ADVANTEST CORPORATION

U3700 Series
User's Guide

MANUAL NUMBER FOE-8440185H00

Applicable Models
U3741
U3751
U3771
U3772

First printing November 20, 2004
Printed in Japan

Certificate of Conformity

This is to certify, that

Spectrum Analyzer

U3700 Series

instrument, type, designation

complies with the provisions of the EMC Directive 89/336/EEC (All of these factors are revised by 91/263/EEC,92/31/EEC,93/68/EEC) in accordance with EN61326
and Low Voltage Directive 73/23/EEC (All of these factors are revised by 93/68/EEC) in accordance with EN61010.

ADVANTEST Corp.
Tokyo, Japan

ROHDE&SCHWARZ
Europe GmbH
Munich, Germany

3700.05

有毒有害物质含量信息说明书

- 本有毒有害含量含量说明内容是为了贯彻 [电子信息产品污染控制管理办法] 而编制的。

  This document is made for Chinese Administration on the Control of Pollution Caused by Electronic Information Products, unofficially called "China-RoHS".

  この文書は、中国の「電子情報製品汚染防止管理弁法」のための文書です。

适用机种	U3741, U3751, U3771, U3772

1. 产品中贴有电子信息产品污染控制标志及产品中有毒有害物质或元素的名称及含量

电子信息产品污染控制标志	部件名称	有毒有害物质或元素					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
20	Main frame	×	○	○	○	○	○
	Boards	×	○	○	○	○	○
	Power supply parts	×	○	×	○	○	○
	Cable	×	○	○	○	○	○
	LCD Panel	×	×	○	○	○	○
	Module	×	○	○	○	○	○
	Parts	×	○	○	○	○	○
e	CD-ROM	○	○	○	○	○	○

○: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 规定的限量要求以下。

×: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 规定的限量要求。
（企业可在此处，根据实际情况对上表中打×的技术原因进行进一步说明。）

本表对此次发送产品中所有部件中有毒有害物质的含量，全部作了注明。另外，也有可能包含了与本次发送的产品无关的部件的相关信息。

2. 环保使用期限内的使用条件

运作环境	温度范围	0°C ~ +50°C
	相对湿度	在 85% 以下 （但是，不得结霜）
设置环境	温度范围	-20°C ~ +60°C
	相对湿度	在 85% 以下 （但是，不得结霜）
周围环境		不会产生腐蚀性气体的地方 不是直射阳关的地方 灰尘少的地方 没有震动的地方

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LIST OF TABLES

1. INTRODUCTION

This chapter describes the contents of this manual and the product overview of the U3700 series Spectrum Analyzer to help you get the most out of this manual.

1.1 Contents of This Manual

This manual can be used by novices or experienced users of this instrument. You may read through this manual from Chapter 1 to learn more about this instrument or you may refer to the table of contents, which is found at the beginning of each chapter and directly jump to the section that you need.

The contents of each chapter are as follows:

CHAPTER 1. INTRODUCTION	This chapter describes the contents of this manual and the product overview.
CHAPTER 2. PRECAUTIONS WHEN USING THE U3700	This chapter describes precautions when using this instrument. Read this chapter before using this instrument.
CHAPTER 3. SETUP	This chapter describes how to setup this instrument. After setting up this instrument in an appropriate location, turn on the power and check that this instrument starts correctly.
CHAPTER 4. INSTRUMENT CONFIGURATION AND BASIC OPERATIONS	This chapter describes the functions of each part of the panel and the screen of this instrument. You can learn how to operate this instrument from the operations and simple examples.
CHAPTER 5. MENU MAP, FUNCTIONAL EXPLANATION	This chapter describes the menu structure and functions of soft keys.
CHAPTER 6. OVERVIEW OF REMOTE CONTROL	This chapter describes how to connect and set the GPIB and LAN interfaces, and also describes the program examples used when programming and table of commands.
CHAPTER 7. SPECIFICATIONS	This chapter describes the specifications of this instrument.
CHAPTER 8. OPTIONS AND ACCESSORIES	This chapter describes options and accessories which are sold separately.
CHAPTER 9. MAINTENANCE	This chapter describes how to care for this instrument such as cleaning, calibration, and storage to maintain the high performance and smooth functioning of this instrument. Also this chapter describes how to identify problems and the relevant procedures to follow.
APPENDIX	This chapter describes the following information: • Initial Setting List • Principles of measurement • Technical terms used in this manual • Menu Map List

1.2 Product Overview

The U3700 series spectrum analyzers are compact, lightweight, and portable.

The U3700 series spectrum analyzers are ideal for use in the field because they operate on battery and can be used anywhere.

The main features of this instrument are as follows:

- Wide frequency measurement range
    - U3741: 9 kHz - 3 GHz
    - U3751: 9 kHz - 8 GHz
    - U3771: 9 kHz - 31.8 GHz
    - U3772: 9 kHz - 43 GHz
- High-speed and high-accuracy sweep
    - Frequency span accuracy: 1% or less
    - 20 ms sweep time
- Extremely low noise level:
    - -135 dBm @ 5 GHz (typical value, built-in preamplifier ON)
    - -120 dBm @ 40 GHz (typical value)
- High measurement level accuracy
    - ±0.8 dB Frequency range 10 MHz - 3.1 GHz
    - ±1.0 dB Frequency range 3.1 GHz - 8 GHz
- 3-way power supply system: AC, DC, and attachable battery
- Compact: Approximately 308 mm (W) × 175 mm (H) × 209 mm (D)
- Lightweight:
    - U3741: Approximately 5.0 kg or less (without option)
    - U3751: Approximately 5.6 kg or less (without option)
    - U3771/U3772: Approximately 6 kg or less (without option)

1.3 Conventions of Notation Used in This Document

The panel and soft key notations used in this manual are described below.

Panel key: Bold Example: **FREQUENCY**, **SPAN**

Soft keys: Bold italics Example: ***Center***, ***Span***

NOTE: Screen displays and diagrams such as external view of the main unit in this manual are those of the U3771 in the U3700 series.

1.4 Advantest Homepage

The product information for the U3700 series Spectrum Analyzer is published on the Advantest homepage (http://www.advantest.co.jp).

On the homepage, sample software can be downloaded and the following information can be browsed: Application notes such as the GP-IB command table and technical notes.

How to access

Select "English", "PRODUCTS & SUPPORTS", "Electronic Measuring Instruments", and "Product" from the top page, and then choose a product model to be browsed.

2. PRECAUTIONS WHEN USING THE U3700

This chapter describes precautions when using this instrument. Read this chapter before using this instrument.

2.1 If a Fault Occurs

If any smoke, smell, or noise emanates from this instrument, turn off the MAIN POWER switch, remove the power cable from the AC power connector, and then contact an Advantest sales representative immediately.

2.2 Removing the Case

The case of this instrument should only be opened by Advantest service engineers.

2.3 Electromagnetic Interference

This instrument may cause electromagnetic interference and affect television and radio. If this instrument's power is turned off and any electromagnetic interference that may be present is reduced, then this instrument has caused the interference.

Electromagnetic interference from this instrument may be prevented by the following precautions.

- Changing the direction of the antenna of the television or radio.
- Placing this instrument on the other side of the television or radio.
- Placing this instrument away from the television or radio.
- Using a different power source for the television or radio, and this instrument.

2.4 Note when Turning on the Power

When turning on the power, do not connect a DUT to this instrument.

3. SETUP

This chapter describes how to set up this instrument on delivery. Topics covered in this chapter are:

- 3.1 Inspection on Delivery
- 3.2 Locating This Instrument
- 3.3 Power Supply
- 3.4 Caution when Connecting Peripherals
- 3.5 Checking Operations

3.1 Inspection on Delivery

After receiving the product, inspect the outside and the accessories according to the following procedure.

1. Check that the shipping container and the cushioning material are not damaged.

IMPORTANT: If the shipping container or the cushioning material is damaged, keep them until the following inspections are complete.

2. Check that the outside of the product is not damaged.

WARNING: If any outside components of the product such as the cover, panel (front or rear), LCD display, power switch, or connector are damaged, do not turn on the power. You may receive an electrical shock.

3. Check that the standard accessories listed in Table 3-1 (and option accesories listed in Table 3-2) are complete and they are not damaged.

   If any of the following occur, contact an Advantest sales representative.

   - The shipping container or the cushioning material is damaged, or signs of stress are found.
   - The outside of the product is damaged.
   - The standard accessories are incomplete or are damaged.
   - Defects are found in the operation check.

Table 3-1 Standard Accessories

Name	Model	Quantity		
		U3741	U3751	U3771/U3772
Power cable	A01412	1	1	1
Input cable (50 Ω)	A01037-0300	1*1	1	1
N(m)-BNC(f) adaptor	JUG-201A/U	1*1	1	1
Ferrite core	ESD-SR-120	3	3	3
Ferrite core	E04SR150718	1	1	1
BNC-SMA adaptor	HRM-517	0	0	1
Adapter for RF INPUT2	HE-A-PJ	0	0	1
U3700 Series User's Guide	BU3700S	1	1	1

*1 The quantity decreases to zero when the 75 Ω option (OPT15) is included.

Table 3-2 Option Accessories

Name	Model	Quantity		
		OPT15	OPT76/OPT77	OPT75
Input cable (75 Ω)	A01045	1	0	0
N(m)-BNC(f) adaptor	JUG-201A/U	0	1	0
C15-type adapter	NCP-NFJ	1	0	1
NC-BNC adapter	BA-A165	1	0	1

Table 3-3 OPT10 Accessories

Name	Model	Quantity
N(m)-BNC(f) adaptor	JUG-201A/U	1

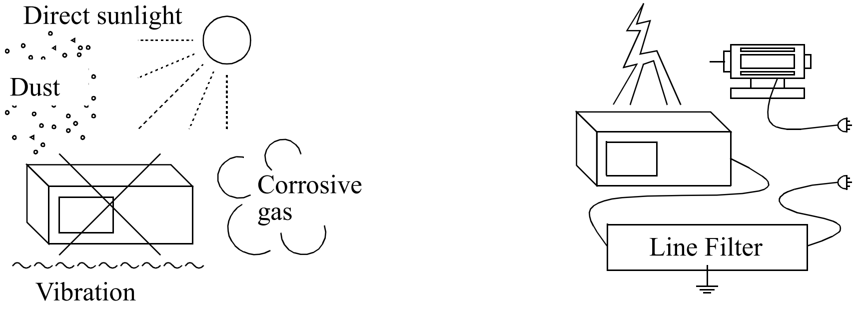
3.2 Locating This Instrument

This section describes the installation environment in which this instrument runs successfully.

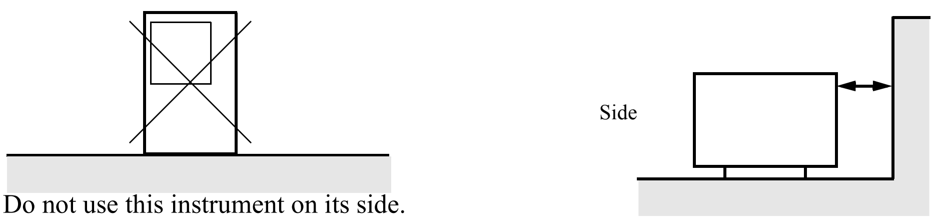
3.2.1 Operating Environment

Install this instrument in an environment in which the following conditions are satisfied.

- Ambient temperature: 0°C to +50°C (operating temperature)
  -20°C to +60°C (storage temperature)
- Relative humidity: 85 percent or less with no condensation
- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- A low noise area
  Although this instrument has been designed to withstand a certain amount of noise from the AC power line, it should be used in a low noise area.
  Use a noise cut filter if ambient noise is unavoidable.
- An area in which the airflow is not obstructed
  There is an exhaust-cooling fan and exhaust vents on both sides of this instrument. Do not obstruct the fan and vents. If there is insufficient airflow around the vents, the internal temperature will rise and the instrument may operate incorrectly. Keep a space of 10 centimeters between the side panel and the wall. Do not use this instrument on its side.



- Avoid operating in these areas.
- Use a noise cut filter if noise is unavoidable on the AC power line.



- Do not use this instrument on its side.
- Keep a space of 10 centimeters from the wall.

Figure 3-1 Operating Environment

3.3 Power Supply

This instrument can use the following three types of power sources.

- An AC Power Supply
  Automatically switches the power supply voltage between 100 V AC and 200 V AC.
- A battery
  Use an external battery pack (A870008).
  Recommended battery pack: DIONIC90 (Manufactured by Anton Bauer Inc.)
- An external DC power supply
  Use an external DC power cable (A114020).

CAUTION: ***Connect this instrument to an AC power supply, DC power supply, or battery.***

3.3.1 Using the AC Power Supply

This section describes power requirements and how to connect the power cable.

3.3.1.1 AC Power Requirements

The AC power requirements of this instrument are shown in Table 3-4. Check that the power supply, which is supplied to this instrument, satisfies the conditions shown in Table 3-4.

Table 3-4 Power Requirements

	100 V AC	200 V AC	Remarks
Power supply voltage range	90 V - 132 V	198 V - 264 V	Automatically switches the input voltage between 100 V AC and 200 V AC.
Frequency range	47 Hz - 63 Hz		
Power consumption	100 VA or less		

WARNING: ***Make sure the power supply, which is supplied to this instrument, satisfies the power requirements. If the power requirements are not satisfied, this instrument may be damaged.***

3.3.1.2 Connecting the Power Cable

This instrument includes a three-core power cable with a grounding conductor. To prevent accidents caused by electric shocks, use the included power cable and securely connect to the ground through a three-pin power outlet.

1. Check that the included power cable is not damaged.

WARNING: ***Never use a damaged power cable. You may receive an electrical shock.***

2. Connect the AC power connector on the rear panel of this instrument to a three-pin power outlet that has a protected ground terminal by using the included power cable (See Figure 3-2).

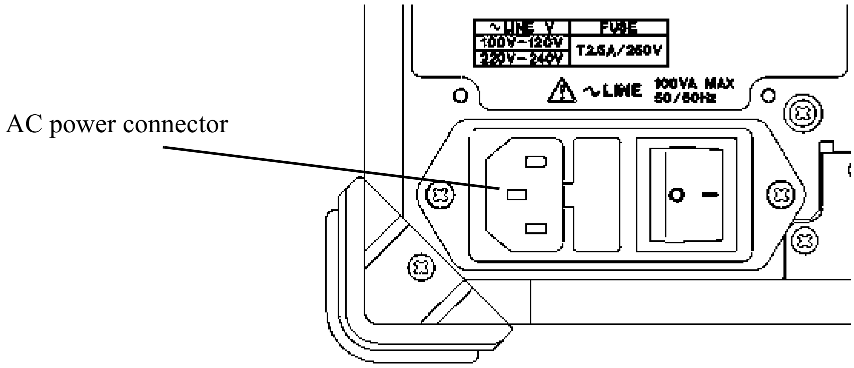


Figure 3-2 Connecting the Power Cable

WARNING:

- ***Use a suitable power cable for the power supply voltage. Use a power cable that complies with the safety standards in your country (Refer to "Safety Summary").***
- ***To prevent any danger of electrical shock, connect the power cable to a three-pin power outlet that is connected to a protected ground terminal. The instrument will not be grounded if an extension cord, which does not include a protected ground terminal, is used.***

3.3.2 Using a Battery

The U3700 series can use a battery as a power source.

An Anton Bauer's battery pack can be used in the U3700 series.
The DIONIC 90 compact lithium-ion battery pack is recommended.

The DIONIC 90 battery pack specifications

Capacity:	90 WH Nominal
Output voltage:	14.4 V
Weight:	Approx. 0.7 kg
Dimensions:	133 × 89 × 54 mm

For more information, refer to the battery pack operation manual.

INFORMATION:Runtime (hours)	***U3741:***	***3 hours***
	U3751:	***2.5 hours***
	U3771/72:	***2 hours***

NOTE: ***The battery life varies depending on the usage situation.***
If using a battery stored over the long term, check the runtime in advance.

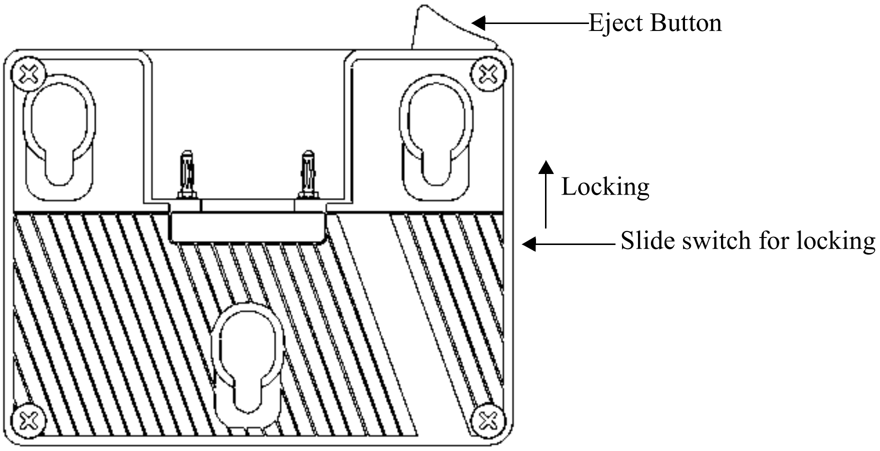
3.3.2.1 Battery Mount System

The QR Gold Mount System, which is included in professional video cameras worldwide, is included in this instrument.

1. How to remove and replace the battery pack

   Align the side of the battery pack that contains the connector with the battery mount on the rear panel of this instrument and push it in and down. The battery is attached when a "click" is heard.

   Turn off the power supply of this instrument when detaching the battery. To detach the battery, lift the battery up while pushing the eject button on the battery mount.



2. Locking the Eject button

   The slide switch to lock the Eject button is located on the right side of the battery mount (lower side of the Eject button).The Eject button is locked by setting the slide switch to upper side.Set the slide switch to the lower side and release the lock before the battery pack is attached or detached.

3.3.2.2 Charging the Battery

This instrument cannot charge the external battery pack.

Use a suitable battery charger for the battery pack.

- For the DIONIC 90

  The TITAN TWIN charger (A870009) is recommended.
  When the TITAN TWIN charger is used, the charging time is approximately 5.5 hours.

3.3.3 Using the External DC Power Supply

3.3.3.1 DC Power Requirements

DC power supply	Requirements
Power supply voltage range	+11 V to +17 V
Power consumption	70 W or less

3.3.3.2 Connecting the DC Power Cable

1. Remove the AC power cable and detach the battery.
2. Connect an A114020 (Sold separately) external DC power cable to the DC power supply input connector on the rear panel.

CAUTION: ***Do not reverse the polarity of the DC power supply.***

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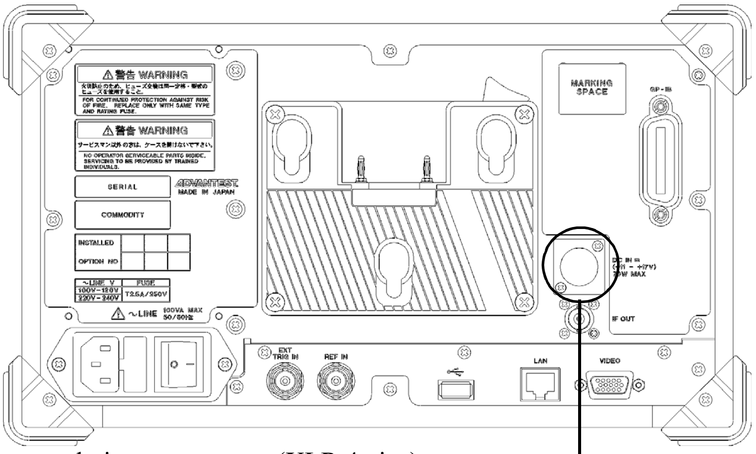
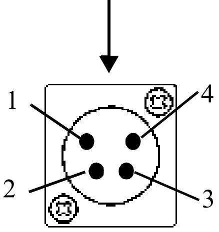
3. To remove the DC power cable, turn off the power supply of this instrument and remove the external DC power cable while pushing the button on the cable connector.



DC power supply input connector (XLR 4 pins)



[Connector pin location]
Pin number 1: GND
Pin number 2: N.C
Pin number 3: N.C
Pin number 4: + terminal

3.4 Caution when Connecting Peripherals

Use shielded cables when connecting peripherals to the USB and LAN connectors on this instrument. Attach the included ferrite core (ESD-SR-120) to the cable.

Figure 3-3 Attachment of a Ferrite Core 1

When connecting an earphone to the PHONE connector, attach the included ferrite core (E04SR150718) to the earphone cable.

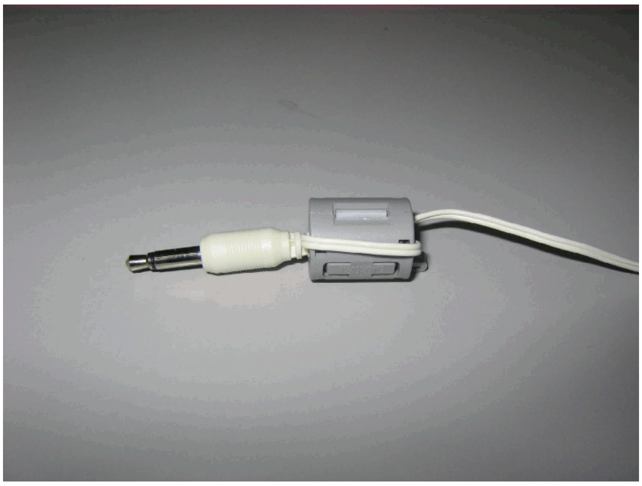


Figure 3-4 Attachment of a Ferrite Core 2

3.5 Checking Operations

This section describes how to check operations by using the calibration function of this instrument. Check that this instrument operates correctly by following the procedure below.

Starting this instrument

1. Connect the power cable according to "3.3.1.2 Connecting the Power Cable".
2. Turn on the AC power switch on the rear panel.
3. Three seconds after turning on the AC power switch on the rear panel, press the power switch on the front panel to turn on the instrument.
   The power supply and the green power light turn on.

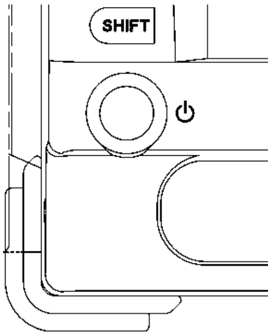
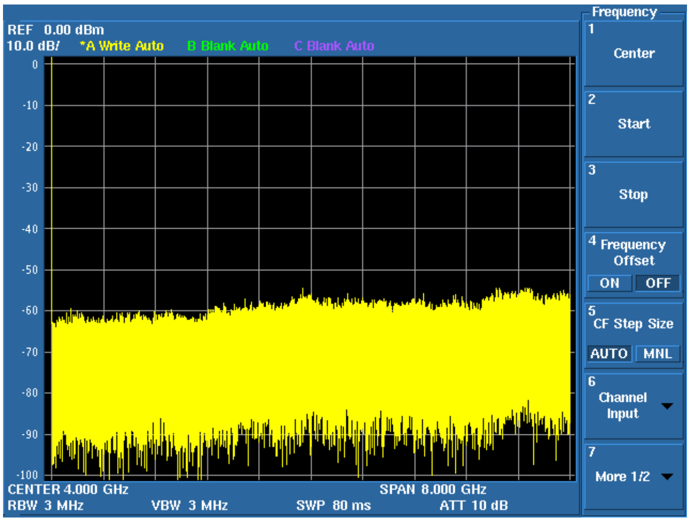


Figure 3-5 **POWER** Switch

4. The system boots up and the program starts.

5. The result of the self-diagnostics and the initial screen are displayed.
   The initial screen display may differ from Figure 3-6 depending on the status of the settings when the power supply was last turned off.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
CENTER 4.000 GHz SPAN 8.000 GHz
RBW 3 MHz VBW 3 MHz SWP 80 ms ATT 10 dB

Figure 3-6 Initial Screen

MEMO: If any error message is displayed, refer to "9. MAINTENANCE".

Running calibration

6. Connect as shown in Figure 3-7 by using the included N-BNC adaptor and input cable (A01037-300).

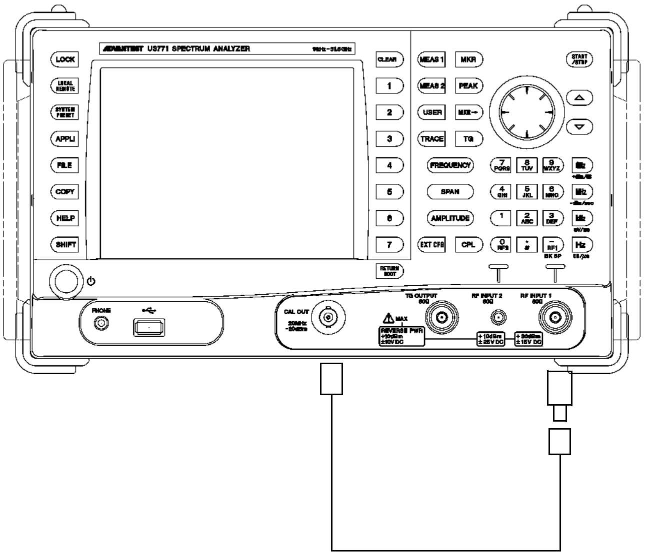


Figure 3-7 Connecting the CAL Signal

***IMPORTANT:** Perform calibration after allowing a warm up time of at least 5 minutes. For more information on how to perform autocalibration, refer to "4.3.1 Calibration".*

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7. Press the **SYSTEM** key of this instrument and select ***Calibration*** from the soft menu.

8. Select ***Calibrate ALL*** on the next soft menu.
   It takes approximately two minutes to complete the autocalibration.

9. Check that no error message is displayed at the end of the calibration.

***MEMO:** If any error message is displayed, refer to "9. MAINTENANCE".*

Turning off the power supply

10. Press the power switch on the front panel.
    The power supply and the power light turn off.

4. INSTRUMENT CONFIGURATION AND BASIC OPERATIONS

This chapter describes the functions of each part on the panels and screen, and describes the basic operations of this instrument by using measurement examples.

4.1 Panel and Screen Descriptions

This section describes the names and functions of each part on the front panel, screen, and rear panel.

4.1.1 Names and Functions of Each Part on the Front Panel

This section describes the names and functions of each part on the front panel.

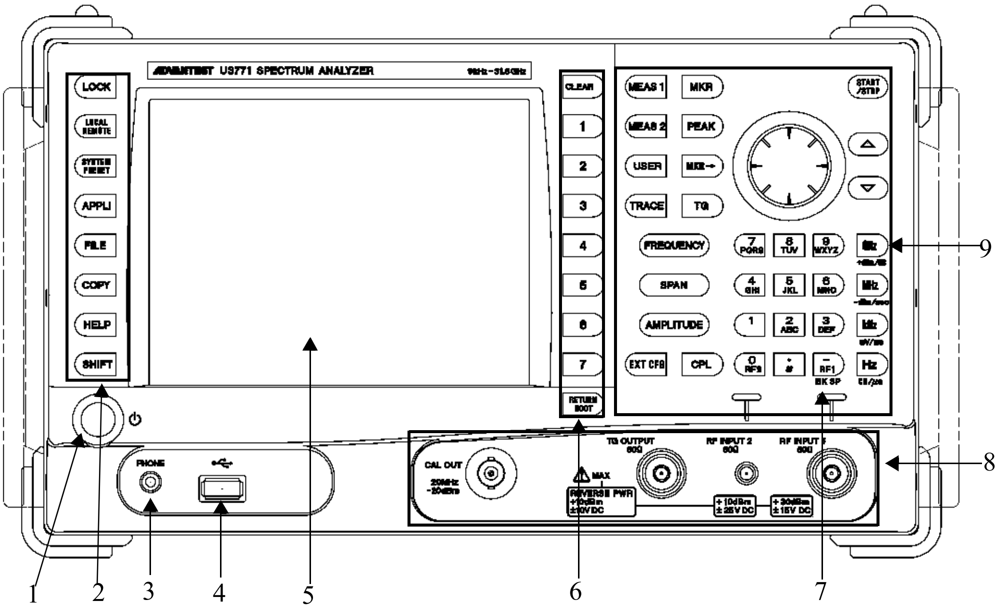

Figure 4-1 Front Panel

1.	POWER switch with lamp	Switches the power supply between ON and OFF. The lamp turns on while the power turns on
2.	Extended function key block	The keys in this block set the extended functions.
3.	PHONE connector	8-ohm earphone terminal for demodulated AM/FM audio signals.
4.	USB connector	Enables a memory device or printer to be connected.
5.	Color LCD	Displays measurement data or setting conditions.
6.	Soft key block	The keys in this block select items from the soft menu on the display.

7.	Input connector lamp	Indicates the input connector is enabled. U3741/U3751: Only RF INPUT 1 is enabled.
8.	Input and output connectors block	The connectors in this block are used in measurements.
9.	Operation key block	The keys in this block are used for changing settings.

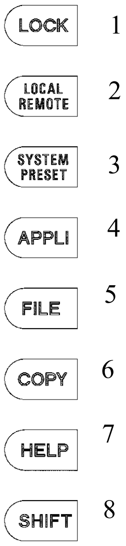

Figure 4-2 Extended Function Key Block

1.	Key lock key with lamp	Locks the key input. Toggles the key lock between ON and OFF. The lamp turns on while the key input is locked.
2.	LOCAL key	Cancels the remote control function.
	REMOTE lamp	The lamp turns on when the instrument is in the remote state.
3.	SYSTEM setting	Sets the operational conditions of an interface.
	Preset key	Initializes the settings of this instrument.
4.	APPLICATION key	Switches between the applications of this instrument.
5.	FILE key	Loads and saves data.
6.	COPY key	Outputs screen data.
7.	HELP key	Explains the soft menu.

NOTE: HELP is loaded and functions when the HELP key is pressed at the first time after the power is turned on.

8.	SHIFT key with lamp	Sets the shift mode which allows the functions indicated by the green font to be selected. Turns on while the shift mode is set.

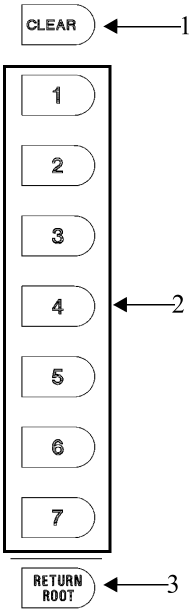

Figure 4-3 Soft Key Block

1. CLEAR key	Cancels data entry mode.
2. Soft menu key	The soft key 1 to 7 correspond with the soft menu 1 to 7 indicated to the left respectively. Press the soft key to select the soft menu.
3. RETURN key	Returns to the previous soft menu.

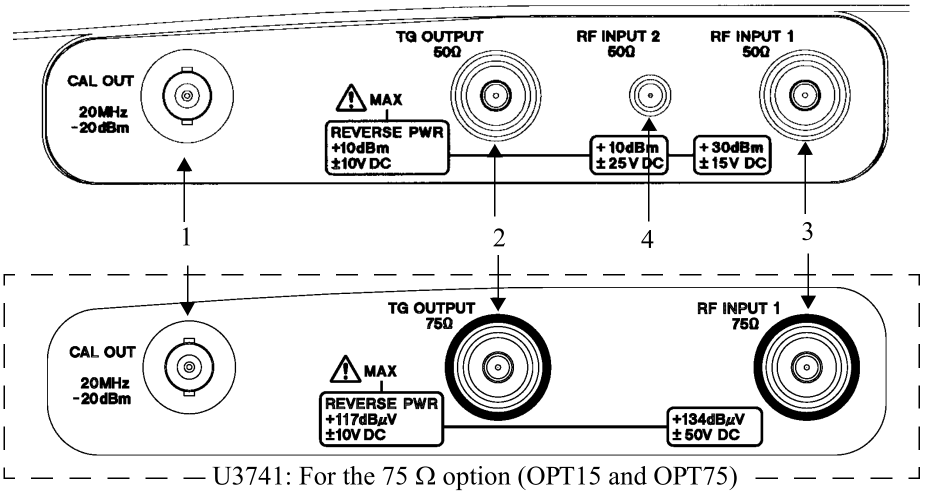

Figure 4-4 Input and Output Connectors Block

1.	CAL OUT connector	Outputs the calibration signal.
2.	TG OUTPUT connector	Outputs the tracking generator signal. (Option)
3.	RF INPUT1 connector	Input the signal to be measured. Measurement frequency range: U3741: 9 kHz - 3 GHz U3751/U3771/U3772: 9 kHz - 8 GHz
4.	RF INPUT2 connector	Input the signal to be measured. Measurement frequency range U3771: 10 MHz to 31.8 GHz U3772: 10 MHz to 43 GHz

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CAUTION:

1. ***Do not apply an RF power or DC voltage that exceeds the limited value to the INPUT and OUTPUT connectors.***
   Be careful of static electricity. Internal circuit components such as the input attenuator and mixer may be damaged.
2. ***The precision microwave connector is used as the RF INPUT2 connector.***
   This connector is compatible with the K connector (K connector is a trademark of Anritsu Corporation) and can be connected to a common SMA connector.
   Be careful when handling this connector because the connector is delicate and is damaged easily.
   Use the included adapter (HE-A-PJ) if the connection and disconnection to this connector are performed frequently.
3. ***For the 75 Ω option (OPT15 and OPT75), input and output connectors are changed to 75 Ω type connectors.***
   If a 50 Ω cable or connector is connected to a 75 Ω connector, the center contact of the 75 Ω connector may be damaged.
   Verify that cables and connectors, which are used, are 75 Ω type.

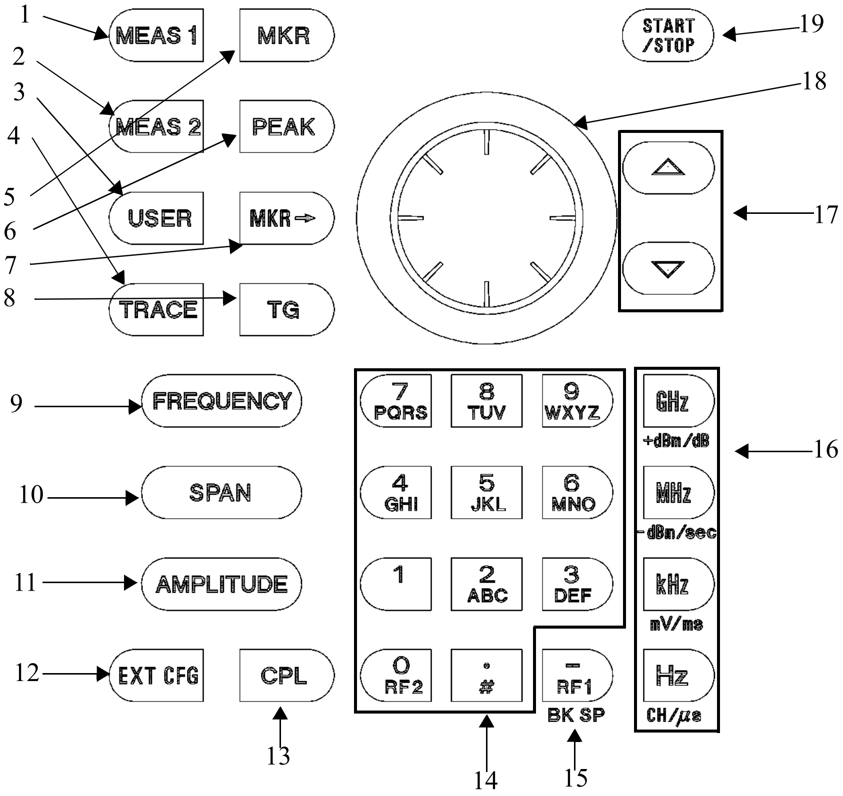


Figure 4-5 Operation Key Block

1.	MEAS 1	Selects a measurement such as Channel Power, OBW or ACP.
2.	MEAS 2	Selects a measurement such as Noise/Hz, X dB down or Counter.
3.	USER	Allocates soft menu keys to be used.
4.	TRACE	Sets the trace function.
5.	MKR	Displays the marker.
6.	PEAK	Searches for a peak on a trace.
7.	MKR→	Sets the values of the marker to that of another function.
8.	TG	Sets the tracking generator. (Option)
9.	FREQUENCY	Sets the center frequency.
10.	SPAN	Sets the frequency span.
11.	AMPLITUDE	Sets the level.
12.	EXT CFG	Sets the sweep mode and trigger.
13.	CPL	Sets the RBW, VBW, and sweep time.

14. Keypad	There are numeric keys (0 to 9) and decimal point key.
15. - (Backspace)key	Enters the minus sign and corrects entered data.
16. Unit key	Selects a unit and determines the entered value.
GHz	Sets a unit of GHz, +dBm, or dB.
MHz	Sets a unit of MHz, -dBm, sec, V, or W.
kHz	Sets a unit of kHz, mV, msec, or mW.
Hz	Sets a unit of Hz, μsec, CH, μV, or μW.
	Can also be used as the ENTER key
17. Step key	Enters data at each step.
18. Data knob	Fine tunes the entered data.
19. START/STOP key	Starts or stops the sweep.

4.1.2 Names and Functions of Each Part on the Screen

This section describes the names and functions of each part on the screen of this instrument.

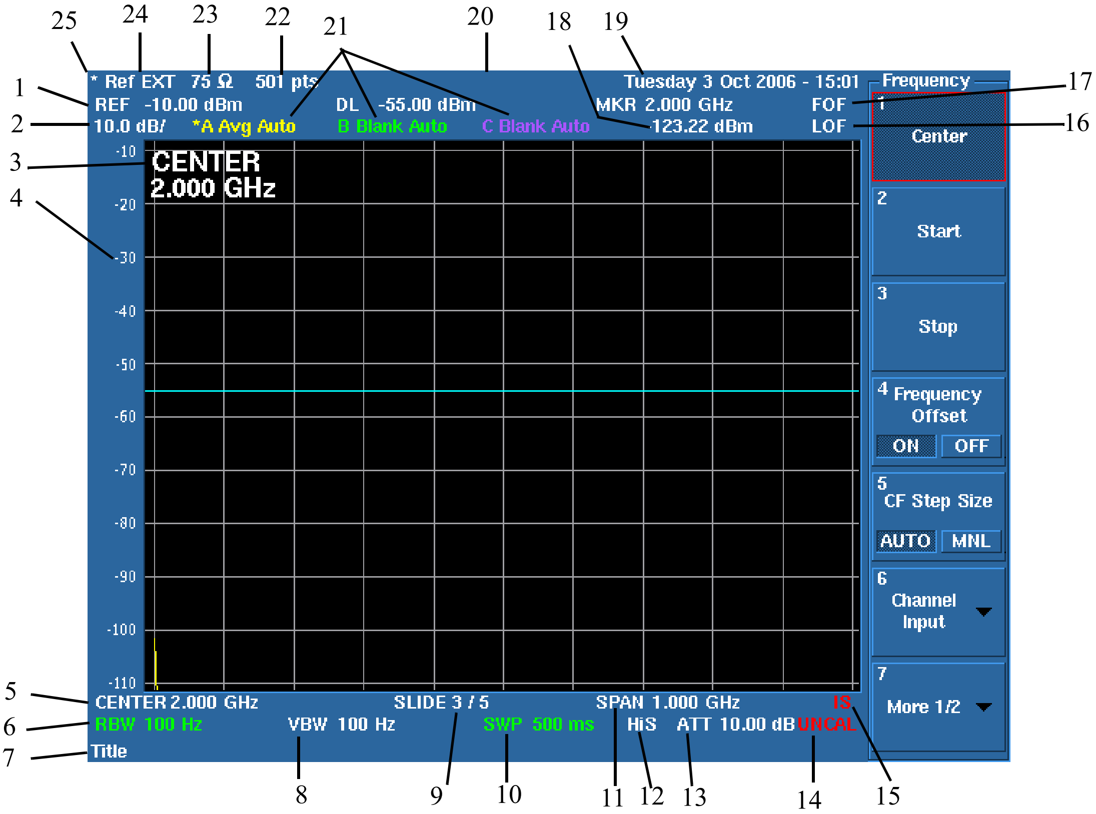


Figure 4-6 Screen Display

1.	Reference level	Displays the reference level setting value.
2.	Amplitude scale in log mode or linear mode	Displays the amplitude scale setting in log mode.
3.	Active function	Displays the function enabled by the keypad or data knob.
4.	Level scale	Displays the level scale.
5.	Center frequency or start frequency	Displays the center frequency or start frequency.
6.	Resolution bandwidth (RBW)	Displays the resolution bandwidth setting value. Displays the font color of RBW in green if RBW is set in the manual mode.
7.	User’s title	Displays the description of the details of the measured data.
8.	Video bandwidth (VBW)	Displays the video bandwidth setting value. Displays the font color of VBW in green if VBW is set in the manual mode.

9.	Number of times averaging is performed	Displays the set and current number of times averaging is performed.
10.	Sweep time	Displays the sweep time setting value. Displays the font color of SWP in green if SWP is set in the manual mode.
11.	Frequency span or stop frequency	Displays the frequency span or stop frequency.
12.	High-sensitivity (Hi-sensitivity)	Displays HiS while the preamplifier is set to On.
13.	RF attenuator	Displays the attenuator setting value. Displays the font color of ATT in green if ATT is set in the manual mode.
14.	UNCAL message	Displays UNCAL while the manual settings are inappropriate.
15.	Image Suppression	Displays IS while the image suppression function is set to On.
16.	Level offset	Displays LOF while the reference offset is set to On.
17.	Frequency offset	Displays FOF while the frequency offset is set to On.
18.	Marker area	Displays the marker frequency (time) and level.
19.	Date	Displays the current date and time.
20.	Measurement function display	Displays the currently performed measurement function.
21.	Trace and trace detector	Displays the selected trace mode and trace detector mode. The trace with * displayed at the beginning is the active trace. For a display of two traces or more, the trace with * is displayed at the front.
22.	Trace point	Displays "501 pts" while the number of trace points is set to 501 points.
23.	Input impedance 75 Ω	Displays "75 Ω" while the Input Impedance is set to 75 Ω.
24.	External reference signal	Displays Ref EX1 while the external reference signal is selected.
25.	R3162/R3131 mode ON	R3131 mode: Displays "*" while the R3131 mode is set to ON in U3741. R3162 mode: Displays "*" while the R3162 mode is set to ON in U3751/U3771/U3772.

4.1.3 Names and Functions of Each Part on the Rear Panel

This section describes the names and functions of each part on the rear panel.

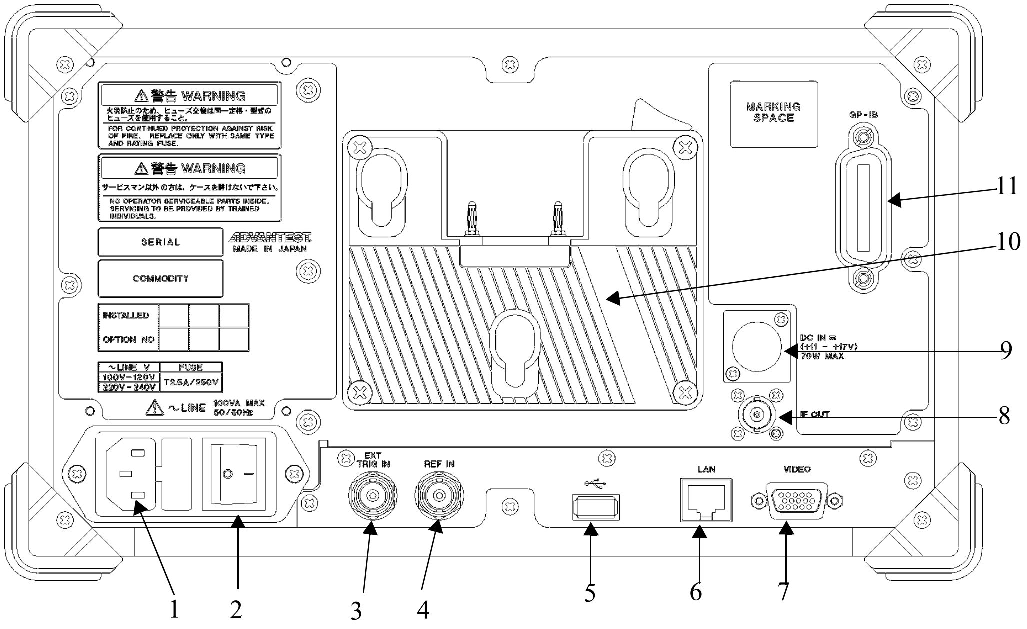


Figure 4-7 Rear Panel

1.	AC power connector	Connects this instrument to the AC power supply by using the included power cable.
2.	AC power switch	Switches the AC power ON and OFF.
3.	EXT TRIG connector	Inputs the external trigger signal (TTL level).
4.	EXT REF connector	Inputs the external reference signal.
5.	USB A connector	Enables a memory device or printer to be connected.
6.	LAN connector	For 10BaseT-specific LAN connector
7.	VIDEO connector	Connects to the monitor for VGA specification.
8.	IF OUT connector	Outputs an IF signal of 21.4 MHz.
9.	DC INPUT connector	Connects to the external DC power supply.
10.	Battery mount	The Anton Bauer's battery pack can be used.
11.	GP-IB connector	Connects to the external controller when the remote-control is used through the GPIB interface.

4.2 Basic Operation

This section describes the menu operation, data entry, and usage of the basic measurement functions.

4.2.1 Menu Operation and Data Entry

Panel keys and soft menus are used to operate this instrument.

Press a panel key to display its menu to the right of the screen. Certain panel keys such as the LOCAL key do not display a soft menu.

The menu items are arranged according to the soft keys.

The number of the menu item accords with the number of the related soft key.

Press a soft key to select the related menu.

Certain soft keys display another menu.

The following describes the functions of the panel key and soft key.

1. Selecting a menu

   To set the measurement conditions, press the panel key and select the menu.

   Press **AMPLITUDE**.

   The reference level setting value is displayed in the active function display area and the following Level menu is displayed to the right of the screen.

   1 Ref Level

   2 ATT ▼

   3 dB/div ▼

   4 Vertical Scale LIN/LOG

   5 Units ▼

   6 Slide Screen ON/OFF

   7 More 1/2 ▼

   The frame of the ***1 Ref Level*** menu is displayed in red. This red frame menu means that data can be entered.

2. Data entry

   If the set value is displayed in the active function display area, it can be changed by using keypad, step key, or data knob.

   - Data entry by using the keypad

     Enter data by using the keypad, decimal point key, BK SP (backspace) key, and minus (-) key. If any wrong numbers are entered by using the keypad, use the BK SP to delete a character to the left and enter the correct number. If no data is entered and BK SP is pressed, "- (minus)" is entered.

     After entering data, press the unit key (ENTER) to complete the entry.

     If any other panel key is pressed before the unit key is pressed, any entered data becomes invalid.

     Example: Set the reference level to -20 dBm by using the keypad.
     Press **-**, **2**, **0**, **GHz(+dBM)** or **2**, **0**, **MHz(-dBM)**.

- Data entry by using the step key

  The step key enters data in the defined step size. Pressing ▼ decreases data and pressing ▲ increase data.

  Example: Set the reference level to 0.0 dBm by using the step key.
  Press the step key ▲. The reference level is set to -10.0 dBm. Press the step key ▲ again to set to 0.0 dBm.

- Data entry by using the data knob

  The data knob enters data in the determined display resolution. The data knob is available for the fine adjustment of the entry data.

  Example: Set the reference level to 0.5 dBm by using the data knob.
  Rotating the data knob in the clockwise direction increases the reference level in steps of 0.1 dBm. Rotate the data knob until the display of the active function display area shows 0.5 dBm.
  Rotating the data knob in the counterclockwise direction decreases the reference level in steps of 0.1 dBm.

- ACTIVE OFF

  Pressing the **CLEAR** key hides the active function display area.
  Data cannot be entered if the active function display area is hidden.
  To redisplay the active function display area, press a panel key or soft key.

3. Menu layer

   Certain soft menus have ▼ at the right end and the sub menu is displayed by pressing the soft key. Certain soft menus such as ON/OFF or AUTO/MNL switch the setting by pressing the soft key.

   Press **MKR**. The following Marker menu is displayed.

   1 Select Marker
   2 Marker ON/OFF
   3 Marker Trace A/B/C
   4 Delta Mode ▼
   5 Peak Menu ▼
   6 Clear All
   7 More 1/2 ▼

- Switching the setting

  If a menu includes a dual-state button such as ON/OFF or AUTO/MNL, the state can be switched by pressing the soft key. The selected setting is displayed convexly.

  The non-selected setting is displayed concavely.

  Example: Press ***2 Marker ON/OFF***.
  The setting is turned OFF and the markers disappear.
  Press ***2 Marker ON/OFF*** again to turn the setting ON and the markers reappear.

- Sub menu display

  Pressing a soft key, which has ▼ to the right of the menu, displays a sub menu.

  Example: Press ***4 Delta Mode*** ▼. The following Peak menu is displayed.

  1 Delta ON/OFF

- RETURN

  Press **RETURN** to return to the previous menu from the sub menu.

4. Using SHIFT

   The SHIFT key is used for selecting functions, which are indicated in green on the key.

   These functions are described below.

• PRESET	Returns to the initial settings.
• ROOT	Returns the soft menu to the top menu.
• RF1	Selects RF INPUT1. (U3771/U3772)
• RF2	Selects RF INPUT2. (U3771/U3772)

   To perform the function, which is written on the key in green, press the **SHIFT** key and then press each key.

   Pressing the **SHIFT** key turns on its LED and the shift mode is available.

   Press the **SHIFT** key again to cancel the shift mode. The green LED turns off and the shift mode is unavailable.

   Other keys

   Nothing is printed on these keys, but they have the functions shown below.

• USER	Sets and cancels the USER menu.
• COPY	Displays the Copy menu.
• Select Marker	Returns one selected marker number.

5. Displaying a dialog box

   Pressing certain soft keys displays a dialog box.

• Selecting items	Select the horizontal items by using the data knob and select the vertical items by using the step keys.
• Entering numeric values	Enter values by using the keypad and unit key.
• Determining the setting	Press the unit key (ENTER) to determine.

4.3 Basic Measurement

This section uses the following measurement examples to describes basic measurement procedures which will allow the user to become familiar with the operation of this instrument.

4.3.1 Calibration

4.3.2 Displaying Spectrum and Operating Markers

4.3.3 How to Cancel the UNCAL Message

4.3.4 Identifying an Image Signal

4.3.5 Hard Copy Output

4.3.1 Calibration

Correcting the measurement by using the calibration factor, which is acquired from the calibration, can increase the measurement accuracy.

Calibration items

1. Total Gain
   Measuring the calibration signal of -20 dBm and acquiring the level difference
2. Step ATT
   Minimizing the level error when switching STEP ATT at 20 MHz
3. RBW
   Optimizing the RBW adjustment and minimizing the level error when switching RBW
4. PBW
   (Noise power bandwidth)

IMPORTANT: Perform calibration after allowing a warm up time of 5 minutes or more.

Required equipment

This instrument

Conversion adaptor: N (m)-BNC (f)
Conversion adaptor: BNC (f)-SMA (m)
Input cable: BNC (m)-BNC (m)

Turning on the power supply

1. Verify that the AC power switch on the rear panel is set to OFF.
2. Connect the included power cable to the AC power connector on the rear panel.

CAUTION: ***To prevent damage, do not supply a voltage and frequency, which exceed the specified range, to this instrument.***

---

3. Connect the power cable to an electrical outlet.
4. Turn on the AC power switch on the rear panel.
   After turning on the AC power switch, wait for three seconds or more
5. Turn on the power switch on the front panel.

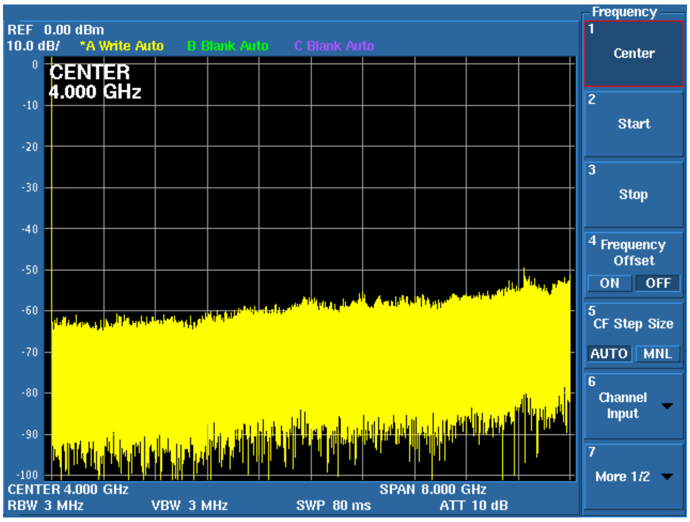
MEMO: ***The display may be different depending on the state of the instrument when the power was last turned off.***

NOTE: ***Before turning the power on, remove the USB memory key. Otherwise, the system does not start.***

Initialization

Initializes the settings of this instrument.

6. Press **SHIFT** and **SYSTEM(PRESET)**.
   Initial setting conditions are loaded.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto

CENTER
4.000 GHz

CENTER 4.000 GHz SPAN 8.000 GHz
RBW 3 MHz VBW 3 MHz SWP 80 ms ATT 10 dB

Figure 4-8 Initial Setting Screen

Selecting the input connector

For the U3741 and U3751, only RF INPUT1 can be used as the input connector. No need to select the input connector.

For the U3771 and U3772, select the input to be performed the calibration.

Press **SHIFT** and **- (RF1)**.
RF INPUT1 is selected.

Press **SHIFT** and **0 (RF2)**.
RF INPUT2 is selected.

The calibration of either RF INPUT1 or RF INPUT2 can be performed first.

The following describes the procedure in which the calibration of RF INPUT1 is performed first.

Connecting the input signal

Connect the calibration signal.

7. Attach the N(m)-BNC(f) adaptor to the RF INPUT1 connector on the front panel. Connect the included BNC (m)-BNC (m) input cable to the CAL OUT connector on the front panel and the N(m)-BNC(f) adaptor.

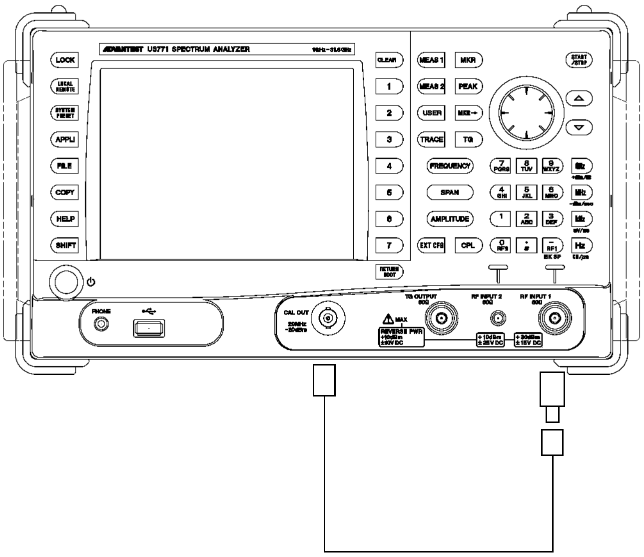


Figure 4-9 Connecting the CAL Signal (RF INPUT1 connector)

8. Press **SYSTEM**.

9. Press ***6 Calibration*** on the soft key menu.
The Calibration menu is displayed.

10. Press ***Calibrate All*** on the Calibration menu.
    Calibration starts.

    The following message is displayed if the calibration of RF INPUT1 is complete.

    First step of calibration completed.

    Connect the calibrator to RF2 connector.

    Then press OK to continue.

    The calibration is canceled if **Hz** is pressed.

    To perform the calibration of RF INPUT2, change the cable connection.

11. Attach the BNC(f)-SMA(m) adapter to the RF INPUT2 connector on the front panel.
    Connect the included BNC(m)-BNC(m) input cable to the CAL OUT connector on the front panel and the BNC(f)-SMA(m) adapter.

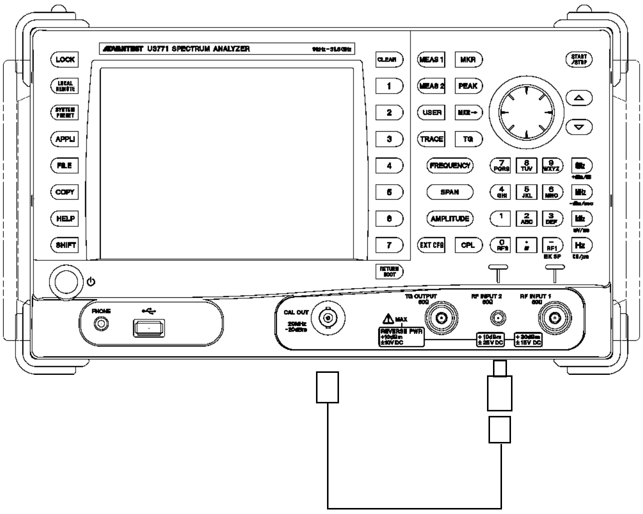


Figure 4-10 Connecting the CAL Signal (RF INPUT2 connector)

12. Press ▼ and select OK.
    Press **Hz** to start the calibration.

4.3.2 Displaying Spectrum and Operating Markers

This section describes how to display spectrums and use markers by using the CAL signal of this instrument.

The level difference between the CAL signal and its second harmonics are measured as an example.

Required equipment

This instrument
Conversion adaptor: N (m)-BNC (f)
Input cable: BNC (m)-BNC (m)

Turning on the power supply

IMPORTANT: ***Use this instrument within a specified temperature range to perform accurate measurements. Perform calibration after allowing a warm up time of 5 minutes or more.***

1. Verify that the AC power switch on the rear panel is set to OFF.
2. Connect the included power cable to the AC power connector on the rear panel.

CAUTION: ***To prevent damage, do not supply a voltage and frequency, which exceed the specified range, to this instrument.***

3. Connect the power cable to an electrical outlet.
4. Turn on the AC power switch on the rear panel.
   After turning on the AC power switch, wait for three seconds or more.
5. Turn on the power switch on the front panel.

MEMO: ***The display may be different depending on the state of the instrument when the power was last turned off.***

Initialization

Initialize the settings of this instrument.

6. Press **SHIFT** and **SYSTEM(PRESET)**.
   Initial setting conditions are loaded.

Connecting the input signal

Connecting the calibration signal.

7. Attach the N(m)-BNC(f) adaptor to the INPUT connector on the front panel. Connect the included BNC (m)-BNC (m) input cable to the CAL OUT connector on the front panel and the N(m)-BNC(f) adaptor.

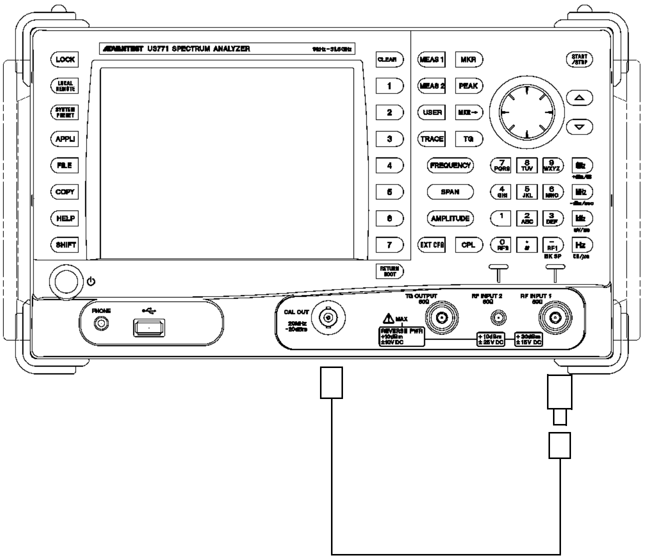


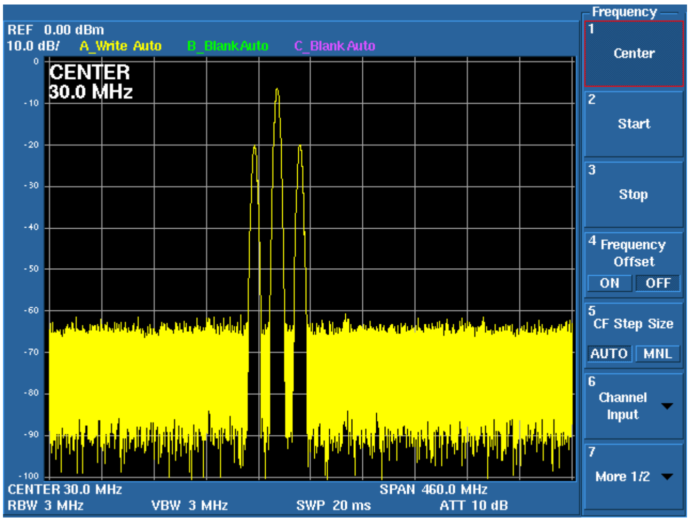
Figure 4-11 Connecting the CAL Signal

Setting measurement conditions

Setting the measurement conditions to observe the input signal more easily.

After initialization, the center frequency can be set.

8. Press **3**, **0**, and **MHz**.
The center frequency is set to 30 MHz.



REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto

CENTER
30.0 MHz

CENTER 30.0 MHz SPAN 460.0 MHz
RBW 3 MHz VBW 3 MHz SWP 20 ms ATT 10 dB

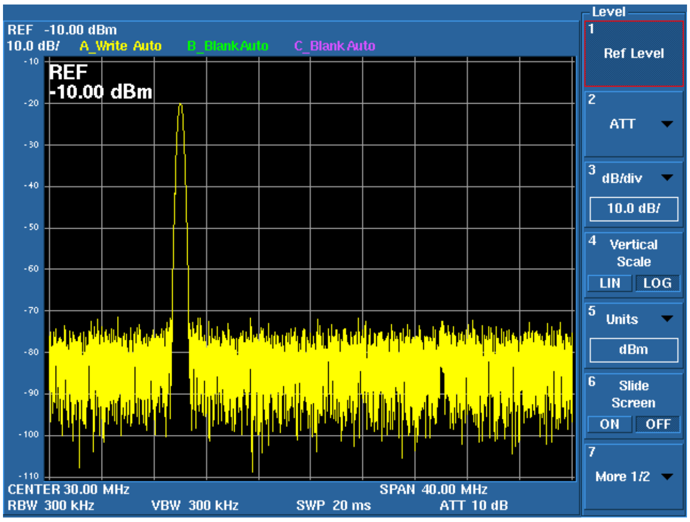
Figure 4-12 Setting the Center Frequency

9. Press **SPAN**.
   The current frequency span is displayed in the active function display area and the Span menu is displayed.

10. Press **4**, **0**, and **MHz**.
    The frequency span is set to 40 MHz.

11. Press **AMPLITUDE**.
    The current reference level is displayed in the active function display area and the Level menu is displayed.

12. Press **-**, **1**, **0**, and **GHz(dBm)**.
    The reference level is set to -10 dBm.



REF -10.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto

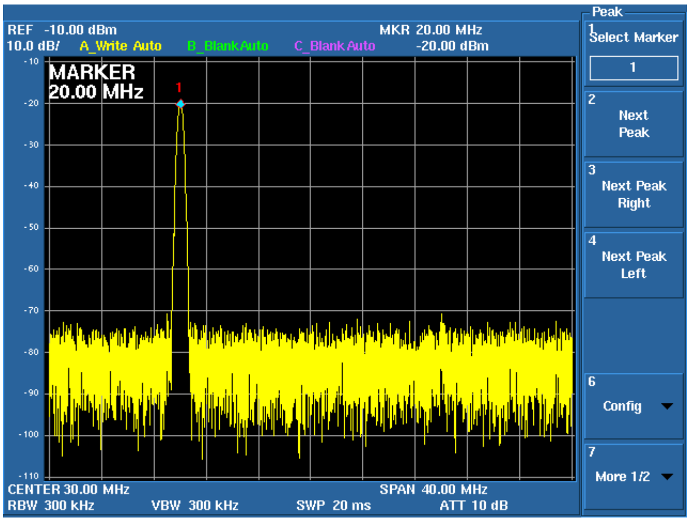
REF
-10.00 dBm

CENTER 30.00 MHz SPAN 40.00 MHz
RBW 300 kHz VBW 300 kHz SWP 20 ms ATT 10 dB

Figure 4-13 Completing the Setting of the measurement conditions

Displaying a marker on the peak

13. Press **PEAK**.
    The marker is displayed on the peak and the frequency (approximately 20 MHz) and level (approximately -20 dBm) of the marker are displayed in the marker area



REF -10.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
MKR 20.00 MHz
-20.00 dBm
MARKER
20.00 MHz
CENTER 30.00 MHz
SPAN 40.00 MHz
RBW 300 kHz VBW 300 kHz SWP 20 ms ATT 10 dB

Figure 4-14 Displaying the Peak Search

Displaying a delta marker

14. Press **MKR**.

    The Marker menu used for the marker function is displayed.

    Press ***4 Delta Mode***.
    Press ***1 Delta ON/OFF***.

    The delta marker is displayed and the frequency difference and level difference between the marker and delta marker are displayed in the marker area.

    MKΔ 0 Hz

    0.00 dB

15. Press **2**, **0**, and **MHz**.

    The active marker is displayed on the second harmonics, which is 20 MHz away from the CAL signal.
    The differences of frequency and level between two signals are displayed in the marker area.

    MKΔ 20.00 MHz

    -52.21 dB

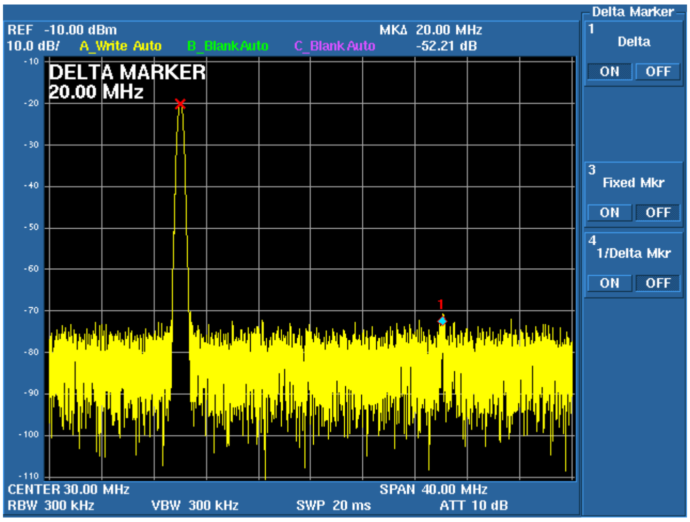

REF -10.00 dBm
10.0 dB/
MKΔ 20.00 MHz
-52.21 dB
DELTA MARKER
20.00 MHz
CENTER 30.00 MHz
SPAN 40.00 MHz
RBW 300 kHz
VBW 300 kHz
SWP 20 ms
ATT 10 dB

Figure 4-15 Measuring the Difference of Frequency and Level by Using the Delta Marker

4.3.3 How to Cancel the UNCAL Message

The setting among the resolution bandwidth (RBW), video bandwidth (VBW), frequency span (Span), and sweep time (Sweep Time) affect to each other.
If the combination of these settings in the manual setting is inappropriate, the UNCAL message is displayed at the bottom to the right of the scale. If the UNCAL message is displayed, the measurement level accuracy cannot be guaranteed.

Change the following settings to cancel the UNCAL message.

- Expand the resolution bandwidth (RBW).
- Expand the video bandwidth (VBW).
- Slow the sweep time (Sweep Time).
- If RBW or VBW cannot be changed, narrow the frequency span (Span).

IMPORTANT: Accurate measurement data cannot be acquired while the UNCAL message is displayed.

This section describes how to cancel the UNCAL message, which was generated because of the fast sweep time, by changing the RBW setting.

Required instruments

This instrument
Conversion adaptor: N (m)-BNC (f)
Input cable: BNC (m)-BNC (m)

Turning on the power supply

IMPORTANT: Use this instrument within the specified temperature range to perform accurate measurements. Perform calibration after allowing a warm up time of 5 minutes or more.

---

1. Verify that the AC power switch on the rear panel is set to OFF.
2. Connect the included power cable to the AC power connector on the rear panel.

   CAUTION: To prevent damage, do not supply a voltage and frequency, which exceed the specified range, to this instrument.

3. Connect the power cable to an electrical outlet.
4. Turn on the AC power switch on the rear panel.
   After turning on the AC power switch, wait for three seconds or more.
5. Turn on the power switch on the front panel.

   MEMO: The display may be different depending on the state of the instrument when the power was last turned off.

Initialization

Initialize the settings of this instrument.

6. Press **SHIFT** and **SYSTEM(PRESET)**.
   Initial setting conditions are loaded.

Connecting the input signal

Connect the calibration signal.

7. Attach the N(m)-BNC(f) adaptor to the INPUT connector on the front panel. Connect the included BNC (m)-BNC (m) input cable to the CAL OUT connector on the front panel and the N(m)-BNC(f) adaptor.

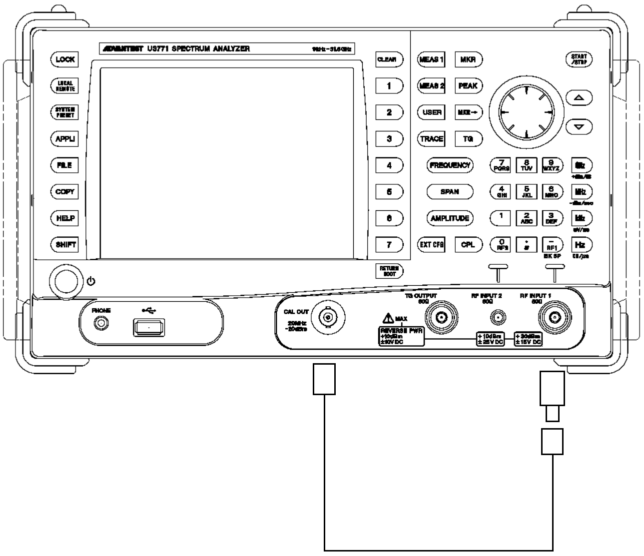


Figure 4-16 Connecting the CAL Signal

Setting measurement conditions

Set the measurement conditions to observe the input signal more easily.

8. Press **FREQUENCY**, **2**, **0**, and **MHz**.
   The center frequency is set to 20 MHz.

9. Press **CPL**, ***Sweep Time AUTO/MNL***, **2**, **0**, and **kHz (ms)**.
   The sweep time is set to 20 ms.

10. Press **SPAN**, **1**, **0**, and **kHz**.
    The span is set to 10 kHz.

    The RBW is automatically set to 300 Hz according to the span setting and UNCAL message is displayed.

    The sweep time setting of 20 msec is too fast for the set conditions.

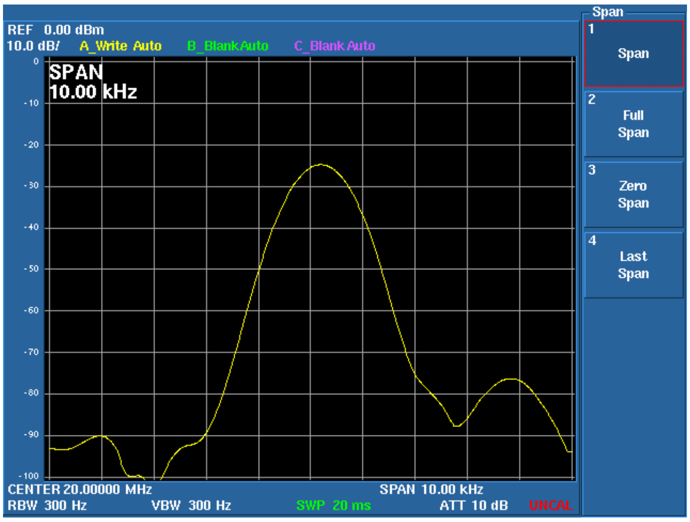

REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
SPAN
10.00 kHz
CENTER 20.00000 MHz SPAN 10.00 kHz
RBW 300 Hz VBW 300 Hz SWP 20 ms ATT 10 dB UNCAL

Figure 4-17 Displaying the UNCAL Message

How to cancel the UNCAL message

11. Press **CPL**, ***RBW AUTO/MNL***, **1**, and **kHz**.
    Setting the RBW to 1 kHz cancels the UNCAL message because the sweep time of 20 msec meets the set conditions.

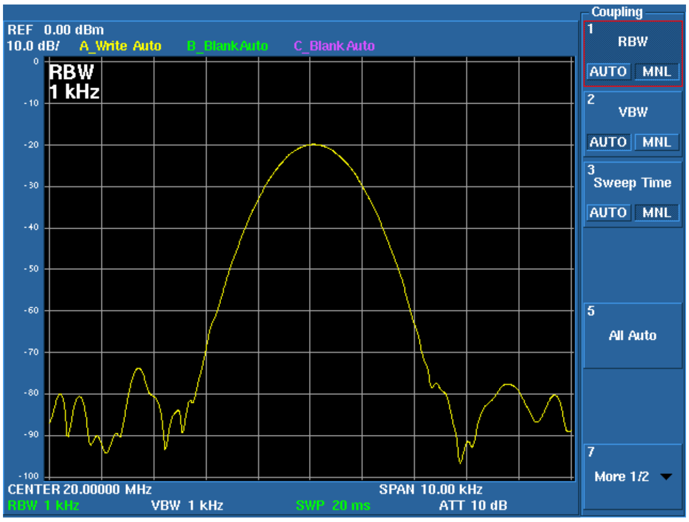

REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
RBW
1 kHz
CENTER 20.00000 MHz SPAN 10.00 kHz
RBW 1 kHz VBW 1 kHz SWP 20 ms ATT 10 dB

Figure 4-18 Canceling the UNCAL Message

4.3.4 Identifying an Image Signal

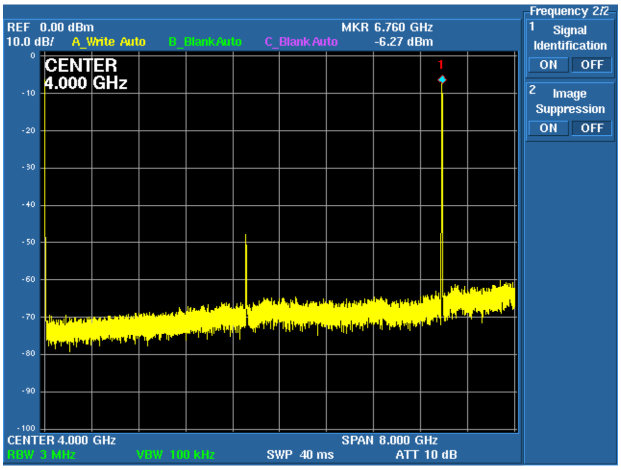
This function is available only for the U3751, U3771, and U3772.

This instrument may display an image signal depending on the input signal.
If measuring an unknown frequency signal, the real signal and image signal must be identified before starting the measurement.
The Image Suppression and Signal Identification functions can be used to identify the image signal.

Image Suppression function

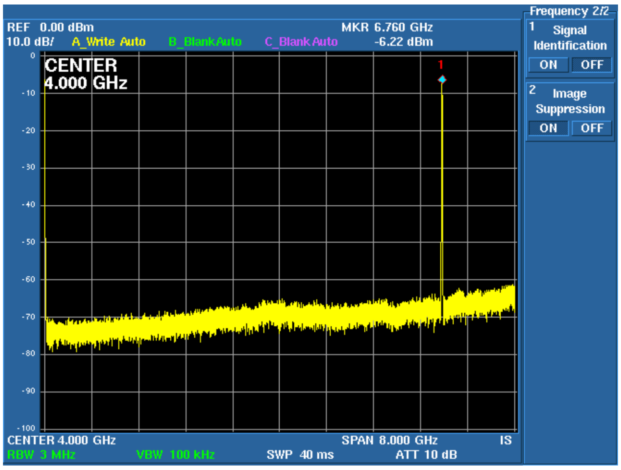
Detects image signals and automatically deletes them from the display.
Press **FREQUENCY**, ***More1/2***, and ***Image Suppression ON/OFF***.

[OFF]



REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
MKR 6.760 GHz
-6.27 dBm
CENTER 4.000 GHz
CENTER 4.000 GHz SPAN 8.000 GHz
RBW 3 MHz VBW 100 kHz SWP 40 ms ATT 10 dB

[ON]



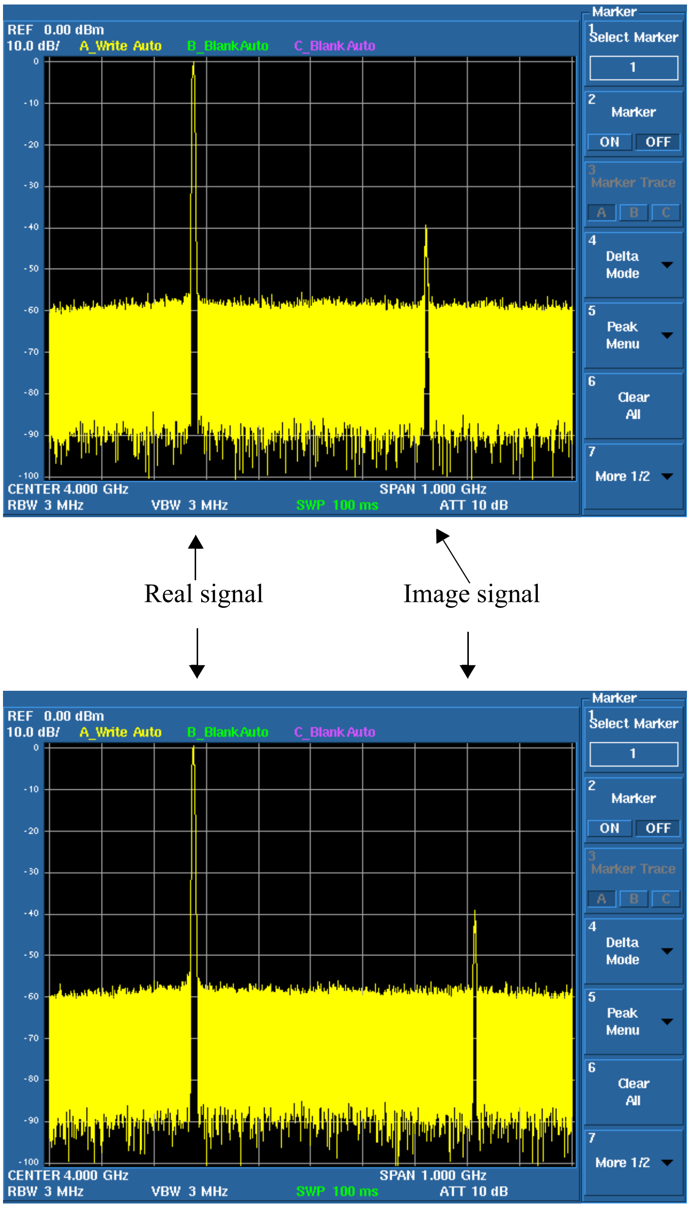
REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
MKR 6.760 GHz
-6.22 dBm
CENTER 4.000 GHz
CENTER 4.000 GHz SPAN 8.000 GHz IS
RBW 3 MHz VBW 100 kHz SWP 40 ms ATT 10 dB

"IS" is displayed at the bottom right of the screen when the Image Suppression function is set to ON.

White font:	Indicates that the calculation process of Image Suppression is correctly performed.
Red font:	Indicates that the calculation process of Image Suppression is being performed or the calculation results are indefinite. For example, when the center frequency is changed or the frequency of the input signal changes.

Signal Identification function

The frequencies of Image signals are shifted and displayed in each sweep.
The displayed frequencies of real signals do not change.
Press **FREQUENCY**, ***More1/2***, and ***Signal Identification ON/OFF***.



REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_Blank Auto
CENTER 4.000 GHz SPAN 1.000 GHz
RBW 3 MHz VBW 3 MHz SWP 100 ms ATT 10 dB

4.3.5 Hard Copy Output

4.3.5.1 Output to a Printer

Printer connection

When using a printer which is used for the first time,

1. Turn off the power of the printer and this instrument and connect the printer to the USB connector on the front or rear panels of this instrument.
2. Turn on the power of the printer.
3. Turn on the power of this instrument.

Anytime after the second time the printer is used, the printer can be connected to this instrument even if the power of this instrument is turned on.

Output to a printer

1. Specify the printer as the output device in COPY Config.
   SYSTEM, ***More1/2***, ***Copy Config***,
   or
   SHIFT, **COPY**
   Select ***PRT*** (printer) from the ***Copy Device*** menu.
2. Press the **COPY** key or ***Copy*** in the Copy menu to start printing.

Printers whose operation has been checked

Manufacturer	Model name
Epson	PM-900C, PM-760C, PM-740C, PM-2200C, PM-G720, PX-V500
HP	HP5650, HP6122, Deskjet5740, Deskjet6840, Photosmart7830
Canon	iP4200

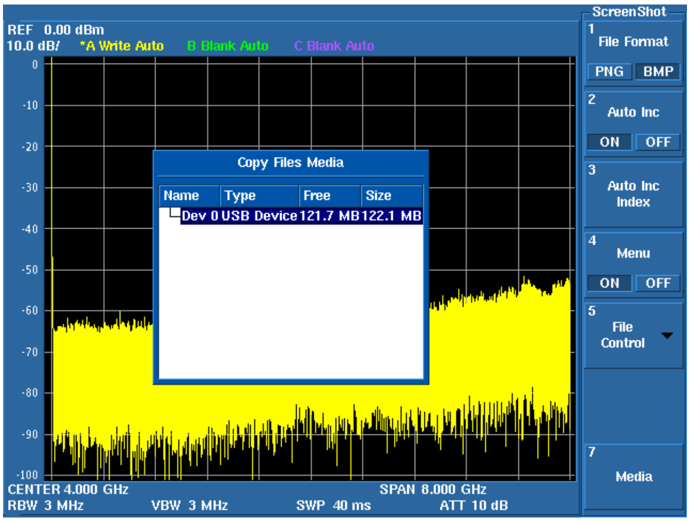
MEMO: The printing time can be reduced by performing the following:

1. ***Start copying during a sweep stop.***
2. ***Use White and Black for Color Pattern.***

4.3.5.2 File Output to USB Memory

Connecting a USB memory device

1. Connect a memory device to a USB port on the front or rear panels of this instrument.
2. Press **SYSTEM**, ***More1/2***, ***Copy Config***, ***Screen Shot Config***, and ***Media***.
   A dialog box is displayed.
   Select a memory device by using the ▼ key and confirm it by using the **Hz** key.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto

Copy Files Media

Name	Type	Free	Size
Dev 0	USB Device	121.7 MB	122.1 MB

CENTER 4.000 GHz SPAN 8.000 GHz
RBW 3 MHz VBW 3 MHz SWP 40 ms ATT 10 dB

3. Press the **Media** key.
   The dialog box closes.

File output

1. Selecting a file format

   Select the PNG or BMP format by pressing **SYSTEM**, ***More1/2***, ***Copy Config***, ***Screen Shot Config***, and ***File Format PNG/BMP***.

2. File name

   COPYxxx.BMP(PNG) is used as the file name.
   File number xxx is specified by Auto Inc Index and automatically increments by 1 each time a file is saved when Auto Inc is set to ON.
   The file name COPY.BMP(PNG) is fixed when Auto Inc is set to OFF.

3. Output

   Images on the screen can be saved to the USB memory device by pressing the **COPY** key.

4. Time Stamp

   A time stamp (date and time), which uses the same format as the computer, is included in a file.The order in which files are saved can be checked by using this time stamp.

   The date and time can be checked and set by panel operations or GPIB commands.

   Examples of GPIB commands:

   - Command to check the date and time

     Date: SETDATE?
     Time: SETTIME?

   - Command to set the date and time

     Date: SETDATE yy/mm/dd
     Time: SETTIME hh/mm/ss

   - Example

     Set the date to January 1, 2005.
     SETDATE 050101

     Set the time to 10:10.
     SETTIME 101000

Table 4-1 USB Memory Devices Whose Operation with this Instrument has Already Checked

Manufacturer	Model name
BUFFALO	RUF-C128ML/U2, RUF2-M128/256/1G, RUF2-E2GL-BL
HAGIWARA	HUD-128PJ *
IO DATA	EasyDisk EDP-128, TB-B128, TB-ST2G/K
LEXAR	JumpDrive 128MB
SanDisk	CruzerMini 128MB, SDCZ4-128-J65 *, SDCZ23-002G-J65N
ADTEC	AD-UMX128MSB *
GREEN HOUSE	GH-UFD128PLZ *
ELECOM	MF-PU2128SV *, MF-AU202GSV
Princeton	PFU-2JU/128/256/512/1G
Transcend	TS2GJF160

* For the 256-MB type, the operation with this instrument has also been checked.

NOTE: The USB memory key with a security function cannot be used.

4.3.6 Measuring by using the TG (OPT76/OPT77)

Measures the characteristics of the bandpass filter, whose pass band is located near the frequency of 1900 MHz.
(Measuring the insertion loss and pass bandwidth of the filter)

Required equipment

This instrument
Conversion adaptor: N (m)-BNC (f) ×2
Input cable: BNC (m)-BNC (m)

Turning on the power supply

IMPORTANT: Use this instrument within the specified temperature range to perform accurate measurements. Perform calibration after allowing a warm up time of 5 minutes or more.

1. Verify that the AC power switch on the rear panel is set to OFF.
2. Connect the included power cable to the AC power connector on the rear panel.

CAUTION: To prevent damage, do not supply a voltage and frequency, which exceed the specified range, to this instrument.

3. Connect the power cable to an electrical outlet.
4. Turn on the AC power switch on the rear panel.
   After turning on the AC power switch, wait for three seconds or more.
5. Turn on the power switch on the front panel.

MEMO: The display may be different depending on the state of the instrument when the power was last turned off.

Initialization

Initialize the settings of this instrument.

6. Press **SHIFT** and **SYSTEM(PRESET)**.
   Initial setting conditions are loaded.
7. Regarding U3771 and U3772, press **SHIFT** and **- (RF1)** to select RF INPUT1.

Connecting the cable

1. Attach the N(m)-BNC(f) adapters to the RF INPUT1 connector and the TG OUTPUT connector on the front panel and then connect the BNC(m)-BNC(m) cable to both connectors.

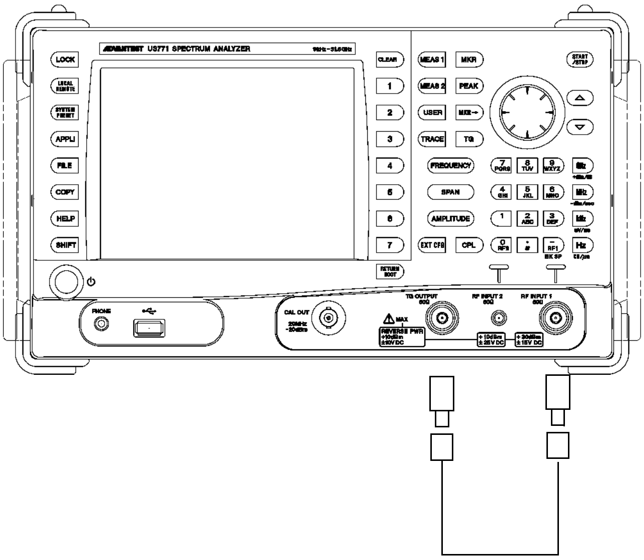


Figure 4-19 Connecting the TG Mesurement

Setting the measurement conditions to allow easier measurement of the input signal.

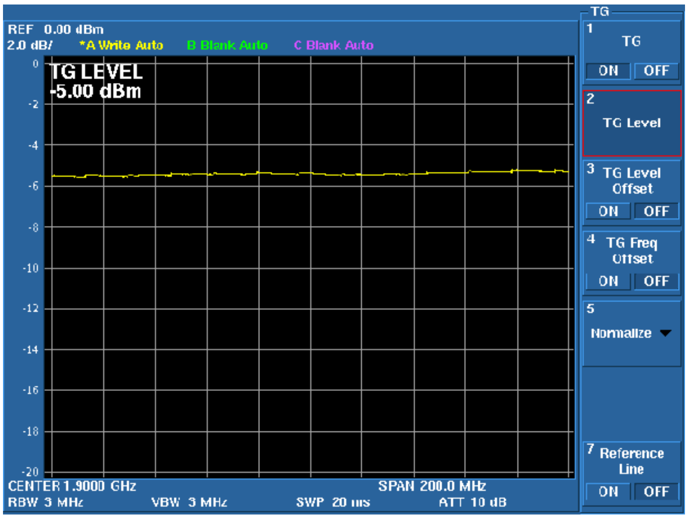
2. Press **FREQUENCY**, **1**, **9**, **0**, **0**, and **MHz**.
   The center frequency is set to 1900 MHz.

3. Press **SPAN**, **2**, **0**, **0**, and **MHz**.
   The frequency span is set to 200 kHz.

4. Press **AMPLITUDE**, ***dB/div***, and ***2dB/div***.
   The level display scale is set to 2 dB/div.

5. Press **TG**, ***TG Level***, **5**, and **MHz(-dBm)**.
   The output level of the tracking generator is set to -5 dBm.

6. Press ***TG ON/OFF*** to turn on the TG output.



REF 0.00 dBm
2.0 dB/ *A Write Auto B Blank Auto C Blank Auto
TG LEVEL
-5.00 dBm
CENTER 1.9000 GHz SPAN 200.0 MHz
RBW 3 MHz VBW 3 MHz SWP 20 ms ATT 10 dB

Performing the normalization

MEMO: ***The frequency response errors of accessories used in the measurement such as cables and adapters can be removed by performing the normalization and the accurate measurement can be performed.***

---

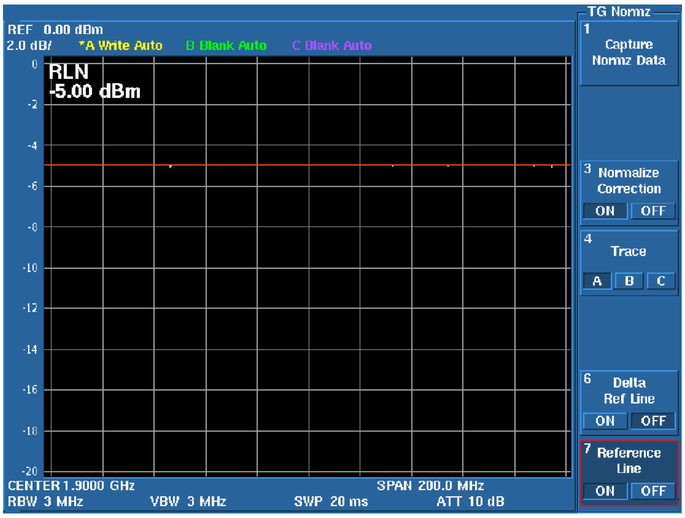
1. Press *Normalize*.
   The TG Normz menu is displayed.

2. Press ***Reference Line ON/OFF***, **5**, and **MHz(-dBm)**.
   The Reference Line position, at which the normalization is performed, is set to -5 dB.

3. Press ***Capture Normz Data***.
   The normalization data is acquired based on the set Reference Line position.

4. Press ***Normalize Correction ON/OFF***.
   The normalization is performed.

CAUTION: ***If the settings of the center frequency, frequency span, reference level, or level display scale are changed after the normalization is performed, the normalization subsequent to this change does not perform correctly.***
Re-perform the normalization after changing the settings.



REF 0.00 dBm
2.0 dB/ *A Write Auto B Blank Auto C Blank Auto

RLN
-5.00 dBm

CENTER 1.9000 GHz SPAN 200.0 MHz
RBW 3 MHz VBW 3 MHz SWP 20 ms ATT 10 dB

Connecting the unit under test

1. Connect the unit under test to TG OUTPUT and RF INPUT1 of this instrument as shown in Figure 4-20.

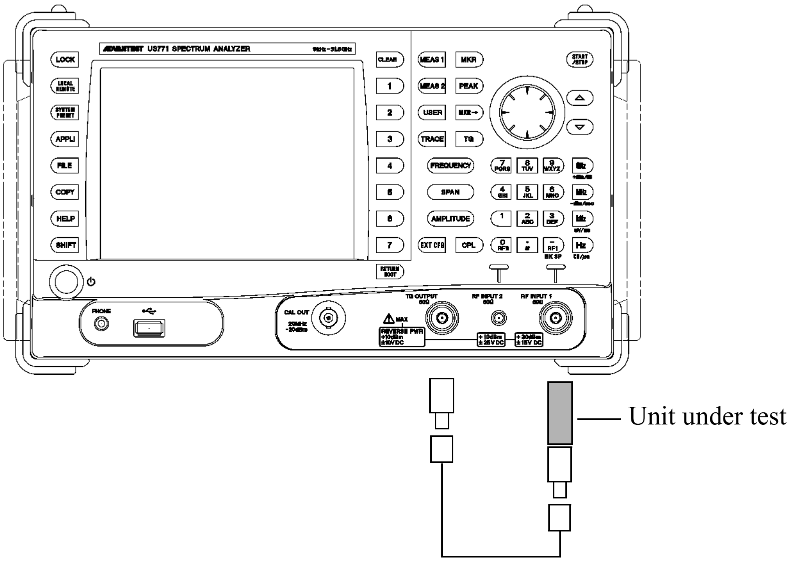
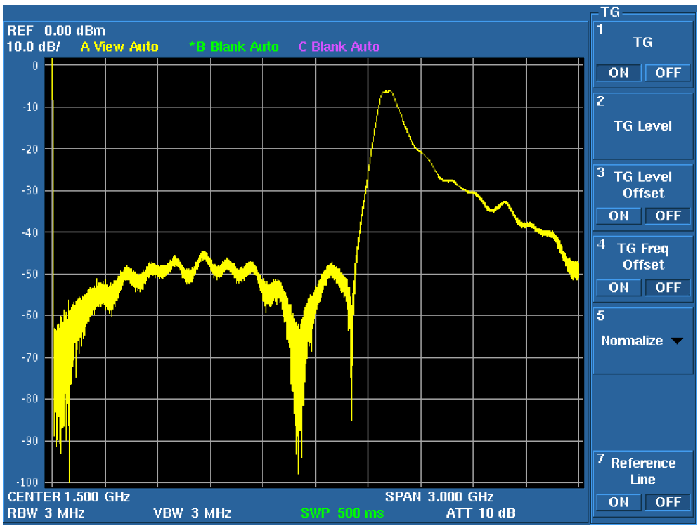


Figure 4-20 Connecting the Unit Under Test

CAUTION:

> ***In the frequency response measurement by using the TG, the level measurement error may be larger even if the UNCAL message is not displayed on the screen. Increase the sweep time until the displayed waveform does not change.***
> ***The TG response affects the measurement accuracy in the following cases:***
>
> - ***The unit under test has high Q and sharp level change characteristics. (For example, crystal filter)***
> - ***The measurement is performed in the wide frequency span.***



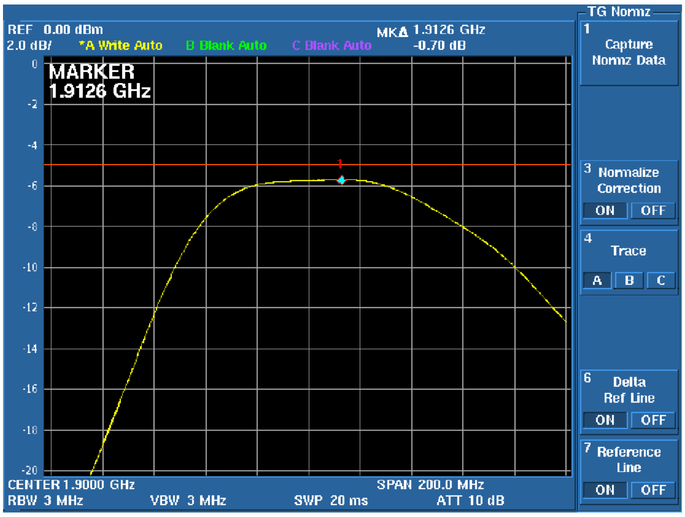
REF 0.00 dBm
10.0 dB/ A View Auto *B Blank Auto C Blank Auto

CENTER 1.500 GHz SPAN 3.000 GHz
RBW 3 MHz VBW 3 MHz SWP 500 ms ATT 10 dB

Measuring the insertion loss

1. Press ***Delta Ref Line ON/OFF***.
   The MKΔ value displays the level difference to the reference line.

2. Press **PEAK**.
   The marker level indicates the insertion loss of the filter.



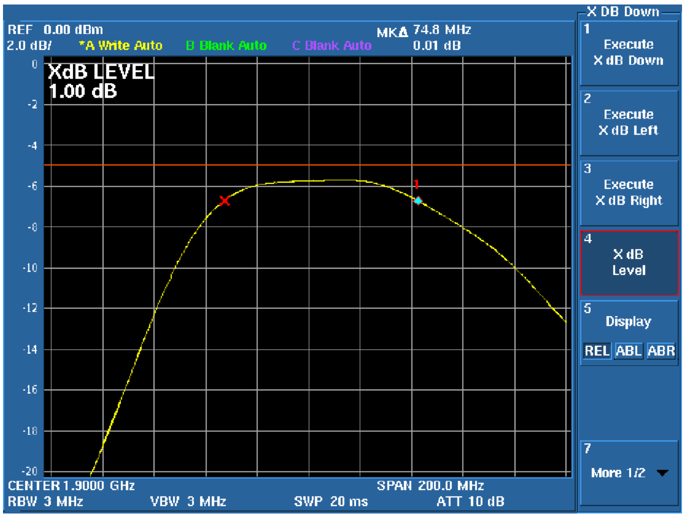
REF 0.00 dBm
2.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKΔ 1.9126 GHz
-0.70 dB
MARKER
1.9126 GHz
CENTER 1.9000 GHz SPAN 200.0 MHz
RBW 3 MHz VBW 3 MHz SWP 20 ms ATT 10 dB

Measuring the 1-dB bandwidth

1. Start from the state of the insertion loss measurement.

   Press **MEAS2**, ***XdB Down***, ***XdB Level***, **1**, **GHz(+dBm)**, and ***Execute XdB Down***.

   A marker is displayed at the right and left points on the waveform at a level which is 1 dB below the peak.
   The marker frequency indicates the 1-dB bandwidth of the filter.



REF 0.00 dBm
2.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKΔ 74.8 MHz
0.01 dB
XdB LEVEL
1.00 dB
CENTER 1.9000 GHz SPAN 200.0 MHz
RBW 3 MHz VBW 3 MHz SWP 20 ms ATT 10 dB

4.3.7 USER Key

A soft menu related to operation keys and extended function keys can be set to the USER key menu. The operability is improved by allocating functions, which are frequently-used or are located in a deep multilayer menu, to the USER key menu.

How to set a function menu to the USER menu

1. Display a function menu, which is set to the USER menu, in the soft menu display area.
2. Press **SHIFT** and then **USER**.
3. Press a menu key to be set.
   If canceling the setting, press any other operation key.

If setting an additional function menu to the USER menu, repeat the above procedure.

How to delete a function menu from the USER menu

1. Press **USER** to display the USER menu.
2. Press **SHIFT** and then **USER**.
3. Press a menu key to be deleted.

If deleting an additional soft key, repeat the above procedure.

4.4 Measurement Examples

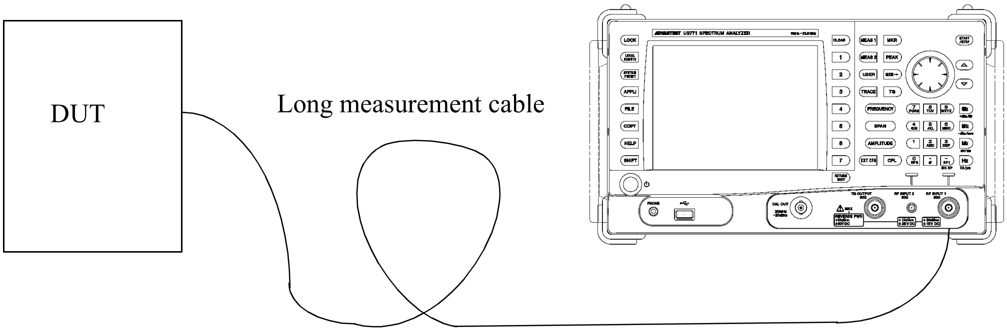
Descriptions regarding "Turning on the power" and "Initializing this instrument" are omitted from this chapter.

4.4.1 Using the Normalize Function and Level Correction Table

When a signal is measured by using a long measurement cable, the measurement level accuracy can be improved by correcting the cable frequency loss.

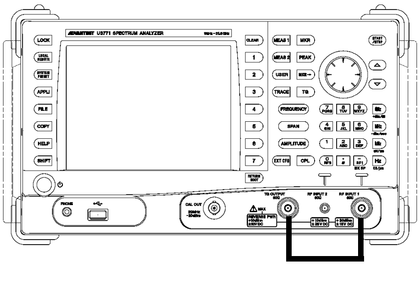
Functions used in this measurement

1. TG option + Normalize function → Cable loss measurement
2. Level correction table



Measuring the cable loss

1. Connect TG OUTPUT and RF INPUT1 by using the input cable included with this instrument.

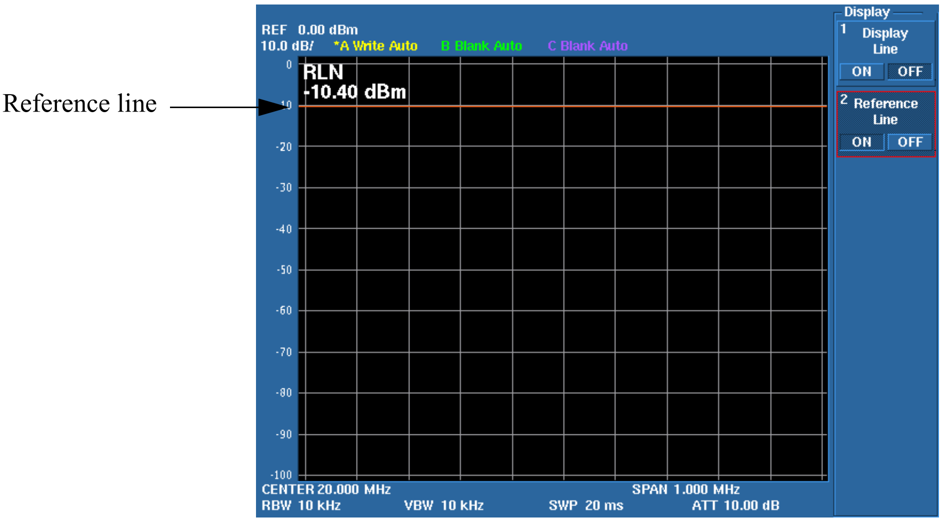


2. Press **FREQUENCY**, **2**, **0**, **MHz**, **SPAN**, **1**, **MHz**, **TG**, and ***TG ON/OFF (ON)***.

   The center frequency is set to 20 MHz, the frequency span is set to 1 MHz, and the TG (option) is set to ON.

3. Press **EXT CFG**, ***Ref/Disp Lines***, and ***Reference Line ON/OFF (ON)***.

   The reference line is displayed on the screen.



4. Turn the knob to adjust the reference line to the TG signal.

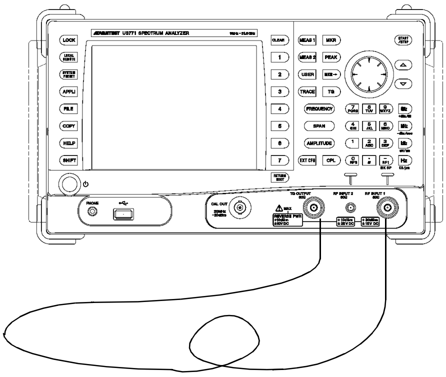
5. Press **FREQUENCY**, **1**, **.**, **5**, **GHz**, **SPAN**, **3**, and **GHz**.

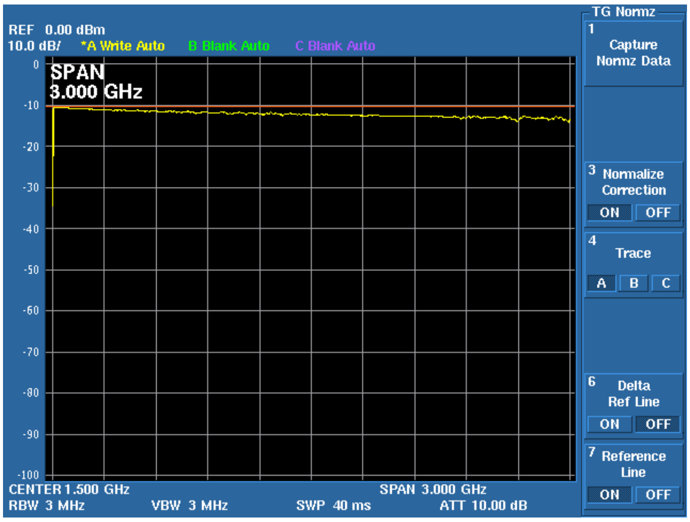
   The center frequency is set to 1.5 GHz and the frequency span is set to 3 GHz.

6. Press **TG**, ***Normalize***, ***Capture Normz Data***, and ***Normalize Correction ON/OFF (ON)***.

7. Connect TG OUTPUT and RF INPUT1 by using a cable that is actually used for this measurement.

   The frequency characteristic of the cable used in the measurement is displayed.



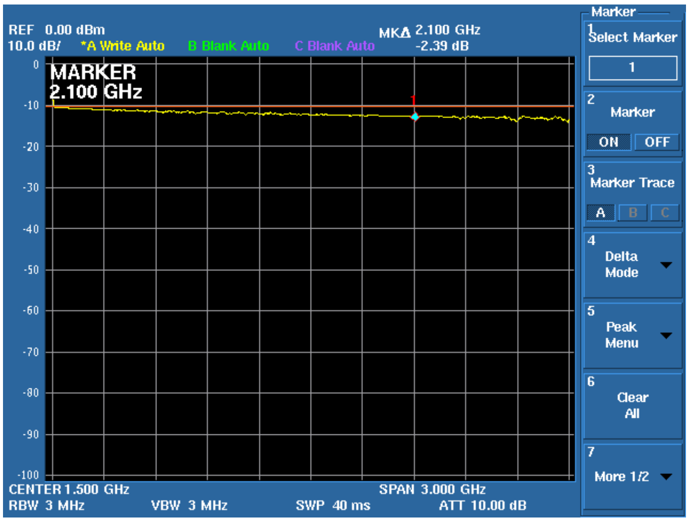


REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
SPAN 3.000 GHz
CENTER 1.500 GHz SPAN 3.000 GHz
RBW 3 MHz VBW 3 MHz SWP 40 ms ATT 10.00 dB

8. Press **MKR**, ***Delta Mode***, ***Delta ON/OFF (ON)***, ***Ref Object***, and ***Reference Line***.

   The marker delta mode is set.

   The marker value shows a cable loss based on a frequency of 20 MHz.



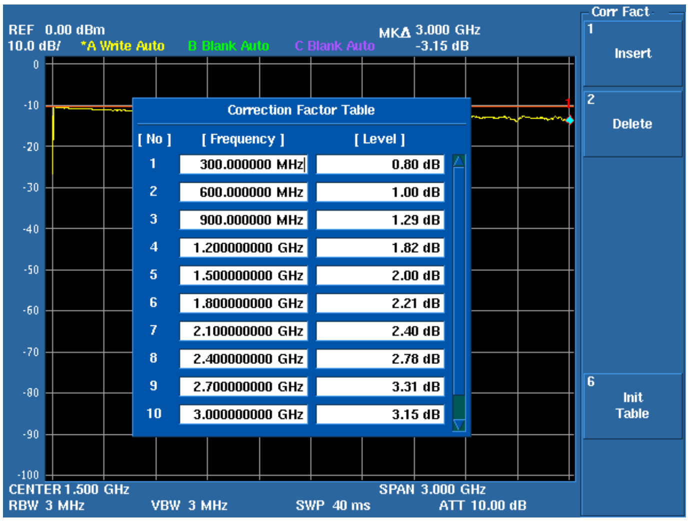
REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKΔ 2.100 GHz
-2.39 dB
MARKER 2.100 GHz
CENTER 1.500 GHz SPAN 3.000 GHz
RBW 3 MHz VBW 3 MHz SWP 40 ms ATT 10.00 dB

9. Move the marker and read a cable loss for each frequency.

   For this measurement, 10 frequency points from 300 MHz to 3 GHz are used.

Creating the correction table

10. Press **AMPLITUDE**, ***More 1/2***, and ***Edit Corr Factor***.
    The Correction Factor Table is displayed.
    The cursor is positioned at the frequency setting text field of correction point 1.
11. Press **3**, **0**, **0**, and **MHz**.
    The correction point 1 frequency is set to 300 MHz.
    The cursor moves to the level setting text field.
12. Press **0**, **.**, **8**, and **GHz**.
    The correction value of correction point 1 is set to 0.8 dB.
    The cursor moves to the frequency setting text field of correction point 2.
13. Repeat the above procedure and complete the correction table.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKΔ 3.000 GHz
-3.15 dB

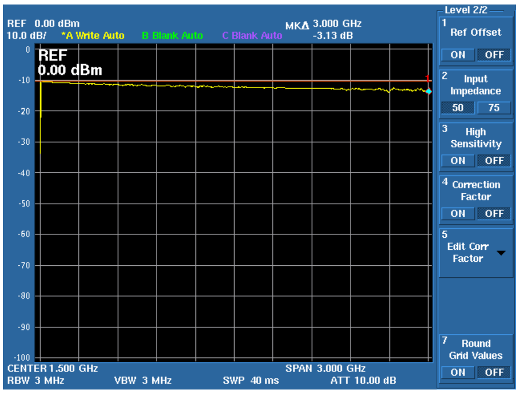
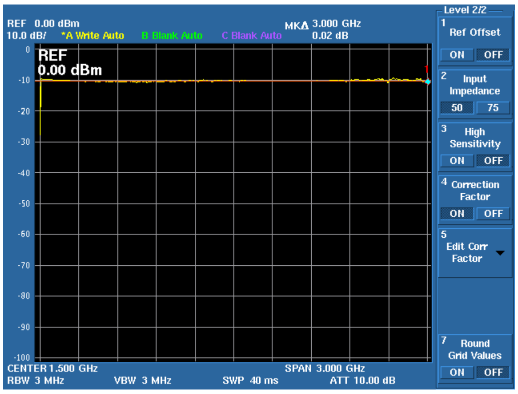
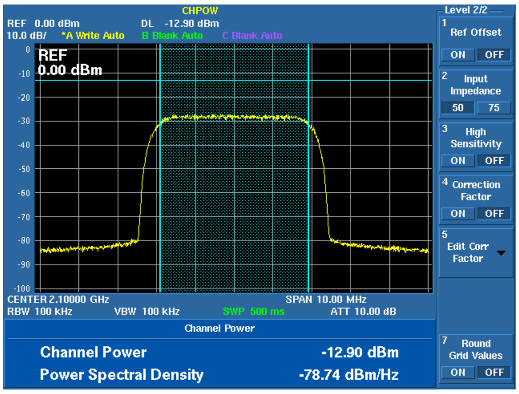
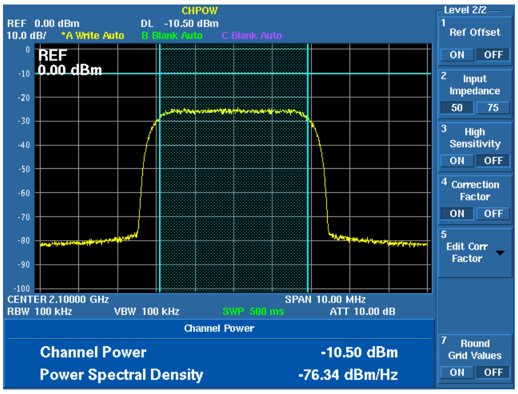
Correction Factor Table

[No]	[Frequency]	[Level]
1	300.000000 MHz	0.80 dB
2	600.000000 MHz	1.00 dB
3	900.000000 MHz	1.29 dB
4	1.200000000 GHz	1.82 dB
5	1.500000000 GHz	2.00 dB
6	1.800000000 GHz	2.21 dB
7	2.100000000 GHz	2.40 dB
8	2.400000000 GHz	2.78 dB
9	2.700000000 GHz	3.31 dB
10	3.000000000 GHz	3.15 dB

CENTER 1.500 GHz SPAN 3.000 GHz
RBW 3 MHz VBW 3 MHz SWP 40 ms ATT 10.00 dB

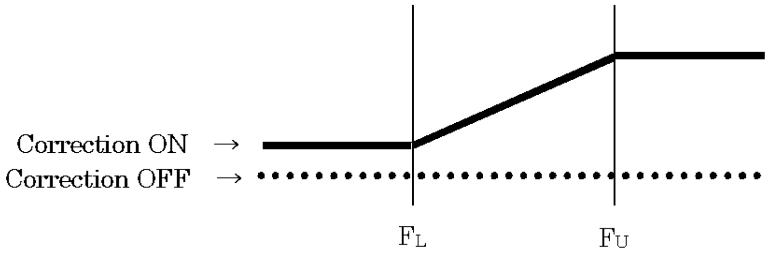
Using the correction table

14. Press **AMPLITUDE**, ***More 1/2***, and ***Correction Factor ON/OFF (ON)***.
    The displayed measurement value is corrected based on the correction table.

Correction Factor OFF	Correction Factor ON
	
Cable loss: 3.13 dB at 3 GHz	The cable frequency loss is corrected.
 Channel Power -12.90 dBm Power Spectral Density -78.74 dBm/Hz	 Channel Power -10.50 dBm Power Spectral Density -76.34 dBm/Hz
Frequency: 2.1 GHz Measurement value: -12.9 dBm	Frequency: 2.1 GHz Measurement value: -10.5 dBm

Available range of the correction value

Up to ±100 dB can be set as the correction value.
The correction value of the first correction point is applied to frequencies from 0 Hz to the first correction point frequency.
Correction values between points where correction values are set are obtained by using a method of linear interpolation.
The correction value of the last correction point is applied to frequencies following to the last correction point frequency.



4.4.2 W-CDMA Channel Power Measurement

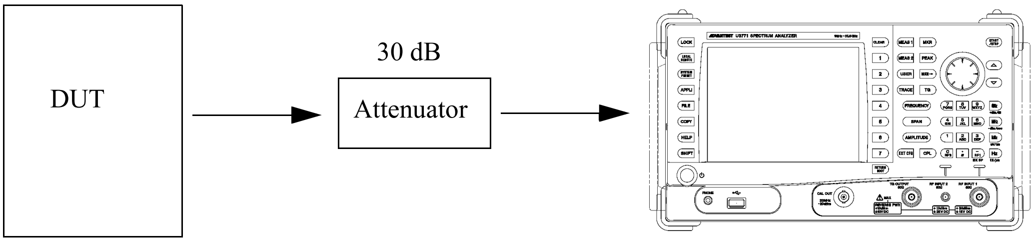
This section describes a measurement example of the W-CDMA signal by using the MEAS1 function.

- The maximum input level of this instrument
  RF1: +30 dBm ±50 VDC (U3741)
  RF1: +30 dBm ±15 VDC (U3751/U3771/U3772)
  RF2: +10 dBm ±25 VDC (U3771/U3772)

CAUTION:

1. ***When measuring signal power that exceeds the maximum input level, connect an external attenuator to ensure that the input level does not exceed it.***
   A band rejection filter may be required depending on the standard.
2. ***When turning the power on, do not connect a DUT to this instrument.***
3. ***Before turning the power off, disconnect the DUT from this instrument.***

The W-CDMA mobile station signal, whose frequency is 1952.4 MHz and level is +24 dBm, is measured.

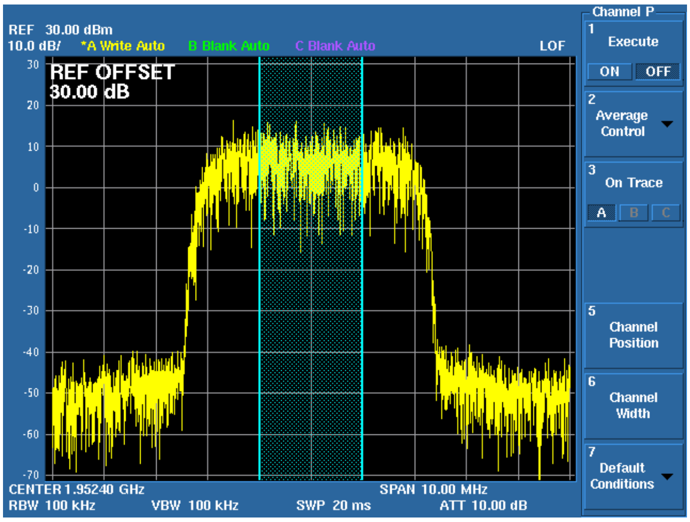


Setting measurement conditions

1. Press **FREQUENCY**, **1**, **9**, **5**, **2**, **.**, **4**, and **MHz**.
   The center frequency is set to 1952.4 MHz.
2. Press **SPAN**, **1**, **0**, and **MHz**.
   The frequency span is set to 10 MHz.
3. Press **AMPLITUDE**, ***More 1/2***, ***Ref Offset ON/OFF (ON)***, **3**, **0**, and **GHz**.
   A value of 30 dB, which is the attenuation of the external attenuator, is added to a level reading value.

4. Press **MEAS1** and ***Channel Power***.

   A window that shows the measurement channel width is displayed at the center of the screen.



REF 30.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto LOF

REF OFFSET
30.00 dB

CENTER 1.95240 GHz SPAN 10.00 MHz
RBW 100 kHz VBW 100 kHz SWP 20 ms ATT 10.00 dB

5. Press ***Channel Width***, **3**, **.**, **8**, **4**, and **MHz**.

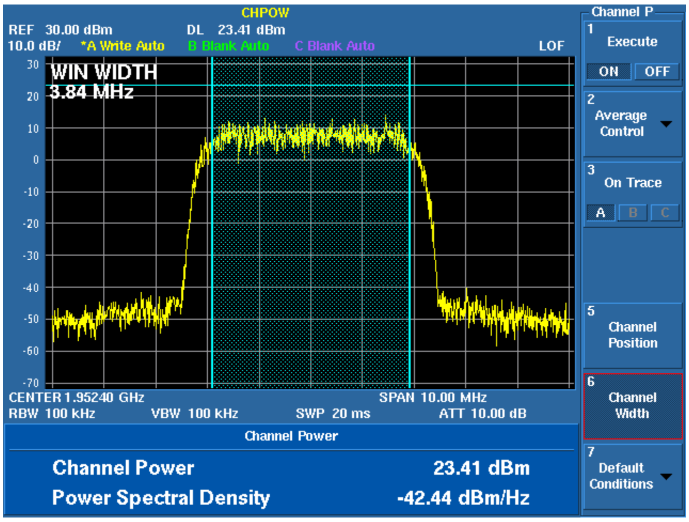
   The channel width is set to 3.84 MHz.

Measuring the channel power

6. Press ***Execute ON/OFF (ON)***.

   The channel power measurement starts.

   The detector is automatically set to RMS.



CHPOW
REF 30.00 dBm DL 23.41 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto LOF

WIN WIDTH
3.84 MHz

CENTER 1.95240 GHz SPAN 10.00 MHz
RBW 100 kHz VBW 100 kHz SWP 20 ms ATT 10.00 dB

Channel Power

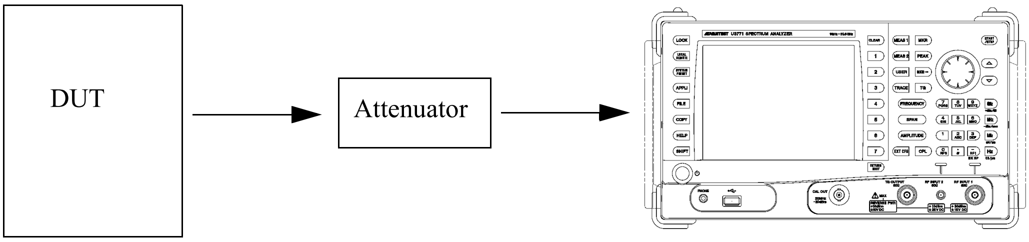
Channel Power	23.41 dBm
Power Spectral Density	-42.44 dBm/Hz

The measurement result is displayed.

A display line that shows the channel power is displayed.

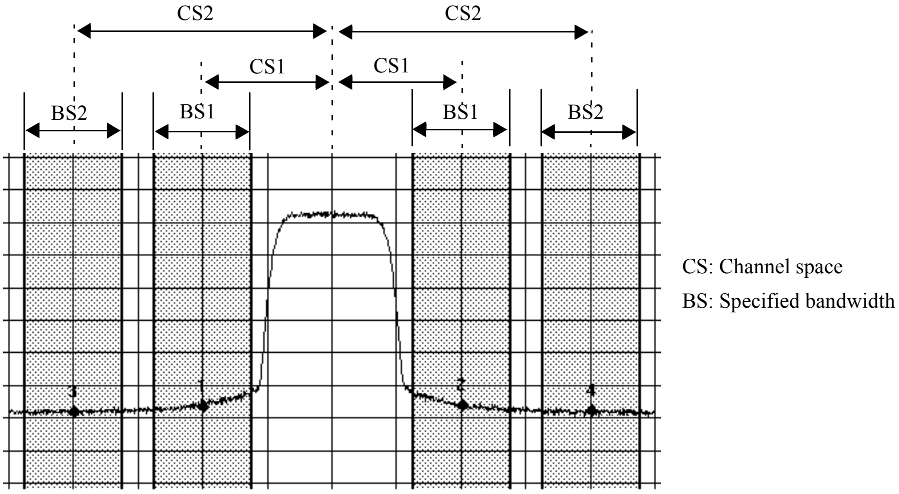
4.4.3 W-CDMA Adjacent Channel Leakage Power (ACP) Measurement

A signal of 2100 MHz output from the W-CDMA transmitter is measured.



Examples of measurement specifications

Channel space	Specified bandwidth	Specification
5 MHz	3.84 MHz	45 dB
10 MHz	3.84 MHz	50 dB



Setting measurement conditions

1. Press **FREQUENCY**, **2**, **1**, **0**, **0**, and **MHz**.
   The center frequency is set to 2100 MHz.
2. Press **SPAN**, **2**, **5**, and **MHz**.
   The frequency span is set to 25 MHz.

CAUTION:

Set the frequency span according to the following conditions.

- ***For Nyquist Filter OFF:***
  SPAN > 2*CS + BS
- ***For Nyquist Filter ON:***
  SPAN > 2*CS + (1 + Roll Off Factor)*Symbol Rate

---

3. Press **AMPLITUDE**, ***More 1/2***, ***Ref Offset ON/OFF(ON)***, **3**, **0**, and **GHz**.

   A value of 30 dB, which is the attenuation of the external attenuator, is added to a level reading value.

4. Press **MEAS1** and ***ACP***.

   The ACP menu is displayed.

Setting the CS/BS table

5. Press ***Channel Definition***.

   The CS/BS table is displayed.
   The cursor is positioned at the Channel Space 1 setting text field.

6. Press **5** and **MHz**.

   Channel Space 1 is set to 5 MHz.
   The cursor moves to the Channel Bandwidth 1 setting text field.

7. Press **3**, **.**, **8**, **4**, and **MHz**.

   Channel Bandwidth 1 is set to 3.84 MHz.
   The cursor moves to the Channel Space 2 setting text field.

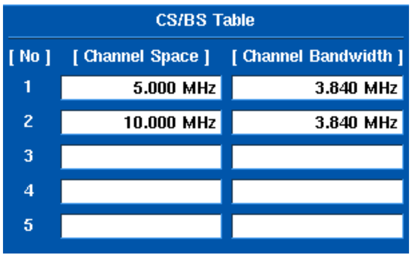
8. Press **1**, **0**, and **MHz**.

   Channel Space 1 is set to 10 MHz.
   The cursor moves to the Channel Bandwidth 2 setting text field.

9. Press **3**, **.**, **8**, **4**, and **MHz**.

   Channel Bandwidth 2 is set to 3.84 MHz.

10. Press **RETURN**.

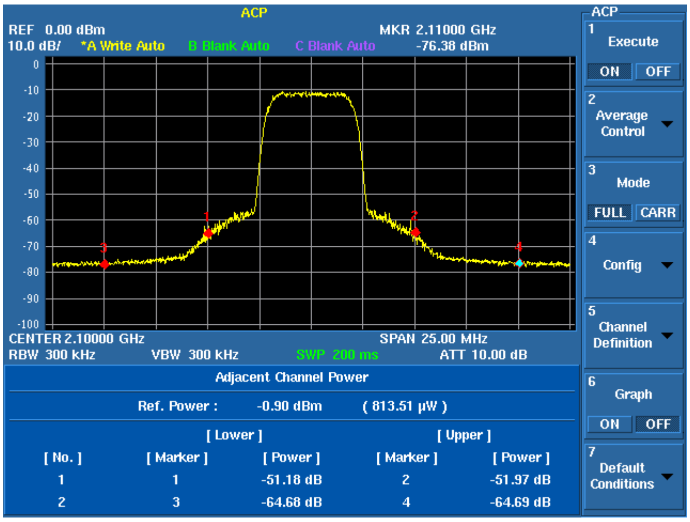


CS/BS Table

[No]	[Channel Space]	[Channel Bandwidth]
1	5.000 MHz	3.840 MHz
2	10.000 MHz	3.840 MHz
3		
4		
5		

Measuring the ACP

11. Press ***Execute ON/OFF (ON)***.
    The ACP measurement starts.
    The detector is automatically set to RMS.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKR 2.11000 GHz
-76.38 dBm
CENTER 2.10000 GHz
SPAN 25.00 MHz
RBW 300 kHz VBW 300 kHz SWP 200 ms ATT 10.00 dB

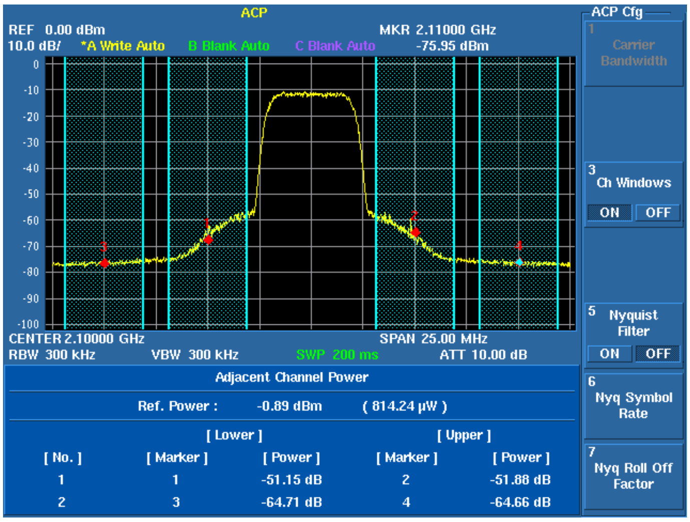
Adjacent Channel Power

Ref. Power : -0.90 dBm (813.51 µW)

	[Lower]		[Upper]	
[No.]	[Marker]	[Power]	[Marker]	[Power]
1	1	-51.18 dB	2	-51.97 dB
2	3	-64.68 dB	4	-64.69 dB

Displaying the channel bandwidth

12. Press ***Config*** and ***Ch Windows ON/OFF (ON)***.
    The set channel bandwidth window is displayed on the screen.
    The frequency span must be set so that all channels are included in it.



REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
MKR 2.11000 GHz
-75.95 dBm
CENTER 2.10000 GHz
SPAN 25.00 MHz
RBW 300 kHz VBW 300 kHz SWP 200 ms ATT 10.00 dB

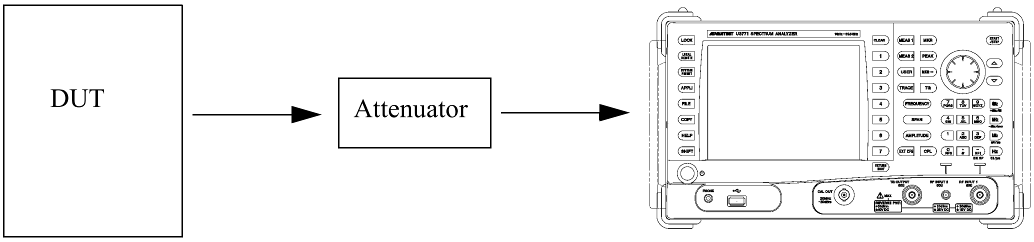
Adjacent Channel Power

Ref. Power : -0.89 dBm (814.24 µW)

	[Lower]		[Upper]	
[No.]	[Marker]	[Power]	[Marker]	[Power]
1	1	-51.15 dB	2	-51.88 dB
2	3	-64.71 dB	4	-64.66 dB

4.4.4 W-CDMA Spurious Measurement

The spurious response is measured in frequency bands higher than 30 MHz.



Examples of measurement specifications

Frequency range	RBW	Spurious level
9 kHz ~ 150 kHz	1 kHz	-13 dBm
150 kHz ~ 30 MHz	10 kHz	-13 dBm
30 MHz ~ 1 GHz	100 kHz	-13 dBm
1 GHz ~ 12.75 GHz (*)	1 MHz	-13 dBm

(*) In a frequency range from 1.8935 GHz to 1.9196 GHz and the 300-kHz RBW, the spurious level is -41 dBm or less.

Setting measurement conditions

1. Press **TRACE**, ***Detector***, and ***Posi***.

   Detector is set to Posi to perform the spurious measurement.

2. Press **MEAS1**, ***Spurious***, and ***Bands Definition***.

   The Spurious Bands table is displayed.

   The cursor is positioned at the start frequency setting text field of frequency band 1.

3. Press **3**, **0**, and **MHz**.

   The start frequency is set to 30 MHz and the cursor moves to the stop frequency setting text field.

4. Press **1** and **GHz**.

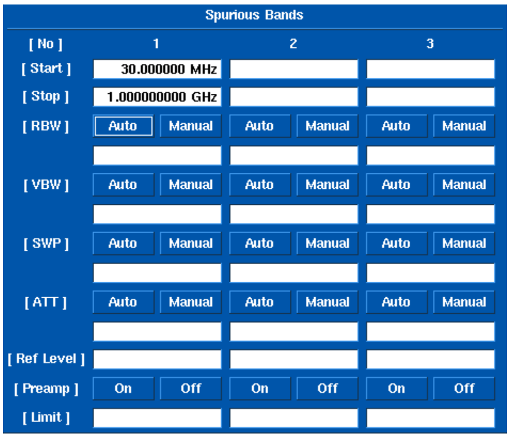
   The stop frequency is set to 1 GHz and the cursor moves to the RBW selection button from Auto and Manual.

   If selecting Auto, press **Hz**.

   If selecting Manual, turn the knob clockwise for one click to select the Manual button, and then press **Hz**.

5. Select ***Manual***, and then press **1**, **0**, **0**, and **kHz**.

   The RBW is set to Manual and 100 kHz.



Spurious Bands

[No]	1	2	3
[Start]	30.000000 MHz		
[Stop]	1.000000000 GHz		
[RBW]	Auto Manual	Auto Manual	Auto Manual
[VBW]	Auto Manual	Auto Manual	Auto Manual
[SWP]	Auto Manual	Auto Manual	Auto Manual
[ATT]	Auto Manual	Auto Manual	Auto Manual
[Ref Level]			
[Preamp]	On Off	On Off	On Off
[Limit]			

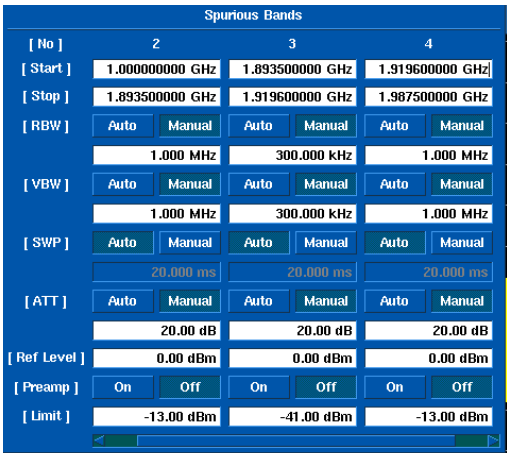
6. Repeat the above procedure and set the VBW to Manual and 100 kHz, the SWP to Auto, the ATT to Manual and 20 dB, the Ref Level to 0 dBm, and the Preamp to Off.

   The cursor moves to the limit value setting text field.

7. Press **-**, **1**, **3**, and **GHz**.

   The limit value is set to -13 dBm, and then the cursor moves to the start frequency setting text field of the next frequency band.

8. Repeat the above procedure and complete the Spurious Bands table.



Spurious Bands

[No]	2	3	4
[Start]	1.000000000 GHz	1.893500000 GHz	1.919600000 GHz
[Stop]	1.893500000 GHz	1.919600000 GHz	1.987500000 GHz
[RBW]	Auto Manual	Auto Manual	Auto Manual
	1.000 MHz	300.000 kHz	1.000 MHz
[VBW]	Auto Manual	Auto Manual	Auto Manual
	1.000 MHz	300.000 kHz	1.000 MHz
[SWP]	Auto Manual	Auto Manual	Auto Manual
	20.000 ms	20.000 ms	20.000 ms
[ATT]	Auto Manual	Auto Manual	Auto Manual
	20.00 dB	20.00 dB	20.00 dB
[Ref Level]	0.00 dBm	0.00 dBm	0.00 dBm
[Preamp]	On Off	On Off	On Off
[Limit]	-13.00 dBm	-41.00 dBm	-13.00 dBm

9. Press **RETURN**.

   The spurious measurement menu is displayed.

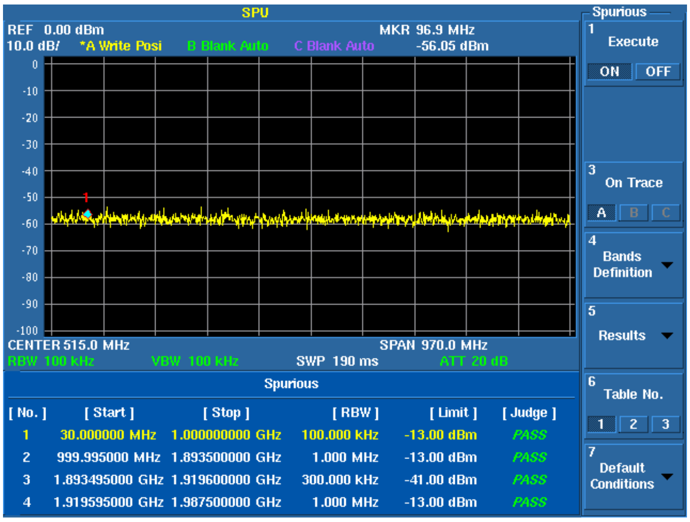
Measuring the spurious response

10. Press ***Execute ON/OFF (ON)***.

    The spurious response in each frequency band that changes after a sweep is measured according to the measurement conditions set in the Spurious Bands table.

    Characters that indicate a frequency band, in which the spurious response is being measured, are displayed in yellow.

    If the measured value is equal to the set limit value or less, the judgment is PASS. If the measured value is more than the set limit value, the judgment is FAIL.



SPU

REF 0.00 dBm   MKR 96.9 MHz
10.0 dB/   *A Write Posi   B Blank Auto   C Blank Auto   -56.05 dBm

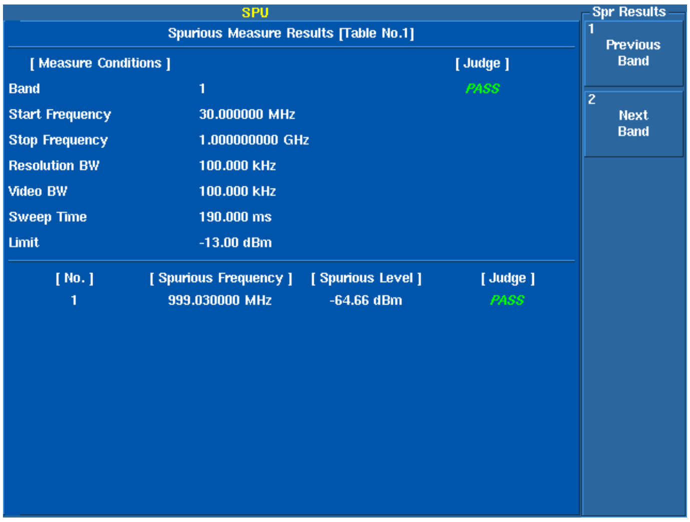
CENTER 515.0 MHz   SPAN 970.0 MHz
RBW 100 kHz   VBW 100 kHz   SWP 190 ms   ATT 20 dB

Spurious

[No.]	[Start]	[Stop]	[RBW]	[Limit]	[Judge]
1	30.000000 MHz	1.000000000 GHz	100.000 kHz	-13.00 dBm	PASS
2	999.995000 MHz	1.893500000 GHz	1.000 MHz	-13.00 dBm	PASS
3	1.893495000 GHz	1.919600000 GHz	300.000 kHz	-41.00 dBm	PASS
4	1.919595000 GHz	1.987500000 GHz	1.000 MHz	-13.00 dBm	PASS

11. Press ***Results***.

    Measurement results in each frequency band are displayed.



SPU

Spurious Measure Results [Table No.1]

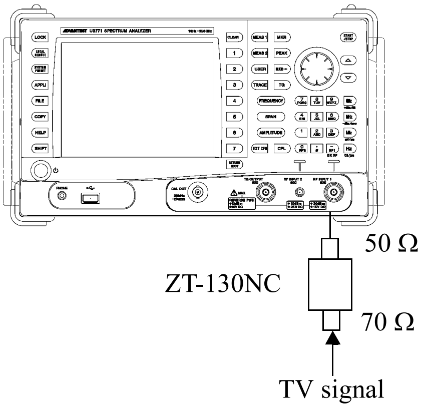
[Measure Conditions]		[Judge]
Band	1	PASS
Start Frequency	30.000000 MHz	
Stop Frequency	1.000000000 GHz	
Resolution BW	100.000 kHz	
Video BW	100.000 kHz	
Sweep Time	190.000 ms	
Limit	-13.00 dBm	

[No.]	[Spurious Frequency]	[Spurious Level]	[Judge]
1	999.030000 MHz	-64.66 dBm	PASS

4.4.5 CN Measurement in Terrestrial Digital Broadcasting

The difference (CN ratio) between a carrier level (C) and noise level (N) in terrestrial digital broadcasting is measured.

When measuring the CN ratio, connect the 75-Ω impedance converter (ZT-130NC) to the RF1 input connector of this instrument. Set the measurement unit to dBμV.



Setting the measurement unit

1. Press **AMPLITUDE**, ***Units***, and ***dBμV***.

   The measurement unit is set to dBμV.

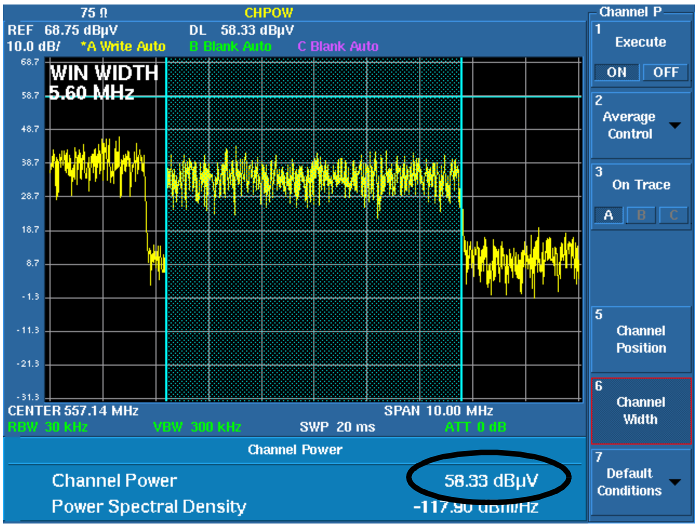
2. Press **AMPLITUDE**, ***More1/2***, and ***Input Impedance 50/75 (75)***.

   The conversion loss of the 75-Ω impedance converter (ZT-130NC) is corrected for the measured value.

Measuring the carrier level (C)

Setting this instrument

Measurement mode:	Channel power measurement function
Center frequency:	Center frequency in the channel
SPAN	10 MHz
RBW:	30 kHz
VBW:	300 kHz
Measurement bandwidth:	5.6 MHz (Channel power bandwidth)



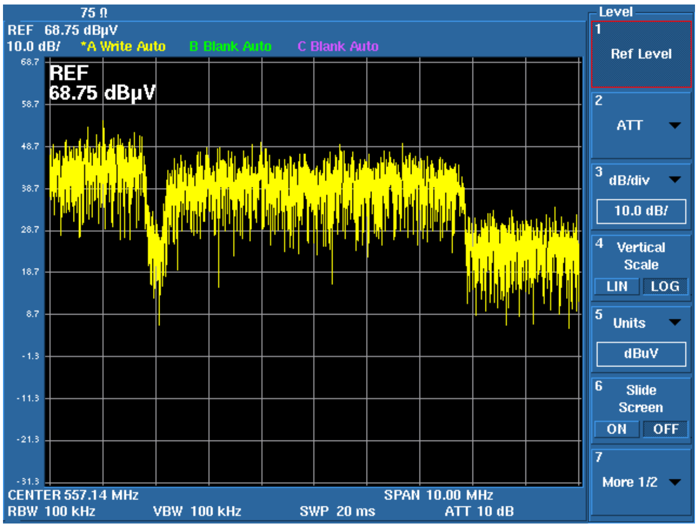
```
75 Ω                          CHPOW
REF   68.75 dBμV              DL    58.33 dBμV
10.0 dB/   *A Write Auto      B Blank Auto      C Blank Auto
CENTER 557.14 MHz                               SPAN 10.00 MHz
RBW 30 kHz         VBW 300 kHz       SWP 20 ms        ATT 0 dB
                        Channel Power
Channel Power                                   58.33 dBμV
Power Spectral Density                          -117.90 dBm/Hz
```

Figure 4-21 Measurement Display for Channel Power

Procedure (Example for 27 channels)

1. Press **FREQUENCY**, **5**, **5**, **7**, **.**, **1**, **4**, **2**, **8**, **5**, **7**, and **MHz**.
   The center frequency is set to 557.142857 MHz.
2. Press **SPAN**, **1**, **0**, and **MHz**.
   The frequency span is set to 10 MHz.

3. Press **AMPLITUDE** and then press ▼ to adjust a signal peak on the third scale from the top.



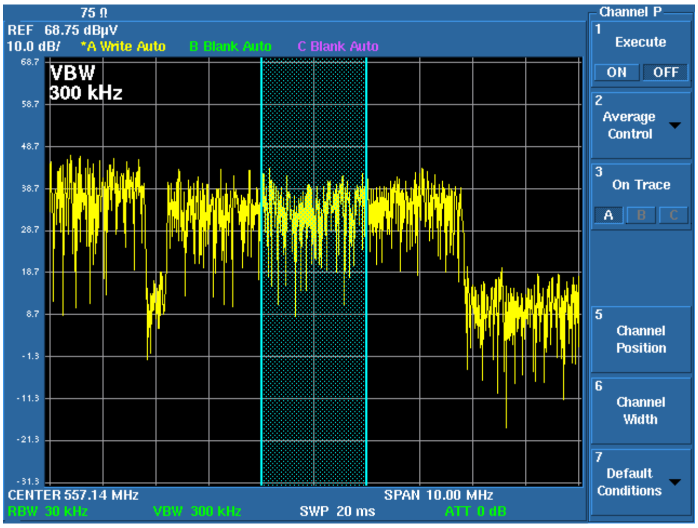
75 Ω
REF 68.75 dBμV
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
REF 68.75 dBμV
CENTER 557.14 MHz SPAN 10.00 MHz
RBW 100 kHz VBW 100 kHz SWP 20 ms ATT 10 dB

4. Press **CPL**, ***RBW AUTO/MNL***, **3**, **0**, **kHz**, ***VBW AUTO/MNL***, **3**, **0**, **0**, and **kHz**.

   The RBW is set to 30 kHz and the VBW is set to 300 kHz.

5. Press **MEAS1** and ***Channel Power***.

   A window that shows the measurement channel width is displayed in the center of the screen.



75 Ω
REF 68.75 dBμV
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto
VBW 300 kHz
CENTER 557.14 MHz SPAN 10.00 MHz
RBW 30 kHz VBW 300 kHz SWP 20 ms ATT 0 dB

6. Press ***Channel Width***, **5**, **.**, **6**, and **MHz**.

   The channel width is set to 5.6 MHz.

7. Press ***Execute ON/OFF (ON)***.

   The channel power measurement begins.

8. The measurement result is displayed in the Channel Power window.

   C = 58.33 dBµV (Figure 4-21)

Measuring the noise level (N)

Setting this instrument

Measurement mode: Noise/Hz measurement function

Measurement noise area frequency: Noise that is adjacent to the measurement signal and not affected by the signal

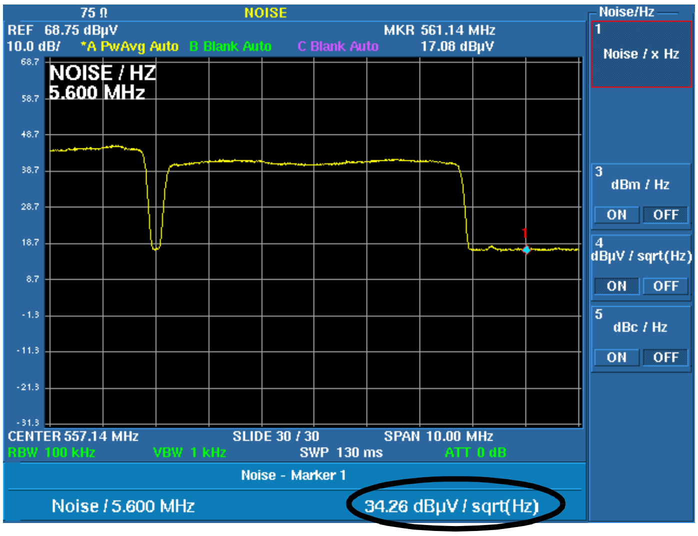
SPAN: 10 MHz

RBW: 100 kHz

VBW: 1 kHz

Measurement bandwidth: 5.6 MHz (A value for the Noise/Hz conversion)

Averaging count: 30 times



75 Ω NOISE

REF 68.75 dBµV

10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto

MKR 561.14 MHz 17.08 dBµV

NOISE / HZ 5.600 MHz

CENTER 557.14 MHz SLIDE 30 / 30 SPAN 10.00 MHz

RBW 100 kHz VBW 1 kHz SWP 130 ms ATT 0 dB

Noise - Marker 1

Noise / 5.600 MHz 34.26 dBµV / sqrt(Hz)

Figure 4-22 Measurement Display for Noise Power Converted into 5.6 MHz Bandwidth

Procedure

9. Press ***Execute ON/OFF (OFF)***.

   The channel power measurement is canceled.

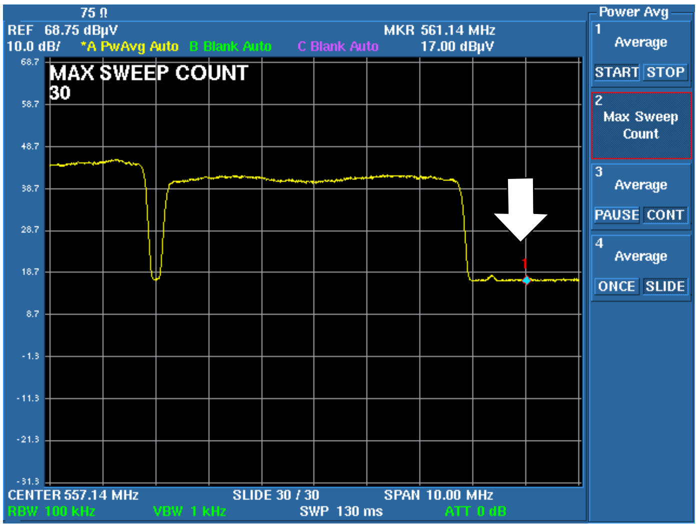
10. Press **CPL**, ***RBW AUTO/MNL***, **1**, **0**, **0**, **kHz**, ***VBW AUTO/MNL***, **1**, and **kHz**.

    The RBW is set to 100 kHz and the VBW is set to 1 kHz.

11. Press **MKR** and then press ▲ to move the marker into a noise area.

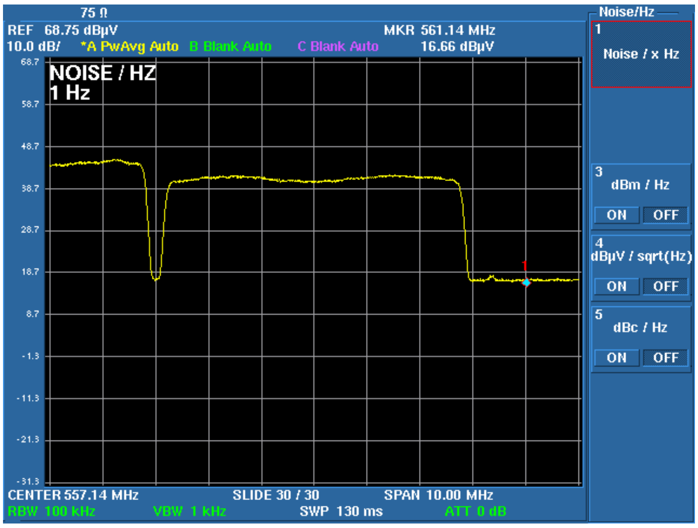
12. Press **TRACE**, ***Calc, Power Average***, ***Start/Stop (Start)***, ***Max Sweep Count***, **3**, **0**, and **Hz (Enter)**.

    The Max Sweep Count is set to 30.



75 Ω
REF 68.75 dBμV
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto
MKR 561.14 MHz
17.00 dBμV
MAX SWEEP COUNT
30
CENTER 557.14 MHz SLIDE 30 / 30 SPAN 10.00 MHz
RBW 100 kHz VBW 1 kHz SWP 130 ms ATT 0 dB

13. Press **MEAS 2**, ***Noise/Hz***, **5**, **.**, **6**, and **MHz**.



75 Ω
REF 68.75 dBμV
10.0 dB/ *A PwAvg Auto B Blank Auto C Blank Auto
MKR 561.14 MHz
16.66 dBμV
NOISE / HZ
1 Hz
CENTER 557.14 MHz SLIDE 30 / 30 SPAN 10.00 MHz
RBW 100 kHz VBW 1 kHz SWP 130 ms ATT 0 dB

14. Press ***dBμV/Sqrt (Hz) ON/OFF (ON)***.

    The measurement begins.

15. The measurement result is displayed in the Noise-Marker 1 window.
    N = 34.26 dBμV (Figure 4-22)

Calculating the CN ratio

The CN ratio can be obtained by calculating the values, which are measured from the carrier (C) and noise (N) level measurements.
(C: a value in step 8, N: a value in step 15)

CN ratio = C - N = 58.33 - 34.26 = 24.07 dB

4.4.6 Television Signal Measurement

Japanese television channels are pre-saved to OPT15 (75 Ω input option).

The table can be read using the Recall function and a measurement frequency can be set using the channel number.

Registered files and setting conditions

1_CATV_CH:	CATV channel (See A.6.1)
2_VHF&UHF_CH:	VHF and UHF channels (See A.6.2)
3_BS_IF_CH:	BS-IF channel (See A.6.4)
4_CS_IF_CH:	CS-IF channel (See A.6.5)
5_Digital_CH:	Terrestrial digital channel (See A.6.3)
6_Digital_Noise:	Terrestrial digital noise measurement
7_Digital_ChPower:	Terrestrial digital channel power measurement

Recall the file and refer to the registered channel table. The center frequency can be set using the channel number.

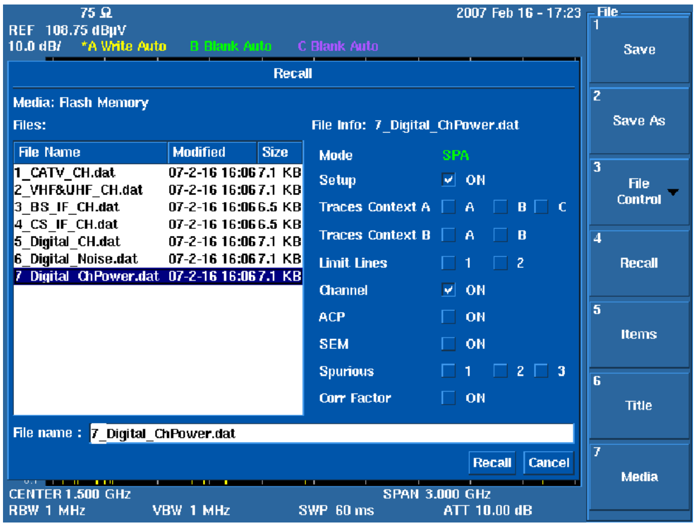
Change SPAN, REF LEVEL, and input attenuator settings according to the operating environment.

NOTE: ***When the 6_Digital_Noise file is recalled, the input attenuator is set to 0 dB. Be careful of the input signal level.***

Example of recalling the 7_Digital_ChPower file and measuring the Channel 28 power

Procedure

1. Press **FILE** and ***Recall***.
   The Recall window is displayed.
2. Turn the knob to select the 7_Digital_ChPower.dat file.



Media: Flash Memory

Files:

File Name	Modified	Size
1_CATV_CH.dat	07-2-16 16:06	7.1 KB
2_VHF&UHF_CH.dat	07-2-16 16:06	7.1 KB
3_BS_IF_CH.dat	07-2-16 16:06	6.5 KB
4_CS_IF_CH.dat	07-2-16 16:06	6.5 KB
5_Digital_CH.dat	07-2-16 16:06	7.1 KB
6_Digital_Noise.dat	07-2-16 16:06	7.1 KB
7_Digital_ChPower.dat	07-2-16 16:06	7.1 KB

File Info: 7_Digital_ChPower.dat

Mode	SPA		
Setup	☑ ON		
Traces Context A	☐ A	☐ B	☐ C
Traces Context B	☐ A	☐ B	
Limit Lines	☐ 1	☐ 2	
Channel	☑ ON		
ACP	☐ ON		
SEM	☐ ON		
Spurious	☐ 1	☐ 2	☐ 3
Corr Factor	☐ ON		

File name : 7_Digital_ChPower.dat

3. Press **Hz** or ▼.

   The 7_Digital_ChPower.dat file is determined as a file to be recalled.

4. Press **Hz** or ▼.

   Select the Recall button.

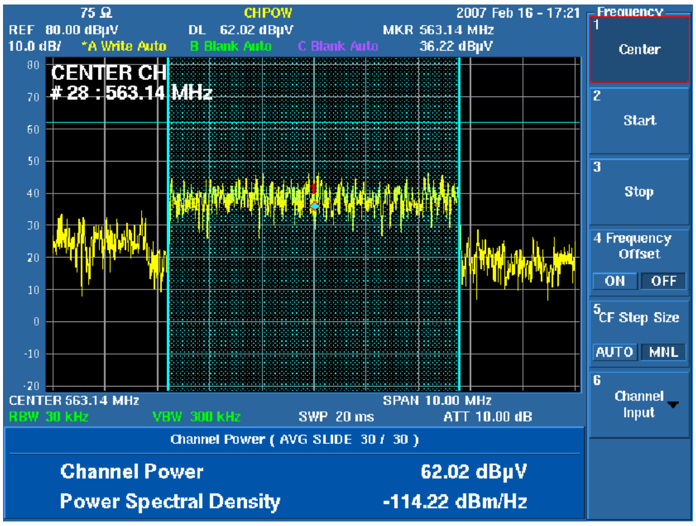
5. Press **Hz**.

   The terrestrial digital broadcasting channel table and measurement conditions are recalled and set.

6. Press **FREQUENCY**, **2**, **8**, and **Hz**.

   The center frequency is set to 563.14 MHz, that is for Channel 28.

   At the same time, the channel power measurement starts and then the measurement result is displayed.



REF 80.00 dBμV
10.0 dB/
DL 62.02 dBμV
MKR 563.14 MHz
36.22 dBμV
CENTER 563.14 MHz
SPAN 10.00 MHz
RBW 30 kHz
VBW 300 kHz
SWP 20 ms
ATT 10.00 dB

Channel Power (AVG SLIDE 30 / 30)

Channel Power	62.02 dBμV
Power Spectral Density	-114.22 dBm/Hz

4.4.7 VSWR Measurement

Reflection characteristics of an antenna and filter are measured by using the SWR bridge.

A return loss and VSWR at a marker point are displayed.

1. Connect the SWR bridge as shown in Figure 4-23 VSWR Measurement.

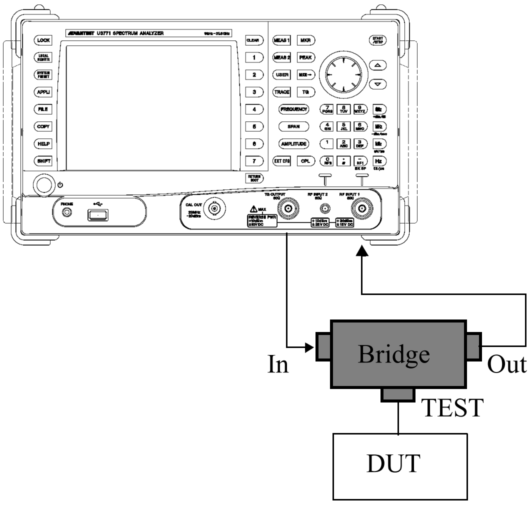


Figure 4-23 VSWR Measurement

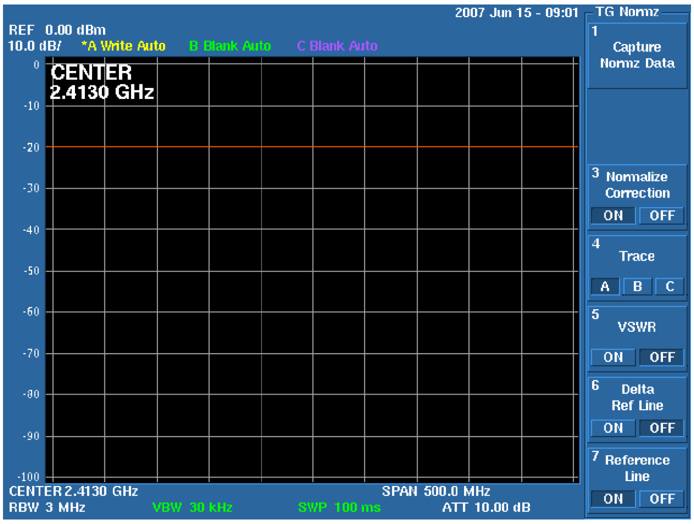
2. Execute normalization without connecting a DUT to the TEST port of the SWR bridge.
   Set CENTER, SPAN, and REF in accordance with the DUT.

   Press **TG**, ***Reference Line ON/OFF(ON)***, **2**, **0**, and **MHz**.
   Set the reference line to -20 dBm.

   Press **TG** and ***TG ON/OFF(ON)***.
   Set the TG output to ON.

   Press ***Normalize***, ***Capture Normz Data***, and ***Normalize Correction ON/OFF(ON)***.
   Normalization is executed while the TEST port is open.

CAUTION: ***If a setting condition is changed after normalization is executed, re-execute normalization.***



2007 Jun 15 - 09:01

REF 0.00 dBm

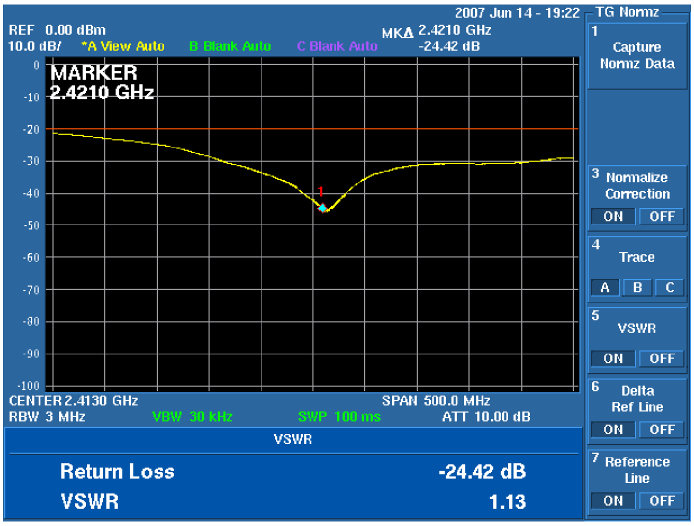
10.0 dB/ *A Write Auto B Blank Auto C Blank Auto

CENTER 2.4130 GHz SPAN 500.0 MHz

RBW 3 MHz VBW 30 kHz SWP 100 ms ATT 10.00 dB

3. Connect the DUT to the TEST port of the SWR bridge.

   Press ***VSWR ON/OFF(ON)***.
   A return loss and VSWR at the marker point are displayed.



2007 Jun 14 - 19:22

REF 0.00 dBm

10.0 dB/ *A View Auto B Blank Auto C Blank Auto

MKΔ 2.4210 GHz -24.42 dB

CENTER 2.4130 GHz SPAN 500.0 MHz

RBW 3 MHz VBW 30 kHz SWP 100 ms ATT 10.00 dB

VSWR

Return Loss -24.42 dB

VSWR 1.13

5. MENU MAP, FUNCTIONAL EXPLANATION

This chapter describes the configurations and functions of the soft keys displayed on the touch screen.

Menu Index:	This section can be used to refer to the keys in this chapter.
Menu Map:	This section shows the menu configurations of the panel keys.
Functional Descriptions:	This section describes the functions of the panel keys and soft keys.

5.1 Menu Index

5.2 Functional Descriptions

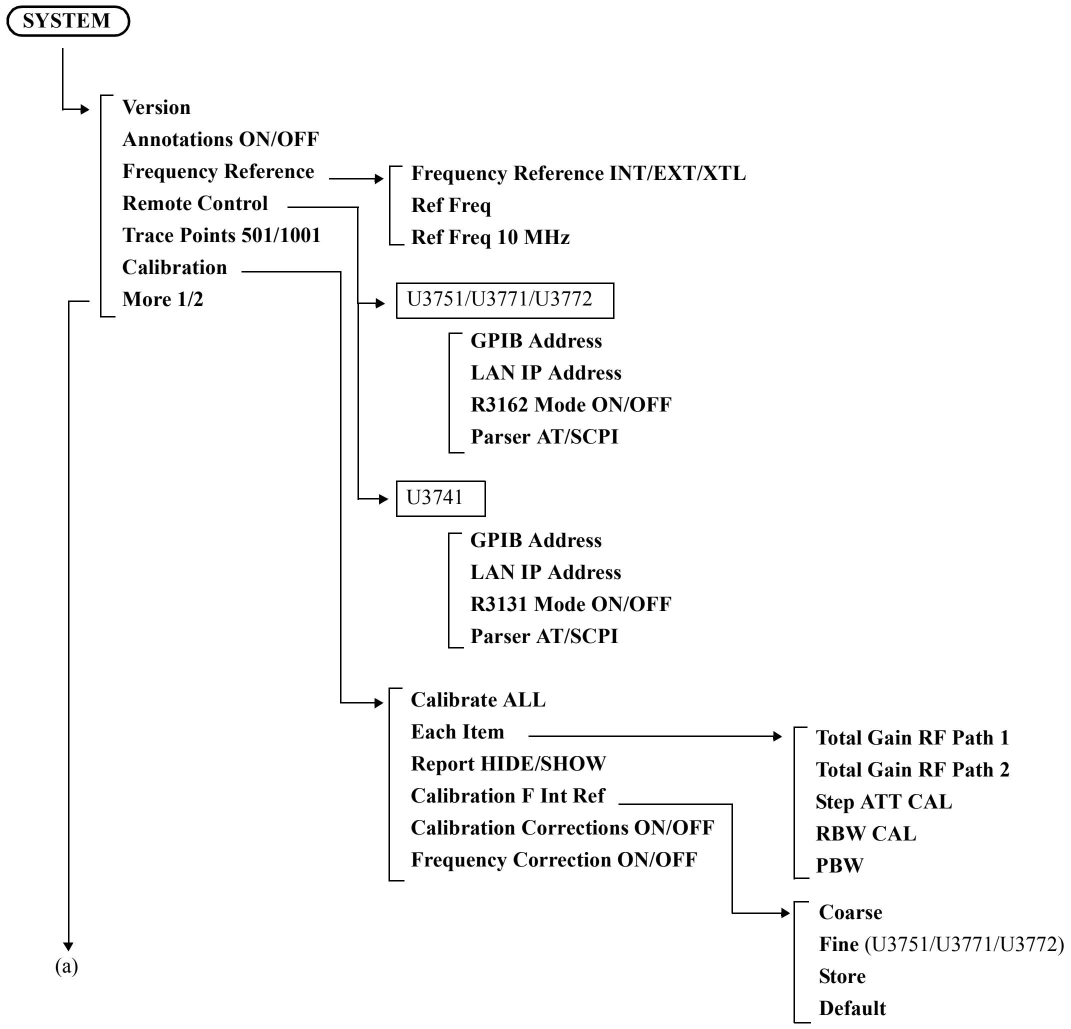
This section describes the functions of the panel keys and soft keys.

MEMO:

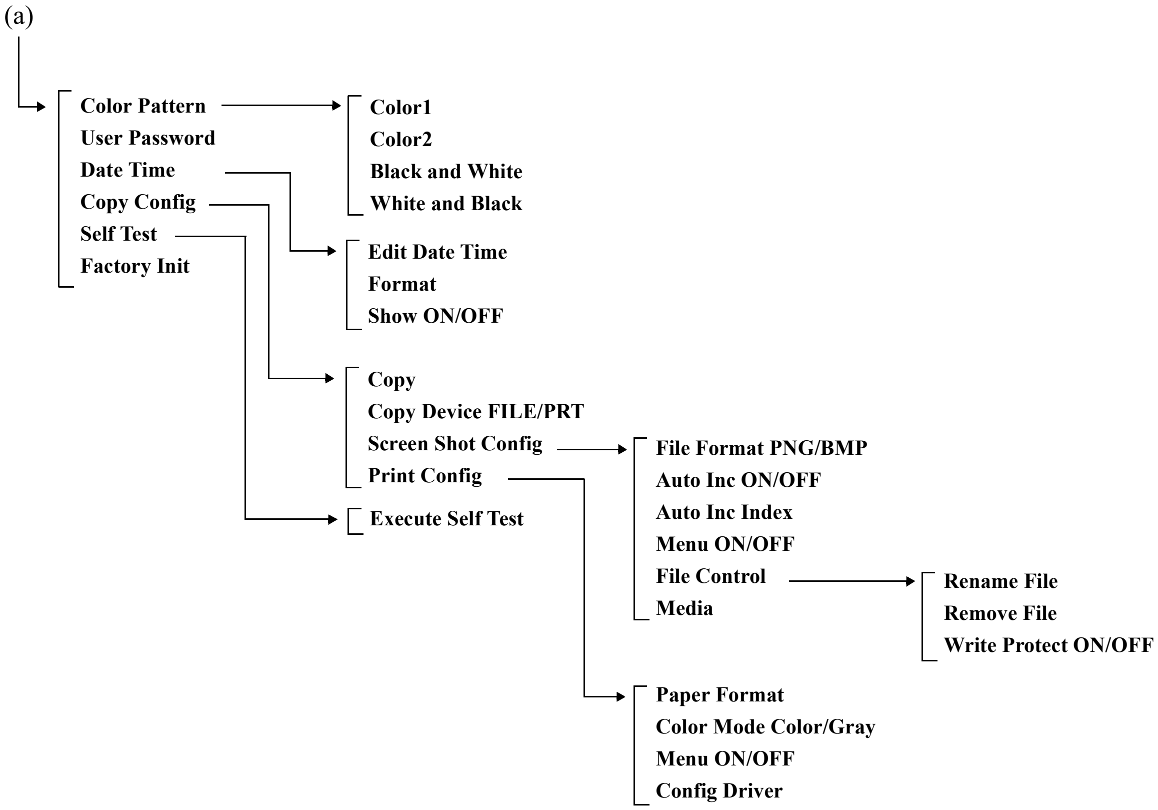
- ⬭ ***indicates a panel key.***
- ***All other names are soft menus.***

5.2.1 SYSTEM

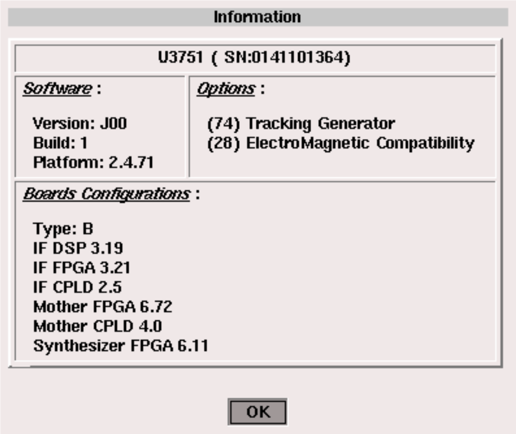
This subsection describes how to configure this instrument.



5.2.1 SYSTEM


(a)
Color Pattern
User Password
Date Time
Copy Config
Self Test
Factory Init
Color1
Color2
Black and White
White and Black
Edit Date Time
Format
Show ON/OFF
Copy
Copy Device FILE/PRT
Screen Shot Config
Print Config
Execute Self Test
File Format PNG/BMP
Auto Inc ON/OFF
Auto Inc Index
Menu ON/OFF
File Control
Media
Rename File
Remove File
Write Protect ON/OFF
Paper Format
Color Mode Color/Gray
Menu ON/OFF
Config Driver

Version Displays the software version dialog box.



Information

U3751 (SN:0141101364)

Software :

Version: J00
Build: 1
Platform: 2.4.71

Options :

(74) Tracking Generator
(28) ElectroMagnetic Compatibility

Boards Configurations :

Type: B
IF DSP 3.19
IF FPGA 3.21
IF CPLD 2.5
Mother FPGA 6.72
Mother CPLD 4.0
Synthesizer FPGA 6.11

Annotations ON/OFF

ON: Displays set values such as the center frequency on the top and bottom of the vertical scale.

OFF: Hides set values and zooms into the area in which set values are displayed.

Frequency Reference Selects the signal source of the reference frequency.

Frequency Reference INT/EXT/XTL

INT: Selects the internal signal source.

EXT: Uses an external input signal from the EXT. REF connector.

XTL: Selects an optional crystal oscillator.

Ref Freq The reference frequency can be changed by using the step keys. The following frequencies can be set as the reference frequency.

1 MHz, 1.544 MHz, 2.048 MHz, 5 MHz

10 MHz, 12.8 MHz, 13 MHz, 13.824 MHz,

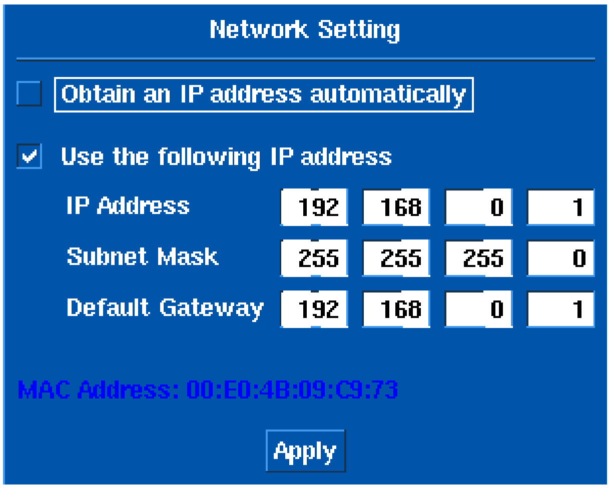
14.4 MHz, 15.36 MHz, 15.4 MHz, 16.8 MHz,

19.2 MHz, 19.44 MHz, 19.6608 MHz,

19.68 MHz, 19.8 MHz, 20 MHz, 26 MHz

Ref Freq 10 MHz Sets the reference frequency to 10 MHz.

Remote Control	Displays the Remote Ctrl menu.
GPIB Address	Sets the GPIB address of this instrument.
LAN IP Address	Sets the IP address of this instrument. Displays the Network Setting dialog window.



☐ Obtain an IP address automatically

☑ Use the following IP address

IP Address 192 168 0 1

Subnet Mask 255 255 255 0

Default Gateway 192 168 0 1

MAC Address: 00:E0:4B:09:C9:73

R3162 Mode ON/OFF (U3751/U3771/U3772)

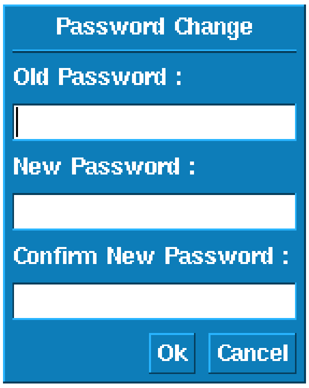
ON: The following R3162GPIB commands can be used and their operations are the same as those of the R3162. For more information on the commands, refer to the R3162 manual.

Command
MN *
MKD *
PWCH
PWTM *
PWTOTAL
PWM
OBW [ON]|OFF
OBWEXE
ACPEXE
LIMTYP *
LMTAIN *
LMTADEL
LIMAPOS REL
LIMASFT *
LIMSFT *
AT 0DB
RO *
DL *

OFF: Operates in the U3700 series command system.

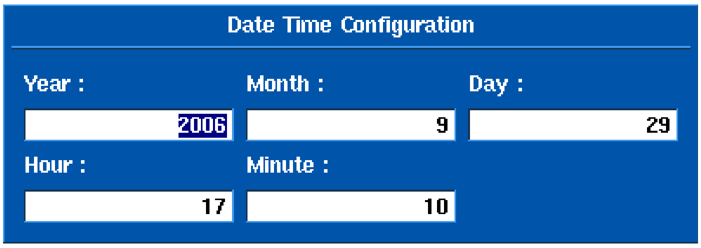
R3131 Mode ON/OFF (U3741)		
	ON:	Except for certain R3131/R3131A functions, the same GPIB commands as those for the R3131/R3131A can be used. For more information on commands, refer to the R3131 Series Operation Manual.
		Unavailable functions: Trigger (LINE), EMC, Calibration, Hard Copy
	OFF:	Operates in the U3700 series command system.
Parser AT/SCPI		Selects a remote command set to be used.
	AT:	The AT (Advantest) command set is selected.
	SCPI:	The SCPI command set is selected.
Trace Points 501/1001		Switches the horizontal axis trace points to 501 or 1001.
	501:	Sets trace points to 501 points.
	1001:	Sets trace points to 1001 points.
Calibration		Displays the Calibration menu.
Calibrate ALL		Performs all calibrations.
Each Item		Displays the Each Item menu.
Total Gain RF Path 1		Measures the absolute error at 20 MHz based on the CAL signal that is input to the RF INPUT1 connector.
Total Gain RF Path 2		Measures the absolute error at 20 MHz based on the CAL signal that is input to the RF INPUT2 connector. (U3771, U3772)
Step ATT CAL		Measures the error at 20 MHz when switching ATT.
RBW CAL		Automatically adjusts IF filters.
PBW		Performs the calibration of the noise power bandwidth.
Report HIDE/SHOW		Hides or displays the calibration results.
Calibration F Int Ref		Calibrates the frequency of the crystal oscillator that is used for the internal frequency reference.
Coarse		Changes the data of the coarse adjustment.
Fine		Changes the data of the fine adjustment.
Store		Saves the adjusted data. The saved data is used even if this instrument is preset.
Default		Sets the calibration data when this instrument is shipped from the factory.
Calibration Corrections ON/OFF		Switches the calibration factor ON and OFF.
	ON:	Uses the CAL factor.
	OFF:	Does not use the CAL factor.
Frequency Correction ON/OFF		Switches the frequency correction function ON and OFF.
	ON:	Corrects the frequency characteristics.
	OFF:	Cancels the frequency correction function.

More 1/2	Displays the System 2/2 menu.
Color Pattern	
Color1	Selects the standard color.
Color2	Selects the second set of colors.
Black and White	Selects the black and white mode (white traces).
White and Black	Selects the white and black mode (black traces).
User Password	Sets the password used to lock the panel. The password is set to [0,0,0,0] when this instrument is shipped from the factory. The password can be changed in the dialog box.



A password can be initialized (0,0,0,0) through the GPIB.
GPIB AT command: "RPWD"

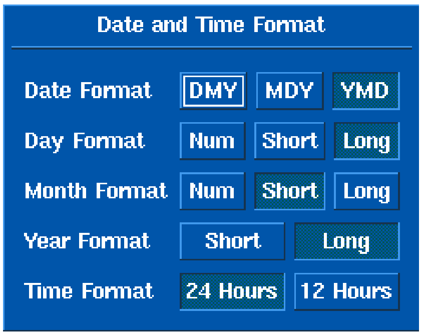
Date Time	Displays the Date Time menu.
Edit Date Time	Sets a date and time. They are set or changed in the dialog window.



Year : 2006
Month : 9
Day : 29
Hour : 17
Minute : 10

Year:	Set a year.
Month:	Set a month.
Day:	Set a date.
Hour:	Set an hour.
Minute:	Set a minute.

Format Sets date display formats.
They are set or changed in the dialog window.



Show ON/OFF Switches ON and OFF the date display.

ON: Displays the date.

OFF: Hides the date display.

Copy Config Displays the Copy menu.

Copy Outputs screen data according to Config.

Copy Device FILE/PRT Specifies the copy output device.

FILE: Selects an external USB memory device.

PRT: Selects a printer.

Screen Shot Config Displays the File Config menu.

File Format PNG/BMP

Selects either PNG (portable network graphics) or BMP (bit map) as the file format.

Auto Inc ON/OFF Sets the automatic incremental function of the file number.

ON: Increments the file number when the screen data is copied.

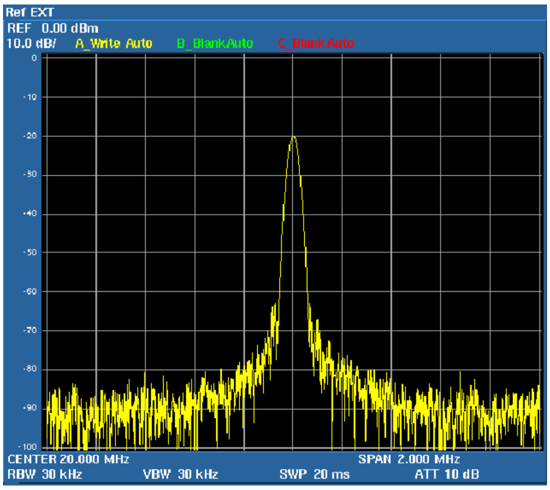
OFF: The file COPYxxx.BMP(PNG) is overwritten.

Auto Inc Index Sets the start number to increment automatically.

Menu ON/OFF Hides the soft menu area when a copy is output.

ON: Displays the menu.

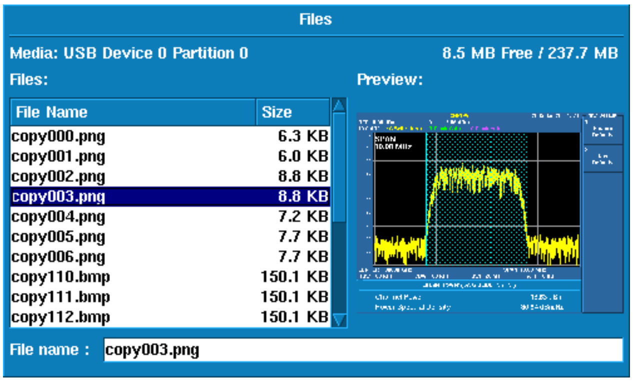
OFF: Hides the menu.



Ref EXT
REF 0.00 dBm
10.0 dB/ A_Write Auto B_BlankAuto C_BlankAuto

CENTER 20.000 MHz SPAN 2.000 MHz
RBW 30 kHz VBW 30 kHz SWP 20 ms ATT 10 dB

File Control Displays the Shot File menu.
Displays the Files window.



Files

Media: USB Device 0 Partition 0 8.5 MB Free / 237.7 MB

Files:

Preview:

File Name	Size
copy000.png	6.3 KB
copy001.png	6.0 KB
copy002.png	8.8 KB
copy003.png	8.8 KB
copy004.png	7.2 KB
copy005.png	7.7 KB
copy006.png	7.7 KB
copy110.bmp	150.1 KB
copy111.bmp	150.1 KB
copy112.bmp	150.1 KB

File name : copy003.png

Rename File Changes the selected filename.

Remove File Deletes the selected file.

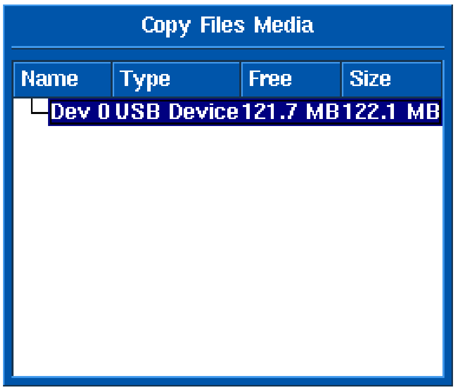
Write Protect ON/OFF
Write-protects the selected file.

ON: Prevents data from being written to the file.

OFF: Allows data to be written to the file.

Media

Selects the media on which to save data.
Selects the external USB memory device in the dialog box.



Copy Files Media

Name	Type	Free	Size
Dev 0	USB Device	121.7 MB	122.1 MB

NOTE: ***Data cannot be saved in the internal memory.***

Print Config

Paper Format

Selects the paper size and print direction.

Color Mode Color/Gray

Selects either color or gray scale in the Print Config mode.

Menu ON/OFF

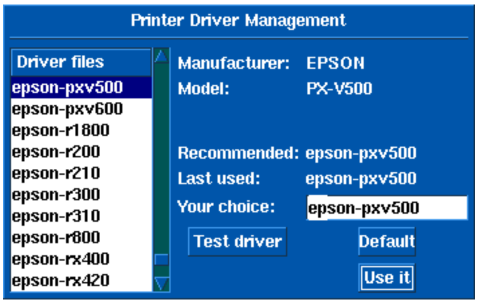
Displays or hides the soft menu when a file is printed.

ON: Displays the menu

OFF: Hides the menu.

Config Driver

Selects a printer driver to be used.
The Printer Driver Management window is displayed.



Printer Driver Management

Driver files

epson-pxv500
epson-pxv600
epson-r1800
epson-r200
epson-r210
epson-r300
epson-r310
epson-r800
epson-rx400
epson-rx420

Manufacturer: EPSON
Model: PX-V500
Recommended: epson-pxv500
Last used: epson-pxv500
Your choice: epson-pxv500

Driver files:
Printer drivers registered in this instrument are listed.
Select a driver name to be used by using the knob.

Your choice:
The selected driver name is displayed.

Test driver:
Starts a test printing using the selected driver.

Default: This instrument automatically selects a driver.

	Use it: Decides to use the selected driver.
Self Test	Displays the Self Test menu.
Execute Self Test	Executes the self-test. The self-test is the same as when the power turns on. Test Items 1. Supply_Voltage 2. Memory 3. CPU_Registers 4. RF_Registers 5. RF_PLL_LOCK 6. LO_Registers 7. LO_PLL_LOCK 8. AIF_Registers 9. AIF_PLL_LOCK 10. TG_Registers 11. Temperature
Factory Init	Initializes this instrument to the factory settings. Refer to “A.1 Initial Setting List.”

5.2.2 APPLI

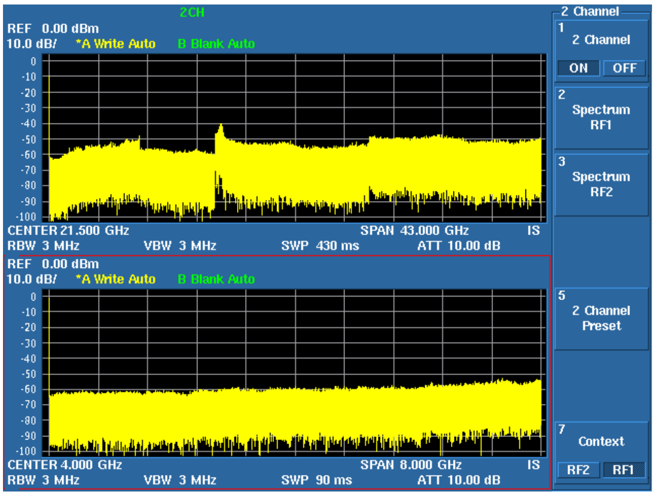
Displays the APPLI menu.

APPLI
- **Spectrum Analyzer**
- **2 Channels Viewer**
  - **2 Channel ON/OFF**
  - **Spectrum RF1**
  - **Spectrum RF2**
  - **2 Channel Preset**
  - **Context RF2|RF1**
- **3GPP DL Modulation**
  - Refer to the separate volume of the U3700 Series OPT50 User's Guide (FOE-8440247).

Spectrum Analyzer

2 Channels Viewer Displays the 2 Channel menu.
Functions only for the U3771 or U3772.

2 Channel ON/OFF Sets the 2 Channels Viewer mode.
The sweep and measurement are performed only for the active channel.
The active channel screen is enclosed within a red frame.


2CH
REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto
CENTER 21.500 GHz SPAN 43.000 GHz IS
RBW 3 MHz VBW 3 MHz SWP 430 ms ATT 10.00 dB
REF 0.00 dBm
10.0 dB/ *A Write Auto B Blank Auto
CENTER 4.000 GHz SPAN 8.000 GHz IS
RBW 3 MHz VBW 3 MHz SWP 90 ms ATT 10.00 dB

ON: Splits the screen into an upper and lower windows.
Upper window: INPUT2
Lower window: INPUT1

OFF: Cancels the dual-screen display.
The measurement display returns to the active channel screen.

Spectrum RF1 Cancels the 2 Channel mode and enables INPUT1.

Spectrum RF2 Cancels the 2 Channel mode and enables INPUT2.

2 Channel Preset Initializes the INPUT1 and INPUT2 settings.

Context RF2|RF1

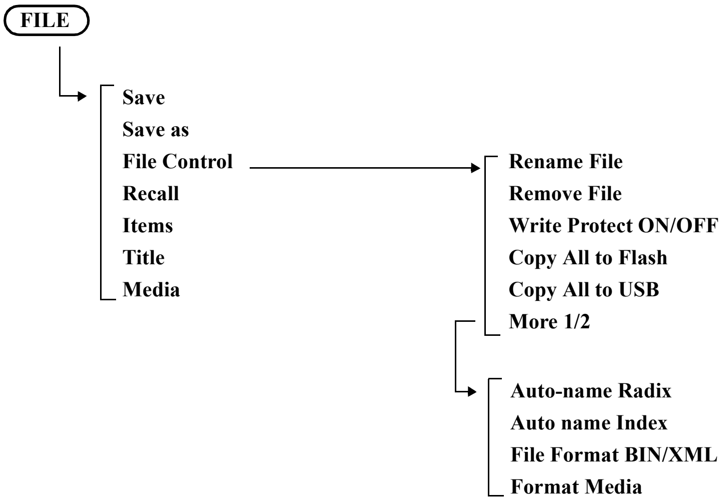
Switches the active screen.

RF2: The RF2 (upper window) settings can be changed.

RF1: The RF1 (lower window) settings can be changed.

5.2.3 FILE

Displays the File menu.



Save

Saves the items specified in Items to the memory device specified in Media.
The format in which to save data can be selected from either binary (.dat) or XML (eXtensible Markup Language) (.xml).

File size (For saving the setting data)

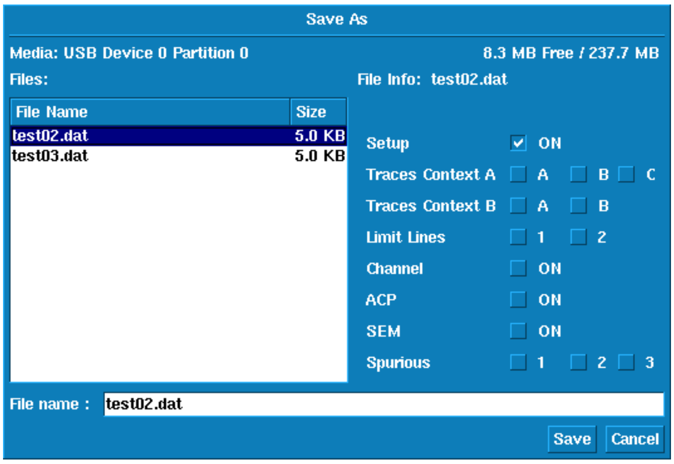
BIN: Approximately 4.8 KB

XML: Approximately 16 KB

NOTE: Only binary data can be saved in the internal memory.

Save as

Specifies the filename and saves the file.
Displays the Save As window.



Media: USB Device 0 Partition 0 8.3 MB Free / 237.7 MB

Files: File Info: test02.dat

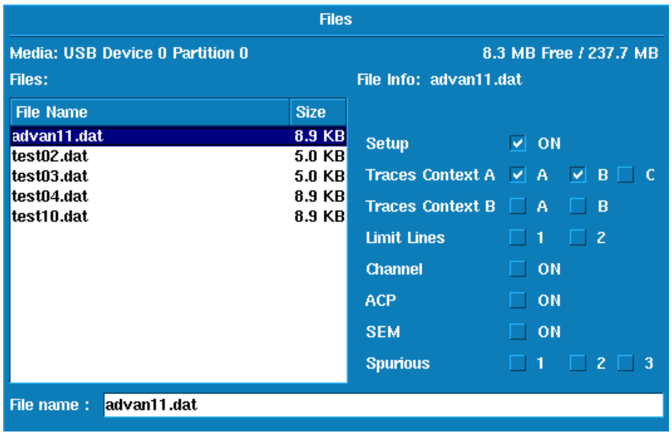
File Name	Size
test02.dat	5.0 KB
test03.dat	5.0 KB

Setup ☑ ON
Traces Context A ☐ A ☐ B ☐ C
Traces Context B ☐ A ☐ B
Limit Lines ☐ 1 ☐ 2
Channel ☐ ON
ACP ☐ ON
SEM ☐ ON
Spurious ☐ 1 ☐ 2 ☐ 3

File name : test02.dat

File Control

Displays the File Control menu and Files window.



Media: USB Device 0 Partition 0 8.3 MB Free / 237.7 MB

Files: File Info: advan11.dat

File Name	Size
advan11.dat	8.9 KB
test02.dat	5.0 KB
test03.dat	5.0 KB
test04.dat	8.9 KB
test10.dat	8.9 KB

Setup ☑ ON
Traces Context A ☑ A ☑ B ☐ C
Traces Context B ☐ A ☐ B
Limit Lines ☐ 1 ☐ 2
Channel ☐ ON
ACP ☐ ON
SEM ☐ ON
Spurious ☐ 1 ☐ 2 ☐ 3

File name : advan11.dat

Rename File Changes the selected filename.

Remove File Deletes the selected file.

Write Protect ON/OFF Write-protects the selected file.

ON: Prevents data from being written to the file.

OFF: Allows data to be written to the file.

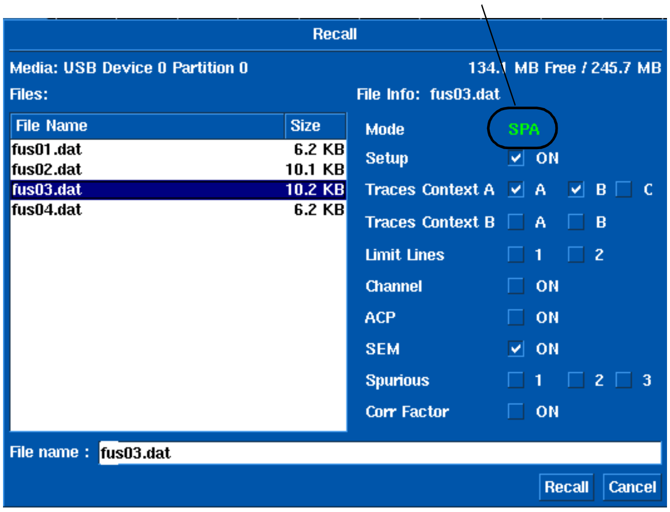
Copy All to Flash	Copies all files in the USB memory key to the internal memory. (*)
Copy All to USB	Copies all files in the internal memory to the USB memory key. (*)

:

- ***The file format that can be copied into the USB memory key is ".dat". The screen image cannot be copied.<-->\adv\dat.***
- ***If the same file name exists in the USB memory key, the file is overwritten.***
- ***Select USB memory from the Media menu.***

More 1/2	Displays the File Ctrl menu (2/2).
Auto-name Radix	Defines the common part of the filename under which files are saved. The file name follows the following format "Radix+Index". When a file is saved, an extension [.dat] is automatically added to the file name which is saved in the format "Radix+Index.dat". Radix can be up to six characters long.
Auto name Index	Specifies the Index part of the filename, under which files are saved. The Index increments by 1 each time a file is saved. Zero to 99 can be specified in the Index.
File Format BIN/XML	BIN: Saves the data in binary format. Only binary formats can be saved in the internal memory.The settings of files saved in binary format can be recalled. XML: Saves the data in XML format. Files which are saved in XML format can be read easily but the settings cannot be recalled.
Format Media	Formats external USB memory devices. Do not remove the memory device while the memory is being formatted.

Recall Recalls file which was saved in binary format and displays the settings and trace data.
Displays the Recall window.
Execute Recall in the same mode as when the file was saved.
Mode is displayed in File Info of the Recall window. The font color is green for a Recall-enabled file and red for a Recall-disabled file.


Green: Recall can be executed.

Red: Recall cannot be executed.

Media: USB Device 0 Partition 0 134.1 MB Free / 245.7 MB

Files:

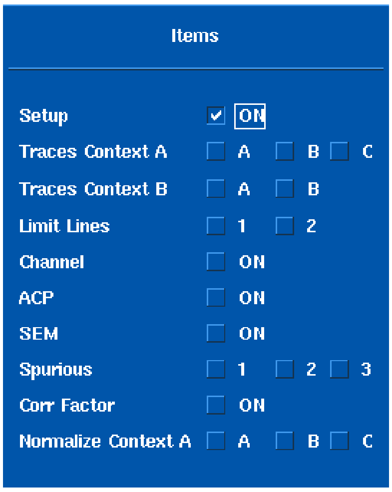
File Name	Size
fus01.dat	6.2 KB
fus02.dat	10.1 KB
fus03.dat	10.2 KB
fus04.dat	6.2 KB

File Info: fus03.dat

Mode SPA
Setup ☑ ON
Traces Context A ☑ A ☑ B ☐ C
Traces Context B ☐ A ☐ B
Limit Lines ☐ 1 ☐ 2
Channel ☐ ON
ACP ☐ ON
SEM ☑ ON
Spurious ☐ 1 ☐ 2 ☐ 3
Corr Factor ☐ ON

File name : fus03.dat

Items Selects items to be saved.
Displays the Items dialog box.



Setup ☑ ON
Traces Context A ☐ A ☐ B ☐ C
Traces Context B ☐ A ☐ B
Limit Lines ☐ 1 ☐ 2
Channel ☐ ON
ACP ☐ ON
SEM ☐ ON
Spurious ☐ 1 ☐ 2 ☐ 3
Corr Factor ☐ ON
Normalize Context A ☐ A ☐ B ☐ C

Setup: Saves the setting conditions.

Trace Context A A/B/C:
Saves the trace data.
Even if the Write mode is set, the setting is changed to the View mode while the trace data is recalled.

Trace Context B A/B

Limit Lines:Saves the Limit Line table.

Channel: Saves the Channel Formula table and Channel Table.

ACP: Saves CS/BS Table for the ACP.

SEM: Saves SEM Table.

Spurious 1/2/3:
Saves the Spurious Bands table.

Corr Factor:
Saves Correction Factor Table.

Normalize Context A/B/C:
Saves Normz Data that uses the TG.

Title Displays the Edit Title dialog box.

Edit Title

Title : abc

How to enter

Pressing a key cycles through a list of characters, which are allocated to that key, and displays them at the cursor position. If the key is not pressed for a few seconds after the previous key entry or another key is pressed, the displayed character is entered.

Table 5-1 Character allocation table

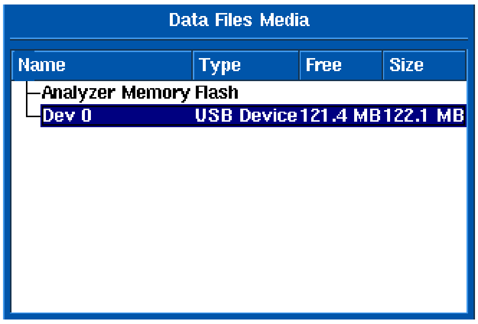
Key	Allocated Characters
0	0
.	. space , ; :- + _ = ~ # < > ! ?
-	[Back Space]
1	1
2	a b c 2
3	d e f 3
4	g h i 4
5	j k l 5
6	m n o 6
7	p q r s 7
8	t u v 8
9	w x y z 9

To enter a capital letter, hold down the **SHIFT** key and a key.

1. Enter a character by using the keypad.
2. Press a unit key such as the Hz key to finish entering the title.
3. Press **Title** to close the Edit Title dialog box.

Media

Displays the Media dialog box.
Selects either the internal memory or an external USB memory device in the dialog box.



Data Files Media

Name	Type	Free	Size
Analyzer Memory	Flash		
Dev 0	USB Device	121.4 MB	122.1 MB

5.2.4 COPY

Outputs a screen image according to the conditions set by pressing **SYSTEM**, **MORE 1/2**, and **COPY Config**.

The COPY menu can also be displayed by pressing the **SHIFT** key and **COPY** key.

File size (For saving the image data)

PNG: Approximately 8 KB

BMP: Approximately 150 KB

5.2.5 HELP

Pressing the **HELP** key displays "HELP?" which indicates the HELP mode.

NOTE: The HELP file is loaded the first time the HELP key is pressed after the power is turned on.

When the HELP mode is set

Press a soft menu key to display the relevant menu description.

Press the soft menu key again to hide the display.

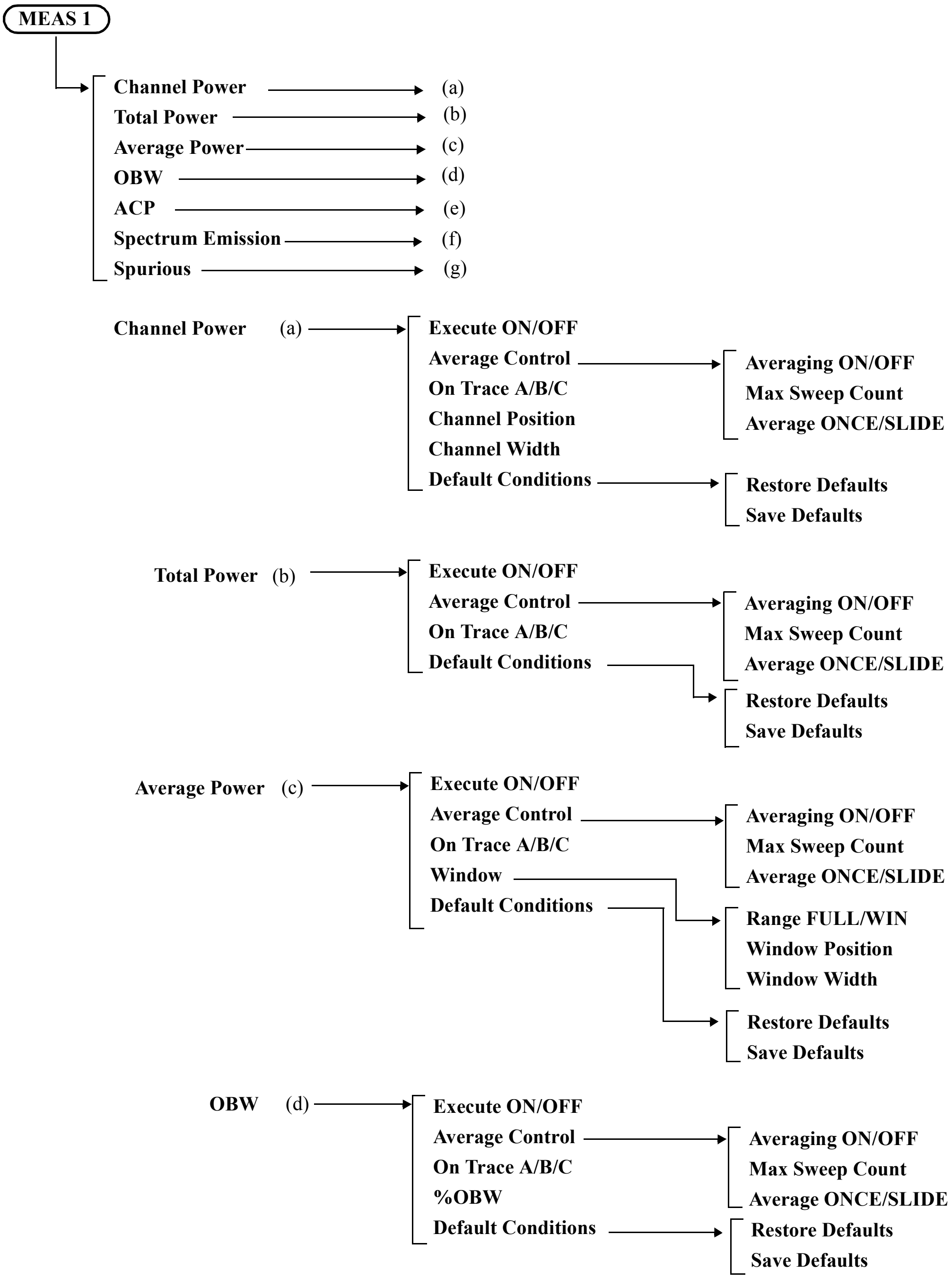
Press the **HELP** key again to cancel the HELP mode.

Procedure

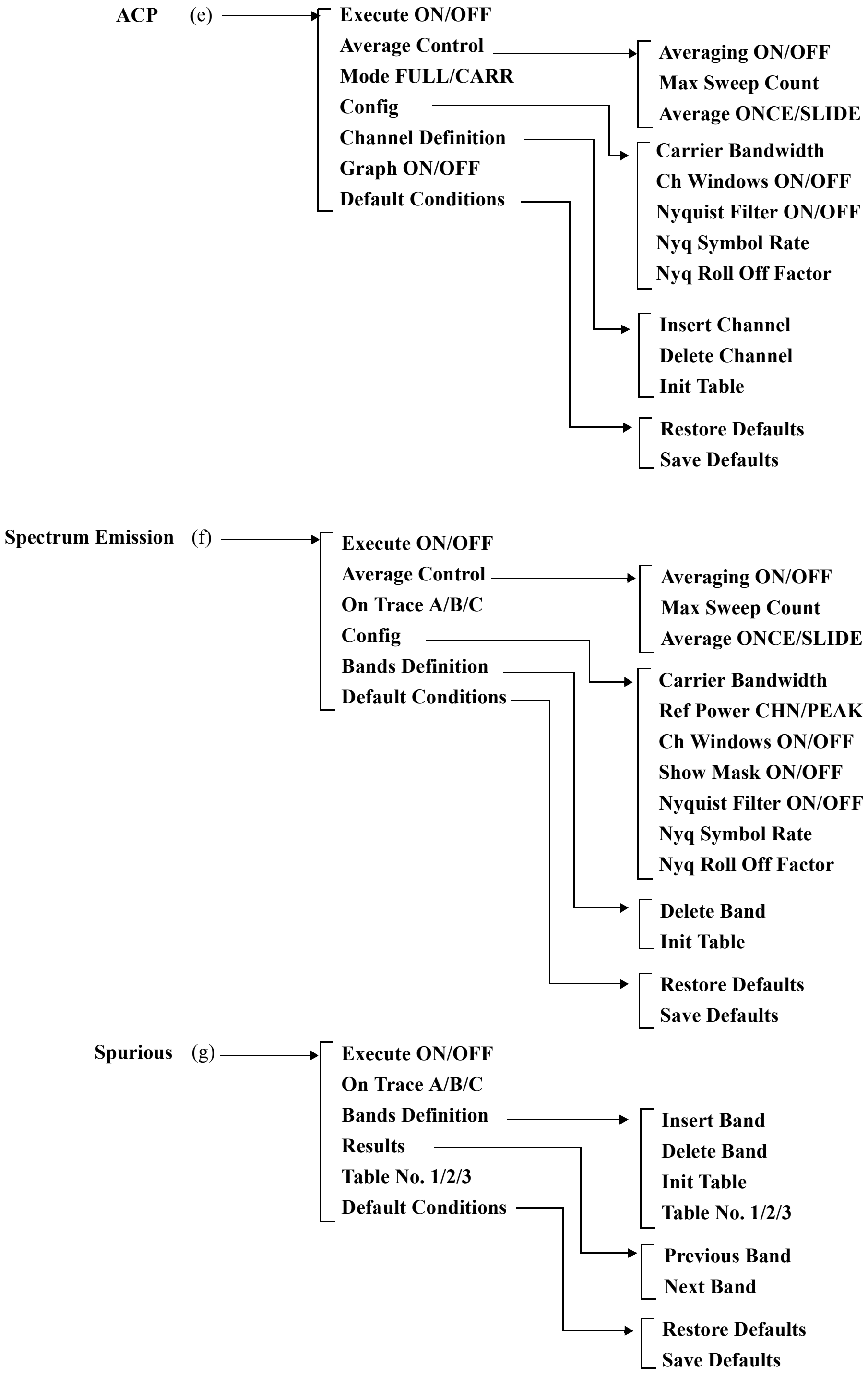
1. Select a menu.
2. Press the **Help** key.
3. Press a soft menu key.
4. Press the **HELP** key to cancel the HELP mode.
5. Repeat from step 1 to display the HELP of other menus.

5.2.6 MEAS 1

Displays the Meas 1 menu.



5.2.6 MEAS 1


ACP (e)
Execute ON/OFF
Average Control
Mode FULL/CARR
Config
Channel Definition
Graph ON/OFF
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Carrier Bandwidth
Ch Windows ON/OFF
Nyquist Filter ON/OFF
Nyq Symbol Rate
Nyq Roll Off Factor
Insert Channel
Delete Channel
Init Table
Restore Defaults
Save Defaults
Spectrum Emission (f)
Execute ON/OFF
Average Control
On Trace A/B/C
Config
Bands Definition
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Carrier Bandwidth
Ref Power CHN/PEAK
Ch Windows ON/OFF
Show Mask ON/OFF
Nyquist Filter ON/OFF
Nyq Symbol Rate
Nyq Roll Off Factor
Delete Band
Init Table
Restore Defaults
Save Defaults
Spurious (g)
Execute ON/OFF
On Trace A/B/C
Bands Definition
Results
Table No. 1/2/3
Default Conditions
Insert Band
Delete Band
Init Table
Table No. 1/2/3
Previous Band
Next Band
Restore Defaults
Save Defaults

Channel Power Activates the measuring window and displays the Channel P menu.

The channel power can be obtained by using the following equation.

$$P_{CH} = 10\log\left[\sum_{n=X1}^{X2}\left(10^{\frac{P(n)}{10}}\right) \times \frac{1}{PBW} \times \frac{SPAN}{(X2 - X1)}\right]$$

PCH: Channel power to be obtained

P(n): Displayed data at each trace point (dBm)

SPAN: Channel Width setting value

PBW: Noise power bandwidth

X1: Trace point at the window's left edge

X2: Trace point at the window's right edge

Execute ON/OFF

ON: Performs a channel power measurement.

OFF: Cancels the channel power measurement.

Average Control Performs the average settings for the channel power measurement.
Displays the Ch Avg menu.

Averaging ON/OFF Switches the averaging function ON and OFF.

ON: Measures the average channel power.

OFF: Cancels the averaging function.

Max Sweep Count Sets the number of times averaging is performed.
Up to 999 counts can be set.

Average ONCE/SLIDE

ONCE: Performs averaging for the set number of times and then the process terminates.

SLIDE: Performs averaging for the set number of times and then calculates the moving average.

On Trace A/B/C Selects a trace in which to execute the channel power measurement.

Channel Position Activates the settings of the measuring window position.

Channel Width Activates the setting of the measuring window width.

Default Conditions Displays the Pow Default menu.

Restore Defaults Recalls the saved setting conditions.

Save Defaults Saves the currently set conditions.

Total Power

Measures the total power in the measuring span.
Displays the Toal Pow menu.

The total power can be obtained by using the following equation.

$$P_T = 10\log\left[\sum_{n=X1}^{X2}\left(10^{\frac{P(n)}{10}}\right) \times \frac{1}{PBW} \times \frac{SPAN}{1001}\right]$$

P_T: Total power to be obtained

P(n): Displayed data at each trace point (dBm)

SPAN: Span setting value

PBW: Noise power bandwidth

X1: 1

X2: 1001

Execute ON/OFF

ON: Performs a total power measurement.

OFF: Cancels the total power measurement.

Average Control

Performs the average settings for the total power measurement.
Displays the Tot P Avg menu.

Averaging ON/OFF

Switches the averaging function ON and OFF.

ON: Measures the average total power.

OFF: Cancels the averaging function.

Max Sweep Count

Sets the number of times averaging is performed.
Up to 999 counts can be set.

Average ONCE/SLIDE

ONCE: Performs averaging for the set number of times and then the process terminates.

SLIDE: Performs averaging for the set number of times and then calculates the moving average.

On Trace A/B/C

Selects a trace in which to perform the total power measurement.

Default Conditions

Displays the Pow Default menu.

Restore Defaults

Recalls the saved setting conditions.

Save Defaults

Saves the currently set conditions.

Average Power

Measures the average power in the measuring range.
Displays the Average P menu.

The average power can be obtained by using the following equation.

$$P_{AVG} = 10\log\left[\sum_{n=X1}^{X2}\left(10^{\frac{P(n)}{10}}\right) \times \frac{1}{1001}\right]$$

P_{AVG}: Average power to be obtained

P(n): Displayed data at each trace point (dBm)

X1: 1

X2: 1001

Execute ON/OFF

ON: Performs an average power measurement.

OFF: Cancels the average power measurement.

Average Control

Performs the average settings for the average power measurement.

Displays the Av P Avg menu.

Averaging ON/OFF

Switches the averaging function ON and OFF.

ON: Measures the average power.

OFF: Cancels the averaging function.

Max Sweep Count

Sets the number of times averaging is performed.
Up to 999 counts can be set.

Average ONCE/SLIDE

ONCE: Performs averaging for the set number of times and then the process terminates.

SLIDE: Performs averaging for the set number of times and then calculates the moving average.

On Trace A/B/C

Selects a trace in which to execute the average power measurement.

Window

Sets a measuring range in which to execute the average power measurement.
Displays the Avg P Win menu.

Range FULL/WIN

FULL: Measures the average power in the full measuring span.

WIN: Measures the average power in the measuring window.

Window Position

Sets the measuring window position.

Window Width

Sets the measuring window width.

Default Conditions

Displays the Pow Default menu.

Restore Defaults

Recalls the saved setting conditions.

Save Defaults

Saves the currently set conditions.

OBW			Displays the OBW menu.
	Execute ON/OFF		
			ON: Performs an occupied bandwidth measurement.
			OFF: Cancels the occupied bandwidth measurement.
	Average Control		
		Averaging ON/OFF	Switches the averaging function ON and OFF.
			ON: Measures the occupied bandwidth power.
			OFF: Cancels the averaging function.
		Max Sweep Count	Sets the number of times averaging is performed. Up to 999 counts can be set.
		Average ONCE/SLIDE	
			ONCE: Performs averaging for the set number of times and then the process terminates.
			SLIDE: Performs averaging for the set number of times and then calculates the moving average.
	On Trace A/B/C		Selects a trace in which to execute the occupied bandwidth measurement.
	%OBW		Sets the ratio of the occupied bandwidth power to the total power in percentage. The initial value is 99%.
	Default Conditions		Displays the OBW Default menu.
		Restore Defaults	Recalls the saved setting conditions.
		Save Defaults	Saves the currently set conditions.
ACP			Displays the ACP menu.
	Execute ON/OFF		
			ON: Performs the adjacent channel leakage power measurement.
			OFF: Cancels the adjacent channel leakage power measurement.
	Average Control		
		Averaging ON/OFF	Switches the averaging function ON and OFF.
			ON: Measures the adjacent channel leakage power.
			OFF: Cancels the averaging function.
		Max Sweep Count	Sets the number of times averaging is performed. Up to 999 counts can be set.
		Average ONCE/SLIDE	
			ONCE: Performs averaging for the set number of times and then the process terminates.
			MUL: Performs averaging for the set number of times and then calculates the moving average.

Mode FULL/CARR

FULL: Calculates the adjacent channel leakage power in relation to the reference power, the measurement of which is taken from the full bandwidth on the screen.

CARR: Calculates the adjacent channel leakage power to the reference power, the measurement of which is taken from the bandwidth set in Carrier Bandwidth.

Config Displays the ACP Cfg menu.

Carrier Bandwidth Sets the measurement bandwidth of channel power measurement used as the reference power.

Ch Windows ON/OFF

ON: Displays the ACP channel window.

OFF: Closes the ACP channel window.

Nyquist Filter ON/OFF

Switches the Nyquist filter function ON and OFF.

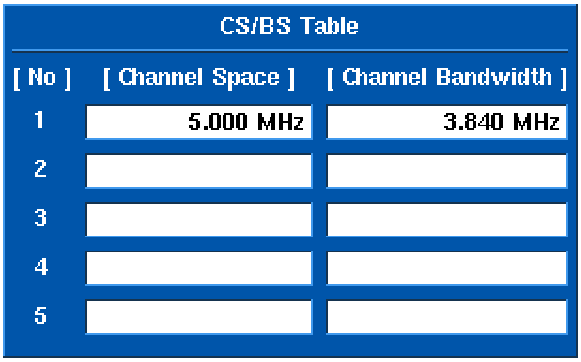
ON: Activates a Nyquist filter.

OFF: Cancels the Nyquist filter.

Nyq Symbol Rate Sets a symbol rate.

Nyq Roll Off Factor Sets a roll-off factor.

Channel Definition Displays the ACP Ch menu.
Displays the CS/BS Table dialog box.



CS/BS Table

[No]	[Channel Space]	[Channel Bandwidth]
1	5.000 MHz	3.840 MHz
2		
3		
4		
5		

[Channel Space]:
Sets the Offset frequency from the carrier frequency that shows the adjacent channel measuring position.

[Channel Bandwidth]:
Sets the measurement bandwidth used in the adjacent channel leakage power measurement.

Insert Channel Inserts a line, on which to set an adjacent channel measurement condition, at the current cursor position.
The data in the line that existed in the position before insertion is copied to each setting value as new line data.

Delete Channel Deletes the measurement condition at the current cursor position.

Init Table Initializes the contents of the ACP channel table.

Graph ON/OFF

ON: Displays an ACP graph.

OFF: Hides the ACP graph.

Default Conditions Displays the ACP Default menu.

Restore Defaults Recalls the saved setting conditions.

Save Defaults Saves the currently set conditions.

Spectrum Emission Displays the SEM (Spectrum Emission Mask) menu.

Execute ON/OFF

ON: Performs a spectrum emission mask measurement.

OFF: Terminates the spectrum emission mask measurement.

Average Control Displays the SEM Avg menu.

Averaging ON/OFF Switches the averaging function ON and OFF.

ON: Measures the spectrum emission mask.

OFF: Cancels the averaging function.

Max Sweep Count Sets the number of times averaging is performed. Up to 999 counts can be set.

Average ONCE/SLIDE

ONCE: Performs averaging for the set number of times and then the process terminates.

SLIDE: Performs averaging for the set number of times and then calculates the moving average.

On Trace A/B/C Selects a trace in which to execute the spectrum emission mask measurement.

Config Displays the SEM Cfg menu.

Carrier Bandwidth Sets the power conversion bandwidth for carrier signals.

Ref Power CHN/PEAK

Switches the calculation mode of the reference power between the Channel mode and the Peak Power mode.

CHN: Calculates the channel power and sets the result as the reference power for the mask measurement.

PEAK: Sets the Peak power value of the waveform as the reference power for the mask measurement.

Ch Windows ON/OFF

ON: Displays the SEM window.

OFF: Hides the SEM window.

Show Mask ON/OFF

ON: Displays the Mask line.

OFF: Hides the Mask line.

Nyquist Filter ON/OFF

Switches the Nyquist filter function ON and OFF.

ON: Activates the Nyquist filter.

OFF: Cancels the Nyquist filter.

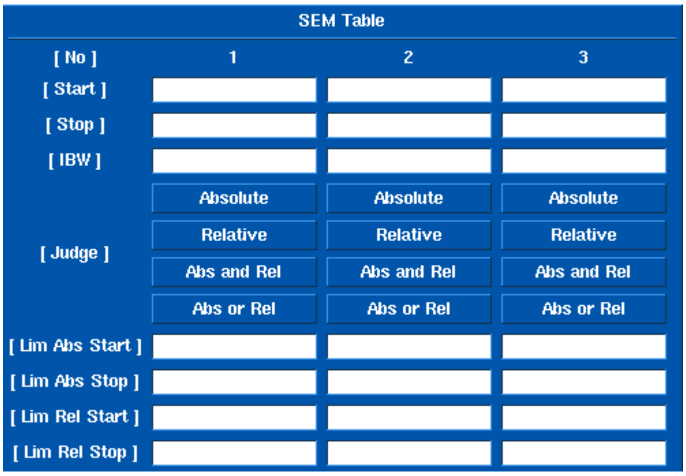
Nyq Symbol Rate Sets a symbol rate.

Nyq Roll Off Factor Sets a roll-off factor.

Bands Definition Displays the SEM Bands menu and SEM Table window.

Delete Band Deletes a column of measurement conditions from the current cursor position.

Init Table Initializes all data in the table.



SEM Table

[No]	1	2	3
[Start]			
[Stop]			
[IBW]			
[Judge]	Absolute	Absolute	Absolute
	Relative	Relative	Relative
	Abs and Rel	Abs and Rel	Abs and Rel
	Abs or Rel	Abs or Rel	Abs or Rel
[Lim Abs Start]			
[Lim Abs Stop]			
[Lim Rel Start]			
[Lim Rel Stop]			

[Start] Sets the offset frequency from the center frequency as the start frequency of the emission mask judgment frequency band.

[Stop] Sets the offset frequency from the center frequency as the stop frequency of the emission mask judgment frequency band.

[Integral BW] Sets the power integral bandwidth at each frequency point.

[Judge] Specifies how to compare the waveform with the set mask values (absolute or relative values) when the mask judgment is performed.

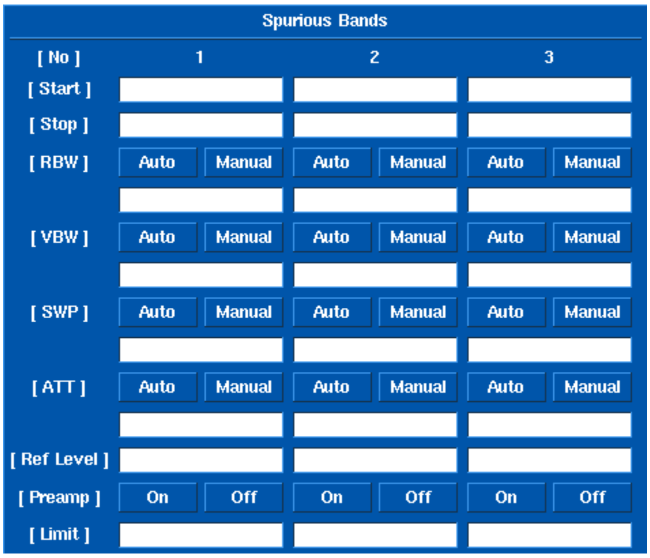
Absolute: Compares the waveform with the mask values set in Limit Abs Start and Limit Abs Stop. If the waveform is equal to or less than the mask values, the result is Pass.

Relative: Compares the waveform with the mask values set in Limit Rel Start and Limit Rel Stop. If the waveform is equal to or less than the mask values, the result is Pass.

Abs and Rel:
Compares the waveform with both the Limit Abs Start, Limit Abs Stop values and the Limit Rel Start, Limit Rel Stop values. If both conditions are satisfied, Pass is displayed.

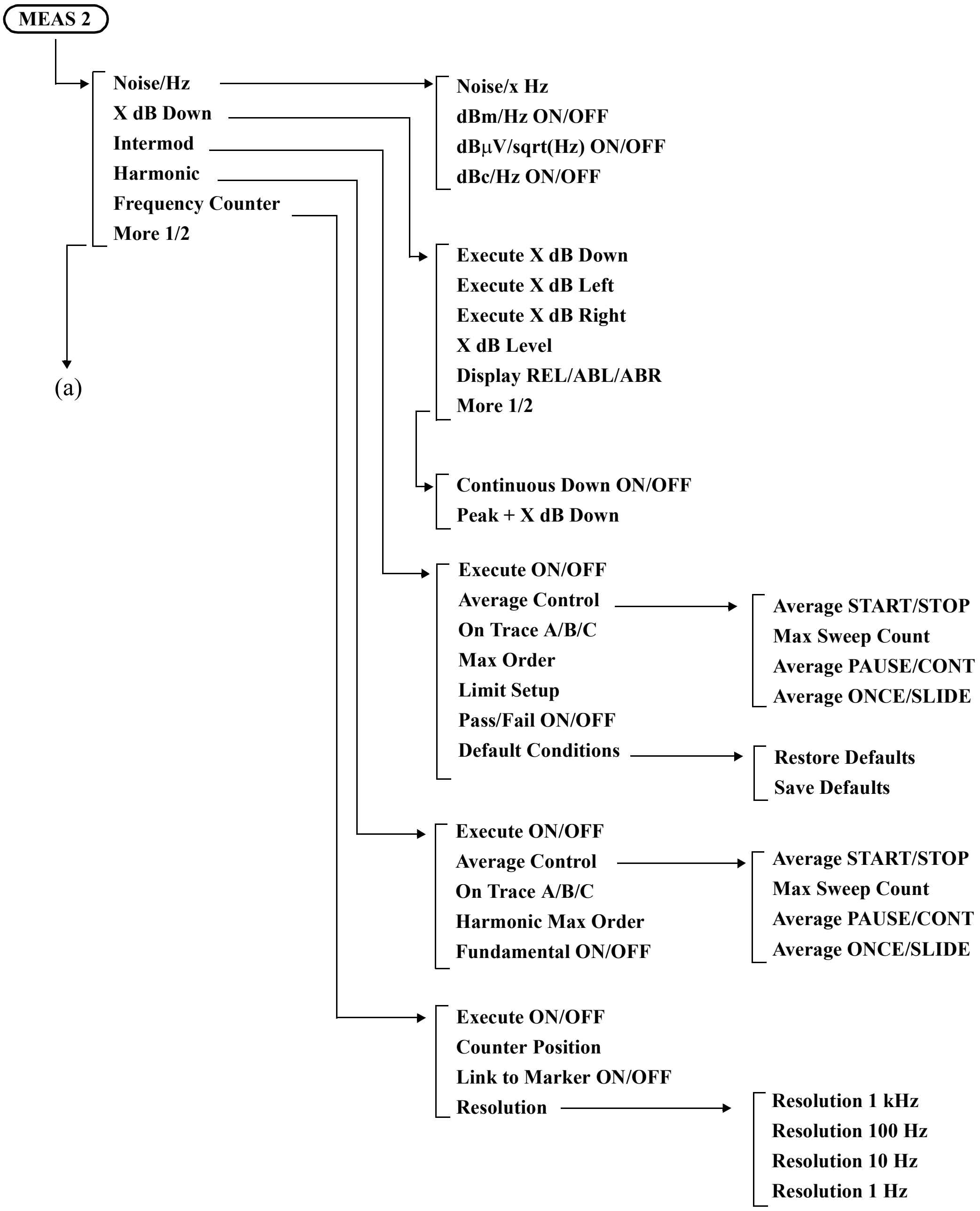
Abs or Rel:
Compares the waveform with both the Limit Abs Start, Limit Abs Stop values and the Limit Rel Start, Limit Rel Stop values. If either of the conditions is satisfied, Pass is displayed.

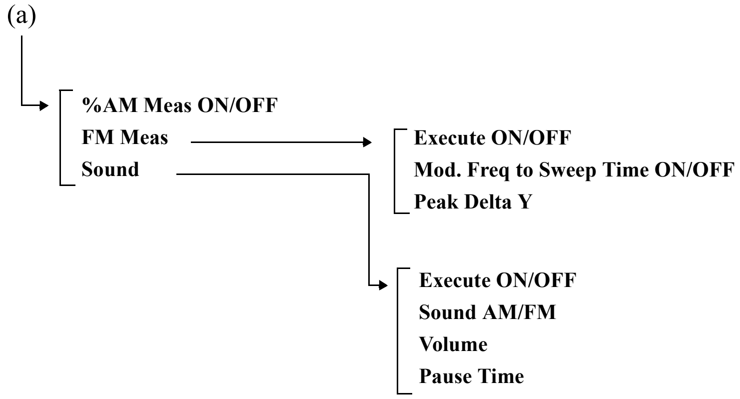
[Limit Abs Start]	Sets the absolute mask value at the position of the start frequency.
[Limit Abs Stop]	Sets the absolute mask value at the position of the stop frequency. A mask value at a position between the start and stop frequencies is calculated by using the linear interpolation.
[Limit Rel Start]	Sets the relative mask value at the position of the start frequency. The set mask value is used to compare with the offset value from the measured reference power.
[Limit Rel Stop]	Sets the relative mask value at the position of the stop frequency. A mask value at a position between the start and stop frequencies is calculated by using the linear interpolation.
Default Conditions	Displays the SEM Default menu.
Restore Defaults	Recalls the saved setting conditions.
Save Defaults	Saves the currently set conditions.
Spurious	Displays the Spurious menu.
Execute ON/OFF	ON: Performs the spurious measurement. OFF: Terminates the spurious measurement.
On Trace A/B/C	Selects a trace in which to execute the spurious measurement.
Bands Definition	Displays the Spr Config menu. At the same time, the Spurious Bands setting window is displayed. The start and stop frequencies of the spurious measurement band, the RBW, VBW, sweep time, attenuator, reference level, preamp ON or OFF, and the judgment level value used in the measurement can be set in the Spurious Bands setting window.



Insert Band	Inserts a column, in which spurious measurement conditions can be set, at the current cursor position. The data contained in the row that existed in the position before insertion is copied to each setting value as new row data.
Delete Band	Deletes a column of measurement conditions from the current cursor position.
Init Table	Initializes all data in the table currently being edited.
Table No. 1/2/3	Sets the setting sequence table number for the spurious measurement to 1, 2, or 3.
	1: Sets table number 1.
	2: Sets table number 2.
	3: Sets table number 3.
Results	Displays the Spr Results menu. Displays Spurious Measure Results Table.
Previous Band	Displays the previous screen.
Next Band	Displays the next screen.
Table No. 1/2/3	Sets the setting sequence table number for the spurious measurement to 1, 2, or 3.
	1: Sets table number 1.
	2: Sets table number 2.
	3: Sets table number 3.
Default Conditions	Displays the Spr Default menu.
Restore Defaults	Recalls the saved setting conditions.
Save Defaults	Saves the currently set conditions.

5.2.7 MEAS 2


MEAS 2
Noise/Hz
X dB Down
Intermod
Harmonic
Frequency Counter
More 1/2
(a)
Noise/x Hz
dBm/Hz ON/OFF
dBμV/sqrt(Hz) ON/OFF
dBc/Hz ON/OFF
Execute X dB Down
Execute X dB Left
Execute X dB Right
X dB Level
Display REL/ABL/ABR
More 1/2
Continuous Down ON/OFF
Peak + X dB Down
Execute ON/OFF
Average Control
On Trace A/B/C
Max Order
Limit Setup
Pass/Fail ON/OFF
Default Conditions
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Restore Defaults
Save Defaults
Execute ON/OFF
Average Control
On Trace A/B/C
Harmonic Max Order
Fundamental ON/OFF
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Execute ON/OFF
Counter Position
Link to Marker ON/OFF
Resolution
Resolution 1 kHz
Resolution 100 Hz
Resolution 10 Hz
Resolution 1 Hz



Noise/Hz		Displays the Noise/Hz menu.
Noise/x Hz		Activates settings of the noise measurement bandwidth. The initial value is 1 Hz.
dBm/Hz ON/OFF		
	ON:	Displays the marker automatically if the marker is set to OFF. Sets the vertical axis unit to dBm and sets the marker unit to dBm/Hz.
	OFF:	Terminates the dBm/Hz function.
dBμV/sqrt(Hz) ON/OFF		
	ON:	Displays the marker automatically if the marker is set to OFF. Sets the vertical axis unit to dBμV and sets the marker unit to dBμV/sqrt(Hz).
	OFF:	Terminates the dBμV/sqrt(Hz) function.
dBc/Hz ON/OFF		
	ON:	Automatically sets the marker to the delta marker mode if the marker is set to OFF. Sets the delta marker unit to dBc/Hz.
	OFF:	Terminates the dBc/Hz function.
X dB Down		Displays the X dB Down menu. Displays the marker automatically if the marker is set to OFF. The trace, for which the X dB Down function is executed, is the active trace. Set the marker on the active trace.
Execute X dB Down		According to the Mode setting, displays a normal marker and a delta marker X dB lower than the current position.
Execute X dB Left		Displays a normal marker to the left of and X dB lower than the current position.
Execute X dB Right		Displays a normal marker to the right of and X dB lower than the current position.
X dB Level		Activates the X dB Level setting.

Display REL/ABL/ABR		Sets the display method of the X dB Down marker data.
	REL:	Sets the marker to the delta marker mode when X dB Down is executed. Displays a normal marker on the right and a delta marker on the left.
	ABL:	Displays the left marker as an absolute value.
	ABR:	Displays the right marker as an absolute value.
More 1/2		Displays the XdB 2/2 menu.
Continuous Down ON/OFF		Switches the continuous X dB down function ON and OFF.
	ON:	Repeats Peak X dB down in every sweep.
	OFF:	Cancels the continuous X dB down function.
Peak + X dB Down		Performs the peak search in the search range and then executes X dB Down.
Intermod		Displays the Intermod menu.
Execute ON/OFF		
	ON:	Performs the intermodulation measurement.
	OFF:	Terminates the intermodulation measurement.
Average Control		
Average START/STOP		
	START:	Performs averaging.
	STOP:	Cancels averaging.
Max Sweep Count		Sets the number of times Video averaging is performed. Up to 999 counts can be set.
Average PAUSE/CONT		
	PAUSE:	Pauses averaging and displays the current number of times averaging has been performed.
	CONT:	Restarts averaging from the point at which averaging was paused.
Average ONCE/SLIDE		
	ONCE:	Performs averaging for the set number of times and then the process terminates.
	SLIDE:	Performs averaging for the set number of times and repeats averaging continuously by using the last data.
On Trace A/B/C		Selects a trace in which to execute the inter-modulation measurement.
Max Order		Sets the measuring order. The third, fifth, seventh, and ninth orders can be set.

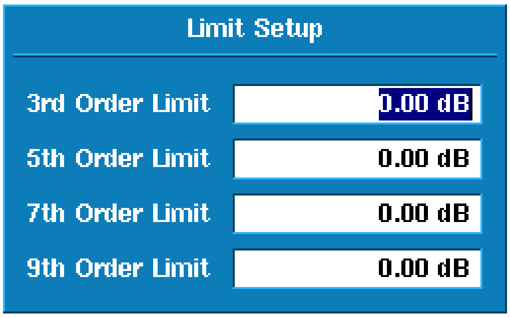
Limit Setup Displays the Limit Setup dialog box.

[3rd Order Limit]:
Sets the limit value of the third-order distortion signal.

[5th Order Limit]:
Sets the limit value of the fifth-order distortion signal.

[7th Order Limit]:
Sets the limit value of the seventh-order distortion signal.

[9th Order Limit]:
Sets the limit value of the ninth-order distortion signal.



Limit Setup

3rd Order Limit 0.00 dB
5th Order Limit 0.00 dB
7th Order Limit 0.00 dB
9th Order Limit 0.00 dB

Pass/Fail ON/OFF Switches the Pass/Fail judgment due to the comparison with the limit value set in the Limit Setup dialog box ON and OFF.

ON: Performs the Pass/Fail judgment.
If the measurement result is larger than the set limit value, a Fail judgment is performed.

OFF: Does not perform the Pass/Fail judgment.

Default Conditions Displays the IM Default menu.

Restore Defaults Recalls the saved setting conditions.

Save Defaults Saves the currently set conditions.

Harmonic Displays the Harmonic menu.

Execute ON/OFF

ON: Executes the harmonic measurement function.

OFF: Terminates the harmonic measurement function.

Average Control

Average START/STOP

START: Performs averaging.

STOP: Cancels averaging.

Max Sweep Count Sets the number of times Video averaging is performed.
Up to 999 counts can be set.

Average PAUSE/CONT	
	PAUSE: Pauses averaging and displays the current number of times averaging has been performed.
	CONT: Restarts averaging from the point at which averaging was paused.
Average ONCE/SLIDE	
	ONCE: Performs averaging for the set number of times and then the process terminates.
	SLIDE: Performs averaging for the set number of times and repeats averaging continuously by using the last data.
On Trace A/B/C	Selects a trace in which to execute the harmonic measurement.
Harmonic Max Order	Sets the measuring harmonic order. The measuring order can be set from 1 to 10. The default value is 3.
Fundamental ON/OFF	
	ON: Sets the fundamental frequency. The measuring span is set in the range that includes the fundamental and set harmonic order frequencies.
	OFF: Sets the current center frequency to the fundamental frequency.
Frequency Counter	Displays the Counter menu.
Execute ON/OFF	
	ON: Sets a frequency counter mode.
	OFF: Cancels the frequency counter mode.
Counter Position	Adjusts a cursor on the measured signal.
Link to Marker ON/OFF	Corresponds the cursor at the counter position with the marker position. If the marker position moved, then the counter position also moved.
	OFF: Cancels the function.
Resolution	Displays the Cnt Res menu.
Resolution 1 kHz	Sets the resolution of the frequency counter to 1 kHz.
Resolution 100 Hz	Sets the resolution of the frequency counter to 100 Hz.
Resolution 10 Hz	Sets the resolution of the frequency counter to 10 Hz
Resolution 1 Hz	Sets the resolution of the frequency counter to 1 Hz.
More 1/2	Displays the Meas2 2/2 menu.
%AM Meas ON/OFF	Switches ON and OFF the %AM modulation factor measurement.
	ON: Acquires an AM modulation factor and modulation frequency by using the peak search function and displays a calculation result in percentage.
	OFF: Cancels the %AM function.

FM Meas		Displays the FM Meas menu.
	Execute ON/OFF	Switches ON and OFF the frequency deviation measurement function. ON: Measures the frequency deviation of an FM signal. OFF: Cancels the frequency deviation measurement function of an FM signal. A value of Peak Delta Y is used as a condition of performing the peak search. If setting the Mod. Freq to Sweep Time ON/OFF menu to ON and setting a modulation frequency in advance, a optimum sweep time is automatically set based on the modulation frequency and the number of display points. If OFF is set for the Mod. Freq to Sweep Time ON/OFF menu, a sufficient sweep time must be set according to the following formula: SWP > PT × 1 / Fmod SWP: Sweep time PT: The number of display trace points Fmod: Modulation frequency (When the FM Meas function is selected, the trace detector is automatically set to the Posi mode.)
	Mod. Freq to Sweep Time ON/OFF	Switches ON and OFF a mode, in which a sweep time is determined based on a modulation frequency. ON: Sets a modulation frequency and then sets a sweep time based on the modulation frequency. OFF: Cancels a mode in which a modulation frequency is set. A value set for SWP Time AUTO/MNL is applied to a sweep time when measurement starts.
	Peak Delta Y	Sets a level difference for a signal to be judged as a peak point during the peak search. A level difference set here is used as a threshold level while searching for a peak value.
Sound		Displays the Sound menu. For a signal where the marker is positioned, sound demodulation is performed when a sweep ends.
	Execute ON/OFF	Switches the sound demodulation function ON and OFF. ON: Outputs the demodulated sound signal to the PHONE terminal on the front panel. OFF: Cancels the sound demodulation function.
	Sound AM/FM	Switches the demodulation mode between AM and FM. AM: Selects the AM demodulation. FM: Selects the FM demodulation.

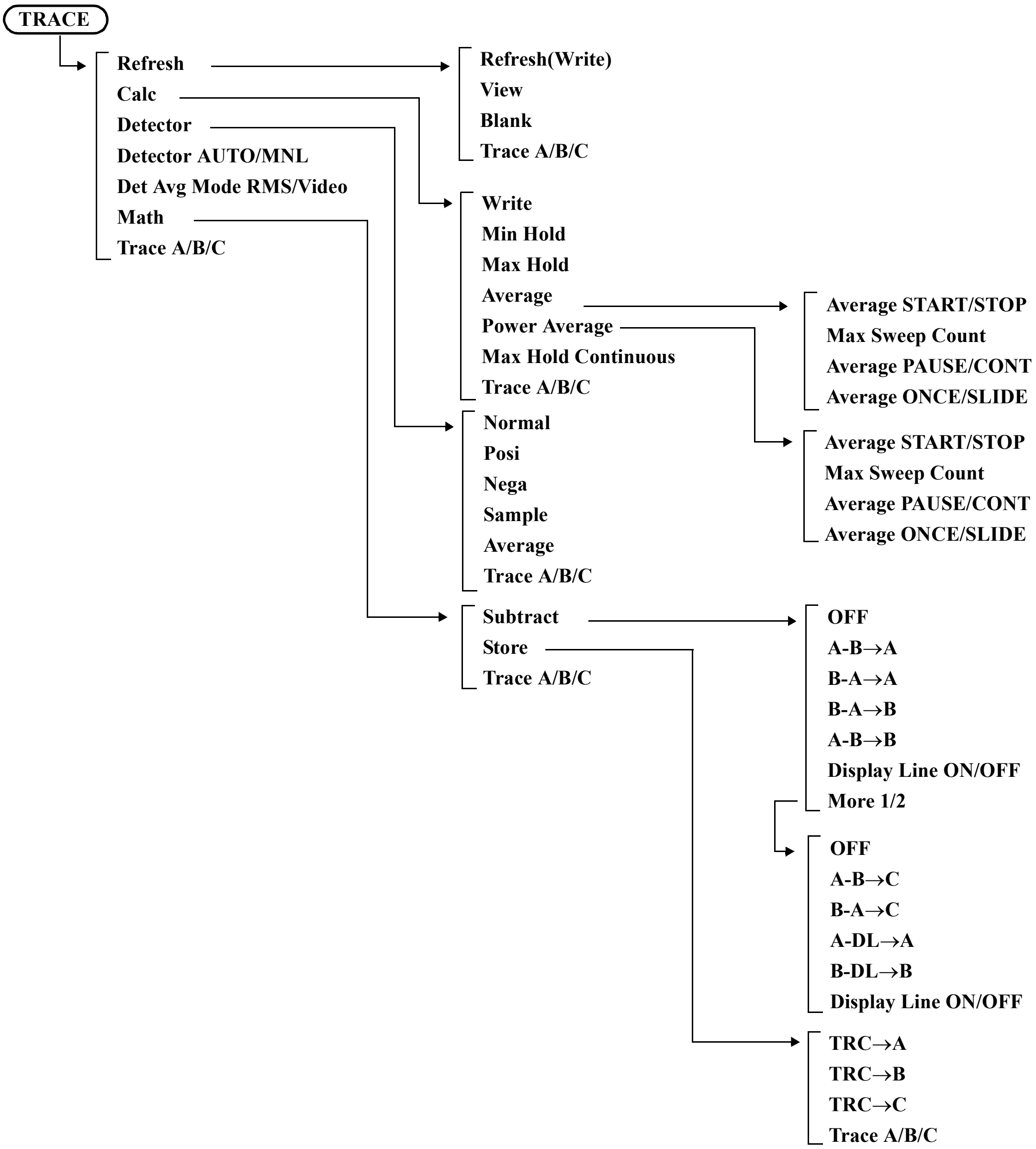
Volume	Sets the demodulated sound volume. The sound volume can be adjusted in 16 levels.
Pause Time	Sets the demodulation time. The setting range is from 100 ms to 1000 s.

5.2.8 TRACE

Displays the Trace menu and performs the settings related to the trace.
The Trace menu includes the trace selection menu, which corresponds to the menu key 7. The trace is changed each time the key is pressed; A → B → C.

Trace A/B/C

A:	Selects trace memory A.
B:	Selects trace memory B.
C:	Selects trace memory C.



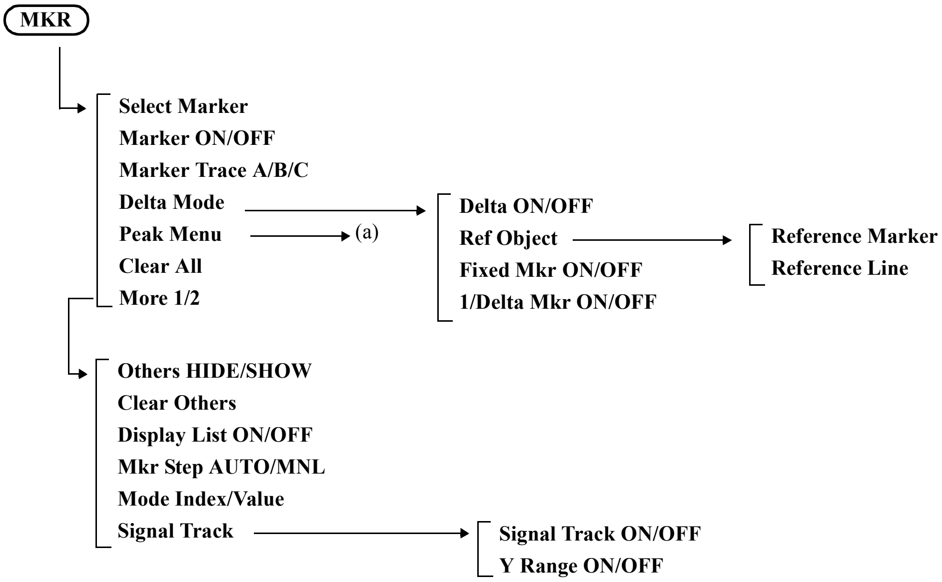
Refresh			Displays the Refresh Mode menu. The selected setting is displayed at the bottom of the menu.
	Refresh(Write)		Refreshes trace data in each sweep.
	View		Displays the trace data stored in the memory.
	Blank		Hides the trace. Traces A, B, and C cannot be set to Blank at the same time.
	Trace A/B/C		Selects the applied trace memory.
Calc			Displays the Calc Mode menu. The selected setting is displayed at the bottom of the menu.
	Write		Displays the waveform data acquired in the default settings.
	Min Hold		Displays the minimum value of points in each trace sample.
	Max Hold		Displays the maximum value of points in each trace sample.
	Average		Displays the Video Average menu. The Video average performs averaging of the display data.
		Average START/STOP	
			START: Performs averaging.
			STOP: Cancels averaging.
		Max Sweep Count	Sets the number of times Video averaging is performed. Up to 999 counts can be set.
		Average PAUSE/CONT	
			PAUSE: Pauses averaging and displays the current number of times averaging has been performed.
			CONT: Restarts averaging from the point in which averaging was paused.
		Average ONCE/SLIDE	
			ONCE: Performs averaging for the set number of times and then the process terminates.
			SLIDE: Performs averaging for the set number of times and repeats averaging continuously by using the last data.
	Power Average		Displays the Power Average menu. Performs averaging of power (W) and draws waveforms.
		Average START/STOP	
			START: Performs averaging.
			STOP: Cancels averaging.
		Max Sweep Count	Sets the number of times Video averaging is performed. Up to 999 counts can be set.
		Average PAUSE/CONT	
			PAUSE: Pauses averaging and displays the current number of times averaging has been performed.
			CONT: Restarts averaging from the point in which averaging was paused.

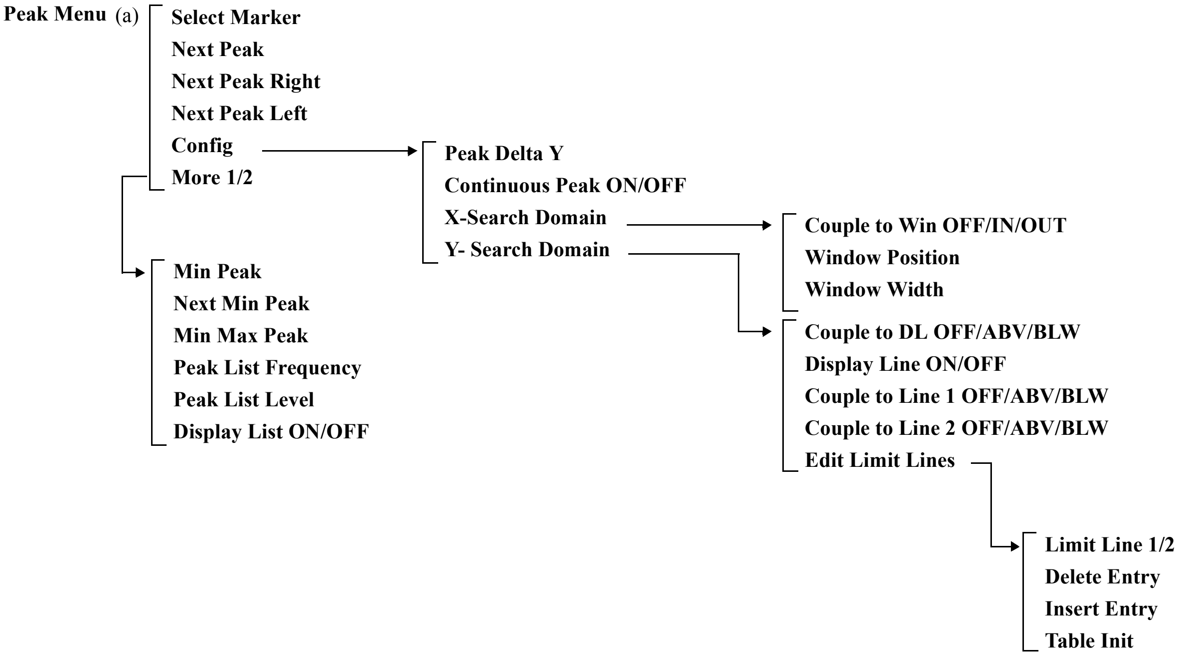
Average ONCE/SLIDE	ONCE: Performs averaging for the set number of times and then the process terminates. SLIDE: Performs averaging for the set number of times and then calculates the moving average.
Max Hold Continuous	Displays the maximum value for each trace sample. The trace is not reset in this function which is different from the Max Hold function in the Calc menu. The Max Hold operation starts at a trace point when the key is pressed. This function can be used when the Detector mode is set to MNL.
Trace A/B/C	Selects the applied trace memory.
Detector	Displays the Detector menu. The selected setting is displayed at the bottom of the menu.
Normal	Sets the normal detection mode, in which a positive or negative peak is automatically detected at each trace point.
Posi	Sets the positive peak detection mode.
Nega	Sets the negative peak detection mode.
Sample	Sets the sample detection mode.
Average	Sets the average detection mode. The average detection mode includes RMS (power average) and Video (Trace average), which can be selected in the Det Avg Mode menu.
Trace A/B/C	Selects the applied trace memory.
Detector AUTO/MNL	Switches the detection mode between the auto and manual settings. AUTO: Automatically sets the optimum detection mode for measurement based on the trace mode. MNL: Sets the detection mode manually.
Det Avg Mode RMS/Video	RMS: Selects RMS (power average). Video: Selects Video (Trace average).
Math	Displays the Math menu.
Subtract	Displays the Subtract menu. The selected setting is displayed at the bottom of the menu.
OFF	Does not perform the trace calculation.
A-B→A	When trace A is set to the Write mode, the data in memory B is subtracted from the data acquired in the sweep and the result is entered into memory A.
B-A→A	When trace A is set to the Write mode, the data acquired in the sweep is subtracted from the data in memory B and the result is entered into memory A.
B-A→B	When trace B is set to the Write mode, the data in memory A is subtracted from the data acquired in the sweep and the result is entered into memory B.

A-B→B	When trace A is set to the Write mode, the data acquired in the sweep is subtracted from the data in memory A and the result is entered into memory B.
Display Line ON/OFF	
	ON: Displays and activates the display line.
	OFF: Cancels the display line.
More 1/2	Displays the Subtract 2/2 menu.
OFF	Does not perform the trace calculation.
A-B→C	When trace A is set to the Write mode, the data in memory B is subtracted from the data acquired in the sweep and the result is entered into memory C.
B-A→C	When trace A is set to the Write mode, the data acquired in the sweep is subtracted from the data in memory B and the result is entered into memory C.
A-DL→A	When trace A is set to the Write mode, the data on the display line is subtracted from the data acquired in the sweep and the result is entered into memory A.
B-DL→B	When trace B is set to the Write mode, the data on the display line is subtracted from the data acquired in the sweep and the result is entered into memory B.
Display Line ON/OFF	
	ON: Displays and activates the display line.
	OFF: Cancels the display line.
Store	Displays the Store menu. Copies the active trace data and sets to the View mode.
TRC→A	Saves the active trace data to trace memory A.
TRC→B	Saves the active trace data to trace memory B.
TRC→C	Saves active trace data to trace memory C.
Trace A/B/C	Selects the applied trace memory.
Trace A/B/C	Selects the applied trace memory.
Trace A/B/C	Selects the applied trace memory.

5.2.9 MKR

Displays the Marker menu and an active marker by pressing the **MKR** key. The frequency and level on the marker are displayed in the marker area.





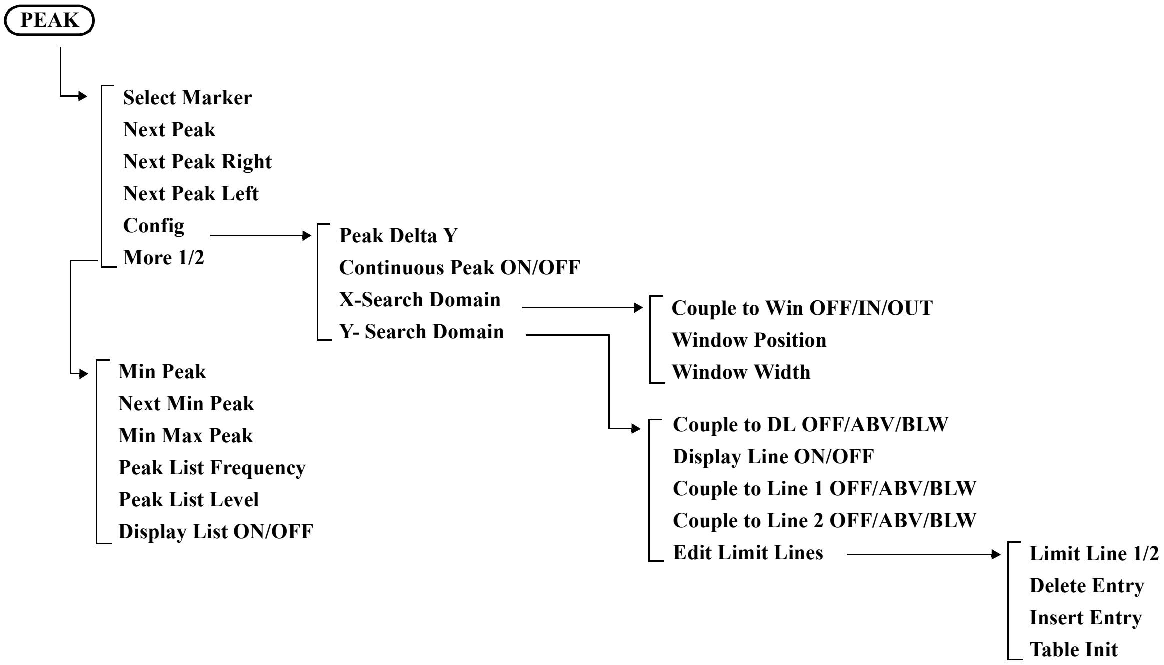
Select Marker	Selects the active marker and sets its position. The marker number increases by one each time the key is pressed. The marker number cycles from 1 to 10: 1-2-3-4-5-6-7-8-9-10-1- The marker number decreases by one if **SHIFT** is pressed and then **Select Marker** is pressed.
Marker ON/OFF	Activates the marker selected by Select Marker.
Marker Trace A/B/C	Moves the active marker to the selected trace.
Delta Mode	Displays the Delta Marker menu.
Delta ON/OFF	Switches the delta marker display function ON and OFF.
	ON: Displays a delta marker at the same position as a normal marker. The relative values of frequency and level to the normal marker are displayed in the marker area.
	OFF: Hides the delta marker.
Ref Object	Sets the reference in the delta marker mode.
Reference Marker	Selects the reference marker.
Reference Line	Selects the reference line.
Fixed Mkr ON/OFF	Switches the fixed marker function ON and OFF.
	ON: Maintains the frequency and level of the delta marker.
	OFF: Cancels the fixed marker function.
1/Delta Mkr ON/OFF	Switches the inverse number display function for the delta marker value ON and OFF.
	ON: Displays a frequency value on the time axis and a time value on the frequency axis.
	OFF: Cancels the inverse number display function.
Peak Menu	Displays the Peak menu. Does not move the marker. Refer to "5.2.10 PEAK".
Clear All	Clears all markers. The marker display position is set at the center of the screen (default value).
More 1/2	Displays the Marker 2/2 menu.
Others HIDE/SHOW	Hides all markers except for the active marker.
Clear Others	Clears all markers except for the active marker.
Display List ON/OFF	Switches the list display of enabled markers ON and OFF.
	ON: Displays a list of frequencies and levels in order of marker number.
	OFF: Hides the display of marker list.
Mkr Step AUTO/MNL	Switches the step size between auto and manual settings when the marker is moved by the step key.
	AUTO: Sets the marker step size to 1/10 of the frequency span.
	MNL: Sets the step size manually.

Mode Index/Value	Selects either Index or Value as the marker position setting. Index: Maintains the marker position at the point on the screen. If the center frequency is changed, the marker does not move and remains at the same position on the screen. Value: The marker position retains the frequency information. If the center frequency is changed, the marker position moves according to the frequency.
Signal Track	Displays the Sig Track menu.
Signal Track ON/OFF	Switches the signal truck function ON and OFF. ON: Performs the peak search for the same peak in each sweep, and sets the marker frequency to the center frequency. OFF: Cancels the signal truck function.
Y Range ON/OFF	Sets the margin when the signal track function detects the peak.

5.2.10 PEAK

Displays the Peak menu.

Displays the marker at the maximum level of the trace in the search range and displays the frequency and level of the marker. However, the frequency of the feed-through (zero carrier) is excluded.



Select Marker	Selects the active marker. The marker number increases by one each time the key is pressed. The marker number decreases by one if **SHIFT** is pressed and then **Select Marker** is pressed.
Next Peak	Moves the marker to the next highest peak from the current marker position in the search range.
Next Peak Right	Moves the marker to the next peak on the right (higher frequency than the current marker position) in the search range.
Next Peak Left	Moves the marker to the next peak on the left (lower frequency than the current marker position) in the search range.
Config	Displays the Peak Cfg menu.
Peak Delta Y	Sets the level difference from the peak, in which a signal is recognized as a peak point during the peak search. This level difference is used as the threshold level for the peak point search.
Continuous Peak ON/OFF	Switches the continuous peak search function ON and OFF.
	ON: Repeats the peak search in each sweep.
	OFF: Cancels the continuous peak search function.
X-Search Domain	Displays the X PK Area menu.

Couple to Win OFF/IN/OUT

Sets a peak search range on the horizontal axis.

OFF:	Sets the full range on the screen as the search range.
IN:	Sets the inside of the displayed window as the search range.
OUT:	Sets the outside of the displayed window as the search range.

Window Position	Sets the center position of the window defined by Couple to Win.
Window Width	Sets the window width defined by Couple to Win.
Y- Search Domain	Displays the Y PK Area menu.

Couple to DL OFF/ABV/BLW

Sets a peak search range on the vertical axis.

OFF:	Sets the full range as the search range.
ABV:	Sets the range above the display line as the search range.
BLW:	Sets the range below the display line as the search range.

Display Line ON/OFF

ON:	Displays the display line. Sets the position of the display line.
OFF:	Hides the display line.

Couple to Line 1 OFF/ABV/BLW

Specifies the search range for limit line 1.

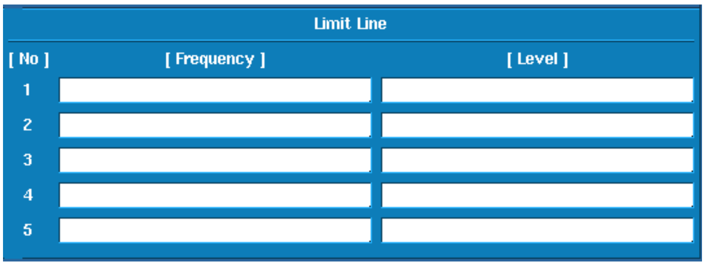
OFF:	Does not specify the search range related to limit line 1.
ABV:	Specifies the range above limit line 1 as the search range.
BLW:	Specifies the range below limit line 1 as the search range.

Couple to Line 2 OFF/ABV/BLW

Specifies the search range for limit line 2.

OFF:	Does not specify the search range related to limit line 2.
ABV:	Specifies the range above limit line 2 as the search range.
BLW:	Specifies the range below limit line 2 as the search range.

Edit Limit Lines	Displays the Limit Line menu and Limit Line table.



Limit Line

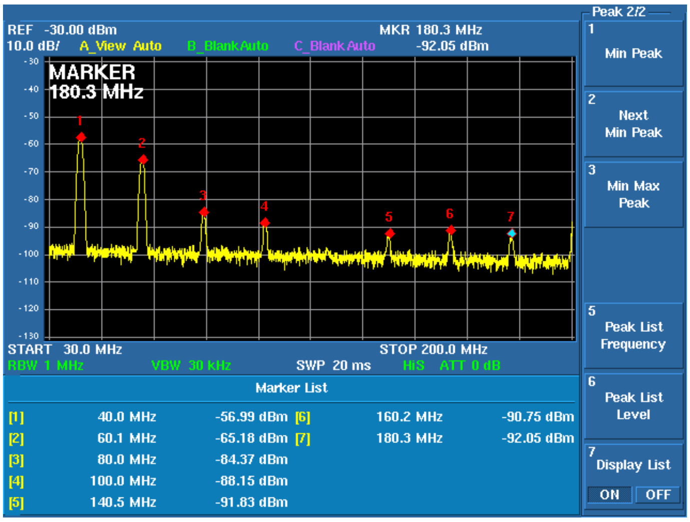
[No]	[Frequency]	[Level]
1		
2		
3		
4		
5		

Limit Line 1/2

1:	Edits limit line 1.
2:	Edits limit line 2.

Delete Entry	Deletes a line on which the cursor is positioned in the limit line table.
Insert Entry	Inserts a line in the limit line table.
Table Init	Clears all settings in the limit line table.

More 1/2	Displays the Peak 2/2 menu.
Min Peak	Moves the active marker to the minimum value of the trace in the search range.
Next Min Peak	Moves the marker to the next lowest peak from the current marker position in the search range.
Min Max Peak	Automatically sets the delta marker mode, moves the reference marker to the maximum value, and moves active marker to the minimum value.
Peak List Frequency	Lists peak levels and peak frequencies in order of frequency.



REF -30.00 dBm
10.0 dB/ A_View Auto B_BlankAuto C_Blank Auto
MKR 180.3 MHz
-92.05 dBm

MARKER
180.3 MHz

START 30.0 MHz
STOP 200.0 MHz
RBW 1 MHz VBW 30 kHz SWP 20 ms HiS ATT 0 dB

Marker List

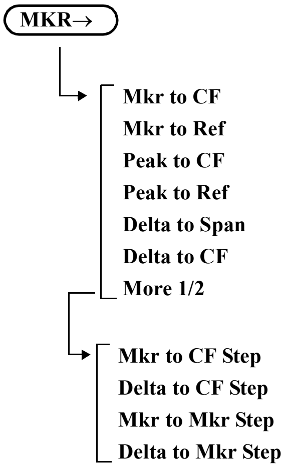
[1]	40.0 MHz	-56.99 dBm	[6]	160.2 MHz	-90.75 dBm
[2]	60.1 MHz	-65.18 dBm	[7]	180.3 MHz	-92.05 dBm
[3]	80.0 MHz	-84.37 dBm			
[4]	100.0 MHz	-88.15 dBm			
[5]	140.5 MHz	-91.83 dBm			

Peak List Level	Lists peak levels and peak frequencies in order of peak level.
Display List ON/OFF	Switches the peak list display. ON: Displays the list. OFF: Hides the list.

5.2.11 MKR→

If the **MKR→** key is pressed, active marker data such as the frequency and level can be used as the data of other function.

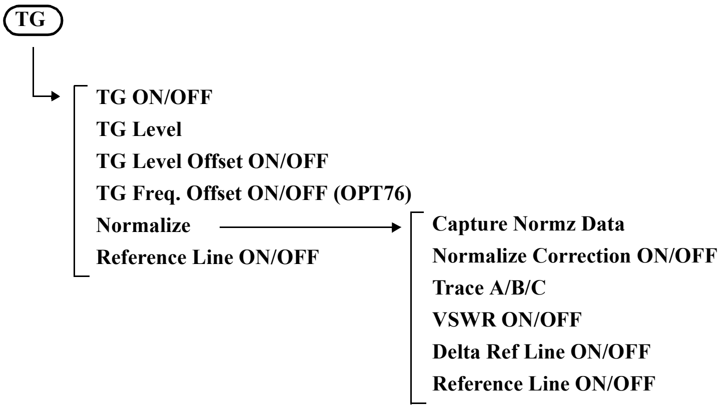
Displays the Mkr to menu.



Mkr to CF	Sets the frequency of the active marker to the center frequency.
Mkr to Ref	Sets the level of the active marker to the reference level.
Peak to CF	Displays the marker at the highest peak in the search range and sets the center frequency to the frequency of the marker.
Peak to Ref	Displays the marker at the highest peak in the search range and sets the reference level to the level of the marker.
Delta to Span	Sets the frequency span to the difference between the frequencies of the delta marker and the normal marker.
Delta to CF	Sets the center frequency to the difference between the frequencies of the delta marker and the normal marker.
More 1/2	Displays the Mkr to 2/2 menu.
Mkr to CF Step	Sets the step size of the center frequency to the frequency of the marker as.
Delta to CF Step	Sets the step size of the center frequency to the difference between the frequencies delta marker and the normal marker as.
Mkr to Mkr Step	Sets the step size of the marker to the frequency of the marker.
Delta to Mkr Step	Sets the step size of the marker to the difference between the frequencies of the delta marker and the normal marker.

5.2.12 TG (Option)

Displays the TG menu.



TG ON/OFF

ON: Turns on a tracking generator.

OFF: Turns off the tracking generator.

TG Level

Sets the output level of the tracking generator.

Setting range
0 dBm to -30 dBm (OPT77)
0 dBm to -60 dBm (OPT76)

TG Level Offset ON/OFF

Switches the TG level offset function ON and OFF.

ON: The offset level can be set in the range of 0 ± 100.0 dB. The relationship between the displayed TG level, set TG level, and offset is as follows:
Displayed TG level = Set TG level + Offset

OFF: Cancels the offset function.

TG Freq. Offset ON/OFF

Adds the offset frequency to the TG output frequency.
It functions with OPT76.

ON: The offset frequency can be set in the range of 0 Hz to +1 GHz and the resolution of approx. 1 kHz.
The output frequency is up to 3 GHz even if adding the offset frequency.

OFF: Cancels the offset function.

Normalize

Displays the TG Normz menu.

Capture Normz Data

Acquires the normalization data at the position of the reference line.

Normalize Correction ON/OFF

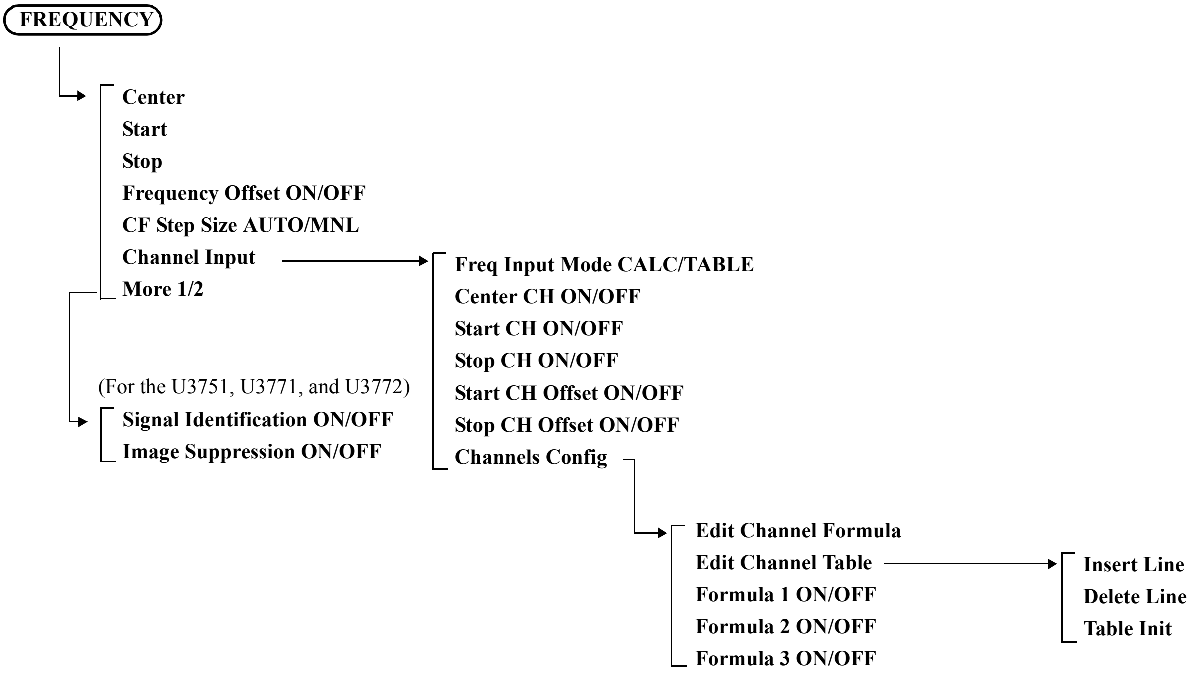
ON: Normalizes the measurement data by using the normalization data.
Only trace A can be normalized.

OFF: Cancels the normalization function.

Trace A/B/C	Selects the trace memory in which the data to be normalized is acquired and the normalization function is performed.
VSWR ON/OFF	Displays a return loss and VSWR as marker values. When performing a measurement, advance normalization with the SWR bridge must be executed. Refer to Section 4.4.7, "VSWR Measurement". ON: Displays Return Loss and VSWR. R.L = 20 log ρ VSWR = (1+ρ) / (1-ρ) OFF: Cancels the Return Loss and VSWR displays.
Delta Ref Line ON/OFF	ON: Sets the marker to ON and displays the level difference to the reference line. (MKΔ) OFF: Hides the MKΔ display.
Reference Line ON/OFF	ON: Displays the reference line and sets its display position. OFF: Hides the reference line.

5.2.13 FREQUENCY

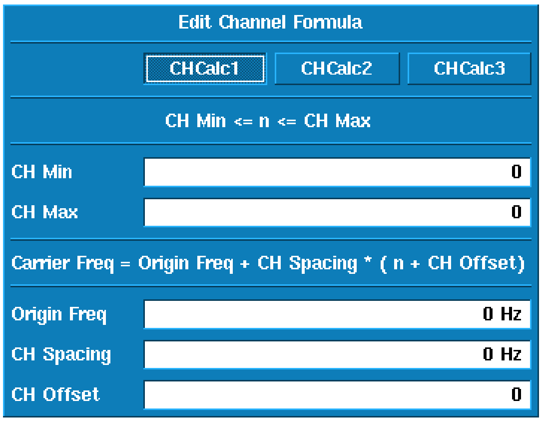
Displays the Frequency menu.



Center	Sets the center frequency. The frequency range is displayed by the center frequency and frequency span.
Start	Sets the start frequency. The frequency range is displayed by the start frequency and stop frequency.
Stop	Sets the stop frequency. The frequency range is displayed by the start frequency and stop frequency.
Frequency Offset ON/OFF	Switches the frequency offset function ON and OFF. ON: Sets the offset value and changes only the display of the frequency by the offset value. (Displayed value of frequency = Set value + Offset value) OFF: Cancels the offset function.
CF Step Size AUTO/MNL	Switches the step size between auto and manual settings when the center frequency is changed by the step key. AUTO: Automatically sets the step size to 1/10 of the span width. MNL: Sets the step size manually.

Channel Input	Displays the Channel menu. Uses the channel code instead of the frequency for the frequency setting.
Freq Input Mode CALC/TABLE	Selects the channel input format. CALC: Acquires a frequency from a channel number by using the mathematical formula. TABLE: Acquires a frequency from a look-up table, which corresponds to a channel number.
Center CH ON/OFF	Sets the center frequency input mode to the channel. ON: Sets the channel code input mode. OFF: Sets the frequency input mode.
Start CH ON/OFF	Sets the start frequency input mode to the channel. ON: Sets the channel code input mode. OFF: Sets the frequency input mode.
Stop CH ON/OFF	Sets the stop frequency input mode to the channel. ON: Sets the channel code input mode. OFF: Sets the frequency input mode.
Start CH Offset ON/OFF	Switches the start frequency offset function ON and OFF when the channel input mode is set. ON: Sets the offset value. Start frequency = Carrier frequency (Start channel) - start offset frequency OFF: Cancels the offset function.
Stop CH Offset ON/OFF	Switches the stop frequency offset function ON and OFF when the channel input mode is set. ON: Sets the offset value. Stop frequency = Carrier frequency (Stop channel) + stop offset frequency OFF: Cancels the offset function.
Channels Config	Displays the Channels Config menu.

Edit Channel Formula Displays the dialog box in which the mathematical formula to acquire the channel set frequency is defined.
The set frequency is as follows:
Carrier frequency = Origin + CH spacing * (CH No. - CH offset)



CH Min <= n <= CH Max

CH Min 0

CH Max 0

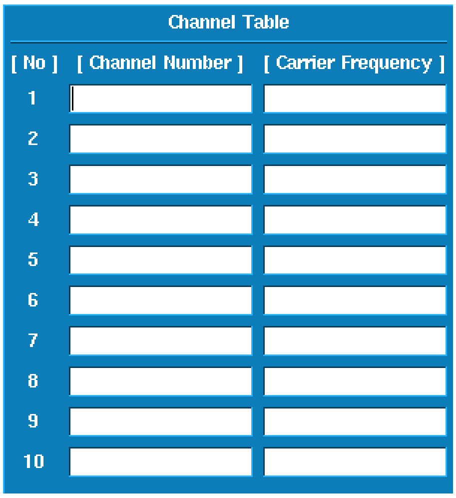
Carrier Freq = Origin Freq + CH Spacing * (n + CH Offset)

Origin Freq 0 Hz

CH Spacing 0 Hz

CH Offset 0

Edit Channel Table Displays the dialog box used to set the channel table.



[No]	[Channel Number]	[Carrier Frequency]
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Insert Line Inserts a line in the channel table.

Delete Line Deletes the line where the cursor is positioned.

Table Init Initializes the channel table.
Clears all settings.

Formula 1 ON/OFF

Formula 2 ON/OFF

Formula 3 ON/OFF

Sets the mathematical formula used in the channel input mode. This function is enabled when Freq Input Mode is set to CALC.

More 1/2 Displays the Frequency 2/2 menu.

Signal Identification ON/OFF (U3751/U3771/U3772)

ON: Turns on the Signal Identification function. Image signals shift on the screen but the signals do not move in each sweep.

OFF: Cancels the Signal Identification function.

Image Suppression ON/OFF (U3751/U3771/U3772)

ON: Turns on the Image Suppression function. Detects image signals and deletes them from the display.

OFF: Cancels the Image Suppression function.

5.2.14 SPAN

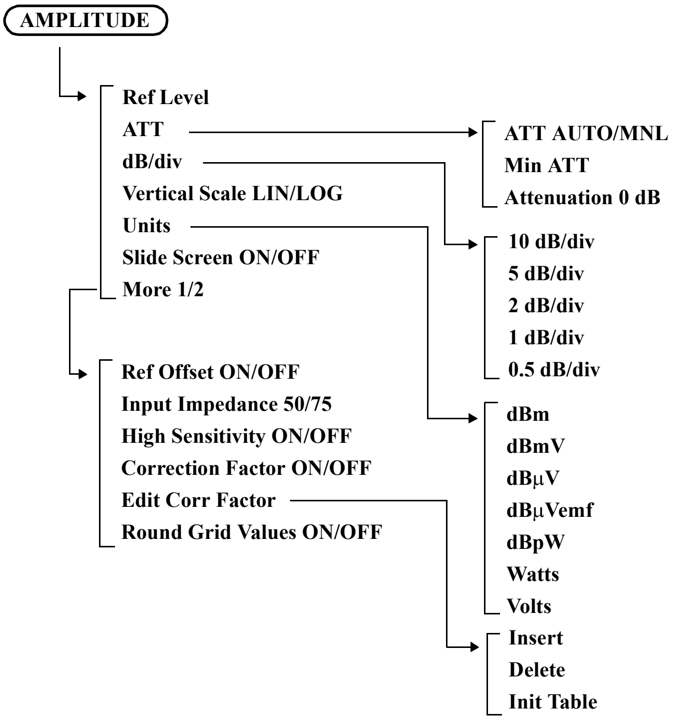
SPAN

- Span
- Full Span
- Zero Span
- Last Span
- Peak Zoom
- Auto Tune

Span	Sets the frequency span. The frequency range is displayed by the center frequency and frequency span.
Full Span	Sets the frequency span to full span. (SPAN - 8 GHz)
Zero Span	Sets the zero span mode at the center frequency.
Last Span	Returns the frequency span to the previous value.
Peak Zoom	Displays the marker at the highest peak in the targeted search range and sets the frequency of the marker to the center frequency. At this time, the frequency span is changed to 1/10 of the currently set value.
Auto Tune	Searches the maximum signal level in the full band and captures the signal, then finally sets the frequency span to a value before AUTO TUNE starts. The reference level is set to the peak level of the searched signal. ON: Starts AUTO TUNE. OFF: Stops AUTO TUNE.

5.2.15 AMPLITUDE

Displays the Level menu and enables the settings related to the amplitude display.



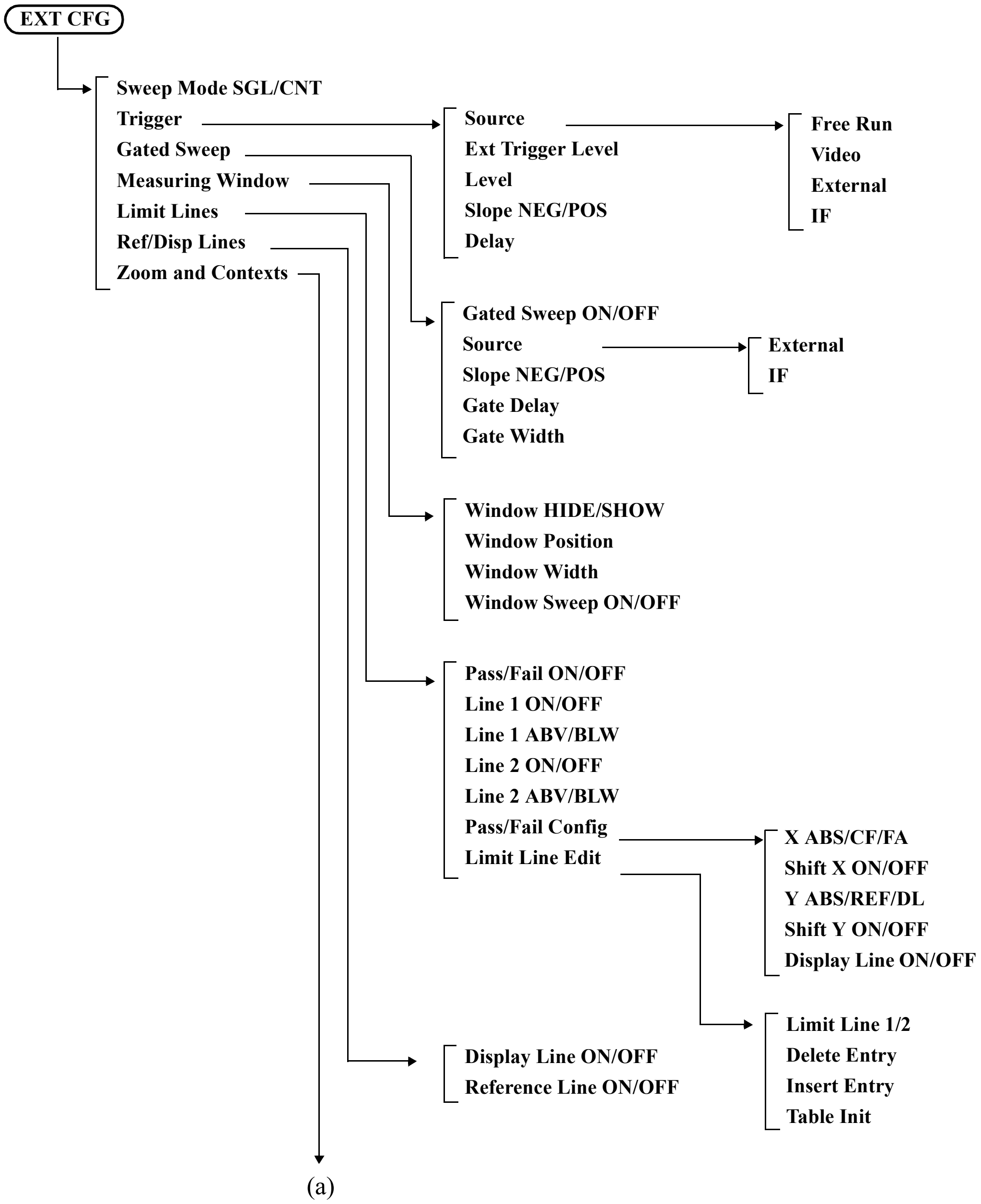
Ref Level	Sets the reference level.
ATT	Displays the Attenuation menu.
ATT AUTO/MNL	Switches the attenuator function between auto and manual settings. AUTO: Automatically sets the attenuator value according to the reference level. MNL: Sets the attenuator value manually.
Min ATT	Sets the minimum value of the attenuator. This setting is enabled only when the attenuator is set manually.
Attenuation 0 dB	Sets the attenuator to 0 dB. Displays the confirmation window before setting. This setting can be set by selecting OK with step keys and pressing the unit key (ENTER).

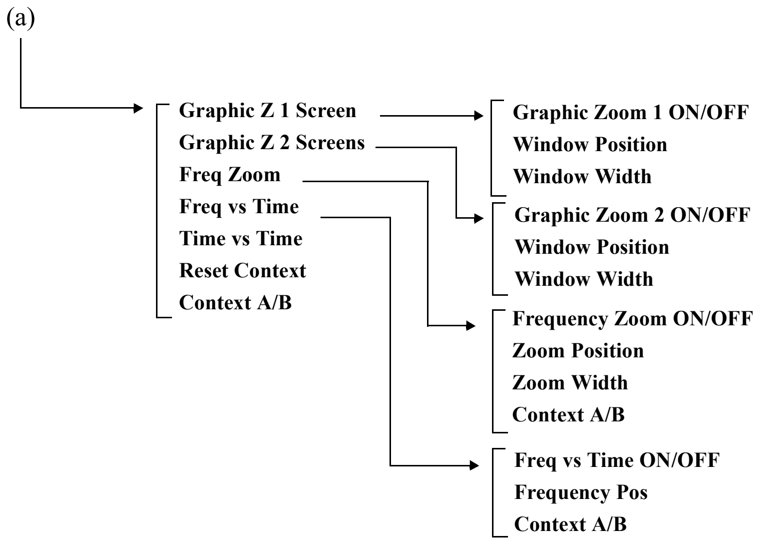
dB/div	
10 dB/div	Sets the LOG scale to 10 dB/div
5 dB/div	Sets the LOG scale to 5 dB/div.
2 dB/div	Sets the LOG scale to 2 dB/div.
1 dB/div	Sets the LOG scale to 1 dB/div.
0.5 dB/div	Sets the LOG scale to 0.5 dB/div.
Vertical Scale LIN/LOG	LIN: Displays waveform data on a linear scale. LOG: Displays waveform data on a log scale.
Units	
dBm	Sets the display unit to dBm.
dBmV	Sets the display unit to dBmV.
dBμV	Sets the display unit to dBμV.
dBμVemf	Sets the display unit to dBμVemf.
dBpW	Sets the display unit to dBpW.
Watts	Sets the display unit to Watts.
Volts	Sets the display unit to Volts.
Slide Screen ON/OFF	Scrolls the screen display up and down up to ±100%. ON: Enables the function. Enter the amount of the display scrolls by using the knob, step keys or keypad. OFF: Cancels the slide function.
More 1/2	Displays the Level 2/2 menu.
Ref Offset ON/OFF	Switches the reference level offset function ON and OFF. ON: The offset level can be set in the range of 0 to ±100.0 dB. The relationship among the displayed reference level, set reference level, and offset is as follows: Displayed reference level = Set reference level + Offset OFF: Cancels the offset.
Input Impedance 50/75	50: Converts the power assuming that the input impedance is 50 Ω. This setting is the standard value that is 50. 75: Converts the power assuming that the input impedance is 75 Ω. The 6 dB conversion loss of the ZT-130NC 75/50 Ω impedance converter is added automatically.

NOTE: ***For OPT15 (75 Ωoption), Input Impedance is fixed at 75 Ω This impedance cannot be changed to 50 Ω***

High Sensitivity ON/OFF	Switches the high-sensitivity input function ON and OFF. ON: Turns on the built-in preamp. The preamp gain is corrected at each frequency and it does not need to be considered in level measurements. OFF: Turns off the built-in preamp.
Correction Factor ON/OFF	ON: Corrects the display level according to the correction table. OFF: Cancels the correction based on the correction data.
Edit Corr Factor	Displays the Corr Factor menu and the correction table. A frequency of up to 400 GHz and a level of ±100 dB can be set.
Insert	Inserts a line in the correction table.
Delete	Deletes a line on which the cursor is positioned in the correction table.
Init Table	Clears all settings in the correction table.
Round Grid Values ON/OFF	ON: Displays the vertical scale by rounding off the Ref Level setting value to integers. OFF: Displays the vertical scale according to the Ref Level setting value.

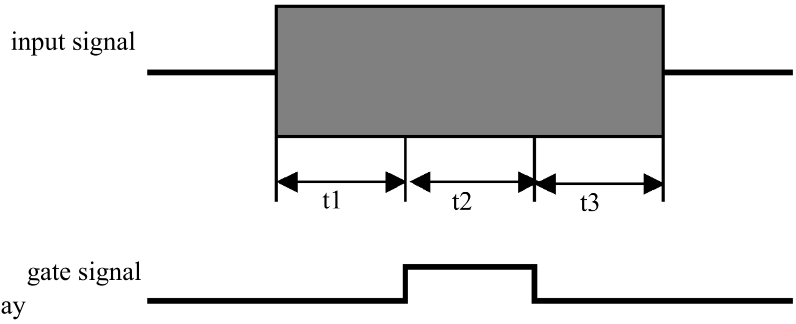
5.2.16 EXT CFG (Extended Configuration options)





Sweep Mode SGL/CNT	Sets the sweep mode. SGL: Sets the SINGLE mode. The sweep starts by pressing the **START/STOP** key and stops. CNT: Sets the CONTINUOUS mode. Repeats the sweep automatically by the next trigger signal after the sweep stops.
Trigger	Displays the Trigger menu.
Source	Displays the Trig Source menu.
Free Run	Repeats the sweep automatically.
Video	Synchronizes the sweep with the video signal and then starts the sweep.
External	Synchronizes the sweep with the external trigger signal (EXT terminal) and then starts the sweep.
IF	Synchronizes the sweep with the IF signal and then starts the sweep.
Ext Trigger Level	Sets the trigger signal for the external trigger signal.
Level	Sets the trigger level for the Video or IF trigger.
Slope NEG/POS	Switches the trigger slope polarity. This setting is enabled only when the video trigger, external trigger or IF trigger is used. NEG: Starts the sweep at the falling edge of a trigger. POS: Starts the sweep at the rising edge of a trigger.
Delay	Sets the delay time from a trigger point.

Gated Sweep	Displays the Gated Sweep menu.
Gated Sweep ON/OFF	Switches the gated sweep ON and OFF.
	ON: Sweep is executed according to the currently set gate conditions (gate position and width).
	OFF: Turns the gated sweep mode off.
Source	Displays the Gate Source menu.
	External: Performs sweep synchronizing with the external trigger signal.
	IF: Performs sweep synchronizing with the IF signal.
Slope NEG/POS	Switches the trigger slope polarity.
	NEG: The sweep starts at the falling edge of a trigger signal.
	POS: The sweep starts at the rising edge of a trigger signal.
Gate Delay	Sets the delay time from a trigger point. Setting range: 0 sec to 1 sec
Gate Width	Sets the gate time width. Setting range: 50 µsec to 1 sec



t1: Gate Delay

t2: Gate Width

Measuring Window	Displays the Window menu.
Window HIDE/SHOW	
	HIDE: Hides the measuring window.
	SHOW: Displays the measuring window.
Window Position	Sets the center position of the window.
Window Width	Sets the window width.
Window Sweep ON/OFF	
	ON: Performs the sweep only in the range set in the measuring window.
	OFF: Performs the sweep in the range of the set span width.

Limit Lines Displays the Pass/Fail menu.

Pass/Fail ON/OFF Switches the Pass/Fail judgment due to the comparison with the limit value ON and OFF.

ON: Performs the Pass/Fail judgment.
Performs the Judgment in each sweep.
If the limit line is not defined, this setting cannot be used.

OFF: Does not perform the Pass/Fail judgment.

Line 1 ON/OFF Switches limit line 1 ON and OFF.

ON: Displays limit line 1.

OFF: Hides limit line 1.

Line 1 ABV/BLW Sets the judgment condition for limit line 1.

ABV: Sets the range above limit line 1 as the PASS condition.

BLW: Sets the range below limit line 1 as the PASS condition.

Line 2 ON/OFF Switches limit line 2 ON and OFF.

ON: Displays limit line 2.

OFF: Hides limit line 2.

Line 2 ABV/BLW Sets the judgment condition for limit line 2.

ABV: Sets the range above limit line 2 as the PASS condition.

BLW: Sets the range below limit line 2 as the PASS condition.

Pass/Fail Config Displays the PF Config menu.

X ABS/CF/FA Sets the attributes of the horizontal axis data of the limit line.

ABS: Sets the horizontal axis position according to the absolute value of the limit line set in Limit Line Edit.
The horizontal axis position of the limit line moves according to changes in the frequency span and center frequency setting.

CF: Sets the reference position to the center of the horizontal axis.

FA: Sets the reference position to the leftmost point on the horizontal axis.

Shift X ON/OFF

ON: Sets the offset frequency from the reference position.
The limit line display is shifted by the frequency offset.

OFF: Cancels the shift of the limit line.

Y ABS/REF/DL Sets the attributes of the vertical axis (level) data of the limit line.

ABS: Sets the vertical axis position according to the absolute value of the limit line set in Limit Line Edit.
The vertical axis position of the limit line moves according to the change of the level setting.

REF: Sets the reference level as the reference position.

DL: Sets the display line as the reference position.

Shift Y ON/OFF	
	ON: Sets the offset (dB) of the vertical axis from the limit line. The limit line display is shifted by the level offset.
Display Line ON/OFF	
	ON: Displays the display line. Sets the position of the display line.
	OFF: Hides the display line.
Limit Line Edit	Displays the Limit Line menu.
Limit Line 1/2	
	1: Edits limit line 1.
	2: Edits limit line 2.
Delete Entry	Deletes a line on which the cursor is positioned in the limit line table.
Insert Entry	Inserts a line in the limit line table.
Table Init	Clears all settings in the limit line table.
Ref/Disp Lines	Displays the Display menu.
Display Line ON/OFF	Switches the display of the display line, which is used as the reference line when trace levels are compared, between ON and OFF.
	ON: Displays the display line.
	OFF: Hides the display line.
Reference Line ON/OFF	Switches the display of the reference line, which is used as the reference to display level data in relative value, between ON and OFF.
	ON: Displays the reference line. The reference line position can be changed.
	OFF: Hides the reference line.
Zoom and Contexts	Displays the Zoom Contexts menu.
Graphic Z 1 Screen	Displays the G Zoom 1 Screen menu.
Graphic Zoom 1 ON/OFF	
	ON: Zooms in the area selected by the window.
	OFF: Cancels the zoom-in display.
Window Position	Sets the center position of the window.
Window Width	Sets the window width.

Graphic Z 2 Screens Displays the G Zoom 2 Screen menu.

Graphic Zoom 2 ON/OFF

ON: Splits the screen into an upper and lower display.
The upper screen displays the original waveform.
The lower screen zooms in on the area selected by the window.

OFF: Cancels the zoom-in display.

Window Position Sets the center position of the window.

Window Width Sets the window width.

Freq Zoom Displays the Freq Zoom menu.

Frequency Zoom ON/OFF

ON: Splits the screen into an upper and lower display.
The upper screen displays the original waveform.
The lower screen zooms in on the frequency range selected by the window, in which the sweep is performed.

OFF: Cancels the dual-screen display.

Zoom Position Sets the center position of the window.

Zoom Width Sets the window width.

Context A/B Switches the active screen between A (upper screen) and B (lower screen).

A: The upper screen settings can be changed.

B: The lower screen settings can be changed.

Freq vs Time Displays the Freq vs Time menu.

Freq vs Time ON/OFF

ON: Splits the screen into an upper and lower display.
The horizontal axis in the upper screen represents frequency, and the lower screen represents the time (zero span) at the zoomed position.

OFF: Cancels the dual-screen display.

Frequency Pos Sets the frequency where the zero span is performed.

Context A/B Switches the active screen between A (upper screen) and B (lower screen).

A: The upper screen settings can be changed.

B: The lower screen settings can be changed.

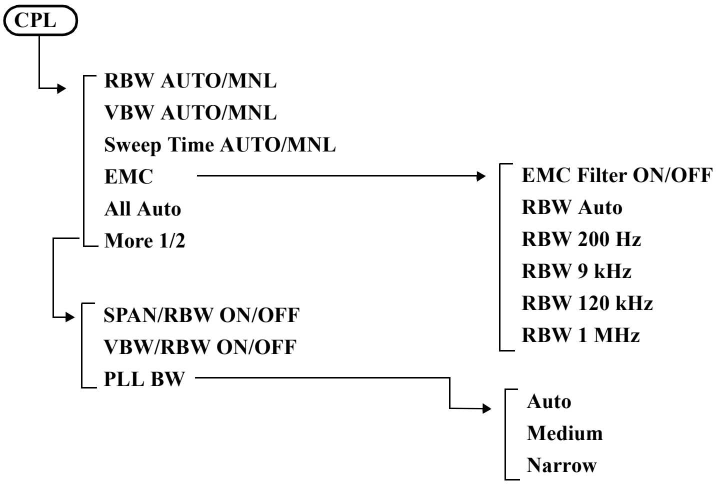
Time vs Time Sets the dual-screen display and displays the horizontal axis in time for both the upper and lower screens.
The display of the horizontal axis in time is retained even if the dual-screen has been canceled by using Reset Context.
Re-set SPAN to display the horizontal axis in frequency.

Reset Context	Cancels the dual-screen display.
Context A/B	Switches the active screen between A (upper screen) and B (lower screen).

A:	The upper screen settings can be changed.
B:	The lower screen settings can be changed.

5.2.17 CPL (Coupled function)

Sets the resolution bandwidth (RBW), video bandwidth (VBW), and sweep time.



RBW AUTO/MNL	Switches the RBW between auto and manual settings.
	AUTO: Automatically sets the optimum RBW according to the frequency span setting.
	MNL: The RBW can be set arbitrarily.
VBW AUTO/MNL	Switches the VBW between auto and manual settings.
	AUTO: Automatically sets the optimum VBW according to the RBW setting.
	MNL: The VBW can be set arbitrarily.
Sweep Time AUTO/MNL	Switches the sweep time between auto and manual settings.
	AUTO: Automatically sets the optimum sweep time according to the frequency span, RBW, and VBW settings.
	MNL: The sweep time can be set arbitrarily.
EMC	Displays the EMC menu. (OPT28)
EMC Filter ON/OFF	ON: Uses the EMC filter.
	OFF: Cancels the EMC filter mode.
RBW Auto	Sets the resolution bandwidth automatically according to the measurement frequency band.
RBW 200 Hz	Sets the resolution bandwidth to 200 Hz.
RBW 9 kHz	Sets the resolution bandwidth to 9 kHz.
RBW 120 kHz	Sets the resolution bandwidth to 120 kHz.
RBW 1 MHz	Sets the resolution bandwidth to 1 MHz.

All Auto	Automatically sets the optimum RBW, VBW, and sweep time according to the frequency span setting.
More 1/2	Displays the Coupling 2/2 menu.
SPAN/RBW ON/OFF	Switches the RBW vs frequency span function between the auto and manual settings. This setting is enabled only when the RBW is set to AUTO. ON: The frequency vs RBW span ratio can be changed. OFF: The frequency/RBW span value is fixed to 100.
VBW/RBW ON/OFF	Switches the VBW vs RBW function between the auto and manual settings. This setting is enabled only when the VBW is set to AUTO. ON: The VBW vs RBW ratio can be changed. OFF: The VBW/RBW value is fixed to 1.
PLL BW	Displays the PLL Band Width menu. (OPT 70) Sets the band-pass filter width in the PLL circuit.
Auto	Sets the filter width automatically so that the optimum phase noise characteristics corresponding to the frequency span can be obtained.
Medium	Sets the filter width to Medium.
Narrow	Sets the filter width to Narrow. The phase noise around 300 kHz to 2 MHz away from the carrier is improved.

CAUTION: ***When PLL Band Width is set to Medium or Narrow, the phase noise may deteriorate depending on the set frequency span.***
In such a case, set to AUTO.

6. OVERVIEW OF REMOTE CONTROL

This chapter describes the overview of the remote control system.

6.1 Remote Control

6.1.1 Types of Systems

The following two types of remote control systems can be configured, depending on the interface:

Interface	Overview
GPIB (Talker/Listener mode)	The external controller controls the U3700 Series and other devices, which are connected with each other through the GPIB, in this system. For more information, refer to "6.2 GPIB Remote Control System" (on page 6-2).
LAN	The external controller controls the U3700 Series and other devices, which are connected with each other through LAN, in this system. For more information, refer to "6.3 LAN Remote Control System" (on page 6-6).

6.1.2 Selecting the Command Set

Either the AT (Advantest) command set or SCPI command set is selected as a command set used for programming in this instrument.

Both command sets cannot be used together.

Press **SYSTEM**, ***Remote Control***, and ***Parser AT/SCPI***.

6.2 GPIB Remote Control System

The GPIB (General Purpose Interface Bus) that is compliant with IEEE standards 488.1-1978 and 488.2-1987 comes standard with this instrument so that remote control can be performed from the external controller.

The following describes how to control this instrument by using the GPIB remote control function.

6.2.1 What is the GPIB?

The GPIB (General Purpose Interface Bus) is a high performance bus that integrates computers and measuring instruments.

The GPIB operations are defined by IEEE standard 488.1-1978. Since the GPIB is a bus structure interface, the specific device can be identified by assigning a unique device address to each device. Up to 15 devices can be connected to a bus in parallel. A GPIB device includes at least one of the following functions:

- Talker

  A device that is specified to send data to the bus is called a "talker". Only one device operates as an active talker on a GPIB bus.

- Listener

  A device that is specified to receive data from the bus is called a "listener". Two or more active listener devices exist on a GPIB bus.

- Controller

  A device that specifies talkers and listeners is called a "controller". On a GPIB bus, only one device operates as an active controller. Of these controllers, a device that can control IFC and REN messages is called the "system controller".

  Only one system controller is permitted on a GPIB bus. If there are two or more controllers on a bus, the system controller becomes the active controller at the time of system startup and the other devices with controller capability act as addressable devices.

  To set another controller as the active controller, use Take Control (TCT) interface messages. At this time, this controller becomes a non-active controller.

  The controller controls the entire system by sending interface or device messages to each measuring instrument. The roles of these messages are shown below.

  - Interface message: Controls the GPIB bus.
  - Device message: Controls the measuring instruments.

6.2.2 Setting up the GPIB

1. GPIB connection

   The standard GPIB connection is shown below. Secure the GPIB connector with two screws.

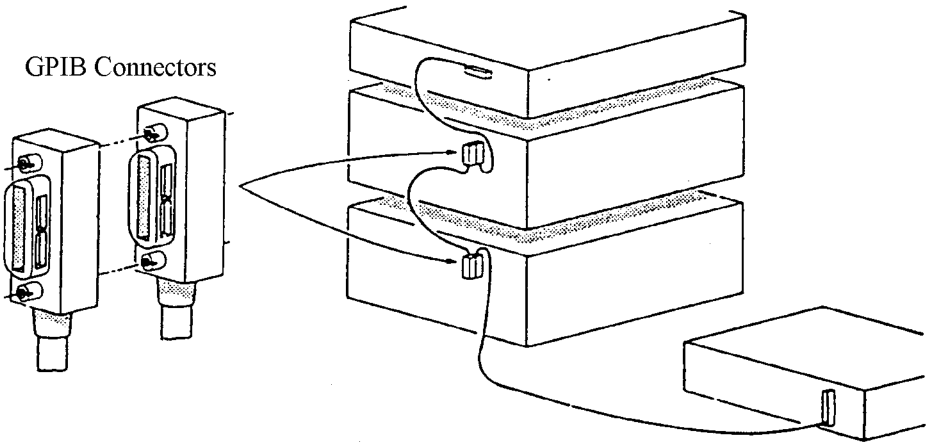


Figure 6-1 GPIB Connection

Note the following when using the GPIB interface:

- Connect the GPIB cable to the GP-IB 1 connector on the rear panel of this instrument.
- The total cable length of the GPIB cable used in one bus system should not be longer than 2 m × {the number of connected devices (the GPIB controller is counted as one device)}.
  The total cable length should be 20 m or less.
- Up to 15 devices can be connected to one bus system.
- There is no restriction in how cables are connected. However, no more than three GPIB connectors should be stacked on one device. If four or more GPIB connectors are stacked, the joints of the connectors may break because excessive force is applied to them.

  For example, a system consisting of five devices can use cables of up to 10 m (2 m/device × 5 devices = 10 m) length. Cable lengths can be allocated freely unless the total cable length exceeds the permitted maximum length. If 10 or more devices are connected, however, some devices should be connected with cables less than 2 m so that the total cable length does not exceed 20 m.

2. GPIB address setting

   GPIB addresses should be set by pressing the **System** key and selecting ***GPIB Address***.

6.2.3 GPIB Bus Functions

6.2.3.1 GPIB Interface Functions

Table 6-1 GPIB Interface Functions

Code	Description
SH1	Source handshake function
AH1	Accepter handshake function
T6	Basic talker function, serial polling function, listener-specified talker cancel function
TE0	No extended talker function
L4	Basic listener function, talker-specified listener cancel function
LE0	No extended listener function
SR1	Service request function
RL1	Remote function, local function, local lockout function
PP0	No parallel polling function
DC1	Device clear function
DT1	Device trigger function
DT0	No device trigger function
C0	No system controller function
E1	Using the open-collector bus driver

6.2.3.2 Responses to Interface Messages

The responses of this instrument to interface messages described in this section are defined in IEEE standards 488.1-1978 and 488.2-1987.

For more information on how to send interface messages to this instrument, refer to the operation manual of the controller used.

1. Interface clear (IFC)

   This message is directly sent to this instrument through a signal line.

   This instrument stops the operation of the GPIB bus by using this message. Though all input/output is stopped, the I/O buffer is not cleared (it is cleared by DCL).

2. Remote enable (REN)

   This message is directly sent to this instrument through a signal line.

   If this instrument is specified as a listener when this message is TRUE, it enters the remote state.

   This instrument remains in this state until it receives a GTL command, REN changes to FALSE, or the LOCAL key is pressed.

   This instrument ignores all received data when it is in the local state.

When it is in the remote state, this instrument ignores all key entry except the LOCAL key.

When it is in the local lockout state (referred to as "Local lockout (LLO)"), this instrument ignores all key entry.

3. Serial poll enable (SPE)

   When receiving this message from a controller, this instrument enters the serial polling mode.

   When this instrument specified as a talker in this mode, it sends status bytes instead of ordinary messages. This mode continues until this instrument receives a serial polling disable (SPD) message or an IFC message.

   When this instrument is sending a service request (SRQ) message to the controller, bit6 (RQS bit) of response data is set to 1 (TRUE). After transmission is completed, RQS bit is set to 0 (FALSE). Service request (SRQ) messages are directly sent through a signal line.

4. Device clear (DCL)

   When receiving DCL, this instrument performs the following operations:

   - Clearing the input and output buffers
   - Resetting the syntax analysis, execution control, and response data generation units
   - Canceling all the commands that impede the remote command to be executed next
   - Canceling any commands that are waiting for other parameters

   The following operations are not executed:

   - Changing data that is set or stored in this instrument
   - Interrupting front panel operations
   - Affecting or interrupting the operations of this instrument in mid-execution
   - Changing status byte excluding MAV (MAV is set to 0 as a result of clearing the output buffer)

5. Selected device clear (SDC)

   Performs the same operation as DCL. However, SDC is executed only when this instrument is a listener.
   In other cases, it is ignored.

6. Go to local (GTL)
   This message sets this instrument to the local state. In the local state, all front panel operations are enabled.

7. Local lockout (LLO)

   This message sets this instrument to the local lockout state. When this instrument enters the remote state from this state, all front panel operations are disabled (In the ordinary remote state, front panel operation can be performed by pressing the LOCAL key).

   In this case, this instrument can be set to the local state by any of the following two methods:

   - Setting the REN message to FALSE (The local lockout state is also canceled)
   - Turning off and turning on the power

6.3 LAN Remote Control System

The LAN (Local Area Network) interface that is compliant with IEEE standard 802.3 is included as standard with this instrument so that this instrument can be controlled remotely through socket communication by the external controller.

The controlling method using the LAN remote control function is described below.

6.3.1 Setting up the LAN

1. LAN connection

   The standard LAN setup is shown below. To allow communication through the LAN between an external controller and this instrument or other devices, connect them with 10BASE-T LAN cable and RJ45 connectors. To directly connect this instrument and an external controller with a LAN cable, use a LAN cable (cross over cable) and connect as shown in Table 6-2. To connect this instrument and other devices (excluding an external controller) with a LAN, use an external device designed to connect devices that has two or more LAN interfaces such as an Ethernet hub. The LAN cable used in this case is connected as shown in Table 6-3.

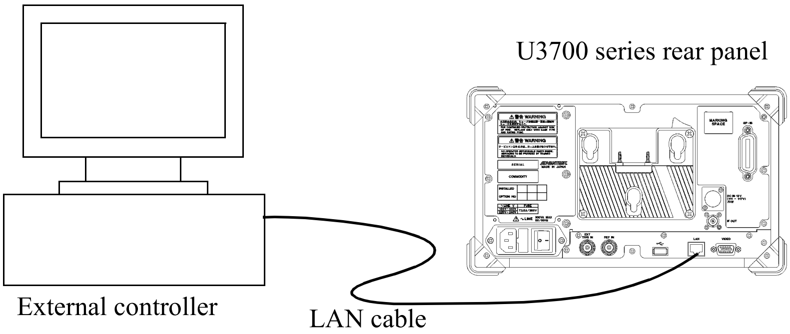


Figure 6-2 LAN Setup

Table 6-2 Connection of 10BASE-T Cross-over Cables

Connector A		Connector B	
Signal name	RJ45 Pin number	RJ45 Pin number	Signal name
RX+	1	3	TX+
RX-	2	6	TX-
TX+	3	1	RX+
TX-	6	2	RX-
Not Used	4	4	Not Used
	5	5	
	6	6	
	7	7	
	8	8	

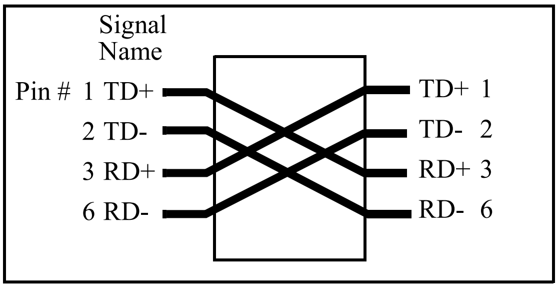


Figure 6-3 Connection of Cross-over Cables

Table 6-3 Connection of 10BASE-T Straight Cables

Signal name	RJ45 Pin number	Line color	Pair number
RX+	1	White/Orange	2
RX-	2	Orange	
TX+	3	White/Green	3
TX-	6	Green	
Not Used	4	Blue	1
	5	White/Blue	
	7	White/Brown	4
	8	Brown	

6.3.2 Setting the IP Address

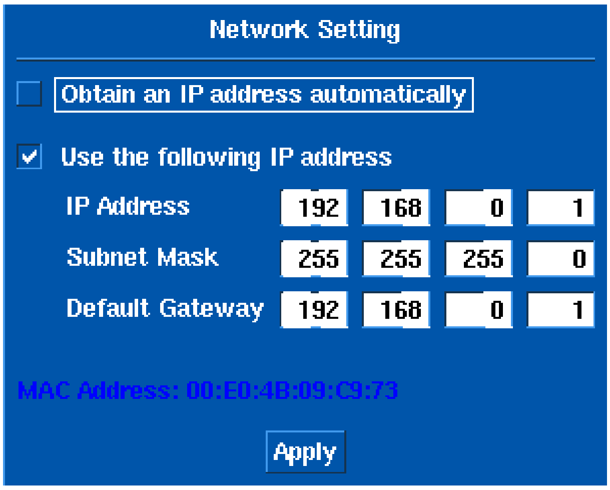
Press **SYSTEM**, ***Remote Control***, and ***LAN IP Address***.

1. Setting the IP Address Manually

   Enter a check mark into the "Use the following IP address" check box.

   IP Address
   Subnet Mask
   Default Gateway

   Set the above items.



Network Setting

☐ Obtain an IP address automatically

☑ Use the following IP address

IP Address 192 168 0 1

Subnet Mask 255 255 255 0

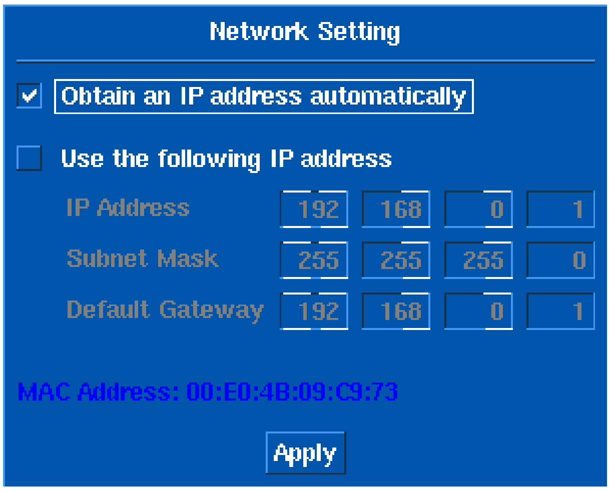
Default Gateway 192 168 0 1

MAC Address: 00:E0:4B:09:C9:73

   Click the ***Apply*** button and press **Hz**.

2. Obtaining the IP Address Automatically

   Enter a check mark into the "Obtain an IP address automatically" check box.



Network Setting

☑ Obtain an IP address automatically

☐ Use the following IP address

IP Address 192 168 0 1

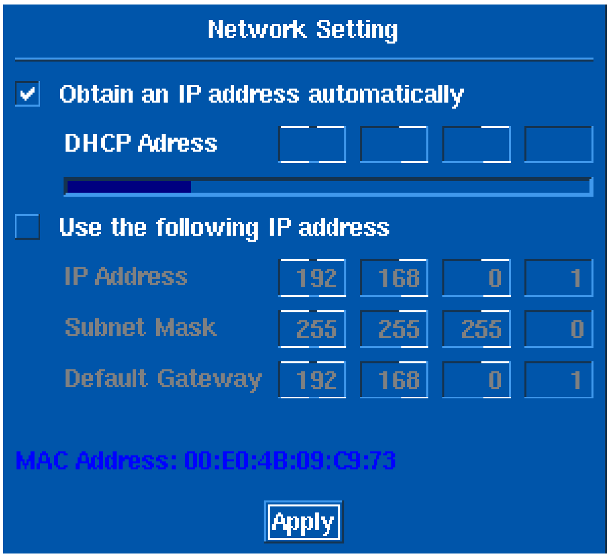
Subnet Mask 255 255 255 0

Default Gateway 192 168 0 1

MAC Address: 00:E0:4B:09:C9:73

   Click the ***Apply*** button and press **Hz**.

After an IP address is obtained, the IP address is displayed in the window.



Network Setting

☑ Obtain an IP address automatically

DHCP Adress

☐ Use the following IP address

IP Address 192 168 0 1

Subnet Mask 255 255 255 0

Default Gateway 192 168 0 1

MAC Address: 00:E0:4B:09:C9:73

6.3.3 Control from a Controller

To control this instrument from an external controller, a port number for socket communication is required. The port number “5025” is assigned for socket communication in the remote state in this instrument. To write a program for socket communication, a library for network connection with the TCP/IP protocol is required. The library differs depending on the environment, such as the OS of the external controller. In the Windows OS environment, for example, WinSock is provided.

After completing the network connection with this instrument, send the "REN" command to this instrument to enable the remote control.
(At this time, the remote lamp on the front panel of this instrument is on.)
After that, this instrument can be remotely controlled by sending the same commands as the GPIB.

Some of the functions available in the GPIB remote control system are specific to the GPIB bus, such as service requests, and cannot be used in the LAN remote control system.

6.4 Message Exchanging Protocol

This instrument receives program messages from the controller or other devices through the GPIB bus or LAN and generates a response. Program messages include commands, queries (which are commands that ask for a response) and data.

6.4.1 Buffers

This instrument has two buffers.

1. Input buffer

   This buffer temporarily stores data to analyze commands.

   (1024-byte length)

   The input buffer can be cleared by the following two methods:

   - Turning the power on
   - Executing a DCL or SDC

2. Output buffer

   This buffer stores data until the data is read by the controller.

   (1024-byte length)

   The output buffer can be cleared by the following two methods:

   - Turning the power on
   - Executing a DCL or SDC

6.4.2 Message Exchange

When other controllers or devices receive messages from this instrument, the following items must be observed:

- Generating a response in reply to a query (Refer to "Parser").
- Generating responses in the order queries are executed (Refer to "Generating response data").

Parser

- The parser receives command messages from the input buffer in the order queries are received, executes syntax analysis, and determines what operations are to be executed by the commands received.

Generating response data

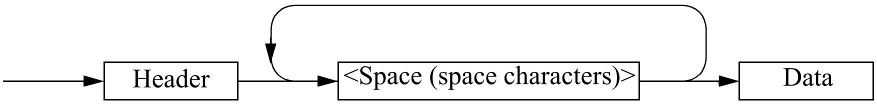
- When the parser executes a query, this instrument generates data on the output buffer as its response (that is, a query must be sent immediately before outputting data).

6.5 Command Syntax

This chapter describes the command syntax.

6.5.1 Command Syntax

The command syntax is defined in the following format:



1. Header

   Two types of header are available: the common command header and the simple header. The common command header starts with an asterisk (*).The simple header is a functionally independent command that has no hierarchical structure.
   If a question mark (?) is attached immediately after a header, it becomes a query command.

2. Spaces

   Spaces may be used to separate headers from data to ease readability.

3. Data

   When the command requires more than one data item, list these data items by delimiting them with commas (,). A space may be inserted before or after the comma (,). For more information on data types, refer to Section 6.5.2 "Data Formats."

4. Writing more than one command

   You can write multiple commands by delimiting them with semicolons (;) in one line.

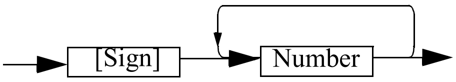
6.5.2 Data Formats

This instrument uses the following data formats for the input and output data.

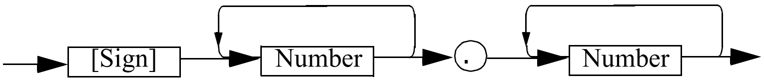
1. Numeric data

   There are three formats for numeric data as shown below.
   When entering numeric values for this instrument, any format may be used.
   Depending on the command, a unit may be attached to the entered numeric value.

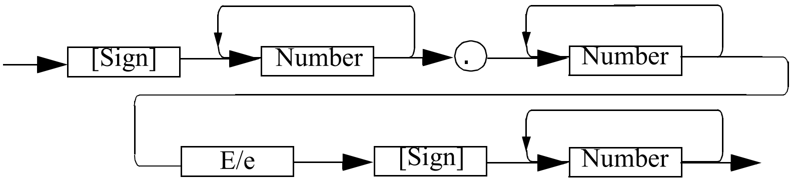
   - Integer type: NR1 format



   - Fixed-point type: NR2 format



   - Floating-point type: NR3 format



2. Unit

   Available units are listed below:

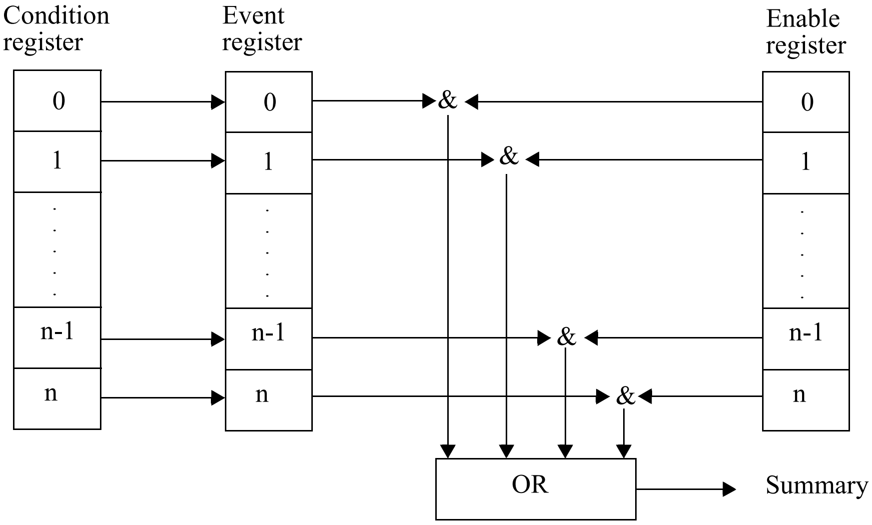
Unit	Exponential	Description
GZ	10^9	Frequency
MZ	10^6	Frequency
KZ	10^3	Frequency
HZ	10^0	Frequency
VOLT	10^0	Voltage
MV	10^{-3}	Voltage
UV	10^{-6}	Voltage
NV	10^{-9}	Voltage
MW	10^{-3}	Power
DB	10^0	dB description
MA	10^{-3}	Current
SC	10^0	Second
MS	10^{-3}	Second
US	10^{-6}	Second
PER	10^0	Percentage
%	10^0	Percentage

6.5.3 Status Byte

This instrument has a layered status register structure that is compliant with IEEE standard 488.2-1987, and can send various statuses of this instrument to the controller. This section describes the behavioral model of status bytes and allocation of events.

1. Status Register

   This instrument adopts the model of the status registers defined in IEEE standard 488.2-1987. The status registers consist of the condition register, event register, and enable register.



a. Condition Register

   The condition register is always monitoring the status of this instrument. That is, this register always retains the latest status of this instrument. However, data cannot be both written into and read from the condition register because the condition register retains data as internal information.

b. Event Register

   The event register latches and retains statuses from the condition register (or retains changes).

   Once this register is set, the setting value is kept until it is read by a query or cleared by *CLS. Data cannot be written into the event register.

c. Enable Register

   The enable register specifies which bit in the event register is set as an effective status to generate a summary. The enable register is ANDed with the event register and the OR of the result is generated as a summary. The summary is written into the status byte register.
   Data can be written into the enable register.

   This instrument uses the following three types of status registers:

   - Status byte register
   - Standard event register
   - Standard operation status register

   The arrangement of the status register in this instrument is shown in Figure 6-4.

   The details of the status register are shown in Figure 6-5.

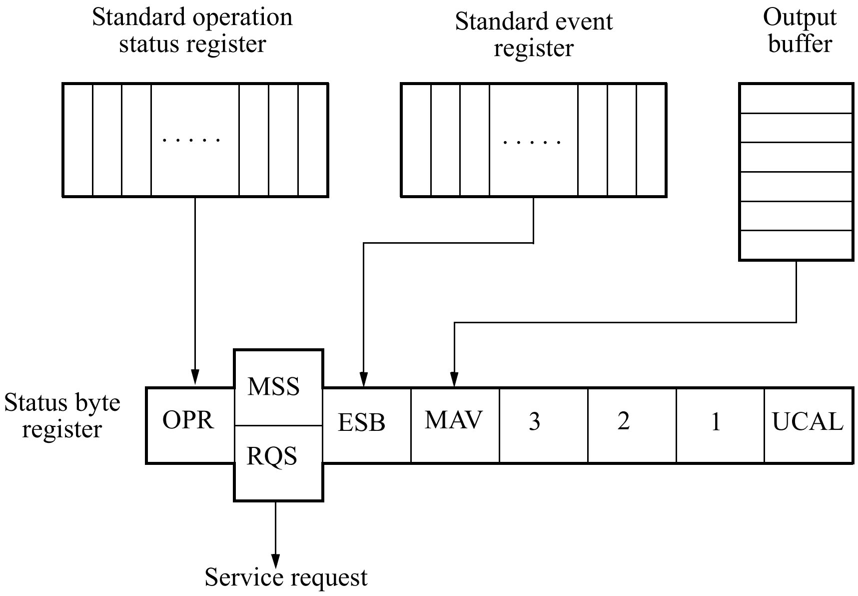


Figure 6-4 Status Register Arrangement

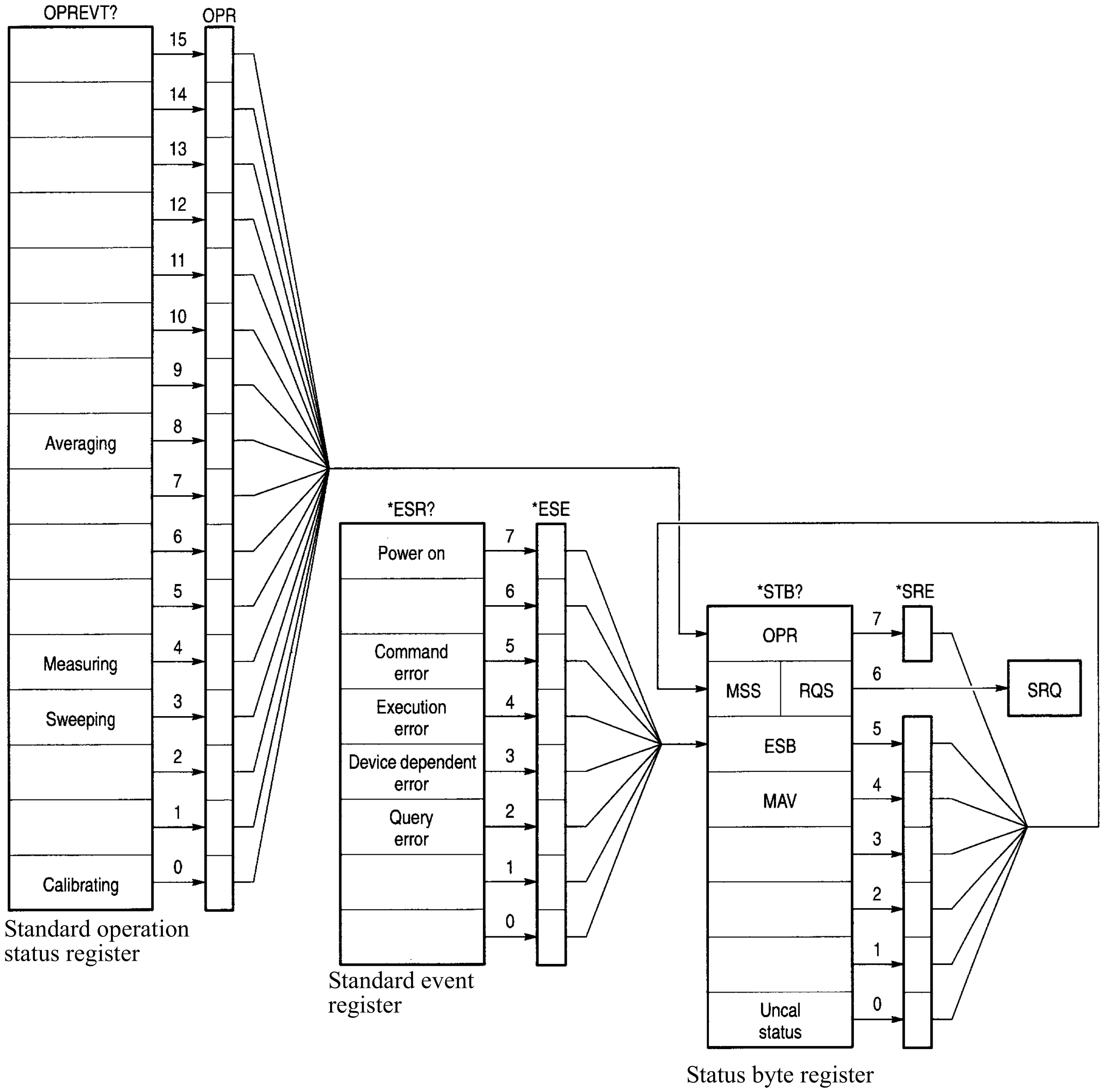


Figure 6-5 Details of Status Register

2. Event Enable Register

   Each event register has an enable register to determine which bit is available. The enable register sets the corresponding bit in decimal value.

   - Service request enable register setting: *SRE
   - Standard event status enable register setting: *ESE
   - Operation status enable register setting: OPR

3. Standard Operation Status Register

   Assignment in the standard operation status register is listed below:

Bit	Functional definition	Description
15 to 9		Always 0
8	Averaging	Set to 1 when averaging is complete.
7 to 5		Always 0
4	Measuring	Set to 1 when sequence measuring is complete.
3	Sweeping	Set to 1 when sweeping is complete
2 to 1		Always 0
0	Calibrating	Set to 1 when correction data acquisition is completed.

4. Status Byte Register

   The status byte register summarizes the information from the status register. A summary of this status byte register is sent to the controller as a service request. Therefore, the status byte register operates slightly differently than the status register structure. This section describes the status byte register.

   The structure of the status byte register is shown in Figure 6-6.

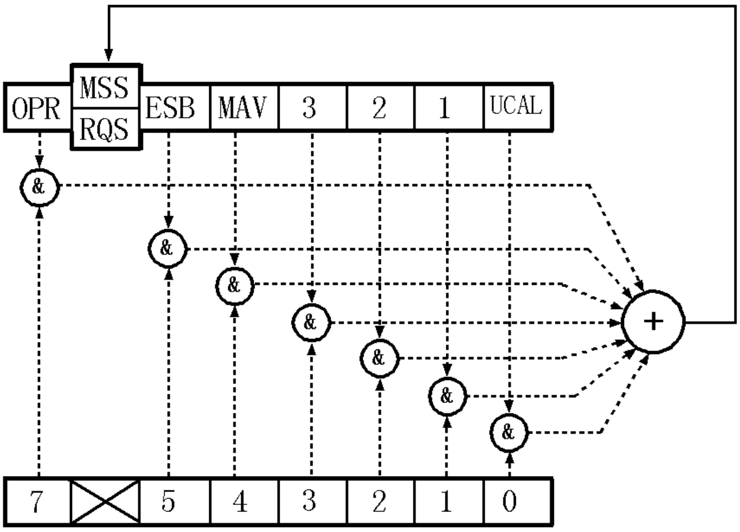


Figure 6-6 Structure of the Status Byte Register

This status byte register follows the status register except for the following three points:

- The summary of the status byte register is written to bit6 of the status byte register.
- Bit6 of the enable register is always valid and cannot be changed.
- Bit6 (MSS) of the status byte register writes the RQS of the service request.

This register responds to the serial polling from the controller. When the register responds to the serial polling, bit0 to bit5, bit7, and the RQS of the status byte register are read, and then the RQS is reset to 0. No other bits are cleared until each factor is set to 0.
The status byte register, RQS, and MSS can be cleared by executing "CLS" and "S2". Consequently, the SRQ line is set to FALSE.

The meaning of each bit in the status byte register is shown below:

Bit	Functional definition	Description
7	OPR	A summary of the standard operation status register.
6	MSS	The summary bit of the entire status data structure. RQS is set to TRUE when MSS is set to 1 in the status byte register. MSS cannot be read during serial polling but it is 1 when RQS is 1. To read the MSS, use the common command *STB?. MSS, bit0 to bit5, and bit7 of the status byte register are read by *STB?. In this case, the status byte register and MSS are not cleared. MSS is not set to 0 until all the unmasked factors in the status register structure are cleared.
5	ESB	A summary of the standard event register.
4	MAV	The summary bit of the output buffer. Not uses in this instrument.
3 to 1		Always 0
0	UCAL	Set to 1 if a signal level error occurs because the sweep is too fast.

5. Standard Event Register
   Assignments in the standard event register are listed below:

Bit	Functional definition	Description
7	Power on	Set to 1 when the power is turned on.
6		Always 0
5	Command Error	Set to 1 if the parser detects a syntax error.
4	Execution Error	Set to 1 if an instruction that was received as a GPIB command fails to execute for some reason (e.g., the parameter is out of range).
3	Device Dependent Error	Set to 1 if any errors except for Command Error, Execution Error, and Query Error occur.
2	Query Error	Set to 1 if no data exists or if data is lost when the controller tries to read data from this instrument.
1	Request Control	Not uses in this instrument.
0	Operation Complete	Not uses in this instrument.

6.6 GPIB Remote Programming

This section shows the AT commands in each function:

- Command code

  An asterisk "*" indicates a function that numeric or character strings data follows after the code.
  Numeric data and "ON" can be omitted from [ ].

- Output format
  - A comma "," indicates that two or more data are output.
  - ON or OFF indicates that 1 or 0 is output.
  - Frequency is output in Hz and time is output in sec.
  - Level data is output in the currently set display unit.

6.7 AT Command Index

6.8 AT Command List

6.8.1 Frequency

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Center Frequency	CF*	Frequency	CF?	Frequency
CF Step Size	CS*	Frequency	CS?	Frequency
CF Step Auto	CA [*]	[ON]|OFF	CA?	0 = OFF (manual) 1 = ON (auto)
Frequency Offset	FO [ON,]* FO ON|OFF	Frequency	FO? FOON?	Frequency 0 = OFF 1 = ON
Start Frequency	FA*	Frequency	FA?	Frequency
Stop Frequency	FB*	Frequency	FB?	Frequency
Frequency Span	SP*	Frequency	SP?	Frequency
Full Span	FS	---	---	---
Zero Span	ZS	---	---	---
Last Span	LTSP|LS	---	---	---
Frequency Setting Mode	FINPMD*	CALC|TBL	FINPMD?	0 = CALC 1 = TBL
Set Start Channel Offset	FACHO*	Frequency	FACHO?	Frequency
Set Stop Channel Offset	FBCHO*	Frequency	FBCHO?	Frequency
Start Channel Offset	FACHOON*	ON|OFF	FACHOON?	0 = OFF 1 = ON
Stop Channel Offset	FBCHOON*	ON|OFF	FBCHOON?	0 = OFF 1 = ON
Set Center Channel Setting	CFCH*	Integer	CFCH?	Integer (Channel Number)
Set Start Channel Setting	FACH*	Integer	FACH?	Integer (Channel Number)
Set Stop Channel Setting	FBCH*	Integer	FBCH?	Integer (Channel Number)
Center Channel Setting	CFCHON*	ON|OFF	CFCHON?	0 = OFF 1 = ON
Start Channel Setting	FACHON*	ON|OFF	FACHON?	0 = OFF 1 = ON

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Stop Channel Setting	FBCHON*	ON|OFF	FBCHON?	0 = OFF 1 = ON
Channel Type 1 Input3 Formulas :	CHCALC1 *,*,*,*,* CHCALC2 *,*,*,*,* CHCALC3 *,*,*,*,*	Integer, Integer, Frequency, Frequency, Integer	---	---
Formula 1 for Type 1	CHCON1*	ON|OFF	CHCON1?	0 = OFF 1 = ON
Formula 2 for Type 1	CHCON2*	ON|OFF	CHCON2?	0 = OFF 1 = ON
Formula 3 for Type 1	CHCON3*	ON|OFF	CHCON3?	0 = OFF 1 = ON
Channel Type 2 Input	CHTIN*,*	Integer, Frequency	---	---
Channel Type 2 Deletion	CHTDEL	---	---	---
Signal Ident	SIGID*	ON|OFF	SIGID?	0 = OFF 1 = ON
Image Suppress	IMGSP*	ON|OFF	IMGSP?	0 = OFF 1 = ON
Auto Tune	TN	---	---	---
Peak Zoom	PKZOOM	---	---	---

6.8.2 Level

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Reference Level	RL*	Level	RL?	Level
Attenuation	AT*	DB (Integer)	AT?	DB (Integer)
Min Attenuation	ATMIN*	DB (Integer)	ATMIN?	DB (Integer)
Zero Attenuation	ZAT	---	---	---
Attenuation Auto	AA[*]	[ON]|OFF	AA?	0 = OFF (manual) 1 = ON (auto)
XdB/Div	DD*	DB (Discr. Val.: 10, 5, 2, 1, 0.5 dB)	DD?	0 = 10 dB 1 = 5 dB 2 = 2 dB 3 = 1 dB 4 = 0.5 dB -1 = others
			DDB?	DB
Linear × 1	LL1	---	---	---
Vertical Scale	VS*	LIN|LOG	VS?	0 = LOG 1 = LIN
Level Offset	RO* RO ON|OFF	DB	RO?	DB
			ROON?	0 = OFF 1 = ON
Hi Sens	HS[*]	[ON]|OFF	HS?	0 = OFF 1 = ON
Input	OHM*	Integer (Discr. Val.: 50, 75)	OHM?	Integer
Display Unit (Level Unit)	AUNITS*	DBM|DBMV|DBUV|DBEMF|DBPW|W[ATT]|V[OLT]	AUNITS?	0 = DBM 1 = DBMV 2 = DBUV 3 = DBEMF 4 = DBPW 5 = WATT 6 = VOLT
Correction Factor ON OFF	CR ON CR OFF	--- ---	CRON?	0 = OFF 1 = ON
Table Input	CRIN*,*	Frequency, Level (DB)	---	---
Table Delete	CRDEL	---	---	---

6.8.3 Bandwidth

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
RBW	RB*	Frequency	RB?	Frequency
RBW Auto	BA[*]	[ON]|OFF	BA?	0 = OFF 1 = ON
VBW	VB*	Frequency	VB?	Frequency
VBW Auto	VA[*]	[ON]|OFF	VA?	0 = OFF (manual) 1 = ON (auto)
Couple All Auto	AL[*]	[ON]|OFF	AL?	0 = OFF 1 = ON (all auto)
RBW : Span	CORS* CORS ON[*] CORS OFF	Ratio (float)	CORS?	Ratio (float)
			CORSON?	0 = OFF 1 = ON
VBW : RBW	COVR* COVR ON[*] COVR OFF	Ratio (float)	COVR?	Ratio (float)
			COVRON?	0 = OFF 1 = ON
PLL Band Width	PLLBW*	AUTO|MID|NARW	PLLBW*	0 = Auto 1 = Narrow 2 = Medium

6.8.4 Sweep

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Sweep Time	SW|ST*	Time	SW?|ST?	Time
Sweep Auto	AS[*]	[ON]|OFF	AS?	0 = OFF (manual) 1 = ON (auto)
Sweep Mode	---	---	SWM?	0 = Single 1 = Normal
Sweep Mode Normal	SN|CONTS	---	---	---
Sweep Mode Single	SI|SNGLS	---	---	---
Take Sweep	TS	---	---	---
Sweep Start / Stop	SR	---	---	---
Gated Sweep Mode	GTSWP*	ON|OFF	GTSWP?	0 = OFF 1 = ON
Gate Source	GTSRC*	EXT|IF	GTSRC?	2 = EXT 3 = IF
Gate Slope	GTSLP*	(FALL|NEG|-)| (RISE|POS|+)	GTSLP?	0= RISE|POS|+ 1= FALL|NEG|-
Gate Delay	GTPOS	Time	GTPOS?	Time
Gate Width	GTWID*	Time	GTWID?	Time

6.8.5 Trigger

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Trigger Mode	TRGSRC*	FREE|IF|EXT|VIDEO	TRGSRC?	0 = FREE 1 = TRG_VIDEO 2 = TRG_EXT 3 = TRG_IF
Video or IF Trigger Level	TRGLVL*	Level	TRGLVL?	Level
External Trigger Level	TRGTTLLVL*	Voltage	TRGTTLLVL?	Voltage
Trigger Slope	TRGSLP*	(FALL|NEG|-)| (RISE|POS|+)	TRGSLP?	0 = RISE|POS| +1 = FALL|NEG|-
Trigger Delay	TRGDLY*	Time	TRGDLY?	Time

6.8.6 Trace

NOTE: ***Three Traces are available A, B and C. In the Command List below, just replace <n> by the letter for the selected trace ie***
<n> = A | B | C

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Trace Mode	---	---	T<n>?	0 = WRITE 1 = VIEW 2 = BLANK
Write	<n>W	---	---	---
View	<n>V	---	---	---
Blank	<n>B	---	---	---
Calc Mode Trace A	CALCA*	WRITE|MIN|MAX|AVG|PAVG|MAXCONT	CALCA?	0 = WRITE 1 = MIN HOLD 2 = MAX HOLD 3 = AVERAGE 4 = POWER AVG 5 = MAX HOLD CONT
Calc Mode Trace B	CALCB*	WRITE|MIN|MAX|AVG|PAVG|MAXCONT	CALCB?	0 = WRITE 1 = MIN HOLD 2 = MAX HOLD 3 = AVERAGE 4 = POWER AVG 5 = MAX HOLD CONT
Calc Mode Trace C	CALCC*	WRITE|MIN|MAX|AVG|PAVG|MAXCONT	CALCC?	0 = WRITE 1 = MIN HOLD 2 = MAX HOLD 3 = AVERAGE 4 = POWER AVG 5 = MAX HOLD CONT
Calc Mode : Max Hold	<n>MAX*	ON|OFF	<n>MAX?	0 = OFF 1 = ON
Calc Mode : Min Hold	<n>MIN*	ON|OFF	<n>MIN?	0 = OFF 1 = ON
Averaging and Power Averaging Times	<n>G*	Integer	<n>G?	Integer

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Averaging and Power Averaging Times Active Trace	SWPCNT*	Integer	SWPCNT?	Integer
Average Start	<n>AVG*|<n>GR	ON	<n>AVG?	0 = OFF 1 = ON
Average Stop	<n>AVG*|<n>GS	OFF		
Average : Pause	<n>GP	---	<n>GP?	0 = Continue 1 = Pause
Average : Continue	<n>GC	---		
Average : 1 Time	<n>GSGL	---	<n>GSGL?	0 = sliding 1 = once
Average : Continuous	<n>GCNT	---		
Power Average Start	<n>PAVG*	ON	<n>PAVG?	0 = OFF 1 = ON
Power Average Stop	<n>PAVG*	OFF		
Power Average : Pause	<n>PGP	---	<n>PGP?	0 = Continue 1 = Pause
Power Average : Continue	<n>PGC	---		
Power Average : 1 Time	<n>PGSGL	---	<n>PGSGL?	0 = sliding 1 = once
Power Average : Continuous	<n>PGCNT	---		
Math : A-B→A	ABA	---	---	---
Math : B-A→A	BAA	---	---	---
Math : A-DL→A	ADLA	---	---	---
Math : B-A→B	BAB	---	---	---
Math : A-B→B	ABB	---	---	---
Math : B-DL→B	BDLB	---	---	---
Math : A-B→C	ABC	---	---	---
Math : B-A→C	BAC	---	---	---
Math : Trace Subtraction	TRSUB*	OFF|ABA|BAA|ADLA|BAB|ABB|BDLB|ABC|BAC	TRSUB?	0 = OFF 1 = ABA 2 = BAA 3 = ADLA 4 = BAB 5 = ABB 6 = BDLB 7 = ABC 8 = BAC
Math : Trace Store (Current trace → trace n)	STORE*	TRA|TRB|TRC	---	---
Number of Trace Points	TPS|TP*	501	TP?	0 = 501 1 = 1001
	TPL|TP*	1001		

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Detector Mode Trace A	DET*	NRM|POS|NEG|SMP|AVG	DET?	0 = NRM 1 = POS 2 = NEG 3 = SMP 4 = AVG
Detector Mode Trace B	DETB*	NRM|POS|NEG|SMP|AVG	DETB?	0 = NRM 1 = POS 2 = NEG 3 = SMP 4 = AVG
Detector Mode Trace C	DETC*	NRM|POS|NEG|SMP|AVG	DETC?	0 = NRM 1 = POS 2 = NEG 3 = SMP 4 = AVG
Detector Mode Auto	DETA<n>*	ON|OFF	DETA<n>?	0 = OFF 1 = ON
Detector Average Mode	DETAVG*	RMS|VIDEO	DETAVG?	0 = VIDEO 1 = RMS
Select Active Trace	TRACESEL*	TRA|TRB|TRC	TRACESEL?	0 = TRA 1 = TRB 2 = TRC
Trace A I/O ASCII	TAA	DDDDD<DLM>× TRP (*1)	TAA?	DDDDD<DLM>× TRP (*1)
Trace A I/O Binary	TBA	2Bytes*TRP	TBA?	2Bytes×TRP
Trace B I/O ASCII	TAB	DDDDD<DLM>× TRP (*1)	TAB?	DDDDD<DLM>× TRP (*1)
Trace B I/O Binary	TBB	2Bytes×TRP	TBB?	2Bytes×TRP
Trace C I/O ASCII	TAC	DDDDD<DLM>× TRP (*1)	TAC?	DDDDD<DLM>× TRP (*1)
Trace C I/O Binary	TBC	2Bytes×TRP	TBC?	2Bytes×TRP
Trace Output Fornat				
16bits Integer	FORM1	---	---	
16bits Integer	FORM2	---	---	
IEEE 32bits Float	FORM3	---	---	
IEEE 32bits Float	FORM4	---	---	

6.8.7 Pass/Fail

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Pass/Fail Judgement	PFC*	ON|OFF	PFC?	0 = OFF 1 = ON
Judgement Result	---	---	PFJ?|OPF?	0 = Pass 4 = Error 1 = Fail Limit 1 2 = Fail Limit 2 3 = Fail Limit 1&2
X Position Mode	LIMPOS*	ABS|LFT|CENT	LIMPOS?	0 = ABS 1 = CENT (center freq) 2 = LFT (start freq)
Y Position Mode	LIMAPOS*	ABS|REF|DL	LIMAPOS?	0 = ABS 1 = REF 2 = DL
X Offset Activate	LIMS*	ON|OFF	LIMS?	0 = OFF 1 = ON
X Offset Frequency Domain	LIMSF*	Frequency	LIMSF?	Frequency
X Offset Time Domain	LIMST*	Time	LIMST?	Time
Y Offset Activate	LIMAS*	ON|OFF	LIMAS?	0 = OFF 1 = ON
Y Offset	LIMASFT*	DB	LIMASFT?	DB
Limit Line 1	LMTA*	ON|OFF	LMTA?	0 = OFF 1 = ON
Limit Line 1 Frequency Domain Data Input	LMTAINF*,*	Frequency, Level	---	---
Limit Line 1 Time Domain Data Input	LMTAINT*,*	Time, Level	---	---
Limit Line 1 Frequency Domain Data Erase	LMTADELF	---	---	---
Limit Line 1 Time Domain Data Erase	LMTADELT	---	---	---
Limit Line 2	LMTB*	ON|OFF	LMTB?	0 = OFF 1 = ON
Limit Line 2 Frequency Domain Data Input	LMTBINF*,*	Frequency, Level	---	---

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Limit Line 2 Time Domain Data Input	LMTBINT*,*	Time, Level	---	---
Limit Line 2 Frequency Domain Data Erase	LMTBDELF	---	---	---
Limit Line 2 Time Domain Data Erase	LMTBDELT	---	---	---
Limit Line 1 Pass Range	LARNG*	ABOVE|BELOW	LARNG?	0 = ABOVE 1 = BELOW
Limit Line 2 Pass Range	LBRNG*	ABOVE|BELOW	LBRNG?	0 = ABOVE 1 = BELOW

6.8.8 Display

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Display Line Level	DLN DLN ON[,*] DLN OFF	Level	DLN?	Level
			DLNON?	0 = OFF 1 = ON
Reference Line Level	RLN* RLN ON[,*] RLN OFF	Level	RLN?	Level
			RLNON?	0 = OFF 1 = ON
Window Center Position	WLX*	Frequency|Time	WLX?	Frequency|Time
Window Width	WDX*	Frequency|Time	WDX?	Frequency|Time
Window Sweep	WDOSWP*	ON|OFF	WDOSWP?	0 = OFF 1 = ON
Zoom	MLTSCR*	ZM|FT|TT|OFF	MLTSCR?	0 = OFF 1 = ZM 2 = FT 3 = TT 4 = DUAL VIEWER
Zoom Position	ZMPOS*	Frequency|Time	ZMPOS?	Frequency|Time
Zoom Width	ZMWID*	Frequency|Time	ZMWID?	Frequency|Time
Frequency Pos	FTPOS*	Frequency	FTPOS?	Frequency
Select Active Context	CTXTSEL*	Integer (0|1)	SCRSEL?	0 = CTXT A 1 = CTXT B

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
2 Channels Viewer	DUALCH[*]	[ON]|OFF	DUALCH?	0 = OFF 1 = ON
2 Channel Preset	DUALCHINIT	---	---	---

6.8.9 Marker

<n> = 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

NOTE: Marker 0 is the reference marker.

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
All Markers Off	MO|MKOFF	---	---	---
All Markers Off Except Active Marker	MLTOFF	---	---	---
Select Active Marker	MKRSEL*	<n>	MKRSEL?	<n>
Active Marker ON / OFF	MLN*	ON|OFF	MLN?	0 = OFF 1 = ON
Marker ON / OFF	MLN<n>*	[ON]|OFF	MLN<n>?	0 = OFF 1 = ON
Active Marker Frequency	MK*	Frequency|Time	MK? MF?	Frequency|Time
Marker Frequency	MF<n>*	Frequency|Time	MF<n>?	Frequency|Time
Active Marker Level	---	---	ML?	Level
Marker Level	---	---	ML<n>?	Level
Active Marker Freq + Lev	---	---	MFL?	Frequency|Time, Level
Marker Freq + Lev	---	---	MFL<n>?	Frequency|Time, Level
Active Marker Num + Stauts + Freq + Lev	---	---	MFLC?	Marker Number, Status (1=ON|0=OFF), Frequency|Time, Level

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
MarkerNum + Stauts + Freq + Lev	---	---	MFLC<n>?	Marker Number, Status (1=ON|0=OFF), Frequency|Time, Level
Reference Marker Frequency Absolute Value	---	---	MDF2? MFR?	Frequency|Time
Reference Marker Level Absolute Value	---	---	MDL2? MLR?	Level
Delta Mode	MKD*	[ON]|OFF	---	---
Reference Object	MKROBJ*	MARK|RLIN	MKROBJ?	0 = MARK 1 = RLIN
Fixed ΔMarker	FX*	ON|OFF	FX?	0 = OFF 1 = ON
Inverse ΔMarker	REDLT*	ON|OFF	REDLT?	0 = OFF 1 = ON
Delta Mode Reference	MKROJB*	MARK|RLIN|DLIN|LLINU|LLINL	MKROBJ?	MARK|RLIN|DLIN|LLINU|LLINL
Marker Step Size	MPM*	Frequency|Time	MPM?	Frequency|Time
Marker Step Auto	MPA[*]	[ON]|OFF	MPA?	0 = OFF 1 = ON
Signal Track	SG[*]	[ON]|OFF	SG?	0 = OFF 1 = ON
Signal Track Y Range	SGY[ON,]* SGY ON SGY OFF	Level	SGY?	Level
			SGYON?	0 = OFF 1 = ON
Active Marker Trace	MKTRACE*	TRA|TRB|TRC	MKTRACE?	0 = TRA 1 = TRB 2 = TRC
Marker Mode	MKMODE*	INDEX|VAL	MKMODE?	0 = INDEX 1 = VAL
Display Marker List	MKLST	ON|OFF	MKLST?	0 = OFF 1 = ON
Get Marker List	---	---	MLSFL?	Num Marker, Active (1=ON|0=OFF), Frequency|Time, Level (, …)

6.8.10 Peak and Marker Move

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
MKR → CF	MC|MKCF	---	---	---
MKRΔ → CF	MTCF	---	---	---
MKR → REF	MR|MKRL	---	---	---
PEAK → CF	PKCF	---	---	---
PEAK → REF	PKRL	---	---	---
MKRΔ → SPAN	DS|MTSP	---	---	---
MKR → CF Step	M0|MKCS	---	---	---
MKRΔ → CF Step	M1|MTCS	---	---	---
MKR → MKR Step	M2|MKMKS	---	---	---
MKRΔ → MKR Step	M3|MTMKS	---	---	---

6.8.11 Peak

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Peak Search	PS	---	---	---
Next Peak	NXP	---	---	---
Next Peak Left	NXL	---	---	---
Next Peak Right	NXR	---	---	---
Min Search	MIS	---	---	---
Next Min Peak	NXM	---	---	---
Min Max Peak	MMS	---	---	---
Continuous Peak	CP*	ON|OFF	CP?	0 = OFF 1 = ON
Peak ΔY Div	DY*	Level Div	DY?	Level Div
Peak List Frequency Level	PLS FREQ PLS LEVEL	---	---	---
X Peak Area Couple to Window	MKSX	OFF|IN|OUT	MKSX?	0 = OFF 1 = IN 2 = OUT
X Peak Area Position	MKSPOS*	Frequency|Time	MKSPOS?	Frequency|Time
X Peak Area Width	MKSWID*	Frequency|Time	MKSWID?	Frequency|Time
Y Peak Area Couple to Display Line	MKSYDL	OFF |ABOVE |BELOW	MKSYDL?	2 = OFF 0 = ABOVE 1 = BELOW
Y Peak Area Couple to Limit Line 1	MKSYLA	OFF |ABOVE |BELOW	MKSYLA?	2 = OFF 0 = ABOVE 1 = BELOW
Y Peak Area Couple to Limit Line 2	MKSYLB	OFF |ABOVE |BELOW	MKSYLB?	2 = OFF 0 = ABOVE 1 = BELOW

6.8.12 Measurement

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Noise	NI*	Frequency	NI?	Frequency
Noise ON + dBm/Hz	NIM	---	---	---
Noise ON + dBμV/√Hz	NIU	---	---	---
Noise ON + dBc/Hz	NIC	---	---	---
Noise OFF	NIF	---	---	---
Noise Mode Query	---	---	NION?	0 = OFF 1 = dBm/Hz 2 = dBμV/√Hz 3 = dBc/Hz
Noise Value	---	---	NIRES?	Level
X dB Down Level	MKBW*	DB	MKBW?	DB
X dB Down	XDB	---	---	---
X dB Down Left	XDL	---	---	---
X dB Down Right	XDR	---	---	---
X dB Relative X dB Absolute Left X dB Absolute Right	DC0 DC1 DC2	--- --- ---	DC?	0 = Relative 1 = Absolute Left 2 = Absolute Right
Continuous dB Down	CDB[*]	[ON]|OFF	CDB?	0 = OFF 1 = ON
Peak + X dB Down	PSXDB	---	---	---
IM Measurement Mode	IMM[*]	[ON]|OFF	IMM?	0 = OFF 1 = ON
IM Reference Frequency	---	---	IMMREF?	Frequency, Level
IM Delta Frequency	---	---	IMMDF?	Delta Frequency
IM Distortion Signal Data Readout	---	---	IMMRES?	n<DLM>LL1, LJ1, UL1, UJ1<DLM>… (*1)
IM Order Setting	IMODR*	Integer (3|5|7|9)	IMODR?	Integer (3|5|7|9)
IM Criteria Input 3rd Order	IMLS3*	DB	IMLS3?	DB
IM Criteria Input 5th Order	IMLS5*	DB	IMLS5?	DB

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
IM Criteria Input 7th Order	IMLS7*	DB	IMLS7?	DB
IM Criteria Input 9th Order	IMLS9*	DB	IMLS9?	DB
IM Pass/Fail Judgement	IMPFC*	ON|OFF	IMPFC?	0 = OFF 1 = ON
IM Save Setup	IMSAVE	---	---	---
IM Restore Setup	IMLOAD	---	---	---
Harmonics Measurement	HARM[*]	[ON]|OFF	HARMON?	0 = OFF 1 = ON
Harmonics Results	---	---	HARM?	n<DLM>Freq1, Level1, DeltaLevel1 <DLM>…(*2)
Harmonics Max Order	HARMNUM*	Integer	HARMNUM?	Integer
Harmonics Fundamental	HRMFND [ON,] * HRMFND ON HRMFND OFF	Frequency	HRMFND?	Frequency
			HRMFND ON?	0 = OFF 1 = ON

(*1)

n:	Result set number corresponding to the order
LLn:	Level difference in the lower frequency signal
LJn:	Pass/Fail judgment in the lower frequency signal
0:	Pass
1:	Fail
-1:	Judgment off
ULn:	Level difference in the upper frequency signal
UJn:	Pass/Fail judgment in the upper frequency signal
<DLM>:	Delimiter

(*2)

n:	Result set number.
Freqn:	Harmonic frequency.
Leveln:	Harmonic level.
DeltaLeveln:	Harmonic level difference with fundamental frequency.
<DLM>:	Delimiter

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
AM Modulation Measurement	AMMOD*	ON|OFF	AMMODON?	0=OFF 1=ON
AM Modulation Depth	---	---	AMMOD?	Real %
AM Modulation	---	---	AMMF?	Frequency
FM Measurement	FMMEAS*	ON|OFF	FMMEASON?	0=OFF 1=ON
FM Frequency Deviation	---	---	FMMEAS?	Frequency
Modulation Frequency to Sweep time	FMMODF[ON,]* (*3)	Frequency	FMMODF?	Frequency
	FMMODFY* (*4)	Frequency	FMMODFY?	Frequency
	FMMODF*	ON|OFF	FMMODFON?	0=OFF 1=ON
Sound Mode				
:ON	SON	---	SD?	0 = OFF 1 = ON (AM) 2 = ON (FM)
:ON (AM)	SAM			
:ON (FM)	SFM			
:OFF	SOF			
Sound Volume	SDV*	Integer	SDV?	Integer
Demodulation Time	PU*	Time	PU?	Time

(*3) Sets the Modulation Frequency to Sweep Time mode to ON and then sets an FM frequency deviation value.

(*4) Sets an FM frequency deviation value without setting the Modulation Frequency to Sweep Time mode to ON.

6.8.13 Counter

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Resolution 1 kHz	CN0	---	---	---
Resolution 100 Hz	CN1	---	---	---
Resolution 10 Hz	CN2	---	---	---
Resolution 1 Hz	CN3	---	---	---
Resolution Query	---	---	CN?	0 = 1 kHz 1 = 100 Hz 2 = 10 Hz 3 = 1 Hz
Counter Position	CNPOS*	Frequency	CNPOS?	Frequency
Counter Position Auto (Position Linked to Marker)	CNPOSA[*]	[ON]|OFF	CNPOSA?	0 = OFF 1 = ON
Counter	COUNT*	ON|OFF	COUNT?	0 = OFF 1 = ON
Counter Value	---	---	CNRES?	Frequency

6.8.14 Power

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Measure Mode			PMEASMODE?	0 = OFF 1 = CHPOW 2 = TOTPOW 3 = AVGPOW 4 = OBW 5 = ACP 6 = SEM 7 = SPU
Measure OFF	PMEASOFF	---	---	---
Measure Averaging	PMEASAVG*	ON|OFF	PMEASAVG?	0 = OFF 1 = ON
	PMEASAVGONCE *	ONCE|MULT	PMEASAVGONCE?	0 = ONCE 1 = MULT
Measure Averaging Times	---	---	PMEASTM?	Integer
Measure Trace	PMEASTRACE*	TRA|TRB|TRC	PMEASTRACE ?	0 = TRA 1 = TRB 2 = TRC
Channel Power ON/OFF	PWCHON[*]	[ON]|OFF	PWCHON?	0 = OFF 1 = ON
Channel Power Average Times	PWCHTM*	Integer	PWCHTM?	Integer
Channel Power	---	---	PWCH?	Level
Channel Power Spectral Density	---	---	PWCHPSD?	dB
Power Measure Save	PWCHSAVE	---	---	---
Power Measure Restore	PWCHLOAD	---	---	---
Total Power ON/OFF	PWTOTALON[*]	[ON]|OFF	PWTOTALON?	0 = OFF 1 = ON
Total Power Average Times	PWTOTALTM*	Integer	PWTOTALTM?	Integer
Total Power	---	---	PWTOTAL?	Level
Total Power Spectral Density	---	---	PWTOTALPSD ?	dB
Power Measure Save	PWTOTSAVE	---	---	---
Power Measure Restore	PWTOTLOAD	---	---	---

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Average Power ON/OFF	PWAVGON[*]	[ON]|OFF	PWAVGON?	0 = OFF 1 = ON
Average Power Average Times	PWAVGTM*	Integer	PWAVGTM?	Integer
Average Power Range	PWAVGRANGE*	FULL|WIN	PWAVGRANGE?	0 = FULL 1 = WIN
Average Power	---	---	PWAVG?	Level
Power Measure Save	PWAVGSAVE	---	---	---
Power Measure Restore	PWAVGLOAD	---	---	---
OBW Execution	OBWON[*]	[ON]|OFF	OBWON?	0 = OFF 1 = ON
OBW Measurement Value	---	---	OBW?	Frequency (Fc), Frequency (OBW)
OBW %	OBWPER*	Real%	OBWPER?	Real%
OBW Average Times	OBWTM*	Integer	OBWTM?	Integer
OBW save setup	OBWSAVE	---	---	---
OBW restore setup	OBWLOAD	---	---	---
ACP Execution	ACP[*]	[ON]|OFF	ACPON?	0 = OFF 1 = ON
ACP Measurement Value	---	---	ACP?	n<DLM>f1L, l1L, f1H, l1H<DLM>…(*1)
ACP Average Times	ACPTM*	Integer	ACPTM?	Integer
ACP Reference Power Value	---	---	ACPREF?	Level
ACP Screen	ACPSCR*	FULL|CARR	ACPSCR?	0 = FULL 1 = CARR
ACP Carrier Bandwidth	CARRBS* ACPCBW*	Frequency	CARRBS? ACPCBW	Frequency
CS/BS Table Input	CSBSIN*,*	Frequency (CS), Frequency (BS)	---	---
CS/BS Table Deletion	CSBSDEL	---	---	---
ACP Graphics Mode	ADG[*]	[ON]|OFF	ADG?	0 = OFF 1 = ON
ACP save setup	ACPSAVE	---	---	---
ACP restore setup	ACPLOAD	---	---	---
ACP Nyquist Filter	ACPNQST*	ON|OFF	ACPNQST?	0 = OFF 1 = ON

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Nyquist Symbol Rate	SYMRT*	Frequency	SYMRT?	Frequency
Nyquist Roll Off Factor	RFACT*	Real	RFACT?	Real
Spectrum Emission Mask Execution	SEMON[*]	[ON]|OFF	SEMON?	0 = OFF 1 = ON
SEM Average Times	SEMTM*	Integer	SEMTM?	Integer
SEM Carrier Bandwidth	SEMCBW*	Frequency	SEMCBW?	Frequency
SEM Ref Power	SEMRFCALC*	CHN|PEAK	SEMRFCALC?	0 = Channel 1 = Peak
SEM Nyquist Filter	SEMNQST*	ON|OFF	SEMNQST?	0 = OFF 1 = ON
SEM save setup	SEMSAVE	---	---	---
SEM restore setup	SEMLOAD	---	---	---
SEM Band Table Input	SEMTIN *,*,*,*,*,*,*,*	Frequency, (start) Frequency, (stop) Frequency, (ibw) dB, (limit abs start) dB, (limit abs stop) dB, (limit rel start) dB, (limit rel stop) ABS|REL|A_AND_R|A_OR_R (judge)	---	---
SEM Band Table Delete	SEMTDEL	---	---	---
SEM Reference Power	---	---	SEMRFPOW?	dBm
SEM Measurement Value	---	---	SEM?	Channel Number, Start Frequency, Stop Frequency, Frequency, Absolute Power, Relative Power, Judge (, …)
Spurious Measurement Execution	SPURI*	[ON|FREQ]|OFF	SPURION?	0 = OFF 1 = ON

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
SPU Measurement Result	---	---	SPURI?	n<DLM>m1<DLM>f1, l1, j1<DLM>… fm1, lm1, jm1<DLM>m2<DLM>f1, l1, j1<DLM> … fm2, lm2, jm2<DLM>…mn <DLM>f1, l1, j1<DLM> … fmn, lmn, jmn<DLM>(*2)
SPU Table Selection	SPRTBL*	Integer (0|1|2)	SPRTBL?	Integer (0|1|2)
SPU Table Input Freq	SPRIN|SPRFIN *,*,*,*,*	Freq, (start) Freq, (stop) AUTO|Freq, (rbw) AUTO|Freq, (vbw) AUTO|Time, (swp) Level, (ref level) AUTO|Level, (att) ON|OFF, (preamp) Level (Limit)	---	---
SPU Freq Table Deletion	SPRFDEL	---	---	---

(*1)

n:	Number of points (0 thru 5)
fnL:	nth frequency Low
lnL:	nth level Low
fnH:	nth frequency High
lnH:	nth level High
<DLM>:	Delimiter

(*2)

n:	Number of measurement points (0 thru 15)
m:	Number of spurious signal (0 thru 10)
f:	Spurious frequency
l:	Spurious level
j:	Spurious judgment result (0:Pass, 1:Fail)
<DLM>:	Delimiter

6.8.15 EMC

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Correction Factor	CR[*]	[ON]|OFF	CRON?	0 = OFF 1 = ON
Correction Factor Table Input	CRIN*,*	Frequency, Level(DB)	---	---
Correction Factor Table Deletion	CRDEL	---	---	---
EMC Trace Detection	EMCON|EMCDET			
Normal		NRM|OFF	EMCON?	0 = Normal
Peak		PEAK|ON	EMCDET?	3 = Peak
EMC BW		---		
Auto	QPAUTO|QA		QPAUTO? QA?	0 = Auto
200 Hz	QP0			1 = 200 Hz
9 kHz	QP1			2 = 9 kHz
120 kHz	QP2			3 = 120 kHz
1 MHz	QP3			4 = 1 MHz

6.8.16 Calibration

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Calibration All	CLALL[*]	[RFC1]|RFC2	---	---
Total Gain Calibration	CLGAIN[*]	[RFC1]|RFC2	CLGAIN [RFC1]|RFC2?	Integer 0 = OK >0 = Warning <0 = Error
RBW Calibration	CLRBW	---	CLRBW?	Integer 0 = OK >0 = Warning <0 = Error
PBW Calibration	CLPBW	---	CLPBW?	Integer 0 = OK >0 = Warning <0 = Error

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
ATT step Calibration	CLATT	---	CLATT?	Integer 0 = OK >0 = Warning <0 = Error
CAL 10 M Reference Coarse	CLCREF*	Integer	CLCREF?	Integer
CAL 10 M Reference Fine	CLFREF*	Integer	CLFREF?	Integer
CAL 10 M Reference Default	CLDREF	---	---	---
CAL 10 M Reference Store	CLSREF	---	---	---
F-Correction	FC*	ON|OFF	FC?	0 = OFF 1 = ON
CAL-Correction	CC*	ON|OFF	CC?	0 = OFF 1 = ON

6.8.17 Save/Recall

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Save (File or File Number)	SV[*]	:String|Integer	---	---
Delete (File)	DEL*	:String	---	---
Recall (File)	RC*	:String	---	---
Rename (File, New Name)	RENAME*,*	:String, :String	---	---
Write Protect (File)	WP*,*	:String, ON|OFF	---	---
File Format	FILEFORMAT*	BIN|XML	FILEFORMAT?	0 = BIN 1 = XML
Media	FILEMEDIA*	FLASH|USB	FILEMEDIA?	0 = FLASH 1 = USB
Save Setup	SVSET*	ON|OFF	SVSET?	0 = OFF 1 = ON
Save Trace A Context 1	SVTRC1A*	ON|OFF	SVTRC1A?	0 = OFF 1 = ON

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Save Trace B Context 1	SVTRC1B*	ON|OFF	SVTRC1B?	0 = OFF 1 = ON
Save Trace C Context 1	SVTRC1C*	ON|OFF	SVTRC1C?	0 = OFF 1 = ON
Save Trace A Context 2	SVTRC2A*	ON|OFF	SVTRC2A?	0 = OFF 1 = ON
Save Trace B Context 2	SVTRC2B*	ON|OFF	SVTRC2B?	0 = OFF 1 = ON
Save Limit Line 1	SVLIM1*	ON|OFF	SVLIM1?	0 = OFF 1 = ON
Save Limit Line 2	SVLIM2*	ON|OFF	SVLIM2?	0 = OFF 1 = ON
Save Spurious Table 1	SVSPR1*	ON|OFF	SVSPR1?	0 = OFF 1 = ON
Save Spurious Table 2	SVSPR2*	ON|OFF	SVSPR2?	0 = OFF 1 = ON
Save Spurious Table 3	SVSPR3*	ON|OFF	SVSPR3?	0 = OFF 1 = ON
Save Channel	SVCH*	ON|OFF	SVCH?	0 = OFF 1 = ON
Save Spectrum Emission Mask Table	SVSEM*	ON|OFF	SVSEM?	0 = OFF 1 = ON
Save ACP	SVACP*	ON|OFF	SVACP?	0 = OFF 1 = ON
Save Correction Factor	SVANT*	ON|OFF	SVANT?	0 = OFF 1 = ON
Save Normalize Context A	SVNRM1A	ON|OFF	SVNRM1A?	0 = OFF 1 = ON
Save Normalize Context B	SVNRM1B	ON|OFF	SVNRM1B?	0 = OFF 1 = ON
Save Normalize Context C	SVNRM1C	ON|OFF	SVNRM1C?	0 = OFF 1 = ON
Syncronize All Files : USB to Flash : Flash to USB	SYNCTO	 FLASH USB	---	---

6.8.18 File Management

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Reading Bitmap File	---	---	BMP?	Binary data <EOI>
Reading Portable Network Graphics File	---	---	PNG?	Binary data <EOI>
Reading Image File	---	---	GIMAG :String	Binary data <EOI>
Reading Data File	---	---	GDATA :String	Binary data <EOI>

6.8.19 Config

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Title	LON*	/*String*/	LB?	String
Erase Title	LOF	---	---	---
10 MHz Internal Reference Signal Source	RFI	---	FREF?	0 = INT 1 = EXT 2 = XTL
10 MHz External Reference Signal Source	RFE			
Xtal	RFX			
Reference Signal Source	RF*	Frequency	RF?	Frequency
Input RF Connector	RFC	RFC1|RFC2	RFC?	1 = RFC1 2 = RFC2
Device Select	HCDEV		HCDEV?	
Printer		PRT		0 = Printer
USB		USB		1 = USB
Screen Copy	HCOPY	---	---	---
U37xx Mode	SETFUNC*	SPA|3GPPDL	SETFUNC?	0=SPA 1=3GPPDL (*1)

(*1) OPT50 is required.

6.8.20 Preset

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Preset	IP|*RST	---	---	---
Factory Init	SUPIP	---	---	---

6.8.21 GPIB

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Status Byte Clear	*CLS	---	---	---
STB Read	---	---	*STB?	Integer
SRE Read/Write	*SRE0*	Integer	*SRE?	Integer
ESR Read	---	---	*ESR?	Integer
ESE Read/Write	*ESE	Integer	*ESE?	Integer
OSR Read	---	---	OPREVT?	Integer
OSER Read	OPR*	Integer	OPR?	Integer
SRQ Interrupt ON	S0	---	---	---
SRQ Interrupt OFF	S1	---	---	---
SRQ status clear	S2	---	---	---
Delimiter CR LF EOI	DLIM0	---	---	---
Delimiter LF	DLIM1			
Delimiter EOI	DLIM2	---	---	---
Delimiter ;	DLIM5			
Local Lockout	LLO	---	---	---
Remote Control	REN	---	---	---
Local Control	GTL	---	---	---
R3162 Mode	INSTR*	FUS|SA2	INSTR?	0 = FUS 1 = SA2
Refresh Screen in Remote Control	SCRF[*]	[ON]|OFF	SCRF?	ON|OFF
Open Menus in Remote Control	MNRF[*]	[ON]|OFF	MNRF?	ON|OFF
Annotations	ANNOT[*]	[ON]|OFF	ANNOT?	ON|OFF
Parser Mode	PARSER*	ATSET|SCPISET	PARSER?	0 = AT 1 = SCPI

(*1) TRP: Number of trace points
<DLM>: Delimiter

6.8.22 Others

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
Device ID Output	---	---	*IDN? ID?	Maker Name, Device Name, Serial No., Revision
Date Setting	SETDATE*	Date (YYMMDD)	SETDATE?	Date
Time Setting	SETTIME*	Time (HHMMSS)	SETTIME?	Time
Reset user password (for front panel lock)	RPWD	---	---	---
Option List	---	---	*OPT?	Opt1,Opt2,..., Optn<DLM>
Option				
:75 Ohm Input	---	---	OPT15?	1 = Installed 0 = Not installed
: High Stability	---	---	OPT20?	
: EMC Filter	---	---	OPT28?	
: 3GPP Demod	---	---	OPT50?	
: TG -30 dBm	---	---	OPT74?	
: TG -60 dBm 75 Ohm	---	---	OPT75?	
: TG -60 dBm	---	---	OPT76?	

6.8.23 TG

Function	Command (EXE, SET)		Query (GET)	
	Code	Argument Format	Code	Output Format
TG ON	TG	---	TG?	0 = OFF 1 = ON
TG OFF	TGF	---	---	---
TG Level	TGL*	Level	TGL?	Level
TG Frequency Offset	TGO[ON,]* TGO ON|OFF	Frequency	TGO? TGOON?	Frequency 0 = OFF 1 = ON
TG Level Offset	TGLO[ON,]* TGLO ON|OFF	DB	TGLO? TGLOON?	DB 0 = OFF 1 = ON
Capture Normalize Data Active Trace	CAPND	---	---	---
Normalize Correction Active Trace	NORM*	ON|OFF	NORM?	0 = OFF 1 = ON
Capture Normalize Data Trace (n = A|B|C)	<n>RX	---	---	---
Normalize Correction Trace (n = A|B|C)	<n>NORM*	ON|OFF	<n>NORM?	0 = OFF 1 = ON
Normalize Execute Active Trace	AR	---	---	---
Delta Reference Line	TGDLTRLN*	ON|OFF	TGDLTRLN?	0 = OFF 1 = ON
VSWR ON/OFF	VSWRON [*]	[ON]|OFF	VSWRON?	0 = OFF 1 = ON
VSWR Measurement Value	---	---	VSWR?	Real
VSWR Return Loss Value	---	---	VSWRLOSS?	DB (Real)

6.8.24 Units

Function	Code
Exponent	E (see IEEE Std 488.2-1992 page 89)
GHz	GZ
MHz	MZ
KHz	KZ
Hz	HZ
DB	DB
DBM	DBM
DBMV	DBMV
DBUV	DBUV
DBEMF	DBEMF
DBPW	DBPW
Watt	W | WATT
mW	MW
Volt	V | VOLT
Millivolt	MV
Microvolt	UV
Nanovolt	NV
Second	SC
Millisecond	MS | MSEC
Microsecond	US | USEC
Nanosecond	NSEC
%	% | PER
ppm	PPM

6.9 Example of Remote Control Programs

This chapter describes examples of programs which control the instrument by remote.

The example programs in this chapter use the Microsoft Corp. Visual Basic language. If programming in another language, the example programs must be described in that language.

The explanation of the programs here assumes that the GPIB board provided by the National Instruments Corp. (hereafter referred to as the NI Corp.) is used as a GPIB controller.

6.9.1 Basic Steps for GPIB Bus Control

This section describes the step-by-step procedures in which the GPIB bus is controlled by the Visual Basic programs. For operations such as initializing variables and defining function routines, which depend on Visual Basic, the notational rules for the Visual Basic program must be applied.

6.9.1.1 Reading the GPIB Control Library for Visual Basic

To control the GPIB board provided by NI Corp. by using the program described in the Visual Basic language, the two files must be built into the Visual Basic Project. Those two files are the VBIB-32.BAS file, in which the GPIB communication interface for the Visual Basic language provided by the NI Corp. is described, and the NIGLOBAL.BAS file, in which errors and timeout values are defined.

6.9.1.2 Program Examples Using VB

Example 1 Setting the center frequency after resetting this instrument.

```
Call ibdev(0,8,T10S,1,0,SPA)    ' Initialize
Call ibclr(spa)                 ' Performs a Device Clear.

Call ibwrt(spa, "IP")           ' preset
Call ibwrt(spa, "CF 30MZ")      ' Sets the center frequency to 30 MHz.
```

Example 2 Setting the start frequency to 300 kHz, setting the stop frequency to 800 kHz and adding 50 kHz to the frequency offset.

```
Call ibclr(spa)                 ' Performs a Device Clear.
Call ibwrt(spa, "FA 300KZ")     ' Sets the start frequency to 300 kHz.
Call ibwrt(spa, "FB 800KZ")     ' Sets the stop frequency to 800 kHz.
Call ibwrt(spa, "FO 50KZ")      ' Adds 50 kHz to the frequency offset.
```

Example 3 Setting the reference level to 87 dBμV (in 5 dB/div) and the RBW to 100 kHz

```
Call ibclr(spa)                ’ Performs a Device Clear.

Call ibwrt(spa, "AUNITS DBUV") ’ Sets the level unit to dBμV.
Call ibwrt(spa, "RL 87DB")     ’ Sets the reference level to 87 dB (μV).
Call ibwrt(spa, "DD 5DB")      ’ Sets the vertical scale to 5 dB/div.
Call ibwrt(spa, "RB 100KZ")    ’ Sets the RBW to 100 kHz.
```

Example 4 Setting the instrument using variables

```
Dim A As String
Dim B As String
Dim C As String

A = "10"                       ’ Sets the character string.
B = "2"
C = "20"

Call ibclr(spa)                ’ Performs a Device Clear.

Call ibwrt(spa, "CF " & A & "MZ")
                               ’ Sets the center frequency to A MHz.
Call ibwrt(spa, "SP " & B & "MZ")
                               ’ Sets the span to B MHz.
Call ibwrt(spa, "AT " & C & "DB")
                               ’ Sets the ATT to C dB.
```

Example 5 Saving set values in Register 5 and recalling them from Register 5

```
Dim LabelBuff As String        ’ Defines the character string buffer for the
                               ’ label

LabelBuff = "SPECTRUM Analyzer"’ Sets the label.

Call ibclr(spa)                ’ Performs a Device Clear.

Call ibwrt(spa, "CF 30MZ")     ’ Sets the parameter.
Call ibwrt(spa, "SP 1MZ")
Call ibwrt(spa, "DET POS")
Call ibwrt(spa, "LON " & LabelBuff)
                               ’ Sets the label.

Call ibwrt(spa, "SV 5")        ’ Saves the data to Register 5.

Call ibwrt(spa, "CF 1GZ")      ’ Changes the set parameters.
Call ibwrt(spa, "SP 200MZ")

Call ibwrt(spa, "RC 5")        ’ Recalls the data from Register 5.
```

Example 6 Enter Limit line1 in the table and turn Limit line 1 on

```
Call ibclr(spa)                ' Performs a device clear.

Call ibwrt(spa, "LMTADEL")     ' Clears the table used for Limit Line 1.
Call ibwrt(spa, "AUNITS DBUV") ' Sets the level unit to dBμV.

Call ibwrt(spa, "LMTAIN 25MZ, 49.5DB")
                               ' Enters data used by Limit Line 1.
Call ibwrt(spa, "LMTAINF 35MZ, 49.5DB")
Call ibwrt(spa, "LMTAINF 35MZ, 51.5DB")
Call ibwrt(spa, "LMTAINF 55MZ, 51.5DB")
Call ibwrt(spa, "LMTAINF 55MZ, 54.3DB")
Call ibwrt(spa, "LMTAINF 65MZ, 54.3DB")
Call ibwrt(spa, "LMTAINF 65MZ, 57.0DB")
Call ibwrt(spa, "LMTAINF 68MZ, 57.0DB")
Call ibwrt(spa, "LMTAINF 68MZ, 60.0DB")
Call ibwrt(spa, "LMTAINF 75MZ, 60.0DB")
Call ibwrt(spa, "LMTAINF 75MZ, 62.5DB")
Call ibwrt(spa, "LMTAINF 82MZ, 62.5DB")
Call ibwrt(spa, "LMTAINF 82MZ, 64.7DB")

Call ibwrt(spa, "FA 0MZ")      ' Sets the start frequency to 0 MHz.
Call ibwrt(spa, "FB 100MZ")    ' Sets the stop frequency to 100 MHz.
Call ibwrt(spa, "LMTA ON")     ' Turns Limit line 1 on.
```

6.9.1.3 Sample Programs for Reading Data

In order to output measurement data or settings, use the "xx?" command. This ensures that the data is read when this instrument is in the talker mode. Available output formats are listed in the table below. The delimiter positioned at the end of data can be specified from 5 types (refer to "Others" in the GPIB code list). Once set, "xx?" command continues to operate until it is changed.

Output Format	
Frequency	± D.DDDDDDDDDDD E ± DD CR LF ↑ ↑ ↑ ↑ 1 2 3 4 The maximum size of data 1 + 2 + 3 is 19 bytes long and the unit is Hz
	ExampleSpecify "CF?" and output as center frequency.
Level	± D.DDDDDDD E ± DD CR LF ↑ ↑ ↑ ↑ 1 2 3 4 The maximum size of data 1 + 2 + 3 is 19 bytes long and the unit depends on the setting of each UNIT.
	ExampleSpecify "ML?" and output as the marker level.
Time	± D.DDD E ± DD CR LF ↑ ↑ ↑ ↑ 1 2 3 4 The maximum size of data 1 + 2 + 3 is 19 bytes and the unit is sec
	ExampleSpecify "SW?" and the output sweep time.
Constant	DDDD CR LF ↑ ↑ 2 4 The maximum size of the data in bytes corresponds to the maximum size of the output data
	ExampleThe ON/OFF status or Averaging count is output

<Supplement> 1 = Sign (a space for plus sign; "-" for minus sign)
2 = Mantissa of data
3 = Exponent of data
4 = Delimiter (CR/LF in initial setting can be changed with "DLn" code.)

Example 1 Reading and displaying the marker level

```
Dim sep As Integer

Call ibclr(spa)                ' Performs a device clear.

Call ibwrt(spa, "CF 30MZ")     ' Sets the parameter.
Call ibwrt(spa, "SP 1MZ")
Call ibwrt(spa, "MLN ON")      ' Marker ON
Call ibwrt(spa, "MK 30MZ")     ' Sets the marker to 30 MHz.
Call ibwrt(spa, "TS")

Call ibwrt(spa, "ML?")         ' Requests the value of the marker level.

Rdbuff = Space(30)             ' Allocates 30 bytes to the buffer area.

Call ibrd(spa, Rdbuff)         ' Reads the data (30 bytes Max.).
sep = InStr(1, Rdbuff, vbCrLf, 0)
                               ' Checks the number of character up to the
                               ' delimiter.
RichTextBox1.Text = "MarkerLevel = " & Left(Rdbuff, sep - 1)
                               ' Displays the data on the screen.

An example display:
MarkerLevel = -88.1875
```

Example 2 Reading and displaying the center frequency

```
Dim sep As Integer

Call ibclr(spa)                ' Performs a Device Clear.

Call ibwrt(spa, "CF?")         ' Query command for the center frequency.

Rdbuff = Space(30)             ' Allocates 30 bytes to the buffer memory.
Call ibrd(spa, Rdbuff)         ' Reads the data (30 bytes Max.)
sep = InStr(1, Rdbuff, vbCrLf, 0)
                               ' Checks the number of character to the
                               ' delimiter.
RichTextBox1.Text = "CenterFreq = " & Left(Rdbuff, sep - 1)
                               ' Displays the data on the screen.

An example display:
CenterFreq = +30000000.0000
```

Example 3 Reading the level and display unit and displaying them

```
Dim sep As Integer

Call ibclr(spa)               ’ Performs a Device Clear.

Call ibwrt(spa, "RL?")        ’ Query command for the reference level.

Rdbuff = Space(30)            ’ Allocates 30 bytes to the buffer memory.
Call ibrd(spa, Rdbuff)        ’ Reads the data from the spectrum analyzer.
sep = InStr(1, Rdbuff, vbCrLf, 0)
                              ’ Checks the number of characters to the
                              ’ delimiter.
RichTextBox1.Text = "RefLevel = " & Left(Rdbuff, sep - 1)
                              ’ Display the data on the screen.

Call ibwrt(spa, "AUNITS?")    ’ Requests the level unit.

Rdbuff = Space(3)
Call ibrd(spa, Rdbuff)
sep = InStr(1, Rdbuff, vbCrLf, 0)
                              ’ Checks the number of characters to the
                              ’ delimiter.
RichTextBox1.Text = RichTextBox1.Text & vbCrLf & "UNIT = " & Left(Rdbuff, sep
                              - 1)
                              ’ Displays the previous result, followed by a
                              ’ return mark and the most recent result.

An example display:
RefLevel = +0.0000
UNIT = 0
```

Example 4 Executing the 6 dB-down operation, reading the frequency and level and displaying them

```
Dim sep As Integer

Call ibclr(spa)               ’ Performs a Device Clear.

Call ibwrt(spa, "CF 30MZ")    ’ Sets the parameter.
Call ibwrt(spa, "SP 20MZ")

Call ibwrt(spa, "MKBW 6DB")   ’ Sets a 6 dB down measurement.
Call ibwrt(spa, "PS")         ’ Executes the peak search.
Call ibwrt(spa, "XDB")        ’ Performs the 6 dB down measurement.
Call ibwrt(spa, "MFL?")       ’ Requests the value of the marker level and
                              ’ frequency.

Rdbuff = Space(50)            ’ Allocates the buffer memory space to 50
                              ’ bytes.
Call ibrd(spa, Rdbuff)        ’ Reads the data (50 bytes Max.) from the
                              ’ spectrum analyzer.

sep = InStr(1, Rdbuff, vbCrLf, 0)
                              ’ Checks the number of characters to the
                              ’ delimiter.

RichTextBox1.Text = "Marker Freq & Level = " & Left(Rdbuff, sep - 1)
                              ’ Displays the data on the screen.

An example display:
Marker Freq & Level = +2.000000000000E+05, +1.023437500000E+00
```

Example 5 Measuring OBW and displaying it

```
Dim LENG1 As Integer, LENG2 As Integer
Dim OBW As String
Dim FC As String
Dim searchchar As String

Call ibclr(spa)                ' Performs a device clear.

Call ibwrt(spa, "CF 30MZ")     ' Sends the command already set.
Call ibwrt(spa, "SP 1MZ")
Call ibwrt(spa, "MLN ON")      ' Marker ON
Call ibwrt(spa, "MK 30MZ")
Call ibwrt(spa, "OBWON ON")
Call ibwrt(spa, "TS")

Call ibwrt(spa, "OBW?")        ' Sends the query command.
Rdbuff = Space(60)             ' Allocates the area to the read buffer.
Call ibrd(spa, Rdbuff)         ' Reads the read buffer (the maximum number of
                               ' bytes to be output is determined by the buffer
                               ' area size).

                               ' Formatting output character string
LENG1 = InStr(1, Rdbuff, Chr(44), 0)
                               ' Searches for the first comma.
FC = Mid(Rdbuff, 1, LENG1 - 1) ' Reads the character before the comma.

DoEvents

LENG2 = InStr((LENG1 + 1), Rdbuff, Chr(13), 0)
                               ' Determines the last data by searching for the
                               ' delimiter.
OBW = Mid(Rdbuff, (LENG1 + 1), (LENG2 - LENG1-1))
                               ' Reads the data between the second comma and
                               ' the delimiter.

RichTextBox1.Text = "OBW = " & OBW & vbCrLf & "Fc = " & FC & vbCrLf
                               ' Displays the data on the screen.

An example display:
OBW = +9.810000000000E+05
FC = +3.000250000000E+07
```

Example 6 Reading and displaying the three largest peak levels

```
Dim pk1 As String, pk2 As String, pk3 As String

Call ibclr(spa)                ’ Performs a device clear.
Call ibwrt(spa, "CF 0MZ")      ’ Applies the settings.
Call ibwrt(spa, "SP 100MZ")
Call ibwrt(spa, "TS")
Call ibwrt(spa, "PS")          ’ Executes the peak search.
Call ibwrt(spa, "ML?")         ’ Query command to search for the marker level
Rdbuff = Space(25)             ’ Allocates the buffer memory.
Call ibrd(spa, Rdbuff)         ’ Receives the output.
pk1 = LeftB(Rdbuff, (InStrB(1, Rdbuff, Chr(13), 1) - 1))
                               ’ Reads the data between the starting point and
                               ’ the delimiter.

Call ibwrt(spa, "NXP")         ’ Searches for the next peak.
Call ibwrt(spa, "ML?")
Rdbuff = Space(25)
Call ibrd(spa, Rdbuff)
pk2 = LeftB(Rdbuff, (InStrB(1, Rdbuff, Chr(13), 1) - 1))
                               ’ Reads the data between the starting point and
                               ’ the delimiter.

Call ibwrt(spa, "NXP")
Call ibwrt(spa, "ML?")
Rdbuff = Space(25)
Call ibrd(spa, Rdbuff)
pk3 = LeftB(Rdbuff, (InStrB(1, Rdbuff, Chr(13), 1) - 1))
                               ’ Reads the data between the starting point and
                               ’ the delimiter.

RichTextBox1.Text = "1st PK = " & pk1 & vbCrLf & "2nd PK = " & pk2 & vbCrLf &
                               "3rd PK = " & pk3 & vbCrLf
                               ’ Displays the data on the screen.
```

An example display:

```
1st PK = -8.553906250000E+01
2nd PK = -7.004687500000E+01
3rd PK = -8.655468750000E+01
```

6.9.1.4 Sample Programs for Inputting or Outputting Trace Data

Trace data on the screen includes data for 501 or 1001 points on the frequency axis. For inputting and outputting data, it is necessary to transfer data for 501 or 1001 points from the left side (start frequency) in order. Each point level is expressed by an integer from 1792 to 14592 (however, if the trace exceeds the upper limit of the vertical scale, a value greater than 14592 is transferred).

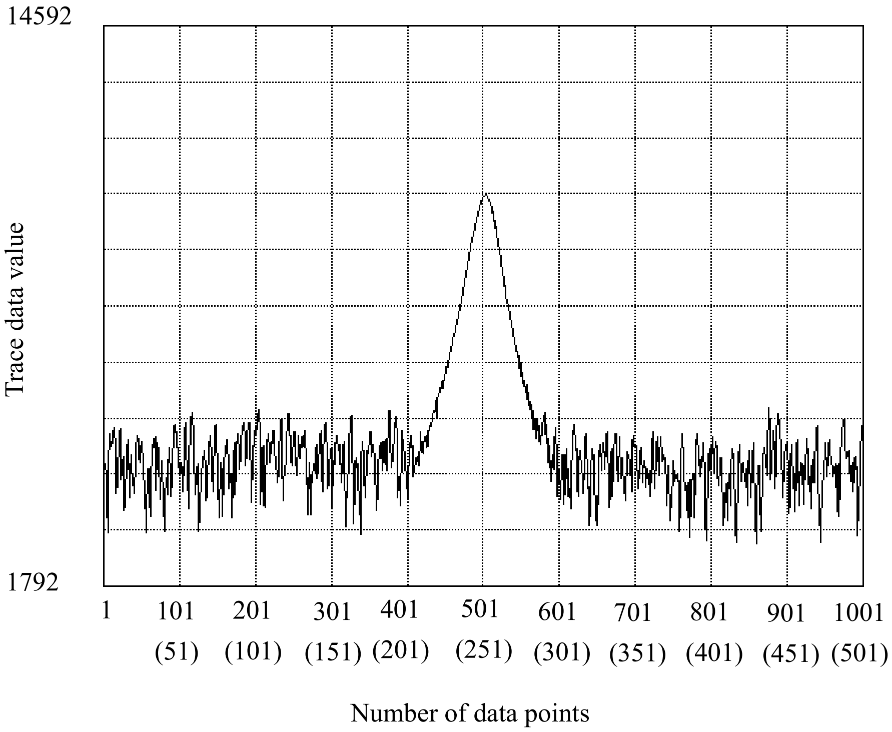


Figure 6-7 Relationship between the Screen Graticule and Trace Data

Trace data can be input or output in either ASCII or binary format.

Specify the output by using 16-bit integer data or the absolute value when outputting a value with binary data.
For the "FORM1" or "FORM3" format, transfer data in order from the high-order byte of the data. For the "FORM2" or "FORM4" format, transfer data in order from the low-order byte.

NOTE: ***Only "dB" can be used as a unit for the absolute value output.***
When the Units setting is Watts or Volts, a value with a unit of dBm is output.

Table 6-4 Trace Point Specification Codes

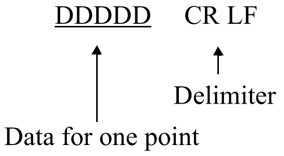
GPIB Code	Description
TPS	Sets the number of measurement points to 501.
TPL	Sets the number of measurement points to 1001.

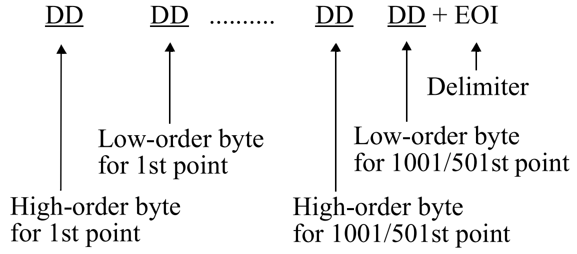
Table 6-5 Binary Data Output Format Specified Code

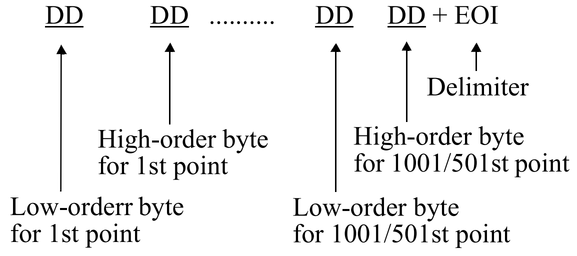
GPIB code	Description	Byte order
FORM1 (*1)	16-bit integer value from 1792 to 14592	
FORM2 (*2)	16-bit integer value from 1792 to 14592	Order swap
FORM3 (*2)	Absolute value IEEE 32 bit floating-point type	
FORM4 (*2)	Absolute value IEEE 32 bit floating-point type	Order swap

*1: When not specified, FORM1 is used.
*2: The input format cannot be specified.

Table 6-6 I/O Format

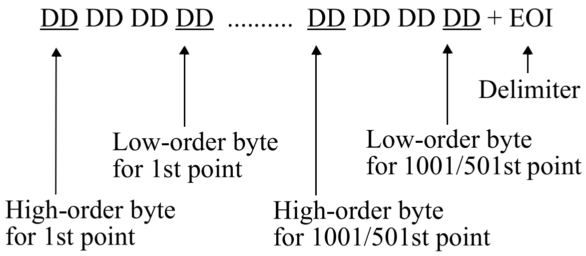
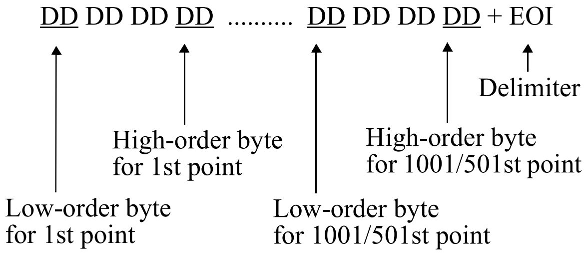
<table>
<tr><th>I/O format</th><th colspan="3">Description</th></tr>
<tr><td rowspan="3">ASCII format</td><td colspan="3">

Five-byte data without header</td></tr>
<tr><td></td><td>Input GPIB code</td><td>Output GPIB code</td></tr>
<tr><td>Memory A
Memory B
Memory C</td><td>TAA
TAB
TAC</td><td>TAA?
TAB?
TAC?</td></tr>
<tr><td rowspan="3">Binary format
16 bit-integer</td><td colspan="3">FORM1


FORM2


Each point data is divided into two parts: high-and low-order bytes. EOI signal is attached at the end of the data for continuous 1001 points.</td></tr>
<tr><td></td><td>Input GPIB code</td><td>Output GPIB code</td></tr>
<tr><td>Memory A
Memory B
Memory C</td><td>TBA
TBB
TBC</td><td>TBA?
TBB?
TBC?</td></tr>
</table>

Table 6-7 Absolute Value Output Format

<table>
<tr><th>I/O format</th><th colspan="3">Description</th></tr>
<tr><td rowspan="3">Binary format
32-bit floating point</td><td colspan="3">FORM3

For DDDDDDDD=12345678, data is output in order from 12345678.
FORM4

For DDDDDDDD=12345678, data is output in order from 78563412.
Each point data is 32-bit (4 bytes) floating-point type. EOI signal is attached at the end of the data for continuous 1001 points.</td></tr>
<tr><td></td><td></td><td>Output GPIB code</td></tr>
<tr><td>Memory A
Memory B
Memory C</td><td></td><td>TBA?
TBB?
TBC?</td></tr>
</table>

Example 1 Read the trace data in ASCII format

```
Dim tr(1000) As String          ' Allocates an array in the buffer for 1001
                                ' points.
Dim i As Integer
Dim res As String

Call ibclr(spa)                 ' Performs a Device Clear.

Call ibwrt(spa, "DLIM0")        ' CR LF EOI
Call ibwrt(spa, "TAA?")

For i = 0 To 1000 Step 1        ' Repeats the operation for 1001 points.
  tr(i) = Space(7)              ' Allocates 7 bytes (5 bytes for the data, and
                                ' 2 bytes for delimiters).
  Call ibrd(spa, tr(i))         ' Reads the data.
                                ' Displays the data on the screen.
  res = res & "tr(" & Str(i) & ") = " & Left(tr(i), 5) & vbCrLf
  DoEvents
Next i

RichTextBox1.Text = res
```

Example 2 Reading the memory A data in binary format

```
Dim tr(1000) As Integer         ' Allocates an array in the buffer for 1001
                                ' points.
Dim i As Integer
Dim res As String
Dim Rslt As Integer, tmp As Integer

Call ibclr(spa)                 'Performs a device clear.
Call ibconfig(0, IbcEndBitIsNormal, 0)
                                ' Sets the GPIB-board software so that the end
                                ' bit of the Ibsta variable is set to 1 only
                                ' when EOI has been received.
Call ibwrt(spa, "DLIM2")        ' Sets the delimiter to EOI only.
Call ibwrt(spa, "TBA?")         ' Requests Trace A in binary data.
Call ibrdi(spa, tr(), 1001 * 2)' Reads 1001 points of binary data.
For i = 0 To 1000 Step 1        ' Repeats the operation for 1001 points.
    tmp = tr(i)                 ' Swaps the high and low bites.
    Rslt = (tmp And &HFF&) * 256
    Rslt = Rslt + ((tmp And &HFF00&) / 256)
    res = res & Str(Rslt) & vbCrLf
                                'Displays the data on the screen.
    DoEvents
Next i
RichTextBox1.Text = res
Call ibwrt(spa, "DLIM0")        'Sets the delimiter to the CR, LF and EOI.
Call ibconfig(0, IbcEndBitIsNormal, 1)
```

Example 3 Entering data into memory A in ASCII format

```
Dim trdata(1000) As Integer
Dim i As Integer

trdata(0) = 1792               ' Creates a temporary test value used to test
                               ' the input (*).
For i = 1 To 1000 Step 1
  trdata(i) = Str(Val(trdata(i - 1)) + 12)
  DoEvents
Next i                         ' If measurement data exists, the steps between
                               ' the place marked with (*) and this point are
                               ' not required.

Call ibclr(spa)                ' Performs a device clear.
Call ibwrt(spa, "AB")          ' Sets Trace A to BLANK.
Call ibwrt(spa, "TAA")         ' Sets Trace A in ASCII.

For i = 0 To 1000 Step 1       ' Repeats the operation for 1001 points.
  Call ibwrt(spa, CStr(trdata(i)))
                               ' Sends the value after it has been converted
                               ' to the ASCII data.
  DoEvents
Next i

Call ibwrt(spa, "AV")          ' Sets Trace A to VIEW.
```

<Program example of absolute value output>

When using FORM3, add the line shown below to NIGLOBAL.
The CopyValtoVal API function is required to shift 32 bits.

```
Declare Sub CopyValtoVal Lib "kernel32" Alias "RtlMoveMemory" (Destination As
Any, Source As Any, ByVal length As Long)
```

Example 4 FORM2 Reading the memory A data in binary 16-bit integer (order swap)

```
Dim tr(1000) As Integer        ' Allocates an array in the buffer for 1001
                               ' points.
Dim i As Integer
Dim res As String

Call ibclr(spa)                ' Performs a Device Clear.
Call ibwrt(Spa, "FORM2")       ' Switches to FORM2.
Call ibconfig(0, IbcEndBitIsNormal, 0)
                               ' Sets the GPIB-board software so that the end
                               ' bit of each Ibsta variable is set to 1 only
                               ' when EOI has been received.
Call ibwrt(Spa, "DLIM2")       ' Sets a delimiter to EOI only.
Call ibwrt(Spa, "TBA?")        ' Requests Trace A in binary data.

Call ibrdi(Spa, tr(), 1001 * 2)' Reads 1001 points of binary data.

For i = 0 To 1000 Step 1       ' Repeats the operation for 1001 points.
    res  =  res & Str(tr(i)) & vbCrLf
                               ' Displays the data on the screen.
    DoEvents
Next i
RichTextBox1.Text  =  res
Call ibwrt(Spa, "DLIM0")       ' Sets the delimiter to the CR, LF and EOI.
Call ibconfig(0, IbcEndBitIsNormal, 1)
```

Example 5 FORM3 Reading the memory A data in binary 32-bit floating point

```
Dim tr(1000) As Single          ' Allocates an array in the buffer for 1001
                                ' points.
                                ' 32-bit floating point type
Dim i As Integer
Dim res As String
Dim tra(4) As Byte              ' Variable which swaps the high-order byte and
                                ' low-order byte
Dim tran As Byte                ' Variable which swaps the high-order byte and
                                ' low-order byte
Dim tmp As Single               ' Variable which stores converted data

Call ibclr(spa)                 ' Performs a Device Clear.
Call ibwrt(Spa, "FORM3")        ' Switches to FORM3.
Call ibconfig(0, IbcEndBitIsNormal, 0)
                                ' Sets the GPIB-board software so that the end
                                ' bit of each Ibsta variable is set to 1 only
                                ' when EOI has been received.
Call ibwrt(Spa, "DLIM2")        ' Sets a delimiter to EOI only.
Call ibwrt(Spa, "TBA?")         ' Requests Trace A in binary data.

Call ibrd32(Spa, tr(0), 1001 * 4)
                                ' Reads 1001 points of binary data.
                                ' * 4 for four bytes.

For i = 0 To 1000 Step 1        ' Repeats the operation for 1001 points.
    Call CopyValtoVal(tra(0), tr(i), 4)
                                ' Copies the 4-byte data stored in tri(i) to
                                ' tra (0 to 3).
    tran = tra(0)               ' Swaps the high and low orders.
     tra(0) = tra(3)
     tra(3) = tran
     tran = tra(1)
     tra(1) = tra(2)
     tra(2) = tran
     Call CopyValtoVal(tmp, tra(0), 4)
                                ' Copies the 4-byte data stored in tra (0 to
                                ' 3), whose high and low orders are swapped, to
                                ' tmp.
     res  =  res & Str(tmp) & vbCrLf
     DoEvents
Next i
RichTextBox1.Text  =  res       ' Displays the data on the screen.
Call ibwrt(Spa, "DLIM0")        ' Sets the delimiter to the CR, LF and EOI.
Call ibconfig(0, IbcEndBitIsNormal, 1)
```

Example 6 FORM4 Reading the memory A data in binary 32-bit floating point (order swap)

```
Dim tr(1000) As Single          ' Allocates an array in the buffer for 1001
                                ' points.
                                ' 32-bit floating point type
Dim i As Integer
Dim res As String

Call ibclr(spa)                 ' Performs a Device Clear.
Call ibwrt(Spa, "FORM4")        ' Switches to FORM3.
Call ibconfig(0, IbcEndBitIsNormal, 0)
                                ' Sets the GPIB-board software so that the end
                                ' bit of each Ibsta variable is set to 1 when
                                ' EOI has been received.
Call ibwrt(Spa, "DLIM2")        ' Sets a delimiter to EOI only.
Call ibwrt(Spa, "TBA?")         ' Requests Trace A in binary data.

Call ibrd32(Spa, tr(0), 1001 * 4)
                                ' Reads 1001 points of binary data.
                                ' * 4 for four bytes.

For i = 0 To 1000 Step 1        ' Repeats the operation for 1001 points.
    res  =  res & Str(tr(i)) & vbCrLf
                                ' Displays the data on the screen.
    DoEvents
Next i
RichTextBox1.Text  =  res
Call ibwrt(Spa, "DLIM0")        ' Sets the delimiter to the CR, LF and EOI.
Call ibconfig(0, IbcEndBitIsNormal, 1)
```

6.9.1.5 Example Program for Screen Image Output

Example 1 Outputs a current screen image as bitmap data and writes it to a file. Data, which is approximately 150 KB for the BMP format or approximately 5 KB for the PNG format, is output.

```
Call ibclr(spa)                 ' Performs a Device Clear.

Call ibwrt(spa, "DLIM2")        ' Sets a delimiter to EOI only.
Call ibwrt(spa, "BMP?")         ' Requests bitmap data output.
Call ibrdf(spa, "bitmap.bmp")   ' Writes bitmap data to a file.
Call ibwrt(spa, "DLIM0")        ' Returns delimiter setting to CR, LF and EOI.
```

Example 2 Writes a screen image that is copied into a USB memory to a file.

```
Call ibclr(spa)                 ' Performs a Device Clear.

Call ibwrt(spa, "DLIM2")        ' Sets a delimiter to EOI only.
Call ibwrt(spa, "GIMAG :copy003.bmp")
                                ' Specifies a screen image name and requests
                                ' its output.
Call ibrdf(spa, "copy003.bmp")  ' Writes a screen image to a file.
Call ibwrt(spa, "DLIM0")        ' Returns delimiter setting to CR, LF and EOI.
```

6.9.1.6 Example Program Which Uses the TS (Take Sweep) Command

Example 1 An ACP measurement is taken and then the measurement result is read (using the TS command).

```
Dim state As Integer
Dim sep1 As Integer, sep2 As Integer
Dim i As Integer, j As Integer
Dim cnt As Integer
Dim LvlH As String, LvlL As String
Dim FrqH As String, FrqL As String

Call ibclr(spa)                ' Performs a Device Clear.

Call ibwrt(spa, "SI")          ' Sets the single mode.
Call ibwrt(spa, "CF 1500MZ")   ' Sets the center frequency to 1500 MHz.
Call ibwrt(spa, "SP 250KZ")    ' Sets the frequency span to 250 kHz.
Call ibwrt(spa, "RB 1KZ")      ' Sets RBW to 1 kHz.
Call ibwrt(spa, "VB 3KZ")      ' Sets VBW to 3 kHz.
Call ibwrt(spa, "ST 20SC")     ' Sets the sweep time to 20 sec.
Call ibwrt(spa, "CSBSDEL")     ' Clears the channel space and bandwidth
                               ' previously set.
Call ibwrt(spa, "CSBSIN 50KZ,21KZ")
                               ' Sets CS to 50 kHz, and BS to 21 kHz.
Call ibwrt(spa, "ACP ON")      ' Starts the ACP measurement.

For j = 1 To 10 Step 1
  Call ibwrt(spa, "TS")        ' Executes one sweep.
  Call ibwrt(spa, "ACP?")      ' Requests the result of the ACP measurement.
  Rdbuff = Space(3)            ' Assigns 1 byte for an integer and 2 bytes for
                               ' a delimiter before reading the result.
  Call ibrd(spa, Rdbuff)       ' Reads the data.
  cnt = CInt(Rdbuff)           ' Converts the contents of the buffer into
                               ' integers.

  For i = 1 To cnt Step 1
    Rdbuff = Space(81)         ' Assigns an area of 81 bytes (Real number x 4
                               ' + ',' x 3 + CRLF).
    Call ibrd(spa, Rdbuff)     ' Reads the data.

    sep1 = InStr(1, Rdbuff, ",", 0)
                               ' Searches for the first comma starting from
                               ' the top of the buffer.
    FrqL = Left(Rdbuff, sep1 - 1)
                               ' Reads the string between the top and the
                               ' character string.
    sep2 = InStr(sep1 + 1, Rdbuff, ",", 0)
                               ' Searches for the next comma.
    LvlL = Mid(Rdbuff, sep1 + 1, sep2 - sep1 - 1)
                               ' Reads the string between the first and second
                               ' commas.

    sep1 = InStr(sep2 + 1, Rdbuff, ",", 0)
                               ' Searches for the next comma.
    FrqH = Mid(Rdbuff, sep2 + 1, sep1 - sep2 - 1)
                               ' Reads the string between the second and third
                               ' commas.
    sep2 = InStr(sep1, Rdbuff, Chr(13), 0)
                               ' Searches for the terminator (CR).
```

```
        LvlL = Mid(Rdbuff, sep1 + 1, sep2 - sep1 - 1)
                                ' Reads the string between the third comma and
                                ' the CR.

                                ' Displays the data on the screen.
        RichTextBox1.Text = RichTextBox1.Text & FrqL & "Hz;" & LvlL & vbCrLf
        RichTextBox1.Text = RichTextBox1.Text & FrqH & "Hz;" & LvlL & vbCrLf

        Next i
        DoEvents
    Next j
```

6.9.1.7 Example Programs Which Use the Status Byte

Example 1 Execute a single sweep and wait until its finished (when not using SRQ).

```
Dim state As Integer

Call ibclr(spa)                 ' Performs a Device Clear.
Call ibwrt(spa, "SI")           ' Turns the single sweep mode on.
Call ibwrt(spa, "OPR8")         ' Enables the sweep-end bit of the operation
                                ' status register.
Call ibwrt(spa, "*CLS")         ' Clears the status byte.
Call ibwrt(spa, "SI")           ' Begins sweeping.

Do

  Call ibwrt(spa, "*STB?")      ' Requests the value of the status byte.
  Rdbuff = Space(8)             ' Reserve a maximum of 8 bytes including the
                                ' delimiter.
  Call ibrd(spa, Rdbuff)        ' Reads the data.
  state = Val(Rdbuff)           ' Converts the character string into numeric
                                ' values.

  DoEvents                      ' Checks the loop for other events currently
                                ' taking place.
Loop Until (state And 128)      ' Exits from the loop if the sweep-end bit is
                                ' set to 1.
```

Example 2 Reading the peak frequency and level at the end of a single sweep (when using SRQ)

```
Dim boardID As Integer
Dim I As Integer
Dim res As Integer
Dim CFLEV As String

boardID = 0                     ' Sets the board ID.

Call ibclr(spa)                 ' Performs a Device Clear.

Call ibwrt(spa, "SI")           ' Turns the single sweep mode on.

Call ibwrt(spa, "*CLS")         ' Clears the status byte.
Call ibwrt(spa, "OPR 8")        ' Enables the Sweep-end bit of the operation
                                ' status register
Call ibwrt(spa, "*SRE 128")     ' Enables the Operation status bit of the
                                ' status byte.
Call ibwrt(spa, "S0")           ' Specifies Send mode for the SRQ signal.
```

```
For I = 1 To 10 Step 1         ’ Sets up a 10-loop.
  Call ibwrt(spa, "SI")        ’ Begins sweeping.
  Call WaitSRQ(boardID, res)   ’ Waits until SRQ interruption occurs.
  Call ibrsp(spa, res)         ’ Executes serial polling.

  Call ibwrt(spa, "PS")        ’ Executes the peak search.
  Call ibwrt(spa, "MFL?")      ’ Request the values of the marker frequency
                               ’ and level.

  Rdbuff = Space(43)           ’ Reserves 43 bytes.
  Call ibrd(spa, Rdbuff)       ’ Reads the data.

  CFLEV = Left(Rdbuff, InStr(1, Rdbuff, Chr(13), 0) - 1)
  RichTextBox1.Text = RichTextBox1.Text & "Freq ,Level = " & CFLEV & vbCrLf
                               ’ Display data on the screen and start a new
                               ’ line.

  DoEvents                     ’ Executes any other events in Windows.
Next I
```

6.9.1.8 Program Examples Using the LAN

Example 1 Connection LAN Interface

```
Public Sub ConnectTCP( )
Dim Ini as String
tcpClient.RemoteHost = "192.168.1.1"
                               ’ Sets IP Address of SA
tcpClient.Protocol = sckTCPProtocol
                               ’ Sets protocol to TCP
tcpClient.RemotePort = 5025    ’ Sets port no. 5025 of SA
tcpClient.Connect              ’ Connects to SA's port

  Do While (tcpClient.BytesReceived = 0)
                               ’Waits connection
    DoEvents
  Loop
  tcpClient.GetData Ini
  ErrRet = SendDtFunc("REN"  & vbLf)
                               ’Remote enable

End Sub
```

Example 2 Initialize Spectrum Analyzer

```
Public Sub InitSA( )
tcpClient.SendData "*CLS" & vbLf
                               ’ Resets status register
tcpClient.SendData "*RST" & vbLf
                               ’ Resets this instrument
End Sub
```

Example 3 Brief setting of Spectrum Analyzer
(Set Center freq. to 1.9984 GHz, Span to 10 MHz and Reference level to 10 dBm)

```
Public Sub SASetting( )
tcpClient.SendData "CF 1.9984GZ" & vbLf
tcpClient.SendData "SP 10MZ" & vbLf
tcpClient.SendData "RL 10DB" & vbLf
End Sub
```

Example 4 Read the setting value of Spectrum Analyzer

```
Public Sub ReadSASetting( )
CF$= Space$(20)                ' Prepares the text variable for read
tcpClient.SendData "CF?" & vbLf' Reads request of center freq.
Do While (tcpClient.BytesReceived = 0)
                               ' Waits for receiving a character
  DoEvents
Loop
tcpClient.GetData CF$          ' Reads setting value
SP$= Space$(20)                ' Prepares the text variable for read
tcpClient.SendData "SP?" & vbLf' Reads request of span freq.
Do While (tcpClient.BytesReceived = 0)
                               ' Waits for receiving a character
  DoEvents
Loop
tcpClient.GetData SP$          ' Reads setting value
```

Example 5 Display setting value

```
Call MsgBox( "Center freq.: " & CF$ & "Span freq.: " & SP$)
End Sub
```

Example 6 Read signal level using the marker function

```
Public Sub ReadMkrSignal( )
MKLevel$= Space$(20)           ' Prepares the text variable for read
tcpClient.SendData "MLN ON"& vbLf
                               ' Turns on the marker
tcpClient.SendData "PS" & vbLf ' Searches peak point of signal
tcpClient.SendData "MF?" & vbLf' Query the marker frequency
Do While (tcpClient.BytesReceived = 0)
                               ' Waits for receiving a character
  DoEvents
Loop
tcpClient.GetData MKFreq$      ' Reads it
tcpClient.SendData "ML?" & vbLf' Query the marker level
Do While (tcpClient.BytesReceived = 0)
                               ' Waits for receiving a character
  DoEvents
Loop
tcpClient.GetData MKlevel$     ' Reads it
```

Example 7 Display the freq. and level of signal

```
Call MsgBox("Marker freq.: " & MKFreq$ & " Level: " & MKLevel$)
End Sub
```

Example 8 Measure Adjacent Channel Power

```
Public Sub MeasACP( )
ResultACP$ = Space(200)
tcpClient.SendData "CF 2GZ" & vbLf’ Sets carrier freq.
tcpClient.SendData "SP 25MZ" & vbLf
```

Example 9 Setting of Adjacent channel parameters

```
tcpClient.SendData "CSBSDEL" & vbLf
                               ’ Clears Channel Space param.
tcpClient.SendData "ACPSCR CARR"& vbLf
                               ’ Sets ACP mode to Carrier
tcpClient.SendData "CARRBS 3.84MHz"& vbLf
                               ’ Sets Channel Bandwidth
tcpClient.SendData "CSBSIN 5MZ,3.84MZ" & vbLf
                               ’Adj. Channel param.
tcpClient.SendData "CSBSIN 10MZ,3.84MZ" & vbLf
                               ’ Adj. Channel param.
```

Example 10 Setting of Root Nyquist filter's parameters

```
tcpClient.SendData "ACPNQST ON" & vbLf
                               ’ Sets Nyq. Filter operation to on
tcpClient.SendData "SYMRT 3.84MZ" & vbLf
                               ’ Sets Symbol rate of filter
tcpClient.SendData "RFACT 0.22" & vbLf
                               ’ Sets Roll off factor of filter
tcpClient.SendData "ACPTM 10" & vbLf
                               ’ Sets average times
tcpClient.SendData "PMEASAVG ON" & vbLf
                               ’ Sets average func. to ON
tcpClient.SendData "ACP" & vbLf’ Starts measurement
tcpClient.SendData "*CLS;OPR 16;*SRE 128" & vbLf
                               ’Sets status byte
Stb$ = Space(10)
Do
  tcpClient.SendData "*STB?" + vbLf
  Do While (tcpClient.BytesReceived = 0)
                               ’ Waits for receiving a character
    DoEvents
  Loop
  tcpClient.GetData Stb
  If CLng(Val(Stb)) And 128 Then Exit Do
Loop

tcpClient.SendData "ACP?" + vbLf
tcpClient.GetData ResultACP$   ’ Reads out all meas. results of ACP
Call MsgBox("ACP results : " & ResultACP$)
End Sub
```

6.10 SCPI Command Reference

This chapter describes the SCPI command reference for this instrument.

6.10.1 Command Reference Syntax

This section describes the function, syntax, and parameter of each SCPI command discussed in this chapter.

- [Function description]

  How to use a command or operations when the command is executed are described.

- [SCPI command]

  Syntax when the command is sent from an external controller to this instrument is described.

  Example: Marker setting

Function description	SCPI command	Parameter	Query reply
Enable Marker	:CALCulate#1:MARKer#2:STATe @3 $1 = :CALCulate#1:MARKer#2:STATe?	Context index, Marker index, ON|OFF	1|0

Space

#1

#2

@3

1. The syntax consists of a command section and parameter section.
   The command section and parameter section are delimited by a space.
2. #1, #2, and @3 are parameters required for sending a command.

   A number that follows on # or @ corresponds to a row number in the parameter column.

   The # parameter may be omitted. If omitted, the parameter is set to 1.

   The @ parameter cannot be omitted.
3. Lowercase alphabetical characters written in syntax can be omitted.
4. [ ] shows that the command is optional.
   This command can be omitted.
5. "|" shows that only one item is required to be selected from multiple items.

- [Parameter]

  Following parameters from 1 to 7 can be omitted:

  1. Context Index

     1|2|0

       1 = Context A (RF2)

       2 = Context B (RF1)

       0 = Active context

  2. Marker Index

     1|2|3|4|5|6|7|8|9|10|0

     0 = Active marker

  3. Trace Index

     1|2|3|0

       1 = Trace A

       2 = Trace B

       3 = Trace C

       0 = Active trace

  4. Limit Line Index

     1|2

  5. SEM channel Index

     1|2|3|4|5|

  6. Spurious band Index

     1|2|3|4|5|6|7|8|9|10|11|12|13|14|15

  7. Spurious Table Index

     1|2|3

  8. Intermodulation Order Index

     3|5|7|9

     This parameter cannot be omitted.

- [Query reply]

  1. $1

     This query reply shows that one variable is replied.
     For this example, 1 or 0 is replied.

  2. Example of a query reply consisting of multiple variables

     $1,$2,$3,$4=*IDN?

6.10.2 Common Commands

This section describes IEEE common commands.

Function description	SCPI Command	Parameter	Query reply	Remarks
Goto Local (LAN)	GTL	–	–	
Local Lockout (LAN)	LLO	–	–	
Set Operation Register Mask	OPR @1 $1 = OPR?	16 bit register	16 bit register	
Query Operation Register	$1 = OPREVT?	–	16 bit register	
Set the parser command set	PARSER @1 $1 = PARSER ?	ATset|SCPIset	AT|SCPI	
REN	REN	–	–	
Clear Registers	*CLS	–	–	
Enable Standard Event Register	*ESE @1 $1 = *ESE?	8 bit register	8 bit register	
Query Standard Event Register	$1 = *ESR?	–	8 bit register	
Return various identifiers of the instrument	$1, $2, $3, $4 = *IDN?	–	Corporate Name (String), Model Name (String), Serial Number (String), Software version (String)	
Instrument Preset	*RST	–	–	
Set Service Request Enable	*SRE @1 $1 = *SRE?	8 bit register	8 bit register	
Query Status Byte	$1 = *STB?	–	8 bit register	
Execute Self Test	$1,{$2,$3} = *TST?	–	number of rows {check item (SUPP|MEM|CPU|RFRG|RFLK|LORG|LOLK|IFRG|IFLK|TGRG|TEMP), check result (Status)}	
Wait	*WAI	–	–	
Query Installed Option Number	$1,$2,...$n = *OPT?	–	Option No. (string)	

6.10.3 List of Commands

6.10.3.1 Subsystem-CALCulate

Function description	SCPI command	Parameter	Query reply	Remarks
Set Center Frequency From Delta Marker Postion Difference	:CALCulate#1:MARKer#2:DELTa[:SET]:CENTer	Context index, Marker index	--	
Set Marker Step From Marker Delta Position Difference	:CALCulate#1:MARKer#2:DELTa[:SET]:MARKer:STEP	Context index, Marker index	--	
Set Span From Delta Marker Position Difference	:CALCulate#1:MARKer#2:DELTa[:SET]:SPAN	Context index, Marker index	--	
Set Frequency Step From Marker Delta Position Difference	:CALCulate#1:MARKer#2:DELTa[:SET]:STEP	Context index, Marker index	--	
Execute X dB Down	:CALCulate#1:MARKer#2:FUNCtion:XDBDown	Context index, Marker index	--	
Execute X dB Left	:CALCulate#1:MARKer#2:FUNCtion:XDBDown:LEFT	Context index, Marker index	--	
Execute Peak Search and X dB Down	:CALCulate#1:MARKer#2:FUNCtion:XDBDown:PEAK	Context index, Marker index	--	
Execute X dB Right	:CALCulate#1:MARKer#2:FUNCtion:XDBDown:RIGHt	Context index, Marker index	--	
Get Specific Marker Information	$1,$2,$3,$4 = :CALCulate#1:MARKer#2:INFO?	Context index, Marker index	marker index (Marker index), marker enable (1|0), marker position (Position (Hz|s)), marker amplitude (Amplitude)	
Execute Next Peak Search to the Left	:CALCulate#1:MARKer#2:MAXimum:LEFT	Context index, Marker index	--	
Execute Next Peak Search	:CALCulate#1:MARKer#2:MAXimum:NEXT	Context index, Marker index	--	
Execute Next Peak Search to the Right	:CALCulate#1:MARKer#2:MAXimum:RIGHt	Context index, Marker index	--	
Execute Maximum Peak Search	:CALCulate#1:MARKer#2:MAXimum[:PEAK]	Context index, Marker index	--	
Execute Next Minimum Search	:CALCulate#1:MARKer#2:MINimum:NEXT	Context index, Marker index	--	
Execute Minimum Search	:CALCulate#1:MARKer#2:MINimum[:PEAK]	Context index, Marker index	--	
Execute Minimum Maximum Search	:CALCulate#1:MARKer#2:PTPeak	Context index, Marker index	--	
Enable Marker	:CALCulate#1:MARKer#2:STATe @3 $1 = :CALCulate#1:MARKer#2:STATe?	Context index, Marker index ON|OFF	1|0	
Select Marker Trace	:CALCulate#1:MARKer#2:TRACe @3 $1 = :CALCulate#1:MARKer#2:TRACe?	Context index, Marker index, Trace index	Trace index	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Marker Position	:CALCulate#1:MARKer#2:X @3 $1 = :CALCulate#1:MARKer#2:X?	Context index, Marker index, Frequency|Time	Position (Hz|s)	
Get Marker Absolute Position	$1 = :CALCulate#1:MARKer#2:X :ABSolute?	Context index, Marker index	Position (Hz|s)	
Get Marker Coordinates	$1, $2 = :CALCulate#1:MARKer#2:XY?	Context index, Marker index	Position (Hz|s), amplitude (Amplitude)	
Get Marker Amplitude	$1 = :CALCulate#1:MARKer#2:Y?	Context index, Marker index	Amplitude	
Get Marker Absolute Amplitude	$1 = :CALCulate#1:MARKer#2:Y :ABSolute?	Context index, Marker index	Amplitude	
Set Center Frequency from Marker Position	:CALCulate#1:MARKer#2[:SET] :CENTer	Context index, Marker index	--	
Set Marker Step from Marker Position	:CALCulate#1:MARKer#2[:SET] :MARKer:STEP	Context index, Marker index	--	
Set Reference Level from Marker Amplitude	CALCulate#1:MARKer#2[:SET] :RLEVel	Context index, Marker index	--	
Set Span from Marker Delta Position Difference	:CALCulate#1:MARKer#2[:SET] :SPAN	Context index, Marker index	--	
Set Center Frequency Step from Marker Position	:CALCulate#1:MARKer#2[:SET] :STEP	Context index, Marker index	--	
Select Active Marker	:CALCulate#1:MARKer:ACTive @2 $1 = :CALCulate#1:MARKer:ACTive?	Context index, Marker index	Marker index	
Query Markers List	$1, {$2,$3,$4,$5} = :CALCulate#1 :MARKer:ALL:INFO?	Context index	number of rows {marker index (Marker index), marker enable (1|0), marker position (Position (Hz|s)), marker amplitude (Amplitude)}	
Clear All Markers	:CALCulate#1:MARKer:AOFF	Context index	--	
Enable Continuous Peak Search	:CALCulate#1:MARKer :CPEak[:STATe] @2 $1 = :CALCulate#1:MARKer :CPEak[:STATe]?	Context index, ON|OFF	1|0	
Enable Fixed Reference Marker Mode	:CALCulate#1:MARKer:DELTa :FIXed[:STATe] @2 $1 = :CALCulate#1:MARKer:DELTa :FIXed[:STATe]?	Context index, ON|OFF	1|0	
Enable Marker Delta Mode	:CALCulate#1:MARKer:DELTa [:STATe] @2 $1 = :CALCulate#1:MARKer:DELTa [:STATe]?	Context index, ON|OFF	1|0	
Set Center Frequency from Peak	:CALCulate#1:MARKer:MAXimum [:SET]:CENTer	Context index	--	
Set Reference Level from Peak	:CALCulate#1:MARKer:MAXimum [:SET]:RLEVel	Context index	--	
Set Marker Mode	:CALCulate#1:MARKer:MODE @2 $1 = :CALCulate#1:MARKer:MODE?	Context index, POSition|DELTa	POS|DELT	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Peak Excursion	:CALCulate#1:MARKer:PEAK :EXCursion @2 $1 = :CALCulate#1:MARKer:PEAK :EXCursion?	Context index, Number	Number	
Set the Delta Marker Reference Object	:CALCulate#1:MARKer:REFerence :OBJEct @2 $1 = :CALCulate#1:MARKer:REFerence :OBJEct ?	Context index, RMARker|RLINe	RMAR|RLIN	
Query Reference Marker Absolute Position	$1 = :CALCulate#1:MARKer:REFerence :X?	Context index	Position (Hz|s)	
Query Reference Marker Absolute Amplitude	$1 = :CALCulate#1:MARKer:REFerence :Y?	Context index	Amplitude	
Turn Off Multi-Marker Mode	:CALCulate#1:MARKer:RESet	Context index	--	
Set X Axis Marker Search Area Mode	:CALCulate#1:MARKer:SEARch:X :MODE @2 $1 = :CALCulate#1:MARKer:SEARch:X :MODE?	Context index, ALL|INNer| OUTer	ALL|INN|OUT	
Set X Axis Marker Search Area Center Position	:CALCulate#1:MARKer:SEARch:X :POSition @2 $1 = :CALCulate#1:MARKer:SEARch:X :POSition?	Context index, Frequency|Time	Position (Hz|s)	
Set X axis Marker Search Area Width	:CALCulate#1:MARKer:SEARch:X :WIDTh @2 $1 = :CALCulate#1:MARKer:SEARch:X :WIDTh?	Context index, Frequency|Time	Position (Hz|s)	
Set the Marker Search Area Relative to the Display Line	:CALCulate#1:MARKer:SEARch:Y :DLINe @2 $1 = :CALCulate#1:MARKer:SEARch:Y :DLINe?	Context index, OFF|ABOVe| BELow	OFF|ABOV|BEL	
Set the Marker Search Area Relative to Limit Line 1	:CALCulate#1:MARKer:SEARch:Y :LIM#2 @3 $1 = :CALCulate#1:MARKer:SEARch:Y :LIM#2?	Context index, Limit line index, OFF|ABOVe| BELow	OFF|ABOV|BEL	
Set Marker Step	:CALCulate#1:MARKer:STEP @2 $1 = :CALCulate#1:MARKer:STEP?	Context index, Frequency|Time	Position (Hz|s)	
Enable Marker Step Auto	:CALCulate#1:MARKer:STEP :AUTO @2 $1 = :CALCulate#1:MARKer:STEP :AUTO?	Context index, ON|OFF	1|0	
Set Signal Track Y Ranging Excursion	:CALCulate#1:MARKer:TRCKing :EXCursion @2 $1 = :CALCulate#1:MARKer:TRCKing :EXCursion?	Context index, Relative amplitude	Relative amplitude	
Enable Signal Track Y Ranging	:CALCulate#1:MARKer:TRCKing :EXCursion:STATe @2 $1 = :CALCulate#1:MARKer:TRCKing :EXCursion:STATe?	Context index, ON|OFF	1|0	
Set Marker Readout Mode	:CALCulate#1:MARKer:X:READout @2 $1 = :CALCulate#1:MARKer:X :READout?	Context index, NORMal| INVerse	NORM|INV	
Set Measuring Window Position	:CALCulate#1:WINDow:POSition @2 $1 = :CALCulate#1:WINDow:POSition?	Context index, Frequency|Time	Position (Hz|s)	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Measuring Window Width	:CALCulate#1:WINDow:WIDTh @2 $1 = :CALCulate#1:WINDow:WIDTh?	Context index, Frequency|Time	Position (Hz|s)	
Insert a Limit Line Vertex	:CALCulate:LLINe#1:DATA @2 :CALCulate:LLINe#1:DATA @2	Limit line index, X-coordinate of limit line point (Time), ordinate of limit line point (Relative amplitude)	--	
Insert a Frequency Domain Limit Line Vertex	:CALCulate:LLINe#1:DATA :FREQuency @2	Limit line index, X-coordinate of table point (Frequency), ordinate of table point (Relative amplitude)	--	
Insert a Time Domain Limit Line Vertex	:CALCulate:LLINe#1:DATA:TIME @2	Limit line index, X-coordinate of limit line point (Time), ordinate of limit line point (Relative amplitude)	--	
Erase a Limit Line	:CALCulate:LLINe#1:DELete	Limit line index	--	
Erase a Frequency Domain Limit Line	:CALCulate:LLINe#1:DELete :FREQuency	Limit line index	--	
Erase a Time Domain Limit Line	:CALCulate:LLINe#1:DELete:TIME	Limit line index	--	
Enable a Limit Line	:CALCulate:LLINe#1:DISPlay @2 $1 = :CALCulate:LLINe#1:DISPlay?	Limit line index, ON|OFF	1|0	
Set Limit Lines Detection Type	:CALCulate:LLINe#1:TYPE @2 $1 = :CALCulate:LLINe#1:TYPE?	Limit line index, UPPer|LOWer	UPP|LOW	
Set Limit Lines X axis Reference	:CALCulate:LLINe:CMODe @1 $1 = :CALCulate:LLINe:CMODe?	FIXed|RELative	FIX|REL	
Set Limit Lines X axis Reference	:CALCulate:LLINe:CMODe:X @1 $1 = :CALCulate:LLINe:CMODe:X?	ABSolute|CENTer|LEFT	ABS|CENT|LEFT	
Set Limit Lines Frequency Offset	:CALCulate:LLINe:CMODe:X :OFFSet:FREQuency @1 $1 = :CALCulate:LLINe:CMODe:X :OFFSet:FREQuency?	Frequency	Frequency	
Enable Limit Lines X axis Offset	:CALCulate:LLINe:CMODe:X :OFFSet:STATe @1 $1 = :CALCulate:LLINe:CMODe:X :OFFSet:STATe?	ON|OFF	1|0	
Set Limit Lines Time Offset	:CALCulate:LLINe:CMODe:X :OFFSet:TIME @1 $1 = :CALCulate:LLINe:CMODe:X :OFFSet:TIME?	Time	Time	
Select Limit Lines Y axis Positioning	:CALCulate:LLINe:CMODe:Y @1 $1 = :CALCulate:LLINe:CMODe:Y ?	ABSolute|TOP|DLINe	ABS|TOP|DLIN	
Set Limit Lines Y axis Offset	:CALCulate:LLINe:CMODe:Y :OFFSet @1 $1 = :CALCulate:LLINe:CMODe:Y :OFFSet?	Relative amplitude	Relative amplitude	

Function description	SCPI command	Parameter	Query reply	Remarks
Enable Limit Line Y axis Offset	:CALCulate:LLINe:CMODe:Y :OFFSet:STATe @1 $1 = :CALCulate:LLINe:CMODe:Y :OFFSet:STATe?	ON|OFF	1|0	
Select Limit Line Domain	:CALCulate:LLINe:CONrol :DOMain @1 $1 = :CALCulate:LLINe:CONrol :DOMain?	FREQuency|TIME	FREQ|TIME	
Query Limit Line Application Result	$1 = :CALCulate:LLINe:FAIL?	--	Pass Fail Result	
Enable Limit Line Application	:CALCulate:LLINe:TESTing [:STATe] @1 $1 = :CALCulate:LLINe:TESTing [:STATe]?	ON|OFF	1|0	
Execute Noise Per Herz	:CALCulate:MARKer#1:FUNCtion @2 $1 = :CALCulate:MARKer:FUNCtion?	Marker index, NOISe|OFF|DBUV|DBC	NOIS|OFF|DBUV|DBC	
Set Frequency Counter Position	:CALCulate:MARKer:FCOunt :POSition @1 $1 = :CALCulate:MARKer:FCOunt :POSition?	Frequency	Frequency	
Set Frequency Counter Resolution	:CALCulate:MARKer:FCOunt :RESolution @1 $1 = :CALCulate:MARKer:FCOunt :RESolution?	Frequency	Frequency	
Query Frequency Counter Measurement	$1 = :CALCulate:MARKer:FCOunt:X?	--	Frequency	
Enable Frequency Counter	:CALCulate:MARKer:FCOunt [:STATe] @1 $1 = :CALCulate:MARKer:FCOunt [:STATe]?	ON|OFF	1|0	
Read Noise Measurement	$1 = :CALCulate:MARKer:FUNCtion :NOISe?		Power per Herz	
Set Noise Per Herz Bandwidth	:CALCulate:MARKer:FUNCtion :NOISe:BANDwidth|BWIDth @1 $1 = :CALCulate:MARKer:FUNCtion :NOISe:BANDwidth|BWIDth?	Frequency	Frequency	
Enable Continuous X dB Down	:CALCulate:MARKer:FUNCtion :XDBDown:CONTinuous[:STATe] @1 $1 = :CALCulate:MARKer:FUNCtion :XDBDown:CONTinuous[:STATe]?	ON|OFF	1|0	
Set X dB Down Excursion	:CALCulate:MARKer:FUNCtion :XDBDown:LEVel @1 $1 = :CALCulate:MARKer:FUNCtion :XDBDown:LEVel?	Relative amplitude	Relative amplitude	
Set X dB Down Display Mode	:CALCulate:MARKer:FUNCtion :XDBDown:MODE @1 $1 = :CALCulate:MARKer:FUNCtion :XDBDown:MODE?	RELative|ABSLeft|ABSRight	REL|ABSL|ABSR	
Enable Marker List Display	:CALCulate:MARKer:TABLe :STATe @1 $1 = :CALCulate:MARKer:TABLe :STATe?	ON|OFF	1|0	

Function description	SCPI command	Parameter	Query reply	Remarks
Enable Signal Track	:CALCulate:MARKer:TRCKing [:STATe] @1 $1 = :CALCulate:MARKer:TRCKing [:STATe]?	ON|OFF	1|0	
Set Marker Persistent Attribute	:CALCulate:MARKer:X:PERSist @1 $1 = :CALCulate:MARKer:X:PERSist?	INDex|VALue	IND|VAL	
Enable AM Measurement	:CALCulate:MARKer#1:FUNCtion :AM:STATe @2 $1=:CALCulate:MARKer#1:FUNCtion :AM:STATe?	Marker index ON|OFF	1|0	
Query AM Modulation Depth	:CALCulate:MARKer:FUNCtion :AM[:DEPTh]?	--	Percent	
Query AM Modulation Frequency	:CALCulate:MARKer:FUNCtion :AM:FREQuency?	--	Frequency	
Enable FM Measurement	:CALCulate:MARKer#1:FUNCtion :FM:STATe @2 $1=:CALCulate:MARKer#1:FUNCtion :FM:STATe?	Marker index ON|OFF	1|0	
Query FM Deviation	:CALCulate:MARKer:FUNCtion:FM?	--	Frequency	
Enable Modulation Freq to Sweep Time	:CALCulate:MARKer:FUNCtion :FM:COUPle[:STATe] @1 $1=:CALCulate:MARKer:FUNCtion :FM:COUPle[:STATe]?	ON|OFF	1|0	
Set Modulation Frequency	:CALCulate:MARKer:FUNCtion :FM:COUPle:FREQuency @1 $1=:CALCulate:MARKer:FUNCtion :FM:COUPle:FREQuency?	Frequency	Frequency	
Enable VSWR Measurement	:CALCulate:MARKer:FUNCtion :VSWR[:STATe] @1 $1=:CALCulate:MARKer:FUNCtion :VSWR[:STATe]?	ON|OFF	1|0	
Query VSWR	:CALCulate:MARKer:FUNCtion :VSWR:RATio?	--	Real	
Query Return Loss	:CALCulate:MARKer:FUNCtion :VSWR:LOSS?	--	DB	

6.10.3.2 Subsystem-CALibration

Function description	SCPI command	Parameter	Query reply	Remarks
Get Step Attenuator Calibration Report	:CALibration:ATTenuation $1 = :CALibration:ATTenuation @1?	--	Status	
Enable Calibration Correction	:CALibration:CORRection[:STATe] @1 $1 = :CALibration:CORRection[:STATe]?	ON|OFF	1|0	
Select Frequency Reference Source	:CALibration:FREQuency :REFerence @1 $1 = :CALibration:FREQuency :REFerence?	INTernal| EXTernal|XTAL	INT|EXT|XTAL	
Coarse Adjust Internal Frequency Reference	:CALibration:FREQuency:REFerence :COARse @1 $1 = :CALibration:FREQuency:REFerence :COARse?	8 bit register	8 bit register	
Restore Frequency Reference Adjustment Defaults	:CALibration:FREQuency:REFerence :DEFault	--	--	
Fine Adjust Internal Frequency Reference	:CALibration:FREQuency:REFerence :FINE @1 $1 = :CALibration:FREQuency:REFerence :FINE?	8 bit register	8 bit register	
Set External Frequency Reference	:CALibration:FREQuency:REFerence :FREQuency @1 $1 = :CALibration:FREQuency:REFerence :FREQuency?	Frequency	Frequency	
Save Frequency Reference Adjustments	:CALibration:FREQuency:REFerence :STORe	--	--	
Enable Flatness Correction	:CALibration:FREQuency[:STATe] @1 $1 = :CALibration:FREQuency[:STATe]?	ON|OFF	1|0	
Get Total Gain Calibration Report	:CALibration:GAIN @1 $1 = :CALibration:GAIN?	RFC1|RFC2	Status	
Get PBW Calibration Report	:CALibration:PBW @1 $1 = :CALibration:PBW?	--	Status	
Get RBW Calibration Report	:CALibration:RBW $1 = :CALibration:RBW?	--	Status	
Execute Full Calibration	:CALibration[:ALL] @1 :CALibration[:ALL]	RFC1|RFC2	--	

6.10.3.3 Subsystem-CONFigure

Function description	SCPI command	Parameter	Query reply	Remarks
Get the Current Measurement	$1 = :CONFigure?	--	NORM|ACP|AVP| CHP|HARM|IM| OBW|SEM|SPUR| TOTP|XDB| DBMH|DBUH| DBCH|SG|AM|FM	
Enable ACP Measurement	:CONFigure:ACPower	--	--	
Enable Power Average Measurement	:CONFigure:AVPower	--	--	
Enable Channel Power Measurement	:CONFigure:CHPower	--	--	
Enable Harmonics Measurement	:CONFigure:HARMonics	--	--	
Enable Intermodulation Measurement	:CONFigure:IM	--	--	
Disable All Measurements	:CONFigure:NORMal	--	--	
Enable Occupied Band Width Measurement	:CONFigure:OBW	--	--	
Enable Spectrum Emission Mask Measurement	:CONFigure:SEMask	--	--	
Enable Spurious Measurement	:CONFigure:SPURious	--	--	
Enable Total Power Measurement	:CONFigure:TOTPower	--	--	

6.10.3.4 Subsystem-COUPle

Function description	SCPI command	Parameter	Query reply	Remarks
Enable All Auto Coupling	:COUPle @1 $1 = :COUPle?	ALL|NONE	ALL|NONE	

6.10.3.5 Subsystem-DISPlay

Function description	SCPI command	Parameter	Query reply	Remarks
Set Title	:DISPlay:ANNotation:TITLe:DATA @1 $1 = :DISPlay:ANNotation:TITLe:DATA?	String	String	
Preset Dual Channel Viewer	:DISPlay:DUALchannel:PRESet	--	--	
Enable Dual Channel Viewer Mode	:DISPlay:DUALchannel:STATe @1 $1 = :DISPlay:DUALchannel:STATe ?	ON|OFF	1|0	
Enable Normalize Correction	:DISPlay:NTData#1[:STATe] @2 $1 = :DISPlay:NTData#1[:STATe]?	Trace index, ON|OFF	1|0	
Set Frequency Offset	:DISPlay:WINDow#1:TRACe :X[:SCALe]:OFFSet @2 $1 = :DISPlay:WINDow#1:TRACe :X[:SCALe]:OFFSet?	Context index, Frequency	Frequency	

Function description	SCPI command	Parameter	Query reply	Remarks
Enable Frequency Offset	:DISPlay:WINDow#1:TRACe :X[:SCALe]:OFFSet:STATe @2 $1 = :DISPlay:WINDow#1:TRACe :X[:SCALe]:OFFSet:STATe?	Context index, ON|OFF	1|0	
Set Display Line Amplitude	:DISPlay:WINDow#1:TRACe:Y :DLINe @2 $1 = :DISPlay:WINDow#1:TRACe:Y :DLINe?	Context index, Amplitude	Amplitude	
Enable Display Line	:DISPlay:WINDow#1:TRACe:Y :DLINe:STATe @2 $1 = :DISPlay:WINDow#1:TRACe:Y :DLINe:STATe?	Context index, ON|OFF	1|0	
Set Reference Line Amplitude	:DISPlay:WINDow#1:TRACe :Y[:SCALe]:NRLevel @2 $1 = :DISPlay:WINDow#1:TRACe :Y[:SCALe]:NRLevel?	Context index, Amplitude	Amplitude	
Enable Reference Line	:DISPlay:WINDow#1:TRACe :Y[:SCALe]:NRLevel:STATe @2 $1 = :DISPlay:WINDow#1:TRACe :Y[:SCALe]:NRLevel:STATe?	Context index, ON|OFF	1|0	
Select Active Context	:DISPlay:WINDow:ACTive @1 $1 = :DISPlay:WINDow:ACTive?	TOP|BOTtom	TOP|BOT	
Enable Annotation Display	:DISPlay:WINDow :ANNotation[:ALL] @1 $1 = :DISPlay:WINDow :ANNotation[:ALL]?	ON|OFF	1|0	
Set Measuring Window Position	:DISPlay:ZOOM:FREQuency :CENTer @1 $1 = :DISPlay:ZOOM:FREQuency :CENTer?	Frequency	Frequency	
Set Measuring Window Width	:DISPlay:ZOOM:FREQuency:SPAN @1 $1 = :DISPlay:ZOOM:FREQuency:SPAN?	Frequency	Frequency	
Select Multiple Screen Mode	:DISPlay:ZOOM:MODE @1 $1 = :DISPlay:ZOOM:MODE?	OFF|ZMFF| ZMTT|ZMFT	OFF|ZMFF| ZMTT|ZMFT	
Set Frequency versus Time Frequency Position	:DISPlay:ZOOM:TIME:CENTer @1 $1 = :DISPlay:ZOOM:TIME:CENTer?	Frequency	Frequency	
Set Averaging Count	:DISPlay[:WINDow#1]:TRACe#2 :AVERage:COUNt @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :AVERage:COUNt?	Context index, Trace index, Integer	Integer	
Set Trace Calculation Mode	:DISPlay[:WINDow#1]:TRACe#2 :CALCulate:MODE @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :CALCulate:MODE?	Context index, Trace index, WRITe| MAXHold| MAXCont| MINHold| VideoAVG| PowerAVG	WRIT|MAXH| MAXC|MINH| VAVG|PAVG	

Function description	SCPI command	Parameter	Query reply	Remarks
Select Trace Mode	:DISPlay[:WINDow#1]:TRACe#2 :MODE @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :MODE?	Context index, Trace index, WRITe|MAXHold|MAXCont|MINHold|VideoAVG|PowerAVG|VIEW|BLANk	WRIT|MAXH|MAXC|MINH|VAVG|PAVG|VIEW|BLAN	
Enable Trace Power Average Pause	:DISPlay[:WINDow#1]:TRACe#2 :PAVG:PAUSe @3} $1 = :DISPlay[:WINDow#1]:TRACe#2 :PAVG:PAUSe?	Context index, Trace index, ON|OFF	1|0	
Enable Trace Video Average	:DISPlay[:WINDow#1]:TRACe#2 :PAVG:STATe @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :PAVG:STATe?	Context index, Trace index, ON|OFF	1|0	
Set Trace Power Average Control Mode	:DISPlay[:WINDow#1]:TRACe#2 :PAVG:TCONrol @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :PAVG:TCONrol?	Context index, Trace index, ONCE|SLIDe|EXPonential	ONCE|SLID	
Set Trace Refresh Mode	:DISPlay[:WINDow#1]:TRACe#2 :REFResh:MODE @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :REFResh:MODE?	Context index, Trace index, WRITe|VIEW|BLANk	WRIT|VIEW|BLAN	
Enable Trace Video Average Pause	:DISPlay[:WINDow#1]:TRACe#2 :VAVG:PAUSe @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :VAVG:PAUSe?	Context index, Trace index, ON|OFF	1|0	
Enable Trace Video Average	:DISPlay[:WINDow#1]:TRACe#2 :VAVG:STATe @3 $1 = :DISPlay[:WINDow#1]:TRACe#2 :VAVG:STATe?	Context index, Trace index, ON|OFF	1|0	
Set Trace Video Average Control Mode	:DISPlay[:WINDow#1]:TRACe#2:VAVG:TCONrol @3$1 = :DISPlay[:WINDow#1]:TRACe#2:VAVG:TCONrol?	Context index, Trace index, ONCE|SLIDe|EXPonential	ONCE|SLID	
Select Active Trace	:DISPlay[:WINDow#1]:TRACe :ACTive @2 $1 = :DISPlay[:WINDow#1]:TRACe :ACTive?	Context index, Trace index	Trace index	
Order Peak in Position or Amplitude Order	:DISPlay[:WINDow#1]:TRACe:MATH :PEAK:SORT @2	Context index, FREQuency|AMPLitude		
Set dB per Screen Division	:DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:PDIVision @2 $1 = :DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:PDIVision?	Context index, Relative amplitude	Relative amplitude	
Set Reference Level	:DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel @2 $1 = :DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel?	Context index, Amplitude	Amplitude	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Reference Level Offset	:DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel:OFFSet @2 $1 = :DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel:OFFSet?	Context index, Relative amplitude	Relative amplitude	
Enable Reference Level Offset	:DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel:OFFSet:STATe @2 $1 = :DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:RLEVel:OFFSet:STATe?	Context index, ON|OFF	1|0	
Set Vertical Scale	:DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:SPACing @2 $1 = :DISPlay[:WINDow#1]:TRACe :Y[:SCALe]:SPACing?	Context index, LINear| LOGarithmic	LIN|LOG	
Acquire Trace Normalization Data	:DISPlay[:WINDow]:TRACe#1 :NCORrection:STORe	Trace index		

6.10.3.6 Subsystem-FETch

Function description	SCPI command	Parameter	Query reply	Remarks
Fetch ACP results	$1, {$2,$3,$4,$5} = :FETch:ACPower?	--	number of rows {lower channel frequency (Frequency), lower channel amplitude (Amplitude), upper channel frequency (Frequency), upper channel amplitude (Amplitude)}	
Fetch ACP Reference Power	$1 = :FETch:ACPower:RPOWer?	--	Amplitude	
Fetch Average Power Measurement	$1 = :FETch:AVPower?	--	Amplitude	
Fetch the Channel Power	$1 = :FETch:CHPower?	--	Amplitude	
Fetch the Power Spectral Density for Channel Power Measurement	$1 = :FETch:CHPower:DENSity?	--	Power per Herz	
Fetch Harmonics Results	$1, {$2,$3,$4,$5} = :FETch:HARMonics?	--	number of rows {marker index (Integer), frequency (Frequency), amplitude (Amplitude), amplitude difference (Relative amplitude)}	
Fetch the Intermodulation Results (array)	$1, {$2,$3,$4,$5, $6,$7,$8,$9, $10} = :FETch:IM?		number of rows {Lower Frequency Marker Index (Integer), Lower Frequency Marker Number (Integer), Lower Frequency Distortion Amplitude (Amplitude), Upper Frequency Marker Index (Integer), Upper Frequency Marker Number (Integer), Upper Frequency Distortion Amplitude (Amplitude), Intermodulation Product (Amplitude), Lower Frequency Test Result (Pass Fail Result), Upper Frequency Test Result (Pass Fail Result)}	
Fetch the Intermodulation Gap	$1 = :FETch:IM:DELTa?	--	Frequency	
Fetch the Intermodulation Frequency Reference	$1 = :FETch:IM:REFerence?	--	Frequency	

Function description	SCPI command	Parameter	Query reply	Remarks
Fetch OBW Results	$1, $2 = :FETch:OBW?	--	Occupied Bandwidth (Frequency), Frequency Error (Frequency)	
Fetch Spectrum Emission Mask Results	$1, {$2,$3,$4,$5, $6,$7,$8} = :FETch:SEMask?	--	number of rows {channel enabled (1|0), channel start frequency (Frequency), channel stop frequency (Frequency), channel center frequency (max power) (Frequency), absolute power (Amplitude), power relative to the carrier (Relative amplitude), test result (Pass Fail Result)}	
Fetch Spectrum Emission Mask Reference Power	$1 = :FETch:SEMask:RPOWer?	--	Amplitude	
Fetch All Spurious Results	$1, {$2,$3,$4} = :FETch:SPURious:BAND#1 ?	Spurious band index	number of rows {spurious frequency (Frequency), spurious level (Amplitude), test (Pass Fail Result)}	
Fetch Total Power	$1 = :FETch:TOTPower?	--	Amplitude	
Fetch Power Spectral Density for Total Power Measurement	$1 = :FETch:TOTPower:DENSity?	--	Power per Herz	

6.10.3.7 Subsystem-FORMat

Function description	SCPI command	Parameter	Query reply	Remarks
Set File Format	:FORMat:FILE @1 $1 = :FORMat:FILE?	BINary|XML	BIN|XML	
Set Trace Buffer Transfer Format	:FORMat[:TRACe][:DATA] @1 $1 = :FORMat[:TRACe][:DATA]?	ASCii | BINary	ASC|BIN	

6.10.3.8 Subsystem-HCOPy

Function description	SCPI command	Parameter	Query reply	Remarks
Set Hard Copy Device	:HCOPy:DEVice:TYPE @1 $1 = :HCOPy:DEVice:TYPE ?	PRINter|USB	PRIN|USB	
Copy to the Selected Device	:HCOPy[:IMMediate]	--	--	

6.10.3.9 Subsystem-INITiate

Function description	SCPI command	Parameter	Query reply	Remarks
Set Sweep Mode	INITiate:CONTinuous @1 $1 = :INITiate:CONTinuous?	ON|OFF	1|0	
Abort and Restart Sweep	INITiate:RESTart	--	--	
Start Sweeping Until Measurement End	:INITiate:SMEAsure	--	--	
Execute Sweep to the End	:INITiate:TS	--	--	

6.10.3.10 Subsystem-INPut

Function description	SCPI command	Parameter	Query reply	Remarks
Set Input RF Connector	INPut:CONNector @1 $1 = :INPut:CONNector?	RFC1|RFC2	RFC1|RFC2	

6.10.3.11 Subsystem-MMEMory

Function description	SCPI command	Parameter	Query reply	Remarks
Delete File	:MMEMory:DELete @1	File name	--	
Enable Saving ACP Configuration	:MMEMory:ITEM:ACP @1 $1 = :MMEMory:ITEM:ACP?	ON|OFF	1|0	
Enable Saving Antenna Correction Table	:MMEMory:ITEM:ANTEnna @1 $1 = :MMEMory:ITEM:ANTEnna?	ON|OFF	1|0	
Enable Saving Channel Table	:MMEMory:ITEM:CHANnel @1 $1 = :MMEMory:ITEM:CHANnel?	ON|OFF	1|0	
Enable Saving General Instrument Setup	:MMEMory:ITEM:CONFig @1 $1 = :MMEMory:ITEM:CONFig?	ON|OFF	1|0	
Enable Saving Limit Lines	:MMEMory:ITEM:LIMit#1 @2 $1 = :MMEMory:ITEM:LIMit#1?	Limit line index, ON|OFF	1|0	
Enable Saving SEM Configuration	:MMEMory:ITEM:SEMask @1 $1 = :MMEMory:ITEM:SEMask?	ON|OFF	1|0	
Enable Saving Spurious Tables	:MMEMory:ITEM:SPURious#1 @2 $1 = :MMEMory:ITEM:SPURious#1?	Spurious Table Index, ON|OFF	1|0	
Enable Saving Trace Data	:MMEMory:ITEM[:WINDow#1] :TRACe#2 @3 $1 = :MMEMory:ITEM[:WINDow#1] :TRACe#2?	Context index, Trace index, ON|OFF	1|0	
Enable Normalize Data	:MMEMory:ITEM[:WINDow#1] :TRACe#2:NRMalize @3 $1 = :MMEMory:ITEM[:WINDow#1] :TRACe#2:NRMalize?	Context index, Trace index, ON|OFF	1|0	
Recall Information from a File	:MMEMory:LOAD:ITEMs @1	File name	--	
Set File Media	:MMEMory:MEDIA @1 $1 = :MMEMory:MEDIA?	FLASh|USB	FLAS|USB	

Function description	SCPI command	Parameter	Query reply	Remarks
Rename File	:MMEMory:MOVE @1, @2	Source filename (String), Destination filename (String)	--	
Save File Save File AS	:MMEMory:STORe:ITEMs MMEMory:STORe:ITEMs @1	--	--	
Synchronize File to Media	:MMEMory:SYNChronize @1	FLASh|USB	FLAS|USB	
Enable File Write Protection	:MMEMory:WLOCk[:STATe] @1, @2	File name (String), Write protect enable (ON|OFF)	--	
Get BMP/PNG Screen Image	:MMEMory:DUMP @1?	BMP|PNG	Binary stream	
Get Data File	:MMEMory:DATA @1	String (file name)	Binary stream	
Get Screen Image File	:MMEMory:IMAGe @1	String (file name)	Binary stream	

6.10.3.12 Subsystem-OUTPut

Function description	SCPI command	Parameter	Query reply	Remarks
Enable Tracking Generator	:OUTPut[:STATe] @1 $1 = :OUTPut[:STATe]?	ON|OFF	1|0	

6.10.3.13 Subsystem-READ

Function description	SCPI command	Parameter	Query reply	Remarks
Read ACP results	$1, {$2,$3,$4,$5} = :READ:ACPower?	--	number of rows {lower channel frequency (Frequency), lower channel amplitude (Amplitude), upper channel frequency (Frequency), upper channel amplitude (Amplitude)}	
Read ACP Reference Power	$1 = :READ:ACPower:RPOWer?	--	Amplitude	
Read Average Power Measurement	$1 = :READ:AVPower?	--	Amplitude	
Read the Channel Power	$1 = :READ:CHPower?	--	Amplitude	
Read the Power Spectral Density for Channel Power Measurement	$1 = :READ:CHPower:DENSity?	--	Power per Herz	
Read Harmonics Results	$1, {$2,$3,$4,$5} = :READ:HARMonics?	--	number of rows {marker index (Integer), frequency (Frequency), amplitude (Amplitude), amplitude difference (Relative amplitude)}	

Function description	SCPI command	Parameter	Query reply	Remarks
Read the Intermodulation Results (array)	$1, {$2,$3,$4,$5, $6,$7,$8,$9, $10} = :READ:IM?		number of rows {Lower Frequency Marker Index (Integer), Lower Frequency Marker Number (Integer), Lower Frequency Distortion Amplitude (Amplitude), Upper Frequency Marker Index (Integer), Upper Frequency Marker Number (Integer), Upper Frequency Distortion Amplitude (Amplitude), Intermodulation Product (Amplitude), Lower Frequency Test Result (Pass Fail Result), Upper Frequency Test Result (Pass Fail Result)}	
Read the Intermodulation Gap	$1 = :READ:IM:DELTa?	--	Frequency	
Read the Intermodulation Frequency Reference	$1 = :READ:IM:REFerence?	--	Frequency	
Read OBW Results	$1, $2 = :READ:OBW?	--	Occupied Bandwidth (Frequency), Frequency Error (Frequency)	
Read Spectrum Emission Mask Results	$1, {$2,$3,$4,$5, $6,$7,$8} = :READ:SEMask?	--	number of rows {channel enabled (1|0), channel start frequency (Frequency), channel stop frequency (Frequency), channel center frequency (max power) (Frequency), absolute power (Amplitude), power relative to the carrier (Relative amplitude), test result (Pass Fail Result)}	
Read Spectrum Emission Mask Reference Power	$1 = :READ:SEMask:RPOWer?	--	Amplitude	
Read All Spurious Results	$1, {$2,$3,$4} = :READ:SPURious:BAND#1 ?	Spurious band index	number of rows {spurious frequency (Frequency), spurious level (Amplitude), test (Pass Fail Result)}	
Read Total Power	$1 = :READ:TOTPower?	--	Amplitude	
Read Power Spectral Density for Total Power Measurement	$1 = :READ:TOTPower:DENSity?	--	Power per Herz	

6.10.3.14 Subsystem-SENSe

Function description	SCPI command	Parameter	Query reply	Remarks
Set Averaging Count	[:SENSe#1]:AVERage:COUNt @2 $1 = [:SENSe#1]:AVERage:COUNt?	Context index, Integer	Integer	
Enable RMS Detector	[:SENSe#1]:AVERage:TYPE @2 $1 = [:SENSe#1]:AVERage:TYPE?	Context index, RMS|VIDeo	RMS|VID	
Set EMC Filter	[:SENSe#1]:BANDwidth:EMC @1 $1 = [:SENSe#1]:BANDwidth:EMC ?	Context index, AUTO|W200| W9K|W120k|W1M	AUTO|W200| W9K|W120|W1M	
Set EMC Enable	[:SENSe#1]:BANDwidth:EMC :STATe @1 $1 = [:SENSe#1]:BANDwidth:EMC :STATe ?	Context index, ON|OFF	1|0	
Set Video Bandwidth	[:SENSe#1]:BANDwidth:VIDeo @2 $1 = [:SENSe#1]:BANDwidth:VIDeo?	Context index, Frequency	Frequency	
Enable Video Band Width Auto Coupling	[:SENSe#1]:BANDwidth:VIDeo :AUTO @2 $1 = [:SENSe#1]:BANDwidth:VIDeo :AUTO?	Context index, ON|OFF	1|0	
Set Resolution Band Width	[:SENSe#1]:BANDwidth [:RESolution] @2 $1 = [:SENSe#1]:BANDwidth [:RESolution]?	Context index, Frequency	Frequency	
Enable Resolution Band Width Auto Coupling	[:SENSe#1]:BANDwidth [:RESolution]:AUTO @2 $1 = [:SENSe#1]:BANDwidth [:RESolution]:AUTO?	Context index, ON|OFF	1|0	
PLL Band Width	[:SENSe]:BANDwidth:PLL @1 $1 = [:SENSe]:BANDwidth:PLL?	AUTO|MEDIum| NARRow	AUTO|MEDI| NARR	
Enable All Auto Coupling - Context Dependent Command	[:SENSe#1]:COUPle @2 $1 = [:SENSe#1]:COUPle?	Context index, ALL|NONE	ALL|NONE	
Enable Trace Detector Auto Selection	[:SENSe#1]:DETector#2:AUTO @3 $1 = [:SENSe#1]:DETector#2:AUTO?	Context index, Trace index, ON|OFF	1|0	
Set Trace Detector	[:SENSe#1]:DETector#2 [:FUNCtion] @3 $1 = [:SENSe#1]:DETector#2 [:FUNCtion]?	Context index, Trace index, NORMal|POSitive| NEGative|SAMPle| AVERage	NORM|POS| NEG|SAMP| AVER	
Set Center Frequency	[:SENSe#1]:FREQuency:CENTer @2 $1 = [:SENSe#1]:FREQuency:CENTer?	Context index, Frequency	Frequency	
Set Center Frequency Step	[:SENSe#1]:FREQuency:CENTer :STEP @2 $1 = [:SENSe#1]:FREQuency:CENTer :STEP?	Context index, Frequency	Frequency	
Enable Center Frequency Step Auto	[:SENSe#1]:FREQuency:CENTer :STEP:AUTO @2 $1 = [:SENSe#1]:FREQuency:CENTer :STEP:AUTO?	Context index, ON|OFF	1|0	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Center Channel	[:SENSe#1]:FREQuency:CHANnel :CENTer @2 $1 = [:SENSe#1]:FREQuency:CHANnel :CENTer?	Context index, Channel number	Channel number	
Enable Setting Center Frequency as Channel	[:SENSe#1]:FREQuency:CHANnel :CENTer:STATe @2 $1 = [:SENSe#1]:FREQuency:CHANnel :CENTer:STATe?	Context index, ON|OFF	1|0	
Enable Channel Formula	[:SENSe#1]:FREQuency:CHANnel :FORMula#2:STATe @3 $1 = [:SENSe#1]:FREQuency:CHANnel :FORMula#2:STATe?	Context index, Integer, ON|OFF	1|0	
Enable Start Channel Frequency Offset	[:SENSe#1]:FREQuency:CHANnel :OFFSet:STARt:STATe @2 $1 = [:SENSe#1]:FREQuency:CHANnel :OFFSet:STARt:STATe?	Context index, ON|OFF	1|0	
Enable Stop Channel Frequency Offset	[:SENSe#1]:FREQuency:CHANnel :OFFSet:STOP:STATe @2 $1 = [:SENSe#1]:FREQuency:CHANnel :OFFSet:STOP:STATe?	Context index, ON|OFF	1|0	
Set Start Channel	[:SENSe#1]:FREQuency:CHANnel :STARt @2 $1 = [:SENSe#1]:FREQuency:CHANnel :STARt?	Context index, Channel number	Channel number	
Enable Setting Start Frequency as Channel	[:SENSe#1]:FREQuency:CHANnel :STARt:STATe @2 $1 = [:SENSe#1]:FREQuency:CHANnel :STARt:STATe?	Context index, ON|OFF	1|0	
Set Stop Channel	[:SENSe#1]:FREQuency:CHANnel :STOP @2 $1 = [:SENSe#1]:FREQuency:CHANnel :STOP?	Context index, Channel number	Channel number	
Enable Setting Stop Frequency as Channel	[:SENSe#1]:FREQuency:CHANnel :STOP:STATe @2 $1 = [:SENSe#1]:FREQuency:CHANnel :STOP:STATe?	Context index, ON|OFF	1|0	
Enable Image Identification Mode	[:SENSe#1]:FREQuency :IMIDentify[:STATe] @2 [:SENSe#1]:FREQuency :IMIDentify[:STATe]?	Context index, ON|OFF	1|0	
Enable Image Suppression Mode	[:SENSe#1]:FREQuency :IMSUppression[:STATe] @2 [:SENSe#1]:FREQuency :IMSUppression[:STATe]?	Context index, ON|OFF	1|0	
Set Frequency Span	[:SENSe#1]:FREQuency:SPAN @2 $1 = [:SENSe#1]:FREQuency:SPAN?	Context index, Frequency	Frequency	
Set Span to Full Span	[:SENSe#1]:FREQuency:SPAN:FULL	Context index		
Restore Last Span Setting	[:SENSe#1]:FREQuency:SPAN:PREVious	Context index		
Set Span to Zero Span (Time Domain)	[:SENSe#1]:FREQuency:SPAN:ZERO	Context index		
Set Start Frequency	[:SENSe#1]:FREQuency:STARt @2 $1 = [:SENSe#1]:FREQuency:STARt?	Context index, Frequency	Frequency	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Stop Frequency	[:SENSe#1]:FREQuency:STOP @2 $1 = [:SENSe#1]:FREQuency:STOP?	Context index, Frequency	Frequency	
Set Input Attenuation	[:SENSe#1]:POWer[:RF] :ATTenuation @2 $1 = [:SENSe#1]:POWer[:RF] :ATTenuation?	Context index, Relative amplitude	Relative amplitude	
Enable Attenuation Auto	[:SENSe#1]:POWer[:RF] :ATTenuation:AUTO @2 $1 = [:SENSe#1]:POWer[:RF] :ATTenuation:AUTO?	Context index, ON|OFF	1|0	
Set Minimum Attenuation	[:SENSe#1]:POWer[:RF] :ATTenuation:MINimum @2 $1 = [:SENSe#1]:POWer[:RF] :ATTenuation:MINimum?	Context index, Relative amplitude	Relative amplitude	
Enable High Sensitivity	[:SENSe#1]:POWer[:RF] :GAIN[:STATe] @2 $1 = [:SENSe#1]:POWer[:RF] :GAIN[:STATe]?	Context index, ON|OFF	1|0	
Set Sweep Time	[:SENSe#1]:SWEep:TIME @2 $1 = [:SENSe#1]:SWEep:TIME?	Context index, Time	Time	
Enable Sweep Time Auto Coupling	[:SENSe#1]:SWEep:TIME:AUTO @2 $1 = [:SENSe#1]:SWEep:TIME:AUTO?	Context index, ON|OFF	1|0	
Set Window Sweep Enable	[:SENSe#1]:SWEep :WINDow[:STATe] @2 $1 = [:SENSe#1]:SWEep :WINDow[:STATe] ?	Context index, ON|OFF	1|0	
Set ACP Maximum Sweep Count	[:SENSe]:ACPower:AVERage :COUNt @1 $1 = [:SENSe]:ACPower:AVERage :COUNt?	Integer	Integer	
Set ACP Average Control Mode	[:SENSe]:ACPower:AVERage :TCONrol @1 $1 = [:SENSe]:ACPower:AVERage :TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	
Enable ACP Averaging	:SENSe]:ACPower:AVERage [:STATe] @1 $1 = [:SENSe]:ACPower:AVERage [:STATe]?	ON|OFF	1|0	
Set ACP Carrier Band Width	[:SENSe]:ACPower :BANDwidth|BWIDth:INTegration @1 $1 = [:SENSe]:ACPower :BANDwidth|BWIDth:INTegration?	Frequency	Frequency	
Enable ACP Channel Window Display	[:SENSe]:ACPower:BSWIndow @1 $1 = [:SENSe]:ACPower:BSWIndow?	FULL|CARRier	FULL|CARR	
Restore Previous Settings for ACP	[:SENSe]:ACPower:DATA:LOAD	--	--	
Save Current Settings for ACP	[:SENSe]:ACPower:DATA:SAVE	--	--	
Set Root Nyquist Filter Roll-off Factor (ACP)	[:SENSe]:ACPower:FILTer[:RRC] :ALPHA @1 $1 = [:SENSe]:ACPower:FILTer[:RRC] :ALPHA?	Number	Number	

Function description	SCPI command	Parameter	Query reply	Remarks
Set Root Nyquist Filter Symbol Rate (ACP)	[:SENSe]:ACPower:FILTer[:RRC] :SRATe @1 $1 = [:SENSe]:ACPower:FILTer[:RRC] :SRATe?	Frequency	Frequency	
Enable Root Nyquist Filter	[:SENSe]:ACPower :FILTer[:RRC][:STATe] @1 $1 = [:SENSe]:ACPower :FILTer[:RRC][:STATe]?	ON|OFF	1|0	
Enable ACP Graph Display	[:SENSe]:ACPower:GRAPh @1 $1 = [:SENSe]:ACPower:GRAPh?	ON|OFF	1|0	
Insert New Channel in ACP Channel Table	[:SENSe]:ACPower:OFFSet:DATA @1	Channel Spacing (Frequency), Channel Width (Frequency)	--	
Delete ACP Channel Table	[:SENSe]:ACPower:OFFSet:DATA :DELete	--	--	
Select ACP Trace	[:SENSe]:ACPower:TRACe @1 $1 = [:SENSe]:ACPower:TRACe?	Trace index	Trace index	
Set Average Power Maximum Sweep Count	[:SENSe]:AVPower:AVERage :COUNt @1 $1 = [:SENSe]:AVPower:AVERage :COUNt?	Integer	Integer	
Set Average Power Averaging Control Mode	[:SENSe]:AVPower:AVERage :TCONrol @1 $1 = [:SENSe]:AVPower:AVERage :TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	
Enable Average Power Averaging	[:SENSe]:AVPower:AVERage [:STATe] @1 $1 = [:SENSe]:AVPower:AVERage [:STATe]?	ON|OFF	1|0	
Restore Power Average Setting	[:SENSe]:AVPower:DATA:LOAD	--	--	
Save Current Settings for Power Average	[:SENSe]:AVPower:DATA:SAVE	--	--	
Set Power Average Trace	[:SENSe]:AVPower:TRACe @1 $1 = [:SENSe]:AVPower:TRACe?	Trace index	Trace index	
Set Power Average Range	[:SENSe]:AVPower:WINDow @1 $1 = [:SENSe]:AVPower:WINDow?	ON|OFF	1|0	
Set Measuring Window Position (Average Power)	[:SENSe]:AVPower:WINDow :POSition @1 $1 = [:SENSe]:AVPower:WINDow :POSition?	Frequency	Frequency	
Set Measuring Window Width (Average Power)	[:SENSe]:AVPower:WINDow :WIDTh @1 $1 = [:SENSe]:AVPower:WINDow :WIDTh?	Frequency	Frequency	
Set VBW to RBW Ration	[:SENSe]:BANDwidth:VIDeo :RATio @1 $1 = [:SENSe]:BANDwidth:VIDeo :RATio?	Number	Number	
Enable VBW to RBW ratio Auto	[:SENSe]:BANDwidth:VIDeo:RATio :AUTO @1 $1 = [:SENSe]:BANDwidth:VIDeo:RATio :AUTO?	ON|OFF	1|0	

Function description	SCPI command	Parameter	Query reply	Remarks
Set RBW to SPAN ratio	[:SENSe]:BANDwidth[:RESolution]:RATio @1 $1 = [:SENSe]:BANDwidth[:RESolution]:RATio?	Number	Number	
Enable RBW to SPAN Ration Auto	[:SENSe]:BANDwidth[:RESolution]:RATio:AUTO @1 $1 = [:SENSe]:BANDwidth[:RESolution]:RATio:AUTO?	ON|OFF	1|0	
Set Channel Power Maximum Sweep Count	[:SENSe]:CHPower:AVERage:COUNt @1 $1 = [:SENSe]:CHPower:AVERage:COUNt?	Integer	Integer	
Set Channel Power Average Control Mode	[:SENSe]:CHPower:AVERage:TCONrol @1 $1 = [:SENSe]:CHPower:AVERage:TCONrol?	ONCE|SLIDe|EXPonential	ONCE|SLID	
Enable Channel Power Averaging	[:SENSe]:CHPower:AVERage[:STATe] @1 $1 = [:SENSe]:CHPower:AVERage[:STATe]?	ON|OFF	1|0	
Restore Channel Power Settings	[:SENSe]:CHPower:DATA:LOAD	--	--	
Save Current Settings for Channel Power	[:SENSe]:CHPower:DATA:SAVE	--	--	
Select Channel Power Trace	[:SENSe]:CHPower:TRACe @1 $1 = [:SENSe]:CHPower:TRACe?	Trace index	Trace index	
Set Measuring Window Position (Channel Power)	[:SENSe]:CHPower:WINDow:POSition @1 $1 = [:SENSe]:CHPower:WINDow:POSition?	Frequency	Frequency	
Set Measuring Window Width (Channel Power)	[:SENSe]:CHPower:WINDow:WIDTh @1 $1 = [:SENSe]:CHPower:WINDow:WIDTh?	Frequency	Frequency	
Insert New Correction Factor Vertex	[:SENSe]:CORRection:CSET:DATA @1	X-coordinate of table point (Frequency), ordinate of table point (Relative amplitude)	--	
Delete Correction Factor Table	[:SENSe]:CORRection:CSET:DELete	--	--	
Enable User Correction Factor	[:SENSe]:CORRection:CSET:STATe @1 $1 = [:SENSe]:CORRection:CSET:STATe?	ON|OFF	1|0	
Set Input Impedance	[:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude] @1 $1 = [:SENSe]:CORRection:IMPedance[:INPut][:MAGNitude]?	Input impedance	Input impedance	

Function description	SCPI command	Parameter	Query reply	Remarks
Define Channel Formula Parameters	[:SENSe]:FREQuency:CHANnel :FORMula#1 @2	Integer, Minimum Channel (Channel number), Maximum Channel (Channel number), Origin Frequency (Frequency), Channel Spacing (Frequency), Channel Offset (Channel number)	--	
Select Channel Setting Mode	[:SENSe]:FREQuency:CHANnel :MODE @1 $1 = [:SENSe]:FREQuency:CHANnel :MODE?	CALCulate|TABLe	CALC|TABL	
Set Start Channel Frequency Offset	[:SENSe]:FREQuency:CHANnel :OFFSet:STARt @1 $1 = [:SENSe]:FREQuency:CHANnel :OFFSet:STARt?	Frequency	Frequency	
Set Stop Channel Frequency Offset	[:SENSe]:FREQuency:CHANnel :OFFSet:STOP @1 $1 = [:SENSe]:FREQuency:CHANnel :OFFSet:STOP?	Frequency	Frequency	
Insert New Channel Into Channel Table	[:SENSe]:FREQuency:CHANnel :TABLe:DATA @1	Channel (Channel number), Frequency (Frequency)	--	
Delete Channel Table	[:SENSe]:FREQuency:CHANnel :TABLe:DELete	--	--	
Query Current Measurement Function	$1 = [:SENSe]:FUNCtion?	--	NORM|ACP| AVP|CHP| HARM|IM| OBW|SEM| SPUR|TOTP| XDB|DBMH| DBUH|DBCH| SG|AM|FM	
Auto tune	[:SENSe]:TUNE:AUTO	--	--	
Peak Zoom	[:SENSe]:FREQuency:SPAN:ZOOM	--	--	
Set Harmonics Maximum Sweep Count	[:SENSe]:HARMonics:AVERage :COUNt @1 $1 = [:SENSe]:HARMonics:AVERage :COUNt?	Integer	Integer	
Set Harmonics Averaging Control Mode	[:SENSe]:HARMonics:AVERage :TCONrol @1 $1 = [:SENSe]:HARMonics:AVERage :TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	
Enable Harmonics Averaging	[:SENSe]:HARMonics: AVERage[:STATe] @1 $1 = [:SENSe]:HARMonics: AVERage[:STATe]?	ON|OFF	1|0	
Set User Defined Harmonics Fundamental Frequency	[:SENSe]:HARMonics :FUNDamental @1 $1 = [:SENSe]:HARMonics :FUNDamental?	Frequency	Frequency	

Function description	SCPI command	Parameter	Query reply	Remarks
Enable User Defined Harmonics Fundamental Frequency	[:SENSe]:HARMonics:FUNDamental :STATe @1 $1 = [:SENSe]:HARMonics:FUNDamental :STATe?	ON|OFF	1|0	
Set Harmonics Maximum Order	[:SENSe]:HARMonics:NUMBer @1 $1 = [:SENSe]:HARMonics:NUMBer?	Integer	Integer	
Set Intermodulation Maximum Sweep Count	[:SENSe]:IM:AVERage:COUNt @1 $1 = [:SENSe]:IM:AVERage:COUNt?	Integer	Integer	
Set Intermodulation Averaging Control	[:SENSe]:IM:AVERage:TCONrol @1 $1 = [:SENSe]:IM:AVERage:TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	
Enable Intermodulation Averaging	[:SENSe]:IM:AVERage[:STATe] @1 $1 = [:SENSe]:IM:AVERage[:STATe]?	ON|OFF	1|0	
Restore Intermodulation Settings	[:SENSe]:IM:DATA:LOAD	--	--	
Save Current Settings for Intermodulation	[:SENSe]:IM:DATA:SAVE	--	--	
Enable Limit Testing for Intermodulation	[:SENSe]:IM:LIM:STATe @1 $1 = [:SENSe]:IM:LIM:STATe?	ON|OFF	1|0	
Set Intermodulation Maximum Order	[:SENSe]:IM:ORDER @1 $1 = [:SENSe]:IM:ORDER?	Integer	Integer	
Set Intermodulation Limits	[:SENSe]:IM:THReshold#1 @2 $1 = [:SENSe]:IM:THReshold#1?	Intermodulation order index, Relative amplitude	Relative amplitude	
Set Occupied Band Width Maximum Sweep Count	[:SENSe]:OBWidth:AVERage :COUNt @1 $1 = [:SENSe]:OBWidth:AVERage :COUNt?	Integer	Integer	
Set Occupied Band Width Averaging Control Mode	[:SENSe]:OBWidth:AVERage :TCONrol @1 $1 = [:SENSe]:OBWidth:AVERage :TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	
Enable Occupied Band Width Averaging	[:SENSe]:OBWidth:AVERage [:STATe] @1 $1 = [:SENSe]:OBWidth:AVERage [:STATe]?	ON|OFF	1|0	
Restore Occupied Band Width Settings	[:SENSe]:OBWidth:DATA:LOAD	--	--	
Save Current Settings for Occupied Band Width	[:SENSe]:OBWidth:DATA:SAVE	--	--	
Set Occupied Band Width Percentage	[:SENSe]:OBWidth:PERCent @1 $1 = [:SENSe]:OBWidth:PERCent?	Percent	Percent	
Select Occupied Band Width Trace	[:SENSe]:OBWidth:TRACe @1 $1 = [:SENSe]:OBWidth:TRACe?	Trace index	Trace index	
Set Spectrum Emission Mask Maximum Sweep Count	[:SENSe]:SEMask:AVERage :COUNt @1 $1 = [:SENSe]:SEMask:AVERage :COUNt?	Integer	Integer	
Set Spectrum Emission Mask Averaging Control Mode	[:SENSe]:SEMask:AVERage :TCONrol @1 $1 = [:SENSe]:SEMask:AVERage :TCONrol?	ONCE|SLIDe| EXPonential	ONCE|SLID	

Function description	SCPI command	Parameter	Query reply	Remarks
Enable Spectrum Emission Mask Averaging	[:SENSe]:SEMask:AVERage [:STATe] @1 $1 = [:SENSe]:SEMask:AVERage [:STATe]?	ON|OFF	1|0	
Set Spectrum Emission Mask Carrier Band Width	[:SENSe]:SEMask :BANDwidth|BWIDth @1 $1 = [:SENSe]:SEMask :BANDwidth|BWIDth?	Frequency	Frequency	
Restore Spectrum Emission Mask Settings	[:SENSe]:SEMask:DATA:LOAD	--	--	
Save Current Settings for Spectrum Emission Mask	[:SENSe]:SEMask:DATA:SAVE	--	--	
Set Root Nyquist Filter Roll-off Factor (SEM)	[:SENSe]:SEMask:FILTer[:RRC] :ALPHA @1 $1 = [:SENSe]:SEMask:FILTer[:RRC] :ALPHA?	Number	Number	
Set Root Nyquist Filter Symbol Rate (SEM)	[:SENSe]:SEMask:FILTer[:RRC] :SRATe @1 $1 = [:SENSe]:SEMask:FILTer[:RRC] :SRATe?	Frequency	Frequency	
Enable Root Nyquist Filter (SEM)	[:SENSe]:SEMask:FILTer[:RRC] [:STATe] @1 $1 = [:SENSe]:SEMask:FILTer [:RRC][:STATe]?	ON|OFF	1|0	
Insert New Row into SEM Definition Table	[:SENSe]:SEMask:OFFSet:DATA @1	start frequency (Frequency), stop frequency (Frequency), ibw (Frequency), start absolute limit (Relative amplitude), stop absolute limit (Relative amplitude), start relative limit (Relative amplitude), stop relative limit (Relative amplitude), test mode (ABSolute| RELative|AND|OR)	--	
Delete SEM Definition Table	[:SENSe]:SEMask:OFFSet:DATA:DELete	--	--	
Set Reference Power Calculation Mode (SEM)	[:SENSe]:SEMask:RPOWer @1 $1 = [:SENSe]:SEMask:RPOWer?	CHANnel|PEAK	CHAN|PEAK	
Select Spectrum Emission Mask Trace	[:SENSe]:SEMask:TRACe @1 $1 = [:SENSe]:SEMask:TRACe?	Trace index	Trace index	
Set Spurious Active Configuration Table	[:SENSe]:SPURious:LIST:ACTive @1 $1 = [:SENSe]:SPURious:LIST:ACTive?	Spurious Table Index	Spurious Table Index	

Function description	SCPI command	Parameter	Query reply	Remarks
Insert New Band into Active Spurious Configuration Table	[:SENSe]:SPURious:LIST:DATA @1, @2, @3, @4, @5, @6, @7, @8, @9	Band start frequency (Frequency), Band stop frequency (Frequency), Resolution bandwidth (), Video bandwidth (), Sweep time (), Reference level (Amplitude), Attenuation (), Pre-amplifier (ON|OFF), Limit (Amplitude)	--	
Delete Active Spurious Configuration Table	[:SENSe]:SPURious:LIST:DELete	--	--	
Set Number of Points in Trace Buffers	[:SENSe]:SWEep:POINts @1 $1 = [:SENSe]:SWEep:POINts?	Integer	Integer	
Set Total Power Maximum Sweep Count	[:SENSe]:TOTPower:AVERage :COUNt @1 $1 = [:SENSe]:TOTPower:AVERage :COUNt?	Integer	Integer	
Set Total Power Averaging Control Mode	[:SENSe]:TOTPower:AVERage :TCONrol @1 $1 = [:SENSe]:TOTPower:AVERage :TCONrol?	ONCE|SLIDe|EXPonential	ONCE|SLID	
Enable Total Power Averaging	[:SENSe]:TOTPower :AVERage[:STATe] @1 $1 = [:SENSe]:TOTPower :AVERage[:STATe]?	ON|OFF	1|0	
Restore Total Power Settings	[:SENSe]:TOTPower:DATA:LOAD	--	--	
Save Current Settings for Total Power	[:SENSe]:TOTPower:DATA:SAVE	--	--	
Select Total Power Trace	[:SENSe]:TOTPower:TRACe @1 $1 = [:SENSe]:TOTPower:TRACe?	Trace index	Trace index	

6.10.3.15 Subsystem-SOURce

Function description	SCPI command	Parameter	Query reply	Remarks
Enable TG Reference Line	:SOURce:CORRection :RLINe[:STATe] @1 $1 = :SOURce:CORRection :RLINe[:STATe]?	ON|OFF	1|0	
Acquire Trace Normalization Data	:SOURce:CORRection:TRACe#1 :CAPTure	Trace index	--	
Enable TG Normalization Correction	:SOURce:CORRection:TRACe#1 :STATe @2 $1 = :SOURce:CORRection:TRACe#1 :STATe?	Trace index, ON|OFF	1|0	
Set TG Frequency Offset	:SOURce:FREQuency[:OFFSet] @1 $1 = :SOURce:FREQuency[:OFFSet]?	Frequency	Frequency	
Enable TG Frequency Offset	:SOURce:FREQuency[:OFFSet] :STATe @1 $1 = :SOURce:FREQuency[:OFFSet] :STATe?	ON|OFF	1|0	
Set TG Level Offset	:SOURce:POWer[:LEVel] [:IMMediate]:OFFSet @1 $1 = :SOURce:POWer[:LEVel] [:IMMediate]:OFFSet?	Relative amplitude	Relative amplitude	
Enable TG Level Offset	:SOURce:POWer[:LEVel] [:IMMediate]:OFFSet:STATe @1 $1 = :SOURce:POWer[:LEVel] [:IMMediate]:OFFSet:STATe?	ON|OFF	1|0	
Set TG Level	:SOURce:POWer[:LEVel] [:IMMediate][:AMPLitude] @1 $1 = :SOURce:POWer[:LEVel] [:IMMediate][:AMPLitude]?	Amplitude	Amplitude	

6.10.3.16 Subsystem-SYSTem

Function description	SCPI command	Parameter	Query reply	Remarks
Execute Factory Initialization	:SYSTem:FACTory:PRESet	--	--	
Execute System Preset	:SYSTem:PRESet	--	--	
Enable Menu Refresh	:SYSTem:REFResh:MENU[:STATe] @1 $1 = :SYSTem:REFResh:MENU[:STATe]	ON|OFF	1|0	
Enable Screen Refresh	:SYSTem:REFResh:SCREen[:STATe] @1 $1 = :SYSTem:REFResh:SCREen[:STATe]	ON|OFF	1|0	
Date	:SYSTem:DATE @1, @2, @3	<year>,<month>, <day>	--	
Time	:SYSTem:TIME @1, @2, @3	<hour>,<minute>, <second>	--	

6.10.3.17 Subsystem-TRACe

Function description	SCPI command	Parameter	Query reply	Remarks
Copy Traces	:TRACe:COPY @1, @2	TRACE1|TRACE2| TRACE3, TRACE1|TRACE2| TRACE3	--	
Set Trace Buffer	:TRACe:DATA @1, @2 $1 = :TRACe:DATA @1 ?	TRACE1|TRACE2| TRACE3, Binary block| {Integer}	Binary Block| {Integer}	
Disable Trace Math Operations	:TRACe:MATH:NORMal	--	--	
Order Peak in Position or Amplitude Order	:TRACe:MATH:PEAK:SORT @1	FREQuency| AMPLitude	--	
Subtract Traces	:TRACe:MATH:SUBTract @1, @2, @3	TRACE1|TRACE2| TRACE3, TRACE1|TRACE2| TRACE3, TRACE1|TRACE2| TRACE3	--	
Subtract Display Line To Trace	:TRACe:MATH:SUBTract:DLINe @1	TRACE1|TRACE2| TRACE3	--	

6.10.3.18 Subsystem-TRIGger

Function description	SCPI command	Parameter	Query reply	Remarks
Set Trigger Delay	:TRIGger#1[:SEQuence]:DELay @2 $1 = :TRIGger#1[:SEQuence]:DELay?	Context index, Time	Time	
Set External Trigger Level (V)	:TRIGger#1[:SEQuence]:EXTernal :LEVel @2 $1 = :TRIGger#1[:SEQuence]:EXTernal :LEVel?	Context index, Amplitude	Amplitude	
Set External Trigger Slope	:TRIGger#1[:SEQuence]:EXTernal[1] :SLOPe @2 $1 = :TRIGger#1[:SEQuence]:EXTernal[1] :SLOPe?	Context index, NEGative|POSitive	NEG|POS	
Set IF Trigger Level	:TRIGger#1[:SEQuence]:IF:LEVel @2 $1 = :TRIGger#1[:SEQuence]:IF:LEVel?	Context index, Amplitude	Amplitude	
Set IF Trigger Slope	:TRIGger#1[:SEQuence]:IF:SLOPe @2 $1 = :TRIGger#1[:SEQuence]:IF:SLOPe?	Context index, NEGative|POSitive	NEG|POS	
Set Trigger Source	:TRIGger#1[:SEQuence]:SOURce @2 $1 = :TRIGger#1[:SEQuence]:SOURce?	Context index, IMMediate|IF|VIDeo|EXT	IMM|IF|VID|EXT	
Set Video Trigger Level	:TRIGger#1[:SEQuence]:VIDeo :LEVel @2 $1 = :TRIGger#1[:SEQuence]:VIDeo :LEVel?	Context index, Amplitude	Amplitude	
Set Video Trigger Slope	:TRIGger#1[:SEQuence]:VIDeo :SLOPe @2} $1 = :TRIGger#1[:SEQuence]:VIDeo :SLOPe?	Context index, NEGative|POSitive	NEG|POS	

6.10.3.19 Subsystem-UNIT

Function description	SCPI command	Parameter	Query reply	Remarks
Set Amplitude Units	:UNIT#1:POWer @2 $1 = :UNIT#1:POWer?	Context index, DBM|DBMV|DBUV|DBUE|DBPW|V|W	DBM|DBMV|DBUV|DBUE|DBPW|V|W	

6.10.3.20 Units

Function	Code
dB	DB
dBm	DBM
dBmV	DBMV
dBμV	DBUV
dBμVemf	DBUE
dBpW	DBPW
Volt	V
milliVolt	MV
microVolt	UV
nanoVolt	NV
Watt	W
milliWatt	MW
Hz	HZ
kHz = 1e3 Hz	KHZ
MHz = 1e6 Hz	MHZ
GHz = 1e9 Hz	GHZ
second	S
millisecond	MS
microsecond	US
ppm	PPM

6.10.4 Example Programs in which SCPI Commands Are Used

Example 1 Master-resetting this instrument and setting the center frequency

```
Private Sub cmdEx1_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' Reset the instrument, then set center frequency to 30 MHz
  Call ibwrt(spa, "*RST")
  Call ibwrt(spa, ":FREQ:CENT 30 MHZ")
End Sub
```

Example 2 Setting the start frequency to 300 kHz, stop frequency to 800 kHz, and frequency offset to 50 kHz

```
Private Sub cmdEx2_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  'Set Start Frequency to 300 kHz, Stop Frequency to 800 kHz
  'Set frequency Offset to 50 kHz
  Call ibwrt(spa, ":FREQ:START 300 KHZ;STOP 800 KHZ")
  Call ibwrt(spa, ":DISPLay:WINDow:TRACe:X:OFFSet 50KHZ;OFFSET:STATe ON")
End Sub
```

Example 3 Setting the reference level to 87 dBμV, dB/div to 5 dB, and RBW to 100 kHz

```
Private Sub cmdEx3_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' Set the units to dBUV
  Call ibwrt(spa, ":UNIT:POWER DBUV")
  ' Set the reference level to 87 dBuV
  Call ibwrt(spa, ":DISP:TRACE:Y:RLEVEL 87")
  ' Both commands above have the same effect as:
  '   call ibwrt(spa,":disp:trace:y:rlevel 87 dbuv")

  ' Set the amplitude per division to 5 db / division
  Call ibwrt(spa, ":DISP:TRACE:Y:PDIV 5 DB")
  ' Set the resolution bandwidth to 100 kHz
  Call ibwrt(spa, ":SENS:BAND:RESOLUTION 100 KHZ")

End Sub
```

Example 4   Setting the center frequency, frequency span, and attenuator by using variables

```
Private Sub cmdEx4_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' tbxCenter, tbxSpan and tbxAttenuation are 3 text boxes on the form
  ' A user would give a value in MHz to center, span and a value in dB to attenuation
  ' in this example we shall show how to use these
  Call ibwrt(spa, ":FREQ:CENTER " + tbxCenter.Text + " MHZ")
  Call ibwrt(spa, ":FREQ:SPAN " + tbxSpan.Text + " MHZ")
  Call ibwrt(spa, ":POWER:ATT " + tbxAttenuation.Text + " DB")

End Sub
```

Example 5   Saving and recalling the set values

```
Private Sub cmdEx5_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' In this example, we shall setup a few instrument parameters,
  ' set a title, and save these information to a file.
  ' Execute an instrument preset, then restore the saved configuration

  ' Define the instrument title
  Dim LabelBuff As String
  LabelBuff = "Spectrum Analyzer U37xx"

  ' Set up the instrument
  Call ibwrt(spa, ":FREQ:CENT 30 MHZ")
  Call ibwrt(spa, ":FREQ:SPAN 1 MHZ")
  Call ibwrt(spa, ":DETECTOR POS")
Call ibwrt(spa, ":DISP:ANN:TITLE:DATA """ + LabelBuff + """")    ' set the title

  ' Save the data to a file called "SET5"
  Call ibwrt(spa, ":MMEMORY:STORE:ITEMS ""SET5""")

  ' Clear the configuration
  Call ibwrt(spa, "*RST")

  ' Recall the configuration
  Call ibwrt(spa, ":MMEMORY:LOAD:ITEMS ""SET5""")

End Sub
```

Example 6 Filling limit line table 1 and displaying limit line 1

```
'   Configuring a Limit Line
Private Sub cmdEx6_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' in this example, we shall use the frequency specific commands
  ' however, it is also possible to select the limit line domain
  ' call ibwrt(spa,":CALC:LLIN:CONT:DOMAIN FREQ")
  ' and to use the genertic commands ":CALC:LLIN:DELETE" and ":CALC:LLIN:DATA"
  ' Clear limit line table 1 (frequency)
  Call ibwrt(spa, ":CALC:LLIN1:DELETE:FREQ")
  ' select dBuV as Amplitude Units
  Call ibwrt(spa, ":UNIT:POWER DBUV")

  ' Fill in the limit line table (1)
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 25 MHZ, 49.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 35 MHZ, 49.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 35 MHZ, 51.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 55 MHZ, 51.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 55 MHZ, 54.3")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 65 MHZ, 54.3")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 65 MHZ, 57.0")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 68 MHZ, 57.0")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 68 MHZ, 60.0")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 75 MHZ, 60.0")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 75 MHZ, 62.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 82 MHZ, 62.5")
  Call ibwrt(spa, ":CALC:LLIN1:DATA:FREQ 82 MHZ, 64.7")

  ' Set up the instrument
  Call ibwrt(spa, ":FREQ:START 0 HZ")
  Call ibwrt(spa, ":FREQ:STOP 100 MHZ")

  ' Display limit line 1
  Call ibwrt(spa, ":CALC:LLIN1:DISPLAY ON")

End Sub
```

Example 7 Reading and displaying the marker level

```
Private Sub cmdEx2_1_Click()
  'Initialization
  Dim spa As Integer
  spa = ildev(0, 8, 0, T10s, 1, 0)
  ilclr (spa)

  ' Reading and displaying the marker level

  'Set up the instrument
  Call ibwrt(spa, ":FREQ:CENT 30 MHZ")
  Call ibwrt(spa, ":FREQ:SPAN 1 MHZ")

  ' Enable marker 1
  Call ibwrt(spa, ":CALC:MARK1:STATE ON")
  ' Set the marker to 30 MHz
  Call ibwrt(spa, ":CALC:MARK1:x 30 MHZ")
'    Call ibwrt(spa, ":SENS:SWEEP:TIME 2 S")
  ' Execute a single-uninterruptible sweep
  Call ibwrt(spa, ":INIT:TS")

  ' Request the marker level read-out and read the answer
  Call ibwrt(spa, ":CALC:MARK1:y ?")
  Dim myBuff As String
  Dim sepa As Integer

  myBuff = Space(30)
  Call ilrd(spa, myBuff, 30)
  sepa = InStr(1, myBuff, vbCrLf)
  txbAnswer.Text = "MarkerLevel " + Left(myBuff, sepa - 1)


End Sub
```

Example 8 Reading trace A data in ASCII format

```
Private Sub cmdAsciiTraceGet_Click()
    'Initialization
    Dim spa As Integer
    spa = ildev(0, 8, 0, T10s, 1, 0)
    ilclr (spa)

    Dim i
    Dim trace(1001) As Integer ' array to contain the trace points amplitudes
                               ' at the end
    Dim tmp As String
    Dim before As Integer
    Dim after As Integer
    Dim cnt


    Dim buf As String
    buf = Space(1001 * 6)
       ' set the trace transfer format to ASCII
    Call ibwrt(spa, ":FORMAT ASCII")
       ' query trace A (1) amplitudes
    Call ibwrt(spa, ":TRACE:DATA TRACE1 ?")
         ' read trace A buffer ascii points on 5 maximum characters (digits)
         ' separated by a comma
    Call ilrd(spa, buf, 1001 * 6)
    cnt = ibcnt
    i = 1
    before = 1
        ' loop on each point in the buffer
    Do
        ' find the next comma separator
        after = InStr(before, buf, ",")
        If after = 0 Then
            tmp = Mid(buf, before)
        Else
            tmp = Mid(buf, before, after - before)
        End If
           ' tmp contains the next point amplitude in ASCII
        trace(i) = CInt(tmp)
        before = after + 1
        i = i + 1
    Loop Until (i > 1001)

End Sub
```

Example 9 Reading trace A data in binary format

```
Private Sub cmdGetBinary_Click()
    'Initialization
    Dim spa As Integer
    spa = ildev(0, 8, 0, T10s, 1, 0)
    ilclr (spa)

    Dim buf(1001 * 2 + 5 + 2) As Integer
    Dim cnt As Integer
    Dim tmp As Integer
    Dim ch As String
    Dim size As Integer
    Dim Hsize As Integer
    Dim sSize As String

    Dim word As Integer
    Dim trace(1001) As Integer

       ' set trace A in view mode to guaranty data integrity
    Call ibwrt(spa, ":DISP:TRACE1:MODE VIEW ")
       ' select trace transfer mode as BINARY
    Call ibwrt(spa, ":FORMAT BIN")
       ' read the buffer
    Call ibwrt(spa, ":TRACE:DATA TRACE1 ?")
    Call ilrdi(spa, buf, 1001 * 2 + 5 + 2)
    cnt = ibcnt
    ' interpret the header
    tmp = buf(0) And &HFF&
    ch = Chr(tmp)
    If ch <> "#" Then Exit Su   'this is incorrect - first character of the
                                'header is a #
    tmp = (buf(0) And &HFF00&) / 256
    Hsize = tmp - Asc("0")       ' header size
    sSize = ""
       ' next Hsize characters describe the buffer size in bytes
    For i = 1 To Hsize / 2
        word = buf(i)
        tmp = word And &HFF&
        ch = Chr(tmp)
        sSize = sSize + ch
        tmp = (word And &HFF00&) / 256
        ch = Chr(tmp)
        sSize = sSize + ch
    Next

    'now we know how many bytes the binary buffer contains: size
    size = CInt(sSize)
    Dim offset As Integer
    offset = 2 ' number of integers we have read in the buffer - assuming the
              ' number of bytes is on 4 digits
    For i = 1 To size / 2
           ' loop on each integer and re-interpret the bytes
        word = buf(offset + i)
        trace(i) = (word And &HFF&) * 256 + (word And &HFF00&) / 256
    Next

End Sub
```

Example 10 Entering data to trace A buffer in ASCII format

```
'Initialization
    Dim spa As Integer
    spa = ildev(0, 8, 0, T10s, 1, 0)
    ilclr (spa)

    Dim buf As String
    Dim tracePoint As Integer

    ' set trace A in view mode (otherwise, sent data would be cleared
    ' immediately by the next acquisition)
    Call ibwrt(spa, ":DISP:TRACE1:MODE VIEW")
       ' select ASCII as the trace transfer format
    Call ibwrt(spa, ":FORMAT ASCII")

       ' build the trace setting command
       ' header first
    buf = ":trace:data trace1 "      'note the ending space. required!

       ' then each point amplitude, separated by a comma
    For i = 0 To 1000
        tracePoint = 7000 + 5000# * Sin(i / 50#)
        Debug.Print tracePoint
        buf = buf + ", " + CStr(tracePoint)
    Next

       ' send the trace setting command
    Call ibwrt(spa, buf)

End Sub
```

Example 11 Outputs a current screen image as bitmap data and writes it to a file.
Data, which is approximately 150 KB for the BMP format or approximately 7 KB for the PNG format, is output.

```
Call ibclr(spa)                ’ Performs a Device Clear.

Call ibwrt(spa, ":MMEM:DUMP BMP?")
                               ’ Requests bitmap data output.
Call ibrdf(spa, "bitmap.bmp")  ’ Writes bitmap data to a file.
```

Example 12 Writes a screen image that is copied into a USB memory to a file.

```
Call ibclr(spa)                ’ Performs a Device Clear.

Call ibwrt(spa, ":MMEM:IMAG 'copy020.png'?")
                               ’ Specifies a screen image name and requests
                               ’ its output.
Call ibrdf(spa, "copy020.png") ’ Writes a screen image to a file.
```

7. SPECIFICATIONS

This chapter describes the specifications of this instrument.

The performance of this instrument is guaranteed under the following conditions unless otherwise specified.

- The specified calibration period must be adhered to.
- After turning on the power and warming-up for 5 minutes or more under the specified environmental conditions.
- After automatic calibration has been performed.

Reference data is provided to help you use the product efficiently, but it will not guarantee the performance of this instrument. The data is described by using the following notation.

Specifications (spec.):	Indicates the specifications within which the performance of the product can be guaranteed. Includes variations in the performance of each product, uncertainty in calibrations, and changes in performance due to the environment.
Typical value (typ.):	Indicates the average performance of the product. Excludes variations in the performance of each product, uncertainty in measurements, and changes in performance due to the environment.
Nominal value (nom.):	Indicates the general performance of the product and does not refer to the guaranteed performance.

7.1 U3741 Performance Specifications

7.1.1 Frequency

Description	Specifications
Frequency range Built-in preamp	9 kHz to 3 GHz 10 MHz to 3 GHz
Frequency readout accuracy	± (Marker readout × Freq.reference accuracy + SPAN × SPAN accuracy + Residual FM)
Internal frequency reference stability Aging rate Temperature stability	 $\pm 2 \times 10^{-6}$/ year $\pm 2.5 \times 10^{-6}$ (0°C to 50°C)
Marker frequency counter Resolution Accuracy	RBW < 100 kHz, Signal level S/N > 50 dB, SPAN < 100 MHz 1 Hz to 1 kHz ± (Counter readout × Freq.reference accuracy + Residual FM + 1LSB)
Frequency stability Residual FM	(When the internal frequency reference is used.) ≤ 60 Hz p-p/100 ms
Frequency span Range Accuracy	 0, 5 kHz to Full ± 1%
Signal purity (When the internal frequency reference is used.)	-85 dBc/Hz, 10 kHz offset (SPAN < 200 kHz)
Resolution bandwidth (RBW) Range Accuracy	 100 Hz to 1 MHz (1, 3 sequence) ±12%
Video bandwidth (VBW) Range	 10 Hz to 3 MHz (1, 3 sequence)

7.1.2 Sweep

Description	Specifications
Sweep	
Sweep time setting range	
Zero span	50 µs to 1000 s
Spectrum mode	20 ms to 1000 s
Sweep time accuracy	±2% (Zero Span)
Sweep mode	CONTINUOUS, SINGLE, GATE
Trigger function	
Trigger source	Free run, Video, IF, External

7.1.3 Amplitude

Description	Specifications
Amplitude measurement range	+30 dBm to displayed average noise level
Maximum safe input level	
Average continuous power	+30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator ≥ 0 dB) Preamp On
DC voltage	±50 VDCmax
Input attenuator range	0 to 50 dB, 10 dB step
Display range	100, 50, 20, 10, 5 dB, Linear
Scale unit	dBm, dBmV, dBµV, dBµVemf, dBpW, W, V
Reference level setting range	
Log scale	-140 dBm to +40 dBm
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

7.1.4 Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz)	
Frequency	20 MHz
Amplitude	-20 dBm
Accuracy	±0.3 dB
Scale display accuracy	
Log	±0.5 dB/10 dB ±0.5 dB/80 dB ±0.2 dB/1 dB
Total level accuracy	(After performing the automatic calibration, Signal level: -10 dBm to -50 dBm, Preamp Off, Input attenuator: 10 dB, REF = 0 dBm, Temperature +20°C to +30°C) ±0.8 dB Frequency range 10 MHz to 3 GHz ±1.0 dB Frequency range 9 kHz to 3 GHz

7.1.5 Dynamic Range

Description	Specifications
Displayed average noise level	Ref level < -45 dBm RBW = 100 Hz -123 dBm + 2 f (GHz)dB f < 2.5 GHz Preamp Off -123 dBm + 2.5 f (GHz)dB f ≥ 2.5 GHz Preamp Off -138 dBm + 3 f (GHz)dB Preamp On
1 dB gain compression	Frequency range > 20 MHz > -5 dBm Preamp Off > -25 dBm Preamp On
Second harmonic distortion	< -70 dBc (Preamp Off, Mixer input level: -30 dBm, Frequency > 20 MHz)
Third order intermodulation distortion (TOI)	(Frequency range > 20 MHz, Preamp Off, Mixer input level: -20 dBm, Frequency separation: 200 kHz) < -60 dBc
Image responses, Multiple responses, and Out-of-band responses	< -60 dBc, Mixer input level: -20 dBm
Residual responses	(Frequency > 1 MHz, Preamp Off) < -90 dBm

7.1.6 Input and Output

Description	Specifications
RF input	
Connector	Type-N (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	Input attenuator ≥ 10 dB < 1.5:1
Calibration signal output	
Connector	BNC (f) on the front panel
Impedance	50 Ω (nom.)
Frequency	20 MHz
Level	-20 dBm
External trigger input	
Connector	BNC (f) on the rear panel
Impedance	10 kΩ (nom.), DC coupling
Trigger level	0 V to 5 V
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency [MHz]	1, 1.544, 2.048, 5, 10, 12.8, 13, 13.824, 14.4, 15.36, 15.4, 16.8, 19.2, 19.44, 19.6608, 19.68, 19.8, 20, 26
Level	0 dBm to +16 dBm
21.4 MHz IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Output level	Approximately mixer input level +10 dB at 20 MHz center frequency
Battery mount	
Connector	Antonbauer QR mount
External DC input	
Connector	XLR-4
Voltage range	11 V to 17 V
GPIB	IEEE-488 bus connector
USB-A	USB1.1 on the front and rear panels
LAN	RJ45 on the rear panel 10/100Base-T, Protocol TCP/IP
Video out	VGA (15pin f) on the rear panel
Sound out	Small monophonic jack

7.2 U3751 Performance Specifications

7.2.1 Frequency

Description	Specifications
Frequency range	9 kHz to 8 GHz
Frequency band	9 kHz to 3.1 GHz Band0 3.0 GHz to 8 GHz Band1
Built-in preamp	10 MHz to 8 GHz
Frequency readout accuracy	± (Marker readout × Freq.reference accuracy + SPAN × SPAN accuracy + Residual FM)
Internal frequency reference stability	
Aging rate	±2 × 10^{-6}/ year
Temperature stability	±2.5 × 10^{-6} (0°C to 50°C)
Marker frequency counter	RBW < 100 kHz, Signal level S/N > 50 dB, SPAN < 100 MHz
Resolution	1 Hz to 1 kHz
Accuracy	± (Counter readout × Freq.reference accuracy + Residual FM + 1LSB)
Frequency stability	(When the internal frequency reference is used.)
Residual FM	≤ 60 Hz p-p/100 ms
Frequency span	
Range	0, 5 kHz to Full
Accuracy	± 1%
Signal purity (When the internal frequency reference is used.)	-85 dBc/Hz, 10 kHz offset (SPAN < 200 kHz)
Resolution bandwidth (RBW)	
Range	100 Hz to 3 MHz (1, 3 sequence)
Accuracy	±12%
Video bandwidth (VBW)	
Range	10 Hz to 3 MHz (1, 3 sequence)

7.2.2 Sweep

Description	Specifications
Sweep	
Sweep time setting range	
Zero span	50 μs to 1000 s
Spectrum mode	20 ms to 1000 s
Sweep time accuracy	±2% (Zero Span)
Sweep mode	REPEAT, SINGLE
Trigger function	
Trigger source	Free run, Video, IF, External

7.2.3 Amplitude

Description	Specifications
Amplitude measurement range	+30 dBm to displayed average noise level
Maximum safe input level	
Average continuous power	+30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator ≥ 10 dB) Preamp On
DC voltage	±15 VDCmax
Input attenuator range	0 to 50 dB, 10 dB step
Display range	100, 50, 20, 10, 5 dB, Linear
Scale unit	dBm, dBmV, dBμV, dBμVemf, dBpW, W, V
Reference level setting range	
Log scale	-140 dBm to +40 dBm
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

7.2.4 Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz)	
Frequency	20 MHz
Amplitude	-20 dBm
Accuracy	±0.3 dB
Scale display accuracy	
Log	±0.5 dB/10 dB ±0.5 dB/80 dB ±0.2 dB/1 dB
Total level accuracy	(After performing the automatic calibration, Image Suppression Off, Signal level: -10 dBm to -50 dBm, Preamp Off, Input attenuator: 10dB, REF = 0 dBm, Temperature 20°C to 30°C) ±0.8 dB Frequency range 10 MHz to 3.1 GHz ±1.0 dB Frequency range 3.1 GHz to 8 GHz ±1.5 dB Frequency range 9 kHz to 10 MHz

7.2.5 Dynamic Range

Description	Specifications
Displayed average noise level	Frequency range 10 MHz to 8 GHz Ref level < -45 dBm RBW = 100 Hz -123 dBm + 2 f (GHz)dB Band0 Preamp Off -122 dBm + 1 f (GHz)dB Band1 Preamp Off -138 dBm + 3 f (GHz)dB Band0 Preamp On -139 dBm + 1.3 f (GHz)dB Band1 Preamp On
1 dB gain compression	Frequency range 10 MHz to 8 GHz > -8 dBm Preamp Off > -25 dBm Preamp On
Second harmonic distortion	<-70 dBc (Preamp Off, Mixer input level: -40 dBm, Frequency > 200 MHz) <-75 dBc typ (Preamp Off, Mixer input level: -30 dBm, Frequency > 300 MHz)
Third order intermodulation distortion (TOI)	(Frequency range 10 MHz to 8 GHz, Preamp Off, Mixer input level: -20 dBm, Frequency separation: 200 kHz) -50 dBc
Image responses, Multiple responses, and Out-of-band responses	(Image Suppression On) < 60 dBc
Residual responses	(Frequency 10 MHz to 8 GHz) < -80 dBm Preamp Off

7.2.6 Input and Output

Description	Specifications
RF input	
Connector	Type-N (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	Input attenuator ≥ 10 dB < 1.7:1 (< 3.0 GHz) < 2.0:1 (> 3.0 GHz)
Calibration signal output	
Connector	BNC (f) on the front panel
Impedance	50 Ω (nom.)
Frequency	20 MHz
Level	-20 dBm
External trigger input	
Connector	BNC (f) on the rear panel
Impedance	10 kΩ (nom.), DC coupling
Trigger level	0 V to 5 V
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency [MHz]	1, 1.544, 2.048, 5, 10, 12.8, 13, 13.824, 14.4, 15.36, 15.4, 16.8, 19.2, 19.44, 19.6608, 19.68, 19.8, 20, 26
Level	0 dBm to +16 dBm
21.4 MHz IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Output level	Approximately mixer input level +10 dB at 20 MHz center frequency
Battery mount	
Connector	Antonbauer QR mount
External DC input	
Connector	XLR-4
Voltage range	11 V to 17 V
GPIB	IEEE-488 bus connector
USB-A	USB1.1 on the front and rear panels
LAN	RJ45 on the rear panel 10/100Base-T, Protocol TCP/IP
Video out	VGA (15pin f) on the rear panel

7.3 U3771/U3772 Performance Specifications

7.3.1 Frequency

Description	Specifications
Frequency range [RF Input 1]	9 kHz to 8 GHz: U3771/U3772
Frequency band	9 kHz to 3.1 GHz: Band0 3.0 GHz to 8 GHz: Band1
Built-in preamp	10 MHz to 8 GHz
Frequency range [RF Input 2]	10 MHz to 31.8 GHz U3771 10 MHz to 43 GHz U3772
Frequency band	10 MHz to 3.1 GHz Band0 (N=1) 3.0 GHz to 8.0 GHz Band1 (N=1) 7.8 GHz to 14.573 GHz Band2 (N=2) 14.4288 GHz to 28.0 GHz Band3 (N=4) 27.8 GHz to 31.8 GHz Band4 (N=6) (U3771) 27.8 GHz to 43.0 GHz Band4 (N=6) (U3772)
Frequency readout accuracy	± (Marker readout × Freq.reference accuracy + SPAN × SPAN accuracy + Residual FM)
Internal frequency reference stability	
Aging rate	$\pm 2 \times 10^{-6}$/ year
Temperature stability	$\pm 2.5 \times 10^{-6}$ (0°C to 50°C)
Marker frequency counter	RBW < 100 kHz, Signal level S/N > 50 dB, SPAN < 100 MHz
Resolution	1 Hz to 1 kHz
Accuracy	± (Counter readout × Freq.reference accuracy + Residual FM + 1LSB)
Frequency stability	(When the internal frequency reference is used.)
Residual FM	≤ 60 Hz *N p-p/100 ms
Frequency span	
Range	0, 5 kHz to Full
Accuracy	± 1%
Signal purity (When the internal frequency reference is used.)	(-85 + 20logN) dBc/Hz, 10 kHz offset (SPAN < 200 kHz)
Resolution bandwidth (RBW)	
Range	100 Hz to 3 MHz (1, 3 sequence)
Accuracy	±12%
Video bandwidth (VBW)	
Range	10 Hz to 3 MHz (1, 3 sequence)

7.3.2 Sweep

Description	Specifications
Sweep	
Sweep time setting range	
Zero span	50 µs to 1000 s
Spectrum mode	20 ms to 1000 s
Sweep time accuracy	±2% (Zero Span)
Sweep mode	REPEAT, SINGLE
Trigger function	
Trigger source	Free run, Video, IF, External

7.3.3 Amplitude

Description	Specifications
Amplitude measurement range	
[RF Input 1]	Noise to +30 dBm
[RF Input 2]	Noise to +10 dBm
Maximum safe input level	
[RF Input 1]	+30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator = 0 dB) Preamp On
DC voltage	±15 VDCmax
[RF Input 2]	+10 dBm (Input attenuator = 0 dB)
DC voltage	±25 VDCmax
Input attenuator range	
[RF Input 1]	0 to 50 dB, 10 dB step
[RF Input 2]	0 to 30 dB, 10 dB step
Display range	100, 50, 20, 10, 5 dB, Linear
Scale unit	dBm, dBmV, dBµV, dBµVemf, dBpW, W, V
Reference level setting range	
[RF Input 1]	-140 dBm to +40 dBm
[RF Input 2]	-140 dBm to +20 dBm
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

7.3.4 Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz)	
Frequency	20 MHz
Amplitude	-20 dBm
Accuracy	±0.3 dB
Scale display accuracy	
Log	±0.5 dB/10 dB ±0.5 dB/80 dB ±0.2 dB/1 dB
Total level accuracy	(After performing the automatic calibration, Image Suppression Off, Signal level: -10 dBm to -50 dBm, Preamp Off, Input attenuator: 10 dB, REF = 0 dBm, Temperature 20°C to 30°C)
[RF Input 1]	±0.8 dB (Band0) Frequency 10 MHz to 3.1 GHz ±1 dB (Band1) Frequency 3.1 GHz to 8 GHz ±1.5 dB Frequency 9 kHz to 10 MHz
[RF Input 2]	±0.8 dB (Band0) Frequency 10 MHz to 3.1 GHz ±1 dB (Band1) Frequency 3.1 GHz to 8 GHz ±3.0 dB (Band2) Frequency 7.8 GHz to 14.573 GHz ±3.5 dB (Band3) Frequency 14.4288 GHz to 28.0 GHz ±4.5 dB (Band4) Frequency 27.8 GHz to 31.8 GHz (U3771) ±4.5 dB (Band4) Frequency 27.8 GHz to 43 GHz (U3772)

7.3.5 Dynamic Range

Description	Specifications
Displayed average noise level [RF Input 1] [RF Input 2]	Frequency range > 10 MHz Ref level < -45 dBm RBW = 100 Hz -123 dBm + 2 f (GHz)dB Band0 Preamplifier Off -122 dBm + 1.2 f (GHz)dB Band1 Preamplifier Off -138 dBm + 3 f (GHz)dB(TBD) Band0 Preamplifier On -139 dBm + 1.4 f (GHz)dB Band1 Preamplifier On -121 dBm + 2 f (GHz)dB Band0 -120 dBm + 1.5 f (GHz)dB Band1 -111 dBm (-118 dBm typ.) Band2 -109 dBm (-117 dBm typ.) Band3 -105 dBm (-112 dBm typ.) Band4
1 dB gain compression	Frequency range > 10 MHz > -8 dBm Preamp Off > -25 dBm Preamp On
Second harmonic distortion [RF Input 1] [RF Input 2]	Preamp Off -70 dBc Mixer input level: -40 dBm, Frequency > 200 MHz <-75 dBc typ Mixer input level: -30 dBm, Frequency > 300 MHz -40 dBc Mixer input level: -30 dBm, Frequency 300 MHz ~ 31.8 GHz (U3771) 300 MHz ~ 40 GHz (U3772)
Third order intermodulation distortion (TOI)	(Frequency range > 10 MHz, Preamp Off, Mixer input level: -20 dBm, 2-Signal separation:1 MHz) -50 dBc
Image responses, Multiple responses, and Out-of-band responses	(Image Suppression On, Span < 5 GHz) < 60 dBc
Residual responses	(Frequency range > 10 MHz) -80 dBm Preamp Off

7.3.6 Input and Output

Description	Specifications
RF input 1	
Connector	Type-N (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	< 1.7:1 (< 3.0 GHz) Band0 Input attenuator ≥ 10 dB < 2.0:1 (> 3.0 GHz) Band1 Input attenuator ≥ 10 dB
RF input 2	
Connector	Type-K (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	1.7 : 1 (typ.) Band0 Input attenuator ≥ 10 dB 2.0 : 1 (typ.) Band1, Band2, Band3, Input attenuator ≥ 10 dB 2.5 : 1 (typ.) Band4 Input attenuator ≥ 10 dB
Calibration signal output	
Connector	BNC (f) on the front panel
Impedance	50 Ω (nom.)
Frequency	20 MHz
Level	-20 dBm
External trigger input	
Connector	BNC (f) on the rear panel
Impedance	10 kΩ (nom.), DC coupling
Trigger level	0 V to 5 V
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency [MHz]	1, 1.544, 2.048, 5, 10, 12.8, 13, 13.824, 14.4, 15.36, 15.4, 16.8, 19.2, 19.44, 19.6608, 19.68, 19.8, 20, 26
Amplitude	0 dBm to +16 dBm
21.4 MHz IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Output level	Approximately mixer input level +10 dB at 20 MHz center frequency
Battery mount	
Connector	Antonbauer QR mount
External DC input	
Connector	XLR-4
Voltage range	11 V to 17 V
GPIB	IEEE-488 bus connector
USB-A	USB1.1 on the front and rear panels
LAN	RJ45 on the rear panel 10/100Base-T, Protocol TCP/IP
Video out	VGA (15pin f) on the rear panel

7.4 General Specifications

Description	Specifications
Operation environment	Ambient temperature: 0°C to +50°C Relative humidity: 85% or less (no condensation)
Storage environmental range	Ambient temperature: -20°C to +60°C Relative humidity: 85% or less (no condensation)
AC Power supply input	AC100 V to 120 V, 50 Hz/60 Hz AC220 V to 240 V, 50 Hz/60 Hz (Automatically switches the input voltage between 100 V AC and 220 V AC.)
DC Power input	DC +11 V to +17 V
Power consumption	100 VA or less For the AC power supply 70 W or less For the DC power supply
Dimensions	Approximately 308 mm (W) × 175 mm (H) × 209 mm (D) Approximately 337 mm (W) × 190 mm (H) × 307 mm (D) (Including the handle and feet)
Mass	Approximately 5.0 kg or less (without option) U3741 Approximately 5.6 kg or less (without option) U3751 Approximately 6 kg or less (without option) U3771/U3772

7.5 Options

7.5.1 Option 10 2-Channel Input Option (Can be Installed only in the U3741)

Item	Description
Frequency	Conforms to the standard specifications except the items shown below and the specifications when OPT 15 is installed (Note). ***NOTE: Cannot be installed together with OPT 15.***
Sweep	
Amplitude range	
Amplitude accuracy	
Dynamic range	
Input and output	
General specifications	

- Difference with the standard specifications

Item	Description
Crosstalk between input channels (when OPT 10 is installed.)	< -90 dBc (Input level -10 dBm, Input attenuator 0 dB)
RF input 2 (when OPT 10 is installed.)	OPT 10 and OPT 15 cannot be installed together.
Connector	N type female
Impedance	50 Ω (nom.)
VSWR	Input attenuator > 10 dB <1.5 : 1
External trigger input	Can be selected as the trigger input of RF input 2 when OPT 10 is installed. The input connector is a single line only.
21.4 MHz IF output	When OPT 10 is installed, it is only the IF output which corresponds to RF input 1.

7.5.2 Option 15 75 Ω Input

- Frequency

Description	Specifications
Frequency range	9 kHz to 2.2 GHz
Built-in preamp	10 MHz to 2.2 GHz
Tunable frequency	9 kHz to 3 GHz

- Amplitude

Description	Specifications
Amplitude measurement range	+134 dBµV to displayed average noise level
Maximum safe input level	Input attenuator ≥ 10 dB
Average continuous power	+134 dBµV Preamp Off +120 dBµV Preamp On
DC voltage	±50 VDCmax
Input attenuator range	0 to 50 dB, 10 dB step
Display range	100, 50, 20, 10, 5 dB, Linear
Scale unit	dBm, dBmV, dBµV, dBµVemf, dBpW, W, V
Reference level setting range	
Log scale	-31.2 dBµV to +148.8 dBµV
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

- Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz)	
Frequency	20 MHz
Amplitude	-20 dBm
Accuracy	±0.4 dB
Scale display accuracy	
Log	±0.5 dB/10 dB ±0.5 dB/80 dB ±0.2 dB/1 dB
Total level accuracy	(After performing the automatic calibration, Signal level: +98.8 dBµV to +58.8 dBµV, Preamp Off, Input attenuator: 10 dB, REF = +107 dBµV, Temperature +20°C to +30°C) ±0.9 dB Frequency range 10 MHz to 2.2 GHz ±2.1 dB Frequency range 9 kHz to 2.2 GHz

- Dynamic Range

Description	Specifications
Displayed average noise level	Ref level < +63.8 dBμV RBW = 100 Hz -12 dBμV + 2 f (GHz)dB Preamp Off -27 dBμV + 3 f (GHz)dB Preamp On
1 dB gain compression	Frequency range > 20 MHz > +102 dBμV Preamp Off > +82 dBμV Preamp On
Second garmonic distortion	< -70 dBc (Preamp Off, Mixer input level: +77 dBμV, Frequency > 20 MHz)
Third order intermodulation distortion (TOI)	(Frequency range > 10 MHz, Preamp Off, Mixer input level: +88.8 dBμV, Frequency separation: 200 kHz) < -60 dBc
Image responses, Multiple responses, and Out-of-band responses	< -60 dBc, Mixer input level: +88.8 dBμV
Residual responses	(Frequency > 1 MHz, Preamp Off) < +21 dBμV

- Input and Output

Description	Specifications
RF input	
Connector	Type-N (f) on the front panel
Impedance	75 Ω (nom.)
VSWR	Input attenuator ≥ 10 dB < 1.6:1
Calibration signal output	
Connector	BNC (f) on the front panel
Impedance	75 Ω (nom.)
Frequency	20 MHz
Level	-20 dBm

7.5.3 Option 20 High Stability Frequency Reference

Description	Specifications
Reference frequency stability	
Aging rate	±2 × 10^{-8}/ day, ±1 × 10^{-7}/ year
Warm-up drift (nominal)	±5 × 10^{-8} (+25°C, 10 minutes after turning the power on)
Temperature drift	±5 × 10^{-8} (0 to +40°C, with reference to +25°C)

7.5.4 Option 28 EMC Filter

Description	Specifications
6 dB bandwidth	
Range	200 Hz, 9 kHz, 120 kHz, 1 MHz
Accuracy	< ±10%

7.5.5 Option 53 Time Domain Analysis Option

- Time axis waveform record

Item	Description
RF frequency range	Conforms to the frequency range for each model of the U3700 series.
RF amplitude range	Noise level to +30 dBm (*1)
Waveform record format	I/Q vector time waveform
Measurement bandwidth (BW)	100 Hz to 3 MHz (1 to 3 steps)
I/Q sampling rate	713 Hz (BW 100 Hz) to 21.4 MHz (BW 3 MHz)
I/Q waveform record time	49 msec (BW 3 MHz) to 1000 sec (BW 100 Hz)
Number of I/Q waveform record samples	1M Samples (I/Q)

(*1) The noise level conforms to the dynamic range specifications for each model of the U3700 series.

7.5.6 Option 70 High C/N

1. U3741
    - Frequency

Description	Specifications
Frequency span	
Range	0, 1 kHz to Full
Accuracy	± 1%
Signal purity (When the internal frequency reference is used.)	-98 dBc/Hz, 10 kHz offset (SPAN < 1 MHz)
Resolution bandwidth (RBW)	
Range	30 Hz to 1 MHz (1, 3 sequence)
Accuracy	±12%

- Dynamic Range

Description	Specifications
Displayed average noise level	Frequency range > 10 MHz, Ref level < -45, dBm RBW = 30 Hz -126 dBm + 2 f (GHz)dB f < 2.5 GHz Preamp Off -126 dBm + 2.5 f (GHz)dB f ≥ 2.5 GHz Preamp Off -141 dBm + 3 f (GHz)dB Preamp On

2. U3751

- Frequency

Description	Specifications
Frequency span	
Range	0, 1 kHz to Full
Accuracy	± 1%
Signal purity (When the internal frequency reference is used.)	-98 dBc/Hz, 10 kHz offset (SPAN < 1 MHz)
Resolution bandwidth (RBW)	
Range	30 Hz to 3 MHz (1, 3 sequence)
Accuracy	±12%

- Dynamic Range

Description	Specifications
Displayed average noise level	Frequency range > 10 MHz Ref level < -45 dBm RBW = 30 Hz -126 dBm + 2 f (GHz)dB Band0 Preamp Off -125 dBm + 1 f (GHz)dB Band1 Preamp Off -141 dBm + 3 f (GHz)dB Band0 Preamp On -142 dBm + 1.3 f (GHz)dB Band1 Preamp On

3. U3771/U3772

- Frequency

Description	Specifications
Frequency span	
Range	0, 1 kHz to Full
Accuracy	± 1%
Signal purity (When the internal frequency reference is used.)	(-98 + 20logN) dBc/Hz, 10 kHz offset (SPAN < 1 MHz)
Resolution bandwidth (RBW)	
Range	30 Hz to 3 MHz (1, 3 sequence)
Accuracy	±12%

- Dynamic Range

Description	Specifications		
Displayed average noise level	Frequency range > 10 MHz Ref level < -45 dBm RBW = 30 Hz		
[RF Input 1]	-126 dBm + 2 f (GHz)dB	Band0	Preamplifier Off
	-125 dBm + 1.2 f (GHz)dB	Band1	Preamplifier Off
	-141 dBm + 3 f (GHz)dB(TBD)	Band0	Preamplifier On
	-142 dBm + 1.4 f (GHz)dB	Band1	Preamplifier On
[RF Input 2]	-124 dBm + 2 f (GHz)dB	Band0	
	-123 dBm + 1.5 f (GHz)dB	Band1	
	-114 dBm	Band2	
	-112 dBm	Band3	
	-108 dBm	Band4	

7.5.7 Option 75 75 Ω Tracking Generator

Description	Specifications	
Frequency range	100 kHz to 2.2 GHz	
Frequency offset		
Range	0 to 1 GHz	
Resolution	1 kHz	
Accuracy	±300 Hz	
Output level range	+107 to +47 dBμV	0.5 dB step
Output level accuracy	±0.5 dB	20 MHz, +97 dBμV, +20°C to +30°C
Output level flatness	Reference signal level: +97 dBμV, Frequency: 20 MHz ±1.0 dB (1 MHz to 1 GHz) ±1.5 dB (100 kHz to 2.2 GHz)	
Output level switching uncertainty	Reference level: +97 dBμV	
	±1.0 dB (1 MHz to 1 GHz) +107 to +47 dBμV	
	±2.0 dB (1 MHz to 2.2 GHz) +107 to +47 dBμV	
	±3.0 dB (100 kHz to 2.2 GHz)+107 to +77 dBμV Frequency Offset OFF	
	±4.0 dB (100 kHz to 2.2 GHz)+77 to +47 dBμV Frequency Offset OFF	
	±5.0 dB (100 kHz to 2.2 GHz)+107 to +47 dBμV Frequency Offset ON	
Spurious output	Output level: +97 dBμV	
Harmonics	≤ -15 dBc	(100 kHz to 1 MHz)
	≤ -20 dBc	(1 MHz to 2.2 GHz)
Non-harmonics	≤ -20 dBc	Frequency Offset OFF
TG leakage	≤ +39 dBμV	Input attenuator: 0 dB
Output impedance	75 Ω (nom.)	
VSWR	≤ 2 (typ.)	Output level ≤ +97 dBμV
Maximum allowable input	+117 dBμV, ±10 V	

7.5.8 Option 76 Tracking Generator

Description	Specifications
Frequency range	100 kHz to 3 GHz
Frequency offset	
Range	0 to 1 GHz
Resolution	1 kHz
Accuracy	±300 Hz
Output level range	0 to -60 dBm 0.5 dB step
Output level accuracy	±0.5 dB 20 MHz, -10 dBm, +20°C to +30°C
Output level flatness	Reference signal level: -10 dBm, Frequency: 20 MHz ±1.0 dB (1 MHz to 1 GHz) ±1.5 dB (100 kHz to 3 GHz)
Output level switching uncertainty	Reference level: -10 dBm ±1.0 dB (1 MHz to 1 GHz) 0 to -60 dBm ±2.0 dB (1 MHz to 2.6 GHz) 0 to -60 dBm ±3.0 dB (100 kHz to 3 GHz) 0 to -30 dBm Frequency Offset OFF ±4.0 dB (100 kHz to 3 GHz) -30.5 to -60 dBm Frequency Offset OFF ±5.0 dB (100 kHz to 3 GHz) 0 to -60 dBm Frequency Offset ON
Spurious output	Output level: -10 dBm
Harmonics	≤ -15 dBc (100 kHz to 1 MHz) ≤ -20 dBc (1 MHz to 3 GHz)
Non-harmonics	≤ -20 dBc Frequency Offset OFF
TG leakage	≤ -80 dBm Input attenuator: 0 dB
Output impedance	50 Ω (nom.)
VSWR	≤ 2 (typ.) Output level ≤ -10 dBm
Maximum allowable input	+10 dBm, ±10 V

7.5.9 Option 77 6 GHz Tracking Generator

Item	Description
Frequency range	100 kHz to 6 GHz
Output level range	0 to -30 dBm (0.5 dB step)
Output level accuracy	≤ ± 0.5dB 20MHz, -10 dBm, +20°C to +30°C
Output level flatness	-10 dBm, +20°C to +30°C based on 20 MHz, -10 dBm. ≤ ±1 dB (1 MHz to 1 GHz) ≤ ± 1.5 dB (100 kHz to 3.1 GHz) ≤ ± 2.0 dB (100 kHz to 6 GHz)
TG leakage	≤ -80 dBm (Input attenuator 0 dB)
Output impedance	50 Ω (nom.)
VSWR	≤ 2 (typ.) Output level ≤ -10 dBm
Maximum allowable applied level	+10 dBm ± 10 V DC

8. OPTIONS AND ACCESSORIES

This chapter describes the options and accessories for this instrument.

8.1 Options

Table 8-1 Options

Option	Description	Note
OPT01	Digital modulation analysis module	
OPT10	2-channel input option	For U3741 only
OPT15	75 Ω input	For U3741 only
OPT20	High stability frequency reference	
OPT28	EMC filter	
OPT53	Time domain analysis option	
OPT70	High C/N	
OPT75	Tracking generator 75 Ω	For U3741 only
OPT76	Tracking generator	
OPT77	6 GHz tracking generator	U3751, U3771, and U3772

8.2 Accessories

Table 8-2 Accessories

Name	Product Code
50 Ω/ 75 Ω converter	ZT-130NC
DC cable	A114020
Battery pack	A870008
Battery charger	A870009
Carrying bag	A129001
Transit case	A129002
Rack mount kit (JIS)	A122003
Rack mount kit (EIA)	A124004
Highpass filter (2.8 GHz to 18 GHz)	A899001
Highpass filter (8 GHz to 18 GHz)	A899002
Highpass filter (11 GHz to 26 GHz)	A899003
Highpass filter (18 GHz to 30 GHz)	A899004
VSWR bridge	A199001

9. MAINTENANCE

This chapter describes the following matters related to the maintenance of this instrument in order to maintain its designed performance.

- 9.1 Cleaning
- 9.2 About Calibration
- 9.3 About Replacement of Limited-Life Parts
- 9.4 Method of Storing the Instrument
- 9.5 Transportation
- 9.6 Notes for Requesting Repair, Replacement of Parts, and Periodic Calibration
- 9.7 List of Error Messages
- 9.8 In Case of Difficulty
- 9.9 Product Disposal and Recycle

9.1 Cleaning

This section describes how to clean this instrument and some matters to note.

WARNING: ***Turn off the power breaker on the rear panel and extract the power cable from the wall socket to protect yourself from electric shock accidents.***
Never attempt to remove the cabinet cover to clean the inside of the instrument.

9.1.1 Cabinet Cleaning

Use the following procedure to clean the cabinet of this instrument.

Clean the cabinet surface with a soft dry cloth.
If the surface is not clean enough, try again with a cloth soaked in a weakened neutral detergent. Then wipe the surface with a soft dry cloth.

CAUTION: ***Do not allow water to splash into the inside of the instrument.***
Do not use an organic solvent such as benzene, toluene, xylene, or acetone and the cleanser for cleaning. They can cause the paint on the cabinet to come off, deform, or degrade.

9.1.2 Cleaning of Other Parts

Use appropriate caution to protect this instrument from dust.

WARNING: ***Remove dust periodically from wall sockets and power connector plugs.***
Dust that is wet with humidity may cause tracking that could cause a fire.
The rear panel is equipped with an exhaust cooling fan and the side and the bottom panels have exhaust vents. Keep these vents clean for sufficient exhaustion. If dust piled on the vents causes exhaustion to become poor, the temperature inside will rise and the instrument will not work correctly.

9.2 About Calibration

Calibration should be performed periodically to prevent performance deterioration or to adjust chronological performance changes.
The recommended period of regular calibration is once a year.

Calibration is done at the factory site.
For more information, call a sales representative.

9.3 About Replacement of Limited-Life Parts

Table 9-1 lists the proper limited-life parts of this instrument.
The table also shows the number of operations for the expected life spans of each of these parts, to suggest a recommended time of replacement in terms of the number of times of operations. For replacement, call the Service Center (Advantest Customer Support (ACS)).

Note that the life span can become shorter than expected depending on the operation environment, frequency of use, and storage environment.

MEMO: ***The table shows the expected life spans or recommended time of replacement only for the user's reference. It does not guarantee the life of the components.***

Table 9-1 Limited-Life Parts

Name	Life (Reference values provided by manufacturer)
Panel key switch Key switch with LED	10^6 operations 10^5 operations
LCD back light	50,000 hours
Rotary encoder	25×10^6 operations
Cooling fan	40,000 hours
Lithium battery cells for data backup	About 3 years
Mechanical relay (For EXT. DC)	10^5 operations

9.4 Method of Storing the Instrument

When you store this instrument, keep it in an environment that meets the following requirements.

- Reduced vibration
- Not dusty
- Protected from direct sunlight
- Ambient temperature range: -20°C to +60°C
- Relative humidity: 30% to 85%

When you do not use the instrument for 90 days or more, store it in an appropriate moisture-proof bag with desiccant.

9.5 Transportation

For transportation, use the packing materials used for the shipping of this instrument. If you use other materials, pack the instrument using the following procedure.

1. Install the protection cover of the touch screen display on this instrument.
2. Cover the instrument with a protective plastic sheet. (Put desiccant inside for protection from moisture.)
3. Prepare a carton case.
   The panels of the case must be 5 mm or more thick. The inner dimensions must be 10 cm or more larger than the physical size of this instrument because cushioning materials are placed inside.
   Place the instrument so that it is covered with cushioning or plastic foam material on all sides. (The cushioning material must be 4 cm or more thick.)
4. Seal the carton case with an industrial stapler or packing tape.

9.6 Notes for Requesting Repair, Replacement of Parts, and Periodic Calibration

9.6.1 Work Request

Attach a tag indicating the following data to this instrument when you send it to a sales representative.

- Your company name and address
- Name of the person in charge
- Serial number (on the rear panel)
- What work to request (repair or periodic calibration)

9.6.2 Destination and Phone Number for Contact

Call Advantest MS (Measuring Instruments) Call Center.

9.7 List of Error Messages

This section describes error messages which are displayed because of function restrictions or errors in operation of this instrument.

Error code	Type	Displayed Message
0/2	WARNING	Some formula parameters are out of range. The system has adjusted automatically the value.
0/3	WARNING	Some channel table parameters are out of range. The system has adjusted automatically the value.
0/4	WARNING	Some limit line table parameters are out of range. The system has adjusted automatically the value.
0/5	WARNING	The table is full. Impossible to insert a new item.
0/7	WARNING	No formula for this channel number.
0/8	WARNING	Channel number not in table.
0/12	WARNING	The pass fail table is empty.
0/15	WARNING	No peak detected.
0/16	WARNING	The bandwidth of the SEM item is null. Insertion forbidden.
0/18	WARNING	The current environment does not authorize this command.
0/-100	ERROR	There is no normalization data available for the selected trace.
0/-114	ERROR	The ElectroMagnetic Compatibility option is required.
0/-115	ERROR	The target trace is not available in this environment for the store functionality.
0/-116	ERROR	The Window sweep mode is not allowed if a measure is active.
0/-117	ERROR	The Signal Track is not allowed when Image Suppression is active.
0/-118	ERROR	This functionality is not allowed if the Tracking Generator is not active.
0/-119	ERROR	This functionality is not allowed if the Reference Object in Delta mode is not the Ref Marker.
0/-120	ERROR	The Tracking Generator is out of band. Please change the stop frequency or/and TG frequency offset. (Stop Freq + (TG freq offset)<= 3.1 GHz)
0/-121	ERROR	This functionality is not allowed if Channel or Average or Total Power Measure is active.
0/-122	ERROR	The Tracking Generator option is required.
0/-123	ERROR	This functionality is not allowed on Spurious Power Measure mode.
0/-124	ERROR	All limit Lines are OFF. Please activiate at least one line.
0/-125	ERROR	The active measure is not allowed in this context mode. The measure has been switched off.

Error code	Type	Displayed Message
0/-126	ERROR	This functionality is not allowed on Graphical Zoom Mode. Please change the context mode. (Ext Cfg -> Zoom & Context)
0/-127	ERROR	This functionality is not allowed on multi-context Mode. Please change the context mode. (Ext Cfg -> Zoom & Context -> Reset Context)
0/-128	ERROR	The Frequency Reference INT mode is not available with crystal option.
0/-129	ERROR	The crystal option is required.
0/-130	ERROR	Not available in Zoom (F/F) mode.
0/-131	ERROR	Not available in Zoom (T/T) mode.
0/-132	ERROR	Not available in F/T mode (Ext. config).
0/-133	ERROR	Not available in T/T mode (Ext. config).
0/-135	ERROR	The trace subtract result should be in Write mode. Please change it. (operand1 - operand 2 -> result) (Trace -> Refresh ->Write)
0/-136	ERROR	The second operand trace should not be in Blank mode. Please change it. (operand1 - operand 2 -> result)
0/-137	ERROR	The first operand trace should not be in Blank mode. Please change it. (operand1 - operand 2 -> result)
0/-138	ERROR	The table selected for the spurious measure is empty. Please fill the table.
0/-141	ERROR	Impossible to change the Fundamental Frequency . Please change to Fundamental mode ON. (Meas2 -> Harmonics -> Fundamental)
0/-142	ERROR	Impossible to execute recall functionality. The file is not compatible with this FUS version.
0/-145	ERROR	The TTL Trigger level is available only in EXTERNAL mode.
0/-146	ERROR	The Trigger level is available only in IF or VIDEO mode.
0/-147	ERROR	The Trigger slope is not available in FREE RUN mode.
0/-148	ERROR	The Trigger video is only available in zero span mode.
0/-149	ERROR	The ACP graph mode is ON. Watt and Volt Units is not allowed.
0/-150	ERROR	The ACP graph mode is not allowed in multi-context mode.
0/-151	ERROR	The Carrier Band Width is not available when Nyquist Filter is ON. Please change to OFF. (Meas 1 -> ACP -> Config -> Nyquist Filter)
0/-152	ERROR	The Carrier Band Width is not available in FULL mode screen. Please change to CARR mode. (Meas 1 -> ACP -> Mode)
0/-153	ERROR	The ACP Power Measure is executed on Trace A. This trace is actually in blank mode. Please change to Write mode. (Trace -> Refresh ->Write)
0/-154	ERROR	The ACP Channel definition table is empty.
0/-155	ERROR	The Carrier Band Width is not available when Nyquist Filter is ON. Please change to OFF. (Meas 1 -> SEM ->Config ->Nyquist Filter)
0/-157	ERROR	The SEM table is empty.
0/-158	ERROR	Impossible to insert in the SEM table. Overlapping Band.

Error code	Type	Displayed Message
0/-159	ERROR	Pass Fail functionality not authorized. Spectrum Emission Mask active.
0/-160	ERROR	The power measure is performed on a blank trace.
0/-161	ERROR	The OBW Power Measure is active.
0/-162	ERROR	The Power Measure environment is not valid. Please do ensure you have already save an environment for this Power Measure.
0/-163	ERROR	The power measure trace is in blank mode. Please change to Write mode. (Trace -> Refresh -> Write)
0/-166	ERROR	Scale is Linear Mode. Please select dB/div scale. (Level -> dB/div)
0/-167	ERROR	The target stored trace is the same to the active trace.
0/-168	ERROR	Impossible to set all the trace in blank mode.
0/-169	ERROR	The active trace is in blank mode.
0/-170	ERROR	Noise Measure (dBc/Hz) Impossible to work on the reference marker.
0/-171	ERROR	Impossible to work on the reference marker.
0/-172	ERROR	The delta mode is disable.
0/-173	ERROR	The fixed mode is active.
0/-174	ERROR	The active marker is not enable.
0/-175	ERROR	There is no enable marker.
0/-178	ERROR	Span is not set to 0 Hz. Please change span.
0/-179	ERROR	Span is set 0 Hz. Please change span.
0/-180	ERROR	Impossible to change the parameter. Please insert data in channel table.
0/-181	ERROR	Impossible to change the parameter. Please switch on at least one formula.
0/-182	ERROR	Impossible to change the Stop Frequency via normal mode.
0/-183	ERROR	Impossible to change the Start Frequency via normal mode.
0/-184	ERROR	Impossible to change the Center Frequency via normal mode.
0/-185	ERROR	Impossible to change the Stop Frequency via channel mode.
0/-186	ERROR	Impossible to change the Start Frequency via channel mode.
0/-187	ERROR	Impossible to change the Center Frequency via channel mode.
3/1	ERROR	Could not save screen copy.
3/2	ERROR	The screen copy cannot be saved on the analyzer memory. Please select another media.
3/3	ERROR	Cannot remove protected file : %1
3/4	ERROR	Cannot rename protected file : %1
3/5	ERROR	Cannot replace protected file : %1
3/6	ERROR	Cannot open file : %1
3/7	ERROR	File %1 Unknown data format.

Error code	Type	Displayed Message
3/8	ERROR	File %1 Corrupted Data.
3/9	ERROR	File %1 Incompatible Version.
3/10	ERROR	Cannot access media.
3/11	ERROR	File not saved. Not enough space on media.
3/12	ERROR	XML files cannot be saved on the analyzer memory. Please select another media.
3/13	ERROR	Cannot create file.
3/14	ERROR	Format media failed.
3/15	ERROR	No printer detected.
3/16	ERROR	No driver available for this printer.
3/17	WARNING	The last power measure mode has been turned off.
3/18	WARNING	The selected button already exist.
3/19	WARNING	The user menu is full.
3/20	WARNING	Incorrect password.
3/21	WARNING	Quit spurious results before.
3/22	WARNING	Quit table edition before.
3/24	WARNING	Cannot format flash memory.
3/25	WARNING	The tracking generator option is required.
3/26	WARNING	No DHCP server found. Please ensure ethernet cable is connected and verify DHCP server configuration.
5/-87	WARNING	NO PEAK FOUND.
5/-88	WARNING	NO MIN PEAK FOUND.
5/-89	WARNING	NO PEAK FOUND.
5/-90	WARNING	IM : NO PEAK FOUND.
5/-92	WARNING	Parameter out of range : Nyquist data must be changed.
5/-93	WARNING	Integration bandwidth out of range.
5/-94	WARNING	Parameter out of range.
5/-95	WARNING	Parameter out of range : the SPAN must be reduced.
5/-96	WARNING	The Channel table is empty.
5/-97	WARNING	ACP parameter out of range.
5/-98	WARNING	Parameter out of range. Please set the span to a value greater than (1+B)1/T.
5/-99	WARNING	Parameter out of range. Please change span.
5/-100	WARNING	Parameter out of range.

Error code	Type	Displayed Message
7/83	WARNING	Frequency Reference Unlocked

CAUTION:

An error may be displayed because of a hardware failure. In this case, contact Advantest.

1. ***An error that occurred when the calibration was performed***
2. ***An error that was detected while the self test was performed***
3. ***Others***

9.8 In Case of Difficulty

Check the following basics before calling Advantest.

No.	Description	Operation
1	"Warning 7/83 Frequency Reference Unlocked" is displayed.	
	Is the Frequency Reference set to EXT?	**SYSTEM** , ***Frequency Reference***,
	1. Set it to INT.	***INT***
	2. If EXT is used as the Frequency Reference: Is a frequency reference signal input to the REF IN connector on the rear panel?	
	Is the input reference frequency equal to the reference frequency set in this instrument?	***Ref Freq***
2	After the power is turned on, the system does not boot up.	
	Is a USB memory key inserted? Remove the USB memory key and then turn the power on again.	
3	Any key input cannot be accepted.	
	Is the key lock set to ON? (Is the LOCK key lamp illuminated?).	
	Set the key lock to OFF.	**LOCK**, **(password x,x,x,x,) Hz**, **Hz** Turning off and on the power is also recommended.
4	If you do not remember the User Password:	
	Perform the Initialization by using the GPIB. The User Password returns to "0,0,0,0".	Command "RPWD"
5	The USB memory key is not recognized.	
	1. Check its format. If formatting the USB memory key on a PC, use the FAT format. Some formats such as NTFS are not recognized.	
	2. The USB memory key with a security function cannot be used.	
	3. A USB port is located on the front and rear panels. Attempt to change the USB memory key to a different port.	
6	An incorrect measured value, which is approx. 6 dB higher than the correct level, is displayed.	
	Is the Input Impedance set to 75 Ω? Set it to 50 Ω.	**AMPLITUDE**, ***Input Impedance*** (50)

9.9 Product Disposal and Recycle

This product should be disposed of according to the regulations and laws that are established in your country and municipality.

Before this product is disposed of, separately collect components shown in the table below to prevent the spread of substances, which may be harmful to the global environment, humans, and ecology.

Substance/Component	Used/ Not used	Location	Parts and material
Polychlorinated biphenyls (PCB) containing capacitors	Not used	-	-
Mercury containing components	Used	LCD monitor	Fluorescent tube
Batteries	Used	BPG-032411	Lithium-ion battery
Printed circuit boards	Used	Panel	Printed circuit board
		Power supply	
		Board	
Toner cartridges	Not used	-	-
Plastic containing brominated flame retardants	Used	WBL-FUS#FRONT*E BEB-032400 BEG-032413 BEG-032415 BPG-032410 BPG-032411 BPG-032412 BPB-032890 BPG-032405 BPG-032409 BPG-033493 BPG-034304 BPG-034495 BPG-034498 BEG-036043	Connectors, inductors, tantalum capacitors, diodes, transistors, semiconductor packages
Asbestos waste and components which contain asbestos	Not used	-	-
Cathode ray tubes	Not used	-	-
Chlorofluorocarbons (CFC), Hydrochlorofluorocarbons (HCFC), Hydrofluorocarbons (HFC) or Hydrocarbons (HC)	Not used	-	-
Gas discharge lamps	Used	LCD monitor	Fluorescent tube

Substance/Component	Used/ Not used	Location	Parts and material
Liquid crystal displays of a surface greater than 100 square centimeters and all those back-lighted with gas discharge lamps	Used	LCD monitor	Liquid crystal displays
External electric cables	Used	WBL-U3751*F WBL-U377X#F	Power cable
		WBL-U3751*F WBL-U377X#F	Signal cable
Components containing refractory ceramic fibers	Not used	-	-
Components containing radioactive substances	Not used	-	-
Electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)	Not used	-	-
Cadmium and Cadmium compounds	Used	BPC-032551	Variable resistor electric contact
Antimony and Antimony compounds	Used	WBL-FUS#FRONT*E BEB-032400 BEG-032413 BEG-032415 BPG-032410 BPG-032411 BPG-032412 BPB-032890 BPC-032551 BPG-032405 BPG-032409 BPG-033493 BPG-034304 BPG-034495 BPG-034498 BEG-036043 A199001 (Accessory)	Electronic components (Semiconductors, capacitors, inductors, resistors), electric components (Connectors)
Beryllium and Beryllium compounds	Used	WBL-FUS#COXCBL WBL-U3751*F WBL-U377X#F WBL-FUS#HONTAI*E WHB-THK700 BEG-032413 BPG-033493 BPG-034495	Electric components (Switches, connectors)

Substance/Component	Used/ Not used	Location	Parts and material
Arsenic and Arsenic compounds	Used	WBL-FUS#FRONT*E WHB-THK700 BEG-032413 BEG-036043	Module (Inverter), electronic components (GaAs)
Lead and Lead compounds	Used	WBL-FUS#FRONT*E WBL-FUS#COXCBL WBL-FUS#OPT20 WBL-FUS#FRONT*E WBL-FUS#HONTAI*E BEB-032400 BEG-032413 BEG-032415 BPG-032410 BPG-032411 BPG-032412 BPB-032890 BPC-032551 BPG-032405 BPG-032409 BPG-033493 BPG-034304 BPG-034495 BPG-034498 BEG-036043 A199001 (Accessory)	Electronic components mounted on the printed circuit board and lead solder used for mounting.
Vinyl chloride (PVC)	Used	WBL-FUS#COXCBL WBL-FUS#OPT20 WBL-FUS#FRONT*E	PVC-material resin parts

APPENDIX

A.1 Initial Setting List

This section describes the default preset parameter setting list.

Values are set for the RF1 input of the U3751, U3771, and U3772. Values in parenthesis are set for the U3741.

Function	Parameter	Initial set value
FREQUENCY	Center Freq setting	4 GHz (1.5 GHz)
	Start Freq setting	0 Hz
	Stop Freq setting	8 GHz (3 GHz)
	Freq Offset setting	0 Hz
	Freq Offset ON/OFF	Off
	CF Step Size setting (Manual)	0.8 GHz (0.3 GHz)
	CF Step Size (Auto/Manual)	Auto
	Channel Input	OFF
SPAN	Span setting	8 GHz
AMPLITUDE	Ref Level setting	0 dBm
	LOG/LIN selection	LOG
	dB/div setting	10 dB/div
	Unit setting	dBm
	ATT (Auto/Manual)	Auto
	ATT setting (Manual)	10 dB
	Min ATT setting	10 dB
	Min ATT ON/OFF	OFF
	High Sensitivity ON/OFF	OFF
	Ref Offset setting	0.00 dB
	Ref Offset ON/OFF	OFF
	Slide Screen	OFF
CPL	RBW setting (Manual)	3 MHz (1 MHz)
	RBW (Auto/Manual)	Auto
	VBW setting (Manual)	3 MHz (1 MHz)
	VBW (ON/OFF)	OFF
	VBW/RBW ratio	1
	VBW/RBW ratio (Auto/Manual)	Auto
	SPAN/RBW ratio	100

Function	Parameter	Initial set value
	SPAN/RBW ratio (ON/OFF)	OFF
	Sweep Time setting (Manual)	90 ms (60 ms)
	Sweep Time (Auto/Manual)	Auto
EXT CFG	Sweep Mode (SGL/CNT)	CNT
	Trigger Source	Free Run
	Limit Lines	OFF
	Display Line ON/OFF	OFF
	Reference Line ON/OFF	OFF
	Measuring Window	OFF
MKR		OFF
MEAS1		
Channel Power	Execute ON/OFF	OFF
Total Power	Execute ON/OFF	OFF
Average Power	Execute ON/OFF	OFF
OBW	Execute ON/OFF	OFF
ACP	Execute ON/OFF	OFF
Spectrum Emission	Execute ON/OFF	OFF
Spurious	Execute ON/OFF	OFF
MEAS2		
Noise/Hz	Execute ON/OFF	OFF
XdB down	XdB setting	OFF
Intermod	Execute ON/OFF	OFF
Harmonic	Execute ON/OFF	OFF
Frequency Counter	Execute ON/OFF	OFF
TRACE	Refresh Mode setting	Write
	Active Trace setting	A
	Trace Detector Normal/Posi/Nega/Sample/Average	Normal
	Calc Mode setting	Write
	Detector (Auto/Manual)	Auto
	Detector Avg Mode RMS/Video	RMS
SYSTEM	Annotation ON/OFF	ON
	GPIB Address	8
	LAN IP Address	refer to “6.3.2”
	Color Pattern	Color1

.

Function	Parameter	Initial set value
[GPIB Address…]	GPIB address of this instrument	8
[Freq Reference…]	INT/EXT	INT
	Ext. Reference	10 MHz
[Display…]	Title setting	NULL

A.2 Principle of Operation

This section describes a root Nyquist filter used for input saturation and ACP measurement based on the operating principle of this instrument.

A.2.1 Input Saturation

When a large level signal is applied to this instrument, measurement errors may become larger, depending on the attenuator setting. Input saturation may be suspected as a cause of this. This section describes input saturation.

- Cause of Input Saturation

  A block diagram of the input section of this instrument is shown in Figure A-1. The signal entering from the input connector is input into the mixer through the attenuator.

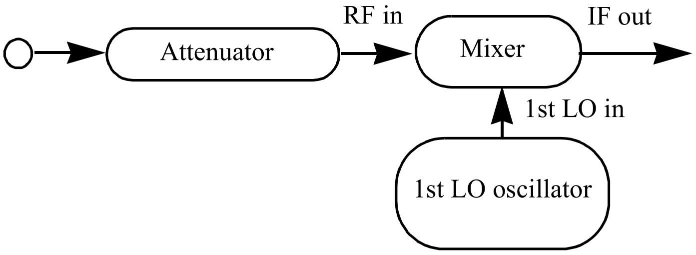


Figure A-1 Block Diagram of the Input Section

Under normal conditions, the input level and output level of the mixer are proportionate to each other. However, if the input level of the mixer increases, the mixer becomes saturated and the output level of the mixer is disproportionate to the input level.
This phenomena is called input saturation and it prevents accurate measurements from being made (see Figure A-2).

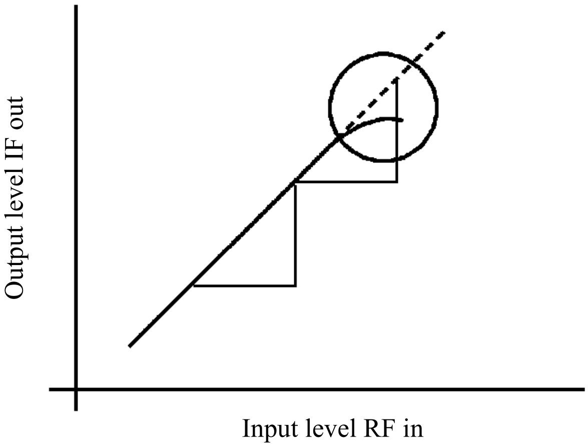


Figure A-2 Relation Between Input and Output of the Mixer

- Preventing Input Saturation
  If input saturation occurs, set the most suitable attenuator value to lower the mixer input level.

IMPORTANT: If the attenuator setting is too high, the mixer input signal becomes smaller and analysis becomes impossible. However, if the attenuator setting is too low, the internal mixer circuit may become damaged.

Usually, the appropriate settings are automatically set for a continuous wave (CW) input signal if you set the attenuator to auto and set the peak of the signal to or below the reference level.

If the resolution bandwidth (RBW) is narrower than the modulation bandwidth in the measurement of an input signal with a wide modulation band, the display level decreases. Therefore, the attenuator must be manually set to the optimum value.

- Confirming that the attenuator is set to the optimum value
  1. Obtain a rough set value for the attenuator by using the following formula.
     The maximum input level of the mixer is -5 dBm.
     Input attenuator set value (dB) ≥ Input level (dBm) + 10 dB
  2. Decrease the attenuator setting in steps while watching the screen. If the peak value on the screen does not change, no input saturation occurs and the measurement can be continued.
     If the peak value changes, increase the attenuator setting to eliminate the change.

A.2.2 Root Nyquist Filter

When measuring the adjacent channel leakage power, this instrument is able to make a correction to the input signal equivalent to as if the signal passed through the root Nyquist filter.

When calculating the power for each channel by integrating the trace data, the power is multiplied by the coefficient of the root Nyquist filter at the corresponding frequency (H(n)).

$$P''_U = \sum_{n=a}^{b} 10^{\left(\frac{P(n)}{10}\right)} \times H(n)$$

$$a = f_{Uch} - \frac{(1+\alpha)}{2T},\ b = f_{Uch} + \frac{(1+\alpha)}{2T}$$

$$P''_L = \sum_{n=a}^{b} 10^{\left(\frac{P(n)}{10}\right)} \times H(n)$$

$$a = f_{Lch} - \frac{(1+\alpha)}{2T},\ b = f_{Lch} + \frac{(1+\alpha)}{2T}$$

The coefficient of the root Nyquist filter (H(n)) is calculated from the symbol rate (T) and the roll-off factor (α) by using the following formula.

$$|H(n)| = \begin{cases} 1 & 0 \leqq |f| \leqq (1-\alpha)/2T \\ \mathrm{COS}[(T/4\alpha)\ (2\pi\ |f|\ - \pi\ (1-\alpha)/T)] & (1-\alpha)/2T \leqq |f| \leqq (1+\alpha)/2T \\ 0 & (1+\alpha)/2T \leqq |f| \end{cases}$$

The characteristics of the root Nyquist filter are shown below.

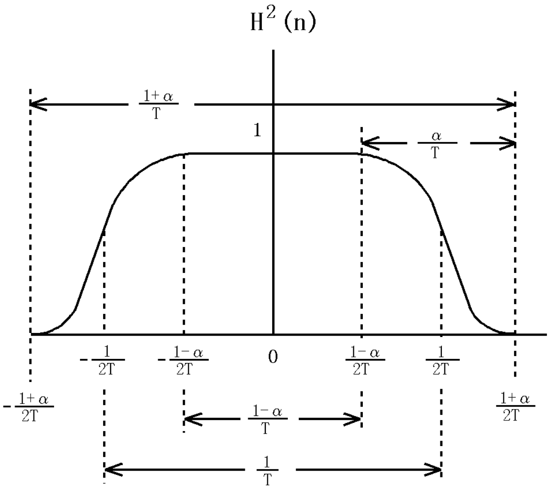


Figure A-3 Characteristics of the Root Nyquist Filter

A.3 Glossary

Resolution Bandwidth

The spectrum analyzer uses the band-pass filter (BPF) to analyze certain frequencies in the input signal. The 3 dB bandwidth of the BPF is called the resolution bandwidth. (See Figure A-4) The BPF characteristics should be set according to the sweep width and the sweep speed used for the trace.
This spectrum analyzer sets the optimal value for the sweep width. In general, smaller bandwidths improve resolution and the resolution of the spectrum analyzer should be expressed by using the narrowest resolution bandwidth (See Figure A-4 (b) below).

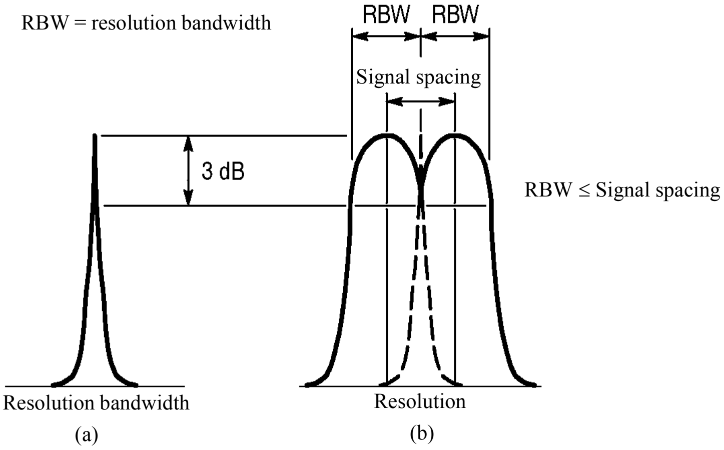


Figure A-4 Resolution Bandwidth

IF Gain Uncertainty

The uppermost scale on the screen is the reference used to read the absolute level of an input signal on the spectrum analyzer. The level set for this uppermost scale is referred to as the reference level.
The reference level is set using the **Ref Level** key and displayed in dBm or dBμ. The absolute accuracy of this display is determined by the IF gain uncertainty assuming the input attenuator is at a constant level.

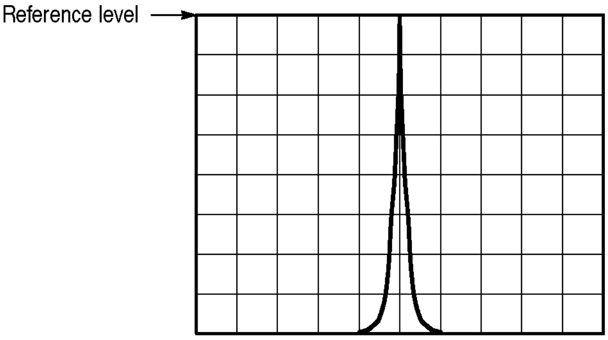


Figure A-5 IF Gain Uncertainty

Gain Compression

If the input signal is greater than a certain value, the correct value is not displayed on the screen, and the input signal appears as if it were compressed. This phenomenon is called gain compression, and it reflects the linearity in the input signal range. Normally, the gain compression for a spectrum analyzer is specified as the input signal level that produces a 1 dB error from a perfect linear response.

Maximum Input Level

This is the maximum level allowed for the input circuit of the spectrum analyzer. The level can be modified by the input attenuator.

Noise Sidebands

Noise sidebands are used to show the purity of the oscillator.
Spectrum analyzer efficiency is reduced by noise generated in the local oscillator and phase lock loop of the analyzer. This noise will appear in the vicinity of the spectrum on the screen.
Therefore, the sideband noise of the analyzer is defined and the signals that are larger than the sideband noise of the analyzer can be analyzed.
The spectrum analyzer's noise sideband characteristics are shown in the following example.

Example Suppose the noise level measured in the resolution bandwidth of 1 kHz is -70 dB at 20 kHz apart from the carrier. The noise level is normally expressed by the energy contained in the 1 Hz bandwidth (Figure A-6 (b)). With a bandwidth of 1 Hz, the following applies: Since the value is -70 dB when the bandwidth is 1 kHz, the signals within the 1 Hz bandwidth will be lower than this by about 10 log 1 Hz/1 kHz [dB], or about 30 dB. Consequently, it is expressed as -100 dBc/Hz at 20 kHz apart from the carrier when the resolution bandwidth is 1 kHz.

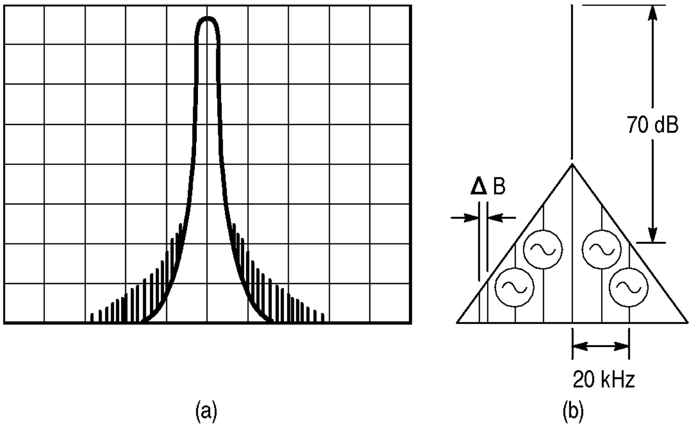


Figure A-6 Noise Sidebands

Residual FM

The short-term frequency stability of the local oscillators built in the spectrum analyzer is expressed as residual FM. The frequency width fluctuating per unit time is expressed as p-p. This also determines the measurement limit value when measuring the residual FM of a signal.

Residual Response

Residual response is how much the spurious signal, which is generated by the spectrum analyzer, is suppressed after being treated as an input signal.
Residual response is generated by the leaking of signals such as local oscillator output in the spectrum analyzer. This should be taken into consideration when analyzing a low-level input signal.

Frequency Response

This term represents the amplitude characteristics for given frequencies (frequency characteristics).

In the spectrum analyzer, frequency response means the frequency characteristics (flatness) of the input attenuator and mixer for the input frequency, and is given in ± ΔdB.

Spurious Response

Spurious responses that mean any non-measured signal are classified according to their characteristics.

Second Harmonic Distortion:

This is the distortion caused by the non-linearity of a spectrum analyzer (especially generated in the mixer) when an ideal and undistorted signal is input to the spectrum analyzer. This performance determines spectrum analyzer's capability of measuring harmonic distortion.(see Figure A-7)

Third Order Distortion:

The third order distortion is caused by the non-linearity of a spectrum analyzer when two signals with different frequencies f1 and f2 are input and two signals of 2f1-f2 and 2f2-fi are generated near the input signals. The amplitude of these signals depends on the mixer input level. (see Figure A-7)
The maximum value is specified.

Image/Multiple/Out-of-band responses:

In addition to the two types of spurious signals described above, a spurious called "non-harmonic spurious" is generated at particular frequencies by the spectrum analyzer. There are three types of responses in the non-harmonic spurious: the image, multiple and out-of-band responses.

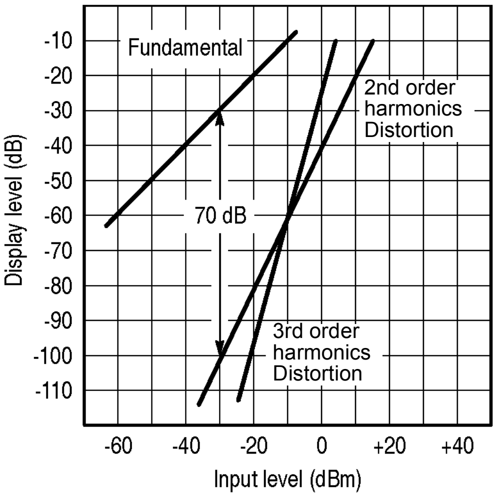


Figure A-7 Spurious Response

Zero Span

The spectrum analyzer sweeps the time in the horizontal axis at certain frequency but does not sweep frequencies in this mode.

Occupied Bandwidth

When information is transmitted through radio waves, the spread of the frequency spectrum is caused along with the modulation. The occupied bandwidth is defined as the width of frequency spectrum that occupies 99% of total average power. (see Figure A-8)

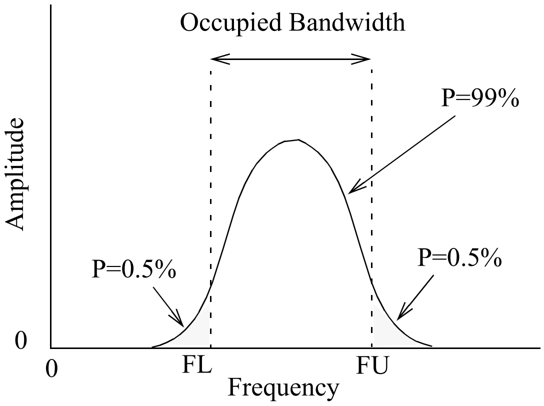
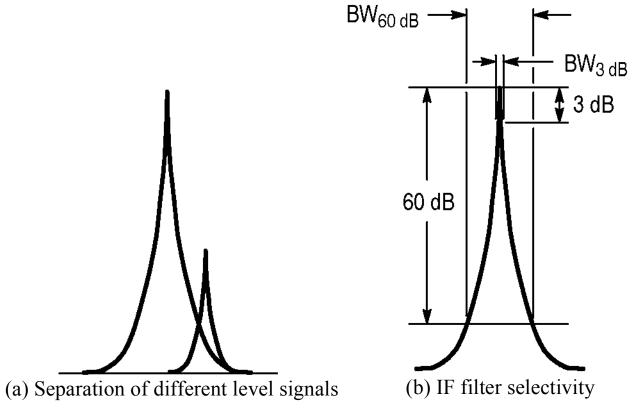


Figure A-8 Occupied Bandwidth

Bandwidth Selectivity

The band-pass filter normally has a Gaussian distribution characteristics instead of the so-called rectangular characteristic. Consequently, if two adjacent signals of different levels exist, the smaller signal hides in the skirt of the larger signal. (See Figure A-9)

Therefore, the bandwidth at a certain attenuation range (60 dB) should also be defined. The ratio between the 3 dB width and 60 dB width is expressed as the bandwidth selectivity.



(a) Separation of different level signals

(b) IF filter selectivity

Figure A-9 Bandwidth Selectivity

Bandwidth Accuracy

The bandwidth accuracy of the resolution bandwidth filter is expressed by the deviation from the nominal value of the 3 dB-lowered point. This specification has almost no effect when measuring the level of a continuous signal, but it should be taken into consideration when measuring the level of a noise signal.

Bandwidth Switching Uncertainty

Several resolution bandwidth filters are used to obtain the optimal resolution in a signal spectrum analysis according to the frequency span. When switching from one resolution bandwidth filter to another while measuring one signal, an error is generated because of the differences in loss between resolution bandwidth filters. This error is defined as the bandwidth switching uncertainty.

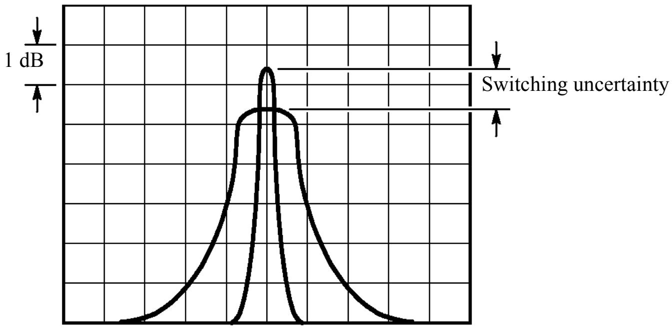


Figure A-10 Bandwidth Switching Uncertainty

Average Noise Level

This sensitivity represents spectrum analyzer's capability of detecting the smallest signal and is directly related with noises generated from a spectrum analyzer itself. The sensitivity, however, varies depends on the used resolution bandwidth. In general, the maximum input sensitivity of a spectrum analyzer is expressed as average noise level when the instrument is used with its minimum resolution bandwidth.

VSWR: Voltage Standing Wave Ratio

This shows the state of impedance matching when a spectrum analyzer is connected to a signal source that includes ideal and nominal output impedance. The VSWR is expressed as the ratio of the maximum value to minimum value of a standing wave, which consists of traveling and reflected waves. The VSWR is another expression of the reflection coefficient or return loss.

Referring to Figure A-11, the signal E1 at the receiving end (the spectrum analyzer input section) is the same as the signal E0 at the transmitting end if the impedance of the receiving end is matched to that of the transmitting end.
The reflection coefficient is expressed in the formula shown below when the reflected wave ER exists due to a mismatch between the impedances.

Reflection coefficient m = Reflected wave E_R / Traveling wave E_0

The Return loss is expressed in the formula shown below.

Return loss $= 20 \log E_R / E_0$ [dB]

VSWR $= (E_0 + E_R) / (E_0 - E_R)$

The relationship of VSWR with the reflection coefficient is as follows.

$\text{VSWR} = (1 + | m |) / (1 - | m |)$

The range of VSWR is between 1 and ∞ the nearer to 1 this value is, the better the state of impedance matching is.

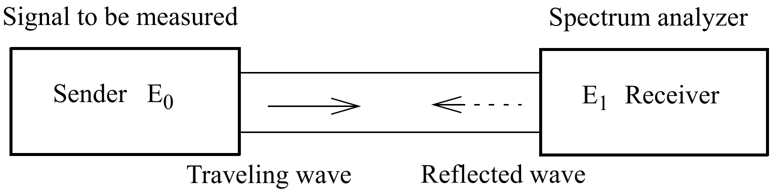


Figure A-11 VSWR

A.4 dB Conversion Formula

1. Definitions

0 dBV = 1 Vrms $\quad$ $Y\text{ dBV} = 20\log\frac{X\text{ V}}{1\text{ V}}$

0 dBm = 1 mW $\quad$ $Y\text{ dBm} = 10\log\frac{X\text{ mW}}{1\text{ mW}}$

0 dBμV = 1 μVrms $\quad$ $Y\text{ dB}\mu\text{V} = 20\log\frac{X\ \mu\text{V}}{1\ \mu\text{V}}$

0 dBpw = 1 pW $\quad$ $Y\text{ dBpw} = 10\log\frac{X\text{ pW}}{1\text{ pW}}$

2. Conversion formulas

If R = 50 Ω:	If R = 75 Ω:
dBV ≅ (dBm - 13 dB)	dBV ≅ (dBm - 11 dB)
dBμV ≅ (dBm + 107 dB)	dBμV ≅ (dBm + 109 dB)
dBμVemf ≅ (dBm + 113 dB)	dBμVemf ≅ (dBm + 115 dB)
dBpw ≅ (dBm + 90 dB)	dBpw ≅ (dBm + 90 dB)

3. Examples

Converting 1 mV into dBμV: $\quad$ $20\log\frac{1\text{ mV}}{1\ \mu\text{V}} = 20\log 10^3 = 60\text{ dB}\mu\text{V}$

Converting 0 dBm into dBμV: $\quad$ $\begin{cases} 0\text{ dBm} + 107\text{ dB} = 107\text{ dB}\mu\text{V}(R = 50\ \Omega) \\ 0\text{ dBm} + 109\text{ dB} = 109\text{ dB}\mu\text{V}(R = 75\ \Omega) \end{cases}$

Converting 60 dBμV into dBm: $\quad$ $\begin{cases} 60\text{ dB}\mu\text{V} - 107\text{ dB} = -47\text{ dBm}(R = 50\ \Omega) \\ 60\text{ dB}\mu\text{V} - 109\text{ dB} = -49\text{ dBm}(R = 75\ \Omega) \end{cases}$

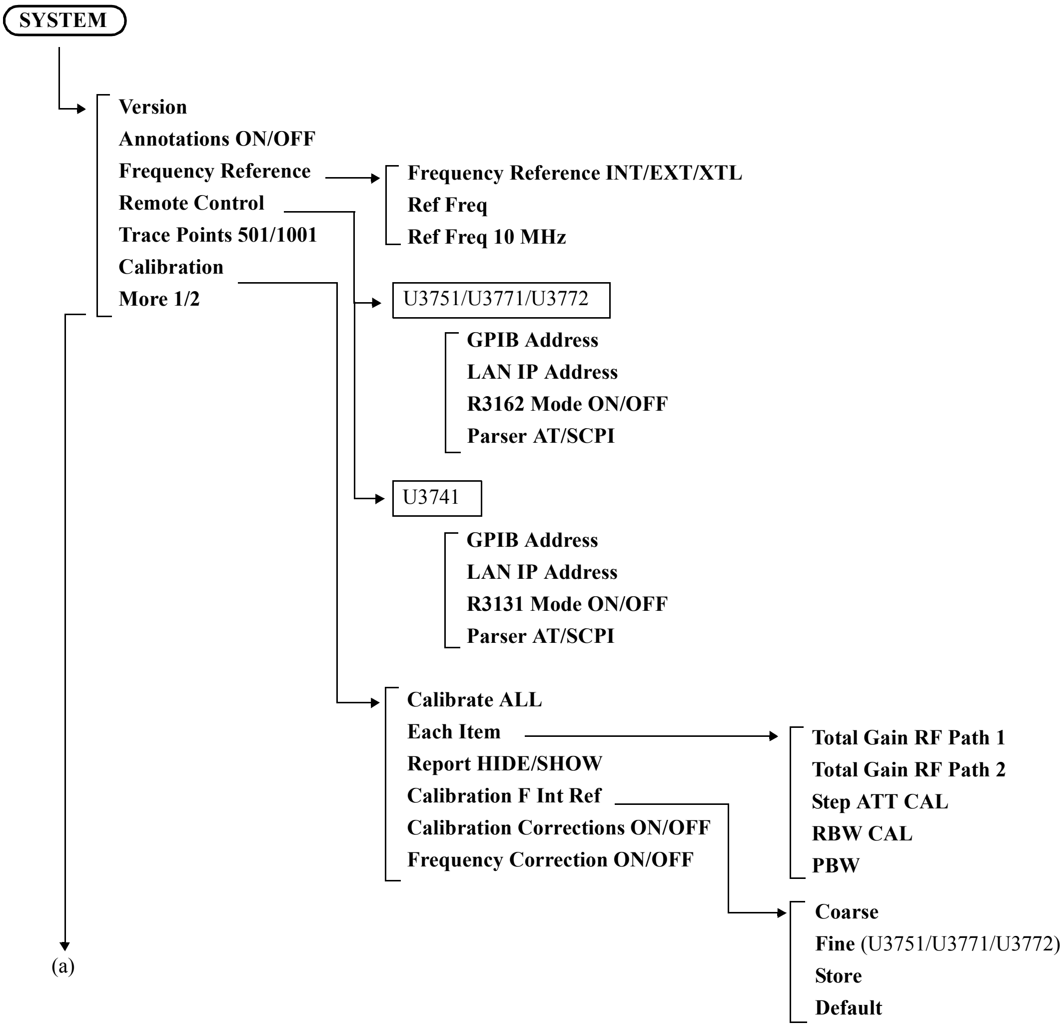
Converting 10 V/m into dBμV/m: $\quad$ $20\log\frac{10\text{ V/m}}{1\ \mu\text{V/m}} = 140\text{ dB}\mu\text{V/m}$

4. Relationship between dBm and Watt

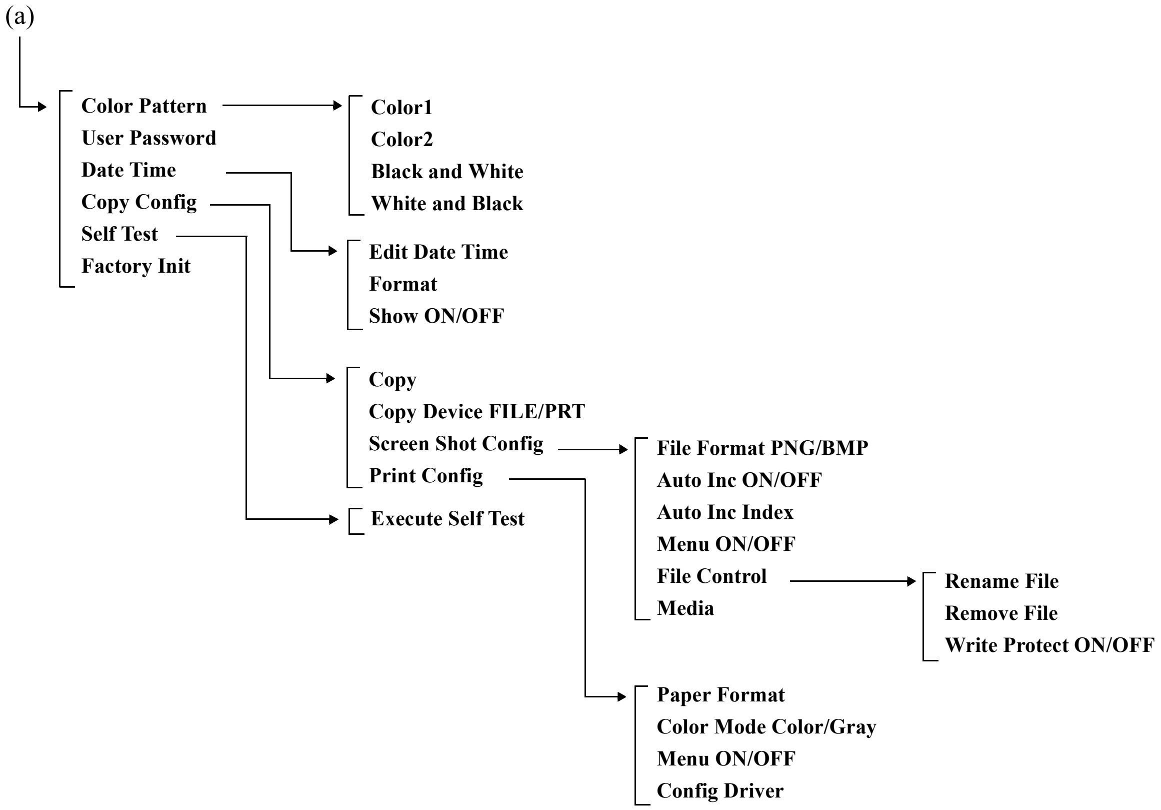
+50 dBm	+40 dBm	+30 dBm	+20 dBm	+10 dBm	+0 dBm	-10 dBm	-20 dBm	-30 dBm
100 W	10 W	1 W	100 mW	10 mW	1 mW	0.1 mW	0.01 mW	0.001 mW

A.5 Menu Map List

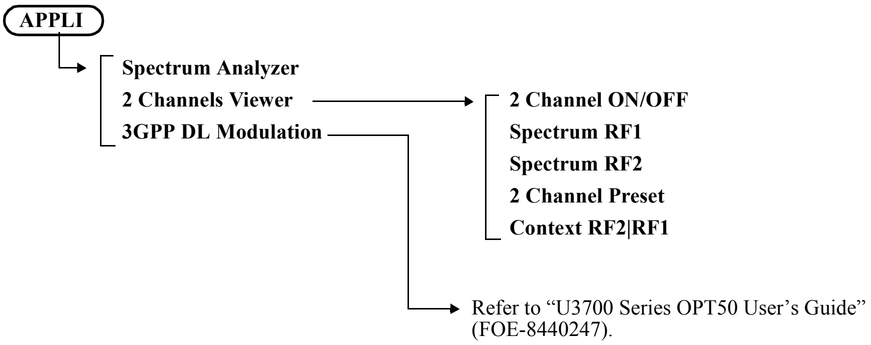
- SYSTEM (1)



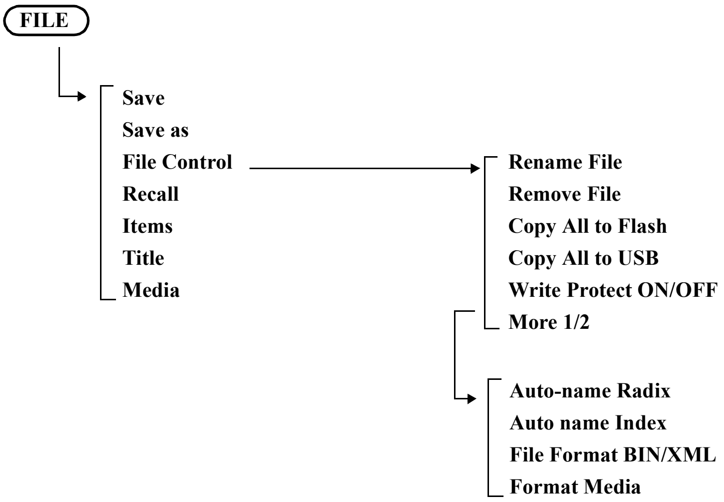
SYSTEM (2)


(a)
Color Pattern
User Password
Date Time
Copy Config
Self Test
Factory Init
Color1
Color2
Black and White
White and Black
Edit Date Time
Format
Show ON/OFF
Copy
Copy Device FILE/PRT
Screen Shot Config
Print Config
Execute Self Test
File Format PNG/BMP
Auto Inc ON/OFF
Auto Inc Index
Menu ON/OFF
File Control
Media
Rename File
Remove File
Write Protect ON/OFF
Paper Format
Color Mode Color/Gray
Menu ON/OFF
Config Driver

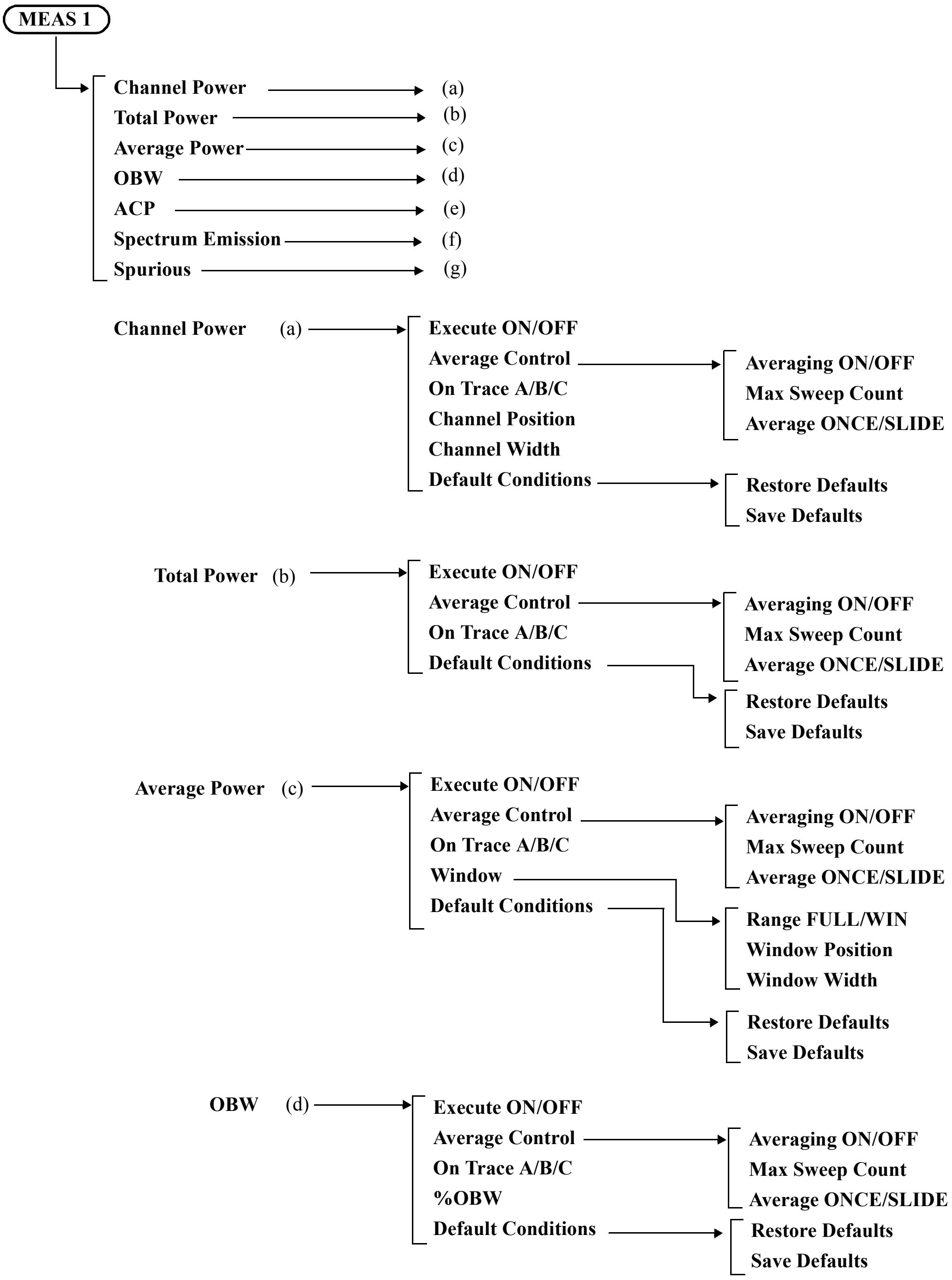
- APPLI


APPLI
Spectrum Analyzer
2 Channels Viewer
3GPP DL Modulation
2 Channel ON/OFF
Spectrum RF1
Spectrum RF2
2 Channel Preset
Context RF2|RF1
Refer to "U3700 Series OPT50 User's Guide" (FOE-8440247).

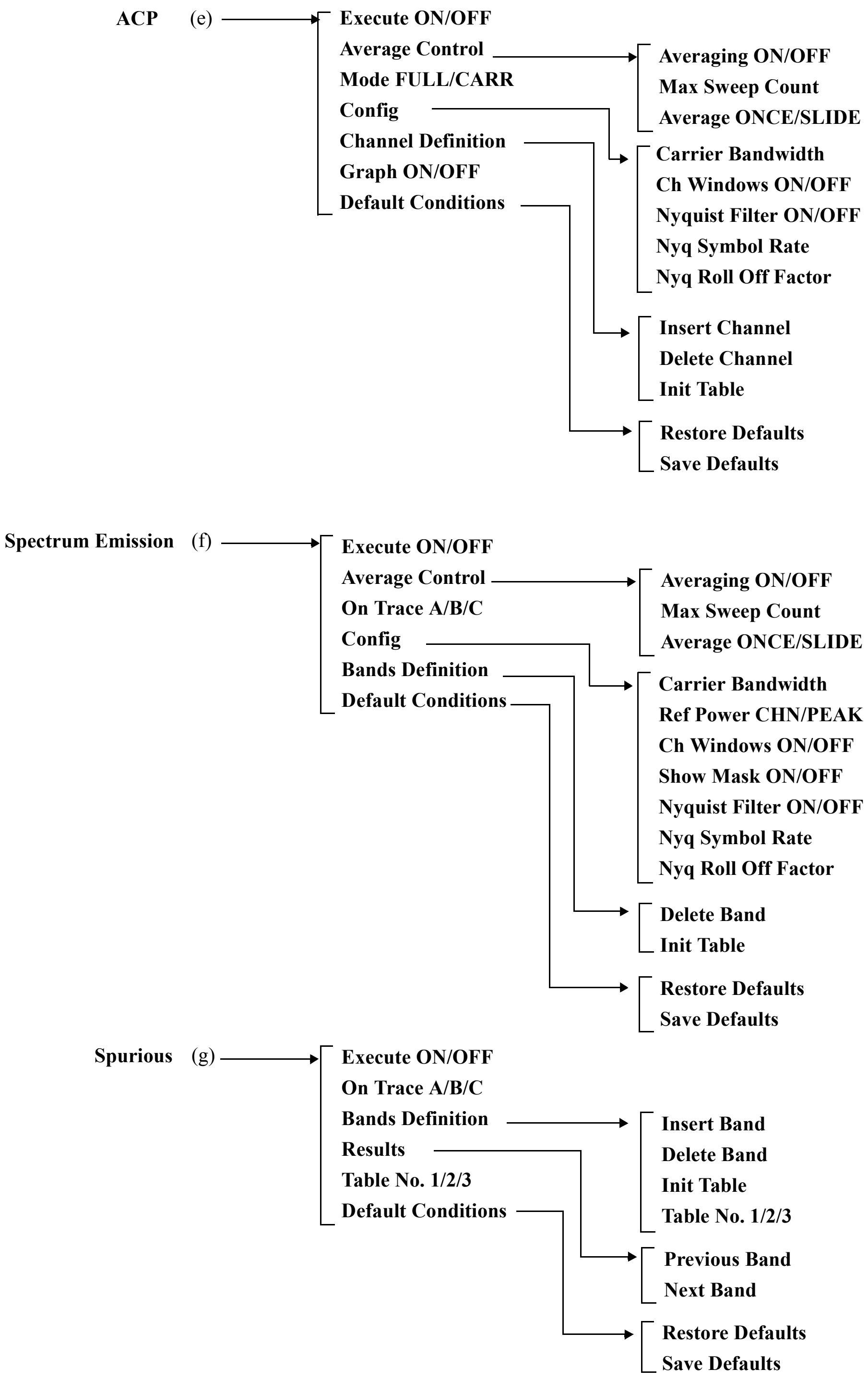
- FILE


FILE
Save
Save as
File Control
Recall
Items
Title
Media
Rename File
Remove File
Copy All to Flash
Copy All to USB
Write Protect ON/OFF
More 1/2
Auto-name Radix
Auto name Index
File Format BIN/XML
Format Media

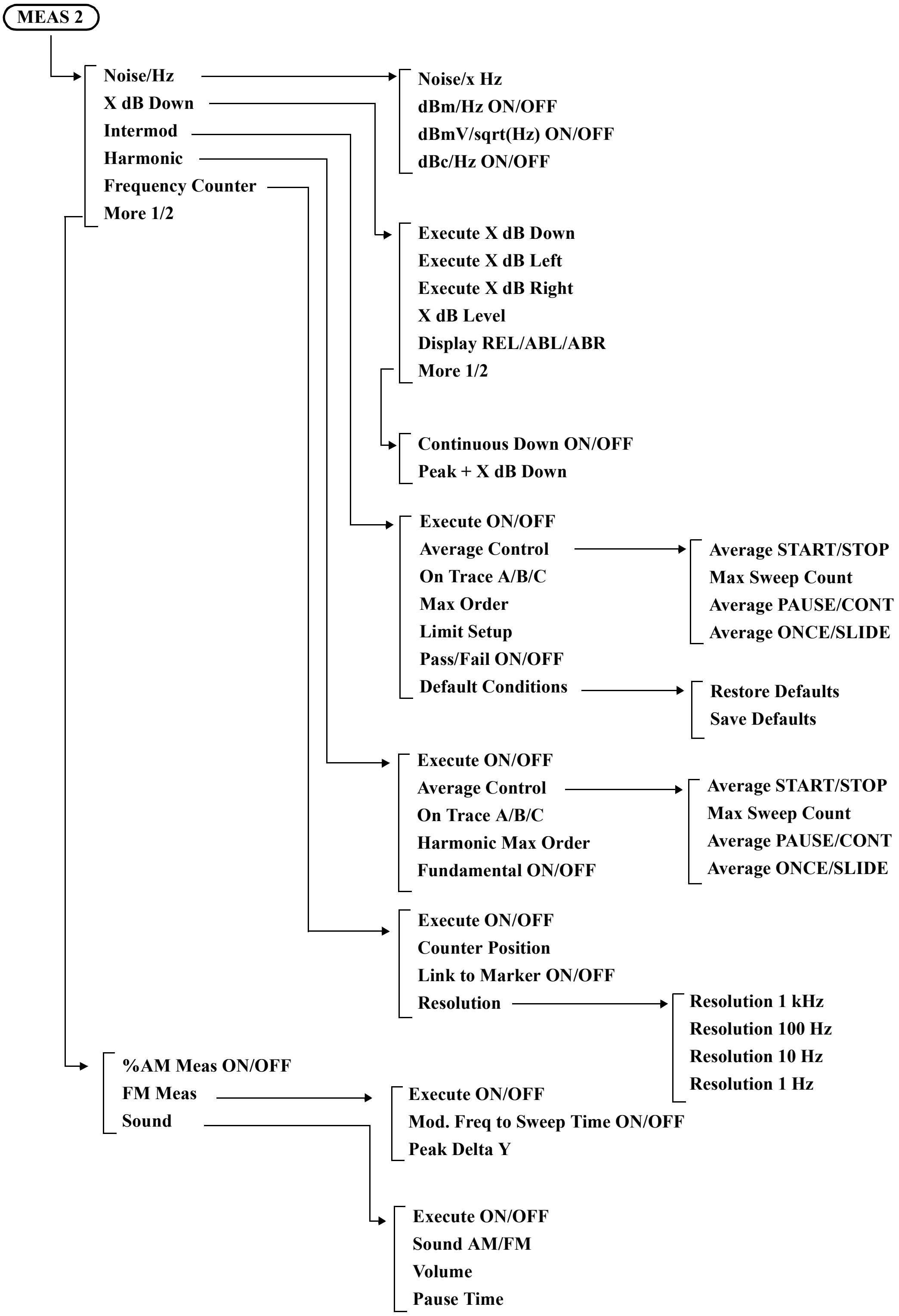
- MEAS 1 (1)


MEAS 1
Channel Power
(a)
Total Power
(b)
Average Power
(c)
OBW
(d)
ACP
(e)
Spectrum Emission
(f)
Spurious
(g)
Channel Power
(a)
Execute ON/OFF
Average Control
On Trace A/B/C
Channel Position
Channel Width
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Restore Defaults
Save Defaults
Total Power
(b)
Execute ON/OFF
Average Control
On Trace A/B/C
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Restore Defaults
Save Defaults
Average Power
(c)
Execute ON/OFF
Average Control
On Trace A/B/C
Window
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Range FULL/WIN
Window Position
Window Width
Restore Defaults
Save Defaults
OBW
(d)
Execute ON/OFF
Average Control
On Trace A/B/C
%OBW
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Restore Defaults
Save Defaults

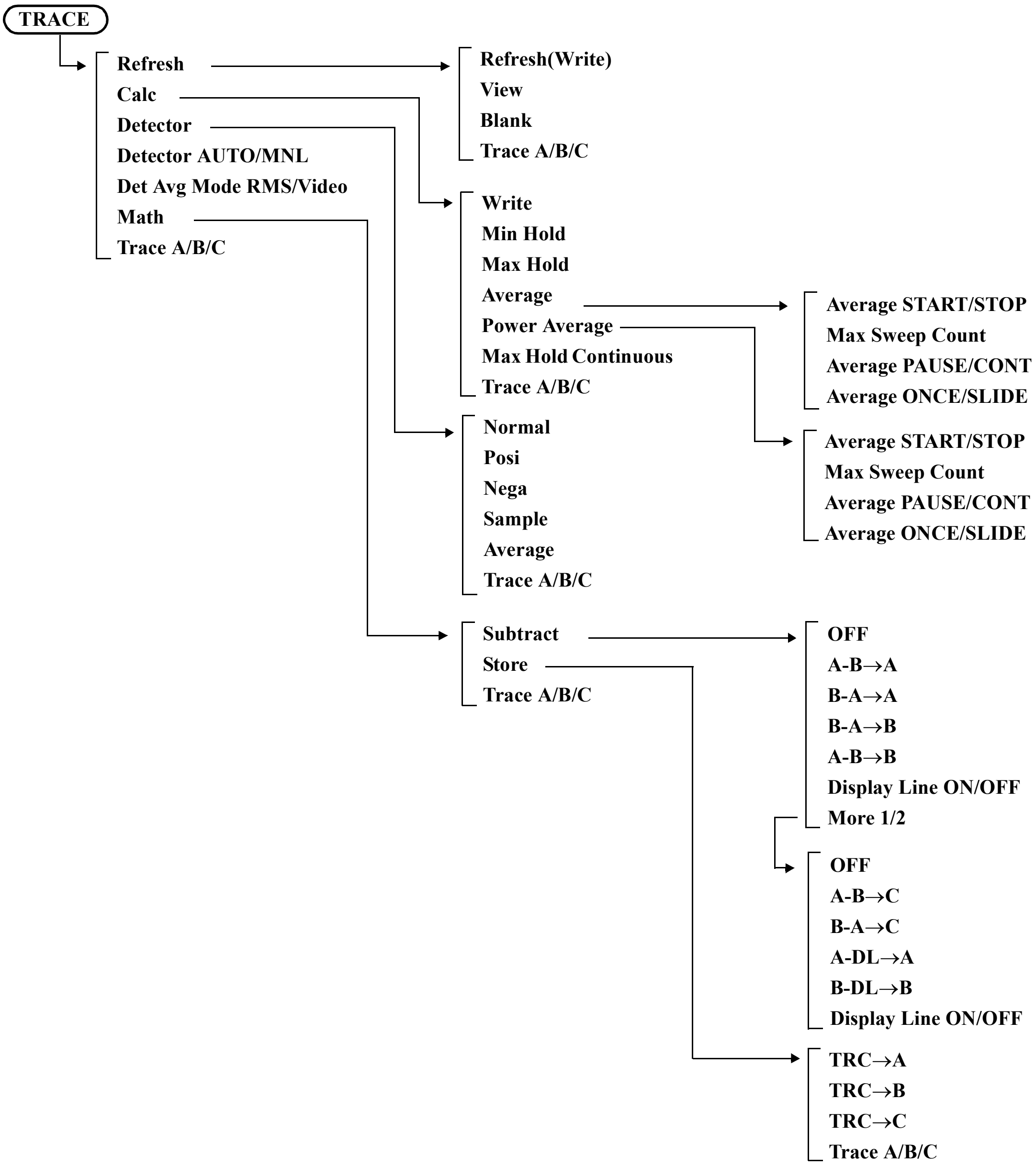
MEAS 1 (2)


ACP (e)
Execute ON/OFF
Average Control
Mode FULL/CARR
Config
Channel Definition
Graph ON/OFF
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Carrier Bandwidth
Ch Windows ON/OFF
Nyquist Filter ON/OFF
Nyq Symbol Rate
Nyq Roll Off Factor
Insert Channel
Delete Channel
Init Table
Restore Defaults
Save Defaults
Spectrum Emission (f)
Execute ON/OFF
Average Control
On Trace A/B/C
Config
Bands Definition
Default Conditions
Averaging ON/OFF
Max Sweep Count
Average ONCE/SLIDE
Carrier Bandwidth
Ref Power CHN/PEAK
Ch Windows ON/OFF
Show Mask ON/OFF
Nyquist Filter ON/OFF
Nyq Symbol Rate
Nyq Roll Off Factor
Delete Band
Init Table
Restore Defaults
Save Defaults
Spurious (g)
Execute ON/OFF
On Trace A/B/C
Bands Definition
Results
Table No. 1/2/3
Default Conditions
Insert Band
Delete Band
Init Table
Table No. 1/2/3
Previous Band
Next Band
Restore Defaults
Save Defaults

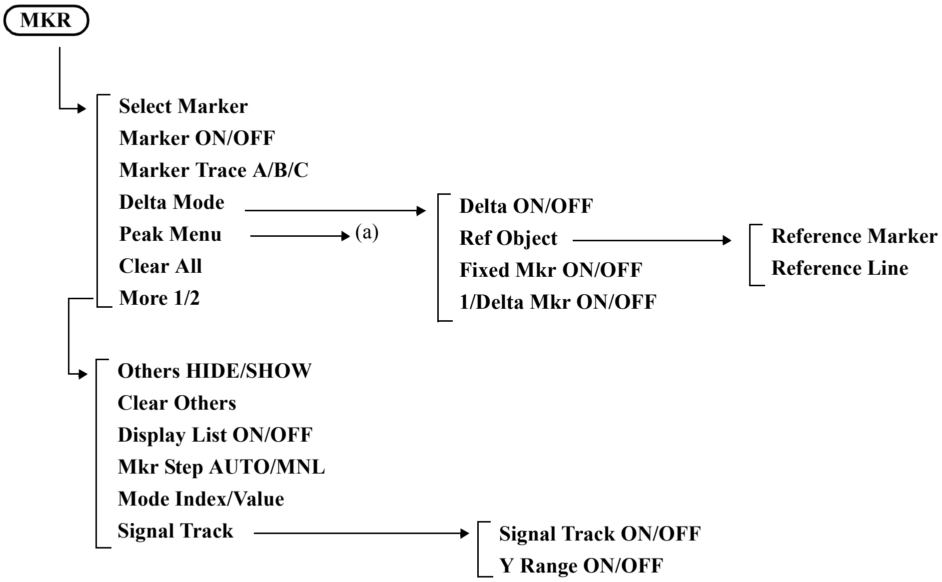
- MEAS 2

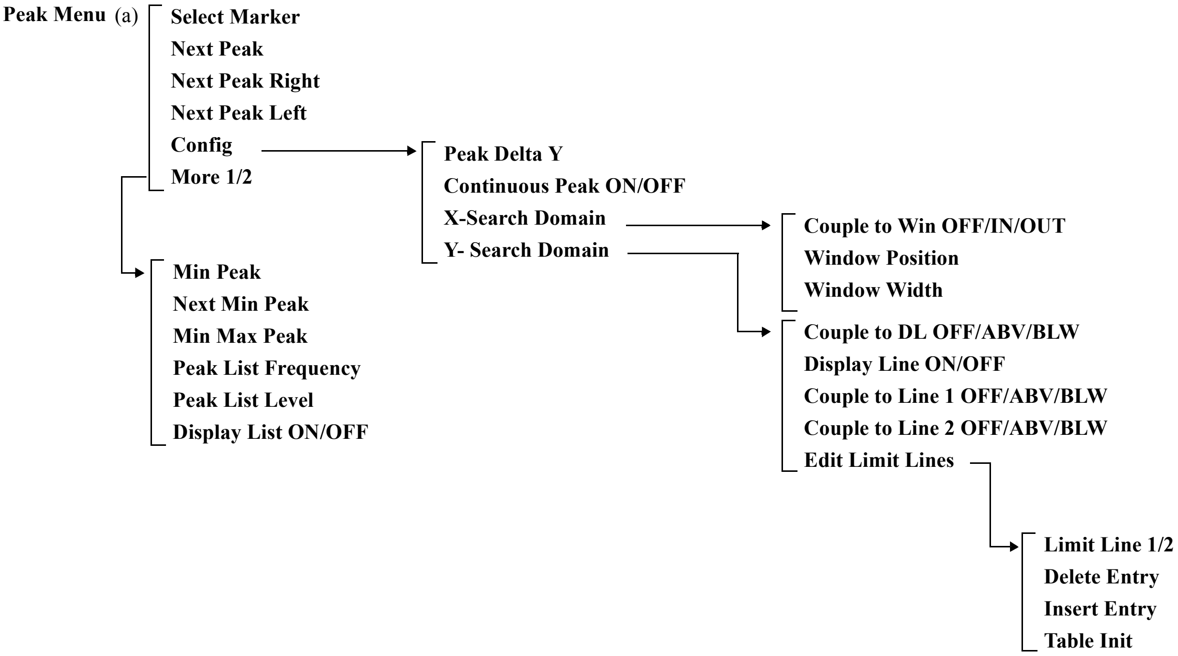

MEAS 2
Noise/Hz
X dB Down
Intermod
Harmonic
Frequency Counter
More 1/2
Noise/x Hz
dBm/Hz ON/OFF
dBmV/sqrt(Hz) ON/OFF
dBc/Hz ON/OFF
Execute X dB Down
Execute X dB Left
Execute X dB Right
X dB Level
Display REL/ABL/ABR
More 1/2
Continuous Down ON/OFF
Peak + X dB Down
Execute ON/OFF
Average Control
On Trace A/B/C
Max Order
Limit Setup
Pass/Fail ON/OFF
Default Conditions
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Restore Defaults
Save Defaults
Execute ON/OFF
Average Control
On Trace A/B/C
Harmonic Max Order
Fundamental ON/OFF
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Execute ON/OFF
Counter Position
Link to Marker ON/OFF
Resolution
Resolution 1 kHz
Resolution 100 Hz
Resolution 10 Hz
Resolution 1 Hz
%AM Meas ON/OFF
FM Meas
Sound
Execute ON/OFF
Mod. Freq to Sweep Time ON/OFF
Peak Delta Y
Execute ON/OFF
Sound AM/FM
Volume
Pause Time

- TRACE

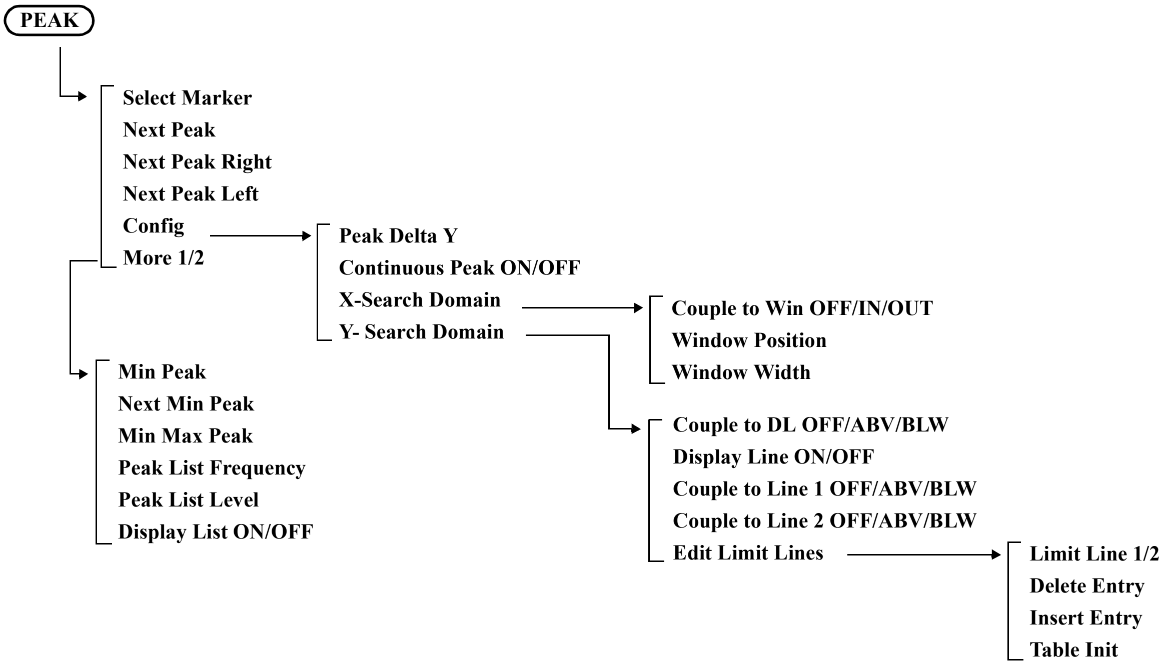

TRACE
Refresh
Calc
Detector
Detector AUTO/MNL
Det Avg Mode RMS/Video
Math
Trace A/B/C
Refresh(Write)
View
Blank
Trace A/B/C
Write
Min Hold
Max Hold
Average
Power Average
Max Hold Continuous
Trace A/B/C
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Normal
Posi
Nega
Sample
Average
Trace A/B/C
Average START/STOP
Max Sweep Count
Average PAUSE/CONT
Average ONCE/SLIDE
Subtract
Store
Trace A/B/C
OFF
A-B→A
B-A→A
B-A→B
A-B→B
Display Line ON/OFF
More 1/2
OFF
A-B→C
B-A→C
A-DL→A
B-DL→B
Display Line ON/OFF
TRC→A
TRC→B
TRC→C
Trace A/B/C

- MKR

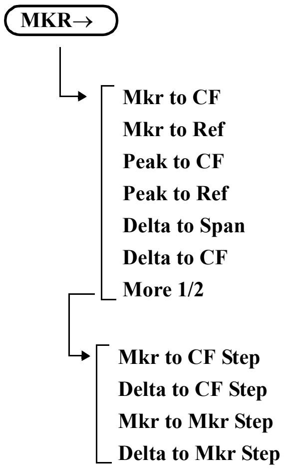

MKR
Select Marker
Marker ON/OFF
Marker Trace A/B/C
Delta Mode
Peak Menu
(a)
Clear All
More 1/2
Delta ON/OFF
Ref Object
Fixed Mkr ON/OFF
1/Delta Mkr ON/OFF
Reference Marker
Reference Line
Others HIDE/SHOW
Clear Others
Display List ON/OFF
Mkr Step AUTO/MNL
Mode Index/Value
Signal Track
Signal Track ON/OFF
Y Range ON/OFF


Peak Menu (a)
Select Marker
Next Peak
Next Peak Right
Next Peak Left
Config
More 1/2
Peak Delta Y
Continuous Peak ON/OFF
X-Search Domain
Y- Search Domain
Couple to Win OFF/IN/OUT
Window Position
Window Width
Couple to DL OFF/ABV/BLW
Display Line ON/OFF
Couple to Line 1 OFF/ABV/BLW
Couple to Line 2 OFF/ABV/BLW
Edit Limit Lines
Limit Line 1/2
Delete Entry
Insert Entry
Table Init
Min Peak
Next Min Peak
Min Max Peak
Peak List Frequency
Peak List Level
Display List ON/OFF

- PEAK


PEAK
Select Marker
Next Peak
Next Peak Right
Next Peak Left
Config
More 1/2
Peak Delta Y
Continuous Peak ON/OFF
X-Search Domain
Y- Search Domain
Couple to Win OFF/IN/OUT
Window Position
Window Width
Min Peak
Next Min Peak
Min Max Peak
Peak List Frequency
Peak List Level
Display List ON/OFF
Couple to DL OFF/ABV/BLW
Display Line ON/OFF
Couple to Line 1 OFF/ABV/BLW
Couple to Line 2 OFF/ABV/BLW
Edit Limit Lines
Limit Line 1/2
Delete Entry
Insert Entry
Table Init

- MKR→


MKR→
Mkr to CF
Mkr to Ref
Peak to CF
Peak to Ref
Delta to Span
Delta to CF
More 1/2
Mkr to CF Step
Delta to CF Step
Mkr to Mkr Step
Delta to Mkr Step

- TG (Option)

TG

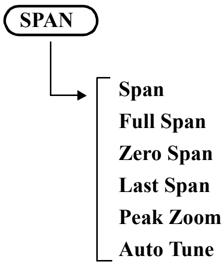
- **TG ON/OFF**
- **TG Level**
- **TG Level Offset ON/OFF**
- **TG Freq. Offset ON/OFF**
- **Normalize**
  - **Capture Normz Data**
  - **Normalize Correction ON/OFF**
  - **Trace A/B/C**
  - **VSWR ON/OFF**
  - **Delta Ref Line ON/OFF**
  - **Reference Line ON/OFF**
- **Reference Line ON/OFF**

- FREQUENCY

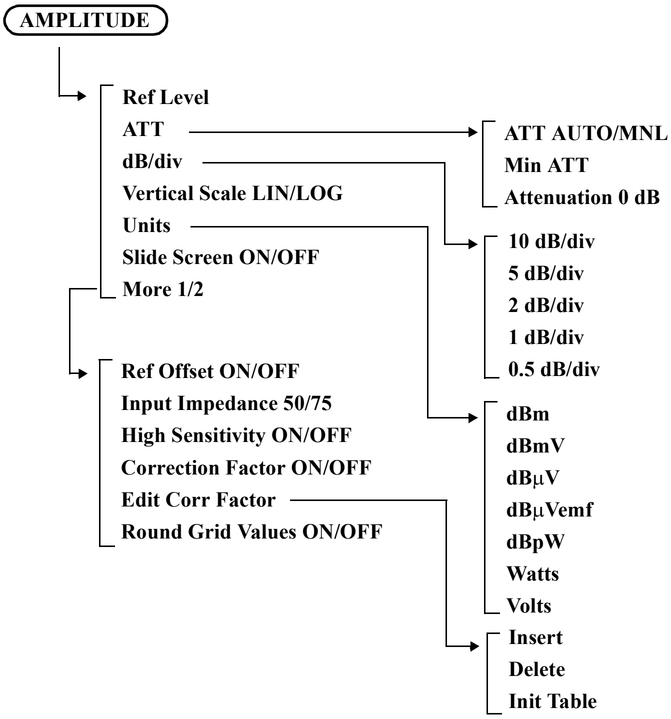
FREQUENCY

- **Center**
- **Start**
- **Stop**
- **Frequency Offset ON/OFF**
- **CF Step Size AUTO/MNL**
- **Channel Input**
  - **Freq Input Mode CALC/TABLE**
  - **Center CH ON/OFF**
  - **Start CH ON/OFF**
  - **Stop CH ON/OFF**
  - **Start CH Offset ON/OFF**
  - **Stop CH Offset ON/OFF**
  - **Channels Config**
    - **Edit Channel Formula**
    - **Edit Channel Table**
      - **Insert Line**
      - **Delete Line**
      - **Table Init**
    - **Formula 1 ON/OFF**
    - **Formula 2 ON/OFF**
    - **Formula 3 ON/OFF**
- **More 1/2**
  - (U3751/U3771/U3772)
  - **Signal Identification ON/OFF**
  - **Image Suppression ON/OFF**

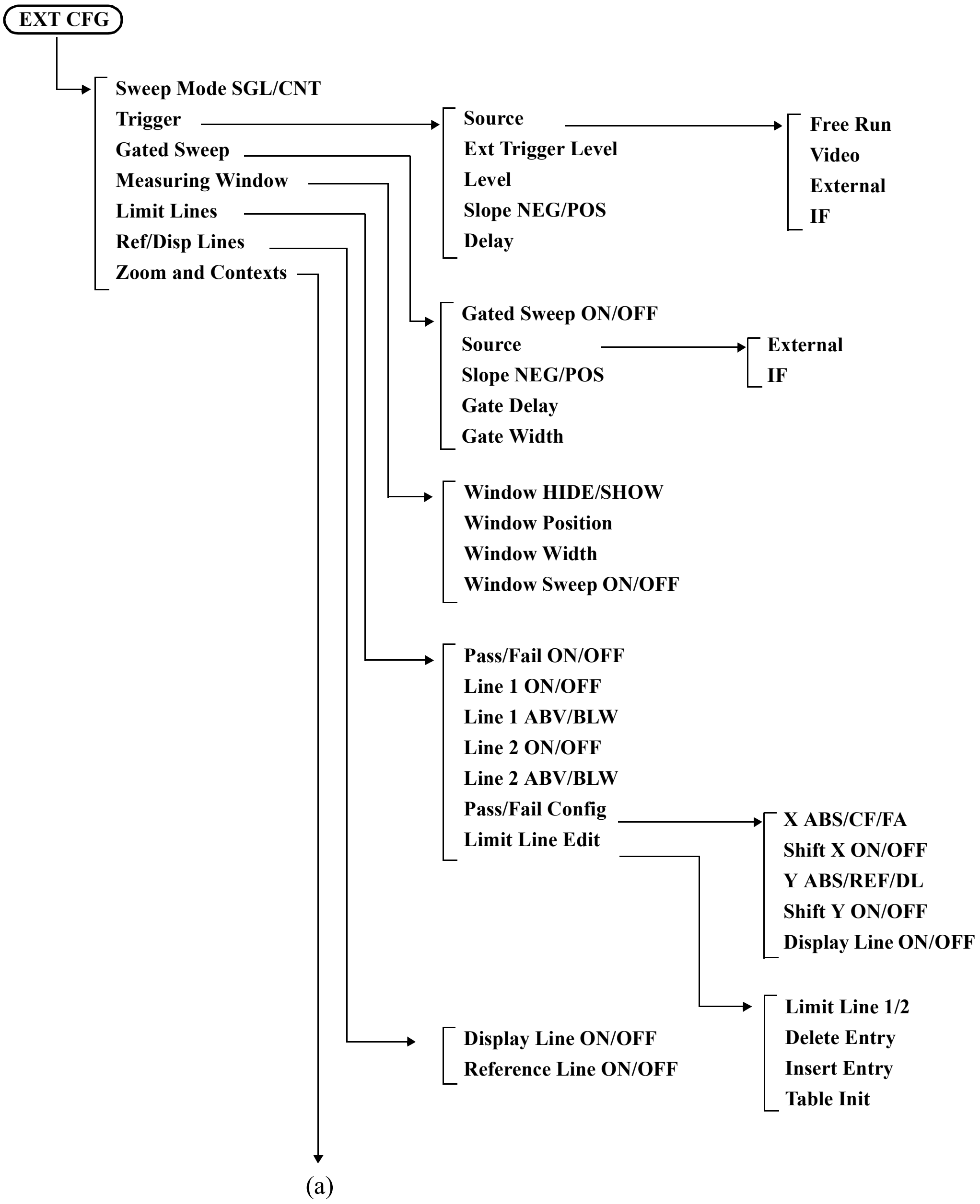
- SPAN



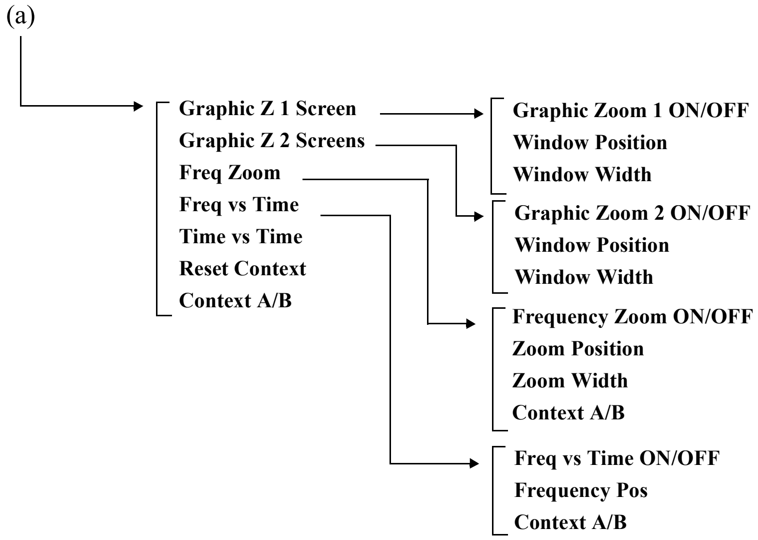
- AMPLITUDE



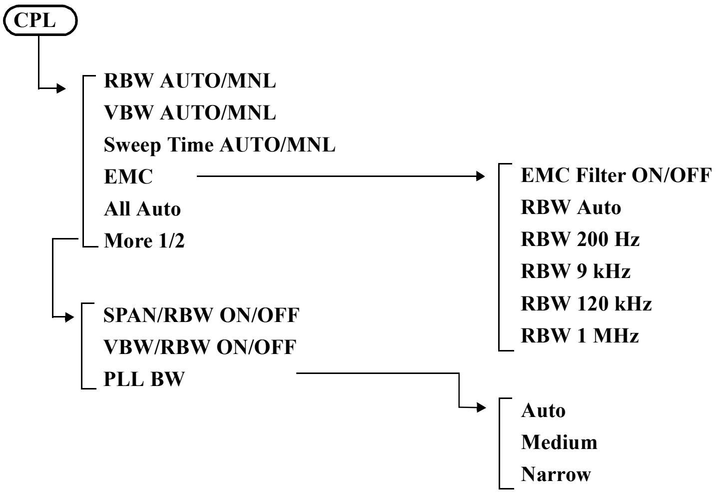
- EXT CFG (Extended Configuration options) (1)



EXT CFG (Extended Configuration options) (1)



- CPL (Coupled function)



A.6 TV Channel Table (Japan)

A.6.1 CATV Channel Number and Frequency

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)	Picture frequency (MHz)	Sound frequency (MHz)
1	1	90.00 ~ 96.00	93	91.25	95.75
2	2	96.00 ~ 102.00	99	97.25	101.75
3	3	102.00 ~ 108.00	105	103.25	107.75
4	4	170.00 ~ 176.00	173	171.25	175.75
5	5	176.00 ~ 182.00	179	177.25	181.75
6	6	182.00 ~ 188.00	185	183.25	187.75
7	7	188.00 ~ 194.00	191	189.25	193.75
8	8	192.00 ~ 198.00	195	193.25	197.75
9	9	198.00 ~ 204.00	201	199.25	203.75
10	10	204.00 ~ 210.00	207	205.25	209.75
11	11	210.00 ~ 216.00	213	211.25	215.75
12	12	216.00 ~ 222.00	219	217.25	221.75
13	Cl3	108.00 ~ 114.00	111	l09.25	113.25
14	C14	114.00 ~ 120.00	117	115.25	119.75
15	C15	120.00 ~ 126.00	123	121.25	125.75
16	C16	126.00 ~ 132.00	129	127.25	131.75
17	C17	132.00 ~ 138.00	135	133.25	137.75
18	C18	138.00 ~ 144.00	141	139.25	143.75
19	C19	144.00 ~ 150.00	147	145.25	149.75
20	C20	150.00 ~ 156.00	153	151.25	155.75
21	C21	156.00 ~ 162.00	159	157.25	161.75
22	C22	164.00 ~ 170.00	167	165.25	169.75
23	C23	222.00 ~ 228.00	225	223.25	227.75
24	C24	230.00 ~ 236.00	233	231.25	235.75
25	C25	236.00 ~ 242.00	239	237.25	241.75
26	C26	242.00 ~ 248.00	245	243.25	247.75
27	C27	248.00 ~ 254.00	251	249.25	253.75
28	C28	252.00 ~ 258.00	255	253.25	257.75
29	C29	258.00 ~ 264.00	261	259.25	263.75
30	C30	264.00 ~ 270.00	267	265.25	269.75

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)	Picture frequency (MHz)	Sound frequency (MHz)
31	C31	270.00 ~ 276.00	273	271.25	275.75
32	C32	276.00 ~ 282.00	279	277.25	281.75
33	C33	282.00 ~ 288.00	285	283.25	287.75
34	C34	288.00 ~ 294.00	291	289.25	293.75
35	C35	294.00 ~ 300.00	297	295.25	299.75
36	C36	300.00 ~ 306.00	303	301.25	305.75
37	C37	306.00 ~ 312.00	309	307.25	311.75
38	C38	312.00 ~ 318.00	315	313.25	317.75
39	C39	318.00 ~ 324.00	321	319.25	323.75
40	C40	324.00 ~ 330.00	327	325.25	329.75
41	C41	330.00 ~ 336.00	333	331.25	335.75
42	C42	336.00 ~ 342.00	339	337.25	341.75
43	C43	342.00 ~ 348.00	345	343.25	347.75
44	C44	348.00 ~ 354.00	351	349.25	353.75
45	C45	354.00 ~ 360.00	357	355.25	359.75
46	C46	360.00 ~ 366.00	363	361.25	365.75
47	C47	366.00 ~ 372.00	369	367.25	371.75
48	C48	372.00 ~ 378.00	375	373.25	377.75
49	C49	378.00 ~ 384.00	381	379.25	383.75
50	C50	384.00 ~ 390.00	387	385.25	389.75
51	C51	390.00 ~ 396.00	393	391.25	395.75
52	C52	396.00 ~ 402.00	399	397.25	401.75
53	C53	402.00 ~ 408.00	405	403.25	407.75
54	C54	408.00 ~ 414.00	411	409.25	413.75
55	C55	414.00 ~ 420.00	417	415.25	419.75
56	C56	420.00 ~ 426.00	423	421.25	425.75
57	C57	426.00 ~ 432.00	429	427.25	431.75
58	C58	432.00 ~ 438.00	435	433.25	437.75
59	C59	438.00 ~ 444.00	441	439.25	443.75
60	C60	444.00 ~ 450.00	447	445.25	449.75
61	C61	450.00 ~ 456.00	453	451.25	455.75
62	C62	456.00 ~ 462.00	459	457.25	461.75
63	C63	462.00 ~ 468.00	465	463.25	467.75

A.6.2 VHF/UHF Channel Number and Frequency

1. VHF

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)	Picture frequency (MHz)	Sound frequency (MHz)
1	1	90.00 ~ 96.00	93	91.25	95.75
2	2	96.00 ~ 102.00	99	97.25	101.75
3	3	102.00 ~ 108.00	105	103.25	107.75
4	4	170.00 ~ 176.00	173	171.25	175.75
5	5	176.00 ~ 182.00	179	177.25	181.75
6	6	182.00 ~ 188.00	185	183.25	187.75
7	7	188.00 ~ 194.00	191	189.25	193.75
8	8	192.00 ~ 198.00	195	193.25	197.75
9	9	198.00 ~ 204.00	201	199.25	203.75
10	10	204.00 ~ 210.00	207	205.25	209.75
11	11	210.00 ~ 216.00	213	211.25	215.75
12	12	216.00 ~ 222.00	219	217.25	221.75

2. UHF

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)	Picture frequency (MHz)	Sound frequency (MHz)
13	13	470.00 ~ 476.00	473	471.25	475.75
14	14	476.00 ~ 482.00	479	477.25	481.75
15	15	482.00 ~ 488.00	485	483.25	487.75
16	16	488.00 ~ 494.00	491	489.25	493.75
17	17	494.00 ~ 500.00	497	495.25	499.75
18	18	500.00 ~ 506.00	503	501.25	505.75
19	19	506.00 ~ 512.00	509	507.25	511.75
20	20	512.00 ~ 518.00	515	513.25	517.75
21	21	518.00 ~ 524.00	521	519.25	523.75
22	22	524.00 ~ 530.00	527	525.25	529.75
23	23	530.00 ~ 536.00	533	531.25	535.75
24	24	536.00 ~ 542.00	539	537.25	541.75
25	25	542.00 ~ 548.00	545	543.25	547.75
26	26	548.00 ~ 554.00	551	549.25	553.75
27	27	554.00 ~ 560.00	557	555.25	559.75
28	28	560.00 ~ 566.00	563	561.25	565.75

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)	Picture frequency (MHz)	Sound frequency (MHz)
29	29	566.00 ~ 572.00	569	567.25	571.75
30	30	572.00 ~ 578.00	575	573.25	577.75
31	31	578.00 ~ 584.00	581	579.25	583.75
32	32	584.00 ~ 590.00	587	585.25	589.75
33	33	590.00 ~ 596.00	593	591.25	595.75
34	34	596.00 ~ 602.00	599	597.25	601.75
35	35	602.00 ~ 608.00	605	603.25	607.75
36	36	608.00 ~ 614.00	611	609.25	613.75
37	37	614.00 ~ 620.00	617	615.25	619.75
38	38	620.00 ~ 626.00	623	621.25	625.75
39	39	626.00 ~ 632.00	629	627.25	631.75
40	40	632.00 ~ 638.00	635	633.25	637.75
41	41	638.00 ~ 644.00	641	639.25	643.75
42	42	644.00 ~ 650.00	647	645.25	649.75
43	43	650.00 ~ 656.00	653	651.25	655.75
44	44	656.00 ~ 662.00	659	657.25	661.75
45	45	662.00 ~ 668.00	665	663.25	667.75
46	46	668.00 ~ 674.00	671	669.25	673.75
47	47	674.00 ~ 680.00	677	675.25	679.75
48	48	680.00 ~ 686.00	683	681.25	685.75
49	49	686.00 ~ 692.00	689	687.25	691.75
50	50	692.00 ~ 698.00	695	693.25	697.75
51	51	698.00 ~ 704.00	701	699.25	703.75
52	52	704.00 ~ 710.00	707	705.25	709.75
53	53	710.00 ~ 716.00	713	711.25	715.75
54	54	716.00 ~ 722.00	719	717.25	721.75
55	55	722.00 ~ 728.00	725	723.25	727.75
56	56	728.00 ~ 734.00	731	729.25	733.75
57	57	734.00 ~ 740.00	737	735.25	739.75
58	58	740.00 ~ 746.00	743	741.25	745.75
59	59	746.00 ~ 752.00	749	747.25	751.75
60	60	752.00 ~ 758.00	755	753.25	757.75
61	61	758.00 ~ 764.00	761	759.25	763.75
62	62	764.00 ~ 770.00	767	765.25	769.75

A.6.3 Terrestrial Digital Broadcasting Channel Number and Frequency

- UHF that supports terrestrial digital broadcasting

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)
13	13	470.00 ~ 476.00	473.142857
14	14	476.00 ~ 482.00	479.142857
15	15	482.00 ~ 488.00	485.142857
16	16	488.00 ~ 494.00	491.142857
17	17	494.00 ~ 500.00	497.142857
18	18	500.00 ~ 506.00	503.142857
19	19	506.00 ~ 512.00	509.142857
20	20	512.00 ~ 518.00	515.142857
21	21	518.00 ~ 524.00	521.142857
22	22	524.00 ~ 530.00	527.142857
23	23	530.00 ~ 536.00	533.142857
24	24	536.00 ~ 542.00	539.142857
25	25	542.00 ~ 548.00	545.142857
26	26	548.00 ~ 554.00	551.142857
27	27	554.00 ~ 560.00	557.142857
28	28	560.00 ~ 566.00	563.142857
29	29	566.00 ~ 572.00	569.142857
30	30	572.00 ~ 578.00	575.142857
31	31	578.00 ~ 584.00	581.142857
32	32	584.00 ~ 590.00	587.142857
33	33	590.00 ~ 596.00	593.142857
34	34	596 .00 ~ 602.00	599.142857
35	35	602.00 ~ 608.00	605.142857
36	36	608.00 ~ 614.00	611.142857
37	37	614.00 ~ 620.00	617.142857
38	38	620.00 ~ 626.00	623.142857
39	39	626.00 ~ 632.00	629.142857
40	40	632.00 ~ 638.00	635.142857
41	41	638.00 ~ 644.00	641.142857
42	42	644.00 ~ 650.00	647.142857
43	43	650.00 ~ 656.00	653.142857
44	44	656.00 ~ 662.00	659.142857

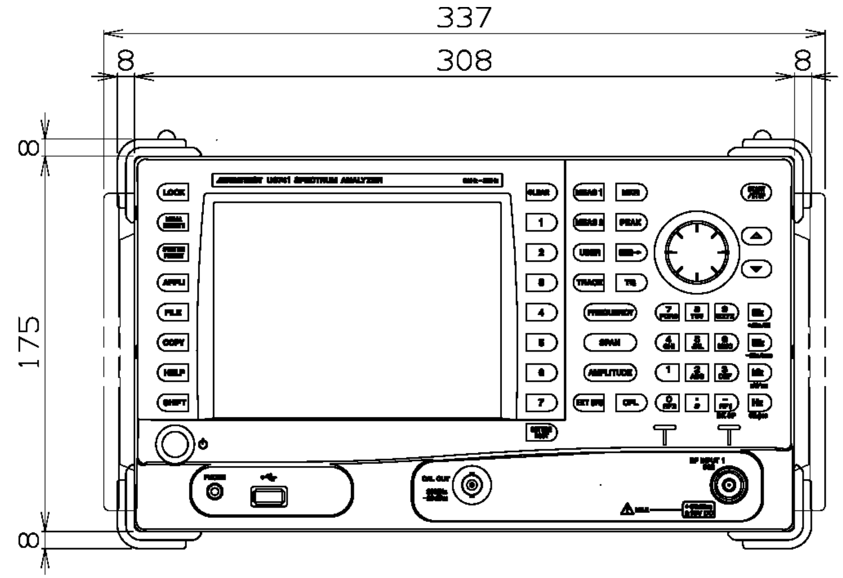
Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)
45	45	662.00 ~ 668.00	665.142857
46	46	668.00 ~ 674.00	671.142857
47	47	674.00 ~ 680.00	677.142857
48	48	680.00 ~ 686.00	683.142857
49	49	686.00 ~ 692.00	689.142857
50	50	692.00 ~ 698.00	695.142857
51	51	698.00 ~ 704.00	701.142857
52	52	704.00 ~ 710.00	707.142857
53	53	710.00 ~ 716.00	713.142857
54	54	716.00 ~ 722.00	719.142857
55	55	722.00 ~ 728.00	725.142857
56	56	728.00 ~ 734.00	731.142857
57	57	734.00 ~ 740.00	737.142857
58	58	740.00 ~ 746.00	743.142857
59	59	746.00 ~ 752.00	749.142857
60	60	752.00 ~ 758.00	755.142857
61	61	758.00 ~ 764.00	761.142857
62	62	764.00 ~ 770.00	767.142857

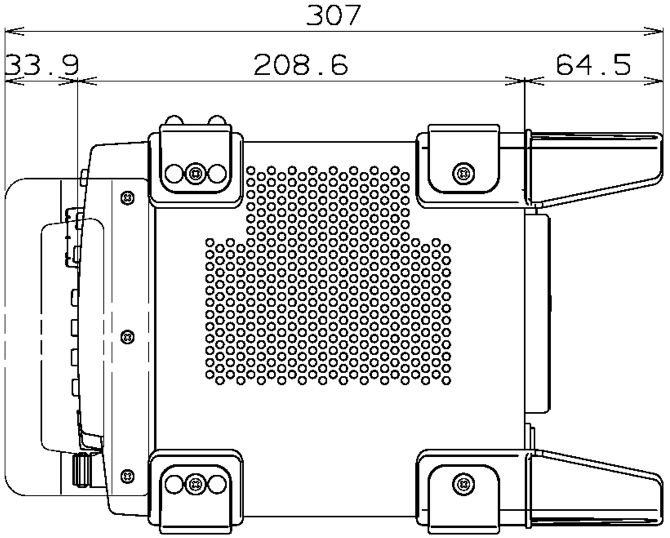
A.6.4 Satellite Broadcasting (BS-IF Band) Channel Number and Frequency

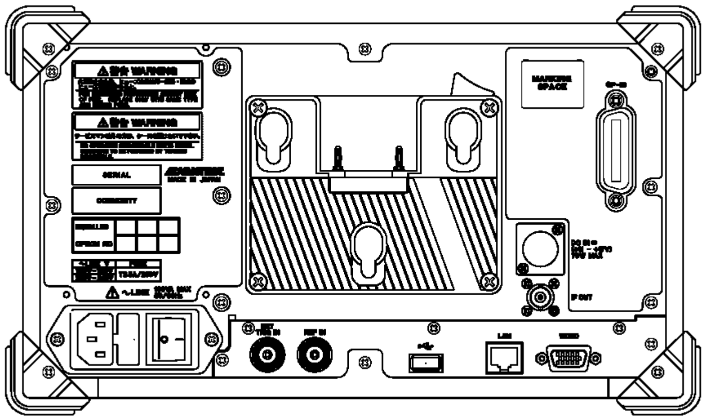
Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)
1	BS-1	1032.23 ~ 1066.73	1049.48
3	BS-3	1070.59 ~ 1105.09	1087.84
5	BS-5	1112.70 ~ 1139.70	1126.20
7	BS-7	1151.06 ~ 1178.06	1164.56
9	BS-9	1189.42 ~ 1216.42	1202.92
11	BS-11	1227.78 ~ 1254.78	1241.28
13	BS-13	1262.39 ~ 1296.89	1279.64
15	BS-15	1300.75 ~ 1335.25	1318.00
17	BS-17	1339.11 ~ 1373.61	1356.36
19	BS-19	1377.47 ~ 1411.97	1394.72
21	BS-21	1415.83 ~ 1450.33	1433.08
23	BS-23	1454.19 ~ 1488.69	1471.44

A.6.5 110 CS (CS-IF Band) Channel Number and Frequency

Analyzer's channel	Channel	Frequency range (MHz)	Center frequency (MHz)
2	ND2	1595.75 ~ 1630.25	1613
4	ND4	1635.75 ~ 1670.25	1653
6	ND6	1675.75 ~ 1710.25	1693
8	ND8	1715.75 ~ 1750.25	1733
10	NDl0	1755.75 ~ 1790.25	1773
12	ND12	1795.75 ~ 1830.25	1813
14	ND14	1835.75 ~ 1870.25	1953
16	ND16	1875.75 ~ 1910.25	1893
18	ND18	1915.75 ~ 1950.25	1933
20	ND20	1955.75 ~ 1990.25	1973
22	ND22	1995.75 ~ 2030.25	2013
24	ND24	2035.75 ~ 2070.25	2053

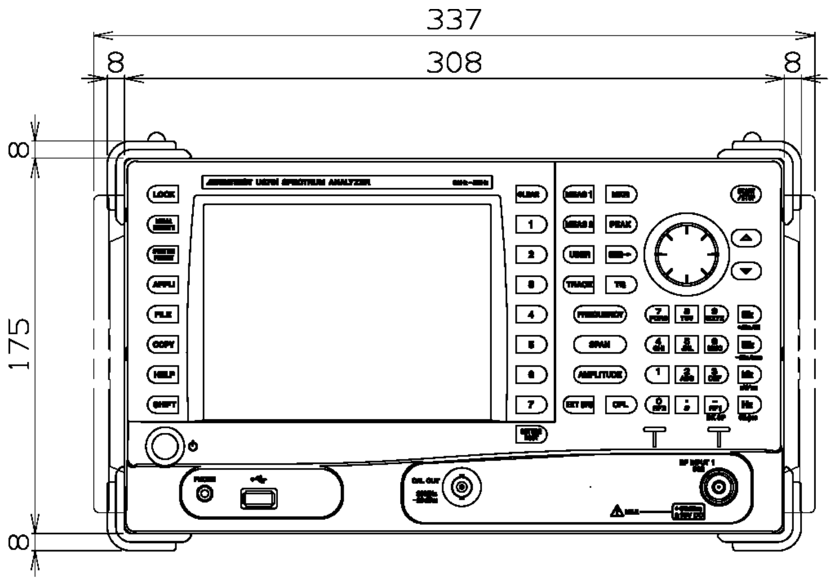


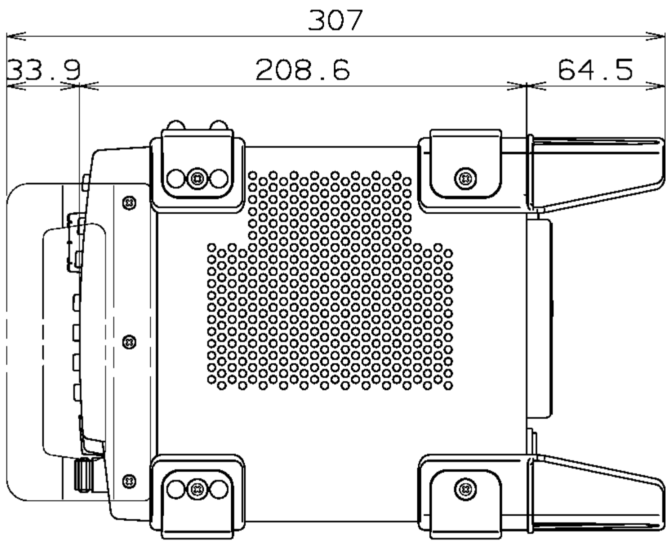


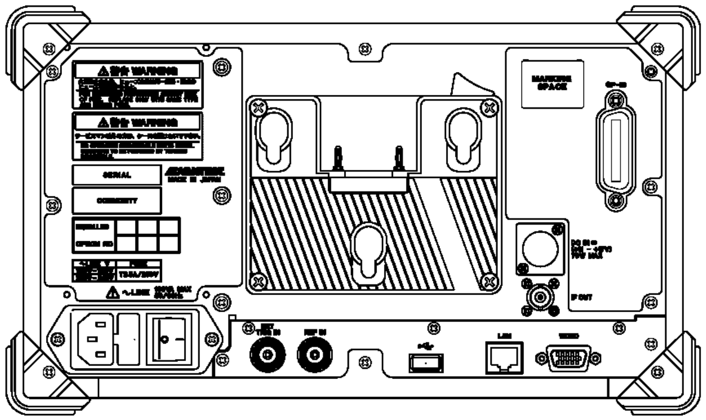


NOTE Unit:mm
This drawing shows external dimensions of
this instrument.
The difference in products and options
used can cause a change in the appearance
of the instrument.

U3741 DIMENSIONAL OUTLINE DRAWING



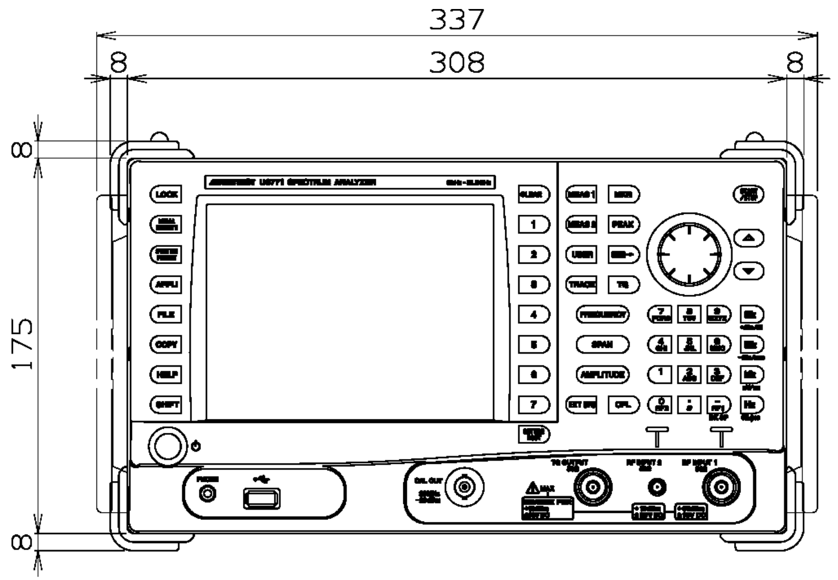


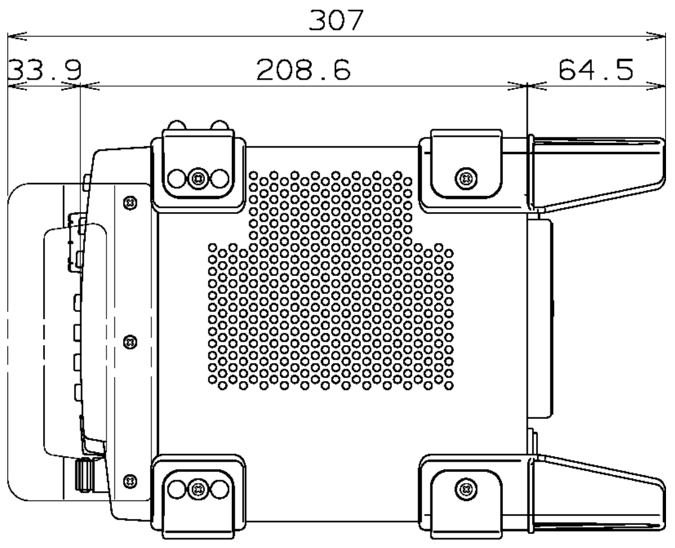


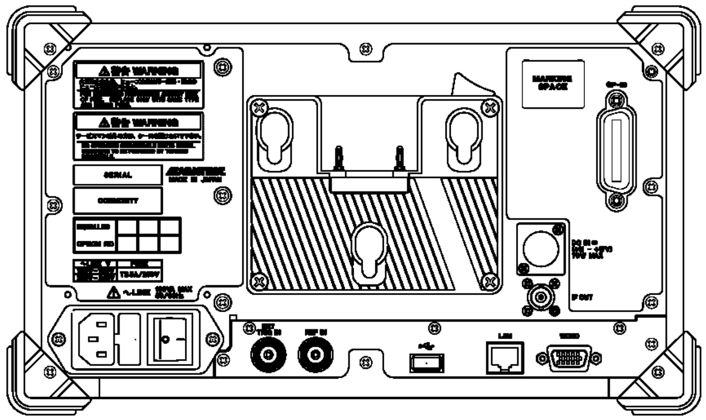
NOTE Unit:mm
This drawing shows external dimensions of this instrument.
The difference in products and options used can cause a change in the appearance of the instrument.

U3751 DIMENSIONAL OUTLINE DRAWING

U3771 DIMENSIONAL OUTLINE DRAWING

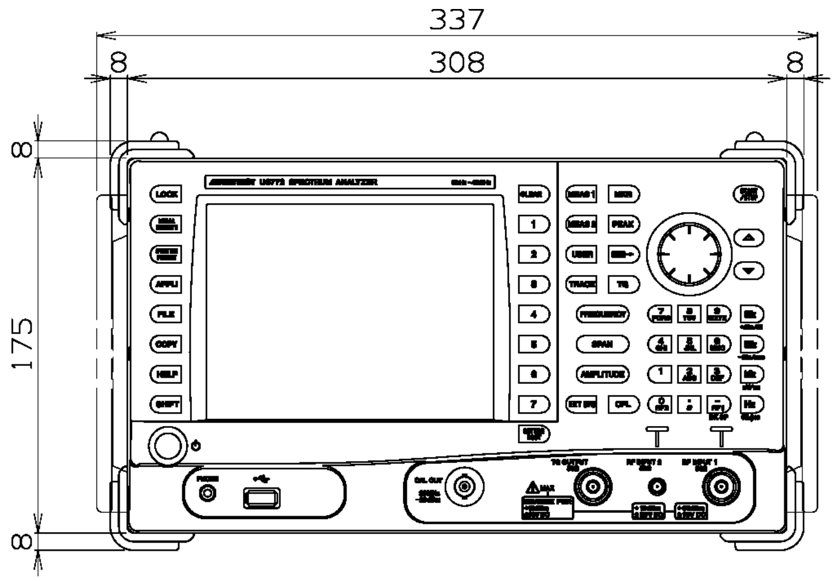


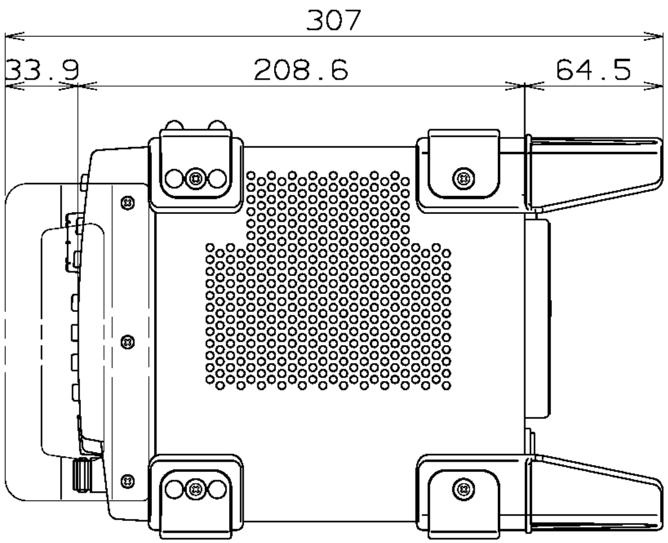


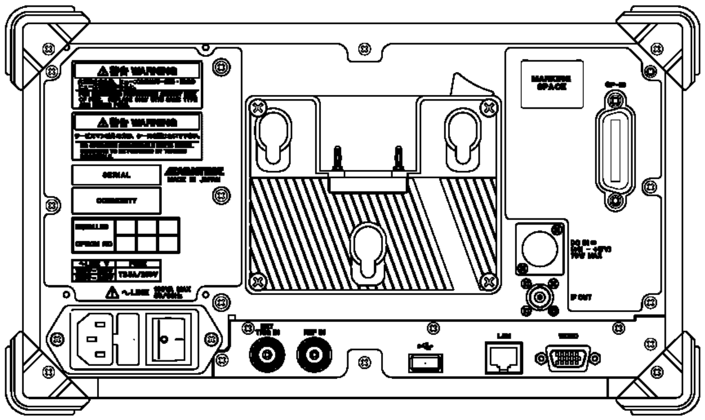


NOTE Unit:mm
This drawing shows external dimensions of this instrument.
The difference in products and options used can cause a change in the appearance of the instrument.

U3772 DIMENSIONAL OUTLINE DRAWING



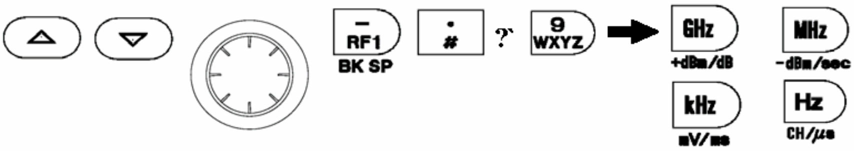




NOTE Unit:mm
This drawing shows external dimensions of this instrument.
The difference in products and options used can cause a change in the appearance of the instrument.

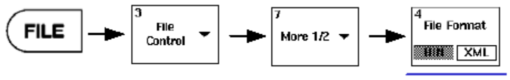
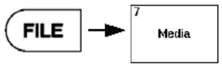
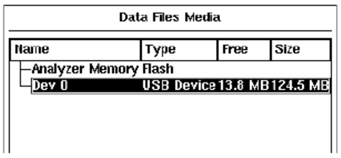
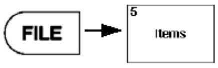
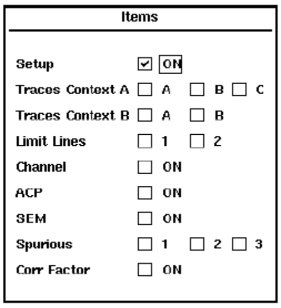
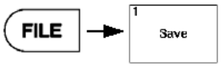
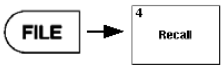
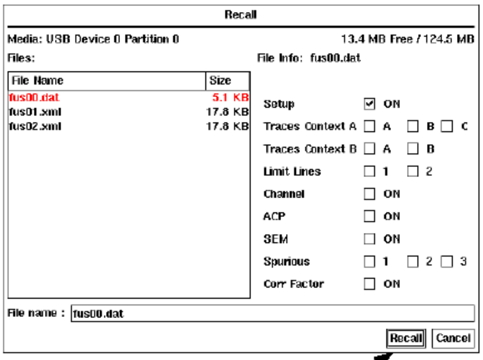
U3741/U3751/U3771/U3772 QUICK GUIDE

For Basic Operation

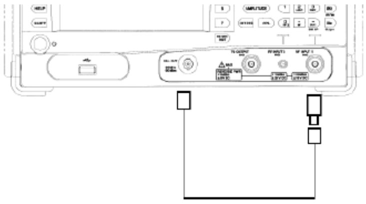
Item		Operation procedure
Start	**Instrument preset**	SHIFT → SYSTEM PRESET
	Data setting	Data input can be done by step keys, data knob, or numeric keys. (Press a unit key for entering.)  The term [Data setting] is used to represent this step in this guide. Press the **BK SP** key for input correction.
Basic operation	**Frequency and level setting**	FREQUENCY → [Data setting] Center frequency setting SPAN → [Data setting] Frequency span setting AMPLITUDE → [Data setting] Reference level setting
	Start / Stop frequency setting	FREQUENCY → 2 Start → [Data setting] Start frequency setting FREQUENCY → 3 Stop → [Data setting] Stop frequency setting
	Resolution bandwidth setting	CPL → 1 RBW AUTO MNL → [Data setting] Select the Manual mode.
	Video bandwidth setting	CPL → 2 VBW AUTO MNL → [Data setting] Select the Manual mode.
	Sweep time setting	CPL → 3 Sweep Time AUTO MNL → [Data setting] Select the Manual mode.
	Input ATT setting	AMPLITUDE → 2 ATT ▾ → 1 ATT AUTO MNL → [Data setting] Select the Manual mode. Normally select the Auto-attenuator mode to avoid damaging the input Mixer when selecting ATT=0dB. (If setting ATT=0dB, press "Attenuation 0 dB" and confirm.)

U3741/U3751/U3771/U3772 QUICK GUIDE

Item		Operation procedure
Basic operation	**Sweep start / stop**	Press START /STOP to stop a sweep, and press again to start a sweep.
	Single sweep	EXT CFG → 1 Sweep Mode SGL CNT → Press START /STOP Select the Single mode.
	Detection mode setting	TRACE → 3 Detector Normal → Select a Detection mode → 1 Normal: Alternative detection of positive and negative peaks → 2 Posi: Positive peak detection mode → 3 Nega: Negative peak detection mode → 4 Sample: Sample detection mode → 5 Average: The average detection mode includes RMS (power average) and Video (trace average), but either can be selected in the Det Avg Mode menu.
Marker	**Peak search**	PEAK
	Peak wave centering	MKR→ → 1 Mkr to CF
	Delta marker	MKR → [Data setting] → 4 Delta Mode → 1 Delta ON OFF → [Data setting] Reference marker setting Select the ON mode. Move the active marker. → Frequency and level differences between the reference marker and active marker are displayed.
	Peak list display	PEAK → 7 More 1/2 → → 5 Peak List Frequency: A peak list in frequency order is displayed. → 6 Peak List Level: A peak list in level order is displayed.
	Frequency counter	MEAS 2 → 6 Frequency Counter → [Data setting] → 1 Execute ON OFF → Counter position setting Select the ON mode. Select a resolution. → 1 Resolution 1 kHz → 2 Resolution 100 Hz → 3 Resolution 10 Hz → 4 Resolution 1 Hz Be sure to set "Counter OFF" after measurement.

Item		Operation procedure
SAVE / RECALL	**SAVE file format setting**	 BIN : Binary (.dat) XML : Extensible Markup Language (.xml) Select the BIN or XML mode. Only **BIN** data can be saved to the internal memory. Only **XML** data can be opened to an external PC.
	SAVE or RECALL Media setting	  Data Files Media Name | Type | Free | Size Analyzer Memory Flash Dev 0 | USB Device | 13.8 MB | 124.5 MB Select Data Files Media.
	SAVE Items setting	  Items Setup ☑ ON Traces Context A ☐ A ☐ B ☐ C Traces Context B ☐ A ☐ B Limit Lines ☐ 1 ☐ 2 Channel ☐ ON ACP ☐ ON SEM ☐ ON Spurious ☐ 1 ☐ 2 ☐ 3 Corr Factor ☐ ON Select SAVE Items.
	SAVE execute	
	RECALL execute	 (A) → **A ;** Choose a recall file with the data knob and press a unit key. **B ;** Move a cursor to “Recall” point with UP/DN keys and press a unit key.  Recall Media: USB Device 0 Partition 0 13.4 MB Free / 124.5 MB Files: File Info: fus00.dat File Name | Size fus00.dat | 5.1 KB fus01.xml | 17.8 KB fus02.xml | 17.8 KB Setup ☑ ON Traces Context A ☐ A ☐ B ☐ C Traces Context B ☐ A ☐ B Limit Lines ☐ 1 ☐ 2 Channel ☐ ON ACP ☐ ON SEM ☐ ON Spurious ☐ 1 ☐ 2 ☐ 3 Corr Factor ☐ ON File name : fus00.dat Recall Cancel (B) Only **BIN** data can be recalled.

U3741/U3751/U3771/U3772 QUICK GUIDE

Item		Operation procedure
Screen Shot copy	**Output device and format setting**	Case of output to USB memory SYSTEM PRESET → 7 More 1/2 → 4 Copy Config → 2 Copy Device FILE PRT FILE : Dumped to a USB memory. PRT : Dumped to a printer with USB interface. Select the FILE mode. 3 ScreenShot Config → 1 File Format PNG BMP PNG : Portable Network Graphics format BMP : Bitmap format Select PNG or BMP.
	Dump execute	COPY
USER key	**Set the USER menu**	A soft menu related to operation keys and extended function keys can be set to the USER key menu. The operability is improved by allocating functions, which are frequently-used or are located in a deep multilayer menu, to the USER key menu. A function menu is displayed in the soft menu display area. SHIFT → USER → [Press a menu key to be set.] Repeat the above procedure.
	Delete the USER menu	Press USER to display the USER menu. SHIFT → USER → [Press a menu key to be deleted.] Repeat the above procedure.
Calibration	**CAL. execute**	Perform calibration after allowing a warm up time of 5 minutes or more.  Connect the CAL signal to RF INPUT connector. SYSTEM PRESET → 6 Calibration → 1 Calibrate ALL
	Other	Before turning the power on, remove the USB memory key. Otherwise, the system does not start.

ALPHABETICAL INDEX