

# Digital Multimeter LCR-Reader-BT

## Bluetooth Data Acquisition Tool



## LCR-Reader-Logger

### User's Manual

Version 2.47

Firmware Version 33

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## 1. Introduction

Data logger for LCR-Reader line of multimeters is an application program that provides a graphical user interface for controlling the multimeter and recording measurement data with available voice accompaniment. Components can be selected for test both in the table (BOM) and in visually the PCB drawing by a mouse click.

## 2. System requirements

Operating system Windows 7 or higher and Bluetooth adapter.

## 3. Installation (removal) of software

- Download the program installer from the page <http://www.lcr-reader.com/downloads/BT>.
- Unpack the LCR-Reader-Logger\_Installer.zip archive.
- Run the installation file LCR-Reader-Logger\_Installer.exe as an administrator and follow the installer prompts.
- Desktop icon  is created and a folder \Documents\LCR-Reader-Logger\ containing manuals, drivers and initial data example. The dongle driver required to run Logger under Windows 7 or older has to be installed using files ccxxxx\_usb\_cdc.\* in \Documents\LCR-Reader-Logger\drv\ folder.

### 3.1 Removing software.

- Go to Windows **Control Panel**
- Select **Programs and Features**
- Select the **LCR-Reader-Logger** program and click the **Uninstall** button

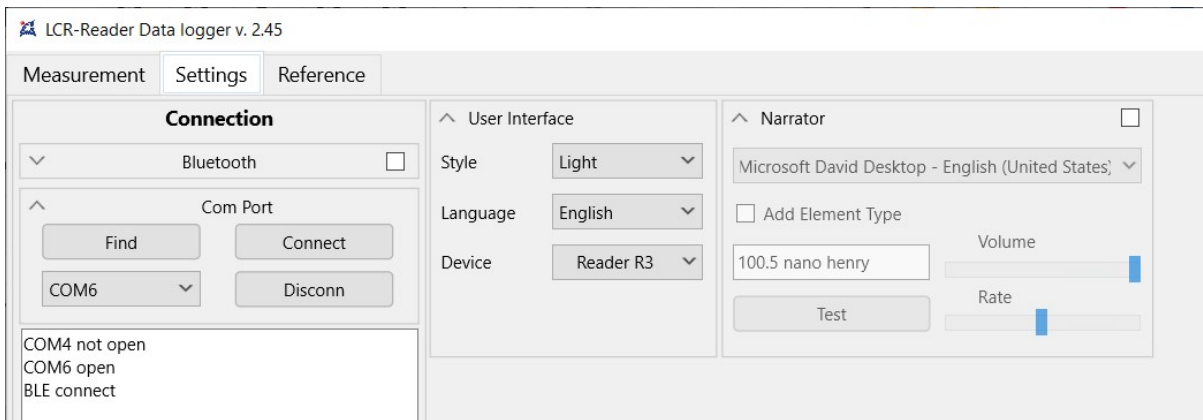
## 4. Setting up the program

There are three tabs in the main Logger window: Measurement, Settings and Reference. When the program is used for the first time, user preferences have to be established by using Setting window.

### 4.1 GUI Settings window

The following GUI settings are available

- **Style:** Light, Dark, Blue and Dark1 themes are available
- **Language:** Currently only English is available
- **Device:** Select as required LCR-Reader-MPA, LCR-Reader-R2 or LCR-Reader-R3



#### 4.2 Narrator window

This window allows to configure the voiceover for measurements. When the Narrator checkbox is checked, the instrument readings are voiced in the selected language.

- **Language:** Only English interface language is currently available
- **Component type:** Component type is voiced if the checkbox is checked
- **Volume:** Set audio volume level
- **Rate:** Set narrator rate
- **Test:** Verify Voice Acting settings

#### 4.3 Connection window

This window allows to configure connection for the device. There are two options: direct Bluetooth connection and virtual Com Port connection.

##### 4.3.1 Bluetooth connection

When the Bluetooth connection is selected:

- Turn on the device
- Launch the program from your desktop
- Click the **Scan** button
- Select the desired device found with the left mouse button click

If the connection is established successfully, the program will go into the Measurement mode and start showing the measurement results.

##### 4.3.2 Virtual Com Port connection

1. Connect the USB Bluetooth adapter dongle to your PC. The system may or may not discover a new device and install the required drivers.
2. If the drivers have not been installed, manually install them using files `ccxxxx_usb_cdc.*` in `Documents\LCR-Reader-Logger\drv\` folder.
3. Launch `LCR-Reader-Logger.exe` from your desktop.
4. In the COM Port window, click the **Find** button.
5. Below, in the drop-down menu, select the COM port that is created by the TICC 2540 USBCDC device.
6. Press the **Connect** button with the device turned on.
7. If the connection is established successfully, the program will go into the Measurement mode and start showing the measurement results.

## 5. Reference tab: Setting up measurement parameters

The Reference tab has five additional tabs: Database, I-V, Table Row, Add from CSV, and Add from Device. These tabs allow to modify the database using different source of data and change the test parameters.

When Reference tab is open, it allows to modify the reference component list and to link a PCB image that is interlinked with the component table. If the PCB image is linked, then component selection can be done in either the PCB image or the table.

Parameters for component being tested are set in the Reference window. There you also can add more components for testing by using different built-in tools. Components can be added by manually adding a row, using measurement data from the device, or by appending a simple semicolon “;” separated file with 5 columns: Designator; Comment; Accuracy; Layer; Center X (mm); Center Y (mm) . Here the Designator is the component name, Comment is component value, Accuracy is the required tolerance, Center X and Center Y are the coordinates of components on the PCB (optional parameters). The latter two parameters allow to link the PCB image to the component list thus allowing to visually select components for testing on the board image.

All made changes are immediately stored in the database in the User Documents folder in the **RLC Data** subfolder. You may save all data including linked PCB image using Save As button under Database tab.

N°	Test On/Off	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time	Hold	Sound	I-V	Mark	Side	
1	<input checked="" type="checkbox"/>	BT1	OFF			Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T	
2	<input checked="" type="checkbox"/>	C1	C 5.0%	10.0000	μF	OFF		Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	T
3	<input checked="" type="checkbox"/>	C2	C 5.0%	10.0000	μF	OFF		Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	T
4	<input checked="" type="checkbox"/>	C3	C 5.0%	100.0000	nF	OFF		Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	T
5	<input checked="" type="checkbox"/>	C4	C 5.0%	22.0000	nF	OFF		Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	T

### 5.1 Database window

The reference data is stored in a SQLite database. You may **Open**, **Save As**, and **Create** database files .

### 5.2 Table Row window

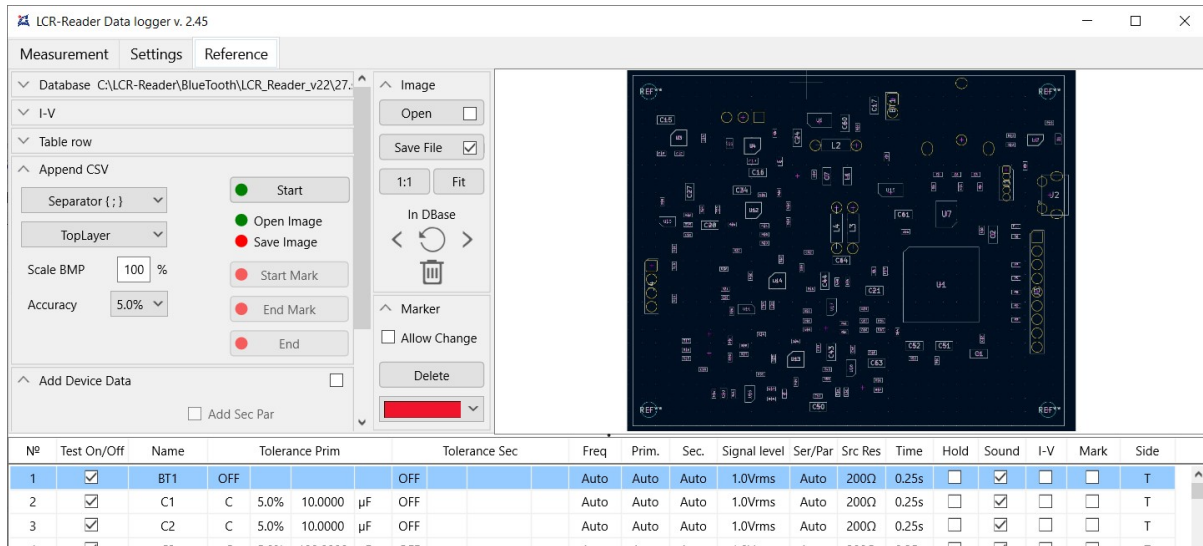
You may **Add**, **Copy** and **Cut** the selected table row. Check the checkbox for adding a mouse click on the table while changing data manually.

### 5.3 Upend CSV file Window

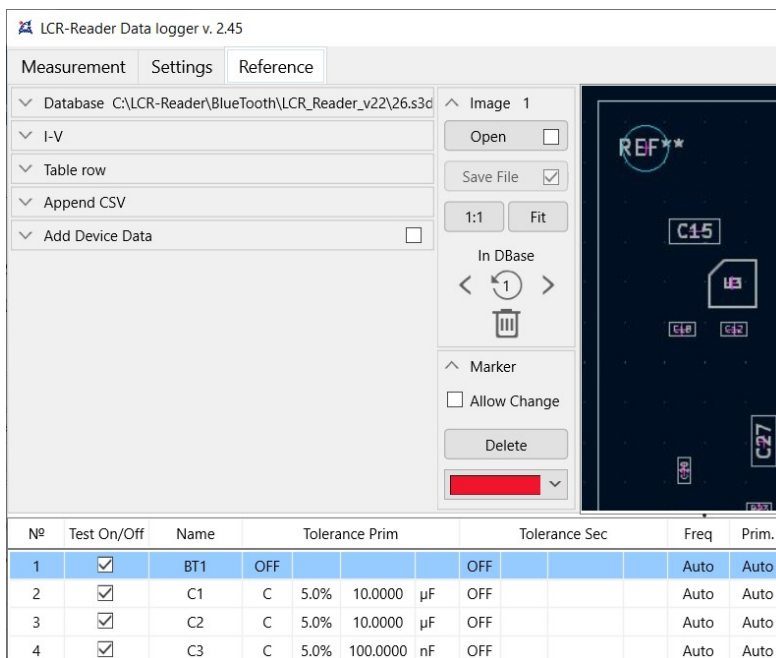
This window allows to upend data from a CSV file at the end of the database. The CSV file can be generated by any text editor, Excel or Altium Designer and should be formatted according to Appendices A, B.

1. Select the **Separator** for the CSV file, the **PCB layer**, the **Scale** of the PCB image and the component tolerances that are not specified in the CSV file.

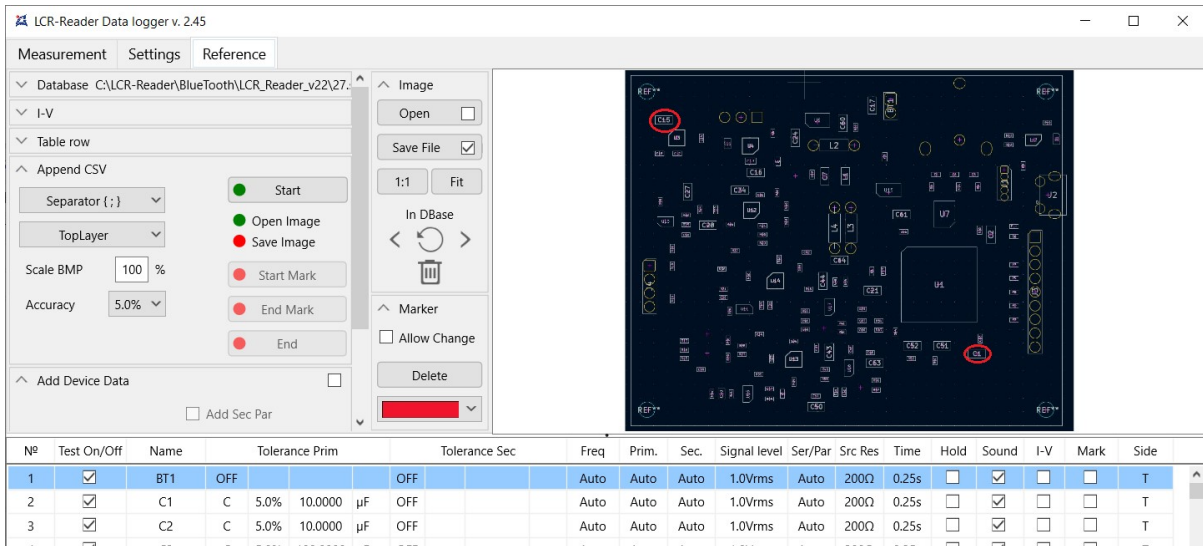
2. Click the **Begin** button and select the prepared CSV file in the dialog window that opens. The table at the bottom of the window will be filled with data.
3. Green and red circles indicate level of completeness of data import stages. Green/Red indicate completed/uncompleted actions. If no PCB image is available the dots will be red but the database will work as is.
4. To link an image to the component list, load the image in the **Figure** window by clicking the **Open** button to open a dialog for selecting a PCB image file. Image of the board will appear in the top right window. Click **Save Image** (Save path) button, to save the file (or the path) in the database.
5. Buttons **1:1** and **Fit** scale the open image.



6. **In Dbase** buttons allow you to view and delete saved pictures in the database. The number in the middle of the **Update** button is the number of the current picture in the database.



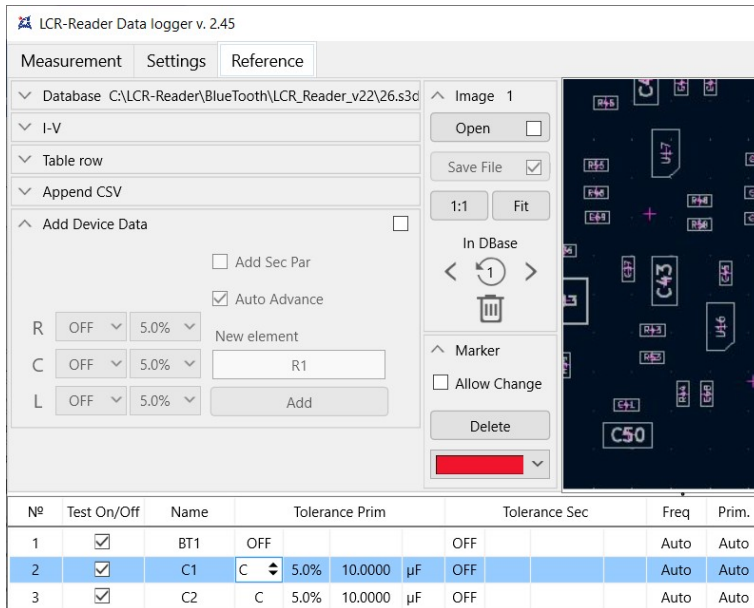
7. Select two components located at opposite ends of the board as shown on the picture.



8. Click on the first part in the table. Click the **Start Mark** button and click on the component in the picture. A cross marker will appear at the component.
9. Click on the second component in the list. Press the **End Mark** button and click the component in the picture. A cross marker will appear at the component.
10. Click the **End** button to complete linking the image and the component table. Now any selection of a component made in the image will be immediately reflected in the component table and vice versa.

There is an additional editing capability for manually editing the marked elements on the PCB image by using the **Marker** window. When the **Edit on** checkbox is checked, the selected component in the component list is linked to the image by clicking on its image on the board, on the contrary, the **Delete** button delete the marker on the board image and unlink it from the component table. The marker color can be selected in the dropdown menu of the **Marker** window.

#### 5.4 Add device data window



You can fill out the table of standards by measuring the parts with the device, simultaneously recording the current-voltage characteristic and marking the part in the photo. In the left half of the window, data from the device is displayed. Data rounding from the E24, E12 or E6 series and the tolerance have to be selected from the dropdown menu. Check the **Secondary enabled** box if you wish to include recording of the secondary device parameter in the table. Check the **Auto move** to move the cursor to the next line for a new record.

To add a component to the list do the following:

1. The device must be connected to the program.
2. If you need to record the current-voltage characteristics, turn on the current-voltage characteristic in the **I-V** window.
3. Using the mouse, select the starting position in the table for recording data.
4. In the **New element** window, enter the name of the element.
5. Connect the element being measured to the device.
6. Click the **Add** button.
7. Repeat steps 4, 5 and 6 for other board elements.

To mark a component on the board, do the following:

1. Open the board drawing. In the **Image** window, click the **Open** button . The board drawing will be displayed in the window.
2. Click **Save to file (Save path)** button to save the file (or the its path) in the database.
3. If you need to record the current-voltage characteristics, turn on the current-voltage characteristic in the **I-V** characteristic window.
4. In the **Marker** window, check the checkbox **Edit on**.
5. The device must be connected to the program.
6. Using the mouse, select the starting position in the table for recording data.
7. In the **New component** window, enter the name of the element.
8. Connect the component being measured to the device.
9. Use the mouse wheel to set the scale of the drawing and use the left mouse click to mark the component location on the board. A cross mark will appear in 2 seconds.
10. Repeat steps 7, 8 and 9 for other board components.

### 5.5 Changing data in a table.

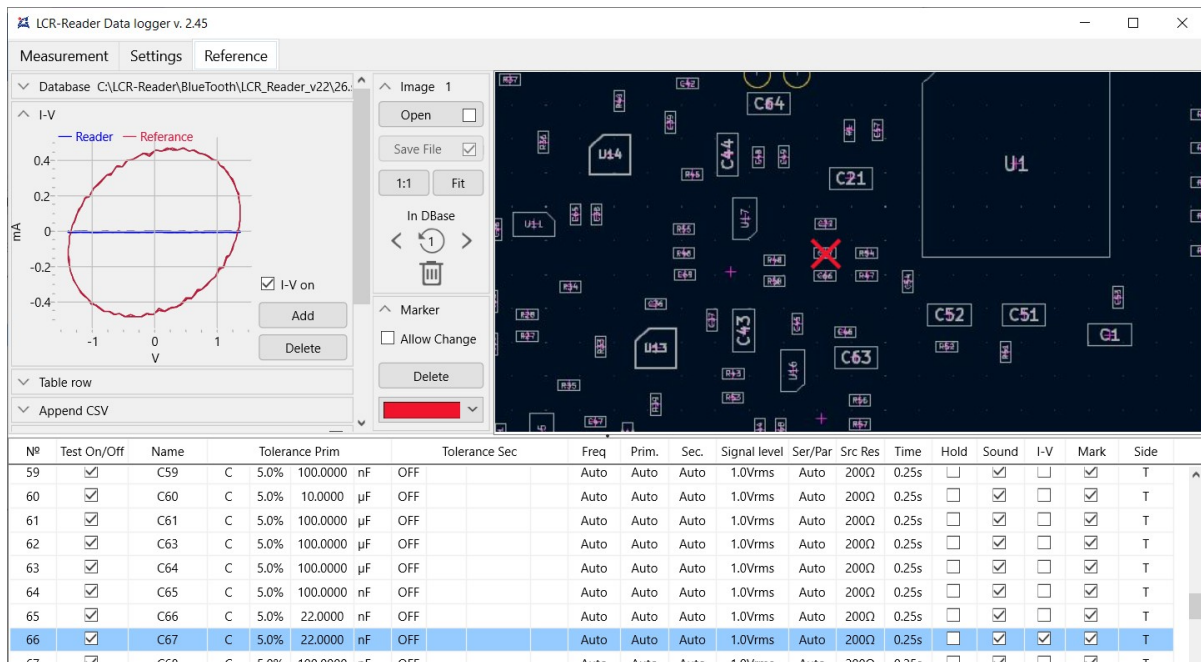
N°	Test On/Off	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time	Hold	Sound	I-V	Mark	Side
1	<input checked="" type="checkbox"/>	BT1	OFF			Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T
2	<input checked="" type="checkbox"/>	C1	C 5.0%	10.0000 µF	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	T
3	<input checked="" type="checkbox"/>	C2	C 5.0%	10.0000 µF	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T
4	<input checked="" type="checkbox"/>	C3	C 5.0%	100.0000 nF	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T
5	<input checked="" type="checkbox"/>	C4	C 5.0%	22.0000 nF	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T

Use the left mouse button to select the parameter to be changed. Select from the drop-down or type to change, or check (uncheck) the box. The data is automatically saved.

- **No:** Component number in the table, read only. To change the position of an element in the table, use the **Cut** and **Paste** buttons in the **Table Row** window.
- **Test:** when checked, allows testing of this component.
- **Designation:** name of the component.
- **First condition:** sets the first condition for rejecting the component.
- **Second condition:** sets the second condition for rejecting the component.
- **Frequency:** Test frequency.
- **Prim.:** Primary parameter on the device screen.
- **Sec.:** - Secondary parameter on the device screen.
- **Level:** Test signal level.
- **Mode:** Serial/Parallel equivalent circuit.
- **Source:** Signal source resistance (only for R2).
- **Time:** Measurement time.
- **Hold:** Enable the hold function.
- **Sound:** Turn on/off the sound.
- **I-V:** If checked, the I-V data is saved in the database, read only. Data can be entered and deleted in the **I-V** window.
- **Mark:** If checked the location (marker) of the component on the board is saved in the database, read only. Data can be entered and deleted in the **Picture** window. See also **Marker** window and **Figure** window Sections.
- **Side:** Top/Bottom side of the board.

## 5.6 I-V window

Displays both stored reference I-V data and data coming from the device. Turn on the IVC mode in the device. Check the **I-V on** checkbox to turn on display of data from the device. Click on **Add** button to save the I-V data from the device for the selected reference in the database. Click on **Delete** button to deletes the I-V data from the database for the component.



## 6. Measurement tab

When at the Measurement tab, the following window appears comprising four distinct areas: measurement frame (top left), I-V frame (top middle), circuit board image (top right) and component data frame at the bottom:

Nº	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time
132	R55	R 1.0%	68.000	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω 0.25s

Time	Nº	Name	Primary	Secondary	SER/PAR mode	Frequency	Signal level	Pass/Fail	% Primary
	129	R52							
	130	R53							
	131	R54							
	132	R55							
	133	R56							
	134	R57							
	135	R58							

The I-V frame, and circuit board image can be empty depending on whether the data is present in the data base.

The following control buttons are in the measurement frame:

**RLCD, RD** buttons to select the operating mode of the LCR-Reader device.

**LCD** button turns on/off the backlight of the device screen.

**Default** button resets measurement parameters to default options.

**I-V** button turns on/off display of I-V data (if it is present in the data base).

**Image Scale** field changes the scale of PCB image.

**Start** button starts periodic measurement of the selected component with a period specified in Reference tab for the component.

**Hold** button turns on/off the data hold mode.

**Test** button makes a single measurement of the selected component, alternatively can be done by pressing Shift keyboard key

**Pass** and **Fail** buttons indicate the test result status.

In addition to the buttons, five areas in the measurement frame, encircled in red, are clickable, these are signal level, test frequency, equivalent circuit, secondary and primary measured parameter. Left mouse button click opens a menu for selection of the parameter as shown below. Use the left mouse click to select the desired option from the menu.

Frequency	Primary parameter
Auto	Auto
100Hz	R Resistance
120Hz	C Capacitance
1kHz	L Inductance
10kHz	Z Impedance
100kHz	Large Cap
	Very Large Cap

## 6.1 Making measurements

There are two ways of testing the components: test many components in the component list one after another (**Multiple** tab) or testing the same component a few times in a row (**Single** tab). Initially the Measurement starts in the **Multiple** tab which looks like this:

Nº	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time	Hold	Sound	I-V	Mark	Side	
2	L1	L 5.0%	10.000 µH	OFF	Auto	Auto	Auto	Auto	Auto	Auto	2.0s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	T
Multiple		Single		<input checked="" type="checkbox"/> Auto Advance				Clear Test		Save Test						
Time	Nº	Name	Primary	Secondary	SER/PAR mode	Frequency	Signal level	Pass/Fail	% Primary	Deviation % Sec						
06.08.24 10:08:34	1	R1	R 351.41kΩ		P	10kHz	1.0Vrms	Fail	>100%							
	2	L1														
	3	C1														
	4	R2														

A component can be selected directly from the component list or from the PCB using the linked circuit board image. To test the selected component, press Shift or SpaceBar keys on the keyboard or click the **Test** button. If **Auto Advance** checkbox is checked, after writing the measurement data to the table, automatic transition to the next row of the component table will occur and next component from the list will be ready for testing, otherwise the same component may be checked a few times before selecting another component using left mouse click on a component in the list or in the PCB image.

To measure one or a few components with a single value and keep records of the measurements, select it in the component list under **Multiple** tab and click on the **Single** tab. The following window will appear:

Nº	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time	Hold	Sound	I-V	Mark	Side	
2	L1	L 5.0%	10.000 µH	OFF	Auto	Auto	Auto	Auto	Auto	Auto	2.0s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	T
Multiple		Single		<input checked="" type="checkbox"/> Auto Advance				Clear Test		Save Test						
Time	Nº	Name	Primary	Secondary	SER/PAR mode	Frequency	Signal level	Pass/Fail	% Primary	Deviation % Sec						
06.08.24 10:28:05	4	L1	L 10.638µH		S	10kHz	1.0Vrms	Fail	6.38%							
06.08.24 10:28:09	5	L1	L 9.9655µH		S	10kHz	1.0Vrms	Pass	-0.34%							
06.08.24 10:28:12	6	L1	L 9.9658µH		S	10kHz	1.0Vrms	Pass	-0.34%							
06.08.24 10:28:17	7	L1	L 9.9716µH		S	10kHz	1.0Vrms	Pass	-0.28%							
06.08.24 10:28:32	8	L1	L >500H		P	10kHz	1.0Vrms	Fail	>100%							

Repetitive measurements are done by pressing Shift or SpaceBar keys on the keyboard or by clicking the **Test** button. Alternatively, it can be done by clicking **Start** button, then measurement recordings occur at the specified recording interval shown in the Time column of the component list. After the test is completed, the results can be saved in a CSV file using **Save Test** tab. **Clear Test** tab clears current measurement results.

To measure several components, select the **Multiple** tab.

The data for culling and testing is displayed in the line in red:

Nº	Name	Tolerance Prim	Tolerance Sec	Freq	Prim.	Sec.	Signal level	Ser/Par	Src Res	Time	Hold	Sound	I-V	Mark	Side	
66	C67	C 5.0%	22.000 nF	OFF	Auto	Auto	Auto	1.0Vrms	Auto	200Ω	0.25s	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	T
Multiple		Single		<input checked="" type="checkbox"/> Auto Advance				Clear Test		Save Test						
Time	Nº	Name	Primary	Secondary	SER/PAR mode	Frequency	Signal level	Pass/Fail	% Primary	Deviation % Sec						
	129	R52														

Data is recorded in the results table:

- Click on **the Start button** in the program window. Recording.
- By pressing **the Spacebar** (or **SHIFT**) on the keyboard. **The Key** button in the program window duplicates the recording command.
- The write command comes from the device when capturing data in RLCD mode. **The Capture** button in the program window duplicates the RLCD mode menu item.

**The Clear** button clears data from the results table.

## 6.2 Data recording

To save the recorder measurement data to a CSV file, click the **Save** button.

## Appendix A

### Creating a CSV file using EXCEL

	A	B	C	D	E	F
1	Designator	Comment	Accuracy	Layer	Center-X(mm)	Center-Y(mm)
2	C1	100uF 16V	20%	TopLayer	167.894	20.609
3	C10	0.1uF	5%	Bottom	118.843	37.355
4	C11	0.1uF	5%	BottomLayer	121.743	37.355
5	C12	0.1uF		TopLayer	126.443	37.355
6	C13	10uF	10%	TopLayer	156.698	35.195
7	C14	10uF		BoTTomLayer	160.698	33.095
8	C15	100nF	10%	BottomLayer	88.999	16.593
9	C16	100nF		BottomLayer	94.599	16.593
10	C17	0.1uF	1%	BottomLayer	99.057	30.070
11	C18	0.1uF	1%	BottomLayer	129.957	30.070
12	C19	100nF		BottomLayer	91.499	16.593
13	C2	100uF 16V		TopLayer	167.894	15.009

Column A - names of board elements.

Column B - values of board elements.

Column C - detail accuracy. If not specified, the default value will be accepted

Column D is the board layer. If the part is on the **Bottom** layer, then you need to write **bottom**. If there is no combination of letters **bottom**, then the **Top** side is assumed.

Column E is the value of the X element position on the board (mm).

Column F is the value of the Y position of the element on the board (mm).

Keyword **Designator** in the first line is mandatory. Other words on this line are optional. Data recognition begins from the next line.

After filling out the columns of the Excel table, save the data as \*. **CSV file**.