DS-X2-FC10G-LR-C

Cisco® DS-X2-FC10G-LR Compatible TAA 10GBase-LR X2 Transceiver (SMF, 1310nm, 10km, SC, DOM)

Features:

- X2 MSA 2.0 Compliance
- Duplex SC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free

Applications:

- 10GBase-LR Ethernet
- 8x/10x Fibre Channel
- Access, Datacenter and Enterprise
- Mobile Fronthaul CPRI/OBSAI

Product Description

This Cisco® DS-X2-FC10G-LR compatible X2 transceiver provides 10GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an SC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Cisco®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")

TAA COMPLIANT

Rev. 012026

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Storage Ambient Temperature	T_S	-40		85	°C
Supply Voltage (5V)	V_S	0		6	V
Supply Voltage (3.3V)	V_3	0		4	V
Supply Voltage (APS)	V_{APS}	0		1.5	V
Optical Receiver Input	P_{IMAX}			1.5	dBm

General Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Data Rate	DR		10.3125		GBd
Bit Error Rate	BER			10^{-12}	
Total Power Consumption	P			3	W
Supply Voltage (5V)	V_{CC5}	4.75	5	5.25	V
Supply Voltage (+3.3V)	V_{CC3}	3.14	3.3	3.47	V
Supply Voltage (APS)	V_{CCAPS}	1.152	1.2	1.248	V
Supply Current (5V)	I_{CC5}			100	mA
Supply Current (+3.3V)	I_{CC3}			300	mA
Supply Current (APS)	I_{CCAPS}			1000	mA
Case Operating Temperature	T_C	0		70	°C

Link Distance

Parameter	Fiber Type	Distance Range (km)
10.3 GBd	9/125µm SMF	10

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Optical Wavelength	λ	1290		1330	nm	
Launch Power	P_{OUT}	-8.2		0.5	dBm	
Launch Power in OMA minus TDP	P_{OUT_OMA}	-5.2			dBm	
Launch Power of OFF Transmitter	P_{OUT_OFF}			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectral Width (-20dB)	Δ λ			0.6	nm	
Optical Extinction Ratio	ER	3.5			dB	
Optical Modulation amplitude	OMA	-5.2			dBm	
Optical Return Loss Tolerance	ORL_T			12	dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Transmitter Reflectance	TR_{TX}			-12	dB	
Eye Mask Definition		According to IEEE 802.3ae				
Receiver						
Center Wavelength Range	λ_C	1260		1600	nm	
Optical Input Power	P_{IN}	-14.4		0.5	dBm	
Receiver Sensitivity in OMA	P_{IN_OMA}			-12.6	dBm	
Stressed Receiver Sensitivity	P_{IN_S}			-10.3	dBm	
Receiver Reflectance	TR_{RX}			-12	dB	
Loss of Signal Assert Level	P_{LOS_A}	-25			dBm	
Loss of Signal De-assert Level	P_{LOS_D}			-16	dBm	
Loss of Signal Hysteresis	P_{LOS_H}	1			dBm	
Receiver electrical 3dB upper cutoff frequency	FR			12.3	GHz	

Electrical Characteristics - DC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
A. 1.2V COMS I/O DC Characteristics (PRTAD; LASI; RESET; TX_ON/OFF)						
External Pull-Up Resistor for Open Drain	R_{PU}	10		22	KΩ	
Output High Voltage	V_{OH}	1			V	
Output Low Voltage	V_{OL}			0.15	V	
Input High Voltage	VIH	0.84		1.2	V	
Input Low Voltage	VIL			0.36	V	
Input Pull-Down Current	IPD	20	120	120	µA	VIN=1.2V
B. XAUI I/O DC Characteristics (TXLAN[0..3]; RXLANE[0..3])						
Differential Input Amplitude (pk-pk)	V_{IN_XAUI}	200		2500	mV	AC Coupled
Differential output Amplitude (pk-pk)	V_{OUT_XAUI}	800		1600	mV	AC Coupled
C. MDIO I/O DC Characteristics (MDIO; MDC)						
Output Low Voltage	V_{OL}			0.2	V	I_{OL} = 100µA
Output Low Current	I_{OL}			4	mA	
Input High Voltage	V_{IH}	0.84		1.2	V	
Input Low Voltage	V_{IL}			0.36	V	
Pull-Up Supply Voltage	V_{PU}	1.152	1.2	1.248	V	
Input Capacitance	C_{IN}			10	pF	
Load Capacitance	C_{LOAD}			470	pF	
External Pull-Up Resistance	RPU	200			Ω	

Electrical Characteristics - AC

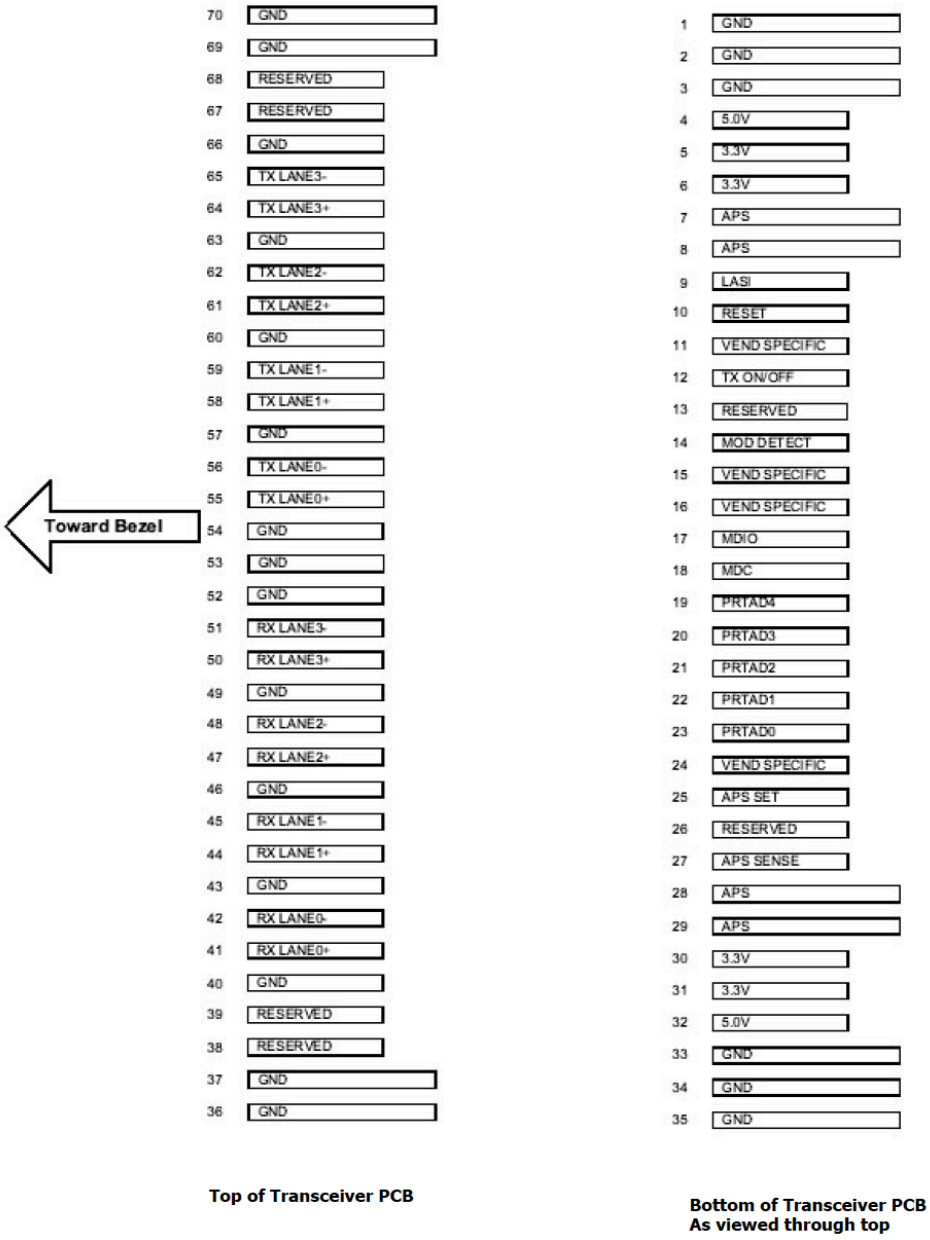
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
A. XAUI Input AC Characteristics (TXLANE[0..3])						
Baud Rate	BR_{XAUI_IN}		3.125		GBd	
Baud Rate Tolerance	BR_{TOL_XAUI}	-100		100	ppm	
Differential Input Impedance	Z_{IN_XAUI}	80	100	120	Ω	
Differential Return Loss	RL_{IN}	10			dB	100MHz to 2.5 GHZ
Input Differential Skew	T_{IN_SKEW}			75	ps	Crossing Point
Jitter Amplitude Tolerance	J_{XAUI_TOL}			0.65	UI_{PP}	IEEE 802.3ae
B. XAUI Output AC Characteristics (RXLANE[0..3])						
Baud Rate	BR_{XAUI_OUT}		3.125		GBd	
Baud Rate Variation	BR_{XAUI_VAR}	-100		100	ppm	
XAUI Eye Mask (far-end)		According to IEEE 802.3ae				
Output Differential Skew	T_{OUT_SKEW}			15	ps	
Output Differential Impedance	Z_{OUT_XAUI}	80	100	120	Ω	
Differential Output Return Loss	RL_{OUT}	10			dB	100 MHz to 2.5 GHz
Total Jitter	TJ_{XAUI}			0.35	UI	Near-end No pre-equalization 1 UI=320 ps
Deterministic Jitter	DJ_{XAUI}			0.17	UI	
C. Power-On Reset Characteristics						
Power-On Reset and TX_ONOFF Characteristics		According to X2 MSA Issue				
D. MDIO I/O AC Characteristics (MDIO; MDC)						
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	

Pin Descriptions

Pin#	Symbol	I/O	Logic	Description	Pin#
1	GND	I	Supply	Electrical ground	1
2	GND	I	Supply	Electrical ground	2
3	GND	I	Supply	Electrical ground	3
4	5.0V	I	Supply	Power	4
5	3.3V	I	Supply	Power	5
6	3.3V	I	Supply	Power	6
7	APS	I	Supply	Adaptive Power Supply	7
8	APS	I	Supply	Adaptive Power Supply	8
9	LASI	O	Open Drain	Link Alarm Status Interrupt. 10-22k ohm pull up on host	9
10	REST	I	1.2V CMOS	TX OFF when MDIO RESET	10
11	VEND SPECIFIC			Vendor Specific Pin. Leave unconnected	11
12	TX ON/OFF	I	1.2V CMOS	Transmitter ON/OFF	12
13	Reserved			Reserved	13
14	MOD DETECT	O		Pulled low inside module through 1k ohm	14
15	VEND SPECIFIC			Vendor Specific Pin. Leave unconnected	15
16	VEND SPECIFIC			Vender Specific Pin. Leave unconnected	16
17	MDIO	I/O	Open Drain	Management Data IO	17
18	MDC	I	1.2V CMOS	Management data clock	18
19	PRTAD4	I	1.2V CMOS	Port Address bit 4 (Low=0)	19
20	PRTAD3	I	1.2V CMOS	Port Address bit 3 (Low=0)	20
21	PRTAD2	I	1.2V CMOS	Port Address bit 2 (Low=0)	21
22	PRTAD1	I	1.2V CMOS	Port Address bit 1 (Low=0)	22
23	PRTAD0	I	1.2V CMOS	Port Address bit 0 (Low=0)	23
24	VEND SPECIFIC			Vendor Specific Pin. Leave unconnected	24
25	APS SET	O		Feedback output for APS	25
26	RESERVED			Reserved for Avalanche Photodiode use	26
27	APS SENSE	O	Analog	APS Sense Connection	27
28	APS	I	Supply	Adaptive Power Supply	28
29	APS	I	Supply	Adaptive Power Supply	29
30	3.3V	I	Supply	Power	30
31	3.3V	I	Supply	Power	31
32	5.0V		Supply	Power	32
33	GND	I	Supply	Electrical Ground	33
34	GND	I	Supply	Electrical Ground	34

35	GND	I	Supply	Electrical Ground	35
36	GND	I	Supply	Electrical Ground	36
37	GND	I	Supply	Electrical Ground	37
38	RESERVED			Reserved	38
39	RESERVED			Reserved	39
40	GND	I	Supply	Electrical ground	40
41	RX LANE 0+	O	AC	Module XAUI Output Lane 0+	41
42	RX LANE 0-	O	AC	Module XAUI Output Lane 0-	42
43	GND	I	Supply	Electrical ground	43
44	RX LANE 1+	O	AC	Module XAUI Output Lane 1+	44
45	RX LANE 1-	O	AC	Module XAUI Output Lane 1-	45
46	GND	I	Supply	Electrical ground	46
47	RX LANE 2+	O	AC	Module XAUI Output Lane 2+	47
48	RX LANE 2-	O	AC	Module XAUI Output Lane 2-	48
49	GND	I	Supply	Electrical ground	49
50	RX LANE 3+	O	AC	Module XAUI Output Lane 3+	50
51	RX LANE 3-	O	AC	Module XAUI Output Lane 3-	51
52	GND	I	Supply	Electrical ground	52
53	GND	I	Supply	Electrical ground	53
54	GND	I	Supply	Electrical ground	54
55	TX LANE 0+	O	AC	Module XAUI Input Lane 0+	55
56	TX LANE 0-	O	AC	Module XAUI Input Lane 0-	56
57	GND	I	Supply	Electrical ground	57
58	TX LANE 1+	O	AC	Module XAUI Input Lane 1+	58
59	TX LANE 1-	O	AC	Module XAUI Input Lane 1-	59
60	GND	I	Supply	Electrical ground	60
61	TX LANE 2+	O	AC	Module XAUI Input Lane 2+	61
62	TX LANE 2-	O	AC	Module XAUI Input Lane 2-	62
63	GND	I	Supply	Electrical ground	63
64	TX LANE 3+	O	AC	Module XAUI Input Lane 3+	64
65	TX LANE 3-	O	AC	Module XAUI Input Lane 3-	65
66	GND	I	Supply	Electrical ground	66
67	RESERVED			Reserved	67
68	RESERVED			Reserved	68
69	GND	I	Supply	Electrical Ground	69
70	GND	I	Supply	Electrical Ground	70

Electrical Pad Layout



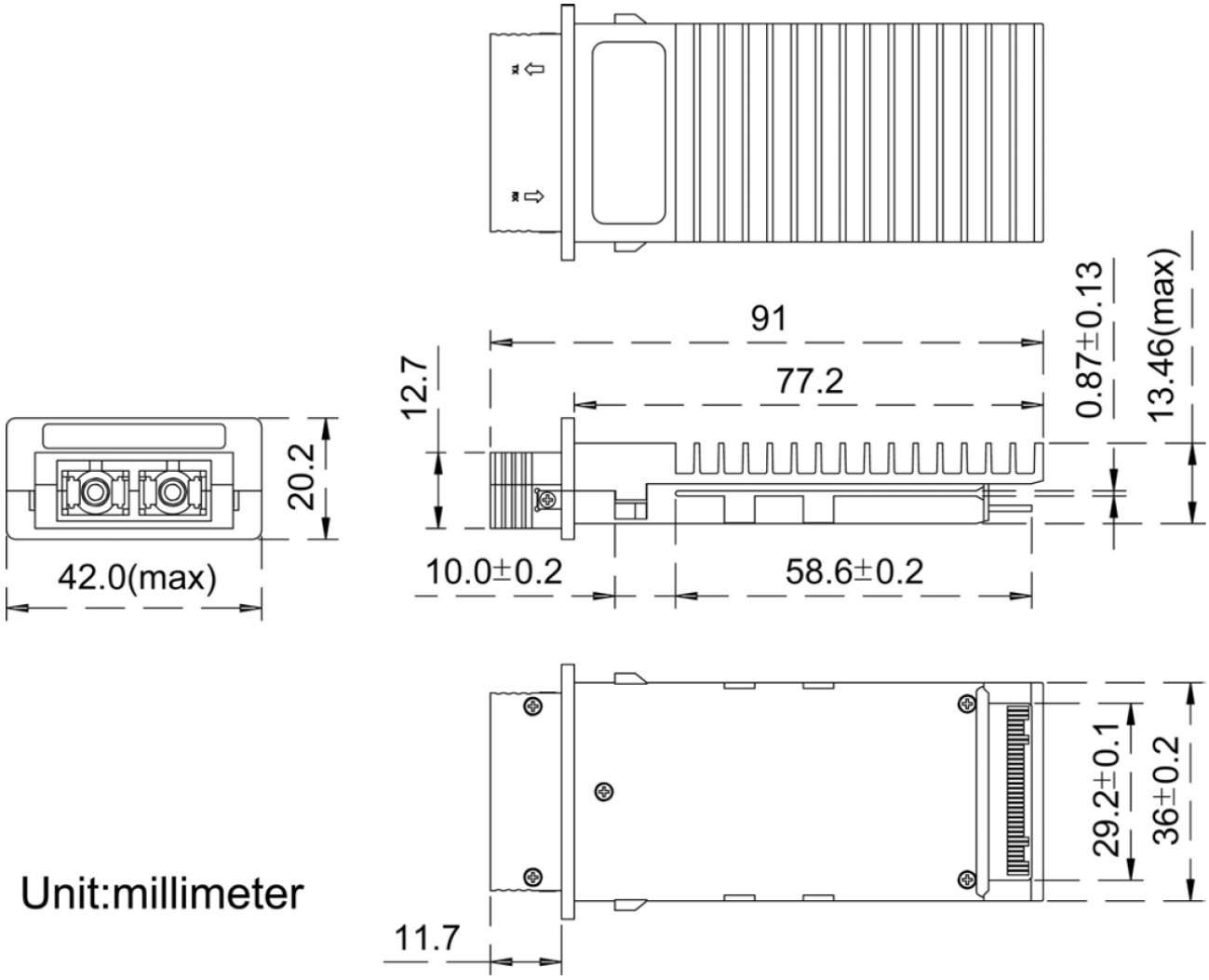
Top of Transceiver PCB

Bottom of Transceiver PCB
As viewed through top

Digital Diagnostic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Temperature Monitor	T_{MON}	-5		5	°C	
Laser Bias Monitor	I_{MON}	-10		10	%	
TX Power Monitor	P_{TX}	-3		3	dBm	
RX Power Monitor	P_{RX}	-3		3	dBm	

Mechanical Specifications



About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

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