

Preliminary Specification

Quad Small Form Factor Pluggable Module 112

Optical Transceiver Module

400G QSFP112 PAM4 DR4

Model Name	TQS-P16B9-C81	Note
Voltage	3.3V	
Device type	1310nm DFB	
Interface	CML/CML	
Temperature	0°C ~ +70°C	

■ Features

- Supports 425Gb/s aggregate bit rate
- Commercial case temperature range of 0°C to 70°C
- Single 3.3V power supply
- Maximum link length of 500m on single-mode Fiber (SMF)
- 4x100G PAM4 DFB-based 1310nm transmitter
- MPO-12 receptacles
- Hot-pluggable QSFP112 form factor
- Compliant with QSFP112 MSA.
- Compliant with IEEE 802.3db.
- RoHS compliant

■ Application

- 400G Ethernet
- Other Optical Links.

■ Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Storage temperature	Tst	-40	85	°C	
3.3V Power Supply voltage	Vcc	-0.3	3.6	V	
Relative humidity	Rh	15	85		

■ Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Note
Case Operating Temperature	Top	0		70	°C	
Power Supply voltage	Vcc	3.135	3.3	3.465	V	
Data Rate per Channel	Dr		53.125		Gbaud	
Power Dissipation	Pd		10		W	

■ Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Note
Differential input impedance	90	100	110	ohm	
Differential Output impedance	90	100	110	ohm	
Differential data input voltage per lane			1000	mVpp	
Differential data output voltage per lane			900	mVpp	
Near-end ESMW (Eye symmetry mask width)	TBD			UI	
Near-end eye height, differential (min)	TBD			mV	
Far-end ESMW (eye symmetry mask width)	TBD			UI	
Far-end eye height, differential (min)	TBD			mV	
Bit Error Rate			2.4E-4		

■ Optical Characteristics

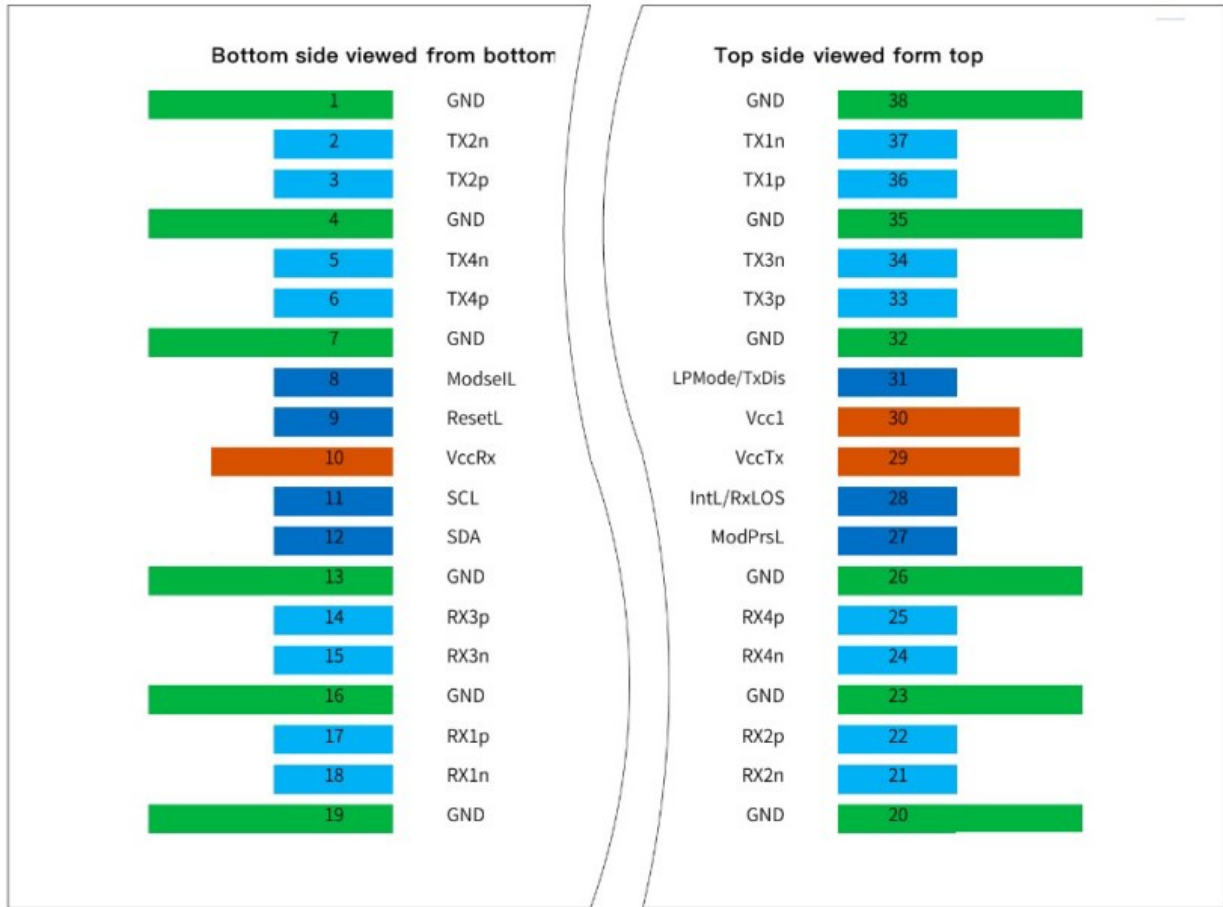
Parameter	Min	Typ	Max	Unit	Note
Transmitter					
Center wavelength	1304.5		1317.5	nm	
Side-mode suppression ratio (SMSR)	30			dB	
Average launch power	-2.9	1	4	dBm	
Outer optical modulation amplitude (OMA _{outer})	-0.8	1	4.2	dBm	
Launch power in OMA _{outer} minus TDECQ	-2.2			dBm	
TDECQ, each lane			3.4	dB	
Average launch power of OFF transmitter			-15	dB	
Extinction ratio	3.5			dB	
RIN 12 OMA			-136	dB/Hz	
Optical return loss tolerance			21.4	dB	
Receiver					
Center wavelength	1304.5		1317.5	nm	
Damage threshold (min)	5			dBm	
Average receive power	-5.9		4	dBm	1
Receive power each lane (OMA _{outer})			4.2	dBm	
Receiver reflectance			-26	dB	
Stressed receiver sensitivity (OMA _{outer})		Max (-1.9)		dBm	
Receiver sensitivity (OMA _{outer})		Max (-4.4)		dBm	2

Note:

1: 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.

2: Receiver sensitivity (OMA_{outer}), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.

■ QSFP112 Module Pad Assignments and Descriptions



Pin	Logic	Symbol	Description	Plug Sequence
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3
7		GND	Ground	1
8	LVTTTL-I	ModSeLL	Module Select	3
9	LVTTTL-I	ResetL	Module Reset	3
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-wire serial interface clock	3
12	LVC MOS-I/O	SDA	2-wire serial interface data	3
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3
15	CML-O	Rx3n	Receiver Inverted Data Output	3
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3

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

■ ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

■ LASER Safety

This is a Class 1 Laser Product according to IEC/EN60825-1:2014 (Third Edition). This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 56, MAY 8, 2019.

■ Caution:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Attention: L'utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans le document peut entraîner une exposition à des radiations dangereuses.

■ Contact Information

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■ Revision History

Date	Version	Description
2022/Aug	0.1	Preliminary datasheet