



400G QSFP-DD ZR+ (TX -10~ -6 dBm) Coherent Transceiver CL400GQDDZR+-300

Features

- ◆ Compliant with QSFP-DD MSA, Type 2B package
- ◆ Compliant with Open ZR+ MSA and OIF 400ZR MSA, support OFEC and CFEC FEC
- ◆ Line rate 100G/200G/300G/400G
- ◆ Client rate 1/2/3/4x100GbE or 1x400GbE
- ◆ C-band tunable, supports 100/75/50GHz grid spacing, support 0.1GHz fine tuning
- ◆ TX VOA inside, with 4dB attenuation window
- ◆ Support ingress LF hold-off time configure
- ◆ Support hitless firmware upgrade
- ◆ Compact size (18.35 mm x 93.26 mm x 8.50 mm)
- ◆ Duplex LC connector
- ◆ Operating case temperature: 0°C to 75°C
- ◆ Single 3.3 V power supply
- ◆ Typical power consumption 21W (400GbE), maximum power consumption 22.5W(400GbE)
- ◆ RoHS 2 compliant

Applications

- ◆ Edge DCI with extended Reach or with OLP protection
- ◆ IP Over Metro or Long Haul DWDM

Compliance

- ◆ Open ZR+ MSA 2.0 and OIF-400ZR-02.0
- ◆ OIF-CMIS-05.2
- ◆ IA OIF-C-CMIS-01.2
- ◆ QSFP-DD-Hardware-Rev6.3
- ◆ IEEE Std 802.3-2018

Recommended Operating Conditions



Table2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	TC	0		75	°C	
Power supply voltage	VCC	3.135	3.3	3.465	V	
	ICC			7.2	A	Note1
Maximum sustained peak Current(<500ms)				7.4	A	
Maximum Instantaneous peak current(<50us)				9	A	
Electro-Static discharge	ESD			1000	V	
Power Consumption(400ZR+)	PD		21	22.5	W	Note1
Relative humidity	RH	15		85	%	
Client Mode	400G (400ZR)	1 x 400GAUI-8				
		4 x 100GAUI-2				
	400G (400ZR+)	1 x 400GAUI-8				
		4 x 100GAUI-2				
	300G (300ZR+)	3 x 100GAUI-2				
	200G (200ZR+)	2 x 100GAUI-2				
		2 x CAUI-4				Note2
100G (100ZR+)	1 x 100GAUI-2					
		1 x CAUI-4				Note2
Transmission Distance	400G (OIF 400ZR app code 0x01)			120	Km	
	400G (OIF 400ZR app code 0x02)			30~40		
	400G (400ZR+)			450		
	300G (300ZR+)			600		
	200G (200ZR+)			1000		
	100G (100ZR+)			2000		
Power Supply Noise	Vrip			1%	DC-1MHz	
				2%	1-10MHz	

Optical, Electrical Characteristic

Tested under recommended operating conditions, unless otherwise noted

Table3-Transmitter Operating Characteristic-Optical , Electrical

Parameters		Unit	Min.	Typ.	Max.	Note
Modulation format	400G		ZR400-CFEC-16QAM		CFEC FEC, NCG 10.8dB	
	300G		ZR400-OFEC-16QAM		OFEC FEC, NCG 11.6dB	
	200G		ZR300-OFEC-8QAM			
	100G		ZR200-OFEC-QPSK			
		ZR100-OFEC-QPSK				
Baud Rate	400G	GBd	59.843750000±20ppm		400ZR, SFF-8024 Media ID 3Eh/3Fh	
			60.138546798±20ppm		400ZR+, SFF-8024 Media ID 46h	
	300G		60.138546798±20ppm		300ZR+, SFF-8024 Media ID 47h	
	200G		60.138546798±20ppm		200ZR+, SFF-8024 Media ID 48h	
	100G	30.069273399±20ppm		100ZR+, SFF-8024 Media ID 49h		
Transmitter frequency range		THz	191.3		196.1	For OIF 400ZR app code 0x02 the frequency is fixed at 193.7THz and not configurable.
Flexible DWDM Grid		GHz	3.125			
Frequency Fine Tuning range		GHz	-5		5	bright tuning
Frequency Fine Tuning step		GHz	0.1			
Laser frequency accuracy		GHz	-1.8		1.8	
TX spectral Upper Mask		(GHz,dB)			(30.0, 0.0) (37.0, -10.0) (39.2, -15.0) (40.4, -20.0)	Refer to OIF-400ZR-02.0 13.3.201a Refer to openzrplus_2p0 11.4.10
TX spectral Lower Mask		(GHz,dB)	(30.0, -9.0) (31.3, -20.0) (31.3, -35.0)			Refer to OIF-400ZR-02.0 13.3.201b Refer to openzrplus_2p0 11.4.10
Transmitter laser disable time		ms			100	
Transmitter wavelength switching time		s			60	
Transmitter laser enable time		s			10	



Tx output power	400G	dBm	-10		-6	At Programmed Output Power Max, Transmit output power over wavelength, temperature, and aging.
	300G	dBm	-10		-6	
	200G	dBm	-9		-5	
	100G	dBm	-8		-4	
Transmit Output Power at 400G ZR Gray		dBm	-9		-6	For OIF 400ZR app code 0x02
Transmit Output Power Adjustable Range	400G 300G	dBm	-13		-9	The absolute accuracy is ±1dB For OIF 400ZR app code 0x02 the output power is not configurable.
Transmit Output Power Adjust step		dB	0.1			
Optical power setting accuracy		dB	-1		1	Diff between setting and reporting
Output power monitor accuracy		dB	-1		1	
Power stability		dB	-0.5		0.5	At fixed wavelength, room temp
			-1		1	At fixed wavelength
Total output power with Tx disabled		dBm			-20	
Total output power during wavelength switching		dBm			-20	
Transmitter reflectance		dB			-20	Looking into the Tx
Inband (IB) OSNR		dB	40			
Out-of-band (OOB) OSNR		dB	35			
Lorentzian linewidth		kHz			300	Tx and LO
Relative intensity noise		dB/Hz			-140	
Mean I-Q amplitude imbalance		dB			1	
Transmitter polarization dependent power		dB			1.5	
DC I-Q offset (mean per polarization)		dB			-26	
I-Q instantaneous offset		dB			-20	

Table4- Receiver Operating Characteristic-Optical



Parameters		Unit	Min.	Typ.	Max.	Note	
Modulation format	400G		ZR400-CFEC-16QAM			CFEC FEC, Net Coding Gain(NCG) 10.8dB, Theoretical Max Pre-FEC BER 1.25E-2	
	300G		ZR400-OFEC-16QAM			OFEC FEC, Net Coding Gain(NCG) 11.6dB,	
	200G		ZR300-OFEC-8QAM			Theoretical Max Pre-FEC BER 2.0E-2	
	100G		ZR200-OFEC-QPSK				
			ZR100-OFEC-QPSK				
Baud Rate	400G	GBd	59.843750000±20ppm		400ZR, SFF-8024 Media ID 3Eh/3Fh		
			60.138546798±20ppm		400ZR+, SFF-8024 Media ID 46h		
	300G		60.138546798±20ppm		300ZR+, SFF-8024 Media ID 47h		
	200G		60.138546798±20ppm		200ZR+, SFF-8024 Media ID 48h		
	100G		30.069273399±20ppm		100ZR+, SFF-8024 Media ID 49h		
Frequency offset between received carrier and LO		GHz	-3.6		+3.6		
Input power range	400G	dBm	-12		0	Signal power, OSNR>26dB,400ZR	
			-12		0	Signal power, OSNR>24dB, 400ZR+	
	300G		-15		0	Signal power, OSNR>21dB, 300ZR+	
	200G		-18		0	Signal power, OSNR>16dB, 200ZR+	
	100G		-18		0	Signal power, OSNR>12.5dB,100ZR+	
OSNR Tolerance	400G	dB/0.1nm			26	400ZR	Measured
					24	400ZR+	back-to-back with short optical channel
	300G				21	300ZR+	
	200G				16	200ZR+	
	100G				12.5	100ZR+	
RX sensitivity	400G	dBm	-20			400ZR	Inband (IB) OSNR ≥ 34dB, OIF 400ZR app code 0x02
			-22			400ZR+	Point to point
non-damaging input power		dBm			10	Total power	



Optical input power monitor accuracy		dB	-2		2	Total power	
MAX Pre-FEC BER			0.017		0.020		
Chromatic dispersion tolerance	400G	ps/nm			2,400	400ZR	Tolerance to CD with ≤ 0.5 dB penalty to OSNR sensitivity when change in SOP is ≤ 1 rad/ms
	300G				20,000	400ZR+	
	200G				40,000	300ZR+	
	100G				50,000	200ZR+	
CD monitor accuracy		ps/nm	-200		+200		
DGD tolerance	400G	ps	33			400ZR	OSNR penalty < 0.5dB
			66			400ZR+	
	300G		83			300ZR+	
	200G		83			200ZR+	
DGD monitor accuracy		ps	-15		15	0~40ps for 400ZR 0~100ps for 400/300/200/100ZR+	
Peak PDL tolerance		dB			3.0	Tolerance to peak PDL with ≤ 1.3 dB additional OSNR penalty when change in SOP is ≤ 1 rad/ms	
					3.5	Tolerance to peak PDL with ≤ 1.8 dB additional OSNR penalty when change in SOP is ≤ 1 rad/ms	
Tolerance to change in SOP		krad/s	50			With ≤ 0.5 dB additional OSNR penalty over all PMD and PDL values	
Optical return loss		dB	20			Optical reflectance at Rx connector input.	
Optical Rx_LOS Assert	400G	dBm	-28	-26	-24	OIF 400ZR app code	
Threshold						0x01, 0x02, 0x03,	
	400G		-30	-28	-26	400 ZR+	
	300G		-32	-30	-28		
	200G		-32	-30	-28		
Optical Rx_LOS Hysteresis		dB	1	1.5	2.5		
						Tolerance to change in input power with < 0.5 dB	



Telecom



FTTx



DWDM



Data Center

Optical input power transient tolerance	dB	-2		2	penalty to OSNR tolerance. The 20% to 80% rise/fall times for the input power change shall be no faster than 50 μs.
Service recovery time	ms			40	

Ordering Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
CL400QDDZR+-300	400G QSFP-DD ZR+ (-10dBm)	400G/300G/200G/100G	191.3-196.1 THz	Single Mode Fiber