

# Harvest the maximum power from ambient energy



## SPV1050 ultra-low-power TEG and PV energy harvester and battery charger

The SPV1050 provides an ultra-low-power management solution by harvesting energy from both photovoltaic (PV) cells and thermoelectric generators (TEGs) to charge and ensure the longest battery lifetime. It guarantees an extremely high conversion efficiency and environmental energy scavenging maximization thanks to the embedded maximum power point tracking (MPPT) function and is suitable for any battery chemistry (lithium-ion, supercapacitor, NiMH, etc.). It enhances battery lifetime by preventing overcharge and overdischarge, and provides two regulated voltage outputs to supply the surrounding ICs through two fully independent embedded LDOs.

### KEY BENEFITS

- Energy harvesting from light or thermal gradient with more than 90% conversion efficiency
- Embedded boost and buck-boost topologies fitting indoor and outdoor lighting conditions
- Maximizes ambient energy harvesting with up to 60% gain compared to solutions without MPPT
- Enhances battery lifetime by avoiding battery overcharge and overdischarge
- Reduces bill of materials
- Strongly improves system integration and reliability

### KEY APPLICATIONS

Internet of Things application such as:

- Wearable and fitness gears
- Pedometers and heart-rate meters
- Smart watch and wrist band
- Wireless sensor nodes for smart homes and cities

The SPV1050 is an ultra-low-power energy harvester and battery charger that scavenges the maximum energy which can be extracted from a photovoltaic (PV) cell or a thermo-electric generator (TEG) thanks to its embedded maximum power point tracking (MPPT) with more than 95% accuracy. The energy harvested gain compared to solutions without MPPT can reach up to 60% or more.

The SPV1050 features a very wide input voltage range, from 75 mV up to 18 V and it's able to start with only a very few uW of input power. In addition, the buck configuration makes it ideal for outdoor lighting conditions, thus augmenting the battery driving current capability.

It tightly charges and monitors any battery type (lithium-ion and polymer, lithium thin-film solid state, NiMH, NiCd, super-capacitor, etc.) by using very accurate under-voltage and end-of-charge thresholds, and by implementing safe control logic to prevent battery depletion and life shortening.

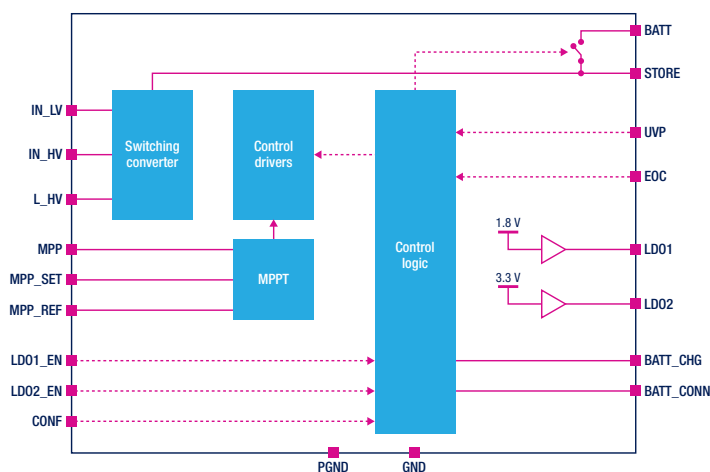
Two independent embedded LDOs can be enabled to power external companion chips such as microcontrollers, low-power transmitters (including sub-GHz RF, ZigBee, BLE and NFC) and sensors while reducing the BOM and boosting the overall system reliability and integration.

This device makes many applications fully

autonomous energy-wise by optimizing the free ambient energy stored in a battery tank and guaranteeing a very long lifetime. Typical target applications include industrial monitoring, presence detection, IoT, wearable and fitness, access control, smart lighting, home and building automation, asset and livestock tracking.

Thanks to the described key features, the SPV1050 significantly cuts costs for primary battery monitoring and out-of-operation time for charge monitoring and replacement, and the huge wiring costs in new buildings and industrial plants.

## SPV1050 MAIN FUNCTIONAL BLOCKS



## PRODUCT TABLE

Part number	Input voltage range	MPPT function	Topologies	Maximum battery current	LDOs	Add-on Features
SPV1050	75 mV to 18 V	Programmable, can be disabled	Boost, Buck/boost	Up to 70 mA	Fully independent LDOs (1.8 V and 3.3 V output)	End-of-charge, undervoltage, battery disconnect function

## EVALUATION TOOLS

Part number	Description	Documentation
STEVAL-IDS002V1	Autonomous wireless multi-sensor node powered by PV cells	User manual UM1752 Application Note AN4395
STEVAL-ISV019V1	Evaluation board for SPV1050 ULP energy harvester and battery charger - boost configuration	Application note AN4394
STEVAL-ISV020V1	Evaluation board for SPV1050 ULP energy harvester and battery charger - buck-boost configuration	Application note AN4397
STEVAL-ISV021V1	Energy harvesting evaluation kit based on the SPV1050	User manual UM1752, Application note AN4396
STEVAL-GPT001V1*	Thin-Film Solar Smart Watch based on Sensor Tile platform and powered by SPV1050	User Manual UM2260*
STSW-IDS002V1	Application software setup	User manual UM1752

\* available in Q1'18



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