WTQ2S13002C0CN1 QSFP28 FR1 Transceiver

100Gb/s 1310nm Single Lambda SMF 2km / Product Overview 3



Part Number	Temperature
WTQ2S13002C0CN1	0°C~+70°C

1. Product Overview

General Description

This product is a transceiver module designed for 2km optical communication applications. The module incorporates one channel optical signal, on 1310nm center wavelength, operating at 50Gbaud data rate. The transmitter path incorporates an EML Driver and a cooled EML together. On the receiver path, the input optical signal is coupled to a Pin photodiode detector. A DSP based gearbox is used to convert 4x25Gbps NRZ signals to 1x50Gbaud PAM4 signal. Also, a 4-channel retimer and FEC block are integrated in this DSP. The electrical interface is compliant with IEEE 802.3cd and QSFP28 MSA in the transmitting and receiving directions, and optical interface is compliant to IEEE 802.3cd and 100G Lambda MSA with Duplex LC connector. The module has a maximum power consumption of 4.5W.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference.

Functional Description

This product converts the 4-channel of 100Gbps aggregated NRZ electrical input data into one channel of 50Gbaud PAM4 optical signal (light) on 1310nm center wavelength through a DSP based gearbox, by a driven cooled Electro-absorption Modulated DFB Laser (EML). The light propagates out of the transmitter into an SMF fiber. The receiver module accepts the 50Gbaud PAM4 optical signal input, and converts it into a 50Gbaud PAM4 electrical signal via a linear amplifier. And then convert the 50Gbaud PAM4 signal into 4 channels of 25Gbps NRZ signals. Figure 1 shows the functional block diagram of this product.

Features

- 100G Lambda MSA 100G-FR Specification compliant
- Up to 2km transmission on single mode fiber (SMF) with FEC
- Operating case temperature: 0 to 70°C
- 4x25G electrical interface (OIF CEI-28G- VSR)
- Maximum power consumption 4.5W
- LC duplex connector
- RoHS compliant

Applications

- Data Center
- 100G Ethernet
- Enterprise networking

2. Ordering Information

Part Number	Data Rate (Gbps)	Wavelength (nm)	Transmission Distance(km)	Temperature (oC) (Operating Case)
WTQ2S13002C0CN1	100Gb/s	1310nm	2km SMF	0°C~+70°C

3. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units
Operating Case Temperature	TOP	0		70	degC
Power Supply Voltage	VCC	3.135	3.3	3.465	V
Electrical Data Rate, each Lane (NRZ)			25.78125		Gb/s
Optical Data Rate (PAM4)			53.125		GBd
Data Rate Accuracy		-100		100	ppm
Pre-FEC Bit Error Ratio				2.4x10-4	
Post-FEC Bit Error Ratio				1x10-12	
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Link Distance with G.652	D	0.002		2	km

4. Recommended Operating Conditions

Parameter	Test Point	Min	Typical	Max	Units	Notes
Power Consumption				4.5	W	
Supply Current	Icc			1.36	A	
Transmitter (each Lane)	Transmitter (each Lane)	Transmitter (each Lane)	Transmitter (each Lane)	Transmitter (each Lane)	Transmitter (each Lane)	Transmitter (each Lane)
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI- 28G-VSR Equation13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	TP1			See CEI- 28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI- 28G-VSR Section13.3.11.2.1				
Receiver (each Lane)	Receiver (each Lane)	Receiver (each Lane)	Receiver (each Lane)	Receiver (each Lane)	Receiver (each Lane)	Receiver (each Lane)
Differential Voltage, pk- pk	TP4			900	mV	

Parameter	Test Point	Min	Typical	Max	Units	Notes
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common Mode Noise,RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSREquation 13-19	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22, SCD22)	TP4			See CEI-28G-VSREquation 13-21	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10-15 probability (EW15)	TP4	0.57			UI	
Eye Height at 10-15 probability (EH15)	TP4	228			mV	

5. Optical Parameters

Parameter	Symbol	Min	Min	Typical	Max	Units	Notes
Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter	Transmitter
Center Wavelength	λt	1304.5	1304.5		1317.5	nm	
Side Mode Suppression Ratio	SMSR	30	30			dB	
Average Launch Power	PAVG	-2.4	-2.4		4	dBm	1
Outer Optical Modulation Amplitude (OMAouter)	POMA	-0.2	-0.2		4.2	dBm	2
Launch Power in OMAouter minus TDECQ for ER ≥ 5dB for ER < 5dB		-1.6 -1.5	-1.6 -1.5			dBm	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ)	TDECQ				3.4	dB	
TDECQ – 10*log10(Ceq)					3.4	dB	3
Extinction Ratio	ER	3.5	3.5			dB	
RIN15.5OMA	RIN				-136	dB/Hz	
Optical Return Loss Tolerance	TOL				17.1	dB	

Parameter	Symbol	Min	Min	Typical	Max	Units	Notes
Transmitter Reflectance	RT				-26	dB	
Transmitter Transition Time					17	ps	
Average Launch Power of OFF Transmitter	Poff				-15	dBm	
Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver	Receiver
Center Wavelength	λr	1304.5			1317.5	nm	
Damage Threshold	THd	5.5				dBm	4
Average Receive Power		-6.4			4.5	dBm	5
Receive Power (OMAouter)					4.7	dBm	
Receiver Sensitivity (OMAouter)	SEN				Equation (1)	dBm	6
Stressed Receiver Sensitivity (OMAouter)	SRS				-2.5	dBm	7
Receiver Reflectance	RR				-26	dB	
LOS Assert	LOSA	-15				dBm	
LOS Deassert	LOSD				-9.4	dBm	
LOS Hysteresis	LOSH	0.5				dB	
Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)	Conditions of Stress Receiver Sensitivity Test (Note 5)
Stressed Eye Closure for PAM4 (SECQ)			3.4	3.4		dB	
SECQ – 10*log10(Ceq)					3.4	dB	

6. Digital Diagnostics

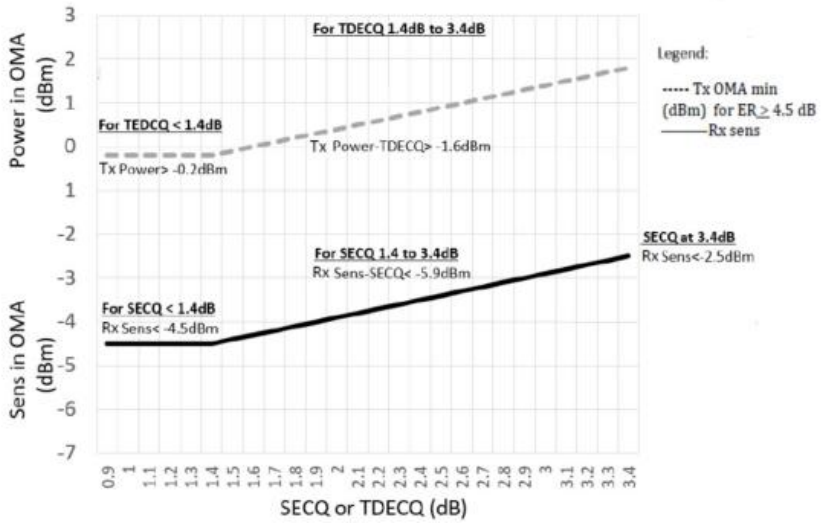
Parameter	Symbol	Min	Max	Units	Notes
Temperature Monitor Absolute Error	DMI_Temp	-3	3	degC	Over operating temperature range
Supply Voltage Monitor Absolute Error	DMI _VCC	-0.1	0.1	V	Over full operating range
RX Power Monitor Absolute Error	DMI_RX	-2	2	dB	1
Bias Current Monitor	DMI_Ibias	-10%	10%	mA	
TX Power Monitor Absolute Error	DMI_TX	-2	2	dB	1

7. Pin Descriptions

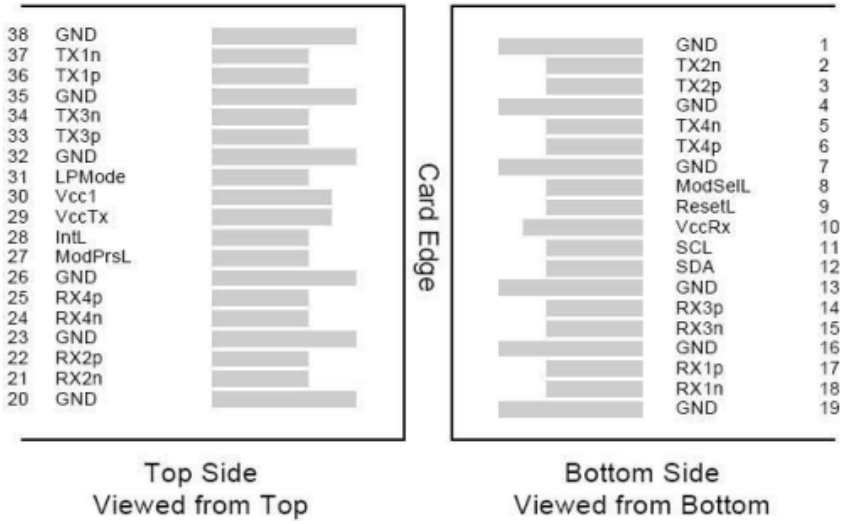
PIN	Logic	Symbol	Name/Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	1
8	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3 V Power Supply transmitter	2

PIN	Logic	Symbol	Name/Description	Notes
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
38		GND	Ground	1

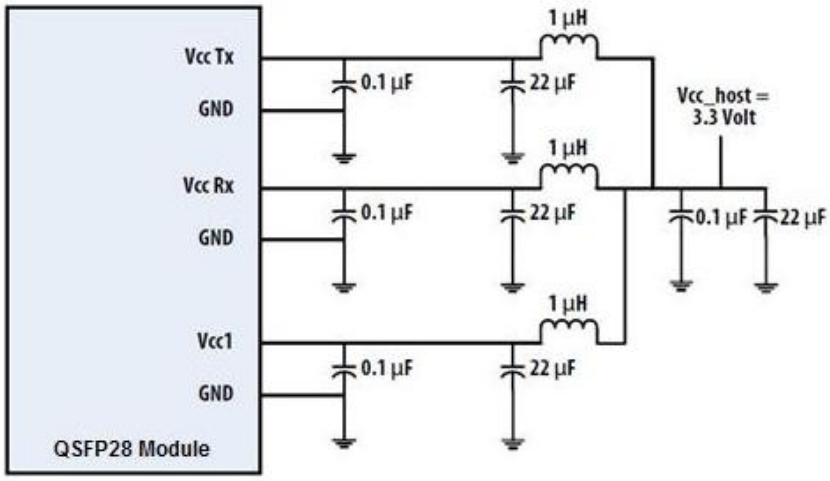
8. Transmitter OMA and Receiver Sensitivity versus TDECQ and SECQ



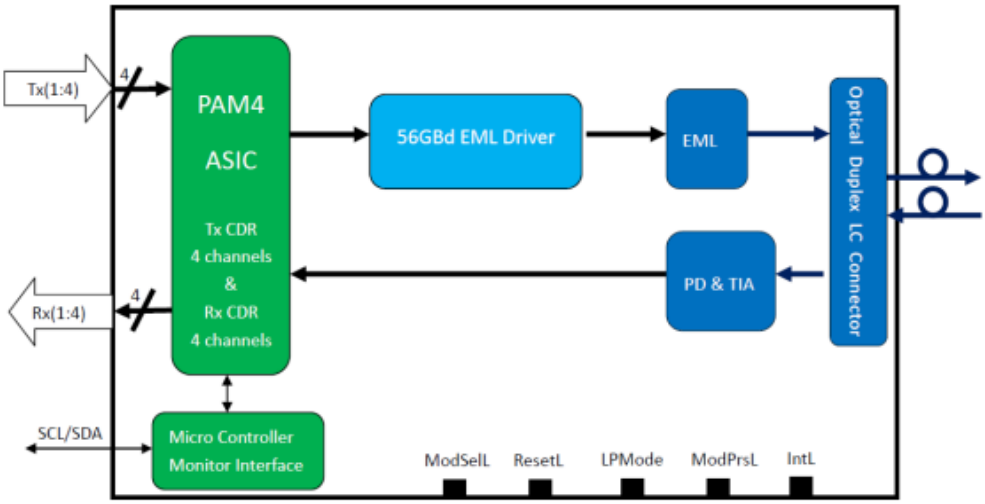
9. Pin Assignment



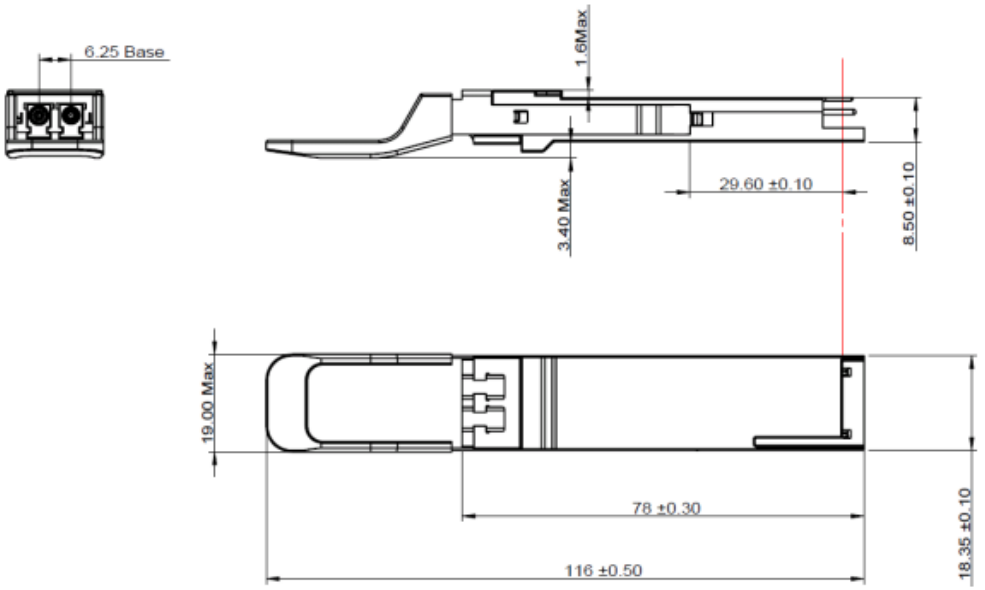
10. Power Supply Filtering Circuit



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