12-03-2005, 01:40 AM #1

CY
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

EZ 15 min fenix two stage switch mod instructions

EZ 15 min fenix two stage switch mod instructions

first posted these instruction in another thread, but decided to start a new one, when instructions were getting buried.
http://candlepowerforums.com/vb/sho...?t=98221&page=1

anyways here's my version of fenix two stage switch mod.

EZ 15 min two stage fenix mod...

thanks wwglen!

here's a few pic to help illustrate. place common rat shack 10 ohm resister on side of switch. simply bridge to two switch

contacts. center resister and solder.

that's it, if you have the 10 ohm resister. you are done in a jiff. Works great!

simply twist to turn on. click to go from low to high.

edit: ohm selection instructions: general rule of thumb of figuring out which resister to use in two stage mods, seems to be:

for five watt luxeon use aprox. 30 ohms with 2x CR123 or single li-ion.
for one watt or 3watt using CR123 or single li-ion use aprox. 10 ohms. (can use 2x 10 ohm = 5 ohm)
for one watt or 3watt using single AA use aprox 5 ohms


271-1301
Pkg. of 5
RadioShack
10-Ohm
Resistors
1/4 watt • 5% tolerance

http://img39.imageshack.us/img39/6679/snapring7wz.jpg

_____
no matter where you go
there you are

Last edited by cy : 01-13-2006 at 12:12 PM.

Quote

12-03-2005, 03:00 AM #2

Sinjz
Flashaholic*

Join Date: Oct 2003
Location: six blocks from ground zero
Posts: 1,043

Re: EZ 15 min fenix two stage switch mod instructions

Looks like something even I can do!

Now can i get a close up of exactly what I'm soldering each end of the resistor to?

Quote

12-03-2005, 06:11 AM #3

CY
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

here's another pic clarifing resister position.
someone PM'd me requesting I email them pic's

no matter where you go
there you are

Last edited by cy : 12-28-2005 at 05:53 AM.

Quote

12-03-2005, 03:09 PM #4

testmonket

Join Date: Oct 2005
Location: New England

Enlightened Posts: 36

Re: EZ 15 min fenix two stage switch mod instructions

Looks like a great mod... So how much does a 10-ohm resistor attenuate the output? Have you played with different resistor values?

Quote

12-03-2005, 05:16 PM #5

Leow
Enlightened
Join Date: Oct 2004
Location: cheltenham uk
Posts: 99

Re: EZ 15 min fenix two stage switch mod instructions

Wow, that was easy,
thanks Cy.

Leo

Quote

12-03-2005, 08:12 PM #6

eng50
Unenlightened
Join Date: Nov 2005
Location: Richmond, VA
Posts: 4

Re: EZ 15 min fenix two stage switch mod instructions

CY,
Thanks, awesome upgrade! Just my tiny addition, it is much easier if you flatten the ends of the resistor so they tuck in to the tabs instead of trying to hold them outside to solder. It also makes a neater job with minimal solder to hit the case. Hope this helps

Thanks Again!!

Bill

Quote

12-05-2005, 10:23 PM #7

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Thanks wwglen and cy for a great mod with pics!

I just got my light today and modded it this evening. I did mine a little different and thought I'd post a couple of pics here. I'm not trying to hijack your thread, but just had a different idea that I thought others might be interested in. If this isn't kosher, I can start my own thread.

I decided to solder the resistor leads to the pads without sticking them into any holes or behind the switch legs. This eliminates the possibility of the leads and/or solder sticking out too far.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

12-05-2005, 10:49 PM #8

cy
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

glad you posted, anything to help with how-to instructions.

when I started modding, really apreciated folks who took the time to post clear instructions with pictures.

feel it's important to give back after taking....

_____
no matter where you go
there you are

Quote

12-06-2005, 12:35 AM #9

greenLED
Flashaholic

Join Date: Mar 2004
Location: getting there
Posts: 8,995

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **cy**
> *when I started modding, really apreciated folks who took the time to post clear instructions with pictures.*
>
> *feel it's important to give back after taking....*

Nicely said! The first "hard" mod I tried was to put a Luxeon in an Infinity head, and I was lost without pics (until people posted a couple). I should make a point of taking pics when I work on stuff.

BTW, AuroraLite's Dummy guides are very visual and easy to follow.
[/highjack]

I'm definitely doing this if/when I get my Fenix. I wonder if it'd work on the L2P.

_____

CPF Specials thread ** **FS: Glow in the dark o-rings** ** Free modding services

Quote

12-07-2005, 01:01 AM #10

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

I had to add another 10 ohm resistor- low just wasn't bright enough for me. Now low is just slightly less bright than my River Rock 2aaa.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

12-07-2005, 03:46 AM #11

korpx
Enlightened

Join Date: Jun 2004
Location: sweden
Posts: 83

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **srvctec**
> *I had to add another 10 ohm resistor- low just wasn't bright enough for me. Now low is just slightly less bright than my River Rock 2aaa.*

Any idea what the runtime is on your low?

Quote

12-07-2005, 03:51 AM #12

Emilion

Join Date: Mar 2004
Location: Hong Kong
Posts: 1,202

Re: EZ 15 min fenix two stage switch mod instructions

Will 10 ohm SMD works ? I've quite a lot ...

_____

Lights.emilionworkshop.com

Authorized Distributor of NexTorch Flashlight

Quote

12-07-2005, 01:12 PM #13

greenLED
Flashaholic

Join Date: Mar 2004
Location: getting there
Posts: 8,995

Re: EZ 15 min fenix two stage switch mod instructions

I don't see why not. Unless there's a problem with the power rating or something like that. 

CPF Specials thread ** **FS: Glow in the dark o-rings** ** Free modding services

Quote

12-07-2005, 01:22 PM #14

CY
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **Emilion**
> *Will 10 ohm SMD works ? I've quite a lot ...*

10 ohm SMD is the cleanest method to do this mod. Don was first to post mod using SMD resister.

but not everyone has soldering skills necessary to do SMT work. VS soldering 1/4 watt resister is pretty basic

that's pretty slick adding a second 10ohm on back side.

thanks again to wwglen for coming up original idea.

no matter where you go
there you are

Last edited by cy : 12-07-2005 at 01:25 PM.

Quote

12-07-2005, 04:26 PM #15

Mike abcd
Flashaholic

Join Date: Oct 2005
Posts: 130

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **srvctec**
> *I had to add another 10 ohm resistor- low just wasn't bright enough for me. Now low is just slightly less bright than my River Rock 2aaa.*

I didn't think my v2.5 was nearly that bright with 5 ohms. It had the same total output as an unmodified Dorcy 1AAA. A Nichia modified Dorcy 1AAA blew it away.

I'm running a single 2.7 ohm now and like it a lot, It has enough output so I rarely need/want high and should still get 15-16 hours on low.

Mike

Quote

12-07-2005, 06:53 PM #16

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **korpx**
> *Any idea what the runtime is on your low?*

No idea. I don't really have time to test it either. I wish there was a standard formula to use for calculating the run time for lights without actually having to leave the light on for long periods.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

12-07-2005, 08:32 PM #17

cy
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

to calculate aprox runtime. measure current draw at cell with a reliable meter. then divide that into mah rating of cell. note most cell's rating are not accurate.

for example most R123 li-ion cells claim anything from 550 mah to 750 mah. so best anyone has actually measured is aprox. 625 mah from a R123 cell. (note these figure may be out of date)

---

no matter where you go
there you are

Quote

12-08-2005, 12:55 AM #18

Roy82
Enlightened

Join Date: Nov 2005
Location: Melbourne, Australia
Posts: 40

Re: EZ 15 min fenix two stage switch mod instructions

10 ohm was too dim for me too. Trying 2 x 10 ohm now. Now its not quite as bright as my 35k Photon clone, but much closer than 10 ohm. I haven't soldered the leads yet, they're just jammed behind the tabs, after flattenimg the ends with pliers; suppose I'll have to solder them for long term reliability after I work out what light level is good.

Is there a trick to holding all the parts while trying to measure the current? I couldn't work out how to do it after I took the tail cap off.

Quote

12-08-2005, 01:54 AM #19

wwglen
Flashaholic*

Join Date: May 2003
Location: NC
Posts: 541

Re: EZ 15 min fenix two stage switch mod instructions

Take the tail cap off, hold the resistor leads across the bottom of the battery tube and the battery.

Measure the voltage across the resistor(s) and use the formular.

Voltage / Resistance = Current.

OR

Take the tail cap off and place one lead of the resistor(s) on the end of the battery case. The second resistor lead goes to one lead of the meter. The second meter lead goes to the battery and measure current.

I got 80mA with 10ohms and I got almost 3 nights (8-9 hours per night) on low until the battery ran out. This was with 2300mA-H batteries.

It is NOTICABLY brighter on low with Lithiums.

wwglen

Quote

12-08-2005, 03:19 AM #20

Roy82
Enlightened

Join Date: Nov 2005
Location: Melbourne, Australia
Posts: 40

Re: EZ 15 min fenix two stage switch mod instructions

Thanks!

Doing that I measure 80mA also, from a somewhat drained 2500mAH AA, trying both options, 5 ohm.

Going to have to try the Lithiums when I get some, sounds good.

Quote

12-16-2005, 12:31 PM #21

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Thought people here may like to know this. You can use the two way switch with this mod as well.

I designed a driver for the Fenix that will drive the Lux at 490 mA from a NIMH AA cell. That's right, 1.7+ watts to the Lux. This is easily double the power the stock circuit drives the Lux (I have taken measurements of the stock and it's more like 3/4 watts or less). My mod circuit draws 1.8+ amps from the cell giving the Fenix a runtime of over an hour with a super bright output. I will post pictures tonight or tommorow.

Quote

12-16-2005, 09:22 PM #22

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Just an FYI for those interested.

I measured the current from my 5ohm 2-stage modded L1P with a freshly charged 2500mah NiMh and got 110ma on low and 1.05A on high checked with my Fluke 77 set to 10A mode.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

12-16-2005, 10:07 PM #23

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **srvctec**
> *Just an FYI for those interested.*
>
> *I measured the current from my 5ohm 2-stage modded L1P with a freshly charged 2500mah NiMh and got 110ma on low and 1.05A on high checked with my Fluke 77 set to 10A mode.*

I have a Fluke meter and a Tektronics oscilliscope, but either of my Fenix flashlights only draw .87 Amps from the battery according to the fluke (not sure why yours is so much higher, all I use is NIMH cells), but this is not a good way to judge the actual current draw. The best way to measure the current from these switching mode power supplies is to use a .1 Ohm resistor in series with the battery and view the voltage drop across the resistor on an oscilliscope. This way you can view the mean value of the actual current draw. Each division on the scope it equal to 500mA on the 50mV scale. With this method I get a reading of about 750mA being drawn from either Fenix flashlight I own.

Last edited by MillerMods : 12-16-2005 at 10:19 PM.

Quote

12-16-2005, 10:40 PM #24

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *I have a Fluke meter and a Tektronics oscilliscope, but either of my Fenix flashlights only draw .87 Amps from the battery according to the fluke (not sure why yours is so much higher, all I use is NIMH cells), but this is not a good way to judge the actual current draw. The best way to measure the current from these switching mode power supplies is to use a .1 Ohm resistor in series with the battery and view the voltage drop across the resistor on an oscilliscope. This way you can view the mean value of the actual current draw. Each division on the scope it equal to 500mA on the 50mV scale. With this method I get a reading of about 750mA being drawn from either Fenix flashlight I own.*

I apppreciate the info, however...
I don't have an o-scope or access to one 

so I posted the results with a regular meter so that others in the same boat would have an idea what the current would be if they measured it with a meter. This may not be the best way, but it's the only way I and many others have to check current.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

12-16-2005, 11:23 PM #25

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **srvctec**
> *I apppreciate the info, however...*
> *I don't have an o-scope or access to one* SIGH *so I posted the results with a regular meter so that others in the same boat would have an idea what the current would be if they measured it with a meter. This may not be the best way, but it's the only way I and many others have to check current.*

I understand, but I just thought it was strange that you and I got such different results with our Fluke meters. I thought Flukes were supposed to be consistent. Soo, I wonder what others are getting for readings on their Fluke meters. I don't know, let's ask.

Quote

12-17-2005, 07:11 AM #26

pbarrette
Flashaholic

Join Date: May 2004
Location: Wiesbaden, Germany
Posts: 366

Re: EZ 15 min fenix two stage switch mod instructions

Hi MillerMods,

Perhaps your current reading is lower due to the .1ohm resistor being in series with the battery. A 0.1ohm resistor would give a serious current loss at 1A. Also, some boost circuits seem to be much more sensitive to inline resistance than others. For example, with many of the Zetex ZXSC300 circuits I have built, using a 0.1ohm resistor to measure both current draw and output seemed to have virtually no effect on draw or output. However, with a circuit based on the TPS61070 the 0.1ohm resistor resulted in a roughly 15% efficiency loss. Even when switching to a precision Vishay Dale 0.025ohm resistor there was a minor performance hit.

Also, the LTC3490 IC's don't seem to like inline resistance. I have noticed a major difference in runtime between 2" long wires to the LED vs ~1cm when using a 1xAAA battery. And I'm talking relatively big wires here, roughly 20ga copper. When using a 0.1ohm resistor inline with LED- and Gnd on this circuit, the runtime goes from 45mins to 30mins (both to 50% brightness). And in this case, we're only talking about ~300-350mA. Luckily it seems that there is a 0.1ohm resistor internally wired between pins 5 and 6 on this IC. I'm going to have to do some testing to determine if I can take reliable

current measurements using this resistor without affecting the circuit performance.

But as for your Fluke measurement, I'd at least consider that at 1A draw the resistor is just adding to the internal battery resistance which is causing a lower than expected reading.

pb

Quote

12-17-2005, 08:48 AM #27

Christoph
Flashaholic*

Join Date: Aug 2002
Location: Hagerstown,Md
Posts: 1,321

Re: EZ 15 min fenix two stage switch mod instructions

Using my fluke 75 I get a .75a draw on a rwoh in my v2.5 fenix using a L91 lith cell and around .65a with a 2000mah la cross nimh it is as bright as any that I have now(6).

C

_____
Chris

Quote

12-17-2005, 09:47 AM #28

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **pbarrette**
> *Hi MillerMods,*
>
> *Perhaps your current reading is lower due to the .1ohm resistor being in series with the battery. A 0.1ohm resistor*

> *would give a serious current loss at 1A.*
>
> *pb*

Any meter used will utilize a drop resistor to get the reading. I'm sure you understand that, so back to the original question, why is one fluke so different from another?? It's hard for me to believe one Fenix draws 1.05 Amps and another only .75. I guess this might show us that the Fenix circuit is inconsistent from one to another.
If the Fenix was that sensitive to a .1 ohm resistor at 1 amp (a total of a 100mV drop), it wouldn't get very good performance (constant output) through out the batteries discharge curve. We all used fresh batteries, so the lowest voltage that anyone of us fed the Fenix would be 1.2 volts. At that, given the current drive of the circuit (300mA or less), I believe you will find that it doesn't matter if I used a .01 ohm resistor (10 mV drop), my results would be very close to the same. I'll try it and get back with you.

Quote

12-17-2005, 01:19 PM #29

NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *Any meter used will utilize a drop resistor to get the reading. I'm sure you understand that, so back to the original question, why is one fluke so different from another?? It's hard for me to believe one Fenix draws 1.05 Amps and another only .75. I guess this might show us that the Fenix circuit is inconsistent from one to another.*
> *If the Fenix was that sensitive to a .1 ohm resistor at 1 amp (a total of a 100mV drop), it wouldn't get very good performance (constant output) through out the batteries discharge curve. We all used fresh batteries, so the lowest voltage that anyone of us fed the Fenix would be 1.2 volts. At that, given the current drive of the circuit (300mA or less), I believe you will find that it doesn't matter if I used a .01 ohm resistor (10 mV drop), my results would be very close to the same. I'll try it and get back with you.*

You might consider that there is a wide variation in LED forward voltages. You need to transfer power, which is V*I. So if one Luxeon 1W had a Vf of 3.048V and you were trying to drive it at 350mA, you would need 1.107 Watts of power.

So if one Luxeon 1W had a Vf of 3.489V and you were trying to drive it at 350mA, you would need 1.221 Watts of power.

Now, if under load, your cell sagged to 1.193V, the converter would be less than 63% efficient.

In the first case, where you needed 1.107 Watts for the LED, you would need
1.7 Watts input to make up for losses in the converter.

In the second case, where you needed 1.221 Watts for the LED, you would need 1.94 Watts input to make up for losses in the converter.

In the first case, you needed 1.7W into the converter. 1.7W/1.193V= 1.42 Amps from the cell.

Now in the second case you will need pull more current out of the cell. This will cause it's voltage to sag. Lets say the cell sags 25mV with the extra loading, for a battery voltage of 1.193, sagged by extra loading of 25mV, the cell voltage drops to 1.168V. For the second case, you needed 1.94W. 1.94W/1.168V= 1.66 Amps draw.

So in one case you had 1.42 Amps draw from the cell, and in the second, 1.66 Amps. Thats 0.24A variation alone, due to LED forward voltage only.

Now, when you pull additional current in from the cell, the converter gets less efficient. With that difference there, the converter efficiency would drop about 6%. So we need to re-calculate for the new losses in the second case.
In the second case, where you needed 1.221 Watts for the LED, we take the original 63% efficiency number, drop it by the extra 6% losses in the converter, to get to 57% efficiency. 1.221Watts/57%= 2.14 Watts needed on the converter input. Well at this point (with the extra current needed), the cell will sag further, lets say to 1.14V. 2.14W/1.14V= 1.88 Amps.

Now we have one light pulling 1.4 Amps and the other 1.9 Amps, just because of LED Vf variation.

It would take a few more iterations to arrive at the final number in the second case.

All this is just an example, with semi-real numbers, so you can learn a little.

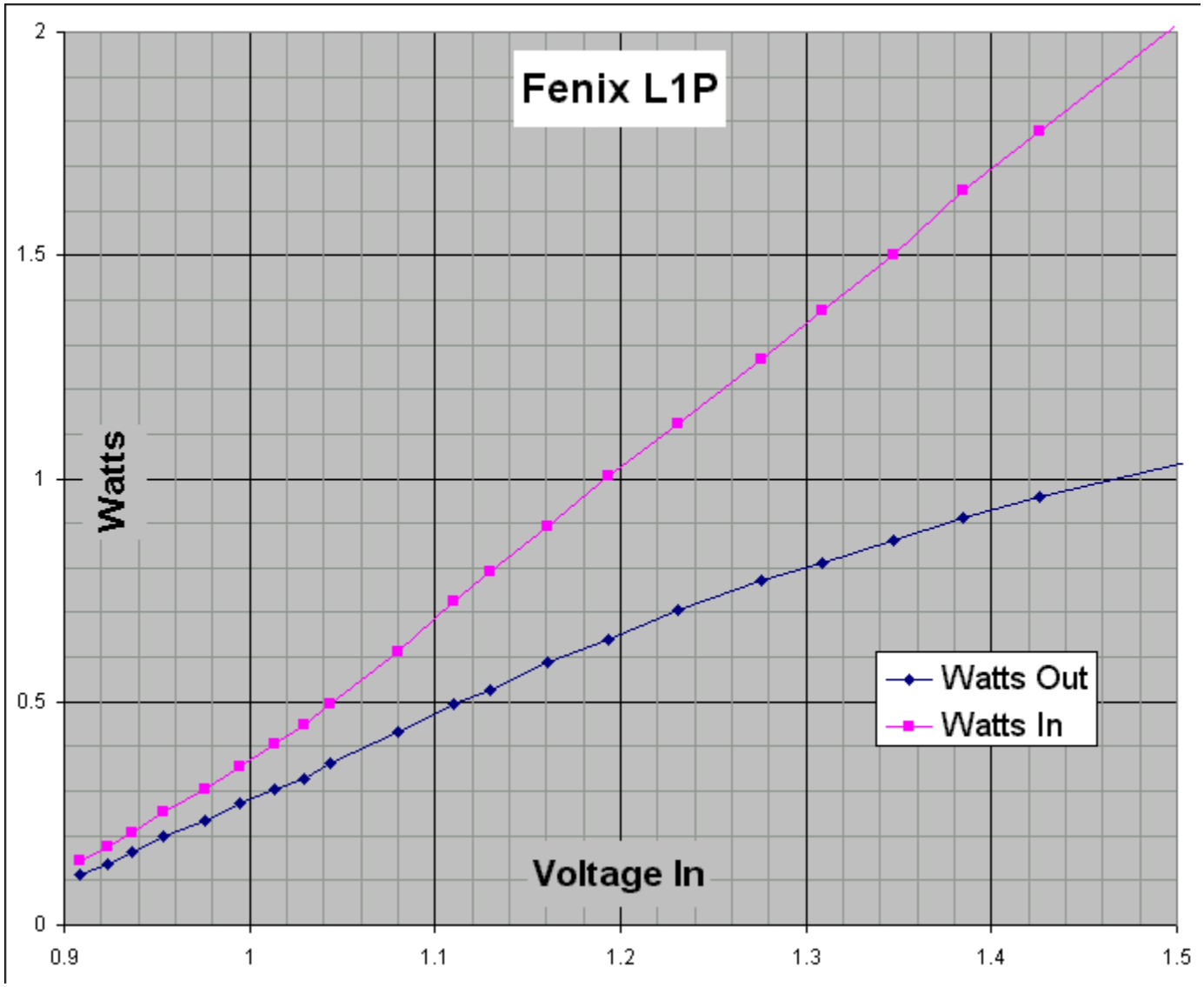
In the case where you had 0.1ohms (woefully high, imho) in line with the cell, to measure the current draw, if you were pulling 1.5A through it, you would have .15V of drop across that resistor alone. This would cause the converter to need to pull an additional 10% current out of the cell to convert the same power, which would cause both the battery voltage to drop, and additional drop across your sense resistor. The current goes up to 1.65A, and the drop across the resistor rises to

.165V, so the cell voltage drops a bit more, and the converter needs to pull more current, to keep the same input Watts. While all this is happening, the converter is rapidly getting less efficient, due to the high input currents caused by your 0.1 ohm current sense resistor. Why? I^2*R losses in the inductor and the MOSFET/transistor in the converter. That squared factor on the current is brutal.

0.1 ohms was fine three years ago, when folks were making converters for powering 5mm LEDs, and you were converting small amounts of power and using it to measure efficiency. Now, that 0.1 ohms is just too large. Using just the meter, in-line, is even worse, due to lead resistances and inductance and the meter's sense resistor. Personally, I'd seriously consider making measurements with smaller sense resistor values. You can use a smaller value on the input, for boost supplies (high current), and a larger value on the output (lower current), so you still have enough resolution for reading. You need to keep your wires thick, and rather short, or you will be seriously affecting your readings. Pomona test leads and clips really suck for this. Also make your voltage readings right on the board input and board output, so you don't include your wiring losses into your calculations. Many here use the readings off their power supplies, which might be okay for the current, but the voltage at the meter is not the voltage at the input to the converter- under load.

BTW, the L1P Fenix is not regulated, nor does it fully drive the Luxeon at the 350mA. It is also running wide open, which kills it's efficency.

A chart for you to consider, from the L1P:



I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Quote

12-17-2005, 03:07 PM #30

sniper
Flashaholic

Join Date: Jan 2005
Posts: 462

Re: EZ 15 min fenix two stage switch mod instructions

Wow! Neat mod! Will it work as well with the Fenix L2P?

_____
That old Black Maglight has me in its spell;
That old Black Maglight that shines so well...

Quote

12-17-2005, 03:36 PM #31

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **NewBie**
> *You might consider that there is a wide variation in LED forward voltages. You need to transfer power, which is V*I. So if one Luxeon 1W had a Vf of 3.048V and you were trying to drive it at 350mA, you would need 1.107 Watts of power.*
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>
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>
> *Now we have one light pulling 1.4 Amps and the other 1.9 Amps, just because of LED Vf variation.*

The efficiency of a step-up converter is mainly based on whether the frequency is high or low, is the quality of the inductor used good (current saturation and resistance characteristics), and whether or not you are current saturating the inductor. Your basis for efficiency calculations don't seem to explore these facts.

Last edited by MillerMods : 12-17-2005 at 03:40 PM.

Quote

12-17-2005, 07:55 PM #32

NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *The efficiency of a step-up converter is mainly based on whether the frequency is high or low, is the quality of the inductor used good (current saturation and resistance characteristics), and whether or not you are current saturating the inductor. Your basis for efficiency calculations don't seem to explore these facts.*

If you don't understand the losses due to the switching MOSFET resistances, I'm sorry, you missed the ballpark. Obviously inductors play a role, as well as the switching frequency. So does the resistance in the input/output path, as well as the ESR in the capacitors.

I was just exploring your problem with your very high value sense resistors- since that was the topic of discussion. That was mainly what was considered.

If your chosen switches (internal/external MOSFETs/transistors) have 0.26 ohms of resistance, most of your losses will occur here. Not in the inductor, and not due to frequency.

The losses due to frequency can be reduced by utilizing MOSFETs with low Qg, and drivers that are sufficiently fast enough to keep the on/off transistions fast. If you drive them too hard, your gate driver will burn up extra energy here. One of the tricks is to consider the Qg and on-resistance trade off, commonly called the **Figure of Merit** to folks in the industry, familar with power supply design. Excel can be very helpful here.

In this application, only a fool would run an inductor into magnetic saturation, as you are just burning up power for nothing. It is not just the saturation, nor just the DCR, but a combination of all this, and carefully considering the B-H curves on the inductor and the choice of ferrites/powdered iron cores, and keeping the area the loop travels over, as small as possible.

Then one can play the trade-off for ripple current in the inductor and the capacitors, as capacitors also have an ESR, or Equivalent Series Resistance, which is a contributing factor to the converter losses, as the energy goes into and out of the capacitor.

The ripple current can also increase losses in the battery itself, and in the load.

You can also further consider, heating in the MOSFETs, as this will cause their resistance to rise, as the die temperature rises. Keeping them cool will help keep this loss factor low.

Board layout can also cause a very considerable contribution to the losses.

Some of the basics for power supply design:
http://focus.ti.com/lit/ml/slup169/slup169.pdf

http://www.planetanalog.com/features/OEG20021211S0027 (although it covers the buck converter, with a little thought, you can apply alot of the principles to boost supplies)
http://www.smpstech.com/map.htm

Use the search function, sometime, and learn a lot, all this has been discussed alot, before. We are not covering anything new here.

_____
I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Last edited by NewBie : 12-17-2005 at 08:09 PM.

Quote

12-17-2005, 08:28 PM #33

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

I see you know your stuff, but notice I said "mainly", not "only". Everything you are saying seems correct to an extent. Low frequency however will make for more efficient switchers but causes need for larger components (i.e. cap. and inductor). Any data sheet for a switcher that has selectable switching speeds will reveal that frequency plays a key role in efficiency. The reason is, is because you reduce to number of times you have a conversion loss and therefore it's more efficient. And yes some power is lost through the mosfet, but given the right choice of mosfet, the RDS can be as low as 20 milliohms with as little as 4 volts drive. The mosfet in the switcher I designed doesn't seem to dissipate much of any heat, maybe slightly warm. I realize the driver for the mosfet has to be up to the task, but if all things were equal the 3 things I mentioned are definite. Everything can cause a loss of power including the temperature, but the list of things I mentioned are some major ones. With all of the variables involved, and I say we are both correct, I just go by power in to power out ratio to determine the efficiency. I should also thank you, because some of the links you listed are very interesting. I like learning new things and I have learned some things from you.

Last edited by MillerMods : 12-18-2005 at 12:22 AM.

Quote

12-18-2005, 03:47 AM #34

NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *I see you know your stuff, but notice I said "mainly", not "only". Everything you are saying seems correct to an extent. Low frequency however will make for more efficient switchers but causes need for larger components (i.e. cap. and inductor). Any data sheet for a switcher that has selectable switching speeds will reveal that frequency plays a key role in efficiency. The reason is, is because you reduce to number of times you have a conversion loss and therefore it's more efficient. And yes some power is lost through the mosfet, but given the right choice of mosfet, the RDS can be as low as 20 milliohms with as little as 4 volts drive. The mosfet in the switcher I designed doesn't seem to dissipate much of any heat, maybe slightly warm. I realize the driver for the mosfet has to be up to the task, but if all things were equal the 3 things I mentioned are definite. Everything can cause a loss of power including the temperature, but the list of things I mentioned are some major ones. With all of the variables involved, and I say we are both correct, I just go by power in to power out ratio to determine the efficiency. I should also thank you, because some of the links you listed are very interesting. I like learning new things and I have learned some things from you.*

Good deal. Together we can do much more than what an individual can accomplish.

When designing a switcher, there are a whole variety of factors, which can cause power losses. Carefully considering each piece, and reducing the losses, of that piece, and repeating this for other pieces of the equation, makes the other remaining pieces each become a larger part of the pie. Then you have other realities, such as folks wanting the whole circuit to fit on a dime. It is much like a juggling act. A person can go after the MOSFET RdsOn, and make that absolutely as low as possible, but the trade-off is much greater total gate charge (Qgtot). This is something you have to drive, which consumes power. If you go too far, in reducing the RdsOn, you can end up with a larger problem in the Qgtot, which can either mean you use a weak driver, and burn up power during the transition time, or you drive it hard, and burn up power in the gate driver.

Additionally, the body diode of the MOSFET may store very considerable charge, or very little, depending on the choice of MOSFET. Also the forward voltage of the MOSFET's diode can be high, which causes additional stored charge. And the diode can be slow, taking a long time to sweep the charge out of it. This is an often overlooked when choosing a MOSFET. Taking

this into consideration will help. You can minimize this effect with a schottky diode across the MOSFET, which turns on before the body diode, and has very little stored charge. This prevents the MOSFET body diode from impacting things. If you look around, you will find that there are MOSFETs with integrated schottky diodes. The schottky in parallel across the MOSFET can typically buy you another 1-5% efficiency in a synchronous switcher, being a little higher when it is internal to the MOSFET, as it reduces the parasitics in the path.

Anyhow, time to hit the sack, ttyl.

_____
I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Last edited by NewBie : 12-18-2005 at 12:29 PM.

Quote

12-18-2005, 05:37 PM #35

JonSidneyB

CPF Supporting Dealer

Join Date: Jun 2001
Location: Greenfield In
Posts: 5,859

Re: EZ 15 min fenix two stage switch mod instructions

Jarhead/Newbie might be our most knowledgable electronics person on CPF.

_____
J.S. Burly's | www.JSBurlys.com

Last edited by JonSidneyB : 12-18-2005 at 06:17 PM.

Quote

12-18-2005, 09:50 PM #36

jdriller
Flashaholic*

Join Date: Feb 2003
Location: New York
Posts: 1,330

Re: EZ 15 min fenix two stage switch mod instructions

Yeah, umm.... right, one MOSFET RdsOn, two schottky diodes and a Qgtot synchronous switcher that reduces the parasitics in a pear tree!!! Right on board with you guys.....(oh boy, feeling very stoooopid now)

I'm glad it is dark, half of the time.

Quote

12-18-2005, 10:48 PM #37

NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **jdriller**
> *Yeah, umm.... right, one MOSFET RdsOn, two schottky diodes and a Qgtot synchronous switcher that reduces the parasitics in a pear tree!!! Right on board with you guys.....(oh boy, feeling very stoooopid now)*

ROTGLMAO!!!

I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Last edited by NewBie : 12-27-2005 at 09:29 AM.

Quote

12-24-2005, 06:41 AM #38

Wong
Flashaholic*

Join Date: Oct 2004
Location: Singapore
Posts: 768

Re: EZ 15 min fenix two stage switch mod instructions

Thanks for the mod instructions :):

Success to mod my L1P with .5watt 5ohm resistor

MERRY CHRISTMAS & HAPPY NEW YEAR
TO ALL

Cheers
Wong

Last edited by Wong : 12-24-2005 at 04:00 PM.

Quote

12-25-2005, 12:22 PM #39

CY
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

Wong, thanks for bringing this thread back on topic!

This is suppose to be an EZ 15 min fenix two stage switch mod instructions

and yes you can use two 10 ohm resisters, one on each side to make 5ohms. only real reason to use two 10ohm VS single 5 ohm is availability. rat shak only stocks 10ohm version for a $1 package.

_____
no matter where you go
there you are

Last edited by cy : 12-26-2005 at 10:22 AM.

Quote

12-28-2005, 02:07 AM #40

kenster
Flashaholic

Join Date: Nov 2005
Location: San Antonio, Texas
Posts: 409

Re: EZ 15 min fenix two stage switch mod instructions

Hello Cy,

This is great addition to Fenix having 2 stage and realy easy to do. Myself I like to click light on and off. I have not seen if anyone else has done this yet but my second light became a 2 stage with click on/off twist high/low. It took me quite a while to dig through stuff to figure what might be usuable to make it but finally made it work. The switch is more how I like it staying with click on/off. A small twist to choose between high and low. I will play with it tomorrow to see if making it momentary also looks like something that can be added hopefully easier than what I just did. Thank you for posting this mod because it got me started on a fun project. It looks mighty dark outside so it is time to take Fenix out to play.

Quote

12-28-2005, 05:55 PM #41

korpx
Enlightened

Join Date: Jun 2004
Location: sweden
Posts: 83

Re: EZ 15 min fenix two stage switch mod instructions

I've modded 4 lights with a single 4,7 Ohm resistor. I've found that to be perfect for me. Not able to provide any runtime stats though I'm afraid, but it seems to last a long time without sacrificing too much light.

Last edited by korpx : 12-28-2005 at 06:18 PM. Reason: spelling errors

Quote

12-28-2005, 06:03 PM #42

greenLED
Flashaholic

Join Date: Mar 2004
Location: getting there
Posts: 8,995

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **cy**
> *This is suppose to be an EZ 15 min fenix two stage switch mod instructions*

I wish I could speak EE. You guys are good!

Gimme the parts and tell me who goes with what (preferrably with pics)... anything beyond that...

CPF Specials thread ** **FS: Glow in the dark o-rings** ** Free modding services

Quote

01-01-2006, 01:43 AM #43

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **kenster**
> *Hello Cy,*
>
> *This is great addition to Fenix having 2 stage and realy easy to do. Myself I like to click light on and off. I have not seen if anyone else has done this yet but my second light became a 2 stage with click on/off twist high/low. It took me quite a while to dig through stuff to figure what might be usuable to make it but finally made it work. The switch is more how I like it staying with click on/off. A small twist to choose between high and low. I will play with it tomorrow to see if making it momentary also looks like something that can be added hopefully easier than what I just did. Thank you for posting this mod because it got me started on a fun project. It looks mighty dark outside so it is time to take Fenix out to play.*
>
> 

Soooo Kenster,

Are you going to let the rest of us know how you made your version? I'd really like to know since I'd prefer the click on/off to the twist and would like to have high/low twist instead of high/low click.

If you have pics, that would be great as well along with a description.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

01-01-2006, 09:43 AM #44

cy
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

kenster, there are several production lights with two stage clickies. a common one is the most excellent $15 headlamp by river rock at target.

was going to transplant two stage clicky to put in fenix, but target is out of stock and I've been using that headlamp as my main headlamp worklight.

_____
no matter where you go
there you are

Quote

01-01-2006, 01:34 PM #45

milkyspit
Flashaholic*

Join Date: Sep 2002
Location: New Jersey
Posts: 2,925

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **cy**
> *to calculate aprox runtime. measure current draw at cell with a reliable meter. then divide that into mah rating of cell. note most cell's rating are not accurate.*
>
> *for example most R123 li-ion cells claim anything from 550 mah to 750 mah. so best anyone has actually measured is aprox. 625 mah from a R123 cell. (note these figure may be out of date)*

Cy, I've got a slight modification to your calculation... been using it for a couple years and it seems to work fairly well... not sure if it'll work with R123 cells, but with pretty much any primary cell (meaning the non-rechargeable kind), I take 70% of

the cell's rated capacity and divide by the current flow I measure using the 10A scale on my DMM. A couple notes on the rationale, then an example...

NOTES

1. The 70% takes into account that most cells won't be able to deliver the necessary current flow as they approach the end of their life, so light output will pretty much tank. I don't consider that part of the "real" runtime of the light, but rather the light's "afterglow," which is pretty important in emergencies but NOT what you generally grabbed that light to provide!

2. I'm very fortunate to own a Fluke 189 DMM (Digital MultiMeter), which has the advantage of FOUR digits after the decimal point... this means that even in the 10A range, the highest available for this meter, I still get readings right down to the mA... for instance, right now the Fenix by my side is measuring "0.7751" (meaning 775.1mA) in the 10A scale. Many DMMs only read to two decimal places in the 10A scale, so the same reading would appear as "0.78". For low beams this might not give such great accuracy... is that "0.03" reading 39mA, 35mA, 30mA, 28mA? No way to tell. Anyway, the point is this: use the HIGHEST amperage range available on your DMM to get the most accurate result, UNLESS that range doesn't give you enough of a readout (as above) to be useful! Every meter will introduce a certain amount of error in the current flow measurement, but the higher the range you use, the less error you'll get.

EXAMPLE

Using my Fenix with the 775.1mA reading shown above, here's how the calculation would work...

1. AA lithium cells are rated at 3000mAh capacity.
2. 70% of this rating is 3000x0.7 = 2100.
3. 2100/775.1 is roughly 2.7.
4. This suggests my Fenix will give me ***about 2.7 hours*** of runtime.

Anyway, no intent to steal your thunder, cy! This is a TERRIFIC thread and I'm going to use your instructions to do my first Fenix switch mod. Just wanted to offer my two cents on the runtime issue. Many thanks!

Thanks to cy, I just finished my first Fenix L1P tailswitch mod. Also need to credit MSaxatilus for first showing me the mod and getting me excited about undertaking it in the first place. Thanks guys! 

I used a pair of 10 ohm surface mount resistors on the SPRING side of the board... if you keep them as close to center as possible, the threaded ring won't interfere at all once retightened... the resistors themselves will be under the O-ring at the center. All told, I get 5 ohms for low beam, which IMHO is pretty much perfect... great diversity from high to low beam, but still bright enough to be useful even when the battery's toward the end of

its lifespan (and therefore dimmer). Yippee!

Also applied just a bit of Loktite to keep the threaded ring from loosening, a problem I've had with the Fenix in the past.

_____
--Scott


Milkyspit: Be Very Afraid.

MC2 order NOW!

9/06 Campout?

For Sale or Trade.

Old Threads Index.

Last edited by milkyspit : 01-01-2006 at 04:19 PM.

Edit Quote

01-01-2006, 06:01 PM #46

CY
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

milky... coooool...

general rule of thumb of figuring out which resister to use in two stage mods, seems to be:

for five watt luxeon use aprox. 30 ohms with 2x CR123 or single li-ion.

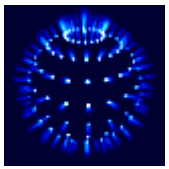
for one watt or 3watt using CR123 or single li-ion use aprox. 10 ohms.

for one watt or 3watt using single AA use aprox 5 ohms

_____
no matter where you go
there you are

Quote

01-04-2006, 07:43 PM #47



srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Kenster,

Please check your PM.

Thanks!

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

01-04-2006, 09:41 PM #48

CroMAGnet
Flashaholic*

Join Date: Sep 2004
Location: Los Gatos, CA
Posts: 2,780

Re: EZ 15 min fenix two stage switch mod instructions

So where is a good place to find a 5ohm or 2.5 ohm resistor?

I'm also interested in the double clicky and will be taking apart my RR headlamp if we dont get any fw'p posts on this mod

.

Tiger11 & 74|ArcAAA-CPF|Lambda TurboLight MiniPro MicroPill|S2K LUX3 Solitaire|Aleph NG1000-A1 A2 A3 A19-5w|McLuxTK

CTT|Jil.DD|Q3R|RAW U |CR2 Ion|EliteMax CPF|NEOCA Wood|Orange Minitrios|Key-Lux N|My Collection|Shasta-Ion
Costco 35w HiD|Commando II|McFlood mmmMag|Mag2C-1499| USL|inbound, AWR's NANO still waiting for a WORKING model...

LINK to the DRACO Interest THREAD and interest list POST 6 for the SMALLEST/BRIGHTEST limited production light in its class.

Quote

01-04-2006, 10:04 PM #49

srvctec
Flashaholic

Join Date: Feb 2005
Location: Central Kansas, USA
Posts: 446

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **CromagNet**
> *So where is a good place to find a 5ohm or 2.5 ohm resistor?*
>
> *I'm also interested in the double clicky and will be taking apart my RR headlamp if we dont get any fw'p posts on this mod*
>
> .

I got my 10 ohm resistors at Radio Shack and just used 2 of them accross the switch for a total of 5 ohms. You may also be able to get some 5 ohm there as well, but I didn't notice if they had them or not.

I've pmed Kenster about his version of this mod 3 days ago, but have not heard back from him- he may not be following this thread.

Kurt B **Click here to view or purchase my photos** Fenix L1P real world beamshots
******IF GUNS CAUSE CRIME THEN MATCHES CAUSE ARSON****** Inside the Fenix L1P switch

Quote

01-04-2006, 10:05 PM #50

cy
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

most any electronic supply house should have common 1/4 watt resisters.

smallest rat shak carries is 10 ohm for $1 a package. simpler to use two to make 5ohms

_____
no matter where you go
there you are

Quote

01-05-2006, 12:11 AM #51

CroMAGnet
Flashaholic*

Join Date: Sep 2004
Location: Los Gatos, CA
Posts: 2,780

Re: EZ 15 min fenix two stage switch mod instructions

I think I will like the 1/4 watt. Do you think Fry's would carry those resistors?

_____
Tiger11 & 74|ArcAAA-CPF|Lambda TurboLight MiniPro MicroPill|S2K LUX3 Solitaire|Aleph NG1000-A1 A2 A3 A19-5w|McLuxTK CTT|Jil.DD|Q3R|RAW U |CR2 Ion|EliteMax CPF|NEOCA Wood|Orange Minitrios|Key-Lux N|My Collection|Shasta-Ion Costco 35w HiD|Commando II|McFlood mmmMag|Mag2C-1499| USL|inbound, AWR's NANO still waiting for a WORKING model...

LINK to the DRACO Interest THREAD and interest list POST 6 for the SMALLEST/BRIGHTEST limited production light in its class.

Quote

01-13-2006, 11:54 AM #52

Tremendo
Flashaholic

Join Date: Dec 2005
Location: Kingwood, TX
Posts: 171

Re: EZ 15 min fenix two stage switch mod instructions

.99 for a 5 pack of 10ohm 1/4 watt resistors at Rat Shack. I was a little scared to mess up my new light, but this was easy

and painless.

Yesterday it took me about 5 minutes to push a resisitor under each side of the switch assembly, no soldering for now until I decide if it stays. Very easy, very quick, and the 10 ohm I think is perfect. Way low for outside at night, but perfect for inside a house in a pitch dark room. Also, looks like it's just enough light to read to.

On a side note, I almost have the momentary on switch I wanted for my Fenix. If I leave it on high and rotate the tail just enough to get it off, the switch works pretty well as a momentary on, but sometimes with some flickering.

Quote

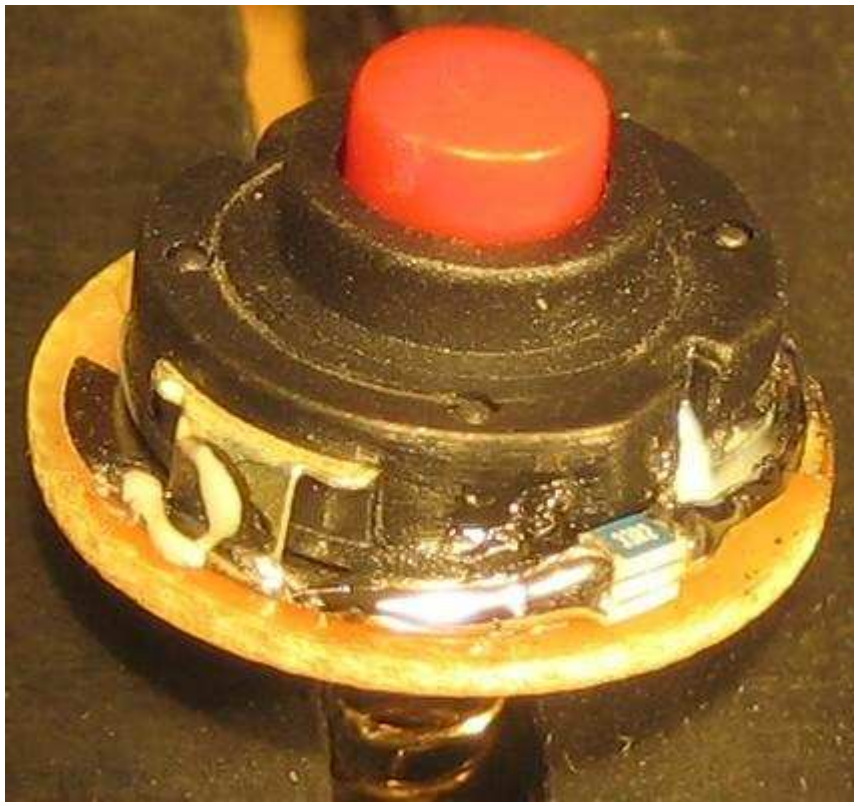
01-18-2006, 01:33 PM #53

PrebKlok
Flashaholic

Join Date: May 2004
Location: Denmark
Posts: 153

Re: EZ 15 min fenix two stage switch mod instructions

Here is my version, 3 SMD resistors...



Quote

01-18-2006, 06:40 PM #54

Lunal_Tic
Flashaholic*

Join Date: Jul 2004
Location: The Wilds of Tokyo
Posts: 2,528

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **CroMAGnet**
> *I think I will like the 1/4 watt. Do you think Fry's would carry those resistors?*

I picked up 10ohm 1/4watt resistors there but I don't know if they stock the same stuff nationwide.

-LT

_____
lunal tic (n)
a distinctive behavioral trait or quirk directly related to or caused by light [15th cent. Latin lunaris. Ultimately from an IE word meaning "light,"] and [Early 19th cent. Italian ticchio.] see also: moon quirk

Quote

01-19-2006, 12:02 PM #55

Vikas Sontakke
Flashaholic

Join Date: May 2002
Posts: 324

Re: EZ 15 min fenix two stage switch mod instructions

I have unmodified Fenix L1. I remove the tail cap and then switch the tail cap on. As I put back the tail cap, light will go on and off many times while I am turning the cap. Only on the last quarter turn travel, it will positively remain OFF until it goes ON. But it I leave it there (i.e. not fully tightened in by that quarter turn) slight push to the entire tail-cap will bring the light on.

What is causing the circuit to be completed as I am turning the switch? With the two stage mod, doesn't your light jumps back between low and off while you are puting on the tail cap? Aren't you worried that you could accidentally drain the battery if it gets stuck in the low mode?

Or do I have a flakey switch with my Fenix?

- Vikas

Quote

01-19-2006, 12:30 PM #56

cy
Flashaholic

Join Date: Dec 2003
Location: USA
Posts: 7,837

Re: EZ 15 min fenix two stage switch mod instructions

with two stage mod, clicky no longer functions as an on/off switch. that turns into hi/low.

light becomes a twisty for on/off operation

most LED lights with clickies can be modded into two stage lights using simular techniques.

spring on some lights may need to be removed with a non-compression fitting added

_____
no matter where you go
there you are

Quote

01-19-2006, 12:41 PM #57

Tremendo
Flashaholic

Join Date: Dec 2005
Location: Kingwood, TX
Posts: 171

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **Vikas Sontakke**
> *Aren't you worried that you could accidentally drain the battery if it gets stuck in the low mode?*

I need to make sure I un-screw it enough (only 1/4 - 1/2 turn), or the light my stay on un-noticeably. However, once I get beyond the 1/2 turn, there's never a flash back on.

_____
Surefire: U2, E2D, G2(P61), G2, G2 with G&P 3w; DSpeck FireFly 3 (my EDC), JetBeam CR123, Fenix L2T, L1P, 1.7w MillerMods L1P; Golston 7w; Streamlight PP 4AA LED; Brinkmann Maxfire LX; Dorcy Metal Gear; Sam's Cyclops x 4; RR 2xAA 1.5w; RR 2xAAA .5w; 12 LED UV; 8 LED; MANY Fauxtons; etc...

Quote

01-20-2006, 05:32 PM #58

wwglen
Flashaholic*

Join Date: May 2003
Location: NC
Posts: 541

Re: EZ 15 min fenix two stage switch mod instructions

Vikas,

You probably have a little bit of one of the RESISTOR leads extending past the circuit board.

This could cause the lead to short out to the body of the flashlight.

wwglen

Quote

02-08-2006, 12:27 AM #59

NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *I see you know your stuff, but notice I said "mainly", not "only". Everything you are saying seems correct to an extent. Low frequency however will make for more efficient switchers but causes need for larger components (i.e. cap. and inductor). Any data sheet for a switcher that has selectable switching speeds will reveal that frequency plays a key role in efficiency. The reason is, is because you reduce to number of times you have a conversion loss and therefore it's more efficient. And yes some power is lost through the mosfet, but given the right choice of mosfet, the RDS can be as low as 20 milliohms with as little as 4 volts drive. The mosfet in the switcher I designed doesn't seem to dissipate much of any heat, maybe slightly warm. I realize the driver for the mosfet has to be up to the task, but if all things were equal the 3 things I mentioned are definite. Everything can cause a loss of power including the temperature, but the list of things I mentioned are some major ones. With all of the variables involved, and I say we are both correct, I just go by power in to power out ratio to determine the efficiency. I should also thank you, because some of the links you listed are very interesting. I like learning new things and I have learned some things from you.*

Care to offer up the details on your new super-efficient circuit you were talking about? It looks like you have started building them. Efficiency at 1.7W off a NiMH AA would be a good place to start. A chart would be even better.

_____
I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Quote

02-08-2006, 12:48 AM #60

Tremendo
Flashaholic

Join Date: Dec 2005
Location: Kingwood, TX
Posts: 171

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **NewBie**
> *Care to offer up the details on your new super-efficient circuit you were talking about? It looks like you have started building them. Efficiency at 1.7W off a NiMH AA would be a good place to start. A chart would be even better.*

I got 2 of 'em and only know of 3 that got done for the L1P. MillerMods 1.7watt L1P mods. They are bright, seems 70-100% brighter than stock L1P (with Lithium or NiMh), and has a bigger hot spot. One has become my EDC (with 2 stage mod). Battery has held up well so far (1 has a Lithium, my EDC I'm using has a 2500 mAh NiMh). Apparently it is very efficient, look for a detailed review in the next day or so (better than my cheesy review with bad photos).

I think Eric (MillerMods) has been focusing on the L0P mod, which seems to have drawn more interest.

_____
Surefire: U2, E2D, G2(P61), G2, G2 with G&P 3w; DSpeck FireFly 3 (my EDC), JetBeam CR123, Fenix L2T, L1P, 1.7w MillerMods L1P; Golston 7w; Streamlight PP 4AA LED; Brinkmann Maxfire LX; Dorcy Metal Gear; Sam's Cyclops x 4; RR 2xAA 1.5w; RR 2xAAA .5w; 12 LED UV; 8 LED; MANY Fauxtons; etc...

Quote

02-28-2006, 09:57 AM #61

NewBie
Flashaholic*

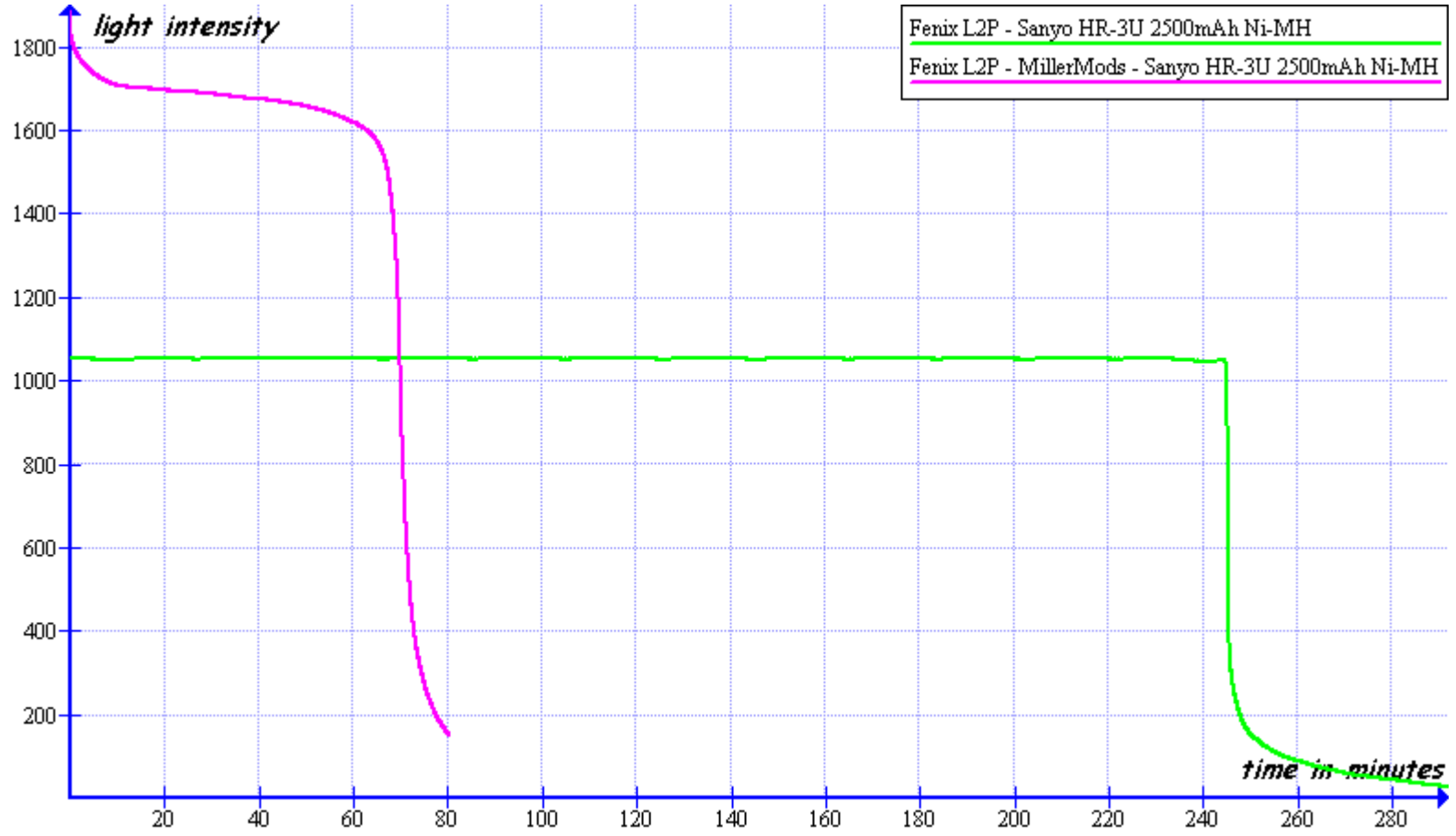
Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 3,858

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **MillerMods**
> *The efficiency of a step-up converter is mainly based on whether the frequency is high or low, is the quality of the inductor used good (current saturation and resistance characteristics), and whether or not you are current saturating the inductor. Your basis for efficiency calculations don't seem to explore these facts.*

Okay, here is the L2P plot, and I'm looking at things and noticing there is a large reduction of the area under the curve. Alot of the battery power is being wasted it appears. I could understand slightly less area under the curve due to higher losses in cell and LED, but not such a large reduction in area. Yes, it is a little brighter. Do you have any improvements planned soon?



I exist, therefor I am!
a.k.a. Jarhead

DC Stats

Quote

02-28-2006, 10:43 AM #62

wasBlinded
Flashaholic*

Join Date: Dec 2004
Location: Oklahoma
Posts: 919

Re: EZ 15 min fenix two stage switch mod instructions

Don't forget the LED efficiency will be lower when driven harder, which affects the area under those curves. A current vs time plot would be a little more informative if circuit efficiency is the issue.

Quote

02-28-2006, 01:15 PM #63

MillerMods
Flashaholic*

Join Date: Mar 2005
Location: Cincinnati, Ohio
Posts: 835

Re: EZ 15 min fenix two stage switch mod instructions

Quote:

> Originally Posted by **NewBie**
> *Okay, here is the L2P plot, and I'm looking at things and noticing there is a large reduction of the area under the curve. Alot of the battery power is being wasted it appears. I could understand slightly less area under the curve due to higher losses in cell and LED, but not such a large reduction in area. Yes, it is a little brighter. Do you have any improvements planned soon?*

I know with out a doubt, that the switcher I'm using is at least 75% efficent at that drive level; I've measured it many times with different equipment (e.g. Fluke, and a Tektronix O'scope). If you're looking for something more efficent you'll have to look elsewhere.

_____

My Fenix mods (3-stage 1.5W L0P, 1.7W L1P, and 3W L2P) are available for purchase at 4seven's webstore, fenix-store.com

How's it going?....It keeps going no matter what. Smile

Quote

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