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The McGizmo A19/GD825 digging in

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11-11-2006, 08:56 PM

#1



NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

The McGizmo A19/GD825 digging in

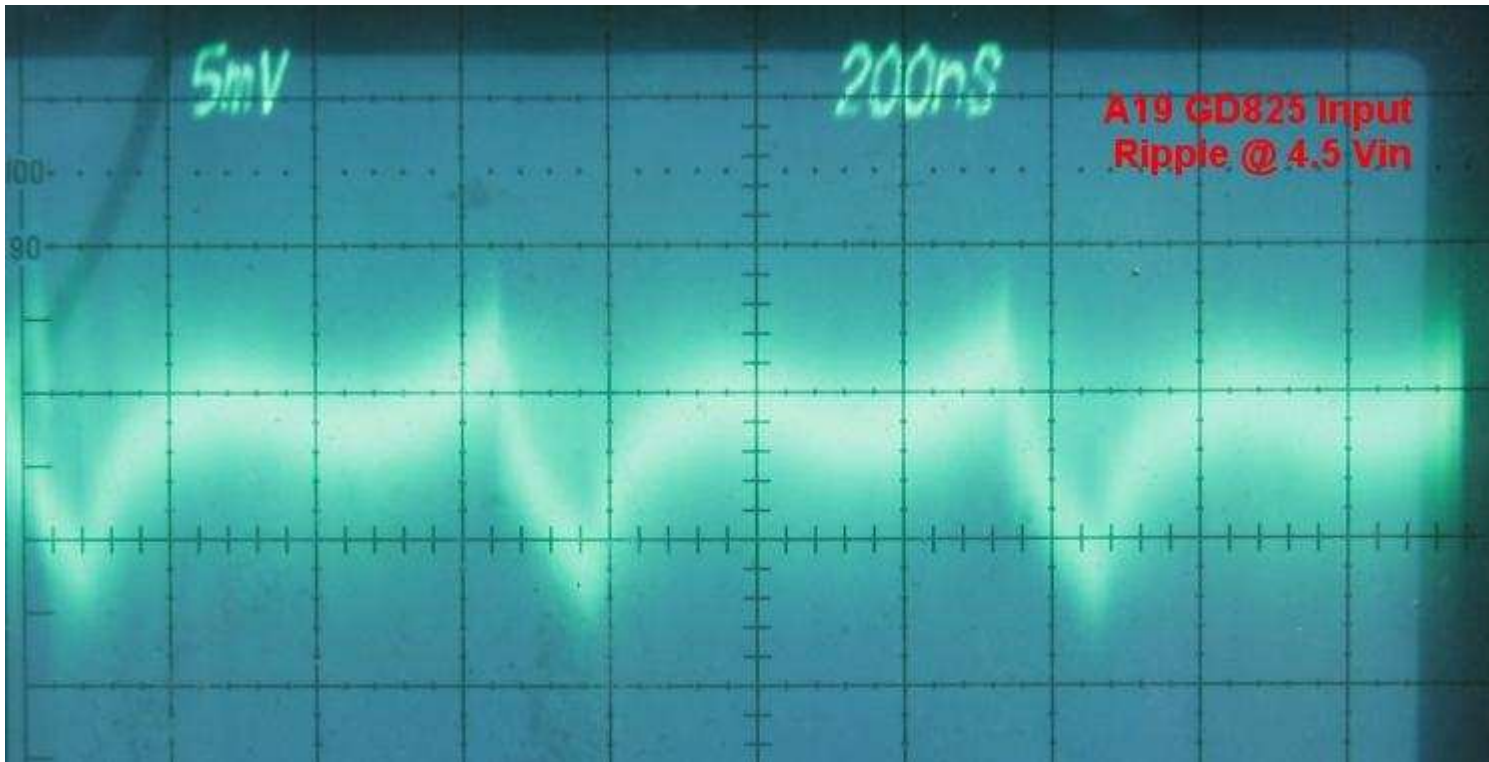
Okay, I've been lagging on digging into the A19 flashlight, with the GD825.

So, looking at some of the more technical aspects, how does it look?

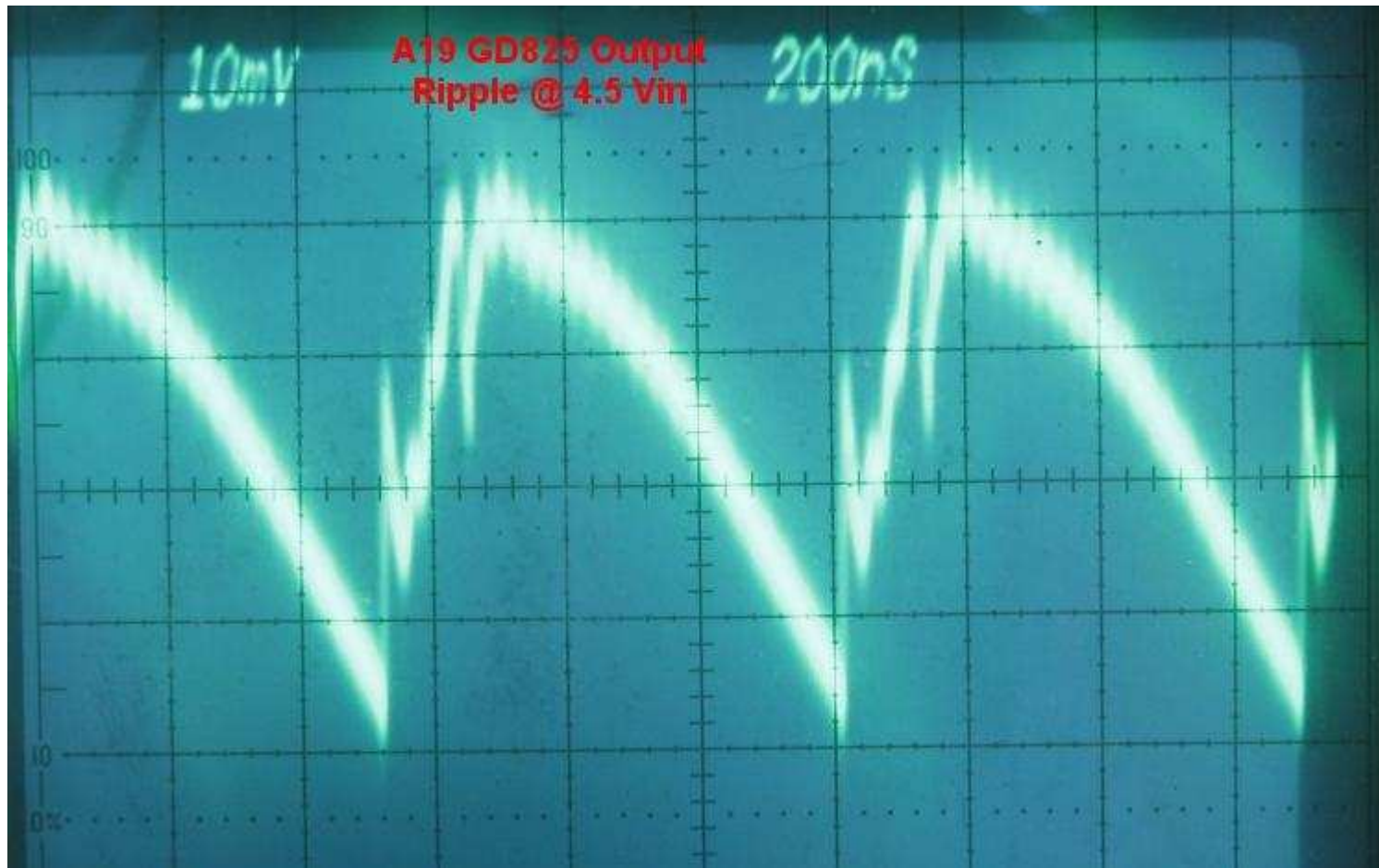
One item, that reduces efficiencies in cells and LEDs is ripple. So, I ran some wires into the light, to provide a kelvin connection for efficiency testing, and though, hey, lets look at the ripple first. One of the common things that is missing

from many converters, which robs some of your efficiency, is adequate capacitors. Decent capacitors will reduce the ripple both in the cells, and the LEDs. All tests were run with the GD825 converter, still in the flashlight, for thermal reasons. So how does it look?

Input ripple at 4.5 Volts input is an exceedingly low, 0.01V (10mV) :

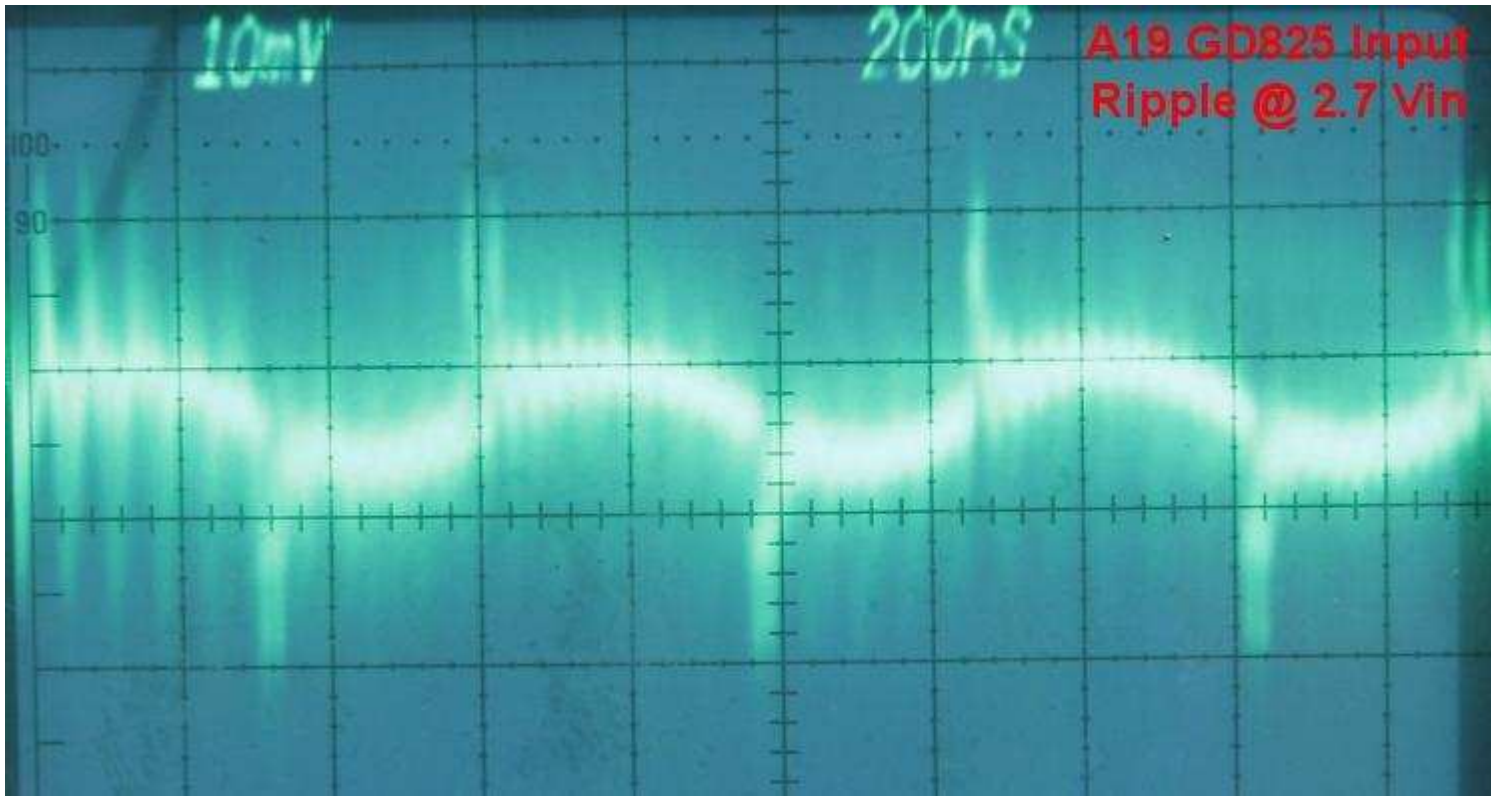


Output ripple at 4.5 Volts input is below, 0.05V (50mV) which is very good:

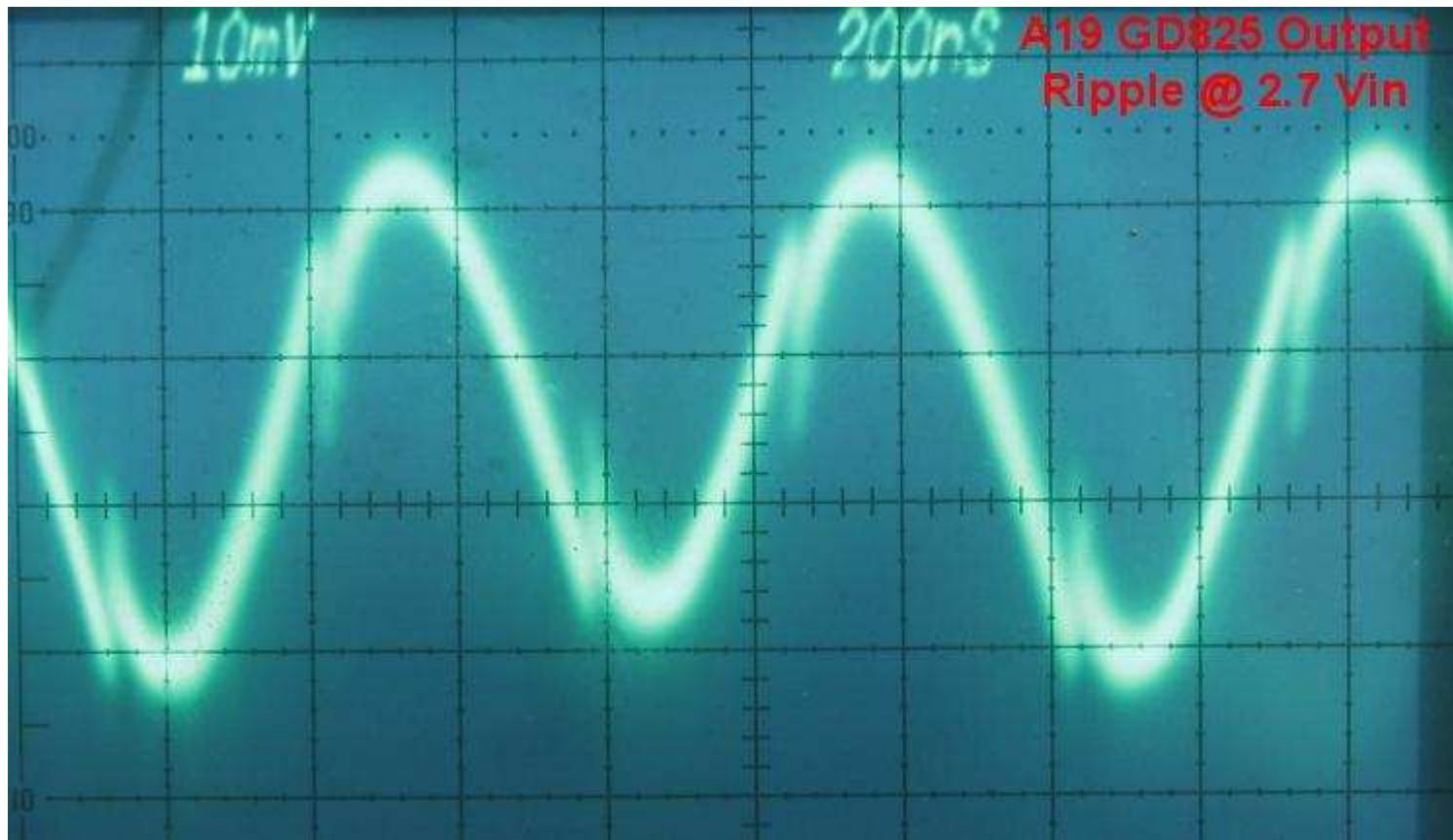


Since the A19 with the GD825 is a buck-boost, I also supplied it with 2.7 Volts in.

Input ripple at 2.7 Volts input is an exceedingly low, 0.01V (10mV), with a little bit of higher frequency switching noise that is still below 0.03V (30mV). In the world of typical flashlights, this is very low:



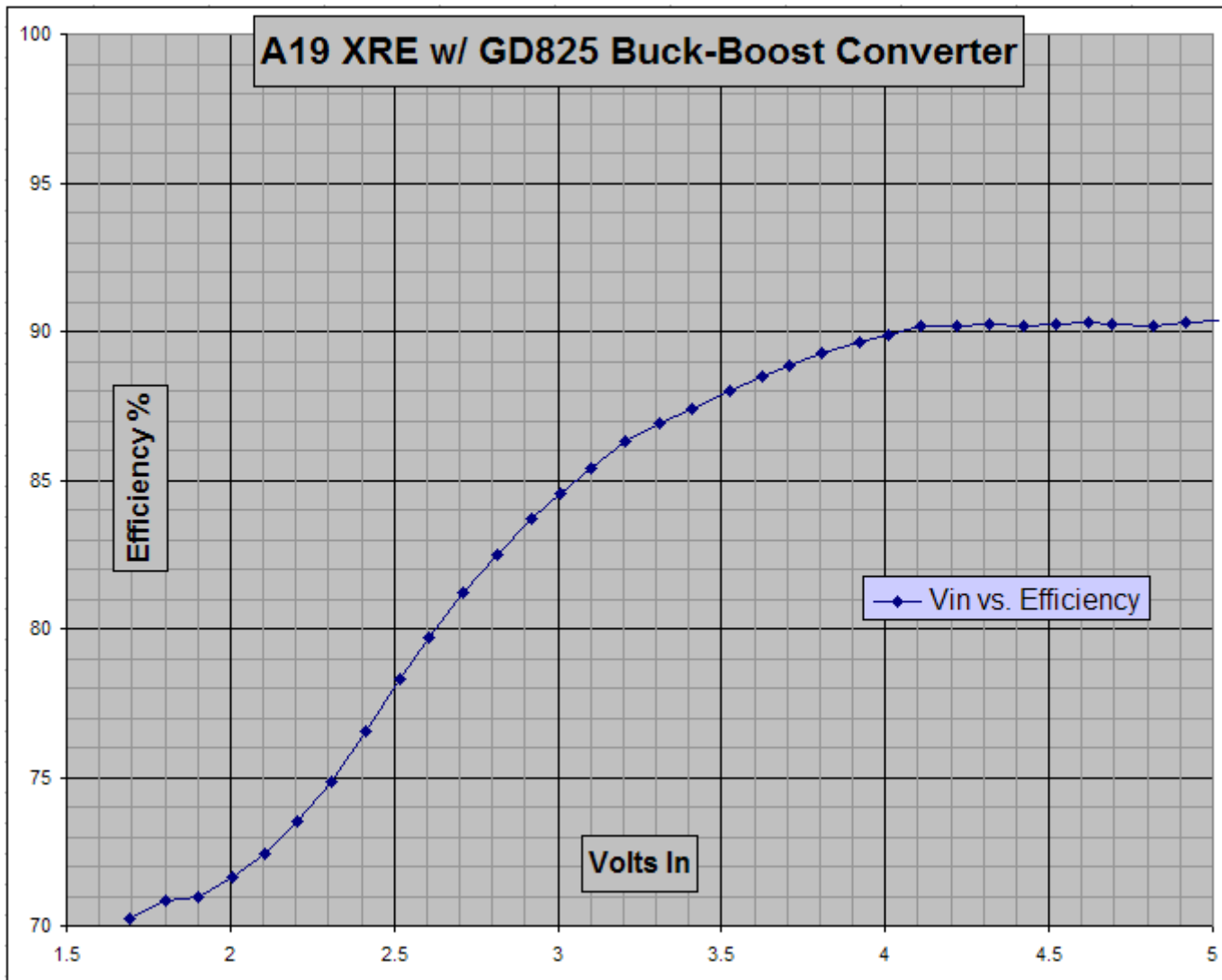
Output ripple at 2.7 Volts input is also very low, below 0.035V (35mV). In the world of typical flashlights, this is is great:



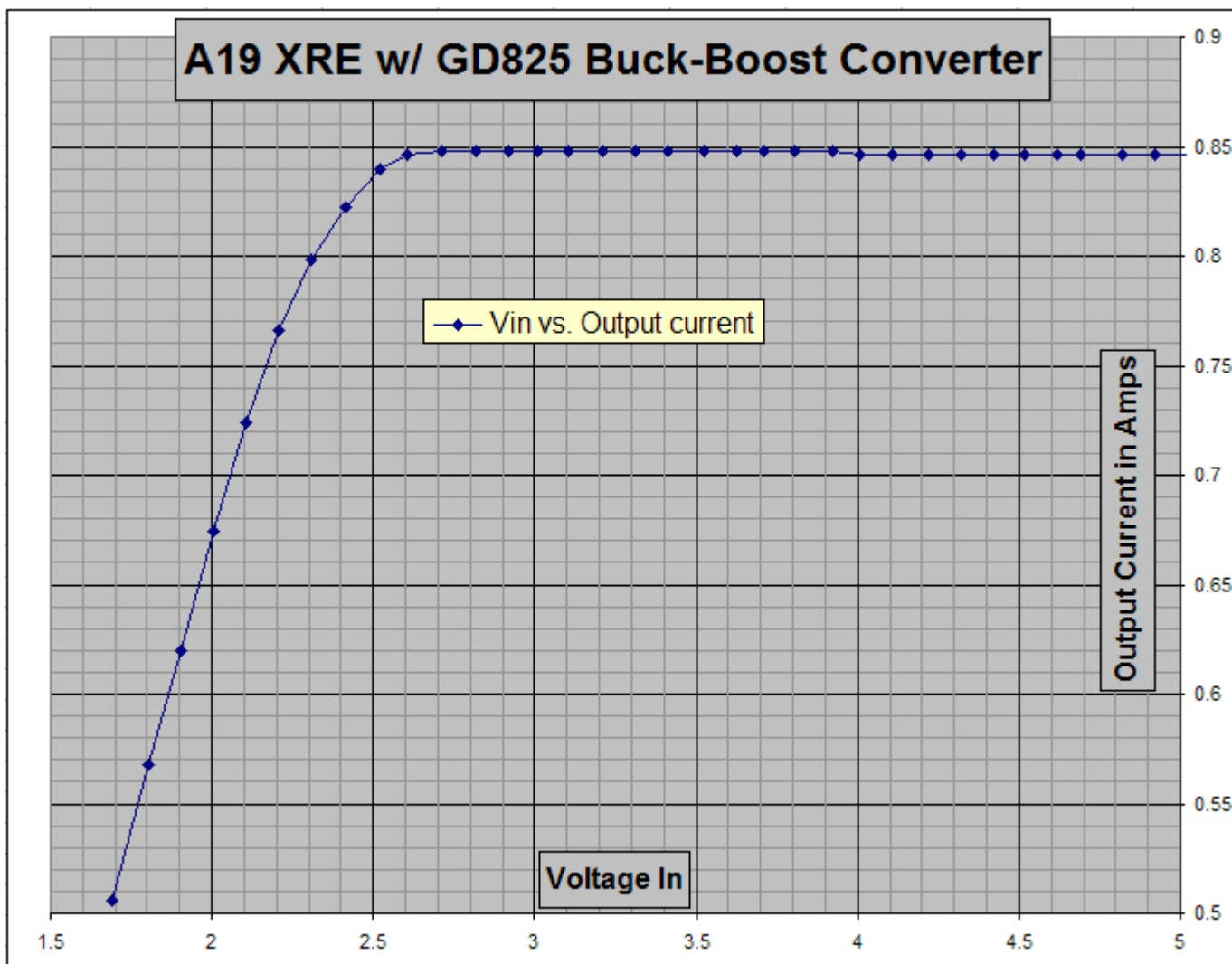
Obviously, the switchers operating frequency is 1.4MHz.

Next are efficiency measurements, where the current values were taken with very low value sense resistors inserted inline with the input and output of the converter. Kelvin connections were used for the sense resistors, and Kelvin connections were made to the converter itself, for voltage measurements. This reduces the large error which results from other methods.

The efficiency vs. input voltage:



Output current vs. input voltage:

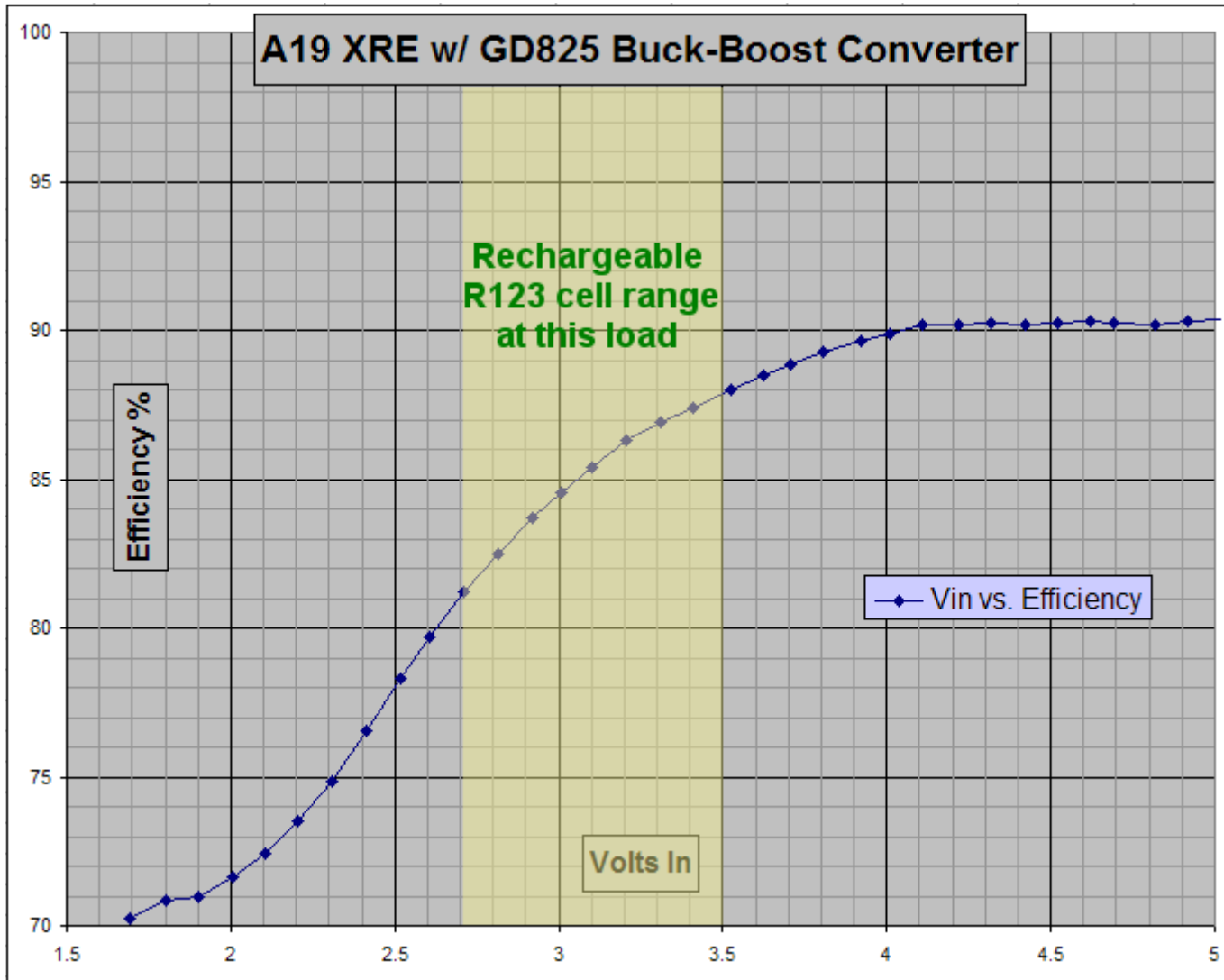


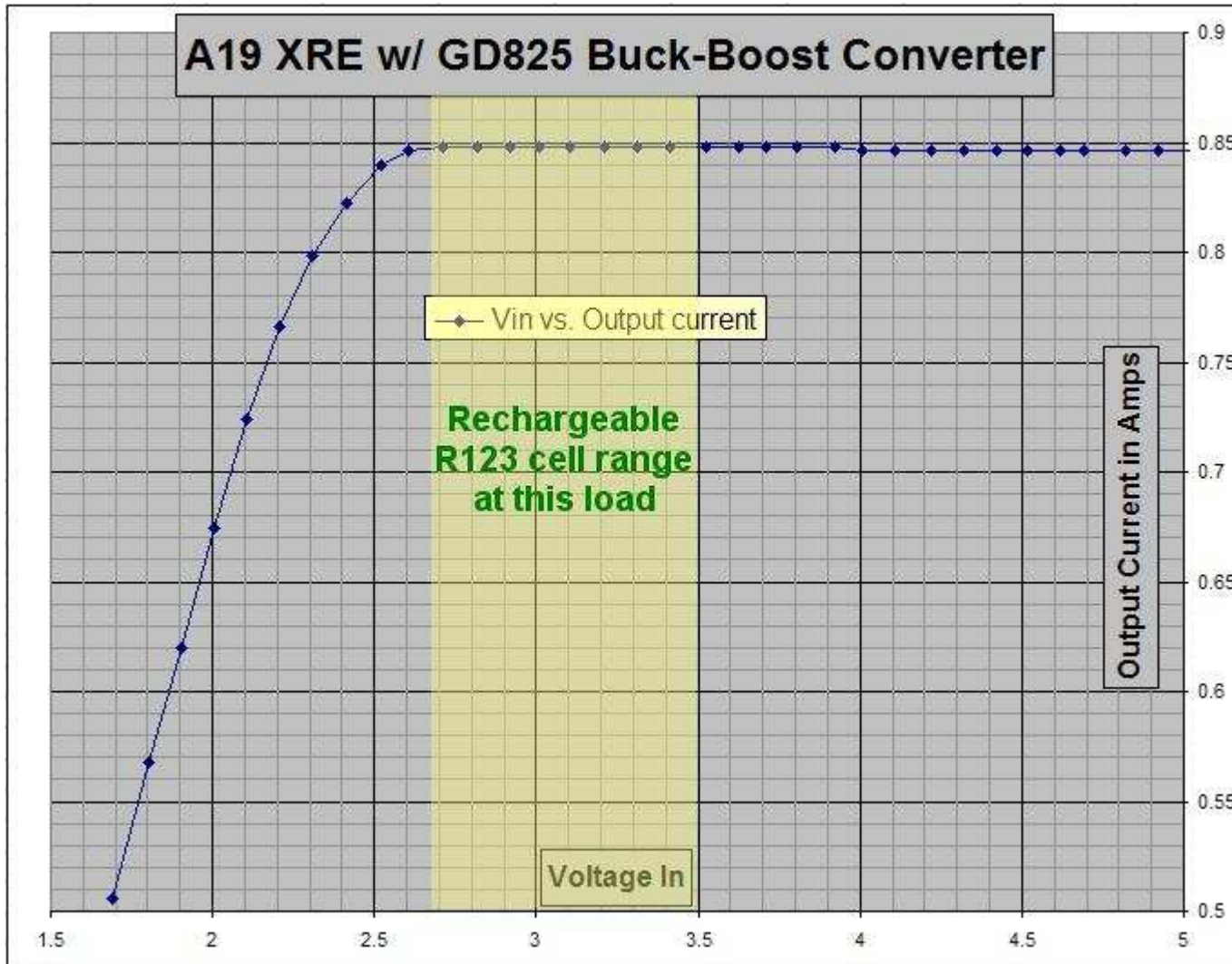
As you can see, the flashlight/GD825 is actually regulated from 5.0V input down to 2.6V input. None of this pseudo-regulation crap that many flashlight review sights call regulated. Either you are regulated, or you are not. Below 2.6V, the regulator actually falls out of regulation, but attempts to do its best to hold the line.

If the converter was set for lower output currents, the efficiency numbers would obviously rise from the plots above.

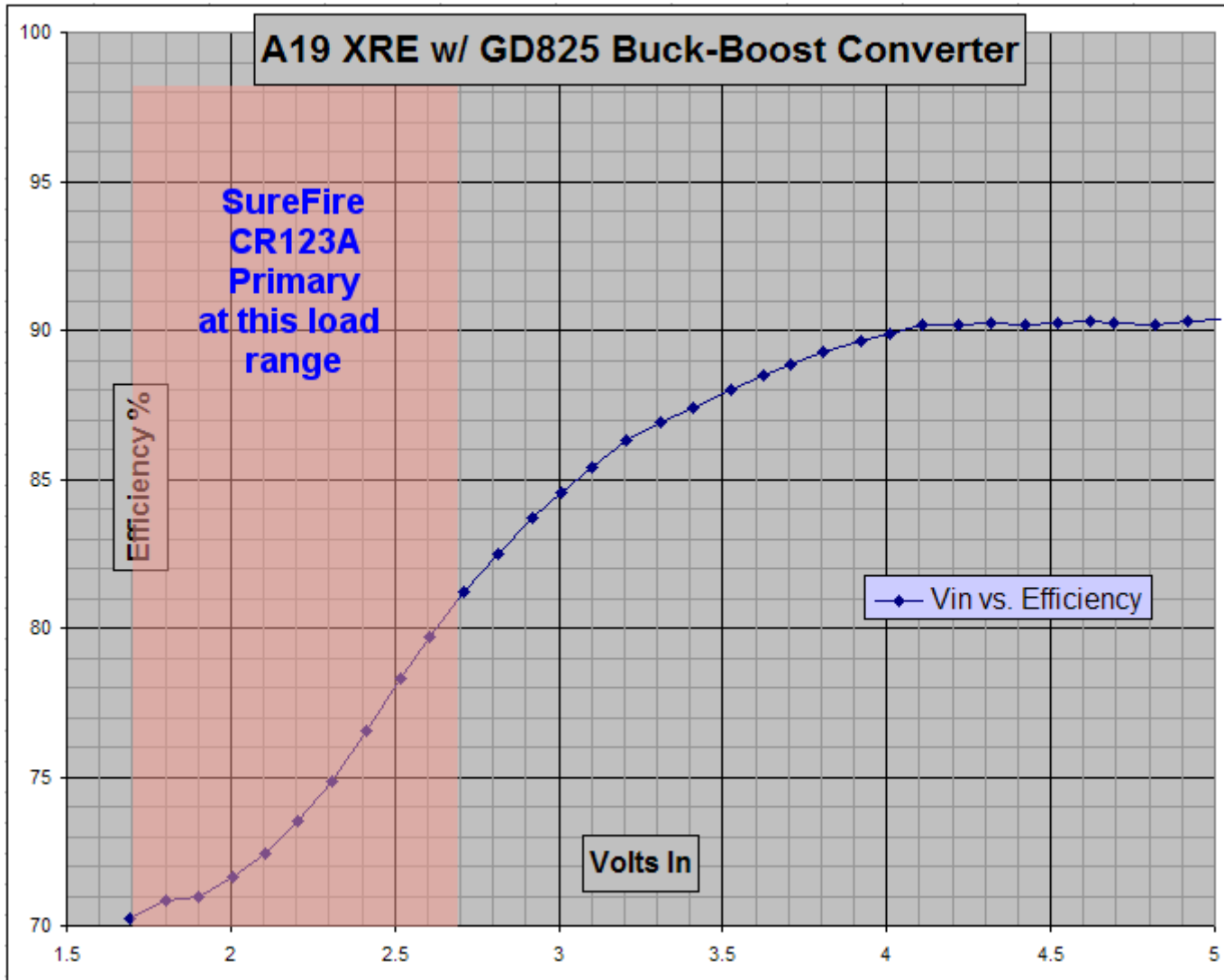
To better understand where the A19/GD825 is operating with various cells, I've actually taken several cells and hooked them up to the flashlight, and measured what the cell voltage drops to under the load of the A19/GD825. I then shaded the area down to the point to the rechargeable cells minimum recommended discharge voltage, or as with a primary CR123A cell, where the converter cuts out.

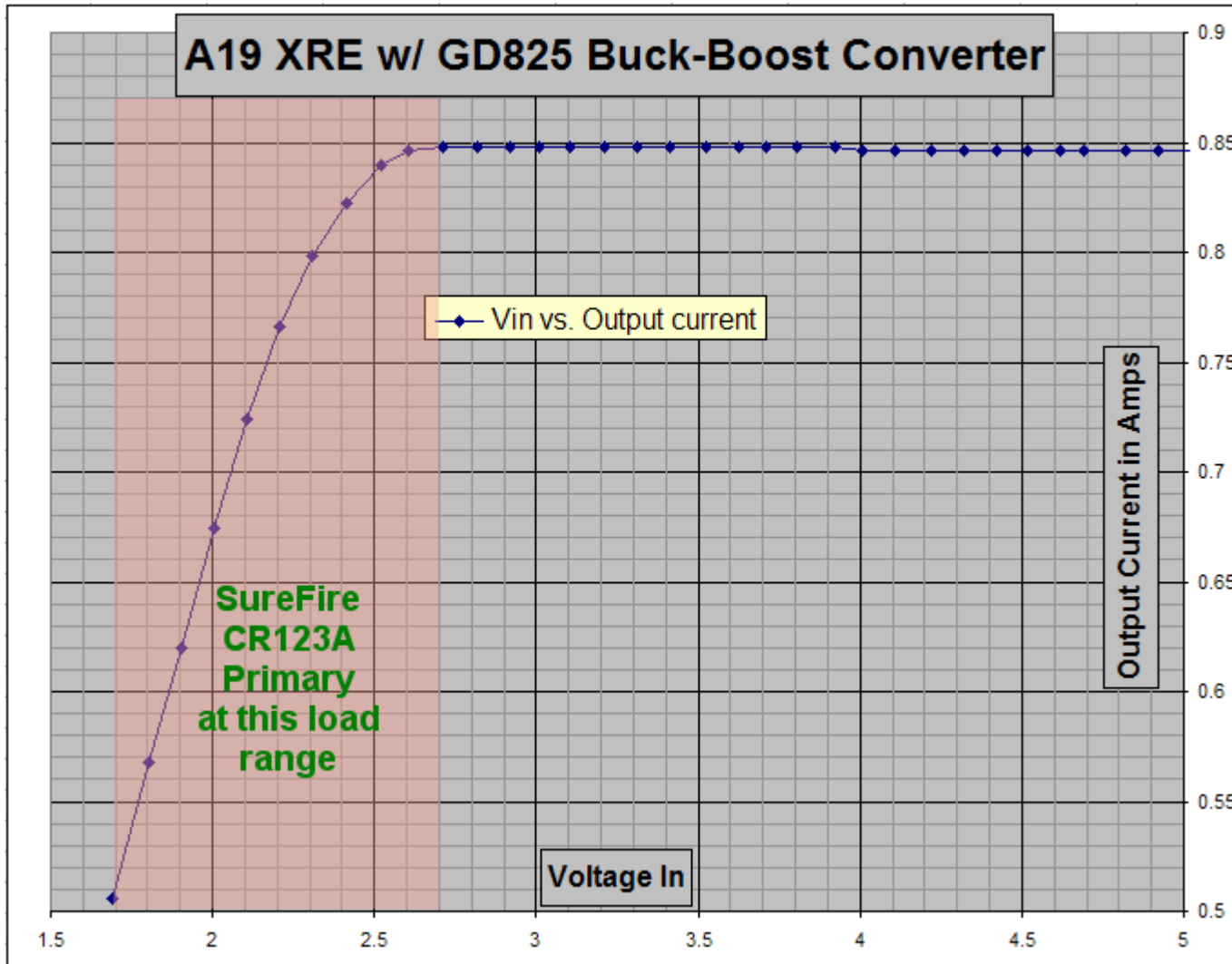
R123 Secondary Li-Ion rechargeable cell:



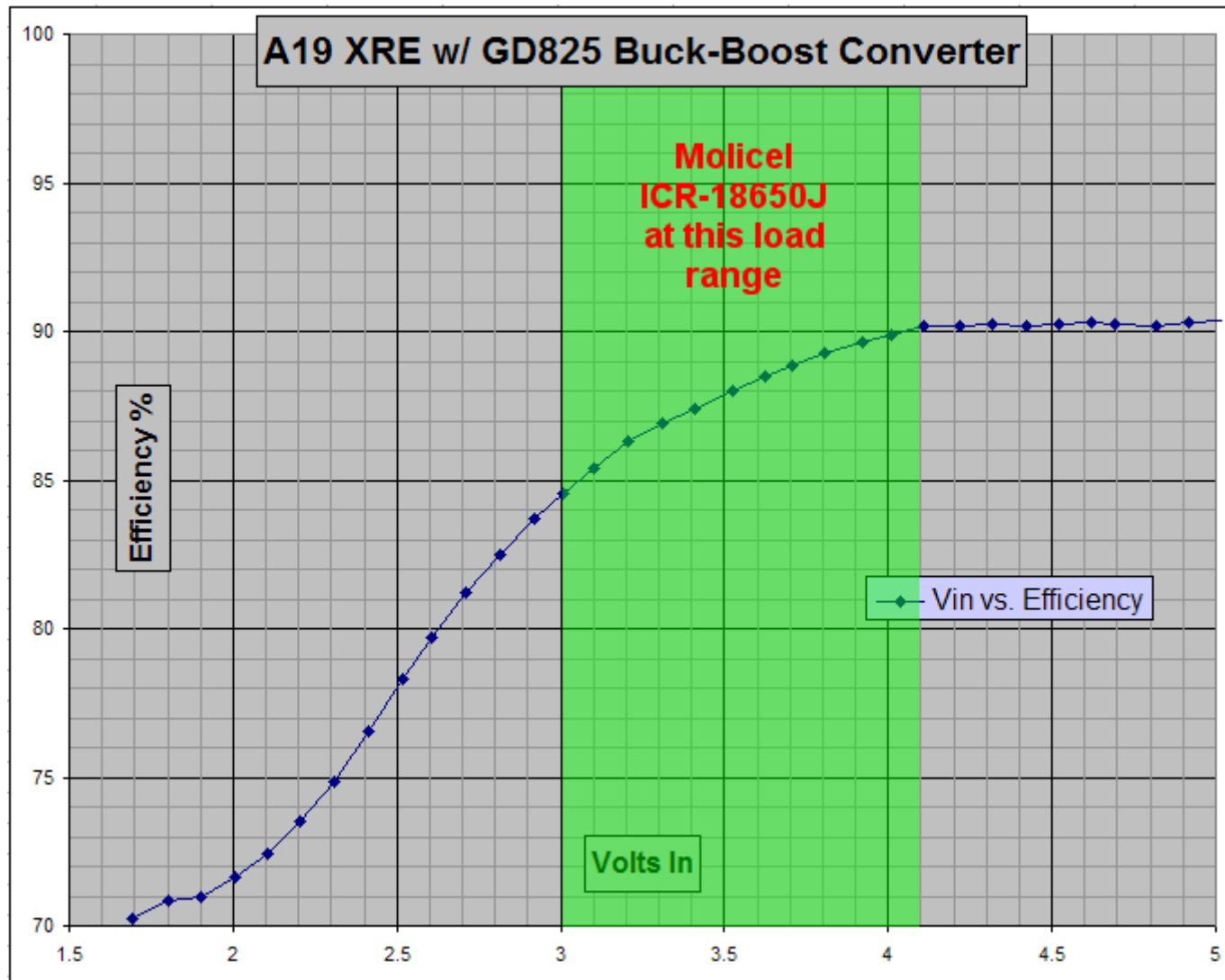


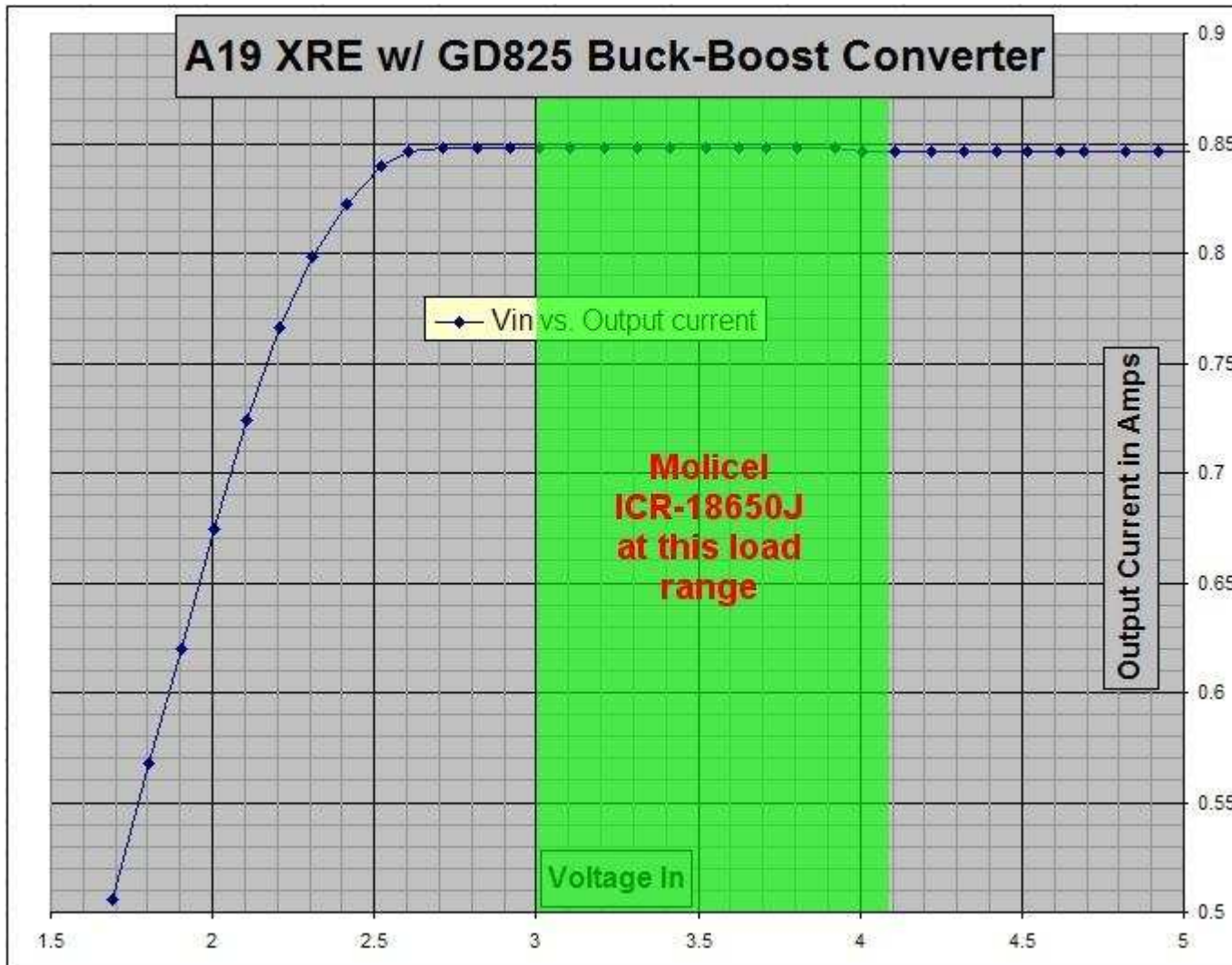
SureFire CR123A Primary Lithium cell (non-rechargeable):





Molicel ICR-18650J Secondary Li-Ion rechargeable cell:





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

DC Stats

Last edited by NewBie : 11-11-2006 at 09:08 PM.



11-11-2006, 10:44 PM

#2 



chimo
Flashaholic*

Join Date: Sep 2004
Location: Ottawa, Canada
Posts: 1,534

 **Re: The McGizmo A19/GD825 digging in**

Great write-up! Concise and loaded with helpful info!

Gotta love those shaded graphs. Perhaps they may help convince Bernhard switch to Li-ions. 😊

Paul



11-11-2006, 10:52 PM

#3 



NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

 **Re: The McGizmo A19/GD825 digging in**

Quote:

Originally Posted by **chimo**
Great write-up! Concise and loaded with helpful info!

Gotta love those shaded graphs. Perhaps they may help convince Bernhard switch to Li-ions. 😊

Paul

Is that your dog?

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

DC Stats



11-11-2006, 10:57 PM

#4



chimo
Flashaholic*

Join Date: Sep 2004
Location: Ottawa, Canada
Posts: 1,534

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **NewBie**
Is that your dog?



Kiessling. (Referring to efficiency gain in the Li-ion range over primaries)

Last edited by chimo : 11-11-2006 at 10:59 PM.



11-11-2006, 10:59 PM

#5



jch79
CPF
Silver
Supporter

Join Date: May 2006
Location: Chicago
Posts: 872

Re: The McGizmo A19/GD825 digging in

Ha ha... the Bernhard guy sure is a stubborn one!
Newbie - great tests... I really appreciate all the work you've done with the Cree XR-E's - why don't I see a cheer to you for all this work yet?
john



11-11-2006, 11:40 PM

#6

CM
Flashaholic*

Join Date: Sep 2002
Location: Mesa, AZ
Posts: 3,043

Re: The McGizmo A19/GD825 digging in

Newbie, how did you probe the test points without getting inductive pickup? Any lead length on the return (ground) path will look like a big inductor or antenna. Those waveforms look very clean. That is to say, the converter is very well designed!

Edited to add: The data here is worthy to be put into a sticky.
Edited again.

This page is now on my hard drive



11-12-2006, 01:04 AM

#7

Bullzeyebill
Flashaholic*

Join Date: Feb 2003
Location: CA, Lake Co.
Posts: 3,278

Re: The McGizmo A19/GD825 digging in

I wonder how Georges80 Chameleon buckboost circuit would compare if run at same bias as GD825?

Bill



11-12-2006, 01:05 AM

#8



NewBie 
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

 **Re: The McGizmo A19/GD825 digging in**

Quote:

Originally Posted by **CM**
Newbie, how did you probe the test points without getting inductive pickup? Any lead length on the return (ground) path will look like a big inductor or antenna. Those waveforms look very clean. That is to say, the converter is very well designed!

*Edited to add: The data here is worthy to be put into a sticky.
Edited again.*

This page is now on my hard drive 

Yes, the converter is very clean.

I found some larger sense resistors to use, so I could actually look at the ripple current present.

Here is the input ripple current:



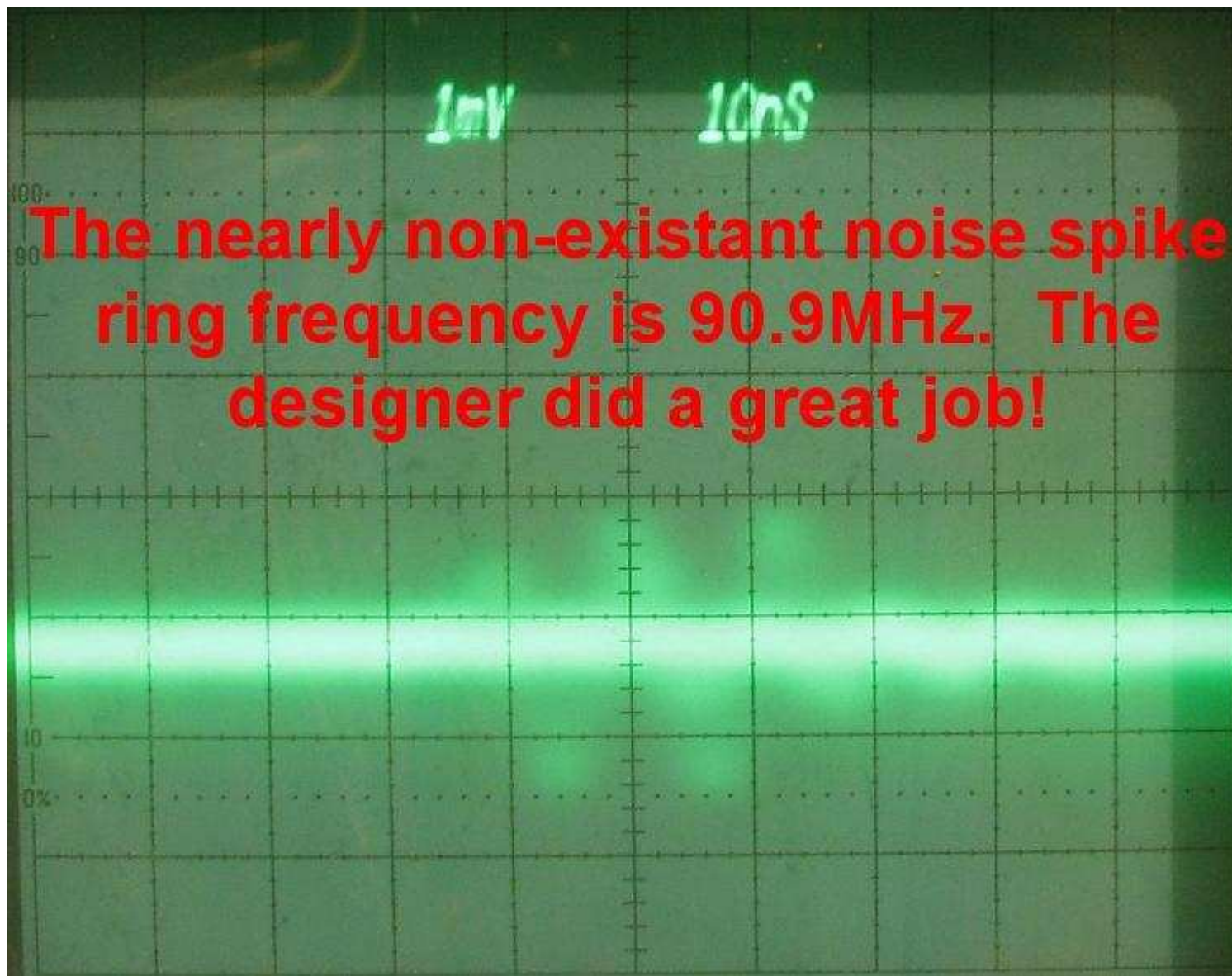
Here is the output ripple current, I believe I can make out 0.004 Amps of ripple current, which works out to only 0.5% of ripple current!





I added a little inductance to make it easier to trigger on the noise and was able to measure the ring frequency of the

miniscule noise spike, which works out to 90.9 MHz. Once the circuit is put back to it's shipped condition, the paths would be much shorter, and one would need some very sensitive RF equipment to even find any radiation at all.





OMGOSH, I've been reduced to 1's and 0's and archived!!!

(BTW, you might want to re-save it...)

.

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

DC Stats

Last edited by NewBie : 11-12-2006 at 01:11 AM.



11-12-2006, 08:56 AM

#9



Kiessling
Moderator



Join Date: Nov 2002
Location: Germany, Old World
Posts: 11,557

Re: The McGizmo A19/GD825 digging in

This is some GREAT info here!

Not that I'd understand the tech stuff and wave-things, but the shaded graphs are a blast!!

As to Li-Ion ... what's dat?

Don't get me wrong ... I appreciate it when things can run on Li-Ions, TOO, but they are not my primary power source. And will never be.

bernie, the dog

It's always darkest just before it goes pitch black.
My shoes are too tight. But it doesn't matter, because I have forgotten how to dance.



11-12-2006, 08:58 AM

#10

lightrod
Flashaholic

Join Date: Feb 2006
Posts: 280

Re: The McGizmo A19/GD825 digging in

Holy smokes NewBie - what a wealth of information! Wish I could really interpret it all. I think I can pull out some conclusions but I clearly need some training if you could answer/confirm a few things.

Do I conclude that this converter is more efficient with the RCR123 (3.7V) cell and therefore one should get (slightly) more runtime per maH than with a primary?

The RCR123 operates on the flat part of the Vin vs output curve - is that why the light abruptly turns off when the batteries are "drained"?

Unless I'm missing something the output current is regulated to 825 ma. Why then does my RCR123 at 700 maH last only 20 minutes? Is there still some "juice" left but just not enough to kick this converter on?

If I want a two stage resistor switch with a low that provides about 15-20 lumens (or about 15% of max output) using a RCR123, what should I use? Or is this a crazy thing to do with this light? I have a 8 ohm resistor switch but it only provides about 4% of max output.

Thanks for any guidance.



11-12-2006, 09:00 AM

#11



Kiessling
Moderator




Join Date: Nov 2002
Location: Germany, Old World
Posts: 11,557

Re: The McGizmo A19/GD825 digging in

I linked the thread in the McGizmo FAQ:
<http://www.candlepowerforums.com/vb...604#post1687604>

It's always darkest just before it goes pitch black.
My shoes are too tight. But it doesn't matter, because I have forgotten how to dance.



11-12-2006, 09:07 AM

#12



chimo
Flashaholic*

Join Date: Sep 2004
Location: Ottawa, Canada
Posts: 1,534

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **Kiessling**
bernie, the dog

Sorry, couldn't resist...

German Shepherd?



11-12-2006, 09:28 AM

#13




Kiessling
Moderator





Join Date: Nov 2002
Location: Germany, Old World
Posts: 11,557

Re: The McGizmo A19/GD825 digging in

No ... Cerberus  

Quote:

Originally Posted by **chimo**
Sorry, couldn't resist...

 *German Shepherd?* 

Apart from that ... it is not recommended to use 2xCR123 with the GD driver IIRC, isn't it?

bernie

It's always darkest just before it goes pitch black.
My shoes are too tight. But it doesn't matter, because I have forgotten how to dance.



11-12-2006, 10:20 AM

#14 



chimo 
Flashaholic*

Join Date: Sep 2004
Location: Ottawa, Canada
Posts: 1,534

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **Kiessling**

Apart from that ... it is not recommended to use 2xCR123 with the GD driver IIRC, isn't it?

bernie

I'm not sure if Wayne has put up the specs yet on the GD. 🤔

However, that's probably why Newbie only went to 5V.

Paul



11-12-2006, 10:25 AM

#15



chimo
Flashaholic*

Join Date: Sep 2004
Location: Ottawa, Canada
Posts: 1,534

Re: The McGizmo A19/GD825 digging in

Two Quote Reply Freeze Ups!!!!!!! 🤔 🤔 (OK, over it quickly because I copied response to Notepad first.)

*****QUOTE=lightrod

Unless I'm missing something the output current is regulated to 825 ma. Why then does my RCR123 at 700 maH last only 20 minutes? Is there still some "juice" left but just not enough to kick this converter on?

*****/QUOTE

Perhaps I can help. There's a lot of factors that contribute to the answer. (I will use approximate numbers from the charts)

The GD's output is fully regulated at 825mA in the Li-ion drive range. If we use the Cree's VI curve from an earlier post from Newbie, the voltage across the Cree was about 3.3V at about 825mA (Power is approx 2.7W). Assume the output power is constant.

The input power is must be equal to the output power plus the driver efficiency losses.

Let's look at the start and end of the Li-ion battery cycle:

At the START of the cycle, the efficiency is about 88%.
Power from the battery needs to be 3.07W (2.7W/0.88)
The battery voltage was about 3.5V so the current draw from it would be about 877mA (3.07W/3.5V)

At the END of the cycle, the efficiency is about 81%.
Power from the battery needs to be 3.33W (2.7W/0.81)
The battery voltage was about 2.7V so the current draw from it would be about 1233mA (3.33W/2.7V)

If you consult SilverFox's Li-ion battery shootout you will find that a lot of manufacturers tend to overstate the capacity of their batteries. See if you can find your battery and trace for the current draw above. Your results seem within the norm.

Remember that there will be some natural variances between emitters, drivers and batteries that may skew results a bit.

NOTE: If you use this method for primaries ensure to account for the variances in output power as a function of battery voltage.

That's why Newbie's data above is so handy - you can do the calculations, make predictions and have an idea what to expect!

Last edited by chimo : 11-12-2006 at 07:43 PM.



11-12-2006, 12:47 PM

#16



NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **lightrod**
Holy smokes NewBie - what a wealth of information!

The RCR123 operates on the flat part of the Vin vs output curve - is that why the light abruptly turns off when the batteries are "drained"?

Li-Ion, once they can't hold their voltage, drop like a rock.

Quote:

Originally Posted by **lightrod**

Unless I'm missing something the output current is regulated to 825 ma. Why then does my RCR123 at 700 maH last only 20 minutes? Is there still some "juice" left but just not enough to kick this converter on?

Li-Ion are often tested at like C/5, or one fifth their mAH rating. When you pull a full 1C worth of discharge current out of them, especially for a R123, you won't get nearly their mAH rating for capacity. You will also note they get a lot hotter when running them hard. This is where the lost power is going, it goes up as heat.

Quote:

Originally Posted by **lightrod**

If I want a two stage resistor switch with a low that provides about 15-20 lumens (or about 15% of max output) using a RCR123, what should I use? Or is this a crazy thing to do with this light? I have a 8 ohm resistor switch but it only provides about 4% of max output.

Best ask the designer on that one.

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

DC Stats



11-12-2006, 07:35 PM

#17




TENMMIKE
Flashaholic*

Join Date: Jan 2006
Location: puyallup WA.
Posts: 674

 **Re: The McGizmo A19/GD825 digging in**

i believe a 5 ohm has been used with some success EDIT LOOK HERE

<http://www.candlepowerforums.com/vb...6&dateline=2005dat2zip>  vbmenu_register("postmenu_1672409", true);



Join Date: Jan 2002

Location: Bay Area

Posts: 2,845

 **Re: Announcing the Aleph A19 Cree XR-E**

I saw a post somewhere where someone tried a 5 ohm tailcap and it worked with the GD driver. I'll be damned.... I thought I tried all the different resistor values and was bummed nothing worked. I guess I didn't try the low values like 5 ohms.

I tried it and it works fine. Haven't done a lot of testing, but, it appears to work.

That means when the one part we have backordered for the two stage switch assembly comes in you can get the switch assembly with a 5 ohm configuration and upgrade your A19XRE GD825 to be a two stage setup.

If you have a Wiz2 setup with a 5 ohm, 7 ohm or 10 ohm you might want to give it try. You might be surprised.

-Wayne

Quote:

Originally Posted by **lightrod**

If I want a two stage resistor switch with a low that provides about 15-20 lumens (or about 15% of max output) using a RCR123, what should I use? Or is this a crazy thing to do with this light? I have a 8 ohm resistor switch but it only provides about 4% of max output.

Thanks for any guidance.

Last edited by TENMMIKE : 11-12-2006 at 08:05 PM.



 11-13-2006, 02:28 PM

#18 

LightBright

Flashaholic

Join Date: Dec 2001
Location: Silicon Valley CA
Posts: 113

Re: The McGizmo A19/GD825 digging in

Wow Newbie, very thorough, thanks for the info. Is there a "Converter Board Comparison Chart" anywhere on the forums similar to this type of info?

I think you should Update your account name, you don't seem to be a Newbie!



11-13-2006, 07:22 PM

#19

LED Thrift

Flashaholic

Join Date: Mar 2005
Location: Northern NJ
Posts: 110

Re: The McGizmo A19/GD825 digging in

Newbie that is great work. Thanks. Your data shows a max efficiency above ~4.1 volts. Is there a combo of rechargeable batteries that would give 5.0 volts fully charged, and declining from there with use, to get the maximun efficiency from this setup?

Pal Light / Nuwai 0.5W AAA / AAA & AA MagLights w Terralux / Dorcy Super 1 W [CR123] / UK 4AA eLed* / SL ProPoly 4AA** / UK 2L Incand / MagLight 2D w Diamond 3W / CPF 2005 Peak Special Lux3** / Nuwai ALX-253L [5W] / PrincetonTech Yukon HL* / SL Septor Headlamp / FavorLight HLX-712L Headlamp / Pelican M1* [on RCR] /Innova X-1



11-13-2006, 10:51 PM

#20



NewBie

Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **LightBright**

Wow Newbie, very thorough, thanks for the info. Is there a "Converter Board Comparison Chart" anywhere on the forums similar to this type of info?

I think you should Update your account name, you don't seem to be a Newbie!

No, many of the designers/companies do not like to publish charts of their converters for a reason.

Keep in mind, on this converter, if you were to lower the output current, the efficiency would rise, and it would continue to regulate to a lower input voltage before the output starts to fall.

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

DC Stats



11-13-2006, 11:16 PM

#21

CM
Flashaholic*

Join Date: Sep 2002
Location: Mesa, AZ
Posts: 3,043

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **NewBie**
No, many of the designers/companies do not like to publish charts of their converters for a reason....

No one wants to air dirty laundry

The converters from the shop has undergone a boat load of testing and revisions to get where they are. Those controllers are not easy to work with. Easy to blow, packaging that make it hard to re-work, stability issues...They are a work of art, in a way, by themselves. Coupled with McGizmo's creations, these semi-custom lights are at the pinnacle of performance and design.



11-14-2006, 09:04 AM

#22

Ty Bower
Flashaholic*

Join Date: Feb 2004
Location: Newark, DE
Posts: 750

Re: The McGizmo A19/GD825 digging in

Quote:

Originally Posted by **LED_Thrift**
Is there a combo of rechargable batteries that would give 5.0 volts fully charged, and declining from there with use, to get the maximun efficiency from this setup?

I wonder how the GD825 would handle four fully charged AA NiMH cells...? If you put it in a Dorcy Boss body (think Turtlelight), would the stock reflector be good for anything? It's got a fairly large diameter, but isn't very deep.



11-14-2006, 09:51 AM

#23

LED Thrift
Flashaholic

Join Date: Mar 2005
Location: Northern NJ
Posts: 110

Re: The McGizmo A19/GD825 digging in

I have two Turtlelights ready to modify. The original beam was incredibly even and smooth. It had a small hotspot and a large even spill area. I think trying a Cree with this board would be a worthy experiment.

[Pal Light](#) / [Nuwai 0.5W AAA](#) / [AAA & AA MagLights w Terralux](#) / [Dorcy Super 1 W \[CR123\]](#) / [UK 4AA eLed*](#) / [SL ProPoly 4AA**](#) / [UK 2L Incand](#) / [MagLight 2D w Diamond 3W](#) / [CPF 2005 Peak Special Lux3**](#) / [Nuwai ALX-253L \[5W\]](#) / [PrincetonTech Yukon HL*](#) / [SL Septor Headlamp](#) / [FavorLight HLX-712L Headlamp](#) / [Pelican M1* \[on RCR\]](#) / [Innova X-1](#)



11-18-2006, 11:04 AM

#24



NewBie
Flashaholic*

Join Date: Feb 2004
Location: Oregon- United States of America
Posts: 4,750

 **Re: The McGizmo A19/GD825 digging in**

Quote:

Originally Posted by **Ty_Bower**
I wonder how the GD825 would handle four fully charged AA NiMH cells...?

Best ask the designer this question.

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

[DC Stats](#)




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Forum Jump

LED

All times are GMT -5. The time now is 12:59 PM.

---- Silver

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