WTQD400-FR4

QSFP-DD 400Gb/s FR4 2km Transceiver / PRODUCT FEATURES

Part Number WTQD400-FR4	Data Rate 400Gb/s	Temperature 0 ~ 70ºC



1. Product Overview

Features

- Compliant with 400GBASE-FR4(IEEE802.3cu)
- Compliant with IEEE 802.3bs standard:
- 400GAUI-8 electrical interface
- Compliant with QSFP-DD MSA HW Rev 5.1
- type 2 housing with duplex LC connector
- Compliant with QSFP-DD CMIS Rev 5.0
- Maximum power consumption 9 W
- Case operating temperature 0ºC to 70ºC
- Two wire serial Interface with digital diagnostic monitoring
- Complies with EU Directive 2011/65/EU
- RoHS compliant
- Class 1 Laser

Applications

- High performance computing interconnect
- Data Centers
- Cloud Networks

2. Ordering Information

Part No.	Application	Data Rate	Laser	Fiber Type	Temp
WTQD400-FR4	400GBASE-FR4	400Gb/s	EML	SMF	0 ~ 70ºC

3. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	85	ºC
Supply Voltage	VCC	-0.5	3.6	V
Relative Humidity (non-condensing)	RH	5	95	%
Data Input Voltage Differential	lVDIP-VDINl	-	1	V
Control Input Voltage	VI	-0.3	VCC+0.5	V
Control Output Current	IO	-20	20	mA

4. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TOPR	0	-	70	°C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Instantaneous peak current at hot plug	ICC_IP	-	-	3600	mA	
Sustained peak current at hot plug	ICC_SP	-	-	2970	mA	
Maximum Power Dissipation	PD	-	-	9	W	
Maximum Power Dissipation, Low Power Mode	PDLP	-	-	1.5	W	
Signalling Rate per Lane	SRL	-	53.125	-	GBd	PAM4
Two Wire Serial Interface Clock Rate	-	-	-	400	kHz	
Module power supply noise tolerance 10 Hz - 10 MHz (ptp)	-	-	-	66	mVpp	
Rx Differential Data Output Load	-	-	100	-	Ohm	
Operating Distance	-	2	-	2000	m	

5. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter
Wavelength L0	λC0	1264.5	1271	1277.5	nm	
Wavelength L1	λC1	1284.5	1291	1297.5	nm	
Wavelength L2	λC2	1304.5	1311	1317.5	nm	
Wavelength L3	λC3	1324.5	1331	1337.5	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Launch Power, each lane	AOPL	-3.2	-	4.4	dBm	1
Outer Optical Modulation Amplitude (OMAouter), each lane	TOMA	-	-	3.7	dBm	
Outer Optical Modulation Amplitude (OMAouter) each lane: for TDECQ <1.4dB for 1.4=TDECQ=3.4dB	TOMA	-0.2 -1.6+TDECQ				

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Difference in launch power between any two lanes (OMAouter)	DP	-	-	3.9	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane	TDECQ	-	-	3.4	dB	
Transmitter eye closure for PAM4(TECQ)	TECQ	-	-	3.4	dB	
| TDECQ - TECQ |	-	-	-	2.5	dB	
Over/under-shoot	-	-	-	22	%	
Transmitter power excursion	-	-	-	1.8	dB	
Average Launch Power of OFF Transmitter, each lane	TOFF	-	-	-16	dBm	
Extinction Ratio, each lane	ER	3.5	-	-	dB	
Transmitter transition time	-	-	-	17	ps	
RIN17.1OMA	RIN	-	-	-136	dB/Hz	
Optical Return Loss Tolerance	ORL	-	-	17.1	dB	
Transmitter Reflectance	TR	-	-	-26	dB	
Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver
Wavelength L0	λC0	1264.5	1271	1277.5	nm	
Wavelength L1	λC1	1284.5	1291	1297.5	nm	
Wavelength L2	λC2	1304.5	1311	1317.5	nm	
Wavelength L3	λC3	1324.5	1331	1337.5	nm	
Damage Threshold, each lane	AOPD	5.4	-	-	dBm	
Average Receive Power, each lane	AOPR	-7.2	-	4.4	dBm	2
Receive Power (OMAouter), each lane	OMAR	-	-	3.7	dBm	
Difference in receive power between any two lanes (OMAouter)	DR	-	-	4.1	dB	
Receiver Reflectance	RR	-	-	-26	dB	
Receiver Sensitivity (OMAouter), each lane for TECQ <1.4dB for 1.4=TECQ=3.4dB	SOMA	-	-	-4.6 -6+TECQ	dBm	
Stressed Receiver Sensitivity (OMAouter), each lane	SRS	-	-	-2.6	dBm	

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Conditions of stressed receiver sensitivity test						
Stressed eye closure for PAM4 (SECQ)	-	-	3.4	-	dB	
OMAouter of each aggressor lane	-	-	1.4	-	dBm	

6. Optical Parameters

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Receiver (Module Output)	Receiver (Module Output)	Receiver (Module Output)	Receiver (Module Output)	Receiver (Module Output)	Receiver (Module Output)	Receiver (Module Output)
AC common-mode output Voltage (RMS)		-	-	17.5	mV	
Differential output Voltage		-	-	900	mV	
Near-end Eye height, differential		70	-	-	mV	
Far-end Eye height, differential		30	-	-	mV	
Far end pre-cursor ISI ratio		-4.5	-	2.5	%	
Differential Termination Mismatch		-	-	10	%	
Transition Time (min, 20% to 80%)		9.5	-	-	ps	
DC common mode Voltage		-350	-	2850	mV	
Transmitter (Module Input)	Transmitter (Module Input)	Transmitter (Module Input)	Transmitter (Module Input)	Transmitter (Module Input)	Transmitter (Module Input)	Transmitter (Module Input)
Differential pk-pk input Voltage tolerance		900	-	-	mV	
Differential termination mismatch		-	-	10	%	
Single-ended voltage tolerance range		-0.4	-	3.3	V	
DC common mode Voltage		-350	-	2850	mV	

7. Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	ºC	Internal
Voltage	0 to VCC	0.1	V	Internal
Tx Bias Current (Each Lane)	0 to 100	10%	mA	Internal

Parameter	Range	Accuracy	Unit	Calibration
Tx Output Power (Each Lane)	-3.2 to +4.4	±3	dB	Internal
Rx Receive Power (Each Lane)	-7.2 to +4.4	±3	dB	Internal

8. Digital Diagnostics

Version No.	Date	Description
1.0	May 17, 2023	Specification datasheet

9. Pin Descriptions

Pin #	Logic	Logic	Symbol	Definition	Pin #	Logic	Logic	Symbol	Definition
1			GND	Ground	39			GND	Ground
2	CML-I	CML-I	Tx2n	Transmitter Inverted Data Input	40	CML-I	CML-I	Tx6n	Transmitter Inverted Data Input
3	CML-I	CML-I	Tx2p	Transmitter Non-inverted Data Input	41	CML-I	CML-I	Tx6p	Transmitter Non-inverted Data Input
4			GND	Ground	42			GND	Ground
5	CML-I	CML-I	Tx4n	Transmitter Inverted Data Input	43	CML-I	CML-I	Tx8n	Transmitter Inverted Data Input
6	CML-I	CML-I	Tx4p	Transmitter Non-inverted Data Input	44	CML-I	CML-I	Tx8p	Transmitter Non-inverted Data Input
7			GND	Ground	45			GND	Ground
8	LVTTL-I	LVTTL-I	ModSelL	Module Select	46			Reserved	
9	LVTTL-I	LVTTL-I	ResetL	Module Reset	47			VS1	Module Vendor Specific 1
10			VccRx	+3.3V Power Supply Receiver	48			VccRx1	3.3V Power Supply
11	LVCMOS -I/O	LVCMOS -I/O	SCL	2-wire serial interface clock	49			VS2	Module Vendor Specific 2
12	LVCMOS -I/O	LVCMOS -I/O	SDA	2-wire serial interface data	50			VS3	Module Vendor Specific 3
13			GND	Ground	51			GND	Ground
14	CML-O	CML-O	Rx3p	Receiver Non-inverted Data Output	52	CML-O	CML-O	Rx7p	Receiver Non-inverted Data Output
15	CML-O	CML-O	Rx3n	Receiver Inverted Data Output	53	CML-O	CML-O	Rx7n	Receiver Inverted Data Output
16			GND	Ground	54			GND	Ground
17	CML-O	CML-O	Rx1p	Receiver Non-inverted Data Output	55	CML-O	CML-O	Rx5p	Receiver Non-inverted Data Output

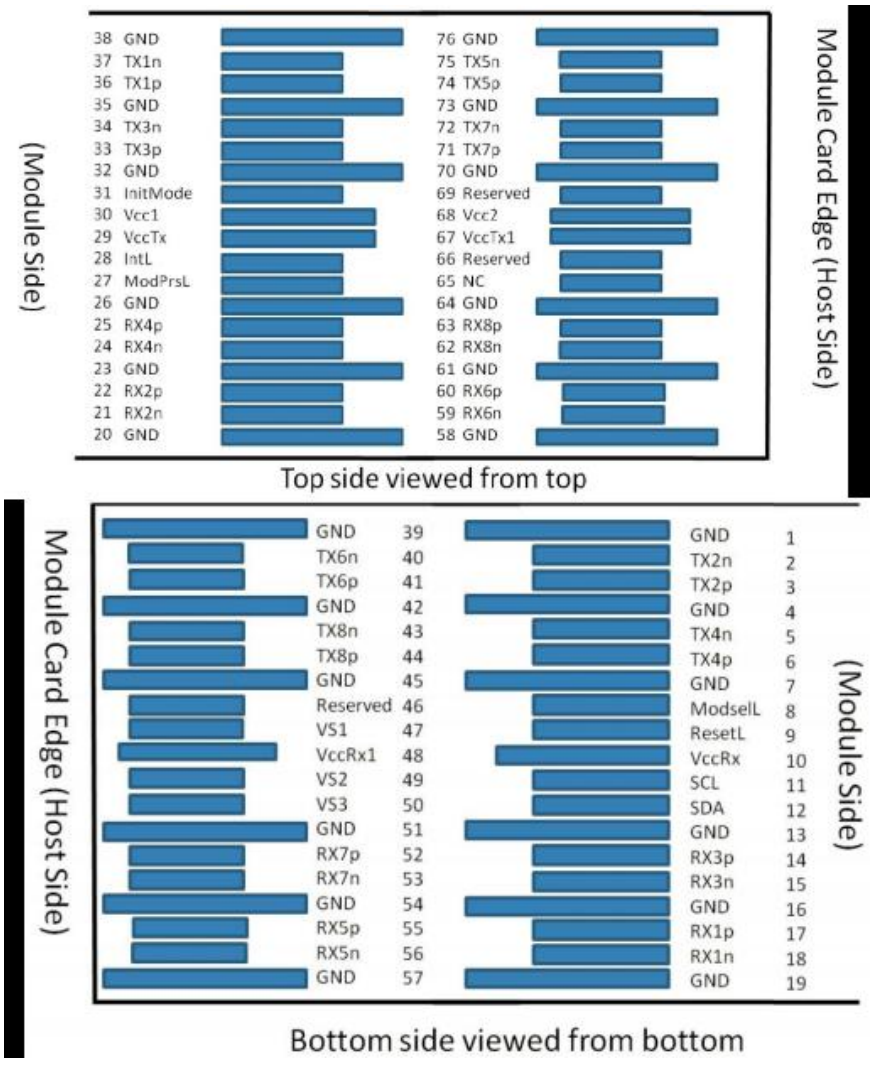
Pin #	Logic	Logic	Symbol	Definition	Pin #	Logic	Logic	Symbol	Definition
18	CML-O	CML-O	Rx1n	Receiver Inverted Data Output	56	CML-O	CML-O	Rx5n	Receiver Inverted Data Output
19			GND	Ground	57			GND	Ground
20			GND	Ground	58			GND	Ground
21	CML-O	CML-O	Rx2n	Receiver Inverted Data Output	59	CML-O	CML-O	Rx6n	Receiver Inverted Data Output
22	CML-O	CML-O	Rx2p	Receiver Non-inverted Data Output	60	CML-O	CML-O	Rx6p	Receiver Non-inverted Data Output
23			GND	Ground	61			GND	Ground
24	CML-O	CML-O	Rx4n	Receiver Inverted Data Output	62	CML-O	CML-O	Rx8n	Receiver Inverted Data Output
25	CML-O	CML-O	Rx4p	Receiver Non-inverted Data Output	63	CML-O	CML-O	Rx8p	Receiver Non-inverted Data Output
26			GND	Ground	64			GND	Ground
27	LVTTL-O	LVTTL-O	ModPrsL	Module Present	65			NC	Not connected
28	LVTTL-O	LVTTL-O	IntL	Interrupt	66			Reserved	
29			VccTx	+3.3V Power Supply Transmitter	67			VccTx1	3.3V Power Supply
30			Vcc1	+3.3V Power Supply	68			Vcc2	3.3V Power Supply
31	LVTTL-I	LVTTL-I	InitMode	Initialization mode	69			Reserved	
32			GND	Ground	70			GND	Ground
33	CML-I	CML-I	Tx3p	Transmitter Non-inverted Data Input	71	CML-I	CML-I	Tx7p	Transmitter Non-inverted Data Input
34	CML-I	CML-I	Tx3n	Transmitter Inverted Data Input	72	CML-I	CML-I	Tx7n	Transmitter Inverted Data Input
35			GND	Ground	73			GND	Ground
36	CML-I	CML-I	Tx1p	Transmitter Non-inverted Data Input	74	CML-I	CML-I	Tx5p	Transmitter Non-inverted Data Input
37	CML-I	CML-I	Tx1n	Transmitter Inverted Data Input	75	CML-I	CML-I	Tx5n	Transmitter Inverted Data Input
38	38		GND	Ground	76	76		GND	Ground

10. Management Interface Timing

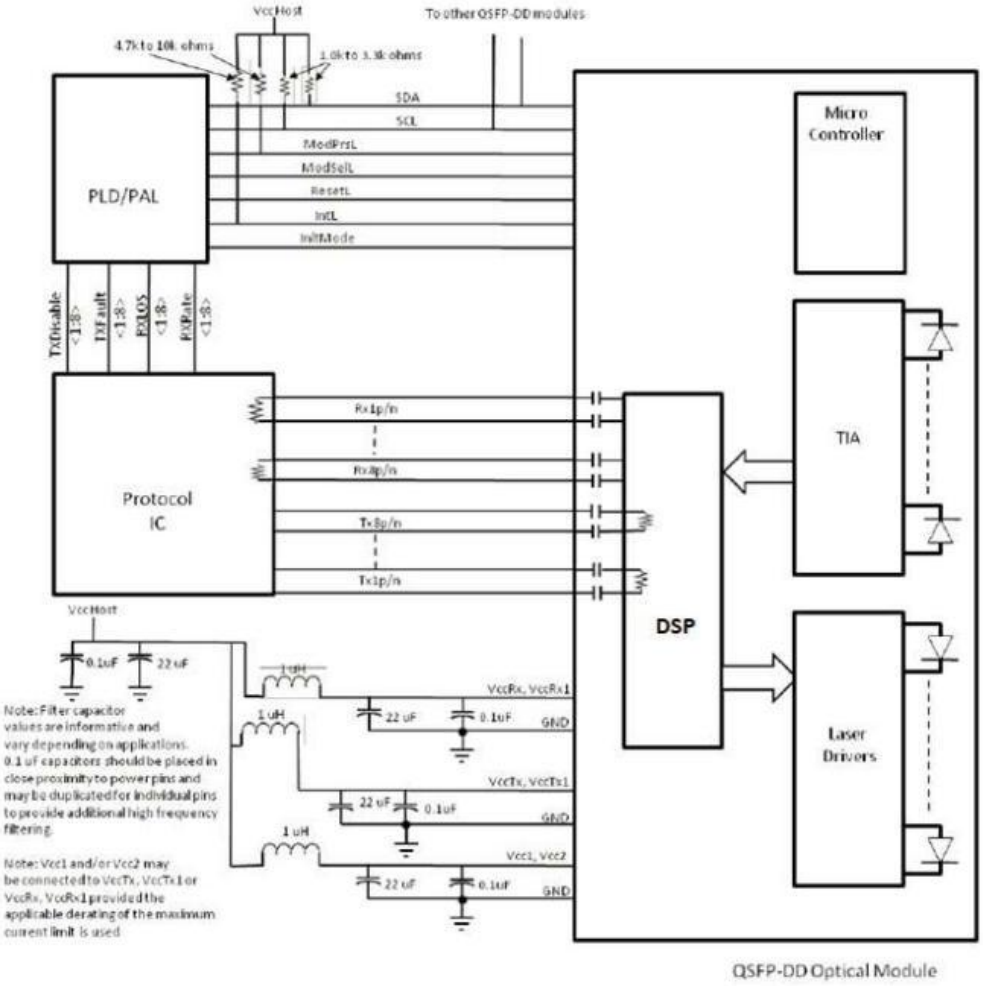
Parameter	Symbol	Min.	Max.	Unit	Condition
Module output SCL and SDA	VOL	0	0.4	V	
Module Input SCL and SDA	VIL	-0.3	VCC*0.3	V	
Module Input SCL and SDA	VIH	VCC*0.7	VCC+0.5	V	

Parameter	Symbol	Min.	Max.	Unit	Condition
LPMode, ResetL, ModSelL and ePPS	VIL	-0.3	0.8	V	
LPMode, ResetL, ModSelL and ePPS	VIH	2	VCC+0.3	V	
IntL	VOL	0	0.4	V	
IntL	VOH	VCC-0.5	VCC+0.3	V	

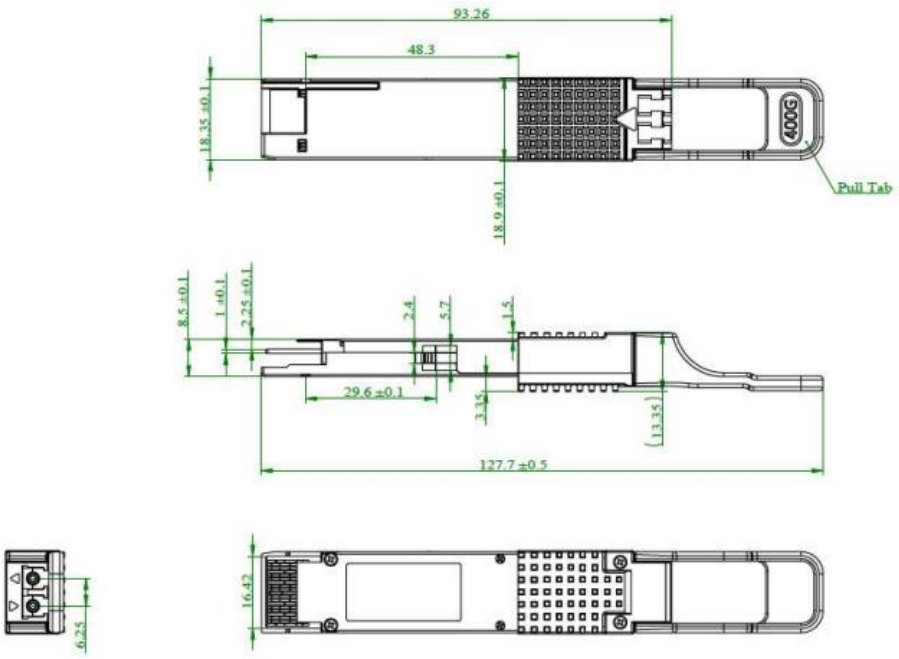
11. Pin Assignment



12. Recommended Interface Circuit



13. Mechanical Specifications



14. Revision History

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