QSFP-DD 400G LR4 10Km

DDM Transceiver / .PRODUCT FEATURES

Part Number WTQD400-LR4-10K-LC



1. Product Overview

Features

- 400G QSFP-DD LR4 optical transceiver.
- Up to 10 km over single-mode fiber with duplex LC.
- Four 106.25 Gb/s optical channels using PAM4 at 53.125 GBd.
- Digital diagnostic monitoring (DDMI).
- Commercial case temperature: 0 to 70 °C.
- 3.3 V nominal supply; maximum power consumption 12 W.

Applications

- Data Center 400GE 10 km SMF links
- 400GE to 4x 100GE breakout over 10 km
- 400GE Metro Ethernet
- .

2. Ordering Information

Part NO.	Bit Rate	Laser	Distance	Media	DDMI	Connector	Temp（℃）
WTQD400-LR4-10K-LC	425Gbps	1310nm	10Km	SMF	YES	dual LC	0~70

3. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	Vcc	0	-	3.6	V	
Storage Temperature		-40	-	85	°C	
Optical Receiver Input		-	-	+4.5	dBm	Average,each lane

4. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Module Power Supply Noise Tolerance	PSNRmod			66	mV	10 Hz – 10 MHz
Power Consumption		-	-	12	W	
Instantaneous peal current	Icc_ip_6	-	-	4800	mA	
Sustained peak current	Icc_sp_6	-	-	3960	mA	
Supply Current	Icc_6	-	-	3827.8	mA	Steady state

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Case Temperature	TC	0	25	70	°C	

5. Absolute Maximum Ratings

Spcifications	Min.	Typ.	Typ.	Max.	Unit	Ref.
Transmitter (each lane)	Transmitter (each lane)	Transmitter (each lane)	Transmitter (each lane)	Transmitter (each lane)	Transmitter (each lane)	Transmitter (each lane)
Signaling rate per lane (range)	- 100ppm	26.5625	26.5625	+100ppm	GBd	
Differential peak-to-peak input voltage	-	-	-	900	mV	at TP1a
Differential termination mismatch	-	-	-	10	%	at TP1
Single-ended input voltage tolerance range	-0.4	-	-	3.3	V	at TP1a
DC common mode voltage	-350	-	-	2850	mV	at TP1
Receiver (each lane, at TP4)	Receiver (each lane, at TP4)	Receiver (each lane, at TP4)	Receiver (each lane, at TP4)	Receiver (each lane, at TP4)	Receiver (each lane, at TP4)	Receiver (each lane, at TP4)
Signaling rate per lane (range)	- 100ppm	26.5625	26.5625	+100ppm	GBd	
AC Common-mode output voltage (RMS)	-	-	-	17.5	mV	
Differential pk-pk input voltage tolerance	900	-	-	-	mV	
Differential termination mismatch	-	-	-	10	%	
Near-end ESMW (Eye symmetry mask width)	0.265	-	-	-	UI	
Near-end Eye height, differential	70	-	-	-	mV	
Far-end ESMW (Eye symmetry mask width)	0.2	0.2	-	-	UI	
Far-end Eye height, differential	30	-	-	-	mV	
Transition time (20% to 80%)	9.5	-	-	-	ps	
DC common mode voltage	-350	-	-	2850	mV	

6. Optical Parameters

Parameter	Parameter	Symbol	Min.	Min.	Typ.	Max.	Max.	Unit	Ref.
Channel data rate	Channel data rate	fDC	106.25	106.25	106.25	106.25	106.25	Gb/s	
Signaling rate	Signaling rate	fSG	53.125	53.125	53.125	53.125	53.125	GBd	PAM4

Parameter	Parameter	Symbol	Min.	Min.	Typ.	Max.	Max.	Unit	Ref.
Signal speed variation from nominal	Signal speed variation from nominal	⊿fSG	- 100	-	-	-	+100	ppm	
Wavelength (Range)	Lane 0	□CT0	1264.5	-	-	-	1277.5	nm	
Wavelength (Range)	Lane 1	□CT1	1284.5	-	-	-	1297.5	nm	
Wavelength (Range)	Lane 2	□CT2	1304.5	-	-	-	1317.5	nm	
Wavelength (Range)	Lane 3	□CT3	1324.5	-	-	-	1337.5	nm	
Side-mode suppression ratio	Side-mode suppression ratio	SMSR	30	-	-	-		dB	
Total average launch power	Total average launch power		-	-	-	-	10.0	dBm	
Average launch power	Average launch power		-2.8	-	-	-	4.0	dBm	
Outer Optical Modulation Amplitude (OMAouter), each lane	Outer Optical Modulation Amplitude (OMAouter), each lane	OMAouter	+0.2	-	-	-	4.2	dBm	Note 1
Difference launch power between any two lanes (OMAouter)	Difference launch power between any two lanes (OMAouter)						4.0	dB	Note 2
Launch power in OMAouter minus TDECQ, each lane	Launch power in OMAouter minus TDECQ, each lane		-1.2					dBm	For ER＞ 4.5dB
Launch power in OMAouter minus TDECQ, each lane	Launch power in OMAouter minus TDECQ, each lane		-1.1					dBm	For ER＜ 4.5dB
Transmitter and dispersion eye closure for PAM4	Transmitter and dispersion eye closure for PAM4	TDECQ	-	-	-	-	3.9	dB	
TDECQ – 10*log10(Ceq) , each lane	TDECQ – 10*log10(Ceq) , each lane	TECQ	-	-	-	-	3.9	dB	Note 3
Transmitter power excursion	Transmitter power excursion		-	-	-	-	2.8	dB	
Extinction Ratio	Extinction Ratio	ER	3.5	-	-	-		dB	
Transmitter transition time	Transmitter transition time		-	-	-	-	17	ps	
Average Optical Output Power of Off Transmitter	Average Optical Output Power of Off Transmitter	Poff	-	-	-	-	-15	dBm	
RIN15.6OMA	RIN15.6OMA		-	-	-	-	- 136	dB/Hz	
Optical return loss tolerance	Optical return loss tolerance		-	-	-	-	15.6	dB	
Transmitter reflectance	Transmitter reflectance		-	-	-	-	-26	dB	Note 4
Average receive power, each lane	Average receive power, each lane		-9.1	-	-	-	4.0	dBm	Note 5

Parameter	Parameter	Symbol	Min.	Min.	Typ.	Max.	Max.	Unit	Ref.
Receive power (OMAouter)	Receive power (OMAouter)		-	-	-	-	4.2	dBm	
Receiver reflectance	Receiver reflectance		-	-	-	-	-26	dB	
Receiver sensitivity (OMAouter), each lane	Receiver sensitivity (OMAouter), each lane		RS = max (-6.6, SECQ - 8.0)	RS = max (-6.6, SECQ - 8.0)	RS = max (-6.6, SECQ - 8.0)	RS = max (-6.6, SECQ - 8.0)	RS = max (-6.6, SECQ - 8.0)		Note 6
Stressed receiver sensitivity (OMAout), each lane	Stressed receiver sensitivity (OMAout), each lane						-4.1	dBm	Note 7
Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test	Conditions of stressed receiver sensitivity test
Stressed eye closure for PAM4	Stressed eye closure for PAM4	SECQ	3.9	3.9	3.9	3.9	3.9	dB	
SECQ – 10*log10(Ceq) , lane under test	SECQ – 10*log10(Ceq) , lane under test						3.9	dB	Note 3
OMAouter of each aggressor lane	OMAouter of each aggressor lane			0	0	0		dBm	
RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics	RX_LOS Characteristics
Receiver Loss of Signal Indicator Assert Level	Receiver Loss of Signal Indicator Assert Level	RX_LOS	- 30	-	-	-	-12.1	dBm	Average power
Receiver Loss of Signal Indicator De-assert Level	Receiver Loss of Signal Indicator De-assert Level	RX_LOS	-	-	-	-	-9.1	dBm	Average power
Hysteresis	Hysteresis	RX_LOS	0.5	-	-	-	-	dB	

7. Pin Descriptions

Pad	Symbol	Description	Ref.
1	GND	Ground	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	
8	ModSelL	Module Select	
9	ResetL	Module Reset	

Pad	Symbol	Description	Ref.
10	VccRx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	
20	GND	Ground	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMode	Low Power mode;	
32	GND	Ground	
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	
39	GND	Ground	
40	Tx6n	Transmitter Inverted Data Input	
41	Tx6p	Transmitter Non-Inverted Data Input	
42	GND	Ground	
43	Tx8n	Transmitter Inverted Data Input	
44	Tx8p	Transmitter Non-Inverted Data Input	

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

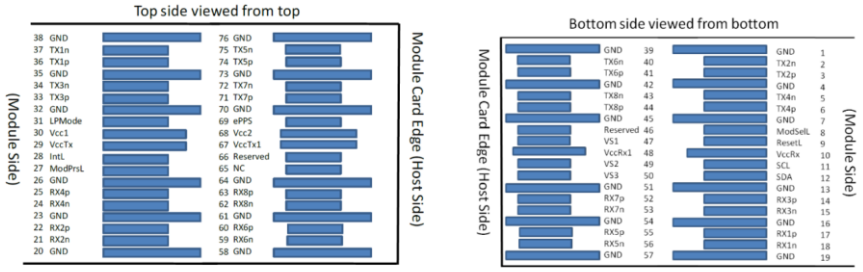
8. Pin Descriptions

Power Class	Max Power (W)
1	1.5
2	3.5
3	7.0
4	8.0
5	10
6	12
7	14
8	＞14

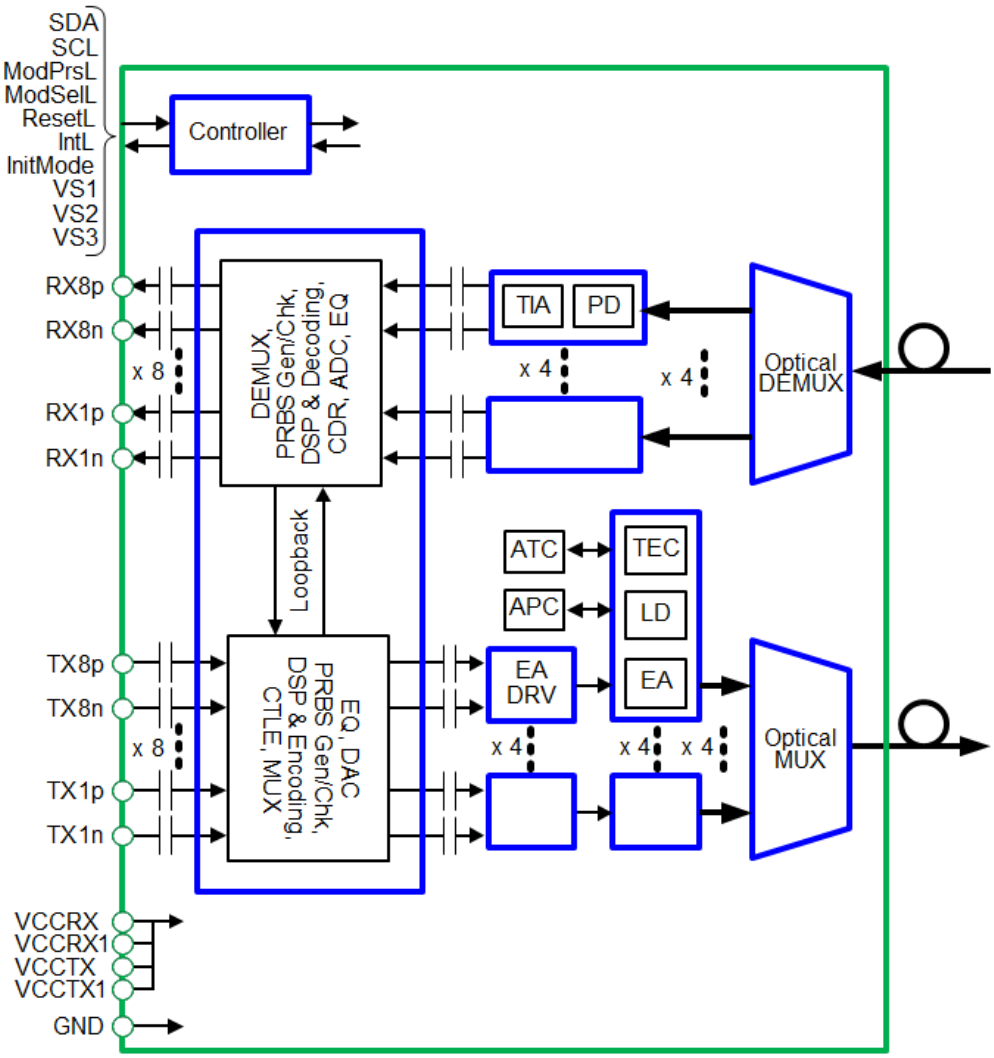
9. Additional Specifications

Parameter	Symbol	Min.	Max.	Unit.	Condition
SCL and SDA	VOL	0	0.4	V	IOL(max)=3mA for fast mode, 20mA for fast-mode plus
SCL and SDA	VOH	Vcc-0.5	Vcc+0.3	V	
SCL and SDA	VIL	-0.3	Vcc+0.3	V	
SCL and SDA	VIH	VCC-0.7	Vcc+0.5	V	
Capacitance for SCL and SDA I/O signal	Ci	-	14	pF	
Total bus capacitive load for SCL and SDA	Cb	-	100	pF	For 400kHz clock rate use MAX 3.0k ohm pull-up resistor. For 1000kHz clock rate refer to Figure 40 in Reference [3].
Total bus capacitive load for SCL and SDA	Cb	-	200	pF	For 400kHz clock rate use MAX 1.6k ohm pullup resistor. For 1000kHz clock rate refer to Figure 40 in Reference [3].
InitMode, ResetL and ModSelL	VIL	-0.3	0.8	V	
InitMode, ResetL and ModSelL	VIH	2	VCC+0.3	V	
InitMode, ResetL and ModSelL	|Iin|		360	uA	0V<Vin<Vcc
IntL	VOL	0	0.4	V	IOL=2.0mA
IntL	VOH	VCC-0.5	VCC+0.3	V	10k ohms pull up to Host Vcc
ModPrsL	VOL	0	0.4	V	IOL=2.0mA
ModPrsL	VOH				ModPrsL can be implemented as a short-circuit to GND on the module

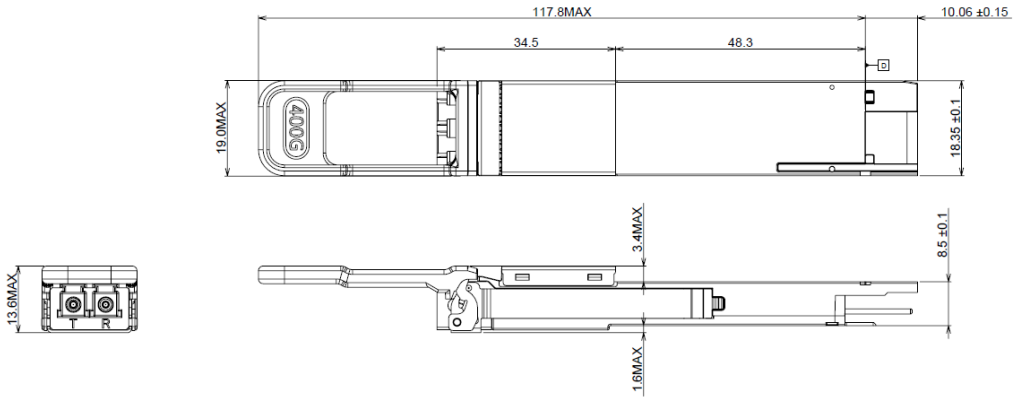
10. Pin Assignment



11. Functional Block Diagram



12. Mechanical Specifications



13. Revision History

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