

# OPERATION MANUAL

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## U2829 Series

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The logo for EUCCOL is displayed in a bold, orange, sans-serif font. The letters are thick and have a slight shadow effect, giving it a three-dimensional appearance. The logo is centered on the page.

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## Announcement

The description of the manual may not cover all contents of the instrument, and our company is subject to change and to improve the performance, function, inner structure, appearance, accessory and package of the instrument without notice. If there is puzzle caused by inconsistency of manual and instrument, then you can contact with our company by the address on the cover.

## Chapter 1 Out of Box Audit

When you receive the instrument, some inspections are necessary, and the condition must be understood and available before installing the instrument.

### 1.1 To Inspect the package

Inspect the shipping container for damage after unpacking it. It is not recommended to power on the instrument in the case of a damaged container. If the contents in the container do not conform to the packing list, notify us or your dealer.

### 1.2 Power connection

- 1) Power-supplying voltage range: 100~120Vac or 198~242Vac. Being related with the power setup on the rear panel.
- 2) Power-supplying frequency range: 47~63Hz.
- 3) Power-supplying power range: less than 80VA.
- 4) Power supplying input phase line L, zero line N, ground lead E should be as same as the power plug of the instrument.
- 5) After careful design, the instrument can reduce the clutter jamming caused by AC power terminal input, however, it should be used under the environment with low-noise. Please install power filter if being unavoidable.

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**Warning: In order to prevent user and instrument from being hurt by leakage, it is necessary for user to guarantee the ground line of supply power being reliably grounded.**

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### 1.3 Fuse

The instrument has installed fuse, so operators should use the installed fuse of our company.

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**Warning: Be sure that the location of fuse is consistent with power-supplying voltage range before charging.**

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## 1.4 Environment

- 1) Please do not operate the instrument in the place that is vibrative, dusty, under direct sunlight or where there is corrosive air.
- 2) The normal working temperature is 0°C~40°C, relative humidity  $\leq 75\%$ , so the instrument should be used under above condition to guarantee the accuracy.
- 3) There is heat abstractor on the rear panel to avoid the inner temperature rising. In order to keep good airiness, please don't obstruct the left and right airiness holes to make the instrument maintain the accuracy.
- 4) Although the instrument has been specially designed for reducing the noise caused by ac power, a place with low noise is still recommended. If this cannot be arranged, please make sure to use power filter for the instrument.
- 5) Please store the instrument in the place where temperature is between 5°C and 40°C, humidity is less than 85%RH. If the instrument will not be put in use for a time, please have it properly packed with its original box or a similar box for storing.
- 6) The instrument, especially the test cable should be far from strong electro-magnetic field, to avoid the jamming on measurement.

## 1.5 Use of Test Fixture

Please use the accessory test fixture or cable, **the test fixture made by user or from other company may cause the incorrect measurement result**. The test fixture or cable should be kept clean, as well as the pin of DUT, thus to guarantee the good connection between DUT and fixture.

Connect the fixture or cable to four test terminals Hcur, Hpot, Lcur, Lpot on the front panel. As for the DUT with shielding shell, connect shielding layer or ground "⊥".

Note: When test fixture or cable has not being installed, the instrument will display an unstable test result.

## 1.6 Warm-up

- 1) To guarantee the accurate measurement, the warm-up time is no less than 15min.
- 2) Please not turn on or off instrument frequently, in order to avoid the inner data fluster.

## **1.7 Other features**

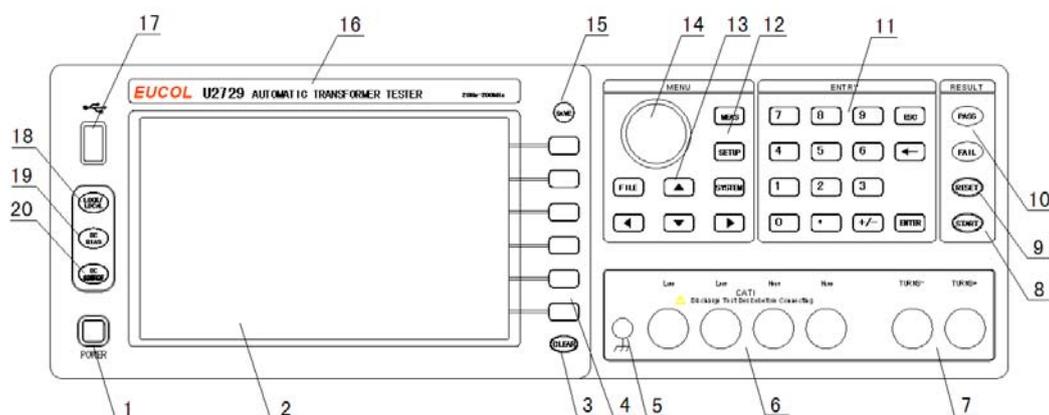
- 1) Power: consumption power $\leq$ 80VA.
- 2) Dimension (W\*H\*D): 400mm\*132mm\*350mm
- 3) Weight: About 10kg.

## Chapter 2 Introduction

In this chapter, the basic operation features of U2829 series are described. Please read the content carefully before using U2829 series instruments, thus you can learn the operation of U2829.

### 2.1 Introduction to front panel

Figure 2-1 shows the front panel of U2829.



- 1) POWER  
Power switch
- 2) LCD  
800\*480 colorful TFT LCD displays measurement results and conditions.
- 3) [CLEAR]  
Execute the calibration operation. Press this key to execute OPEN/SHORT calibration.
- 4) Soft keys  
Six soft keys are used to select parameters. The corresponding function of each soft key has been displayed on its left (the right part of LCD). The function definition varies with different pages.
- 5) Ground terminal  
The ground terminal is connected with the case of instrument, which can be used to protect or shield the ground connection.
- 6) Test terminals (UNKNOWN)  
4-terminal test pair are used to connect 4-terminal test fixture or cable to measure DUT.  
The 4 terminals are respectively as follows: Hcur, Hpot, Lpot and Lcur.
- 7) Transformer secondary test terminal (TURNS)  
(+): Secondary (+) terminal  
(-): Secondary (-) terminal

- 8) [TRIG]  
When the trigger mode is set to MAN mode, press this key to trigger the instrument.
- 9) [RESET]  
Press this key, when transformer auto scanning is cancelled, other operation cannot be executed on other pages.
- 10) PASS indicator and FAIL indicator  
LED indicator shows the test result has passed or failed.
- 11) Numerical keys  
These keys are used to input data to the instrument. The key consists of numerical keys [0] to [9], decimal point [.] , [+/-],[ESC],[←] and [ENTER] key.
- 12) [MEAS]  
Press this key to enter into the display page of transformer scanning test.  
[SETUP]  
Press this key to enter into the setup page of transformer scanning test.  
[SYSTEM] Press this key to enter into the system setup page.  
[FILE] Press this key to enter into the file list page.
- 13) CURSOR  
This key is used to move the cursor on the LCD displayed page. When the cursor moves to a zone, the corresponding zone will be lightened.
- 14) Knob for menu selection and numeric input  
This knob is used to move the cursor, select and set parameters.
- 15) [SAVE]  
Copy the currently displayed page to USB memory.
- 16) Brand and model  
Brand and model
- 17) USB HOST interface  
Connect U flash disk so as to save or use a specified file.
- 18) [KEYLOCK]  
Press [KEYLOCK], it will be lighted, which means the function of current panel is locked. Press it again, it will be off, which means discharging the lock status. If the password function is ON, it means correct password is necessary when discharging the key-lock, or the key cannot be unlocked.
- 19) [DC SOURCE]  
This key is used to permit or forbid the output of a 10V individual voltage source.
- 20) [DC BIAS]  
[DC BIAS] is used to permit or forbid the output of 0-100mA/10V DC bias source. Press this key, it will be lighted which means DC bias output is permitted. Press this key once more, it will be off which means DC bias output is prohibited. The key is useless in some pages where the DC BIAS cannot be added.

## 2.2 Introduction to rear panel

Figure 2-2 shows the rear panel of U2829.

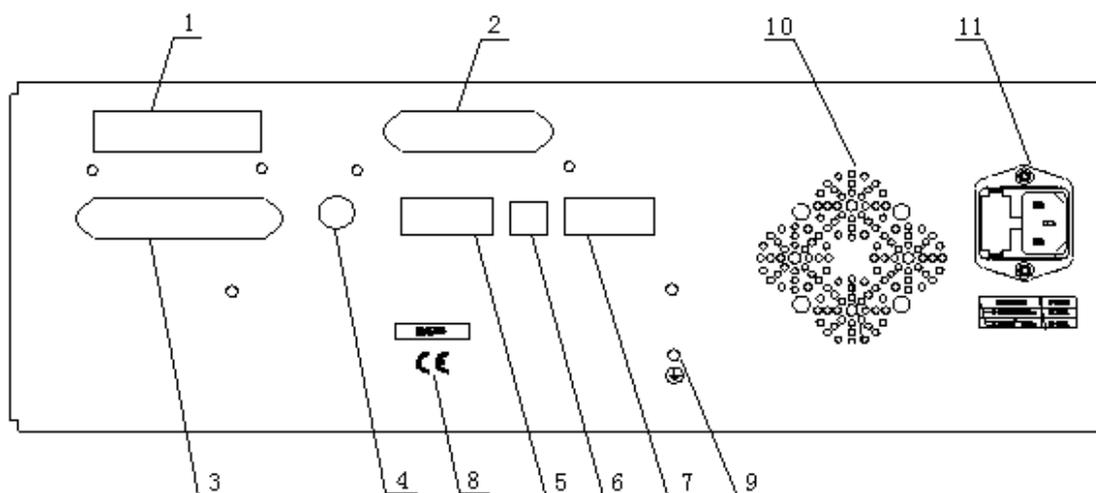


Figure 2-2 Rear panel

- 1) SCANNER interface  
Control the transformer scanning box through SCANNER interface.
- 2) IEEE-488 interface  
The tester can communicate with PC through GPIB interface.
- 3) HANDLER interface  
Handler interface is used to realize the sorting output of test results.
- 4) EX.TRG interface  
External trigger signal, foot switch(optional) can be used to trigger measurement when the trigger source is EXT.
- 5) RS232 interface  
Series communication interface can realize the communication with PC.
- 6) USB DEVICE interface  
The tester can communicate with PC through the USB DEVICE interface.
- 7) Bar-code scanner interface  
The tester can be connected to a bar-code scanner.
- 8) Nameplate  
Information about production date, instrument number and manufacturer etc..
- 9) Ground terminal  
The ground terminal is connected with instrument casing, being available for protecting or shielding ground connection.
- 10) Fan window  
Heat elimination, maintaining the normal working temperature

## 11) Power socket and Fuse base

Input AC power and being used to install power fuse, protect instrument.

## 2.3 Introduction to display zone

U2829 applies a 65k, 7-inch TFT display. The display screen is divided into the following zones:



Figure 2-3 display zones

- 1) Display page name  
Indicate the name of the currently displayed page.
- 2) Soft keys  
The zone is used to display the function definition of soft key. The definition of soft key can be different as the difference of cursor's direction in the zone.
- 3) Test result/ condition display zone  
In this zone, test result information and current condition are displayed.
- 4) Help  
In this zone, information about system and user data input is displayed.

## 2.4 Main menu keys and corresponding displayed pages

### 2.4.1 [MEAS]

When the LCR function is active, press this key **[MEAS]** to enter into the LCR

measurement display page, the following soft keys will be displayed in the soft key zone.

**<MEAS DISPLAY>**

**<BIN DISPLAY>**

**<PASS FAIL>**

**<LIST SWEEP>**

**<GRAPH SWEEP>**

When the transformer measurement function is active, press this key-**[MEAS]**, the following soft keys will be displayed on the transformer measurement display page.

**< MEAS DISP>**

**<JUDGE DISP>**

**<MEAS SETUP>**

**<LIMIT SETUP>**

When the transformer scan function is active, press this key-**[MEAS]**, the following soft keys will be displayed on the transformer scan display page.

**<LOAD STD.>**

**<DEVIATION>**

**<SPEED>**

**<PRI.1>**

**<TEST FAIL>**

### 2.4.2 [SETUP]

When the LCR function is active, press this key-**[SETUP]**, the following soft keys will be displayed in the soft key zone on the LCR measurement setup page.

**<MEAS SETUP>**

**<CORRECTION>**

**<LIMIT TABLE>**

**<LIST SETUP>**

**<GRAPH SETUP>**

When the transformer measurement function is active, press this key-**[SETUP]**, the following soft keys will be displayed on the transformer measurement setup page.

**<MEAS SETUP>**

**<LIMIT SETUP>**

**<CORRECTION>**

**<MEAS DISP>**

**<JUDGE DISP>**

When the transformer scan function is active, press this key-**[SETUP]**, the following soft keys will be displayed on the transformer scan setup page.

**<TRANS ID>**

**<PIN SETUP>**

**<TEST CONDITION>**

**<STAT.>**

**<SCAN MEAS>**

### **2.4.3 [SYSTEM]**

This key-[**SYSTEM**] is used to enter into the system setup page. The following soft keys will be available:

**<SYSTEM SETUP>**

**<SYSTEM INFO>**

**<FIRMWARE UPDATE>**

**<SYSTEM TEST>**

## **2.5 Basic Operation**

Basic operation of U2829 is as follows:

- Use menu keys ([MEAS], SETUP], [SYSTEM]) and soft keys to select the desired page.
- Use cursor keys ([←][→]) and the slide switch to move the cursor to the desired zone. When the cursor moves to a specified zone, the zone will become reverse expression.
- The soft key functions corresponding to the current zone of the cursor will be displayed in the soft key zone. Users can select and use the desired key. Numeric keys, [BACKSPACE] and [ENTER] are used to input data. When a numeric key is pressed down, the usable unit soft key will be displayed in the soft key zone. You can choose a unit soft key or press [ENTER] to end data inputting. When [ENTER] is used to terminate data inputting, the unit of data will be set to a default unit, such as Hz, V or A. For example, the default unit for frequency is Hz.

## **2.6 Start the instrument**

Plug in 3-line power plug.

Caution: Keep the power-supply voltage and frequency conform to above specifications. Power input phase line L, zero line N, ground line E should be the same as that of the instrument.

Press the power switch at the left corner on the front panel and then a boot screen will appear which displays our company logo, instrument model (U2829), and the version number of the software (Ver1.0.0).



If the password protection function is on, users are required to input the password and then press [ENTER] to enter into the page of main menu.

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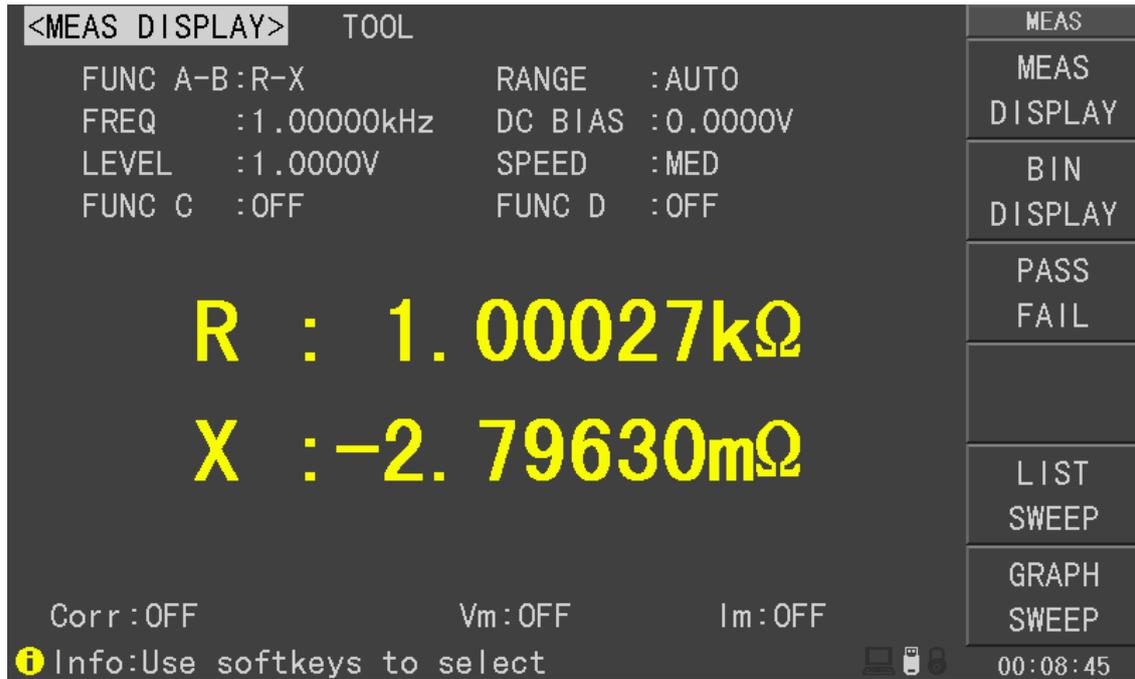
Note: The instrument has a **default password-123456**. In your practical use, you can change it and set your own one. Please see <SYSTEM> section for more information.

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# Chapter 3 Introduction to [DISP]

## 3.1 <MEAS DISPLAY>

When the LCR function is applied, press [MEAS], the <MEAS DISPLAY> page will be displayed on screen as shown in the following figure.



U2829-301

On this page, the test result is displayed in upper-case character. The measurement control parameters can be set in this page:

- Test function (FUNC A-B)
- Test frequency (FREQ)
- Test level (LEVEL)
- Test function (FUNC C)
- Test range (RANGE)
- DC bias
- Test speed (SPEED)
- Test function (FUNC D)

There are 8 zones in this page: FUNC A-B, FUNC C, FUNC D, FREQ, LEVEL, RANG, SPEED, DC BIAS. The details will be discussed later.

The test result/ condition display zone shows the information about test condition. These conditions can be set on <Measure> page or <Correction> page.

- Signal source voltage/ current monitor (**Vm, Im**)
- Open, short, load correction ON/OFF status (**CORR**)

### 3.1.1 Test function

In a measurement period, U2829 can test four parameters for an impedance component: two primary parameters and two secondary parameters. Parameters that can be tested are as follows:

#### Primary parameters

- $|Z|$  (Module of impedance)
- $|Y|$  (Module of admittance)
- L (Inductance)
- C (Capacitance)
- R (Resistance)
- G (Conductance)
- DCR (DC resistance)

#### Secondary Parameters

- D (Dissipation factor)
- Q (Quality factor)
- $R_s$  (Equivalent Series Resistance ESR)
- $R_p$  (Equivalent Parallel Resistance)
- X (Reactance)
- B (Admittance)
- $\theta$  (Phase Angle)

Test results of primary and secondary parameters are respectively displayed in two lines in the form of upper-case characters. The primary parameter displays in the upper line while the secondary parameter displays in the lower line.

Operation steps for setting test function:

1) Move the cursor to FUNC A-B zone, the following soft keys will be displayed on the screen.

- Cp—...→
- Cs—...→
- Lp—...→
- Ls—...→
- Z—...→
- Y—...→

2) Press the soft key corresponding to Cp—...→, the following parameters will be shown for your choice.

- Cp-D
- Cp-Q
- Cp-G
- Cp-Rp
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

3) Press Cs—...→, the following parameters will be shown for your choice.

- Cs-D

- Cs-Q
- Cs-Rs
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

4) Press Lp—...→, the following parameters will be shown for your choice.

- Lp-D
- Lp-Q
- Lp-G
- Lp-Rp
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

5) Press Ls—...→, the following parameters will be shown for your choice.

- Ls-D
- Ls-Q
- Ls-Rs
- DCR
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

6) Press Z—...→, the following parameters will be shown for your choice.

- Z- $\theta_r$
- Z- $\theta^\circ$
- R-X
- Rp-Q
- Rs-Q
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

7) Press Y—...→, another group of soft keys will be shown.

- Y- $\theta_r$
- R- $\theta^\circ$
- G-B
- RETURN

Press the soft key corresponding to your desired parameter. Then press RETURN to return to upper soft key menu.

Parameter setup of **FUNC C** and **FUNC D** are the same as that of **FUNC A-B**, but **FUNC C** and **FUNC D** can be turned off (**OFF**).

### 3.1.2 Test range

Measurement range should be selected in accordance with the impedance value of the tested LCR component.

U2829 has 8 AC measurement ranges: 10 $\Omega$ , 100 $\Omega$ , 300 $\Omega$ , 1k $\Omega$ , 3k $\Omega$ , 10k $\Omega$ , 30k $\Omega$ , 100k $\Omega$ .

U2829 has 10 DCR measurement ranges: 100m $\Omega$ , 1 $\Omega$ , 10 $\Omega$ , 100 $\Omega$ , 300 $\Omega$ , 1k $\Omega$ , 3k $\Omega$ , 10k $\Omega$ , 30k $\Omega$ , 100k $\Omega$ .

#### Operation steps for setting test range:

- 1) Move the cursor to the range zone, the following soft keys will be displayed:
  - **AUTO** The soft key is used to set the range mode to **AUTO**.
  - **HOLD** The soft key is used to switch the **AUTO** mode to the **HOLD** mode. When the range mode is set to **HOLD**, the range will be locked in the current measurement range. The current measurement range will be displayed in the range zone.
  - **↑(+)** The soft key is used to increase the range under **HOLD** mode.
  - **↓(-)** The soft key is used to decrease the range under **HOLD** mode.
- 2) Use soft keys to set measurement range.

### 3.1.3 Test frequency

The measurement range of U2829 ranges from 20Hz to 500kHz with an increase or decrease of 0.01Hz. When the test function is set as DCR, the **FREQ** zone will display "---".

#### Operation steps for setting test frequency:

U2829 provides two methods to set measurement frequency. The first one is to use soft keys and the other one is to input data by using numeric keys.

- 1) Move the cursor to the **FREQ** zone, the following soft keys will be displayed.
  - **↑(++)**  
This is a coarse adjustment soft key used to increase the frequency. Press this key, the frequency will change as the following sequence: 20Hz, 100Hz, 1kHz, 10kHz, 100kHz, 200kHz.
  - **↑(+)**  
This is a fine adjustment soft key used to increase the frequency. Press this key, the frequency will switch between the following ones:  

20 Hz	100 Hz	1 kHz	10 kHz	100 kHz
25 Hz	120 Hz	1.2 kHz	12 kHz	120 kHz
30 Hz	150 Hz	1.5 kHz	15 kHz	150 kHz
40 Hz	200 Hz	2 kHz	20 kHz	200 kHz
50 Hz	250 Hz	2.5 kHz	25 kHz	250 kHz
60 Hz	300 Hz	3 kHz	30 kHz	300 kHz
80 Hz	400 Hz	4 kHz	40 kHz	400 kHz
	500 Hz	5 kHz	50 kHz	500 kHz
	600 Hz	6 kHz	60 kHz	
	800 Hz	8 kHz	80 kHz	
  - **↓(-)**  
This is a fine adjustment soft key used to decrease the frequency. The

- selectable frequencies are the same as that of ↑(+).
  - ↓(--)  
This is a coarse adjustment soft key used to decrease the frequency. The selectable frequencies are the same as that of ↑(++).
- 2) Use soft keys or numeric keys to select or set frequency. When using numeric keys to input the required frequency value, the soft key displays the available frequency units (Hz, kHz and MHz). You can use unit soft key to input unit and data. When using [ENTER] to input frequency, the default unit is Hz.

### 3.1.4 Test level

The measurement level of U2829 can be set according to the RMS value of sine wave signal. The frequency of sine wave signal is the test frequency which is generated by inner oscillator. You can set measurement voltage or current. The output impedance of U2829 signal source can be 10Ω, 25Ω, 50Ω or 100Ω. When the test function is DCR, the **FREQ** zone will display "---".

---

**Note: The measurement current is the output one when the tested terminal is short, while the measurement voltage is the output one when the tested terminal is open.**

---

The auto level control function of U2829 can realize the measurement of constant voltage or current. The auto level control function (ALC) can be set as ON in <MEAS> page. When the auto level control function is set to ON, "\*" will be displayed following the current level value. Refer to <MEAS> for more information.

#### Operation steps for setting test level:

U2829 provides two methods to set the level of test signal source. The first one is to use soft keys, while the second one is to input data by numeric keys.

- 1) Move the cursor to LEVEL, the following soft keys will be displayed.
  - ↑(+)  
This soft key is used to increase the level of test signal source.
  - ↓(-)  
This soft key is used to decrease the level of test signal source.
- 2) Soft or numeric keys are used to select or set the test level. When numeric keys are used to input the desired level, the available units (mV, V, μA, mA and A) will be displayed in the soft key zone. Users can use these unit keys to input unit and data. When [ENTER] is used to terminate the input of level, the default level is V or A.

---

**NOTE: When you need to switch the level between current and voltage, numeric keys and unit soft keys must be used.**

### 3.1.5 DC bias

U2829 provides internal DC bias voltage from -10V to +10V. When the test function is selected as DCR, the bias zone will display "---".

#### Operation steps for setting DC bias:

U2829 provides two methods to set the DC bias. The first one is to use soft keys, while the second one is to input data by numeric keys.

1) Move the cursor to DC BIAS, the following soft keys will be displayed.

- ↑(+)

This soft key is used to increase the output level of DC bias.

- ↓(-)

This soft keys is used to decrease the output level of DC bias.

2) Soft or numeric keys can be used to select or set the DC bias source. When numeric soft keys are used to input the desired bias level, the available units ((mV, V,  $\mu$ A, mA and A) will be displayed in the soft key zone. Users can use these soft keys to input unit or data. When [ENTER] is used to terminate the input of bias value, the default unit is V or A.

-----

**NOTE: When you need to switch the DC bias level between current and voltage, numeric keys and unit soft keys must be used.**

-----

Press the [DC BIAS] key on the front panel to allow the output of DC bias. When DC bias is permitted to output, the [DC BIAS] key will be lighted.

### 3.1.6 Test speed

The test speed of U2829 is determined by the following factors:

- Integration time (A/D conversion)
- Average times (average test times per each test)
- Measurement delay (from startup to the start of measurement)
- Display time of test results

You can select test mode as FAST, MED or SLOW. Generally, the test result is more stable and accurate in SLOW test mode.

#### Operation steps for setting test speed:

1) Move the cursor to SPEED, the following soft keys will be displayed:

- FAST

- MED

- SLOW

- HIGH

2) Use above soft keys to set the test speed.

### 3.1.7 Tools

The test result of U2829 is displayed as 6 floating-point digits. Decimal point lock function can make U2829 output the test result in fixed way. Meanwhile this function can change the displayed count of test result. This displayed result can be selected to be shown in large character or small character.

#### Operation steps for tools

Set the display mode of decimal point in fixed mode according to the following operation steps. Also the character size of test result can be set.

- 1) Move the cursor to TOOL zone, the following soft keys will be displayed:
  - **D.P. AUTO**
  - **D.P. FIX A**
  - **D.P.FIX B**
  - **DISP OFF ON**
- 2) Press **D.P. AUTO** to reset the decimal position of the primary or the secondary parameter test result to its default setting.
- 3) Press **D.P. FIX A** to lock the decimal location of primary parameter TEST result.
- 4) Press **D.P. FIX B** to lock the decimal location of secondary parameter TEST result.
- 5) Press **DISP OFF ON** to close the display of test results.

---

**NOTE: Under the following circumstance, the function of decimal lock will be cancelled automatically to recover to floating decimal point status.**

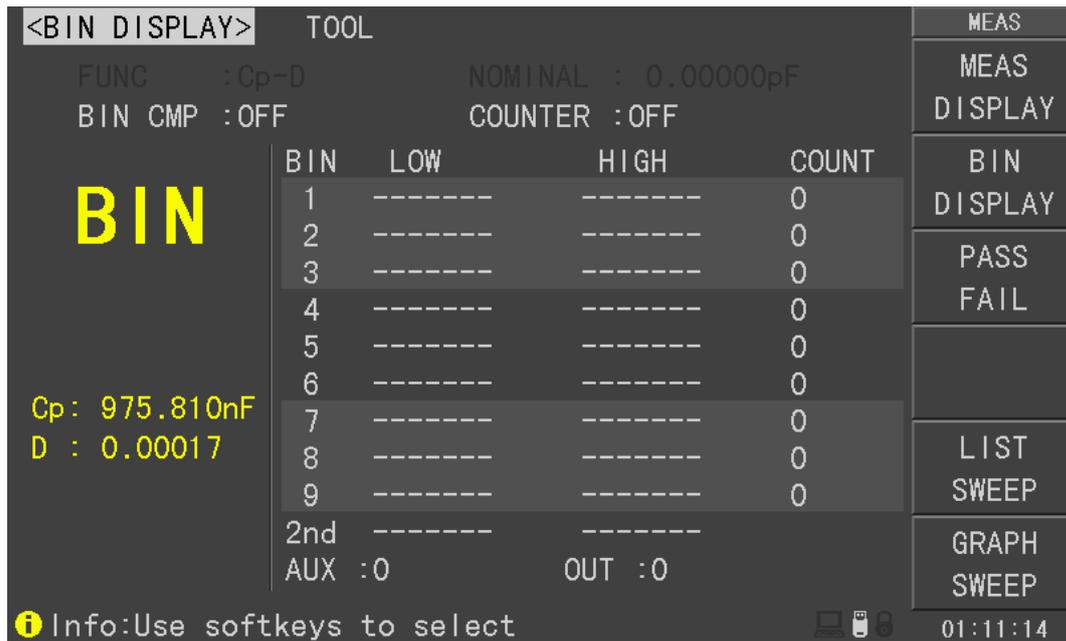
- **Test function is changed.**

**In deviation test, the deviation test mode ( $\Delta$ ABS,  $\Delta$ %, OFF) is changed.**

---

## 3.2 <BIN DISPLAY>

Press [**MEAS**] firstly and then the **BIN DISPLAY** soft key to enter into <BIN DISPLAY> display page. On this page, bin NO. is displayed in upper-case character while the test result, in lower-case character.



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The following control parameters can be set on **<BIN DISPLAY>**.

- Compare function ON/OFF (**BIN CMP**)
- Counter switch ON/OFF(**COUNTER**)

There are 2 zones: **BIN NO. DISP**, **COMP**. Their detailed information will be introduced as below.

The following test conditions are displayed in the measurement result/condition zone. These zones cannot be set on this page but can be set on **<MEAS SETUP>**, **<MEAS DISP>**, **<CORRECTION>** or **<LIMIT TABLE>**.

- Test function (FUNC)
- Nominal value(NOMINAL)
- Bin limit value (HIGH/ LOW)

### 3.2.1 Comparator function

U2829 has an inserted compare function which can divide DUT to up to 10 bins (from BIN1 to BIN9 and BIN OUT). Users can set 9 pairs of primary parameter limit and one pair of secondary bin limit. If the primary parameter of DUT is within the range of the bin limit but the secondary parameter is outside of the bin limit, the DUT will be sorted into the auxiliary bin. When U2829 has installed an HANDLER interface, the compare result will be output into the automatic test system and further realizing auto-sorting test. These limits can only be set on the **<LIMIT TABLE SETUP>** page. Users can set the compare function to ON or OFF in the **BIN CMP** zone.

#### Operation steps for compare function

- 1) Move the cursor to **BIN CMP**, the following soft keys will be displayed.
  - ON

- OFF

2) Select one of above soft keys to set the compare function as ON or OFF.

### 3.2.2 FUNC

Parameter zone shows the "Function" parameter, if user selects primary and secondary parameter swap compare mode, the parameter will be displayed as swap parameter, such as: "Cp-D" is displayed as "D-Cp", which means the current D is compared as primary parameter while Cp is compared as secondary parameter.

### 3.2.3 NOMINAL

Nominal parameter is the nominal value used to make bin compare.

### 3.2.4 BIN

This zone shows the bin number of the limit list. "2nd" means the secondary parameter limit.

### 3.2.5 HIGH/LOW

This zone shows the high and the low limits of the limit list.

### 3.2.6 COUNT

This zone shows the count value of the current bin.

### 3.2.7 AUX

This zone shows the count value of the auxiliary bin.

### 3.2.8 OUT

This zone shows the count value of the out bin.

#### Operation steps for bin count function

Execute the following operations to set the bin count function ON/OFF on <**BIN DISPLAY**> page.

1) On < **BIN DISPLAY**> page, move the cursor to **COUNTER** zone, the following soft keys will be displayed.

- ON
- OFF

- 2) Press the soft key **ON** to turn on the count function.
- 3) Press the soft key **OFF** to turn off the count function.
- 4) On < **BIN DISPLAY** > page, move the cursor to **TOOL** zone, the following soft keys will be displayed.
  - **Clear Counter**
- 5) Press the soft key **Clear Counter**, “☺ : Sure clear bin counter?” will be displayed in the help zone. Then the following soft keys will be displayed.
  - **YES**
  - **NO**
- 6) Press the soft key **YES** to reset all bin counts to 0.
- 7) Press the soft key **NO** to cancel the reset operation.

### 3.3 <LIST SWEEP DISP>

Up to 10 test frequencies, test levels or DC bias can be set on this page. Users can set the high and the low limits for each list-sweep test point. Auto sweep test will be made on these test points. And their test results will be compared with their limits.

Press down the menu key [**MEAS**] and then the soft key **LIST SWEEP** to enter into the <**LIST SWEEP**> page, shown as below.

<LIST SWEEP>							MEAS
SWEEP MODE:SEQ			FAIL MODE:STOP				MEAS
No.	FUNC	FREQ[Hz]	LEV[V]	BIAS[x]	RESULT	COMP	DISPLAY
1	OFF						BIN
2	OFF						DISPLAY
3	OFF						PASS
4	OFF						FAIL
5	OFF						
6	OFF						
7	OFF						
8	OFF						LIST
9	OFF						SWEEP
10	OFF						GRAPH
Corr:OFF							SWEEP
Info:Udisk is installed							01:37:14

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Test points will be automatically tested in a scanning mode. Meanwhile, comparison will be made between test results and limit values. In the process of list sweep test, “▶” denotes the current sweep test point. The following control parameters can be set on <**LIST SWEEP**>.

- Sweep mode (**SWEEP MODE**)

### ■ Fail mode(**FAIL MODE**)

There are 2 zones on this page: **LIST SWEEP DISP** and **mode**. List sweep points cannot be set on this page but can be set on **<LIST SWEEP SETUP>**.

### 3.3.1 Sweep mode

The list sweep function of U2829 can make automatic sweep test for up to 10 points' test frequencies, test levels or DC bias. Two sweep modes are available on U2829: SEQ and STEP. In SEQ mode, each press of [**TRIG**] will direct U2829 to automatically test all list sweep test points. In STEP mode, each press of [**TRIG**] will direct U2829 to test one list sweep point.

-----

NOTE: When the trigger mode is set to INT, sweep test modes of SEQ and STEP will not be controlled by [**TRIG**].

When the trigger mode is set to MAN, [**TRIG**] can be used to trigger the list sweep test.

-----

#### **Operation steps for setting the list sweep mode:**

Set the sweep mode on the **<LIST SWEEP>** page as **SEQ** or **STEP**.

- 1) On the **< LIST SWEEP >** page, move the cursor to the **SWEEP MODE** zone, the following soft keys will be displayed:
  - **SEQ**
  - **STEP**
- 2) Press **SEQ** to set the sweep mode as sequential sweep test mode.
- 3) Press **STEP** to set the sweep mode as single step sweep test mode.

#### **Operation steps for setting the list sweep fail mode:**

Set the sweep fail mode on the **<LIST SWEEP>** page as **STOP** or **CONTINUE**.

- 4) On the **< LIST SWEEP >** page, move the cursor to the **FAIL MODE** zone, the following soft keys will be displayed:
  - **STOP**
  - **CONTINUE**
  - **PAUSE**
  - **RETRY**

### 3.3.2 FREQ (Hz)

This zone shows the currently swept parameter mode and its unit. What are right below this item are parameters of the sweep list.

### 3.3.3 Ls[H] Q[ ]

This zone is the currently swept Function parameter and its unit. What are right

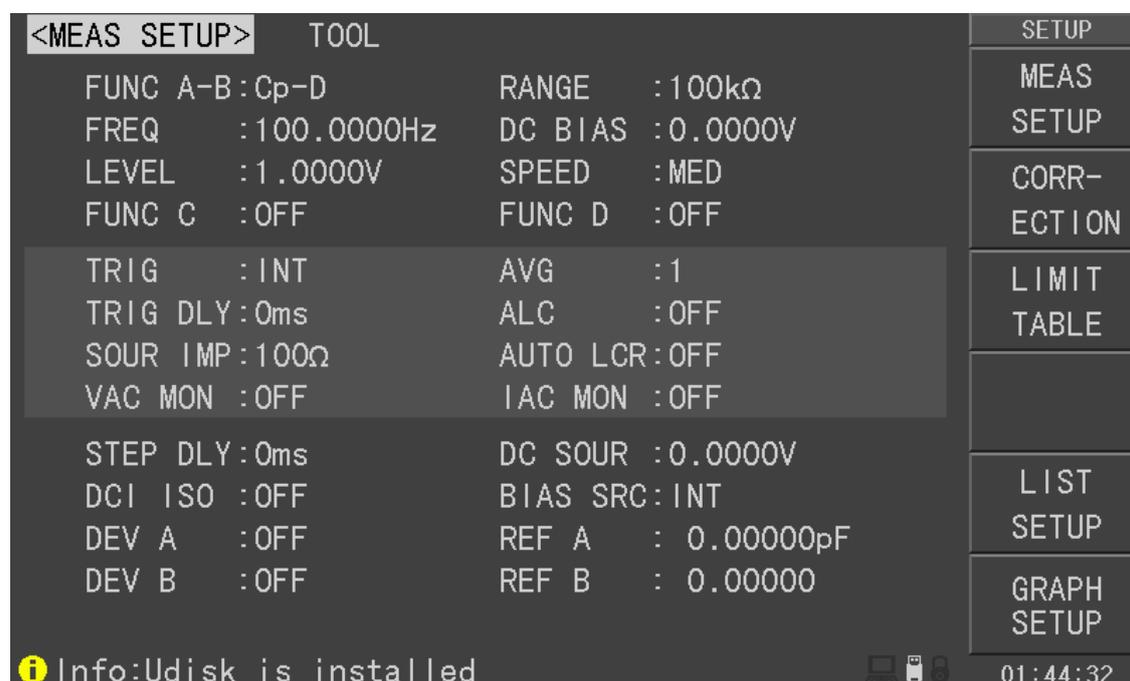
below this item are the sweep results.

### 3.3.4 COMP (Compare)

This zone indicates the compare results of the currently swept points. L means the result is lower than the standard and H is higher than the standard, while blank is medium.

## 3.4 <MEASURE SETUP>

Press [**SETUP**] to enter into the <**MEAS SETUP**> page shown as below:



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In this page, the following control parameters can be set. (Items in parenthesis can be set)

- Test function (**FUNC A-B**)
- Test function (**FUNC C**)
- Test function (**FUNC D**)
- Test frequency (**FREQ**)
- Test level (**LEVEL**)
- Test range (**RANGE**)
- Test speed (**SPEED**)
- DC Bias (**DC BIAS**)
- DC Voltage Source (**DC SOUR**)
- Trigger Mode (**TRIG**)
- Auto Level Control (**ALC**)
- Delay Time (**TRIG DLY**)

- Output Resistance (**SOUR IMP**)
- Average times (**AVG**)
- Voltage Level Monitor ON/ OFF (**VAC MON**)
- Current Level Monitor ON/ OFF (**IAC MON**)
- Bias Current Isolation ON/ OFF (**DCI ISO**)
- Deviation Test Mode A (**DEV A**)
- Deviation Test Mode B (**DEV B**)
- Deviation Test Reference Value A (**REF A**)
- Deviation Test Reference Value B (**REF B**)

Some zones listed below are as same as that on <MEAS DISP> page, so it is not necessary to introduce in this section, but others will be introduced briefly in the following sections.

- Test function (**FUNC A-B**)
- Test function (**FUNC C**)
- Test function (**FUNC D**)
- Test frequency (**FREQ**)
- Test level (**LEVEL**)
- Test range (**RANGE**)
- Test speed (**SPEED**)
- DC Bias (**DC BIAS**)

### 3.4.1 Trigger mode

There are 4 trigger modes on U2829: INT, MAN, EXT and BUS.

When the trigger mode is set as INT, U2829 will make sequential and repeated tests.

When the trigger mode is set as MAN, press [TRIGGER] once, U2829 will make one test.

When the trigger mode is set as EXT, once the HANDLER interface receives a positive impulse, U2829 will execute one measurement.

When the trigger mode is set as BUS, once the IEEE 488 interface receives a TRIGGER command, U2829 will execute a test. The BUS mode cannot be set on the front panel.

-----

Note: In the process of testing, when U2829 receives a trigger signal, it will be ignored. So the trigger signal should be sent after the test is done.

When optional HANDLER interface triggers U2829, the trigger mode is set as EXT.

-----

#### Operation steps for the trigger mode setup

Execute the operation of other trigger modes except BUS trigger. If BUS trigger mode is necessary, then use IEEE4888 interface to send **TRIGger:SOURce BUS** command.

- 1) Move the cursor to the **TRIG** zone, the following soft keys will be displayed:
  - **INT**
  - **MAN**
  - **EXT**
  - **DUT**
- 2) Use above soft keys to set the trigger mode.

### 3.4.2 Auto level control function

Auto level control function can adjust the real test level (voltage across or current through DUT) to the test level value. This function can guarantee the test voltage or current being constant.

When using this function, the test level can be set within the range below:

The range of constant voltage: 10 mV<sub>rms</sub> to 1 V<sub>rms</sub>

The range of constant current: 100 μA<sub>rms</sub> to 10 mA<sub>rms</sub>

-----

NOTE: When the constant level function is valid, if the level exceeds above ranges, this function will be automatically set as OFF. The level value currently set is generally deemed as non-constant level value.

-----

#### Operation steps for setting auto level control function

Execute the following steps and set the constant level function as ON or OFF.

- 1) Move the cursor to **ALC** zone, the following soft keys are displayed.
  - **ON**
  - **OFF**
- 2) Press **ON** to turn on the auto level control function.
- 3) Press **OFF** to turn off the auto level control function.

### 3.4.3 Bias current isolation function

Bias current isolation function can prevent the DC current from affecting the test input circuit. In **DCI ISO** zone, users can set the bias current isolation function as ON or OFF. When the bias current isolation function is set as ON, the bias current flowing through DUT can reach 100mA. When the bias current isolation function is set as OFF, the bias current value allowed to flow through DUT is shown as figure 3-1, if the bias current flowing through DUT is over the value in figure 3-1, then instrument cannot work normally.

Figure 3-1 Max. DC bias current

Test range	10 Ω	30 Ω	100 Ω	300 Ω	1 kΩ	3 kΩ	10 kΩ	30 Ω	100 kΩ
Max. current	2 mA	2 mA	2 mA	2 mA	1 mA	300 μA	100 μA	30 μA	10 μA

---

Note: Bias current isolation function (ISO) can only be set as ON after installing bias board. After bias current isolation function is turned on, the test accuracy will be influenced, so under the condition of low frequency and bias current, the bias current isolation function should be set as OFF.

---

#### **Operation steps for setting the bias current isolation function** (Bias board has been installed)

Execute the following steps and set the bias current isolation function as ON or OFF.

- 1) Move the cursor to **DCI ISO** zone, the following soft keys will be displayed.
  - **ON**
  - **OFF**
- 2) Press **ON** to turn on the bias current isolation function.
- 3) Press **OFF** to turn off the bias current isolation function.

### **3.4.4 Average**

The AVERAGE function can calculate the average value of two or more test results. The average times can be set from 1 to 255 with an increase or decrease of 1. Operation steps for setting test average times.

- 1) Move the cursor to the **AVG** zone, the following soft keys are displayed.
  - **↑ (+)**  
This key is used to increase the average times.
  - **↓ (-)**  
This key is used to decrease the average times.
- 2) Use above soft keys to set the average times or use numeric keys and **[ENTER]** input average times directly.

### **3.4.5 Level monitor function**

The level monitor function can monitor the real voltage across DUT or real current through DUT. The monitored voltage value is displayed in **VAC MON** zone on **<MEAS DISPLAY>** page while the monitored current value is in **IAC MON** zone.

---

Note: The correction function can influence the level monitor function, so when the correction data changes the level monitor value will change. When the correction is switched between OPEN or SHOR or LOAD, the level monitor value will be influenced as well

---

#### **Operation steps for setting the level monitor function**

Execute the following operation steps to set the level monitor function as ON or

OFF.

- 1) Move the cursor to **VAC MON** zone, the following soft keys will be displayed.
  - **ON**
  - **OFF**
- 2) Press **ON** to set the voltage monitor function as ON while press **OFF** to set the voltage monitor function as OFF.
- 3) Move the cursor to **IAC MON** zone, the following soft keys will be displayed.
  - **ON**
  - **OFF**
- 4) Press **ON** to set the current level monitor function as ON while press **OFF** to set the current level monitor function as OFF.

### 3.4.6 Delay time

U2829 trigger delay means the delay time from triggering to test-start. Delay function can set the trigger delay time. When the list sweep test function is used, all set delay time will be delayed at each sweep test point. The range of the trigger delay time can be set from 0s to 60s with 1ms as the resolution. The trigger delay function is great useful when the instrument is applied in an auto test system. When the instrument is triggered by HANDLER interface, the trigger delay time can ensure DUT and test terminal has a reliable contact.

#### Operation steps for setting the delay function

Execute the following steps to set the measurement delay time.

- 1) Move the cursor to the **TRIG DLY** zone.
- 2) Use numeric keys to input delay time. After pressing a numeric key, the following unit keys will be displayed. These soft keys can replace **[ENTER]** to input delay time.
  - **msec**
  - **sec**

### 3.4.7 Output impedance

U2829 provides four output impedances for your choice: 100  $\Omega$ , 50  $\Omega$ , 25  $\Omega$  and 10 $\Omega$ /CC. When testing inductance, it is necessary to input the same output impedance so as to make data comparison with other instruments.

**Note: When an optional bias board is selected, only 100 $\Omega$  is available.**

#### Operation steps for setting output resistance

Execute the following operations to set output impedance

- 1) Move the cursor to the **SOUR IMP** zone, the following soft keys will be displayed.
  - **100  $\Omega$**
  - **50  $\Omega$**
  - **25  $\Omega$**
  - **10 $\Omega$ /CC**

- 2) Press **100Ω** to select the output impedance as 100Ω. Press **25Ω** to select the output impedance as 25Ω.

### 3.4.8 Deviation test function

The deviation test function can make the deviation value (instead of real test value) be directly displayed on the screen. The deviation value is equivalent to the real test value subtracting the pre-set reference value. This function brings great convenience to observe variations of component parameters with temperature, frequency, bias. Bias test function can be used for primary or secondary parameter or primary and secondary parameters meanwhile. The instrument provides two deviation test modes as below:

■ **ΔABS (Absolute Deviation mode)**

The deviation currently displayed is the difference between the test value of the DUT and the preset reference value. The formula of calculating ΔABS is as below:

$$\Delta ABS = X - Y$$

Where, X is the test value of DUT

Y is the preset reference value.

■ **Δ% (Percentage deviation mode)**

The deviation currently displayed is the percentage of the difference between the test value of DUT and the preset reference value divided by the reference value. Its calculating formula is as below:

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

Where, X is the test value of DUT.

Y is the preset reference value.

#### Operation steps for setting deviation test function

- 1) Move the cursor to the **REF A** zone to input the reference value of the primary parameter, the following soft key will be displayed.

■ **MEAS**

When the reference component is connected with the test terminal, you should press **MEAS**. Then U2829 will test the reference component and the test result will be automatically input as the value of **REF A**.

- 2) Use **MEAS** or numeric keys to input the reference value of primary parameter.  
3) Move the cursor to the **REF B** to input the reference value of the secondary parameter, the following soft key will be displayed.

■ **MEAS**

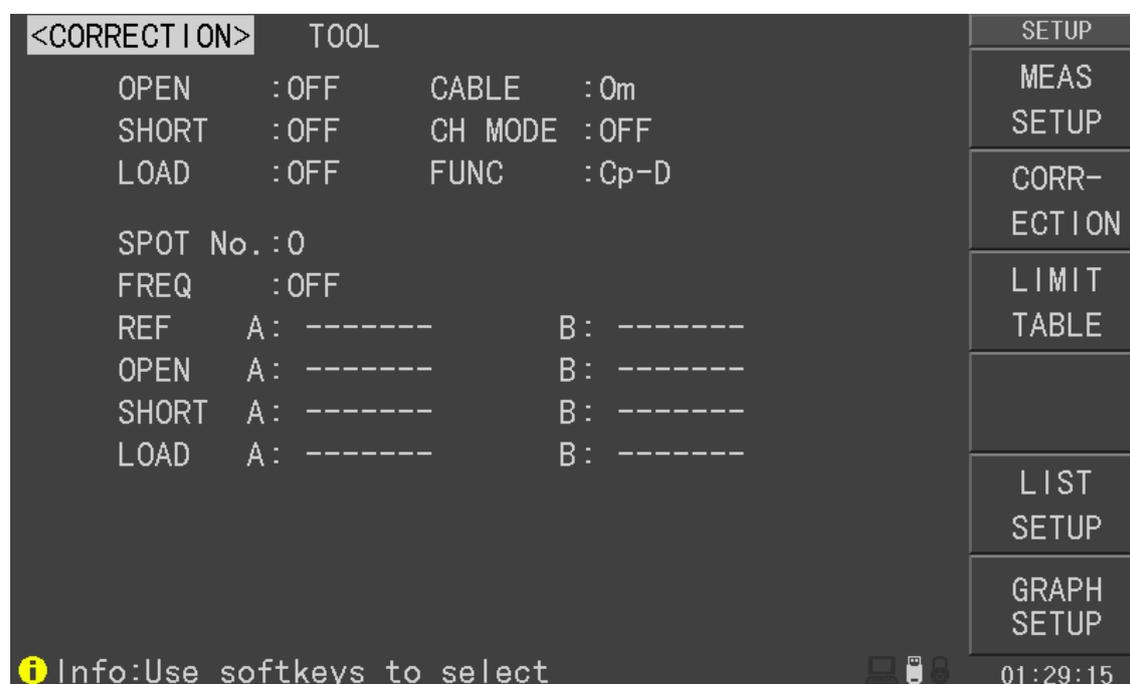
When the reference component is connected to the test terminal, you should press **MEAS**. Then U2829 will test the reference component and the test result will be automatically input as the value of **REF B**.

- 4) Use **MEAS** or numeric keys to input the reference value of the secondary parameter. If the reference values of primary and secondary parameters have been set in steps 2), you can skip this step.  
5) Move the cursor to the **DEV A** zone, the following soft keys will be displayed:

- **$\Delta$ ABS**
  - **$\Delta\%$**
  - **OFF**
- 6) Use above soft keys to set the deviation mode of the primary parameter.
- 7) Move the cursor to the **DEV B** zone, the following soft keys will be displayed.
- **$\Delta$ ABS**
  - **$\Delta\%$**
  - **OFF**
- 8) Use above soft keys to set the deviation mode of the secondary parameter.

### 3.5 <CORRECTION>

Press [**SETUP**] to select **CORRECTION** to enter into the **<CORRECTION>** page.



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Open, short and load correction on the **<CORRECTION>** page can be used to eliminate the distribution capacitance, spurious impedance and other measurement errors. U2829 provides two correction modes: the first one is executing open and short correction on all frequency points through interpolation method; the other one is executing open, short and load correction on the frequency point currently set. The following measurement control parameters can be set on the **<Correction>** page.

- Open correction (**OPEN**)
- Short correction (**SHORT**)
- Load correction (**LOAD**)
- Cable length selection (**CABLE**)
- Single/ multiple correction mode selection (**CH MODE**)

- Frequency points of OPEN, SHOR and LOAD (**SPOT NO.**, **FREQ**)
  - Reference values for 3 frequency points of load correction ( **REF A**, **REF B**)
- There are 16 zones on this page: **Correction**, **Open**, **Short**, **Load**, **Cable**, **CH Mode**, **Func**, **SPOT NO.**, **FREQ**, **REF A**, **REF B**, **OPEN A**, **OPEN B**, **SHORT A**, **SHORT B**, **LOAD A**, **LOAD B**. Each control function zone will be introduced in the following paragraphs.

Besides above setting zones, the <CORRECTION> page will also display the following monitoring zones. The monitoring zones are similar with the setting zones, but the monitoring zones can only provide reference information and you cannot change state or parameter of these zones.

- Real test results of the load correction (**LOAD A**, **LOAD B**)

The real test results of load correction can be tested on **SPOT NO. 0** to **SPOT NO. 63**. Channels of the current multiple correction mode can be set through the multiple-channel sweep interface or IEEE 488 interface.

### 3.5.1 OPEN

The open correction function of U2829 can eliminate the error caused by the stray admittance (G, B) parallel-connected with DUT, shown as figure 3-1.

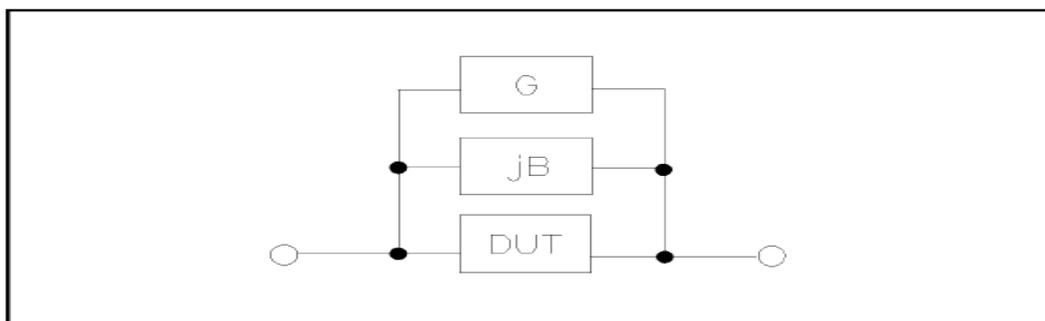


Figure 1 Stray Admittance

U2829 adopts the following two kinds of open correction data:

- U2829 will automatically make open correction test on 41 fixed frequency points no matter what the currently set frequency is. Based on the open correction data of the following 41 frequencies, the instrument can calculate all open correction data of different test ranges which corresponds to all test frequencies. Move the cursor to **OPEN** and then used **ALL** to execute full frequency open correction.

20 Hz	100 Hz	1 kHz	10 kHz	100 kHz
25 Hz	120 Hz	1.2 kHz	12 kHz	120 kHz
30 Hz	150 Hz	1.5 kHz	15 kHz	150 kHz
40 Hz	200 Hz	2 kHz	20 kHz	200 kHz
50 Hz	250 Hz	2.5 kHz	25 kHz	
60 Hz	300 Hz	3 kHz	30 kHz	
80 Hz	400 Hz	4 kHz	40 kHz	
	500 Hz	5 kHz	50 kHz	
	600 Hz	6 kHz	60 kHz	

800 Hz      8 kHz      80 kHz

- 64 open correction frequencies can be set in **SOPT NO.** and **FREQ** on **<CORRECTION>**: Move the cursor to **SPOT NO.** and then use the **INCR++**, **INCR+**, **DECR-**, **DECR--** soft key to set the 64 points frequencies respectively.

### Operation steps of open correction function

- 1) Move the cursor to OPEN, the following soft keys will be displayed:
  - **ON**
  - **OFF**
  - **SWEEP ON**
- 2) Connect test fixture to test terminal. The fixture is open and not connecting to any DUT.
- 3) Press **SWEEP ON**, U2829 will test the open admittance (capacitance and inductance) under 41 frequencies. It will take about 75 seconds to finish the open full-frequency correction. In the process of correction, the following soft key will be displayed:
  - **ABORT**

This soft key can be used to terminate the current open correction operation and reserve the formal open correction data.
- 4) Press **ON** to turn on the function of open-circuit correction, then U2829 will perform open-circuit correction calculation in the later testing process. IF SPOT FREQ is set as OFF, the open-circuit correction data of the current frequency will be calculated by imbedding algorithm. When SPOT FREQ is set as ON, the value of the current test frequency will be that of SOPT FREQ, in this case, the open correction data of SPOT FREQ will be used to the calculation of open correction.
- 5) Press **OFF** to turn off the open correction function. In later measurement, no open correction calculation will be taken.

### 3.5.2 SHORT

The short correction function of U2829 can eliminate the error caused by spurious inductance (R, X) in serial with DUT as shown in figure 3-2.

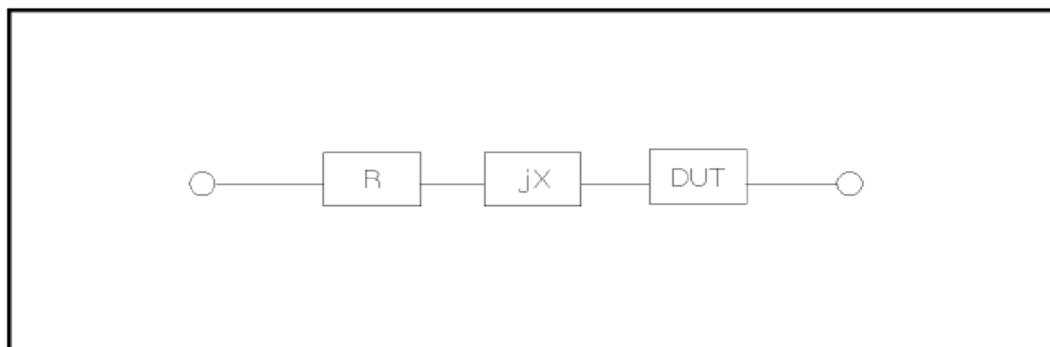


Figure 3-2 Spurious Inductance

U2829 adopts two kinds of short correction data.

- No matter what the current frequency is, U2829 will execute short correction test on the 41 fixed frequency points. Except the 41 frequencies, the instrument will adopt imbedding algorithm to calculate the short correction data of different test frequencies which correspond to different ranges. Move the cursor to the **SHORT** zone, and then use the **SWEEP SHORT** soft key to execute full frequency open correction. The 43 fixed frequencies are the same as that in open correction.
- U2829 can set 64 short correction frequencies in the **SPOT NO.** and **FREQ** zone on the **<CORRECTION>** page. Move the cursor to **SPOT NO.** and **FREQ**, and then use **SPOT SHORT** to short correct the set frequencies.

### Operation steps of short correction function

Short correction includes full frequency short correction which adopts imbedding algorithm and single frequency short correction on 64 frequencies. Execute the following operation steps to make short correction. The single frequency short correction can refer to "Load correction".

- 1) Move the cursor to the **SHORT** zone, the following soft keys will be displayed:
  - **ON**
  - **OFF**
  - **SWEEP SHORT**
- 2) Connect the test fixture to the test ports. Short the test fixture by using short plate.
- 3) Press the **SWEEP SHORT** soft key, U2829 will test the short spurious impedances (resistance and reactance) of 41 frequencies. Short full frequency correction takes about 75 seconds and in this process, the following soft keys will be displayed.
  - **ABORT**

This soft key can be used to cancel the current short correction operation and reserve the formal open correction data.
- 4) Press **ON** to validate the short correction function. U2829 will make short correction calculation in latter test. If SPOT FREQ is set as OFF, the short correction function will calculate the short correction data of the current frequency. If SPOT FREQ is set as ON and the current frequency is SPOT FREQ, the short correction data of SPOT FREQ will be used in the calculation of the short correction.
- 5) Press **OFF** to turn off the short correction function. In latter test, no short correction calculation will be performed.

### 3.5.3 LOAD

By using transport coefficient between the real test value and the standard reference value at the preset frequency (**SPOT NO.**), the load correction of U2829 can eliminate the test error. It is obvious that open, short, and load correction can be performed at preset frequencies. The 64 preset frequencies can be set in the setup zones of **SPOT NO.**. The standard reference values can be set

in the setup zones of **REF A** and **REF B**. The standard test function must be set in the **Func** zone before setting standard reference value. When the cursor moves to **FREQ**, the **MEAS LOAD** soft key will be displayed. Press **MEAS LOAD** to perform the load correction test.

### Operation steps for setting load correction

According to the following steps, perform open/ short/ load correction test at preset frequencies.

- 1) Move the cursor to **SPOT NO.**, the following soft keys will be displayed:
  - **INCR++**  
This is a coarse adjustment soft key used to increase series number of frequency.
  - **INCR+**  
This is a fine adjustment soft key used to increase series number of frequency.
  - **DECR-**  
This is a fine adjustment soft key used to decrease series number of frequency.
  - **DECR--**  
This is a coarse adjustment soft key used to decrease series number of frequency.
- 2) Use soft keys or numeric keys to select or set frequency spot. When using numeric keys to input the required frequency spot, the soft key displays the available units (**x1**, **ESC**). You can use unit soft key or **[ENTER]** to input data.
- 3) Move the cursor to **FREQ**, the following soft keys will be displayed:
  - **ON**  
Press this soft key to make the open/short/load correction data be available.
  - **OFF**  
Press the soft key to make the open/short/load correction data be unavailable.
  - **SPOT OPEN**  
Press this soft key to execute open correction at SPOT FREQ.
  - **SPOT SHORT**  
Press this soft key to execute short correction at SPOT FREQ.
  - **MEAS LOAD**  
Press this soft key to execute the load correction at SPOT FREQ.
- 4) Press the soft key **ON**, the original preset open/short/load correction frequency is displayed on the frequency setting zone.
- 5) Use numeric keys to input the correction frequency. After pressing any numeric key, the available unit keys (**Hz**, **kHz** and **MHz**) will be displayed on the soft key zone and these soft keys can replace the **[ENTER]** key to input correction frequency. When the **[ENTER]** key is used to input correction frequency, the default unit is Hz.
- 6) Connect the test fixture to the test terminal.

- 7) Make the test fixture be open.
- 8) Press **SPOT OPEN** to perform open correction at the current set frequency. The test result (G, B) of the open correction test will be displayed in the help line (the bottom line).
- 9) Move the cursor to **OPEN**.
- 10) Press **ON** to perform the open correction calculation at preset frequency in latter measurements.
- 11) Move the cursor to **FREQ** to set the required correction frequency.
- 12) Make the test fixture be short.
- 13) Press **SPOT SHORT** to perform short correction at preset frequency. The test result (R, X) of the short correction will be displayed in the help line (the bottom line).
- 14) Move the cursor to **SHORT**.
- 15) Press **ON** to perform the short correction calculation at preset frequency in latter measurements.
- 16) Prepare a standard test component.
- 17) Move the cursor to **FUNC**.
- 18) Set the function parameters required to be set.
- 19) Move the cursor to **REF A**.
- 20) Use numeric keys and unit keys to input the primary reference values of the standard component.
- 21) Move the cursor to **REF B**.
- 22) Use numeric keys and unit keys to input the secondary reference value of the standard component.
- 23) Move the cursor to the corresponding **FREQ**.
- 24) Connect the standard component to the test fixture.
- 25) Press **MEAS LOAD**, the instrument will execute a load correction. The real test results of the standard component will be displayed in **LOAD A** and **LOAD B**.
- 26) Move the cursor to **LOAD**.
- 27) Press **ON** to perform load correction calculation at preset frequencies in latter measurements.

### 3.5.4 Load correction test function

When performing load correction, the reference value of the standard component is required to be input in advance. The test parameters of reference value should conform with the preset load correction test function.

Load correction function adopts the transport coefficient between the real test value of preset frequency and the standard reference value to eliminate the test error. Load correction function is only available for calculating transport coefficient.

#### Operation steps for setting load correction test function

Refer to section 3.5.3.

### 3.5.5 Cable length selection

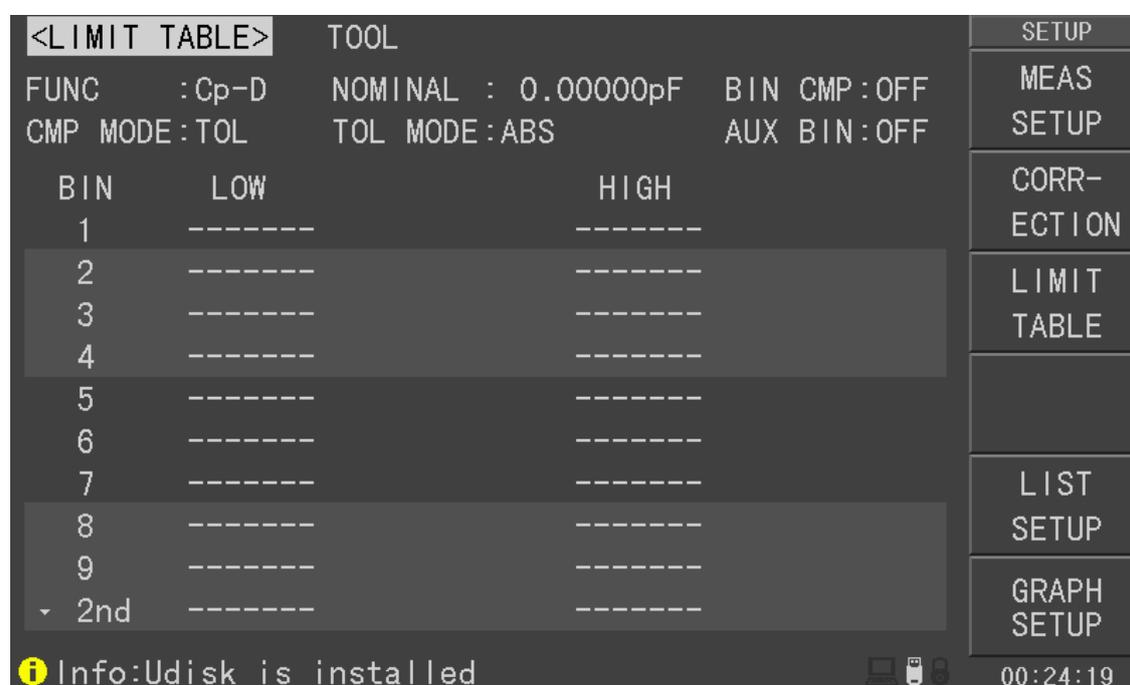
The available cable length is 0m, 1m, 2m and 4m.

### 3.5.6 Single/ multi correction mode

Refer to the instruction of the scanning optional interface.

## 3.6 <LIMIT TABLE>

Press [**SETUP**] and then **LIMIT TABLE** to enter into the **<LIMIT TABLE SETUP>** page as the following figure shown.



U2829308

Compare function can be set on this page. U2829 can set 9 bin limits of primary parameters and one of secondary parameters. The tested result can be divided into up to 10 bins (BIN 1 to BIN 9 and BIN OUT). If the primary parameter of DUT is within the limit range from BIN1 to BIN9, but the secondary parameter is out of the limit range, in this case the DUT will be sorted into aux bin. When U2829 installs the HANDLER interface and it is used in automatic sorting system, the compare function will be especially useful. The following limit parameter of compare function only be set on **<LIMIT TABLE SETUP>** page.

- Test parameter (**FUNC**)
- Limit mode of compare function (**CMP MODE**)
- Nominal value (**NOMINAL**)
- Auxiliary bin ON/OFF (**AUX BIN**)

- Compare function ON/OFF (**BIN COM**)
- Low limit of each bin (**LOW**)
- High limit of each bin (**HIGH**)

### 3.6.1 Swap parameter

The swap parameter function can swap the primary and the secondary parameter in **FUNC**. For example, when the test parameter is Cp-D, the swap parameter function can change the test parameter as D-Cp. Then user can set 9 pairs of compare limits for D, but only 1 pair of compare limit can be set for Cp.

#### Operation steps for the swap parameter function

Execute the following operations to swap the primary and the secondary parameters.

- 1) Move the cursor to **FUNC**, the following soft key will be displayed.
  - **SWAP**
- 2) Press **SWAP** to swap the primary and the secondary parameters.
- 3) Press **SWAP** to swap the primary and the secondary parameter, which is to recover the formal setup.

### 3.6.2 Limit modes of compare function

Compare functions has two limit setup modes for primary parameters as shown in figure 3-3.

#### ■ Tolerance mode

Under tolerance mode, set the deviation value of the nominal one (be set in the **NOMINAL** zone) as the compare limit value. Deviation value has two modes: percentage deviation and absolute deviation.

#### ■ Sequential mode

Under sequential mode, the range of the test value is the compare limit value. The compare limit value should be set in the order from small to large.

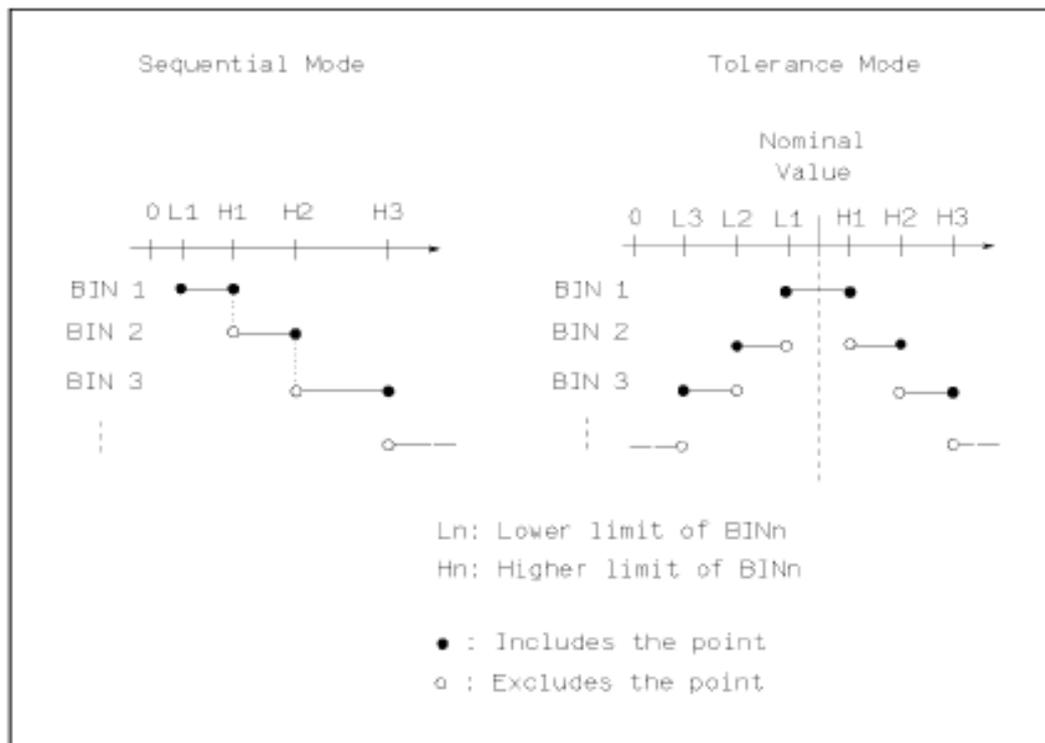


Figure 3-3 Tolerance mode and Sequential mode

---

**Note:** When setting limit values of tolerance mode, the error range should be set in the order from small to large. If the error range of BIN1 is the largest one, then all DUT will sort into BIN 1.

Under tolerance mode, the low limit is not necessary to be smaller than the nominal value and the high limit is not necessary to be larger than the nominal value. The limit range of each bin can be discontinues or overlapped.

---

### Operation steps for setting the limit mode of the compare function

1) Move the cursor to the **CMP MODE** zone, the following soft keys will be displayed.

■ **TOL**

This soft key is used to set the limit mode as the tolerance mode.

■ **SEQ MODE**

This soft key is used to set the limit mode as sequential mode.

2) Use above soft keys to set the limit mode.

### 3.6.3 Set nominal value of tolerance mode

When the tolerance mode is selected as the limit mode of the primary parameter, it is necessary to set the nominal value. The nominal value can be any one within

the display range.

When the sequential mode is selected as the limit mode the primary parameter, the nominal value can be set, but it is not necessary to use it under this mode.

#### Operation steps for setting the nominal value

- 1) Move the cursor to **NOMINAL**.
- 2) Use numeric keys to input nominal value. After inputting the data, the following soft keys (**p, n,  $\mu$ , m, k, M, \*1**) can replace the **[ENTER]** key to input the nominal value. When using **[ENTER]** to input the nominal value, the default unit is the same as that input last time. Press **\*1** to input nominal value, the instrument will select F, H or  $\Omega$  as the default unit of the nominal value according to primary parameter.

### 3.6.4 Comparator function ON/OFF

U2829 can set 9 bin limits of primary parameters and 1 bin limit of secondary parameters. The tested results can be sorted into 10 bins (BIN 1 to BIN 9 and BIN OUT) at most. If the primary parameter of DUT is within the limit range from BIN 1 to BIN 9, but the secondary parameter is out of the limit range, in this case the DUT will be sorted into aux bin. When U2829 installs the HANDLER interface and it is used in the automatic sorting system, the compare function will be especially useful.

#### Operation steps for setting the compare function ON/OFF

- 1) Move the cursor to **BIN CMP**, the following soft keys will be displayed.
  - **ON**
  - **OFF**
- 2) Use above soft keys to set the compare function as ON or OFF.

### 3.6.5 Auxiliary bin ON/OFF

When it is necessary to sort the secondary parameters, the limits of the secondary parameter can be set in **HIGH** and **LOW** of 2<sup>nd</sup>.

Three cases may occur in the process of secondary parameter sorting:

- On **<LIMIT TABLE SETUP>** page, no low / high limit of the secondary parameters has been set.
- On **< LIMIT TABLE SETUP >** page, the low/high limit of secondary parameters has been set but **AUN BIN** function is set as OFF.

In this case, only those components whose secondary parameters are qualified can perform primary parameter sorting according to sorting limits. If the secondary parameters are unqualified and the corresponding primary parameters are within limit ranges, those components will be sorted into BIN OUT.

- On **<Limit list setup>** page, the low/high limit of the secondary parameters has been set and the **AUX BIN** function is set as ON.

If the primary parameter is out of the limit range, it is sorted into BIN OUT. If the primary parameter of DUT is within the limit range but its secondary parameter is

out of the limit range, the DUT will be sorted into the **AUX BIN**.

-----

Note: When the secondary parameter only has low limit and the auxiliary bin is set as ON, if the primary parameter of DUT is within the limit range and the secondary parameter is smaller than or equal to its low limit, the DUT will be sorted into the auxiliary bin. When the secondary parameter only has high limit and the auxiliary bin is set as ON, if the primary parameter of DUT is within the limit range and the secondary parameter is larger than or equal to its high limit, the DUT will be sorted into the auxiliary bin.

-----

### Operation steps for setting the auxiliary bin function ON/OFF

- 1) Move the cursor to **AUX BIN**, the following soft keys will be displayed.
  - **ON**
  - **OFF**
- 2) Use above soft keys to set the auxiliary function as ON or OFF.

## 3.6.6 HIGH/LOW

U2829 can set bin limits of 9 primary parameters and one secondary parameter. The test results can be sorted into 10 bins at most (BIN 1 to BIN 9 and BIN OUT). The high/low limits of primary parameters can be set in high limit and low limit of bins from BIN 1 to BIN 9. The limit of the secondary parameter can be set in **HIGH** and **LOW** of 2<sup>nd</sup>.

### Operation steps for setting high/low limit

Execute the following steps to set sorting limits.

- 1) Set **FUNC** and **NOMINAL** in the compare function menu and the limit **CMP MODE** and **TOL MODE** of the primary parameter.
- 2) Move the cursor to Low limit of BIN 1. If you select tolerance mode, the following operation steps should be from step 3 to step 6; if you select sequential mode, the following operation steps should be from step 7 to step 11.
- 3) User numeric keys to input low limit value in Low limit. After inputting the data, you can use (**p, n, μ, m, k, M, \*1**) to replace **[ENTER]** to input the limit value. When **[ENTER]** is used, the default unit is the same as that being input last time. When pressing **\*1**, the default unit will be F, H or Ω. After inputting limit value in **LOW** of BIN 1, the low limit of BIN 1 will be automatically set as – (absolute limit) and the high limit will be + (absolute limit).
- 4) The cursor will automatically move to **LOW** of BIN 2. Repeat step 3 until the limits of BIN 9 are input. Then the cursor will automatically move **LOW** of 2<sup>nd</sup>.
- 5) After inputting the low limit of the secondary parameter, the cursor will automatically move to **HIGH** of 2<sup>nd</sup>.
- 6) Input the high limit of the secondary parameter.
- 7) In Low limit of BIN 1, use numeric keys to input the low limit. After inputting

the data, you can use (**p, n,  $\mu$ , m, k, M, \*1**) to replace **[ENTER]** to input the limit value. When **[ENTER]** is used to input the limit value, the default unit is the same as that being input last time. When pressing **\*1**, the default unit will be F, H or  $\Omega$ .

- 8) After inputting the low limit of BIN 1, the cursor will automatically move to **HIGH** of BIN 1. Input the high limit of BIN 1.
- 9) The cursor will automatically move **HIGH** of BIN 2. For the limit mode is sequential mode, the low limit of BIN 2 will be the high limit of BIN 1. Input the high limit of BIN 2.
- 10) Repeat step 9 until the high limit of BIN 9 is input. Then the cursor will automatically move to **LOW** of 2<sup>nd</sup>. Input the low limit of the secondary parameter.
- 11) The cursor will automatically move to **HIGH** of 2<sup>nd</sup>. Input the high limit of the secondary parameter.

### 3.7 <LIST SETUP>

Press **[SETUP]** and then **LIST SETUP** to enter into the **<LIST SETUP>** page as shown below.

<LIST SETUP> TOOL								SETUP
SWEEP MODE: SEQ				FAIL MODE: STOP				MEAS SETUP
No.	FUNC	FREQ[Hz]	LEV[V]	BIAS[x]	STEP DLY	LMT:LOW	LMT:HIG	CORR- ECTION
1	OFF	-----	----	----	-----	-----	-----	LIMIT TABLE
2	OFF	-----	----	----	-----	-----	-----	LIST SETUP
3	OFF	-----	----	----	-----	-----	-----	
4	OFF	-----	----	----	-----	-----	-----	GRAPH SETUP
5	OFF	-----	----	----	-----	-----	-----	
6	OFF	-----	----	----	-----	-----	-----	LIST SETUP
7	OFF	-----	----	----	-----	-----	-----	
8	OFF	-----	----	----	-----	-----	-----	GRAPH SETUP
9	OFF	-----	----	----	-----	-----	-----	
10	OFF	-----	----	----	-----	-----	-----	

**i** Info:Udisk is installed 00:34:11

U2829309

The list sweep function of U2829 can perform auto sweep test for the test frequency, test level or bias voltage of 10 points. On **<LIST SETUP>** page, the following list sweep parameters can be set.

- Sweep mode (**SWEEP MODE**)
- Sweep parameter setup (frequency **[Hz]**, level **[V]**, level **[I]**, bias **[V]**, bias **[I]**)

- Sweep test point setup (sweep point)
- Selection of limit parameter (**LMT**)
- High/low limit (**HIGH**, **LOW**)

### 3.7.1 MODE

Mode menu is the same as the mode on <List sweep display> page.

### 3.7.2 Test parameter

Sweep parameters can be: frequency [Hz], level [**V**], level [**I**], bias [**V**], bias [**I**].

#### Operation steps for setting test parameter

- 1) Move the cursor the line following **MODE**; the following soft keys will be displayed.
  - **FREQ [Hz]**
  - **LEVEL [V]**
  - **LEVEL [A]**
  - **BIAS [V]**
  - **BIAS [A]**
- 2) Press one of above soft keys to select the list sweep parameter.

### 3.7.3 Sweep parameter setup

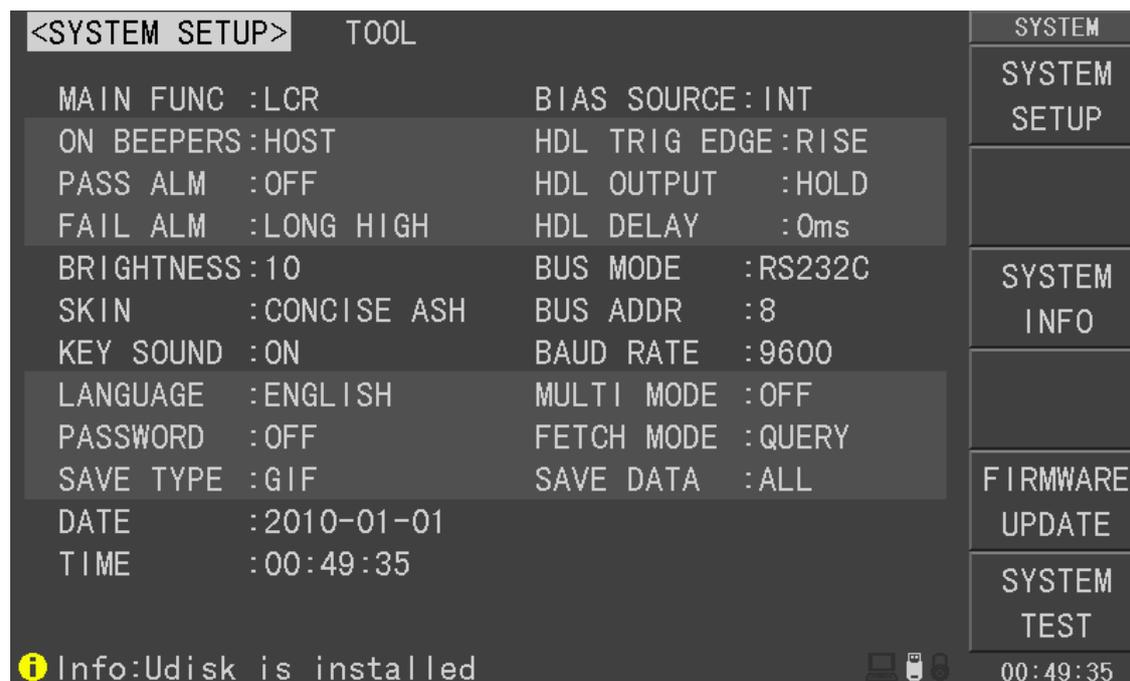
Move the cursor to the table to perform the setup of each sweep parameter: **FREQ (HZ)**, **LMT**, **HIGH** and **LOW**. Use numeric keys on the front panel to input the data of test frequency/level/bias and high/low limit used to compare, as well as the selected primary/secondary use to compare. After setting, if some inputs are unnecessary, you can execute the function of "Delete line" in the soft key zone to delete the corresponding value.

In the bottom of the **LMT** zone, parameter A indicates that the primary parameters of the measurement result are use to compare with the high and low limits of the table. Parameter B indicates that the secondary parameters of the measurement result are used to compare with the high and low limits of the table. "---" means no compare. The soft key zone has corresponding items. Press the soft key **LMT A**, "A" will be displayed in the **LMT** zone. When press the soft key **LMT B**, "B" will be displayed in the **LMT** zone. While press the soft key **OFF**, data in LMT zone and the corresponding high and low limits will be cleared and be displayed as "---".

## Chapter 4 [SYSTEM] and <FILE MANAGE>

### 4.1 <SYSTEM SETUP>

Press [**System**] and then **SYSTEM SETUP** to enter into the <SYSTEM SETUP> page shown as below.



U2829401

On this page, most system setup items are displayed, such as instrument main function, beeper, PASS beeper, FAIL beeper, language, PASS word, bus mode, GPIB address, TALK only, Bias SRC, baud rate, data/time.

#### 4.1.1 MAIN FUNC

The function of this zone is to control and display available instrument functions.

##### Operation steps for setting the instrument main function

- 1) Move the cursor to **MAIN FUNC**, the following soft keys will be displayed.
  - **LCR**  
This soft key is used to select the component measurement function.
  - **TRANS MEAS**  
This soft key is used to select the transformer stand-alone test function.
  - **TRANS SCAN**  
This soft key is used to select the transformer scanning test function.

### 4.1.2 ON BEEPERS

This zone is used to control and display the beeper source.

#### Operation steps for selecting beeper

- 1) Move the cursor to **Beeper**, the following soft keys will be displayed.
  - **HOST**  
This soft key is used to select the instrument as the beeper source.
  - **SCANNER**  
This soft key is used to select the scanner as the beeper source (available only when U2829 connects a transformer scanning box).
  - **ALL**  
This soft key is used to select both the instrument and the scanning box as the beeper source.

### 4.1.3 PASS BEEP

This zone is used to control and display the beep mode when the test result is qualified.

#### Operation steps for setting PASS ALM

- 1) Move the cursor to **PASS ALM**, the following soft keys will be displayed.
  - **HIGH LONG**  
This soft key is used to select high and long beep.
  - **LOW LONG**  
This soft key is used to select low and long beep.
  - **SHORT**  
This soft key is used to select high and short beep.
  - **TWO SHORT**  
This soft key is used to select two low and short beeps.
  - **OFF**  
This soft key is used to set the pass beep function OFF.

---

Note: In the scanning box, the potentiometer is used to adjust the volume, so when selecting SCANBOX as the beep source, you can only control the volume to be long and short but not high and low.

---

### 4.1.4 FAIL BEEP

This zone is used to control and display the beep mode as **FAIL BEEP** when the test result is unqualified.

#### Operation steps for setting FAIL ALM

- 1) Move the cursor to **FAIL ALM**, the following soft keys will be displayed.

**■ HIGH LONG**

This soft key is used to select high and long beep.

**■ LOW LONG**

This soft key is used to select low and short beep.

**■ SHORT**

This soft key is used to select high and short beep.

**■ TWO SHORT**

This soft key is used to select two low and short beeps.

**■ OFF**

This soft key is used to set the fail beep mode OFF.

-----

Note: In scanning box, the potentiometer is used to adjust the volume, so when selecting SCANBOX as the beep source, you can only control the beep to be long and short but not high and low.

-----

#### 4.1.5 LANGUAGE

This zone is used to control and display the current language mode of the operating instrument.

**Operation steps for setting language**

1) Move the cursor to Language, the following soft keys will be displayed.

**■ English**

This soft key is used to select English as the operation language.

**■ Chinese**

This soft key is used to select Chinese as the operation language.

#### 4.1.6 PASS WORD

This zone is used to display the password –protection mode.

**Operation steps for setting the password**

1) Move the cursor to Password, the following soft keys will be displayed.

**■ OFF**

This soft key is used to turn off the password protection mode.

**■ KEYLOCK**

This soft key is used to protect unlock keyboard.

**■ SYSTEM**

This soft key is used to turn on the password protection function including file protection and starting up password.

**■ FILE**

This soft key is used to protect user's file.

**■ MODIFY**

This soft key is used to modify the password. The operation steps are as

follows:

Press **MODIFY** to input a new password. After inputting, a prompt information will appear on the screen to prompt you to confirm the new password. Input the new password again till the modification finishes.

---

Note: The default password is 123456.

---

#### 4.1.7 BUS MODE (Reserved function)

This mode is used to select RS232C, GPIB, LAN, USBTMC or USBCDC.

##### Operation steps for setting bus mode

- 1) Move the cursor to **Bus**, the following soft keys will be displayed.
    - **RS232C**
    - **USBTMC**
    - **USBCDC**
    - **GPIB**
  - 2) Use above soft keys to select the required interface bus.
- 

Note: GPIB optional must be installed before GPIB mode is available.

---

#### 4.1.8 BUS ADDR (Reserved function)

This zone is used to control and display the current GPIB address.

Operation steps for setting GPIB address:

- 1) Move the cursor to **BUS ADDR**, the following soft keys will be displayed.
  - **↑ (+)**  
This soft key is used to increase the GPIB address.
  - **↓ (-)**  
This soft key is used to decrease the GPIB address.

#### 4.1.9 FETCH MODE

The fetch mode function is used to control the instrument to send each measurement result to bus through its interface of RS232C, GPIB, LAN, USBTMC or USBCDC. When the fetch mode function is AUTO, the instrument cannot be controlled by PC.

##### Operation steps for setting the talk only function

- 1) Move the cursor to **FETCH MODE**, the following soft keys will be displayed.
  - **QUERY**

- **AUTO**

- 2) Press **QUERY** to turn on the talk only function or **AUTO** to turn off this function.

#### 4.1.10 BIAS SRC

Bias source is used to select the DC bias power. The instrument provides 3 kinds of bias source as shown below:

- **INT mode**

The standard DC bias voltage source is from -10V to +10V and the DC bias current source is from 0 to 100mA.

-----  
NOTE: When the DC bias source is in use, only the output impedance of 100Ω can be used.  
-----

- **OPT mode**

The optional DC bias source can provide internal DC bias current source (0~1A).

-----  
NOTE: U2901-1A optional must be installed, then the mode can be supported.  
-----

- **EXT mode**

When the instrument adopts the external bias source to perform on-line test, the EXT mode should be selected. We provide the following external bias source for your choice: U1773 and U1776.

-----  
NOTE: U1773 must be connected, then this mode can be supported.  
-----

#### Operation steps for setting bias source

- 1) Move the cursor to **BIAS SRC**, the following soft keys will be displayed.

- **INT**
- **OPT**
- **EXT**

- 2) Press **INT** to select the INT bias source.
- 3) Press **OPT** to select the OPT bias source.
- 4) Press **EXT** to select the EXT bias source.

#### 4.1.11 BAUD RATE

Baud rate is used select the baud rate of the RS232C interface. The available baud rate of this instrument is from 4.800k to 115.200k.

#### Operation steps for setting the baud rate

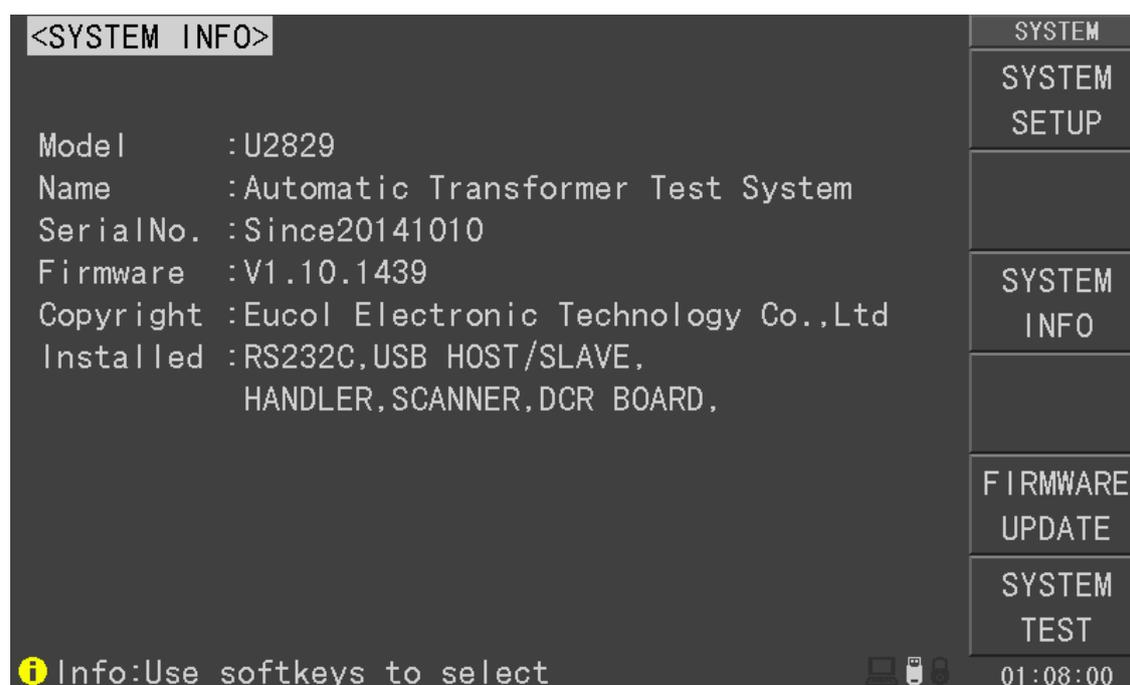
- 1) Move the cursor to **BAUD RATE**, the following soft keys will be displayed.
  - **4800**
  - **9600**
  - **19200**
  - **38400**
  - **57600**
  - **115200**
- 2) Use above soft key is to set the baud rate.

#### 4.1.12 DATA/TIME

When moving to the time zone, user should input the password to enter.

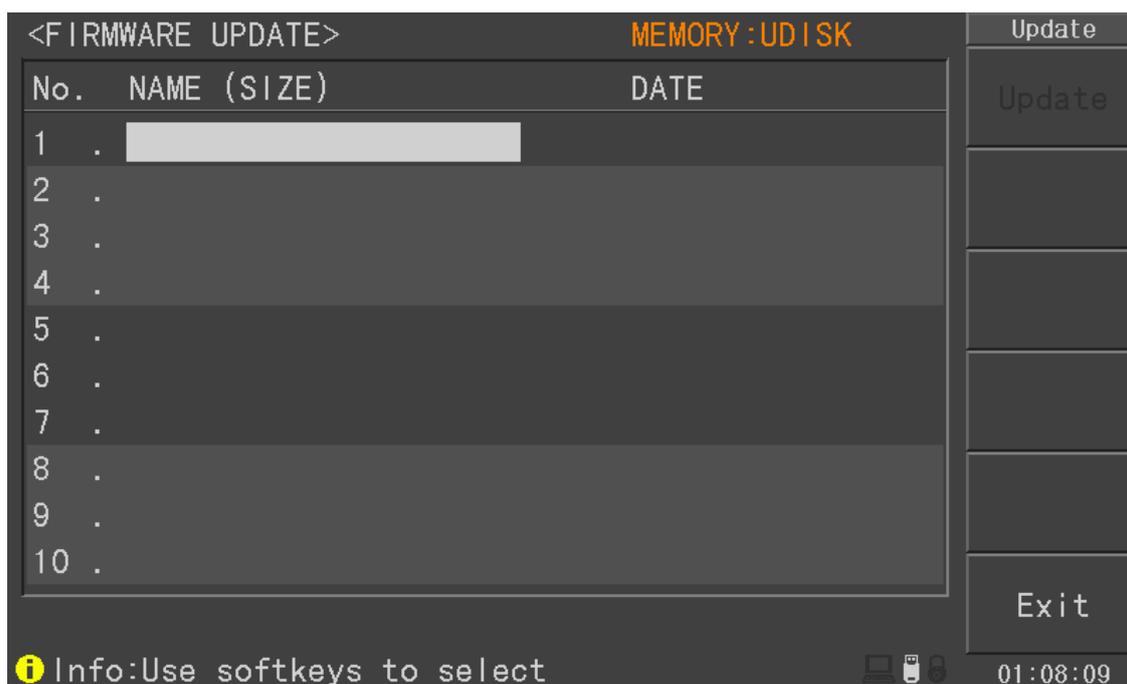
#### 4.1.13 SYSTEM INFORMATION

Press **SYSTEM INFO** enter into the **<SYSTEM INFO>** page shown as below.



#### 4.1.14 FIRMWARE UPDATE

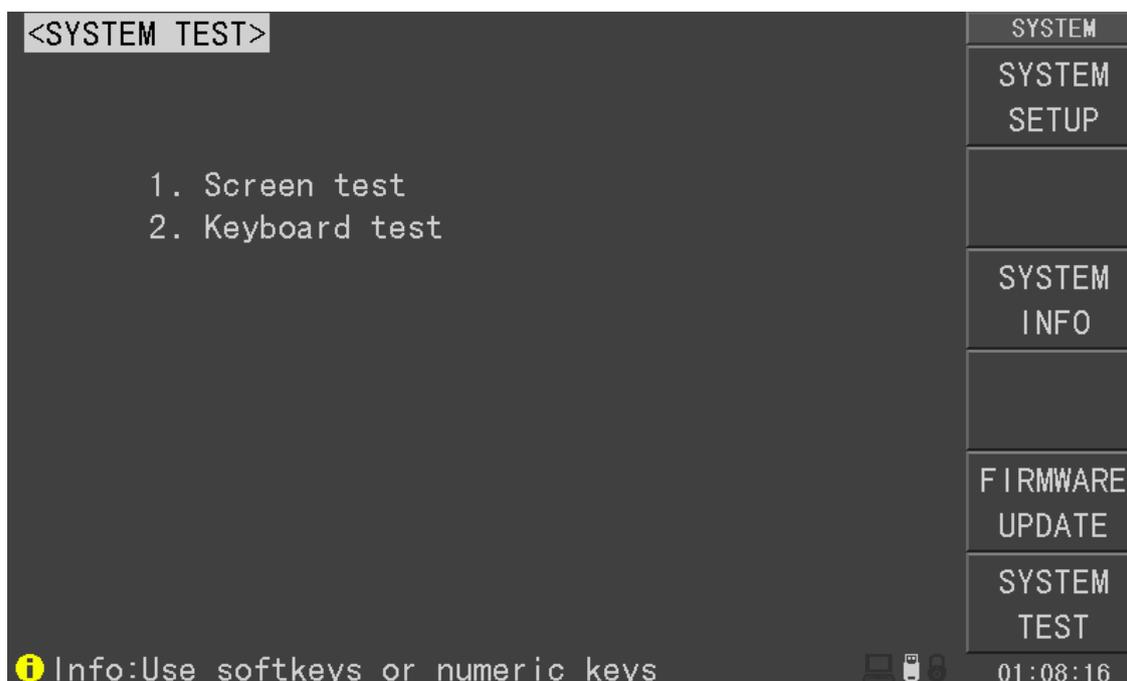
- 1) Press **FIRMWARE UPDTE** enter into the **<FIRMWARE UPDATE>** page shown as below.



- 2) Press **UPDTE**, the following soft keys will be displayed.
  - **YES**
  - **NO**
- 3) Press **YES** soft key to update the firmware of the instrument.

#### 4.1.15 SYSTEM TEST

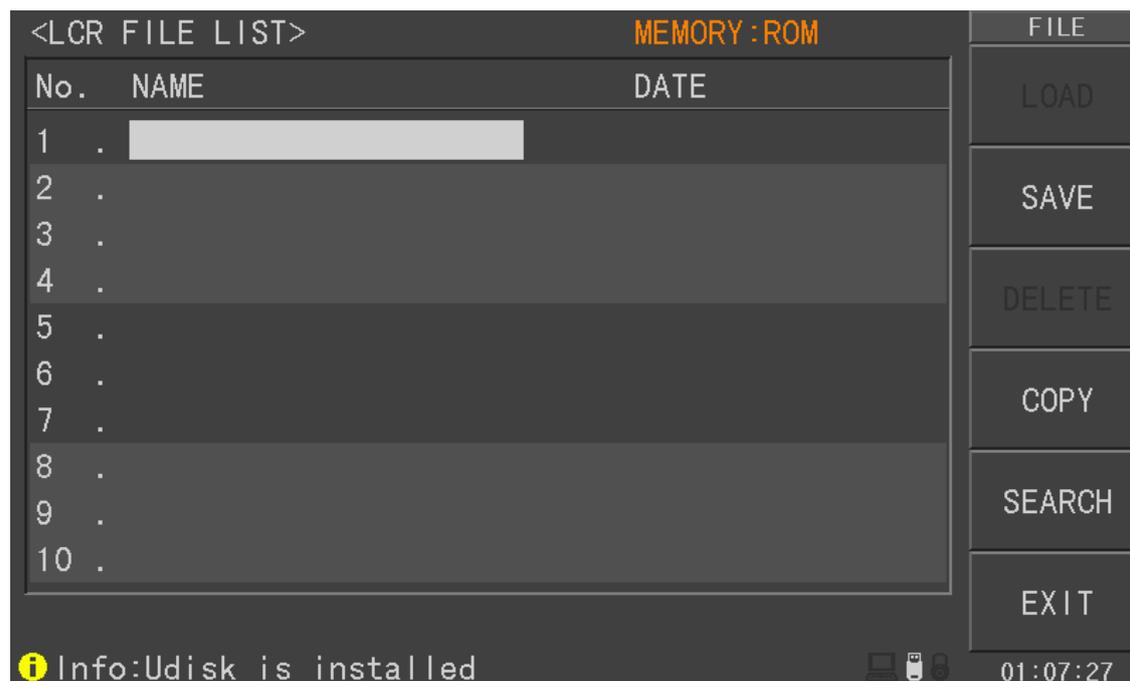
Press **SYSTEM TEST** enter into the **<SYSTEM TEST>** page shown as below.



## 4.2 LCR <FILE MANAGE>

U2829 series instrument can save the user-set parameter to the nonvolatile memory in the form of file, so when use the same setting next time user can load a corresponding file to obtain the parameter set and used last time. By doing so, it can save the time of setting parameter and improve the production efficiency. The file manage function of the transformer scanning will be described in the part of transformer test setting.

Press [FILE] to enter into the file manage page, shown as below.



U2829402

### 4.2.1 Setup file for single-group component (\*.STA)

100 groups of different single groups of component set file (\*.LCR file) can be saved in the instrument, but the \*.LCR file with the number more than 100 should be saved in external U-disc (note: U-disc is an optional accessory).

Use **FILE** function on the following File menu, the following data will be saved or loaded in the form of file, which are called \*.STA file.

- Control and setting parameter on <MEASURE SETUP> page
  - FUNC A-B
  - FUNC C
  - FUNC D
  - FREQ
  - LEVEL
  - RANGE
  - SPEED

- DC BIAS
- BIAS SRC
- TRIGG
- ALC
- DELAY
- Rsou
- AVG
- Vm
- Cm
- ISO
- DEV A
- DEV B
- REF A
- REF B
- Control and set parameters on <BIN COUNT DISP> page
  - BIN COUNT (ON/OFF)
- Control and set parameter on <LIMIT TAABLE SETUP> page
  - PARAM (swap parameter)
  - NOM
  - MODE (%-TOL/ABS-TOL/SEQ-MODE)
  - AUX (ON/OFF)
  - COM (ON/OFF)
  - High and low limits of each bin
- Control and set parameters on <List Sweep Setup> page
  - List Sweep Mode (SEQ/STEP)
  - List Sweep Parameter (Frequency/Level/Bias)
  - Test points of all sweep parameters
  - High and low limits of all test points, including limit parameters (LIMIT-DATA A/LIMIT-DATA B)
- Page format currently displayed
- Control and set parameters on <TRANS TEST SET> page
  - Transformer sweep test mode (SEQ/ STEP)
  - Test frequency of turn, inductance, leakage and DCR
  - Test level of turn, inductance, leakage and DCR
  - ON/ OFF state of turn, inductance, leakage and DCR
- Control and set parameters on <TRANS LIMIT SET > page
  - Limit mode (ABS/ $\Delta$ %)
  - Nominal values of primary winding, secondary winding, inductance, leakage and DCR
  - High limits of secondary winding, inductance, leakage and DCR
  - Low limits of secondary winding, inductance, leakage and DCR

### 4.2.2 U-disk manage performance

As described above, U2829 has a standard configuration of USB HOST interface, so the external U-disk can be used as the memory media. In this condition, it breaks the memory limit of 100 groups of \*.LCR files. Meanwhile those files can be copied to IBM PC or compatible desk-top computer, laptop with USB interface to reach the infinite extension.

U2829 supports the USB memory devices as below:

- Meet the USB 1.0/1.1 standard
- Capacity: 32MB/64MB/128MB/256MB
- File format: FAT32(Format the USB memory on Microsoft Windows operation system)

### 4.2.3 Operation steps for file management

#### A. Search an existed file

- 1) Roll the knob to view one by one.
- 2) Use the [←] and [→] to view one page by one page.
- 3) Press the soft key **SEARCH**. Input the file name and then press the [ENTER] to search the target file.

#### B. Save the following control and setting parameters to a file by the following steps

- 1) Select and set all control and setting parameters on the desired page.
- 2) Press **[FILE]** key, the following soft keys will be displayed.
  - **LOAD**
  - **SAVE**
  - **DELETE**
  - **COPY**
  - **SEARCH**
  - **EXT**
- 3) In the file list, move the cursor to the file-saved position or input the file number directly.
- 4) Press **SAVE**, the following soft keys will be displayed.
  - **Yes**
  - **No**
- 5) Press **No** to cancel the current save operation and return step 2.
- 6) Press **Yes**, and "**☺**: Input LCR file name: " will displayed
- 7) Use numeric keys to input the current file name and press [ENTER]. Then U2829 will save the control and setting parameters as a file in this name.

#### C. Load the control and setting parameters from a file by the following steps

- 1) Press [File] key, the file list and the following soft keys will be displayed.
  - **LOAD**

- **SAVE**
  - **DELETE**
  - **COPY**
  - **SEARCH**
  - **EXT**
- 2) In the file list, move the cursor to the file-saved position or input the file number directly.
  - 3) Press **LOAD**, the following soft keys will be displayed.
    - **Yes**
    - **No**
  - 4) Press **No** to cancel the current load operation and return step 1.
  - 5) Press **Yes** to load the currently selected file. Then U2829 will return the current display page.

**D. Copy a file to an U disk by the following steps**

- 1) Assuming that it is necessary to copy internal files 2 and 3 to files 12 and 13 respectively.
- 2) Press **[FILE]** key, the file list and the following soft keys will be displayed.
  - **LOAD**
  - **SAVE**
  - **DELETE**
  - **COPY**
  - **SEARCH**
  - **EXT**
- 3) Press **COPY** soft key, the help information display "Input source file's No."
- 4) Using numeric keys to input the source file's position, press **[ENTER]**, the help information display "Input destination file's No."
- 5) Using numeric keys to input the destination file's position, press **[ENTER]**, the help information display "Input file's nums."
- 6) Using numeric keys to input the number of files, press **[ENTER]**, the files are copied to the position.
- 7) If the input file number is larger than the maximum memory number (100 groups of file setting), the instrument will automatically read and write file in U-disk automatically. You have to insert a U-disk to the USB interface, **UDISK OK!** will be displayed in the file status zone.

---

NOTE: Please make sure that your U-disk meets the standard that described in this chapter and no write-read protection.

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## Chapter 5 Execute LCR operation and some examples

### 5.1 Correction operation

To execute correction operation (in order to prevent the stray impedance from affecting the test accuracy, it is necessary to make open/short correction), users can select one of the two correction modes.

#### 5.1.1 Sweep correction

- a) Press the menu key **[SETUP]** and then the soft key **CORRECTION**, the instrument will enter into the **<CORRECTION>** page.
- b) Move the cursor to the **OPEN** zone. **ON**, **OFF** and **SWEEP OPEN** will be displayed in the soft key zone.
- c) Keep the test fixture be in the open status, then press **SWEEP OPEN** to execute open correction till the prompt information zone displays that open correction is finished.
- d) Press **ON** to turn on the open correction function.
- e) Insert the short plate (U26010) to the test fixture.
- f) Move the cursor to the **Short** zone. **ON**, **OFF** and **SWEEP SHORT** will be displayed in the soft key zone.
- g) Press **SWEEP SHORT** to execute the short correction till the prompt information zone displays that the short correction is finished.
- h) Press **ON** to turn the short correction function.
- i) Move the cursor to the **LOAD** zone. **ON**, **OFF** will be displayed in the soft key zone.
- j) Press **OFF** to turn off the load correction function.
- k) Move the cursor to the **TOOL** zone, **CLOSE ALL SPOT** will be displayed in the soft key zone.
- l) Press **CLOSE ALL SPOT** to turn off all the point-frequency correction function.

#### 5.1.2 Point-frequency correction

This function will gain better results in single-frequency test.

If the test frequency is 5.5kHz,

- a) Press the menu key **[SETUP]** and then **CORRECTION**, then instrument will display the **<CORRECTION>** function.
- b) Move the cursor to the **Open** zone, **ON**, **OFF** and **SWEEP OPEN** will be

- displayed in the soft key zone.
- c) Press **ON** to turn on the open correction function.
  - d) Move the cursor to the **Short** zone, **ON**, **OFF** and **SWEEP SHORT** will be displayed in the soft key zone.
  - e) Press **ON** to turn on the short correction function.
  - f) Move the cursor to the **LOAD** zone, **ON**, **OFF** will be displayed in the soft key zone.
  - g) Press **OFF** to turn on the load correction function.
  - h) Move the cursor to the **FREQ** zone, **ON**, **OFF**, **SPOT OPEN**, **SPOT SHORT** and **MEAS LOAD** will be displayed in the soft key zone.
  - i) Press **ON** to turn on the point-frequency correction function of **Freq**.
  - j) Press [5] [.] [5], +5.5 will be displayed in the prompt information zone at the bottom of the screen meanwhile the available units (**Hz**, **kHz** and **MHz**) will be displayed in the soft key zone. Press **kHz**, the **FREQ 1** zone will be changed as 5.5000kHz (be the same as that of test frequency).
  - k) Keep the test fixture be in open status and press **SPOT OPEN** to execute open correction.
  - l) Insert the short plate (U26010) to the test fixture.
  - m) Press **SPOT SHORT** to execute short correction.

## 5.2 Correct connection of DUT

There are 4 pairs of test terminal: Hcur, Hpot, Lpot and corresponding shielding terminal of each terminal.

Each terminal contains shielding layer whose function is to reduce the influence of the ground stray capacitance and the interference of the electromagnetic field. In the process of testing, Hcur, Hpot and Lpot, Lcur should be connected with DUT lead to form a complete 4-terminal measurement, thus reducing the effect of the lead and the connection points on the test results (especially the dissipation measurement). When testing low-ohm components, Hpot, Lpot should be connected to the lead terminal so as to avoid the impedance being added to the lead impedance and the connection principle is that the Hpot and Lpot test should be the actual existed voltage on DUT.

In other words, before connecting to DUT, it is not recommended to connect Hcur, Hpot with Lpot, Lcur, for doing this will increase test error.

If the connection point and the lead resistance  $R_{lead}$  are far weaker than the tested impedance (for example:  $R_{lead} < Z_x / 1000$ , the accuracy error is required to be less than 0.1%), before connecting to DUT, it is recommended to connect Hcur, Hpot and Lpot, Lcur (Two terminal test).

In the test with high accuracy requirement, using Kelvin test fixture (standard accessory) will gain better results than using test leads. When Kelvin test lead is used under 10kHz, a better measurement result can be obtained. However, when the frequency is higher than 10kHz, it cannot meet the measurement demand. In high frequency, the change of the clearance between test leads will directly

change stray capacitance and inductance on test terminals and this problem is unavoidable, because the test leads cannot be fixed in a position.

So, the use of the test fixture should be used as possible in high frequency. If the test fixture is unavailable or cannot be used, the status of test leads should be the same in the processes of correction and test.

No matter the standard Kelvin test fixture or Kelvin test leads or user-made fixture is used, the following requirements should be met.

1. Distribution impedance must be reduced to the Min. especially when testing high impedance components.
2. Contact resistance must be reduced to Min.
3. Short and open must be available between contact points. Open and short correction can easily reduce the influence of distribution impedance of the test fixture on measurement. For open correction, the clearance between test terminals should be the same with that when they connects with DUT. For short correction, the short plate of low impedance should be connected between test terminals. Another way is to directly connect Hc with Lc or Hp with Lp, then connect both.

**Note:** When the DUT is a polarity component, before testing, the high potential terminal should be connected to the terminal with mark "+", "Hc" or "Hp" and the low terminal should be connected to the terminal with mark "-", "Lc" or "Lp".

**Warning: Before testing, please discharge the tested polarity component so as to avoid the damage to the instrument.**

### **5.3 Eliminate the influence of stray impedance**

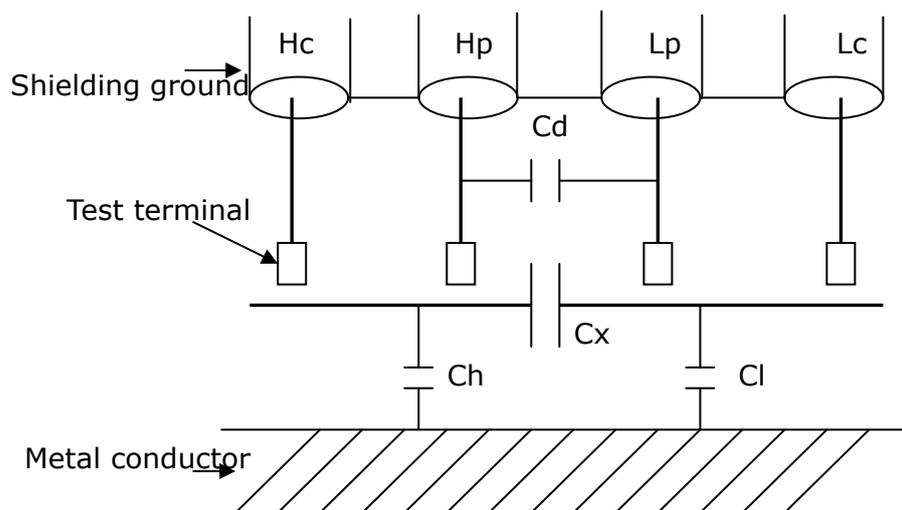


Figure 5-1 Influence of stray capacitance

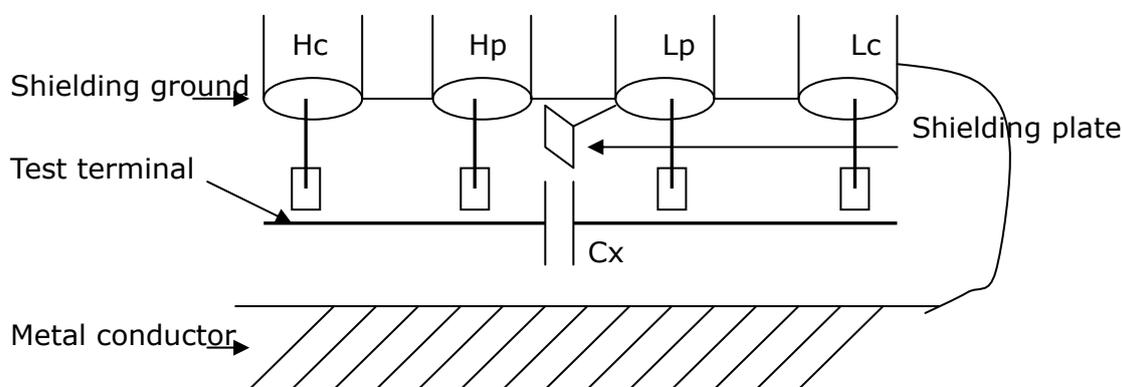


Figure 5-2 Eliminate the influence of stray capacitance

When the DUT has high impedance (such as small capacitance), the influence of stray capacitance cannot be ignored. Figure 5-1 is an example of the use of 4 terminal pair measurement. In this figure,  $C_d$  is connected with  $C_x$  in a parallel way and when a conductance plate is positioned under DUT, capacitance  $C_h$  will connect with  $C_x$  in parallel after connecting with  $C_l$  in series and by this way the measurement result will have errors. If a ground conductor is installed between high and low terminals,  $C_d$  can be reduced to Min. Meanwhile if the ground terminal is connected to the conductance plate, the influence of  $C_h$  and  $C_l$  will be eliminated.

When the DUT is low impedance (such as small inductance, large capacitance), a large current will flow through test leads  $H_c$  and  $L_c$ . In this case, **electromagnetic coupling between test leads becomes the main source of test errors** except the influence of the contact resistance on test terminals. If this coupling cannot be eliminated, it will bring unexpected influence on test results. Generally, contact resistance affects the resistance of impedance and electromagnetic affects the reactance of impedance. Test terminals can adopt 4TP connection method. For 4TP connection, the currents flow though  $H_c$  and  $L_c$  are equal in value and opposite in direction with those flowing through each shielding terminals. By this way, the magnetic fields produced by these currents can be mutually offset and further eliminate the influence of mutual inductance

coupling on test results.

## 5.4 Operation example for testing inductance with U2829

### Test Condition

Function: Ls-Q

Frequency: 5.5kHz

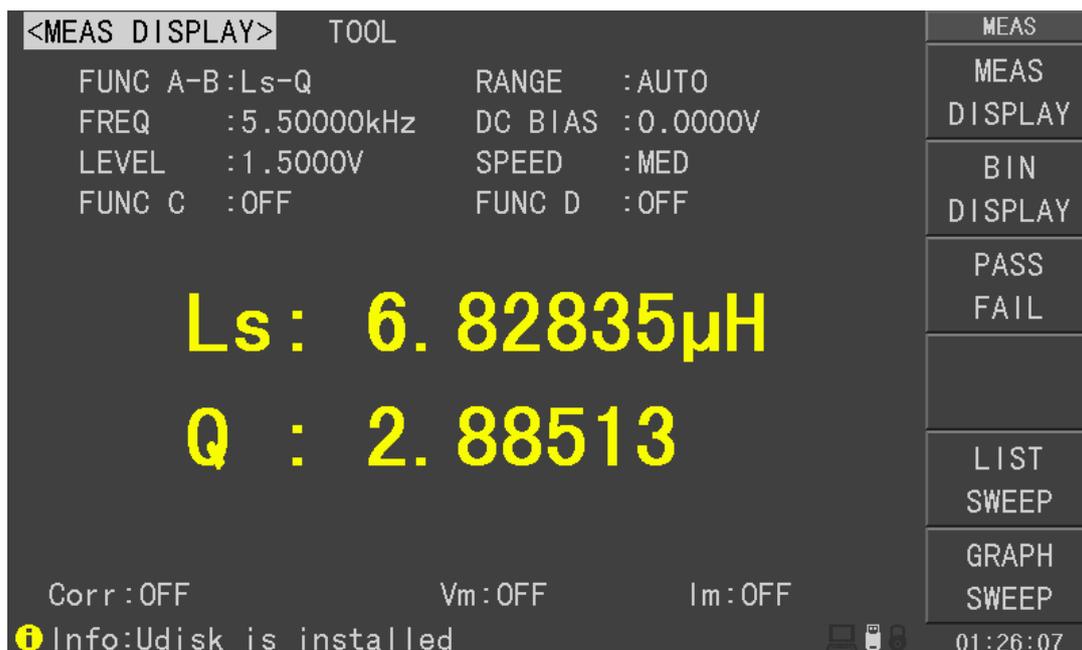
Level: 1.5Vrms

Internal impedance: 100Ω

### Operation steps

- 1) Turn on the instrument.
- 2) Set basic parameters
  - a) Press [MEAS] to enter into the <MEAS DISPLAY> page.
  - b) Move the cursor to FUNC A-B, the current item is displayed as Cp-D. Meanwhile Cp—...→, Cs—...→, Lp—...→, Ls—...→, Z—...→, Y—...→ will be displayed in the soft key zone.
  - c) Press the soft key Ls—...→, Ls-D, Ls-Q and Ls-Rs will be displayed.
  - d) Press Ls-Q to select the Ls-Q function.
  - e) Move the cursor to Freq., the current frequency is 1.0000kHz.
  - f) Press [5][.][5], +5.5 will be displayed in the prompt information zone at the bottom of the screen. The available units Hz, kHz and MHz will be displayed in the soft key zone. Press kHz, the frequency will be changed as 5.5000kHz.
  - g) Move the cursor to LEVEL, the current displayed level will be 1.000V.
  - h) Press [1][.][5], +1.5 will be displayed in the prompt information zone at the bottom of the screen. The available units mV, V, μA, mA and A will be displayed in the soft key zone. Press [ENTER], the level will be changed as 1.5V.
  - i) Press [SETUP] to enter into the <MEAS SETUP> page.
  - j) Move the cursor to SOUR IMP zone, 100Ω, 50Ω, 25Ω and 10Ω/CC will be displayed in the soft key zone.
  - k) Press 100Ω to select 100Ω as the signal internal impedance.
- 3) Connect the test fixture (U26005) to the test terminals of U2829.
- 4) Execute correction (To avoid the influence of stray impedance on measurement accuracy, Open/ Short correction must be operated) (refer to 5.1.2 "Point-frequency correction")
- 5) Mount the tested inductance to the test fixture.
- 6) Execute test operation.

Press [MEAS] to enter into the <MEAS DISPLAY> page. The instrument can test continuously and the test result will be displayed in upper case character in the center of the page, shown as below:



U2829501

- 7) If the test result is obviously incorrect, please check the following items.
- Check the tested inductance is in good connection with the test fixture or not.
  - Check the test fixture is in good connection with the test terminals of the instrument or not.
  - Redo the open/short correction.

**\*NOTE:** When the sweep open/short correction is used, the point-frequency correction function should be set as OFF. Refer to Correction operation in this chapter.

## 5.5 Operation example of testing capacitance by multi-frequency list sweep

### Test condition

Function: Cp-D

Level: 1Vrms

Other parameters

Frequency	Compare parameter	Low limit	High limit
1kHz	Cp(capacitance)	325.0nF	333.0nF
10kHz	D (Dissipation)	0.0001	0.0003
100kHz	D (Dissipation)	0.0060	0.0100

Beep: LONG HIGH

Alarm mode: OUT

### Operation steps

- Turn on the instrument.
- Set basic parameters.

- a) Press [MEAS] to enter into the <MEAS DISPLAY> page.
- b) The **FUNC A-B** zone is currently displayed as Cp-D and the Level zone is 1.000V.
- c) Press [SETUP] to enter into the <MEAS SETUP> page, meanwhile the following soft keys will be displayed in the soft key zone: MEAS SETUP, CORRECTION, LIMIT TABLE, LIST SETUP and GRAPH SETUP.
- d) Press LIST SETUP to enter into the <LIST SETUP> page.
- e) Move the cursor to the **FUN** zone of sweep point 0, then the soft key zone will be displayed as OFF, Ls, Lp, Cs, Cp, MORE. Press Cp to set the parameter zone of sweep point 1.
- f) Move the cursor to **FREQ** zone of sweep point 1, then this zone will be displayed as 1.00000k.
- g) Move the cursor to **LEVEL** zone of sweep point 1, then this zone will be displayed as 1.0000.
- h) Move the cursor to **LMT:LOW** zone of sweep point 1, then this zone will be displayed as 0.00000pF.
- i) Press [3][2][5], +325 will be displayed in the prompt information zone and the following available units will be displayed in the soft key zone: p, n,  $\mu$ , m. Press n, this zone will be changed as 325.000n.
- j) Move the cursor to **LMT:HIGH** zone of sweep point 1, then this zone will be displayed as 0.00000pF.
- k) Press [3] [3] [3], +333 will be displayed in the prompt information zone and the following units will be displayed in the soft key zone: p, n,  $\mu$ , m. Press n, this zone will be changed as 333.000n.
- l) Move the cursor to the **FUN** zone of sweep point 2, then the soft key zone will be displayed as OFF, Ls, Lp, Cs, Cp, MORE.
- m) Press MORE, then the soft key zone will display LESS, Rs, Rp, R, ESR, MORE.
- n) Press MORE, then the soft key zone will display LESS, D, Q, MORE, Press D to set the parameter zone of sweep point 2.
- o) Move the cursor to **FREQ** zone of sweep point 2, then this zone will be displayed as 1.00000k.
- p) Press [10], +10 will be displayed in the prompt information zone and the soft key zone will display the following available units: Hz, kHz and MHz. Press kHz, this zone will be displayed as 10.0000k.
- q) Move the cursor to **LEVEL** zone of sweep point 2, then this zone will be displayed as 1.0000.
- r) Move the cursor to **LMT:LOW** zone of sweep point 2, then this zone will be displayed as 0.00000p.
- s) Press [0][.][0][0][0][8], +0.0008 will be displayed in the prompt information zone and the soft key zone will display the following available units: p, n,  $\mu$ , m. Press [ENTER], this zone will be changed as 0.00080.
- t) Move the cursor to **LMT:HIGH** zone of sweep point 2, then this zone will be displayed as 0.00000p.
- u) Press [0][.][0][0][2], +0.002 will be displayed in the prompt information

zone and the soft key zone will display the following available units: p, n, μ, m. Press ENTER, this zone will be changed as 0.00200.

- v) Based on I-u steps, input 100kHz, 0.0060 and 0.0100 for the 3rd sweep point.
- 3) Alarm setup
  - a) Press [SYSTEM] to enter into the <System Setup> page.
  - b) Move the cursor to the FAIL ALARM zone to select LONG HIGH.
- 4) Mount the test fixture (U26005) to the test terminals of U2829.
- 5) Execute correction function (To avoid the influence of the stray impedance on the measurement accuracy, it is necessary to execute open/short correction (refer to chapter 5.1.1 Sweep Correction)).
- 6) Insert the tested capacitor to the test fixture.
- 7) Execute test operations.

Press [MEAS] and then List Sweep to enter into the <List Sweep> page. The instrument will test continuously and then display the test and the compare results on page. If the compare result is HIGH (higher than the high limit) or LOW (lower than the low limit), there is a beep alarm. The following figure shows the measurement display page.

<LIST SWEEP>							MEAS
SWEEP MODE : SEQ			FAIL MODE : CONTINUE				MEAS DISPLAY
No.	FUNC	FREQ[Hz]	LEV[V]	BIAS[x]	RESULT	COMP	
1	Cp	1.00000k	1.0000		329.890nF	PASS	BIN DISPLAY
2	D	10.0000k	1.0000		0.00365	HIGH	DISPLAY
*3	D	100.000k	1.0000		0.05118	HIGH	PASS
4	OFF						FAIL
5	OFF						
6	OFF						
7	OFF						
8	OFF						LIST SWEEP
9	OFF						
10	OFF						GRAPH SWEEP
Corr : OPEN, SHORT							
Info:Udisk is installed							01:58:13

- 8) If the test result is obviously incorrect, please check the following items.
    - d) Check the tested inductance is in good connection with the test fixture or not.
    - e) Check the test fixture is in good connection with the test terminals of the instrument or not.
    - f) Redo the open/short correction.
- \*NOTE:** When the sweep open/short correction is used, the point-frequency correction function should be set as OFF. Refer to Correction operation in this chapter.
- a)

## 5.6 Operation example of load correction

### 1) Operation steps

#### Test condition

Frequency: 100kHz

Cp: 11nF

D: 0.0005

- a) Press [SETUP], the following soft keys will be displayed in the soft key zone: MEAS SETUP, CORRECTION, LIMIT TABLE LIST SETUP and GRAPH SETUP.
- b) Press CORRECTION to enter into the <CORRECTION> page.
- c) Move the cursor to Open, the following soft keys will be displayed in the soft key zone: ON, OFF and SWEEP OPEN.
- d) Press ON to turn on the open correction function.
- e) Move the cursor to Short, the following soft keys will be displayed in the soft key zone: ON, OFF and SWEEP SHORT.
- f) Press ON to turn on the short correction function.
- g) Move the cursor to **LOAD**, the following soft keys will be displayed in the soft key zone: ON and OFF.
- h) Press ON to turn on the load correction function.
- i) Move the cursor to **FUNC**, this zone will display Cp-D. Meanwhile Cp—...→, Cs—...→, Lp—...→, Ls—...→, Z—...→, Y—...→ will be displayed in the soft key zone.
- j) Press Cp-D to select the Cp-D function.
- k) Move the cursor to **FREQ** zone, the following soft keys will be displayed in the soft key zone: ON, OFF, SPOT OPEN, SPOT SHORT and MEAS LOAD.
- l) Press ON to turn on the point-frequency correction function of **FREQ**.
- m) Press [1][0][0], +100 will be displayed in the prompt information zone and the soft key zone will display the following available units: Hz, kHz and MHz. Press kHz, the **FREQ** zone will be changed as 100.000kHz (the same with the test frequency).
- n) Move the cursor to the **REF A:** zone of the frequency. Press [1][1], +11 will be displayed in the prompt information zone and the following available units will be displayed in the soft key zone: p, n, μ, m and more 1/2. Press n, this zone will be changed as 11.000nF.
- o) Move the cursor the **REF B:** zone of the frequency. Press [0][.][0][0][0][5], +0.0005 will be displayed in the prompt information zone and the following available units will be displayed in the soft key zone: p, n, μ, m. Press [ENTER], this zone will be changed as 0.00050.
- p) Move the cursor to Freq. The following soft keys will be displayed: ON, OFF, SPOT OPEN, SPOT SHORT and MEAS LOAD.
- q) Hold the test fixture be in open status and keep user's hands or other interference source be far away from the test fixture. Press the soft key SPOT OPEN to execute open correction.

- r) Insert the short plate (U26010) into the test fixture. Please ensure that the short plate and the reeds of the test fixture have good contact.
- s) Press the soft key **SPOT SHORT** to execute short correction.
- t) Insert a standard capacitance into the test fixture. Please ensure that the pins of the standard capacitance have good connection with the reeds of the test fixture.
- u) Press the soft key **MEAS LOAD** to execute load correction.

**2) Note**

- a) Because of the different software editions, the soft keys and status information may be different from this book, but it may not affect users' understanding.
- b) The load correction is only valid for the components with the same specification. If the specification is changed, it is required to redo load correction.

## Chapter 6 Performance and Test

### 6.1 Test function

#### 6.1.1 Parameter and symbol

C: capacitance	L: Inductance	
R: resistance	Z: impedance	Y: Admittance
X: reactance	B: susceptance	G: Conductance
D: dissipation	$\theta$ : phase angle	Q: Quality factor

Lk: leakage inductance      DCR: DC resistance      Turn-Ratio  
 Turns      Phase

#### 6.1.2 Test combination

Parameters described above are combined in the following modes:

Primary parameter	Z, Y	L, C	R	G
Secondary parameter	$\theta$ (deg phase), $\theta$ (rad radian)	D, Q, $R_S$ , $R_P$ , G	X	B

There is no combination for DCR.

Turns-Ratio, Turns and Phase are only used in transformer measurement.

#### 6.1.3 Mathematical operation

Operation between the measurement value and the programmable nominal value:  
 absolute deviation  $\Delta ABS$  and percent deviation  $\Delta\%$ .

#### 6.1.4 Equivalent mode

Series and parallel

#### 6.1.5 Range

Auto, Manual (Hold, increase and decrease)

#### 6.1.6 Trigger

Internal, external and manual

Internal: Test DUT constantly and display the result

Manual: Press TRIGGER to test once then the result will be displayed.

External: After HANDLER receiving "start" signal, perform a measurement and output test result.

### **6.1.7 Delay time**

Delay time: time from trigger to start. 0 to 60s are programmable with a resolution of 1ms.

### **6.1.8 Connection modes of test terminals**

U2829 adopts 4-terminal test method.

HD(Hcur): current sample high terminal

LD(Lcur): Current sample low terminal

HS(Hpot): voltage sample high terminal

LS(Lpot): Voltage sample low terminal

### **6.1.9 Test speed (Frequency $\geq$ 10kHz)**

Fast: about 75 times/s (13ms/time)

Medium: about 11 times/s (90ms/time)

Slow: about 2.7 times/s (370ms/time)

The fast and middle speed will be slow down when frequency  $<$ 10kHz.

### **6.1.10 Average**

Be programmable from 1 to 255.

### **6.1.11 Display digit**

6 digits, max. displayed digit: 999999

## **6.2 Test signal**

### **6.2.1 Test signal frequency**

Test signal is sine wave, accuracy: 0.01%

Frequency range:

20Hz~200kHz (U2829)

20Hz~500kHz (U2829A)

20Hz~1MHz (U2829B)  
Min. resolution: 0.5mHz

### 6.2.2 Signal mode

Normal: When testing, on measurement display page, voltage across test terminals may be smaller than preset voltage.

Constant level: The auto adjustment of internal level makes the voltage of DUT accordant with preset voltage.

### 6.2.3 Test signal level

	Mode	Range	Accuracy	Resolution
Voltage	Normal constant level	5mV <sub>RMS</sub> —10V <sub>RMS</sub>	± (10%×preset value+2mV)	100μV
		10mV <sub>RMS</sub> —5V <sub>RMS</sub>	± (6%×preset value+2mV)	
Current	Normal constant current	50μA <sub>RMS</sub> —100mA <sub>RMS</sub>	± ( 10%×preset value+ 10μA <sub>RMS</sub> )	1μA
		100μA <sub>RMS</sub> —50mA <sub>RMS</sub>	± ( 6%×preset value+ 10μA <sub>RMS</sub> )	

When testing Turns Ratio, Phase, the voltage range is : 5mV<sub>RMS</sub>—10V<sub>RMS</sub>, ± (10%×preset value+2mV) , with resolution of 1mV.

### 6.2.4 Output impedance

10Ω, 30Ω, 50Ω and 100Ω are selectable.

### 6.2.5 Monitor for test signal level

Mode	Range	Accuracy
Voltage	5mV <sub>RMS</sub> —2V <sub>RMS</sub>	± (3%×reading+0.5mV)
	0.01mV <sub>RMS</sub> —5mV <sub>RMS</sub>	± (12%×reading +0.1mV)
Current	50μA <sub>RMS</sub> —20mA <sub>RMS</sub>	± (3%×reading +5μA)
	0.001μA <sub>RMS</sub> —50μA <sub>RMS</sub>	± (12%×reading +1μA)

### 6.2.6 Maximum measurement display range

Parameter	Measurement display range
L、Lk	0.00001μH ~ 99.9999kH
C	0.00001pF ~ 9.99999F
Z、R、X、DCR	0.00001Ω~ 99.9999MΩ

Y, B, G	0.00001 $\mu$ s ~ 99.9999S
D	0.00001 — 9.99999
Q	0.00001 — 99999.9
$\theta$	Deg -179.999 $^{\circ}$ ~179.999 $^{\circ}$ Rad -3.14159 ~ 3.14159
Turns Ratio	1: 0.001—1000: 1

### 6.2.7 DC bias voltage source

0V—  $\pm$  10V Minimum resolution: 0.5mV, Accuracy: 1% $\times$ preset voltage+5mV  
0mA— $\pm$  100mA Minimum resolution: 5 $\mu$ A

### 6.2.8 Diode test

Forward voltage: 0 — 9.9999 V  
Reverse current: 0 — 99.999 mA

## 6.3 Measurement accuracy

Test accuracy includes stability、temperature coefficient、linear degree、test repeatability and calibration inter-error.

Check the accuracy of instrument should be under the following circumstances:

- warm-up time:  $\geq$  30 min
- cable: 0m, 1m
- correct open and short correction after warming up
- DC bias is in the position of "OFF"
- The range works in "AUTO" to select correct test range

### 6.3.1 Accuracies of $|Z|$ , $|Y|$ , L, C, R, X, G, B

The accuracy  $A_e$  of  $|Z|$ ,  $|Y|$ , L, C, R, X, G and B are expressed as:

$$A_e = \pm[A + (K_a + K_b + K_c) \times 100 + K_d + K_f] \times K_e [\%]$$

A: basic test accuracy (figure A)

$K_a$ : impedance rate factor (table A)

$K_b$ : impedance rate factor (table A)

$K_c$ : calibrated inter-factor (table B)

$K_d$ : cable length factor (table D)

$K_e$ : temperature factor (table E)

$K_f$ : scan fixture modification factor (no add:  $K_f = 0$ , add:  $K_f = 0.2$ )

L, C, X, B accuracy using condition:  $D_x$  (Test value)  $\leq 0.1$

R, G accuracy using condition:  $Q_x$  (Q test value)  $\leq 0.1$

When  $D_x \geq 0.1$ , L, C, X, B accuracy factor  $A_e$  should be multiplied by  $\sqrt{1 + D_x^2}$

When  $Q_x \geq 0.1$ , R, G accuracy factor  $A_e$  should be multiplied by  $\sqrt{1 + Q_x^2}$

Accuracy of G can only be available in G-B combination

### 6.3.2 Accuracy of D

The accuracy of D is given by  $D_e$ :

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

The formula is only available when  $D_x \leq 0.1$ .

When  $D_x > 0.1$ ,  $D_e$  should be multiplied by  $(1 + D_x)$

### 6.3.3 Accuracy of Q

The accuracy of Q is given by the formula below:

$$Q_e = \pm \frac{Q_x \times D_e}{1 \mp Q_x \times D_e}$$

Where,  $Q_x$  is the value of the tested Q.

$D_e$  is the accuracy of D

Above formula should be used when  $Q_x \times D_e < 1$ .

### 6.3.4 Accuracy of $\theta$

The accuracy of  $\theta$  is given by the formula below:

$$\theta_e = \frac{180}{\pi} \times \frac{A_e}{100} \quad [\text{deg}]$$

### 6.3.5 Accuracy of G

When  $D_x$  (tested value of D)  $\leq 0.1$

The accuracy of G is given by the formula below:

$$G_e = B_x \times D_e \quad [S]$$

$$B_x = 2\pi f C_x = \frac{1}{2\pi f L_x}$$

Where,  $B_x$  is the value of tested B with the unit [S].

$C_x$  is the value of tested C with the unit [F].

$L_x$  is the value of tested L with the unit [H].

$D_e$  is the accuracy of D.

F is test frequency.

The accuracy of G is only available in C<sub>p</sub>-G and L<sub>p</sub>-G combination

### 6.3.6 Accuracy of R<sub>p</sub>

when  $D_x$  (value of tested D)  $\leq 0.1$

The accuracy of R<sub>p</sub> is given by the formula below:

$$R_p = \pm \frac{R_{px} \times D_e}{D_x \mp D_e} \quad [\Omega]$$

Where, R<sub>px</sub> is the value of tested R<sub>p</sub> with the unit [S].

$D_x$  is the value of test D with the unit [F].

$D_e$  is the accuracy of D.

### 6.3.7 The accuracy of R<sub>s</sub>

when  $D_x$  (value of tested D)  $\leq 0.1$

The accuracy of R<sub>s</sub> is given by the formula below:

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

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

Where,  $X_x$  is the value of test X with the unit [S].

$C_x$  is the value of test C with the unit [F].

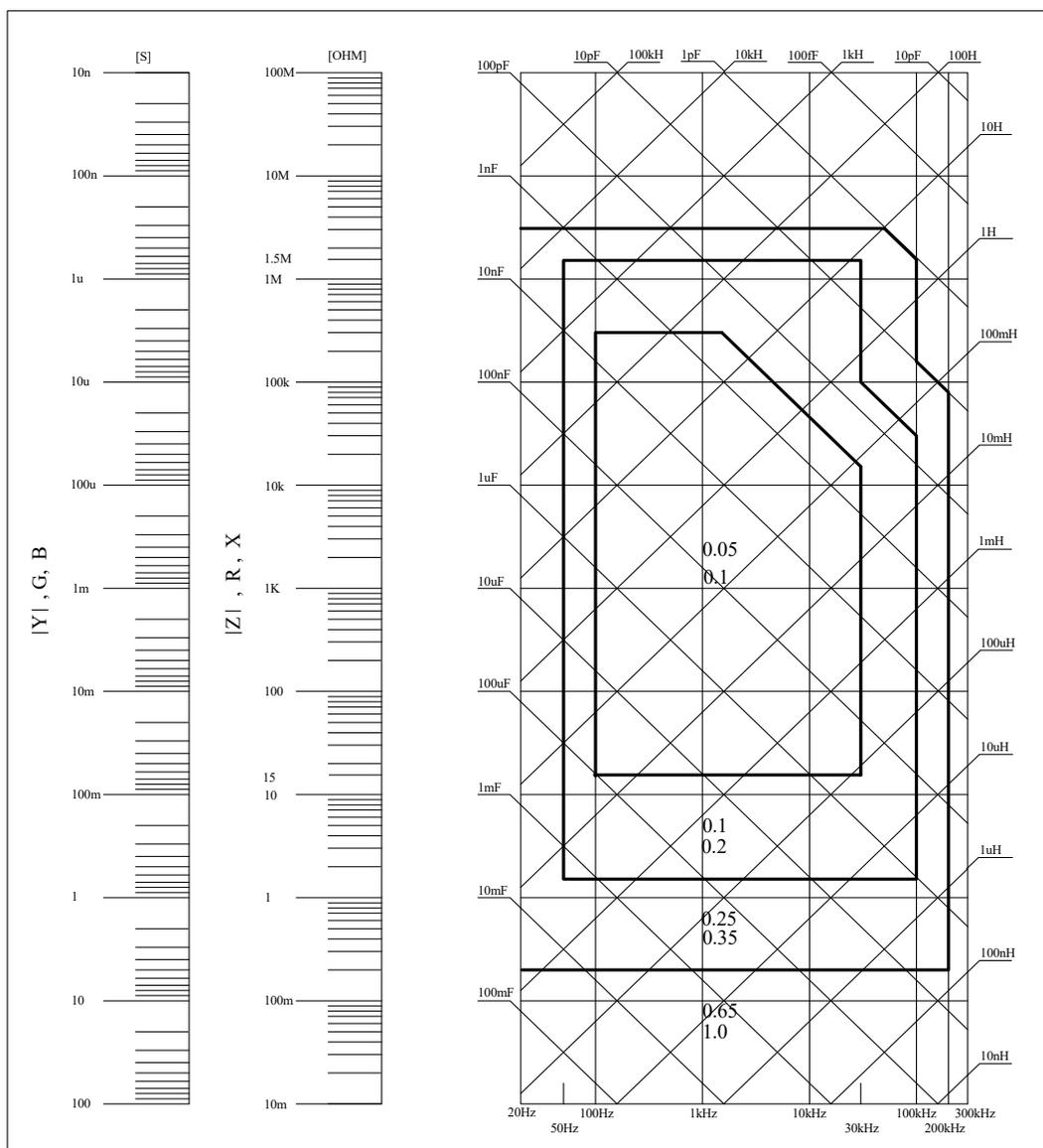
$L_x$  is the value of test L with the unit [H].

$D_e$  is the accuracy of D

F is test frequency

### 6.3.8 Accuracy factor

Figure A shows the basic measurement accuracy A.



In figure A, select a smaller value on boundary line.

In this figure, the basic accuracy value A can be obtained by the following methods:

0.1---When  $0.4V_{rms} \leq V_s \leq 1.2V_{rms}$ , the test speed is the value A of medium, slow and fast.

0.2---When  $0.4V_{rms} \leq V_s \leq 1.2V_{rms}$ , the test speed is the value A.

When  $V_s < 0.4V_{rms}$  or  $V_s > 1.2V_{rms}$ , the calculation method of value A is as the following steps:

1. Obtain A according to the current measurement speed;
2. According to the current test signal voltage to select the accuracy modification coefficient  $A_r$  (refer to figure B), the current basic measurement accuracy A is obtained by multiplying A got in step 1 with  $A_r$ .

Figure B is the basic accuracy modification curve, where  $V_s$  is the test signal voltage.

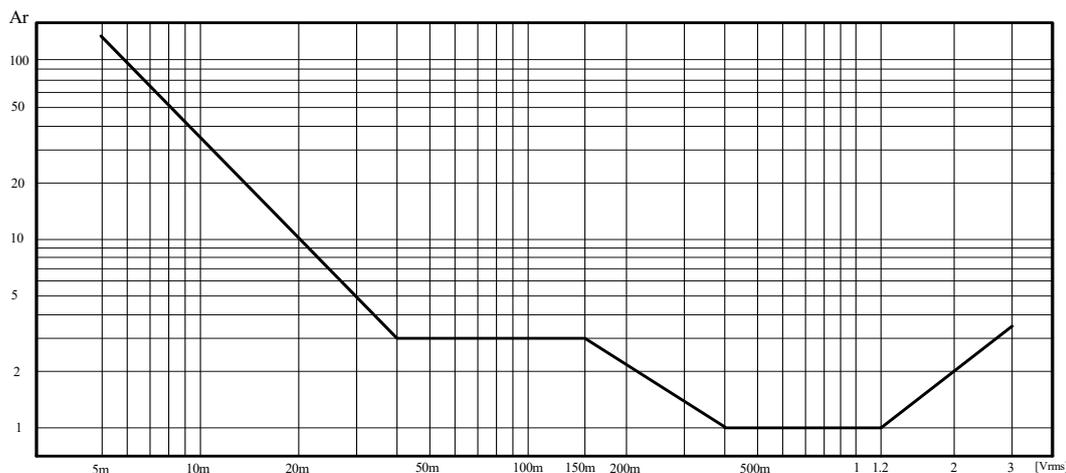


Table A Impedance rate factors:  $K_a, K_b$

Speed	Frequency	$K_a$	$K_b$
Medium Slow	$f_m < 100\text{Hz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(1 + \frac{200}{V_s})(1 + \sqrt{\frac{100}{f_m}})$	$ Z_m (1 \times 10^{-9})(1 + \frac{70}{V_s})(1 + \sqrt{\frac{100}{f_m}})$
	$100\text{Hz} \leq f_m \leq 100\text{kHz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(1 + \frac{200}{V_s})$	$ Z_m (1 \times 10^{-9})(1 + \frac{70}{V_s})$
	$100\text{kHz} < f_m \leq 200\text{kHz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(2 + \frac{200}{V_s})$	$ Z_m (3 \times 10^{-9})(1 + \frac{70}{V_s})$
Fast	$f_m < 100\text{Hz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(1 + \frac{400}{V_s})(1 + \sqrt{\frac{100}{f_m}})$	$ Z_m (2 \times 10^{-9})(1 + \frac{100}{V_s})(1 + \sqrt{\frac{100}{f_m}})$
	$100\text{Hz} \leq f_m \leq 100\text{kHz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(1 + \frac{400}{V_s})$	$ Z_m (2 \times 10^{-9})(1 + \frac{100}{V_s})$
	$100\text{kHz} < f_m \leq 200\text{kHz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(2 + \frac{400}{V_s})$	$ Z_m (6 \times 10^{-9})(1 + \frac{100}{V_s})$

Where,  $f_m$  is the test frequency and the unit is [Hz].

The unit of the tested impedance is [ $\Omega$ ].

The unit of the test signal voltage is [ $\text{mV}_{\text{rms}}$ ].

When the impedance is smaller than  $500\Omega$ ,  $K_a, K_b$  is unavailable.

When the impedance is larger than  $500\Omega$ ,  $K_a, K_b$  is unavailable.

Table B calibrated interpolating factor  $K_c$

Test frequency	$K_c$
----------------	-------

Direct calibrated frequency	0
Other frequency	0.0003

Table C Direct Calibrated frequency

			20	25	30	40	50	60	80	[Hz]
100	120	150	200	250	300	400	500	600	800	[Hz]
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					[kHz]

There are 43 frequencies in table C, there is no 250kHz and 300kHz in U2829.

Table D Cable length factor  $K_d$ 

Test signal level	Cable length		
	0m	1m	2m
$\leq 1.5V_{rms}$	0	$2.5 \times 10^{-4} (1+50 \times f_m)$	$5 \times 10^{-4} (1+50 \times f_m)$
$> 1.5V_{rms}$	0	$2.5 \times 10^{-3} (1+16 \times f_m)$	$5 \times 10^{-3} (1+50 \times f_m)$
$f_m$ : test frequency [MHz]			

Table E Temperature factor  $K_e$ 

Temperature (°C)	5		8		18		28		38	
$K_e$	6	4		2		1		2		4

### 6.3.9 Accuracy of DCR

$$A(1+R_x/5M\Omega+16m\Omega/R_x)[\%] \pm 0.2m\Omega$$

When the instrument is in Middle and slow speed,  $A=0.25$

In Fast speed,  $A=0.5$

Where,  $R_x$  is the tested resistance.

### 6.3.10 Accuracy of leakage inductance $L_k$

Inductance  $L$ 's accuracy  $+0.2\%$

### 6.3.11 Accuracy of the rate of Turns to Ratio

$$\pm A_T \times A_r (1+1\Omega/Z_p+1/Q) [\%] \pm 0.002$$

Fast:  $A_T = 0.5$

Middle and slow:  $A_T = 0.25$

$Z_p$  is the impedance of the tested primary inductance

$A_r$  is the test signal accuracy modification value in figure B

The accuracy index is used when the coupling coefficient is 1 or next to 1.

## 6.4 Safety requirement

The instrument is the I class safety instrument.

### 6.4.1 Insulation resistance

Under reference working condition, the insulation resistance between power terminal and instrument jacket should not be smaller than 50MΩ.

Under humidity condition, the insulation resistance between voltage terminal and instrument jacket should not be smaller than 2 MΩ.

### 6.4.2 Insulation intensity

Under reference working condition, the insulation between the power terminal and the instrument jacket should bear an AC voltage (50Hz frequency and 1.5kV rated voltage) for 1 minute and there is no breakdown and flashover.

### 6.4.3 Leakage current

The leakage current should not be larger than 3.5mA (AC effective value).

## 6.5 Electromagnetic compatibility

- Transient sensitivity, based on the requirement of GB6833.4.
- Conductive sensibility, based on the requirement of GB6833.6.
- Radiated interference, based on the requirement of GB6833.10.

## 6.6 Performance test

### 6.6.1 Working condition

All tests should be performed under the working condition listed in Chapter 1. In this part, only the main indexes are listed. Users can make test under the specified condition mentioned in this manual. Performance test can be worked in the warm up conditions discussed in Chapter 1.

### 6.6.2 The used instruments and devices

No.	Instrument and Device		Specification
1	Standard	100pF	0.02%

	capacitor	1000pF	D is known
		10000pF	
		10nF	
		0.1uF	
		1uF	
2	AC standard resistor	10Ω	0.02%
		100Ω	
		1kΩ	
		10kΩ	
		100kΩ	
3	DC standard resistor	0.1Ω	0.02%
		1Ω	
		10Ω	
		100Ω	
		1kΩ	
		10kΩ	
		100kΩ	
4	Standard inductor	100μH	0.02%
		1mH	
		10mH	
		100mH	
5	Frequency counter	(0~1000) MHz	
6	Digital Multimeter	0.5%	
7	Insulation resistance meter	500V 10 levels	
8	Hipot Tester	0.25kW (0~500) V	

### 6.6.3 Function check

Ensure function keys, displayer and terminal etc. can work normally.

### 6.6.4 Test signal level

Adjust multimeter in AC voltage range, where one test cable is connected to H<sub>CUR</sub> and the other is connected to ground terminal. Change level as: 10mV, 20mV, 100mV, 200mV, 1V, 2V, the reading should meet the demand of test signal level in this chapter.

### 6.6.5 Frequency

Connect frequency meter to ground terminal. The test terminal of the frequency meter is connected with H<sub>CUR</sub>. Change the frequency as: 20Hz, 100Hz, 1kHz,

10kHz, 100kHz, 200kHz (U2829 is 200kHz) . The reading of frequency meter should meet the demand of the test signal frequency in this chapter.

### 6.6.6 Measurement accuracy

Basic parameters are R, L, C and D, so measurement accuracy is mainly about R, L, C and D.

### 6.6.7 Accuracy of C and D

Function	C <sub>p</sub> -D				
Test frequency	100Hz	1kHz	10kHz	100kHz	Test respectively
Level	1V				
Range	AUTO				
Bias	0V				
Speed	Slow				

Open and short correction should be made before testing. Connect standard capacitors: 100pF, 1000pF, 10nF, 0.1uF, 1uF and change the frequency. The error capacitance C between reading and nominal value should be in the range ruled in this chapter, dissipation D should be in the range ruled in this chapter.

### 6.6.8 Accuracy of L

Test condition:

Function	L <sub>s</sub> -Q				
Test frequency	100Hz	1kHz	10kHz	100kHz	Test respectively
Level	1V				
Range	AUTO				
Bias	0V				
Speed	Slow				

Open and short correction should be made before testing. Connect standard inductors: 100μH, 1mH, 10mH, 100mH and change the frequency. The error between reading and nominal value should be in the range ruled in this chapter.

### 6.6.9 Accuracy of Z

Test condition:

Function	Z-θ				
Test frequency	100Hz	1kHz	10kHz	100kHz	Test respectively
Level	1V				
Range	AUTO				
Bias	0V				
Speed	Slow				

Open and short correction should be made before testing. Connect standard AC resistors: 10 $\Omega$ , 100 $\Omega$ , 1k $\Omega$ , 10k $\Omega$ , 100k $\Omega$  and change the frequency. The error between reading and nominal value should be in the range ruled in this chapter.

### 6.6.10 Accuracy of DCR

Test condition

Function	DCR
Test frequency	-----
Level	-----
Range	AUTO
Bias	-----
Speed	Slow

Short correction should be made before testing. Connect standard DC resistors: 0.1 $\Omega$ , 1 $\Omega$ , 10 $\Omega$ , 100 $\Omega$ , 1k $\Omega$ , 10k $\Omega$ , 100k $\Omega$ . The error between reading and nominal value should be in the range ruled in this chapter.

# Chapter 7 Command Reference

The signs in this manual are as follows:

NR1: integer, e.g.:123

NR2: fix-point number, e.g.: 12.3

NR3: floating-point number, e.g.: 12.3E+5

NL: carriage key, ASCII code: 10

^END: EOI signal in IEEE-488

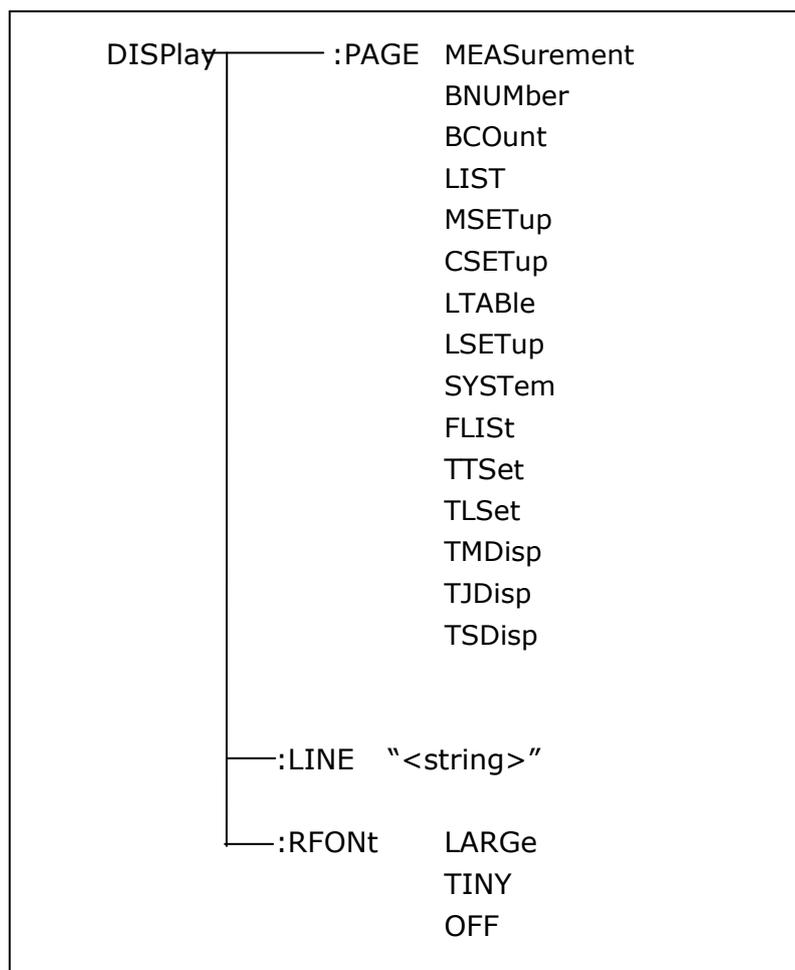
## 7.1 Subsystem commands for U2829

- DISPlay
- ORESister
- TRIGger
- CORRection
- FREQuency
- BIAS
- INITiate
- COMParator
- VOLTage
- FUNCTion
- FETCh?
- Mass MEMory
- CURRent
- LIST
- ABORT
- TRAN
- AMPLitude
- APERture
- STATus

### 7.1.1 DISPlay subsystem commands

DISPlay subsystem commands are mainly used to set the display page for the instrument. The :DISPlay? Query returns the current page.

Command tree:



The :PAGE command sets the display page.

The :DISPlay:PAGE? query returns the current page.

Command syntax: DISPlay:PAGE<page name>

<Page name> can be set as the following items:

MEASurement	Set the display page as the LCR measurement display.
BNUmber	Set the display page as the bin number display.
BCOunt	Set the display page as the bin count display.
LIST	Set the display page as the list sweep display.
MSETup	Set the display page as the measurement display.
CSETup	Set the display page as the correction setup.
LTABle	Set the display page as the limit table setup.
LSETup	Set the display page as the list sweep setup.
SYSTem	Set the display page as the system setup page.
FLISt	Set the display page as the file list page.
TTSet	Set the display page as the transformer test setup.
TLSet	Set the display page as the transformer list setup.
TMDisp	Set the display page as the transformer measurement display.
TJDisp	Set the display page as the transformer judge display.
TSDisp	Set the display page as the transformer scan test page.

For example: WrtCmd("DISP:PAGE MEAS"), Set the display page as the LCR

measurement display page.

Query syntax: DISPlay:PAGE?

Return format: <page name><NL^END>

<page name> can be set as the following items:

- <LCR MEAS DISP> The current page is the LCR measurement display page.
- <BIN No. DISP> The current page is the bin number display page.
- <BIN COUNT DISP> The current page is the bin count display page.
- <LIST SWEEP DISP> The current page is the list sweep display page.
- <MEAS SETUP> The current page is the measurement setup page.
- <CORRECTION> The current page is the correction page.
- <LIMIT TABLE SETUP> The current page is the limit table setup page.
- <LIST SWEEP SETUP> The current page is the list sweep setup page.
- <SYSTEM SETUP> The current page is the system setup page.
- <FILE LIST> The current page is the file list page.
- <TRANS TEST SET> The current page is the transformer test setup page.
- <TRANS LIMIT SET> The current page is the transformer limit setup page.
- <TRANS MEAS DISP> The current page is the transformer measurement display page.
- <TRANS JUDGE DISP> The current page is the transformer judge display page.

The :LINE command is used to set the current measurement item which can be a substring with up to 16 characters. The :LINE? query returns the current measurement item. The character string of the measurement item can be used as the file name when saving a file.

Command syntax: DISPlay:LINE"<string>"

Where,

<string> can be an ASCII character string (maximum number is 16).

For example: WrtCmd("DISP:LINE" Resistor meas")

Query syntax: DISPlay:LINE?

Return format: <string><NL^END>

The :ResultFont command is used to set the current font of the measurement result. The :ResultFont? Query returns the current font of the measurement result.

Command syntax: DISPlay:RFONT <font>

<font> can be the following information:

LARGE: Use large character to display the measurement result, 12ms/meas.

TINY: Use tiny character to display the measurement result, 5ms/meas.

OFF: Measurement result will not be displayed but can be read from the bus.

Query syntax: DISPlay:FRONT?

Return format: <font><NL^END>

<font> can be the following information:

LARGE  
TINY  
OFF

### 7.1.2 FREQuency subsystem commands

The FREQuency subsystem commands are mainly used to set the measurement frequency of the instrument. The :FREQuency query returns the current measurement frequency.

Command syntax:     FREQuency  $\left\{ \begin{array}{l} <value> \\ \text{MIN} \\ \text{MAX} \end{array} \right.$

Where,

<value>     NR1, NR2 or NR3 data format followed by Hz, kHz, MHz.

MIN         Set the measurement frequency as 20Hz.

MAX         Set the measurement frequency as 200kHz (The maximum frequency of U2829 is 200kHz)

For example: WrtCmd("FREQ 1KHZ")     Set the frequency as 1000Hz.

Query syntax: FREQuency?

Return format: <NR3><NL^END>

### 7.1.3 VOLTage subsystem commands

The VOLTage subsystem commands are mainly used to set the measurement voltage. The VOLTage? query returns the current measurement voltage.

Command syntax:

VOLTage  $\left\{ \begin{array}{l} <value> \\ \text{MIN} \\ \text{MAX} \end{array} \right.$

Where,

<value>     NR1, NR2 or NR3 data format followed by V.

MIN         Set the measurement voltage as 5mV.

MAX         Set the measurement voltage as 2V.

For example: WrtCmd("VOLT 1V")     Set the measurement voltage as 1V.

Query syntax: VOLTage?

Return format: <NR3><NL^END>

### 7.1.4 CURRent subsystem commands

The CURRent subsystem commands are mainly used to set the measurement

current. The CURRent? query returns the current measurement current.

Command syntax:

CURRent { <value>  
MIN  
MAX

Where,

<value> NR1, NR2 or NR3 data format followed by MA.

MIN Set the measurement current as 50 $\mu$ A.

MAX Set the measurement current as 20mA.

For example: WrtCmd ("CURR 10MA") Set the measurement current as 10mA.

Query syntax: CURRent?

Return format: <NR3><NL^END>

### 7.1.5 AMPLitude subsystem commands

The :AMPLitude subsystem commands are mainly used to set the auto level control (ALC) function as ON or OFF. The :AMPLitude? query returns the current status of the ALC function.

Command systax:

AMPLitude:ALX { ON  
OFF  
1  
0

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

For example: WrtCmd ("AMPL:ALC 0") Set the ALC function as OFF.

Query syntax: AMPLitude:ALC?

Return format: <NR1><NL^END>

### 7.1.6 Output RESister subsystem commands

The Output RESister subsystem commands are mainly used to set the output internal resistor mode. The Output RESister? query returns the current output internal resistance status.

Command syntax:

ORESister { 30  
50  
100  
10CC

For example: WrtCmd ("ORES 30") Set the output internal resistance is 30 OHM.

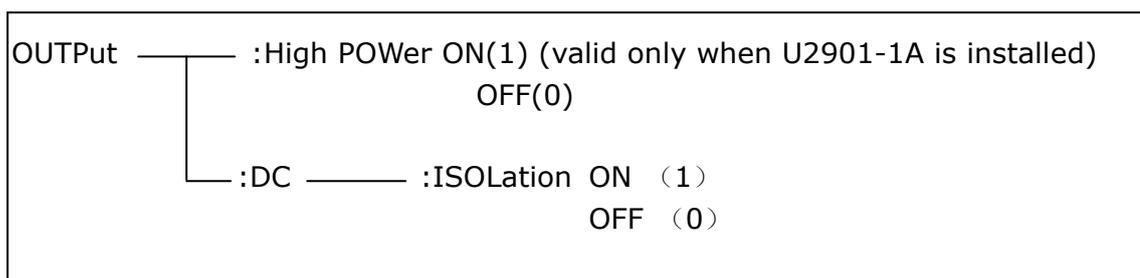
Query syntax: ORESister?

Return format: <NR1><NL^END>

### 7.1.7 OUTPut subsystem commands

The OUTPut subsystem commands are mainly used to set the status of the 1A DC bias source and DC isolation function.

Command tree:



The :HPOWer command is used to set the 1A DC bias source as ON or OFF. The :HPOWer? query returns the current status of the 1A DC bias source. Before using this command, please ensure the option component 1A DC bias source has been installed.

Command syntax:

OUTPut:HPOWer { ON  
OFF  
1  
0

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

Query syntax: OUTPut:HPOWer?

Return format: <INT><NL^END> or <OPT1><NL^END>, OPT means the 1A DC bias source is used, or unused.

The :DC:ISOLation command is used to set the DC isolation function of the 100mA/10V DC bias source as ON or OFF. The :DC:ISOLation? query returns the current status of the DC isolation function.

Command syntax:

OUTPut:DC:ISOLation  $\left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right.$

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

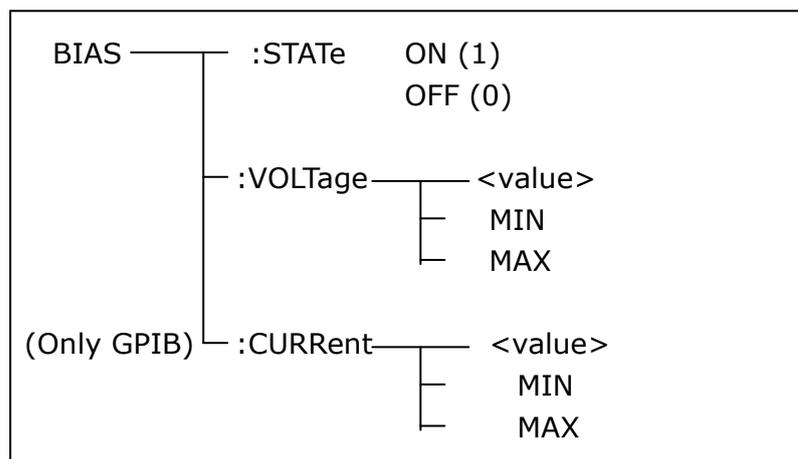
Query syntax: OUTPut:DC:ISOLation?

Return format: <NR1><NL^END>

### 7.1.8 BIAS subsystem commands

The :BIAS subsystem commands are mainly used to set the internal bias voltage and the bias status.

Command tree:



The BIAS:STATE command is used to set the bias status. The :STATE? query returns the current bias status.

Command syntax:

BIAS:STATE  $\left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right.$

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

For example: WrtCmd ("BIAS:STATE 0") Set the DC bias function as OFF.

Query syntax: BIAS:STATE?

Return format: <NR1><NL^END>

The BIAS:VOLTage command is used to set the internal bias voltage. The

BIAS:VOLTage? query returns the current bias voltage.

Command syntax:

$$\text{BIAS:VOLTage} \begin{cases} \langle \text{value} \rangle \\ \text{MIN} \\ \text{MAX} \end{cases}$$

Where,

$\langle \text{value} \rangle$  NR1, NR2 or NR3 data format.

MIN Set the bias voltage as 0V.

MAX Set the bias voltage as 10V.

For example: WrtCmd ("BIAS:VOLT MIN") Set the DC bias voltage as 0V.

Query syntax: BIAS:VOLTage?

Return format:  $\langle \text{NR1} \rangle \langle \text{NL} \rangle \text{END}$

The BIAS:CURRent (only GPIB interface) command is used to set the external bias current. The BIAS:CURRent? query returns the bias current. The external bias current is controlled by serial interface, so only GPIB interface supports this command.

Command syntax:

$$\text{BIAS:CURRent} \begin{cases} \langle \text{value} \rangle \\ \text{MIN} \\ \text{MAX} \end{cases}$$

Where,

$\langle \text{value} \rangle$  NR1, NR2 or NR3 data format

MIN Set the bias current as 0A.

MAX Set the bias current as 10A.

For example: WrtCmd ("BIAS:CURR MIN") Set the DC bias current as 0A.

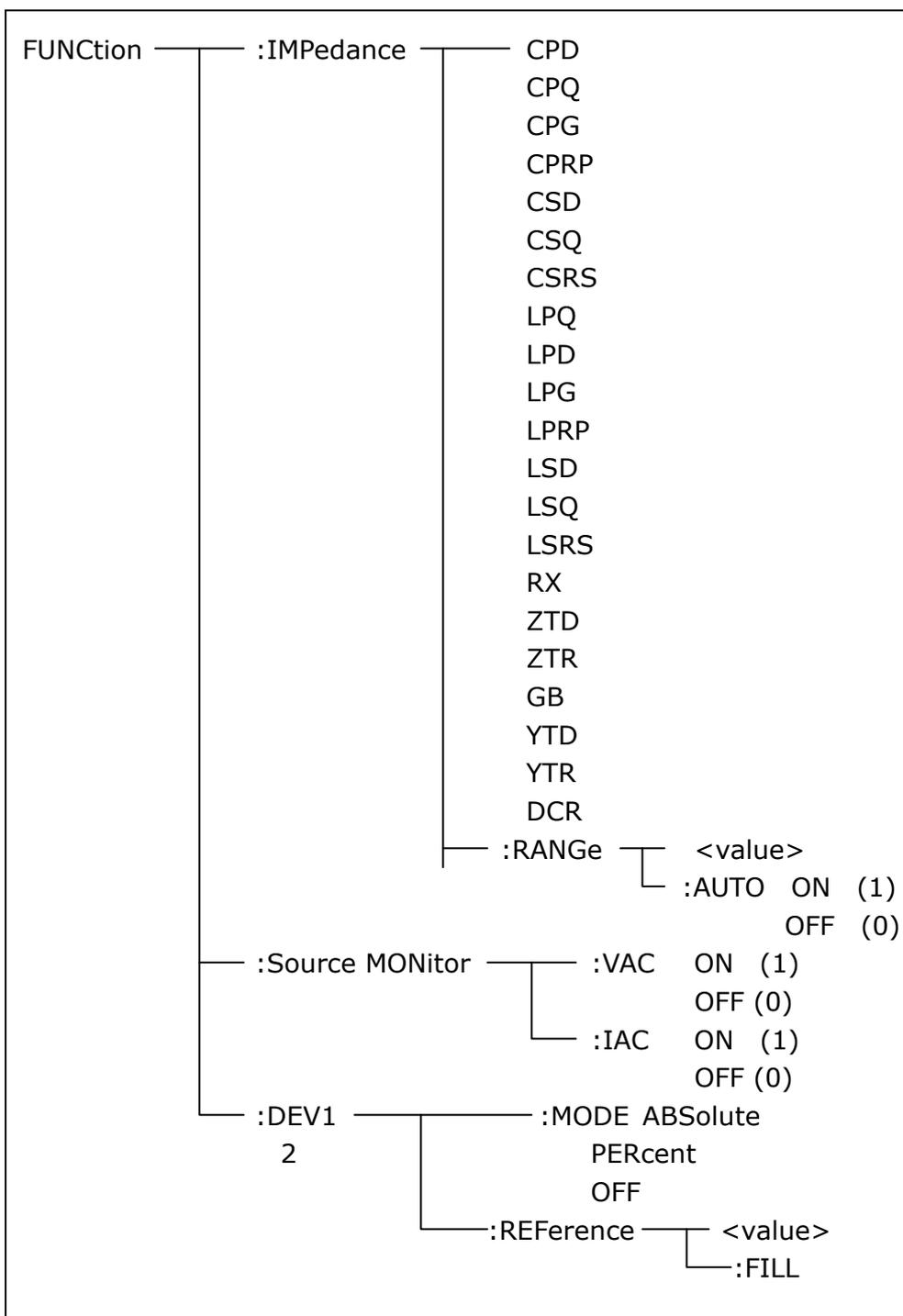
Query syntax: BIAS:CURRent?

Return format:  $\langle \text{NR1} \rangle \langle \text{NL} \rangle \text{END}$

### 7.1.9 FUNCTION subsystem commands

The FUNCTION subsystem commands are mainly used to set measurement functions, range, current/voltage monitor ON/OFF, deviation display mode, nominal setting.

Command tree:



The FUNCTION:IMPedance command is used to set instrument functions. The FUNCTION:IMPedance? query returns the current function parameters.

Command syntax: FUNCTION:IMPedance <function>

<function> can be one of the following items.

- |     |                          |      |                           |
|-----|--------------------------|------|---------------------------|
| CPD | Set the function as Cp-D | LPRP | Set the function as Lp-Rp |
| CPQ | Set the function as Cp-Q | LSD  | Set the function as Ls-D  |
| CPG | Set the function as Cp-G | LSQ  | Set the function as Ls-Q  |

CPRP	Set the function as Cp-Rp	LSRS	Set the function as Ls-Rs
CSD	Set the function as Cs-D	RX	Set the function as R-X
CSQ	Set the function as Cs-Q	ZTD	Set the function as Z- $\theta^\circ$
CSRS	Set the function as Cs-Rs	ZTR	Set the function as Z- $\theta_r$
LPQ	Set the function as Lp-Q	GB	Set the function as G-B
LPD	Set the function as Lp-D	YTD	Set the function as Y- $\theta^\circ$
LPG	Set the function as Lp-G	YTR	Set the function as Y- $\theta_r$

For example: WrtCmd ("FUNC:IMP RX") Set the function as R-X.

Query syntax: FUNCtion:IMPedance?

Return format: <function><NL^END>

The FUNCtion:IMPedance:RANGe command is used to set the range. The FUNCtion:IMPedance:RANGe? query returns the current range.

Command syntax: FUNCtion:IMPedance:RANGe <value>

Where, <value> can be the impedance of the DUT or NR1, NR2 or NR3 data format followed by OHM or KOHM.

For example: WrtCmd ("FUNC:IMP:RANG 1KOHM") Set the range as 1kOHM.

Query syntax: FUNCtion:IMPedance:RANGe?

Return format: <value><NL^END>

Where, <value> can be

10	30	100
300	1000	3000
10000	30000	100000

The FUNCtion:IMPedance:RANGe:AUTO command is used to set the automatic range selection status. The FUNCtion:IMPedance:RANGe:AUTO? query returns the current range status.

Command syntax:

FUNCtion:IMPedance:RANGe:AUTO  $\left\{ \begin{array}{l} \text{ON (1)} \\ \text{OFF (0)} \end{array} \right.$

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

For example: WrtCmd ("FUNC:IMP:RANG:AUTO ON") Set the automatic range as ON.

Query syntax: FUNCtion:IMPedance:RANGe:AUTO?

Return format: <NR1><NL^END>

The FUNCtion:Source MONitor:VAC command is used to set the voltage monitor ON or OFF. The FUNCtion:Source MONitor:VAC? query returns the current voltage monitor status.

FUNCTION:SMONitor:VAC  $\left\{ \begin{array}{l} \text{ON (1)} \\ \text{OFF (0)} \end{array} \right.$

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

For example: WrtCmd ("FUNC:SMON:VAC ON") Set the voltage monitor as ON.

Query syntax: FUNCTION:SMONitor:VAC?

Return format: <NR1><NL^END>

The FUNCTION:SMONitor:IAC command is used to set the current monitor as ON or OFF. The FUNCTION:SMONitor:IAC? query returns the current monitor status.

Command syntax:

FUNCTION:SMONitor:IAC  $\left\{ \begin{array}{l} \text{ON (1)} \\ \text{OFF (0)} \end{array} \right.$

Where,

Character 1 (49) is equal to ON.

Character 0 (48) is equal to OFF.

For example: WrtCmd ("FUNC:SMON:IAC ON") Set the current monitor as ON.

Query syntax: FUNCTION:SMONitor:IAC?

Return format: <NR1><NL^END>

The FUNCTION:DEV<n>:MODE command is used to set the deviation measurement mode. The FUNCTION:DEV<n>:MODE? query returns the current deviation measurement mode.

Command syntax:

FUNCTION:DEV<n>:MODE  $\left\{ \begin{array}{l} \text{ABSolute} \\ \text{PERCent} \\ \text{OFF} \end{array} \right.$

Where,

ABSolute Absolute value deviation display

PERCent Percent deviation display

OFF Real value display

Where, <n> is

Character 1 (49) is equal to the nominal value of primary parameter.

Or character 2 (50) is equal to the nominal value of the secondary parameter.

For example: WrtCmd ("FUNC:DEV1:MODE ABS")

Query syntax: FUNCTION:DEV<n>:MODE?

Return format:

```

ABX  }
PERC } <NL^END>
OFF  }

```

The FUNCTION:DEV<n>:REFerence<value> command is used to set the nominal value of the deviation. The FUNCTION:DEV<n>:REFerence<value>? query returns the current nominal value of the deviation.

Command syntax: FUNCTION:DEV<n>:REFerence<value>

Where,

<value> is NR1, NR2 or NR3 data format.

<n> is

Character 1 (49) is equal to the nominal value of primary parameter.

Or character 2 (50) is equal to the nominal value of the secondary parameter.

For example: WrtCmd ("FUNC:DEV1:REF 10")

Query syntax: FUNCTION:DEV<n>:REFerence?

Return format: <NR1><NL^END>

The FUNCTION:DEV<n>:REFerence:FILL command is used to set the nominal value of the deviation. This command directs the instrument to make a test and then copies the results of the primary and the secondary parameters as the nominal values of the deviation.

Command syntax: FUNCTION:DEV<n>:REFerence:FILL

Where,

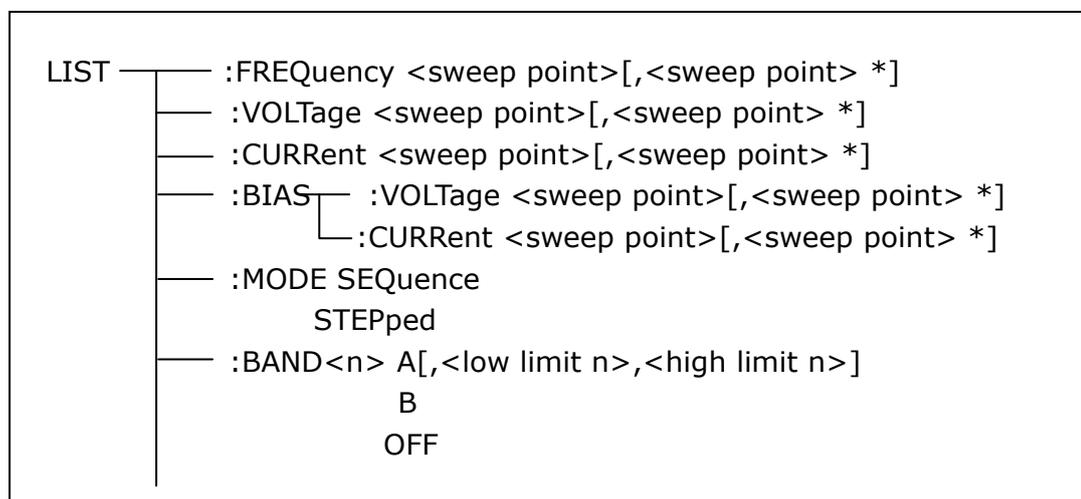
Character 1 (49) or character 2 (50) is equal to the nominal values of the primary and secondary parameters.

For example: WrtCmd ("FUNC:DEV1:REF:FILL")

### 7.1.10 LIST subsystem commands

The LIST subsystem commands are mainly used to set the list sweep function, sweep points, sweep mode, sweep limits.

Command tree:



The LIST:FREQuency command is used to clear the original sweep points and set the frequencies of the sweep points. The LIST:FREQuency? query returns the current frequency of each sweep point.

Command syntax: LIST:FREQuency<value>[,<value>\*]

**NOTE: \* part means 10 sweep points at most can be set.**

Where,

<value> is NR1, NR2 or NR3 data format.

**<value> should be set from 20HZ to 200KHZ, or return format will report errors.**

For example: WrtCmd("LIST:FREQ 1E3, 2E3, 3E3, 4E3")

Set the frequency of the sweep point 1 as 1KHZ;

Set the frequency of the sweep point 2 as 2KHZ;

Set the frequency of the sweep point 3 as 3KHZ;

Set the frequency of the sweep point 4 as 4KHZ;

NOTE: HZ(hertz) is the suffix unit, MAHZ and MHZ is MHz (1E6 Hz).

Query syntax: LIST:FREQuency?

Return format: <NR3>[,<NR3>\*]<NL^END>

The LIST:VOLTage command is used to clear the original voltage of the each sweep point and reset the voltage. The LIST:VOLTage? query returns the current voltage of each sweep point.

Command syntax: LIST:VOLTage<value>[,<value>\*]

**NOTE: \* part means 10 sweep points at most can be set.**

Where,

<value> is NR1, NR2 or NR3 data format.

For example: WrtCmd ("LIST:VOLT 1.5") Set the frequency of the sweep point 1 as 1.5V.

WrtCmd ("LIST:VOLT 1E-2, 2E-2, 3E-2, 4E-2") Set the frequencies of sweep point 1, 2, 3 and 4 respectively as 10mV, 20mV, 30mV and 40mV.

NOTE: This command can be followed by suffix unit V.

Query syntax: LIST:VOLTage?

Return format: <NR3>[,<NR3>\*]<NL^END>

**<value> should be set from 5mV to 2V, or return format will report errors.**

The LIST:CURRent command is used to clear the measurement current of each sweep point and reset the current. The LIST:CURRent? query returns the current of each sweep point.

Command syntax: LIST:CURRent<value>[,<value>\*]

**NOTE: \* part means 10 sweep points at most can be set.**

Where,

<value> is NR1, NR2 or NR3 data format.

For example: WrtCmd ("LIST:CURREnt 100MA") Set the measurement current of the sweep point 1 as 100mA.

WrtCmd ("LIST:CURREnt 1E-2, 2E-2, 3E-2, 4E-2") Set the currents of sweep points 1, 2, 3 and 4 respectively as 10mA, 20mA, 3mA and 4mA.

**NOTE: This command can be followed by a suffix unit A (ampere).**

Query syntax: LIST:CURREnt?

Return format: <NR3>[,<NR3>\*]<NL^END>

**NOTE: The current of each sweep point should be set from 50µA to 20mA, or return format will report errors.**

The LIST:BIAS:VOLTage command is used to clear the original DC bias voltage of each sweep point and reset the voltage. The LIST:BIAS:VOLTage? query returns the current DC bias voltage of each sweep point.

Command syntax: LIST:BIAS:VOLTage<value>[,<value>\*]

**NOTE: \* part means 10 sweep points at most can be set.**

Where,

<value> is NR1, NR2 or NR3 data format.

For example: WrtCmd ("LIST:BIAS:VOLT 1.5V")

Set the DC bias voltage of sweep point 1 as 1.5V.

Query syntax: LIST:BIAS: VOLTage?

Return format: <NR3>[,<NR3>\*]<NL^END>

The LIST:BIAS:CURREnt command is used to clear the original DC bias current of each sweep point and reset them. The LIST:BIAS:CURREnt? query returns the the DC bias current of each sweep point.

Command syntax: LIST:BIAS:CURREnt<value>[,<value>\*]

**NOTE: \* part means 10 sweep points at most can be set.**

Where,

<value> is NR1, NR2 or NR3 data format.

For example: WrtCmd ("LIST:BIAS:CURREnt 100MA") Set the DC bias current of the sweep point 1 as 100mA.

WrtCmd ("LIST:BIAS:CURREnt 1E-2, 2E-2, 3E-2,4E-2") Set the DC bias currents of sweep points 1, 2, 3 and 4 respectively as 10mA, 20mA, 30mA and 40mA.

Query syntax: LIST:BIAS:CURREnt?

Return format: <NR3>[,<NR3>\*]<NL^END>

**NOTE: U2829 series instrument has installed a 10V/100mA internal DC bias current source. If 1A DC source is required, please install an external source. U2829 can be used with TH1773 DC Bias Source (providing DC current from 0 to 10A and can be bought from our**

**company).**

The LIST:MODE command is used to set the list sweep mode. The LIST:MODE? query returns the current list sweep mode.

Command syntax:

$$\text{LIST:MODE} \left\{ \begin{array}{l} \text{SEQ} \\ \text{STEP} \end{array} \right\}$$

Where,

SEQ means sequential mode.

STEP means single step mode.

For example: WrtCmd ("LIST:MODE SEQ")

Query syntax: LIST:MODE?

Return format:

$$\left\{ \begin{array}{l} \text{SEQ} \\ \text{STEP} \end{array} \right\} \text{ <NL^END>}$$

The LIST:BAND<n> command is used to set the limits of list sweep table. The LIST:BAND<n>? query returns the current limits.

Command syntax: LIST:BAND<n><parameter>[,<low limit n>,<high limit n>]

Where,

<n> 1 to 10 (NR1 format): sweep points on the  $n_{th}$  line

<parameter> A Compare the primary parameter of the test results with the high and the low limits.

B Compare the secondary parameter of the test results with the high and the low limits.

OFF No comparison

<low limit n> NR1, NR2 or NR3 data format, low limit of the sweep point on the  $n_{th}$  line.

<high limit n> NR1, NR2 or NR3 data format, high limit of the sweep point on the  $n_{th}$  line.

For example: WrtCmd ("LIST:BAND1 A, 10, 20")

WrtCmd ("LIST:BAND3 OFF")

Query syntax: LIST:BAND<n>?

Return Format: <parameter>,<low limit n>,<high limit n>

### 7.1.11 APERTure subsystem commands

The APERTure subsystem commands are mainly used to set the measurement speed, average times used in measurement. The APERTure? query returns the current measurement speed, average times.

Command syntax:

APERture  $\left\{ \begin{array}{l} \text{FAST} \\ \text{MEDium} \\ \text{SLOW} \end{array} \right\} [,<\text{value}>]$

Where,

FAST: 30 times/sec

MEDium: 10 times/sec

SLOW: 2 times/sec

<value> 1 to 255 in NR1

For example: WrtCmd ("APER MED, 55")

Query syntax: APERture?

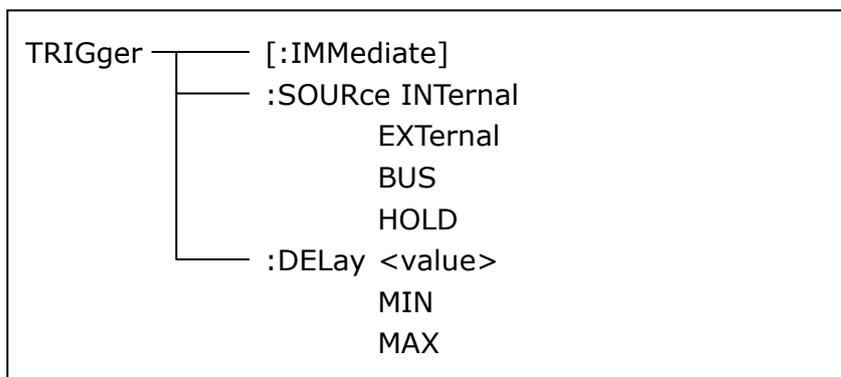
Return format:

$\left\{ \begin{array}{l} \text{FAST} \\ \text{MED} \\ \text{SLOW} \end{array} \right\} , <\text{NR1}><\text{NL}^{\wedge}\text{END}>$

### 7.1.12 TRIGger subsystem commands

The TRIGger subsystem commands are mainly used to set the instrument trigger source, trigger delay and trigger measurement.

Command tree:



The TRIGger[:IMMEDIATE] command is used to trigger a test.

Command syntax: TRIGger[:IMMEDIATE]

For example: WrtCmd("TRIG")

The TRIGger:SOURce command is used to set the trigger source mode. The TRIGger:SOURce? query returns the current trigger source mode.

Command syntax:

TRIGger:SOURce  $\left\{ \begin{array}{l} \text{INTernal} \\ \text{EXTernal} \\ \text{BUS} \\ \text{HOLD} \end{array} \right.$

Where,

INTernal The default trigger mode.

EXTernal Triggered by HANDLER interface.  
 BUS Triggered by RS232C interface or GPIB interface  
 HOLD Triggered by pressing **TRIGGER**.  
 For example: WrtCmd ("TRIG:SOUR BUS")

Query syntax: TRIGger:SOURce?

Return format:

$\left. \begin{array}{l} \text{INT} \\ \text{EXT} \\ \text{BUS} \\ \text{HOLD} \end{array} \right\} <\text{NL}^{\wedge}\text{END}>$

The TRIGger:DElay command is used to set the delay time after triggering. The TRIGger:DElay? query returns the current delay time.

Command syntax:

$\text{TRIGger:DElay} \left\{ \begin{array}{l} <\text{value}> \\ \text{MIN} \\ \text{MAX} \end{array} \right.$

Where,

<value> In NR1, NR2 or NR3 data format, from 0 to 60s with 1ms as the resolution.

MIN Set the delay time as 0s.

MAX Set the delay time as 60s.

For example: WrtCmd ("TRIG:DEL 5s") Set the delay time as 5s.

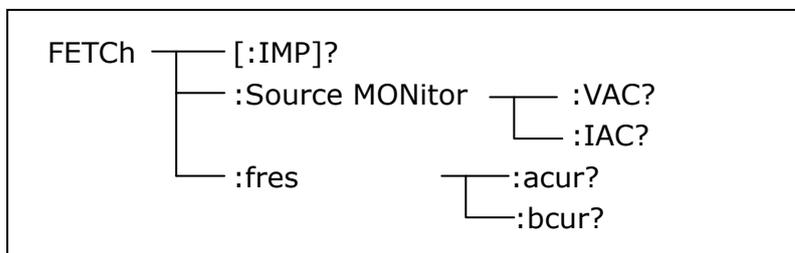
Query syntax: TRIGger:DElay?

Return format: <NR3><NL^END>

### 7.1.13 FETCh? subsystem commands

The FETCh? subsystem commands are mainly used to direct U2829 to input a measurement result.

Command tree:



The FETCh[:IMP]? query directs U2829 to input the last measurement result to the output buffer zone.

Query syntax: FETCh[:IMP]?

For example: WrtCmd ("TRIG:SOUR BUS")

WrtCmd ("TRIG")

WrtCmd ("FETC?")

U2829 applies ASCII to delivery result, details are follows.

On measurement display page, bin NO. display page, bin count display page, ASCII data output format are described as below:

SN.NNNNNESNN , SN.NNNNNESNN , SN , SN or SNN NL^END  
 <DATA A>                      <DATA B>                      <Status>                      <BIN number>

Where,

<DATA A>, <DATA B> format: <DATA A> (primary measurement data), <DATA B> (secondary measurement data)

12-digits ASCII format are as below:

SN.NNNNNESNN

(S: +/-, N: from 0 to 9, E: Exponent Sign)

Status	Description
-1	(In data buffer memory) no data
0	Common measurement data
+1	Analog LCR unbalance
+2	A/D converter is not working.
+3	Signal source is over loading.
+4	Constant voltage cannot be adjusted.

<status> format: When above measurement data is used, <status> data will display measurement status.

The output format of the <Status> display data uses 2-digits ASCII: SN (S: +/-, N: from 0 to 4)

**NOTE: When <status> is -1, +1 or +2, the measurement data is 9.9E37. When <status> is 0, +3 or +4, the real measurement data is beyond the limits.**

Data	Sort result
0	Out of tolerance
+1	Bin 1
+2	Bin 2
+3	Bin 3
+4	Bin 4
+5	Bin 5
+6	Bin 6
+7	Bin 7
+8	Bin 8
+9	Bin 9
+10	Auxiliary bin

<Bin No.> format: The data displays the sorting results of the displayed bin, shown as above.

Only when the instrument compare function is set as ON, <bin No.> data can be displayed.

The output format of <bin No.> data applies 2 to 3 digits ASCII: SN or SNN (S: +/\_, N: from 0 to 9).

**On list sweep display page, the ASCII data output format is shown as below, that is, the return-circuit replaces sweep point number.**

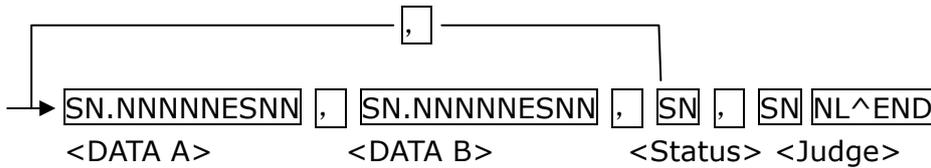


Figure 6 ASCII format 2 (list sweep)

Where,

Descriptions for <DATA A>, <DATA B>, <Status> are the same described before.

<Judge> format is as below:

<Input/Output> format: The data displays the compare result of the list sweep..

Data	Result
-1	low
0	pass
+1	high

When the compare function of the list sweep measurement is turned off, the output result of <Input/Output> is 0.

<Input/Output> data output format applies 2-digits ASCII format: SN (S: +/\_, N: from 0 to 1)

On transformer single-machine measurement display page, ASCII data output format is as below:



<SN> is described as below:

SN	Description
1	TURN
2	Zx
3	Acr
4	Lx
5	LK
6	DCR

Description of <DATA A> is the same as that described above. Secondary parameter of <DATA B> has two formats:

When the measurement parameter is the turn ratio (TURN), secondary parameter <DATA B> is the phase and input format is + (in-phase), - (anti-phase);

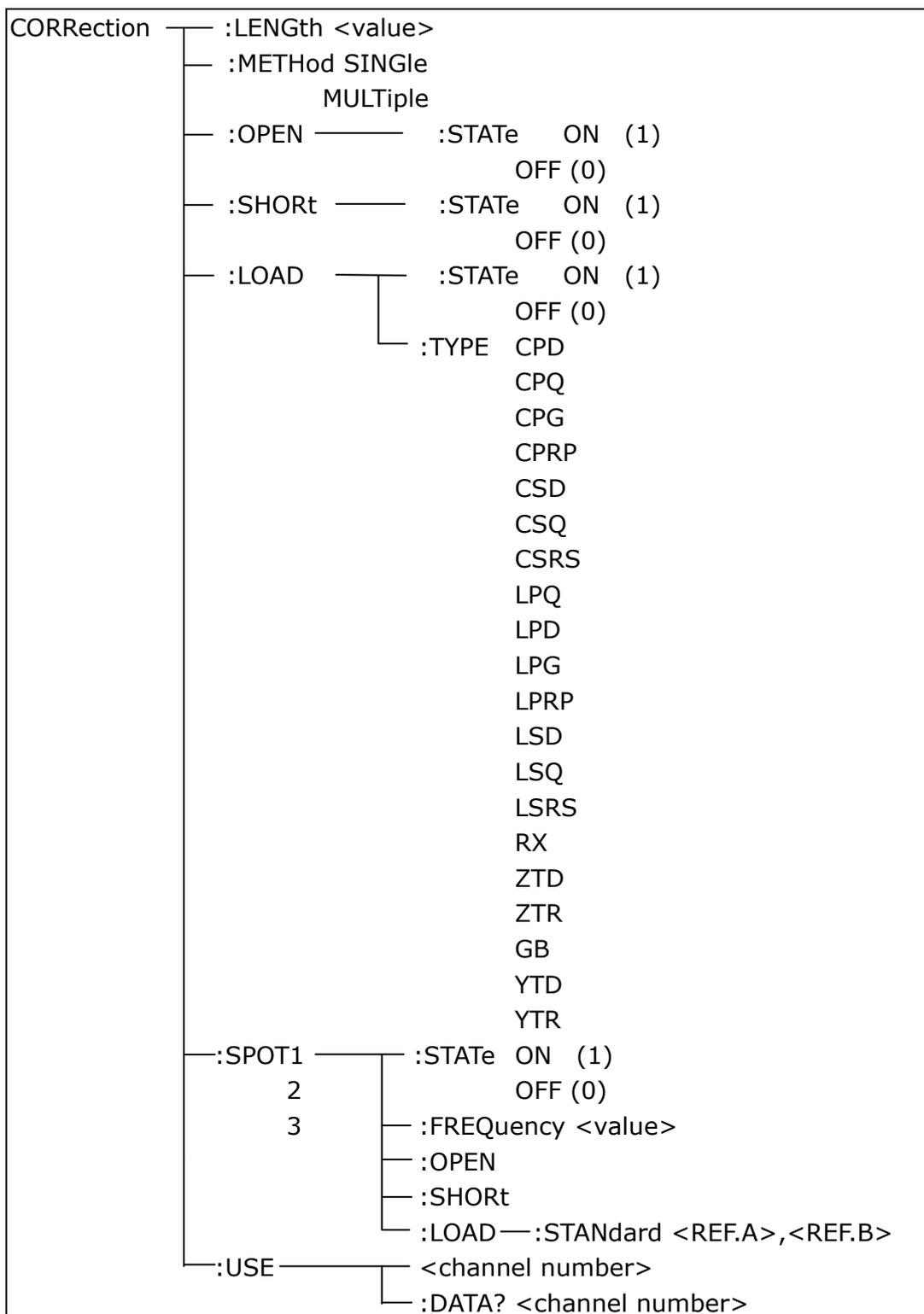
When the measurement parameter is inductance ( $Z_x$ ), secondary parameter <DATA B> is the phase angle  $\theta$ , its description is the same as that of <DATA A>. When the measurement parameter is inductance ( $Acr$ ), secondary parameter of <DATA B> is inductance  $X$ , its description is the same as that of <DATA A>. When the measurement parameter is inductance  $L_x$ , the secondary parameter of <DATA B> is the quality factor  $Q$ , its description is the same as that of <DATA A>. Meanwhile when the measurement serial number is equal to or larger than 5 (that is to say testing leakage inductance  $LK$  and DC resistance  $DCR$ ), no secondary parameter will be displayed but directly display the status. The status format is : SN: +/-, N is 0/1.

Status	Description
-1	Low
0	Pass
1	High

#### 7.1.14 CORRection subsystem commands

The CORRection subsystem commands are mainly used to set the correction function, OPEN, SHORT, LOAD.

Command tree:



The CORRection:LENGth command is used to set the correction cable length. The CORRection:LENGth? query returns the current set cable length.

Command syntax: CORRection:LENGth<value>

Where,

<value> is 0, 1, 2 or 4 followed by M.

For example: WrtCmd ("CORR:LENG 1M") Set the cable length as 1 meter.

Query syntax: CORRection:LENGth?

Return format: <NR1><NL^END>

The CORRection:MEtHod command is used to set the correction mode. The CORRection:MEtHod? query returns the current correction mode.

Command syntax: CORRection:MEtHod  $\left\{ \begin{array}{l} \text{SINGle} \\ \text{MULTi} \end{array} \right\}$

Where,

SINGle Set or return single channel mode.

MULTi Set or return multi channel mode.

For example: WrtCmd ("CORR:MEtH MULT") Set the instrument as multi channel mode.

Query syntax: CORRection:MEtHod?

Return format:  $\left\{ \begin{array}{l} \text{SINGle} \\ \text{MULTi} \end{array} \right\} <NL^END>$

The CORRection:OPEN command is used to execute open correction for 43 preset test points (U2829 has 41 preset test points).

Command syntax: CORRection:OPEN

For example: WrtCmd ("CORR:OPEN")

The CORRection:OPEN:STATe command is used to set the open correction ON or OFF. The CORRection: OPEN:STATe? query returns the current open correction status.

Command syntax:

CORRection:OPEN:STATe  $\left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("CORR:OPEN: STAT ON")

Query syntax: CORRection:OPEN:STATe?

Return format: <NR1><NL^END>

The CORRection:SHORt command is used to execute short correction for 43 preset test points (U2829 has 41 preset test points).

Command syntax: CORRection:SHORt

For example: WrtCmd ("CORR:SHOR")

The CORRection:SHORt:STATe command is used to set the short correction status.

The CORRection:SHORT:STATe? query returns the current short correction status.

Command syntax:

$$\text{CORRection:SHORT:STATe} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("CORR:SHOR:STAT ON")

Query syntax: CORRection:SHORT:STATe?

Return format: <NR1><NL^END>

The CORRection:LOAD:STATe command is used to set load correction. The CORRection:LOAD:STATe? query returns the current load correction status.

Command syntax:

$$\text{CORRection:LOAD:STATe} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("CORR:LOAD:STAT ON")

Query syntax: CORRection:LOAD:STATe?

Return format: <NR1><NL^END>

The CORRection:LOAD:TYPE command is used to set the tested parameter type. The CORRection:LOAD:TYPE query returns the current parameter type.

Details of function are as follows:

CPD	Set the function as Cp-D	LPRP	Set the function as Lp-Rp
CPQ	Set the function as Cp-Q	LSD	Set the function as Ls-D
CPG	Set the function as Cp-G	LSQ	Set the function as Ls-Q
CPRP	Set the function as Cp-Rp	LSRS	Set the function as Ls-Rs
CSD	Set the function as Cs-D	RX	Set the function as R-X
CSQ	Set the function as Cs-Q	ZTD	Set the function as Z-θ°
CSRS	Set the function as Cs-Rs	ZTR	Set the function as Z-θr
LPQ	Set the function as Lp-Q	GB	Set the function as G-B
LPD	Set the function as Lp-D	YTD	Set the function as Y-θ°
LPG	Set the function as Lp-G	YTR	Set the function as Y-θr

For example: WrtCmd ("CORR:LOAD:TYPE CPD")

Query syntax: CORRection:LOAD:TYPE?

Return format: <function><NL^END>

The CORRection:SPOT<n>:STATe command is used to set the state of some specific frequency spots. The CORRection:SPOT<n>:STATe query returns the current state of each frequency spot (FREQ 1, FREQ 2 or FREQ 3).

Command syntax:

$$\text{CORRection:SPOT<n>:STATe} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

<n>:

1 refers to frequency spot 1.

2 refers to frequency spot 2.

3 refers to frequency spot 3.

For example: WrtCmd ("CORR:SPOT1:STAT ON")

Query syntax: CORRection:SPOT<n>:STATe?

Return format: <NR1><NL^END>

The CORRection:SPOT<n>:FREQuency command is used to set the frequencies of frequency spots 1, 2 and 3. The CORRection:SPOT<n> query returns the current frequency of specific frequency spot.

Command syntax: CORRection:SPOT<n>:FREQuency<value>

Where,

<value> can be NR1, NR2 or NR3 data format followed by HZ, KHZ and MHZ.

<n>:

1 refers to frequency spot 1.

2 refers to frequency spot 2.

3 refers to frequency spot 3.

For example: WrtCmd ("CORR:SPOT1:FREQ 2KHZ") Set the frequency of frequency spot 1 as 2KHZ.

**NOTE: <value> should be ranged from 20HZ to 200KHZ (U2829), or return format will report errors.**

Query syntax: CORRection:SPOT<n>:FREQuency?

Return format: <NR3><NL^END>

The CORRection:SPOT<n>:OPEN command is used to execute open correction for specific frequency spots (frequency 1, frequency 2 and frequency 3).

Command syntax: CORRection:SPOT<n>:OPEN

Where,

<n>:

1 refers to frequency spot 1.

2 refers to frequency spot 2.

3 refers to frequency spot 3.

For example: WrtCmd ("CORR:SPOT1:OPEN") Execute open correction for frequency spot 1.

The CORRection:SPOT<n>:SHORt command is used to execute short correction for specific frequency spots (frequency 1, frequency 2 and frequency 3).

Command syntax: CORRection:SPOT<n>:SHORt

Where,

<n>:

1 refers to frequency spot 1.

2 refers to frequency spot 2.

3 refers to frequency spot 3.

For example: WrtCmd ("CORR:SPOT1:SHOR") Execute short correction for frequency spot 1.

The CORRection:SPOT<n>:LOAD:STANdard command is used to set the standard reference of specific frequency spots (frequency spot 1, frequency spot2 and frequency spot 3 which are taking load correction). The CORRection:SPOT<n>:LOAD:STANdard query returns the current standard reference of specific frequency spot.

Command syntax: CORRection:SPOT<n>:LOAD:STANdard <REF. A><REF. B>

Where,

<n>:

1 refers to frequency spot 1.

2 refers to frequency spot 2.

3 refers to frequency spot 3.

<REF. A> can be NR1, NR2 or NR3 data format and taken as the standard reference of the primary parameter.

<REF. B> can be NR1, NR2 or NR3 data format and taken as the standard reference of the secondary parameter.

For example: WrtCmd ("CORR:SPOT1:LOAD:STAN 100.7, 0.0002")

Query syntax: CORRection:SPOT<n>:LOAD:STANdard?

Return format: <NR3><NL^END>

The CORRection:USE command is used to set the channel number of multi-channel correction. The CORRection:USE? query returns the current used channel number.

Command syntax: CORRection:USE <channel number>

Where,

<channel number> ranges from 1 to 127 (NR1, NR2 or NR3 data format).

For example: WrtCmd ("CORR:USE 10") Set the channel number as 10.

Query syntax: CORRection:USE?

Return format: <channel number><NL^END>

The CORRection:USE:DTAT? query returns the OPEN/SHORT/LOAD correction measurement data of specific frequency spot 1, 2 or 3.

Command syntax: CORRection:USE:DATA?<channel number>

Where,

<channel number> ranges from 1 to 127 (NR1 format).

Return format:

<open1 A>,<open1 B>,<short1 A>,<short1 B>,<load1 A>,<load1 B>,<open2 A>,<open2 B>,<short2 A>,<short2 B>,<load2 A>,<load2 B>,<open3 A>,<open3 B>,<short3 A>,<short3 B>,<load3 A>,<load3 B>,<open1/2/3 A>,<open1/2/3 B>,<short1/2/3 A>,<short1/2/3 B>,<load1/2/3 A>,<load1/2/3 B>

Where,

<open1/2/3 A> is NR3 data format and the primary open correction data at frequency spot 1/2/3.

<open1/2/3 B> is NR3 data format and the secondary open correction data at frequency spot 1/2/3.

<short 1/2/3 A> is NR3 data format and the primary short correction data at frequency spot 1/2/3.

<short 1/2/3 B> is NR3 data format and the secondary short correction data at frequency spot 1/2/3.

<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

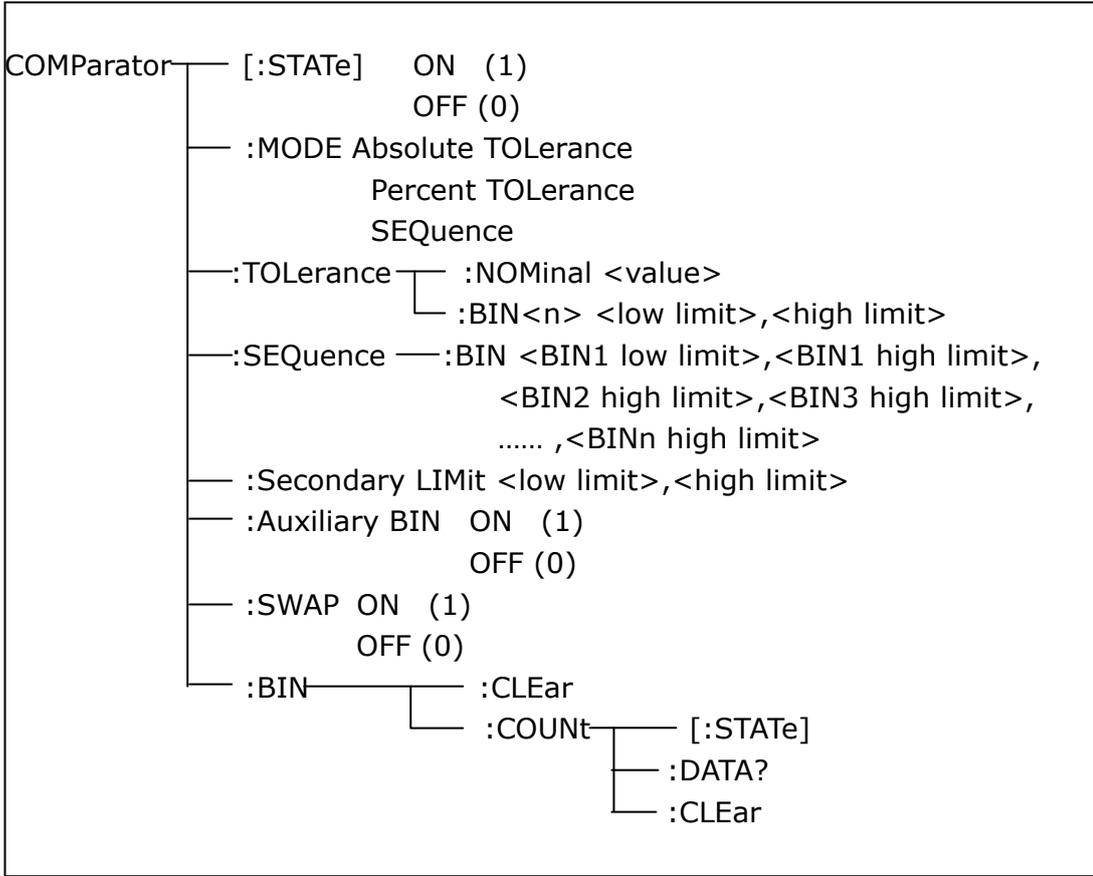
<load1/2/3 A> is NR3 data format and the primary load correction data at frequency spot 1/2/3.

<load1/2/3 B> is NR3 data format and the secondary load correction data at frequency spot 1/2/3.

### 7.1.15 COMParator subsystem commands

The COMParator subsystem commands are used to set the bin comparator function including ON/OFF setting, Limit table setting.

Command tree:



The COMPArator[STATe] command is used to set the comparator function as ON or OFF. The COMPArator[STATe]? query returns the current comparator state.

Command syntax:

$$\text{COMPArator[:STATe]} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("COMP ON")

Query syntax: COMPArator[:STATe]?

Return format: <NR1><NL^END>.

The COMPArator:MODE command is used to set the comparator mode. The COMPArator:MODE? query returns the current mode.

Command syntax:

$$\text{COMPArator:MODE} \left\{ \begin{array}{l} \text{ATOLerance} \\ \text{PTOLerance} \\ \text{SEQuence} \end{array} \right\}$$

Where,

ATOLerance means absolute tolerance mode.  
 PTOLerance means proportional tolerance mode.  
 SEQUence means sequential tolerance mode.  
 For example: WrtCmd ("COM:MODE ATOL")

Query syntax: COMParator:MODE?

Return format:  $\left. \begin{array}{l} \text{ATOL} \\ \text{PTOL} \\ \text{SEQ} \end{array} \right\} \langle \text{NL}^{\wedge} \text{END} \rangle$

The COMParator:TOLerance:NOMinal command is used to set the nominal value (this function is valid only when the limit mode is set as deviation mode). The COMParator:TOLerance:NOMinal? query returns the current nominal value.

Command syntax: COMParator:TOLerance:NOMinal<value>

Where,

<value> is a nominal value in NR1, NR2 or NR3 data format.

For example: WrtCmd ("COMP:TOL:NOM 100E-12")

Query syntax: COMParator:TOLerance:NOMinal?

Return format: <NR3><NL^END>

The COMParator:TOLerance:BIN<n> command is used to set the high and the low limits of each bin (this function is valid only when the limit mode is set as deviation mode). The COMParator:TOLerance:BIN<n>? query returns the current high and the low limits of each bin.

Command syntax: COMParator:TOLerance:BIN<n><low limit><high limit>

Where,

<n> is the bin number from 1 to 9.

<low limit> is the low limit in NR1, NR2 or NR3 data format.

<high limit> is the high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("COMP:TOL:BIN1 -5,5")

WrtCmd ("COMP:TOL:BIN2 -10,10")

Query syntax: COMParator:TOLerance:BIN<n>?

Return format: <low limit><high limit><NL^END>

The COMParator:SEQUence:BIN command is used to set the high and the low limits of sequential mode (this function is valid only when the limit mode is set as the sequential mode.). The COMParator:SEQUence:BIN? query returns the current high and the low limits of each bin.

Command syntax: COMParator:SEQUence:BIN <BIN1 low limit>, <BIN 1 high limit>, <BIN2 high limit>, ..., <BINn high limit>

Where,

<BIN1 low limit> is the low limit of BIN 1 in NR1, NR2 or NR3 data format.

<BIN1 high limit> is the high limit of BIN1 in NR1, NR2 or NR3 data format.

<BINn high limit> is the high limit of BINn (the maximum of n is 9) in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("COMP:SEQ:BIN 10, 20, 30, 40, 50")

Query syntax: COMPArator:SEQuence:BIN?

Return format: <BIN1 low limit>, <BIN1 high limit>, <BIN2 high limit>, ...,  
<BINn high limit><NL^END>

The COMPArator:Secondary LIMit command is used to set the high and the low limits of the secondary parameter. The COMPArator:Secondary LIMit query returns the current high and the low limits of the secondary parameter.

Command syntax: COMPArator:SLIMit<low limit><high limit>

Where,

<low limit> is the low limit in NR1, NR2 or NR3 data format.

<high limit> is the high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("COMP:SLIM 0.001, 0.002")

Query syntax: COMPArator:SLIMit?

Return format: <NR3><NL^END>

The COMPArator:Auxiliary BIN command is used to set the auxiliary bin as ON or OFF. The COMPArator:Auxiliary BIN? query returns the current auxiliary bin state.

Command syntax:

$$\text{COMPArator:Auxiliary BIN} \left\{ \begin{array}{c} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("COMP:ABIN ON")

Query syntax: COMPArator:Auxiliary BIN?

Return format: <NR1><NL^END>

The COMPArator:SWAP command is used to set the swap mode ON or OFF. For example: the original function parameter is Cp-D, after the SWAP mode is set as

ON, the function parameter will be changed as D-Cp. In this case, the limits from BIN1 to BIN9 become the high and the low limits of D, the original secondary limits become that of Cp. That is to say, this function is to make swap comparison between the primary and the secondary parameters. On the contrary, If OFF is selected, the comparison will be made according to the original sequence. The COMPArator:SWAP? query returns the current state of the swap function.

Command syntax:

$$\text{COMParator:SWAP} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("COMP:SWAP ON")

Query syntax: COMPArator:SWAP?

Return format: <NR1><NL^END>

The COMPArator:BIN:CLEAr command is used to clear all limits on limit table setup page.

Command syntax: COMPArator:BIN:CLEAr

For example: WrtCmd ("COMP:BIN:CLE")

The COMPArator:BIN:COUNT[:STATe] command is used to set the bin count function as ON or OFF. The COMPArator:BIN:COUNT[:STATe]? query returns the current state of the bin count function.

Command syntax:

$$\text{COMParator:BIN:COUNT[:STATe]} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("COMP:BIN:COUN ON")

Query syntax: COMPArator:BIN:COUNT[STATe]?

Return format: <NR1><NL^END>

The COMPArator:BIN:COUNT:DATA? query returns the current comparison result of the bin count.

Query syntax: COMPArator:BIN:COUNT:DATA?

Return format: <BIN1 count>, <BIN2 count>, ..., <BIN9 count>, <OUT OF BIN

count>, <AUX BIN count><NL^END>

Where,

<BIN1-9 count> is the count result of BIN1-9, in NR1 data format.

<OUT OF BIN count> is the count result of the OUT OF BIN, in NR1 data format.

<AUX BIN count> is the count result of the auxiliary bin, in NR1 data format.

The COMPArator:BIN:COUNT:CLEAr command is used to clear all bin count results.

Command syntax: COMPArator:BIN:COUNT:CLEAr

For example: WrtCmd ("COMP:BIN:COUN:CLE")

### 7.1.16 Mass MEMory subsystem commands

The Mass MEMory subsystem commands are used for file storing and load.

Command tree:

Mass MEMory	├── :LOAD──	:STATe <record number>
	└── :STORE──	:STATe <record number>, "<string>"

The MMEMory:LOAD:STATe command is used to load the existed file.

Command syntax: MMEMory:LOAD:STATe<value>

Where,

<value> is the file number ranging from 0 to 39 (NR1).

For example: WrtCmd ("MMEM:LOAD:STAT 1")

The MMEMory:STORE:STATe command is used to storing the current setting to a file.

Command syntax: MMEMory:STOR:STATe<value>, "<string>"

Where,

<value> is the file number ranging from 0 to 39 (NR1).

<string> can be ASCII character string (maximum length is 16).

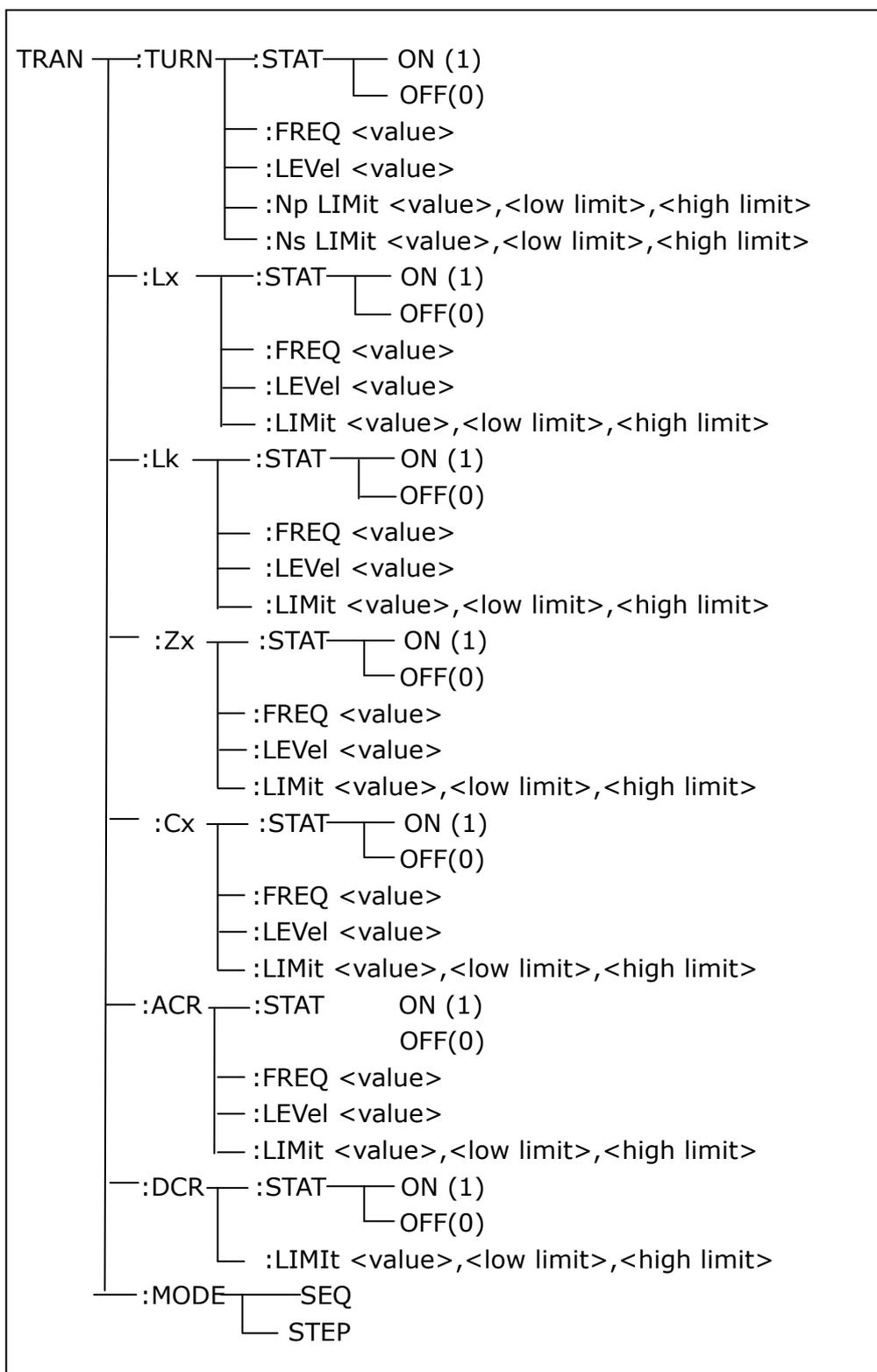
For example: WrtCmd ("MMEM:STOR:STAT 1, "Resistor meas")

or WrtCmd ("MMEM:STOR:STAT 1"), IF "<string>" has not been input, the default file name will be stored.

### 7.1.17 TRAN subsystem commands

The TRAN subsystem commands are mainly used to transformer parameters, such as turn-ratio, primary inductance, leakage inductance, stray capacitance, impedance, AC impedance, DC resistance, working mode and limits of each parameter.

Command tree:



The TRAN:TURN:STAT command is used to set the turn-ratio ON or OFF. The TRAN:TURN:STAT? query returns the current state of the turn-ratio.

Command syntax:

$$\text{TRAN:TURN:STAT} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:TURN:STAT:ON") All test parameter setting of turn-ratio is valid.

Query syntax: TRAN:TURN:STAT?

Return format: <NR1><NL^END>

The TRAN:TURN:FREQ command is used to set the test frequency of turn-ratio.

The TRAN:TURN:FREQ? query returns the current test frequency of turn-ratio.

Command syntax: TRAN:TURN:FREQ <value>

Where,

<value> can be NR1, NR2 or NR3 data format followed by HZ, KHZ, and MHZ.

For example: WrtCmd ("TRAN:TURN:FREQ 1KHZ") Set the test frequency of turn-ratio as 1KHZ.

Query syntax: TRAN:TURN:FREQ?

Return format: <NR3><NL^END>

The TRAN:TURN:LEVEL command is used to set the test level of the turn-ratio.

The TRAN:TURN:LEVEL query returns the current test level of the turn-ratio.

Command syntax: TRAN:TURN:LEVEL<value>

Where,

<value> can be NR1, NR2 or NR3 data format followed by mV or V.

NOTE: <value> ranges from 5mV to 10V. Beyond this range, error information will be reported.

For example: WrtCmd ("TRAN:TURN:LEVEL 1V")

Query syntax: TRAN:TURN:LEVEL?

Return format: <NR3><NL^END>

The TRAN:TURN:NP LLimit command is used to set the primary nominal value, high and low limits. The TRAN:TURN:NP LLimit query returns the current primary nominal value, limits.

Command syntax: TRAN:TURN:NP LLimit <value>, <low limit>, <high limit>

Where,

<value> is the primary nominal value in NR1, NR2 or NR3 data format.

<low limit> is the primary low limit in NR1, NR2 or NR3 data format.

<high limit> is the primary high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:TURN:NPLI 100, -0.01, 0.01")

Query syntax: TRAN:TURN:NPLI?

Return format: <NR3>, <NR3>, <NR3><NL^END>

The TRAN:TURN:NS Limit command is used to set the secondary nominal value, high and low limits. The TRAN:TURN:NS Limit query returns the secondary nominal value, high and low limits.

Command syntax: TRAN:TURN:NS Limit <value>,<low limit>,<high limit>

Where,

<value> is the secondary nominal value in NR1, NR2 or NR3 data format.

<low limit> is the secondary low limit in NR1, NR2 or NR3 data format.

<high limit> is the secondary high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:TURN:NSLI 100, -0.01, 0.01")

Query syntax: TRAN:TURN:NSLI?

Return format: <NR3>,<NR3>,<NR3><NL^END>

The TRAN:Lk:STAT command is used to set the leakage inductance test parameter ON or OFF. The TRAN:Lk:STAT? query returns the current leakage inductance state.

Command syntax:

$$\text{TRAN:Lk:STAT} \left\{ \begin{array}{c} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:Lk:STAT:ON") Set all leakage inductance test parameters to be valid.

Query syntax: TRAN:Lk:STAT?

Return format: <NR1><NL^END>

The TRAN:Lk:FREQ command is used to set the test frequency of the leakage inductance. The TRAN:Lk:FREQ query returns the current test frequency of the leakage inductance.

Command syntax: TRAN:Lk:FREQ<value>

Where,

<value> is NR1, NR2 or NR3 data format followed by HZ, KHZ and MHZ.  
 For example: WrtCmd ("TRAN:Lk:FREQ 1KHZ") Set the test frequency of the leakage inductance is 1KHZ.

Query syntax: TRAN:Lk:FREQ?  
 Return format: <NR3><NL^END>

The TRAN:Lk:LEVel command is used to set the test level of the leakage inductance. The TRAN:Lk:LEVel query returns the current test level of the leakage inductance.

Command syntax: TRAN:Lk:LEVel<value>

Where,

<value> is NR1, NR2 or NR3 data format followed by mV or V.

**Note: <value> ranges from 5mV to 2V. Beyond this range, error information will be reported.**

For example: WrtCmd ("TRAN:Lk:LEVel 1V")

Query syntax: TRAN:Lk:LEVel?  
 Return format: <NR3><NL^END>

The TRAN:Lk:LIMit command is used to set the Lk nominal value, high and low limits. The TRAN:Lk:LIMit? query returns the current Lk nominal value, high and low limits.

Command syntax: TRAN:Lk:LIMit <value>, <low limit>, <high limit>

Where,

<value> is the Lk nominal value in NR1, NR2 or NR3 data format followed by H.

<low limit> is the Lk low limit in NR1, NR2 or NR3 data format.

<high limit> is the Lk high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:Lk:LIMit 0.01H, -0.01H, 0.01")

Query syntax: TRAN:Lk:LIMit?  
 Return format: <NR3>,<NR3><NR3><NL^END>

The TRAN:Lx:STAT command is used to set the primary Lx ON or OFF. The TRAN:Lx:STAT? query returns the current state of the primary Lx.

Command syntax:

TRAN:Lx:STAT  $\left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:Lx:STAT:ON") Set all Lx parameters to be valid.

Query syntax: TRAN:Lx:STAT?

Return format: <NR1><NL^END>

The TRAN:Lx:FREQ command is used to set the Lx test frequency. The TRAN:Lx;FREQ query returns the current Lx test frequency.

Command syntax: TRAN:Lx:FREQ <value>

Where,

<value> is NR1, NR2 or NR3 data format followed by HZ, KHZ and MHZ.

For example: WrtCmd ("TRAN:Lx:FREQ 1KHZ") Set the Lx test frequency as 1KHZ.

Query syntax: TRAN:Lx:FREQ?

Return format: <NR3><NL^END>

The TRAN:Lx:LEVel command is used to set the Lx test level. The TRAN:Lx:LEVel query returns the current Lx test level.

Command syntax: TRAN:Lx:LEVel<value>

Where,

<value> can be NR1, NR2 or NR3 data format followed by mV or V.

NOTE: <value> ranges from 5mV to 2V. Beyond this range, error information will be reported.

For example: WrtCmd ("TRAN:Lx:LEVel 1V")

Query syntax: TRAN:Lx:LEVel?

Return format: <NR3><NL^END>

The TRAN:Lx:LIMit command is used to set the Lx nominal value, high and low limits. The TRAN:Lx:LIMit query returns the current nominal value, high and low limits.

Command syntax: TRAN:Lx:LIMIit <value>, <low limit>, <high limit>

Where,

<value> is the Lx nominal value in NR1, NR2 or NR3 data format followed by H.

<low limit> is the Lx low limit in NR1, NR2 or NR3 data format.

<high limit> is the Lx high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:Lx:LIMit 0.01H, -0.01, 0.01")

Query syntax: TRAN:Lx:LIMit?

Return format: <NR3>,<NR3><NR3><NL^END>

The TRAN:Zx:STAT command is used to set the Zx test parameter as ON or OFF. The TRAN:Zx:STAT? query returns the current state of the Zx test parameter.

Command syntax:

$$\text{TRAN:Zx:STAT} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:Zx:STAT:ON") Set all Zx test parameters to be valid.

Query syntax: TRAN:Zx:STAT?

Return format: <NR1><NL^END>

The TRAN:Zx:FREQ command is used to set the Zx test frequency. The TRAN:Zx:FREQ query returns the current Zx test frequency.

Command syntax: TRAN:Zx:FREQ<value>

Where,

<value> is NR1, NR2 or NR3 data format followed by HZ, KHZ or MHZ.

For example: WrtCmd ("TRAN:Zx:FREQ 1KHZ") Set the Zx frequency as 1KHZ.

Query syntax: TRAN:Zx:FREQ?

Return format: <NR3><NL^END>

The TRAN:Zx:LIMit command is used to set the Zx nominal value, high and low limits. The TRAN:Zx:LIMit? query returns the current Zx nominal value, high and low limits.

Command syntax: TRAN:Zx:LIMit <value>, <low limit>, <high limit>

Where,

<value> is the Zx nominal value in NR1, NR2 or NR3 data format followed by H.

<low limit> is the Zx low limit in NR1, NR2 or NR3 data format.

<high limit> is the Zx high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:Zx:LIMit 0.01H, -0.01, 0.01")

Query syntax: TRAN:Zx:LIMit?

Return format: <NR3>,<NR3><NR3><NL^END>

The TRAN:ACR:STAT command is used to set the ACR test parameter to be ON or OFF. The TRAN:ACR:STAT query returns the current state of the ACR test parameter.

Command syntax:

$$\text{TRAN:ACR:STAT} \left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:ACR:STAT:ON") Set the ACR test parameter to be valid.

The TRAN:ACR:FREQ command is used to set the ACR test frequency. The TRAN:ACR:FREQ? query returns the current ACR test frequency.

Command syntax: TRAN:ACR:FREQ<value>

Where,

<value> is NR1, NR2 or NR3 data format followed by HZ, KHZ, or MHZ.

For example: WrtCmd ("TRAN:ACR:FREQ 1KHZ") Set the ACR test frequency as 1KHZ.

Query syntax: TRAN:ACR:FREQ?

Return format: <NR3><NL^END>

The TRAN:ACR:LEVel command is used to set the ACR test level. The TRAN:ACR:LEVel query returns the current ACR level.

Command syntax: TRAN:ACR:LEVel<value>

Query syntax: TRAN:ACR:LEVel?

Return format: <NR3><NL^END>

The TRAN:ACR:LIMit command is used to set the ACR nominal value, high and low limits. The TRAN:ACR:LIMit query returns the current ACR nominal value, high and low limits.

Command syntax: TRAN:ACR:LIMit<value>,<low limit>,<high limit>

Where,

<value> is the ACR nominal value in NR1, NR2 or NR3 data format followed by H.

<low limit> is the ACR low limit in NR1, NR2 or NR3 data format.

<high limit> is the ACR high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:ACR:LIMit 0.01H, -0.01, 0.01")

Query syntax: TRAN:ACR:LIMit?

Return format: <NR3>,<NR3><NR3><NL^END>

The TRAN:Cx:STAT command is used to set the Cx test parameter to be ON or OFF. The TRAN:Cx:STAT query returns the current state of the Cx test parameter.

Command syntax:

$$\text{TRAN:Cx:STAT} \left\{ \begin{array}{c} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:Cx:STAT:ON") Set the Cx test parameter to be valid.

Query syntax: TRAN:Cx:STAT?

Return format: <NR1><NL^END>

The TRAN:Cx:FREQ command is used to set the Cx test frequency. The TRAN:Cx:FREQ? query returns the current Cx test frequency.

Command syntax: TRAN:Cx:FREQ <value>

Where,

<value> is NR1, NR2 or NR3 data format followed by HZ, KHZ and MHZ.

For example: WrtCmd ("TRAN:Cx:FREQ 1KHZ") Set the Cx test frequency as 1KHZ.

Query syntax: TRAN:Cx:FREQ?

Return format: <NR3><NL^END>

The TRAN:Cx:LEVel command is used to set the Cx test level. The TRAN:Cx:LEVel? query returns the current Cx text level.

Command syntax: TRAN:Cx:LEVel <value>

Where,

<value> is NR1, NR2 or NR3 data format followed by mV or V.

**NOTE: <value> ranges from 5mV to 2V. Beyond this range, error information will be reported.**

For example: WrtCmd ("TRAN:Cx:LEVel 1V")

Query syntax: TRAN:Cx:LEVel?

Return format: <NR3><NL^END>

The TRAN:Lx:LIMit command is used to set the Cx nominal value, high and low limits. The TRAN:Lx:LIMit? query returns the current Cx nominal value, high and low limits.

Command syntax: TRAN:Cx:LIMit <value>,<low limit>,<high limit>

Where,

<value> is the Cx nominal value in NR1, NR2 or NR3 data format followed by H.

<low limit> is the low limit in NR1, NR2 or NR3 data format.

<high limit> is the high limit in NR1, NR2 or NR3 data format.

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd ("TRAN:Cx:LIMit 0.01H, -0.01, 0.01")

Query syntax: TRAN:Cx:LIMit?

Return format: <NR3>, <NR3><NR3><NL^END>

The TRAN:DCR:STAT command is used to set the DCR test parameter to be ON or OFF. The TRAN:DCR:STAT? query returns the current state of the DCR test parameter.

Command syntax:

$$\text{TRAN:DCR:STAT} \left\{ \begin{array}{c} \text{ON} \\ \text{OFF} \\ 1 \\ 0 \end{array} \right\}$$

Where,

1 (decimal 49) is equal to ON.

0 (decimal 48) is equal to OFF.

For example: WrtCmd ("TRAN:DCR:STAT:ON")

Query syntax: TRAN:DCR:STAT?

Return format: <NR1><NL^END>

The TRAN:DCR:LIMit command is used to set the DCR nominal value, high and low limit. The TRAN:DCR:LIMit? query returns the current DCR nominal value, high and low limits.

Command syntax: TRAN:DCR:LIMit <value>,<low limit>,<high limit>

Where,

<value> is the DCR nominal value in NR1, NR2 or NR3 data format followed by  $\Omega$ .

<low limit> is the DCR low limit in NR1, NR2 or NR3 data format.

<high limit> is the DCR high limit in NR1, NR2 or NR3 data format

**NOTE: The low limit should be smaller than the high limit, or error information will be reported.**

For example: WrtCmd("TRAN:DCR:LIMIT 50  $\Omega$ , -0.01, 0.01")

Query syntax: TRAN:DCR:LIMI?

Return format: <NR3>,<NR3><NR3><NL^END>

The TRAN:MODE is used to set the transformer working mode. The TRAN:MODE? query returns the current working mode of the transformer.

Command syntax:

TRAN:MODE { SEQuence  
STEPped }

Where,

SEQuence refers to sequential mode.

STEPped refers to single step mode.

For example: WrtCmd ("TRAN:MODE SEQ")

Query syntax: TRAN:MODE?

Return format: { SEQ  
<NL^END>  
STEP }

## 7.2 GPIB Common Commands

- \*RST      ● \*TRG      ● \*IDN      ● \*TST
- \*ESE      ● \*SRE      ● \*ESR      ● \*STB
- \*OPC      ● \*CLS

- The \*RST command resets the instrument.  
For example: WrtCmd ("\*RST")
- The \*TRG command triggers the measurement and then sends the result to the output buffer.  
For example: WrtCmd ("\*TRG")
- The \*CLS command clears the standard event status register and the service request status register.  
Command syntax: \*CLS  
For example: WrtCmd ("\*CLS")
- The \*IDN? query returns U2829 ID.  
Query syntax: \*IDN?  
Return format: <manufacturer>,<model>,<firmware><NL^END>  
Where,  
<manufacturer>      Name of Manufacturer ( Eucl)  
<model>              Instrument Model (U2829)  
<firmware>            Firmware Version (VER1.0.0)  
For example: WrtCmd ("\*IDN?");
- The \*TST? query executes an internal self test and returns the test result as the sum of all existing errors codes. If there are no error U2829 returns 0.  
Query syntax: \*TST?  
Return format: 0<NL^END>  
Where,  
0            0 (NR1 format)  
For example: WrtCmd ("\*TST?");
- The \*ESE (standard Event Status Enable command) command sets each open bit of the standard event status register. This command returns setups of each open bit for the standard event status permission register.

Command syntax: \*ESE<value>

Where,

<value> NR1 format: decimal expression for each bit of operation status register.

Descriptions for each byte of the standard event status register are shown as follows:

Bit number	Description
7	Power On(PON) Bit
6	User Request(URQ) Bit
5	Command Error(EME) Bit
4	Execution Error(EXE) Bit
3	Device Dependent Error(DDE) Bit
2	Query Error(QYE) Bit
1	Request Control(RQC) Bit
0	Operation Complete(OPC) Bit

Query syntax: \*ESE?

Return format: <value><NL^END>

For example: WrtCmd ("\*ESE?")

- The \*SRE (Service Request Enable command) command sets each open bit of the service status byte register. This command returns the current setups for each open bit of the status byte permission register.

Command syntax: \*SRE<value>

Where,

<value> NR1 format: decimal expression for each permission bit of the status byte register.

Descriptions for each byte of the status byte register are shown as follows:

Bit number	Description
7	Operation Status Register Summary Bit
6	RQS(Request Service) Bit
5	Standard Event Status Register Summary Bit
4	MAV(Message Available) Bit
3-0	Always 0(zero):

Query syntax: \*SRE?

Return format: <value><NL^END>

For example: WrtCmd ("\*SRE?");

- The \*ESR? query returns the contents of the standard event status register.

Query syntax: \*ESR?

Return format: <value><NL^END>

Where,

<value> NR1 format: decimal expression for contents of the standard event status register.

Descriptions for each bit of the standard event status register

Bit number	Description
7	Power On(PON) Bit
6	User Request(URQ) Bit
5	Command Error(EME) Bit
4	Execution Error(EXE) Bit
3	Device Dependent Error(DDE) Bit
2	Query Error(QYE) Bit
1	Request Control(RQC) Bit
0	Operation Complete(OPC) Bit

For example: WrtCmd ("\*ESR?")

- The \*STB? query returns contents of the standard service status byte register. The execution of this command will not affect contents of the standard status byte register.

Query syntax: \*STB?

Return format: <value><NL^END>

Where,

<value> NR1 format: decimal expression for contents of the standard status byte register.

Descriptions for each bit of the standard status byte register

Bit number	Description
7	Operation Status Register Summary Bit
6	RQS(Request Service) Bit
5	Standard Event Status Register Summary Bit
4	MAV(Message Available) Bit
3-0	Always 0(zero)

For example: WrtCmd ("\*STB?")

- The \*OPC command equals to set the OPC bit of the standard event status register when U2829 finishes all parameter measurements. Ever since all pending operations have been completed, this command will inform the instrument to add a ASCII number "1" (decimal number: 49) into the output buffer.

Command syntax: \*OPC

For example: OUTPUT 717;"\*OPC"! Set the OPC bit of the instrument when the last command is done.

Query syntax: \*OPC?

Return format: 1 <NL^END>

Where,

1 ASCII number 1 (decimal number: 49)

For example: WrtCmd ("\*OPC?")