

LQ-CW200-FR4C

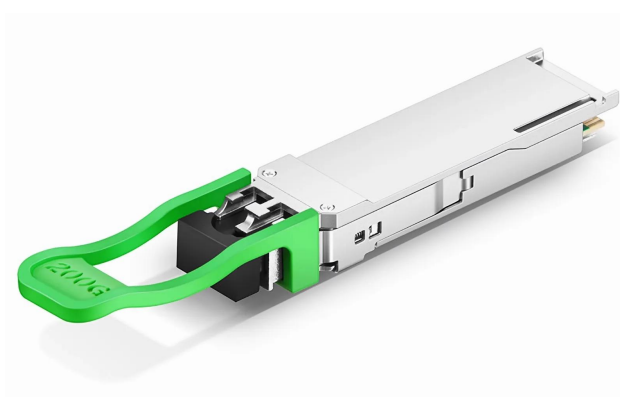
200GBASE-FR4 QSFP56, Optical Transceiver Module, 2km Reach

Features

- IEEE 802.3-2018 200GE FR4 specification compliant
- 4 CWDM lanes MUX/DEMUX design
- 4x 53.125 Gbps PAM4 electrical interface (200GAUI-4, CEI-56G-VSR-PAM4)
- Non-hermetic package design
- Maximum power consumption 6.0 W
- LC duplex connector
- 212.5 Gbps aggregate bit rate
- Up to 2 km transmission on single mode fiber with FEC
- Operating case temperature: 0 to 70°C
- Single 3.3 V power supply
- I2C digital management interface
- Hardware SFF-8679 Rev 1.8 compliant
- Software QSFP-DD CMIS Rev 4.0 compliant
- RoHS 2 compliant

Applications

- IEEE 802.3bs 200GBASE-FR4 Ethernet (PAM4)
- 5G Back-haul
- Data center



Description

LINK-PP LQ-CW200-FR4C 200GE QSFP56 Optical Transceiver is a QSFP56 transceiver module designed for 2km optical communication applications with single mode fiber. It is compliant with IEEE 802.3-2018 200GBASE FR4, SFF-8679, and CEI-56G-VSR-PAM4 standards. Digital diagnostic management interface (DDMI) is realized by I2C interface in compliance with CMIS4. The module is RoHS 2 compliant.

The module can convert 4-channel 53.125 Gbps electrical data to 4-channel optical signals, and multiplex them

into a single channel for 212.5 Gbps optical transmission. Similarly, it optically de-multiplexes a 212.5 Gbps input into 4-channel signals, and converts them to 4-channel output electrical data on the receiver side. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. A block diagram is shown in below picture.

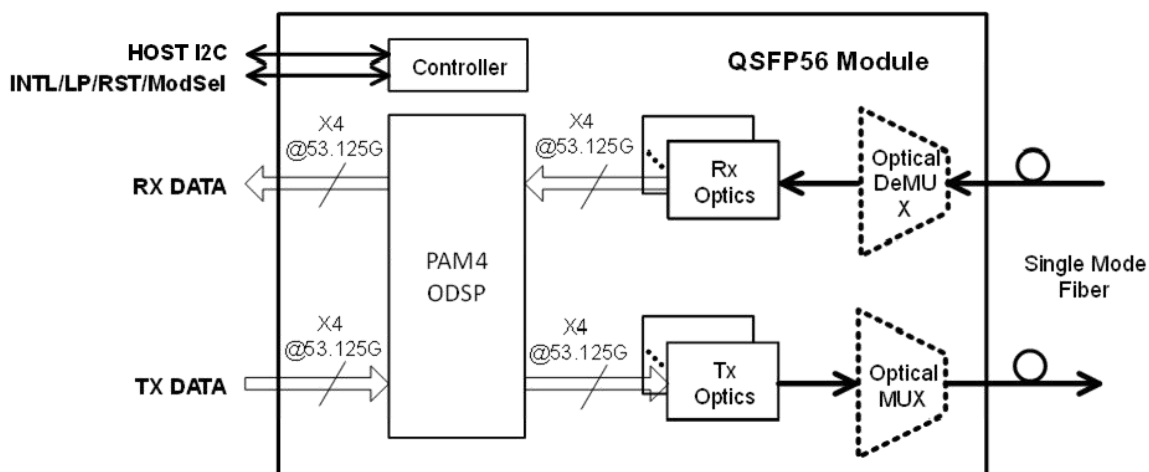


Figure 1. Transceiver block diagram

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Maximum supply voltage	Vcc	-0.3	3.3	3.6	V	
Storage temperature	Ts	-40		85	°C	
Relative humidity	RH	0		85	%	Non-condensing
Damage threshold, each lane	THd	5.7			dBm	

Operating Environments

Electrical and optical characteristics below are defined under this operating environment, unless otherwise specified.

Parameter	Symbol	Min	Typical	Max	Unit
Supply voltage	Vcc	3.135	3.3	3.465	V
Case temperature	T	0		70	°C
Signaling rate, each lane			26.5625		GBd
Data rate accuracy		-100		100	ppm
Link distance with G.652		2		2000	m

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power dissipation				6.0	W	
Supply current	I _{cc}			1.9138	A	
Transmitter (module output)						
Signaling rate per lane (range)		26.5625 ± 100 ppm			GBd	
Differential voltage pk-pk	V _{pp}			900	mV	At 1 MHz
Common mode voltage	V _{cm}	-350		2850	mV	
Common mode noise, RMS				17.5	mV	
Differential termination resistance mismatch				10	%	
Differential return loss	SDD22	Complaint to CEI-56G-VSR-PAM4				
Common mode to differential mode conversion	SDC22	Complaint to CEI-56G-VSR-PAM4				
Transition time	Trise/Tf all	9.5			ps	20%~80%
Near-end eye width at 10 ⁻⁶ probability	EW6	0.265			UI	
Near-end eye height at 10 ⁻⁶ probability	EH6	70			mV	
Far-end eye width at 10 ⁻⁶ probability	EW6	0.2			UI	
Far-end eye height at 10 ⁻⁶ probability	EH6	30			mV	
Near-end eye linearity		0.85				
Receiver (module input)						
Signaling rate per lane (range)		26.5625 ± 100 ppm			GBd	
Overload differential voltage pk-pk	V _{pp}	900			mV	

Common mode voltage	Vcm	-350		2850	mV	
Differential termination resistance mismatch				10	%	At 1 MHz
Differential return loss	SDD11	Complaint to CEI-56G-VSR-PAM4				
Differential mode to common mode conversion	SCD11	Complaint to CEI-56G-VSR-PAM4				
Stressed input test		Complaint to CEI-56G-VSR-PAM4				

Optical Characteristics

Parameters	Unit	Min.	Typ.	Max.
Transmitter				
Signaling rate, each lane	GBd	26.5625 ± 100 ppm		
Total average launch power	dBm			10.7
Average launch power, each lane	dBm	-4.2		4.7
Line wavelengths	nm	1264.5		1277.5
		1284.5		1297.5
		1304.5		1317.5
		1324.5		1337.5
Optical modulation amplitude (OMA _{outer}), each lane	dBm	-1.2		4.5
Difference in launch power between any two lanes (OMA _{outer})	dB			4
Extinction ratio (ER)	dB	3.5		
Side-mode suppression ratio (SMSR)	dB	30		
Launch power in OMA _{outer} mi-nus TDECQ, each lane for extinction ratio ≥ 4.5 dB for extinction ratio < 4.5 dB	dBm	-2.6 -2.5		
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane	dB			3.3
Average launch power of OFF transmitter, each lane	dBm			-30
Optical return loss tolerance	dB			17.1
Transmitter reflectance	dB			-26

Receiver				
Signaling rate, each lane	GBd	26.5625 ± 100 ppm		
Line wavelengths	nm	1264.5		1277.5
		1284.5		1297.5
		1304.5		1317.5
		1324.5		1337.5
Average receiver power, each lane	dBm	-8.2		4.7
Receiver power, each lane (OMA)	dBm			4.5
Damage threshold, each lane	dBm	5.7		
Difference in receive power between any two lanes(OMAuter)	dB			4.1
Receiver sensitivity (OMA), each lane	dBm			max (-5.5, SECQ-6.9)
Receiver reflectance	dB			-26
Stressed receiver Sensitivity (OMA), each lane	dBm			-3.6
Conditions of stressed receiver sensitivity				
Stressed eye closure for PAM4 (SECQ), lane under test	dB			3.3
OMAuter of each aggressor lane	dBm			0.5

Pin Description

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	VccRx	+3.3 V Power Supply Receiver	2
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	
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/RxLOS	Interrupt. Optionally configurable as RxLOSL	
29	VccTx	+3.3 V Power Supply Transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMODE/Tx	Low Power Mode. Optionally configurable as	
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

Note:

1. Circuit ground is internally isolated from chassis ground. GND is the symbol for signal and supply (power) common for the module. All are common within the module and all module voltages are referenced to this

potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

2. VccRx, Vcc1 and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1A.

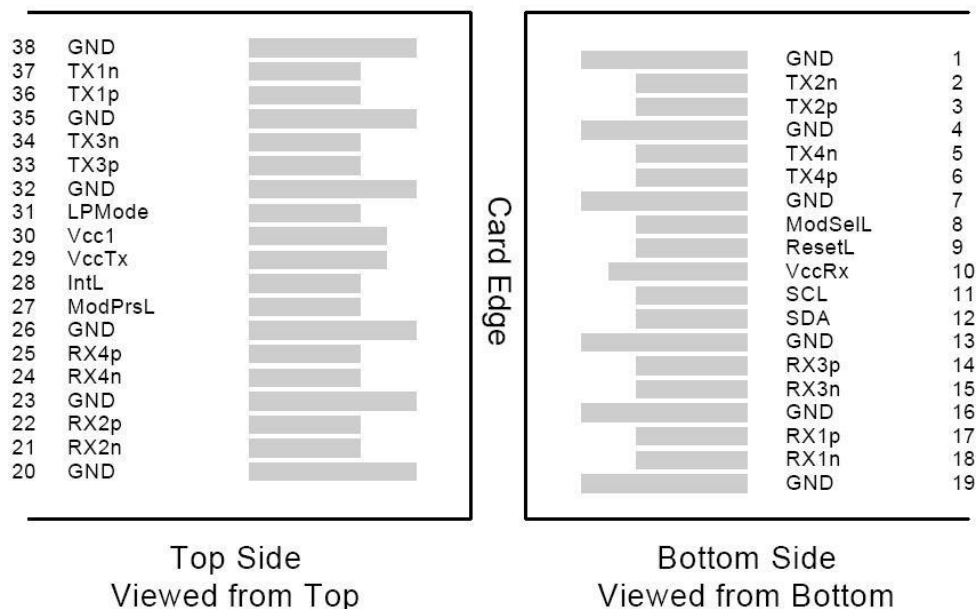


Figure 2. Electrical Pin-out Details

Digital Diagnostic Functions

Performance Item	Data Address	
	Alarm & Warning	Alarm & Warning Thresholds
Module temperature	Lower page 9	Page2h (128-135)
Module voltage	Lower page 9	Page2h (136-143)
Bias current	Page11h (143-146)	Page2h (184-191)
Transmitter optical power	Page11h (139-142)	Page2h (176-183)
Receiver optical power	Page11h (149-152)	Page2h (192-199)

Mechanical Dimensions

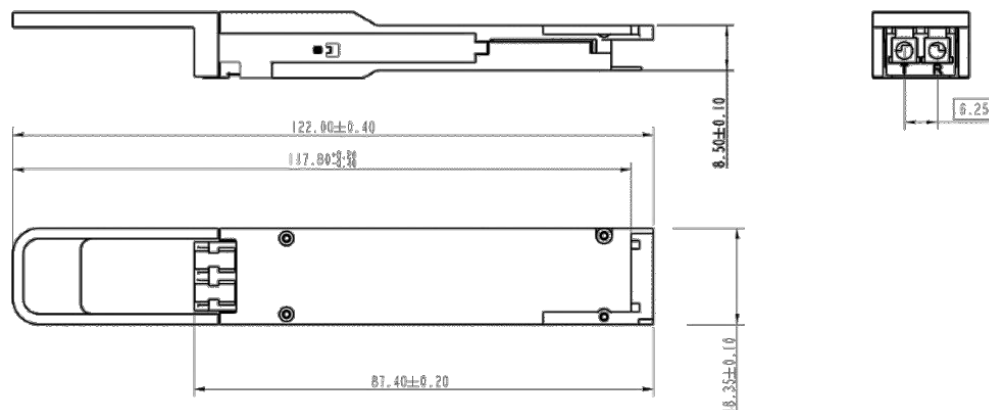


Figure 3. Mechanical Specifications

Ordering information

Part Number	Product Description
LQ-CW200-FR4C	QSFP56, 200GBASE-FR4 Transceiver, LC, 2km over SMF, PAM4, 0~70°C