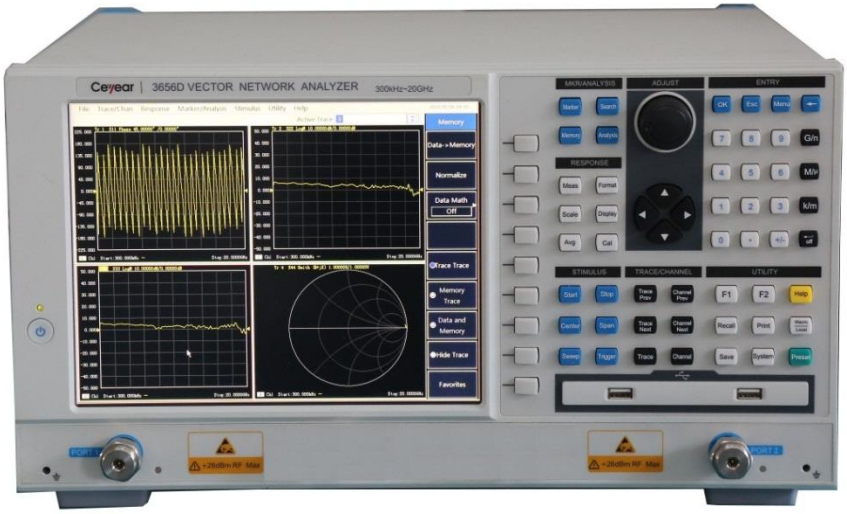
3656 Series
Vector Network Analyzer
Quick Start Guide



China Electronics Technology Instruments Co., Ltd (CETI)

This guide is applicable to Vector Network Analyzer of the following models, based on firmware of version 1.0 or above.

- 3656A Vector Network Analyzer
- 3656B Vector Network Analyzer
- 3656D Vector Network Analyzer

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Preface

Thank you for choosing 3656 Series Vector Network Analyzer developed and produced by the CETI . As a high-grade, precise and advanced product, this Tester has higher cost performance of its kind.

We will try our best to meet your needs as our responsibility is to provide high quality instruments for you and also bring you first-class after-sales service. We always persist in “Good Quality, Satisfied Service” and promise to offer satisfactory products and service for you.

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China Electronics Technology Instruments Co., Ltd (CETI)

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Product Warranty

From the date of production, warranty period of this product is 18 months. Within warranty period, we will repair or replace the damaged parts according to the actual situations. This requires users to return the product back to the manufacturer and prepay the postage, which will be returned together after maintenance.

Certificate of Quality

We ensure that this product meets the indexes in the manual from the date of production. Calibration measurements will be carried out and finished by measurement unit with national qualification, providing users with relevant information for reference.

Quality/Environment Management

This product strictly adheres to quality and environmental management system in the whole process from research and development, manufacturing to testing. China Electronics Technology Instruments Co., Ltd (CETI) has got the ISO 9001 and ISO 14001 system certifications.

Safety Precautions

“Warning” denotes a hazard. It calls attention to a particular operating procedure, method, or other similar situations which, if not correctly performed or not adhered to, could result in personal injury. Don’t continue the next step until you have fully understood and met the indicated warning conditions.

The sign of CAUTION represents important tips, but no danger. It calls attention to a particular operating procedure, method, or other similar situations which, if not correctly performed or not adhered to, could result in damage to the instrument or loss of important data. Don’t continue the next step until you have fully understood and met the indicated attention conditions.

Contents

1. Manual Overview 1

1.1 About Manual 1

1.2 Relevant Files 1

2. Ready for Use 4

2.1 Pre-operation Preparations 4

2.2 Startup and Shutdown 6

2.3 Front Panel 7

2.4 Operating Interface 8

2.5 Rear Panel 9

Chapter III Typical Applications 11

3.1 Filter Test 12

3.2 Amplifier Test 22

3.3 Customization of TRL Cal Kit 26

3.4 Limit Test 31

4 Getting Help 36

4.1 Basic Check 36

4.2 Help Information 37

4.3 Repair Methods 38

Appendix I: Technical Indicators 39

Annex II: Accessories/Options List 43

1. Manual Overview

This chapter introduces the structure and main content of 3656 Series Vector Network Analyzer Quick Start Guide, and also the relevant files provided to users with instrument.

1.1 About Manual

This manual introduces basic functions and basic operating methods of 3656 Series Vector Network Analyzer and contains content such as operating guide before startup, characteristics of front and rear panel of product, basic operating method and examples with simple fault diagnosis and repair methods etc. in order to understand and grasp operating methods and key points in usage. For your proficiency of the instrument, please read the manual carefully and operate properly upon instructions in the manual before operation.

Quick Start Guide for 3656 Series Vector Network Analyzer contains chapters as follows:

- **Ready for Use**

This Chapter introduces preparations before operation, startup and operation, panel introduction etc. of 3656 Series Vector Network Analyzer. Through this chapter, you may acquire knowledge of 3656 Series Vector Network Analyzer on the whole, and make a well preparation for proper and safe operation.

- **Typical Application**

It introduces test cases such as the setup before measurement, calibration setup, and filter test of 3656 Series Vector Network Analyzer. In addition, steps and operating methods of basic measurement of 3656 Series Vector Network Analyzer are also introduced. By reading this chapter, you may acquire knowledge of 3656 Series Vector Network Analyzer as soon as possible and use it to finish tests over DUT.

- **Getting Help**

This chapter contains fault diagnosis and solutions and repair method.

1.2 Relevant Files

3656 Series Vector Network Analyzer product files include:

- Quick Start Guide
- User Manual

- Programming Manual
- Online Help

Quick Start Guide

This manual introduces instrument startup and basic operating methods of measurement in order to make users understand characteristics of instrument and grasp basic setup, basic local and distance control operating methods. It mainly contains:

- Manual Overview
- Ready for Use
- Typical Application
- Getting Help

User Manual

This manual introduces instrument functions and operating methods in details, including: information on measurement setup, data analysis, calibration methods, and technical parameters etc. in order to guide users to obtain knowledge on product functions and characteristics on the whole and grasp testing methods of instruments in common use. It mainly contains:

- Overview
- Routine Maintenance
- Operation Introduction
- Measurement Setup
- Optimizing Measurement
- Calibration
- Time Domain Measurement
- Working Principle and Technical Parameters

Programming Manual

This manual introduces remote programming basics, SCPI basics, SCPI commands, programming examples etc. in order to guide users to grasp program control commands and methods rapidly and fully. It mainly contains:

- Distance Control
- Program Control Commands
- Programming Examples
- Error Description
- Appendix

Online Help

Online help is integrated in the instruments, which provides rapid document navigation service to make local and distance operation convenient for users. All front panel keys of instrument or user interface menu have corresponding shortcut keys to activate this function.

2. Ready for Use

3656 Series Vector Network Analyzer is designed with neat appearance and comfortable operation. Its largest overall dimension is only 233mm (H) × 435mm (W) × 348mm (D) with a maximum weight of 16kg, which is smaller and lighter than pervious Vector Network Analyzers. This Chapter mainly introduces instrument testing environment, power supply, and structures etc.

Caution

In this guide, front panel keys are indicated as 【XXX】and XXX is key name. Menu items and soft key menu are indicated as [XXX] and XXX is menu name.

2.1 Pre-operation Preparations

This Section describes precautions before initial use of 3656 Series Vector Network Analyzer. It meets security requirements specified in GJB3947A-2009. Please read the following precautions carefully and prevent damage to instruments or unnecessary personal injury.

WARNING

To prevent damage to instruments and avoid electric shock, fire and personal injury:

- Do not open instrument without authorization;
- Do not attempt to disassemble or modify any part not described in this manual. Disassembly at your own discretion might cause various consequences such as degradation of electromagnetic shielding performance and damage to internal parts, thus affecting product reliability. We will no longer provide free maintenance if disassembly without authorization occurs, even during warranty period.

2.1.1 **Environment**

To ensure the service life and measurement validity & accuracy of 3656 Series Vector Network Analyzer, please use instrument under following conditions:

1. Temperature range:

Storage temperature range: -20° C～+70° C

Operating temperature range: 0° C～+40° C

2. Low air pressure:

Low air pressure(altitude): 0～4600m

2.1.2 **Power Supply**

3656 Series Vector Network Analyzer uses 220V or 110V alternating currents. The requirements of analyzer on external power supply are listed in the following table:

Table 2-1 Requirements of Power Supply

Power Supply Parameters	**Applicable Range**	
Output Voltage	AC220V	AC110V
Output Power	>150W	>150W
Operating Frequency	50Hz	50/60Hz

To prevent or reduce damage to hardware of Analyzer due to mutual disturbance generated by different equipment through power supply, especially potential destruction of Analyzer hardware caused by peak pulse disturbance generated by high-power equipment, 220V or 110V AC stabilized voltage supply is preferred to supply power for Analyzer.

WARNING

To prevent damage to instruments and personal injury:

- Do not use power cord without protection;
- Properly ground the protection cord of power supply socket. Do not float or keep improper grounding.

2.1.3 **ESD Protection**

Pay attention to ESD protection when using instruments. The following ESD protection measures shall be taken if possible:

1. Ground yourself before cleaning and checking test port of instrument or connecting. You may realize it via grabbing metal case of grounded instrument or shell of test cable connector.

2. Ground central conductor of cable first before connecting cable to instrument and performing testing: connect short circuit on one end of cable and make central conductor and external conductor short-circuit. When wearing antistatic wrist strap, you shall grab the shell of cable connector and connect the other end of cable and remove short-circuit.

3. Perform testing on worktables with grounded and conductive mats; wear antistatic ankle strap when working in areas with conductive ground surface. You'd better wear antistatic ankle strap whether you could confirm the conductivity of ground surface or not.

2.2 Startup and Shutdown

Before powering on 3656 Series Vector Network Analyzer, please check power supplying equipment as required in 2.1.2 **"Power Supply Requirements"**. Do not power on instrument until confirming that power supplying device is in normal condition.

2.2.1 **Startup**

Connect AC POWER with three-core power cord in conformity with requirements of international security standard. Press **【ON/STANDBY】**key in bottom left corner on front panel. Analyzer will take 40s to enter Windows system and start running main process of measurement. In order to stabilize performance of internal parts and obtaining better testing results, it is recommended to pre-heat for 30 minutes before measurement.

Caution

When the analyzer works on a rack, you must guarantee smooth cross-ventilation between internal instrument and external instrument. Whenever thermal power inside rack increases for 100W, ambient temperature (outside rack) is required to be 4° C lower than maximum working temperature of the analyzer. If total thermal power exceeds 800W then compulsory air cooling measures must be taken.

2.2.2 **Shutdown**

Press **【ON/STANDBY】**key on bottom left corner of front panel of the analyzer. Do not hold it down for long or do not release it. The analyzer will exit from measurement application process automatically, turn off Power of its own and enter into Standby status. Please switch power switch on rear panel to Off or pull out power cord if required when the analyzer is under standby status.

WARNING

The analyzer may sometimes fail to respond to operation of mouse or keyboard as abnormalities of operating system or application process. if it occurs, you may turn it off by holding 【ON/STNDBY】key for at least 4s. However, it shall be avoided in normal conditions, as unstable system might be led to. Although the analyzer will recover to normal

conditions in most cases, it does not mean that this is a safe operating method.

2.3 Front Panel

This section describes front panel of 3656 Series Vector Network Analyzer in details, as shown in Figure 2.1:

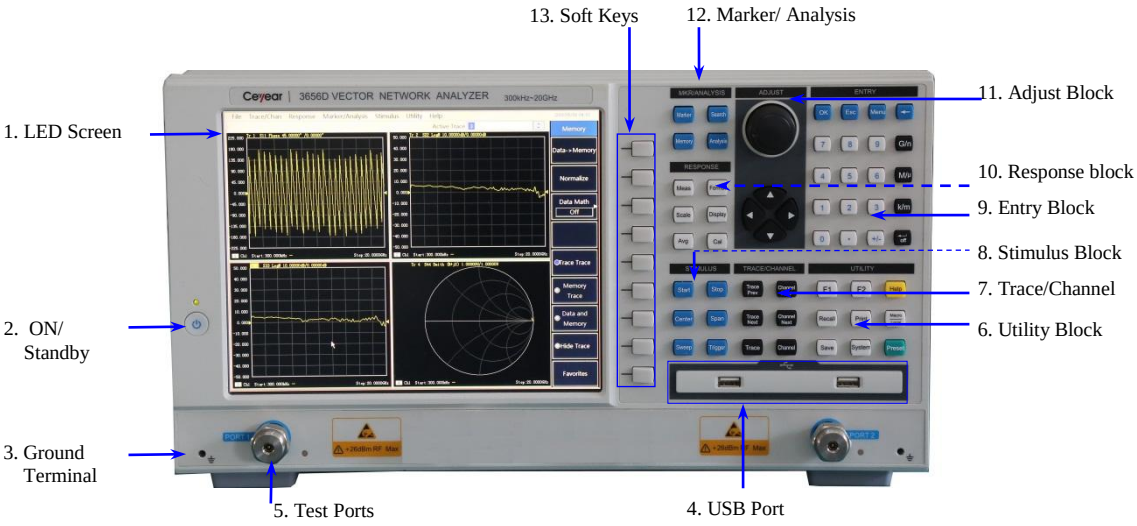

Figure 2.1 Front Panel of 3656 Series Vector Network Analyzer

The features of front panel keys are described as below:

Table 2-2 Description of Front panel keys

S/N	Name	Description
1	LED Screen	The instrument is equipped with a 10.4-inch LED screen with a resolution of 800×600, which displays all measurement related information.
2	ON/Standby	Used for choosing between power-on or standby state of the analyzer, yellow indicator on the right side of the swich is lit in the standby state; press the swich once ,the indicator turning to green, which indicates the instrument is under “Working” status.
3	Ground Terminal	Connected to the chassis of the analyzer. You may insert antistatic wrist strap plug here when operating the instrument.
4	USB Port	Used to connect keypad, mouse or other USB devices.
5	Test Ports	Include 2 ports of N-type female which the DUT is connected, switching between signal source and receiver. While signals are being output from a test port , the yellow LED above the test port is lit.
6	Utility Block	The keys related to the store and recall function, record function, macro function, preseting analyzer, printing and help etc.
7	Trace/Channel	Used to select active traces and channels on display of the analyzer.
8	Stimulus Block	For Setting up frequency range, sweep type and trigger mode of the signal sources and triggers.
9	Entry Block	The keys are used to enter numeric data for measure setting, which can also activate main menu etc.
10	Response Block	For setting up response measurements, such as format, scale, calibration, averaging of traces etc.
11	Adjust Block	Include adjustment knobs and navigation key, and moving among selected

		menus or changing numeric values.
12	Marker/ Analysis	Marker function for searching, data math and memory of measurement traces; data analysis function for limit test,Bandwidth test, fixture simulator etc.
13	Soft Keys	A group keys on the screen. any key on front panel can recall corresponding soft key menu.

WARNING

Ultimate damage bearing level of instrument port: +26dBm radio frequency power. Input beyond this range might burn the analyzer.

2.4 Operating Interface

3656 Series Vector Network Analyzer is equipped with TFT 10.4 inch LED crystal display screen and supports touch-screen function, which displays all measurement setup, status and results etc. Operating interface after opening all tool bars are as the following picture:

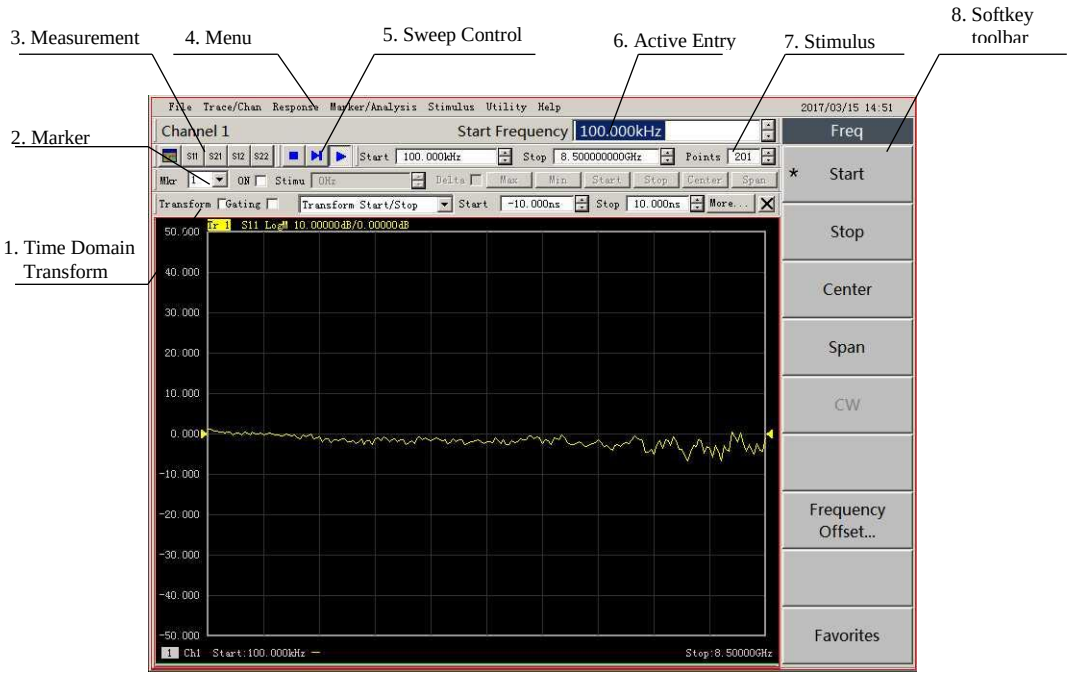

Figure 2.2 3656 Series Vector Network Analyzer Operating Interface

Descriptions over screen display are as follows:

Table 2-3 Interface Display Descriptions

S/N	Name	Description
1	Time Domain Transform	Turn on or off time domain function and door function, which can switch frequent domain data to time domain data for measurement and analysis.
2	Marker	Turn on or off marker function, which can enable 9 markers and one reference marker simultaneously. You may set up activation value of

		marker.
3	Measurement	You may create S parameter measurement trace and display in different windows.
4	Menu Bar	Major menu of the analyzer process, including all functions of the analyzer's measurements. You may operate by mouse or touch screen.
5	Sweep Control	Terminat, pause or carry on the sweep of current measurement trace.
6	Active Entry	Input values required of current operation.
7	Stimulus	Set up start frequence, stop frequence, and points of the actived trace.
8	Soft Key Tool Bar	Every key on front panel has corresponding soft key menu and makes it simpler to operate.

2.5 Rear Panel

This section describes rear panel of 3656 Series Vector Network Analyzer in details, as shown in the following picture:

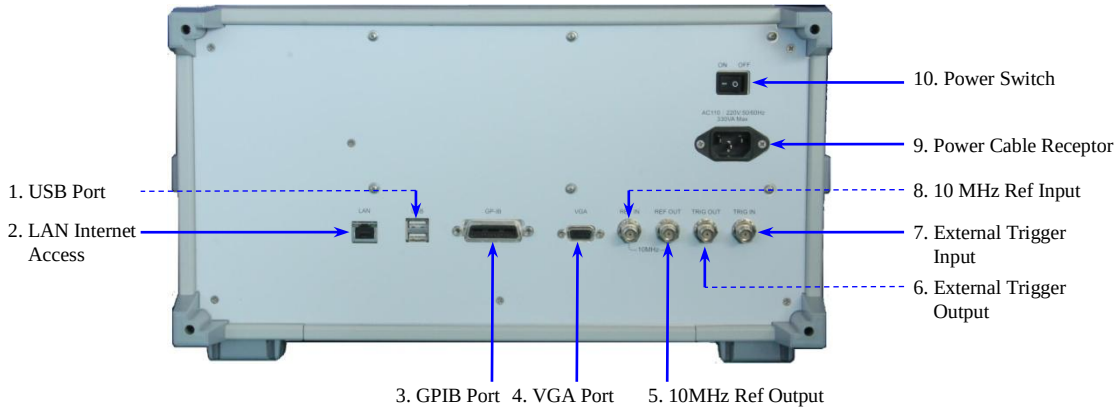

Figure 2-3 Rear Panel of 3656 Series Vector Network Analyzer

Descriptions of keys on rear panel are as follows:

Table 2-4 Description of Rear Panel

S/N	Name	Description
1	USB Port	Used to connect keyboard, mouse or other USB devices.
2	LAN Internet Access	100/1000 BaseT Ethernet connecting port.
3	GPIB Port	In conformity with IEEE-488 standard and used for sending and receiving GP-IB/SCPI commands through GPIB connector.
4	VGA Port	Used in connecting VGA monitor.
5	10MHz Ref Output	BNC female connector. the analyzer outputs a 10MHz sine wave signal， which can be as the external reference signal of another device. The device can be phase-locked to the reference signal of the analyzer. Output frequency: 10MHz±10ppm, output level: 10dBm±4dB.
6	External Trigger Output	Analyzer outputs trigger signal with 5V TTL level after system is ready.
7	External Trigger Input	Analyzer triggers sweep via signal input by this connector. You may set up level trigger and edge trigger in trigger menu. Requirements of input signal: -0.5V≤ low level ≤0.8V, 5 V≥high level ≥2.0V.
8	10MHz Ref Input	BNC Female Connector. You may input 10MHz external reference signal, the measurement signal of the analyzer is automatically phase-

		locked to the external reference signal. Input frequency: 10MHz±10ppm, input level: -5dBm～+5dBm.
9	Power Cable Receptor	Connect the analyzer to the power source. It is recommended to use the three-core power cable with a ground conductor equipped with the instrument. It's best to use the one of same type as that equipped with the instrument, when replacing the power cable.
10	Power Switch	Keep the switch "On" during startup and operation of Analyzer.

3. Typical Applications

With efficient and strong error correction capability, 3656 Series Vector Network Analyzer supports rapid and precise measurement of amplitude, phase, and group delay characteristics of S parameters of DUT and can be used in tests of filter, amplifier, and parts such as attenuator, connector, antenna, cable etc. You may also select 75Ω testing subassembly to perform performance measurements etc. over parts of cable TV. Steps of basic measurements of 3656 Series Vector Network Analyzer are as follows:

1. Set up Testing Conditions

First preset the analyzer and then set up testing conditions such as “S Parameter”, “Format”, “Intermediate Frequency Bandwidth”, “Measurement Frequency Range”, “Number of Measuring Points”, “Power Level” etc. bandwidth.

2. Analyzer Calibration

First select calibration kit and then select calibration type to complete corresponding measurement calibration and perform error correction over Analyzer.

3. Measurement of DUT

Connect DUT to port of Vector Network Analyzer. Normally, display scale by default cannot reach sound display results. You may adjust to the most observation friendly testing status via automatic scale and corresponding scale manually input.

4. Measurement Result Analysis and Output

Mark and analyze measurement results of functions such as cursor, limit line and time domain gate. You may store measurement results into different formats such as recallable files or pictures on disk.

This Chapter describes some testing examples of DUT in common use with 3656 Series Vector Network Analyzer. It describes tests over filters and amplifiers in details and other featured functions and setup of 3656 Series Vector Network Analyzer.

Notice

Support front panel keys and mouse operation

User interface of 3656 Series Vector Network Analyzer supports front panel of instrument and mouse operation. The following detailed examples are mainly about operation of front panel keys. Front panel keys operation corresponds to mouse selected menu operation.

3.1 Filter Test

This section describes how to measure the characteristics of a 2GHz center frequency as an example, such as insertion losses, out-of-band rejection, return loss, and etc.

3.1.1 **Set up measurement Conditions**

➢ Press【**Preset**】on front panel to return the analyzer to the initial setup state, when it reaches regulated pre-heating time. Default trace parameter is S11. The number of default sweep points is 201. Default trace display scale is "10dB" and reference value is "0dB".

➢ Press 【**Start**】and 【**Stop**】on front panel to call up the following soft key menu as shown in the following picture. Click **[Start]**, press 【**1**】→【**G/n**】 on the entry bar of the screen, and set the start frequency 1 GHz; Click **[Stop]** ,press 【**3**】→【**G/n**】 on the entry bar, and set the stop frequency 3 GHz.

Figure 3-1 Frequency Soft Key Menu

➢ Press 【**Sweep**】key on front panel to call up soft key menu as shown in the following picture. Press [**Power**] →[**Power Level**], press【**10**】→【**↵/off**】 on the entry bar, and set power level 10dBm .

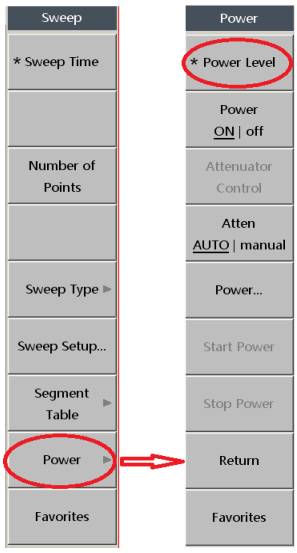

Figure 3-2 Sweep Soft Key Menu

➢ Press 【**Avg**】key on front panel and press [**IF Bandwidth**] in soft key menu displayed on the right side of display screen. press【**10**】→【↵ **/off**】 in the entry bar on screen to set IF frequency 10Hz.

Figure 3-3 Average Soft Key Menu

3.1.2 **Calibration**

To improve the accuracy of measurement results, you may calibrate the analyzer before measuring the DUT to eliminate system errors. It is required to perform dual-port SOLT calibration for the measurement of a filter. Calibration kit 20202(3.5mm) is selected suitable for the measurement cable.

➢ Select calibration kit: press 【**Cal**】key on front panel to call up soft key menu as shown on the

left side of the following picture. If default calibration kit under **Cal Kit** is not current calibration kit required, press **[Cal Kit 20205]** and select **[20202]**;

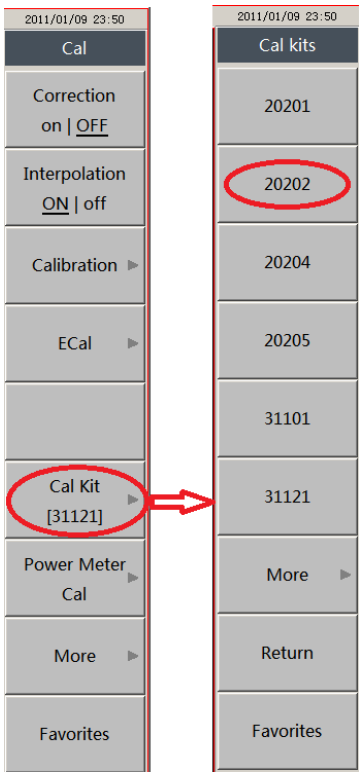

Figure 3-4 Calibration Kit Soft Key Menu

➢ Set up calibration type: Press **[Calibration]** → **[Solt 2-Port]**. **Solt 2-Port** soft key menu will be shown on the right side of the following picture.

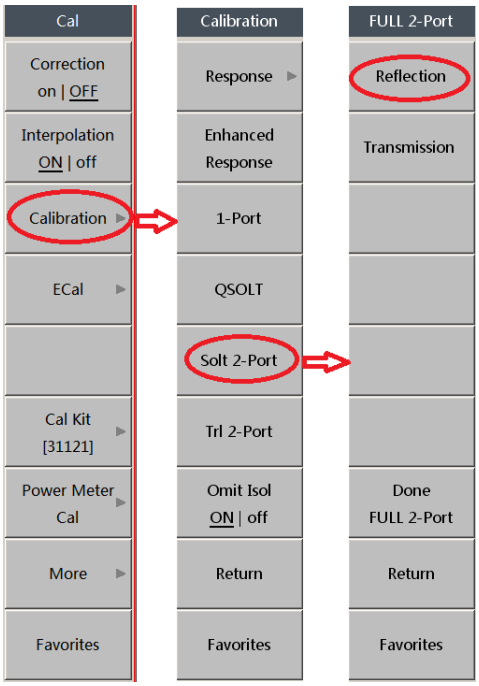

Figure 3-5 Soft Key Process of Calibration Setup

➢ Press **[Reflection]** in **Solt 2-port** soft key menu in the right side of the above picture. Reflection calibration menu will be shown in the following picture.

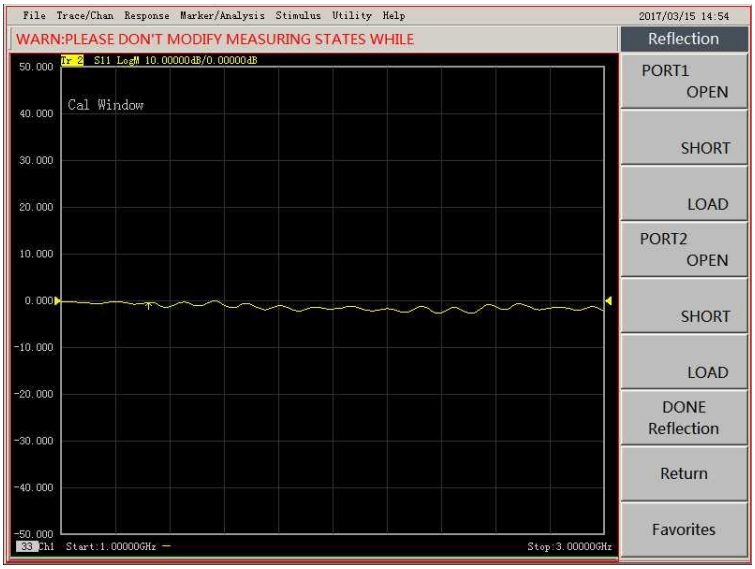

Figure 3-6 Solt 2-Port Reflection calibration

➢ Connect Port 1 and Port 2 of the analyzer respectively with N-3.5mm cable. Connect 3.5mm female OPEN standard to the other end of the cable connected to the PORT 1. Press **[PORT1 OPEN]** and start to calibrate as shown in Figure 3-6. PORT1 open calibration is completed when menu item turns to be **[PORT1 OPEN]**. In the same way, complete calibrations separately by connecting cable of Port 1 with female SHORT/LOAD standards.

➢ Connect cable of Port 2 of the analyzer with female OPEN calibration kit. Press **[PORT2 OPEN]** and start to calibrate as shown in Figure 3-6. PORT2 open calibration is completed when menu items turn to be **[PORT2 OPEN].** Take the same steps and complete calibration separately by connecting cable with female SHORT calibration kit and female LOAD calibration kit. The soft key menu status after reflection calibrations of two ports are completed is as shown in the following picture. Press **[DONE Reflection]**.

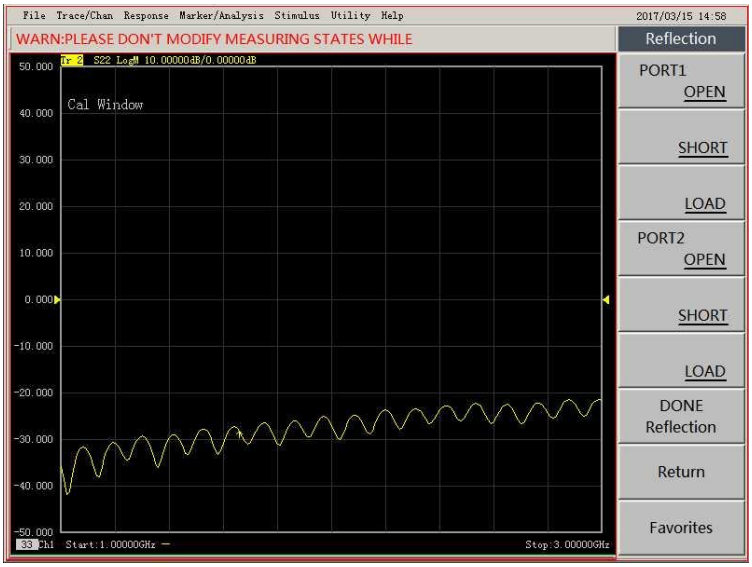

Figure 3-7 Soft Key Menu of SOLT 2-Port Reflection Calibration Completion

Caution There is no regulated sequence for open circuit, short-circuit, and loading in practical calibration. You may choose arbitrarily.

➢ Connect 3.5mm THRU connector to between Port 1 and Port 2. Press **[Transmission]** in **Full 2-Port** soft key menu. Transmission soft key menu will pop up as shown in Figure 3-8. You may perform calibration by pressing **[Unknown THRU]** as shown in the following picture as cables are not directly connected but inserted with 3.5mm THRU connector in the middle. Transmission calibration is completed when menu items turn to **[Unknown THRU]**. Press **[DONE Transmission]**.

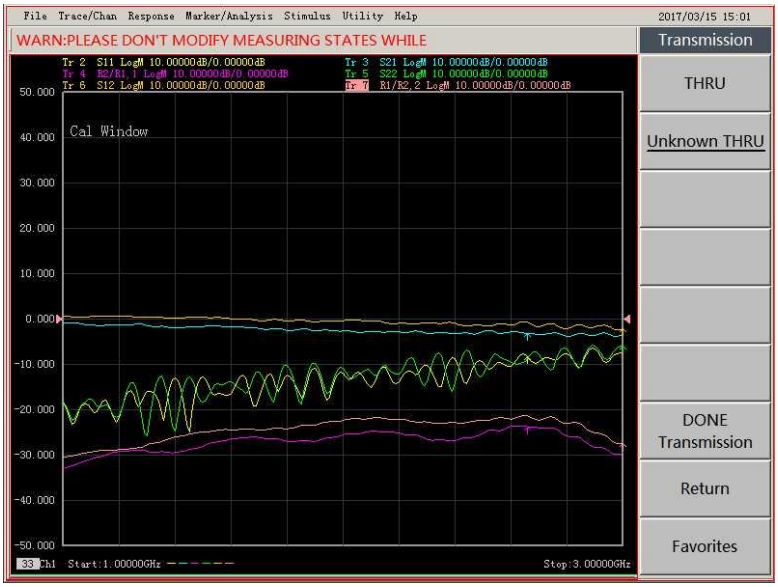

Figure 3-8 Soft Key Menu of Transmission Calibration Completion

➢ **Reflection** and **Transmission** calibrations are completed as shown in the following picture. Press **[Done FULL 2-Port]** to complete SOLT 2-port calibration.

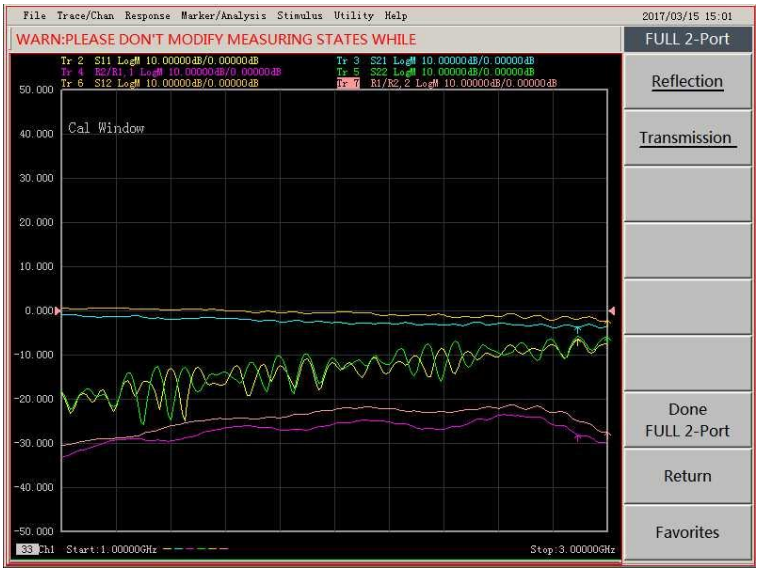

Figure 3-9 Soft Key Menu of FULL 2-Port Calibration Completion

➢ Dialog box of **Delay** will pop up after full 2-port calibration and measurement is completed as shown in the following picture. For unknown through adapter is used in previous **transmission** calibration, the Analyzer will automatically calculate delay value of unknown thru and display it in dialog box. If you do not know specific value of unknown through, value calculated automatically will be used by default. Click **[OK]** directly and close dialog box; if you have already known delay value of unknown through, you may directly input in dialog box. Click **[OK]** and close dialog box after setup. The value shall be calculated automatically into calibration result.

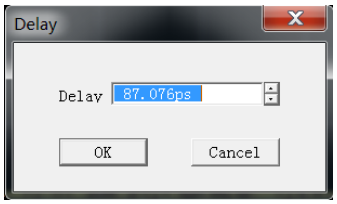

Figure 3-10 Dialog Box for Delay

Caution

If cables of Port 1 and Port 2 can be connected through in transmission calibration. You may select [**Thru**] in calibration as shown in Figure 3-8. This dialog box will not pop up if calibration is completed.

3.1.3 **DUT Measurement**

➢ Press 【**Meas**】key on front panel after calibration is completed. Press **[S21]** in **Measurement** soft key menu on the right side of screen after calibration is completed. Connect filter between Port 1 and Port 2 to perform measurement, as shown in the following picture.

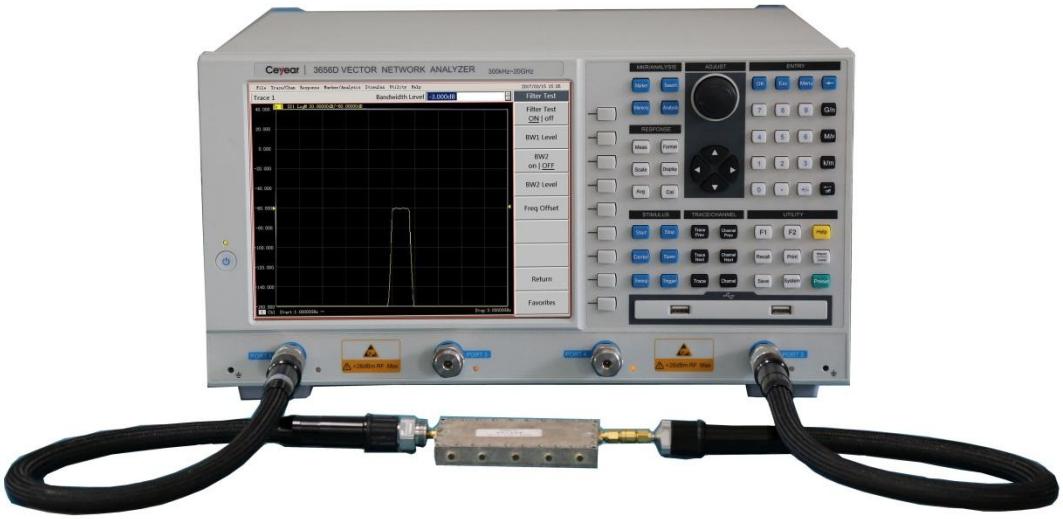

Figure 3-11 Filter Connection

➢ To present measurement curves of filter better, you can manually enter the arbitrary values to adjust the scale: Press 【**Scale**】key on front panel and press **[Scale]** in Scale soft key menu on the right side of screen. Press【**20**】→【↵ **/off**】 in the entry box on the screen. Press **[Reference level]** and press 【**+/-**】→【**60**】→【↵**/off**】in entry box on the screen. As shown in the following picture.

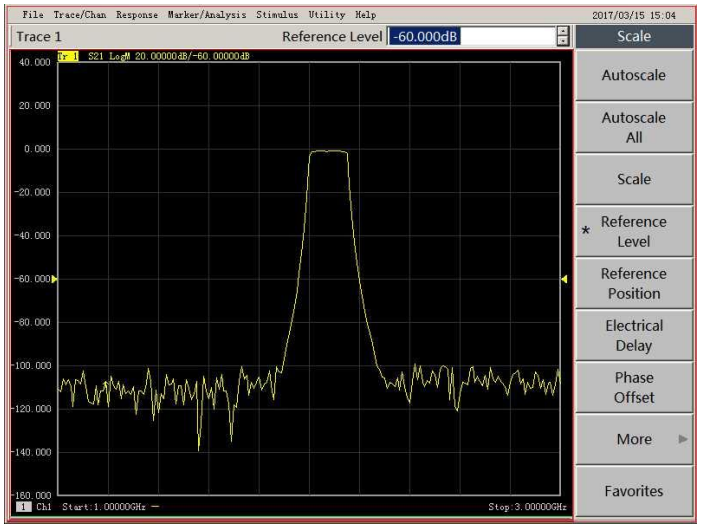

Figure 3-12 Filter measurement Curves

3.1.4 **Measurement Results Analysis and Output**

The Analyzer has filter test and filter statistical function. You may read all parameters of filter directly through marker values.

➢ Press【**Search**】key on front panel. Press [**Filter Stats on**|**OFF**] and turn on filter statistics in **Search** soft key menu. When it is shown as the red circle marked in **Search** soft key menu in the left in Figure 3-14, it displays the menu status when **Filter Statistics** is opened.

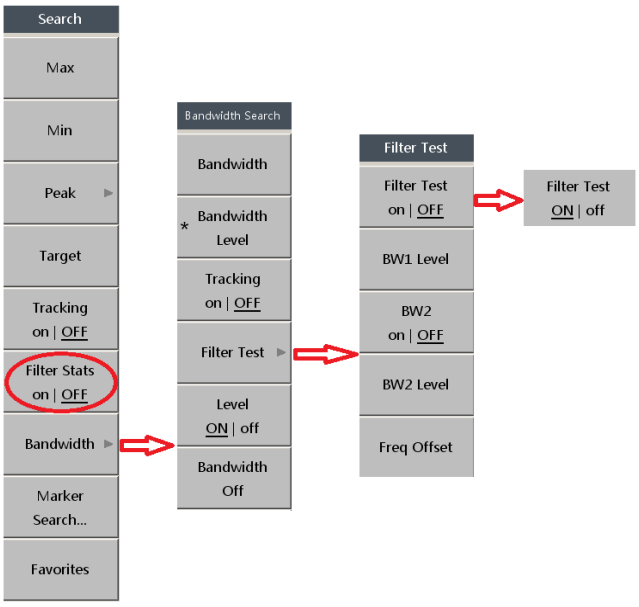

Figure 3-13 Soft Key Menu Process of Filter Test

➢ Press **[Bandwidth**] as shown in Figure 3-14. Press **[Filter Test**] in soft key menu of **Bandwidth Search**. Press [**Filter Test on|OFF**] in soft key menu of **filter test**. As shown in Figure 3-14, the rightmost menu indicates Filter Test function is on.

➢ Measurement traces after turning on **Filter Statistics** and **Filter Test** function is displayed in the following picture. You may read performance parameters required directly from the screen.

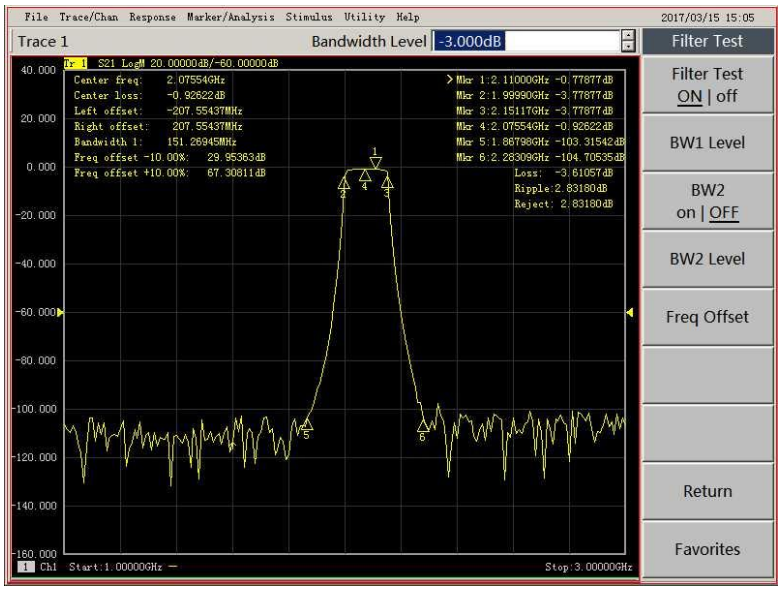

Figure 3-14 Filter Statistics

➢ The analyzer can display four traces at the same time if you need to see status of more than 1 S parameter. The Analyzer provides single window and multiple traces displaying function and functions of displaying multiple windows and multiple traces. This test selects display method of single window and

multiple traces. Steps are as follows: Press 【**TRACE**】key on front panel and press **[New S-Parameter]** in soft key menu. Four S parameters will be displayed. You may select **[S11], [S12],** and **[S22]** in sequence.

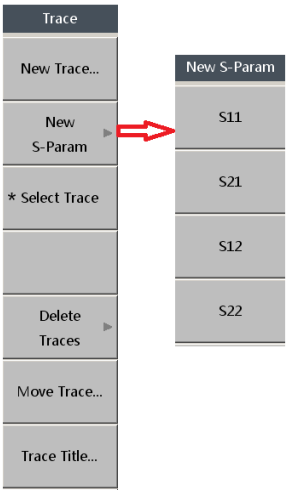

Figure 3-15 New S Parameter Soft Key Menu

➢ Press 【**Trace Prev**】key and activate S12 trace. Press 【**Scale**】key on front panel. Press **[Scale]** in scale soft key menu on the right side of screen. Press【**20**】→【**↵/off**】 in the entry box on the screen, set scale 20dB; press **[Reference Level]** and press【**+/-**】→【**20**】→【**↵/off**】 in the entry box on the screen, set Ref value -60dB . Curves of four S parameters of filter test are shown as the following picture.

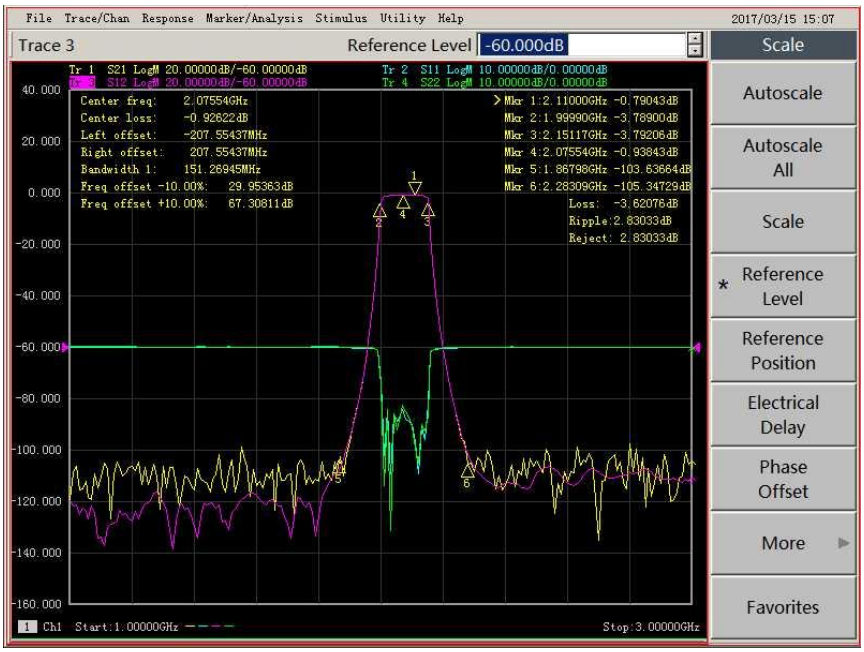

Figure 3-16 Filter Test Diagram of 4 S Parameters

➢ The analyzer provides function of measurement result output after test is completed. You may output and save all calibration data and measurement status of the analyzer. Press 【**Save**】key on front panel and soft key menu on the right side of screen will be as shown in the following picture. [**Store**

UserPreset.cst] is to save current status as user reset status. Press 【**Recall**】key after setup and recall this status saved directly.

Figure 3-17 Save Soft Key Menu

➢ The analyzer also provides various other saving formats. Press **[Save as …]** and a dialog box as shown below will pop up. You may check different saving formats available in the submenu of **Saving Format:** Status File, Calibration File, Data File, List File, and graphics file etc. Please select saving type needed before saving and set up file name in input box of **File Name**. Click **[Save]** to complete.

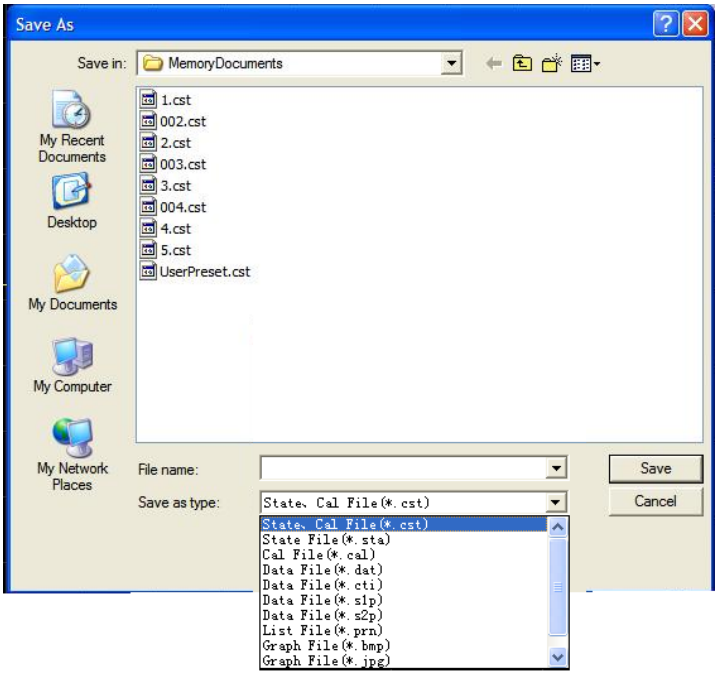

Figure 3-18 **Save as** Dialog Box

➢ Where, ".cst" files are recallable status files. Press 【Recall】on front panel and then soft key

menu will pop up in the right side of screen. As shown in the left side of the picture below, you may select file required to recall directly in soft key menu list. You may also press **[Recall…]** and select status file needed to recall in the dialog box in the right side.

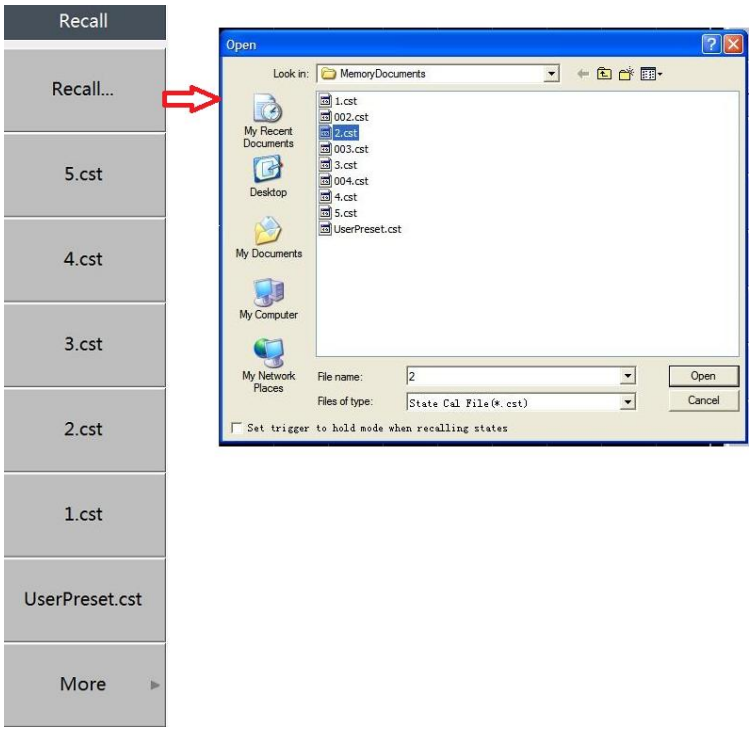

Figure 3-19 Recall Menu and Dialog Box

3.2 Amplifier Test

This Section describes how to measure the characteristics of an amplifier with a bandwidth of 500MHz-6GHz and gain in bandwidth of 12dB, such as gain flatness in bandwidth of amplifier and 1dB compression point under 3GHz etc.

3.2.1 **Set up Test Conditions**

➢ After reaching pre-heating time regulated by the analyzer, you may press 【**Preset**】to reset the analyzer. Default trace parameter is S11. Number of default sweep points is 201. Default trace display scale is "10dB" and reference value is "0dB".

➢ Press【**Start**】key and 【**Stop**】key and set up Start Frequency as "500MHz" and Stop Frequency as "6GHz".

➢ Press【**Avg**】key and press **[IF Bandwidth]** in soft key menu displayed in the right side of screen. Press 【**100**】→【↵ **/off**】 in input box on the upper right side of screen and set up IF Bandwidth as 100Hz.

➢ Press 【**Sweep**】key and press **[Power]** in the soft key menu displayed in the right side of screen. Press **[Power Level]** in submenu ,press 【**+/-**】→【**10**】→【**↵/off**】in input box displayed in the upper right side of screen and set up current power as -10dBm.

Notice

Maximum power 3656 Series Vector Network Analyzer can test is +10dBm. It is required to lower output power of the analyzer because the gain of amplifier tested is around 12dB. It can be guaranteed that the maximum power will not be exceeded after going through amplifier. If gain of the amplifier is considerably large, then it shall be considered to test by connecting attenuator at the end of output end of the amplifier.

3.2.2 **Calibration**

To improve the accuracy of measurement results, you may calibrate the analyzer before measuring the DUT to eliminate system errors. It is required to perform dual-port SOLT calibration for the measurement of an amplifier. Calibration kit 20202(3.5mm) is selected suitable for the DUT. Refer to calibration chapter 3.1.2 in **Filter Test** above mentioned for calibration process.

3.2.3 **Measurement of DUT**

➢ Cut off cable between Port 1 and Port 2 after completing calibration. Perform measurement by connecting amplifier in the middle, as shown in the following picture.

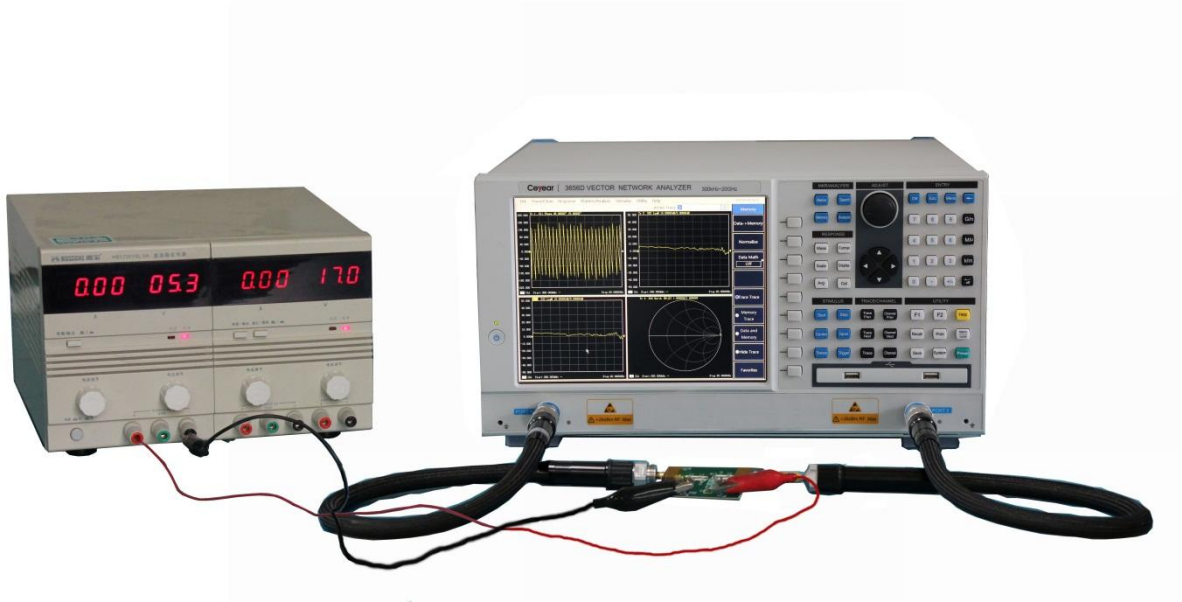

Figure 3-20 Amplifier Connection Diagram

➢ Press 【**Trace**】key on front panel and press **[New S-Param]** to call up submenu soft key menu. Four S parameters will be displayed, please click **[S21], [S12],** and **[S22]** in sequence.

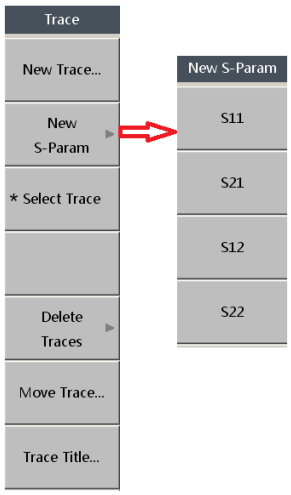

Figure 3-21 New Trace Soft Key Menu

➢ Press 【**Display**】key. Press **[Quad 4x]** in soft key menu, as shown in the following picture.

Figure 3-22 Display Soft Key Menu

➢ Curves of 4 S parameters of amplifier test are shown as the following picture. It will display performance parameters such as standing-wave scale, gain flatness within band, reverse isolation etc. directly. You may also mark measurement value through setting up marker as for frequency point concerned. Press 【**Marker**】key on front panel to call up soft key menu and then press **[Marker 1].** Press 【**2**】→【**G/n**】 in input box of Marker 1 after activating Marker 1. Press **[Marker 2]** and press 【4.2125】

→【G/n】 in input box of Marker 2. Data of these 2 frequency points will be displayed on the screen.

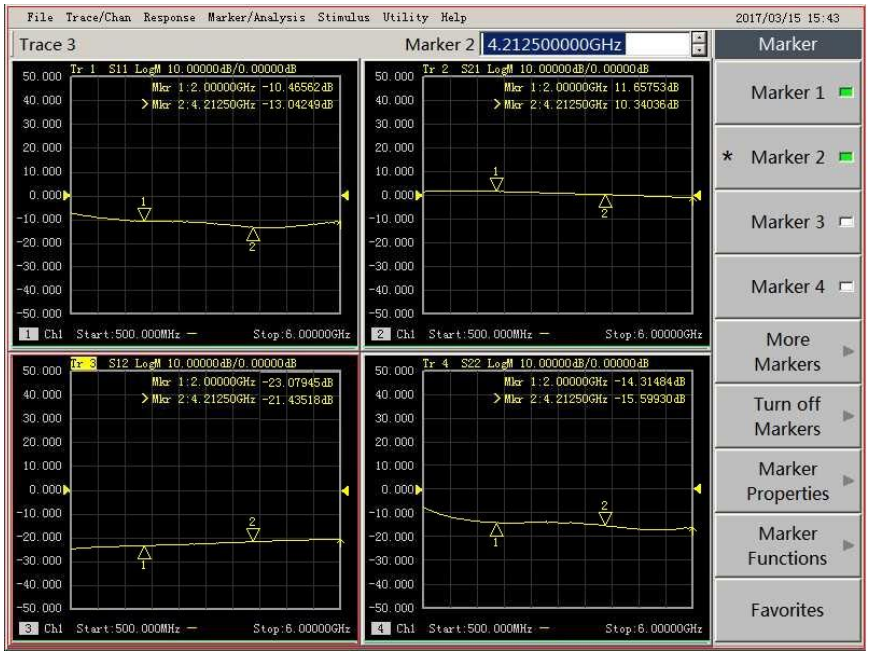

Figure 3-23 Amplifier Test Displayed in Four Windows

➢ **Measurement of 1dB compression point of amplifier:** you may connect 20dB attenuator first at output end of amplifier and reset analyzer. Press【**Sweep**】key on front panel to call up **Sweep** soft key menu displayed as shown in the left side of the following picture and then press **[Sweep Type]**. Soft key menu will be as the middle menu shown in the picture below. Select **[Power Sweep]**.

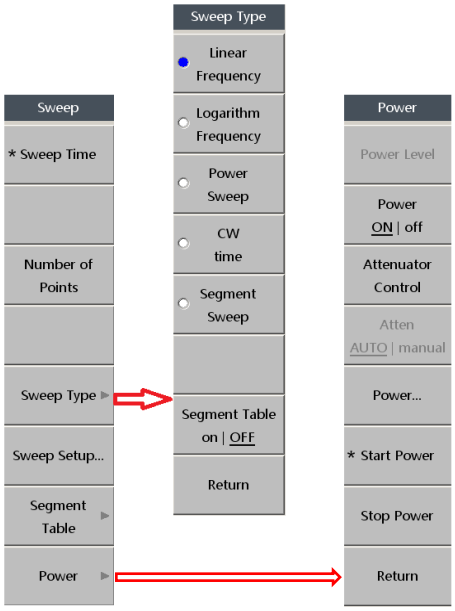

Figure 3-24 Set up Power Sweep

➢ Press **[Power]** in **Sweep** soft key menu to call up **Power** soft key menu as the right menu shown in

Figure 3-25. Press **[Start Power]** , press 【+/-】→【15】→【↵/off】 in input box in the upper right side of screen and set up the start power as -15dBm. Press **[Stop Power]** , press 【10】→【↵/off】and set up the stop power as 10dBm. Press 【**Start**】key on front panel. Press 【3】→【G/n】 in dot frequency dialog box. Power sweep testing curves of amplifier are shown as the picture below. Press 【**Marker**】key on front panel and press **[Marker 1]** in soft key menu called up. press 【+/-】→【15】→【↵/off】 in dialog box of Marker 1, Press **[Marker 2]** and activate Marker 2. Use adjust knob to move Marker 2. Then you may find 1dB compression point of magnifier by comparing values of makers.

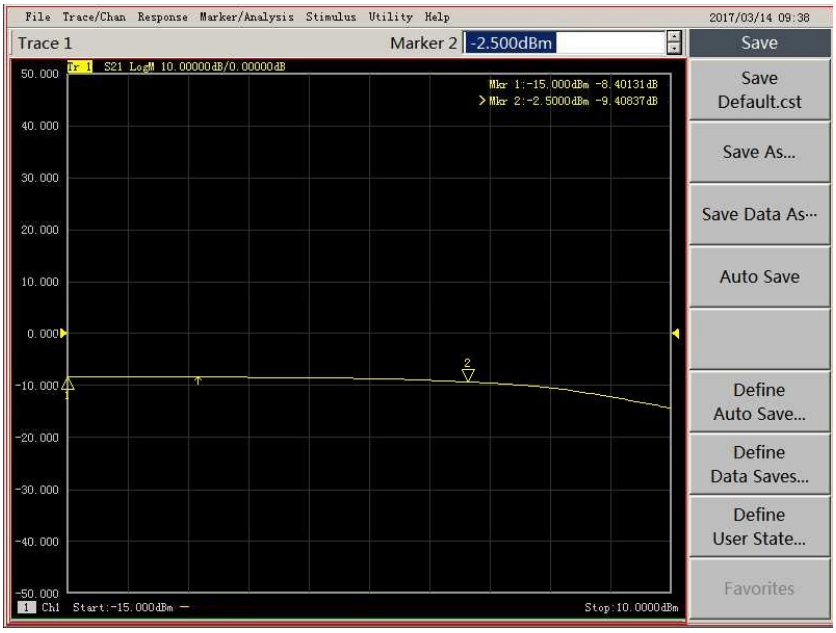

Figure 3-25 Power Sweep Test Curve

3.3 Customization of TRL Cal Kit

Apart from the basic functions of measuring the normal DUT, 3656 Series Vector Network Analyzer can also provide users with accurate TRL calibration and measurement, particularly suitable for the measurement under non-coaxial environment, which provides a more accurate solution for users to perform measurement with non-standard coaxial cable. TRL calibration kit is mainly customized by the users, therefore the analyzer supports user to modify the calibration kit definition or create customized calibration kit.

This section introduces the calibration kit customization function of the analyzer, taking the definition of a set of TRL calibration kit as an example. The TRL standard kits used in this example include OPEN, THRU, and transmission LINE, with frequency range of transmission LINE being 200MHz-800MHz, transmission LINE delay being 480ps, OPEN and THRU kits defaulted to be the ideal calibration kits. Connect the USB keyboard and mouse to the DUT before the test, and create a TRL calibration kit as follows:

➢ Click **[Response]** on the program main menu, as shown in below figure, click **[Edit Cal Kit...]** on the **[Cal]** sub-menu, then **Edit Cal Kit** dialog box pops up.

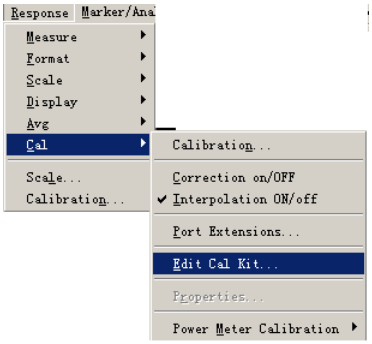

Figure 3-26 Edit Cal Kit Menu

➢ Click **[Insert New…]** on the **Edit Cal Kit** dialog box at the bottom of the following picture, a dialog box pops up as shown by the arrow. Click **[Add]**, **Add Connector** dialog box pops up as shown by the arrow. Then you can perform setting and add the new connector.

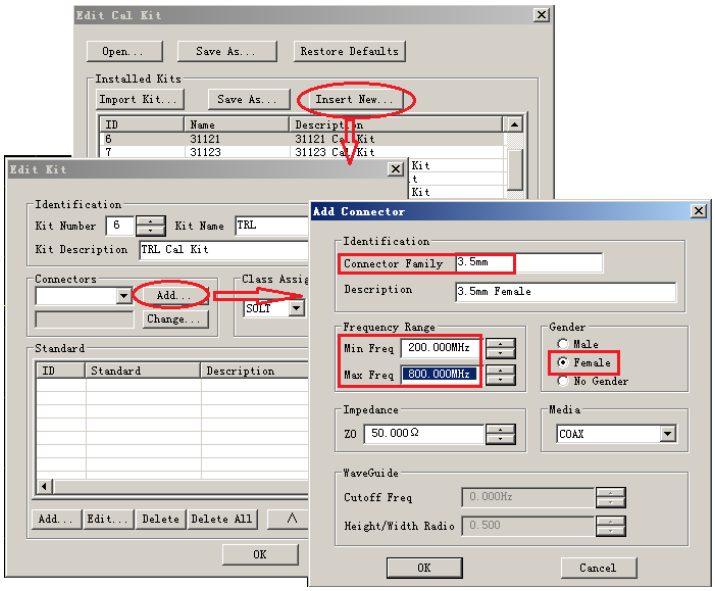

Figure 3-27 Add Connector

➢ Set the parameters in the **Add Connector** dialog box: as shown by the red block in the above picture, set the **Connector Family** as 3.5mm, **Min Freq** as 200MHz, **Max Freq** as 800MHz, **Gender** as **Female**, which the other items are in default. Then after clicking **[OK]** to close dialog box, it cannot edit the characters of the connector.

➢ After defining the connector, it needs to add the calibration standards, including OPEN, THRU and transmission LINE in this example. As shown by the arrow in the following picture, click **Edit Kit** dialog box and then click **[Add]**, the **Add Standard** dialog box will pop up.

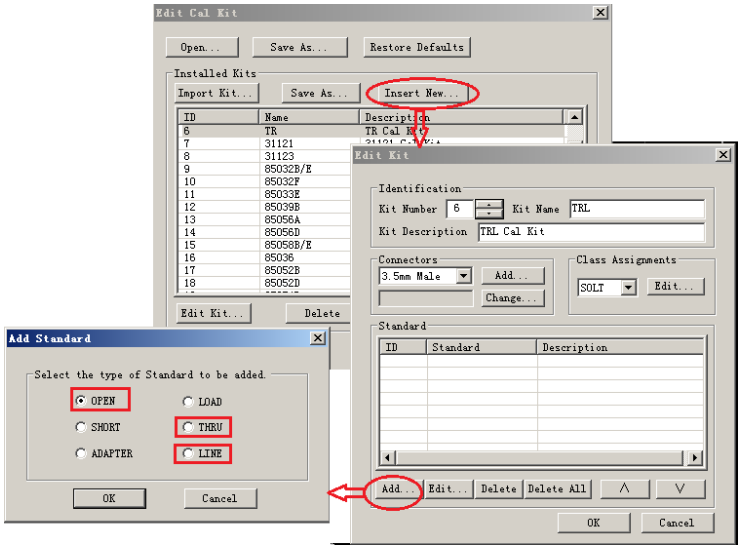

Figure 3-28 Add Cal Standard

➢ As shown in the below figure, click **[OPEN]** and then **[OK]**, **Opens** dialog box pops up, where the default value is adopted. After setting, click **[OK]** to close the dialog box, thus the OPEN standard is defined.

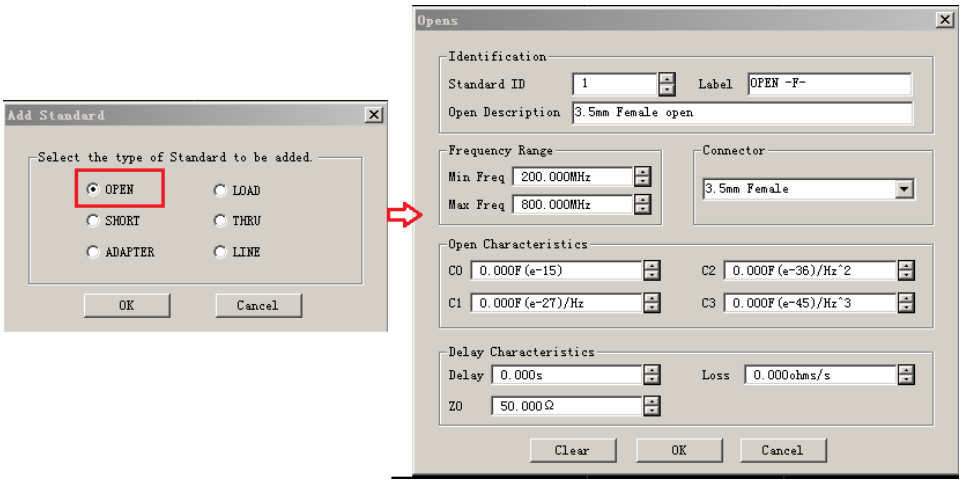

Figure 3-29 Edit OPEN Cal Standard

➢ As shown in the following picture, click **[THRU]** and then **[OK]**, **Thru/Line/Adapter** dialog box will pop up, where the default value is adopted. After setting, click **[OK]** to close the dialog box, thus the THRU standard is defined.

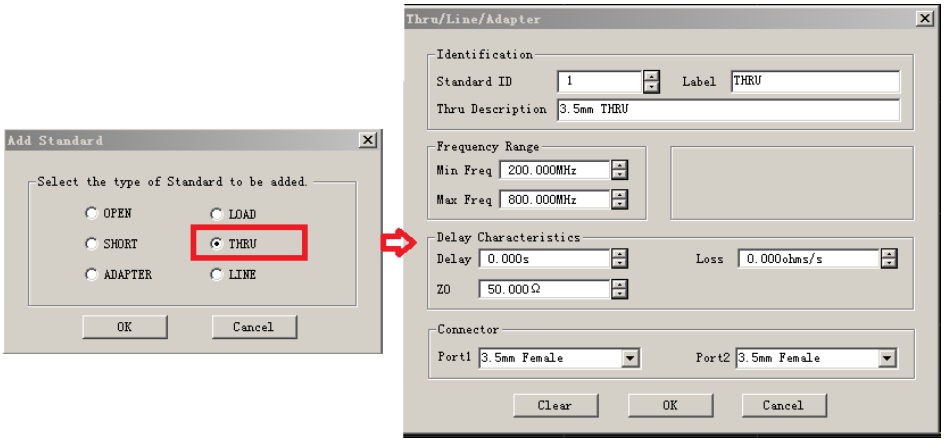

Figure 3-30 Edit THRU Cal Standard

➢ As shown in the following picture, click **[LINE]** and then **[OK]**, **Thru/Line/Adapter** dialog box pops up. Input 0.48 to Delay Characteristics dialog box, then press 【**G/n**】key of ENTRY on the front panel to set the delay as 480ps. After setting, click **[OK]** to close the dialog box, thus LINE standard is defined.

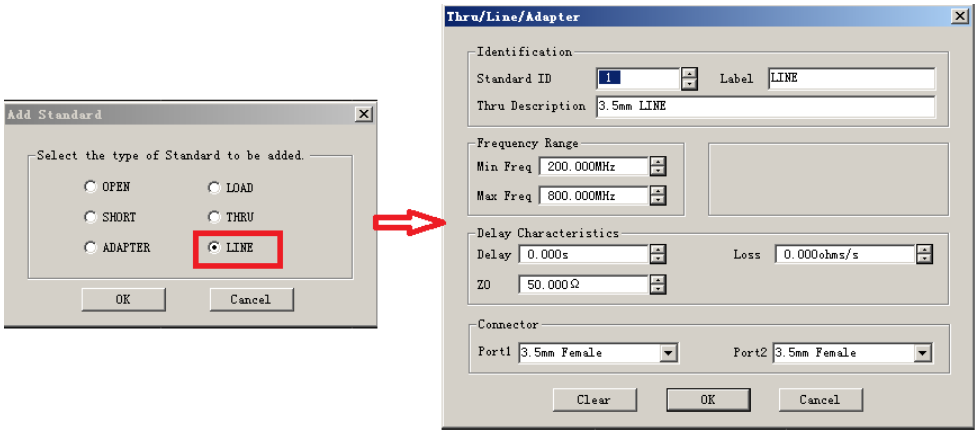

Figure 3-31 Edit Calibration Standard for Transmission LINE

➢ In the **Class Assignments** area of **Edit Kit** dialog box, select **[TRL]** from the sub-menu, then click **[Edit…]** key and **Modify TRL Calibration Class Assignments** dialog box pops up to set the newly-added calibration standards as per class. Click **[LINE Z0]** in the **Calibration Reference Z0** area, then click **[THRU STANDARD]** in the **Testport Reference Plane** area, the completion is as shown below.

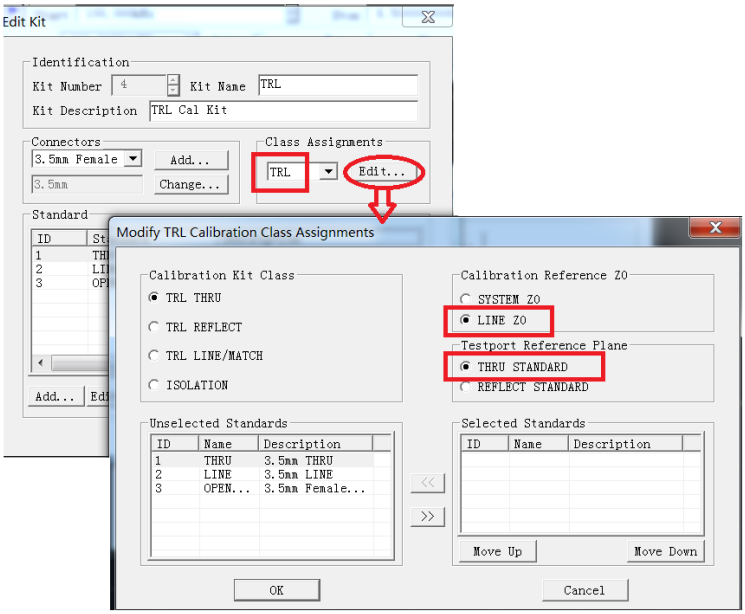

Figure 3-32 Modify TRL Calibration Class Assignments Dialog Box

➢ As shown in the left figure of the following picture, on the **Calibration Kit Class** area, select **[TRL THRU]**, then select **[3 THRU 3.5mm THRU]** in the area of **Unselected Standards**. Then click the button on the red circle to add the standard to the area of **Selected Standards**, the completion is as shown in the right figure of the following picture.

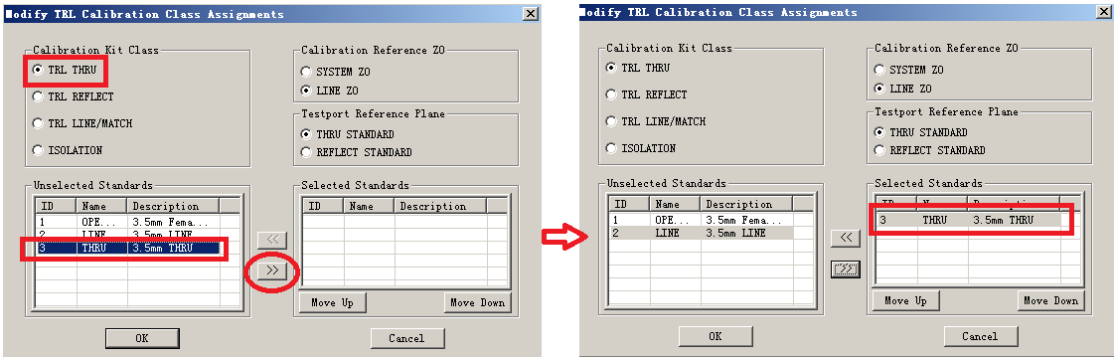

Figure 3-33 Edit TRL THRU Class

➢ In the same way, select the calibration standard for TRL reflection, as shown in the following picture, select **[TRL REFLECT]** for calibration kit class, then select the **[1 OPEN 3.5mm Female]** option in the area of unselected standards, then click the button on the red circle to add the standard to the area of selected standards, the completion is as shown in the right figure of the following picture.

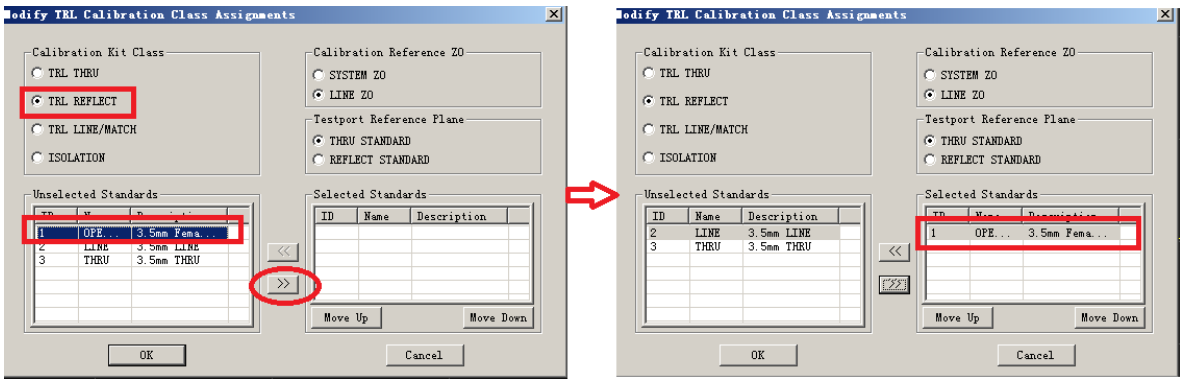

Figure 3-34 Edit TRL Reflection Class

➢ Select the calibration standard for TRL transmission LINE, as shown in the below figure, select **[TRL LINE/MATCH]** for calibration kit, then select the **[2 LINE 3.5mm LINE]** option in the area of unselected standards, then click the button on the red circle to add the standard to the area of selected standards, the completion is as shown in the right figure of the following picture.

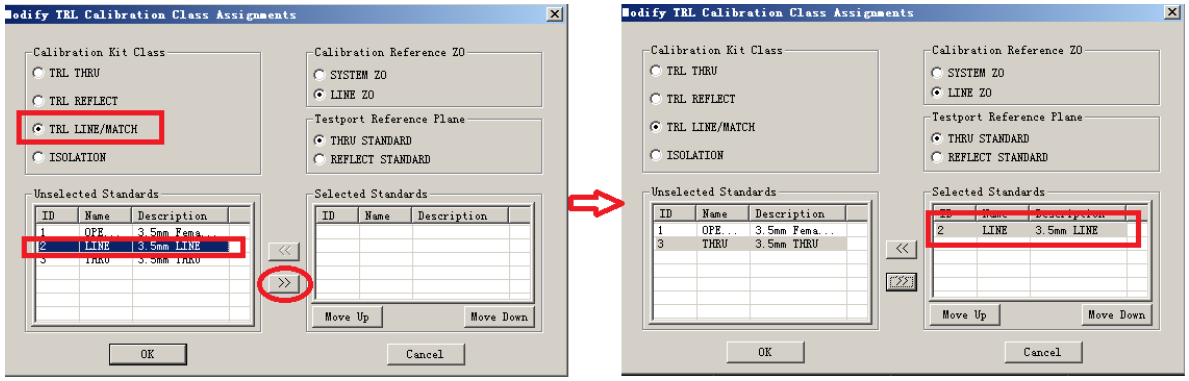

Figure 3-35 Edit TRL Transmission Line Class

➢ After completing the edit for all classes, click **[OK]** to close all dialog boxes, then a set of TRL calibration kit is customized.

3.4 Limit Test

Limit test function compares the limits of data and definition, and provides PASS and FAIL information. Each trace supports up to 100 separate limit lines giving precise definition to limit. This Section introduces the basic setup steps of limit test by setting a limit line of a band-pass filter:

➢ The test curve of band-pass filter is as shown below: the center frequency of this band-pass filter is 2GHz, out-of-band rejection of which needs to reach 120dB and 110dB respectively.

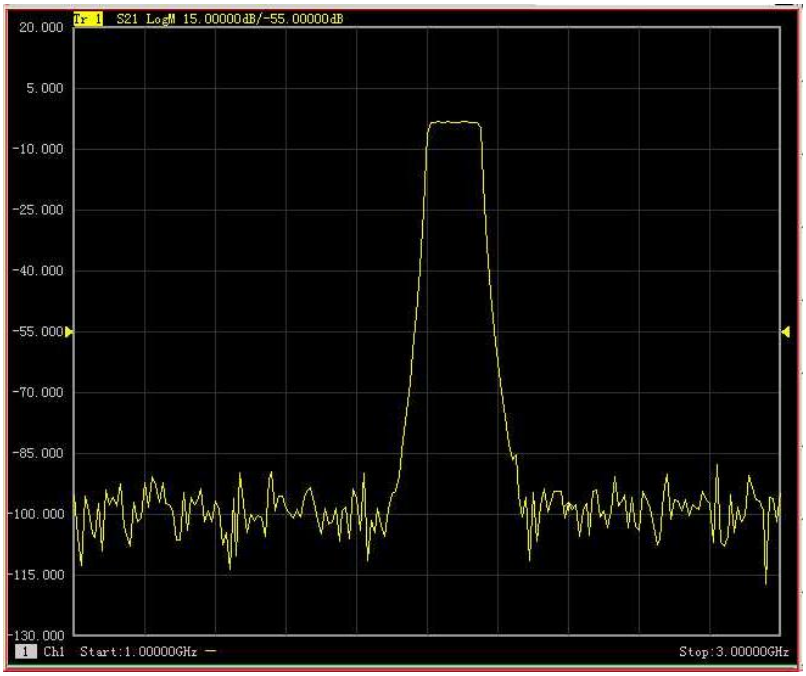

Figure 3-36 Filter Test Curve

➢ Press 【**Analysis**】key on the front panel, then press **[Limits]** on the **Analysis** soft key menu as shown below. On the **Limits** soft key menu, press **[Limit Test on|OFF]** to open the limit test; press [**Limit Line on|OFF]** to open the limit line; press **[Sound on Fail on|OFF]** to open the failure noise warning as shown in below figure. Press **[Edit Limit Table]** on the **Limit** soft key menu, then press **[Limit Table on|OFF]** on the Edit Limit Table soft key menu, to open the limit table.

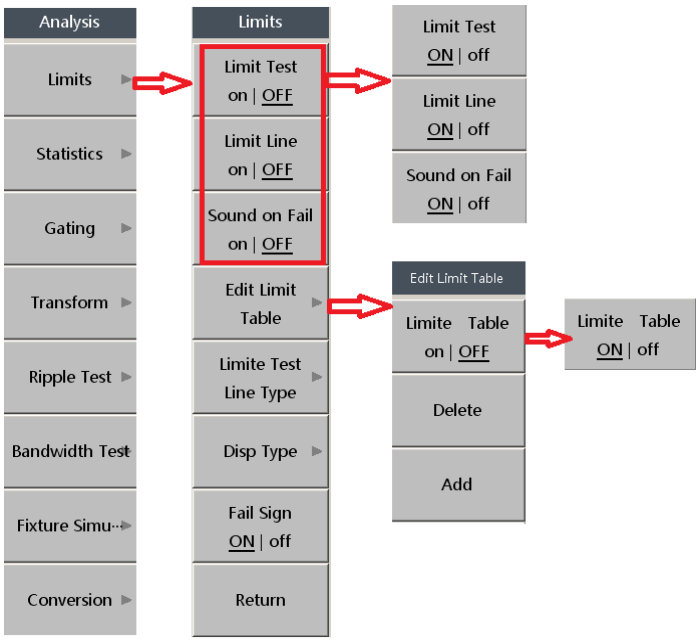

Figure 3-37 Limit Soft Key Menu Opescalen

➢ The opened limit table is as shown below, when the **Type** Box is set to **MAX**, the measured results must be less than the limit line value before PASS; when set to **MIN**, the test results must be greater than

the set limit line value before PASS. Users may set up multi-segment limits as required, the first segment of limit line in this example is set as follows: **[Type]**:MAX**; [Start Stimulus]**: 1.0GHz, **[Stop Stimulus]**: 1.7GHz; **[Start Response]**: -120dB, **[Stop Response]**: -120dB; **[Limit Type]**: SLOP.

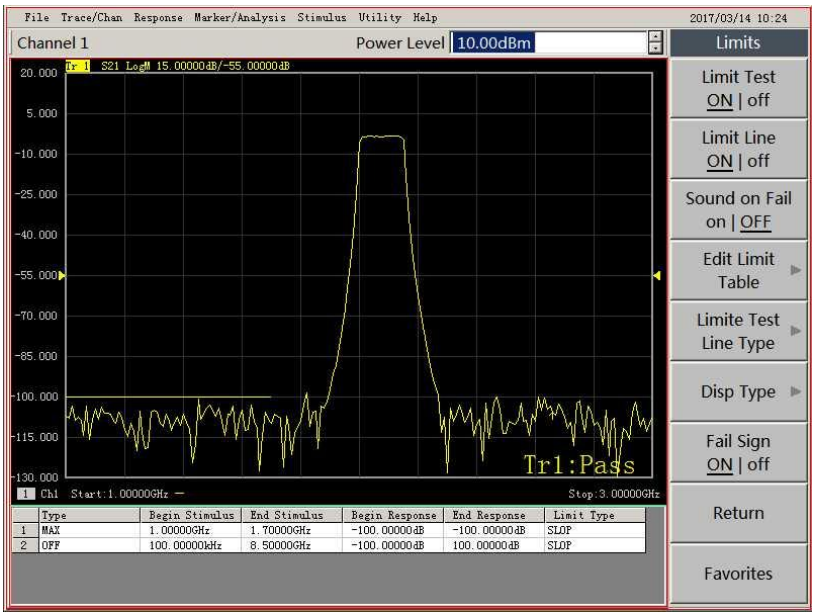

Figure 3-38 Limit Table Setting

➢ The second segment of limit line is set as: **[Type]**:MAX**; [Start Stimulus]**: 2.35GHz, **[Stop Stimulus]**: 2.6GHz; **[Start Response]**: -110dB, **[Stop Response]**: -110dB; **[Limit Type]**: SLOP. The third segment of limit line is set as: **[Type]**:**MIN; [Start Stimulus]**: 2.01GHz, **[Stop stimulus]**: 2.15GHz; **[Start Response]**: -3dB, **[Stop Response]**: -3dB; **[Limit Type]**: SLOP. As shown in the below figure, if the test result meets the pre-set limit value, then **Trl: Pass** will display on the lower right corner of the screen, indicating pass the test.

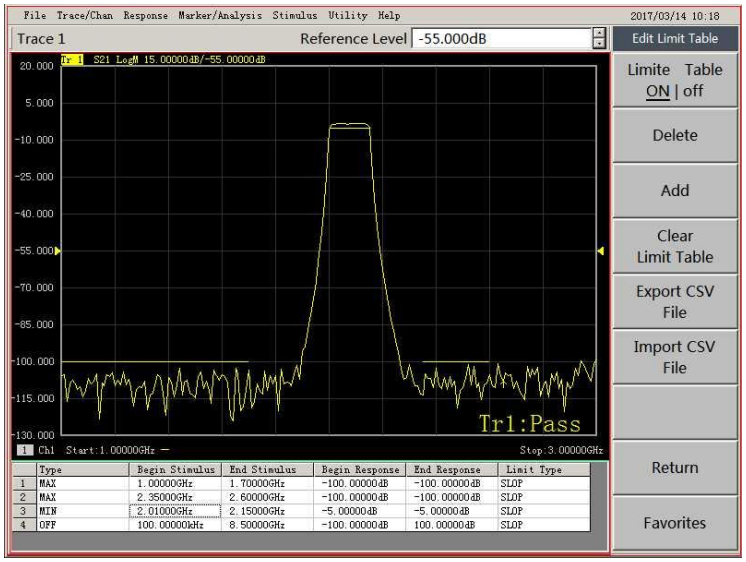

Figure 3-39 Pass Limit Test

➢ If the test result fails to meet the pre-set limit value, then a red **FAIL** as shown in the following picture will display and **Trl: Fail** will display on the lower right corner of the screen, sending voice warning at the same time. The frequency band failing to meet the limit test will be displayed in red, for users positioning.

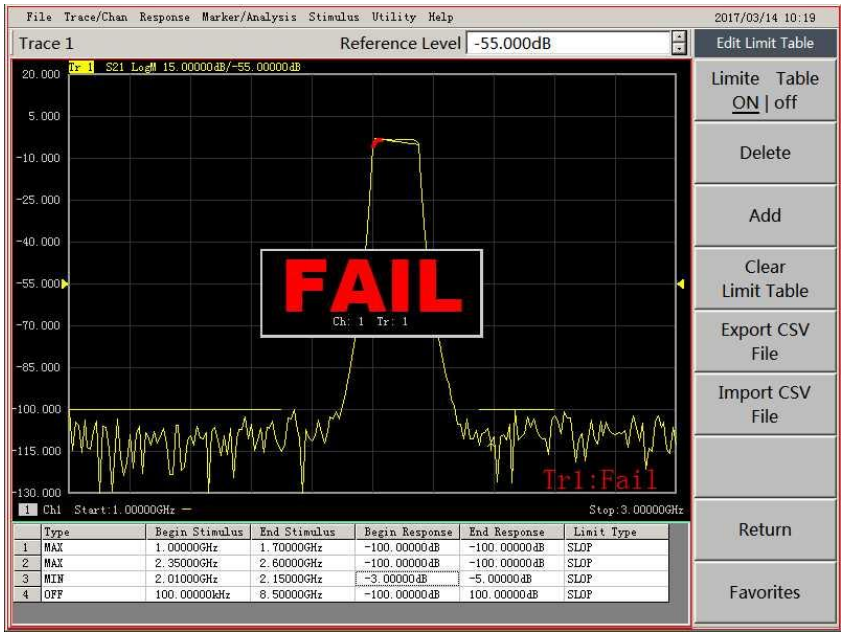

Figure 3-40 Fail to Pass Limit Test

➢ The color of limit line segment and test curve can be changed by setting. Right click the test screen background, the context menu appears as shown, and then click **[Set Color]** to display the sub-menu, as shown below.

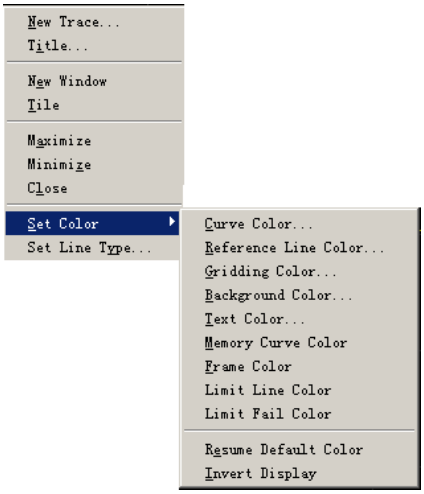

Figure 3-41 Limit Line Coloring Setting Menu

➢ Click **[Limit Line Color]**, then the following dialog box appears, and it can select the other color and test curve to distinguish.

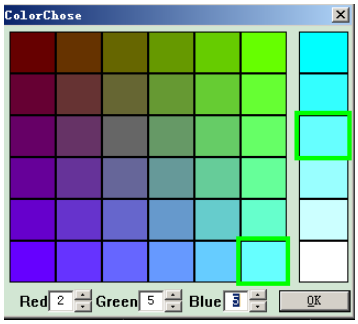

Figure 3-42 Color Selection

➢ Select the color required in the above figure in this example and click **[OK]**, and the color of the limit line will change to the color selected by the users.

4 Getting Help

Under normal circumstances, problems are caused by hardware, software, or improper operation of users. If there are any problems, first observe error messages and store them; analyze the possible reasons and use the methods provided in "4.1 Basic check" as reference and perform primary check to solve the problems. You can also contact our customer service center and provide error messages collected. We will assist you in solving problems as fast as we can. Please check Section 4.2 for detailed contact information or via www.ceyear.com online for the nearest technical support contact information.

4.1 Basic Check

If any problems occur on the 3656 Series Vector Network Analyzer you are using. You can check them yourself following the below guidance. If the problems persist, please contact us.

- ✧ If it cannot be started after pressing **【ON/Standby】**, please check whether the power cord is connected, or whether the indicator lights next to **【ON/Standby】** key are lit; If nothing wrong with the aforementioned problems, then it might be an instrument failure, please contact us for repair.

- ✧ If 3656 Series Vector Network Analyzer cannot enter the system after startup, then restart it. If nothing wrong with the aforementioned problems, then it might be an abnormal startup in contingency of Windows System, and the instrument can run normally; otherwise, it is an instrument failure, please contact us for repair.

- ✧ If "DSP Initialization Failed" occurs to 3656 Series Vector Network Analyzer before entering the analyzer programs, or "EEPROM Test Failure" prompts pop up, then it is an instrument failure, please contact for repair.

- ✧ If 3656 Series Vector Network Analyzer cannot communicate via LAN, first confirm whether the current network supports the Internet access, and then check the yellow LED indicator next to the LAN interface on the rear panel. If this indicator is not flashing, then check whether LAN cable is well connected.

4.2 Help Information

3656 Series Vector Network Analyzer provides “Error Log” function, when a problem occurs, the instrument will automatically generate an “Error Log”, which records the abnormities of hardware, file deletions, program control, etc.; it is composed of three levels, including message, warning and error, and used for assisting in analyzing instrument failure. Users can view “Error Log” via [**Help**] →**[Error Message]**→**[View Error Log...]**.

In addition, the Customer Service Support Center is ready to help users at any time. Points of sales and offices have been set up all over the country. Technical support personnel located there can provide services such as rapid on-site technical exchange, training, and product maintenance, etc. We can provide comprehensive and convenient technical support and related services for your convenience.

Tel: **+86-0532-86896691**

Website: **www.ceyear.com**

E-mail: **sales@ceyear.com**

Zip code: **266555**

The instruments we supplied have been checked by quality and security departments to be qualified. We guarantee an 18-month warranty and long-term maintenance; free maintenance for those instruments under warranty, damaged for reasons excluding man-made causes; fees will be charged for those after warranty based on maintenance costs. Different methods such as telephone or home maintenance, etc. will be adopted to solve your problems.

In addition, please contact us in time if instrument failure occurs, we will provide you with assistance required. Repair is also supported if necessary. Users are forbidden to disassemble the instrument by themselves in case damages to internal circuits and part caused by wrong operation.

Warning Hereby declares! Full responsibility shall be taken at your own risk in case the damages to the instrument or personnel injury are caused by wrong operation or violation operation.

4.3 Repair Methods

When problems with 3656 Series Vector Network Analyzer are difficult to solve, please contact us by phone or fax. If the instrument needs to be repaired, please follow the steps below to package the instrument:

1) Write a paper document describing the instrument failure and put it in the packing case with the analyzer;

2) Package the instrument with the original packaging materials to reduce potential damage;

3) Place gaskets in the four corners of the outer carton and place the instrument inside the outer packaging case;

4) Seal the mouth of packaging case with adhesive tape and reinforce the packaging case with nylon tape;

5) Mark “Fragile! Do not touch! Handle with care!” on the box;

6) Consign this instrument in conformity with precision instrument and keep all copies of transport document.

Appendix I: Technical Indicators

The technical indicators of 3656 Series Vector Network Analyzer have been strictly tested when leaving the factory, the major ones are as shown in the below table.

Technical Indicators of 3656A/B Vector Network Analyzer

Test Item	3656A	3656B
Frequency Range	100kHz ～ 3GHz	100kHz ～ 8.5GHz
Frequency Resolution	1Hz	1Hz
Frequency Accuracy	±5×10^{-6}(23℃±3℃)	±5×10^{-6}(23℃±3℃)
Power Range	-45dBm～+10dBm	-55dBm～+10dBm
Dynamic Range	（10Hz） （3kHz） 100kHz～1MHz 90dB 60dB 1MHz～10MHz 110 dB 80 dB 10MHz～3GHz 125dB 95dB	（10Hz） （3kHz） 100kHz～20MHz 110dB 80dB 20MHz～3GHz 125 dB 95 dB 3GHz～6GHz 123dB 93dB 6GHz～8.5GHz 118dB 88dB
Reflection Track	100kHz～10MHz ±0.030dB 10MHz～3GHz ±0.020dB	100kHz～3GHz ±0.030dB 3GHz～6GHz ±0.040dB 6GHz～8.5GHz ±0.050dB
Transmission Track	100kHz～10MHz ±0.030dB 10MHz～3GHz ±0.020dB	100kHz～3GHz ±0.030dB 3GHz～6GHz ±0.040dB 6GHz～8.5GHz ±0.050dB
Effective Directivity	100kHz～10MHz 49 dB 10MHz～3GHz 46 dB 100kHz～10MHz 49dB （Option H01） 10MHz～3GHz 46dB （Option H01）	100kHz～3GHz 46dB 3GHz～6GHz 40dB 6GHz～8.5GHz 38dB
Effective Source Match	100kHz～10MHz 44dB 10MHz～3GHz 40dB 100kHz～10MHz 43dB （Option H01） 10MHz～3GHz 21dB （Option H01）	100kHz～3GHz 36dB 3GHz～6GHz 35dB 6GHz～8.5GHz 33dB
Effective Load Match	100kHz～10MHz 49 dB 10MHz～3GHz 46 dB 100kHz～10MHz 48dB （Option H01） 10MHz～3GHz 41dB （Option H01）	100kHz～3GHz 44dB 3GHz～6GHz 40dB 6GHz～8.5GHz 36dB
Test Points	1 to 16001	

IF Bandwidth	Min. 1Hz；Max. 5MHz，in 1，2，3，5，7 step
Port connector type	N type (female) 50 ohm system impedance N type (female) 75 ohm system impedance（3656-H01）
Number of test ports	2
Number of test receivers	4
Reference level amplitude setting	Setting range: ±500dB Setting resolution: 0.001dB
Reference phase setting	Setting range: ±500° Setting resolution: 0.01°
Time-base reference output	Output frequency: 10MHz Output level: +10dBm±4dB
Digital interface	GP-IB,USB, Ethernet interface and VGA display interface
Opescalen system	Windows XP
Display	10.4-inch high brightness LCD
Test domain	Frequency domain, Time domain
Dimensions	435×233×348 (W×H×D)（including foot pad, foot, lateral stripping, input and output port）
Power consumption	150W
Power supply	50Hz single phase 220V or 50Hz/60Hz single phase 110V AC
Weight	16kg

Technical Indicators of 3656D Vector Network Analyzer

Test Item	3656D		
Frequency range	300kHz ～ 20GHz		
Frequency resolution	1Hz		
Frequency accuracy	±1×10^{-6}(23℃±3℃)		
System dynamic range IF Bandwidth：10Hz	Frequency range	2-port	4-port
	300kHz～100MHz	95dB	90 dB
	100MHz～1GHz	110dB	100 dB
	1GHz～6GHz	120dB	115 dB
	6GHz～8GHz	117dB	110 dB
	8GHz～10GHz	115dB	105 dB
	10GHz～15GHz	110dB	100 dB
	15GHz～20GHz	100dB	90 dB
Reflection track	300kHz～10MHz ±0.030dB 10MHz～3GHz ±0.040dB 3GHz～20GHz ±0.050dB		
Transmission track	300kHz～10MHz ±0.030dB 10MHz～3GHz ±0.040dB 3GHz～6GHz ±0.100dB 6GHz～20GHz ±0.150dB		
Effective directivity	300kHz～10MHz 46dB 10MHz～3GHz 42dB 3GHz～6GHz 38dB 6GHz～20GHz 36dB		
Effective source match	300kHz～10MHz 37dB 10MHz～3GHz 37dB 3GHz～6GHz 31dB 6GHz～20GHz 28dB		
Effective load match	300kHz～10MHz 44dB 10MHz～3GHz 42dB 3GHz～6GHz 38dB 6GHz～20GHz 36dB		

Test points	1 to 16001
IF Bandwidth	Min. 1Hz；Max. 5MHz，in 1，2，3，5，7 step
Port connector type	3.5mm (male) 50 ohm system impedance
Number of test ports	2/4
Number of test receivers	2/4
Reference level amplitude setting	Setting range：±500dB Setting resolution：0.001dB
Reference phase setting	Setting range：±500° Setting resolution：0.01°
Time-base reference output	Output frequency：10MHz　Output level：+10dBm±4dB
Digital interface	GPIB, USB, Ethernet interface and VGA display interface
Opescalen system	Windows XP
Display	10.4-inch high brightness LCD
Test domain	Frequency domain, Time domain
Dimensions	436×236.5×410 (W×H×D) (including foot pad, foot, lateral stripping, input and output port)
Power consumption	150W
Power supply	50Hz single phase 220V or 50Hz/60Hz single phase 110V AC
Weight	18kg

Annex II: Accessories/Options List

Accessories/Options List of 3656A Vector Network Analyzer

Atribut	No.	Accessories/Options
Accessories	---	Powercord, 1 piece
	---	USB mouse, 1 piece
	---	Quick start guide, 1 piece
	---	Certificate of conformity, 1 piece
	---	CD, 1 piece
Options	3656-H01	75Ω port impedance system Note: After choosing this option, the main unit will not has 50Ω port impedance system,
	3656-H02	N-type test cable (GORE-OSZKUZKU0240, NMNM, 60cm)
	3656-H03	N- type test cable (GORE-OSZKUZKV0240, NMNF, 60cm)
	3656-H04	Options in English (key, front panel and plate) Note: This option will replace the chinese key , front panel and plate once assembled
	3656-H05	20205 N-type calibration kit (DC~3GHz)
	3656-H06	20204 N-type 75Ω calibration kit (DC~3GHz)
	3656-H07	Economic-type phase-stable test cable CETC41-N/J.SMA/J.197C-800 (N-type to 3.5mm , NMNM, 80cm)
	3656-H08	Economic-type phase-stable test cable CETC41-N/J.N/K..197C-800(N-type, NMNF, 80cm)
	3656-H09	Economic-type phase-stable test cable CETC41-N/J.N/J.197C-800(N-type, NMNM, 80cm)
	3656-H10	75Ω test cable 24-0800-51M1-51M1
	3656-H11	20402 electronic calibration kit (300kHz～18GHz，N-type(NMNF)，2-port）
	3656-H12	20403 electronic calibration kit（10MHz～26.5GHz，3.5mm（NMNF），2-port）
	3656-H13	20405 electronic calibration kit（10MHz～20GHz，3.5mm（NF），4-port）
	3656-H14	3656 Series User’s Manual (Chinese)
	3656-H15	3656 Series User’s Manual (English)
	3656-H16	Aluminum alloy transportation case
	3656-H17	Front paneljumper（supporting 4-port extension and receiver through test）
	3656-H18	2813A 4-port test device （supported by the option 3656-H17）
	3656-H19	Uppercomputer cabinet, for building of upper computer system

Accessories/Options List of 3656B Vector Network Analyzer

Atribut	No.	Accessories/Options
Accessories	---	Powercord, 1 piece
	---	USB mouse, 1 piece
	---	Quick start guide, 1 piece
	---	Certificate of conformity, 1 piece
	---	CD, 1 piece
Options	3656-H02	N-type test cable (GORE-OSZKUZKU0240, NMNM, 60cm)
	3656-H03	N- type test cable (GORE-OSZKUZKV0240, NMNF, 60cm)
	3656-H07	Economic-type phase-stable test cable CETC41-N/J.SMA/J.197C-800 (N-type to 3.5mm , NMNM, 80cm)
	3656-H08	Economic-type phase-stable test cable CETC41-N/J.N/K..197C-800(N-type, NMNF, 80cm)
	3656-H09	Economic-type phase-stable test cable CETC41-N/J.N/J.197C-800(N-type, NMNM, 80cm)
	3656-H11	20402 electronic calibration kit (300kHz～18GHz，N-type(NMNF)，2-port）
	3656-H12	20403 electronic calibration kit（10MHz～26.5GHz，3.5mm（NMNF），2-port）
	3656-H13	20405 electronic calibration kit（10MHz～20GHz，3.5mm（NF），4-port）
	3656-H14	3656 Series User’s Manual (Chinese)
	3656-H15	3656 Series User’s Manual (English)
	3656-H16	Aluminum alloy transportation case
	3656-H18	2813A 4-port test device （supported by the option 3656-H29）
	3656-H19	Uppercomputer cabinet, for building of upper computer system
	3656-H20	Options in English (key, front panel and plate) Note: This option will replace the chinese key , front panel and plate once assembled
	3656-H21	20201 N-type calibration kit (DC~9GHz)
	3656-H22	20202 3.5mm calibration kit(DC~9GHz)
	3656-H23	32111 waveguide calibration kit（1.72～2.61GHz）
	3656-H24	32112 waveguide calibration kit （2.60～3.95GHz）
	3656-H25	32113 waveguide calibration kit （3.94～6.00GHz）
	3656-H26	32114 waveguide calibration kit （4.64～7.05GHz）
	3656-H27	32115 waveguide calibration kit （5.88～8.17GHz）
	3656-H28	32116 waveguide calibration kit （7.00～10.0GHz）
	3656-H29	Front panel jumper（Supports 4-port extension and receiver through test）

Accessories/Options List of 3656D Vector Network Analyzer

Atribut	No.	Accessories/Options
Accessories	---	Powercord, 1 piece
	---	USB mouse, 1 piece
	---	Quick start guide, 1 piece
	---	Certificate of conformity, 1 piece
	---	CD, 1 piece
Options	3656-H02	N-type test cable (GORE-OSZKUZKU0240, NMNM, 60cm)
	3656-H03	N- type test cable (GORE-OSZKUZKV0240, NMNF, 60cm)
	3656-H07	Economic-type phase-stable test cable CETC41-N/J.SMA/J.197C-800 (N-type to 3.5mm , NMNM, 80cm)
	3656-H08	Economic-type phase-stable test cable CETC41-N/J.N/K..197C-800(N-type, NMNF, 80cm)
	3656-H09	Economic-type phase-stable test cable CETC41-N/J.N/J.197C-800(N-type, NMNM, 80cm)
	3656-H11	20402 electronic calibration kit (300kHz～18GHz，N-type(NMNF)，2-port）
	3656-H12	20403 electronic calibration kit（10MHz～26.5GHz，3.5mm（NMNF），2-port）
	3656-H13	20405 electronic calibration kit（10MHz～20GHz，3.5mm（NF），4-port）
	3656-H14	3656 Series User's Manual (Chinese)
	3656-H15	3656 Series User's Manual (English)
	3656-H16	Aluminum alloy transportation case
	3656-H18	2813A 4-port test device （supported by the option 3656-H29）
	3656-H19	Uppercomputer cabinet, for building of upper computer system
	3656-H20	Options in English (key, front panel and plate) Note: This option will replace the chinese key , front panel and plate once assembled
	3656-H21	20201 N-type calibration kit (DC~9GHz)
	3656-H22	20202 3.5mm calibration kit(DC~9GHz)
	3656-H23	32111 waveguide calibration kit（1.72～2.61GHz）
	3656-H24	32112 waveguide calibration kit （2.60～3.95GHz）
	3656-H25	32113 waveguide calibration kit （3.94～6.00GHz）
	3656-H26	32114 waveguide calibration kit （4.64～7.05GHz）
	3656-H27	32115 waveguide calibration kit （5.88～8.17GHz）
	3656-H28	32116 waveguide calibration kit （7.00～10.0GHz）
	3656-H29	Front panel jumper（Supports 4-port extension and receiver through test）