

LXM

Narrow Linewidth DFB Laser Module



The Narrow Linewidth DFB Laser Module (LXM) is based on TeraXion proprietary laser diode technology. Ultra-low phase noise and fast frequency modulation properties make this laser module unique and sets new standards in single frequency lasers.

TeraXion Narrow Linewidth DFB Laser Module is available in both standard (<25 kHz linewidth) and frequency-locked ultra-narrow (<0.2 kHz linewidth) models. It can provide >40 mW fiber coupled optical power with central wavelength options around 1545 nm, 1550 nm and 1560 nm.

The LXM laser module is based on a proprietary DFB laser diode design that exhibits an intrinsically narrow linewidth and a high frequency modulation bandwidth.

It is perfectly suited for frequency modulated continuous wave (FMCW) Lidar, Doppler Lidar, distributed acoustic sensing based on Rayleigh scattering (DAS), Brillouin sensing, quantum key distribution (QKD), and precision metrology applications.

Top 4 Features

- **Narrow Linewidth Monolithic Design:** <25 kHz instantaneous linewidth under direct drive and <0.2 kHz for the ultra-narrow linewidth mode.
- **Best-in-class Packaging and Low-noise Control Electronics:** Rugged, stable and reliable laser modules delivered on spec.
- **Frequency Modulation Interface:** 5 V peak to peak input allowing total freedom in terms of frequency modulation control for >3 GHz frequency chirp.
- **High Modulation Bandwidth:** Unique frequency modulation properties that can be leveraged in use cases such as frequency chirp linearity optimization or optical frequency and phase locking.



Optical Specifications

Parameters	Standard Module LXM-S	Ultra-narrow Linewidth Module LXM-U	Units
Center wavelength ⁽¹⁾	1545 1550 1560		nm
Center wavelength tuning ⁽²⁾	±25		GHz
Wavelength tuning resolution	20	5	MHz
Instantaneous linewidth	< 25 ⁽³⁾	< 0.2 ⁽⁴⁾	kHz
Output power	> 40	> 25	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) Contact TeraXion for specific/other wavelengths

(2) LXM-U can be tuned to ±25 GHz prior to locking. Once locked, wavelength tuning is limited to ±2 GHz

(3) Lorentzian instantaneous linewidth obtained by multiplying the one-sided PSD of frequency noise measured at 10 MHz by π

(4) Instantaneous linewidth obtained by multiplying the one-sided PSD of frequency noise measured at 1 MHz by π

Fast Frequency Modulation

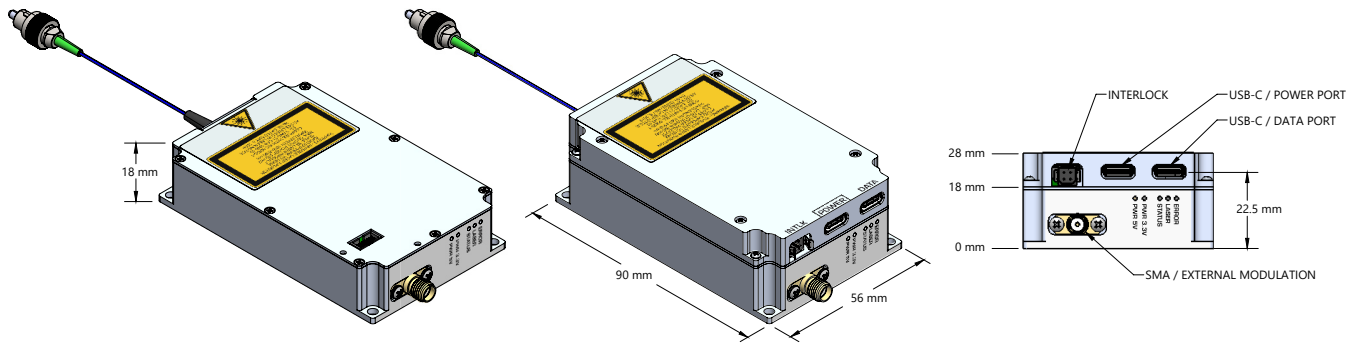
Parameters	Standard Module LXM-S	Ultra-narrow Linewidth Module LXM-U	Units
Frequency modulation amplitude 10 kHz repetition rate 100 kHz repetition rate	> 3.0 > 2.0	0.2	GHz _{p-p}
Frequency modulation method	Analog voltage input		-
Modulation voltage magnitude	5	< 5	V _{p-p}

Mechanical, Electrical, and Environmental Specifications

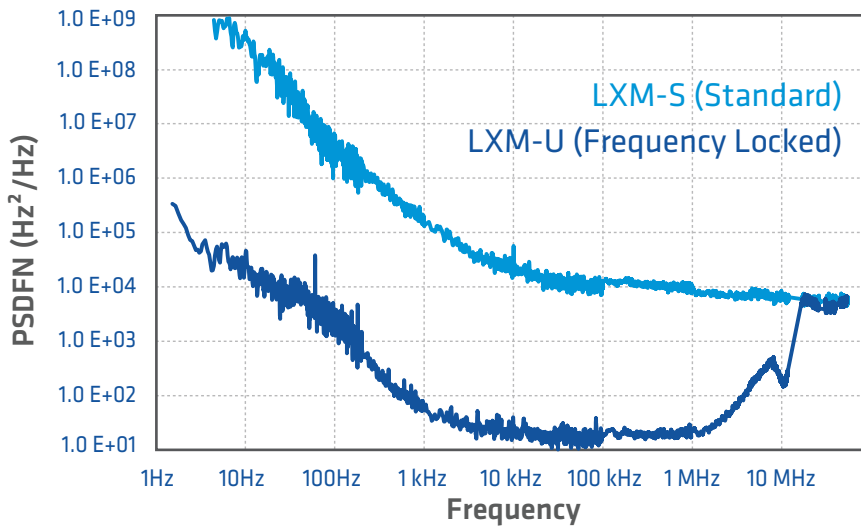
Parameters	Laser Only	With Interface Board	Units
Dimensions (L x W x H)	90 x 56 x 18	90 x 56 x 28	mm
Power and communication connectors	14-pin FTMH	USB-C PD3.0 (power), USB-C (comm), MMCX (interlock)	-
Communication interface	uArt, LVTTTL	USB-C Software included (Windows®)	-
Power supply voltage	5	USB-C PD3.0 power block included	VDC
Power consumption	< 15 at start up, Typ. 5 steady-state		W
Interlock shut down time	< 10		ms
Frequency modulation connector	SMA		-
Optical fiber	Panda polarization maintaining		-
Optical connector	FC / APC (narrow key), slow axis aligned to key		-
Operating temperature	-20 to 65		°C
Storage temperature	-40 to 85		°C
Humidity (non-condensing)	< 95		%

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Mechanical Diagrams



Power Spectral Density of Frequency Noise



Typical Applications

- Frequency Modulated Continuous Wave (FMCW) Lidar
- Doppler Lidar
- Distributed Acoustic Sensing based on Rayleigh Scattering (DAS / ϕ -OTDR)
- Brillouin Sensing (BOTDR)
- Quantum Key Distribution (QKD)
- Radio Frequency over Fiber
- Precision Metrology

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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