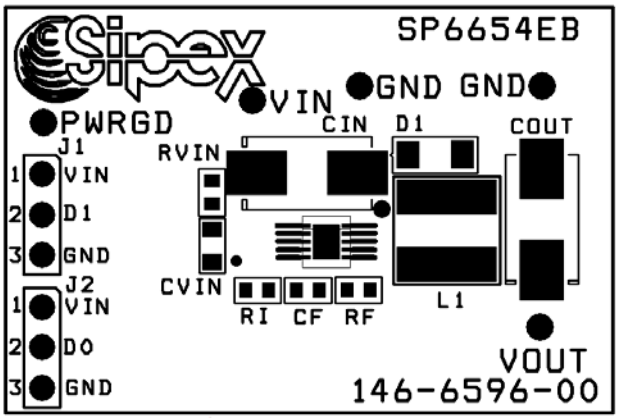
SP6654EB
Evaluation Board Manual

- 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
- μSOIC Package & DFN Ceramic Capacitors for small, low profile Power Supply



DESCRIPTION

The **SP6654 Evaluation Board** is designed to help the user evaluate the performance of the SP6654 for use as a single Li-Ion battery Step-Down DC-DC Converter. The SP6654 operates from 2.7V to 5.5Vinput, with the highest efficiency in the range 3.0V to 4.2V where the Li-Ion battery has the most energy. The SP6654EB evaluation board is a complete power supply circuit to provide ease of evaluation for the DC/DC Converter performance.

FIGURE 1. SP6654 3.3V OUTPUT EVALUATION BOARD SCHEMATIC

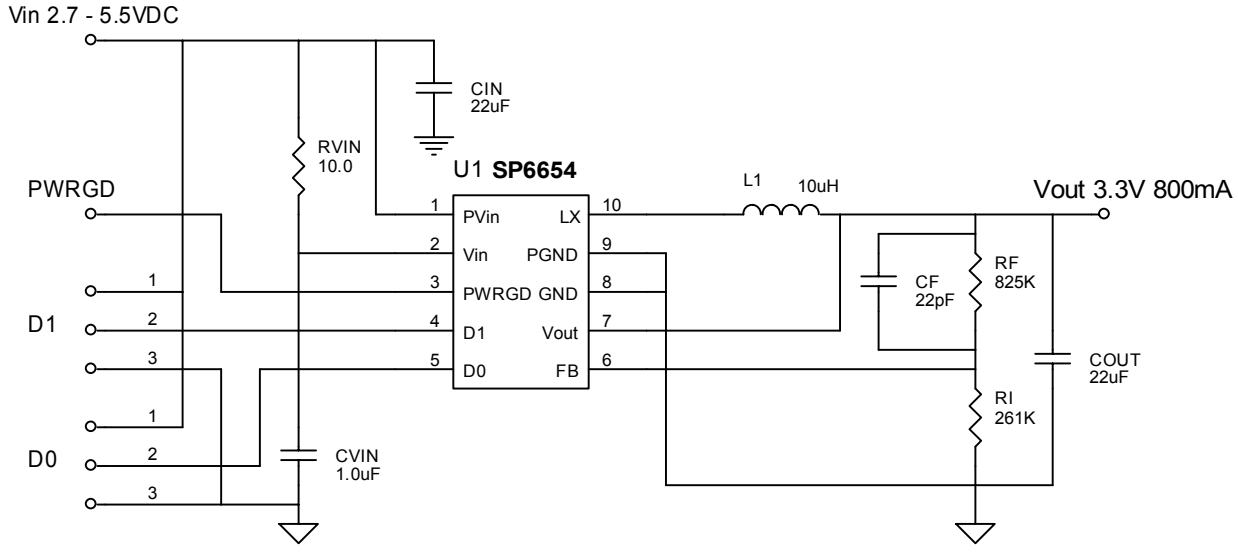
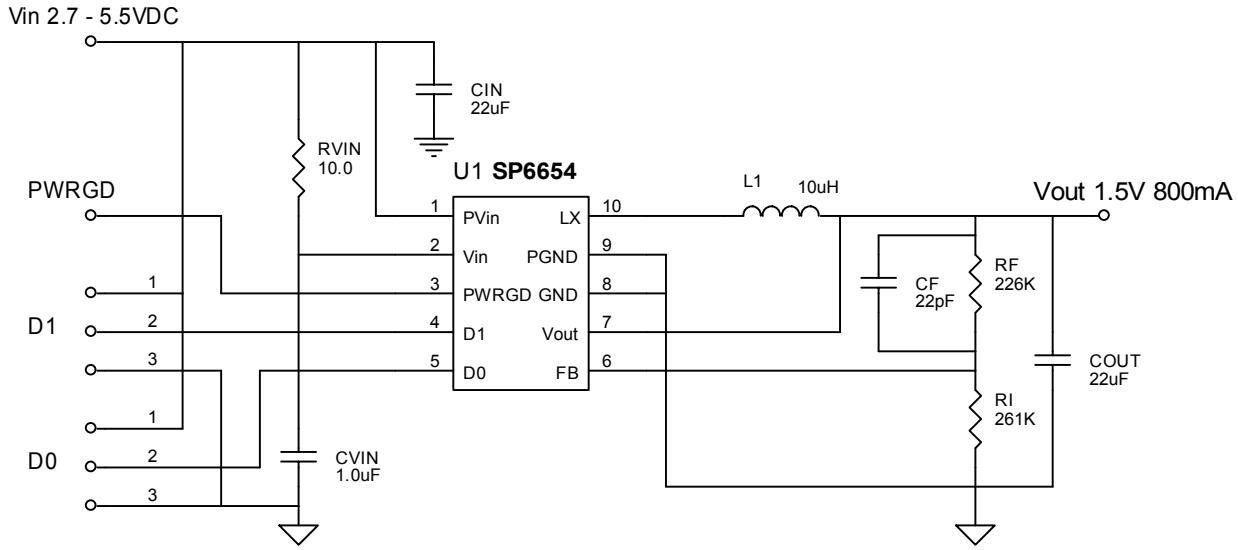


FIGURE 2. SP6654 1.5V OUTPUT EVALUATION BOARD SCHEMATIC



USING THE EVALUATION BOARD

1) Powering up the SP6654 Circuit & Programming the UVLO threshold

The SP6654 Evaluation Board can be powered from a single Li-Ion battery or a +2.7 to +5.5V power supply. Connect with short leads directly to the "Vin" and "Gnd" posts. Note the SP6654 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 SP6654 requires 2 feedback resistors to control the output voltage. Connect the appropriate resistors RF and RI (Table 2) from pin 6 SP6654 FB to Vout and to the GND.
For Vout different from that shown in the Table 2, use equation:

$$RF = \left(\frac{Vout}{0.8} - 1 \right) \bullet RI$$

Table 2. SP6654EB 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	SP6654EU or SP6654ER	SP6654EU or SP6654ER

Table 3. SP6654 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**
PWRGD	Open drain battery low output – need to pullup to supply externally. Vout below threshold pulls this node to ground. 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

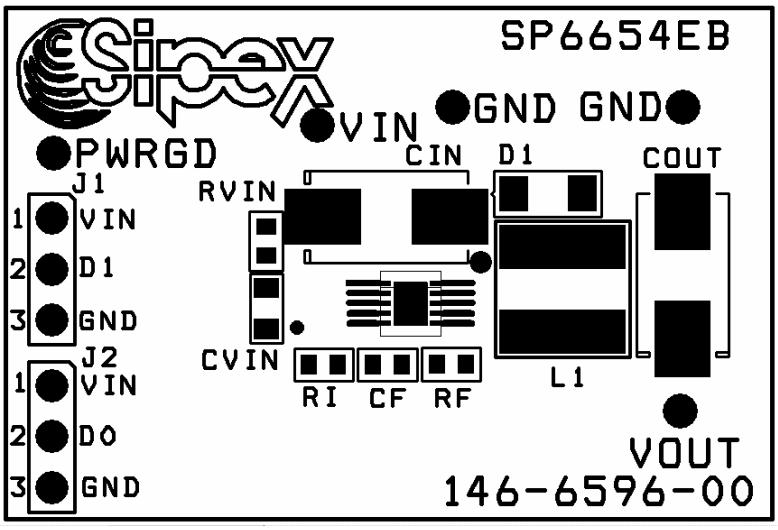


FIGURE 3: SP6654EB COMPONENT PLACEMENT

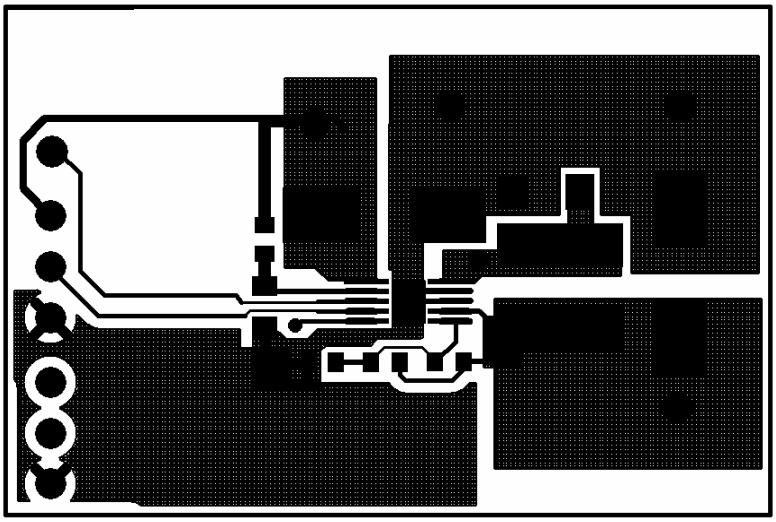


FIGURE 4: SP6654EB PC LAYOUT TOP SIDE

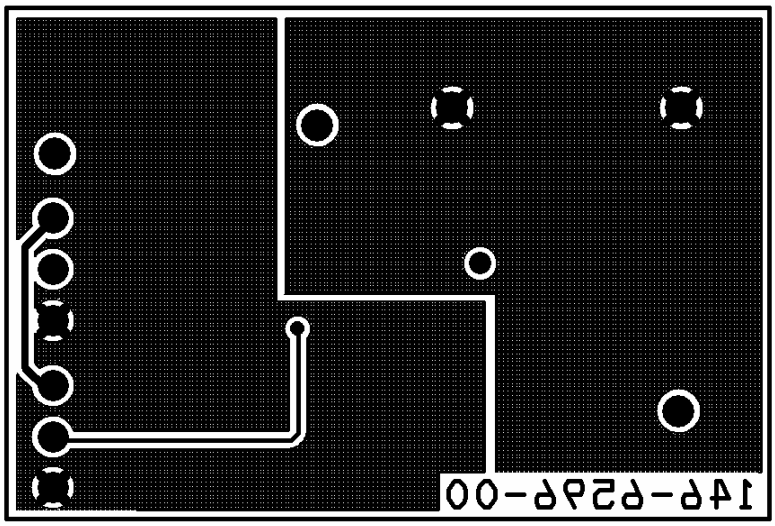


FIGURE 5: SP6654EB PC LAYOUT BOTTOM SIDE

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