

### QPS-2502FWG

(RoHS Compliant)

### 128GFC / CWDM 4-λ QSFP28 LC SINGLE-Mode Optical Transceiver

#### FEATURES

- Up to 28.05 Gbps Bi-directional Data Links Per Lane
- Compliant with Fibre Channel 128GFC-CWDM4 (32GFC per lane)
- Compatible with 16GFC and 8GFC per lane
- Compatible with 100G CWDM4 MSA
- Hot Pluggable Electrical Interface
- Link Length up to 2km with SMF
- Uncooled CWDM 4-Wavelength DFB LDs: 1271, 1291, 1311, and 1331 nm
- 2-Wire Interface for Integrated Digital Diagnostic Monitoring
- Power Consumption < 3.5W
- Single +3.3V Power Supply
- RoHS Compliant
- 0 to 70°C Case Operating Temperature
- Duplex LC Connector
- Support Extended Rate Select Version 2

#### APPLICATIONS

- 8/16/32/128G Fibre Channel
- ITU-T OTU4
- 100G CWDM4 MSA

#### DESCRIPTION

QPS-2502FWG series single mode QSFP28 transceiver is designed for single-mode fiber optical data communications such as FC-PI-6P 128GFC-CWDM4.

The transceiver consists of two sections: The transmitter section consists of four directly modulated uncooled CWDM 4-λ 1271, 1291, 1311, and 1331 nm DFB lasers and four drivers.

The module is with the QSFP28 38-pin connector to allow hot plug capability. The internally ac coupled high speed serial I/O simplifies interfacing to external circuitry. Only single 3.3V power supply is needed.

A serial EEPROM in the transceiver allows the user to access transceiver digital diagnostic monitoring and configuration data via the 2-wire QSFP28 Management Interface. This interface uses a single address, A0h, with a memory map divided into a lower and upper area. Basic digital diagnostic data is held in the lower area while specific data is held in a series of tables in the high memory area.

#### LASER SAFETY

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

#### ORDER INFORMATION

P/No.	Bit Rate (Gb/s)	Wavelength (nm)	Package	Connector	Temp (°C)	RoHS Compliant
QPS-2502FWG	112.2	CWDM 4-λ*	QSFP28 with DMI	LC	0 to 70	Yes

CWDM 4-λ\*: 1271, 1291, 1311, and 1331 nm DFB LDs.

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0	70	°C	
Relative Humidity	RH	0	85	%	Non condensing

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	V <sub>CC</sub>	3.15	3.3	3.45	V
Power Supply Current	I <sub>CC</sub>			1200	mA
Power Dissipation	P <sub>D</sub>			3.5	W
Operating Case Temperature	Topr	0		70	°C
Singling Data Rate, each Channel			28.05		Gb/s

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<b>Transmitter Optical Specifications (Topr= 0 to 70°C, Vcc3 = 3.3V ±5%)</b>						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average Launch Power, each lane	P <sub>O, Avg</sub>	-6.5		2.5	dBm	1
Launch Power in OMA, each lane	P <sub>O, OMA</sub>	-4		2.5	dBm	
Total average launch power	P <sub>O, Total</sub>			8.5	dBm	
Center Wavelength – lane 0	λ <sub>C0</sub>	1264.5	1271	1277.5	nm	
Center Wavelength – lane 1	λ <sub>C1</sub>	1284.5	1291	1297.5	nm	
Center Wavelength – lane 2	λ <sub>C2</sub>	1304.5	1311	1317.5	nm	
Center Wavelength – lane 3	λ <sub>C3</sub>	1324.5	1331	1337.5	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty, each lane	TDP			3	dB	2
Optical Eye Mask	Compliant with 128GFC-CWDM4					
Average Launch Power of OFF Transmitter				-30	dBm	

1. Output power is power coupled into a 9/125 μm single-mode fiber.
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @28.05Gbps.

<b>Receiver Optical Specifications (Topr= 0 to 70°C, Vcc3 = 3.3V ±5%)</b>						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average receive power, each lane		-11.5	---	2.5	dBm	
Receiver power (OMA), each lane			---	2.5	dBm	
Receiver Sensitivity (OMA)	Sen.			-9.1	dBm	3
Damage Threshold		3.5	---		dBm	
LOS -- Deasserted	LOS <sub>D</sub>	---	---	-11.6	dBm	Transition: high to low
LOS -- Asserted	LOS <sub>A</sub>	-24	---	---	dBm	Transition: low to high
LOS -- Hysteresis		0.5	---		dB	
Wavelength of Operation – lane 0	λ <sub>C0</sub>	1264.5		1277.5	nm	
Wavelength of Operation – lane 1	λ <sub>C1</sub>	1284.5		1297.5	nm	
Wavelength of Operation – lane 2	λ <sub>C2</sub>	1304.5		1317.5	nm	
Wavelength of Operation – lane 3	λ <sub>C3</sub>	1324.5		1337.5	nm	
Receiver reflectance (max)				26	dB	

3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @28.05Gbps, BER < 1E-5.

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CONNECTION DIAGRAM

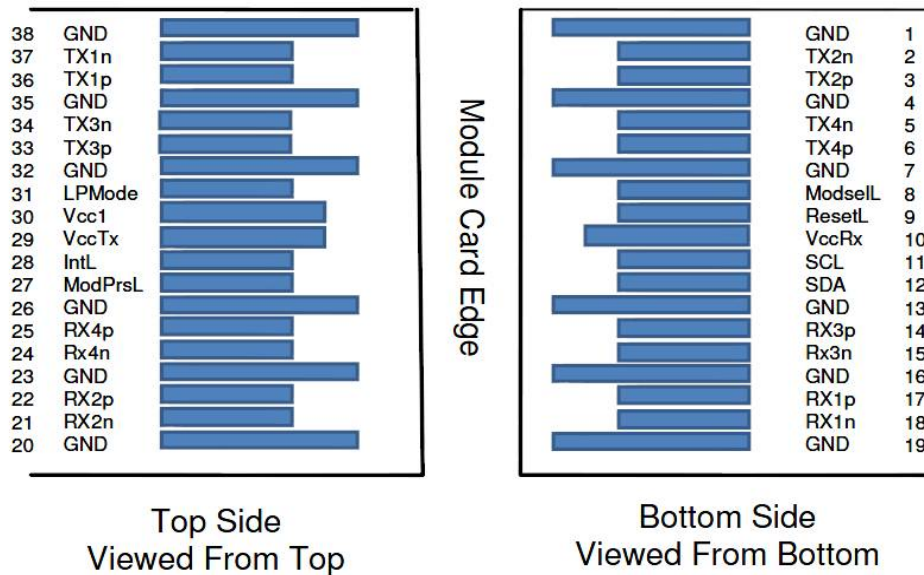


Table 3 PIN Description

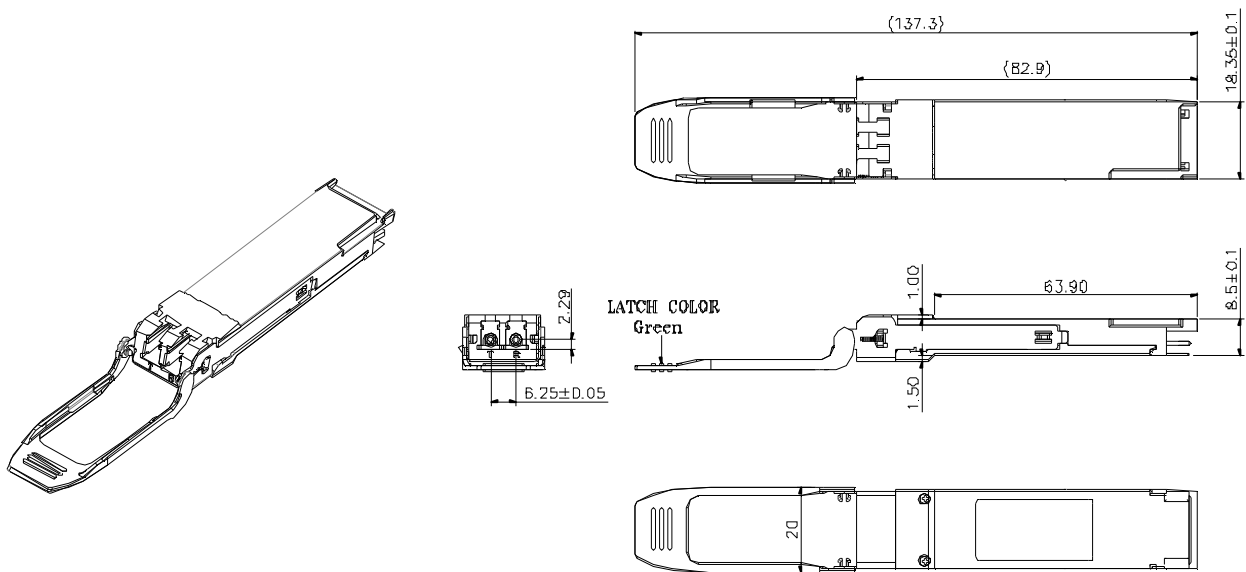
PIN	Logic	Signal Name	Description	Note
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-wire serial interface clock	
12	LVC MOS-I/O	SDA	2-wire serial interface data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	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	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
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

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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

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP28 module in any combination.

## MECHANICAL SPECIFICATION (UNITS IN MM)



**Note:** Specifications subject to change without notice.

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**REVISION HISTORY**

Version	Subject	Release Date
1.0	Initial datasheet	2021/9/14