



X2-LR-OPC

MSA and 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 MSA compliant 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. All of our transceivers are built to comply with Multi-Source Agreement (MSA) standards and are uniquely serialized and tested for data-traffic and application to ensure 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.

OptioConnect's transceivers are RoHS compliant and lead-free.

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)	$\Delta \lambda$			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	V _{IH}	0.84		1.2	V	
Input Low Voltage	V _{IL}			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

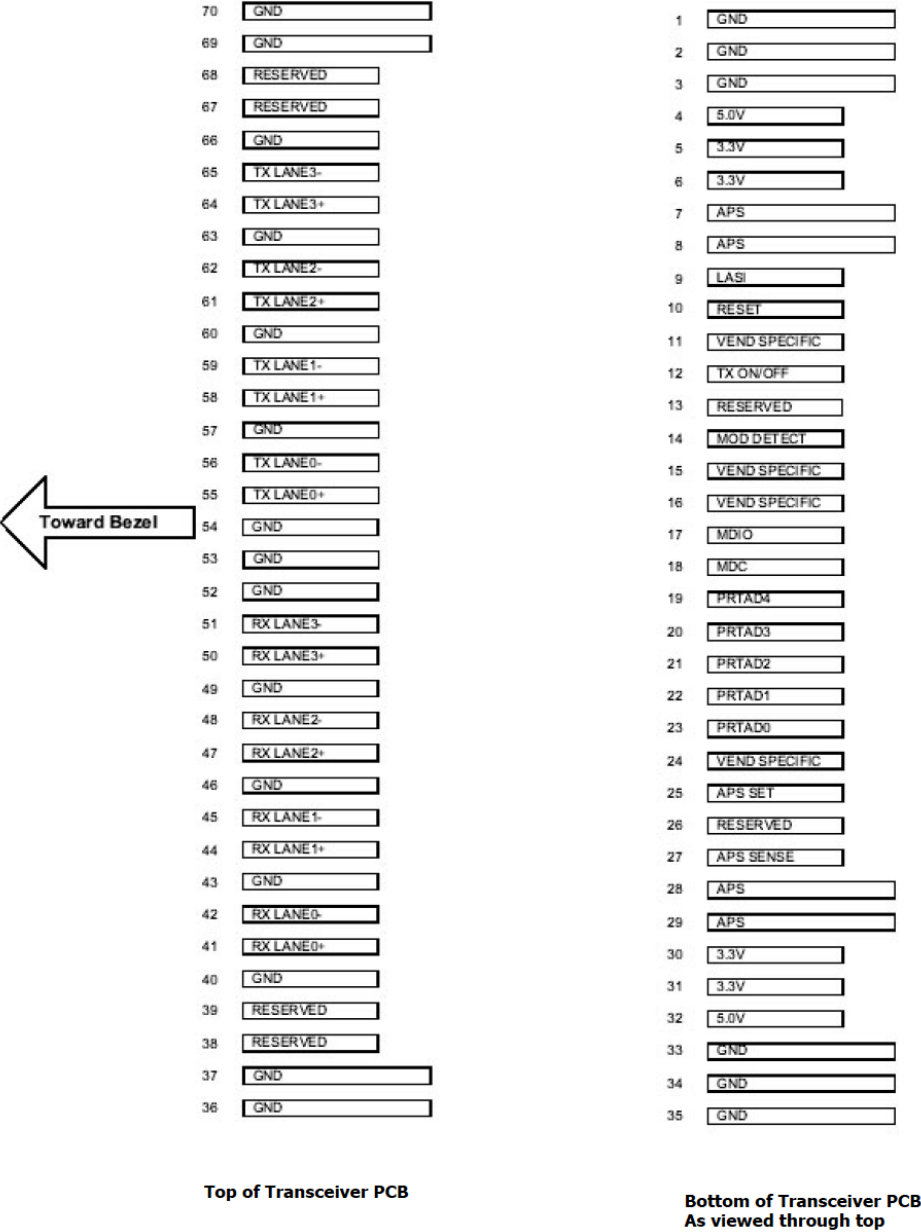
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
A. XAUI Input AC Characteristics (TXLANE[0..3])						
Baud Rate	BR _{XAUI_IN}		3.125		GBd	
Baud Rate Tolerance	BR _{TOL_XAUI}	-100		100	ppm	
Differential Input Impedance	Z _{IN_XAUI}	80	100	120	Ω	
Differential Return Loss	RL _{IN}	10			dB	100MHz to 2.5 GHz
Input 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			Vendor 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

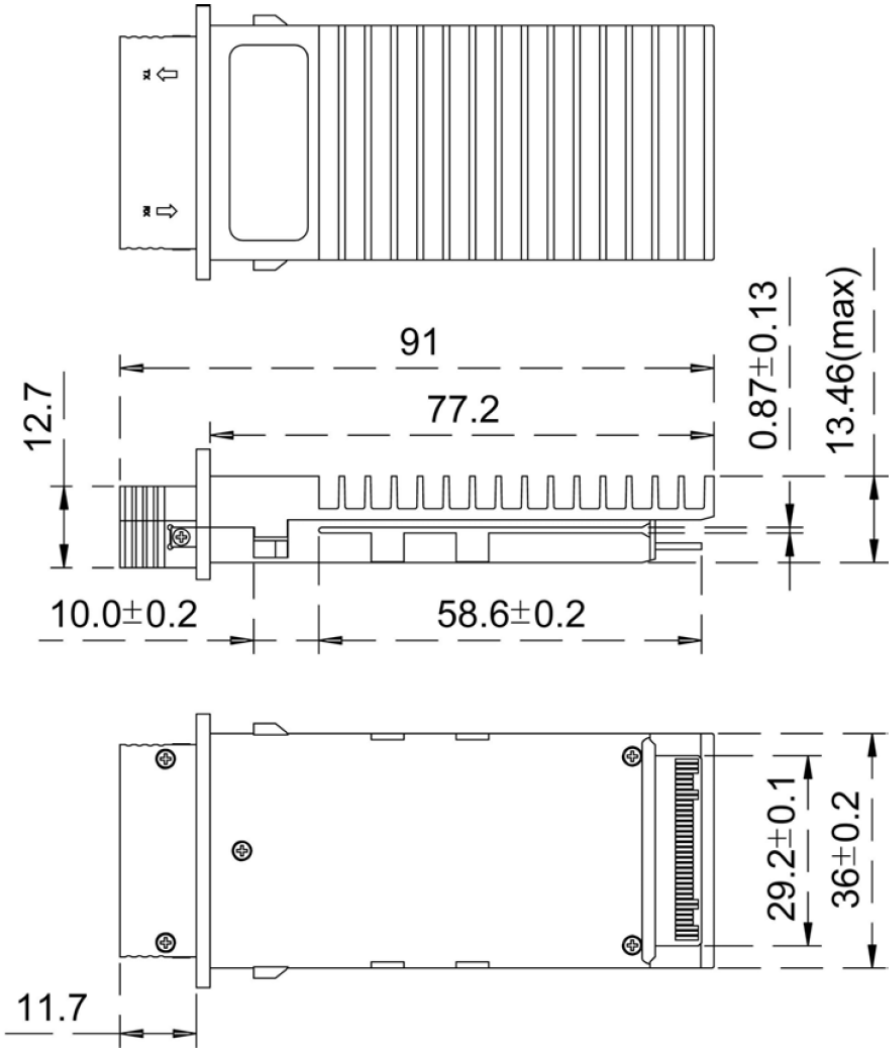
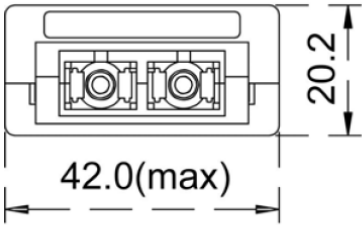
Electrical Pad Layout



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



Unit:millimeter

OptioConnect

Innovation for the Future of High-Speed Networking

Who We Are

OptioConnect is reshaping the landscape of communication and high-speed networking through intelligent technology. With a core focus on cutting edge technology, we deliver smarter fiber optic solutions for enterprise networks, data centers, and next-gen telecom infrastructures.

What We Do

At OptioConnect, we fuse advanced engineering with intelligent automation to drive the future of networking. Our AI-integrated solutions are designed to optimize performance and streamline operations with:

- Superior Performance
- Network and traffic optimization
- Intelligent energy management
- Seamless OEM compatibility
- Scalable cost-efficiency

Smarter Networks by Design

Innovation isn't just a goal—it's our process. We embed AI and machine learning across our R&D and product lines, enabling adaptive performance, automated tuning, and faster deployment cycles. The result? Networks that don't just work—they learn, evolve, and outperform.

Our Team

Our engineers, data scientists, and network architects bring decades of experience and a future-focused mindset. We provide hands-on support with intelligent insights that turn complex challenges into simple solutions.

Our Mission

To deliver AI-enhanced connectivity that reduces cost, increases speed, and maximizes efficiency—empowering our partners to operate at the forefront of a rapidly evolving digital world.

Let's Connect

Discover how OptioConnect's intelligent infrastructure solutions can power your network's next leap forward.

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