RPMC Lasers, Inc.
203 Joseph St. • O'Fallon, MO 63366 • PH: 636-272-7227
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Dual Wavelength OEM Laser Module

RPMC Lasers' proprietary Dual Wavelength Single-Mode Spectrum Stabilized Laser features two wavelengths with ultra-narrow spectral bandwidth and a circularized and collimated output beam. Designed to replace expensive DFB, DBR, fiber, and external cavity lasers, the Single-Mode Spectrum Stabilized Laser offers superior wavelength stability over time, temperature (0.007 nm/^{0}C), and vibration, and is manufactured to meet the most demanding wavelength requirements.

The Dual Wavelength Source features circularized and collimated output beam, integral laser line filter pack, and internal thermistor/TEC for each laser. Each laser can be modulated at up to 1 kHz and has independent laser drive and TEC controllers. Lasing wavelength can be accurately specified and repeatedly manufactured to within 0.1 nm upon request (+/- 0.5 nm standard).

Ideal applications include Raman Spectroscopy, OEM systems based upon Raman Optical Activity (ROA), Polarization studies, Differential Absorption Spectroscopy, Difference Frequency Generation, CARS (Coherent Anti-Stokes Raman Spectroscopy), multi-wavelength excitation, and metrology.

Features

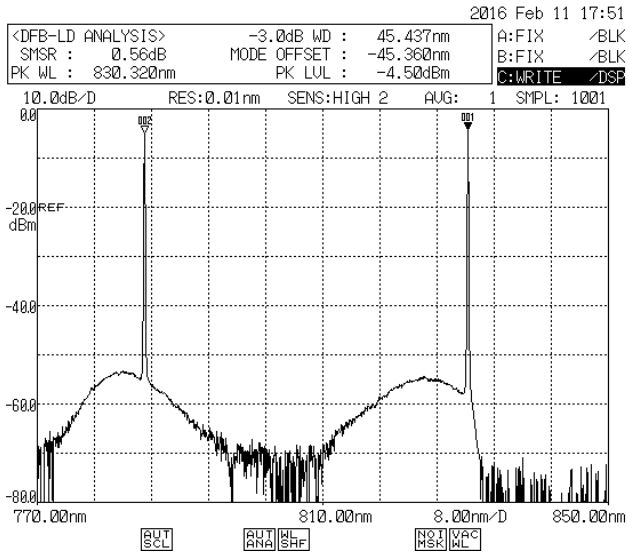
- Single-mode collinear dual wavelength output
- Available with or without RPMC electronics
- Independent laser drive and TEC control (if RPMC electronics package is selected)
- Up to 1 kHz modulation
- Ultra-Narrow Spectral Bandwidth
- Circularized & Collimated Output Beam
- Gaussian TEM_{00} Spatial Mode
- Integral Thermistor & TEC

Standard Wavelengths[1]

• 633 nm	• 808 nm	• 1030 nm
• 638 nm	• 830 nm	• 1053 nm
• 660 nm	• 976 nm	• 1064 nm
• 785 nm	• 1023 nm	• 1070 nm

Additional wavelengths available

Typical Spectral Plot



Typical 785 nm and 830 nm SS Laser Spectrum

RoHS COMPLIANT

1 – Select two different wavelengths or the same wavelength with opposite polarization. For wavelengths other than 785 nm and 830 nm, there will be additional cost and longer lead time

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Beam Specifications					
Parameter	**Unit**	**Min**	**Typ**	**Max**	**Notes**
Spatial Profile			TEM00		
Beam Type			Collimated Near Diffraction Limited Beam		
Spot Size, vertical	µm		TBD	150	Applies to WL1 and WL2, Measured in the focal plane of an f = 50 mm lens
Spot Size, horizontal	µm		TBD	150	
Spot Separation (WL1, WL2)	µm		TBD	20	Measured in focal plane of an f = 50 mm lens (equiv. to 0.4 mrad co-alignment accuracy)
Beam Pointing Error	degree			1	Both wavelengths with reference to package
Beam Co-Axis*	µm		100		At package window

Performance Specifications					
Parameter	**Unit**	**Min**	**Typ**	**Max**	**Notes**
Wavelength Tolerance	nm	-0.5	center λ	0.5	from center wavelength
Output power stability	%		± 3		over 1 hour
3 dB bandwidth (FWHM)	nm		0.02	0.06	
Spectral Filtering	OD	5	7		Typical
Optical signal-to-noise ratio (SMSR)	dB	35	45		without laser line filter
Optical signal-to-noise ratio (SMSR)	dB		70		with laser line filter

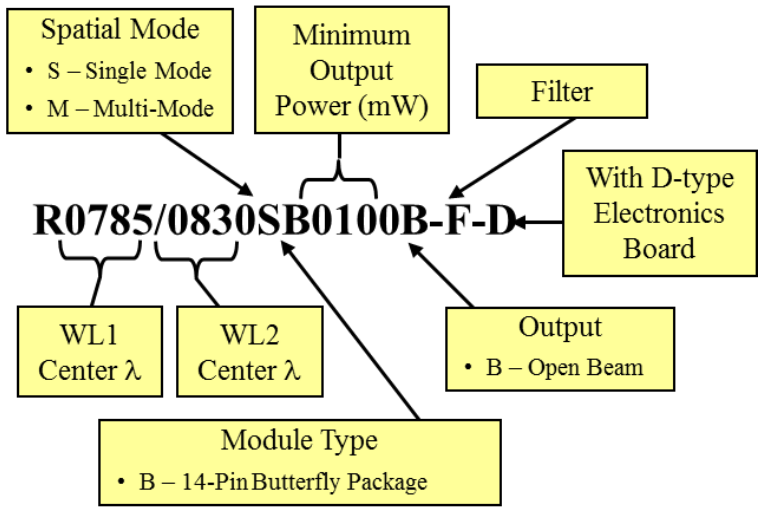
Electrical Specifications					
Parameter	**Unit**	**Min**	**Typ**	**Max**	**Notes**
Supply voltage	V	4.9	5	5.1	1.5 Amps Minimum
Power consumption	W		3.5	10	Case Temperature Dependant

Physical Specifications		
Parameter	**Unit**	**Value**
Electical connector	type	14-pin, Molex #5023861470 (mating connector: 5023801400/5023810000)
Module dimensions	mm	25x25x11 (excluding mounting flange. See drawing for details)
Module weight	g (oz)	42
Operating temperature	deg. C	15 to 35 deg case temperature
Storage temperature range	deg. C	-10 to +55

Wavelength and Power Options[1]	
Wavelength (nm)	**Minimum Power Output (mW)**
633	15
633	50
638	35
638	60
785	100
808	100
830	100
1023	100
1030	100
1053	120
1064	120
1070	120

1 – Select two different wavelengths or the same wavelength with opposite polarization. For wavelengths other than 785 nm and 830 nm, there will be additional cost and longer lead time

Part Numbering Schema



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DWLS 14-Pin Connector Electrical Pinout

	PIN	FUNCTION	Color
Photo Diode (Optional)	1	PD - Cathode	Brown
	2	PD - Anode	Red
Laser #1	3	Thermistor	Orange
	4	Thermistor	Yellow
	5	TEC -	Green
	6	Laser – Cathode	Blue
	7	Laser – Anode	Purple
	8	TEC +	Gray
Laser #2	9	TEC -	White
	10	Thermistor	Black
	11	Thermistor	Brown*
	12	TEC +	Red*
	13	Laser – Cathode	Orange*
	14	Laser – Anode	Yellow*

Operational Notes

For DWLS with or without RPMC Electronics

1. DWLS Module should be mounted on a heat sink with a thermal compound (thermal grease).
2. Do not retro-reflect beam! This can cause Catastrophic Optical Damage (COD) and is not covered under warranty.
3. Take care not to over-tighten screws when mounting. This can bend the DWLS package causing damage and hindering performance, and is not covered under warranty.
4. RPMC recommends not grounding anode and cathode as this can cause ground loops.
5. To adjust power output, RPMC strongly recommends using a neutral density filter or Pulse Width Modulation (PWM) to adjust average power.
6. By using PWM, user can adjust average power from 10% to 100% in digital increments by setting pulse width and duty cycle. For example, if a 50% duty cycle is selected, the laser will be on 50% of the time, and off 50% of the time, making the average power equal to 50% of the CW output power. and the sample will experience a lower average power. Rise/fall time is approximately 20 microseconds.

For DWLS without RPMC Electronics

7. Laser will operate in single frequency mode at set-points between 15 and 35 degrees, however, optimal operating set point must be determined for each laser diode to avoid mode-hopping (see note 4).
8. To determine optimal operating point, plot output power vs temperature to determine where mode-hop locations are. Set operating temperature halfway between mode-hops. This will ensure the most stable operation (RPMC can offer the option of determining this optimal operating point for each diode).
9. Driver circuitry should be configured in a manner to prevent power surges and power spikes.

D-Type Driver Board I/O

Laser #1 Driver Board I/O

Pin #	Symbol	Wire Color	Description	Notes
1	VCC	Green	Supply Voltage	5 V DC, 1.5 Amp
2	GND Return	Blue	Ground Return	Need to connect to Signal Ground
3	PD	Purple	Linear Tracking PhotoDiode	Photodiode Output. Connect across Sig GND for TIA Voltage Output
4	LD SET	Grey	Laser Power Control	Factory Pre-set for SM operation
5	LD Enable	White	Laser Enable	5 V TTL, See Adjacent Note on Laser Enable Configurations
6	Sig GND	Black	Signal Ground	Tie to GND Return (Pin 2)

Laser #2 Driver Board I/O

Pin #	Symbol	Wire Color	Description	Notes
1	VCC	Green	Supply Voltage	5 V DC, 1.5 Amp
2	GND Return	Blue	Ground Return	Need to connect to Signal Ground
3	NC	Purple	NC	Not Connected
4	LD SET	Grey	Laser Power Control	Factory Pre-set for SM operation
5	LD Enable	White	Laser Enable	5 V TTL, See Adjacent Note on Laser Enable Configurations
6	Sig GND	Black	Signal Ground	Tie to GND Return (Pin 2)

Note: Laser Enable Configurations

1. **Option 1: Laser Enable on Rising Edge**
   The optical output is enabled when pin (5) is changed from TTL "LO" (0 V) to TTL "HI" (5 Volt). A built-in safety circuit keeps the laser turned off after a power failure, even when pin (5) is set to 5 Volt. The laser output turns on only at the rising edge of the signal applied to pin (5).

2. **Standard Laser Enable Configuration: TTL**
   The optical output is enabled when pin (5) is changed from TTL "LO" (0 V) to TTL "HI" (5 Volt).

3. **Option 2: Always on**
   Laser comes on when 5 V is applied to laser driver board

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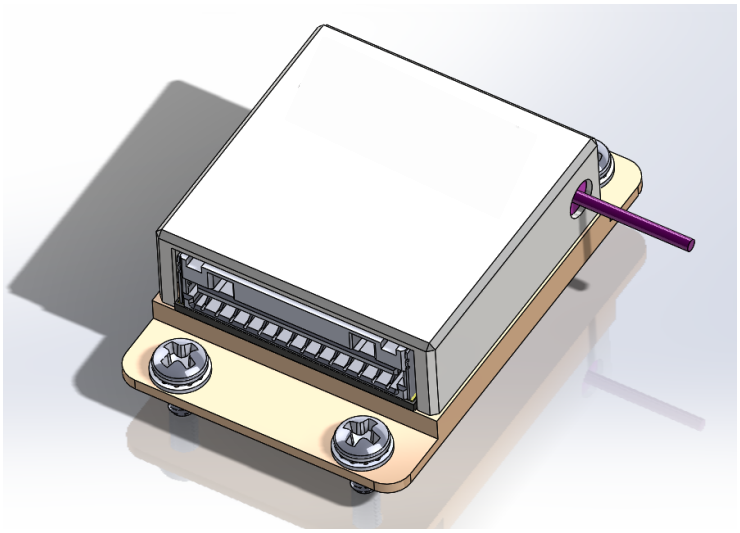
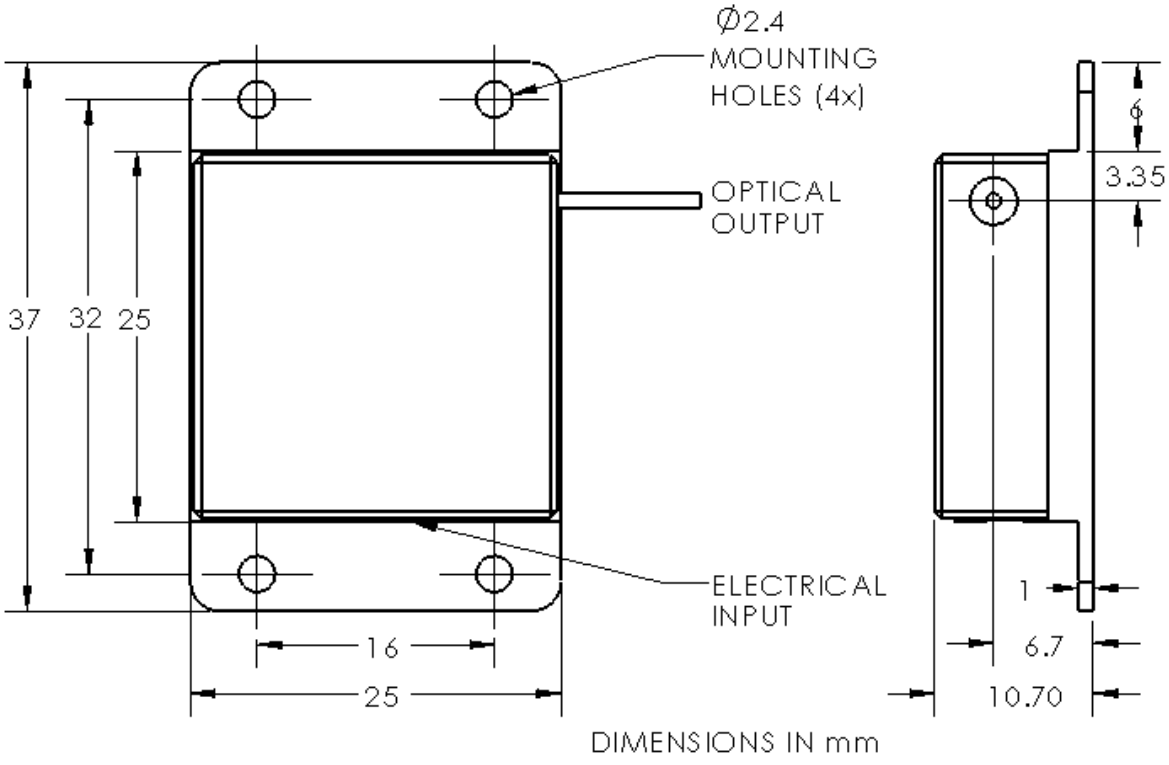
DWLS Mechanical Dimensions





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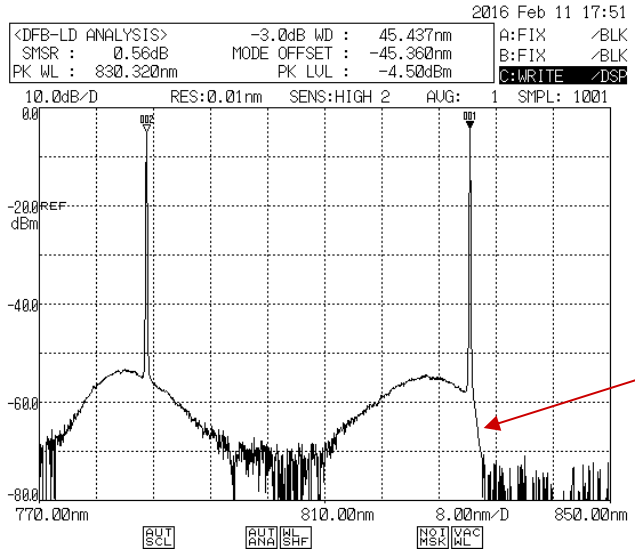
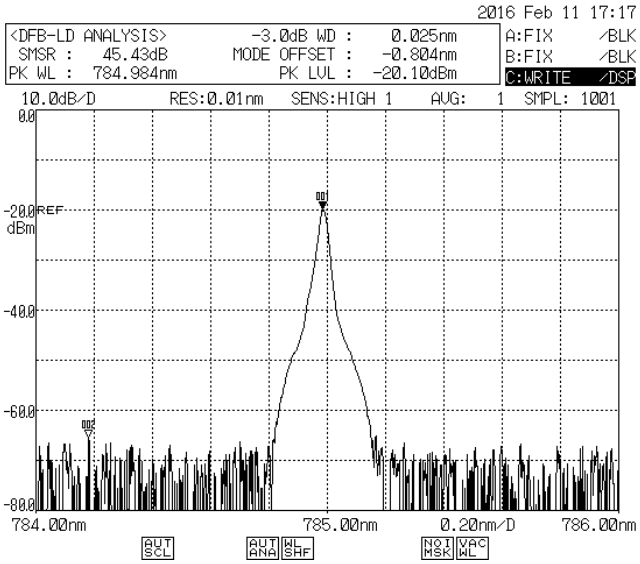
DWLS Spectral Profile(Typical) - 785 nm & 830 nm Wavelengths

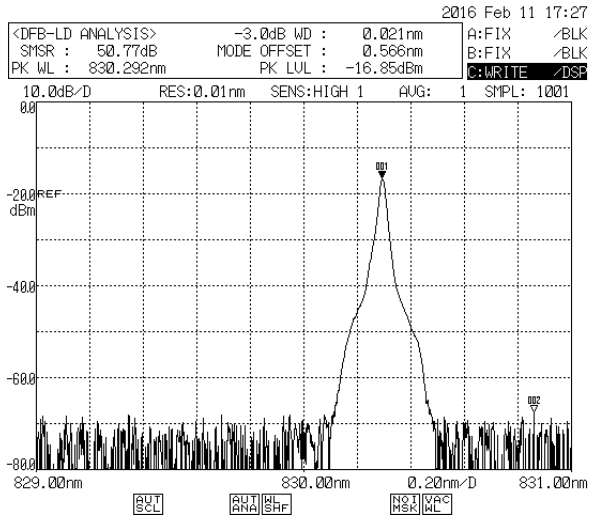


Spectral plot depicting both 785 nm & 830 nm wavelengths with short pass filter installed

Short Pass Filter Cut-Off



785 nm Spectral Plot (High Resolution)



830 nm Spectral Plot (High Resolution)