Application Report
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TPS61150 Dual Output Boost Converter to Drive up to 14 WLEDs, Keypad, and LCD Backlight

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ABSTRACT

The TPS61150/1 is a high-frequency boost converter with two regulated current outputs for driving white light-emitting diodes (WLED). The reference design and applications examples in this document show the TPS61150 driving up to 14 WLEDs, a keypad, and a LCD backlight application. The two current outputs are ideal for driving WLED backlight for the sub and main displays in clamshell phones.

1 Features

- 3 V to 6 V Input Voltage Range
- Two Outputs Each up to 27 V
- 0.7 A Integrated Switch
- Built-in Power Diode
- 1.2 MHz Fixed PWM Frequency
- Individually Programmable Output Current
- Input-to-Output Isolation
- Built-in Soft Start
- Overvoltage Protection
- Up to 83% Efficiency
- Up to 30 kHz PWM Dimming Frequency
- Availiable in a 10 Pin, 3 × 3 mm QFN Package

2 TPS61150 Reference Design

The reference design contains a TPS61150 IC and supports passives which provide two independently regulated output currents using a single inductor step-up boost converter. One output drives two parallel strings of WLEDs. One string can be configured for two or four series WLEDs. The other string has four series WLEDs.

The TPS61151 IC has the same pinout as the TPS61150; the only difference is the overvoltage protection (OVP) at 28 V for the TPS61150 and 22 V for the TPS61151. Therefore, they can be switched out and used on the same board.

3 TPS61150 Schematic and Bill of Materials

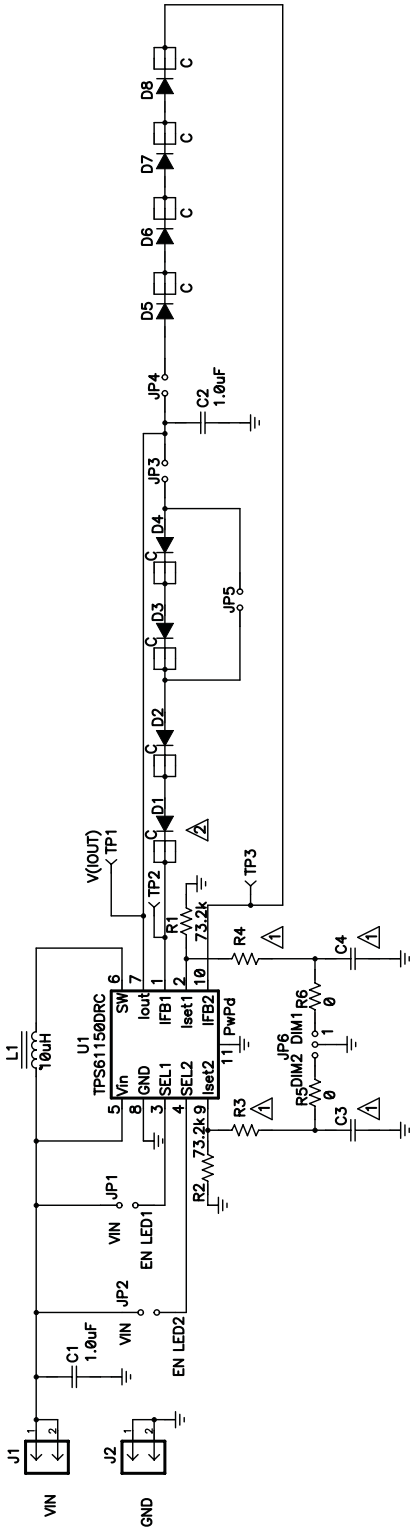

Figure 1. Schematic

3.1 Bill of Materials

Table 1. HPA150 Bill of Materials

COUNT	REF DES	VALUE	DESCRIPTION	SIZE	PART NUMBER	MFR
1	C1	1.0 µF	Capacitor, Ceramic, 25 V, X5R, 10%	0603	C1608X5R1E105K	TDK
1	C2	1.0 µF	Capacitor, Ceramic, 50V, X7R, 10%	1206	C3216X7R1H105K	TDK
2	C3, C4	Open	Capacitor, Ceramic, vvV	0603		
8	D1–D8		Diode, LED, White, 30 mA, Common Anode	P-LCC-4	Q65110A1931 LW E67C-U2V2-5K8L-1	Osram
2	J1, J2		Header, 2-pin, 100 mil spacing, (36-pin strip)	0.100 × 2	PTC36SAAN	Sullins
5	JP1–JP5		Header, 2-pin, 100 mil spacing, (36-pin strip)	0.100 × 2	PTC36SAAN	Sullins
1	JP6		Header, 3-pin, 100 mil spacing, (36-pin strip)	0.100 × 3	PTC36SAAN	Sullins
1	L1	10 µH	Inductor, SMT, 1.26 A, 163 mΩ	0.137 × 0.147	VLF4018AT-100MR74-2	TDK
2	R1, R2	73.2 kΩ	Resistor, Chip, 1/16 W, 1%	0603	Std	Std
2	R3, R4	Open	Resistor, Chip, 1/16 W	0603		
2	R5, R6	0	Resistor, Chip, 1/16 W, 1%	0603	Std	Std
3	TP1–TP3		Test Point, Red, Thru Hole Color Keyed	0.100 x 0.100	5000	Keystone
1	U1		IC, Dual Output Boost Regulator Using Single Inductor	DRC10	TPS61150DRC	TI
1	–		PCB, 1.95 In × 1.55 In × 0.062 In		HPA150	Any
6	–		Shunt, 100-mil, Black	0.100	929950-00	3M

4 Using the TPS61150 in Other WLED and LCD Backlight Applications

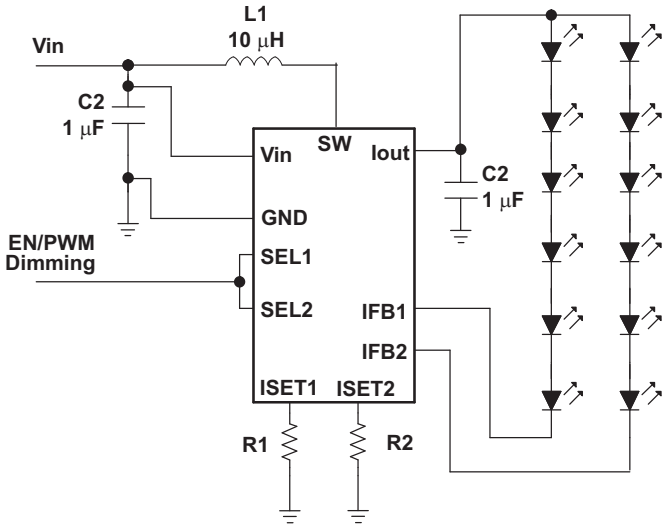

Figure 2. Driving Up to 14 WLEDs With One LCD Backlight

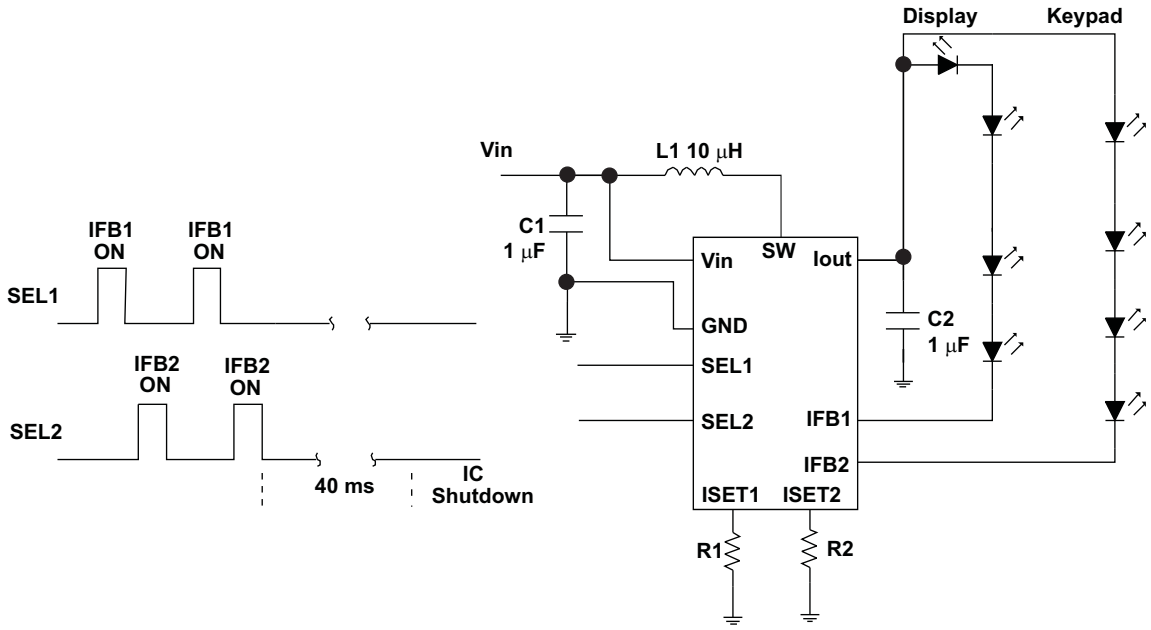

Figure 3. Driving a Keypad and LCD Backlight by applying interleaved PWM signal to the SEL1 and SEL2 pins. The duty cycle of the PWM signal controls brightness dimming

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