

High Power LED Driver with Dimmer

Designed by: Matthew Szaniawski (mszaniawski@sipex.com)

Part Number: SP7652

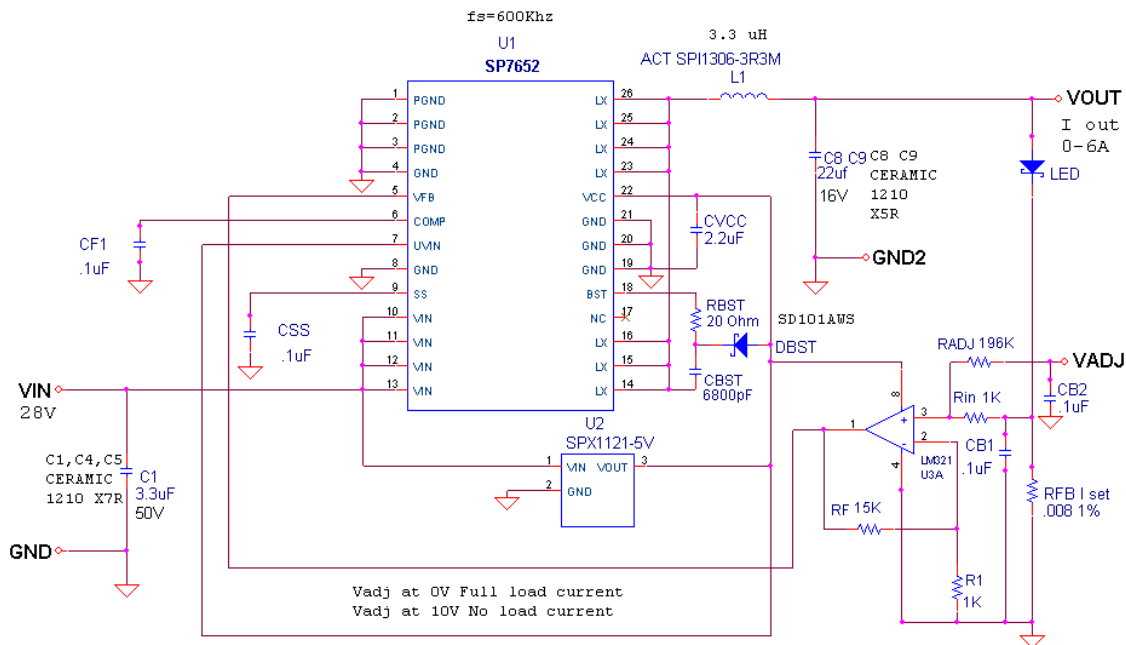
Application Description: High Power LED driver with analog 0V-to-10V dimmer

Electrical Requirements:

Input Voltage	5.5V to 28V
Output Voltage	V _F of LED
Output Current	0 to 6A

Circuit Description:

This circuit has been designed to provide a high output constant current source to drive a single high power LED. Also included in this circuit is a Dimmer function. The dimmer function is done by the use of an external operational amplifier; this amplifier also serves to lower the feedback voltage to 50mV, thus reducing the amount of power lost in the R_{set} resistor.



Schematic for SP7652 LED Driver

The output current of the regulator is set by the following formulas

$$R_F = \left(\frac{.8}{V_{set}} - 1\right) \cdot R_1 \quad (1)$$

Where

R_F is the feedback resistor

R_1 should be chosen between 1Ω and $10K\Omega$

V_{set} is the feedback voltage set point should be chosen between $50mV$ and $200mV$

$$I_{out} = \frac{V_{set}}{R_{FB}} \quad (2)$$

Where I_{out} is the desired output current

V_{set} is the feedback voltage set point from Equation 1

R_{FB} is the feedback resistor

The dimming function is done by injecting current into pin 3 of the operational amplifier through resistor R_{ADJ} . For the 0V-to-10V dimming function, the resistor is approximately $200K\Omega$; for 0V-to-5V, adjust the resistor to be half that, about $100K\Omega$.

This report includes application schematic, complete Bill of Materials and figures 1-4 illustrating electrical performance of the design.

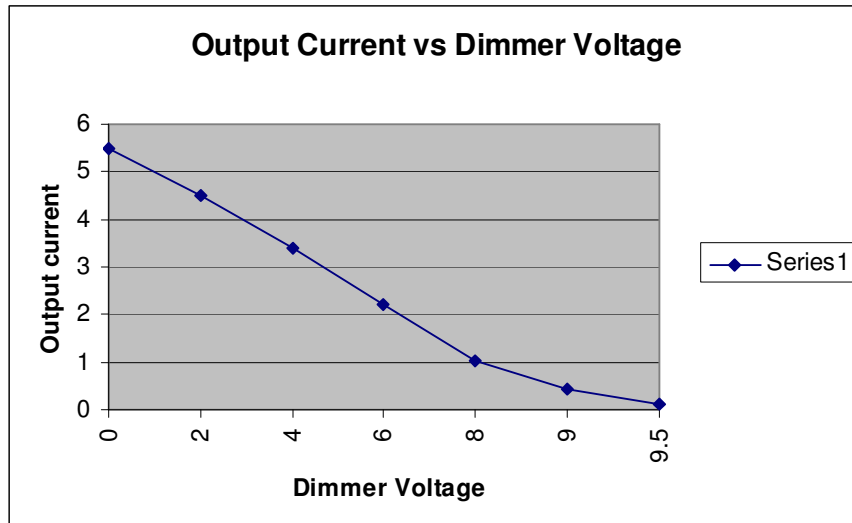


Figure 1. Typical Dimmer Voltage vs. I_{out}
 V_f 12V

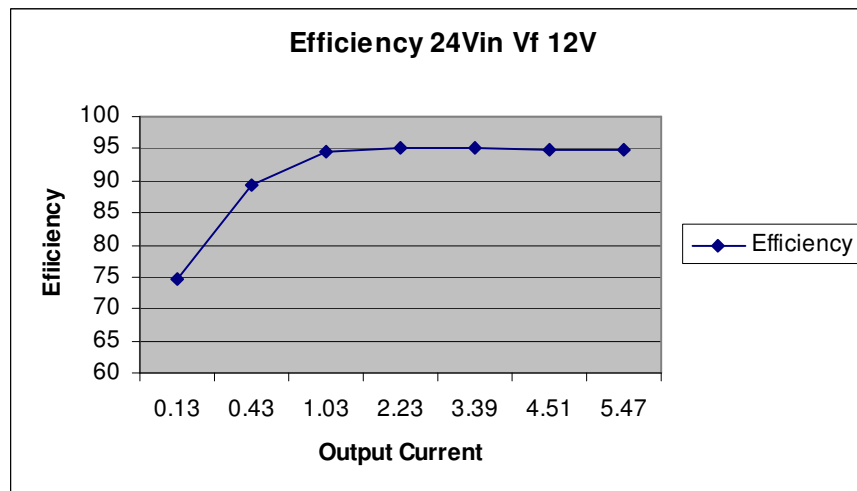


Figure 2. Efficiency at 24V in V_f 12V

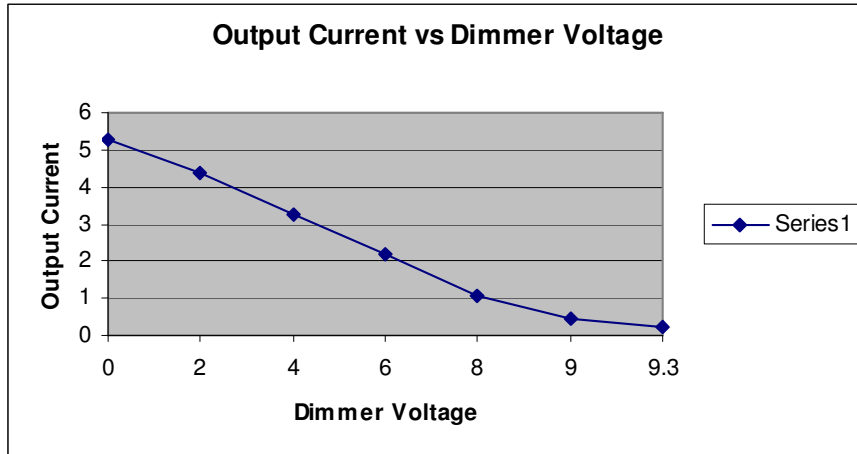


Figure 3. Output current vs. Dimmer Voltage
 V_f 3.7V V_{in} 12V

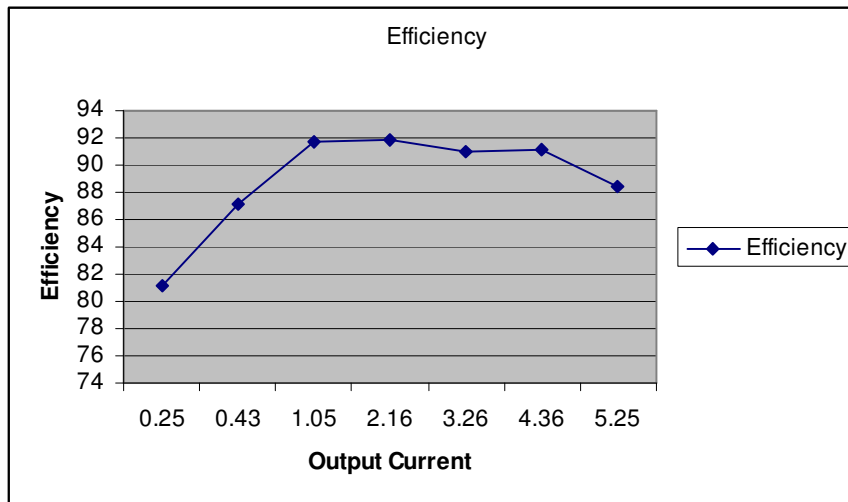


Figure 4. Efficiency 12V_{in} 3.7V_f

**SP7652 Evaluation Board Rev. 02 List of
Materials**

6/20/2006

Line No.	Ref. Des.	Qty .	Manuf.	Manuf. Part Number	Layout Size	Component	Vendor Phone Number
2	U1	1	Sipex	SP7652EU	DFN-26	2-FETs Buck Ctrl	978-667-7800
3	U2	1	Sipex	SPX1125M5-5.0	SOT-23-5	150mA LDO Voltage Reg	978-667-7800
4	DBST	1	Vishay Semi	SD101AWS	SOD-323	15mA Schottky Diode	800-344-4539
5	L1	1	Inter-Technical	ACT1306-3R3M	6.8X6.8mm	3.3uH Coil 8A	
6	C1 C4 C5	1	TDK		1210	3.3uF Ceramic X5R 50V	978-779-3111
7	C8,C9	2	TDK	C3225X5R1C226M	1210	22uF Ceramic X5R 16V	978-779-3111
8	CVCC	1	TDK	C1608X5R1A225K	0603	2.2uF Ceramic X5R 10V	978-779-3111
9	CBST	1	TDK	C1608X5R1C103K	0603	.01uF Ceramic X5R 10V	978-779-3111
11	CF1 CSS	1	TDK	C1608X5R1C104K	0603	.1uF Ceramic X7R 50V	978-779-3111
15	RADJ	1	Panasonic	ERJ-3EKF1963V	0603	196K Ohm Thick Film Res 1%	800-344-4539
16	RF	1	Panasonic	ERJ-3EKF1502V	0603	15K Ohm Thick Film Res 1%	800-344-4539
17	RIN R1	1	Panasonic	ERJ-3EKF1001V	0603	1K Ohm Thick Film Res 1%	800-344-4539
18	RFB	1	Panasonic		0603	.008 Ohm Thick Film Res 1%	800-344-4539
20	RBST	1	Panasonic	ERJ-3EKF05R0V	0603	5.0 Ohm Thick Film Res 1%	800-344-4539

Figure 5. BOM