Energy Harvesting Bluetooth® Low Energy (BLE) Reference Design

Enabled by ON Semiconductor's RSL10 SIP Solution

The Energy Harvesting Bluetooth® Low Energy Switch is a complete reference design for energy harvesting applications including lighting, door and window control, and step counters. Featuring the RSL10 SIP and high-efficiency harvester switch from ZF Electronic, the battery-less switch offers very low power consumption and is entirely self-powered. A DC/DC converter is not required in this setup, saving BOM cost and board space.

A low-loss Schottky Diode bridge rectifier and electrolytic capacitor combined with an LDO are enough to provide power from the switch to the RSL10 SIP Bluetooth® 5 device. By combining the ultra-low power technology from RSL10 SIP with the ZF energy harvesting switch, this reference design is a good starting point for battery-less applications.

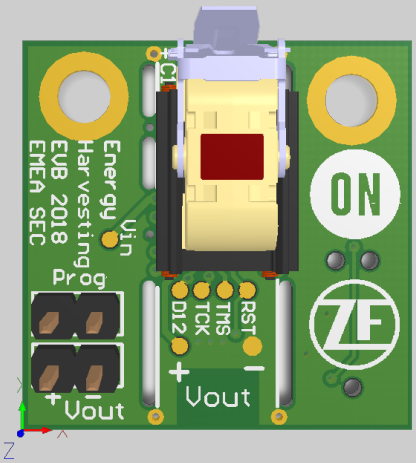
The source code included provides a platform from which to develop application code. Documentation details how to customize the firmware and connect the reference design to a BLE scanner application running on a smart phone or tablet.

Use Cases

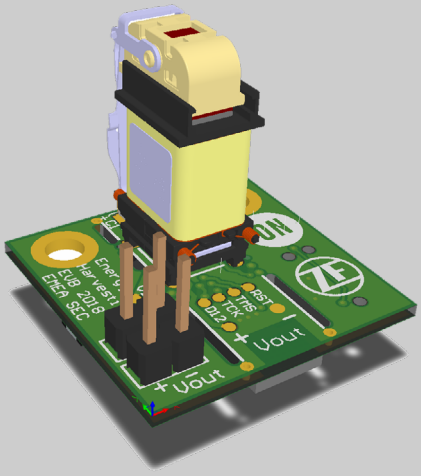
- Lighting & shutter control
- Alarm systems
- Fall detection
- Vehicle counting
- Asset tracking

Energy Harvesting Bluetooth® Low Energy Switch

Top View



Side View



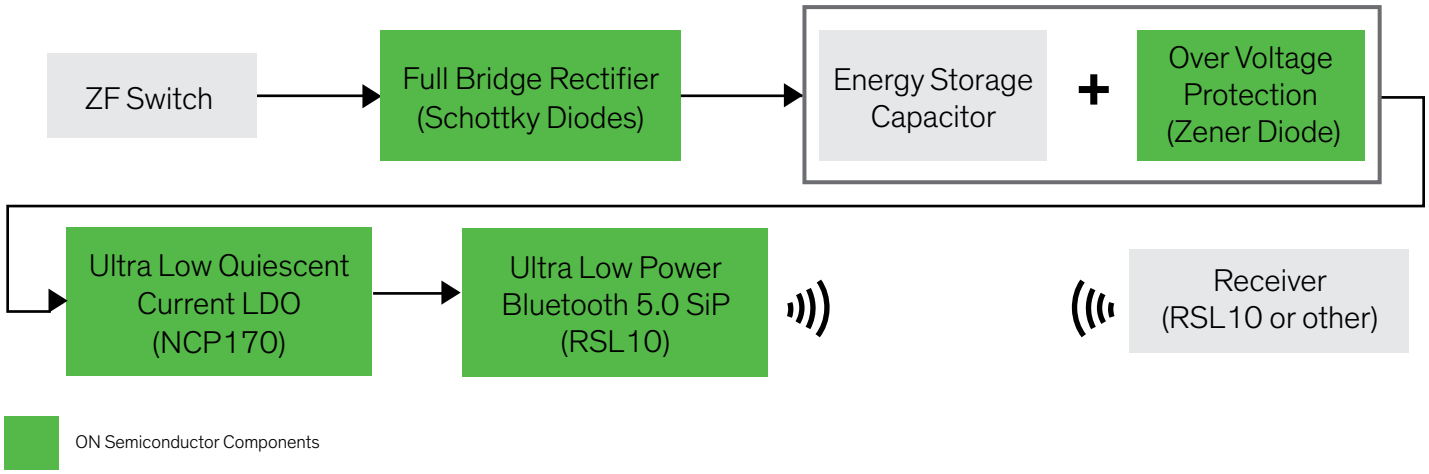
Resources for the board include

- Source code
- Firmware
- RSL10 Software Development Kit (SDK)
- Schematics
- PCB layout & Gerber files
- Documentation

Part #: BLE-SWITCH001-GEVB

How the Energy Harvesting Technology Works

The ZF switch captures the energy transferred when a user presses a button. The switch converts energy from kinetic to electromagnetic and stores it for use by the RSL10 SIP. Each time the button is pressed the fully integrated energy harvesting solution generates 300 µJ. This is enough to meet the extremely low power requirements of the RSL10 SIP, which is just 62.5nW in deep sleep and only 10 mW when transceiving.



Block Diagram

Key Features of the BLE Energy Harvesting Reference Design

- Features RSL10 SIP
- 2 Mbps data rates (Bluetooth® 5)
- 62.5 nW power consumption in deep sleep mode; 7 mW in peak receiving
- Fully integrated antenna with no additional RF considerations
- Segger compatible programming interface
- Compatible with the IoT development kit and Bluetooth® IoT development kit
- Easily connect to standard BLE scanner or mobile/lighting applications (iOS and Android)
- Simple power supply schematic
- Full linear voltage regulation (no switching)
- No EMC during energy conversion, no perturbation of Bluetooth® Low Energy Tx / Rx
- No need for scheduler
- Instant startup
- Features an ultra low quiescent current LDO (NCP170)
- No buck boost or coil

Related Products

- RSL10 SIP: Ultra-Low Power Bluetooth® 5 System-in-Package
- Bluetooth® IoT Development Kit
- IoT Development Kit

Ordering Information

Part # is BLE-SWITCH001-GEVB

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Five Years Out

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