Features

- Compliant with X2 MSA
- Up to 10GBd bi-directional data links
- Compliant with IEEE802.3ae 10GBASE-LR Application
- XAUI Electrical Interface: 4 Lanes@3.125Gbit/s
- Hot Z-Pluggable
- SC Duplex Optical Receptacle
- MDIO, DOM(Digital Optics Monitoring) Support
- 1310nm DFB laser
- PIN Photo-detector
- RoHS Compliant

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_S	–40	85	°C	
Supply Voltage	V_5	0	6	V	+5V
Supply Voltage	V_3	0	4	V	+3.3V
Supply Voltage	*VAps*	0	1.5	V	APS
Optical Receiver Input	P_{IMAX}		1.5	dBm	Average

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_C	0	70	°C	
Supply Voltage	*Vcc5*	4.75	5.25	V	+5V
Supply Voltage	*Vcc3*	3.14	3.47	V	+3.3V
Supply Voltage	V_{ccAPS}	1.152	1.248	V	APS
Supply Current	I_{CC5}		100	mA	
Supply Current	I_{CC3}		300	mA	
Supply Current	I_{CCAPS}		1000	mA	
Power Consumption	*P*		3	W	

Transmitter Electro-optical Characteristics

Vcc5 **= 4.75 V to 5.25 V,** ***Vcc3*** **= 3.14 V to 3.47 V,** V_{CCAPS}**=1.152V to 1.248V ;** T_C **= 0 °C to 70 °C**

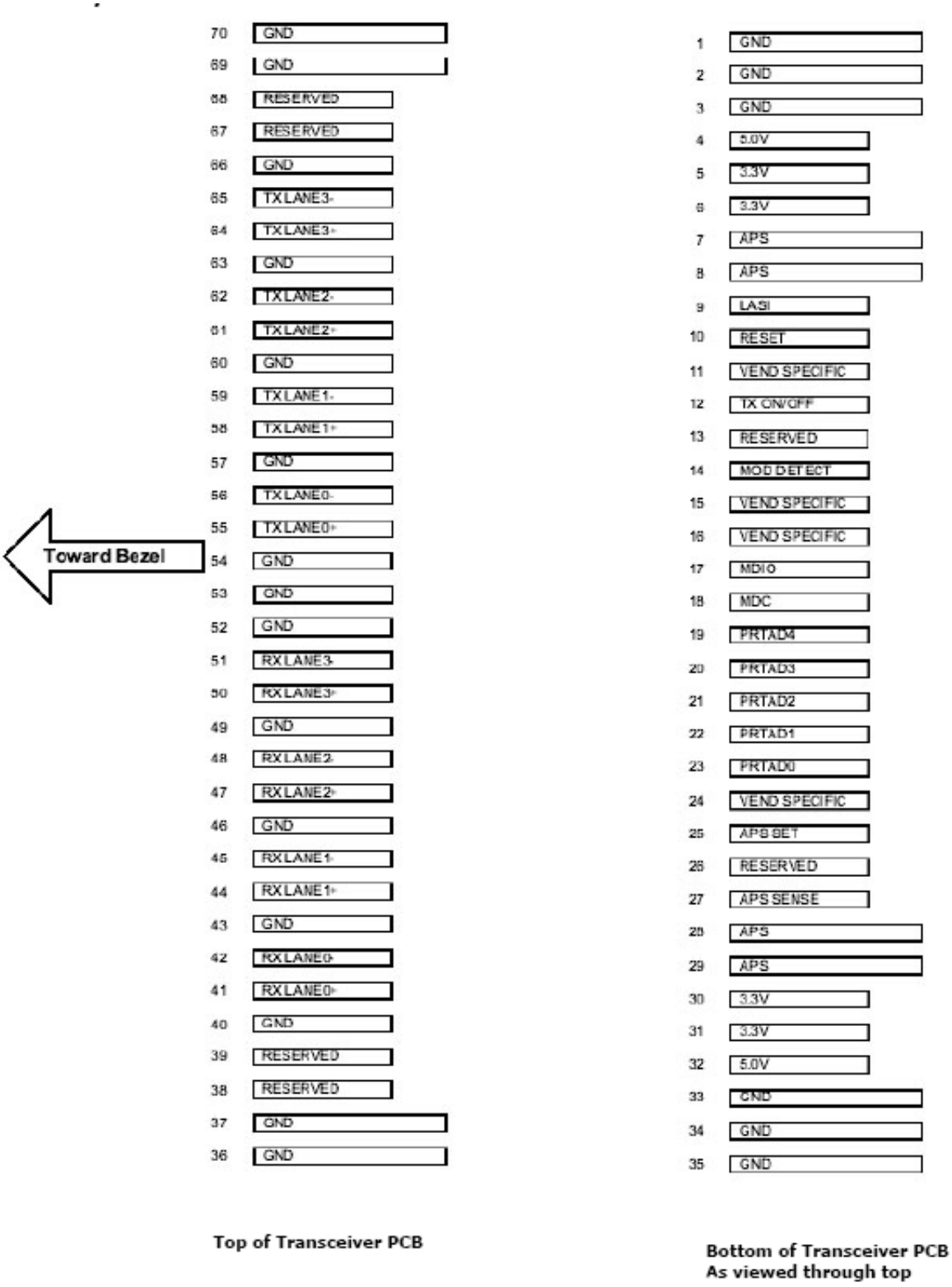
Parameter	*Symbol*	*Min.*	*Typ.*	*Max.*	*Units*	*Note*
Operating Date Rate			10.3125		Gbps	
Bit Error Rate	*BER*			10^{-12}		
Output Optical Power	*Pout*	-8.2		0.5	dBm	Average
Launch power in OMA minus TDP	P_{OUT_OMA}	-5.2			dBm	
Launch power of OFF Transmit Power	P_{OUT_OFF}			-30	dBm	Average
Center Wavelength	λ_C	1290		1330	nm	
Side Mode Suppression Ratio	*SMSR*	30			dB	
Extinction Ratio	*ER*	3.5			dB	
Spectral Width (-20dB)	$\Delta\lambda$			0.6	nm	
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	
Transmitter eye mask			Compliant with IEEE802.3ae			

Receiver Electro-optical Characteristics

Vcc5 **= 4.75 V to 5.25 V,** ***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	1260	---	1600	nm	
Optical Input Power	P_{IN}	-14.4	---	0.5	dBm	Average, Informative
Receiver Sensitivity in OMA	P_{IN_OMA}	---	---	-12.6	dBm	INformative
Stressed Receiver Sensitivity	P_{IN_S}	---	---	-10.3	dBm mW	
Receiver Reflectance	TR_{RX}			-12	dB	
Loss of Signal Assert Level	P_{LOS_A}	-25			dBm	
Loss of Signal DeAssert 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	

Pin Assignment



Top of Transceiver PCB

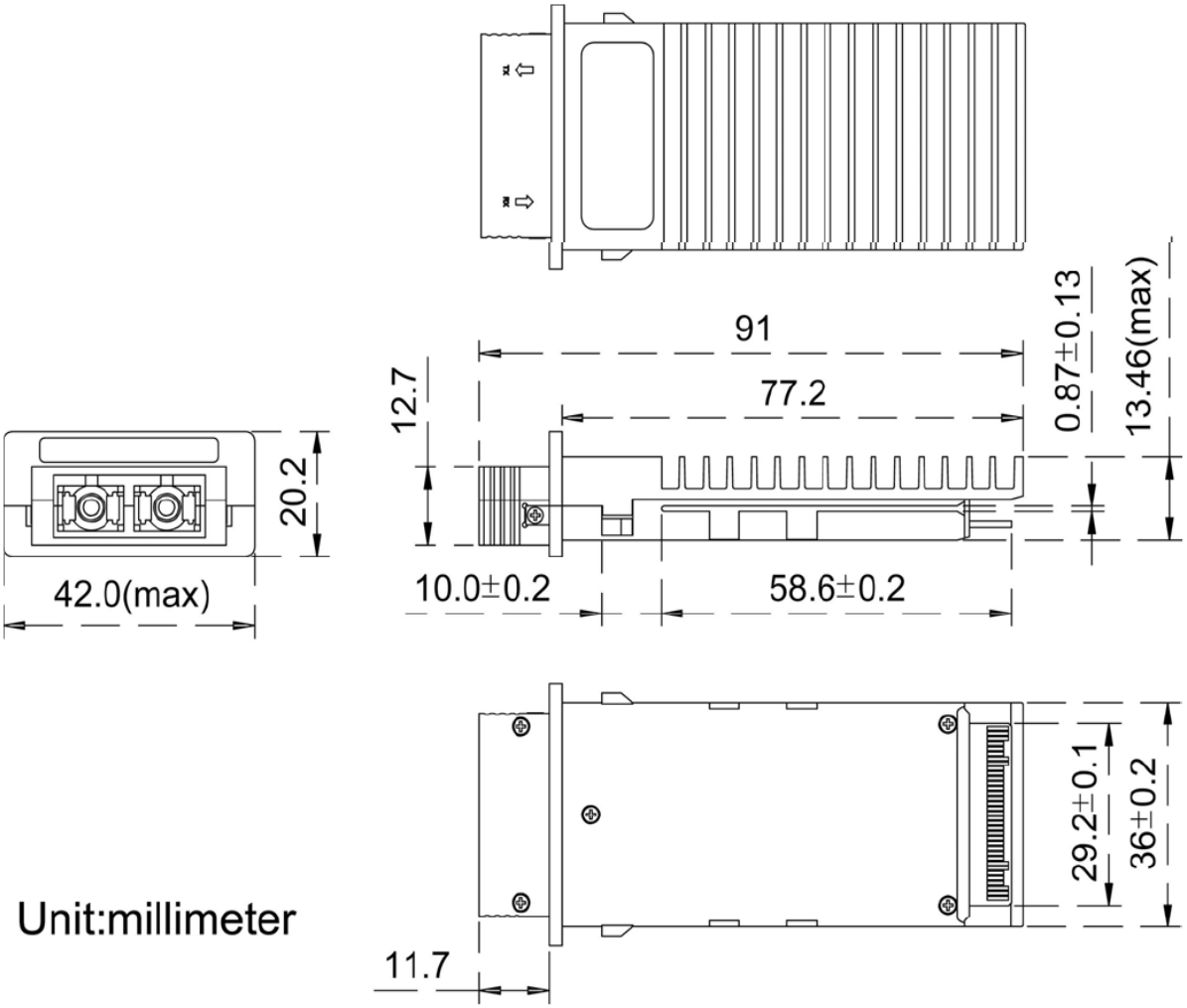
Bottom of Transceiver PCB
As viewed through top

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

PIN	Logic	Symbol	I/O	Description
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



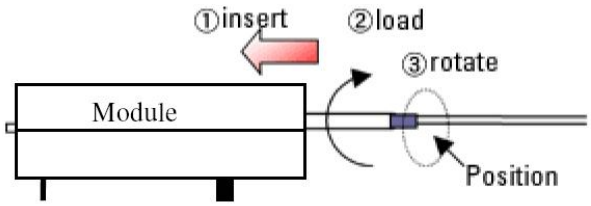
ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED

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:
5=GBIC;
6=SFP-LC;
7=XFP;
8=XENPAK;
9=X2;
A=SFP+;
C=QSFP;
F=CFP;
P=SFP-SC;
Q=SFP-MTRJ

Data Rate:
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;

Type:
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

Reach:
Normal:
X1=Under 150m;
X3=300m;
X5=550m;
02=2km,
10=10km;
70=70km;
A0=100km;
C0=120km

CWDM:
20=20dB;
24=24dB;
28=28dB

Wavelength:
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

Operating Temperature:
C=Commercial Purpose
(0~70℃);
I= Industrial Purpose
(Extended Range)

Additional Feature:
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-LR	OP9K-S10-13-C	10km	AC/AC	TTL	3.3V/5V	0°C to 70 °C

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