Re: Circuit Design Q. − battery charger

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- *Date*: Thu, 10 Jul 2008 05:12:16 −0700 (PDT)

On 9 Jul, 21:42, Kris Krieger <m...@xxxxxxxxxx> wrote:

> Hello, All!
>
> I'm working on a high−brightness solar−charged lighting system, and I have
> some questions (I'm just a beginning hobbyist, so I ask for your
> indulgence, and apologize for those questions that are overly−simplistic
> and/or worded in a non−technical manner...)
>
> Many thanks in advance for answers, suggestions, information, references,
> and so on!
>
> −−−−−−−−−−
>
> To start, this is my proposed overall diagram (vertical so as to get it all
> in the diagram in TXT formet here − the bar on the left indicated GRND):

```
|−−−solar cell(s)  (SEE: #1 below)
|      |
|      |
|−−Booster Circuit  (SEE: #2 below)
|      |
|      |
|      |
|−−−DS2715  (SEE: #3 below)
|      |
|     diode?    (SEE: #4 below)
|      |
|      |
|    photoresistor?  (SEE: #5 below)
|      |
|      |
|−−−battery pack  (SEE: #6 below)
|      |
|      |
|     MAX1848  (SEE: #7 below)
|      |
|      |
|−−−−−−LEDs  (SEE: #8 below)
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(ground)

#1 − for the Solar Cells, I can use anything from 0.8V to 4.5V, so I'm figuring on using 1 volt − for the mA rating, the Booster Circuit (#2) outputs 500mA, but there is nothing I can find re: *input* mA, so my question is, should I use 400mA or 800mA? Or do I need to create a configuration that outputs 500mA?
**Yes, I understand that Solar Cell ratings are for bright maximal sunlight on a clear day, but pls. see section #3 re: battery charging)

#2 − The Booster Circuit − I intend to directly use the circuit illustrated by the Maxim Application Note 1029:http://www.maxim−ic.com/appnotes.cfm/an_pk/1029 "Supply Generates 5V from Low−Voltage Solar−Cell Power" − uses the MAX866 and MAX1771 ICs

#3 − The Maxim SD2715 NiMH Battery Pack Charge Controller − I'm using this becasue I want to have a solar cell arrangement that will charge the batteries fairly quickly, BUT I don't want to "fry" the batteries − hence, a charging controller. It's after the Boost Circuit because it requires a minimum of 4.5V to start up. Here is The Big Question: I've been looking at the Circuit illustrated in the last section of App Note 4180:http://www.maxim−ic.com/appnotes.cfm/an_pk/4180− "Optimizing the Load−Switch Function of the DS2715 Battery−Charger IC" − the last section is titled: "Powering the Load Directly from Batteries".
My questions here are these:
A) do I really need to have this entire complex circuit, which is what I suspect, or can it be simplified?
B) when resistors in a Circuit Scehmatic are left unidentified other than their resistance value, how do I decide upon which Voltage Rating to look at when buying components? I assume I need to use a voltage higher than both the Input Voltage, and the Output Voltage, but I'm not at all sure about that.
C) if I do need the entire circuit (which is what I suspect), pg 12 of the Datasheet http://datasheets.maxim−ic.com/en/ds/DS2715.pdf states that the sense resistor has to be changed if a current other than 1.07A is required, but AFAIK, what I need to do is basically double the resistance (from 0.1 Ohm to 0.214 Ohms) to reduce that to 500mA, but is that the case, or is there something special about Current Sensing Resistors that I need to know?

#4 − I know that for very simple solar−recharged battery−operated lights, a Diode is required between the battery packm, and the solar cell, so as to block any current "backflow" from the batteries to the cell(s), but should I still include such a diode if using the battery charger IC? If so, how do I calculate which diode to get?

#5 − I don't want the LEDs to come on duing the day (i.e. during the battery charging cycle), so I assume that I need a photocell to "disconnect" the LED Driver from the batteries during the day, and :connect" them at night − I assume the component would be a Photoresistor.. Is that the case? If so, how do I calculate the type (i.e. ratings thereof) that I need?

#6 − battery pack − prob 3 cells, NiMH 1.2V, probably 1500mA, because even 6 LEDs (see #8) should still

#7 − MAX1848 LED driver − I figure I need to use the direct circuits (four OR six LEDs depending upon the size/design of eachlamp I'll be making) as illustrated in the references *except* that I think I just leave off the "PWM Dimming" connection, since firstly, I won't be using a dimmer switch, and second, I can't tell what the connection is supposed to connect *to*:http://www.maxim−ic.com/appnotes.cfm/an_pk/1750− "Powering Six White LEDs with High Efficiency Using the Max1848"http://www.maxim−ic.com/appnotes.cfm/an_pk/1736− "Powering Four White LEDs with High Efficiency Using the Max1848"http://datasheets.maxim−ic.com/en/ds/MAX1848.pdf− Datasheet for MAX1848

#8 − LEDs − I've been looking at these: OVLEW1CB9 3.4V avg, 25mA avg, luminosity avg. 18,000mcd at 20 mAhttp://www.optekinc.com/datasheets/OVLEW1CB9.PDF Does anyone know whetehr there is any problem with them re: relaibility or anything else? I'd like to crank out as much light as possible, and these seem so far to offer the maximum light for teh given system I'm looking to do up. ((I'd looked at various "pucks" and "stars", but they seemed to pull significantly more voltage and current, for no real gain in Lumens.))

If anyone knows of a better LED, I'd be interested in the mfgr and designation so I can look into it.

Once again, many thanks in advance for answers, suggestions, information, references, and so on :) !

− Kris Krieger

Lots of questions there but just to start with one of them:

The led you quote are typically 18000mCd @ 20mA.
With their angle (2*theta1/2) of 15 deg this would calc to a bit under 1 lumen. The forward voltage is ~3.4V @ 20mA giving 68mW for 0.98 lumen or about 14.4 lumen per watt.
Although they may be more watty animals than you require the latest offerings from Lumileds, Cree, Seoul Semi and the like are 70 lumen per watt and upwards − 100 lumen per watt binning being offered −at a price− in production quantities.
All the work in white leds is in the 1 and higher wattage devices and

it may be that the 5mm led marker is being ignored but I would look
for a more efficacious led if you can.

Regards
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