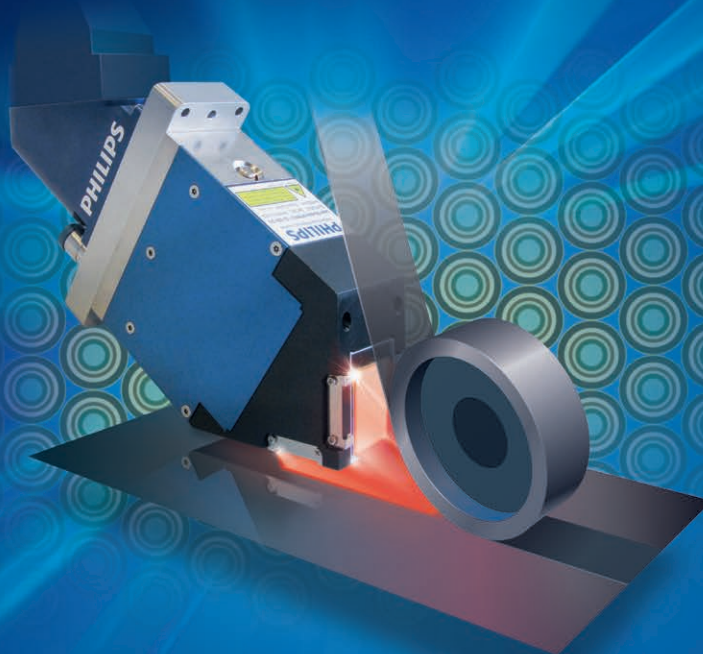


PHILIPS

Photonics

Industrial heating

VCSEL technology



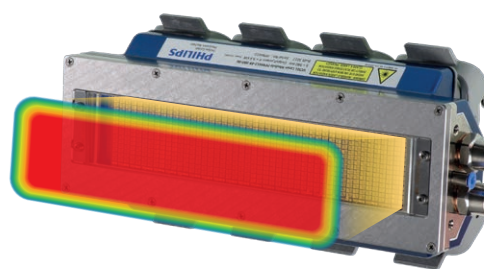
High Power Infrared Sources for Composite Manufacturing

Scalable and flexible solutions for fiber placement and tape laying processes

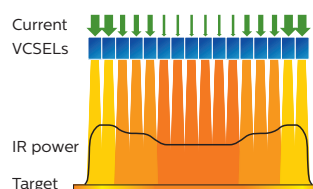
Designed for the specific requirements of fiber placement / tape laying applications, new compact VCSEL laser sources deliver directed and controlled infrared power and enable high productivity in narrow and wide layout width process configurations.

Philips Photonics is producing industrial laser sources based on VCSEL (Vertical Cavity Surface Emitting Laser) micro laser arrays. The robust and compact laser modules deliver directed large-area beams of infrared power and are easily integrated into industrial heating applications and production processes.

An electronic driver system enables precise power control and fast switching. As a unique feature, individual emission zones of the source can be controlled independently. Thereby dynamic programming of the spatial heating pattern is possible, enabling an unprecedented level of process flexibility and control.



Direct large area treatment



Flexible control of heating profile

Philips Photonics

Philips Photonics is a leading innovator in VCSEL-based infrared lasers, developing and manufacturing devices, modules, systems and applications. Philips Photonics develops optimal solutions tailored to the specific needs of the process, in close collaboration with customers. Products and solutions are based on Philips' comprehensive know-how in technology, design, quality and production and a strong network to leading suppliers and scientific institutes. Philips Photonics is a fully owned business of Philips Electronics N.V.

Philips Photonics' VCSEL sources offer powerful and reliable performance for industrial production of composites

Key features

- High power infrared laser sources designed for the requirements of fiber placement / tape laying applications
- Scalable kilowatt-range output power based on Philips VCSEL (Vertical Cavity Surface Emitting Laser) technology
- High power density on the target, enabling fast processing
- Precisely controllable by individually addressable emission zones (tailored intensity profiles, in time and spatially)
- Compact, robust and easy to integrate
- Lower cost than conventional laser systems

PPM412-12-980-24-c

Based on the standard PPM412 industrial range of laser modules, a more compact version of the 2.4 kW module was developed, where the electrical power connector was moved to the end of a cable attached to the module. Performance data and specifications, besides geometry and electrical interface, are the same as for the standard PPM412-12-980-24 laser module. Because of the minimized size, the laser module can be mounted in very restricted geometries. In addition, tape laying configurations with two laser modules are possible, as shown in the illustration on the right. Here, one module is pre-heating the layup substrate and a second module delivers the heat for the consolidation process.

PPM417-10-980-20

The new PPM417 laser module is optimized for the specific process boundary conditions of fiber/tape-placement applications. It is extremely compact, with only 49mm width, and delivers more than 2 kW of infrared power from five VCSEL emitters. The module is typically equipped with a concentration optics for 25mm tapes, thereby enabling layup of narrow 3D forms. The high power density enables fast placement speed for various types of fibers and tapes, including thermoplastic materials with high melting temperature. Besides using a single unit, stacking of many of the laser modules is possible, supporting applications of wide layup width and high productivity. Because of the dynamic programming of the spatial heating profile, in such a configuration still the flexibility to produce at narrower layup width is maintained.

Typical Data Laser Module	PPM412-12-980-24-c	PPM417-10-980-20
Optical power kW (cw)	0.1 ... 2.4	0.1 ... 2.0
Emission area mm ²	40 x 52	47 x 26
Distinct emission zones	12	10
Wavelength nm	980 ± 20	980 ± 20
Power density ¹⁾ W/cm ²	typ. 115	typ. 140
Optics	none (lens optional)	26 mm mirror concentrator
Protective front glasses ²⁾	1 internal & 1 outer borosilicate, anti-reflex coated	1 internal & 2 outer borosilicate, anti-reflex coated
Electrical interface	industry standard power connectors	
Laser module size ³⁾ mm	W87 x H48 x L108	W49 x H133 x L270

Driver Unit

Number of driver racks	1 x PPD007/008	1 x PPD007/008
Laser control	typ. 10ms time constant, individual control and fault monitoring of laser zones	
Machine communication	Ethernet-based (EtherCAT® protocol)	
Mains voltage	3 phases 230V / 400V (±10%), 47-63 Hz	
Mains supply unit (option)	mains connection unit with safety circuit	

¹⁾ at emission aperture ²⁾ outer glasses user-replaceable ³⁾ without connector

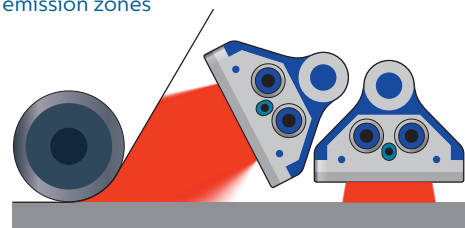
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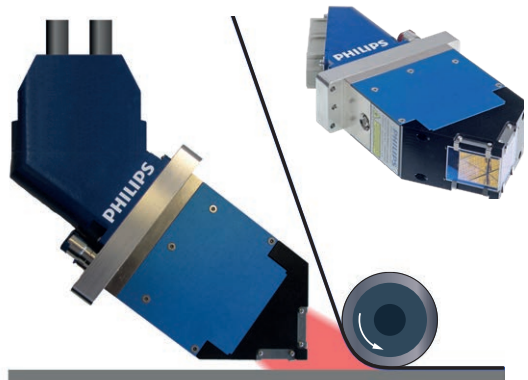


2.4 kW VCSEL module PPM412-12-980-24-c.

52 mm x 40 mm emission area, 12 programmable emission zones



Configuration example for multi-material layup



2.0 kW VCSEL module PPM417-10-980-20

with concentration optics and two protective front glasses

Safety information

The products contain laser arrays emitting invisible high power laser radiation of laser class 4, which can cause serious injury. The machine manufacturer is responsible to fulfill the relevant laser-related and other safety regulations.

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