

Re: Ideas for low voltage sound activated switch

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- *From:* Nobody <nobody@xxxxxxxxxxx>
 - *Date:* Tue, 18 Oct 2005 11:38:29 +0100
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Ian Stirling wrote:

Nobody <nobody@xxxxxxxxxxx> wrote:

I'm looking for ideas how to solve a problem of designing a very small sound-activated switch.

The basic requirements are:

0) Sound triggers a mechanical action. A piece of nylon stops the mechanical action, so if the nylon is melted, the action takes place. Hence sound must melt nylon.

What's this for?

A medical application.

1) Circuit works from two button cells. Size is a real limit. The ultimate (and distant) aim is to build a circuit that is small enough that a person could swallow it.

I would not go with button cells as such, but something like 1/3AAA cell.

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I think that will be too big. And it is still going to be a very low voltage. Not even sufficient to make an electret microphone work.

Are there any switching devices that will have an on-resistance of well under 0.1 Ohms whilst still being very small? A large power FET is out of the question due to size.

Yes.

Such as? I can't find anything small that offers such a low on resistnace.

A high on-resistance will mean the switching device will dissipate more power than the load resistor, which is not a good idea. At that point I might as well use the switch as the heater! That might be possible in fact, although a concern is the semiconductor will be destroyed before the nylon melts.

Why do you have to use nylon, and not (for example) hot-melt-glue?

That is one aspect I need to discuss. I am not sure exactly how the mechanism is triggered and so how it might be done in another way.

Using a DC-DC step up converter and storing some charge in a cap is one idea I am considering. That way, I will have a source of reasonable

Useless.

Caps of a worthwhile size are HUGE, compared to what you are aiming at.

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I was not thinking of trying to power the load from the cap, but perhaps use charge in the cap to keep the electronics (perhaps gate drive, or base current) flowing whilst the battery dropped to 50% of its value.

I've been asked to look at designing this, but I think the size constraints are quite serious given the circuit will need to supply about 7W of power for a short time period.

And this is where you find another client, if this one won't negotiate. Small button cells are low current. (generally)

I'm told they are using 0.2 Ohms. I believe this matches the internal resistance of the cells used, but I have not verified this myself. I am taking their word for it, but will check more carefully if I take on the job.

Have you ruled out pyro devices?

No. I am open to ideas.

Your first step is the battery.
What is the maximum size (button cells go all the way from about 5*1mm to 30*4mm).

I understand they are using two hearing aid cells and don't wish to use anything bigger. But this may just be impractical to use.

I'm not sure of exact type of battery. Of course, they are getting the circuit to heat up the resistor (which I believe is 0.2 Ohms, but may be wrong) when they connect two cells to the load. That is not the same as doing it electronically of course, in response to sound.

Now, go away and find the impedance of those cells.
I'd be really surprised if you could get 7W out of anything smaller than 1/2AAA.

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I can't believe 7W is needed, but if the cell's impedance is matched to that of the load resistor, and the load resistor is 0.2 Ohms (both may be incorrect, but I believe are true), then it would imply 7W.

And sound triggering may be fairly simple - can you use an ultrasound machine to trigger them?

Potentially yes. Sound was just one idea. Radio starts getting big. Light is not practical as the circuit will be hidden.

Hmm.

Images of glass toroids, with the string tied to them shattering when hit by ultrasound emerge.