

# SV-QSFP-400G-HZR+

Starview QSFP56-DD Multi-rate  
 100/200/300/400G DCO module, Full C-Band  
 tuneable High Tx Power 400G-ZR+ oFEC SM  
 (LC) with DDM, distance up to 120km



## Features

- Support Flex-grid channel spacing DWDM in C-band
- Support Line-side and Client-side Interfaces:  
 Line-side: 400G DP- 16QAM, Client-side: 400GAUI-8/4\*100GAUI-2  
 Line-side: 300G DP-8QAM, Client-side: 3\*100GAUI-2  
 Line-side: 200G DP-QPSK, Client-side: 2\*100GAUI-2/2\*CAUI-4  
 Line-side: 100G DP-QPSK, Client-side: 100GAUI-2/CAUI-4
- Standard QSFP-DD Type 2 form factor
- 76pin QSFP-DD MSA compliant connector
- Compliant to CMIS 5.0
- Compliant to OIF Implementation Agreement for Coherent CMIS, Rev 01.1
- OpenZR+ Specifications, version 2.0, 29 July 2022
- RoHS compliant

Part number	Description
<b>SV-QSFP-400G-HZR+</b>	Starview QSFP56-DD Multi-rate 100/200/300/400G DCO module, Full C-Band tuneable High Tx Power 400G-ZR+ oFEC SM (LC) with Digital Diagnostic Monitoring (DDM), distance up to 120km, support 400GAUI-8 / 4x100GUI-2

## Host Interfaces

Host Interface	Application Data Rate	Lane Count	Lane Signaling Rate	Modulation
400GAUI-8	425.00 Gb/s	8	26.5625 GBaud (+/- 100 ppm)	PAM4
4*100GAUI-2	4*106.25 Gb/s	4*2	26.5625 GBaud (+/- 100 ppm)	PAM4
3*100GAUI-2	3*106.25 Gb/s	3*2	26.5625 GBaud (+/- 100 ppm)	PAM4
2*100GAUI-2	2*106.25 Gb/s	2*2	26.5625 GBaud (+/- 100 ppm)	PAM4
2*CAUI-4	2*103.13 Gb/s	2*4	25.78125 GBaud (+/- 100 ppm)	NRZ
100GAUI-2	1*106.25 Gb/s	2	26.5625 GBaud (+/- 100 ppm)	PAM4
CAUI-4	103.13 Gb/s	4	25.78125 GBaud (+/- 100 ppm)	NRZ

## Media Interface

Application	Application Bit Rate	Baud Rate	Modulation	FEC
ZR400-OFEC-16QAM	481.108374 Gb/s	60.1385468 GBd	DP-16QAM	oFEC
ZR300-OFEC-8QAM	360.831281 Gb/s	60.1385468 GBd	DP-8QAM	oFEC
ZR200-OFEC-QPSK	240.554187 Gb/s	60.1385468 GBd	DP-QPSK	oFEC
ZR100-OFEC-QPSK	120.277094 Gb/s	30.069273 GBd	DP-QPSK	oFEC

## Absolute Maximum Ratings

Parameter	Min	Max	Unit	Note
Storage Temperature	-40	85	°C	
Storage Humidity (Relative)	-	85	%	no-Condensing
Operating Humidity (Relative)	-	85	%	no-Condensing
Power Supply Absolute Range	-0.3	3.63	V	
RX Optical Maximum Input Power	-	10	dBm	

## Operating Environments

Parameter	Min	Max	Unit	Note
Operating Case Temperature	0	70	°C	
Operating Humidity (Relative)	-	85	%	no-Condensing
Power Supply Operating Range	3.135	3.465	V	
RX Optical Input Power	-	0	dBm	

## Power Supply Specifications

Parameter	Min	Typ.	Max	Unit	Note
3.3V DC Power Supply Voltage	3.135	3.3	3.465	V	
3.3V DC Power Supply Current			7	A	
Power Dissipation			22	W	ZR400-OFEC-16QAM
			22	W	ZR300-OFEC-8QAM
			22	W	ZR200-OFEC-QPSK
			18	W	ZR100-OFEC-QPSK
Low Power Consumption			1.5	W	
Module Inrush Current			100	mA/us	
Turn-off Current	-100			mA/us	
Power Supply Noise			25	mV	

## Low Speed Control and Sense Signals

Parameter	Symbol	Min	Max	Unit	Condition
SCL and SDA	VOL	0	0.4	V	IOL(max)=3 mA for fast mode, 20 mA for Fast-mode plus
SCL and SDA	VIL	-0.3	V <sub>cc</sub> * 0.3	V	
	VIH	V <sub>cc</sub> * 0.7	V <sub>cc</sub> + 0.5	V	
Capacitance for SCL and SDA I/O signal	C <sub>i</sub>		14	pF	
Total bus capacitive load for SCL and SDA	C <sub>b</sub>		100	pF	For 400 kHz clock rate use 3.0k Ohms Pull-up resistor, max.
			200	pF	For 400 kHz clock rate use 1.6k Ohms Pull-up resistor, max.
LPMode,	VIL	-0.3	0.8	V	

ResetL, ModSelL and ePPS	VIH	2	Vcc + 0.3	V	
LPMODE, ResetL and ModSelL	Iin		360	uA	0V<Vin<Vcc
ePPS	Iin		TBD	uA	0V<Vin<Vcc
IntL	VOL	0	0.4	V	IOL=2.0 mA
	VOH	Vcc - 0.5	Vcc + 0.3	V	10k Ohms pull-up to Host Vcc
ModPrsL	VOL	0	0.4	V	IOL=2.0 mA
	VOH			V	ModPrsL can be implemented as a short-circuit to GND on the module

## Electrical Characteristics for Transmitter

Parameter	Min	Typ.	Max	Unit	Note
<b>CEI-56G-VSR-PAM4</b>					
Signal Rate, each Lane		26.5625±100ppm		GBaud	
Differential Peak-Peak Input Voltage Tolerance			900	mVpp	
<b>CEI-28G-VSR</b>					
Signal Rate, each Lane		25.78125±100ppm			
Differential Peak-Peak Input Voltage Tolerance			900	mVpp	

## Electrical Characteristics for Receiver

Parameter	Min	Typ.	Max	Unit	Note
<b>CEI-56G-VSR-PAM4</b>					
Signal Rate, each Lane		26.5625±100ppm		GBaud	
Differential Peak-Peak Input Voltage Tolerance	900			mVpp	
Transition Time, 20% to 80%		9.5		ps	
<b>CEI-28G-VSR</b>					
Signal Rate, each Lane		25.78125±100ppm		GBaud	
Differential Peak-Peak Input Voltage Tolerance	900			mVpp	
Transition Time, 20% to 80%		9.5		ps	

## Optical Transmitter Specifications

Parameter	Min	Typ.	Max	Unit	Notes
Transmitter Frequency Range	191.3	193.7	196.1	THz	C band 75GHz ITU-T grid. Frequency range over which the specifications hold unless noted otherwise.
Laser Frequency Stability	-1.8		1.8	GHz	Frequency stability relative to ITU grid.
Laser Frequency Accuracy	-2.5		2.5	GHz	
Laser Frequency Fine Tuning Range	-6.0		6.0	GHz	
Fine Tuning Resolution		100		MHz	
Channel Tuning Speed	-		60	s	
Laser LineWidth			100	kHz	
Transmitter Output Power Range	-5		5	dBm	
Transmitter Output Disable Time			300	ms	
Output Power Stability	-0.5		0.5	dB	Difference over temperature, time, wavelength and aging.
Output Power Accuracy	-2		2	dB	Difference between the set value and actual value over aging.
Transmitter Turn-up Time from Cold Start	-		120	s	
Transmitter OSNR (Inband)	34		-	dB/0.1nm	
Transmitter Back Reflectance	-		-24	dB	
Transmitter Output Power with TX Disabled	-		-20	dBm	
Transmitter Polarization Dependent Power	-		1.5	dB	Power deference between X and Y polarization

## Optical Receiver Specifications

Parameter	Min	Typ.	Max	Unit	Notes
Receiver Frequency Range	191.3	193.7	196.1	THz	
Input Power Range	-12		0	dBm	Signal power of the channel at the OSNR Penalty < 0.5dB for ZR400-OFEC- 16QAM
	-15		0		Signal power of the channel at the OSNF Penalty < 0.5dB for ZR300-OFEC-8QAM
	-18		0		Signal power of the channel at the OSNF Penalty < 0.5dB for ZR200-OFEC-QPSK
	-18		0		Signal power of the channel at the OSNF Penalty < 0.5dB for ZR100-OFEC-QPSK
		22	24		ZR400-OFEC- 16QAM
			21		ZR300-OFEC-8QAM

OSNR Sensitivity	16		dB/0.1nm	ZR200-OFEC-QPSK
	12.5			ZR100-OFEC-QPSK
Receiver Sensitivity	-24			ZR400-OFEC-16QAM
	-26		dBm	ZR300-OFEC-8QAM
	-28			ZR200-OFEC-QPSK
	-32			ZR100-OFEC-QPSK
	12000			ps/nm
20000		Tolerance to CD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR300-OFEC-8QAM.		
30000		Tolerance to CD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR200-OFEC-QPSK.		
50000		Tolerance to CD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR100-OFEC-QPSK.		
PMD (avg) Tolerance	20		ps	Tolerance to PMD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR400-OFEC-16QAM.
	25			Tolerance to PMD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR300-OFEC-8QAM.
	25			Tolerance to PMD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR200-OFEC-QPSK.
	30			Tolerance to PMD with $\leq 0.5$ dB penalty to OSNR sensitivity when change in SOP is $\leq 1$ rad/ms for ZR100-OFEC-QPSK.
Peak PDL Tolerance	3.0		dB	Tolerance to peak PDL with $\leq 1.3$ dB additional OSNR penalty when change in SOP is $\leq 1$ rad/ms.
	3.5		dB	Tolerance to peak PDL with $\leq 1.8$ dB additional OSNR penalty when change in SOP is $\leq 1$ rad/ms.
Tolerance to Change in SOP	50	-	rad/ms	With $\leq 0.5$ dB additional OSNR penalty over all PMD and PDL values.
Input Power Transient Tolerance	-2	2	dB	Tolerance to change in input power with $< 0.5$ dB penalty to OSNR sensitivity.
Input Power Reading Accuracy	-2	2	dB	
Optical Return Loss	20		dB	Optical reflectance at Rx connector input.
Receiver Turn-up Time from Cold Start		120	s	From module reset, with valid optical input signal present.