

CFPQD010C10D – CFP Dual Fibre 1310nm* / 10km / 100GBASE-LR4 & OTN OTU4

*1310nm LAN-WDM 800GHz

#01 Overview

CFPQD010C10D is a high performance dual rate CFP transceiver module for 100 Gigabit Ethernet data links over two single mode fibres. The maximum reach1 is 10km, with 6.3dB end of life (EOL) power budget. The transmitters are cooled Electro-Absorption Modulated Lasers (EML) generating four optical 25Gbps output signals which are multiplexed together at the optical output port. The receivers are PIN photodiodes which detects (after optical de-multiplexing) 25Gbps optical input signals.

This transceiver module is compliant with the CFP Multisource Agreement (MSA) and hot pluggable. Always contact Skylane Optics® commercial agents for compatibility with different equipment platforms.

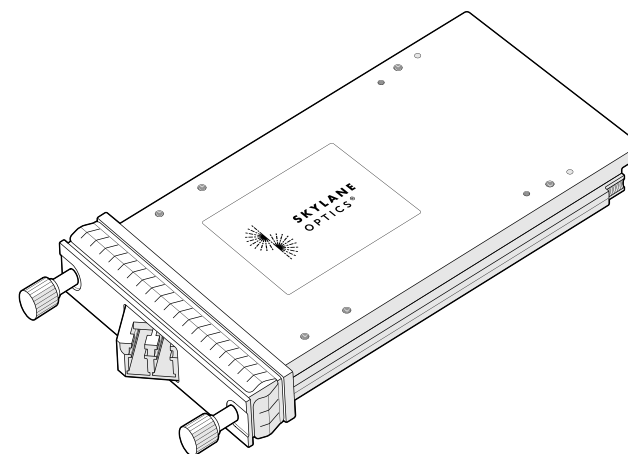


Figure 1. CFP Dual Fibre
(non-binding illustration)

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#02 Features

- CFP Multi-Source Agreement compliant
- Hot pluggable CFP footprint
- Supports 103.125 and 111.810Gbps Data Rates
- 10×10.3125 (CAUI) and 10×11.181Gbps (OTL4.10)

Serial Electrical Interface

- Dual LC Optical Connector
- Cooled 1310nm LAN-WDM EML Transmitters
- PIN Receivers
- Up to 10km Point-to-Point Transmission on Single Mode Fibre
- Operating temperature range 0°C to 70°C
- Power Dissipation <16W
- Single +3.3V Power Supply
- MDIO Management Interface

#03 Applications

- IEEE 802.3ba 100GBASE-LR4
- ITU-T G.959.1 4I1-9D1F

#04 Optical Interface

P/N	CFPQD010C10D
Wavelength	1310nm LAN-WDM 800GHZ
Protocol	100GBASE-LR4 G.959.1 4I1-9D1F
Optical Output Power ² [dBm]	1.7 to 10.5 3.5 to 8.9
Optical Receiver Sensitivity ³ [dBm]	≤ -4.6 ≤ -2.8
Optical Path Penalty ³ [dB]	≤ 2.2 ≤ 1.5
Optical Receiver Overload ⁴ [dBm]	10.5 8.9
Power Budget ² [dB]	≥ 6.3

1. Distance is estimated assuming typical optical losses after decent quality fibre deployment; only optical budget value is guaranteed.

2. EOL over operating temperature range

3. See section 5.2 for definitions

4. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers (optical loop back) before ensuring that proper optical attenuation is used

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#05 Technical Parameters

5.1. Recommended Operating Conditions					
Parameter	Min	Typ	Max	Unit	Notes
Storage temperature	-40		85	°C	
Operating Case Temperature	0		70	°C	
Relative Humidity	5		85	%	Non-Condensing
Power Supply Voltage	3.2	3.3	3.4	V	
Power Supply Current			4850	mA	
Power Dissipation			16	W	

5. Output power coupled into a 9/125 μm single-mode fibre
6. Measured with 10.3125Gbps PRBS 2³¹-1, BER≤10⁻¹²

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#05 Technical Parameters

5.2. Transmitter Optical Specifications						
100GBASE-LR4						
Parameter	Min	Typ	Max	Unit	Notes	
Data Rate, each Lane		25.781		Gbps	5	
Aggregated Data Rate		103.125		Gbps	5	
Average Output Power			10.5	dBm	6,8	
Average Output Power, each Lane	-4.3		4.5	dBm	6,8	
Output Power Difference between any two Lanes			5	dB		
Centre Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm		
	1299.02	1300.05	1301.09			
	1303.54	1304.58	1305.63			
	1308.09	1309.14	1310.19			
Transmitter and Dispersion Penalty (TDP), each Lane			2.2	dB	9	
Extinction Ratio, each Lane	4			dB		

5. IEEE 802.3ba-2012

6. Minimum value corresponding to $OMA \geq -1.3\text{dBm}$. Maximum value corresponding to $OMA \leq 4.5\text{dBm}$

7. ITU-T G.959.1 (02/12), optical interface 4I1-9D1F

8. Output power coupled into a $9/125\text{ }\mu\text{m}$ single mode fibre

9. Optical path dispersion between -28.5 and 9.5ps/nm

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#05 Technical Parameters

5.2. Transmitter Optical Specifications						
4I1-9D1F						
Parameter	Min	Typ	Max	Unit	Notes	
Data Rate, each Lane		27.952		Gbps	7	
Aggregated Data Rate		111.810		Gbps	7	
Average Output Power			8.9	dBm	8	
Average Output Power, each Lane	-2.5		2.9	dBm	8	
Output Power Difference between any two Lanes			5	dB		
Centre Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm		
	1299.02	1300.05	1301.09			
	1303.54	1304.58	1305.63			
	1308.09	1309.14	1310.19			
Transmitter and Dispersion Penalty (TDP), each Lane			1.5	dB	9	
Extinction Ratio, each Lane	7			dB		

5. IEEE 802.3ba-2012

6. Minimum value corresponding to $\text{OMA} \geq -1.3\text{dBm}$. Maximum value corresponding to $\text{OMA} \leq 4.5\text{dBm}$

7. ITU-T G.959.1 (02/12), optical interface 4I1-9D1F

8. Output power coupled into a $9/125\text{ }\mu\text{m}$ single mode fibre

9. Optical path dispersion between -28.5 and 9.5ps/nm

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#05 Technical Parameters

5.3. Receiver Optical Specifications						
100GBASE-LR4						
Parameter	Min	Typ	Max	Unit	Notes	
Operating Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm		
	1299.02	1300.05	1301.09			
	1303.54	1304.58	1305.63			
	1308.09	1309.14	1310.19			
Receiver Overload	10.5			dBm	10	
Receiver Overload, each Lane	4.5			dBm	10	
Receiver Sensitivity			-4.6	dBm	10	
Receiver Sensitivity, each Lane			-10.6	dBm	11	
Input Power Difference between any two Lanes			5.5	dB		

10. $BER \leq 10^{-12}$, PRBS $2^{31}-1$
11. $BER \leq 10^{-12}$, PRBS $2^{31}-1$. Corresponding to $OMA \leq -8.6$ dBm using $ER=9$ dB
12. $BER \leq 10^{-12}$, $ER \geq 7$ dB, with FEC. The BER can be significantly higher at the input to the FEC decoder
13. $BER \leq 10^{-12}$, $7\text{ dB} > ER \geq 4\text{ dB}$, with FEC. The BER can be significantly higher at the input to the FEC decoder

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#05 Technical Parameters

5.3. Receiver Optical Specifications						
100GBASE-LR4						
Parameter	Min	Typ	Max	Unit	Notes	
Operating Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm		
	1299.02	1300.05	1301.09			
	1303.54	1304.58	1305.63			
	1308.09	1309.14	1310.19			
Receiver Overload	8.9			dBm	12	
	10				13	
Receiver Overload, each Lane	2.9			dBm	12	
	4				13	
Receiver Sensitivity			-2.8	dBm	12	
			-0.9		13	
Receiver Sensitivity, each Lane			-8.8	dBm	12	
			-6.9		13	
Input Power Difference between any two Lanes			5.5	dB		

10. $BER \leq 10^{-12}$, PRBS $2^{31}-1$
11. $BER \leq 10^{-12}$, PRBS $2^{31}-1$. Corresponding to $OMA \leq -8.6$ dBm using $ER=9$ dB
12. $BER \leq 10^{-12}$, $ER \geq 7$ dB, with FEC. The BER can be significantly higher at the input to the FEC decoder
13. $BER \leq 10^{-12}$, 7 dB $> ER \geq 4$ dB, with FEC. The BER can be significantly higher at the input to the FEC decoder

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#06 Transceiver Electrical Pad Layout

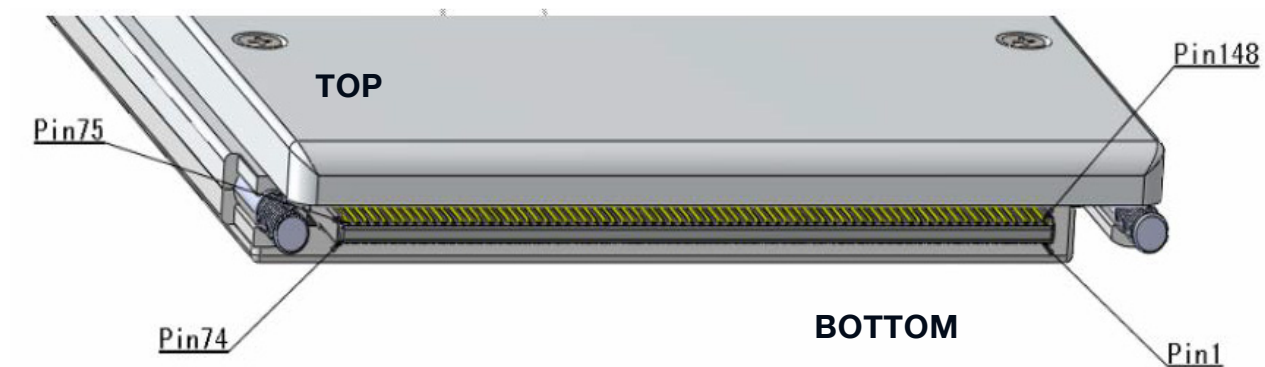


Figure 2. Transceiver Electrical Pad Layout

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#07 Module Pin Assignment

Pin	Symbol	I/O	Description	Logic	Pin	Symbol	I/O	Description	Logic
1	GND		Ground		75	GND		Ground	
2	GND				76	RX_MCLKp		Not for normal use	
3	GND				77	RX_MCLKn			
4	GND				78	GND		Ground	
5	GND				79	RX0p	O	CAUI ch0 Receive Output	CML
6	3.3V		3.3V Power Supply		80	RX0n			
7	3.3V				81	GND		Ground	
8	3.3V				82	RX1p	O	CAUI ch1 Receive Output	CML
9	3.3V				83	RX1n			
10	3.3V				84	GND		Ground	
11	3.3V				85	RX2p	O	CAUI ch2 Receive Output	CML
12	3.3V				86	RX2n			
13	3.3V				87	GND		Ground	
14	3.3V				88	RX3p	O	CAUI ch3 Receive Output	CML
15	3.3V				89	RX3n			

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#07 Module Pin Assignment

Pin	Symbol	I/O	Description	Logic	Pin	Symbol	I/O	Description	Logic
16	GND				90	GND		Ground	
17	GND				91	RX4p			
18	GND		Ground		92	RX4n	O	CAUI ch4 Receive Output	CML
19	GND				93	GND		Ground	
20	GND				94	RX5p			
21	VND_IO_A				95	RX5n	O	CAUI ch5 Receive Output	CML
22	VND_IO_B		Do not connect		96	GND		Ground	
23	GND		Ground		97	RX6p			
24	RX_MCLKn				98	RX6n	O	CAUI ch6 Receive Output	CML
25	RX_MCLKp		Not for normal use		99	GND		Ground	
26	GND		Ground		100	RX7p			
27	VND_IO_C				101	RX7n	O	CAUI ch7 Receive Output	CML
28	VND_IO_D		Do not connect		102	GND		Ground	
29	VND_IO_E				103	RX8p			
30	PRG_CNTL1	I	Programmable Control 1	LVC MOS w/ PUR	104	RX8n	O	CAUI ch8 Receive Output	CML

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#07 Module Pin Assignment

Pin	Symbol	I/O	Description	Logic	Pin	Symbol	I/O	Description	Logic
31	PRG_CNTL2	I	Programmable Control 2	LVCMOS w/ PUR	105	GND		Ground	
32	GND		Programmable Control 3		106	RX9p	O	CAUI ch9 Receive Output	CML
33	PRG_ALRM1		Programmable Alarm 1		107	RX9n			
34	PRG_ALRM2	O	Programmable Alarm 2	LVCMOS	108	GND		Ground	
35	PRG_ALRM3		Programmable Alarm 3		109	NC	O	Do not connect	CML
36	TX_DIS	I	Transmitter Disable		110	NC			
37	VND_IO_B	I	Module Low Power Mode	LVCMOS w/ PUR	111	GND		Ground	
38	MOD_ABS	O	Module Absent Indicator		112	GND			
39	MOD_RSTn	I	Module Reset		113	TX0p	I	CAUI ch0 Transmit Input	CML
40	RX_LOS	O	Loss of Optical Input Signal	LVC MOS	114	TX0n			
41	GLB_ALRMn		Global Alarm	LVCMOS (open drain)	115	GND		Ground	
42	PRTADR4		MDIO Physical Port addr. bit4		116	TX1p	I	CAUI ch1 Transmit Input	CML
43	PRTADR3		MDIO Physical Port addr. bit3		117	TX1n			
44	PRTADR2	I	MDIO Physical Port addr. bit2	1.2V CMOS	118	GND		Ground	
45	PRTADR1		MDIO Physical Port addr. bit1		119	TX2p	I	CAUI ch2 Transmit Input	CML
46	PRTADR0		MDIO Physical Port addr. bit0		120	TX2n			

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#07 Module Pin Assignment

Pin	Symbol	I/O	Description	Logic	Pin	Symbol	I/O	Description	Logic
60	3.3V		3.3V Power Supply		134	TX7p	I	CAUI ch7 Transmit Input	CML
61	3.3V				135	TX7n			
62	3.3V				136	GND		Ground	
63	3.3V				137	TX8p	I	CAUI ch8 Transmit Input	CML
64	3.3V				138	TX8n			
65	3.3V				139	GND		Ground	
66	3.3V				140	TX9p	I	CAUI ch9 Transmit Input	CML
67	3.3V				141	TX9n			
68	3.3V				142	GND		Ground	
69	3.3V		Ground		143	NC		Do not connected	
70	GND				144	NC			
71	GND				145	GND		Ground	
72	GND				146	REFCLKp	I	Reference Clock Input	CML
73	GND				147	REFCLKn			
74	GND				148	GND		Ground	

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#08 Register Allocation - CFP MSA Management Interface Specification

Start Address (hex)	End Address (hex)	Table Name and Description	Start Address (hex)	End Address (hex)	Table Name and Description
0000	7FFF	Reserved for IEEE 802.3 use	9000	9FFF	Reserved for vendor private use
8000	807F	CFP NVR 1. Basic ID registers	A000	A07F	CFP Module VR 1. CFP Module level control and DDM registers
8080	80FF	CFP NVR 2. Extended ID registers	A080	A0FF	MLG VR 1. MLG Management Interface registers
8100	817F	CFP NVR 3. Network lane specific registers	A100	A1FF	Reserved by CFP MSA
8180	81FF	CFP NVR 4	A200	A27F	Network Lane VR 1. Network lane specific registers
8200	83FF	MSA Reserved	A280	A2FF	Network Lane VR 2. Network lane specific registers
8400	847F	NVR 1, Vendor data registers	A300	A37F	Network Lane VR 3. Network Lane and Vendor Specific FAWS Registers
8480	84FF	NVR 2, Vendor data registers	A380	A3FF	Reserved by CFP MSA
8500	87FF	Reserved by CFP MSA	A400	A47F	Host Lane VR 1. Host lane specific registers
8800	887F	NVR 1, User data registers	A480	ABFF	Reserved by CFP MSA
8880	88FF	NVR 2, User data registers	AC00	AFFF	Common Data Block Registers
8900	8EFF	Reserved by CFP MSA	B000	BFFF	Allocated for OIF MSA-100GLH modules
8F00	8FFF	Reserved for User private use	C000	FFFF	Reserved by CFP MSA

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#09 Ordering information

Part Number	Description
CFPQD010C10D	CFP LR-4, 1310nm LAN-WDM, Tx (EML), Rx (PIN), maximum distance 10km on SMF, power budget 6.3dB, 100 Gigabit Ethernet & OTN OTU4, dual LC connector, 0°C to 70°C, DDM

#10 Document Revision Information

Revision	Description
RevA	Initial release

For your product safety, please read the following information carefully before any manipulation of the box:



ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



LASER SAFETY

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

Skylane Optics® supplies a broad range of optical transceivers. Our engineers work closely with our customers to find the best solutions for every application. We are committed to provide high quality products and services to our customers.

For questions on this product please contact: support@skylaneoptics.com