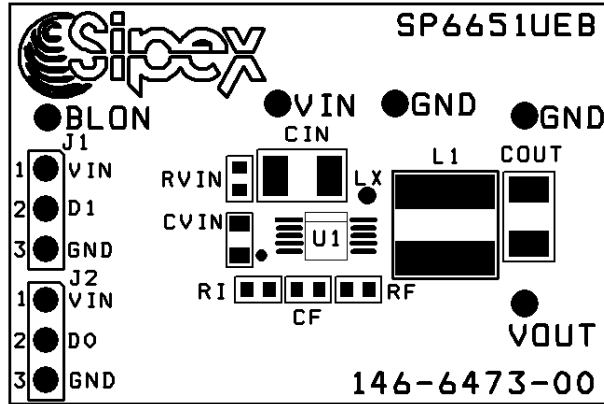




SP6651AEU Evaluation Board Manual

- High Efficiency Synchronous Step-Down Converter with up to 98% efficiency
- 800mA Output Current, only 20uA Quiescent Current
- 2.7V-6.5V Input Voltage range, Output Adjustable down to 0.8V
- μ SOIC Package & Ceramic Capacitors for small, low profile Power Supply
- Ideal for PDAs, Digital Cameras, Wireless Modems, Cellular Telephones



DESCRIPTION

The **SP6651A Evaluation Board** is designed to help the user evaluate the performance of the SP6651A for use as a single Li-Ion battery Step-Down DC-DC Converter. The SP6651A operates from 2.7V to 6.5V input, with the highest efficiency in the range 3.0V to 4.2V where the Li-Ion battery has the most energy. The SP6651AEU evaluation board is a complete power supply circuit to provide ease of evaluation for the DC/DC Converter performance.

FIGURE 1. SP6651A 3.3V OUTPUT EVALUATION BOARD SCHEMATIC

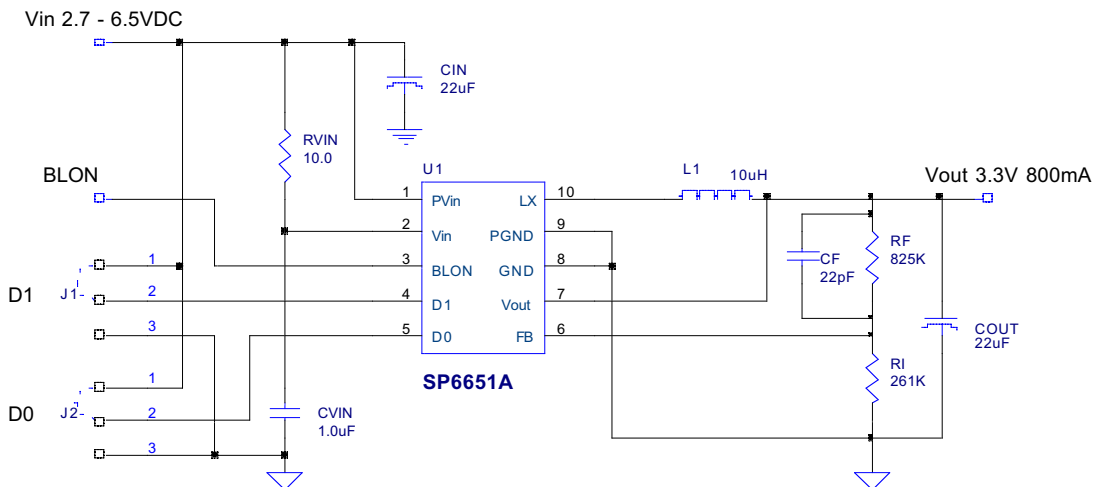
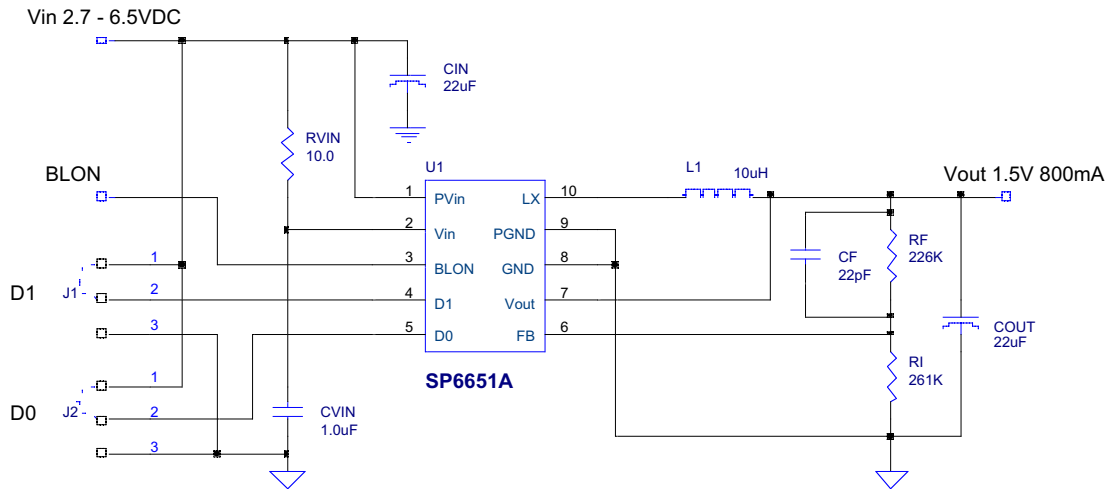


FIGURE 2. SP6651A 1.5V OUTPUT EVALUATION BOARD SCHEMATIC



USING THE EVALUATION BOARD

1) Powering up the SP6651A Circuit & Programming the UVLO threshold

The SP6651A Evaluation Board can be powered from a single Li-Ion battery or a +2.7 to +6.5V power supply. Connect with short leads directly to the “Vin” and “Gnd” posts. Note the SP6651A will remain in “shutdown” until D0 or D1 of the Jumpers J1 or J2 are applied to the Vin or position 1 to 2. See Table 1 for UVLO threshold programming and D1 and D0 pin definition.

Table 1. Operating Mode Definition

| D1 | D0 | Definition |
|----|----|---|
| 0 | 0 | Shutdown. All internal circuitry is disabled and the power switches are opened. |
| 0 | 1 | Device enabled, falling UVLO threshold = 2.70V |
| 1 | 0 | Device enabled, falling UVLO threshold = 2.85V |
| 1 | 1 | Device enabled, falling UVLO threshold = 3.00V |

2) VOUT PROGRAMMING

The SP6651A requires 2 feedback resistors to control the output voltage. Connect the appropriate resistors RF and RI (Table 2) from pin 6 SP6651A FB to Vout and to the GND.

For Vout different from that shown in the Table 2, use equation:

$$RF = \left(\frac{V_{out}}{0.8} - 1 \right) \cdot RI$$

Table 2. SP6651AUEB BILL OF MATERIALS

| Component | Vo = 3.3V | Vo = 1.5V |
|------------------|----------------------------|----------------------------|
| L1 | 10uH, CDRH5D28-100, Sumida | 10uH, CDRH5D28-100, Sumida |
| CIN | 22uF, TDK C3225X5R0J226M | 22uF, TDK C3225X5R0J226M |
| COUT | 22uF, TDK C3225X5R0J226M | 22uF, TDK C3225X5R0J226M |
| RVIN | 10 Ohm 5% | 10 Ohm 5% |
| CVIN | 1uF ceramic X7R SM 0805 | 1uF ceramic X7R SM 0805 |
| RI | 261k 1% | 261k 1% |
| RF | 825k 1% | 226k 1% |
| CF | 22pF ceramic | 22pF ceramic |
| U1 | SP6651AEU | SP6651AEU |

Table 3. SP6651A PIN ASSIGNMENT

| Pin Name | Pin Description | Pin NO. |
|-----------------|--|----------------|
| PVin | Input voltage power pin. Inductor charging current passes through this pin. | 1 |
| Vin | Internal supply voltage. Control circuitry powered from this pin. | 2 |
| BLON | Open drain battery low output – need to pullup to supply externally. Vin - Vout below threshold pulls this node to ground. Vin - Vout above threshold, this node is open. | 3 |
| D1 | Digital mode control input. See Table 1 for definition. | 4 |
| D0 | Digital mode control input. See Table 1 for definition. | 5 |
| FB | External feedback network input connection. Connect a resistor from FB to ground and FB to Vout to control the output voltage. This pin regulates to the internal reference voltage of 0.8V. | 6 |
| Vout | Output voltage sense pin. Used for internal timing and BLON circuitry. | 7 |
| GND | Internal ground pin. Control circuitry returns current to this pin. | 8 |
| PGND | Power ground pin. Synchronous rectifier current returns through this pin. | 9 |
| LX | Inductor switching node. Inductor tied between this pin and the output capacitor to create Vout. | 10 |

EVALUATION BOARD LAYOUT

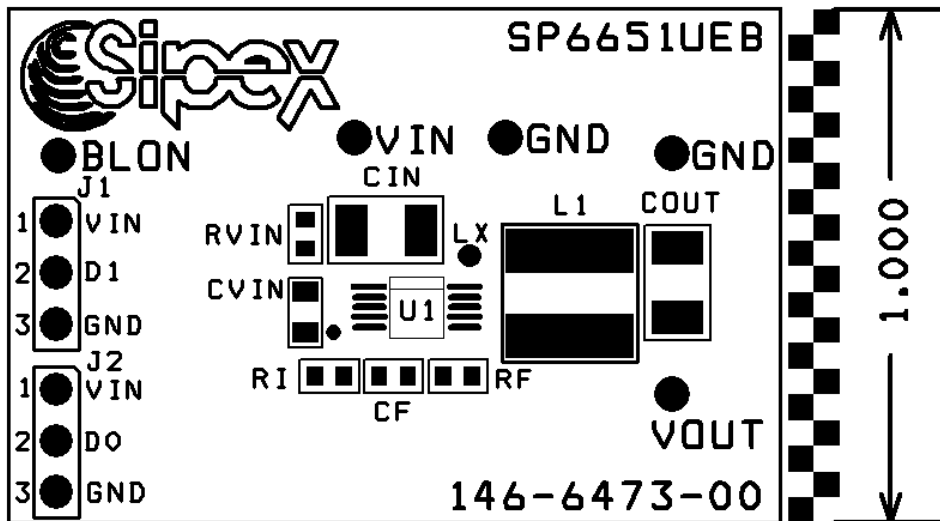


FIGURE 3: SP6651AEU COMPONENT PLACEMENT

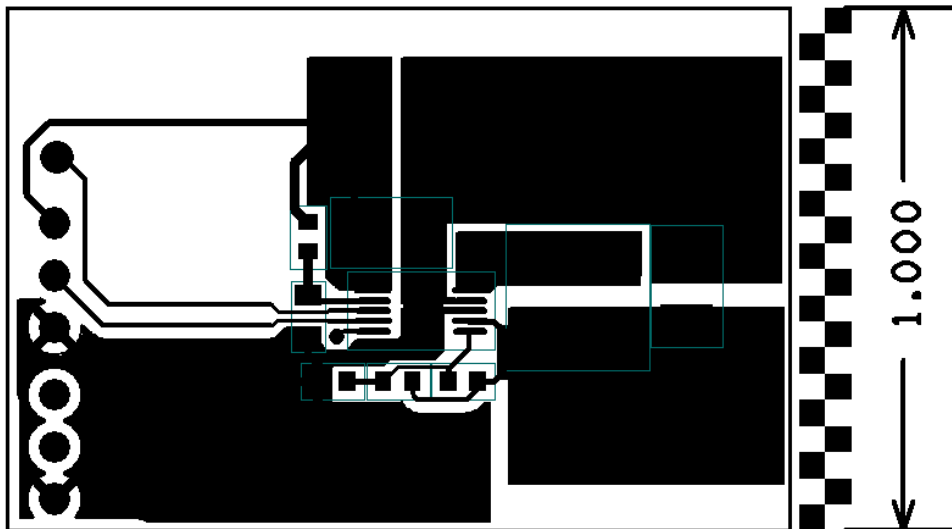


FIGURE 4: SP6651AEU PC LAYOUT TOP SIDE

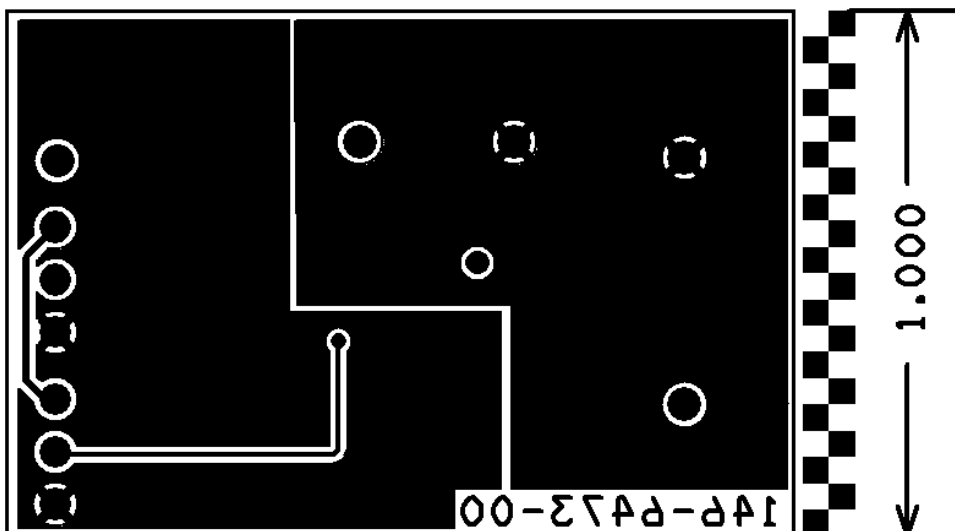


FIGURE 5: SP6651AEU PC LAYOUT BOTTOM SIDE