

A5 - V3.2

Elektor 2 MHz LCR Meter Kit



Description

Essentials

An important parameter to characterize passive components (resistors, capacitors, and inductors) is their impedance (Z), which cannot be measured with a multimeter. To measure Z , at least two AC values are needed (in magnitude and in phase), generally the voltage across the component and the current flowing through it. Other parameters are important when characterising passive components. The large LCD of the Elektor 2 MHz LCR Meter displays all relevant values, depending on the type of component being measured.

Up to 2 MHz!

The Elektor 2 MHz LCR Meter uses the self-balancing bridge method to analyse passive components, a relatively easy method with good accuracy, at reasonable cost. Whereas the measuring range of most commercially available, high-tech equipment is limited to 100 or 200 kHz, the Elektor's meter can carry out measurements of up to 2 MHz!

Features

The designer has paid special attention to the ease of use (including automated calibration) and ergonomics: a rotary encoder associated with five multi-function pushbuttons and a 240 x 128-pixel LCD graphic display enable users to navigate easily and intuitively in the menus, to change the frequency, and, of course, to display the measurements. Elektor's do-it-yourself kit features a main board and a display board, which are supplied, assembled, and tested in working order. They are ready for the semi-automatic calibration that the user will do by himself thanks to the precision components present on the main board, guided by an illustrated and printed manual included in the kit.

Specifications

The Elektor 2 MHz LCR Meter Kit is an automatic impedance measuring bridge with extended functionality:

- Measures the resistance, capacitance and inductance of components with an impedance of 10 m Ω to 100 M Ω
- Test frequency from 50 Hz to 2 MHz
- Four possible test voltages (0.1, 0.2, 0.5 and 1 V_{rms})
- Additional DC polarization up to 5 V for capacitors and 50 mA for inductors
- Two configurations possible:
 - Standalone mode with main board + display extension
 - Main board (without display extension) connected via USB to a computer running the user program (Windows, Linux, MacOS)

Display	- LCD dark dots on light background - Format: 240 x 128 dots - Viewing area: 92x52 mm	
Buttons & switches	On-Off power switch	Rotary knob and 5 pushbuttons for menu navigation and parameter selection
Case	Hammond 1455 series extruded aluminum case with two black plastic bezels. Dimensions : 4.173" x 6.535" x 2.205" 106 mm x 166 mm x 56 mm	
Inputs	HD-HS-LS-LD 4 BNC sockets (Kelvin)	mini-USB (power + data)
Languages	English (default), Dutch, French, German	
Calibration	Semi-automatic, no external components are required. All high precision components required for calibration are originally fitted on the main board.	
Weight	987 g	

Main Technical Specifications

Display	<ul style="list-style-type: none">- Parameter values (principal and secondary)- Equivalent circuit: series or parallel- Frequency- Z- Φ- Q or D- Voltage and current of DUT (V_x and I_x)- Test voltage (AC) and polarization (DC)- Range hold status (R_Hold)- Labels for multi-function buttons (right-hand side)	
Measurement range	Parameter	Value
	L	10 nH → 100 H
	C	1 pF → 100 mF
	R, $ Z $	10 mΩ → 100 MΩ
	Q	0 – 5000 for display
	Φ	– 90.00 ° / +90.00 °
Test frequencies	50 Hz to 2 MHz in 54 predefined steps or any frequency within the range	
PC software	for Windows, macOS and Linux	
Test conditions:		
Open-circuit test voltage	4 options: 0.1 V_{rms} , 0.2 V_{rms} , 0.5 V_{rms} , 1 V_{rms} ± 5%	
DC Polarization	For C : 0 to 5 V For L : 0 to 50 mA	
Accuracy of main parameter (R, L, C) :		
Conditions	After calibration and with use of a suitable test frequency for the DUT (at high frequencies parasitic components become very important)	
Accuracy	Up to ± 0.1% ±1 of last digit	
Test connections	4 wire Kelvin via BNC connectors	
Total current with MCU board + backlit display board		
	without polarization	while polarizing the DUT
	420 mA	up to 620 mA
Backlit display board alone	82 mA	
Power supply	5 V_{DC} 1 A ± 5%, USB A (not included)	

Contents of the Kit

- Assembled MCU board (BNC connectors not mounted)
- Assembled Display board (button of the rotary switch not mounted)
- Four PCB-mount BNC connectors
- Flatcable (reversible)
- Button, Ø 24mm
- Test clip with two Kelvin clips and 4 BNC connectors
- Four jumpers (for settings during calibrations)
- Screwdriver (trimming tool)
- Machined and screen-printed Hammond case with special screws (8) and rubber feet (4)
- Screws and bolts
 - 5 x M3 male-female standoffs, 6 mm high
 - 5 x 4 mm Pozidrive countersunk M3 screws
 - 1 flat washer DM3, thickness 0.5 mm
 - 5 x M3 self-locking nuts
- Assembly Manual (full-color 32 pages)



Information sources

Product description in Elektor Store:

www.elektor.com/19883

Project page on elektor Labs:

www.elektormagazine.com/labs/remake-lcr-meter

Various information documents (*Operation, Operating instructions, PC interface, etc...*) in English and French can be downloaded from this page:

www.elektormagazine.com/magazine/elektor-167/59255

The file named 190311 AU2019 DOC EN & FR 2021-01-04.zip on the "Software" tab contains useful information:

- LCR Meter AU2019 - EN Operation Rev 6b.pdf
Description of the device's operation.
- LCR Meter AU2019 - EN Operating Instructions Rev 16a.pdf
The User Manual.
- LCR Meter AU2019 - EN Communications Rev 6b.pdf
Description of the messages exchanged by the device and the PC program (AU2019).
- LCR Meter AU2019 - EN PC interface Rev 0b.pdf
To view / modify the AU2019 program code.
Description of the required tools.
- LCR Meter AU2019 - EN Changing the code Rev 1c.pdf
To change the code of the Firmware or the Bootloader.
Description of the required tools.
- LCR Meter AU2019 - EN The text file Rev 4a.pdf
To change the displayed texts or add a language.
Description of the formatting of this file.

