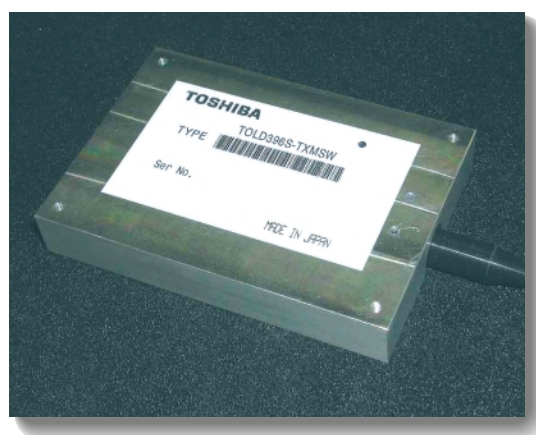


# Optical Communication Devices

## 2.5 Gb/s Optical Transmitter Module

### TOLD396S-TXMSW Series (PRERIMINARY)



#### APPLICATIONS

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- SONET / SDH (OC-48 / STM-16) applications
- WDM system application

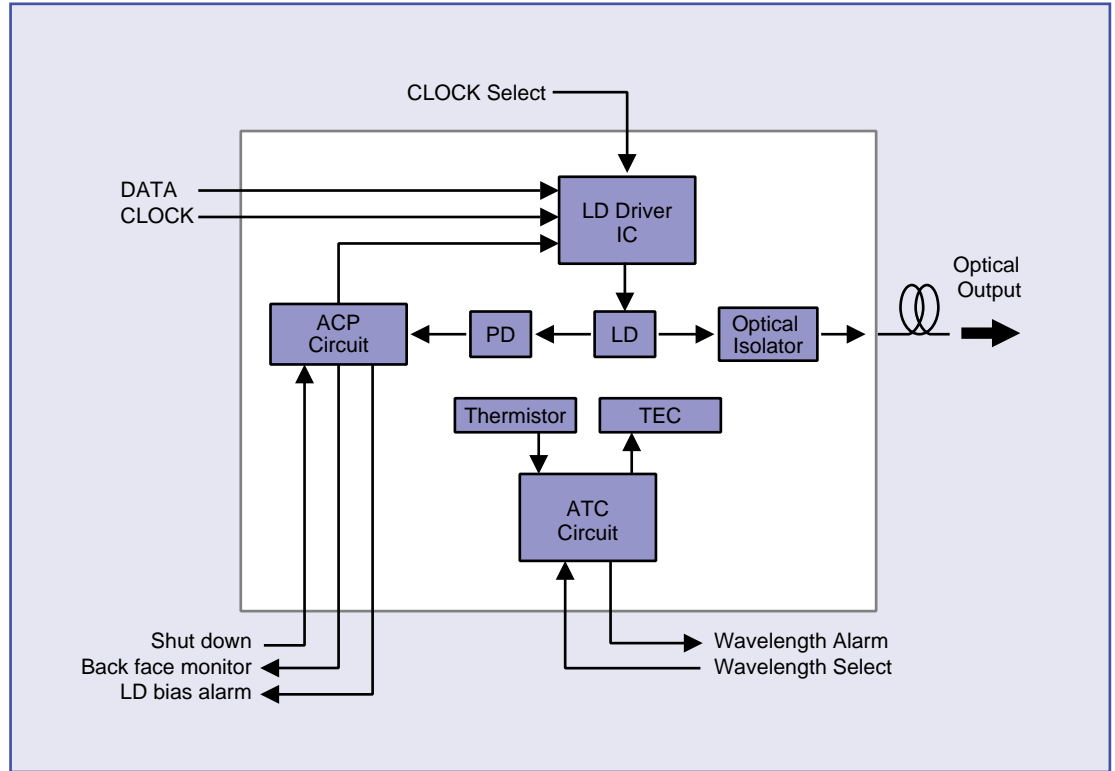
#### FEATURES

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- 1.55- $\mu\text{m}$  cooled DFB LD
- 100-GHz ITU-T grid compliant
- Clocked or non-clocked operation
- Wave length alarm
- Automatic power control
- Automatic temperature control

## TOLD396S-TXMSW Series

### BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Storage temperature	Tstg	-40 to +85	°C
Operating case temperature	Topr	-5 to +70	°C
Positive supply voltage	Vcc	0 to 6.0	V
TEC supply voltage	Vtec	0 to 4.0	V
Input data signal voltage	Vi	2.0	V
Soldering temperature	Tsol	260	°C
Soldering time	tsol	10	s

# ELECTRICAL AND OPTICAL CHARACTERISTICS

## ELECTRICAL INTERFACE and POWER SUPPLY

Item	Min	Typ.	Max	Unit	Note
Positive power supply voltage	4.75	5.0	5.25	V	
TEC supply voltage	3.14	3.30	3.47	V	
Supply current (positive)	-	-	350	mA	
(TEC)	-	-	1000	mA	
Total power dissipation	-	-	5.5	W	
Input data/clock voltage					
Differential voltage (P-N)	300	800	1000	mVpp	(1)
Per complementary rail	150	400	500	mVpp	
Input clock & data					
Rise time	-	-	150	ps	
Fall time	-	-	150	ps	
Input impedance	-	50	-	ohm	
Clock duty cycle	40	50	60	%	
Setup and hold time	-	65	75	ps	(6)
Laser degrade alarm					
Activated	0.0	-	0.4	V	(2)
Deactivated	2.4	-	Vcc	V	
Laser degrade alarm					
Activation delay	-	-	200	ms	
Deactivation delay	-	-	400	ms	
Clocked/nonclocked select voltage					
Clocked operation	GND	-	0.8	V	
Nonclocked operation	Vcc-2.0	-	Vcc	V	
Transmitter disable voltage	Vcc-2.0	-	Vcc	V	(3)
Transmitter enable voltage	GND	-	0.8	V	
Response time					
To disable optical output	-	-	500	ms	
To enable optical output	-	-	500	ms	
Wavelength deviation alarm					
Activated	2.4	-	Vcc	V	
Deactivated	0.0	-	0.4	V	
Data format	NRZ, scrambled				
Consecutive identical bits	72			bits	
Clock and data differential skew	40	-	-	ps	(4)
Back-facet monitor voltage (duty 50%)	-	500	-	mV	(5)

Notes: (1) Internally AC coupled with 50 Ω termination.

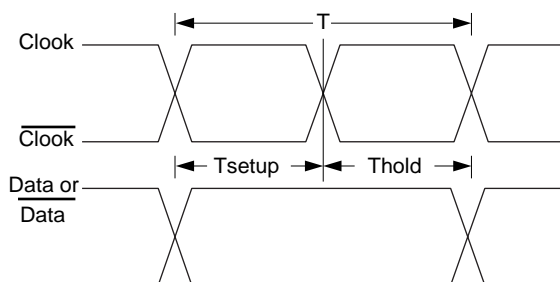
(2) Stated for Vcc = 5.0 V, Vee = 0 V. Laser degrade alarm is activated when the laser bias control circuit can no longer maintain output power through the monitor of laser bias current.

(3) The shutdown function is not activate the laser degrade alarm.

(4) This parameter is intended to specify a maximum input skew.

(5) This monitor voltage is converted laser back-face monitor current.

(6) Clock-data timing



T=402ps

T<sub>setup</sub> & T<sub>hold</sub> ≤ 75ps

## ELECTRICAL AND OPTICAL CHARACTERISTICS

### OPTICAL CHARACTERISTICS (Case temperature: Tc= -5 to +70 °C)

Item	Min	Typ.	Max	Unit	Note
Wavelength	–	100 GHz spacing ITU-T grid compliant			table 1.
Wavelength tolerance			+/-65	pm	
Spectral width	–	0.3	0.5	nm	(1)
Side mode suppression ratio	30	–	–	dB	
Wavelength temperature coefficient	–	–	0.002	nm/°C	
Average output power	-1.0	+1.0	+3.0	dBm	
Extinction ratio	9.0	10	–	dB	
Output power in disable	–	-50	-40	dBm	
Optical mask	–	–	–	–	(2)
Maximum path penalty	–	–	2.0	dB	(3)
Jitter generation(RMS)	–	–	0.01	UIrms	
Jitter generation(peak to peak)	–	–	0.1	UIpp	
Optical return loss	20	–	–	dB	

Notes: (1) Measured at 20 dB down from the maximum point with RMS method.

(2) G.957/GR-253-CORE.

(3) For STM-16/OC-48 and long haul / long reach applications.

**Table 1.Wavelength**

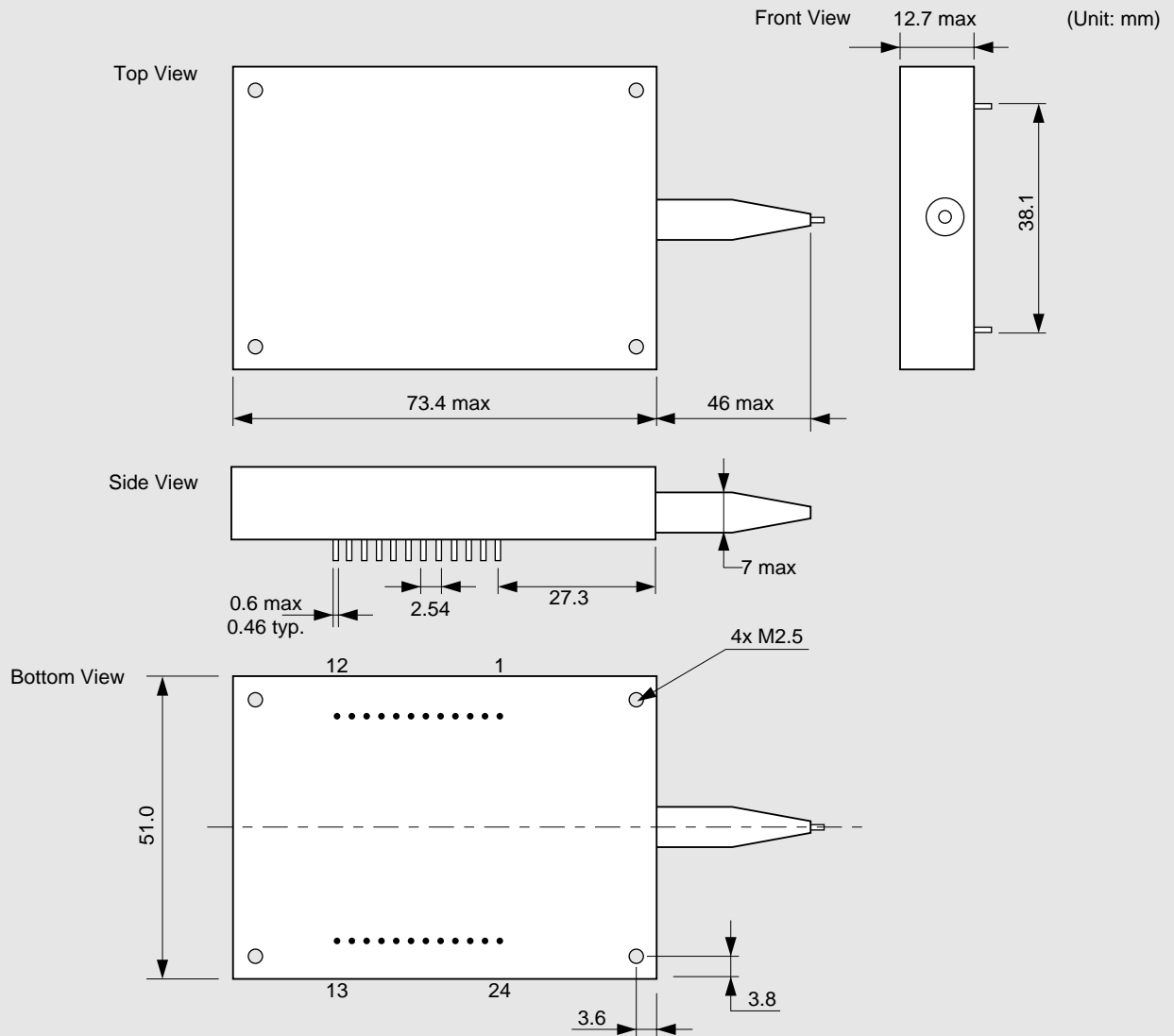
Freq (THz)	Channel	Wavelength (nm)	Freq (THz)	Channel	Wavelength (nm)
196.0	60	1529.550	193.8	38	1546.920
195.9	59	1530.330	193.7	37	1547.720
195.8	58	1531.120	193.6	36	1548.514
195.7	57	1531.900	193.5	35	1549.315
195.6	56	1532.683	193.4	34	1550.116
195.5	55	1533.466	193.3	33	1550.918
195.4	54	1534.249	193.2	32	1551.721
195.3	53	1535.040	193.1	31	1552.524
195.2	52	1535.815	193.0	30	1553.329
195.1	51	1536.610	192.9	29	1554.134
195.0	50	1537.400	192.8	28	1554.940
194.9	49	1538.190	192.7	27	1555.747
194.8	48	1538.980	192.6	26	1556.555
194.7	47	1539.770	192.5	25	1557.363
194.6	46	1540.560	192.4	24	1558.173
194.5	45	1541.350	192.3	23	1558.980
194.4	44	1542.140	192.2	22	1559.794
194.3	43	1542.940	192.1	21	1560.610
194.2	42	1543.730	192.0	20	1561.420

## PRECAUTIONS

- Power supply: Transient electric spike may cause a damage to the laser, the photodiode or IC chips. A surge-free power supply and a slow starter circuit should be used. To avoid causing an electrical surge, pins should not be connected or disconnected on the test fixture before turning the power off.
- The product should be grounded for obtaining the performance.
- Safety: The laser emits invisible light harmful to the human eyes. Direct viewing should be avoided.

## DIMENSIONAL OUTLINE AND PIN ASSIGNMENT

### TOLD396S-TXMSW



The case temperature shall be measured at the center of the package top.

### Pin Assignment

Pin	Symbol	Function	Pin	Symbol	Function
1	GND	Ground	24	Vcc	Positive power supply
2	Back(+)	Monitoring for back facet PD current	23	GND	Ground(4)
3	LDA	Laser degrade alarm	22	CLK (-)	False clock input
4	SDC	Shut down command(2)	21	GND	Ground(4)
5	SELC	Clock mode select(3)	20	CLK (+)	True clock input
6	GND	Ground(4)	19	GND	Ground(4)
7	WDA	Wavelength deviation alarm	18	D (-)	False data input
8	RSVD	Reserved(1)	17	GND	Ground(4)
9	RSVD	Reserved(1)	16	D (+)	True data input
10	WSC	Wavelength select control	15	GND	Ground(4)
11	GND	Ground(4)	14	Vtec	TEC supply, +3.3 V
12	NIC	No internal connection	13	Vcc	Positive power supply

Notes: (1)These two pins are reserved for future use as a serial link interface to the TX module.

(2)When left open (or low) the module is in the operating mode.

(3)When left open (or low) the module is in the clocked mode. When high, the module is in the non clocked mode.

(4)The case is ground.

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