

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 4 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.

Optical Specifications

Parameters	Values	Units
Center wavelength	1550 ± 5	nm
Instantaneous linewidth ⁽¹⁾	< 100 (Typ. 60)	kHz
Frequency noise @ 10 MHz	< 3.5 × 10 ⁴ (Typ. 2 × 10 ⁴)	Hz ² /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: $\Delta\nu = \pi S_0$

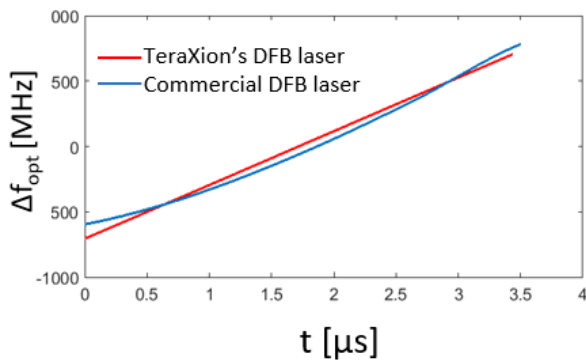
Fast Frequency Tuning – Linear Triangular Modulation

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)	μ s (kHz)
Ramp span	> 1	GHz _{pp}
Tuning voltage magnitude	4	V _{pp}
Residual non-linearity ⁽¹⁾	≤ 0.3 e.g. 3 MHz standard deviation for 1 GHz pp	%
Laser phase noise under modulation ⁽²⁾	≤ 0.03 e.g. 0.3 MHz standard deviation for 1 GHz pp	%

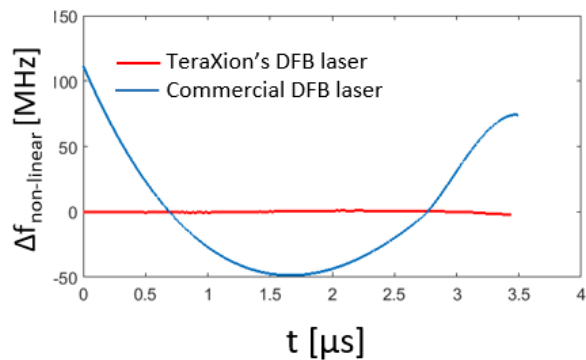
(1) Measured standard deviation of the optical frequency after removal of a linear fit over 90% of the ramp

(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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