.4		dB
SECQ - 10*log <sub>10</sub> (C <sub>eq</sub> ), Lane under Test				dB
OMA <sub>outer</sub> of each Aggressor Lane		-8		dBm