



300Pin MSA 40Gbps USFF Transponder Module

RTXM298-301

Features

- *Operating Temperature Range from 0°C up to 70°C*
- *40 Gbps 300 pin MSA compliant*
- *40 Gbps NRZ modulation*
- *16 to 1 Multiplexing of 2.5Gb/s signals and 1 to 16 De-Multiplexing of 2.5Gb/s*
- *Supports OC-768/ STM-256 (39.8Gbps) and G.709 (43.1 Gbps)*
- *Supports VSR2000 3R2, 3R3, and 3R5*
- *Provides MSA I2C Edition 4 compliant control, monitoring, and alarms for optics management*
- *OIF SFI-5 compliant electrical interface*
- *Provides both direct input and PLL (jitter reduction circuit) reference clock options*
- *Uses standard un-sequencing supply voltages*
- *3.5" x 4.5" x 0.54" small form factor*

Application

- *Cross-office Telecommunication & High-speed Data Communication*
- *Applications*
- *Intra-office SONET/SDH systems*

- *Optical Cross-connects , Optical switches and router*

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Case Temperature Range	T _s	°C	-40	+85
Relative Humidity	RH	%		85
Power Supply Voltage	+3.3V Supplies	V	-0.3	+3.6
	+1.8V Supplies	V	-0.3	+2.0
	+5.0V Supplies	V	-0.3	+6.0
	-5.2V Supplies	V	-5.5	+0.3
Fiber Bend Radius		mm	30	
Receive Optical Input Power PIN	P _{max}	dBm		+3

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Max
Case Operating Temperature Range	T _c	°C	0	+70
Power Supply Voltage	+3.3V Supplies	V	+3.13	+3.47
	+1.8V Supplies	V	+1.2	+2.5
	+5.0V Supplies	V	+4.75	+5.25
	-5.2V Supplies	V	-5.45	-4.94
Receive Optical Input Power PIN	P _{max}	dBm	-	0

Specifications (T=25°C, BOL, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Test condition
Electrical Characteristics						
ITU-T						VSR2000-3R2
Target distance		km		2		
Bit rate/line coding of optical signals						NRZ 40G
Optical transmitter Characteristics						
Data Rate		Gbps	39.8		43.1	
Average Optical Power	P _o	dBm	0		+3	
Operating Wavelength Range	λ _c	nm	1530		1565	
Extinction Ratio	EX	dB	8.2			
Side Mode Suppression Ratio	SMSR	dB	35			
Eye cross Level		%	45		55	
Eye Diagram						ITU G.691 compliment

Optical receive Characteristics				
Data Rate		Gbps	39.8	43.1
Receiver Sensitivity	S	dBm	-6	BER=10 ⁻¹²
Overload Input Optical Power	P _{OL}	dBm	+3	
Optical Return Loss	RL	dB	27	
Optical Path Penalty	Pp	dB		2

Electrical Characteristics

LVC MOS/LVTTL Signal Characteristics

Parameters	Cond	Symb	Min	Typ	Max	Unit
LVC MOS output						
LVC MOS output high level			2 400		3300	mV
LVC MOS output low level					400	mV
LVC MOS input						
LVC MOS input high level			2 000		3300	mV
LVC MOS input low level					800	mV
LVTTL output						
LVTTL output high level			2 400		3300	mV
LVTTL output low level					400	mV
LVTTL input						
LVTTL input high level			2 000		3300	mV
LVTTL input low level					800	mV

Differential CML Input and Output Signals

Symbol	Parameter	Max	Min	Units
CML Output				
V _{CM}	Output Common Mode Voltage	1.23	0.72	V
T _{DRF}	Driver Rise/Fall Time		50	ps
I _{DSHORT}	Short Circuit Current	100	-100	mA
f	Output Clock Frequency	697	621	MHZ
SK	Output data to reference channel skew	100	-100	ps
R _{DIFF}	Differential output impedance	125	75	Ω
R _{SE}	Single-ended output impedance	65	35	Ω
R _D	Differential Impedance	125	75	Ω
R _{HS}	Single-ended return loss		7.5	dB
RL _{DIFF}	Differential return loss		7.5	dB

V_H	Differential output high level	$V_{CM}+0.5$	$V_{CM}+0.17$	V
V_L	Differential output low level	$V_{CM}-0.17$	$V_{CM}-0.5$	V
DC	Clock Duty Cycle	55	45	%
CML Input				
V_{tt}	Termination Voltage	1.30	1.10	V
V_{Rsense}	Input Sensitivity		0.175	Vp-p
Z_{Vtt}	Bias Voltage Source Impedance	30		Ω
$T_{rise/fall}$	Rise/Fall time	0.36		UI
V_{Rmax}	Maximum Input Voltage	1.15		Vp-p
V_{RCM}	Input Common Mode Voltage	V_{tt}	0.7	V
Z_{INDIFF}	Differential input impedance	125	75	Ω
Z_{se}	Single-ended input impedance	65	35	Ω
L_{DR}	Differential return loss		10	dB
V_H	Differential input high level	$V_{CM}+0.5$	$V_{CM}+0.125$	V
V_L	Differential input low level	$V_{CM}-0.5$	$V_{CM}-0.125$	V

Input Reference Clock Characteristics

Parameters	conditions	Min	Typ	Max	Unit
TXREFCK					
TXREFCK Frequency			622.08		MHz
Differential Input Impedance Diff	AC Coupled	90	100	110	Ω
TXREFCK Jitter				1.8	ps (RMS)
TXREFCK Duty Cycle		45		55	%
TXREFCK Level	Peak - peak	400		1000	mV _{pp} (Single Ended)
TXREFCK Accuracy				30	ppm
RXREFCK					
RXREFCK Frequency			622.08		MHz
Differential Input Impedance Diff	AC Coupled	90	100	110	Ω
RXREFCK Jitter				1.8	ps (RMS)
RXREFCK Duty Cycle		45		55	%
RXREFCK Level	Peak - peak	400		1000	mV _{pp} (Single Ended)
RXREFCK Accuracy				30	ppm

TXMONCK and RXMONCK

Parameters	Cond	Symb	Min	Typ	Max	Unit
TXMONCK	Frequency	TXMON_Freq		622.08		MHz
	Jitter generation				5.0	pS _{RMS}
	Level	Single Ended	TXMON_LVL	300	500	mVpp
RXMONCK	Frequency	RXMON_Freq		622.08		MHz
	Jitter generation				3.0	pS _{RMS}
	Level	Single Ended	RXMON_LVL	300	500	mVpp

Electrical power supplies

Parameters		Unit	Min	Typ	Max
+5.0V Supply	voltage	V	4.75	5.0	5.25
	current	A		0.3	0.5
+3.3V Supply	voltage	V	3.13	3.3	3.47
	current	A		0.4	
-5.2V Supply	voltage	V	- 5.45	- 5.2	- 4.94
	current	A		1.7	
+1.8V Supply	voltage	V	1.2	1.8	2.5
	current	A		0.4	0.6
Power dissipation		W		12	14

Pin Description

	K	J	H	G	F	E	D	C	B	A
1	GND	RxDSC	GND	RxData1	GND	RxData8	GND	RxData	GND	RxData
2	GND	RxDSC	GND	RxData1	GND	RxData8	GND	RxData	GND	RxData
3	THRESH A	GND	-5.2V	GND	FFU	GND	1.	GND	3.	GND
4	GND	RxDCK	GND	RxData1	GND	RxData9	GND	RxData	GND	RxData
5	GND	RxDCK	GND	RxData1	GND	RxData9	GND	RxData	GND	RxData
6	LOS	GND	-5.2V	GND	I2C_ADDR	GND	1.	GND	3.	GND
7	GND	RxREFC	GND	RxData1	GND	RxData1	GND	RxData	GND	RxData
8	GND	REFCKN	GND	RxData1	GND	RxData1	GND	RxData	GND	RxData
9	FFU	GND	-5.2V	GND	I2C_ADDR	GND	1.	GND	3.	GND
10	I2C_SDA	FF	GND	RxData1	GND	RxData1	GND	RxData	GND	RxData
11	GND	RxMONC	GND	RxData1	GND	RxData1	GND	RxData	GND	RxData
12	I2C_SCL	GND	R	GND	I2C_ADDR	GND	1.	GND	3.	GND
13	FFU	NUC	NUC	NUC	NUC	NUC	FF	NUC	NUC	FF
14	GND	-5.2V	GND	-5.2V	GND	3.3	GND	3.	GND	5.
15	GND	-5.2V	GND	-5.2V	GND	3.3	GND	3.	GND	5.

16	GND	-5.2V	GND	-5.2V	GND	3.3	GND	3.	GND	5.
17	FFU	NUC	NUC	NUC	NUC	NUC	FF	NUC	NUC	FF
18	GND	TxMONCK	F	FF	GND	FF	FF	FF	FF	FF
19	LS_ENABLE	GND	-5.2V	GND	FFU	GND	1.	GND	3.	GND
20	GND	TxDSC	GND	TxData1	GND	TxData8	GND	TxData	GND	TxData
21	GND	TxDSC	GND	TxData1	GND	TxData8	GND	TxData	GND	TxData
22	STAT_INT	GND	-5.2V	GND	<i>TxLINE/IMS</i>	GND	1.	GND	3.	GND
23	GND	TxDCKP	GND	TxData1	GND	TxData9	GND	TxData	GND	TxData
24	GND	TxDCK	GND	TxData1	GND	TxData9	GND	TxData	GND	TxData
25	REG_RESE	GND	-5.2V	GND	1.8V	GND	1.	GND	3.	GND
26	GND	TxCKSR	GND	TxData1	GND	TxData1	GND	TxData	GND	TxData
27	GND	TxCKSR	GND	TxData1	GND	TxData1	GND	TxData	GND	TxData
28	MOD_RESE	GND	-5.2V	GND	1.8V	GND	1.	GND	3.	GND
29	GND	TxREFC	GND	TxData1	GND	TxData1	GND	TxData	GND	TxData
30	GND	TxREFCK	GND	TxData1	GND	TxData1	GND	TxData	GND	TxData
	Differential Data / Clock Signals					NUC: no user connection				
	Power Pins					FFU: reserved for future use				
	Ground Pins					Italics: optional feature				
	Control Signals									

Signal Definition

Electrical specifications for the SFI-5 interface can be found in OIF2001.145.X and OIF 2001.149.X. The signal descriptions for the SFI-5 bus are reproduced below.

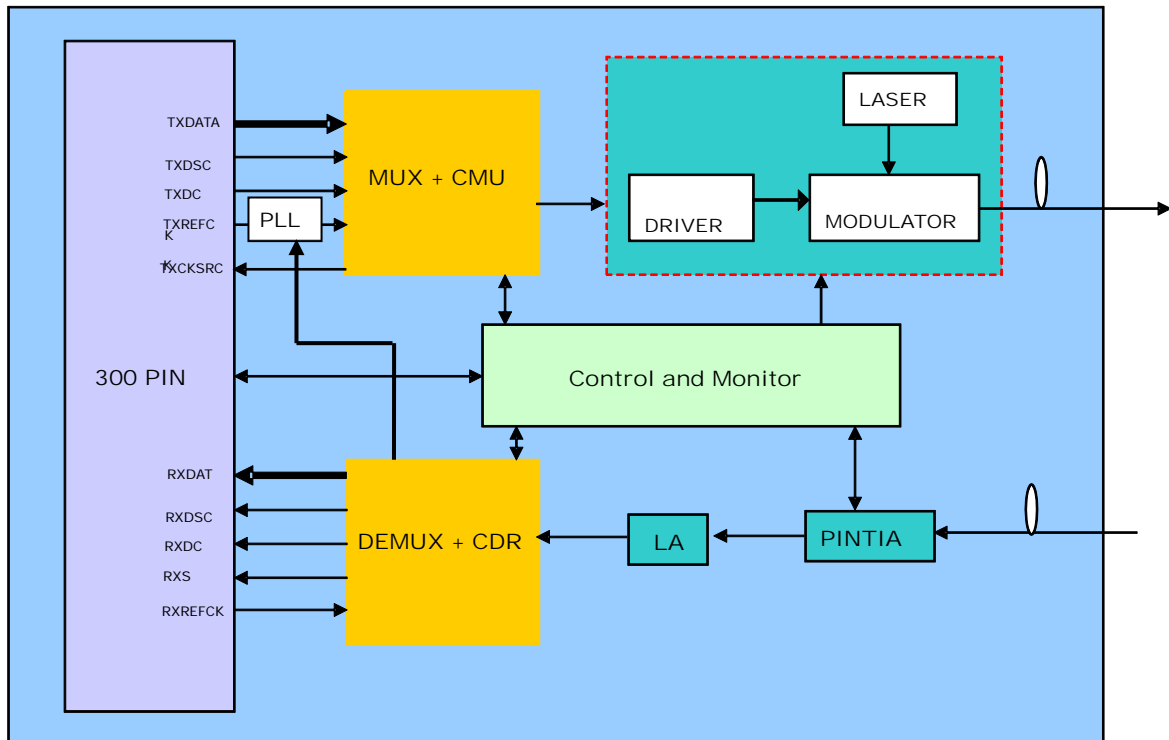
Name	Type	I/O	Signal Description
TXDATA[15:0]	Diff CML Note 1	I	Transmit Data Bus SFI-5 compliant 16 wide transmit data bus from Framer/FEC chip.
TXDSC	Diff CML Note 1	I	Transmit Deskew channel used to deskew the TXDATA[15:0]
TXDCK	Diff CML Note 1	I	Transmit Data Clock provides a timing reference for transmit data. It is at ¼ data rate of TXDATA and TXDSC
TXREFCK	AC Coupled LVPECL Note 1	I	Transmit Reference Clock provides an alternate timing reference. The clock is at ¼ data rate of TXDATA and TXDSC
TXCKSRC	Diff CML Note 1	O	The Transmit Reference Clock (TXCKSRC) signal provides timing reference for the Transmit data path signals (TXDATA, TXDSC, TXDCK)
TXMONCK	Analog	O	Transmit Monitor Clock provides a single ended clock that can be used to monitor the transmit clock on the mux. This clock shall be turned off during normal operation and startup.
RXDATA[15:0]	Diff CML	O	Receive Data Bus SFI-5 compliant 16 wide receive data

	Note 1		bus from SerDes
RXDSC	Diff CML Note 1	O	Receive Deskew channel used to deskew the RX_DATA[15:0]
RXDCK	Diff CML Note 1	O	Receive Data Clock provides a timing reference for receive data. It is at ¼ data rate of RXDATA and RXDSC
RXREFCK	AC Coupled LVPECL Note 1	I	Receive Reference Clock provides an alternate timing reference. The clock is at ¼ data rate of RXDATA and RXDSC
RXMONCK	Analog	O	Receive Monitor Clock provides a single ended clock that can be used to monitor the receive clock on the demux. This clock shall be turned off during normal operation and startup.
RXS	LV_CMOS Note 1	O	Receiver Status is an asynchronous signal used to indicate an alarm to the Framer (activehigh).
I2C_ADDR[2:0]	LV_TTL with 1k ohm pull down resistors Note 2	I	I²C Address[2:0] is the 3 bit address provided to the transponder for the I ² C protocol. Each bit in the address is zero if left open.
I2C_SCL	Open Collector Note 2	I/O	I²C Clock is a signal used to control the data transfer on the I ² C serial interface.
I2C_SDA	Open Collector Note 2	I/O	I²C Data is a signal used to transfer data across the serial I ² C bus. The bus is used for control information and some alarms.
TXLINETIMSEL	LVC MOS	I	Line Time Select is used to select between source and line (loop) timing. (internal pull-up in module)
LS_ENABLE	LVC MOS	I	Laser Enable is low to enable laser and driven high to disable laser. (internal pull-up in module)
LOS	LVC MOS	O	Loss of Signal is a signal to indicate to the there is no incoming optical signal (active low).
THRESH_ADJ	Analog	I	Threshold Adjust is a un-used pin, This feature is supported through I2C.
STAT_INT	LVC MOS	O	Status Interrupt is an electrical “or” of the status register (active low).
REG_RESET	LVC MOS	I	Register Reset is active low and when asserted to its low state will return all writable registers to their default state after resetting the MCU on the transponder.
MOD_RESET	LVC MOS	I	Module Reset is active low and when asserted to its low state will reset the optical module. The module reset will force all components in the transponder to their reset state, including the I ² C registers, the laser and the respective chips.
CFG_ALM	LVC MOS	O	User Configurable Alarm is a user selectable alarm pin. TBD Alarm signals can be software configured to this pin.

Note 1: These Signals are specified in SFI-5 OIF2001.145.x.

Note 2: See I2C document for clarification.

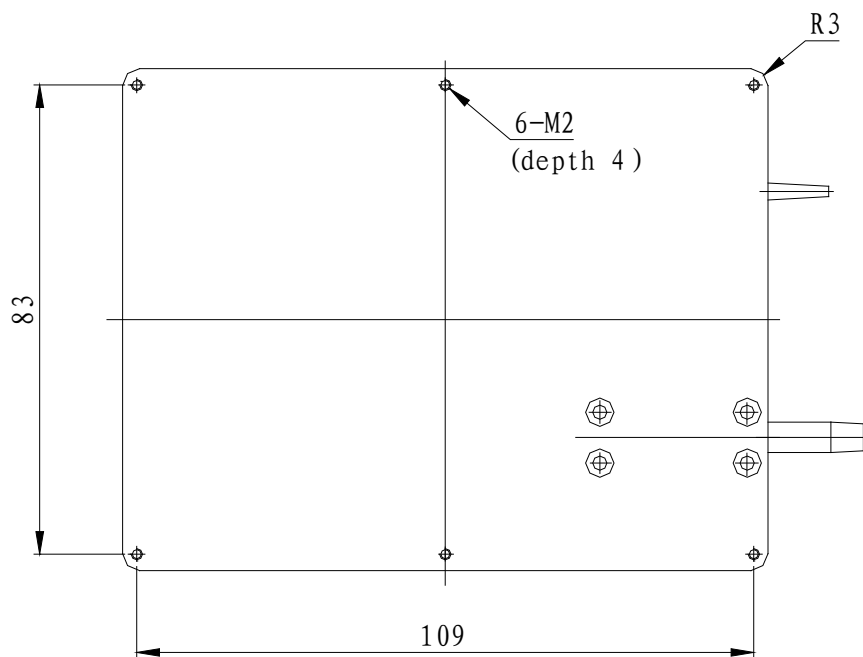
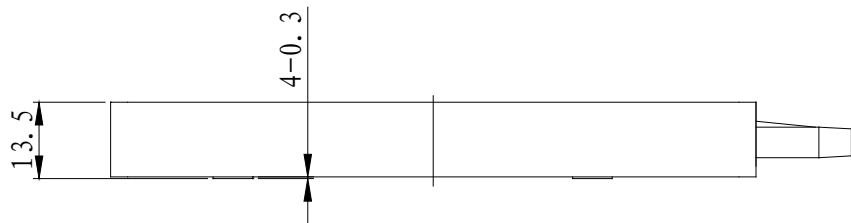
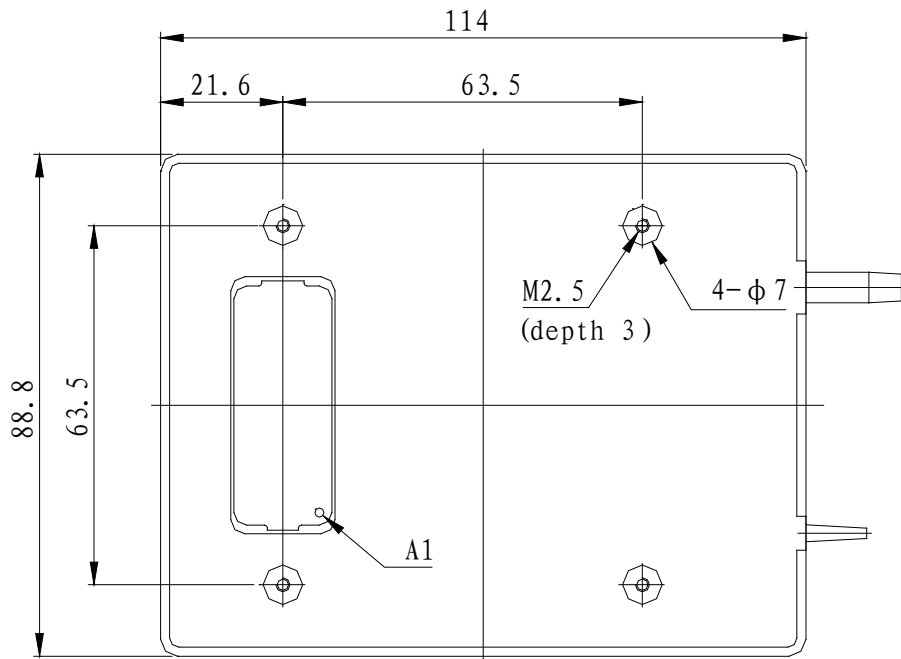
Block diagram



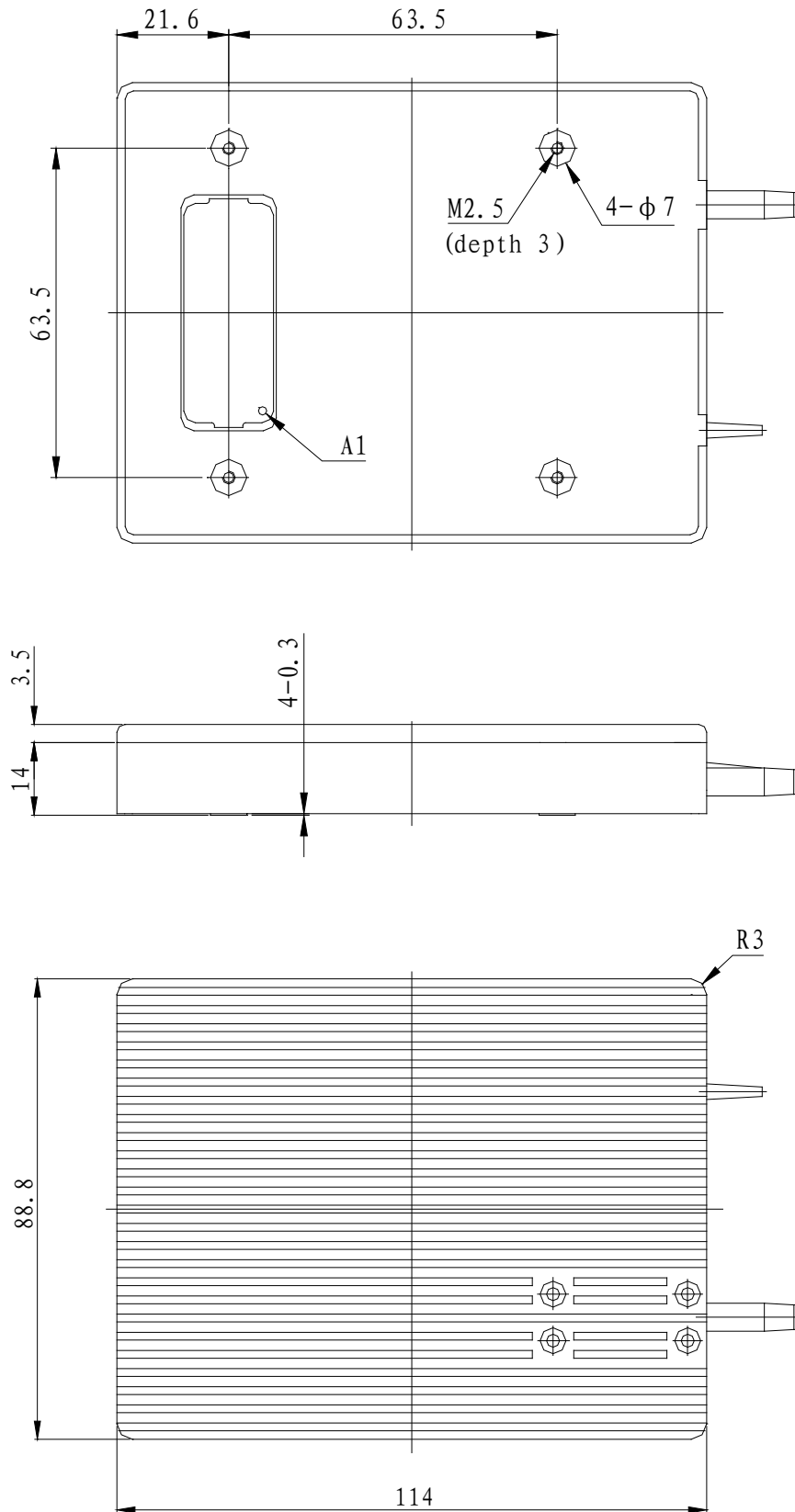
Connector description

FCI Meg-Array® 300 position receptacle, 1.27 mm x 1.27 mm (0.050 x 0.050 inch) ball to ball pitch, FCI part number 84501-10X. Mating line card connector shall be FCI part number 84500-002.

Package Outline (Unit: mm)



Flat-top module



Module with heat sink

I2C Command Information

Cmd hex	data	Bit	Name	Description	Condition	Default	MSA	Prot	Support	default
00 to 0F				Reserved For Future Use			√	-	-	
10 to 1F				Reserved For Future Use			√	-	-	
20 to 2F				Reserved For Future Use			√	-	-	
30 to 3F				Reserved For Future Use			√	-	-	

Command Codes

Cmd hex	data	Bit	Name	Description	Condition	MSA	Default	MSA	Prot.	Support	RTXM298	default	
				Set TX Command Register				√	-	-			
40	0	PRBSEN	enables PRBS generator	0 for PRBS mode	1	√	x	1					
				1 for normal operation									
	1	2	PRBSPAT1	selects PRBS pattern length	Pat1 Pat0 Pattern	11	√	x	11				
					0 0 2 ⁷								
					0 1 2 ¹⁵								
					1 0 2 ²³								
					1 1 2 ³¹								
	3	TxDESKEWEN	enables Tx SFI-5 deskew algorithm	0 for disable	1	√	x	1					
				1 for enable									
	4~7 FFU						All 1's						√
2	0	TxDCKSEL	selects TxDCK frequency	0 for TxDCK = fedata/4	0	√	x	0					
				1 for TxDCK = fedata									
1	TxLINETIMSEL	selects line timing mode (Note 1)	0 for line timing mode	1	√	√	1						
			1 for normal operation										
2	TxLLOOPENB	enables line loopback	0 for enable line loopback	1	√	x	1						

				1 for normal operation					
3	TxRESET	Mux system reset	0 for Reset 1 for normal operation		1	√	×	1	
4	TxFIFORES	Mux FIFO reset	0 for Reset 1 for normal operation		1	√	√	1	
5	AUTOTxFIFORES	Automatic Mux FIFO Reset	0 for auto reset on error enabled 1 for auto reset not enabled		1	√	√	1	
6	SCTxRESET	Self-Clearing Mux system reset	0 for Reset 1 for normal operation		1	√	√	1	
7	TxMUTEMONCLK		0 for Mute 1 for normal operation		1	√	√	1	
0	LsENABLE	laser enabled or disabled (Note2)	0 for normal operation 1 for laser disable		0	√	√	0	
1	TxRATESELO	rate selection of system	Sel1	Sel0	Rate Gbps				
2	TxRATESEL1	rate selection of system	0	0	FFU	11	√	√	11
			0	1	FFU				
			1	0	43.1 FEC				
3			1	1	39.8 SONET				
3	TxREFSEL	selects TxREFCLK	0 for TXREFCLK = fedata/4, 1 for TXREFCLK = fedata		0	√	×	0	
4	TxSRCKSEL	selects the source clock only when TxLINETIMSEL = 1 nominal	0 for TxDCK as source, 1 for TxREFCK as source		1	√	×	1	
					5~7 FFU	111	√	111	
41		Read TX Command Register				√	√		
42		Save TX Command Register				√	√	√	
43		Restore TX Command Register				√	√	√	
		Set RX Command Register				√	√		
44	1	0-7 FFU				All 1's	√		
	2	0 RxMUTE Dout	Mutes the	0 for	mute	1	√	√	1

		RxDout[0:15]	1 for normal operation						
1	RxDLOOPENB	diagnostic loopback	0 for line timing mode 1 for normal operation			1	√	×	1
2	SCRxRESET	Self-Clearing DeMux system reset	0 for Reset 1 for normal operation			1	√	√	1
3	PRBSEN	enables PRBS checker	0 for PRBS mode 1 for normal operation			1	√	×	1
4	PRBSPAT0	PRBS data length	Pat1	Pat0	Pattern				
			0	0	2 ⁷				
5	PRBSPAT1	PRBS data length	0	1	2 ¹⁵	11	√	×	11
			1	0	2 ²³				
			1	1	2 ³¹				
6~7 FFU						All 1's √			
0	RxRATESELO	rate selection of system	Sel1	Sel0	Rate Gbps				
			0	0	FFU				
1	RxRATESEL1	rate selection of system	0	1	FFU	11	√	√	11
			1	0	43.1 FEC				
			1	1	39.8 SONET				
2	RxREFSEL	selects RxREFCLK frequency	0 for RXREFCLK = fedata/4 1 for RXREFCLK = fedata			0	√	×	0
3	RxLCKREF	Locks RxDCK to RxREFCLK	0 locks RXDCK to RXREFCLK 1 for normal operation			1	√	×	1
4	RxMONCLKSEL	selects RxMONCLK frequency	0 for RXMONCLK = fedata/4 1 for RXMONCLK = fedata			1	√	×	0
5	RxRESET	DeMux system reset	0 for Reset 1 for normal operation			1	√	×	1
6	RxMUTERxDCK	mutes the RxDCLK	0 for RxDCK mute 1 for normal operation			1	√	×	1
7	RxMUTEMONCLK	mutes the RxMONCLK	0 for RXMONCLK mute 1 for normal operation			1	√	×	1

45	Read RX Command Register		√	√
46	Save RX Command Register		√	√ √
47	Restore RX Command Register		√	√ √
48	Reserved For Future Use		√	
49	Set Laser ITU Channel		√	√ ×
4A	Read Laser ITU Channel		√	×
4B	Set Receive Decision Threshold	1~100% 256step	√	√ ×
4C	Read Receive Decision Threshold	1~100% 256step	√	×
4D	Set Demux Phase Offset	-127°~+127°	√	√ ×
4E	Read Demux Phase Offset	-127°~+127°	√	×
4F	Set Configurable Alarm (Decimal)		√	
	RxPOWALM	Loss average optical power alarm 0 Default	√	√
	RxLOCKERR	Loss of RxPLL lock indicator 1	√	√
	Reserved	2	√	×
	LsBIASALM	Laser bias current alarm 3	√	√
	LsTEMPALM	Laser temperature alarm 4	√	√
	TxLOCKERR	Loss of TxPLL lock indicator 5	√	√
	TxFIFO ERR	Mux FIFO error indicator 6	√	√
	TxOOA	SFI-5 DESKEW Alarm 7	√	√
	PRBSERRDET	an error was detected by the PRBS error checker 8	√	×
	PRBSCntHalfFull	PRBS error counter register is half full 9	√	×
	EOL	end of life 10	√	√
	PSUMMARY	power supply fault 11	√	×
FFU	12-239	√	×	
Vendor Specific	240-255	√	×	
50	Read Configurable Alarm		√	√
51	Set Transmit Chirp Value		√	√ ×
52	Read Transmit Chirp Value		√	×

53		
to	Reserved For Future Use	√
5F		

Note 1: LsENABLE hardware pin and LsENABLE bit are logically ORed according to the following truth table:

LsEnable Bit	LsEnable Pin	Laser Output
0	0	0, Enabled
0	1	1, Disabled
1	0	1, Disabled
1	1	1, Disabled

Note2: TxLINETIMSEL hardware pin and TxLINETIMSEL bit are logically ORed according to the following truth table:

TxLineTimSel Bit	TxLineTimSel Pin	Timing Mode
0	0	Line
0	1	Source
1	0	Source
1	1	Source

Measurements Codes

Cmd hex	data	Bit	Name	Description	Condition	Default	MSA	Prot.	Support	default
60			LsBIASMON	Laser Bias Current Monitor	[μ A]		√		√	
61			LsPOWMON	Laser Output Power Monitor	[μ W]		√		√	
62			LsTMPMON	Laser Temperature Monitor	[$^{\circ}$ C]		√		√	
63			RxSIGMON	Receiver Signal Monitor AC Optical Power			√		×	
64			RxPOWMON	Receiver Signal Monitor Average Optical Power	[nW]		√		√	
65				Laser Wavelength Monitor			√		×	
66				Transponder Temperature Monitor			√		√	
67				Photodiode Temperature Monitor			√		×	
68				Modulator Bias Monitor			√		×	
69				Read Error Checker Error Count			√		×	
6A				Laser Output Power Monitor in dBm			√		√	

6B	Receiver Signal Monitor Average Optical Power in dBm		√	×
6C	Laser Absolute Temperature Monitor		√	√
6D	Reserved For Future Use		√	
6F	Reserved For Future Use		√	
70	Reserved For Future Use		√	
7F	Reserved For Future Use		√	
Read TX Alarm Status Register			√	
1	0~7 FFU		All 1	√
	0	EOLALM Laser end of life alarm		√
	1	ModTEMPALM Modulator Temperature Alarm		√
	2	TxOOA SFI-5 DESKEW alarm	0 for alarm since last read,	√
	3	TxLOFALM Loss of Frame alarm	1 for no alarm since last	√
2		Latching SFI-5 DESKEW read or not supported		√
	4	TxDSCERR Channel error, cleared on read		√
	5	LsWAVALM Laser Wavelength Alarm		√
80	6~7 FFU		All 1	√
	0	TxALM INT Tx summary alarm		√
	1	LsBIASALM Laser bias current alarm		√
	2	LsTEMPALM Laser temperature alarm	0 for alarm since last read,	√
	3	TxLOCKERR Loss of TxPLL lock indicator	1 for no alarm since last read or not supported	√
3	4	Reserved		√
	5	LsPOWALM Laser power alarm		√
	6	ModBIASALM Modulator bias alarm		√
	7	LATCHEDTxFIFOERR Historical Mux FIFO error indicator		√

Alarm Codes

Cmd hex	data	Bit	Name	Description	Condition	Default	MSA	Prot.	Support	default
				Read RX Alarm Status Register			√			
81	1	0~7	FFU			All 1	√			
		0	RxALM INT	RX summary alarm, with exception to PRBSERRDET	0 for alarm since last read, 1 for no alarm since last read PRBSERRDET excluded from both states		√		√	
		1	RxPOWALM	Loss average optical power alarm			√		√	
		2	RxLOS	Loss AC modulated power alarm			√		√	
	2	3	RxLOCKERR	Loss of RxPLL lock indicator	0 for alarm since last read, 1 for no alarm since last read or not supported		√		√	
		4	RXS	SFI-5 DEMUX status			√		√	
		5	PRBSERRDET	an error was detected by the PRBS error checker			√		×	
		6~7	FFU			All 1	√			
				Read Power Supply Alarm Register			√		×	
		0	PSUMMARY	Power summary alarm			√		×	
		1	P5VANALOG	+5V analog			√		×	
		2	N5V2ANALOG	-5.2V analog	0 for alarm since last read, 1 for no alarm since last read or not supported		√		×	
	1	3	P3P3VANALOG	+3.3V analog			√		×	
		4	P3P3VDIGITAL	+3.3V digital			√		×	
		5	LVDIGITAL	low voltage digital			√		×	
		6	N5P2VDIGITAL	-5.2V digital			√		×	
		7	FFU		1		√			
				Set Rx Interrupt Alarm Mask Register			√			
83	1	0~7	FFU		All bits 1	N/A	√			0xff
	2	0	Reserved		0	0	√		√	0

	1	RxPOWALM	Loss average optical power alarm		0	√	√	0
	2	RxLOS	Loss of AC modulated optical signal	0 for alarm enabled, 1 for alarm disabled	0	√	√	0
	3	RxLOCKERR	Loss of RxPLL lock indicator		0	√	√	0
	4	RXS	SFI-5 DEMUX status		0	√	√	0
	5	PRBSERRDET	an error was detected by the PRBS error checker		0	√	×	0
	6~7 FFU		All bits 1		N/A			11
84	Read Rx Interrupt Alarm Mask Register					√	√	
	Set Tx Interrupt Alarm Mask Register					√		
	1	0~7 FFU	All bits 1		N/A	√		0xff
	0	EOLALM	Laser end of life alarm		0	√	×	0
	1	ModTEMPALM	Modulator Temperature Alarm		0	√	√	0
	2	TxOOA	SFI-5 DESKEW alarm	0 for alarm enabled, 1 for alarm disabled	0	√	√	0
	3	TxLOFALM	Loss of Frame alarm		0	√	×	0
	4	TxDSCERR	SFI-5 DESKEW Channel error		0	√	×	0
	5	LsWAVALM	Laser Wavelength Alarm		0	√	×	0
	6~7 FFU		All bits 1		N/A	√		11
85	0	Reserved		0	0	√		0
	1	LsBIASALM	Laser bias current alarm		0	√	√	0
	2	LsTEMPALM	Laser temperature alarm		0	√	√	0
	3	TxLOCKERR	Loss of TxPLL lock indicator	0 for alarm enabled, 1 for alarm disabled	0	√	√	0
	4	TxFIFO ERR	Mux FIFO error indicator		0	√	×	0
	5	LsPOWALM	Laser power alarm		0	√	√	0
	6	ModBIASALM	Modulator bias alarm		0	√	×	0
	7	LATCHEDTxFIFOERR	Historical Mux FIFO error indicator		0	√	×	0

86	Read Tx Interrupt Alarm Mask Register			✓	✓	
	Set Power Supply Alarm Mask Register			✓		
87	1	0	Reserved	0	N/A ✓ 0	
		1	P5VANALOG	+5V analog	0 ✓ × 0	
		2	N5V2ANALOG	-5.2V analog	0 ✓ × 0	
		3	P3P3VANALOG	+3.3V analog	0 for alarm enabled, 1 for alarm disabled	0 ✓ × 0
		4	P3P3VDIGITAL	+3.3V digital		0 ✓ × 0
		5	LVDIGITAL	low voltage digital	0 ✓ × 0	
		6	N5P2VDIGITAL	-5.2V digital	0 ✓ × 0	
		7	FFU		1	N/A ✓ 1
88	Read Power Supply Alarm mask Register			✓	✓	
	Read Summary Alarm Register			✓		
89	1	0	TxALM INT	TX summary alarm	Mirror of command 0x80, Data3, Bit 0	✓ ✓
		1	RxALM INT	RX summary alarm	Mirror of command 0x81, Data2, Bit 0	✓ ✓
		2	PSUMMARY	Power summary alarm	Mirror of command 0x82, Data1, Bit 0 or 1 if not supported	✓ ×
		3~7	FFU			All 1 ✓ 11111
8A	Interrupt Control			✓	× 2	
8B to 8F	Reserved For Future Use			✓		
90 to 9F	Reserved For Future Use			✓		

Identifier Codes

Cmd hex	data	Bit	Name	Description	Condition	Default	MSA	Prot.	Support	default
A0				Read Supplier Identifier Code		✓			✓	
A1				Read Module Type Code		✓			✓	

A2	Read Customer Parameter	√	√	
A3	Write Customer Parameter	√	√	
A4	Read First Laser ITU Channel	√	×	
A5	Read Last Laser ITU Channel	√	×	
A6	Read Laser ITU Channel Spacing	√	×	
A7	Read Revision Codes	√	√	
A8	Read Unit Serial Number	√	√	
A9	Read Unit Manufacture Date	√	√	
AA	Read Unit Part Number	√	√	
AB to AF	Reserved For Future Use	√		
B0 to BF	Reserved For Future Use	√		
C0	Read Link Status	√	√	
C1	No Operation	√	√	√
C2	Read Maximum I2C Rate	√	√	0x04
C3	Enter Protected Mode	√	√	
C4	Exit Protected Mode	√	√	
C5	Reset CPN	√	√	
C6	Reserved For Future Use	√		
C7	Read Edition and Mode	√	√	0x04-00-00
C8	Data Loopback	√	×	
C9 to CF	Reserved For Future Use	√		
D0 to DF	Reserved For Future Use	√		
E0 to EF	Reserved For Future Use	√		
F0 to FF	Supplier Reserved Codes		√	

Ordering information

Part No.	Specification								Application
	Package	Datarate	Laser	Optical Power	Detector	Sensitivity	Temp Reach	Interface	
RTXM298-301	300pin	40G	1550nm EML	0 ~ +3dBm	PIN	-6dBm(Max)	0~70 2km	Duplex LC	

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