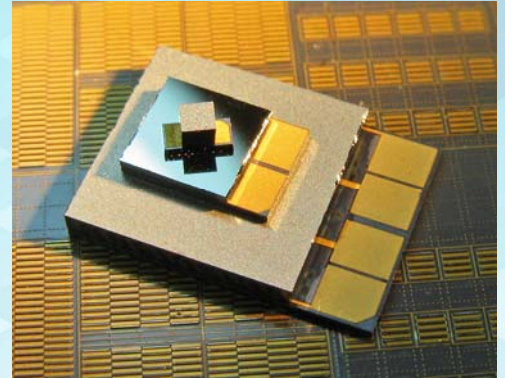


Micro-Scale TEC Solutions for Cooled TOSA and Stabilized Photonics and Sensor Applications

Micropelt Silicon Wafer Based TEC Technology

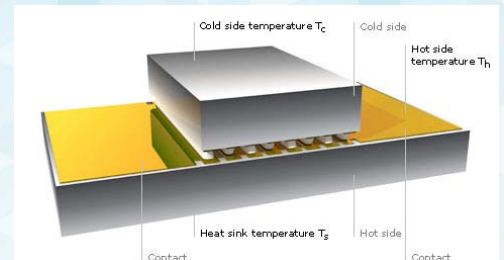
- Micropelt products are fabricated on silicon wafer using standard semiconductor processes:
- Device soldering temperature is near 300°C, lead free solder
- Operating temperature $\leq 200^\circ\text{C}$
- Substrates are standard silicon wafers, 4 or 6 inch.
- Electrical connection:
Standard wire bonding or via pre-soldered wires.
- Backside metallization (currently TiPt), attachment guidelines provided.
- Attractive economies of scale:
Higher volume – lower device cost



Micropelt Cooler stack on wafer

Ultra-small TE coolers on Silicon substrates

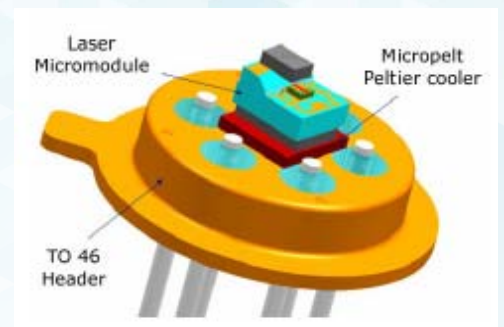
- Max. ΔT is, device dependent, up to 60 K in vacuum.
- High Power Cooling @ Chip Dimensions:
- The smallest device:
Cold side of 1.18 mm x 0,83 mm (MPC-D303) to accommodate just a laser diode or sensor.
- The largest device:
3.4 mm x 4.3 mm (MPC-D701) ideal for high power water-cooled applications
- Extremely dynamic with up to 180 K/s ramp rate and 60 to 100 W/cm² pumping power
- Low-Q / high volt designs (28K/20mW @ 1V/100mA)
- Low dimensional tolerances
- Compatible thermal expansion coefficient



Micropelt Micro Cooler MPC-D303

Customization Options for Volume Applications

- Total cooler heights of 0.5 mm or 1.1 mm respectively for easy package integration and short RF connections.
- Micro-structures can be customized to match electrical, thermal and physical requirements
- Special temperature feedback solutions
- Various metallization
- Packaging platforms for batch assembly & test



Micropelt chip-sized thermoelectric coolers offer superior performance for thermal management and fast, precise temperature control of small low power devices - in the smallest possible package.

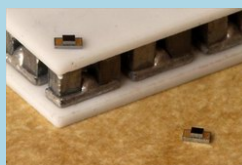
Engineering samples are available from stock.

Contact us: info@micropelt.com or +49 761 156 3370

Scaled Performance

vs. conventional TECs:

- 10 x higher cooling power density
- 50 x more leg pairs per sqmm
- 100 x faster response times



MPC-D303 on conventional thermoelectric element

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Samples and Eval.-Kits available from stock.

Low cost thermal management for next generation packages!

Company Overview:

Micropelt focuses its resources primarily on core technology and IP development while generating application related know-how and IP wherever necessary to enable target applications. As a product company, Micropelt will start with a small wafer production of up to 30 wafer starts per week in its own fabrication site, which will drive down cost and protect non-patented IP and know-how.

Micropelt addresses **four target markets:**

Power generation



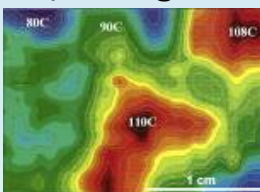
Embedded and discrete “energy harvesting” from waste heat. Self sustaining power supply for sensor systems in condition monitoring of machines, buildings, cars, etc. Helps avoiding unpredicted production down time and reduces maintenance and production cost. Reduces cost of ownership, while increasing life cycles.

Laser cooling



Laser thermal management increases Laser efficiency or to stabilize wavelength in Telecom (TOSA) and Industrial Laser/Sensor applications. Conventional TECs are limited in miniaturization. Micropelt Micro-TECs reduce packaging cost as well as cost of ownership by facilitating the use of smaller TO can packages (picture) instead of expensive butterfly packages.

Chip cooling



Integrated circuits, in particular high performance microprocessors, are limited in clock speed performance by so called hot-spots. Increasing packaging density limits passive heat removal. A package with integrated spot cooling devices can solve heat piping problems for better performance and longer product life time.

Rapid Thermal Cycling



Three to five times faster temperature ramping (>15 °C/sec up or down) applied to smallest footprints support thermal cycling on a new performance level, e.g. for faster and more precise standard PCR and lab-on-chip applications. Direct, individual well control, increased throughput and superior packaging potential open new ways towards advanced analytical and diagnostic applications, including disposable point-of-care devices.

Micropelt in Brief

The company has developed a unique technology with no other comparable thin-film process technology existing world-wide. The experienced management team and key technical staff are on board since many years with in-depth know-how in thermoelectric and related applications. Products are fabricated on a pilot production line with up to 15 wafer starts per week in Freiburg, Germany. A serial production plant, fully financed and currently under construction in Halle, Sachsen-Anhalt, is expected to raise capacity to some 10 Mio devices per year by mid 2010.

Product sizes range from sub-mm² Laser cooling products (left) to 25 mm² high performance heating/cooling elements (right). Power generation (MPG-Series) and cooling devices (MPC-Series) have identical dimensions but differ in the number of leg pairs and leg geometries.



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