WTQ112400-FR4-2C

400G QSFP112 FR4 2KM 1310nm LC Transceiver / 4x106.25 Gbps (PAM4) electrical interface

Part Number WTQ112400-FR4-2C	Data Rate 425.0



1. Product Overview

Features

- 4x106.25 Gbps (PAM4) electrical interface
- PIN and TIA array on the receiver side
- Up to 2km over SMF with KP4 FEC supported at the Host side
- Duplex LC connector
- Hot-pluggable QSFP112 form factor
- +3.3V single power supply
- Power dissipation <10W
- Operating case temp : 0°C to +70 °C
- RoHS compliant

Applications

- Data centers and cloud networks
- Infiniband interconnects
- Order Information
- Note1: Case Temperature
- Absolute Maximum Ratings
- Note1: No condensation
- Recommended Operating Conditions
- Note1: the recommended power supply filter with the module and recommended filter in place. Voltage levels including peak-to peak noise are limited to the recommended operating range of the associated power supply.
- Note2: 400GAUI-4 operation with Host generated FEC. The transmitter must receive pre-coded FEC signals from the host ASIC.
- Note3: 400G FR4 operation with Host generated FEC. The transmitter must receive pre-coded FEC signals from the host ASIC.
- Electrical Characteristics
- Note1: DC common mode voltage generated by the host. Specification includes effects of ground offset voltage

2. Ordering Information

Part No.	Bit Rate (Gbps)	Laser	Distance	Fiber Type	DDMI	Connector	Tempnote1
WTQ112400-FR4-2C	425.0	1310nm	2km	SMF	YES	Duplex LC	0℃~+70℃

3. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc3	-0.3	-	+3.6	V	
Storage Temperature	Ts	-40	-	+85	°C	
Operating Humidity	RH	5	-	95	%	1

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
RX damage threshold, per Lane	PRdmg	+5.4	-	-	dBm	

4. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Ref.
Operating Case Temperature	TC	0	-	+70	°C	
Operating Relative Humidity	RH			65	%	
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Power Dissipation	Pd	-	-	10	W	
Power Supply Noise				50	mVpp	* 1
Electrical Signal Rate Per Channel (PAM encoded)			53.125		GBd	* 2
Optical Signal Rate Per Channel (PAM encoded)			53.125		GBd	* 3
Receiver Differential Data Output Load		100			Ohm	
Fiber Length (9μm SMF)				2000	M	*4

5. Electrical Characteristics

Parameter	Parameter	Symbol	Min.	Typ.	Max.	Max.	Units	Ref.
Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter
Signaling Rate per Lane	Signaling Rate per Lane	TP	53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	GBd	
Differential P-P voltage tolerance	Differential P-P voltage tolerance	TP1a	750				mV	
DC common-mode voltage tolerance*1	DC common-mode voltage tolerance*1	TP1	-350		2850	2850	mV	
Differential-mode to common-mode return loss, RLcd	Differential-mode to common-mode return loss, RLcd	TP1	Equation (120G-2)	Equation (120G-2)	Equation (120G-2)	Equation (120G-2)	dB	802.3ck
Effective return loss, ERL	Effective return loss, ERL	TP1	8.5				dB	802.3ck
Differential Termination Mismatch	Differential Termination Mismatch	TP1			10	10	%	
Module stressed input tolerance	Module stressed input tolerance	TP1a	see 120G.3.4.3	see 120G.3.4.3	see 120G.3.4.3	see 120G.3.4.3		802.3ck
Single-ended voltage tolerance range	Single-ended voltage tolerance range	TP1a	-0.4		3.3	3.3	V	
Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver
Parameter	Parameter	Symbol	Min.	Typ.	Typ.	Max.	Units	Ref.

Parameter	Parameter	Symbol	Min.	Typ.	Max.	Max.	Units	Ref.
Signaling Rate per Lane(range)TP4	Signaling Rate per Lane(range)TP4	TP4	53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	GBd	
Differential P-P output voltage	Short mode	TP4			600	600	mV	
Differential P-P output voltage	Long mode	TP4			845	845	mV	
Eye height	Eye height			15			mV	
Vertical eye closure, VEC	Vertical eye closure, VEC				12	12	dB	
common-mode to Differential - mode return loss, RLcd	common-mode to Differential - mode return loss, RLcd	TP4	Equation (120G-1)	Equation (120G-1)	Equation (120G-1)	Equation (120G-1)	dB	802.3ck
Effective return loss, ERL	Effective return loss, ERL	TP4	8.5				dB	
Differential Termination Mismatch	Differential Termination Mismatch	TP4			10	10	%	
Transition time TP4 8.5 ps	Transition time TP4 8.5 ps	TP4	8.5				ps	
DC common-mode voltage tolerance*2	DC common-mode voltage tolerance*2	TP4	-0.35		2.85	2.85	V	802.3ck

6. Electrical Characteristics

Parameter	Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter
Signaling Rate per Lane	Signaling Rate per Lane		53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	GBd	
Modulation Format	Modulation Format		PAM4	PAM4	PAM4		
Lane Center Wavelengths (range)	Lane0	λC0	1264.5		1277.5	nm	
Lane Center Wavelengths (range)	Lane1	λC1	1284.5		1297.5	nm	
Lane Center Wavelengths (range)	Lane2	λC2	1304.5		1317.5	nm	
Lane Center Wavelengths (range)	Lane3	λC3	1324.5		1337.5	nm	
Side-mode Suppression ratio (SMSR)	Side-mode Suppression ratio (SMSR)	SMSR	30			dB	
Total average launch power	Total average launch power				10.4	dBm	
Average Launch Power, each lane *1	Average Launch Power, each lane *1		-3.2		4.4	dBm	
Optical Extinction Ratio	Optical Extinction Ratio	ER	3.5			dB	
Outer Optical Modu-lation Amplitude, (OMA outer), each Lane	for TDECQ <1.4dB	TxOMA	-0.2		3.7	dBm	

Parameter	Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Outer Optical Modu-lation Amplitude, (OMA outer), each Lane	for 1.4dB≤ TDECQ≤3.4dB	TxOMA	-1.6+TDECQ		3.7	dBm	
Difference in launch power between any two lanes (OMAouter)	Difference in launch power between any two lanes (OMAouter)	Txoutdif			3.9	dB	
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane	Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane	TDECQ			3.4	dB	
Transmitter eye closure for PAM4, each lane	Transmitter eye closure for PAM4, each lane	TECQ			3.4	dB	
|TDECQ- TECQ|	|TDECQ- TECQ|				2.5	dB	
RINOMA 17.1	RINOMA 17.1				-136	dB/Hz	
Average launch power of OFF transmitter	Average launch power of OFF transmitter				-16	dBm	
Optical Return Loss Tolerance	Optical Return Loss Tolerance				17.1	dB	
Transmitter Reflectance	Transmitter Reflectance				-26	dB	
Transmitter transition time	Transmitter transition time				17	ps	
Transmitter over/under-shoot	Transmitter over/under-shoot				22	%	
Transmitter power excursion	Transmitter power excursion				1.8	dB	
Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver
Parameter	Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Signaling Rate per Lane	Signaling Rate per Lane		53.125 ± 100 ppm	53.125 ± 100 ppm	53.125 ± 100 ppm	GBd	
Modulation Format	Modulation Format		PAM4	PAM4	PAM4		
Lane Center Wavelengths (range)	Lane0	λC0	1264.5		1277.5	nm	
Lane Center Wavelengths (range)	Lane1	λC1	1284.5		1297.5	nm	
Lane Center Wavelengths (range)	Lane2	λC2	1304.5		1317.5	nm	
Lane Center Wavelengths (range)	Lane3	λC3	1324.5		1337.5	nm	
Damage threshold, each lane	Damage threshold, each lane		5.4			dBm	
Average receiver power each lane	Average receiver power each lane		-7.2		4.4	dBm	
Receive power (OMAouter) each Lane	Receive power (OMAouter) each Lane				3.7	dBm	
Difference in receive power between any two lanes (OMAouter)	Difference in receive power between any two lanes (OMAouter)				4.1	dB	

Parameter	Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Receiver sensitivity (OMAouter) each Lane	for TDECQ <1.4dB	sen			-4.6	dBm	
Receiver sensitivity (OMAouter) each Lane	for 1.4dB≤ TDECQ≤3.4dB	sen			-6+TECQ	dBm	
LOS Assert	LOS Assert	LOS-A	-15			dBm	
LOS De-Assert	LOS De-Assert	LOS-D			-10	dBm	
RSSI accuracy	RSSI accuracy		-2		+2	dB	
Receiver reflectance	Receiver reflectance				-26	dB	
Stressed receiver sensitivity (OMAouter), each lane	Stressed receiver sensitivity (OMAouter), each lane				-2.6	dBm	
Stressed eye closure for PAM4 (SECQ), lane under test	Stressed eye closure for PAM4 (SECQ), lane under test			3.4		dB	*2
OMAouter of each aggressor lane	OMAouter of each aggressor lane			1.4		dBm	*2

7. Pin Descriptions

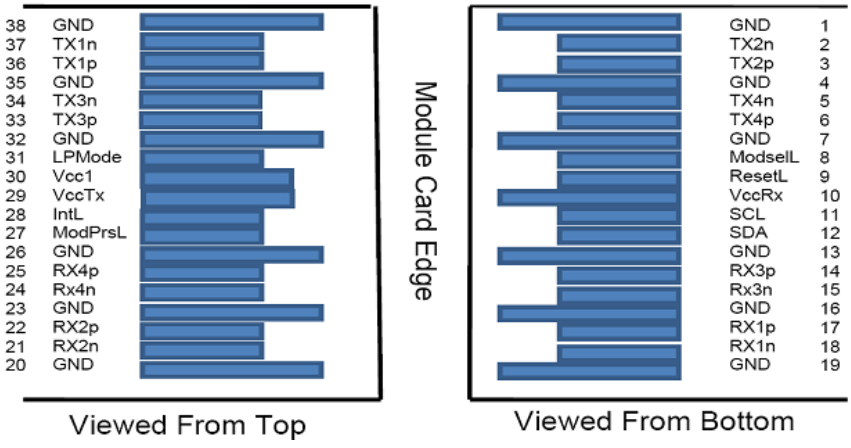
Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	

Pin	Symbol	Name/Description	Notes
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

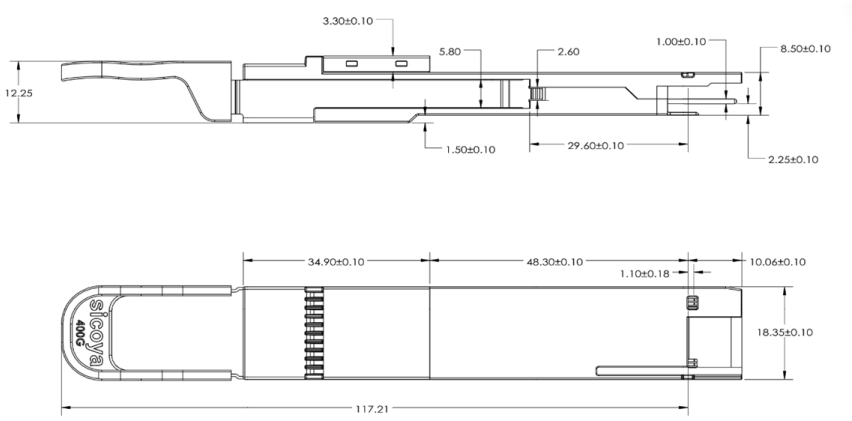
8. Revision History

Version	Initiated	Reviewed	Revision	Release Date
A0	Lynn	Luke	New Release	2023-12-17

9. Technical Figure 1



10. Technical Figure 2



11. Revision History

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