

R&E - Feature #1117

Article about measuring low capacitance with DMM

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Description

Proper probe setup and compensation is crucial for low capacitance measurements. That's why handhelds, including 87V are barely a tool for such applications, it's rather indicator tool, then measurement.

Used tools:

- [Repaired HP 4263B LCR bridge meter](#), with [modified generic twizzer probe](#), after open and short self-calibration.
- Fluke 87V
- 2-lug banana jack with soldered 4 x 22pF NP0 0805 C0G capacitors, giving total 88pF spec
- [Repaired Nikon D3 camera](#)

My 87V without anything connected to it was reading 0.26 nF, stable and steady. I nulled that by pressing REL Delta, as that's just parasitic capacitance of measuring path of terminals/meter itself.

f_open.jpg

This is open baseline, reading 0.00 nF, stable. It's only 3.5 digits in this mode, lowest 10nF range, so it already gives idea that you are at very limit of an instrument itself.

Now get 4263B powered on and ready.

hp_open_end.jpg

Here is probe tip for LCR bridge. It's 70 cm long, 4 coax probe with BNC ends for common terminal connection at LCR bridges.

hp_open.jpg

Here's display output. 10kHz test frequency at 1V level. This frequency gives most digits on HP/Agilent 4263B for capacitance measurement.

hp_meas_end.jpg

You can see capacitors soldered to flat copper stubs between banana terminals. This is by no means best setup, but it should do the job.

Best would be having full coax setup right to the capacitors.

And result: 89.67pF

hp_meas.jpg

Now plug that bodge probe thing into Fluke 87V:

f_meas_end.jpg

And result: stable 0.09 nF.

f_meas.jpg

Take my word, it's not bouncing or changing unless I touch terminals.

So in two words: Handheld DMM ain't a right tool for pF and below range measurements.