

Vanguard®

Component Selection Guide



The Spectra-Physics® Vanguard™ lasers are state-of-the-art DPSS lasers specifically designed to produce exceptionally reliable quasi-CW output at 355 nm or 532 nm. This family of rugged OEM lasers use advanced mode-locking technology to deliver picosecond pulses with low noise and excellent TEM₀₀ mode quality. Vanguard lasers are available with 350 mW at 355 nm, 2.5 W at 355 nm, or 2 W at 532 nm, each providing ultrafast pulse trains with outstanding long-term stability.

The Vanguard lasers were developed for demanding 24x7 OEM applications, emphasizing consistency and uptime, low cost of ownership, and ease of integration. Designed for the stringent requirements of semiconductor wafer processing, it has found ready acceptance in cell-sorting flow cytometry, synchronous dye-laser pumping, and micro-material processing applications where its superb reliability and dependability are similarly appreciated.

The Vanguard series of lasers are field proven with over 1,000 systems installed. Every feature of the Vanguard is designed for continuous and consistent operation for demanding applications. The system can be remotely controlled via an RS-232 interface, and incorporates extensive on-board data logging of key parameters. The diode module has demonstrated exceptionally long life, and being remotely located in the power supply enables easy replacement without impacting the laser head alignment.

- High power, Quasi-CW UV output up to 2.5 W
- High power, mode-locked 532 nm output up to 2 W
- Outstanding power stability

Recommended Optics & Optomechanics

It is critical to choose the right optics and optomechanical components that work best with your Vanguard laser. Vanguard's high UV and green output power necessitates optics that have a high damage threshold. MKS Newport offers a wide selection of the highest quality optics and optical components covering the entire spectrum UV, VIS, NIR and IR wavelengths to help you with your most challenging applications. In addition, for more than 30 years, we have manufactured the world's most comprehensive line of optical mounts and mechanics. Our precision optomechanics help our customers stay at the leading edge. MKS also offers LaserClean™ components for low-contamination applications.

Please use the following recommendations to determine which components best serve your needs. If you need help making a selection or have questions about the following tables, please contact us at tech@newport.com.

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Recommended Optics & Optomechanics

Optics					Optomechanics			Vanguard Model		
Optics Type	λ	Part Number	LIDT	Description	Mount P/N	Mount Description	355-350	355-2500	532-2000	
 Mirrors	355 nm	10QM20HM.45	3.5 J/cm ² @355 nm, 10 ns, 10 Hz	1" dia Mirror, 45° AOI	SN100C-F2H-V6	Suprema Clear Edge Mirror Mount, 1.0 in., (2) 100-TPI Locking Hex Key	•	•		
	532 nm	10QM20HM.35	20 J/cm ² @532 nm, 20 ns, 20 Hz	1" dia Mirror, 45° AOI	9817-6-Ni-K	Stability OEM Center Mount, Nickel Plated, 1.0 in., 3 Allen Adjust			•	
	532 nm	10Q20HE.2	15 J/cm ² @532 nm, 20 ns, 20 Hz	1" dia Mirror, 45° AOI	9814-6-Ni-K	Stability Top Adjust Mirror Mount, Nickel Plated, 1.0 in., 2 Allen-key			•	
 Polarizing Cube Beam Splitters	532 nm	05BC15PH.3	10 J/cm ² @1064 nm, 10 ns, 10 Hz	0.5" Polarizing Cube BS, High Power	UGP-1 and UGP-KIT-1	Ultima Gimbal Prism Mount, 1 in., 100 TPI Adjustment Screws and Adapter Kit, 0.50 in. (12.7 mm) Cube Riser			•	
 Waveplates	355 nm	10RP02-08	2 J/cm ² @355 nm, 10 ns, 10 Hz	1" dia zero order 1/2 waveplate	RM25B	Polarizer Rotation Mount, 25.4 mm, 2° Grads, 1° Sensitivity	•	•		
	355 nm	10RP04-08	2 J/cm ² @355 nm, 10 ns, 10 Hz	1" dia zero order 1/4 waveplate	9401	Rotary Mount, 1 inch Waveplates or Polarizers	•	•		
	532 nm	10RP02-16	2 J/cm ² @532 nm, 10 ns, 10 Hz	1" dia zero order 1/2 waveplate	RSP-1T	360° Continuous Rotation Stage, 1 in. Aperture, Coarse & Fine Adj.			•	
	532 nm	10RP04-16	2 J/cm ² @532 nm, 10 ns, 10 Hz	1" dia zero order 1/4 waveplate	GM-1RA	Gimbal Tip/Tilt Rotation Mount, Ø1 in., 100 TPI			•	
 Lenses (AR.10 for 355 nm & AR.14 for 532 nm)	355 nm	SPXxxxAR.10	2 J/cm ² @355 nm, 10 ns, 10 Hz	Plano-convex lens, fused silica, 25.4 mm	(M-) LH-1A	A-LINE Fixed Lens Mount, 1.0 in. (25.4 mm) Diameter, 8-32(M4) Thd.	•	•		
	355 nm	SBXxxxAR.10	2 J/cm ² @355 nm, 10 ns, 10 Hz	Bi-convex lens, fused silica, 25.4 mm	LPV-1	XYZ ØXØY Compact Lens Positioner, 1.0 in. Diameter	•	•		
	355 nm	SPCxxxAR.10	2 J/cm ² @355 nm, 10 ns, 10 Hz	Plano-concave lens, fused silica, 25.4 mm	HVM-1t	Vertical Drive, Thin Optic Industrial Mount, 1 in., 2 Locking Allen-Keys	•	•		
	355 nm	SBCxxxAR.10	2 J/cm ² @355 nm, 10 ns, 10 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A-XYZ	XYZ Lens Positioner, 1.0 in. (25.4 mm) Diameter	•	•		
	532 nm	SPXxxxAR.14	7.5 J/cm ² @532 nm, 10 ns, 20 Hz	Plano-convex lens, fused silica, 25.4 mm	LA1V-XY	XY Compact Lens Positioner, 1.0 in. Diameter			•	
	532 nm	SBXxxxAR.14	7.5 J/cm ² @532 nm, 10 ns, 20 Hz	Bi-convex lens, fused silica, 25.4 mm	P100-At38	Kinematic, Thin Optic Mount, 25.4 mm, 3 Locking Allen-Key, 80 TPI			•	
	532 nm	SPCxxxAR.14	7.5 J/cm ² @532 nm, 10 ns, 20 Hz	Plano-concave lens, fused silica, 25.4 mm	LP-1A-XY	XY Lens Positioner, 1.0 in. (25.4 mm) Diameter			•	
	532 nm	SBCxxxAR.14	7.5 J/cm ² @532 nm, 10 ns, 20 Hz	Bi-concave lens, fused silica, 25.4 mm	LP-1A	XYZ ØXØY Lens Positioner, 1.0 in. Diameter			•	
 High Energy Plano-Convex Lenses	355 nm	SPXxxxAR.3	5 J/cm ² @355 nm, 20 ns, 10 Hz	Plano-Convex Lens, Fused Silica, 25.4 mm AR.3 coated	LP-1A-XYZ and A-1.25-1RR-L	XYZ Lens Positioner, 1.0 in. (25.4 mm) Diameter	•	•		
	532 nm	SPXxxxAR.2	8 J/cm ² @532 nm, 20 ns, 10 Hz	Plano-Convex Lens, Fused Silica, 25.4 mm AR.2 coated	LP-1A and A-1.25-1RR-L	XYZ ØXØY Lens Positioner, 1.0 in. Diameter			•	
 Nano-Texture Surface Lenses	355 nm	SPXxxxRAR.S	35 J/cm ² @1064 nm, 10 ns, 10 Hz	Plano-Convex Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XY	XY Lens Positioner, 0.5-in. Diameter	•	•		
	355 nm	SPCxxxRAR.S	35 J/cm ² @1064 nm, 10 ns, 10 Hz	Plano-Concave Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XYZ	XYZ Lens Positioner, 0.5-in. Diameter	•	•		
	532 nm	SPXxxxRAR.L	35 J/cm ² @1064 nm, 10 ns, 10 Hz	Plano-Convex Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A	XYZ ØXØY Lens Positioner, 0.5 in. Diameter			•	
	532 nm	SPCxxxRAR.L	35 J/cm ² @1064 nm, 10 ns, 10 Hz	Plano-Concave Lens, Nano-Textured Fused Silica, 12.7 mm	LP-05A-XYZ	XYZ Lens Positioner, 0.5-in. Diameter			•	
 Attenuators	355 nm	VA-355	2 J/cm ² @355 nm, 10 ns, 10 Hz	Manual Variable Attenuator	PS- series Pedestal Posts	1.0 in. Optical Pedestals, Graduated Diameter	•	•		
	355 nm	VA-355-CONEX	2 J/cm ² @355 nm, 10 ns, 10 Hz	Motorized Variable Attenuator, CONEX	PX Forkless Pedestal Posts	1.0 in. PX Forkless Optical Pedestals and Posts	•	•		
	532 nm	VA-532	2 J/cm ² @532 nm, 10 ns, 10 Hz	Manual Variable Attenuator	Pedestal Forks	1.0 in. Pedestal Base Clamping Forks			•	
	532 nm	VA-532-CONEX	2 J/cm ² @532 nm, 10 ns, 10 Hz	Motorized Variable Attenuator, CONEX	PS-series Pedestal Spacers	1.0 in. Pedestal Spacers & Extensions			•	

* Multiple lenses can be mounted with Newport's lens tubes and spacers

** Additional optics types and sizes are available – please go to <http://www.newport.com> or contact your local MKS sales representative

*** The optics listed in this guide will meet the requirements of most customer applications for the Vanguard laser. Not all optics have been tested for all potential Vanguard applications, so compatibility with all applications cannot be guaranteed.

When selecting optics, please evaluate suitability for requirements of your application. If you need assistance, please contact your local MKS sales representative

Recommended Laser Measurement Sensors*



For optimal application results, it is critical to ensure that the delivered laser power at the sample is precisely controlled. Laser power sensor is a detector that absorbs a laser beam and outputs a signal proportional to the beam's power. MKS Newport offers a wide selection of power sensors to accurately measure the Vanguard laser power delivered to the sample. The specific type of sensor depends on the details of the laser beam being measured, including power level, spectral region, beam size, etc.

Vanguard Model	Recommended Sensor	Laser Damage Threshold	Aperture	Power/Energy Measurement Range	Spectral Range	Description
Vanguard 355-350	919P-003-10	1 kW/cm ²	9.5 mm	40 μW to 3 W; 20 μJ to 2 J	0.19 to 11 μm	<ul style="list-style-type: none"> • Spectrally flat broadband coating • NIST-traceable calibration included • Insensitive to beam position • Sensitive with low noise & drift
Vanguard 355-2500	919P-010-16	28 kW/cm ²	16 mm	20mW to 10W; 6mJ to 2J		
Vanguard 532-2000						

* Order a 1.5" optical post holder VPH-1.5, a pedestal base adapter PS-A, a 1.5" post SP-1.5, and a fork PS-F to mount the sensor vertically at beam height

** Additional options from MKS Ophir are available. Please visit www.ophiropt.com or contact your Ophir sales representative for consultation

Recommended Power Meter*

1919-R is one of MKS Newport's most feature rich and technologically advanced power meters. It offers a plug-and-play functionality and is compatible with almost any of the wide range of Newport sensors. 1919-R is also the most precisely calibrated unit on the market thus measuring with the highest accuracy. With its versatility, ease of use, and user-friendly interface, the sensor can be used stand-alone or interfaced with LabVIEW or the user's own software.

Power Meter	Part Number	Description
	1919-R	<ul style="list-style-type: none"> • Compatible with all standard Newport thermal sensors • USB and RS232 interfaces with PMManager PC applications and User Commands document • LabVIEW driver and COM Object Interface • Select between English, Japanese, Russian, and Chinese interfaces

PC Interface (optional)

A PC interface allows you to connect your laser power sensor directly to the PC. The Model 841-PE-USB is a Power Meter with a USB connection to use a computer as the monitor, allowing the user to access the full computing power of the PC.

PC Interface	Part Number	Description
	841-PE-USB	<ul style="list-style-type: none"> • Optical Power and Energy Meter, Virtual, USB • Ideal when equipment space is tight or there is a need to control multiple power meter channels • Has a USB output and 0-1 V analog output. Application installation is simple & takes care of the USB driver installation

* Other Newport display meters are available – please contact your local MKS sales representative

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Recommended Beam Profiler & Attenuators*



In addition to the average or instantaneous Watts or Joules of the laser beam, it is critical to understand how the power is spatially distributed in the cross-section of the beam. A beam profiler can help detect laser performance issues such as beam wander, jitter, divergence and astigmatism. MKS is the market leader with the largest installed base of laser beam profilers. With our unmatched accuracy, customizable layout, cutting edge R&D and global support system, we are ready to help our customers solve their most challenging problems.

Vanguard Model	Recommended beam profiler	Recommended Attenuator	Description
Vanguard 355-350	LBP2-HR-VIS2	LBP2-SAM-UV2	<ul style="list-style-type: none"> The LBP2-HR-VIS2 Laser Beam Profiler is a powerful software driven system with comprehensive beam diagnostic measurement features. It features a 1924 x 1448 pixel CCD camera for the wavelength range between 190 and 1100 nm. The easy to use graphical user interface includes all of the accuracy and ISO approved quantitative results.
Vanguard 355-2500			
Vanguard 532-2000		LBP2-SAM-VIS2	<ul style="list-style-type: none"> The LBP2-SAM beam sampler operates by reflecting the incoming beam from the front surfaces of a pair of wedges through 90 degrees into the camera. Approximately 99% of the beam is transmitted through the beam sampler with 0.01% passed on to the available filter slides where you can add an additional attenuation up to ND6.

* Additional options from MKS Ophir are available. Please visit www.ophiropt.com or contact your Ophir sales representative for consultation

MKS Instruments is your one-stop-shop partner for all the critical components surrounding your workpiece. Working very closely with customers globally and with diverse applications ranging from PCB, ceramic and glass cutting & drilling to micromachining & solar cell processing, chances are we have already experienced & solved the challenges you may be facing now. That is how we **Solve Together, Succeed Together™**.

Make Light

LASERS & LIGHT SOURCES

Ultrafast, Q-switched DPSS, CW, quasi-CW, high-energy pulsed, tunable and fiber lasers, low power laser diode modules, HeNe lasers, incoherent sources, laser diode instrumentation, laser diode reliability & burn-in test systems, electro-optic modulators & accessories. Includes ILX Lightwave, New Focus, Oriel, and Spectra-Physics products and brands.



MOTION CONTROL

Our motion product portfolio includes high precision XY stages, vertical stages, rotation stages, air bearing stages, custom-made motion systems, XPS high performance universal motion controller/driver and LMS-Pro laser machining software. Over the decades, we have served customers with diverse applications including ablation, ultrafast micromachining, laser additive manufacturing, laser cutting, scribing and drilling.



Manage Light

PRECISION OPTICAL SYSTEMS/ SUBASSEMBLIES

Precision subassemblies and subsystems encompass our knowledge & expertise in optics, lasers, opto-mechanics, motion control, & electro-optics to meet the most demanding customer needs for performance, reliability, value & schedule. Incorporating precision optics fabrication and coating capabilities and components, optical solutions for the DUV, VIS, and NIR spectral ranges are produced from prototype through volume production.



OPTICAL TABLES & VIBRATION ISOLATION

With nearly 50 years of vibration control and vibration isolation design and manufacturing experience, MKS Newport has become the industry standard for optical tables, isolation systems, and vibration control products. Our diverse offering includes optical tables, breadboards, vibration isolators, Guardian Active Isolation workstations and custom built solutions.



Measure Light

LIGHT ANALYSIS

MKS offers industry leading tools for measuring power or energy of an optical beam, profiling a laser, locating the position of a beam, spectral analysis, or characterizing a laser pulse. In addition to Newport brand optical meters, optical sensors, and beam characterization instrumentation, our Ophir Photonics business offers a diverse selection of these products as well.



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MKS Instruments, Inc. (NASDAQ: MKSI) is a \$1.9B global provider of instruments, subsystems and process control solutions that measure, control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. Our products are derived from our core competencies in pressure measurement and control, materials delivery, gas composition analysis, control and information technology, power and reactive gas generation, vacuum technology, photonics, lasers, optics and motion control.

The laser measurement sensors, power meter & PC interface, beam profilers & attenuators listed in this document are RoHS compliant

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