



## **Press Release**

# **TRUMPF presents VCSEL heating systems for faster microchip assembly**

**Electronics industry to benefit from VCSEL heating systems by increasing quality of solder interfaces // Direct heat treatment to improve die attach and assembly process // Laser Assisted Bonding process for faster and cost-efficient flip-chip assembly // Laser Assisted Soldering process to support flatter design of microelectronic assemblies**

*Ulm, March 24, 2021* – TRUMPF Photonic Components presents new processes utilizing their VCSEL heating systems for flip-chip assemblies in the electronics industry. By using VCSEL heating systems for Laser Assisted Bonding (LAB) and Laser Assisted Soldering (LAS) cycle times are reduced down to a ninth compared to standard reflow soldering processes. Furthermore, the quality and reliability of PCB assemblies are increasing, as the VCSEL heating systems work with high precision. As the intensity distribution of laser radiation can be adjusted by the individual control of single laser zones, the heat is only applied on the PCB and semiconductor die where it is needed. Consequently, the quality and lifetime of the PCB boards as well as the die attach and solder interfaces benefit from this technology because warpage and heat within the die are significantly reduced. The assembly process also benefits from very repeatable and accurate die bonding and soldering conditions, as the VCSEL heating system allows homogenous illumination, fast switching times and precise power control. Another aspect is the overall footprint for microchip assembly. It can be reduced compared to conventional reflow solutions because the VCSEL heating systems are very compact.

### **How Laser Assisted Soldering and Laser Assisted Bonding works**

LAS is the process called, when the solder balls are soldered directly on the PCB using VCSEL infrared heat treatment. This is particularly of relevance to support the trend towards using smaller solder balls and pitches, which in turn also allows for a reduction in overall building space needed in consumer electronics.

During the LAB process, a flip-chip is placed on a PCB board, using solder balls as a connection. The VCSEL system heats the chip from above, and the laser



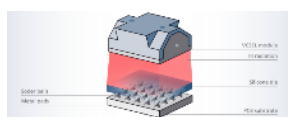
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energy is transmitted through a silicon die to melt the solder balls between the chip and PCB. VCSEL heating systems can either be used for stationary heating or for on-the-fly heating applications. The VCSEL-based systems offer bigger heating areas with higher power compared to other solutions.

In the Customer Application Center in Aachen, Germany, TRUMPF offers customers a testing lab for these potential applications. “It is great to see that with our unique VCSEL heating modules electronics manufacturing can also benefit. The compact design and its homogeneous heating patterns lead to better process control and higher product quality. At the same time, it reduces the footprint of the assembly production line – in the case of LAB of up to 30 percent”, explains Ralph Gudde, VP Marketing and Sales at TRUMPF Photonic Components.

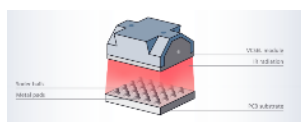
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### Laser Assisted Bonding (LAB)

Schematic drawing of the LAB process. A flip-chip is attached to a PCB board by laser energy transmitted through a silicon die to melt the solder balls between chip and PCB.



### Laser Assisted Soldering (LAS)

Schematic drawing of the LAS process. A flip-chip is attached to a PCB board by laser energy directly melting the solder balls to the PCB.



### VCSEL heating module

High-power infrared VCSEL heating modules provide scalable power and can be regulated precisely.



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### **About TRUMPF Photonic Components**

TRUMPF Photonic Components is a global technology leader, supplying VCSEL and photodiode solutions for consumer electronics, datacom, automotive, industrial sensing and heating markets. So far, more than two billion VCSEL chips and photodiodes have been shipped worldwide. The staff continues to drive its technological know-how, that has been established for over 20 years now, in order to maintain its leadership position. The long-established technology was acquired by TRUMPF in 2019. The company has its headquarters in Ulm, Germany, with further sales locations in the Netherlands, China, Korea and the US.

TRUMPF Photonic Components belongs to the TRUMPF Group, a high-technology company that offers production solutions in the machine tool and laser sectors.

TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, and also for industrial lasers and metal 3D printing. In the 2020/21 fiscal year, the company employed some 14,800 people and generated sales of about 3.5 billion euros. With over 80 subsidiaries, the TRUMPF Group is represented in nearly every European country, in North America, South America and Asia. The company has production facilities in Germany, France, the United Kingdom, Italy, Austria, Switzerland, Poland, the Czech Republic, the United States, Mexico and China.

For more information about TRUMPF Photonic Components visit:

[www.trumpf.com/s/VCSEL-solutions](http://www.trumpf.com/s/VCSEL-solutions)

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