

Product Features

- Hot pluggable X2 MSA form factor
- Wavelength selectable to C-band grid wavelengths
- Hot Pluggable 70-PIN Connector with XAUI Electrical Interface
- SC Duplex Optical Receptacle
- Cooled EA-DFB Laser
- Full duplex transmission mode
- Digital Optics Monitoring
- Management and control via MDIO 2-wire bus
- Power Supply :+5.0V,+3.3V, APS(+1.2V)
- Commercial operating temperature:0°C to +70°C
- Up to 40Km on 9/125µm SMF
- RoHS Compliant



Applications

- 40Km 10G DWDM Network

Descriptions

LX51xxCDR is a high performance and cost effective optical transponder module. It consists of 10.3Gbit/s cooled EML optical transmitter and PIN receiver, 4x3.125Gbps Ethernet Signal input XAUI interface, Mux and Demux with clock and data recovery (CDR). Digital diagnostics functions are available via MDIO 2-wire bus, They meet the t requirements for 40km 10G DWDM Network and X2 MSA Rev2.0b.

LX51xxCDR is compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power	Receiver	Sensitivity	Reach	Temp	DDM	RoHS
LX51xxCDR	DWDM EML	-1 ~ +3dBm	PIN	< -16.0dBm	40Km	0 ~ 70°C	Available	Compliant

Notes: See Table 2 – Wavelength Guide for “xx” value.

Table 2. Wavelength Guide for “xx” value (100GHz ITU-T channel)

Channel #	Product Part Number	Frequency (THz)	Center Wavelength (nm)
17	LX5117CDR	191.7	1563.86
18	LX5118CDR	191.8	1563.05
19	LX5119CDR	191.9	1562.23
20	LX5120CDR	192.0	1561.42
21	LX5121CDR	192.1	1560.61



LX51xxCDR
10Gb/s 1550nm X2 Optical Transponder
10GBASE-ER 40Km Reach

22	LX5122CDR	192.2	1559.79
23	LX5123CDR	192.3	1558.98
24	LX5124CDR	192.4	1558.17
25	LX5125CDR	192.5	1557.36
26	LX5126CDR	192.6	1556.55
27	LX5127CDR	192.7	1555.75
28	LX5128CDR	192.8	1554.94
29	LX5129CDR	192.9	1554.13
30	LX5130CDR	193.0	1553.33
31	LX5131CDR	193.1	1552.52
32	LX5132CDR	193.2	1551.72
33	LX5133CDR	193.3	1550.92
34	LX5134CDR	193.4	1550.12
35	LX5135CDR	193.5	1549.32
36	LX5136CDR	193.6	1548.51
37	LX5137CDR	193.7	1547.72
38	LX5138CDR	193.8	1546.92
39	LX5139CDR	193.9	1546.12
40	LX5140CDR	194.0	1545.32
41	LX5141CDR	194.1	1544.53
42	LX5142CDR	194.2	1543.73
43	LX5143CDR	194.3	1542.94
44	LX5144CDR	194.4	1542.14
45	LX5145CDR	194.5	1541.35
46	LX5146CDR	194.6	1540.56
47	LX5147CDR	194.7	1539.77
48	LX5148CDR	194.8	1538.98
49	LX5149CDR	194.9	1538.19
50	LX5150CDR	195.0	1537.40
51	LX5151CDR	195.1	1536.61
52	LX5152CDR	195.2	1535.82
53	LX5153CDR	195.3	1535.04
54	LX5154CDR	195.4	1534.25
55	LX5155CDR	195.5	1533.47
56	LX5156CDR	195.6	1532.68
57	LX5157CDR	195.7	1531.90
58	LX5158CDR	195.8	1531.12

59	LX5159CDR	195.9	1530.33
60	LX5160CDR	196.0	1529.55
61	LX5161CDR	196.1	1528.77

Electrical Pin Description

Table 3. Electrical Pin Description

Pin	Logic	Symbol	Name/Description
1	-	GND	Electrical Ground
2	-	GND	Electrical Ground
3	-	GND	Electrical Ground
4	-	5.0V	Power Supply
5	I	3.3V	Power Supply
6	I	3.3V	Power Supply
7	I	APS	Adaptive power supply
8	I	APS	Adaptive power supply
9	Open Drain-O	LASI	Link Alarm Status Interrupt. 10-22K Ω resistor pull-up to 1.2V on host Logic High: Normal Operation; Logic low: Link Alarm is indicated
10	Open Drain-I	RESET	Low active Reset input ,10K Ω pull-up inside Transponder Logic High: Normal Operation; Logic low: Reset asserted
11	-	VEND SPECIFIC	Vendor Specific Pin, leave unconnected
12	Open Drain-I	TX ON/OFF	High active Transmitter Enable, 10K Ω pull-up inside Transponder Logic High: Transmitter on ; Logic low: Transmitter off
13	-	RESERVED	Reserved
14	O	MOD DETECT	1K Ω to Ground inside Transponder
15	-	VEND SPECIFIC	Vendor Specific Pin, leave unconnected
16	-	VEND SPECIFIC	Vendor Specific Pin, leave unconnected
17	Open Drain-I/O	MDIO	Management Data I/O. Requires external 10-22K Ω pull-up to 1.2V on host
18	1.2V COMS-I	MDC	Management Clock Input
19	1.2V COMS-I	PRTAD4	Port Address bit 4(low=0)
20	1.2V COMS-I	PRTAD3	Port Address bit 3(low=0)
21	1.2V COMS-I	PRTAD2	Port Address bit 2(low=0)
22	1.2V COMS-I	PRTAD1	Port Address bit 1(low=0)
23	1.2V COMS-I	PRTAD0	Port Address bit 0(low=0)
24	-	VEND SPECIFIC	Vendor Specific Pin, leave unconnected
25	I	APS SET	Feedback input for APS, Input of APS setting resistor
26	-	RESERVED	Reserved
27	O	APS SENSE	APS Sense output for APS control circuit
28	I	APS	Adaptive power supply
29	I	APS	Adaptive power supply

30	I	3.3V	Power Supply
31	I	3.3V	Power Supply
32	-	5.0V	Power Supply
33	-	GND	Electrical Ground
34	-	GND	Electrical Ground
35	-	GND	Electrical Ground
36	-	GND	Electrical Ground
37	-	GND	Electrical Ground
38	-	RESERVED	Reserved
39	-	RESERVED	Reserved
40	-	GND	Electrical Ground
41	O	RX LANE 0+	Module XAUI output lane 0+
42	O	RX LANE 0-	Module XAUI output lane 0-
43		GND	Electrical Ground
44	O	RX LANE 1+	Module XAUI output lane 1+
45	O	RX LANE 1-	Module XAUI output lane 1-
46		GND	Electrical Ground
47	O	RX LANE 2+	Module XAUI output lane 2+
48	O	RX LANE 2-	Module XAUI output lane 2-
49		GND	Electrical Ground
50	O	RX LANE 3+	Module XAUI output lane 3+
51	O	RX LANE 3-	Module XAUI output lane 3-
52		GND	Electrical Ground
53		GND	Electrical Ground
54		GND	Electrical Ground
55	I	TX LANE 0+	Module XAUI Input lane 0+
56	I	TX LANE 0-	Module XAUI Input lane 0-
57		GND	Electrical Ground
58	I	TX LANE 1+	Module XAUI Input lane 1+
59	I	TX LANE 1-	Module XAUI Input lane 1-
60		GND	Electrical Ground
61	I	TX LANE 2+	Module XAUI Input lane 2+
62	I	TX LANE 2-	Module XAUI Input lane 2-
63		GND	Electrical Ground
64	I	TX LANE 3+	Module XAUI Input lane 3+
65	I	TX LANE 3-	Module XAUI Input lane 3-
66		GND	Electrical Ground
67		RESERVED	Reserved

68	RESERVED	Reserved
69	GND	Electrical Ground
70	GND	Electrical Ground

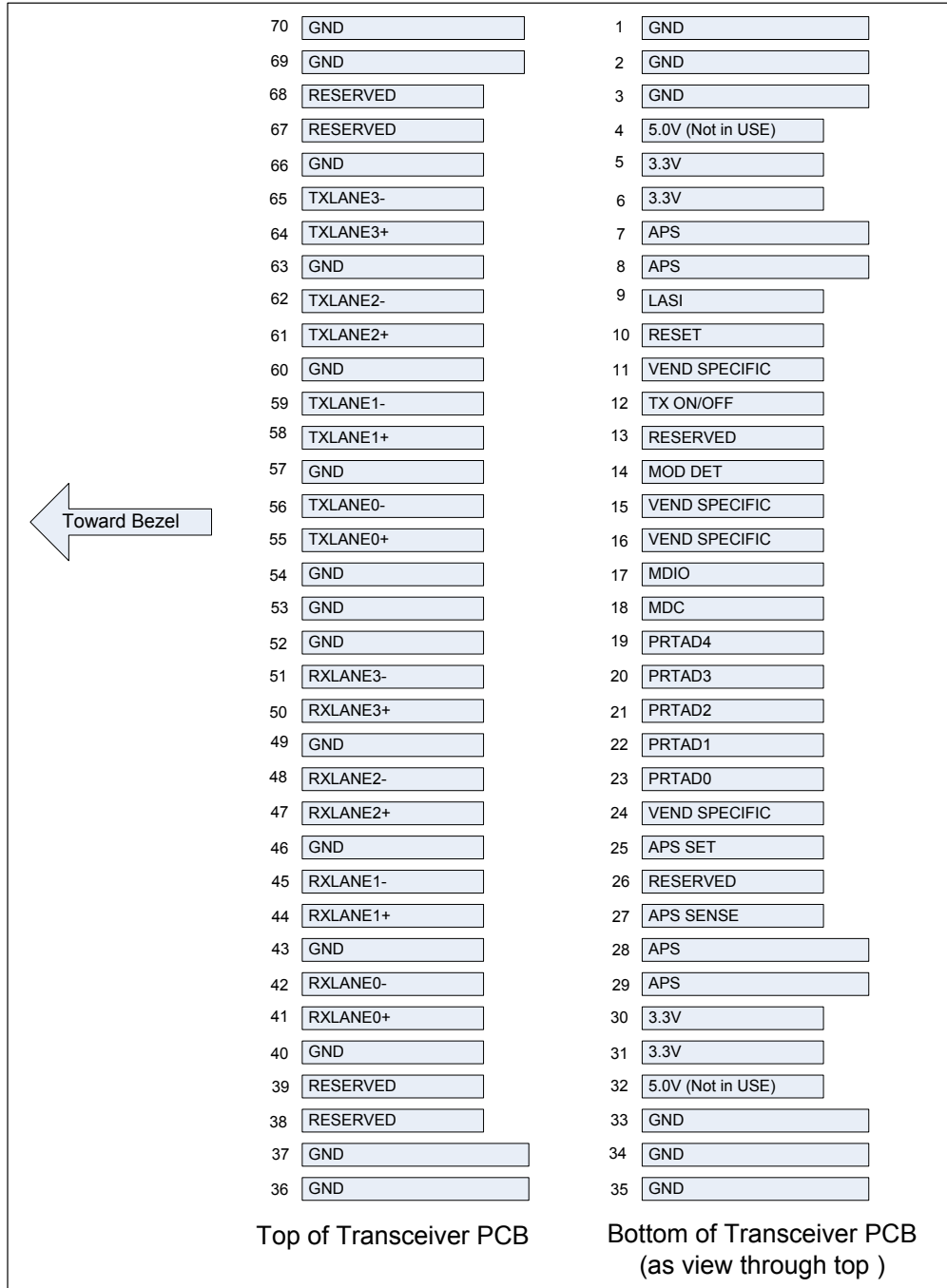


Figure 1. X2 Transponder Electrical Pad Layout

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for

extended periods can adversely affect device reliability.

Table 4. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T _s	-20	85	°C
Supply Voltage 5.0v	V _{CC5}	0	6.0	V
Supply Voltage 3.3v	V _{CC3}	0	4.0	V
Supply Voltage APS	V _{CC5}	0	1.5	V
Average Receive Optical Power	R _{XPmax}		-7	dBm

Recommended Operating Conditions

Table 5. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T _c	0	25	70	°C
Supply Voltage	V _{CC5}	4.75	5.0	5.25	V
Supply Voltage	V _{CC3}	3.135	3.3	3.465	V
Supply Voltage	V _{aps}	1.152	1.2	1.248	V
Total Power Dissipation	-		-	4.0	W

Transponder Electrical Characteristics

Table 6. Transponder Electrical Characteristics

XAUI I/O	Symbol	Minimum	Typical	Maximum	Unit	Notes
XAUI Data Rate	DR	-	3.125		Gb/s	-
XAUI Baud Rate Tolerance		-100	-	+100	ppm	-
XAUI Eye Mask	According to IEEE 802.3ae					
Output Differential Impedance	Z _{OUT_XAUI}	80	100	120	Ω	
Differential Input Amplitude	V _{in_xaui}	220		1600	mv	1
Differential Output Amplitude	V _{out_xaui}	800		1600	mv	1
Total Jitter	T _{JXAUI}			0.35	UI	2
Deterministic Jitter	D _{JXAUI}			0.37	UI	2
1.2V CMOS I/O						
Output High Voltage	V _{OH}	1	-	-	V	-
Output Low Voltage	V _{OL}	-	-	0.15	V	-
Input High Voltage	V _{IH}	0.84	-	1.5	V	-
Input Low Voltage	V _{IL}	-	-	0.36	V	-
MDIO I/O						

Output High Voltage	V_{OHM}	1.0	-	1.5	V	-
Output Low Voltage	V_{OLM}	-0.3	-	0.2	V	
Input High Voltage	V_{IHM}	0.84	-	1.5	V	
Input Low Voltage	V_{ILM}	-0.3		0.36	V	
MDIO Data Hold Time	t_{HOLD}	10			ns	
MDIO Data Setup Time	t_{SU}	10			ns	
Delay from MDC Rising Edge to MDIO Data Change	t_{DELAY}			300	ns	
MDC Clock Rate	f_{MAX}			2.5	MHz	

Notes:

1. Internally AC coupled.
2. XAUI Output ,No pre-equalization.

Transmitter Optical Characteristics

Table 7. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Operating Data Rate	-	-	10.3125	-	Gb/s	-
Launch Average Optical Power	P_o	-1	-	+3	dBm	1
Center Wavelength Range	λ_c	1528.77	-	1563.86	nm	-
Center Wavelength Spacing	-	-	100	-	GHz	-
Center Wavelength Tolerance	$\Delta\lambda_c$	-100	-	100	pm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	EX	9	-	-	dB	-
Dispersion Penalty@800ps/nm	TDP	-	-	2.0	dB	-
Average Optical Power (Laser Off)	P_{OFF}	-	-	-30	dBm	1
Eye Diagram			IEEE802.3ae Compliant			

Notes:

1. The optical power is launched into 9/125 μ m SMF.

Receiver Optical Characteristics

Table 8. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Operating Data Rate	-	-	10.3125	-	Gb/s	-
Center Wavelength	λ_c	1528	-	1565	nm	
Receiver Overload (P_{avg})	P_{OL}	-1	-	-	dBm	1
Average sensitivity	S			-16.0	dBm	1
Optical Return Loss	ORL	27	-	-	dB	-

Notes:

1. PRBS 2³¹-1 test pattern, BER<10⁻¹².

Mechanical specifications

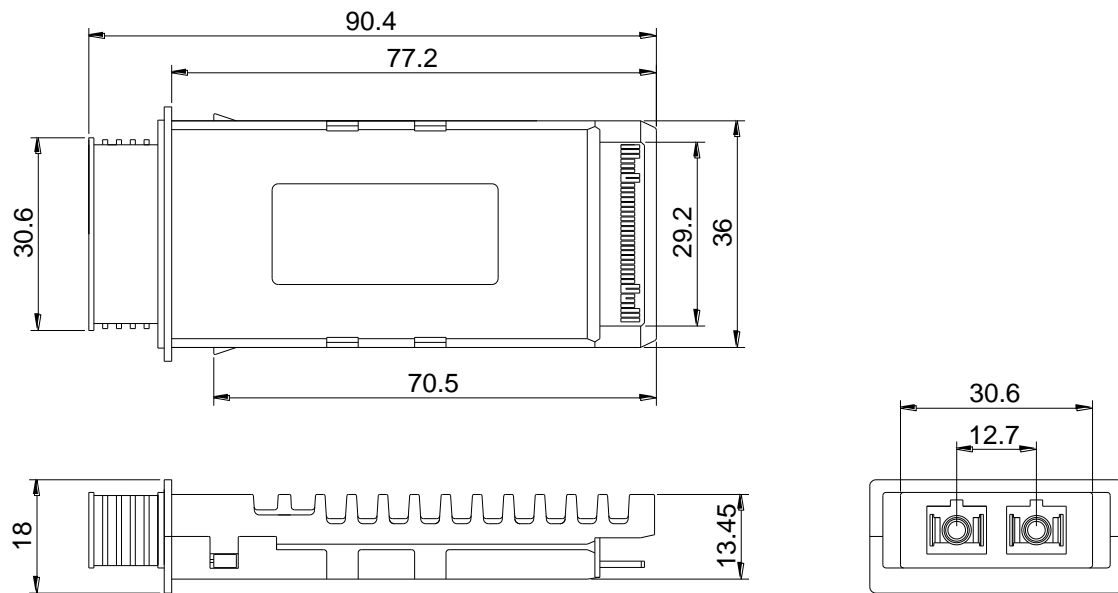


Figure 4. Outline Drawing

For More Information

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LX51xxCDR
10Gb/s 1550nm X2 Optical Transponder
10GBASE-ER 40Km Reach

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