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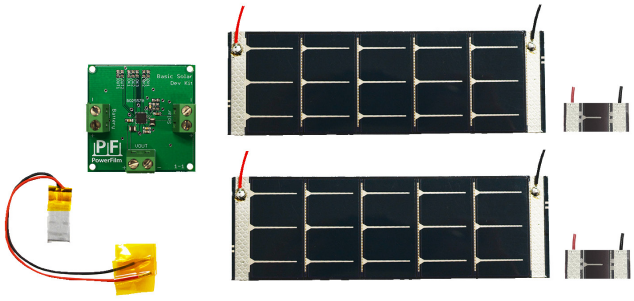
Solar Development Kit (DEV-BASIC)

System Overview

The DEV-BASIC is a complete energy harvesting power management solution using TI BQ25570 PMIC. It is able to efficiently extract energy from solar whether in a dim indoor environment or outdoors in direct sunlight.

Once collected, the BQ25570 can store energy in a variety of storage elements while providing a regulated voltage output to power your application devices.

The kit includes everything you need to start developing power autonomous electronics. Use Indoor Light series panels for indoor applications and use Classic Application panels for outdoor environments. Pre-configured to charge 3.7V Lithium batteries, you can use the included Li-Po battery or swap in a more suitable size.



Solar panel leads cropped for photo

Kit Contents

- DEV-BASIC circuit board assembly
- (2) LL200-3-37 Indoor Solar Panel with 6" leads
- (2) ONP1.2-12x24 Classic Application Solar Panel with 6" leads
- 60mAh rechargeable Li-Polymer battery
- Instructions, hardware and software files, and product documentation

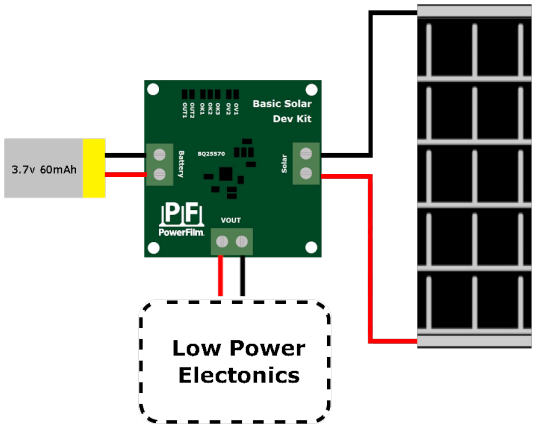
Use Cases - Power Source For

- BLE Beacons and Tags
- E-Paper Displays
- Telematics
- Smart Locks
- Thermostats
- Smart Windows and Shades
- Wireless Sensors
- Wearables
- Field and Herd Monitoring
- Other Low Power Electronics

Panel Specifications

Indoor Series	Classic Application
LL200-3-37	ONP1.2-12x24
1000 lux:	100% Sun
• 1.089mW	• 4mW
• 0.419mA	• 3.33mA
• 2.6V	• 1.2V
200 lux:	25% Sun
• 0.166mW	• 0.9mW
• 0.079mA	• 0.7mA
• 2.1V	• 1.2V

System Diagram



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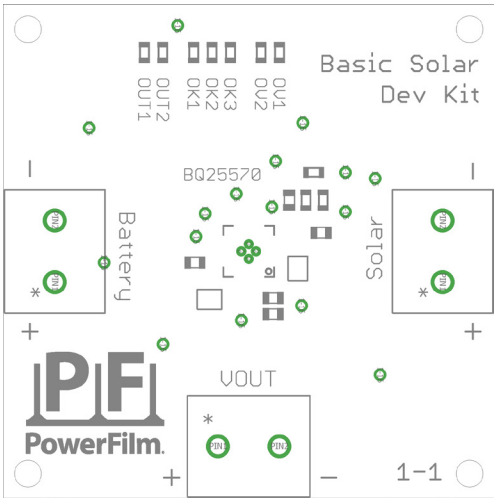
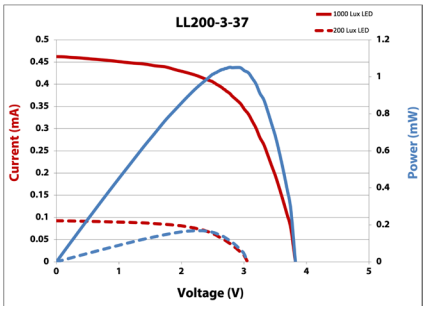
Board Layout

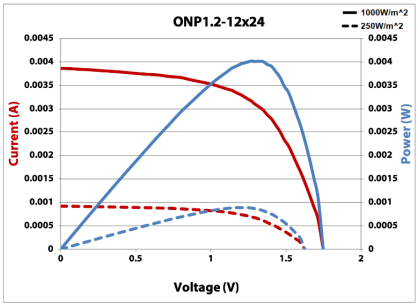


IV Curves

Indoor Series



Classic Application



Notes

Capacitor / Super Capacitor Storage Element Operation

The DEV-BASIC is capable of running and operating with a capacitor as the storage element instead of the Li-Polymer 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.

Board Configuration and Customization

The Solar Development Kit hardware is currently configured to charge a Li-Polymer type battery with max voltage of 4.2V and the output voltage set to 3.0V. The configuration can be customized by modifying SMT resistor dividers per the BQ25570 datasheet specifications which can be found under "Additional Resources" on the Solar Development Kit's product page on our website: www.powerfilmsolar.com.

Resistors OV1(2), OK1(2)(3), and OUT1(2) control the output voltage, charge configuration, and power management of the BQ25570 PMIC. Use the formulas below to determine appropriate 0603 package resistor values for your desired application.

Output Voltage: VOUT = 1.21 * (R_OUT2 + R_OUT1)/R_OUT1
Charge Termination Voltage: VBAT_OV = 1.815 * (1 + R_OV2/R_OV1)
Low Voltage Load Disconnect: VBAT_MIN = 1.21 * (1 + R_OK2/R_OK1)
Load Re-connect Hysteresis: VBAT_MIN_HYST = 1.21 * (1 + (R_OK2+R_OK3)/R_OK1)

For best results the sum of each resistor divider should be as close too but not exceeding 13Mohms. VOUT cannot exceed VBAT, VBAT_OV cannot exceed 5.5V, and VBAT_MIN cannot be less than 2V.