

Features



- Compliant with X2 MSA
- Up to 10GBd bi-directional data links
- Compliant with IEEE802.3ae 10GBASE-SR Application
- XAUI Electrical Interface: 4 Lanes@3.125Gbit/s
- Hot Z-Pluggable
- SC Duplex Optical Receptacle
- MDIO, DOM(Digital Optics Monitoring) Support
- 850nm wavelength VCSEL laser
- PIN Photo-detector
- Up to 300m reach over 50/125 μm MMF with Minimum modal bandwidth @850 nm of 2,000 MHz •km
- RoHS Compliant

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_s	-40	85	°C	
Supply Voltage	V_3	0	4	V	+3.3V
Supply Voltage	V_{APS}	0	1.5	V	APS
Optical Receiver Input	P_{IMAX}		1	dBm	Average

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_c	0	70	°C	
Supply Voltage	V_{CC3}	3.14	3.47	V	+3.3V
Supply Voltage	V_{CCAPS}	1.152	1.248	V	APS
Supply Current	I_{CC3}		300	mA	APS
Supply Current	I_{CCAPS}		1000	mA	APS
Power Consumption	P		2.2	W	

Link Distances

Parameter	Fiber Type	Modal Bandwidth @ 850nm (MHz-km)	Distance Range (m)
10.3 GBd	62.5/125μ m MMF	160	2-26
	62.5/125μ m MMF	200	2-33
	50/125μ m MMF	400	2-66
	50/125μ m MMF	500	2-82
	50/125μ m MMF	2000	2-300

Transmitter Electro-optical Characteristics

V_{CC3} = 3.14 V to 3.47 V, V_{CCAPS} = 1.152V to 1.248V ; T_C = 0 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Data Rate			10.3125		Gbps	
Bit Error Rate	BER			10 ⁻¹²		
Output Optical Power	P _{out}	-7.3	---	-1.3	dBm	
Launch power in OMA	P _{OUT_OMA}	-4.3	---	-2.8	dBm	
Launch power of OFF Transmit Power	P _{OUT_OFF}			-30	dBm	Average
Center Wavelength	λ _C	840	850	860	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3			dB	
Spectral Width (RMS)	Δλ			0.45	nm	
Optical Modulation amplitude	OMA	525			μ W	
Optical Return Loss Tolerance	ORL _T			12	dB	
Relative Intensity Noise	RIN	---	---	-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3.9	dB	
Transmitter eye mask		Compliant with IEEE802.3ae and 10GBASE-SR				

Receiver Electro-optical Characteristics

Vcc3 = 3.14 V to 3.47 V, V_{CCAPS}=1.152V to 1.248V ; T_C = 0 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Center Wavelength	λ_C	840	---	860	nm	
Optical Input Power	P_{IN}	-9.9	---	-1	dBm	Average, Informative
Receiver Sensitivity in OMA	P_{IN_OMA}	---	---	-11.1	dBm	INformative
Stressed Receiver Sensitivity	P_{IN_S}	---	---	-7.5	dBm mW	
Receiver Reflectance	TR_{RX}			-12	dB	
Receiver electrical 3dB upper cutoff frequency	FR			12.3	GHz	

Pin Assignment

70	GND
69	GND
68	RESERVED
67	RESERVED
66	GND
65	TX LANE3-
64	TX LANE3+
63	GND
62	TX LANE2-
61	TX LANE2+
60	GND
59	TX LANE1-
58	TX LANE1+
57	GND
56	TX LANE0-
55	TX LANE0+
54	GND
53	GND
52	GND
51	RX LANE3-
50	RX LANE3+
49	GND
48	RX LANE2-
47	RX LANE2+
46	GND
45	RX LANE1-
44	RX LANE1+
43	GND
42	RX LANE0-
41	RX LANE0+
40	GND
39	RESERVED
38	RESERVED
37	GND
36	GND



1	GND
2	GND
3	GND
4	5.0V
5	3.3V
6	3.3V
7	APS
8	APS
9	LAS1
10	RESET
11	VEND SPECIFIC
12	TX ON/OFF
13	RESERVED
14	MOD DETECT
15	VEND SPECIFIC
16	VEND SPECIFIC
17	MDIO
18	MDC
19	PRTAD4
20	PRTAD3
21	PRTAD2
22	PRTAD1
23	PRTAD0
24	VEND SPECIFIC
25	APB SET
26	RESERVED
27	APS SENSE
28	APS
29	APS
30	3.3V
31	3.3V
32	5.0V
33	GND
34	GND
35	GND

Top of Transceiver PCB

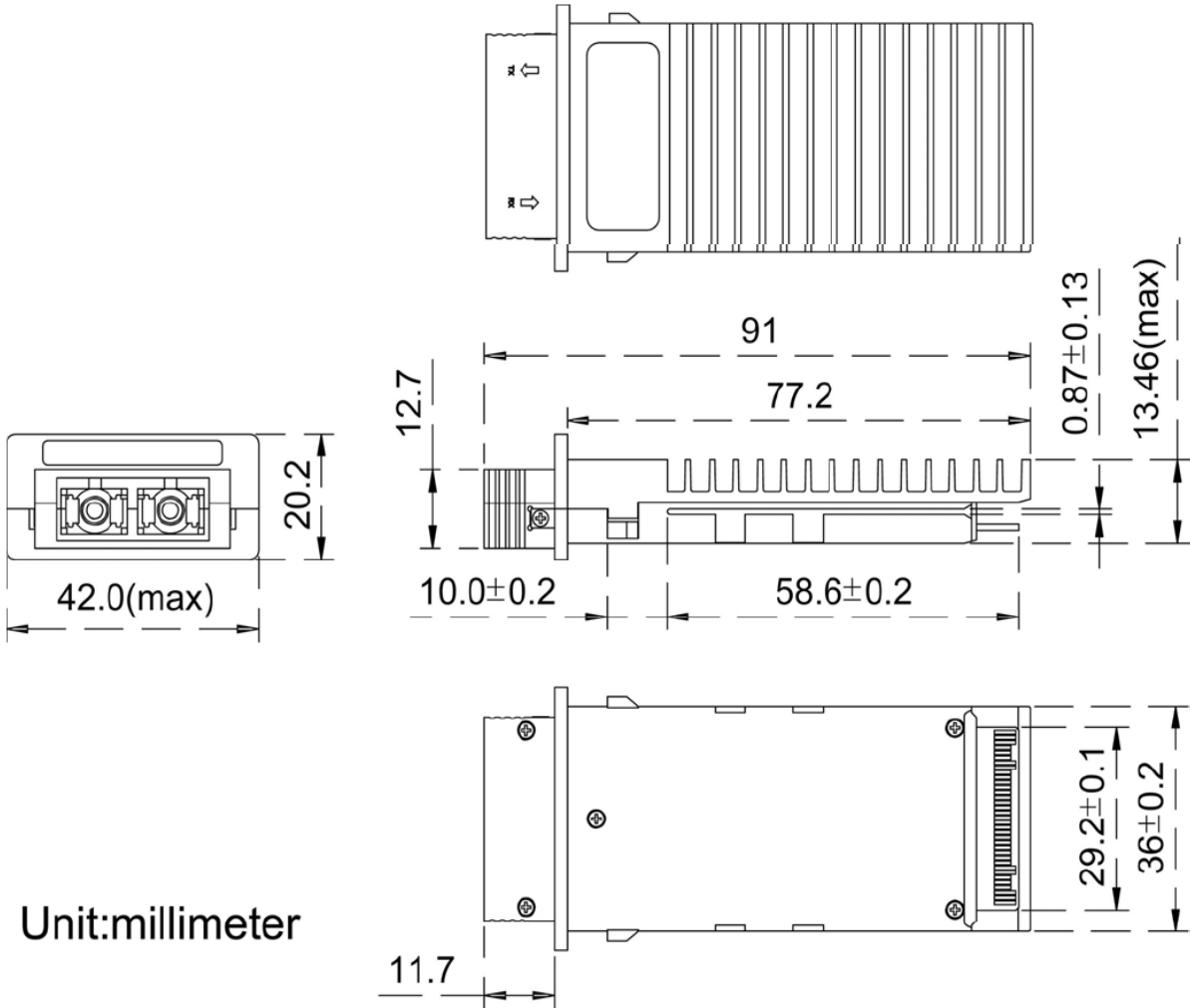
Bottom of Transceiver PCB
As viewed through top

Pin Description

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

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

Dimensions



Unit: millimeter

ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED

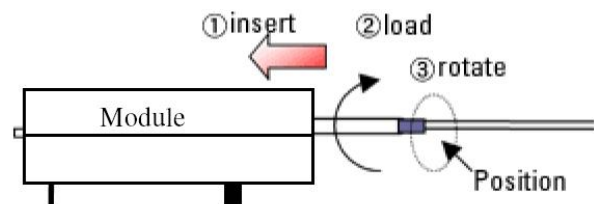
Optical Receptacle Cleaning Recommendations :

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Cleaning of patch-cord



Cleaning of fiber stub



1. Insert
Ensure that stick is held straight when inserting into sleeve.
2. Load
Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

*Notice: Number of possible wipes:
Maintenance (repair) ~1 use / piece
Equipment construction: 4 uses / piece (max.)*

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

Ordering Information

OP	6	C	-	S	10	-	13	-	C	M
	↑	↑		↑	↑		↑		↑	↑
Product Code:	Data Rate:	Type:	Reach:	Wavelength:	Operating Temperature:	Additional Feature:				
5=GBIC; 6=SFP-LC; 7=XFP; 8=XENPAK; 9=X2; A=SFP+; C=QSFP; F=CFP; P=SFP-SC; Q=SFP-MTRJ	A=155Mb/s; B=622Mb/s; C=1.25Gb/s; D=2.125Gb/s; E=2.5Gb/s; F=4.25Gb/s; G=3.1Gb/s; J=2.97G; P=6.144G; Q=7.37G; H=8.5Gb/s; K=10Gb/s; T=1/10Gb/s; L=11.09Gb/s; R=20Gb/s; S=40Gb/s; M=100Base-X SGMII; N=100/1000Base-X SGMII;	S=Single-mode; M=Multi-mode; W=BWDM; C=CWDM; D=DWDM; T=Copper-T (RJ-45) E=GEPON ONU; F=GEPON OLT; G=GPON ONU; H=GPON OLT	Normal: X1=Under 150m; X3=300m; X5=550m; O2=2km, 10=10km; 70=70km; A0=100km; C0=120km CWDM: 20=20dB; 24=24dB; 28=28dB	Normal: 85=850nm; 13=1310nm; 15=1550nm; 00=Copper T (RJ-45) CWDM: 27=1270nm; 47=1470nm; 61=1610nm BWDM: B3=Tx1310/Rx1550; B5=Tx1550/Rx1310; B4=Tx1310/Rx1490; B9=Tx1490/Rx1310; 51=Tx1510/Rx1570; 57=Tx1570/Rx1510; 27=Tx1270/Rx1330; 33=Tx1330/Rx1270; B2=Tx1270/Rx1577; B7=Tx1577/Rx1270 T2=2TX1310nm; T3=TX1310nm; T5=TX1550nm DWDM: 17=Channel 17 34= Channel 34 00=Channel 17~61 Tunable	C=Commercial Purpose (0~70℃); I= Industrial Purpose (Extended Range)	M=Digital Optical Monitoring (DOM) (RX_LOS for Copper TX); F=with Fiber Stub; I=with Isolator; S=Customized Style				

Model Number	Part Number	Reach	Input/Output	Signal Detect	Voltage	Temperature
X2-SR	OP9K-MX3-85-C	300 m	AC/AC	TTL	3.3V	0°C to 70 °C

Note: All information contained in this document is subject to change without notice.