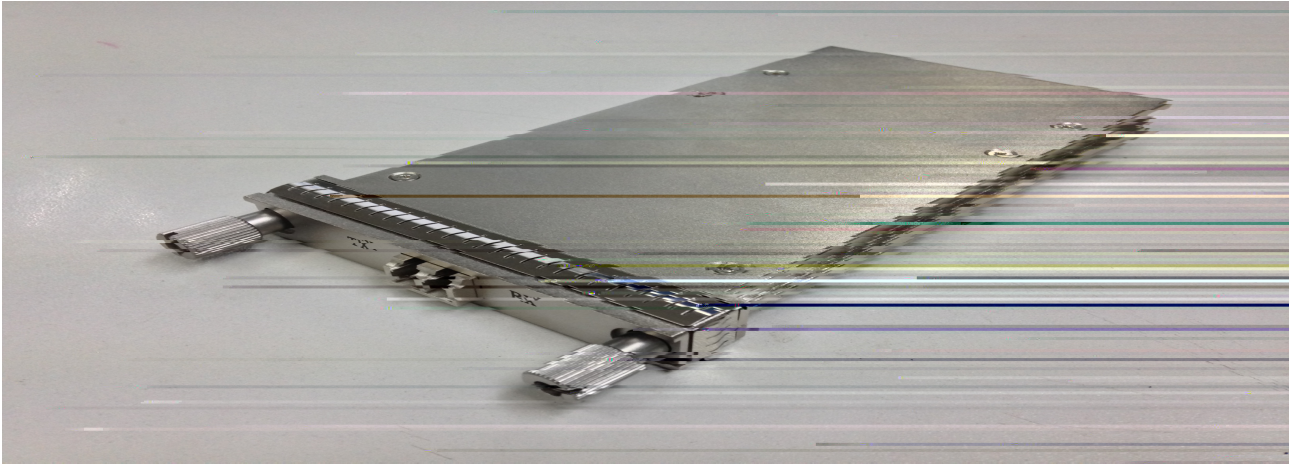


100Gb/s CFP Optical Transceiver

RTXM290-404



Features

- *Direct LC receptacle optical interface*
- *Single +3.3V power supply*
- *Hot-pluggable*
- *Operating optical data rate up to 112Gbps*
- *Operating electrical serial data rate up to 10.3125Gbps*
- *10 parallel electrical serial interface*
- *Transmission distance up to 10km*
- *AC coupling of CML signals*
- *1310 nm window cooled EA-DFB LD*
- *PIN ROSA*
- *Low power dissipation(Max:16W)*
- *Built in digital diagnostic function*
- *Operating case temperature range:0℃ to 70℃*
- *Compliant with RoHs*
- *MDIO Communication Interface*

Application

- *OTN-OTU4*
- *Switch to switch interface*
- *Switch to router interface*
- *P to P Access Network*

Standards

- **Compliant with IEEE 802.3ba**
- **Compliant with CFP MSA hardware specification**
- **Compliant with CFP MSA management specification**
- **Compliant with ITU-T G.709/Y.1331**
- **Compliant with RoHS&WEEE**

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Relative Humidity	RH	%	5	85
Power Supply Voltage	Vcc	V	-0.5	+3.6
Operating Case Temperature Range	Tc	°C	-5	75
Receiver Damage Threshold Per Lane	P _{dag}	dBm	+5.5	

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	°C	0		70
Power Supply Voltage	Vcc	V	3.2	3.3	3.4
Data rate		Gb/s		103.125	112

Specifications (tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Voltage Supply Electrical Characteristics						
Supply Current	<u>Tx Section</u> <u>Rx Section</u>	I _{cc}	A	-	-	5 1
Power Supply Noise	V _{rip}				2% 3%	DC-1MHz 1-10MHz
Dissipation	Class2	P _w	W		16	

Note1. The supply current includes CFP module's supply current and test board working current.

Note2. Average launch power ,each lane(min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance

Note3. Even if the TDP<1dB, the OMA(min) must exceed this value

Note4. Transmitter reflectance is defined looking into the transmitter

Note5. The receiver shall be able to tolerate , without damage, continuous exposure to an optical input signal having this average power level

Note6. The average receive power , each lane (max) for 100GBASE-ER4 is larger than the 100BASE-ER4 transmitter value to allow compatibility with 100BASE-LR4 units at short distances

Note7. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance

Note8. Receiver sensitivity (OMA), each lane (max) is informative

Note9. Measured with PRBS $2^{31}-1$ for BER= 10^{-5} . The BER for the OTU4 application is required to be met only after FEC has been applied.

Note10. Measured with conformance test signal at TP3 for BER= 10^{-12}

Note11. conditions of stressed receiver sensitivity test: vertical eye closure penalty for each lane is 1.8dB;stressed eye J2 jitter for each lane is 0.3UI; stressed eye J9 jitter for each lane is 0.47UI.

Hardware Control Pins

The CFP Module support real-time control functions via hardware pins, listed in the following table: Hardware Control Pins

Hardware Control Pins							
Pin #	Symbol	Description	I/O	Logic	H	L	Pull-up/down
30	PRG_CNTL1	Programmable Control 1 MSADefault:TRXIC_RSTn , TX&RX ICs reset, "0":reset;"1"	I	3.3V LVCMOS	per CFP MSA Management Interface Specification		Pull-Up Note1
31	PRG_CNTL2	Programmable Control 2 MSADefault :Hardware Interlock LSB	I	3.3V LVCMOS			Pull-Up Note1
32	PRG_CNTL3	Programmable Control 3 MSA Default:Hardware Interlock MSB	I	3.3V LVCMOS			Pull-Up Note1
36	TX_DIS	Transmitter Disable	I	3.3V LVCMOS	Disable	Enable	Pull-Up Note1
37	MOD_LOPWR	Module Low Power Mode	I	3.3V LVCMOS	Low Power	Enable	Pull-Up Note1
39	MOD_RSTn	Module Reset(Invert)	I	3.3V LVCMOS	Enable	Reset	Pull-Down Note2

Note1: Pull-Up resistor (4.7KOhm to 10 KOhm) is located within the CFP module

Note2: Pull-Down resistor (4.7KOhm to 10 KOhm) is located within the CFP module

Hardware Alarm Pins

The CFP Module supports alarm hardware pins listed in the following table: Hardware Alarm Pins

Hardware Alarm Pins							
Pin #	Symbol	Description	I/O	Logic	H	L	Pull-up/down
33	PRG_ALARM1	Programmable Alarm 1 MSA	O	3.3V LVCMOS	Active High per MDIO document		

		Default:HIPWR_ON				
34	PRG_ALRM 2	Programmable Alarm 2 MSA default:MOD_READY , Ready State has been reached	O	3.3V LVCMOS		
35	PRG_ALRM 3	Programmable Alarm 3 MSA Default: MOD_FAULT	O	3.3V LVCMOS		

					Vendor Datasheet
Hardware MOD_LOPWR deassert	t_MOD_LOPWR_deassert			ms	Value is dependent upon module start-up time. Please See register "Maximum High-Power-up time" in "CFP MSA Management Interface Specification"
Receiver Loss of Signal Assert Time	t_loss_assert		100	us	Maximum value designed to support telecom applications
Receiver Loss of Signal De-Assert Time	t_loss_deassert		100	us	Maximum value designed to support telecom applications
Global Alarm Assert Delay Time	GLB_ALRMn_assert		150	ms	This is a logical "OR" of Associated MDIO alarm & status registers. Please see MDIO document for further details
Global Alarm De-assert Delay Time	GLB_ALRMn_deassert		150	ms	This is a logical "OR" of Associated MDIO alarm & status registers. Please see MDIO document for further details
Management Interface Clock Period	t_prd	250		ns	MDC is 4MHz rate
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	Application Specific
Transmitter Enabled(TX_DIS_asserted)	t_assert		10	ms	Value is dependent upon module start-up time. Please See register "Maximum TX-Turn-on Time" in "CFP MSA Management Interface Specification"

High Speed Electrical Characteristics

Reference Clock Characteristics

		Min	Typ	Max	Unit	Notes
Impedance	Zd	80	100	120	Ω	
Frequency			161.1328125/644.53125		MHz	1/64 or 1/16 of electrical lane rate
Frequency Stability	Δf	-100		100	ppm	For Ethernet applications
		-20		20		For Telecom applications
Output Differential Voltage	V _{DIFF}	400		1200	mV	Peak to Peak Differential
RMS jitter ^{1,2}	σ			10	ps	Random Jitter Over frequency band of 10KHz<f<10MHz
Clock Duty Cycle		40		60	%	
Clock Rise/Fall Time 10%/90%	t _{r/f}	200		1250	ps	1/64 of electrical lane rate
		50		315		1/16 of electrical lane rate

Note1: The term "40GBASE_FR" is the 40GbE serial optical interface in the task force phase at IEEE-SA at the time of this publication. Also, 1/16 of optical lane clock is recommended for TX_MCLK and RX_MCLK

Note2: Multi-protocol modules are recommended to adopt the clock rate rate used in Telecom applications

Optional Transmitter and Receiver Monitor Clock Characteristics

		Min	Typ	Max	Unit	Notes
Impedance	Zd	80	100	120	Ω	
Frequency					MHz	1/8 of Network lane rate
Output Differential Voltage	V _{DIFF}	400		1200	mV	Peak to Peak Differential
Clock Duty Cycle		40		60	%	

CFP Register Allocation

CFP Register Allocation					
Starting Address in Hex	Ending Address in Hex	Access Type	Allocated Size	Data Bit Width	Table Name and Description
0000	7FFF	N/A	32768	N/A	Reserved for IEEE 802.3 use
8000	807F	RO	128	8	CFP NVR 1. Basic ID register
8080	80FF	RO	128	8	CFP NVR 2. Extended ID register
8100	817F	RO	128	8	CFP NVR 3. Network lane specific registers
8180	81FF	RO	128	8	CFP NVR 4
8200	83FF	RO	4x128	N/A	MSA Reserved
8400	847F	RO	128	8	Vendor NVR 1. Vendor data registers
8480	84FF	RO	128	8	Vendor NVR 2. Vendor data registers
8500	87FF	RO	6x128	N/A	Reserved by CFP MSA
8800	887F	R/W	128	8	User NVR 1. User data registers
8880	88FF	R/W	128	8	User NVR 2. User data registers

8900	8EFF	RO	12x128	N/A	Reserved by CFP MSA
8F00	8FFF	N/A	2x128	N/A	Reserved for User private use
9000	9FFF	RO	4096	N/A	Reserved for vendor private use
A000	A07F	R/W	128	16	CFP Module VR1. CFP Module level control and DDM registers
A080	A0FF	RO	128	16	Reserved by CFP MSA
A100	A1FF	RO	2x128	N/A	Reserved by CFP MSA
A200	A27F	R/W	128	16	Network Lane VR 1. Network lane specific register
A280	A2FF	R/W	128	16	Network Lane VR 2. Network lane specific register
A300	A3FF	RO	2x128	N/A	Reserved by CFP MSA
A400	A47F	R/W	128	16	Host lane VR1. Host lane specific registers
A480	AFFF	RO	23x128	N/A	Reserved by CFP MSA
B000	FFFF	RO	5x4096	N/A	Reserved by CFP MSA

CFP NVR1

				Power per Connector		
801C	1	RO	7~0	Maximum Optical Input Power per Network Lane		
801D	1	RO	7~0	Maximum Power Consumption		
801E	1	RO	7~0	Maximum Power Consumption in Low Power Mode		
801F	1	RO	7~0	Maximum Operating Case Temp Range		
8020	1	RO	7~0	Minimum Operating Case Temp Range		
8021	16	RO	7~0	Vendor Name		
8031	3	RO	7~0	Vendor OUI		
8034	16	RO	7~0	Vendor Part Number		
8044	16	RO	7~0	Vendor Serial Number		
8054	8	RO	7~0	Data Code		
805C	2	RO	7~0	Lot Code		
805E	10	RO	7~0	CLEI Code		
8068	1	RO	7~0	CFP MSA hardware Specification Revision Number		
8069	1	RO	7~0	CFP MSA Management Interface Specification Revision Number		
806A	2	RO	7~0	Module Hardware Version Number		
806C	2	RO	7~0	Module Firmware Version Number		
806E	1	RO	7~0	Digital Diagnostic Monitoring Type		
806F	1	RO	7~0	Digital Diagnostic Monitoring Capability 1		
8070	1	RO	7~0	Digital Diagnostic Monitoring Capability 2		
8071	1	RO	7~0	Module Enhanced Options		
8072	1	RO	7~0	Maximum High-Power-up Time		
8073	1	RO	7~0	Maximum TX-Turn-on Time		
8074	1	RO	7~0	Host Lane Signal Spec		
8075	1	RO	7~0	Heat Sink Type		
8076	1	RO	7~0	Maximum TX-Turn-off Time		
8077	1	RO	7~0	Maximum High-Power-down Time		
8078	1	RO	7~0	Module Enhanced Options 2		
8079	1	RO	7~0	Transmitter Monitor Clock Options		
807A	1	RO	7~0			

808C	2	RO	7~0	VCC Low Warning Threshold		
808E	2	RO	7~0	VCC Low Alarm Threshold		
8090	2	RO	7~0	SOA Bias Current High Alarm Threshold		
8092	2	RO	7~0	SOA Bias Current High Warning Threshold		
8094	2	RO	7~0	SOA Bias Current Low Warning Threshold		
8096	2	RO	7~0	SOA Bias Current Low Alarm Threshold		
8098	2	RO	7~0	Auxili05 059Cs1 cs 0 0 0 sc q0.24		

CFP NVR3

Network Lane BOL Measurement Registers

Hex Addr	Size	Access Type	Bit	Register Name	Content (HEX)	LSB Unit
Base ID Information						
8100	32	RO	7~0	Rx Sensitivity Spec for network lanes 0~15		
8120	32	RO	7~0	Tx Power Spec for network lanes 0~15		
8140	32	RO	7~0	Measured ER for network lanes 0~15		
8160	32	RO	7~0	Path Penalty for network lanes 0~15		

A00B	1	RW	7~0	Alarm Source Code		
		RO		Module Bi-/Uni-Directional Operating Mode Select		
			15~3	Reserved		
		RW	2~0	Module Bi/uni-Direction Mode Select		
A00C	4	RO		Reserved		
Module Control Registers						
A010	1			Module General Control		
		RW/SC/LH	15	Soft Module Reset		
		RW	14	Soft Module Low Power		
		RW	13	Soft TX Disable		
		RW	12	Soft PRG_CNTL3 Control		
		RW	11	Soft PRG_CNTL2 Control		
		RW	10	Soft PRG_CNTL1 Control		
		RW	9	Soft GLB_ALRM Test		
		RO	8~6	Reserved		
		RO	5	TX_DIS Pin State		
		RO	4	MOD_LOPWR Pin State		
		RO	3	PRG_CNTL3 Pin State		
		RO	2	PRG_CNTL2 Pin State		
		RO	1	PRG_CNTL1 Pin State		
		RO	0	Reserved		
A011	1			Network Lane TX Control		
		RO	15	Reserved		
		RW	14	TX PRBS Generator Enable		
		RW	13	TX PRBS Pattern 1		
		RW	12	TX PRBS Pattern 0		
		RW	11	TX De-skew Enable		
		RW	10	TX FIFO Reset		
		RW	9	TX FIFO Auto Reset		
		RW	8	TX Reset		
		RW	7~5	TX MCLK Control		
		RO	4	Reserved		
		RW	3~1	TX Rate Select (10G lane rate)		
		RW	0	TX Reference CLK Rate Select		
A012	1			Network Lane RXControl		
		RW	15	Active Decision Voltageand Phase function		
		RW	14	RX PRBS CheckerEnable		
		RW	13	RX PRBS Pattern 1		
		RW	12	RX PRBS Pattern 0		
		RW	11	RX Lock RX_MCLK to Reference CLK		
		RW	10	Network Lane Loop-back		
		RW	9	RX FIFO Auto Reset		
		RW	8	RX Reset		
		RW	7~5	RX MCLK Control		
		RW	4	RX FIFO Reset		
		RW	3~1	RX Rate Select		
		RW	0	RX Reference CLK Rate Select		
A013	1	RW		Individual Network Lane TX_DIS Control		
			15	Lane 15 Disable		
			14	Lane 14 Disable		
			13	Lane 13 Disable		
			12	Lane 12 Disable		
			11	Lane 11 Disable		

			10	Lane 10 Disable		
			9	Lane 9 Disable		
			8	Lane 8 Disable		
			7	Lane 7 Disable		
			6	Lane 6 Disable		
			5	Lane 5 Disable		
			4	Lane 4 Disable		
			3	Lane 3 Disable		
			2	Lane 2 Disable		
			1	Lane 1 Disable		
			0	Lane 0 Disable		
A014	1			Host Lane Control		
		RO	15	Reserved		
		RW	14	TX PRBS Checker Enable		
		RW	13	TX PRBS Pattern 1		
		RW	12	TX PRBS Pattern 0		
		RO	11	Reserved		
		RW	10	Host Lane Loop-back Enable		
		RO	9	Reserved		
		RO	8	Reserved		
		RW	7	RX PRBS Generator Enable		
		RW	6	RX PRBS Pattern 1		
		RW	5	RX PRBS Pattern 0		
		RO	4~0	Reserved		
A015	1	RO		Reserved		
A016	1	RO		Module State		
			15~9	Reserved		
			8	High-Power-down State		
			7	TX-Turn-off State		
			6	Fault State		
			5	Ready State		
			4	TX-Turn-on State		
			3	TX-Off State		
			2	High-Power-up State		
			1	Low-Power State		
			0	Initialize State		
A017	1	RO		Reserved		
A018	1	RO		Global Alarm Summary		
			15	GLB_ALRM Assertion Status		
			14	Host Lane Fault and Status Summary		
			13	Network Lane Fault and Status Summary		
			12	Network Lane Alarm and Warning Summary		
			11	Module Alarm and Warning 2 Summary		
			10	Module Alarm and Warning 1 Summary		
			9	Module Fault Summary		
			8	Module General Status Summary		
			7	Module State Summary		
			6~1	Reserved		
			0	Soft GLB_ALRM Test Status		
A019	1	RO		Network Lane Alarm and Warning Summary		
			15	Lane 15 Alarm and Warning Summary		
			14	Lane 14 Alarm and Warning Summary		

			13	Lane 13 Alarm and Warning Summary		
			12	Lane 12 Alarm and Warning Summary		
			11	Lane 11 Alarm and Warning Summary		
			10	Lane 10 Alarm and Warning Summary		
			9	Lane 9 Alarm and Warning Summary		
			8	Lane 8 Alarm and Warning Summary		
			7	Lane 7 Alarm and Warning Summary		
			6	Lane 6 Alarm and Warning Summary		
			5	Lane 5 Alarm and Warning Summary		
			4	Lane 4 Alarm and Warning Summary		
			3	Lane 3 Alarm and Warning Summary		
			2	Lane 2 Alarm and Warning Summary		
			1	Lane 1 Alarm and Warning Summary		
			0	Lane 0 Alarm and Warning Summary		
A01A	1	RO		Network Lane Fault and Status Summary		
			15	Lane 15 Fault and Status Summary		
			14	Lane 14 Fault and Status Summary		
			13	Lane 13 Fault and Status Summary		
			12	Lane 12 Fault and Status Summary		
			11	Lane 11 Fault and Status Summary		

A01B	1	RO		Host Lane Fault and Status Summary		
			15	Lane 15 Fault and Status Summary		
			14	Lane 14 Fault and Status Summary		
			13	Lane 13 Fault and Status Summary		
			12	Lane 12 Fault and Status Summary		
			11	Lane 11 Fault and Status Summary		
			10	Lane 10 Fault and Status Summary		
			9	Lane 9 Fault and Status Summary		
			8	Lane 8 Fault and Status Summary		
			7	Lane 7 Fault and Status Summary		
			6	Lane 6 Fault and Status Summary		
			5	Lane 5 Fault and Status Summary		
			4	Lane 4 Fault and Status Summary		
			3	Lane 3 Fault and Status Summary		
			2	Lane 2 Fault and Status Summary		
			1	Lane 1 Fault and Status Summary		
			0	Lane 0 Fault and Status Summary		
A01C	1	RO		Reserved		
Module FAWS Registers						
A01D	1	RO		Module General Status		
			15	Reserved		
			14	Reserved		
			13	HW_Interlock		
			12~11	Reserved		
			10	Loss of REFCLK Input		
			9	TX_JITTER_PLL_LOL		
			8	TX_CMU_LOL		
			7	TX_LOSF		
			6	TX_HOST_LOL		
			5	RX_LOS		
			4	RX_NETWORK_LOL		
			3	Out of Alignment		
			2	Reserved		
			1	HIPWR_ON		
			0	Reserved		
A01E	1	RO		Module Fault Status		
			15	Reserved		
			14~7	Reserved		
			6	PLD or Flash Initialization Fault		
			5	Power Supply Fault		
			4~2	Reserved		
			1	CFP Checksum Fault		
			0	Reserved		

A01F	1	RO		Module Alarms and Warnings 1		
			15~12	Reserved		
			11	Mod Temp High Alarm		
			10	Mod Temp High Warning		
			9	Mod Temp Low Warning		
			8	Mod Temp Low Alarm		
			7	Mod Vcc High Alarm		
			6	Mod Vcc High Warning		
			5	Mod Vcc Low Warning		
			4	Mod Vcc Low Alarm		
			3	Mod SOA Bias High Alarm		
			2	Mod SOA Bias High Warning		
			1	Mod SOA Bias Low Warning		
			0	Mod SOA Bias Low Alarm		
A020	1	RO		Module Alarms and Warnings 2		
			15~8	Reserved		
			7	Mod Aux 1 High Alarm		
			6	Mod Aux 1 High Warning		
			5	Mod Aux 1 Low Warning		
			4	Mod Aux 1 Low Alarm		
			3	Mod Aux 2 High Alarm		
			2	Mod Aux 2 High Warning		
			1	Mod Aux 2 Low Warning		
			0	Mod Aux 2 Low Alarm		
A021	1	RO		Reserved		
A022	1			Module State Latch		
		RO	15~9	Reserved		
		RO/LH/COR	8	High-Power-down State Latch		
		RO/LH/COR	7	TX-Turn-off State Latch		
		RO/LH/COR	6	Fault State Latch		
		RO/LH/COR	5	Ready State Latch		
		RO/LH/COR	4	TX-Turn-on State Latch		
		RO/LH/COR	3	TX-Off State Latch		
		RO/LH/COR	2	High-Power-up State Latch		
		RO/LH/COR	1	Low-Power State Latch		
		RO/LH/COR	0	Initialize State Latch		
A023	1			Module General Status Latch		
		RO	15	Reserved		
		RO	14	Reserved		
		RO/LH/COR	13	HW_Interlock Latch		
		RO	12~11	Reserved		
		RO/LH/COR RO/LH/COR	10	Loss of REFCLK Input Latch		

		RO	0	Reserved		
A025	1			Module Alarms and Warnings 1 Latch		
		RO	15~12	Reserved		
		RO/LH/COR	11	Mod Temp High Alarm Latch		
		RO/LH/COR	10	Mod Temp High Warning Latch		
		RO/LH/COR	9	Mod Temp Low Warning Latch		
		RO/LH/COR	8	Mod Temp Low Alarm Latch		
		RO/LH/COR	7	Mod Vcc High Alarm Latch		
		RO/LH/COR	6	Mod Vcc High Warning Latch		
		RO/LH/COR	5	Mod Vcc Low Warning Latch		
		RO/LH/COR	4	Mod Vcc Low Alarm Latch		
		RO/LH/COR	3	Mod SOA Bias High Alarm Latch		
		RO/LH/COR	2	Mod SOA Bias High Warning Latch		
		RO/LH/COR	1	Mod SOA Bias Low Warning Latch		
		RO/LH/COR	0	Mod SOA Bias Low Alarm Latch		
A026	1			Module Alarms and Warnings 2 latch		
		RO	15~8	Reserved		
		RO/LH/COR	7	Mod Aux 1 High Alarm Latch		
		RO/LH/COR	6	Mod Aux 1 High Warning Latch		
		RO/LH/COR	5	Mod Aux 1 Low Warning Latch		
		RO/LH/COR	4	Mod Aux 1 Low Alarm Latch		
		RO/LH/COR	3	Mod Aux 2 High Alarm Latch		
		RO/LH/COR	2	Mod Aux 2 High Warning Latch		
		RO/LH/COR	1	Mod Aux 2 Low Warning Latch		
		RO/LH/COR	0	Mod Aux 2 Low Alarm Latch		
A027	1	RO		Reserved		
A028	1			Module Stable Enable		
		RO	15~9	Reserved		
		RW	8	High-Power-down State Enable		
		RW RW	7 6	TX-Turn-off State Enable		

		RW	5	RX_LOS Enable		
		RW	4	RX_NETWORK_LOL Enable		
		RW	3	Out of Alignment Enable		
		RO	2~0	Reserved		
A02A	1			Module Fault Status Enable		
		RO	15~7	Reserved		
		RW	6	PLD or Flash Initialization Fault Enable		
		RW	5	Power Supply Fault Enable		
		RO	4~2	Reserved		
		RW	1	CFP Checksum Fault Enable		
		RO	0	Reserved		
A02B	1	RO		Module Alarm and Warnings 1 Enable		
			15~12	Reserved		
			11	Mod Temp Hi Alarm Enable		
			10	Mod Temp Hi Warn Enable		
			9	Mod Temp Low Warning Enable		
			8	Mod Temp Low Alarm Enable		
			7	Mod Vcc High Alarm Enable		
			6	Mod Vcc High Warning Enable		
			5	Mod Vcc Low Warning Enable		
			4	Mod Vcc Low Alarm Enable		
			3	Mod SOA Bias High Alarm Enable		
			2	Mod SOA Bias High Warning Enable		
			1	Mod SOA Bias Low Warning Enable		
			0	Mod SOA Bias Low Alarm Enable		
A02C	1			Module Alarms and Warnings Enable		
		RO	15~8	Reserved		
		RW	7	Mod Aux 1 High Alarm Enable		
			6	Mod Aux 1 High Warning Enable		
			5	Mod Aux 1 Low Warning Enable		
			4	Mod Aux 1 Low Alarm Enable		
			3	Mod Aux 2 High Alarm Enable		
			2	Mod Aux 2 High Warning Enable		
			1	Mod Aux 2 Low Warning Enable		
			0	Mod Aux 2 Low Alarm Enable		
A02D	2	RO		Reserved		
Module Analog A/D Value Registers						
A02F	1	RO	15~0	Module Temp Monitor A/D Value		
A030	1	RO	15~0	Module Power supply 3.3 V Monitor A/D Value		
A031	1	RO	15~0	SOA Bias Current A/D Value		
A032	1	RO	15~0	Module Auxiliary 1 Monitor A/D Value		

A220	16	RO/LH/COR		Network Lane n Alarm and Warning Latch		
			15	Bias High Alarm Latch		
			14	Bias High Warning Latch		
			13	Bias Low Warning Latch		
			12	Bias Low Alarm Latch		
			11	TX Power High Alarm Latch		
			10	TX Power High Warning Latch		

				Alarm Enable		
			3	RX Power High Alarm Enable		
			2	RX Power High Warning Enable		
			1	RX Power Low Warning Enable		
			0	RX Power Low Alarm Enable		
A250	16			Network Lane n Fault and Status Enable		
		RW	15	Lane TEC Fault Enable		
		RW	14	Lane Wavelength Unlocked Fault Enable		
		RW	13	Lane APD Power Supply Fault Enable		
		RO	12~8	Reserved		
		RW	7	Lane TX_LOSF Enable		
		RW	6	Lane TX_LOL Enable		
		RO	5	Reserved		
		RW	4	Lane RX_LOS Enable		
		RW	3	Lane RX_LOL Enable		
		RW	2	Lane RX FIFO Status Enable		
		RO	1~0	Reserved		
A260	32	RO		Reserved		

CFP Network Lane VR2

Network Lane VR2

Network Lane VR1

Host Lane VR1						
Host Lane VR1						
Hex Addr	Size	Access Type	Bit	Register Name	Content (HEX)	LSB Unit
Host Lane FAWS Status Registers						
A400	16					

	Name				Name		
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

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
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			
8	3.3V			
9	3.3V			
10	3.3V			
11	3.3V			
12	3.3V			
13	3.3V			
14	3.3V			
15	3.3V			
16	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal
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. Do Not Connect
22	VND_IO_B	I/O		Module Vendor I/O. Do Not Connect
23	GND			
24	TX_MCLKn	O	CML	For optical waveform testing. Not for normal use
25	TX_MCLKp	O	CML	For optical waveform testing. Not for normal use
26	GND			
27	VND_IO_C	I/O		Module Vendor I/O C. Do Not Connect
28	VND_IO_D	I/O		Module Vendor I/O C. Do Not Connect
29	VND_IO_E	I/O		Module Vendor I/O C. Do Not Connect
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≤24W=not used

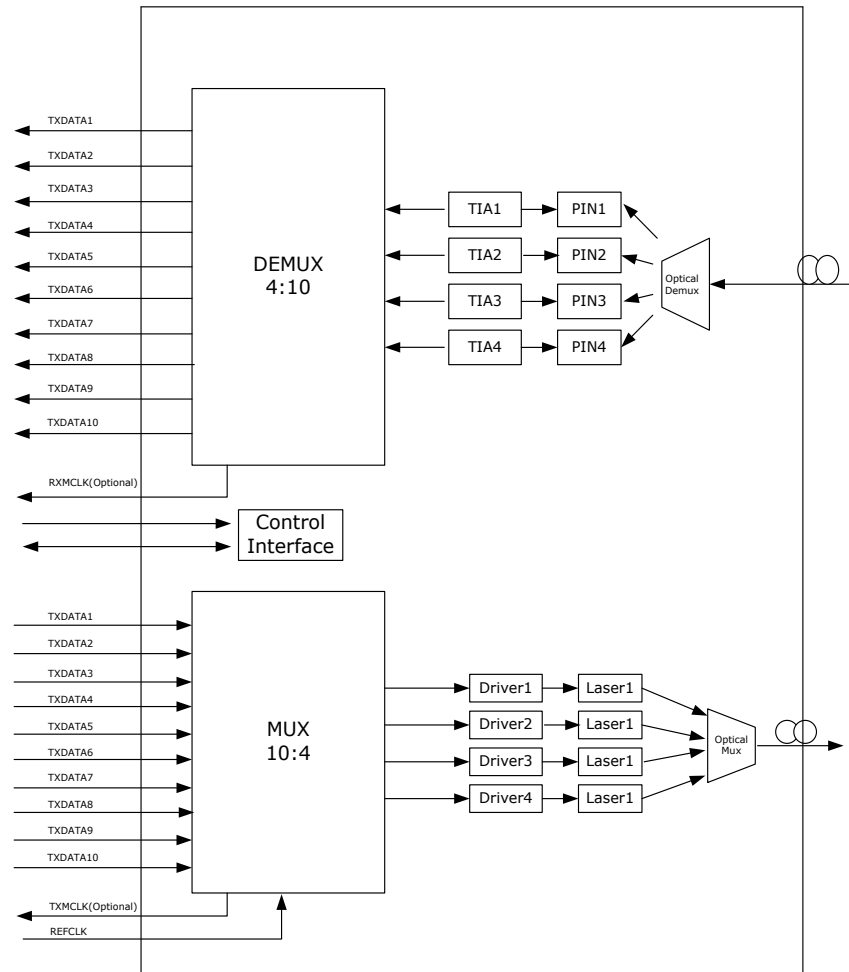
32	PRG_CNTL3	I	LVC MOS w/PUR	Programmable Control 2 set over MDIO. MSA Default: Hardware Interlock MSB, "00"≤8W, "01" ≤16W, "10" ≤24W, "11" or NC≤24W=not used
33	PRG_ALRM1	O	LVC MOS	Programmable Alarm 1 set over MDIO, MSA Default: HIPWR_ON."1":module power up completed,"0": module not high powered up
34	PRG_ALRM2	O	LVC MOS	Programmable Alarm 2 set over MDIO, MSA Default: MOD_READY, "1": Ready, "0": not Ready
35	PRG_ALRM3	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 in Module
39	MOD_RSTn	I	LVC MOS w/PDR	Module Reset. "0" reset 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 bit4
43	PRTADR3	I	1.2V CMOS	MDIO Physical Port address bit3
44	PRTADR2	I	1.2V CMOS	MDIO Physical Port address bit2
45	PRTADR1	I	1.2V CMOS	MDIO Physical Port address bit1
46	PRTADR0	I	1.2V CMOS	MDIO Physical Port address bit0
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 F. Do Not Connect
51	VND_IO_G	I/O		Module Vendor I/O G. Do Not Connect
52	GND			
53	VND_IO_H	I/O		Module Vendor I/O H. Do Not Connect
54	VND_IO_J	I/O		Module Vendor I/O J. Do Not Connect
55	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal
56	3.3V_GND			
57	3.3V_GND			
58	3.3V_GND			
59	3.3V_GND			
60	3.3V			3.3V Module Supply Voltage
61	3.3V			
62	3.3V			
63	3.3V			
64	3.3V			
65	3.3V			
66	3.3V			
67	3.3V			
68	3.3V			
69	3.3V			
70	3.3V_GND			3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal
71	3.3V_GND			
72	3.3V_GND			
73	3.3V_GND			
74	3.3V_GND			
75	GND			
76	RX_MCLKp	O	CML	Receiver Monitor Clock (Optional)
77	RX_MCLKn	O	CML	Receiver Monitor Inverted Clock (Optional)
78	GND			
79	RX0p	O	CML	Output Data
80	RX0n	O	CML	Inverted Output Data
81	GND			
82	RX1p	O	CML	Output Data
83	RX1n	O	CML	Inverted Output Data
84	GND			
85	RX2p	O	CML	Output Data
86	RX2n	O	CML	Inverted Output Data
87	GND			
88	RX3p	O	CML	Output Data

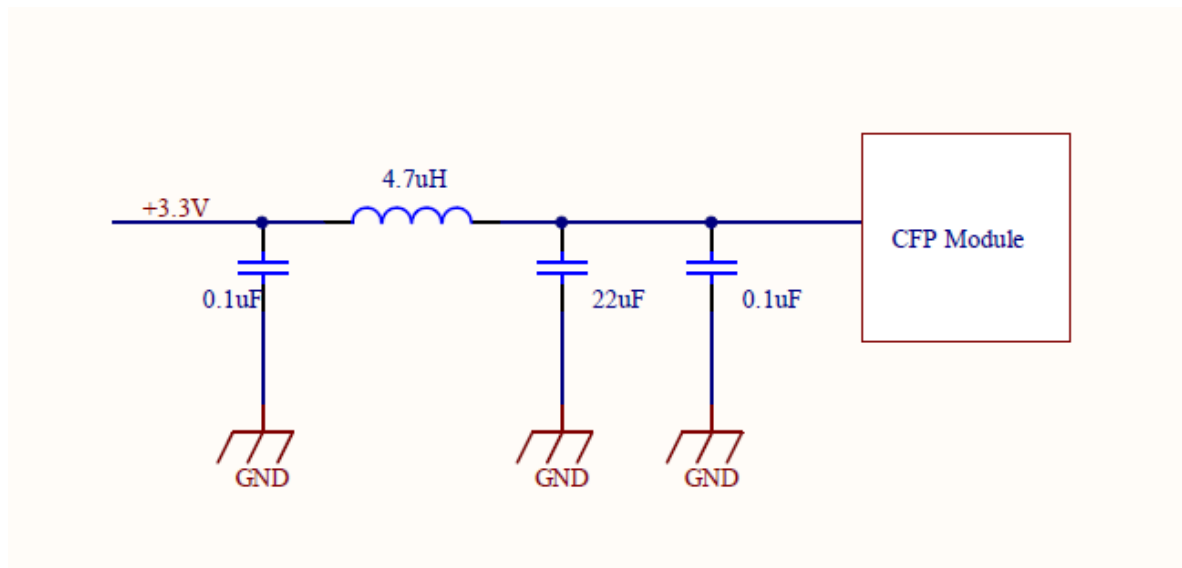
89	RX3n	O	CML	Inverted Output Data
90	GND			
91	RX4p	O	CML	Output Data
92	RX4n	O	CML	Inverted Output Data
93	GND			
94	RX5p	O	CML	Output Data
95	RX5n	O	CML	Inverted Output Data
96	GND			
97	RX6p	O	CML	Output Data
98	RX6n	O	CML	Inverted Output Data
99	GND			
100	RX7p	O	CML	Output Data
101	RX7n	O	CML	Inverted Output Data
102	GND			
103	RX8p	O	CML	Output Data
104	RX8n	O	CML	Inverted Output Data
105	GND			
106	RX9p	O	CML	Output Data
107	RX9n	O	CML	Inverted Output Data
108	GND			
109	N.C			
110	N.C			
111	GND			
112	GND			
113	TX0p	In	CML	Input Data
114	TX0n	In	CML	Inverted Input Data
115	GND			
116	TX1p	In	CML	Input Data
117	TX1n	In	CML	Inverted Input Data
118	GND			
119	TX2p	In	CML	Input Data
120	TX2n	In	CML	Inverted Input Data
121	GND			
122	TX3p	In	CML	Input Data
123	TX3n	In	CML	Inverted Input Data
124	GND			
125	TX4p	In	CML	Input Data
126	TX4n	In	CML	Inverted Input Data
127	GND			
128	TX5p	In	CML	Input Data
129	TX5n	In	CML	Inverted Input Data

130	GND			
131	TX6p	In	CML	Input Data
132	TX6n	In	CML	Inverted Input Data
133	GND			
134	TX7p	In	CML	Input Data
135	TX7n	In	CML	Inverted Input Data
136	GND			
137	TX8p	In	CML	Input Data
138	TX8n	In	CML	Inverted Input Data
139	GND			
140	TX9p	In	CML	Input Data
141	TX9n	In	CML	Inverted Input Data
142	GND			
143	N.C.			
144	N.C.			
145	GND			
146	REFCLKp	In	CML	Reference Input Clock
147	REFCLKn	In	CML	Reference Inverted Input Clock
148	GND			

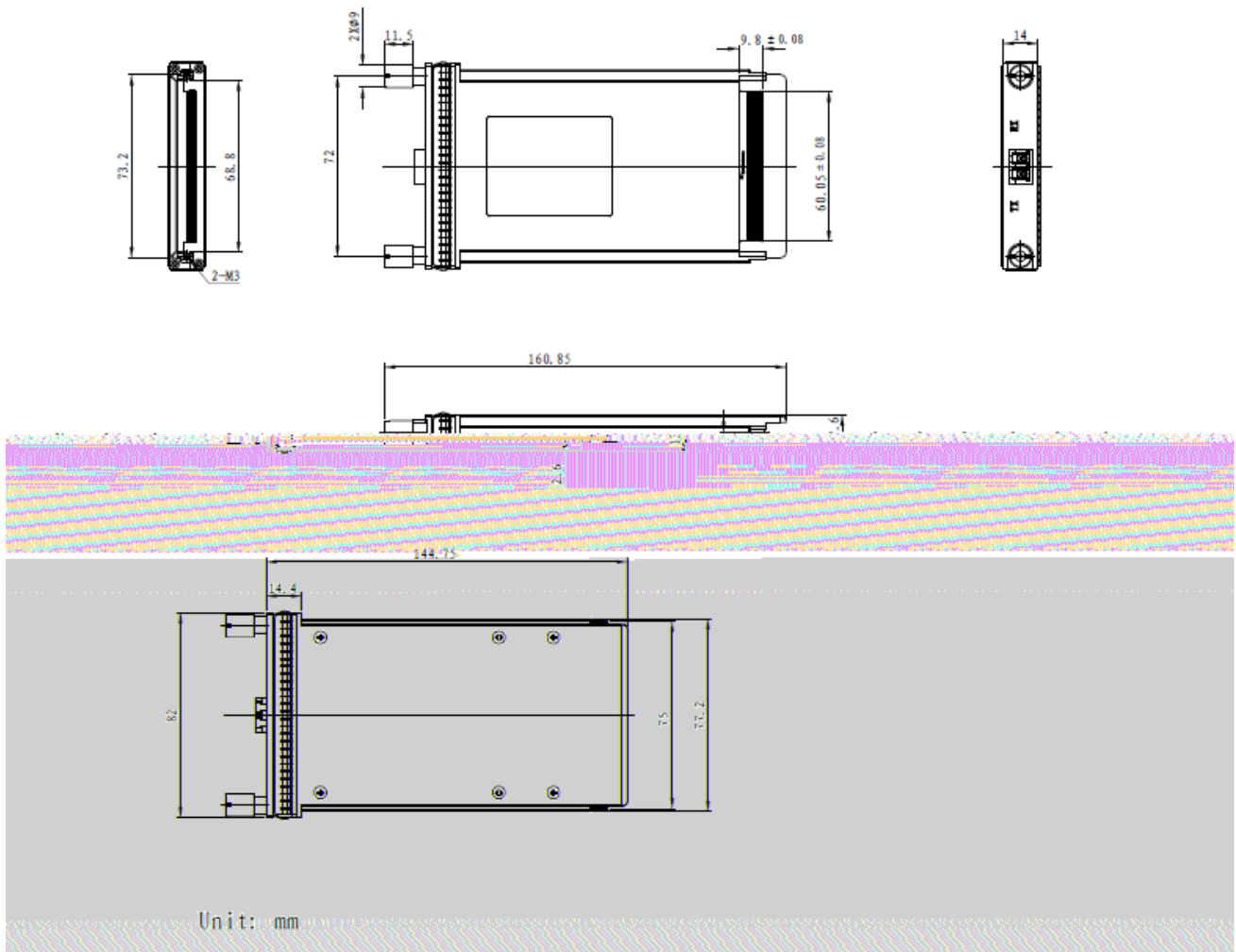
Block diagram

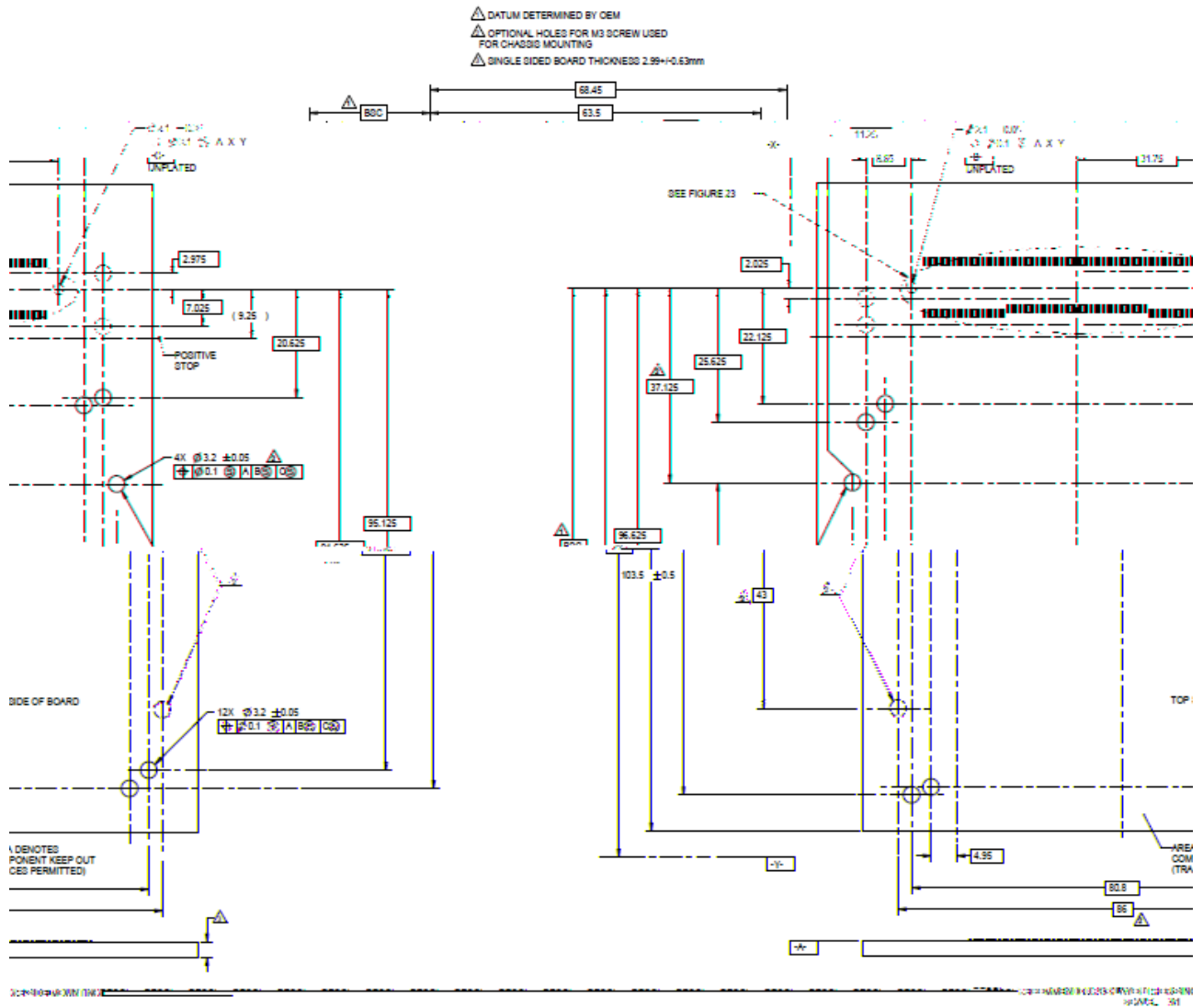


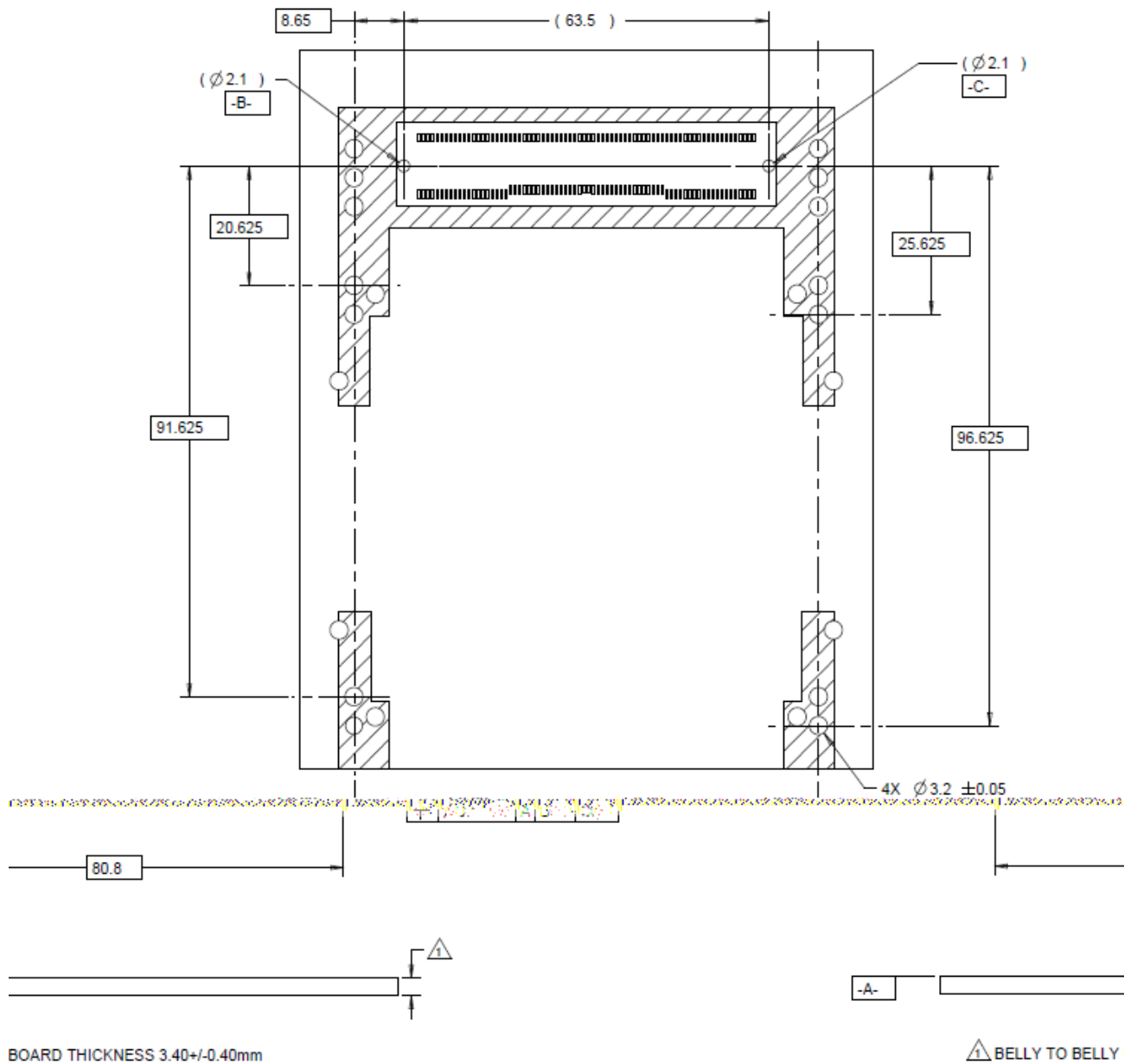
Required Host Board Components

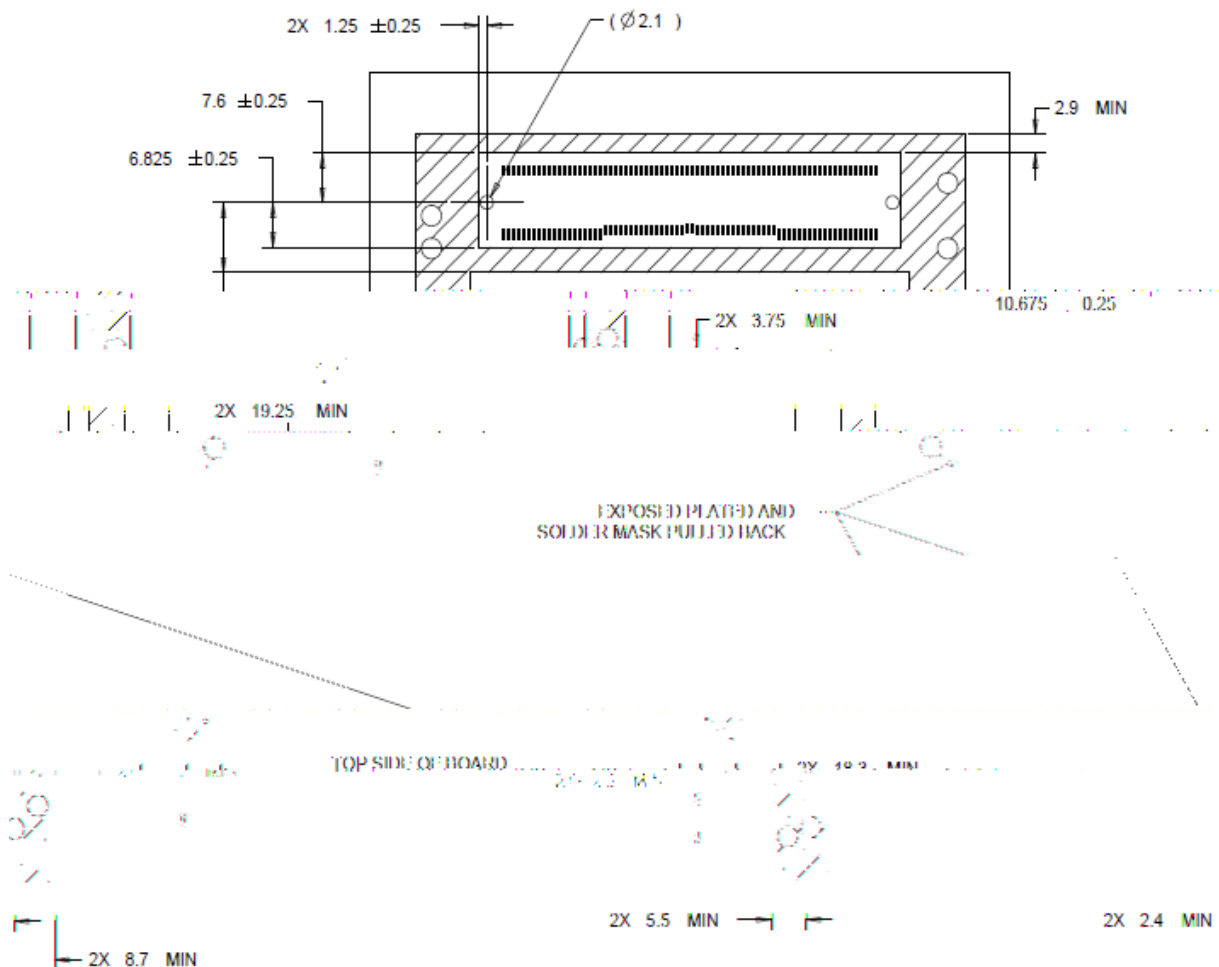


PCB layout recommendation









Regulatory Compliance

Feature	Test Method		Performance
Electrostatic Discharge (ESD) to the Electrical Pins	Discharge	MIL-STD-883E Method 3015.7	high speed signal pins shall withstand 500V electrostatic discharge based on Human Body Model per JEDEC JESD22-A114-B
			the other pins with exception of the high speed signal pins shall withstand 2kV electrostatic discharge based on Human Body Model per JEDEC JESD22-A114-B
Electrostatic Discharge (ESD) Immunity	Discharge	IEC61000-4-2 Class B	15kV air discharges during operation and 8kV direct contact discharge
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B		Compliant with standard

	CENELEC EN55022 VCCI Class 1	
Immunity	IEC61000-4-3 Class 2	Compliant with any electro-magnetic regulations
Safety	FDA CDRH 21-CFR 1040 Class 1	
	UL	
	TUV-GS	
	CE	

Ordering Information

Part No	Specifications									Application
	Pack	Data rate	Tx	Pout	Rx	S	Top	Reach	Others	Code
			1310nm							
			LAN							
RTXM290-404	CFP	103.125Gbps	Cooled	-4.3 ~ +4.5 dBm	PIN < -8.6dBm	0 ~ 70°C	10km	DDM	100GbE/OTU4	
			EMA							
			DFB-LD							