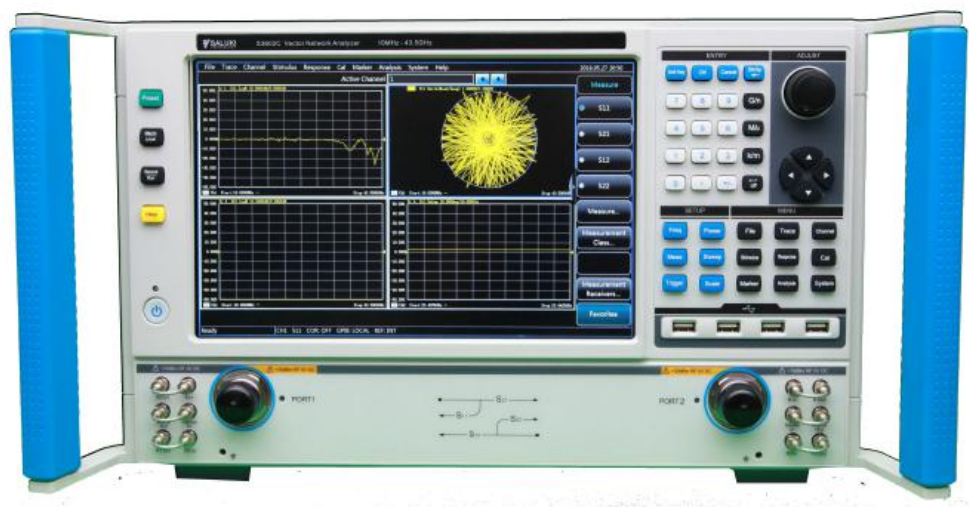# S3602 Series Vector Network Analyzer

Quick Start Guide

Saluki Technology Inc

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

- S3602A vector network analyzer (10MHz-13.5GHz)

- S3602B vector network analyzer (10MHz-26.5GHz)

- S3602C vector network analyzer (10MHz-43.5GHz)

- S3602D vector network analyzer (10MHz-50GHz)

- S3602E vector network analyzer (10MHz-67GHz)

Options of the S3602 Series Vector network analyzer

- **S3602A**

Part No.	Name	Description
S3602A-201	2-Port Programmable Step Attenuator	Set two 70dB programmable step attenuators for the source path, and two 35dB programmable step attenuators for the receiver path.
S3602A-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA configuration
S3602A-401	4-Port Programmable Step Attenuator	Set four 70dB programmable step attenuators for the source path, and four 35dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602A-402	Active Inter-modulation Measurement	For inter-modulation signal measurement of amplifier (Option 400, S80 is needed)
S3602A-003	Vector Noise Figure Measurement	The built-in 10MHz-13.5GHz high-sensitivity noise receiver requires external electronic calibration components. Using advanced source matching error and vector error correction calibration techniques, the industry's highest noise figure measurement accuracy can be obtained. This option contains "Scalar Noise Figure Measurement" functions.
S3602A-008	Pulse Measurement	For pulse S-parameter measurement
S3602A-3648	Multi-port Network Parameter Expansion Device	Extended to 16-port network parameter measurement (10MHz-13.5GHz)
S3602A-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df

Part No.	Name	Description
		extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602A-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602A-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602A-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.
S3602A-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602A-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602A-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers (Option 400, S80 is needed)
S3602A-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602A-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602A-S88	Phase Scan Option	Used for phase scan measurement (need option S3602A-400)
31121	3.5mm Calibration Kit	For calibration of the VNA
SCAVNA26FM-(3.5/3.5)	3.5mm Test Cable	For measurement of the analyzer, 3.5mm (female) to 3.5mm (male)
SCAVNA26FF-(3.5/3.5)	3.5mm Test Cable	For measurement of the analyzer, 3.5mm (female) to 3.5mm (female)
20403	E-Cal Kit	For calibration of the analyzer (10MHz-26.5GHz, 2 ports)
20405	E-Cal Kit	For calibration of the analyzer (10MHz-20GHz, 4 ports)
S87232	USB Power Probe	For 402, S82, S86 Options in the process of power calibration (50MHz-26.5GHz)
Top Rack	/	Easy to build the system and use on the cabinet
S3602A-EWT1	Extend 1 year warranty	/

- **S3602B**

Part No.	Name	Description
S3602B-201	2-Port Programmable Step Attenuator	Set two 70dB programmable step attenuators for the source path, and two 35dB programmable step attenuators for the receiver path.
S3602B-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA

		configuration
S3602B-401	4-Port Programmable Step Attenuator	Set four 70dB programmable step attenuators for the source path, and four 35dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602B-402	Active Inter-modulation Measurement	For inter-modulation signal measurement of amplifier (Option 400, S80 is needed)
S3602B-003	Vector Noise Figure Measurement	The built-in 10MHz-26.5GHz high-sensitivity noise receiver requires external electronic calibration components. Using advanced source matching error and vector error correction calibration techniques, the industry's highest noise figure measurement accuracy can be obtained. This option contains "Scalar Noise Figure Measurement" functions.
S3602B-008	Pulse Measurement	For pulse S-parameter measurement
S3602B-3648	Multi-port Network Parameter Expansion Device	Extended to 16-port network parameter measurement (10MHz-26.5GHz)
S3602B-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602B-S06	MiliMeter Extension Port Power Control	Special for Saluki VNA. Suitable for extension modules with power adjustable function such as 3643P S-parameter extension module.
S3602B-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602B-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602B-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.
S3602B-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602B-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602B-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers

Part No.	Name	Description
		(Option 400, S80 is needed)
S3602B-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602B-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602B-S88	Phase Scan Option	Used for phase scan measurement (need option S3602B-400)
31121	3.5mm Calibration Kit	For calibration of the VNA
SCAVNA26FM-(3.5/3.5)	3.5mm Test Cable	For measurement of the analyzer, 3.5mm (female) to 3.5mm (male)
SCAVNA26FF-(3.5/3.5)	3.5mm Test Cable	For measurement of the analyzer, 3.5mm (female) to 3.5mm (female)
20403	E-Cal Kit	For calibration of the analyzer (10MHz-26.5GHz, 2 ports)
20405	E-Cal Kit	For calibration of the analyzer (10MHz-20GHz, 4 ports)
S87232	USB Power Probe	For 402, S82, S86 Options in the process of power calibration (50MHz-26.5GHz)
Top Rack	/	Easy to build the system and use on the cabinet
S3602B-EWT1	Extend 1 year warranty	/

- **S3602C**

Part No.	Name	Description
S3602C-201	2-Port Programmable Step Attenuator	Set two 60dB programmable step attenuators for the source path, and two 35dB programmable step attenuators for the receiver path
S3602C-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA configuration
S3602C-401	4-Port Programmable Step Attenuator	Set four 60dB programmable step attenuators for the source path, and four 35dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602C-402	Active Inter-modulation Measurement	For inter-modulation signal measurement of amplifier (Option 400, S80 is needed)
S3602C-003	Vector Noise Figure Measurement	Frequency range: 10MHz to 43.5GHz; Measurement bandwidth: 800kHz to 24MHz; Noise figure + gain measurement range: 0 to +55dB; Noise source driving voltage: +28V±1V; Noise jitter: <0.15dB;
S3602C-008	Pulse Measurement	For pulse S-parameter measurement
S3602C-480	Four-port Spread Spectrum System Cable	Required connection cable for four-port vector network analyzer when directly building a spread spectrum system.

S3602C-3648	Multi-port Network Parameter Expansion Device	Extended to 16-port network parameter measurement (10MHz-43.5GHz)
S3602C-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602C-S06	MiliMeter Extension Port Power Control	Special for Saluki VNA. Suitable for extension modules with power adjustable function such as 3643P S-parameter extension module.
S3602C-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602C-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602C-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.
S3602C-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602C-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602C-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers (Option 400, S80 is needed)
S3602C-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602C-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602C-S88	Phase Scan Option	Used for phase scan measurement (need option S3602C-400)
31123	2.4mm Calibration Kit	For calibration of the VNA
SCAVNA50FM-(2.4/2.4)	2.4mm Test Cable	For measurement of the analyzer, 2.4mm (female) to 2.4mm (male)
SCAVNA50FF-(2.4/2.4)	2.4mm Test Cable	For measurement of the analyzer, 2.4mm (female) to 2.4mm (female)
20404	E-Cal Kit	For calibration of the analyzer (10MHz-50GHz, 2 ports)

S87233	USB Power Probe	For 402, S82, S86 options in the process of power calibration (50MHz-40GHz)
Top Rack	/	Easy to build the system and use on the cabinet
S3602C-EWT1	Extend 1 year warranty	/

● **S3602D**

Part No.	Name	Description
S3602D-201	2-Port Programmable Step Attenuator	Set two 60dB programmable step attenuators for the source path, and two 35dB programmable step attenuators for the receiver path
S3602D-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA configuration
S3602D-401	4-Port Programmable Step Attenuator	Set four 60dB programmable step attenuators for the source path, and four 35dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602D-402	Active Inter-modulation Measurement	For inter-modulation signal measurement of amplifier (Option 400, S80 is needed)
S3602D-003	Vector Noise Figure Measurement	Frequency range: 10MHz to 50GHz; Measurement bandwidth: 800kHz to 24MHz; Noise figure + gain measurement range: 0 to +55dB; Noise source driving voltage: +28V±1V; Noise jitter: <0.15dB
S3602D-008	Pulse Measurement	For pulse S-parameter measurement
S3602D-480	Four-port Spread Spectrum System Cable	Required connection cable for four-port vector network analyzer when directly building a spread spectrum system.
S3602D-3648	Multi-port Network Parameter Expansion Device	Extended to 16-port network parameter measurement (10MHz-50GHz). This device is 12 ports.
S3602D-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602D-S06	MiliMeter Extension Port Power Control	Special for Saluki VNA. Suitable for extension modules with power adjustable function such as 3643P S-parameter extension module.

S3602D-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602D-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602D-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.
S3602D-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602D-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602D-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers (Option 400, S80 is needed)
S3602D-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602D-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602D-S88	Phase Scan Option	Used for phase scan measurement (need option S3602D-400)
31123A	2.4mm Calibration Kit	For calibration of the VNA
SCAVNA50FM-(2.4/2.4)	2.4mm Test Cable	For measurement of the analyzer, 2.4mm (female) to 2.4mm (male)
SCAVNA50FF-(2.4/2.4)	2.4mm Test Cable	For measurement of the analyzer, 2.4mm (female) to 2.4mm (female)
20404	E-Cal Kit	For calibration of the analyzer (10MHz-50GHz, 2 ports)
Top Rack	/	Easy to build the system and use on the cabinet
S3602D-EWT1	Extend 1 year warranty	/

● **S3602E**

Part No.	Name	Description
S3602E-201	2-Port Programmable Step Attenuator	Set two 50dB programmable step attenuators for the source path, and two 50dB programmable step attenuators for the receiver path
S3602E-400	4-Port Measurement	Two-source stimulus configuration, four-port VNA configuration
S3602E-401	4-Port Programmable Step Attenuator	Set four 50dB programmable step attenuators for the source path, and four 50dB programmable step attenuators for the receiver path (Option 400 is needed)
S3602E-402	Active Inter-modulation	For inter-modulation signal measurement of

	Measurement	amplifier (Option 400, S80 is needed)
S3602E-008	Pulse Measurement	For pulse S-parameter measurement
S3602E-480	Four-port Spread Spectrum System Cable	Required connection cable for four-port vector network analyzer when directly building a spread spectrum system.
S3602E-S05	S-parameter Signal Integrity Analysis	Used to display the frequency domain characteristics and time domain TDR characteristics of the system. Built-in crosstalk evaluation modules such as NEXT, FEXT, PSXT, ILD, ICR and ICN. Built-in standards such as IEEE 802.3, PCIe, SAS and SATA help to quickly evaluate whether S parameters Meet the design requirements. Can automatically convert the software graphic curve into Word or PPT report. Support a variety of Dk/Df extraction methods. Support NRZ, PAM-4 eye diagram drawing function.
S3602E-S06	MiliMeter Extension Port Power Control	Special for Saluki VNA. Suitable for extension modules with power adjustable function such as 3643P S-parameter extension module.
S3602E-S07	AFR Automatic Fixture Removal Option	Used for automatic testing and removal of single-ended and balanced device measurement fixtures.
S3602E-S10	Time Domain Measurement	For time-domain test, can locate and analyze the discontinuous positions in devices, fixtures or cables.
S3602E-S11	Advanced Time Domain Analysis	Used for TDR time domain impedance test, eye diagram analysis, etc.. S10 option is included in S11.
S3602E-S80	Frequency Offset Measurement	For frequency offset measurement. millimeter-wave frequency extension main unit needs this option
S3602E-S82	Mixer Scalar Measurement	For the scalar parameter measurement of mixers (Option 400, S80 is needed)
S3602E-S83	Mixer Vector Measurement	For the vector parameter measurement of mixers (Option 400, S80 is needed)
S3602E-S84	Embedded LO Frequency Converter Measurement	For the measurement of embedded LO frequency converters (Option 400, S82 or S83, S80 are needed)
S3602E-S86	Gain Compression Two-Dimension Sweep Measurement	For the gain compression two-dimension sweep test of amplifier
S3602E-S88	Phase Scan Option	Used for phase scan measurement (need option S3602E-400)
31128	1.85mm Calibration Kit	For calibration of the VNA
SCAVNA67FM-(1.85/1.85)	1.85mm Test Cable	For measurement of the analyzer, 1.85mm (female) to 1.85mm (male)
SCAVNA67FF-	1.85mm Test Cable	For measurement of the analyzer, 1.85mm (female)

(1.85/1.85)		to 1.85mm (female)
Top Rack	/	Easy to build the system and use on the cabinet
S3602E-061	Extension Workbench	/
S3602E-EWT1	Extend 1 year warranty	For S3602E main machine
S3602E-3648-EWT1	Extend 1 year warranty	For S3602E-3648 link expansion device

Preface

Thanks for choosing S3602 vector network analyzer produced by Saluki Technology Inc.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with "superior quality and considerate service", and are committed to offering satisfactory products and service for our clients.

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Saluki Technology

Document Authorization

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Saluki Tech owns the copyright of this document which should not be modified or tampered by any organization or individual, or reproduced or transmitted for the purpose of making profit without its prior permission, otherwise Saluki will reserve the right to investigate and affix legal liability of infringement.

Product Quality Assurance

The warranty period of the product is 36 months from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

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/Settings Management

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

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Contents

1   Manual Navigation

This chapter introduces the functions, chapter composition and main contents of the quick start guide of the S3602 series vector network analyzer, and the instrument-related documents for the user.

1.1   About Manual

The manual introduces the basic functions and operations of the S3602 series vector network analyzer produced by Saluki Technology Inc. It describes the guidance of operation before start-up, system Setup, characteristics of the front and rear panel, basic operation method, simple fault diagnosis and repair, etc., to help you rapidly get familiar with and understand key points of the instrument operation method and use. For the convenience of operation, please carefully read the manual before operating the instrument, and properly operating it according to the guidance in the manual.

Due to the limit of time and knowledge of the writer, there may be some omissions or errors. Please kindly contact us to correct such errors. We are sorry for the flaws which may cause your any inconvenience.

The quick start guide includes the following chapters.

- **Preparation for use**

This chapter introduces the inspection before operation, operating system configuration, initial configuration, appearance, etc. of S3602 series vector network analyzer to help the user make preparation for proper and safe operation.

- **Instrument Appearance**

This chapter introduces the elements and functions of the front panel, rear panel and operation interface of S3602 series vector network analyzer.

- **Instrument Power-on/off**

This chapter introduces S3602 turn on/off operations and system recovery.

- **Human Machine Interface**

This chapter introduces the HMI of S3602 and display setups.

- **Typical application**

This chapter describes some basic operations in detail , such as RF continuous wave Setup, modulation, sweep, data storage/call, etc. This will help user to get familiar with the operations rapidly.

- **Help**

This chapter Includes the basic fault diagnosis, troubleshooting and repair methods.

1.2   Related Documents

The documents related to S3602 series vector network analyzer include:

- User Manual

- Program control document

- Online help

User Manual

This manual introduces the functions and operations of the instrument in details, including configuration, measurement, program control, maintenance, etc. It aims to guide the user to comprehensively understand the functional characteristics and common test methods of the instrument. It mainly includes the following chapters:

- Manual Navigation

- Overview

- Introduction to Use

- Operation guide

- Menu

- Fault diagnosis and repair

- Technical indicators and test methods

- Appendix

Program control document

This manual introduces the remote programming basis, SCPI basis, SCPI commands, programming examples, I/O drive function library, etc. It aims to guide the user to rapidly and comprehensively know the program control commands and methods of the instrument. It mainly includes the following chapters:

- Remote control

- Program control commands

- Programming examples

- Error illustration

- Appendix

Online help

Online help is integrated in the instrument to provide rapid text navigation help and facilitate local and remote operation. A help button is provided on the front panel of the instrument. There is also a shortcut key in HMI tool bar.

2 Preparation for use

2.1 Preparation before operation

This chapter introduces the precautions for initial Setup and operation of S3602 series vector network analyzer.

⚠ **Warning**

Prevent damage to the instrument.

In order to avoid electric shock, fire and personal injury:

➢ Do not open the casing without permission.

➢ Do not disassemble or modify any part which is not described in this manual. Disassemble may result in declining of the electromagnetic shielding performance, damage to parts in the instrument, etc., thus affecting the product reliability.

Caution

Electrostatic protection

Pay attention to anti-static measures in the workplace to prevent damage to the instrument. .

Caution

Pay attention to the following requirements before operation:

The improper operation location or measurement Setup may result in damage to the instrument or the connected instrument. Pay attention to the following requirements before powering on the instrument:

➢ The fan blades and ventilation holes are not blocked, and the instrument is at least 10cm away from the wall.

➢ Keep the instrument dry.

➢ Horizontally and reasonably arrange the instrument.

➢ The ambient temperature meets the requirements on the page of data.

➢ The input signal power of the port is within the specified range.

➢ The signal output port is properly connected and not overloaded.

Prompt

Influence of electromagnetic interference (EMI):

Electromagnetic interference will affect measurement results, therefore:

➢ Select the appropriate shielded cable. Example: use the dual-shielded radio-frequency/network connection cable.

➢ Always close the cable connection port which is not used temporarily.

2.1.1 Unpacking

Appearance inspection

Step 1   Check whether the outer package and anti-vibration package are damaged. In case of no damage, store the outer package for future use. Continue inspection according to the following steps.

Step 2   Unpack the instrument and check whether the host and accompany articles are damaged.

Step 3   Check the above articles according to the requirements.

Step 4   Do not power on the instrument if the outer package is damaged or the instrument or accompanying article is damaged or inappropriate. Contact our service consultation center at the service consultation hotline provided in the guide. We will rapidly repair or replace the instrument or articles, depending on the actual situation.

Caution

Handling: The instrument and packing box are heavy and should be handled by two people with care.

2.1.2 Instrument placement and measurement

In order to ensure normal functions of S3602 series vector network analyzer, pay attention to the following items:

➢ The operation location should meet the requirements of the operating environment and heat dissipation.

Take appropriate measures of electrostatic protection. For details, refer to "3.1.1.2 Environmental Requirements" of the User Manual.

➢ The operating requirements of the desktop instrument should be met. The instrument can be horizontally placed on the workbench with anti-static pad, or supported with legs. For details, refer to "2.2.4 Operating Status and Location" of the User Manual.

⚠ Caution

Pay attention to the following items while placing the instrument:

➢ In order to ensure the instrument stability and personal safety, place the instrument in a solid and flat place, such as anti-static workbench.

➢ Do not move the instrument or operate or place any article under the instrument after the instrument is set.

3   Instrument Appearance

This chapter introduces the elements and functions of the front panel, rear panel and operation interface of S3602 series vector network analyzer.

3.1   Front Panel

This section introduces the structure and functions of the front panel of S3602 series vector network analyzer. The front panel is shown in the following figure.
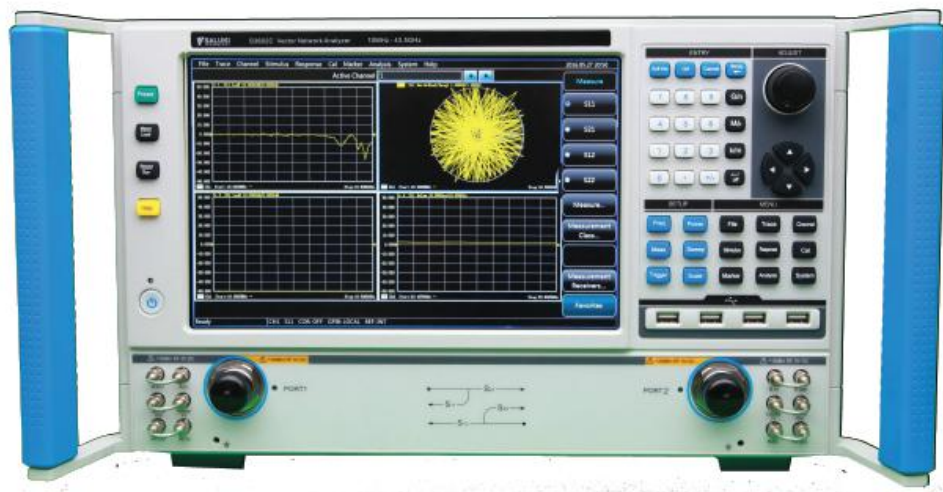

Fig. 3-1:Front Panel of S3602

1)   Input Key zone

The keys are used to enter measurement Setups, as shown in Fig 3-2.

Fig. 3- 2 Input Key Zone of S3602

a)   **[OK] key**

Confirm the Setups and input values in the dialog box and close the dialog box, equivalent to the ―OK‖ button in the dialog box.

b)   **[Cancel] key**

Ignore the Setups and input in the dialog box and close the dialog box, equivalent to the ―Cancel‖ button in the dialog box.

c)   **[Soft Keyboard] key**

Call the soft keyboard of the Windows 7 system.

d) [Backspace/←] key

Move the cursor back and delete the original input after entering.

e)   Number keys

Include 0-9. Enter the numbers in measurement Setup and press the corresponding unit keys to complete input.

f)   Unit keys

End the number input and distribute a unit to each input value. The unit corresponding to each key is as follows:

[G/n]	G/ns (109/10-9)
[M/μ]	M/μs (106/10-6)
[k/m]	k/ms (103/10-3)

【↵】   Basic units include dB, dBm, degree, second, Hz or dB/GHz. The keys can also be used to input values with no unit and have the functions of the ―Enter‖ key.

2)   **Adjustment key zone**

Include navigation keys and knobs, as shown in Fig.3-3

Fig. 3-3 Adjustment Key Zone of S3602

a)   Knob

Rotate the knob to adjust the set value in the current active input box.

b)   [←] and [→] key

. Move left or right to select the menu.

. Switch the active options in the dialog box.

c)   [↑] and [↓] key

Move up and down in the menu to select the menu item. When interact with dialog box, the arrow keys can be used to change value, select item in the drop-down list, and select the desired option in a group of option list.

3)   Setup key zone

Setup key zone include 6 Setup keys shown in Fig. 3-4.

Fig. 3-4: Functional Key Zone of S3602

a)   [Freq] key

It is shortcut key to set the measurement frequency. The starting frequency, ending frequency, center frequency, frequency span and frequency offset.

b)   [Power] key

It is a shortcut key to set the measurement power. The power level, power status ON/OFF, power attenuation and power slope.

c)   [Measurement Setup] key

It is a shortcut key to measurement Setups. For Measurement Setup Details, please refer to section 6.2

d)   [Sweep Setup]key

It is a shortcut key to sweep Setups. For Sweep Setup Details, please refer to section 6.5

e)   [Trigger Mode] key

It is a shortcut key to Trigger mode. For trigger mode Details, please refer to section 6.6

f)   [Scale Setup] key

It is a shortcut key to scale Setups. For scale Setup Details, please refer to section 6.7

4)   Menu key zone

Menu key zone include 9 menu keys shown in Fig. 3-5.

Fig.3- 5: Menu Key Zone of S3602

a)   [File] key

Open the main file menu. Following options will be displayed on screen: "Save", "Call", "Print", "Minimize application program" and "Exit".

b)   [Trace] key

Open the main Trace menu. Following options will be displayed on screen: "New Trace", "Delete Trace", "Select Trace", "Move Trace", "Trace title" and "Maximize Trace".

c)   [Channel] key

Open the main channel menu and the current channel will be selected automatically. Following options will be displayed on screen: "Channel 1/2/3/4", "Open channel", "Close channel", "Select channel", "Copy channel" and "Hardware Setup".

d)   [Stimulus] key

Open the main Stimulus menu. Following options will be displayed on screen: "Frequency", "Power", "Sweep" and "Trigger".

e)   [Response] key

Open the main response menu. Following options will be displayed on screen: "Measurement", "Format", "Scale", "Display" and "Average".

f)   [Calibration] key

Open the main calibration menu. Following options will be displayed on screen: "Calibration", "Correction ON/OFF", "Interpolation ON/OFF", "Port extension", "Fixture", "Edit calibrator", "Attribute" and "Power calibration".

g)   [Cursor] key

Open the main cursor menu. Following options will be displayed on screen: "Cursor", "Cursor function", "Cursor search", "Cursor attribute" and "Cursor display". If no cursor is enabled at present, the cursor 1 will be enabled automatically in the default mode. If a cursor is enabled, the current cursor will be selected automatically.

h)   [Analysis] key

Open the main analysis menu. Following options will be displayed on screen: "Save", "Test", "Trace statistics", "Gate", "Window", "Time domain", "Structural return loss" and "Formula editor".

i)   [System] key

Open the main system menu. Following options will be displayed on screen: "Configuration", "Record/Run", "Spread spectrum", "Windows task bar", "Reset", "Custom user reset state" and "Language".

5)   Function Key Zone

Function key zone include 4 function keys on the left side of the screen as shown in Fig. 3-6.

Fig. 3-6: Function Key Zone of S3602

a)   [Help] key

Open the main help menu. Following options will be displayed on screen: "User manual", "Programming manual", "Technical support", "Error information" and "About".

b)   [Record/run] key

It is a shortcut key to enable the recording/running function of the analyzer. Press the key to automatically start recording. If recording is completed, press this key to automatically start running. This key is only effective for Record/Run 1, and cannot be used to control Record/Run 2.

c)   [Macro/local] key

If the analyzer is programmed, press this key to switch to the macro state. If the analyzer is not programmed, press this key to open the macro menu.

d)   [Preset]key

 It is a shortcut key to reset the analyzer. If the user has saved the reset state and tick the item "Enable user reset state", press this key to recover the state saved by the user; otherwise, the system reset state will be recovered.

6)   USB Interface

The USB interface can be connected with the keyboard, mouse and other USB devices. The front panel is equipped with four USB interfaces in total and conforms to the USB2.0 specifications. The interface jack is of A type (four embedded contacts; Contact 1 on the left side).

Fig. 3-7: USB Interface

7)   Display screen

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The display screen of the analyzer is a TFT LCD screen. Technical indicators are as follows:

. 12.1-inch touch screen

. Resolution: 1280×800

. Vertical refresh rate: 60Hz

. Horizontal refresh rate: 48.4Hz

Display Setup details, please refer to section 5.

8)　　[Start/Standby] key and indicator

The **[Start/Standby]** key and indicator are shown in Fig. 3-8. The power switch is used to start the analyzer or enable the standby state of the analyzer.

. The indicator is green when the analyzer is started.

. The indicator is orange when the analyzer is in the standby state.

. Press the power button to start the analyzer. Then the Windows 7 operating system will be run automatically and the measurement application program will be loaded.

. When the power button is pressed in the standby state, the analyzer will automatically exit the application program. When the power supply will be turned off, the standby state will be enabled.

. This is only a standby switch. It cannot be directly connected with the external power supply or used to cut off the connection between the instrument and external power supply. The external power supply of the analyzer can be shut down by the power switch on the rear panel. The connection between the analyzer and external power supply can be fully cut off by removing the power cable.

Fig. 3-8: [Start/Standby] Key and Indicator

9)　　Test port

As shown in Fig. 3-9, the instrument is equipped with 2x 50Ω ports and 2x 3.5mm/2.4mm/1.85mm ports (male). The instrument can act as both RF source and receiver. so as to measure the tested device in bi-directions. The yellow light indicates the source output port.
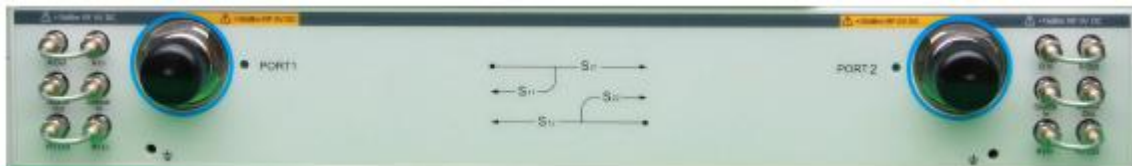
Fig. 3-9: Test Ports of Analyzer

3.2　　Rear Panel

This section introduces the structure and functions of the rear panel of S3602 series vector network analyzer. The rear panel is shown in the following figure.

Fig. 3-10: Rear Panel of Network Analyzer

1) 10MHz reference connector

a) 10MHZ reference output

As shown in Fig. 3-11, the BNC (female) connector can be used for connection between the analyzer and external reference signal. The 10MHZ external reference signal detected by the port will be used as the reference frequency of the instrument, instead of the internal reference frequency. The 10MHz reference input port has the following features:

.   Input frequency: 10MHz±1ppm

.   Input level: -15dBm to +20dBm

.   Input impedance: 200Ω

b) 10MHZ reference output

The reference signal with the following features can be provided for the outside through the BNC (female) connector.

.   Output frequency: 10MHz±1ppm

.   Signal type: sine wave

.   Output level: 13dBm±4dB into 50Ω

.   Output impedance: 50 Ω

Fig.3-11: 10MHz Reference Connector

2) General-interface bus connector

As shown in Fig.3-12 this is a 24-pin D-type female connector, meeting the IEEE-488 standards. It is used to

transmit and receive GPIB/SCPI commands.
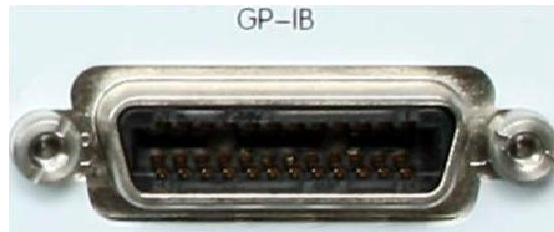
Fig. 3-12: General-interface Bus Connector

3)   LAN connector

As shown in Fig. 3-13, this is a 10/100/1000BaseT Ethernet connector of standard 8-pin structure, and three data rates can be selected.
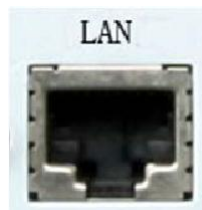
Fig. 3-13: LAN Connector

4)   USB connector

As shown in Fig. 3-14, the connector jack is of Type A (four embedded contacts; with Contact 1 on the left side) and Type B. Type A connector can be connected to the USB mouse, keyboard or other USB interface devices. The rear panel is equipped with four interfaces in total.

Type B connector is mainly used for control. The network analyzer can be connected to the external computer or remote device through SCPI control. The rear panel is equipped with one interface.
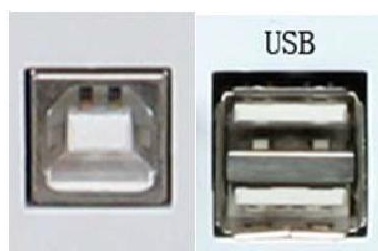
Fig. 3-14: USB Connector (B-type on the left and A-type on the right)

5)   Video graphic adapter (VGA) output connector

As shown in Fig. 3-15, this is a 15-pin D-sub female connector to be connected with the external VGA display of corresponding resolution. In this case, the user can observe the internal and external display at the same time.

Fig. 3-15: VGA Connector

6)   LO and RF output connector

As shown in Fig. 3-16, the 3.5mm female interface is used for LO output and RF output. The LO interface is used for internal LO signal output, and RF interface for RF source signal output. The connector can be used for fault detection and millimeter wave spreading. The interface features are as follows:

.   Frequency range of LO output signal:

12.535MHz-13.507606GHz/26.507606GHz/43.507606GHz/50.007606GHz/67.007606GHz

.   Power range of LO output signal: -4dBm to 6dBm

.   Frequency range of RF output signal: 3.2GHz-13.5GHz/26.5GHz/43.5GHz/50GHz/67GHz

.   RF output signal power: -3dBm±2dB

Fig. 3-16：LO and RF Output Connector

7)   Pulse input/output connector

As shown in Fig. 3-17, this is a 15-pin D-type female connector. The working status of the internal pulse generator can be monitored synchronously through this interface.
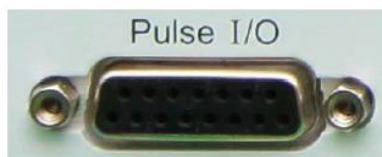
Fig. 3-17：Pulse Input/Output Connector

8)   External intermediate frequency input connector

As shown in Fig. 3-18, five SMA interfaces are used for external intermediate-frequency input of the vector network. The two-port model is marked with A, B, R1 and R2, and the four-port with A, B, C, D and R.

Fig. 3-18：Intermediate Input Connector

9)   Automatic test interface connector

As shown in Fig. 3-19, this interface is a 36-pin female connector. The network analyzer and material handler can exchange signals through this interface to provide a stable and reliable automatic test environment for the user.

Fig. 3-19： Automatic Test Interface Connector

10)   Extension interface connector

As shown in Fig. 3-20, this interface is a 9-pin D-type female connector.

Fig. 3-20： Extension Interface Connector

11)   External tester interface connector

As shown in Fig. 3-21, this tester interface is a DB-25 female interface, including 13 addresses and data multiplexing lines, three control lines and one interruption control line, and is used to control the external tester (such as the external spread spectrum controller).

Fig. 3-21： External Tester Interface Connector

12)   Trigger input/output interface connector

As shown in Fig. 3-22, this interface is an external and auxiliary trigger input/output interface. Specific functions are as follows:

.   External trigger input - if it is enabled, the vector network analyzer will be triggered according to the connected signal.

.   External trigger ready - if it is enabled, the vector network analyzer will send a "Ready" signal to the external device through this interface.

.   Auxiliary trigger input 1/2 - if it is enabled, the external device will send an "OK" signal (meaning the external device is ready to receive trigger signal) to the vector network analyzer through this interface.

.   Auxiliary trigger output 1/2 - if it is enabled, the vector network analyzer will send an "OK" signal through this interface before (or after) one measurement.

Fig.3-22： Trigger Input/Output Interface Connector

13)   28V (BNC) interface connector

As shown in Fig. 3-23, this BNC (female) connector can be used to drive a noise source.

Fig.3-23： 28V (DC) Interface Connector

3.3   Proper Use of Connector

The connector is always required in various tests of the network analyzer. Although the connectors of the calibrator, test cable and analyzer measurement port are designed and manufactured according to the highest standards, the service life is limited. Inevitable wear in normal operation may result in declining of performance indicators of the connector and failure to meet measurement requirements. Proper connection of the connector in maintenance and measurement can help to obtain accurate and repeatable results, prolong the service life of the connector, and reduce the measurement cost. Pay attention to the following items in actual operation.

3.3.1 Connector Inspection

Wear the anti-state wristband in connector inspection. It is recommended to use the magnifying lens to check the following items.

1) Check whether the plating surface is worn or deeply scratched.

2) Check whether threads are deformed.

3) Check whether there are metal particles on the connector threads and joint surfaces.

4) Check whether the internal conductor is bent or cracking.

5) Check whether the connector screw is tightened properly.

⚠ **Caution**

Prevent damage to the instrument port in connector inspection.

During the measurement, a damaged connector may cause damage to any other good connectors connected to it. In order to protect each interface of the network analyzer, the connector must be checked before connection.

3.3.2 Connection Method

Check and clean the connector before measurement connection. Ensure that the connector is clean and intact. Wear the anti-static wristband in connection. The correct connection method and steps are as follows.

Step 1   As shown in following fig below, align the axes of two connectors to be interconnected, and ensure that the pin of the male connector can concentrically slide into the jack of the female connector.

Step 2   As shown in following fig below, horizontally move two connectors to make them connected smoothly. Tighten the connector nut by means of rotation (do not rotate the connector). Avoid relative rotation of connectors during connection.

Keep it stationary
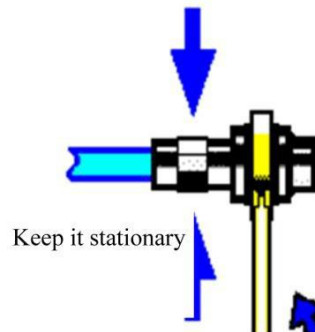
Step 3   As shown in following fig, complete the final connection by tightening with the torque wrench. Note that the torque wrench must not be beyond the initial break point. Use the auxiliary wrench to prevent the connectors from rotation.

Rotate the nut

Keep it stationary
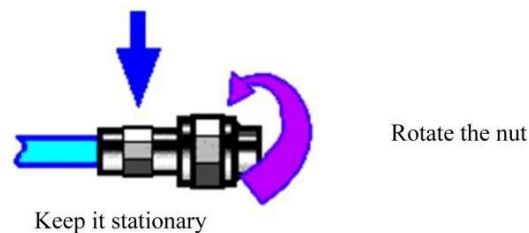
3.3.3 Disconnection Method

Step 1   Support the connectors to prevent any kind of force which may result in distortion, shaking or bending.

Step 2   Use the open-end wrench to prevent the connector body from rotation.

Step 3   Use another wrench to loosen the connector nut.

Step 4   Rotate the connector nut by hand to complete final disconnection.

Step 5   Horizontally separate two connectors.

3.3.4 Use of Torque Wrench

The use of the torque wrench is shown in Fig. 3-24. Pay attention to the following items.

➢ Check whether the torque of the torque wrench is set properly before use.

➢ Ensure that the angle between the torque wrench and the other wrench (used to support the connector or cable) is less than 90° before applying force.

➢ Carefully grip the handle end of the torque wrench, and apply force in the direction vertical to the handle to reach the break point of the wrench.

Torque direction
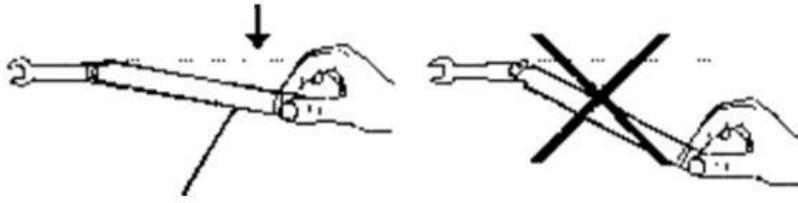
Fig. 3-24: Use of Torque Wrench

4   Instrument Power-on/off

This chapter introduces how to turn on/off the instrument and how to recovery the system when it fails.

4.1   Connection of power supply

Check the power supply parameters and power cord before initial powering-on. For details, refer to the precautions before powering-on in 3.1.1.3 of the User Manual.

Step 1   **Connect the power cord.** Connect one end of the supporting power cord of the network analyzer in the packing box or the three--core power cord conforming to the requirements to the power socket on the rear panel of the network analyzer (as shown in Fig. 4-1). The voltage indicator of the network analyzer is marked beside the power socket to remind the user to apply the required voltage. Connect the other end of the power cord to the required AC

Step 2   **Turn on the power switch of the rear panel**, as shown in Fig. 4-2. Observe whether the standby status indicator above the power switch of the front panel (as shown in Fig. 4-3) becomes yellow.

Step 3   T**urn on the power switch of the front panel,** as shown in Fig. 4-3. Do not connect any device to the network analyzer before start-up. Start the network analyzer if all conditions are normal. After start-up, the indicator above the power switch of the front panel will become

Fig.4- 1 S3602 Power Socket (left)

Fig.4- 2 Power Switch of Rear Panel of S3602(middle)

Fig.4- 3Switch of Front Panel of S3602(right)

4.2   Start-up/Shutdown of Instrument

4.2.1 Start-up

Step 1   Turn on the power switch ("|") of the rear panel.

Step 2   Turn on the power switch in the lower left corner of the front panel. If the power switch is pressed (   ), the color of the power indicator above the power switch will change from yellow to green.

Step 3   About one minute is required to start the Windows 7 system of the network analyzer. After a series of self-inspection and adjustment procedures, run the main measurement program.Then the instrument can be operated.

Prompt

In order to meet the performance indicators of S3602 series vector network analyzer in cold start, preheat it more than 30 minutes before measurement.

Prompt

Run the analyzer application program.

The application program automatically run after the network analyzer started. If the application is closed, user can restart the program :

Method 1   Click **[Start]** in the task bar in the lower left corner of the screen. Point **[Program]** > **[Vector network analyzer]**. Click **[Vector network analyzer]** in the sub-menu which pops up. Then the analyzer starts running the measurement program. You can also double-click the desktop shortcut to run the program.

Method 2   Press **[Preset]** in the functional key zone.

4.2.2 Shutdown

Step 1   Turn off the power switch in the lower left corner of the front panel, and check whether it is in the pop-up position (⊥⊥). In this case, the shutdown process is started (the power supply must not be turned off until certain processing of software and hardware is completed). The instrument will be shut down after dozens of seconds. In this case, the color of the power indicator above the power switch will change from green to yellow.

Step 2   Turn off the power switch of the rear panel ("O"), or cut off the power supply of the instrument.

Caution

Shutdown of Instrument

The instrument in normal operation must be shut down by operating the power switch of the front panel. Do not directly operate the power switch of the rear panel or directly cut off the power supply of the instrument; otherwise, the instrument cannot be shut down normally and may be damaged, or the current status/measurement data may be lost. Shut down the instrument properly. In case of failure of normal shutdown caused by the anomaly of the operating system or application program, press [Power/Standby] key four seconds at least to shut down the analyzer.

4.2.3 Cutoff of Power Supply

In order to prevent personal injury under abnormal conditions, the power supply of the network analyzer requires emergency cutoff. In this case, pull off the power cord (from the AC power socket or the power socket of the rear panel of the instrument). Therefore, sufficient operating space should be reserved for direct cutoff of the power supply if necessary.

4.3   System Recovery

Abnormal shutdown of software, infection of viruses or use of other kinds of software in the analyzer may result in anomaly of the operating system of the analyzer. In this case, system recovery is recovered. Recover default Setups of the analyzer according to the following steps:

1) Shut down the analyzer and connect the keyboard to the USB interface.

2) Press the [Power/Standby] key in the lower left corner of the front panel of the analyzer. When the indicator of the external keyboard is ON and immediately press [↑] and [↓], select "System Recovery", and press [Enter] of the keyboard to automatically recover the system.

3) If the screen shown in Fig. 4-4 appears, system recovery is started. About 10min is required in the whole process of system recovery. Restart the analyzer after recovery.
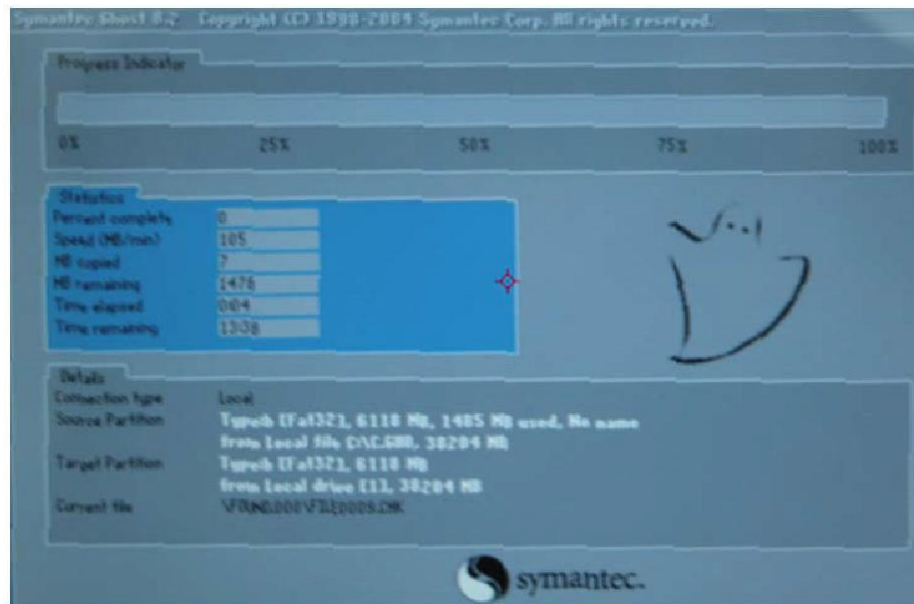
Fig.4- 4 System Recovery Screen

5   Human Machine Interface

As shown in Fig. 5-1, the mouse can be used to realize the following operations.

➢   Click the **menu** bar to display the drop-down menu.

➢   Click the **input** toolbar to adjust the entered number.

➢   Click the **cursor** toolbar to use the cursor.

➢   Click the **measurement** toolbar to add the measurement Trace.

➢   Click the **sweep** toolbar to control sweep of the analyzer.

➢   Click the **Stimulus** toolbar to set sweep Stimulus.

➢   Click the **time domain** toolbar to set time domain Setups.

➢   Right-click the mouse on the screen to display the right-click menu.

➢   Click the Trace bar to select the current activation Trace.

➢   Right-click the mouse on the Trace bar to set the current activation Trace in the right-click menu.

➢   Click the auxiliary menu bar and shortcut toolbar to perform corresponding Setups.
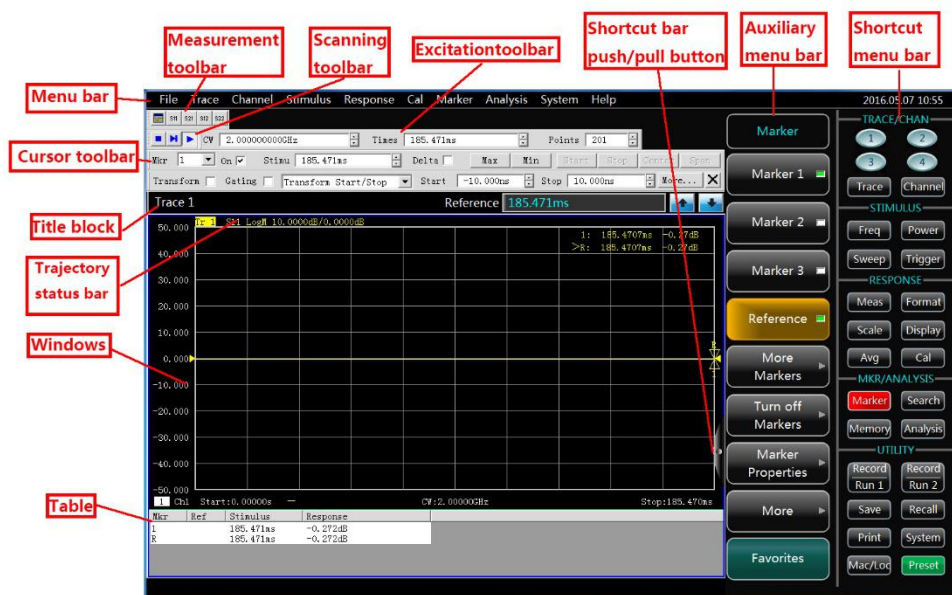
Fig 5- 1Display Screen of Analyzer

5.1   Analyzer Display

You can use the display menu of the analyzer to display or hide the display elements and customize the screen. These display elements are usable for measurement observation, Setup and modification, including the status bar, toolbar, list, measurement display, data Trace, memory Trace and title bar.

5.1.1 Status Bar

1) The opened status bar will be displayed at the bottom of the screen, including the following contents:

➢ Current active channel

➢ Measurement parameter of active Trace

➢ Mathematical operation of active Trace

➢ Error correction status of active Trace

➢ If the average function is enabled, the average factor of the current active channel and the average times will be displayed.

➢ If the smoothing function is enabled, the number of smoothing points will be displayed.

➢ If the function of time domain transformation is enabled, ―TRANSFORM: ON‖ will be displayed.

➢ If the gate Setup function is enabled, "GATE: ON" will be displayed.

➢ GPIB status: LOCAL or REMOTE.

➢ Reference (REF) signal status: INT or EXT

2) Display of trigger status bar

Menu path: **[Response] > [Display]**. Tick **[Status bar]** in the display sub-menu to open the status bar display and clear [Status bar] to close the status bar display. Or, press the **status bar opening/closing** item of the auxiliary menu bar to open or close the status bar.

5.1.2 Tool bar

1) Six different toolbars can be displayed at the same time. Measurement can be easily set through the toolbar.

a) Input toolbar

Input the value through the input toolbar to set the measurement parameter.

b) Cursor toolbar

Set and modify the cursor.

Including:

➢ Cursor number

➢ Cursor ON/OFF check box

➢ Stimulus value

➢ Cursor function: △ cursor, maximum/minimum value, starting/ending value and center/span value.

Click the [Stimulus] value of the cursor toolbar and rotate the knob on the front panel to change the cursor

Position.

c) Measurement toolbar
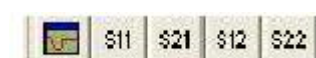
The measurement toolbar is used to create the S parameter Trace in the current active window or new window. If the left button of the measurement toolbar is lifted, the S parameter Trace will be created in the current active window. If this button is pressed, the S parameter Trace will be created in a new window.

d) Sweep control toolbar

The buttons of the sweep control toolbar are respectively used to set the following modes of the active channel in sequence:

➢ Holding mode

➢ Single sweep

➢ Continuous sweep

e) Stimulus toolbar
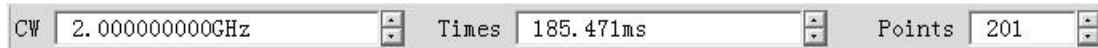
f) The Stimulus toolbar is used to observe, set and modify the sweep Stimulus, including:

➢ Starting Stimulus value (CW frequency in the CW mode)

➢ Ending Stimulus value (time in the CW mode)

➢ Number of sweep points

g) Time domain toolbar

➢ Time domain ON/OFF check box

➢ Gate ON/OFF check box

➢ Sweep Setup type

➢ Starting Stimulus value

➢ Ending Stimulus value

➢ More

2) Trigger toolbar display

Menu path: **[Response] > [Display]**. Point to the toolbar in the display sub-menu.

Click the **toolbar** item to be set in the toolbar sub-menu. Tick the item to open the toolbar display and clear it to close the toolbar display.
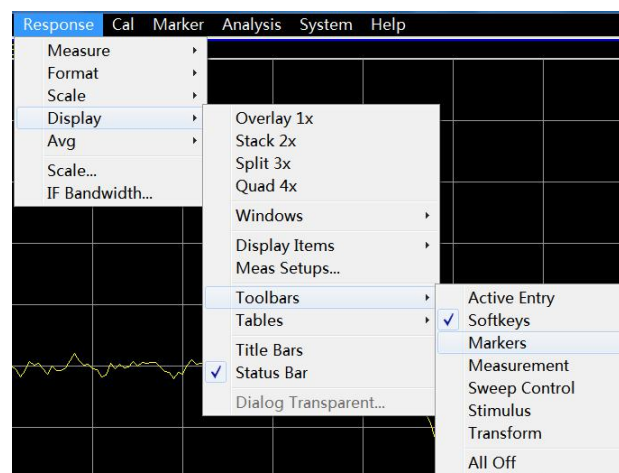
Fig. 6-27 Trigger Toolbar Display

5.1.3 Table Area

1) Display the cursor, limit and segment table so that the user can observe and modify the Setups (except the cursor table). The list is displayed in the lower part of the window. Only one table can be displayed in each window.

a) Cursor table

Mkr	Ref	Stimulus	Response
1		185.471ms	−0.272dB
R		185.471ms	−0.272dB

Fig. 6-28 Cursor Table

The cursor table is used to display the cursor parameters, including:

➢ Cursor number

➢ Reference cursor (for relative measurement)

➢ Stimulus value

➢ Response value

b) Limit table

	Type	Begin Stimulus	End Stimulus	Begin Response	End Response	Limit Type
1	MAX	10.000MHz	50.000GHz	−100.000dB	100.000dB	SLOP
2	MIN	10.000MHz	50.000GHz	−100.000dB	100.000dB	SLOP
3	OFF	10.000MHz	50.000GHz	−100.000dB	100.000dB	SLOP

Fig. 6-29 Limit Table

The limit table is used to display, set and modify the limit test parameters, including:

➢ Type (minimum, maximum or closed)

➢ Starting and ending Stimulus value

➢ Starting and ending response value

c) Segment table

	Type	Begin Stimulus	End Stimulus	Max Ripple
1	ON	10.000MHz	50.000GHz	100.000dB
2	ON	10.000MHz	50.000GHz	100.000dB
3	OFF	10.000MHz	50.000GHz	100.000dB

Fig. 6-30 Segment Table

The segment table is used to display, set and modify the segment sweep parameters, including:

➢ Status(ON/OFF)

➢ Starting and ending Stimulus value

➢ Number of sweep points

➢ Power level (separately set for each segment)

➢ Intermediate frequency bandwidth (separately set for each segment)

➢ Sweep time (separately set for each segment)

2) Triggering of table display

Menu path: **[Response] > [Display]**. Point to the **[Tables]** in the **display** sub-menu.

Click the table to be triggered in the **sub**-menu. Tick this item to display the table and clear it to hide the table.
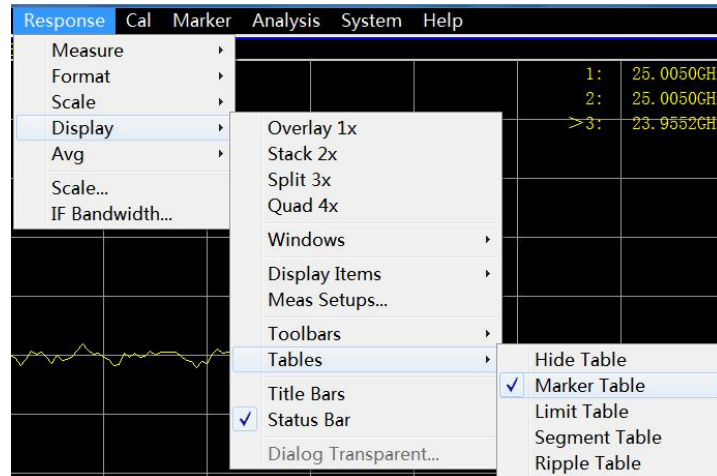

Fig. 6-31 Triggering of Table Display

5.1.4 Display Contents

1) Six kinds of measurement information can be displayed or hided so that the user can observe the current measurement state, including:

➢ Title

➢ Trace state

➢ Frequency/Stimulus state

➢ Cursor display

➢ Display time state

a) Title

One title can be set for each window. The title will be created through the **title input** dialog box, and the entered title will be displayed in the upper left corner of the window. If required, delete the title through the **[Input]** box of the **title input** dialog box. Click **[OK]** to close the dialog box.
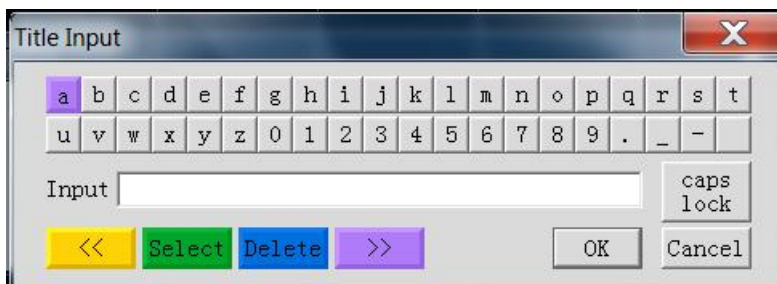
Fig. 6-32 Title Input Dialog Box

b) Trace state

The Trace state will be displayed in the upper left corner of each window on the screen, including:

➢ Measured parameters

➢ Format

> Scale

> Reference value

The Trace state button can be used to set the corresponding Trace as the current active Trace so as to set the Trace. Point to the button and right-click the mouse. Delete the Trace or set the Trace scale, color and line through the right- click menu.

c) Frequency/Stimulus state

The frequency/Stimulus information will be displayed under each window on the screen. The display can be hided for security purposes. The following information will be displayed.

> Channel number

> Starting Stimulus value

> Ending Stimulus value

d) Cursor display

The cursor display information includes the cursor reading ON/OFF, Trace cursor ON/OFF, large font ON/OFF, leftward movement of display position, and downward movement of display position. The cursor reading information is displayed in the upper right corner of each window on the screen. The following information will be displayed:

> Cursor number

> Stimulus value

> Response value

e) Display time state

If the display time is ON, the system time will be displayed in the upper right corner of the screen.

2) Triggering of display contents

Menu path: **[Response] > [Display]**. Point to **[Display Items]** in the **display** sub-menu.

Tick or click the auxiliary menu bar in the drop-down menu of the menu bar to display or hide the corresponding contents.
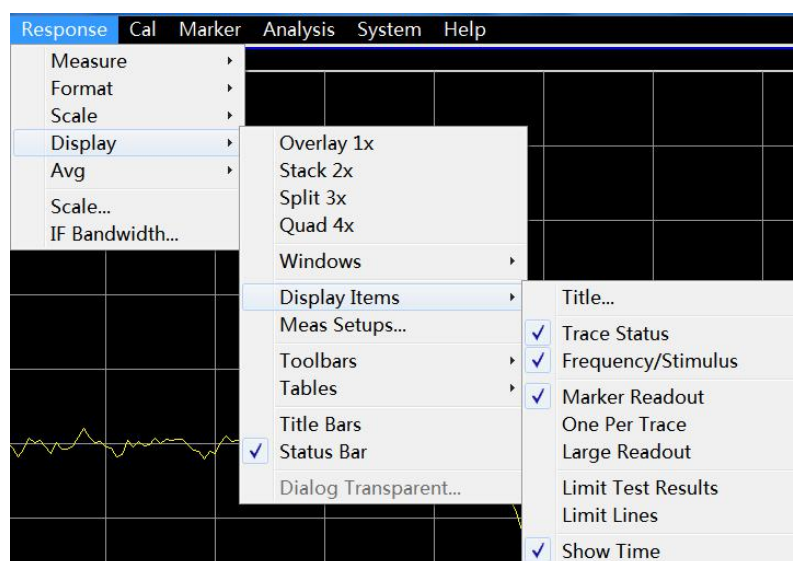
Fig. 6-33 Triggering of Display Contents

5.1.5 Title bar

The title bar includes the application program title bar and window title bar, including the title name and window

control button. Click [Hide title bar] to hide all title bars on the screen. In this case, the display of measurement results on the screen can be maximized.

Triggering of title bar display

Menu path: **[Response] > [Display]**. Click **[Title bar]** in the **display** sub-menu. Tick this item to display the title bar and clear it to hide the title bar.

6   Typical Application

This chapter mainly describes the operation of S3602 series network analyzers in measurement, creation of the measurement of the known status by analyzer reSetup, selection of measurement Setup, adjustment of the analyzer display so as to better observe measurement results, specifically including:

● ReSetup of analyzer

● Selection of measurement parameter

● Setup of frequency range

● Setup of signal power level

● Setup of Sweep

● Trigger mode

● Setup of data format and scale

● Observation of multiple Traces and opening of multiple channels

● Setup of analyzer display

● Data output

6.1   ReSetup of Analyzer

6.1.1 Default Reset State

Press the **[Preset]** on the front panel to return to the known default state, i.e. reset state. For Details of reset state please refer to User Manual Section 4.1.1.

6.1.2 User Reset State

The analyzer can reset into the user-defined status by means of Setup. Specific steps of Setup the user reset status are as follows.

1) Menu path: **[System] > [Define user status...]**. Then the **[Define user reset status...]** dialog box will appear.

2) Click **[Enable user reset status]** and tick the check box.

Notes:

a) If you tick **[Save final status as user preset]**, the final status before exiting the program will be saved as the user reset state.

b) Click **[Save current status as user reset status]**. Then the current Setups of the analyzer will be saved as the user reset status.

c) To use the known status, click **[Load exist file as user reset status]**. Select the status in the dialog box, and open the file. Then the selected file will be used as the user reset status file of the analyzer.
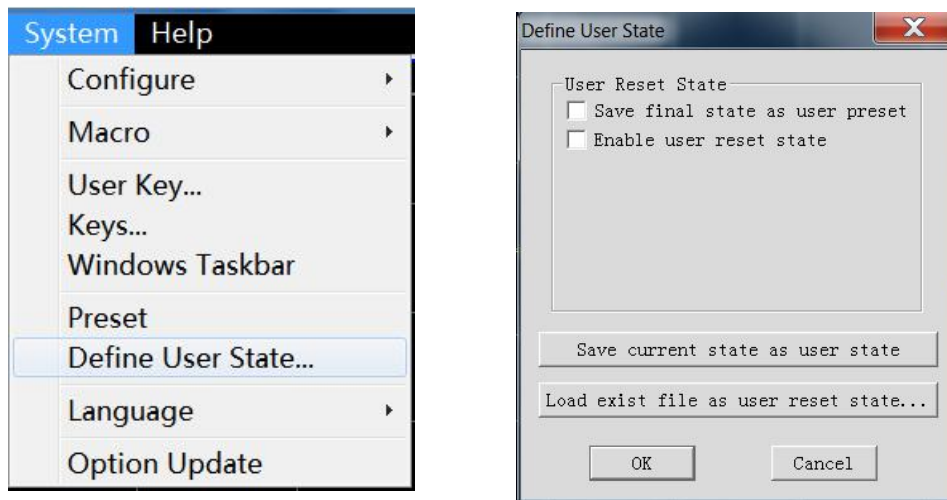
Fig. 6-1 User Reset Status

6.1.3 ReSetup of Analyzer

Menu path: **[System] > [Preset]**
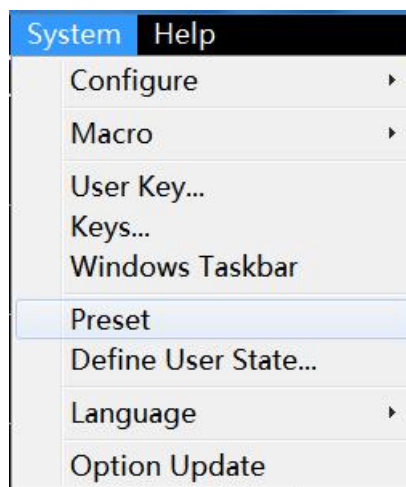
If the user reset state has been set, click **[User Preset]**.

Fig. 6-2 ReSetup of Analyzer

[Preset] shortcut key

The **[Preset]** shortcut key is set in the **functional** key zone and shortcut menu bar.

6.2   Selection of Measurement Parameter

The following parameters can be set in an S3602 series vector network analyzer to measure the electrical characteristics of devices.

- S parameter (fixed ratio)
- Any ratio (custom ratio for measurement)
- Non-ratio power measurement (absolute power measurement)

6.2.1 Parameter S

The parameter S (scattering parameter) is used to describe the change of input signal and the reflection and transmission characteristics of the tested device. The S-parameter is shown in the prescribed digit row, and

indicates the proportion of two complex vectors, i.e. S$_{output/input}$, including the amplitude and phase information. The output refers to the output signal port number of the tested device, and the input refers to the input signal port number of the tested device. The analyzer is equipped with four test ports to test single-port, double-port, three-port and four-port devices.

6.2.1.1 New S measurement Trace

Menu path: **[Trace] > [New Trace]**. Click the **S-parameter** in the dialog box.
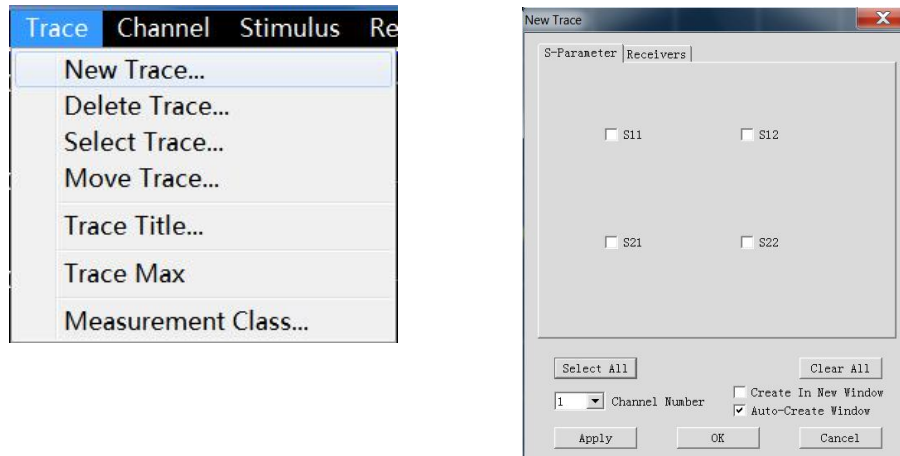
Fig. 6-3 S-parameter Dialog Box

a) **[S Parameter selection] zone**
Select the S parameter measurement Trace to be created.

b) **[Receiver] button**
 Open the dialog box to create any ratio or non-ratio power measurement Trace.

c) **[Balance parameter] button**
Open the dialog box to create the balance parameter measurement Trace.

d) **[Channel selection] box**
Select the channel where the new Trace is located.

e) **[Create in new window] check box**
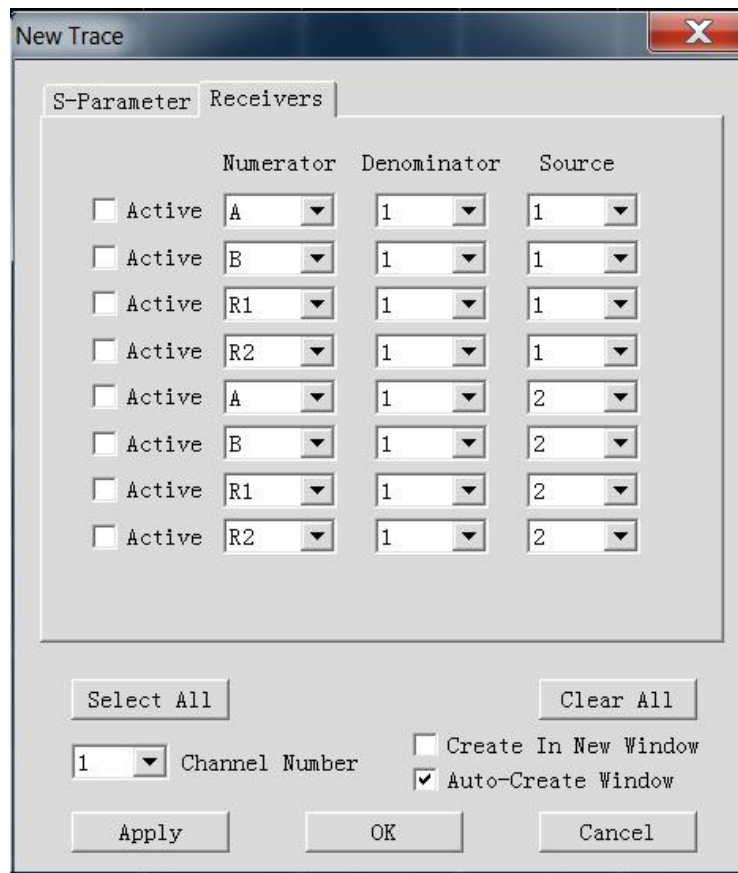
If this check box is selected, a Trace will be created in the new window. If this check box is cleared, a Trace will be created in the current active window.

6.2.2 Ratio

The input signal and reference signal are selected from the receiver A, B, C, D, R1, R2, R3 or R4 for ratio measurement.

1) Create measurement Trace of any ratio

Menu path: **[Trace] > [New Trace]**. Click "**Receivers**" in the dialog box.

Fig. 6-4 Definition of Parameter

6.2.3 Non-ratio Power Measurement

The absolute power of the receiver A, B, C, D, R1, R2, R3 and R4 can be measured in the non-ratio power measurement mode, however, the phase, group delay and other items under the ―average‖ function cannot be measured.

1) New non-ratio power measurement Trace
Menu path: **[Trace] > [New Trace]**. Click "**Receiver**" in the dialog box.

2) [New Trace] dialog box (any ratio and non-ratio power measurement)
a) **[Activation]** check box
 Tick it to create a new Trace.

b) [Numerator] zone
 Select the numerator of any ratio measurement or the receiver for non-ratio power measurement.

c) [Denominator] zone
 Select the denominator of any ratio measurement. The value is 1 in non-ratio power measurement.

d) [Source port] box
 Select the source signal output port of the analyzer.

e) [Channel selection] box
 Select the channel for the new Trace.

f) [Create in new window] check box

If this check box is selected, a Trace will be created in the new window. If this check box is cleared, a Trace will be created in the current active window.

g) [Automatically create window] check box

If this check box is ticked and the number of Traces in the window exceeds 8, excessive Traces will be automatically created in a new window.

If this check box is cleared and the number of Traces in the window exceeds 8, excessive Traces will not be created.

6.2.4 Measurement mode of Trace change

The Trace must be activated before Setup and modification.

1) Change the Trace activation status

Click the **[Trace status]** button in the window. The corresponding Trace will be activated.

```
Tr 1  A Log M 0.000dBm/10.000dBm          Tr 2  S11 Log M 0.000dB/10.000dB
```
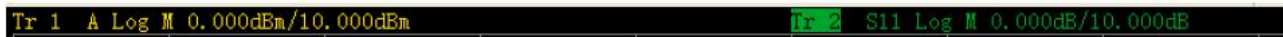
Fig. 6-5 Change of Trace Activation Status

2) Change the measurement parameter of the activated Trace

Menu path: **[Response] > [Measure]**. The **measurement** sub-menu will appear. Or, right-click the Trace title bar, and click **[Measure]** in the menu, as shown in Fig. 6-6.
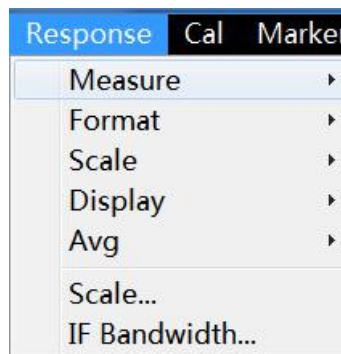
Fig. 6-6 Setup of Parameter S Measurement Mode of Activated Trace

6.3   Setup of Frequency Range

Frequency range: 10MHz-13.5GHz/26.5GHz/43.5GHz/50GHz/67GHz

Frequency resolution: 1Hz

1) Two ways of frequency range Setup
a) Specify the starting and ending frequency.
b) Specify the center frequency and frequency span.

2) Setup of starting and ending frequency
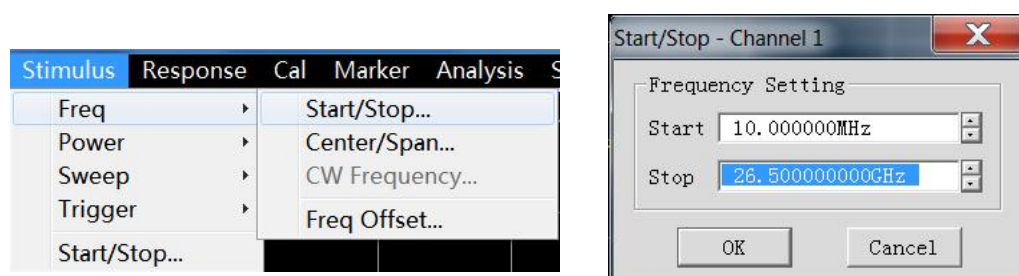Menu path: **[Stimulus] > [Freq]**

Fig. 6-7 Setup of Starting and Ending Frequency

3) Setup of center frequency and frequency span
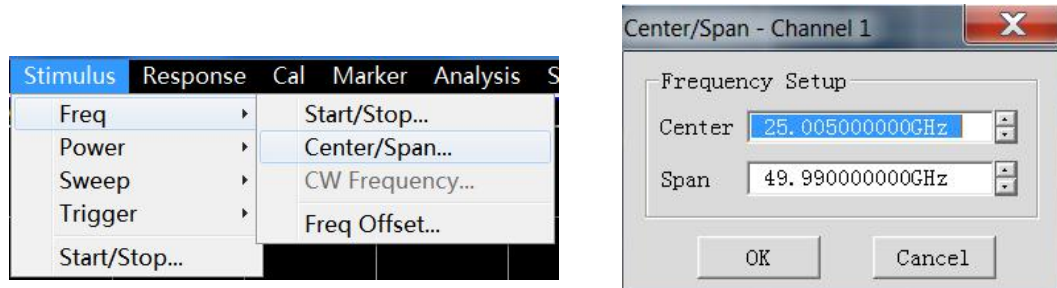
Menu path: **[Stimulus] > [Freq]**

Fig. 6-8 Setup of Center Frequency and Frequency Span

Prompt

[Freq] shortcut key

The frequency can be rapidly set with the **[Freq]** shortcut key in the functional key zone of the front panel.

6.4   Setup of Signal Power Level

The power level refers to the power level of the output signal of the test port. The power level indicators of the port of S3602 series vector network analyzer are as follows.

Table 6-1 Power Level Indicators of Source Output Signal

Frequency range	Source frequency range (dBm)	Configuration
10MHz to 13.5GHz/26.5GHz/43.5GHz/50GHz/67GHz	-30 to +20	Standard configuration
10MHz to 13.5GHz/26.5GHz	-100 to +20	Option: program-controlled step attenuator
10MHz to 43.5GHz/50GHz	-90 to +20	Option: program-controlled step attenuator

1) Setup of power level

Menu path: **[Stimulus] > [Power]**. Also, the **[Power]** shortcut key is set in the **functional** key zone of the front panel and the shortcut menu bar.
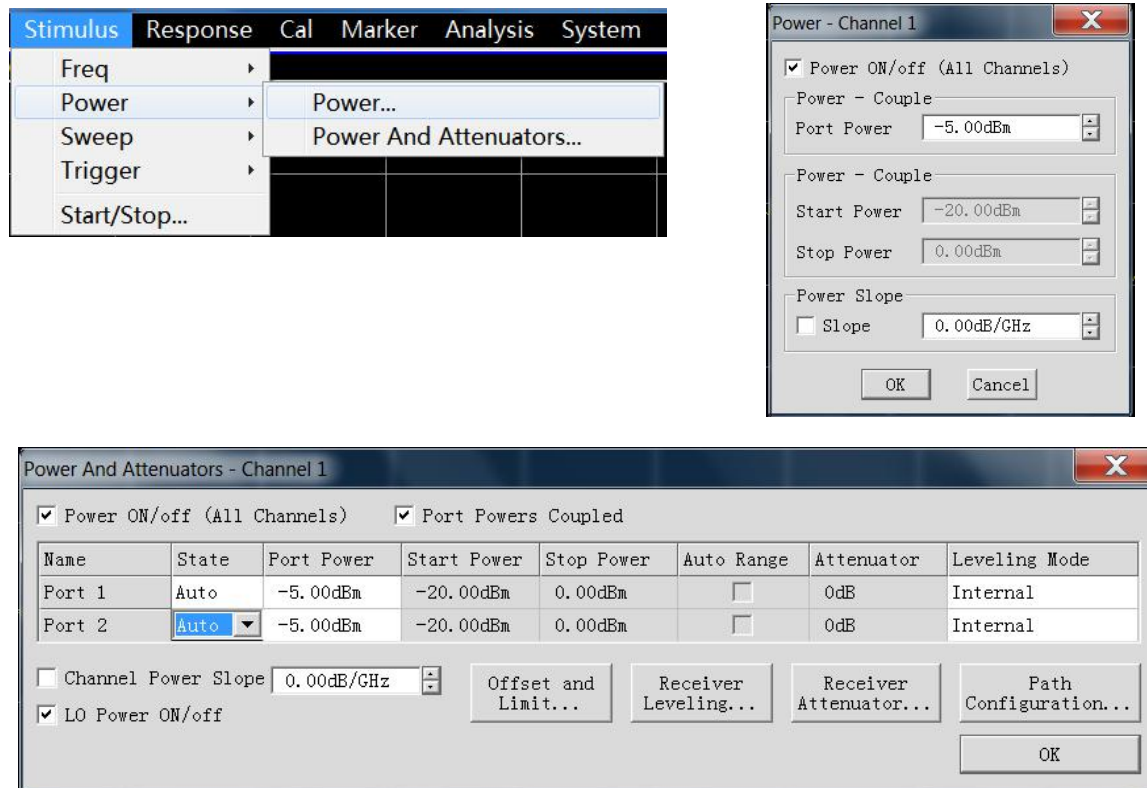
Fig. 6-9 Setup of Power Level

2) Cutoff of port power

Menu path: **[Stimulus] > [Power] > [Power state ON/off]**. Or, switch the power by changing the Setup of the

[Power ON/off] check box in the [Power Setup] dialog box.

3) Manual Setup of attenuation

Menu path: **[Stimulus] > [Power] > [Power and attenuation...]**. The **[Power and attenuation]** will appear. Click to clear the **[Auto attenuation]** zone check box. Click the **[Attenuation]** input box and enter the attenuation value.

4) Setup of power slope

Menu path: **[Stimulus] > [Power] > [Power...]**. The [Power] dialog box will appear. Click **[Slope]** check box. Click the **[Slope]** input box and enter the power slope.

5) [Power] dialog box

a) [Power ON/off] check box
If this check box is ticked, the port will normally output the power. If this check box is cleared, the port output power will be cut off.

b) [Power-port 1]
Set the power level of the port 1.

c) [Power slope] check box

Tick the **[Power slope]** check box and enter the slope value in the **[Slope]** input box to enable the power slope function.

The power slope is used to compensate the power loss of the cable and test fixture as a result of frequency increase.

➢ If the power slope function is enabled, the output power of the test port will increase (or decrease) with the increase of Sweep frequency.

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- ➢ Unit of power slope: dB/GHz.
- ➢ Power slope Setup range: -2 to +2.

6) [Power and attenuation] dialog box

a) [Power ON/off] check box

If this check box is ticked, the port will normally output the power. If this check box is cleared, the port output power will be cut off.

b) [Coupling port power] check box

If the **[Coupling port power]** check box is ticked in the default mode, the power level Setups of two ports of the analyzer will be identical. However, different power levels are required for ports in some measurement applications. For example, the power of each port must be set separately to measure the gain and reverse isolation of one high-gain amplifier, as the power of the input port of the amplifier is lower than that of the output port. If the **[Coupling port power]** check box is cleared, the power level of each port can be set separately in the analyzer.

c) [State] bar

It is **[Auto]** in the default mode. In this case, the power ON/OFF state can be switched according to the measurement needs. **[ON]** indicates the port power is always ON, while **[OFF]** indicates the port power is always OFF.

d) [Port power] bar
Set the port power.

e) [Automatic attenuation] bar

If this check box is ticked, any power level can be set within the allowable range of the instrument. If this check box is cleared, the source power and attenuation can be set manually for certain measurement, such as the reflection amplifier (oscillator or unsteady-state amplifier) measurement. In this case, the matching source impedance (better than the return loss of 20dB) should be set within a wide frequency range.

f) [Attenuation] bar
Set the attenuation

g) [Fixed amplitude mode] bar
Set the fixed amplitude mode, including **[Internal fixed amplitude]**, **[Receiver]** and **[Open loop]**. The amplitude is not fixed in the **[Open loop]** mode.

h) [Power slope] check box

Tick the **[Slope]** check box and enter the slope value in the **[Slope]** input box to enable the power slope function. The power slope is used to compensate the power loss of the cable and test fixture as a result of frequency increase.

- ➢ If the power slope function is enabled, the output power of the test port will increase (or decrease) with the increase of Sweep frequency.
- ➢ Unit of power slope: dB/GHz.
- ➢ Power slope Setup range: -2 to +2.

i) Attenuator Setups and power range

The programmable attenuator is used to cover the whole power range. It can adjust the power level of the tested device while the power level of the reference path of the analyzer remains unchanged. Thus, higher accuracy and characteristic indicates and more accurate matching of source output signals can be realized.

The fully accurate error correction can be done at the power point for measurement calibration. If the power level is changed in the same attenuator Setups as those of measurement calibration, the accuracy of error correction is higher in ratio measurement but poorer in non-ratio measurement.

6.5   Setup of Sweep

Sweep refers to the process of continuously measuring data points according to the Stimulus values in the specified sequence.

6.5.1 Overview of Sweep Types

The network analyzer supports six Sweep types shown below.

1) Linear frequency

This is the default Sweep type of the instrument. The whole frequency range is covered continuously by the frequency linearity.

2) Logarithmic frequency

In the logarithmic frequency mode, the source frequency increases in logarithmic steps, and the frequency ratio of every two adjacent frequency points is identical.

3) Power Sweep

The power is Sweepned at the point frequency. The maximum Sweep range is 50dB. The default frequency Sweep range is -30dBm to +20dBm.

4) Point frequency

In the point frequency Sweep mode, a single Sweep frequency is set in the analyzer, measurement data are accurately and continuously samples at the intervals determined according to the Sweep time and the number of measurement points, and changes of measurement data with time are displayed.

5) Segment Sweep

Segment Sweep aims to start Sweep of several segments. The power level, intermediate frequency bandwidth and Sweep time of each segment can be set independently. After calibration of all segments, one or several segment(s) can be measured according to the calibrations. Segments are defined according to the frequency increase sequence, and the frequency range must be prevented from overlapping. The attenuator Setups of the power levels of all segments must be identical to prevent damage caused by frequent switching of the attenuator. If the attenuator Setups of the current segment and defined segment are different, the analyzer will automatically change the power level and attenuator Setups of the defined segment.

6) Phase Sweep

Sweep the phase of one or several source(s) relative to another source. The measured value is -360° to +360°.

6.5.2 Setup of Sweep Type

1)   Setup of Sweep type

Menu path: **[Stimulus] > [Sweep] > [Sweep type]**.

Select the corresponding Sweep type in the auxiliary menu bar or in the [Setup of Sweep type] dialog box.
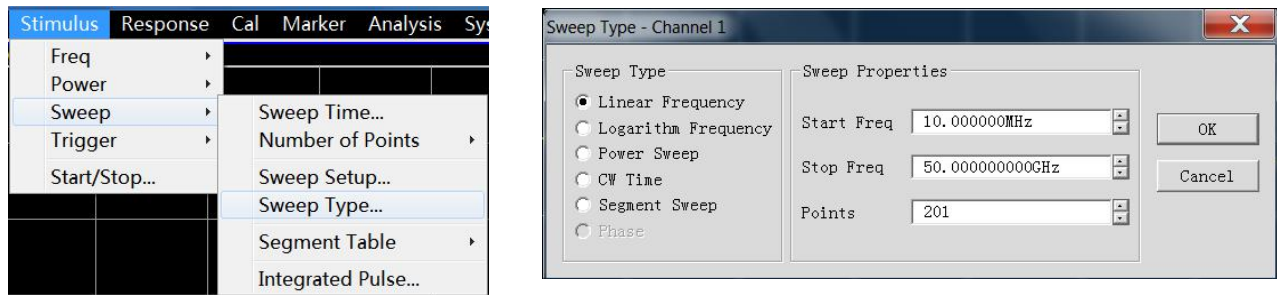
Fig. 6-10 Setup of Linear Frequency Sweep Type

2) Setup of segment Sweep type

Menu path: **[Stimulus] > [Sweep] > [Sweep type].**

Auxiliary menu bar: click **[Segment Sweep]** or select **[Segment Sweep]** in the [Setup type] dialog box.
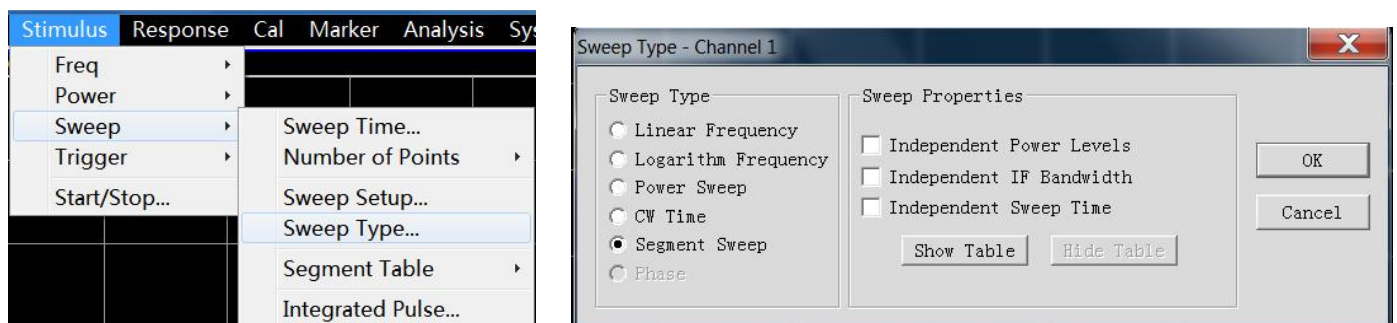

Fig. 6-11 Setup of Segment Sweep Type

Dialog box Setup instructions:

- **[Independent power levels]** check box: tick it to set the independent power level of each segment. In this case, the attenuator Setups must be identical.

- **[Independent IF Bandwidth]** check box: tick it to set the independent intermediate frequency bandwidth of each segment.

- **[Independent Sweep time]** check box: tick it to set the independent Sweep time of each segment.

- **[Display table]** button: click it to create and edit the Sweep table.

- **[Hide table]** button: click it to hide the segment Sweep table.

3) Segment insertion and deletion
Only the displayed segment table can be edited.

Menu path: **[Stimulus] > [Sweep] > [Segment table] > [Show table]**. The **segment table** sub-menu will appear.

Tick **[Show table]** in the **segment table** sub-menu. Click **[Insert segment]** in the **segment table** sub- menu to add a new segment in front of the selected segment. Click **[Delete segment]** in the **segment table** sub- menu to delete the selected segment. Click **[Delete all]** to delete the whole segment table.
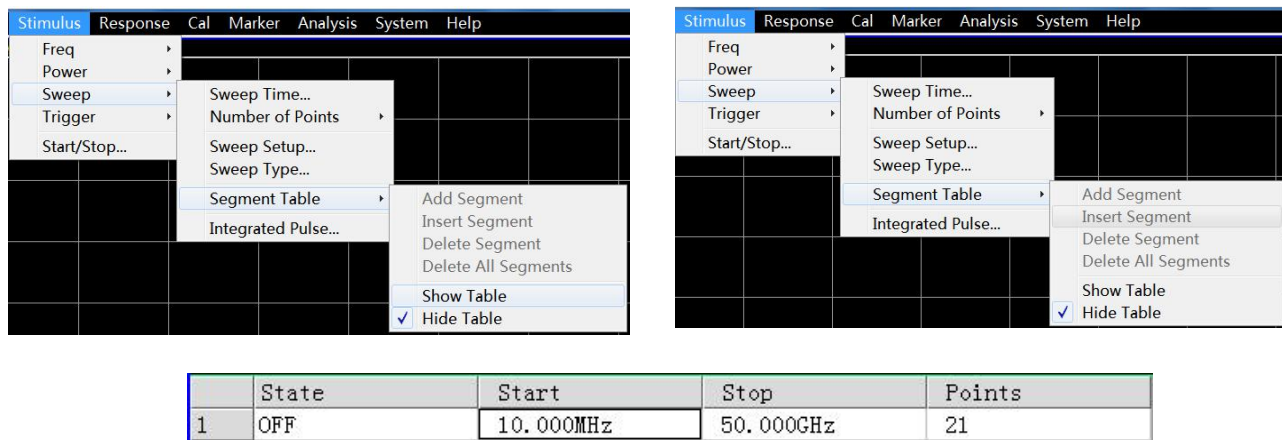
Fig. 6-12 Segment Insertion and Deletion

4) Editing of segment table

- Double-click the [State] box of the segment and select "ON" or "OFF" to open or close the segment.

- Double-click the [Starting Stimulus] box of the segment and enter the starting frequency of the segment.

- Double-click the [Ending Stimulus] box of the segment and enter the ending frequency of the segment.

- Double-click the [Number of Sweep points] box of the segment and enter the number of Sweep points of the segment.

- Double-click the [Power level] box of the segment and enter the power level of the segment (the independent power level option is opened).

- Double-click the [Intermediate frequency bandwidth] box of the segment and enter the intermediate frequency bandwidth of the segment (the intermediate frequency bandwidth option is opened).

- Double-click the [Sweep time] box of the segment and set the Sweep time (the independent Sweep time option is opened).

6.5.3 Sweep Time

After Setup of measurement, the minimum Sweep time will be adopted by the analyzer. The Sweep time can be increased to meet certain requirements of measurement. If the Sweep time is set as 0, the minimum Sweep time will be adopted automatically by the analyzer. If the Sweep is no less than 300ms, a Sweep indicator will be displayed on the analyzer, indicating the point-to-point measurement Sweep. The measurement indicator is a small upward arrow, showing the point at which measurement is just completed on the Trace.

1) Setup of Sweep time

Menu path: **[Stimulus] > [Sweep] > [Sweep time...]**. The dialog box of **Sweep time** will appear.

Enter the Sweep time directly in the **[Sweep time]** box. For Setup of the Sweep time with the keys and auxiliary menu bar, directly enter the Sweep time in the input toolbar.
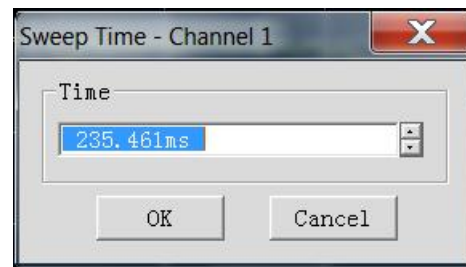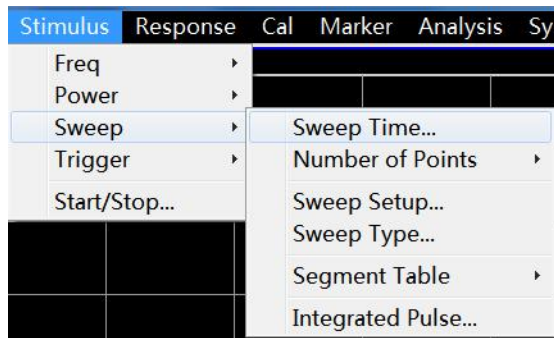
Fig. 6-14 Setup of Sweep Time

6.5.4 Setup of Sweep

1) Sweep Setup

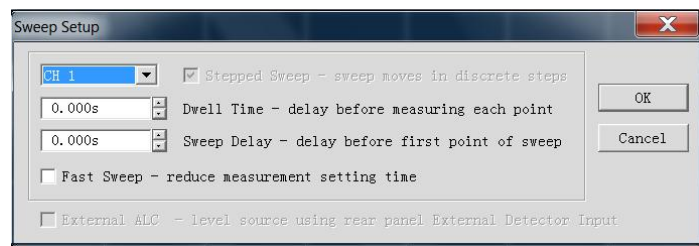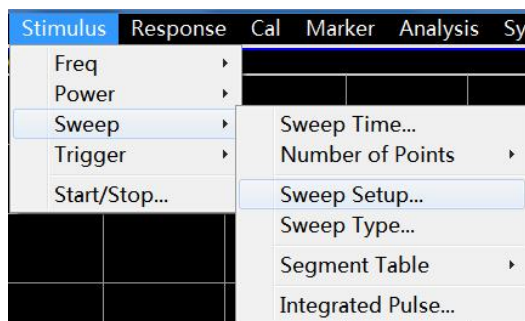Menu path: **[Stimulus] > [Sweep] > [Sweep Setup]**. The **[Sweep Setup]** dialog box will appear.

Fig. 6-15 Sweep Setup

2) [Sweep Setup] dialog box

a) [Channel] box

Select the channel applicable to Sweep Setup.

b) [Step Sweep] check box

In the **step Sweep** mode, the source is tuned to a frequency point and the frequency point is measured after the specified residence time. Then the source is tuned to next frequency point. A device of long electrical delay can be accurately measured. If this check box is cleared, the analyzer may work in the **analog Sweep** or **step Sweep** mode, depending on the Setup of the Sweep time and intermediate frequency bandwidth.

c) [Residence time] input box

Set the residence time at each point before obtaining the measurement data. This is only applicable to the **step Sweep** mode.

d) [Sweep delay] input box

Set the waiting time of the analyzer before obtaining the measurement data. It refers to the delay before measurement of the first point.

e) [Quick Sweep] check box

If the **[Quick Sweep]** check box is selected, analog Sweep will be started. Data are collected in the Sweep process, thus reducing the waiting time of Sweep.

6.6   Trigger Mode

The trigger signal is used to enable measurement Sweep of the analyzer. The Sweep mode and time to stop Sweep and return to the holding state are determined by trigger Setups. The vector network analyzer has high

flexibility in trigger Setup.

6.6.1 Simple Trigger Setup

Only the trigger mode of the current active channel can be set by simple trigger Setup.

Menu path: **[Stimulus] > [Trigger]**. The **trigger** sub-menu will appear.

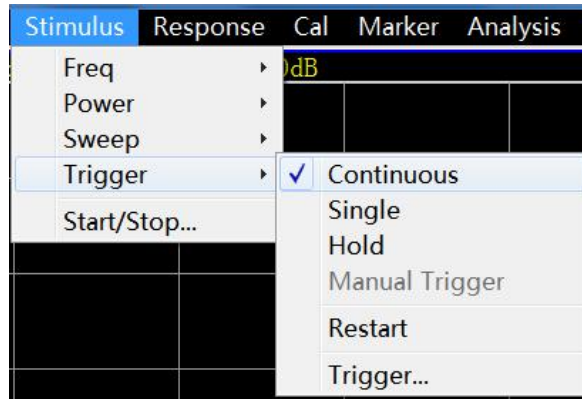Click **[Continuous], [Single] or [Hold]** in the sub-menu and select the trigger mode.

Fig. 6-16 Simple Trigger Setup

6.6.2 Detailed Trigger Setup

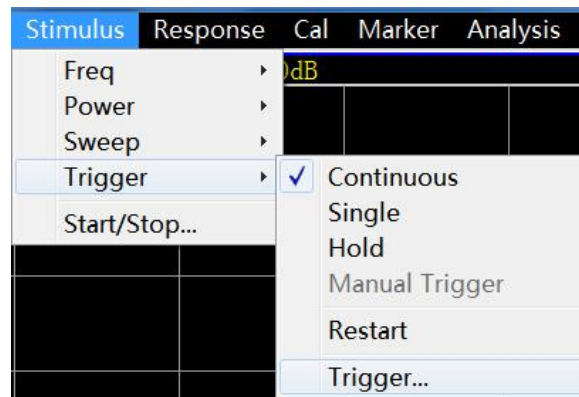Menu path: **[Stimulus] > [Trigger] > [Trigger...]**. The **trigger** dialog box will appear.

Fig. 6-17 Trigger Sub-menu
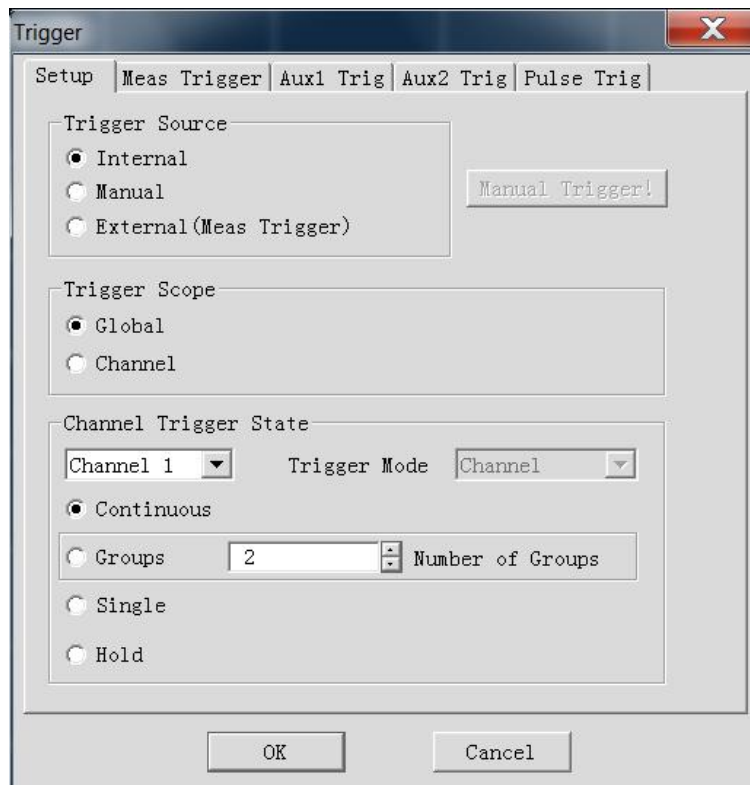
Fig. 6-18 Trigger Setup Dialog Box

6.6.3 [Trigger] Dialog Box

1) Trigger Setup options

a) Trigger source zone

The source of the channel trigger signal is determined by trigger source Setup of the trigger source zone. The effective trigger signal is generated when Sweep is not done by the vector network analyzer. Three trigger sources can be selected: **internal**, **manual** and **external**. The set trigger source will be used as the trigger source of all channels.

➢   **[Internal] (default)**

1) Trigger signal generation is controlled automatically by the analyzer.

2) One trigger signal is generated immediately after one measurement.

➢   **[Manual]**

The manual trigger signal is generated in the following methods.

1) Click the **[Manual trigger]** button in the **[Trigger]** dialog box.

2) Click the **[Manual trigger]** item in the **[Trigger]** sub-menu under the **[Stimulus]** menu of the menu bar.

➢   **[External]**

1) The trigger signal is input by **[External trigger input]** of the BNC connector on the rear panel.

2) The signal is TTL level.

3) Level trigger: the high or low level can be set in the **[External trigger]** dialog box.

4) The pulse width is 1μs at and must not be longer than the Sweep time (otherwise, the trigger may be enabled several times).

b) Range zone

The measurement channel receiving the trigger signal is determined by trigger range Setup. Two types of trigger range can be set: **global** and **channel**.

➢   **[Globa]**

This is the default Setup of the analyzer. Except the channel in the **holding** mode, all channels can receive the

trigger signal.

➢ **[Channe]**

Next channel which is not in the **holding** mode will receive the trigger signal. After the current channel is measured, next channel will be selected automatically. Except the channel in the **holding** mode, all channels will be selected in sequence. The **trigger source** should be set in the **manual** mode to make the above Setup effective. Set the **[Channel]** to enable the **spot Sweep** function.

c) Trigger Setup zone

The number of trigger signals to be received by one channel is determined by trigger Setup. Four channel triggering states are provided:

➢ **[Continuou]**

The channel will receive a number of trigger signals. Sweep will be done continuously.

➢ **[Group]**

The channel will only receive the trigger signals, the number of which is set in the **[Group]** input box. Sweep will be done for the set times, and then the channel will enter the **holding** mode.

➢ **[Single]**

The channel will receive one trigger signal. Sweep will be done once, and then the channel will enter the **holding**

mode.

➢ **[Hold]**

The channel will not receive the trigger signal, and Sweep will be stopped.

➢ **[Spot] ([Trigger mode] check box)**

The **spot Sweep** mode can be selected only when the **trigger source** is **manual** or **external** and the **trigger range** is the **channel**. In the **spot Sweep** mode, next data point will be measured in Sweep after the channel receives the trigger signal. The channel will continuously receive the trigger signal until all measurements in the channel are done. Then next channel which is not in the **holding** mode will be triggered.

➢ **[Channel] ([Trigger mode] check box)**

All Traces in the channel will be triggered.

➢ **[Sweep] ([Trigger mode] check box)**

The **Sweep trigger** mode can be selected only when the **trigger source** is **manual** or **external** and the **trigger rang**e is the **channel**. The Traces sharing one source port in the channel will be triggered.

2) Measurement trigger options
a) Main trigger input zone
Set the nature of the external trigger signal to be received in the trigger input zone.

➢ **[Global/channel trigger delay]**

[Delay]: Enter the delay time in the delay input box. When the instrument receives the external trigger signal, Sweep will be started after the delay time.

➢ **[Trigger source]**

Set the external trigger signal input interface, including the BNC interface and automatic test interface (18-pin).

➢ **[Level/edge]**

Set the trigger mode of the external trigger signal, including high level, low level, rising edge and falling edge.

➢ **[Ready to enable trigger signal received before triggering]**

If this item is ticked, corresponding Sweep will be executed immediately after the vector network analyzer receives the trigger signal; otherwise, all the received trigger signals will be ignored.

➢ **[Ready to receive trigger prompt]**

The trigger READY signal is sent by the BNC interface and automatic test interface (21-pin). High level and low level of the signal are optional.

3) Auxiliary 1/2 trigger option

a) Auxiliary trigger output zone

➢ **[Enabled]**

Tick the check box to open the external trigger output of the corresponding channel; otherwise, the external trigger output will be closed.

➢ **[Polarity]**
Set the polarity of the trigger output signal in the radio box: **[Positive pulse]** or **[Negative pulse]**.

➢ **[Position]**
Set the time to send the trigger output signal in the radio box: **[Before data capturing]** or **[After data capturing]**.

➢ **[Pulse width]**
Input the pulse width of the trigger output signal in the input box.

➢ **[Enable the waiting for external equipment holding signal]**

If this check box is ticked, data will not be captured until the vector network analyzer receives the specific level from the **auxiliary trigger input (1&2) connector** of the rear panel. This signal indicates that the external device is ready and the network analyzer is allowed to capture data. Otherwise, the network analyzer will not wait. However, a trigger signal will be sent when the network analyzer is ready. This signal cannot be used to trigger the network analyzer. It is generated by the internal, manual or external source.

➢ **[Auxiliary trigger input]**

When the network analyzer is ready, a confirmation signal will be sent to the auxiliary 1 & 2 connection port. The signal can be in the rising edge, falling edge, high level or low level form.

➢ **[Delay]**
When the network analyzer receives the holding signal, data will be captured after the corresponding delay time.
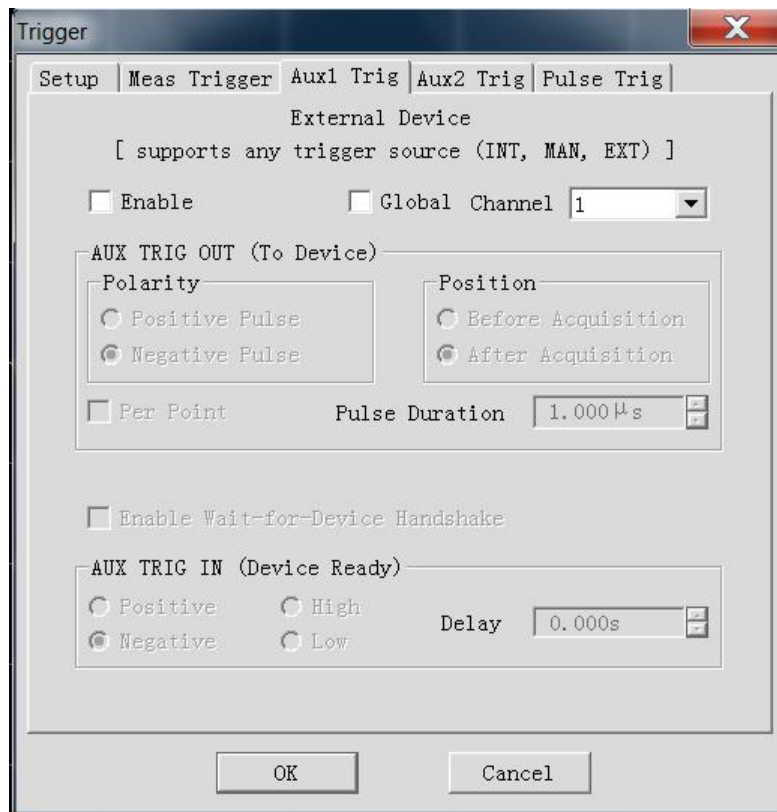
Fig. 6-19 Auxiliary 1/2 Trigger Dialog Box

4) Pulse trigger options

a) Synchronous pulse input zone

Select the internal or external source to synchronize the internal pulse generator of the analyzer.

➢ **[Synchronization]**

1) **Internal**: the pulse generator is synchronized according to the periodic signal generated in the analyzer, and the output pulse train period is determined according to the pulse repetition period in the pulse measurement interface.

2) **External**: the pulse repetition period specified by the user is ignored. One pulse train will be output once an effective external pulse synchronization signal is detected by the analyzer. The delay and width of the pulse generator can be set respectively in the pulse measurement interface. The external pulse synchronization input signal will be input through the **pulse input/output interface** of the rear panel of the analyzer. The configurable synchronization trigger signal can be input to the analyzer according to the pulse synchronization input signal. If the level is trigger, the analyzer will output a pulse train. If the level is continuously effective, the analyzer will continue to output another pulse train. If the edge is triggered, the analyzer will be triggered by one effective edge signal to output a pulse train. The pulse train length is the maximum value (delay + width) in all the enabled pulse generators.

➢ **[Level/edge]**

Set the characteristics of the effective external pulse synchronization input signal to be received by the analyzer: high level, low level, rising edge or falling edge.

b) Receiver output zone

➢ **[Synchronization of receiver and pulse generator 0]**

It is used to measure the broadband synchronization pulse. When this function is enabled, the pulse generator output and data collection are allowed to be synchronized.

➢ **[Delay]**

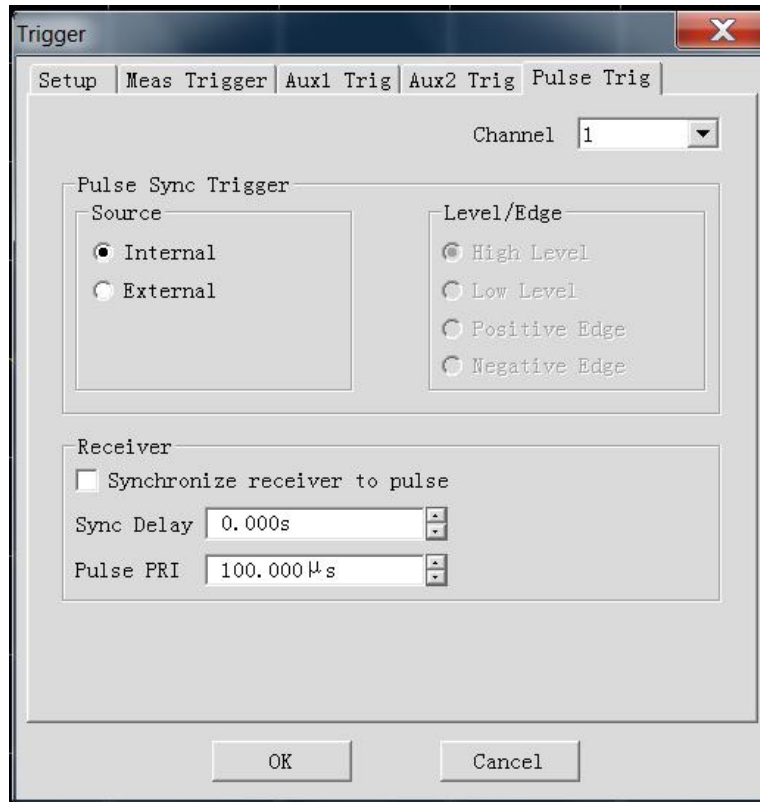Set the delay time before collection of AD data.

Fig. 6-20 Pulse Trigger Dialog Box

6.7   Setup of Data Format and Scale

The data format refers to the display of measurement data in the graphical form. Select the data format which is the most favorable to understand the characteristics of the tested device. This section introduces nine data formats and the method of scale Setup so as to better display the measurement information.

6.7.1 Data Format

1) Rectangular coordinate format

Seven of nine formats of measurement data are in the rectangular coordinate form. This format is also known as the Cartesian format, X/Y format or linear format and is suitable to display the frequency response information of the tested device. For example, the rectangular coordinates in Fig. 6-21 show the following information.

➢ Stimulus value (frequency, power or time) in the linear scale form on the X-axis in the default mode.
➢ Response value corresponding to the Stimulus value on the Y-axis.
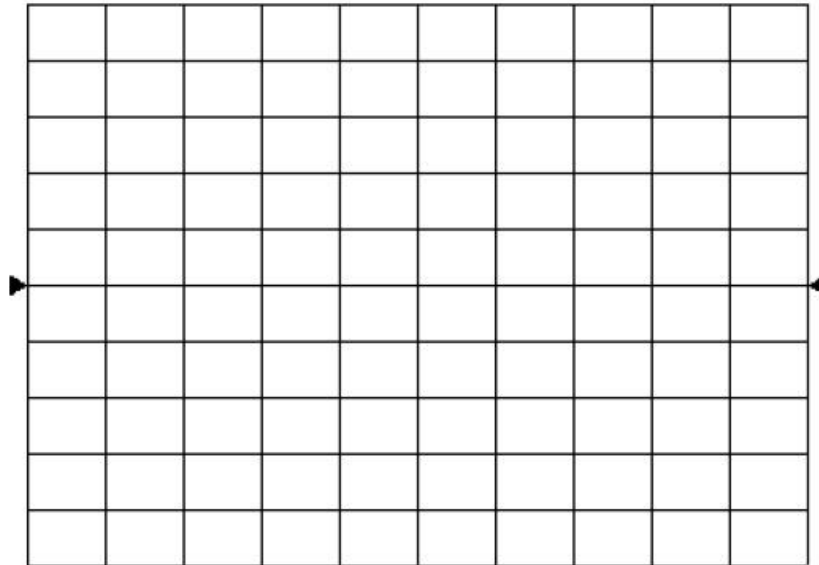
Fig. 6-21 Rectangular Coordinate Format

a)Logarithmic amplitude format

➢ Display the amplitude information (no phase information).
➢ Y-axis unit: dB
➢ Applicable typical measurement: return loss, insertion loss and gain.

b)Phase format

➢ Display the phase information (no amplitude information).
➢ Y-axis unit: phase (degree)
➢ Applicable typical measurement: linear phase deviation.

c)Group delay format

➢ Display the signal transmission time through the tested device.
➢ Y-axis unit: time (second)
➢ Applicable typical measurement: group delay.

d)Linear amplitude format

➢ Only display the positive value.
➢ Y-axis: no unit (U) in ratio measurement and milliwatt (mW) in non-ratio measurement.
➢ Applicable typical measurement: reflection and transmission coefficient (amplitude) value and time domain transformation

e)Standing wave ratio format

➢ Display the reflection measurement data calculated by the formula $(1+\rho)/(1-\rho)$, where ρ is the reflection coefficient.
➢ Effective in reflection measurement.
➢ Y-axis: no unit.
➢ Applicable typical measurement: standing wave ratio.

f)Real part format

➢ Display the real part of the measurement complex.

➢ It is similar to the linear amplitude format, but both the positive value and negative value can be displayed.
➢ Y-axis: no unit.
➢ Applicable typical measurement: time domain and auxiliary input voltage for maintenance purposes.

g)Imaginary part format

➢ Only display the imaginary part of measurement data.
➢ Y-axis: no unit.
➢ Applicable typical measurement: impedance measurement in design of matching network.

2) Polar coordinate format

The polar coordinate format shown in Fig. 6-22 includes the amplitude and phase information. The vector value can be read in the following method.

a) The amplitude of any point is determined by the displacement of this point relative to the central point (or zero point). In the default mode, the amplitude is a linear scale, and the excircle scale is set as 1.

b) The phase of any point is determined by the angle relative to the X-axis.

c) The frequency information can only be read through the cursor. The default cursor format includes the real part and imaginary part. The **cursor** dialog box can be opened in the **cursor/analysis** menu. Other formats can be selected in the **advanced cursor** menu.
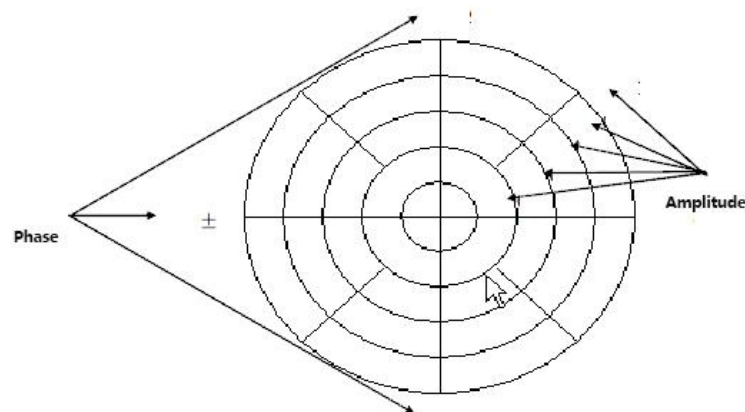

Fig. 6-22 Polar Coordinate Format

3) Smith chart format
Smith chart shown in Fig. 6-23 is a tool to map the reflection measurement data of the tested device into impedance.

Each point of the chart represents a complex impedance composed of the real resistance (R) and virtual reactance ($\pm jX$). The resistance, reactance, equivalent capacitance and inductance can be read through the cursor.
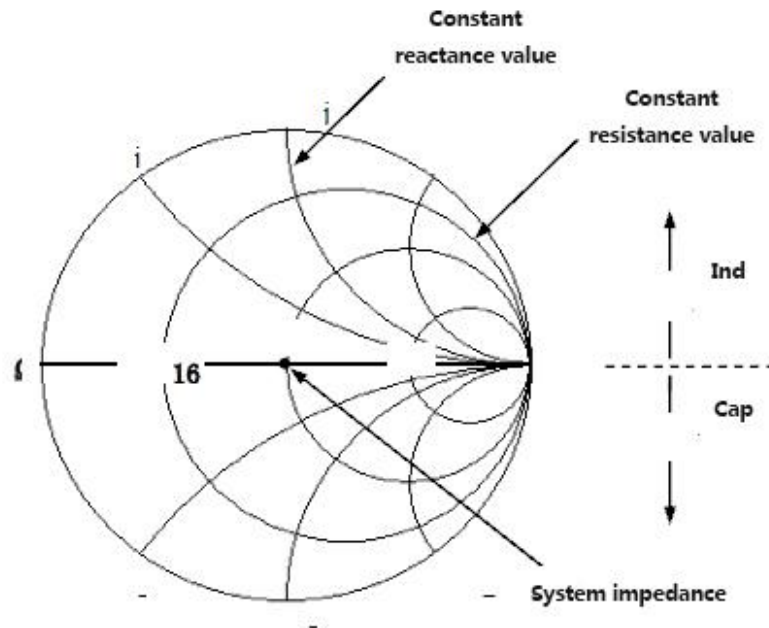
Fig. 6-23 Smith Chart Format

a) The horizontal axis of the center of Smith chart represents the pure resistance, and the center of the horizontal axis represents the system impedance. The leftmost resistance on the horizontal axis is zero, indicating a short circuit. The rightmost resistance of the horizontal axis is infinite, indicating an open circuit.

b) The points on the intersecting circle of Smith chart and horizontal axis have the same resistance.

c) The points on the tangent of Smith chart and horizontal axis have the same reactance.

d) The reactance of the upper part of Smith chart is positive. Therefore, the upper part is the sensitive zone.

e) The reactance of the lower part of Smith chart is negative. Therefore, the lower part is the capacitive zone.

6.7.2 Data Format Setup

Menu path: **[Response] > [Format]**. The **format** sub-menu will pop up.

6.7.3 Scale

The scale refers to the scale of the vertical part of the display grid. In the polar coordinate and Smith chart format, the scale refers to the full scale of the excircle. The display mode of measurement data on the screen are determined by scale and format Setups. In the log format, the scale Setup range is 0.001dB/grid to 500dB/grid.

1) Scale Setup

Menu path: **[Response] > [Scale]**. The **scale** sub-menu will pop up.

Set the appropriate scale, reference location and reference level by clicking the corresponding input zone or keys.
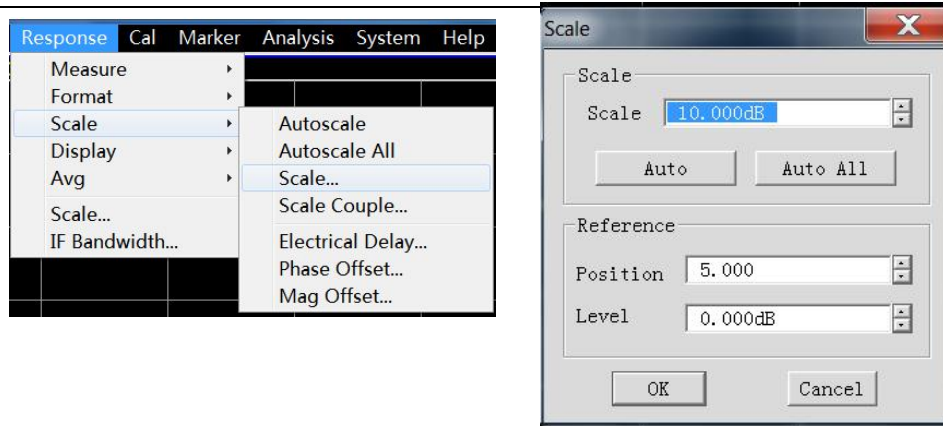
Fig. 6-24 Setup of Scale

2) Scale Setup dialog box

a)Scale zone

➢ **[Scale]** box

Enter the set scale value.

➢ **[Automatic scale] button**

Click the **[Automatic scale]** button. The analyzer will automatically select the vertical scale to better display the active Trace in the vertical grid of the screen. The Stimulus value will not be affected, and only the scale value and reference value are changed.

i. An appropriate scale factor will be selected so that data are displayed in 80% of the screen.

ii. he center value of the Trace on the screen will be selected as the reference value.

➢ **[All automatic scales] button**

Click the **[All automatic scales]** button. The analyzer will select appropriate scales of all Traces in the window so that the Traces are better displayed in vertical grids of the window.

➢ **[Reference position] button**

The reference position refers to the position of the reference line in the rectangular coordinate figure. The position of the bottom line in the figure is 0, the position of the top line is 10, and the default value of the reference position is 5.

➢ **[Reference value] button**

The reference value refers to the value of the reference line in the rectangular coordinate format, and the value of the excircle in the polar coordinate and Smith chart format. The Setup range is -500dB to +500dB in the logarithmic amplitude format.

6.8   Observation of Multiple Traces and Opening of Multiple Channels

A convenient method is provided in the preconfiguration function of the analyzer for multi-Trace, multi-channel and multi-window measurement. The analyzer has four preconfigured measurement Setups. If one kind of Setup is selected, the current Trace and window will be closed, and a new Trace and window will be created. The window arrangement of four preSetups is as follows.
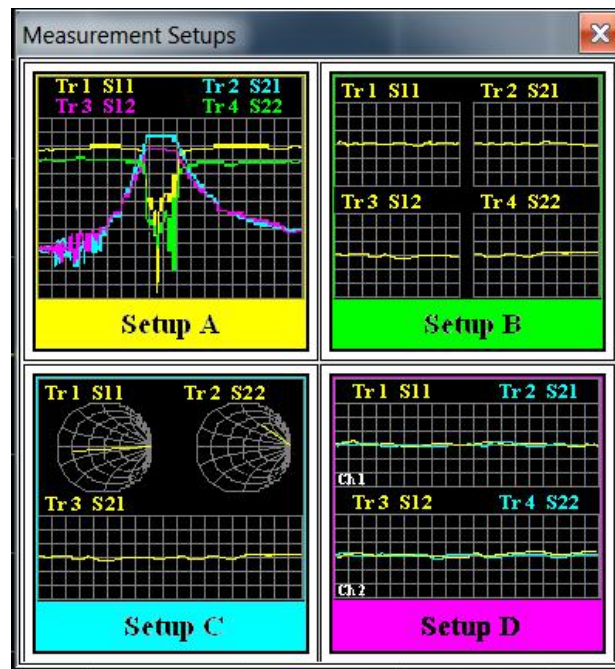
Fig. 6-25 Preconfigured Window Arrangement

➢ **Setup A**

Four Traces will be created in Window 1: S11, S21, S12 and S22, in the logarithmic format in Channel 1.

➢ **Setup B**

Four Traces will be created in four windows, in the logarithmic format in Channel 1. S11 will be displayed in Window 1, S21 in Window 2, S12 in Window 3 and S22 in Window 4.

➢ **Setup C**

Three Traces will be created in three windows of Channel 1. S11 will be displayed in the Smith chart format in Window 1, S22 in the Smith chart format in Window 2 and S21 in the logarithmic format in Window 3.

➢ **Setup D**

Four Traces will be displayed in two windows, in the logarithmic format in two channels. S11 and S21 will be displayed in Window 1 of Channel 1, and S12 and S22 in Window 2 of Channel 2.

1) Preconfigured measurement Setup

Menu path: **[Response] > [Display] > [Measure Setup]**. The **measure Setup** dialog box will appear. Select the

preconfigured measurement Setup in the dialog box.

2) Window arrangement

a)Several methods of window adjustment are provided in the analyzer.

➢ Use the mouse to move and adjust the window.
➢ Arrange the windows of the analyzer by the **[Tile]**, **[Cascade]**, **[Maximize]** and **[Minimize]** items of the **window** menu.

➢ Arrange the windows by the **[One-window]**, **[Two-window]**, **[Three-window]** and **[Four-window]** items of the **display** menu.
➢ Use the **[Minimize]**, **[Maximize/reduce down]** and **[Close]** button in the top right corner of the window to

adjust or hide the window.

b)The display menu of the analyzer provides four kinds of window arrangement. The existing Traces are distributed into different windows according to a certain algorithm.

➢ One-window arrangement
 All Traces are displayed in one window in a cascading manner.

➢ Two-window arrangement
 All Traces are displayed in two windows which are vertically overlapped.

➢ Three-window arrangement

 All Traces are displayed in three windows. Two of the three windows are arranged in the upper part, and the other in the lower part.

➢ Four-window arrangement
 All Traces are displayed in four windows which respectively cover one fourth of the screen.

c) Setup of window arrangement
 Menu path: **[Response] > [Display]**. The display sub-menu will pop up. Select the window arrangement mode in the **display** sub-menu.
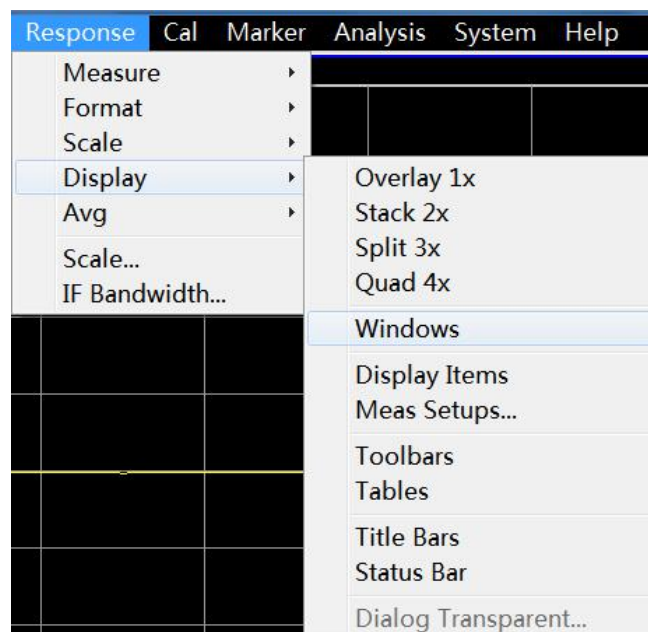

Fig. 6-26 Setup of Window Arrangement

6.9   Data output

6.9.1 Saving and Calling of File

S3602 series vector network analyzer supports the saving and calling of files in various formats.

Save files

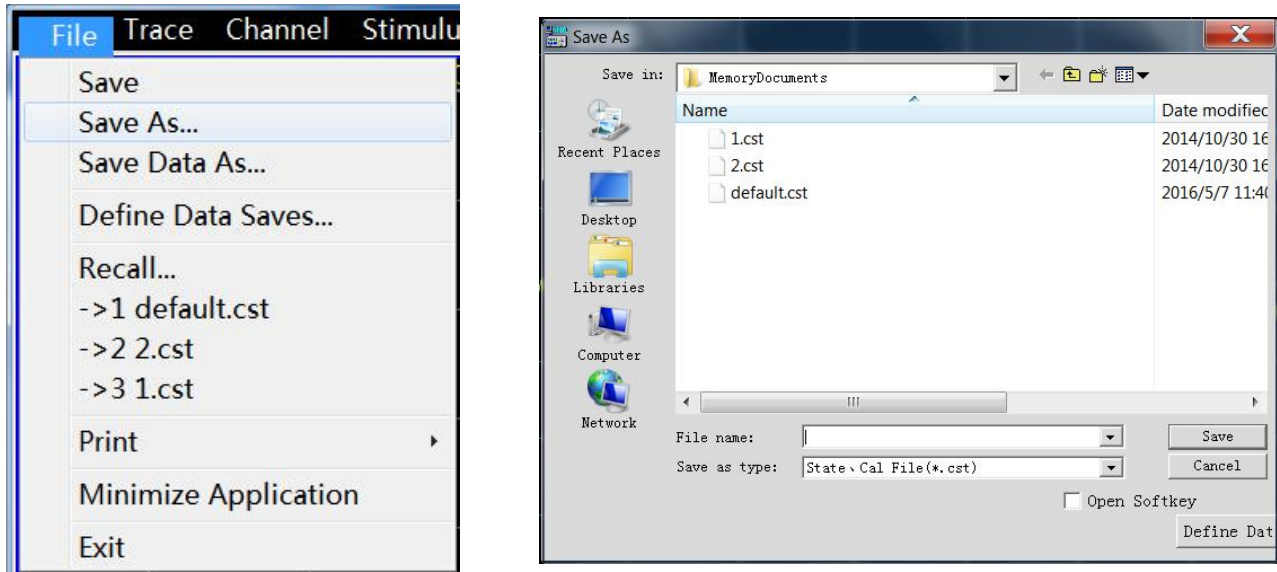Menu path: **[File] > [Save] > [Save]/[Save as...]**.

Fig. 6-27 Save files

Recall of file

1) Call status and calibration data:

a) sta file

The status data of the instrument are saved in the sta file, including the Setups, Trace data, limit line and cursor.

b) cal file

Calibration data are saved in the cal file, excluding status data. The correction accuracy of calibration data is associated with the status Setup. To realize the highest accuracy of measurement, the instrument Setups should be identical in file calling and calibration; otherwise, the accuracy of calibration will not be guaranteed.

c) cst file

All measurement status and calibration data of the instrument are saved in the cst file, therefore, the cst file can be called to save time.

2) File calling:

Menu path: **[File] > [Recall]**. The dialog box will appear.

Select the load file type in the **[File type]** box.

Set the call file directory through the **[Search range]** box and the **[File list]** below.
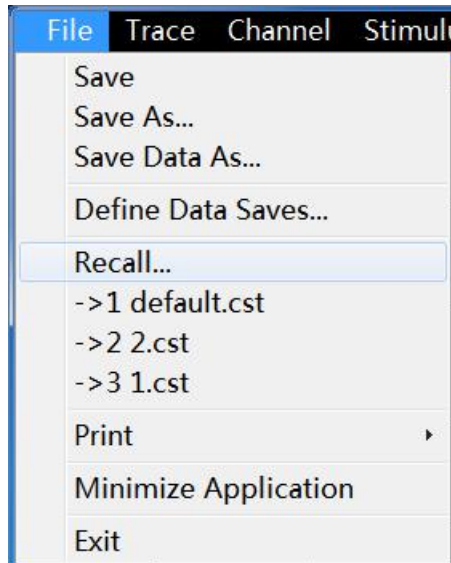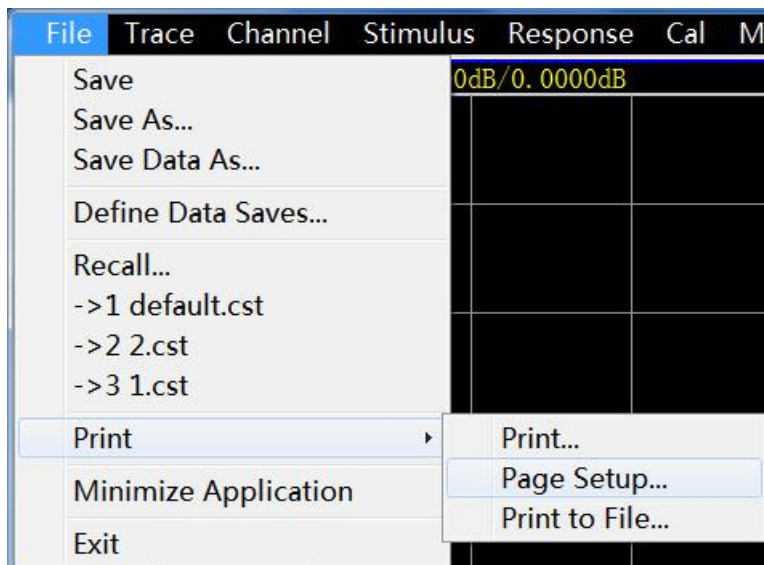
After the printer is added and the print contents are set, measurement information can be output through the printer, as shown below:

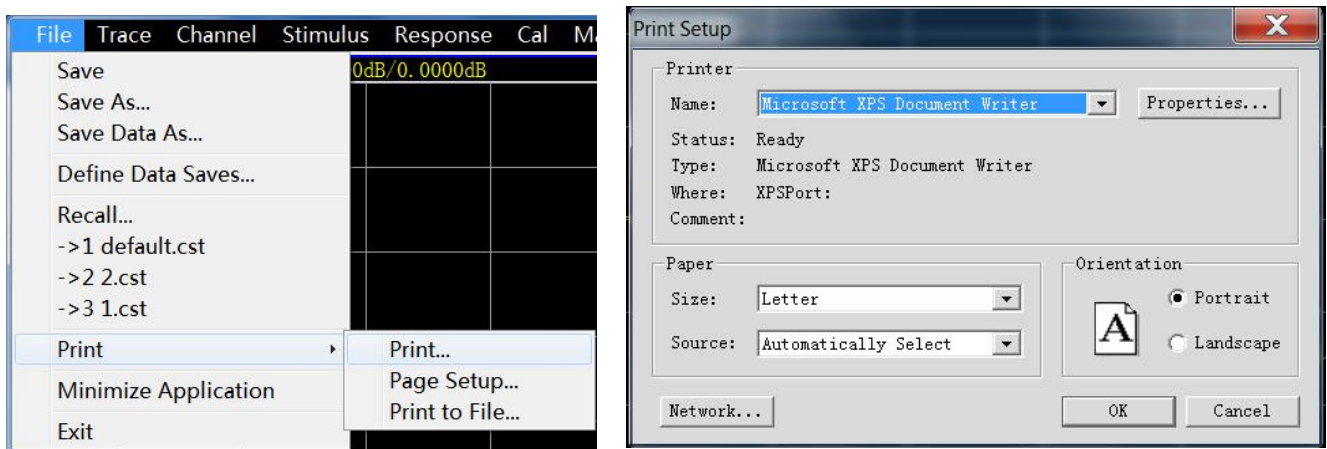Menu path: **[File] > [Print] > [Print...]**. The **print Setup** dialog box will appear.

Fig. 6-30 Printing of Measurement Information

Printing into File

The analyzer supports the output of print contents into the bitmap (BMP) file. To print several pages, various BMP files will be created automatically, respectively corresponding to each page. The other files are identified in the "file name (number).bmp" format, such as amp.bmp, amp(1).bmp and amp(2).bmp. The printing method is as follows:

Menu path: **[File] > [Print] > [Print to file...]**.

Set the file directory and name in the dialog box.

Click **[Save]** to save the file.

7   Help

Generally, problems are caused by hardware, software or improper use. In case of any problem, check and save error information, analyze possible causes, and perform preliminary troubleshooting with reference to the method prescribed in "4.1 Fundamental inspection". You can also contact our customer service center and provide the collected error information. We will assist you to solve the problem as soon as possible. For details, refer to the contact information on the cover or visit the website www.salukitec.com to obtain the contact information of the nearest technical support center.

7.1   Foundational checks

Check whether the power socket is connected to the power supply.

Check whether the vector network analyzer is started. Check whether the green LED beside the power switch is ON. Pay attention to the internal fan noise and check whether the cooling fan of the analyzer works.

If any, check whether the other instruments, cables and connectors are connected properly and work normally.

If the communication of the network analyzer through LAN fails, check the yellow LED beside the LAN interface of the rear panel. If this indicator does not flash, check the LAN cable and connection.

If the operating system cannot be fully loaded or run or the application program of the instrument is not successfully started, the hard disc may be damaged. If the system recovery is run for a long time in the start- up process, refer to the "System recovery of analyzer" in "2.2 Configuration of Operating System"

Check whether the measurement application program is running. In case of failure in running, click the program start-up shortcut icon on the desktop.

Check whether the measurement application window is selected. (The blue window is highlighted). In case of failure in selection, select the application window with Alt-Tab.

If the problem occurs again, check all measurement steps. Check whether all Setups are correct.

If the analyzer does not work normally, press [Preset] to go back to a known status of the analyzer.

Check whether the measurement and results comply with the requirements of the performance indicators and features of the analyzer. Refer to the relevant performance indicators in "9.1 Technical Indicators" of the user manual of the analyzer.

7.2   Help information

Error information will be generated in case of any problem. In most cases, error causes and countermeasures can be found according to the information. The error information is described in "Fault Diagnosis" of the user manual.

In addition, our customer support center can, at any time, assist the user to solve any problem in typical applications of S3602 series vector network analyzer. If you can provide the following information, we can find the solution more quickly and efficiently.

➢   **System configuration:** the information of the following items is provided in the [About...] dialog box.

-    Frequency range: host model and frequency range.

-    Options: status of all software and hardware accessories installed in the instrument.

➢   **Error log:** open [Error information] > [View error log]. Then you can view the error log.

7.3   Return for Repair

If you cannot solve the problem of the network analyzer, contact us by phone or fax. If it is confirmed that the network analyzer needs to be returned for repair, pack the network analyzer with the original packing material and box according to the following steps:

1) Write fault details of the network analyzer and place it with the network analyzer into the packing box.

2) Pack the network analyzer with the original packing material to reduce possible damage.

3) Set pads in the four corners of the outer packing box, and place the instrument into the outer packing box.

4) Seal the opening of the packing box with a tape and strengthen the packing box with nylon straps.

5) Mark "Fragile!" on the box. "No touch! Handle with care!" on the box body.

6) Transport the network analyzer as a precision instrument.

7) Keep the copies of all transport

Documents

Pay attention to the packing of the network analyzer.

The instrument may be damaged if packed with other materials. Do not pack the instrument with the polystyrene sphere; otherwise, the instrument cannot be fully protected, and the generated static electricity may be sucked into the fan to cause damage to the instrument.

Prompt

Instrument packing and transportation

Strictly follow the notes in "2.1.1 Unpacking" during transportation and handling of the instrument (such as damage in delivery).

Properly keep the packing box. Use the packing box to return the instrument for repair; otherwise, the user will be liable for any damage caused in transportation with other packing boxes.

Contact Information:

Service Tel:	886.909 602 109
Website:	www.salukitec.com
Email:	sales@salukitec.com
Address:	No. 367 Fuxing N Road, Taipei 105, Taiwan (R.O.C.)