

# TeraXion

## High Linearity DFB Laser Module (NLM)



**The High Linearity DFB Laser Module (NLM) enables customers to quickly start FMCW LiDAR design and proof of concept initiatives based on TeraXion's monolithic DFB diode technology.**

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

Thanks to its unique epitaxy design, TeraXion's DFB combines stunning performances with ease of drive and modulation. This monolithic DFB diode represents a key building block to achieve low cost FMCW LiDAR scalability.

### Top 5 Features

- **High Linear Frequency Modulation Response:**  $\leq 0.3\%$  native distortion over 1 GHz frequency excursion, which is 50 times better than a standard DFB.
- **Narrow Linewidth Monolithic Design:**  $< 60$  kHz linewidth, equivalent to a coherence length of about 2 km.
- **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:** 0-4 V input, allows customers to develop and test their own linearity enhancement IP.
- **FMCW LiDAR Transceiver SiP Chip:** Available option to co-package the DFB diode with a coherent detection SiP chip. Laser module includes built-in TIAs and analog outputs to access the beat signal.

## Optical Specifications

Parameters	Values	Units
Center wavelength	1550 ± 5	nm
Instantaneous linewidth <sup>(1)</sup>	< 100 (Typ. 60)	kHz
Frequency noise @ 10 MHz	< 3.5 × 10 <sup>4</sup> (Typ. 2 × 10 <sup>4</sup> )	Hz <sup>2</sup> /Hz
Output power	> 20 (Typ. 40)	mW
Output type	CW	-
Relative intensity noise at > 1 MHz	< -155	dBc/Hz
Side mode suppression ratio	> 30	dB
Polarization extinction ratio	> 15	dB

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

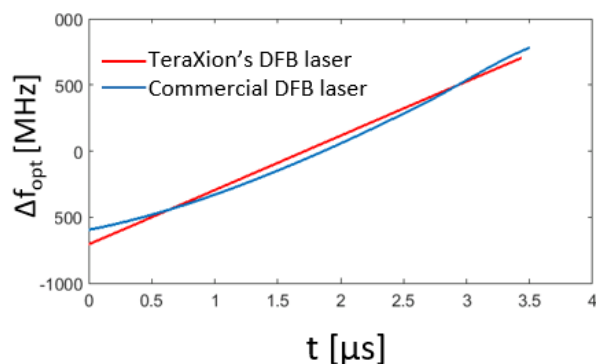
## Fast Frequency Tuning – Linear Triangular Modulation

Parameters	Values	Units
Modulation method	Analog voltage input	-
Small signal bandwidth	> 10	MHz
Waveform	Triangular ramp up & ramp down	-
Ramp time (Complete up & down cycle repetition rate)	5 to 500 (1 to 100)	$\mu$ s (kHz)
Ramp span	> 1	GHz <sub>pp</sub>
Tuning voltage magnitude	4	V <sub>pp</sub>
Residual non-linearity <sup>(1)</sup>	≤ 0.3 e.g. 3 MHz standard deviation for 1 GHz pp	%
Laser phase noise under modulation <sup>(2)</sup>	≤ 0.03 e.g. 0.3 MHz standard deviation for 1 GHz pp	%

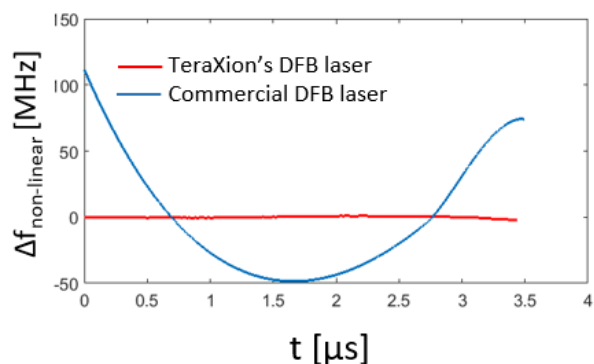
(1) Measured standard deviation of the optical frequency after removal of a linear fit over 90% of the ramp

(2) Measured standard deviation between acquisitions at a fixed time for interferometer length of ≥ 50 m

## TeraXion's DFB vs Commercial DFB Frequency Modulation Response Comparison



1.4 GHz chirp response following linear current ramp



Residual non-linearity after subtraction of a linear fit

## Mechanical/Electrical

Parameters	Values	Units
Dimensions (H x W x L)	30 x 70 x 130	mm
Optical fiber	Panda polarization maintaining, slow axis aligned to key	-
Optical connector	FC / APC (narrow key)	-
Frequency modulation connector	MMCX	-
Power & communication connector	Hirose # DF51K-10DP-2DS(805)	-
Communication interface	RS-485	-
Interface control document (ICD)	Includes laser status, monitoring and control information	-
Power supply voltage	5	VDC
Power consumption	< 15 at start up, Typ. 6 steady-state	W
Interlock shut down time	< 10	ms

## External PS-PU Power and Communication Unit Option

Parameters	Values	Units
Power supply voltage	120 to 240	VAC
Computer interface	USB	-
Communication connector	USB-B	-
PC-side software	NLM control and monitoring software	-

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