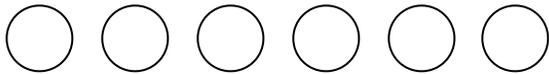


NASA TechBriefs Publishes White Paper for Siborg's All-in-One LCR-Reader-MPA Digital Multimeter

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A paper describing a technique to measure very small capacitors using LCR-Reader-MPA Digital Multimeter has been published. It also covers the devices capabilities and features.

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Siborg Systems Inc. has recently published a white paper on TechBriefs about their newest device, the LCR-Reader-MPA. The paper gives insight to the devices' measurement capabilities.

The [LCR-Reader-MPA white](#) paper reviews how the device uses different measurement methods in order to produce high accuracy measurement results, the principles of operations, including how the device can automatically determine the types of components and best test parameters to use. The paper also provides a short summary of the device's features,



LCR-Reader-MPA all-in-one multi tester with wide range of

functions and how to use the Offset Removal feature to provide more accurate measurements for specific measurements.

[LCR-Reader-MPA](#) offers users automatic and manual measurements of L, C, R, and ESR by grasping a component. The device will determine the type of component, best test range frequency, and signal frequency before displaying all measurement data on the OLED screen.

The white paper explains that MPA uses two methods of measuring capacitance using AC response method and DC charge/discharge methods. Using the AC response method allows the device to have a 0.1% basic accuracy for capacitances from 0.1 pF to 1 mF; the DC charge/discharge is more efficient in the range from 1 mF to 1 F.

To use the Offset Elimination Technique, the paper explains how to use the Capacitance Offset Calibration board to obtain more accurate results with a specific component in mind. The [Offset Calibration board](#) is a dummy PCB with holes to represent the various sizes of components which is used to accurately determine the parasitics of the tweezer probes at that size. Users place the tweezers' tips into the corresponding holes on the PCB and make open calibration by pushing the joystick to the right and holding for 2 beeps. The value is stored on the device and automatically removed from the measured value.

The same approach could be used with other tweezer-meters such as [Smart Tweezers](#) but the subtraction of the offset is less intuitive.

“Initial values of the Impedance (offsets) obtained during calibration with Open and Short probes are stored in the non-volatile memory of the device and are considered in the calculation in the impedance of the measured component thus eliminating the offset due to the device internal parasitics.”

The principle of operations is explained as: “Voltage from the voltage source through a limiting 100 Ω resistor is applied to the DUT connected at points A and B. The amplitude and frequency of the Test Signal V are adjustable. The voltage drop on resistor R_j measured by DA_j is proportional to the current flowing through the measured component. After digitizing the ADC signals the impedance is calculated according to the formula DUT impedance $Z = R_j \cdot V_{au} / V_{aj}$.”

The main features on LCR-Reader are as follows:

- L, C, R, ESR measurements
- Oscilloscope, Signal Generator,
- Open/Short Calibration
- AC/DC Voltage/Current measurements
- Frequency, Pulse Period, Duty Cycle meter
- Component sorting
- Super Cap Testing
- 100 Hz - 100 kHz Test frequency
- NIST Traceable Calibration Certificate
- 0.1% Basic accuracy
- 3 Test signal levels :0.1, 0.5, and 1.0 Vrms
- 1 oz. Weight
- Li-Po battery with micro-USB charging

The [LCR-Reader-MPA Digital Multimeter](#) also has an optional Bluetooth model that connects to PC using Bluetooth dongle. The device is able to send measurement data in real-time over the remote connection. Other

features and functions and 0.1% basic accuracy

LCR-Reader-MPA is capable of accurately measuring sub-picofarad capacitors. This is an all-in-one Digital Multimeter with 0.1% basic accuracy and wide range of features including 100 kHz test frequency, Oscilloscope mode, AC/DC Voltage/Current measurements, LED/Diode testing and more.

Digital Multimeters including [Smart Tweezers](#) and accessories are available in Siborg's Online Store.
