

Re: luxeon led dimmer circuit

Source: <http://sci.tech-archive.net/Archive/sci.electronics.basics/2005-10/msg00078.html>

- *From:* andy <news4@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Mon, 03 Oct 2005 06:34:20 +0100
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On Sun, 02 Oct 2005 21:44:49 -0400, John Popelish wrote:

> andy wrote:

>> I've built the following circuit on breadboard as a dimmer circuit for 3

>> luxeon III Star ultrabright LEDs:

>>

>> <http://www.niftybits.ukfsn.org/electronics/luxeon-dimmer.png>

>>

>> any comments welcome. It does work at the moment, but when the battery is

>> low, the maximum current drops from 0.9 A to 0.7 A, and the op-amp swings

>> near to the top rail. The one thing I'm thinking of changing before I

>> solder it up is to change the 1 ohm sense resistor for a lower value

>> (maybe 0.5 ohm) so that the transistor has a bit more headroom to work

>> with, which should cure this I think.

>

> Does the BD139 get very hot?

Yes, but not as bad as the other power components, so probably not desperately in need of heat sinking. (The LEDs get hot enough to scald when run at full current, so I'll probably heat sink them with some aluminium sheet. They already have mini heat sinks built in though.)

> I agree that you can use a lower value

> current sense resistor. But you also have to scale the reference

> voltage down by half.

Yes, I was assuming that.

> I think you don't need the first opamp to

> supply the divider, since it is a constant load, so it can be factored

> into the zener bias design. Also, the divider can be very much higher

> value resistors, since the opamp draws almost no current from it. For

> instance, a 10k pot in series with a 100k resistor (to use with a .5

> ohm sense resistor). You could use the opamp to regulate the current

> to the zener, instead, to make that voltage almost completely

> independent of the battery.

>

> The idea is to have the opamp output drive the zener through a current

> limiting resistor, while the zener is also tied to non inverting

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> input. The inverting input is connected to a voltage divider (could
> also be your output adjust divider) between the opamp output and
> ground, which sets the voltage gain of the opamp to something a little
> more than 1. Lets say you use a divider that creates 5.6 volts when
> the opamp produces 8.4. (say, a 10k resistor to the opamp output and a
> 20k to ground) To bias the zener with about 5 mA, the resistor from
> output to zener would have to be about $2.8/.005=560$ ohms. you may
> have to add a 10k pull up resistor to the opamp output to make sure it
> starts positive when the power is applied. You tap off the lower half
> volt across the lower part of the 20k resistor to produce the 0 to .5
> volt needed for the current reference.

Thanks for the idea – I'll give it a try.

cheers, andy.

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<http://www.niftybits.ukfsn.org/>

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• **References:**

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◇ *From:* andy

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