

TLMZ-3003-C-100 TLMZ-3003-L-100

Chirped 10Gb/s integrated tunable transmitter butterfly

Integrated Tunable Transmitter Butterfly

Features

- Wide tuning range using highly reliable DFB laser arrays
- Excellent wavelength stability
- Modulated output power of 3.5 dBm
- Negative chirp (up to 1600ps/nm applications)
- External control of modulator AC and DC signals for advanced modulation formats

Applications

- 10Gb/s Long Haul DWDM dispersion compensated links
- 10Gb/s Metro DWDM single span uncompensated links
- LR2 full-band tunable transponders

Benefits

- Compact size
- Eliminates PM fiber, splicing, and reduces fiber handling
- Co-planar differential drive enables use of EML drivers
- Ease of integration

The TLMZ-3003-C-100 and TLMZ-3003-L-100 are a new generation of compact C and L band widely tunable 10Gb/s modulated sources. They integrate Santur's widely tunable DFB array technology with a semiconductor Mach-Zehnder modulator. The integrated assembly provides for a highly efficient, small form factor assembly that can replace a CW ITLA and LiNbO₃ modulator in many applications. It can also be used to replace EMLs in single span uncompensated links with the additional benefit of making these links tunable.

*Ideally suited for use in a wide variety of DWDM systems, the Santur **TLMZ-3003 C/L-100** provides the best combination of performance features available. They offer a unique combination of modulated optical power, wide tunability, and excellent modulation characteristics. The module is a combination of the TL3000 series tunable laser, with integrated wavelength locker, and a chirped 10Gb/s InP Mach-Zehnder modulator.*

Excellent performance characteristics, reliability, ease of manufacture, and economies of scale derived from Santur's exclusive, proven design, differentiate this product from others in the industry.



Specifications:

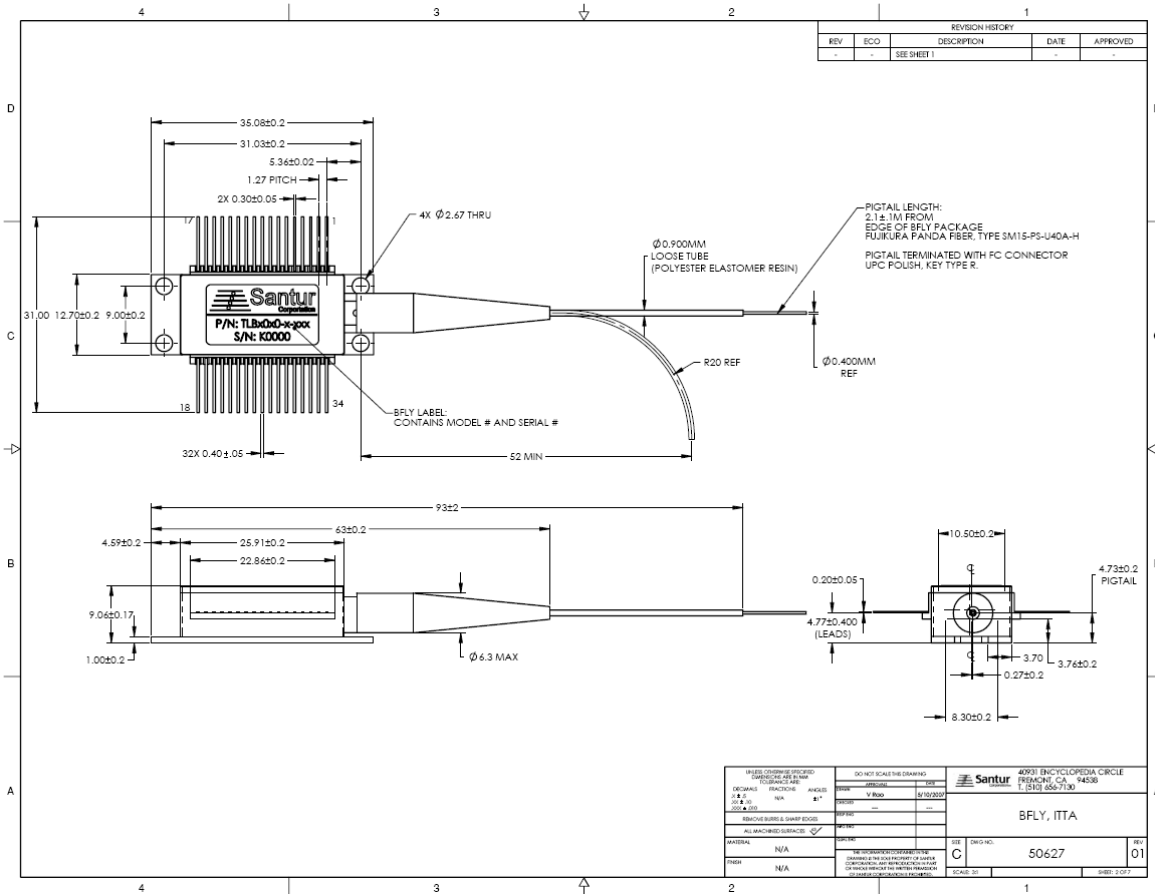
Absolute Maximum Ratings					
Parameter	Symbol	Min.	Max.	Unit	Comments
Storage temperature	T_{stg}	-40	85	C	
Laser diode reverse voltage	V_{R_max}		2	V	
Laser diode forward current	I_{f_max}		420	mA	
Etalon photodiode reverse voltage	V_{EPD_max}		10	V	
Etalon photodiode reverse current	I_{EPD_max}		3	mA	
Quad detector reverse voltage	V_{quad_max}		5	V	
Quad detector reverse current, each	I_{quad_max}		3	mA	
MEMs voltage X	V_{X_max}		210	V	
MEMs voltage Y	V_{Y_max}		195	V	
MEMs current	I_{MEMS_max}		100	μ A	
Laser TEC current	I_{OSATEC_max}		3	A	
Laser TEC voltage	V_{OSATEC_max}		3.4	V	
Locker TEC current	I_{WLTEC_max}		1.5	A	
Locker TEC voltage	V_{WLTEC_max}		2.8	V	
Lead Soldering			250C, 5sec		
Electrostatic discharge (ESD)	V_{ESD}		500	V	C=100pF, R=1.5k Ω Human Body Model
Laser temperature	T_{laser_max}		90	C	
Locker temperature	T_{locker_max}		90	C	

Tunable Laser Specifications									
Symbol	Parameter	Conditions	TLMZ-C			TLMZ-L			Unit
			Min	Typ	Max	Min	Typ	Max	
P_{mod}	Modulated Output Power		3	3.5		3	3.5		dBm
ν_{max}	Optical Frequency Range		191.5		196.1	187.6		190.9	THz
	Total Tuning Range		36.7						nm
T_{set}	Laser Set Temperature		18		58	18		58	C
T_{case}	Case Temperature	TEC Active	-5	-	75	-5	-	75	C
ΔP_{mod}	Power variation over case temp		-0.5		0.5	-0.5		0.5	dBm
I_{op}	Laser Forward Current @ rated power	@ P_{mod} min, 310 BOL	-	-	400	-	-	400	mA
V_{op}	Laser Forward Voltage @ rated power	@ P_{mod} min, BOL and EOL	-	-	2.2	-	-	2.2	V
I_{th}	Threshold Current	BOL	-	40	75	-	40	75	mA
$\Delta\lambda$	Spectral Width	FWHM	-	2	10	-	2	10	MHz
SMSR	Side-mode Suppression Ratio	-	40	50	-	40	50	-	dB
RIN	Relative Intensity Noise at 27.5 mW	20 MHz to 10 GHz	-	-145	-140	-	-145	-140	dB/Hz
ISO	Optical Isolation	-	30	35	-	30	35	-	dB
	SBS Linewidth		1		4.9	1		4.9	GHz
	SBS AM				4.5			4.5	%/GHz
	Dither Frequency	Triangle	7		100	7		100	KHz
$V_{xp}, V_{xn},$	MEMS X Voltage	190 BOL	-	-	205	-	-	205	V
V_{yp}, V_{yn}	MEMS Y Voltage	-	-	-	170	-	-	170	V
V_{x_snap}	MEMS X snapdown Voltage*			-	$ V_{x_cal} + 10$		-	$ V_{x_cal} + 10$	V
I_{TEC}	Laser TEC Current	steady-state		-	1.9		-	1.9	A
I_{TEC}	Laser TEC Current	peak			2.3			2.3	A
V_{TEC}	Laser TEC Voltage	steady-state		-	2.4		-	2.4	V
R_{TH}	Laser Thermistor Resistance	@ 25 C	9.5	10	10.5	9.5	10	10.5	k Ω
β	Laser Thermistor Beta		3800		4000	3800		4000	K
Tswitch	Wavelength switching time			3	30		3	30	s

Wavelength Locker Specifications									
Symbol	Parameter	Conditions	TLMZ-C			TLMZ-L			Unit
			Min	Typ	Max	Min	Typ	Max	
	Optical frequency accuracy (BOL)		-1.5		1.5	-1.5		1.5	GHz
	Optical frequency accuracy (EOL)		-2.5		2.5	-2.5		2.5	GHz
	Capture range			+/-15			+/-15		GHz
	Etalon max/min ratio		2		8	2		8	
I _{pref}	Pref photocurrent	3 dBm Pmod	TBD	0.8	TBD	TBD	0.8	TBD	mA
I _{EPD}	Peak etalon photodiode photocurrent	27.5 mW output	0.02	0.10	0.2	0.02	0.10	0.2	mA
I _{TEC}	Locker TEC Current	-	-	-	0.8	-	-	0.8	A
V _{TEC}	Locker TEC Voltage	-	-	-	1.5	-	-	1.5	V
T _{Lock}	Locker Temperature	on-channel	40	50	60	40	50	60	C
R _{TH}	Locker Thermistor Resistance	@ 25 C	9.5	10	10.5	9.5	10	10.5	kΩ
β	Locker Thermistor Beta		3800		4000	3800		4000	K
T _{switch}	Wavelength switching time			3	30		3	30	s
Modulator Specifications									
	Bit Rate				11.3			11.3	Gb/s
α	Chirp		-0.8	-0.7	-0.6	-0.8	-0.7	-0.6	
V _{rf} (SE)	Modulation voltage (pk-pk), single ended drive		2		6	2		6	V
V _{rf} (Diff)	Modulation voltage (pk-pk), differential drive (per arm)		1		3	1		3	V
V _π	DataN arm V _π (dc)				4.5			4.5	V
V _{-bias}	MZ Bias		-5		0	-5		0	V
V _{-biasN}	MZ bias N		-5		0	-5		0	V
ER	AC extinction ratio	10.7 Gbps, Filtered, using Agilent 86105C optical head	10			10			dB
S ₂₁	3dB frequency		10			10			GHz
Δ S ₂₁	S21-ripple	100KHz to 7.5GHz	-0.5		0.5	-0.5		0.5	dB
S ₁₁	Return loss of RF port	0 to 6 GHz			-10			-10	dB
DP	Dispersion penalty	At 1600ps/nm, single/dual drive, 10.7Gb/s, BER=1e-12			2			2	dB
XP	Optical cross point		40		60	40		60	%
MM	Mask margin	At 10.7 Gbps	10			10			%
Fiber Pigtail									
	Fiber type	SMF-28							
L	Length of pigtail		1.0			1.0			M
R	Bending radius		35			35			Mm
F	Tensile strength (fiber to case)				5			5	N
	Optical connector	FC/UPC R-Type (narrow key)							

Custom OEM specifications possible. Contact Santur for your needs.

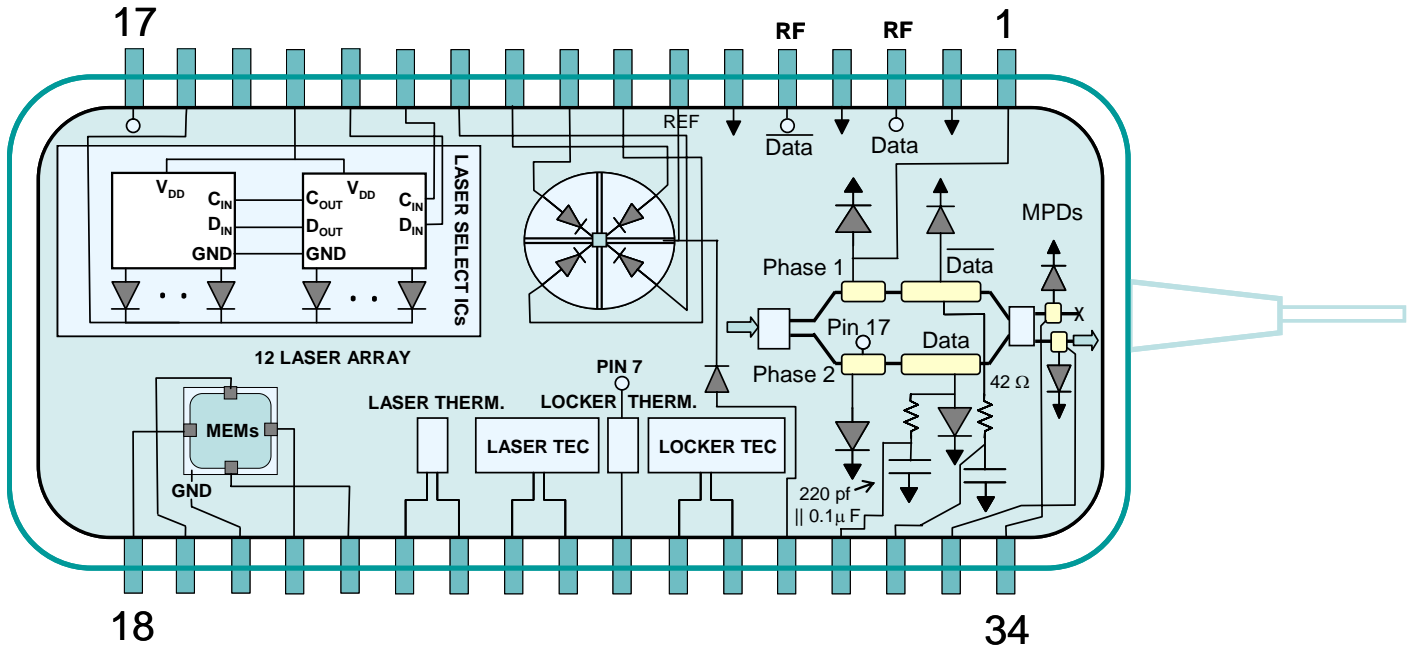
Mechanical Outline



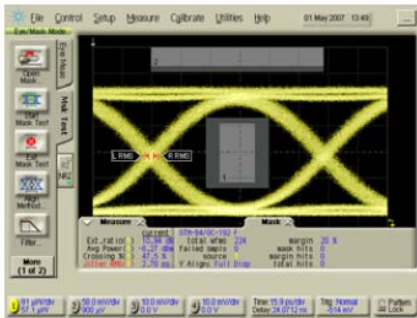
Pin Assignment:

Pin #	Function	Pin #	Function
1	Phase control 2	18	MEMS Vyn
2	High speed ground (G)	19	MEMS Vxp
3	High speed signal (S)	20	MEMS Ground
4	High speed ground (G)	21	MEMS Vyp
5	High speed signal (S)	22	MEMS Vxn
6	High speed ground (G)	23	Laser Therm. (+)
7	Quad & Etalon PD V _{ref}	24	Thermistor Ground
8	Quad Anode 1 (LL)	25	Laser TEC(-)
9	Quad Anode 2 (UL)	26	Laser TEC(+)
10	Quad Anode 3 (UR)	27	Locker Therm. (+)
11	Quad Anode 4 (LR)	28	Locker TEC (-)
12	Laser Select CLK	29	Locker TEC (+)
13	Laser Select DATA	30	Locker PD Anode
14	Laser Select (+)	31	MZ bias V1
15	Laser VOA	32	MZ bias V2
16	Laser Cathode	33	MZ PD1 Anode
17	Phase control 1	34	MZ PD2 Anode

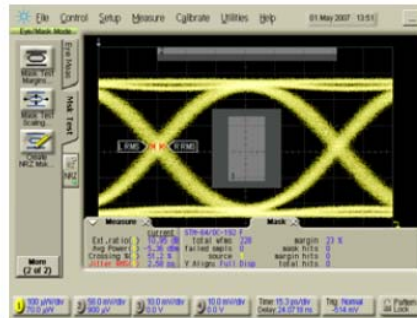
Electrical Schematic:



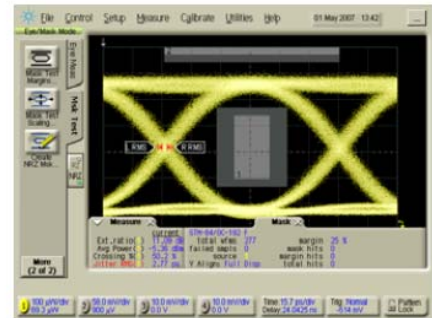
Performance Characteristics



1565 nm

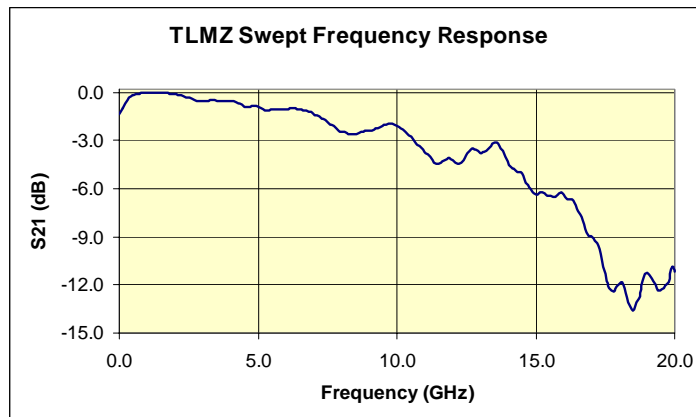


1550 nm



1530 nm

Eye diagrams vs. wavelength





International Sales Contacts

Benelux and Nordics

Laser 2000 Benelux S.A.
Rue du Moulin 18
5650 Fraire, Belgium
Tel: +32 (0) 71 610 640
Fax: +32 (0) 71 610 649
sales@laser2000.be

Germany

Laser 2000 GmbH
Argelsrieder Feld 14
82234 Wessling
Tel: +49 (0) 8153 405-0
Fax: +49 (0) 8153 405-33
contact@laser2000.de

United Kingdom

Laser 2000 (UK) Ltd
Britannia House
Denford Road
Ringstead, Northants NN14 4DF
Tel: +44 (0) 1933 461 666
Fax: +44 (0) 1933 461 699
sales@laser2000.co.uk

China

LuY Broadband Tech. Co.
Room 824 Hua Tong Plaza
No. 19A West Rd. of Che Gong Zhuang
Haidan Dist, Beijing 100044
Tel: +86 (8610) 68700016
Fax: +86 (8610) 6845151
william.lu@luy-tech.com

Israel

Bitel Technologies Ltd.
P.O. Box 94, Yehud
Tel: +972-3-632 2655
Fax: +972-3-632 2279
info@bitel.co.il

France

Laser 2000 S.A.
Park d'Affaires
3, Rue de la Plaine
78860 Saint-Nom la Bretèche
Tel: +33 (0) 1 30 80 00 60
Fax: +33 (0) 1 30 80 00 40
contact@laser2000.fr

Japan

Marubun Corporation
Components Dept.
Marubun Daiya Bldg., 8-1
Nihonbashi Odenmachi
Chuo-ku, Tokyo 103-8577
Tel: (03) 3639-9881
Fax: (03) 5644-7627
motizuki@marubun.co.jp



This is an OEM product that does not comply with the requirements of 21 CFR Subchapter 1 as applicable. It is the responsibility of the user to report the end product and to certify that it meets all applicable requirements.



DANGER: Fiber output is >10 mWatt at 1555 nm.
Do not look into fiber end.

Santur Corporation
40931 Encyclopedia Circle
Fremont, CA 94538
Phone: (510) 656-7130
Fax (510) 656-7563
www.santurcorp.com
1-866-TUNABLE

© 2005 Santur Corporation. The Santur Corporation logo is a trademark of Santur Corporation. The ITLA-3020-C/L product is registered with the U.S. Office of Patents and Trademarks. All rights reserved. Santur Corporation reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use of application.