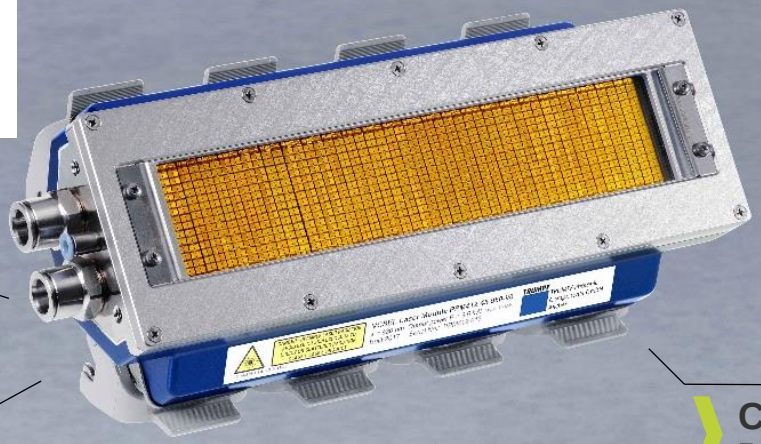
Industrial Heating

# VCSEL High Power Infrared Sources



**Scalable**
Application specific IR-output

**Fast processing**
Thanks to high power density

**Compact**
Easy to integrate

**Precise control**
Local control by individually addressable emission zones

**Low cost**
For cost sensitive applications

## 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, 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

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

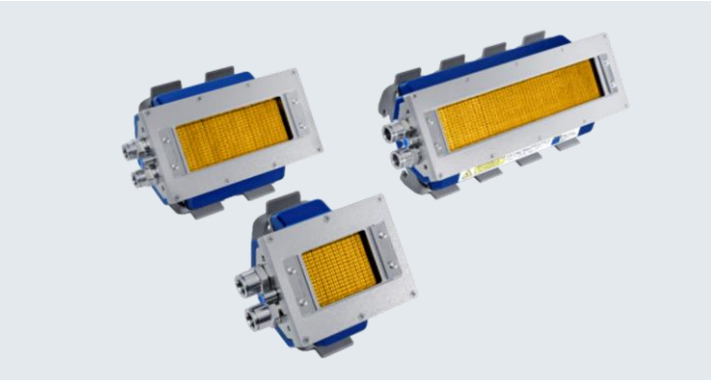
**High power infrared sources for industrial heating serve a wide range of application fields, such as:**

- General thermal processing
- Plastics welding / forming
- Composite manufacturing
- Drying / curing of coatings
- Printed electronics
- Photovoltaics
- Selective metal treatment
- Preheating for metal 3D printing
- Battery foil drying and pouch sealing in e-mobility

**Key features of industrial VCSEL heating solutions:**

- High power infrared laser source based on VCSEL (Vertical Cavity Surface Emitting Laser) technology
- Scalable kW 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 emitted IR-radiation



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 System | | | | |
|---|---|---|---|---|
| **Laser Module** | | **PPM412-12-980-24** | **1PPM412-24-980-48** | **PPM412-48-980-96** |
| Optical power (max.) | kW (cw) | 2.4 | 4.8 | 9.6 |
| Emission area | mm² | 40 x 52 | 40 x 104 | 40 x 208 |
| Distinct emission zones | | 12 | 24 | 48 |
| Power density | W/cm² | 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 | | |
| 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 | | typically 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 | | |

**For more information visit**
www.trumpf.com/s/vcsel-heating-systems

**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.

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