

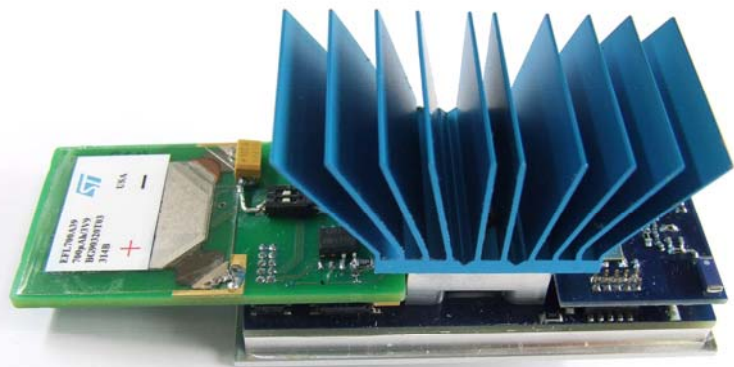
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STMicroelectronics and Micropelt Demonstrate 'Perpetual Energy' Thermoharvesting Power Supply

Jointly-developed evaluation kit combines thermal electrical energy harvesting and solid-state thin-film battery for autonomous wireless sensor.

Geneva, Switzerland and Freiburg, Germany, May 18, 2010 – STMicroelectronics (NYSE: STM), the world's number one supplier of semiconductors for power and power management applications, and Micropelt GmbH, a young German company specializing in novel thin film thermoelectric devices, have announced a jointly-developed autonomous wireless sensor evaluation kit. The TE-Power NODE evaluation kit combines Micropelt's Thermogenerator and ST's EnFilm™ solid-state thin-film battery as energy storage for power backup and pulse current. Power management and charge monitoring circuitry connect to the included graphical user interface software via a 2.4 GHz wireless link. Micropelt will demonstrate the product at Sensor and Test 2010, to be held in Nuremberg, Germany, on May 18-20.

Energy harvesting, in which useful electrical energy is generated from freely available sources such as vibration, heat, or light, is an essential part of building self-powered wireless sensors that do not require battery maintenance. Today, there is a growing trend towards the use of wireless sensor networks, particularly in applications such as process



automation, condition monitoring, and smart buildings. While these wireless sensor networks produce immediate benefits, including the avoidance of costly wiring of sensors and easy deployment in previously inaccessible locations, a truly 'intelligent environment' approach envisages a large number of sensors mounted at every useful measurement point. The sensors measure parameters such as temperature, pressure or vibration, and send this data wirelessly to a control or monitoring system. The information is then used for better process control and energy management, lower maintenance cost and more efficient buildings.



At the heart of the new evaluation kit, a Thermoelectric Generator (TEG) exploits a physical phenomenon known as the Seebeck Effect, in which electric power results from the heat flux produced by a temperature differential across a thermoelectric micro-structured layer. From an effective gradient of 10°C, the TEG generates a voltage of 1.4V. Micropelt's custom power conditioning converts this into sufficient power to drive the wireless sensor node and charge a battery using excess thermal energy. In the TE-Power NODE evaluation kit, the Micropelt TEG MPG-D751 is housed between a solid Aluminium base plate and a finned heatsink. The base is attached to a suitable heat source, so the cooling effect of the heatsink can create a temperature differential across the embedded TEG.

■ "Harvesting thermal energy holds enormous potential as a virtually infinite self-sustaining energy source, exploiting free surplus heat that would otherwise be wasted," said Micropelt's CEO, Fritz Volkert. "As the world leader in power management, ST was the natural choice of partner to optimize the performance profile of our advanced thermoharvesting technology."

The rechargeable battery used in the enhanced TE-Power NODE kit is ST's EFL700A39 EnFilm™ thin film solid state battery, a 700-microamp-hour UL1642-certified rechargeable battery that can deliver high pulsed peak current (up to 10mA) to provide power to the wireless sensor node during its communication with the network. When the base plate of the evaluation kit is in contact with a heat source, the Micropelt TEG provides power to the system and recharges the EnFilm. When the heat source is removed, the TEG stops and only the EnFilm battery provides power to the wireless sensor. The combination of TEG and EnFilm battery balances thermal supply gaps and establishes a virtually perpetual energy supply to the attached wireless system.

The battery board, designed by ST, contains the EnFilm battery and the electronic circuitry that controls and monitors both battery charge level and the energy balance. The board includes a BiCMOS linear regulator (STLQ50) specifically designed for operating in environments with very low power consumption constraints, as well as the STC3100 battery management chip, which monitors battery voltage, current and temperature. The circuitry also incorporates a Coulomb counter to keep track of the charge/discharge status.

"The move towards ubiquitous monitoring and more intelligent control requires renewable power sources that tap into available ambient energy most effectively," said Ricardo de Sa Earp, Group Vice President and General Manager of the ASD & IPAD Division, STMicroelectronics. "With ST's world-leading expertise in power management, we are ideally placed to work with innovative companies such as Micropelt to ensure that their novel energy harvesting technologies deliver optimal performance and high reliability at minimum cost."

The wireless sensor module included in the evaluation kit was designed by Micropelt to establish a versatile ultra-low power link to its graphical user interface named TE-Power



SCOPE. The software displays and logs essential thermal and electrical system parameters, including a continuously measured power balance between the TEG and the EnFilm battery. To the user this setup provides a means to assess the performance of the EnFilm-buffered thermoharvester in an intended application, facilitating system design and speeding time to market.

About STMicroelectronics

STMicroelectronics is a global leader serving customers across the spectrum of electronics applications with innovative semiconductor solutions. ST aims to be the undisputed leader in multimedia convergence and power applications leveraging its vast array of technologies, design expertise and combination of intellectual property portfolio, strategic partnerships and manufacturing strength. In 2009, the Company's net revenues were \$8.51 billion. Further information on ST can be found at www.st.com.

About Micropelt

Micropelt GmbH, a 2006 VC funded spin-off from Chipmaker Infineon Technologies and the Fraunhofer IPM Research Institute, is based in Freiburg, Germany. The company with approx. 20 staff develops and markets the world's highest power density thermoelectric elements for clean-tech energy harvesting, thermal sensing, cycling and cooling. Core technology is based on a combination of thermoelectric thin film deposition and MEMS micro-structuring technologies, backed with profound application expertise. Micropelt's Germany based volume production facility is scheduled to ramp up from third quarter 2010. Further information on Micropelt can be found at www.micropelt.com.

Notes for Editors

EnFilm is a new generation of high-energy-density solid-state thin-film battery technology. It is a rechargeable battery with a high number of charge/discharge cycles (above 1000 at 50% depth of discharge). The EFL700A39 has a footprint of 25.4 x 25.4mm and, with a thickness of just 0.2mm, it can be used in systems where thickness is a critical parameter. The battery can be recharged to 80% of its initial capacity in 20 min by applying a constant voltage of 4.2Vdc, no need for charge-current limiting. EnFilm batteries do not contain solvents and are completely safe, with no risk of burning in the event of short circuits or overcharging.

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