

SO-CFP2-LR4

CFP2, 103/112 Gbps, 1310nm, SM, DDM, 6.3 dB, 10km

OVERVIEW

The SO-CFP2-LR4 is a 100G transceiver module designed for applications over single-mode (SM) fiber with transmission distances of up to 10km. The module supports both 100GBASE-LR4 and OTU4 operation. It uses 4 WDM optical signals (around 1310nm), and multiplexes them into a single channel for 100Gbps optical transmission. Reversely, on the receiver side, the module optically de-multiplexes a 100Gbps LR4 input into 4 WDM channels signals, and converts them to electrical data. The central wavelengths of the WDM channels are 1295.56nm, 1300.05nm, 1304.58nm and 1309.14nm according to the IEEE LR4 recommendation. The module contains a duplex LC connector for the optical interface and a 148-pin connector for the electrical interface. The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the CFP2 MSA hardware specification.

PRODUCT FEATURES

- Hot-pluggable CFP2 footprint LC duplex connector
- Supports 103Gbps and 112Gbps aggregated signal
- Single 3.3V power supply and power dissipation < 12W
- Up to 10km transmission on SM fiber
- Class 1 FDA and IEC60825-1 laser safety compliant
- MDIO interface with digital diagnostic monitoring (DDM)
- 4x 28G electrical interface
- Compliant with CFP2 MSA specification
- RoHS6 compliant
- Operating temperature: 0°C to +70°C

APPLICATIONS

- 100GBASE-LR4 Ethernet links
- OTU-4

ORDERING INFORMATION

Part Number	Description
SO-CFP2-LR4	CFP2, 103/112 Gbps, 1310nm, SM, DDM, 6.3dB, 10km

FUNCTIONAL DIAGRAM

This product converts the 4x 28Gbps electrical input data into 4 channel WDM optical signals. The WDM light signals are combined by an optical MUX to a 103 or 112 Gbps data stream. The connector interface towards the SM fiber is LC. The receiver part accepts 103 or 112Gbps WDM optical signals and de-multiplexes them into 4 individual channels. Each wavelength is received by a photo diode (PIN) and converted into an electrical signal of 25Gbps or 28Gbps. Figure 1 shows the functional block diagram of this product.

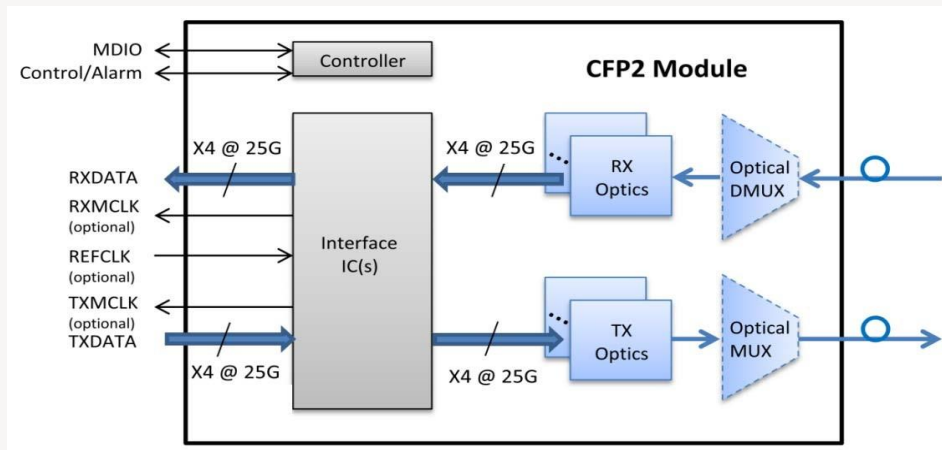


Figure 1. Functional diagram

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Storage temperature	T_s	-40	+85	°C
Supply voltage	V_{cc}	-0.5	3.6	V
Operating relative humidity	RH	5	85	%

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Operating case temperature	T_c	0		70	°C
Power supply voltage	V_{cc}	3.2	3.3	3.4	V
Power consumption	P			12	W
Baud rate			103	112	Gbps
Link distance (SM fiber)				10	km

ELECTRICAL CHARACTERISTICS – TRANSMITTER & RECEIVER (EACH LANE)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter						
Input amplitude (differential)	V_{in}	150		1050	mVpp	AC coupled inputs
Differential input impedance	Z_{in}	85	100	115	Ohm	$R_{in} > 100k\Omega @ DC$
Receiver						
Output amplitude (differential)	V_{out}	360		770	mVpp	AC coupled outputs
Differential output impedance	Z_{out}	85	100	115	Ohm	

MDIO INTERFACE SPECIFICATION

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input voltage	V_{IH}	0.84		1.5	V	
	V_{IL}	-0.3		0.36	V	
Input leak current	I_{IN}	-100		100	μA	
Output voltage	V_{OH}	1.0		1.5	V	
	V_{OL}	-0.3		0.2	V	
Input capacitance	C_i			10	pF	
Input MDC clock	f_{MDC}	0.1		4	MHz	
MDC clock period	T_{MDC}	250		10000	nsec	
MDIO hold time	T_{hold}	10			nsec	
MDIO setup time	T_{setup}	10			nsec	
GLB_ALM	$T_{glb_alm_ass}$			150	msec	
	$T_{glb_alm_dea}$			150	msec	

OPTICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Wavelength assignment	λ_0	1294.53	1295.56	1296.59	nm
	λ_1	1299.02	1300.05	1301.09	nm
	λ_2	1303.54	1304.58	1305.63	nm
	λ_3	1308.09	1309.14	1310.19	nm
Signalling speed per lane			27.95		Gbps
Data rate variation		-20		+20	ppm

OPTICAL CHARACTERISTICS – TRANSMITTER

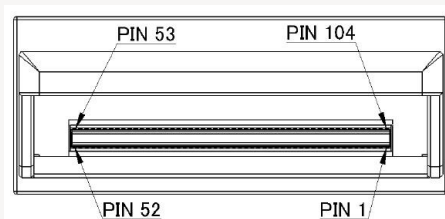
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Total average launch power	P_o			+10	dBm	
Average launch Power (each lane)	P_{each}	-0.6		+4	dBm	
Side Mode Suppression Ratio	$SMSR$	30			dB	
Optical return loss tolerance				20	dB	
Extinction Ratio	ER	4			dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}			G.959.1 Complaint			
TX disable assert time	T_{off}			100	μ sec	

OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Average receive power (each lane)	R_{POW}	-6.9		4	dBm	
Receiver sensitivity per lane	P_{min}			-8.4	dB	
Maximum optical path penalty				1.5	dB	
Optical Return Loss	ORL			-26	dB	
LOS assert	LOS_A	-19.4			dBm	
LOS deassert	LOS_D			-9.4	dBm	
LOS hysteresis	LOS_H	0.5			dB	

PIN ASSIGNMENT AND FUNCTION DEFINITIONS

PIN ASSIGNMENT



PIN DEFINITION

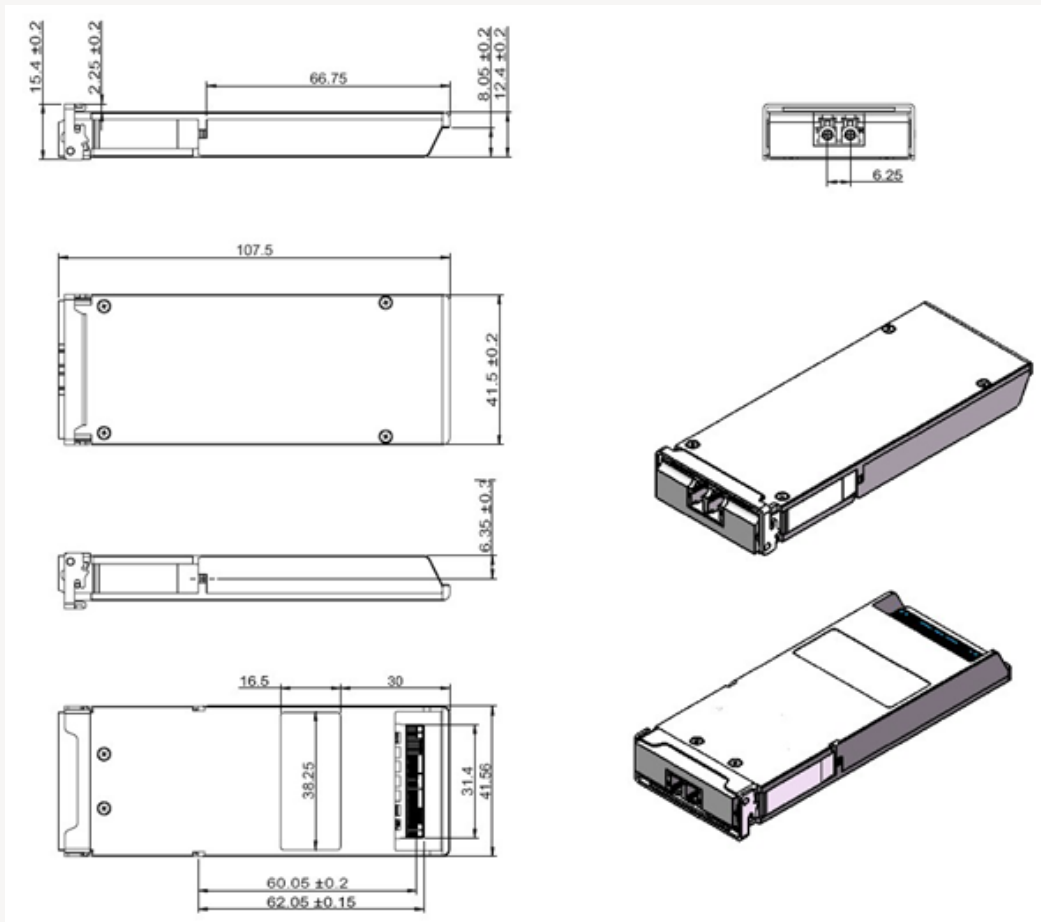
PIN	Signal Name	Description	PIN	Signal Name	Description
1	GND		53	GND	
2	(TX_MCK_N)	For optical waveform testing. Not for normal use.	54	N.C.	
3	(TX_MCK_P)	For optical waveform testing. Not for normal use.	55	N.C.	
4	GND	3.3V module supply ground	56	GND	
5	N.C.		57	RX0p	CML output
6	N.C.		58	RX0n	CML output
7	3.3V_GND		59	GND	
8	3.3V_GND		60	RX1p	CML output
9	3.3V	3.3V module supply voltage	61	RX1n	CML output
10	3.3V	3.3V module supply voltage	62	GND	
11	3.3V	3.3V module supply voltage	63	N.C.	
12	3.3V	3.3V module supply voltage	64	N.C.	
13	3.3V_GND		65	GND	
14	3.3V_GND		66	N.C.	
15	VND_IO_A	Module Vendor I/O, Do not connect!	67	N.C.	
16	VND_IO_B	Module Vendor I/O, Do not connect!	68	GND	
17	PRG_CNTL1	Programmable control 1 set over MDIO, MSA default: TRXIC_RSTn. TX&RX ICs reset. "0": reset; "1" or NC: enabled = not used.	69	RX2p	CML output
18	PRG_CNTL2	Programmable control 2 set over MDIO, MSA Default: Hardware interlock LSB, "00": ≤3W, "01": ≤6W, "10": ≤9W, "11" or NC: ≤12W = not used	70	RX2n	CML output
19	PRG_CNTL3	Programmable control 3 set over MDIO, MSA default: Hardware interlock MSB, "00": ≤3W, "01": ≤6W, "10": ≤9W, "11" or NC: ≤12W = not used	71	GND	
20	PRG_ALRM1	Programmable alarm 1 set over MDIO, MSA default: HIPWR_ON. "1": module power up completed; "0": module not high powered up	72	RX3p	CML output
21	PRG_ALRM2	Programmable alarm 2 set over MDIO, MSA default: MOD_READY. "1": ready; "0": not ready	73	RX3n	CML output
22	PRG_ALRM3	Programmable alarm 3 set over MDIO, MSA default: MOD_FAULT, fault detected. "1": fault; "0": not fault.	74	GND	

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23	GND		75	N.C.	
24	TX_DIS)	Transmitter disable for all lanes. "1" or NC: transmitter disabled; "0": transmitter enabled.	76	N.C.	
25	RX_LOS	Receiver loss of optical signal. "1": low optical signal; "0": normal condition.	77	GND52	
26	MOD_LOPWR	Module Low power mode. "1" or NC: module in low power (safe) mode; "0": power-on enabled.	78	(REFCLKn)	Reference clock input
27	MOD_ABS	Module Absent. "1" or NC: module absent; "0": module present. Pull up resistor on Host.	79	(REFCLKp)	Reference clock input
28	MOD_RSTn	Module Reset. "0": resets the module; "1" or NC: module enabled. Pull down resistor in module.	80	GND	
29	GLB_ALRMn	Global Alarm "0": alarm condition in any MDIO alarm register "1": no alarm condition	81	N.C.	
30	GND		82	N.C.	
31	MDC	1.2V CMOS Input, Management Data Clock	83	GND	
32	MDIO	1.2V CMOS I/O, Management Data I/O bi-directional data	84	TX0n	CML Input
33	PRTADR0	1.2V CMOS Input, MDIO Physical port address bit 0	85	TX0p	CML Input
34	PRTADR1	1.2V CMOS Input, MDIO Physical port address bit 1	86	GND	
35	PRTADR2	1.2V CMOS Input, MDIO Physical port address bit 2	87	TX1n	CML Input
36	VND_IO_C	Module Vendor I/O, Do not connect!	88	TX1p	CML Input
37	VND_IO_D	Module Vendor I/O, Do not connect!	89	GND	
38	VND_IO_E	Module Vendor I/O, Do not connect!	90	NC	
39	3.3V_GND		91	NC	
40	3.3V_GND		92	GND	
41	3.3V	3.3V module supply voltage	93	NC	
42	3.3V	3.3V module supply voltage	94	NC	
43	3.3V	3.3V module supply voltage	95	GND	
44	3.3V	3.3V module supply voltage	96	TX2n	CML Input
45	3.3V_GND		97	TX2p	CML Input
46	3.3V_GND		98	GND	
47	N.C.		99	TX3n	CML Input
48	N.C:		100	TX3p	CML Input
49	GND		101	GND	
50	(RX_MCK_N)	For optical waveform testing. Not for normal use.	102	NC	
51	(RX_MCK_P)	For optical waveform testing. Not for normal use.	103	NC	
52	GND		104	GND	

MECHANICAL DRAWING



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