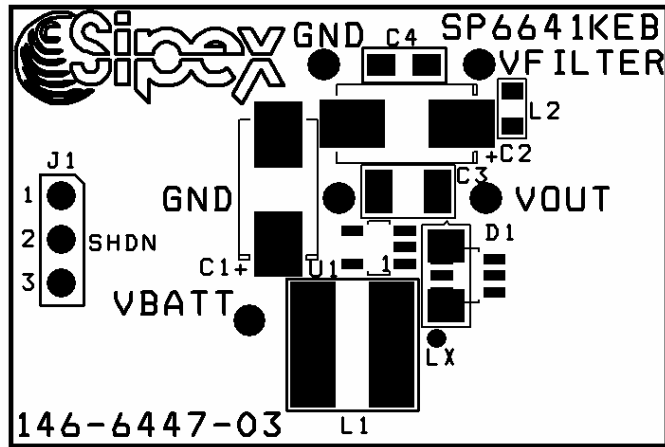


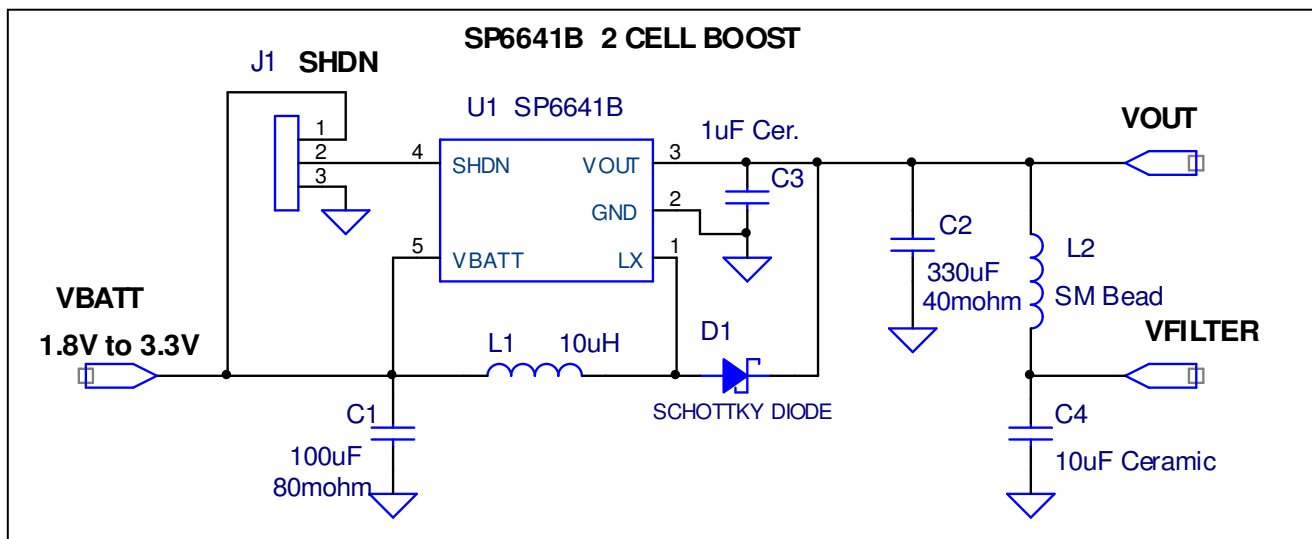
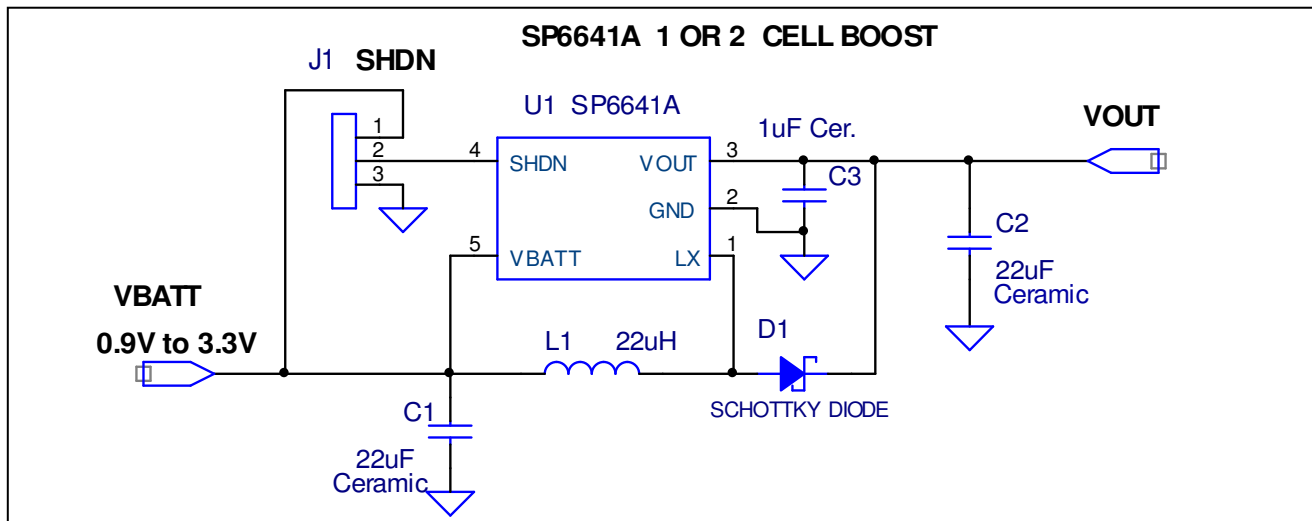


## SP6641A/6641B Low Noise Evaluation Board

- Easy Evaluation for the SP6641A/6641B Single or Dual Cell Alkaline to 3.3V or 5V Output
- SP6641B provides up to 500mA output current with less than 50mVpp ripple
- High Efficiency: up to 87%
- SOT23-5 Package & SMT components for small, low



### SP6641A/6641B Evaluation Board Schematics



## USING THE EVALUATION BOARD

### 1) Powering Up the SP6641A/6641B Circuit

The SP6641A/6641B Evaluation Board can be powered from inputs from a +0.9V to +3.3V from 1 or 2 alkaline cells or a power supply. Connect with short leads directly to the “Vbatt” and “Gnd” posts. Monitor the Output Voltage and connect the Load between the “Vout” post and the “GND” post.

### 2) Using the J1 Jumper: Enabling the SP6641A/6641B Output and using the Shutdown Mode

The SP6641A/6641B output will be enabled if the J1 Jumper is in the upper or pin 1 to 2 position. If J1 is in the pin 2 to 3 position, the Shutdown pin is brought to GND, which puts the SP6641A/6641B in the low quiescent Shutdown Mode.

### 3) Selecting the Inductor

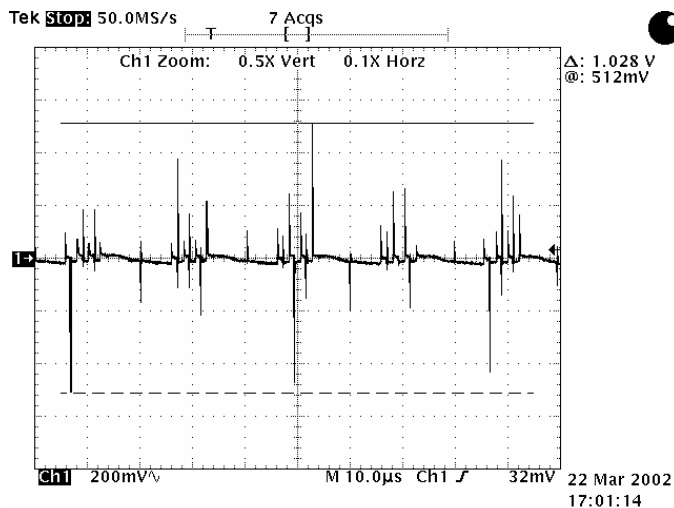
In selecting an inductor, the saturation current specified for the inductor needs to be greater than the SP6641A/6641B peak current to avoid saturating the inductor, which would result in a loss in efficiency and could damage the inductor. The SP6641A evaluation board uses a Sumida CDRH5D28 22uH inductor with an Isat value of 0.9A and a DCR of 0.095ohms, which easily handles the Ipeak of 0.33A of the SP6641A and will deliver high efficiencies. The SP6641B evaluation board uses a Sumida CDRH5D28 10uH inductor with an Isat value of 1.3A and a DCR of 0.065ohms, which easily handles the Ipeak of 1.0A of the SP6641B and will deliver high efficiencies. Other inductors could be selected provided their Isat is greater than the Ipeak of the SP6641A/6641B.

### 4) Selecting the Capacitors and Filter Components

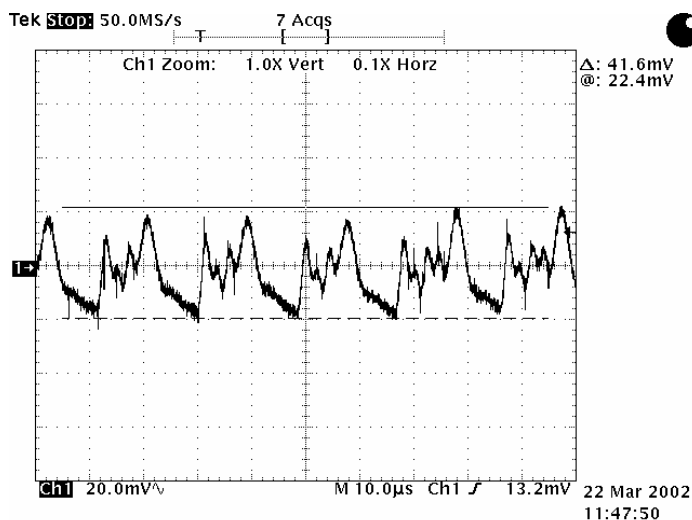
For the SP6641A, 22uF ceramic capacitors are used, which work well due to their inherently low ESR, which will help produce low peak to peak output ripple, and reduce high frequency spikes as well due to their low impedance. To obtain low peak to peak ripple for the SP6641B, the output capacitor needs to have ESR as low as 35 to 40 mohms and have a value of at least 100uF, for which the 330uF Sanyo POSCAP was chosen for its 40mohms max. ESR. Other ultra low ESR capacitors such the radial lead 100uF Sanyo OSCON or one of the new SM low ESR Polymer capacitors like the 100uF Panasonic UD series could be used. This low ripple is obtained with no output spikes through the use of a LC filter consisting of small 0805 SM bead core L2 and 10uF ceramic capacitor C3.

## POWER SUPPLY DATA

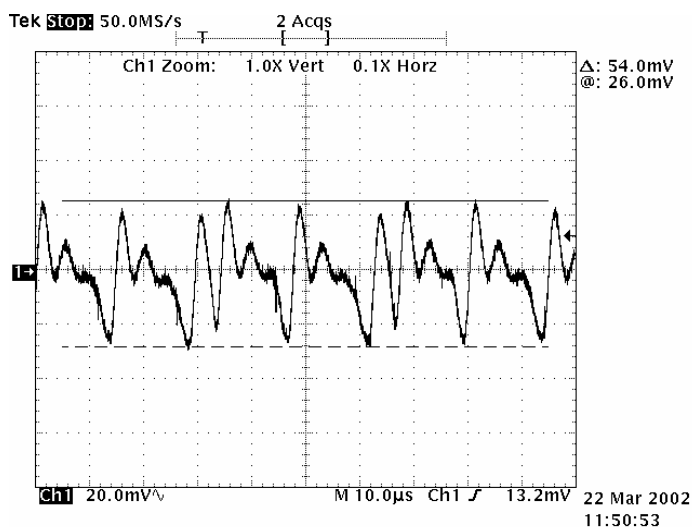
Power supply data is provided for the “B” version of the SP6641B, which has a peak inductor current limit of 1A, with the 3.3V output option. Figure 1 shows the switching signals still present as 1.0V spikes on the 330uF capacitor C2. Note that no output spikes are seen in figures 2 and 3 through the use of a small LC filter after the 330uF capacitor. The SP6641B’s low output ripple of 45 to 50mVpp is shown for a typical input of 2.0V to 3.0V and an output load of 300mA.



**Figure 1. SP6641B Switching Signals on 330uF: Vin = 2.0V, Iout = 300mA, Spikes = 1.0Vpp**



**Figure 2. SP6641B Output Ripple: Vin = 2.0V, Iout = 300mA, Vout ripple = 42mVpp, 51kHz**



**Figure 3. SP6641B Output Ripple: Vin = 3.0V, Iout = 500mA, Vout ripple = 54mVpp, 50kHz**

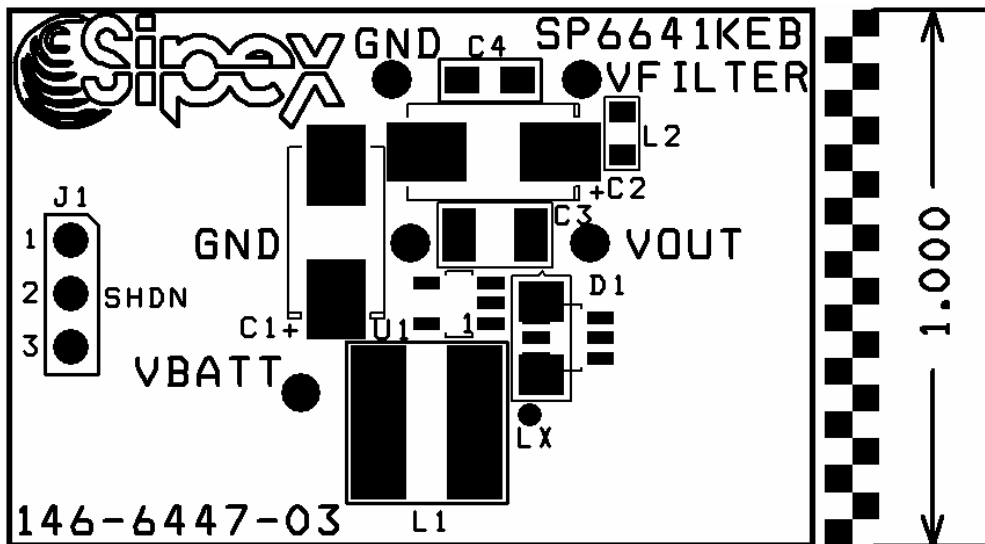


FIGURE 4: SP6641A/6641B COMPONENT PLACEMENT

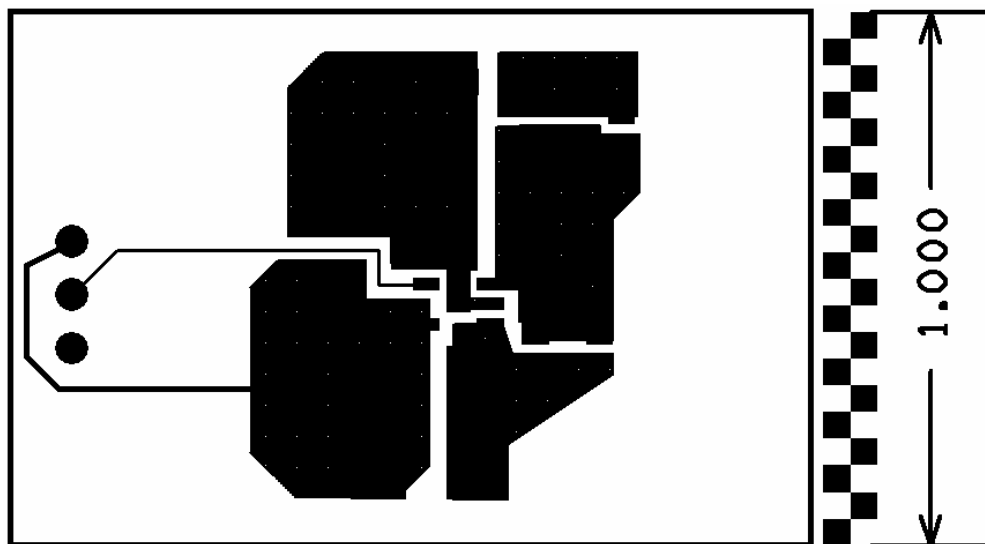


FIGURE 5: SP6641A/6641B PC LAYOUT TOP SIDE

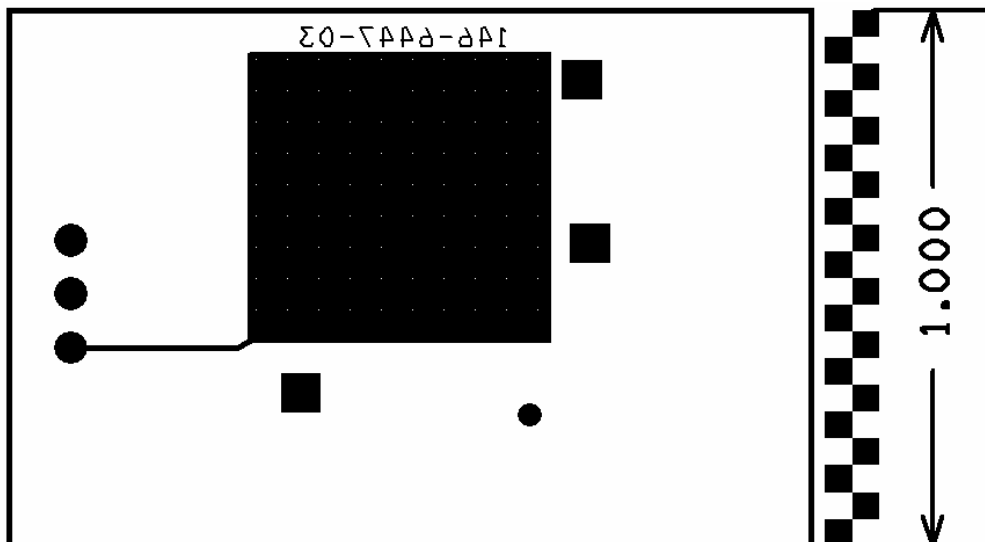


FIGURE 6: SP6641A/6641B PC LAYOUT BOTTOM SIDE

**TABLE1: SP6641A BILL OF MATERIALS**

| Ref. Des. | Qty. | Manufacturer       | Part Number          | Layout Size<br>LxWxH | Component                          | Vendor               |
|-----------|------|--------------------|----------------------|----------------------|------------------------------------|----------------------|
|           | 1    | Sipex Corp.        | 146-6447-03          | 1"x1.5"              | SP6641 Eval PC Board               | Sipex 978-667-8700   |
| U1        | 1    | Sipex Corp.        | SP6641AEK-3.3 or 5.0 | SOT23-5              | 5-pin SOT23 Step-Up DC/DC Conv     | Sipex                |
| C1,C2     | 2    | TDK Corp           | C3225X5R0J226K       | 1210                 | Ceramic 6.3V 22uF SM 0.005ohm ESR  | TDK 847-803-6100     |
| C3        | 1    | TDK Corp           | C2012X5R1A105K       | 805                  | Ceramic 10V 1uF SM 0.02ohm ESR     | TDK 847-803-6100     |
| L1        | 1    | Sumida             | CDRH5D28-220         | 5.7x5.5x3mm          | 22uH, 0.90A, 0.095ohm, SM Inductor | Sumida 847-956-0666  |
| D1        | 1    | STMicroelectronics | STPS0520Z            | SOD-123              | Schottky diode 0.5A, 0.385V        | STMicro 847-585-3023 |
| TP        | 5    | Mill-Max           | 0300-115-01-4727100  | .042 Dia             | Test Point Female Pin              | 800-Digi-Key         |
| J1        | 1    | Sullins            | PTC36SAAN            | .23x.12              | 3-Pin Header                       | 800-Digi-Key         |

**TABLE2: SP6641B BILL OF MATERIALS**

| Ref. Des. | Qty. | Manufacturer | Part Number          | Layout Size<br>LxWxH | Component                              | Vendor              |
|-----------|------|--------------|----------------------|----------------------|----------------------------------------|---------------------|
|           | 1    | Sipex Corp.  | 146-6447-03          | 1"x1.5"              | SP6641 Eval PC Board                   | Sipex 978-667-8700  |
| U1        | 1    | Sipex Corp.  | SP6641BEK-3.3 or 5.0 | SOT23-5              | 5-pin SOT23 Step-Up DC/DC Conv         | Sipex               |
| C1        | 1    | Sanyo Video  | 10TPA100M            | 7343                 | POSCAP 10V 100uF SM 0.080ohm Max. ESR  | Sanyo 978-922-6573  |
| C2        | 1    | Sanyo Video  | 6TPB330M             | 7343                 | POSCAP 6.3V 330uF SM 0.040ohm Max. ESR | Sanyo 978-922-6573  |
| C3        | 1    | TDK Corp     | C2012X5R1A105M       | 805                  | Ceramic 10V 1uF SM 0.02ohm ESR         | TDK 847-803-6100    |
| C4        | 1    | TDK Corp     | C3216X5R0J106M       | 1206                 | Ceramic 6.3V 10uF SM 0.005ohm ESR      | TDK 847-803-6100    |
| L1        | 1    | Sumida       | CDRH5D28-100         | 5.7x5.5x3            | 10uH, 1.3A, 0.065ohm, SM Inductor      | Sumida 847-956-0666 |
| L2        | 1    | Panasonic    | EXC-ML20A390U        | 805                  | SM Bead Core 100MHz                    | 800-Digi-Key        |
| D1        | 1    | Zetex        | ZCHS2000             | SOT23-6              | Schottky diode 2A, 0.42V               | Zetex 631-360-2222  |
| TP        | 5    | Mill-Max     | 0300-115-01-4727100  | .042 Dia             | Test Point Female Pin                  | 800-Digi-Key        |
| J1        | 1    | Sullins      | PTC36SAAN            | .23x.12              | 3-Pin Header                           | 800-Digi-Key        |
|           | 1    | Sullins      | STC02SYAN            | .2x.1                | Shunt                                  | 800-Digi-Key        |

**ORDERING INFORMATION**

| Model               | Temperature Range   | Package Type                  |
|---------------------|---------------------|-------------------------------|
| SP6641AKEB-3.3..... | -40°C to +85°C..... | SP6641A 3.3V Evaluation Board |
| SP6641AEK-3.3.....  | -40°C to +85°C..... | 5-pin SOT23                   |
| SP6641AKEB-5.0..... | -40°C to +85°C..... | SP6641A 5.0V Evaluation Board |
| SP6641AEK-5.0.....  | -40°C to +85°C..... | 5-pin SOT23                   |
| SP6641BKEB-3.3..... | -40°C to +85°C..... | SP6641B 3.3V Evaluation Board |
| SP6641BEK-3.3.....  | -40°C to +85°C..... | 5-pin SOT23                   |
| SP6641BKEB-5.0..... | -40°C to +85°C..... | SP6641B 5.0V Evaluation Board |
| SP6641BEK-5.0.....  | -40°C to +85°C..... | 5-pin SOT23                   |

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