

#### Features

- ☑ Designed for SONET/SDH OC-48/STM-16 (2.5 Gb/s) 1550 nm ("C" & "L" Band) DWDM operation
- ☑ ITU-grid wavelength compliance
- ☑ Eye Safe (Class I Laser Safety)
- ☑ 100 GHz wavelength spacing
- ☑ Long Reach 1550 nm (80 km)
- ☑ Two wavelength selectable for each transmitter module
- ☑ Clocked or Non-clocked operation
- ☑ Low profile, compact 24-pin package
- ☑ -20°C to +70°C Operating Case Temperature
- ☑ Single +3.3 V supply or Dual supply (+3.3 V and +5.0 V)
- ☑ AC-coupled DATA & CLOCK interface

#### Description

The DWTX-48 Laser Transmitters are designed to meet or exceed the SONET/SDH standards for OC-48/STM-16 Long Reach 1550 nm (80 km) specifications. The transmitter incorporates a highly reliable (1550 nm) InGaAsP MQW DFB Laser with an operating wavelength in full compliance with 100 GHz (0.8nm) spacing per ITU-grid. One particular advantage of the DWTX-48 transmitters is that each transmitter module can be operated at one of two wavelength ("n" and "n-1"). This wavelength selection is controlled via a Wavelength Select input. All modules satisfy Class I Laser Safety requirements in accordance with the US FDA/CDRH and international IEC-825 standards.

The transmitters are AC coupled with 50 ohms internally terminated and it could operate in Clocked or Non-Clocked mode operation. Also, the transmitters are provided with additional functions such as Disable inputs, LD Degradation Alarm, and Wavelength Deviation Alarm signals.

The DWTX-48 transmitters are contained in a compact, low-profile 24-pin package (with 2 pins removed). They are available with two supply voltage options: single +3.3V or dual +3.3V & 5.0V, over an operating case temperature range of -20°C to +70°C.

#### Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Operating Case Temperature	$T_{op}$	- 20	+ 70	°C
Storage Temperature	$T_{st}$	- 40	+ 85	°C
Supply Voltage	$V_{CC}$	0	+ 7.0	V
	$V_{TEC}$	0	+ 3.5	
Lead Soldering Temperature & Time	-	-	260°C, 10 sec	

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## Transmitter Performance Characteristics (over Operating Case Temperature)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Rate	$B$	0.15	2.488	3.0	Gb/s
Average Optical Output Power ( 50% duty cycle)	$P_{o\_BOL}$	0	-	+ 2.0	dBm
	$P_{o\_EOL}$	- 2.0	-	+ 3.0	
Extinction Ratio	$P_{hi}/P_{lo}$	8.2	-	-	dB
Center Wavelength	$\lambda_c$	see Ordering Table			-
Center Wavelength Accuracy	$\Delta\lambda_c$	- 0.05	-	0.05	nm
Spectral Width (-20 dB)	$\Delta\lambda_{20}$	-	0.3	1.0	
Side Mode Suppression Ratio	$SMSR$	30	-	-	dB
Dispersion Penalty <sup>1</sup>	-	-	-	2.0	dB
Intrinsic Jitter	-	-	-	0.05	Ulp-p
Optical Output Eye	compliant with Bellcore TR-NWT-000253 and ITU-T Recommendation G.957				
<sup>1</sup> Measured with 1600ps/nm dispersion (approximate worst case dispersion for 80Km of G.652/G.654 fiber per ITU-G.957).					

## Transmitter Electrical Interface (over Operating Case Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units	
Input Voltage (DATA & CLOCK)	$V_{IN}$	0.13	0.45	0.65	Vp-p	
Input impedance	$Z_{IN}$	-	50	-	ohm	
MODE SELECTOR Input Voltage	Clocked	$V_{MSCK}$	0	-	0.8	V
	Non-Clocked	$V_{MSNCK}$	2.0	-	$V_{CC}$	V
Transmitter Disable Voltage	$V_{DIS}$	2.0	-	$V_{CC}$	V	
Transmitter Enable Voltage	$V_{EN}$	0	-	0.8	V	
$\lambda$ Selection	Ch(n) Selection	$V_{\lambda SELH}$	0	-	0.8	V
	Ch(n -1) Selection	$V_{\lambda SELL}$	2.0	-	$V_{CC}$	V
$\lambda$ Deviation Alarm Voltage	HIGH Voltage	$V_{\lambda ALMH}$	2.7	-	$V_{CC}$	V
	LOW Voltage	$V_{\lambda ALML}$	0	-	0.3	V
LD Degradation Alarm Voltage	HIGH Voltage	$V_{ALMH}$	2.7	-	$V_{CC}$	V
	LOW Voltage	$V_{ALML}$	0	-	0.3	V
Laser Bias Monitor Voltage	$V_{BM}$	-	20	-	mV/mA	
Laser Back Facet Monitor Voltage	$V_{FM}$	-	500	-	mV/mW	

## Electrical Power Supply Characteristics (over Operating Case Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units	
Supply Voltage	Single Supply	$V_{CC}, V_{TEC}$	3.15	3.3	3.45	V
	Double Supply	$V_{CC}$	4.75	5.0	5.25	
		$V_{TEC}$	3.15	3.3	3.45	
Supply Current (Transmitter)	$I_{CC}$	-	135	180	mA	
Supply Current (TEC)	$I_{TEC}$	-	0.4	1.2	A	
Input DATA & CLOCK timing	$T_{SETUP}$	100	-	-	ps	
	$T_{HOLD}$	100	-	-		

**Laser Safety:** All transmitters are Class I Laser products per FDA/CDRH and IEC-825 standards. They must be operated under specified operating conditions.

### Optical Communication Products, Inc.

DATE OF MANUFACTURE:

MANUFACTURED IN THE USA

This product complies with

21 CFR 1040.10 and 1040.11

**Meets Class I Laser Safety Requirements**

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## Application Notes

**DATA+ and DATA-** : Data input interface is AC coupling with internal 50 ohm termination.

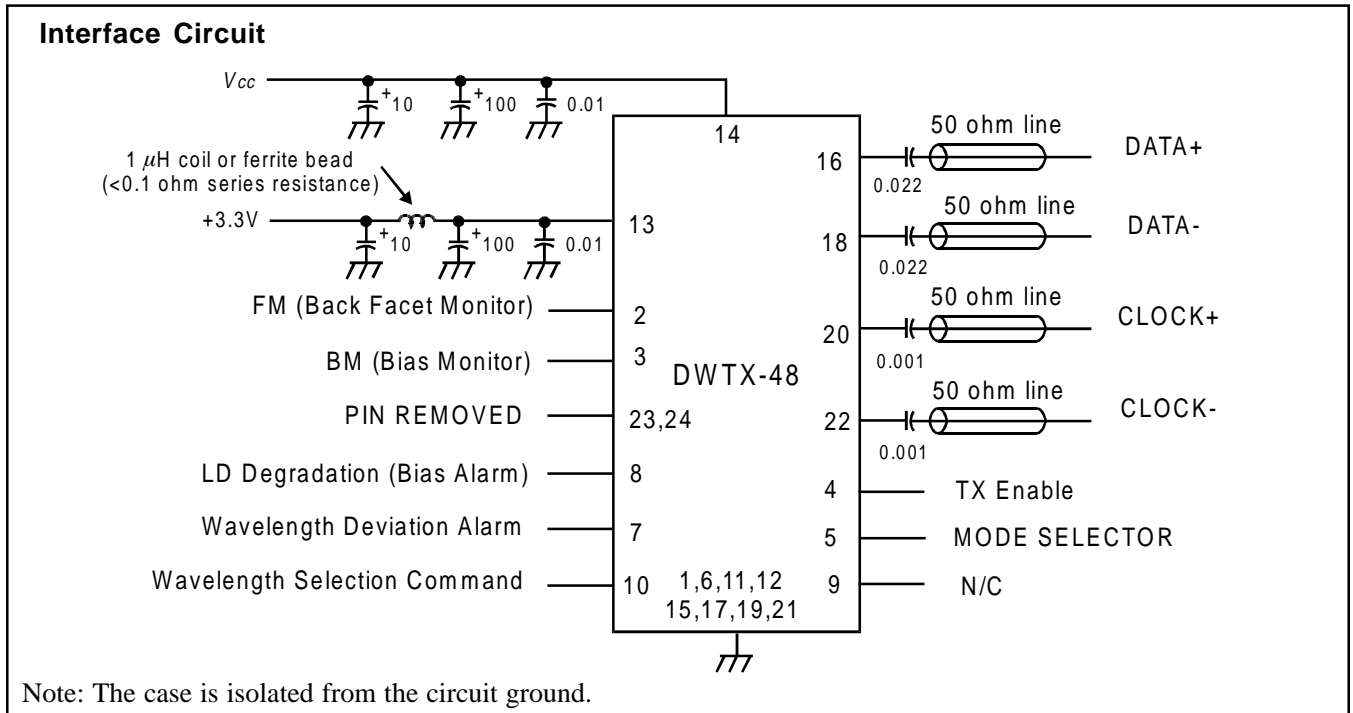
**TX Enable:** The transmitter is normally enabled (i.e. when the TX Enable control input is not connected). When the TX Enable control input voltage is higher than 2 V, the laser is turned off independent of the input data.

**MODE SELECTOR:** When the input is at logic “LOW” (0 to 0.8V), the transmitter is in clocked operation mode. In this mode, the input clock re-synchronizes the incoming data to reduce timing jitter. The timing between the DATA and CLOCK inputs is as shown. When the MODE SELECTOR input at logic “HIGH” ( $V_{cc} - 2V$  to  $V_{cc}$ ), the transmitter is in non-clocked operation mode. In this mode, the CLOCK inputs are not used and hence need not be provided.

**Wavelength Selection Command:** When the input command is at logic “LOW” (0 to 0.8V), or no connection, the transmitter operates on channel “n”. When the input command is at logic “HIGH” (2V to  $V_{cc}$ ), the transmitter operates on channel “n-1”.

**Wavelength Deviation Alarm:** The transmitter normally operates on channel “n” or “n-1”. If wavelength deviates for any reason, the output voltage will be logic “HIGH” (2.7 to  $V_{cc}$ ). Normally the output voltage is at logic “LOW” (0 to 0.3V), when the transmitter operating at correct wavelength. Load must exceed 10K Ohms.

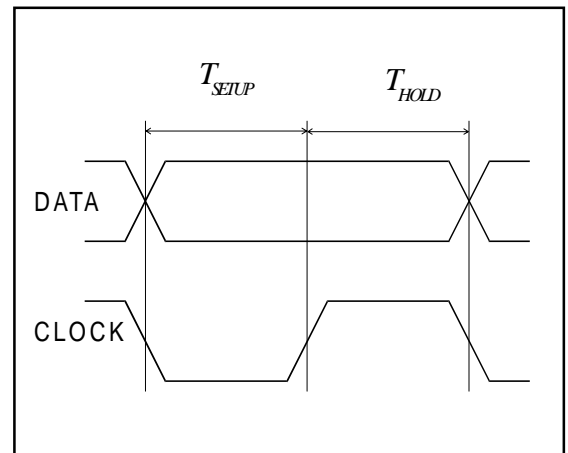
**LD Degradation Alarm:** When the output is at logic “HIGH” (2.7 to  $V_{cc}$ ), it indicates that LD is degrading. Otherwise, the output voltage will stay logic “LOW” (0 to 0.3V). Load must exceed 10K Ohms.



## Pin Assignments

PIN	FUNCTION	PIN	FUNCTION
1	GND	24	PIN REMOVED
2	FM (Back Facet Monitor)	23	PIN REMOVED
3	BM (Bias Monitor)	22	CLOCK -
4	TX Enable	21	GND
5	MODE SELECTOR	20	CLOCK +
6	GND	19	GND
7	Wavelength Deviation Alarm	18	DATA -
8	LD Degradation (Bias Alarm)	17	GND
9	N/C	16	DATA +
10	Wavelength Selection Command	15	GND
11	GND	14	VTEC
12	GND	13	VCC (Transmitter)

## Timing Diagram (Clocked Operation)



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## Wavelength Selection Code

Wavelength Code	ITU Frequency (THz)	Center Wavelength (nm)	Wavelength Code	ITU Frequency (THz)	Center Wavelength (nm)
17	191.7	1563.86	39	193.9	1546.12
18	191.8	1563.05	40	194.0	1545.32
19	191.9	1562.23	41	194.1	1544.53
20	192.0	1561.42	42	194.2	1543.73
21	192.1	1560.61	43	194.3	1542.94
22	192.2	1559.79	44	194.4	1542.14
23	192.3	1558.98	45	194.5	1541.35
24	192.4	1558.17	46	194.6	1540.56
25	192.5	1557.36	47	194.7	1539.77
26	192.6	1556.55	48	194.8	1538.98
27	192.7	1555.75	49	194.9	1538.19
28	192.8	1554.94	50	195.0	1537.40
29	192.9	1554.13	51	195.1	1536.61
30	193.0	1553.33	52	195.2	1535.82
31	193.1	1552.52	53	195.3	1535.04
32	193.2	1551.72	54	195.4	1534.25
33	193.3	1550.92	55	195.5	1533.47
34	193.4	1550.12	56	195.6	1532.68
35	193.5	1549.32	57	195.7	1531.90
36	193.6	1548.51	58	195.8	1531.12
37	193.7	1547.72	59	195.9	1530.33
38	193.8	1546.92	60	196.0	1529.55
			61	196.1	1528.77

### Ordering Information

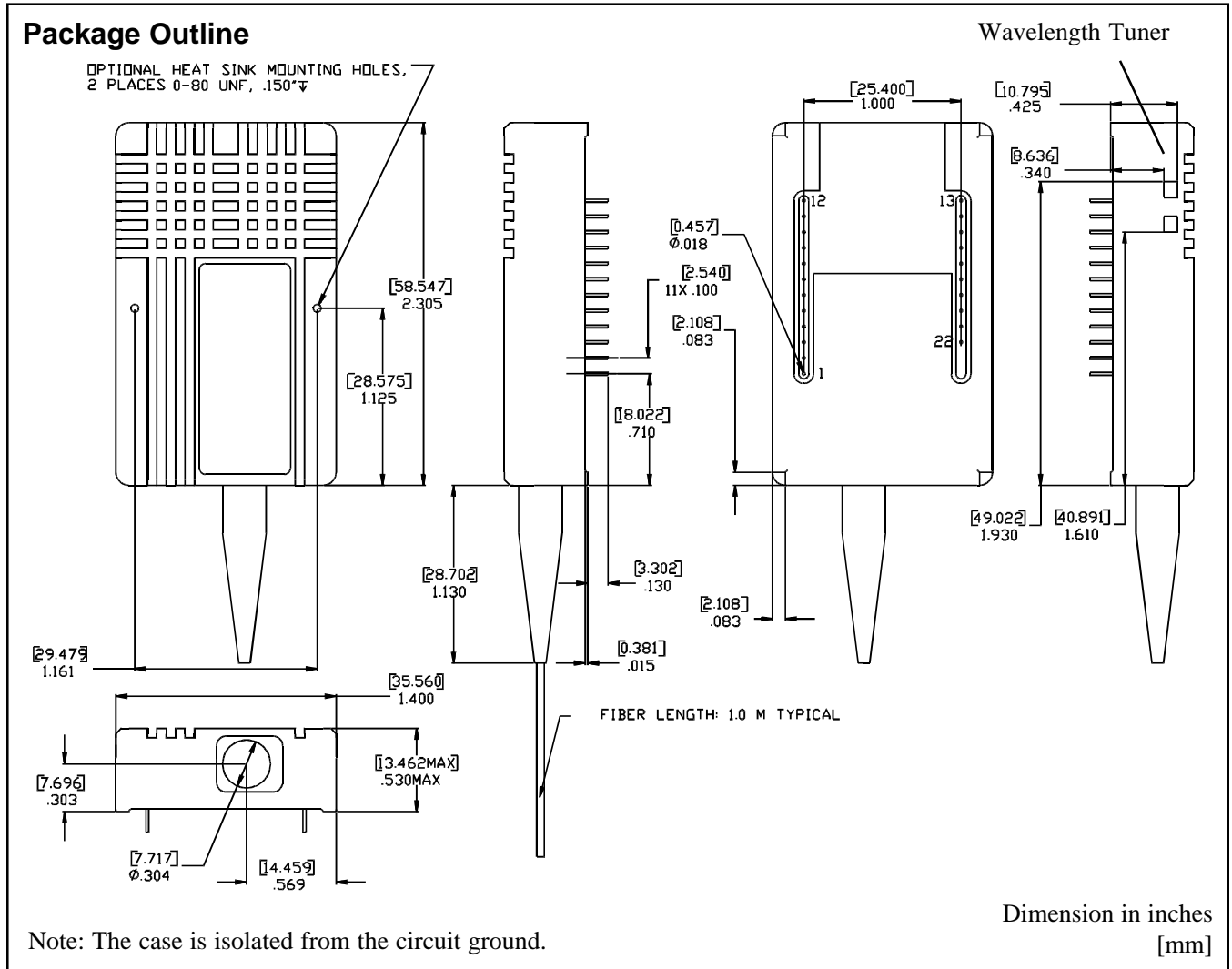
DWTX - 48 - X-YYY - LR2 - ZZ

*Power Supply Option*  
Blank: Dual Supply (+3.3V & +5.0V)  
3.3: Single Supply (+3.3V)

*Pigtail Connector*  
PFC: pigtailed with FC  
PSC: pigtailed with SC  
PST: pigtailed with ST

*Wavelength Selection Code*  
(Order by using wavelength code, see Table)

# DWTX-48



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