S3600 Series Vector Network Analyzer

User Manual

Saluki Technology Inc.

The document applies to the vector network analyzer of the following models:

- S3600-265 Vector network analyzer (300kHz - 6.5GHz, 2 ports)
- S3600-465 Vector network analyzer (300kHz - 6.5GHz, 4 ports)
- S3600-285 Vector network analyzer (300kHz - 8.5GHz, 2 ports)
- S3600-485 Vector network analyzer (300kHz - 8.5GHz, 4 ports)

Standard Accessories of S3600 Series Vector network analyzer

Item	Name	Qty
1	Main Machine	1 Set
2	Power Cord	1 pcs
3	User Manual	1 pcs
4	CD or U disk	1 pcs

Options of the S3600 Series Vector network analyzer

Part No.	Name	Description
S3600-01	SK-CAL-NM_60 calibration kit	High precision, 6.5GHz, Type-N Male calibration kits, Open-Short-Load-Through
S3600-02	SK-CAL-NF_60 calibration kit	High precision, 6.5GHz, Type-N Female calibration kits, Open-Short-Load-Through
S3600-03	SK-CAL-SMAM_60 calibration kit	High precision, 6.5GHz, SMA Male calibration kits, Open-Short-Load-Through
S3600-05	SK-CAL-SMNF_60 calibration kit	High precision, 6.5GHz, SMA Female calibration kits, Open-Short-Load-Through
S3600-06	SK-CAL-NM_90 calibration kit	High precision, 9GHz, Type-N Male calibration kits, Open-Short-Load-Through
S3600-07	SK-CAL-NF_90 calibration kit	High precision, 9GHz, Type-N Female calibration kits, Open-Short-Load-Through
S3600-08	SK-CAL-SMAM_90 calibration kit	High precision, 9GHz, SMA Male calibration kits, Open-Short-Load-Through
S3600-09	SK-CAL-SMAF_90 calibration kit	High precision, 9GHz, SMA Female calibration kits, Open-Short-Load-Through
S3600-10	C9502A electronic calibration kit	2 port, 9.5GHz, 3.5mm Female electronic Calibration Module
S3600-11	C9502A_N electronic calibration kit	2 port, 9.5GHz, Type-N Female electronic Calibration Module
S3600-12	C9504A electronic calibration kit	4 port, 9.5GHz, 3.5mm Female electronic Calibration Module

Part No.	Name	Description
S3600-13	C9504A_N electronic calibration kit	4 port, 9.5GHz, Type-N Female electronic Calibration Module
S3600-14	RF cable	High precision, 6.5GHz, 50Ω, N-N cable
S3600-15	RF cable	High precision, 6.5GHz, 50Ω, N-SMA cable
S3600-16	RF cable	High precision, 18GHz, 50Ω, N-N cable
S3600-17	RF cable	High precision, 18GHz, 50Ω, N-SMA cable
S3600-18	Time domain option	/
S3600-21	Circuit simulation function option	/
S3600-22	Power range expansion option	Power range -70dBm to +10dBm

Preface

Thanks for choosing S3600 series vector network analyzer produced by Saluki Technology Inc.

Document No.

S3600-03-01

Version

Rev01 2021.04

Saluki Technology

Document Authorization

The information contained in this document is subject to change without notice. The power to interpret the contents of and terms used in this document rests with Saluki.

Product Quality Assurance

The warranty period of the product is 36 months from the date of delivery.

Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

Quality/Environment Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

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Safety Precautions

The following are general safety precautions that are not necessarily related to any specific part or procedure, and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and apply to all phases of operation and maintenance.

WARNING
KeepAwayfromLiveCircuits
Operating Personnel must at all times observe general safety precautions. Do not replace components or make adjustments to the inside of the test equipment with the high voltage supply turned on. To avoid casualties, always remove power.

WARNING
Shock Hazard
Do not attempt to remove the RF transmission line while RF power is present.

WARNING
Do Not Service or Adjust Alone
Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

WARNING
Safety Earth Ground
An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two-conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

WARNING
Resuscitation
Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

WARNING
Remove Power
Observe general safety precautions. Do not open the instrument with the power applied.

WARNING
Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

CAUTION

Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.

The caution symbol appears on the equipment indicating there is important information in the instruction manual regarding that particular area

Note: *Calls attention to supplemental information.*

Content

1 General Overview

S3600 series vector network analyzer offers wide dynamic range, low noise level, high resolution scanning with laboratory and research grade performance. It is suitable for laboratory, manufacturing and many other safety testing environment. S3600 series covers frequency range of 300kHz to 8.5GHz, and provides measurement convenience by offering user excellent performance and attractive pricing.

1.1 Introduction

1.1.1 Panel Description

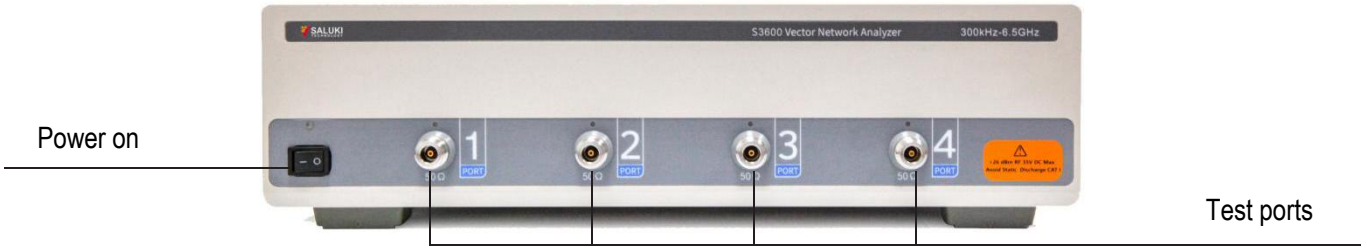


Figure 1-1 Front Panel

Figure 1-2 Rear Panel

Main interface description:

1. VIDEO Interface

An interface for connecting an external monitor (display device). By connecting the monitor to this connector, you can synchronize the same information displayed on the host LCD screen on the external monitor.

Connector type: DVI, HDMI.

2. USB Interface

The instrument provides multiple USB (Universal Serial Bus) interfaces that can be used to connect a USB keyboard, a USB mouse, a USB memory, or a USB printer.

3. LAN Interface

Connect the instrument to the LAN (LAN) interface. 8-pin RJ-45, 10Base-T/100Base-TX Ethernet interface.

4. Reference Clock

REF IN, 10MHz reference signal input interface. When the instrument is set to external reference, the reference clock signal is input from this interface, the instrument will automatically lock the signal, improve the accuracy of the measurement signal and frequency stability.

REF OUT, 10MHz reference signal output interface. The instrument internal clock signal is output from this interface and used as a reference clock for other instruments.

5. External Trigger Interface

External trigger signal interface. SMA, female connector, this interface detects the TTL signal from the high state of the negative transition as a trigger signal. To use this interface to generate a trigger signal, the instrument trigger source must be set to "external".

6. Power Plug and Switch

The main power switch of the instrument. Used to connect (|) or disconnect (O) external power supply.

[Note]: The instrument must be powered by a power outlet with a ground terminal and the ground terminal of the power outlet must be properly grounded.

7. Nameplate

Identify the product model, P/N number, S/N number, date of growth, service call and other information.

8. Ground Terminal

The ground terminal, used for instrumentation and environment, can be connected to this ground terminal using a banana plug.

[Note]: When using the instrument, be sure to ground the instrument.

1.2 Interface

The main interface of the instrument is as follows:

Figure 1-3 Instrument Display Interface

1.2.1 Channel Window

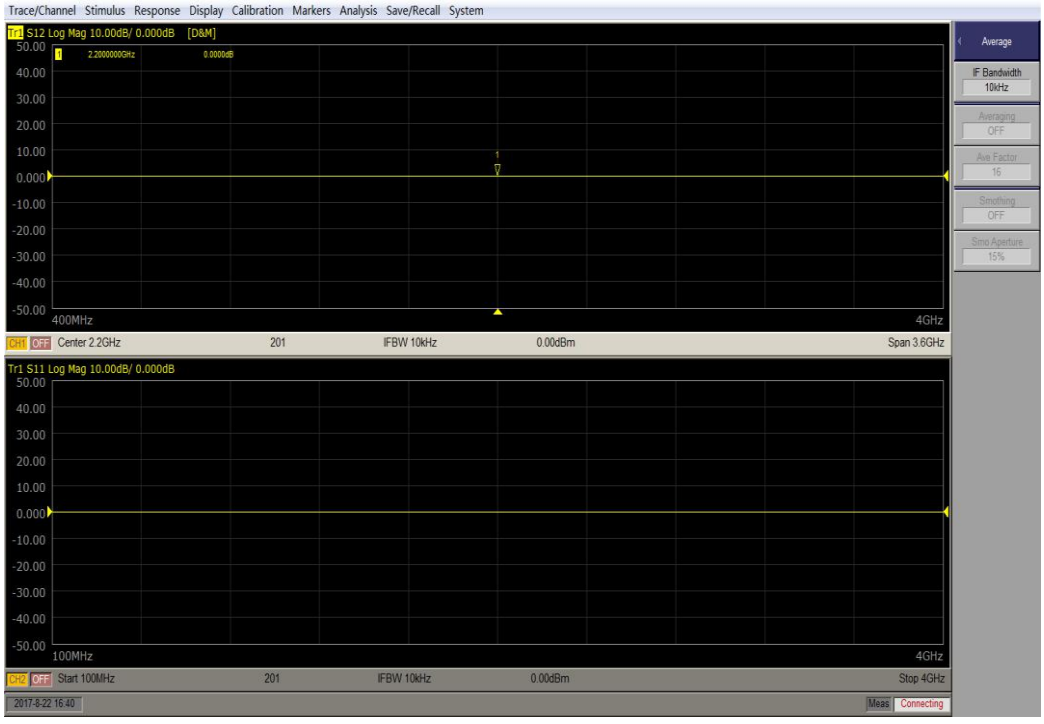


Figure 1-4 Channel Window

The window used to display the trace. Because a channel corresponds to a window, it is called a channel window. When the outline of the channel window is light gray, it indicates that the channel is a working channel (the setting is being made for that channel). In the following figure, channel 1 (upper window) is the working channel.

To make the channel a working channel, use the Channel Next or Channel Prev button. Clicking inside the channel window also makes the channel a working channel.

Channel 1 Window and Channel 2 Window Describes the different measurement parameters available in the channel measurement window. The measurement parameters described in channels 1 and 2 correspond to the same channel measurement window. These parameters are displayed in a separate window for ease of reading.

1.2.2 Data Entry Bar

Data entry field. Used to enter numeric data. Press the button or function key of the input data, the data entry bar will appear at the top of the screen. As shown below:

Figure 1-5 Data Entry Bar

Parameter name: Displays the name of the parameter for which you want to enter a value.

Data entry box: The first time the data entry field is displayed, the current setting is displayed in the column. By typing in the input area of the front panel, you can also use the mouse or touch screen to operate the large step button and enter the value with the small step button.

Small step button: Increase or decrease the value in the data entry box in small steps. Use the mouse or touch screen to operate this button.

Big step button: Increase or decrease the value in the data entry box in large steps. Use the mouse or touch screen to operate this button.

Confirm button: Press this button to confirm the input value. Use the mouse or touch screen to operate this button.

Close button: Close the data entry box. Use the mouse or touch screen to operate this button.

1.2.3 Instrument Status Bar

The instrument status bar shows the current operating status of the entire instrument.

READY	Indicates that the instrument is operating normally.
NOT READY	Indicates that the instrument is abnormal.

1.2.4 Function Menu

The function menu is a set of function buttons on the display, use the front panel , and , buttons, select the Enter button, or turn the knob, press the knob, or use the mouse, touch screen operation. Use the shortcut buttons on the front panel to quickly access the corresponding function menu. The following to Marker Search as an example to illustrate:

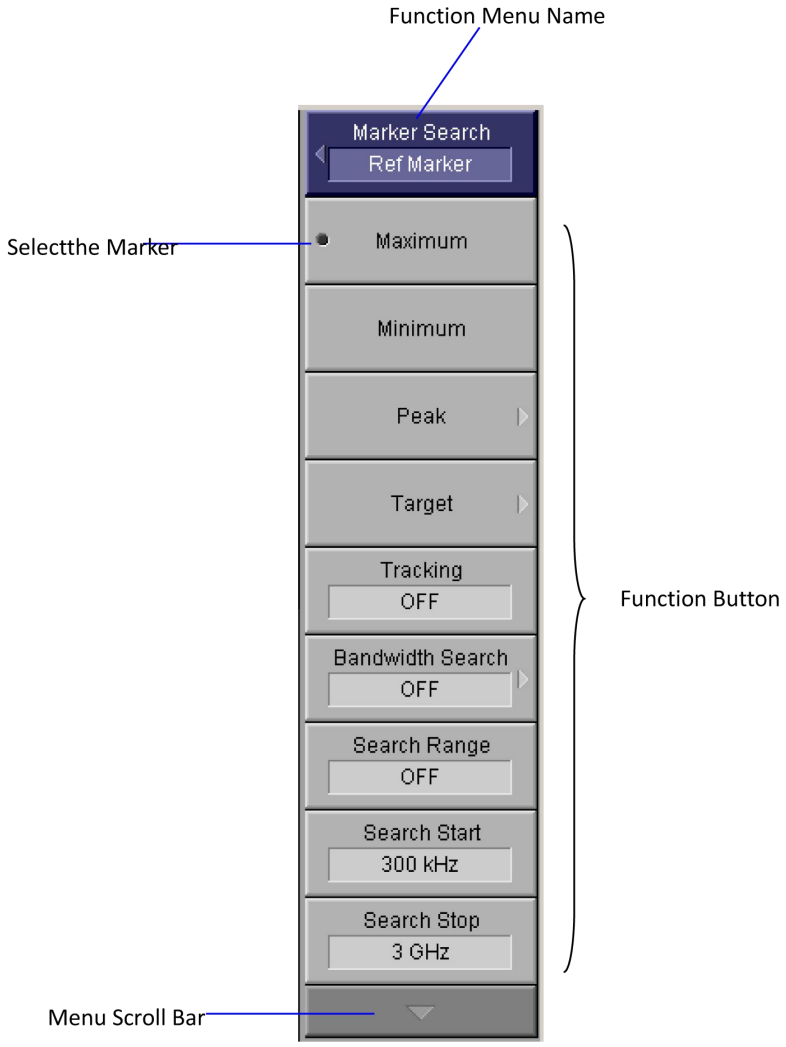
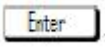
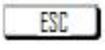


Figure 1-6 Function Menu

Mouse or panel keyboard  or  knob to select the function button, the selected function button color reverse display.  ,  or  when you select the function button, move the cursor up and down,  and  select between the main menu and the sub menu.

Function button select  button or  knob to perform this function.Press  to exit the current operation.

Select the marker. RBI "●" indicates that the function button is selected.

Menu scroll bar. When the menu is not displayed on the screen, press the function button on the mouse or touch screen, or press the  button down on the panel  keyboard to scroll up.

Function button. The function button is the softkey to be used when the actual setting is made. When "▶" is displayed on the right side of the function button, the function button will display the next function menu.

1.3 Power On Operation

1.3.1 Preparations Before Starting Up

1. Check whether the power supply to meet the requirements.
2. The instrument is properly grounded.
3. Disconnect the device under test and the connection.

1.3.2 Startup Steps

1. Turn on the power switch on the rear panel (desktop) of the instrument.
2. Turn on the power switch on the front panel (desktop) or side panel (portable) of the instrument.
3. The instrument display is lit, start the process, after the start is complete, the main interface "instrument status" is displayed as "Ready" (instrument status see "interface" section description).
4. Connect the test cable, adapter, etc. to the test port of the instrument.
5. The instrument preheat. When the instrument is not started for a long time, it is necessary to warm up for a certain period of time and start the measurement. The time of warm-up is shown in the data sheet of the corresponding model instrument.

1.4 Instrument Operation Method

You can use one of the following three methods of operation or various methods and operate the instrument:

1) Use the front panel buttons.
2) Use the mouse.
3) Use the touch screen.

1.5 Measurements Steps

The basic test procedure is as follows:

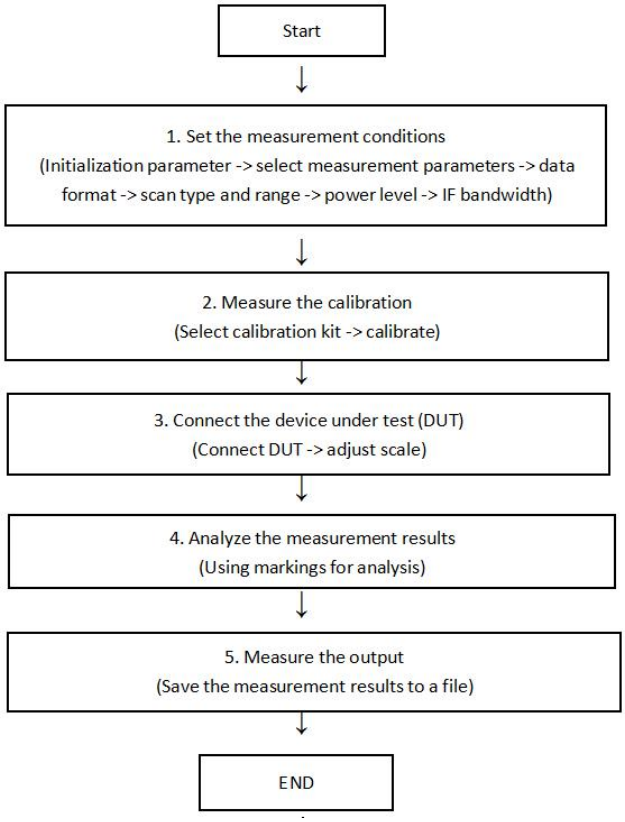


Figure 1-7 Basic test operation flow

2 Set the Measurement Conditions

2.1 Preset

This functions returns the instrument to factory default.

Steps:

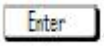
1. Press the function button Preset or front panel shortcut buttons 

.
2. Click the function button OK.

2.2 Calibration/System Z0

Steps:

1. Press the function button Calibration or the panel shortcut 

.
2. Click the Function button System Z0.
3. Press the 
, 
button to select the impedance value, or type the impedance value directly.
4. Press the 

button to confirm.

2.3 Set the Channel and Trace

2.3.1 Number of Channels and Display Window Layout Settings

Steps:

1. Click the function button Display or press the panel keypad 

.
2. Click the function button Allocate Channels.
3. Press 
, 
to select or use the touch screen, and click the desired window layout. As shown below:

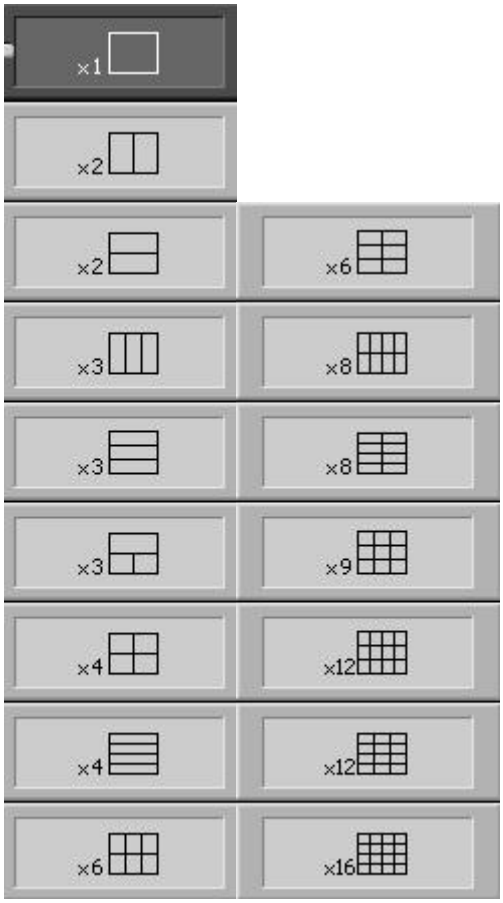


Figure 2-1 Channel window layout settings

2.3.2 Trace Quantity and Display Window Layout Settings

(1) the number of traces set

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set the trace to display.
2. Press the Display button.
3. Click the Number of Traces button to set the number of traces to be displayed.

(2) trace display window layout settings

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set the trace to display.
2. Press the Display button.
3. Click the Allocate Traces function button.

4. Press , to select or use the touch screen, and click the desired window layout. As shown below:

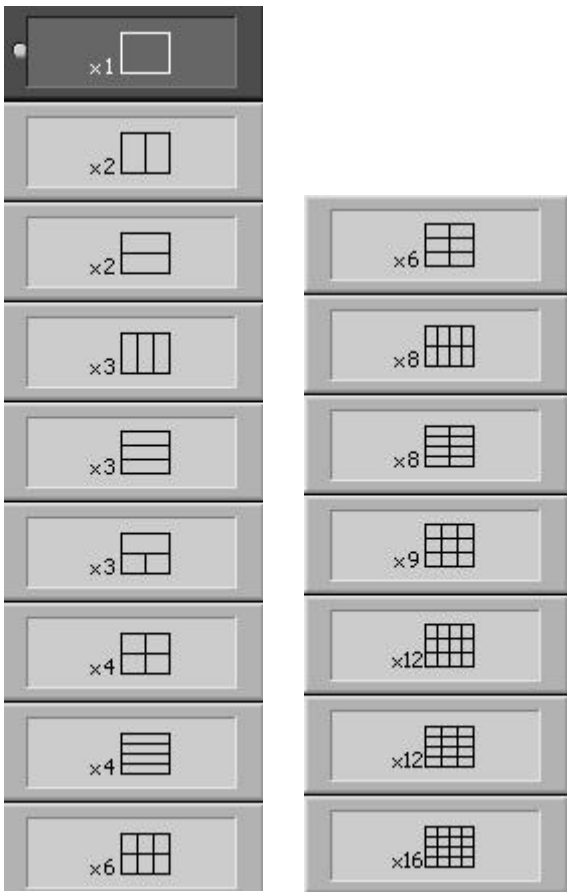


Figure 2-2 Trace window layout settings

2.3.3 Active Channel

Steps:

Press Channel Next or Channel Prev to select the channel you want to activate.

Or press the function button Display> Active Trace/Channel> Next Channel,

Previous Channel select the channel to be activated.

The buttons are defined as follows:

Button	Function
Channel Next	Change the active work channel to the next channel with the larger channel number.
Channel Prev	Change the active working channel to the last channel with a smaller channel number.

2.3.4 Active Trace

Steps:

Press Trace Next or Trace Prev to select the trace you want to activate.

Or click the function button Display> Active Trace/Channel> Next Trace, Previous Trace select the channel to be activated trace.

The buttons are defined as follows:

Button	Function
Trace Next	Change the active job trace to the next trace of the trace number.
Trace Prev	Change the active job trace to the last trace of the trace number.

2.4 Stimulus

2.4.1 Sweep Type

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to activate.
2. Press the Sweep Setup button.
3. Click the Sweep Type function button.
4. Select the desired scan type, press the Enter button. The scan type is as follows:

Scan Type	Description
Linear	Linear frequency scanning
Log	Logarithmic frequency sweep
Segment	Segmented frequency sweep
Power Sweep	Power scan

2.4.2 Sweep Range

(1) Set the scan range through Freq

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Freq button.

3. Enter the value through the (Enter) button in the panel input area.

(2) Set the scan range by Marker

Steps:

1. Operate the Marker function to set the Marker point.

2. Press the Marker Fctn button.

3. On the function menu, press the relevant function button to set the Start, Stop, Center values.

The Marker Fctn function button is as follows:

Function Button	Description
Marker → Start	Set the Start value to the Marker value selected on the currently active trace.
Marker → Stop	Set the Stop value to the Marker value selected on the currently active trace.
Marker → Center	Set the Center value to the Marker value selected on the currently active trace.

Note: If the marker value is relative to the reference marker, its absolute value will be set to the scan range.

2.4.3 Rf Out

Turns on and off the output of the excitation signal. When the excitation signal is turned off, normal measurement can not be performed, so it is usually not necessary to turn off the excitation signal output. This function is mainly used for the output is closed and then restart the occasion.

Steps:

1. Press the Sweep Setup button.

2. Click the Power button.

3. Click the RF Out function button to switch between ON and OFF once every click. When set to ON, the signal output is turned on. When set to OFF, the signal output is turned off.

2.4.4 CW Freq

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Power button.

4. Click the CW Freq button.

5. Enter the value through the buttons on the panel.

2.4.5 Power

In the frequency sweep mode, the source output power can be set in the power range.

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Power button.

4. Then click the next level of the Power button.

5. Enter the value through the buttons on the panel.

The correction power can be turned on, off, and the correction factor as needed.

(1) The calibration power to open, close the operating method

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Power button.

4. Click the Slope State function button to switch between ON and OFF once every click. When set to ON, the calibration power is turned on; when set to OFF, the calibration power is turned off.

(2) Power correction factor setting

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Power button.

4. Click the Slope Data button.

5. Enter the value through the buttons on the panel.

2.4.6 Point

Set the number of scans to be scanned once, and the number of points refers to the number of data items collected at a time. The purpose is to obtain a higher trace resolution for the stimulus value. The number of scanning points is usually selected according to the following conditions.

1) To obtain a higher trace resolution for the stimulus value, select a larger point value.

2) For higher throughput, keep a small value within the allowable trace resolution range.

3) To obtain a higher measurement accuracy after calibration, use the same points as the actual measurement to calibrate.

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Points button.

4. Press the "enter" button on the panel, then enter the value. Refer to the data sheet for each model instrument for the range of input values.

2.4.7 Meas Delay

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.

2. Press the Sweep Setup button.

3. Click the Meas Delay button.

4. Enter the value through the buttons on the panel.

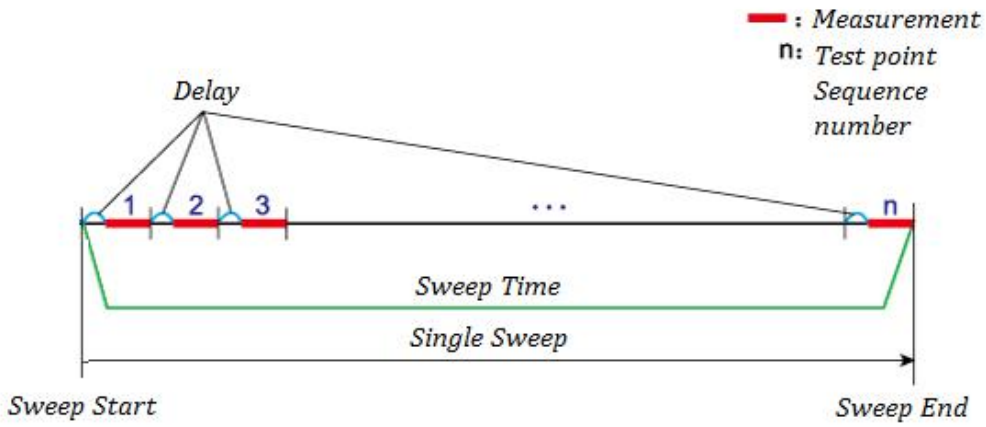


Figure 2-3 Measurement delay diagram

2.5 Measurement

2.5.1 S-parameter Measurement

The S parameter (scattering parameter) is used to evaluate the performance of the DUT reflected signal and the transmitted signal. The S parameter is defined by the ratio of two complex numbers, which contains information about the amplitude and phase of the signal. The S parameter is usually expressed as:

S output input

Output: DUT port number of the output signal

Input: The DUT port number of the input signal

For example: S parameter S21 is the ratio of the output signal of DUT port 2 to the input signal of DUT port 1, and the output signal and input signal are expressed in complex numbers.

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.
2. Press the Meas button.
3. Click the function button for the relevant S parameter. S parameters include: S11, S21, S12, S22.

2.6 Format

Provide the following data display format:

1. Rectangular display format
2. Polar coordinate format
3. Smith chart format

2.6.1 Rectangular

Including Log Mag, SWR, Phase, Expand Phase, Group Dalay, Lin Mag, Real, Imag.

The specific meaning is as follows:

Type Symbol	Type Name	Introduction	Unit	Examples
Log Mag	Logarithmic Amplitude	Amplitude	dB	Return loss measurement, insertion loss measurement (or gain measurement)
SWR				

	Column Ratio	$\frac{1+\rho}{1-\rho}$ (ρ : Reflection coefficient)		
Phase	Phase	Phase(The display range is -180 ° to + 180 °)	Degree (°)	Measure the deviation from the linear phase.
Expand Phase	Extended Phase	Phase(It is possible to display a phase of + 180 ° or more and -180 ° or less)	Degree (°)	Measure the deviation from the linear phase.
Group Dalay	Group Dalay	Signal transmission delay in the DUT	Second (s)	
Lin Mag	Linear amplitude			
Real	Real number	The real part of the measured complex parameter		
Imag	Imaginary number	The imaginary part of the measured complex number		

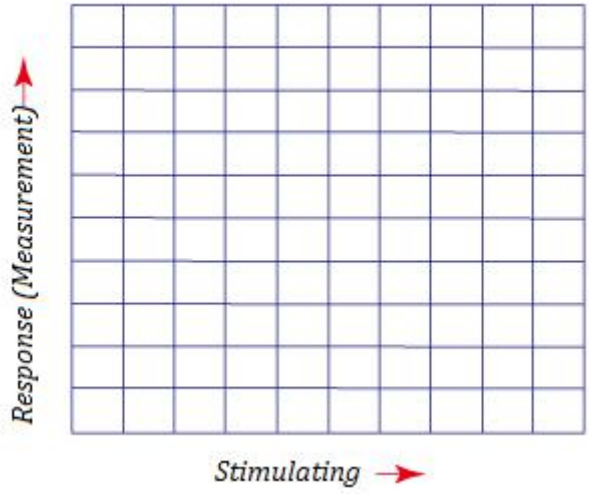


Figure 2-4 Data format - Rectangular

2.6.2 Polar

In the polar coordinate scheme, the magnitude is represented by the displacement (the linearity) with the displacement of the origin, and the traces are drawn in an offset from the positive X-axis in the counterclockwise direction.

You can select one of the following three data sets to display the tag response value:

a) Log/Phase

b) Lin/Phase

c) Real/Imag.

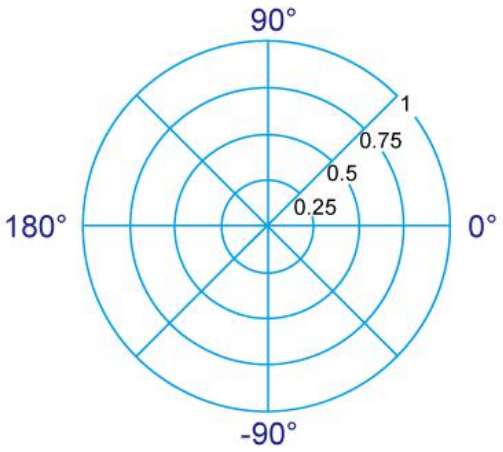


Figure 2-5 Data format - Polar format

2.6.3 Smith

The Smith chart format is used to display the impedance based on the DUT reflection measurement data.

You can select one of the following three data sets to display the tag response value:

a) Log/Phase

b) Lin/Phase

c) Real/Imag.

d) R＋jX

e) G＋jB

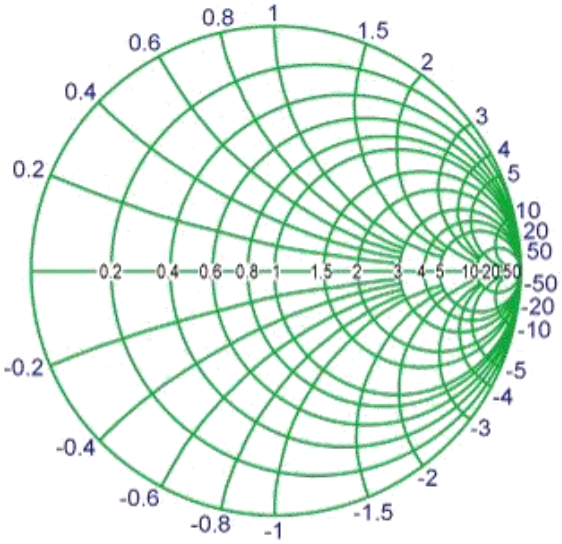


Figure 2-6 Data format - Smith chart format

2.7 Scale

2.7.1 Auto Scale

The auto calibration function is used to automatically adjust each scale (scale/index and reference line), which will cause the trace to be displayed on the screen at the appropriate size for easy viewing.

(1) Single trace automatic calibration

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to perform the automatic calibration function.
2. Press the Scale button.
3. Click the Auto Scale button.

(2) Automatically calibrate all traces within the channel

Steps:

1. Press Channel Next or Channel Prev button to select the channel to perform the auto calibration function.
2. Press the Scale button.
3. Click the Auto Scale All button.

2.7.2 Adjust the Cartesian Scale Manually

For Cartesian display formats, you can use the four parameters to manually adjust the scale.

Adjustable Features	Introduction
Divisions	Defines the degree of division on the Y axis. You must use an even number between 4 and 30. After setting, it is usually applied to all traces of the channel that are displayed in any Cartesian format.
Scale/Div	Defines the number of increments for each index on the Y axis. This value applies only to work traces.
Ref Position	Defines the position of the reference line. The position must be specified using the value (the least significant value) starting from 0 on each of the sub-indexes on the Y-axis, up to the number of divisions used (maximum effective value). This position applies only to work traces.
Ref Value	Defines the value corresponding to the reference line. Must be set on the unit on the Y axis. The reference line value is only applied to the working trace.

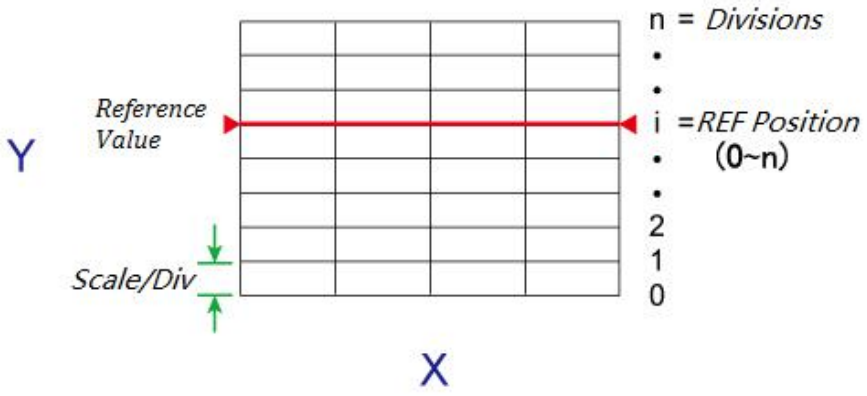


Figure 2-7 Manual adjustment Cartesian scale

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to perform the automatic calibration function.
2. Press the Scale button.
3. Select the need to adjust the specific characteristics of the corresponding function keys.

The function keys are shown in the following table:

Function Keys	Function
Divisions	Defines the degree of division on the Y axis
Scale/Div	Defines the number of increments for each index on the Y axis

Ref Position	Defines the position of the reference line
Ref Value	Defines the value corresponding to the reference line

2.7.3 Artificially Adjust the Polar Plot Smith Scale

Use the displacement (the outermost scale/Div) to manually adjust the Smith chart format or the polar coordinate format. As shown below:

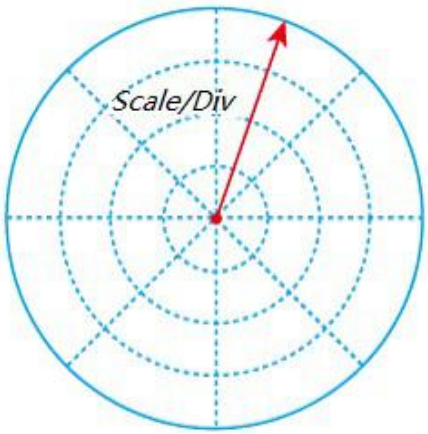


Figure 2-8 Polar plot scale adjustment

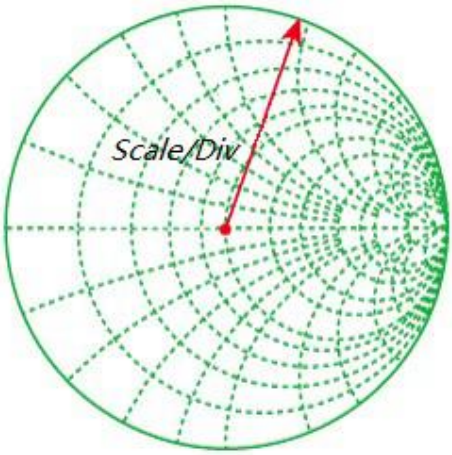


Figure 2-9 Smith chart scale adjustment

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to perform the automatic calibration function.
2. Press the Scale button.
3. Click the Scale/Div button.

4. Enter the value through the buttons on the panel.

2.7.4 Other Parameter Settings

(1) Electrical delay

The electrical delay function can add or remove a pseudo-depleted transmission line whose length varies with the receiver input. Use this function to increase the resolution of the phase measurement so that the linear phase offset can be measured. You can specify an electrical delay for each trace.

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to perform the automatic calibration function.
2. Press the Scale button.
3. Click the Electrical delay button.
4. Enter the value through the buttons on the panel.

(2) Phase offset

The phase offset function may be used to add or subtract a predetermined value associated with the frequency of the incoming and outgoing traces. Use this function to simulate a phase shift that occurs after an event such as adding a cable.

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to perform the automatic calibration function.
2. Press the Scale button.
3. Click the Phase offset button.
4. Enter the value through the buttons on the panel.

2.8 Display

2.8.1 Channel Max

When multiple channels are used, the specific channel window on the screen can be maximized.

Steps:

1. Press Channel Next or Channel Prev button to select the channel to maximize its window.
2. Press the Channe button to maximize the channel window.

3. Press the Channe button again to narrow the window to the previous size.

2.8.2 Trace Max

When multiple traces are displayed in the channel window, you can also maximize the particular trace displayed in the channel window.

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to maximize the trace.
2. Press the Trace button to maximize the trace display.
3. Press the Trace button again to reduce the display to the previous size.

2.8.3 Trace Data Operations

This function is to select the trace measurement data and memory data and the two operations after the data display. For each trace that displays the measurement data, there is an additional trace called a storage trace for temporarily storing the measurement data. You can use storage traces to compare traces on the screen or perform complex data calculations between storage traces and measurement data.

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or Trace Prev to select the trace to be performed.
2. Press the Display button.
3. Click the Data-> Memory button to save the currently active trace data to memory.
4. Click the Data Math function button, click the corresponding function button, select the measurement trace data and memory data to calculate, including the following operations:

Function Button	Introduction
Data/Mem	The measurement data for the current trace is divided by the memory data, which is used to evaluate the ratio of the current measurement data to the memory data, such as the evaluation magnification, the attenuation factor, and so on.
Data*Mem	The measured data of the current trace is multiplied by the memory data.

Data-Mem	The measurement data for the current trace minus the memory data, which is often used to evaluate the vector error.
Data+Mem	The current trace of the measured data plus the memory data.
OFF	Turn off the trace data operation function.

5. Click Click the Data Math function button, click the corresponding function button, select the measurement trace data and memory data to calculate, including the following operations:

Function Button	Introduction
Data	Only the measurement data of the trace is displayed, or the result of the measurement data and the memory data operation is displayed.
Memory	Only the memory trace data is displayed.
Data&Memory	Display the measurement data of the trace, or display the result of the measurement data and the memory data, and the memory trace data.
OFF	Turn off the measurement data, or the operation data, as well as the display of the memory trace data.
Data	Only the measurement data of the trace is displayed, or the result of the measurement data and the memory data operation is displayed.

2.8.4 Title

This function allows you to assign a name to a channel and display the name on the screen. This function can be used to save or print the measurement results, and add the measurement results to the archive.

Steps:

1. Press Channel Next or Channel Prev button and press Trace Next or to select the channel to which you want to add the marker.
2. Press the Display button.
3. Click the Edit Title Label function button, pop up the soft keyboard, enter the channel window title.
4. Press the Enter button.
5. Click the Title Label function button, function button in front of RBI "●", then display the window title, otherwise, do not display the window title.

2.8.5 Update

Turn off the update function of the on-screen display information to save the processing time required to update the display information in the analyzer, thus increasing the measurement speed.

Steps:

1. Press the Display button.

2. Click the Update button to switch its status to OFF, turn off the display of information updates, otherwise, open the display information updates. When the display message is updated, the "Update Off" message is displayed in the instrument status bar. As shown below:

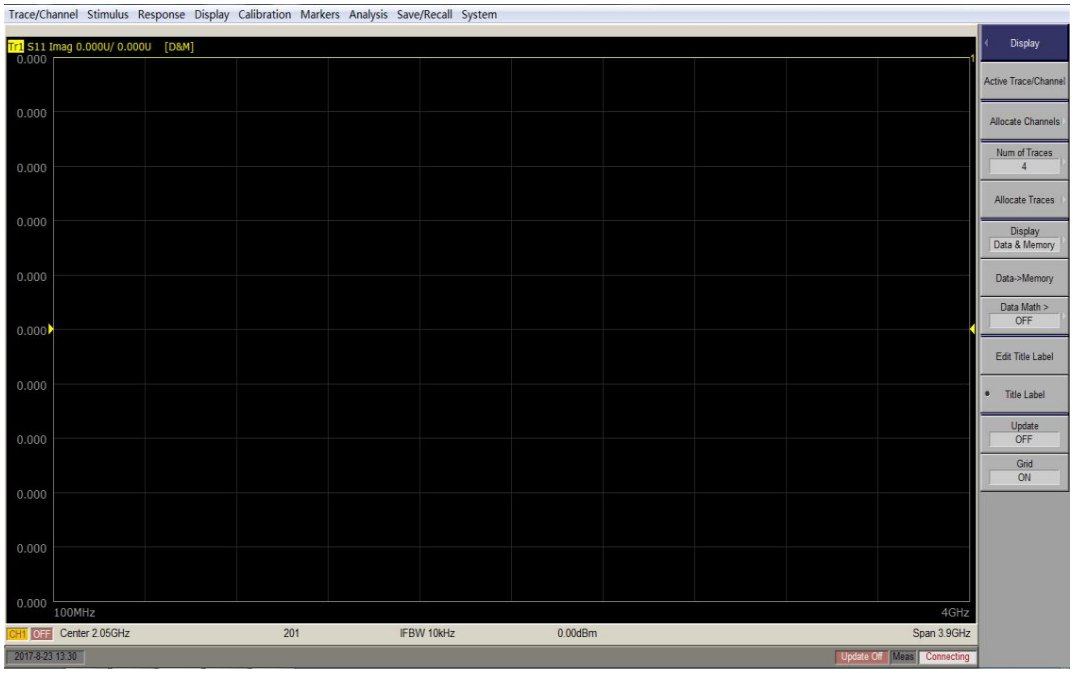


Figure 2-10 Close the screen display information update

3 Measure The Calibration

3.1 Calibration Type Description

Calibration Type	Use the Standard	Corrected Error Factor	Measurement Parameters
No calibration	No	No	All parameters
Response calibration	• Open or short circuit • Load (optional)	There are two error terms: • Er • Ed	S11 (reflection characteristic of port 1) S22 (reflection characteristics of 2 ports)
	• Direct access • Isolation	There are two error terms: • Et • Ex	S21 (1-way transmission characteristic of 2-port) S12 (1-port 2-direction transmission characteristic)
All 1 port calibration	• Open • Short circuit • Load	There are three error terms: • Ed • Es • Er	S11 (reflection characteristic of port 1) S22 (reflection characteristics of 2 ports)
Single path 2 port calibration	• Open • Short circuit • Load • Pass through	There are five error terms: • Et • Ex • Ed • Es • Er	1-2(S12,S22) or 2-1(S21,S11)
Full 2 port calibration	• Open • Short circuit • Load • Pass through	There are 12 error terms: • Ed1, Ed2 • Ex21, Ex12 • Es1, Es2 • El12, El21 • Et21, Et12 • Er1, Er2	S11, S21, S12, S22 (All S parameters for 2 ports)

Note: The above calibration type, including all the calibration type, different types of equipment, calibration type is not exactly the same, please refer to the model of the instrument data sheet.

3.2 Calibration Status Query

3.2.1 Calibration Status of the Channel

The error correction execution status of each channel can be checked by the error correction status. The error correction status is indicated by the symbol located in the channel status bar below the window, and these symbols are shown in the following table.

Symbols	Error Calibration Status
Cor (Black background)	Error calibration: On (for all traces enabled)
Cor (Red on white)	Error calibration: On (for partial trace enabled)
--- (Red on white line)	Error calibration: On (no calibration data)
Off (red on white)	Error calibration: off
C? (Black and white)	Error correction: On (execution of interpolation, or IF bandwidth, power level, power range, scan time, scan delay, scan mode or scan type is different from when the calibration is performed.)

The channel calibration status is shown below:

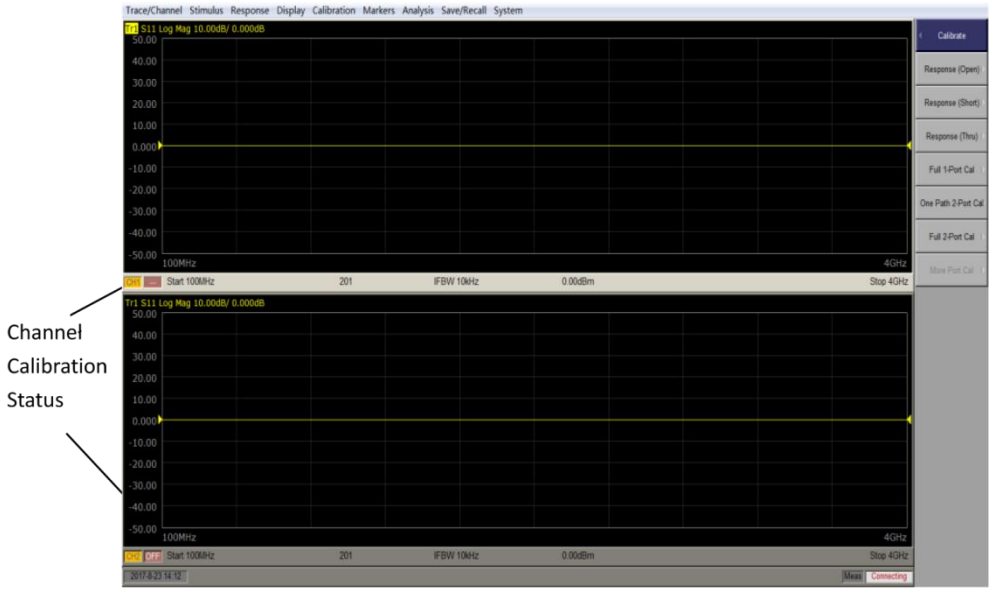


Figure 3-1 Channel calibration status

3.2.2 Trace Status Check for Trace

Symbols	Calibration Type
RO	Open circuit response calibration
RS	Short circuit response calibration
RT	Direct response calibration
F1	All 1 port calibration
OP	Single path 2 port calibration
F2	Full 2 port calibration

The calibration status of the trace is shown in the following figure:

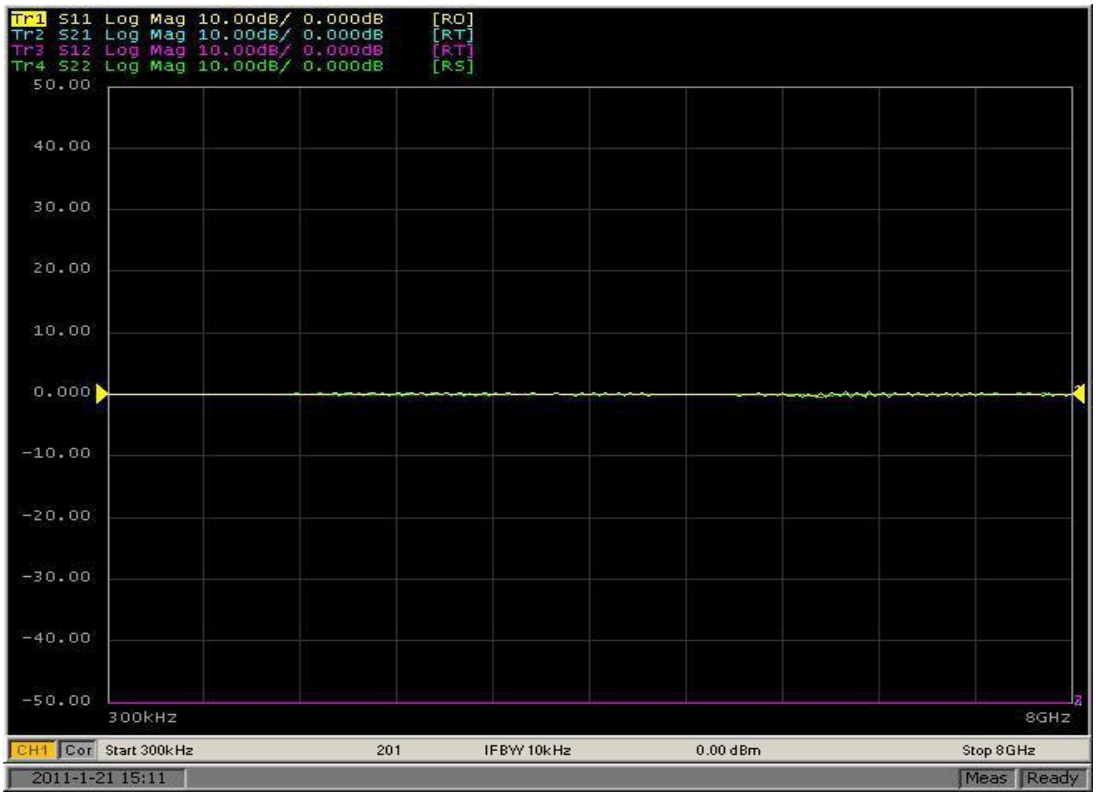


Figure 3-2 Trace status of the trace

3.3 Calibration Process

3.3.1 Select the Calibration Parts

Before performing calibration, you need to select the calibration kit. If you are using a pre-defined calibration kit, you need to define it. If the type of connector used for the standard calibration kit has polarity (to distinguish between positive and negative), the standard category definition of the calibration kit needs to be changed according to the actual use criteria.

The instrument provides four sets of preset calibrators, Agilent's three: 85032B/E, 85033D/E, 85036B/E, 85032F, USER and a remote custom calibration CAL-F/MN-C.

Calibration Part Type	Basic Indicators
85032B/E	DC to 6GHz, N, 50Ω
85033D/E	30kHz to 9GHz, 3.5mm, 50Ω
85036B/E	30kHz to 3GHz, N, 75Ω
85032F	DC to 9GHz, N, 50Ω
85054D	DC to 18GHz, N, 50Ω
85039B	DC to 3GHz, F, 75Ω
CAL-F/MN-C	DC to 6GHz, N, 50Ω
USER	Customize calibration parts

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to enter the Cal Kit function menu.
4. Press the ↑ ↓ button, move the cursor to the Cal Kit function button to select, press the Enter button, select the Cal Kit function button in front of RBI "●".

3.3.2 Calibration Part Parameter Editing

Because the calibration is a non-ideal device, there are certain indicators in itself, in order to improve the calibration accuracy, the calibration parameters of the instrument input instrument for the calculation of calibration data used. The parameter editing function is used to input the calibration parameters into the instrument.

Steps:

1. Press the Cal button.
2. Click the Cal Kit function button to select the calibration unit (see the "Selecting the Calibrator" section).
3. Click the Edit Cal Kit function button, enter the calibration parameter editing menu, select the parameters need to edit to edit.

3.3.3 Open-circuit Response Calibration

In open-circuit response calibration, the calibration data is measured by connecting the open-circuit calibrator to the desired test port, respectively. For the frequency response, these calibrations can effectively eliminate the reflection tracking error of the test device in the reflection test using the port. The error model is shown below:

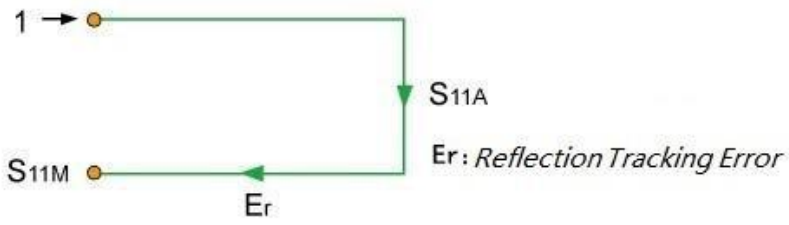


Figure 3-3 Open-circuit response calibration (open-circuit response)

You can also use the load calibrator for isolation calibration during open-circuit response calibration. Isolation calibration will eliminate the directional error of the test device in the reflection test using the port. The error model is shown below:

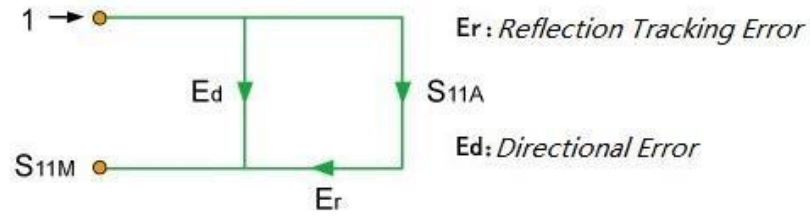


Figure 3-4 Open-circuit response calibration (open-circuit response + isolation)

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).
4. Click the Calibrate function button.
5. Click the Response (Open) function button.
6. Click the Select Port function button, select the calibration port, each click the function button for 1 (S11), 2 (S22) switch.
7. The correct connection calibration parts. As shown below:

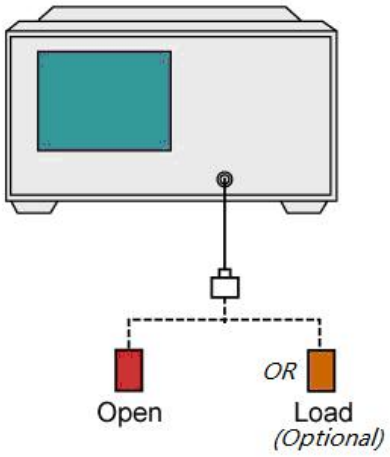


Figure 3-5 Open Response Calibration - DUT Connection Diagram

8. Click the Open function button to start the open calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Open function button in front of RBI "●".
9. If you must perform a quarantine calibration using the load calibrator, follow the steps below.
10. Connect the load calibrator to the selected test port, as shown above.
11. Click the Load (Optional) button, the load calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Load (Optional) function button in front of RBI "●".
12. Click the Done function button, save the calibration data, complete the calibration.

3.3.4 Short-circuit Response Calibration

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).
4. Click the Calibrate function button.
5. Click the Response (Short) function button.
6. Click the Select Port function button, select the calibration port, each click the function button for 1 (S11), 2 (S22) switch.
7. The correct connection calibration parts. As shown below:

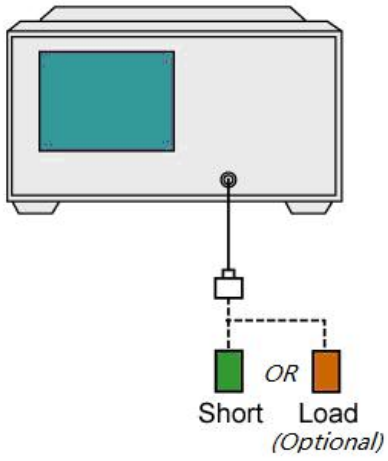


Figure 3-6 Short-circuit response calibration - DUT connection diagram

8. Click the Short function button to start the short calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Close function button in front of RBI "●".
9. If you must perform a quarantine calibration using the load calibrator, follow the steps below.
10. Connect the load calibrator to the selected test port, as shown above.

11. Click the Load (Optional) button, the load calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Load (Optional) function button in front of RBI "●".
12. Click the Done function button, save the calibration data, complete the calibration.

3.3.5 Transmission Response Calibration

In the pass-through response calibration, the calibration data is measured by connecting the pass-through calibration to the desired test port. This calibration method can effectively eliminate the frequency response transmission tracking error of the test device in the transmission test using the port. The error model is shown below:

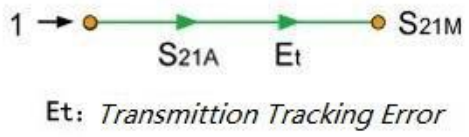


Figure 3-7 Transmission Response Calibration (Direct Response)

In the pass-through calibration process, you can also use the load calibrator for isolation calibration. Isolation calibration will eliminate the isolation error (crosstalk error) of the test device in the transmission test using this port. The error model is shown below:

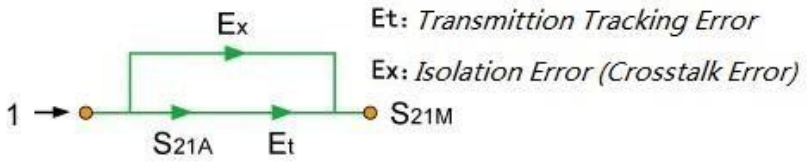


Figure 3-8 Transmission Response Calibration (Direct Response + Isolation)

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).
4. Click the Calibrate function button.
5. Click the Response (Thru) function button.
6. Click the Select Port function button, select the calibration port, each click the function button for 1-2(S12), 2-1 (S21) switch.
7. The correct connection calibration parts. As shown below:

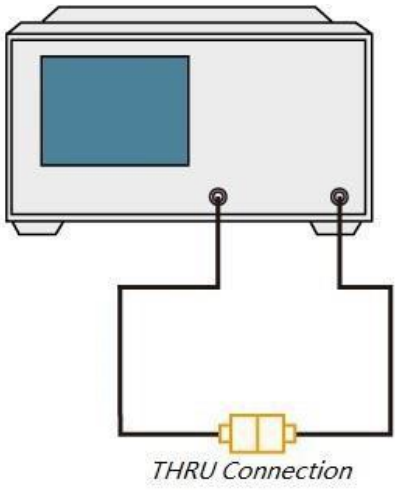


Figure 3-9 Transmission Response Calibration - DUT Connection Diagram

8. Click the Thru function button, start the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Thru function button in front of RBI "●". If you must perform a quarantine calibration using the load calibrator, follow the steps below.
9. Connect the load calibrator to the selected test port. As shown below:

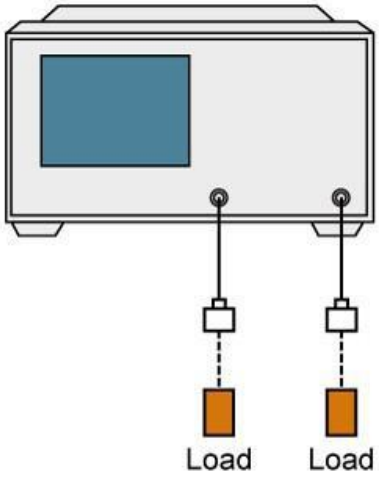


Figure 3-10 Transmission Response Calibration (Isolation Calibration) - DUT Connection Diagram

10. Click the Isolation (Optional) function button to start the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Isolation (Optional) function button in front of RBI "●".
11. Click the Done function button, save the calibration data, complete the calibration.

3.3.6 All 1 Port Calibration

All 1-port calibration means that the calibration data is calibrated by connecting the open calibration, short-circuit calibrator, and load calibrator to the test port. This calibration method can effectively eliminate the frequency response of the test device in the reflection test using the port, the tracking error, the directional error, and the source matching error. As shown below:

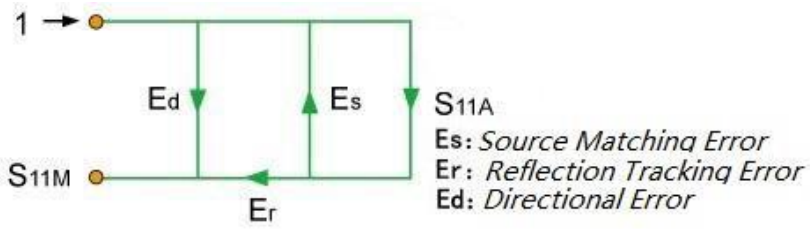


Figure 3-11 Full port calibration

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.

2. Press the Cal button.

3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).

4. Click the Calibrate function button.

5. Click the Full 1-Port Cal function button.

6. Click the Select Port function button, select the calibration port, each click the function button for 1 (S11), 2 (S22) switch.

7. The correct connection calibration parts, according to the order of calibration in turn connected Open, Short, Load calibration parts. As shown below:

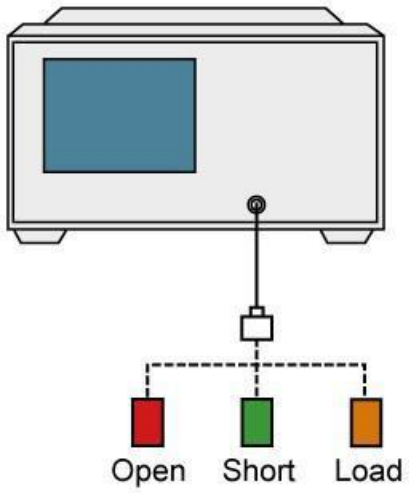


Figure 3-12 Full 1 port calibration - DUT connection diagram

8. Click the Open function button, open the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Open function button in front of RBI "●".

9. Click the Short function button, short circuit calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Short function button in front of RBI "●".

10. Click the Load button, the load calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Load function button in front of RBI "●".

11. Click the Done function button, save the calibration data, complete the calibration.

3.3.7 Single Channel 2 Port Calibration

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).
4. Click the Calibrate function button.
5. Click the One Path 2-Port Cal function button.
6. Click the Select Port function button, select the calibration port, press the function button for each 1-2 (S12 S22), 2-1 (S21 S11) switch.
7. The correct connection calibration parts, according to the order of calibration in turn connected Open, Short, Load, Thru calibration parts. As shown below:

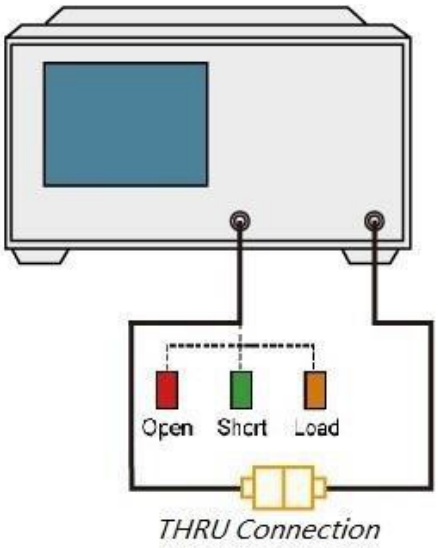


Figure 3-13 Full 2-port calibration - DUT connection diagram

8. Click the Open function button, open the road calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Open function button in front of RBI "●".
9. Click the Short function button, short circuit calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Short function button in front of RBI "●".
10. Click the Load button, the load calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Load function button in front of RBI "●".
11. Click the Thru function button, start the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Thru function button in front of RBI "●". If you must perform a quarantine calibration using the load calibrator, see the procedure for "Transfer Response Calibration".

12. Click the Done function button, save the calibration data, complete the calibration.

3.3.8 All 2-port Calibration

In full 2-port calibration, the calibration data is measured by connecting the open calibration, short-circuit alignment, or load calibrator to the desired test port (or between the two ports). This calibration method can effectively eliminate the directional error, crosstalk, source matching error, frequency response reflection tracking error, and frequency response transmission tracking error in the transmission or reflection test of these ports using these ports. This calibration method performs the measurement with the highest possible accuracy. A total of twelve error terms are used in the calibration, six in the forward and reverse directions, as shown in the following figure:

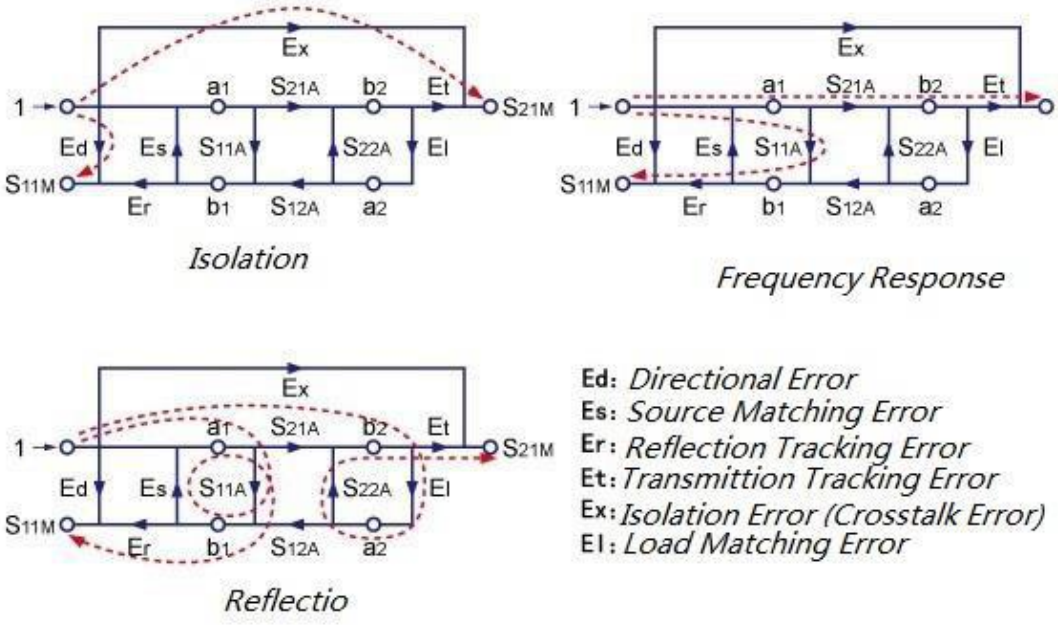


Figure 3-14 All 2 port calibration - 12 error

Steps:

1. Press Channel Next or Channel Prev button to select the channel to be calibrated.
2. Press the Cal button.
3. Click the Cal Kit function button to select the calibration unit (see the "Selecting Calibration Parts" section).
4. Click the Calibrate function button.
5. Click the Full 2-Port Cal function button.
6. Connect the calibration parts correctly, and connect Port1 Open, Port1 Short, Port1 Load, Port2 Open, Port2 Short, Port2 Load, Thru calibrator according to the calibration order. As shown below:

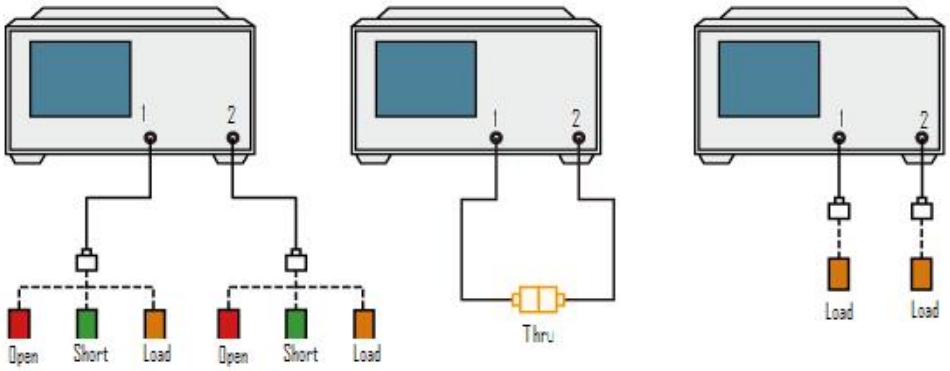


Figure 3-15 Full 2-port calibration - Calibration section connection diagram

7. Click the Port1 Open function button, open the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port1 Open function button in front of RBI "●".
8. Click the Port1 Short function button, short circuit calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port1 Short function button in front of RBI "●".
9. Click the Port1 Load function button, the load calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port1 Load function button in front of RBI "●".
10. Click the Port2 Open function button, open the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port2 Open function button in front of RBI "●".
11. Click the Port2 Short function button, short circuit calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port2 Short function button in front of RBI "●".
12. Click the Port2 Load function button, load the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port2 Load function button in front of RBI "●".
13. Click the Port1-2 Thru function button, start the calibration process, and pop-up prompt window, and so after the prompt window is closed, the calibration is completed, Port1-2 Thru function button in front of RBI "●". If you must perform a quarantine calibration using the load calibrator, see the procedure for "Transfer Response Calibration".
14. Click the Done function button, save the calibration data, complete the calibration.

4 Measure The Trigger

4.1 Select the Trigger Source

When the trigger source detects a trigger signal that has occurred, the channel is scanned or measured. Performing measurements on each channel does not depend on whether the channel is displayed or not. Activated channels can be measured even if they are not displayed. For each channel, only the excitation port of the parameter that needs to be updated to display the trace is scanned.

The trigger source will generate a prompt to initiate the measurement process. There are four types of trigger sources to choose from, as shown in the following table:

Trigger Source	Description
Internal	Use the continuous signal generated by the firmware as the trigger source. The trigger will be sent immediately after each measurement is completed.
External	The external signal is used as the trigger source from the Trig input (BNC).
Manual	Press the function button to generate the trigger signal.
Bus	Trigger via GPIB/LAN/USB.

Steps:

1. Press the Trigger button.
2. Click the Trigger Source button.
3. Click the function button corresponding to the required trigger source, the function button in front of RBI "●".

4.2 Set the Trigger Mode

Steps:

1. Press Channel Next or Channel Prev button to select the channel to set the trigger mode.
2. Press the Trigger button.
3. Click the function button corresponding to the desired trigger mode. Click the Hold All Channels function button. After the completion of the Hold function button, press the "Continuous All Channels" button. After the execution of the Continuous All Channels function button, the Continuous function is enabled. Button before the RBI "●". The function buttons corresponding to the desired trigger mode are described in the following table:

Function Button	Description
Hold	Set the working channel trigger mode to hold the scan mode

Single	Set the working channel trigger mode to single scan mode
Continuous	Set the working channel trigger mode to continuous scan mode
Hold All Channels	Set all channel trigger modes to hold scan mode
Continuous All Channels	Set all channel trigger modes to continuous scan mode

4. Repeat the above steps to set the trigger mode for each channel.

4.3 Trigger Control

Controls the triggering in the scan, aborts the scanning process, and restarts the scan.

Steps:

1. Press the Trigger button.
2. Click the Restart button to stop the scanning process and start scanning again.

5 Analysis of Measurement Results

5.1 Markers

5.1.1 Marker Overview

Marker can be used for the following aspects:

1) The measured value is read as a numeric data (The relative value of the absolute value or the reference point).

2) Move the marker to a specific point on the trace line (Marker search).

3) Analyze trace data to determine specific parameters.

4) Used marker values to change incentives(Scanned area)and scale(Reference line value)

[Specification]: The device can display up to 16 markers. These include reference markers for each trace line. Each marker has an incentive value (Cartesian coordinates display values on the X -axis in the format) and a response value (Rectangular coordinates display the value of the Y-axis in the format).Smith chart and polar coordinates each have two marker response values (Logarithmic amplitude and phase).

5.1.2 Marker Read

In the Cartesian display format, the marker response value is always the same as the Y-axis data format. Polar and Smith charts can be used to mark the response values (two values: primary and secondary) in a variety of types. From which you can select a format that is in the format of the data, polar coordinates and Smith chart data formats are described in the following table:

Data Format	Responder	
	Principal Value	Auxiliary Value
Smith - Lin/Phase	Linear Amplitude	Phase
Smith - Log/Phase	Logarithmic Amplitude	Phase
Smith - Real/Imag	Real Component	Imaginary Component
Smith - R + jX	Resistance	Reactance
Smith - G + jB	Conductance	Charge
Polar - Lin/Phase	Linear Amplitude	Phase
Polar - Log/Phase	Logarithmic Amplitude	Phase
Polar - Real/Imag	Real Component	Imaginary Component

5.1.3 Marker Operation

5.1.3.1 Marker Adding

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.
2. Press Trace Next or Trace Prev to select the trace you want to set.
3. Press the Marker .
4. Click the Add Marker function button and open the data entry dialog box.
5. In the dialog box, enter the need to stimulate the value, as shown below:

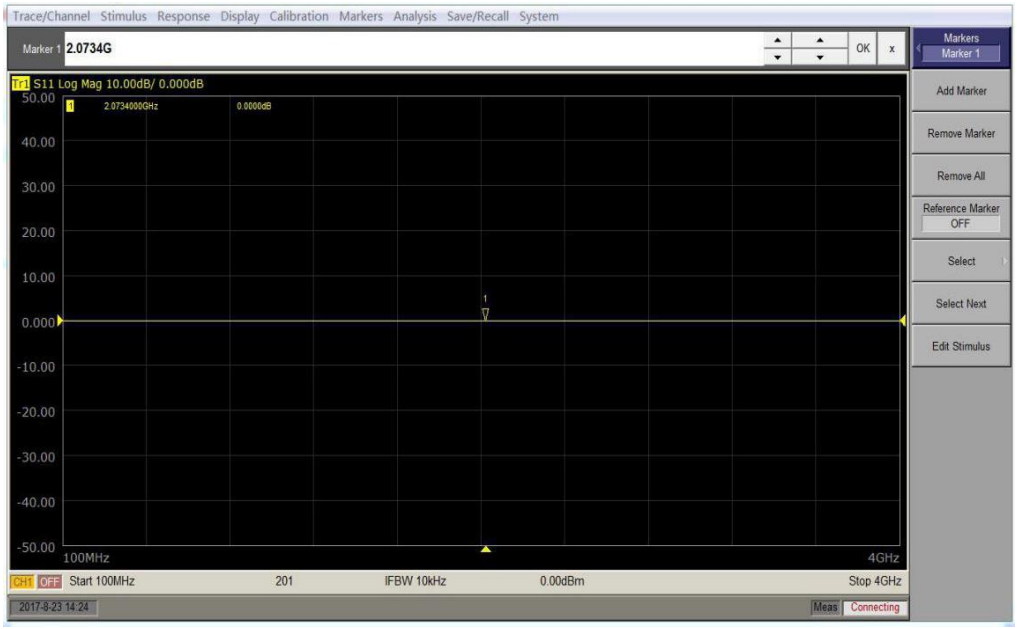


Figure 5-1 Add Marker Dialog Box

6. After the input is complete, press Enter.
7. According to steps 4 to 6 operation, increase the number of marker.

5.1.3.2 Marker Deleting

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.
2. Press Trace Next or Trace Prev to select the trace you want to set.
3. Press the Marker.

4. Click the Remove Marker function button, delete the last marker.
5. In step 4, delete the marker.
6. If you delete all the marker, click the Remove All function button, delete all the marker.

5.1.3.3 Reference Marker

Activate the reference marker, which converts the marker reading to the relative value of the reference marker, as shown in the following figure:

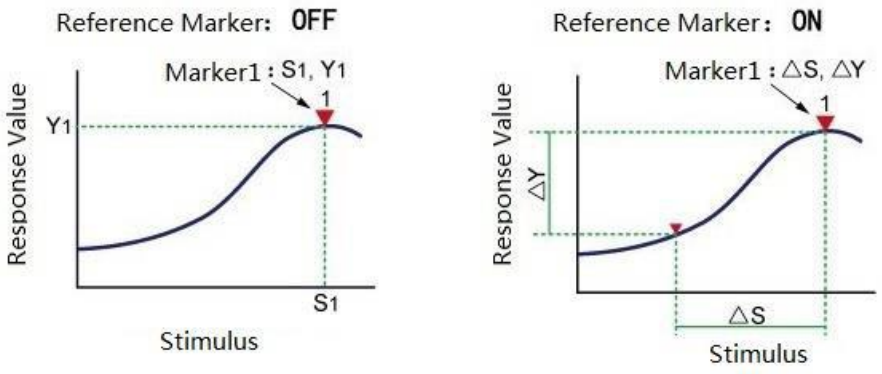


Figure 5-2 Reference Marker

Steps:

1. Press the Marker.
2. Click the Reference Marker function button.
3. Press Enter to set its status to ON, then activate the reference mark; set its status to OFF, then turn off the reference mark.

5.1.3.4 Choose to Modify the Marker

Steps:

1. Press Channel Next or Channel Prev to select the channel you want to set.
2. Press Trace Next or Trace Prev to select the trace you want to set.
3. Press the Marker.
4. Click the Select button.
5. Select the need to modify the marker (Marker1…Marker15, Ref Marker).

6. Press Enter to bring up the data entry dialog box.

7. In the dialog box, enter the need to stimulate the value, as shown below:

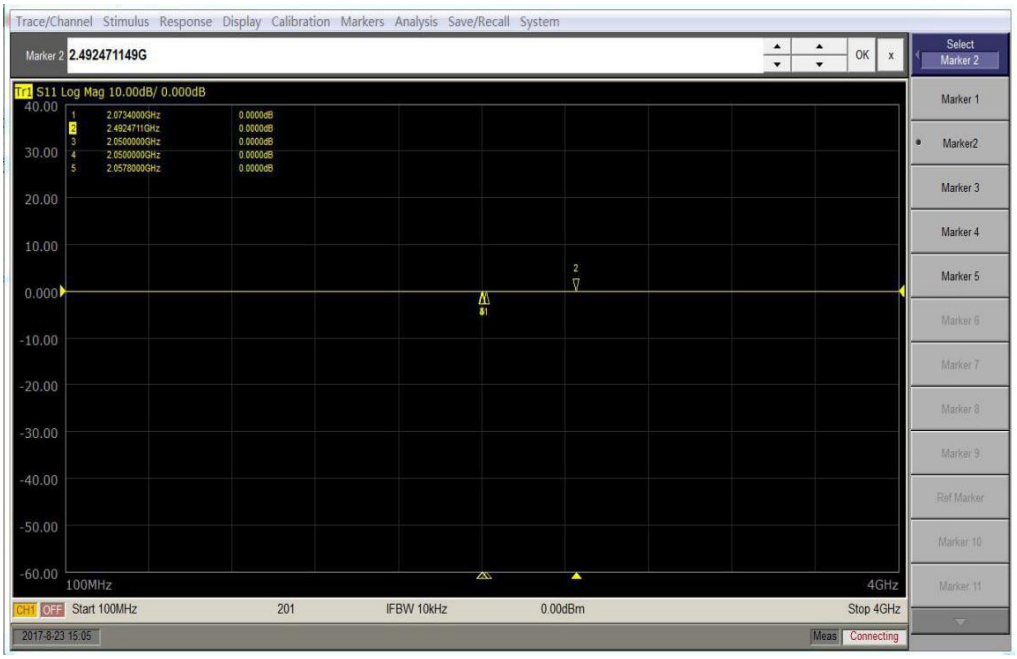


Figure 5-3 Choose to Modify the Marker

5.1.4 Marker Search

Use the marker search function to search for marker locations that match the specified values. The instrument provides the following search methods:

1) Maximum search
2) Minimum search
3) Target value search
   a) The target closet to the mark position
   b) The left target closet to the marker position
   c) The right side of the target closet to the marker position

4) Peak search
   a) Maximum peak (positive peak),minimum peak (negative peak)
   b) The left side of the peak closet to the marker position
   c) The right side of the peak closet to the marker position

5.1.4.1 Search the Maximum Value

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press the Search.
3. Click the Maximum function button, Marker tag points automatically moved to the maximum measured value, as shown below:

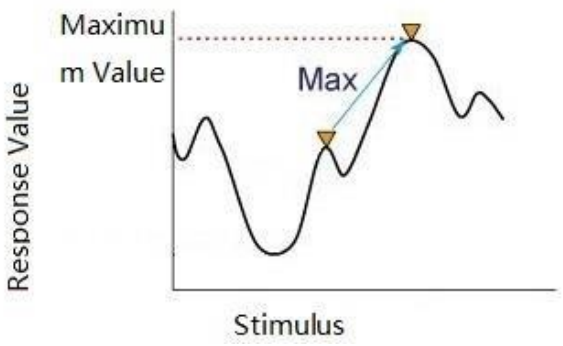


Figure 5-4 Marker Value Search Max

5.1.4.2 Search the Minimum Value

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press the Search.
3. Click the Minimum function button, Marker tag points automatically moved to the minimum measured value, as shown below:

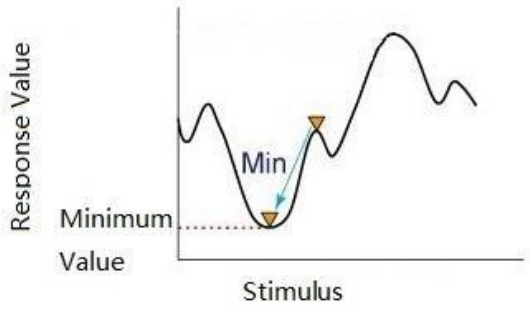


Figure 5-5 Marker Value Search Min

Note: when the data format is a Smith chart or a polar coordinate format, only the primary response value is searched.

5.1.4.3 Search Target Value

Use the target search function to move the marker to a point with the target measurement .The target is a point with a specific measure on the trace. Depending on the type of transfer of the target, the target can be divided into two categories, as follows:

Target Transition	Description
Positive Transfer	The value of the target is greater than the next measured value(on the left)
Negative Transfer	The target value is less than the next measured value(on the left)
Both	Positive transfer or negative transfer

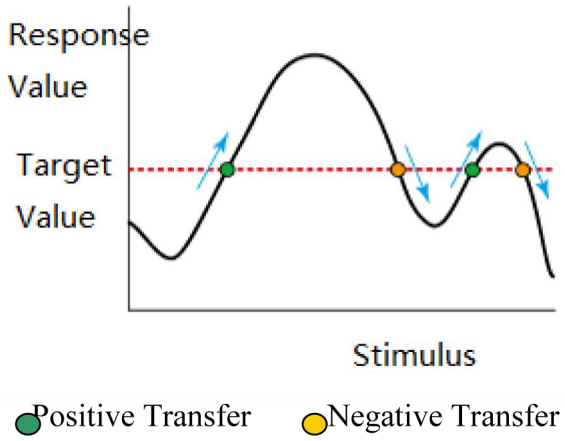


Figure 5-6 Target Transfer Category

Target search category:

Search Category	Description
Search Target	Move the marker to the target value
Search Left	Searches from the current marker position to the smaller stimulus value, and then moves the marker to the first target encountered
Search Right	Searches from the current marker position to the direction of the larger stimulus value, and then moves the marker to the first target encountered

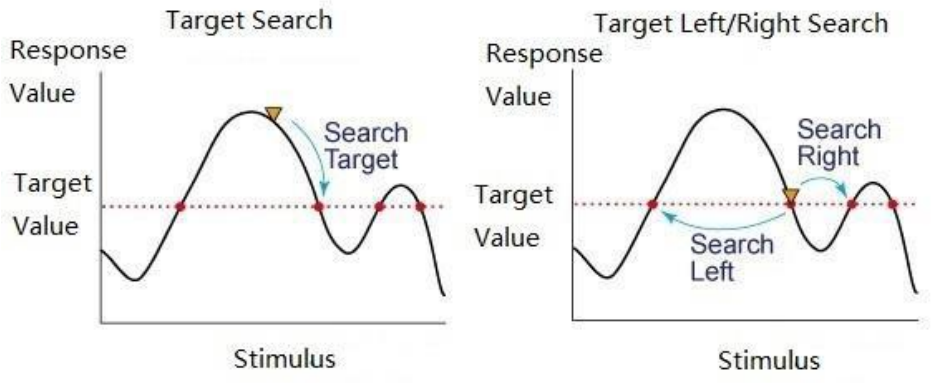


Figure 5-7 Target Search Category

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press the Search.
3. Click the Target Transition button to set the destination transfer category. ”Positive” means forward search,” Negative” means negative search,” Both” means positive and negative search.
4. Click the Target Value function button, pop-up data input dialog box, enter the target value in the dialog box, as shown below, then press Enter.
5. Click the Search Target button to search for the target value.
6. Click the Search Target Left function button, search the left to set the target value. And then click the function button, continue to search the left.
7. Click the Search Target Right function button, search the right to set the target value. And then click the function button, continue to search the right.

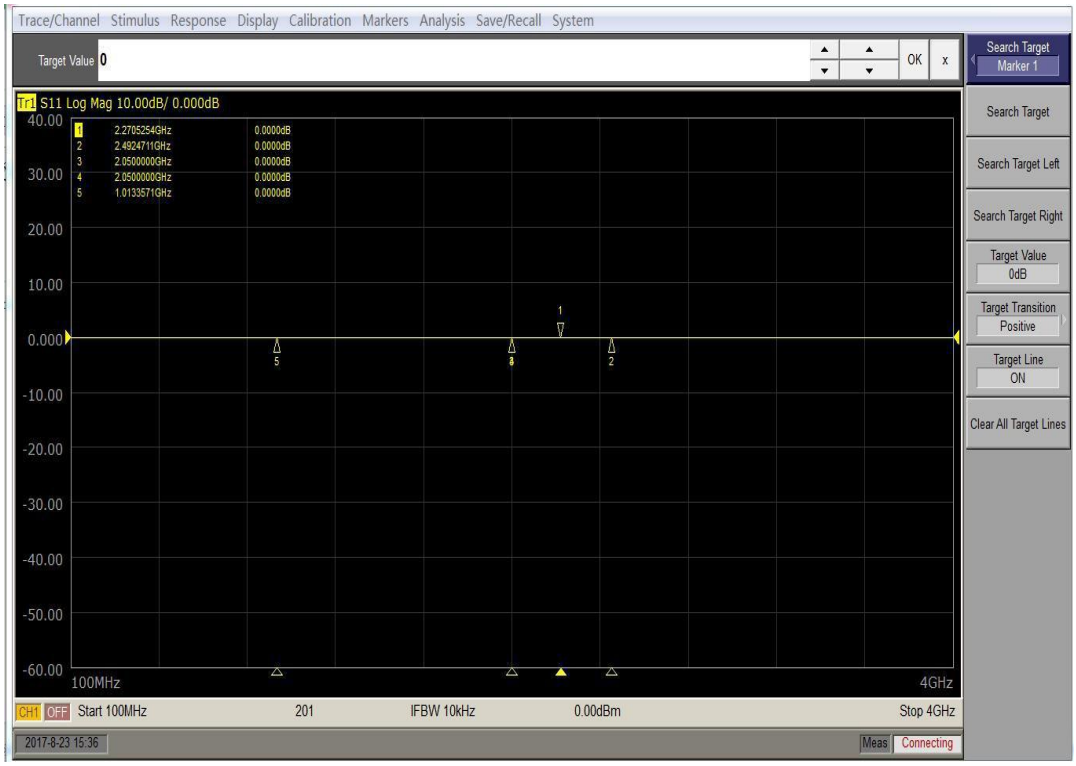


Figure 5-8 Target Value Data Entry Dialog Box

5.1.4.4 Search Peak

Use the peak search function to move the marker to the peak on the trace.

(1) Peak Polarity

Peak Polarity	Description
Positive Peak	The measured value is greater than the measured value of any one of the measuring points(peak polarity: positive)
Negative Peak	The measured value is less than the measured value of any one of the measuring points(peak polarity: negative)
Both	Positive or negative peak

As shown below:

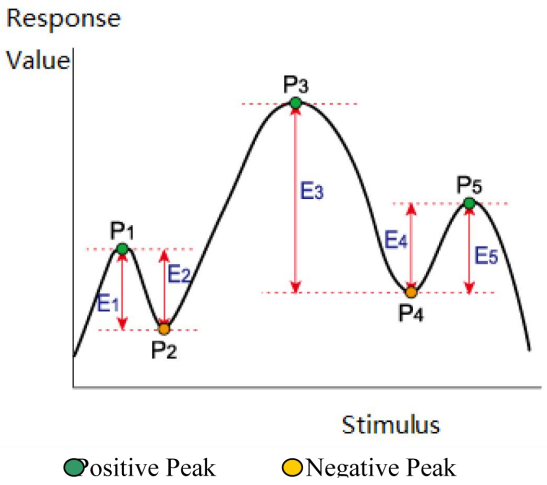


Figure 5-9 Peak Polarity

(2) The peak drift value is the smaller value of the difference between the adjacent peak of the opposite polarity and the measured value.

(3) Peak search category, as shown the following table:

Search Category	Description
Search Peak	When the peak polarity is “Positive”, “Both” (positive and negative),move the mark to the maximum peak. When the peak polarity is “Negative”, the marker is moved to the minimum peak.
Search Left	Searches from the current marker position to the smaller stimulus value, and then moves the marker to the first peak encountered.
Search Right	Searches from the current marker position to the larger stimulus value, and then moves the marker to the first peak encountered.

As shown below:

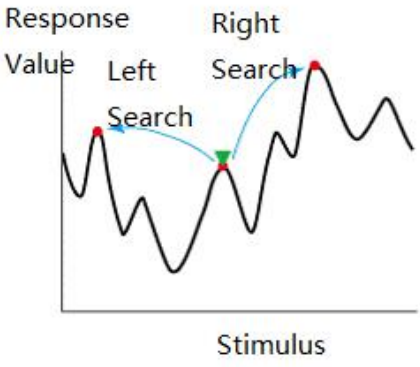


Figure 5-10 Peak Search Category

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press the Search.
3. Click Peak function button.
4. Click the Peak Excursion function button to set the peak drift value .Pop-up data input dialog box, enter the target value in the dialog box, as shown below, then, press Enter.

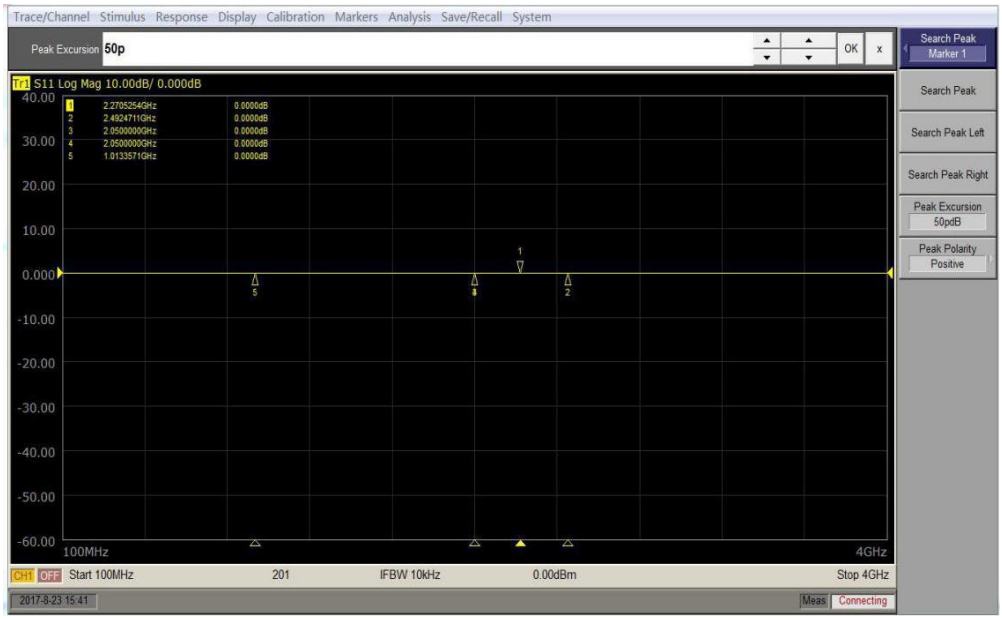


Figure 5-11 Peak Drift Value Data Entry Dialog Box

5. Click the Peak Polarity function button, select the search category. “Positive” means positive peak search, ”Negative” means negative peak search, “Both” means positive and negative peak search.
6. Click the Search Peak function button to search for peaks.
7. Click the Search Peak Left function button, search the peak to the left. And then click the function button, continue to search the left.
8. Click the Search Peak Right function button, search the peak to the right. And then click the function button, continue to search the right.

5.1.4.5 Search Tracking

The search tracking function can set the search to repeat the search every time a scan is executed, even when the search (maximum, minimum, peak, and target value) execution keys are not pressed. This function is convenient for observing the measurement results, such as the maximum value of the trace.

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press Search.
3. Click the Tracking function button, and switch between ON and OFF for each click. If the status is set to ON, it means to open the search and tracking function; if it is set to OFF, it means to close the search and tracking function.

5.1.4.6 Bandwidth Search

The bandwidth search determines the function of the trace bandwidth, the center frequency, the cutoff point (the higher frequency side and the lower frequency side), Q, and the insertion loss according to the position of the work mark. The parameters defined for the bandwidth search are defined below.

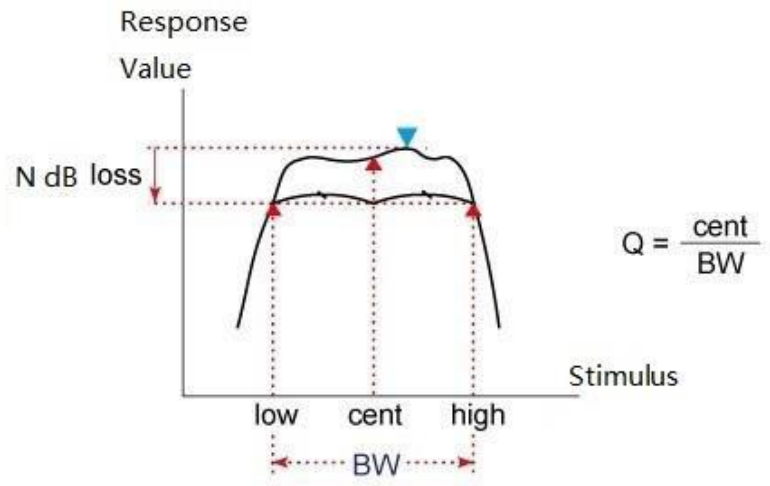


Figure 5-12 Bandwidth Search Parameter Definition--- Bandpass Filter

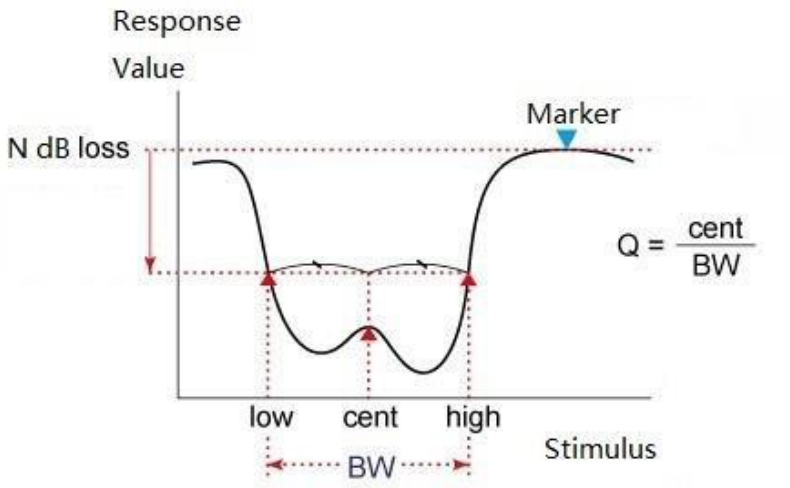


Figure 5-12 Bandwidth Search Parameter Definition---Bander Filter

The definition of the parameters defined for the bandwidth search is shown in the following table:

Bandwidth Parameters	Description
Insertion loss	When performing a bandwidth search, the measured valued at the job marker location (Search Ref To set to Marker) or the maximum value (Search Ref To set to Max)
Lower frequency cutoff point	The lowest frequency among the two measurement points separated by the defined bandwidth value from the work mark position
Higher frequency cutoff point	The highest frequency among the two measurement points separated by the defined bandwidth value from the work mark position
Center frequency	The frequency between the lower frequency cutoff point (high+ low)/2
Bandwidth	The frequency difference between the higher frequency cutoff point and the lower frequency cutoff point (high-low)
Q	The center frequency is divided by the bandwidth obtained by the value (cent/BW)

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press Search.
3. Click Bandwidth Search function button.
4. Click the Type function button, select the filter type, select Bandpass to measure the band-pass filter, select Notch to measure the band-stop filter (limiter).
5. Press  or ESC, return to the parent Bandwidth Search menu.
6. Click the Search Ref To button to select the location of the marker for the bandwidth search. When Marker is selected, the currently active Marker is used as the search mark point. When Max is selected, the maximum value of the current trace is used as the search mark point. The response value of this marker is used as the insertion loss in the bandwidth search.
7. Click the Bandwidth Value function button, pop-up bandwidth value data input dialog box, enter the bandwidth value in the dialog box, as shown below, then, press Enter.

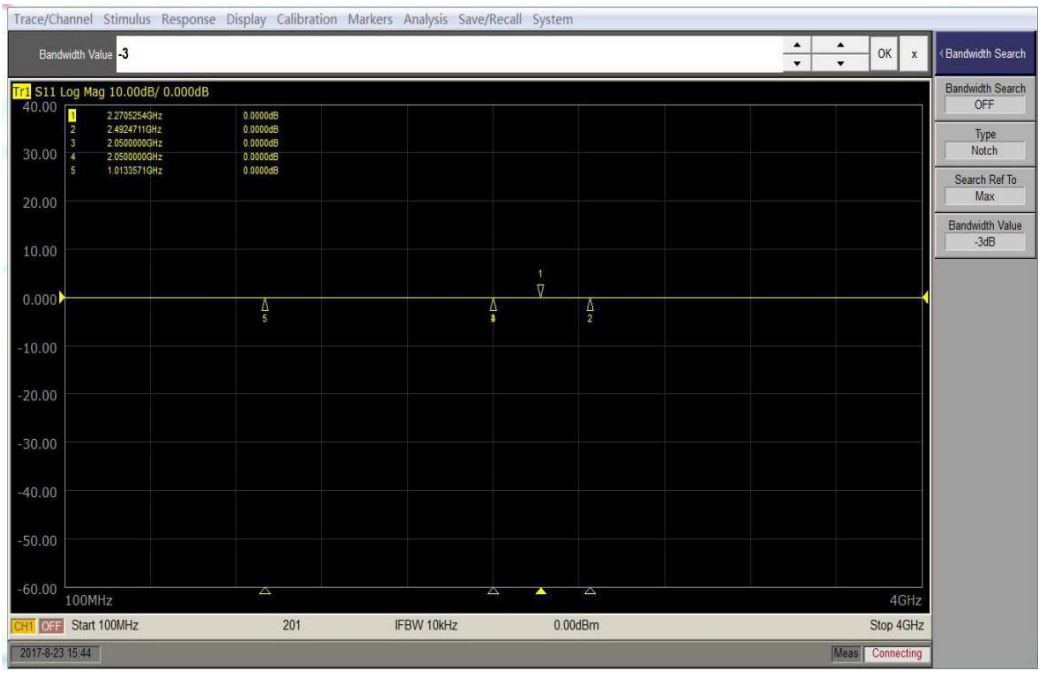


Figure 5-14 Bandwidth Search--- Bandwidth Value Data Entry Dialog Box

8. Click the Bandwidth Search function button, the bandwidth search measurement. As shown below:

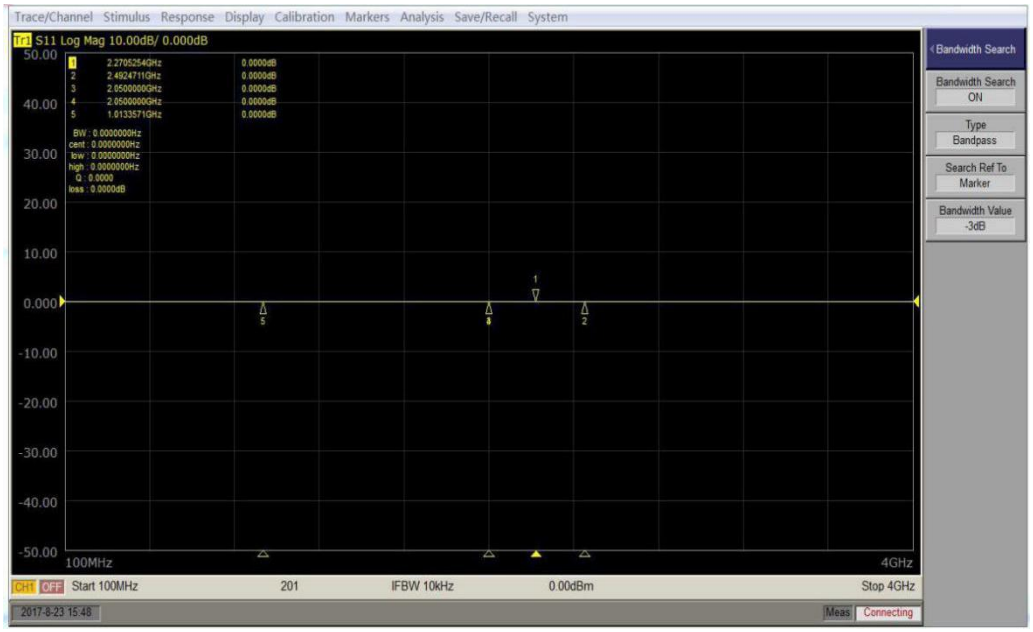


Figure 5-15 Bandwidth Search for Measurement Results

5.1.4.7 Search Range

Use the tag search function to set the partial scan range to the search target (partial search function) and the entire search range. For some search functions.

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press Search .
3. Click the Search Start button, pop-up data input dialog box, enter the search range of the start value.
4. Note: the input value is greater than the current channel start value.
5. Click the Search Stop function button, pop-up data input dialog box, enter the search range of the termination value.
6. Note: the input value is less than the current channel termination value.
7. Click the Search Range function button to turn ON and OFF each time it is clicked. When the status is ON, the search range functions is turned on. When the status is OFF, the search range functions is turned off.

5.1.4.8 Search Range Coupling

The search range coupling indicates the search when the trace in the channel is coupled.

Steps:

1. Press Channel Next or Channel Prev and Trace Next or Trace Prev to select the trace to search for.
2. Press Search .
3. Click the Couple function button to turn ON and OFF each time it is clicked. When the status is ON, the search range functions is turned on. When the status is OFF, the search range functions is turned off.

5.1.5 Marker Function

5.1.5.1 Marker Transfer Setting

(a) Use the Marker value to set the scan range

Steps:

1. In the need to set the scope of the channel window, the work of the work mark on the traces places in the new range (minimum, maximum or center value) corresponding to the location.
2. Press Search .
3. Click the Marker-> Start button to set the start value of the scan range to the stimulus value of the work mark on the current job trace. As shown below:

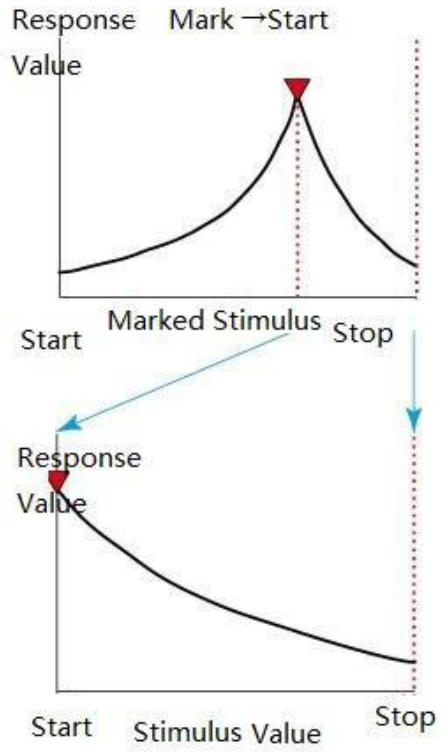


Figure 5-16 Marker Transfer --- Marker -> Start Function

4. Click the Marker -> Stop function button to set the sweep range's stop value to the stimulus value for the work mark on the current job trace. As shown below

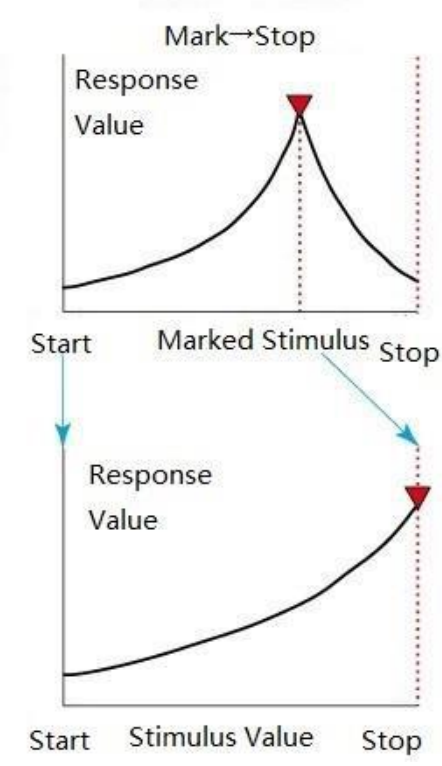


Figure 5-17 Marker Transfer --- Marker -> Stop Function

5. Click the Marker -> Center function button to set the center value of the scan range to the value of the work mark on the current job trace. As shown below:

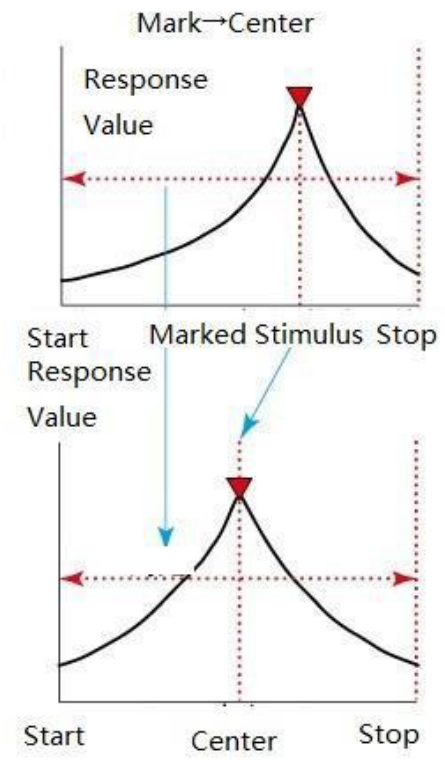


Figure 5-18 Marker Transfer --- Marker -> Center Function

Note: if the reference mark is activated and the stimulus value of the work mark is represented by the value relative to the reference mark, the absolute stimulus value is used to set the new sweep range.

(b) Use the marker to set the reference line value

When using Cartesian display format, you can change the value of the reference line, so that it is equal to the response value of the work mark on the job trace.

Steps:

1. Place the work mark on the job trace at the position corresponding to the new reference line value.
2. Press Marker.
3. Click the Marker -> Reference button to change the value of the reference line to the tag response value.

Note: if the reference mark has been activated and the stimulus value of the work mark is represented by the value relative to the reference mark, the absolute reference value will be set using the absolute stimulus value.

(c) Use the marker to set the electrical delay

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or to select the trace to set the electrical delay trace .

2. Place the marker in the appropriate position.

3. Press Marker.

4. Click the Marker -> Delay button to set the group delay value of the marker to the Scale/Electrical Delay.

Notes: The value of the markers is measured by the group delay, which means that the function is valid when Format of the trace where the maker is located is set to Group Delay. If the reference mark is activated and the value of the work mark is relative, the value of the reference mark indicates that the transfer setting value will use the absolute value.

5.1.5.2 Marker Coupling Setting

If you close the coupling, you can set and move the markers individually for each trace; if open, the trace is set and moved for all traces in the channel. The method of setting the coupling state is as follows:

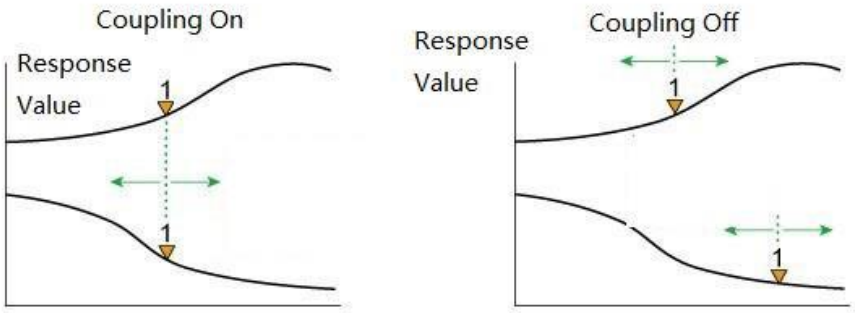


Figure 5-19 Marker Coupling Setting

Steps:

1. Press Channel Next or Channel Prev to activate the channel to which the tag is to be set.

2. Press Marker.

3. Click the Couple function button, once every click, turn ON, OFF switch once, when its state is set to ON, that open the coupling; when its state is set to OFF, then close the coupling.

5.1.5.3 List the Tag Values for All Channels

To operate this function, you can list all the tag values in all channels on the screen.

Steps:

1. Press Marker.

2. Click the Marker Table function key, once every click, then ON, OFF switch once, when set to ON, then open the tag table, display all the channel all the tag values; when set to OFF, the tag table is closed and the display of all tag values in all channels is turned off.

5.1.5.4 Marker Statistics

The Marker Statistical function is used to determine the statistics of the traces, such as span, mean, standard deviation, and peak-to-peak. The definition of statistical data elements as shown below, can be in the entire range of traces of statistics, can also be between a two Marker statistics.

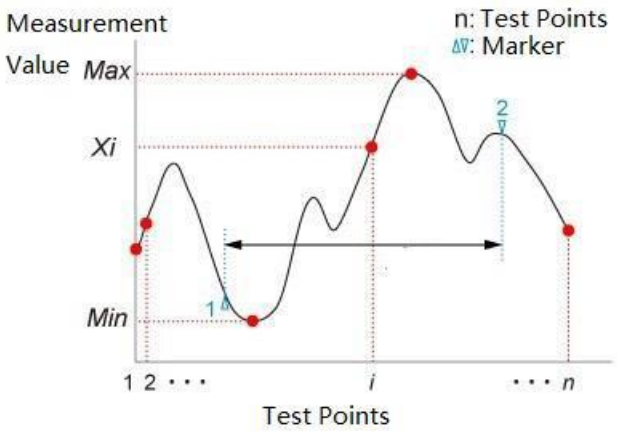


Figure 5-20 Marker Statistics

Statistical Data Element	Description
Span	The span between markers 1 and 2 (which can be set to any other two markers)
mean	$\frac{\sum_{i=1}^{n} x_i}{n}$ (n:the number of points; x_i :the measured value at the i-th measurement point)
s.dev	$\sqrt{\frac{\sum_{i=1}^{n}(x_i - mean)^2}{n-1}}$ (n:the number of points; x_i :the measured value at the i-th measurement point; mean：average value)
p-p	Max-Min (Max: maximum measured value; Min: minimum measured value)

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to set the electrical delay trace .

2. Press Marker .
3. Click the Statistics function button, enter the marker statistics function menu.
4. Click the Statistics Start button and select marker to set the start marker for the statistics range.
5. Click the Statistics Stop button and select marker to set the stop marker for the statistics range.
6. Press or ESC to return to the superior function menu Statistics.
7. Click the Statistics Range function button, once every click, turn ON, OFF switch once, when its state is set to ON, then open the statistical range; when its state is set to OFF, then close the statistical range.
8. Click the Statistics function button, each click once, turn ON, OFF switch once, when its state is set to ON, then statistics; when its state is set to OFF, then turn off the statistics.

5.1.5.5 Display the Mark Point Values For All Traces

When there are multiple traces in the trace window, the Markers points on all traces are displayed.

Steps:

1. Press Channel Next or Channel Prev to activate the channel you want to set.
2. Press Marker .
3. Click the Marker Functions ->Annotation Options button.
4. Click the Active Only function button, the function button in front of the RBI “●” that only show the current activation of all the Markers value, the function button in front of no RBI “●” shows all the traces of the trace window all the Marker value.

5.1.5.6 Display Position Annotation of the Marker Value

If you have a Marker, you can adjust the Marker’s display position.

Steps:

1. Press Channel Next or Channel Prev to activate the channel you want to set.
2. Press Marker .
3. Click the Annotation Options button.
4. Click the Data X Position function button, pop-up data input dialog box, enter the X axis percentage (0 ~ 100), set the horizontal display position.
5. Click the Data Y Position function button, pop-up data input dialog box, enter the Y axis percentage (0 ~ 100), set the vertical display position.

Note: if there are multiple traces in a window, the position of the marker is displayed in the current trace window only when the first trace is activated.

5.2 Limit Test

The use of the limit test function allows the limit line to be set for each trace and then the pass/fail judgment of the measurement result.

Limit test is based on the limit table set the limit line to Pass, Fail to determine the function.

In the limit test, if the upper limit or lower limit of the limit line indication is not exceeded, the result of the judgment is qualified for all the measurement points on the trace. The measurement point within the excitation range where the limit line is not set is judged as acceptable.

[Description]: Passed/Failed to determine the target is limited to the measurement point.

Define the limit line by defining a limit table, limit the table including the specified start excitation value, the termination stimulus, the start response value, the stop response, and the type (lower/upper limit). The limit table is as follows:

	Type	Begin Stimulus	End Stimulus	Begin Response	End Response
1	MAX	880.0000000 MHz	900.0000000 MHz	-48 dB	-48 dB
2	MAX	937.0000000 MHz	961.0000000 MHz	2 dB	2 dB
3	MIN	937.0000000 MHz	961.0000000 MHz	-5 dB	-5 dB
4	MAX	982.0000000 MHz	1.000000000 GHz	-32 dB	-32 dB
5	OFF	1.010000000 GHz	1.030000000 GHz	-48 dB	-48 dB
6					

Figure 5-21 Limit Table

Limit table of the failed parameters meaning table:

Field Parameter	Description
Type	OFF: limit test does not use segmentation MIN: specifies the segment where the minimum value is located. MAX: specifies the segment where the maximum value is located
Begin Stimulus	specifies the starting point for the stimulus value on the limit line
End Stimulus	specifies the end of the stimulus value for the limit line
Begin Response	specifies the starting point for the limit line response value
End Response	specifies the end of the limit line response value

Note:

1. You can define a limit line, the limit line can be free to overlap the other limit line excitation range.
2. Define a limit line of the same type as the second limit line, and the second limit line of the excitation range and the first limit line overlap, which will lead to the same measurement point at two or more limits value. In this case, the limit values to be used in the limit test are defined as follows:

a) When the type of two or more limit values is set to the maximum value (MAX), the minimum limit value is used as the maximum value.

b) When the type of two or more limit values is set to the minimum value (MIN), the maximum limit value is used as the minimum value.

When the limit test is in progress, the unacceptable measurement point is displayed on the screen in red, and the result of the pass/fail judgment of the trace based on the result of each measurement point is displayed (if one or more measurement points on the trace Unqualified, the judgment result is unqualified). As shown below:

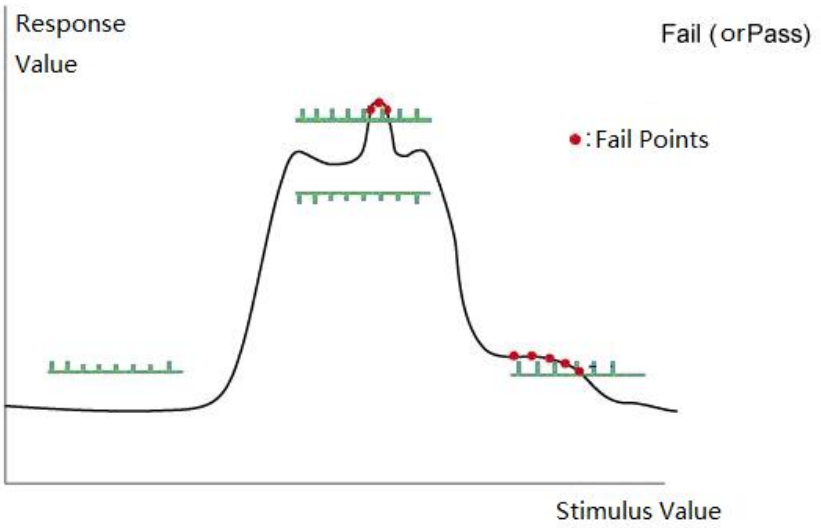


Figure 5-22 Limit test schematic

In addition to observing the screen, the buzzer can also be sent by the buzzer to determine the results.

5.2.1 Limit Table Editing

Limit table editing, including add, delete, modify, clear, save, restore and other operations.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to use the limit test function.
2. Press Analysis .
3. Click the Limit Test button.
4. Click the Edit Limit Line function button, enter the limit table editing status, as shown below:

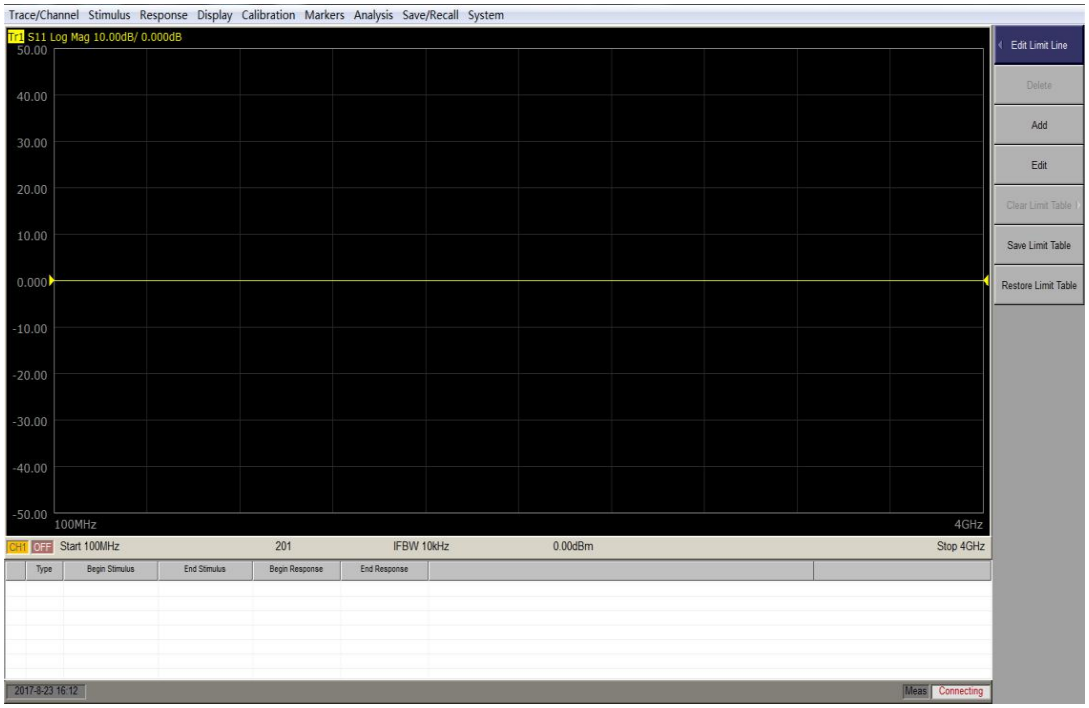


Figure 5-23 Limit table editing

5. The operation of the function button to limit the table operation, the function buttons as described in the following table:

Function Button	Description
Delete	Delete the limit table where the cursor is located
Add	Add a row at the end of the limit table
Edit	Enter the limit table edit status
Clear Limit Table	Empty the entire limit table
Save Limit Table	Save the limit table as a file. Save the limit table as a file, extension: *. Lim, you can call it at any time on the screen and use it. You can use this text editor to open and edit.
Restore Limit Table	Restores the limit table from the file

Note: Press ESC front panel of the instrument to switch the control focus from the Limit Table edit status to the function menu operating status.

5.2.2 Limit Line Offset

By adding a specific offset to the limit value, you can adjust the limit line.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to use the limit test function.

2. Press Analysis.

3. Click the Limit Test button.

4. Click the Limit Line Test function button to enter the limit line offset function menu, enter the Stimulus Offset, and Response Offset, add the amplitude offset equal to the search value of the job marker Marker-> Response Ofs. The meaning of each parameter is as follows:

Parameter	Description
Stimulus Offset	Add a certain offset to the stimulus value for the entire segment in the limit table. (Excitation Offset)
Response Offset	Add a certain offset to the response value of the entire segment in the limit table. (Amplitude offset)
Marker-> Response Ofs.	Adds an amplitude offset equal to the search value of the work marker. The current setting value of the amplitude offset can be confirmed by pressing Amplitude Offset. (Mark amplitude offset)

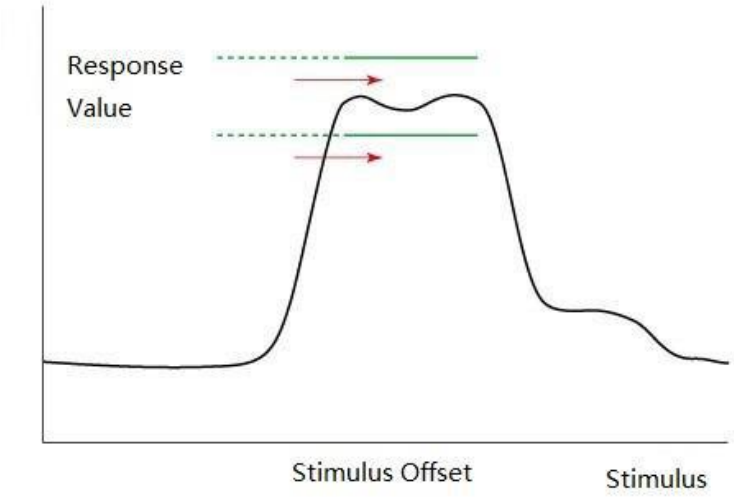


Figure 5-24 Limit Line Offset - Excitation Offset

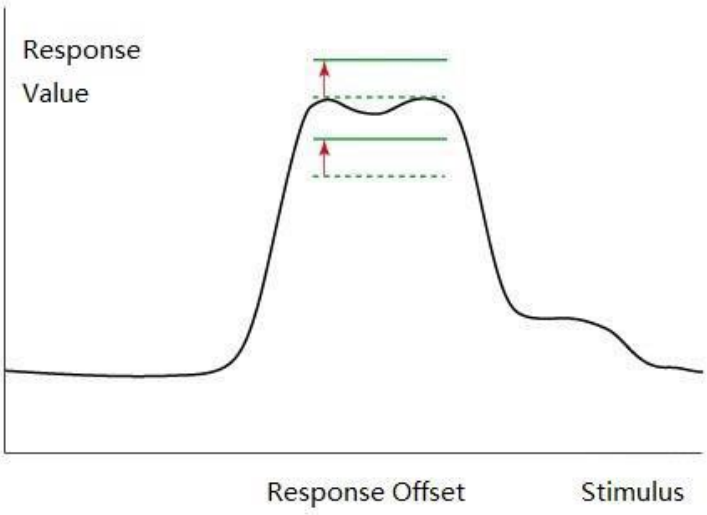


Figure 5-25 Limit Line Offset - Response Offset

5.2.3 Turn ON/OFF Limit Test

Steps:

1. Limit table editing. <Reference limit table edit section>.
2. The limit line offset editing. <Reference limit line offset>.
3. Click the Limit Line function button, once every click, turn ON, OFF switch once, when its state is set to ON, then the definition of the limit line; when its state is set to OFF, then hide the definition of the limit line.
4. Click the Fail Sign button, turn ON and OFF each time it is clicked. When the status is set to ON, the channel Fail/Pass test result is displayed. When the status is set to OFF, then hidden channel test results display.
5. Click the Limit Test function button, each click once, turn ON, OFF switch once, when its state is set to ON, then test; when its state is set to OFF, then stop the test.

5.3 Ripple Test

According to the ripple limit set by the ripple limit table, evaluate whether the test result is qualified or not. You can specify up to 12 bands to allow each band to be tested.

If the ripple value specified by the fluctuation limit is not exceeded by any measurement point on the trace, the ripple test will determine that the measurement is "Pass"; otherwise, the determination is judged as "Fail". For measurements that are not specified in the range of excitation limits, the test will determine that the measurement is "Pass" and "Fail". The corresponding measurement point will be indicated in red on the screen. The trace test results will be indicated at the top right of the graph. The result of each trace will be displayed as "Ripln: Pass" (ripple n: pass) or "Ripln: Fail" (ripple n: fail). N indicates the trace number. If the test result display (Ripple Value) is turned on, the measured value for each band is displayed as Bn: <measurement value>, n is the band number, as shown in the following figure:

Figure 5-26 Ripple test results

5.3.1 Ripple Limit Table Editing

Ripple limit table editing, including add, delete, modify, clear, save, restore and other operations.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to use the ripple test function.
2. Press Analysis.
3. Click the Ripple Limit function button, enter the ripple test function menu, as shown below:
4. Click the Ripple Value Band function button, pop-up data input dialog box, enter the band number (1 to 12).
5. Click Edit Ripple Limit function button, enter the ripple limit table edit state, as shown below:

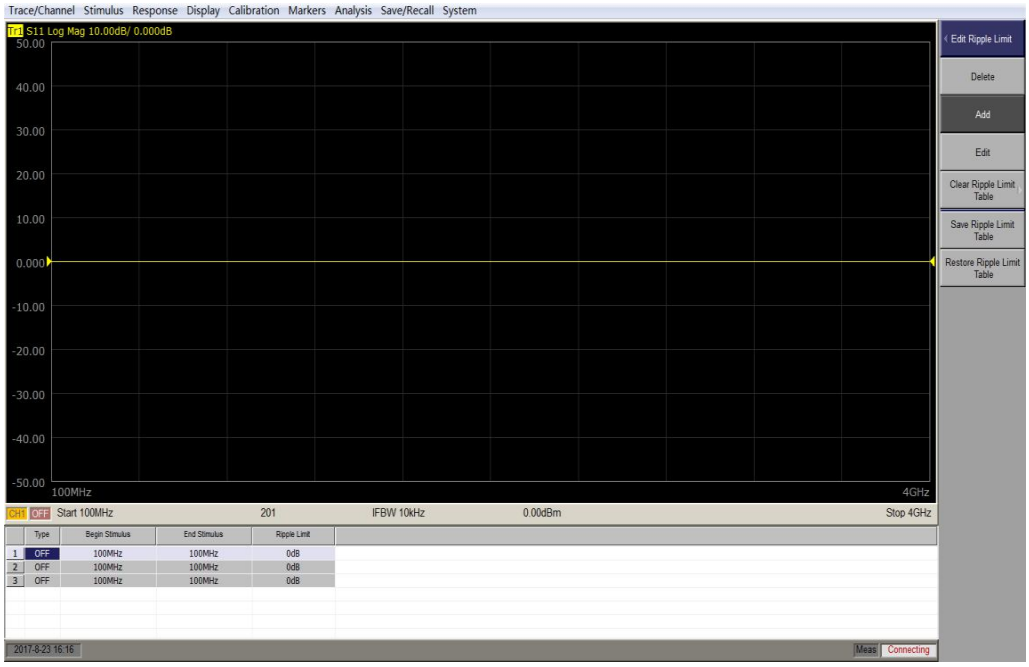


Figure 5-27 Ripple Test Limit Table Edit

6. the operation of the function button to limit the table operation, the function buttons as described in the following table:

Function button	Description
Delete	Remove the ripple limit table where the cursor is located
Add	Add a row at the end of the ripple limit table
Edit	Enter the ripple limit table to edit the state
Clear Ripple Limit Table	Empty the entire ripple limit table
Save Ripple Limit Table	Save the ripple limit table into a file. Save the limit table as a file, extension: *. Rlm, you can call it at any time on the screen and use it. You can use this text editor to open and edit.
Restore Ripple Limit Table	Restore the ripple limit table from the file

5.3.2 Turn ON/OFF Ripple Limit Test

Steps:

1. Ripple limit table editing. <Reference ripple limit table edit section>.
2. Click the Ripple Limit function button, enter the ripple test function menu, as shown below:

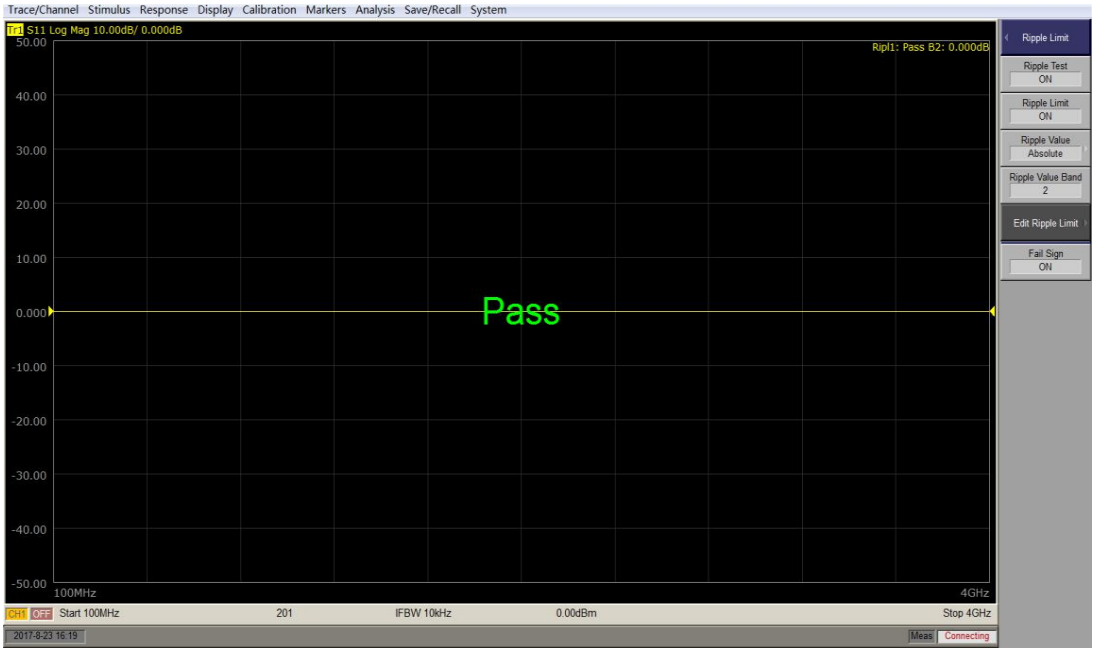


Figure 5-28 Ripple Test - Function Menu

Ripple Test The function buttons are described in the following table:

Function button	Description
Ripple Test	Set the ripple test on/off
Ripple Limit	Set the ripple limit line to show the opening/closing
Ripple Value	OFF: Turns off the display of test result values Absolute: Absolute value (the difference between the maximum and minimum values in the band) Margin: margin (the difference between the absolute value of the ripple and the fluctuation limit)
Ripple Value Band	Select the band to display its ripple value (1 to 12)
Edit Ripple Limit	Open the fluctuation limit table to edit the fluctuation limit. To use the ripple test function, you must first define the ripple limit.
Fail Sign	ON: Displays the channel test result OFF: Channel test results are not displayed

3. Click the Ripple Limit function button, once every click, turn ON, OFF switch once, when its state is set to ON, then the definition of the ripple limit line; when its state is set to OFF, then hide the definition of Ripple limit line.
4. Click the Ripple Value function button to select the display format of the fluctuation value. When OFF is selected, the test result will not show the ripple value. When Absolute is selected, the test result shows the absolute value of the ripple. When Margin is selected, the test result is displayed Ripple margin value.

5. Press  or ESC to return to the parent function menu Ripple Limit.

6. Click the Fail Sign function button, and turn ON and OFF each time it is clicked. When the status is set to ON, the test result of the channel is displayed. When the status is set to OFF, the channel test is not displayed result.

7. Click the Ripple Test function button, once every click, turn ON, OFF switch once, when its state is set to ON, then the ripple test, and according to the settings show the test results; when its status is set to OFF, no ripple test is performed.

5.4 Stable Test

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to use the ripple test function.

2. Press Analysis.

3. Click the Stable Test->Check Devices function button to find the connected devices, and then click the Stations function button to select single mode or mixed mode. The mixed mode is as follows:

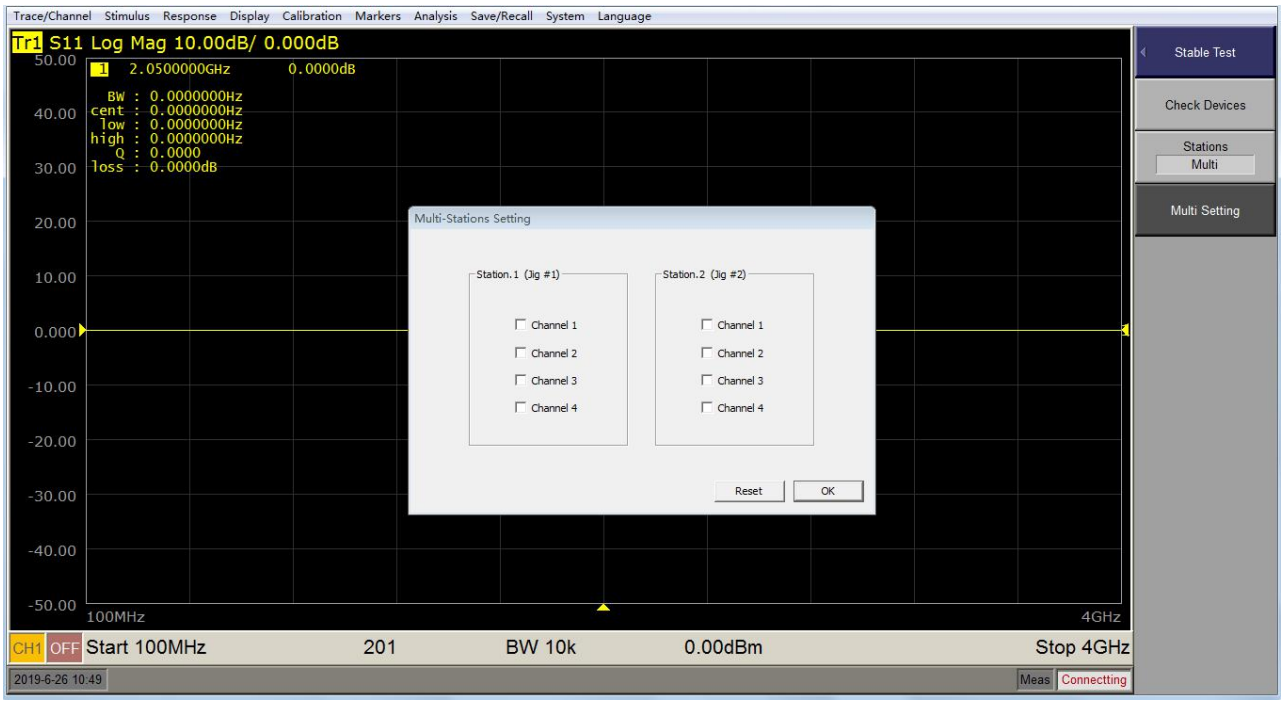


Figure 5-29 Stable Test - Mixed Mode Option

5.5 Time Domain Analysis

The time domain analysis includes the following functions for determining the position and size of the mismatch.

1) Converts the measured data to the time domain (conversion function).

Using this conversion function, you can convert the frequency domain measurement results to the time domain measurement data and make the necessary analysis.

2) Delete unnecessary measurement data in the time domain (gating function)

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to analyze.
2. Press Analysis.
3. Click the Time Domain function key to enter the time domain analysis function.
4. Turn on/off the function. Click the Time Domain button to turn ON and OFF each time it is clicked. When set to ON, the function is turned on. When set to OFF, the function is turned off.
5. Set the strobe range. Click Start to set the start time; click Stop to set the stop time; click Center to set the time middle value; click Span to set the time interval value.
6. Set the strobe type.Click the Type function button and click the following function button to select the gating type.

Function button	Description
Bandpass	Bandpass
Lowpass Step	Lowpass step
Lowpass Impulse	Lowpass impulse

7. Set the window shape.Click the Window function button, click the following function button, the window shape selection.

Function button	Description
Maximum	β maximum
Normal	β normal
Minimum	β minimum
Impluse Width	Impluse width setting
KiserBeta	KiserBeta β

8. Set the low-pass measured frequency. Click the Set Frequency Low Pass function button to set the frequency of the frequency to be measured when the conversion type is low.

Note: The frequency of the measured point is a multiple of the starting frequency

5.6 Time Domain Gating Function

This function is used to remove unwanted response data from time domain measurements by mathematical operations. This function is used to measure the spurious effects of the frequency response when the fixture is measured, provided that the useful signal and the spurious signal can be separated in the time domain.

The measurement flow is shown in the following table and the following figure:

Measurement Steps and Items	Description
Frequency Domain measurement	Measure in the frequency domain
Change to the time domain	The transform function is enabled and the measured data is converted into data in the time domain
Set the gate	The following settings are made for gating: gated type, gated shape, gated range
Change back to the frequency domain	The conversion function is disabled and the frequency domain response corresponding to the data selected using the gating is displayed.

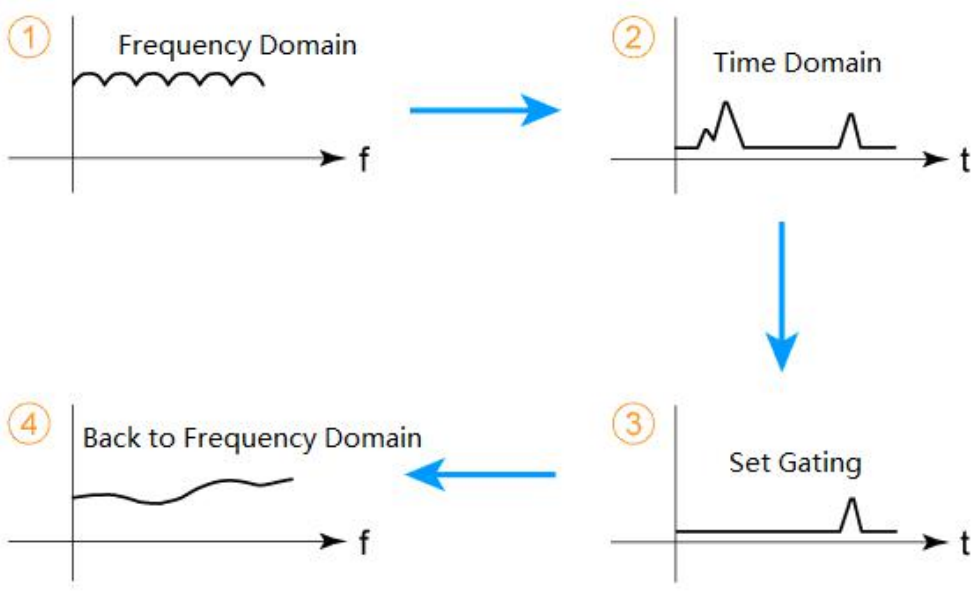


Figure 5-30 Time domain gating measurement flow diagram

(A) Gated Type

Gated Type	Description
Bandpass	Removes the response outside the threshold range
Notch	Remove the threshold within the response

Steps:

1. Press the or key and press or to select the trace you want to use to set the gating type.
2. Press the button.
3. Click the Gating function button.
4. Click the Type function button, every click, switch between Bandpass and Notch once.

(B) Gated Shape

The gated shape is similar to a bandpass filter with a number of parameters representing the gated shape. The following figure illustrates the definition of gated shape parameters.

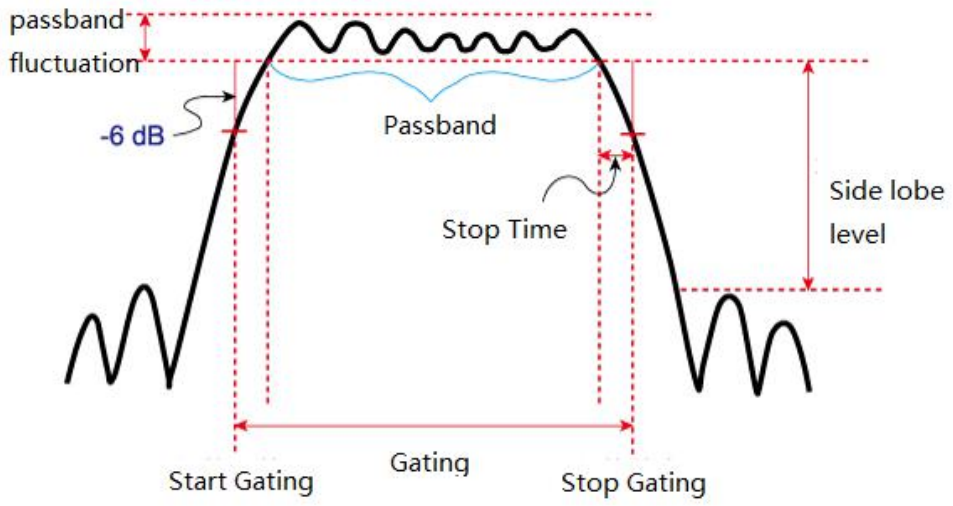


Figure 5-31 Time-domain gated measurement - Gated shape parameter definition

The parameters are described in the following table:

Gated Shape	Sidelobe Level	Gated resolution (minimum gated span)
Minimum	- 48 dB	2.8/ Frequency span
Normal	- 68 dB	5.6/ Frequency span
Wide	- 57 dB	8.8/ Frequency span
Maximum	- 70 dB	25.4/ Frequency span

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace you want to use to set the gating type.
2. Press Analysis .
3. Click the Gating function button.
4. Click the Shape function button.
5. Click the function button to set the gated shape.

(C) Gated Range

Set the gated range by specifying the gating start time and gated end time, or by specifying the center time and time span, as shown in the figure above. The gated range that can be set is: -Tspan to Tspan, ie, the lower limit: -Tspan , upper limit: Tspan

Description: Tspan = Fspan /(Nmeas — 1), Fspan is the span of the sweep frequency, Nmea is the measured number of points.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace you want to use to set the gating type.
2. Press Analysis.
3. Click the Gating function button.
4. Click the Start button to set the start time.
5. Click the Stop function button to set the end time.
6. Click the Center function button to set the gating center time.
7. Click the Span function button to set the gating time span.

(D) Start the Gating Function

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace you want to use to set the gating type.
2. Press Analysis.
3. Click the Gating function button.
4. click the Gating function button, each click once, between ON and OFF, when set to ON, then start the gating function; when set to OFF, then turn off the gating function.

Note: The time domain gating function only works in linear frequency sweep mode.

6 Data Output

6.1 Save the Data

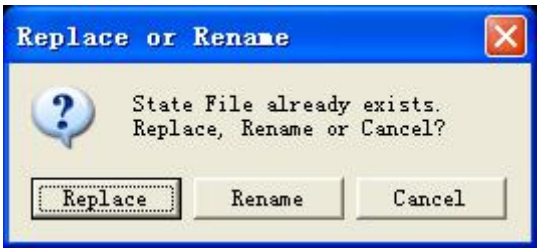
6.1.1 Data Save Type

Data save type	Description
State	Save the settings of the instrument, and later save the saved settings to the instrument, you can reproduce the state when saved.
State & Cal	Save the instrument settings and calibration data, the saved data will be transferred to the instrument, you can reproduce the state of preservation, at the same time, the calibration data is also transferred to the instrument, you can use the calibration data to call the measurement error correction.
State & Trace	Save the instrument settings and trace (error correction data array and error correction memory array), the saved data will be transferred to the instrument, you can reproduce the state of preservation, at the same time, will also call the trace and display to the screen
All	Save the instrument settings, calibrate the data and trace, and then save the saved data to the instrument to reproduce the status of the save, and also call the calibration data and trace.

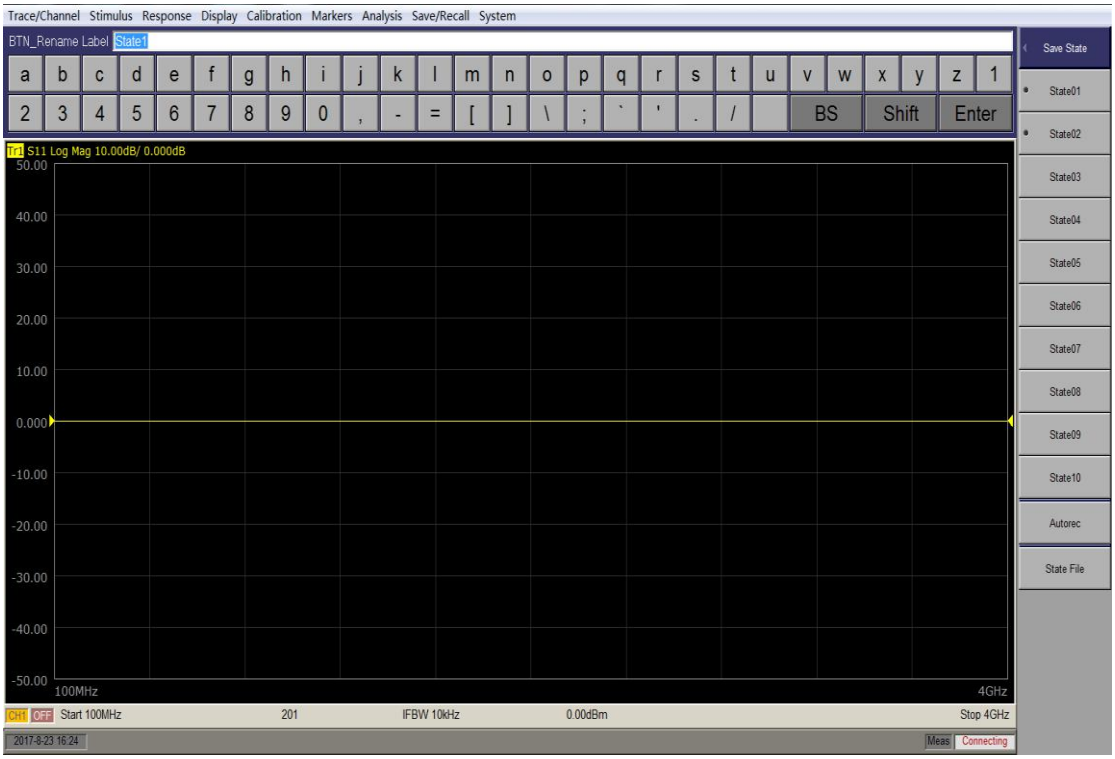
6.1.2 Save State

Steps:

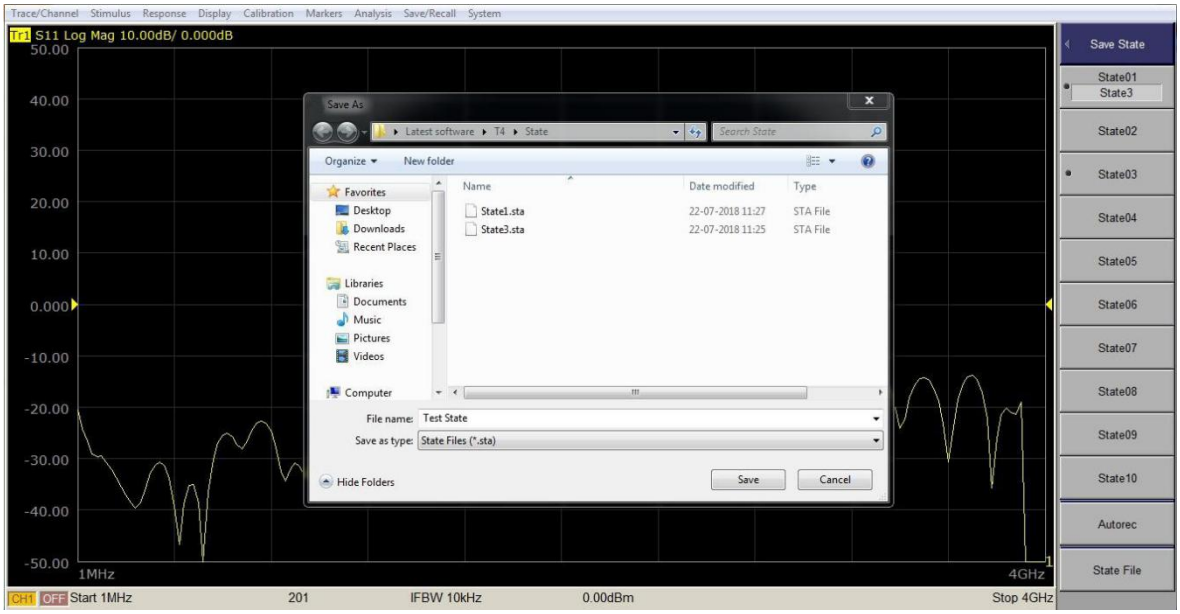
1. Press Save.
2. Click the Save Type button and select the Save category (see section "Data retention category").
3. Press or ESC to return to the higher function menu Save.
4. Click the Save State button to enter the Save State menu.
5. Save to the status function button and add comments to the function button. Press to select the function button to be saved (State1 ~ State10), pop up the dialog box of the input function button, enter the function button comment, then press Enter; if the function button has been RBI, it indicates that the instrument has saved the status file, When saved, the system will pop up whether to replace the selection window, as shown below:



Click the "Replace" function button, overwrite the original settings; click "Rename" function button, you can define a function button comment name, as shown below:



6. Keep to the file. Press , select and click the State File button, enter the status file name, click the "Save" button, or select an existing file, click the "Save" button to overwrite the original file. As shown below:



6.1.3 Save Channel

The instrument allows you to individually save/recall the instrument status of each channel. With this function, the instrument status of the working channel can be saved separately to one of the four registers (A to D, volatile memory, power off, this state will be lost), and the instrument status can be recalled from the register and restored to The status of the current working channel.

Since this function is used to call the instrument status of each channel from the different channels used to save the instrument status, this function is useful for copying the instrument status between channels.

Note: Unlike the state of the entire instrument, the instrument status of each channel is saved to the volatile memory, rather than being saved to the file, so that the state is lost if the power is turned off.

Steps:

1. Press Channel Next or Channel Prev to activate the channel to save its status.
2. Press Save.
3. Click the Save Channel button.
4. Click one of the State A to State D function buttons to save the instrument status of the working channel to the specified register. After the completion of the function button in the function before the button "●", if the function button has been RBI before, that the instrument has been saved in the state, save, cover it.

6.1.4 Save Trace Data

The work trace data on the working channel can be saved to a CSV file (file extension * .csv), and the data can be loaded into the PC application for further processing.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace you want to save.
2. Press Save.
3. Click the Save Trace Data button, open the "Save As" dialog box, enter the file name to save, click the Save button. As shown below:

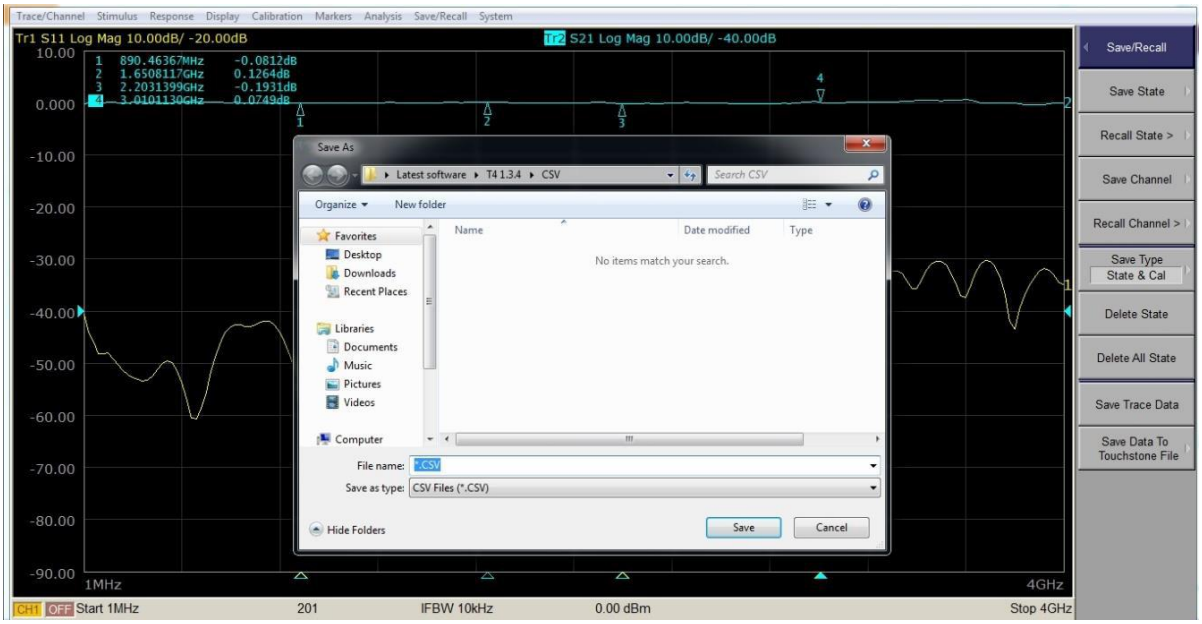


Figure 6-1 Save trace data

6.2 Save Data TouchStone

You can save data in "real-imaginary", "linear-angle-angle", "logarithmic-angle" format. The file types are * .s1p and * .s2p. The file type indicates the number of ports that output the data structure to the Touchstone file.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace you want to save.
2. Press Save.
3. Click the Save Data To Touchstone File button.
4. Click the Type button, select the file type, click the 1-Port (s1p) function button, select s1p, click the 2-Port (s2p) function button, select s2p, select the function button before the RBI "●" .
5. Press or ESC to return to the higher function menu Save Data To Touchstone File.

6. If you select the file type is s1p, you need to select the port number, otherwise, do not need this step. Click the Select Port function button, once for each click, once to switch 1,2.
7. Click the Format function button, enter the Touchstone Format function menu, select the file format. The file format is shown in the following table:

File format	Description
Real-Imaginary	Select the "real-imaginary" data format
Magnitude-Angle	Select the "Linear Amplitude - Angle" data format
dB-Angle	Select the "logarithmic amplitude - angle" data format

8. Press the key or key to return to the higher function menu Save Data To Touchstone File.
9. Click the Save File button, open the "Save As" dialog box, enter the file name to save, click the Save button. As shown below:

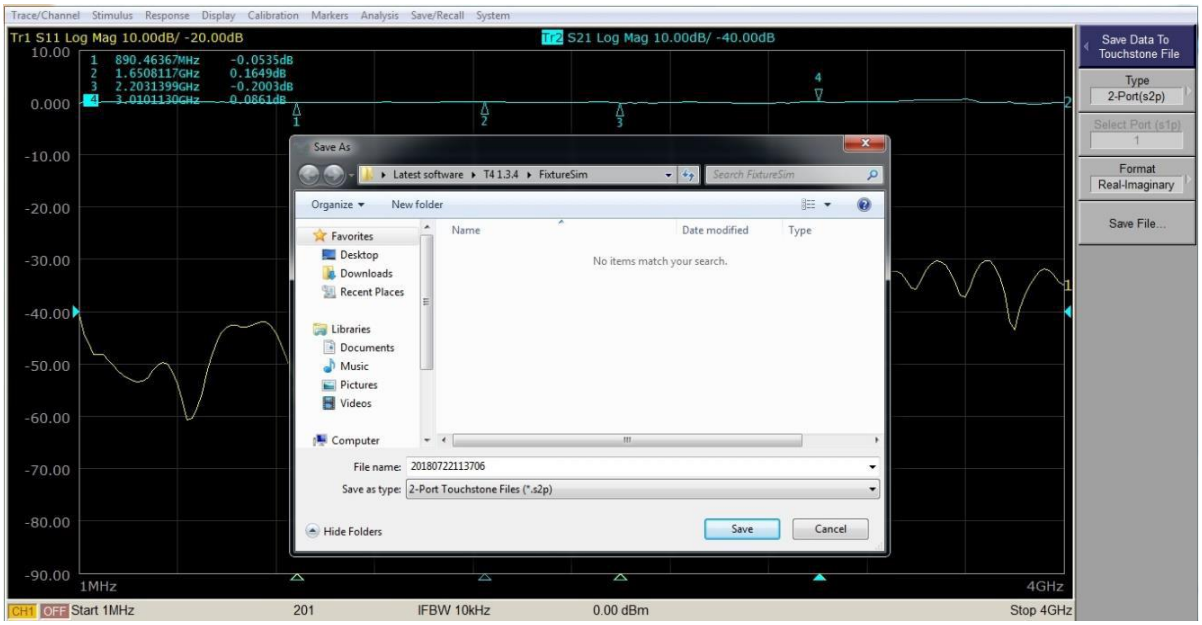


Figure 6-2 Save the data to TouchStone

6.3 Data Recall

6.3.1 Recover State

Steps:

1. Press Recall , enter the Recall function menu.
2. Click the Recall State function button to enter the Recall State function menu.

3. Press  to select the status to be saved function button State1 ~ State10 (only the instrument has been saved in the state button can choose), press Enter , or click the State File function button, select the instrument to save the status file, click Open button. As shown below:

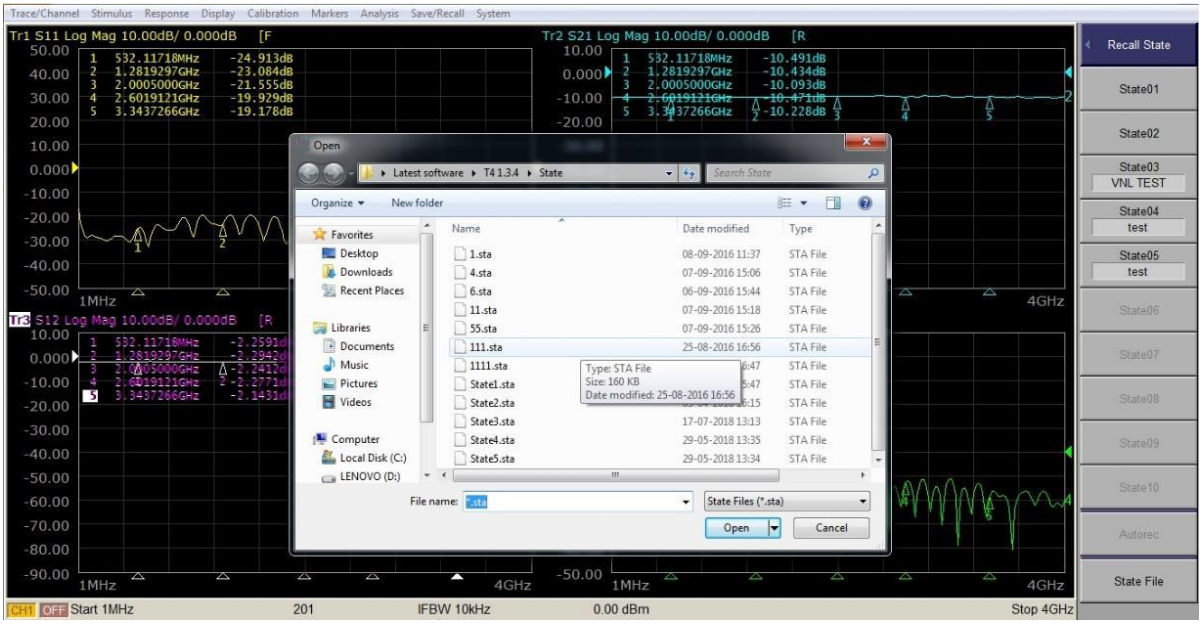


Figure 6-3 State recovery

6.3.2 Channel Recovery Recall Channel

Steps:

1. Press Recall , enter the Recall function menu.
2. Click the Recall State function button to enter the Recall State function menu.
3. Press  to select the status to be saved function button State A ~ State D (only the instrument has been saved in the state button can choose), press Enter . As shown below:

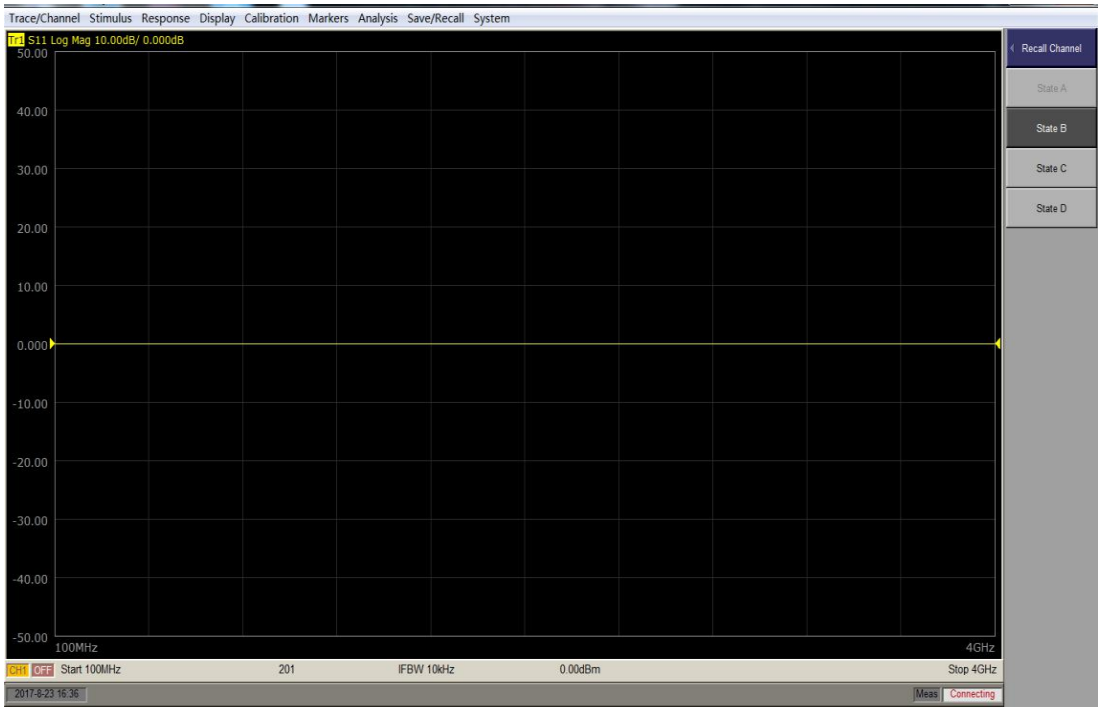


Figure 6-4 Channel recovery

6.3.3 Delete State

Steps:

1. Press Recall , enter the Recall function menu.
2. Click the Delete State function button, open the Delete State File dialog box, select the state file to delete, click the Open button, as shown below:

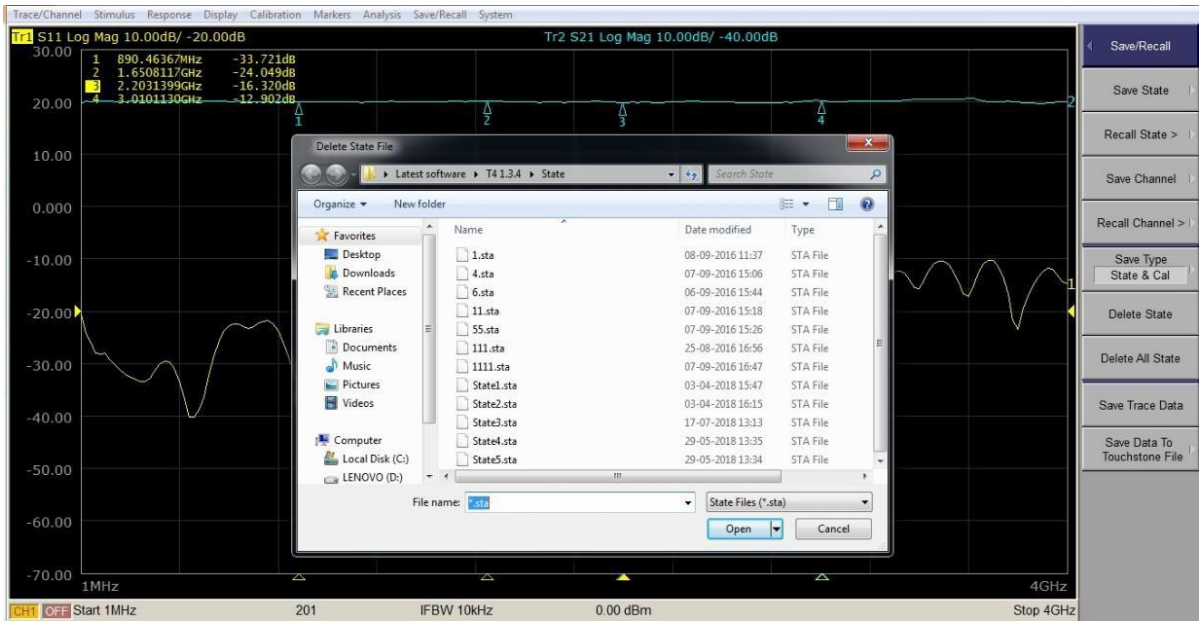


Figure 6-5 Delete status

6.3.4 Delete all States

Steps:

1. Press Recall , enter the Recall function menu.
2. Click Delete All State 1, pop-up warning dialog box, click OK button. As shown below:

Figure 6-6 Delete all states

7 Measurement Optimization

7.1 Expand the Dynamic Range

The dynamic range is the finite difference between the maximum input power level of the analyzer and the minimum measured power level (background noise). It is important to increase the dynamic range when evaluating a characteristic accompanied by a large change in amplitude (eg, passband and stopband for the filter). The dynamic range can be increased by reducing the noise floor of the receiver.

There are two ways to reduce the receiver noise:

(I) reduce IF bandwidth

(II) open the scan average

7.1.1 Reduce IF Bandwidth

Reducing the IF bandwidth of the receiver can reduce the impact of random noise on the measurement. Reducing the IF bandwidth to 1/10 of the original bandwidth reduces the bottom noise of the receiver by 10 dB.

Steps:

1. Press Channel Next or Channel Prev to select the channel to modify the IF bandwidth.
2. Press Avg .
3. Press the IF Bandwidth function button.
4. Change the IF bandwidth in the data entry area.

7.1.2 Open the Average Scan Averaging

The average scan can reduce the impact of random noise on the measurement. The scan averages averaged the data (vectors) for each point based on the average of the user-specified averages of the weighted average of the successive scans. The scanning average can be represented by the following equation.

$$A_n = \frac{S_n}{F} + \left(1 - \frac{1}{F}\right) \times A_{n-1}$$

Among them:

An = Scan average calculation result when the nth scan operation is performed at the relevant point (vector)

Sn = Measured value obtained when the nth scan operation is performed at the relevant point (vector)

F = scan average factor (integer from 1 to 999)

Steps:

1. Press Channel Next or Channel Prev to select the channel to modify the IF bandwidth.
2. Press Avg .
3. Click the Ave Factor function button.
4. Change the Ave Factor value in the data entry area.
5. Click the Averaging function button, each click once, turn ON, OFF switch once, when the settings to switch its state to ON, then open the average scan function; when set to OFF, then turn off the average scan function.

7.2 Reduce Trace Noise

Start Smooth Measurements to reduce trace noise. After smoothing, the values of the points on the trace will be represented by the moving average of the values of multiple neighboring points. Smooth aperture (percentage of scan span) Defines the range of points to be included in the moving average calculation. You can define smoothing for each trace.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to be smooth trace.
2. Press Avg .
3. Click the Smo Aperture function button.
4. Change the smooth aperture (%) value in the data entry area.
5. Click the Smothing function button, each click once, turn ON, OFF switch once, when its state is switched to ON, then open the smoothing function; when set to OFF, then turn off the smoothing function.

7.3 Improve the Accuracy of Phase Measurement

7.3.1 Electrical Delay

The electrical delay function can add or remove a lossless transmission line whose length varies with the receiver input. Use this function to increase the resolution of the phase measurement so that the linear phase offset can be measured. You can specify an electrical delay for each trace.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to set the electrical delay trace.

2. Press Scale.
3. Click the Electrical Delay button.
4. Enter the value through the buttons in the panel input area.

7.3.2 Phase Offset

The phase offset function may be used to add or subtract a predetermined value associated with the frequency of the incoming and outgoing traces. Use this function to simulate a phase shift that occurs after an event such as adding a cable.

Steps:

1. Press Channel Next or Channel Prev and press Trace Next or Trace Prev to select the trace to set the phase offset trace.
2. Press Scale.
3. Click the Phase Offset function button.
4. Enter the value through the buttons in the panel input area.

7.4 Increase the Measurement Speed

7.4.1 Closing the Update of Display Information

Turn off the update function of the on-screen display information to save the processing time required to update the display information in the analyzer, thus increasing the measurement speed.

Steps:

1. Press Display.
2. Click the Update button to switch its status to OFF to close the update of the displayed message.

7.4.2 Offset Calibration Correction

After closing the error calibration, you can reduce the data processing time required during the measurement process, thereby increasing the measurement speed.

(A) Turn Off the Measurement Calibration Data

Steps:

1. Press Cal.
2. Click the Correction function button, switch its status to OFF, turn off the error calibration function.

(B) Turn Off the System Calibration Data Steps:

1. Press System.
2. Click the Misc Setup function button.
3. Click the System Correction function button, once every click, turn ON, OFF switch once, when you need to turn off the system calibration data, set to OFF, when you need to open the system calibration data, set to ON.

7.4.3 Segment

7.4.3.1 Overview

Segmentation is to define two or more bands (called segments), and then specify the number of points, IF bandwidth, power level, scan mode, scan delay, and scan time for each segment. Perform a scan of all segments in sequence, just as the scan was done in one scan operation.

By skipping the band that you do not need to measure, you can scan and measure only the parts you need to increase the measurement speed.

You can define the best measurement conditions for each of the specified segments. For example, you can specify as many points as possible in segments that require high trace resolution; specify as few points as possible in segments that do not require high resolution. This reduces the measurement time and the overall measurement throughput is optimized because there is no need to perform the entire operation under the same measurement conditions for a particular band.

For example, to evaluate a bandpass filter with transmission characteristics (shown below), you can select the desired frequency band from A to G and determine the measurement conditions (as shown in the table below). This allows them to be measured simultaneously in a single scan operation.

As shown in the following figure and table, set A, B, C, E, G5 segments.

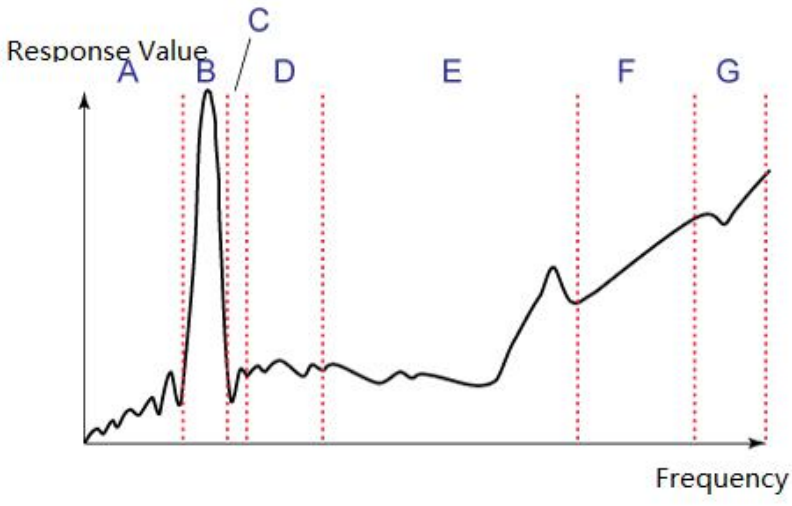


Figure 7-1 Schematic diagram of segmented scanning

	Start Frequency	Termination Frequency	Points	IF Bandwidth	Power	Dely

A	440 MHz	915MHz	50	50kHz	0dBm	0s
B	915 MHz	980MHz	130	70kHz	0dBm	0s
C	980 MHz	1.035GHz	60	50kHz	0dBm	0s
D	1.035GHz	1.07GHz				
E	1.07GHz	2GHz	100	70kHz	0dBm	0s
F	2GHz	2.6GHz				
G	2.6GHz	3GHz	40	70kHz	0dBm	0s

7.4.3.2 Definition of Segmentation Tables

1. Segmentation is to define two or more bands (called segments), and then specify the number of points, IF bandwidth, power
2. A segmented frequency band can not overlap with another segmented frequency band. (The start frequency of the segment must be higher than the termination frequency of its previous segment).
3. The start frequency of segment 1 must be higher than the starting frequency of the instrument frequency range, and the end frequency of the last segment must be lower than the end frequency of the instrument frequency range.
4. If the start frequency and the ending frequency of the segment are different, two of the maximum number of points supported by the instrument can be defined in the segment.
5. If the start frequency and end frequency of the segment are the same, the maximum number of points supported by the instrument can be defined in the segment.
6. Can set the items for each segment, scan range (Start, Stop), point (Point), IF bandwidth (IF BW), power level (Power), scan delay (Delay). As shown in the following table:

Data Item	Description
Start	Sets the start value of the scan range
Stop	Sets the end value of the scan range
Points	Set the number of scanning points
IFBW	Set the IF bandwidth
POWER	Set the scan function

Steps:

1. Press Channel Next or Channel Prev to select the channel to create the segment table.
2. Press Sweep.

3. Click the Segment Table function button, enter the sub-table definition function menu, operate the function button to complete the definition of segment ratio. The functions of each function button are described in the following table:

Function Button	Description
Add	Add a row of data to the segment table
Delete	Delete the last row of data in the staging table
Edit	Enter the segment table item edit status
List IFBW	Turns on or off the IFBW data item
List Power	Turns the Power data item on or off
List Delay	Turns the Delay data item on or off

Press ESC to return the job focus from the segment table edit status to the menu function button operation status.

The sub-table definition interface is shown in the following figure:

Figure 7-2 Segment table definition interface

7.4.3.3 Execution of Segmented Scans

Steps:

1. Press Channel Next or Channel Prev to select the channel to perform the segmented scan operation.
2. Press Sweep.
3. He definition of sub-table. (See section "Definition of segmentation tables").
4. Click the Sweep Type function button.
5. Click the Segment function button.

8 System Function

8.1 Print Function

8.1.1 Printer Output Function

Steps:

1. Press System .
2. Click the Print button.
3. Click the Invert Image function button, select the normal print or reverse print, ON for the reverse print, OFF for normal printing.
4. Click the Print button, pop-up printer settings window, as shown below, press the OK button to start printing.

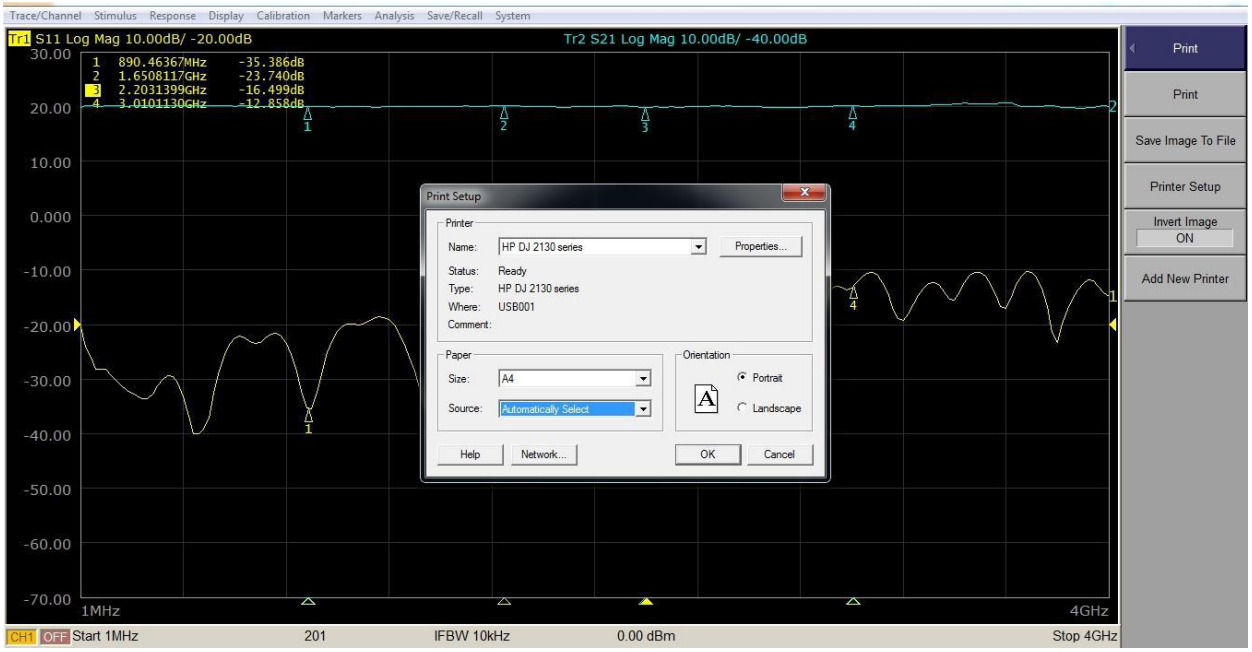


Figure 8-1 Printer Settings Window

8.1.2 Save Image to File

Steps:

1. Press System .
2. Click the Print button.
3. Click the Invert Image function button, choose to save the normal image or reverse image, ON for the normal image, OFF for the reverse image.

4. Click the Save Image To File button, pop-up file name input window and soft keyboard, as shown below, enter the file name, press the Save button to save the image file.

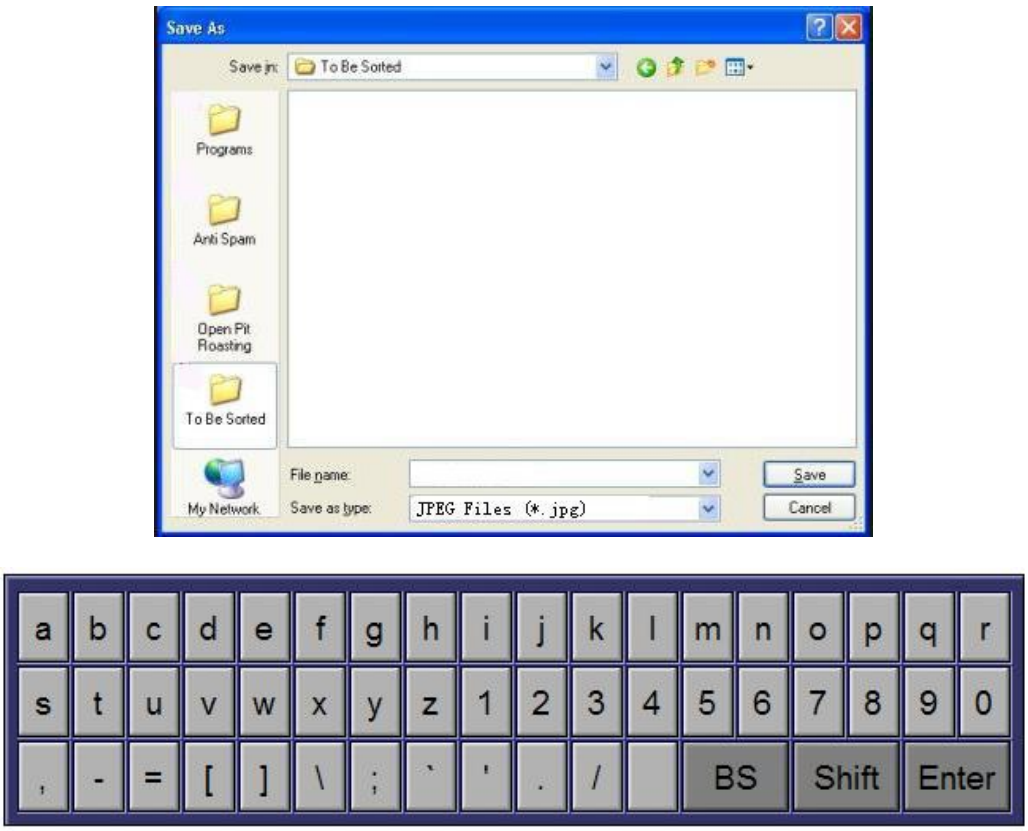


Figure 8-2 File name input window and soft keyboard

8.2 Misc Setup

8.2.1 Ref Source

Steps:

1. Press System .
2. Click the Misc Setup function button.
3. Click the Ref Source button, select Internal if the internal reference source is selected, and External for the external reference source.

8.2.2 System Correction

The system calibration data is the error calibration data generated when the instrument is shipped from the factory. Open the system calibration data can improve the measurement accuracy, turn off the system calibration data can improve the measurement speed.

Steps:

1. Press System.
2. Click the Misc Setup function button.
3. Click the System Correction function button, once every click, turn ON, OFF switch once, when you need to turn off the system calibration data, set to OFF, when you need to open the system calibration data, set to ON.

8.2.3 Key Lock

You can lock (disable) the front panel keys, mouse, touch screen. Use this function to prevent the measurement from being affected by misoperation.

Steps:

1. Press System.
2. Click the Misc Setup function button.
3. Click the Key Lock function button.
4. Click the Keyboard Lock function button, so that the button on the left side of the RBI, the instrument front panel keys are locked, RBI disappears, the instrument front panel keys to unlock.
5. Click the Touch Screen Lock function button, so that the button on the left side of the RBI, the instrument touch screen and the mouse is locked, RBI disappears, the instrument touch screen and mouse to unlock.
6. In the instrument panel keys and touch screen and mouse are locked, press Enter to unlock the currently selected.

8.2.4 Explorer

Operate the function into the windows resource management function interface, to achieve the copy of the file and other operations.

Steps:

1. Press System.
2. Click the Misc Setup function button.
3. Click the Explorer function button, enter the windows explorer interface.

8.2.5 Color Setup

This function is used to set the color of the different traces.

Steps:

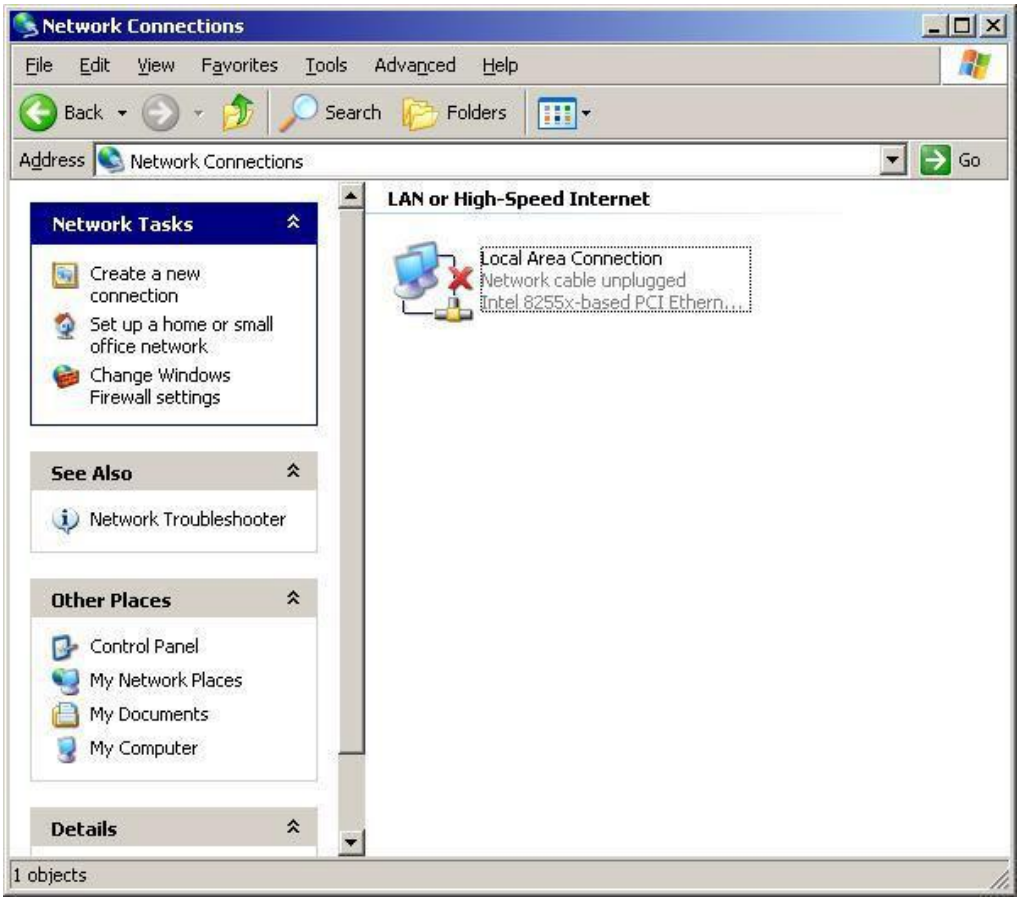
1. Press System.

2. Click the Misc Setup function button.
3. Click the Color Setup function button.
4. Click the trace function button, select the need to set the color of the trace.
5. Click the Red function button, press the red component function button, set the red color of the color.
6. Click the Green function button, press the green component function button, set the color of the green component.
7. Click the Blue function button, press the blue component value function button, set the color of the blue component.
8. Click the Default button to restore the factory default color settings.

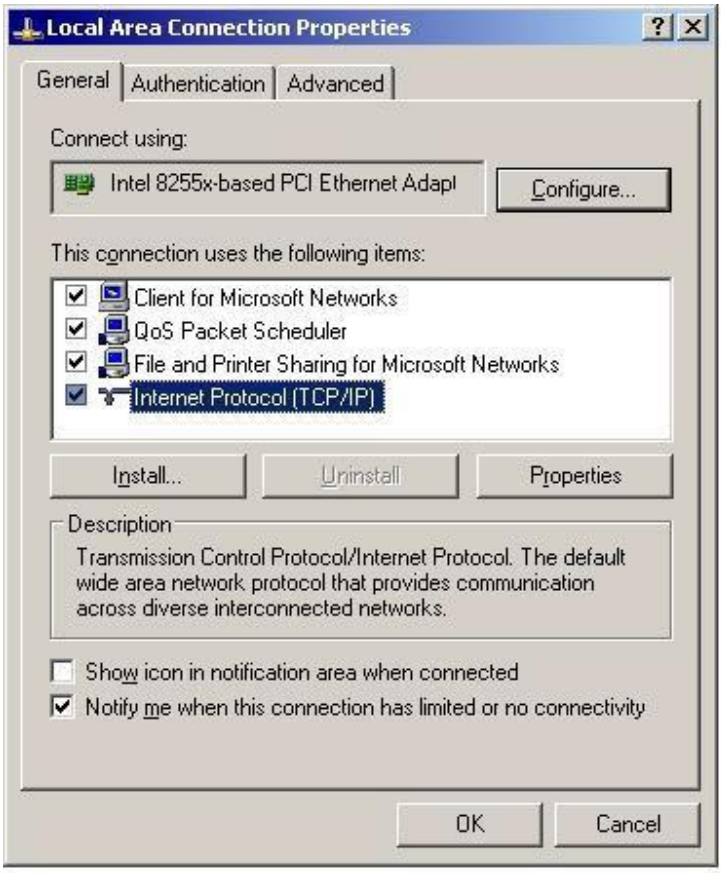
8.3 LAN Setting

Steps:

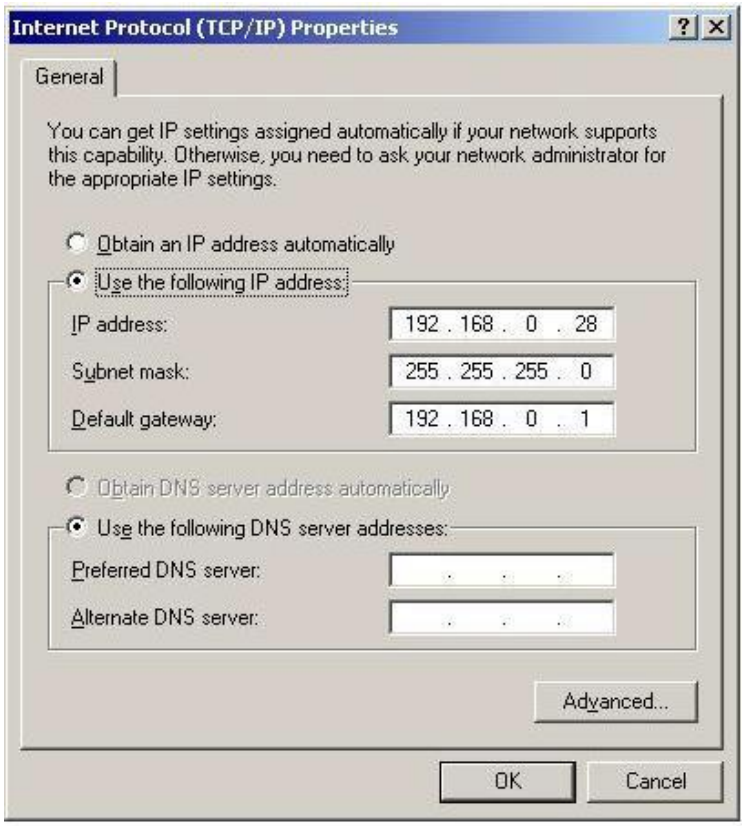
1. Press System .
2. Click the Network Setup function button, enter the windows Network Connection settings, as shown below:



3. Double-click "Local Area Connection", the following pop-up window:



4. Select Internet Protocol (TCP/IP), the following pop-up window:



5. Enter the IP Address, Subnet Mask equivalent, press OK.

8.4 Preset

Return the instrument to the instrument preset state.

Steps:

1. Press Preset.
2. Click the OK button.

8.5 Minimize the Window

Window minimization is convenient for users to minimize the current software interface when using the instrument, and perform other operations on the windows interface.

Steps:

1. Press Preset.
2. Click the Minimiza function button to exit the current software interface.

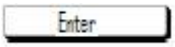
8.6 Software Exit

This function can easily realize software exit.

Steps:

1. Press Preset.
2. Click the Exit function button to exit the current software interface.

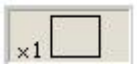
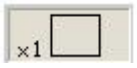
9 Common Faults and Solutions

No.	Fault Phenomenon	Solution
1	The instrument can not start normally	1) Check that the power cord is plugged in and check that the power outlet is connected. 2) Check that the power switch on the rear panel of the instrument is turned on. 3) The instrument has a delay protection function to prevent the power supply is not good, the instrument frequently restart, after the shutdown, you need to wait 1-2 minutes, then boot.
2	The instrument starts normally, but does not see the measurement trace.	Press  on the front panel of the instrument and click the AutoScale function button.
3	Instrument front panel keyboard, touch screen and mouse can not operate.	Press instrument panel keyboard  , try the touch screen or mouse, or whether the panel keyboard can be used normally; then, enter the System-> Misc Setup-> Key Lock function menu to check whether the Keyboard Lock, Touch Screen Lock option is selected.
4	The instrument front panel keyboard can not operate.	Use the touch screen or mouse to enter the System-> Misc Setup-> Key Lock function menu to check if the Keyboard Lock option is selected.
5	Instrument touch screen and mouse can not operate.	Use the instrument front panel keypad to access the System-> Misc Setup-> Key Lock function menu to check if the Touch Screen Lock option is selected.
6	The measurement results are larger each measurement error.	1) Check the normal connection of the cable and the connection is secure and reliable. 2) Check whether the measurement calibration is normal. 3) Check that the calibration options used are correct. 4) Check that the excitation source signal is set to ON.

7	The file can not be copied to the U disk.	1) Please check whether the U disk is not writable. 2) Please check whether the U disk is available. 3) U disk inserted into the instrument, you need to wait 1-2 minutes, waiting for the instrument automatically recognize the U disk.

10 Initialize the Parameter Value

After the instrument is initialized, the default value of each parameter is as follows.

No.	Parameter Description	Default Setting	Parameter Setting Object
1	Data Saving Type	State and Cal	Analyzer
2	Touchstone Data Format	Real-Imaginary	Analyzer
3	Allocation of Channels		Analyzer
4	Active Channel Number	1	Analyzer
5	Marker Value Identification Capacity (Stimulus)	7 digits	Analyzer
6	Marker Value Identification Capacity (Response)	4 digits	Analyzer
7	Marker Table	OFF	Analyzer
8	Reference Frequency Source	Internal	Analyzer
9	Trigger Signal Source	Internal	Analyzer
10	Reference Channel Error Correction	ON	Analyzer
11	System Correction	ON	Analyzer
12	Allocation of Traces		Channel
13	Vertical Divisions	10	Channel
14	Channel Title Bar	OFF	Channel
15	Channel Title	Empty	Channel
16	«FAIL» Label Display (Limit Test)	OFF	Channel
17	Traces per Channel	1	Channel
18	Active Trace Number	1	Channel
19	Marker Coupling	ON	Channel
20	Sweep Type	Linear Frequency	Channel
21	Number of Sweep Points	201	Channel
22	Stimulus Start Frequency	300 kHz	Channel
23	Stimulus Stop Frequency	1.5GHz/3.0GHz/8.0GHz	Channel
24	Stimulus CW Frequency	300 kHz	Channel

25	Stimulus Start Power Level	–55 dBm /–60 dBm	Channel
26	Stimulus Stop Power Level	10dBm	Channel
27	Stimulus Power Level	0dBm	Channel
28	Stimulus Power Slope	0dBm	Channel
29	Stimulus IF Bandwidth	10 kHz	Channel
30	Sweep Measurement Delay	0sec	Channel
31	Sweep Range Setting	Start/Stop	Channel
32	Number of Segments	1	Channel
33	Points per Segment	2	Channel
34	Segment Start Frequency	300 kHz	Channel
35	Segment Stop Frequency	300 kHz	Channel
36	Segment Sweep Power Level	0 dBm	Channel
37	Segment Sweep IF Bandwidth	10 kHz	Channel
38	Segment Sweep Measurement Delay	0 sec.	Channel
39	Segment Sweep Power Level (Table Display)	OFF	Channel
40	Segment Sweep IF Bandwidth (Table Display)	OFF	Channel
41	Segment Sweep Measurement Delay (TableDisplay)	OFF	Channel
42	Segment Sweep Range Setting	Start/Stop	Channel
43	Averaging	OFF	Channel
44	Averaging Factor	10	Channel
45	Trigger Mode	Continuous	Channel
46	Table of Calibration Coefficients	Empty	Channel
47	Error Correction	OFF	Channel
48	Port Z Conversion	OFF	Channel
49	Port 1 Simulated Impedance	50 Ω	Channel
50	Port 2 Simulated Impedance	50 Ω	Channel
51	Port 1 De-embedding	OFF	Channel

52	Port 2 De-embedding	OFF	Channel
53	Port 1 De-embedding S-parameter File	Empty	Channel
54	Port 2 De-embedding S-parameter File	Empty	Channel
55	Port 1 Embedding	OFF	Channel
56	Port 2 Embedding	OFF	Channel
57	Port 1 Embedding User File	Empty	Channel
58	Port 2 Embedding User File	Empty	Channel
59	Measurement Parameter	S11	Trace
60	Trace Scale	10 dB/Div.	Trace
61	Reference Level Value	0 dB	Trace
62	Reference Level Position	5 Div.	Trace
63	Data Math	OFF	Trace
64	Phase Offset	0°	Trace
65	Electrical Delay	0 sec.	Trace
66	S-parameter Conversion	OFF	Trace
67	S-parameter Conversion Function	Z: Reflection	Trace
68	Trace Display Format	Logarithmic Magnitude (dB)	Trace
69	Time Domain Transformation	OFF	Trace
70	Time Domain Transformation Start	–10 nsec.	Trace
71	Time Domain Transformation Stop	10 nsec.	Trace
72	Time Domain Kaiser-Beta	6	Trace
73	Time Domain Transformation Type	Bandpass	Trace
74	Time Domain Gate	ON	Trace
75	Time Domain Gate Start	–10 ns	Trace
76	Time Domain Gate Stop	10 ns	Trace
77	Time Domain Gate Type	Bandpass	Trace
78	Time Domain Gate Shape	Normal	Trace
79	Smoothing	OFF	Trace

80	Smoothing Aperture	1%	Trace
81	Trace Display Mode	Data	Trace
82	Limit Test	OFF	Trace
83	Limit Line Display	OFF	Trace
84	Defined Limit Lines	Empty	Trace
85	Number of Markers	0	Trace
86	Marker Position	300 kHz	Trace
87	Marker Search	Maximum	Trace
88	Marker Tracking	OFF	Trace
89	Marker Search Target	0 dB	Trace
90	Marker Search Target Transition	Both	Trace
91	Marker Search Peak Polarity	Positive	Trace
92	Marker Search Peak Excursion	3 dB	Trace
93	Bandwidth Parameter Search	OFF	Trace
94	Marker Search Bandwidth Value	-3 dB	Trace
95	Marker Search Range	OFF	Trace
96	Marker Search Start	0	Trace
97	Marker Search Stop	0	Trace

11 Set Parameters And Range

The following table lists the setup parameters, the range, instrument, channel, or trace that it controls.

No.	Parameter	Controlled Range			Set Key
		Instrument	Channel	Trace	
Incentive Settings					
	Scanning range		√		Start, Stop, Center, Span
	Power, CW frequency		√		“Sweep Setup”>“Power”
	Scan time/scan delay		√		“Sweep Setup”>“Sweep Time”/“Sweep Delay”
	Points		√		Sweep Setup” >“Points”
	Segmented scanning		√		“Sweep Setup”>“Sweep Type”, “Edit Segment Table”/“Segment Display”
	scanning method		√		“Sweep Setup”>“Sweep Mode”
Trigger Settings					
	Trigger source	√			“Trigger”>“Trigger Source”/“ Restart”/“Trigger”
	Trigger mode		√		“Trigger” > “Hold”/“Hold All Channels”/“Single”/“Continuo us”/“Continuous Disp Channels”
Response Settings					
	Measurement parameters			√	Meas
	Data Format			√	Format
	Scale,electrical delay,			√	Scale

	phase offset				
	Storage traces and data calculations			√	“Display”>“Display”/“Data -> Mem”/“Data Math”
	Window title		√		“Display” >“Edit Title Labe” /“Title Label (ON/OFF)”
	Display update on/off	√			“Display” >“Update (ON/OFF)”
	average		√		“Avg”>“Averaging Restart”/“ Avg Factor” /“Averaging (ON/OFF)”
	smooth			√	“Avg” >“Smo Aperture”/“Smoothing (ON/OFF)”
	IF bandwidth		√		“Avg” >“IF Bandwidth”
	calibration		√		Cal
	mark			√	“Marker”, “Marker Search”, “Maker Fctn”
Analysis					
	Fixture simulator		√		“Analysis” >“Fixture Simulator”
	Time Domain			√	“Analysis”>“Gating” /“ Transform”
	Parameter conversion			√	“Analysis” >“Conversion”
	Limit test			√	“Analysis”>“Limit Test”
	Save and call data	√			Save/Recall
System					

	Print/copy /buzzer/GRIB settings/network settings/data and time/lock key	√			System
	Preset	√			Preset

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