

# Ceyear

## 4957D/E/F

### Microwave Analyzer

### Quick Start Guide



China Electronics Technology Instruments Co., Ltd.



## Foreword

Thank you for choosing and using 4957D/E/F microwave Analyzers developed and produced by China Electronics Technology Instruments Co., Ltd!

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China Electronics Technology Instruments Co., Ltd.

## Manual Authorization

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## Product Warranty

We will repair or replace the damaged components as required within the warranty period. For this purpose, the user shall return the product to the manufacturer and prepay the mailing fee.

## Product Quality certificate

We guarantee that the product can meet the indicator requirement in the manual upon delivery. The calibration and measurement are completed by measuring bodies with national qualification, with relevant data to be provided for reference by users.

## Quality / Environment Management

This product complies with the quality and environmental management systems during R&D, manufacturing and testing. China Electronics Technology Instruments Co., Ltd has passed the certification of ISO 9001 and ISO 14001 systems.

## Safety precautions



The warning sign indicates a potential risk. It reminds the user of certain operation process, operation method or similar situation. In case of any failure of observing the rule or maloperation, personal injury can occur. Proceed to the next step only after fully understanding and meeting the warning conditions indicated.

## Note

Note mark, indicating some important information which will not cause danger. It reminds the user of certain operation process, operation method or similar situation. In case of any failure of observing the rule or maloperation, instrument damage or important data loss can occur. Proceed to the next step only after fully understanding and meeting the caution conditions indicated.

# Contents

|  |    |
|--|----|
| Chapter I Manual Navigation .....  | 1  |
| Chapter II Getting Prepared.....   | 2  |
| 2.1 Preparation before operation.....  | 2  |
| 2.2 Power-on .....   | 4  |
| 2.3 Front Panel .....  | 4  |
| 2.4 Operator Interface .....   | 6  |
| 2.5 Top Interfaces .....   | 6  |
| 2.6 Battery.....   | 8  |
| Chapter III Typical Applications.....  | 9  |
| 3.1 Calibration in the VNA Mode.....   | 9  |
| 3.2 DTF Measurement in the CAT Mode.....   | 15 |
| 3.3 Signal Measurement in the SA Mode .....  | 16 |
| 3.4 Measuring Signal Power in the Power Monitor (PM) Mode.....                       | 18 |
| 3.5 Measuring the Electrical Length of Cables or Other DUTs in the<br>VVM Mode ..... | 19 |
| 3.6 Measuring Average Power in the UBS-PM Mode.....                                  | 21 |
| 3.7 TestingSkills.....   | 23 |
| Chapter IV Getting Help .....  | 26 |
| 4.1 Basic Inspection.....  | 26 |
| 4.2 Help information.....  | 26 |
| 4.3 Repair.....  | 27 |
| Annex 1: Technical indicators .....  | 28 |
| Annex 2: List of Accessories / Options.....  | 30 |

## Chapter I Manual Navigation

This manual introduces the structure and use of 4957D/E/F microwave analyzer (hereinafter referred to as 4957D/E/F or analyzer) from such aspects as instrument panel, power supply, startup, typical applications and obtaining after-sales support. By reading this manual, we can have a relatively systematic overall understanding of 4957D/E/F, and can quickly master some basic operations of the analyzer. To facilitate your skillful use of such instrument, please read carefully and follow this manual in advance for correct operation.

The *Quick Start Guide of 4957D/E/F Microwave Analyzer* contains the following chapters and sections:

- **Get Prepared**

This chapter introduces the preparation before operation, startup, panel introduction and battery replacement of 4957D/E/F. After reading this chapter, you can have a perceptual knowledge of 4957E/E/F as a whole, and make early preparation for correct and safe operation of the instrument.

- **Typical Applications**

This chapter introduces the calibration of 4957D/E/F in detail and, through DTF test and other test examples, details the operation steps for the basic measurement format of 4957D/E/F, and briefly introduces the skills used in the tests. After reading this chapter, you can independently use 4957D/E/F to complete the testing of some typical tested pieces.

- **Get Help**

This chapter includes two parts: After-sales maintenance and repair, with a focus on troubleshooting, maintenance and repair of the instrument during use.

## Chapter II Getting Prepared

The 4957D/E/F microwave analyzers are exquisitely designed and comfortable to operate. They are small in size, with the maximum external dimensions (width × height × depth) of only 315 mm × 220 mm × 102 mm (excluding handles, footpads and supports); light, with the total weight of not more than 5.3 kg for each unit (excluding rechargeable lithium batteries). Therefore, they are easily carried for field tests. This chapter will focus on the test environment, power supply, structure and battery replacement of the instrument.

### 2.1 Preparation before operation

This section introduces the precautions before first use of a 4957D/E/F microwave analyzer. 4957D/E/F meets the safety requirements specified in GJB3947A-2009. Please read the following safety instructions carefully so as not to cause damage to the instrument or unnecessary personal injury.



#### Warning

#### To prevent the instrument from damages and to avoid electric shock, fire and personal injury:

- Do not open the cabinet without permission;
- Do not try to disassemble or refit any part of the instrument not mentioned in the manual. Otherwise, such consequences as reduced electromagnetic shielding property and internal component damage can occur, affecting product reliability. In this case, we will not provide any free maintenance any more even if the product is still in the warranty period.

#### 2.1.1 Environmental Requirements

In order to ensure the service life of 4957D/E/F and the validity and accuracy of measurement, please carry out the tests under the following environmental conditions:

##### 1. Temperature range:

Storage temperature range:  $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Working temperature range:  $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$



#### Warning

Since the working temperature range of the battery equipped with the instrument is  $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$ , the instrument should not work continuously for a long time when it is equipped with the battery at high temperature, so as to avoid danger caused by too high internal temperature. It is recommended to use an adapter for power supply.

##### 2. Low air pressure:

Low air pressure (altitude):  $0 \sim 4,600 \text{ m}$

#### 2.1.2 Power Supply Requirements

4957D/E/F can be powered in three ways:

##### 1. AC power supply and adapter

When adopting AC power supply, the enclosed AC-DC adapter must be used. With the input of 220 V / 50 Hz AC, the adapter is connected with a standard three-core power cord. Pay attention to ensure proper grounding.

To avoid overheating, please do not connect the AC-DC adapter to the analyzer when transporting or carrying it with a backpack. The voltage input range of the AC-DC adapter is wide. Please ensure that the power supply voltage is within the range required in Table 2.1.

Table 2.1 power supply requirements

| Power supply parameter   | Applications    |
|--------------------------|-----------------|
| Input voltage            | 100 V ~ 240 VAC |
| Rated input current      | ≥ 1.7 A         |
| Working frequency        | 50 / 60 Hz      |
| Output voltage / current | 15.0 V / 4.0 A  |

**Note**

The operating voltage and frequency ranges should be subject to the data on the nameplate of the power adapter.

## 2. DC power supply

Voltage: 13 V ~ 17 V (without batteries), 15 V ~ 17 V (with batteries)

Current: 4 A (min.)

## 3. Built-in battery power supply

4957D/E/F can be powered by rechargeable li-ion batteries. If the battery is left unused for a long time, it will be discharged by itself, so it must be charged before being used again. See section 2.6 for details of battery usage. The basic parameters of the enclosed battery are as follows:

Nominal voltage: 10.8 V

Nominal capacity: 7,800 mAh

Working time: About 2.5 h

Charging time: About 6 h

**Note**

Rechargeable batteries should not be exposed to fire and high temperature (higher than 60°C), thrown into fresh water or salt water or wetted, and should be kept away from children.

Rechargeable batteries can be reused and should be placed in suitable containers to avoid short-circuit. Heavy metals such as nickel and chromium in batteries will pollute the natural environment. Waste batteries should not be discarded casually, but should be put into a special battery recovery bins.

## 2.1.3 Electrostatic Discharge (ESD) Protection

Attention should be paid to ESD protection when using the instrument. The following ESD protection measures, if applicable, can be taken:

1. Before connecting the cable to the instrument for testing, make sure that the center conductor of the cable is grounded first. This can be achieved in the following steps: Connect a shorting device to one end of the cable to short-circuit the center conductor and the outer conductor of the cable. When wearing antistatic wrist straps, grasp the

housing of the cable connector, connect the other end of the cable, and then remove the shorting device.

2. Perform grounding to yourself before cleaning, connecting or inspecting the test port of the instrument. This can be achieved by grasping the grounded metal housing of the instrument or the housing of the test cable connector.

## 2.2 Power-on

Before powering up 4957D/E/F, please check the power supply equipment according to "Power supply requirements" in section 2.1.2. The power-on test can only be performed after everything is confirmed to be correct.

Press and hold the Power On / Off key ([U] key) for about three seconds, after hearing a "beep", release the key, and the analyzer will take about 15 seconds to enter the self-check program. In order to stabilize the performance indicators of the internal devices of the instrument and achieve better test effect, it is recommended to preheat the instrument for 20 ~ 30 min before measurement.

Note

In this guide, the keys on the front panel are represented by [XXX], with XXX being the key name; The keys on the bottom of the touch screen are represented by [XXX], with XXX being the name of the key; The menu keys on the right are represented by [XXX], with XXX being the menu name.

## 2.3 Front Panel

This section details the front panel of 4957D/E/F, which is shown in Figure 2.1.



Figure 2.1 Front panel of 4957D/E/F microwave analyzer

The functions of common keys are described as follows:

- [Freq]: In the Cable and Antenna Test (CAT) mode, Network Analyzer mode, Spectrum Analyzer mode and Power Monitor mode, it is used to set such measurement parameters as center frequency, start and stop frequencies, sweep and frequency step. In USB Power Meter mode and Vector Voltmeter, it is used to set the center frequency.
- [Amp]: It is used to set such parameters as Auto Scale, Ref Level, Ref Pos, Scale and Power in the CAT mode and Network Analyzer mode. In the Spectrum Analyzer mode, it is used to set the amplitude parameters for displaying measurement results, including setting reference level, attenuator, display scale, unit and preamplifier control, etc.. In Power Monitor mode and USB Power Meter mode, it is used to set



parameters such as reference, scale, max and min values, relative measurement switch state, offset, etc.. In the Power Monitor mode, it can also turn on / off the preamplifier.

- [BW]: It is used to set such parameters as Average, Smooth and MF BW, etc., in the CAT mode and the Network Analyzer mode. In the Spectrum Analyzer mode and the Power Monitor, it is used to set RBW, VBW, Detector and Average, etc..
- [Mkr]: In the CAT mode and Network Analyzer mode, it is used to open function menus related to markers, including marker switching, opening and closing, Mkr Peak Search, Delta Mkr and marker function settings. In the Spectrum Analyzer mode, it is used to open function menus related to markers, including marker switching, opening and closing, Mkr Peak Search, Delta Mkr, Counter and Noise Mkr settings.
- **【Measure】** : In the CAT mode, it is used to select the data format of measurement, including VSWR, Return Loss, Impedance, Cable Loss, DTF VSWR and DTF@Return Loss. In the Network Analyzer mode, it is used to select the required S parameter measurement mode, data format and time domain function settings. In the Spectrum Analysis mode, it is used to select different measurement functions, including field strength measurement, channel power, OBW, AM / FM DM, ACPR, etc. or set signal source power output. In the Vector Voltmeter mode, it is used to set such parameters as measurement type, port selection, measurement format, relative measurement switch and output power, etc..
- [Mode]: It is used to select the working mode of the analyzer, which can be selected as CAT, Network Analyzer, Spectrum Analyzer, Power Monitor, USB Power Meter and Voltage Voltmeter, etc..
- [Cal]: It is used to select the type of device under calibration piece, perform calibration, turn calibration on and off, and resume calibration in the CAT mode, Network Analyzer mode, and Vector Voltmeter mode.
- [Trace]: It is used to set such parameters as trace calculation and limit line in the CAT mode and the Network Analyzer mode. In the Spectrum Analyzer mode, it is used for switching, opening, closing, holding and refreshing traces and setting limit lines, etc..
- [Sweep]: It is used to set such parameters as Swp Time, Points, Swp mode and Trigger mode in the CAT mode and the Network Analyzer mode. In the Spectrum Analyzer mode, it is used to set such parameters as Swp Time, Swp Type and Swp Mode, etc.. In the Power Monitor mode, it is used to set Swp Type.
- [System]: In the local working mode, it is used for system date, time and power saving mode, viewing electronic serial numbers of products, selecting system operation language and other system-related settings; When the analyzer is under remote control, press this key to restore local functions.
- [File]: It is used for setting the working state of the analyzer as well as storing and calling measurement data.
- [↑] and [↓]: Are used to control stepping up and down or to move up and down to select the current item.
- [←] Backspace key: Is used to delete the last number or character entered.
- [Cancel]: Is used to ignore the settings and input in the dialog box and close the dialog box.
- [OK]: Is used to confirm the settings and input values in the dialog box and close the dialog box.
- [Reset]: Is used for system reset, system restart and restoring to the default initial state. Press this key and release it to reset.

- **[Power Icon]**: Is used for turning on and off the analyzer. If an external power adapter is used for power supply, when the instrument is in the "standby" state, the yellow indicator near the power switch is on; Press and hold the power switch for over 3 seconds, and the green indicator will be on, indicating that the instrument is in the "working" state. Its colors corresponding to the physical states of the instrument are as shown in the following table.

Table 2.2 Indicators states

| Instrument state | Indicator state   | Physical state of spectrum analyzer   |
|------------------|-------------------|---|
| Power off        | Off               | a) Battery installed, power not connected.<br>b) Battery not installed, power not connected.  |
|                  | Normal on, yellow | a) Battery not installed, power connected.<br>b) Battery installed and full, power connected.   |
|                  | Flashing, yellow  | a) Battery installed and not full, power connected.   |
| Power on         | Normal on, green  | a) Battery not installed, power connected.<br>b) Battery installed and full, power connected.<br>c) Battery installed, power not connected. |
|                  | Flashing, green   | a) Battery installed and not full, power connected.   |

- **Speaker**: Please keep the opening clean, so as to guarantee the sound effect.

## 2.4 Operator Interface

4957D/E/F is equipped with a 8.4" touch screen LCD, which can offer good visibility under direct sunshine. The operation interface is shown in Figure 2.2. Adhering to the concept of energy conservation and environmental protection, 4957D/E/F also features the sleep and automatic shutdown functions.

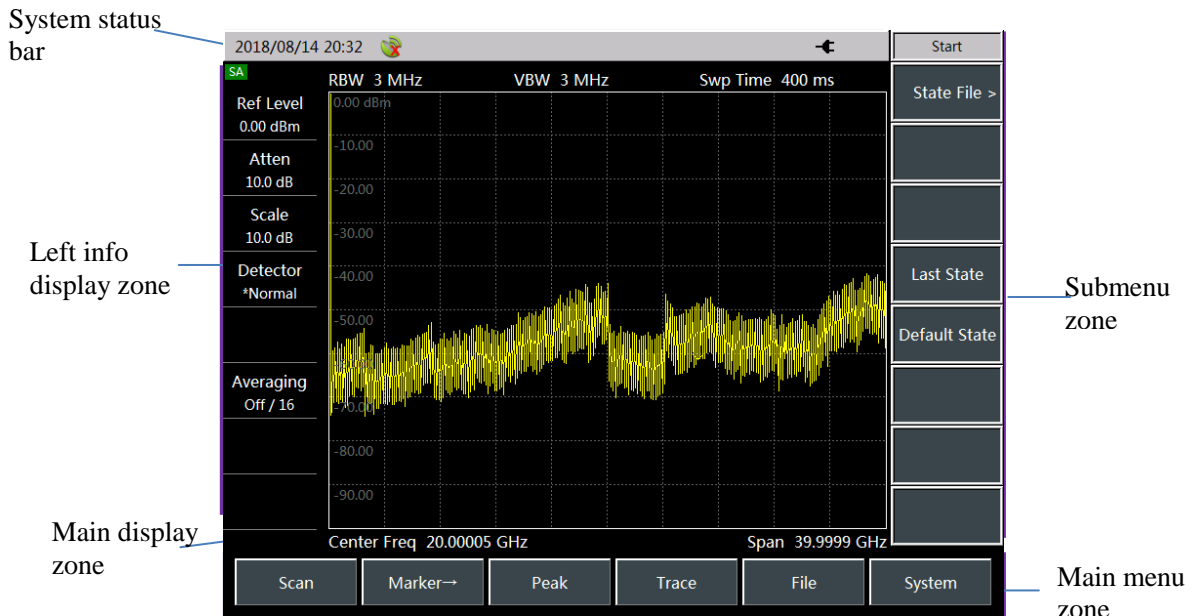


Figure 2.2 Operation interface of 4957D/E/F microwave analyzer

## 2.5 Top Interfaces

The top panel of the 4957D/E/F can be divided into three parts: Power interface, digital interfaces and test ports.

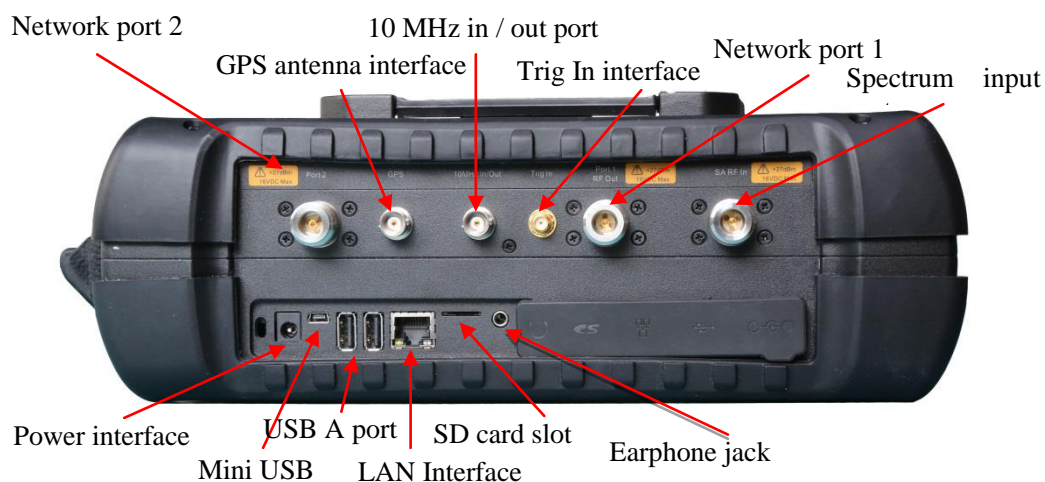


Figure 2.3 Top interfaces of 4957D/E/F microwave analyzer

### 2.5.1 Power Interface

The power supply interface of the instrument can supply power to the analyzer through DC output of a AC-DC adapter or external DC power supply. The inner conductor of the external power interface is positive, and the outer conductor is grounded.

### 2.5.2 Test Ports

1. GPS antenna interface: Marked as "GPS antenna", BNC (female), is used to connect GPS antenna, with the internal GPS receiving module providing GPS functions.
2. Trig In interface: Marked as "Trig In", is used for external trigger signals and is a 3.5mm female port.
3. 10 MHz input / output port: Marked as "10 MHz In / Out", with 50  $\Omega$  impedance, BNC female adapter. 4957D/E/F microwave analyzers can receive externally input 10 MHz sine signals as phase-locked reference signals, and the input signals should meet the frequency of 10 MHz + 100 Hz and the amplitude of 0 dBm (limited range:-20 DBM + 10 DBM); It can also output a sine signal of 10 MHz as the frequency reference signal of an external device.
4. Spectrum input port: Marked as "SA RF In", is used for input of measured signals in the Spectrum Analyzer mode. The test signal input port of 4957D/E/F microwave analyzers is 50  $\Omega$ , N-type female or 3.5 mm or 2.4 mm male port.
5. Network test port: The test ports in the Network Test mode of the analyzer are two 50  $\Omega$ , N-type female or 3.5 mm or 2.4 mm male ports, respectively marked "Port 1" and "Port 2", which can be switched between the RF source and the receiver to measure the in two directions.



#### Warning

In order to better protect the analyzer, the test port of the instrument is provided with some symbols. When using the analyzer, users must pay attention to the symbols, so as to avoid permanent damage to the instrument.

See section 2.5.4 for the description of the symbols of the instrument.

### 2.5.3 Communication Interfaces

1. Mini USB interface: Is used to connect the main equipment. If connected to an external computer, the PC can run relevant tool software for programming and data transmission of 4957D/E/F.
2. LAN (Network) Interface: Standard RJ-45 type, a 10 / 100 Mbps Ethernet connector with a standard 8-pin structure that allows for automatic selection between two data rates. It is used to connect to a local network or to realize remote control of the instrument.
3. Type A USB interfaces: 2, for connecting slave devices, such as USB storage devices, a mouse or a keyboard, etc..
4. SD card slot: Micro SD card slot, which can be used for expanding the storage space of the instrument.
5. Earphone interface: A 3.5 mm / 3-wire standard earphone interface for output of FM / AM / SSB demodulated audio signal. When no earphone is connected to the interface, the sound is output by the speaker of the analyzer; when an earphone is connected, the sound output is automatically switched from the speaker to the earphone.

### 2.5.4 Instrument Symbols



The instrument symbol (yellow label) shown in the figure indicates that the max power input from the test spectrum input port and the network input port is +27 dBm and the maximum input DC level is 16 VDC. When using the instrument, do not connect a signal exceeding this range to the port, otherwise, the instrument may be burnt down!

## 2.6 Battery

The 4957D/E/F is equipped with a large-capacity rechargeable li-ion battery, which can last for more than 2 hours. **In order to ensure the battery life, the battery should be taken out of the battery compartment during transportation and long-term storage.** For a long-term field test, it is recommended to purchase a battery of the same model as the enclosed battery for backup.

The 4957D/E/F battery is easy to install or replace. First, open the battery cover, then put the battery into the battery compartment, push the battery in, and finally close the battery cover.

In addition, for the exhausted battery, the charging time in the shutdown state is more than 6 hours. It is not recommended to make the battery empty. When the instrument indicates that the battery level is low, please charge it in time.

## Chapter III Typical Applications

4957D/E/F offers a variety of measurement modes. This chapter will provide a detailed introduction to commonly used test cases in each mode.

### 3.1 Calibration in the VNA Mode

In order to ensure the accuracy of the measurement results, the instrument must be calibrated before testing to eliminate the systematic error of the analyzer. 4957D/E/F adopts mechanical calibration method with the process is as follows:

#### 1. Frequency response error correction

You can eliminate the frequency responses of the following measurements for measured test component assembly:

- Reflection measurement
  - Transmission measurement
- a) Frequency response error correction of reflection measurement
    - 1) In the VNA mode, select the desired type of measurement:
      - If reflection measurement is required at port 1 (positive, S11), keep the default setting of the instrument.
      - If reflection measurement is required at port 2 (reverse, S22), press [Measure] → [S22].
    - 2) Set other parameters of the equipment measurement: Start Freq, Stop Freq, Power, Points or IF BW, etc..
    - 3) Press [Cal] to open the calibration menu.
    - 4) Press [Cal Kit] to see if the calibration kit is consistent with the kit specified with the current soft key. If not, press the corresponding soft key to select the correct calibration kit model.
    - 5) Press [OK], return to the menu bar of [Cal], select the frequency response error correction function, press [M Cal>] → [Freq Resp>] → [OPEN S11>], and the system will automatically prompt "Connect OPEN in P1, then press corresp. menu button to start!" then connect the open circuit device to port 1 selected as the test port.
    - 6) After the display trace is stable, to measure the standard piece, press [OPEN], the analyzer will display "calibration standard measurement ..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, it will display the prompt "Press [Done] to complete the measurement!" And the software menu will be underlined to indicate that the project has been tested, such as [OPEN].
    - 7) Press [Done] to complete the error correction of reflection measurement, which allows for connection and measurement of the DUT.
    - 8) Similarly, repeat step 5), select another frequency response error correction function, press [M Cal>] → [Freq Resp.>] → [SHORT S11>] or [OPEN S22>] or [SHORT S22>], and connect an open circuit or a short circuit device at the corresponding test port according to different prompts to perform steps 6) and 7).

#### Note

The standard allows only one standard piece to be measured. If a wrong key is pressed when selecting a standard piece, return to [Cal] → [M Cal] → [Freq Resp.] and select the correct standard piece. Do not use the standard pieces of the circuit closer in reflection response correction.

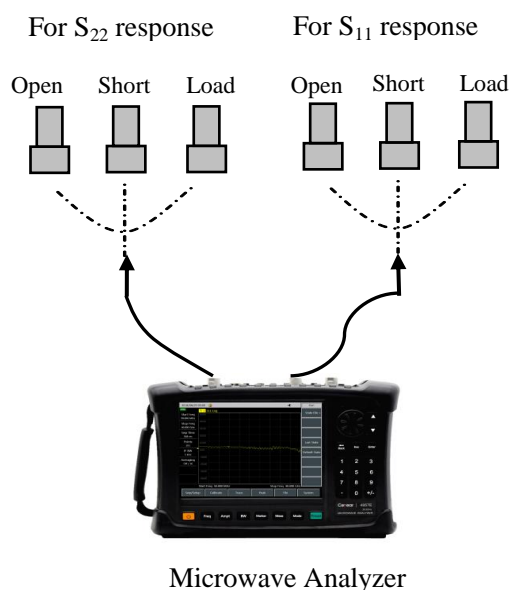


Figure 3.1 Standard piece connection of reflection measurement response correction

- b) Response error correction of transmission measurement
- 1) In the VNA mode, select the desired type of measurement:
    - If transmission measurement is required in the positive direction ( $S_{21}$ ), press **【Measure】** → [ $S_{21}$ ].
    - If transmission measurement is required in the reverse direction ( $S_{12}$ ), press **【Measure】** → [ $S_{12}$ ].
  - 2) Set other parameters of the equipment measurement: Start Freq, Stop Freq, Power, Points or IF BW, etc..
  - 3) Press [Cal] to open the calibration menu.
  - 4) Select the frequency response error correction function, Press [M Cal>] → [Freq Resp>] → [THRU  $S_{12}$ >] or [THRU  $S_{21}$ >], and the system will automatically prompt "Connect Thru cable between P1 and P2, then press corresp. menu button to start!" Then connect N-type cable between ports 1 and 2.

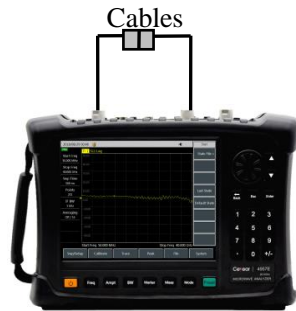
**Note**

All adapters or cables used in device measurement should be included, i.e. connecting standard equipment to the location where the DUT is to be connected.

- 5) After the display trace is stable, press [THRU], the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, the measured item will be underlined, e.g., [THRU], with the soft key [Done] displayed.
- 6) Press [Done] to complete the error correction of reflection measurement, which allows for connection and measurement of the DUT.

**Note**

Do not use open circuit device or short circuit device standard pieces for transmission response correction.



Microwave analyzer

Figure 3.2 Standard piece connection of transmission measurement response error correction

- c) Correction of transmission measurement response and isolation
  - 1) In the VNA mode, select the desired type of measurement:
    - If transmission measurement is required in the positive direction (S21), press **【Measure】** → [S21].
    - If transmission measurement is required in the reverse direction (S12), press **【Measure】** → [S12].
  - 2) Set other parameters of the equipment measurement: Start Freq, Stop Freq, Power, Points or IF BW, etc..
  - 3) Open the calibration menu and press [Cal].
  - 4) Select the frequency response error correction function, Press [M Cal>] → [Resp.&Iso@S12] or [Resp.&Iso@S21, and the system will automatically prompt "Connect Thru cable between P1 and P2, then press corresp. menu button to start!", then perform cable connection at the point where you want to measure the DUT.

**Note**

All adapters or cables used in device measurement should be included, i.e. connecting standard equipment to the location where the DUT is to be connected.

- 5) After the display trace is stable, press [THRU], and the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, the measured item will be underlined, e.g., [THRU], with the display "Connect LOADs in P1 and P2, then press corresp. menu button to start!" to complete the measurement!"
- 6) Then connect the impedance matching load to port 1 and port 2 of the analyzer.
- 7) After the display trace is stable, press [Iso], and the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, the measured item will be underlined, e.g., [Iso], with the display "Press [Done] to finish measure!" At the same time, the [Done] soft key is displayed.
- 8) Press [Done], the system will calculate the isolation error coefficient, and will display the corrected data record line, indicating that the data of this channel is enabled.
- 9) In this way, the response and isolation correction of transmission measurement is completed and you can connect and measure the DUT.

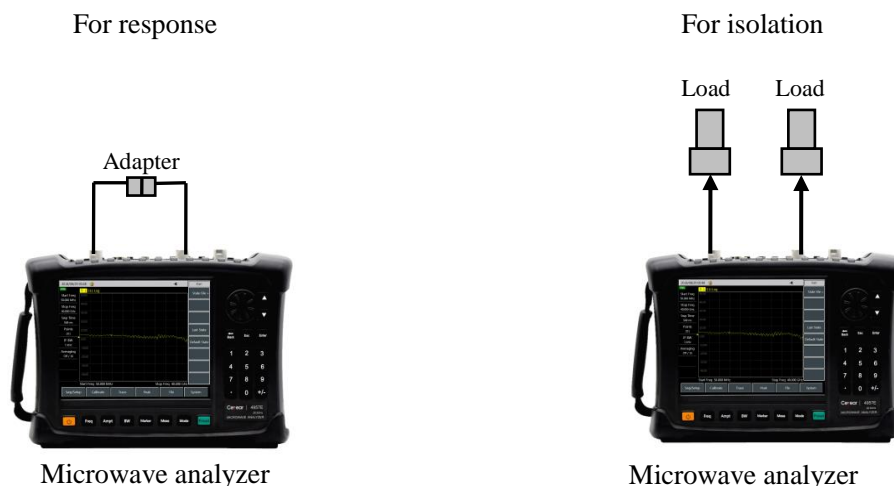


Figure 3.3 Standard piece connection of transmission measurement response and isolation error correction

## 2. Single port error correction

- The directional error of the assembly of the DUT is eliminated
- The source matching error of the assembly of the DUT is eliminated
- The frequency response of the assembly of the DUT is eliminated

You can perform single port correction on S11 or S22 measurements of the analyzer. The two processes are basically the same except that the selected measurement parameters are different.

- 1) In the VNA mode, select the desired type of measurement:
  - If reflection measurement is required at port 1 (positive, S11), keep the default setting of the instrument.
  - If reflection measurement is required at port 2 (reverse, S22), press [Measure] → [S22].
- 2) Set other parameters of the equipment measurement: Start Freq, Stop Freq, Power, Points or IF BW, etc.
- 3) Open the calibration menu and press [Cal].
- 4) Press [Cal] → [Cal Kit] to see if the calibration kit is consistent with the kit specified with the current soft key. If not, press the corresponding soft key to select the correct calibration kit model. Press [Back] to return to the [Cal] menu and press [M Cal] to select the type to be corrected.
  - If reflection measurement is required at port 1, press [One Port@S11].
  - If reflection measurement is required at port 2, press [One Port@S22].
- 5) If it is at port 1, the system will automatically prompt "Connect OPEN in P1, then press corresp. menu button to start!" , and then connect the standard open circuit device to the port selected as the test port (port 1 for S11, port 2 for S22).

### Note

All adapters or cables used in device measurement should be included, i.e. connecting standard equipment to the location where the DUT is to be connected.

- 6) After the display trace is stable, to measure the standard piece, press [OPEN], the analyzer will display "Cal std measuring..." during the measurement of the standard



piece, and after completing the measurement and calculating the error coefficient, it will display the prompt "Connect SHORT in P1, then press corresp. menu button to start!" And the software menu will be underlined to indicate that the project has been tested, such as [OPEN].

- 7) Disconnect the open circuit device, and connect the short circuit device to the test port.
- 8) After the display trace is stable, to measure the standard piece, press [SHORT], the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, it will display the prompt "Connect LOAD in P1, then press corresp. menu button to start!" And the software menu will be underlined to indicate that the project has been tested, such as [SHORT].
- 9) Disconnect the breaker, and connect the load to the test port.
- 10) After the display trace is stable, to measure the standard piece, press [LOAD], the analyzer will display "calibration standard measurement ..." during the measurement of the standard piece, and after completing the measurement and calculating the error coefficient, it will display the prompt "Press [Done] to complete the measurement!" And the software menu will be underlined to indicate that the project has been tested, such as [LOAD].
- 11) Pay attention to record the error coefficient, and press [Done]. The analyzer will display the corrected data trace, indicating that correction is enabled.

In this way, the single port calibration of reflection measurement is completed and you can connect and measure the DUT.

### Note

The open circuit device, short circuit device and load can be measured in any order without following the order in this example.

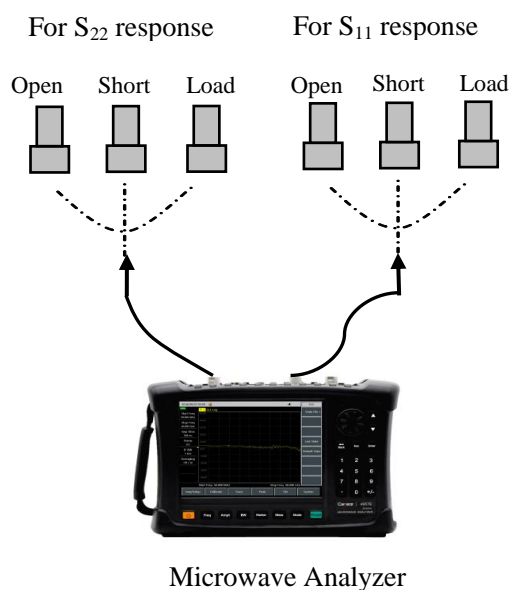


Figure 3.4 Standard piece connection of single port error correction

### 3. Full 2 ports error correction

Full 2 ports error correction allows for correction of 12 error terms such as positive and reverse directivity, source matching, load matching, frequency response and isolation, etc..

#### Note

This is the accurate error correction process. The analyzer performs positive and reverse sweeps to update a measurement trace, which takes more time than other correction processes.

- 1) Set parameters of the equipment measurement: Start Freq, Stop Freq, Power, Points or IF BW, etc..
- 2) Open the calibration menu and press [Cal].
- 3) Press [Cal Kit] to see if the calibration kit is consistent with the kit specified with the current soft key. If not, press the corresponding soft key to select the correct calibration kit model.
- 4) Press [Back] to return to the [Cal] menu bar, and press [M Cal>], select the type to be corrected, then press [Full 2 Ports], and the system will prompt "Press [Reflect] to start Reflect measure!".
- 5) To perform reflection measurement, press [Reflect>], and the system will prompt "Connect OPEN in P1, then press corresp. menu button to start!" , connect the open circuit device to test port 1 according to the diagram, and after the display trace is stable, press [P1 OPEN], the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement, it will display the prompt "Connect SHORT in P1, then press corresp. menu button to start!" And the software menu will be underlined to indicate that the project has been tested, such as [P1 OPEN].
- 6) Disconnect the open circuit device, and connect the short circuit device to the test port 1. After the display trace is stable, to measure the standard piece, press [P1 SHORT], the analyzer will display "calibration standard measurement..." during the measurement of the standard piece, and after completing the measurement, it will display the prompt "Port 1 Short Measure Done. Connect LOAD in P1, press 'P1 LOAD'", and the software menu will be underlined to indicate that the project has been tested, such as [P1 SHORT].
- 7) Disconnect the short circuit device, connect the load to test port 1, after the display trace is stable, press [P1 LOAD], and the analyzer will display "Cal std measuring..." during the measurement of the standard piece, and after completing the measurement, the system will display "Connect LOAD in P1, then press corresp. menu button to start!" And the software menu will be underlined to indicate that the project has been tested, such as [P1 LOAD].
- 8) Disconnect the load from port 1, and connect the open circuit device, short circuit device and load in sequence at port 2 according to the calibration method of port 1 to complete the measurement of standard pieces such as open circuit, short circuit and load of S22.
- 9) After completing all reflection calibration of ports 1 and 2, the system will prompt "Press [Done] to finish measure!", press [Done], and the system will automatically calculate the reflection coefficient.
- 10) Return to the parent menu for transmission calibration. Press [Tr>], and the system will display "Connect Thru cable between P1 and P2, then press corresp. menu button to start!" , connect test port 1 and test port 2 with cables. You can press [Auto Meas], and the system can automatically complete four transmission calibration tasks in turn, or press [Pos Match], [Pos Trans], [Rev Match] and [Rev Trans] in turn

to complete each calibration task individually. When all four tasks are completed, the full 2 ports transmission calibration is completed.

- 11) Press [Back] to return to the parent menu for isolation calibration. Press [Iso].
- 12) To perform isolation measurement, press [Iso], and the system will display "Connect LOADs in P1 and P2, then press corresp. menu button to start!" Connect loads at test port 1 and test port 2 respectively. You can press [Auto Meas], and the system will automatically complete two isolation calibration tasks in turn, or press [Pos Iso] and [Rev Iso] in turn to complete each calibration task individually. Or you can press [Ignore Iso] directly to ignore isolation calibration.
- 13) Finally, press the [Done] key to complete the full 2 ports calibration. After the calibration is completed, "Cal Off/On" will be displayed in the information zone. Connect the DUT for measure.

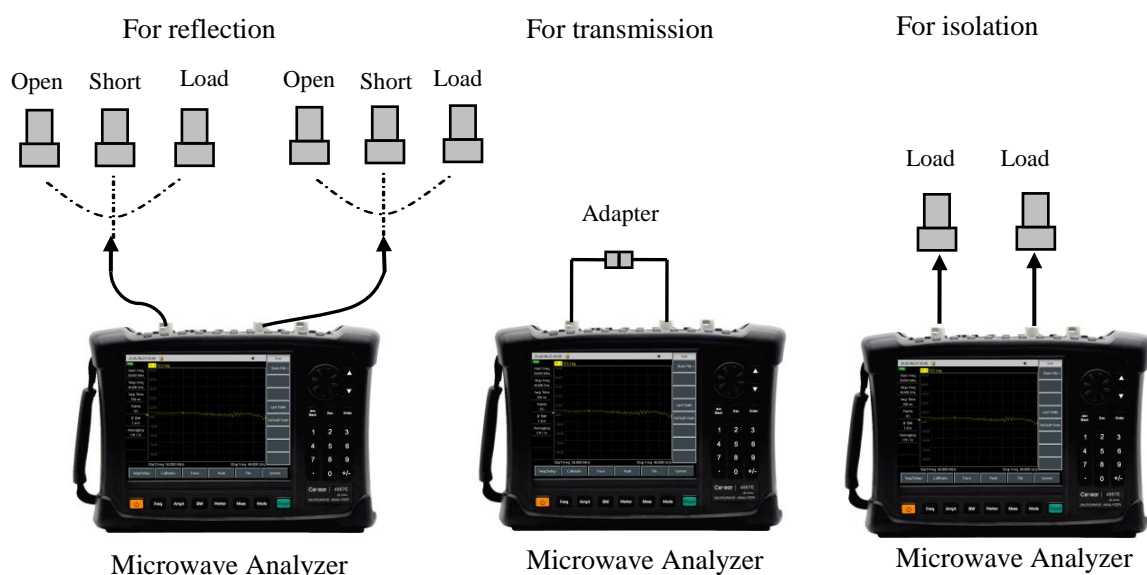


Figure 3.5 Standard piece connection of full 2 ports error correction

#### Note

In actual calibration, there is no sequence for the open circuit device, short circuit device and the loads, and users can choose the order at will. When calibration of all three states have been completed, click the [Done] menu to complete the calibration.

## 3.2 DTF Measurement in the CAT Mode

DTF (Distance to Fault) measurement, namely, fault locating measurement, is a performance verification and fault analysis tool used in the maintenance and repair of antennas and transmission lines. The DTF function of 4957D/E/F is realized by frequency domain reflectometer measurement technology. In engineering applications, DTF measurement usually adopts the connection method shown in Figure 3.6 to measure the fault point status of connection cables of equipment such as base stations.

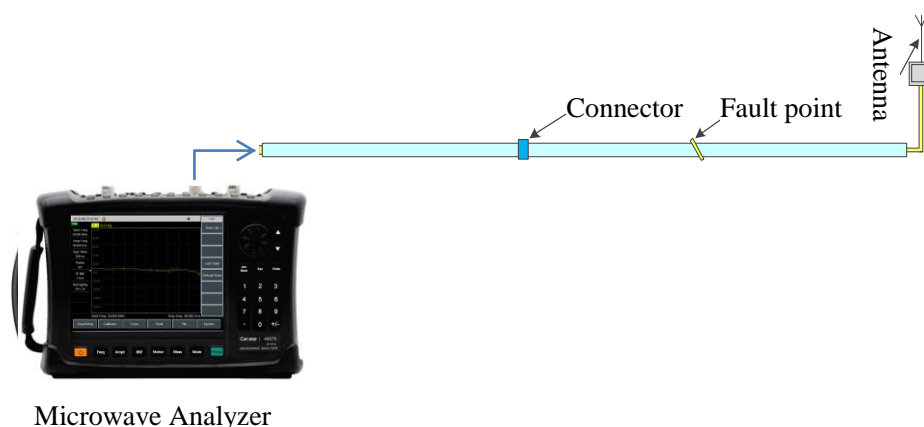


Figure 3.6 DTF measurement connection

4957D/E/F provides two measurement formats, DTF@return loss and DTF VSWR. The difference between the two is similar to that between return loss and VSWR measurements and will not be repeated here. Before entering the DTF measurement mode, measurement parameters such as Meas Freq Range, Points, IF BW, etc. should be set up to complete single port calibration, and then the DTF test should be carried out according to the following steps. First, connect the tested cable to network port 1:

- 1) Press **【Measure】**, then press [DTF VSWR] or [DTF Return Loss] soft key to activate the time domain conversion function and enter DTF measurement mode;
- 2) Press [Freq] and [Start Dist] to enter the start distance to be observed, and select the unit key [meter] on the touch screen to complete the setting and close the dialog box;
- 3) Press [Freq] and [Stop Dist] to enter the stop distance to be observed, and select the unit key [meter] on the touch screen to complete the setting and close the dialog box;
- 4) To set the window function, press [Freq] and [Window] to display the submenu of [Window>], and then select different window functions;
- 5) Press [Back], [Unit@m|ft] to set the required distance unit system;
- 6) Press [Cable@Specification>] and [Load Cable] to select the model of the cable to be tested in the cable model selection list, then press [OK] to complete the selection and close the dialog box;
- 7) If there is no corresponding cable model, press [Cable@Specification>] and [Cable Loss] to enter the cable loss of the tested piece, press [OK] to complete the setting and close the dialog box;
- 8) Press [Velocity] to enter the transmission velocity of the DUT, and press [OK] to complete the setting and close the dialog box;
- 9) Observe and record the test result.

### 3.3 Signal Measurement in the SA Mode

This section will briefly introduce the measurement functions and methods of the spectrum analysis mode of 4957D/E/F microwave analyzer so that users who are using this instrument for the first time can have a general understanding of the test operation processes and can perform basic measurement.

#### 1. Mode selection

Connect the measured signal to the spectrum input port of the analyzer through a cable, and press [Mode] → [Spectrum Analyzer] and [OK] to finish after startup and preheating. The spectrum analyzer mode is shown in Figure 3.7

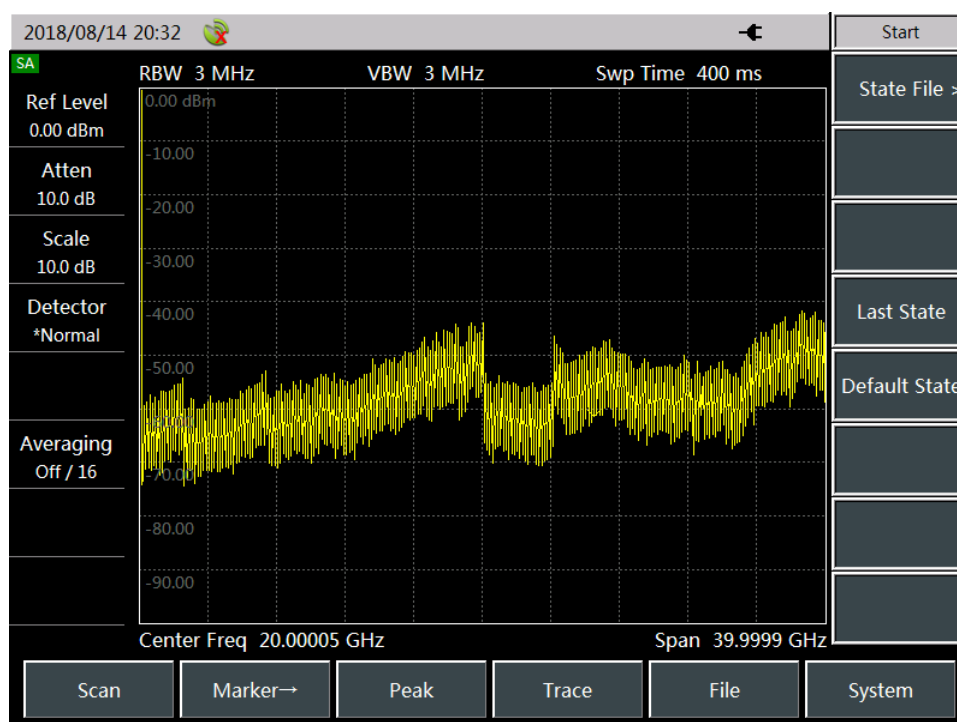


Figure 3.7 Test interface of the SA mode

## 2. Setting reference level

Set reference level in the spectrum analysis mode. Press [Amplitude] → [Ref Level], then input the value with the numeric keys, and select the corresponding unit from the touch screen to complete the input. For Example: Press [Amplitude] → [Refer Level] → [0] → [dBm] to set the reference level to 0 dBm.

## 3. Setting center frequency

Press the [Freq] key. This operation activates the function to set parameters like the center frequency, allows the information input zone to display the current center frequency value, and make the soft menu display the contents corresponding to the [Freq] key. Set the center frequency to 300 MHz. Enter [3], [0], and [0] directly with the keys in the data zone of the front panel, and then press the corresponding [MHz] keys. These numeric keys can be used to set exact values for the current parameters, and the step key and the roller can also be used to change the center frequency value.

## 4. Setting sweep span

Press [Freq] → [Span>] Note whether the span data is displayed in the information input zone to determine the currently activated parameters. Reduce the span, to 20MHz, for instance, type [2] and [0] with the data keyboard, select the unit [MHz], or use the [↓] key to step down to this value (both numeric keys and step keys can be used to change the value of the current parameter). You can also press [Span Zero] or [Span Full] to set the min and max sweep spans. Press [Span Pre] to set the value of the previous sweep span.

## 5. Activating marker

4957D/E/F microwave analyzer provides up to eight independent markers for reading out the measurement results. Press [Mkr] → [Sel Mkr] → [Mkr 1], [[Mkr 2]...[[Mkr 7], [[Mkr 8] to select the currently displayed marker. Each marker has two working modes, normal mode and delta mode. Set the marker to the delta mode. Press [Mkr] → [Delta Mkr] to directly input the frequency delta value. You can also move the marker with the [↑] [↓] keys or the rotary pulse generator to view the frequency and amplitude delta values.

Press [Peak] → [Max] and [Min] to let the analyzer automatically search for the max and min values of the measurement traces, or perform peak search of the marker, including

[Peak], [Sub Peak], [Right Peak], [Left Peak], etc.. You can also move the marker with the [↑] / [↓] keys and the roller, or position the marker by setting the standard marker according to the pop-up marker position and inputting the numerical value when pressing [Normal Mkr] and [Delta Mkr].

Press [Mkr] → [Counter Off / On] or [Noise Marker Off / On] to turn on counting and noise testing functions.

### 3.4 Measuring Signal Power in the Power Monitor (PM) Mode

The PM mode is an optional test function of the 4957D/E/F microwave analyzer, with the measured frequency range covering 100 kHz – 18 GHz (4957D), 100 kHz - 26.5 GHz (4957E), 100 kHz – 40 GHz (4957F). This mode, without the need of connection to an external power probe, can conveniently test the power of continuous wave signals with a certain bandwidth, and the channel bandwidth can be set to a larger value so as to simulate the average power meter measurement.

The test steps are shown as follows:

#### 1. Mode selection

Connect the measured signal to the spectrum input port of the analyzer through a cable, and press [Mode] → [Power Monitor] to select the PM mode and press [OK] to finish the mode setting.



Figure 3.8 Test interface of the PM mode

#### 2. Setting reference level

Press [Amplitude], and the setting options related to reference will be shown in the right side of the screen, then press [Refer Level 0.00 dBm] → [0] → [dBm] to set the reference level to 0 dBm.

#### 3. Setting center frequency

Press [Freq] → [Center] → [1] → [GHz], set the center frequency to 1 GHz, press [Freq] → [Span>] → [1] [0] [MHz] to set the span to 10 MHz.

#### 4. Reading test results

The measured power readings are displayed in two ways, dial and number, and the latter also offers display in dB or uW.

### 3.5 Measuring the Electrical Length of Cables or Other DUTs in the VVM Mode

The VVM mode of 4957D/E/F is a very convenient tool to ensure the phase matching of RF cables. It is mainly used to measure the electrical lengths of cables or other DUTs. This mode can directly replace a vector voltmeter and has the same flexible and convenient operation interface as the vector voltmeter. The results of single port electrical length measurement are displayed in amplitude and phase formats, while the results of all port are only displayed in the amplitude format.

The test steps are shown as follows:

#### 1. Mode selection

Connect the cable under test or another DUT to the network input port 1 of the analyzer as shown in Figure 3.9. Press [Mode] after startup and preheating, then select the **VVM** mode with the touch screen, and press [OK] to complete.

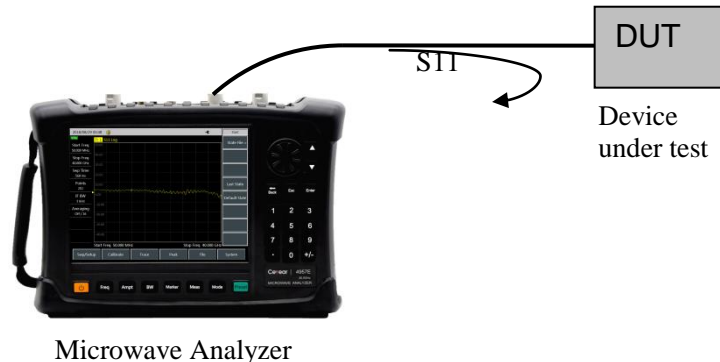


Figure 3.9 Measurement connection of the VVM mode

The interface of the VVM mode is shown in the figure:

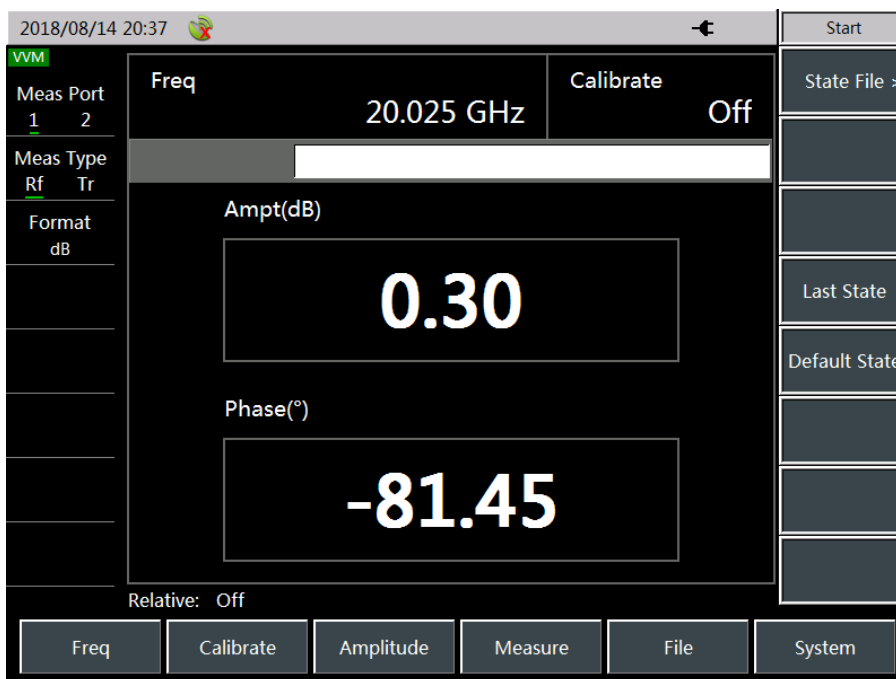


Figure3.10 Test interface of the VVM mode

## 2. Setting frequency range

Before vector voltage measurement, it is required to set the frequency value of the measured CW Freq signal. The frequency ranges of 4957D/E/F microwave analyzers in the VVM mode are 30 kHz – 18 GHz (4957D), 30 kHz - 26.5 GHz (4957E), 50 MHz - 40 kHz (4957F), respectively, and the corresponding key operations are as follows:

Press [Freq] and enter the frequency value, select corresponding frequency unit from the touch screen to complete center frequency setting.

## 3. Setting Measurement Ports

If reflection measurement is required at port 1, keep the default setting of the instrument.

If reflection measurement is required at port 2,

Press **【Measure】** → [Meas Port 1 2], switch to [Meas Port 1 2] with the soft key to change the default measurement type from port 1 to port 2.

If transmission measurement is required, when the excitation source port is port 1 or port 2, switch with the same operation method.

## 4. Calibration

Before vector voltage measurement and after the frequency setting and other measurement settings, calibration must be carried out to eliminate the systematic errors of the analyzer so as to ensure the validity and correctness of the measurement results. Please refer to the introduction of single port reflection error correction and all port error correction in the VVM mode.

## 5. Selecting measurement mode

The VVM mode of the analyzer allows for measurement of parameters of the DUT like amplitude, phase, VSWR and impedance, etc.

1) Press **【Measure】** → [Format dB>].

2) Select different measurement parameters with the menu soft keys, dB by default.

[dB], select the measurement parameter as amplitude, with the amplitude value and phase value displayed; [VSWR], select the measurement parameter as VSWR; [Re / Im], select the test parameter as impedance, with the information displayed in the real value and the imaginary value.

## 6. Setting the measurement type

If single port measurement is required, keep the default setting of the instrument.

If all port measurement is required,

Press [Measure] → [Meas Type@Rf|Tr], switch to [Meas Type@Rf|Tr] with the soft key to change the default measurement type from reflection to transmission.

## 7. Setting output frequency

It is used to set the source output power of the analyzer, which is divided into high, low and manual. The actual power output range is different for each model. The operation for setting the output function is as follows:

1) Press the [Amplitude] key, and selects [High] or [Low] from the touch screen to select the required power.

To improve the accuracy of the output power, you can manually set the output power as follows:

2) Press [Man -18 dBm] to select manual output power.

Enter the numbers with the numeric keys and select the unit on the touch screen to complete the input or adjust the roller or press [↑] [↓] to adjust the manual power.



### 3.6 Measuring Average Power in the UBS-PM Mode

The USB Power Meter (USB Power Meter) mode of 4957D/E/F adopts a USB interface to for connecting an external USB power probe via an UBS cable for power test. With the 8723X series USB power probes provided by China Electronics Technology Instruments Co., Ltd., it can test radio frequency / microwave signals up to 40 GHz and can measure real average power in a high dynamic range of -60 dBm to +20 dBm. The measurement reading is displayed on the display interface of the USB Power Meter mode of 4957D/E/F. The test block diagram is shown in Figure 3.11, and attenuators can be added as required.

The test steps are shown as follows:

#### 1. Mode selection

After startup, press [Mode], select the "USB Power Meter" mode, and press [OK] to complete.



Figure 3.11 Test interface of USB Power Meter mode

#### 2. Connecting power probes

- 1) As shown in the figure, connect the small end of the USB cable to 8723X series USB power probe.
- 2) Then connect the large end of the USB cable to the USB interface of the analyzer, and the green indicator light of the power probe will be on later.
- 3) If the power is turned off, remove the USB cable to turn off the power of the USB power probe, and then the green LED indicator will go out.

#### 3. Connecting the tested signal

- 1) Connect the power probe with the signal to be measured, and connect an attenuator or gain between the signal to be measured and the power probe as necessary to ensure that the signal power of the input probe is within the power range marked on the probe.
- 2) If an attenuator or gain is connected, the offset function can be used to set the offset value to cancel the attenuation value or gain value so as to read the actual power

value.

A typical test connection is shown in Figure 3.12 (an attenuator or gain to be added as necessary).

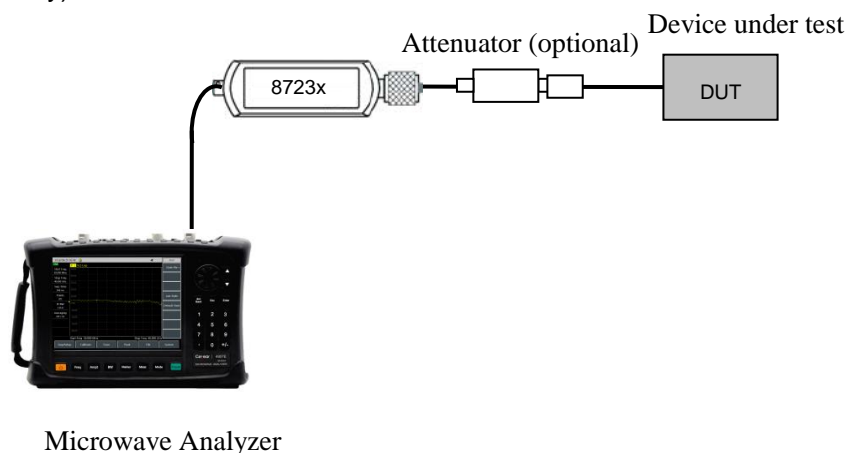


Figure 3.12 Measuring structure of UBS power measurement mode

#### 4. Zeroing

In order to improve the measuring accuracy of the instrument, zeroing is necessary before using 8723X series USB power probes to measure small signal power. Zeroing refers to measuring and storing the noise of the whole measuring channel. During the measurement, it is required to deduct the zeroing value from the actual measurement value, namely, deducting the noise of the channel, and after that the reading should be the input signal level of the channel. The zeroing of USB power probes is consistent with that of ordinary power probes. If the probe is connected to another device, please first turn off the signal output of such device before zeroing. The operation is as follows:

Press [Zero] → [Zero], then the analyzer will send a zeroing instruction to the USB power probe to perform internal zeroing.

#### 5. Setting frequency

Before USB power measurement, it is required to set the frequency value of the measured CW Freq signal. The USB power probe will store a set of correction factors for each frequency. The frequency corresponding to the measured power signal that is input corresponds to an appropriate correction factor. The frequency of power measurement, generally with no limit on the setting, can be set within the nominal frequency range of the USB power probe. The corresponding key operation is as follows:

Press [Freq] → [Freq], enter the frequency value with the numeric keys, and tap the frequency unit key on the right side of the touch screen to complete the center frequency setting.

#### 6. Setting measurement power range

The scale display of USB power measurement can be set to automatic or manual. The maximum and minimum values of the scale display can be set manually and will not change after setting, while the manual mode allows for more intuitive observation of the measurement results through the dial.

##### 1) Manual settings

If you need to manually set the power measurement range displayed on the dial according to user requirements, follow the following steps:

##### ➤ Max

Press [Amplitude] → [Max Scale], enter the max value with the numeric keys, and

press [OK] to complete the input.

➤ Min

Press [Amplitude] → [Min Scale], enter the min value with the numeric keys, and press [OK] to complete the input.

2) Auto Scale

With auto scale function of this mode, the display range of the measured power can be automatically adjusted in the following steps:

Press [Amplitude] → [Auto Scale].

7. Setting the relative measurement function

The relative measurement function reflects the changes of the power that has been set as the reference signal. The readings of the power value changes are expressed in dB and % respectively. When the relative measurement switch is turned on, the analyzer will measure and store the current power level, while the power measurement will display a power level relative to the saved value. Follow these steps:

Press [Amplitude] → [Relative Off / On], and switch to [Relative Off / On].

When the relative measurement function is turned on, the power readings will be shown as 0 dB and 100%. For example, to measure a signal with a power of 5 dBm, when the relative measurement function is turned on and the signal power is reduced to 2 dBm, the power readings at this time are -3 dB and 50%.

8. Setting the offset function

When the power of the measured DUT is greater than the maximum power that the instrument can measure, the measured power can be reduced within the normal measurement range by connecting an attenuator. The power offset function allows for setting offset values to offset attenuation values or cable losses for added attenuators or connecting cables. It also allows for setting power offsets for gains of added amplifiers. Positive values can compensate losses and negative values can compensate gains. For example, if a 10 dB attenuator is added to protect the probe, to avoid excessive input power, the offset value is set to 10 dB. At this time, the power reading of the analyzer is the actual reading. If an amplifier with a gain of 10dB is added to the measuring end, the offset value is set to -10 dB, and then the power reading of the analyzer is the actual reading. The function settings are as follows:

Press [Amplitude] → [Offset Off / On] to enable the power offset function.

9. Setting averaging

The averaging function is generally used to measure low-power signals or signals close to noise power. It can smooth traces to reduce the influence of random noise on the measurement and improve measurement accuracy, but at the same time it will reduce measuring speed. The times of averaging determine the times for reading averaging. The more averaging times, the more the noise will be reduced. The times of averaging are displayed at the upper left corner of the measurement data display zone. The times of averaging can be set between 1 ~ 999. Setting the averaging times will not affect the calibration accuracy. The averaging function is set as follows:

Press [BW] → [Ava Off / On] to turn on the averaging function, with the times set to 16 by default. You can also enter the desired averaging times with the numeric keys, and press [OK] to complete.

### 3.7 Testing Skills

The test steps of several test formats have been described in detail above, and now we'll introduce some common skills during the measurement below.

1. **Limit Line:** In batch tests, users have their own standards of qualification. In response, 4957D/E/F provides the [Limit] function of [Trace] in the Spectrum Analyzer mode to set the limit lines, which can facilitate product inspection. During batch testing, it is possible to judge whether a product is qualified by replacing the DUTs. The limit line function can be used to monitor signals in a certain frequency band. The 4957D/E/F microwave analyzer provides two limit lines, upper and lower. When the amplitude of a signal in a certain frequency band exceeds the set upper limit or is less than the set lower limit, the analyzer will send out an audio alarm signal. It can also store / recall the limit lines, thus avoiding repeated editing of the limit lines. Figure 3.13 shows an edited limit line.

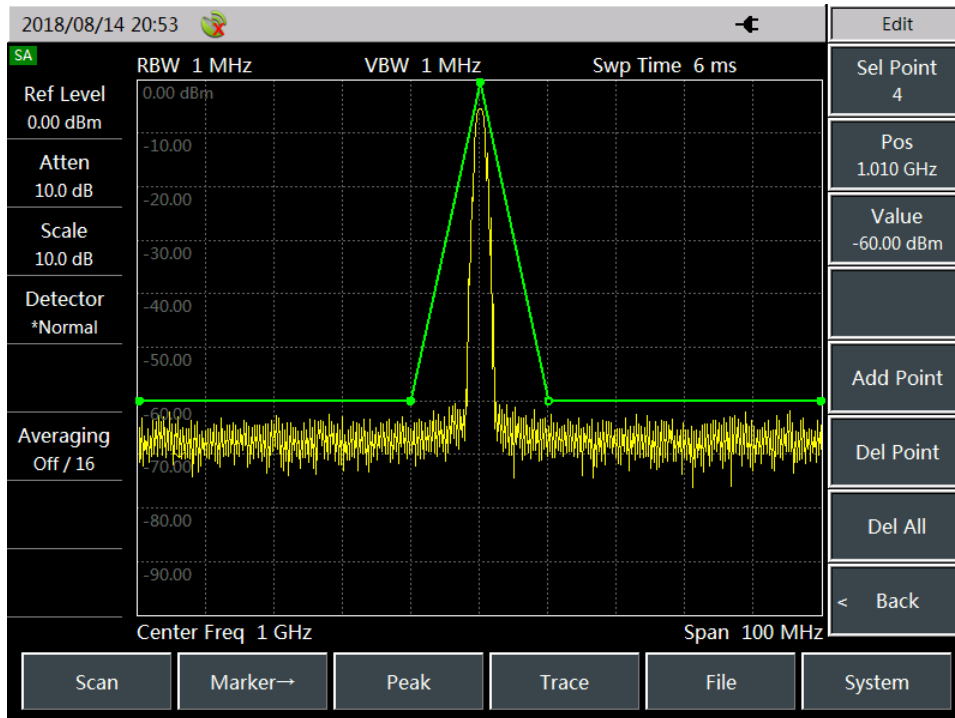


Figure 3.13 Use of limit lines

2. **List sweep:** A list sweep function is provided in the Spectrum Analyzer mode of 4957D/E/F microwave analyzer. In the list sweep mode, the analyzer performs sweep with the frequency range and other parameters set in the edited list. Figure 3-14 shows three results of list sweep.



Figure 3.14 List sweep function

3. **Save/Recall:** 4957D/E/F provides storage / recall functions, which, in the [File] menu, can store and recall measurement states, traces and pictures, thus effectively meeting users' demand for subsequent tasks like report writing, status viewing and data analysis. Note: The storage and calling function will not save the list related state. Please use the list related function under [Sweep] [Sweep Mode] to store and call the list related state. The Save / Recall@State function allows for saving and recalling relevant test settings of the analyzer, such as frequency settings, resolution bandwidth and video bandwidth settings. The Save / Recall@Trace function allows for selecting trace format as binary format or .csv data text format. The Print Screen function allows for saving the information displayed on the current screen into the memory of the instrument in an image format. The storage medium for state files and trace files can be selected as the memory of the analyzer, an SD card or a USB mobile storage device.

4. **DTF Measurement Distance and Resolution:** In DTF analysis, the measurement distance is affected by frequency sweep width (span), sweep points and the propagation speed of electromagnetic wave in the cable to be measured. The smaller the span, the longer the maximum distance of measurement. The more points, the longer the maximum distance of measurement.

In terms of cable loss, the effective directivity indicator of 4957D/E/F is  $\geq 30$  dB. If the energy of the reflected signal is less than the effective directivity, the effective test result cannot be obtained.

The DTF measurement resolution is related to frequency span. The wider the span, the higher the resolution.

## Chapter IV Getting Help

Generally, causes of problems are due to hardware, software or user maloperation. In case of any problem, check and save the error message, analyze possible causes, and refer to the methods provided in “4.1 Basic Inspection” for preliminary troubleshooting. You can also contact our service center and provide the error messages you’ve collected, and we will coordinate with you to solve the problem as soon as possible. Please refer to Section 4.2 for specific contact information, or check the website [www.ceyear.com](http://www.ceyear.com) to find contact information of the local technical team.

### 4.1 Basic Inspection

In case of any problem with the 4957D/E/F you are using, you can check it by yourself according to the following tips. If the problem cannot be solved, please contact us.

- ✧ If the 4957D/E/F cannot be started after pressing the start button, please check whether the power supply is normal and whether the adapter indicator is on or whether the battery level is normal. If there is nothing abnormal, instrument may be faulty, please contact us for repair.
- ✧ If the 4957D/E/F cannot enter the system or application program after startup, please press the [Reset] key to make 4957D/E/F return to a known state. If it still cannot work normally, it may be faulty, please contact us for repair.
- ✧ If the startup self-check of 4957D/E/F fails, press the [Reset] key to make 4957D/E/F return to a known state. If the self-test still fails, the instrument may be faulty, please contact us for repair.
- ✧ If the performance indicators of 4957D/E/F are abnormal, please check the test tools and test environment for compliance with the requirements, the test port connectors for any damages and the calibration piece for normal performance indicators; If everything above is normal, the instrument may be faulty, please contact us for repair.
- ✧ If the 4957D/E/F cannot realize communication via LAN, check the IP settings of the analyzer first, and check whether the yellow LED beside the LAN port on the rear panel flashes. If no, check the LAN cable connection.

### 4.2 Help information

Our customer service center can provide help to users at any time. We have set up sales points and offices throughout the country, each with technical support personnel stationed, who can quickly go to your site for technical exchange, training, product maintenance and other services and provide you with comprehensive and convenient technical support and related services for your convenient use of the instrument.

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

**Website: [www.ceyear.com](http://www.ceyear.com)**

**Email: [sales@ceyear.com](mailto:sales@ceyear.com)**

You can also get online query service at [www.ceyear.com](http://www.ceyear.com) or via QQ.

All the instruments we supply have passed the inspection by the internal quality and safety department, and we promise warranty of the instruments during the 18 months of warranty period since shipment; Instruments within the warranty period will enjoy free repair except for instrument failures due to human reasons; instruments outside the warranty period may be repaired at corresponding costs. We can solve your problems by telephone or on-site repair according to different situations of instrument failures,.

In addition, if the instrument fails, please contact us in time, and we will provide you with necessary assistance and repair, if necessary. To avoid damage to the internal circuits and devices due to wrong operation, users are strictly forbidden to disassembly the instrument without permission.



**Warning**

It is hereby declared that the user shall be responsible for any instrument damage or personal injury caused by improper or illegal operation.

### 4.3 Repair

In case of any failure to the 4957D/E/F that is difficult to be eliminated, contact us by phone or fax. If it is confirmed that the instrument needs to be repaired, please package the instrument according to the following steps:

- 1) Write a paper document describing the instrument failure and put it in the package together with the analyzer;
- 2) Pack it with the original packing materials, so as to minimize possible damage;
- 3) Place cushions at the four corners of the outer packing carton, and place the instrument in the outer packing carton;
- 4) Seal the opening of the packing carton with adhesive tape and reinforce the packing carton with nylon tape;
- 5) Specify text like “Fragile! Do not touch! Handle with care!” and so on;
- 6) Please check it as precision instrument, and keep a copy of all shipping documents.

## Annex 1: Technical indicators

The technical indicators of 4957D/E/F have been strictly tested at the factory. Users can also test and verify them according to the technical indicators provided in this manual, which are shown in the following schedule.

Schedule 1: Technical indicators of 4957D/E/F microwave analyzer

|                                     |                              | 4957D                                      | 4957E                                      | 4957F                                      |
|-------------------------------------|------------------------------|--|--|--|
| Antenna and vector network analysis | Frequency range              | 30 kHz ~ 18 GHz                            | 30 kHz ~ 26.5 GHz                          | 50 MHz ~ 40 GHz                            |
|                                     | Frequency accuracy           | $\pm 1 \times 10^{-6}$                     |  |  |
|                                     | Power range:                 | Hi, Low, Manual                            |  |  |
|                                     | Effective directivity        | 32 dB ~ 40 dB                              | 32 dB ~ 40 dB                              | 28 dB ~ 35 dB                              |
|                                     | Effective source matching    | 25 dB ~ 37 dB                              | 25 dB ~ 37 dB                              | 18 dB ~ 30 dB                              |
|                                     | Reflected tracking           | $\pm 0.10\text{dB} \sim \pm 0.14\text{dB}$ | $\pm 0.10\text{dB} \sim \pm 0.25\text{dB}$ | $\pm 0.10\text{dB} \sim \pm 0.25\text{dB}$ |
|                                     | Transmission tracking        | $\pm 0.25\text{dB} \sim \pm 0.33\text{dB}$ | $\pm 0.25\text{dB} \sim \pm 0.35\text{dB}$ | $\pm 0.25\text{dB} \sim \pm 0.50\text{dB}$ |
|                                     | Dynamic range                | $\geq 85 \text{ dB}$                       | 80 dB ~ 85 dB                              | 65 dB ~ 85 dB                              |
| Power Meter                         | Frequency range              | 100 kHz ~ 18 GHz                           | 100 kHz ~ 26.5 GHz                         | 100 kHz ~ 40 GHz                           |
|                                     | Power range:                 | -60 dBm ~ +20 dBm                          | -60 dBm ~ +20 dBm                          | -50 dBm ~ +20 dBm                          |
| Spectrum Analyzer mode              | Frequency range              | 100 kHz ~ 18 GHz                           | 100 kHz ~ 26.5 GHz                         | 100 kHz ~ 40 GHz                           |
|                                     | Res BW                       | 1 Hz ~ 5 MHz (1, 3 sequence)               |  |  |
|                                     | Video bandwidth              | 1 Hz ~ 5 MHz (1, 3 sequence)               |  |  |
|                                     | Explicit average noise level | -140 dBm ~ -151 dBm (Pre Amp On)           | -138 dBm ~ -151 dBm (Pre Amp On)           | -135 dBm ~ -151 dBm (Pre Amp On)           |
| -120 dBm ~ -135 dBm (Pre Amp Off)   |                              | -116 dBm ~ -135 dBm (Pre Amp Off)          | -113 dBm ~ -135 dBm (Pre Amp Off)          |  |



|  |   |  |               |                |
|--|---|--|---------------|----------------|
|  | Noise sideband (CF=1 GHz)                                 | $\leq -102$ dBc / Hz@30 kHz; $\leq -99$ dBc / Hz@100 kHz; $\leq -110$ dBc / Hz@1 MHz |               |                |
|  | Residual response   | $\leq -80$ dBm   |               | $\leq -70$ dBm |
|  | Maximum safe input level                                  | +27 dBm  |               |                |
| Test port type                                   | N type (female)   | 3.5 mm (male)  | 2.4 mm (male) |                |
| Power supply                                     | Rechargeable li-ion battery or power adapter              |  |               |                |
| Power consumption                                | $\leq 45$ W (excluding battery charging)                  |  |               |                |
| Working temperature range                        | $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$            |  |               |                |
| Storage temperature range                        | $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$            |  |               |                |
| Max. weight                                      | 5.3 kg (excluding battery)                                |  |               |                |
| Max. outside dimensions (Width x Height x Depth) | 315 mm x 220 mm x 102 mm (excluding handles and supports) |  |               |                |

## Annex 2: List of Accessories / Options

Schedule 2: List of Accessories / Options of 4957D/E/F Microwave Analyzer

| Category  | Accessory / Option No. | Accessory / Option  |
|-----------|------------------------|---|
| Accessory | ---                    | Power cord assembly 1   |
|           | ---                    | AC-DC adapter 1   |
|           | ---                    | Rechargeable li-ion battery 1   |
|           | ---                    | Quick Start Guide 1   |
|           | ---                    | CD 1  |
|           |                        | Certificate of Conformity 1   |
|           | ---                    | Packing list 1  |
| Optional  | 4957D-01               | User's Manual   |
|           | 4957D-02               | Programmer's Manual   |
|           | 4957D-S02              | Antenna test (software)   |
|           | 4957D-S03              | Vector voltmeter (software)   |
|           | 4957D-S04              | USB power measurement (software, USB power probe to be equipped separately) |
|           | 4957D-S05              | Power meter (software)  |
|           | 4957D-S06              | Field strength measurement (software, antenna to be equipped separately)    |
|           | 4957D-S07              | GPS positioning (software, including GPS antenna)                           |
|           | 4957D-H01              | Rechargeable li-ion battery   |
|           | 4957D-H02              | AC-DC adapter   |
|           | 4957D-H03              | English (panel, keys, nameplate)  |
|           | 4957D-H04              | 31101A N-type male calibration piece  |
|           | 4957D-H05              | 31101B N-type female calibration piece                                      |
|           | 4957D-H06              | 31121 3.5 mm calibration piece  |
|           | 4957D-H07              | 31123 2.4 mm calibration piece  |
|           | 4957D-H08              | N-type male-male calibration cable  |

|           |  |
|-----------|--|
|           | GORE-OSZKUZKU0240  |
| 4957D-H09 | N-type female-male calibration cable<br>GORE-OSZKUZKV0240    |
| 4957D-H10 | 3.5 mm female-female calibration cable<br>GORE-0RD02D02024.0 |
| 4957D-H11 | 3.5 mm female-male calibration cable<br>GORE-0RD01D02024.0   |
| 4957D-H12 | 2.4 mm female-female calibration cable<br>GORE-0K0CK0CK024.0 |
| 4957D-H13 | 2.4 mm female-male calibration cable<br>GORE-0K0CJ0CK024.0   |
| 4957D-H14 | 87230 USB CW power probe                                     |
| 4957D-H15 | 87231 USB CW power probe                                     |
| 4957D-H16 | 87232 USB CW power probe                                     |
| 4957D-H17 | 87233 USB CW power probe                                     |
| 4957D-H18 | 89101A antenna   |
| 4957D-H19 | 89101B antenna   |
| 4957D-H20 | 89101C antenna   |
| 4957D-H21 | 89101D antenna   |
| 4957D-H22 | 89901 antenna  |
| 4957D-H23 | 89401 antenna amplifier                                      |
| 4957D-H24 | 71522D attenuator  |
| 4957D-H25 | 71523C attenuator  |
| 4957D-H26 | 71524C attenuator  |
| 4957D-H27 | 71101 adapter  |
| 4957D-H28 | 71115 adapter  |
| 4957D-H29 | 71116 adapter  |
| 4957D-H30 | 71117 adapter  |
| 4957D-H31 | 81101 adapter  |

|  |           |                              |
|--|-----------|------------------------------|
|  | 4957D-H32 | Soft backpack                |
|  | 4957D-H33 | Aluminum alloy carrying case |
|  | 4957D-H34 | Waterproof case              |