RIO COLORADO Widely Tunable 1550nm Narrow Linewidth Laser Source

Data Sheet
July 2019

Key features

- Wide wavelength tuning range across C- or L- band
- Single longitudinal mode
- Low phase and frequency noise
- Narrow linewidth, long coherence length
- Ultra low RIN
- Excellent SMSR
- PM output
- Fast FM modulation
- Compact size, low power consumption
- Easy to set-up and use
- Digital controller and firmware, USB interface, GUI

Description

The RIO COLORADO widely tunable laser sources are compact benchtop lasers based on semiconductor external cavity laser technology. Key characteristics include:

- Wavelength tuning range:
  - o C-band, 1530nm-1565nm, including ITU wavelength
  - o L-band, 1570nm-1608nm, including ITU wavelength
- Low phase / frequency noise
- Narrow linewidth, long coherence length
- Low relative intensity noise (RIN)
- High wavelength stability
- Frequency modulation
- AM trace tone

The RIO COLORADO laser features provide the end user with a stable, self-contained, easy-to-use alternative to complicated and expensive fiber lasers or SSL sources.

The RIO COLORADO laser source uses reliable, Telcordia qualified and industry proven components, and includes low noise laser bias current and temperature control circuitry and controllers to set and monitor laser performance.

External monitoring and control can be employed via a standard USB interface, using RIO-supplied software and GUI. The RIO COLORADO laser is an ideal source for R&D and development of advanced fiber optic sensing and metrology applications, such as laser spectroscopy, interferometric/acoustic sensing, coherent communications, LIDAR and others.

Applications

- Interferometric fiber optic sensing
- Acoustic sensing
- LIDAR
- Laser spectroscopy
- Metrology
- Coherent Communication
- Test & Measurement

OptaSense Inc.
DBA RIO
3350 Scott Blvd, Bldg 1
Santa Clara, CA 95054 USA

Tel (408) 970 3500
sales@rio-lasers.com

Absolute Maximum Ratings

Operation of the device beyond these maximum conditions may degrade device performance, lead to device failure, shorten product lifetime, and invalidates the device warranty.

Parameter	Min	Max	Unit
Storage temperature	0	+ 60	°C
Laser source supply voltage		25	V
ESD-susceptibility		500	V

Optical and Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output optical power	P_{out}	CW, adjustable			50	mW
Optical output power setting step size	ΔP_{step}			0.1		dB
Wavelength tuning range	$\Delta\lambda_{C\text{-}tune}$	CW, C-band	1527.60		1565.60	nm
	$\Delta\lambda_{L\text{-}tune}$	CW, L-band	1570.01		1608.76	
Side mode suppression ratio	SMSR	CW, at specified P_{out}		55		dB
Optical signal to noise ratio	OSNR	1 nm RBW, 0.5 nm from peak wavelength		60		dB
Relative Intensity Noise	RIN	> 10 kHz		-140		dB/Hz
		> 25 MHz to 1 GHz		-165		
Optical Isolation	ISO		30			dB
Linewidth, FWHM [1]	$\Delta\nu_1$	Operation mode 1, instantaneous, measured from self-delayed Heterodyne and Lorentzian model fit		25	35	kHz
	$\Delta\nu_2$	Operation mode 2, Lorentzian calculated from white noise level of Frequency noise PSD			100	
Frequency noise	FN_{100}	At 100 Hz			4000	$Hz/\sqrt{Hz}$
	FN_{1k}	At 1 kHz			600	
Frequency jitter [1, 2]	δf_1	Operation mode 1		30		$MHz_{p\text{-}p}$
	δf_2	Operation mode 2		400		
Wavelength stability [1]	$\delta\lambda_1$	Operation mode 1, over 10 min. at constant case temperature		$\pm$ 25		pm
	$\delta\lambda_2$	Operation mode 2		$\pm$ 2		
Warm-up time	T_{WM}	Cold start		30	60	min.
Polarization Extinction Ratio	PER	Polarization and key aligned to slow axis	20			dB
Voltage Supply	V_{cc}		12		24	V

1. Operation mode1: Ultra narrow linewidth (UNL) mode, Operation mode 2: High wavelength stability (HWS) mode
2. Over 10 sec.

OptaSense Inc.
DBA RIO
3350 Scott Blvd, Bldg 1
Santa Clara, CA 95054 USA

Tel (408) 970 3500
sales@rio-lasers.com

Wavelength Tuning and Frequency Modulation Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelength tuning resolution [2]	$d\lambda_{res}$		1			MHz
Continuous wavelength tuning range [2]	$d\lambda_T$	Thermal tuning			±12	GHz
Continuous wavelength tuning rate [1,2]	$d\lambda$	Thermal tuning		2		GHz/s
Frequency modulation bandwidth [3]	BW_{FM}	Input from external source, AC coupling	5		100	kHz
Frequency modulation range [3]	Δf_{FM}	Over frequency modulation bandwidth, measured with sinusoidal waveform			800	MHz_{p-p}
Frequency modulation voltage input [3]	V_{FM}	From external source, AC coupling			10	V_{p-p}
Amplitude tone modulation bandwidth [2]	BW_{AM}	Input from external source	10		1000	kHz
Amplitude modulation voltage input [2]	V_{AM}	From external source, AC coupling			10	V_{p-p}
Amplitude tone modulation index [2]	MI_{AM}	Sinusoidal input		10		%

1. Tuning rate is dependent of tuning resolution.
2. Available only at Operation mode2: High wavelength stability mode
3. Available only at Operation mode1: Narrow linewidth mode

Thermal Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating temperature range (ambient)	T_c		+15		+ 50	°C
Power Consumption	P_d	Over operating temperature range			7	W
Total current	I_{max}	Over operating temperature range			1	A

Front Panel Connectors

#	Description
F-1	FC/APC bulkhead connector, PM output (PANDA), narrow key (aligned to slow axis)
F-2	BNC female connector for frequency modulation, input impedance: 50 Ω
F-3	BNC female connector for AM tone, input impedance: 50 Ω

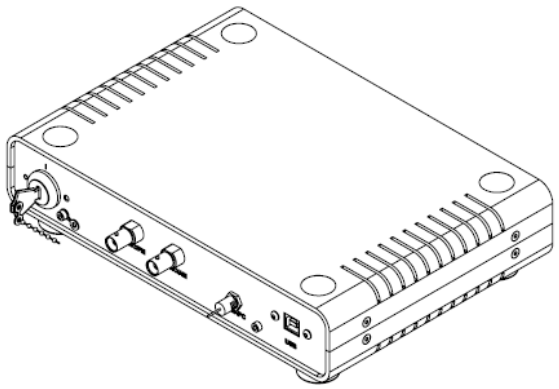
Back Panel Connectors

#	Description
B-1	12 ~ 24 V DC adaptor for power supply
B-2	Interface USB type B connector for external monitoring and control.
B-3	Interlock

OptaSense Inc.
DBA RIO
3350 Scott Blvd, Bldg 1
Santa Clara, CA 95054 USA

Tel (408) 970 3500
sales@rio-lasers.com

Outline Diagram



Dimensions		Units
L	180	mm
W	260	
H	55	

Ordering Information

R	I	O	3	2	3	5	-	5	-	X	X	-	0

Controller Interface	
3	USB

Fiber/Connector *	
5	PM/FC-APC

Wavelength	
03	C-band tunable
04	L-band tunable

Output Power	
5	20 mW
6	50 mW

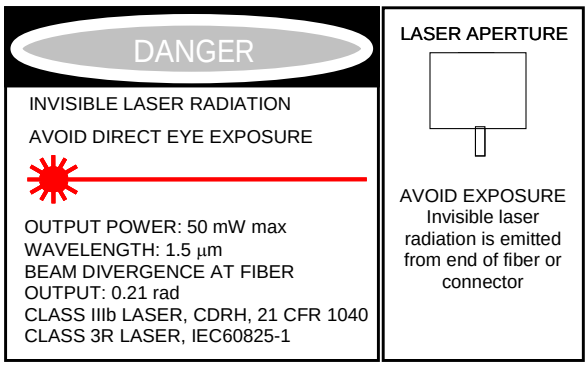
***** Contact RIO for other fiber/connector option availability.

Accessories Included

- AC 100-240V, 1.2A – DC 12 V power supply
- GUI installation Flash Drive including operational manual
- USB cable

Laser Safety Information

The RIO Colorado laser module is classified as FDA/CDRH Class IIIb laser products per CDRH, 21 CFR 1040 laser safety requirements, and complies as Class 3R laser product per international standard IEC 60825-1, 2014.



OptaSense Inc.
DBA RIO
3350 Scott Blvd, Bldg 1
Santa Clara, CA 95054 USA

Tel (408) 970 3500
sales@rio-lasers.com