

Re: Where are all the ESR meters?

Re: Where are all the ESR meters?

Source: <http://sci.tech-archive.net/Archive/sci.electronics.design/2007-07/msg03896.html>

- *From:* MooseFET <kensmith@xxxxxxxxxx>
 - *Date:* Thu, 26 Jul 2007 06:40:13 -0700
-

On Jul 24, 4:05 am, Winfield <winfieldh...@xxxxxxxxxx> wrote:

On Jul 23, 9:31 am, MooseFET <kensm...@xxxxxxxxxx> wrote:

On Jul 22, 8:23 pm, ehsjr <eh...@xxxxxxxxxxxxxxxxxxxxxx> wrote:

Jeff L wrote:

"Winfield" <winfieldh...@xxxxxxxxxx>
wrote in message
news:1185103461.604452.53880@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Jim Thompson wrote:

Winfield
wrote:

I'll
post
mine,
when
I
get
enough
energy
to
transcribe
it

Re: Where are all the ESR meters?

from
my
paper
scratchings,
calculations
and
notes.
Remember,
it
must
be
four
terminal,
and
handle
high
DC
voltages
when
probing
in-circuit
storage
capacitors.

How high is
"high"?

Perhaps a better question is,
how big is big?

Several designs we've been
considering have a
pair of diodes to discharge
the test capacitor
and limit the circuit
voltages, but I've heard
these can fail with large,
charged capacitors.

I think the issue isn't
necessarily how high
the voltage (tube amplifiers
get to hundreds

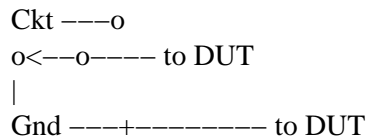
Re: Where are all the ESR meters?

of volts), or how high the current delivered, but how much energy is going to be dissipated in the protection components that discharge the guilty capacitor.

I'd say the answer is, the size of two fists. I think we're talking about ~ 100J of energy. Isn't that more than enough to blow out a common glass diode and/or a 1/4-watt resistor?

Protection is easy – read the voltage across the cap in question with a comparator, if it is more than a few volts, have a indicator displayed to discharge the cap first. If it is below a few volts, connect the cap to the metering circuitry with a couple of low RDS on FET's.

Just use a spring return spdt toggle.
Toggle to test.



If the DUT is a large capacitor charged to several hundred volts, that would have to be one heck of a switch.

I think it would be far better to make a current source and voltage preamp that can both withstand several hundred volts.

Re: Where are all the ESR meters?

Neither the current source nor the voltage preamp needs to be super good they just have to not crosstalk. Assuming we have well regulated $\pm 12V$ supplies, the current source can be just a rail to rail output driving a resistor. For a measurement current of 1mA, a 12K resistor would be required. Assuming we have to withstand 500V, we need a resistor that can take a 21W pulse.

Operating at 1mA results in about a 1uV measurement requirement. This would let us use a resistor on the order of 100K on the input of the preamp without getting swamped with noise.

Your numbers don't compute for me. I'd like a 100mA signal if it worked out, but have accepted 10mA as a compromise. 1mA seems very wimpy,

I accepted a 1mA to keep the power in the resistor within reason. If I would like a bigger signal and to be rich and good looking. I don't think I will get wither wish.

but assuming that,
your 12V supply (while a pain for batteries) doesn't allow proper operation if there's very more than 12V sitting on the cap.

"proper operation" in this case I defined as not going BANG not making a measurement was not a problem to me in this situation.

And your 12k resistor would mean
a 1-min discharge time constant with say 5000uF, yawn,
waiting to get within the operating-voltage range.

So long as the meter tells you what is wrong, I will accept the job of discharging the capacitor. It makes the meter design a lot simpler not to have to deal with that issue.

I'm going for 25 ohms of discharge resistance, using another set of diodes to $\pm 3V$ rails. Of course, the rails must have a way to get rid of any excess energy.

Re: Where are all the ESR meters?

Re: Where are all the ESR meters?

I wouldn't put the energy onto the power rail and then try to figure out how to get rid of it. It would be better to discharge to the ground more or less directly

One side could look like this:

Vcc-----/\-----
! e PNP
Probe--\V----->!-----+-----GND
\/
--- Perhaps TIP-36
!
Vcc