200Gb/s QSFP56 HDR SR4 100m Immersion Cooling Transceiver

Features

- 4x50G PAM4 retimed 200GAUI-4 C2M electrical interface
- MPO-12 female/male plug tail fiber
- 4 channel VCSEL array and 4 channels PIN photodetector array
- Maximum link length of 100m
- Supports liquid cooling
- Hot Pluggable QSFP56 form factor
- Compliant with CMIS 5.2
- Compliant with IEEE 802.3cd
- Less than 5W in temperature range of 10 to 60℃

Applications

- 200GBASE-SR4 200G InfiniBand/Ethernet (immersion cooling)
- Data center (immersion cooling)

Description

NADDOD 200G QSFP56 SR4 transceiver modules are high performance modules that support Immersion cooling for short-range data communication and interconnect application. They integrate four data lanes in each direction with 4x53.125GBd. The length of QSFP56 SR4 is up to 100 meters. They are compliant with the QSFP56 MSA , IEEE 802.3cd and CMIS 5.2.

Absolute Maximum Ratings and Recommended Operating Conditions

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Ts	-40	85	℃
Case Operating Temperature	Top	10	60	℃
Relative Humidity (non-condensation)	RH		85	%
Supply Voltage	Vcc	-0.5	3.6	V
Receiver Damage Threshold, per Lane	PRdmg	5		dBm

Table2-Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Top	10	60	°C
Power Supply Voltage	Vcc	3.135	3.465	V
Total Power Consumption	Pc	-	5	W
Bit Rate	BR		212.5	Gbps
Fiber Length on OM3 MMF			70	m
Fiber Length on OM4 MMF			100	m

Electrical Specifications

Table3-Electrical Specifications

Parameter	Typical	Max.	Unit	Note
Supply voltage	3.135		3.465	V
Supply Current			1.59	A
Input differential impedance	90	100	110	Ω
Differential pk-pk input Voltage Tolerance	900			mVpp
Differential data output swing			900	mVpp
Bit Error Rate Pre-FEC			2.4E-4	
Input Logic Level High	2		Vcc	V
Input Logic Level Low	0		0.8	V
Output Logic Level High	Vcc-0.5		Vcc	V
Output Logic Level Low	0		0.4	V

Optical Specifications

Table4-Transmitter Optical Interface

Parameter	Symbol	Min.	Typical	Max.	Unit
Data rate per lane	DR		26.5625		Gbd
Modulation format			PAM4		
Center Wavelength	λ	840	850	860	nm
RMS spectral width	σ			0.6	nm
Average Launch power, each lane	Pavg	-6.5		4	dBm
Optical Power OMA, each Lane	POMA	-4.5		3	dBm
Launch power in OMAouter minus TDECQ		–5.9			dBm
Transmitter and dispersion eye closure (TDECQ), each lane	TDECQ			4.5	dB
Extinction ratio	ER	3			dB
Optical Return Loss Tolerance	ORLT			12	dB
Optical Power for TX DISABLE				-30	dBm

Notes:

[1] Defined according to the performance of the laser used.

[2] Measured into type A1a.2 or type A1a.3, or A1a.4, 50 um fiber, in accordance with IEC 61280-1-4.

Table5-Receiver Optical Interface

Parameter		Symbol	Min.	Typical	Max.	Unit
Data rate per lane		BR		26.5625		Gbd
Modulation format				PAM4		
Center Wavelength		λ	840	850	860	nm
Damage threshold			5			dBm
Average receive power, each lane			–8.4		4	dBm
Receiver reflectance		Rr			–12	dB
Receiver sensitivity, each lane[1]			RS = max (-6.5, SECQ – 7.9)			dBm
Stressed receiver sensitivity, each lane					–3.4	dBm
Rx LOS	Assert		-30			dBm
	De-assert				-9	dBm
	Hysteresis		0.5			dB

Notes:

[1] Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ. Measured with conformance test signal at TP3 for BER = 2.4E-4 Pre-FEC.

Pin Description

Table6- Pin Function Definition

Pin	Logic	Symbol	Description	Note
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ModSelL	Module Select	
10		Vcc Rx	+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	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Outpu	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1p	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	
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output Ground	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		Vcc Tx	+3.3V Power supply transmitter	2
30		Vcc1	+3.3V 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 Input	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	

37	CML-I	Tx1n	Transmitter Inverted Data Input	
38		GND	Ground	1

QSFP56 Module Pad Layout

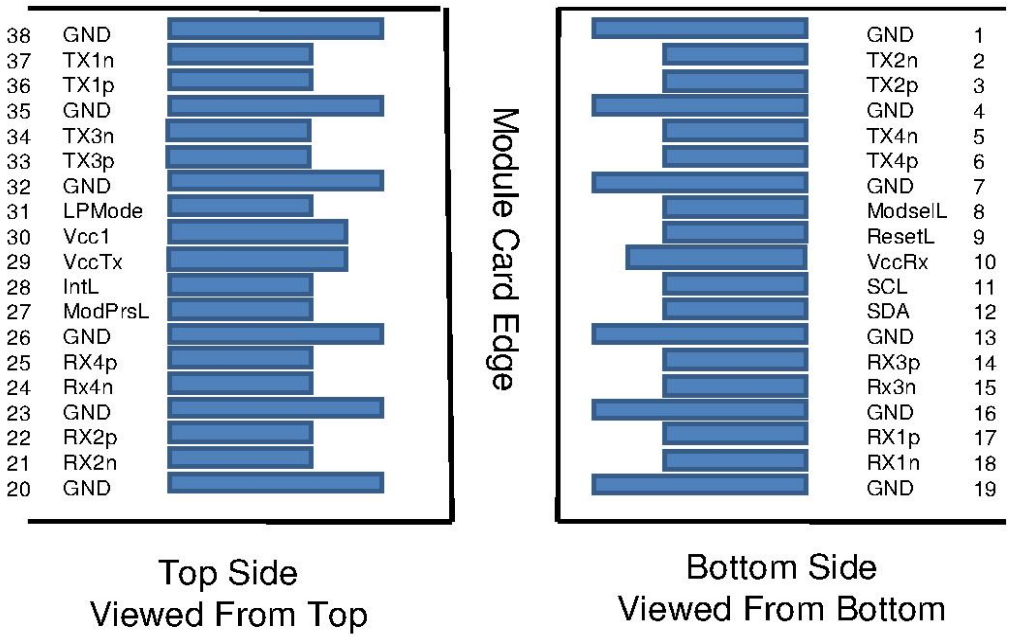

Figure 1 QSFP56 Transceiver Electrical Pad Layout

Management Interface

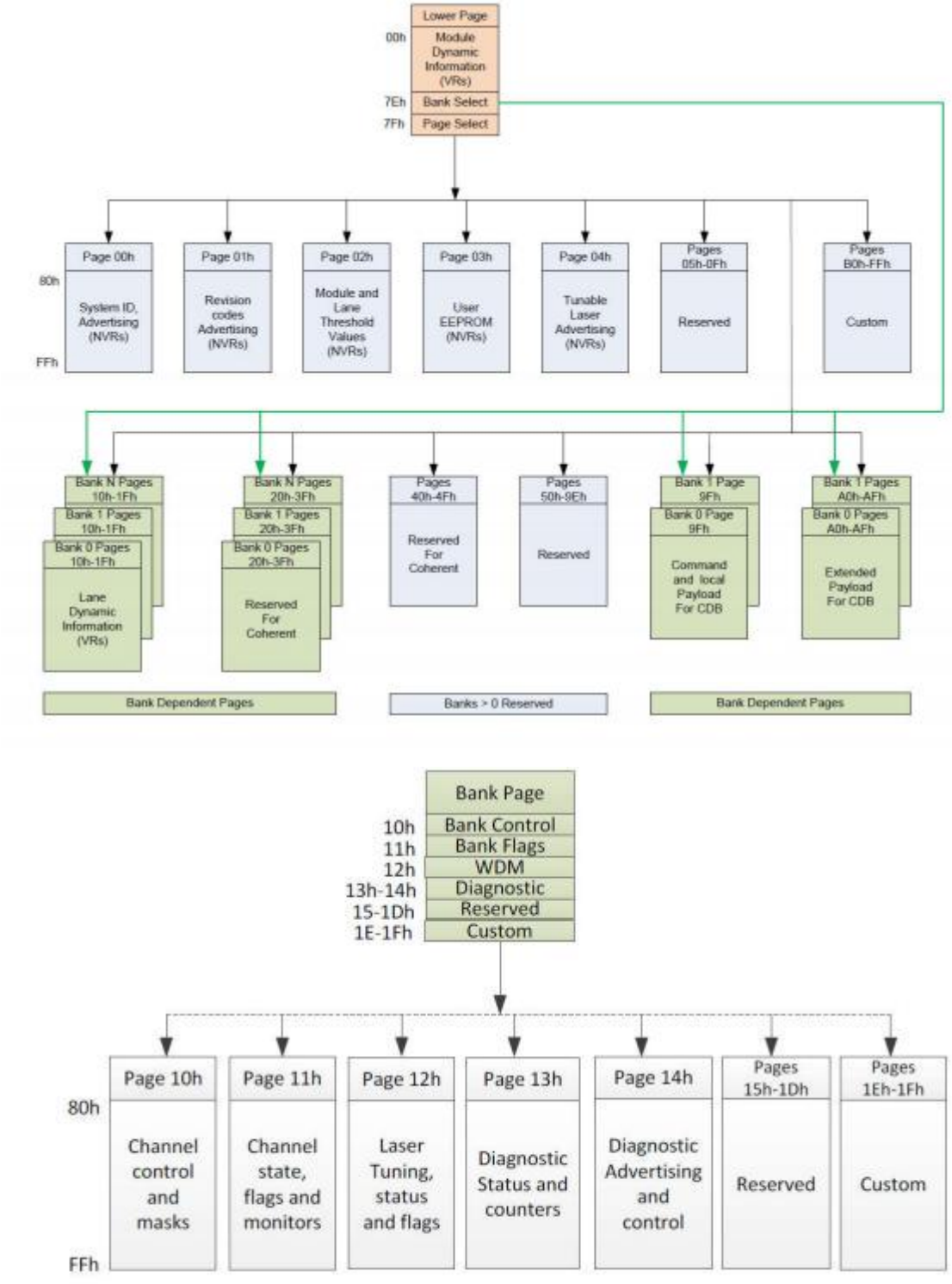

Figure2 CMIS Module Memory Map

Digital Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions.

Table7- Digital Diagnostic Monitor Accuracy

Parameter	Accuracy	Unit
Internally measured transceiver temperature[1]	+/-3	°C
Internally measured transceiver supply voltage	+/-3%	V
Measured Tx bias current	+/-10%	mA
Measured Tx output power[2]	+/-3	dB
Measured Rx received average optical power	+/-3	dB

Notes:

[1] Test point is the hotspot of the module.

[2] DDM reports stability within 0.5 dB when temperature is stable. TX DDM reportes -40 dBm when TX disable.

Mechanical Dimensions

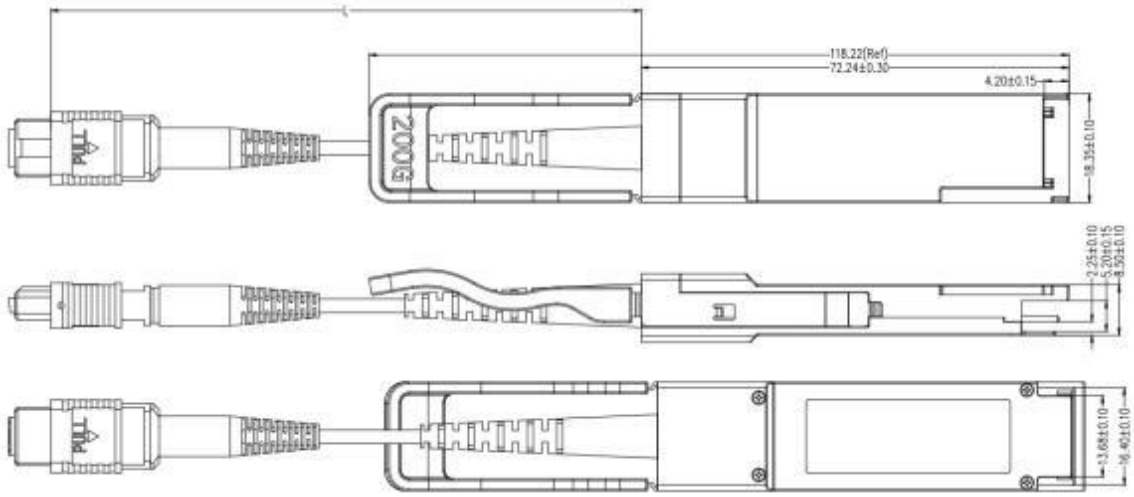

Figure3 Package dimensions (female)

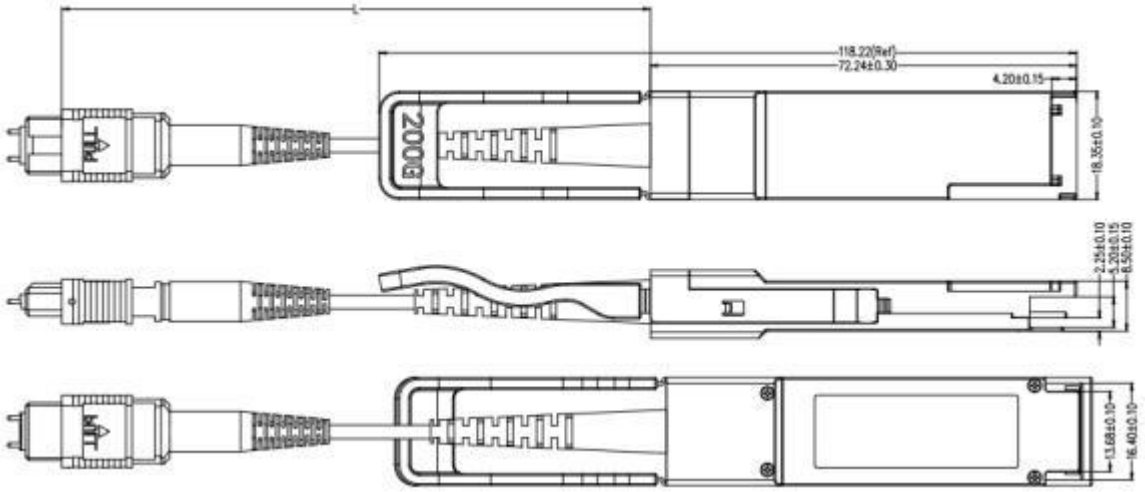

Figure4 Package dimensions (male)

Optical interface requirement

The optical port is a tail fiber of the MPO12 female.

The optical port is a tail fiber of the MPO12 male plug.

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