

### T-X2-CWDM-80KM 10Gbps X2 CWDM Transceiver 80KM

#### **Features**

X2 MSA Compliant 70-PIN Connector

SC duplex receptacle package

Wavelength selectable to ITU-T standard covering

Cooled EA-DFB/APD-PD

1470nm~1570nm Link Length up to 80km(1600ps/nm)

1590nm~1610nm Link Length up to 70km( 1400ps/nm)

Power Supply: +5.0V,+3.3V, APS:+1.2V

Power Dissipation 4W Maximum

Digital Diagnostic Monitoring

Management and control with MDIO 2 wire bus

XAUI electrical interface 4X3.125Gb/s Ethernet

RoHS compliant

#### **Applications**

10Gb/s Ethernet transmission systems

10Gb/s Ethernet Switched and Routers

10GE Core-routers and Storage

#### **Regulatory Compliance**

Feature Agency		Standard	Certificate / Comment		
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 SGS RoHS Di		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
Supply Voltage +5V	Vcc5		6.0	V
Supply Voltage _3.3V	Vcc3		4	V
Supply Voltage APS	Vaps		2	V
Storage Temperature	Tst	-20	85	°C
Optical Input Received Power	PIN		-7	dBm
		-		





## **Recommended Operating Conditions**

Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Case Temperature	Tca	0		70	°C	
Supply Voltage +5V	Vcc5	4.75	5	5.25	V	
Supply Current +5V	lcc5			500	mA	
Supply Voltage +3.3V	Vcc3	3.14	3.3	3.47	V	
Supply Current +3.3V	Icc3			1000	mA	
Supply Voltage APS	Vaps	1.14	1.2	1.26	V	
Supply Current APS	laps			1100	mA	
Module Power Dissipation	Pm			4	W	

## **Transmitter Specifications-Optical**

Parameter	Symbol	Min.	Typical	Max.	Unit	
Center Wavelength	λε	1464.5		1617.5	nm	
Center Wavelength Stability	Δλο	-6.5	λε	6.5	nm	
Optical Transmit Power	Po	0		4	dBm	
Optical Transmit Power(disable)	Ptx-dis			-40	dBm	
Extinction Ratio	ER	9			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Eye Mask	IEEE 802.3ae Compliant					

### **Receiver Specifications-Optical**

Parameter	Symbol	Min.	Typical	Max.	Unit
Input Operating Wavelength	λε	1260		1600	nm
Received Power	Rpo	-24		-7	dBm
Maximum Input Power	Rx-overload	-7			dBm
Reflectance	Rrx			-27	dB

## **Transmitter Specification-Electrical**

Parameter	Symbol	Min.	Тур.	Max	Unit	
Data Rate( TXLINE0-3)	TX-xaui		3125		Mbps	
Differential Impendence	Zo	80	100	120	Ω	
Differential Input Amplitude	Vin P-P	160		2000	m∨pp	
Input Rise/Fall	TR/TF	60		130	ps	
Differential Impendence of Zin	Zin		100		ohm	



## **Receiver Specification-Electrical**

Parameter	Symbol	Min.	Тур.	Max	Unit	
Data Rate( TXLINE0-3 )	RX-xaui		3125		Mbps	
Supply Voltage	VccRX	3.13	3.3	3.47	V	
Differential Output Amplitude	Vout P-P	800		1600	mV	
Rise / Fall Time	Tr/Tf	50		90	ps	
Differential Impendence of Zout	Zout		100		ohm	

# **Signal Specification-Electrical**

Parameter	Symbol	Min.	Тур.	Max	Unit
1.2V CMOS				3	
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	ID Electrical Ground		1
3	GND		Electrical Ground	1
4	5.0V		Power	2
5	3.3V		Power	2
6	3.3V	3.3V Power		2
7	APS=1.2V		Adaptive Power Supply	2
8	APS=1.2V		APS=1.2V Adaptive Power Supply	
		1		



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9	LASI		Open Drain Compatible 10K-22K pull up on host. Logic High: Normal Operation Logic Low: LASI Asserted	4
10	RESET	1	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. Leave unconnected when not in use.		8
12	TX ON/OFF	1	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	0	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	1/0	Management Data IO	4.5
18	MDC	1	Management Data Clock	4.5
19	PRTAD4	1	Port Address Bit 4 (Low = 0)	4
20	PRTAD3	1	Port Address Bit 3 (Low = 0)	4
21	PRTAD2	1	Port Address Bit 2 (Low = 0)	4
22	PRTAD1	1	Port Address Bit 1 (Low = 0)	4
23	PRTAD0	1	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



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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+	0	Module XAUI Output Lane 0+	7
42	RX LANE0-	0	Module XAUI Output Lane 0-	7
43	GND		Electrical Ground	1
44	RX LANE1+	0	Module XAUI Output Lane 1+	7
45	RX LANE1-	0	Module XAUI Output Lane 1-	7.
46	GND		Electrical Ground	1
47	RX LANE2+	0	Module XAUI Output Lane 2+	7
48	RX LANE2-	0	Module XAUI Output Lane 2-	7
49	GND		Electrical Ground	1
50	RX LANE3+	0	Module XAUI Output Lane 3+	7
51	RX LANE3-	0	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+	1	Module XAUI Input Lane 0+	7
56	TX LANE 0-	1	Module XAUI Input Lane 0-	7
57	GND		Electrical Ground	1
58	TX LANE 1+	1	Module XAUI Input Lane 1+	7
59	TX LANE 1-	1	Module XAUI Input Lane 1-	7
60	GND		Electrical Ground	1
61	TX LANE2+	1	Module XAUI Input Lane 2+	7
62	TX LANE2-	1	Module XAUI Input Lane 2-	7
63	GND		Electrical Ground	1
64	TX LANE3+	1	Module XAUI Input Lane 3+	7
65	TX LANE3-	1	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

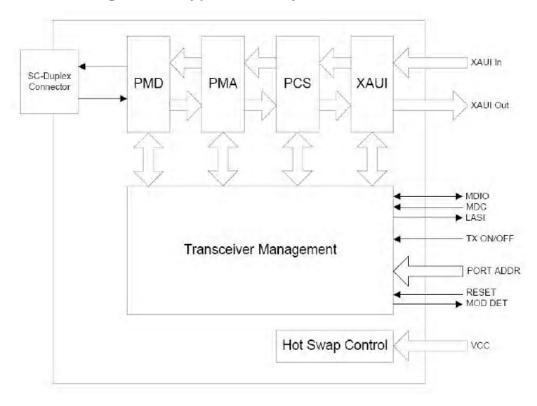
#### Notes:

- 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**



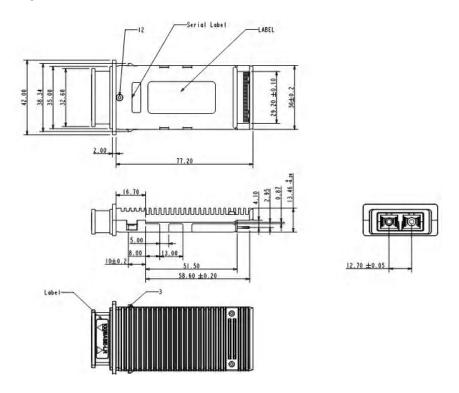


# **Electrical Pin-out Details**

70	OND			
			1	GND
69	GND	1	2	GND
68	RESERVED	:	3	GND
67	RESERVED		4	5.0V
66	GND		5	3.3V
65	TX LANE3-	(	6	3.3V
64	TX LANE3+	;	7	APS
63	GND		8	APS
62	TX LANE2-	1	9	LASI
61	TX LANE2+	1	0	RESET
60	GND	1	1	VEND SPECIFIC
59	TX LANE1-	12	2	TX ON/OFF
58	TX LANE1+	1;	3	RESERVED
57	GND	14	4	MOD DETECT
56	TX LANE0-	1:	5	VEND SPECIFIC
55	TX LANE0+	10	8	VEND SPECIFIC
54	GND	17	7	MDIO
53	GND	11	8	MDC
52	GND	11	9	PRTAD4
51	RX LANE3-	20	0	PRTAD3
50	RX LANE3+	2'	1	PRTAD2
49	GND	2	2	PRTAD1
48	RX LANE2-	23	3	PRTAD0
47	RX LANE2+	24	4 [	VEND SPECIFIC
46	GND	26	, 5 [	APS SET
45	RX LANE1-			RESERVED
44	RX LANE1+		,	APS SENSE
43	GND			
				APS
		28	9	APS
		30	0 [	3.3V
		31	1 [	3.3V
39	RESERVED	32	2 [	5.0V
38	RESERVED	33	3 [	GND
37	GND	34	4 [	GND
36	GND	35	5 [	GND
	67 66 66 64 63 62 61 60 59 58 57 56 55 51 60 49 48 47 46 45 44 43 42 41 40 39 38 37	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- 56 TX LANE0+ 57 GND 58 GND 59 TX LANE0- 59 TX LANE0- 50 TX LANE0- 50 TX LANE0- 51 RX LANE0- 52 GND 51 RX LANE3- 50 RX LANE3- 50 RX LANE3- 50 RX LANE3- 49 GND 48 RX LANE2- 47 RX LANE2+ 49 GND 40 GND 41 RX LANE1- 44 RX LANE1- 44 RX LANE1- 44 RX LANE0- 45 RX LANE0- 46 GND 47 RX LANE0- 48 RX LANE0- 49 GND 49 RESERVED 40 GND 41 RX LANE0-	69 GND 68 RESERVED 67 RESERVED 60 GND 65 TX LANE3- 64 TX LANE3+ 63 GND 62 TX LANE2- 61 TX LANE2- 60 GND 62 TX LANE1- 63 GND 64 TX LANE1- 65 TX LANE1- 66 GND 67 TX LANE1- 68 TX LANE1- 69 TX LANE1- 60 GND 60 TX LANE1- 61 TX LANE2- 61 TX LANE2- 62 TX LANE2- 63 GND 64 TX LANE2- 65 TX LANE2- 66 GND 67 TX LANE3- 68 GND 68 TX LANE3- 69 TX LANE3- 60	99 GND 2 88 RESERVED 3 97 RESERVED 4 98 GND 5 95 TX LANE3- 9 94 TX LANE3+ 7 93 GND 8 94 TX LANE2- 9 95 TX LANE2- 9 96 GND 11 97 TX LANE1- 12 98 TX LANE1- 12 98 TX LANE1- 13 97 GND 14 98 TX LANE0- 15 98 TX LANE0- 15 99 TX LANE0- 15 90 TX LANE0- 15 90 TX LANE0- 15 91 TX LANE0- 15 92 GND 19 93 GND 19 94 GND 22 95 TX LANE3- 20 96 TX LANE3- 20 97 TX LANE3- 20 98 TX LANE2- 23 98 TX LANE2- 24 99 TX LANE1- 25 98 TX LANE2- 25 99 TX LANE0- 26 99 TX LANE0- 27 90 TX LANE0- 29 90 TX LANE0- 29 91 TX LANE0- 20 91 TX LAN



### **Mechanical Specifications**



### **Ordering information**

Part Number	Product Description
T-X2-CWDM-80KM	9.95~10.3Gbps CWDM X2 80km -5℃~+70℃ (1470~1610nm)

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