

# 10 Gb/s, 40 - 80 km DWDM ITU Channels 17 - 61 SFP+ Dual LC Package



## Description

OptixCom's DWDM SFP+ fiber optics transceivers are designed with high performance EML laser and PIN or APD receiver. They are used in 100 GHz channel spacing DWDM systems. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. Our transceivers cover the ITU channels from 17 to 61. It is compliant with SFP Multi-Source Agreement (MSA).

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 15 dB power budget for 40 km, and > 23 dB for 80 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 2W.



Lead-Free

**SFP-10000DEX-AT40K-XX**  
**SFP-10000DEX-AT80K-XX**



## Key Features

- Cover ITU channels 17-61, 10 Gb/s data rate.
- > 15 dB power budget for 40 km
- > 23 dB power budget for 80 km
- Duplex LC connector optical interface
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- Z-axis hot pluggable
- AC coupling LVPECL differential I/O logics
- SFF-8431MSA Compliant
- Single 3.3 V power supply
- RoHS compliant

## Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

## Ordering Information

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

### Description:

DWDM, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 40 km, XX ITU channel code 17-61, -5 -70°C.

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

### Description:

DWDM, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 80 km, XX ITU channel code 17-61, -5 -70°C

XX specifies ITU channel code associated with the wavelength. For example, SFP-10000DEX-AT40K-17 is the 11TU-17 channel with the 1563.86 nm wavelength and 191.7 THz frequency.

## Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	-5	25	70	°C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.13	3.3	3.47	V
Supply Current (40km)	---	360	450	mA
Supply Current (80km)	---	420	620	mA

### 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			

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	$T_{st}$	-40	85	°C
Supply Voltage	$V_{cc}$	-0.5	3.8	V
Input Voltage	$V_{in}$	-0.5	$V_{cc}$	V
Relative Humidity	R.H.	0	85	%
Output Current	$I_o$	---	50	mA

### General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage <sup>1</sup>	$\Delta V_i$	0.2	---	0.8	V
Differential Input Impedance <sup>2</sup>	Z	---	100	---	ohm
Spectral Width (-20 dB)	$\Delta\lambda$	---	0.1	0.3	nm
Side Mode Suppression Ratio	SMSR	30	---	---	dB
Channel Spacing	$\Delta f$	---	100	---	GHz
Total Jitter	$T_j$	---	---	0.1	UI
Relative Intensity Noise	RIN	---	---	-130	dB/Hz
TX Fault Output – Low	$V_{FL}$	0	---	0.5	V
TX Fault Output – High	$V_{FH}$	2.4	---	$V_{CC}$	V
TX Disable Voltage – Low	$V_{DL}$	0	---	0.5	V
TX Disable Voltage – High	$V_{DH}$	2.4	---	$V_{CC}$	V
TX Disable Deassert Time	$T_{disass}$	---	---	1.0	ms
TX Disable Assert Time	$T_{ass}$	---	---	10	$\mu$ s
TX Fault from Fault to Assertion	$T_{fault}$	---	---	100	$\mu$ s
TX Disable Time to Start Reset	$T_{reset}$	10	---	---	$\mu$ s
Time to Initialize	$T_{as}$	---	---	300	ms

### General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage <sup>1</sup>	$\Delta V_o$	0.4	---	0.8	V
Differential Input Impedance <sup>2</sup>	Z	---	100	---	Ohm
Optical Return Loss	OL	27	---	---	dB
Rise/Fall Time (20% - 80%)	$T_r/T_f$	---	---	40	ps
Dispersion Penalty		---	---	2	dB
RX Signal Loss Output - High	$V_{RL+}$	2.4	---	$V_{CC}$	V
RX Signal Loss Output - Low	$V_{RL-}$	0	---	0.5	V
RX Signal Loss Assert Time	$T_{RL+}$	---	---	100	$\mu$ s
RX Signal Loss Deassert Time	$T_{RL-}$	---	---	100	$\mu$ s

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.
3. Refer to OptixCom "SFP Design Reference Guide" for more design details.

### Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power <sup>1</sup>	$P_o$	-1	---	+3	dBm
Extinction Ratio	$ET$	8.2	---	---	dB
TX Disable Asserted	$P_{OFF}$	---	---	-30	dBm
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
Operating Wavelength	$\lambda_c$	1528	---	1564	nm
Receiver Overload	$P_{max}$	--	---	-1	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-16	dBm
Receiver Sensitivity in OMA <sup>2</sup>	$P_I$	---	---	-14.1	dBm
RX Signal Loss – Asserted	$P_{RL+}$	---	---	-20	dBm
RX Signal Loss – Deasserted	$P_{RL-}$	-28	---	---	dBm

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>	$P_o$	-1	---	+3	dBm
Extinction Ratio	$ET$	8.2	---	---	dB
TX Disable Asserted	$P_{OFF}$	---	---	-30	dBm
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
Operating Wavelength	$\lambda_c$	1528	---	1564	nm
Receiver Overload	$P_{max}$	--	---	-7	dBm
Receiver Sensitivity <sup>2</sup>	$P_I$	---	---	-24	dBm
Receiver Sensitivity in OMA <sup>2</sup>	$P_I$	---	---	-23	dBm
RX Signal Loss – Asserted	$P_{RL+}$	---	---	-24	dBm
RX Signal Loss – Deasserted	$P_{RL-}$	-34	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125  $\mu$ m SMF.
2. Test at 10 Gb/s, 2<sup>31</sup> – 1 PRBS data pattern, and > 1x10<sup>-12</sup> of Bit-Error-Rate (BER).

Class 1 Laser Product  
Complies with  
21 CFR 1040.10 and 1040.11

