OPERATION MANUAL

STE110 SERIES

Semiconductor C-V Analyzer

V1.0.2@2022.12

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Chapter 1 Overview

This chapter describes some of the checks you must carry out when you receive your instrument and the conditions you must know and have before you can install and use it.

As a semiconductor CV characteristic analyzer, the STE110 series is not only good for accurate testing of single tubes, but also provides solutions for module testing, such as IGBT all-in-one modules, and the STE110 series is equipped with up to 6 test channels on a single machine, which can perfectly solve the accurate measurement of single tubes in modules.

1.1 Out of Box Audit

Thank you for purchasing and using our products. After opening the box, you should first check whether the instrument is damaged in appearance due to transportation, we do not recommend that you power up the instrument if the exterior is damaged.

Then confirm according to the packing list, if there is a discrepancy, you can contact our company or distributor as soon as possible to protect your rights and interests.

1.2 Power Connection

- Supply voltage: 100 to 120 Vac or 198 to 242 Vac, depending on the rear panel power setup.
- Power supply frequency: 47 to 63 Hz.
- Power supply: not less than 130 VA.

This instrument has been designed to reduce a certain amount of spurious interference caused by the input from the AC power supply terminal, but it should still be used in a low noise environment as much as possible, and if this cannot be avoided, please install a power supply filter.

Warning: In order to prevent leakage of electricity to the instrument or human injury, the user must ensure that the ground wire of the power supply is reliably connected to earth.

1.3 Fuse

The instrument is equipped with a fuse at the factory, users should use the fuse equipped by our company.

Warning: Before powering up, you should pay attention whether your fuse position is in line with the supply voltage range.

1.4 Environmental Requirements

■ Please do not use it under dusty, vibrating, direct sunlight, or corrosive gas.

■ Normal operating conditions of the instrument: temperature 0℃～40℃, relative humidity ≤75% of the environment to ensure the accuracy of the measurement.

■ To ensure good heat dissipation and ventilation of the instrument, do not block the left and right ventilation holes to maintain accurate measurements.

■ If the instrument is not used for a long period of time, please store it in its original packing box or similar case. Storage conditions: a ventilated room with a temperature of 5℃ to 40℃ and a relative humidity of not more than 85% RH. The air should not contain harmful impurities that corrode the measuring instrument and should be protected from direct sunlight.

■ The test leads connecting the parts under test should be kept away from strong electromagnetic fields to avoid interference with the measurement.

1.5 Test Fixture

Use the test fixture or test cable supplied by the company. User-made or other companies' test fixtures or test cables may lead to incorrect measurement results. The instrument test fixture or test cable and the pins of the device under test should be kept clean to ensure good contact between the device under test and the fixture.

Connect the test fixture or test cable to the corresponding test terminal on the rear panel of this instrument. For parts under test with a shielded housing, the shield can be connected to the instrument ground "⊥".

Note: When no test fixture or test cable is installed, the instrument will display an unstable measurement result.

1.6 Warm-up

To ensure accurate measurement, the warm-up time should be at least 30 minutes.

Do not switch the instrument on and off frequently as this may cause

confusion in the internal data.

1.7 Safety Requirements

The measuring instrument is a Class I safety instrument.

1.7.1 Insulation Resistance

Under reference operating conditions, the insulation resistance between the power supply terminals and the housing should be not less than 50 MΩ.

Under hot and humid conditions of transport, the insulation resistance between the voltage terminals and the housing should be not less than 2 MΩ.

1.7.2 Dielectric Strength

Under reference operating conditions, the power supply terminals and the housing should be able to withstand an AC voltage with a frequency of 50Hz, and a rated voltage 1.5kV for 1 minute. There shall be no breakdown or flying arc.

1.7.3 Leakage Current

The leakage current should not be greater than 3.5mA (AC rms).

1.8 Electromagnetic Compatibility Requirements

The power supply transient sensitivity of the measuring instrument is required in accordance with GB6833.4.

The conducted susceptibility of the measuring instrument is required in accordance with GB6833.6.

The radiated interference of the measuring instrument is required in accordance with GB6833.10.

1.9 Other features

Power consumption: power consumption ≤ 130VA.

Dimension (W*H*D): 430mm*177mm*405mm

Weight: approximately 16kg.

Chapter 2 Panel Description

This chapter describes the basic operational features of the STE110 series instruments. Please read this chapter in detail before using the STE110 series instruments so that you can quickly learn to operate the STE110 series instruments.

2.1 Front Panel Description

Figure 2-1 provides a brief description of the STE110 series front panel.
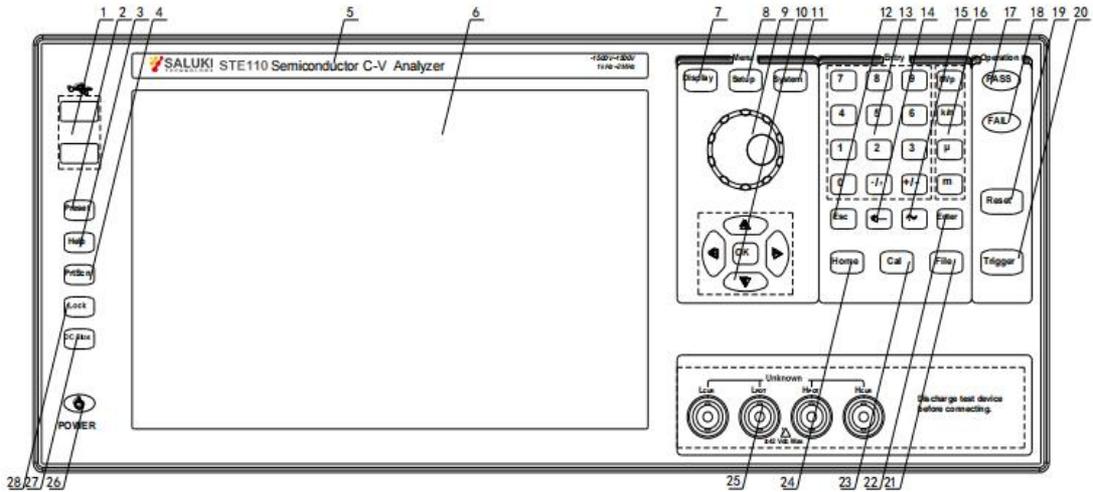
Figure 2-1 Front Panel Description

Marking	Name	Meaning
1	USB HOST Interface	Two USB HOST ports are provided for connection to a USB memory stick for file saving and recall, as well as for connection to a mouse, keyboard, scan gun, etc. Note that only one USB memory can be inserted at any one time.
2	[Preset] key	Reset key, press [Preset] to return the instrument to the factory default settings
3	[Help] key	Help key. Press the [Help] key and the [Help] button will be illuminated, and the display will show the meaning of the function and the operating instructions where the marker is located. Press the [Help] key again and the [Help] key will go out and the operating instructions window will disappear.
4	[PrtScn] key	Screenshot button to save the picture of the current screen to a USB memory.
5	Trademark and Model	Instrument trademark and model number
6	LCD	1280x800 color LCD capacitive touch display shows measurement results, measurement conditions, etc.

Marking	Name	Meaning
7	[Display] Menu key	Press the [Display] key to enter the test display page for the corresponding instrument functions (bridge, transformer measurement, transformer scan, positioning scan).
8	[Setup] Menu key	Press the [Setup] key to enter the test setup page for the corresponding instrument functions (bridge, transformer measurement, transformer scan).
9	Knob with Confirmation Function	Move the cursor to select and set parameters. The confirmation button function in the middle is used to terminate the data entry and to confirm and save the data entered by the knob.
10	Marker key and OK key	The cursor keys consist of up (↑) down (↓) left (←) right (→) and are used to move the cursor between domains and fields on the LCD display page. When the cursor is moved to a field, the field is displayed on the LCD with a highlight. The middle cursor key is the OK key, which has a similar function to the [Enter] key
11	[System] Menu key	Press the [System] key to enter the system setup page.
12	[Esc] key	Escape button.
13	Numeric keys	The numeric keys are used to enter data into the instrument. The numeric keys consist of the numeric keys [0] to [9], the decimal point [. /,] and [+/-] key.
14	[←] key	Backspace key. Press this key to delete the last digit of the entered value.
15	[~] key	No functional description for now.
16	Order of Magnitude keys	The order of magnitude key is used for the input of the order of magnitude of the corresponding parameter.
17	PASS indicator	Test judgment PASS LED indication
18	FAIL indicator	Test judgment FAIL LED indication
19	[Reset] key	Press the [Reset] key to pause the operation after the trigger
20	[Trigger] key	When the instrument trigger mode is set to single mode, the instrument can be triggered manually by pressing this key.
21	[File] key	This function key is used to quickly access the file management interface.
22	[Enter] key	The [Enter] key is used to terminate data entry, confirm, and save the data displayed in the input line.
23	[Cal] key	User calibrated execution shortcuts.
24	[Home] key	The [Home] key is used to switch between different functions such

Marking	Name	Meaning
		as bridge, transformer single group test, and transformer scan.
25	Test (UNKNOWN)	Four-terminal test terminal, formerly LCR defined, for metering and auxiliary range AC signals. Current Excitation High End (Hcur). Voltage Sampling High End (Hpot); Voltage Sampling Low End (Lpot). Current Excitation Low End (Lcur).
26	Power Switch (POWER)	Power switch. The instrument is red when in standby and green when switched on. To switch off the instrument, press and hold the power switch.
27	[DC Bias] key	Original LCR indicator, indirectly characterizing the Vg output status
28	[LOCK] key	Press the [LOCK] key and the [LOCK] button will be lit, indicating that the current panel key function is locked; press the [LOCK] key again and the [LOCK] button will go out, indicating that the keypad is unlocked. If the password function is set to "ON", the correct password must be entered when unlocking the keypad, otherwise the keypad cannot be unlocked. When the instrument is controlled by RS232, USB device, Lan port, etc., the [LOCK] key is illuminated. Press the [LOCK] key again and the [LOCK] key will go out, indicating a return to the local unlocked state.

2.2 Rear Panel Description

Figure 2-2 provides a brief description of the STE110 rear panel.
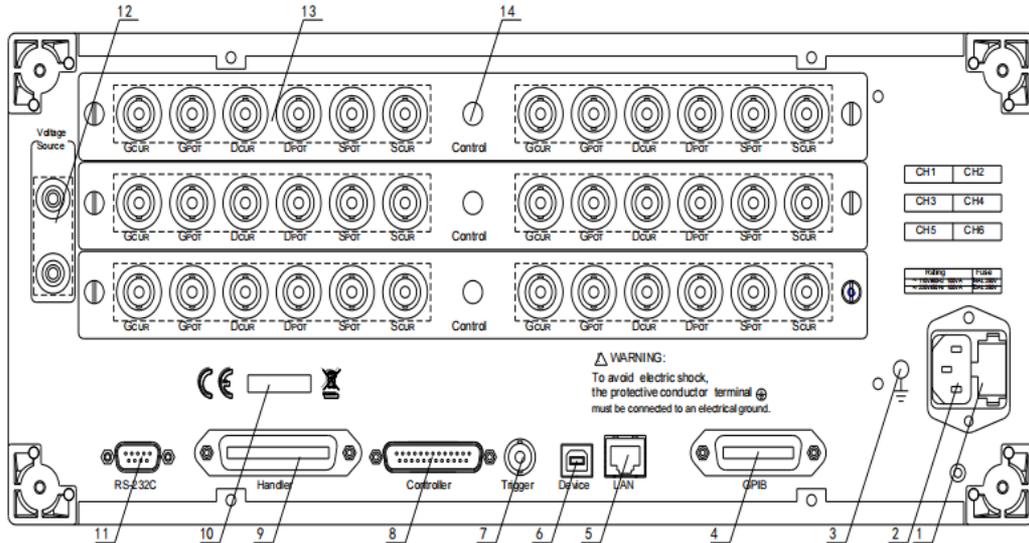
Figure 2-2 Back Panel Description

Marking	Name	Meaning
1	Fuse Holder	Used to install the power fuse to protect the instrument, the direction of replacement the inner core can switch 110V/220V.
2	Power Outlet	For inputting AC power. Warning: Before powering up, note that your fuse position is in line with the supply voltage range.
3	Grounding Terminal	This terminal is connected to the instrument housing. It can be used for protective or shielding earth connections.
4	GPIB Interface	Implementing GPIB communication
5	LAN Interface	Network interface for control and communication of network systems.
6	USB Device Interface	USB communication interface for on-line communication with a PC.
7	TRIGGER Interface	External trigger devices such as foot control can be connected.
8	Controller	Reserved interface
9	HANDLER Interface	The sorting output of test results, this interface is used for the sorting of bridge and transformer single group tests.
10	Nameplate	Indicates the date of manufacture, instrument number, manufacturer, etc.
11	RS232C Serial Interface	Serial communication interface for on-line communication with a PC.

12	High Voltage Source Terminal	Auxiliary detection of the CV high voltage output. Warning: Not to be used as a stand-alone high voltage source output
13	Test Terminal	Four-terminal testing principle
14	Control	For STB66063C (2 m cable) end relay control

2.3 On/Off

Plug in the three-wire power supply, note that: the supply voltage, frequency and other conditions should be maintained in accordance with the provisions outlined in Chapter 1. The power input phase L, zero N and ground E should be the same as the phase, zero and ground lines on the power plug of this instrument.

The STE110 series instruments are soft switched and certain front panel indicators will flash for a few seconds after plugging in the three-wire power supply. After a few seconds, the power button is red and other buttons with LED indications will go out.

Power on: Press the POWER switch on the lower left corner of the front panel to turn on the instrument and display the power-on screen. The power button is green when the instrument starts up. The STE110 series instruments have a memory function for the power button.

Figure 2-3 shows the STE110 power-up screen, which also shows the company logo, the model number of the instrument, and the software version number (Ver 1.0.0).

(Figure 2-3 Power-on Screen)

Switching off: when the instrument is finished using, press and hold the power button to turn off the instrument. When the instrument is switched off, the power button is red, and the instrument is in standby mode. If the instrument is not to be used for a long period of time, disconnect the power cable and store the

instrument in the environment required by 1.4.

Note: The series is set with a factory password of 110, which can be reset by the user as required during use. See 4.1.2.5 Password for details.

2.4 Main Menu Page
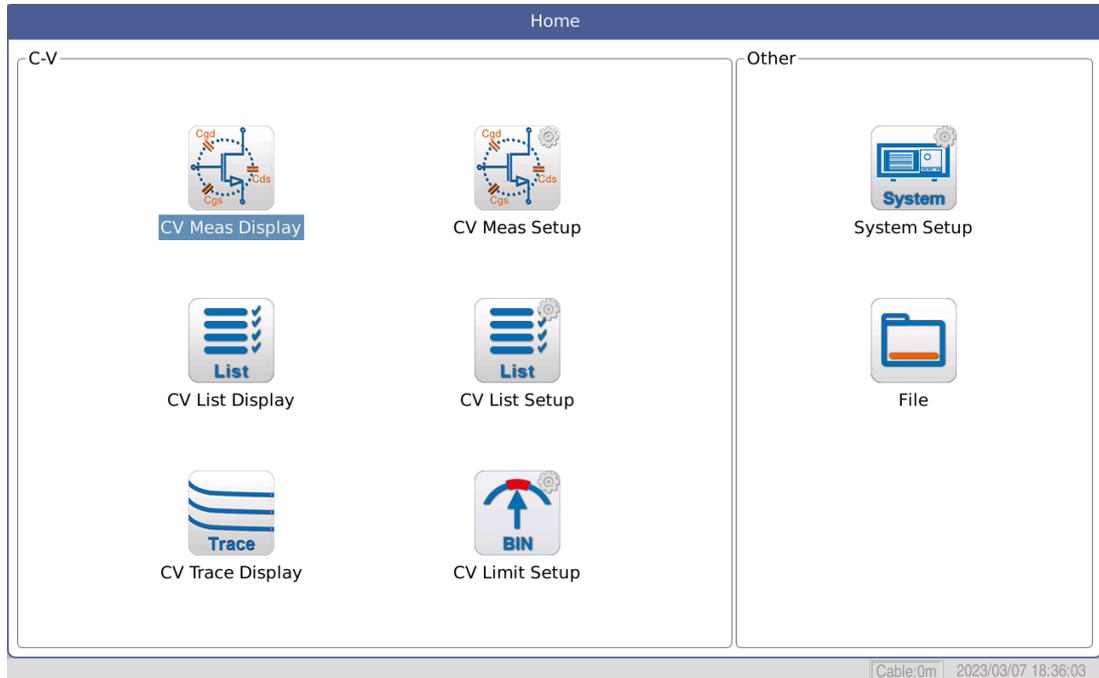
(Figure 2-4 Home Function Page)

The instrument is divided into: CV measurement, CV measurement setup, CV list, CV list setup, CV trace, CV limit setup, system setup and file management.

2.5 Basic operation

The basic operations are described below:

- Use the menu buttons ([Display], [Setup], [System], [Home]) and the touch screen to select the desired display page.
- Use the cursor keys ([←][→][↑][↓]), the knob or touch the screen directly to move the cursor to the area you want to set. When the cursor is moved to a certain area, that area will be highlighted to indicate it. This area is the area where the cursor can be set.
- The corresponding softkey function for the current cursor field is displayed in the "Softkey Area". Select and press the desired softkey. The number keys, [←], the order of magnitude keys and the [Enter] key are used for data entry. When a numeric

key is pressed, you can end the data entry by pressing the order
of magnitude key or the [Enter] key.

Chapter 3 CV Function Module Description

- Ciss: Input Capacitance

With the drain source shorted, the capacitance between the gate and source measured with an AC signal is the input capacitance. Ciss is made up of the gate drain capacitor Cgd and the gate source capacitor Cgs in parallel, i.e., Ciss = Cgs + Cgd. The device can only be switched on when the input capacitor is charged to a threshold voltage and can only be switched off when it is discharged to a certain value. The drive circuit and Ciss therefore have a direct influence on the turn-on and turn-off delay of the device.

- Coss: Output Capacitor

With the gate source shorted, the capacitance between the drain and source measured with an AC signal is the output capacitance. Coss is made up of the drain source capacitor Cds and the gate drain capacitor Cgd in parallel, or Coss = Cds + Cgd. For soft switching applications, Coss is very important as it can cause resonance in the circuit.

- Crss: Reverse Transfer Capacitance

With the source grounded, the capacitance measured between the drain and the gate is the reverse transfer capacitance. The reverse transfer capacitance is equivalent to the gate drain capacitance; Cres = Cgd, the reverse transfer capacitance is also often called the Miller capacitance and is one of the important parameters for the rise and fall times of the switch, which also affects the off-delay time. The capacitance decreases as the drain voltage increases, especially the output capacitance and the reverse transfer capacitance.

- Rg: Grid Input Resistance

Rg is defined as drain source shorted (Rg-DSS) and occasionally as drain open (Rg-DSO). The series impedance Rs-Cs at the gate source is measured and the result of Rs is considered to be the value of Rg. The gate voltage dependence of Ciss can also be obtained by simultaneous measurement when shorting the gate source.

- OpSh: On-Off Test

Conduction test, i.e., the D and S terminals of the device under test are tested for conduction and disconnection, which is regarded as a good basic function of the device under test and can be used as a filtering condition for CV testing, if the conduction test fails, the testing of other parameters is meaningless.

- Contact: Contact Inspection Test

Contact inspection test, i.e., used to determine whether the Kelvin test circuit is in good contact and whether the wire contact between the test end of the instrument and the fixture of the part under test is good, as a filtering condition for the CV test, if the contact inspection fails, the test of other parameters is

meaningless.

3.1 <CV Measurement> Page

Starting from the Home page, press the [Display] menu button or touch the <CV Measurement> module to enter the <CV Meas Display> page. As shown in Figure 3-1-1:
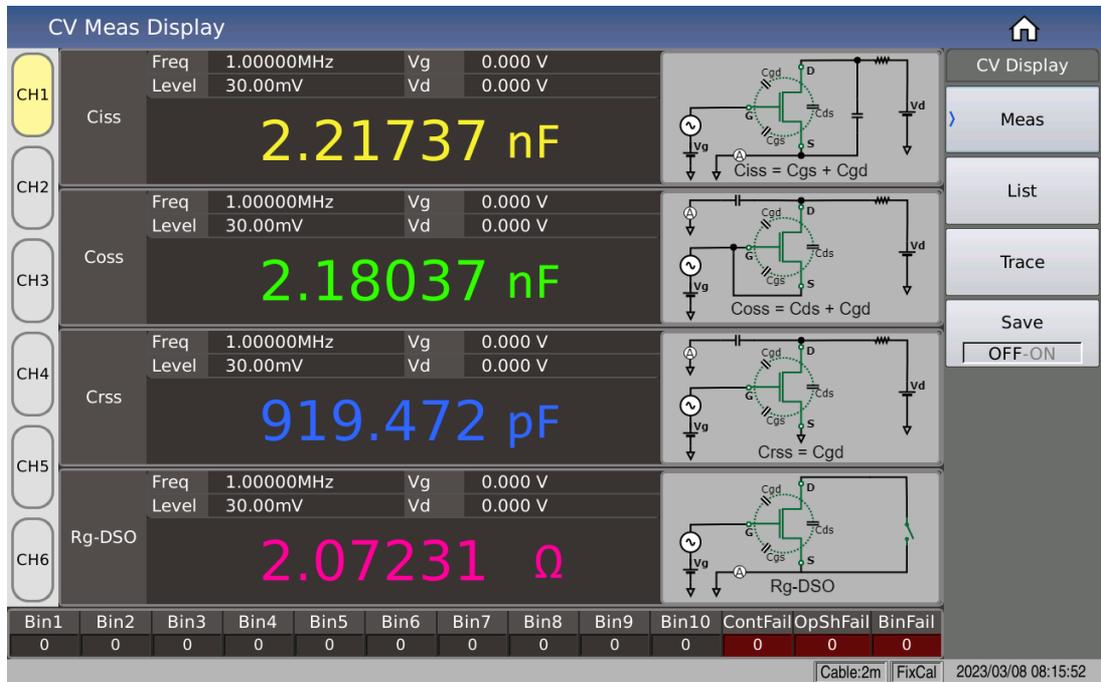
(Figure 3-1-1 Measurement Display)

The elements of this page consist of:

- Title Area
- Channel marking area
- 4 Parameter quick setting and result display area
- Sorting result display area
- Menu area
- Status Bar

3.1.1 Channel

The channel identification area of this display page is located on the far left of the display area and is mainly used to identify the channel where the current test is taking place; the channel identification corresponds to the insert on the rear panel.

One insert corresponds to two scanning channels; the instrument is supplied with one insert by default, i.e., two channels.

If additional channel boards are required, the corresponding channel board needs to be activated by the software. The corresponding channel is identified by a character that identifies that the channel has been activated and the channel is available.

Channel switching method: just touch the corresponding channel position in the display area directly.

3.1.2 Functional Parameters

Touch the position of the parameter name in the test result area to see the selection menu of the corresponding test function in the menu area on the right and touch the corresponding selection area of the menu to complete the function setting of the specified parameter. The menu is displayed as shown in Figure 3-1-2:
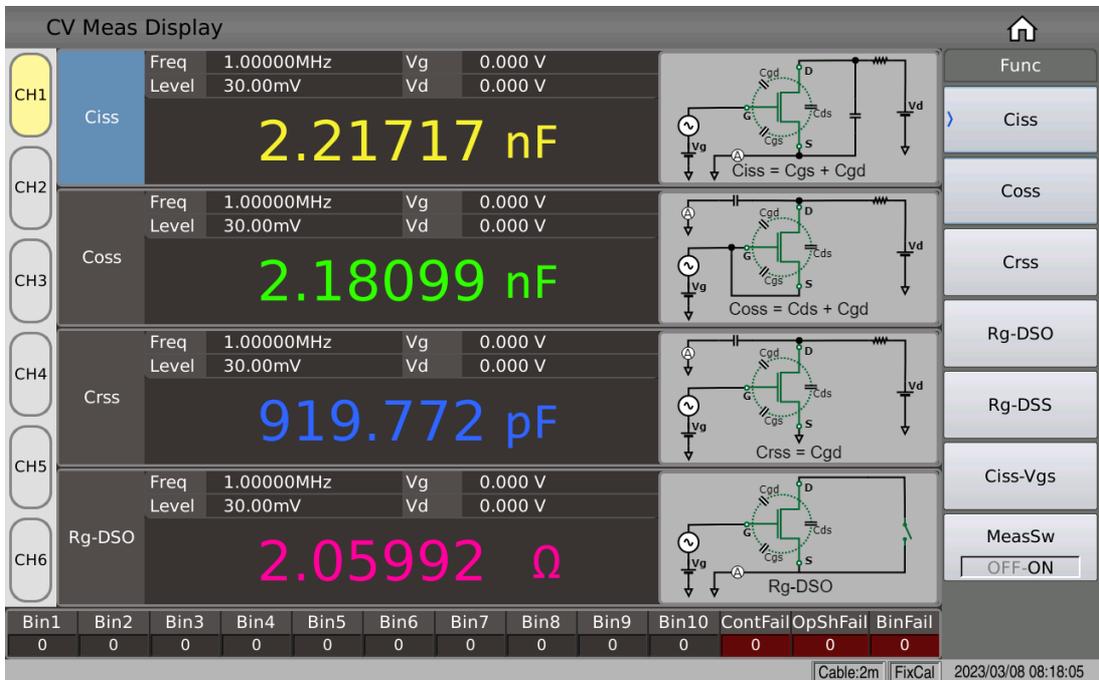
(Figure 3-1-2 Measurement Parameter Function Selection)

Touch the parameter name in the test result area to see a selection menu for the corresponding test function in the menu area on the right and touch the corresponding selection area in the menu to set the function for the specified parameter. The setting of the test parameters here is the same as in the <CV Measurement Setup> page (see 3.4.1) regarding the setting of measurement parameters. The menu is divided into: Ciss, Coss, Crss, Rg-DSO, Rg-DSS, Ciss-Vgs and measurement switches, in addition to Contact (contact check) and OpSh (on/off test), the relevant test conditions can be set in the CV measurement setup page.

Basic measurement logic:

● If the contact check is open, the subsequent test will only be carried out if the contact check is passed, if the instrument alarm indicates "Contact check failed!", then it is necessary to check the relationship between the measured part and the instrument.

● If the OpSh (on-off test) is open, the on-off test is passed before the subsequent test is carried out, and if the instrument alarm indicates "on-off test failed!", then the part under test is abnormal.

● If both Contact (contact check) and OpSh (on-off test) are on, the contact check function will be judged first, followed by the on-off test, and only after both have passed will the regular CV test be performed normally.

3.1.3 Condition Parameter Setup

Touch the Frequency, Level, Vg and Vd parameter setting boxes to quickly set the parameter conditions for simple measurements and the settings here are equivalent to those on the <CV Measurement Setup> page for Frequency, Level, Vg and Vd.

3.1.4 Results Display

The results of the touch measurement parameters can be set in decimal places and the position of the decimal point is directly related to the resolution of the result display, allowing visualization of the relative stability of the results.

The decimal digit enumeration is set so that the decimal point position can be set left or right while ensuring that the number of valid digits remains the same (adjustable when measurements are available).

Menu Options	Function Description
Auto	Default setting item, i.e., automatic display of decimal point positions
Fixed	Used to fix the current decimal point position in the automatic state
Addition	Shift the decimal point position to the left
Reduction	Shift the decimal point position to the right

Note: The decimal point position lock function is automatically canceled to revert to the floating decimal point display in the following cases: the test function is changed; the deviation mode is changed.

3.1.5 The BIN Sorting Result Display

After touching or moving the cursor to the sorting result display area, the corresponding menu will involve part of the sorting control, such as compare switch, count switch, count clear; as shown in Figure 3-1-3:
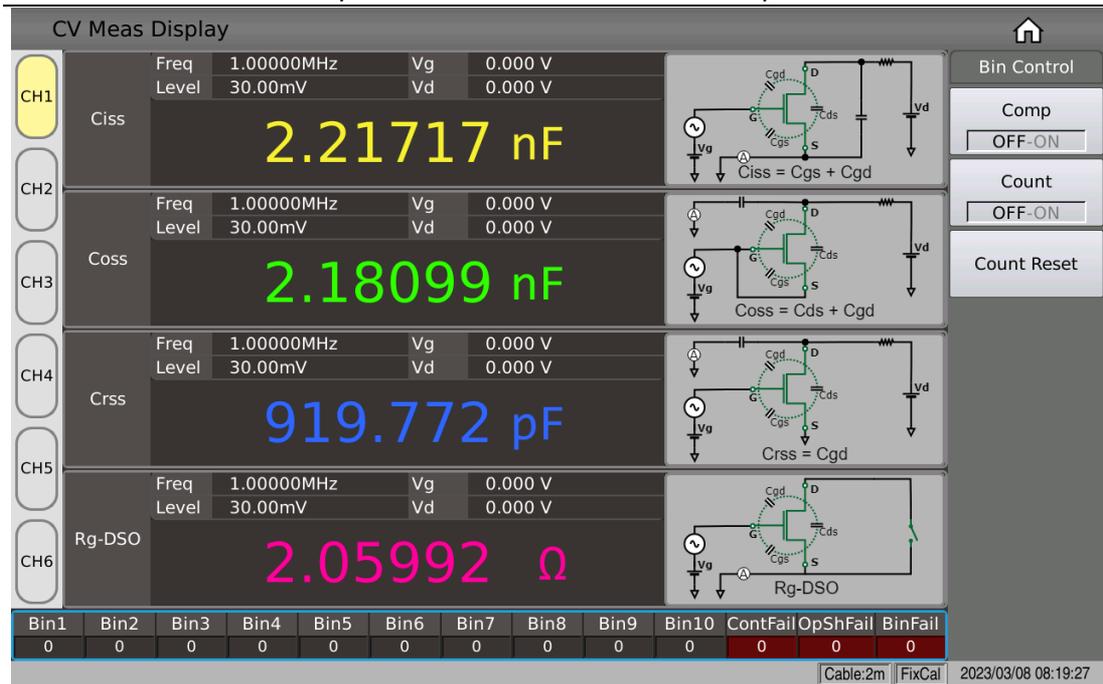
(Figure 3-1-3 Measurement Page Sorting-Related Setup)

3.1.5.1 Compare Switch

The built-in comparison function of this series can divide the component under test into up to 10 steps (BIN1 to BIN10). The upper and lower limits can be set in 10 groups, and each BIN contains 4 parameters whose upper and lower limits can be set independently. If you want one or more of the parameters not to participate in the comparison, just clear the corresponding upper and lower limits. If one or more of the parameters are not to be compared, the corresponding upper and lower limits are cleared. When the parameters to be compared are within the limits of the BIN, the corresponding BIN is found. The results of the sorting can be output to the automatic test system through the HANDLER interface for the comparison test results, enabling automatic sorting tests. These limit settings can only be set in the <CV Limit Setup> page.

The comparison function can be set optionally: ON or OFF (ON or OFF), the default state is: OFF.

3.1.5.2 BIN Count Function

Used to record and display the count value of each BIN.

Count function can be set optionally: ON or OFF (ON or OFF), the default state is: OFF.

3.1.5.3 Count Clear

A clear operation is performed on the count result of the current sorting BIN to reset the BIN count to 0, i.e., for restarting the count.

3.1.6 USB Stick to Save Test Results

Use a USB stick to save the test results.

The test results and formats that can be saved are as follows:

Time,Para,P1,P2,P3,P4,BIN,OpSh,Contact

---- corresponds to the test time,2 parameter names, parameters 1~4 results, sorting results, on-off test results, and contact check test results.

The states involved in data preservation are:

- Save switch.
- Save path hint, default path location: under the path "usb/CSV/".
- The naming rule for the file name is, cvm + machine number + date, e.g.cvm-SN12345678-20210811.csv.

3.2 <CV Measurement Setup> Page

Starting from the Home page, press the menu key [Setup] or touch the screen <CV Measurement Setup> to enter the <CV Measurement Setup> page. As shown in Figure 3-2-1

	Trigger	Single	Speed	Fast	Contact	关	CV Setup
CH1	Func	Ciss	Coss	Crss	Rg-DSO	OP_SH	› Meas Setup
	MeasSw	ON	ON	ON	ON	关	
CH2	Freq	1.00000MHz	1.00000MHz	1.00000MHz	1.00000MHz		Limit Setup
	Level	30.00mV	30.00mV	30.00mV	30.00mV		List Setup
CH3	Vg	0.000 V	0.000 V	0.000 V	0.000 V	0.000 V	Trace Setup
	Vd	0.000 V	0.000 V	0.000 V	0.000 V	0.000 V	
CH4	Delay	0 s(Auto)	0 s(Auto)	0 s(Auto)	0 s(Auto)	0 s(自动)	Handler
	Dev	OFF	OFF	OFF	OFF		Tools
CH5	Ref	0.00000 F	0.00000 F	0.00000 F	0.00000 Ω		
	Load	0.00000 F	0.00000 F	0.00000 F	0.00000 Ω		Module ▶
CH6	Avg	1	1	1	1		

Cable:2m FixCal 2023/03/08 08:19:51

(Figure 3-2-1 Measurement Setup)

3.2.1 Channel

- Meaning: Mainly used to identify the current test channel; channel identification corresponds to the insert, one insert corresponds to two scanning channels, the instrument is equipped with one insert by default, i.e., two channels.
- Value: enumerated type, CH1 to CH6, factory default CH1.
- Operation steps: Simply touch the position of the corresponding channel in the display area.
- Activation: If additional channel boards are required, the corresponding channel board needs to be activated by the software. The corresponding channel is identified by a character that identifies that the channel has been activated and the channel is available.

3.2.2 Trigger

- Meaning: The control method used to set the instrument to trigger the test, if it is found that the instrument does not update the test results, try to trigger it manually.
- Value:

Continuous	Set the Instrument in a Continuous Trigger State
Single (factory default)	Sets the instrument in a single-trigger state. Accepts panel manual triggering, command triggering, external triggering
Note: When a trigger signal is received while a test is in progress, the trigger signal will be ignored. Therefore, the trigger signal needs to be sent after the test has been completed. When triggering from the optional HANDLER interface is required, set the trigger method to single trigger.	

- Operation steps: touch the display area or move the cursor to the corresponding position and select according to the menu prompts.

3.2.3 Speed

- Meaning: Used to set the test speed of the instrument, which is mainly concerned with the length of the bridge sampling integration time; the slower the speed, the better the accompanying stability.
- Value:

Value State	AD Integration Time (plus data calculation time)
Fast+	Approx. 0.56ms
Fast (factory default)	Approx. 3.3ms
Medium	Approx. 90ms

Slow	Approx. 220ms

- Operation steps: touch the display area or move the cursor to the corresponding position and select according to the menu prompts.

3.2.4 Function

- Meaning: The function for setting the measurement parameters of the instrument, i.e., the specific parameters involved in the CV test.
- Value:

Parameter Name	Parameter Meaning
Ciss	Input Capacitance
Coss	Output Capacitance
Crss	Reverse Transfer Capacitance
Rg-DSO	Grid Input Resistance (DS open-circuit state)
Rg-DSS	Grid Input Resistance (DS short-circuit state)
Ciss-Vgs	Input Capacitance (DS short-circuit state)
OpSh	On-Off Test
Contact	Contact Inspection Test

- Operation steps: touch the display area or move the cursor to the corresponding position and select according to the menu prompts.
- Description: No restrictions on the combination of 4 parameters, any combination can be chosen.
- Parameter test switch: 4 parameters can be set with independent display switches: i.e., when the display corresponding to a parameter is switched off, the corresponding result area will be displayed OFF in place of the test result display, the display switch function can be set in the parameter setting area of the measurement display page.

3.2.5 Frequency

- Meaning: Used to set the signal frequency of the digital bridge AC test, factory default 1M.
- Value: The maximum test frequency range of this series is from 1 kHz to 2 MHz, with a minimum resolution of 0.01 Hz.

Frequency Range (F)	Test Frequency Points	Resolution
1kHz <= F<= 9.999kHz	1.0000kHz, 1.00001kHz 9.99999kHz	0.01Hz
10kHz <= F<=99.99kHz	10.0000kHz, 10.0001kHz 99.9999kHz	0.1Hz
100kHz<= F<=999.9kHz	100.000 kHz, 100.001 kHz 1MHz	1Hz
1MHz<= F<=2MHz	1.00000 MHz, 1.00001 MHz ......2 MHz	10Hz

● Operation steps:

Touch directly or use the arrow keys or knob to make the cursor move to the frequency domain.

Two test frequency settings are available for stand-alone machines:

1) Use the number keys to enter directly.

2) Use of the menu area (perform enumeration increase and decrease operations as often as prompted).

3.2.6 Level

● Meaning: Refers to the AC level, set at the RMS value of the test sine wave signal. The frequency of the sine wave signal is the test frequency and is generated by the instrument's internal oscillator.

● Value: Voltage level range: 5mV~2V; signal source output impedance fixed 100Ω.

Voltage Level (Vrms)	Resolution
[5m,1)	1mV
[1,2]	10mV
Note: The test voltage set is the output voltage value when the terminal under test is open.	

● Operation steps:

By touching the area corresponding to [Level], the menu area shows the function for switching the level type and increasing the smaller function, which can be modified and adjusted according to the menu prompts, or the numeric keys can be entered directly to achieve the value modification.

3.2.7 Vg Bias Voltage

● Meaning: Provides the drive control voltage for semiconductor CV testing, i.e., the grid voltage.

● Value: -40V to +40V DC bias voltage

● Operation steps: Touch the corresponding area and the menu area displays the commonly used bias voltage values, which can be modified and adjusted according to the menu prompts, or the numeric keys can be entered directly to achieve the value modification.

3.2.8 Vd Bias Voltage

● Meaning: Provides the operating voltage of the device for semiconductor CV testing, i.e., the drain voltage.

● Value:

Instrument Specifications	Bias Voltage Range
STE111	-200V~200V
STE112	-1500V~1500V
STE113	-3000V~3000V

- Operation steps: Touch the corresponding area and the menu area displays the commonly used bias voltage values, which can be modified and adjusted according to the menu prompts, or the numeric keys can be entered directly to achieve the value modification.

3.2.9 Time delay

- Meaning: 4 parameter tests provide independent delay time settings, mainly to provide time for bias stabilization.
- Values: 0 s to 60 s with a minimum resolution of 1 ms or set the automatic delay function.
- Operation steps: Touch the corresponding area and the menu area displays the commonly used bias voltage values, which can be modified and adjusted according to the menu prompts, or the numeric keys can be entered directly to achieve the value modification.

3.2.10 Deviation and Reference

3.2.10.1 Deviation Mode

- Meaning: The deviation test function displays the deviation value directly on the screen instead of the actual test value. The deviation value is equal to the current actual test value minus a pre-set reference value. This function makes it easy to observe the variation of the component parameters under test with temperature, frequency, bias etc.
- Value: The instrument provides two types of deviation tests as follows:

1) Δ mode (absolute deviation mode)

The deviation currently displayed is the difference between the test value of the measured part and the set reference value. The formula for calculating the Δ deviation is as follows:

$$\Delta = X - Y$$

Here, X: The current measured value of the measured part.

Y: The pre-set reference value.

2) $\Delta\%$ way (percentage deviation mode)

The deviation currently displayed is the percentage error obtained by dividing the difference between the test value of the part under test and the set reference value by the reference value. The formula for calculating the Δ% deviation is as follows:

$$\Delta\% = (X - Y) / Y \times 100 \; [\%]$$

Here, X: The current measured value of the measured part.

Y: The pre-set reference value.

If the reference value is 0, the test result shows Inf.

- Operation steps: Touch the corresponding area and the menu area displays the commonly used bias voltage values, which can be modified and adjusted according to the menu prompts.

3.2.10.2 Deviation Reference Value

- Meaning: Reference values for deviation calculation of test results.
- Operation steps: Regular numerical input.

3.2.11 Load

- Meaning: Provides a means of load calibration for instruments to improve measurement consistency
- Switch: On or off (ON or OFF) two states, the default state: off
- Value: Manual input or automatic load calculation
- Operation steps: Touch the corresponding area to operate according to the menu and enter the numeric keys directly for value modification.
- Description: After touching the load calibration menu, the instrument calculates a load calibration factor based on the previous test result and the reference value entered. The theoretical test result is then calculated from this factor and displayed in the load area for reference. In subsequent tests, if the load calibration switch is on, the measurements of the corresponding parameters will be calculated from this factor and used as the final test result.

3.2.12 Averaging

- Meaning: The averaging function averages the results of 2 or more tests.
- Value: The range is 1 to 32 with a minimum resolution of 1 and a factory default of 1.
- Operation steps: Touch the corresponding area to set it according to the menu, or enter the numeric keys directly for value modification.

3.3 <CV List> Page

From the Home page, press the menu key [Display] then touch the screen List Display or touch the screen <CV List> directly to enter the <CV List> display page. As shown in Figure 3-3-1:

Pt	Func	CH	Freq	Level	Vg	Vd	Value	P/F		CV Display
1	Ciss	1	1.00000MHz	30.00mV	0.000 V	0.000 V	3.38709nF	---		Meas
2	Coss	1	1.00000MHz	30.00mV	0.000 V	0.000 V	3.86668nF	---		
3	Crss	1	1.00000MHz	30.00mV	0.000 V	0.000 V	1.68351nF	---		
4	Rg-DSO	1	1.00000MHz	30.00mV	0.000 V	0.000 V	3.75461 Ω	---		List
5	Rg-DSS	1	1.00000MHz	30.00mV	0.000 V	0.000 V	4.05829 Ω	---		
6	Ciss-Vgs	1	1.00000MHz	30.00mV	0.000 V	0.000 V	3.39715nF	---		Trace
7	Ciss	2	1.00000MHz	30.00mV	0.000 V	0.000 V	374.126pF	---		
8	Coss	2	1.00000MHz	30.00mV	0.000 V	0.000 V	731.007pF	---		Save
9	Crss	2	1.00000MHz	30.00mV	0.000 V	0.000 V	606.836pF	---		OFF-ON
10	Rg-DSO	2	1.00000MHz	30.00mV	0.000 V	0.000 V	16.3690 Ω	---		
11	Rg-DSS	2	1.00000MHz	30.00mV	0.000 V	0.000 V	14.2553 Ω	---		
*12	Ciss-Vgs	2	1.00000MHz	30.00mV	0.000 V	0.000 V	375.534pF	---		

Cable:0m | Open | 2023/03/08 08:34:34

(Figure 3-3-1 List display page)

The <CV list> display shows up to 50 points of test frequency, test level, DC bias, independent functions corresponding to the 4 parameters, the results of the automatic scan measurements and the results of the comparison with the corresponding limit values.

During the list scan test, the symbol "*" on the far left indicates the current scan test point.

The rightmost P/F (for PASS/FAIL), which indicates the result of the comparison at the current point.

Not compared display: "---"

PASS display: PASS (green)

FAIL display: FAIL (red)

3.4 <CV List Setup> Page

Starting from the Home page, press the menu button [Setup] then touch the screen List Setup or touch the screen <CV List Setup> directly to enter the <CV List Setup> page. As shown in Figure 3-4-1:

CV List Setup												⌂

Total Point	8		Trigger Mode		Single		List Mode	Seq		List Comp	开

Pt	Func	CH	Freq (Hz)	Level (V)	Vg (V)	Vd (V)	Delay (s)	Avg	Ref	Load	Low	High
1	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
2	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
3	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
4	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
5	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
6	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
7	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----
8	Ciss	1	1.00000M	30.00m	0.000	0.000	0	1	0.00000 F	关	-----	-----

Menu: CV Setup — Meas Setup — Limit Setup — ❭ List Setup — Trace Setup — Handler — Tools

Cable:2m FixCal 2023/03/08 08:21:48

(Figure 3-4-1 List Setup Page)

The list scan function allows automatic scan testing of up to 50 points for function, channel, frequency, level, Vg bias voltage, Vd bias voltage, etc.

3.4.1 Points

Parameter setting attribute: enumerated type.

- Meaning: Sets the number of scan points used for the current list
- Value: 0 to 50, factory default value 8; (0 means no scan points)
- Operation: Touch the corresponding area to set it according to the menu or enter the numeric keys directly for value modification.

3.4.2 Trigger Mode

- Meaning: The trigger mode is detailed in the trigger description on the CV measurement setup page.
- List application: After the list scan has been triggered normally, the user can interrupt the list scan process by using the Reset button.

Trigger Mode	Special Applications
Continuous	Press panel Reset to enter the reset state and scan from the first point after triggering again
Single	

3.4.3 List Mode

- Meaning: Provides scanning mode for the list

● Value: Sequential mode or single-step mode

Sequential Mode	Scan sequentially from the first point to the last point if the trigger is valid
Single-step Mode	Step test one point at a time if the trigger is valid

Note: Note: The effect of the list mode is mainly reflected in the single trigger mode, in case of continuous trigger mode, the testing process of the two modes will be visually different.

3.4.4 Scan Conditions

Function, channel, frequency, level, Vg bias voltage, Vd bias voltage, averaging, upper and lower limits of the parameters can be set independently, for a description of the meaning refer to the description of the parameters related to CV measurement settings.

If you are only concerned about the effect that a change in one condition has on the part under test, you can simply set the other test condition to the same result with a quick setup, e.g., Vd varies linearly and frequency, level and Vg are fixed.
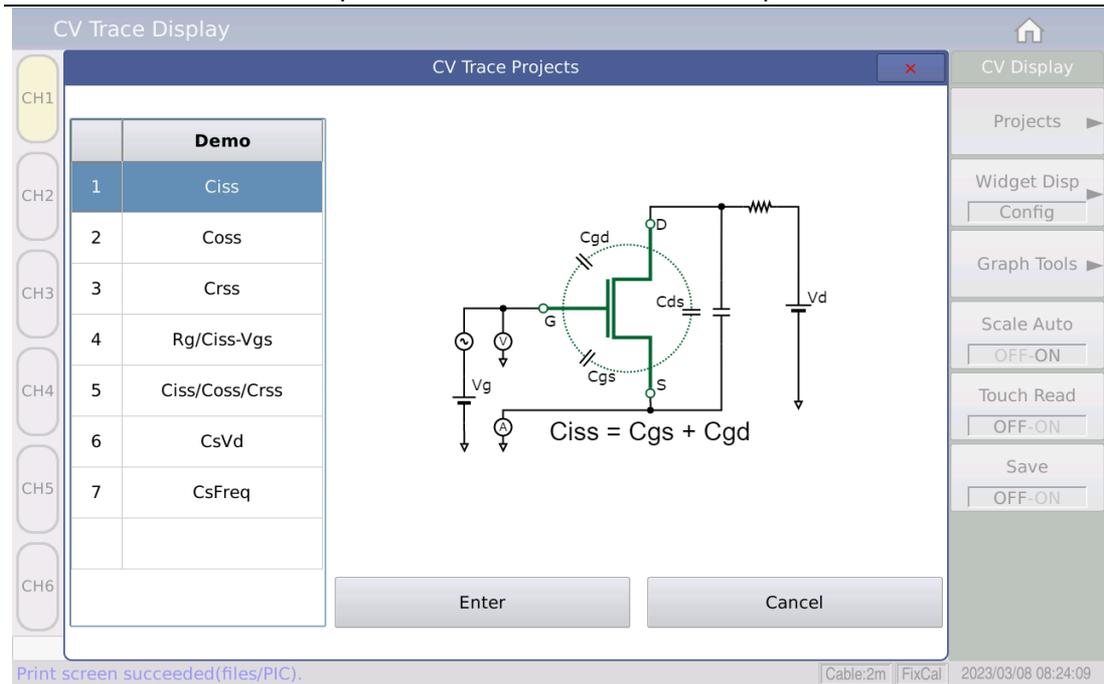
3.4.5 Time Delay

The delay time parameter indicates the delay time between the completion of each scan step and the next scan measurement, adapting to the required delay time setting for different offsets. (Note: this delay time can be added to the delay time in the measurement setup screen.)

3.5 <CV Trace> Page

From the Home page, press the menu key [Display] and then touch the screen Trace Display or touch the screen <CV Trace> directly to enter the <CV Trace> page. As shown in Figure 3-5-1

CV Trace Display

CV Trace Projects

	Demo
1	Ciss
2	Coss
3	Crss
4	Rg/Ciss-Vgs
5	Ciss/Coss/Crss
6	CsVd
7	CsFreq

$Ciss = Cgs + Cgd$

Enter   Cancel

CV Display

Projects ►

Widget Disp ►
Config

Graph Tools ►

Scale Auto
OFF-ON

Touch Read
OFF-ON

Save
OFF-ON

Print screen succeeded(files/PIC).   Cable:2m FixCal 2023/03/08 08:24:09

(Figure 3-5-1 Trace Model Selection)

3.5.1 Model Mechanism

Touch screen Project from the <CV Trace> page to access the Trace Scan Model Selection page. The different Demos of the model mechanism are independent of each other and do not interfere with each other. As shown in Figure 3-5-1

Touch screen Graph from the <CV Trace> page to visualize the graphical results of the trace scan test; touch screen Table to list the measurement result data for the trace scan test.

The currently available models are as follows:

Device Type	Functional Model
MOSFET	Ciss
	Coss
	Crss
	Rg+Ciss
	Ciss+Coss+Crss

Note: Once the user has set the scan conditions, the [Trigger] key on the front panel must be pressed to start the scan. Pressing the [Reset] key once will pause the test and pressing it again will reset it to scan again.

3.5.2 Model Case

Touch screen Setting from the <CV Trace> page to access the Trace Setup

page.

The effect of the trace setting display is model specific and requires different setting items depending on the model, as detailed in the specific model descriptions below:

Frequency and level are common test conditions, the meaning and setting of which are exactly the same as described in the Measurement Setup page.
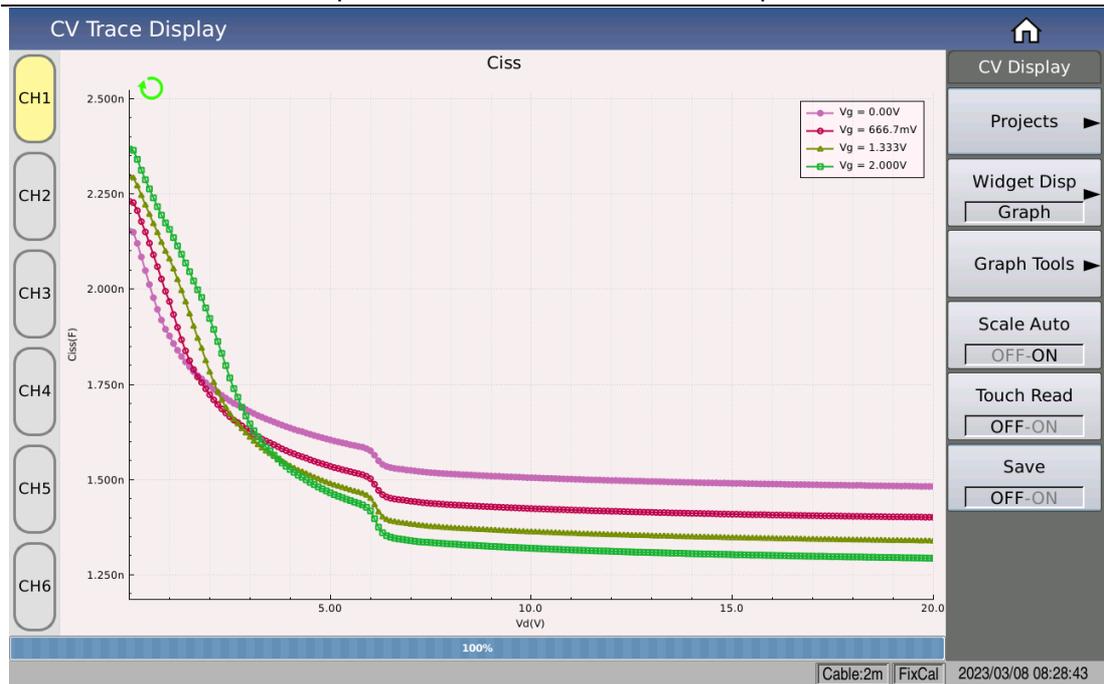
3.5.2.1 Ciss Model

(Figure 3-5-2 Trace Ciss Model Setup Display)

(Figure 3-5-3 Trace Ciss Model Scan Graphic Display)

3.5.2.2 Coss Model
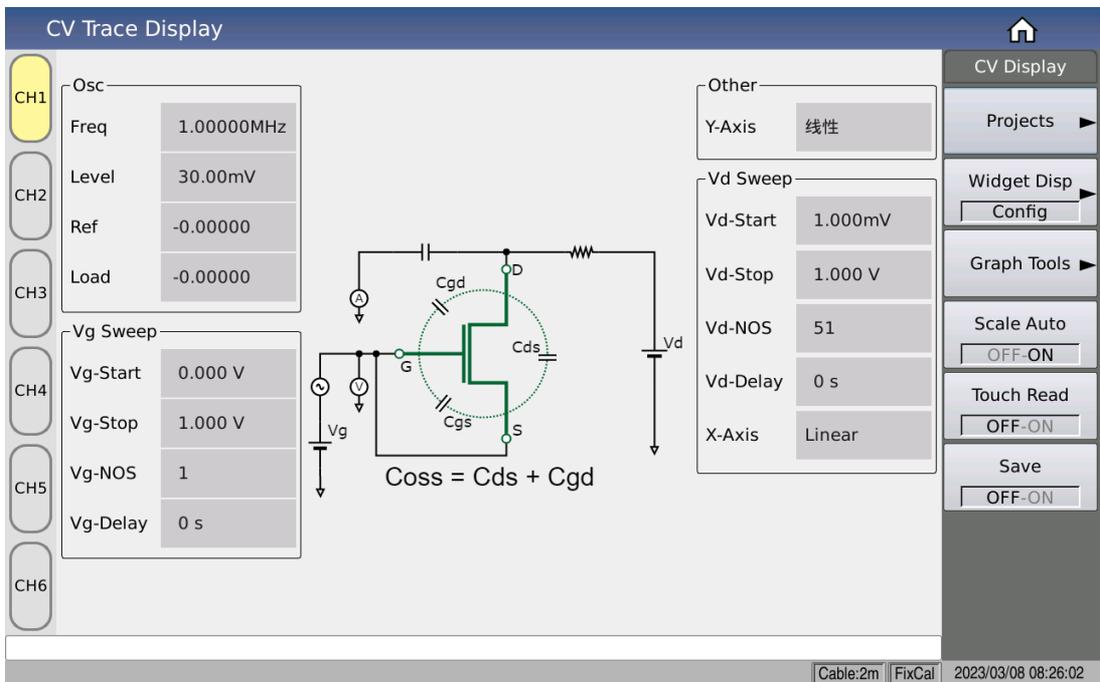
(Figure 3-5-4 Trace Coss Model Setup Display)

(Figure 3-5-5 Trace Coss Model Scan Graphic Display)

3.5.2.3 Crss Model
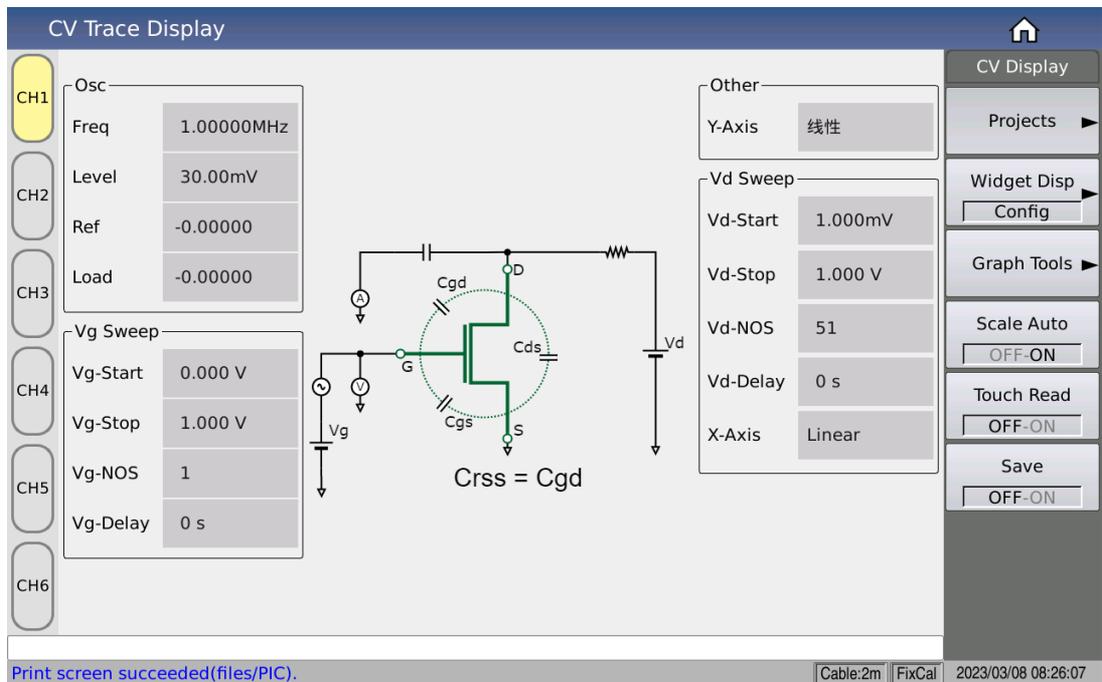
(Figure 3-5-6 Trace Crss Model Setup Display)
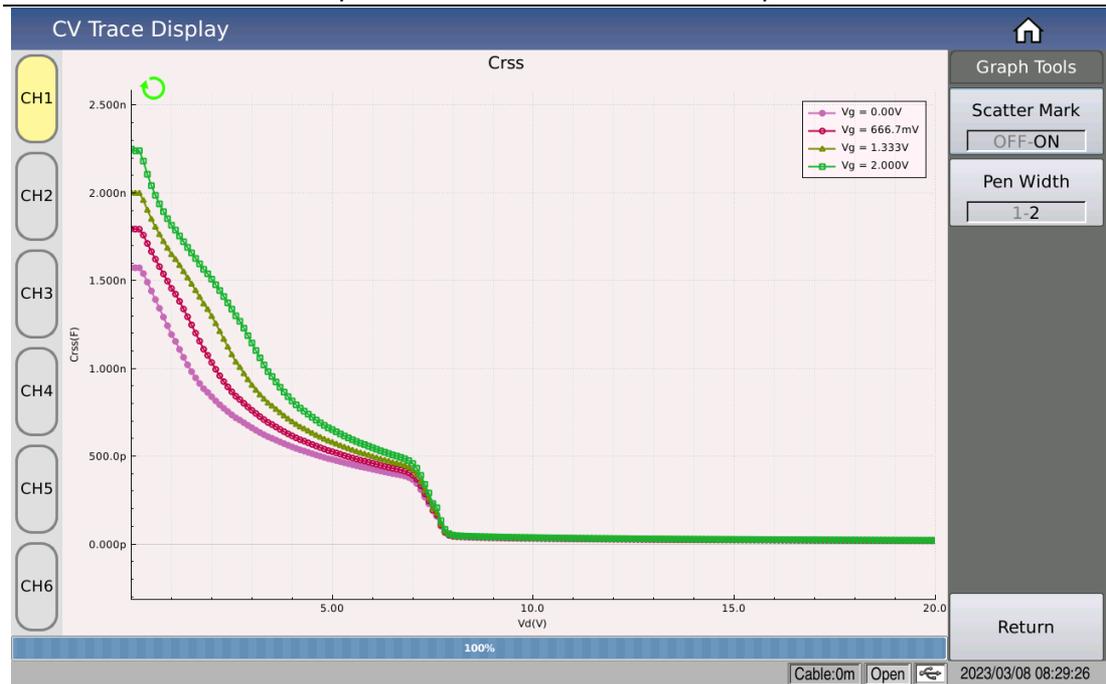
(Figure 3-5-7 Trace Crss Model Scan Graphic Display)

3.5.2.4 Rg+Ciss model
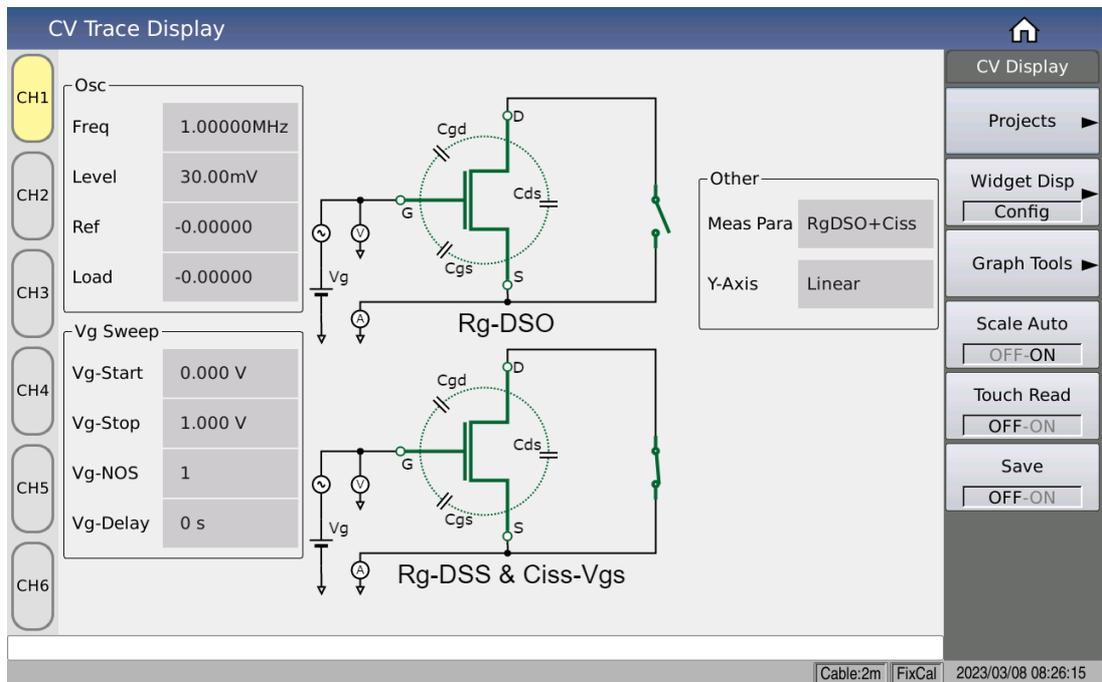
(Figure 3-5-8 Trace Rg+Ciss Model Setup Display)
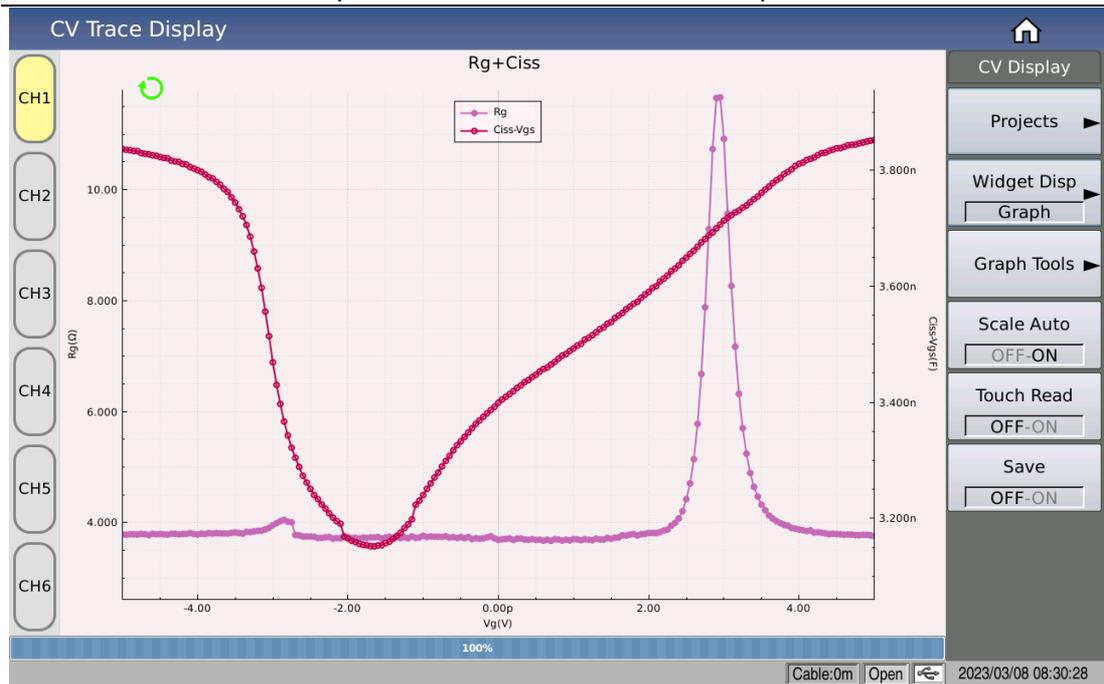
(Figure 3-5-9 Trace Rg+Ciss Model Scan Graphic Display)

3.5.2.5 Ciss+Coss+Crss Model
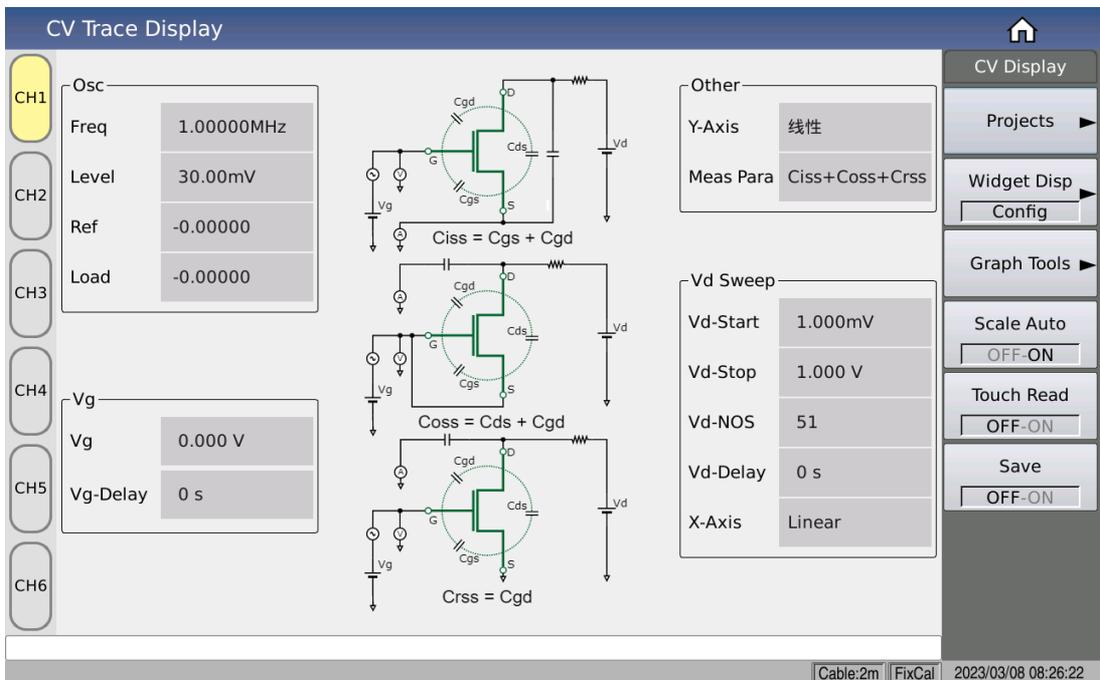
(Figure 3-5-10 Trace CapGroup Model Setup Display)
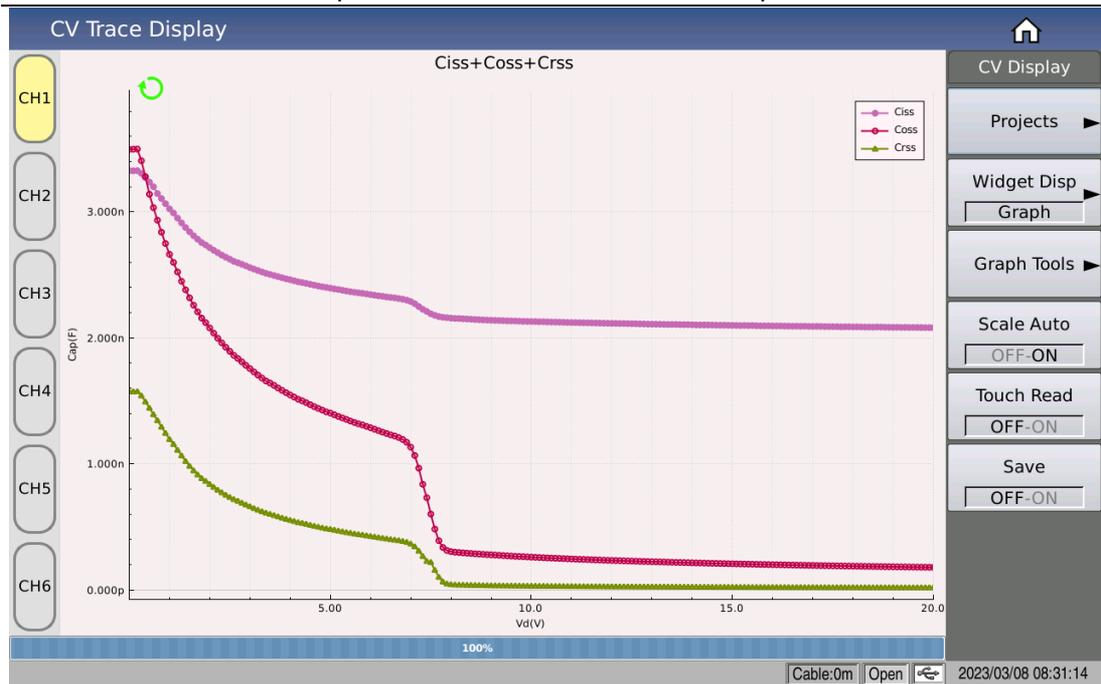
(Figure 3-5-11 Trace CapGroup Model Setup Display)

3.6 <Limit Setup> Page

From the Home page, press the menu button [Setup] then touch the screen Limit Setup or touch the screen <CV Limit Setup> directly to enter the <CV Limit Setup> page.

As shown in Figure 3-6-1:

(Figure 3-6-1 Limit Setup Page)

The comparator function of the instrument can be set up on this page with 10 step limits and the measured result can be sorted into up to 11 steps (BIN1 to BIN10 and FAIL).

3.6.1 Compare Switch

Parameter setting attribute: enumerated type.

Setting Items	Description of Meaning
OFF	Turn off the compare function
ON	Turn on the compare function

3.6.2 Compare Count Switch

Parameter setting attribute: enumerated type.

Setting items	Description of Meaning
OFF	Turn off the compare count function
ON	Turn on the compare count function

3.6.3 Compare Parameter

The compare parameters use the 4 parameters of the measurement setup, i.e., they are consistent with the 4 parameters of the measurement; the sorting parameters can be modified on the measurement display page or on the measurement setup page.

Limit setting and channel selection binding of comparison parameters, as well as independent setting of each channel, independent saving and complementary interference.

3.6.4 Deviation and Reference

See the description of deviations and references on the measurement setup page for details, the meaning of the parameters here is identical to the meaning of the measurement settings.

3.6.5 Sorting BIN switch

Parameter setting attribute: enumerated type.

Set the individual compare switches for specific sorting BIN steps:

Setting Items	Description of Meaning
OFF	Disable the compare function for the specified BIN
ON	Enable the compare function for the specified BIN

When the corresponding sorting BIN is closed, the sorting process will skip this sorting limit comparison.

3.6.6 Upper and Lower Limits

It is as the main basis for parameter comparison.

If the upper and lower limits of the corresponding BIN are not set, it indicates that this parameter under the corresponding BIN does not participate in the comparison, i.e., the test result does not have an effect on the comparison result; if only a lower or upper limit is set, it produces the effect of one-sided comparison.

Parameter setting attribute: numeric input type.

Note: When the upper or lower limit is set only the upper or lower limit is treated as a one-sided comparison.

Chapter 4 [System] Description and File Management

4.1 <System Setup> Page

Press the menu key [System] to enter the <System Setup> page.

As shown in Figure 4-1-1:
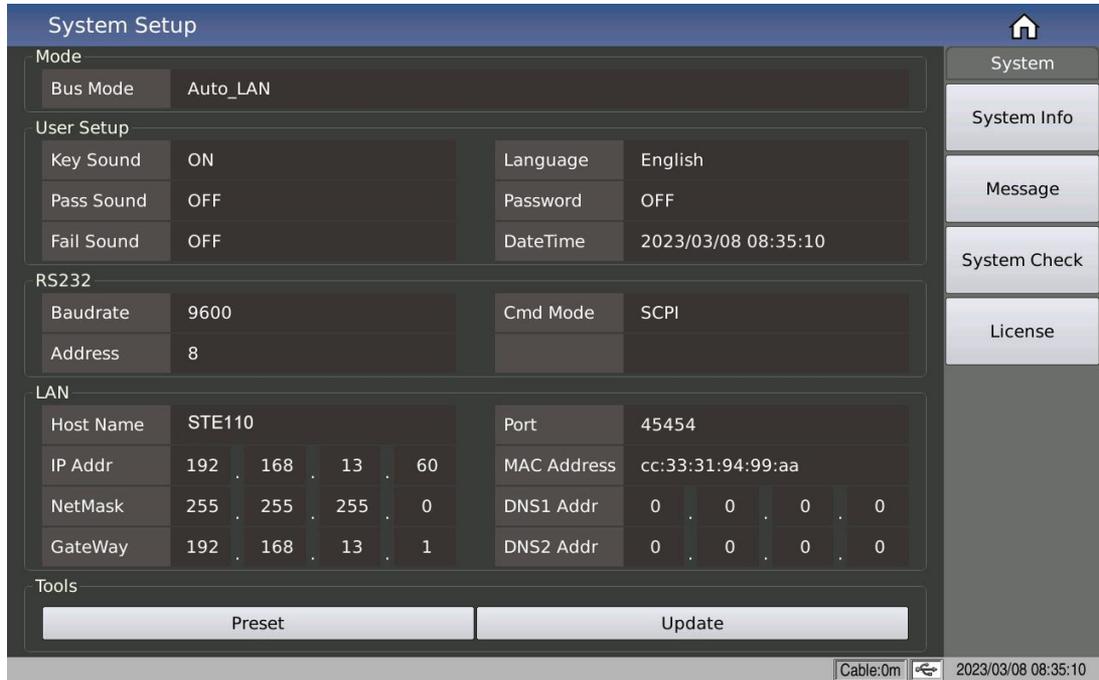
(Figure 4-1-1 System Setup)

This function page shows most of the system setup menus, including meter functions, tone on, pass tone, bad tone, system language, password setting, bus mode, GPIB address, baud rate, time, etc.

4.1.1 Bus Mode

Bus mode is used to select the communication method used by the instrument.

The following options are available:

Automatic	Automatic selection of RS232/LAN/USB communication according to external signal input
RS232	
GPIB	Extended from internal RS232
LAN	10M/100M Adaptive
USBCDC	USB Device switch requires shutdown and reboot to take effect
USBTMC	

RS485	Extended from internal RS232

When using the RS485 or GPIB interface, the bus address under the RS232 setting will be used as the local address.

4.1.2 User Setup

4.1.2.1 Key Signal

Parameter type: enumerated type

Parameter Options	Description
Off	Turn off the key signal
On	Turn on the key signal

4.1.2.2 PASS Signal

Parameter type: enumerated type

Parameter function: This area is used to control and display the audible mode when the instrument's measurement comparison results in a pass.

Parameter Options	Description
Off	Select no alarm sound
Two Shorts	Select two low and short alarm sounds
Low Long	Select a low and long alarm sound
High Short	Select a high and short alarm sound
High Long	Select a high and long alarm sound

4.1.2.3 Fail Signal

Parameter type: enumerated type

Parameter function: This area is used to control and display the alarm sounding mode when the instrument's measurement comparison results in a defective product.

Parameter Options	Description
Off	Select no alarm sound
Two Shorts	Select two low and short alarm sounds
Low Long	Select a low and long alarm sound
High Short	Select a high and short alarm sound
High Long	Select a high and long alarm sound

4.1.2.4 System Language

Parameter type: enumerated type

Parameter function: This area is used to control and display the current operating language mode of the instrument.

Parameter Options	Description
English	Select English operating language
Chinese	Select Chinese operating language

4.1.2.5 Password

Parameter type: enumerated type + input type

Parameter function: This area shows the current password protection mode.

Parameter Operation Options	Description
Off	Turn off password protection
Lock System	Open password protection, including file protection and boot password
Lock File	For user file protection
Lock Setup	Used to restrict the tester from modifying the settings file
Modify	This softkey is used to change the password. Modify the operation press this key and enter the new password according to the screen prompt, after input by the keyboard, the screen prompt to confirm the new password, repeat the new password, until this password modification is complete

Note: The factory default password is 110

4.1.2.6 Time

When moving to the time area, the system time can be modified.

4.1.3 RS232 Serial Port Setup

Common setting parameters for serial ports: 8 data bits, 1 stop bit, no parity bits

4.1.3.1 Baud Rate

Parameter type: enumerated type

Parameter function: Used to select the baud rate of the instrument's built-in RS232 interface.

Available Options	
4800	9600
19200	38400
57600	115200

4.1.3.2 Bus Address

Parameter type: input type

Parameter function: Used to control and display RS485, GPIB interface of the current instrument as well as Modbus Bus address.

Value range: 1~32

4.1.3.3 Command Mode

Parameter type: enumerated type

Parameter function: Can be set with SCPI command and ModeBus command protocol.

Parameter Options	Description
SCPI	Uses common ascii string command protocol
ModBus	Uses ModBus command protocol

See Chapter 7, Communication Commands Reference section for a detailed description.

4.1.3.4 232 Mode

● Meaning: Based on a hardware RS232 interface, offering the possibility of expansion into other interface applications.

● Value:

Parameter Options	Description
RS232	Standard RS232 hardware connection (factory default)
Extension 485	Extension to 485 hardware connection
Extended GPIB	Extension to GPIB hardware connection

Description: The specific operation of the extension is done automatically by the instrument. The emphasis here is on the fact that the extended hardware principle is still based on RS232 hardware communication.

4.1.4 Local Area Network LAN

Configure the corresponding address parameters according to the specific properties of the LAN you are accessing and plug in the network cable at the rear panel to use the network port for communication.

If you need to modify the relevant address parameters, you can go directly to the corresponding address display window on the contact screen, enter the correct network configuration on the numeric keypad and click on the confirmation to complete the modification.

If the access network equipment (router or switch) supports the automatic IP allocation function, you can directly contact the menu bar of the Automatic Configuration, the configuration takes a few seconds, do not operate the machine during the configuration; if not supported, you need to manually assign the set address; if the automatic configuration failure may get the IP address of the local loopback, i.e. 127.0.0.1; at this time, you can click on the menu bar of Default Settings, restore the default configuration, and then on the basis of the default configuration can be fine-tuned, you can consult the company's network technical

engineer to obtain the address parameters of the network configuration.

Port number default: 45454

The host's name generally corresponds to the instrument model.

4.1.5 Tools

4.1.5.1 Preset

For the convenience of the customer the instrument can be initialized to a known uniform initial state

Standardize initial software operation design

To solve the problem of inconsistent setting states when instruments are shipped from the factory

	English Menu	Chinese Menu	Explanation	Command
1	CLEAR SETTING	Clear Setting	Restore the following parameters to their factory default settings: a. Parameters set via front panel operation b. Parameters set by the SCPI commands	*RST
2	CLEAR SET&CORR	Clear Setting & User Calibration	Restore the following parameters to their factory default settings: a. Parameters set via front panel operation b. Parameters set by the SCPI command c. Switching power-down protection parameters d. Clear user calibration data	:SYST:PRES
3	FACTORY DEFAULT	Factory Setting	Restore the following parameters to their factory default settings: a. Parameters set via front panel operation b. Parameters set via the SCPI command c. Power-down protection data d. Clear user zero data e. Clear user saved files	:SYS:DEFT

Note: Parameters that cannot be initialized

The initialization operation does not allow the system calibration data to be cleared.

The real time clock date and time is not allowed to be cleared or initialized.

See the appendix table for a detailed list of parameters to be restored later.

4.1.5.2 Software Upgrade

This function is mainly used for software version upgrade maintenance, this series of machines are designed to carry multiple CPUs, for the convenience of users, provide a key upgrade operation, after operating a key upgrade, the user

only needs to follow the prompts, wait for about 15 seconds, after the upgrade is complete the instrument will automatically restart, after restarting you can return to this menu whether the software version is the latest version after the upgrade.

The instrument provides a direct upgrade of specified files in the file system management list in order to facilitate multiple upgrade paths for users.

You can also use the default upgrade path, i.e., the "usb/update110.sec" file to perform an upgrade, i.e., the upgrade file update110.sec file is placed in the root directory of the USB stick, and the operation menu will send commands to the instrument to perform a one-click upgrade operation.

It is also possible to use our own designed upper computer tool to upgrade the file specified by the upper computer.

4.2 <File Management>

As this series is equipped with an embedded system, it is easy to store the parameters set by the user in the form of a file inside the system or on an external USB stick. When the same settings are to be used next time, the user does not need to reset these parameters, but simply loads the corresponding file and the last set parameters are available. This saves the user a lot of time in setting parameters repeatedly and increases productivity.

From the Home page, touch the <File Management> module to access the <File Management> function page. As shown in Figure 4-2-1.

File				
Name	/	Size	Date Modified	File
⊟ files			2023/02/21 19:15:02	Save .cv
⊟ PIC			2023/02/21 19:15:17	
⊟ PIC202211082			2022/11/08 18:33:51	Rename
update110.sec		3.4 MB	2023/02/06 16:38:06	
⊟ usb			1970/01/01 00:00:00	Delete
				New folder
				Update
Int:129MB(210MB)	Ext:24.6GB(28.9GB)		Mem:113MB(247MB)	

Cable:0m 2023/03/08 08:37:28
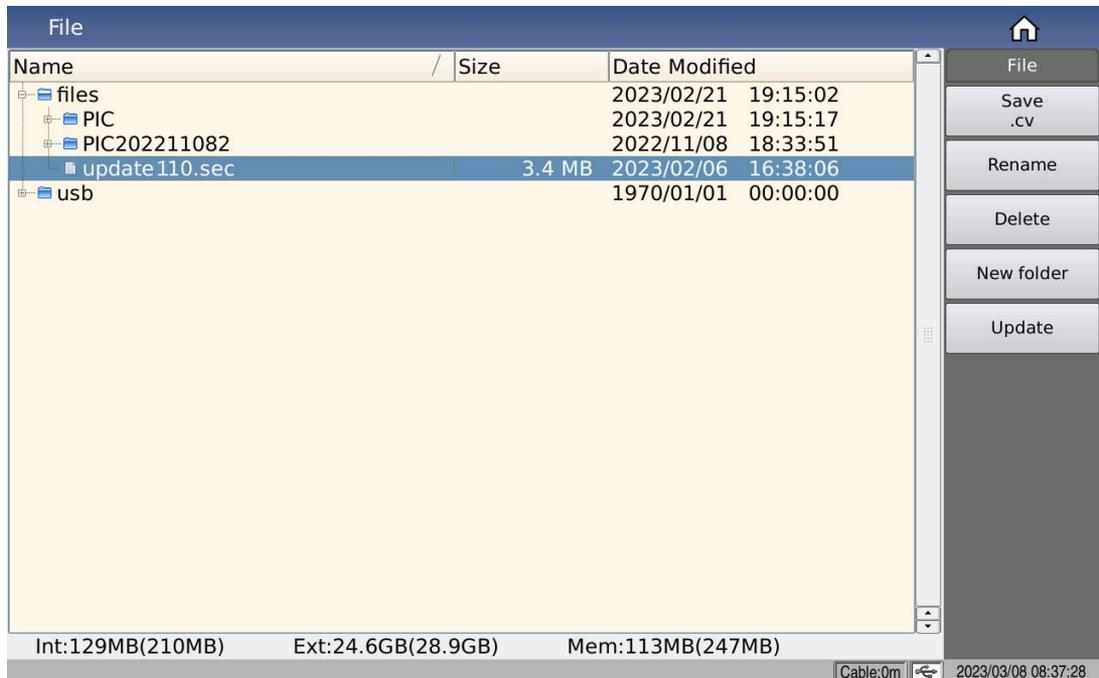
(Figure 4-2-1 File Management)

4.2.1 USB Management Performance

As mentioned above, this series is equipped with a USB HOST interface as standard, allowing the use of external USB flash drives as storage media, thus breaking the internal storage size limits of the instrument, and also allowing the copying of these files to an IBM PC with a USB interface or to a compatible desktop or laptop computer, thus allowing unlimited expansion.

USB storage devices (flash drives) with the following performance are supported:

Compliant with USB 2.0 standard

File format: FAT16 or FAT32 (formatted with Microsoft Windows operating system)

4.2.2 Store/Recall Function Introduction

This section provides information on the store/recall function. The store/recall function allows the user to save instrument configuration information to and from the instrument's internal Flash or external USB stick, while test results and screenshots can only be saved to the external USB stick.

Symbol description:

◆ files: internal files.

◆ usb: external files

Preservation methods and uses are described in Table 4-1 below, which illustrates the available preservation methods and their uses.

Preservation Methods		Recallable or not	Uses
Type	File Format		
Parameter Setting File	*.cv	Yes	Save the test configuration status of the instrument
Screenshot Saving	*.png	No	Save a screenshot of the instrument.
Test Data	*.csv	No	Save test data

Table 4-1 Preservation Methods and Uses

4.2.3 Basic Menu Operations of File Management

The various operations on the file are carried out as follows:

The up and down keys and the knob of the arrow keys are used to move the file cursor up and down, and the left and right keys of the arrow keys are used to operate on the expanded state of the current path.

Click to select the name of the file to be manipulated and according to the toolbar on the right-hand side of the screen the following can be done:

◆ Save.cv

According to the main mode of the current test, the default menu is the corresponding file save menu, which will save the measurement setup file in the root directory with the files file after entering the file name when the focus of the file list is under the files path.

◆ Copy to E:\

When the cursor is in the path corresponding to files, copy the file or folder corresponding to the cursor to the usb root directory.

Note: If the file to be copied is a file, the file under the usb path will be overwritten if a file with the same name exists in the usb; if the file to be copied is a folder, please make sure that no folder with the same name exists in the usb root directory, otherwise the copy will fail.

◆ Delete

The instrument will delete the file where the cursor is located.

◆ Loading

Loading the settings file specified by the file index to reconfigure the instrument's parameter settings.

◆ Rename

Renames the name of the file or folder where the cursor is located.

Note: The root directory provided is not allowed to be modified.

◆ New Folder

Create a new folder directory at the current cursor location; new test files can be saved in the new folder directory.

4.2.4 File Management Operation Steps

Move the cursor: The arrow keys up and down and the knob enable cursor movement.

Expand and contract: The arrow keys left and right can be used to expand and contract the folder.

Directly contact with the screen to respond to files.

4.2.4.1 File Saving

Move the cursor to the folder where you want to save the settings file or to any file inside the folder and the file menu will be displayed in the corresponding menu area.

Load (this menu will be displayed if it is a loadable file type)

Save

Copy to E:\

Rename

Delete

New folder

Press the Save soft key and the numeric keypad will be displayed for entering the file name. The file name suffix is generated automatically, and no suffix is required.

Enter OK and a named setting file will be generated in the currently created directory.

4.2.4.2 Load Files

When the cursor is moved to the type of file that can be loaded, the menu is displayed as above.

Move the cursor to the location of the file to be loaded in the file list, or enter the file serial number directly.

Press the Load soft key and the following confirmation dialog will be displayed.

Loading

Cancel

Press the soft key, No will cancel the current load operation and return to step 1.

Press Load to confirm that the currently selected file is loaded. After the loading is completed, the corresponding measurement display page is returned intelligently.

4.2.4.3 File Copy

Move the cursor to the folder or file to be copied and the menu area will be displayed with

Copy to E:\

Copy to I:\

Press Copy to E: to copy the file to the root directory of the instrument's external storage flash drive.

Press the Copy to I: key to copy the file to the internal root directory of the instrument.

Note: Please ensure that your USB stick meets the criteria described in this section and that it is not write protected.

Chapter 5 User Correction Operation

Pressing the [Cal] button on the front panel will bring up the user correction menu under the corresponding measurement function, displayed as follows.
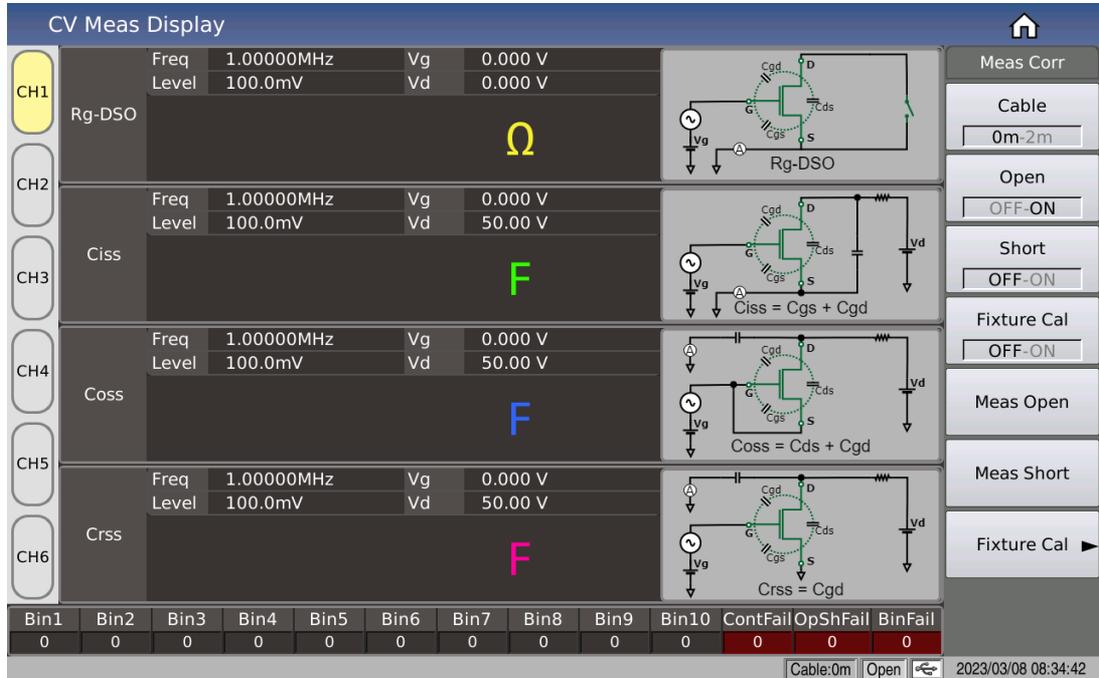
(Figure 4-1-1 Measurement Display - User Correction Menu)

- Open circuit switch, short circuit switch, i.e., the switch setting for open and short circuit clearing respectively, the default state is off.

- Open-circuit test, short-circuit test, i.e., the control instrument executes open and short-circuit clearing operation according to the selection of channel parameters.

- Cable length, i.e., setting the length of the cable used for the optional calibration.

The zeroing data for different channels are stored independently, but if the parameters in the channel are changed, the original zeroing data will be meaningless, and the zeroing operation needs to be performed again as required.

Chapter 6 Performance and Testing

6.1 Measurement Functions

6.1.1 Measurement Parameters and Symbols

Parameter Name	Parameter Meaning
Ciss	Input Capacitance
Coss	Output Capacitance
Crss	Reverse Transfer Capacitance
RgDSS	Grid input resistance (short circuit drain source)
RgDSO	Grid input resistance (open circuit drain source)
Ciss-Vgs	Input capacitance (DS direct short circuit state)
OpSh	On-off Test
Contact	Contact Inspection

6.1.2 Measurement Combinations

Any of the four parameters can be selected, regardless of the primary and secondary parameters.

6.1.3 Mathematical Operations

The absolute deviation Δ and the percentage deviation Δ% of the measured value from the programmable nominal value are calculated.

6.1.4 Equivalent way

Series connection

6.1.5 Measurement range

Automatic

6.1.6 Trigger

Single, continuous.

Continuous: Continuous measurement of the measured part and output of the results for display.

Single: Pressing the panel "TRIGGER" key, the instrument's HANDLER interface receiving an external "start" signal, using the foot switch or using the bus trigger command causes the instrument to take a measurement and output the result for display, normally in a waiting state.

6.1.7 Delay Time

Delay: Time from measurement trigger to start of measurement. 0-60 seconds programmable in 1ms steps.

6.1.8 Test Terminal Connection Method

Six-terminal measurement method is used.

Gcur: Grid current sampling   Scur: Source current sampling

Gpot: Grid sampling high end   Spot: Source sampling low end

Dcur: Drain current sampling   Dpot: Drain sampling low end

The following 4 terminals are recommended for testing two-terminal devices such as diodes and capacitors

Gcur: Grid current sampling   Dcur: Drain current sampling

Gpot: Grid sampling high end   Dpot: Drain sampling low end

6.1.9 Measurement Time (at frequencies >= 10 kHz)

Fast+: approx. 0.56ms/time

Fast: approx. 3.3ms/time

Medium: approx. 90ms/time

Slow: approx. 220ms/time

Note: The time mentioned here refers to the AD conversion and calculation time and does not include the channel control time and the delay time required to add the bias voltage.

6.1.10 Average

Programmable from 1-255.

6.1.11 Display Digits

6 digits, maximum display number 999999

6.2 Test Signals

6.2.1 Test Signal Frequency

Test signal is sine wave

Frequency accuracy: ±0.01%

Test frequency range: 1kHz ~ 2MHz

Minimum resolution: 10mHz

6.2.2 Signal Mode

Set the test voltage on the measurement display page to the voltage of the open circuit at the measuring terminal. The voltage at the measuring terminal may be smaller than the set voltage when measuring.

6.2.3 Test Signal Level

	Scope	Accuracy	Stepping
Voltage	5mVRMS-2VRMS	$\pm(10\% \times$setting value + 2mV)	100μV

6.2.4 Output Impedance

100Ω±2%

6.2.5 DC Bias Voltage Source

Grid Bias Voltage			
Instrument Specifications	Scope	Resolution	Accuracy
STE111	0V- ±40V	1mV	$\pm(1\% \times$ set voltage + 8mV)
STE112	0V- ±40V	1mV	$\pm(1\% \times$ set voltage + 8mV)
STE113	0V- ±40V	1mV	$\pm(1\% \times$ set voltage + 8mV)
Drain Bias Voltage			
Instrument Specifications	Scope	Resolution	Accuracy
STE111	-200V~200V	10mV	$\pm(1\% \times$ set voltage + 200mV)
STE112	-1500V~1500V	10mV	$\pm(1\% \times$ set voltage + 200mV)
STE113	-3000V~3000V	10mV	$\pm(1\% \times$ set voltage + 200mV)

6.3 Measurement Accuracy

Measurement accuracy comprises measurement stability, temperature coefficient, linearity, and measurement repeatability and calibration interpolation error.

The checking of the measurement accuracy of the instrument must be carried out under the following conditions:

Warm-up time: $\geq$ 60 minutes

Test cable length: 0m, 2m

Correct open circuit and short circuit clearing "0" after warm-up

The accuracy values described below are the basic accuracy of channel 1 measured on the end face or with 2m of cable

6.3.1 Accuracy of C

The accuracy of C, Ae, is expressed by:

Ae= $\pm[AL\times A+ (Ka+Kb+Kc) \times100+ Kd] \times Ke$ [%]

A: Basic measurement accuracy (see Figure A)

AL: Level correction factor (see Table A)

Ka: Impedance scaling factor (see Table B)

Kb: Impedance scaling factor (see Table B)

Kc: Calibration interpolation factor (see Table E)

Kd: Cable length factor

Ke: Temperature factor (see Table G)

For C Accuracy Ae Conditions of use: Dx (D measured value) ≤ 0.1

When Dx ≥ 0.1, the accuracy factor Ae for C should be multiplied by $\sqrt{1 + D_x^2}$

6.3.2 Accuracy of D

D Accuracy De is expressed by the following equation:

$$D_e = \pm \frac{A_e}{100}$$

The above equation is used only when Dx≤0.1.

When Dx>0.1, De should be multiplied by (1+Dx)

6.3.3 Rs Accuracy

When Dx (measured D value) ≤ 0.1

The accuracy of Rs is expressed by the following equation:

$$R_{se} = X_x \times D_e \qquad [\Omega]$$

$$X_x = \frac{1}{2\pi f C_x}$$

Here, Xx is the value of the measured X [Ω].

Cx is the value of the measured C [F].

De is the accuracy of D

F is the test frequency

6.3.4 Accuracy Factor

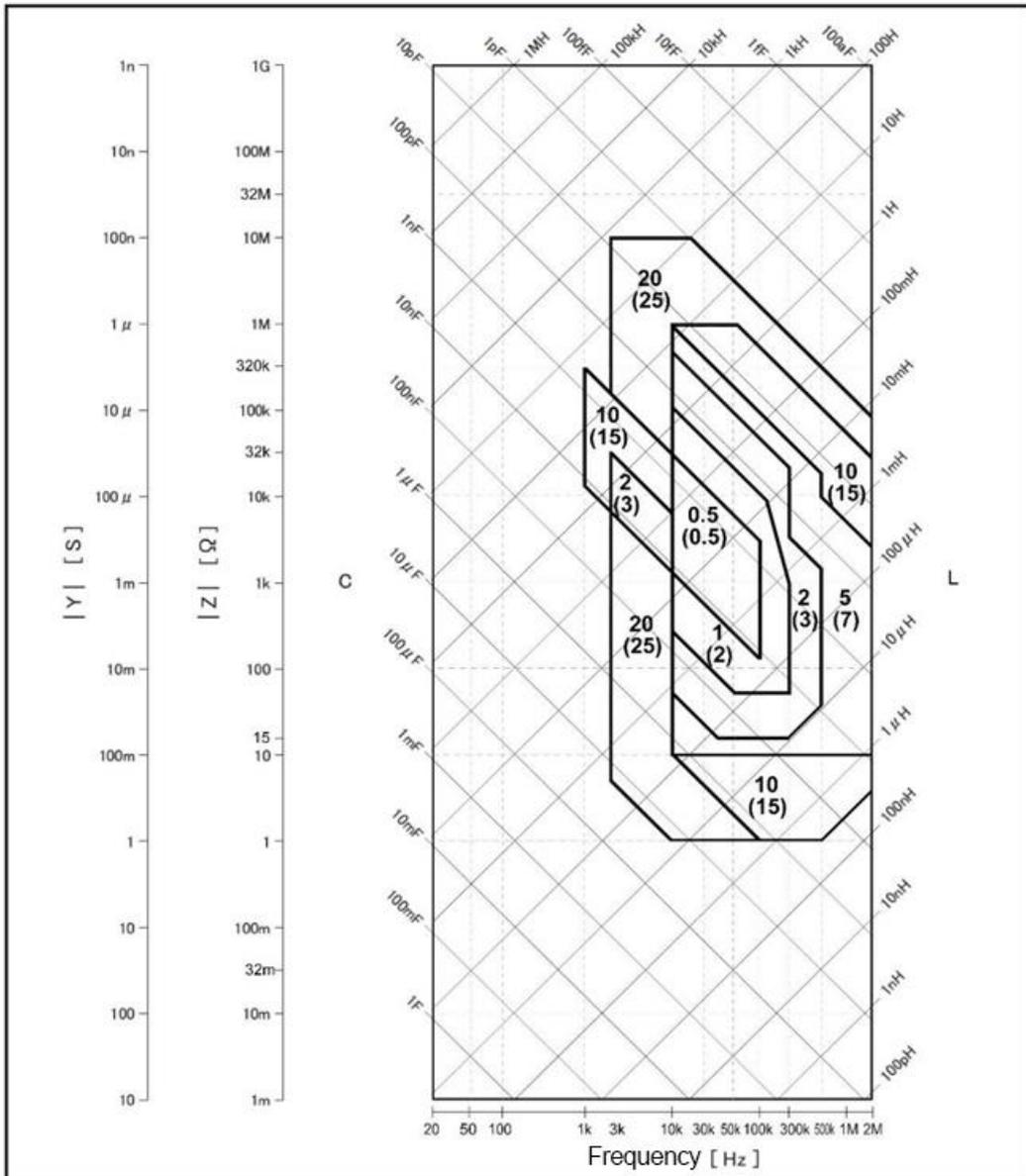## 6.3.4.1 Basic Measurement Accuracy A

Figure A Basic Accuracy A (to be replaced)

The basic measurement accuracy factor A is selected as follows:

In Figure A above, each frame includes the upper and lower values of the basic measurement accuracy A, e.g., 0.2 (upper) / (0.3) (lower) in the middle frame.

When the measurement speed is medium or slow, select the data in the upper bracket, e.g., 0.2.

When the measured speed is fast, select the data in the lower brackets ( ), e.g., 0.3.

On the borderline of the graph, select the smaller value.

The basic accuracy A in figure A above applies to a test level in the range 500mVrms - 1.0Vrms. When this level range is exceeded, the current basic measurement accuracy is obtained by calculating ALA from the value of AL as determined in table A below.

Here, Vs is the test signal voltage.

Table A: Level Correction Factor AL

Test Signal Voltage Vs (Vrms)				
[50m, 5m]	[200m, 50m)	[500m, 200m)	[1, 500m)	[2, 1)
2.5×50mVrms / Vs	2.5	500mVrms / Vs	1	2

Table B Impedance Scaling Factors K_a, K_b

Speed	Frequency	K_a	K_b
Medium Slow	1.2kHz<fm ≤8kHz	$(\dfrac{1 \times 10^{-3}}{|Z_m|})(1 + \dfrac{200}{V_s})$	$|Z_m|(1 \times 10^{-9})(1 + \dfrac{70}{V_s})$
	8kHz<fm ≤150kHz		$|Z_m|(3 \times 10^{-9})(1 + \dfrac{70}{V_s})$
	150kHz<fm ≤1MHz	$(\dfrac{1 \times 10^{-3}}{|Z_m|})(3 + \dfrac{200}{V_s})$	$|Z_m|(10 \times 10^{-9})(1 + \dfrac{70}{V_s})$
Fast	1.2kHz<fm ≤8kHz	$(\dfrac{2.5 \times 10^{-3}}{|Z_m|})(1 + \dfrac{400}{V_s})$	$|Z_m|(2 \times 10^{-9})(1 + \dfrac{100}{V_s})$
	8kHz<fm ≤150kHz		$|Z_m|(6 \times 10^{-9})(1 + \dfrac{100}{V_s})$
	150kHz<fm ≤1MHz	$(\dfrac{2.5 \times 10^{-3}}{|Z_m|})(2 + \dfrac{400}{V_s})$	$|Z_m|(20 \times 10^{-9})(1 + \dfrac{100}{V_s})$

fm: Test frequency [Hz]

Impedance of the measured part [Ω]

Test signal voltage [mVrms]

Ka is used when the impedance is less than 500Ω, Kb is invalid.

Kb is used when the impedance is greater than 500Ω, Ka is invalid.

6.3.4.2 Table C, when the cable length is extended, Ka should additionally increase by the following values

Cable Length L [m]	0	2
K_a Value Added	0	0.0010

6.3.4.3 Table D, when the cable length is extended, K_b should be additionally

multiplied by the following values

Cable Length L [m]	0	2
fm≤100kHz	1	1+10×fm
100kHz<fm≤300kHz	1	1+4×fm
300kHz<fm≤2MHz	1	1+1×fm

6.3.4.4 Table E Calibration Interpolation Factor Kc

Test Frequency	K_c
Direct Calibration Frequency (frequencies listed in Table F)	0
Other Frequencies	0.0003

6.3.4.5 Table F Direct Calibration Frequency

1	1.2	1.5	2	2.5	3	4	5	6		8		[kHz]
10	12	15	20	25	30	40	50	60		80		[kHz]
100	120	150	200	250	300	400	500	600	700	800	900	[kHz]
1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2		[MHz]

Table F 43 points of frequency

6.3.4.6 Table F Cable Length Factor K_d

Test Signal Level	Cable Length	
	0m	2m
≤2V$_{rms}$	0	$0.1 + f_m /10$

f_m: Test frequency [MHz]

6.3.4.7 Table G Temperature Factor K_e

Temperature (℃)	0 - 18	18 - 28	28 - 40
K_e	4	1	4

6.3.4.8 Examples of Measurement Accuracy Calculation for C

Frequency	Measured Capacitance	Basic Accuracy	Accuracy (add Ka, Kb)	Conditions
10kHz	100pF	±2%		
	1nF	±0.5%		
	10nF	±0.5%		
100kHz	10pF	±10%		Temperature: 22
	100pF	±2%		Level: 1V
	1nF	±0.5%		Cable: 0m
	10 nF	±0.5%		
1MHz	10pF	±10%		
	100pF	±5%		

	1nF	±5%		
	10pF	±10%		
2MHz	100pF	±5%		
	1nF	±5%		

6.4 Performance Test

6.4.1 Operating Conditions

Each test should be carried out under the reference operating conditions in Chapter 1. This test only includes the testing of the main part of the instrument's indicators. Other parts not included, such as tests on transformer parameters, can be tested by the user under the specified conditions according to the indicators listed in this manual. The performance tests shall be carried out under the preheating conditions specified in chapter 1.

6.4.2 Test Apparatus and Equipment are Shown in the Following Table.

Serial Number	Instrument Name		Technical Requirements
1	Standard Capacitor	100pF	0.02% Loss D is known
		1000pF	
		10000pF	
2	AC Standard Resistor	10Ω	0.02%
		100Ω	
		1kΩ	
		10kΩ	
		100kΩ	
5	Frequency Meter		(0~1000) MHz
6	Digital Multimeter		0.5%
7	Insulation Resistance Meter		500V Class 10
8	Hi-pot Tester		0.25kW (0~500) V

6.4.3 Function Inspection

The instrument's function keys, display, terminals, etc. should be working properly and the functions should be correct.

6.4.4 Test Signal Level

Place the digital multimeter in the AC voltage range with one test bar connected to the HCUR terminal of the meter and the other test bar connected to the earth terminal. Change the level to: 10mV, 20mV, 100mV, 200mV, 1V, 2V

readings should be in accordance with this chapter on test signal level requirements.

6.4.5 Frequency

Connect the earth terminal of the frequency meter to the earth terminal of the instrument. Connect the test terminal of the frequency meter to the HCUR terminal of the STE110 series instrument. Change the frequency to 1kHz, 10kHz, 100kHz, 200kHz, 500kHz, 1MHz, 2MHz. The reading of the frequency meter should comply with the requirements of this chapter regarding the test signal frequency.

6.4.6 Measurement Accuracy

The basic measurement parameter is C. The rest of the parameters can be calculated from the above parameters, so the accuracy measurement is mainly performed on C.

6.4.7 Capacitance C Accuracy

Test conditions:

Test frequency   10kHz   100kHz   Separate test

Level   1V

Range   AUTO

Slow speed

Short circuit and open circuit clearing should be carried out before the test. Access to the standard capacitor 100pF, 1000pF, 10nF to change frequency, the error capacity C between the instrument reading and the standard value should be within the permissible error range specified in this chapter on the accuracy of C.

Chapter 7 Handler Interface Instruction

The STE110 series provides the user with a Handler interface, which is primarily used for the output of the sorting results of the instrument. When the instrument is used in an automatic component sorting test system, this interface provides a contact signal to the system and an output signal for the sorting results.

The STE110 series of instruments use the 57BR-4036L interface for the output of BIN sorting and list scan sorting.

7.1 BIN Sorting HANDLER Description

The interface model 57BR-4036L is supplied with the BIN sorting instrument, which is provided with a 10-step sorting from /BIN1 to /BIN10, /Cont Fail on/off discrimination and the total PASS and FAIL signals.

7.1.1 Technical Description

7.1.1.1 Output Signal

Active low, open collector, optoelectronic isolation

Table 10-1 Output Signal

Signal	Overview
/BIN1-/BIN10 /OP_SH Fail, /Cont Fail PASS, Bin FAIL	Results output
/INDEX	"End of analog measurement" signal
/EOM	"All measurements complete" signal
/ALARM	Provides an alarm when a transient power failure is detected or when the processor interface board is reset.

7.1.1.2 Input Signal

Optoelectronic isolation

Table 10-2 Input Signal

Signal	Overview
/KEY_LOCK	Key lock (locks front panel keypad, including touch screen)
/EXT_TRIG	External trigger signal, pulse width $\geq$ 1μs

7.1.1.3 Signal Line Definition

The HANDLER interface of the BIN sorting uses three signals: compare output, control input and control output. The following are the signal definitions for the HANDLER interface when the BIN compare function is used.

Compare output signal: /BIN1 - /BIN10, /OP_SH Fail, /Cont Fail, Pass, Bin

Fail.

Control output signal: /INDEX (analog measurement completion signal)

/EOM (end of measurement and valid signal for comparison data)

/ALARM (instrument power-down signal).

Control input signal: /EXT.TRIG (external trigger signal)

/Keylock (Keylock)

The interface diagram for each of the above contacts is shown in Figure 7-1.

The signal assignments and brief descriptions for each of the above contacts are shown in Table 7-3.

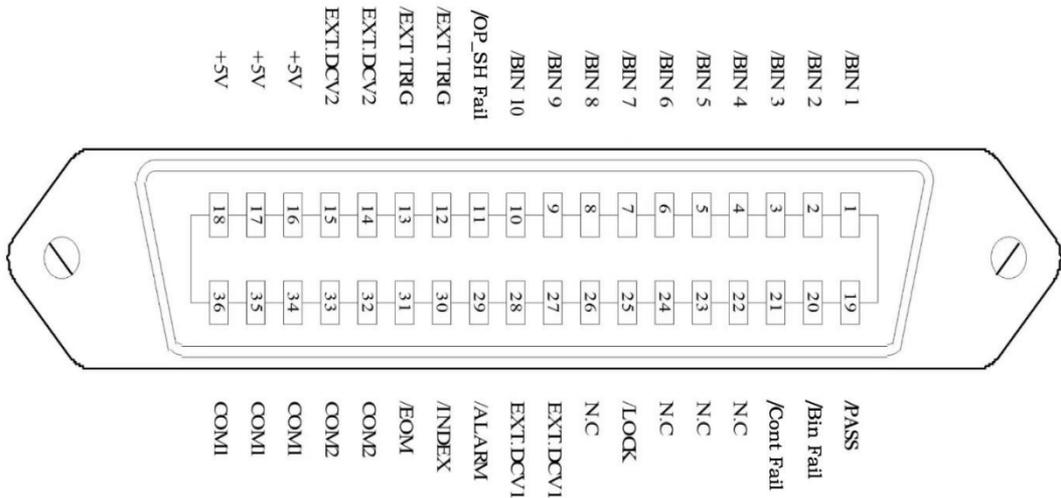The timing diagram is shown in Figure 7-3.

Table 7-3 Signal Assignment of the BIN Compare Function Contacts

Pin No.	Signal Name	Signal Direction	Description
1	/BIN1	Output	
2	/BIN2		
3	/BIN3		
4	/BIN4		
5	/BIN5		Sorting results
6	/BIN6		All /BIN (BIN signal) outputs are open-collector output.
7	/BIN7		
8	/BIN8		
9	/BIN9		
10	/BIN10		

11	/OP_SH Fail	Output	On-off test sorting output
12 13	/EXT.TRIG	Input	External trigger: When the trigger mode is set to single, the test is triggered by the rising edge pulse signal added to the pin.
14 15	EXT.DCV2	Input	External DC voltage 2: DC power supply pin for signals optically coupled to the instrument (/EXT_TRIG, /KeyLock; /ALARM, /INDEX, /EOM).
16 17 18	+5V	Output	Instrument internal power supply +5V: It is not recommended to use the instrument's internal power supply, but if you must, ensure that the current used is less than 0.3A and that the signal lines are kept away from sources of interference.
19	/PASS	Output	The measurement result is PASS as long as it is in any of the steps /BIN1 - /BIN10 (see Figure 7-2)
20	/FAIL	Output	Measurement results not in /BIN1-/BIN10 /FAIL for any gear (See Figure 7-2)
21	/Cont Fail	Output	Contact check failed output
22 23 24	Undefined	Output	Factory test signal, please do not connect
25	/KEY LOCK	Input	When this line is active, all STE110 front panel function keys and the touch screen are locked and no longer work.
27 28	EXT.DCV1	Input	External DC voltage 1: Pull-up DC power supply pin for signals optically coupled to the instrument (/BIN - /BIN10 PASS FAIL).
29	/ALARM	Output	/ALARM is active when a power-down occurs.
30	/INDEX	Output	The /INDEX signal is valid when the analogue measurement is complete, and the next DUT can be connected at the UNKNOWN test terminal. However, the comparison result signal is not valid until /EOM is active. (See Figure 7-3)
31	/EOM	Output	End Of Measurement: This signal is valid when the measurement data and the compare result are valid. (See Figure 7-3)
32,33	COM2	---	Reference ground used for external power supply EXTV2
34,35,36	COM1	---	Reference ground used for external power supply EXTV1

FAIL	PASS										FAIL
	BIN1	BIN2	BIN3	BIN4	BIN5	BIN6	BIN7	BIN8	BIN9	BIN10	
	PASS										

Figure 10-2 Example of the Assignment area for the BIN Compare Function Signals /PASS and /FAIL

7.1.2 Electrical Characteristics

The meaning of some signals in the BIN sorting function and the list scan compare function are different. However, the electrical characteristics of these signals are the same in both operations, so the following description is equally suitable for the BIN compare function and the list scan function.

7.1.2.1 DC-Isolated Output Signal

Each DC output (pins 1 to 11, 19 to 24 and 29 to 31) is isolated via an open collector opto-coupler output. The output voltage per line is set by a pull-up resistor on the HANDLER interface board. The pull-up resistor is connected via a jumper to an internally supplied voltage (+5V) or to an externally supplied voltage (EXTV: +5V-24V).

The DC-isolated output signals make use of an electrical system which is independent of that dedicated to the control output signals. The processor board therefore has two common lines for independent circuits: COM1 and COM2.

The electrical characteristics of the DC isolated outputs are divided into two types, see Table 7-4. The output circuit configuration for the test result output signal is shown in Figure 7-5 and for the control output signal in Figure 7-4.

Table 7-4 Electrical Characteristics of DC Isolated Outputs

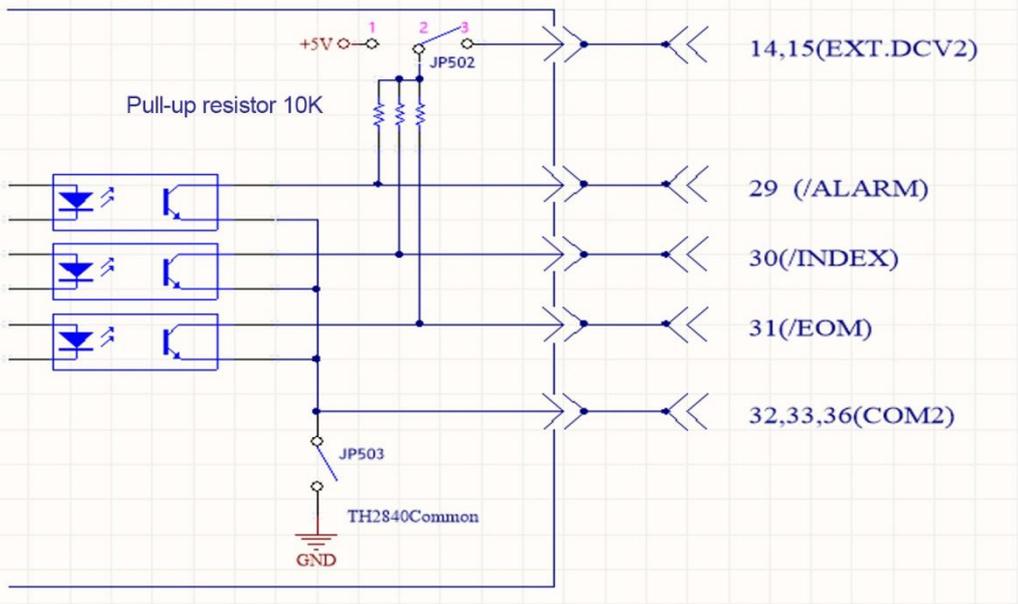| Output Signal	Output Rated Voltage		Maximum Current	Circuit Reference Ground
	LOW	HIGH		
Compare Signals /BIN1 - /BIN10 /OP_SH Fail /Cont Fail /PASS /FAIL	≤0.5V	+5V--+24V	6mA	Internal pull-up voltage: STE110 Ground External voltage (EXTV1): COM1
Control Signals /INDEX /EOM /ALARM	≤0.5V	+5V--+24V	5mA	Internal pull-up voltage: STE110 Ground External voltage (EXTV2): COM2

Figure 7-4 Control Signal Output Circuit
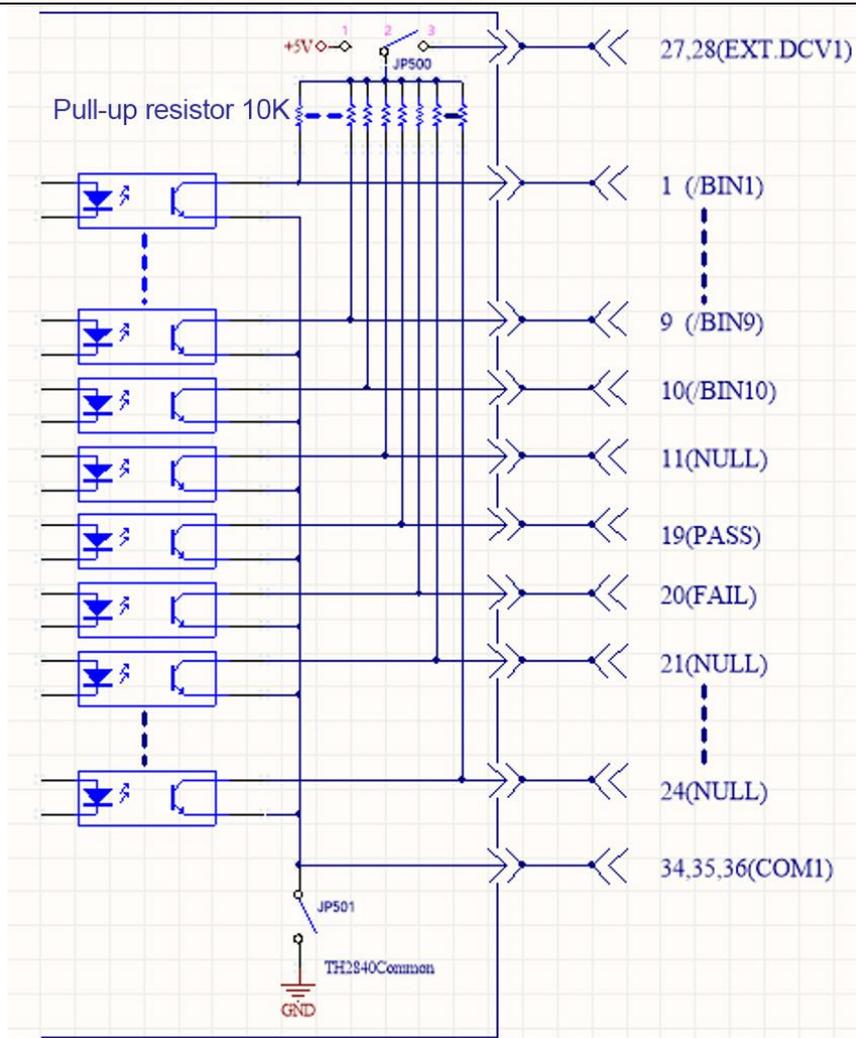
Figure 10-5 Compare Result Signal Output Circuit

7.1.2.2 DC-Isolated Input Signal

The DC isolated input signals include the /EXT_TRIG and /KEY_LOCK signals.

The /EXT_TRIG signal (pins 12 and 13) is input to the cathode side of the opto-coupler LED. The instrument is triggered when the signal increases from LOW to HIGH. The photocoupler LED (anode side) can be driven by an internal pull-up voltage (+5 V) or an external voltage (EXT.DCV2).

The /KEY_LOCK signal (pin 25) is input to the opto-coupler LED (on the cathode side). As long as this is low level, the keys on the front panel of the instrument will all be locked. The photocoupler LED (on the anode side) can be driven by internal voltage (+5V) or external voltage (EXT.DCV2).

The input circuit configuration for the DC isolated input signal is shown in
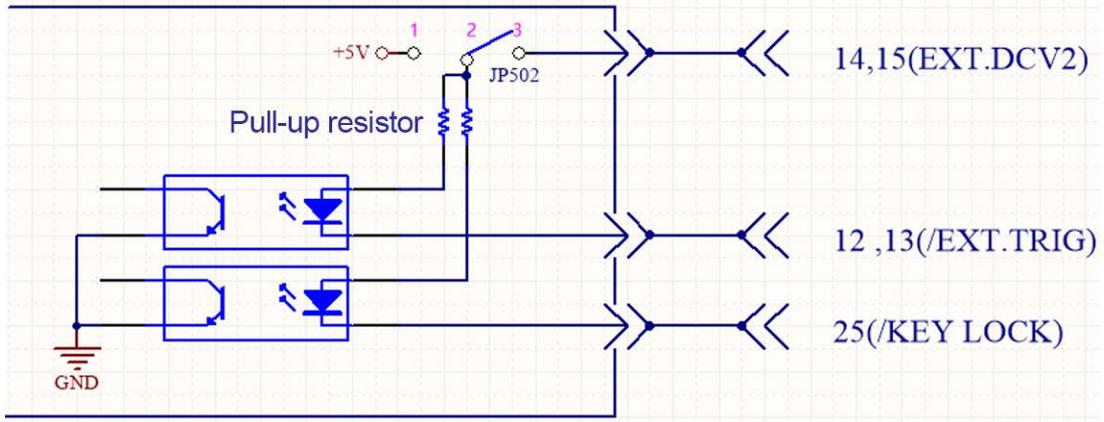
Figure 7-6.

Figure 7-6 Input Signal Circuit Configuration

7.1.3 BIN Sorting HADLER Wiring Operation Instruction

This sub-section focuses on examples of wiring of instruments to typical PLCs. Only two types of PLC wiring are described in the wiring examples, i.e., PLC input circuit common anode and PLC input circuit common cathode. For other types of input circuit PLCs, please consult our after-sales service.

PLC input circuit common anode means that the current flows from the common terminal of the module and out of the input channel of the module, which is often referred to as the source type of wiring.

PLC input circuit common cathode means that the current flows from the input channel of the module and out from the common terminal of the module, which is often referred to as the drain type of wiring.

In the use of gear sorting with the input circuit for the common anode PLC wiring as Figure 10-7, and with the input circuit for the common cathode PLC wiring as Figure 10-8.

The factory default for STE110 series instruments is external power supply . That is, JP500's pins 2 and 3 are short-circuited, JP502 with short circuit on pins 2 and 3, JP501 with open circuit and JP503 with open circuit. Therefore, be sure to connect power to the external power supply pins when using the instrument. If you need to use the internal power supply of the instrument, you need to change the jumper wire method of JP500-JP503, consult our after-sales service for details.

Note: 16, 17 and 18 are the internal 5V power supply of the instrument and must not be connected to any external power supply as this may damage the instrument.

For reasons of the instrument's immunity to interference, the STE110 recommends that the user provide and use an external power supply as the pull-up operating power for the optocoupler.
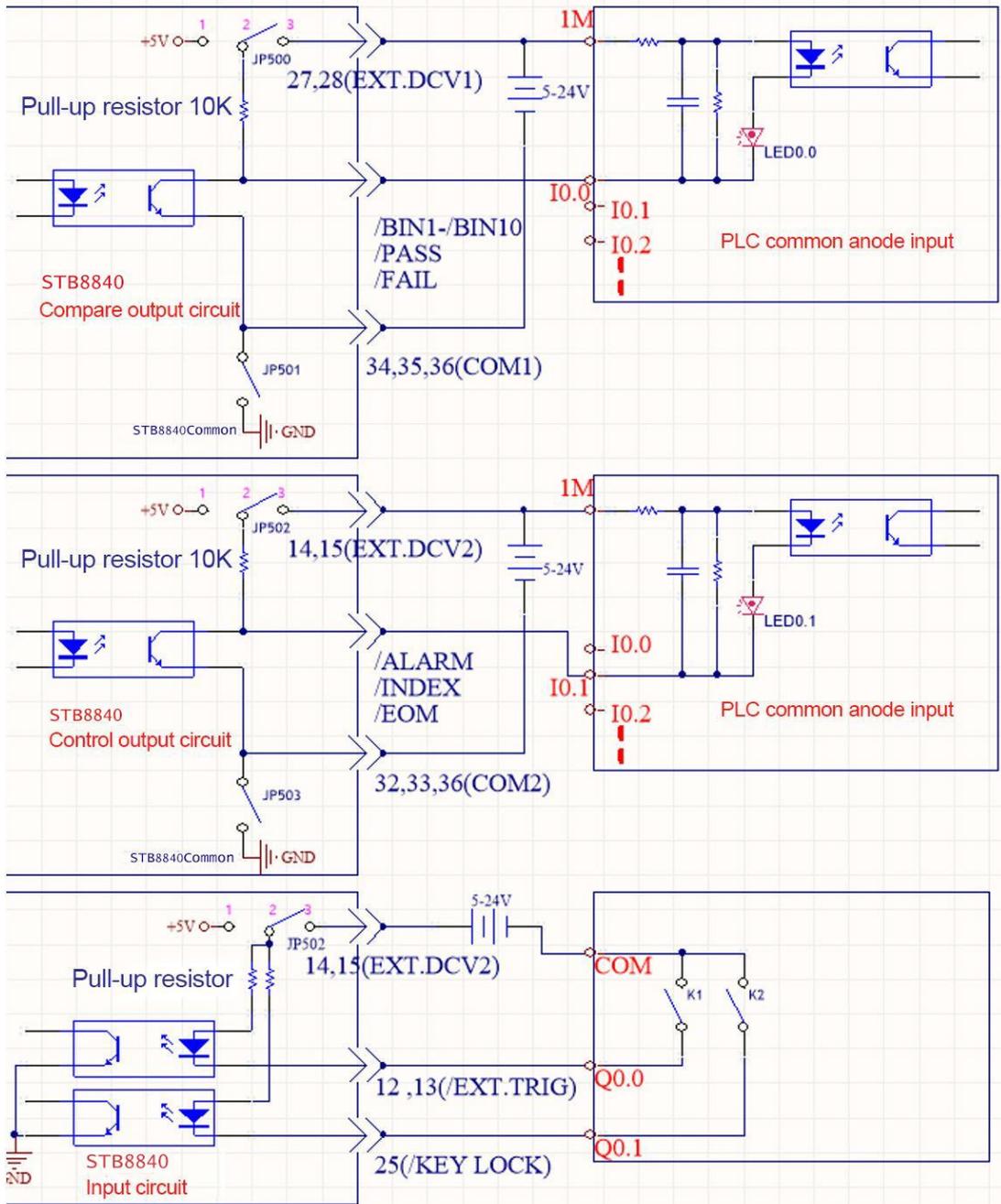
Figure 7-7 PLC Wiring Diagram with Common Anode for Input Circuit

Figure 7-7 illustrates: EXT.DCV1 and EXT.DCV2 can use the same external power supply or different sets of power supplies. DCV1 corresponds to COM1 on the low side and EXT.DCV2 corresponds to COM2 on the low side. The input circuit uses the same power supply as the control output circuit i.e., EXT.DCV2. The diagram provides a typical wiring method, but in practice it should be applied flexibly according to the actual situation.
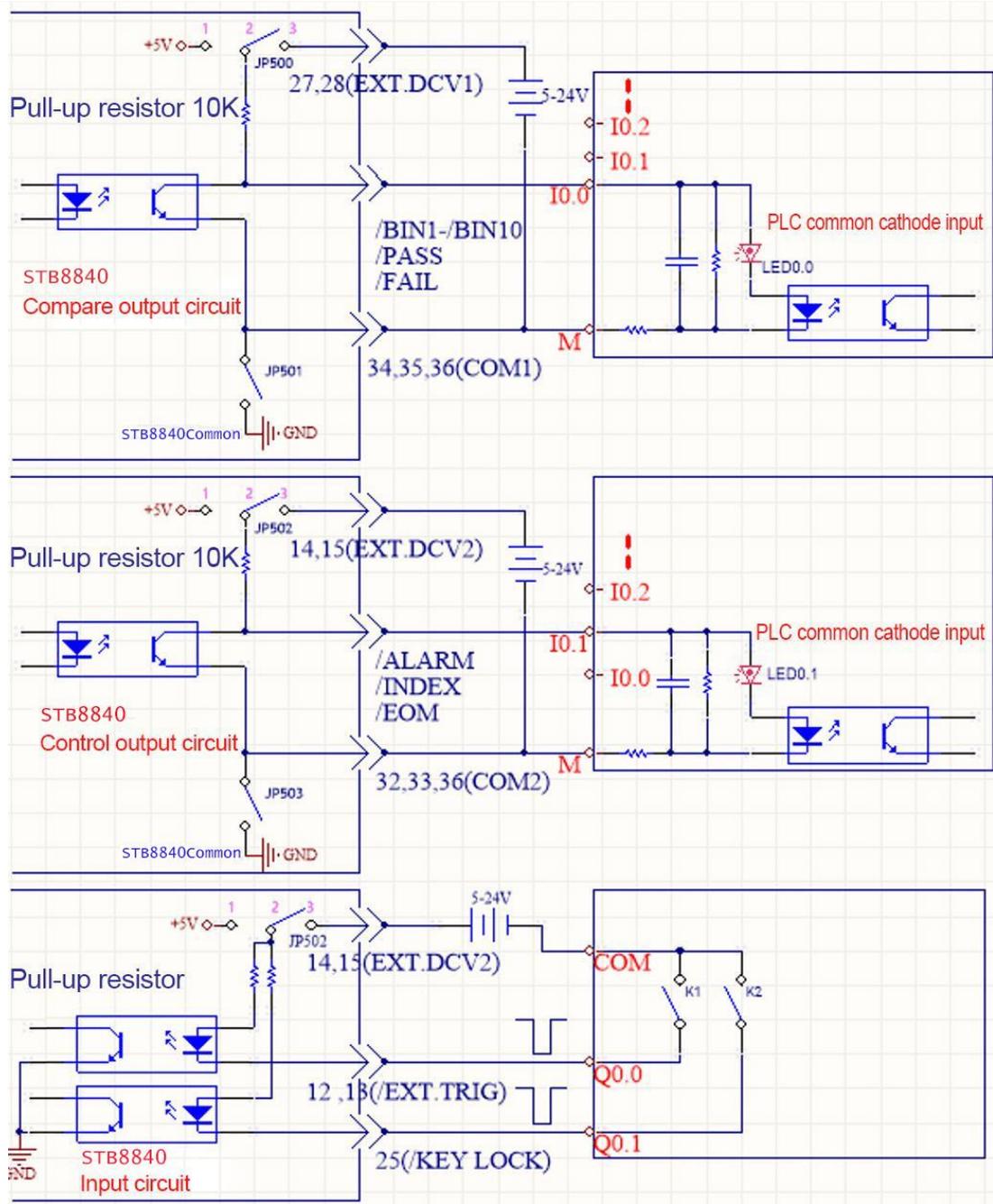
Figure 7-8 PLC Wiring Diagram with Common Cathode Input Circuit

7.1.4 Use and Operation

After the HANDLER interface has been correctly wired to the PLC, set the limit list to use the compare function. The HANDLER interface is then set up to enable OUTPUT/INPUT (output/input) signals. The following procedure shows how to use the compare function of the HANDLER interface.

Compare Function Setting Procedure

The following steps are for compare function using the HANDLER interface (only for the automatic component analyzer function)

1. Press the [Setup] key and select <Limit Setup> in the menu on the right side of the display to enter the limit setting page.

2. Move the cursor to "Compare" and select [ON] in the menu area on the right side of the screen to turn on the compare function.

3. Move the cursor to "Count" and select [ON] in the menu area on the right side of the screen to turn on the count function.

4. Move the cursor to "Mode" and select "Tolerance" or "Continuous" in the menu area on the right side of the screen.

5. Set the BIN sorting deviation type, reference value, BIN limit and related options in the <Limit Setup> page.

6. Press [Display] to enter the <Measurement Display> page and enter the corresponding page to measure the device under test (DUT).

Note: The compare function ON/OFF and count function ON/OFF settings can also be set in the <Measurement Display> page.

Chapter 8 Command Reference

8.1 GPIB Common Commands

●*RST   ●*TRG   ●*IDN   ●*TST

●*ESE   ●*SRE   ●*ESR   ●*STB

●*OPC   ●*CLS

◆ Description: Used to reset the instrument

Syntax:

*RST

◆ Description: Used to trigger an instrument measurement and return the measurement result

Syntax:

*TRG

Test Page			
CV Measurement	Measurement Display		Parameter 1 Result, Parameter 2 Result, Parameter 3 Result, Parameter 4 Result, Sorting Result e.g., 1.12345E2, 1.23456E-2, 1.11023E2, -1.12345E2,1 where the sorting results are taken as follows: <table><tr><td>Sorting Results</td><td>Description</td></tr><tr><td>0</td><td>Super poor</td></tr><tr><td>1~10</td><td>Grade 1~10</td></tr></table> Note: \<File Number\> data will be displayed only when the instrument compare function is set to ON (open).
	List Display	Single Step Mode	Point index, parameter results, compare results e.g.: 2,1.12345E2,1 where the compare results take the following values. <table><tr><td>Compare Results</td><td>Description</td></tr><tr><td>0</td><td>Not compared</td></tr><tr><td>1</td><td>PASS</td></tr><tr><td>Other</td><td>FAIL</td></tr></table>
		Sequential Mode	Return all point data at the end of all point tests, in the same format as above
	Trace Display		All point data is returned at the end of all point tests and the data format is as follows:

◆ Description: Used to return the ID of the instrument

Syntax:

*IDN?

Return:

<model>,<firmware>,<sn>,<date>

Return Parameters	Description of Meaning
model	Machine model (e.g., STE110)
firmware	Software version number (e.g., V1.0.0)
sn	Instrument serial number (e.g., sn12345678)
date	Date corresponding to the software version (e.g., 2022-08-01)

8.2 SCPI Commands

Available on the company website at www.salukitec.com

SCPI (Standard Commands for Programmable Instruments) is an ASCII-based instrument command language for use with test and measurement instruments. SCPI commands are based on a hierarchical structure (also known as a tree system). In this system, related commands are grouped under a common node or root so that subsystems are formed.

In accordance with the command syntax, most commands (and certain parameters) are represented in a mixture of upper- and lower-case letters. Capital letters indicate the abbreviation of a command. For shorter program lines, commands can be sent in abbreviated format. For better program readability, long format commands can be sent.

Note: To avoid misunderstanding of command abbreviations, try to avoid too many abbreviations optional in the command description, most command descriptions will be described directly in abbreviated form.

Syntax conventions:

[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}

[SOURce[1|2]:]FREQuency:CENTer {<frequency>|MINimum|MAXimum|

DEFault}

Note: Command syntax conventions:

◆ The curly brackets ({ }) contain the parameter options for the given command string. The curly brackets are not sent with the command string.

◆ The vertical bar (|) separates multiple parameter selections for a given command string. For example, in the above command, {VPP|VRMS|DBM} means you can specify "VPP", "VRMS" or "DBM". The vertical bar is not sent with the command string.

◆ The angle brackets (<>) in the second example indicate that a value

must be specified for the parameter inside the brackets. For example, in the syntax statement above, the argument within the angle brackets is <frequency>. The angle brackets are not sent with the command string. You must specify a value for the parameter (e.g. "FREQ:CENT 1000") unless you select one of the other options shown in the syntax (e.g. "FREQ:CENT MIN").

◆ Some syntax elements (e.g. nodes and parameters) are enclosed in square brackets ([ ]). This means that the element is optional and can be omitted. The angle brackets are not sent with the command string. If no value is specified for an optional parameter, the instrument will select the default value. In the example above, "SOURce[1|2]" means that you can pass "SOURce" or "SOURce1", or "SOUR1" or "SOUR" refers to source channel 1. In addition, since the entire SOURce node is optional (in square brackets), you can also refer to channel 1 by omitting the SOURce node altogether, since channel 1 is the default channel for the SOURce language node. On the other hand, to refer to channel 2, you must use "SOURce2" or "SOUR2" in the program line.

◆ ^END: The EOI (end of line) signal for the IEEE-488 bus.

8.2.1 DISPlay Display Command Set

◆ Description: Control page switch

Syntax:

:DISPlay:PAGE?

:DISPlay:PAGE <PageName>

Parameters: The meaning of the value of PageName is described in Table 7-1 below:

PageName Value	Meaning	Query Return Content
SYST	System Setup	SYSTem
FLIS	File List	FLISt
CVM	CV Measurement Display	CVMeas
CVL	CV List Display	CVList
CVT	CV Trace Display	CVTrace
CVMS	CV Measurement Setup	CVMeasSet
CVLS	CV List Setup	CVListSet
CVTS	CV Trace Setup	CVTrace
CVBS	CV Limit Setup	CVBinSet
CVTOOL	CV Tool Setup	CVTOOL
HAND	Handler Interface Setup	HANDler

Table 7-1 PageName Meaning Description

Example:

:DISP:PAGE CVM	Access to the measurement display page;
:DISP:PAGE CVMS	Access to the measurement setup page;
:DISP:PAGE?	Return the currently displayed page, refer to the table above.

8.2.2 TRIGger Command Set

The TRIGger subsystem command set is used to set the instrument's trigger source, the delay time after triggering, and to trigger instrument measurements.

◆ Description: Trigger the instrument to measure once

Syntax:

:TRIG

8.2.2.1 Trigger Mode

◆ Description: Set the instrument's trigger source mode

Syntax:

:TRIGger:SOURce?

:TRIGger:SOURce <CONTinue| SINGle>

Parameters:

:CONT ---Continuous

:SING ---Single

Example:

:TRIG:SOUR CONT	---Set continuous trigger
:TRIG:SOUR SING	---Set single trigger
:TRIG:SOUR?	---Query trigger mode

8.2.3 CVMeas Measurement Command Set

8.2.3.1 Channel

◆ Description: Set the test channel corresponding to the CV measurement

Syntax:

:CVMeas:CHannel?

:CVMeas:CHannel <1|2|3|4|5|6>

Parameters:

1~6 ---Indicates measurement channel index

(Channel availability depends on whether the channel board is plugged in or not)

Example:

:CVM:CH 1   ---Switch to channel 1

:CVM:CH 2   ---Switch to channel 2

:CVM:CH 3   ---Switch to channel 3

:CVM:CH 4   ---Switch to channel 4

:CVM:CH 5   ---Switch to channel 5

:CVM:CH 6   ---Switch to channel 6

:CVM:CH?   ---Query the current channel

8.2.3.2 Speed

◆ Description: Set the measurement speed of the CV

Syntax:

:CVMeas:SPEED?

:CVMeas:SPEED <str>

Parameters:

str values as follows:

str Value	Meaning
FAST+	Fast+
FAST	Fast
MED	Medium
SLOW	Slow

Example:

:CVM:SPEED FAST+   ---Test speed is fast+

:CVM:SPEED FAST   ---Test speed is fast

:CVM:SPEED MED   ---Test speed is fast

:CVM:SPEED SLOW   ---Test speed is fast

:CVM:SPEED?   ---Query the current test speed

8.2.3.3 Parameter Function

◆ Description: Set the measurement parameter functions corresponding to the CV measurement

Syntax:

:CVMeas:FUNCtion[1|2|3|4]?

:CVMeas:FUNCtion[1|2|3|4] <str>

Parameters:

[1|2|3|4]   ---Indicates the position of the specified parameter, corresponding to 4 parameters

str values as follows:

Parameter Name	Parameter Meaning
CISS	Input capacitance
COSS	Output capacitance
CRSS	Reverse transfer capacitance
RG-DSO	Grid input resistance (DS open circuit)
RG-DSS	Grid input resistance (DS short circuit)
CISS-VGS	Input capacitance - Grid input voltage

Example:

:CVM:FUNC CISS	Set 1 parameter to CISS continuously
:CVM:FUNC CISS,COSS	Set 2 parameters to CISS,COSS continuously
:CVM:FUNC CISS,COSS,CRSS	Set 3 parameters continuously
:CVM:FUNC CISS,COSS,CRSS,RG-DSO	Set 4 parameters continuously
:CVM:FUNC1 CISS	Set the 1st parameter to CISS
:CVM:FUNC2 COSS	Set the 2nd parameter to COSS
:CVM:FUNC3 COSS	Set the 3rd parameter to COSS
:CVM:FUNC4 COSS	Set the 4th parameter to COSS
:CVM:FUNC?	Query and return all 4 parameter names
:CVM:FUNC1?	Query and return the 1st parameter name
:CVM:FUNC2?	Query and return the 2nd parameter name
:CVM:FUNC3?	Query and return the 3rd parameter name
:CVM:FUNC4?	Query and return the 4th parameter name

◆ Description: Set the switch for CV measurement corresponding to 4 parameters

Syntax:

:CVMeas:SWitch[1|2|3|4]?

:CVMeas:SWitch[1|2|3|4] <0|1|ON|OFF>

Parameters:

[1|2|3|4] ---Indicates the position of the specified parameter, corresponding to 4 parameters

0|OFF ---OFF

1|ON ---ON

Example:

:CVM:SW 0	Set 1 parameter switch to OFF continuously

:CVM:SW 0,1	Set 2 parameter switches to OFF and ON continuously
:CVM:SW 1,0,0	Set 3 parameter switches to ON, OFF, and OFF continuously
:CVM:SW 1,0,0,1	Set 4 parameter switches to ON, OFF, OFF, ON continuously
:CVM:SW1 1	Specify to set the 1st parameter switch to ON
:CVM:SW2 0	Specify to set the 2nd parameter switch to OFF
:CVM:SW3 0	Specify to set the 3rd parameter switch to OFF
:CVM:SW4 0	Specify to set the 4th parameter switch to OFF
:CVM:SW?	Query and return all 4 parameter switches state
:CVM:SW1?	Query and return the 1st parameter switch state
:CVM:SW2?	Query and return the 2nd parameter switch state
:CVM:SW3?	Query and return the 3rd parameter switch state
CVM:SW4?	Query and return the 4th parameter switch state

8.2.3.4 Frequency

◆ Description: Set the signal frequency used for the CV measurement parameter

Syntax:

:CVMeas:FREQuency[1|2|3|4]?

:CVMeas:FREQuency[1|2|3|4] <float|MIN|MAX>

Parameters:

[1|2|3|4] ---Indicates the position of the specified parameter, corresponding to 4 parameters

float ---Floating point data

MIN ---Set the minimum value that can be set

MAX ---Set the maximum value that can be set

Example:

:CVM:FREQ 1M	Set the frequency of 1 parameter continuously
:CVM:FREQ 1M,1M	Set the frequency of 2 parameter continuously
:CVM:FREQ 1M,1M,1M	Set the frequency of 3 parameter continuously
:CVM:FREQ 1M,1M,1M,1M	Set the frequency of 4 parameter continuously
:CVM:FREQ1 1M	Specify to set the frequency of the 1st parameter
:CVM:FREQ2 100K	Specify to set the frequency of the 2nd parameter
:CVM:FREQ3 10K	Specify to set the frequency of the 3rd parameter
:CVM:FREQ4 10.5K	Specify to set the frequency of the 4th parameter
:CVM:FREQ?	Query and return the frequency of all 4 parameters
:CVM:FREQ1?	Query and return the frequency of the 1st parameter
:CVM:FREQ2?	Query and return the frequency of the 2nd parameter

:CVM:FREQ3?	Query and return the frequency of the 3rd parameter
:CVM:FREQ4?	Query and return the frequency of the 4th parameter

8.2.3.5 Level

◆ Description: Set the signal level used for the CV measurement parameter

Syntax:

:CVMeas:LEVel[1|2|3|4]?

:CVMeas:LEVel[1|2|3|4] <float|MIN|MAX>

Parameters:

[1|2|3|4] ---Indicates the position of the specified parameter, corresponding to 4 parameters

float ---Floating point data

MIN ---Set the minimum value that can be set

MAX ---Set the maximum value that can be set

Example:

:CVM:LEV 30m	Set the level of 1 parameter continuously
:CVM:LEV 30m,0.03	Set the level of 2 parameters continuously
:CVM:LEV 30m,30m,30m	Set the level of 3 parameters continuously
:CVM:LEV 30m,30m,30m,30m	Set the level of 4 parameters continuously
:CVM:LEV1 30m	Specify to set the level of the 1st parameter
:CVM:LEV2 30m	Specify to set the level of the 2nd parameter
:CVM:LEV3 30m	Specify to set the level of the 3rd parameter
:CVM:LEV4 30m	Specify to set the level of the 4th parameter
:CVM:LEV?	Query and return the level of all 4 parameters
:CVM:LEV1?	Query and return the level of the 1st parameter
:CVM:LEV2?	Query and return the level of the 2nd parameter
:CVM:LEV3?	Query and return the level of the 3rd parameter
:CVM:LEV4?	Query and return the level of the 4th parameter

8.2.3.6 Vg Bias

◆ Description: Set the Vg bias voltage used for the CV measurement parameter

Syntax:

:CVMeas:VG[1|2|3|4]?

:CVMeas:VG[1|2|3|4] < float | MIN | MAX >

Parameters:

[1|2|3|4] ---Indicates the position of the specified parameter, corresponding to 4 parameters

float ---Floating point data

MIN ---Set the minimum value that can be set

MAX ---Set the maximum value that can be set

Example:

:CVM:VG 5V	Set the Vg of 1 parameter continuously
:CVM:VG 5V,5V	Set the Vg of 2 parameters continuously
:CVM:VG 5,5,5	Set the Vg of 3 parameters continuously
:CVM:VG 5,5,5,5	Set the Vg of 4 parameters continuously
:CVM:VG1 5V	Specify to set the Vg of the 1st parameter
:CVM:VG2 5V	Specify to set the Vg of the 2nd parameter
:CVM:VG3 5V	Specify to set the Vg of the 3rd parameter
:CVM:VG4 5V	Specify to set the Vg of the 4th parameter
:CVM:VG?	Query and return the Vg of all 4 parameters
:CVM:VG1?	Query and return the Vg of the 1st parameter
:CVM:VG2?	Query and return the Vg of the 2nd parameter
:CVM:VG3?	Query and return the Vg of the 3rd parameter
:CVM:VG4?	Query and return the Vg of the 4th parameter

8.2.3.7 Vd Bias

◆ Description: Set the Vd bias voltage used for the CV measurement parameter

Syntax:

:CVMeas:VD[1|2|3|4]?

:CVMeas:VD[1|2|3|4] <float|MIN|MAX>

Parameters:

[1|2|3|4] ---Indicates the position of the specified parameter, corresponding to 4 parameters

float ---Floating point data

MIN ---Set the minimum value that can be set

MAX ---Set the maximum value that can be set

Example:

:CVM:VD 5V	Set the Vd of 1 parameter continuously

:CVM:VD 5V,5V	Set the Vd of 2 parameters continuously
:CVM:VD 5,5,5	Set the Vd of 3 parameters continuously
:CVM:VD 5,5,5,5	Set the Vd of 4 parameters continuously
:CVM:VD1 5V	Specify to set the Vd of the 1st parameter
:CVM:VD2 5V	Specify to set the Vd of the 2nd parameter
:CVM:VD3 5V	Specify to set the Vd of the 3rd parameter
:CVM:VD4 5V	Specify to set the Vd of the 4th parameter
The:CVM:VD?	Query and return the Vd of all 4 parameters
:CVM:VD1?	Query and return the Vd of the 1st parameter
:CVM:VD2?	Query and return the Vd of the 2nd parameter
:CVM:VD3?	Query and return the Vd of the 3rd parameter
:CVM:VD4?	Query and return the Vd of the 4th parameter

8.2.3.8 Time Delay

◆ Description: Set the delay time used for the CV measurement parameter

Syntax:

:CVMeas:DELay[1|2|3|4]?

:CVMeas:DELay[1|2|3|4] <float|MIN|MAX>

:CVMeas:DELay[1|2|3|4]:AUTO?

:CVMeas:DELay[1|2|3|4]:AUTO <0|1|ON|OFF>

Parameters:

float ---Floating point data

MIN ---Set the minimum value that can be set

MAX ---Set the maximum value that can be set

0|OFF ---OFF

1|ON ---ON

Example:

:CVM:DEL 0.005	Set the delay time of 1 parameter continuously
:CVM:DEL 5m,5m	Set the delay time of 2 parameters continuously
:CVM:DEL 5m,5m,5m	Set the delay time of 3 parameters continuously
:CVM:DEL 5m,5m,5m,5m	Set the delay time of 4 parameters continuously
:CVM:DEL1 5m	Set the delay time of the 1st parameter
:CVM:DEL2 5m	Set the delay time of the 2nd parameter
:CVM:DEL3 5m	Set the delay time of the 3rd parameter
:CVM:DEL4 5m	Set the delay time of the 4th parameter
:CVM:DEL?	Query the delay time of all 4 parameters

:CVM:DEL1?	Query the delay time of the 1st parameter
:CVM:DEL2?	Query the delay time of the 2nd parameter
:CVM:DEL3?	Query the delay time of the 3rd parameter
:CVM:DEL4?	Query the delay time of the 4th parameter
:CVM:DEL:AUTO 1,1,1,1	Set the delay auto state of 4 parameters continuously
:CVM:DEL:AUTO?	Query the delay auto state of all 4 parameters

8.2.3.9 Deviation

◆ Description: Set the deviation mode used for the CV measurement parameter

Syntax:

:CVMeas:DEV[1|2|3|4]?

:CVMeas:DEV[1|2|3|4] <OFF|PERcent|ABSolute>

Parameters:

ABS ---Δ Absolute deviation

PER ---Δ% Percent Deviation

OFF ---OFF

Example:

:CVM:DEV OFF	Set the deviation mode of 1 parameter continuously
:CVM:DEV OFF,ABS	Set the deviation mode of 2 parameters continuously
:CVM:DEV OFF,OFF,OFF	Set the deviation mode of 3 parameters continuously
:CVM:DEV OFF,OFF,OFF,OFF	Set the deviation mode of 4 parameters continuously
:CVM:DEV1 ABS	Set the deviation mode of the 1st parameter
:CVM:DEV2 ABS	Set the deviation mode of the 2nd parameter
:CVM:DEV3 ABS	Set the deviation mode of the 3rd parameter
:CVM:DEV4 ABS	Set the deviation mode of the 4th parameter
:CVM:DEV?	Query the deviation mode of all 4 parameters
:CVM:DEV1?	Query the deviation mode of the 1st parameter
:CVM:DEV2?	Query the deviation mode of the 2nd parameter
:CVM:DEV3?	Query the deviation mode of the 3rd parameter
:CVM:DEV4?	Query the deviation mode of the 4th parameter

8.2.3.10 Reference

◆ Description: Set the deviation reference value used for the CV measurement parameter

Syntax:

:CVMeas:REFerence[1|2|3|4]?

:CVMeas:REFerence[1|2|3|4] <float>

Parameters:

float   ---Floating point data

Example:

:CVM:REF 1p	Set the deviation reference value of 1 parameter continuously
:CVM:REF 0.1,1m	Set the deviation reference value of 2 parameters consecutively
:CVM:REF 5m,5m,5m	Set the deviation reference value of 3 parameters consecutively
:CVM:REF 5m,5m,5m,5m	Set the deviation reference value of 4 parameters consecutively
:CVM:REF1 5m	Set the deviation reference value of the 1st parameter
:CVM:REF2 5m	Set the deviation reference value of the 2nd parameter
:CVM:REF3 5m	Set the deviation reference value of the 3rd parameter
:CVM:REF4 5m	Set the deviation reference value of the 4th parameter
:CVM:REF?	Query the deviation reference values of all 4 parameters
:CVM:REF1?	Query the deviation reference value of the 1st parameter
:CVM:REF2?	Query the deviation reference value of the 2nd parameter
:CVM:REF3?	Query the deviation reference value of the 3rd parameter
:CVM:REF4?	Query the deviation reference value of the 4th parameter

8.2.3.11 Load Calibration

◆ Description: Set the load value of the load calibration

Syntax:

:CVMeas:LOAD[1|2|3|4]?

:CVMeas:LOAD[1|2|3|4] <float>

Parameters:

float ---Floating point data

Example:

:CVM:LOAD 0.1,1m	Set the load value of 2 parameters continuously
:CVM:LOAD 1 5m	Specify to set the load value of the 1st parameter
:CVM:LOAD?	Query the load value of all 4 parameters
:CVM:LOAD3?	Query the load value of the 3rd parameter

◆ Description: Set the switch of the load correction

Syntax:

:CVMeas:LOAD:SWitch[1|2|3|4]?

:CVMeas:LOAD:SWitch[1|2|3|4] <0|1|ON|OFF>

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

| :CVM:LOAD:SW 1,0,1,0 | Set the load switch state of 4 parameters continuously |
| :CVM:LOAD:SW1? | Query the load switch state of the 1st parameter |

◆ Description: Perform the calculation of the load calibration

Syntax:

:CVMeas:LOAD:MEAS

Parameters:

Example:

:CVM:LOAD:MEAS   ---Perform a load calibration value update calculation

8.2.3.12 Average

◆ Description: Set the average time used for the CV measurement parameter

Syntax:

:CVMeas:AVG[1|2|3|4]?

:CVMeas:AVG[1|2|3|4] <int>

Parameters:

int   ---Integer data, 1~32

Example:

:CVM:AVG 1	Set the average time of 1 parameter continuously
:CVM:AVG 1,3	Set the average time of 2 parameters continuously
:CVM:AVG 1,3,2	Set the average time of 3 parameters continuously
:CVM:AVG 1,3,4,6	Set the average time of 4 parameters continuously
:CVM:AVG1 2	Set the average time of the 1st parameter
:CVM:AVG2 1	Set the average time of the 2nd parameter
:CVM:AVG3 2	Set the average time of the 3rd parameter
:CVM:AVG4 1	Set the average time of the 4th parameter
:CVM:AVG?	Query the average time of all 4 parameters
:CVM:AVG1?	Query the average time of the 1st parameter
:CVM:AVG2?	Query the average time of the 2nd parameter
:CVM:AVG3?	Query the average time of the 3rd parameter
:CVM:AVG4?	Query the average time of the 4th parameter

8.2.3.13 On-Off Test

◆ Description: Set the on/off test switch of the CV measurement

Syntax:

:CVMeas:OPSH:SW?

:CVMeas:OPSH:SW <0|1|OFF|ON>

Parameters:

    0|OFF   ---OFF

    1|ON   ---ON

Example:

:CVM:OPSH:SW 0	Set the on-off test function to OFF
:CVM:OPSH:SW OFF	Set the on-off test function to OFF
:CVM:OPSH:SW 1	Set the on-off test function to ON
:CVM:OPSH:SW ON	Set the on-off test function to ON
:CVM:OPSH:SW?	Query the switch state of the on/off test function

◆ Description: Set the Vg bias voltage used for the CV measurement on-off test

Syntax:

:CVMeas:OPSH:VG?

:CVMeas:OPSH:VG < float>

Parameters:

float ----Floating point data, value -20~20

Example:

:CVM:OPSH:VG 5	Set Vg=5V for the on/off test
:CVM:OPSH:VG 5V	Set Vg=5V for the on/off test
:CVM:OPSH:VG?	Query the Vg size of the on-off test

◆ Description: Set the Vd bias voltage used for the CV measurement on-off test

Syntax:

:CVMeas:OPSH:VD?

:CVMeas:OPSH:VD <float>

Parameters:

float   ---Floating point data, value 5~20

Example:

:CVM:OPSH:VD 5	Set the Vd of the on-off test
:CVM:OPSH:VD 5V	Set the Vd of on/off test
:CVM:OPSH:VD?	Query the Vd size of the on-off test

◆ Description: Set the delay time used for the CV measurement on-off test

Syntax:

:CVMeas:OPSH:DELay?

:CVMeas:OPSH:DELay <float>

:CVMeas:OPSH:DELay:AUTO?

:CVMeas:OPSH:DELay:AUTO <0|1|ON|OFF>

Parameters:

float ---Floating point data

0|OFF ---OFF

1|ON ---ON

Example:

:CVM:OPSH:DEL 0.005	Set the delay time of the on/off test
:CVM:OPSH:DEL?	Query the delay time of the on/off test
:CVM:OPSH:DEL:AUTO 0	Set the delay auto state of the on-off test to OFF
:CVM:OPSH:DEL:AUTO 1	Set the delay auto state of the on-off test to ON
:CVM:OPSH:DEL:AUTO?	Query the delay auto state of all 4 parameters

8.2.3.14 Contact Inspection Test

◆ Description: Set the contact inspection test switch of the CV measurement

Syntax:

:CVMeas:CONTactSW?

:CVMeas:CONTactSW <0|1|OFF|ON>

Parameters:

0|OFF ---OFF

1|ON ---ON

Example:

:CVM:CONTSW 0	Set the contact inspection test function to OFF
:CVM:CONTSW OFF	Set the contact inspection test function to OFF
:CVM:CONTSW 1	Set the contact inspection test function to ON
:CVM:CONTSW ON	Set the contact inspection test function to ON
:CVM:CONTSW?	Query the switch state of the contact inspection test function

◆ Description: Set the size of the impedance limit value used for the CV measurement contact inspection test

Syntax:

:CVMeas:CONTactMAX?

:CVMeas:CONTactMAX < float>

Parameters:

float ---Floating point data, value 0~100

Example:

:CVM:CONTMAX 1	Set the impedance threshold of the contact inspection test to 1Ω
:CVM:CONTMAX 1.2	Set the impedance threshold of the contact inspection test to 1.2Ω
:CVM:CONTMAX?	Query the impedance threshold of contact inspection test

8.2.4 COMParator Command Set

The COMParator subsystem command set is used to set the BIN comparator function, including the setting of the compare switch and the setting of the limit list.

8.2.4.1 COMP Compare Switch

◆ Description: Set the instrument compare function to ON or OFF

Syntax:

:COMParator?

:COMParator <0|1|ON|OFF >

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

:COMP 0	Set the compare function to OFF
:COMP ON	Set the compare function to ON
:COMP?	Return the switch state of the compare function

8.2.4.2 COUNt Count Switch

◆ Description: Set the instrument compare count function to ON or OFF

Syntax:

:COMP:COUNt?

:COMP:COUNt <0|1|ON|OFF >

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

:COMP:COUN 0	Set the compare count function to OFF
:COMP:COUN ON	Set the compare count function to ON
:COMP:COUN?	Query the switch state of the compare count function

◆   Description: Query the BIN count compare results

Syntax:

:COMP:COUN:DATA?

◆   Description: Clear all BIN count results

Syntax:

:COMP:COUN:CLE

8.2.4.3 CLRar Clear Form

◆   Description: Used to clear the limit setting data for each BIN of the limit setting

Syntax:

:COMP:BIN:CLE

8.2.4.4 TOL:BIN Limit Value

◆   Description: Set the upper and lower limit values for each BIN of the error mode of the compare function (this function is valid only when the limit mode is set as the error mode). You can query the upper and lower limit values of each BIN of the current instrument setting.

Syntax:

:COMP:TOL:BIN<n>?

:COMP:TOL:BIN<n> <lowA,highA>[...][,lowD,highD]

Parameters:

n   ---File number index, value 1~10

lowA   ---Represent the floating-point size of the lower limit for parameter 1

highA   ---Represent the floating-point size of the upper limit for parameter 1

lowD   ---Represent the floating-point size of the lower limit for parameter 4

highD   ---Represent the floating-point size of the upper limit for parameter 4

Example:

:COMP:TOL:BIN1 1,2	Set the upper and lower limits of the 1st parameter of the 1st BIN to [1,2].
:COMP:TOL:BIN3 1,2,3,4	Set the upper and lower limits of the first two parameters of the 3rd BIN to [1,2], [3,4].
:COMP:TOL:BIN10 1,2,3,4,5,6,7,8	Set the upper and lower limits of the 10th BIN 4 parameters.
:COMP:TOL:BIN1?	Return the upper and lower limits of the 1st BIN 4 parameters

8.2.4.5 BIN:SW BIN Switch

◆   Description: Set the specified BIN compare function to ON or OFF

Syntax:

:COMP:BIN<n>:SW?

:COMP:BIN<n>:SW <0|1|ON|OFF >

Parameters:

n   ---File number index, value 1~10

0|OFF   ---OFF

1|ON   ---ON

Example:

:COMP:BIN1:SW 0	Set the BIN 1 compare function to OFF
:COMP:BIN2:SW 1	Set the BIN 2 compare function to ON
:COMP:BIN10:SW?	Return the switch status of the BIN 10 compare function

8.2.5 CVList Command Set

The LIST subsystem command set is used to set the list scan measurement function, the setting of the scan point, the setting of the scan mode and the setting of the scan compare limit.

8.2.5.1 TOTAL Scan Points

◆ Description: Set the total points of the list scan

Syntax:

:CVList:TOTAL?

:CVList:TOTAL <int>

Parameters:

int   ---Total scan points, value 1~30

Example:

:CVL:TOTAL 8   ---Set the number of list scan points to 8

:CVL:TOTAL?   ---Return list scan points

8.2.5.2 MODE List mode

◆ Description: Set the list scan mode of the instrument

Syntax:

:CVList:MODE?

:CVList:MODE <SEQuence|STEPped>

Parameters:

SEQ   ---Sequential scan

STEP   ---Step scan

Example.

:CVL:MODE SEQ   ---Set continuous scan mode

               :CVL:MODE STEP   ---Set step scan mode

               :CVL:MODE?   ---Return list scan mode

8.2.5.3 CLEar Clear

◆ Description: Clear the set data of all scan points

Syntax:

:CVList:CLE [n|ALL]

Parameters:

n   ---Specify the list correspondence point, value 1~30

ALL   ---Specify all list points

Example:

:CVL:CLE   ---Clear the setup data of all scan points

:CVL:CLE ALL   ---Clear the setup data of all scan points

:CVL:CLE 5   ---Clear the setup data of point 5

8.2.5.4 FUNCtion Parameter Function

◆ Description: Set the parameter function corresponding to the list scan point

Syntax:

:CVList:FUNCtion\<n>?

:CVList:FUNCtion\<n> \<CISS|COSS|CRSS|RG|CISSVGS>

Parameters:

n --- Specify the list correspondence point, value 1~20

str values as follows:

Parameter Name	Parameter Meaning
CISS	Input capacitance
COSS	Output capacitance
CRSS	Reverse transfer capacitance
RG-DSO	Grid input resistance (DS open circuit)
RG-DSS	Grid input resistance (DS short circuit)
CISS-VGS	Input capacitance - Grid input voltage
OPSH	On-Off test
CONTACT	Contact inspection test

Example:

:CVL:FUNC4 COSS   ---Set the function of the 4th scan point to COSS

:CVL:FUNC5?   ---Query the function of the 5th scan point

8.2.5.5 CH Channel

◆ Description: Set the test channel corresponding to the list scan point

   Syntax:

   :CVLlist:CHannel<n>?

   :CVLlist:CHannel<n> <1|2|3|4|5|6>

   Parameters:

   1~6　　---Indicates measurement channel index (channel availability depends on whether the channel board is inserted)

   Example:

:CVL:CH2 1　---Set the measurement channel of the scan point 2 to channel 1

:CVL:CH6?　---Query the channel where the current 6th scan point is located

8.2.5.6 FREQuency Frequency

◆ Description: Set the frequency of the scan points, set the frequency size of the several points starting from the nth point

   Syntax:

   :CVLlist:FREQuency[n]?

   :CVLlist:FREQuency[n] $<f_n>[,f_{n+1}][,f_{n+2}]$...

Parameters:

   n　　---Start from the nth point

   f_n　　---The floating-point size of scan point n

   f_{n+1}　　---The floating-point size of scan point n+1

   f_{n+2}　　---The floating-point size of scan point n+2

   f...　　---The floating-point size of scan point...

Example:

:CVL:FREQ6 20,30,40,1k,2k	Set the frequency of 6~10 points
:CVL:FREQ20 20k	Set the frequency of the 20th point
:CVL:FREQ?	Return the frequency of all scan points
:CVL:FREQ4?	Return the frequency of the 4th point

8.2.5.7 LEVel Voltage

◆ Description: Set the test level of the scan point, set the voltage level of several points starting from the nth point

   Syntax:

   :CVLlist:LEVel[n]?

   :CVLlist:LEVel[n] <fn>[,fn+1][,fn+2]...

   Parameters:

n ---Start from the nth point

f_n ---The floating-point size of scan point n

f_{n+1} ---The floating-point size of scan point n+1

f_{n+2} ---The floating-point size of scan point n+2

f...   ---The floating-point size of scan point...

Example:

:CVL:LEV 1,2,3   ---Set the voltage of the first 3 points

:CVL:LEV5 20   ---Set the voltage of point 5

:CVL:LEV?   ---Return the voltage of all scan points

:CVL:LEV4?   ---Return the voltage of point 4

8.2.5.8 Vg/Vd Bias voltage

◆ Description: Set the bias voltage of scan point, set the bias voltage of several points starting from the nth point

Syntax:

:CVList:VG[n]?

:CVList:VG[n] $<f_n>[,f_{n+1}][,f_{n+2}]$...

:CVList:VD[n]?

:CVList:VD[n] $<f_n>[,f_{n+1}][,f_{n+2}]$...

Parameters:

n ---Start from the nth point

f_n ---The floating-point size of scan point n

f_{n+1} ---The floating-point size of scan point n+1

f_{n+2} ---The floating-point size of scan point n+2

f...   ---The floating-point size of scan point...

Example:

:CVL:VG6 1,2,3,4,5	Set the bias voltage of 6~10 points of VG
:CVL:VD 1,2,3,4,5	Set the bias voltage of the first 4 points of VD
:CVL:VD?	Return the bias voltage of all scan points of VD
:CVL:VG4?	Return the bias voltage of the 4th point of VG

8.2.5.9 DELay Delay

◆ Description: Set the test delay of the scan point, set the delay time of several points starting from the nth point

Syntax:

:CVList:DELay[n]?

:CVList:DELay[n] $<f_n>[,f_{n+1}][,f_{n+2}]$...

Parameters:

      n   ---Start from the nth point

      f_n ---The floating-point size of scan point n

      f_{n+1} ---The floating-point size of scan point n+1

      f_{n+2} ---The floating-point size of scan point n+2

      f...   ---The floating-point size of scan point...

Example:

:CVL:DEL 0.01,20m,30m	Set the test delay of the first 3 points
:CVL:DEL6 1m,2m,3m,4m,5m	Set the test delay of 6~10 points
:CVL:DEL?	Return the test delay of all scan points
:CVL:DEL4?	Return the test delay of the 4th point

8.2.5.10 AVG Average

◆ Description: Set the average time of measurement results

Syntax:

    :CVList:AVG[n]?

    :CVList:AVG[n] [n] <In>[,In+1][,In+2]...

Parameters:

      n   ---Start from the nth point

      In   ---The integer size of scan point n, 1~32

      In+1   ---The integer size of scan point n+1, 1~32

      In+2   ---The integer size of scan point n+2, 1~32

      I...   ---The integer size of scan points..., 1~32

Example:

:CVL:AVG 1,5,2,4   Set the average time of the first 3 points

:CVL:AVG6 2,8,4,6   Set the average time of 6 to 10 points

:CVL:AVG?   Return the average time of all scan points

:CVL:AVG4?   Return the average time of the 4th point

8.2.5.11 Limit

◆ Description: Set the bias voltage of scan point, set the bias voltage of several points starting from the nth point

Syntax:

    :CVList:LOw[n]?

    :CVList:LOw[n] <fn>[,fn+1][,fn+2]...

    :CVList:HIgh[n]?

:CVList:HIgh[n] <fn>[,fn+1][,fn+2]...

Parameters:

n   ---Start from the nth point

f_n ---The floating-point size of scan point n

f_{n+1} ---The floating-point size of scan point n+1

f_{n+2} ---The floating-point size of scan point n+2

f...   ---The floating-point size of scan point...

Example:

:CVL:LO6 1,2,3,4,5   ---Set the lower limit size of 6~10 points

:CVL:HI6 1,2,3,4,5   ---Set the upper limit size of 6~10 points

:CVL:LO?   ---Return the lower limit size of all scan points

:CVL:HI?   ---Return the upper limit size of all scan points

:CVL:LO2?   ---Return the lower limit size of the 2nd point

:CVL:HI2?   ---Return the upper limit size of the 2nd point

◆   Description: Set the limit data in the specified point list scan setup form

Syntax:

:CVList:BAND<n>?

:CVList:BAND<n> OFF

:CVList:BAND<n> <lo,hi>

Parameters:

n ---Specify the index of the scan point, value 1 to 50

lo ---The lower limit of the parameter corresponding to the specified point

hi ---The upper limit of the parameter corresponding to the specified point

Example:

:CVL:BAND1 OFF   ---Clear the limit data of the 1st point parameter

:CVL:BAND2 1,2   ---Set the upper and lower limits of the 2nd point parameter

:CVL:BAND9?   ---Return the upper and lower limits of the 9th point parameter

8.2.5.12 REF Reference

◆   Description: The reference value of the list scan load calibration, set the reference value of several points starting from the nth point

Syntax:

:CVList:REF[n]?

:CVLList:REF[n] $<f_n>[,f_{n+1}][,f_{n+2}]...$

Parameters:

n ---Start from the nth point

f_n ---The floating-point size of scan point n

f_{n+1} ---The floating-point size of scan point n+1

f_{n+2} ---The floating-point size of scan point n+2

f... ---The floating-point size of scan point...

Example:

:CVL:REF 1,2,3 ---Set the reference value of the first 3 points

:CVL:REF5 20 ---Set the reference value of the 5th point

:CVL:REF? ---Return the reference value of all scan points

:CVL:REF4? ---Return the reference value of the 4th point

8.2.5.13 LOAD Load

◆ Description: The measurement value of the list scan load calibration, set the load value of several points starting from the nth point

Syntax:

:CVLList:LOAD[n]?

:CVLList:LOAD[n] $<f_n>[,f_{n+1}][,f_{n+2}]...$

Parameters:

n ---Start from the nth point

f_n ---The floating-point size of scan point n

f_{n+1} ---The floating-point size of scan point n+1

f_{n+2} ---The floating-point size of scan point n+2

f... ---The floating-point size of scan point...

Example:

:CVL:LOAD 1,2,3 ---Set the load value of the first 3 points

:CVL:LOAD5 20 ---Set the load value of the 5th point

:CVL:LOAD? ---Return the load value of all scan points

:CVL:LOAD4? ---Return the load value of the 4th point

◆ Description: Set the load calibration switch corresponding to the list scan point

Syntax:

:CVLList:LOAD<n>:SW?

:CVLList:LOAD<n>:SW <0|1|ON|OFF>

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

:CVL:LOAD:SW 1,1,0,0   ---Set the load correction switch of the first 4 points

:CVL:LOAD5:SW 1   ---Set the load correction switch of the 5th point

:CVL:LOAD?   ---Return the load correction switch of all scan points

:CVL:LOAD4:SW?   ---Return the load correction switch of the 4th point

8.2.6 CVTrace Trace Command Set

8.2.6.1 Channel

◆ Description: Set the test channel corresponding to the CV trace.

Syntax:

:CVTrace:CHannel?

:CVTrace:CHannel <1|2|3|4|5|6>

Parameters:

1~6 ---Indicate the measurement channel index (channel availability depends on whether the channel board is inserted)

Example:

:CVT:CH 1   ---Set the measurement channel to channel 1

:CVT:CH?   ---Query the current channel

8.2.6.2 Model

◆ Description: Set the measurement model of the CV trace.

Syntax:

:CVTrace:DEMO?

:CVTrace:DEMO <CISS|COSS|CRSS|RGCISS|MOSCAP>

Parameters:

CISS|COSS|CRSS|RGCISS|MOSCAP ---Corresponding measurement model

Example:

:CVT:DEMO COSS   ---Set the measurement model to COSS

:CVT:DEMO?   ---Query the current measurement model

8.2.6.3 FREQuency Frequency

◆ Description: Set the test frequency of the CV trace model.

Syntax.

:CVTrace:FREQuency?

:CVTrace:FREQuency <f>

Parameters:

    f   ---Floating-point number

Example:

    :CVT:FREQ 1M   ---Set the test frequency

    :CVT:FREQ?   ---Query the current frequency

8.2.6.4 LEVel Voltage

◆ Description: Set the test level of the CV trace model.

Syntax:

    :CVTrace:LEVel?

    :CVTrace:LEVel <f>

Parameters:

    f   ---Floating-point number

Example:

    :CVT:LEV 0.03   ---Set the test voltage

    :CVT:LEV?   ---Return the current test voltage

8.2.6.5 VG Bias Voltage

◆ Description: Set the VG bias voltage range of the CV trace

Syntax:

    :CVTrace:VG:RANGe?

    :CVTrace:VG:RANGe <start,stop>

Parameters:

start ---The starting point of VG bias voltage, floating-point data

stop ---The end point of VG bias voltage, floating-point data

Example:

:CVT:VG:RANG 0,2   ---Set the VG bias voltage range to 0V~2V

:CVT:VG:RANG?   ---Query the range of current VG bias voltage

◆ Description: Set the number of scan steps in the VG bias voltage range

Syntax:

    :CVTrace:VG:NOS?

    :CVTrace:VG:NOS <number>

Parameters:

number ---The number of scan steps 1~8 (can be set to 1001 in Rg model)

Example:

:CVT:VG:NOS 4   ---Set the number of scan steps in the VG voltage range to 4

:CVT:VG:NOS?   ---Query the current number of scan steps

◆　　Description: Set the delay time of the VG bias voltage

Syntax:

:CVTrace:VG:DELay?

:CVTrace:VG:DELay <time>

Parameters:

time   ---Floating-point value

Example:

:CVT:VG:DELay 100m   ---Set the delay time to 100ms

:CVT:VG:DELay?   ---Query the delay of current VG voltage

8.2.6.6 VD Bias Voltage

◆　　Description: Set the VD bias voltage range of the CV trace

Syntax:

:CVTrace:VD:RANGE?

:CVTrace:VD:RANGE <start,stop>

Parameters:

start   ---The starting point of VD bias voltage, floating-point data

stop   ---The end point of VD bias voltage, floating-point data

Example:

:CVT:VD:RANGE 1V, 50V   ---Set the VD bias voltage range to 1V~50V

:CVT:VD:RANGE?   ---Query the range of current VD bias voltage

◆　　Description: Set the number of scan steps in the VD bias voltage range

Syntax:

:CVTrace:VD:NOS?

:CVTrace:VD:NOS <number>

Parameters:

number   ---The number of scan steps 1~1001

Example:

:CVT:VD:NOS 8   ---Set the number of scan steps in the VD voltage range to 8

:CVT:VD:NOS?   ---Query the current number of scan steps

◆　　Description: Set the delay time of the VD bias voltage

Syntax:

:CVTrace:VD:DELay?

:CVTrace:VD:DELay <time>

Parameters:

time ---Floating point value

Example:

:CVT:VD:DEL 100m ---Set the delay time to 100ms

:CVT::VD:DEL? ---Query the delay of current VD voltage

◆ Description: Set the line type of the VD bias voltage

Syntax:

:CVTrace:VD:FMT?

:CVTrace:VD:FMT <LINEAR|LOG>

Example:

:CVT:VD:FMT LOG ---Set the trace line type as the logarithmic type

:CVT::VD:FMT? ---Query the line type of the current trace

8.2.6.7 Y-axis Setup

◆ Description: Set the line type of the Y-axis interval.

Syntax:

:CVTrace:YaxisForMaT?

:CVTrace:YaxisForMaT <LINEAR|LOG>

Example:

:CVT:YFMT LOG ---Set the Y-axis interval to logarithmic type

:CVT:YFMT? ---Query the line type of the current Y-axis interval

8.2.6.8 Model Parameter

◆ Description: Set the model Rg/Ciss-Vgs of the measurement parameters

Syntax:

:CVTrace:RGCISS:PARA?

:CVTrace:RGCISS:PARA <str>

Parameters:

str indicates specific parameter selections

str Value	Meaning
RGDSOCiss	RgDSO + Ciss
RGDSSCiss	RgDSS + Ciss
RGDSO	RgDSO
RGDSS	RgDSS
CISS	Ciss

Example:

:CVT:RGCISS:PARA RG   ---Set the model parameters to Rg parameters

:CVT:RGCISS:PARA?   ---Query the current parameters of the Rg/Ciss-Vgs model

◆ Description: Set the measurement parameters of the Ciss/Coss/Crss model.

Syntax:

:CVTrace:MOSCAP:PARA?

:CVTrace:MOSCAP:PARA <str>

Parameters:

str indicates specific parameter selections

str Value	Meaning
CICOCR	Ciss+Coss+Crss
CICO	Ciss+Coss
CICR	Ciss+Crss
COCR	Coss+Crss

Example:

:CVT:MOSCAP:PARA CICOCR   ---Set the model parameters to Ciss+Coss+Crss

:CVT:MOSCAP:PARA?   ---Query the current parameters of the model

8.2.7 CVCORR User Clearing Command Set

The CVCORR subsystem command set is used to set up the user clear function, open circuit, short circuit, and load calibration settings.

8.2.7.1 Cable Length

◆ Description: Set the cable length of the instrument

Syntax:

:CVCORR:LENGth?

:CVCORR:LENGth <0|2>

Parameters:

0|2   ---0m, 2m

Example:

:CVCORR:LENG 0   ---Set the cable length to 0 meter

:CVCORR:LENG 2   ---Set the cable length to 2 meters

:CVCORR:LENG?   ---Return the cable length

8.2.7.2 Open Circuit Clearing

◆ Description: Set the open circuit switch of the CV measurement

Syntax:

:CVCORR:OPEN?

:CVCORR:OPEN <0|1|ON|OFF>

:CVCORR:OPENMeas

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

:CVCORR:OPRN 0   ---Set the open circuit clear function of the CV measurement to OFF

:CVCORR:OPRN 1   ---Set the open circuit clear function of the CV measurement to ON

:CVCORR:OPRN?   ---Query the switch state of the CV measurement open circuit clear

:CVCORR:OPENMeas ---Perform open circuit clear operation on the CV measurement page

8.2.7.3 Short Circuit Clearing

◆ Description: Set the short circuit switch of the CV measurement

Syntax:

:CVCORR:SHORT?

:CVCORR:SHORT <0|1|ON|OFF>

:CVCORR:SHORTMeas

Parameters:

0|OFF   ---OFF

1|ON   ---ON

Example:

:CVCORR:SHORT 0 ---Set the short circuit clear function of the CV measurement to OFF

:CVCORR:SHORT 1 ---Set the short-circuit clear function of the CV measurement to ON

:CVCORR:SHORT? ---Query the short-circuit clear switch state of the CV measurement

:CVCORR:SHORTMeas ---Perform short circuit clear operation on the CV measurement page

8.2.7.4 Load Calibration

◆ Description: Set CV measurement to measure short-circuit switch

See the section on load instructions related to CV measurement.

8.2.8 Handler Command Set

◆ Description: Set the Handler mode

Syntax:

:HANDler:STATe?

:HANDler:STATe <0|1|2|OFF|ON|BUS>

Parameters:

0|OFF   ---Indicates default

1|ON   ---Indicates custom

2|BUS   ---Indicates bus control

Example:

:HAND:STAT 0   ---Set the HANDLE mode to default

:HAND:STAT ON   ---Set the HANDLE mode to custom

:HAND:STAT BUS   ---Set the HANDLE mode to bus control high and low output

:HAND:STAT?   ---Query the current Handler mode

◆   Description: Set the Handler custom output control

Syntax:

:HANDler:STATe:OFfLO <...>

:HANDler:STATe:OFfHI <...>

:HANDler:STATe:LVLO <...>

:HANDler:STATe:LVHI <...>

:HANDler:STATe:PUHI <...>

:HANDler:STATe:PULO <...>

Parameters:

<...> The form parameters are in list format, e.g., 1, 2,4,7,14,2 0 etc., corresponding to the position of the table displayed on the instrument

Example:

:HAND:STAT:OFLO 1,3,5,9 ---Set the 1,3,5,9 index function to constant low level.

:HAND:STAT:OFHI 1,3,5,9   ---Set the 1,3,5,9 index function to constant high level.

:HAND:STAT:LVLO 1,3,5,9 ---Set the 1,3,5,9 index function to active low.

:HAND:STAT:LVHI 1,3,5,9   ---Set the 1,3,5,9 index function to active high.

:HAND:STAT:PUHI 1,3,5,9   ---Set the 1,3,5,9 index function to high pulse effective.

:HAND:STAT:PULO 1,3,5,9 ---Set the 1,3,5,9 index function to low pulse effective.

◆   Description: Set the Handler bus output control

Syntax:

:HANDler:OUTPut:LVHI <...>

:HANDler:OUTPut:LVLO <...>

Parameters:

<...> The form parameters are in list format, e.g., 1,2,4,7,14,20, etc., corresponding to the position of the table displayed on the instrument

Example:

:HAND:LVHI:LVHI 1,3,5,9   ---Set 1,3,5,9 output high level in Bus mode.

:HAND:LVLO:LVLO 1,3,5,9   ---Set 1,3,5,9 output low level in Bus mode.

8.2.9 FETCh? Command Set

8.2.9.1 General Query Test Results

◆ Description: Query the result of the last measurement in the current test mode

Syntax:

:FETCh?   ---Return the test results of the parameter

Parameters:

Test Page	Return Content Description of CV Measurement Display Page				
CV Measurement Display	The returned data are mainly related to 4 parts: [4 parameter results] [sorting results] [on/off results] [contact inspection results]				

The returned data are mainly related to 4 parts: [4 parameter results] [sorting results] [on/off results] [contact inspection results]

1) 4 Parameter results: Parameter 1 result, Parameter 2 result, Parameter 3 result, Parameter 4 result

e.g.:

9.33199E-09,1.32473E-08,2.62153E-09,1.76975E-084 ---4 parameters are turned on

9.33199e-09,1.32473e-08,1.76975e-08   ----Parameter 3 is not turned on

Paragraph 1	Paragraph 2	Paragraph 3	Paragraph 4
val1	val2	val3	val4

2) Sorting result: bin,cmp1,cmp2,cmp3,cmp4 (This data is available only when the compare function is turned on)

e.g.: 1,1,0,0,0

Paragraph 5	Paragraph 6	Paragraph 7	Paragraph 8	Paragraph 9
bin	4 parameters compare results, 0 not compared, 1 PASS, >=2 FAIL			
	cmp1	cmp2	cmp3	cmp4

Note: Sorting result values 0~10:

bin	Description
0	Super poor
1~10	BIN 1~10

3) ON-OFF result: opsh,<0|1|2|3> (This data is available only when the ON-OFF function is turned on)

Note: Values 0~3:

	Description
0	On/off not tested
1	On-off test PASS

		2	Short circuit test FAIL	
		3	Open circuit test FAIL	

4) Contact inspection: contact,<0|1|2|3|4> (This data is available only when contact inspection function is turned on)

Note: Values 0~4:

	Description
0	Contact inspection not tested
1	Contact inspection PASS
2	G-terminal contact FAIL
3	D-terminal contact FAIL
4	S-terminal contact FAIL

Note: If the contact inspection or the on-off fails, the 4 parameter data is still the last measured data, and has no practical meaning

Test Page	Return content description
List Scan	Return the test result of the current test point Point index, parameter result, compare result e.g.: 2,1.12345E2,1 where the compare result values as follows: | Compare Results	Description
0	Not compared
1	PASS
Other	FAIL	
Trace Scan	None, refer to :FETCh:CVTrace related commands

◆ Description: Automatically return test result settings (no state saved after power off)

Syntax:

:FETCh:AUTO <? |0|1|2>

Parameters:

? ----indicates that to query auto-return state.

0 ----indicates that to turn off auto-return state.

1 ----indicates that the results of this test are automatically returned at the end of the trigger test, in the same format as above.

2----Indicates that the end state is returned after triggering the test result and that the result is not returned directly.

Return "Trig Eom\n"

Example:

:FETCh:AUTO?   ---Query auto-return setting state

:FETCh:AUTO 0   ---Turn off the trigger auto-return setting

:FETCh:AUTO 1   ---Automatically return the test data after the trigger is finished

:FETCh:AUTO 2   ---Return the end state after the trigger is finished

8.2.9.2 List Scan Results

◆ Description: Query list scan result

Syntax:

:FETCh:CVList[n]?   ---Return the 4 parameters and the compare results of all list points

:FETCh:CVList[n]:CMP?   ---Return the compare results of the specified points of the

list

Parameters:

n   ---Indicates the index of the scan point, values 1~50

Example:

:FETCh:CVL?   ---Return the result of all list points

e.g.: 1,val1,cmp1,2,val2,cmp2,3....

:FETCh:CVL5?   ---Return the test result of the 5th point

:FETCh:CVL:CMP?   ---Return the compare result of all list points

:FETCh:CVL4:CMP?   ---Return the compare result of the 4th point of the list

8.2.9.3 Trace Scan Results

◆ Description: Query trace scan results

Syntax:

:FETCh:CVTrace?   ---Return the scan result of the trace scan

Parameters:

Example:

:FETCh:CVTrace?   ---Return the scan result of the trace scan

Return data format: x1,y1,x2,y2,x3,y3...

8.2.10 MassMEMory Command Set

The MassMEMory subsystem command set is used for the saving and loading of files.

8.2.10.1 LOAD Load

◆ Description: Used to load saved files

Syntax:

:MMEM:LOAD?

:MMEM:LOAD <file>

Parameters:

file ---Specify the path to the file to be loaded, the relatively complete file path or the index number of the fixed file in the internal file, values 1~50;

the index number corresponds to the file as follows:

Index number	1~50
1	CV.cv in the root directory of the internal files
2	CV2.cv in the root directory of the internal files
3	CV3.cv in the root directory of the internal files
...	...

Example:

:MMEM:LOAD 1	Load the file with the path CV.cv
:MMEM:LOAD 9	Load the file with the path CV9.cv
:MMEM:LOAD sss.cv	Load the file with the path files/sss.cv
:MMEM:LOAD files/sss.cv	Load the file with the path files/sss.cv
:MMEM:LOAD usb/sss.cv	Load the file with the path usb/sss.cv
:MMEM:LOAD?	Return the pathname of the file to be loaded

8.2.10.2 STORe Save

◆ Description: Used to save the settings of the current instrument to a file

Syntax:

:MMEM:STOR <n>[,file]

Parameters:

n --- For use with the default saved file naming

file --- Specify the file name to be saved

The index number corresponds to the default file as follows:

Index number	1~50
1	CV.cv in the root directory of the internal files
2	CV2.cv in the root directory of the internal files
3	CV3.cv in the root directory of the internal files
...	...

Example:

:MMEM:STOR 1	---Save the CV.cv file (in LCR mode)
:MMEM:STOR 9	---Save the CV9.cv file (in LCR mode)
:MMEM:STOR5,sss.cv	---Save the file with the path sss.cv

:MMEM:STOR5,files/sss.cv	---Save the file with the path files/sss.cv
:MMEM:STOR5,usb/sss.cv	---Save the file with the path usb/sss.cv

8.2.11 SYSTem System Setup Command Set

The SYSTem subsystem command set is mainly used to set system-related parameter functions.

8.2.11.1 Bus Mode

◆ Description: Set the command mode of the communication interface

Syntax:

:SYST:BUSMODE?

:SYST:BUSMODE <RS232|LAN|USBTMC|USBCDC|AUTO>

Parameters:

AUTO ---Automatically select the communication interface

Other ---Lock communication interface for command communication interface

Example:

:SYST:BUSMODE?	Query the current communication interface mode
:SYST:BUSMODE RS232	Set the bus communication to the fixed RS232 interface
:SYST:BUSMODE LAN	Set the bus communication to the fixed LAN interface
:SYST:BUSMODE USBTMC	Set the bus communication to the fixed USBTMC interface
:SYST:BUSMODE USBCDC	Set the bus communication to the fixed USBCDC interface
:SYST:BUSMODE AUTO	Set the bus communication to the auto interface mode

8.2.11.2 Buzzer Sound

◆ Description: Set the keypad sound mode

Syntax:

:SYSTem:BEEPer?

:SYSTem:BEEPer <OFF|ON|0|1 >

Parameters.

0|OFF ---OFF

1|ON ---ON

Example:

:SYST:BEEP?	Query the current keypad sound setting
:SYST:BEEP 0	Set the keypad sound mode to OFF
:SYST:BEEP OFF	Set the keypad sound mode to OFF
:SYST:BEEP 1	Set the keypad sound mode to ON
:SYST:BEEP ON	Set the keypad sound mode to ON

◆ Description: Set the sorting pass sound mode

Syntax:

:SYST:BEEP:PASS?

:SYST:BEEP:PASS <OFF|TwoShort|LowLong|HighShort|HighLong>

Parameters:

OFF   ---OFF

TwoShort|LowLong|HighShort|HighLong   ---Two   Short,   Low   Long, High Short, High Long

Example:

:SYST:BEEP:PASS? ---Query the current FAIL sound setting

:SYST:BEEP:PASS OFF   ---Set the PASS sound mode to OFF

:SYST:BEEP:PASS TS   ---Set the PASS sound mode to Two Short

:SYST:BEEP:PASS LL   ---Set the PASS sound mode to Low Long

:SYST:BEEP:PASS HS   ---Set the PASS sound mode to High Short

:SYST:BEEP:PASS HL   ---Set the PASS sound mode to High Long

◆ Description: Set the sorting FAIL mode

Syntax:

:SYST:BEEP:FAIL?

:SYST:BEEP:FAIL <OFF|TwoShort|LowLong|HighShort|HighLong>

Parameters:

OFF   ---OFF

TwoShort|LowLong|HighShort|HighLong---Two Short, Low Long, High Short, High Long

Example:

:SYST:BEEP:FAIL?   ---Query the current FAIL sound setting

:SYST:BEEP:FAIL OFF   ---Set the FAIL sound mode to OFF

:SYST:BEEP:FAIL TS   ---Set the FAIL sound mode to Two Short

:SYST:BEEP:FAIL LL   ---Set the FAIL sound mode to Low Long

:SYST:BEEP:FAIL HS   ---Set the FAIL sound mode to High Short

:SYST:BEEP:FAIL HL   ---Set the FAIL sound mode to High Long

8.2.11.3 Time and Date

◆ Description: Set the system time and date

Syntax:

:SYST:DATETIME?

:SYST:DATETIME <year, month, day, hour, minute, second>

Parameters:

Year ---Value range 2018~2999

Example:

:SYST:DATETIME?   ---Query the current system time and date

:SYST:DATETIME 2021,11,08,12,35,56   ---set 2021-11-08 12:35:56

8.2.11.4 System Language

◆ Description: The language type displayed on the instrument page

Syntax:

:SYSTem:LANGuage?

:SYSTem:LANGuage <ENglish|CHinese>

Parameters:

EN   ----English

CH   ----Chinese

Example:

:SYST:LANG EN   ---Set the instrument system language to English

:SYST:LANG?   ---Query the current system language

8.2.11.5 RS232 Configuration

◆ Description: Set the baud rate

Syntax:

:SYSTem:RS232:BAUDrate?

:SYSTem:RS232:BAUDrate <4800|9600|19200|38400|57600|115200>

Parameters:

Example:

:SYST:RS232:BAUD?   ---Query the RS232 baud rate

:SYST:RS232:BAUD 19200   ---Set the RS232 baud rate to 19200

◆ Description: Set the instrument bus address

Syntax:

:SYSTem:RS232:ADDR?

:SYSTem:RS232:ADDR <1~32>

Example:

:SYST:RS232:ADDR? ---Query the instrument bus address

:SYST:RS232:ADDR 2 ---Set the instrument bus address to 2

◆ Description: Set the instrument communication command mode

Syntax:

:SYSTem:RS232:CMDMODE?

:SYSTem:RS232:CMDMODE <SCPI|MODBUS>

Example:

:SYST:RS232:CMDMODE? ---Query the instrument command mode

:SYST:RS232:CMDMODE SCPI ---Set the instrument command mode to SCPI

:SYST:RS232:CMDMODE MODBUS ---Set the command mode to MODBUS

◆ Description: Set the RS232 communication mode

Syntax.

:SYSTem:RS232:MODE?

:SYSTem:RS232:MODE <RS232|EXT485|EXTGPIB>

Example:

:SYST:RS232:MODE? ---Query the current RS232 communication mode

:SYST:RS232:MODE RS232 ---Set the communication mode to RS232

:SYST:RS232:MODE EXT485 ---Set the communication mode to EXT485

:SYST:RS232:MODE EXTGPIB ---Set the communication mode to EXTGPIB

8.2.11.6 LAN Configuration

◆ Description: Set the LAN port number

Syntax:

:SYSTem:LAN:PORT?

:SYSTem:LAN:PORT<int>

Parameters:

Int --Consult the network administrator for the value range, recommend 1~65536, the factory default 45454

Example:

:SYST:LAN:PORT?　　---Query the LAN port number

:SYST:LAN:PORT 45454　　　---Set the LAN port number

◆ Description: Set the LAN port dhcp

Syntax:

:SYSTem:LAN:UDhcPc

Example:

:SYST:LAN:UDP? ---Set the instrument to get the network configuration once automatically

◆ Description: Set the LAN port IP address

Syntax:

:SYSTem:LAN:IPADdress?

:SYSTem:LAN:IPADdress 192.168.22.209

Parameters: Default address

Example:

:SYST:LAN:IPAD? ---Query the LAN port IP address

:SYST:LAN:IPAD 192.168.22.209 ---Set the LAN port IP address

◆ Description: Set the LAN port gateway address

Syntax:

:SYSTem:LAN:GATeway?

:SYSTem:LAN:GATeway 192.168.22.1

Parameters: Default address

Example:

:SYST:LAN:GAT? ---Query the LAN port gateway address

:SYST:LAN:GAT 192.168.22.1 ---Set the LAN port gateway address

◆ Description: Set the LAN port subnet mask address

Syntax:

:SYSTemLAN:SMASK?

:SYSTem:LAN:SMASK 255.255.255.0

Parameters: Default address

Example:

:SYST:LAN:SMASK? ---Query the LAN port subnet mask address

:SYST:LAN:SMASK 255.255.255.0 ---Set the LAN port subnet mask address

◆ Description: Set the LAN port DNS address

Syntax:

:SYSTem:LAN:DNS?

:SYSTem:LAN:DNS <255.23.12.0>,<255.23.14.1>

Parameters:

The DNS addresses on both ends represent the primary and alternate DNS addresses respectively

Example:

:SYST:LAN:DNS? ---Query the LAN port DNS address

:SYST:LAN:DNS 255.23.12.0,255.23.14.1 ---Set the LAN port DNS address

◆ Description: Query LAN port MAC address

Syntax.

:SYSTem:LAN:MAC?

8.2.11.7 Upgrade Instructions

◆ Description: The command is to control the instrument to perform the upgrade operation (recall the default file in the USB flash drive to upgrade)

Syntax:

:SYST:UPDATE APP

Parameters:

Example:

:SYST:UPDATE APP--- The command controls the instrument to recall the default file in the USB flash drive for upgrading

Note: The software can also be upgraded by sending the upgrade file directly from the host computer and performing the upgrade operation (a convenient second option for the customer to do the upgrade). The upgrade file sent is stored in the internal storage of the instrument by default, e.g., update110.sec, which may be relatively large at a later stage and can be deleted by the user at regular intervals.

8.3 Modbus Command (incomplete)

8.3.1 Command Format

The command format is the internal version 2.0 standard, see the following description for details:

8.3.1.1 Write Command

➢ Send Format:

Instrument Address	Function Code	Address High	Address Low	Register number high	Register number low	Total bytes	Data byte 1	...	Data byte n	CRC Low	CRC High

➢ Return Format:

Instrument Address	Function Code	Address High	Address Low	Register Number High	Register Number Low	CRC Low	CRC High

a) Instrument address

is the local address of the instrument, which can be set from the bus address in the system setting interface of the instrument, the value range is: 1~31

b) Function code: 0x10

This instruction can write one data or multiple data, so its code is: 0x10

c) Address high bit and address low bit

is the address at which the data is stored in the instrument, which can be either a real storage address or a mapped address.

d) Register number high and register number low

Indicates the number of registers written for this operation, each register is 2 bytes in size

e) Total number of bytes

Indicates the total number of bytes written for this operation

f) Data byte 1~Data byte n

It is to write these data contents to the instrument.

g) CRC High and CRC Low

CRC 16-bit checksum, we use the table look-up method to perform CRC checksum

➢ Example: See Appendix Table ModeBus Command Function Compare Table for details of the specific commands and function setting relationships.

I set the voltage range to range 2 (i.e., 300V), the stored address of the voltage range parameter in the instrument is 0x0003, and the instrument bus address is 8

Then the command is:

0x08	0x10	0x00	0x03	0x00	0x01	0x01	0x02	C5	FD

The penultimate bit corresponds to the index value of the voltage, which is of type char and takes up 1 byte

The return message is as follows:

0x08	0x10	0x00	0x03	0x00	0x01	0XF1	0x50

8.3.1.2 Read Command

➢ Send Format:

Instrument Address	Function Code	Address High	Address Low	Register number high	Register number low	CRC Low	CRC High

➢ Return Format:

Instrument Address	Function Code	Total bytes	Data byte 1	......	Data byte n	CRC Low	CRC High

a) The function code is: 0x03

➢ Example: See Appendix Table ModeBus Command Function Compare Table (Section 9.3.3) for details of the specific commands and function setting relationships.

To read the test value of the voltage in the current mode, the storage address is 0x00A0 and the instrument number is 8

Then the send command as follows:

0x08	0x03	0x00	0xA0	0x00	0x02	0xC4	0xB0

The return message is:

0x08	0x03	0x04	Data Word Section 1	......	Data Word Section 4	CRC Low	CRC High

8.3.2 CRC16 Calculation Method - Table Look-up Method

a) First define the 2 256-byte checksums

// CRC High Byte Value Table

```
const BYTE chCRCHTalbe[] =          // CRC high byte value table
{
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40
};


// CRC low byte value table
const BYTE chCRCLTalbe[] =
{
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7,

0x05, 0xC5, 0xC4, 0x04, 0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E,
```

```
0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09, 0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9,
0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC,
0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32,
0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D,
0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A, 0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38,
0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF,
0x2D, 0xED, 0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1,
0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4,
0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB,
0x69, 0xA9, 0xA8, 0x68, 0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA,
0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0,
0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97,
0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E,
0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89,
0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83,
0x41, 0x81, 0x80, 0x40
};
```

a) Then perform the calculation

```
WORD CRC16(BYTE* pchMsg, WORD wDataLen)
{
BYTE chCRCHi = 0xFF; // High CRC byte initialization
BYTE chCRCLo = 0xFF; // Low CRC byte initialization
WORD wIndex;          // Index in the CRC loop
while (wDataLen--)
{
// Calculate CRC
wIndex = chCRCLo ^ *pchMsg++ ;
chCRCLo = chCRCHi ^ chCRCHTalbe[wIndex];
chCRCHi = chCRCLTalbe[wIndex] ;
}
return ((chCRCHi << 8) | chCRCLo) ;
```

}

8.3.3 Command Function Compare Table

Bus Address (1~31)	Function Code	Command Address	Data bytes Number	Data Number	Data Content	Command Function Meaning	
						Description of the type corresponding to the data content	
Set function	Read/Write 1Byte	High + Low 2Bytes	High + Low 2Bytes	Data number 1Byte	The setting value corresponding to the address nBytes	char	1Byte storage data
						short	2Bytes storage data
						int	4Bytes storage data
						float	4Bytes storage data
Query Instrument IDN	R	0x0000				Query the instrument IDN and return the instrument model number e.g., "STE110"	
	W	0x0040	0x0001	1	1	Start test (Trigger key function)	
	W	0x0041	0x0001	1	1	Stop test (Reset key function)	
	R	0x0042				Read the results	
CV Measurement Setup Start							
Trigger	R/W	0x3000	0x0001	1	char(0~1)	The data content takes the following values: 0 = CONT, 1 = SINGLE	
Speed	R/W	0x3001	0x0001	1	char(0~3)	The data content takes the following values: 0 = FAST, 1 = MED, 2 = SLOW, 3 = SFAST	
CV Measurement Channel	R/W	0x3002	0x0001	1	char(0~5)	The data content takes the following values: 0 = CH1, 1 = CH2, ...	
Function (CV measurement 4 parameters)	R/W	0x3003	0x0002	2	char(0~3) + char(0~5)	Parameter 1 is 4 Parameter index number (0~3). Parameter 2 is the parameter expected to be set and takes the following values: 0 = Ciss, 1 = Coss, 2 = Crss, 3 = Rg-DSO, 4 = Rg-DSS, 5 = Ciss-Vgs	
Parameter Switch (CV measurement 4	R/W	0x3004	0x0002	2	char(0~3) + char(0~1)	Parameter 1 is 4 Parameter index number (0~3). Parameter 2 is the parameter expected to be set and takes the following values:	

parameters)						0 Close 1 Open
Frequency (CV measurement 4 parameters)	R/W	0x3005	0x0002	5	char(0~3) + float	Parameter 1 is 4 Parameter index number (0~3) Parameter 2 is the parameter expected to be set and takes the following values: floating-point size
Level (CV measurement 4 parameters)	R/W	0x3006	0x0002	5	char(0~3) + float	Parameter 1 is 4 Parameter index number (0~3) Parameter 2 is the parameter expected to be set and takes the following values: floating-point size
Vg (CV measurement 4 parameters)	R/W	0x3007	0x0002	5	char(0~3) + float	Floating-point size
Vd (CV measurement 4 parameters)	R/W	0x3008	0x0002	5	char(0~3) + float	Floating-point size
Time Delay (CV measurement 4 parameters)	R/W	0x3009	0x0002	5	char(0~3) + float	Floating-point size
Deviation (CV measurement 4 parameters)	R/W	0x300A	0x0002	5	char(0~3) + char(0~2)	The data content takes the following values: 0 OFF 1 ABS 2 PER
Reference (CV measurement 4 parameters)	R/W	0x300B	0x0002	5	char(0~3) + float	Floating-point size
Load (CV measurement 4 parameters)	R/W	0x300C	0x0002	5	char(0~3) + float	Floating-point size
Load Calculation	R/W	0x300D	0x0001	1	char(0)	Perform load calibration factor calculation
Average (CV measurement 4 parameters)	R/W	0x300E	0x0002	2	char(0~3) + char(1~32)	
Limit Setup Start						
Compare Switch	R/W	0x3050	0x0001	1	0~1	The data content takes the following values:

						0	OFF
						1	ON
Count Switch	R/W	0x3051	0x0001	1	0~1	The data content takes the following values: 0 OFF 1 ON	
Limit Size	R/W	0x3052	0x0003	9	char+ float+ float	BIN 1~10 Lower limit + lower limit Byte meaning: bin index 0~9 float i.e., numerical size, lo+hi	
Sorting Switch	R/W	0x3053	0x0002	2	char(0~9) + char(0~1)	BIN 1~10 sorting switch Byte meaning: bin index 0~9 char(0~1) indicates the switch	
System Setup Start							
	R/W	0x0043	0x0001	1	char	Page switch, char parameter takes the following range of values against: 7 System Setup 8 File Management 9 10 Handler 11 Measurement 12 List 13 Trace 14 15 Measurement Setup 16 List Setup 17 Trace Setup 18 Limit Setup 19 Tool Setup	
	R/W	0x0045	0x0001	1	0~1	Button Sound 0 OFF 1 ON	
	R/W	0x0046	0x0001	1	0~4	PASS Sound 0 OFF 1 two short 2 two long 3 High and short 4 High and long	
	R/W	0x0047	0x0001	1	0~4	FAIL Sound 0 OFF 1 two short 2 two long 3 High and short 4 High and long	
	R/W	0x0048	0x0001	1	0~1	Display Language 0 English	

							1	Chinese	
CV List Setup Start									
	R/W	0x3060	0x0001	1	1~201	List Scan Points			
	R/W	0x3061	0x0001	1	0~1	List Scan Method			
							0	SEQ	
							1	STEP	

8.4 Communication Application Examples

8.4.1 CV Measurement Communication Application Examples

Test condition description: Test 4 parameters are Ciss, Coss, Crss, RgDSO

Result acquisition: the upper computer single acquisition (FETC:AUTO OFF)----factory default state

or

Automatic acquisition by the upper computer (FETC:AUTO ON)

Steps	Name	Command Description
0	Confirm communication is normal	*IDN? Normal communication will return instrument information, e.g., STE110,V1.0.0,12-345-67890,2022-10-17
1	Set test page	DISP:PAGE CVM
2	Set cable length (2m)	CVCORR:LENG 2
3	Set channel (1)	CVM:CH 1
4	Set test parameters	CVM:FUNC CISS,COSS,CRSS,RGDSO
5	Set parameter switch (full open)	CVM:SW 1,1,1,1
6	Set frequency uniformly	CVM:FREQ 1M,1M,1M,1M
7	Set level uniformly	CVM:LEV 30m,30m,30m,30m
8	Set Vg	CVM:VG 0,0,0,0 The above 4 parameters are set uniformly or independently below CVM:VG4 1.2V
9	Set Vd	CVM:VD 20,20,20,0 The above 4 parameters are set uniformly or independently below CVM:VD1 25V
10	Set delay time	Depending on the size of Vd and the capacitance of the measured part, set the appropriate delay time or set auto CVM:DEL 10m,10m,10m,10m

		or CVM:DEL:AUTO 1,1,1,1
11	Set trigger mode (single)	TRIG:SOUR SING
12	Trigger test	Manual trigger: Press Trigger button on the panel to trigger Bus trigger: Send command trig Handler trigger: Specified pin contact to rear panel interface Note: Choose one of the three; if you need to automatically report the test results after the test, you can give the auto-return control command in the initialization state :FETC:AUTO ON
13	Get Results	Command single acquisition :FETC? Command continuous acquisition: If the auto-return state is open, it is not necessary to send data query command Return result format can refer to FETCh? Command Chapter, e.g.: return 4 paragraphs or 9 paragraphs, 9.33199E-09,1.32473E-08,2.62153E-09,1.76975E-08,1,1,0,0,0

Paragraph 1	Paragraph 2	Paragraph 3	Paragraph 4	Paragraph 5	Paragraph 6	Paragraph 7	Paragraph 8	Paragraph 9
4 Parameter measurement results				Sorting Results	4 Parameter compare results			
val1	val2	val3	val4		cmp1	Cmp2	Cmp3	Cmp4

Chapter 9 Appendix

9.1 State Tips

9.2 Record and Explanation of Abnormal Phenomena

9.3 Instruction Change Record

1) Instruction Manual V1.0.0--- 2022/10

   First release.

2) Instruction Manual V1.0.1--- 2022/11

   Add list scan load calibration related SCPI command;

3) Instruction Manual V1.0.2--- 2022/12

   Correct the original Cont (on/off test) to OpSh (on/off test);

   Add contact inspection test and related instructions.

   Modify error message in section 9.1 to state message.

Company Statement:

   What is described in this manual may not be all that is described in the instrument, and Saluki reserves the right to make improvements and enhancements to the performance, functions, internal structure, appearance, accessories, packaging, etc. of this product without stating otherwise! In case of confusion regarding inconsistencies between the manual and the instrument, please contact us at the address on the cover.