

VCSEL solutions

High Power Infrared Sources for Industrial Heating

Fast processing

Thanks to high power density

Scalable

Application specific kW range output

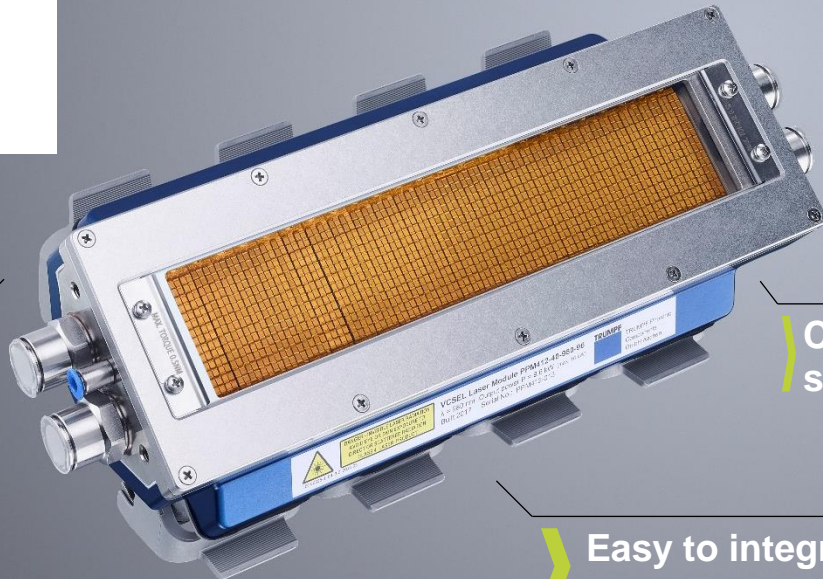
Cost sensitive

Precise control

Tailored solution by individually addressable emission zones

Easy to integrate

Compact and robust design



Compact laser modules offering scalable and flexible solutions for industrial thermal processes

Laser sources based on VCSEL micro laser arrays are delivering directed large-area beams of near infrared power that can be applied in many industrial heating applications and production processes.

Considerable cost advantages compared to conventional lasers can be realized by direct illumination of the target area, without expensive optics or scanner systems.

As a unique feature, beyond precise control and fast switching of the infrared power, also the spatial heating profile can be arbitrarily programmed by independent control of small segments of the laser modules. Heating patterns can even change dynamically during operation, enabling an unprecedented level of process flexibility.

TRUMPF VCSEL light sources offer excellent and reliable performance over a wide range of conditions

High power infrared sources for industrial heating offer a wide range of application fields, such as:

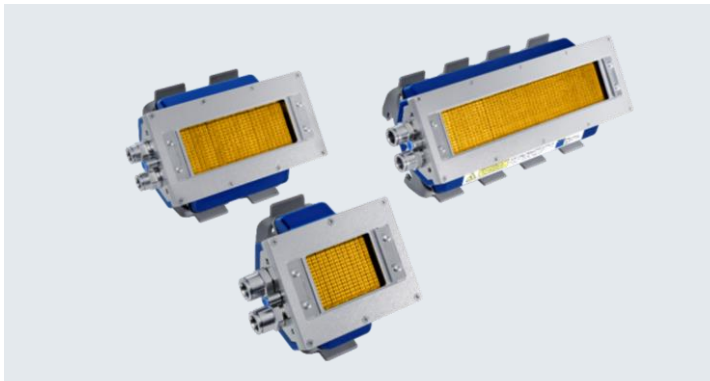
- General thermal processing
- Plastics welding / forming
- Composite manufacturing
- Drying / curing of coatings
- Printed electronics
- Photovoltaics
- Selective metal treatment
- Preheating for additive manufacturing as 3D printing

Key features of industrial VCSEL heating solutions:

- High power infrared laser source based on VCSEL (Vertical Cavity Surface Emitting Laser) technology
- Scalable kilowatt-range output power
- High power density of 100 W/cm² 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



Flexible control of heating



Different product types of VCSEL heating modules

PPM412 High Power Laser System – Typical Data

PPM412 laser systems can be scaled from small to large treatment width and up to several ten kilowatts infrared output power.

PPM412 High Power Laser Systems				
Laser Modules		PPM412-12-980-24	1PPM412-24-980-48	PPM412-48-980-96
Optical Power	kW (cw)	0.1 ... 2.4	0.2 ... 4.8	0.4 ... 9.6
Emission Area	mm ²	40 x 52	40 x 104	40 x 208
Distinct emission zone		12	24	48
Power Density	W/cm ²	min. 100/typ. 115 (at emission aperture)		
Wavelength	nm	980 ± 20		
Beam half angle		typ. 10° (enclosing 95% power)		
Front glass		double borosilicate, anti-reflex coated		
Options		air curtain protection, integrated lenses		
Electrical interface		Industry standard power connector		
Laser module size	mm	W 87 x H 48 (without connector)		
		L 108	L 160	L 264
Driver Unit				
Number of driver racks		1	2	4
Laser control		Typ. 10 ms time constant; individual control of laser emission zones, integrated laser zone monitoring		
Machine communication		Ethernet-based (EtherCAT® protocol)		
Mains voltage		3 phase 400 V (±10%), 47-63 Hz		
Mains supply unit (option)		Mains connection unit with safety circuit		

For more information visit
www.trumpf.com/s/VCSEL-solutions



Safety information:

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