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tech tips

Answers To Common Questions On Z METER™ Leakage Test

These are the answers to the most common questions customers ask about the Z METER leakage test. By learning the answers, you should be able to use your Z METER more effectively.

1. Why does the Z METER use high voltages to test capacitors? Why not just test them with an ohmmeter?

Capacitor leakage is not linear with applied voltage. Therefore, testing for leakage with an ohmmeter, which typically applies less than 3 volts, does not ensure that the capacitor will work in the circuit.

The graph in Figure 2 shows a typical capacitor with leakage. The capacitor is rated at 300 volts. An ohmmeter shows no leakage. It continues to show no leakage at all until the test voltage reaches 50 volts. The leakage current then climbs rapidly, until it has over 9000 microamperes of leakage at 300 volts.

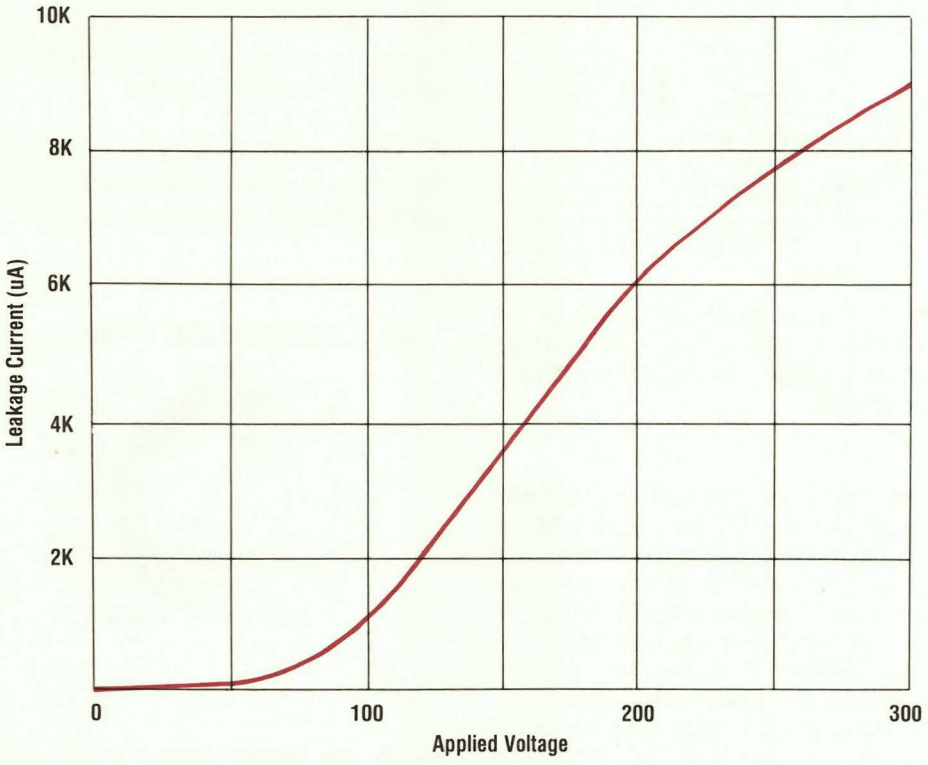

Fig. 2: This 300 volt electrolytic capacitor showed no leakage at all until the test voltage reached 50 volts. The leakage then increased rapidly until it was at 9000 uA at 300 volts!

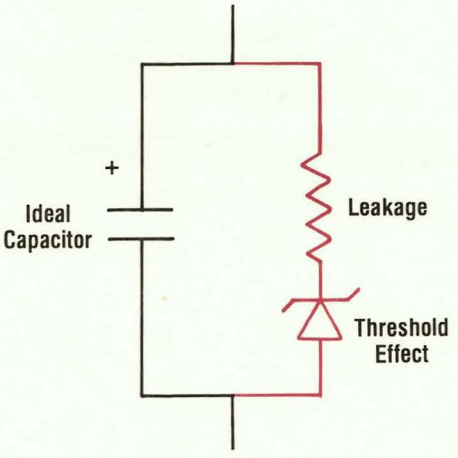

Fig. 1: The Z METER leakage test supplies enough voltage to overcome the threshold, which acts like a zener diode in series with the leakage. Low voltage ohmmeters cannot overcome this threshold.

2. What voltage should I use if the capacitor's voltage falls between two Z METER voltages?

Always use a voltage which is UNDER the rated voltage if the capacitor you are testing falls between two Z METER voltages. This prevents over-loading the capacitor during testing. For example, a 35 volt capacitor should be tested with 25 volts, not 50 volts. Use the selected test voltage (25 volts in this case) when looking for the allowable leakage limit on the leakage chart.

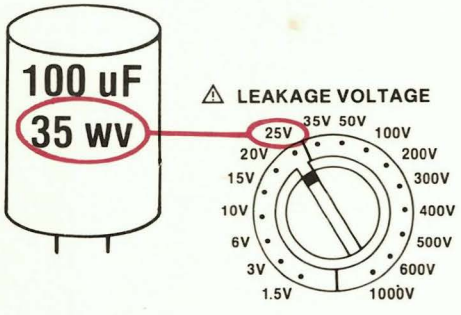

Fig. 3: Always use the next lower voltage if the capacitor's working voltage falls between two Z METER voltage steps.

3. What does it mean when the display flashes eights as soon as I press the LEAKAGE button?

The flashing eights (''overrange'') mean that the capacitor is drawing more current than the meter range you're using. There are three things which may cause this: 1. You may have the wrong leakage current range selected, 2. A larger value capacitor may be charging, or 3. The capacitor may have excessive leakage.

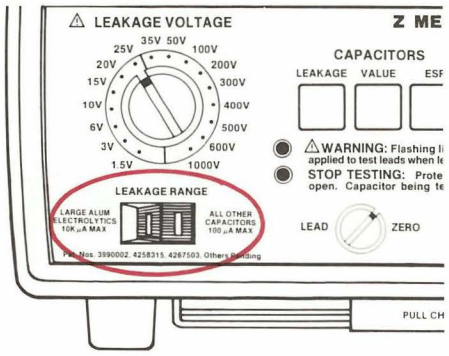

Fig. 4: Always check the setting of the LEAKAGE RANGE switch if the leakage indicator flashes ''888'' for more than a few seconds.

First, check the setting of the LEAKAGE RANGE switch. (NOTE: The LC102 AUTO-Z™ automatically selects the correct range for you.) It should be in the ''All Other Capacitors'' position UNLESS testing an aluminum electrolytic capacitor. If you are testing an electrolytic, the range depends on the capacitor's value and voltage rating. Capacitors which fall into the grey-shaded area of the chart need the large alum electrolytics position of the switch.

Capacitors larger than a few microfarads may show overrange for a few seconds while they charge. Simply hold the LEAKAGE button down for a few seconds to see if the display comes out of the overrange condition. If it continues to overrange, the capacitor has excessive leakage or is shorted.

Leaky electrolytics can sometimes be reformed. Simply follow the instructions for your Z METER to use its power supply to apply continuous voltage. Check the digital readout from time to time to see if the leakage has dropped below the normal limits. If it does, the capacitor is reformed. Most capacitors reform in less than an hour. Throw the capacitor away if the leakage current stays above the maximum value or continues to overrange.

4. What is the difference between the voltages with a blue band on the switch compared to the red band?

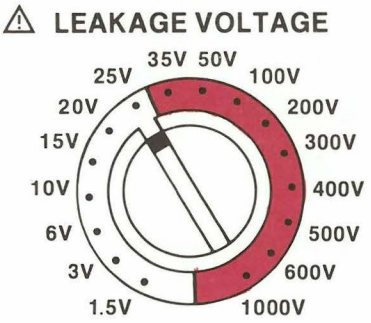

Fig. 5: The voltages marked in red could cause electrical shock, so use extra caution.

The voltages in the red area are high enough to cause a possible shock hazard. Use extra caution when making leakage tests with these voltages. The red warning light also flashes as an added warning.

By the way, the selected voltage is only applied during the leakage test. The Z METER makes all other tests at less than 5 volts, so there is no chance of electrical shock.

5. Why does my voltmeter read low when I measure the output voltage on some Z METERs?

You must connect a capacitor (at least 0.1 uF) in parallel with the meter to get an accurate reading. Here's why.

The LC53 Z Meter™ and the LC75 Z METER 2 use a power transformer to supply the voltage for the leakage test. The output of the transformer is rectified, but not filtered. The capacitor under test acts as the supply filter, charging to the peak voltage supplied by the rectifier.

When you connect a DC voltmeter across the test leads, it will read low because it converts the pulsating, half-wave rectified signal to its AVERAGE value, not its PEAK value. Simply connect a capacitor of at least 0.1 uF (with a voltage rating high enough for the voltage you are testing) across the test leads before testing the voltage with a meter. This filters the supply, so that the meter reads correctly.

for more information

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