

LCR IMPEDANCE TESTER

Product manual

NJ100/200/300 S/A

0Hz-300kHz



(V1.7)

Accuracy Agility Instrument

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一、Product introduction

Digital bridge is an instrument that can measure three basic elements (resistance R, capacitance C, inductance L) and other impedance parts to be measured.

Application scope:

Accurate and extensive measurement of electronic components:

Semiconductor components: impedance parameter measurement of capacitors, inductors, magnetic cores, resistors, transformers, chip assemblies and network components.

Impedance evaluation of other components: printed circuit board, relay, switch, cable, battery, etc.

Dielectric materials: loss angle evaluation of dielectric constants of plastics, ceramics and other materials.

Magnetic materials: evaluation of permeability and loss angle of ferrite, amorphous and other magnetic materials.

Semiconductor materials: dielectric constant, conductivity and C-V characteristics of semiconductor materials and components, and measurement ability of semiconductor device characteristics on wafer..

Liquid crystal materials: C-V characteristics such as dielectric constant and elastic constant of liquid crystal cells, and capacitance characteristics measurement.

Inductive device: combined with scanning test function, it can accurately analyze various characteristics of magnetic materials and inductive devices.

Diodes and MOS transistors.

Accurate ceramic capacitance measurement: ceramic capacitors have the characteristics of low loss value. At the same time, the AC signal applied by their capacity and loss will change significantly.

Inductance L and its DC resistance DCR can be measured and displayed at the same time, which significantly improves the efficiency of inductance measurement.

Multi parameter mixed display function: multi parameter simultaneous display can meet the requirements of comprehensive observation and evaluation of various distributed parameters of complex components without repeatedly switching measurement parameters.

Special note:

The constant pursuit of truth measurement is the process of our IT technicians' constant pursuit of science and truth! Isn't it the pursuit of the "**truth, goodness and patience**" of the world! Although many people do not pursue truth in reality, we still hope that the world will be better, more people have faith and contribute their part!!

NJ100/200/300 S/A series impedance tester, with a high-performance processor and ultra-low power design, is a portable product that is mainly used to measure the performance of the parameters of three basic components (resistance R, capacitive C, inductor L). Products built-in large-capacity lithium-ion battery, small size, light weight, easy to carry, for outdoor, high-altitude special work more convenient. Product display interface and keys clear and simple, at a glance, Chinese and English can be set themselves, easy to use, easy to operate. The measurement can be controlled remotely by serial communication.

main features:

- ① Wide test frequency range, $0.1\text{m}\Omega \sim 20\text{G}\Omega$. frequency range: $0\text{Hz} \sim 300\text{kHz}$, frequency point is continuously adjustable(Except NJ10*S).
- ② Small size, light weight, easy to carry. Size: $130 * 108 * 31$ (mm); net weight: 315g.
- ③ Built-in battery, using 2000mAH lithium polymer battery, continuous working time exceeds 8 hours.
- ④ High resolution, the measurement result is 6 significant digits.
- ⑤ Comes with calibration function, accurate measurement.
- ⑥ It has online test function, frequency sweep function and high cost performance.
- ⑦ Series / parallel mode, internal resistance are optional. The test level can be set arbitrarily.
- ⑧ Strong resistance to power frequency interference, and the interference degree is prompted.
- ⑨ Automatic gear shift without manual intervention.
- ⑩ Disadvantages: fast measurement is about 1 second refresh, medium speed measurement is about 4 seconds refresh, the speed is not fast.

Main difference of each model						
Model	frequency range	Impedance range	$1\Omega \sim 20\text{M}\Omega$ Accuracy	Load calibration points	online	Sweep frequency
NJ100S	23 fixed points	$1\text{m}\Omega \sim 500\text{M}\Omega$	$< 5\text{‰}$	20	×	×
NJ101S	28 fixed points(0Hz DC)	$1\text{m}\Omega \sim 500\text{M}\Omega$	$< 5\text{‰}$	20	×	×
NJ200S	$50\text{Hz} \sim 200\text{kHz}$	$0.1\text{m}\Omega \sim 20\text{G}\Omega$	$< 1\text{‰}$	100	√	√ (plus)
NJ300S	$50\text{Hz} \sim 300\text{kHz}$	$0.1\text{m}\Omega \sim 20\text{G}\Omega$	$< 1\text{‰}$	200	√	√ (plus)
NJ100A	$0\text{Hz} \sim 100\text{kHz}$	$1\text{m}\Omega \sim 1000\text{M}\Omega$	$< 5\text{‰}$	20	√	√
NJ200A	$0\text{Hz} \sim 200\text{kHz}$	$0.1\text{m}\Omega \sim 20\text{G}\Omega$	$< 1\text{‰}$	100	√	√ (plus)
NJ300A	$0\text{Hz} \sim 300\text{kHz}$	$0.1\text{m}\Omega \sim 20\text{G}\Omega$	$< 1\text{‰}$	200	√	√ (plus)

二、Main Specifications

Model	NJ10*S	NJ100A	NJ200S	NJ200A	NJ300S	NJ300A
frequency	50Hz~100kHz	0Hz~100kHz	50Hz~200kHz	0Hz~200kHz	50Hz~300kHz	0Hz~300kHz
Stepping	Fixed	10Hz~1kHz	50Hz~5kHz	10Hz~5kHz	50Hz~10kHz	10Hz~10kHz
Power frequency	Number	NJ100S, NJ101S Frequency point value (Hz)				
50 Hz	NJ100S :23 NJ101S :28	50,100,300,600,1000,1200,3000,6000,10000,12000,20000,24000,30000,38400,40000,48000,50000,60000,75000,80000,93750,96000,100000 (NJ101S have: 0,10,20,30,40Hz)				
60Hz	NJ100S :15 NJ101S :21	60,120,300,600,1200,3000,6000,12000,24000,30000,38400,48000,60000,75000,96000 (NJ101S have: 0,10,20,30,40,50Hz)				
Display		2.4" TFT Resolution 320×240 (QVGA)				
Battery capacity		2000mAH (7.4Wh)				
Power		<1W				
Charging current		400mA				
Charging interface		USB(Only as a charging interface)				
Auto-shutdown		Always, Now, 5 mins to 60 mins (optional)				
Measurement parameters		Rs/Xs/Rp/Xp/Cs/Cp/Ls/Lp Z /D/Q/ θ /Vrms/Irms				
DC bias		no				
Show resolution		6~7 digit valid value				
Measuring speed		Fast, Medium, Slow.				
Volatility		1kHz < 0.1‰ (Z :500m Ω ~50M Ω), < 0.5‰ (Z :200m Ω ~100M Ω)				
Accuracy		< 1‰ (1 Ω ~20M Ω)				
Connector		BNC				
Show range	Z , R, X	0.00001 m Ω ~9999999 M Ω				
	C	0.00001pF~9999999F				
	L	0.00001nH~9999999H				
	D, Q	0.001~99999				
	θ (deg)	-179.9~179.9				
	Vrms	0.0001mV~999999mV				
	Irms	0.0001nA~999999mA				
Measuring range	Z	0.1m Ω ~20G Ω (NJ300S)				
	C	3fF~6F				
	L	0.5nH~600kH				
Level	(mVrms)	Arbitrarily set (1~1000, step 1)				
Output impedance		30 Ω , 100 Ω (Optional)				
Model		Online and SCAN(Except NJ10*S), AUTO, S-CON, P-CON (optional)				
Test piece(DUT)		AUTO, OHM, INDUC, CAP, E-CAP(optional)				
Calibration function		OPEN, SHORT (with factory value), LOAD				
physical dimension		130*108*31 (mm)				
Net weight		315g				
Operating temperature		5℃~40℃				
Atmospheric pressure		860hPa~1060hPa				

三、Body description



Key and interface function description			
Number	sign	Name	Description
1		Main	Function key, press this key to switch between "measurement", "calibration" and "system" interface; after entering the sub-page, change to "BACK" / "NEXT" function.
2		Left	Different pages correspond to functions.
3		Right	Different pages correspond to functions.
4		OK and on/off	OK; Long press (>2s to turn on, >3s to turn off) and then release.
5		LCD	LCD
6		Trademark	“浩蔓” “AAI”
7		LOGO	Brand and product name
8	Hc, Hp Lp, Lc	Measuring port	c: Current; p: Voltage; H: High; L: Low
9		Charging light	When the product is in standby mode, the charging indicator is on.
10		Charging port	Use Mini-USB interface. Requires> 2A 5V charger.
11		Reset	If there is a product deadlock or other problems, use it to reset the product.

四、Function Description

This product has three basic interfaces: measurement, calibration, and system. "Measurement" and "Calibration" contain sub-interfaces.

By default, the system enters the Main test settings page (Figure 1-1).

1、measuring

(1) Main test settings page

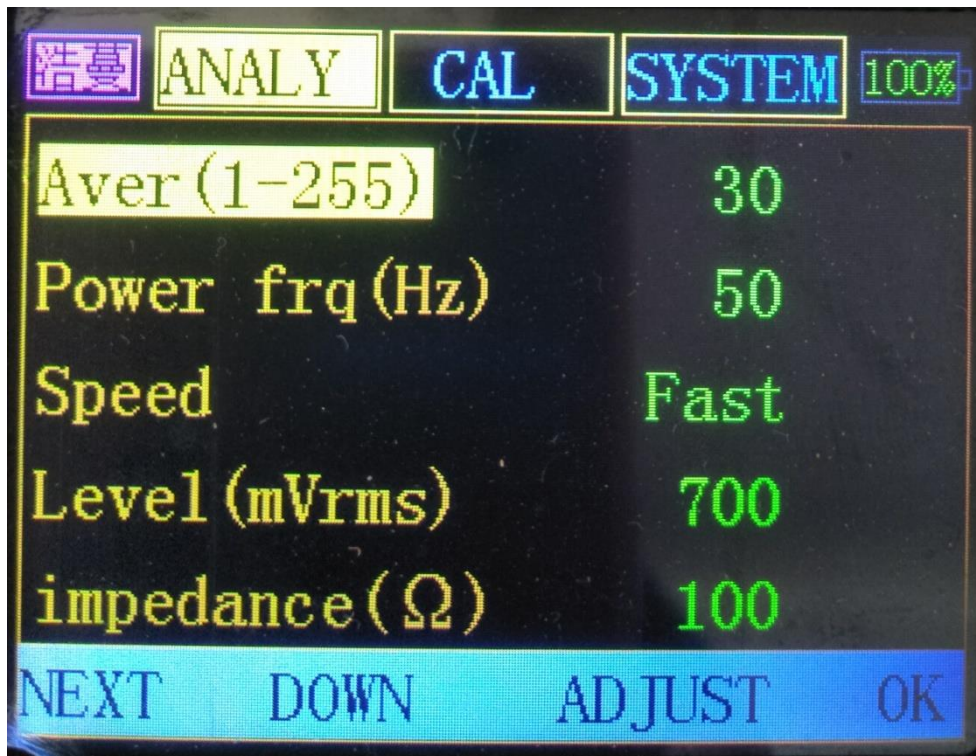


Figure 1-1 Main Settings page (First interface after booting)

Description of five sub-functions:

Aver(Average): The number of times the last formal measurement result is averaged. The larger the value, the smoother the measured value.

Power frq(frequency): Choose to measure the AC power supply frequency of the equipment at the site, so that the system can better deal with mains interference.

Speed: The speed of finding the exact value, that is, the choice of measuring speed. When the measured value fluctuates greatly, you can choose medium speed, slow speed measurement, to improve the stability of the measurement. Loop between "fast", "medium", and "slow".

"Fast"—Measure immediately, without waiting, get the result immediately, and there may be a small deviation from the true value, suitable for situations where you want to know the approximate value;

"Medium speed"/"Slow speed"--wait for a certain period of time, when the font turns yellow, the value can be trusted

Level: The effective measured voltage value mVrms loaded on the DUT. Can be set arbitrarily (1-1000). Due to the limitation of hardware, it is impossible for any value to be valid. When an invalid voltage value occurs, the system will adjust to the nearest voltage value below the set value.

Impedance(Internal resistance): the internal resistance of the local LCR device. 30 Ohm, 100 Ohm optional.

Key:

"NEXT": switch between the three main function areas. "ANALY", "CAL", "SYSTEM".

"DOWN": In the five subfunctions in the left column, the loop switches from top to bottom.

"ADJUST": Corresponding setting selection of corresponding sub-function. select the relevant settings of the corresponding sub functions.

"OK": After confirmation, enter the main measurement page to start measurement (Figure 1-2).

(2) main test page



Figure 1-2 main test page

The bottom line of functional instructions corresponds to the four buttons. The upper right corner is the power display.

The main reference font is enlarged and placed on top for easy viewing. During the measurement, when the font color of the main parameter changes to yellow, The displayed value may be the best observation(When "Online" and "Fast", the result is immediate, the font is yellow). The lower and middle areas show other parameters.

“BACK” : Enter the “main test setting” page (Figure 1-1).

“MODE” : Circuit equivalent mode selection, AUTO(automatic), S-CON(series), P-CON(parallel), ONLINE, SCAN. The current item is displayed directly above.

“ADJFRQ” : Frequency setting (Figure 1-3). The current frequency is displayed above.

“DUT” : Select the type of measurement part, AUTO(automatic), OHM(resistance), INDUC(inductance), CAP(capacitance), E-CAP(Electrolytic capacitor). The current item is displayed above.

“Interference degree” : Next to the model (see “0.35” next to “S-CON” in Figure 1-2). No unit, pure number. Indicates the intensity of electromagnetic interference at the test site. When the general value is less than 50, it has little influence on the measured value.

When you switch between “MODE”, “ADJFRQ” and “DUT”, all values will be remeasured.

(3) Frequency settings page



Figure 1-3 frequency setting page

The small yellow box is the current operation position.

"LEFT", "RIGHT": Change the position. Can be moved cyclically.

"ADJ": Set new value. The current bit cycles from 0 to 9 (the highest bit is limited to 0 to 3).

"OK": The new setting frequency is effective.

Press "ADJ" to set the maximum frequency value when the small yellow box is on the left; press "ADJ" to clear when the small yellow box is on the right.

The minimum setting frequency of S series is 50 Hz. When setting the frequency, the minimum bit is not adjustable. When the frequency value is an integer multiple of the current power frequency (50 / 60Hz) and the last two digits of the frequency display value are 0, the measured value is the most accurate.

A series frequency point value can be set as 0Hz (DC) and a multiple of 10Hz. When it is not an integral multiple of power frequency, the measurement speed is slow, but the anti-interference performance is better.

The frequency point can be set freely. Due to the limitation of hardware, it is impossible for any frequency point to be effective. When the invalid frequency point value occurs, the system will adjust to the nearest frequency point below the set value. The higher the frequency, the larger the step distance.

(Except for NJ10*S: only a limited number of frequency points are available.)

As shown in Figure 1-4, the intended frequency is 70khz(Power frequency 50 Hz), but the actual frequency is 64kHz as shown in Figure 1-5.

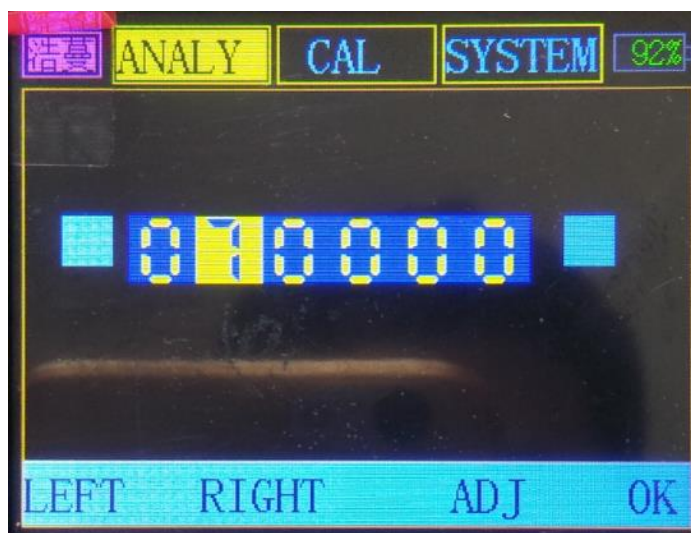


Figure 1-4 frequency setting 1



Figure 1-5 frequency setting 2

2、Calibration



Figure 2-1 calibration page

(1) 、"OPEN": Open calibration. User calibrated open circuit data.

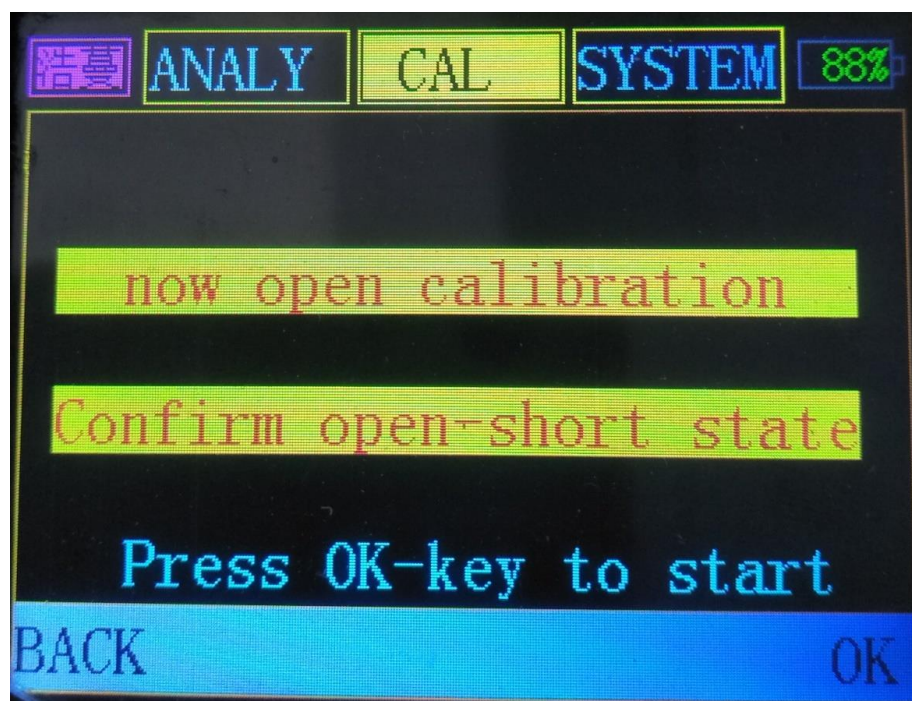


Figure 2-2 Calibration confirmation page

Press the "BACK" key, no calibration; press the "OK" key to start calibration. The calibration process takes a long time, as shown in Figure 2-3. The result

prompt after the calibration is completed is shown in Figure 2-4.

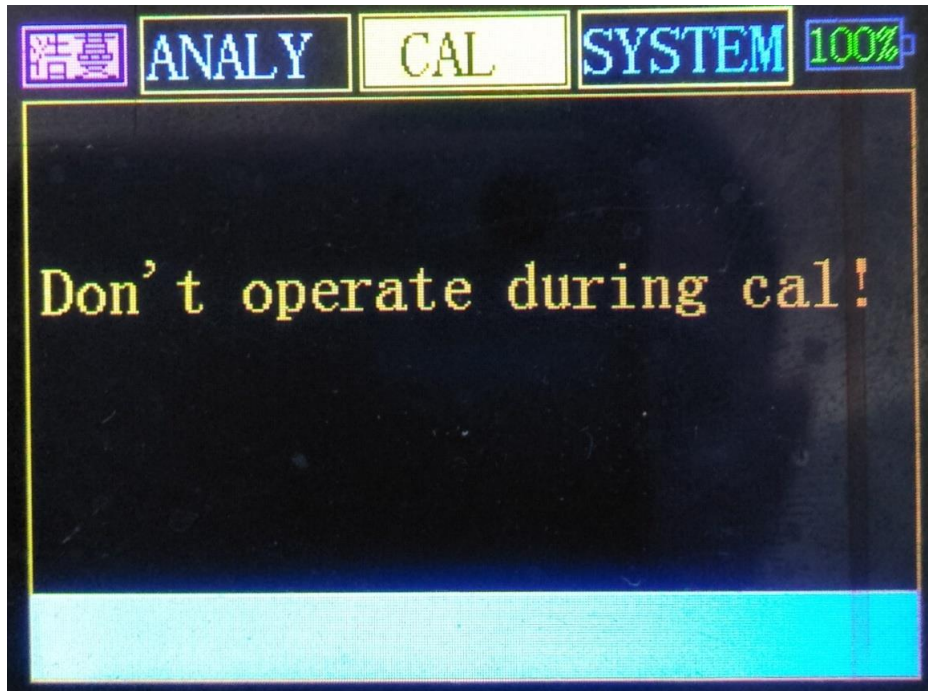


Figure 2-3 Prompt during calibration

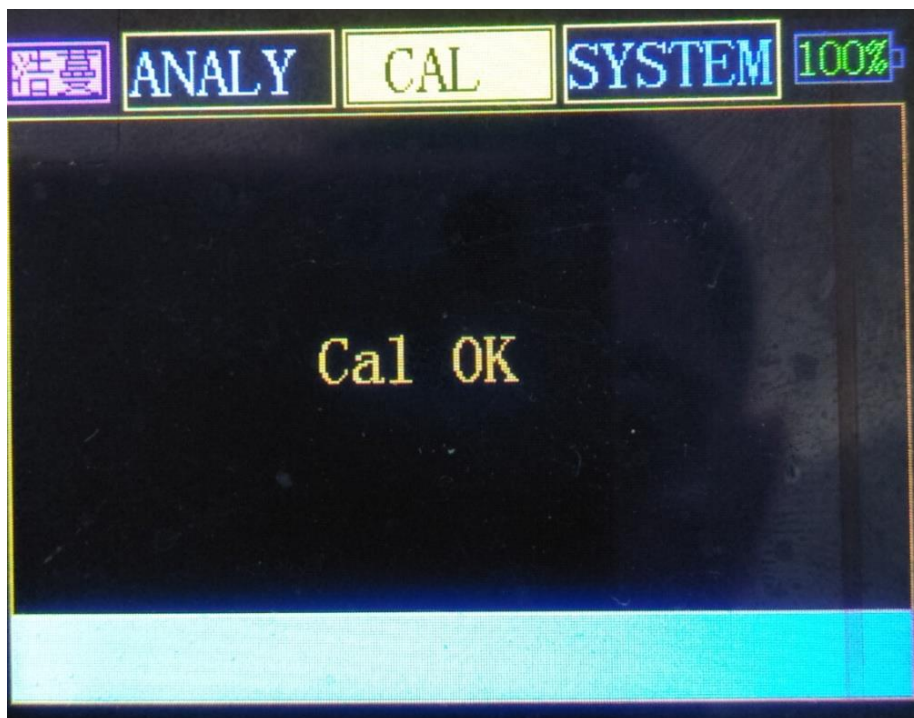


Figure 2-4 Calibration result prompt page

(2) 、 “**SHORT**” : short circuit calibration. The user does short circuit calibration by himself. The operation is similar to “OPEN”.

There are two types: “WHOLE” and “SINGLE”. WHOLE is to do short circuit calibration for all frequency points, and the time is long. The SINGLE short

circuit calibration is performed only on the frequency points currently in use and is suitable for viewing only the current measurement.

(3) 、 “**OPTION**” : “Option”: The user selects the open and short circuit data (the user and the system have open and short circuit data).

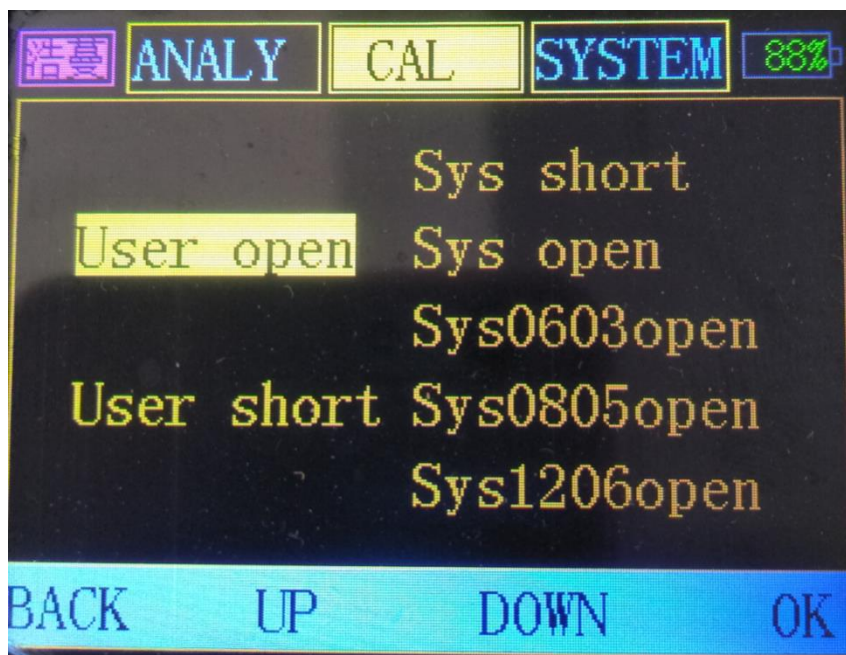


Figure 2-5 Options subpage

User open: Open circuit calibration data made by the user himself.

User short: Short circuit calibration data made by the user himself.

Sys short: the system has short circuit data.

Sys open: the open data of the Kelvin fixture.

Sys0603open: The open data when the opening distance of the patch fixture is 0603 package length.

Sys0805open: Open data when the opening distance of the patch fixture is 0805 package length.

Sys1206open: Open data when the patch fixture opening distance is 1206 package length.

Figure 2-6 shows the appearance of the Kelvin fixture. Figure 2-7 is the patch fixture, the distance between the two needle tip openings at "A" in the figure is the package length. SMD fixtures have better open circuit data than Kelvin fixtures for measurement results.

After selecting a certain item of data and pressing "OK", there will be a prompt as shown in Figure 2-8.



Figure 2-6 Kelvin fixture

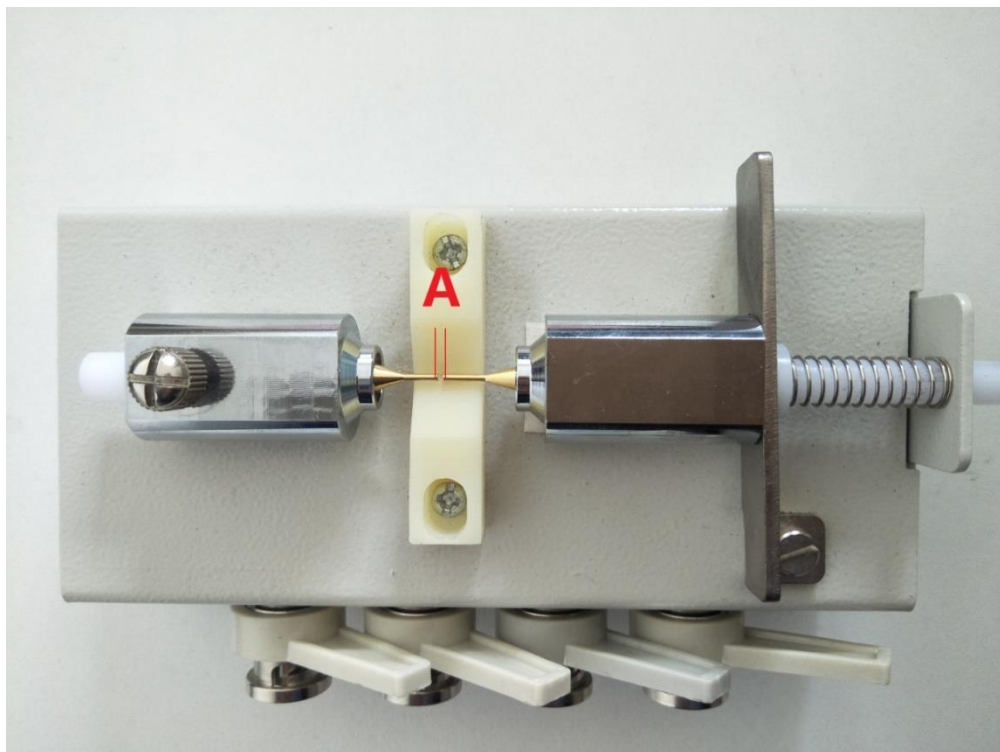


Figure 2-7 SMD fixture

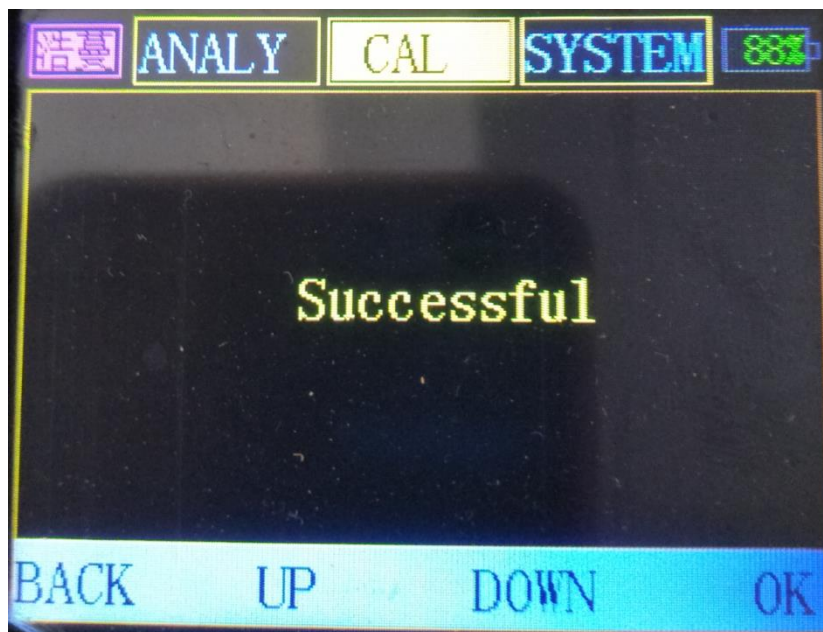


Figure 2-8 Confirmation prompt

(4) 、"LOAD": Load calibration. When the user has higher requirements on the measurement accuracy, the user can calibrate the measured value by himself. After calibration, the measured value near the "calibration resistance" value will be more accurate. (Here "calibrated resistance" means standard parts, such as resistance, inductance, capacitance)

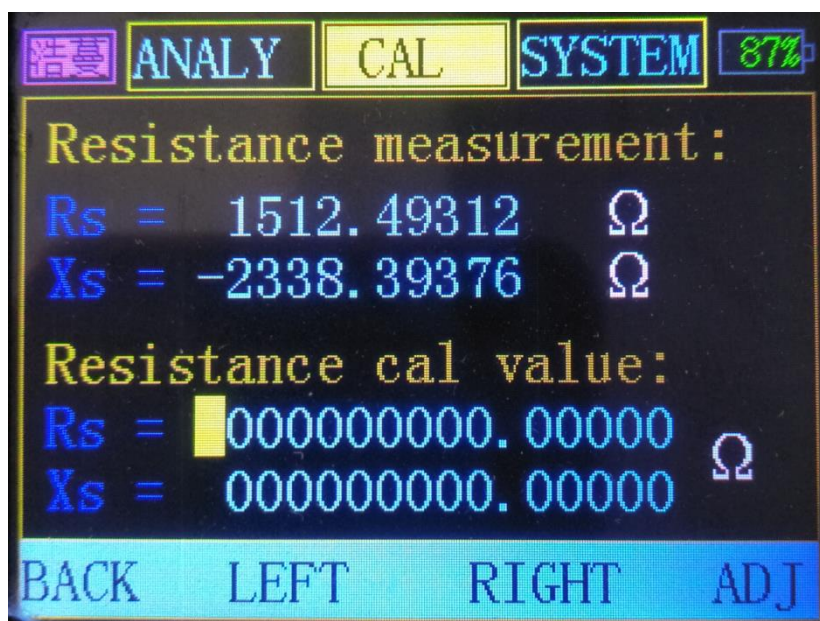


Figure 2-9 Load options

Calibration steps:

- (a) Do open short circuit calibration.
- (b) Clamp the standard resistor correctly.
- (c) Enter the main test setting (Figure 2-10) and set the relevant parameters (general default value).
- (d) Press "OK" to enter the main measurement (Figure 2-11), and press "ADJFRQ"

to set the frequency. After the frequency setting is completed, the system measures immediately.

(e) When the color of the main measurement parameter turns yellow, press "BACK" to the main measurement setting page, then press this "NEXT" to switch to the calibration surface (Figure 2-12), and finally enter the "LOAD" page (Figure 2-13).

The above "Resistance measurement" in Figure 2-13 is the current measured value of the equipment for "calibration resistance".

The following two parameter values of "Resistance cal value" in Figure 2-13 need to be manually filled in with the true value of this "calibration resistance".

(f) When the small yellow box is adjusted to the last bit of Xs, press "RIGHT" again to start the calibration.

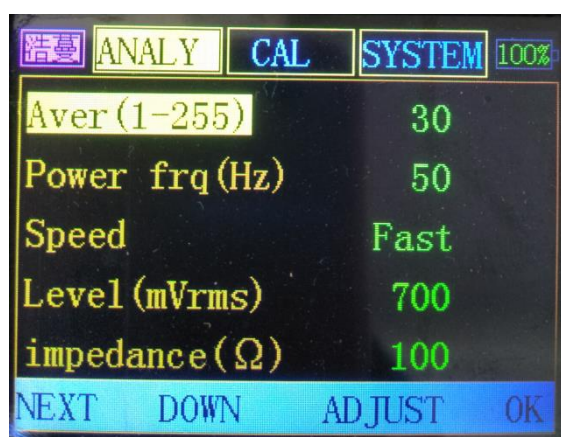


Figure 2-10 main test setting



figure 2-11 main test page

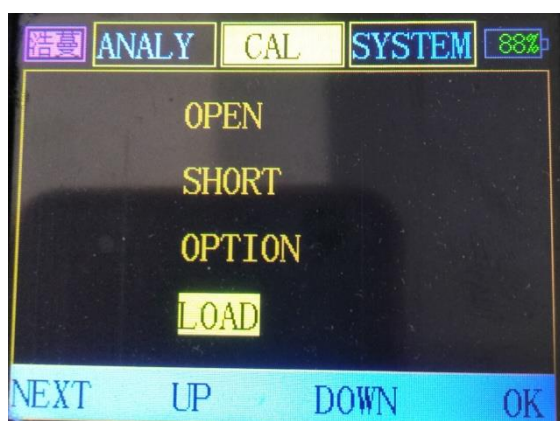


Figure 2-12 calibration page

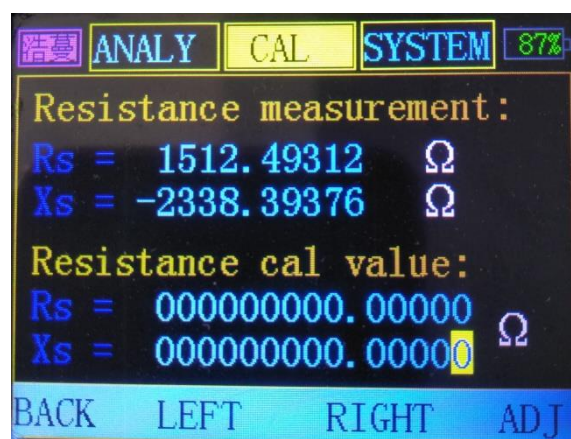


figure 2-13 load calibration page

Note: the load calibration value can store 20 sets of data in total. When the limit is exceeded, the previous value is overwritten.

Effective condition of calibration value:

a. The parameter setting (level, internal resistance, frequency) during measurement must be completely consistent with the parameter setting during calibration;

b. The impedance value of the tested part and the impedance value of the "calibration resistance" used in the calibration shall not be too different.

3、system message

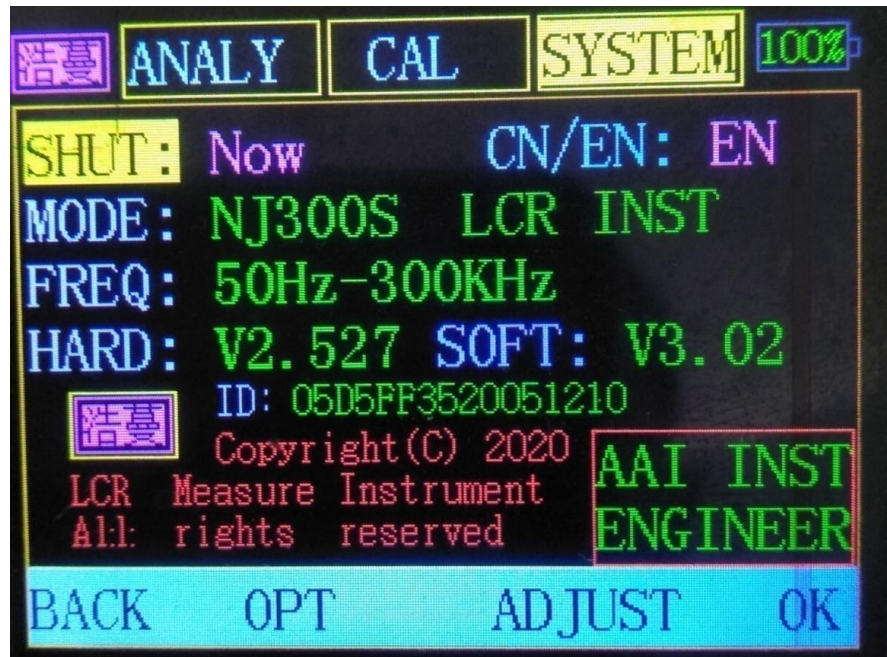


Figure 3-1 System information page

The system information mainly displays the product related information, such as model, frequency range, version, etc.

OPT: switch between " SHUT ", "CN/EN" and "SHOW".

ADJUST: selection of corresponding function parameters.

note:

SHUT(Automatic shutdown): Always, Now, 5 mins, 10 mins, after 30 mins, 60 mins. Only when the option is in "SHUT", select "Now" and press "OK" to shut down immediately. When other items are selected, related functions are automatically saved and activated.

ID number: The device is uniquely coded, one machine, one number, not repeated.

4、 ONLINE (NJ200S and above models)

It can be used to measure the on-board devices without removing the devices.

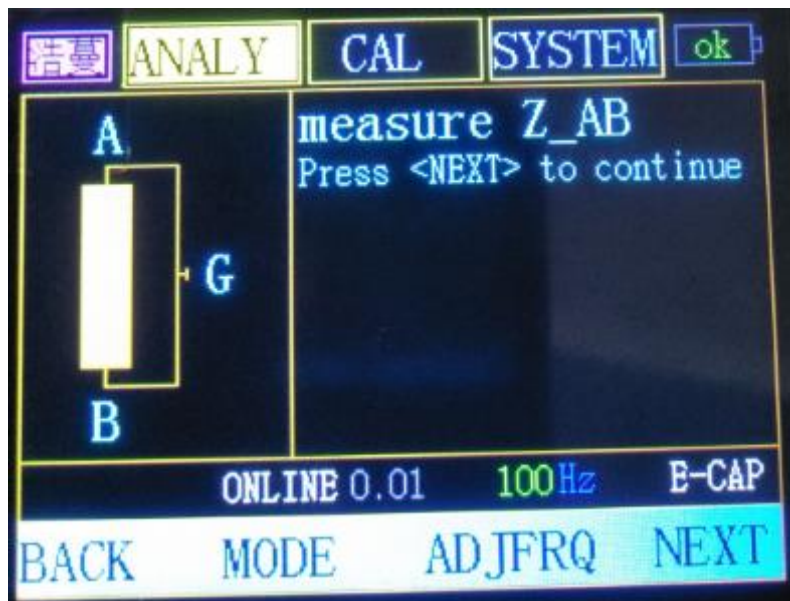


Figure 4—1 ONLINE

The on-line test conditions of "AB" are as follows:

1. The circuit under test and its surrounding circuit can be equivalent to the ABG circuit shown in "Figure 4-1" (AG or BG segment has no branch, and should be as long as possible).

2. The impedance of $A \rightarrow G$ and $G \rightarrow A$ (bidirectional) should be equivalent. Similarly, the impedance of $B \rightarrow G$ and $G \rightarrow B$ should also be equivalent. Otherwise, the measurement may be inaccurate.

3. If there are PN junctions in the test circuit, such as diodes, transistors, etc., the test level signal should not exceed 100mvrms, because it can ensure that the loop in and out is equivalent.

4. The true impedance values of Z_{AB} , Z_A , Z_B , and the independent true impedance values between the three points should not differ greatly, otherwise the measurement results will be affected. For example, if $Z_{AB} = 1000000 \Omega$ and $Z_{AG} = 0.005 \Omega$, the final measurement result will have a large deviation. The actual test difference should not exceed 100k times.

5. The short circuit error and open circuit error should be eliminated as far as possible in the test, so as to obtain better accuracy.

6. The clamping position at the same point shall be the same as possible.

7. Power off and discharge should be carried out before the test.

The following is the operation steps of measuring large electrolytic capacitor:

(1) Do open and short circuit calibration.

(2) In options, select the previous open / short circuit data.

(3) Switch to "Figure 4-1" page. (select "electrolysis" on the main test page, frequency 100Hz)



Figure 4—2 Test point

(4) According to the page prompt, hold the "A-B" point, **Figure 4-3**.



Figure 4—3 A-B point

After clamping, do not move, follow the prompts. Press the "NEXT" key and the system will start automatically. After completion, it is shown in **Figure 4-4**.

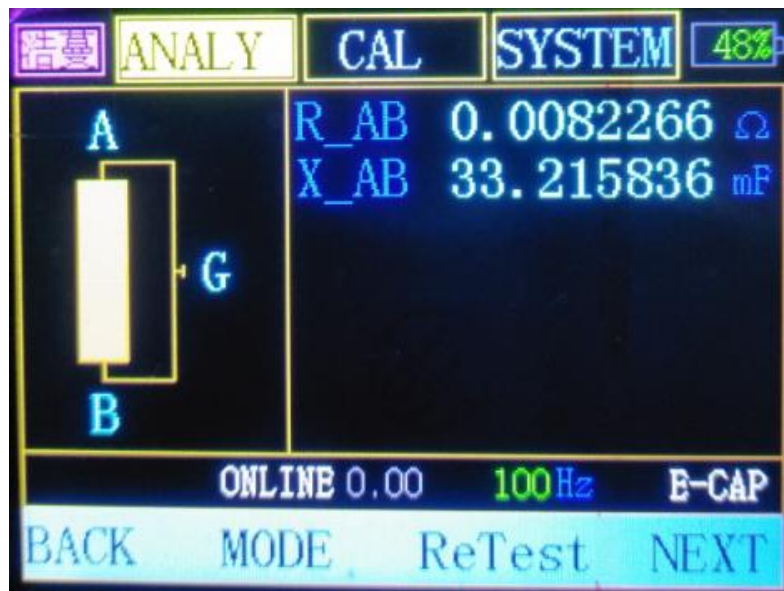


Figure 4—4 A-B test result

(5) Press the "NEXT" key to carry out the next test. Follow the instructions, and the method is the same as above.

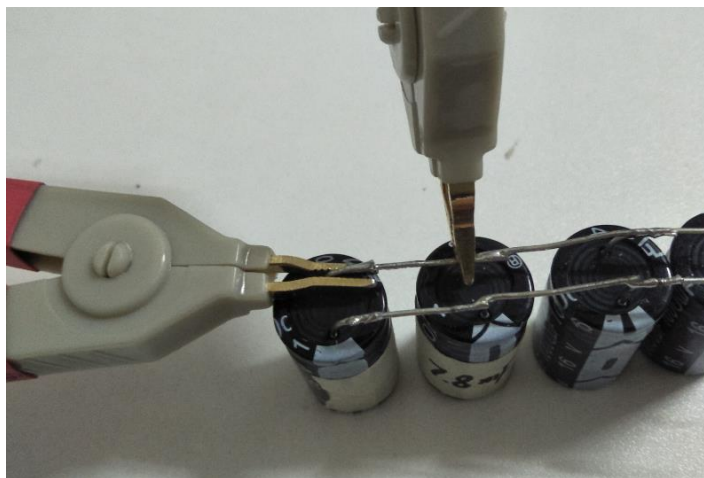


Figure 4—5 A-G point

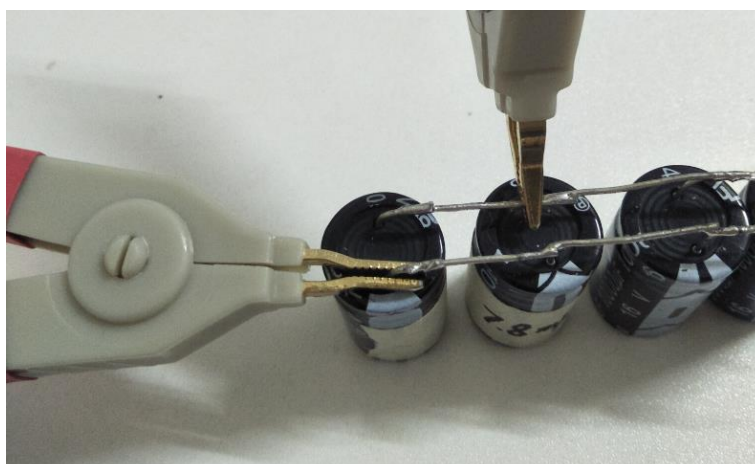


Figure 4—6 B-G point

(6) The final test results are shown in Figure 4-7.



Figure 4-7 test result

(7) Press the "NEXT" key to complete the calculation, and the word turns yellow. As shown in Figure 4-8. The term "X-AB" is the measured capacitance.

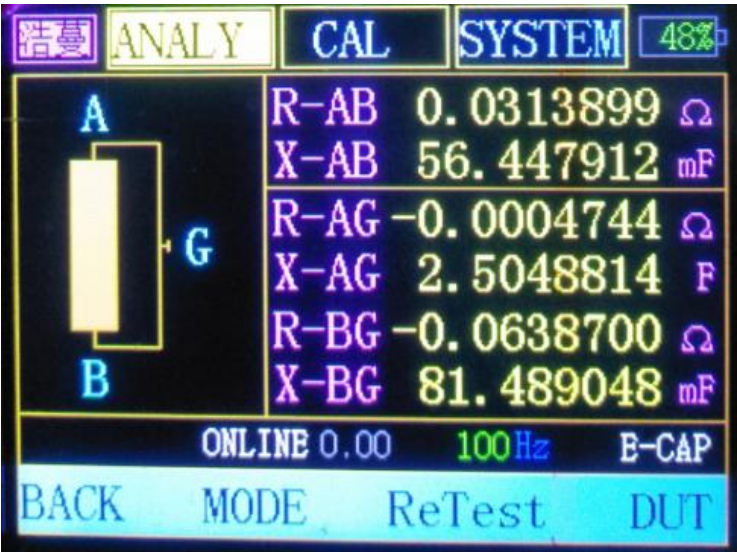


Figure 4-8 Calculation results

5、SCAN

The frequency sweep function can visually see the changes of the focus items in a certain frequency band, which is more convenient to understand the overall situation. The main screen of frequency sweep is shown in Figure 5-1.

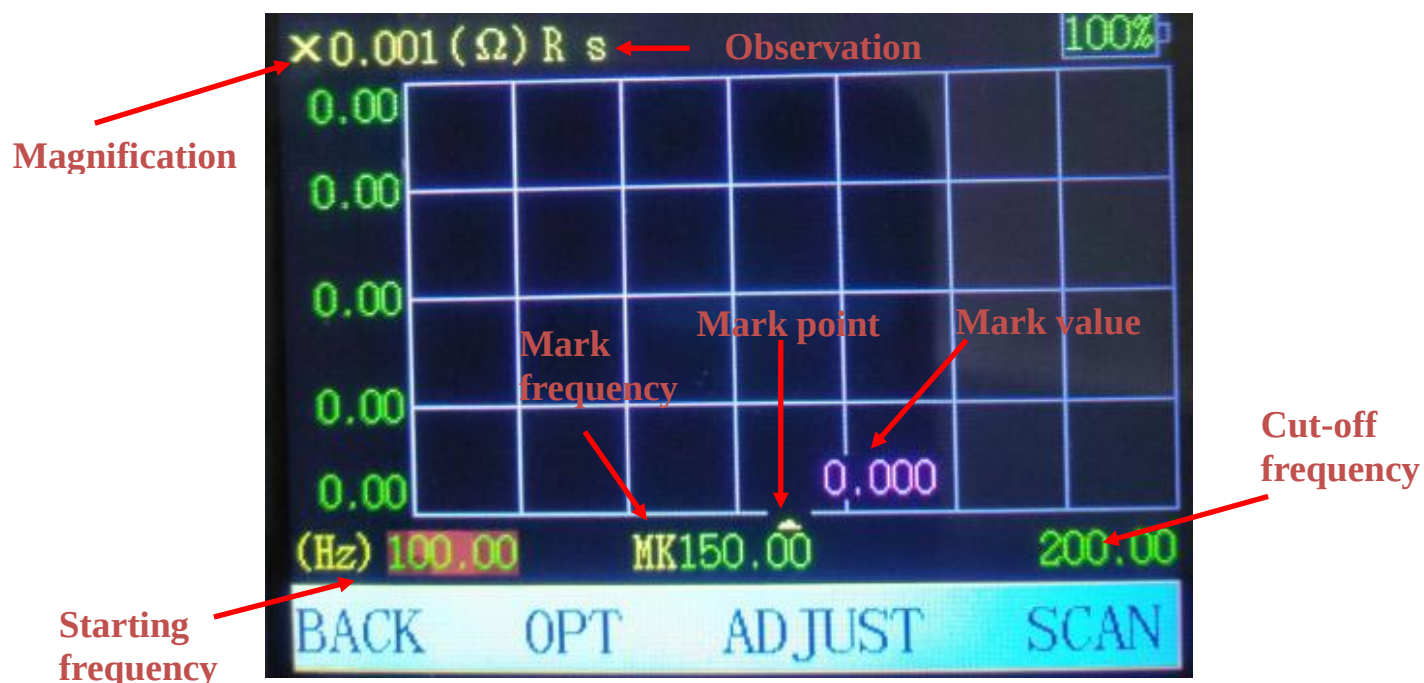


Figure 5-1 SCAN

"BACK": exit the frequency sweep function.

"OPT": cycle between "Observation ", "Start frequency", "Mark frequency" and "Cut-off frequency". Flashing red indicates the current item.

ADJUST: adjust the selected item.

When it is in "observation ", press "ADJ", the background will turn yellow, and switch between "Rs", "Rp", "Xs", "Xp", "Ls", "Lp", "Cs", "Cp" and "|Z|". Press "OK" to confirm, **Figure 5-2**.

When it is in "start frequency" (**Figure 5-3**), press "adjust" to set frequency (**Figure 5-4**).

The setting method of "Kark point frequency" is the same as that of "cut-off frequency".

"SCAN ": start the frequency sweep function.

There are progress prompts in the process, as shown in **Figure 5-5**. As shown in **Figure 5-6**.

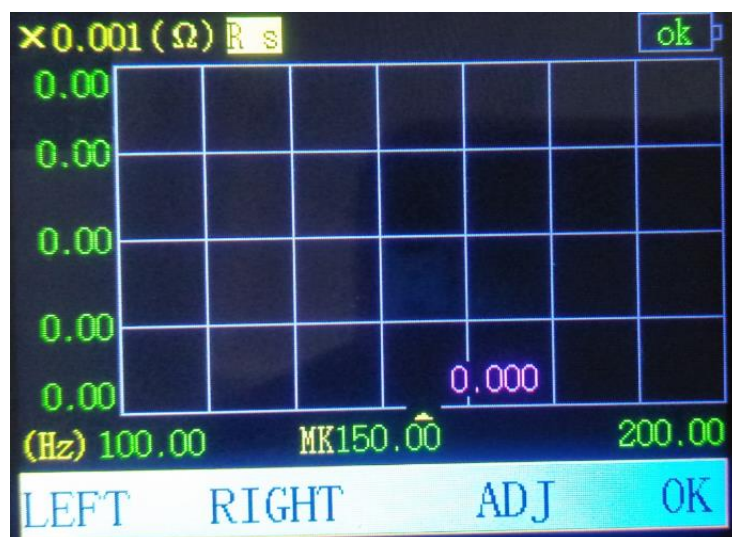


Figure 5-2 Observation



Figure 5-3 Start frequency



Figure 5-4 Frequency setting

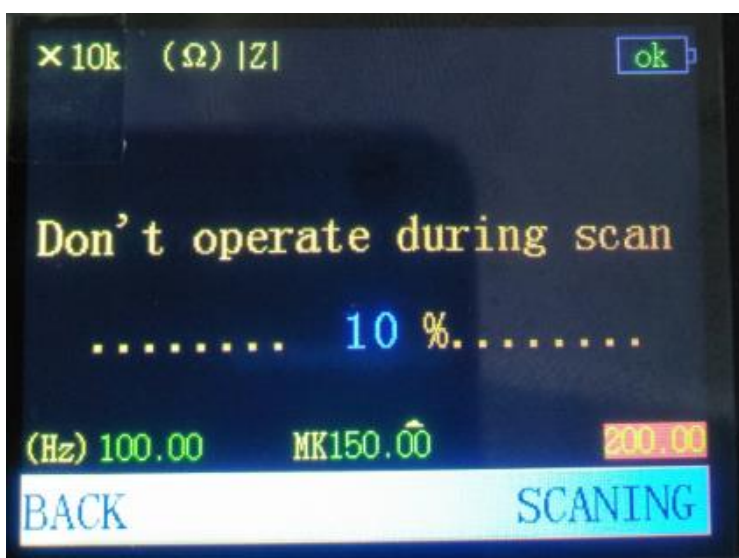


Figure 5-5 Sweep Progress

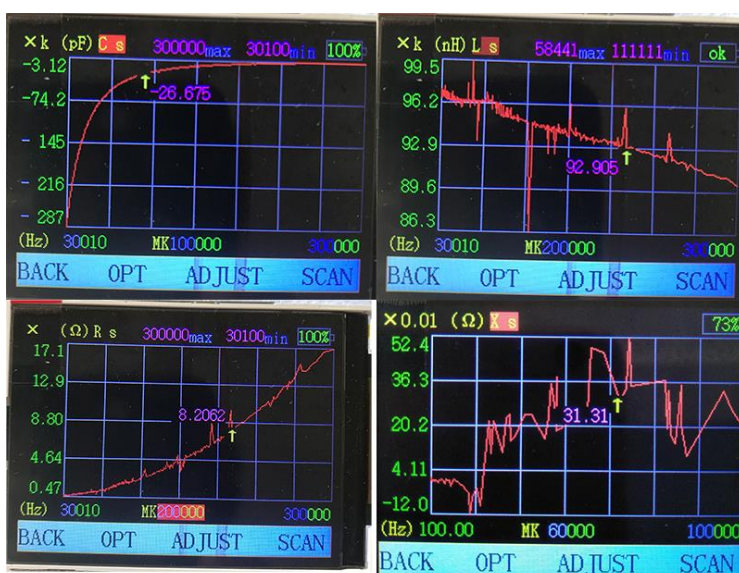


Figure 5-6 Frequency sweep complete

6、Anti-interference

When the frequency value is an integer multiple of the current power frequency (50 / 60Hz), the measured value is superior to other frequency points. In the disturbed environment, the even multiple of the power frequency is better than the odd multiple of the frequency. That is to say: the measured value of odd frequency multiplication point is more susceptible to environmental interference. Even if the system has done anti-interference related processing, it cannot be completely shielded when the interference is large. (Please refer to the previous "Interference Degree" for the size of environmental interference)

五、Operation

Test process:

- ①、Connect the measuring clamp



Figure 5—1 Thimble type test stand



Figure 5—2 Four-wire Kelvin clamp

Note:

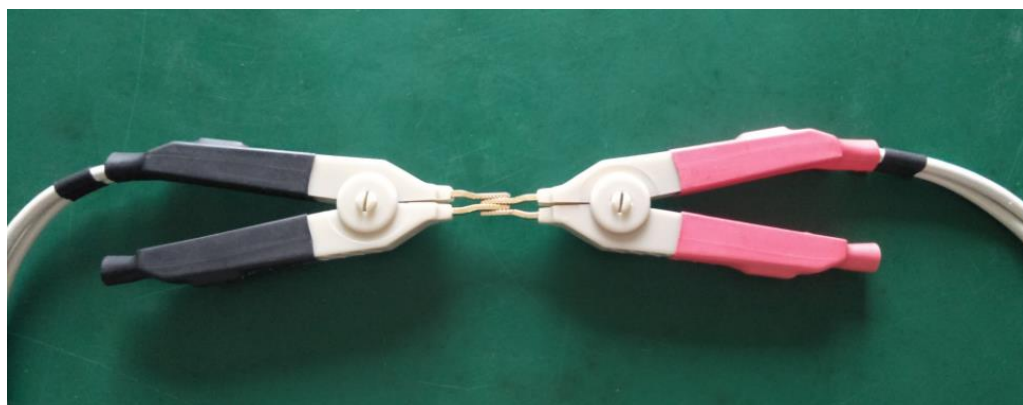
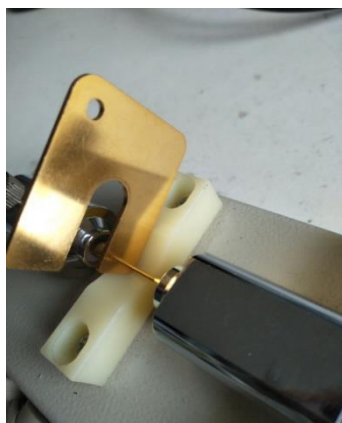


The mark character on each BNC head of Kelvin clamp should be connected with the corresponding mark on the instrument port. (See the white words under the port in the figure above)

- ②、Warm up for a few minutes (depending on the user)

- ③、User open and short circuit calibration (as required by user)

About short circuit: Thimble type see the use of professional short circuit piece. Kelvin clamping as shown in the figure below, The wired end is on the same side.



④、Select open and short data

Please select the appropriate open and short circuit data in "CAL" → "OPTION".

⑤、Start measuring

After the above steps are completed, you can switch to the "ANALY" item and start the formal test.

Press either of the "MODE"/"ADJFRQ"/"DUT" keys to restart the new measurement.

opinion:

In order to use the measured value more accurately, please turn on the machine for preheating for a few minutes before each use, and then do the open short circuit calibration. The tested part shall be close to the instrument as much as possible, and the state of calibration and measurement shall be consistent as much as possible.

Self provided Kelvin fixture: purchase instructions, BNC male pin, regular manufacturer standard head. The non-standard BNC male head will make the female hole become larger and damaged, causing bad contact and affecting the measurement accuracy and accurate value.

六、 Safety requirements

1、 Charge

This unit is not equipped with a charger. Please use a 5V charger for mobile phones or tablet computers with a current of more than 1a. After the product battery is low, please charge it in time to avoid damaging the battery.

In addition, the electric quantity indication of the product is schematic, especially when charging, the error will be relatively obvious. In this case, as long as the error is not very large (about 15%), it is normal, not the product or battery is damaged, please know.

2、 Storage

Since the product contains a lithium polymer battery, please turn off the product and store it when fully charged. If it is not used for a long time, it is recommended to charge it every 3 months to avoid battery damage due to lack of power.

This charging port uses a USB socket, but it is not a USB communication interface. At the same time, connecting the USB port of the computer will produce interference signals, affecting the normal operation of the product.

3、 transport

When transporting, please make shock-proof and drop-proof packaging. Contains batteries, it is recommended to transport by land or water.

七、 Matters needing attention

1. In order to ensure the accuracy of measurement and calibration, please preheat the product for at least 5 minutes before measurement, especially for calibration, it is best to preheat for more than 20 minutes. After preheating, the calibration parameters can be more accurate.

2. When the product is battery powered, the internal noise of the product is the smallest, so it is recommended to measure under battery power. Especially when doing calibration operations, it is strongly recommended to perform under battery power. When the charger is connected, if the quality of the charger is not good, there will be some noise.

3. Please do not connect the USB charging port of the computer for charging, and do not connect it to the 5V charger with large ripple. The voltage fluctuation of USB port will seriously interfere with the working state of the product, resulting in serious inaccuracy of product measurement.

4. For occasions with high accuracy requirements, please try to use fixtures with good quality, and **set the power frequency to 50Hz and medium speed or above, because the instrument is calibrated in this state when leaving the factory.**

5. Before measurement and calibration, please make sure that there is no strong interference signal around to avoid the inaccurate measurement result caused by interference.

6. Charge the battery in time after being under power to avoid long-term power shortage.

7. The interface is BNC. Since copper has a relatively lower strength than other metals, please protect it as carefully as possible to avoid falling and bump damage.

8. In the case of strong interference, unusual operations, and unknown bugs in the software, numerical display anomalies and even crashes may occur (power may be consumed until the battery is exhausted after the crash). At this time, please restart the instrument directly or press the "reset" hole to reset the product to avoid battery damage, If the battery is exhausted, the battery is extremely lack of power, the current will be large when charging, and the charger with small supply current will be short-circuit protected, but please continue to charge Until the battery can be charged normally.

9. When the power level is lower than 15%, the machine will not start; When the power is low, the system will shut down automatically. Please charge it in

time.

10. When measuring large capacitors (uF class), the "electrolytic" item is more accurate than the "capacitance" item.

11. The tested part should not be electrified, especially the energy storage device (such as electrolytic capacitor), and the test should be done after the power is released, otherwise the instrument may be damaged.

12. If more accurate measurement is required for milliohm devices, please calibrate the short circuit again under the same condition of the frequency to be measured.

13. During calibration, try to keep away from the surrounding environment interference, and also far away from the commercial power, such as wires, sockets, etc. For accurate measurement, it is recommended to use the battery of the instrument itself, and do not plug in the USB port for power supply.

八、After-sale service

After the product is sold, AAI will provide free repair or replacement within two years due to problems with its own defects.

Provide technical support for life

九、contact us

AAI promises to provide technical support for life. If you have any questions or needs during the use of the product or this instruction, please contact :

TEL: 13088009627, 13308031321, 18180567523

QQ: 359548220

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