

# 10 Gb/s, 40 - 80 km DWDM ITU Channels 17 - 61 X2 Dual SC Package



## Description

OptixCom's X2 DWDM fiber optics transceiver is designed with advanced EA-DFB laser and high speed electronics receiver. It's used in 100 GHz channel spacing DWDM systems for ITU channels from 17 to 61. The transceiver is compliant with the X2 Multi-Source Agreement (MSA).

X2 uses the same 70-pin electrical connector as XENPAK and supports implementations of XENPAK's four lane XAUI (10 Gigabit attachment unit interface) at both Ethernet (3.125 Gb/sec) and/or Fiber Channel (3.1875 Gb/sec) rates.

The transceiver uses duplex SC connector for the optical interface and is hot pluggable in the z-axis. The transceiver has >15 dB of power budget for 40 km and >24 dB for 80 km of transmission distance with single mode fibers. The product is RoHS compliant. Total power consumption is < 4W.



Lead-Free

**X2-10000DEX-AT40K-XX**  
**X2-10000DEX-AT80K-XX**



## Key Features

- Standard XAUI interface with 3Gb/s per channel
- Cover ITU channels 17-61, 10 Gb/s data rate.
- > 15 dB power budget for 40 km
- > 24 dB power budget for 80 km
- Duplex SC connector optical interface
- 70-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with X2 MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-ER/ZR
- Compliant with 10G FC Fiber Channel Standard
- RoHS compliant

## Applications

- ✓ 10G Fiber Channel & Ethernet
- ✓ OC192/STM-64 for SONET/SDH
- ✓ High speed I/O for file server
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

## Ordering Information

**Part Number:** X2-10000DEX-AT40K-XX

DWDM, 10 Gb/s, single mode, X2 fiber optics transceiver, 40 km, XX ITU channel code 17-61, 0-70°C.

**Part Number:** X2-10000DEX-AT80K-XX

DWDM, 10 Gb/s, single mode, X2 fiber optics transceiver, 80 km, XX ITU channel code 17-59, 0-70°C

XX specifies ITU channel code associated with the wavelength. For example, X2-10000DEX-AT40K-17 is the 1ITU-17 channel with the 1563.86 nm wavelength and 191.7 THz frequency.

## Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage (3.3V)	3.1	3.3	3.5	V
Supply Voltage (5V)	4.75	5	5.25	V
Adaptable Power Supply	1.15	1.2	1.25	V
Module Power Dissipation	---	---	4	W

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-20	85	°C
Supply Voltage @ 3.3V	$V_{cc3}$	-0.5	4.0	V
Supply Voltage @ 5V	$V_{cc5}$	-0.5	6.0	V
Supply Voltage (APS)	$V_{aps}$	0	1.5	V
Humidity	$R.H.$	0	85	%

### DWDM ITU Grid Wavelength Guide

ITU Code	Frequency (THz)	Wavelength (nm)	ITU Code	Frequency (THz)	Wavelength (nm)
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.56	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.52	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12			

### General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
XAUI Data Rate	$X_{DR}$	---	3.125	---	Gb/s
XAUI Baud Rate Tolerance	$X_{BRT}$	-100	---	+100	ppm
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.2	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	ohm
Channel Spacing	$\Delta f$	---	100	---	GHz
Side Mode Suppression Ratio	SMSR	30	---	---	dB

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage	$\Delta V_o$	0.8	---	1.6	V
Differential Input Impedance <sup>2</sup>	$Z$	---	100	---	Ohm
Differential Output Amplitude	$V_{out P-P}$	800	---	1600	mV
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	40	ps

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitor.
2. Single ended will be 50 ohm for each signal line.

### Electrical Signal Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
1.2 V CMOS					
Input High Voltage	$V_{IL(MAX)}$	---	---	0.36	V
Input Low Voltage	$V_{IH(MIN)}$	0.84	---	1.25	V
Capacitance		---	---	320	pF
Pull Up Resistance	$R_{pull}$	10k	---	22k	Ohm
MDIO I/O					
Output Low Voltage	$V_{OL}$	-0.3	---	0.2	V
Output Low Current	$I_{OL}$	---	---	4	mA
Input High Voltage	$V_{IH}$	0.84	---	1.5	V
Input Low Voltage	$V_{IL}$	-0.3	---	0.36	V
Pull-Up Supply Voltage	$V_{PULL}$	1.14	1.2	1.26	
Input Capacitance	$C_{IN}$	---	---	10	pF
Load Capacitance	$C_{LOAD}$	---	---	470	pF
External Pull-Up Resistance	$E_{pull}$	200	---	---	Ohm

### Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-1	---	+2	dBm
Extinction Ratio	$ET$	9	---	---	dB
Center Wavelength (Start of Life)	$\lambda_c$	$\lambda_c - 25$	$\lambda_c$	$\lambda_c + 25$	nm
Center Wavelength (End of Life)	$\lambda_c$	$\lambda_c - 100$	$\lambda_c$	$\lambda_c + 100$	nm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Receiver Sensitivity <sup>2</sup>	$P_i$	-15.8	---	-1.0	dBm
Receiver Sensitivity in OMA <sup>2</sup>	$P_{iOMA}$	---	---	-14.1	dBm
RX Stressed Sensitivity in OMA <sup>2</sup>	$P_{sOMA}$	---	---	-12	dBm
Reflectance	$R_{rx}$	---	---	-26	dB

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 10 Gb/s,  $2^{31} - 1$  PRBS data pattern, and  $> 1 \times 10^{-12}$  of Bit-Error-Rate (BER).

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11



### Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	0	---	+4	dBm
Extinction Ratio	$ET$	9	---	---	dB
Center Wavelength (Start of Life)	$\lambda_c$	$\lambda_c - 25$	$\lambda_c$	$\lambda_c + 25$	pm
Center Wavelength (End of Life)	$\lambda_c$	$\lambda_c - 100$	$\lambda_c$	$\lambda_c + 100$	pm

### Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Receiver Sensitivity <sup>2</sup>	$P_i$	-24	---	-7	dBm
Receiver Sensitivity in OMA <sup>2</sup>	$P_{iOMA}$	---	---	-22	dBm
RX Stressed Sensitivity in OMA <sup>2</sup>	$P_{sOMA}$	---	---	-19	dBm
Reflectance	$R_{rx}$	---	---	-26	dB

Notes:

1. Output of coupling optical power into 9/125  $\mu\text{m}$  SMF.
2. Test at 10 Gb/s,  $2^{31} - 1$  PRBS data pattern, and  $> 1 \times 10^{-12}$  of Bit-Error-Rate (BER).

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11

