



## Bluetooth SMART Advertise-Only Beacon Reference Design



### Features

- **COMPLETE BLE BEACON SYSTEM**
  - EM9301 – Bluetooth SMART Controller
  - EM6819 – 0.9V Flash Microcontroller
  - RF Front End – Chip or Folded Dipole Antenna
  - DC-DC Converter if V<sub>batt</sub> < 1.8V
  - Sensors –
    - Ambient Light
    - Temperature
    - Battery Voltage
    - Button Press
- **Ultra-Low Power Consumption**
  - VDD from 0.9V to 3.6V
  - 155uJ per BLE Advertise Packet
  - 228uJ for VDD < 1.8V
- **Small Form Factor**
- **emBeacon iPhone® App**



Figure 1: TINY and LOWCOST emBeacons

### General Description

The **emBeacon** Reference Design is a complete Bluetooth Low Energy (BLE)/Bluetooth SMART reference design optimized for ultra-low power BLE Advertisement. **emBeacon** can last 3 years on an AAA alkaline battery, or operate continuously on harvested energy from typical indoor lighting. Silver-Oxide, Zinc-Air, and Lithium Ion coin cells can also be used. Sensor data, including ambient light level, temperature, and battery voltage is broadcast in the BLE Advertise Packet to all smartphones within the vicinity (up to 100 meters). With slight modifications, the emBeacon can collect and transmit other data such as humidity, motion or impact, etc...

The free **emBeacon** iPhone App receives emBeacon data from all advertisers in the area and presents it on the phone screen.

GPIO on the EM6819 power the sensors and the EM9301 radio, maximizing efficiency. Firmware on the EM6819 controls and measures the sensors, monitors power supply level, controls the DC-DC converter, and programs EM9301 radio parameters such as transmit power, beacon interval and advertise packet information via Host Control Interface (HCI) commands over an SPI interface.

A TINY **emBeacon** design (schematic, layout, bill-of-materials, and firmware) is provided for applications limited size constraints, and a LOWCOST emBeacon design is provided for lowest cost applications not limited by size.

### Applications

- Remote Environmental Sensors
- Geolocation & RTLS (indoor mapping)
- Attraction Guides
  - Museums
  - Theme Parks
  - Shopping Malls
- Proximity Detectors (“find me”)
- Facility Monitoring – Doors, Lights

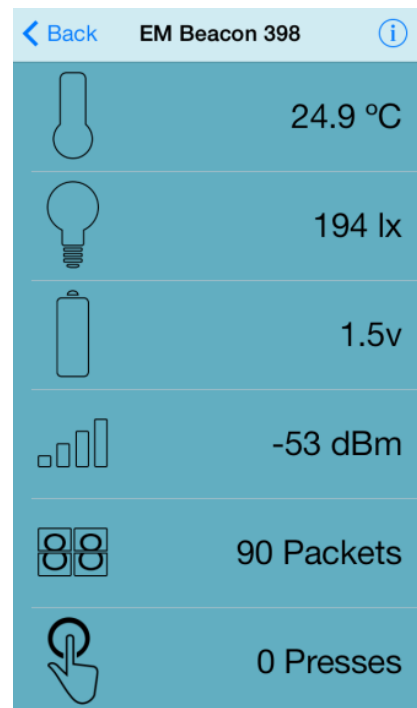


Figure 2: emBeacon iPhone App Screen