# Boost Charger IC Empowers Nanoenergy Harvesting

Texas Instruments introduced its next generation of power management ICs for energy harvesting. The highly efficient boost charger for nano (ultra low) power energy harvesting manages the microwatts to milliwatts of power generated from a number of sources, such as solar, thermoelectric, electromagnetic and vibration, and stores the extracted energy in various storage elements, including Li-ion batteries and super capacitors. The bq25504 also includes circuitry to protect the energy storage element from over voltage and under voltage conditions and to kick-start the system when the battery is deeply discharged.

In a solar panel powering a handheld device that is operating in indoor light conditions, for example, the new boost charger increases the usable harvested energy by 30 to 70 percent compared to a linear regulator. This efficiency allows designers to reduce the size and the number of solar panels in their designs, thus reducing overall solution cost. The device can benefit wireless sensor networks (WSN) for area, industrial, water/waste and structural monitoring, along with consumer, high reliability and medical applications.

“Wireless sensor networks have been limited in their penetration due to the cost associated with maintaining and replacing the batteries within sensor nodes,” said Sami Kiriaki, senior vice president over TI’s Power Management business. “With the bq25504 boost charger, the nodes can power autonomously, which can reduce the operating cost and thereby make ultra low-power wireless sensor networks cost-effective in more applications, such as industrial monitoring of hazardous or restricted areas.”

**Key features and benefits**

- Low quiescent current, typically 330 nA, and high conversion efficiency of greater than 80 percent maximize the energy extracted from the energy harvester.
- Maximum power point tracking (MPPT) optimizes energy extracted from DC harvesters, such as solar panels under varying light conditions and thermoelectric generators (TEG) under varying thermal conditions.
- User-programmable settings allow the boost charger IC to be used with a variety of energy sources and energy storage elements, such as different battery chemistries or super capacitors.
- Low cold start voltage, typically 330 mV, allows the bq25504 to start up from single-cell solar panels under low light, as well as TEGs with low temperature differences and other low-voltage sources.
- Battery OK indicator allows conditional enabling of external loads and protects the storage element.

**Tools and support**

TI offers tools and support to speed the implementation of ultra low-power energy harvesting, including:

- bq25504 Evaluation Module: www.ti.com/bq25504evm-pr [1]
- bq25504 EVM User's Guide: www.ti.com/bq25504evmuser-pr [2].

**Availability and pricing:** The bq25504 boost converter is available now in a 3-mm x 3-mm VQFN package, priced at $2.10 in quantities of 1,000. For more information or to order samples of the bq25504, visit: www.ti.com/bq25504-pr [3].

**Find out more about TI's energy harvesting and wireless connectivity portfolio by visiting the links below:**

- Ask questions, help solve problems in the Battery forum in the TI E2E™ Community: www.ti.com/batteryforum-pr [4]
- Download TI's new Battery Management Solutions Guide: www.ti.com/battery-pr [5].
- Download TI's Energy Harvesting Brochure: www.ti.com/energybrochure-pr [6].
- Download TI's Wireless Connectivity Solutions Guide: www.ti.com/wireconnguide-pr [7]

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