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SP6641A 1 OR 2 CELL BOOST

J1 SHDN

U1 SP6641A

VBATT
0.9V to 3.3V

C1
22uF Ceramic

L1
22uH

D1
SCHOTTKY DIODE

C3
1uF Cer.

C2
22uF Ceramic

VOUT

SP6641B 2 CELL BOOST

J1 SHDN

U1 SP6641B

VBATT
1.8V to 3.3V

C1
100uF 80mohm

L1
10uH

D1
SCHOTTKY DIODE

C3
1uF Cer.

C2
330uF 40mohm

L2
SM Bead

C4
10uF Ceramic

VOUT

VFILTER

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.

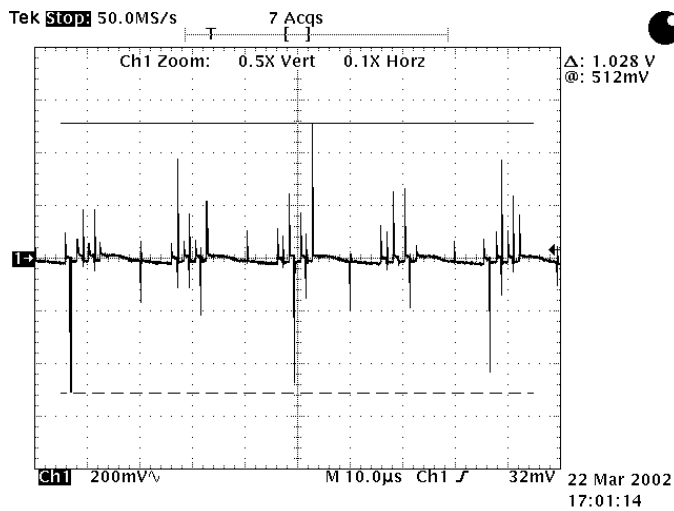


Figure 1. SP6641B Switching Signals on 330uF: $V_{in} = 2.0V$, $I_{out} = 300mA$, Spikes = 1.0Vpp

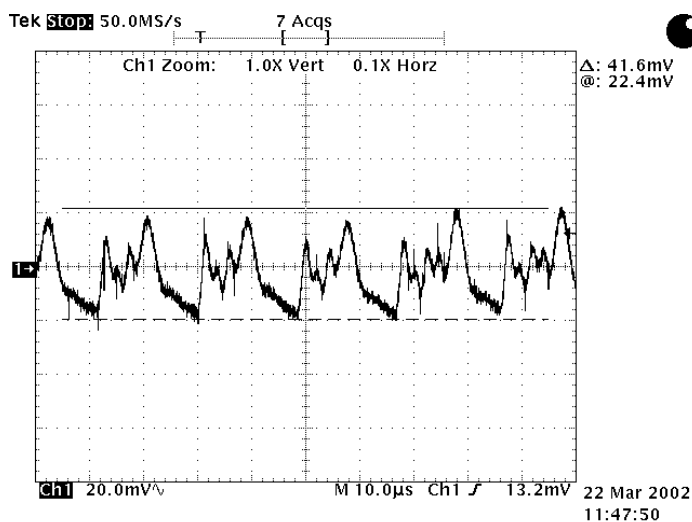


Figure 2. SP6641B Output Ripple: $V_{in} = 2.0V$, $I_{out} = 300mA$, V_{out} ripple = 42mVpp, 51kHz

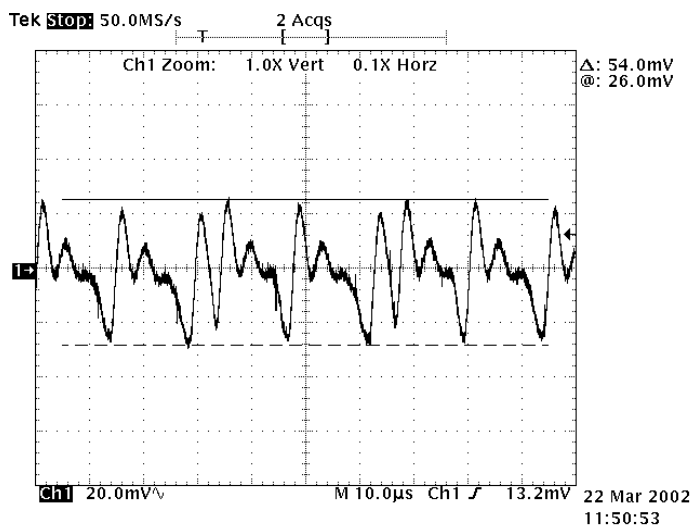


Figure 3. SP6641B Output Ripple: $V_{in} = 3.0V$, $I_{out} = 500mA$, V_{out} ripple = 54mVpp, 50kHz

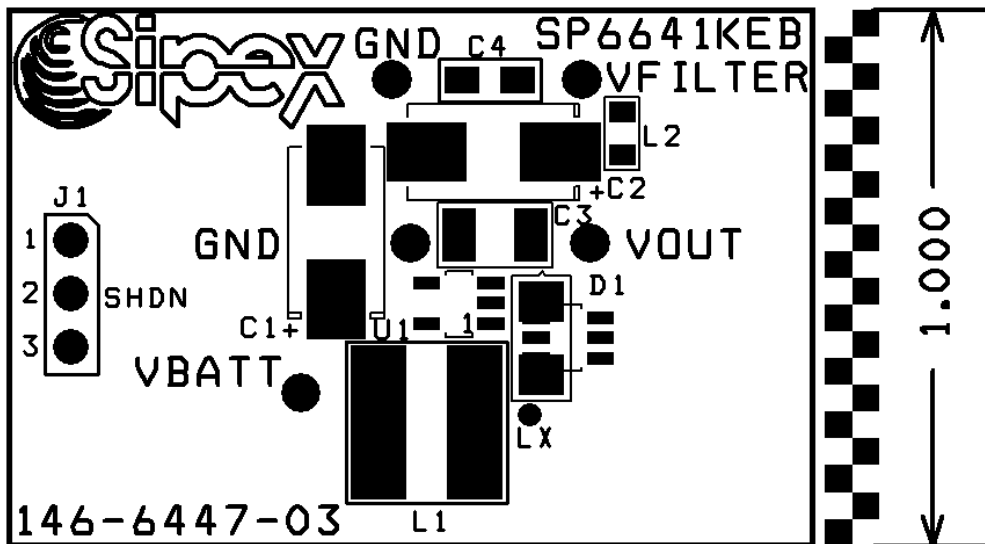


FIGURE 4: SP6641A/6641B COMPONENT PLACEMENT

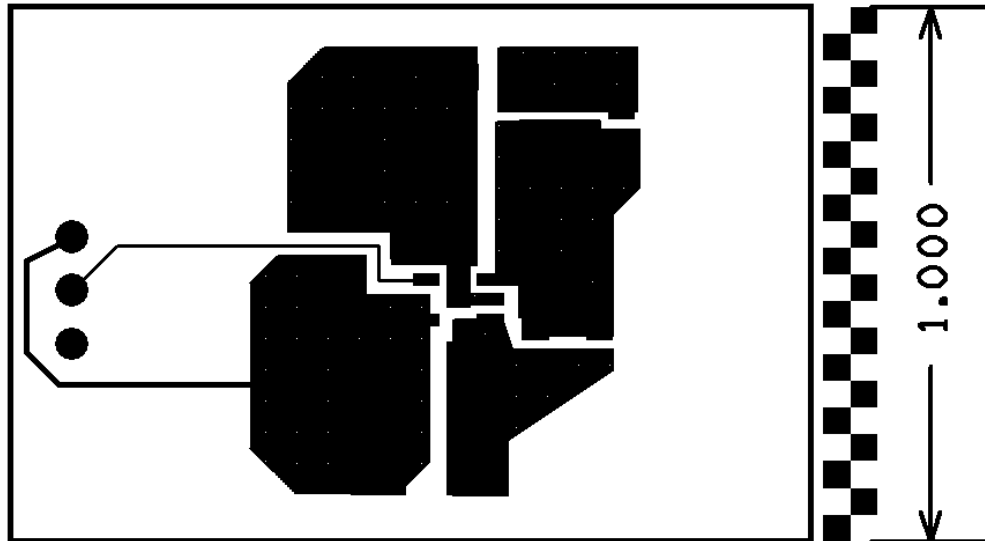


FIGURE 5: SP6641A/6641B PC LAYOUT TOP SIDE

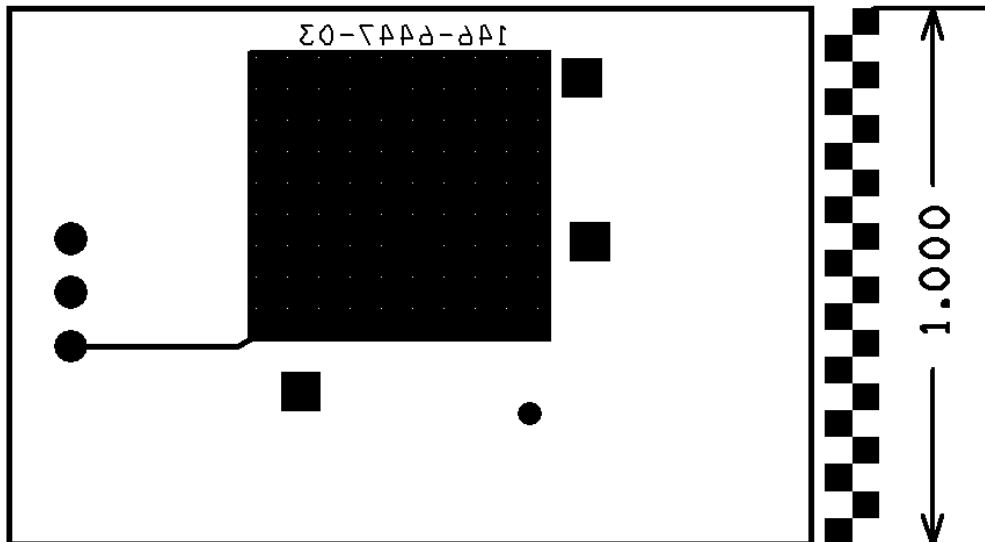


FIGURE 6: SP6641A/6641B PC LAYOUT BOTTOM SIDE

TABLE1: SP6641A BILL OF MATERIALS

Ref. Des	Qty.	Manufacturer	Part Number	Layout Size 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 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