

200G QSFP112 VR2 Transceiver CC-QSFP02VR2-12C

Features

- Hot-pluggable QSFP112 Type 1 form factor
- Data rate up to 212.5Gbps (2x 106.25Gbps)
- Reach up to 50m on MMF(OM4)
- 850nm VCSEL laser and PIN receiver
- High speed I/O electrical interface (200GAUI-2-S C2M)
- Single MPO-12 receptacle
- Operating case temperature: 0 to +70°C
- Compliant to RoHS 6/6
- Compliant to QSFP112 MSA and CMIS4.0

Description

This module is a hot pluggable fiber optic transceiver in the QSFP form factor with digital diagnostics monitoring functionality (DDM) and control function. The 200G QSFP112 VR2 module has two identical and independent lanes which provides a point-to-point 200Gb/s link over OM4 multimode fiber up to 50m. This makes it an ideal low-cost solution for short reach data center optical interconnects.

The central wavelength of each lane is at 850nm wavelength. The low power consumption and excellent EMI performance enable system design with high port density. The product is designed and tested in accordance with industry safety standards. The transceiver is Class 1 Laser product per U.S. FDA/CDRH and IEC 60825-1:2007 & IEC 60825-2:2004+A1+A2standards.

The transceiver can be conveniently assembled into and released from the host system through the latch.

The transceiver operates from a single +3.3V power supply over an operating case temperature range of 0°C to +70°C. The housing is made of metal for EMI immunity.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Case Operating Temperature ^{1,2}	T_{OP}	0	70	°C
Power Supply Voltage	V_{CC}	-0.5	3.6	V
Storage Temperature Range ^{1,2}	T_{ST}	-40	85	°C
Operating Relative Humidity ^{1,2,3}	RH	5	85	%

Notes:

¹ Absolute Maximum Ratings are those beyond which damage to the device may occur.

² Between the Recommended Operating conditions and Absolute Maximum ratings, prolonged operation is not intended, and permanent device degradation may occur.

³ Non-condensing.

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Optical Specification

Parameter	200GBASE-VR2
Application code	200G-VR2
Standard	IEEE Std 802.3db&IEEE Std 802.3ck
Data rate(Gb/s)	212.5Gb/s

Optical Transmitter Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Signaling rate		53.125 ± 100 ppm			GBd	
Modulation format		PAM4				
Wavelength	λ_c	842		948	nm	
RMS spectral width				0.65	nm	1
Average Launch Power, each lane	AOP _L	-4.6	-	4.0	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}), each lane	T _{OMA}			3.5	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}), each lane for max(TECQ, TDECQ) ≤ 1.8 dB or 1.8 < max(TECQ, TDECQ) ≤ 4.4 dB		- 2.6 - 4.4 + max (TECQ, TDECQ)			dBm dBm	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane	TDECQ			4.4	dB	
Transmitter eye closure for PAM4 (TECQ), each lane				4.4	dB	
Average Launch Power of OFF Transmitter, each lane	T _{OFF}			-30	dBm	
Extinction Ratio, each lane	ER	2.5			dB	
Transmitter transition time	-			17	ps	
RIN _{21.4OMA}	RIN			-131	dB/Hz	
Optical Return Loss Tolerance	ORL			12	dB	
Overshoot/undershoot				26	%	
Encircled flux		≥ 86% at 19 nm ≤ 30% at 4.5 μm				2

Notes:

¹ RMS spectral width is the standard deviation of the spectrum

² If measured into type A1a.2 or type A1a.3, or A1a.4, 50 μm fiber, in accordance with IEC 61280-1-4

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Optical Receiver Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Signaling rate		53.125 ± 100 ppm			GBd	
Modulation format		PAM4				
Wavelength	λ_c	842		948	nm	
Damage Threshold, each lane	AOP _D	5	-	-	dBm	1
Average Receive Power, each lane	AOP _R	-6.3	-	3.5	dBm	2
Receive Power (OMA _{outer}), each lane	OMA _R	-	-	3.5	dBm	
Receiver Reflectance	RR	-	-	-12	dB	
Receiver sensitivity (OMA _{outer}), each lane for TECQ ≤ 1.8 dB for 1.8 < TECQ ≤ 4.4 dB	S _{OMA}	-	-	-4.4 -6.4+TECQ	dBm dBm	
Stressed Receiver Sensitivity (OMA _{outer}), each lane	SRS	-	-	-1.8	dBm	3
Conditions of stressed receiver sensitivity test						4
Stressed eye closure for PAM4 (SECQ)			4.4		dB	
OMA _{outer} of each aggressor lane			3.5		dBm	

Notes:

- ¹ The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.
- ² Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
- ³ Measured with conformance test signal at TP3 (see 167.8.13) for the BER specified in 167.1.1.
- ⁴ These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Transmitter Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Signaling rate		53.125 ± 100 ppm			GBd	
Differential pk-pk input voltage tolerance		900			mv	
Differential to common-mode return loss		Equation (120G-2)			dBm	
Effective return loss, ERL		8.5			dB	
Differential termination mismatch				10	%	
Module stressed input test1		See 120G.3.4.2			dB	1
Single-ended voltage tolerance range		-0.4		3.3	V	
DC common-mode voltage		-350		2850	mV	2

Notes:

- 1 Meets BER specified in 120G.1.1.
- 2 DC common-mode voltage generated by the host. Specification includes effects of ground offset voltage.

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Receiver Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Signaling rate		53.1251			GBd	
AC common-mode output Voltage (RMS)		-	-	17.5	mV	
Differential peak-to-peak output voltage		-	-	600	mV	
Short mode				900	mV	
Long mode						
Eye height		15	-	-	mV	
Vertical eye closure, VEC		-	-	12	dB	
Common-mode to differential return loss		Equation (120G-1)		-	-	%
Effective return loss, ERL		8.5	-	-	dB	
Differential termination mismatch		-	-	10	%	
Transition time		8.5	-	-	ps	
DC common-mode voltage		-350	-	2850	mV	1 & 2

Notes:

¹ The signaling rate range is derived from the PMD receiver input.

² DC common-mode voltage is generated by the host. Specification includes effects of ground offset voltage.

Electrical Power Supply Characteristics

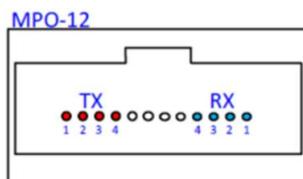
Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	$V_{CC1}, V_{CCTx}, V_{CCRx}$	3.13	3.30	3.47	V
Power Consumption	P_W	-	-	6	W
Power Consumption-LP mode	-	-	-	1.5	W

Notes:

The specified characteristics are met within the recommended range of operation. Unless otherwise noted typical data are quoted at nominal voltage and +25°C ambient temperature.

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Pin Assignment



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Pin Description

Pin	Module	Logic	Symbol	Description	Plug	Notes
1	1		GND	Ground	1	1
2			GND	Ground	1	1
3	2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
4	3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
5	4		GND	Ground	1	1
6			GND	Ground	1	1
7	5	CML-I	Underfined	Transmitter Inverted Data Input	3	
8	6	CML-I	Underfined	Transmitter Non-Inverted Data Input	3	
9	7		GND	Ground	1	1
10			GND	Ground	1	1
11	8	LVTTL-I	ModSelL	Select	3	
12	9	LVTTL-I	ResetL	Reset	3	
13	10		Vcc Rx	+3.3 V Power supply receiver	2	2
14			Vcc Rx	+3.3 V Power supply receiver	2	2
15	11	LVCMOSI/O	SCL	2-wire serial interface clock	3	
16	12	LVCMOSI/O	SDA	2-wire serial interface clock	3	
17	13		GND	Ground	1	1
18			GND	Ground	1	1
19	14	CML-O	Underfined	Receiver Non-Inverted Data Output	3	
20	15	CML-O	Underfined	Receiver Inverted Data Output	3	
21	16		GND	Ground	1	1
22			GND	Ground	1	1
23	17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
24	18	CML-O	Rx1n	Receiver Inverted Data Output	3	
25	19		GND	Ground	1	1
26			GND	Ground	1	1
27	20		GND	Ground	1	1
28			GND	Ground	1	1
29	21	CML-O	Rx2n	Receiver Inverted Data Output	3	
30	22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
31	23		GND	Ground	1	1
32			GND	Ground	1	1
33	24	CML-O	Underfined	Receiver Inverted Data Output	3	

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34	25	CML-O	Underfined	Receiver Non-Inverted Data Output	3	
35	26		GND	Ground	1	1
36			GND	Ground	1	1
37	27	LVTTL-O	ModPrsL	Presen	3	
38	28	LVTTL-O	IntL/RxLOS	Interrupt/optional RxLOS	3	
39	29		Vcc Tx	+3.3 V Power supply transmitter	2	2
40			Vcc Tx	+3.3 V Power supply transmitter	2	2
41	30		Vcc1	+3.3 V Power Supply	2	2
42	31	LVTTL-I	LPMoDe/Tx Di	Low Power Mode/optional TX Disable	3	
43	32		GND	Ground	1	1
44			GND	Ground	1	1
45	33	CML-I	Underfined	Transmitter Non-Inverted Data Input	3	
46	34	CML-I	Underfined	Transmitter Inverted Data Inpu	3	
47	35		GND	Ground	1	1
48			GND	Ground	1	1
49	36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
50	37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
51	38		GND	Ground	1	1
52			GND	Ground	1	1

Note 1: GND is the symbol for signal and supply (power) common for the QSFP112 module. All are common within the QSFP112 module and all voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

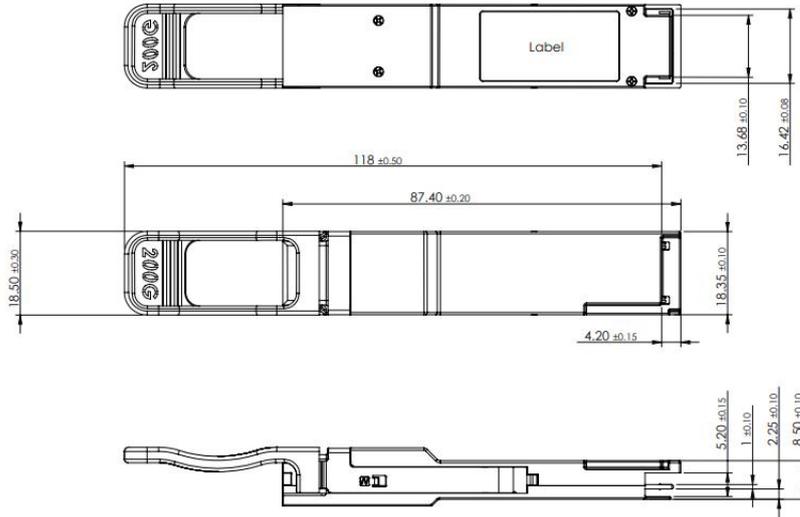
Note 2: Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements, defined for the host side of the Host Edge Card Connector, are listed in Table 4. Recommended host board power supply filtering is shown in Figure 4. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP112 module in any combination. The connector pins are each rated for a maximum current of 1.5A (max. current of 2.0 A is required for high module power of 15-20W).

Digital Diagnostic Monitor Accuracy

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	deg.C
Internally measured transceiver supply voltage	+/-3	%
Measured Tx bias current	+/-10	%
Measured Tx output power	+/-3	dB
Measured Rx received average optical power	+/-3	dB

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Mechanical Diagram



Appendix A Document Revision

Version No.	Date	Description
V1.0	2023-05-20	First released