MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

New 35mv LDO-CC Driver for Luxeon

#720173 - Wed Oct 13 2004 10:26 AM

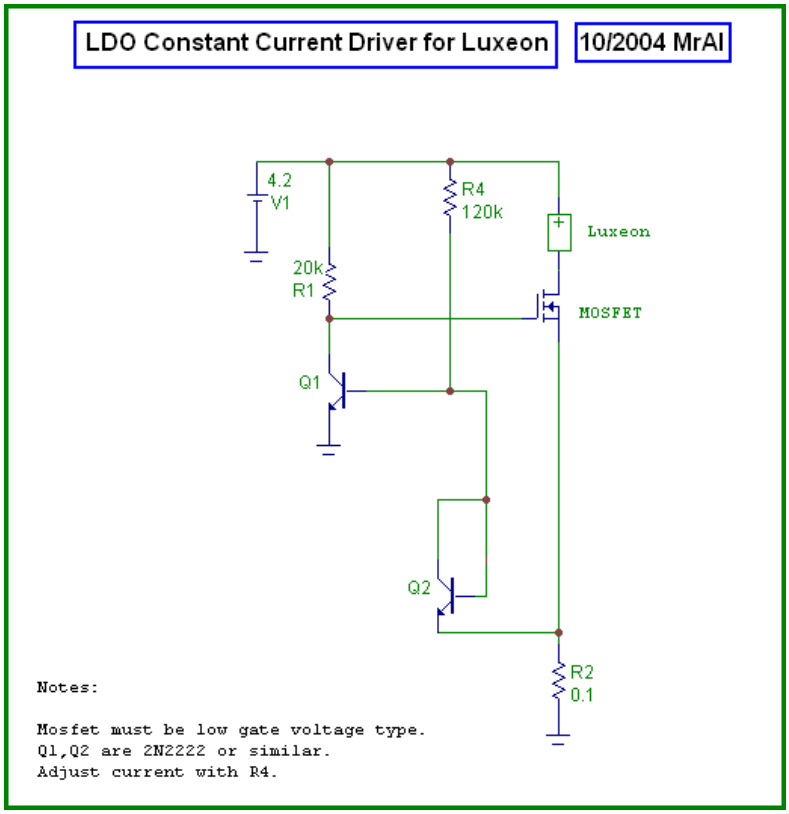
Hi there,

Here's another very low dropout CC driver fresh off the drawing board

It's very well suited for use with a 4.2v Li-ion cell.

All surface mount parts are to be used for small spaces.

Take care,
Al



Post Extras:

Barbarin
Flashaholic

Reged: Jul 30 2001
Posts: 357
Loc: Spain

CPF Supporting Manufacturer

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#720184 - Wed Oct 13 2004 10:34 AM

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Hello Mr. Al

Thanks again for your designs... I asume 35mv is 35 milivolts which is the dropout, a I wrong?
Will it stand 1000 mA? What about 3000 mA? In thsi case is better to triplicate?

Regards,

Javier Lopez

Post Extras:

evan9162

Re: New 35mv LDO-CC Driver for Luxeon [Re: Barbarin]
#720193 - Wed Oct 13 2004 10:43 AM

Edit | Reply | Quote | Quick Reply

Neat.

The current handling capabilities are pretty much exclusively determined by the MOSFET, no? Are there any issues with the voltage across R2 approaching 0.3V or higher? Obviously, you could always drop R2 down to 0.05 ohms if needed.

Edited by evan9162 (Wed Oct 13 2004 10:44 AM)

Post Extras:

Flashaholic*

Reged: Apr 18 2002
Posts: 1417
Loc: Boise, ID

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#720233 - Wed Oct 13 2004 11:27 AM

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awesomeness.. this is exactly along the lines of what i was aiming for way back when started that thread.. simplicity supreme .. no caps, no inductors.. aren't there double-transistors in an sot-23 format i could use?

Also, what range of resistance would i expect to use for R4? I need about 300mA

Oh.. in addition, a quick look at that circuit.. would it be possible to swap R4 and R1 f a single POT of 150k with wiper on Vbat ... trading two components for one, and have adjustability built in (trimpot, not for brightness)..

Then... possible to make it a 'dimmable' by introducing a variable resistance (from infinite to 2k, but starting to 'work' at 20k)?

I guess i can just 'bend' R4 higher or lower depending how i have to set it up, but mostly depends how subtle the change can be... i didn't look close enough to the ckt know if lower or higher R4 = more current.

-awr

Post Extras:

Doug S
Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#720389 - Wed Oct 13 2004 02:07 PM

Edit | Reply | Quote | Quick Reply

Al, interesting circuit. Have you actually built and tested it? Doing a quick mental, non-rigorous analysis, it looks like you would need to tweek the R values for the particular Q1,Q2 used since performance looks to be sensitive to HFE. Also, since HFE temperature dependent it would seem that making Q1, Q2 a single package device would be a good idea. I can't quite get my mind around it but I have a gut feel that t circuit may not regulate very tightly w.r.t. Vin. Hopefully someone can post some act test data.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#720459 - Wed Oct 13 2004 03:29 PM

Edit | Reply | Quote | Quick Reply

Hello again,

barbarin:
Yes, 35mv plus a little bit more for the MOSFET, but not much.
35mv is of course at 350ma output current.
It should be able to go to 1000ma or even 3000ma, with change of R2.
R2 would be set to drop 35mv for whatever current, ie. R2=0.035/Iout.
You'll have to pay close attention to Pdiss of the Mosfet at high
input line, however. If too high, yes, you may have to go to
double or triple the circuit.

evan:
Yes, the current handling is mostly the MOSFET, but power in this device is very important at input high line.
The design point is 35mv across R2, so adjusting this resistor to fit that critereon should do the trick.

andrew:
R4 is set to provide about 350ma as is. I'd have to look at the range of R4 for various currents, but as R4 goes higher the MOSFET turns on harder, and vice versa.
I dont think i'd want to make R1 and R4 a single pot, because you'd eventually run into a no regulation point.

Doug S:
Sure, making Q1,Q2 a single package if you care to is just fine.
If not, they should be mounted close together, possibly even covered with maybe some thermal insulation so they form a sort of single temperature node.
The circuit wont be super good for changes in Vin, but should be ok for 3.2 to 4.2 volts (or abouts). I think i found 280ma to 350ma over something like 3 to 4 volts. I guess adjusting R4 would get into the center of that range. Regulation with load is superb though... meaning of course it will adjust to various voltage drops, even like those with very low volt red LED's. Should be able to unplug one LED and plug in another and have the same current within 2% or something like that.

More Notes:

For example, for Li-ion apps, call 'low line' 3v and 'high line' 4v.

If you'd like to try different resistor values be sure to check at least four points:
1. Output current at low line
2. Output current at high line
3. Output current with a 3.5v (approx) LED
4. Output current with a 3.2v (approx) LED

Sometimes you cant find exactly a 3.2v LED, so find a resistor value that drops 3.2v when connected to the output, or try 1N4003 diodes in series. Make sure it is (say) 3.2v for each test that requires it, and doesnt drop to 3.1 or go up to 3.3v.

If anyone wants to test this circuit please post some data.

Good luck with it and take care,
Al

Post Extras:

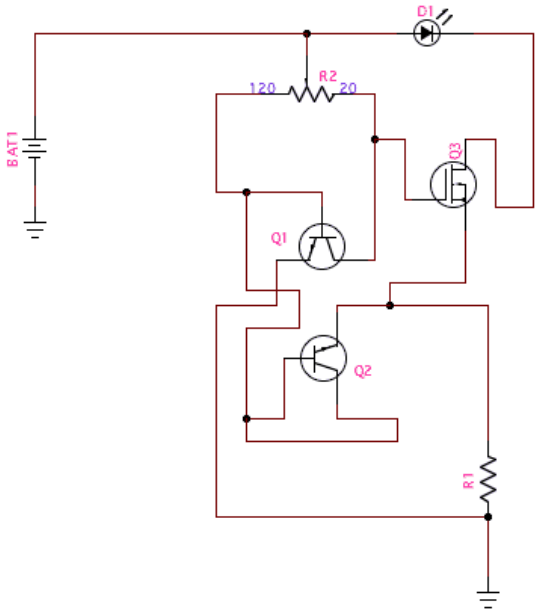
andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

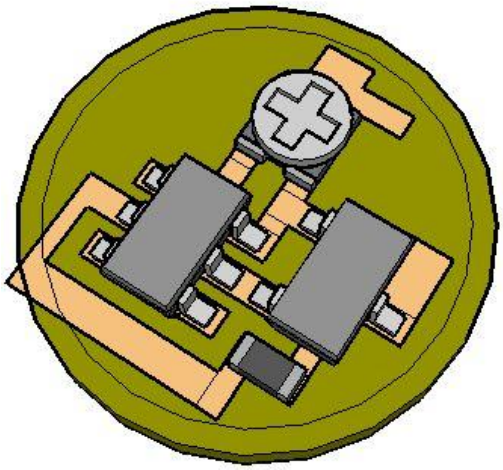
Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#724690 - Sun Oct 17 2004 05:38 AM

Edit | **Reply** | **Quote** | **Quick Reply**

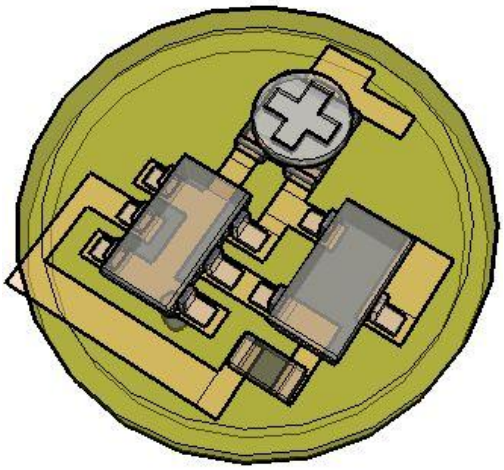
One more 'allnighter' for the good of my AAA project.. wrangled the ckt into the shap to fit inside... here's a preview:



cramming that ckt into a 9mm circle:



and 'x-ray' mode so you can see the traces:



Thanks to Mr Al. for the help on the circuit.. tell me that's not the cleanest LDO ckt

you've ever seen. 3 components, 1 resistor.. dang.

I will likely have to add a supplemental resistor because i could only find 100k or 200 pots.. so.. i was thinking of biasing the pot 20/80 and putting a 40 on the 80 side.. a only 1 more chip.. look how amazingly clean that ckt is.. won't have any problem fitti it into an AAA head.

MrAl.. did i mention i have a special AAA light 'with your name on it' if you want a gre deal.. PM or email.. flashlight@rouse.com

-awr

ps.. Q2 is 'upside down'.. Emitter up.. Q1 is emitter left.. i had a minor heart attack ju now when i thought i wired Q2 wrong.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#725025 - Sun Oct 17 2004 11:45 AM

Edit | Reply | Quote | Quick Reply

Hi andrew,

OH yes, very nice. I see now what you meant with the 'pot',
to set it once and leave it. That's pretty good too.

I'd like to hear any results you might end up with
once built.

Take care,
Al

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#725152 - Sun Oct 17 2004 02:23 PM

Edit | Reply | Quote | Quick Reply

not only 'hear results' my friend, you will be ending up with the results in-hand i thin

Post Extras:

MrAl

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#725169 - Sun Oct 17 2004 02:46 PM

Edit | Reply | Quote | Quick Reply

Hi andrew,

You are a very generous person andrew! I hope i can help
you with any circuit you've got in mind, or any ideas
you come up with.
I hope that doesnt eat up all your profits either, as i
wouldnt be happy at all about that.

Take care,
Al

Post Extras:

Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

djpark
Flashaholic

Reged: Nov 04 2003
Posts: 383
Loc: SJ, Malaysia

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]

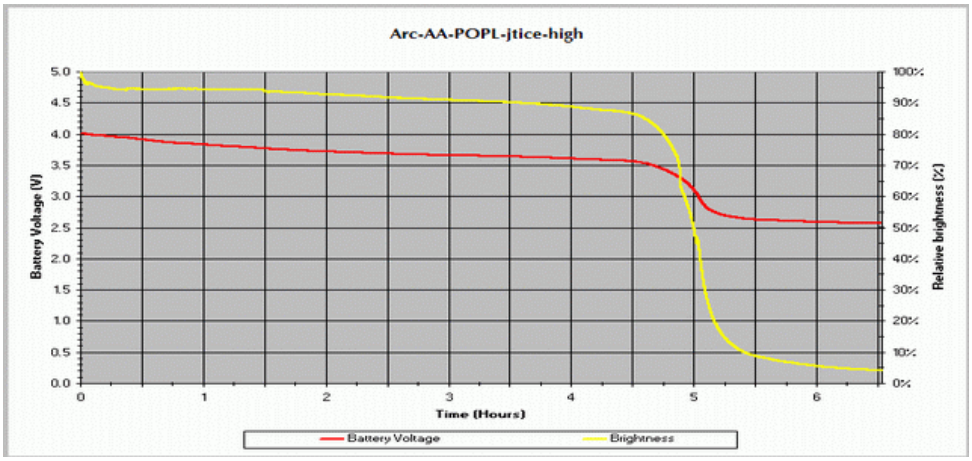
Edit | Reply | Quote | Quick Reply

#725553 - Sun Oct 17 2004 08:25 PM

Thanks MrAl for the circuit.

I use the same circuit without Q2 and R4. It works quite well. The problem I face is tl high voltage drop at R2 which is about 0.5V. With the extra signal amplification with Q2, it sure would make a good LDO. There is enough space to put 3 SOT-23 parts + 1 cap and a few resistors within Arc-AA/AAA board, just nice to stack up a PIC for brightness control.

To give an idea of the feasibility of the circuit, the chart below is done with the circuit without Q2 and R4 running at high brightness mode (150mA). After the initial brightness settling down, the constant current regulation worked till 1.5 hour. But du to the smooth discharge of li-ion, the overall brightness looks quite regular to the enc of the discharge cycle. I hope to try out the new circuit and wonder how the result would turn out.



1Q: I noticed the initial drop of the brightness within a few minutes before settling at constant brightness in many run time tests. Is it something to do with the transistor/FET temperature change?

-- dj

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: djpark]

Edit | Reply | Quote | Quick Reply

#725672 - Sun Oct 17 2004 10:03 PM

Hey DJ good to see you again.. if you beat me to reproducing the ckt.. want to try wh I suggest with the POT? I will breadboard this week for my AAA light. I don't have the capability to chart like you do.. i have to do it by hand!

That little 'spike' of power would probably please most of the users of my light who w be sacrificing max brightness for constant brightness.. you get a little spurt of 'show light in the beginning.

The question I have is.. do you get this spike at all battery levels, just as long as it's cold?

-awr

Post Extras:

djpark
Flashaholic

Reged: Nov 04 2003
Posts: 383
Loc: SJ, Malaysia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]

Edit | Reply | Quote | Quick Reply

#725845 - Mon Oct 18 2004 03:43 AM

Hi Andrew,

All local CPFers have been having problem accessing CPF for last 1 week possibly due the intruder detection system on CPF hosting server blocking entire range of dynamic of local broadband. Strangely it is back now.

I did the prototype on the breadboard with the following parts. Not purposely chose these value sor parts, but just happened to have them ready.

R1 22K
R2 0.25
R4 100k
Q1 BC846B
Q2 2N2222A
FET Si2302DS

This is what got. My PIC data logger can't handle this tiny sense voltage well, so this time I am done with manual reading. Possible error rate 5% (gut feeling).

Code:

```
8mm white led (Vf=3.0V @ 100mA)
Vin    Vf     Vsense  Iled
2.60   2.60   2.6     11
2.83   2.81   12.8    51
3.04   3.00   26.4    102
3.22   3.15   38.9    151
3.35   3.20   43.8    170
3.54   3.22   45.0    175
3.97   3.22   46.3    180
4.24   3.22   46.2    180
4.71   3.22   46.9    181
```

Code:

```
8mm white led (Vf=3.1V @ 100mA)
Vin    Vf     Vsense  Iled
2.64   2.64   2.5     10
2.83   2.82   8.0     31
3.00   2.97   16.0    63
3.15   3.11   26.8    103
3.29   3.22   38.6    150
3.38   3.26   44.0    171
3.47   3.26   45.0    175
```

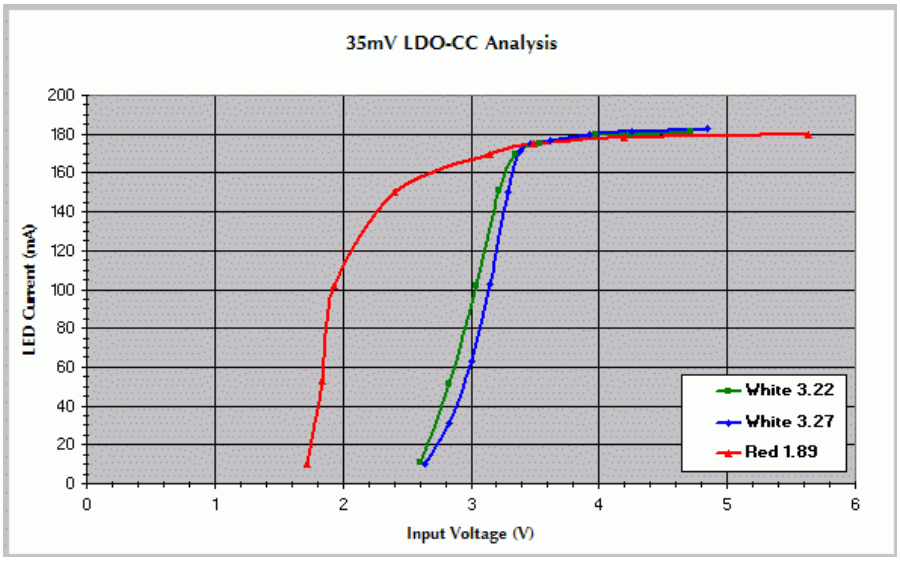
3.62	3.26	45.5	177
3.93	3.27	46.4	180
4.26	3.27	46.3	181
4.85	3.27	47.0	183

Code:

8mm red led (Vf=1.8V @ 100mA)

Vin	Vf	Vsense	Iled
1.72	1.71	2.5	10
1.84	1.81	13.5	53
1.93	1.86	26.4	102
2.40	1.88	39.0	150
3.15	1.89	44.3	170
3.49	1.89	45.5	175
4.20	1.89	46.5	178
5.64	1.89	47.8	180

Very crude measurement. From here I generated XY chart as follow.



With the above componnts, it has to be called 45mV LDO-CC in my case. It is clear th the constant current regulation is effective till Vin=3.4V with white led (Vf=3.2-3.3V) So at this current of 180mA, it should remain under regulation throughout the li-ion charge capacity (or at least 95%).

The measurement of the red led doesn't seem to be correct or convincing. I must hav been rushing to finish, so I don't really consider accurate.

The same circuit on the breadboard let the constant current of 180mA to LED, but I guess it would be different when put on the real circuit.

If R4 is changed from 100k to 200k, the current jumps up. Likewise use smaller R4 t get lower current.

-- dj

Post Extras:

mrsinbad
Flashaholic

Reged: May 30 2003
Posts: 156
Loc: Nassau County, NY

Re: New 35mv LDO-CC Driver for Luxeon [Re: djpark]
#725912 - Mon Oct 18 2004 06:17 AM

Edit | Reply | Quote | Quick Reply

MrAl, any suggestions on what to use for the MOSFET? Any idea what the efficiency w be? Thanks.

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: mrsinbad]
#726324 - Mon Oct 18 2004 01:45 PM

Edit | Reply | Quote | Quick Reply

the .45 makes perfect sense since the higher R sense..

efficiency should be 'simply stunning'.... the problem is how much is lost when the Vb is high on the transistor holding back the flow.. but when Vbat is close to Vf.. say for example, you are running 300mA.. means (with .1 sense) you have .3x.3.x.1 watts lo on the sense resistor. 9mW lost on the resistor.. the mosfet i picked has a 0.045 ohm Rdson so.. another 4mW lost on that when DD.
not sure what the q current will be when not regulating, but thinking it'll be negligable... so.. the highest efficiency should be like 98% when it drops out of regulation..

When it's regulating.. say the Vbat is 3.7 and the Vf is 3.4... power is simply voltage current.. so.. this example would have 1.11W at the battery and 1.02W at the emitte 91% efficient.. LDO's are least efficient on a full battery and most efficient when they drop out of regulation.. i'm betting this design will be close to 95% efficient over the run..

correct me if i'm wrong in my calculations folks..

-awr

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: mrsinbad]
#726349 - Mon Oct 18 2004 02:07 PM

Edit | Reply | Quote | Quick Reply

Hi again folks,

dj:
Oh you're welcome, im glad you found this circuit useful.
And, thank you for the graphs of the new circuit and the
old one too.
I'd have to look closer, but that spike at the beginning
might be due to the change in transconductance of the
FET with temperature. As the temp rises, the device
requires a higher gate voltage in order to maintain the
same current flow. Luckily, it's only about 5 percent
or less so it shouldnt be a problem. Adding a little
more gain (for the NPN by increasing it's collector resistor value)
might help the situation.

What is 'The intruder detection system' you were talking about?

One other note: in the three transistor circuit the two NPN's should be the same type number so that they track with temperature as well as possible.

Thanks for the chart showing the new circuit performance. It shows decent regulation after a certain min voltage level, even better than i expected.

You can decrease your 45mv to 36mv if you change your sense resistor to 0.20 ohms instead of 0.25 (if you can find one). You might even wish to try 0.1 ohms and adjust R4 to lower current. It was originally set up for 35mv but lower might work ok too -- i havent tried that yet.

mrsinbad:
You should be able to use almost any MOSFET that has low gate voltage (usually spec'd at 2.5 volts or lower) and low resistance. The dropout voltage depends on the MOSFET's Ron resistance but of course also depends on the amount of current flowing. If you're using this for small LED's (like 30ma) then even a MOSFET with 1 ohm resistance would only drop 30mv more bringing the total dropout to 65mv (above LED voltage) but if you used a MOSFET with 0.05 ohms Ron you would end up with a total of 37mv dropout! The choice is yours :-)
Low gate voltage spec is a must however, as without that the thing might not work at all at 3 or 4 volts battery input.
The efficiency is low at high batt, and very very high at low battery, so it averages out to about 88 percent or so. This number isnt exactly comparable to a switcher, however, because a good switcher design will draw less current at high battery and more current at low battery, and in the end a switcher with average 85 percent eff will achieve more run time overall with the same battery type.

NOTES:

Now that djpark has been nice enough to test the first built up circuit and the test turned out reasonable, this is looking like a very feasible circuit! All that's left now is to do some temperature rise tests (using two of the same type number NPN transistors, ie 2x2N2222 or similar). If anyone feels like setting this experiment up let me know and i'll post a few more notes.

Take care,
Al

Post Extras:

andrewwynn

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#726427 - Mon Oct 18 2004 03:03 PM

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Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

I have parts ordered to make this ckt in all SMD and hope to make it in a couple days

I've found that once my LiONs get to 3.5 they really drop like a rock, and drop to 3.7 under load, so the swing is not too much, and over that range, i think over 90% efficiency average would not be surprising.

In any event.. i 'dare' somebody to come up with a cleaner design, it's very cool.

-awr

Post Extras:

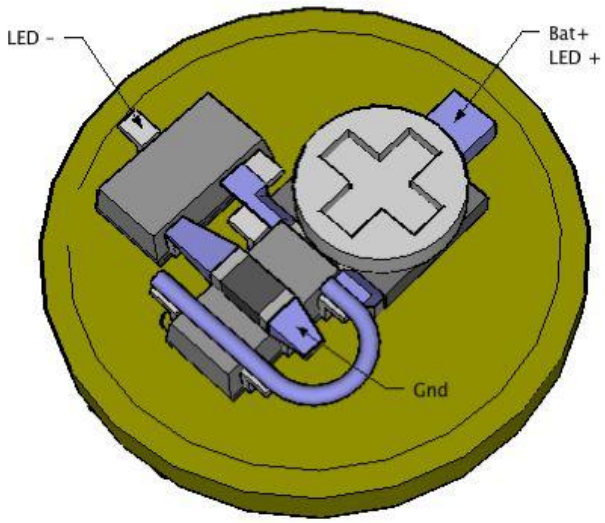
andrewwynn
Flashaholic*

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#728365 - Wed Oct 20 2004 01:04 AM

Edit | Reply | Quote | Quick Reply

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Ok.. gets a little cuter.. i was starting to design the circuit board to have them made make them myself) when i realized something... well a picture says 1000 words so here:



this is the identical circuit to the one above, done without any circuit traces... 'dead bug' style..

this circuit is a 'too good to be true' solution.. thanks Mr.Al...

Three solder joints and one 'J' shaped wire.. i will have the chips to build in a day or two.

-awr

Post Extras:

andrewwynn

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#728379 - Wed Oct 20 2004 01:26 AM

Edit | Reply | Quote | Quick Reply

Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

oops i double posted.. so i guess another shameless plug for my light i needed this driver for:

check it out here

Post Extras:

djpark
Flashaholic

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]

Edit | Reply | Quote | Quick Reply

#729901 - Thu Oct 21 2004 09:55 AM

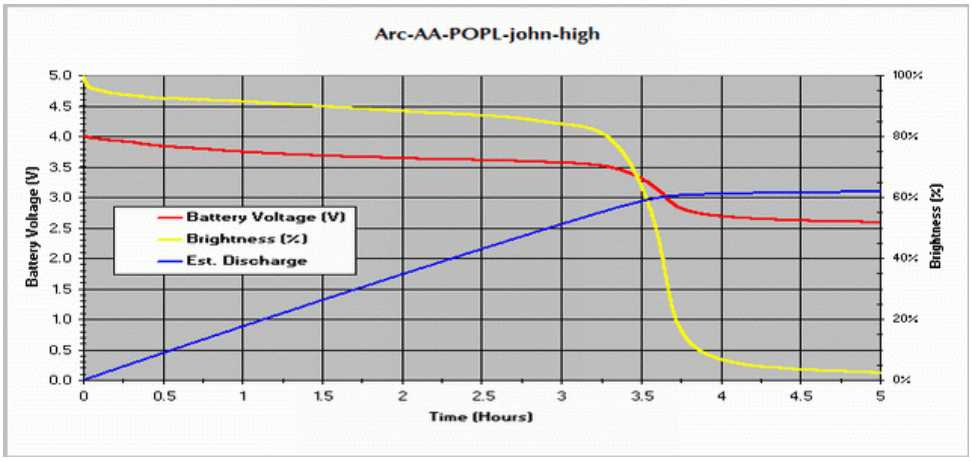
Reged: Nov 04 2003
Posts: 383
Loc: SJ, Malaysia

I made an AA pill using 8mm white to go in to the Arc-AA body based on the same circuit with different component values.

R1 10K
R2 0.33
R4 220k
Q1 MMBT2222ALT
Q2 MMBT2222ALT
FET IRLML2402
8mm LED Vf=3.2V @ 100mA

IRLML has 0.35 ohm Rdson @ Vgs=2.7V which is rather high and to compensate the drop in the current, I used smaller R1 and bigger R4 and got 190mA current flow constantly. The voltage drop at R2 is about 60mV and LED 3.3V.

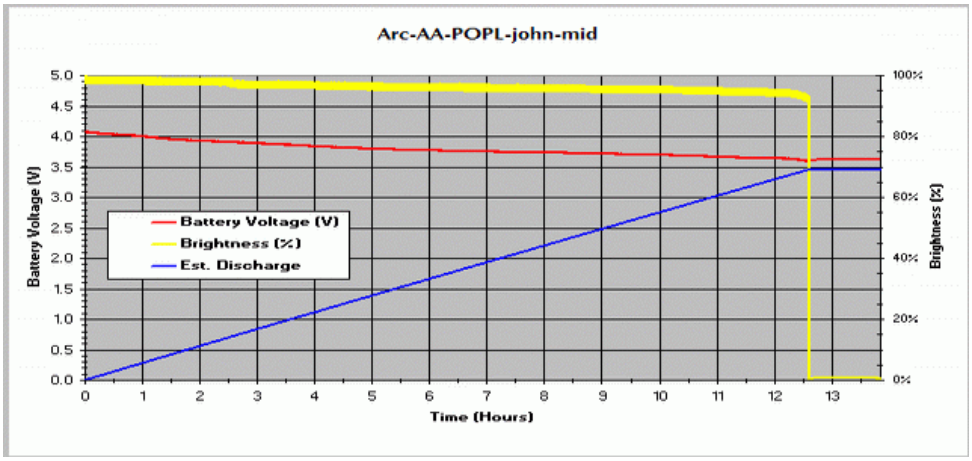
The run time results are as follow. First high brightness mode with POPL (190mA @ 100%):-



May be bacause of the FET, the constant current regulation doesn't seem to be very effective. Perhaps too much voltage drop at the FET? But that's what I had while waiting for Si2314EDS to arrive.

The blue line is estimated total battery discharge in mAh using right Y-axis. It is calculated from the proportion of 190mA with the relative brightness since the brightness measurement is almost linear to the current (with some expected error rate). About 625mAh discharge and still have some juice left for longer moon mode.

Next is medium brightness mode with 30% duty cycle PWM @ 1KHz:- DMM showed actually 57mA which is 30% of 190mA, the brightness is about 40% of the 100% brightness which seems slightly brighter than stock Arc-AAA to natural eye (with perception).



At first, I couldn't understand the sharp drop and sudden shutdown of the light after 12.5 hours. But the total estimated discharge at that time is 690mAh and imagine th is no more juice left in the battery.

The battery voltage is measured 128 times and averaged for every measurement 8 times a sec. It didn't seem to drop much, but I believe it drops while it is on (0.3 mse and recover back during the other 0.7 msec.

So at the end of the near full discharge (700mAh capacity), it couldn't provide any m light to this particular components combination. I used the same battery with the sar circuit but using the MrAl's designed value, it did light up though it was dim.

BTW, the same pill is shaped in a way that it can also be used in the Arc-AAA head ar I carry the AAA with the pill for last a few days. Can it be the first AAA light with strol and SOS feature beside multi brightness?

-- dj

Post Extras:

Doug S

Re: New 35mv LDO-CC Driver for Luxeon [Re: djpark]

#729952 - Thu Oct 21 2004 10:39 AM

Edit | Reply | Quote | Quick Reply

> **Quote:**
>
> ***djpark said:***
> **May be bacause of the FET, the constant current regulation doesn't seem to be very effective. Perhaps too much voltage drop at the FET? But that's what I had while waiting for Si2314EDS to arrive.**

While a higher resistance FET would cause the beginning of dropout at a slightly high cell voltage, I cannot see the mechanism by which it would affect the "flatness" of th regulation while in regulation. The results that you got are very good IMHO. The brightness while in regulation seems to stay within about +/-10% of the mean. As a practical matter this is about as good as perfectly constant since 10% change in brightness level is hardly noticable. This circuit appears to work a bit better that I had suspected it would at least when used with a very narrow voltage range source such a Li-ion.

Post Extras:

Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Kill-O-Zap
Flashaholic

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#729984 - Thu Oct 21 2004 11:08 AM

Edit | Reply | Quote | Quick Reply

Reged: Apr 14 2002
Posts: 400
Loc: New Hampshire

What would really illustrate how this circuit is performing would be an overlayed grap for the LED driven directly off the LiIon, or with resistance so that the starting curren comparable to that out of this circuit. That will show both the "flattening", or regulati performed by the circuit, and perhaps also compararative efficiency.

Post Extras:

MrAl
Flashaholic*

Re: New 35mv LDO-CC Driver for Luxeon [Re: Kill-O-Zap]
#730172 - Thu Oct 21 2004 02:02 PM

Edit | Reply | Quote | Quick Reply

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Hi there,

Kill-O-Zap:
Yes, i'd like to see that too, good idea.

NOTES

I've jumped the gun a little with the transconductance idea, because i assumed the MOSFET would be operating past the 'crossover' point on the transconductance curves, but even so this could still be the cause and i cant find anything else what would have the same effect.
The circuit was originally 'optimized' to keep the current though the LED constant with change in LED characteristics, not necessarily with change in MOSFET characteristics, namely, gate voltage. In other words, for a certain percent change in LED characteristic (voltage drop for ex) the current is quite well maintained at the exact (almost) same level, but for a change in MOSFET gate voltage the change in LED current can be almost 3 times higher.
This means for a 1% change in gate voltage we could see as much as 3% change in current throught the LED.
Luckily, even this isnt that much really, but i have a feeling if this circuit were to be operated at widely swinging ambient temperatures the current could change more and would have to be checked. Putting the circuit into an oven and elevating the temp to about 70 deg C would check this.
There's also the possibility that other MOSFETS could act differently (their crossover point in a different location) so each circuit should be checked if the MOSFET is changed.
Also, as i mentioned before, for optimum temperature tracking *BOTH* NPN transistors should be the same type (you could experiment with different types however).

Take care,
Al

Post Extras:

Doug S
Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#730240 - Thu Oct 21 2004 03:04 PM

Edit | Reply | Quote | Quick Reply

Al, since gate threshold voltage has a significant tempco, I suppose the real proof of t pudding will be the performance in the actual intended host rather than on a breadboard.

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#730437 - Thu Oct 21 2004 05:46 PM

Edit | Reply | Quote | Quick Reply

I will have one of these built into a board to fit in an aaa by next week... my NPNs ar single chip... it will get 'a little toasty' inside the head but actually probably not over 50C.

I'm curious about dropping the sense R to like 0.07 or so.. what are the bigger Rvalu likely to be since that drops the feedback voltage.. so.. guessing need to make the 12 more maybe the 20 less.. or in my case.. using a 200k pot and find happy medium?

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#730845 - Fri Oct 22 2004 06:26 AM

Edit | Reply | Quote | Quick Reply

Hi there andrew,

You should be able to change the sense resistor without
too much trouble if you change one of the other resistors
(like R4) also.
What current are you intending to run on the output?

Take care,
Al

Post Extras:

vicbin
Flashaholic

Reged: Apr 23 2002
Posts: 173
Loc: JKT.ID

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#730870 - Fri Oct 22 2004 07:06 AM

Edit | Reply | Quote | Quick Reply

Hi Andrew,

Most of the time when it come to "tempco" testing, I usually blow my circuit with my wife's hair dryer with hot air settings.

It is interesting to watch the changes especially when its almost too hot to hold by finger !

Some variations was to use some funnel so I can pick a hot spot ! Most fun part was watch the changes back from hot to cold when I switched hot air to cold !

Vic

Edited by vicbin (Fri Oct 22 2004 07:08 AM)

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: vicbin]
#731575 - Fri Oct 22 2004 06:36 PM

Edit | Reply | Quote | Quick Reply

MrAl.. i want to have a range of about 300 to 450mA.. i'm not sure what bin the emitters will be yet, but i'm thinking i'll need Jbin to have it happen, however to get 1.25W for any amt of time, surely need the lowest bin possible, and lowest LDO..

since the pot i have right now is a 100K.. i'll probably put a 47k or 2 on the 'high' sid of the pot to get a 150-200 effective pot and try with a .07ohm Rsense to start with.

I can just put the chip on my 'sled' heat sink of my microlights.. it gets up to about 130F in a few minutes.

I doubt it will ever get above that temp in my use.. i will post my results.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#732406 - Sat Oct 23 2004 02:43 PM

Edit | Reply | Quote | Quick Reply

Hi andrew,

I'd be interested in hearing more about this too. Unfortunately, as Doug and I were discussing earlier in this thread the circuit is a little sensitive to the transistors beta. increase of 10percent could cause a decrease of 8 percent output current and vice versa.
It will be interesting to find out how your circuit works out in the long run once it's mounted and run in the actual flashlight housing.

Take care,
Al

Post Extras:

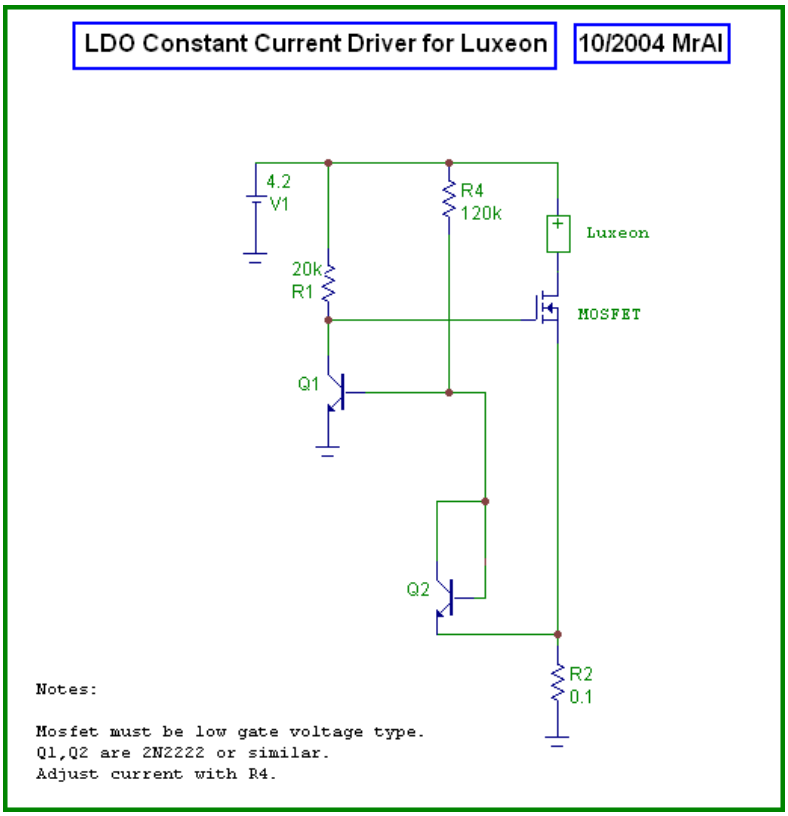
ViReN
Flashaholic

Reged: Apr 03 2004
Posts: 499
Loc: Down to Earth :)

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#732767 - Sat Oct 23 2004 09:43 PM

Edit | Reply | Quote | Quick Reply

> Quote:
>
> *MrAl said:*
> Hi there,
> Here's another very low dropout CC driver fresh off the drawing board
> It's very well suited for use with a 4.2v Li-ion cell.
> All surface mount parts are to be used for small spaces.
> Take care,
> Al



Hello Mr Al

This circuit sounds KOOL I want to modify one of my "Eveready" "Commander" 4D Flashlight (has a PR Based Bulb)... in to a Lux III .... (I got this LuxIII free from Warren(ViKi) ... when i had ordered 2 Nuwai QIII's)

I will be using Ordinary Zinc Carbon or perhaps Alkaline batteries... which means i wi be having 6 Volts at disposal ... this also means.. that if i use the LDO-CC ... down 3.02 Volts.... (each cell will be having .75 Volts each... when drained) which means... will be a GOOD flashlight.. with a FLAT Regulation

I want to drive this Lux III @ 500 - 700 mA Range.... How can we modify this curcuit or the values given are good for the kind of input ? .. For simplicity & because of availability of space, i will be using PTH Components... (i have a couple of 3904's witl me, will they suffice?)... which FET should i use ? (any basic guidelines)...

what will be the changes if i want to drive LED @ lesser current... can we make this dimmable (by using a pot... instead of resistor)....

R2 is for sence current ? or for Current limiting ? (i am dumb .... please try to understand)

Thanks in Advance,
ViReN

Post Extras:

evan9162

Re: New 35mv LDO-CC Driver for Luxeon [Re: ViReN]
#732811 - Sat Oct 23 2004 10:27 PM

Edit | Reply | Quote | Quick Reply

Flashaholic*

Reged: Apr 18 2002
Posts: 1417
Loc: Boise, ID

Viren,

One major disadvantage of a linear regulator (LDO or otherwise) is that any differenc between battery voltage and Vf of the LED is simply burned off as heat.

LDO regulators are wonderful when the battery voltage is relatively close to the Vf of the LED. Good uses are a single Li-Ion cell or 3 NiCD/NiMH cells driving a 1W Luxeon Luxeon III, or 6 cells driving a Luxeon V.

However, when driving a 1W luxeon/Luxeon III from 4 alkaline cells, a linear regulatc is quite wasteful. Initial efficiency is around 60%, increasing to a maximum of 90% a the end of battery life.

When driving a L I/III with 6V, a switching buck converter would be best for efficienc

If you are going to use a linear for 6V to a L-III, you'll have to watch dissipation in th pass transistor very carefully. Initially, the pass transistor will be dissipating between 1.6 and 2.5W, so you'll have to have enough heatsinking on the pass transistor so it doesn't burn up with fresh batteries.

Post Extras:

ViReN
Flashaholic

Reged: Apr 03 2004
Posts: 499
Loc: Down to Earth :)

Re: New 35mv LDO-CC Driver for Luxeon [Re: evan9162]
#733712 - Sun Oct 24 2004 07:43 PM

Edit | Reply | Quote | Quick Reply

Hello evan9162,

Thanks for the response.

so the efficiency will be just around 60.... that is bad.... i think, it would be better if w use 3 Alkalines ..... (i.e. 4.5 Volts input).... isnt it ?

i wonder why is it generating heat... and making losses @ 6 volts

any buck regulator with PTH components is available ???

ViReN

Post Extras:

evan9162

Re: New 35mv LDO-CC Driver for Luxeon [Re: ViReN]
#733753 - Sun Oct 24 2004 08:32 PM

Edit | Reply | Quote | Quick Reply

Viren,

Yes, using 3 cells for 4.5V would be better for efficiency.

You are still generating heat and making losses at 4.5V input, but it is a lot less. Basically, with a linear regulator, when you have an input voltage above the Vf of the LED, the difference between the Vf and input voltage is dropped by the regulator, and dissipated as heat. Closely matching the input voltage to the Vf helps keep the losses a minimum.

Post Extras:

Flashaholic*

Reged: Apr 18 2002
Posts: 1417
Loc: Boise, ID

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: evan9162]

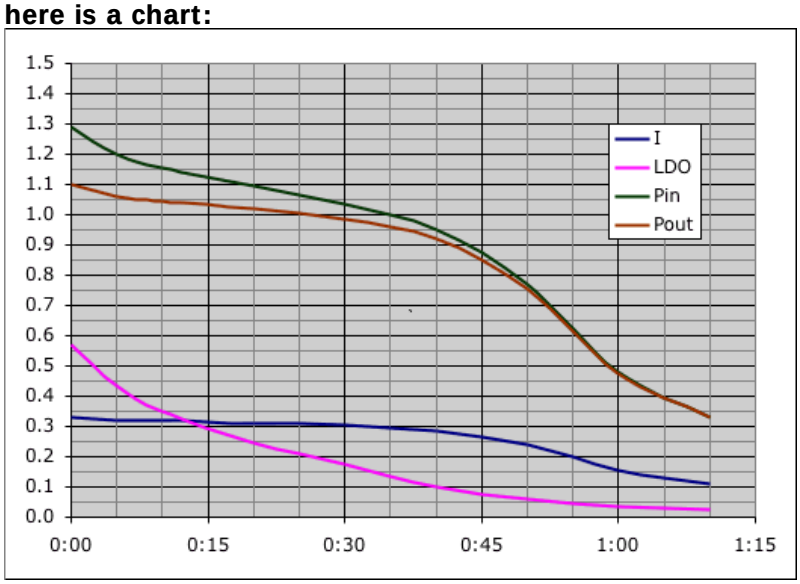
Edit | Reply | Quote | Quick Reply

#733951 - Mon Oct 25 2004 04:01 AM

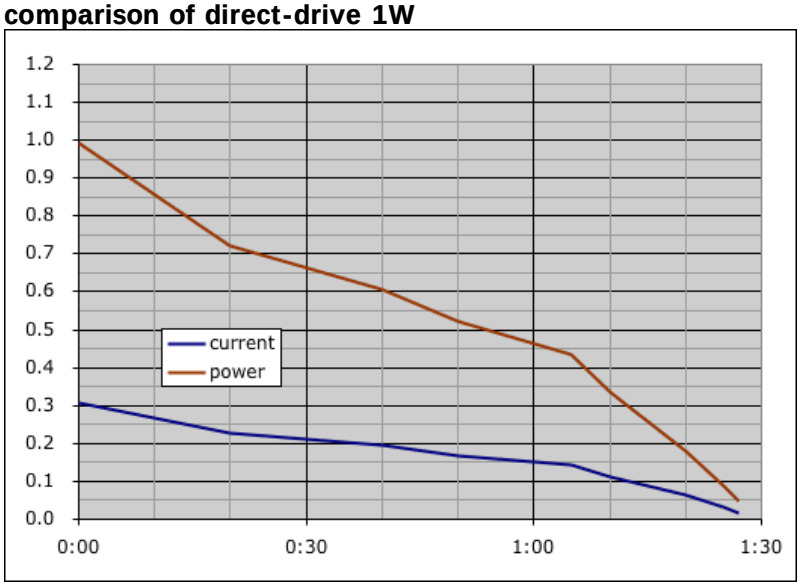
First run test of my copy of this LDO.. very happy so far.

For the first 45 minutes, it pulled a median 1.04W from the battery and put out .96W the emitter for and average efficiency of 92%.

here is a chart:



comparison of direct-drive 1W



as you can see.. the DD model drops in 10min to the level the CC model holds for 45. pretty big difference.. notice that both models take about exactly 1 hr to reach 50% power.

To make the adjustment a little less twitchy i put a 4.7k resistor on the low side of th 100k pot i ended up using. I may have to tweak that resistor to get the full range of

adjustment i want (3/4 to 1 1/4W)... I may be able to get by w/o it (original plan). I make a 'scale model' tester next.

ps. just how touchy are those mosfets anyhow.. seems i killed two before getting the third to work.. maybe from too much heat soldering. I don't think i had a static problem.

I heated up the Bipolar's with a close proximity of soldering iron and the output dropped, maybe 10-20mA and bounced right back up when heat removed.. I will do a better test of heat issue with the small scale model. PS love the surfboard prototyping boards, i won't do another smd test w/o them.. very nice.

I had set the initial current to about 306mA and should have set it just a little higher i'd like the median to be 1.0W vs .96W.. maybe hit 1.0W at 20-25minutes.

All in all, i like a lot.. might not have the most level output, but 10% drop in 35 minu i can deal with. The efficiency gets up to 99% at 1hr, so it gets as much as it can out the battery w/o over-draining issues of a boost ckt.

Post Extras:

vicbin
Flashaholic

Reged: Apr 23 2002
Posts: 173
Loc: JKT.ID

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#733963 - Mon Oct 25 2004 04:34 AM

Edit | Reply | Quote | Quick Reply

Hi Andrew,

Very nice result, Congrats !

What type of Mosfet did you use for that result ? Of course if you don't mind !

Vic

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: vicbin]
#733976 - Mon Oct 25 2004 05:16 AM

Edit | Reply | Quote | Quick Reply

For the NPNs i used a dual NPN from zetex: ZXTD09N50DE6CT-ND it's an sot-23-6.. what a beauty.

For the mosfet i used IRLML2502CT-ND by international rectifier. It has an Rdson of 0.045 ohm! and rated for 4.2A or something nutso.. doesn't apparently take too well too much heat whilst soldering to be careful and buy a couple spares.

Mr Al.. i've swapped my 100k pot in my design with a 200k and a 2M.. I can 'dial in' t power I want with any of them, but haven't tried at all levels of battery yet. (I don't have a bench supply, so i use various batteries and various states of discharge).

I have a 2M pot adjusted for 330mA at the moment, and over 10-15 minutes running on a AA battery with maybe 3.7V, it dropped 4mA .. i'm curious if having a lower or higher pot will make for a more level run of power out.. doesn't make too much difference i'm very happy with the 100k pot i used in the test, but i can get more ma power with a 200, so i'll probably use that in the final drivers.

Thanks again MrAl.. this was 'just the ticket' i needed for my light project.

-awr

Post Extras:

Doug S
Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#734037 - Mon Oct 25 2004 07:10 AM

Edit | Reply | Quote | Quick Reply

Andrew, good performance and very nicely presented graphs too!
I'm curious. Do you have some type of data logger or are you taking all of the measurements manually [as I do, BTW] and then putting the data into a graphing program?
BTW, you should also be able to extend your current range upwards by reducing the value of the 20K resistor [R1] a bit rather than increasing the pot value.

Edit BTW, do you know the Vf bin of the Lux you used in your testing? You will find t the lower the Vf the steeper the Iout dropoff will be towards the end of discharge witl your circuit.

Edited by Doug S (Mon Oct 25 2004 07:24 AM)

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#734043 - Mon Oct 25 2004 07:26 AM

Edit | Reply | Quote | Quick Reply

all manual measurements.. fun fun fun ... graphed with excel.

I don't have an R1 .. i just have a pot that takes the place of both the 120 and the from MrAl's original design. I can just barely get 1W with a 100k pot, but with an AA battery and a 200k i can get over 2W, not quite 3W.. I'd like to be able to dial in up t 1.5W, hoping either 200k or 4/500k and have it adjustable between 3/4 and 1 1/2W a universal design.

-awr

my turn to edit: J-bin.. pretty low Vf.. i'm a little worried that K bin won't be able to r as long at 1W, but if what you are saying is true, they actually might run flatter.

Edited by andrewwynn (Mon Oct 25 2004 07:30 AM)

Post Extras:

Doug S

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#734063 - Mon Oct 25 2004 07:56 AM

Edit | Reply | Quote | Quick Reply

Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

> Quote:
>
> *andrewwynn said:*
> my turn to edit: J-bin.. pretty low Vf.. i'm a little worried that K bin won't be able to run as long at 1W, but if what you are saying is true, they actually might run flatter.

Perhaps you misunderstood me. I am suggesting that the lower Vf [J bin] will have th flatter response, holding level deeper into the discharge and then falling more steeply

Post Extras:

evan9162
Flashaholic*

Reged: Apr 18 2002
Posts: 1417
Loc: Boise, ID

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#734089 - Mon Oct 25 2004 08:42 AM

Edit | Reply | Quote | Quick Reply

The lower Vf will drop out of regulation closer to the end of the battery's life. At that point, the battery voltage is dropping faster per unit time due to the discharge curve. Hence, LED current will drop accordingly.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: evan9162]
#734403 - Mon Oct 25 2004 01:58 PM

Edit | Reply | Quote | Quick Reply

Hi again,

I've been away and im catching up on this thread just now...

Viren:
As even was pointing out, the extra input voltage gets turned into heat, so the transistor gets hotter. The formula is pretty simple:

P=(Vin-VLed)*Iout

From this we can quickly see that the higher Vin is, the more power (P) is dissipated as heat.
Lowering the input to 4.5 volts (intead of 6v) makes a lot of sense, and makes the end package smaller too (3 cells instead of 4). The runtime wont be as long though.

The resistor R2 is for current sense, but can be set to different values for different output current. For example, since 0.1 ohm is for 350ma out, 0.05 would work for twice that, 700ma out. You can fine tune the output current with R4 (higher gives less output current).

Andrew:
Thanks much for the graphs! Very nice. I see you did some thermal tests too, with the soldering iron, and im just now wondering how close you brought the iron to the transistor, and was it the dual transistor package or two discreets?
In any case, very informative.

Take care,
Al

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

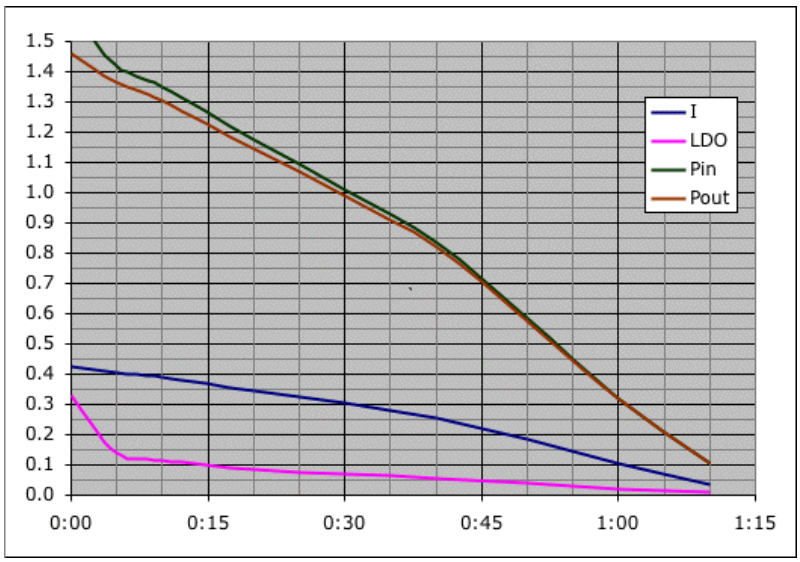
Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]

Edit | Reply | Quote | Quick Reply

#734783 - Mon Oct 25 2004 07:05 PM

to get a response with the soldering iron, it was within about 1.5 mm, so i'm sure locally it was pretty toasty, however since no contact, no real 'heat' transfer and soon as i took it away it went right back to room temp. The NPNs are a dual sot-23-6 package, very cute and very tricky to solder.. my iron has way too big a point for that

I did a test starting at 1.4W today and seems that might just be pushing the combination of ldo and small battery, it doesn't hold a very constant power, but it doe still end up being quite useful and way nicer than direct-drive which plummets so fast it's not funny.



here is the chart.

as you can see.. 1.4W starting gets to 1.0W in about 30 minutes.. gets to about 1/2 power in 45 minutes.. and still is outputting useable light at an hour.

I will re-run this test with either 100 or 200k pot to see if it will run flatter. As you ca see there is only a 'sliver' of power overhead to work with. after a few minutes a direct-drive will only output 1.3-1.4W anyhow, so this just might be strictly limitation the battery coming into play.

I will run a test at 1.2W and then one at like .8W.

I think that the 'non level' nature has to do with how ldo works vs switching circuits. dont' mind it actually, i think that i'm getting more energy out of the battery turned into light, especially at the end where it goes into DD mode, where buck/boost drivers end up getting very inefficient. I'm happier with the results i got at 1W, but it's only logical that any ckt can pull that off.. i think that basically trying to run 1.4 from a AA i'm really bascically starting off in 'phase ii' where the transition has started into the l phase. Looking at my chart, i see that after only 5 minutes, i'm already down to only

.2V dropped on the circuit.

I have a driver ckt designed that is a buck driver but extremely efficient, it uses pulse-frequency-modulation at low power levels and is rated at about 95% efficiency 100mA.. trouble is the complexity. This ldo ckt is a charmer because it is so simple.. two chips, a pot and a resistor.

I think this actually would work ok.. i think that 1.4 dropping to 1 over 30 minutes wi be a much better performance than a resistor solution starting at 1.5W or so... it dro like a rock.

I should be able to run the 1.2 test tonight, and maybe with two sizes of pots.. does take a few hrs to recharge the batteries, as I charge them at C/3 to get a full charge.

-awr

Post Extras:

NewBie
Flashaholic*

Reged: Feb 17 2004
Posts: 1987
Loc: Oregon- United States of Ameri...

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#735012 - Mon Oct 25 2004 09:38 PM

Edit | Reply | Quote | Quick Reply

> Quote:
>
> *andrewwynn said:*
> First run test of my copy of this LDO.. very happy so far.
> For the first 45 minutes, it pulled a median 1.04W from the battery and put out .96W at the emitter for and average efficiency of 92%.

Good job!

Question for you, what are efficiency losses in the battery during this period of time? bring this up, because it is important in LDO regulators and direct drive.

What is the cause of the 15% light output drop in the first 45 minutes?

Which cell did you use for this test, and how many mAH hours is it?

Curious, have you ever thought about utilizing the on resistance of the MOSFET as yo current sense resistor? An advantage also, is as the MOSFET heats up, it's on-resistar goes up, and if done right, could be utilized as self temperature compensating, reduci the output current when things get hot...

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: NewBie]
#735059 - Mon Oct 25 2004 10:15 PM

Edit | Reply | Quote | Quick Reply

The cells i am using are 300 mAH AAA LiON batteries.. I haven't figured out exactly what the 15% drop over the run is about.. DJPark noticed that there was really just a very slow decline in current, not 'constant' current in his version as well. In the 1W version, the battery is running at just about 1C so i believe it is quite efficient, very

little battery heating losses.

That is a very interesting thought to use the mostfet as the Rsense... would that worl MrAl ? my Rdson is only 0.045 ohm rating.. but the problem is.. when the FET is working to hold back voltage, it actually has the voltage of the whole LDO across it, s don't think that will work.

The first test i did with a 100k pot, the second with a 2M pot... i'm just about to run a third test, probably around 3/4W with a 100k or 200k pot. I would like to get the runtime drop less than 10% Trying to figure out if increasing or decreasing the Rsens or the control pot will help. The tricky part is of course that i'm using a pretty limited power source.. 300mAH AAA battery.

Post Extras:

MrAl

Re: New 35mv LDO-CC Driver for Luxeon [Re: NewBie]

Edit | Reply | Quote | Quick Reply

#735210 - Tue Oct 26 2004 02:34 AM

Hi folks,

Newbie:

> Quote:
>
> *NewBie said:*
> Curious, have you ever thought about utilizing the on resistance of the MOSFET as your current sense resistor? An advantage also, is as the MOSFET heats up, it's on-resistance goes up, and if done right, could be utilized as self temperature compensating, reducing the output current when things get hot...

I'd like to hear more about this too Newbie.

Andrew:
Did you mention the value of your sense resistor?
You should be able to go down to 0.05 ohms.

Im beginning to think that 350ma might be too much
current drain for a 300ma Li-ion cell. Is that
(greater than 1C) recommended by the manufacturer?

It is kinda strange that at 300ma the circuit works
like a charm but at 400ma it starts to look a little
shabbie maybe. Im thinking that the voltage drops
too fast at the higher load. What we need to add to
the charts is the voltage of the battery itself.
That will tell me where the problem is i think.
Thanks very much for the graphs, which help to understand
this circuit better and better.
Also what would help is if you could identify your
pot setting with a particular run, like 20k/180k (200k total)
or 50k/150k etc.

Take care,
Al

Post Extras:

Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]

#735279 - Tue Oct 26 2004 04:54 AM

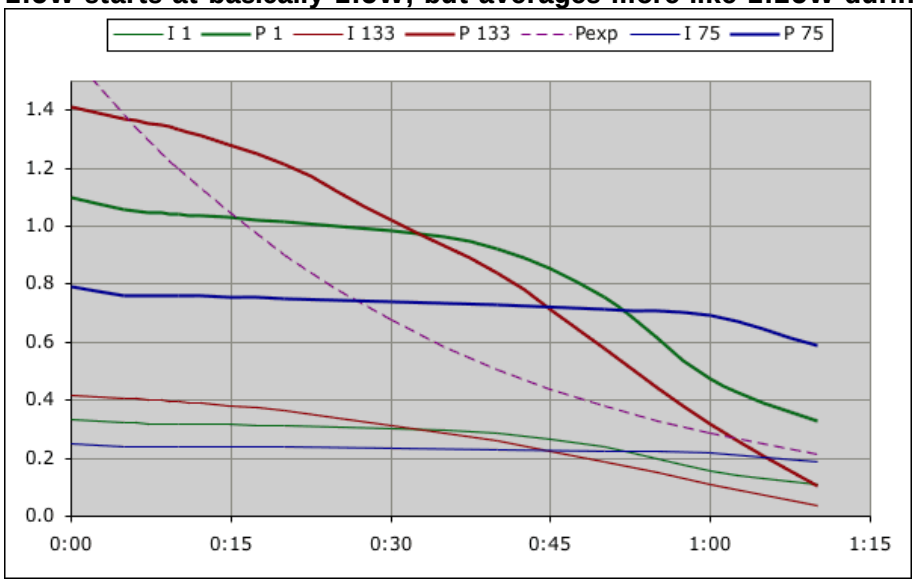
Edit | Reply | Quote | Quick Reply

updates updates...

the 400ma problem isn't that the battery can't handle the current drain.. it's rated to 1.5C or 450mA.. however.. it only has 300mAH storage, so that means the Vbat drop pretty fast. I think this circuit just thinks it's in 'phase two' or the transition right off t bat... I will try a run with 1/2 the resistance of Rsense tomorrow.. here are the latest graphs, comparing 330 starting current and 430 starting current:

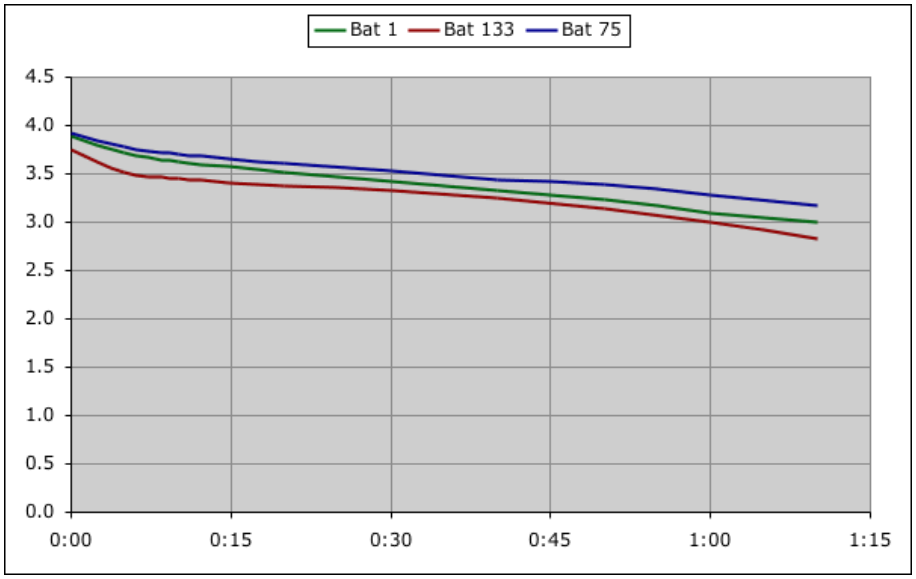
Improved charts: direct comparison..

here is a chart comparing power levels of the '1W' vs the '1.5W'.. in quotes because t 1.5W starts at basically 1.5W, but averages more like 1.25W during it's useful range.

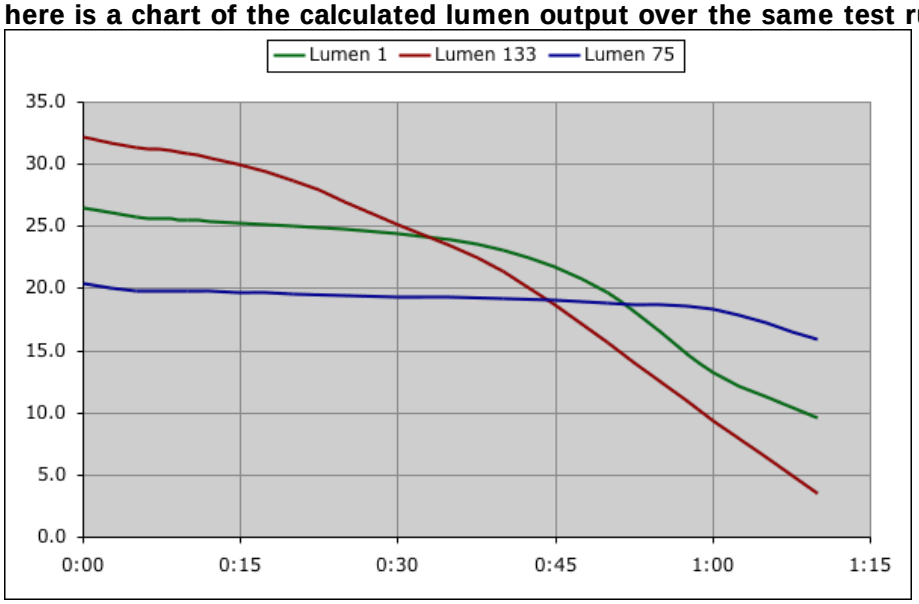


The green represents the '1W' version and the red represents the '1.5W' version. in addition there is a purple dashed line that represents a 1.6W straight-resistor model. The thin lines on the bottom are current.

here is a chart comparing the battery voltages over the same test runs:



here is a chart of the calculated lumen output over the same test runs:



possibly the most interesting of the lot. I am hoping that the 1.25W configuration wil flatten out the curve a little.. I would like to see the 1.25W design outlumen the 1.0 and 1.5 to about 40 minutes. I will of course keep you posted.

Here is the base reason for lack of 'flat' output on the higher current model:

time	LDO 1	LDO 1.5
0:00	0.572	0.330
0:05	0.437	0.140
0:10	0.350	0.113
0:20	0.247	0.086
0:30	0.173	0.070
0:40	0.102	0.056
0:50	0.062	0.039
1:00	0.034	0.021
1:10	0.026	0.010

as you can see.. at 1W there is 1/10th of a volt of headroom between Vf and Vbat for the circuit to drop and therefore 'control' anything up 'til 40 minutes.. but with the 1.5W version.. it only takes about 10 minutes before this happens. This is the stage where the Vbat is really just 'settling in' so the circuit is just battling against this initi Vbat swing, so you don't see a 'flat and level' power. Just my take... if i plug the sam ckt into an AA battery at these power levels it's nice and level.. i'm fighting against a battery that is being pushed right against its limits with this guy.

I have another circuit i will model when i get the chance but it's a lot more work, so r planning to use it for all the lights, but maybe fore generation two with multi-level.

-awr

Post Extras:

NewBie
Flashaholic*

Reged: Feb 17 2004
Posts: 1987
Loc: Oregon- United States of Ameri...

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#735368 - Tue Oct 26 2004 07:12 AM

Edit | Reply | Quote | Quick Reply

I have a suspicion that you may be burning up as much power in the battery as in yo regulator, or more.

Ah, there it is.

In the beginning, it appears there is 0.4V drop in Vbatt at the 1C load, an the circuit i 84% efficient, and the battery is running 90% efficient, for an overall efficiency of 74

At the higher load levels, it looks like the battery becomes even less efficent.

Curious though, at 1W levels, you mentioned 306mA output, which would make the voltage output 3.268V. Which means your power out curve should be flat out to 40 minutes, if your circuit had no dropout. I notice at this voltage, you may no longer ab to drive the MOSFET gate to level to achieve 0.045 ohms (utilizing your max on-resistance number). There is the 0.0306 dropout from the 0.1 ohm resistor, which puts you at 3.2986V dropout, plus 0.01377V drop from the 0.045 ohms of the MOSFET(which is questionable at this voltage), which puts you at 3.31237V input before your regulator just goes full on, resistor mode. Or, 0.04437 V dropout at 306m I just noticed your recent post, with the voltage chart, it would seem from that, you'r output would be flat out beyond 50 minutes then.

So, if everything was working right, you'd be flat out to 30 minutes at the 1C rate. I s a bit of a tilt up to there, so everything isn't perfectly kosher, but not too bad.

Since you know the current output (since you are plotting power), it would be very interesting to watch the voltage drop across the mosfet itself, at the same time.

I am curious as how you arrive at the 25 lumen level, are you somehow holding the LED die at 25 degrees C, and also utilizing no reflector or optics?

Another thought, since the on resistance jumps to 50-80 mOhms at a gate drive of 2.5V... I see the sense resistor to ground, between the Source of the N-ch MOSFET a the Gate, so you have to subtract 30mV from the gate drive due to this....

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: NewBie]
#735408 - Tue Oct 26 2004 08:11 AM

Edit | Reply | Quote | Quick Reply

The lumen output is calculated and just raw output, factoring the actual Tj, not the bogus theoretical Tj of 25C.. my light has no optics, but does use a reflector.. not a particularly efficient one, though it's a decent parabola.. the raw lumen figure is just calculation of the amt of light the emitter is producing, not how much you'll get to us a little like hard drives being 'called' 60GB.. but it's what i have to work with.

Hoping the test with 1/2 the Rsense will be positive... I haven't figured out why there

as much 'tilt' as there is at 1W levels.. does it need a tweak to the gain between the two NPN?

Vdrop on the mosfet is easy calculation, since i have the current, the Rsense and the in my charts. It is the 'lions share' of the voltage drop of the circuit any time it's in regulation. It only takes about 15 minutes at 400mA levels before the total voltage d between the mosfet and the Rsense is less than 1/10th of a volt, so there is very littl headroom for 'control'.

Post Extras:

Doug S
Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#735465 - Tue Oct 26 2004 09:16 AM

Edit | Reply | Quote | Quick Reply

While not a good solution to the slope problem, it should be possible to manipulate th slope of the current vs Vin by placing a high value resistor between the base and emitter of Q2. The problem with this is that it aggravates the sensitivity of the circuit variations in temperature and beta. Also the optimum value of the added resistor will vary with the values of R1 and R4 so it would be optimized for only one setting of you pot, however you should even be able get the current to *increase* with falling Vbat you wish. If you wish to try it, start with Rnew=10XR4 and experiment from there. D not try any Rnew<7XR4 or you risk simply forcing the circuit into shutdown.

Edit Edited to correct erroneous statement about consequence of Rnew<7XR4.

Edited by Doug S (Tue Oct 26 2004 05:26 PM)

Post Extras:

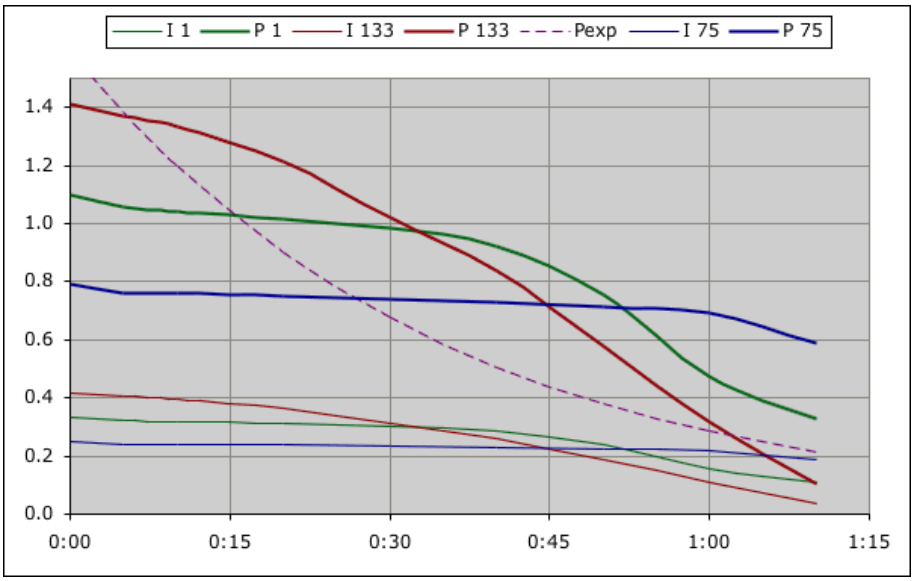
Doug S
Flashaholic*

Reged: Jun 20 2002
Posts: 2660
Loc: Chickamauga Georgia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#735743 - Tue Oct 26 2004 01:35 PM

Edit | Reply | Quote | Quick Reply

> Quote:
>
> *andrewwynn said:*
> updates updates...
> the 400ma problem isn't that the battery can't handle the current drain.. it's rated to 1.5C or 450mA.. however.. it only has 300mAH storage, so that means the Vbat drops pretty fast. I think this circuit just thinks it's in 'phase two' or the transition right off the bat... I will try a run with 1/2 the resistance of Rsense tomorrow.. here are the latest graphs, comparing 330 starting current and 430 starting current:
> Improved charts: direct comparison..
> here is a chart comparing power levels of the '1W' vs the '1.5W'.. in quotes because the 1.5W starts at basically 1.5W, but averages more like 1.25W during it's useful range..



The green represents the '1W' version and the red represents the '1.5W' version. in addition there is a purple dashed line that represents a 1.6W straight-resistor model. The thin lines on the bottom are current.
-awr

There is quite a discrepancy between your modeled resistive performance in terms of shape of the curve and your actual posted test data on 10/25 of a resistive arrangement.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#735822 - Tue Oct 26 2004 02:40 PM

Edit | **Reply** | **Quote** | **Quick Reply**

Hello again,

Doug: I'll take a look at your resistor idea soon.

All:
I think Andrew is on the right track, where the basic parts we have to work with just arent cutting it as well as at lower current levels. To find out if this is true, we can examine one of the most basic things about regulators in general: Controllability, and see how our circuit is affected.

In our case, if the basic unchangeable elements turn out to be uncontrollable, there's no circuit in the world that will improve the response. Also, for us, more controllability equates to a flatter output current level.

To find out once and for all, we can perform a few very simple tests. For this i purpose three simple tests...

Please note this takes longer to read through than to actually perform ☺

SETUP

Connect a 1k carbon resistor to the gate of the MOSFET, keeping the free end pointing upward so a clip lead can be easily clipped on during the tests. Connect a short wire to the base of Q1 so it can be shorted to ground with a short clip lead. Connect short wires to the MOSFET Drain and Source so these can be shorted also during the tests. Have another Li-ion cell ready with jumpers attached and the (-) end connected to ground, or use a 4 or 5 volt power supply with smooth dc output.

TESTS (to be performed in sequence)

1. Connect a fresh cell and monitor output current. After 5 minutes short the base of Q1 to ground and note any change in output current. If current goes up, repeat this test every 1 minute until no change in output current is noted. Record the time and current and batt voltage.

2. At the point where test #1 shows no change in output, connect the other cell's (+) end to the loose end of the 1k resistor (keeping the base of Q1 shorted to ground). Record any change of output current. Remove the second Li cell.

3. If test #2 fails to show any significant change of output current, short the MOSFET drain to source and record any output current change.

INTERPRETTING THE RESULTS

Once test 1 reaches the point where there is no change of output, all controllability is lost and there is no control circuit that can do better without possibly increasing the gate drive, which is the next test.

If test 2 causes a significant increase in output current then there is the possibility that the mosfet can be driven harder to increase controllability, or can be replaced.

If test 2 fails or comes out not very significant, test 3 checks to see if a different mosfet with lower Ron would improve the response.

If test 3 fails to show an significant change of output current then a 'better' mosfet wont help either.

IMPROVEMENT

Since the unchangeable elements are considered to be Vbatt, batt internal R, mosfet Ron, and Rsense, we can start by decreasing Rsense to 1/2 it's original value and do the tests again.

If the MOSFET short test proves significant, we can find a better MOSFET.

If the direct gate drive test (with the second Li-ion cell) proves

significant, we might find another MOSFET that works better at lower gate voltage levels.

Finding a battery with a lower internal R (perhaps higher ma rating) will improve the response also.

Please post results

Take care,
Al

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: Doug S]
#736016 - Tue Oct 26 2004 06:10 PM

Edit | Reply | Quote | Quick Reply

The difference is that was a 1W starting point.. I will be doing an actual runtime test with resistive solution for comparison.. at 1W.. there was a pretty quick drop, then a slower exponential decay, flatter than shown here in purple, before it eventually hits the 'final slope'... the higher power slope will actually do something similar where during the middle, Vbat is a little more stable and will flatten it out a little bit, but in-general it'll be similar to what is shown here.

pulling the purple line down at 15 min and up at 45 minutes will be a little more accurate i believe.. there will be a real test-case modeled soon.

I think that I will be able to some of this testing tonight mentioned above.. it is a fact that using the AAA is the main limitation.. but that's what i have to work with in this particular design. I will try the RNew idea as well as the testing.. the Vfet (drop on mostfet) was extremely low when the ckt is going out of regulation...

What would happen if the Q1 emitter was attached upstream of the Rsense? this shou in effect hold the gate voltage higher if the current is higher, and pull it down if curre goes down, could this help flatten the curve a little bit?

-awr

Edited by andrewwynn (Tue Oct 26 2004 06:38 PM)

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#736325 - Tue Oct 26 2004 10:52 PM

Edit | Reply | Quote | Quick Reply

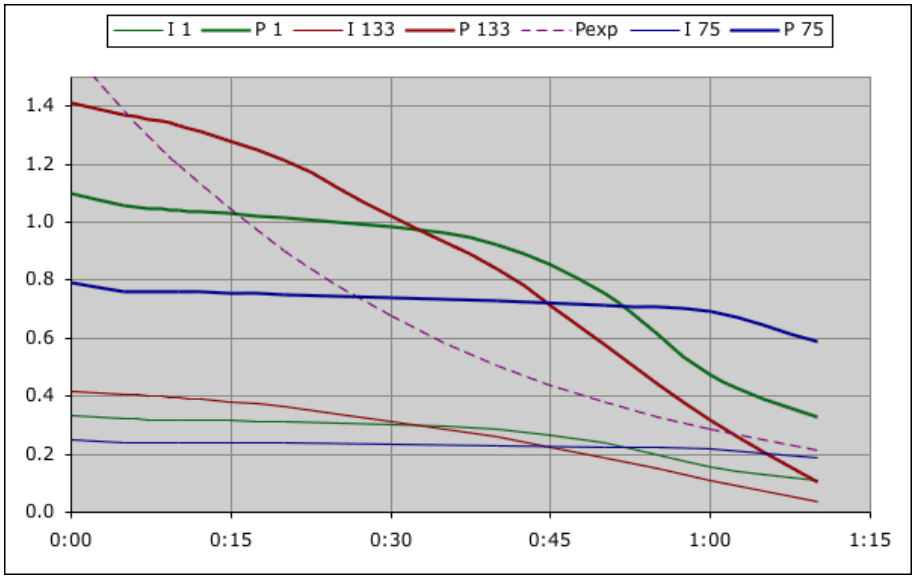
Ok i did a little bit of testing ala MrAl's recommendations above.

when the battery was drained a little but not all the way.. shorting the base of Q1 to ground added about 10mA when i was pulling 250mA or so.. 250mA ->260mA At the same point in discharge, shorting the FET had about the same effect, about 10mA.. s seems the fet is pretty well a short from the gate drive once it's out of regulation, bu there was a smidge of overhead for stronger gate drive, since the current had droppe yet the gate was not fully driven at that particular point.

I think more of the issue at hand is just how limited the power source i am working w

is.

here are the latest power curves:



133 = 1.33W average for 30min, 1 = 1W average for 40min.. 75 = 3/4W average for 60 min.

oops forgot to measure the Pot settings.. here is the setting for 3/4W: 70k and 15.5k

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#737004 - Wed Oct 27 2004 04:42 PM

Edit | Reply | Quote | Quick Reply

Hi there Andrew,

I was suggesting the tests to be done at the 1.4 watt level so we could see if we could get a flatter curve by either using a better control circuit or by replacing the MOSFET. This would require 400ma output current to start with, as that's the level we seem to have a problem with.
What this means is that the test would have to be repeated at the higher level in order to be sure of the results.
I have to agree with you however, in that the battery itself looks like the culprit here. So far it looks like the cell's internal resistance dominates the response even after a few minutes (running at 400 or so milliamps) so trying to improve the circuit will not help.
This means we loose controllability because of the internal resistance of the battery so the only remedy is to use a battery with lower internal resistance.

Please note the time when (at 400ma) the circuit is no longer showing significant increase in output current when the MOSFET is shorted and when the Q1 base is shorted to ground.

10ma out of 250ma is only 4 percent, so i doubt you would

want to replace the MOSFET for that tiny improvement.

The tests are designed to show once and for all if the circuit can be improved or not.

Thanks much for doing these tests, and once we get the final results we'll be able to conclude one way or the other about whether or not to try to improve the circuit or buy another battery.

BTW, the extra Li cell test is to show if injecting a higher voltage will help, but yes, if shorting the MOSFET doesnt help then no amount of voltage will help either.

Take care,
Al

P.S.
I hope im not sounding overly critical here...the tests you've done so far are really outstanding and have helped greatly in finding out the problem. In the end, you're going to have a better circuit (if possible) to work with.

BTW, when we loose controllability because of an unchangeable quantity it means pretty much ANY circuit would not improve anything, even with 100 op amps and 100 volts of drive

Thanks again for all the prevous tests!

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#737563 - Thu Oct 28 2004 04:23 AM

Edit | Reply | Quote | Quick Reply

thanks for the feedback.. yeah sorry about the happenstance of the drive levels wher did the tests.. what i'm going to do is run the higher level with a bigger battery and confirm that it's really just a matter of battery capability. I'm absolutely thrilled overa with this little gem of a driver.. today i got to test a variation using my variable drive design on the breadboard and with the addition of two components i am able to reliab change the drive level from 60mA to 400+mA.. i hope to have that put into a prototy within a week.

The simplicity of a single pot is probably worth any tradeoff of having separate resist for biasing the NPN network. My test pot is a little 'weak' my 100k pot actually is mor like 85, so i think i'll try with a different one, but have to say i'm quite thrilled with what is going on in testing, and will be likely building drivers for production in a few days.

I did a run at 3/4W and exactly as predicted, flat response right to 60 minutes.

I will build a scale prototype next to eliminate all the losses from the breadboard and have feedback on that.. unfortunately my pots are 2mm whew what was i thinking!@ the final boards will have a 3mm pot... i can't wait to get the variable model working.

-awr

Post Extras:

NewBie
Flashaholic*

Reged: Feb 17 2004
Posts: 1987
Loc: Oregon- United States of Ameri...

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#737671 - Thu Oct 28 2004 07:02 AM

Edit | Reply | Quote | Quick Reply

Since a stronger source (battery) would remain at a higher voltage for a longer perio and the regulator would need to drop this amount and turn it into heat, the efficienci should drop.

The same should happen with a lighter load, but not as bad of an efficiency drop.

Do you have any graphs with power in, power out?

Any chance you could toss battery losses into your graphs too? Then the real overall efficiency of the complete solution could be understood.

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: NewBie]
#738738 - Fri Oct 29 2004 01:47 AM

Edit | Reply | Quote | Quick Reply

yup, true less efficiency with bigger battery, kind of an irony..

The charts on the thread for the light i'm using this ckt in show Pin vs Pout: here

I think on page 19. I guess I don't know exact method of calculating the battery losse clearly the higher the power level the more power loss in the battery. I'm thinking yo are saying, measure the no-load voltage and the under-load voltage and calculate the apparent internal resistance losses, correct? that would change all through the range discharge i imaging.

A quick estimation shows that at .75W I get about 1000mWH of energy.. at 1W i get about 950mWH, but run out sooner.. so the extra drain doesn't seem to hurt the capacity much (it's not much higher than 1C discharge so not too surprising).. and at 1.25W average, i get about 900mWH.

so.. the batteries are rated roughly 1.1WH, so that gets me about 91%, 86% and 81% battery efficiency.. that is estimated of course, but probably pretty close. Are these th numbers you are asking about? this is based on the mAH rating of the battery and actual runtime tests. A more realistic WH rating might be more like 1.05mAH or even 1.0 (because load voltage is probably a lot closer to 3.5 not 3.7).. which would bring efficiency up a lot.

-awr

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#739220 - Fri Oct 29 2004 11:34 AM

Edit | Reply | Quote | Quick Reply

Hi andrew,

Would have liked to see those tests done with the small battery, but with a larger battery and same circuit it should still be interesting.

Take care,
Al

Post Extras:

greg_in_canada
Flashaholic

Reged: Jun 07 2004
Posts: 354
Loc: Saskatoon SK Canada

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#739225 - Fri Oct 29 2004 11:42 AM

Edit | Reply | Quote | Quick Reply

If you ran a test at (say) 1/10th of your maximum power you could then assume the battery losses are negligable for that test. Thus you would have a good estimate of the W-hr rating of the cell.

Greg

Post Extras:

rdshores
Flashaholic

Reged: May 03 2004
Posts: 333

Re: New 35mv LDO-CC Driver for Luxeon [Re: greg_in_canada]
#742359 - Mon Nov 01 2004 02:44 PM

Edit | Reply | Quote | Quick Reply

Is there any booster chip that runs in constant current mode from a 1.2 volt NiMh battery? The Madmax will run off a single cell in constant voltage, and a Badboy will r in constant current mode only from two cells. How about boosting the voltage of a Ni up and then using this LDO CC driver to regulate it. Wouldn't the battery resistance losses be less?

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: rdshores]
#742451 - Mon Nov 01 2004 04:13 PM

Edit | Reply | Quote | Quick Reply

Hi there,

Yes, there are booster chips out there that will run from 1.2v and up, but this is a totally different approach and we're using an Li-ion cell for input, which has voltage about 4.1v down to maybe 3.5v. It's like a different animal ☺

Take care,
Al

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: rdshores]
#742603 - Mon Nov 01 2004 06:22 PM

Edit | Reply | Quote | Quick Reply

my second of MrAl's remarks.. once you are building/using a ckt that does boost.. you build right into that circuit, the regulation that will hold the current constant... it's no something that helps my cause... the LDO solution really is best for single LiON to single Lux solution... boost from AAA to lux has a maximum of about 3/4W output, where the LDO from LiON can easily double that. There are circuits that will boost and supply CC from a single NiMH to lux, up to about 3/4W, and they actually will have a more stable level, however they rarely have low voltage cutout, and drain very hard a

the end, something i like about the LDO solution.. toward the end of life, it drops pow exponentially since it basically becomes direct drive.

Post Extras:

Kill-O-Zap
Flashaholic

Reged: Apr 14 2002
Posts: 400
Loc: New Hampshire

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#744138 - Wed Nov 03 2004 04:54 AM

Edit | Reply | Quote | Quick Reply

Is anyone actively pursuing a high-power version of this circuit for Lux V/2xLiIon? I think it could be popular for SpaceNeedle type mods.

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: Kill-O-Zap]
#744155 - Wed Nov 03 2004 05:22 AM

Edit | Reply | Quote | Quick Reply

How high for the current?

Take care,
Al

Post Extras:

Kill-O-Zap
Flashaholic

Reged: Apr 14 2002
Posts: 400
Loc: New Hampshire

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#744357 - Wed Nov 03 2004 09:27 AM

Edit | Reply | Quote | Quick Reply

I'd like to see ~1.2A. For SpaceNeedle type mods, fresh 123's drive about 1.5A, but dropping steadily. 1.2A reasonably steady over most of the discharge (~2h on 2400's think would be really appealing.

edit: I realize it won't be 2h at 1.2A, inefficiency at >Vf. Also, 1.2A may not happen below a certain charge level. So you might get close to 2h but not all of it at 1.2A

Edited by Kill-O-Zap (Wed Nov 03 2004 09:33 AM)

Post Extras:

koala
Flashaholic*

Reged: Mar 05 2003
Posts: 1064
Loc: Australia.

Re: New 35mv LDO-CC Driver for Luxeon [Re: Kill-O-Zap]
#745221 - Thu Nov 04 2004 05:59 AM

Edit | Reply | Quote | Quick Reply

Ok, something struck me here.

> Quote:
>
> Bigger cell(higher voltage) = lower efficiency.

We can keep lithium ion fully charge at all times why suffer lower effiency? It might b good for emergency because lower voltage, higher efficiency but is this really good? I know some may disagree with me.

Post Extras:

andrewwynn

Re: New 35mv LDO-CC Driver for Luxeon [Re: koala]
#745277 - Thu Nov 04 2004 07:15 AM

Edit | Reply | Quote | Quick Reply

Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

LDO design by it's nature is least efficient the higher the battery voltage... you get th most power and runtime with the highest charge on the battery regardless. it's just a price you pay... A double-A (AA) cell has about 3x the energy of a triple A (AAA) cell, even with less initial efficiency.. it is not like it takes away from the increase in storag

-awr

Post Extras:

Crux
Flashaholic

Reged: Nov 04 2003
Posts: 77
Loc: Mentor, Ohio

Re: New 35mv LDO-CC Driver for Luxeon [Re: koala]
#745964 - Thu Nov 04 2004 07:46 PM

Edit | Reply | Quote | Quick Reply

In response to the bigger cell = lower effiency post. I can't belive this is true. The higher capacity of a larger cell only stretches out the discharge curve time axis. Sure spends more time in the 'fresh charge' portion than a smaller cell but it also spends much more time in the 'nearly just right' portion of the curve. I know the curves (wh adjusted for cell capacity) won't be identical because the same Amp load represents a lower rate of discharge on the larger cell, but overall, the effiencies of the two cells should be similar.

Of course I could be way off base... Does anyone agree with this?

Post Extras:

koala
Flashaholic*

Reged: Mar 05 2003
Posts: 1064
Loc: Australia.

Re: New 35mv LDO-CC Driver for Luxeon [Re: Crux]
#746053 - Thu Nov 04 2004 09:11 PM

Edit | Reply | Quote | Quick Reply

Hmm I certainly didn't think about what you guys mention.

Does anyone know what kind of circuit the latest 3.0v R123 use to 'drop' that voltage

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: koala]
#746168 - Fri Nov 05 2004 12:41 AM

Edit | Reply | Quote | Quick Reply

crux.. very good point... i will be doing a two-up, three-up and four-up test soon, it w give me the answer.. it's a very interesting thought..

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#791967 - Sun Dec 12 2004 10:32 PM

Edit | Reply | Quote | Quick Reply

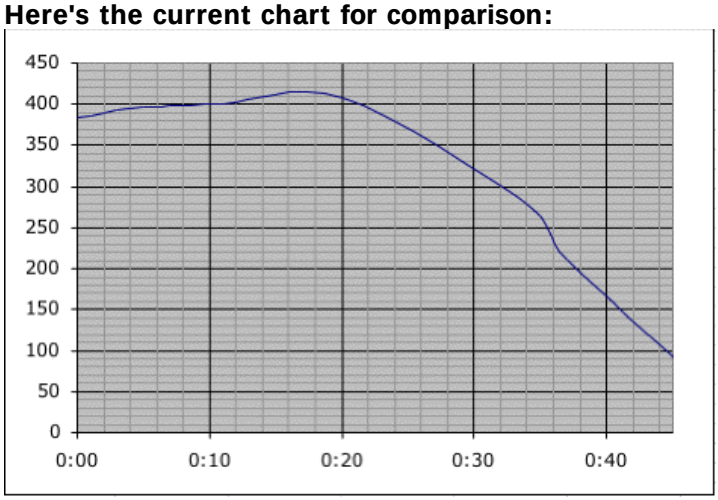
This is a bit of a cross-post but it's valid i believe..

Follow up on the current vs brightness thing..

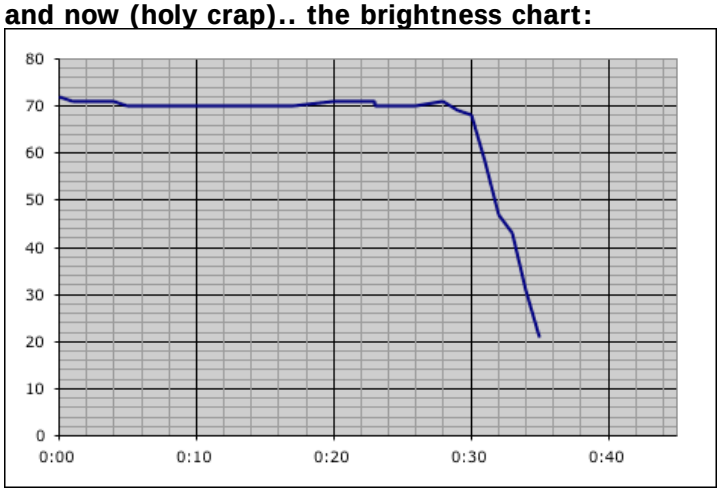
Well, although i was amazingly happy with the outcome of the ldo driver that me and Mr Al developed, i was trying to get it to be a little more stable.. however, something hit me about that whole.. hotter=dimmer that luxes do so i put a light meter in front, and while the amps went up, the lux stayed very much the same. With that in mind i did another runtime test this time measuering just the brightness. The exact brightne is not so important.. didn't really measure the distance.. just looking for relative

brightness.

Here's the current chart for comparison:



and now (holy crap).. the brightness chart:



as you can clearly see.. HOLY COW! when used constantly, eventually the current sta dropping and the light cools off, which makes a marked improvement on the lumen/watt.. and basically exactly counteracted the dropping current up to 30 minute (the light was set to just about 400mA).. i will do a run test on a 'hotter' model soon.

In my wildest dreams i would not have anticipated a brightness level to be so amazin flat.

Needless to say.. 'thrilled'. You guys will be soon..

Subjectively it sure did seem to hold a steady brightness, but your eyes will really pla tricks on you. It was amazing to just watch the light meter.. it did get a little 'jittery' right when the current started dropping.. there were some peaks and valleys that we impossible to keep track of by hand... but just like 1-2lux swings in brightness when was about to drop off.. (it actually went up right at the end to the max. brightness of the test*)

***other than the initial turn on surge.. when the lux is room temp, it will output up to 20% more light than at full temp, so for example, when the initial reading i used was 72 fc.. (lux).. the initial spike was about 77... try as you might you need a meter to 'see' it.. you just can't tell.**

-awr

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#791974 - Sun Dec 12 2004 10:38 PM

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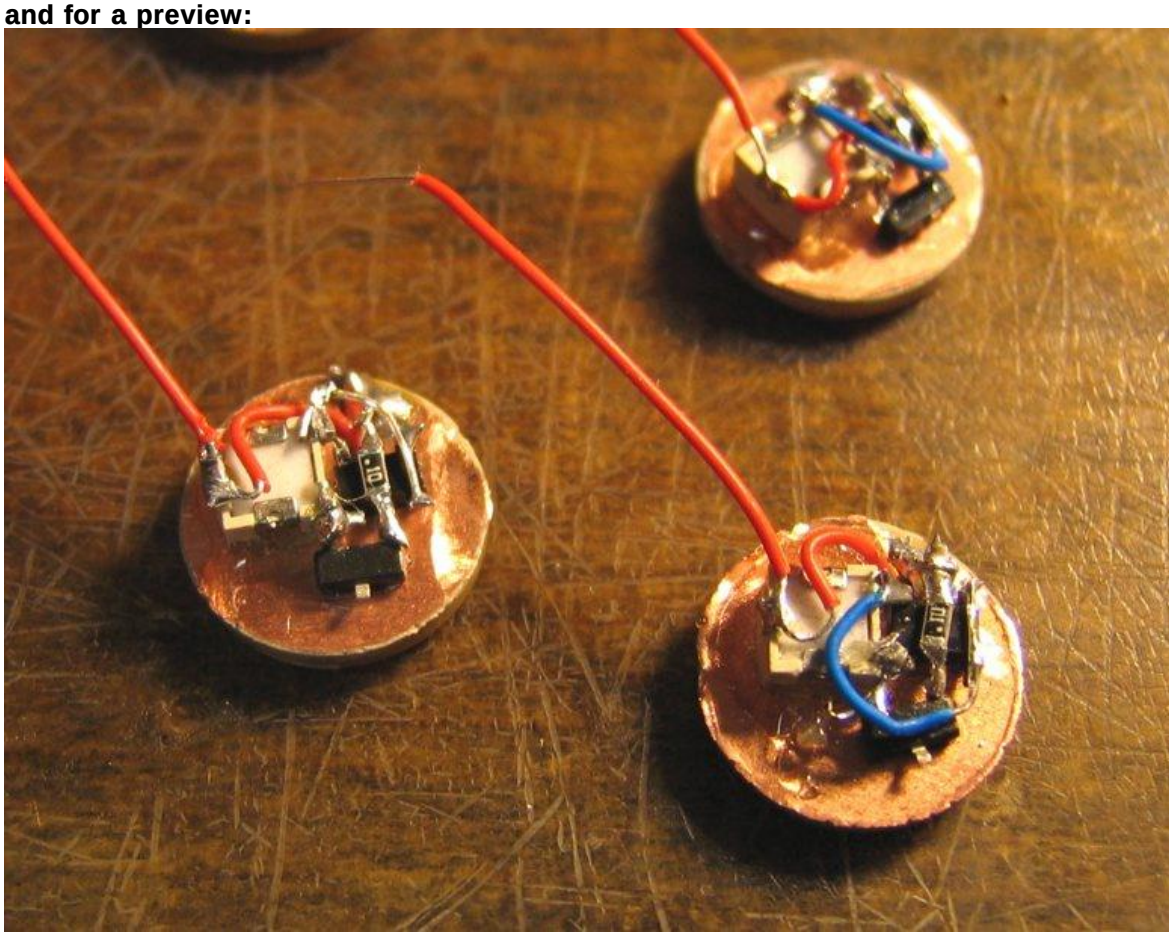
an now for some pictures.. you can check them out here (make sure you click on eac of the links at the top to see the other pages.

and for a preview:



That circle is 3/8in (10mm).. look close you can read the chip.

-awr

Post Extras:

MrAl

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#792294 - Mon Dec 13 2004 07:58 AM

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Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Hi there Andrew,

With this cool circuit i think some cross posting is in order ☺ The more the better ☺
It's rare to find a circuit this good and so small too!

Take care,
Al

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]

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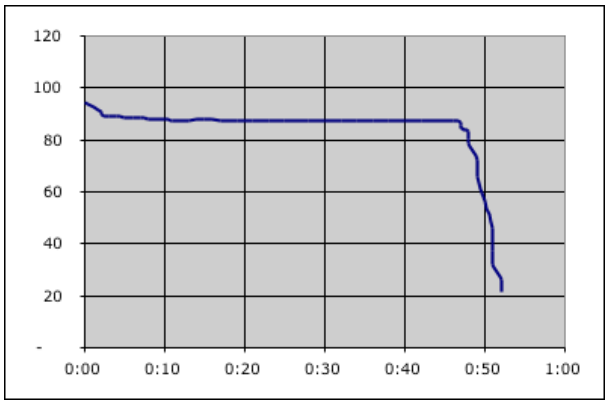
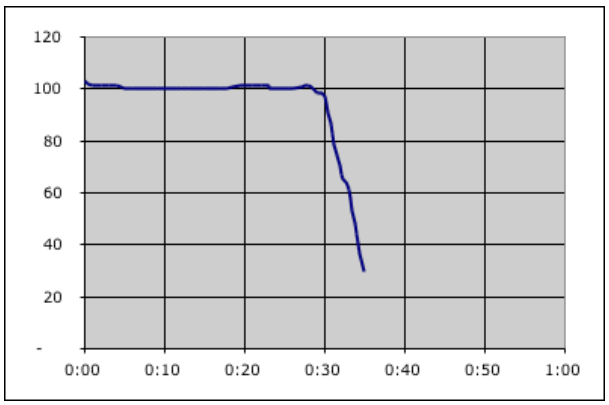
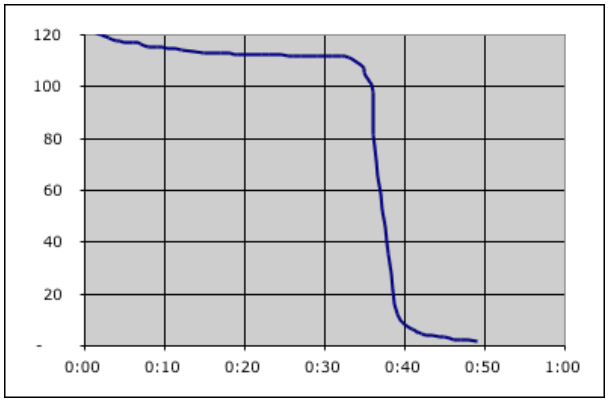
#793259 - Tue Dec 14 2004 03:26 AM

amen to that, you think you didn't earn your vip nano? puuuleese :-D... you have to send my your address (email).

Oh.. updated graphs.. 350mA, 400mA and 450mA:







those times are all with a single AAA LiON Battery of course... why else would the dri be 3/8" diameter?

-awr

note: the more curvy slope on the 400mA is probably due to starting with a warm lig

Edited by andrewwynn (Mon Jan 03 2005 11:18 AM)

Post Extras:

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#795629 - Wed Dec 15 2004 09:37 PM

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Hi Andrew,

Hee hee, ok ill send it email very soon.
Thanks, and best of luck with this really cool circuit.

Take care,
Al

Post Extras:

andrewwynn

Re: New 35mv LDO-CC Driver for Luxeon [Re: MrAl]
#817019 - Mon Jan 03 2005 11:18 PM

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and the charger i built to go with the LDO driver is here

preview:

Post Extras:

Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

MrAl
Flashaholic*

Reged: Sep 09 2001
Posts: 1857
Loc: New Jersey

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#817162 - Tue Jan 04 2005 04:16 AM

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Hi Andrew,

Wow, that's pretty small! Looks like it will fit just about anywhere.

Take care,
Al

Post Extras:

djpark
Flashaholic

Reged: Nov 04 2003
Posts: 383
Loc: SJ, Malaysia

Re: New 35mv LDO-CC Driver for Luxeon [Re: andrewwynn]
#817214 - Tue Jan 04 2005 05:24 AM

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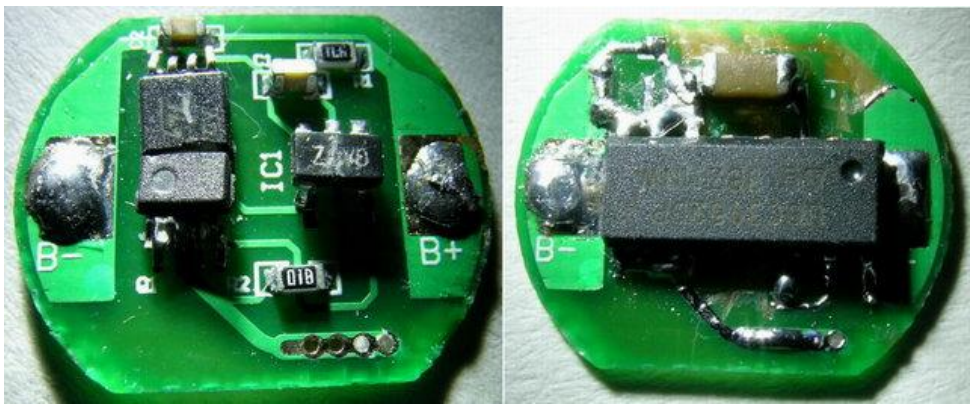
Now what you need is a over-charge, over-discharge, over-current protection circuit t make it complete.



-- dj

Post Extras:

andrewwynn
Flashaholic*

Reged: Apr 28 2004
Posts: 1159
Loc: Racine, WI USA

Re: New 35mv LDO-CC Driver for Luxeon [Re: djpark]
#817946 - Tue Jan 04 2005 03:15 PM

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neat stuff DJ... is that complete with driver, or is that just the protection circuitry?

my over-discharge protection is the luxeon with Vf of 3.4V.. over-current.. been working on that one.. i have these tiny fuses but they are 65 cents/each in quantity yikes! Fortunately.. the AAAs ive been using are pretty robust it seems at dealing wit shorts (brutal testing for sure).

-awr

ps.. the stamp sized one is the 'big' charger, the small one fits inside a 10mm circle.

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