

Indoor Solar Development Kit with TI BLE (DEV-IN-BLE-TI)

System Overview

- The Indoor Solar Development Kit with TI BLE extends the TI CC2650 Sensortag Bluetooth and data collection by integrating energy harvesting and an indoor solar panel. It is capable of operating at extremely low light levels, like those found in warehouses & industrial plants.
- This development kit is designed to be fully customizable. DevPack and JTAG connectors are present for debugging and adding TI DevPack plug-in modules. All IO pins can be accessed via a 10 pin female header so that external sensors can easily be added. The current onboard sensors can be disconnected by rcutting solder bridges to allow access to all 10 IO pins.
- Software development can be done using Code Composer Studio and Android Studio, which are both free to use. Hardware modifications can be done using EAGLE CAD software.

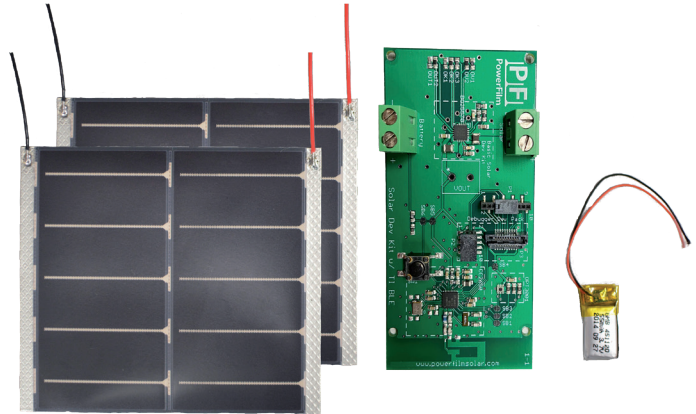


Figure 1: Kit Contents

What's In The Kit?

- DEV-IN-BLE-TI circuit board assembly
- (2) LL200-2.4-75 Indoor Solar Panel with leads
- 40mAh rechargeable Li-Polymer battery
- Instructions, hardware and software files, and product documentation

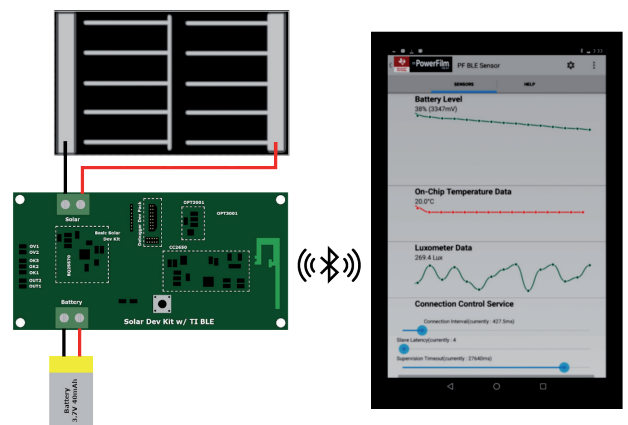


Figure 2: System Diagram

PowerFilm[®]

MADE IN THE USA

SOLAR

Expected Power Generation

200 lux:

- 290uW/panel

1000 lux:

- 1,910uW/panel

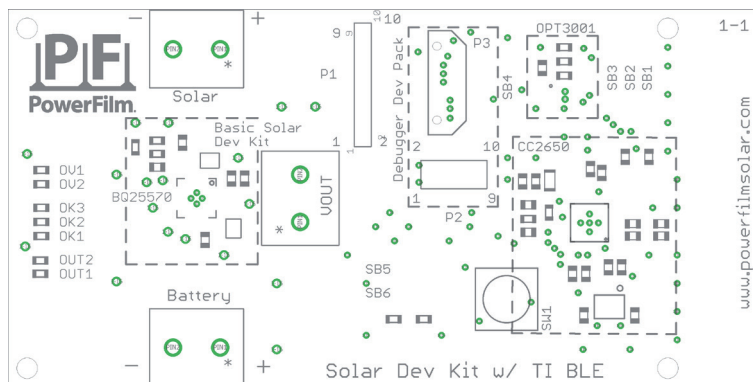


Figure 2: Board Layout

Use Cases:

There are many remote sensing applications. Depending on sensor power requirements, the Indoor Solar Development Kit with TI BLE and PowerFilm solar panels will support the applications listed below:

Sensing Applications

- | | | |
|---------------|----------------|---------------|
| • Temperature | • Humidity | • Pressure |
| • Light Level | • Vibration | • Motion |
| • Acoustic | • Air Flow | • Water Flow |
| • Strain | • Moisture | • Air Quality |
| • Occupancy | • Acceleration | • Water Level |

IoT Applications

- | | |
|-------------------------|-------------------------|
| • Home Automation | • Wearables |
| • Smart City | • Smart Agriculture |
| • Asset Tracking | • Smart Transportation |
| • Beacons | • Equipment Monitoring |
| • Beacons | • Equipment Monitoring |
| • Smart Buildings | • Wireless Nodes |
| • Gateways | • Industrial Automation |
| • Industrial Automation | |

Capacitor / Super Capacitor Storage Element Operation

The Basic Solar Dev Kit sub-circuit is capable of running and operating with a capacitor as the storage element instead of a rechargeable battery. The capacitor will maintain steady power to the system while light is available.

Charge and discharge rate will be greatly affected by the size of the capacitor. If the capacitor is completely discharged (0V) the charge rate will be slower because the harvester chip is not yet fully functional. Figures below show charge up times vs storage capacitance size for 0V-3V and 3V-4.2V. Capacitor must be rated for 6V or greater.