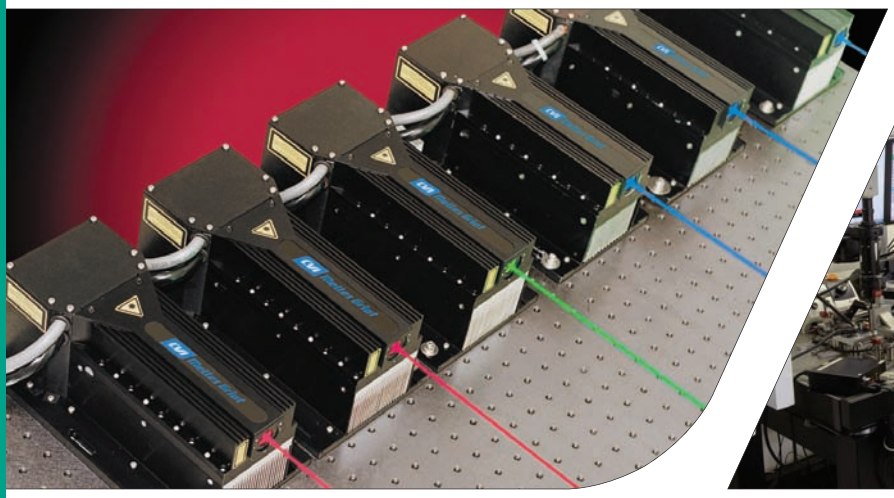
Lasers



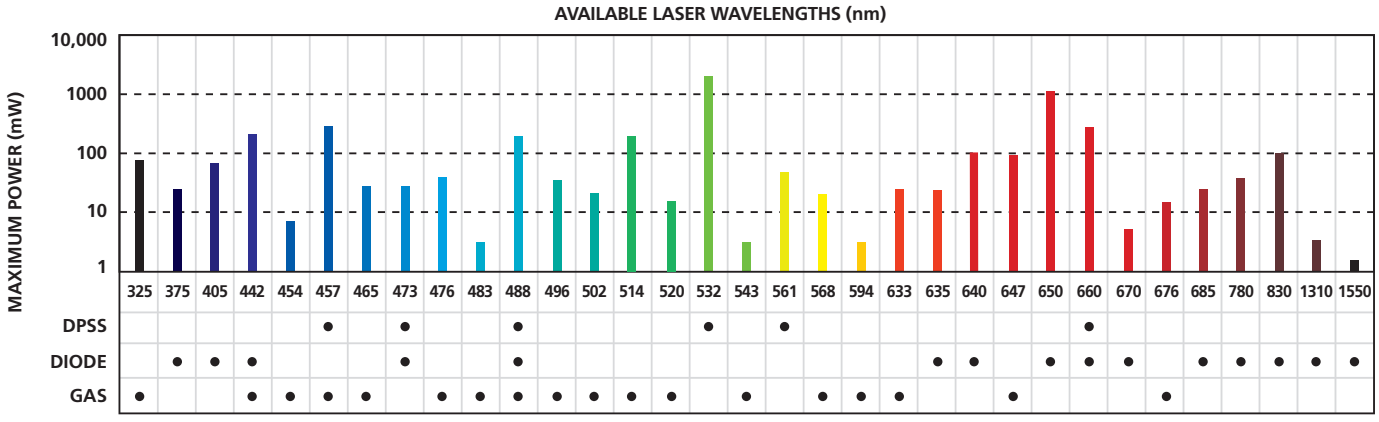
CVI Melles Griot Laser Group

From its beginnings in 1979, CVI Melles Griot Laser Group established itself as a premier manufacturer of laser-based light sources. This was accomplished through a customer-centric philosophy that delivered the exact solution our customer needed — rather than the rigidly defined set of products other companies offered.

This approach quickly catapulted the company to a leadership position in gas lasers. Over thirty years and nearly 3 million units later, CVI Melles Griot is widely known as a stable, reliable source for laser-based components and subsystems to the global marketplace.

The technologies used to generate laser light have changed considerably since 1979 and so have we. Our product portfolio now encompasses over thirty-six discrete laser wavelengths with technologies ranging from gas lasers to the latest developments in semiconductor laser technology.

With a strong core of engineering and development expertise, CVI Melles Griot maintains an ongoing commitment to technology development, state-of-the-art equipment, and world-class manufacturing processes and management systems. Combined with our long history and customer-centric culture, CVI Melles Griot provides the solutions you need to outperform your competition.



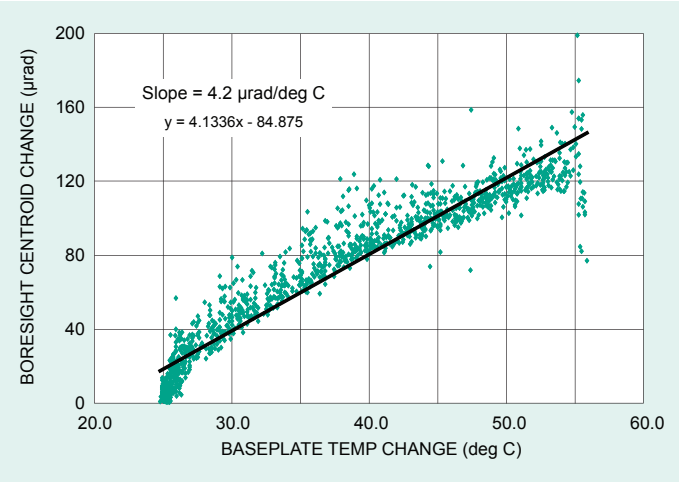
DESIGN | Lasers

Design

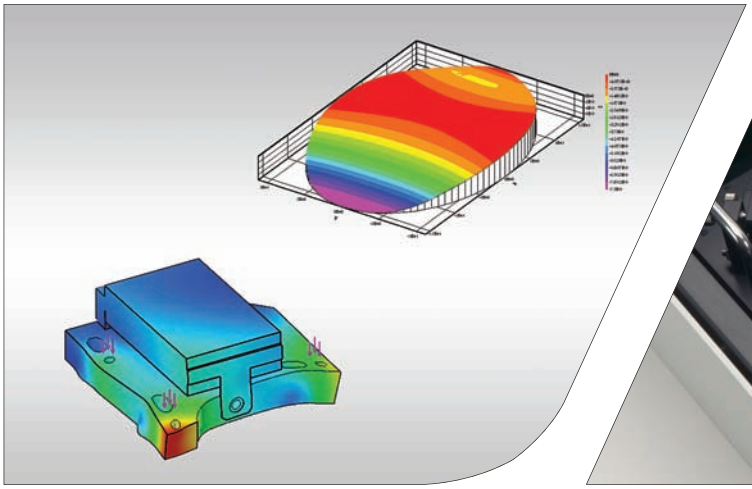
CVI Melles Griot continuously maintains an extensive depth of technological and applications expertise. Our seasoned design and development teams represent disciplines in laser physics, optical design, thin-film coating technology, mechanical and thermal management, electronics, software development, manufacturing and quality engineering. In total, more than a third of our employees are highly qualified engineers and scientists. We maintain a portfolio of more than 125 patents, 100 of which are in solid-state laser technology.

We arm our engineering team with the latest tools and training. Software tools such as Solid Edge™, AutoCAD™, SolidWorks™ and ZEMAX®, along with other finite element analysis methods, are just a small sampling. These tools, combined with extensive training in project management methods and documented design-verification-testing protocol, result in innovative and robust designs that withstand the test of time.

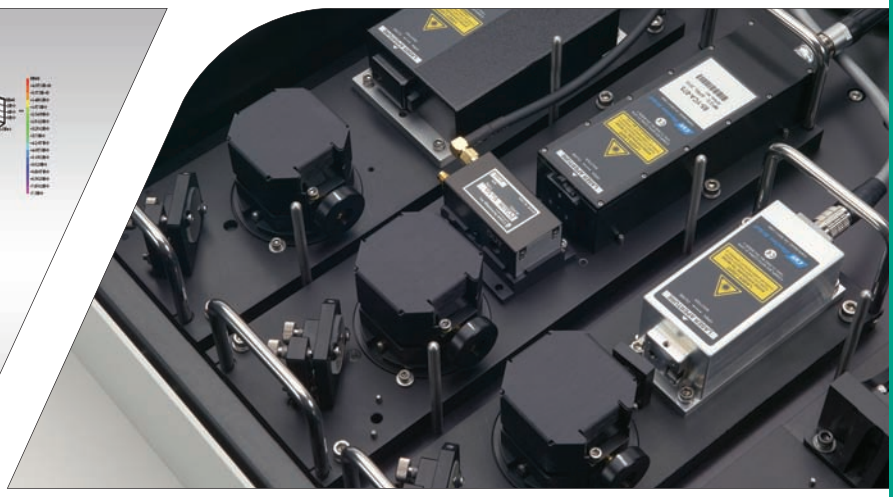
At CVI Melles Griot, our long-term relationships with market leaders and innovators in industrial, scientific, medical, research, and military communities around the world help us understand the product performance attributes that are important to your application. As a result, we work as an extension of your engineering department, keeping you current on the latest in laser technology.



CVI Melles Griot lasers and assemblies are designed for stable pointing performance over large temperature ranges.



Static and thermal Finite Element Analysis of an optical element and a mount design.



Multi-wavelength Laser Electro-Optical Assembly with modular cartridge design approach for easy upgrades.

Lasers | DESIGN

Laser Electro-Optical Assemblies

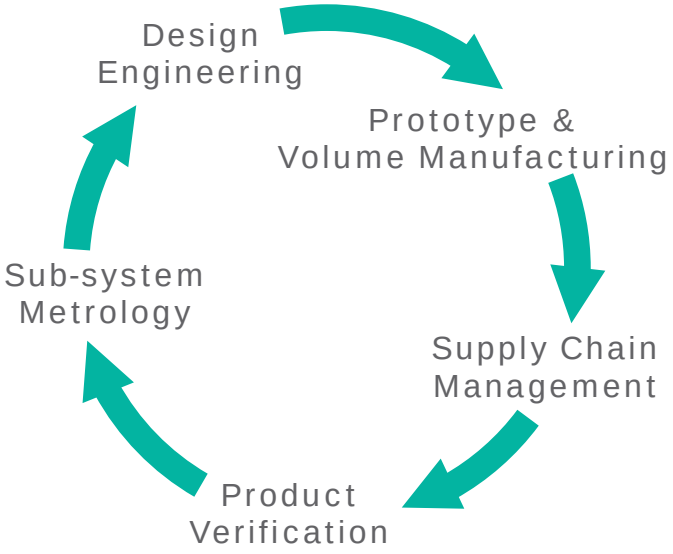
CVI Melles Griot offers the most complete portfolio of laser technologies in the industry. Wavelengths range from the ultraviolet through the near infrared, with delivered power up to 3 Watts.

We also offer design and manufacturing of Laser Electro-Optical Assemblies incorporating multiple laser sources, optics, mechanics and electronics. Reliable assemblies require manufacturing to sub-micron and micro-radian tolerances — one of our key competencies. These turnkey "light engines" can dramatically shorten your supply chain, reduce your field service costs, and minimize production complexities. They also come complete with a CVI Melles Griot guarantee of performance.

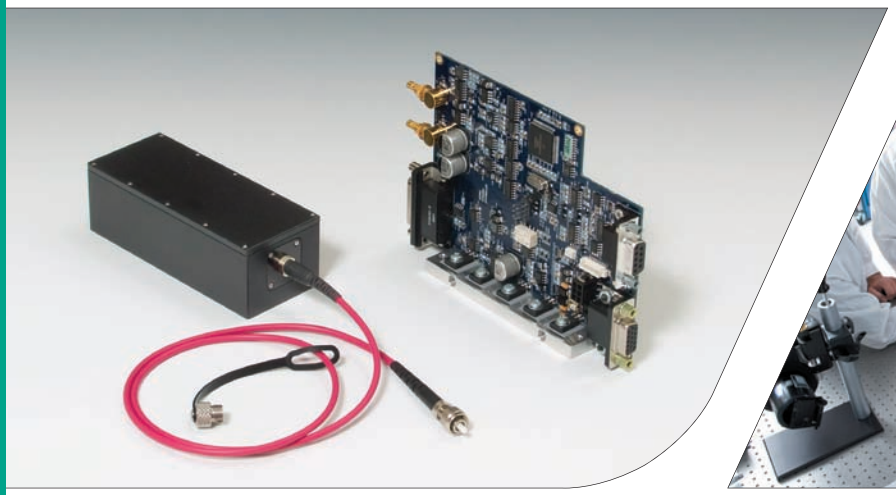
Beam delivery options include precision-focused spots, custom-tailored spot geometries, and fiber optic beam delivery to maximize your installation and service options. Logistics and service arrangements including safety stock, kanban, rotating service spares, and global pricing and service help to ensure that you have the right light sources in the right locations at the right time.

Many of our products are designed to facilitate field installation through the use of fiber optic beam delivery or mechanical means, including fiduciary marks, alignment pins, or pre-aligned mounting brackets. These custom package configurations can significantly reduce field service costs and help you maintain high levels of customer satisfaction.

OEM Value Proposition



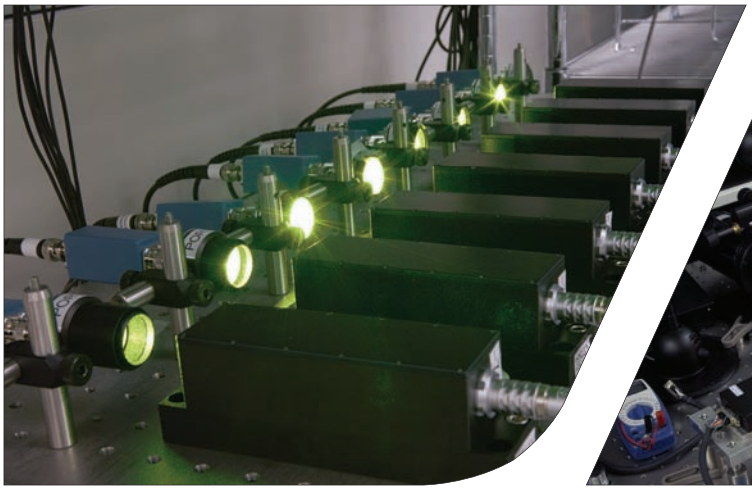
Our collaborative process keeps you involved, informed and helps you drive program timelines to help you out-compete in the marketplace.



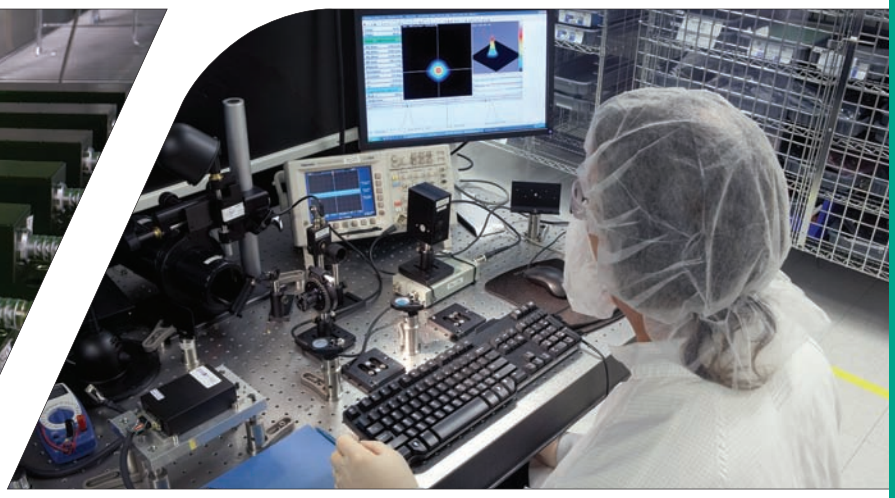
Custom OEM designs that facilitate modularity, mounting flexibility and easy installation.

The design verification testing process requires new products to go through rigorous testing, performance, and reliability hurdles in order to ensure that customers receive a proven product.

CERTIFICATION AND COMPLIANCE | Lasers



CVI Melles Griot offers turn-key, OEM modules, integrated assemblies, CE certified and IEC and CDRH compliant formats.



Automatic verification testing of lasers for power stability, optical noise and beam output characteristics.

Certification and Compliance

ISO 9001:2008

CVI Melles Griot Laser Group is ISO 9001:2008 certified. As a worldwide quality management standard, ISO certification supports a culture of continuous process improvement. Certification mandates a process oriented approach in which close interaction with customers and well-defined design, development, manufacturing and delivery processes translate into satisfied customers.

CE, CDRH, AND IEC

All standard CVI Melles Griot products incorporate applicable CE certification and are CDRH and IEC compliant for emissions and electrical safety. Custom and OEM products may be non-compliant, depending on the configuration you specify. In these cases, you must attain certification for your end product. Our experts can provide additional information about laser safety and compliance on request.

WEEE AND 2002/95/EC (RoHS) DIRECTIVES

CVI Melles Griot Laser Group is committed to compliance with EU Directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS). With this commitment, we support the need to conserve our natural resources whenever possible and restrict or eliminate certain hazardous substances from our products.

Many of our current products are designed for multiple reuse cycles and take advantage of strong recycling policies. As a responsible global citizen, we apply our considerable internal technical resources and strong supplier partnerships to fully meet this commitment.

Lasers | MANUFACTURING AND PROCESS CONTROL

Manufacturing

Our facilities provide 130,000-square-feet of manufacturing space, including localized Class 100 manufacturing areas within Class 10,000 clean rooms for critical processes. Current production lines accommodate unit volumes well in excess of 250,000 per year and are highly scalable as demand dictates.

CVI Melles Griot is vertically integrated for close control of the most critical components while minimizing production lead times. Dedicated ion-assisted ion beam sputtering coating chambers deliver the proprietary steep-cutoff and notch bandwidth coatings that control unit-to-unit consistency and spectral performance — and deliver highly efficient and compact laser sources for a variety of applications.

Cavity optcal substrates are super-polished to within 2-angstroms of surface roughness. Critical components are handled in accordance with the strict cleanliness standards of the ultrahigh vacuum and computer hard drive industries. Coating scatter is verified using a cavity ring-down technique to ensure highly efficient products with minimal heat generation and cooling requirements.

Process Control

Factory floor bar coding allows for statistical process control and lot tracking for critical components during the manufacturing process. Automated data acquisition and testing are incorporated and networked throughout our facilities to maximize production efficiency. This facilitates in-process characterization of sub-assemblies and accommodates final assembly and performance verification to ensure repeatability, high throughput, and accuracy.

New Products

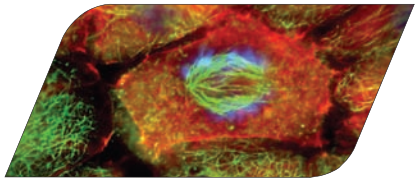
New products are developed using our quality management and formalized product launch process. Each product goes through very specific phases of proof of concept, validation of key specifications, production repeatability, and reliability analysis prior to release to the marketplace. To facilitate this process, CVI Melles Griot incorporates automatic design verification testing. New designs receive rigorous environmental testing including key parameters such as power stability, optical noise, beam pointing, polarization and beam quality measured over time and temperature and under mechanical shock and vibration conditions.

Dedicated state-of-the-art ion-assisted beam sputtering for high efficiency, high reliability lasers with controlled and repeatable spectral output.

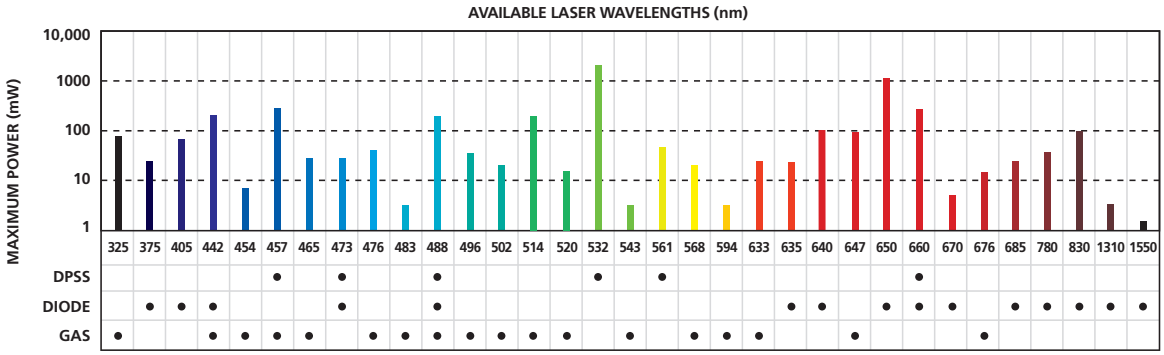
Microscopic inspection and assembly in a clean-room environment.

PRODUCTS AND CAPABILITIES | Lasers

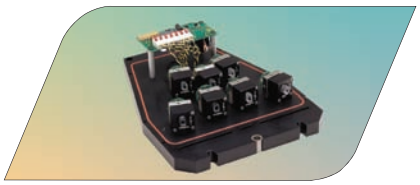
Your Application

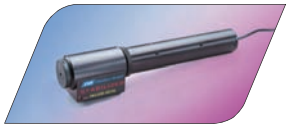

Your Choice



Our Capabilities

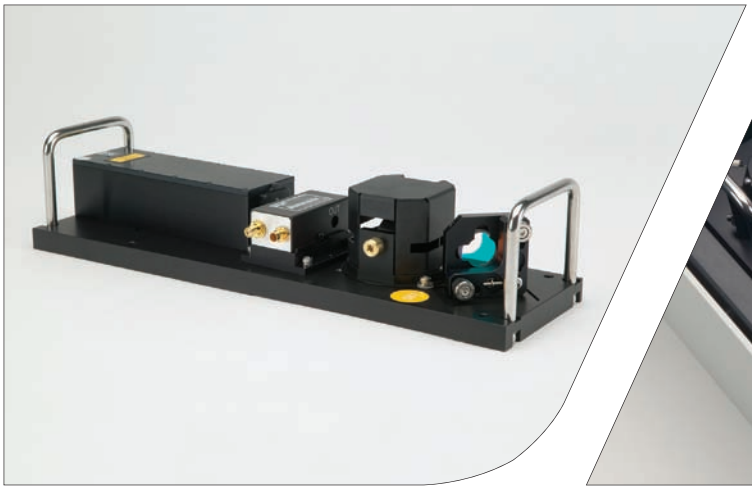
		
Laser Systems	**Laser Systems with Integrated Beam Delivery**	**Fully Integrated Multi-Laser Engines**
• Wavelengths from 375 to 1550 nm • cw and modulated outputs • Turn-key and OEM designs	• Fiber or freespace delivery • Thermally stable output • Mounting flexibility	• Guaranteed system performance • Modular upgrade options • Reduced supply chain

Lasers | PRODUCTS AND CAPABILITIES

Laser Technology	Wavelengths (nm)	Attributes and Options
Semiconductor 	375, 408, 440, 473, 488, 635-830, 1310, 1550	• 1 mW to 1.5 W with cw or high speed modulated output • Turn-key standard, OEM custom and multi-laser integrated assemblies • Precision boresighted and prefocused spot options • Circular, elliptical and fiber delivered beams • Tested and characterized with guaranteed performance • Metrology, imaging, alignment, medical and fluorescence based applications
Diode-Pumped Solid-State 	457, 473, 488, 532, 561, 660, [914, 1064, 1122, 1320]*	• Superior pointing and power stability from 10 to 40 C • Performance verification data • Turn-key, OEM module, multi-laser integrated assemblies • Integrated fiber beam delivery for unique/constrained mounting • Plug and play replacements available • Spectroscopy, imaging, metrology, medical and fluorescence based applications
Argon-Ion 	457-488, 476-514	• Power from 2 to 500mW • Built in or remote cooling • Single-line, tunable and multiline • Cylindrical and rectangular plug and play replacements available • Fiber beam delivery available • Spectroscopy, imaging, metrology and fluorescence based applications
Krypton/Argon 	476-514, 568, 647	• Economical multiline source • Multiline or tunable • Built in or remote cooling • Mirrors substitutions for other spectral outputs • Spectroscopy and fluorescence based applications
Helium Neon 	543, 594-633	• Power from 0.25 to 35mW • Power to 100W intracavity • Low cost wavelength standard • Frequency stabilized, Brewster's tubes, plasma tubes, laser heads • Integrated assemblies and fiber beam delivery • Metrology, interferometry, imaging, spectroscopy and fluorescence based applications
Helium Cadmium 	325, 442	• Economical UV and violet light source • Narrow spectral bandwidth • Inspection, stereolithography and fluorescence based applications

We offer form, fit and function replacements for a wide variety of Ion, HeNe, DPSS and Diode Laser Modules in both cylindrical and rectangular package formats.
** Other possible lasing wavelengths for OEM volume applications.*

PRODUCTS AND CAPABILITIES | Lasers



Laser Based Electro-Optical Assemblies

When designing an integrated system that incorporates either a single laser or multiple lasers, balancing performance parameters and cost can be challenging. This includes design factors such as additive effects of component tolerances, thermal and vibration effects, optical efficiency, regulatory requirements and environmental conditions. You need a broad level of expertise at your fingertips; including laser physics, opto-mechanics, optics, coating design, thermal management, controller hardware and software, to name a few. Design is just the beginning. You then need to verify performance, perform environmental testing, organize regulatory testing and manage and procure materials. When that's done, you have the task of manufacturing, quality control, training and documentation.

By partnering with CVI Melles Griot for your Laser Electro Optical assemblies, the breadth of our photonics engineering expertise is at your fingertips. With entire facilities specializing in lasers, optics, coatings and opto-mechanics, you can count on a breadth and depth of expertise that is unmatched in the industry. Not only do we design it, but we manufacture it ourselves; in our own facilities with our own design teams present. This uniquely positions us to serve you with an intimate understanding of component interaction and reliable, repeatable system level performance.

You also gain access our worldwide volume manufacturing network and extensive vertical integration and investment in capital equipment. Combined with over 50 years of manufacturing expertise, you can feel confident in the solutions we deliver.

We develop and deliver these solutions within a highly collaborative process, that keeps you involved, informed and helps drive program timelines. The result is a laser-based system that meets or exceeds your performance requirements, in a timeframe that helps you out-compete in the marketplace.

Why CVI Melles Griot?

- World-class design and development process
- Highly trained, multi-disciplined design team in-house
- Over 50 years of design and volume OEM manufacturing expertise
- Field-proven system-level platform designs
- Reduced Production Complexities and Supply Chain
- Vertically integrated in key technology areas
- Guaranteed system-level performance