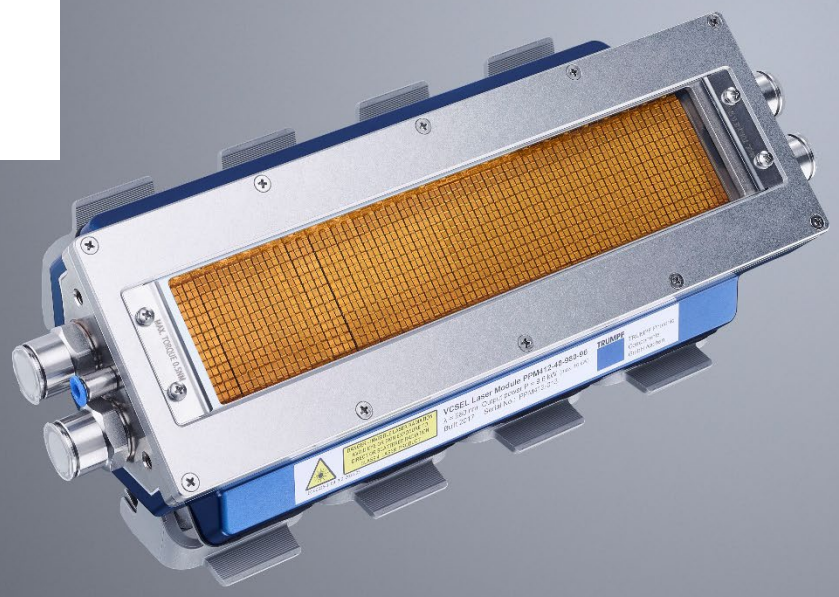
# High Power Infrared Sources for Industrial Heating



## 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

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

**Typical applications:**

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

**Key features:**

- High power infrared laser source based on TRUMPF 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

**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** | | **PPM412-12-890-24** | **PPM412-24-980-48** | **PPM412-48-980-96** |
| Optical Power | kW (cw) | 0.1 … 2.4 | 0.2 … 4.8 | 0.4 … 9.6 |
| Emission Area | mm² | 40 x 52 | 40 x 104 | 40 x 208 |
| Distinct emission zone | | 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 | | |
| 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. 10ms time constant; individual control of laser emission zones, integrated laser zone monitoring | | |
| Machine communication | | Ethernet-based (EtherCAT® protocol) | | |
| Mains voltage | | 3 phase 400V (±10%), 47-63 Hz | | |
| Mains supply unit (option) | | Mains connection unit with safety circuit | | |

**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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