

## **Thermoelectric power generator operates at temperature differentials as low as 10K**

Nextreme Thermal Solutions today announced the availability of the new eTEG HV56 thermoelectric power generator, the next entry in the high-voltage (HV) series of clean energy generators based on thin-film thermoelectrics, that operates at temperature differentials as low as 10K. When combined with batteries and energy cells, the HV56 offers an ideal steady-state energy solution for a variety of self-powered applications in the wireless sensor, automotive, aerospace, industrial and medical device markets.

The HV56 is capable of producing 1.5mW of output power and an open circuit voltage of 0.25V at a 10K  $\Delta T$  in a footprint of only 11mm<sup>2</sup>. At 50K  $\Delta T$ , the HV56 produces 36.5mW of power and an open circuit voltage of 1.25V. The module is extremely thin: only 0.6mm high, and can be configured electrically in series to produce higher voltage and power outputs.

The use of thermoelectric power generators (TEGs), in which a temperature difference creates an electrical potential, can convert waste heat from thermal sources into electricity for an alternative source of energy. In reality, most heat sources come and go and the actual temperature difference depends on several factors such as the time of day, wind speed and heat output, among other variables. Trickle charging energy storage devices using an HV56 power generator offers an ideal solution to provide steady-state energy from variable heat sources.

"For trickle-charging applications using thermoelectrics, a power convertor is required to meet the minimum charge voltage of the cell, such as 3.3 volts for lithium ion batteries," said Dave Koester, vice president of engineering at Nextreme. "Our new HV56 power generator, in conjunction with the latest advances in voltage up-conversion, enables our customers to get the voltages they need at very low  $\Delta T$ s."

The high voltage output of the HV56 is enabled by Nextreme's proprietary micro-scale thermoelectric technology. Certain applications (e.g., generating power off the heat of the human body, or generating power for wireless sensors) require a high density of thermoelectric elements in order to generate power at low temperature differentials. Nextreme's patented thermal bump fabrication process can achieve thousands of elements per square centimeter.

Nextreme engineers are currently working with customers in a variety of industries and applications. These include clean energy harvesting and storage solutions for wireless sensor networks and remote power management.

The eTEG HV56 is RoHS-compliant and manufactured using eutectic gold-tin (AuSn) solder, which enables assembly temperatures as high as 320°C. The module is

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available with an 8 to 10 week delivery lead time. Pricing is available upon request.

Nextreme recommends the use of its thermal modeling, design and engineering services to deliver fully-optimized energy harvesting solutions. Nextreme routinely conducts analytical and numerical thermal modeling at all design levels from component to module to subsystem. Advanced analysis of complex systems, components or packages often require more detailed modeling to understand heat flow and thermal gradients.

More information on the eTEG power generation family can be found at [www.nextreme.com/power](http://www.nextreme.com/power). Contact Nextreme at 3908 Patriot Drive, Suite 140, Durham, NC 27703-8031; call (919)-597-7300; e-mail [info@nextreme.com](mailto:info@nextreme.com) [1]; or go to [www.nextreme.com](http://www.nextreme.com) [2].

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