SpectraTec X

Multi-λ Laser Light Source

BLUE SKY RESEARCH

- **Up to four individual lasers**
- **One Fiber Output – single mode PM Fiber**
- **Directly Fiber Coupled lasers for best stability in class**
- **Ultra Compact : 118mm x 165mm x 34mm**
- **Integrated control, drive and protection circuits**
- **Designed for OEM system integration**
- **Custom collimation optics**

The SpectraTec X provides a stable, laser-based illumination source which never needs laser re-alignment in your system or instrument. This self contained system combines up to four lasers coupled into a single polarization maintaining single mode output fiber; it has integrated individual laser driving, stability and control electronics, and fiber exit collimation-feedback optics.

In the SpectraTec X systems we directly couple our lasers to the appropriate optical fibers for the system. We then use passive, highly stable, wavelength multiplexing to combine the laser energy into a single output fiber. This technique ensures the best long-term stability of the optical coupling. Each laser is individually temperature controlled to deliver the best individual laser stability, noise and lifetime. With all the laser energy delivered through the single fiber, we then deliver the ultimate system performance using our multi-wavelength feedback collimation system. At the fiber output we collimate or shape the laser output beams to meet your system requirements. Additionally we sense the power of each wavelength and use this in our control feedback to stabilize the laser power. This power measurement is also available to you through the system interface.

The SpectraTec X can be operated in two modes. In Automatic Mode, by simply applying the required d.c. voltage the unit will run in constant power mode with all lasers running. A very simple interface can be built to adjust the output power of each wavelength. In Control Mode using the extensive range of electronic functionality available through the interface connector complete control and interrogation of the module status is available to you. We are also able to co-design custom interfaces with you.

WAVELENGTHS

405
440
470
488
515
532
635
660
785
808
850

Contact Information:
Blue Sky Research * 510 Alder Drive * Milpitas, CA 95035 * (408)941-6068* Fax (408)941-0406
www.blueskyresearch.com* email: Sales@blueskyresearch.com

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SpectraTec Multi-Channel Wavelengths

The SpectraTec X provides a stable, laser-based illumination source which never needs laser re-alignment in your system or instrument. This self contained system can combine any four lasers between 405nm -980nm and couple them into a single polarization maintaining single mode output fiber.

An example of a popular 4 laser R-G-B-V system is: 405nm + 488nm + 532nm +638nm

Optical Specifications	**Popular Wavelength's**								
Wavelength's*	nm	405	450	488	520	532	638	660	785
Laser(s) Fiber Output Power (Max)*	mW	25	20	20	25	25	40	50	40
Collimator output beam diameter*	mm	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9
Divergence (Far Field)	mRad	0.45	0.45	0.45	0.4	0.4	0.35	0.35	0.35

* A variety of laser wavelengths and power levels are available for combining; additional wavelengths include 445, 470nm, 690nm, 780nm, 808nm, 830nm, 850nm, or 950nm. Each LD wavelength will have its own unique performance specifications.
- Please talk with Blue Sky Research's Sales about your exact system needs and specifications

General Product Specifications (with fiber feedback collimator)

Optical Parameter	**Units**	**Specification**			**Conditions**
		Min.	**Typ.**	**Max**	**All Laser Wavelengths**
Power stability (2 hours)	%			0.5	All channels, 2 hrs, ΔT =/- 3º
Power stability (24 hours)	%			<2.0	All channels, 24 hrs
Laser(s) Channel Noise	% RMS			<0.5	10Hz – 2MHz BW, at full power
Laser(s) Channel Noise Pk-Pk	%			1.5	10Hz – 2MHz BW, at full power
Polarization Ratio	dB	15	17		Vset=4.75, vertical, both channels
Beam Aspect Ratio		0.9	1.0	1.1	any channel, over beam path, 1/e2
Pointing Angle	mRad		1	3	any channel
Beam Co-alignment	µRad		perfect		At exit aperture
Laser(s) Beam Diameter	mm	1.6	1.7	2.1	Exit - 20cm from collimator, 1/e2 value
Laser(s) Beam Divergence	mrad	-	0.45	0.55	Far Field
M2				1.1	Calculated, Far Field, any channel
X-Talk	%		1	3	Target laser power @ 50-100% Other lasers switched on/off @ 100% power
RoHS Compliant		Yes			All parts, assemblies and packaging
CDRH Classification		IIIb			
ESD Rating		Level 3			

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Absolute Maximum Ratings

Parameter	Units	Specifications		Conditions
		Min	Max	
Operating Temperature	ºC	10	40	
Operating Humidity	%	30	75	Non-Condensing
Storage Temperature	ºC	-10	50	
Storage Humidity	%	10	90	Non-Condensing

General Electrical Specifications

Electrical Specifications	Units	Specifications	
Operating Voltage	V	8.0 ± 0.5 and 5V ± 0.5	
Operating Current	A	1.2A max for the 8V line - 8A max for the 5V line	
		High-Speed modulation – lasers	Standard modulation lasers in APC mode
Analog Modulation Freq		1MHz*	10KHz
Rise Time	nS	50	50(us)
Fall Time	nS	50	20(us)
Dynamic Extinction Ratio	dB	>30	>30

*** 1MHz is option pre-set at factory**

General Mechanical Specifications

Mechanical Parameter	Units	Specification	Comments
SpecTec X Housing		Aluminum	L x W x H, see drawing for details
SpecTec X Dimensions	mm	165 x 125 x 33.5	
Collimator Housing		Aluminum	L x W x H, see drawing for details
Collimator Dimensions	mm	105 x 40 x 26	
Static beam location (V)	mm	9	referenced to collimator base
Static beam location (H)	mm	31.5	referenced to mounting hole center
Fiber Type		PM S460 HP or equivalent	Varies by wavelength plan
Output Fiber Cable		3mm buffer or armored	50 – 100cm lengths available
Interface connector		37 pin D-Sub	On SpectraTec housing

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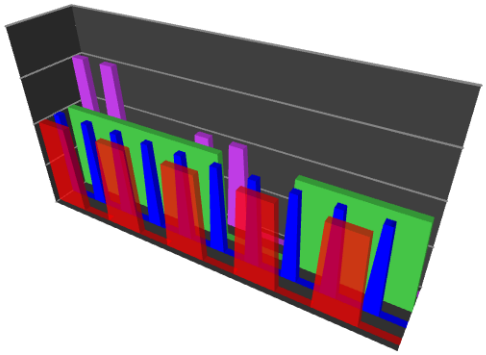

A Key feature of the SpectraTec laser source is that each laser can be activated individually, all lasers can be on at the same time while also maintaining true APC power stabilization, and the intensity of each laser can be adjusted to best suit your application.

Laser power stability within 0.5% of your target power can be achieved with our unique wavelength discriminating power feedback system. Most multi-λ laser engines stabilize the power inside the laser box but then deliver your laser energy through an optical fiber. Is your laser power still stable at your light delivery point?

P	Name	Direction	Comment
J1-1	GND	Power Input	TEC Gnd
J1-2	GND	Power Input	TEC Gnd
J1-3	GND	Power Input	TEC Gnd
J1-4	GND	Power Input	TEC Gnd
J1-5	Laser 1 - Status TEC OK	Digital Output	Output HI when TECs is in temp range
J1-6	Laser 3 - Status TEC OK	Digital Output	Output HI when TEC is in temp range
J1-7	GND	Power Input	System Gnd
J1-8	Laser 4 - Enable	Digital Input	Active HI
J1-9	Laser 4 - PD Monitor I	Analog Output	Photodiode Monitor Voltage
J1-10	Laser 3 - Power Adjust	Analog Input	Output Power Adjustment / Modulation
J1-11	Laser 3 – LD Monitor	Analog Output	Laser Drive Current Monitor Voltage
J1-12	GND	Power Input	System Gnd
J1-13	Laser 2 - Enable	Digital Input	Active HI
J1-14	Laser 2 - PD Monitor I	Analog Output	Photodiode Monitor Voltage
J1-15	Laser 1 - Power Adjust	Analog Input	Output Power Adjustment / Modulation
J1-16	Laser 1 – LD Monitor	Analog Output	Laser Drive Current Monitor Voltage
J1-17	GND	Power Input	System Gnd
J1-18	GND	Power Input	System Gnd
J1-19	GND	Power Input	System Gnd
J1-20	5V	Power Input	Power for TECs
J1-21	5V	Power Input	Power for TECs
J1-22	5V	Power Input	Power for TECs
J1-23	5V	Power Input	Power for TECs
J1-24	Laser 2 - Status TEC OK	Digital Output	Output HI when TECs is in temp range
J1-25	Laser 4 - Status TEC OK	Digital Output	Output HI when TEC is in temp range
J1-26	Laser 4 - Power Adjust	Analog Input	Output Power Adjustment / Modulation
J1-27	Laser 4 – LD Monitor	Analog Output	Laser Drive Current Monitor Voltage
J1-28	GND	Power Input	System Gnd
J1-29	Laser 3 - Enable	Digital Input	Active HI
J1-30	Laser 3 - PD Monitor I	Analog Output	Photodiode Monitor Voltage
J1-31	Laser 2 - Power Adjust	Analog Input	Output Power Adjustment / Modulation
J1-32	Laser 2 – LD Monitor	Analog Output	Laser Drive Current Monitor Voltage
J1-33	GND	Power Input	System Gnd
J1-34	Laser 1 - Enable	Analog Input	Output Power Adjustment / Modulation
J1-35	Laser 1 – LD Monitor	Analog Output	Laser Drive Current Monitor Voltage
J1-36	8V	Power Input	Power for System
J1-37	8V	Power Input	Power for System

Electrical Interface

The SpectraTec X module has a 37 pin D-sub male connector. The module is provided with a 50cm cable terminated in a 37 pin D-Sub Female connector on both ends providing pin functions in the table on the left. Alternative interface options can be discussed.

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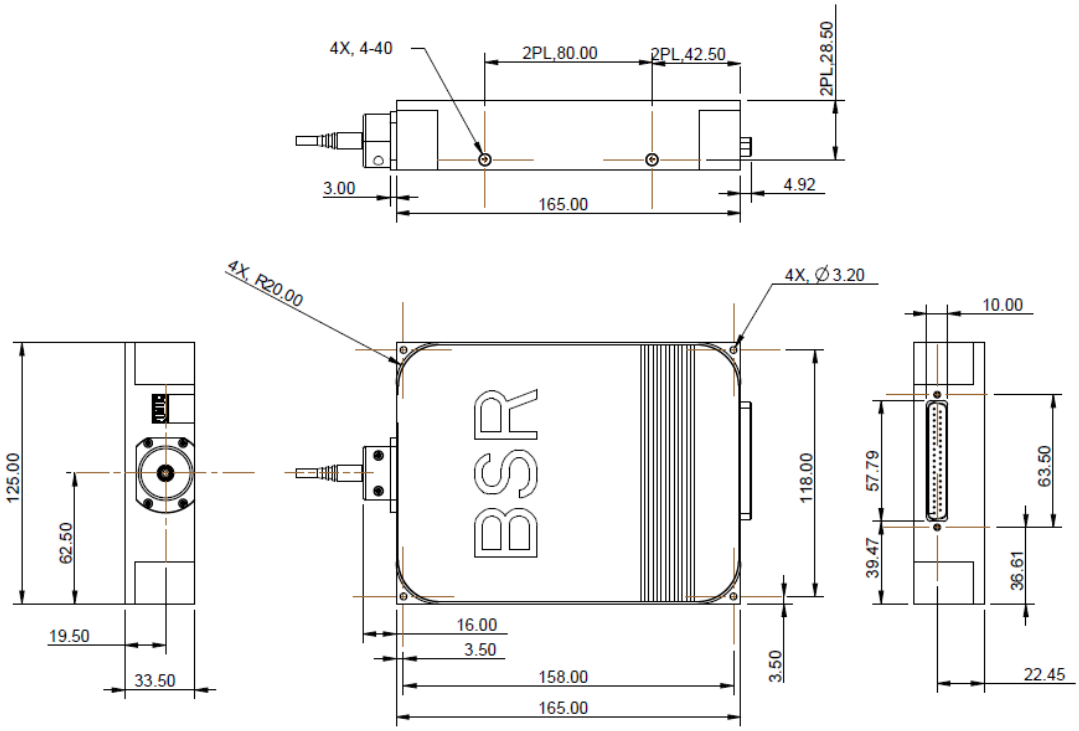
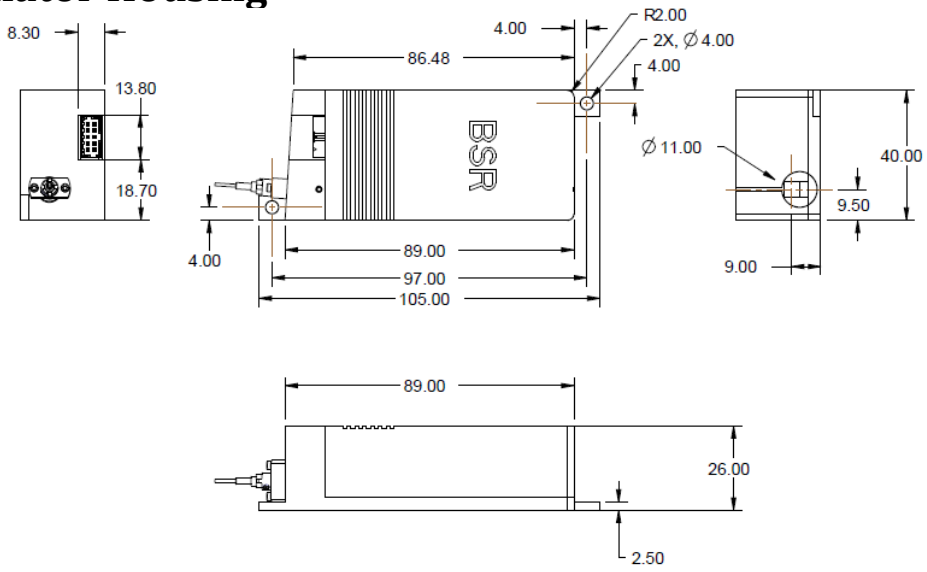
SpectraTec Mechanical Drawing



Collimator Housing



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Ordering Information - . Each SpectraTec X is a self contained system that can combine any four lasers between 405nm -980nm and couple them into a single polarization maintaining single mode output fiber. The fiber output is then coupled into a feedback and collimation system which improves system stability and optically matches your optical system for maximum performance. Please contact Blue Sky Sales and we can discuss the various performance options, wavelengths, power levels and modulation & cabling options.

An example of a popular 4 laser R-G-B-V system is: 405nm + 488nm + 532nm +638nm, armored cable (fiber pigtail), standard protection, drive and modulation electronics, and a 1.9mm collimation system to match your optimal systems NA and throughput.

Why Fiber Delivered Light

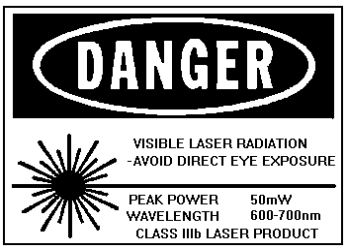
There are several reasons why we deliver the multiple wavelengths of laser energy through a single mode or polarization maintaining fiber.

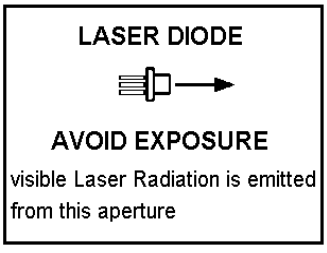
1. The light output from the fiber has excellent beam quality with near circular, Gaussian beam.
2. All wavelengths emanate from the same point, although with differing NA.
3. Excellent beam pointing stability can be achieved with good collimation optics design.
4. Blue Sky likes to use optical fiber because we are experts in directly coupling lasers to single mode fiber and this provides excellent long-term stability and reliability.

Over a decade ago we developed high reliability packaging technology for coupling the light from laser diodes directly into single mode and PM fibers. We thoroughly qualify this technology to international reliability standards such as Telcordia standards. We don't just manufacture a few of these lasers for our SpectraTec products; in fact we manufacture tens of thousands of single mode fiber coupled visible lasers every year. We are confident that the SpectraTec X Multi-Source laser is

This component does not comply with the Federal Regulations (21 CFR Subchapter1) as administered by the Center for Devices and Radiological Health. Purchaser acknowledges that his/her products must comply with these regulations before they can be sold to a customer. The output light from laser diodes is harmful to a human body even if it is invisible. Avoid looking at the output light of a laser directly or even indirectly through a lens during operation. Observance of operation should be through a TV camera or related equipment. Refer to IEC 825-1 and 21 CFR 1040.10-1040.11 as a radiation safety standard for laser products.

Blue Sky Research follows a policy of continuous improvement. Specifications are subject to change without notice.





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