

Re: schottky tempco

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- *From:* gearhead <nospam@xxxxxxxxxxxx>
 - *Date:* Wed, 12 Dec 2007 19:56:55 -0800 (PST)
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On Dec 12, 7:34 pm, John Larkin
<jjlar...@xx> wrote:

On Wed, 12 Dec 2007 16:55:34 -0800 (PST), gearhead

<nos...@xxxxxxxxxxxx> wrote:

On Dec 12, 1:23 pm, gearhead <nos...@xxxxxxxxxxxx> wrote:

Is it 2.2 mV/C?

I need a diode with a low voltage drop and a known temperature coefficient.

I'm going to put it in series with the adjust terminal of a lm317 in constant-current configuration, so the voltage with respect to ground at the output pin of the 317 will be 1.2 volts plus the voltage drop across the schottky (which will have a constant current through it).

This way I can tune the circuit to give me the exact dV/C I need. It will be for temperature compensation in a lead-acid battery charging circuit. Since I need about 2000 ppm/C, or maybe a little more, a "regular" silicon diode won't work. It would have 2.2 mV/C out of nearly 2 volts (1.2 + Vf), giving me in the 1000 ppm range. So I need to consider using a schottky.

Apparently temperature coefficient varies with the log of the current according to the shockley equation. If I can determine the parameters (like the ideality factor) for a particular schottky I can get the math worked out and fiddle with the current setting to get the temperature characteristic of the circuit right.

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I'm going to set the current at 5 or 10 mA to make sure the 317 works right.

Schottkies tend to run less, -1.5 maybe, except that the very small signal-level diodes have decreasing t_c 's as the current increases. Some go to zero t_c at 10–20 mA. I think the exact tempco depends on the metal used.

How about an LM35? It outputs 10 mV per degree C, so you could scale that as needed. But it won't sink much current, so you'd have to buffer it with an opamp or something.

Don't run an LM35 from over +5 volts! And don't pull the output below ground!

John– Hide quoted text –

– Show quoted text –

Whatever kind of temperature sensing element used, be it a diode, LM35 or whatever, needs to be screwed on to the battery terminal. The LM35 probably comes in some fragile package like a TO–92. On the other hand, I can solder a ring terminal right onto the lead of a diode and it will be rugged enough to screw to the battery terminal, and the diode's lead will provide a good thermal path from the battery into the diode.

Ambient temperature sensing really isn't feasible here. The battery enclosure's temperature will undergo temperature variations to extremes, from around freezing to at least 85 C (outdoor machinery). The temp sensing must be through a direct connection to the battery terminal. I think I'm kind of stuck with a diode just for physical reasons.

Thanks for the advice, John.

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