Solution Examples:

Energy Harvesting PMIC

Cypress Energy Harvesting PMIC[1] Solution Example:
Tiny Solar-Powered WSN[2] IoT[3] Device

Energy Harvesting PMIC Value

Design Challenges

Ten years of lifetime operation without maintenance
Bluetooth Low Energy (BLE) for communication
Tiny wireless sensor to transmit temperature and humidity data
Operation at low light level

Design Solution

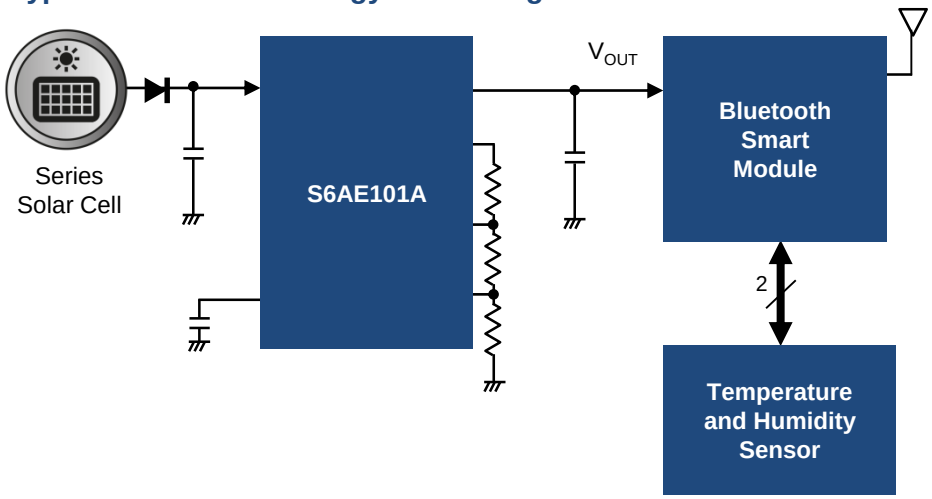
Transmits forever without maintenance
Transmits sensor data every 30 s using BLE at 1,000 Lux (lx)[4]
Harvests energy from light to create a battery-free design
Requires only 100 Lux (lx) to power the WSN
Flexible WSN placement

Suggested Collateral

Video:	Energy Harvesting Solutions
Kit:	Solar-Powered IoT Device Kit
Datasheet:	S6AE101A Datasheet
Software:	Easy DesignSim™ Software

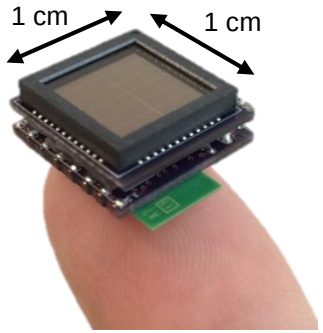
Block Diagram

Cypress S6AE101A Energy Harvesting PMIC Solution



Tiny Solar-Powered WSN

The 1-cm^2 solar-powered WSN using the Cypress S6AE101A energy harvesting PMIC solution



[1] Power Management IC
[2] Wireless Sensor Node
[3] Internet of Things
[4] A unit that measures the level of light emitted (e.g., Moonlight is 1 lx, Office Lighting is ~1,000 lx)

Cypress Energy Harvesting PMIC[1] Solution Example:
Bluetooth Smart Beacon

Energy Harvesting PMIC Value

Design Challenges

Ten years of lifetime operation without maintenance
Bluetooth Low Energy (BLE) for communication
A CR2032 coin-cell battery-based solution lasts for only 6.9 months at a 600-ms transmission interval using BLE
Support for both USB- and solar-powered WSNs[2]

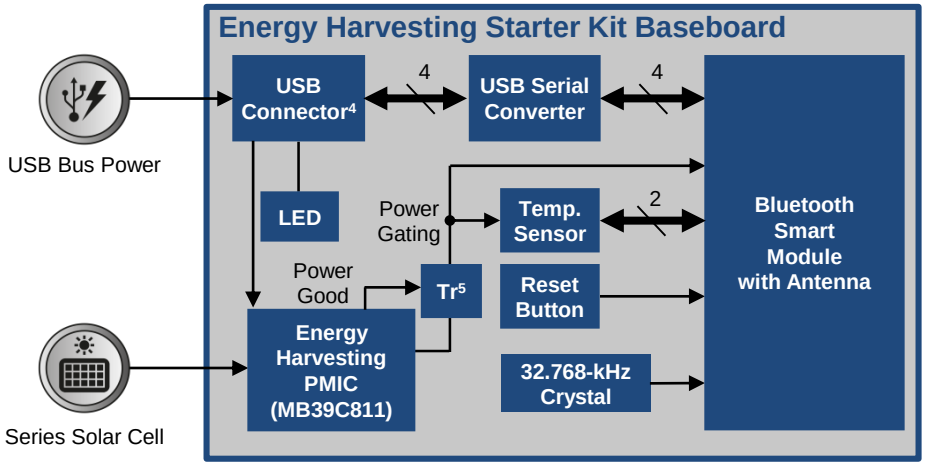
Design Solution

Transmits forever without maintenance
Transmits every 600 ms using BLE
Harvests energy from light to create a battery-free design
Requires only 1,000 Lux (lx)[3] to power a WSN
Supports USB and solar power for flexible WSN deployment

Suggested Collateral

Video:	Energy Harvesting Solutions
Kit:	Energy Harvesting Starter Kit
App Note:	Energy Harvesting Starter Kit Manual
Datasheet:	MB39C811 Datasheet
Software:	Easy DesignSim™ Software

Block Diagram



WSN-Powered Countertop Check-In By Japan Airlines (JAL)

Cypress Energy Harvesting PMIC solutions power the systems used to guide passengers to the right JAL check-in counters at the Tokyo and Osaka airports

[1] Power Management IC
[2] Wireless Sensor Node
[3] A unit that measures the level of light emitted (e.g., Moonlight is 1 lx, Office Lighting is ~1000 lx)
[4] USB connection to power WSN and to update Beacon parameters
[5] Power transistor

Energy Harvesting (EH)[1] Solution Example:
Solar-Powered BLE[2] Sensor Beacon[3]

EH Solution Value

Design Problems

Reduce battery maintenance cost or wiring cost

Minimize the size and cost of the wireless sensor node (WSN)[4] with an EH solution

Operate without an energy source

Quickly design and implement an EH solution

Design Solution

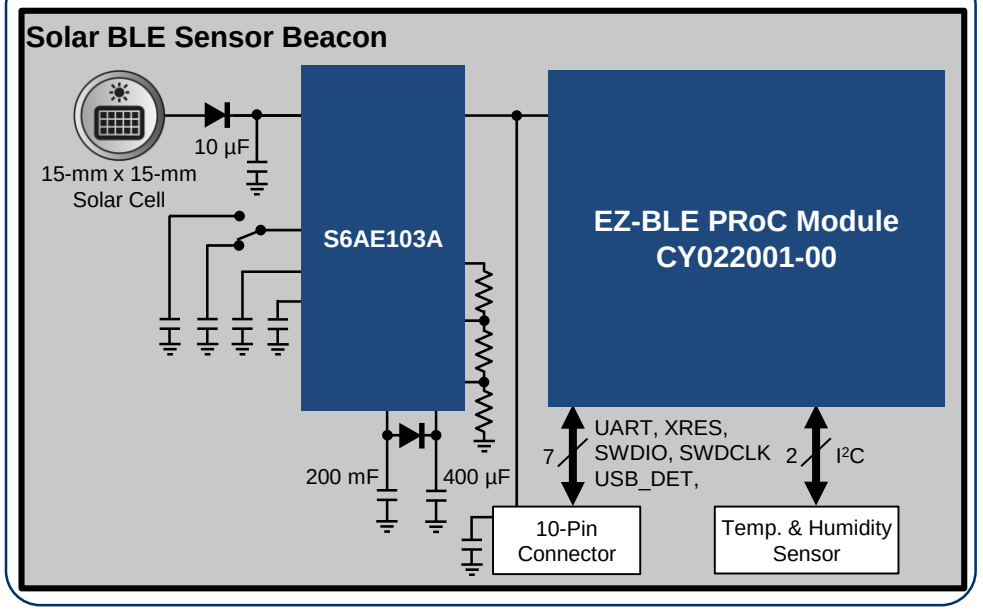
Eliminates a battery or power wiring by providing a completely battery-free solution

Uses a tiny solar EH solution to minimize WSN cost and size

Operates for 30 hours (maximum) without a light source using an energy storage device[5]

Provides an easy-to-design tiny solar-powered BLE sensor beacon system

Block Diagram



Suggested Collateral

Kits: CYALKIT-E02 Reference Design Kit (RDK)
CYALKIT-E03 Expansion Pack
S6AE101A/102A/103A Evaluation Board

Datasheets: S6AE103A and CYBLE-022001-00

App Notes: *Basic Concepts for Energy Delivery* (AN213948)
Energy Calculation for Energy Harvesting (AN210772)

Solar-Powered BLE Sensor Beacon

Cypress' energy harvesting solution enables a tiny, low-cost, battery-free WSN

[1] The process of capturing and converting tiny amounts of energy e.g., from light, vibration or heat) into electricity

[2] Bluetooth Low Energy

[3] A wireless device that transmits data (e.g., temperature) over a periodic radio signal from a known location

[4] A sensor-based device that monitors conditions such as temperature, humidity and pressure and wirelessly transmits that data to a control unit, such as a PC or a mobile device

[5] A low-leakage, low-impedance capacitor that is commonly used to store harvested energy

Energy Harvesting (EH)[1] Solution Example:
Home Monitoring Using a Battery-Free WSN

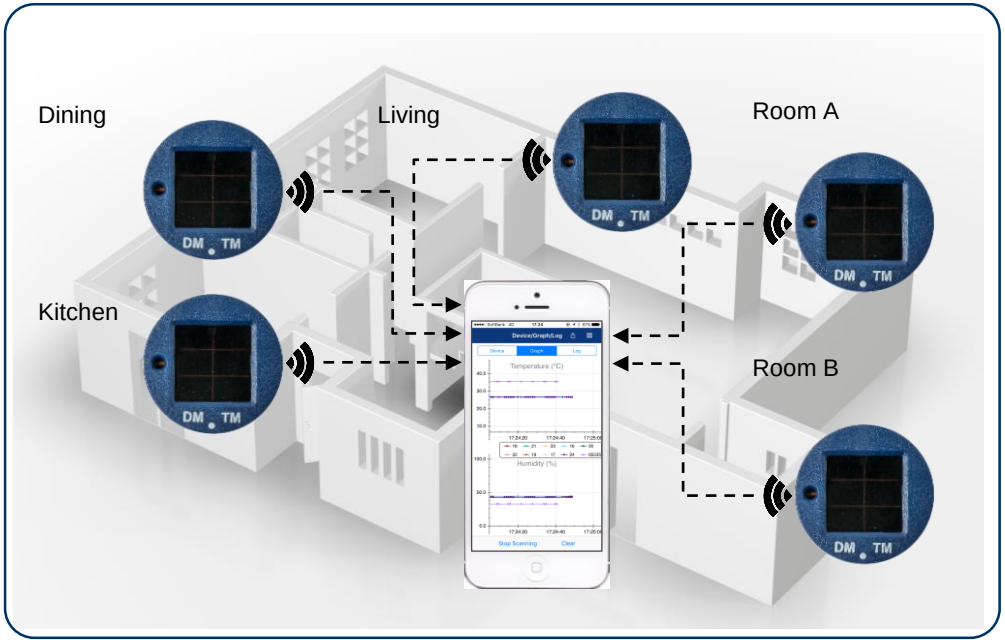
EH Solution Value

Design Problems

Sense temperature and humidity and send the data to a smartphone using BLE[2] communication
Minimize the wireless sensor size
Reduce battery maintenance work
Operates all day

Design Solution

Enables temperature and humidity data sensing and transmits the data to a smartphone with BLE communication
Integrates wireless sensor node (WSN)[3] functions to minimize size
Eliminates the need for a battery by using a tiny solar energy harvesting solution
Operates for 30 hours (maximum) without a light source using an energy storage device[4]



Suggested Collateral

Kits: Solar-Powered BLE Sensor Beacon RDK (CYALKIT-E02)
Solar-Powered BLE Sensor 5 Pack (CYALKIT-E03)

Software: Cypress BLE-Beacon for Mobile

Home Monitoring Using a Solar-Powered BLE Sensor Beacon[5]

Cypress' solar-powered BLE sensor beacon can operate from just 100 lux and can be installed anywhere in the home to monitor temperature and humidity in each room

[1] The process of capturing and converting tiny amounts of energy e.g., from light, vibration or heat) into electricity
[2] Bluetooth Low Energy
[3] A sensor-based device that monitors conditions such as temperature, humidity and pressure and wirelessly transmits that data to a control unit, such as a PC or a mobile device
[4] A low-leakage, low-impedance capacitor that is commonly used to store harvested energy
[5] A wireless device that transmits data (e.g., temperature) over a periodic radio signal from a known location