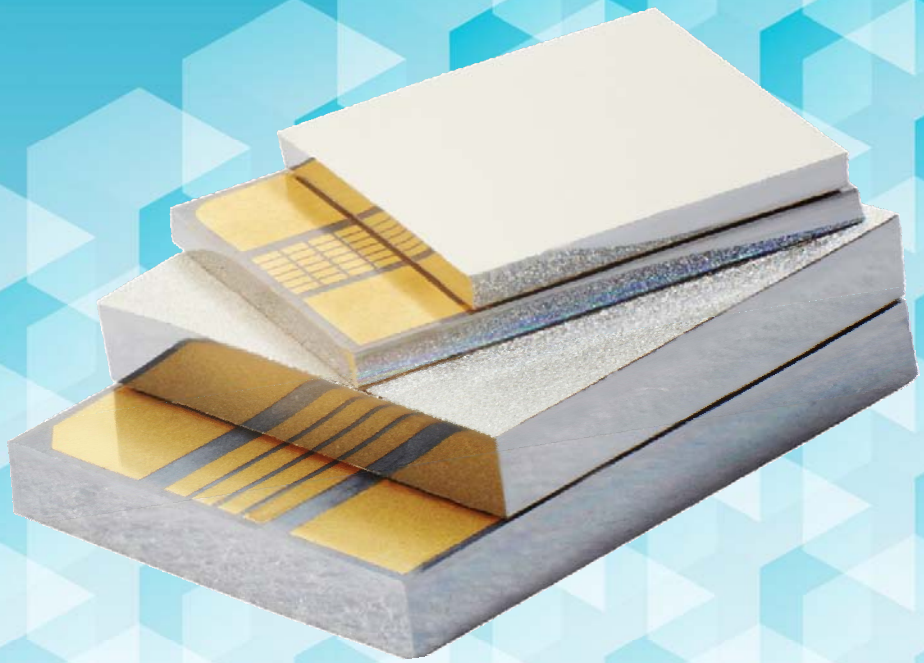
MPG-D651
MPG-D751

Thin Film Thermogenerators and Sensing Devices



micropelt
Power generation.

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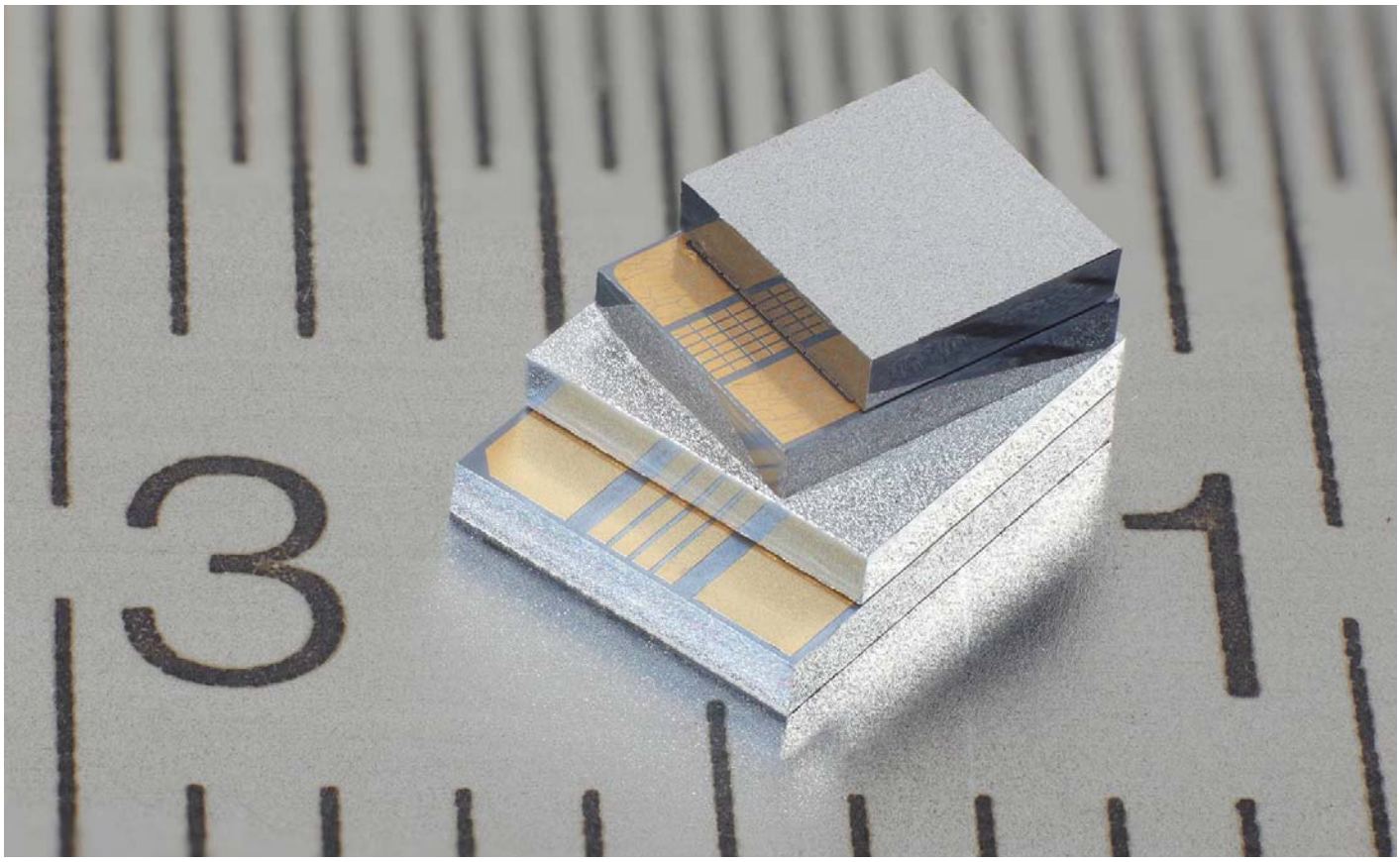
Small and Powerful



Thermoelectric power generation is based on the transfer of thermal energy through multiple couples of p-type and n-type thermoelectric legs. Micropelt uses compounds of Bismuth (Bi), Antimony (Sb), Tellurium (Te) and Selenium (Se) providing optimal efficacy at operating temperatures around ambient and up to 200 °C.

The generated output voltage is proportional to the number of leg pairs and the actual temperature difference ΔT across the thermogenerator.

$$U = N_{legpairs} \times \Delta T \times \alpha$$

Thanks to its patented wafer-based thin-film MEMS-like micro-structuring process the Micropelt MPG thermogenerator series offers the industry's highest available packing density of up to 100 thermoelectric leg pairs per mm^2. As per Seebeck's law this translates into 1.4 V at as little as 10°C of temperature difference.

Our scalable wafer fabrication concept offers unprecedented economies of scale for thermoelectric volume applications .

Micropelt offers two standard product sizes with hot side areas of approx. 8 mm^2 and 14 mm^2, chip height each around 1.1 mm. Customized device sizes and adaptation to electrical and thermal application requirements can be implemented.

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Features and Product Details

Features:

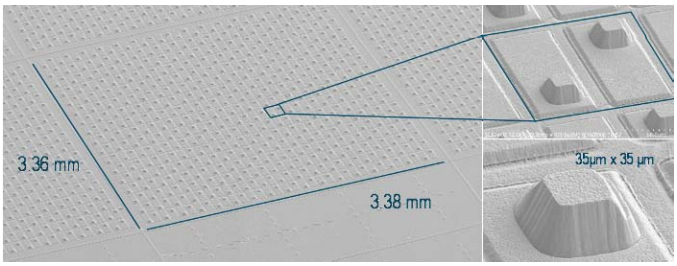
- Micro integrated device with high power density
- Up to 100 leg pairs per mm^2
- Component total height: 1090 µm
- Maintenance-free solid state operation
- Long life time
- Compatible with SMD placement and die bonding assembly, metalized surfaces optional
- Low weight, low thermal mass
- Fast response time < 3 msec (thinned substrate)
- High operating temperatures ≤ 200 °C
- High voltage output of up to 1.75 V per Watt of thermal input

Applications:

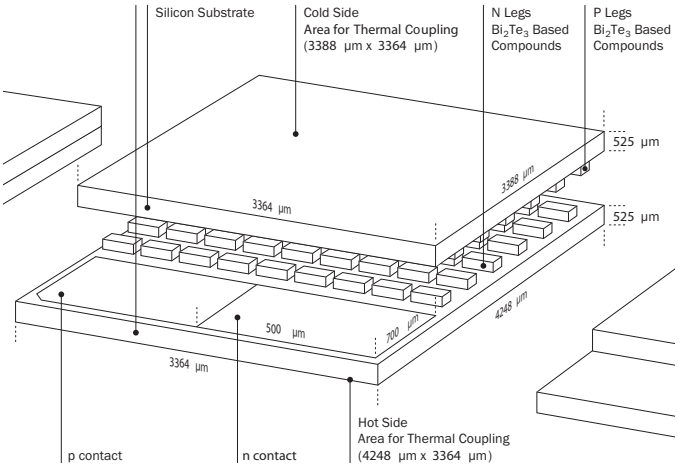
Generic power supply utilizing waste to drive milliwatt (wireless) applications, including:

- Wireless sensor networks (WSN)
- Industrial process monitoring
- Condition monitoring
- Thermal event logging
- Thermal triggering
- Intelligent buildings and HVAC
- Automatic meter reading (AMR)
- Medical devices
- Energy monitoring & control
- Highly sensitive and ultra-fast heat flux sensing

Thermoelectric legs on silicon wafer



MPG-D751 dimensions (schematic drawing)



Product family

Type	Maximum Dimensions [mm] Top side Bottom side	Minimum Dimensions [mm] Top side Bottom side	Number of leg pairs	Thermal Resistance at 85°C	Electrical Resistance at 23°C	Net Seebeck Voltage at 23°C	Thickness [µm]
MPG-D651	2.5 x 2.5 3.375 x 2.5	2.45 x 2.45 3.325 x 2.45	286	22 K/W	185 Ω	75 mV/K	1090
MPG-D751	3.388 x 3.364 4.248 x 3.364	3.388 x 3.314 4.198 x 3.314	540	12.5 K/W	300 Ω	140 mV/K	1090

All non-geometrical values simulated by our simulation tool „mypelt". Data subject to continuous improvement.
mypelt: http://www.micropelt.com/products/mypelt.php

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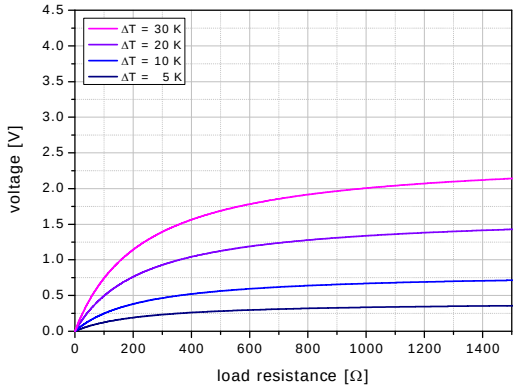
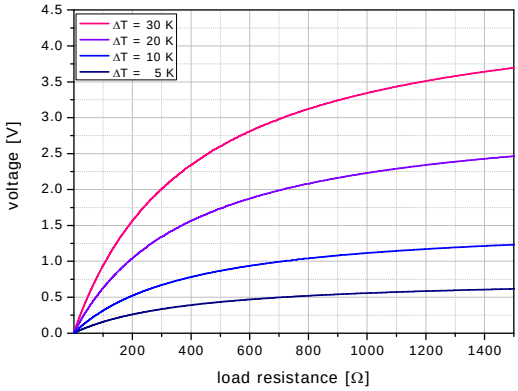
MPG-D651 MPG-D751

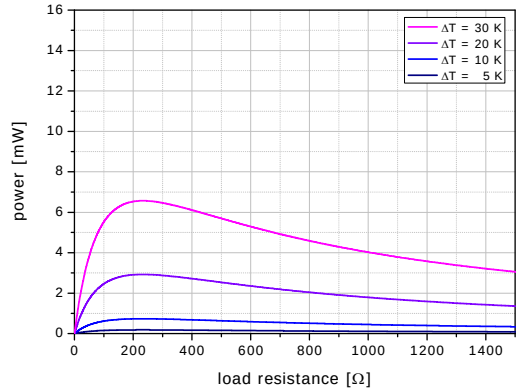
Simulations: Generated voltage and electrical power at ambient temperature 25 °C.
Please note: Simulations assume effective ΔT of 5/10/20/30 K across the thermogenerator element.

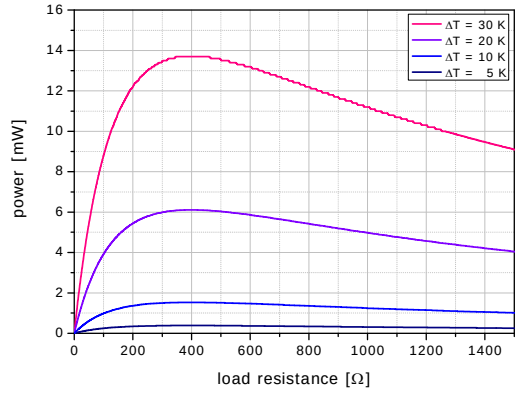
Voltage versus load resistance



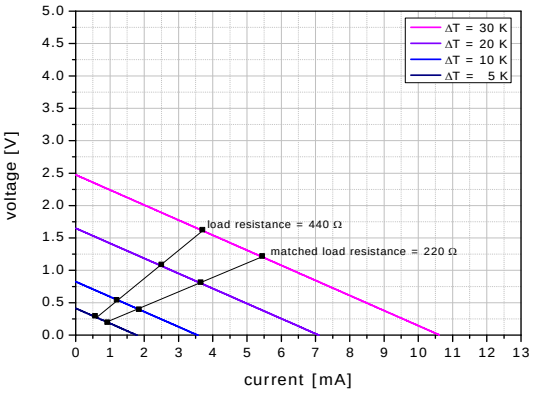


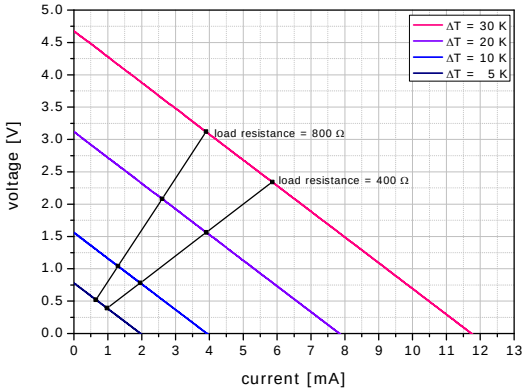
Power versus load resistance



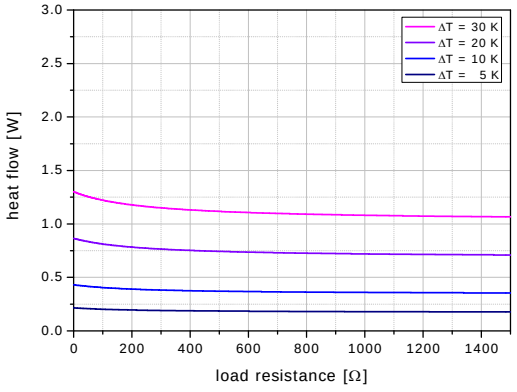


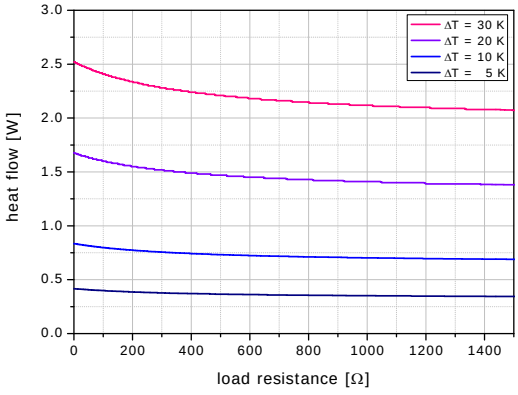
Voltage versus current at different load resistances





Heat flow versus load resistance at different ΔT





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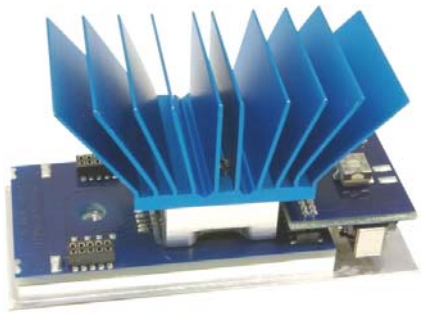
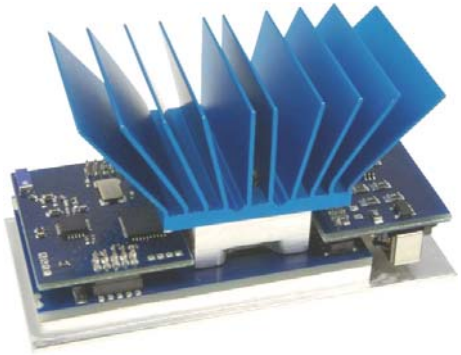
Application Engineering - Evaluation units

TE-Power PLUS



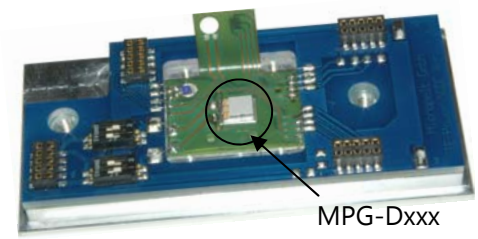
TE-Power PLUS evaluation unit with DC-DC booster module. With potentiometer for output setting from 1.6 V — 5 V and cap interface for

TE-Power NODE



TE-Power NODE thermo-powered wireless sensor, harvesting budget explorer comes with TE-Power SCOPE application software.

Thermo-Generator inside ...



Look inside a TE-Power assembly - a single thermogenerator chip mounted on aluminum (Al) base plate with temperature sensors.

Micropelt offers bare devices as well as evaluation units for energy harvesting exploration.

Our engineering and application team provides services and support to jump-start our customer's energy scavenging applications. We are ready to design your self-sustained power supply.

Start your project now — enjoy thermo-harvesting!

TE-Power RING

TE-Power RING on-shaft thermo-powered wireless condition monitoring simulation system for bearings. Optimized for forced convection.

TE-Power PROBE

TE-Power PROBE is an integrated thermoharvester which we specifically designed for operating conditions using natural convection to ambient air.
A powerful heat sink ensures a high level of heat dissipation which leads to maximal thermoharvesting results when mounted in horizontal orientation.

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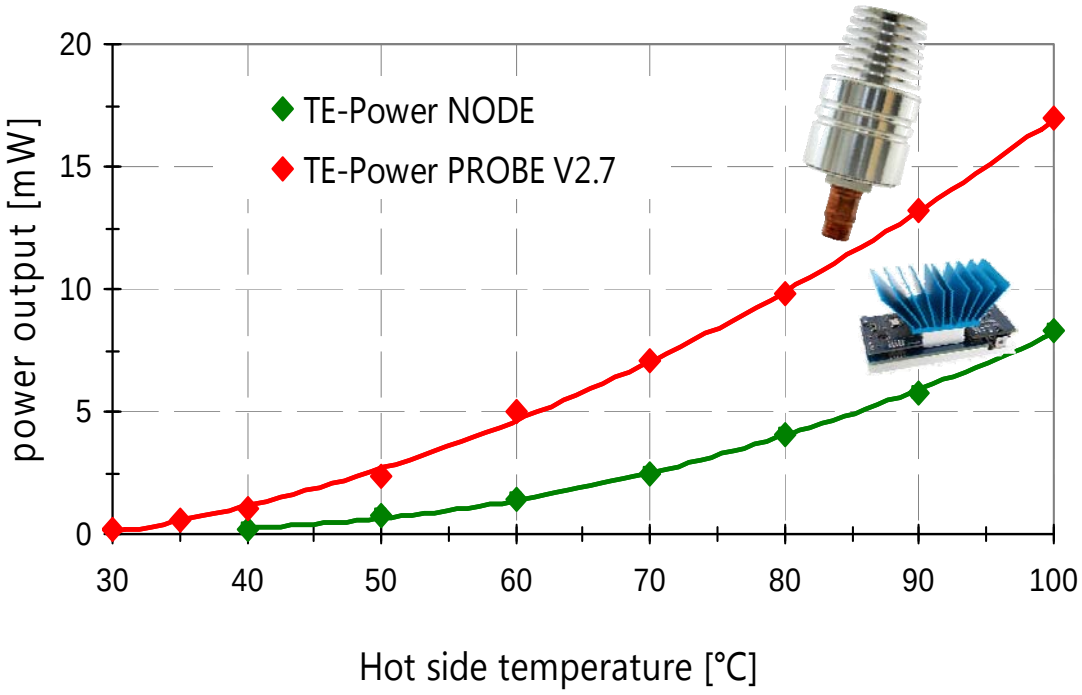
Application Engineering - Evaluation units

Comparison of TE-Power NODE versus TE-Power PROBE

@ ambient 25°C [77°F] and natural convection (worst case)



mypelt Simulation Tool

For those who want to check device matching with actual application data beforehand we have built our simulation tool mypelt. You will find it on our homepage. Select any device and see what it can do for you from all relevant viewpoints. Link to mypelt http://www.micropelt.com/products/mypelt.php