

LXM

Narrow Linewidth and High Linearity DFB Laser Module



The Narrow Linewidth and High Linearity DFB Laser Module (LXM) enables customers to test and adopt TeraXion's proprietary narrow linewidth laser diode technology.

TeraXion's Narrow Linewidth and High Linearity DFB Laser Module provides >40 mW fiber coupled optical power centered at 1550 nm. A frequency modulation analog interface allows users to apply > 2 GHz chirps at a repetition rate up to 100 kHz.

Thanks to its unique epitaxy design, TeraXion's DFB laser diode combines stunning performances with ease of drive and modulation. This monolithic semiconductor laser represents a key building block to achieve low-cost coherent sensing systems that usually rely on expensive narrow linewidth lasers and external modulators.

TeraXion's laser is perfectly suited for frequency modulated continuous wave (FMCW) LiDAR, distributed acoustic sensing (DAS) and precision metrology applications.

Top 4 Features

- **Narrow Linewidth Monolithic Design:** Down to 10 kHz linewidth, equivalent to a coherence length of about 10 km.
- **High Linear Frequency Modulation Response:** $\leq 0.6\%$ native distortion over 1 GHz frequency excursion, which is 50 times better than a standard DFB laser.
- **Built-in Low Noise Current Source and Temperature Controller:** Factory calibrated and tested for quick user's system implementation.
- **Analog Interface for Frequency Modulation Waveform Control:** 4V peak to peak input, allowing total freedom in waveform type and repetition rate.



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Optical Specifications	Linearity optimized module LXM-L	Frequency noise optimized module LXM-S	Units
Center wavelength	1550 ± 2		nm
Instantaneous linewidth ⁽¹⁾	< 80	< 20	kHz
Frequency noise @ 10 MHz	< 2.5 x 10 ⁴	< 6.4 x 10 ³	Hz ² /Hz
Output power	> 40		mW
Output type	CW		-
Relative intensity noise at > 1 MHz	< -155		dBc/Hz
Side mode suppression ratio	> 40		dB
Polarization extinction ratio	> 17		dB

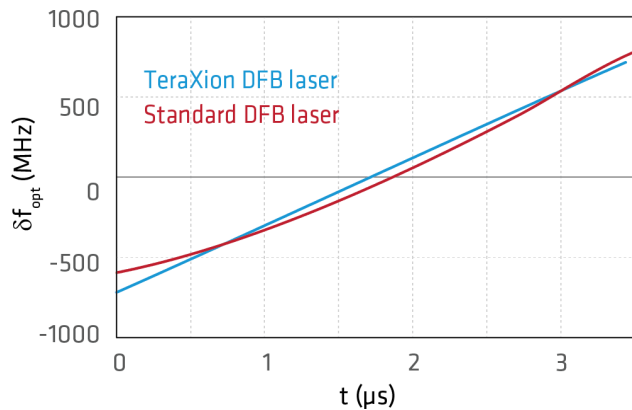
(1) Lorentzian contribution to linewidth calculated from white frequency noise value at > 10 MHz: $\Delta\nu = \pi S_0$

Fast Frequency Tuning	Linearity optimized module LXM-L	Frequency noise optimized module LXM-S	Units
Residual non-linearity ⁽¹⁾	≤ 0.6 e.g. 6 MHz st.dev. for 1 GHz p-p	N/A	%
Frequency tuning amplitude	2	2	GHz _{p-p}
Frequency tuning method	Analog voltage input		-
Tuning voltage magnitude	4		V _{p-p}
Waveform ⁽²⁾	Triangular ramp up & ramp down		-
Full triangle rep rate ⁽²⁾	100	10	kHz

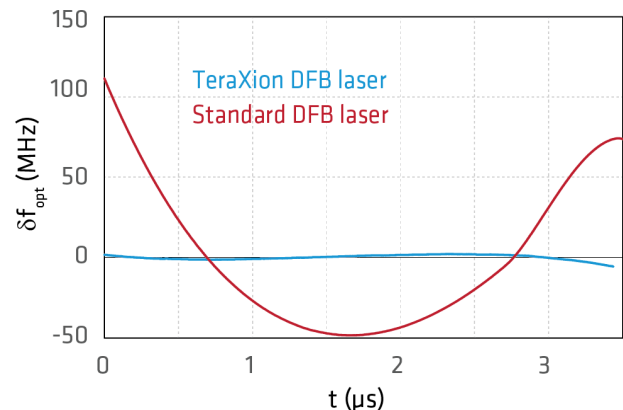
(1) Measured standard deviation of the optical frequency after removal of a linear fit over 90% of the ramp. Valid for 1 GHz frequency tuning amplitude

(2) Modulation parameters applied to specify maximum frequency tuning amplitude and residual non-linearity

TeraXion's DFB Laser vs Standard DFB Laser Frequency Modulation Response Comparison



1.4 GHz chirp response following linear current ramp



Residual non-linearity after subtraction of a linear fit

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Mechanical / Electrical Specifications	Values	Units
Dimensions (H x W x L)	28 x 56 x 90	mm
Optical fiber	Panda polarization maintaining	-
Optical connector	FC / APC (narrow key), slow axis aligned to key	-
Frequency modulation connector	SMA	-
Power connector	USB-C PD3.0	-
Communication connector	USB-C	-
Communication interface	Windows user interface	-
Control software	Complete monitoring and control software	-
Power supply voltage	5	VDC
Power consumption	< 15 at start up, Typ. 5 steady-state	W
Interlock shut down time	< 10	ms

Ordering information

For orders, questions, specific requirements or to learn more about TeraXion's products, contact us at info@teraxion.com

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