Specification

Quad Small Form Factor Pluggable

(QSFP56)

Optical Transceivers

200G QSFP56 PAM4 SR4
(Preliminary)

T Q S – Q 1 5 H 9 – 8 F Z

Ordering Information:

Model Name	TQS-Q15H9-8FZ	Note
Voltage	3.3V	
Device type	VCSEL / PIN Detector	
Interface	AC / AC Coupling	
Temperature	0℃ ~ +70℃	Case Temperture
Distance	100m (OM4)	
Latch Color	Beige	

Features

- QSFP56 Serial Optical Interface
- 4x50G PAM4 retimed 200GAUI-4 C2M electrical interface
- MPO-12 connector
- 4 channel VCSEL array and 4 channels PIN photo detector array
- Maximum link length of 70m on OM3 or 100m on OM4.
- QSFP56 MSA Compliant
- Hot Pluggable QSFP56 form factor
- Compliant with CMIS
- Compliant with IEEE 802.3cd
- Less than 5W in temperature range of 0 to 70℃

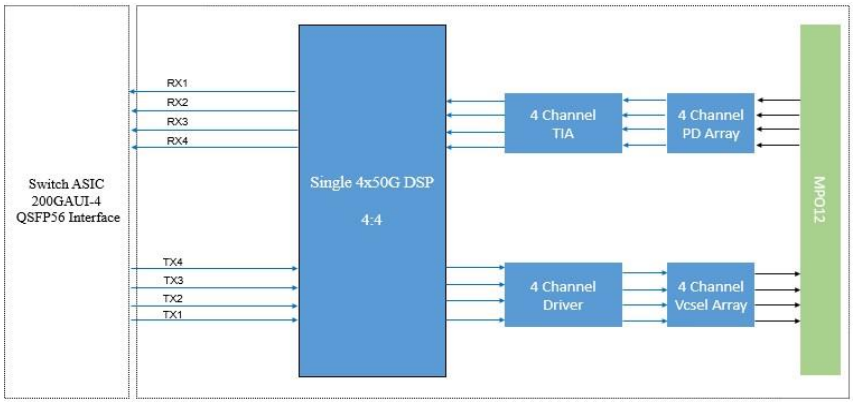
Applications

- 200GBASE-SR4 200G Ethernet
- Data center

Descriptions

This 200GE QSFP56 optical transceiver modules are designed for use in 200 Gigabit Ethernet links over OM3/OM4 multimode fiber. They are compliant with the QSFP MSA and with IEEE 802.3cd 200GBASE-SR4 specification. Digital diagnostics functions are available via the I2C interface as specified by CMIS V5.2. The transceiver is RoHS 2.0 compliant and lead-free per Directive 2011/65/EU.

Functional Bolck Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	T_S	-40	--	85	℃
Supply Voltage	V_{CC}	-0.5	--	3.6	V
Relative humidity (non-condensing)	RH	--	--	85	%
Receiver Damage Threshold, per lane	PRdmg	5	--	--	dBm

General Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Case Operating Temperature	Top	0	--	70	℃
Power Supply Voltage	V_{CC}	3.135	3.3	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

Transmitter Specifications-Electro- Optical (V_{CC}=3.135V~3.465V；Tc= 0°C~70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Data rate per lane	DR	--	26.5625	--	dBm
Modulation format	--	--	PAM4	--	--
Center Wavelength	λ_C	840	850	860	nm
Spectral Width (RMS)	$\Delta\lambda$	--	--	0.6	nm
Average Launch power, each lane	P_{avg}	-6.5	--	4	dBm
Optical Power OMA, each lane	P_{OMA}	-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	P_{DIS}	--	--	-30	dBm

Receiver Specifications - Electro-Optical (V_{CC}=3.135V~3.465V ; Tc= 0°C~70°C)

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

Notes:

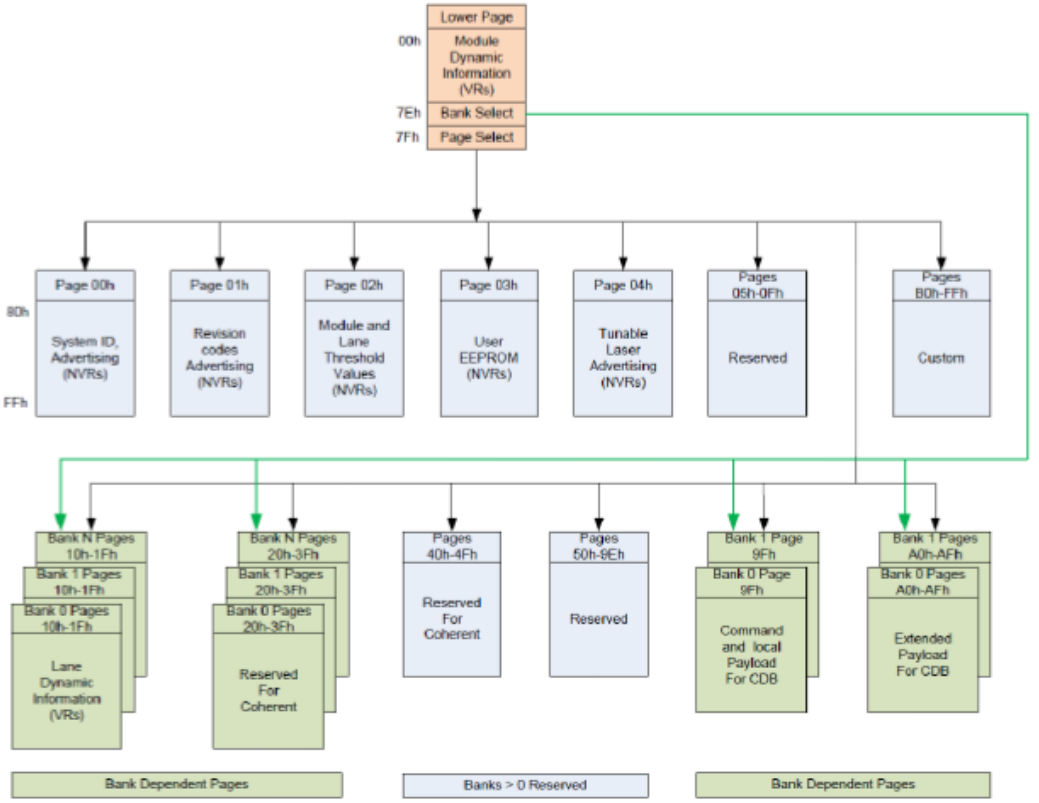
1. Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ. Measured with conformance test signal at TP3 for BER = 2.4E-4 Pre - FEC.

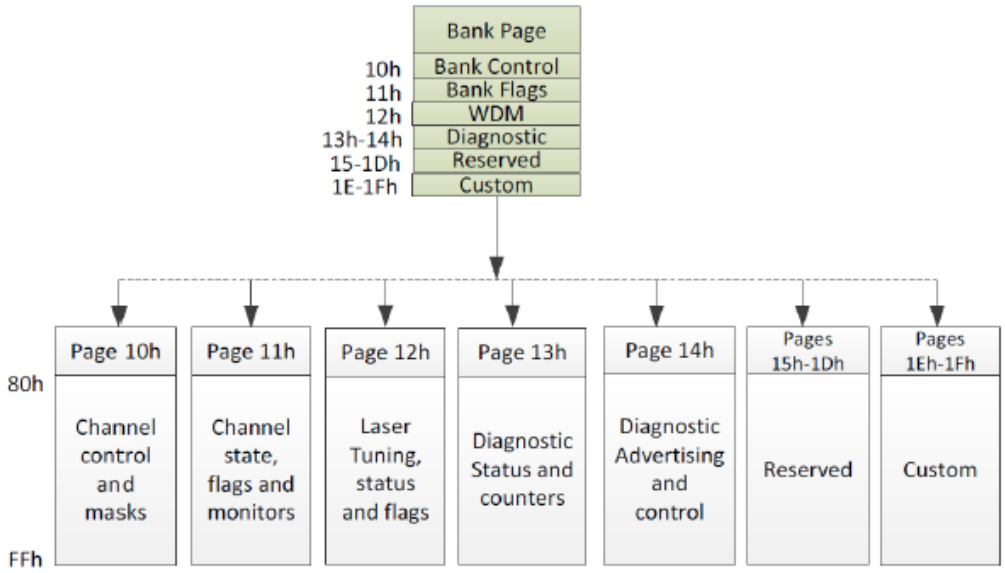
Electrical Specification (V_{CC}=3.135V~3.465V ; Tc= 0°C ~70°C)

Parameter	Min	Typ.	Max	Unit
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

Memory Map

2-Wire Serial Address: 1010000x (A0H). Compliant with CMIS V5.2, CMIS module memory map as shown below.



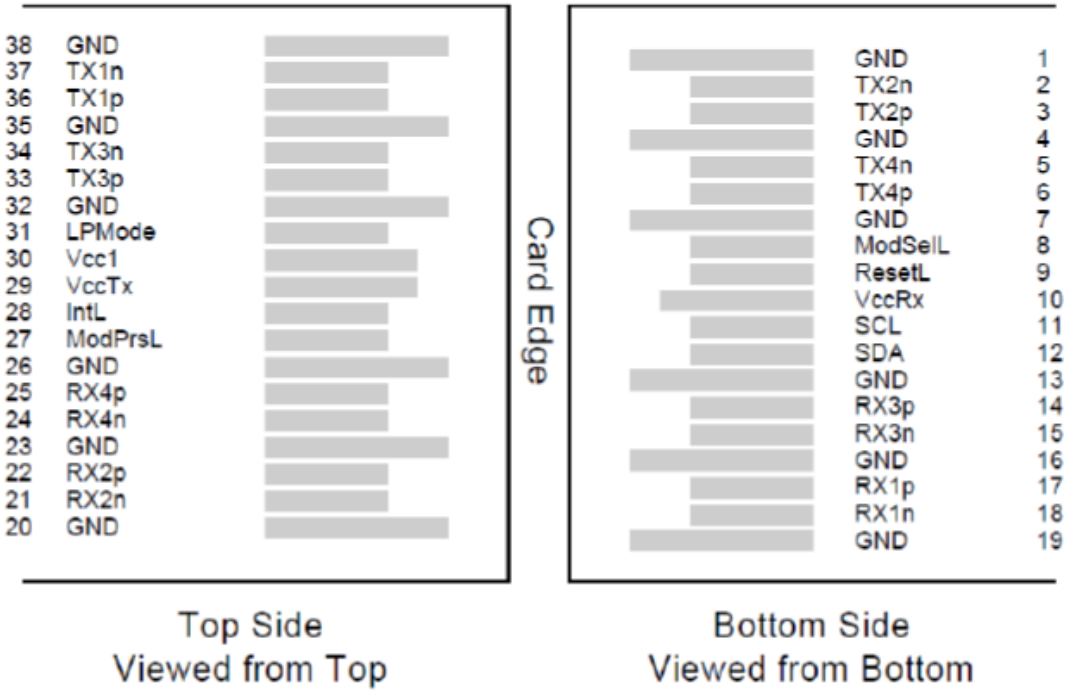


Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions.

Parameter	Accuracy	Unit
Internally measured transceiver temperature	**+/- 3**	℃
Internally measured transceiver supply voltage	**+/- 3%**	V
Measured TX bias current	**+/- 3**	mA
Measured TX output power	**+/- 3**	dB
Measured RX received average optical power	**+/- 3**	dB

Pin Definition and Descriptions



QSFP56 Transceiver Electrical Pad Layout

Pin No.	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModselL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	2
11	LVCMOS-I/O	SCL	2-wire serial interface clock	3	
12	LVCMOS-I/O	SDA	2-wire serial interface data	3	
13		GND	Ground	1	1

14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3V Power supply transmitter	2	2
30		Vcc1	+3.3V Power supply	2	2
31	LVTTL-I	LPMode	Low Power mode	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

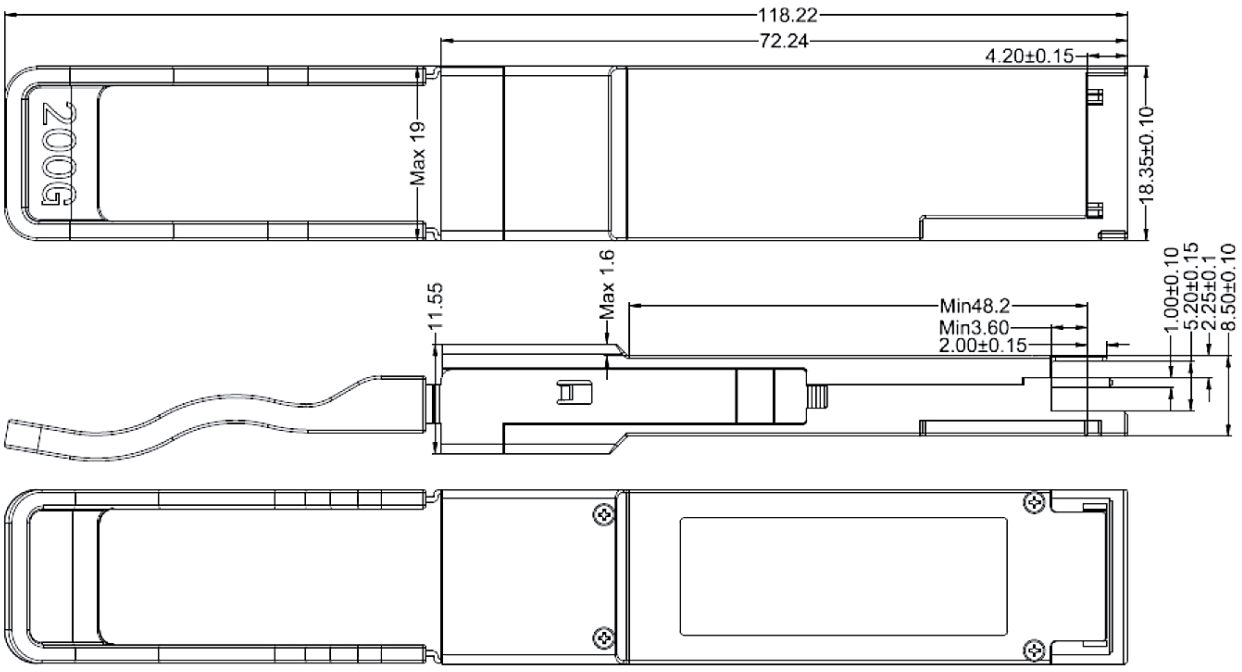
Note:

1. GND is the symbol for signal and supply (power) common for the QSFP 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. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

Mechanical Design Diagram

The package dimensions of the module as shown below. Package dimensions are specified in QSFP MSA.

Units: mm



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Revision History

Date	Version	Description
03/08/2024	0.1	Preliminary release