

TLMZ-3003-C-101 TLMZ-3003-L-101

Zero chirp 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
- Zero chirp (up to +/-1000ps/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-101 and TLMZ-3003-L-101 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-101** 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:

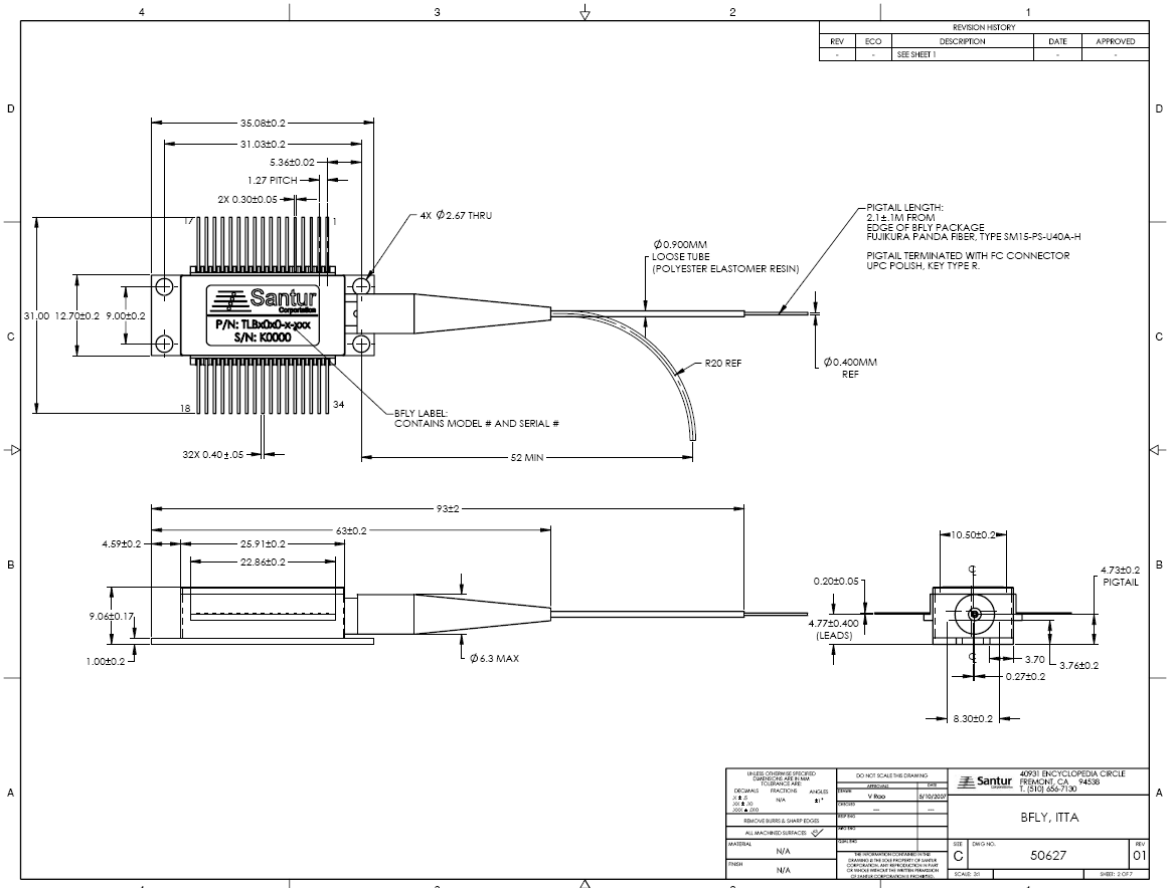
Absolute Maximum Ratings					
Parameter	Symbol	Min.	Max.	Unit	Comments
Storage temperature	T_{stg}	-40	85	C	
Laser diode reverse voltage	V_{R_max}		2	V	
Laser diode forward current	I_{f_max}		420	mA	
Etalon photodiode reverse voltage	V_{EPD_max}		10	V	
Etalon photodiode reverse current	I_{EPD_max}		3	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									
			TLMZ-C			TLMZ-L			
Symbol	Parameter	Conditions	Min	Typ	Max	Min	Typ	Max	Unit
	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		-0.1	0.0	0.1	-0.1	0.0	0.1	
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 +/-1000ps/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.

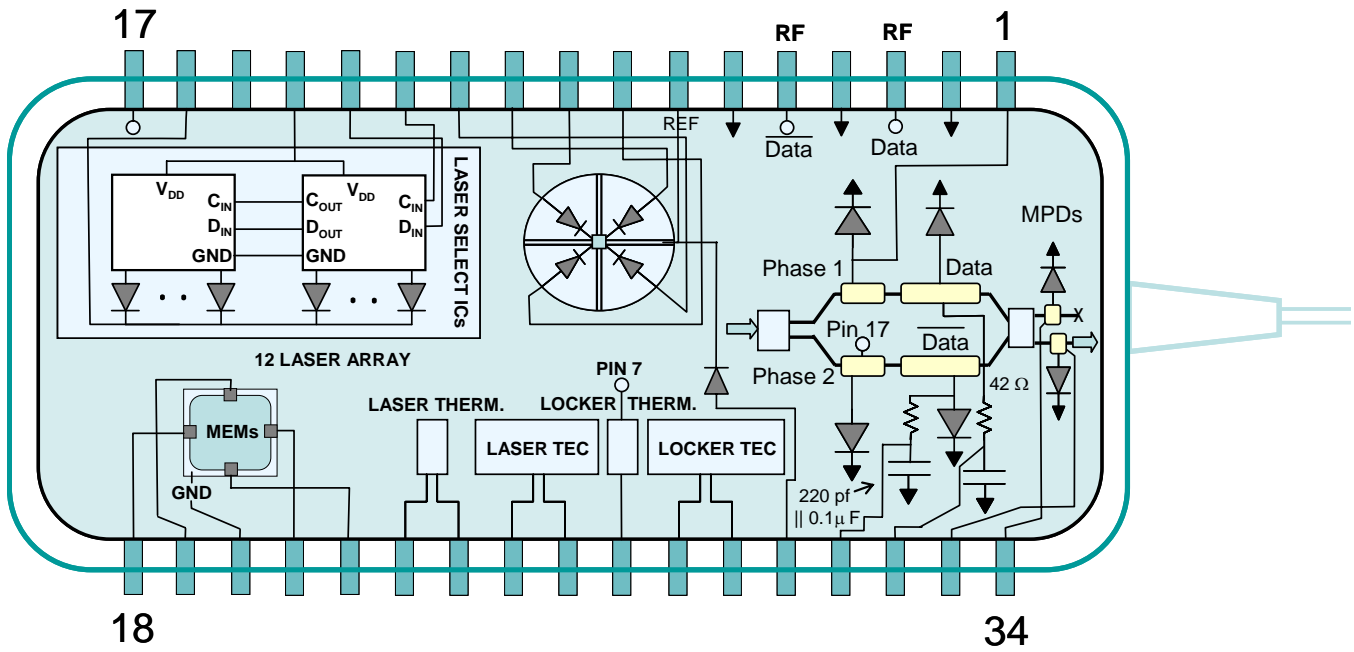
Mechanical Outline



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

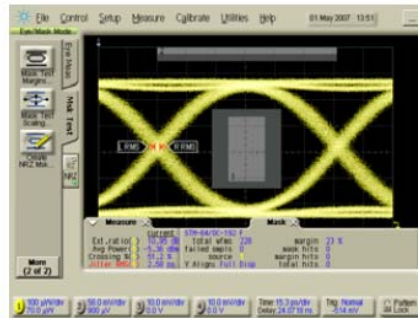
Electrical Schematic:



Performance Characteristics



1565 nm

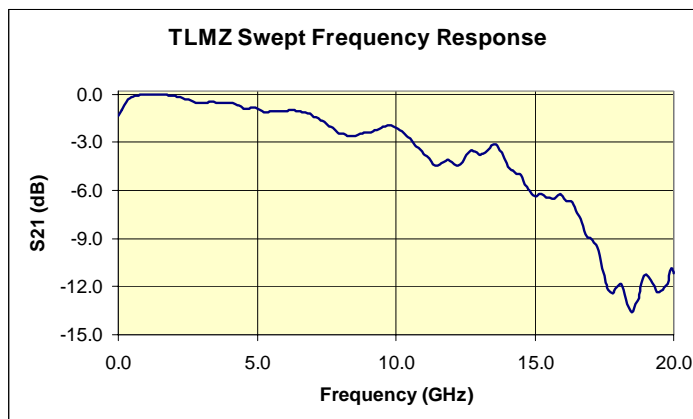


1550 nm



1530 nm

Eye diagrams vs. wavelength





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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.

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