X2-10GB-LRM-LEG
CISCO 10GBASE-LR X2 MMF
1310NM 220M REACH SC DOM

X2-10GB-LRM-LEG

10Gbs X2 Transceiver

Features

- Compatible with X2 MSA Rev2.0b
- Support of IEEE 802.3ae 10GBASE-LR at 10.3125Gbps
- Transmission Distance up to 10km (SMF)
- SC Receptacle 1310nm DFB Laser
- SC Duplex Optical Connector
- Hot Pluggable 70-PIN Connector with XAUI Electrical Interface
- Management and control via MDIO 2-wire interface
- Power Supply: +3.3V, APS (+1.2V)
- Power Dissipation 3.5W Maximum
- Diagnostic Optics Monitoring
- Temperature Range: 0~ 70 °C
- ROHS6 Compatible

Applications

- 10GE Ethernet switches and routers
- 10GE Core-routers
- 10GE Storage
- Other 10Gbps Ethernet Transmission System

Product Description

Legrand's X2-10GB-LRM-LEG transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The X2 transceivers are high performance, cost effective modules supporting dual data-rate of 10Gbps and support distance of 220m with MMF.

Legrand's X2 transceivers are RoHS compliant and lead-free.

Pin Descriptions

Pin	Symbol	Name/Descriptions	Ref.
1	GND	Electrical Ground.	1
2	GND	Electrical Ground.	1
3	GND	Electrical Ground.	1
4	5.0V	Power	2
5	3.3V	Power	2
6	3.3V	Power	2
7	APS =1.2V	Adaptive Power Supply.	2
8	APS =1.2V	Adaptive Power Supply.	2
9	LASI	Open Drain Compatible 10K-22K pull up on host. Logic High: Normal Operation Logic Low: LASI Asserted	3
10	RESET	Open Drain compatible. 10-22K pull-up on transceiver Logic high = Normal operation Logic low = Reset Minimum reset assert time 1 ms	3
11	VEND SPECIFIC	Vendor Specific Pin. Leave unconnected when not in use.	6
12	TX ON/OFF	Open Drain compatible. 10-22K pull-up on transceiver Logic high = Transmitter On (capable) Logic low = Transmitter Off (always)	3
13	RESERVED	Reserved	
14	MODE DETECT	Pulled low inside module through 1k	3
15	VEND SPECIFIC	Vendor Specific Pin. Leave unconnected when not in use.	6
16	VEND SPECIFIC	Vendor Specific Pin. Leave unconnected when not in use.	6
17	MDIO	Management Data IO	3,4
18	MDC	Management Data Clock	3,4
19	PRTAD4	Port Address Bit 4 (Low = 0)	3
20	PRTAD3	Port Address Bit 3 (Low = 0)	3
21	PRTAD2	Port Address Bit 2 (Low = 0)	3
22	PRTAD1	Port Address Bit 1 (Low = 0)	3
23	PRTAD0	Port Address Bit 0 (Low = 0)	3
24	VEND SPECIFIC	Vendor Specific Pin. Leave unconnected when not in use.	6

25	APS SET	Feedback input for APS	
26	RESERVED	Reserved for Avalanche Photodiode use.	6
27	APS SENSE	APS Sense Connection	
28	APS =1.2V	Adaptive Power Supply	2
29	APS =1.2V	Adaptive Power Supply	2
30	3.3V	Power	2
31	3.3V	Power	2
32	5.0V	Power	2
33	GND	Electrical Ground	1
34	GND	Electrical Ground	1
35	GND	Electrical Ground	1
36	GND	Electrical Ground	1
37	GND	Electrical Ground	1
38	RESERVED	Reserved	
39	RESERVED	Reserved	
40	GND	Electrical Ground	1
41	RX LANE0+	Module XAUI Output Lane 0+	5
42	RX LANE0-	Module XAUI Output Lane 0-	5
43	GND	Electrical Ground	1
44	RX LANE1+	Module XAUI Output Lane 1+	5
45	RX LANE1-	Module XAUI Output Lane 1-	5
46	GND	Electrical Ground	1
47	RX LANE2+	Module XAUI Output Lane 2+	5
48	RX LANE2-	Module XAUI Output Lane 2-	5
49	GND	Electrical Ground	1
50	RX LANE3+	Module XAUI Output Lane 3+	5
51	RX LANE3-	Module XAUI Output Lane 3-	5
52	GND	Electrical Ground	1
53	GND	Electrical Ground	1
54	GND	Electrical Ground	1
55	TX LANE0+	Module XAUI Input Lane 0+	5
56	TX LANE0-	Module XAUI Input Lane 0-	5
57	GND	Electrical Ground	1
58	TX LANE1+	Module XAUI Input Lane 1+	5
59	TX LANE1-	Module XAUI Input Lane 1-	5

60	GND	Electrical Ground	1
61	TX LANE2+	Module XAUI Input Lane 2+	5
62	TX LANE2-	Module XAUI Input Lane 2-	5
63	GND	Electrical Ground	1
64	TX LANE3+	Module XAUI Input Lane 3+	5
65	TX LANE3	Module XAUI Input Lane 3	5
66	GND	Electrical Ground	1
67	RESERVED	Reserved	
68	RESERVED	Reserved	
69	GND	Electrical Ground	1
70	GND	Electrical Ground	1

Notes:

1. Ground connections are common for TX and RX.
2. All connector contacts are rated at 0.5A nominal.
3. 1.2V CMOS compatible.
4. MDIO and MDC timing must comply with IEEE802.3ae, Clause 45.3.
5. XAUI output characteristics should comply with IEEE802.3ae Clause 47.
6. Transceivers will be MSA compliant when no signals are present on the vendor specific pins.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Ambient Temperature Range		-40	85	°C
Power Case Temperature Range		0	70	°C
Adaptable Power Supply	Vapsense	0	1.5	V
Supply Voltage Range @ 3.3V	Vcc3	-0.5	4.0	V

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	V_{cc3}	3.14	3.3	3.47	V
	V_{APS}	1.152	1.2	1.248	
Power Dissipation	PD			3.5	W

Transmitter Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Operating Range	Iop	0		220	M	1
Operating Date Rate	DR		10.3125		Gb/s	
Launch Power in OMA	Poma	-4.5		1.5	dBm	
Average Launch Power	Pavg	-6.5	-0.5	0.5	dBm	
Input Center Wavelength	λ	1260	1310	1355	Nm	
RMS Spectral width at 1260 RMS Spectral width at 1260-1300 RMS Spectral width at 1300-1355	LMS	--	--	2.4 Figure 1 4	Nm	
Extinction Ratio	ER	3.5	--			
Transmitter Waveform and Dispersion Penalty	TWDP			4.7	dB	
Peak Launch Power	OMA			3	dB	
RIN20 OMA	RIN			-128	dB/HZ	
Uncorrelated jitter (rms)	Jitter					
Optical Return Loss Tolerance	ORLT	20			dB	

Note: 1.220m in OM1, OM2, OM3

Receiver Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Operating Date Range			10.3125		Gb/s	
Input Center Wavelength	λ	1260		1355	Nm	
Overload in OMA	Po	1.5			dBm	
Stressed Sensitivity in OMA	OMAst			-6.5	dBm	
Sensitivity in OMA for symmetrical test	Pmin			-6	dBm	
Receiver Reflectance	ORL			-12	dBm	1

XAUI I/O Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
XAUI Date Rate	DR		3.125		Gb/s	
XAUI Baud Rate Tolerance		-100		100	Ppm	Relative Tolerance
Differential Input Voltage Swing		220		1600	Mv	8B/10B Coded Input Signal
Differential Output Voltage Swing		800		1600	mVp-p	RLOAD = 100Ω ± 5%
Differential Input Impedance		80	100	120	Ω	

Total Output Jitter	TJXAUI			0.35	UI	No pre-equalization
Total Deterministic Output Jitter	DJXAUI			0.17	UI	No pre-equalization

Signal Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max.	Units
1.2 V CMOS					
Input High Voltage	VIL(MAX)	-	-	0.36	V
Input Low Voltage	VIH(MIN)	0.84	-	1.25	V
Capacitance		-	-	320	pF
Pull Up Resistance	Rpull	4.7k	10k -	22k	Ohm
MDIO I/O					
Output Low Voltage	VOL	-0.3	-	0.2	V
Output Low Current	IOL	-	-	4	mA
Input High Voltage	VIH	0.84	-	1.5	V
Input Low Voltage	VIL	-0.3	-	0.36	V
Pull-up Supply Voltage	VPULL	1.14	1.2	1.26	
Input Capacitance	CIN	-	-	10	Pf
Load Capacitance	CLOD	-	-	470	Pf
External Pull-up Resistance	EPULL	200	-	-	Ohm

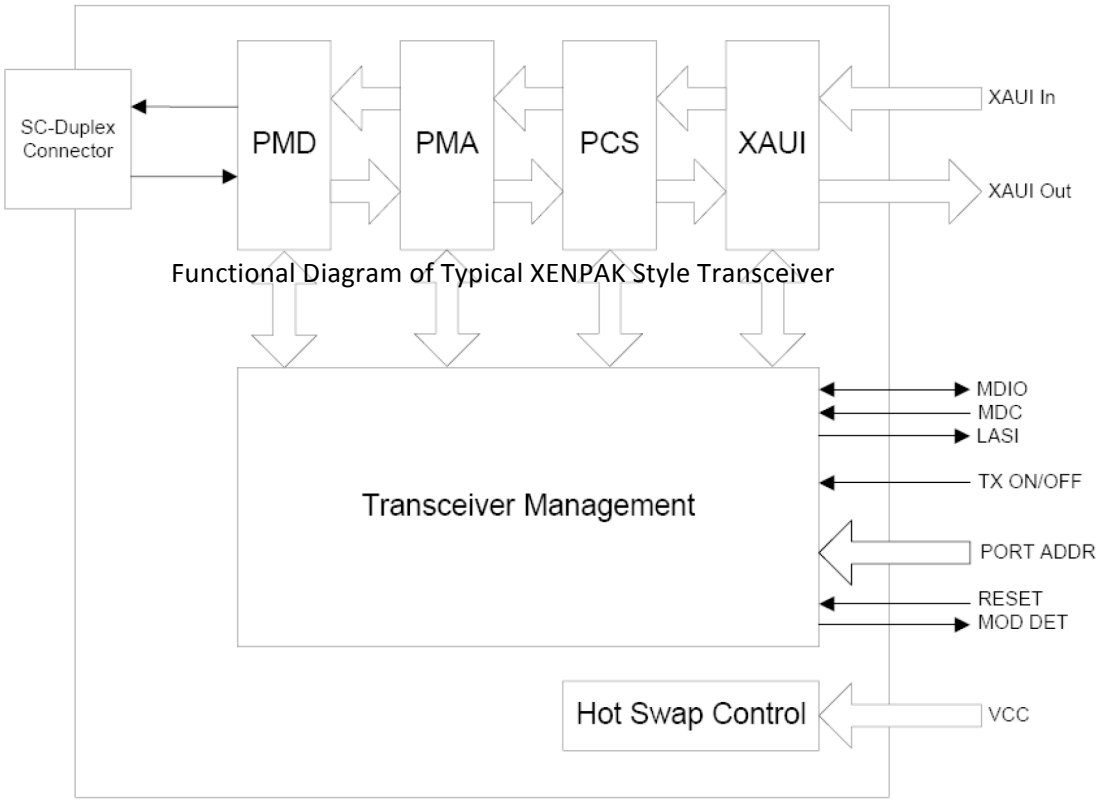


Figure 1. Functional Diagram of Typical X2 Style Transceiver

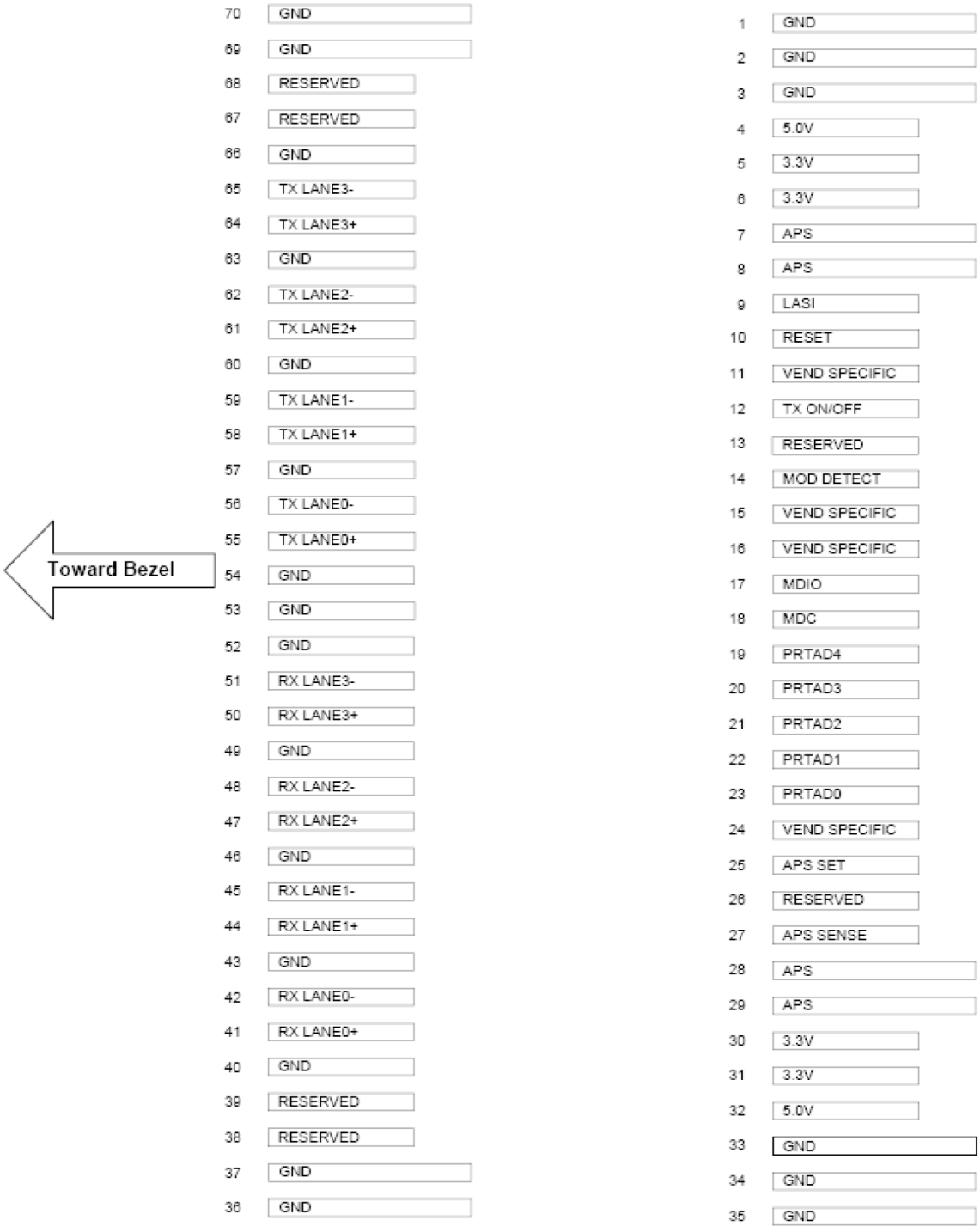
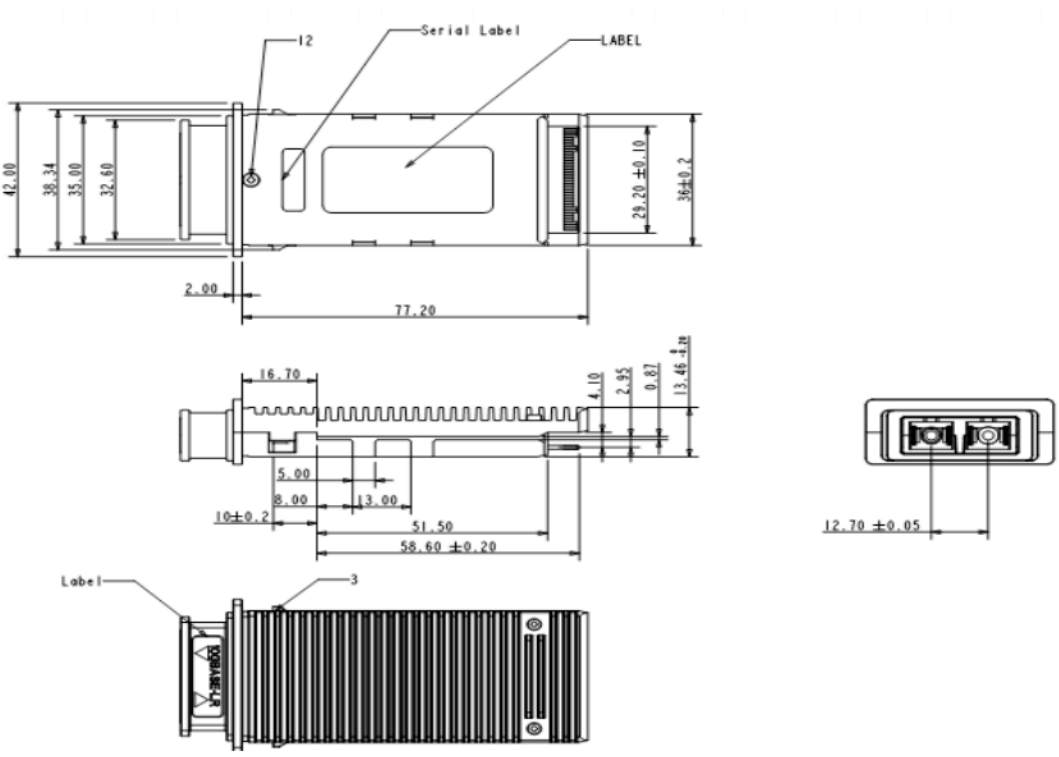


Figure 2. Electrical Pin-out Details



Dimensions in mm

Figure 3. Mechanical Dimensions

Regulatory Compliance

XENPAK Transponder is designed to be Class I Laser safety compliant and is certified per the following standards:

Parameter	Range	Accuracy	Calibration
Laser Safety	FDA	CDRH 21 CFR 1040 and Laser Notice No. 50	1120291-000
Product Safety	UL	UL and CUL EN60950-2:2007	WT10093765-D-E-E
Environmental Protection	SGS	RoHS Directive 2002/95/EC	GZ1001008706/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003 -	WT10093768-D-E-E

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