PROFITAP

PT-100G-CWDM4-31

DATASHEET

PRODUCT FEATURES

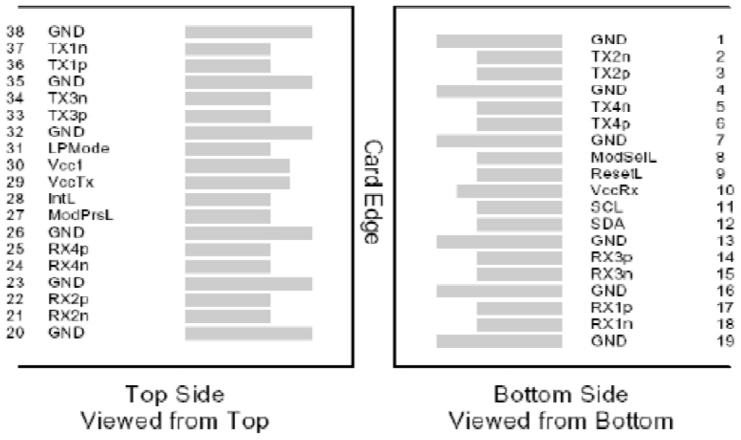
2 km Parallel SMF 100G QSFP28 Optical Transceiver Module

- Hot-pluggable QSFP28 form factor
- Supports 103.1 Gb/s aggregate bit rate
- Power dissipation < 3.5W
- RoHS-6 compliant
- Case temperature range of 0°C to 70°C
- Single 3.3V power supply
- Loss budget of 5 dB on up to 2 km of Single-Mode Fiber (with KR4 FEC)
- 4x25 Gb/s CWDM transmitter
- 4x25 Gb/s retimed electrical interface
- Duplex LC receptacles
- I2C management interface

APPLICATIONS

- 100G CWDM4 applications with FEC

PIN ASSIGNMENT



QSFP28-compliant 38-pin connector (per SFF-8679)

PIN DESCRIPTION

Pin	Symbol	Name / Description	Note
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+3.3 V Power Supply Receiver	
11	SCL	2-Wire Serial Interface Clock	
12	SDA	2-Wire Serial Interface Data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3 V Power Supply Transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note 1: Circuit ground is internally isolated from chassis ground.

ABSOLUTE MAXIMUM RATINGS

Module performance is not guaranteed beyond the operating range. Exceeding the limits below may damage the transceiver module permanently.

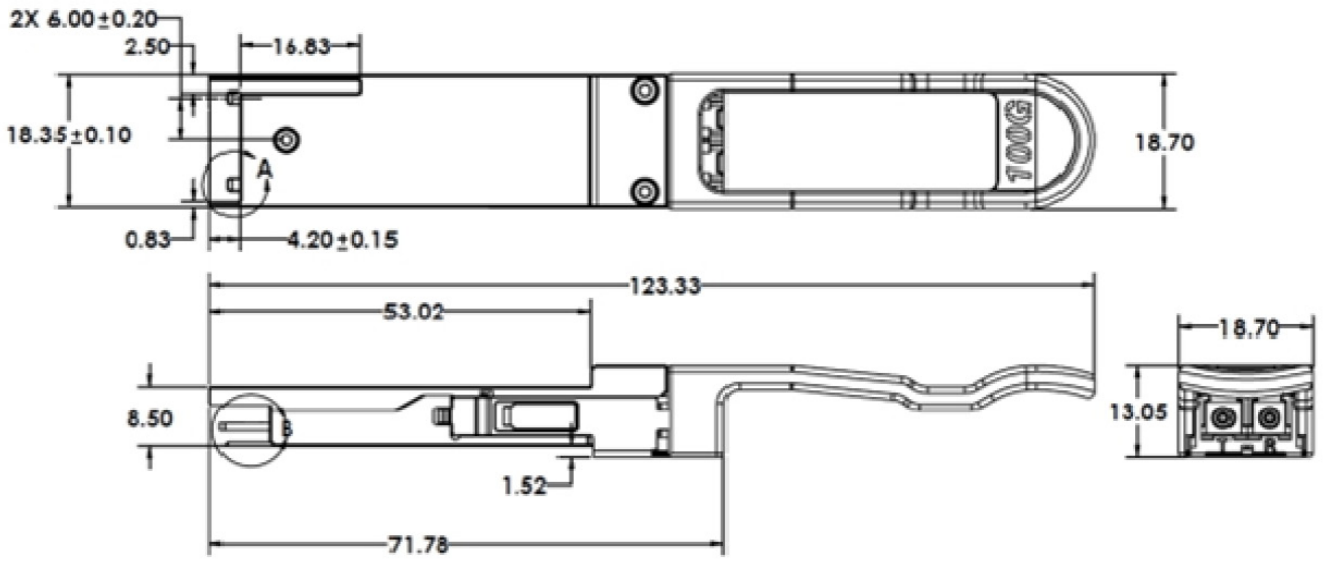
Parameter	Symbol	Min	Max	Unit
Maximum Supply Voltage	V_{CC}	-0.5	4.0	V
Storage Temperature	T_S	-40	85	°C
Case Operating Temperature	T_{op}	-5	75	°C
Relative Humidity (non-condensing)	RH	15	85	%
Receiver Damage Threshold, per Lane	P_{Rdmg}	3.4		dBm

RECOMMENDED OPERATING ENVIRONMENT

Parameter	Symbol	Min	Typical	Max	Unit	Note
Case Operating Temperature	T_c	0		+70	°C	
Supply Voltage	V_{CC}T, R	+3.13	3.3	+3.47	V	
Supply Current	I_{CC}			1000	mA	
Power Dissipation	PD			3.5	W	

MECHANICAL SPECIFICATIONS

PT-100G-CWDM4-31 transceivers are compatible with the QSFP28 Specification for pluggable form factor modules.



ELECTRICAL CHARACTERISTICS

EOL, T_{OP} = 0 to 70 °C, V_{CC} = 3.135 to 3.465 Volts

Parameter	Symbol	Min	Typical	Max	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			1.12	A	
Module total power	P			3.5	W	1
Transmitter						
Signaling rate per lane		25.78125 ± 100 ppm			GBd	
Differential data input swing per lane	$V_{in,pp}$	900			mV	
Differential input return loss (min)	RLd(f)	9.5 – 0.37f, 0.01≤f<8 4.75 – 7.4log10(f/14), 8 ≤f<19			dB	
Differential to common mode input return loss (min)	RLdc(f)	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
Differential termination mismatch				10	%	
Stressed input parameters						
Eye width			0.46		UI	
Applied pk-pk sinusoidal jitter		Per IEEE 802.3bm Table 88-13				
Eye height			95		mV	
DC common mode voltage		-350		2850	mV	
Receiver						
Signaling rate per lane		25.78125 ± 100 ppm			GBd	
Differential data output swing	$V_{out,pp}$	100		400	mVpp	2
		300		600		
		400		800		
		600		1200		
Eye width		0.57			UI	
Vertical eye closure				5.5	dB	
Differential output return loss (min)	RLd(f)	9.5 – 0.37f, 0.01≤f<8 4.75 – 7.4log10(f/14), 8 ≤f<19			dB	
Common to differential mode conversion return loss (min)	RLdc(f)	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
Differential termination mismatch				10	%	
Transition time, 20% to 80%	trtf	12			ps	

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.

2. Output voltage is settable in 4 discrete ranges via I2C. Default range is Range 2 (400 – 800 mV).

OPTICAL CHARACTERISTICS

EOL, T_{OP} = 0 to 70 °C, V_{CC} = 3.135 to 3.465 Volts

Parameter	Symbol	Min	Typical	Max	Unit	Note
Transmitter						
Signaling Speed per Lane		25.78125 ± 100 ppm			GBd	1
Lane center wavelengths (range)		1264.5 – 1277.5 1284.5 – 1297.5 1304.5 – 1317.5 1324.5 – 1337.5			nm	
Transmit OMA per Lane	TxOMA1	-4		2.5	dBm	
Transmit OMA per Lane @TDP max	TxOMA2	-2			dBm	2
Transmit Average Power per Lane				2.5	dBm	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty per Lane	TDP			3	dB	3
Launch Power (OMA-TDP)	OMA-TDP	-5			dBm	
Sidemode Suppression ratio	SSRmin	30			dB	
Average launch power of OFF transmitter, per lane				-30	dBm	
Transmitter Reflectance				-12	dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}				4
Receiver						
Signaling Speed per Lane		25.78125 ± 100 ppm			GBd	5
Lane center wavelengths (range)		1264.5 – 1277.5 1284.5 – 1297.5 1304.5 – 1317.5 1324.5 – 1337.5			nm	
Receive Saturation (OMA) per Lane	Rmax	2.5			dBm	
Damage threshold per Lane		3.5			dBm	
Unstressed Receiver Sensitivity (OMA) per Lane	Rxsens			-10	dBm	6
Stressed Receiver Sensitivity (OMA) per Lane	SRS			-7.3	dBm	7
Conditions of stressed receiver sensitivity test:						
Vertical Eye Closure Penalty	VECP	1.9			dB	
Stressed J2 Jitter	J2	0.33			UI	
Stressed J4 Jitter	J4	0.48			UI	
SRS eye mask definition {X1, X2, X3, Y1, Y2, Y3}		{0.39, 0.5, 0.5, 0.39, 0.39, 0.4}				
LOS De-Assert	LOSD			-11.6	dBm	
LOS Assert	LOSA	-24		-13.6	dBm	
LOS Hysteresis			1.5		dB	

Notes:

1. Transmitter consists of 4 lasers operating at 25.78 Gb/s each.
2. At maximum TDP.
3. TDP value does not include MPI penalty.
4. Hit ratio of 5x10-5, per IEEE.
5. Receiver consists of 4 photodetectors operating at 25.78 Gb/s each.
6. Sensitivity is specified at 5x10-5 BER.
7. Measured with CWDM4 MSA2 conformance test signal at TP3 for 5x10-5 BER.

GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typical	Max	Unit	Note
Bit Rate (all wavelengths combined)	BR			103.1	Gb/s	
Bit Error Ratio @25.78Gb/s	BER			$5*10^{-5}$		1
SMF per G.652	LossBdgt			5	dB	2

Notes:
1. Tested with a PRBS 231 – 1.
2. This 5 dB loss budget includes 2.5dB optical coding gain from FEC on the host [RS-FEC (528,514) per Clause 91]. The maximum informative link length is 2km. The option to bypass RS-FEC is not supported. Loss budget may include up to 1dB MPI loss penalty with worse case Transmitter and worst case connector MPI.

ENVIRONMENTAL SPECIFICATIONS

QSFP28 transceivers have a commercial operating case temperature range of 0°C to +70°C.

Parameter	Symbol	Min	Typical	Max	Unit	Note
Case Operating Temperature	Top	0		+70	°C	
Storage Temperature	Tsto	-40		+85	°C	

REGULATORY COMPLIANCE

QSFP28 transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Agency	Standard
Laser Eye Safety	FDA/CDRH	CDRH 21 CFR 1040 and Laser Notice 50
Laser Eye Safety	TÜV	EN 60825-1: 2007 IEC 60825-2: 2004+A1+A2
Electrical Safety	TÜV	EN 60950
Electrical Safety	UL/CSA	CLASS 3862.07 CLASS 3862.87

ORDERING INFORMATION

Part Number	Product Description
PT-100G-CWDM4-31	100GBASE-CWDM4 QSFP28