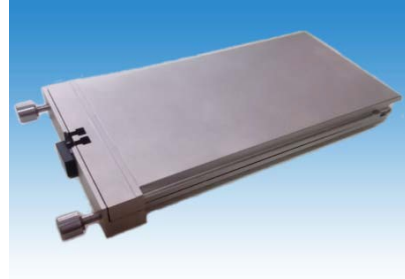




100G-BASE-LR4 10km CFP Optical Transceiver

Features

- Hot Pluggable CFP MSA package
- IEEE 802.3ba 100GBASE-LR4 compliant
- ITU-T 411-9D1F compliant
- CFP-MSA-HW-Spec-rev1-40 compliant
- Up to 10km for G.652 SMF
- Receiver: 4-lane x 25Gb/s PIN ROSAs
- Transmitter: 4-lane x 25Gb/s LAN-WDM EA-DFB TOSAs (1295.56,1300.05,1304.58,1309.14nm)
- 10x10G Electrical Serial Interface (CAUI/OTL4.10)
- MDIO management interface with Digital Diagnostic
- +3.3V power supply
- Power consumption less than 12W
- Compact size: 144.75 x 82 x 13.6 mm
- Operating case temperature: 0 to +70 °C
- Duplex SC or LC Receptacle
- ROHs-6 compliant



Applications

- 100GBase-LR4 Ethernet
- ITU-T OTU4

Description

Modulelink Networks' CFP-100G-LR4 transceivers are designed for use in 100 Gigabit Ethernet links over 10km single module fiber, and it compliant to the CFP MSA and IEEE 802.3ba 100GBASE-LR4. Digital diagnostics are available via MDIO as specified in the CFP MSA Management Interface Specification.

The transceiver's designs are optimized for high performance and cost efficiency to provide customers the best solutions for Datacom and Telecom applications.

The transceiver is RoHS-6 compliant and lead-free per Directive 2002/95/EC.

Product Selection

CFP-100G-LR4

CFP: CFP Transceiver

100G: 100GE/OTU4

LR4: 10km

100Gb/s CFP electrical parameters

Absolute Maximum Ratings

The limit of the maximum value is shown as below Table 1. (If operating out the limit

of the maximum value will cause permanent damage).

Table 1 100Gb/s CFP module limit the maximum value

Parameter	Symbol	Conditions	Min.	Max	Unit
Storage temperature (case)	T _{stg}	—	-40	+85	°C
Relative humidity	RH	0	—	85	%
Damage Threshold for Receiver	P _{max}	—	—	+10.0	dBm
Power Supply	V _{cc} 3.3V	—	-0.3	+3.6	V
	V _{cc} 5.0V	—	—	—	V
Input 3.3V LVCMOS signal level	V _i	—	-0.3	V _{cc} +0.3	V
Input 1.2V LVCMOS signal level	V _i		-0.3	1.6	V
ESD Sensitivity on module and all host pins	HBM	Human Body model R=1.5K, C=100pF	—	2000	V

1.2 Recommended operating conditions

The recommended working conditions are shown as below Table 2.

Table 2 100Gb/s CFP recommended working conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Case Temperature	T _c	0	—	+70	°C
Supply voltage	V _{cc} 3.3V	+3.14	+3.3	+3.47	V
Supply Current	I _{cc} 3.3V	—	—	3.3	A
Power dissipation	P	—	—	12	W
Low Power dissipation	P _{Low}			2	W
In-rush Current	I _{inrush}			50	mA/us
Turn-off rush Current	I _{turnoff}	-50			mA/us
Link Distance	L	2M	—	10km	G.652 SMF

2 100Gb/s CFP Specifications

2.1 Optical Specifications

Table 3 100Gb/s CFP Optical Specifications (100GBase-LR4)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Transmitter						
Channel data rate				25.7812		Gbps
Aggregate data rate				103.125		Gbps

Data rate variation			-100		+100	ppm
Lane Center Wavelength	λ_{CT0}		1294.53	1295.56	1296.59	nm
	λ_{CT1}		1299.02	1300.05	1301.09	nm
	λ_{CT2}		1303.54	1304.58	1305.63	nm
	λ_{CT3}		1308.09	1309.14	1310.19	nm
Total Average Launch Power	Pout		—	—	10.5	dBm
Average Launch Power per Lane	Peach		-4.3	—	4.5	dBm
Optical Modulation Amplitude per Lane	OMA		-1.3	—	4.5	dBm
Difference in Launch power between any two lanes(OMA)			—	—	5.0	dB
Launch power in OMA minus TDP, per lane	Pomatdp		-2.3	—	—	dBm
Average Launch Power of TX_DIS Transmitter per lane	Poff	TX_DIS=H	—	—	-30	dBm
Extinction Ratio	E_R		4	5.5	—	dB
SMSR	SMSR		30	—	—	dB
Dispersion Penalty	DP	10km SMF	—	—	2.2	dB
Relative Intensity Noise	RIN	Mod off	—	—	-130	dB/Hz
Optical Return Loss Tolerance	T_{RL}		—	—	20	dB
Transmitter reflectance	T_{ef}		—	—	-12	dB
Optical Eye Mask {X1, X2, X3, Y1, Y2, Y3} ¹	EM		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			
Receiver						
Channel data rate				25.7812		Gbps
Data rate variation			-100		+100	ppm
Lane Center Wavelength	λ_{CT0}		1264.5 – 1277.5			nm
	λ_{CT1}		1284.5 – 1297.5			
	λ_{CT2}		1304.5 – 1317.5			
	λ_{CT3}		1324.5 – 1337.5			
Damage threshold	P_{DT}		—	5.5	—	dBm
Average receiver power per lane	Rpow		-10.6	—	4.5	dBm
Receive power OMA per Lane	Rovl		—	—	4.5	dBm
Difference in receive power between any two lanes(OMA)			—	—	5.5	dB
Receiver Sensitivity(OMA) per lane	Psen		—	—	-8.6	dBm
Stressed Receiver Sensitivity per Lane	Psen_str		—	—	-6.8	dBm
Receiver Reflectance	Ref		—	—	-26	dB

Conditions of stressed receiver sensitivity test						
Vertical eye closure penalty per Lane			—	—	1.8	dB
Stressed eye jitter per Lane			—	—	0.3	UI
Rx-Lane LOS Assert			—	-18	—	dBm
Rx-Lane LOS Deassert			—	-15	—	dBm
Rx-Lane LOS Hysteresis			0.5	—	—	dB

Note1. Please refer to Figure 1

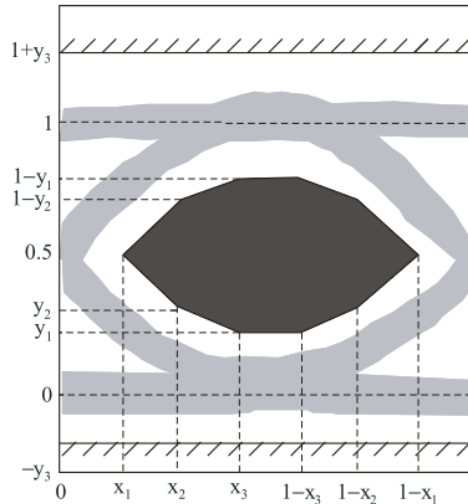


Figure 1. Transmission eye mask definition

Table 4 100Gb/s CFP Optical Specifications (OTU4)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Transmitter						
Channel data rate				27.9525		Gbps
Aggregate data rate				111.809		Gbps
Data rate variation			-20		+20	ppm
Lane Center Wavelength	λ_{CT0}		1294.53	1295.56	1296.59	nm
	λ_{CT1}		1299.02	1300.05	1301.09	nm
	λ_{CT2}		1303.54	1304.58	1305.63	nm
	λ_{CT3}		1308.09	1309.14	1310.19	nm
Total Average Launch Power	Pout		—	—	8.9	dBm
Average Launch Power per Lane	Peach		-2.5	—	2.9	dBm
Optical Modulation Amplitude per Lane	OMA		-1.2	—	4.5	dBm
Difference in Launch power between any two lances(OMA)			—	—	5.0	dB
Average Launch Power of	Poff	TX_DIS=H	—	—	-30	dBm

TX_DIS Transmitter per lane						
Extinction Ratio	E_R		7	—	—	dB
SMSR	SMSR		30			dB
Relative Intensity Noise	RIN	Mod off	—	—	-130	dB/Hz
Optical Return Loss Tolerance	T_{RL}		—	—	20	dB
Transmitter reflectance	T_{ef}		—	—	-12	dB
Optical Eye Mask {X1, X2, X3, Y1, Y2, Y3} ¹	EM		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			
Receiver						
Channel data rate				27.9525		Gbps
Data rate variation			-20		+20	ppm
Lane Center Wavelength	λ_{CR0}		1294.53	1295.56	1296.59	nm
	λ_{CR1}		1299.02	1300.05	1301.09	nm
	λ_{CR2}		1303.54	1304.58	1305.63	nm
	λ_{CR3}		1308.09	1309.14	1310.19	nm
Damage threshold	P_{DT}		—	5.5	—	dBm
Average receiver power per lane	Rpow		—	—	4.5	dBm
Receiver power OMA per lane	Rovl		—	—	4.5	dBm
Difference in receive power between any two lanes(OMA)			—	—	5.5	dB
Optical path penalty					1.5	dB
Receiver Sensitivity per lane ²	Psen		—	—	-10.3	dBm
Receiver Sensitivity(OMA) per lane ²	Psen_OMA				-9.1	dBm
Receiver Reflectance	Ref		—	—	-26	dB
Rx-Lane LOS Assert			—	-18	—	dBm
Rx-Lane LOS Deassert			—	-15	—	dBm
Rx-Lane LOS Hysteresis			0.5	—	—	dB

Note1. Please refer to Figure 1

Note2. OTU-4 Rate, BER < 10⁻¹² with FEC, ER > 7dB

2.2 Electrical specifications

2.2.1 High Speed I/O interface

Table 5 100Gb/s CFP Electrical High Speed I/O Interface Specifications

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Transmitter (CAUI input interface)						
Signal Rate Per Lane				10.3125		Gb/s
Signal Rate Tolerance			-100		100	ppm
AC Common Mode input Voltage Tolerance(RMS)					20	mV

Differential input return loss	$R_{l_{diff}}$	IEEE 802.3ba-2010	See Equation (83B-7)			dB
Total Input Jitter Tolerance	T_{jin}				0.62	UI
Deterministic Input Jitter Tolerance	T_{din}				0.42	UI
Transmitter Input Eye Mask (X1, X2)			(0.31, 0.5)			UI ¹
Transmitter Input Eye Mask (Y1, Y2)			(42.5, 425)			mV ¹
Receiver (CAUI output interface)						
Signal Rate Per Lane				10.3125		Gb/s
Signal Rate Tolerance			-100		100	ppm
Single-ended output voltage	V_{sig}		-0.4		4	V
Output AC common-mode voltage(RMS)	V_{ocomAC}				15	mV
Output transition time	T_r	20%~80%	24	—	—	ps
Differential output return loss		IEEE 802.3ba-2010	See Equation (83B-5)			dB
Total Jitter	T_j				0.4	UI
Deterministic Jitter	T_{dj}				0.25	UI
Receiver Output Eye Mask (X1, X2)			(0.2, 0.5)			UI ²
Receiver Output Eye Mask (Y1, Y2)			(136, 380)			mV ²

Note1. refer to figure 2

Note2. refer to figure 3

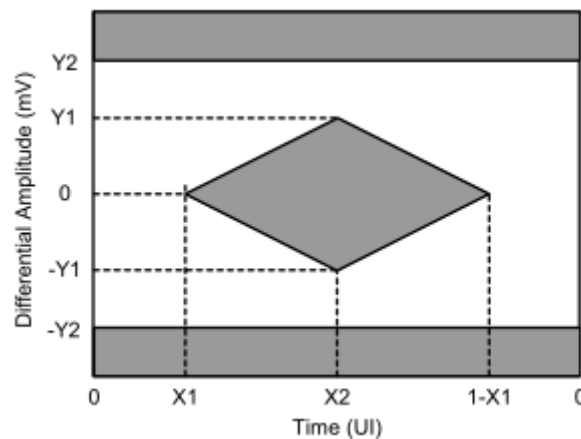


Figure 2.CAUI receiver eye mask

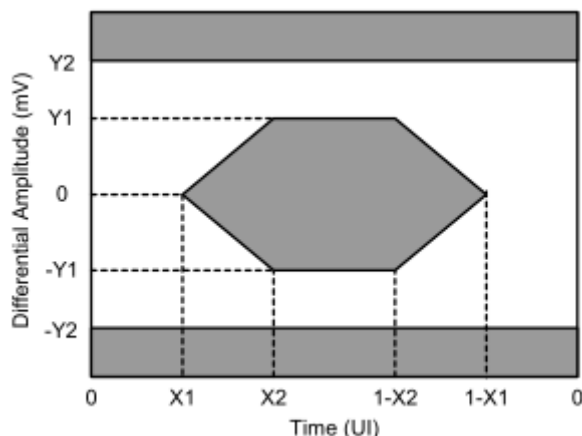


Figure 3. CAUI transmitter eye mask

2.2.2 Low Speed I/O interface

Table 6 100Gb/s CFP 3.3V LVCMOS Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V _{CC}		3.2	3.3	3.4	V
Input High Voltage	V _{IH}		2		V _{CC} +0.3	V
Input Low Voltage	V _{IL}		-0.3		0.8	V
Input Leakage Current	I _{IN}		-10		+10	mA
Output High Voltage (I _{OH} = -100uA)	V _{OH}		V _{CC} -0.2		V _{CC} +0.3	V
Output Low Voltage (I _{OL} = 100uA)	V _{OL}		-0.3		0.2	V
Minimum Pulse Width of Control Pin Signal	t _{CNTL}		100			us

Note. (MOD_RSTn, MOD_LOPWR, TX_DIS, PRG_CNTL, MOD_ABS, RX_LOS, GLB_ALRMn, PRG_ALRM) are LVCMOS I/O interfaces.

Table 7 100Gb/s CFP 1.2V LVCMOS Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input High Voltage	V _{IH}		0.84		1.5	V
Input Low Voltage	V _{IL}		-0.3		0.36	V
Input Leakage Current	I _{IN}		-100		+100	uA
Output High Voltage	V _{OH}		1.0		1.5	V
Output Low Voltage	V _{OL}		-0.3		0.2	V
Output High Current	I _{OH}				-4	mA
Output Low Current	I _{OL}		+4			mA
Input capacitance	C _i				10	pF

Note. (MDIO, MDC, PRTADR4:0) are 1.2V LVCMOS I/O interfaces

Table 8 100Gb/s CFP Timing Parameters for CFP Hardware Signal Pins

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
-----------	--------	-----------	------	------	------	------

Hardware assert	MOD_LOPWR	t_MOD_LOPWR_assert				1	ms
Hardware deassert	MOD_LOPWR	t_MOD_LOPWR_deassert				10	s
Receiver Assert Time	Loss of Signal	t_loss_assert				100	us
Receiver De-Assert Time	Loss of Signal	t_loss_deassert				100	us
Global Alarm Assert Delay Time		GLB_ALRMn_assert				150	ms
Global Alarm De-Assert Delay Time		GLB_ALRMn_deassert				150	ms
Management Interface Clock Period		t_prd		250			ns
Host MDIO t_setup		t_setup		10			ns
Host MDIO t_hold		t_hold		10			ns
CFP MDIO t_delay		t_delay		0		175	ns
Initialization time from Reset		t_initialize				2.5	s
Transmitter Disabled (TX_DIS asserted)		t_deassert				100	us
Transmitter Enabled (TX_DIS de-asserted)		t_assert				2	ms

Table 9 100Gb/s CFP MDIO and MDC Timing Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Management Interface Clock Frequency	F_MDC		0.1		4	MHz
Management Interface Clock Period	t_prd		250		10000	ns
Host MDIO t_setup	t_setup		10			ns
Host MDIO t_hold	t_hold		10			ns
CFP MDIO t_delay ¹	t_delay		0		175	ns
MDC high and low time	twidth		40		60	%
			160			ns
MDIO/MDC termination in CFP	Zt		100			kOhm

Note1. Delay from MDC rising edge to MDIO data change

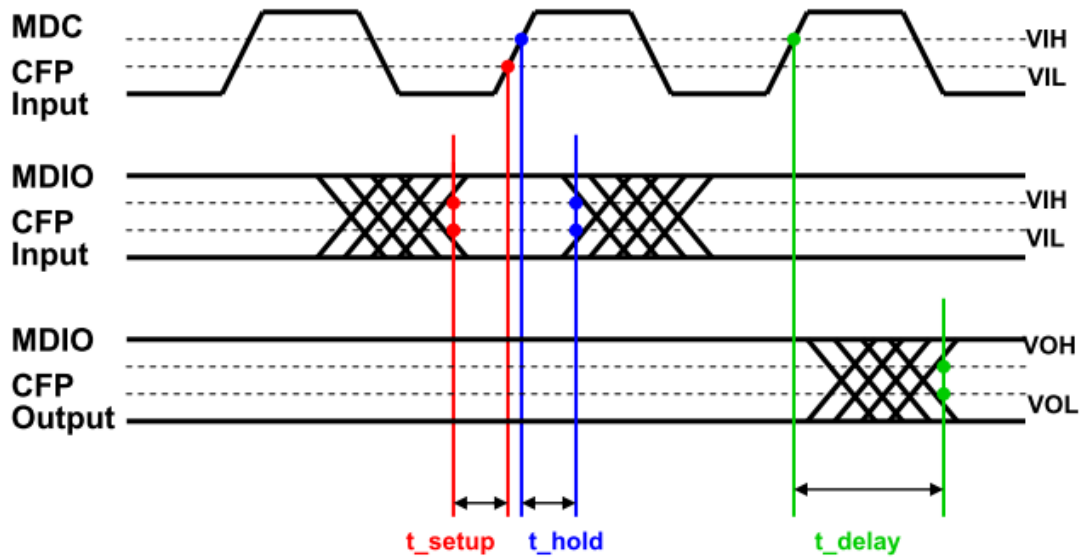


Figure 4. 100Gb/s CFP MDIO & MDC Timing Diagram

2.2.3 Clock interface

Table 10 100Gb/s CFP Reference Clock Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Impedance	Zd		80	100	120	ohm
Frequency			1/64 of host lane rate			
Frequency Stability	Xf		-100		+100	ppm ¹
			-20		+20	ppm ²
Input Differential Voltage	Vdiff		400		1200	mV ³
RMS Jitter	σ				10	ps ⁴
Clock Duty Cycle			40		60	%
Clock Rise/Fall Time 10/90%	Tr/f		200		1250	ps ⁵

Note1. For Ethernet applications

Note2. For Telecom applications

Note3. Peak to Peak Differential

Note4. Random Jitter. Over frequency band of $10\text{kHz} < f < 10\text{MHz}$

Note5. 1/64 of electrical lane

Table 11 100Gb/s CFP Transmitter & Receiver Monitor Clock Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Impedance	Zd		80	100	120	ohm
Frequency			1/8 of network lane rate			
Output Differential Voltage	Vdiff		400		1200	mV ¹
Clock Duty Cycle			40		60	%

Note1. Peak to Peak Differential

3 100Gb/s CFP Function Diagram

3.1 Internal reference structure

The internal structure of 100Gb/s CFP shown as Figure 5.

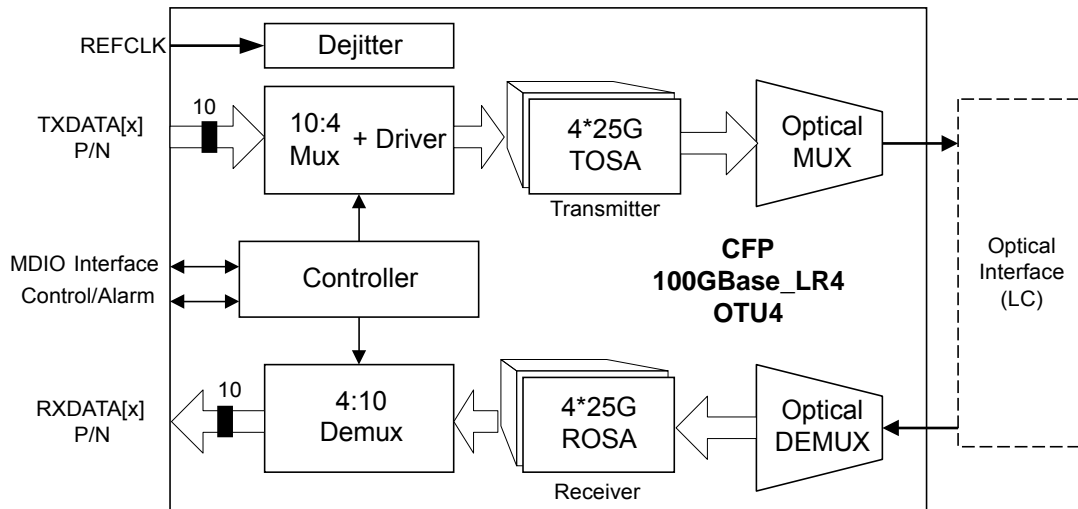


Figure 5. 10km 100Gb/s CFP internal structure

3.2 Recommended Interface Circuit

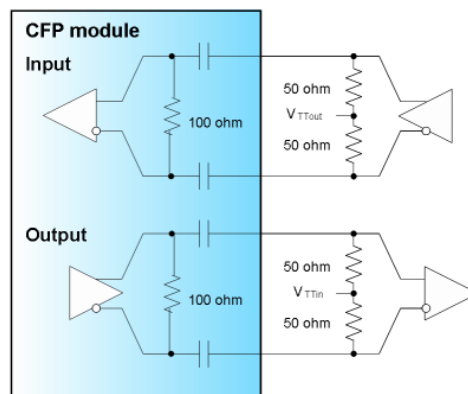


Figure 6. Recommended High Speed I/O for Data and Clocks

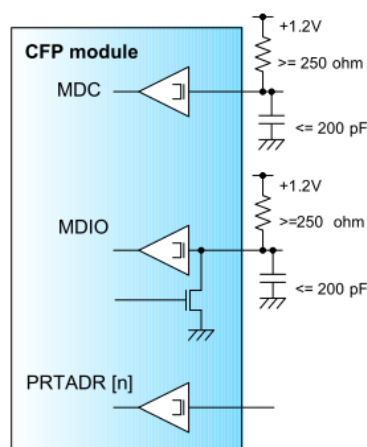


Figure 7. Recommended MDIO Interface Termination

3.3 Pin layout

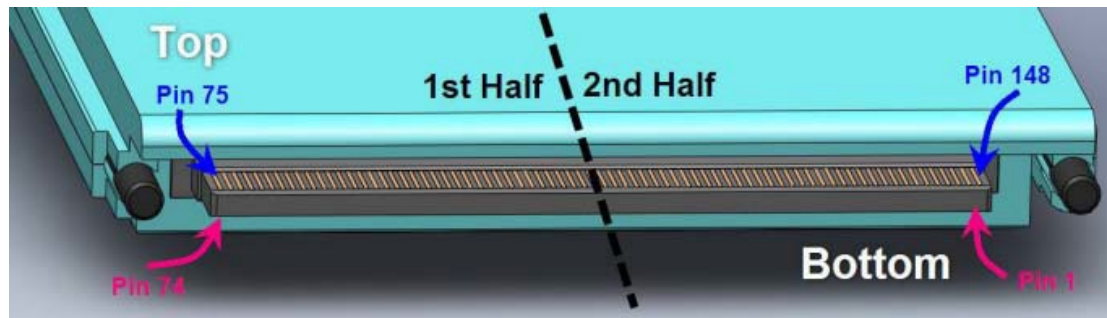


Figure 8. CFP Module Pad Layout

Top Row (2nd Half)		Bottom Row (2nd Half)		Top Row (1st Half)		Bottom Row (1st Half)	
148	GND	1	3.3V_GND	111	GND	38	MOD_ABS
147	REFCLKn	2	3.3V_GND	110	N.C.	39	MOD_RSTn
146	REFCLKp	3	3.3V_GND	109	N.C.	40	RX_LOS
145	GND	4	3.3V_GND	108	GND	41	GLB_ALRMn
144	N.C.	5	3.3V_GND	107	RX9n	42	PRTADR4
143	N.C.	6	3.3V	106	RX9p	43	PRTADR3
142	GND	7	3.3V	105	GND	44	PRTADR2
141	TX9n	8	3.3V	104	RX8n	45	PRTADR1
140	TX9p	9	3.3V	103	RX8p	46	PRTADR0
139	GND	10	3.3V	102	GND	47	MDIO
138	TX8n	11	3.3V	101	RX7n	48	MDC
137	TX8p	12	3.3V	100	RX7p	49	GND
136	GND	13	3.3V	99	GND	50	VND_IO_F
135	TX7n	14	3.3V	98	RX6n	51	VND_IO_G
134	TX7p	15	3.3V	97	RX6p	52	GND
133	GND	16	3.3V_GND	96	GND	53	VND_IO_H
132	TX6n	17	3.3V_GND	95	RX5n	54	VND_IO_J
131	TX6p	18	3.3V_GND	94	RX5p	55	3.3V_GND
130	GND	19	3.3V_GND	93	GND	56	3.3V_GND
129	TX5n	20	3.3V_GND	92	RX4n	57	3.3V_GND
128	TX5p	21	VND_IO_A	91	RX4p	58	3.3V_GND
127	GND	22	VND_IO_B	90	GND	59	3.3V_GND
126	TX4n	23	GND	89	RX3n	60	3.3V
125	TX4p	24	(TX_MCLKn)	88	RX3p	61	3.3V
124	GND	25	(TX_MCLKp)	87	GND	62	3.3V
123	TX3n	26	GND	86	RX2n	63	3.3V
122	TX3p	27	VND_IO_C	85	RX2p	64	3.3V
121	GND	28	VND_IO_D	84	GND	65	3.3V
120	TX2n	29	VND_IO_E	83	RX1n	66	3.3V
119	TX2p	30	PRG_CNTL1	82	RX1p	67	3.3V
118	GND	31	PRG_CNTL2	81	GND	68	3.3V
117	TX1n	32	PRG_CNTL3	80	RX0n	69	3.3V
116	TX1p	33	PRG_ALARM1	79	RX0p	70	3.3V_GND
115	GND	34	PRG_ALARM2	78	GND	71	3.3V_GND
114	TX0n	35	PRG_ALARM3	77	(RX_MCLKn)	72	3.3V_GND
113	TX0p	36	TX_DIS	76	(RX_MCLKp)	73	3.3V_GND
112	GND	37	MOD_LOPWR	75	GND	74	3.3V_GND

Figure 9. CFP Module Pin Map

Note1: Pin 21,22,27,28,29,50,51,53,54 are internally used and NOT allowed to connect any signal and power supply or GND

Note2: Pin 24,25,76,77 are disabled unless MCLK output is enabled via MDIO

3.4 Pin definition

Table 12 100Gb/s CFP Pin Definition(Bottom row)

PIN	Name	I/O	Logic	Description
1	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground
2	3.3V_GND			
3	3.3V_GND			
4	3.3V_GND			
5	3.3V_GND			
6	3.3V			3.3V Module Supply Voltage
7	3.3V			3.3V Module Supply Voltage
8	3.3V			3.3V Module Supply Voltage
9	3.3V			3.3V Module Supply Voltage
10	3.3V			3.3V Module Supply Voltage
11	3.3V			3.3V Module Supply Voltage
12	3.3V			3.3V Module Supply Voltage
13	3.3V			3.3V Module Supply Voltage
14	3.3V			3.3V Module Supply Voltage
15	3.3V			3.3V Module Supply Voltage
16	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground
17	3.3V_GND			
18	3.3V_GND			
19	3.3V_GND			
20	3.3V_GND			
21	VND_IO_A	I/O		Module Vendor I/O. Must No Connect at host board
22	VND_IO_B	I/O		Module Vendor I/O. Must No Connect at host board
23	GND			
24	TX_MCLKn	O	CML	TX Monitor Clock Ouput (Negative)
25	TX_MCLKp	O	CML	TX Monitor Clock Ouput (Positive)
26	GND			
27	VND_IO_C	I/O		Module Vendor I/O. Must No Connect at host board
28	VND_IO_D	I/O		Module Vendor I/O. Must No Connect at host board
29	VND_IO_E	I/O		Module Vendor I/O. Must No Connect at host board
30	PRG_CNTL1	I	LVC MOS w/ PUR	Programmable Control 1 set over MDIO, MSA Default: TRXIC_RSTn, TX & RX ICs reset, "0": reset, "1" or NC: enabled = not used
31	PRG_CNTL2	I	LVC MOS w/ PUR	Programmable Control 2 set over MDIO, MSA Default: Hardware Interlock LSB, "00": ≤8W, "01":≤16W, "10": ≤24W, "11" or NC: ≤32W = not used
32	PRG_CNTL3	I	LVC MOS w/ PUR	Programmable Control 3 set over MDIO, MSA Default: Hardware Interlock MSB, "00": ≤8W, "01": ≤16W, "10": ≤24W, "11" or NC: ≤32W = not used

33	PRG_ALARM1	O	LVC MOS	Programmable Alarm 1 set over MDIO, MSA Default: HIPWR_ON, "1": module power up completed, "0": module not high powered up
34	PRG_ALARM2	O	LVC MOS	Programmable Alarm 2 set over MDIO, MSA Default: MOD_READY, "1": Ready, "0": not Ready.
35	PRG_ALARM3	O	LVC MOS	Programmable Alarm 3 set over MDIO, MSA Default: MOD_FAULT, fault detected, "1": Fault, "0": No Fault
36	TX_DIS	I	LVC MOS w/ PUR	Transmitter Disable for all lanes, "1" or NC = transmitter disabled, "0" = transmitter enabled
37	MOD_LOPWR	I	LVC MOS w/ PUR	Module Low Power Mode. "1" or NC: module in low power (safe) mode, "0": power-on enabled
38	MOD_ABS	O	GND	Module Absent. "1" or NC: module absent, "0": module present, Pull Up Resistor on Host
39	MOD_RSTn	I	LVC MOS w/ PDR	Module Reset. "0" resets the module, "1" or NC = module enabled, Pull Down Resistor in Module
40	RX_LOS	O	LVC MOS	Receiver Loss of Optical Signal, "1": low optical signal, "0": normal condition
41	GLB_ALRMn	O	LVC MOS	Global Alarm. "0": alarm condition in any MDIO Alarm register, "1": no alarm condition, Open Drain, Pull Up Resistor on Host
42	PRTADR4	I	1.2V CMOS	MDIO Physical Port address bit 4
43	PRTADR3	I	1.2V CMOS	MDIO Physical Port address bit 3
44	PRTADR2	I	1.2V CMOS	MDIO Physical Port address bit 2
45	PRTADR1	I	1.2V CMOS	MDIO Physical Port address bit 1
46	PRTADR0	I	1.2V CMOS	MDIO Physical Port address bit 0
47	MDIO	I/O	1.2V CMOS	Management Data I/O bi-directional data (electrical specs as per 802.3ae and ba)
48	MDC	I	1.2V CMOS	Management Data Clock (electrical specs as per 802.3ae and ba)
49	GND			
50	VND_IO_F	I/O		Module Vendor I/O. Must No Connect at host board
51	VND_IO_G	I/O		Module Vendor I/O. Must No Connect at host board
52	GND			
53	VND_IO_H	I/O		Module Vendor I/O. Must No Connect at host board
54	VND_IO_J	I/O		Module Vendor I/O. Must No Connect at host board
55	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be
56	3.3V_GND			separate or tied together with Signal Ground

57	3.3V_GND			
58	3.3V_GND			
59	3.3V_GND			
60	3.3V			3.3V Module Supply Voltage
61	3.3V			3.3V Module Supply Voltage
62	3.3V			3.3V Module Supply Voltage
63	3.3V			3.3V Module Supply Voltage
64	3.3V			3.3V Module Supply Voltage
65	3.3V			3.3V Module Supply Voltage
66	3.3V			3.3V Module Supply Voltage
67	3.3V			3.3V Module Supply Voltage
68	3.3V			3.3V Module Supply Voltage
69	3.3V			3.3V Module Supply Voltage
70	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground
71	3.3V_GND			
72	3.3V_GND			
73	3.3V_GND			
74	3.3V_GND			

Table 13 100Gb/s CFP Pin Definition(Top row)

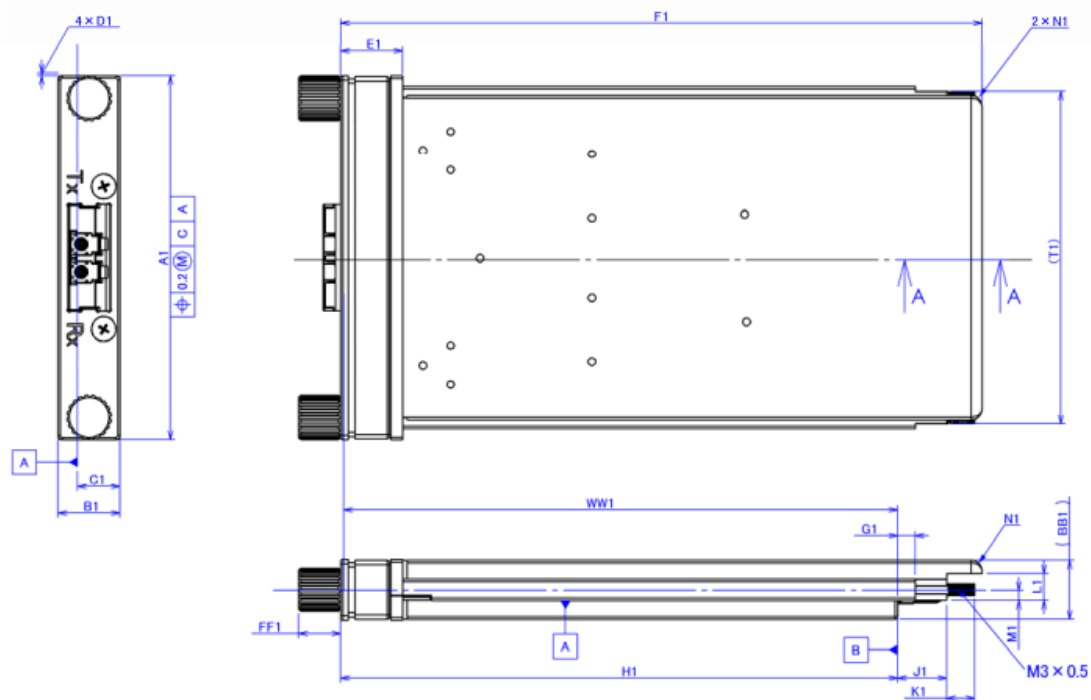
PIN	Name	I/O	Logic	Description
75	GND			
76	RX_MCLKp	O		RX Monitor Clock Output (Positive)
77	RX_MCLKn	O		RX Monitor Clock Output (Negative)
78	GND			
79	RX0p	O	HS I/O	Lane 0 Receiver Output (Positive)
80	RX0n	O	HS I/O	Lane 0 Receiver Output (Negative)
81	GND			
82	RX1p	O	HS I/O	Lane 1 Receiver Output (Positive)
83	RX1n	O	HS I/O	Lane 1 Receiver Output (Negative)
84	GND			
85	RX2p	O	HS I/O	Lane 2 Receiver Output (Positive)
86	RX2n	O	HS I/O	Lane 2 Receiver Output (Negative)
87	GND			
88	RX3p	O	HS I/O	Lane 3 Receiver Output (Positive)
89	RX3n	O	HS I/O	Lane 3 Receiver Output (Negative)
90	GND			
91	RX4p	O	HS I/O	Lane 4 Receiver Output (Positive)
92	RX4n	O	HS I/O	Lane 4 Receiver Output (Negative)
93	GND			
94	RX5p	O	HS I/O	Lane 5 Receiver Output (Positive)
95	RX5n	O	HS I/O	Lane 5 Receiver Output (Negative)

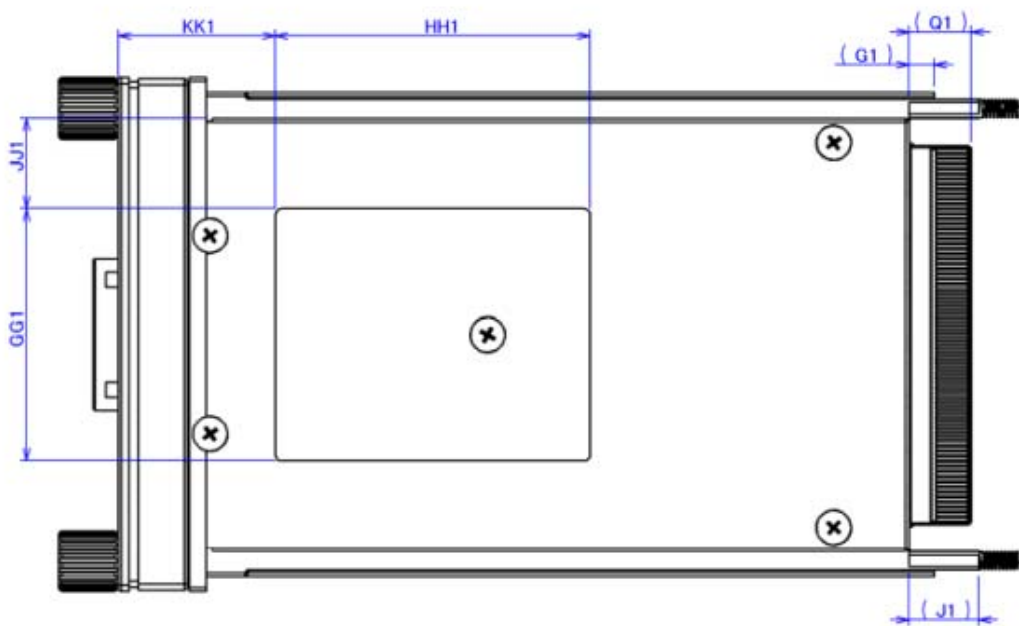
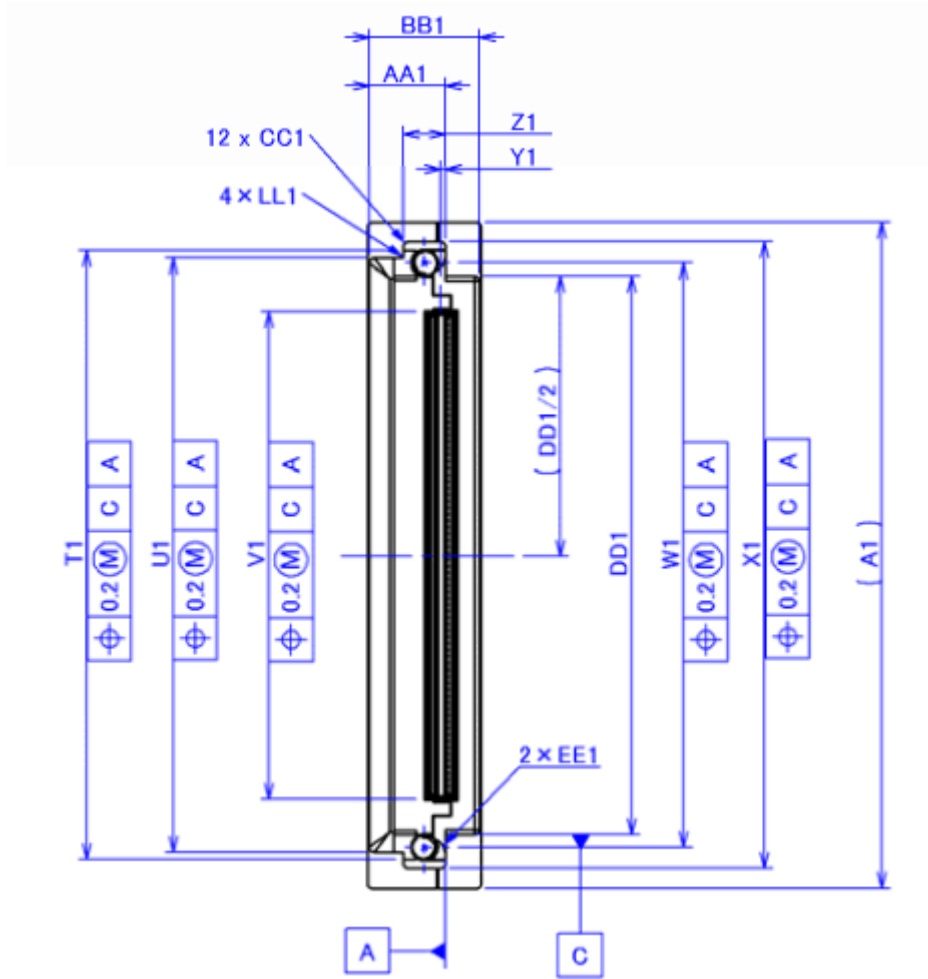
96	GND			
97	RX6p	O	HS I/O	Lane 6 Receiver Output (Positive)
98	RX6n	O	HS I/O	Lane 6 Receiver Output (Negative)
99	GND			
100	RX7p	O	HS I/O	Lane 7 Receiver Output (Positive)
101	RX7n	O	HS I/O	Lane 7 Receiver Output (Negative)
102	GND			
103	RX8p	O	HS I/O	Lane 8 Receiver Output (Positive)
104	RX8n	O	HS I/O	Lane 8 Receiver Output (Negative)
105	GND			
106	RX9p	O	HS I/O	Lane 9 Receiver Output (Positive)
107	RX9n	O	HS I/O	Lane 9 Receiver Output (Negative)
108	GND			
109	NC			Not Connected Internally
110	NC			Not Connected Internally
111	GND			
112	GND			
113	TX0p	I	HS I/O	Lane 0 Transmitter Input (Positive)
114	TX0n	I	HS I/O	Lane 0 Transmitter Input (Negative)
115	GND			
116	TX1p	I	HS I/O	Lane 1 Transmitter Input (Positive)
117	TX1n	I	HS I/O	Lane 1 Transmitter Input (Negative)
118	GND			
119	TX2p	I	HS I/O	Lane 2 Transmitter Input (Positive)
120	TX2n	I	HS I/O	Lane 2 Transmitter Input (Negative)
121	GND			
122	TX3p	I	HS I/O	Lane 3 Transmitter Input (Positive)
123	TX3n	I	HS I/O	Lane 3 Transmitter Input (Negative)
124	GND			
125	TX4p	I	HS I/O	Lane 4 Transmitter Input (Positive)
126	TX4n	I	HS I/O	Lane 4 Transmitter Input (Negative)
127	GND			
128	TX5p	I	HS I/O	Lane 5 Transmitter Input (Positive)
129	TX5n	I	HS I/O	Lane 5 Transmitter Input (Negative)
130	GND			
131	TX6p	I	HS I/O	Lane 6 Transmitter Input (Positive)
132	TX6n	I	HS I/O	Lane 6 Transmitter Input (Negative)
133	GND			
134	TX7p	I	HS I/O	Lane 7 Transmitter Input (Positive)
135	TX7n	I	HS I/O	Lane 7 Transmitter Input (Negative)
136	GND			
137	TX8p	I	HS I/O	Lane 8 Transmitter Input (Positive)

138	TX8n	I	HS I/O	Lane 8 Transmitter Input (Negative)
139	GND			
140	TX9p	I	HS I/O	Lane 9 Transmitter Input (Positive)
141	TX9n	I	HS I/O	Lane 9 Transmitter Input (Negative)
142	GND			
143	NC			Not Connected Internally
144	NC			Not Connected Internally
145	GND			
146	REFCLKp	I		Reference Clock Input (Positive)
147	REFCLKn	I		Reference Clock Input (Negative)
148	GND			

4 100Gb/s CFP Mechanical Specifications

100Gb/s CFP mechanical dimensions should be compliant with CFP MSA specification. Detailed dimensions are shown in Figure 10.





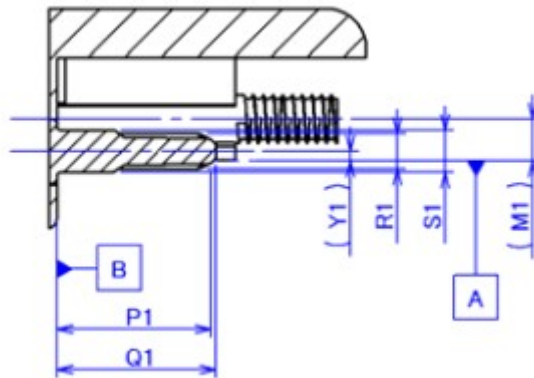


Figure 10. 100Gb/s CFP Mechanical Dimensions

Table 14 Package dimensions

MSA MODULE DIMENSIONS				Notes
KEY	VALUE	TOLERANCE	DESCRIPTION	
A1	82.00	± 0.10	WIDTH OF MODULE FACEPLATE, OVERALL	
B1	14.00	± 0.10	HEIGHT OF MODULE FACEPLATE, OVERALL	
C1	9.60	± 0.20	HEIGHT OF MODULE FACEPLATE TO DATUM -A-	
D1	0.65	MIN.	HEIGHT OF EMI SPRING FINGERS	
E1	14.50	MAX.	LENGTH OF MODULE FACEPLATE, OVERALL	
F1	144.75	± 0.20	LENGTH OF MODULE, OVERALL	
G1	4.80	MAX.	LENGTH OF MODULE RAIL SHOULDER	
H1	125.70	± 0.20	DISTANCE FROM MODULE FACEPLATE TO HARDSTOP DATUM -B-	
J1	11.00	± 0.20	DISTANCE FROM CONNECTOR PROTECTOR TO HARDSTOP DATUM -B-	
K1	6.00	± 0.50	M3 THUMBSCREW THREAD LENGTH IN FULLY LOADED POSITION	
L1	6.40	± 0.20	DISTANCE FROM DATUM -A- TO BOTTOM SURFACE OF MODULE TAIL	
M1	2.60	± 0.20	DISTANCE FROM DATUM -A- TO CENTERLINE OF M3 THUMBSCREW HOLE	
N1	R2.00	MIN.	TOP MODULE LEAD-IN RADIUS	
P1	9.08	± 0.15	LENGTH OF CONNECTOR CONTACT PIN FROM DATUM -B-	
Q1	9.80	± 0.08	LENGTH OF CONNECTOR END FROM DATUM -B-	
R1	2.18	± 0.08	CONNECTOR TIP THICKNESS, OVERALL	
S1	2.62	± 0.08	CONNECTOR SHOULDER THICKNESS, OVERALL	
T1	75.00	± 0.20	WIDTH OF MODULE CONNECTOR PROTECTOR, OVERALL	

U1	73.20	± 0.20	WIDTH, TOP SHOULDER, MODULE, OVERALL	
V1	60.05	± 0.08	WIDTH, CONNECTOR, OVERALL	
W1	72.00	± 0.20	CENTERLINE TO CENTERLINE DISTANCE OF M3 THUMB SCREW HOLES	
X1	77.20	± 0.20	WIDTH, MODULE BODY, OVERALL	
Y1	0.60	± 0.15	DATUM -A- TO CENTERLINE OF CONNECTOR	
Z1	5.20	± 0.20	HEIGHT, RAIL SHOULDER, MODULE, OVERALL	
AA1	9.40	± 0.20	DATUM -A- TO TOP OF MODULE	
BB1	13.60	± 0.20	HEIGHT, MODULE BODY, OVERALL	
CC1	R0.6	± 0.10	MODULE OUTSIDE CORNER RADIUS	
DD1	68.80	± 0.20	WIDTH, MODULE BOTTOM, OVERALL	
EE1	R2.60	± 0.20	RADIUS, CLEARANCE, MODULE, CONNECTOR PROTECTOR FEATURE	
FF1	9.50	± 0.50	THUMBSCREW HEIGHT FROM MODULE FACEPLATE TOP FRONT SURFACE	
GG1	40.00	± 0.20	LABEL RECESS WIDTH	
HH1	50.00	± 0.20	LABEL RECESS LENGTH	
JJ1	14.40	± 0.20	LABEL RECESS TO SIDE OF MODULE	
KK1	25.00	± 0.20	LABEL RECESS TO MODULE FACEPLATE	
LL1	R0.4	MAX.	MODULE INSIDE CORNER RADIUS	
WW1	125.00	± 0.50	CFP module stopper to LC connector Latch	

The mechanical dimensions of the electrical connectors on the CFP Host PCB are shown in Figure 11.

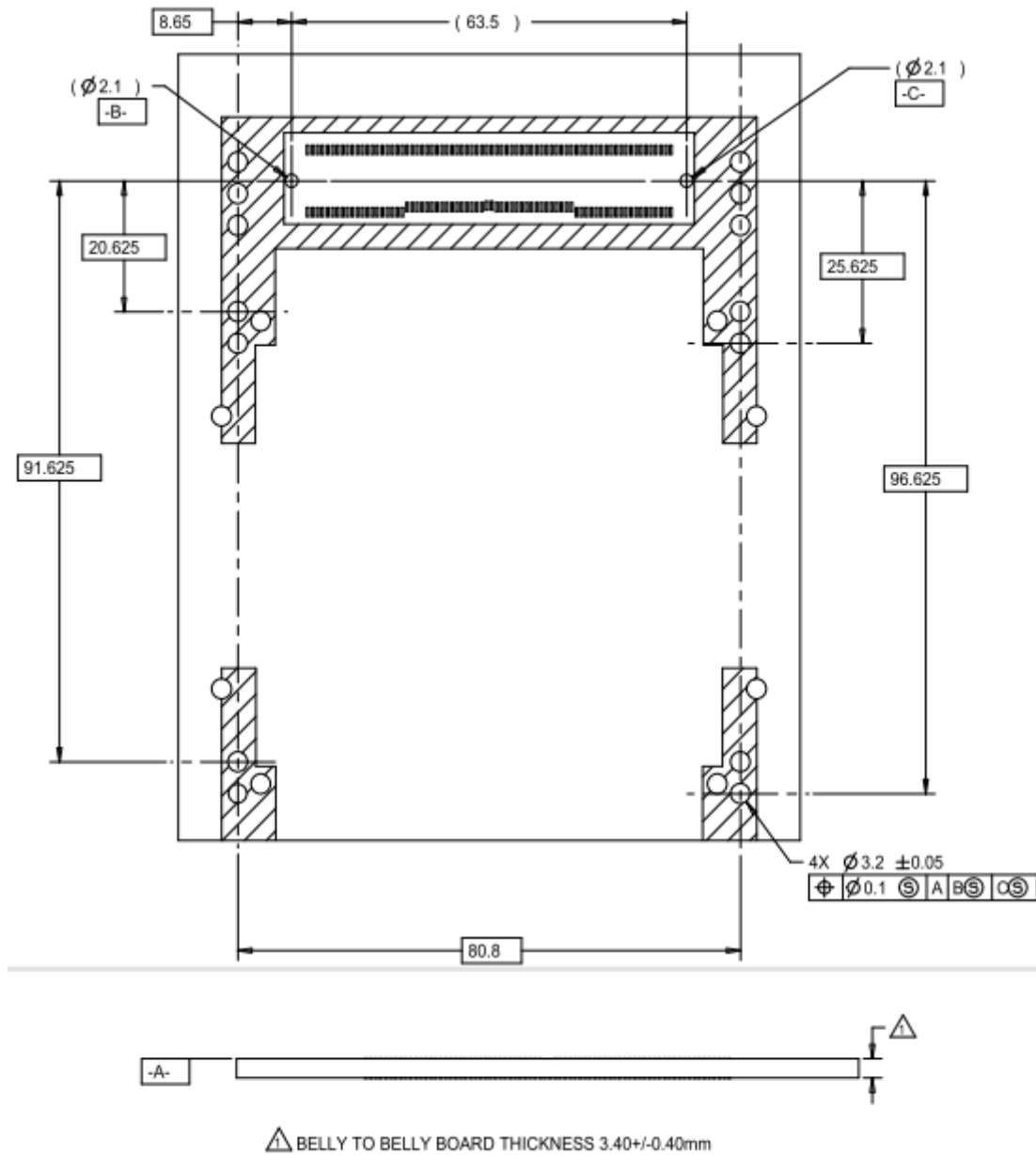


Figure 11 Mechanical Dimensions of Electrical Connectors on CFP Host PCB

Table 15 CFP Mechanical Characteristics

	Max.	Unit	Notes
Weight	350	g	
Flatness	0.15	mm	
Roughness	6.3	Ra	

Table 16/17 specify Host Connector Assembly Information for 100Gb/s CFP application.

Table 16 Host Connector Assembly Information (Tyco)

Part Number	Supplier	Part Name
2057626-1	Tyco Electronics	External Bracket Assembly
2057592-2	Tyco Electronics	Guide Rail

2057631-1	Tyco Electronics	Host Connector Cover Assembly
2057930-1	Tyco Electronics	Backer Plate Assembly
2057630-1	Tyco Electronics	Host Connector

Table 17 Host Connector Assembly Information (Yamaichi)

Part Number	Supplier	Part Name
CA009-1203-001	Yamaichi Electronics	External Bracket Assembly
CA009-1201-001	Yamaichi Electronics	Guide Rail
CA009-1400-001	Yamaichi Electronics	Host Connector Cover Assembly
CA009-1204-001	Yamaichi Electronics	Backer Plate Assembly
CA009-S001-001	Yamaichi Electronics	Host Connector

5 Management Interface

Modulelink Networks' CFP-100G-LR4 transceivers supports the MDIO interface IEEE802.3 Clause 45. This 2-wire management data I/O interface is provided for the module status monitoring and control. The management data clock (MDC) provides clocking for the data that is passed on the MDIO port. Five further pins allow for loading of a port address (PORT_ADDR0-4) into the module.

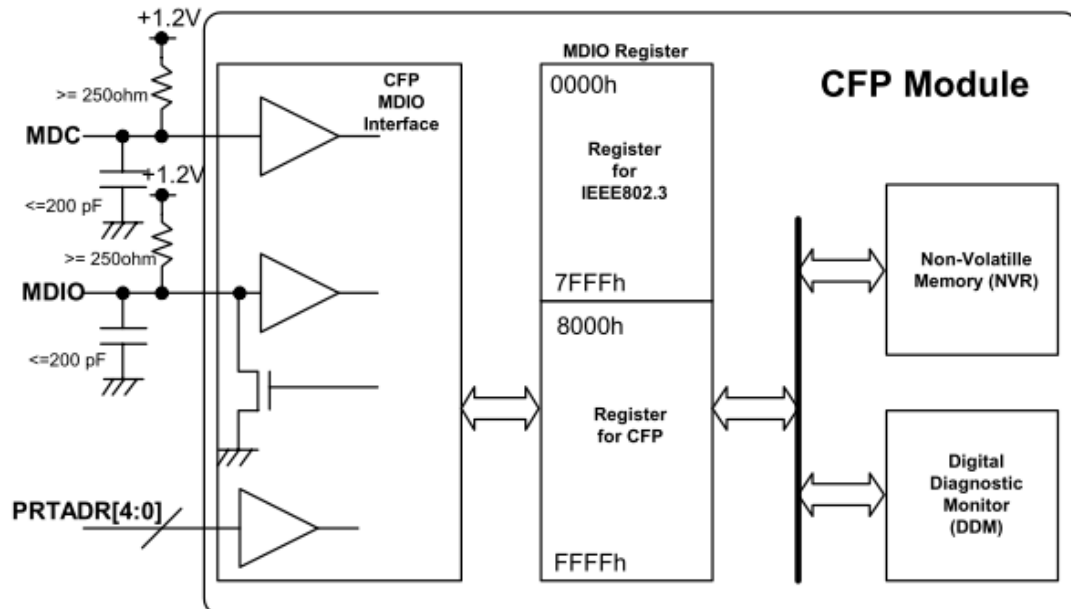


Figure 12 CFP MDIO Interface

Note: Capacitor represents stray capacity 600ohm pull-up is preferred

For more detailed information please refer to "**CFP MSA Management Interface Specification Version 2.2 r06**".

6 Ordering Information

Table 18 Order Information

Part No.	Application	Data Rate	Transmitter	Receiver	Fiber Type	Connector
CFP-100G-LR4 -S	100GBase-LR4	103.125Gb/s	4*25G LAN-WDM TOSA	4*25G PIN ROSA	SMF	LC/PC
CFP-100G-LR4 -D	100GBase-LR4 OTU4	103.125Gb/s 111.809Gb/s	4*25G LAN-WDM TOSA	4*25G PIN ROSA	SMF	LC/PC

7 Revision History

Rev.	Date	Modification	Note
V1.0	Aug 30 th , 2013		New
V1.1	Jan 15 th , 2014	1. add description for "per lane" 2. update product picture	Modified

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.