EEVblog Electronics Community Forum

Products => Test Equipment => Topic started by: Faringdon on June 28, 2022, 02:30:20 pm

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Title: **Accuracy of LCR meter?**
Post by: **Faringdon** on **June 28, 2022, 02:30:20 pm**

Hi,
Do you agree this LCR meter cannot realistically measure 37uH or so?...because its accuracy is stated as 2% of 2mH = 20%.

LCR meter
https://www.farnell.com/datasheets/1955257.pdf (https://www.farnell.com/datasheets/1955257.pdf)

Title: **Re: Accuracy of LCR meter?**
Post by: **rs20** on **June 28, 2022, 02:39:47 pm**

Yeah, I suspect it'd be fairly useless for that, but I think your reasoning is wrong.

37uH would get rendered as "0.037" mH, except it would it would be off by up to (2% of 37 uH (negligible; ~ 1uH) PLUS 8 counts (where the least significant digit here is uH, so ~ 8uH)), so anywhere from "0.028" to "0.046" mH would be reported in the case of a nominal 37uH inductor. In other words, about +/- 25% error on the inductance value. So pretty hopeless.

Title: **Re: Accuracy of LCR meter?**
Post by: **Martin72** on **June 29, 2022, 08:59:32 pm**

Hi,

Quote

> because its accuracy is stated as 2% of 2mH

According to the sheet you´ve linked, there is no remark that the 2mH range got 2%.
It´s only stated, the BEST accuracy will be 2%, not on which range.
Apart from this, 2mH as lowest range makes it useless.
It should have 200µH range at least:

https://www.amazon.de/Kapazit%C3%A4ts-Induktivit%C3%A4ts-Pr%C3%BCfvorrichtung-Meter-Selbstentladung-Strecken-Anzeige/dp/B07BR2N7GB/ref=asc_df_B07BR2N7GB/?tag=googshopde-21&linkCode=df0&hvadid=266451026830&hvpos=&hvnetw=g&hvrand=7066970650968613726&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9043666&hvtargid=pla-444110103102&th=1 (https://www.amazon.de/Kapazit%C3%A4ts-Induktivit%C3%A4ts-Pr%C3%BCfvorrichtung-Meter-Selbstentladung-Strecken-Anzeige/dp/B07BR2N7GB/ref=asc_df_B07BR2N7GB/?tag=googshopde-21&linkCode=df0&hvadid=266451026830&hvpos=&hvnetw=g&hvrand=7066970650968613726&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9043666&hvtargid=pla-444110103102&th=1)

My recommendation :
Save a little bit more money and buy a DER DE5000.
Starting at appx 100 bucks, depending on the accessoires, there´s no better choice for the money, imho.

Title: **Re: Accuracy of LCR meter?**
Post by: **bd139** on **June 29, 2022, 09:17:25 pm**

Buy Peak LCR45 from CPC. That will measure reliably down to 0.3uH which is outside it's specified capability. I've tested one against a fixture with a signal generator and scope and a 6.5uH inductor was measure at 6.6uH.

I wouldn't buy the DER. There's no warranty service or calibration options unlike the Peak.

Title: **Re: Accuracy of LCR meter?**
Post by: **Martin72** on **June 29, 2022, 09:29:07 pm**

Warranty: Who cares about it, when buying ultra-lowcost stuff like DER or peak.
Calibration: It´s the same, open and shorted probes.
We got LCR40 and LCR45 at work for quick checking, can do a comparison between them and the DER, if it´s interesting for anyone.

Title: **Re: Accuracy of LCR meter?**
Post by: **bd139** on **June 29, 2022, 09:32:51 pm**

Please do. Interested in results.

As for warranty I do. Stuff on the cheap end likes to drop dead.

Title: **Re: Accuracy of LCR meter?**
Post by: **TimFox** on **June 29, 2022, 10:04:51 pm**

The DER unit is cost-effective. I have checked my unit's calibration against secondary lab standards, and was amazed at the accuracy.
You do have to run through the calibration routine with the test connections you intend to use for the measurement, and you do have to be careful not to connect a charged capacitor to the terminals.
My only complaint is that if you measure a "capacitor" whose actual reactance at the (high) test frequency is inductive (above SR), it does not return a negative value, so you don't know that it is inductive.
You need to use the phase angle measurements to check on the sign of the imaginary component.
In doubtful cases, I would prefer a real/imaginary component readfout, but the inexpensive DER does not support that.

Title: **Re: Accuracy of LCR meter?**
Post by: **mawyatt** on **June 29, 2022, 11:38:42 pm**

2nd the DE-5000, really good value. Here's a few comparisons we did some time ago with a Tonghui TH2830 lab type LCR meter.

Reading/ESR and TH2830 with supplied Kelvin Clips and DE-5000 with supplied short Alligator clips except as noted.

Type	TH2830	DE-5000	
10uH @100KHz	9.39761/0.1754	9.366/0.13	
470uH @100KHz	449.188/3.8841	449.8/5.1	
470uF @100Hz	439.802/0.13115	440.6/0.1	
100uF @ 1KHz	91.6142/0.43874	91.72/0.43	
1uF @ 1KHz	1.00896/0.0181	1.0097//0.02	
0.1uF @ 100KHz	99.5913nF/0.289	99.52nF/0.28	
2.2nF @ 100KHz	2.18710/11.435	2.193/10.72	
#12 Wire @ 100KHz	51.123nH/0.00206	43nH/0.00	51nH/0.0 with special custom Kelvin Clips
0.1 ohm @ DCR	0.101054	0.11	
1 ohm @ DCR	1.00540	1.01	
10 ohm @ DCR	9.97630	9.97	
100 ohm @ DCR	99.7219	99.61	
1K ohm @ DCR	998.001	998.0	

Judge for yourself how good the DE-5000 behaves!!

Best,

Title: **Re: Accuracy of LCR meter?**
Post by: **bicycleguy** on **June 30, 2022, 01:36:43 am**

I'm really liking my Shannon LCR Tweezers.

There discussed here:
https://www.eevblog.com/forum/testgear/design-a-new-precision-lcr-tweezers/msg3473886/#msg3473886 (https://www.eevblog.com/forum/testgear/design-a-new-precision-lcr-tweezers/msg3473886/#msg3473886)

Kind of new, (device and for me), but 3 firmware updates since I bought :-+. I've been to busy to study the specs, but in use it matches my 121GW. Haven't bothered to calibrate it yet. Repeatedly measures a 10uH inductor as 9.966uH.

Title: **Re: Accuracy of LCR meter?**
Post by: **tautech** on **June 30, 2022, 01:49:01 am**

Quote from: bicycleguy on **Today** at 01:36:43 am

> I'm really liking my Shannon LCR Tweezers.
>
> There discussed here:
> https://www.eevblog.com/forum/testgear/design-a-new-precision-lcr-tweezers/msg3473886/#msg3473886 (https://www.eevblog.com/forum/testgear/design-a-new-precision-lcr-tweezers/msg3473886/#msg3473886)
>
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100% with you on smart tweezers and been using them for 15 years on all TH and SMD work.
Good quality ones and it seems Shannon's are, negate the need for other LCR equipment unless you're chasing high precision in which case you'd be better off with a mains powered bench LCR meter.

Title: **Re: Accuracy of LCR meter?**
Post by: **abdulbadii** on **June 30, 2022, 06:41:03 am**

How SMD C can be known onboard when there often possibility of lowering ohm parallels
need to separate a pin and so ordinary probe should be used finely anyway

Title: **Re: Accuracy of LCR meter?**
Post by: **bd139** on **June 30, 2022, 06:44:23 am**

Indeed. To get an accurate impedance measurement of a part it needs to be in a fixture or you're getting an impedance measurement of the network. That might be good enough but it's not good enough for most diagnostics hence why I don't own SMD tweezers. Lifting a leg or the whole SMD part is advisable and you can usually make do without the tweezers then.

If you must have tweezers, Peak sell 'em: https://www.peakelec.co.uk/acatalog/smd03m-lcr-and-esr-test-tweezers.html (https://www.peakelec.co.uk/acatalog/smd03m-lcr-and-esr-test-tweezers.html)

Title: **Re: Accuracy of LCR meter?**
Post by: **fyl2022** on **June 30, 2022, 07:39:35 am**

you may try a benchtop lcr meter, MATRIX LCR METER MCR-5200 looks nice, it has good accuracy and quality, they sell on amazon, here is the buying link:
https://www.amazon.com/MATRIX-apacitance-Insulation-Resistance-%EF%BC%8840Hz-200kHz%EF%BC%89/dp/B07ZCJ1319/ref=sr_1_1?crid=GFLDWRR2RHG2&keywords=MCR-5200&qid=1656574710&sprefix=mcr-5200%2Caps%2C665&sr=8-1 (https://www.amazon.com/MATRIX-apacitance-Insulation-Resistance-%EF%BC%8840Hz-200kHz%EF%BC%89/dp/B07ZCJ1319/ref=sr_1_1?crid=GFLDWRR2RHG2&keywords=MCR-5200&qid=1656574710&sprefix=mcr-5200%2Caps%2C665&sr=8-1)

Title: **Re: Accuracy of LCR meter?**
Post by: **BravoV** on **June 30, 2022, 11:42:26 am**

Accuracy for LCR meters that use Cyrustek ES51919 and ES51920 based chip sets are pretty good. Example : DE-5000, MS-5308 or UNI-UT612 and etc.

For calibration there was an info shared by other fellow here in this forum ->

Quote from: mwb928 on May 15, 2018, 10:20:56 am

> For those who would like to perform unit calibration, here is the information and it is also works on Mastech MS5308, UNI-UT612 or whatever using Cyrustek ES51919 and ES51920 ship set.
>
> For DE-5000, adjust DC 500mV between TP1 and TP2.
>
> For others, adjust DC 500mV between pin 26 and pin 28 on ES52920.

Using my cheapo MS-5308 compared with probably 5 digits priced Wayne-Kerr 6440B LCR meter :scared: ...

(https://www.eevblog.com/forum/projects/reference-for-lcr-or-esr-meters/?action=dlattach;attach=82495;image)

(https://www.eevblog.com/forum/projects/reference-for-lcr-or-esr-meters/?action=dlattach;attach=82692;image)