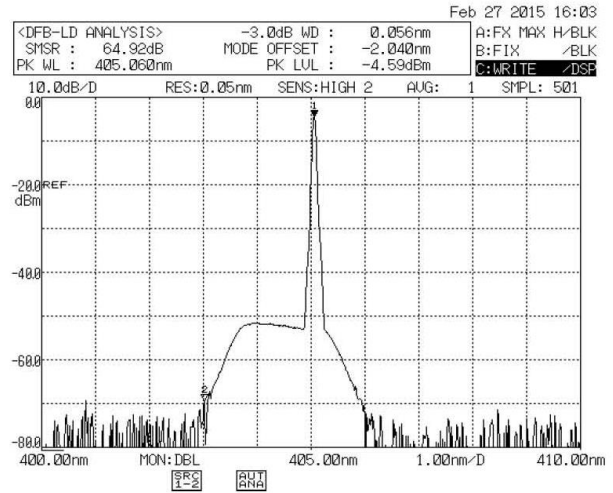


405 nm Diode Lasers

14-pin BF, D-type OEM Module & Turn-key Systems

RPMC's proprietary Single-Mode Spectrum Stabilized Laser features high output power 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/°C), and vibration, and is manufactured to meet the most demanding wavelength requirements.

RPMC offers 405 nm single-mode lasers in our D-Type OEM module, turnkey R-Type or turnkey Tethered Head H-Type. Available in 14-pin BF upon request. Lasing wavelength can be accurately specified and repeatedly manufactured to within 0.5 nm. The laser is ideal for high resolution Raman spectroscopy, confocal microscopy, and other applications where stability and repeatability matter.



Typical 405 nm Stabilized Laser Spectrum

405 nm Single-Mode Wavelength Stabilized Diode Lasers

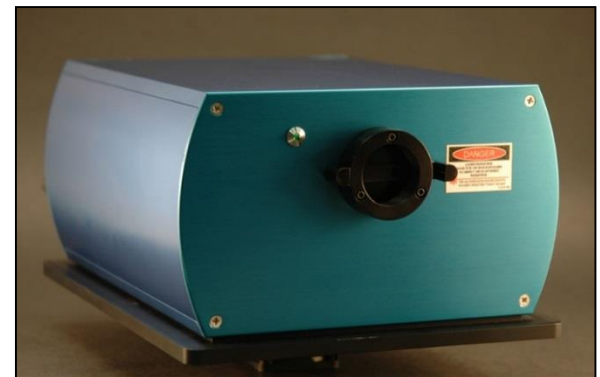
- High Power Single Frequency Output (>35 mW)
- Ultra-Narrow Spectral Bandwidth (<100 MHz typical)
- Circularized & Collimated Output Beam
- Stabilized Output Spectrum (< 0.007 nm/°C)
- Gaussian TEM₀₀ Spatial Mode¹
- Integral Dual Laser Line Filters come standard
- SMSR > 70 dB w/ laser line filter (40 dB without)
- Integral Thermistor & TEC & ESD Protection
- Integral Laser Drive and TEC Control Electronics
- Integral Linear Tracking Photodiode



RoHS Compliant OEM D-type Module



UL/CE and IEC Certified Tethered Head D-type



UL/CE and IEC Certified R-type

1- See beam characteristics of 405 nm diodes on pages 8 and 9 of this document

405 nm D-type OEM Module

General Optical Specifications

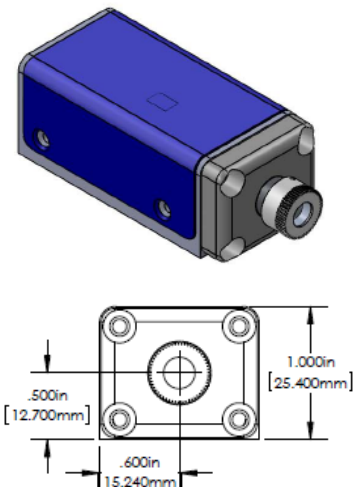
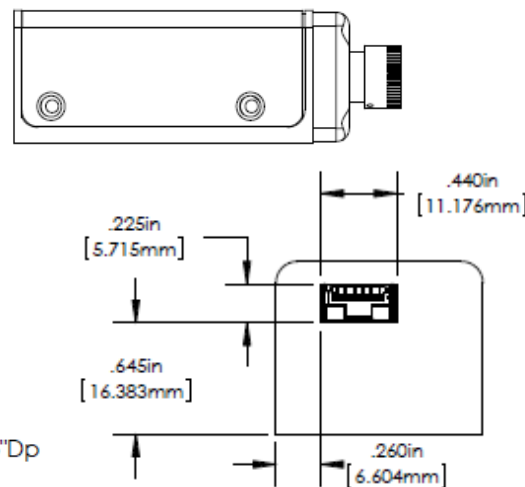
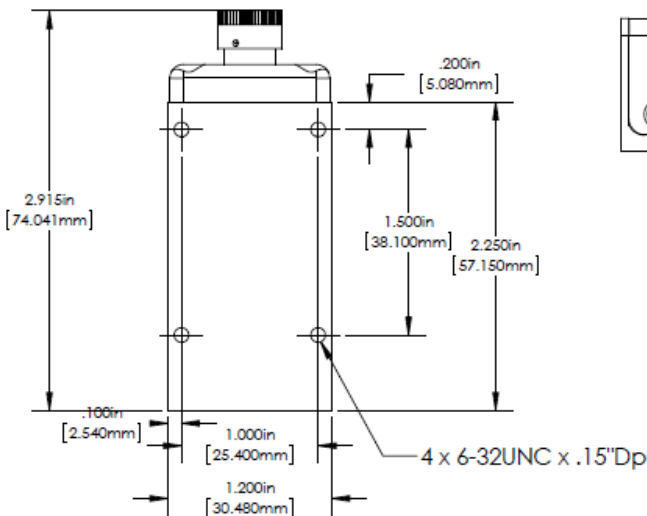
Wavelength	405 nm +/- 0.5 nm measured in air
Power Output	>40 mW
Power Output with Optical Isolator	>35 mW
Spectral Linewidth ($\Delta\lambda$) / FWHM	<100MHz, <0.005 cm^{-1} Typical
Wavelength Stability Range	15 C - 45 C
SMSR w/integral laser line filter	>60 dB
Power Stability	+/- 0.5% to 1% typical
Power Consumption	2W typical, 5W max
Linear Tracking Photodiode (Optional, Internal TIA output)	1V max
Polarization Extinction (PER)	>17 dB
Polarization Orientation	Perpendicular to the plane of the base plate mounting plane
Spatial Profile ¹	TEM00
Beam Quality (M-Squared)	< 1.5
Beam Ellipticity	1.5:1
Spot Size with Beam Expander ²	TBD
Spot Size without Beam Expander ²	~ 0.4 mm at 500 mm
	~ 0.9 mm at 1000 mm
	~1.5 mm mm at 1500 mm
Beam Divergence ²	<1 mrad with beam expander
	< 2mrad without beam expander
Cold Start to <1 wavenumber	10 seconds
Warm Start to <1 wavenumber	1 second
Warm Start to < 0.1 wavenumber	3 seconds



405 nm D-type Options

Min. Power (mW)	Part number
45 (with Beam Expander) ²	R0405SD0045B
45 (No Beam Expander)	R0405SD0045B-NBE
30 (w / Beam Expander & Dual-Stage Optical Isolator)	R0405SD0030B-IS
30 (No Beam Expander & With Dual-Stage Optical Isolator)	R0405SD0030B-IS-NBE

Mechanical Specifications – Standard D-type with Beam Expander²



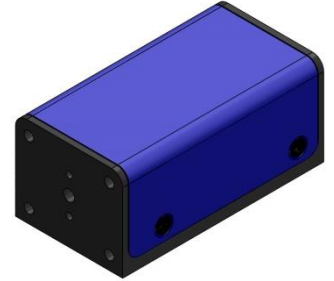
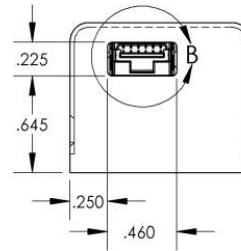
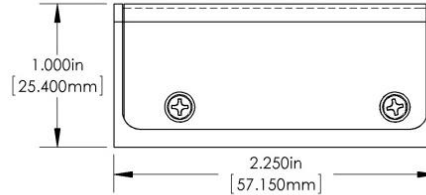
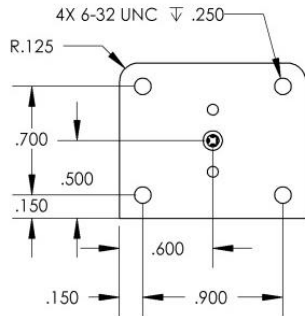
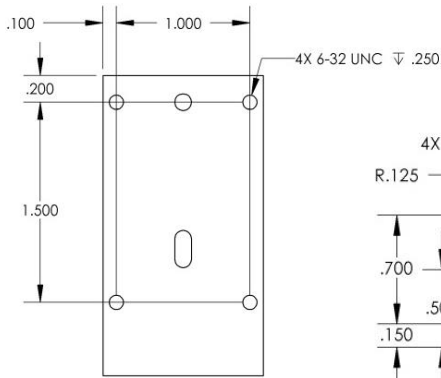
- 1- See beam data on pages 8 and 9 of this document
- 2 - D-type and Tethered head H-type is available without beam expander now. D-type will be available with 3-5x beam expander in Q4 of 2015, and will be the standard

VISIBLE LASER RADIATION
AVOID EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT
 405 nm, 100 mW CW
 EN/IEC 60825-1:2007

OEM Laser Product

This laser module is designed for use as a component (or replacement) part and is thereby exempt from 21 CFR1040.10 and 1040.11 provisions.

Mechanical Specifications – Standard D-type without Beam Expander

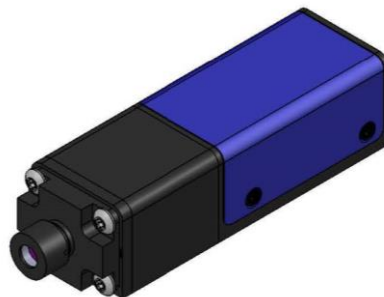
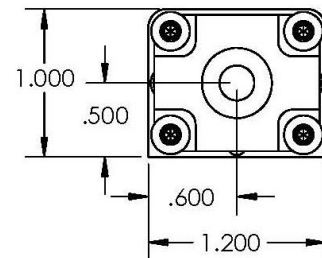
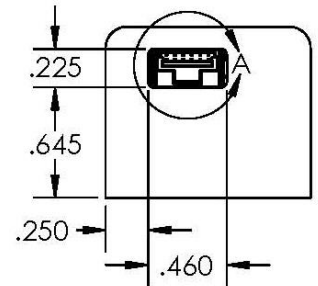
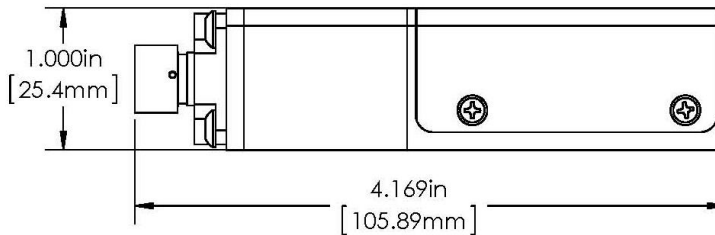
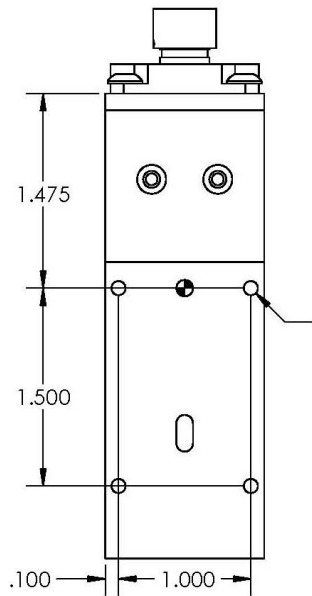


**VISIBLE LASER RADIATION
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 CLASS 3B LASER PRODUCT
 405 nm, 100 mW CW
 EN/IEC 60825-1:2007**

OEM Laser Product

This laser module is designed for use as a component (or replacement) part and is thereby exempt from 21 CFR1040.10 and 1040.11 provisions.

Mechanical Specifications – D-type with Beam Expander and Optical Isolator

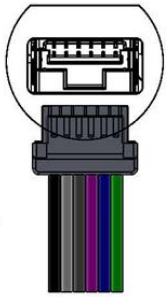


**VISIBLE LASER RADIATION
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 CLASS 3B LASER PRODUCT
 405 nm, 100 mW CW
 EN/IEC 60825-1:2007**

OEM Laser Product

This laser module is designed for use as a component (or replacement) part and is thereby exempt from 21 CFR1040.10 and 1040.11 provisions.

Electrical Pin-out 405 nm D-type OEM Modules (All Variants)



Controller Module 6-Pin
 Molex Connector Pin-Out
 (Molex Part# 5023860670)
 16" long cable

Pin #	Symbol	Wire Color	Description	Notes
1	VCC	Green	Supply Voltage	5 V DC, 1 Amp
2	GND Return	Blue	Ground Return	Need to connect to Signal Ground
3	PD -	Purple	Linear Tracking PhotoDiode	Optional - Not Installed by Default
4	LD SET	Grey	Laser Power Control	0.0 V DC - 0.2 V DC
5	LD Enable	White	Laser Enable	5 V TTL, See Note 1 Below
6	Sig GND	Black	Signal Ground	Tie to GND Return (Pin 2)

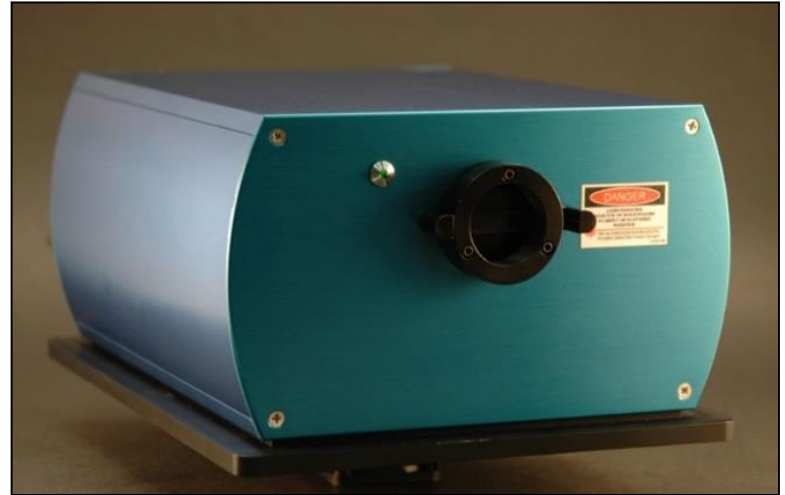
Operational Notes 405 nm D-type OEM Module

1. Do not retro-reflect beam! This can cause Catastrophic Optical Damage (COD) and is not covered under warranty .
2. Laser Enable Safety Feature: 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).
3. To adjust power output, RPMC strongly recommends using Pulse Width Modulation (PWM) to adjust average power rather than using pin 4 (LD SET). See Note 4.
4. 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.
5. RPMC offers a Laser Control Unit (LCU-D) that will allow the laser to be controlled via USB. The LCU-D comes with PWM software.
6. D-type comes with a cable with 6pin Molex connector on both ends (see electrical pinout on p.3). User must supply 5V power and TTL signal to operate.

405 nm R-type Turn-key Module

UL/CE and IEC Certified

- High Power Single Frequency Output (>45 mW without isolator, or >30 mW with isolator)
- Ultra-Narrow Spectral Bandwidth (<100 MHz typical)
- Circularized & Collimated Output Beam
- Stabilized Output Spectrum (< 0.007 nm/°C)
- Gaussian TEM₀₀ Spatial Mode¹
- Integral Dual Laser Line Filters
- SMSR >60 dB w/ laser line filter (40 dB without)
- Integral Thermistor & TEC & ESD Protection
- Integral Laser Drive and TEC Control Electronics
- Integral ESD Protection
- Integral Linear Tracking Photodiode
- UL/CE and IEC Certified
- Remote Interlock



405 nm R-type Optical Specifications

Wavelength	405 nm +/- 0.5 nm
Power Output	45 mW
	30 mW (with integral dual stage optical isolator)
Part Numer	R0405SR0045B
	R0405SR0030B-IS (with integral dual stage optical isolator)
Spectral Linewidth ($\Delta\lambda$)	<100 MHz
Wavelength Stability Range	10 C - 35 C case temperature
SMSR w/integral laser line filter	>60 dB
Polarization Extinction (PER)	>17 dB
Polarization Orientation	Parallel to R-type base mounting plate
Spatial Profile ¹	TEM ₀₀
Beam Quality (M-Squared)	< 1.5
Beam Ellipticity	1.5:1
Beam Diameter (beam expander not available for R-type)	~ 0.4 mm at 500 mm
	~ 0.9 mm at 1000 mm
	~1.5 mm mm at 1500 mm
Beam Divergence	~ 2 mrad
Output Power Stability	+/- 1% typical
Warm-up time	10 seconds from cold start
	1.5 seconds from warm start

Physical Specifications

Output Beam Exit Port	Standard C-Mount Thread (1" - 32)
Module dimensions	8.25" x 7" x 4.25"
Module weight	5 lbs.
Case material	Anodized Aluminum
Operating temperature	+15 to +35 deg C case temperature
Storage temperature range	-10 C to +55 C

Electrical Performance Specifications

Input Power	100-240 VAC, 50-60 Hz, 0.4A
Fuse Rating	250 V, 1A, Fast Blow, 5 mm x 20 mm, 2 each

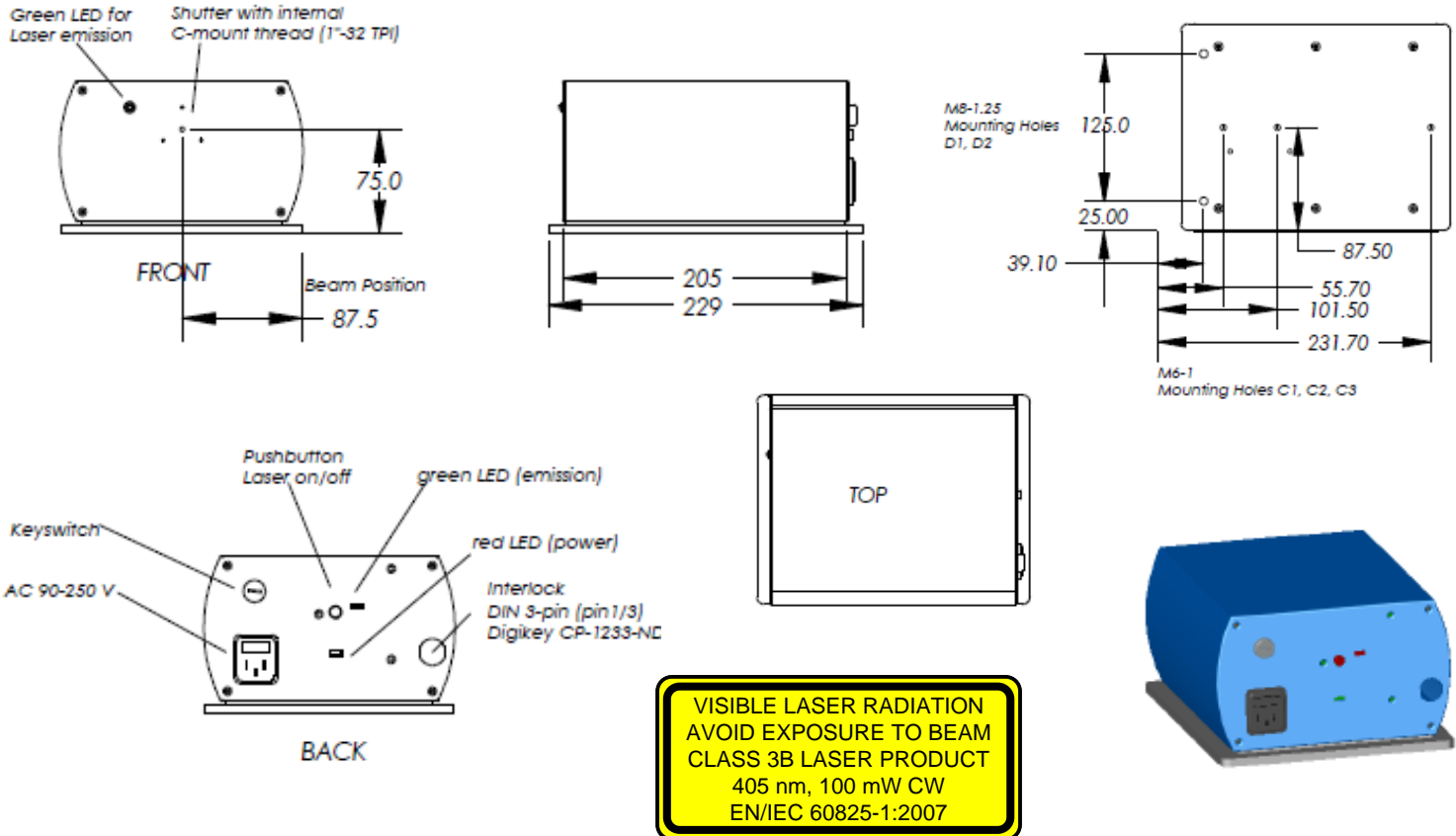
1- See beam data on pages 8 and 9 of this document



405 nm R-type Turn-key Module

UL/CE and IEC Certified

405 nm R-type Mechanical Specifications



Operational Notes

1. Do not retro-reflect beam! This can cause Catastrophic Optical Damage (COD) and is not covered under warranty.
2. The R-type is designed to be used in an open beam configuration – Users should design their optical layout in a manner that minimizes or eliminates the possibility of inadvertent exposure to hazardous laser radiation. To this end, RPMC has provided a SM-1 threaded mount in the laser's shutter module to facilitate the creation of a class I enclosure.
3. See Operation Manual for full operating and safety instructions. This document is meant to offer a product overview only.

405 nm Tethered Head Turn-key Module

UL/CE and IEC Certified

- High Power Single Frequency Output (>35 mW)
- Ultra-Narrow Spectral Bandwidth (<100 MHz typical)
- Circularized & Collimated Output Beam
- Stabilized Output Spectrum (< 0.007 nm/°C)
- Gaussian TEM₀₀ Spatial Mode¹
- Integral Laser Line Filter
- SMSR >60 dB w/ laser line filter (40 dB without)
- Integral Thermistor & TEC & ESD Protection
- Integral Laser Drive and TEC Control Electronics
- Integral ESD Protection
- Integral Linear Tracking Photodiode
- UL/CE and IEC Certified
- Remote Interlock



405 nm Tethered Head D-type Part Numbers	
Min. Power (mW)	Part number
45 (with Beam Expander) ²	R0405SD0045B-TH-L
45 (No Beam Expander)	R0405SD0045B-TH-L-NBE
30 (with Optical Isolator and Beam Expander)	R0405SD0030B-ISTH-L
30 (with Optical Isolator and without Beam Expander)	R0405SD0030B-ISTH-L-NBE

405 nm Tethered Head H-type Optical Specifications

Spectral Linewidth ($\Delta\lambda$)	<100 MHz
Wavelength Stability Range	10 C - 35 C case temperature
SMSR w/integral laser line filter	>60 dB
Polarization Extinction (PER)	>17 dB
Polarization Orientation	Parallel to R-type base mounting plate
Spatial Profile	TEM ₀₀ (see p.8-9 for typical beam data)
Beam Quality (M-Squared)	< 1.5
Beam Ellipticity	1.5:1
Beam Diameter (without Beam Expander) ²	~ 0.4 mm at 500 mm
	~ 0.9 mm at 1000 mm
	~1.5 mm mm at 1500 mm
Beam Divergence	~ 2 mrad
Output Power Stability	+/- 1% typical
Warm-up time	10 seconds from cold start
	1.5 seconds from warm start

Physical Specifications

Module Dimensions	9.48" x 6.94" x 4.14", 48 ounces
H-type Head Dimensions	3.82" x 1.2" x 1", 10 ounces
Case Material	Anodized Aluminum
Operating Temperature	10 to 35 degrees C
Environment	0-80% Humidity, non condensing
Storage Temperature	-10 to + 55 degrees C

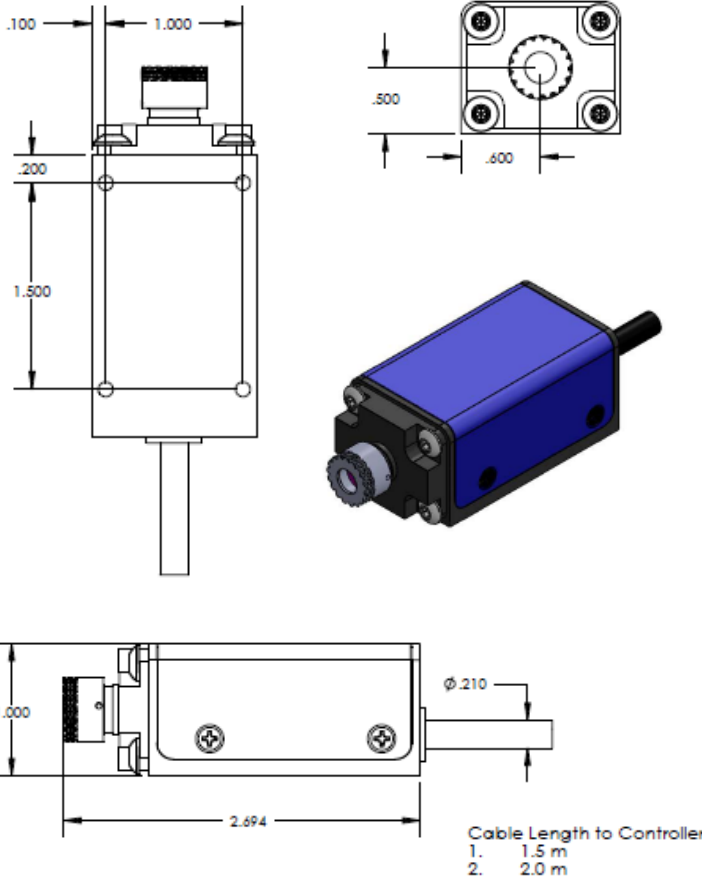
Electrical Requirements

Input Power	100 – 240 VAC, 50 – 60 Hz, 0.4 A
Fuse Rating	250 V, 1 A, Fast Blow, 5 mm x 20 mm, 2 each

- 1- See beam data on pages 8 and 9 of this document
- 2- D-type and Tethered head H-type is available without beam expander now. D-type will be available with 3-5x beam expander in Q4 of 2015, and will be the standard

Mechanical Specifications H-Type Head

Operational Notes



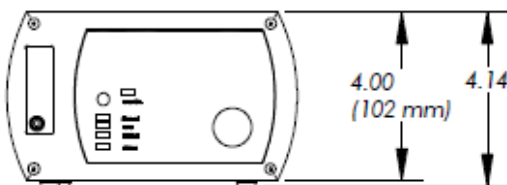
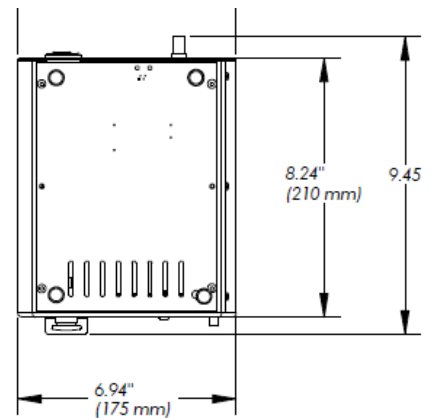
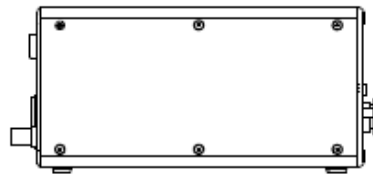
1. Do not retro-reflect beam! This can cause Catastrophic Optical Damage (COD) and is not covered under warranty.
2. To adjust power output, RPMC recommends using Pulse Width Modulation (PWM) to adjust average power or using an external Neutral Density Filter. See Note 3.
3. By using PWM, user can adjust 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. The sample will experience a lower average power (equal to % duty cycle). Rise/fall time is approximately 20 microseconds.
4. RPMC can supply our Laser Control Unit (LCU-M) for pulse width modulation which includes software and hardware interface for digital USB control. Please ask about this product
5. See Operation Manual for full operating and safety instructions. This document is meant to offer a product overview.

Mechanical Specifications – Controller for L-Type and H-Type

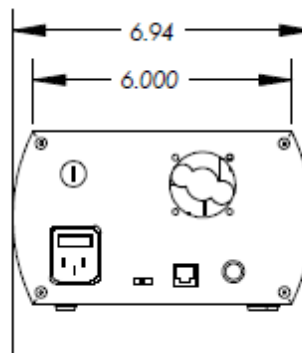
Front View

Side View

Bottom

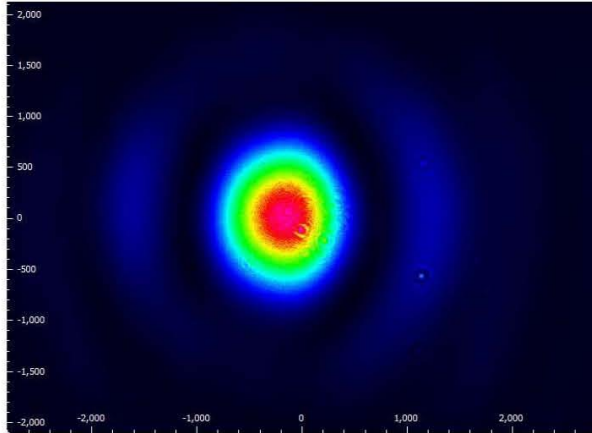


Back

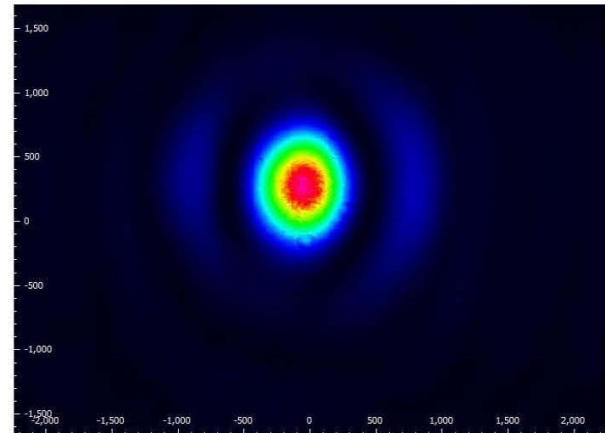


**VISIBLE LASER RADIATION
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 CLASS 3B LASER PRODUCT
 405 nm, 100 mW CW
 EN/IEC 60825-1:2007**

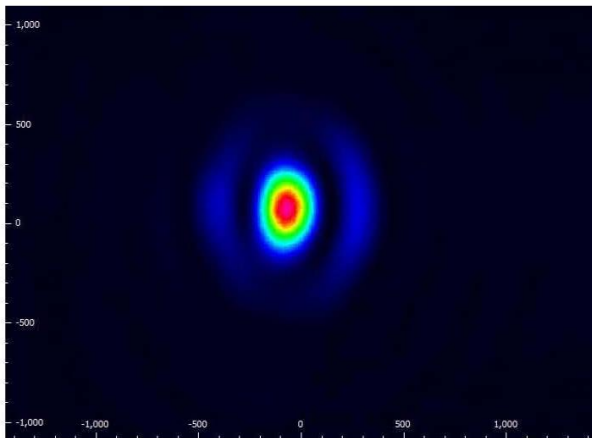
405 nm Typical Beam Profiles



1500 mm



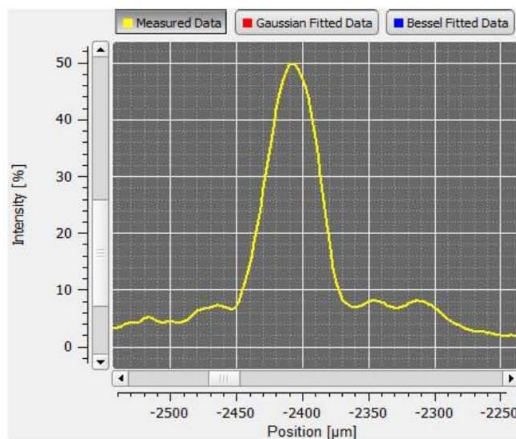
1000 mm



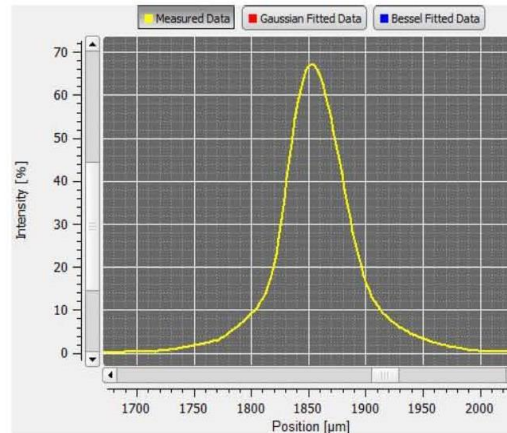
500 mm

405 nm Typical Beam Cross-Sections

Horizontal: X



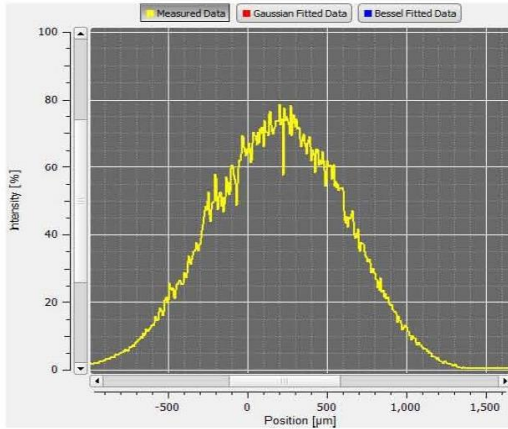
Vertical: Y



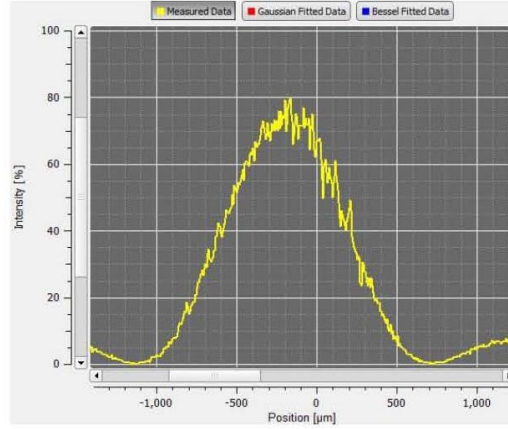
3000 mm

405 nm Typical Beam Cross-Sections

Horizontal: X

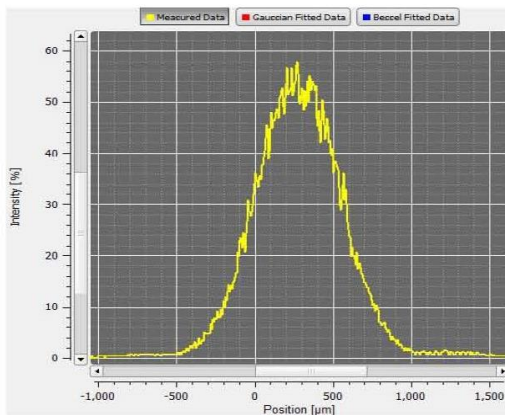


Vertical: Y

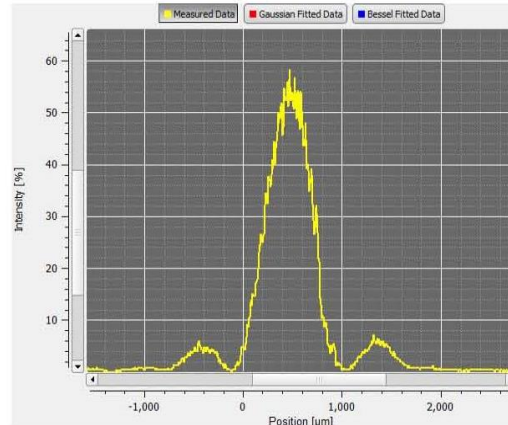


1500 mm

Horizontal: X

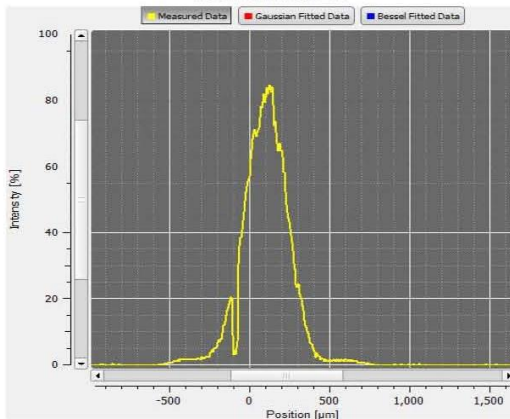


Vertical: Y

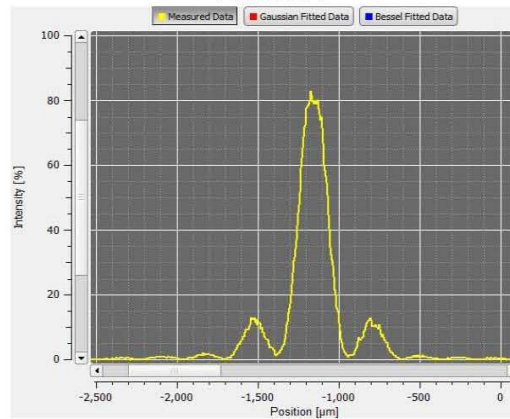


1000 mm

Horizontal: X



Vertical: Y



500 mm