

Re: The ohnosecond

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- *From:* kensmith@xxxxxxxxxxxxxxxx (Ken Smith)
 - *Date:* Sun, 6 Nov 2005 21:39:22 +0000 (UTC)
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In article <1131300404.062488.181460@xx>, slebetman@xxxxxxxx <slebetman@xxxxxxxx> wrote:

>Ken Smith wrote:

[...]

>> My PCB may have a high voltage connected for perhaps a few minutes and I
>> don't want the PCB to be too huge.

[...]

>A few minutes is 'long term'.

Not really. Remember this is the PCB material its self that we are worried about. The failure of a PCB at high voltage can take quite a while. It starts with a few ions moving a few copper atoms along the gradient. Slowly but slowly a little finger of copper grows where there wasn't one in the past. As the finger grows the process slowly speeds up.

> If you are talking a few milliseconds
>then there are various schemes such as thermal fuses and fast transient
>diodes to redirect the spike.

I have just such parts on the PCB. Now the question is "how many volts per inch on the PCB material".

>eternity. Perhaps you only need to protect incoming signals to the PCB
>in which case opto-isolators are perfect.

They are far from perfect. You have to run both sides of the LED in the opto out to the outside world if that is where the signal comes from. If you apply 1000V between said LED's legs, it takes very little time before it isn't a opto-isolator any more. In the process, it can make a surprising amount of light btw.

> Outgoing signals can be
>protected the same way or via a relay.

Among the signals I'm protecting are ones that move at up to 1MHz. Relays are not a option, unless I invest in a MEMS relay.

> Power supplies can be protected

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>using appropriate DC-DC converters. You'd be surprised at the amount of
>punishment some of these are designed to withstand.

Try this with most that you can buy. Apply 12V and see that your
equipment works right. Disconnect the 12V and replace it with 440V AC.
Diconnect the 440VAC and reapply 12V.

> The PCB itself
>should be protected with an appropriate casing.

I have to run wires in and out of the product. Without connections to the
outside world, things would be easier but that isn't the world I live in.

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kensmith@xxxxxxxxx forging knowledge

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• **References:**

- ◆ **The ohnosecond**
◇ *From:* Ken Smith

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