T-10G-X2-SM-10KM

10Gbps X2 Single Mode Transceiver 10km

Features

Compatible with X2 MSA Rev2.0b
Support of IEEE 802.3ae 10GBASE-LR at 10.3125Gbps
Transmission Distance up to 10km(SMF)
SC Receptacle 1310nm DFB Laser
SC Duplex Optical Connector
Hot Pluggable 70-PIN Connector with XAUI Electrical Interface
Management and control via MDIO 2-wire interface
Power Supply:+3.3V, APS(+1.2V)
Power Dissipation 4W Maximum
Digital Diagnostic Monitoring
Temperature Range: 0~70 ℃
RoHS6 compliant

Applications

10Gb/s Ethernet Switched and Routers
10GE Core-routers
10GE Storage
Other 10Gbps Ethernet Transmission System

Ordering Information

Part No.	Data Rate	Fiber	Distance	Interface	Temperature	DDMI
T-10G-X2-SM-10KM	9.95~10.3 Gbps	SMF	1310nm 10KM	SC	Standard	YES

Regulatory Compliance

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 and Laser Notice No.50	1120292-000
Product Safety	UL	UL and CUL EN60950-2:2007	WT10093766-D-E-E
Environmental Protection	SGS	RoHS Directive 2002/95/EC	GZ1001008918/CHEM
EMC	WALTEK	EN55022:2006+A1:20077 EN55024:1998+A1+A2:2003	WT10093759-D-E-E

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Ref.
Storage Ambient Temperature Range		-40	+85	°C	Non condensing
Power Case Temperature Range		0	+70	°C	Non condensing
Adaptable Power Supply (APS)	Vapsense	0	1.5	V	Voltage@Pin APS Sense
Supply Voltage Range@3.3V	Vcc3	-0.5	4.0	V	

Any stress beyond the maximum ratings can result in permanent damage. The device specifications are guaranteed only under the recommended operating conditions.

Recommended Operating Conditions

Parameter		Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature		Tc	0		+70	°C
Power Supply Voltage		Vcc3	3.14	3.3	3.47	V
		V_{APS}	1.152	1.2	1.248	
Module Power Dissipation		PD		3.5	4	W

Transmitter Specifications-Optical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Range				10	km	
Operating Date Rate			10.3125		Gb/s	
Average Optics Power	Po	-8.2		0.5	dBm	
Input Centre Wavelength	λ	1260	1310	1355	nm	
SMSR.	SMSR	30			dB	
Extinction Ratio	ER	3.5				
Optical Modulation Amplitude	OMA	500			μW	
Transmitter and Dispersion Penalty	TDP			3.2	dB	

Receiver Specifications-Optical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Date Rate			10.3125		Gb/s	
Average Receive Power	Po	0.5			dBm	
Sensitivity in OMA	OMA0			-12.6	dBm	
Stressed Sensitivity in OMA	OMAst			-10.3	dBm	
Sensitivity MINI	Pmin			-14.4	dBm	1

Note:

1. Measured at 10.3125Gb/s,Non-framed PRBS2^31-1,NRZ

XAUI I/O Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
XAUI Data Rate	DR		3.125		Gb/s	
XAUI Baud Rate Tolerance		-100		+100	ppm	Relative Tolerance
Differential Input Voltage Swing		220		1600	mv	8B/10B Coded Input Signal
Differntial Output Voltage Swing		800		1600	mVp-p	RLOAD=100Ω +/-5%
Differential InputImpedance		80	100	120	Ω	
Total Output Jitter	TJXAUI			0.35	UI	No pre-equaliization
Total Deterministic Output Jitter	DJXAUI			0.17	UI	No pre-equaliization

Signal Specification-Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit
1.2V CMOS					
Input High Voltage	VIL(MAX)			0.36	V
Input Low Voltage	VIH(MIN)	0.84		1.25	V
Capacitance				320	pF
Pull Up Resistance	Rpull	10k		22k	ohm
MDIO I/O					
Output Low Voltage	VOL	-0.3		0.2	V
Output Low Current	IOL			4	mA
Input High Voltage	VIH	0.84		1.5	V
Input Low Voltage	VIL	-0.3		0.36	V
Pull-up Supply Voltage	VPULL	1.14	1.2	1.26	
Input Capacitance	CIN			10	Pf
Load Capacitance	CLOD			470	Pf
External Pull-up Resistance	EPULL	200			Ohm

Pin Definition

Pin No	Name	Dir	Function	Notes
1	GND		Electrical Ground	1
2	GND		Electrical Ground	1
3	GND		Electrical Ground	1
4	5.0V		Power	2
5	3.3V		Power	2
6	3.3V		Power	2
7	APS=1.2V		Adaptive Power Supply	2
8	APS=1.2V		Adaptive Power Supply	2
9	LASI		Open Drain Compatible 10K-22K pull up on host. Logic High: Normal Operation Logic Low: LASI Asserted	4
10	RESET	I	Open Drain compatible. 10-22K pull-up on transceiver Logic high = Normal operation Logic low = Reset Minimum reset assert time 1 ms	4
11	VEND SPECIFIC		Vendor Specific Pin.	8

			Leave unconnected when not in use.	
12	TX ON/OFF	I	Open Drain compatible. 10-22K pull-up on transceiver Logic high = Transmitter On (capable) Logic low = Transmitter Off (always)	4
13	RESERVED		Reserved	4
14	MOD DETECT	O	Pulled low inside module through 1k	
15	VEND SPECIFIC		Vendor Specific Pin. Leave unconnected when not in use.	8
16	VEND SPECIFIC		Vendor Specific Pin. Leave unconnected when not in use.	8
17	MDIO	I/O	Management Data IO	4.5
18	MDC	I	Management Data Clock	4.5
19	PRTAD4	I	Port Address Bit 4 (Low = 0)	4
20	PRTAD3	I	Port Address Bit 3 (Low = 0)	4
21	PRTAD2	I	Port Address Bit 2 (Low = 0)	4
22	PRTAD1	I	Port Address Bit 1 (Low = 0)	4
23	PRTAD0	I	Port Address Bit 0 (Low = 0)	4
24	VEND SPECIFIC		Vendor Specific Pin. Leave unconnected when not in use.	8
25	APS SET		Feedback input for APS	
26	RESERVED		Reserved for Avalanche Photodiode use.	8
27	APS SENSE		APS Sense Connection	
28	APS=1.2V		Adaptive Power Supply	2
29	APS=1.2V		Adaptive Power Supply	2
30	3.3V		Power	2
31	3.3V		Power	2
32	5.0V		Power	2
33	GND		Electrical Ground	1
34	GND		Electrical Ground	1
35	GND		Electrical Ground	1
36	GND		Electrical Ground	1
37	GND		Electrical Ground	1
38	RESERVED		Reserved	
39	RESERVED		Reserved	
40	GND		Electrical Ground	1
41	RX LANE0+	O	Module XAUI Output Lane 0+	7
42	RX LANE0-	O	Module XAUI Output Lane 0-	7
43	GND		Electrical Ground	1
44	RX LANE1+	O	Module XAUI Output Lane 1+	7

45	RX LANE1-	O	Module XAUI Output Lane 1-	7
46	GND		Electrical Ground	1
47	RX LANE2+	O	Module XAUI Output Lane 2+	7
48	RX LANE2-	O	Module XAUI Output Lane 2-	7
49	GND		Electrical Ground	1
50	RX LANE3+	O	Module XAUI Output Lane 3+	7
51	RX LANE3-	O	Module XAUI Output Lane 3-	7
52	GND		Electrical Ground	1
53	GND		Electrical Ground	1
54	GND		Electrical Ground	1
55	TX LANE 0+	I	Module XAUI Input Lane 0+	7
56	TX LANE 0-	I	Module XAUI Input Lane 0-	7
57	GND		Electrical Ground	1
58	TX LANE 1+	I	Module XAUI Input Lane 1+	7
59	TX LANE 1-	I	Module XAUI Input Lane 1-	7
60	GND		Electrical Ground	1
61	TX LANE2+	I	Module XAUI Input Lane 2+	7
62	TX LANE2-	I	Module XAUI Input Lane 2-	7
63	GND		Electrical Ground	1
64	TX LANE3+	I	Module XAUI Input Lane 3+	7
65	TX LANE3-	I	Module XAUI Input Lane 3-	7
66	GND		Electrical Ground	1
67	RESERVED		Reserved	
68	RESERVED		Reserved	
69	GND		Electrical Ground	1
70	GND		Electrical Ground	1

Notes:

1) Ground connections are common for TX and RX.

2) All connector contacts are rated at 0.5A nominal.

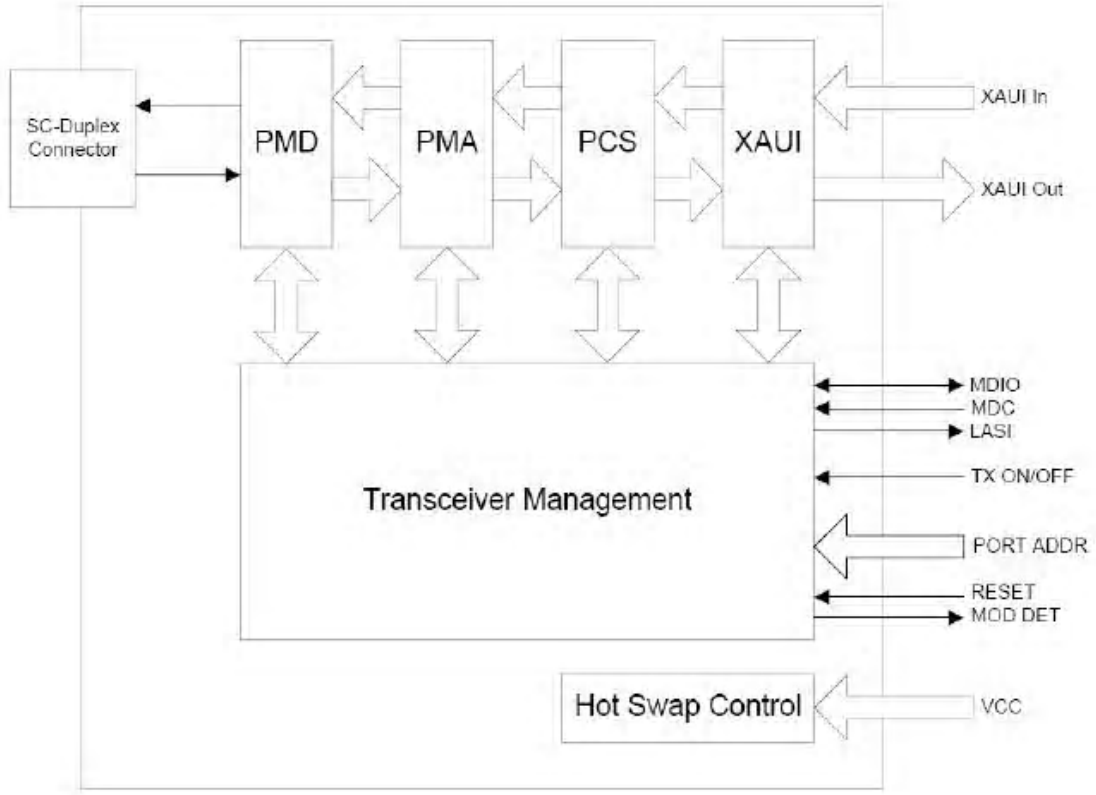
4) 1.2V CMOS compatible.

5) MDIO and MDC timing must comply with IEEE802.3ae, Clause 45.3

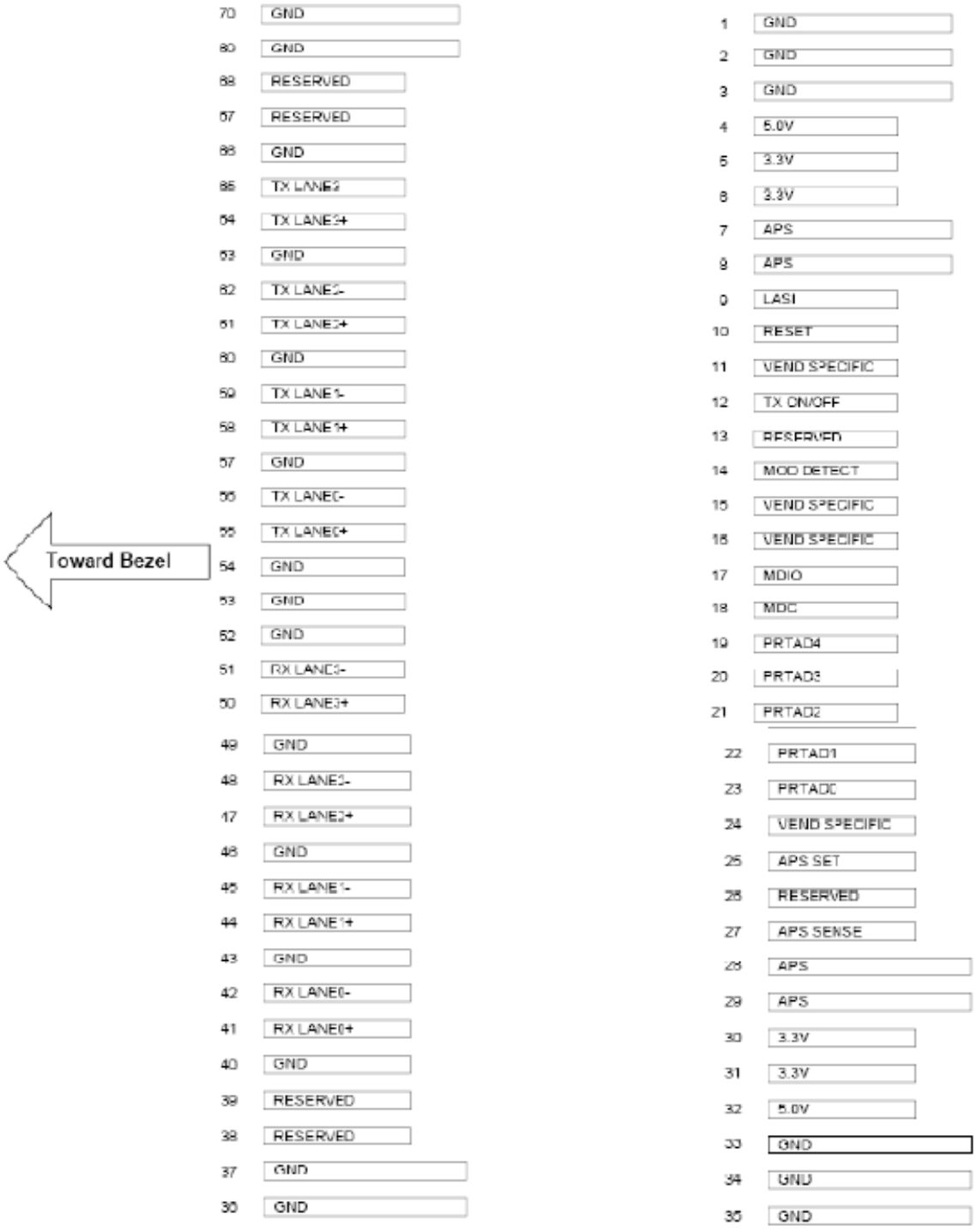
7) XAUI output characteristics should comply with IEEE802.3ae Clause 47.

8) Transceivers will be MSA compliant when no signals are present on the vendor specific pins.

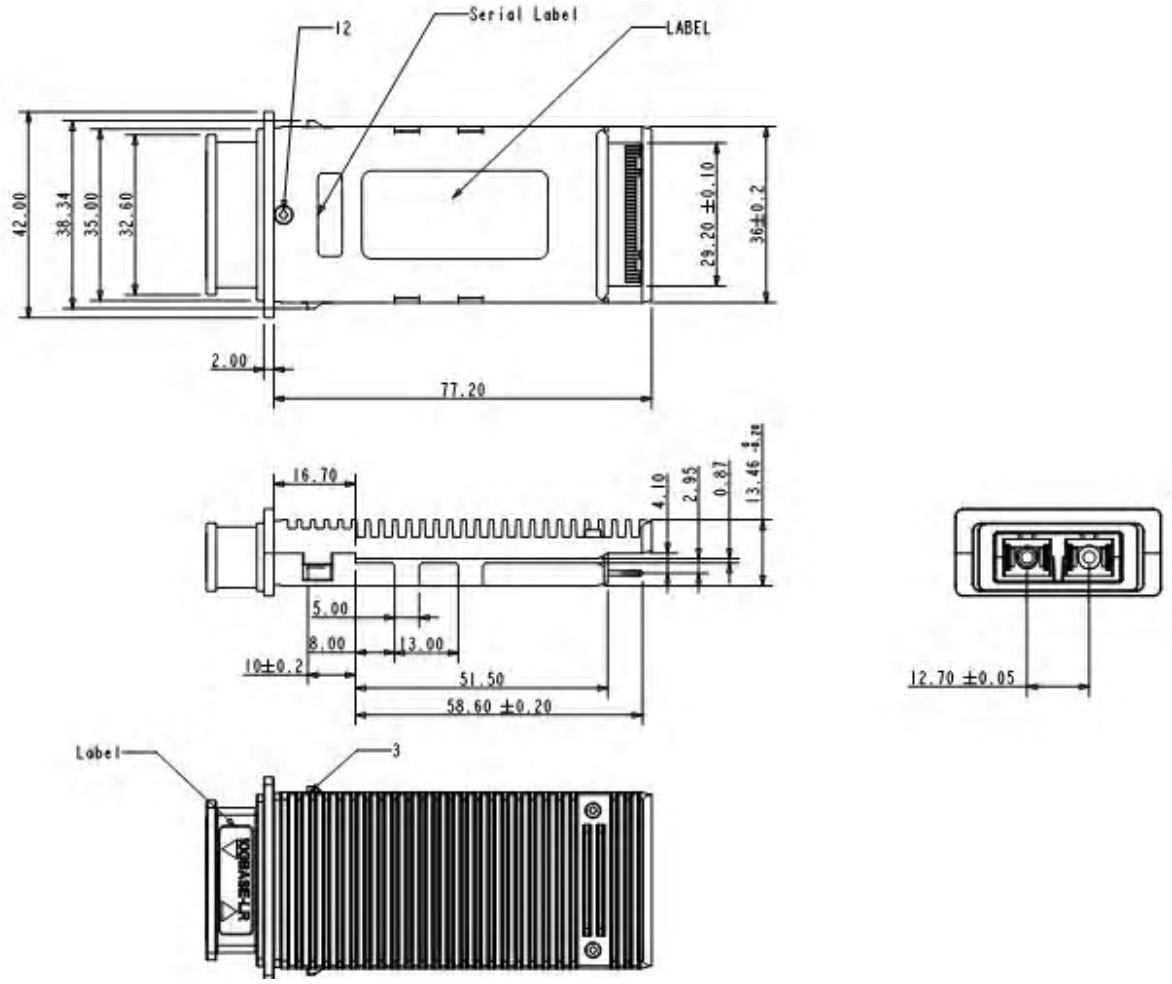
Functional Diagram of Typical X2 Style Transceiver



Electrical Pin-out Details



Mechanical Specification



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