Re: 5V @ 3.5A for automotive − best way?

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2007−01/msg00233.html

- *From*: ferrari.secret.santa@xxxxxxxxx

- *Date*: 2 Jan 2007 17:39:11 −0800

colin wrote:

> <ferrari.secret.santa@xxxxxxxxx> wrote in message
> news:1167757609.733221.4530@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
>
> > I'm trying to make a little project work here... trying to use seven
> > 5x7 dot−matrix displays to make a little "digital readout" that I can
> > display text on based on feedback from various things in a car (like
> > temperature, etc).
> >
> > The 5x7 displays are of course multiplexed and have a 1/10th drive
> > current of 100ma. I am using shift registers to control the state of
> > each row, then sequentially updating the rows to produce the display.
> > That's all fine.
> >
> > Problem is, given 7 rows, 35 dots per row, at 100mA per dot, that's a
> > potential max current of 3.5A! The duty cycle doesn't help me because
> > I drive the rows one after another, so if all elements were on, there's
> > a potential 3.5A constant current requirement, thats a lot.
> >
> > Can anyone suggest solutions for getting such a drive current from a
> > 12V automotive source? The problem is, I do not want the display to
> > flicker in brightness when the vehicle is started, so I really want to
> > use a regulated source, also if I just ran the segments off the 12V,
> > the power dissipation in the resistors becomes huge and I am trying to
> > keep this small. I have looked at the 1084 regulator which can do 5A
> > with up to 30V input, but this is a linear regulator.
> >
> > I am a bit of a noob when it comes to circuit design, but am I correct
> > in believing the power dissipation of the regulator is the voltage drop
> > from Vi to Vo times the current? If so, and if you assume 13.8V in,
> > then that's around 30 watts which seems to be a ton. I have used
> > switchers in the past but the problem is the cost and number of
> > additional components (board space is tight).
> >
> > Am I missing some obvious answer that would solve my problems here?
> > Would you guys go a different route in this design other than a
> > traditional linear or switching regulator, and if so, what would you

> use?
>
> you can make a buck type switching regulator quite small these days,
> if you go SMD of course,
> one small 8pin controll chip and a small mosfet and
> with a high switch frequency a small inductor,
> thats probably the way to go,
> but dont forget the high voltages surges that can apear on car electrics.
>
> however 245 LEDs at 15ma each is going to be a heck of a lot of light,
> I doubt if you seriously need 3.5 amps if its inside the car,
> or is it some sort of external message board ?
>
> Colin =^.^=

Thanks for the info. It sounds like a switcher is the way to go. Is there a preferred source for these? Pricing them out on Digikey (just for reference) they are much more than linears. The least expensive part they have is a 5A/5V switcher at $3.75 or so in 100's. That's a BIG step up from something like a 7805. The part I used before (7856 IIRC) required a decently large inductor, some caps and diode, and even going all SMT it was of reasonable size, certainly very hard to shoehorn into the board size I have available.

On the wattage, the displays I would like to use are red and blue (not together). The Vf of the red is around 2.6 and around 4 on the blue, so of the ~17 watts going to the LED's, around 8 are being dissipated in 35 resistors for the red variant, and 3.5 through the resistors in the blue. I grant that even at 9 watts we're talking about a lot of light, but driving at 100mA (the max current for 1/10th duty) is the "worst case". I can go dimmer in software easily with PWM, but it will only ever be as bright as the hardware allows. Bear in mind that in a convertible in full sunlight in July, its a different animal than on a moonless night in an enclosed car :). Also, the display will rarely ever use all segments, but of course it's possible, so I want to design for that. I would imagine generally around 1/3 of the elements would ever be on simultaneously.

I was thinking of ways I could split up the segments so instead of a 3.5A rail, I could have four .85A segments or something, but those solutions seem inelegant and however you slice it, there would be 30W going *somewhere* which is going to get a bit toasty (then again, thats a max design level, that would rarely ever be reached and if so would be for a few seconds at most).

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