

Re: Where are all the ESR meters?

## Re: Where are all the ESR meters?

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*Source:* <http://sci.tech-archive.net/Archive/sci.electronics.design/2007-07/msg03313.html>

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- *From:* Spehro Pefhany <[speffSNIP@xxxxxxxxxxxxxxxxxxxxxxxxxxxx](mailto:speffSNIP@xxxxxxxxxxxxxxxxxxxxxxxxxxxx)>
  - *Date:* Mon, 23 Jul 2007 09:09:26 -0400
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On Mon, 23 Jul 2007 05:50:10 -0700, Winfield <[winfieldhill@xxxxxxxx](mailto:winfieldhill@xxxxxxxx)> wrote:

On Jul 23, 6:08 am, Fred Bloggs <[nos...@xxxxxxxx](mailto:nos...@xxxxxxxx)> wrote:

John Larkin wrote:

On Sun, 22 Jul 2007 19:39:36 GMT, Fred Bloggs  
<[nos...@xxxxxxxx](mailto:nos...@xxxxxxxx)>  
wrote:

John Larkin wrote:

On Sun, 22 Jul 2007  
15:57:37 GMT, Fred Bloggs  
<[nos...@xxxxxxxx](mailto:nos...@xxxxxxxx)>  
wrote:

Jim  
Thompson  
wrote:

On  
Sun,  
22  
Jul  
2007  
04:24:21  
-0700,  
Winfield

Re: Where are all the ESR meters?

<winfieldh...@xxxxxxxxxx>  
wrote:

Jim  
Thompson  
wrote:

Winfield  
wrote:

I'll  
post  
mine,  
when  
I  
get  
enough  
energy  
to  
transcribe  
it  
from  
my  
paper  
scratchings,  
calculations  
and  
notes.  
Remember,  
it  
must  
be  
four  
terminal,  
and  
handle  
high  
DC  
voltages  
when  
probing  
in-circuit  
storage  
capacitors.

Re: Where are all the ESR meters?

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.

Re: Where are all the ESR meters?

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

Re: Where are all the ESR meters?

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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?

Should  
be  
enough  
to  
crank  
you  
over  
a  
few  
times  
;-)

...Jim  
Thompson

Re: Where are all the ESR meters?

WH is  
stalling...  
input  
protection  
has little to  
do with a  
basic  
measurement  
architecture.  
I had no  
idea this  
little project  
would be so  
difficult for  
everyone:--)

Interesting that for a  
proposed "group design",  
hardly anybody is  
willing to make a first step.  
The psychology of group  
design is  
fascinating, and it turns out  
that an audience is a huge  
inhibition;  
people tend to not expose  
ideas if they fear they are  
imperfect, and  
might give some nit-picker  
grounds for public criticism.

Brainstorming is delicate  
because people are fragile.  
At my place, we  
scribble goofy ideas on a  
whiteboard, do a lot of  
stupid stuff (don't  
distinguish between  
circuit-as-proposal and  
circuit-as-joke), argue  
and laugh a lot, and  
sometimes come up with  
brilliance, with no way to  
tell who gets the credit.  
Some people just can't play  
at this game.

Re: Where are all the ESR meters?

John

Well whatever...the task is straightforward and does not require a great amount of ingenuity. The ingenuity comes in deciding the functionality of the meter. In my opinion there is nothing to accomplish by going half way to an impedance analyzer, there are already plenty of compact and fully functional products in that niche. The key is to produce the simplest possible design that measures ESR, if something else comes free along with that without introducing one iota more of complexity then fine, but if it requires one speck of dedicated hardware not useful for determining ESR then it goes. This will require that you discover something inherent to ESR that allows for a very simple circuit architecture. That is all the help I am going to give you at this stage:-)

Thanks for the excellent illustration of my point. You are far more concerned about your ego than you are about the technology. Probably that explains why you don't design electronics.

I know where you're coming from with that statement and it is not true. I am far enough along to know for sure whether something will work or not. All you have thought of so far is measuring the in-phase component of voltage developed by a current pulse. And your typical white board brainstorming is largely used for the how and not the what. The idea within the original Italian hobby circuit was not too bad, the execution was lacking, and the outputs of interest were sort of compressed, but the idea of a bridge driven by a reasonably \*low\* impedance current source, resulting in short transient recovery from the ESL and limited peak response, is not bad at all.

A better idea, I think, is to use a proper higher-impedance

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current source, and drive with a 100kHz sine wave, thereby greatly reducing the ESL problem, which can otherwise be a killer for the 1 to 30 milliohm region. Using a sine wave also means the measured ESR can be compared with laboratory meter readings. Otherwise, how would one compare sets of square-wave readings with accurate lab instrument readings?

I'm thinking of using a 2-volt peak sine wave with a 200-ohm

2-volt P-P is too high to do in-circuit testing in all cases as it could cause Si junctions to conduct. 0.2V or 0.3V would be a lot better.

resistor (10mA peak test current) delivered from a rail-to-rail opamp with a slew rate exceeding say 2V/us. I'll break the resistor into three parts and add two sets of protection diodes to the rails. The outermost resistor can be a 100-ohm 10-watt high-thermal-mass part to discharge the capacitors.

Some of the designs out there don't bother with discharging the capacitor- they put a low (and stable) -ESR cap of a few uF in series with the DUT. That way you have an upper limit on the energy to be handled (given an upper limit on the voltage of (say) 400VDC or 500VDC to handle off-line filter caps).

Best regards,  
Spehro Pefhany

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"it's the network..." "The Journey is the reward"

speff@xxxxxxxxxxxxx Info for manufacturers: <http://www.trexon.com>

Embedded software/hardware/analog Info for designers: <http://www.speff.com>

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