Application Report
SLVA244–July 2006

Operating the TPS61042 From Two Li-Ion and Input Voltages Higher Than 6 V

PMP Portable Power

ABSTRACT

The following designs show how to operate the TPS61042 switch boost converter from input voltages greater than 6 V.

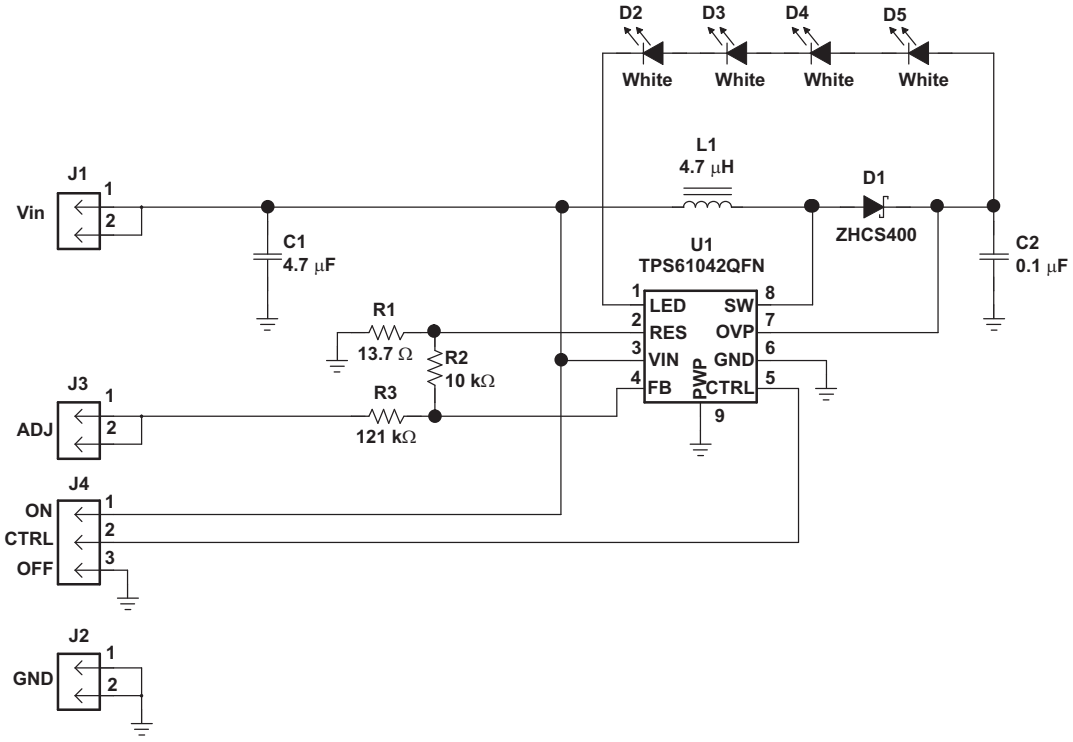
1 Features

- Current Source With Overvoltage Protection
- Input Voltage Range . . 1.8 V to 6.0 V
- Internal 30 V Switch
- Up to 85% Efficiency
- Precise Brightness Control Using PWM Signal or Analog Signal
- Switching Frequency . . Up to 1 MHz
- Internal Power MOSFET Switch . . 500 mA
- Operates With Small Output Capacitors Down to 100 nF
- Disconnects LEDs During Shutdown
- No Load Quiescent Current . . 38 µA Typ
- Shutdown Current . . 0.1 µA Typ
- Available in a Small 3 mm × 3 mm QFN Package

2 TPS61042 Reference Design

The reference design uses the TPS61042 high-efficiency boost converter and is configured to supply 20 mA of bias current to four white LEDs in series, from a 1.8-V to 6-V input voltage.

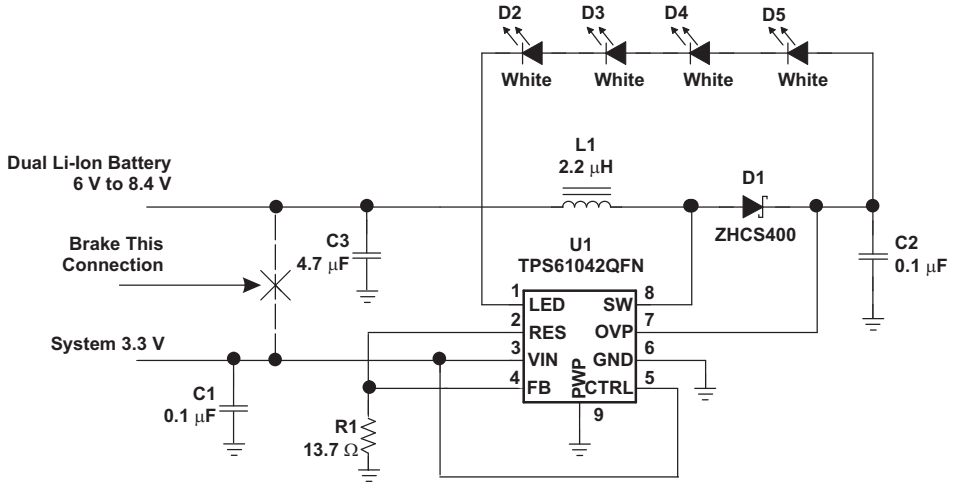
3 Schematic



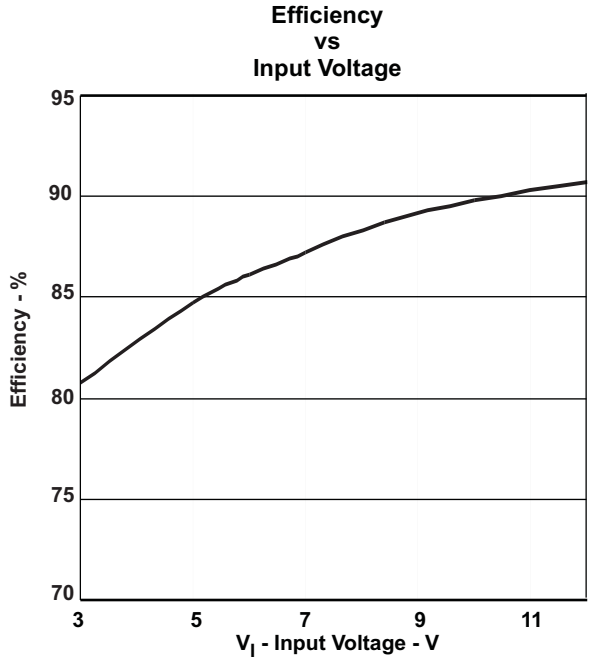
4 Bill of Material

Count	Ref Des	Description	Size	MFR	Part Number
1	C1	Capacitor, ceramic, 4.7 µF, 6.3 V, X5R, 10%	805	Murata	GRM21BR60J475KA11
1	C2	Capacitor, ceramic, 0.1 µF, 25 V, X7R, 10%	603	Murata	GRM188R71E104KA01
1	D1	Diode, Schottky, 400 mA, 40 V	SOD323	Zetex	ZHCS400
4	D2–D5	Diode, LED, white, 30 mA	1210	Lumex	SML-LX2832UWC-TR
3	J1–J3	Header, 2-pin, 100 mil spacing, (36-pin strip)	0.100 × 2	Sullins	PTC36SAAN
1	J4	Header,3-pin, 100 mil spacing, (36-pin strip)	0.100 × 3	Sullins	PTC36SAAN
1	L1	Inductor, 4.7 µH, 750 mA, 216 mΩ	0.500 × 0.500	Sumida	CMD4D11-4R7
1	R1	Resistor, chip, 13.7 W, 1/16-W, 1%	603	Std	Std
1	R2	Resistor, chip, 10 kΩ, 1/16-W, 1%	603	Std	Std
1	R3	Resistor, chip, 121 kΩ, 1/16-W, 1%	603	Std	Std
1	U1	IC, LED driver	QFN-8P	TI	TPS61042QFN
1	—	PCB, 1.2 In × 1.05 In × 0.062 In		Any	SLVP226
1	—	Shunt, 100 mil, black	0.100	3M	929950-00

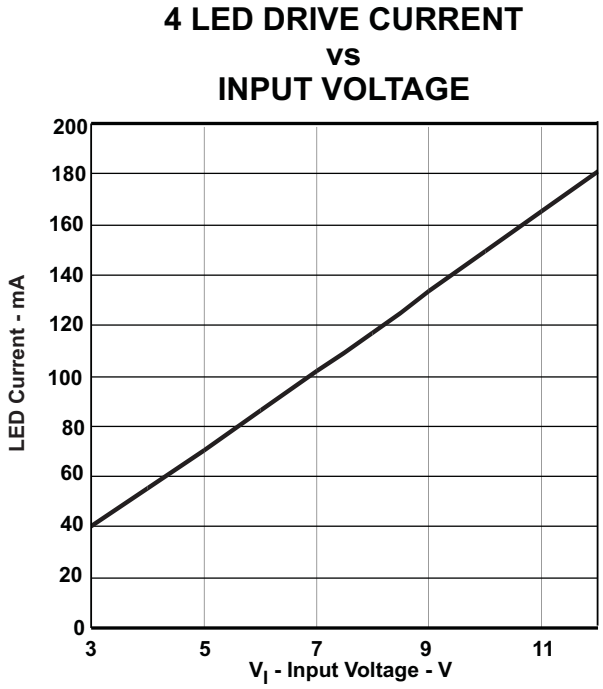
5 Modified TPS61042 Design for Higher Input Voltages



This technique provides two additional benefits: increased efficiency and higher available power output. The following graph shows the increase in efficiency with rising input voltage for a typical four-white-LED application.



The increase in output power with increased input voltage is a function of the TPS61042 operating topology. The following graph shows the TPS61042 maximum drive current versus input voltage for a typical four-white-LED load drive circuit.


4 LED DRIVE CURRENT
vs
INPUT VOLTAGE
LED Current - mA
200
180
160
140
120
100
80
60
40
20
0
3
5
7
9
11
VI - Input Voltage - V

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