400G OpenZR+ QSFP-DD DCO Product Specification

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Part Number
WTQDS400SZPTA00

1. Product Overview

Features

- 400Gb/s single-rate OpenZR+ coherent QSFP-DD DCO.
- Single-channel tunable operation with oFEC.
- 3.3 V power supply; maximum power dissipation 21 W.
- Operating case temperature: 0 to 70 °C.

Applications

2. Ordering Information

Part Number	Description
WTQDS400SZPTA00	Single rate 400Gb/s, single channel tunable coherent QSFP-DD OpenZR+ with oFEC, 0~70C

3. Absolute Maximum Ratings

Id	Parameter	Min	Max	Unit	Note
1	Storage Temperature	-40	85	℃	
2	Storage Humidity (Relative)	-	85	%	no-Condensing
3	Case Temperature	0	75	℃	
4	Operating Humidity (Relative)	-	85	%	no-Condensing
5	Short term Operating Case Temperature		80	℃	<24 hours
6	Power Supply Absolute Range	-0.3	3.63	V	
7	RX Optical Maximum Input Power	-	10	dBm	

4. Absolute Maximum Ratings

Id	Parameter	Min	Max	Unit	Note
1	Operating Case Temperature	0	70	℃	
2	Operating Humidity (Relative)	-	85	%	no-Condensing
3	Power Supply Operating Range	3.135	3.465	V	
4	RX Optical Input Power	-	0	dBm	

5. Recommended Operating Conditions

Id	Parameter	Min	Typ.	Max	Unit	Note
1	3.3V DC Power Supply Voltage	3.135	3.3	3.465	V	
2	3.3V DC Power Supply Current			7	A	
3	Power Dissipation			21	W	
4	Low Power Consumption			1.5	W	
5	Module Inrush Current			100	mA/us	
6	Turn-off Current	-100			mA/us	
7	Power Supply Noise			25	mV	

6. Optical Parameters

36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3B
37	CML-I	Tx1n	Transmitter Inverted Data Input	3B
38		GND	Ground	1B
39		GND	Ground	1A
40	CML-I	Tx6n	Transmitter Inverted Data Input	3A
41	CML-I	Tx6p	Transmitter Non-Inverted Data Input	3A
42		GND	Ground	1A
43	CML-I	Tx8n	Transmitter Inverted Data Input	3A
44	CML-I	Tx8p	Transmitter Non-Inverted Data Input	3A
45		GND	Ground	1A
46		Reserved	For future use	3A

36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3B
47		VS1	Module Vendor Specific 1	3A
48		VccRx1	3.3V Power Supply	2A
49		VS2	Module Vendor Specific 2	3A
50		VS3	Module Vendor Specific 3	3A
51		GND	Ground	1A
52	CML-O	Rx7p	Receiver Non-Inverted Data Output	3A
53	CML-O	Rx7n	Receiver Inverted Data Output	3A
54		GND	Ground	1A
55	CML-O	Rx5p	Receiver Non-Inverted Data Output	3A
56	CML-O	Rx5n	Receiver Inverted Data Output	3A
57		GND	Ground	1A
58		GND	Ground	1A
59	CML-O	Rx6n	Receiver Inverted Data Output	3A
60	CML-O	Rx6p	Receiver Non-Inverted Data Output	3A
61		GND	Ground	1A
62	CML-O	Rx8n	Receiver Inverted Data Output	3A
63	CML-O	Rx8p	Receiver Non-Inverted Data Output	3A
64		GND	Ground	1A
65		NC	No Connect	3A
66		Reserved	For future use	3A
67		VccTx1	3.3V Power Supply	2A
68		Vcc2	3.3V Power Supply	2A
69		Reserved	For Future Use	3A
70		GND	Ground	1A
71	CML-I	Tx7p	Transmitter Non-Inverted Data Input	3A
72	CML-I	Tx7n	Transmitter Inverted Data Input	3A
73		GND	Ground	1A
74	CML-I	Tx5p	Transmitter Non-Inverted Data Input	3A
75	CML-I	Tx5n	Transmitter Inverted Data Input	3A
76		GND	Ground	1A

7. Electrical Characteristics

Id	Parameter	Min	Typ.	Max	Unit	Note
1	Signal Rate, each Lane	26.5625±100ppm	26.5625±100ppm	26.5625±100ppm	GBaud	
2	Differential Peak-Peak Input Voltage Tolerance			900	mVpp	

8. Electrical Characteristics

Id	Parameter	Min	Typ.	Max	Unit	Note
1	Signal Rate, each Lane	26.5625±100ppm	26.5625±100ppm	26.5625±100ppm	GBaud	
2	Differential Peak-Peak Input Voltage Tolerance		750	900	mVpp	
3	Transition Time, 20% to 80%		9.5		ps	

9. Pin Descriptions

Pin #	Logic	Symbol	Description	Plug Sequence
1		GND	Ground	1B
2	CML-I	Tx2n	Transmitter Inverted Data Input	3B
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3B
4		GND	Ground	1B
5	CML-I	Tx4n	Transmitter Inverted Data Input	3B
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3B
7		GND	Ground	1B
8	LVTTL-I	ModSelL	Module Select	3B
9	LVTTL-I	ResetL	Module Reset	3B
10		VccRx	+3.3V Power Supply Receiver	2B
11	LVCMOS- I/O	SCL	2-wire serial interface clock	3B
12	LVCMOS- I/O	SDA	2-wire serial interface data	3B
13		GND	Ground	1B
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3B
15	CML-O	Rx3n	Receiver Inverted Data Output	3B
16	GND	Ground	1B	
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3B

Pin #	Logic	Symbol	Description	Plug Sequence
18	CML-O	Rx1n	Receiver Inverted Data Output	3B
19		GND	Ground	1B
20		GND	Ground	1B
21	CML-O	Rx2n	Receiver Inverted Data Output	3B
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3B
23		GND	Ground	1B
24	CML-O	Rx4n	Receiver Inverted Data Output	3B
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3B
26		GND	Ground	1B
27	LVTTL-O	ModPrsL	Module Present	3B
28	LVTTL-O	IntL	Interrupt	3B
29		VccTx	+3.3V Power supply transmitter	2B
30		Vcc1	+3.3V Power supply	2B
31	LVTTL-I	InitMode	Initialization mode; In legacy QSFP applications, the InitMode pad is called LPMODE	3B
32		GND	Ground	1B
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3B
34	CML-I	Tx3n	Transmitter Inverted Data Input	3B
35		GND	Ground	1B

10. Additional Specifications

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

11. Additional Specifications

Id	Application Bit Rate	Baud Rate	Modulation	FEC
1	481.108374 Gb/s	60.1385468 GBd	DP-16QAM	oFEC

12. Additional Specifications

Id	Parameter	Symbol	Min	Max	Unit	Condition
1	SCL and SDA	VOL	0	0.4	V	IOL(max)=3 mA for fast mode, 20 mA for Fast-mode plus
2	SCL and SDA	VIL	-0.3	Vcc * 0.3	V	
2	SCL and SDA	VIH	Vcc * 0.7	Vcc + 0.5	V	
3	Capacitance for SCL and SDA I/O signal	Ci		14	pF	
4	Total bus capacitive load for SCL and SDA	Cb		100	pF	For 400 kHz clock rate use 3.0k Ohms Pull-up resistor, max.
4	Total bus capacitive load for SCL and SDA			200	pF	For 400 kHz clock rate use 1.6k Ohms Pull-up resistor, max.
5	LPMode, ResetL, ModSelL and ePPS	VIL	-0.3	0.8	V	
5	LPMode, ResetL, ModSelL and ePPS	VIH	2	Vcc + 0.3	V	
6	LPMode, ResetL and ModSelL	|Iin|		360	uA	0V<Vin<Vcc
7	ePPS	|Iin|		TBD	uA	0V<Vin<Vcc
8	IntL	VOL	0	0.4	V	IOL=2.0 mA
8	IntL	VOH	Vcc – 0.5	Vcc + 0.3	V	10k Ohms pull-up to Host Vcc
9	ModPrsL	VOL	0	0.4	V	IOL=2.0 mA
9	ModPrsL	VOH			V	ModPrsL can be implemented as a short-circuit to GND on the module

13. Additional Specifications

Id	Parameter	Min	Typ.	Max	Unit	Notes
1	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.
2	Laser Frequency Stability	-1.8		1.8	GHz	Frequency stability relative to ITU grid.
3	Laser Frequency Accuracy	-1.8		1.8	GHz	
4	Laser Frequency Fine Tuning Range	-6.0		6.0	GHz	
5	Fine Tuning Resolution		100		MHz	
6	Channel Tuning Speed	-		60	s	
7	Laser LineWidth			100	kHz	

Id	Parameter	Min	Typ.	Max	Unit	Notes
8	Transmitter Output Power Range	-10		-6	dBm	
9	Transmitter Laser Disable Time			180	ms	
10	Output Power Stability	-0.5		0.5	dB	Difference over temperature, time, wavelength and aging.
11	Output Power Accuracy	-2		2	dB	Difference between the set value and actual value over aging.
12	Transmitter Turn-up Time from Cold Start	-		120	s	
13	Transmitter OSNR (Inband)	34		-	dB/0.1nm	
14	Transmitter Back Reflectance	-		-24	dB	
15	Transmitter Output Power with TX Disabled	-		-20	dBm	
16	Transmitter Polarization Dependent Power	-		1.5	dB	Power deference between X and Y polarization

14. Additional Specifications

Id	Parameter	Min	Typ.	Max	Unit	Notes
1	Receiver Frequency Range	191.3	193.7	196.1	THz	
2	Input Power Range	-12		0	dBm	Signal power of the channel at the OSNR Penalty < 0.5dB
3	OSNR Sensitivity		22	24	dB/0.1nm	
4	Receiver Sensitivity			-20	dBm	Input power needed to achieve post FEC BER < 1E-15 when OSNR Tolerance > 26dB/0.1nm
5	Los Assert	-24		-20	dBm	
6	Los Hysteresis	1.0		2.5	dB	
7	CD Tolerance	9000			ps/nm	Tolerance to Chromatic Dispersion.
8	PMD Tolerance	20			ps	Tolerance to PMD with < 0.5 dB penalty to OSNR sensitivity.
9	Peak PDL Tolerance	3.5			dB	Tolerance to peak PDL with < 1.3 dB penalty to OSNR sensitivity when change in SOP is < =1 rad/ms.
10	Tolerance to Change in SOP	50		-	rad/ms	

Id	Parameter	Min	Typ.	Max	Unit	Notes
11	Input Power Transient Tolerance	-2		2	dB	Tolerance to change in input power with < 0.5 dB penalty to OSNR sensitivity.
12	Input Power Reading Accuracy	-2		2	dB	
13	Optical Return Loss	-20			dB	Optical reflectance at Rx connector input.
14	Receiver Turn-up Time from Cold Start	-		120	s	From module reset, with valid optical input signal present.

15. Additional Specifications

Id	Parameter	Min	Max	Unit	Note
1	Insertion Force		90	N	
2	Extraction Force		50	N	
3	Retention Force	90		N	

16. Additional Specifications

Id	Parameter	Reference	Value	Unit	Note
1	ESD Immunity	IEC 61000-4-2	8	kV	Contact Discharge
1	ESD Immunity	IEC 61000-4-2	15	kV	Air Discharge
2	ESD (HBM model)	JEDEC JESD22-A114-B	1	kV	High-Speed Contacts
2	ESD (HBM model)	JEDEC JESD22-A114-B	2	kV	Other pins
3	EMC Immunity	IEC 61000-4-3			
4	EMI Emission	FCC Class B			

17. Revision History

Version	Date	Description	Prepared by
V6	2025	Unified WincoTek datasheet format	WincoTek
V6.1	2026-10-23	Engineering and format review	WincoTek