ADVANTEST CORPORATION

U3800 Series
User's Guide

MANUAL NUMBER FOE-8440285E00

Applicable Models
U3841
U3851
U3872

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Printed in Japan

Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

- **Warning Labels**

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

- **Basic Precautions**

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.
- Do not place anything on the product and do not apply excessive pressure to the product. Also, do not place flower pots or other containers containing liquid such as chemicals near this

product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

- **Caution Symbols Used Within this Manual**

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

- **Safety Marks on the Product**

The following safety marks can be found on Advantest products.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : CAUTION - Risk of electric shock.

- **Replacing Parts with Limited Life**

The following parts used in the instrument are main parts with limited life.
Replace the parts listed below before their expected lifespan has expired to maintain the performance and function of the instrument.
Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used.
The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	5 years

- **Hard Disk Mounted Products**

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on.
  Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.

- Store and operate the products under the following environmental conditions.
  An area with no sudden temperature changes.
  An area away from shock or vibrations.
  An area free from moisture, dirt, or dust.
  An area away from magnets or an instrument which generates a magnetic field.

- Make back-ups of important data.
  The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

- **Precautions when Disposing of this Instrument**

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in solder).

Example: fluorescent tubes, batteries

Environmental Conditions

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations
- Altitude of up to 2000 m

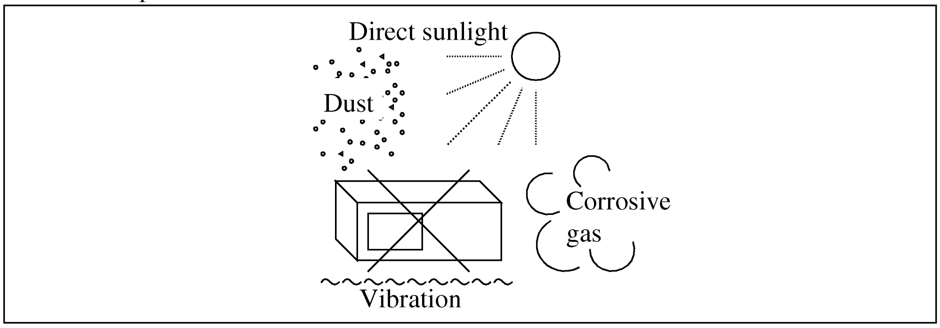
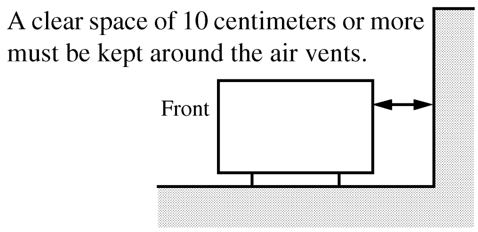


Figure-1 Environmental Conditions

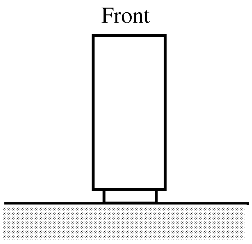
- Operating position



The instrument must be used in a horizontal position.
A cooling fan, which prevents the internal temperature from rising, is equipped with the instrument.
The air vents on the case must be unblocked.

Figure-2 Operating Position

- Storage position



This instrument should be stored in a horizontal position.
When placed in a vertical (upright) position for storage or transportation, ensure the instrument is stable and secure.

-Ensure the instrument is stable.
-Pay special attention not to fall.

Figure-3 Storage Position

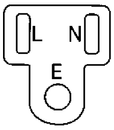
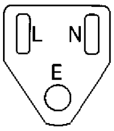
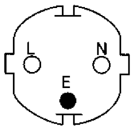
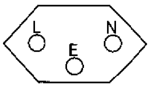
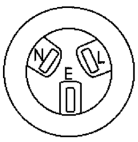
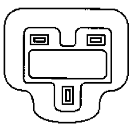
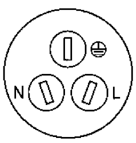
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

Certificate of Conformity

This is to certify, that

Cross Domain Analyzer

U3800 Series

instrument, type, designation

complies with the provisions of the EMC Directive 2004/108/EC in accordance with EN61326 and Low Voltage Directive 2006/95/EC in accordance with EN61010.

ADVANTEST Corp.

Tokyo, Japan

ROHDE&SCHWARZ International Operations GmbH

Munich, Germany

U3800.00

KC Class B

B 급 기기(가정용 방송통신기기) 이 기기는 가정용(B 급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

- Applicant: ADVANTEST corporation
- Registration No.: KCC-REM-qa2-U3872
- Equipment Name: Cross Domain Analyzer
- Basic Model Number: U3841/U3851/U3872
- Manufacturer: ADVANTEST corporation
- Country of Origin: Japan
- Year and month of manufacture: Refer to the product label

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	U3841, U3851, U3872

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)
	Main frame	×	○	○	○	○	○
	Boards	×	○	○	○	○	○
	Power supply parts	×	○	×	○	○	○
	Cable	×	○	○	○	○	○
	LCD Panel	×	×	○	○	○	○
	Module	×	○	○	○	○	○
	Parts	×	○	○	○	○	○
	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

Preface

1. Structure 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 U3800	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 and Function Description	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.

2. Trademarks

- ADVANTEST is a trademark of Advantest Corporation.
- Visual Basic 6.0 and Visual Basic 2008 are trademarks or registered trademarks of Microsoft Corporation in the United States and other countries.
- K Connector is a trademark of Anritsu Corporation.
- All other product names described in this manual are the trademarks of their respective owners.

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List of Illustrations

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1. Introduction

This chapter describes the contents of this manual and the product overview of the U3800 series to help get the most out of this manual.

1.1 Product Overview

The U3800 series cross domain analyzers allow spectrum and vector signal measurements with two-channel RF inputs.
The main features of this instrument are shown below:

Features

- Vector and Spectrum Signal Analyzer
- Performs comparative measurements and analyses of signals between two channels for time, amplitude, phase, and frequency axis by using simultaneous measurements and synchronized measurements
- The best-in-class time domain analysis band of 40 MHz
- "X math" function that can easily realize vector calculation and comparative measurement between two channels
- Spectrum analyzer function that has reliable fundamental performance
- Two-channel RF input and wide frequency range
  U3841: 9 kHz to 3 GHz
  U3851: 9 kHz to 8 GHz
  U3872: 9 kHz to 43 GHz
- Compact: Approximately 337 mm (W) × 190 mm (H) × 437 mm (D)
  (Including protrusions such as handle and feet)
- Lightweight: 10 kg or less

1.2 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***

1.3 Advantest Homepage

The product information for the U3800 series cross domain analyzer is published on the Advantest homepage (http://www.advantest.co.jp).

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 U3800

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 AC power supply switch on the rear panel and remove the power cable from the AC power connector to stop the supply of power to this instrument. Then, contact Advantest 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 Prevention of Electrostatic Buildup

To prevent damages to semiconductor parts from electrostatic discharge (ESD), the precautions shown below should be taken. We recommend that two or more measures be combined to provide adequate protection from ESD. (Static electricity can easily be built up when a person moves or an insulator is rubbed.)

Countermeasure example

Human body:	Use of a wrist strap (see Figure 2-1).
Floor in the work area:	Installation of a conductive mat, the use of conductive shoes, and grounding (see Figure 2-2).
Benchboard:	Installation of a conductive mat and grounding (see Figure 2-3).

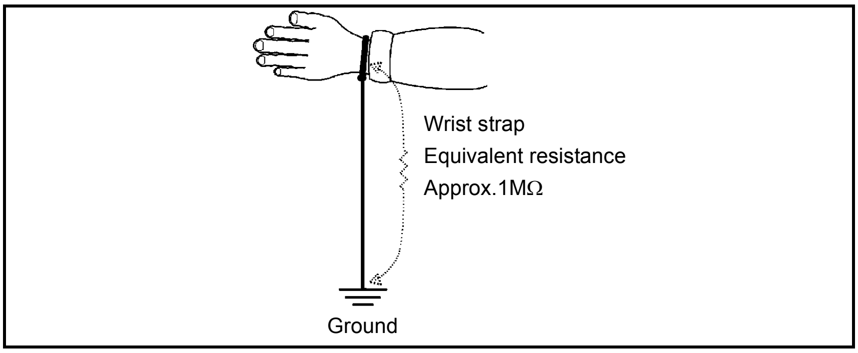


Figure 2-1 Countermeasures for Static Electricity of Human Bodies

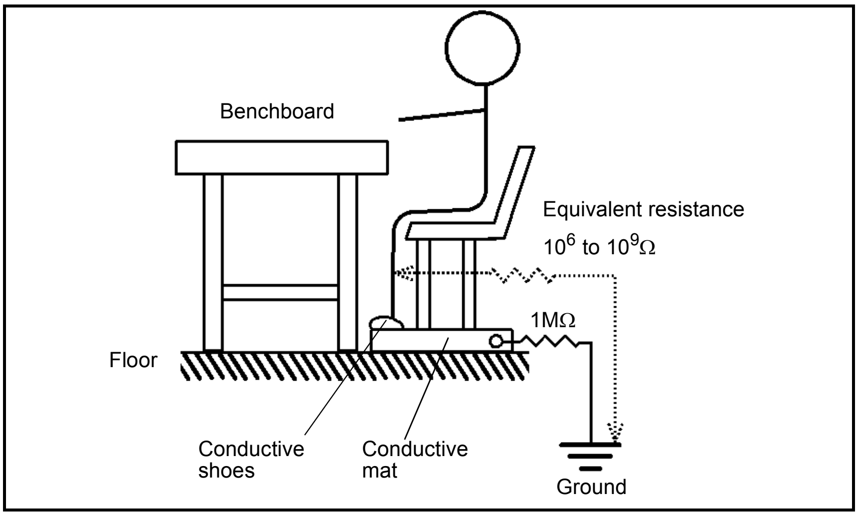


Figure 2-2 Countermeasures for Static Electricity of Work Site Floor

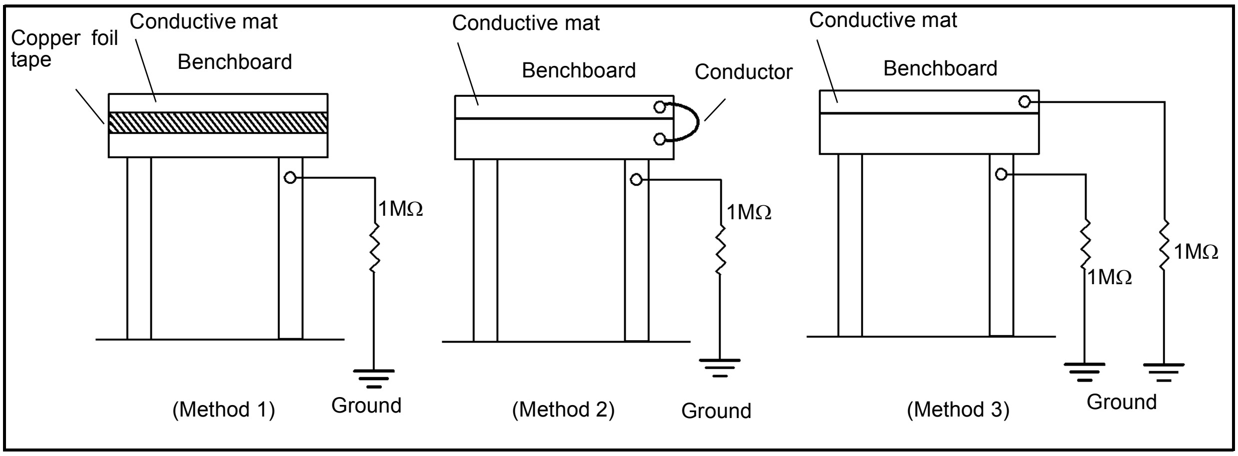


Figure 2-3   Countermeasures for Static Electricity of Work Bench

2.5 Note when Turning on the Power

Do not connect a DUT to this instrument before turning the power on.

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 Requirements
- 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 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		
		U3841	U3851	U3872
Power cable	A01412	1	1	1
Input cable (50 Ω)	A01037-0300	1	1	1
N(m)-BNC(f) adaptor	JUG-201A/U	3	3	3
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 H-INPUT	HE-A-PJ	0	0	2
U3800 Series User's Guide (CD edition)	FOC-8440283	1	1	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

  Keep a space of 10 cm between both the rear and side panels, and the wall.

  There are exhaust-cooling fans and exhaust vents on both sides of this instrument.
  Do not obstruct the fans and vents.
  If there is insufficient airflow around the vents, the internal temperature will increase and the instrument may operate incorrectly.
  Do not use this instrument on its side.

  Remove the power cable from the AC inlet on the rear panel to shut off the AC power line in abnormal circumstances, such as when smoke emanates from the instrument.
  Do not disregard these instructions.

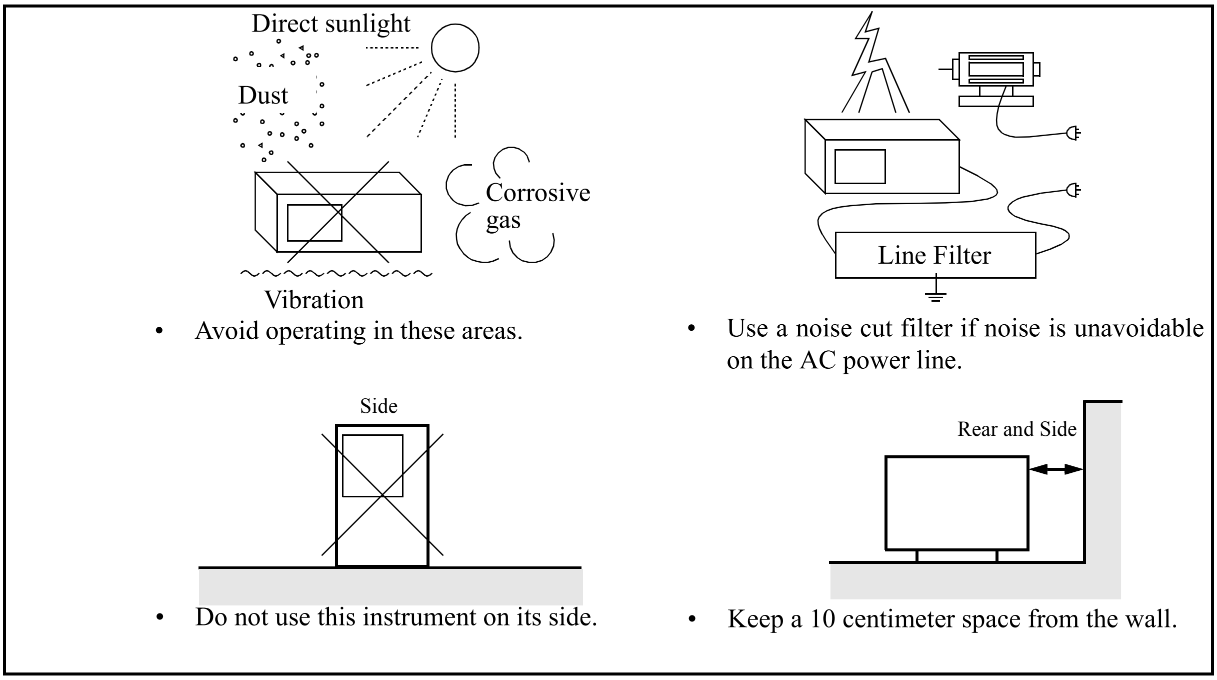


Figure 3-1   Operating Environment

3.3 Power Requirements

The AC power requirements of this instrument are shown in Table 3-2. Check that the power supply, which is supplied to this instrument, satisfies the conditions shown in Table 3-2.

Table 3-2 Power Requirements

	100 V AC	200 V AC	Remarks
Power supply voltage range	100-120 V	220-240 V	Automatically switches the input voltage between 100 V AC and 200 V AC.
Frequency range	50/60 Hz		
Power consumption	150 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 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).

AC power connector

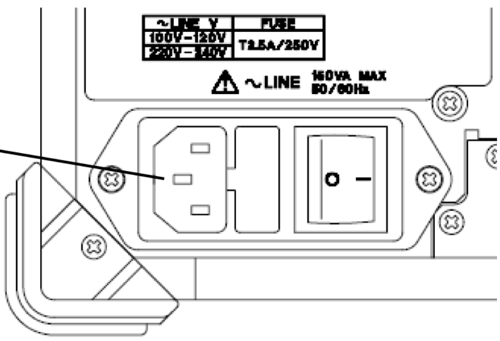


Figure 3-2 Connecting the Power Cable

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 Power Fuse

CAUTION:

1. ***If the power fuse blows, there may be some problems in this instrument. Seek repair. (Refer to Chapter 9, "Maintenance.")***
2. ***Use the same rating and same type power fuse to prevent a fire.***
   Rating: Time-lag 2.5 A/250 V
   Type name: 021802.5 or FSL 250 V 2.5 A

The power fuse is placed in a fuse holder which is located on the rear panel.

The fuse holder varies depending on the AC inlet type. It is either of the two types shown in Figure 3-3.

The power fuse can be checked or replaced according to the following procedure:

1. Turn off the AC power switch on the rear panel.
2. Disconnect the power cable from the AC inlet.
3. Take out the fuse holder located on the rear panel by using a flathead screwdriver.
4. Check or replace the power fuse and put the fuse holder back in.

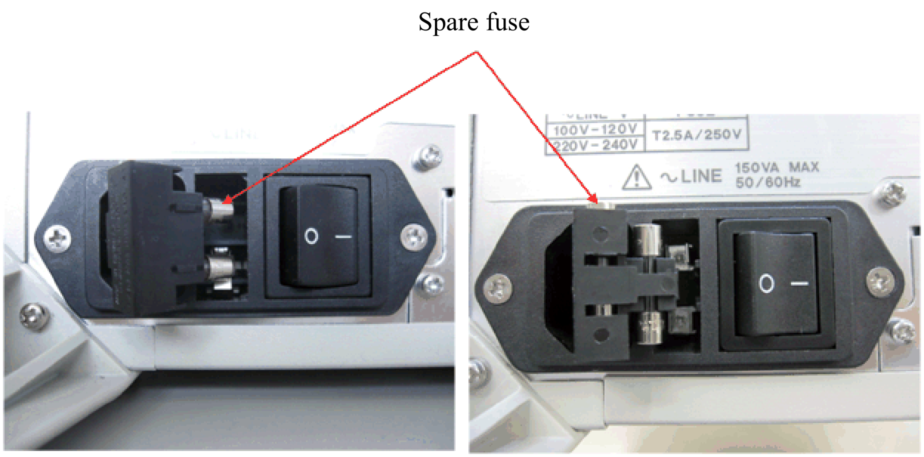


Figure 3-3 Replacing Power Fuse

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 3-4 Attachment of a Ferrite Core 1

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

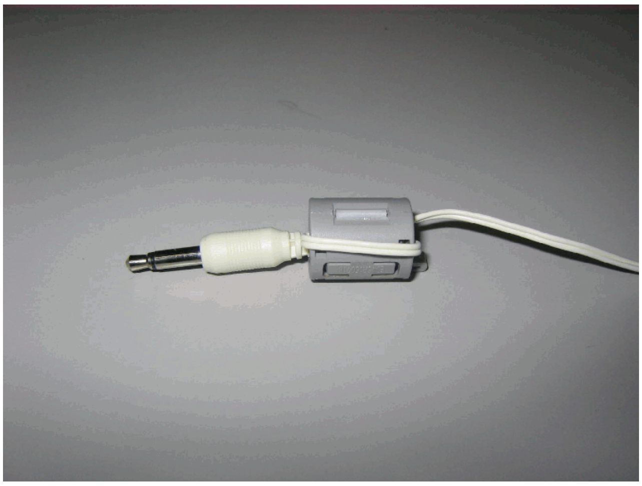


Figure 3-5 Attachment of a Ferrite Core 2

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 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.

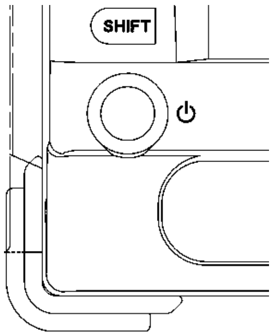


Figure 3-6 POWER Switch

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 3-7 depending on the status of the settings when the power supply was last turned off.

Figure 3-7 Initial Screen

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

Running calibration

6. Connect as shown in Figure 3-8 by using the included N-BNC adaptor and input cable (A01037-300).

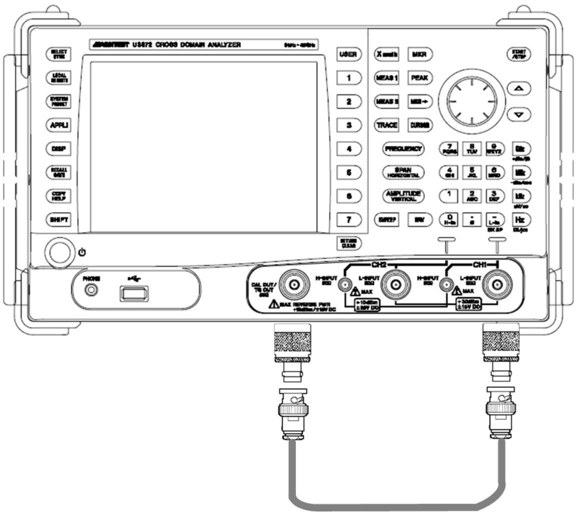


Figure 3-8 Connecting the CAL Signal

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

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 five minutes to complete the autocalibration of each channel.
   When the calibration of channel 1 is complete, change the signal connection to channel 2.

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.

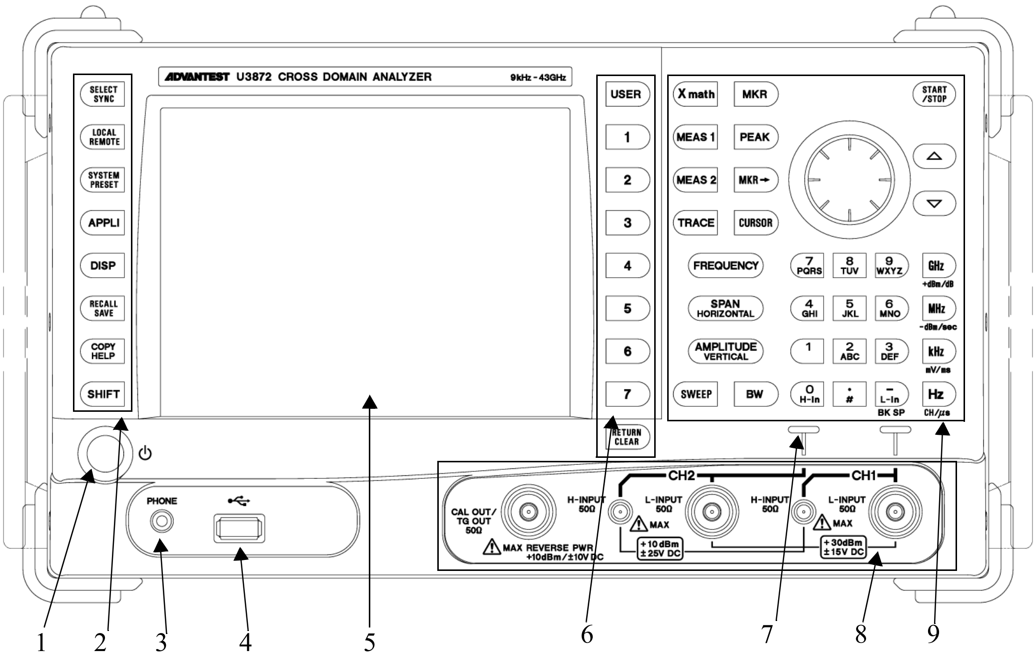


Figure 4-1 Front Panel

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	Earphone terminal for demodulated AM and FM audio signals
4.	USB connector	Enables a USB memory device 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 active channel on which key input operations work.
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.

4.1.1.1 Extended Function Key Block

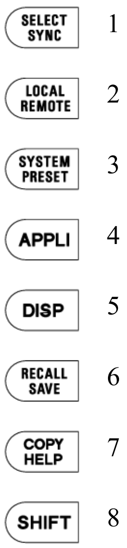


Figure 4-2 Extended Function Key Block

1.	SELECT key	Switches the active window.
	SYNC mode setting	Pressing the SHIFT and SELECT keys turns synchronous mode on and off.
	Synchronous mode lamp	When this instrument is operating in synchronous mode, this lamp illuminates.
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 operation mode of this instrument and the operational conditions of the interface.
	Preset key	Pressing the SHIFT and SYSTEM keys initializes the settings of this instrument.
4.	APPLI key	Switches between the applications of this instrument.
5.	DISP key	Sets the measuring window and limit line display, and switches the display mode.
6.	RECALL key	Recalls and displays setting conditions and trace data.
	SAVE key	Pressing the SHIFT and RECALL keys saves setting conditions and trace data.

7.	COPY key	Saves the screen data to an USB memory device.
	HELP key	Pressing the SHIFT and COPY keys turns HELP mode on and off. In HELP mode, soft menu descriptions are displayed.

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 blue font to be selected. Turns on while the shift mode is set.

4.1.1.2 Soft Key Block

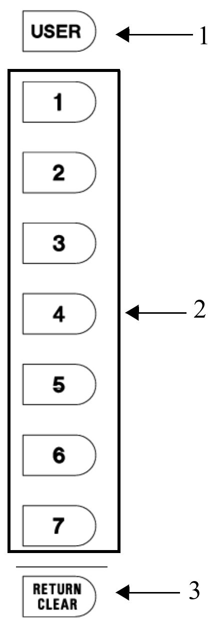


Figure 4-3 Soft Key Block

1.	USER Key	Allocates an arbitrary soft key menu to be used.
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.
	CLEAR key	Pressing the SHIFT and RETURN keys cancels data entry mode.

4.1.1.3 Input and Output Connectors Block

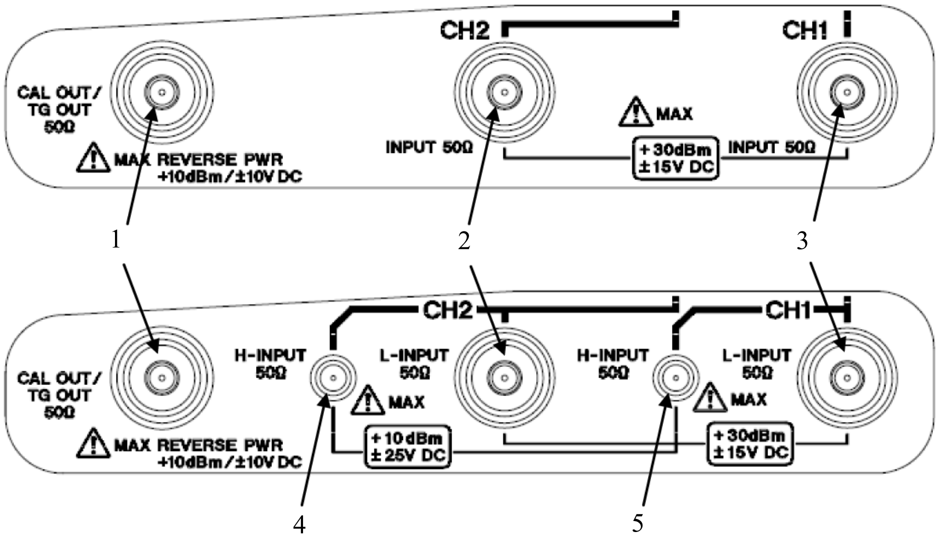


Figure 4-4 Input and Output Connectors Block

1. CAL OUT/TG OUTPUT connector

   Outputs the calibration signal. Outputs a signal in accordance with the level or phase calibration.
   If the tracking generator option (OPT76 and OPT77) is installed, it outputs a tracking generator signal in accordance with the operation.

2. CH2 RF L-INPUT connector — Inputs the signal to be measured.

3. CH1 RF L-INPUT connector — Inputs the signal to be measured.

   Measurement frequency range
   U3841: 9 kHz - 3 GHz
   U3851: 9 kHz - 8 GHz
   U3872: 9 kHz - 8 GHz

4. CH2 RF H-INPUT connector — Inputs the signal to be measured (only for U3872).

5. CH1 RF H-INPUT connector — Inputs the signal to be measured (only for U3872).

   Measurement frequency range: 10 MHz - 43 GHz

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 U3872 H-INPUT 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.

4.1.1.4 Operation Key Block

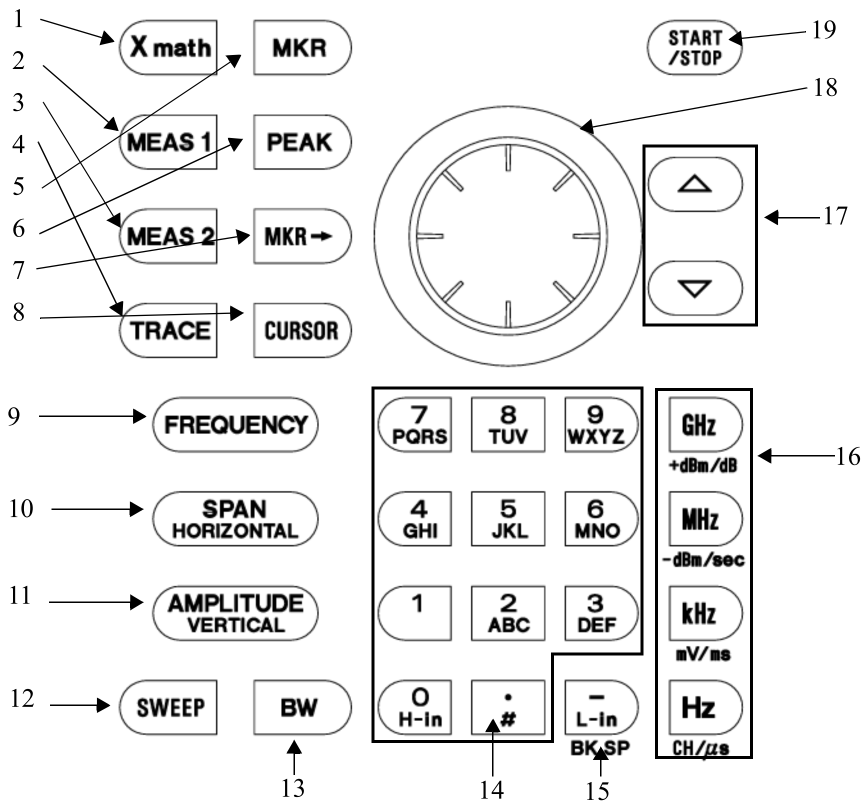


Figure 4-5 Operation Key Block

1.	X math	Selects the function for calculating between channels 1 and 2.
2.	MEAS 1	Selects a measurement mode of the time domain analysis function.
3.	MEAS 2	Selects transmission power measurement, pulse measurement, and other types of measurement.
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.	CURSOR	Displays the difference between the channels based on the vertical axis cursor.
9.	FREQUENCY	Sets the center frequency.
10.	SPAN	Sets the frequency span.
11.	AMPLITUDE	Sets the level.

12.	SWEEP	Sets Sweep Time, Capture Time, and Trigger.
13.	BW	Sets RBW, VBW, and Capture BW.
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.

4.1.2.1 Spectrum Measurement

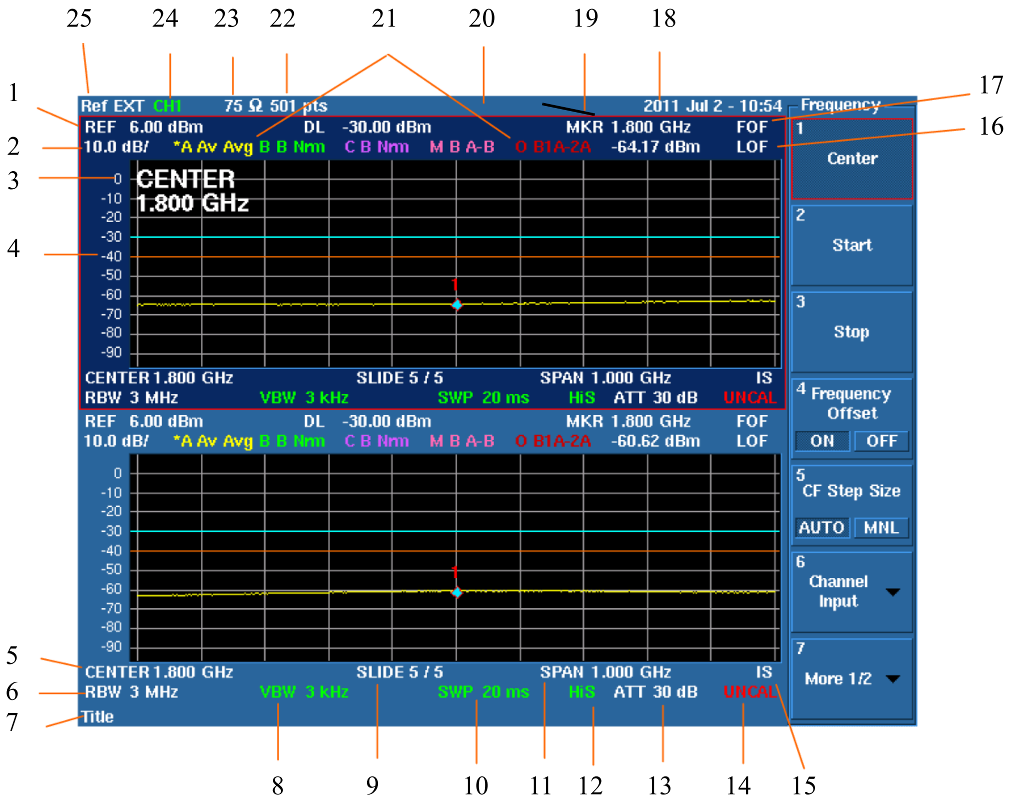


Figure 4-6 Screen Display

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. Date	Displays the current date and time.
19. Marker area	Displays the marker frequency (time) and level.
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. Active channel	Displays the channel input that is set to active.
25. External reference signal	Displays Ref EX1 while the external reference signal is selected.

4.1.2.2 Time Domain Measurement

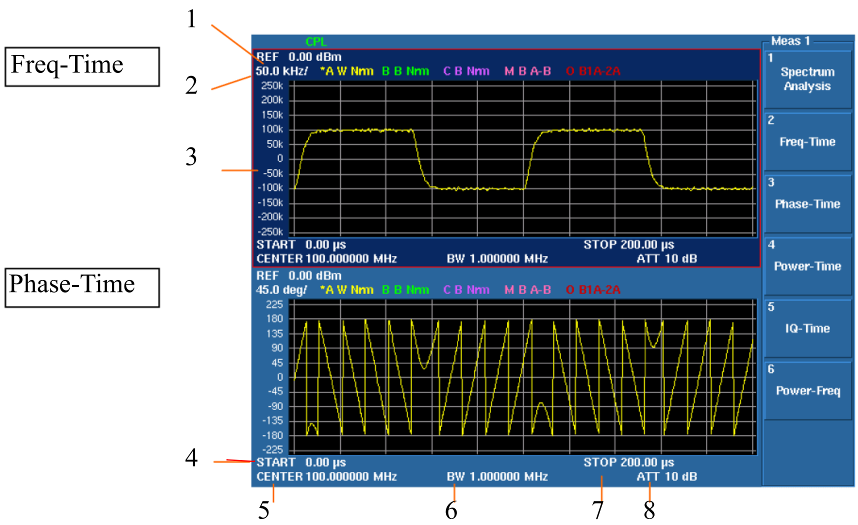


Figure 4-7 Freq-Time and Phase-Time Screens

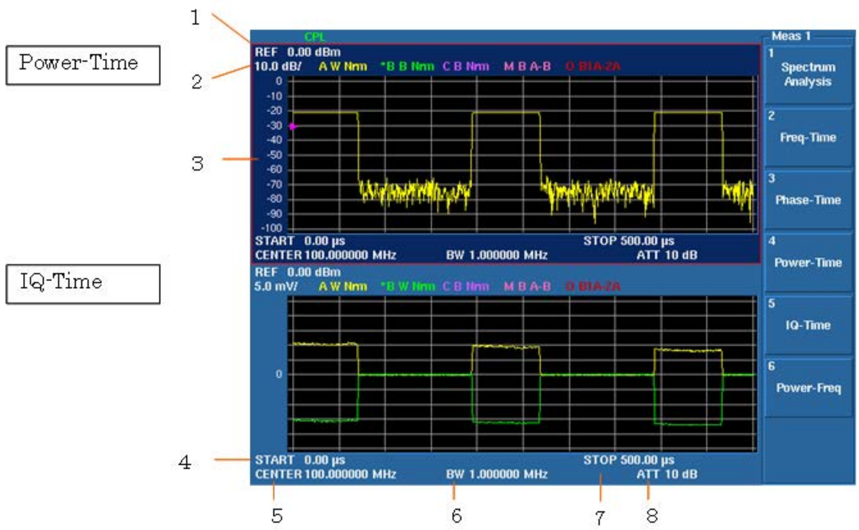


Figure 4-8 Power-Time and IQ-Time Screens

1.	Reference level	Displays the value set for the reference level.
2.	Vertical scale	Displays the value set for the vertical scale.
3.	Vertical scale display	Displays the vertical scale.
4.	Analysis start time	Displays the analysis start time. The value set for Analysis Offset is displayed.

5.	Center frequency	Displays the center frequency.
6.	Analysis bandwidth	Displays the bandwidth in which a time domain waveform is captured and analyzed. A value set for Capture BW is displayed.
7.	Analysis stop time	Displays the analysis stop time.
8.	RF attenuator	Displays the value set for the attenuator.

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.

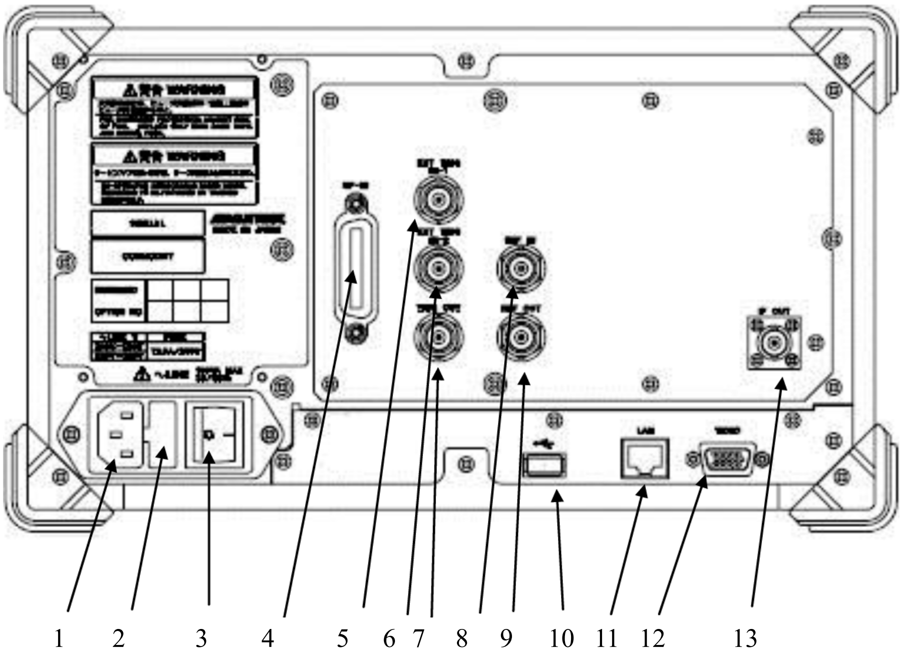


Figure 4-9 Rear Panel

1.	AC power connector	Connects this instrument to the AC power supply by using the included power cable.
2.	Fuse holder	Contains a spare fuse.
3.	AC power switch	Switches the AC power ON and OFF.
4.	GP-IB connector	Connects to the external controller when the remote-control is used through the GPIB interface.
5.	EXT TRIG IN -1 connector	Inputs the external trigger signal (TTL level).
6.	EXT TRIG IN-2 connector	Inputs the external trigger signal (TTL level).
7.	TRIG. OUT connector	Outputs the trigger signal.
8.	REF. IN connector	Inputs the external reference signal.
9.	REF. OUT connector	Outputs the 10-MHz reference signal.
10.	USB A connector	Connects the USB memory key.
11.	LAN connector	LAN connector for 10/100BaseT
12.	VIDEO connector	Connects to an external monitor of VGA specification.
13.	IF OUT connector	Outputs an IF signal of 21.4 or 97.5 MHz.

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 (SHIFT and RETURN keys) hides the active 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

   4 Delta Mode ▼

   5 Search 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 re-appear.

- 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 Delta Marker 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 to select the functions printed in blue on the keys.

   The following functions are available:

   - SYNC: Turns synchronous mode on or off.
   - PRESET: Returns settings to their initial values.
   - SAVE: Saves setting conditions and trace data.
   - HELP: Turns the HELP function on or off.
   - CLEAR: Cancels data entry mode.
   - H-IN: Selects H-INPUT. (U3872)
   - L-IN: Selects L-INPUT. (U3872)
   - #: Turns the couple mode on or off.
     For more information on coupled functions, refer to Section 5.2.4.1, "Mode."

   To execute the functions written in blue on the keys, press the SHIFT key and then press the respective keys.

   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.
   - Select Marker Returns one selected marker number.

5. Displaying a dialog box

   Pressing certain soft keys displays a dialog box.

   - Selecting items and contents
     Select an item using the step key.
     If there are options for the selected item, turn the knob to select an option.
   - 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 describes the following basic measurements so that users can familiarize themselves with the operation of this instrument.

- 4.3.1 Level Calibration
- 4.3.2 Selecting the Active Channel (Window)
- 4.3.3 Setting the Operation Mode and Display Mode
- 4.3.4 Displaying Trace Status
- 4.3.5 Measurement of Signals in Asynchronous Mode
- 4.3.6 How to Cancel the UNCAL Message
- 4.3.7 Identifying an Image Signal
- 4.3.8 Save/Recall
- 4.3.9 COPY (File Output to USB Memory)
- 4.3.10 USER Key
- 4.3.11 Time Domain Analysis
- 4.3.12 Synchronous Mode and Vector Calculation Function
- 4.3.13 Inter-channel Vector Correction

4.3.1 Level Calibration

Measurement accuracy can be increased by correcting measurements using calibration factors obtained from level calibration.

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

Required equipment

This instrument
Conversion adapter: N(m)-BNC(f)
Conversion adapter: BNC(f)-SMA(m) (Used for U3872 H-INPUT calibration)
Input cable: BNC(m)-BNC(m)

Turning on the power

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 apply an input voltage or frequency exceeding 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.

CAUTION: Remove any USB memory keys before turning the power on. Otherwise, the system will not start.

When Calibrate ALL is executed, calibration for the RF input is performed in the following order.

U3841, U3851:
1. CH1
2. CH2

U3872:
1. CH1 L-INPUT
2. CH1 H-INPUT
3. CH2 L-INPUT
4. CH2 H-INPUT

The following describes the procedure in which the calibration is performed, taking U3872 as an example.

Connect the calibration signal used for measurement.

6. Attach the N(m)-BNC(f) adapters to the CH1 RF L-INPUT and CAL OUT connectors on the front panel.

   Connect the N(m)-BNC(f) adapters with the included BNC(m)-BNC(m) input cable.

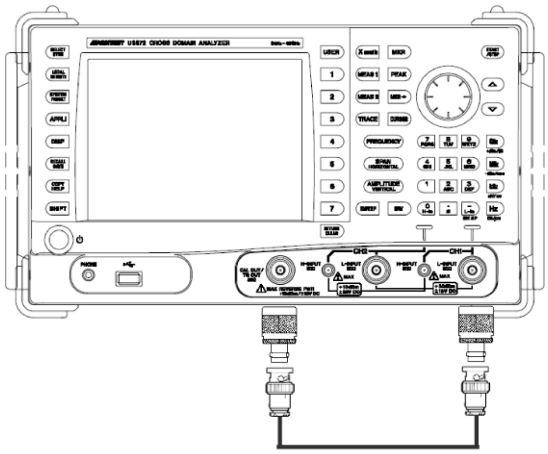


Figure 4-10 Connecting CAL Signal

7. Press **SYSTEM**, ***Calibration***, and ***Calibrate ALL***.

   A message for confirming the CAL signal connection is displayed.

Connect the calibrator to CH1(L-Input) connector. Then press OK continue.

8. Press ▼ and **Hz**.

   Calibration starts.

   The following message is displayed when the calibration of channel 1 (L-Input) is complete.

First step of calibration completed. Connect the calibrator to CH1(H-Input) connector. Then press OK to continue.

   To cancel the calibration, press **Hz**.

   Change the cable connection if calibrating channel 2.

9. Attach the BNC(f)-SMA(m) adapter to the RF H-INPUT connector on the front panel.

   Connect the BNC (m)-BNC (m) cable to the CAL OUT connector and the BNC(f)-SMA(m) adapter.

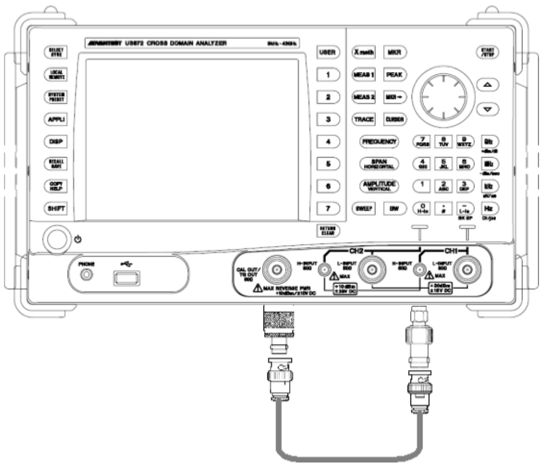


Figure 4-11 Connecting CAL Signal (CH1 H-INPUT Connector)

10. Press ▼ and select OK.

    Press **Hz** to restart calibration.

    A message is also displayed when the calibration of channel 1 (H-Input) is completed. Follow the message to restart calibration from CH2 RF L-INPUT.

    The following message is displayed when calibration of all necessary items is complete.

Calibration finished.

Press the **Hz** key (OK) to exit calibration.

4.3.2 Selecting the Active Channel (Window)

The active channel is the target channel for changing settings.

There are two methods for selecting the active channel.

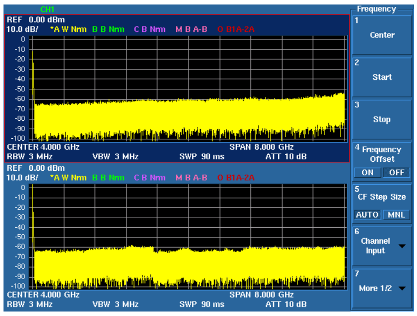
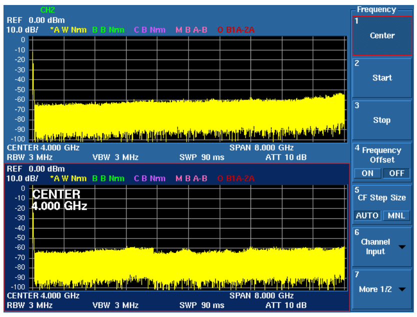
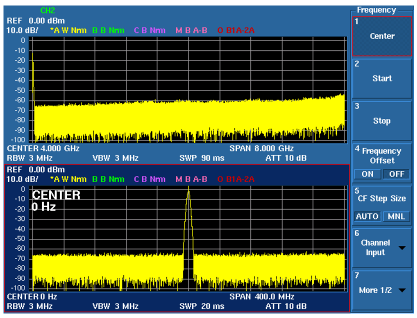
1. Use the **SELECT** key.

   The active channel is switched every time the **SELECT** key is pressed.

   The active channel whose settings can be changed is enclosed by a red frame on the screen.

   The background color of the window is also changed.

Table 4-1 Selecting the Active Channel (Window)

Operation	Display screen
SHIFT, **SYSTEM(PRESET)** Initial screen Active channel: CH1 **SHIFT**, **SELECT** Cancel the synchronous mode.	
SELECT Active channel: CH2	
0, **GHz** The center frequency for channel 2 is changed from 1.5 GHz to 0 MHz.	

2. Use unit keys (excluding the Hz key).

   If a unit key is pressed when the setting input was complete, the active channels switch..

4.3.3 Setting the Operation Mode and Display Mode

This instrument supports the following operation modes:

1. Two channel synchronous mode (Dual Sync CH)

   Channels 1 and 2 operate under the same frequency and trigger conditions.

2. Two channel asynchronous mode (Dual Async CH)
   Channels 1 and 2 operate under independent setting conditions.
   Two signals of different frequencies can be measured at the same time as though two analyzers are being used.

3. Two channel asynchronous couple mode (Dual Async CH, Couple CH ON)
   Channels 1 and 2 operate under the same setting conditions.
   In this operation mode, settings can be made for both channels at the same time by a single key operation.

   Coupled functions

Frequency	Center Start Stop
SPAN	SPAN Full Span Zero Span Last Span Analysis Offset Analysis Window
SWEEP	Sweep Time Sweep Mode Capture Time
BW	RBW VBW All Auto Capture BW

4. One channel mode (Single CH1, Single CH2)
   Either channel 1 or channel 2 operates.

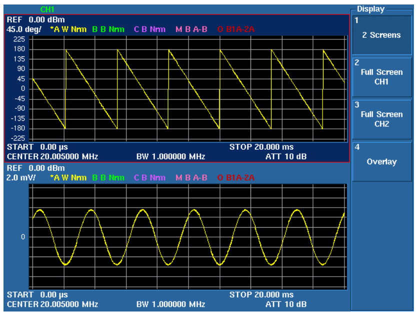
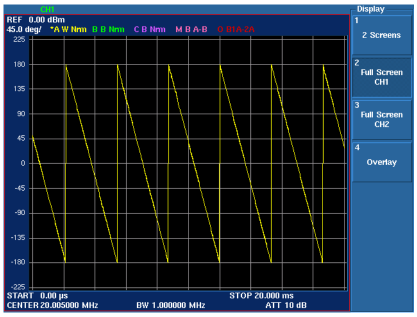
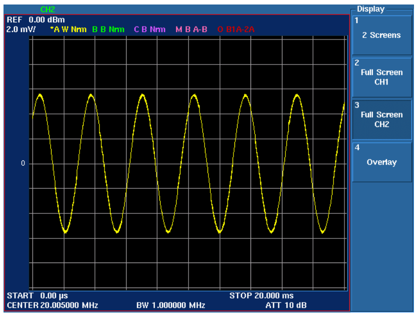
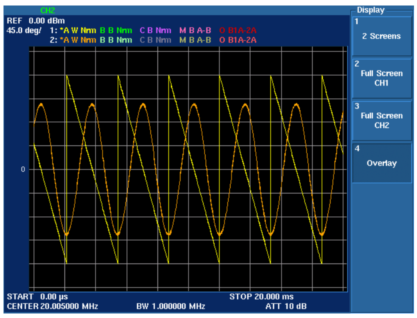
Operation

To switch the operation mode,
press **SYSTEM**, ***Mode***, and ***Dual Sync CH*** /***Dual Async CH***.
Although the synchronous mode can be turned on or off by using **SHIFT** or **SELECT**, single mode cannot be switched to synchronous mode.

The display mode for two-channel measurement can be selected from the following three modes:

1.	2 Screens	Displays channel 1 in the upper window and channel 2 in the lower window.
2.	Full Screen	Displays the specified channel full screen. The displayed channel becomes active.
3.	Overlay	Overlays channels 1 and 2 full screen.

Table 4-2 Display Mode for Two-Channel Measurement

Operation	Display screen
DISP ***Screen, 2 Screens***	
DISP ***Screen, Full Screen CH1***	
DISP ***Screen, Full Screen CH2***	
DISP ***Screen, Overlay***	

4.3.4 Displaying Trace Status

This section describes the meanings of the trace status items displayed at the top of the screen.

* A W NRM
① ② ③ ④

M W A-B
⑤ ③ ⑥

O W 1A-2B
⑦ ③ ⑧

①: Displays the active trace.

②: Displays Trace A, B, or C.

③: Displays the refresh mode.

W:	Write
V:	View
B:	Blank

④: Displays the selected detector.

NRM:	Normal
Pos:	Posi
Neg:	Nega
Smp:	Sample
Avg:	Average
QP:	Quasi Peak
EMC:	EMC Average

⑤: Trace M: Displays the in-channel calculation trace.

⑥: Displays the trace calculational expression.

⑦: Trace O: Displays the inter-channel calculation trace.

⑧: Displays the trace calculational expression.

1A:	1A represents Trace A of channel 1.
2B:	2B represents Trace B of channel 2.

4.3.5 Measurement of Signals in Asynchronous Mode

This section describes the procedure for using external signal sources to measure the frequency difference and level difference between the two channels.

Turning on the power

Refer to Section 4.3.1, "Level Calibration", and turn on the power of this instrument.

Connecting the instrument

Have two signal generators at hand and connect their respective signal outputs to the input connectors for channels 1 and 2.

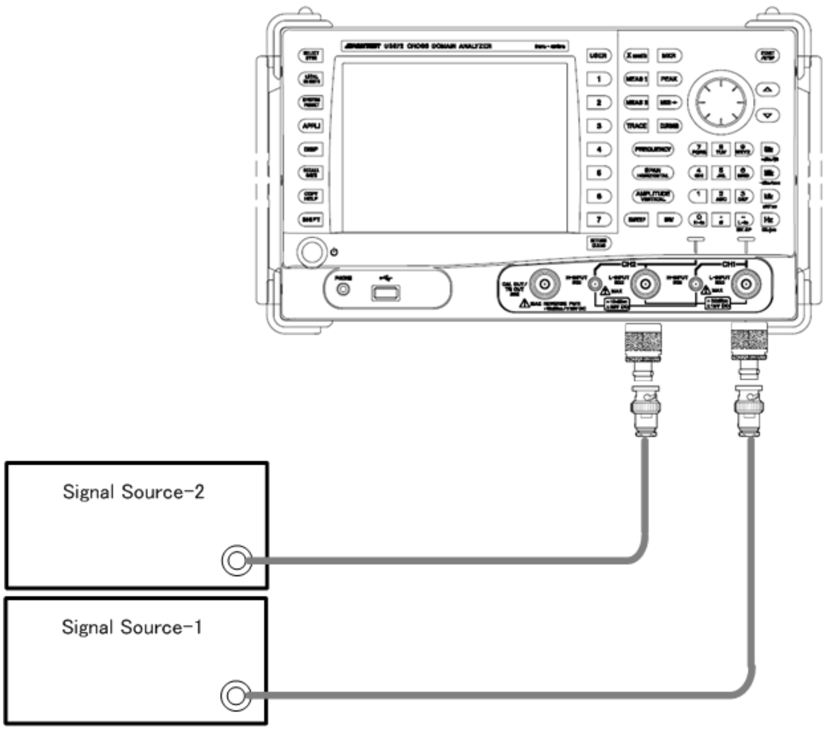


Figure 4-12 Asynchronous Mode Signal Measurement Connection

Setting the signal generators

Signal source 1: 50MHz -20dBm

Signal source 2: 150MHz -30dBm

Initializing the settings

Initialize the settings of this instrument.

1. Press **SHIFT**and **SYSTEM(PRESET)**.

   Initial setting conditions are loaded.

   * For U3872
   Select an input connector.

   Press **SHIFT** and **-**(L-in).
   The L-INPUT connector is selected for both CH1 and CH2.

Setting the operation mode

2. Press **SYSTEM**, and **SELECT(SYNC)**.

   The synchronous mode is cancelled and the SYNC lamp goes out.

   Asynchronous mode is enabled and difference measuring conditions can be set for channels 1 and 2.

Setting conditions for channel 1

3. Press **FREQUENCY**, **5**, **0**, and **MHz**.

   The center frequency is set to 50 MHz.

4. Press **SPAN**, **1**, **0**, and **MHz**.

   The frequency span is set to 10 MHz.

NOTE: Channel 1 is selected as the active channel by default.

Setting conditions for channel 2

5. Press **SELECT**.

   The active channel is switched to channel 2.

6. Press **FREQUENCY**, **1**, **0**, **0**, and **MHz**.

   The center frequency is set to 100 MHz.

7. Press **SPAN**, **2**, **0**, **0**, and **MHz**.

   The frequency span is set to 200 MHz.

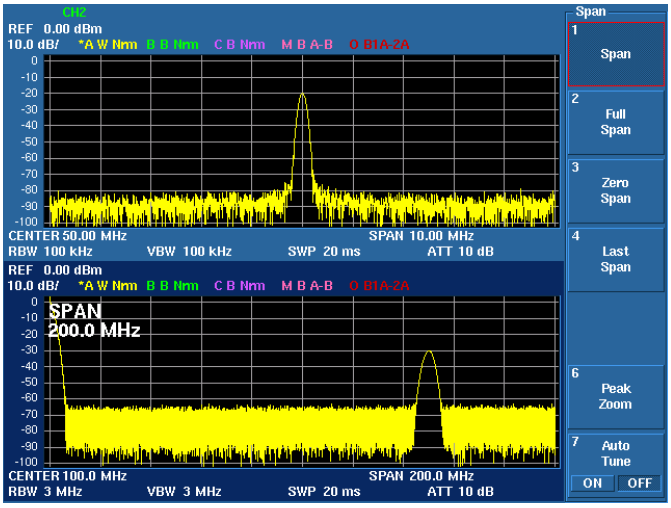


Figure 4-13 Asynchronous Mode Signal Measurement Screen

Changing the display mode to Overlay and measuring the frequency difference and level difference between channel 1 and channel 2 signals

8. Press **DISP**, ***Screen***, and ***Overlay***.

   The display mode is switched, and the trace waveforms for channels 1 and 2 are overlaid on each other.

   The waveform for the active channel comes to the front.

9. Press **CURSOR**, ***Execute ON/OFF(ON)***, and ***Mode SGL/DUAL(DUAL)***.

   Cursors A and B are displayed.

   Cursors A and B correspond to channels 1 and 2.

   The frequencies and levels in the cursor positions and the frequency difference and the level difference between the channels are displayed.

10. Use the knob to move cursor B to the position of the channel 2 signal.

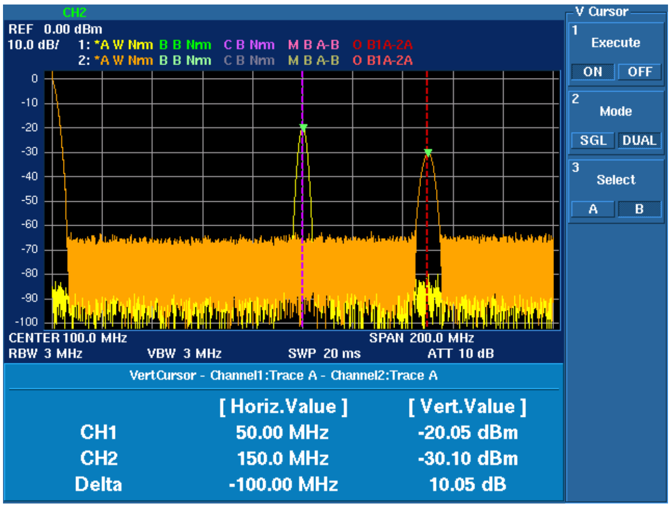


Figure 4-14 Frequencies and Levels in Cursor Positions

4.3.6 How to Cancel the UNCAL Message

The resolution bandwidth (RBW), video bandwidth (VBW), frequency span (Span), and sweep time (Sweep Time) settings affect each other.

If the combination of these settings at the time the manual settings are made 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 down the sweep time (Sweep Time).
- If RBW or VBW cannot be changed, narrow down the frequency span (Span).

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

Example: The same frequency is set for channels 1 and 2.
The sweep time setting for channel 1 is 20 ms, which is the same as for channel 2.
If the video bandwidth for channel 1 is narrowed down (from 300 kHz to 300 Hz), the UNCAL message is displayed.

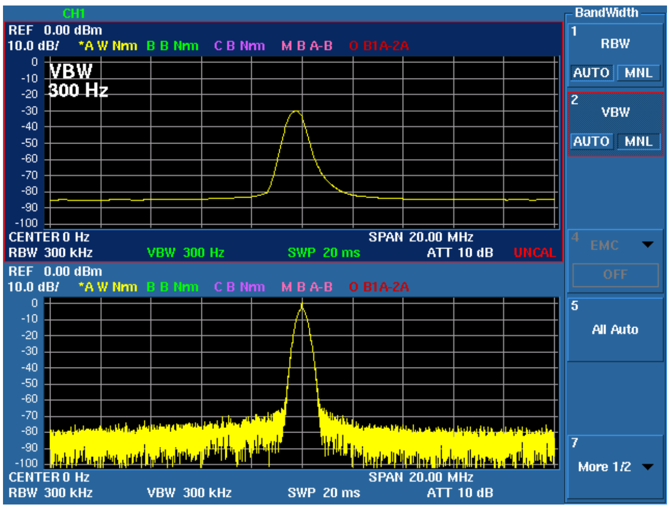


Figure 4-15 UNCAL Message Displayed Screen

To cancel the UNCAL message while keeping the video bandwidth at 300 Hz, make the sweep time longer from 20 ms to 280 ms.

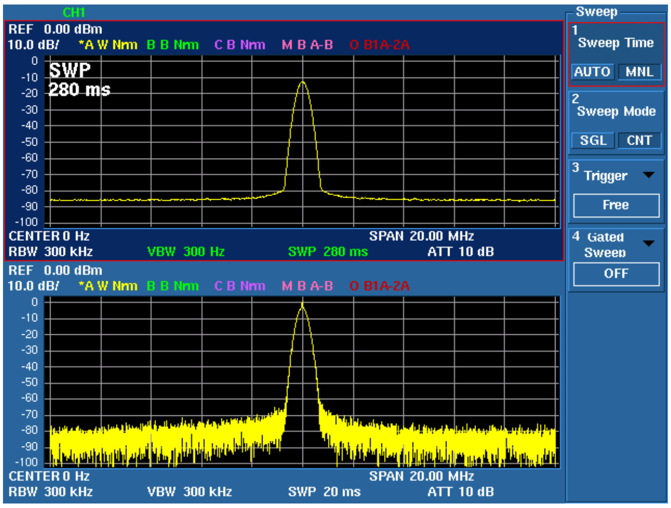


Figure 4-16 UNCAL Message Deleted Screen

4.3.7 Identifying an Image Signal

NOTE: This function is only available for the U3851 and U3872.

This instrument may display an image signal depending on the input signal.

When 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***.

CH1 = OFF, CH2 = ON

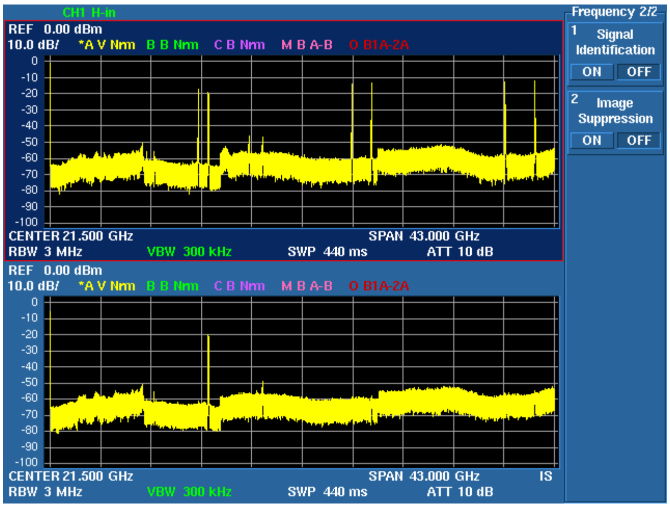


Figure 4-17 Operation Example of Image Suppression

“IS” is displayed at the bottom right of the screen when the Image Suppression function is 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.

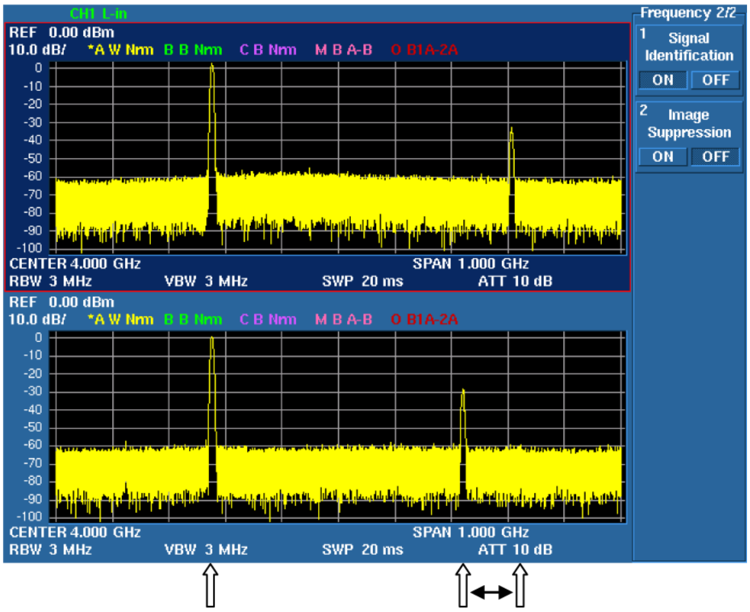
Signal Identification function

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***.

CH1 = Signal Identification ON



Real signal

The frequency of the image signal is shifted.

Figure 4-18 Operation Example of Signal Identification

4.3.8 Save/Recall

Setting conditions and measurement screens used in this instrument are saved in memory so that the settings and screens can be recalled by reading them from the memory later.

Either normal mode or quick mode can be selected for saving or recalling data.

1. Selecting a mode

   Press **SYSTEM**, ***File***, and ***Save/Recall Mode NORM/QUICK***.

   NORM: Selects normal mode.

   QUICK: Selects quick mode.
   In quick mode, 10 types of files are selected by using keys 0 to 9 on the numerical keypad.

   Before executing Save/Recall, set the file format and the memory in which data is saved.

2. File format

   There are three types of file formats, BIN, CSV, and XML.

   The format to be used for recalling data is the BIN format.

   Files in the CSV or XML format can be captured into a PC and then processed.

   Select BIN as the file format.

   Press **SYSTEM**, ***File***, ***More1/2***, ***File Control***, and ***File Format BIN/CSV/XML(BIN)***.

3. Selecting memory

   Either the internal memory or a USB memory key can be selected as the memory in which data is saved.

   USB connectors are located on the front panel and the rear panel, any of which can be used.

   Select USB memory key as the storage destination.

   Press **SYSTEM**, ***File***, ***More1/2***, and ***Media***.

   The USB memory connected to the connector is displayed in the dialog box.

   Press the step key (▼ or ▲) to select a USB memory key to use.

   Press the **Hz** key to determine the selection.

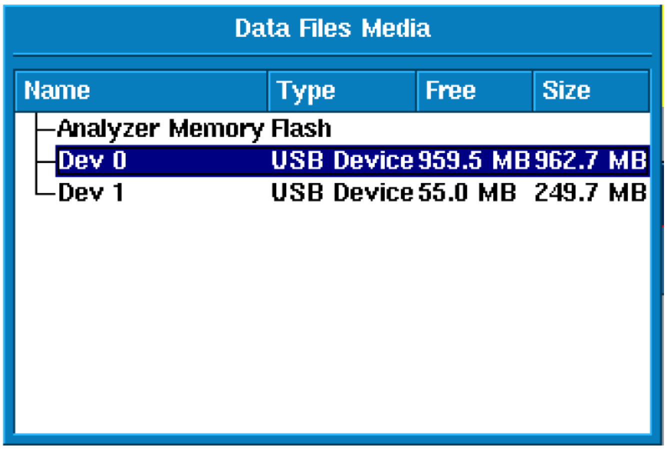


Figure 4-19 Media Selection Dialog Box

4. Saving data

   When saving data, all of the various setting tables such as setting conditions, trace data, and limit lines are saved.

5. Recalling data

   Select an item to retrieve that is appropriate for your purposes.

   When Trace is selected as the item to be recalled, the trace waveforms are recalled and the trace mode is automatically set to VIEW.

   For quick recall, only setting conditions are recalled.

Table 4-3 Save/Recall Procedure (1 of 2)

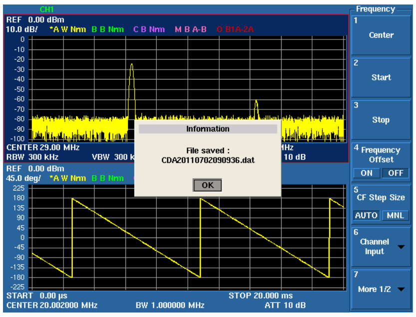
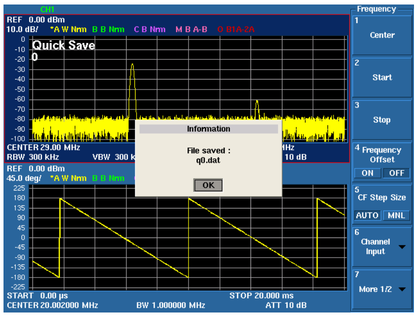
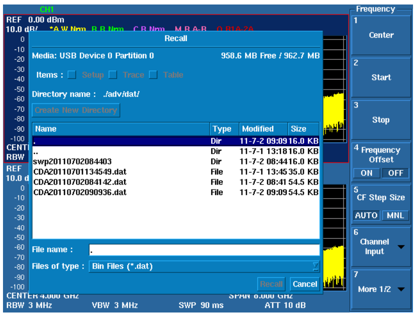
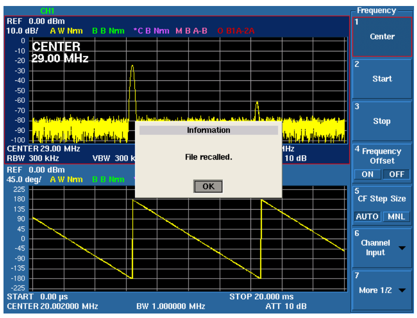
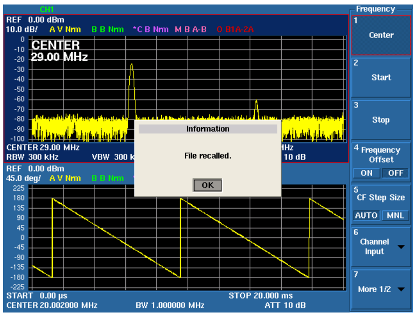
Mode		Normal mode	Quick mode
SAVE operation	1.	SHIFT, RECALL	SHIFT, RECALL
	2.		Any key from 0 to 9
	3.		
RECALL	1.	RECALL	RECALL
	2.		Any key from 0 to 9
	3.	Use the knob to specify the file. **GHz** The file is selected. **GHz** The Recall button is selected. **GHz** Recall is executed.	

Table 4-3 Save/Recall Procedure (2 of 2)

Mode	Normal mode	Quick mode
4.		

Auto Save

The data and screen images are saved when the specified conditions are met.

There are three types of condition settings for saving data as follows:

1. When an event occurs with a limit line + PASS/FAIL
2. For each specified sweep count
3. For each specified time interval

Auto Save is cancelled when it reaches the specified number of files or time.

In addition, Auto Save is cancelled when the setting is made by operating the keys while in Auto Save.

Folders generated in Auto Save

adv	dat	lmtYYYYMMDDHHmmss
		swpYYYYMMDDHHmmss
		tmrYYYYMMDDHHmmss
	img	lmtYYYYMMDDHHmmss
		swpYYYYMMDDHHmmss
		tmrYYYYMMDDHHmmss

4.3.9 COPY (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**, ***Config***, ***More1/2***, ***Screen Shot Config***, and ***Media***.

   A dialog box is displayed.

   Select the USB memory device using the ▼ key and confirm it with the **Hz** key.

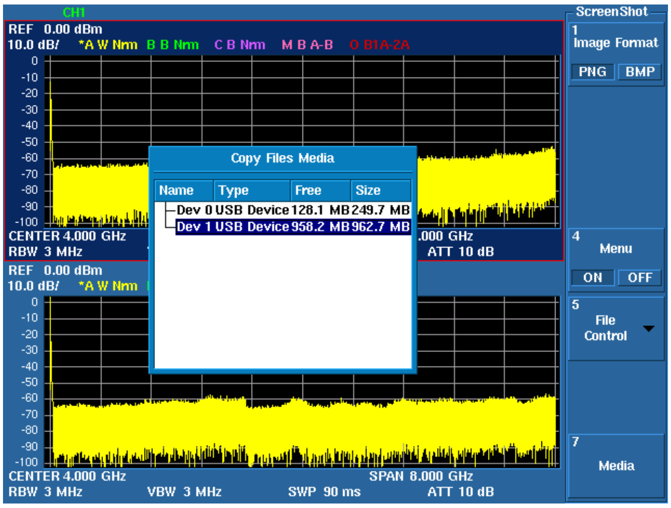


Figure 4-20 USB Memory Selection Dialog Box

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**, ***Config***, ***More1/2***, ***Screen Shot Config***, and ***Image Format PNG/BMP***.
2. File name

   copyYYYYMMDDHHmmss.png(bmp) is used as the file name.
3. Output

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

4.3.10 USER Key

A soft menu corresponding to an operation key or extended function key can be set in the USER key menu.

Operability is improved by assigning frequently used functions or functions buried deep within the menu hierarchy to the USER key menu.

How to set a function menu to the USER menu

1. Display a function menu to be set in the USER menu in the soft menu display area.
2. Press **SHIFT** and then **USER**.
3. Press the menu key to be set.

   To cancel the setting, press any other operation key.

To continue adding other function menus 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 the menu key to be deleted.

To delete another soft key, repeat the above procedure.

4.3.11 Time Domain Analysis

This function analyzes changes of RF signal characteristics with time as changes of fundamental quantities.

Freq-Time:	Frequency versus time
Phase-Time:	Phase versus time
Power-Time:	Power versus time
Power-Freq:	FFT spectrum analysis
IQ-Time:	I/Q voltage versus time

Operating method

This section describes the operating method of the time domain analysis function through a measurement example.

By using the time domain analysis function, changes of RF signal characteristics with time can be measured as each waveform of frequency, phase, power, I/Q waveforms, or spectrum.

This section describes the FSK (Frequency Shift Keying) modulated signal measurement as an example.

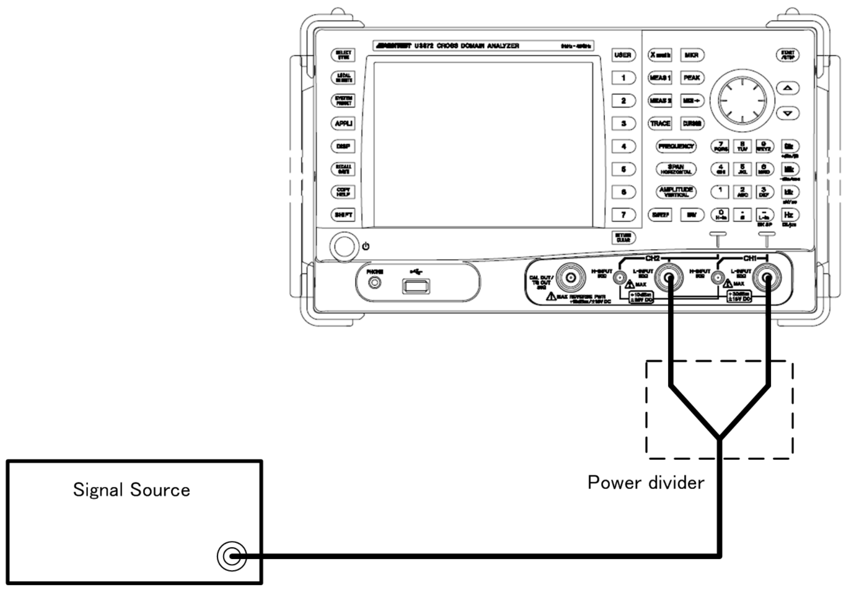


Figure 4-21 Time Domain Analysis Connection

- Signal Source output

Frequency:	2450 MHz
Power:	0 dBm
Modulation Type:	FSK
Frequency Deviation:	40 kHz_{p-p}
Baseband Signal:	2 kHz

Capturing I/Q Waveforms of RF Signal

This section describes procedures for capturing an RF signal into the internal memory of this instrument as I/Q waveforms.

Setting the center frequency, span, and reference level

1. Press **FREQUENCY**, **2**, **4**, **5**, **0**, and **MHz**.
   The center frequency is set to 2,450 MHz.
2. Press **SPAN**, **1**, **0**, **0**, and **kHz**.
   The span is set to 100 kHz.
3. Press **AMPLITUDE**, **0**, and **GHz**.
   The reference level is set to 0 dBm.

Setting the analysis mode of RF signals

Analyses can be performed from various viewpoints including frequency, phase, power, I/Q waveforms, and FFT spectrum by using each function of the Meas-1 menu.

1. Press **MEAS1** and ***Freq-Time***.
   The analysis mode of channel 2 is set to “frequency versus time.”

MEMO: When the spectrum analysis mode is switched to the time domain analysis mode, the menus assigned to the keys are also changed to those for the time domain analysis mode.

Table 4-4 Time Domain Analysis Mode Menu

Key name	Menu	Function
SPAN(HORIZONTAL)	Analysis Offset	Sets the analysis start point.
	Analysis Window	Sets the analysis time length.
AMPLITUDE(VERTICAL)	Vertical Scale /div	Sets the vertical display scale.
	Vertical Position	Sets the vertical display position.
SWEEP	Capture Time	Sets the capture time length of the waveform.
BW	Capture BW	Sets the frequency bandwidth of the waveform to be captured.

Setting the waveform capture time and capture bandwidth

1. Press **SWEEP**, ***Capture Time***, **2**, **0**, **0**, and **kHz**.

   The waveform capture time is set to 200 msec.

2. Press **BW**, ***Capture BW***, **1**, **0**, **0**, and **kHz**.

   The waveform capture bandwidth is set to 100 kHz.

Starting and stopping RF signal capture

1. Press **SWEEP** and ***Sweep Mode SGL/CNT*** to select SGL.

   The sweep mode is set to Single.

2. Press **START/STOP**.

   Capture of an RF signal starts.

   Capture automatically stops 200 msec after the capture start according to the settings of Capture Time (200 ms) and Sweep Mode (Single).

Freq-Time analysis

Function setting

1. Press **MEAS1** and ***Freq-Time***.

   The analysis function for “frequency versus time” is selected.

Display setting

2. Press **SPAN(HORIZONTAL)**, ***Analysis Offset***, **0**, and **MHz**.

   The analysis time offset is set to 0 sec.

3. Press ***Analysis Window***, **2**, and **kHz**.

   The analysis time length is set to 2 msec.

4. Press **AMPLITUDE(VERTICAL)**, ***Vertical Position***, **0**, and **Hz**.

   The vertical offset of the data display is set to 0 Hz.

5. Press ***Vertical Scale/div***, **1**, **0**, and **kHz**.

   The vertical scale of the data display is set to 10 kHz/div.

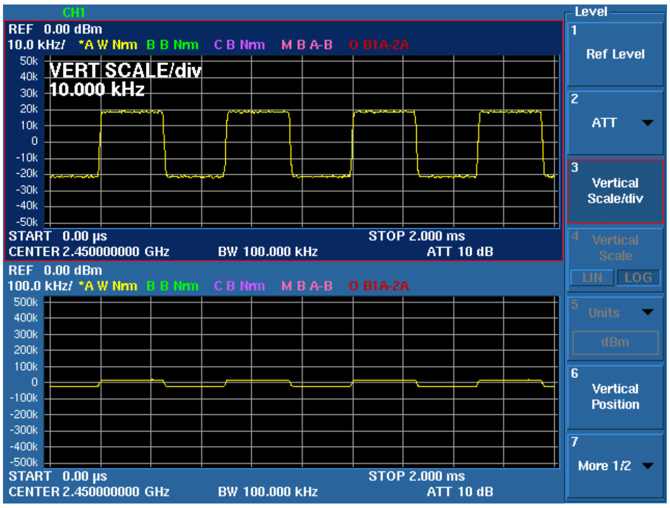


Figure 4-22 Freq-Time Analysis Screen

Phase-Time analysis

Active channel setting

1. Press **SELECT**.

   Channel 2 becomes an active channel.

Function setting

2. Press **MEAS1** and ***Phase-Time***.

   The analysis function for “phase versus time” is selected.

   The change in “time versus phase” can be measured. The phase is displayed wrapping at ±180 degrees.

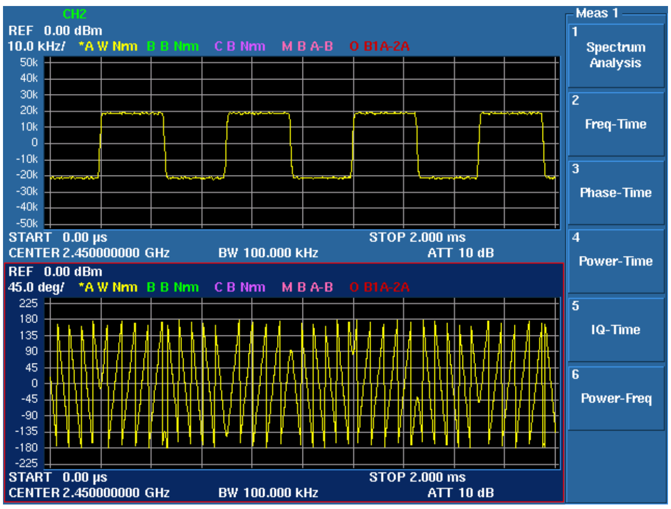


Figure 4-23 Phase-Time Analysis Screen

Power-Time analysis

Function setting

1. Press **MEAS1** and ***Power-Time***.

   The analysis function for "power versus time" is selected.

   The change in "time versus power" can be measured.

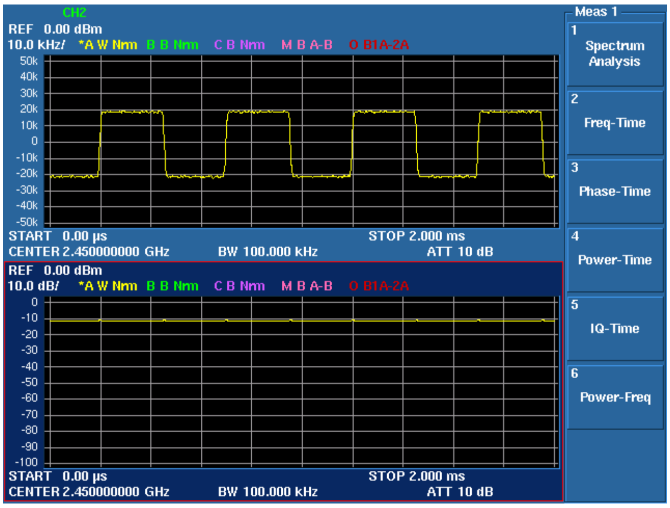


Figure 4-24 Power-Time Analysis Screen

Power-Freq analysis

Function setting

1. Press **MEAS1** and ***Power-Freq***.

   The FFT spectrum analysis function is selected.

   Frequency components included in the specified part of the time waveform can be measured.

   The analysis start point is set by Analysis Offset. The FFT analysis time length is set to a specific value for each setting value of Capture BW but not set by Analysis Time.

   For more information, refer to Chapter 5, "Menu Map and Function Description."

   The frequency span on the FFT spectrum display is the same as the frequency bandwidth set by Capture BW and the frequency resolution is one hundredth of the span (when the frequency resolution setting is AUTO).

   In this measurement example, Span is 100 kHz, the frequency resolution is 1 kHz, and the FFT analysis time length is 10 ms because Capture BW is 100 kHz. (For the horizontal axis of 1001 points)

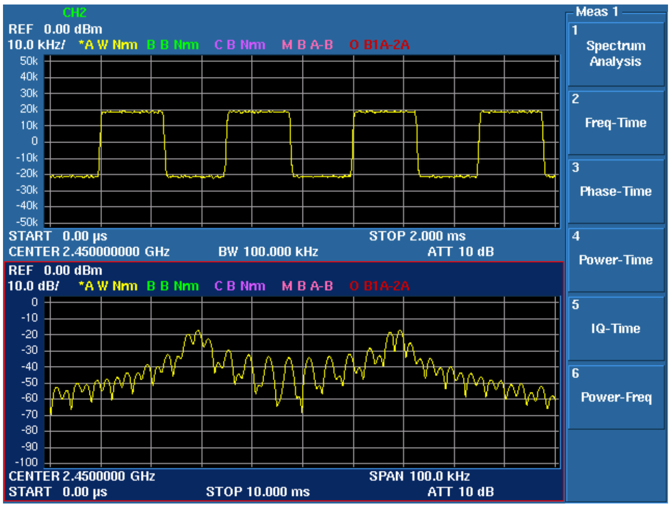


Figure 4-25 Power-Freq Analysis Screen

IQ-Time analysis

Function setting

1. Press **MEAS1** and ***IQ-Time***.

   The analysis function for “I/Q voltage versus time” is selected.

   When the IQ-Time analysis function is selected, an I and Q waveform are allocated to Trace A and Trace B, respectively.

2. Press **TRACE**, ***Trace B***, ***Refresh***, and ***Refresh(Write)***.

   Trace B is set to Write.

Display setting

3. Press **AMPLITUDE(VERTICAL)**, ***Vertical Position***, **0**, and **Hz**.

   The vertical offset of the data display is set to 0 Hz.

4. Press ***Vertical Scale/div***, **1**, **0**, **0**, and **kHz**.

   The vertical display scale is set to 100 mV/div.

5. Press ***START/STOP***.

   Refreshes the Q waveform (trace B).

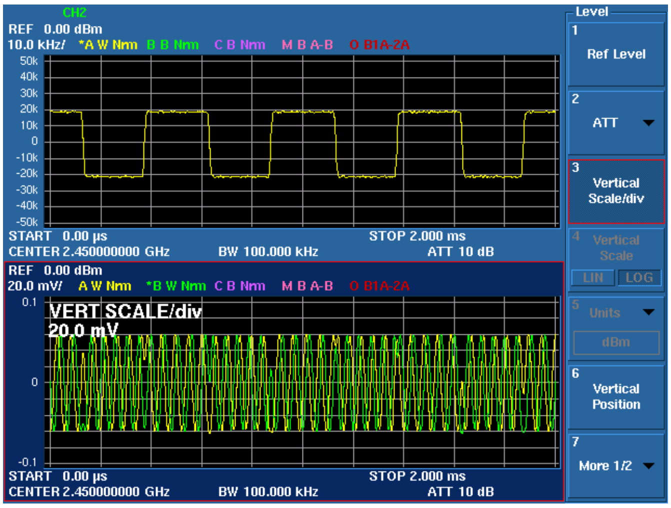


Figure 4-26 IQ-Time Analysis Screen

4.3.12 Synchronous Mode and Vector Calculation Function

If a time domain analysis is performed in synchronous mode, a structure in which phase synchronization can be established between channels is formed and vector calculation analysis between channels becomes enabled.

The calculation function is enabled by the X math key.

Switching to synchronous mode

1. Press **SHIFT** then **SELECT** or **SYSTEM**, ***Mode***, and ***Dual Sync CH***.

   The mode is set to synchronous mode and the lamp of the key lights up.

Setting the Math function

2. **X math**, ***Math***, and ***Math Config***.

   The Math Config window is displayed.

   Set an inter-channel vector arithmetic operation (Math), a domain where calculation between channels is performed (in Domain), a display type (Display Type), and restraining of the signal display with the specified level or lower (Squelch).

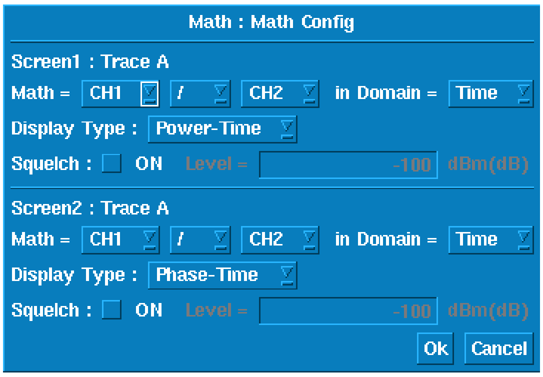


Figure 4-27 Inter-Channel Vector Calculation Dialog Box

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

   The calculation is executed and the result is displayed in Trace A.

Operator and application example

+: Obtain the common component of the differential signal by obtaining the vector sum of two signals.

-: Obtain the differential component of the differential signal by obtaining the vector difference between two signals.

×: Obtain the phase sum between two signals by multiplying those two signals.

/: Obtain the amplitude ratio and phase difference between two signals by dividing those two signals.

NOTE: ***When the results of multiplication and division (× and /) are displayed in Power-Freq, the offset of the center frequency is added to the frequency read value of the marker.***

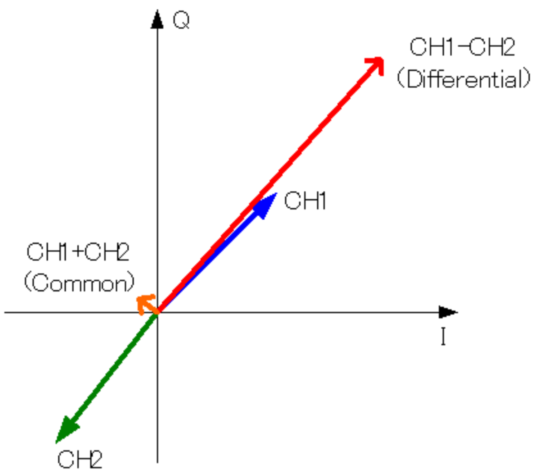


Figure 4-28 Image for Differential Signal Vector Addition/Subtraction

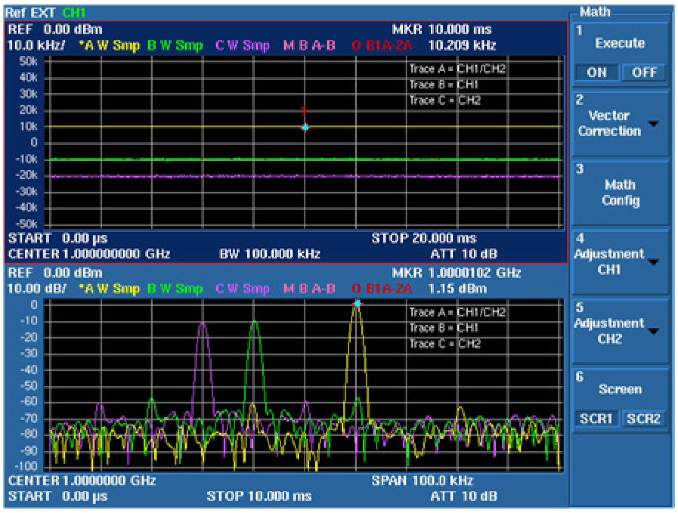


Figure 4-29 Inter-Channel Vector Calculation Analysis Screen

4.3.13 Inter-channel Vector Correction

This section describes how to correct the phase difference and level difference between channels.

Use measurement cables and a power divider to correct the phase difference between channels at the cable ends. When the measurement cables are replaced, perform the correction again.

Select an appropriate conversion adapter in accordance with the power divider to be used.

4.3.13.1 Correction Using Built-in Signal Source

Connect the CAL.OUT connector and the power divider with cables as shown in the figure below to input a signal to the CH1 and CH2 connector.

The signal is used for correction of 8 GHz or lower.

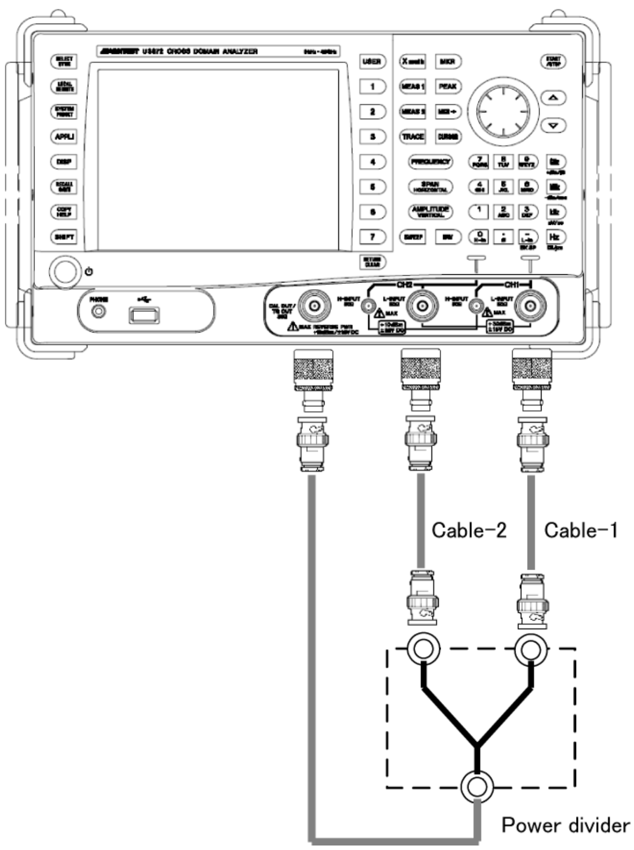


Figure 4-30 Inter-Channel Vector Correction Connection

Setting the synchronous mode

Press **SHIFT** and **SELECT**.
Synchronous mode is set.

X math, ***Power Ratio Phase Diff***, and ***Execute ON/OFF(ON)***.

One-point correction

Correction is performed for the currently set center frequency.

Press ***Vector Correction***, ***Signal Source INT***, and ***Get Current Corr Data***.
A connection confirmation message is displayed.

Connect the calibrator to CH1 and CH2 connector. Then press OK to continue.

Select OK.

When the correction is completed, a message saying "Connection finished." is displayed and the status display of the Vector Correction Data menu changes from OFF to ON.

Also, VCorr (ON for enabled = green, ON for disabled = red, or OFF for disabled = nothing displayed) is displayed on the upper part of the scale.

For more information on the applicable period of vector correction data, refer to "IMPORTANT" or "5.2.13 Xmath" → "5.2.13.5 Correction Data Info."

Press the **Hz** key to delete the message.

IMPORTANT: Applicable period of correction data
Correction data becomes invalid by performing the following operations. Perform the correction again if necessary.

- Common conditions for Current, Specific Span, and Inband
1. Switch the input attenuator.(REF Level, ATT, High Sensitivity ON/OFF)
2. For the U3872, switch the L/H-INPUT connector.
- Individual conditions
1. Current: When changed from the center frequency used when correction data is acquired.
2. Specific Span: When the center frequency is changed to the outside of the correction range.
3. Inband: When changed from the center frequency used when correction data is acquired.

Before correction	After correction
	
In the example in this figure, the phase difference between channels is approximately 45 degrees.	When the correction is completed normally: 1. The menu display in Correction changes from OFF to ON. 2. The phase difference between channels is corrected to nearly 0 degrees.

Figure 4-31 Inter-Channel Vector Correction (before/after Correction)

Correction of full bands(U3841:3GHz, U3851: 8GHz, U3872: 8GHz)

Press ***Vector Correction***, ***Signal Source INT***, ***Get Specific Span Corr Data***, and ***Get CorrectionData***.

A message is displayed as previously described. Select OK.

When the correction is completed, a message saying "Connection finished." is displayed and the status display of the Vector Correction Data menu changes from OFF to ON.

Also, VCorr (ON for enabled = green, ON for disabled = red, or OFF for disabled = nothing displayed) is displayed on the upper part of the scale.

For more information on the applicable period of vector correction data, refer to "IMPORTANT" or "5.2.13 Xmath" → "5.2.13.5 Correction Data Info."

Press the **Hz** key to exit.

IMPORTANT: ***Applicable period of correction data***
Correction data becomes invalid by performing the following operations. Perform the correction again if necessary.

- Common conditions for Current, Specific Span, and Inband
1. Switch the input attenuator.(REF Level, ATT, High Sensitivity ON/OFF)
2. For the U3872, switch the L/H-INPUT connector.
- Individual conditions
1. Current: When changed from the center frequency used when correction data is acquired.
2. Specific Span: When the center frequency is changed to the outside of the correction range.
3. Inband: When changed from the center frequency used when correction data is acquired.

4.3.13.2 Correction Using External Signal Sources

Perform one-point correction using an external signal source.

An external signal source is required for correction of the U3872 H-INPUT frequency of 8 GHz or higher.

Setting external signal source

Press ***Vector Correction*** and ***Signal Source INT|EXT(EXT)***.

The external signal source is set to EXT.

Refer to Sections Refer to Sections 5.2.13, "Xmath", → 4.3.13.1, "Power Ratio Phase Diff", → and 2-6, "Signal Source INT|EXT."

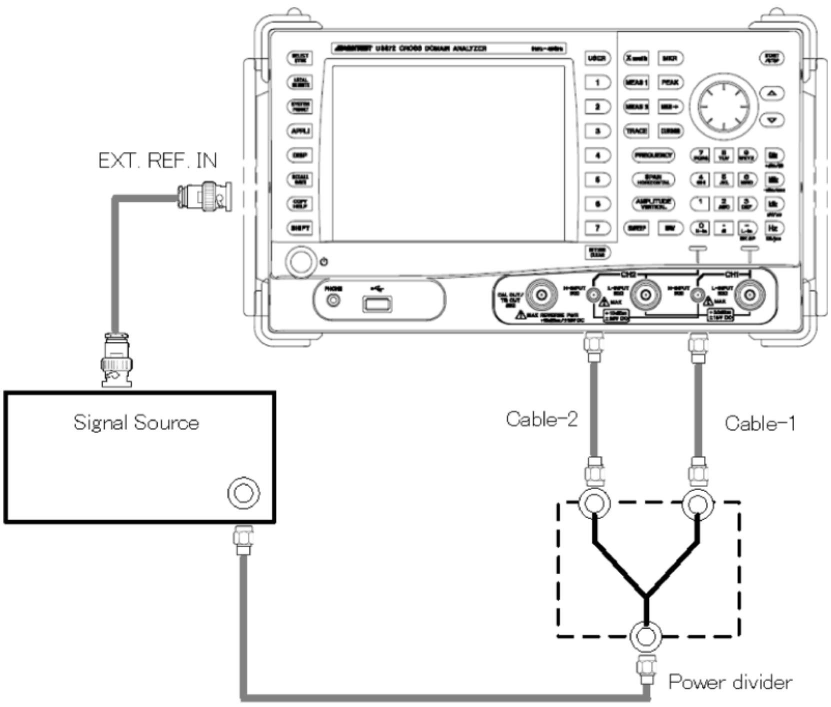


Figure 4-32 Correction Connection Using External Signal Source

For multiple-points correction (Specific Span and InBand) using an external signal source, refer to Section 6.13, "Multiple-Points Correction Using External Signal Sources."

4.4 Measurement Example

This section describes a measurement example of signal comparison and calculation between channels using the Cross Math (X Math) function.

4.4.1 Measurement of Power Ratio/Phase Difference between Channels

As a measurement example for this section, a level calibration signal of 20 MHz at -20 dBm and a signal of 20 MHz at -30 dBm from an external signal source are compared.

Correcting the phase difference between channels

Use cables and a power divider to correct the phase difference between channels at the cable ends.

Refer to Section 4.3.13, "Inter-channel Vector Correction."

1. Press **SHIFT** then **SELECT** or **SYSTEM**, ***Mode***, and ***Dual Sync CH***.
   Synchronous mode is set.
2. Press **FREQENCY**, **2**, **0**, and **MHz**.
   The center frequency is set to 20 MHz.
3. Press **X math**, ***Power Ratio Phase Diff***, and ***Execute ON/OFF(ON)***.
   The Correction menu is displayed.
4. Press ***Vector Correction***, ***Signal Source INT***, and ***Get Current Corr Data***.
   Follow the message and select OK.
   The correction is executed.

Connecting the input signal

Connect the calibration signal and external signal source that are to be used for measurement as shown in the figure.

The cables used for the above vector correction are used for measurement.

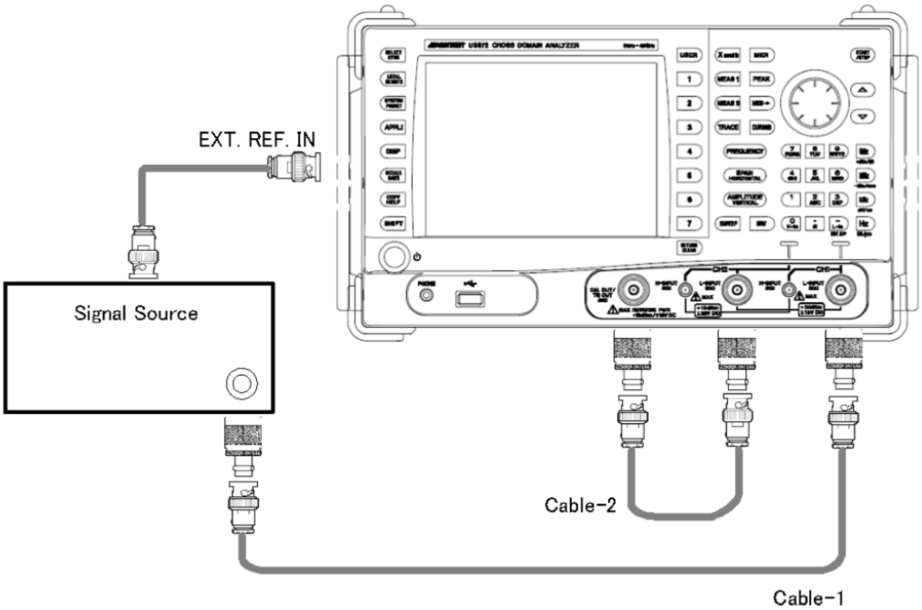


Figure 4-33 Measurement Connection of Power Ratio/Phase Difference between Channels

Selecting the input connector (for U3872)

Press **SHIFT** and **-**(L-in).

The L-INPUT connector is selected for both CH1 and CH2.

Setting the measurement conditions

Press **SYSTEM**, ***Config***, ***Frequency Reference***, and ***INT/EXT (EXT)***.
The frequency reference source is set to EXT.

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

Measuring the power ratio/phase difference between channels

Press **X math**, ***Power Ratio Phase Diff***, and ***Execute ON/OFF(ON)***.

Press **X math** and ***Ref CH CH1/CH2(CH2)***.

The power ratio and phase difference are calculated based on CH2, which is selected.

The following table shows the relationship among the measurement, calculation result, and displayed trace.

Table 4-5 Relationship between Calculation Result and Displayed Trace

	Trace A	Trace B	Trace C
Screen 1 (upper screen)	Calculation result of the power ratio (CH1/CH2)	CH1	CH2
Screen 2 (lower screen)	Calculation result of the phase difference (CH1/CH2)	CH1	CH2

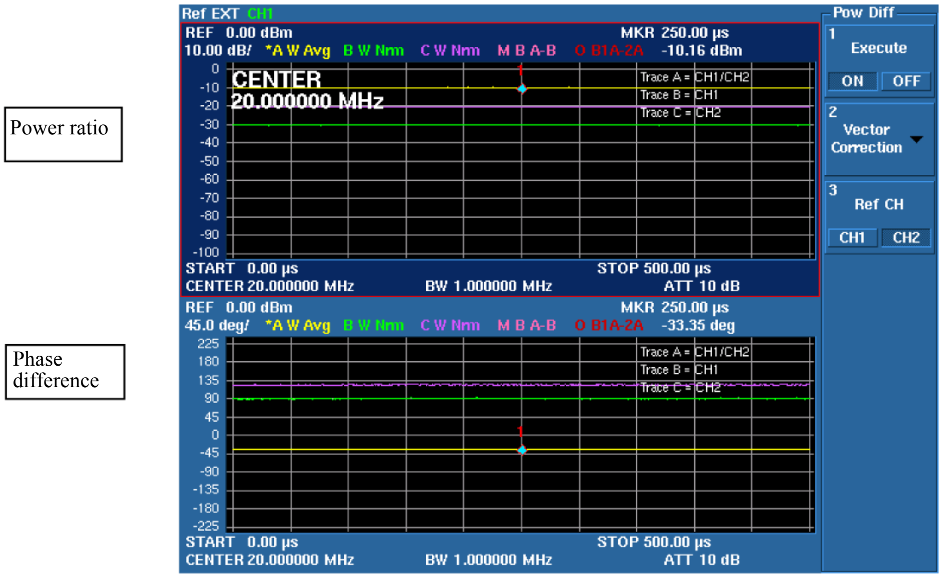


Figure 4-34 Power Ratio and Phase Difference Screen

4.4.2 Measurement Example with Vector Calculation Function

This section observes a change of the power in which the power of channel 1 and the power of channel 2 are synthesized based on the phase difference between channels by using the vector calculation function.

Setting the input signal

Set the signal level of the external signal source to -20 dBm which is the same value as the signal level of the calibration signal.

Exiting the power ratio/phase difference measurement and using the MATH function

Press **X math**, ***Power Ratio Phase Diff***, and ***Execute ON/OFF(OFF)***.
The power ratio/phase difference measurement is cancelled.

Press **X math**, ***Math***, and ***Math Config***.
The Math Config dialog box is displayed.

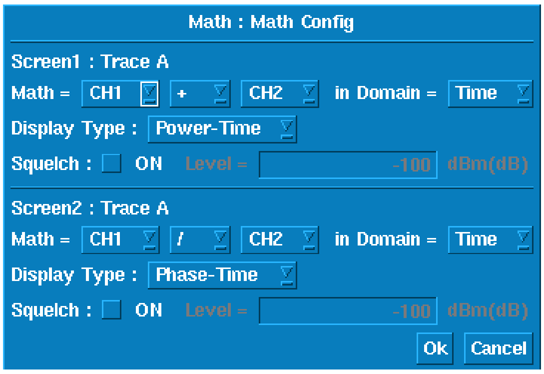


Figure 4-35 Inter-Channel Vector Calculation Dialog Box

Select items using the ▲ and ▼ keys, select the contents using the knob, and finalize the selections using the unit keys to make the settings as follows.

Screen1

Math = CH1 + CH2
in Domain: Time
Display Type: Power - Time
Squelch: OFF (Deselecting the check box.)

Screen2

Math = CH1 / CH2
in Domain: Time
Display Type: Phase - Time
Squelch: OFF (Deselecting the check box.)

Select the OK button and press the Hz key to finalize the settings.

Press ***Math Config*** and ***Execute ON/OFF(ON)***.

The following table shows the relationship among the measurement, calculation result, and displayed trace.

	Trace A	Trace B	Trace C
Screen 1 (upper screen)	Calculation result of the power sum (CH1 + CH2)	CH1	CH2
Screen 2 (lower screen)	Calculation result of the phase difference (CH1/CH2)	CH1	CH2

By changing the frequency of the external signal source, it can be observed that the power sum reaches a minimum when the phase difference is 180 degrees and a maximum when the phase difference is 0 degrees, and the power sum becomes approximately 6 dB higher than the input signal level.

Reading the level difference using markers

Press **MKR**, **PEAK**, **MKR**, ***Delta Mode***, and ***Delta ON/OFF(ON)***.
The marker delta mode is set.
The reference marker and active marker are displayed on Trace A (power sum).

Press **MKR** and ***Marker Trace***.
The active marker moves to Trace B (CH1) and the level difference with the reference marker is displayed.

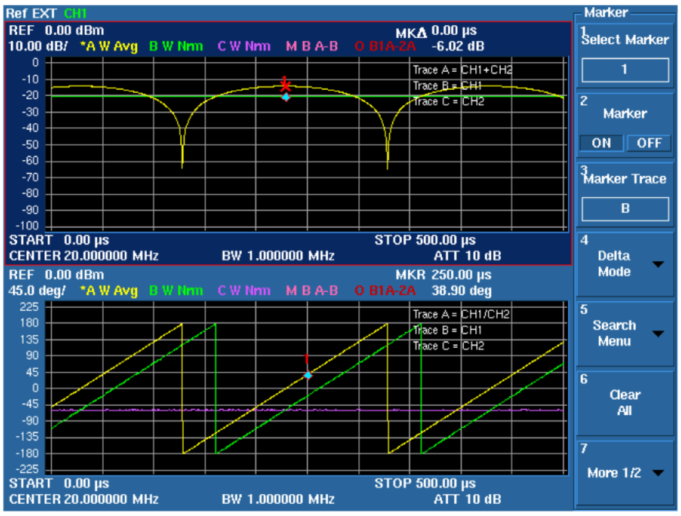


Figure 4-36 Synthesized Power and Phase Difference Display (Dual Display)

Example in which the display mode is changed to Overlay

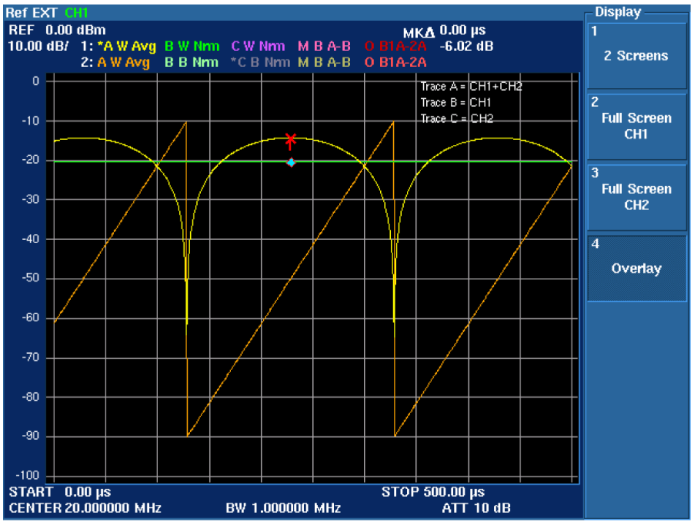


Figure 4-37 Synthesized Power and Phase Difference Display (Overlay Display)

Displaying only the phase difference (Trace A) on screen 2 (lower screen)

Press **TRACE**, ***Trace B***, ***Refresh***, and ***Blank***.
The display of Trace B is hidden.

Press **TRACE**, ***Trace C***, ***Refresh***, and ***Blank***.
The display of Trace C is hidden.

Changing the display mode to Overlay

Press **DISP**, ***Screen***, and ***Overlay***.
The screens at the top and bottom are overlapped and displayed.

4.4.3 Cross Polarization Discrimination (XPD) Measurement

To increase the use of radio waves in the satellite communications and microwave transit trunk, the vertical polarized wave and horizontal polarized wave are transmitted at the same frequency. The cross polarization discrimination (XPD) is measured by inputting the vertical polarized wave and horizontal polarized wave to channel 1 and channel 2 respectively, then performing a parallel test.

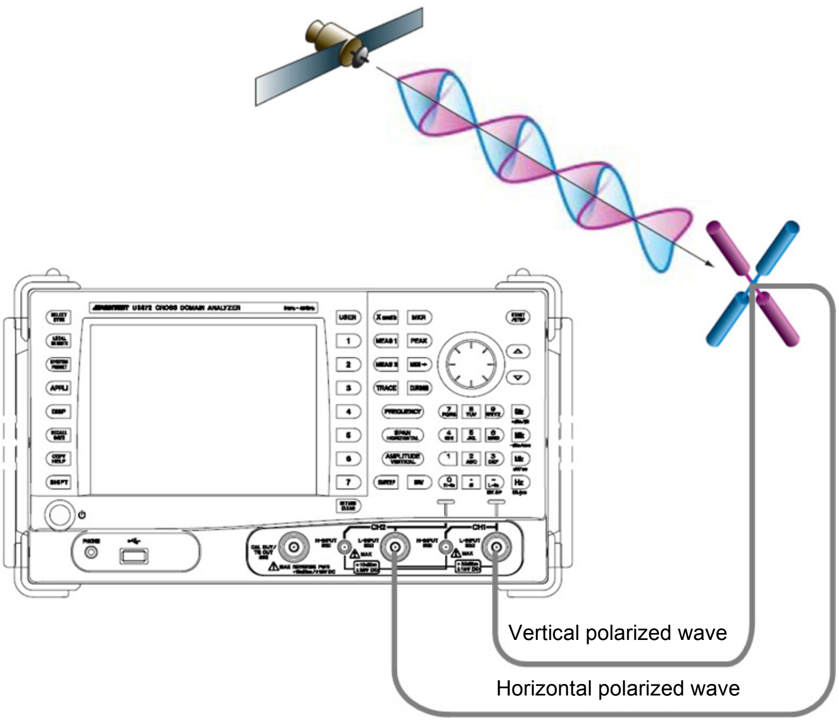


Figure 4-38 XPD Measurement Example (Ch Power)

Example Frequency: 1 GHz
Channel width: 6MHz

4.4.3.1 Using X Math Channel Power Ratio Measurement Function

Setting the measurement conditions

1. Press **FREQUENCY**, **1**, **GHz**, **SPAN**, **2**, **0**, and **MHz**.
   The center frequency is set to 1 GHz and the frequency span is set to 20 MHz.
2. Press **X math** and ***Ch Power Diff***.
   The CH Pow Diff menu is displayed.
3. Press ***Channel Width***, **6**, and **MHz**.
   The channel width of channel 1 is set to 6 MHz.
4. Press **SELECT**, ***Channel Width***, **6**, and **MHz**.
   The channel width of channel 2 is set to 6 MHz.

Measuring the channel power ratio

5. Press ***Execute ON/(OFF) ON***.
   Measurement of the channel power ratio starts and the result is displayed.
   The trace detector is automatically set to RMS.

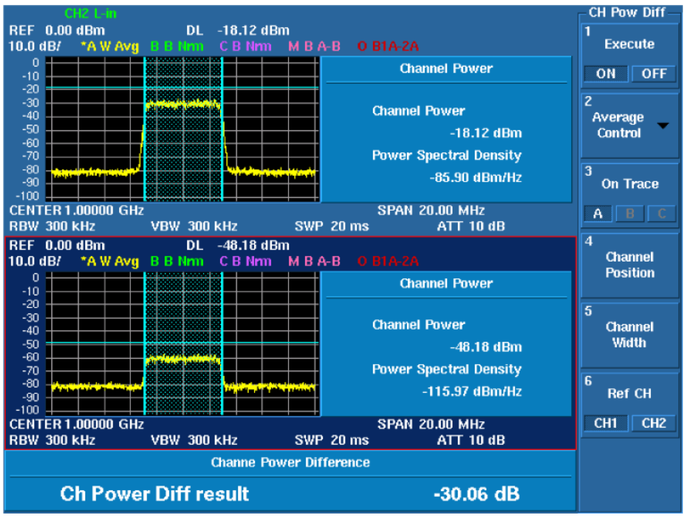


Figure 4-39 Channel Power Ratio Measurement

4.4.3.2 Using Trace Calculation Function

Setting the measurement conditions

1. Press **FREQUENCY**, **1**, **GHz**, **SPAN**, **2**, **0**, and **MHz**.
   The center frequency is set to 1 GHz and the frequency span is set to 20 MHz.
2. Press **TRACE**, ***Trace A***, ***Detector***, and ***Average***.
   The trace detector of CH1 is set to RMS.
3. Press **SELECT**, **TRACE**, ***Trace A***, ***Detector***, and ***Average***.
   The active channel is switched and the same setting is made for CH2.
4. Press **SELECT**.
   The active channel is returned to CH1.
5. Press **TRACE**, ***Trace Math Cross Ch***, and ***Math Config***.
   The Trace Math Cross Channel dialog box is displayed.

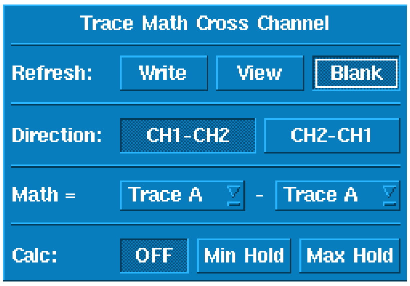


Figure 4-40 Trace Calculation Dialog Box

Select items to be set using the ▼ and ▲ keys and the knob, and finalize the selections using the unit keys.

▼ and ▲ keys: Item selection

Knob: Content selection

Trace Refresh ***Write/View/Blank (Write)***, **GHz**

Trace Write is selected and the calculation result is written in Trace O.

Selecting the calculational expression
CH1-CH2/CH2-CH1 (CH2-CH1), **GHz**

Calculational expression CH2-CH1 is selected.

Selecting a target trace ***Trace A /Trace B/Trace C/Trace M (Trace A)***

Math = Trace A - Trace A is set.

Selecting the calculational function (Calc)
OFF/Min Hold/Max Hold(OFF)

The calculational function OFF is selected.

Hiding the dialog box

6. Press ***Math Config***.

   The dialog box is hidden.

Adjusting the display position of the calculation result (Trace O)

7. ***Reference Line ON/OFF (ON)***, **3**, **0**, and **MHz**.

   The display line is displayed at the position of -30 dBm and the position at which the measurement calculation result is 0 is indicated.

   If the display line is set to off, zero becomes the lowest line of the scale.

Reading the result by using markers

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

   The delta marker is displayed.

   The level difference between channel 1 and channel 2 is displayed in the marker area.

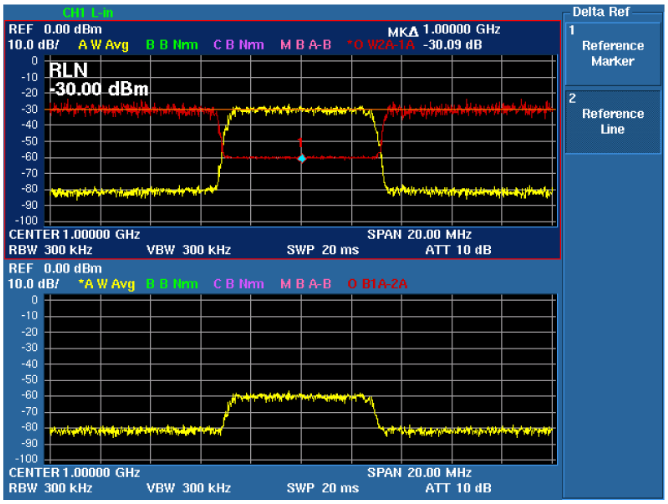


Figure 4-41 XPD Measurement Example (Trace Math)

5. Menu Map and Function Description

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 Function Description

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 SELECT

Switches the Active Contexts and/or Active CH.

Switches both the Active Contexts and Active CH when 2 channels are displayed on the dual screen.

Switches the Active Contexts when 1 channel is displayed on the dual screen.

Disabled for single-screen display.

Pressing the SHIFT and SELECT keys turns synchronous mode on and off.

5.2.2 SYNC

Turns synchronization between the channels on and off.

ON: LED illuminates.

OFF: LED extinguishes.

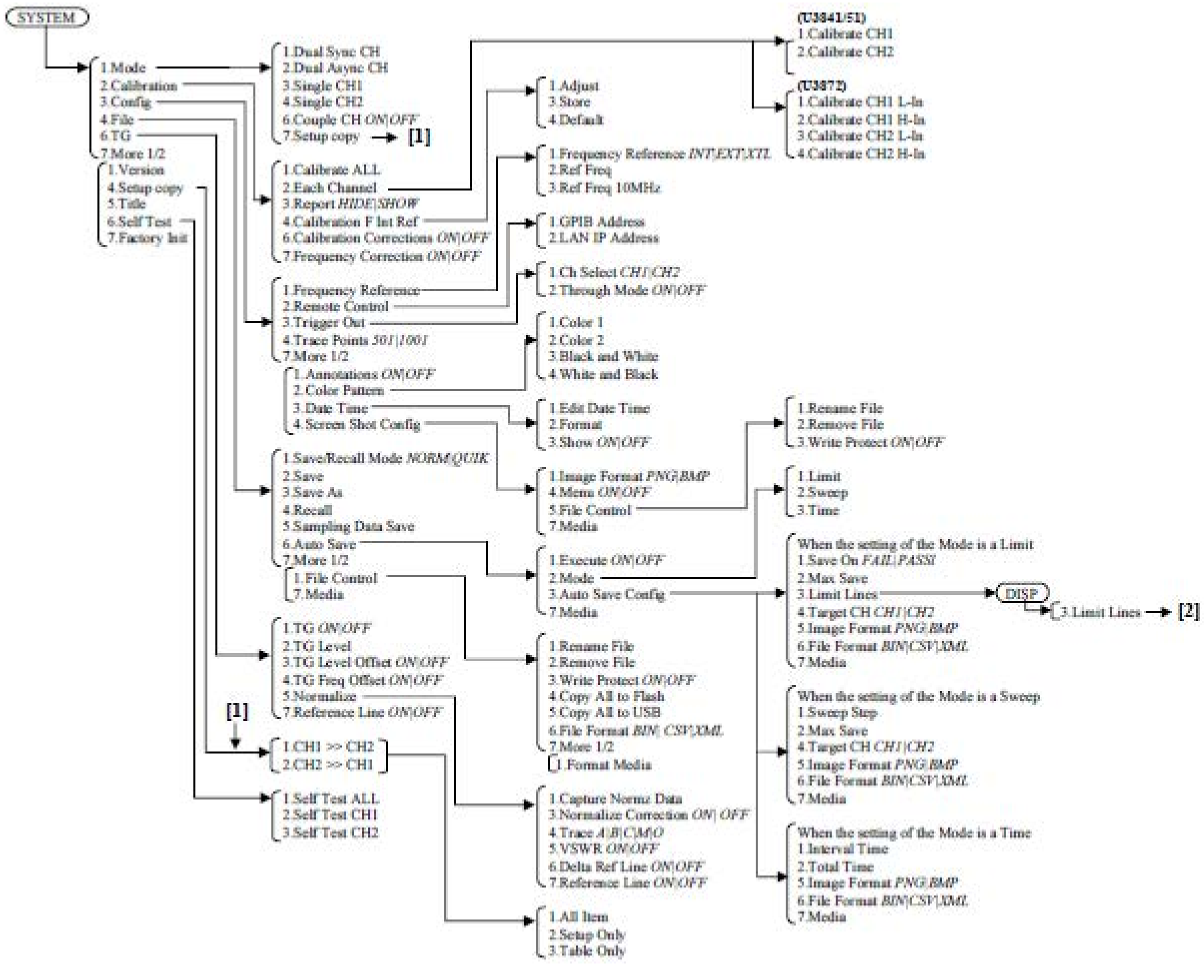
5.2.3 LOCAL REMOTE

Cancels the remote control function.

The REMOTE lamp illuminates when the instrument is in the remote state.

5.2.4 SYSTEM

This subsection describes how to configure this instrument.



5.2.4.1 Mode

SYSTEM

- **Mode**
  - **Dual Sync CH**
  - **Dual Async CH**
  - **Single CH1**
  - **Single CH2**
  - **Couple CH ON|OFF**
  - **Setup copy**

1. Dual Sync CH

   The two channels operate in synchronous mode.

2. Dual Async CH

   Channels 1 and 2 operate independently in asynchronous mode.

3. Single CH1

   Operates in the single channel mode of Channel 1.

4. Single CH2

   Operates in the single channel mode of Channel 2.

5. Couple CH ON|OFF

   Channels 1 and 2 operate in asynchronous mode, but the following settings are synchronized when this mode is on:

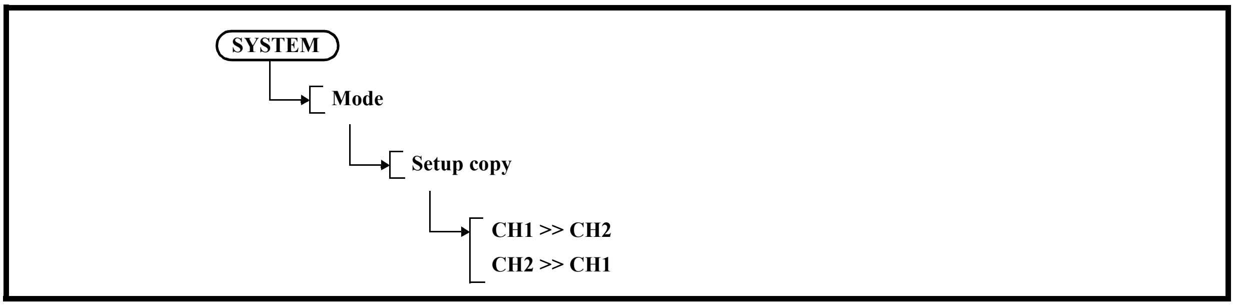
   Coupled functions

   a. Frequency
      Center
      Start
      Stop

   b. SPAN
      SPAN
      Full Span
      Zero Span
      Last Span

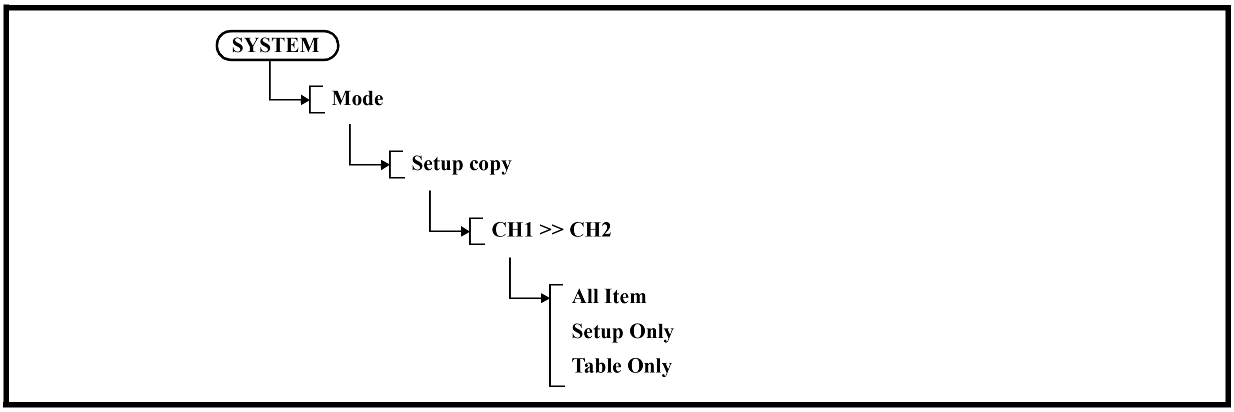
   c. BW
      RBW
      VBW
      Sweep Time
      All Auto

6. Setup copy



6-1 CH1>>CH2

Copies the setting condition of channel 1 to channel 2 and applies it.



6-1-1 All Item

Saves all setting conditions.

6-1-2 Setup Only

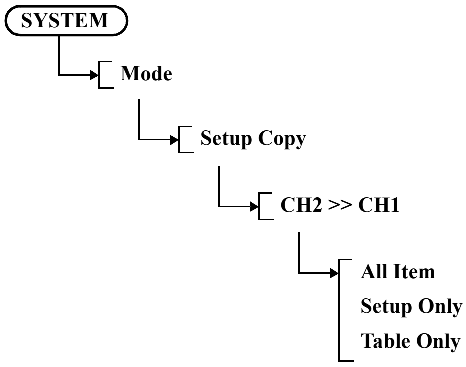
Saves the setting conditions.

6-1-3 Table Only

Saves the table conditions.

6-2 CH2>>CH1

Copies the setting condition of channel 2 to channel 1 and applies it.



6-2-1 All Item

Saves all setting conditions.

6-2-2 Setup Only

Saves the setting conditions.

6-2-3 Table Only

Saves the table conditions.

NOTE: ***After being copied, the setting conditions and contents of the setting table for channels 1 and 2 all become the same.***
If there are tables or other data that you do not want to change, save it in a USB memory device before copying.

5.2.4.2 Calibration

- **SYSTEM**
  - **Calibration**
    - **Calibrate ALL**
    - **Each Channel**
    - **Report HIDE|SHOW**
    - **Calibration F Int Ref**
    - **Calibration Corrections ON|OFF**
    - **Frequency Correction ON|OFF**

1. Calibrate ALL
   Performs all calibrations.
2. Each Channel
   Displays the Each Channel menu.

U3841/U3851

- **SYSTEM**
  - **Calibration**
    - **Each Channel**
      - **Calibrate CH1**
      - **Calibrate CH2**

2-1 Calibrate CH1
Calibrates channel 1.

2-2 Calibrate CH2
Calibrates channel 2.

U3872

- **SYSTEM**
  - **Calibration**
    - **Each Channel**
      - **Calibrate CH1 L-In**
      - **Calibrate CH1 H-In**
      - **Calibrate CH2 L-In**
      - **Calibrate CH2 H-In**

2-1 Calibrate CH1 L-In
Calibrates channel 1 L-Input.

2-2 Calibrate CH1 H-In
Calibrates channel 1 H-Input.

2-3 Calibrate CH2 L-In
Calibrates channel 2 L-Input.

2-4 Calibrate CH2 H-In
Calibrates channel 2 H-Input.

3. Report HIDE|SHOW
Hides or shows the calibration results.

4. Calibration F Int Ref
Calibrates the frequency of the crystal oscillator that is used for the internal frequency reference.

SYSTEM
- **Calibration**
  - **Calibration F Int Ref**
    - **Adjust**
    - **Store**
    - **Default**

4-1 Adjust
Changes the adjustment data.

4-2 Store
Saves the adjusted data.
The saved data is used even if this instrument is preset.

4-3 Default
Sets the factory default calibration data.

5. Calibration Corrections ON|OFF
Switches the calibration factor ON and OFF.
ON: Uses the CAL factor.
OFF: Does not use the CAL factor.

6. Frequency Correction ON|OFF
Switches the frequency correction function ON and OFF.
ON: Corrects the frequency characteristics.
OFF: Cancels the frequency correction function.

5.2.4.3 Config

SYSTEM
- Config
  - Frequency Reference
  - Remote Control
  - Trigger Out
  - Trace Points 501|1001
  - Annotations ON|OFF
  - Color Pattern
  - Date Time
  - Screen Shot Config

1. Frequency Reference

   Selects the signal source of the reference frequency.

SYSTEM
- Config
  - Frequency Reference
    - Frequency Reference INT|EXT|XTL
    - Ref Freq
    - Ref Freq 10MHz

1-1 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.

1-2 Ref Freq

The reference frequency can be changed by using the step keys.

The following frequencies can be set as the reference frequency:

1MHz, 1.544MHz, 2.048MHz, 5MHz,
10MHz, 12.8MHz, 13MHz, 13.824MHz,
14.4MHz, 15.36MHz, 15.4MHz, 16.8MHz,
19.2MHz, 19.44MHz, 19.6608MHz,
19.68MHz, 19.8MHz, 20MHz, 26MHz

1-3 Ref Freq 10MHz

Set the reference value to 10 MHz.

2. Remote Control
   Displays the Remote Ctrl menu.

- SYSTEM
  - Config
    - Remote Control
      - GPIB Address
      - LAN IP Address

2-1 GPIB Address
Sets the GPIB address of this instrument.

2-2 LAN IP Address
Sets the IP address of this instrument.
Displays the Network Setting dialog box.

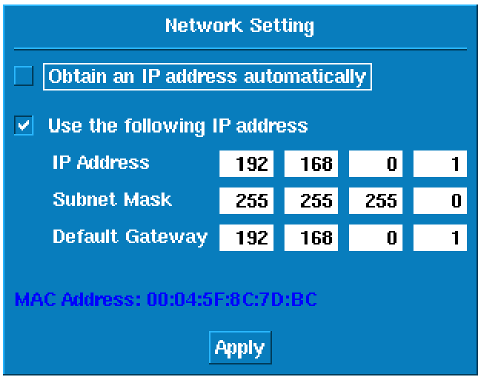


Figure 5-1 Network Setting Dialog Box

3. Trigger Out
   Displays the trigger output menu.

- SYSTEM
  - Config
    - Trigger Out
      - Ch Select CH1|CH2
      - Though Mode ON|OFF

3-1 Ch Select CH1|CH2
Sets the target channel of Trigger Out.

3-2 Through Mode ON|OFF

Sets whether to output external trigger input of the target channel to the trigger output.

4. Trace Points 501|1001

   Switches the trace point in the horizontal axis between 501 and 1001.

   501: Sets the trace point to 501.

   1001: Sets the trace point to 1001.

5. 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.

   Zooms into the area where set values were displayed.

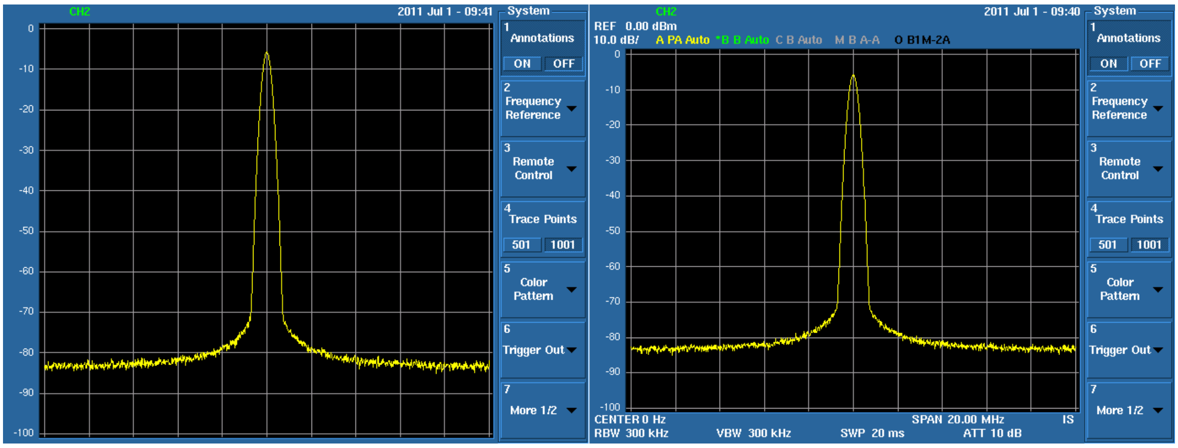


Figure 5-2 Annotations OFF (Left), Annotations ON (Right)

6. Color Pattern

   Displays the color setting menu.

SYSTEM
- **Config**
  - **Color Pattern**
    - **Color 1**
    - **Color 2**
    - **Black and White**
    - **White and Black**

6-1 Color 1

Selects the standard color.

6-2 Color 2

Selects Color 2.

6-3 Black and White

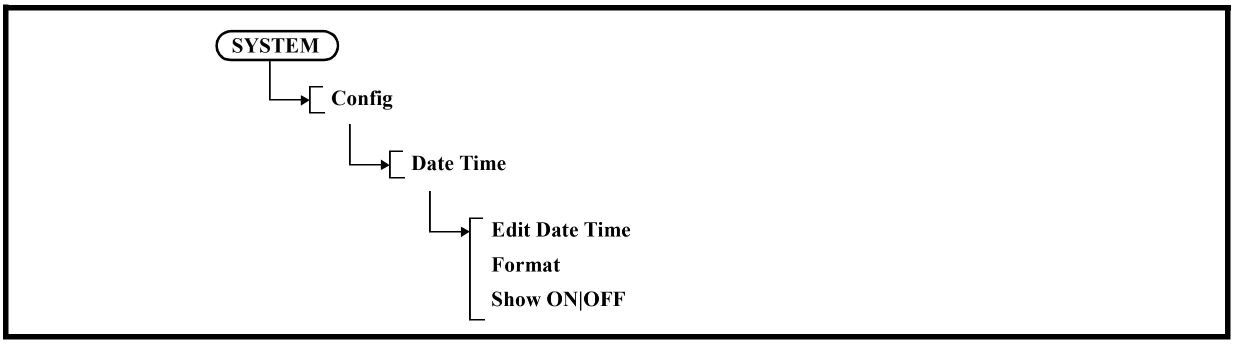
Selects black for the background and white for signals.

6-4 White and Black

Selects white for the background and black for signals.

7. Date Time

Displays the date menu.



7-1 Edit Date Time

Sets a date and time.
They are set or changed in the dialog box.

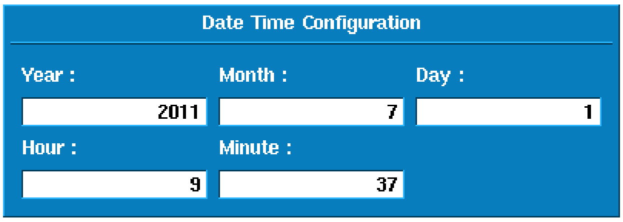


Figure 5-3 Date and Time Setting Dialog Box

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

7-2 Format

Sets date display formats.

They are set or changed in the dialog box.

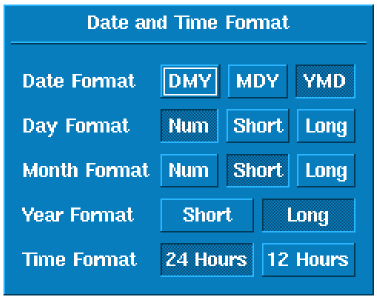


Figure 5-4 Date Display Setting Dialog Box

7-3 Show ON|OFF

Switches ON and OFF the date display.

ON: Displays the date.

OFF: Hides the date display.

8. Screen Shot Config

SYSTEM
- **Config**
  - **Screen Shot Config**
    - **Image Format PNG|BMP**
    - **Menu ON|OFF**
    - **File Control**
    - **Media**

8-1 Image Format PNG|BMP

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

8-2 Menu ON|OFF

Hides the soft menu area when a copy is output.

ON: Displays the menu.

OFF: Hides the menu.

8-3 File Control

Displays the Shot File menu.

Displays the Files window.

SYSTEM
- Config
  - Screen Shot Config
    - File Control
      - Rename File
      - Remove File
      - Write Protect ON|OFF

8-3-1 Rename File

Changes the selected filename.

Select a file name to be renamed with the cursor and press the [1. Rename File] button.

Enter a new file name in New name: by using the keypad.

After entering a new file name, press the [Hz] button.

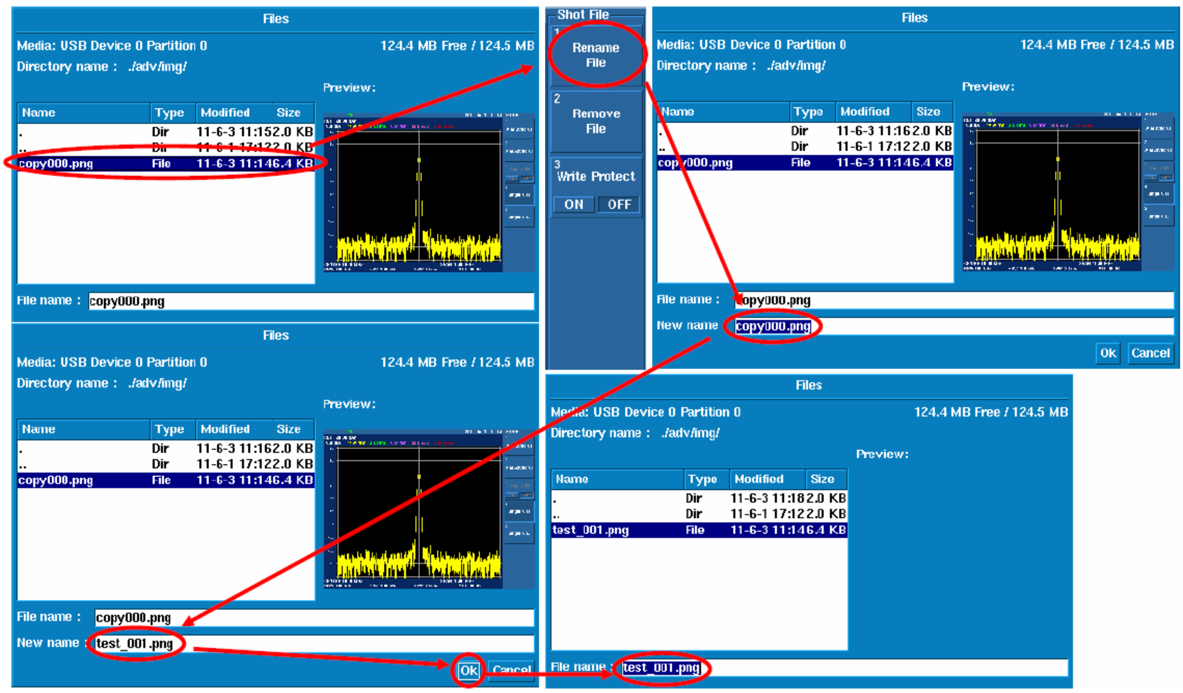


Figure 5-5 Rename File Operation Procedure

8-3-2 Remove File

Deletes the selected file or directory (all the files in the directory).

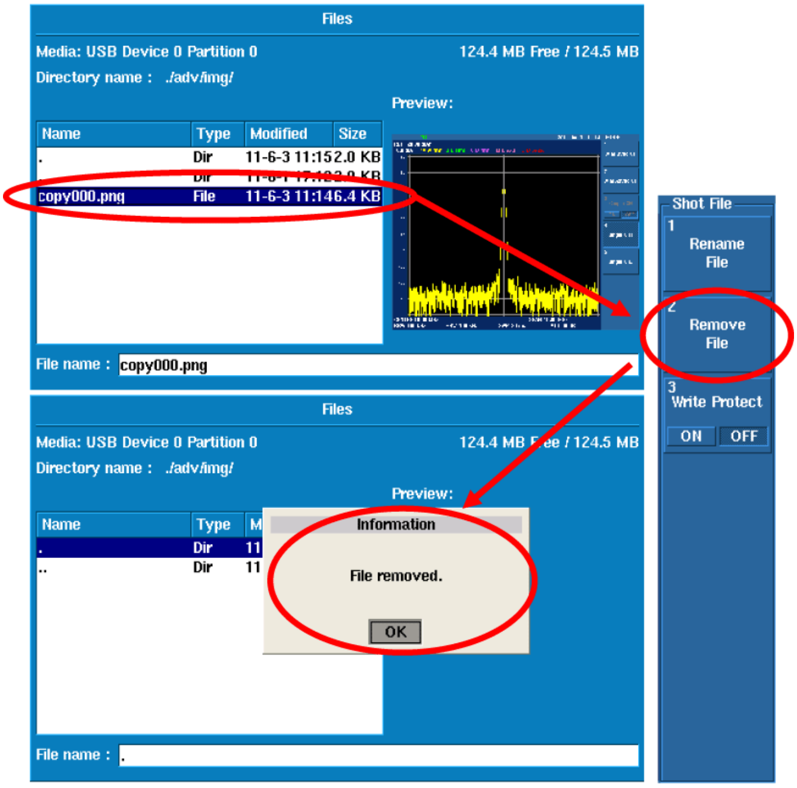


Figure 5-6 Remove File Operation Procedure

8-3-3 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.

8-4 Media

Sets the media in which to save files.

5.2.4.4 File

Displays the File menu.

SYSTEM
- **File**
  - **Save/Recall Mode NORM|QUIK**
  - **Save**
  - **Save As**
  - **Recall**
  - **Sampling Data Save**
  - **Auto Save**
  - **File Control**
  - **Media**

1. Save/Recall Mode NORM|QUIK

   Sets the mode of Save or Recall to Normal or Quick.

   NORM: Normal mode
   The file is saved under the /adv/dat folder by pressing the [Save] or [Save As] button in the menu.

   QUIK: Quick mode (Up to 10 files can be saved or recalled.)
   The file is saved (in one of the formats q0.dat to q9.dat under the /adv/qdat folder) by pressing any of the numerical keys (0 to 9) of the numerical keypad after pressing the (SHIFT)+(RECALL SAVE) button.

2. Save

   Saves setting conditions, trace data, and Vector Correction data in the memory specified by Media.

   The format in which to save data can be selected from binary (.dat), ASCII (.csv), or XML (eXtensible Markup Language) (.xml).

   Note: ***Only binary data can be saved in the internal memory of this instrument.***
   The only format in which data can be recalled is the binary format (.dat). The ASCII CSV (Comma-Separated Values) format and the XML (eXtensible Markup Language) format (.xml) cannot be used to recall data.

3. Save As

   Displays the Save As window.

   Saves a file under a specified name.

   To move the cursor to File name:, use the step keys (▲ and ▼ keys next to the knob).

   After the cursor has been moved to File name:, enter a file name by using the keypad.

   After confirming the file name, position the cursor on the [Save] button with the step keys, and then press the [Hz] button to execute Save.

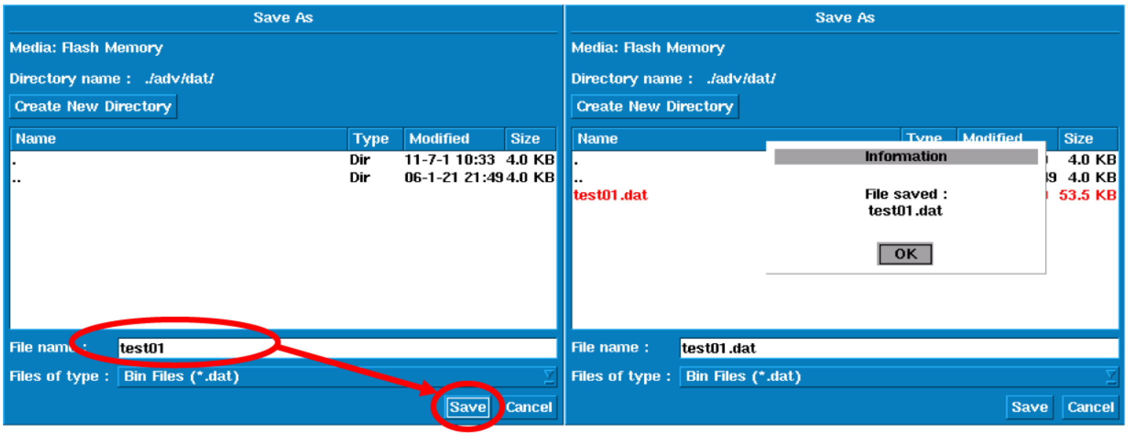


Figure 5-7　Save As Operation Procedure

Creates a directory.
Select the Create New Directory button, and then press the [Hz] button.
Enter a new directory name in New Name: in the Create New Directory window by using the keypad.

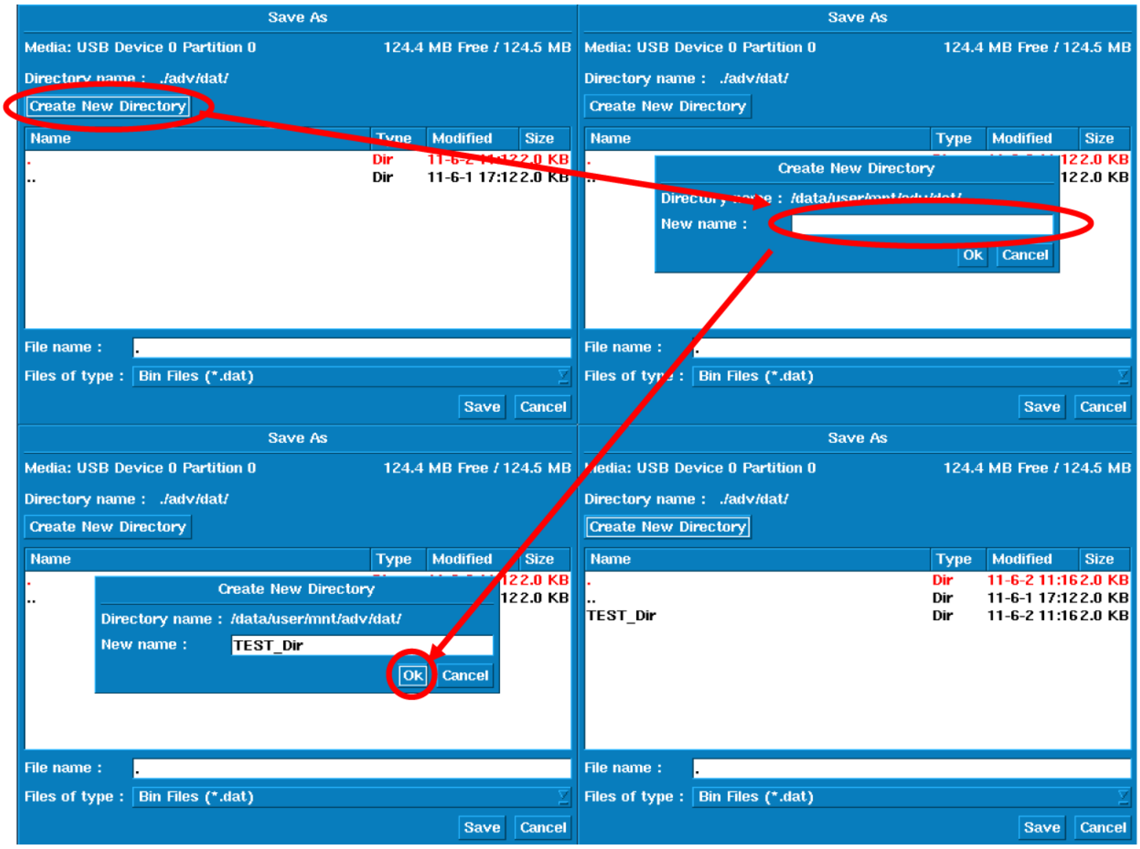


Figure 5-8　Directory Creation Procedure

Moves to a directory.

Allow the cursor to appear in the list of file or directory names and position it on the desired directory by using the knob.

Pressing the [Hz] button moves the user to that directory.

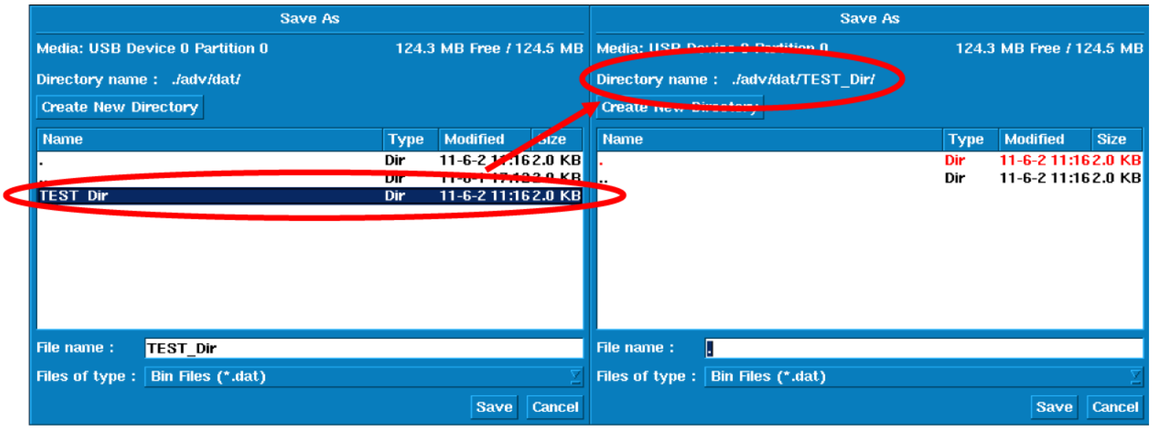


Figure 5-9 Directory Movement Procedure

4. Recall

Recalls files saved in binary format and displays items specified by Items.

Displays the Recall window.

Allow the cursor to appear in the list of file or directory names and position it on the file name to be recalled by using the knob. Position the cursor on the [Recall] button by using the step keys. Pressing the [Hz] button executes Recall.

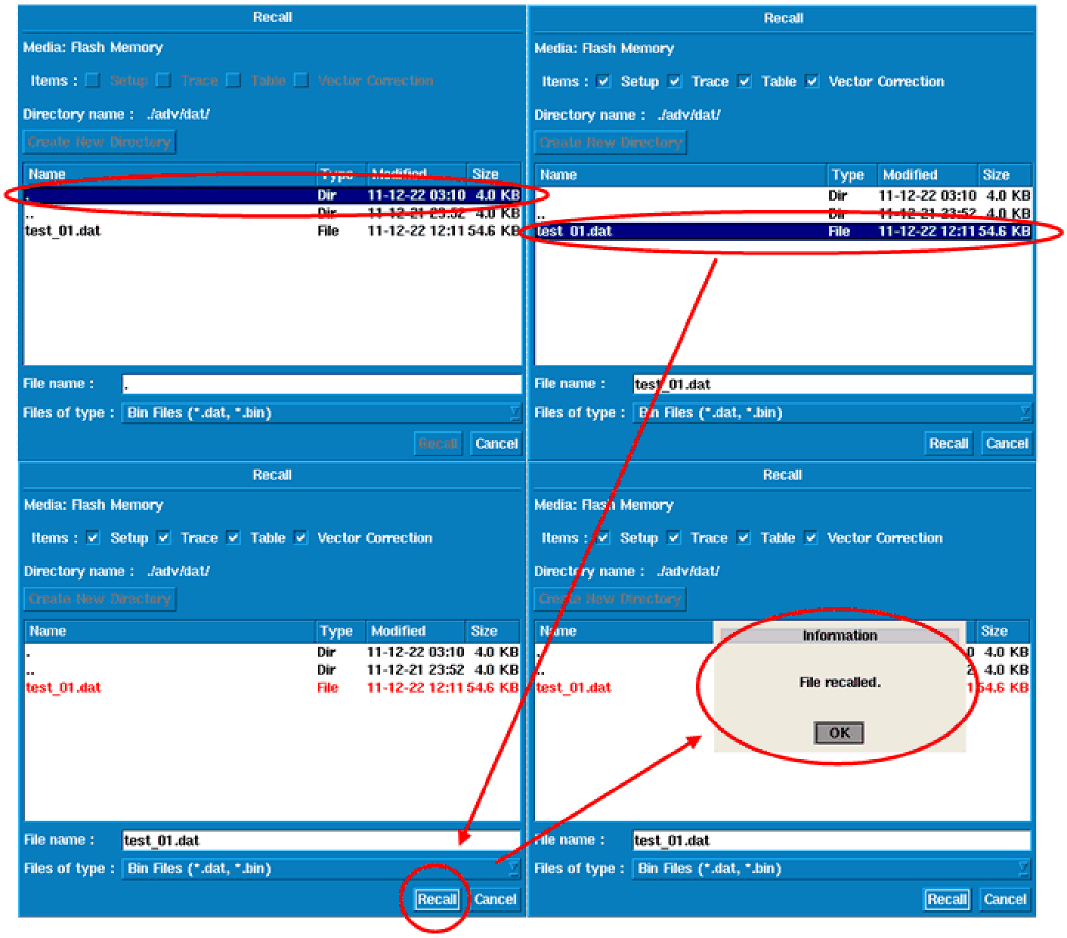


Figure 5-10 Recall Operation Procedure

a. Items
Sets recall conditions.

NOTE: ***If all of the following checkboxes are unchecked, the file is not recalled.***

---

1) Setup
   - Checked: All the conditions from when the file was saved are recalled.
   - Unchecked: The conditions are not recalled.
2) Trace
   - Checked: The trace waveform from when the file was saved is recalled.
   - Unchecked: The trace waveform is not recalled.
3) Table
   - Checked: The table values from when the file was saved are recalled.
   - Unchecked: The table values are not recalled.
4) Vector Correction
   - Checked: Vector Correction data from when the file was saved, is recalled.
   - Unchecked: Vector Correction data is not recalled.

If Recall is executed with the Trace checkbox checked, the screen switches to View mode. If sweep is started, the waveform is not updated. The setting of Refresh for Trace must be changed from View to Refresh (Write).

To uncheck the Trace checkbox, select a file to be recalled, select the Trace checkbox with the step keys, and then press the [Hz] button.

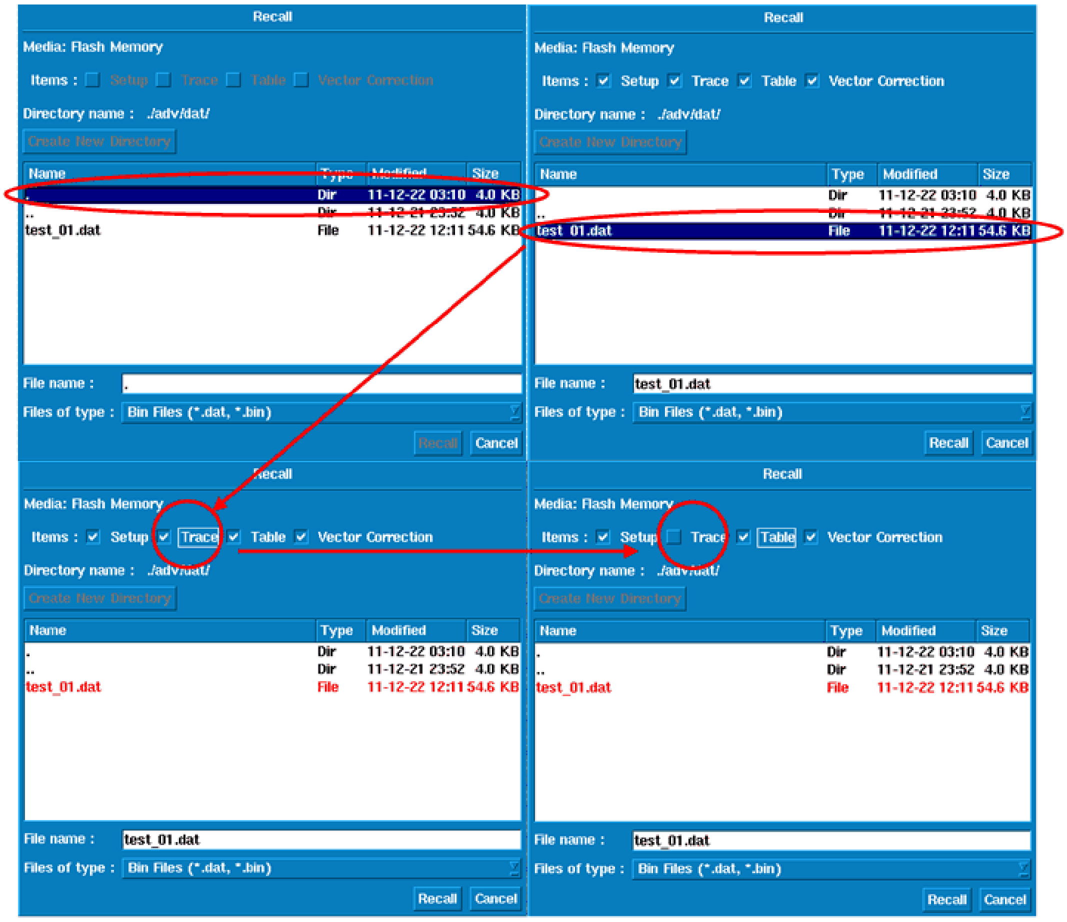


Figure 5-11 Recall Condition Setting

5. Sampling Data Save

   Saves sampling data in a file.

   The **SWEEP** setting is ***Sweep Mode SGL*** and the setting is effective when the **MEAS1** setting is anything other than ***Spectrum Analysis***.

6. Auto Save

Saves data in a file automatically for each sweep, at specified time intervals, or according to PASS/FAIL results.

SYSTEM
- **File**
  - **Auto Save**
    - **Execute ON|OFF**
    - **Mode**
    - **Auto Save Config**
    - **Media**

6-1 Execute ON|OFF

ON: Turns on Auto Save.

OFF: Turns off Auto Save.

6-2 Mode

SYSTEM
- **File**
  - **Auto Save**
    - **Mode**
      - **Limit**
      - **Sweep**
      - **Time**

6-2-1 Limit

Saves data in a file automatically according to the Limit Line and PASS/FAIL results.

6-2-2 Sweep

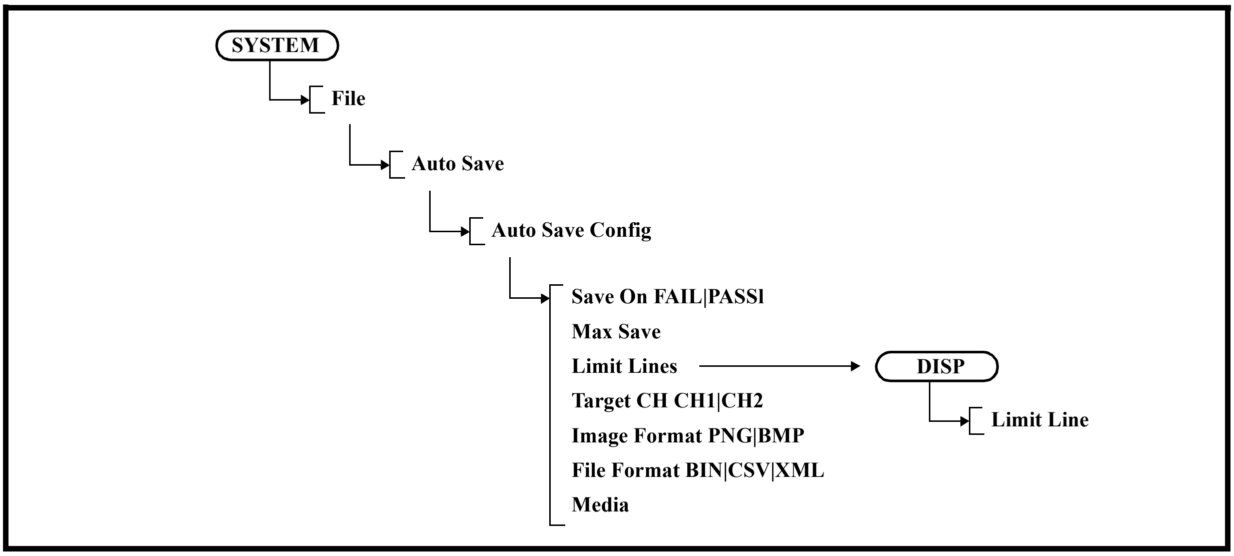
Saves data in a file automatically for each sweep.

6-2-3 Time

Saves data in a file automatically at specified intervals.

6-3 Auto Save Config

When Mode is Limit



6-3-1 Save On FAIL|PASS

Saves data in a file according to the Limit Line and PASS/FAIL results.

6-3-2 Max Save

Sets the maximum number of files to be saved.

6-3-3 Limit Lines

Displays the Limit Line menu.

6-3-4 Target CH CH1|CH2

Sets a target channel.

6-3-5 Image Format PNG|BMP

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

6-3-6 File Format BIN|CSV|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.

CSV: Saves the data in ASCII format.

XML: Saves the data in XML format.
Files which are saved in XML format can be read easily but the settings cannot be recalled.

6-3-7 Media

Sets the media in which to save files.

Displays the Media dialog box.

Select either the internal memory or an external USB memory device in the dialog box.

When Mode is Sweep

- **SYSTEM**
  - **File**
    - **Auto Save**
      - **Auto Save Config**
        - **Sweep Step**
        - **Max Save**
        - **Target CH CH1|CH2**
        - **Image Format PNG|BMP**
        - **File Format BIN|CSV|XML**
        - **Media**

6-3-1 Sweep Step

Sets the interval at which data is saved for each sweep.

6-3-2 Max Save

Sets the maximum number of files to be saved.

Up to 100 files can be set in the internal memory.

Up to 100000 files can be set in the USB memory.

6-3-3 Target CH CH1|CH2

Sets a target channel.

6-3-4 Image Format PNG|BMP

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

6-3-5 File Format BIN|CSV|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.

CSV: Saves the data in ASCII format.

XML: Saves the data in XML format.
Files which are saved in XML format can be read easily but the settings cannot be recalled.

6-3-6 Media

Sets the media in which to save files.

Displays the Media dialog box.

Select either the internal memory or an external USB memory device in the dialog box.

When Mode is Time

- **SYSTEM**
  - **File**
    - **Auto Save**
      - **Auto Save Config**
        - **Interval Time**
        - **Total Time**
        - **Image Format PNG|BMP**
        - **File Format BIN|CSV|XML**
        - **Media**

6-3-1 Interval Time

Sets the time interval (time: 1 second to 1,000 seconds) at which data is saved.

6-3-2 Total Time

Sets the time (from 1 second to 10,000 seconds) over which data is saved in a file.

6-3-3 Image Format PNG|BMP

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

6-3-4 File Format BIN|CSV|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.

CSV: Saves the data in ASCII format.

XML: Saves the data in XML format.
Files which are saved in XML format can be read easily but the settings cannot be recalled.

6-3-5 Media

Sets the media in which to save files.

Displays the Media dialog box.

Select either the internal memory or an external USB memory device in the dialog box.

6-4 Media

Sets the media in which to save files.

Displays the Media dialog box.

Select either the internal memory or an external USB memory device in the dialog box.

7. File Control
   Displays the File Control menu and Files window.

SYSTEM
- **File**
  - **File Control**
    - **Rename File**
    - **Remove File**
    - **Write Protect ON|OFF**
    - **Copy All to Flash**
    - **Copy All to USB**
    - **File Format BIN|CSV|XML**
    - **Format Media**

7-1 Rename File

Changes the selected filename.
Select a file name to be renamed with the cursor and press the [1. Rename File] button.
Enter a new file name in New name: by using the keypad.
After entering a new file name, press the [Hz] button.

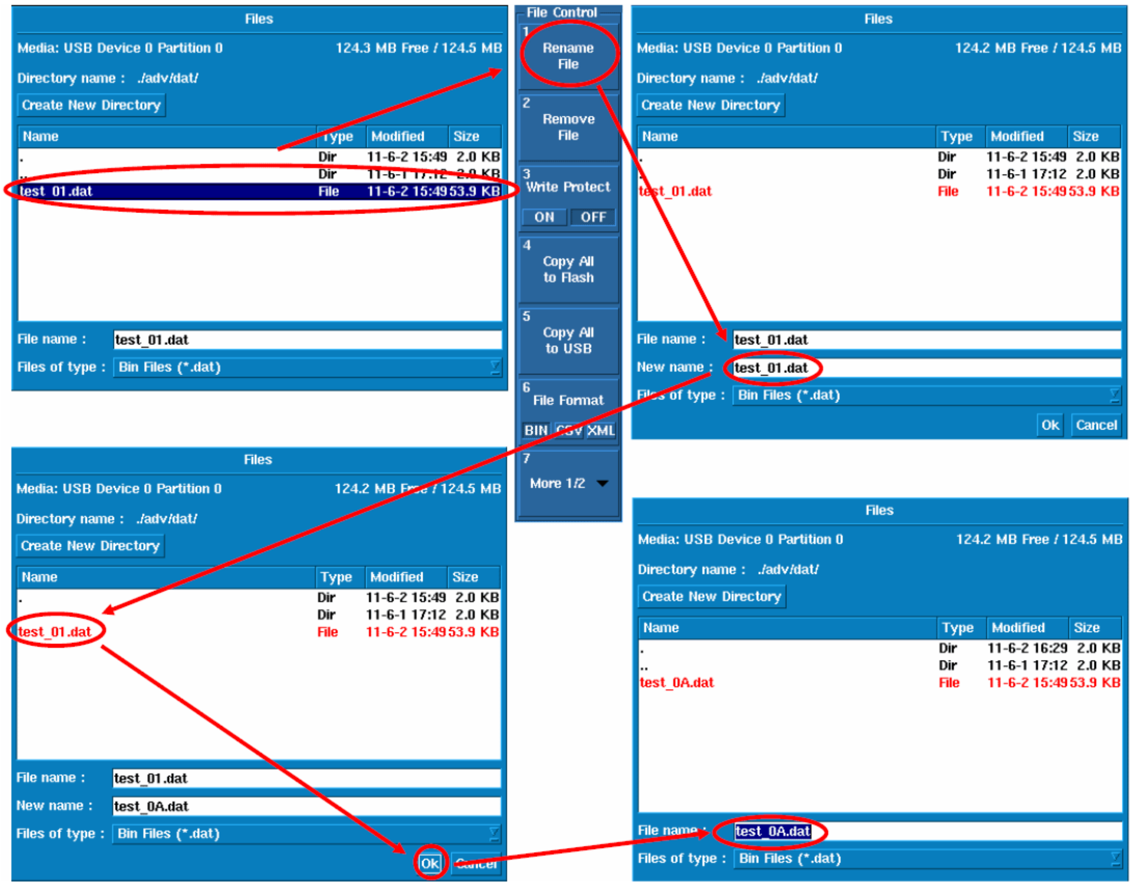


Figure 5-12 Rename File Operation Procedure

7-2 Remove File

Deletes the selected file or directory (all the files in the directory).

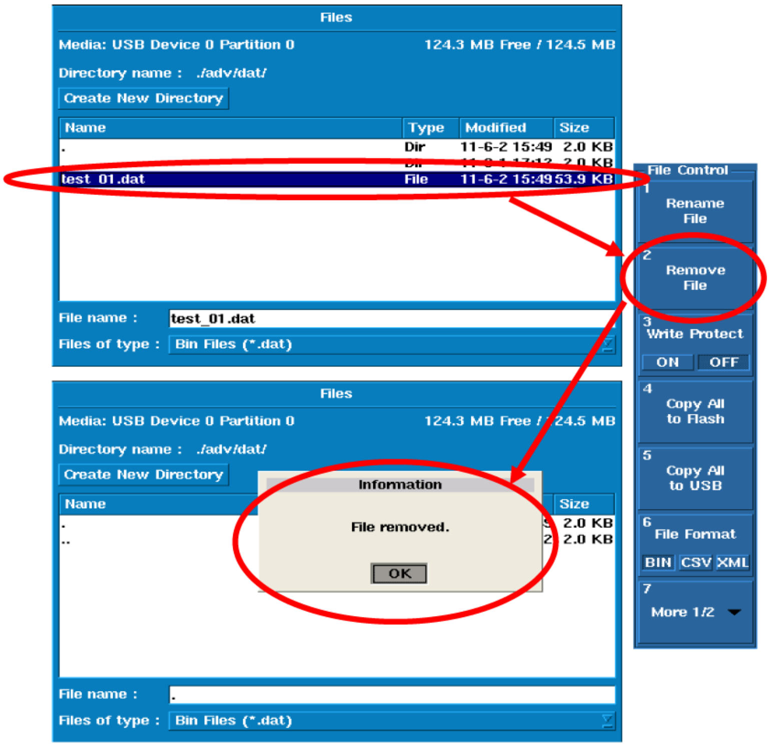


Figure 5-13 Remove File Operation Procedure (Directory)

7-3 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.

7-4 Copy All to Flash

Copies all files in the USB memory key to the internal memory (Refer to the note).

7-5 Copy All to USB

Copies all files in the internal memory to the USB memory key (refer to the note).

7-6 File Format BIN|CSV|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.

CSV: Saves the data in ASCII format.

XML: Saves the data in XML format.
Files which are saved in XML format can be read easily but the settings cannot be recalled.

7-7 Format Media

Formats external USB memory devices.

Do not remove the memory device while the memory is being formatted.

8. Media
   Selects the media in which to save data.
   Displays the Media dialog box.
   Select either the internal memory or an external USB memory device in the dialog box.

NOTE: ***The file format that can be copied into the USB memory key is ".dat".***
The screen image cannot be copied.
The .dat file is saved in the \adv\dat folder.
If the same file name exists in the USB memory key, the file is overwritten.
Select USB memory in Media.

5.2.4.5 TG

Displays theTG menu.

SYSTEM
- **TG**
  - **TG ON|OFF**
  - **TG Level**
  - **TG Level Offset ON|OFF**
  - **TG Freq Offset ON|OFF**
  - **Normalize**
  - **Reference Line ON|OFF**

1. TG ON|OFF
   ON: Turns on the tracking generator.
   OFF: Turns off the tracking generator.

2. TG Level
   Sets the output level of the tracking generator.
   Setting range
   -5 dBm to -60 dBm (OPT76)
   -5 dBm to -30dBm (OPT77)

3. 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.

4. TG Freq Offset ON|OFF
   Switches the TG frequency offset function on and off.

5. Normalize
   Displays the TG Normz menu.

SYSTEM
- **TG**
  - **Normalize**
    - **Capture Normz Data**
    - **Normalize Correction ON|OFF**
    - **Trace A|B|C|M|O**
    - **VSWR ON|OFF**
    - **Delta Ref Line ON|OFF**
    - **Reference Line ON|OFF**

5-1 Capture Normz Data

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

5-2 Normalize Correction ON|OFF

ON: Normalizes the measurement data by using the normalization data.

OFF: Cancels the Normalize function.

5-3 Trace A|B|C|M|O

Selects the trace memory in which the data to be normalized is acquired and the normalization function is performed.

5-4 VSWR ON|OFF

Displays a return loss and VSWR as marker values.
Before performing a measurement, normalization using the SWR bridge must be executed.

ON: Displays Return Loss and VSWR.
R.L = 20 log ρ
VSWR = (1+ρ) / (1-ρ)

OFF: Cancels the Return Loss and VSWR displays.

5-5 Delta Ref Line ON|OFF

ON: Turns on the marker and displays the level difference from the reference line (MKΔ).

OFF: Hides the MKΔ display.

5-6 Reference Line ON|OFF

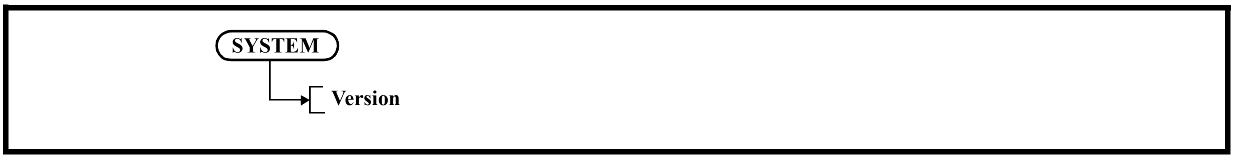
ON: Displays the reference line and sets its display position.

OFF: Hides the reference line.

6. Reference Line ON|OFF
   ON: Displays the reference line and sets its display position.
   OFF: Hides the reference line.

5.2.4.6 Version

Displays the software version in the dialog box.



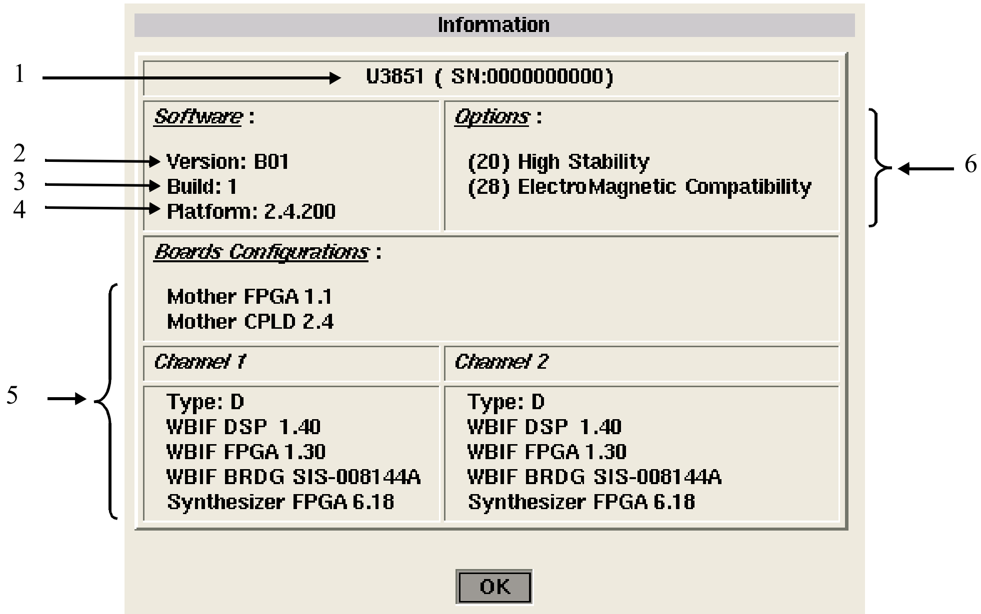


Figure 5-14 Version Dialog Box

1. Product name (serial number)
2. Firmware version
3. Build number
4. Platform version
5. Internal module version
6. Recognized option numbers
   Details of recognized option numbers
   (0) : No option is currently installed
   (20) : High Stability
   (28) : ElectroMagnetic Compatibility
   (76) : Tracking Generator Wide Range
   (77) : High Band Tracking Generator

5.2.4.7 Setup copy

- **SYSTEM**
  - **Setup copy**
    - **CH1 >> CH2**
    - **CH2 >> CH1**

1. CH1>>CH2

   Copies the setting condition of channel 1 to channel 2 and applies it.

- **SYSTEM**
  - **Setup copy**
    - **CH1 >> CH2**
      - **All Item**
      - **Setup Only**
      - **Table Only**

   1-1 All Item

   Copies all setting conditions.

   1-2 Setup Only

   Copies the setting conditions.

   1-3 Table Only

   Copies the table conditions.

2. CH2>>CH1

   Copies the setting condition of channel 2 to channel 1 and applies it.

- **SYSTEM**
  - **Setup copy**
    - **CH2 >> CH1**
      - **All Item**
      - **Setup Only**
      - **Table Only**

2-1 All Item
Copies all setting conditions.

2-2 Setup Only
Copies the setting conditions.

2-3 Table Only
Copies the table conditions.

NOTE: ***After the copy, the setting conditions and contents of the setting table for channels 1 and 2 are all the same.***
If there are tables or other data that the user does not want to change, save it in a USB memory device before copying.

5.2.4.8 Title

Displays the Edit Title dialog box.

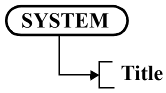


Figure 5-15 Edit Title Dialog Box

Input method.

Pressing a key continuously 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 Keypad and Alphabet

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 after entering the title.
3. Press Title to close the Edit Title dialog box.

5.2.4.9 Self Test

Displays the Self Test menu.

SYSTEM
- Self Test
  - Self Test ALL
  - Self Test CH1
  - Self Test CH2

1. Self Test ALL
   Executes a self-test.
2. Self Test CH1
   Tests an item regarding channel 1.
3. Self Test CH2
   Tests an item regarding channel 2.

5.2.4.10 Factory Init

Initializes this instrument to the factory settings.

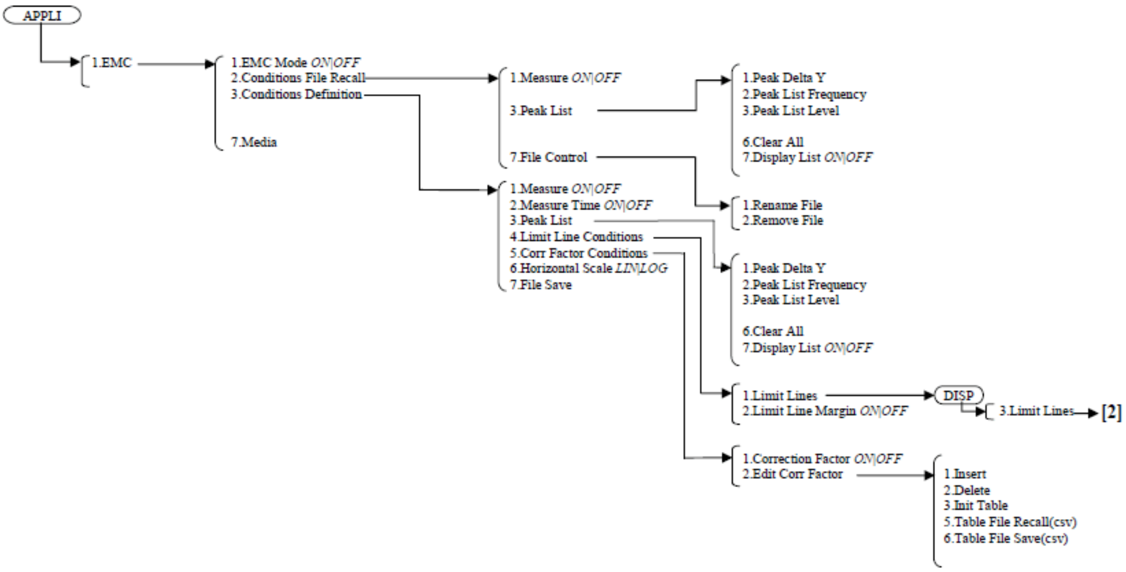
SYSTEM
- Factory Init

5.2.5 PRESET

Initializes the settings of this instrument.

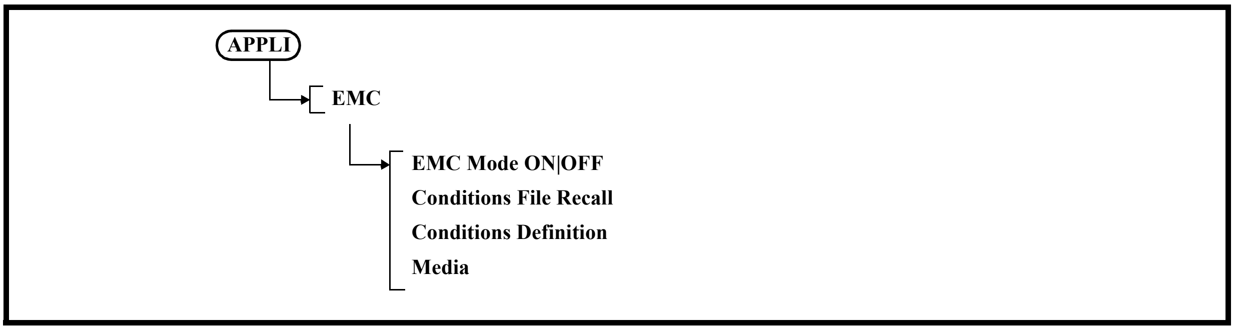
5.2.6 APPLI

This is a function for expansion.



5.2.6.1 EMC

Displays the EMC menu.



1. EMC Mode
   ON: Sets the EMC mode to ON (uses the EMC filter mode).
   OFF: Sets the EMC mode to OFF (cancels the EMC filter mode).

2. Conditions File Recall
   Recalls the measurement condition file.

APPLI
- EMC
  - Conditions File Recall
    - Measure ON|OFF
    - Peak List
    - File Control

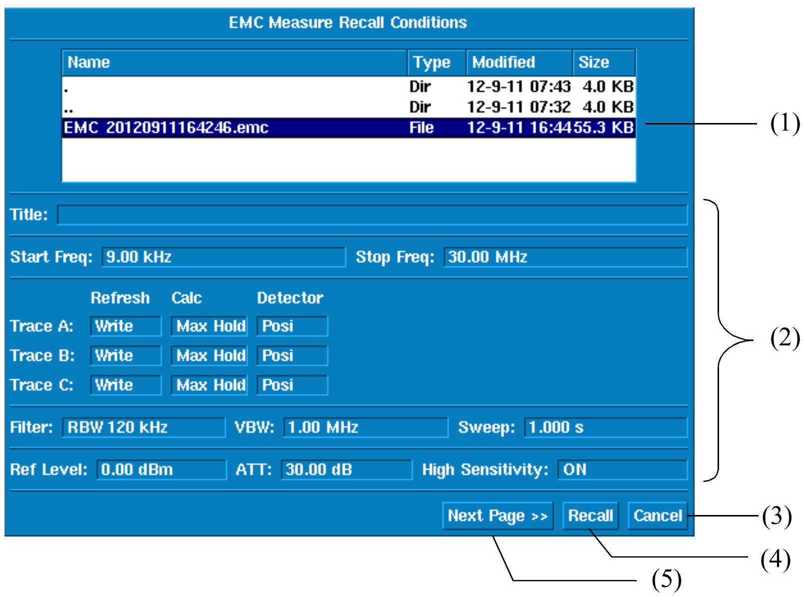


Figure 5-16 EMC Measure Recall Conditions Dialog Window (First Page)

(1) Select the file to be read, using the data knob.

(2) The content of the selected file is displayed.

(3) Cancel: Cancels the process.

(4) Recall: Reads the selected file and applies it to this instrument.
Close the EMC Measure Recall Conditions dialog window.

(5) Next Page >>:
Displays the EMC Measure Recall Conditions dialog window (second page).

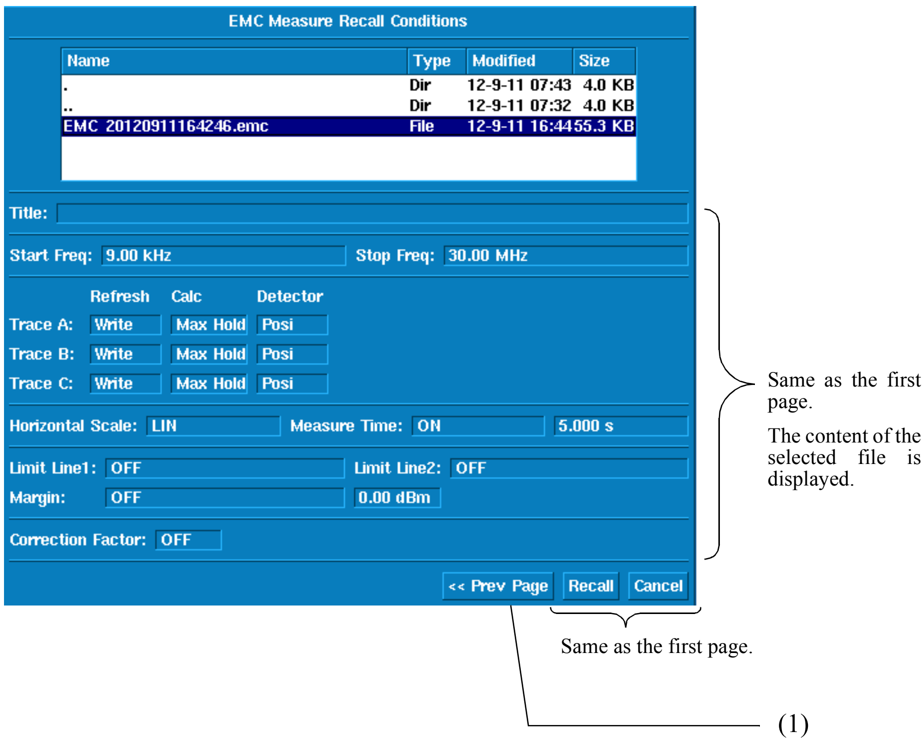


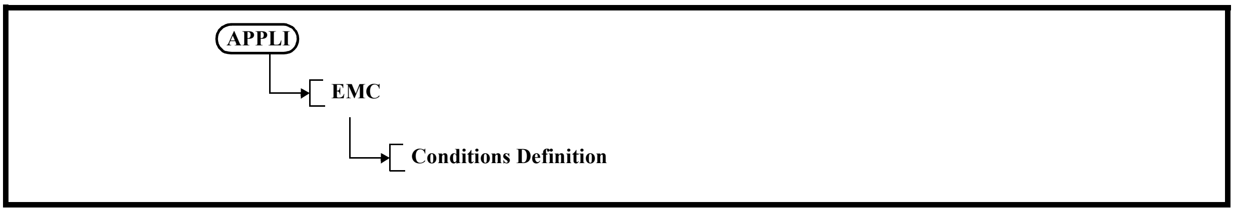
Figure 5-17 EMC Measure Recall Conditions Dialog Window (Second Page)

(1) << Prev Page:
Displays the EMC Measure Recall Conditions dialog window (first page).

3. Conditions Definition

   Sets measurement conditions. Measurement conditions can be saved to a file.

   The data is saved in binary format (.emc).



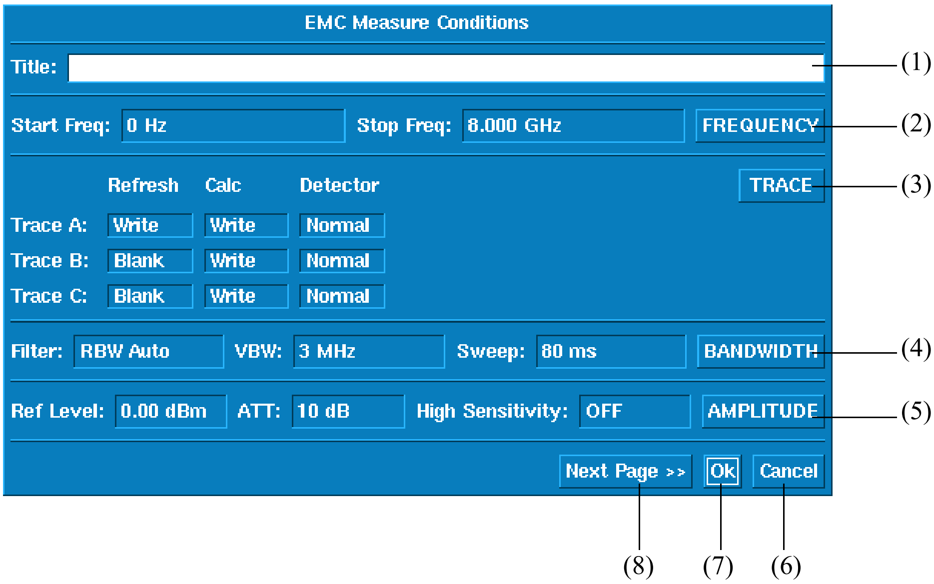


Figure 5-18 EMC Measure Conditions Dialog Window (First Page)

(1) Enter Title information (such as measurement information).

(2) When the FREQUENCY button is selected, a pop-up window is displayed.

Ok: Sets the entered Start Freq and Stop Freq to this instrument.

Cancel: Cancels the process.

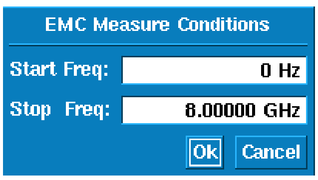


Figure 5-19 FREQUENCY Setting Pop-up Window

(3) When the TRACE button is selected, a pop-up window is displayed.

Ok: Sets the selected Refresh, Calc, and Detector to this instrument.

Cancel: Cancels the process.

CAUTION:

1. ***If Average Detector (any of Video Avg, RMS Avg, and EMC Avg) is selected from the Detector settings for Trace A/B/C, the Average Detector settings for other traces become the same.***
2. ***If Quasi Peak Detector is selected, Video Avg for other traces cannot be selected and RMS Avg is automatically set.***

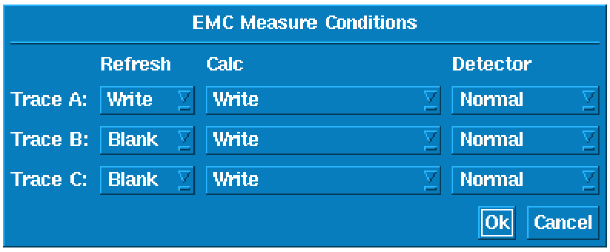


Figure 5-20 TRACE Setting Pop-up Window

(4) When the BANDWIDTH button is selected, a pop-up window is displayed.

Ok: Sets the entered Filter, VBW, and Sweep to this instrument.

Cancel: Cancels the process.

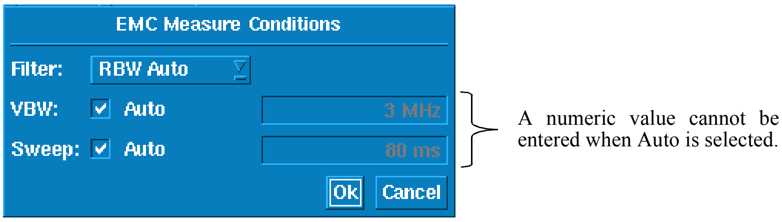


Figure 5-21 BANDWIDTH Setting Pop-up Window

(5) When the AMPLITUDE button is selected, a pop-up window is displayed.

Ok: Sets the entered Ref Level, ATT, and High Sensitivity to this instrument.

Cancel: Cancels the process.

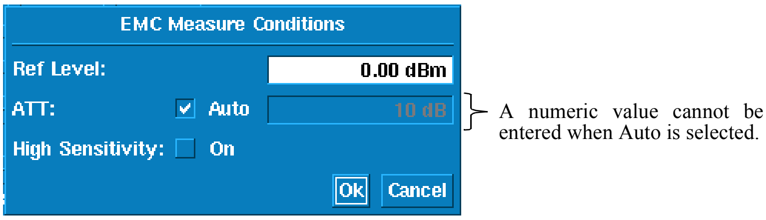


Figure 5-22 AMPLITUDE Setting Pop-up Window

(6) Cancel: Cancels the process.

(7) Ok: Applies Title information to this instrument and closes the EMC Measure Conditions dialog window.

(8) Next Page >>:
Displays the EMC Measure Conditions dialog window (second page).

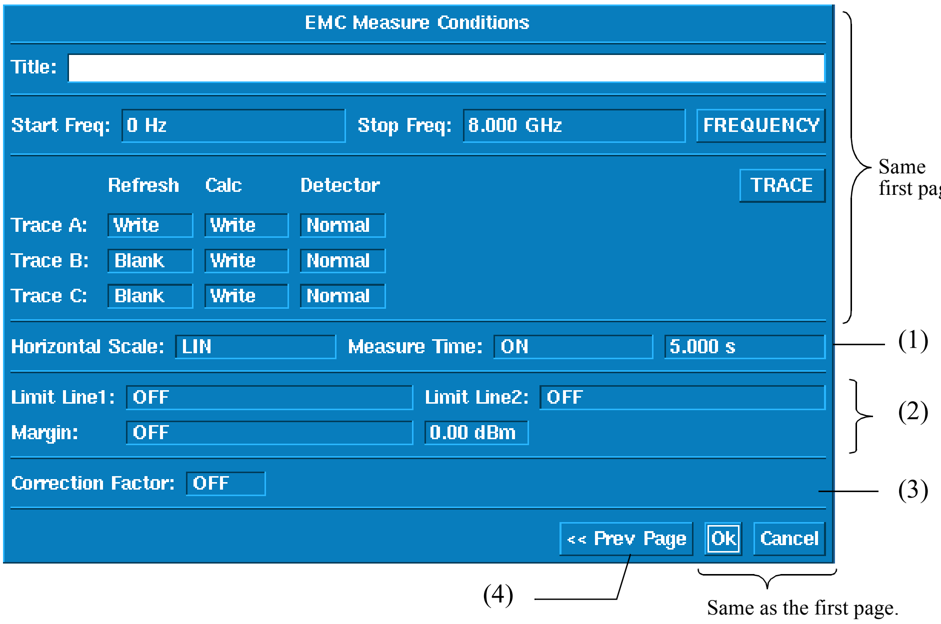


Figure 5-23 EMC Measure Conditions Dialog Window (Second Page)

(1) Sets LIN or LOG for Horizontal Scale.

LIN: Displays the horizontal axis in linear format.

LOG: Displays the horizontal axis in log format.

Sets ON or OFF for Measure Time.

ON: Repeats sweep until the measurement start time. Stops sweep after the specified time elapses. Set the measurement time using keypad, step keys, and data knob.

OFF: Disables the function.

(2) Sets ON or OFF for Limit Line1 and Limit Line2.

Refer to Section 5.2.7, "DISP" → Section 5.2.7.3, "Limit Lines."

Sets ON or OFF for Limit Line Margin.

ON: Sets offset (level) for the vertical axis from the reference position. The limit line display is shifted only by offset (level).

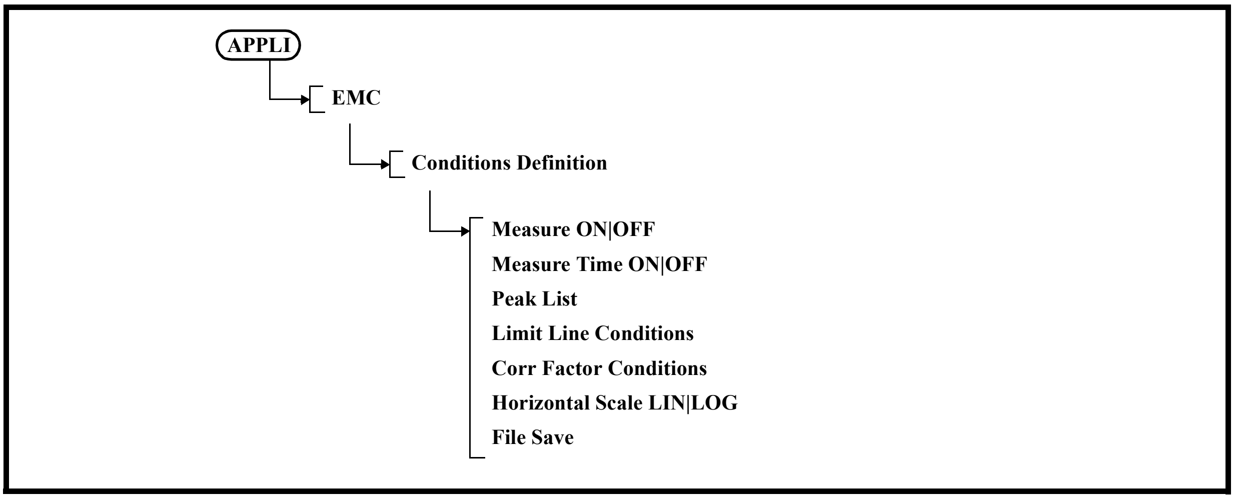
OFF: Cancels the shift of the limit line.

(3) Sets ON or OFF for Correction Factor.

Refer to Section 5.2.23, "AMPLITUDE" → Section 5.2.23.10, "Correction Factor ON|OFF."

(4) << Prev Page:

Displays the EMC Measure Conditions dialog window (first page).



3-1 Measure ON|OFF

ON: Starts measurement.

OFF: Stops measurement.

3-2 Measure Time ON|OFF

ON: Repeats sweep until the measurement start time. Stops sweep after the specified time elapses. Set the measurement time using keypad, step keys, and data knob.

OFF: Disables the function.

3-3 Peak List

Displays the Peak List menu.

- **APPLI**
  - **EMC**
    - **Conditions Definition**
      - **Peak List**
        - **Peak Delta Y**
        - **Peak List Frequency**
        - **Peak List Level**
        - **Clear All**
        - **Display List ON|OFF**

3-3-1 Peak Delta Y

Refer to Section 5.2.17, "MKR" → "1. Peak" → "1-5-1 Peak Delta Y."

3-3-2 Peak List Frequency

Refer to Section 5.2.17, "MKR" → "1. Peak" → "1-9 Peak List Frequency."

3-3-3 Peak List Level

Refer to Section 5.2.17, "MKR" → "1. Peak" → "1-10 Peak List Level."

3-3-4 Clear All

Refer to Section 5.2.17, "MKR" → Section 5.2.17.6, "Clear All"

3-3-5 Display List ON|OFF

Refer to Section 5.2.17, "MKR" → "1. Peak" → "1-11 Display List ON|OFF."

3-4 Limit Line Conditions

Displays the Limit Line Conditions menu.

- **APPLI**
  - **EMC**
    - **Conditions Definition**
      - **Limit Line Conditions**
        - **Limit Lines**
        - **Limit Line Margin ON|OFF**

3-4-1 Limit Lines

Refer to Section 5.2.7, "DISP" → Section 5.2.7.3, "Limit Lines."

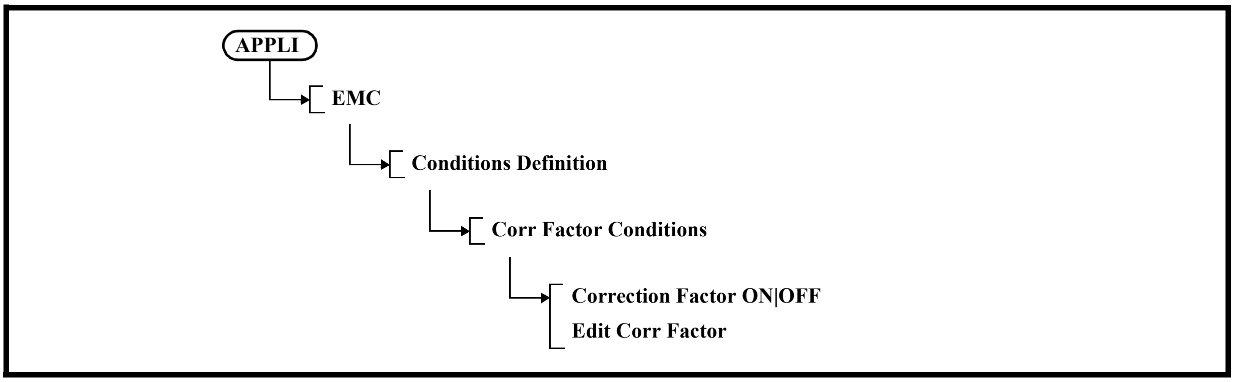
3-4-2 Limit Line Margin ON|OFF

ON: Sets offset (level) for the vertical axis from the reference position.
The limit line display is shifted only by offset (level).

OFF: Cancels the shift of the limit line.

3-5 Corr Factor Conditions

Displays the Corr Factor Conditions menu.



3-5-1 Correction Factor ON|OFF

Refer to Section 5.2.23, "AMPLITUDE" → Section 5.2.23.10, "Correction Factor ON|OFF"

3-5-1 Edit Corr Factor

Refer to Section 5.2.23, "AMPLITUDE" → Section 5.2.23.11, "Edit Corr Factor"

3-6 Horizontal Scale LIN|LOG

LIN: Displays the horizontal axis in linear format.

LOG: Displays the horizontal axis in log format.

3-7 File Save

Refer to Section 5.2.4, "SYSTEM," → Section 5.2.4.4, "File," → "3. Save As."

Saves measurement conditions to a file. The data is saved in binary format (.emc).

4. Media

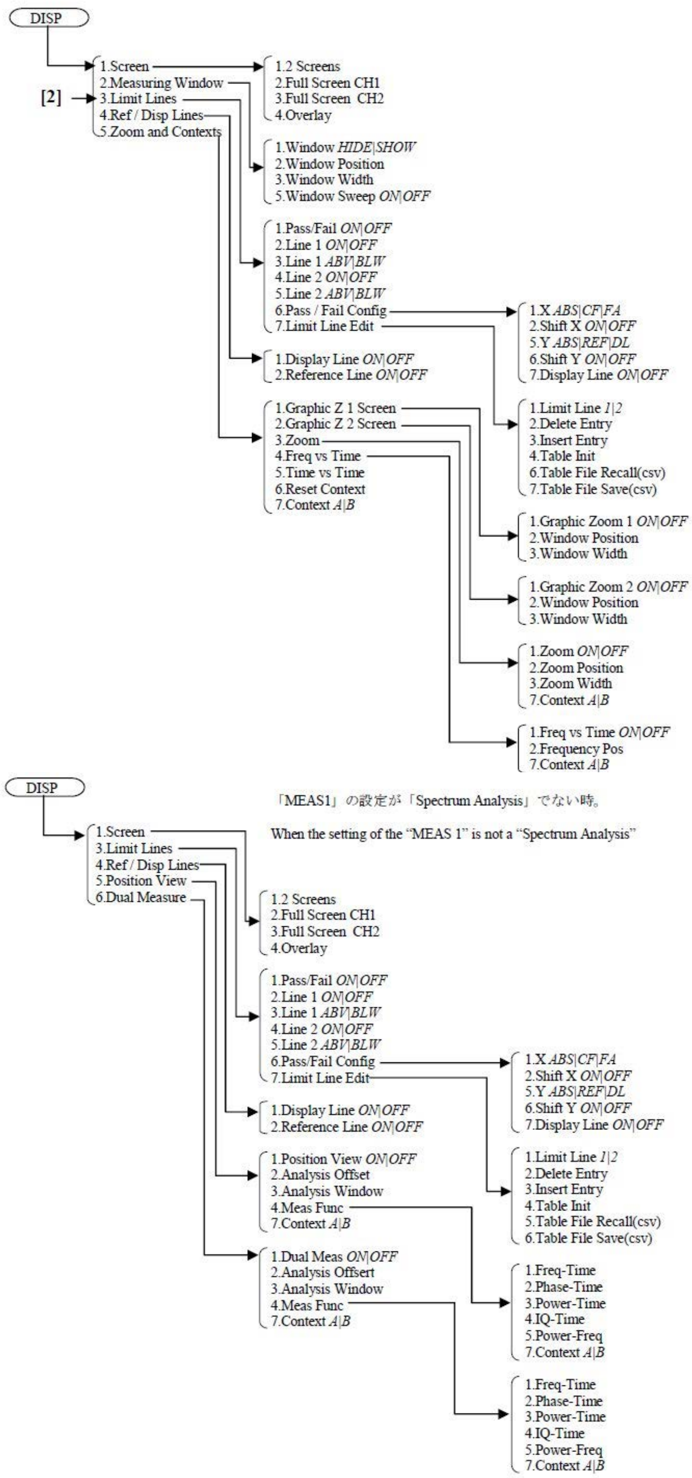
Sets the media in which to save files.

Displays the Media dialog window.

In this dialog window, select internal memory or external USB memory.

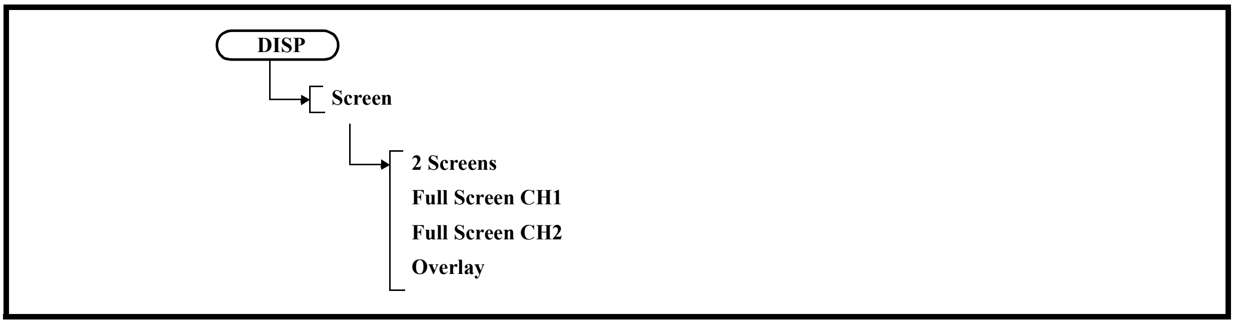
5.2.7 DISP

Sets the display of this instrument.



5.2.7.1 Screen

The display mode can be selected from the following four modes:



1. 2 Screens
   Displays channel 1 in the upper window and channel 2 in the lower window.
2. Full Screen CH1
   Displays channel 1 full screen.
   The displayed channel becomes active.
3. Full Screen CH2
   Displays channel 2 full screen.
   The displayed channel becomes active.
4. Overlay
   Overlays measured waveforms for channels 1 and 2 on each other.

5.2.7.2 Measuring Window

Displays the Window menu.

DISP
- **Measuring Window**
  - **Window HIDE|SHOW**
  - **Window Position**
  - **Window Width**
  - **Window Sweep ON|OFF**

1. Window HIDE|SHOW
   HIDE: Hides the measuring window.
   SHOW: Displays the measuring window.
2. Window Position
   Sets the center position of the window.
3. Window Width
   Sets the window width.
4. 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.

5.2.7.3 Limit Lines

Displays the Pass/Fail menu.

DISP
- **Limit Lines**
  - **Pass/Fail ON|OFF**
  - **Line 1 ON|OFF**
  - **Line 1 ABV|BLW**
  - **Line 2 ON|OFF**
  - **Line 2 ABV|BLW**
  - **Pass / Fail Config**
  - **Limit Line Edit**

1. Pass/Fail ON|OFF

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

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

   OFF: Does not perform Pass/Fail judgment.

2. Line 1 ON|OFF

   Switches limit line 1 ON and OFF.

   ON: Displays limit line 1.
   When Horizontal Scale LIN is set for EMC Mode ON (EMC Filter ON), limit line 1 is displayed as a broken line. At this point, the line is displayed as a straight line but the Pass/Fail function judges according to the Log curve line.

   OFF: Hides limit line 1.

3. Line 1 ABV|BLW

   Sets a judgment condition based on 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.

4. Line 2 ON|OFF

   Switches limit line 2 ON and OFF.

   ON: Displays limit line 2.
   When Horizontal Scale LIN is set for EMC Mode ON (EMC Filter ON), limit line 2 is displayed as a broken line. At this point, the line is displayed as a straight line but the Pass/Fail function judges according to the Log curve line.

   OFF: Hides limit line 2.

5. Line 2 ABV|BLW

   Sets a judgment condition based on 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.

6. Pass/Fail Config
   Displays the Pass/Fail Config menu.

DISP
- **Limit Lines**
  - **Pass / Fail Config**
    - **X ABS|CF|FA**
    - **Shift X ON|OFF**
    - **Y ABS|REF|DL**
    - **Shift Y ON|OFF**
    - **Display Line ON|OFF**

6-1 X ABS|CF|FA

Sets the attributes of the horizontal axis data of the limit line.

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

CF: Sets the center point of the horizontal axis as the reference position.

FA: Sets the left-most point of the horizontal axis as the reference position.

6-2 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.

6-3 Y ABS|REF|DL

Sets the attributes of the vertical axis (level) data of the limit line.

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

REF: Sets the reference level as the reference position.

DL: Sets the display line as the reference position.

6-4 Shift Y ON|OFF

ON: Sets the offset (level) for the vertical axis from the reference position.
The limit line display is shifted by the offset (level).

OFF: Cancels the shift of the limit line.

6-5 Display Line ON|OFF

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

OFF: Hides the display line.

7. Limit Line Edit

   Displays the Limit Line menu and Limit Line table.

   When Horizontal Scale LOG is set for EMC Mode ON (EMC Filter ON), enter a value of 1 Hz or higher for [Frequency].

DISP
- **Limit Lines**
  - **Limit Line Edit**
    - **Limit Line 1|2**
    - **Delete Entry**
    - **Insert Entry**
    - **Table Init**
    - **Table File Recall(CSV)**
    - **Table File Save(CSV)**

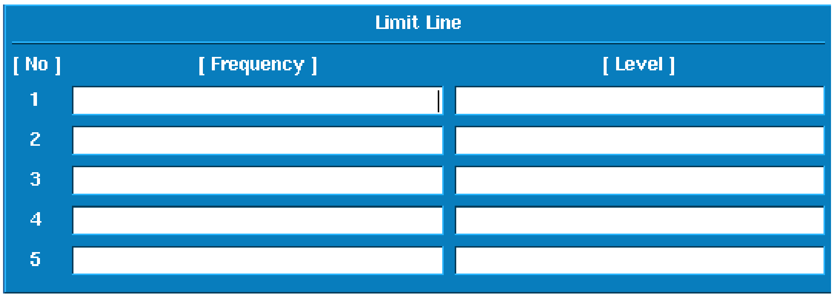


Figure 5-24 Limit Line Edit Dialog Box

7-1 Limit Line 1|2

1: Edits limit line 1.

2: Edits limit line 2.

7-2 Delete Entry

Deletes the line on which the cursor is positioned in the limit line table.

7-3 Insert Entry

Inserts a line in the limit line table.

7-4 Table Init

Clears all settings in the limit line table.

7-5 Table File Recall(CSV)

Recalls a limit line table saved in CSV format from a file and displays the limit table values.

Open the Recall window.

Change Files of type from Bin Files (*.dat) to Txt Files (*.csv). When a list of file or directory names is displayed, position the cursor on the file name to be recalled by using the knob. Position the cursor on the [Recall] button by using the step keys. Pressing the [Hz] button executes Recall.

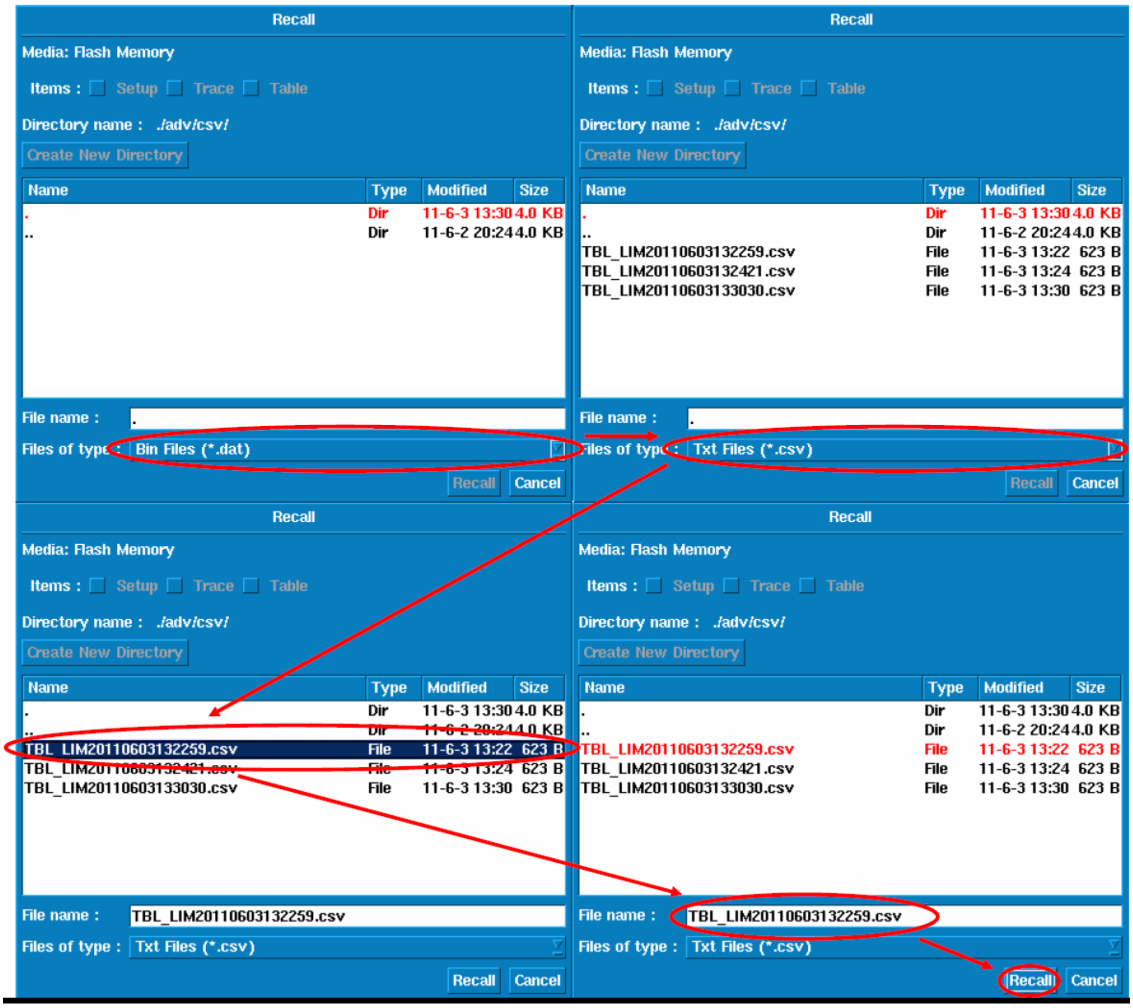


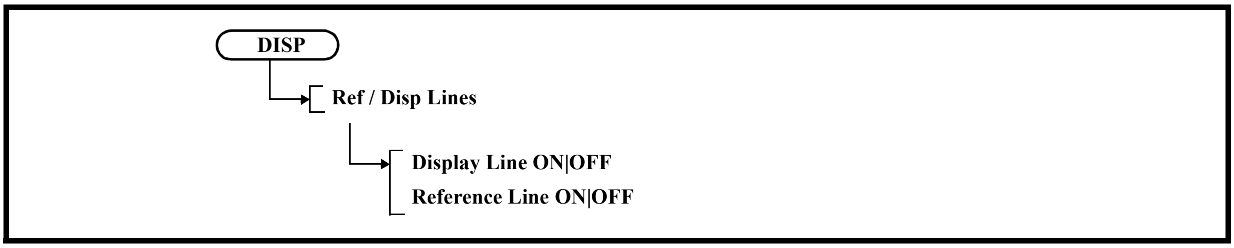
Figure 5-25 Table File Recall (CSV) Operation Procedure

7-6 Table File Save(CSV)

Saves a limit line table in a file in CSV format.

5.2.7.4 Ref / Disp Lines

Displays the menu.



1. 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 and activates the display line.

   OFF: Hides the display line.

2. 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.

5.2.7.5 Zoom and Contexts

Displays the Zoom Contexts menu.

- **DISP**
  - **Zoom and Contexts**
    - **Graphic Z 1 Screen**
    - **Graphic Z 2 Screen**
    - **Zoom**
    - **Freq vs Time**
    - **Time vs Time**
    - **Reset Context**
    - **Context A|B**

1. Graphic Zoom 1 Screen
   Displays the G Zoom 1 menu.

- **DISP**
  - **Zoom and Contexts**
    - **Graphic Z 1 Screen**
      - **Graphic Zoom 1 ON|OFF**
      - **Window Position**
      - **Window Width**

1-1 Graphic Zoom 1 ON|OFF
ON: Zooms in the area selected by the window.
OFF: Cancels the zoom-in display.

1-2 Window Position
Sets the center position of the window.

1-3 Window Width
Sets the window width.

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

- **DISP**
  - **Zoom and Contexts**
    - **Graphic Z 2 Screen**
      - **Graphic Zoom 2 ON|OFF**
      - **Window Position**
      - **Window Width**

2-1 Graphic Zoom 2 ON|OFF

ON: Splits the screen into upper and lower screens.
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.

2-2 Window Position

Sets the center position of the window.

2-3 Window Width

Sets the window width.

3. Zoom
   Displays the Zoom menu.

- **DISP**
  - **Zoom and Contexts**
    - **Zoom**
      - **Zoom ON|OFF**
      - **Zoom Position**
      - **Zoom Width**
      - **Context A|B**

3-1 Zoom ON|OFF

ON: Splits the screen into upper and lower screens.
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.

3-2 Zoom Position

Sets the center position of the window.

3-3 Zoom Width

Sets the window width.

3-4 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.

4. Freq vs Time

Displays the Freq vs Time menu.

- **DISP**
  - **Zoom and Contexts**
    - **Freq vs Time**
      - **Freq vs Time ON|OFF**
      - **Frequency Pos**
      - **Context A|B**

4-1 Freq vs Time ON|OFF

ON: Splits the screen into upper and lower screens. The horizontal axis in the upper screen represents frequency, and the lower screen represents the time (zero span) at Frequency Pos.

OFF: Cancels the dual-screen display.

4-2 Frequency Pos

Sets the frequency where the zero span is performed.

4-3 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. Time vs Time

Sets the dual-screen display and displays the horizontal axis as 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 cancelled by using Reset Context.

Re-set SPAN to display the horizontal axis in frequency.

6. Reset Context

Cancels the dual-screen display.

7. Context A|B

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

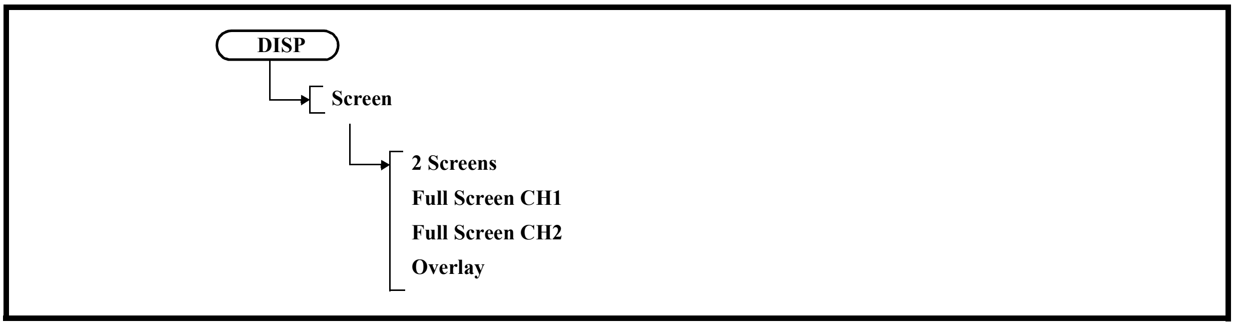
A: The upper screen settings can be changed.

B: The lower screen settings can be changed.

5.2.7.6 Screen

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

The display mode can be selected from the following four modes:



1. 2 Screens
   Displays channel 1 in the upper window and channel 2 in the lower window.
2. Full Screen CH1
   Displays channel 1 full screen.
   The displayed channel becomes active.
3. Full Screen CH2
   Displays channel 2 full screen.
   The displayed channel becomes active.
4. Overlay
   Overlays measured waveforms for channels 1 and 2 on each other.

5.2.7.7 Limit Lines

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Displays the Pass/Fail menu.

DISP
- **Limit Lines**
  - **Pass/Fail ON|OFF**
  - **Line 1 ON|OFF**
  - **Line 1 ABV|BLW**
  - **Line 2 ON|OFF**
  - **Line 2 ABV|BLW**
  - **Pass/Fail Config**
  - **Limit Line Edit**

1. Pass/Fail ON|OFF

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

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

   OFF: Does not perform Pass/Fail judgment.

2. Line 1 ON|OFF

   Switches limit line 1 ON and OFF.

   ON: Displays limit line 1.
   When Horizontal Scale LIN is set for EMC Mode ON (EMC Filter ON), limit line 1 is displayed as a broken line. At this point, the line is displayed as a straight line but the Pass/Fail function judges according to the Log curve line.

   OFF: Hides limit line 1.

3. Line 1 ABV|BLW

   Sets a judgment condition based on 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.

4. Line 2 ON|OFF

   Switches limit line 2 ON and OFF.

   ON: Displays limit line 2.
   When Horizontal Scale LIN is set for EMC Mode ON (EMC Filter ON), limit line 2 is displayed as a broken line. At this point, the line is displayed as a straight line but the Pass/Fail function judges according to the Log curve line.

   OFF: Hides limit line 2.

5. Line 2 ABV|BLW
   Sets a judgment condition based on 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.

6. Pass/Fail Config
   Displays the Pass/Fail Config menu.

DISP
- **Limit Lines**
  - **Pass/Fail Config**
    - **X ABS|CF|FA**
    - **Shift X ON|OFF**
    - **Y ABS|REF|DL**
    - **Shift Y ON|OFF**
    - **Display Line ON|OFF**

6-1 X ABS|CF|FA
Sets the attributes of the horizontal axis data of the limit line.
ABS: Sets the horizontal axis position that assumes the limit line set by Limit Line Edit as the absolute value.
The horizontal axis position of the limit line moves according to changes in the frequency span and center frequency setting.
CF: Sets the center point of the horizontal axis as the reference position.
FA: Sets the left-most point of the horizontal axis as the reference position.

6-2 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.

6-3 Y ABS|REF|DL
Sets the attributes of the vertical axis (level) data of the limit line.
ABS: Sets the vertical axis position that assumes the limit line set by Limit Line Edit as the absolute value.
The vertical axis position of the limit line moves according to a change in the level setting.
REF: Sets the reference level as the reference position.
DL: Sets the display line as the reference position.

6-4 Shift Y ON|OFF
ON: Sets the offset (level) for the vertical axis from the reference position.
The limit line display is shifted by the offset (level).
OFF: The limit line display is shifted by the offset (level).

6-5 Display Line ON|OFF

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

OFF: Hides the display line.

7. Limit Line Edit

Displays the Limit Line menu and Limit Line table.

- **DISP**
  - **Limit Lines**
    - **Limit Line Edit**
      - **Limit Line 1|2**
      - **Delete Entry**
      - **Insert Entry**
      - **Table Init**
      - **Table File Recall(CSV)**
      - **Table File Save(CSV)**

7-1 Limit Line 1|2

1: Edits limit line 1.

2: Edits limit line 2.

7-2 Delete Entry

Deletes the line on which the cursor is positioned in the limit line table.

7-3 Insert Entry

Inserts a line in the limit line table.

7-4 Table Init

Clears all settings in the limit line table.

7-5 Table File Recall(CSV)

Same as the following steps: Section 5.2.7, "DISP," Section 5.2.7.3, "Limit Lines," "7-1 Rename File," and then "7-5 Table File Recall(CSV)."

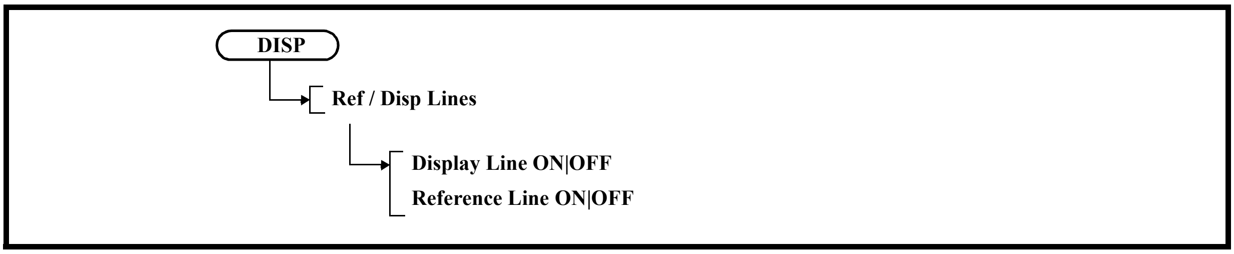
7-6 Table File Save(CSV)

Same as the following steps: Section 5.2.7, "DISP," Section 5.2.7.3, "Limit Lines," "7-1 Rename File," and then "7-6 Table File Save(CSV)."

5.2.7.8 Ref / Disp Lines

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Displays the menu.



1. 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 and activates the display line.

   OFF: Hides the display line.

2. 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.

5.2.7.9 Position View

NOTE:

1. ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***
2. ***It is enabled when SYSTEM → Mode → Single CH1 → Single CH2.***

Displays the Position View menu.

- **DISP**
  - **Position View**
    - **Position View ON|OFF**
    - **Analysis Offset**
    - **Analysis Window**
    - **Meas Func**
    - **Context A|B**

1. Position View ON|OFF

   ON: Zooms in the area selected by the window.

   OFF: Cancels the zoom-in display.

2. Analysis Offset

   Sets the analysis start point (Offset time from the top of the captured waveform) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, “Capture BW.”)

3. Analysis Window

   Sets the analysis time length (time that starts at the Analysis Offset setting value) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, “Capture BW.”)

4. Meas Func

   Selects which analysis function is to be displayed with the horizontal and vertical axes.

- **DISP**
  - **Position View**
    - **Meas Func**
      - **Freq-Time**
      - **Phase-Time**
      - **Power-Time**
      - **IQ-Time**
      - **Power-Freq**
      - **Context A|B**

4-1 Freq - Time

Selects the analysis function for “frequency versus time.”

4-2 Phase - Time
Selects the analysis function for “phase versus time.”

4-3 Power - Time
Selects the analysis function for “power versus time.”

4-4 IQ - Time
Selects the analysis function for “voltage versus time.”

4-5 Power-Freq
Enables the analysis function for “power versus frequency.”

4-6 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.

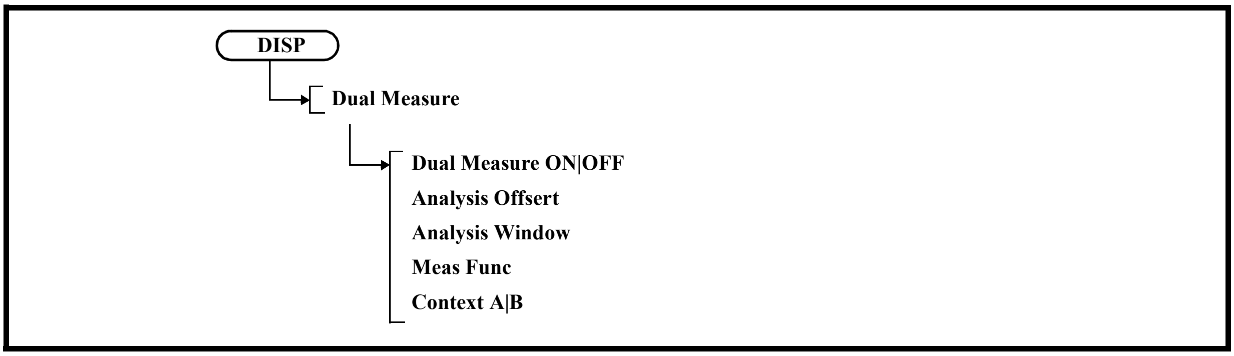
5. Context A|B
Switches the active screen between A (upper screen) and B (lower screen).
A: The upper screen settings can be changed.
B: The lower screen settings can be changed.

5.2.7.10 Dual Measure

NOTE:

1. ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***
2. ***It is enabled when SYSTEM → Mode → Single CH1 → Single CH2.***

Displays the Dual Measure menu.



1. Dual Measure ON|OFF

   ON: Sets the Dual Measure function.
   The screen is split into upper and lower screens.The upper and lower screens display the analysis results of the same captured waveform data.
   Different analysis functions can be set individually to the upper and lower screens.
   Also, the vertical axis display position, vertical axis scale, analysis start time, and analysis time length can be set for each screen.

   OFF: Cancels the Dual Measure function.

2. Analysis Offset

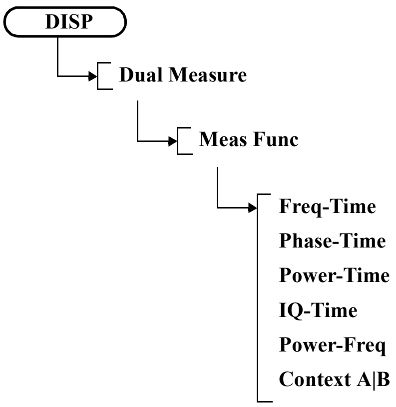
   Sets the analysis start point (Offset time from the top of the captured waveform) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, "Capture BW.")

3. Analysis Window

   Sets the analysis time length (time that starts at the Analysis Offset setting value) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, "Capture BW.")

4. Meas Func

   Displays the Meas Func menu.



4-1 Freq - Time

Selects the analysis function for "frequency versus time."

4-2 Phase - Time

Selects the analysis function for "phase versus time."

4-3 Power - Time

Selects the analysis function for "power versus time."

4-4 IQ- Time

Selects the analysis function for "IQ data versus time."

4-5 Power - Freq

Selects the analysis function for "power versus frequency."

4-6 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. 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.

5.2.8 RECALL

Refer to Section 5.2.4, "SYSTEM," Section 5.2.4.4, "File," and "4. Recall."

5.2.9 SAVE

Refer to Section 5.2.4, "SYSTEM," Section 5.2.4.4, "File," and "2. Save."

5.2.10 COPY

Outputs a screen image to a file according to the conditions set by SYSTEM, Config, MORE 1/2, Copy Config , Screen Shot Config, and Image Format.

File size (For saving the image data)

PNG: Approximately 8 KB

BMP: Approximately 150 KB

5.2.11 HELP

Pressing the HELP key displays "HELP?," which indicates the HELP mode is enabled.

CAUTION: 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.

How to use the Help key

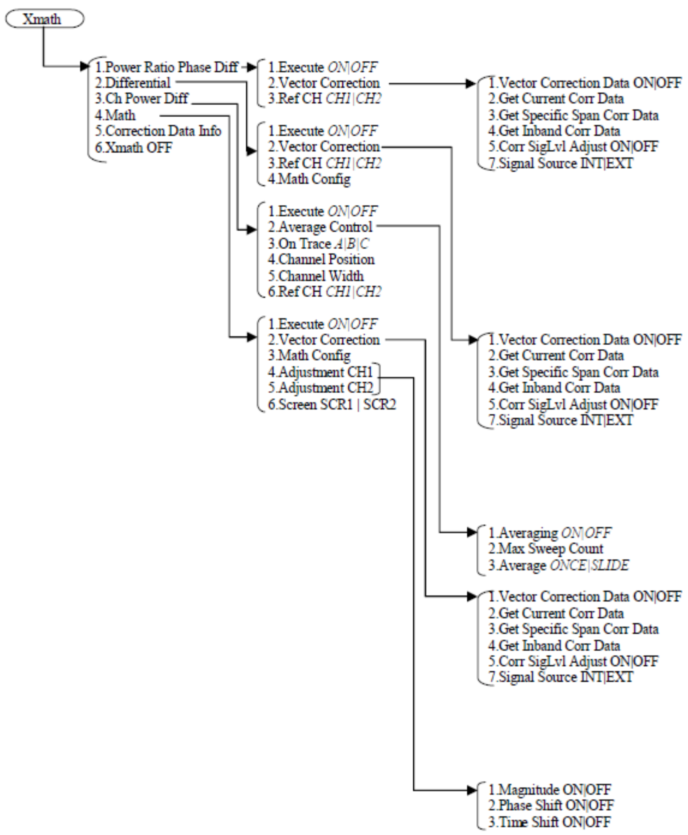
1. Select a menu.
2. Press the Help key.
3. Press a soft menu key.
4. Press the HELP key to cancel the HELP mode.
5. Repeat from step 1 to display HELP information for other menus.

5.2.12 SHIFT

Whether the SHIFT key is on or off is indicated by an LED.
An LED illuminates when the SHIFT key is on.

5.2.13 Xmath

Sets Xmath of this instrument.



5.2.13.1 Power Ratio Phase Diff

Displays the Power ratio and the phase difference of both channels.

Displays the Power ratio as "power versus time" on Screen 1.

Displays the phase difference as "phase versus time" on Screen 2.

Xmath
- **Power Ratio Phase Diff**
  - **Execute ON|OFF**
  - **Vector Correction**
  - **Ref CH CH1|CH2**

1. Execute ON|OFF
   ON : Displays the Power ratio and the phase difference of both channels.
   OFF: Does not display the Power ratio and the phase difference of both channels.
2. Vector Correction
   Corrects the phase of the channel.

Xmath
- **Power Ratio Phase Diff**
  - **Vector Correction**
    - **Vector Correction Data ON|OFF**
    - **Get Current Corr Data**
    - **Get Specific Span Corr Data**
    - **Get Inband Corr Data**
    - **Corr SigLvl Adjust ON|OFF**
    - **Signal Source INT|EXT**

2-1 Vector Correction Data ON|OFF
ON: Enables vector correction data.
OFF: Disables vector correction data.

Note: If vector correction data has been already acquired, ON and OFF can be switched.

2-2 Get Current Corr Data
Corrects the phase and amplitude differences between channels.

2-3 Get Specific Span Corr Data

Corrects within the specified frequency range.

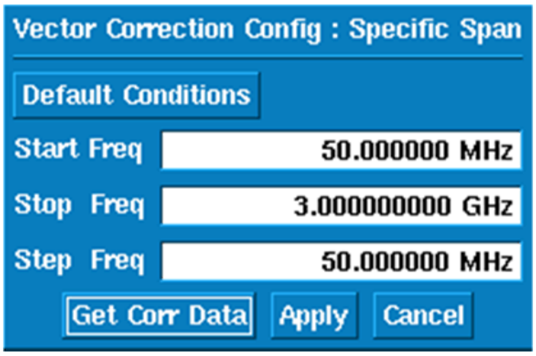


Figure 5-26 Vector Correction Config Dialog Window

Default Conditions: Sets Start Freq, Stop Freq, and Step Freq to the default values.
Start Freq: Enters the frequency where correction starts.
Stop Freq: Enters the frequency where correction stops.
Step Freq: Enters the correction interval frequency.
Get Corr Data: Starts correction.
Apply: Applies the entered setting value.
Cancel: Cancels operation.

IMPORTANT

Specify the frequency within the following ranges:
U3841: 1 MHz to 3 GHz
U3851: 1 MHz to 8 GHz
U3872: 1 MHz to 8 GHz (L-Input, H-Input, internal signal used)

Specify Step Freq so that the range is
(Stop Freq - Start Freq)/1000 ≤ Step Freq ≤ 50 MHz. (Same setting in all models.)

2-4 Get Inband Corr Data

Performs correction for the data in the measurement band.

2-5 Corr SigLvl Adjust ON|OFF

ON: Adjusts the correction signal output level according to the built-in preamplifier setting.

OFF: Does not adjust the correction signal output level.

2-6 Signal Source INT|EXT

INT: Specified when performing correction by using an internal signal source (Correction of 8 GHz or lower).

EXT: Specified when performing correction by using an external signal source.
In this case, correction is made in accordance with the Trigger Source setting.

3. Ref CH CH1|CH2

Sets the Reference CH.

5.2.13.2 Differential

Displays the vector differential measurement for both channels.

The result calculated between the following channels is displayed on Screen 1 and Screen 2.

Screen 1 (upper) = CH1 + CH2

Screen 2 (lower) = CH1 - CH2

Xmath
- **Differential**
  - **Execute ON|OFF**
  - **Vector Correction**
  - **Ref CH CH1|CH2**
  - **Math Config**

1. Execute ON|OFF
   ON: Displays the vector differential measurement for both channels.
   OFF: Does not display the vector differential measurement for both channels.
2. Vector Correction
   Makes corrections between channels.

Xmath
- **Differential**
  - **Vector Correction**
    - **Vector Correction Data ON|OFF**
    - **Get Current Corr Data**
    - **Get Specific Span Corr Data**
    - **Get Inband Corr Data**
    - **Corr SigLvl Adjust ON|OFF**
    - **Signal Source INT|EXT**

2-1 Vector Correction Data ON|OFF
ON: Enables vector correction data.
OFF: Disables vector correction data.

Note: If vector correction data has been already acquired, ON and OFF can be switched.

2-2 Get Current Corr Data

Corrects the phase and amplitude differences between channels.

2-3 Get Specific Span Corr Data

Corrects within the specified frequency range.

For the operation method, refer to Sections 5.2.13.1, "Power Ratio Phase Diff", → 2-3, "Get Specific Span Corr Data."

2-4 Get Inband Corr Data

Performs correction for the data in the measurement band.

2-5 Corr SigLvl Adjust ON|OFF

ON: Adjusts the correction signal output level according to the built-in preamplifier setting.

OFF: Does not adjust the correction signal output level.

2-6 Signal Source INT|EXT

INT: Specified when performing correction by using an internal signal source (Correction of 8 GHz or lower).

EXT: Specified when performing correction by using an external signal source.
In this case, correction is made in accordance with the Trigger Source setting.

3. Ref CH CH1|CH2

Sets the Reference CH.

4. Math Config

Sets Display Type and Squelch for both of the screens.

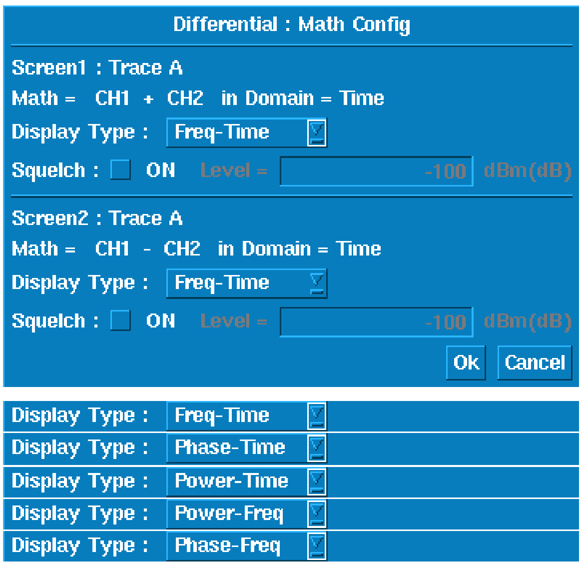


Figure 5-27 Math Config Dialog Box (1)

After selecting Display Type and Squelch, press the [OK] button to apply the settings.
The [Cancel] button cancels the settings that have been selected for Display Type and Squelch.

Freq - Time: Sets the target screen for displaying frequency versus time.
Phase - Time: Sets the target screen for displaying phase versus time.
Power - Time: Sets the target screen for displaying power versus time.
Power - Freq: Sets the target screen for displaying power versus frequency.
Phase - Freq: Sets the target screen for displaying phase versus frequency.

When Squelch is ON, the signal display with the specified level or lower is restrained.

5.2.13.3 Ch Power Diff

Displays the CH Power difference of both channels in the Power difference display window.

- **Xmath**
  - **Ch Power Diff**
    - **Execute ON|OFF**
    - **Average Control**
    - **On Trace A|B|C**
    - **Channel Position**
    - **Channel Width**
    - **Ref CH CH1|CH2**

1. Execute ON|OFF

   Displays the CH Power difference of both channels in the Power difference display window.

   ON : Displays the Power difference display window in the lowest position of the CH Power ON screen of both channels.

   OFF: Closes all of the result display windows.

2. Average Control

   Displays the Power Average menu.

- **Xmath**
  - **Ch Power Diff**
    - **Average Control**
      - **Averaging ON|OFF**
      - **Max Sweep Count**
      - **Average ONCE|SLIDE**

2-1 Averaging ON|OFF

ON: Performs averaging.

OFF: Cancels averaging.

2-2 Max Sweep Count

Sets the averaging count.

Up to 999 times can be set.

2-3 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 averaging using moving average.

3. On Trace A|B|C

   Selects the applied trace memory.

4. Channel Position

   Activates the setting of the position of the measuring window.

5. Channel Width

   Activates the setting of the width of the measuring window.

6. Ref CH CH1|CH2

   Sets the Reference CH.

5.2.13.4 Math

Displays the vector calculation results of both channels.

It is possible to perform vector calculation between channels, and the result is displayed on Screen 1 and Screen 2.

An arbitrary format is used as the waveform format.

- **Xmath**
  - **Math**
    - **Execute ON|OFF**
    - **Vector Correction**
    - **Math Config**
    - **Adjustment CH1**
    - **Adjustment CH2**
    - **Screen SCR1|SCR2**

1. Execute ON|OFF

   ON: Executes vector calculations.

   OFF: Does not execute vector calculations.

2. Vector Correction

   Makes corrections between channels.

- **Xmath**
  - **Math**
    - **Vector Correction**
      - **Vector Correction Data ON|OFF**
      - **Get Current Corr Data**
      - **Get Specific Span Corr Data**
      - **Get Inband Corr Data**
      - **Corr SigLvl Adjust ON|OFF**
      - **Signal Source INT|EXT**

2-1 Vector Correction Data ON|OFF

ON: Enables vector correction data.

OFF: Disables vector correction data.

Note: If vector correction data has been already acquired, ON and OFF can be switched.

2-2 Get Current Corr Data

Corrects the phase and amplitude differences between channels.

2-3 Get Specific Span Corr Data

Corrects within the specified frequency range.

For the operation method, refer to Sections 5.2.13.1, “Power Ratio Phase Diff”, → 2-3, “Get Specific Span Corr Data.”

2-4 Get Inband Corr Data

Performs correction for the data in the measurement band.

2-5 Corr SigLvl Adjust ON|OFF

ON: Adjusts the correction signal output level according to the built-in preamplifier setting.

OFF: Does not adjust the correction signal output level.

2-6 Signal Source INT|EXT

INT: Specified when performing correction by using an internal signal source (Correction of 8 GHz or lower).

EXT: Specified when performing correction by using an external signal source.
In this case, correction is made in accordance with the Trigger Source setting.

3. Math Config

Sets the inter-channel calculational expression, in Domain for inter-channel calculation, Display Type, and Squelch.

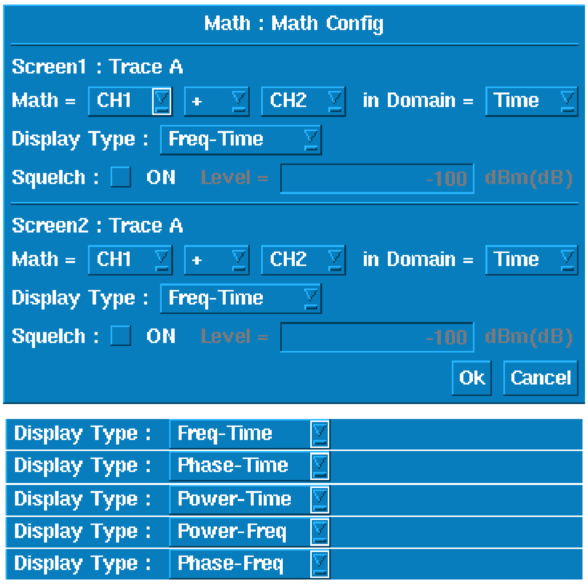


Figure 5-28 Math Config Dialog Box (2)

After selecting the inter-channel calculational expression, Display Type, and Squelch, press the [OK] button to apply the settings.

The [Cancel] button cancels the settings that have been selected for the inter-channel calculational expression, Display Type, and Squelch.

in Domain : Sets the domain, where calculation between channels is performed, to the time or frequency domain. (NOTE)

Freq - Time : Sets the target screen for displaying frequency versus time.

Phase - Time : Sets the target screen for displaying phase versus time.

Power - Time : Sets the target screen for displaying power versus time.

Power - Freq : Sets the target screen for displaying power versus frequency.

Phase - Freq : Sets the target screen for displaying phase versus frequency.

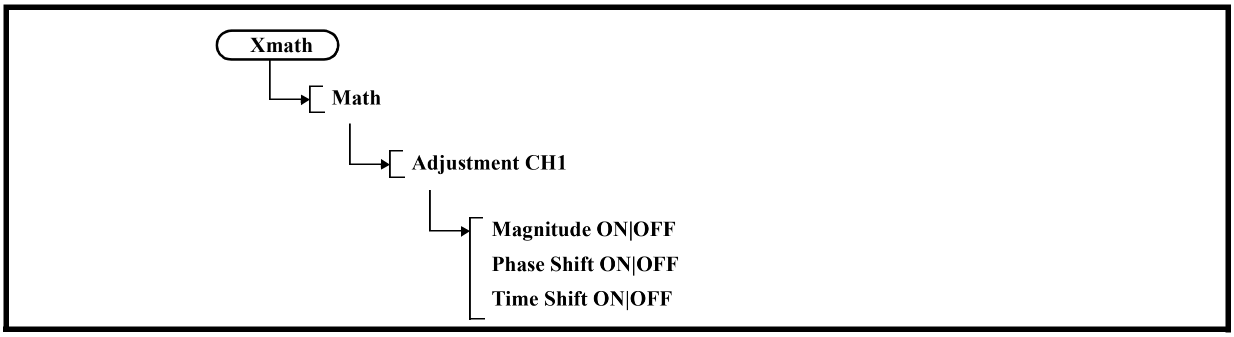
When Squelch is ON, the signal display with the specified level or lower is restrained.

NOTE: ***If the calculational domain setting between channels is Freq, Freq - Time, Phase - Time, or Power - Time cannot be selected for Display Type. If Freq - Time, Phase - Time, or Power - Time is set for Display Type, it is automatically changed to Power - Freq.***

---

4. Adjustment CH1

   Displays the setting menu of CH1.



4-1 Magnitude ON|OFF

ON: Performs correction for the amplitude.
Use the keypad, step keys, and data knob to set the correction value of the amplitude.

OFF: Does not perform correction for the amplitude.

4-2 Phase Shift ON|OFF

ON: Performs correction for the phase.
Use the keypad, step keys, and data knob to set the correction value of the phase.

OFF: Does not perform correction for the phase.

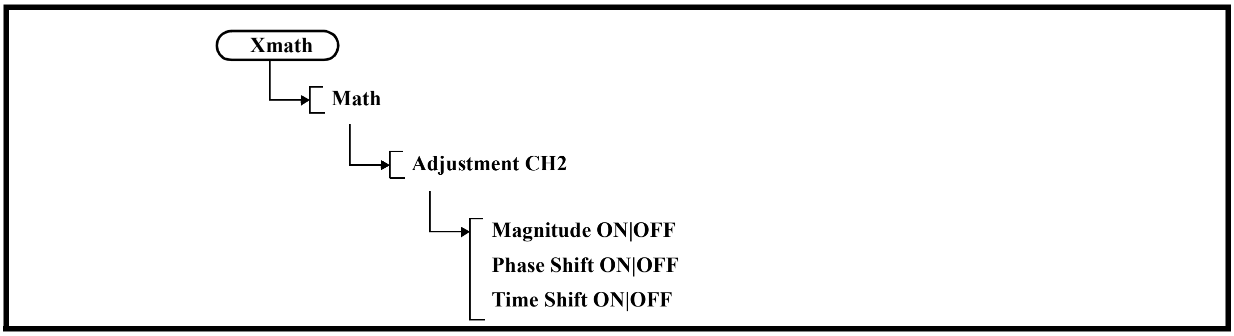
4-3 Time Shift ON|OFF

ON: Performs correction for the measurement start position of the time domain.
Use the keypad, step keys, and data knob to set the correction value of the measurement start position of the time domain.

OFF: Does not perform correction for the measurement start position of the time domain.

5. Adjustment CH2

Displays the setting menu of CH2.



It is the same as "Adjustment CH1" except that the operations are performed on CH2.

6. Screen SCR1|SCR2

Switches the active status between Screen 1 (upper screen) and Screen 2 (lower screen).

5.2.13.5 Correction Data Info

Displays Vector Correction information currently applied inside this instrument.

If application of vector correction data is disabled, change each parameter displayed in the following to those within the specified range. In so doing, application of vector correction data is enabled again.

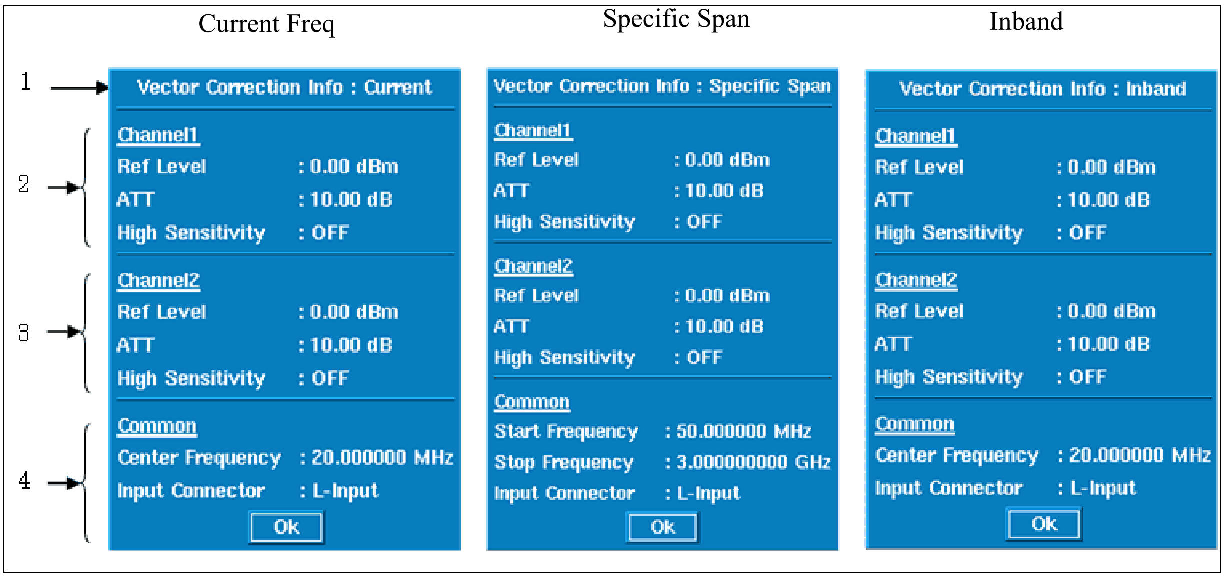


Figure 5-29 Vector Correction Data Information Dialog Window

1. Applied vector correction types
2. Setting value for vector correction on Channel1
3. Setting value for vector correction on Channel2
4. Setting value for vector correction on both Channels 1 and 2*

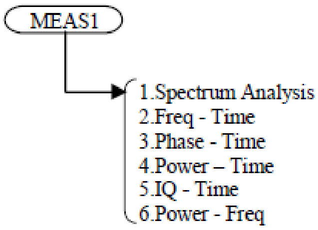
NOTE: * Input Connector information is displayed only for the U3872.

5.2.13.6 Xmath OFF

Sets Power Ratio Phase Diff, Differential, Ch Power Diff, and Math functions to OFF.

5.2.14 MEAS 1

Sets MEAS 1 of this instrument.



5.2.14.1 Spectrum Analysis

Enables spectrum measurement.

5.2.14.2 Freq - Time

Enables the analysis function for "frequency versus time."

5.2.14.3 Phase - Time

Enables the analysis function for "phase versus time."

5.2.14.4 Power - Time

Enables the analysis function for "power versus time."

5.2.14.5 IQ - Time

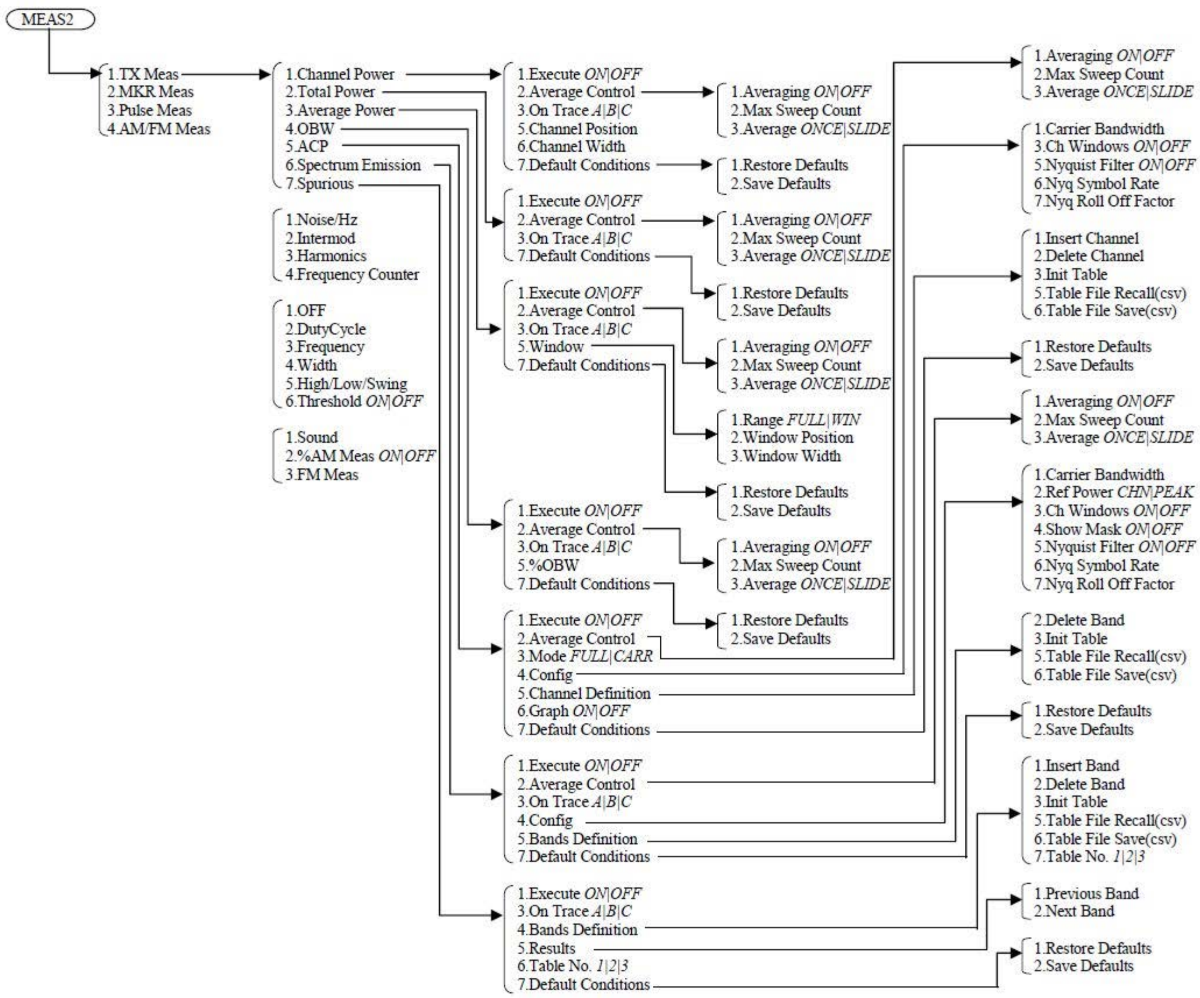
Enables the analysis function for "IQ data versus time."

5.2.14.6 Power - Freq

Enables the analysis function for "power versus frequency."

5.2.15 MEAS 2

Sets MEAS 2 of this instrument.



5.2.15.1 TX Meas

- **MEAS2**
  - **TX Meas**
    - **Channel Power**
    - **Total Power**
    - **Average Power**
    - **OBW**
    - **ACP**
    - **Spectrum Emission**
    - **Spurious**

1. Channel Power
   Activates the measuring window and displays the Channel Power 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
PBW:	Noise power bandwidth
X1:	Trace point at the window's left edge
X2:	Trace point at the window's right edge

- **MEAS2**
  - **TX Meas**
    - **Channel Power**
      - **Execute ON|OFF**
      - **Average Control**
      - **On Trace A|B|C**
      - **Channel Position**
      - **Channel Width**
      - **Default Conditions**

1-1 Execute ON|OFF

ON: Performs a channel power measurement.

OFF: Cancels the channel power measurement.

1-2 Average Control

Performs the average settings for the channel power measurement.

Displays the Ch Aveg menu.

MEAS2
- **TX Meas**
  - **Channel Power**
    - **Average Control**
      - **Averaging ON|OFF**
      - **Max Sweep Count**
      - **Average ONCE|SLIDE**

1-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Measures the average channel power.

OFF: Cancels the averaging function.

1-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

1-2-3 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.

1-3 On Trace A|B|C

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

1-4 Channel Position

Activates the settings of the measuring window position.

1-5 Channel Width

Activates the setting of the measuring window width.

1-6 Default Conditions
Displays the Pow Default menu.

MEAS2
- **TX Meas**
  - **Channel Power**
    - **Default Conditions**
      - **Restore Defaults**
      - **Save Defaults**

1-6-1 Restore Defaults
Recalls the saved setting conditions.

1-6-2 Save Defaults
Saves the currently set conditions.

2. Total Power
Measures the total power in the measuring span.
Displays the Total Pow menu.
The total power can be obtained by using the following equation.

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

PT:	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

MEAS2
- **TX Meas**
  - **Total Power**
    - **Execute ON|OFF**
    - **Average Control**
    - **On Trace A|B|C**
    - **Default Conditions**

2-1 Execute ON|OFF

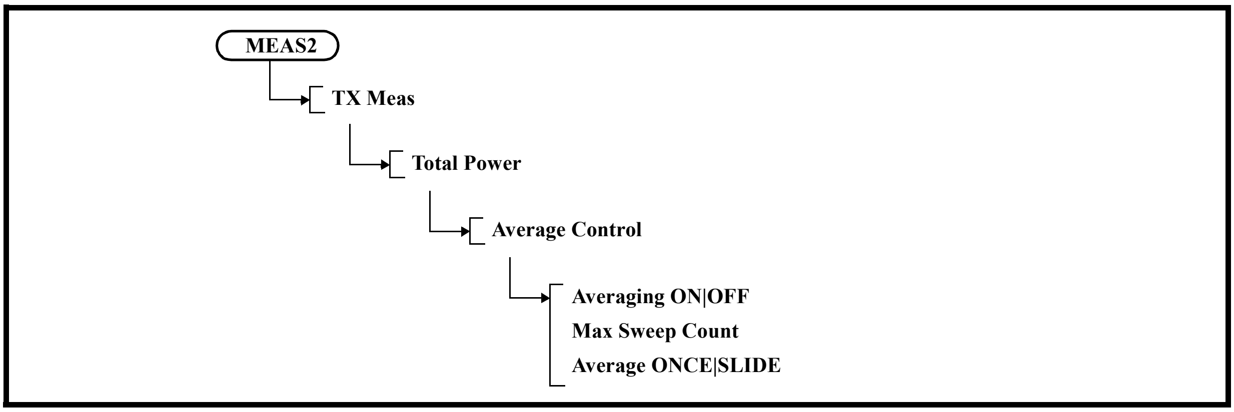
ON: Performs a total power measurement.

OFF: Cancels the total power measurement.

2-2 Average Control

Performs the average settings for the total power measurement.

Displays the Tot P Avg menu.



2-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Measures the average total power.

OFF: Cancels the averaging function.

2-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

2-2-3 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.

2-3 On Trace A|B|C

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

2-4 Default Conditions

Displays the Pow Default menu.

- **MEAS2**
  - **TX Meas**
    - **Total Power**
      - **Default Conditions**
        - **Restore Defaults**
        - **Save Defaults**

2-4-1 Restore Defaults

Recalls the saved setting conditions.

2-4-2 Save Defaults

Saves the currently set conditions.

3. 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.

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

PAVG: Average power to be obtained

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

X1: 1

X2: 1001

- **MEAS2**
  - **TX Meas**
    - **Average Power**
      - **Execute ON|OFF**
      - **Average Control**
      - **On Trace A|B|C**
      - **Window**
      - **Default Conditions**

3-1 Execute ON|OFF

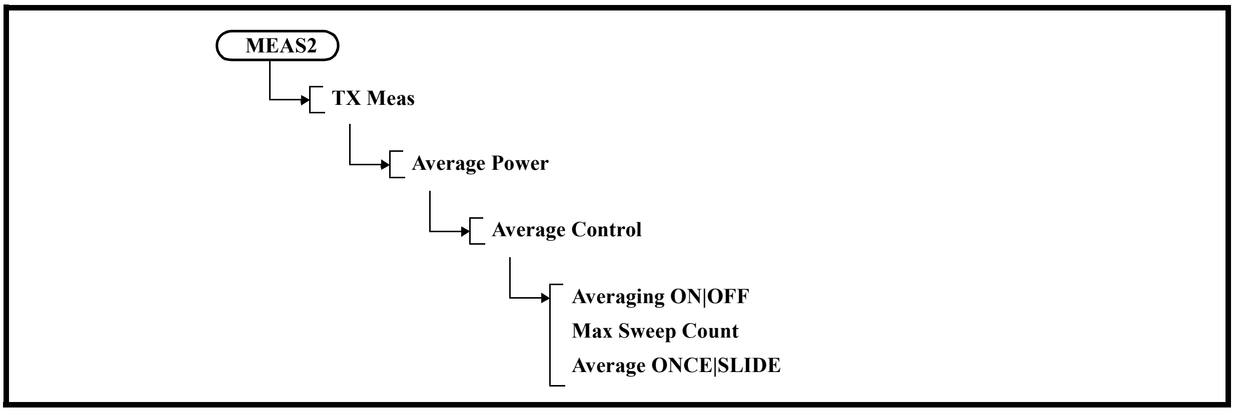
ON: Performs an average power measurement.

OFF: Cancels the average power measurement.

3-2 Average Control

Performs the average settings for the average power measurement.

Displays the Av P Avg menu.



3-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Sets the number of times averaging is performed and measures the average power.

OFF: Cancels the averaging function.

3-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

3-2-3 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.

3-3 On Trace A|B|C

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

3-4 Window

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

MEAS2
- **TX Meas**
  - **Average Power**
    - **Window**
      - **Range FULL|WIN**
      - **Window Position**
      - **Window Width**

3-4-1 Range FULL|WIN

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

3-4-2 Window Position

Activates the settings of the measuring window position.

3-4-3 Window Width

Activates the setting of the measuring window width.

3-5 Default Conditions

Displays the Pow Default menu.

MEAS2
- **TX Meas**
  - **Average Power**
    - **Default Conditions**
      - **Restore Defaults**
      - **Save Defaults**

3-5-1 Restore Defaults

Recalls the saved setting conditions.

3-5-2 Save Defaults

Saves the currently set conditions.

4. OBW
   Displays the OBW menu.

- **MEAS2**
  - **TX Meas**
    - **OBW**
      - **Execute ON|OFF**
      - **Average Control**
      - **On Trace A|B|C**
      - **%OBW**
      - **Default Conditions**

4-1 Execute ON|OFF

ON: Performs an occupied bandwidth measurement.

OFF: Cancels the occupied bandwidth measurement.

4-2 Average Control

Displays the Average Control menu.

- **MEAS2**
  - **TX Meas**
    - **OBW**
      - **Average Control**
        - **Averaging ON|OFF**
        - **Max Sweep Count**
        - **Average ONCE|SLIDE**

4-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Measures the occupied bandwidth power.

OFF: Cancels the averaging function.

4-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

4-2-3 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.

4-3 On Trace A|B|C

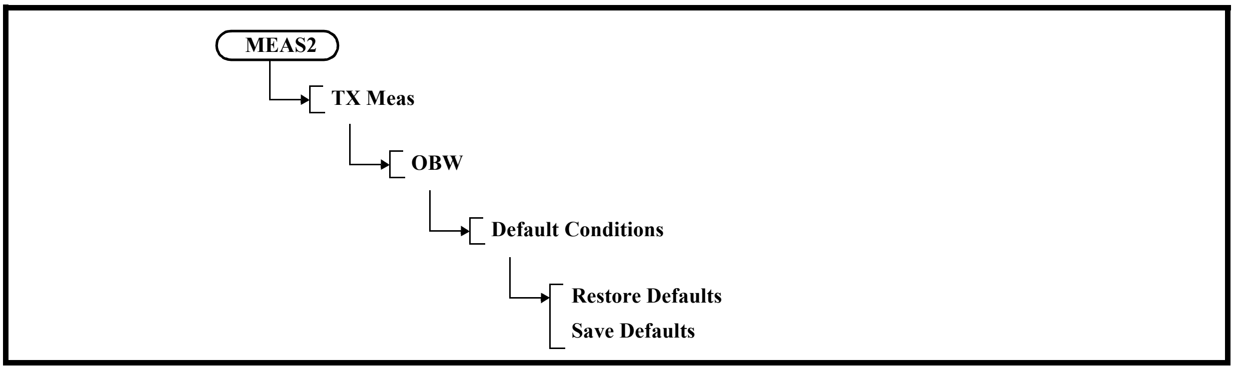
Selects a trace in which to execute the occupied bandwidth measurement.

4-4 % OBW

Sets the ratio of the occupied bandwidth power to the total power in percentage. The initial value is 99%.

4-5 Default Conditions

Displays the OBW Default menu.



4-5-1 Restore Defaults

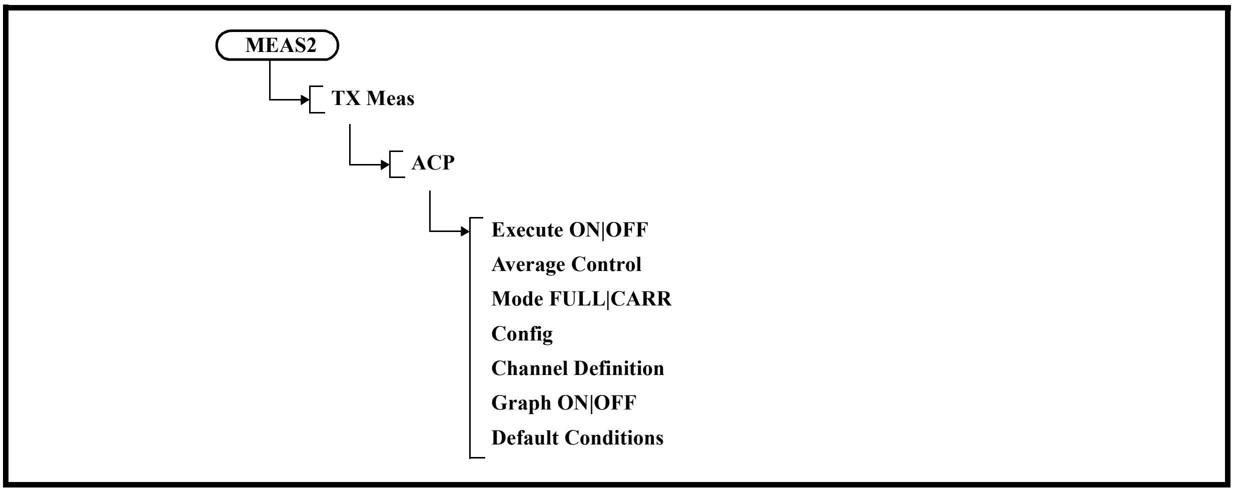
Displays the OBW Default menu.

4-5-2 Save Defaults

Saves the currently set conditions.

5. ACP

Displays the ACP menu.



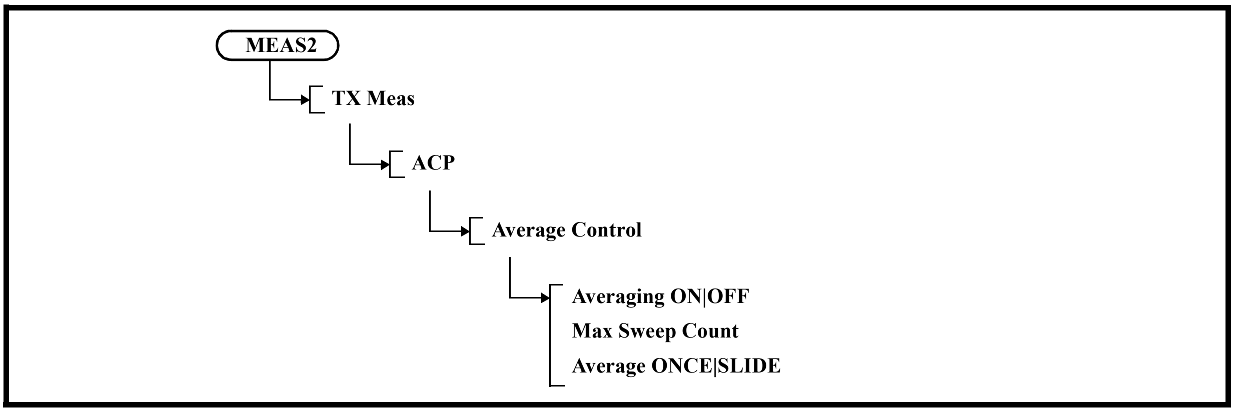
5-1 Execute ON|OFF

ON: Performs an adjacent channel leakage power measurement.

OFF: Cancels the adjacent channel leakage power measurement.

5-2 Average Control

Displays the Average Control menu.



5-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Sets the averaging count and performs the adjacent channel leakage power measurement.

OFF: Cancels the averaging function.

5-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

5-2-3 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.

5-3 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.

5-4 Config

Displays the ACP Cfg menu.

- MEAS2
  - TX Meas
    - ACP
      - Config
        - Carrier Bandwidth
        - Ch Windows ON|OFF
        - Nyquist Filter ON|OFF
        - Nyq Symbol Rate
        - Nyq Roll Off Factor

5-4-1 Carrier Bandwidth

Sets the measurement bandwidth in the channel power measurement used as the reference power.

5-4-2 Ch Windows ON|OFF

ON: Displays the ACP channel window.

OFF: Closes the ACP channel window.

5-4-3 Nyquist Filter ON|OFF

Switches the Nyquist filter function on and off.

ON: Activates the Nyquist filter.

OFF: Cancels the Nyquist filter.

5-4-4 Nyq Symbol Rate

Set a symbol rate.

5-4-5 Nyq Roll Off Factor

Sets the roll-off factor.

5-5 Channel Definition

Displays the ACP Ch menu.

Displays the CS/BS Table dialog box.

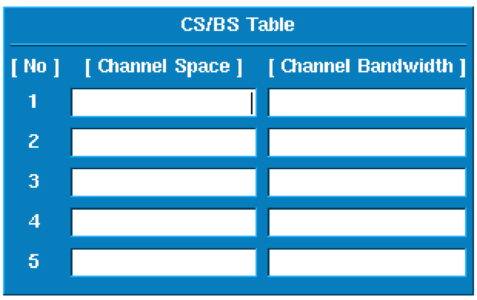


Figure 5-30 CS/BS Table Dialog Box

[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.

- **MEAS2**
  - **TX Meas**
    - **ACP**
      - **Channel Definition**
        - **Insert Channel**
        - **Delete Channel**
        - **Init Table**
        - **Table File Recall(CSV)**
        - **Table File Save(CSV)**

5-5-1 Insert Channel

Inserts a line on which to set adjacent channel measurement conditions at the current cursor position.

The data on the row that existed in the position before the new row was inserted is copied to the new row.

5-5-2 Delete Channel

Deletes the measurement condition from the current cursor position.

5-5-3 Init Table

Initializes the contents of the ACP channel table.

5-5-4 Table File Recall(CSV)

Reads the CS/BS table setting from a file.

5-5-5 Table File Save(CSV)

Saves the CS/BS table setting to a file.

5-6 Graph ON|OFF

ON: Displays an ACP graph.

OFF: Hides the ACP graph.

5-7 Default Conditions

Displays the ACP Default menu.

- **MEAS2**
  - **TX Meas**
    - **ACP**
      - **Default Conditions**
        - **Restore Defaults**
        - **Save Defaults**

5-7-1 Restore Defaults

Recalls the saved setting conditions.

5-7-2 Save Defaults

Saves the currently set conditions.

6. Spectrum Emission

Displays the SEM (Spectrum Emission Mask) menu.

- **MEAS2**
  - **TX Meas**
    - **Spectrum Emission**
      - **Execute ON|OFF**
      - **Average Control**
      - **On Trace A|B|C**
      - **Config**
      - **Bands Definition**
      - **Default Conditions**

6-1 Execute ON|OFF

ON: Performs a spectrum emission mask measurement.

OFF: Terminates the spectrum emission mask measurement.

6-2 Average Control

Displays the SEM Avg menu.

MEAS2
- **TX Meas**
  - **Spectrum Emission**
    - **Average Control**
      - **Averaging ON|OFF**
      - **Max Sweep Count**
      - **Average ONCE|SLIDE**

6-2-1 Averaging ON|OFF

Switches the averaging function ON and OFF.

ON: Measures the spectrum emission mask.

OFF: Cancels the averaging function.

6-2-2 Max Sweep Count

Sets the number of times averaging is performed.

Up to 999 can be set.

6-2-3 Average ONCE|SLIDE

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

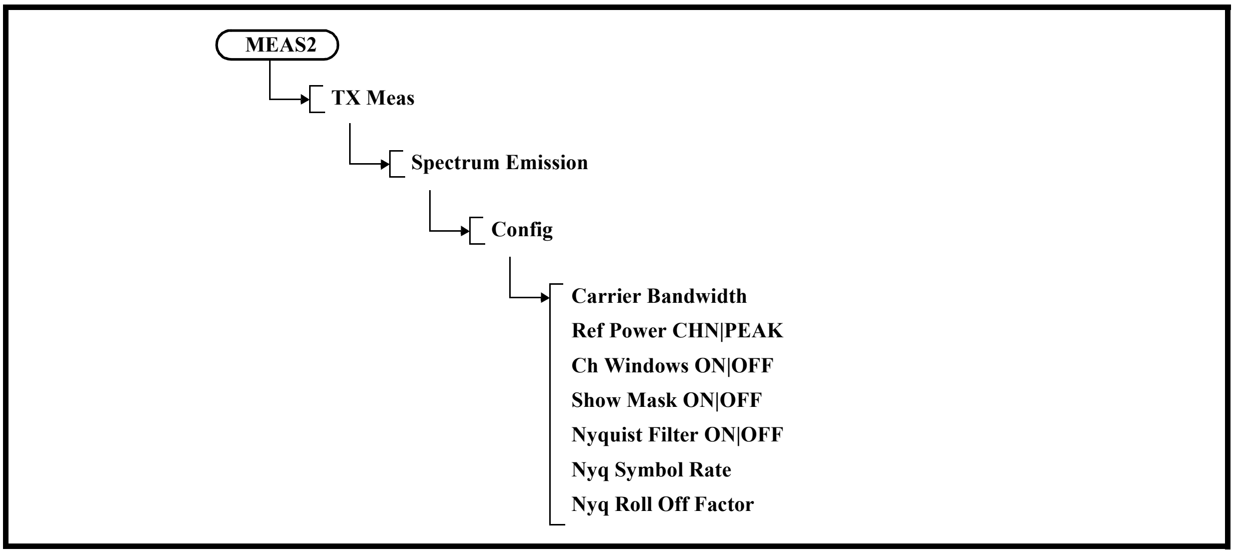
SLIDE: Performs averaging for the set number of times and then calculates the moving average.

6-3 On Trace A|B|C

Selects a trace in which to execute the spectrum emission mask measurement.

6-4 Config

Displays the SEM Cfg menu.



6-4-1 Carrier Bandwidth

Sets the power conversion bandwidth for carrier signals.

6-4-2 Ref Power CHN|PEAK

Switches the reference power calculation mode 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.

6-4-3 Ch Windows ON|OFF

ON: Displays the SEM window.

OFF: Hides the SEM window.

6-4-4 Show Mask ON|OFF

ON: Displays the Mask line.

OFF: Hides the Mask line.

6-4-5 Nyquist Filter ON|OFF

Switches the Nyquist filter function on and off.

ON: Activates the Nyquist filter.

OFF: Cancels the Nyquist filter.

6-4-6 Nyq Symbol Rate

Set a symbol rate.

6-4-7 Nyq Roll Off Factor

Sets the roll-off factor.

6-5 Bands Definition

Displays the SEM Bands menu and the SEM Table window.

- **MEAS2**
  - **TX Meas**
    - **Spectrum Emission**
      - **Bands Definition**
        - **Delete Band**
        - **Init Table**
        - **Table File Recall(CSV)**
        - **Table File Save(CSV)**

6-5-1 Delete Band

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

6-5-2 Init Table

Initializes all data in the table.

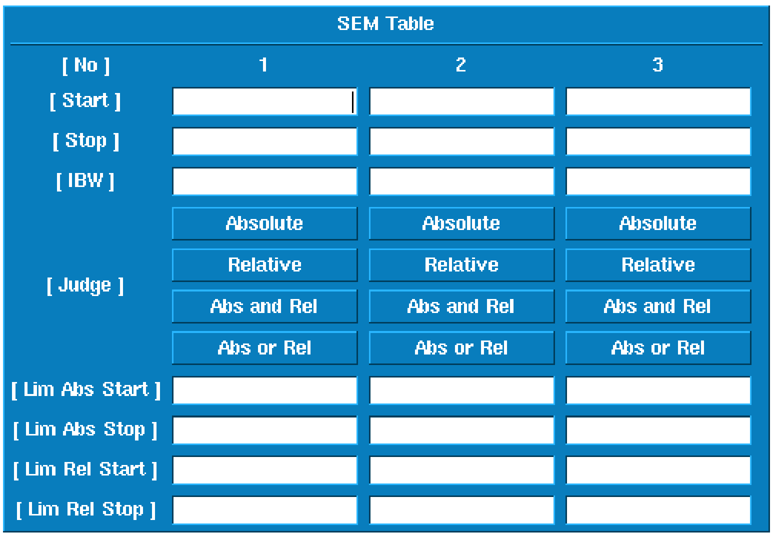


Figure 5-31 SEM Table Window

[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.

[IBW] Sets the power integral bandwidth at each frequency point. (IBW: Integral bandwidth)

[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 and Stop values and the Limit Rel Start and Stop values.
If both conditions are satisfied, Pass is displayed.

Abs or Rel: Compares the waveform with both the Limit Abs Start and Stop values and the Limit Rel Start and 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.

6-5-3 Table File Recall(CSV)

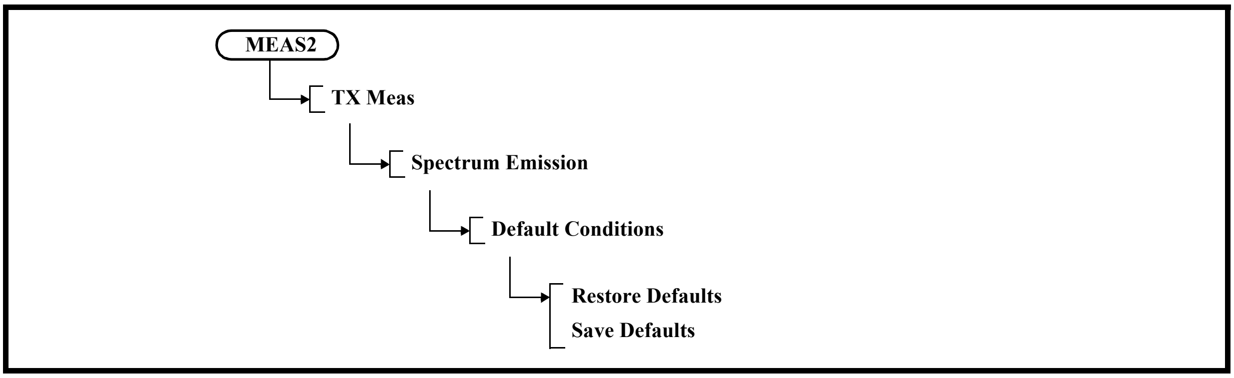
Reads the SEM table setting from a file.

6-5-4 Table File Save(CSV)

Saves the SEM table setting to a file.

6-6 Default Conditions

Displays the SEM Default menu.



6-6-1 Restore Defaults

Recalls the saved setting conditions.

6-6-2 Save Defaults

Saves the currently set conditions.

7. Spurious

Displays the Spurious menu.

- **MEAS2**
  - **TX Meas**
    - **Spurious**
      - **Execute ON|OFF**
      - **On Trace A|B|C**
      - **Bands Definition**
      - **Results**
      - **Table No. 1|2|3**
      - **Default Conditions**

7-1 Execute ON|OFF

ON: Performs the spurious measurement.

OFF: Terminates the spurious measurement.

7-2 On Trace A|B|C

Selects a trace in which to execute the spurious measurement.

7-3 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.

- **MEAS2**
  - **TX Meas**
    - **Spurious**
      - **Bands Definition**
        - **Insert Band**
        - **Delete Band**
        - **Init Table**
        - **Table File Recall(CSV)**
        - **Table File Save(CSV)**
        - **Table No. 1|2|3**

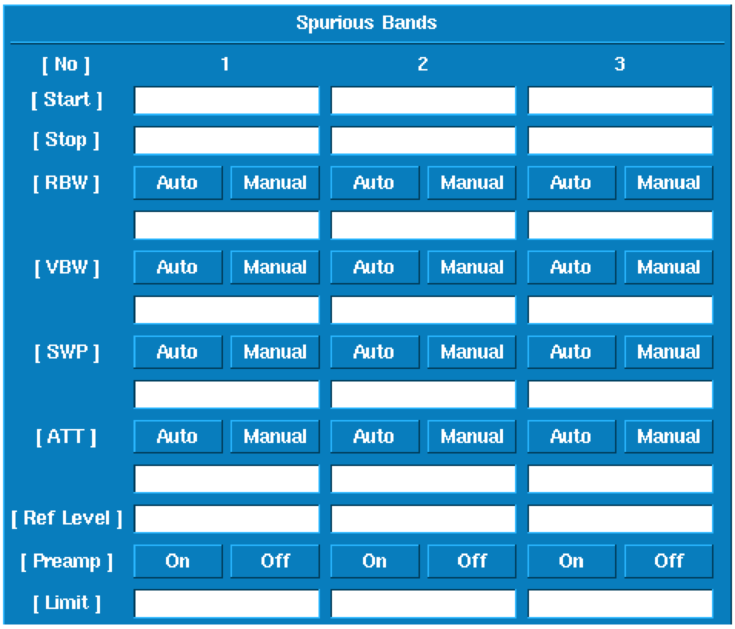


Figure 5-32 Spurious Bands Setting Window

7-3-1 Insert Band

Inserts a vertical column, in which spurious measurement conditions can be set, at the current cursor position.

The data contained in the column that existed in the position before the column was inserted is copied as data of the new column.

7-3-2 Delete Band

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

7-3-3 Init Table

Initializes all data in the table currently being edited.

7-3-4 Table File Recall(CSV)

Reads the Spurious Bands table setting from a file.

7-3-5 Table File Save(CSV)

Saves the Spurious Bands table setting to a file.

7-3-6 Table No. 1|2|3

Sets the setting sequence table number used for the spurious measurement to 1, 2, or 3.

1: Sets table number 1.

2: Sets table number 2.

3: Sets table number 3.

7-4 Results

Displays the Spr Results menu.

Displays Spurious Measure Results Table.

- **MEAS2**
  - **TX Meas**
    - **Spurious**
      - **Results**
        - **Previous Band**
        - **Next Band**

7-4-1 Previous Band

Displays the previous screen.

7-4-2 Next Band

Displays the next screen.

7-5 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.

7-6 Default Conditions

Displays the Spr Default menu.

- **MEAS2**
  - **TX Meas**
    - **Spurious**
      - **[Default Conditions**
        - **Restore Defaults**
        - **Save Defaults**

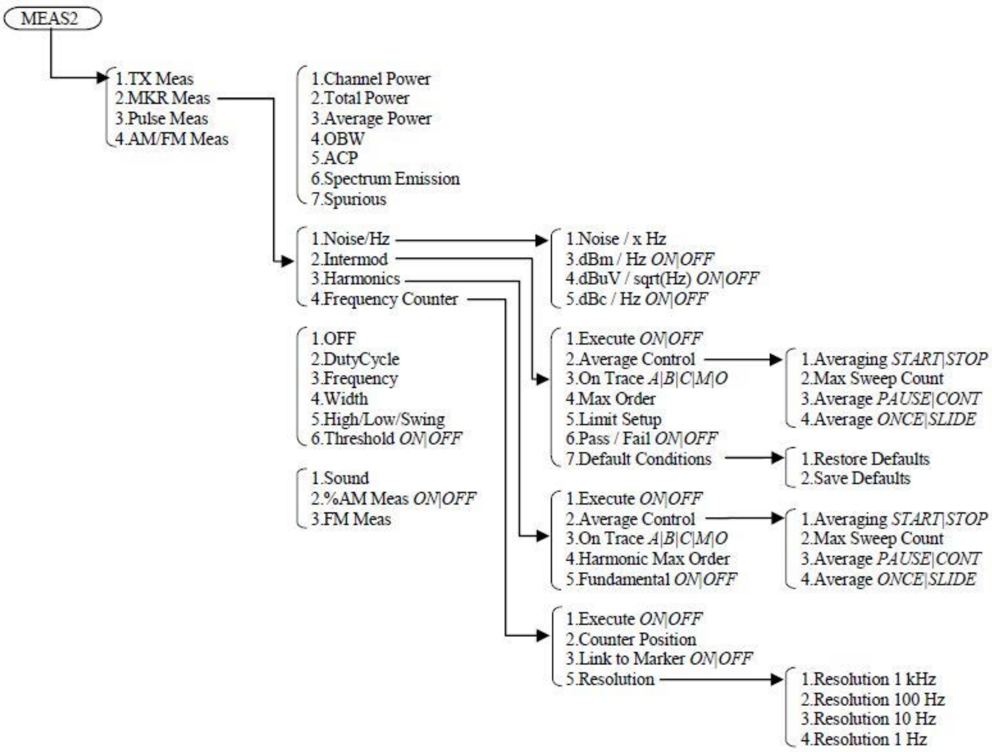
7-6-1 Restore Defaults

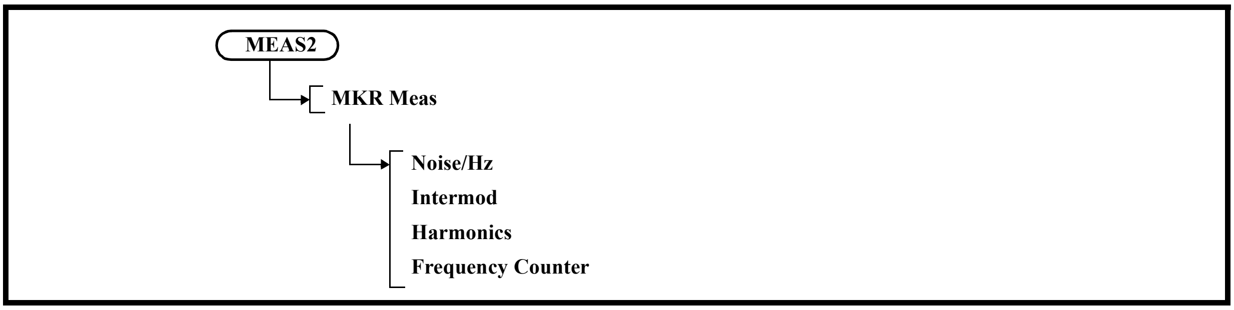
Recalls the saved setting conditions.

7-6-2 Save Defaults

Saves the currently set conditions.

5.2.15.2 MKR Meas





1. Noise/Hz
   Displays the Noise/Hz menu.

MEAS2
- **MKR Meas**
  - **Noise/Hz**
    - **Noise / x Hz**
    - **dBm / Hz ON|OFF**
    - **dBuV / sqrt(Hz) ON|OFF**
    - **dBc / Hz ON|OFF**

1-1 Noise/x Hz

Activates the setting of the noise measurement bandwidth.

The initial value is 1 Hz.

1-2 dBm/Hz ON|OFF

ON: Displays markers automatically if the marker display function is off.
Sets the vertical axis unit to dBm and the marker unit to dBm/Hz.

OFF: Terminates the dBm/Hz function.

1-3 dBuV/sqrt(Hz) ON|OFF

ON: Displays markers automatically if the marker display function is off.
Sets the vertical axis unit to dBμV and the marker unit to dBμV/sqrt (Hz).

OFF: Terminates the dBμV/sqrt (Hz) function.

1-4 dBc/Hz ON|OFF

ON: Enables the delta marker mode automatically if the marker display function is off.
Sets the delta marker unit to dBc/Hz.

OFF: Terminates the dBc/Hz function.

2. Intermod

   Displays the Intermod menu.

- **MEAS2**
  - **MKR Meas**
    - **Intermod**
      - **Execute ON|OFF**
      - **Average Control**
      - **On Trace A|B|C|M|O**
      - **Max Order**
      - **Limit Setup**
      - **Pass / Fail ON|OFF**
      - **Default Conditions**

2-1 Execute ON|OFF

ON: Performs the intermodulation measurement.

OFF: Terminates the intermodulation measurement.

2-2 Average Control

Displays the Average menu.

- **MEAS2**
  - **MKR Meas**
    - **Intermod**
      - **Average Control**
        - **Averaging START|STOP**
        - **Max Sweep Count**
        - **Average PAUSE|CONT**
        - **Average ONCE|SLIDE**

2-2-1 Averaging START|STOP

START: Performs averaging.

STOP: Cancels averaging.

2-2-2 Max Sweep Count

Sets the number of times Video averaging is performed.

Up to 999 can be set.

2-2-3 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.

2-2-4 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.

2-3 On Trace A|B|C|M|O

Selects a trace in which to execute the intermodulation measurement.

2-4 Max Order

Sets the measurement order. The third, fifth, seventh, and ninth orders can be set.

2-5 Limit Setup

Displays the Limit Setup dialog box.

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

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

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

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

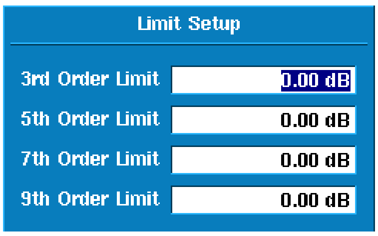


Figure 5-33 Limit Setup Dialog Box

2-6 Pass/Fail ON|OFF

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

ON: Performs Pass/Fail judgment.
If the measurement result is larger than the set limit value, it is judged as Fail.

OFF: Does not perform Pass/Fail judgment.

2-7 Default Conditions
Displays the IM Default menu.

MEAS2
- MKR Meas
  - Intermod
    - Default Conditions
      - Restore Defaults
      - Save Defaults

2-7-1 Restore Defaults
Recalls the saved setting conditions.

2-7-2 Save Defaults
Saves the currently set conditions.

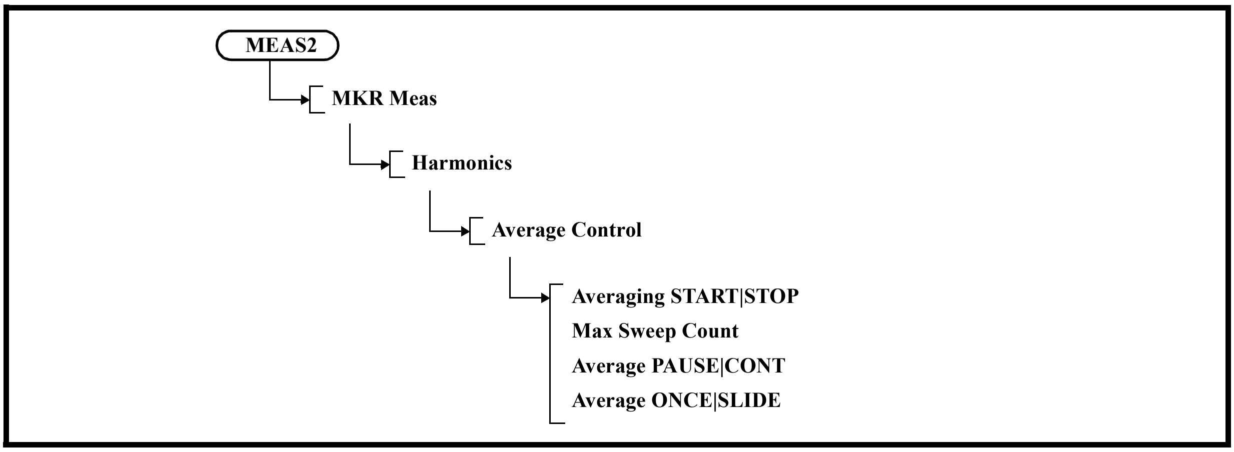
3. Harmonics
Displays the Harmonics menu.

MEAS2
- MKR Meas
  - Harmonics
    - Execute ON|OFF
    - Average Control
    - On Trace A|B|C|M|O
    - Harmonic Max Order
    - Fundamental ON|OFF

3-1 Execute ON|OFF
ON: Executes the harmonic measurement function.
OFF: Terminates the harmonic measurement function.

3-2 Average Control

Displays the Average Control menu.



3-2-1 Averaging START|STOP

START: Performs averaging.

STOP: Cancels averaging.

3-2-2 Max Sweep Count

Sets the number of times Video averaging is performed.

Up to 999 can be set.

3-2-3 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.

3-2-4 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.

3-3 On Trace A|B|C|M|O

Selects a trace in which to execute the harmonic measurement.

3-4 Harmonic Max Order

Activates the setting of the harmonic order to be measured.

The measuring order can be set from 1 to 10.

The default value is 3.

3-5 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 as the fundamental frequency.

4. Frequency Counter
   Displays the Counter menu.

- MEAS2
  - MKR Meas
    - Frequency Counter
      - Execute ON|OFF
      - Counter Position
      - Link to Marker ON|OFF
      - Resolution

4-1 Execute ON|OFF
ON: Sets a frequency counter mode.
OFF: Cancels the frequency counter mode.

4-2 Counter Position
Adjusts a cursor on the measured signal.

4-3 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.

4-4 Resolution
Displays the Cnt Res menu.

- MEAS2
  - MKR Meas
    - Frequency Counter
      - Resolution
        - Resolution 1kHz
        - Resolution 100Hz
        - Resolution 10Hz
        - Resolution 1Hz

4-4-1 Resolution 1kHz
Sets the resolution of the frequency counter to 1 kHz.

4-4-2 Resolution 100Hz
Sets the resolution of the frequency counter to 100 Hz.

4-4-3 Resolution 10Hz

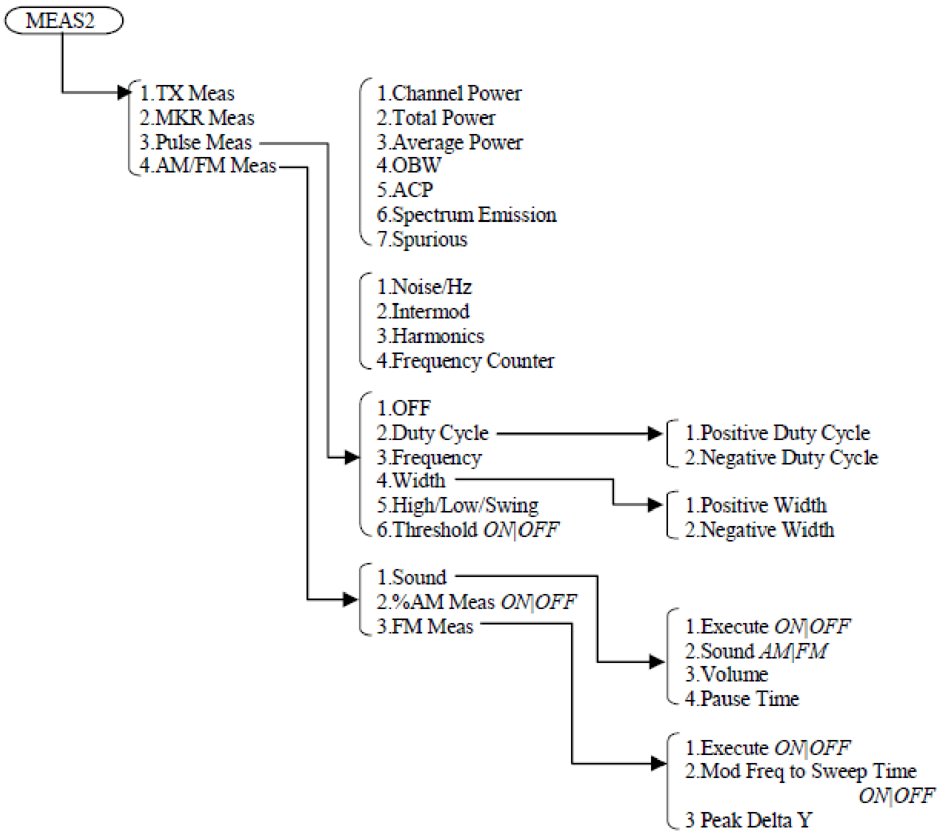
Sets the resolution of the frequency counter to 10 Hz.

4-4-4 Resolution 1Hz

Sets the resolution of the frequency counter to 1 Hz.

5.2.15.3 Pulse Meas

Performs measurement for the time domain screen.



5.2.15 MEAS 2

1. OFF
   Quits measuring.
2. Duty Cycle
   Displays Duty Cycle measurement menus.

MEAS2
- **Pulse Meas**
  - **Duty Cycle**
    - **Positive Duty Cycle**
    - **Negative Duty Cycle**

2-1 Positive Duty Cycle
Measures the ratio of the positive pulse width contained in the first cycle.
Positive Duty Cycle(%) = Positive pulse width/cycle * 100%

2-2 Negative Duty Cycle
Measures the ratio of the negative pulse width contained in the first cycle.
Negative Duty Cycle(%) = Negative pulse width/cycle * 100%

3. Frequency
   Measures the frequency in the first cycle.
   Frequency(Hz) = 1/cycle
4. Width
   Displays Width measurement menus.

MEAS2
- **Pulse Meas**
  - **Width**
    - **Positive Width**
    - **Negative Width**

4-1 Positive Width
Measures the positive pulse width.
Positive Width(sec) = (Point where the waveform first crosses the threshold line from up to down) - (point where the waveform first crosses the threshold line from down to top)

4-2 Negative Width
Measures the negative pulse width.
Negative Width(sec) = (Point where the waveform first crosses the threshold line from down to top) - (point where the waveform first crosses the threshold line from top to down)

5. High/Low/Swing

   Measures the High and Low levels of trace data by using the histogram method.

   When these values are displayed, obtain the amplitude (swing) value from the difference between the High and Low levels and display it.

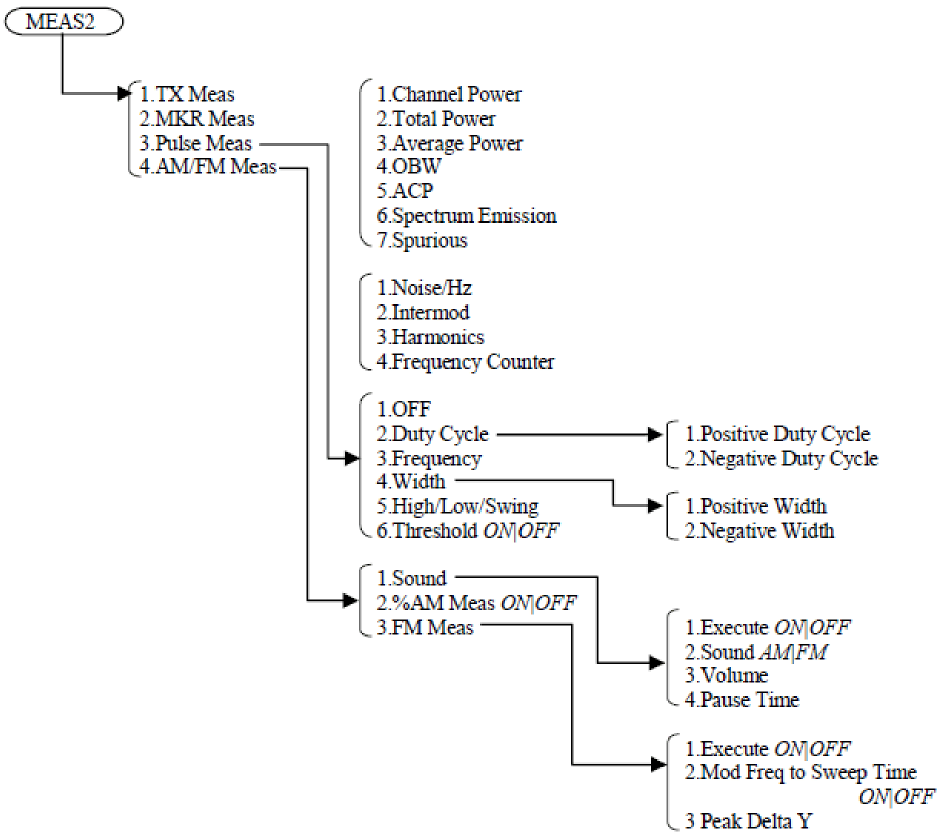
   The horizontal line cursor is displayed at the High and Low level positions on the measurement screen.

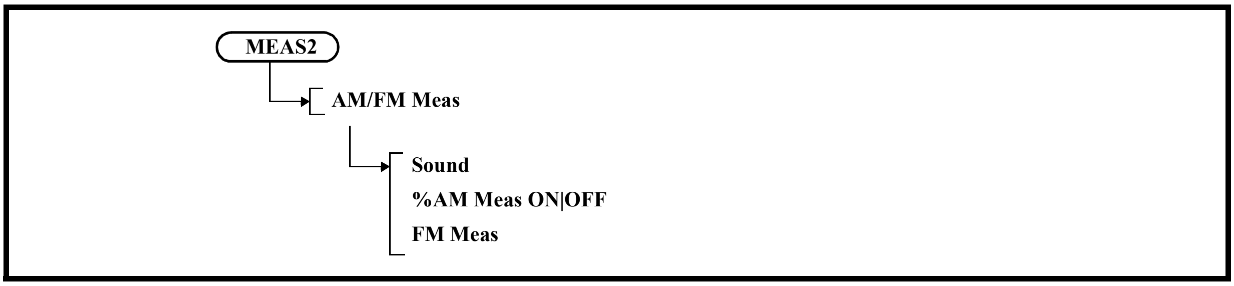
6. Threshold ON|OFF

   Select ON/OFF for the threshold line.

   This is the reference line for Measures.

5.2.15.4 AM/FM Meas





1. Sound
   Displays the Sound menu.
   Performs sound demodulation for a signal where the marker is positioned when seep ends.

MEAS2
- **AM/FM Meas**
  - **Sound**
    - **Execute ON|OFF**
    - **Sound AM|FM**
    - **Volume**
    - **Pause Time**

1-1 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.

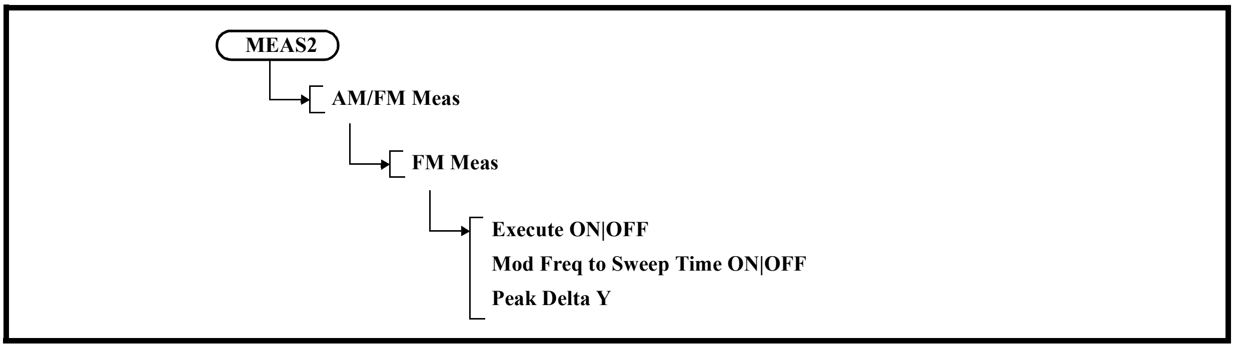
1-2 Sound AM/FM
Switches the demodulation mode between AM and FM.
AM: Selects the AM demodulation.
FM: Selects the FM demodulation.

1-3 Volume
Sets the demodulated sound volume.
The sound volume can be adjusted in 16 levels.

1-4 Pause Time
Sets the demodulation time.
The setting range is from 100 ms to 1000 s.

2. %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.

3. FM Meas
   Displays the FM Meas menu.



3-1 Execute ON|OFF

Switches the FM frequency deviation measurement function on and off.

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:

$SWP > PT \times 1 / Fmod$

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.)

3-2 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.

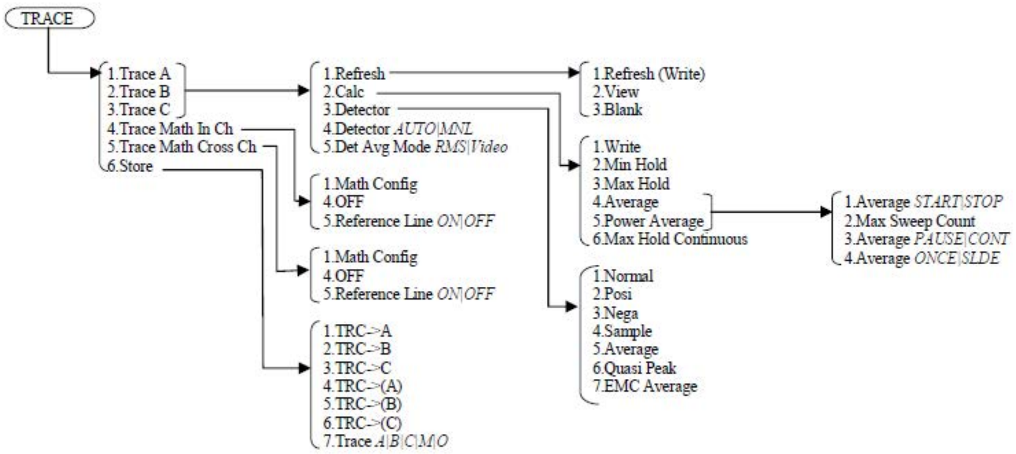
3-3 Peak Delta Y

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.

5.2.16 TRACE

Displays the Trace menu and makes trace related settings.



5.2.16.1 Trace A

TRACE

- **Trace A**
  - **Refresh**
  - **Calc**
  - **Detector**
  - **Detector AUTO|MNL**
  - **Det Avg Mode RMS|Video**

1. Refresh
   Displays the Refresh Mode menu.
   The selected setting is displayed at the bottom of the menu.

- **TRACE**
  - **Trace A**
    - **Refresh**
      - **Refresh (Write)**
      - **View**
      - **Blank**

1-1 Refresh (Write)
Updates the trace data each time a sweep is performed.

1-2 View
Displays the trace data stored in the memory.

1-3 Blank
Hides the trace.

2. Calc
   Displays the Calc Mode menu.
   The selected setting is displayed at the bottom of the menu.

- **TRACE**
  - **Trace A**
    - **Calc**
      - **Write**
      - **Min Hold**
      - **Max Hold**
      - **Average**
      - **Power Average**
      - **Max Hold Continuous**

2-1 Write
Displays the waveform data acquired in the default settings.

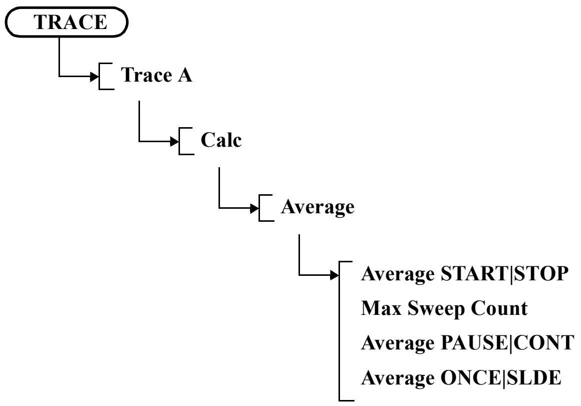
2-2 Min Hold
Displays the minimum point value for each trace sample.

2-3 Max Hold
Displays the maximum point value for each trace sample.

2-4 Average

Displays the Video Average menu.

The Video average performs averaging of the display data.



2-4-1 Average START|STOP

START: Performs averaging.

STOP: Cancels averaging.

2-4-2 Max Sweep Count

Sets the number of times Video averaging is performed.

Up to 999 can be set.

2-4-3 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.

2-4-4 Average ONCE|SLDE

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.

2-5 Power Average

Displays the Power Average menu.

The Power Average function performs averaging of power (W) and draws waveforms.

- **TRACE**
  - **Trace A**
    - **Calc**
      - **Power Average**
        - **Average START|STOP**
        - **Max Sweep Count**
        - **Average PAUSE|CONT**
        - **Average ONCE|SLDE**

2-5-1 Average START|STOP

START: Performs averaging.

STOP: Cancels averaging.

2-5-2 Max Sweep Count

Sets the number of times Video averaging is performed.

Up to 999 can be set.

2-5-3 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.

2-5-4 Average ONCE|SLDE

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.

2-6 Max Hold Continuous

Displays the maximum value for each trace sample.

The trace is not reset in this function which is different from the normal Calc functions.

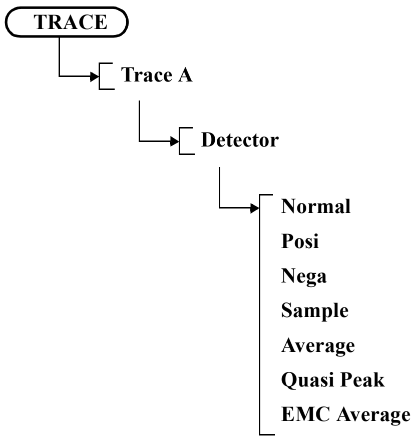
The Max Hold operation starts at a trace point when the key is pressed.

This function can be used when the Detector mode is set to MNL.

3. Detector

   Displays the Detector menu.

   The selected setting is displayed at the bottom of the menu.



3-1 Normal

Sets the normal detection mode to automatically detect whether the peak is positive or negative at each trace point.

3-2 Posi

Sets the positive peak detection mode.

3-3 Nega

Sets the negative peak detection mode.

3-4 Sample

Sets the sample detection mode.

3-5 Average

Sets the average detection mode.

The average detection mode can be selected from between RMS (power average) and Video (Trace average) in the Det Avg Mode menu.

3-6 Quasi Peak

Sets the quasi peak detection mode.(OPT28)

Quasi Peak (QP) can be set when SYSTEM MODE is other than Dual Sync CH, EMC Filter is ON (refer to Section 5.2.25.3, “EMC”), and RBW < 1 MHz.

According to the RBW setting, set an appropriate sweep time using the following conditions as a guide:

When RBW = 200 Hz	1 sec per 200 Hz frequency span
When RBW = 9 kHz	1 sec per 10 kHz frequency span
When RBW = 120 kHz	1 sec per 100 kHz frequency span

3-7 EMC Average

Sets the average value detection mode (OPT28).

EMC Average can be set when SYSTEM MODE is other than Dual Sync CH, and EMC Filter is ON (refer to Section 5.2.25.3, “EMC”).

According to the RBW setting, set an appropriate sweep time using the following conditions as a guide:

When RBW = 200 Hz:	1 sec per 200 Hz frequency span
When RBW = 9 kHz:	1 sec per 10 kHz frequency span
When RBW=120 kHz, 1 MHz:	1 sec per 100 kHz frequency span

4. Detector AUTO|MNL

   Switches whether to set the detection mode automatically or manually.

   AUTO: Automatically sets the optimum detection mode for measurement based on the trace mode.

   MNL: Sets the detection mode manually.

5. Det Avg Mode RMS|Video

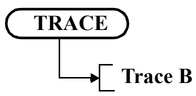
   Sets the average detection mode.

   RMS: Selects RMS (power average).

   Video: Selects VideoÅiTrace average).

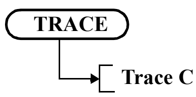
5.2.16.2 Trace B

Same items as Section 5.2.16.1, “Trace A.”

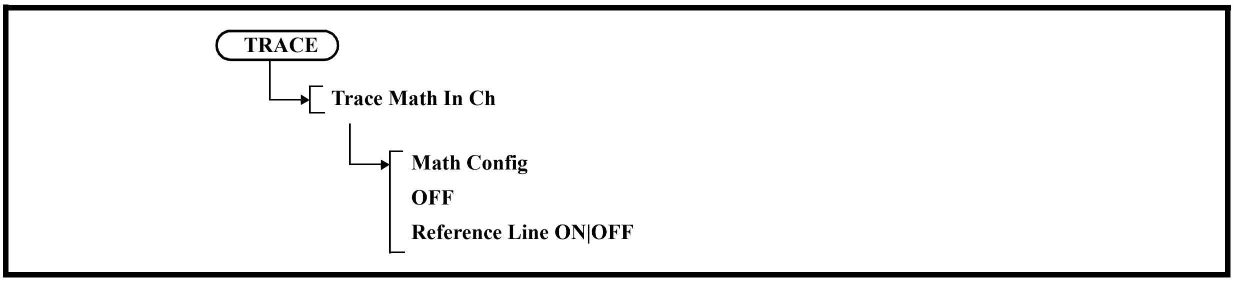


5.2.16.3 Trace C

Same items as Section 5.2.16.1, “Trace A.”



5.2.16.4 Trace Math In Ch



1. Math Config

   Displays the Math Config menu.

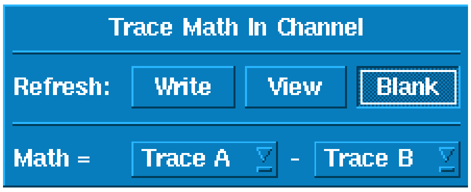


Figure 5-34 Trace Math In Ch Dialog Box

   The cursor movement of the [Write], [View], and [Blank] buttons can be switched using the step key.

   Pressing the [Hz] button switches to the settings of each button.

   The cursor movement of Math = [left-hand side trace] - [right-hand side trace] can also be switched using the step key. Operate the knob to switch the trace selection.

   a. Refresh (Write)
      Refreshes the trace data every sweep.
   b. View
      Displays the trace data stored in memory.
   c. Blank
      Hides the trace.
   d. Selecting left-hand side trace
      Select Trace A, Trace B, or Trace C of the active channel by using the knob.
   e. Selecting right-hand side trace
      Select Trace A, Trace B, Trace C, or RefLine of the active channel by using the knob.

2. OFF

   Does not perform the trace calculation.

3. Reference Line ON|OFF

   ON: Displays and activates the reference line.

   OFF: Hides the reference line.

5.2.16.5 Trace Math Cross Ch

TRACE

- **Trace Math Cross Ch**
  - **Math Config**
  - **OFF**
  - **Reference Line ON|OFF**

1. Math Config

   Displays the Math Config menu.

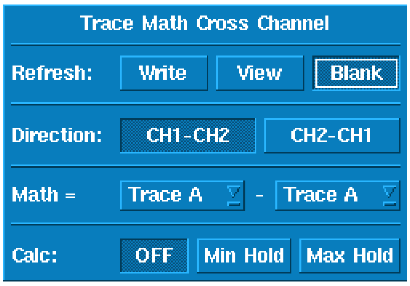


Figure 5-35 Trace Math Cross Ch Dialog Box

The cursor movement of the [Write], [View], [Blank], [CH1-CH2], [CH2-CH1], [OFF], [Min Hold], and [Max Hold] buttons can be switched using the step key. Pressing the [Hz] button switches to the settings of each button.

The cursor movement of Math = [left-hand side trace] - [right-hand side trace] can also be switched using the step key. Operate the knob to switch the trace selection.

a. Refresh (Write)
   Refreshes the trace data every sweep.

b. View
   Displays the trace data stored in memory.

c. Blank
   Hides the trace.

d. CH1-CH2
   Sets a subtraction in which the trace of CH2 is subtracted from the trace of CH1.

e. CH2-CH1
   Sets a subtraction in which the trace of CH1 is subtracted from the trace of CH2.

f. Selecting left-hand side trace
   Select Trace A, Trace B, Trace C, or Trace M of the channel on the left by using the knob.

g. Selecting right-hand side trace
   Select Trace A, Trace B, Trace C, or Trace M of the channel on the right by using the knob.

h. Turns off the Calc function.

i. Displays the minimum point value for each trace sample of the Trace Math result.
   At this point, the Trigger Sync function is set to ON.

j. Displays the maximum point value for each trace sample of the Trace Math result.
   At this point, the Trigger Sync function is set to ON.

2. OFF
   Does not perform the trace calculation.
3. Reference Line ON|OFF
   ON: Displays and activates the reference line.
   OFF: Hides the reference line.

5.2.16.6 Store

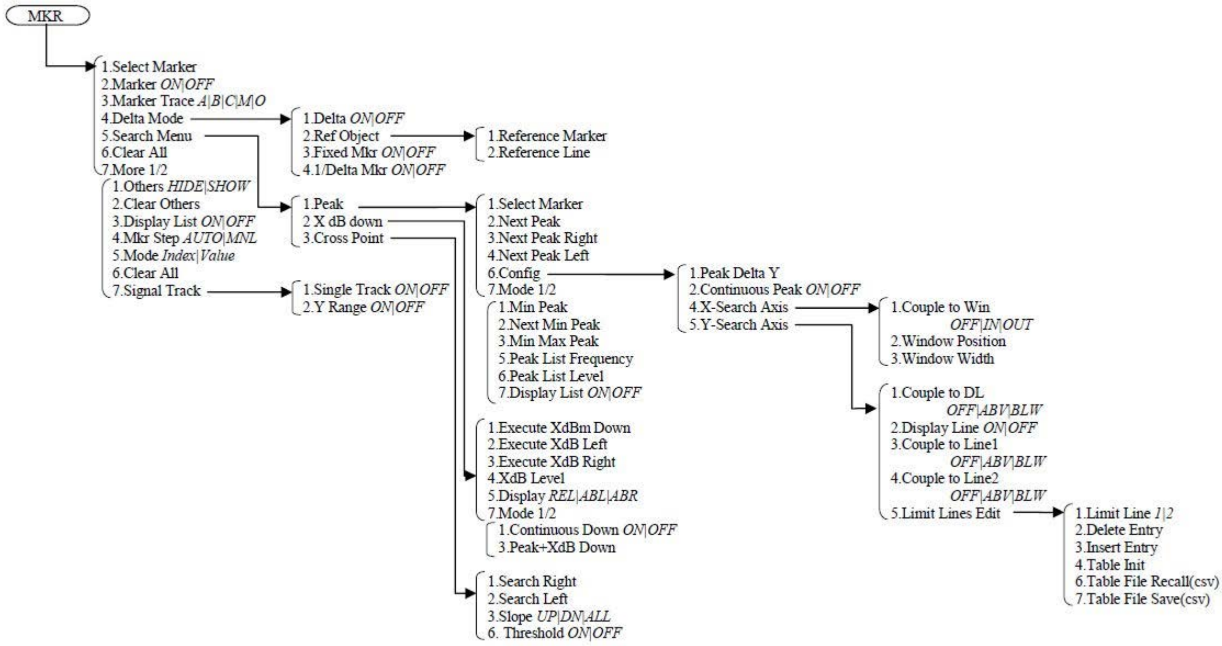
TRACE
- **Store**
  - **TRC→A**
  - **TRC→B**
  - **TRC→C**
  - **TRC→(A)**
  - **TRC→(B)**
  - **TRC→(C)**
  - **Trace A|B|C|M|O**

1. TRC→A
   Saves the active trace data to trace memory A.
2. TRC→B
   Saves the active trace data to trace memory B.
3. TRC→C
   Saves active trace data to trace memory C.
4. TRC→(A)
   Stores the data of the active trace in trace A memory of the inactive channel.
5. TRC→(B)
   Stores the data of the active trace in trace B memory of the inactive channel.
6. TRC→(C)
   Stores the data of the active trace in trace C memory of the inactive channel.
7. Trace A|B|C|M|O
   Selects the applied trace memory.

5.2.17 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.



5.2.17.1 Select Marker

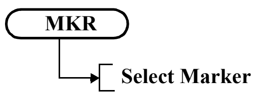
Selects the active marker and sets its position.

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.



5.2.17.2 Marker ON|OFF

Activates the marker selected by Select Marker.

MKR
- **Marker ON|OFF**

5.2.17.3 Marker Trace A|B|C|M|O

Moves the active marker to the selected trace.

MKR
- **Marker Trace A|B|C|M|O**

5.2.17.4 Delta Mode

Displays the Delta Marker menu.

MKR
- **Delta Mode**
  - **Delta ON|OFF**
  - **Ref Object**
  - **Flixed Mkr ON|OFF**
  - **1/Delta Mkr ON|OFF**

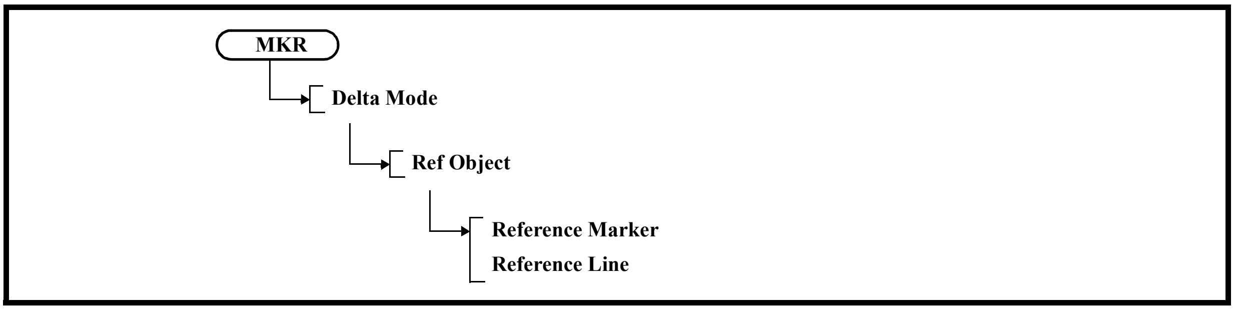
1. Delta ON|OFF

   Switches the delta marker display function ON and OFF.

   ON: Displays the delta marker and normal marker in the same position.
   Displays the relative values (frequency and level) to the normal marker in the marker area.

   OFF: Hides the delta marker.

2. Ref Object
   Sets the reference in the delta marker mode.



   2-1 Reference Marker
   Selects the reference marker.

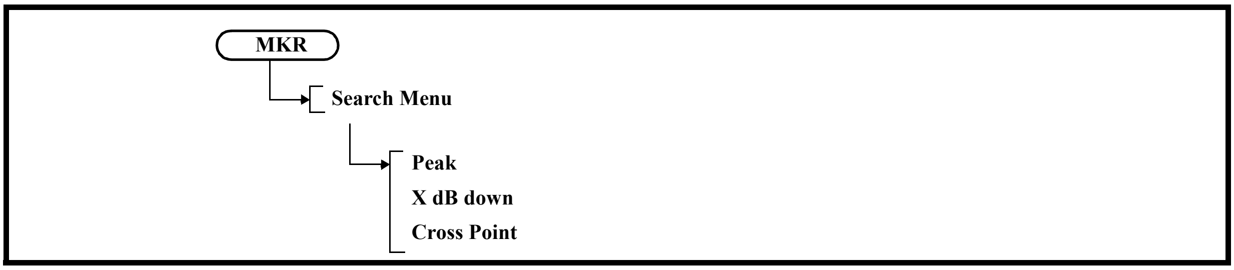
   2-2 Reference Line
   Selects the reference line.

3. 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.

4. 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.

5.2.17.5 Search Menu

Displays the Search Menu menu.



1. 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.

MKR
- **Search Menu**
  - **Peak**
    - **Select Marker**
    - **Next Peak**
    - **Next Peak Right**
    - **Next Peak Left**
    - **Config**
    - **Min Peak**
    - **Next Min Peak**
    - **Min Max Peak**
    - **Peak List Frequency**
    - **Peak List Level**
    - **Display List ON|OFF**

1-1 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.

1-2 Next Peak

Moves the marker to the next highest peak from the current marker position in the search range.

1-3 Next Peak Right

Moves the marker to the next peak on the right (higher frequency than the current marker position) in the search range.

1-4 Next Peak Left

Moves the marker to the next peak on the left (lower frequency than the current marker position) in the search range.

1-5 Config
Displays the Config menu.

MKR
- **Search Menu**
  - **Peak**
    - **Config**
      - **Peak Delta Y**
      - **Continuous Peak ON|OFF**
      - **X-Search Axis**
      - **Y-Search Axis**

1-5-1 Peak Delta Y
Sets a level difference for a signal to be judged as a peak point during the peak search.
This level difference is used as the threshold level for the peak point search.

1-5-2 Continuous Peak ON|OFF
Switches the continuous peak search function ON and OFF.
ON: Performs the peak search repeatedly each time a sweep is performed.
OFF: Cancels the continuous peak search function.

1-5-3 X-Search Axis
Displays the X-Search Axis menu.

MKR
- **Search Menu**
  - **Peak**
    - **Config**
      - **X-Search Axis**
        - **Couple to Win OFF|IN|OUT**
        - **Window Position**
        - **Window Width**

1-5-3-1 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.

1-5-3-2 Window Position

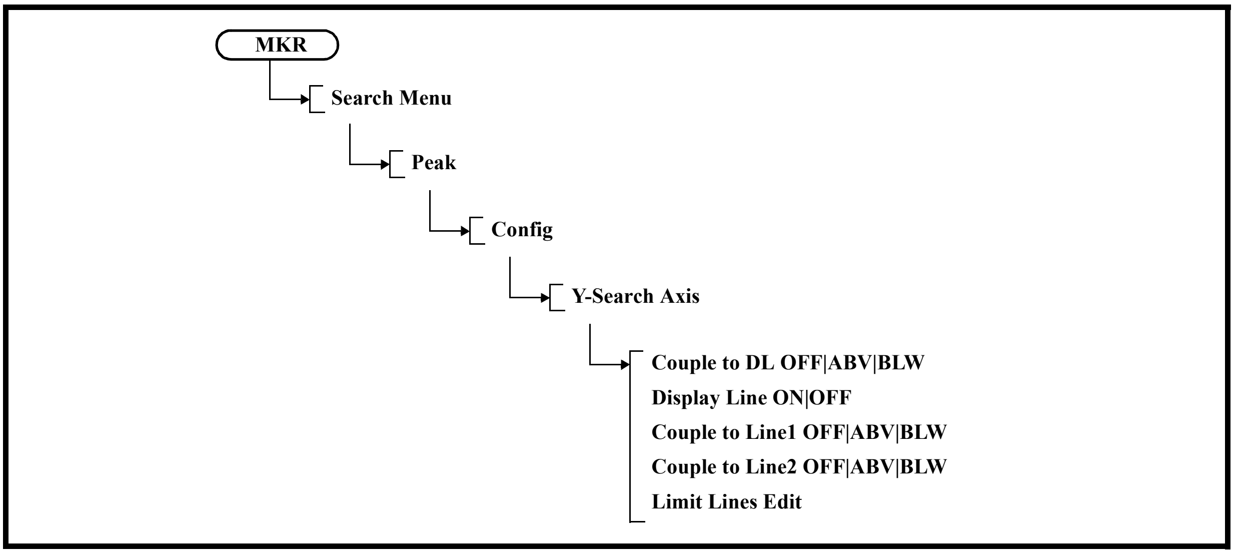
Sets the center position of the window defined by Couple to Win.

1-5-3-3 Window Width

Sets the window width defined by Couple to Win.

1-5-4 Y-Search Axis

Displays the Y- Search Axis menu.



1-5-4-1 Couple to DL OFF|ABV|BLW

Sets a peak search range on the vertical axis.

OFF: Searches the full 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.

1-5-4-2 Display Line ON|OFF

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

OFF: Hides the display line.

1-5-4-3 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: Searches the range above limit line 1.

BLW: Searches the range below limit line 1.

1-5-4-4 Couple to Line 2 OFF|ABV|BLW

Specifies the search range for limit line 2.

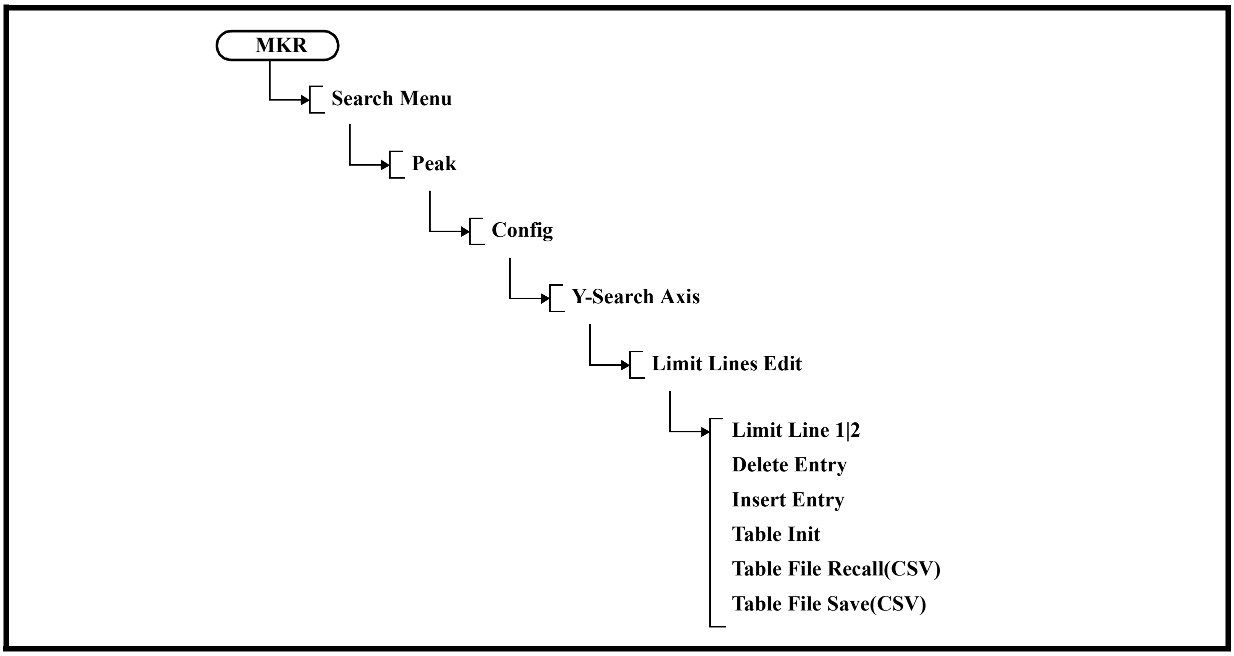
OFF: Does not specify the search range related to limit line 2.

ABV: Searches the range above limit line 2.

BLW: Searches the range below limit line 2.

1-5-4-5 Limit Lines Edit

Displays the Limit Line menu and Limit Line table.



1-5-4-5-1 Limit Line 1|2

1: Edits limit line 1.

2: Edits limit line 2.

1-5-4-5-2 Delete Entry

Deletes the line on which the cursor is positioned in the limit line table.

1-5-4-5-3 Insert Entry

Inserts a line in the limit line table.

1-5-4-5-4 Table Edit

Edits the vertical axis limit setting.

1-5-4-5-5 Table File Recall(CSV)

Reads the vertical axis limit setting from a file.

1-5-4-5-6 Table File Save(CSV)

Saves the vertical axis limit setting to a file.

1-6 Min Peak

Moves the active marker to the minimum value of the trace in the search range.

1-7 Next Min Peak

Moves the marker to the next lowest peak from the current marker position in the search range.

1-8 Min Max Peak

Automatically enables the delta marker mode and moves the reference marker to the maximum value and the active marker to the minimum value.

1-9 Peak List Frequency

Lists peak levels and peak frequencies in order of frequency.

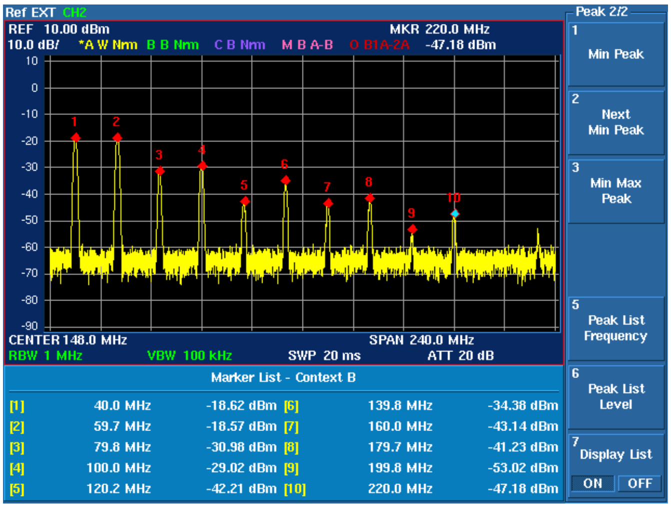


Figure 5-36 Peak List Frequency

1-10 Peak List Level

Lists peak levels and peak frequencies in order of peak level.

1-11 Display List ON|OFF

Switches the peak list display.

ON: Displays the list.

OFF: Hides the list.

2. X dB down
   Displays the X dB Down menu.
   Displays markers automatically if the marker display function is off.
   The trace, for which the X dB Down function is executed, is the active trace.
   Set the marker on the active trace.

MKR
- **Search Menu**
  - **X dB down**
    - **Execute XdBm Down**
    - **Execute XdB Left**
    - **Execute XdB Right**
    - **XdB Level**
    - **Display REL|ABL|ABR**
    - **Continuous Down ON|OFF**
    - **Peak+XdB Down**

2-1 Execute XdBm Down

Displays the normal marker and the delta marker in the positions X dB lower than the current positions based on the Mode setting.

2-2 Execute XdB Left

Displays the normal marker in the position X dB lower than the current left position.

2-3 Execute XdB Right

Displays the normal marker in the position X dB lower than the current right position.

2-4 XdB Level

Activates the attenuation setting.

2-5 Display REL|ABL|ABR

Sets the method for displaying X dB Down marker data.

REL: Enables the delta marker mode when X dB Down is executed.
Displays the normal marker on the right and the delta marker on the left.

ABL: Displays the marker on the left as an absolute value.

ABR: Displays the marker on the right as an absolute value.

2-6 Continuous Down ON|OFF

Switches the continuous X dB down function on and off.

ON: Performs Peak X dB down repeatedly each time a sweep is performed.

OFF: Cancels the continuous X dB down function.

2-7 Peak+XdB Down

Performs the peak search in the search range and then executes X dB Down.

3. Cross Point

   Detects waveform edges (rising and falling).

MKR

- **Search Menu**
  - **Cross Point**
    - **Search Right**
    - **Search Left**
    - **Slope UP|DN|ALL**
    - **Threshold ON|OFF**

3-1 Search Right

Searches in the right direction from the active marker.

3-2 Search Left

Searches in the left direction from the active marker.

3-3 Slope UP|DL|ALL

UP: Searches for waveform rising points and moves the active marker there. Waveform rising points refer to where the waveform crosses the threshold line from down to up.

DN: Searches for waveform falling points and moves the active marker there. Waveform falling points refer to where the waveform crosses the threshold line from up to down.

ALL: Searches for waveform rising and falling points alternatively and moves the active marker there.

3-4 Threshold ON|OFF

This is the reference line for Cross Point search.

Select ON/OFF for the threshold line.

Sets the level when ON is selected.

5.2.17.6 Clear All

Clears all markers.

The marker display position is set at the center of the screen (default value).

MKR

- **Clear All**

5.2.17.7 Others HIDE|SHOW

Hides all markers except for the active marker.

MKR

Ohers HIDE|SHOW

5.2.17.8 Clear Others

Clears all markers except for the active marker.

MKR

Clear Others

5.2.17.9 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

Display List ON|OFF

5.2.17.10 Mkr Step AUTO|MNL

Switches whether to set the step size when markers are moved by the step keys automatically or manually.

AUTO: Sets the marker step size to 1/10 of the frequency span.

MNL: Sets the step size manually.

MKR

Mkr Step AUTO|MNL

5.2.17.11 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.

MKR
→ **Mode Index|Value**

5.2.17.12 Clear All

Same as Section 5.2.17.6, "Clear All."

MKR
→ **Clear All**

5.2.17.13 Signal Track

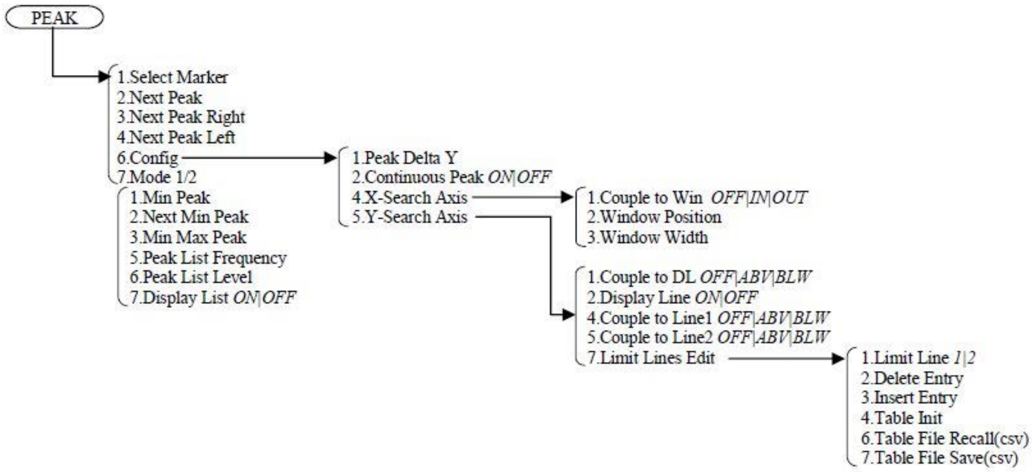
Displays the Signal Track menu.

MKR
→ **Signal Track**
→ **Single Track ON|OFF**
Y Range ON|OFF

1. 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 as the center frequency.
   OFF: Cancels the signal truck function.
2. Y Range ON|OFF
   Sets the margin when the signal track function detects the peak.

5.2.18 PEAK

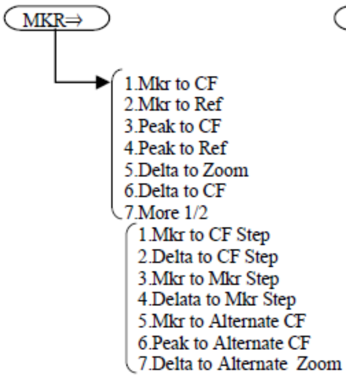
Same as "1. Peak" in Section 5.2.17.5, "Search Menu."

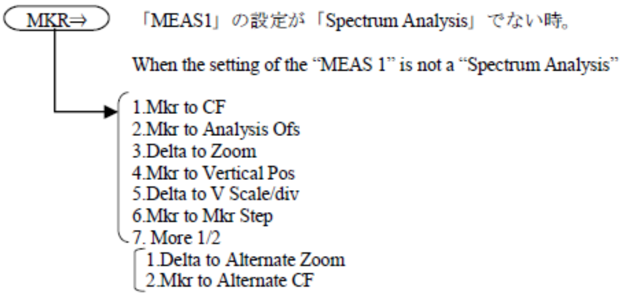


5.2.19 MKR→

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

Displays the Mkr to menu.





5.2.19.1 Mkr to CF

Sets the frequency at the active marker as the center frequency.

MKR→
→ **Mkr to CF**

5.2.19.2 Mkr to Ref

Sets the level of the active marker as the reference level.

MKR→
→ **Mkr to Ref**

5.2.19.3 Peak to CF

Displays the marker at the highest peak in the search range and sets the frequency at the marker as the center frequency.

MKR→
→ **Peak to CF**

5.2.19.4 Peak to Ref

Displays the marker at the highest peak in the search range and sets the level at the marker as the reference level.

MKR→
→ **Peak to Ref**

5.2.19.5 Delta to Zoom

Sets the frequency difference between the delta marker and the normal marker as the frequency span.

MKR→
Delta to Zoom

5.2.19.6 Delta to CF

Sets the frequency difference between the delta marker and the normal marker as the center frequency.

MKR→
Delta to CF

5.2.19.7 Mkr to CF Step

Sets the frequency of the marker as the step size of the center frequency.

MKR→
Mkr to CF Step

5.2.19.8 Delta to CF Step

Sets the frequency difference between the delta marker and the normal marker as the step size of the center frequency.

MKR→
Delta to CF Step

5.2.19.9 Mkr to Mkr Step

Sets the frequency of the marker as the step size of the marker.

MKR→
- **Mkr to Mkr Step**

5.2.19.10 Delta to Mkr Step

Sets the frequency difference between the delta marker and the normal marker as the step size of the marker.

MKR→
- **Delta to Mkr Step**

5.2.19.11 Mkr to Alternate CF

Sets the frequency at the active marker for the active channel as the center frequency of the inactive channel.

MKR→
- **Mkr to Alternate CF**

5.2.19.12 Peak to Alternate CF

Sets the peak frequency of the active channel as the center frequency of the inactive channel.

MKR→
- **Peak to Alternate CF**

5.2.19.13 Delta to Alternate Zoom

Sets the point of the delta marker (frequency) for the active channel as the start or stop frequency of the inactive channel.

MKR→
→ **Delta to Alternate Zoom**

5.2.19.14 Mkr to CF

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the frequency at the active marker as the center frequency.

5.2.19.15 Mkr to Analysis Ofs

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the time at the active marker for the active channel as Analysis Offset.

MKR→
→ **Mkr to Analysis Ofs**

5.2.19.16 Delta to Zoom

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the interval between the delta markers for the active channel as Analysis Wind, and also sets Analysis Offset.

MKR→
→ **Delta to Zoom**

5.2.19.17 Mkr to Vertical Pos

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the vertical position value of the active marker for the active channel as the offset value of the vertical axis when data is displayed.

MKR→
→ **Mkr to Vertical Pos**

5.2.19.18 Delta to V Scale/div

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the vertical position value of the delta marker for the active channel as the scale (Scale/div) of the vertical axis when data is displayed.

MKR→
→ **Delta to V Scale/div**

5.2.19.19 Mkr to Mkr Step

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the time at the active marker for the active channel as the step size of the marker.

MKR→
→ **Mkr to Mkr Step**

5.2.19.20 Delta to Alternate Zoom

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the interval between the delta markers for the active channel as Analysis Wind of the inactive channel, and also sets Analysis Offset.

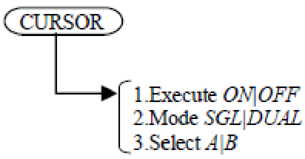
5.2.19.21 Mkr to Alternate CF

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the frequency at the active marker for the active channel as the center frequency of the inactive channel.

5.2.20 CURSOR

Displays the Cursor menu.



5.2.20.1 Execute ON|OFF

Shows or hides VertCursor.

CURSOR
└→ **Execute ON|OFF**

ON: Displays VertCursor when the Dual Sync CH or Dual Async CH display mode is used.

OFF: Hides VertCursor.
Also hides VertCursor when the display mode is switched to the Single CH mode.

5.2.20.2 Mode SGL|DUAL

Switches whether to display VertCursor in SINGLE mode or DUAL mode.

CURSOR
└→ **Mode SGL|DUAL**

SGL: Displays a single VertCursor (Cursor A) for the active channel.
As the measurement value of VertCursor, the absolute value of the intersection of VertCursor with the active trace waveform is displayed along with the horizontal axis after each sweep.
The difference between the 2 channels is also displayed as delta.
If the X/Y domain for time domain analysis is different between the 2 channels, "*****" is displayed.

DUAL: Displays two VertCursors (Cursors A and B) for the both channels.
Cursor A is assigned to channel 1.
Cursor B is assigned to channel 2.

5.2.20.3 Select A|B

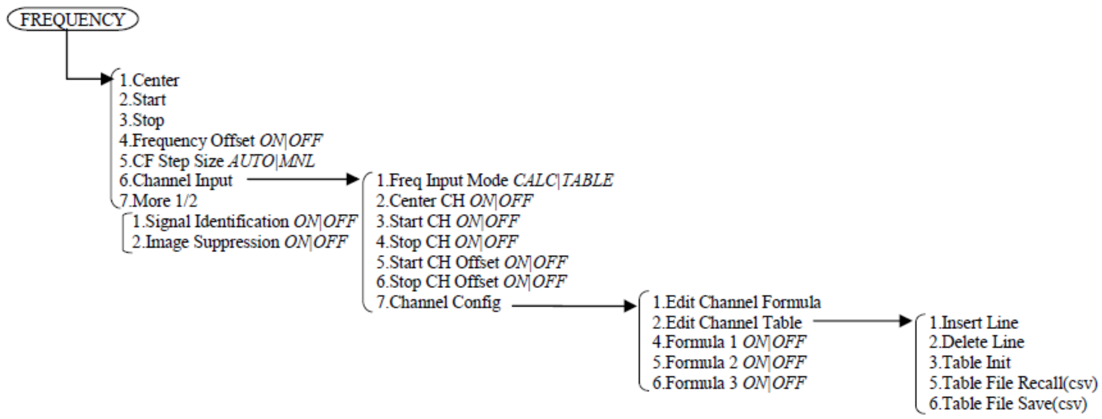
Selects a cursor from between A and B when the cursor display mode is DUAL.

CURSOR
└→ **Select A|B**

When the cursor is switched from A to B and vice versa, the active VertCursor and the active channel are also switched.

5.2.21 FREQUENCY

Displays the Frequency menu.



5.2.21.1 Center

Activates the center frequency setting.

The frequency range is displayed by the center frequency and frequency span.

5.2.21.2 Start

Activates the start frequency setting.

The frequency range is displayed by the start frequency and stop frequency.

5.2.21.3 Stop

Activates the stop frequency setting.

The frequency range is displayed by the start frequency and stop frequency.

FREQUENCY

Stop

5.2.21.4 Frequency Offset ON|OFF

Switches the frequency offset function ON and OFF.

FREQUENCY

Frequency Offset ON|OFF

ON: Sets the offset value and changes only the display of the frequency by the offset value. (Displayed frequency = Set value + Offset value)

OFF: Cancels the offset function.

5.2.21.5 CF Step Size AUTO|MNL

Switches whether to set the step size when the center frequency is changed by the step keys automatically or manually.

FREQUENCY

CF Step Size AUTO|MNL

AUTO: Sets the step size automatically to 1/10 of the span width.

MNL: Sets the step size manually.B

5.2.21.6 Channel Input

Displays the Channel menu.

Uses the channel code instead of the frequency for the frequency setting.

FREQUENCY
- **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**
  - **Channel Config**

1. 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 the frequency from the look-up table corresponding to the channel number.
2. Center CH ON|OFF
   Sets a center frequency input mode for the channels.
   ON: Sets the channel code input mode.
   OFF: Sets the frequency input mode.
3. 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.
4. 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.
5. Start CH Offset ON|OFF
   Enables the offset value of the start frequency.
   ON: Offset frequency is enabled.
   OFF: Offset frequency is disabled.
6. Stop CH Offset ON|OFF
   Enables the offset value of the stop frequency.
   ON: Offset frequency is enabled.
   OFF: Offset frequency is disabled.

7. Channel Config

   Displays the Channels Config menu.

FREQUENCY
- **Channel Input**
  - **Channel Config**
    - **Edit Channel Formula**
    - **Edit Channel Table**
    - **Formula 1 ON|OFF**
    - **Formula 2 ON|OFF**
    - **Formula 3 ON|OFF**

7-1 Edit Channel Formula

Displays the dialog box in which the mathematical formula to acquire the channel set frequency is defined.

The following frequency is set:

Carrier frequency = Origin + CH spacing * (CH No. - CH offset)

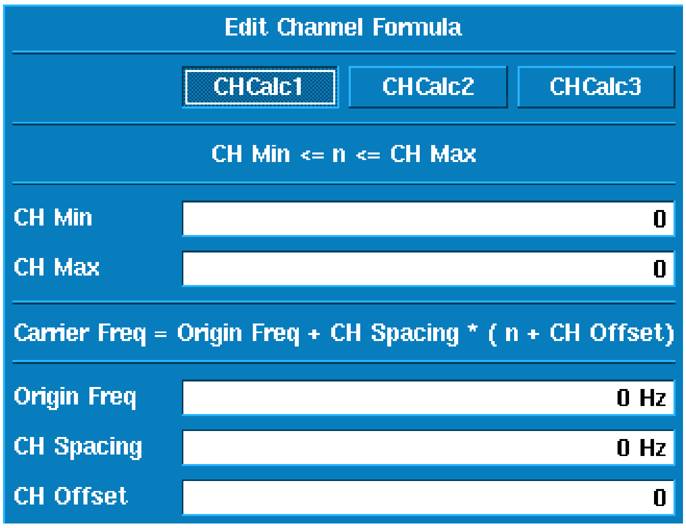


Figure 5-37   Edit Channel Formula Dialog Box

7-2 Edit Channel Table

Displays the dialog box used to set the channel table.

- **FREQUENCY**
  - **Channel Input**
    - **Channel Config**
      - **Edit Channel Table**
        - **Insert Line**
        - **Delete Line**
        - **Table Init**
        - **Table File Recall(CSV)**
        - **Table File Save(CSV)**

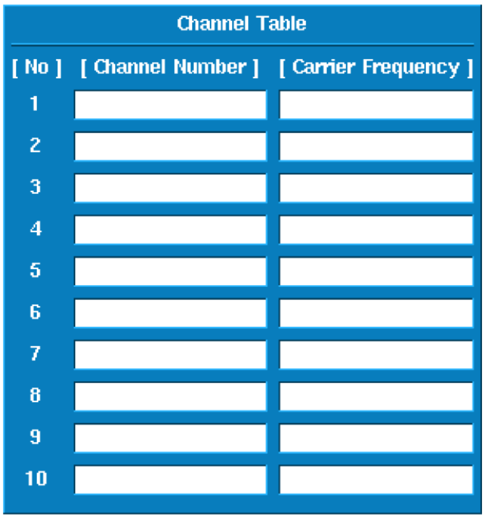


Figure 5-38 Edit Channel Table Dialog Box

7-2-1 Insert Line

Inserts a line in the channel table.

7-2-2 Delete Line

Deletes the line where the cursor is positioned.

7-2-3 Table Init

Initializes the channel table.

Clears all settings.

7-2-4 Table File Recall(CSV)

Reads the channel table setting from a file.

7-2-5 Table File Save(CSV)
Saves the channel table setting to a file.

7-3 Formula 1 ON|OFF
Sets the mathematical formula used in the channel input mode.
This function is enabled when Freq Input Mode is set to CALC.

7-4 Formula 2 ON|OFF
Same items as "7-3 Formula 1 ON|OFF."

7-5 Formula 3 ON|OFF
Same items as "7-3 Formula 1 ON|OFF."

5.2.21.7 Signal Identification ON|OFF

ON: Turns on the Signal Identification function.
Image signals shift to xx MHz on the screen for each sweep, but the real signals do not move.

OFF: Cancels the Signal Identification function.

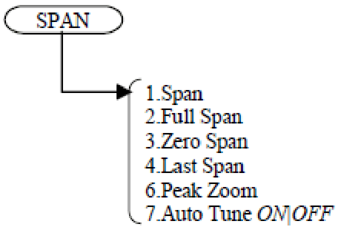
5.2.21.8 Image Suppression ON|OFF

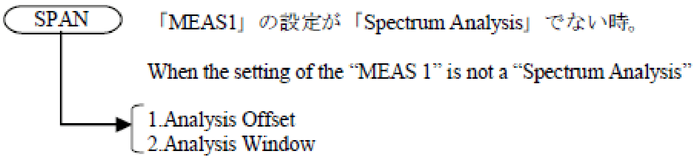
ON: Turns on the Image Suppression function.
Detects image signals and deletes them from the display.

OFF: Cancels the Image Suppression function.

5.2.22 SPAN

Displays the Span menu.

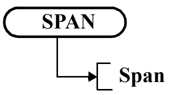




5.2.22.1 Span

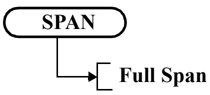
Activates the frequency span setting.

The frequency range is displayed by the center frequency and frequency span.



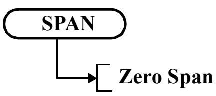
5.2.22.2 Full Span

Sets the frequency span to full span (SPAN - 8 GHz).



5.2.22.3 Zero Span

Sets zero span mode for the center frequency.



5.2.22.4 Last Span

Returns the frequency span to the previous value.

SPAN
→ **Last Span**

5.2.22.5 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.

SPAN
→ **Peak Zoom**

At this time, the frequency span is changed to 1/10 of the currently set value.

5.2.22.6 Auto Tune ON|OFF

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.

SPAN
→ **Auto Tune ON|OFF**

The reference level is set to the peak level of the searched signal.

ON: Starts AUTO TUNE.

OFF: Stops AUTO TUNE.

5.2.22.7 Analysis Offset

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

SPAN
→ **Analysis Offset**

Sets the analysis start point (Offset time from the top of the captured waveform) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, "Capture BW.")

5.2.22.8 Analysis Window

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

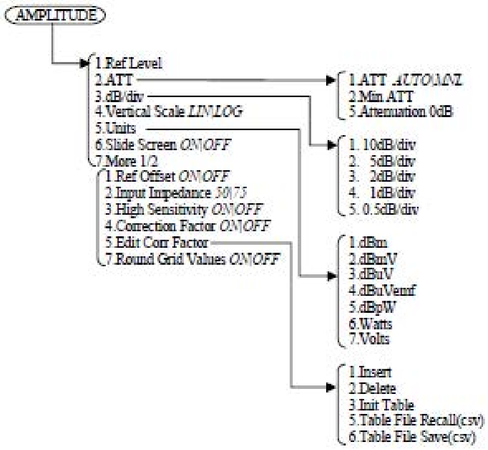
SPAN
→ **Analysis Window**

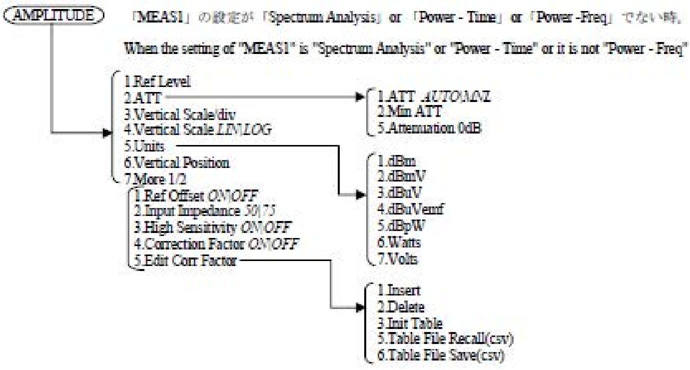
Sets the analysis time length (time that starts at the Analysis Offset setting value) of the measured signal waveform captured in the analyzer. (Refer to Section 5.2.25.7, "Capture BW.")

In FFT analysis, the analysis time length depends on Capture BW and the number of points in the horizontal axis.

5.2.23 AMPLITUDE

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



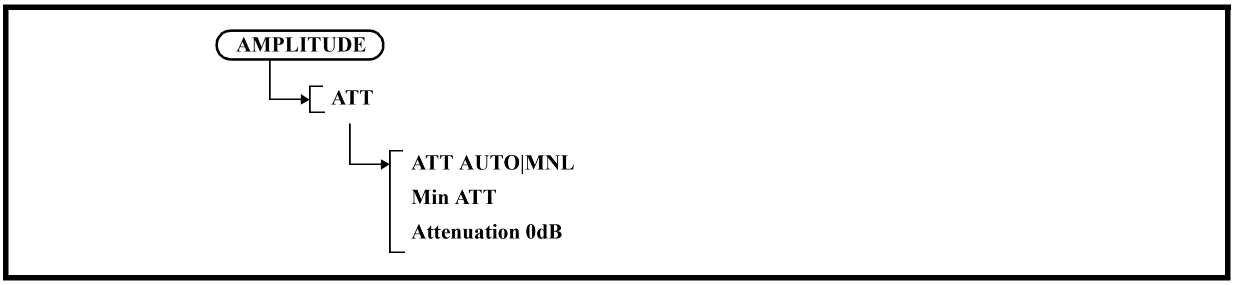


5.2.23.1 Ref Level

Activates the reference level setting.

5.2.23.2 ATT

Displays the Attenuation menu.



1. ATT AUTO|MNL
   Switches whether to set the attenuator function automatically or manually.
   AUTO: Automatically sets the attenuator value based on the reference level.
   MNL: Sets the attenuator value manually.
2. Min ATT
   Sets the minimum value of the attenuator.
   This setting is enabled only when the attenuator is set manually.
3. Attenuation 0dB
   Sets the attenuator to 0 dB.
   Displays the confirmation window before setting.
   Select OK with the step keys and press a unit key (ENTER) to confirm the entry.

5.2.23.3 dB/div

1. 10dB/div
   Sets the LOG scale to 10 dB/div.
2. 5dB/div
   Sets the LOG scale to 5 dB/div.
3. 2dB/div
   Sets the LOG scale to 2 dB/div.
4. 1dB/div
   Sets the LOG scale to 1 dB/div.
5. 0.5dB/div
   Sets the LOG scale to 0.5 dB/div.

5.2.23.4 Vertical Scale LIN|LOG

AMPLITUDE
Vertical Scale LIN|LOG

LIN: Displays waveform data on a linear scale.

LOG: Displays waveform data on a log scale.

5.2.23.5 Units

AMPLITUDE
Units
dBm
dBmV
dBuV
dBuVemf
dBpW
Watts
Volts

1. dBm
   Sets the display unit to dBm.
2. dBmV
   Sets the display unit to dBmV.
3. dBuV
   Sets the display unit to dBμV.
4. dBuVemf
   Sets the display unit to dμVemf.
5. dBpW
   Sets the display unit to dBpW.
6. Watts
   Sets the display unit to Watts.
7. Volts
   Sets the display unit to Volts.

5.2.23.6 Slide Screen ON|OFF

Scrolls the screen display up and down in the range of -100% to +100%.

AMPLITUDE
→ Slide Screen ON|OFF

ON: Enables the function. Enter the amount of the display scrolls by using the knob, step keys or keypad.

OFF: Cancels the slide function.

5.2.23.7 Ref Offset ON|OFF

Switches the reference level offset function on and off.

AMPLITUDE
→ Ref Offset ON|OFF

ON: The offset level can be set in the range of -100.0 dB 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 function.

5.2.23.8 Input Impedance 50|75

AMPLITUDE
→ Input Impedance 50|75

50: Converts the level assuming that the input impedance is 50 Ω. This setting is the standard value that is 50.

75: Converts the level assuming that the input impedance is 75 Ω.
The 6 dB conversion loss of the ZT-130NC, a 75/50 Ω impedance converter, is added automatically.

5.2.23.9 High Sensitivity ON|OFF

Switches the high-sensitivity input function ON and OFF.

AMPLITUDE
└→ **High Sensitivity ON|OFF**

ON: Turns on the built-in preamp. Here, the preamp gain is corrected at each frequency and therefore it does not need to be considered in level measurement.

OFF: Turns off the built-in preamp.

5.2.23.10 Correction Factor ON|OFF

AMPLITUDE
└→ **Correction Factor ON|OFF**

ON: Corrects the display level according to the correction table.

OFF: Cancels the correction based on the correction data.

5.2.23.11 Edit Corr Factor

Displays the Corr Fact menu and the correction table.

AMPLITUDE
└→ **Edit Corr Fact**
  └→ **Insert**
    Delete
    Init Table
    Table File Recall(CSV)
    Table File Save(CSV)

A frequency of up to 400 GHz and a level between -100 dB and + 100 dB can be set.

1. Insert
   Inserts a line in the correction table.

2. Delete
   Deletes the line on which the cursor is positioned in the correction table.
3. Init Table
   Clears all settings in the correction table.
4. Table File Recall(CSV)
   Reads the correction table from a file.
5. Table File Save(CSV)
   Saves the correction table to a file.

5.2.23.12 Round Grid Values ON|OFF

AMPLITUDE
└→ 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.

5.2.23.13 Ref Level

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Activates the reference level setting.

AMPLITUDE
└→ Ref Level

5.2.23.14 ATT

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Displays the Attenuation menu.

AMPLITUDE
- **ATT**
  - **ATT AUTO|MNL**
  - **Min ATT**
  - **Attenuation 0dB**

1. ATT AUTO|MNL
   Switches whether to set the attenuator function automatically or manually.
   AUTO: Automatically sets the attenuator value based on the reference level.
   MNL: Sets the attenuator value manually.
2. Min ATT
   Sets the minimum value of the attenuator.
   This setting is enabled only when the attenuator is set manually.
3. Attenuation 0dB
   Sets the attenuator to 0 dB.
   Displays the confirmation window before setting.
   Select OK with the step keys and press a unit key (ENTER) to confirm the entry.

5.2.23.15 Vertical Scale/div

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Sets the division of Vertical Scale.

AMPLITUDE
- **Vertical Scale/div**

5.2.23.16 Vertical Scale LIN|LOG

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

AMPLITUDE

- **Vertical Scale LIN|LOG**

LIN: Displays waveform data on a linear scale.

LOG: Displays waveform data on a log scale.

5.2.23.17 Units

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

AMPLITUDE

- **Units**
  - **dBm**
  - **dBmV**
  - **dBuV**
  - **dBuVemf**
  - **dBpW**
  - **Watts**
  - **Volts**

1. dBm
   Sets the display unit to dBm.
2. dBmV
   Sets the display unit to dBmV.
3. dBuV
   Sets the display unit to dBμV.
4. dBuVemf
   Sets the display unit to dBμVemf.
5. dBpW
   Sets the display unit to dBpW.

6. Watts
   Sets the display unit to Watts.
7. Volts
   Sets the display unit to Volts.

5.2.23.18 Vertical Position

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Sets the position of Vertical Scale.

5.2.23.19 Ref Offset ON|OFF

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Switches the reference level offset function on and off.

ON: The offset level can be set in the range of -100.0 dB 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 function.

5.2.23.20 Input Impedance 50|75

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

AMPLITUDE

Input Impedance 50|75

50: Converts the level assuming that the input impedance is 50 Ω. This setting is the standard value that is 50.

75: Converts the level assuming that the input impedance is 75 Ω.
The 6 dB conversion loss of the ZT-130NC, a 75/50 Ω impedance converter, is added automatically.

5.2.23.21 High Sensitivity ON|OFF

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Switches the high-sensitivity input function ON and OFF.

AMPLITUDE

High Sensitivity ON|OFF

ON: Turns on the built-in preamp. Here, the preamp gain is corrected at each frequency and therefore it does not need to be considered in level measurement.

OFF: Turns off the built-in preamp.

5.2.23.22 Correction Factor ON|OFF

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

AMPLITUDE

Correction Factor ON|OFF

ON: Corrects the display level according to the correction table.

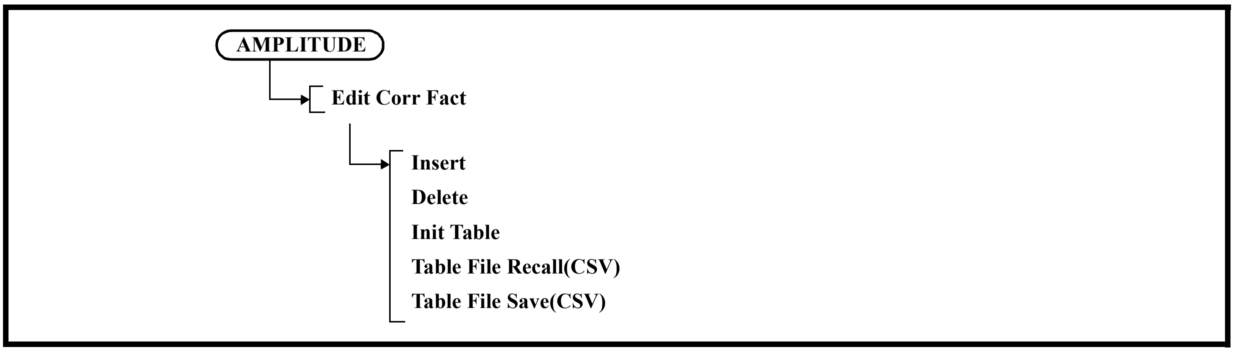
OFF: Cancels the correction based on the correction data.

5.2.23.23 Edit Corr Fact

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS, Power-Time, or Power-Freq.***

Displays the Corr Factor menu and the correction table.

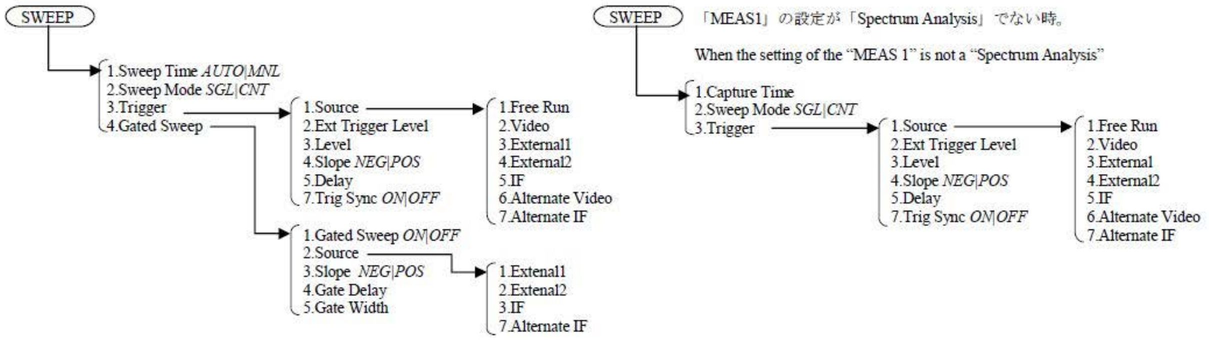
A frequency of up to 400 GHz and a level between -100 dB and + 100 dB can be set.



1. Insert
   Inserts a line in the correction table.
2. Delete
   Deletes the line on which the cursor is positioned in the correction table.
3. Init Table
   Clears all settings in the correction table.
4. Table File Recall(CSV)
   Reads the correction table from a file.
5. Table File Save(CSV)
   Saves the correction table to a file.

5.2.24 SWEEP

Displays the Sweep menu.



5.2.24.1 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.

5.2.24.2 Sweep Mode SGL|CNT

Sets the sweep mode.

SGL: Sets the SINGLE mode.
The sweep starts by pressing the START/STOP key and stops after sweeping once.

CNT: Sets the CONTINUOUS mode.
Repeats the sweep automatically by the next trigger signal after the sweep stops.

5.2.24.3 Trigger

Displays the Trigger menu.

SWEEP
- **Trigger**
  - **Source**
  - **Ext Trigger Level**
  - **Level**
  - **Slope NEG|POS**
  - **Delay**
  - **Trig Sync ON|OFF**

1. Source
   Displays the Trig Source menu.

SWEEP
- **Trigger**
  - **Source**
    - **Free Run**
    - **Video**
    - **External1**
    - **External2**
    - **IF**
    - **Alternate Video**
    - **Alternate IF**

1-1 Free Run
Repeats the sweep automatically.

1-2 Video
Performs sweep in synchronization with the video signal.

1-3 External1
Synchronizes the sweep with external trigger signal 1 (EXT terminal) and then starts the sweep.

1-4 External2
Synchronizes the sweep with external trigger signal 2 (EXT terminal) and then starts the sweep.

1-5 IF
Performs sweep in synchronization with the IF signal.

1-6 Alternate Video
Selects a Video trigger signal of the other channel.

1-7 Alternate IF
Selects an IF trigger signal of the other channel.

2. Ext Trigger Level
Sets the trigger signal for the external trigger signal.

3. Level
Sets the trigger level for the Video or IF trigger.

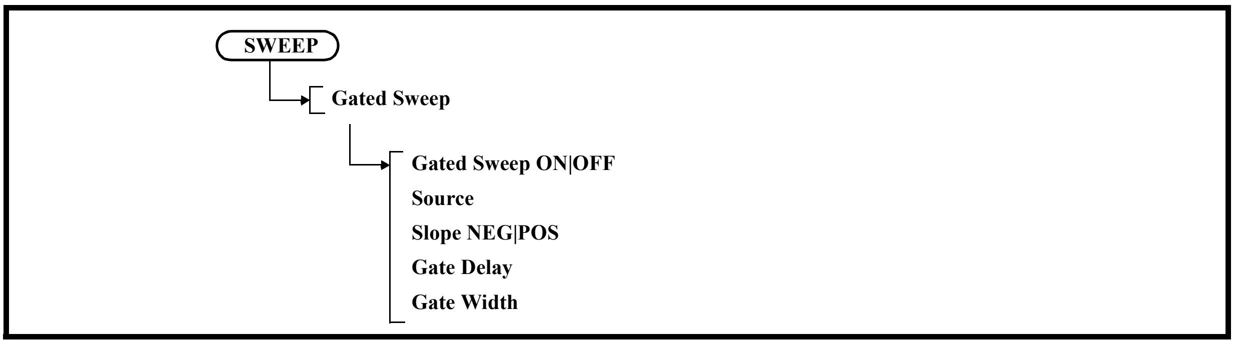
4. Slope NEG|POS
Switches the trigger slope polarity.
This setting is enabled only when the video trigger, external trigger or IF trigger is used.
NEG: The sweep starts at the falling edge of a trigger signal.
POS: The sweep starts at the rising edge of a trigger signal.

5. Delay
Sets the delay time from a trigger point.

6. Trig Sync ON|OFF
ON: When the trigger source of both channels is the same, sweep starts at the same time. When turning it ON, select the setting so that the trigger source of both channels is the same When the sweep time of each channel is different, the sweep cycle corresponds to the slower channel.
OFF: Cancels the trigger sync function. Each channel performs an asynchronous sweep.

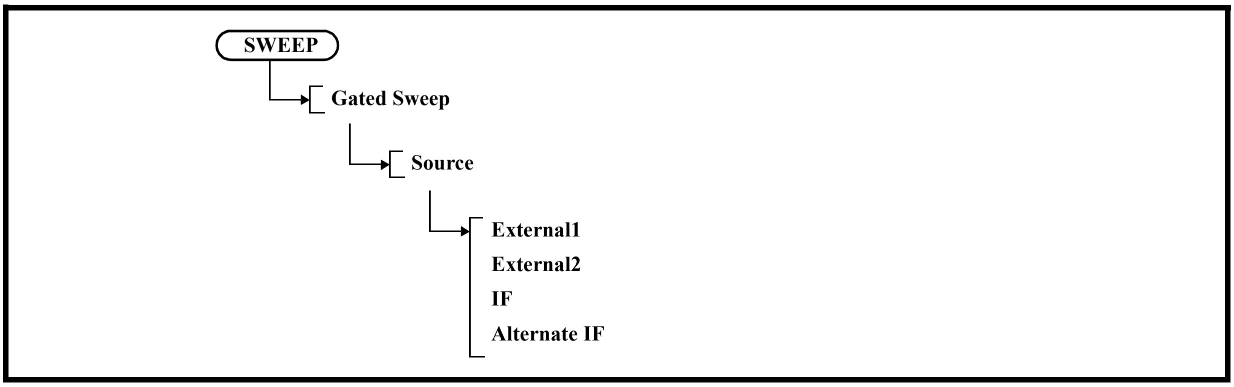
5.2.24.4 Gated Sweep

Displays the Gated Sweep menu.



1. Gated Sweep ON|OFF
Switches the gated sweep ON and OFF.
ON: Performs the gated sweep according to the set gate conditions (gate position and width).
OFF: Cancels the gated sweep mode.

2. Source
   Displays the Gate Source menu.



2-1 External1
Performs sweep in synchronization with external trigger signal 1.

2-2 External2
Synchronizes the sweep with external trigger signal 2 (EXT terminal) and then starts the sweep.

2-3 IF
Performs sweep in synchronization with the IF signal.

2-4 Alternate IF
Selects an IF trigger signal of the other channel.

3. 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.

4. Gate Delay
   Sets the delay time from a trigger point.
   Setting range: 0 - 1sec

5. Gate Width
   Sets the gate time width.
   Setting range: 50µsec - 1sec

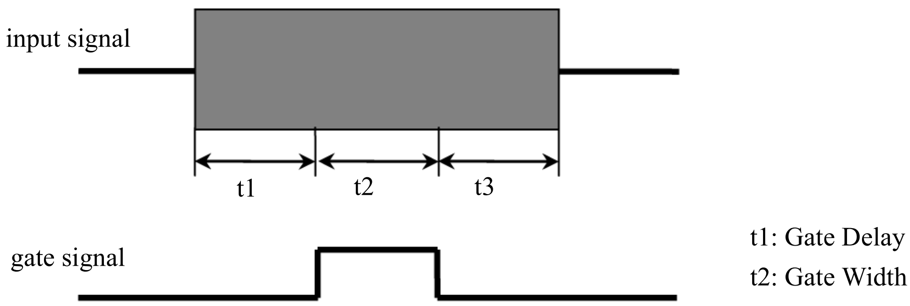


Figure 5-39 Gate Width Timing Chart

5.2.24.5 Capture Time

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

SWEEP
└→ **Capture Time**

Sets the capture time length of the waveform captured in the analyzer.

The maximum capture time depends on the Capture BW setting. (Refer to Section 5.2.25.7, "Capture BW.")

5.2.24.6 Sweep Mode SGL|CNT

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the sweep mode.

SWEEP
└→ **Sweep Mode SGL|CNT**

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.

5.2.24.7 Trigger

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Displays the Trigger menu.

SWEEP
- **Trigger**
  - **Source**
  - **Ext Trigger Level**
  - **Level**
  - **Slope NEG|POS**
  - **Delay**
  - **Trig Sync ON|OFF**

1. Source
   Displays the Trig Source menu.

SWEEP
- **Trigger**
  - **Source**
    - **Free Run**
    - **Video**
    - **External1**
    - **External2**
    - **IF**
    - **Alternate Video**
    - **Alternate IF**

1-1 Free Run
Repeats the sweep automatically.

1-2 Video
Performs sweep in synchronization with the video signal.

1-3 External1
Synchronizes the sweep with external trigger signal 1 (EXT terminal) and then starts the sweep.

1-4 External2
Synchronizes the sweep with external trigger signal 2 (EXT terminal) and then starts the sweep.

1-5 IF

Performs sweep in synchronization with the IF signal.

1-6 Alternate Video

Selects a Video trigger signal of the other channel.

1-7 Alternate IF

Selects an IF trigger signal of the other channel.

2. Ext Trigger Level

   Sets the trigger signal for the external trigger signal.

3. Level

   Sets the trigger level for the Video or IF trigger.

4. 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: The sweep starts at the falling edge of a trigger signal.

   POS: The sweep starts at the rising edge of a trigger signal.

5. Delay

   Sets the delay time from a trigger point.

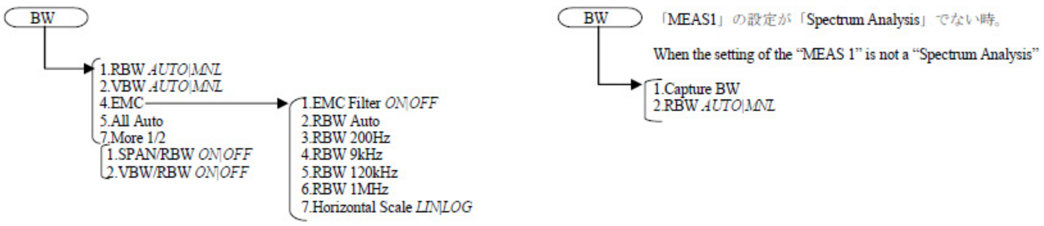
6. Trig Sync ON|OFF

   ON: When the trigger source of both channels is the same, sweep starts at the same time.
   When turning it ON, select the setting so that the trigger source of both channels is the same
   When the sweep time of each channel is different, the sweep cycle corresponds to the slower channel.

   OFF: Cancels the trigger sync function.
   Each channel performs an asynchronous sweep.

5.2.25 BW

Displays the Band Width menu.



5.2.25.1 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.

5.2.25.2 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.

5.2.25.3 EMC

Displays the EMC menu.

BW
- **EMC**
  - **EMC Filter ON|OFF**
  - **RBW Auto**
  - **RBW 200Hz**
  - **RBW 9kHz**
  - **RBW 120kHz**
  - **RBW 1MHz**
  - **Horizontal Scale LIN|LOG**

1. EMC Filter ON|OFF
   Cancels the EMC filter mode.
   ON: Uses the EMC filter mode.
   OFF: Cancels the EMC filter mode.
2. EBW Auto
   Sets the resolution bandwidth (RBW) automatically according to the measurement frequency band.
3. RBW 200Hz
   Sets the resolution bandwidth to 200 Hz.
4. RBW 9kHz
   Sets the resolution bandwidth (RBW) to 9 kHz.
5. RBW 120kHz
   Sets the resolution bandwidth (RBW) to 120 kHz.
6. RBW 1MHz
   Sets the resolution bandwidth (RBW) to 1 MHz.

CAUTION:

When EMC Filter is ON, the resolution bandwidth (RBW) is displayed as follows:
(Example) For RBW 120kHz:
<u>RBW</u> 120kHz

RBW is underlined.
Not displayed when EMC Filter is OFF.

---

7. Horizontal Scale LIN|LOG
   Sets LIN or LOG for Horizontal Scale.
   LIN: Displays the horizontal axis in linear format.
   LOG: Displays the horizontal axis in log format.

5.2.25.4 All Auto

Automatically sets the optimum RBW, VBW, and sweep time according to the frequency span setting.

BW

→ **All Auto**

5.2.25.5 SPAN/RBW ON|OFF

Switches the RBW versus frequency span function between the auto and manual settings.

BW

→ **SPAN/RBW ON|OFF**

ON: The frequency span versus RBW ratio can be changed.

OFF: The frequency span/RBW value is fixed to 100.

5.2.25.6 VBW/RBW ON|OFF

Switches the VBW versus RBW function between the auto and manual settings.

This setting is enabled only when the VBW is set to AUTO.

BW

→ **VBW/RBW ON|OFF**

ON: The VBW versus RBW ratio can be changed.

OFF: The VBW/RBW value is fixed to 1.

5.2.25.7 Capture BW

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Sets the frequency bandwidth of the waveform captured in the analyzer.

BW

Capture BW

For the Capture BW setting, Capture Time is automatically limited to a value within the maximum capture time.

Table 5-2 Capture BW Setting Value and Partial FFT Frequency Resolution

No.	Capture BW bandwidth setting	Partial FFT frequency resolution (NOTE)	Partial FFT analysis data length	
			Horizontal axis of 1001 points	Horizontal axis of 501 points
1	40 MHz	300 kHz	25 μsec	12.5 μsec
2	30 MHz	300 kHz	33 μsec	16.5 μsec
3	10 MHz	100 kHz	100 μsec	50 μsec
4	3 MHz	30 kHz	330 μsec	0.165 msec
5	1 MHz	10 kHz	1 msec	0.5 msec
6	300 kHz	3 kHz	3.3 msec	1.65 msec
7	100 kHz	1 kHz	10 msec	5 msec
8	30 kHz	300 Hz	33 msec	16.5 msec
9	10 kHz	100 Hz	100 msec	50 msec
10	3 kHz	30 Hz	330 msec	165 msec
11	1 kHz	10 Hz	1 sec	500 msec
12	300 Hz	3 Hz	3.3 sec	1.65 sec
13	100 Hz	1 Hz	10 sec	5 sec

NOTE: ***Partial FFT frequency resolution value when it is set to AUTO.***

Table 5-3 Capture BW Setting Value and Capture Time Maximum Value

No.	Capture BW bandwidth setting	Capture Time maximum capture time
1	40 MHz	120 ms
2	30 MHz	120 ms
3	10 MHz	240 ms
4	3 MHz	600 msec
5	1 MHz	2.0 sec
6	300 kHz	6.0 sec
7	100 kHz	20 sec
8	30 kHz	60 sec
9	10 kHz	200 sec
10	3 kHz	600 sec
11	1 kHz	1000 sec
12	300 Hz	1000 sec
13	100 Hz	1000 sec

5.2.25.8 RBW AUTO|MNL

NOTE: ***This is a menu that is displayed when the setting of MEAS1 is anything other than SPECTRUM ANALYSIS.***

Switches the RBW between auto and manual settings.

BW
→ **RBW AUTO|MNL**

AUTO: Automatically sets the optimum RBW according to the Capture BW setting.

MNL: The RBW can be set arbitrarily.

NOTE: ***The RBW is applied when the following settings are specified:***
Xmath: Differential or Math, and Display Type is Power-Freq or Phase-Freq
MEAS1: Power-Freq

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:

Table 6-1 Interface Types

Interface	Overview
GPIB (Talker/Listener mode)	The external controller controls the U3800 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 U3800 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).

6.2 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.

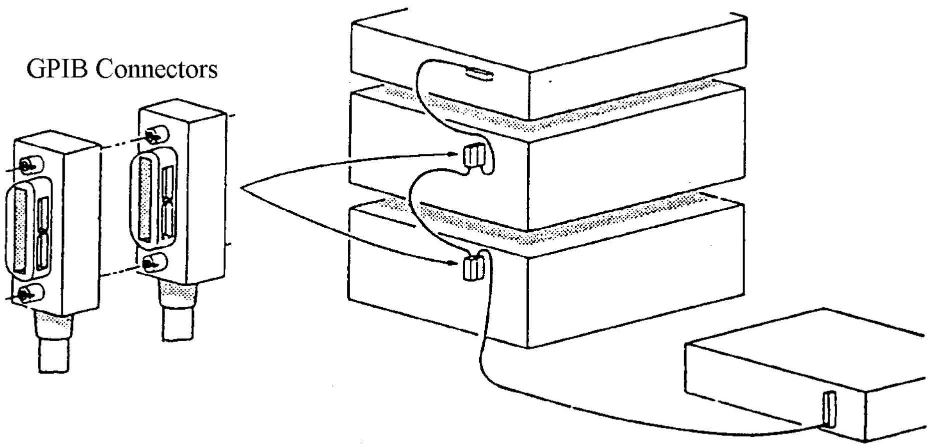


Figure 6-1 GPIB Connection

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.
- Ensure that all devices on the bus are turned on. If any device on the bus is not turned on, the system may not operate correctly.
- Turn off all devices on the bus before connecting or disconnecting GPIB cables.

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 6-2 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
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 6-3. 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 6-4.

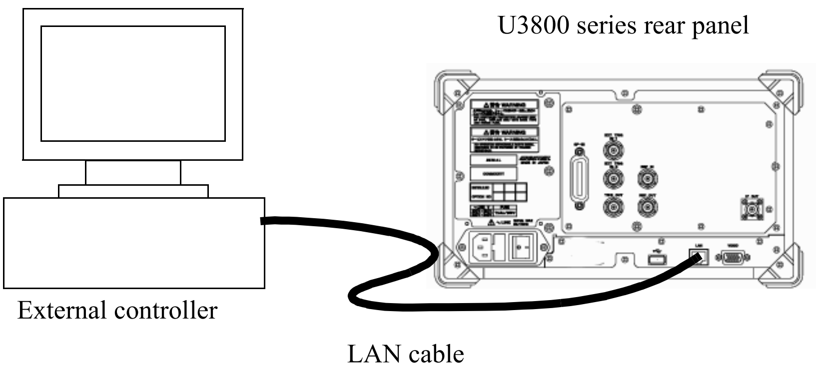


Figure 6-2 LAN Setup

Table 6-3 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	

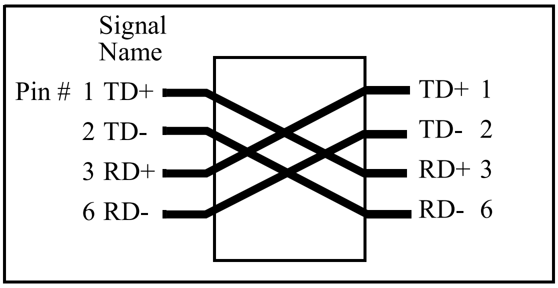


Figure 6-3 Connection of Cross-over Cables

Table 6-4 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.

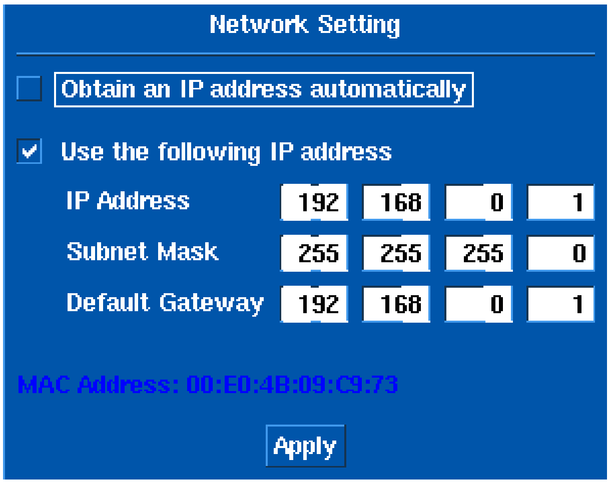


Figure 6-4 LAN IP Address Setting

   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.

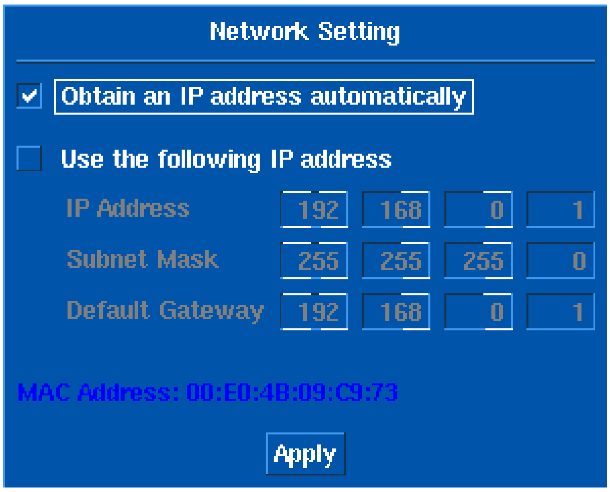


Figure 6-5 LAN IP Address (Automatically) Setting (1)

   Click the ***Apply*** button and press **Hz**.
   After an IP address is obtained, the IP address is displayed in the window.

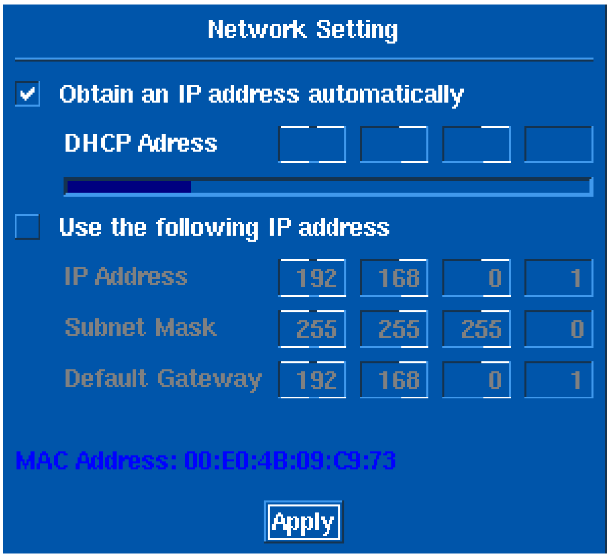


Figure 6-6 LAN IP Address (Automatically) Setting (2)

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.

Use semicolons (;) as the delimiter.

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

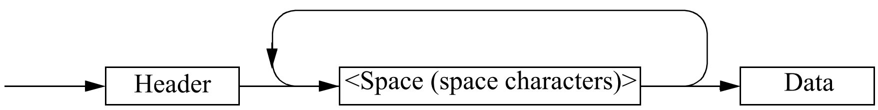
- When the parser executes a query, this instrument generates data on the output buffer as its response (that is, a query must be sent immediately before outputting data).

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.

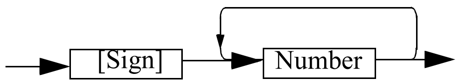
6.5.2 Data Formats

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

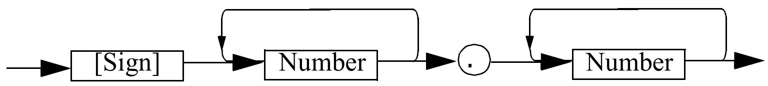
1. Numeric data

   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.

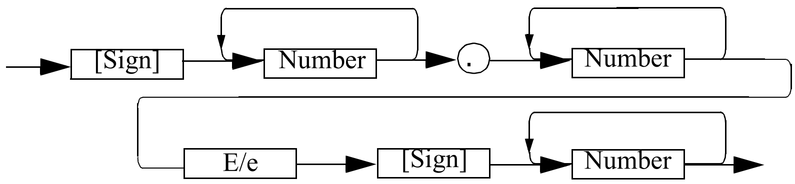
   - Integer type: NR1 format



   - Fixed-point type: NR2 format



   - Floating-point type: NR3 format



2. Unit

   Available units are listed below:

Table 6-5 Units which Can Be Used (1 of 2)

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

Table 6-5 Units which Can Be Used (2 of 2)

Unit	Exponential	Description
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.

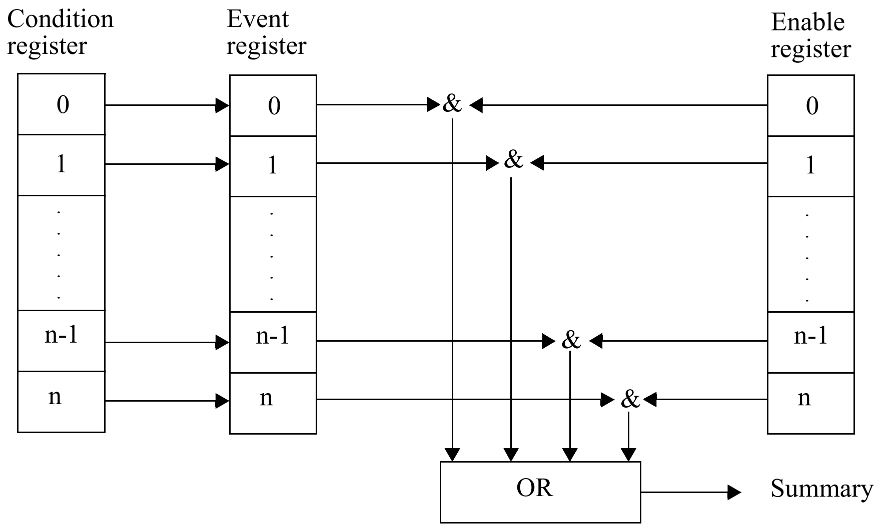


Figure 6-7 Conditions Set for Status Byte Register

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 6-8.

The details of the status register are shown in Figure 6-9.

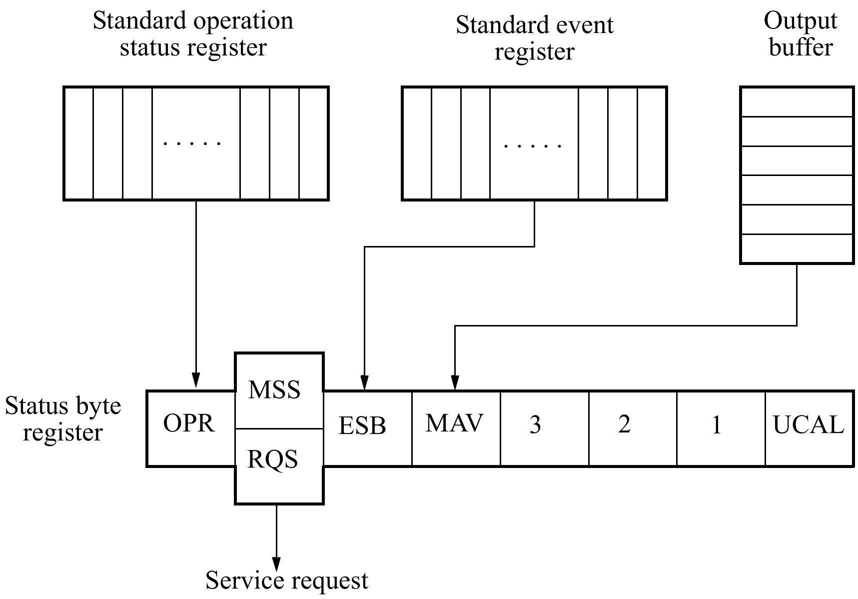


Figure 6-8 Status Register Arrangement

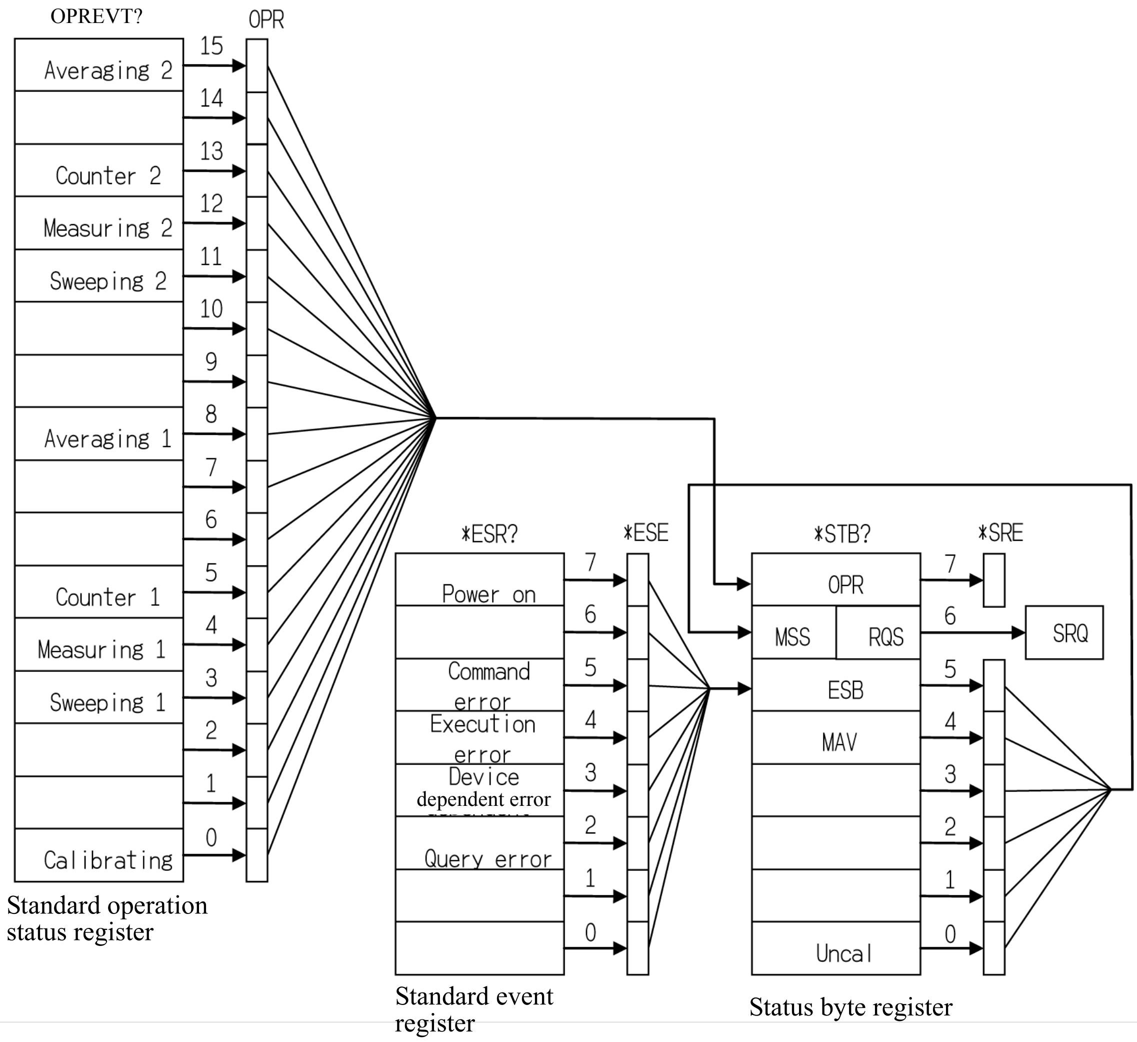


Figure 6-9 Details of Status Register

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:

Table 6-6   Standard Operation Status Register

Bit	Function definition	Description
15	Averaging 2	Set to 1 when averaging of channel 2 is complete.
14		
13	Counter 2	Set to 1 when the counter measurement of channel 2 is complete.
12	Measuring 2	Set to 1 when the sequence measurement of channel 2 is complete.
11	Sweeping 2	Set to 1 when the sweep of channel 2 is complete.
10		
9		
8	Averaging 1	Set to 1 when averaging of channel 1 is complete.
7		
6		
5	Counter 1	Set to 1 when the counter measurement of channel 1 is complete.
4	Measuring 1	Set to 1 when the sequence measurement of channel 1 is complete.
3	Sweeping 1	Set to 1 when the sweep of channel 1 is complete.
2		
1		
0	Calibrating	Set to 1 when correction data acquisition is complete.

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 6-10.

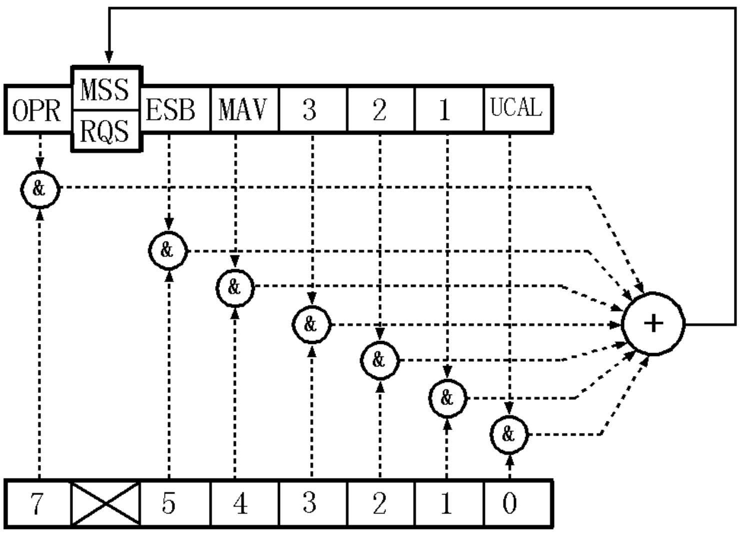


Figure 6-10 Structure of the Status Byte Register

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:

Table 6-7 Meaning of Each Bit in Status Byte Register

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:

Table 6-8 Meaning of Each Bit in Standard Event Register

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 Operation of TS Command upon Dual CH

TS (Take Sweep)

When the TS command is executed, the specified channel switches to single sweep mode and starts sweeping. The GPIB bus maintains the hold state during the sweep, and the next command waits for the completion of the sweep and then it is executed.

6.8.1 Operation

1. TS
   Starts a sweep of the active channel, and holds the GPIB bus until the sweep of the active channel is complete.

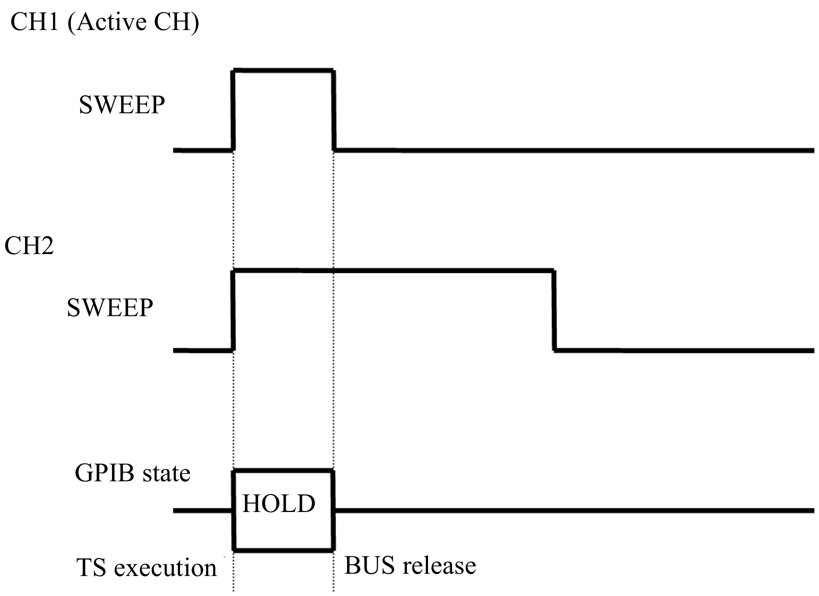


Figure 6-11 TS Command Timing Chart for Dual CH

NOTE: The non-active CH does not relate to TS.

2. TSM

   Starts sweeps of channels 1 and 2 at the same time, and holds the GPIB bus until the sweeps of both channels is complete.

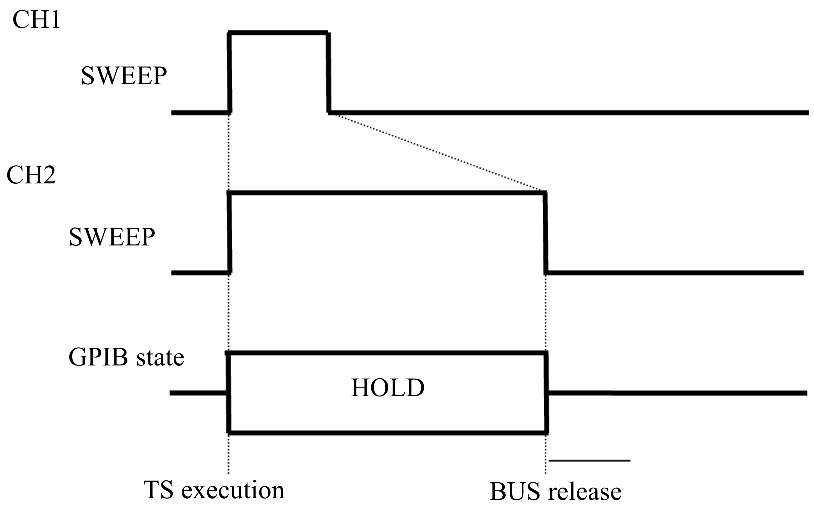


Figure 6-12 TSM Command Timing Chart for Dual CH

3. TSS

   Starts sweeps of channels 1 and 2 at the same time, and holds the GPIB bus until a channel, whichever completes the sweep faster, completes the sweep.

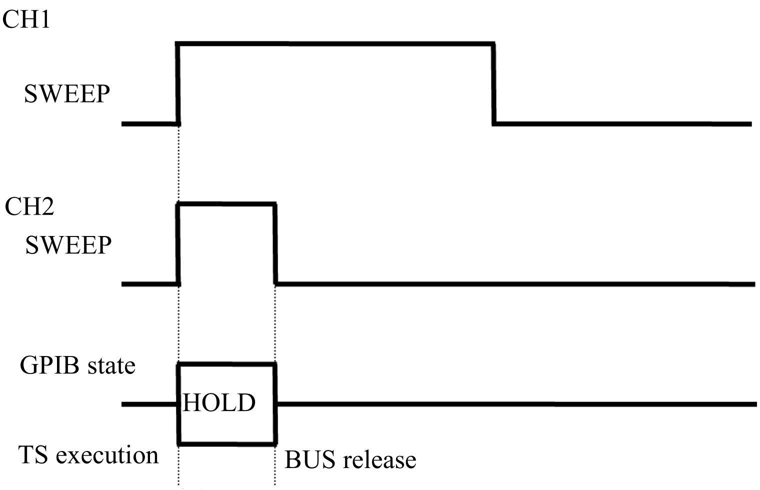


Figure 6-13 TSS Command Timing Chart for Dual CH

6.9 AT Command List

6.9.1 Mode

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Dual Channel	DUAL*	ON|OFF	DUAL?	0 = OFF 1 = ON
2	Active Channel Select	ACTCH*	CH1|CH2	ACTCH?	1 = CH1 2 = CH2
3	Couple Channel	CPLCH*	ON|OFF	CPLCH?	0 = OFF 1 = ON
4	Display mode	DISP*	SPLIT|FULL1| FULL2|OLAY	DISP?	0 = SPLIT 1 = FULL1 2 = FULL2 3 = OLAY
5	Copy Settings Copy CH1 → CH2 Copy CH2 → CH1	 CP1TO2 CP2TO1	---	---	---
6	Copy Table Copy CH1 → CH2 Copy CH2 → CH1 Copy Setup Copy CH1 → CH2 Copy CH2 → CH1	 CP1TBLTO2 CP2TBLTO1 CP1SETTO2 CP2SETTO1	---	---	---
7	SYSTEM MODE	SYSMODE*	SYNC|ASYNC| SCH1|SCH2	SYSMODE?	0 = DualSyncCH 1 =DualAsyncCH 2 = Single CH1 3 = Single CH2
8	MEAS1	MEASFUNC*	FRE|PHA|PWR| IQ|FFT|SPA	MEASFUNCRES?	0 = Freq-Time 1 = Phase-Time 2 = Power-Time 3 = Voltage-Time 4 = Power-Freq 9 = SPA

6.9.2 Power Ratio Phase Diff

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Execute	XPRPDON*	ON|OFF	XPRPDON?	0 = OFF 1 = ON
2	Ref CH	XREFCH*	CH1|CH2	XREFCH?	1 = CH1 2 = CH2
3	Capture Time	XCAPTIM*	Time	XCAPTIM?	Time
4	Capture BW	XCAPBW*	Frequency	XCAPBW?	Frequency
5	Analysis Window Width	XPRPDATIM*	Time	XPRPDATIM?	Time
6	Analysis Window Offset	XPRPDAOFS*	Time	XPRPDAOFS?	Time
7	Vector Correction ON|OFF	VCORR*	ON|OFF	VCORR?	0 = OFF 1 = ON
8	Vector Correction Current Frequency Get Correction Data	VCSMPLEXE	---	---	---
9	Vector Correction Specific Span Get Correction Data	VCSPANEXE	---	---	---
10	Vector Correction Start Frequency	VCFA*	Frequency	VCFA?	Frequency
11	Vector Correction Stop Frequency	VCFB*	Frequency	VCFB?	Frequency
12	Vector Correction Step Frequency	VCFSTEP*	Frequency	VCFSTEP?	Frequency
13	Vector Correction Default Conditions	VCDEFCND	---	---	---
14	Vector Correction Inband Get Correction Data	VCINBEXE	---	---	---
15	Correction Signal Level Adjust	VCSIGLVLADJ*	ON|OFF	VCSIGLVLADJ?	0 = OFF 1 = ON
16	Signal Source INT|EXT	VCSIGSRC*	INT|EXT	VCSIGSRC?	0 = INT 1 = EXT
17	VCSTAT	---	---	VCSTAT?	0 = OFF 1 = ON <0 = Error

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
18	Re-Calculation ON|OFF	RECALCON*	ON|OFF	RECALCON?	0 = OFF 1 = ON

6.9.3 Differential

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Execute	XDIFFON*	ON|OFF	XDIFFON?	0 = OFF 1 = ON
2	Ref CH	XREFCH*	CH1|CH2	XREFCH?	1 = CH1 2 = CH2
3	Capture Time	XCAPTTIM*	Time	XCAPTTIM?	Time
4	Capture BW	XCAPTBW*	Frequency	XCAPTBW?	Frequency
5	Screen Select	XSCRSEL*	SCR1|SCR2	XSCRSEL?	1 = Screen1 2 = Screen2
6	Screen1/2 Display Type	XDISP*	FRE|PHA|PWR|FFT	XDISP?	0 = Freq-Time 1 = Phase-Time 2 = Power-Time 4 = Power-Freq
7	Screen1/2 Analysis Window Width	XATIM*	Time	XATIM?	Time
8	Screen1/2 Analysis Window Offset	XAOFS*	Time	XAOFS?	Time
9	Vector Correction ON|OFF	VCORR*	ON|OFF	VCORR?	0 = OFF 1 = ON
10	Vector Correction Current Frequency Get Correction Data	VCSMPLEXE	---	---	---
11	Vector Correction Specific Span Get Correction Data	VCSPANEXE	---	---	---
12	Vector Correction Start Frequency	VCFA*	Frequency	VCFA?	Frequency
13	Vector Correction Stop Frequency	VCFB*	Frequency	VCFB?	Frequency
14	Vector Correction Step Frequency	VCFSTEP*	Frequency	VCFSTEP?	Frequency

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
15	Vector Correction Default Conditions	VCDEFCND	---	---	---
16	Vector Correction Inband Get Correction Data	VCINBEXE	---	---	---
17	Correction Signal Level Adjust	VCSIGLVLADJ*	ON|OFF	VCSIGLVLADJ?	0 = OFF 1 = ON
18	Signal Source INT|EXT	VCSIGSRC*	INT|EXT	VCSIGSRC?	0 = INT 1 = EXT
19	VCSTAT	---	---	VCSTAT?	0 = OFF 1 = ON <0 = Error
20	Re-Calculation ON|OFF	RECALCON*	ON|OFF	RECALCON?	0 = OFF 1 = ON

6.9.4 Math

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Execute	XMATHON*	ON|OFF	XMATHON?	0 = OFF 1 = ON
2	Capture Time	XCAPTIM*	Time	XCAPTIM?	Time
3	Capture BW	XCAPTBW*	Frequency	XCAPTBW?	Frequency
4	Screen Select	XSCRSEL*	SCR1|SCR2	XSCRSEL?	1 = Screen1 2 = Screen2
5	CH1 Config Magnitu-deMultiplier	XCH1MAG* XCH1MAG*	ON|OFF Real	XCH1MAGON? XCH1MAG?	0 = OFF 1 = ON Real
6	CH1 Config Phase-Shift	XCH1PHA* XCH1PHA*	ON|OFF Phase(degree)	XCH1PHAON? XCH1PHA?	0 = OFF 1 = ON Phase(degree)
7	CH1 Config TimeShift	XCH1TIM* XCH1TIM*	ON|OFF Time	XCH1TIMON? XCH1TIM?	0 = OFF 1 = ON Time
8	CH2 Config Magnitu-deMultiplier	XCH2MAG* XCH2MAG*	ON|OFF Real	XCH2MAGON? XCH2MAG?	0 = OFF 1 = ON Real

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
9	CH2 Config Phase-Shift	XCH2PHA* XCH2PHA*	ON|OFF Phase(degree)	XCH2PHAON? XCH2PHA?	0 = OFF 1 = ON Phase(degree)
10	CH2 Config TimeShift	XCH2TIM* XCH2TIM*	ON|OFF Time	XCH2TIMON? XCH2TIM?	0 = OFF 1 = ON Time
11	Math Config left-hand side	XLHSCH*	CH1|CH2	XLHSCH?	1 = CH1 2 = CH2
12	Math Config math operator	XMATHOP*	ADD|SUB|MUL|DIV	XMATHOP?	0 = Addition 1 = Subtraction 2 = Multiplication 3 = Division
13	Math Config right-hand side	XRHSCH*	CH1|CH2	XRHSCH?	1 = CH1 2 = CH2
14	Domain	XDOM*	XTIM|XFRE	XDOM?	0 = Time 1 = Frequency
15	Display Type	XDISP*	FRE|PHA|PWR|FFT|PHF	XDISP?	0 = Freq-Time 1 = Phase-Time 2 = Power-Time 4 = Power-Freq 5 = Phase-Freq
16	Vertical Scale Phase-Freq	VSCLPHF*	Phase	VSCLPHF?	Phase
17	Vertical Position Phase-Freq	VPOSPHF*	Position	VPOSPHF?	Position
18	Display Line Phase-Freq	DLNPHF*	Phase	DLNPHF?	Phase
19	Reference Line Phase-Freq	RLNPHF*	Phase	RLNPHF?	Phase
20	Threshold	THRIQ* THRPWR* THRFRE* THRPHA* THRFFT* THRPHF* THRESH*	Volt dBm Frequency Phase dBm Phase ON|OFF	THRIQ? THRPWR? THRFRE? THRPHA? THRFFT? THRPHF? THRESHON?	Volt dBm Frequency Phase dBm Phase 0=OFF, 1=ON
21	Squelch	SQL* SQLLVL*	ON|OFF Real	SQL? SQLLVL?	0 = OFF 1 = ON Real(Level)
22	Analysis Window Width	XATIM*	Time	XATIM?	Time

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
23	Analysis Window Offset	XAOFS*	Time	XAOFS?	Time
24	Vector Correction ON|OFF	VCORR*	ON|OFF	VCORR?	0 = OFF 1 = ON
25	Vector Correction Current Frequency Get Correction Data	VCSMPLEXE	---	---	---
26	Vector Correction Specific Span Get Correction Data	VCSPANEXE	---	---	---
27	Vector Correction Start Frequency	VCFA*	Frequency	VCFA?	Frequency
28	Vector Correction Stop Frequency	VCFB*	Frequency	VCFB?	Frequency
29	Vector Correction Step Frequency	VCFSTEP*	Frequency	VCFSTEP?	Frequency
30	Vector Correction Default Conditions	VCDEFCND	---	---	---
31	Vector Correction Inband Get Correction Data	VCINBEXE	---	---	---
32	Correction Signal Level Adjust	VCSIGLVLADJ*	ON|OFF	VCSIGLVLADJ?	0 = OFF 1 = ON
33	Signal Source INT|EXT	VCSIGSRC*	INT|EXT	VCSIGSRC?	0 = INT 1 = EXT
34	VCSTAT	---	---	VCSTAT?	0 = OFF 1 = ON <0 = Error
35	Re-Calculation ON|OFF	RECALCON*	ON|OFF	RECALCON?	0 = OFF 1 = ON

6.9.5 Ch Power Diff

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Execute	CHPDIFON*	ON|OFF	CHPDIFON?	0 = OFF 1 = ON
2	Ch Pow Diff Result	--	--	CHPDIF?	Lev

6.9.6 Frequency

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Center Frequency	CF*	Frequency	CF?	Frequency
2	CF Step Size	CS*	Frequency	CS?	Frequency
3	CF Step Auto	CA [*]	[ON]|OFF	CA?	0 = OFF (manual) 1 = ON (auto)
4	Frequency Offset	FO [ON,]* FO ON|OFF	Frequency	FO? FOON?	Frequency 0 = OFF 1 = ON
5	Start Frequency	FA*	Frequency	FA?	Frequency
6	Stop Frequency	FB*	Frequency	FB?	Frequency
7	Frequency Span	SP*	Frequency	SP?	Frequency
8	Full Span	FS	---	---	---
9	Zero Span	ZS	---	---	---
10	Last Span	LTSP|LS	---	---	---
11	Frequency Setting Mode	FINPMD*	CALC|TBL	FINPMD?	0 = CALC 1 = TBL
12	Set Start Channel Off-set	FACHO*	Frequency	FACHO?	Frequency
13	Set Stop Channel Off-set	FBCHO*	Frequency	FBCHO?	Frequency
14	Start Channel Offset	FACHOON*	ON|OFF	FACHOON?	0 = OFF 1 = ON
15	Stop Channel Offset	FBCHOON*	ON|OFF	FBCHOON?	0 = OFF 1 = ON

6.9.6 Frequency

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
16	Set Center Channel	CFCH*	Integer	CFCH?	Integer (Channel Number)
17	Set Start Channel	FACH*	Integer	FACH?	Integer (Channel Number)
18	Set Stop Channel	FBCH*	Integer	FBCH?	Integer (Channel Number)
19	Center Channel Setting	CFCHON*	ON|OFF	CFCHON?	0 = OFF 1 = ON
20	Start Channel Setting	FACHON*	ON|OFF	FACHON?	0 = OFF 1 = ON
21	Stop Channel Setting	FBCHON*	ON|OFF	FBCHON?	0 = OFF 1 = ON
22	Channel Type 1 Input3 Formulas :	CHCALC1 *,*,*,*,* CHCALC2 *,*,*,*,* CHCALC3 *,*,*,*,*	Integer, Integer, Frequency, Frequency, Integer	---	---
23	Formula 1 for Type 1	CHCON1*	ON|OFF	CHCON1?	0 = OFF 1 = ON
24	Formula 2 for Type 1	CHCON2*	ON|OFF	CHCON2?	0 = OFF 1 = ON
25	Formula 3 for Type 1	CHCON3*	ON|OFF	CHCON3?	0 = OFF 1 = ON
26	Channel Type 2 Input	CHTIN*,*	Integer, Frequency	---	---
27	Channel Type 2 Dele-tion	CHTDEL	---	---	---
28	Signal Ident	SIGID*	ON|OFF	SIGID?	0 = OFF 1 = ON
29	Image Suppress	IMGSP*	ON|OFF	IMGSP?	0 = OFF 1 = ON
30	Auto Tune	TN	---	---	---
31	Peak Zoom	PKZOOM	---	---	---

6.9.7 Level

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Reference Level	RL*	Level	RL?	Level
2	Attenuation	AT*	DB (Integer)	AT?	DB (Integer)
3	Min Attenuation	ATMIN*	DB (Integer)	ATMIN?	DB (Integer)
4	Zero Attenuation	ZAT	---	---	---
5	Attenuation Auto	AA[*]	[ON]|OFF	AA?	0 = OFF (manual) 1 = ON (auto)
6	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
7	Linear × 1	LL1	---	---	---
8	Vertical Scale	VS*	LIN|LOG	VS?	0 = LOG 1 = LIN
9	Level Offset	RO* RO ON|OFF	DB	RO?	DB
				ROON?	0 = OFF 1 = ON
10	Hi Sens	HS[*]	[ON]|OFF	HS?	0 = OFF 1 = ON
11	Input	OHM*	Integer (Discr. Val.: 50, 75)	OHM?	Integer
12	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
13	Correction Factor ON OFF	 CR ON CR OFF	 --- ---	CRON?	0 = OFF 1 = ON
14	Table Input	CRIN*,*	Frequency, Level (DB)	---	---
15	Table Delete	CRDEL	---	---	---

6.9.8 Bandwidth

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	RBW	RB*	Frequency	RB?	Frequency
2	RBW Auto	BA[*]	[ON]|OFF	BA?	0 = OFF 1 = ON
3	VBW	VB*	Frequency	VB?	Frequency
4	VBW Auto	VA[*]	[ON]|OFF	VA?	0 = OFF (manual) 1 = ON (auto)
5	Couple All Auto	AL[*]	[ON]|OFF	AL?	0 = OFF 1 = ON (all auto)
6	RBW : Span	CORS* CORS ON[*] CORS OFF	Ratio (float)	CORS?	Ratio (float)
				CORSON?	0 = OFF 1 = ON
7	VBW : RBW	COVR* COVR ON[*] COVR OFF	Ratio (float)	COVR?	Ratio (float)
				COVRON?	0 = OFF 1 = ON

6.9.9 Sweep

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Sweep Time	SW*|ST*	Time	SW?|ST?	Time
2	Sweep Auto	AS[*]	[ON]|OFF	AS?	0 = OFF (manual) 1 = ON (auto)
3	Sweep Mode	---	---	SWM?	0 = Single 1 = Normal

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
4	Sweep Mode Normal				
	active Ch	SN|CONTS	---	---	---
	both Ch	SNALL| CONTSALL	---	---	---
	Ch1	SN1|CONTS1	---	---	---
	Ch2	SN2|CONTS2	---	---	---
5	Sweep Mode Single				
	active Ch	SI|SNGLS	---	---	---
	both Ch	SIALL| SNGLSALL	---	---	---
	Ch1	SI1|SNGLS1	---	---	---
	Ch2	SI2|SNGLS2	---	---	---
6	Take Sweep				
	active Ch	TS	---	---	---
	Ch1(*1)	TSM	---	---	---
	Ch2(*2)	TSS	---	---	---
7	Sweep Start / Stop				
	active Ch	SR	---	---	---
	both Ch	SRALL	---	---	---
	Ch1(*1)	SR1	---	---	---
	Ch2(*2)	SR2	---	---	---
8	Sweep Abort	SWPABORT	---	---	---
9	Gated Sweep Mode	GTSWP*	ON|OFF	GTSWP?	0 = OFF 1 = ON
10	Gate Source	GTSRC*	EXT|IF	GTSRC?	2 = EXT 3 = IF 5 = XIF 6 = EXT2
11	Gate Slope	GTSLP*	(FALL|NEG|-)| (RISE|POS|+)	GTSLP?	0= RISE|POS|+ 1= FALL|NEG|-
12	Gate Delay	GTPOS*	Time	GTPOS?	Time
13	Gate Width	GTWID*	Time	GTWID?	Time

(*1) Completed when both channels are "Sweep end."

(*2) Completed when either channel is "Sweep end."

6.9.10 Trigger

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Trigger Mode	TRGSRC*	FREE|IF|EXT| VIDEO|XVIDEO| XIF|EXT2	TRGSRC?	0 = FREE 1 = TRG_VIDEO 2 = TRG_EXT 3 = TRG_IF 4 = XVIDEO 5 = XIF 6 = EXT2
2	Video or IF Trigger Level	TRGLVL*	Level	TRGLVL?	Level
3	External Trigger Level	TRGTTLLVL*	Voltage	TRGTTLLVL?	Voltage
4	Trigger Slope	TRGSLP*	(FALL|NEG|-)| (RISE|POS|+)	TRGSLP?	0 = RISE|POS| +1 = FALL|NEG|-
5	Trigger Delay	TRGDLY*	Time	TRGDLY?	Time
6	Trigger Sync ON/OFF	SYNCTRIG*	ON|OFF	SYNCTRIG?	0 = OFF 1 = ON
7	Trigger Out CH Select	TRGOUTCH*	CH1|CH2	TRGOUTCH?	0 = CH1 1 = CH2
8	Trigger Out Through	TRGOUTTHR*	ON|OFF	TRGOUTTHR?	0 = OFF 1 = ON
9	External2 Trigger Level	TRGTTL2LVL*	Voltage	TRGTTL2LVL?	Voltage

6.9.11 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

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Trace Mode	---	---	T<n>?	0 = WRITE 1 = VIEW 2 = BLANK
2	Write	<n>W	---	---	---
3	View	<n>V	---	---	---
4	Blank	<n>B	---	---	---
5	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
6	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
7	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
8	Calc Mode : Max Hold	<n>MAX*	ON|OFF	<n>MAX?	0 = OFF 1 = ON
9	Calc Mode : Min Hold	<n>MIN*	ON|OFF	<n>MIN?	0 = OFF 1 = ON
10	Averaging and Power Averaging Times	<n>G*	Integer	<n>G?	Integer
11	Averaging and Power Averaging Times Active Trace	SWPCNT*	Integer	SWPCNT?	Integer

6.9.11 Trace

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Function</th><th colspan="2">Command (EXE, SET)</th><th colspan="2">Query (GET)</th></tr>
<tr><th>Code</th><th>Argument Format</th><th>Code</th><th>Output Format</th></tr>
<tr><td>12</td><td>Average Start</td><td><n>AVG*|
<n>GR</td><td>ON</td><td><n>AVG?</td><td>0 = OFF
1 = ON</td></tr>
<tr><td>13</td><td>Average Stop</td><td><n>AVG*|
<n>GS</td><td>OFF</td><td></td><td></td></tr>
<tr><td>14</td><td>Average : Pause</td><td><n>GP</td><td>---</td><td><n>GP?</td><td>0 = Continue
1 = Pause</td></tr>
<tr><td>15</td><td>Average : Continue</td><td><n>GC</td><td>---</td><td></td><td></td></tr>
<tr><td>16</td><td>Average : 1 Time</td><td><n>GSGL</td><td>---</td><td><n>GSGL?</td><td>0 = sliding
1 = once</td></tr>
<tr><td>17</td><td>Average : Continuous</td><td><n>GCNT</td><td>---</td><td></td><td></td></tr>
<tr><td>18</td><td>Power Average Start</td><td><n>PAVG*</td><td>ON</td><td><n>PAVG?</td><td>0 = OFF
1 = ON</td></tr>
<tr><td>19</td><td>Power Average Stop</td><td><n>PAVG*</td><td>OFF</td><td></td><td></td></tr>
<tr><td>20</td><td>Power Average : Pause</td><td><n>PGP</td><td>---</td><td><n>PGP?</td><td>0 = Continue
1 = Pause</td></tr>
<tr><td>21</td><td>Power Average : Continue</td><td><n>PGC</td><td>---</td><td></td><td></td></tr>
<tr><td>22</td><td>Power Average : 1 Time</td><td><n>PGSGL</td><td>---</td><td><n>PGSGL?</td><td>0 = sliding
1 = once</td></tr>
<tr><td>23</td><td>Power Average : Continuous</td><td><n>PGCNT</td><td>---</td><td></td><td></td></tr>
<tr><td>24</td><td>Math : Trace Store (Current trace → trace n)</td><td>STORE*</td><td>TRA|TRB|TRC|
TRXA|
TRXB TRXC</td><td>---</td><td>---</td></tr>
<tr><td>25</td><td>Number of Trace Points</td><td>TPS|TP*</td><td>501</td><td>TP?</td><td>0 = 501
1 = 1001</td></tr>
<tr><td>26</td><td></td><td>TPL|TP*</td><td>1001</td><td></td><td></td></tr>
<tr><td>27</td><td>Detector Mode Trace A</td><td>DET*</td><td>NRM|POS|NEG|
SMP|AVG|QP|
EMCAV</td><td>DET?</td><td>0 = NRM
1 = POS
2 = NEG
3 = SMP
4 = AVG
5 = QP
6 = EMCAV</td></tr>
<tr><td>28</td><td>Detector Mode Trace B</td><td>DETB*</td><td>NRM|POS|NEG|
SMP|AVG|QP|
EMCAV</td><td>DETB?</td><td>0 = NRM
1 = POS
2 = NEG
3 = SMP
4 = AVG
5 = QP
6 = EMCAV</td></tr>
</table>

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
29	Detector Mode Trace C	DETC*	NRM|POS|NEG| SMP|AVG|QP| EMCAV	DETC?	0 = NRM 1 = POS 2 = NEG 3 = SMP 4 = AVG 5 = QP 6 = EMCAV
30	Detector Mode Auto	DETA<n>*	ON|OFF	DETA<n>?	0 = OFF 1 = ON
31	Detector Average Mode	DETAVG*	RMS|VIDEO	DETAVG?	0 = VIDEO 1 = RMS
32	Select Active Trace	TRACESEL*	TRA|TRB|TRC| TRM|TRO	TRACESEL?	0 = TRA 1 = TRB 2 = TRC 3 = TRM 4 = TRO
33	Trace A I/O ASCII	TAA*	DDDDD<DLM>× TRP (*1)	TAA?	DDDDD<DLM>×T RP (*1)
34	Trace A I/O Binary	TBA*	2Bytes×TRP	TBA?	2Bytes×TRP
35	Trace B I/O ASCII	TAB*	DDDDD<DLM>× TRP (*1)	TAB?	DDDDD<DLM>×T RP (*1)
36	Trace B I/O Binary	TBB*	2Bytes×TRP	TBB?	2Bytes×TRP
37	Trace C I/O ASCII	TAC*	DDDDD<DLM>× TRP (*1)	TAC?	DDDDD<DLM>×T RP (*1)
38	Trace C I/O Binary	TBC*	2Bytes×TRP	TBC?	2Bytes×TRP
39	Trace Output Fornat				
40	16bits Integer	FORM1	---	---	
41	16bits Integer	FORM2	---	---	
42	IEEE 32bits Float	FORM3	---	---	
43	IEEE 32bits Float	FORM4	---	---	
44	Trace Data Binary Out Channel1 TraceA Channel2 TraceA Channel1 TraceB Channel2 TraceB Channel1 TraceC Channel2 TraceC	---	---	 TBA1? TBA2? TBB1? TBB2? TBC1? TBC2?	Follows the FORM command.

(*1) TRP: Number of trace points
<DLM>: Delimiter

6.9.12 Trace Math

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Math Trace Write	MTW	---	---	---
2	Math Trace View	MTV	---	---	---
3	Math Trace Blank	MTB	---	---	---
4	Cross Channel Math Trace Write	OW	---	---	---
5	Cross Channel Math Trace View	OV	---	---	---
6	Cross Channel Math Trace Blank	OB	---	---	---
7	TRACE MATH IN CHANNEL Math OFF	TRSUB*	OFF	TRSUB?	0 = OFF
8	Trace Math R/W IN CH Ascii	TAM		TAM?	
9	Trace Math R/W IN CH Bin	TBM		TBM?	
10	Trace Math R/W IN Channel1 BIN	---		TBM1?	
11	Trace Math R/W IN Channel2 BIN	---		TBM2?	
12	TRACE MATH IN CHANNEL A - B A - C A - DL B - A B - C B - DL C - A C - B C - DL	TRSUB*	 AMB AMC AMDL BMA BMC BMDL CMA CMB CMDL	TRSUB?	 1 = A - B 2 = A - C 3 = A - DL 4 = B - A 5 = B - C 6 = B - DL 7 = C - A 8 = C - B 9 = C - DL
13	TRACE MATH CROSS CHANNEL Math OFF	TRXSUBOFF	---	TRXSUB?	0 = OFF
14	Trace Math R/W CROSS CH Ascii	TAO		TAO?	
15	Trace Math R/W CROSS CH Bin	TBO		TBO?	

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
16	Trace Math R/W Channel1 BIN	---		TBO1?	
17	Trace Math R/W Channel2 BIN	---		TBO2?	
18	TRACE MATH CROSS CHANNEL CH1-CH2 A - A A - B A - C A - M B - A B - B B - C B - M C - A C - B C - C C - M M - A M - B M - C M - M	TRXSUB12*	 XAMA XAMB XAMC XAMM XBMA XBMB XBMC XBMM XCMA XCMB XCMC XCMM XMMA XMMB XMMC XMMM	TRXSUB?	 0 = OFF 1 = XAMA 2 = XAMB 3 = XAMC 4 = XAMM 5 = XBMA 6 = XBMB 7 = XBMC 8 = XBMM 9 = XCMA 10 = XCMB 11 = XCMC 12 = XCMM 13 = XMMA 14 = XMMB 15 = XMMC 16 = XMMM
19	TRACE MATH CROSS CHANNEL CH2-CH1 A - A A - B A - C A - M B - A B - B B - C B - M C - A C - B C - C C - M M - A M - B M - C M - M	TRXSUB21*	 XAMA XAMB XAMC XAMM XBMA XBMB XBMC XBMM XCMA XCMB XCMC XCMM XMMA XMMB XMMC XMMM	TRXSUB?	 17 = XAMA 18 = XAMB 19 = XAMC 20 = XAMM 21 = XBMA 22 = XBMB 23 = XBMC 24 = XBMM 25 = XCMA 26 = XCMB 27 = XCMC 28 = XCMM 29 = XMMA 30 = XMMB 31 = XMMC 32 = XMMM
20	TRACE MATH CROSS CHANNEL Calc Mode	CALCO*	OFF MIN MAX	CALCO?	0 = OFF 1 = MIN 2 = MAX

6.9.13 Pass/Fail

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Pass/Fail Judgement	PFC*	ON|OFF	PFC?	0 = OFF 1 = ON
2	Judgement Result	---	---	PFJ?|OPF?	0 = Pass 4 = Error 1 = Fail Limit 1 2 = Fail Limit 2 3 = Fail Limit 1&2
3	X Position Mode	LIMPOS*	ABS|LFT|CENT	LIMPOS?	0 = ABS 1 = CENT (center freq) 2 = LFT (start freq)
4	Y Position Mode	LIMAPOS*	ABS|REF|DL	LIMAPOS?	0 = ABS 1 = REF 2 = DL
5	X Offset Activate	LIMS*	ON|OFF	LIMS?	0 = OFF 1 = ON
6	X Offset Frequency Domain	LIMSF*	Frequency	LIMSF?	Frequency
7	X Offset Time Domain	LIMST*	Time	LIMST?	Time
8	Y Offset Activate	LIMAS*	ON|OFF	LIMAS?	0 = OFF 1 = ON
9	Y Offset	LIMASFT*	DB	LIMASFT?	DB
10	Limit Line 1	LMTA*	ON|OFF	LMTA?	0 = OFF 1 = ON
11	Limit Line 1 Frequency Domain Data Input	LMTAINF*,*	Frequency, Level	---	---
12	Limit Line 1 Time Domain Data Input	LMTAINT*,*	Time, Level	---	---
13	Limit Line 1 Frequency Domain Data Erase	LMTADELF	---	---	---
14	Limit Line 1 Time Domain Data Erase	LMTADELT	---	---	---
15	Limit Line 2	LMTB*	ON|OFF	LMTB?	0 = OFF 1 = ON

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
16	Limit Line 2 Frequency Domain Data Input	LMTBINF*,*	Frequency, Level	---	---
17	Limit Line 2 Time Domain Data Input	LMTBINT*,*	Time, Level	---	---
18	Limit Line 2 Frequency Domain Data Erase	LMTBDELF	---	---	---
19	Limit Line 2 Time Domain Data Erase	LMTBDELT	---	---	---
20	Limit Line 1 Pass Range	LARNG*	ABOVE|BELOW	LARNG?	0 = ABOVE 1 = BELOW
21	Limit Line 2 Pass Range	LBRNG*	ABOVE|BELOW	LBRNG?	0 = ABOVE 1 = BELOW

6.9.14 Display

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Display Line Level	DLN* DLN ON[,*] DLN OFF	Level	DLN?	Level
				DLNON?	0 = OFF 1 = ON
2	Reference Line Level	RLN* RLN ON[,*] RLN OFF	Level	RLN?	Level
				RLNON?	0 = OFF 1 = ON
3	Window Center Position	WLX*	Frequency|Time	WLX?	Frequency|Time
4	Window Width	WDX*	Frequency|Time	WDX?	Frequency|Time
5	Window Sweep	WDOSWP*	ON|OFF	WDOSWP?	0 = OFF 1 = ON
6	Zoom	MLTSCR*	ZM|FT|TT|OFF	MLTSCR?	0 = OFF 1 = ZM 2 = FT 3 = TT

6.9.14 Display

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
7	Zoom Position	ZMPOS*	Frequency|Time	ZMPOS?	Frequency|Time
8	Zoom Width	ZMWID*	Frequency|Time	ZMWID?	Frequency|Time
9	Frequency Pos	FTPOS*	Frequency	FTPOS?	Frequency
10	Select Active Context	CTXTSEL*	Integer (0|1)	SCRSEL?	0 = CTXT A 1 = CTXT B
11	Display Line IQ	DLNIQ*	Voltage	DLNIQ?	Voltage
12	Display Line Power	DLNPWR*	Level	DLNPWR?	Level
13	Display Line Freq	DLNFRE*	Frequency	DLNFRE?	Frequency
14	Display Line Phase	DLNPHA*	Phase	DLNPHA?	Phase
15	Display Line FFT	DLNFFT*	Level	DLNFFT?	Level
16	Reference Line IQ	RLNIQ*	Voltage	RLNIQ?	Voltage
17	Reference Line Power	RLNPWR*	Level	RLNPWR?	Level
18	Reference Line Freq	RLNFRE*	Frequency	RLNFRE?	Frequency
19	Reference Line Phase	RLNPHA*	Phase	RLNPHA?	Phase
20	Reference Line FFT	RLNFFT*	Level	RLNFFT?	Level

6.9.15 Marker

<n> = 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

NOTE: Marker 0 is the reference marker.

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	All Markers Off	MO|MKOFF	---	---	---
2	All Markers Off Except Active Marker	MLTOFF	---	---	---
3	Select Active Marker	MKRSEL*	<n>	MKRSEL?	<n>
4	Active Marker ON / OFF	MLN*	ON|OFF	MLN?	0 = OFF 1 = ON
5	Marker ON / OFF	MLN<n>*	[ON]|OFF	MLN<n>?	0 = OFF 1 = ON
6	Active Marker Frequency	MK*	Frequency|Time	MK? MF?	Frequency|Time
7	Marker Frequency	MF<n>*	Frequency|Time	MF<n>?	Frequency|Time
8	Active Marker Level	---	---	ML?	Level
9	Marker Level	---	---	ML<n>?	Level
10	Active Marker Freq + Lev	---	---	MFL?	Frequency|Time, Level
11	Marker Freq + Lev	---	---	MFL<n>?	Frequency|Time, Level
12	Active Marker Num + Stauts + Freq + Lev	---	---	MFLC?	Marker Number, Status (1=ON| 0=OFF), Frequency|Time, Level
13	MarkerNum + Stauts + Freq + Lev	---	---	MFLC<n>?	Marker Number, Status (1=ON|0=OFF), Frequency|Time, Level
14	Reference Marker Frequency Absolute Value	---	---	MDF2? MFR?	Frequency|Time
15	Reference Marker Level Absolute Value	---	---	MDL2? MLR?	Level
16	Delta Mode	MKD*	[ON]|OFF	---	---
17	Reference Object	MKROBJ*	MARK|RLIN	MKROBJ?	0 = MARK 1 = RLIN
18	Fixed ΔMarker	FX*	ON|OFF	FX?	0 = OFF 1 = ON

6.9.15 Marker

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
19	Inverse ΔMarker	REDLT*	ON|OFF	REDLT?	0 = OFF 1 = ON
20	Marker Step Size	MPM*	Frequency|Time	MPM?	Frequency|Time
21	Marker Step Auto	MPA[*]	[ON]|OFF	MPA?	0 = OFF 1 = ON
22	Signal Track	SG[*]	[ON]|OFF	SG?	0 = OFF 1 = ON
23	Signal Track Y Range	SGY[ON,]* SGY ON SGY OFF	Level	SGY?	Level
				SGYON?	0 = OFF 1 = ON
24	Active Marker Trace	MKTRACE*	TRA|TRB|TRC| TRM|TRO	MKTRACE?	0 = TRA 1 = TRB 2 = TRC 3 = TRM 4 = TRO
25	Marker Mode	MKMODE*	INDEX|VAL	MKMODE?	0 = INDEX 1 = VAL
26	Display Marker List	MKLST*	ON|OFF	MKLST?	0 = OFF 1 = ON
27	Get Marker List	---	---	MLSFL?	Num Marker, Active (1=ON|0=OFF), Frequency|Time, Level (, …)
28	Dual Delta Mode	MKDD*	ON|OFF	MKDD?	0 = OFF 1 = ON

6.9.16 Peak and Marker Move

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	MKR → CF	MC|MKCF	---	---	---
2	MKRΔ → CF	MTCF	---	---	---
3	MKR → REF	MR|MKRL	---	---	---
4	PEAK → CF	PKCF	---	---	---
5	PEAK → REF	PKRL	---	---	---
6	MKRΔ → SPAN	DS|MTSP	---	---	---
7	MKRΔ → ZOOM (DGT)	MTAW	---	---	---
8	MKR → CF Step	M0|MKCS	---	---	---
9	MKRΔ → CF Step	M1|MTCS	---	---	---
10	MKR → MKR Step	M2|MKMKS	---	---	---
11	MKRΔ → MKR Step	M3|MTMKS	---	---	---
12	Mkr to Alternate CF	MKACF	---	---	---
13	Peak to Alternate CF	PKACF	---	---	---
14	Delta to Alternate Zoom	MTASP	---	---	---
15	Delta to Alternate Zoom (DGT)	MTAAW	---	---	---
16	MKR→Analysis Ofs	MKAO	---	---	---
17	MKR→Vertical Pos	MKVP	---	---	---
18	MKRΔ → V Scale/div	MTDIV	---	---	---

6.9.17 Peak

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Peak Search	PS	---	---	---
2	Next Peak	NXP	---	---	---
3	Next Peak Left	NXL	---	---	---
4	Next Peak Right	NXR	---	---	---
5	Min Search	MIS	---	---	---
6	Next Min Peak	NXM	---	---	---
7	Min Max Peak	MMS	---	---	---
8	Continuous Peak	CP*	ON|OFF	CP?	0 = OFF 1 = ON
9	Peak ΔY Div	DY*	Level Div	DY?	Level Div
10	Peak List Frequency Level	PLS FREQ PLS LEVEL	---	---	---
11	X Peak Area Couple to Window	MKSX*	OFF|IN|OUT	MKSX?	0 = OFF 1 = IN 2 = OUT
12	X Peak Area Position	MKSPOS*	Frequency|Time	MKSPOS?	Frequency|Time
13	X Peak Area Width	MKSWID*	Frequency|Time	MKSWID?	Frequency|Time
14	Y Peak Area Couple to Display Line	MKSYDL*	OFF |ABOVE |BELOW	MKSYDL?	2 = OFF 0 = ABOVE 1 = BELOW
15	Y Peak Area Couple to Limit Line 1	MKSYLA*	OFF |ABOVE |BELOW	MKSYLA?	2 = OFF 0 = ABOVE 1 = BELOW
16	Y Peak Area Couple to Limit Line 2	MKSYLB*	OFF |ABOVE |BELOW	MKSYLB?	2 = OFF 0 = ABOVE 1 = BELOW

6.9.18 Measurement

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Noise	NI*	Frequency	NI?	Frequency
2	Noise ON + dBm/Hz	NIM	---	---	---
3	Noise ON + dBμV/ √Hz	NIU	---	---	---
4	Noise ON + dBc/Hz	NIC	---	---	---
5	Noise OFF	NIF	---	---	---
6	Noise Mode Query	---	---	NION?	0 = OFF 1 = dBm/Hz 2 = dBμV/√Hz 3 = dBc/Hz
7	Noise Value	---	---	NIRES?	Level
8	X dB Down Level	MKBW*	DB	MKBW?	DB
9	X dB Down	XDB	---	---	---
10	X dB Down Left	XDL	---	---	---
11	X dB Down Right	XDR	---	---	---
12	X dB Relative X dB Absolute Left X dB Absolute Right	DC0 DC1 DC2	--- --- ---	DC?	0 = Relative 1 = Absolute Left 2 = Absolute Right
13	Continuous dB Down	CDB[*]	[ON]|OFF	CDB?	0 = OFF 1 = ON
14	Peak + X dB Down	PSXDB	---	---	---
15	IM Measurement Mode	IMM[*]	[ON]|OFF	IMM?	0 = OFF 1 = ON
16	IM Reference Frequency	---	---	IMMREF?	Frequency, Level
17	IM Delta Frequency	---	---	IMMDF?	Delta Frequency
18	IM Distortion Signal Data Readout	---	---	IMMRES?	n<DLM>LL1, LJ1, UL1, UJ1<DLM>…(*1)
19	IM Order Setting	IMODR*	Integer (3|5|7|9)	IMODR?	Integer (3|5|7|9)
20	IM Criteria Input 3rd Order	IMLS3*	DB	IMLS3?	DB
21	IM Criteria Input 5th Order	IMLS5*	DB	IMLS5?	DB

6.9.18 Measurement

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
22	IM Criteria Input 7th Order	IMLS7*	DB	IMLS7?	DB
23	IM Criteria Input 9th Order	IMLS9*	DB	IMLS9?	DB
24	IM Pass/Fail Judgement	IMPFC*	ON|OFF	IMPFC?	0 = OFF 1 = ON
25	IM Save Setup	IMSAVE	---	---	---
26	IM Restore Setup	IMLOAD	---	---	---
27	Harmonics Measurement	HARM[*]	[ON]|OFF	HARMON?	0 = OFF 1 = ON
28	Harmonics Results	---	---	HARM?	n<DLM>Freq1, Level1, DeltaLevel1 <DLM>…(*2)
29	Harmonics Max Order	HARMNUM*	Integer	HARMNUM?	Integer
30	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

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
31	AM Modulation Measurement	AMMOD*	ON|OFF	AMMODON?	0=OFF 1=ON
32	AM Modulation Depth	---	---	AMMOD?	Real %
33	AM Modulation	---	---	AMMF?	Frequency
34	FM Measurement	FMMEAS*	ON|OFF	FMMEASON?	0=OFF 1=ON
35	FM Frequency Deviation	---	---	FMMEAS?	Frequency
36	Modulation Frequency to Sweep time	FMMODF[ON,]* (*3)	Frequency	FMMODF?	Frequency
		FMMODFY* (*4)	Frequency	FMMODFY?	Frequency
		FMMODF*	ON|OFF	FMMODFON?	0=OFF 1=ON
37	Sound Mode				
	:ON	SON	---	SD?	0 = OFF 1 = ON (AM) 2 = ON (FM)
	:ON (AM)	SAM			
	:ON (FM)	SFM			
	:OFF	SOF			
38	Sound Volume	SDV*	Integer	SDV?	Integer
39	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.

6.9.19 Counter

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Resolution 1 kHz	CN0	---	---	---
2	Resolution 100 Hz	CN1	---	---	---
3	Resolution 10 Hz	CN2	---	---	---
4	Resolution 1 Hz	CN3	---	---	---
5	Resolution Query	---	---	CN?	0 = 1 kHz 1 = 100 Hz 2 = 10 Hz 3 = 1 Hz
6	Counter Position	CNPOS*	Frequency	CNPOS?	Frequency
7	Counter Position Auto (Position Linked to Marker)	CNPOSA[*]	[ON]|OFF	CNPOSA?	0 = OFF 1 = ON
8	Counter	COUNT*	ON|OFF	COUNT?	0 = OFF 1 = ON
9	Counter Value	---	---	CNRES?	Frequency

6.9.20 Power

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Measure Mode			PMEASMODE?	0 = OFF 1 = CHPOW 2 = TOTPOW 3 = AVGPOW 4 = OBW 5 = ACP 6 = SEM 7 = SPU
2	Measure OFF	PMEASOFF	---	---	---
3	Measure Averaging	PMEASAVG*	ON|OFF	PMEASAVG?	0 = OFF 1 = ON
		PMEASAVGON CE*	ONCE|MULT	PMEASAVGON CE?	0 = ONCE 1 = MULT
4	Measure Averaging Times	---	---	PMEASTM?	Integer

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
5	Measure Trace	PMEASTRACE*	TRA|TRB|TRC	PMEASTRACE?	0 = TRA 1 = TRB 2 = TRC
6	Channel Power ON/ OFF	PWCHON[*]	[ON]|OFF	PWCHON?	0 = OFF 1 = ON
7	Channel Power Average Times	PWCHTM*	Integer	PWCHTM?	Integer
8	Channel Power	---	---	PWCH?	Level
9	Channel Power Spectral Density	---	---	PWCHPSD?	dB
10	Power Measure Save	PWCHSAVE	---	---	---
11	Power Measure Restore	PWCHLOAD	---	---	---
12	Total Power ON/OFF	PWTOTALON[*]	[ON]|OFF	PWTOTALON?	0 = OFF 1 = ON
13	Total Power Average Times	PWTOTALTM*	Integer	PWTOTALTM?	Integer
14	Total Power	---	---	PWTOTAL?	Level
15	Total Power Spectral Density	---	---	PWTOTALPSD?	dB
16	Power Measure Save	PWTOTSAVE	---	---	---
17	Power Measure Restore	PWTOTLOAD	---	---	---
18	Average Power ON/ OFF	PWAVGON[*]	[ON]|OFF	PWAVGON?	0 = OFF 1 = ON
19	Average Power Average Times	PWAVGTM*	Integer	PWAVGTM?	Integer
20	Average Power Range	PWAVGRANGE*	FULL|WIN	PWAVGRANGE?	0 = FULL 1 = WIN
21	Average Power	---	---	PWAVG?	Level
22	Power Measure Save	PWAVGSAVE	---	---	---
23	Power Measure Restore	PWAVGLOAD	---	---	---
24	OBW Execution	OBWON[*]	[ON]|OFF	OBWON?	0 = OFF 1 = ON
25	OBW Measurement Value	---	---	OBW?	Frequency (Fc), Frequency (OBW)
26	OBW %	OBWPER*	Real%	OBWPER?	Real%

6.9.20 Power

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
27	OBW Average Times	OBWTM*	Integer	OBWTM?	Integer
28	OBW save setup	OBWSAVE	---	---	---
29	OBW restore setup	OBWLOAD	---	---	---
30	ACP Execution	ACP[*]	[ON]|OFF	ACPON?	0 = OFF 1 = ON
31	ACP Measurement Value	---	---	ACP?	n<DLM>f1L, l1L, f1H, l1H<DLM>…(*1)
32	ACP Average Times	ACPTM*	Integer	ACPTM?	Integer
33	ACP Reference Power Value	---	---	ACPREF?	Level
34	ACP Screen	ACPSCR*	FULL|CARR	ACPSCR?	0 = FULL 1 = CARR
35	ACP Carrier Band-width	CARRBS* ACPCBW*	Frequency	CARRBS? ACPCBW?	Frequency
36	CS/BS Table Input	CSBSIN*,*	Frequency (CS), Frequency (BS)	---	---
37	CS/BS Table Deletion	CSBSDEL	---	---	---
38	ACP Graphics Mode	ADG[*]	[ON]|OFF	ADG?	0 = OFF 1 = ON
39	ACP save setup	ACPSAVE	---	---	---
40	ACP restore setup	ACPLOAD	---	---	---
41	ACP Nyquist Filter	ACPNQST*	ON|OFF	ACPNQST?	0 = OFF 1 = ON
42	Nyquist Symbol Rate	SYMRT*	Frequency	SYMRT?	Frequency
43	Nyquist Roll Off Fac-tor	RFACT*	Real	RFACT?	Real
44	Spectrum Emission Mask Execution	SEMON[*]	[ON]|OFF	SEMON?	0 = OFF 1 = ON
45	SEM Average Times	SEMTM*	Integer	SEMTM?	Integer
46	SEM Carrier Band-width	SEMCBW*	Frequency	SEMCBW?	Frequency
47	SEM Ref Power	SEMRFCALC*	CHN|PEAK	SEMRFCALC?	0 = Channel 1 = Peak
48	SEM Nyquist Filter	SEMNQST*	ON|OFF	SEMNQST?	0 = OFF 1 = ON
49	SEM save setup	SEMSAVE	---	---	---
50	SEM restore setup	SEMLOAD	---	---	---

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
51	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)	---	---
52	SEM Band Table Delete	SEMTDEL	---	---	---
53	SEM Reference Power	---	---	SEMRFPOW?	dBm
54	SEM Measurement Value	---	---	SEM?	Channel Number, Start Frequency, Stop Frequency, Frequency, Absolute Power, Relative Power, Judge (, …)
55	Spurious Measurement Execution	SPURI*	[ON|FREQ]|OFF	SPURION?	0 = OFF 1 = ON
56	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)
57	SPU Table Selection	SPRTBL*	Integer (0|1|2)	SPRTBL?	Integer (0|1|2)
58	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)	---	---

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
59	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

6.9.21 EMC

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Correction Factor	CR[*]	[ON]|OFF	CRON?	0 = OFF 1 = ON
2	Correction Factor Table Input	CRIN*,*	Frequency, Level(DB)	---	---
3	Correction Factor Table Deletion	CRDEL	---	---	---
4	EMC Trace Detection OFF ON	 EMCON*|EMC-DET*	 NRM|OFF PEAK|ON	 EMCON? EMCDET?	 0 = OFF 3 = ON
5	EMC BW Auto 200 Hz 9 kHz 120 kHz 1 MHz	 QPAUTO|QA QP0 QP1 QP2 QP3	---	 QPAUTO? QA?	 0 = Auto 1 = 200 Hz 2 = 9 kHz 3 = 120 kHz 4 = 1 MHz
6	Measure	EMCMEAS[*]	[ON]|OFF	EMCMEAS?	0 = OFF 1 = ON
7	Measure Time	EMCMEASTIM* EMCMEASTIM*	[ON]|OFF Time	EMCMEASTI-MON? EMC-MEASTIM?	0 = OFF 1 = ON Time
8	Horizontal Scale	HSCALE*	LIN|LOG	HSCALE?	0 = LOG 1 = LIN
9	Limit Line Margin	LMTMRGN* LMTMRGN*	ON|OFF dB	LMTMRGNON? LMTMRGN?	0 = OFF 1 = ON dB

6.9.22 Calibration

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	U3841/51 Calibration All (CH1) Calibration All (CH2)	CLALL*	CLCH1 CLCH2	---	---
2	U3872 Calibration All (CH1-L) Calibration All (CH1-H) Calibration All (CH2-L) Calibration All (CH2-H)	CLALL*	CLCH1L CLCH1H CLCH2L CLCH2H	---	---
3	Total Gain Calibration Status	---	---	CLGAIN [RFC1]|RFC2 ? (*1)	Integer 0 = OK >0 = Warning <0 = Error
4	RBW Calibration Status	---	---	CLRBW [RFC1]|RFC2 ? (*1)	Integer 0 = OK >0 = Warning <0 = Error
5	PBW Calibration Status	---	---	CLPBW [RFC1]|RFC2 ? (*1)	Integer 0 = OK >0 = Warning <0 = Error
6	ATT step Calibration	---	---	CLATT [RFC1]|RFC2 ? (*1)	Integer 0 = OK >0 = Warning <0 = Error
7	CAL 10 M Reference Adjust	CLCREF*	Integer	CLCREF?	Integer
8	CAL 10 M Reference Default	CLDREF	---	---	---
9	CAL 10 M Reference Store	CLSREF	---	---	---
10	F-Correction	FC*	ON|OFF	FC?	0 = OFF 1 = ON
11	CAL-Correction	CC*	ON|OFF	CC?	0 = OFF 1 = ON

(*1) RFC1 = Lo input, RFC2 = Hi input

6.9.23 Save/Recall

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Save (File or File Number)	SV[*]	:String|Integer	---	---
2	Delete (File)	DEL*	:String	---	---
3	Recall (File)	RC*	:String	---	---
4	Rename (File, New Name)	RENAME*,*	:String, :String	---	---
5	Write Protect (File)	WP*,*	:String, ON|OFF	---	---
6	File Format	FILEFORMAT*	BIN|CSV|XML	FILEFORMAT?	0 = BIN 1 = CSV 2 = XML
7	Media	FILEMEDIA*	FLASH|USB	FILEMEDIA?	0 = FLASH 1 = USB
8	Auto Save Execute	ASV*	ON|OFF	ASV?	0 = OFF 1 = ON
9	Auto Save Mode	ASVMODE*	LMT|SWP|TIME	ASVMODE?	0 = Limit 1 = Sweep 2 = Time
10	Auto Save Max Save Count	ASVMAXSV*	Integer	ASVMAXSV?	Integer
11	Auto Save Target CH	ASVTGTCH*	CH1|CH2	ASVTGTCH?	0:CH1 1:CH2
12	Auto Save Sweep Step	ASVSWPSTEP*	Integer	ASVSWPSTEP?	Integer
13	Auto Save Interval Time	ASVINTVTM*	Time	ASVINTVTM?	Time
14	Auto Save Total Time	ASVTOTALTM*	Time	ASVTOTALTM?	Time
15	Auto Save Limit Save On	ASVLMTJDG*	PASS|FAIL	ASVLMTJDG?	0:PASS 1:FAIL
16	Quick Save	QSV*	0 to 9	---	---
17	Quick Recall	QRC*	0 to 9	---	---
18	Save Sampling Data	IQBSV*	:String	---	---
19	Recall Items Setup	RCSET*	ON|OFF	RCSET?	0 = OFF 1 = ON
20	Recall Items Trace	RCTRC*	ON|OFF	RCTRC?	0 = OFF 1 = ON

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
21	Recall Items Table	RCTBL*	ON|OFF	RCTBL?	0 = OFF 1 = ON
22	Recall Items Vector Correction	RCVCORR*	ON|OFF	RCVCORR?	0 = OFF 1 = ON
23	Table Data Save (Type,:Filename)	TBLSV *,:*	TLIM|TCHN|TACP|TSEM|TSPU|TANT,:String	---	---
24	Table Data Recall	TBLRC*	:String	---	---

* When specifying a file or folder name, specify it from a folder within the /adv folder (The path setting of /adv is unnecessary.)

Example 1: Save/Recall of the abc001.dat file to the adv/dat folder.

- Save
  SV:dat/abc001.dat
- Recall
  RC:dat/abc001.dat

Example 2: Delete the abc001.dat file in the adv/dat folder.
DEL:dat/abc001.dat

Example 3: Rename the abc001.dat file in the adv/dat folder.
RENAME:dat/abc001.dat,:dat/abc002.dat

Example 4: Write Protect ON/OFF to the abc001.dat file in the adv/dat folder.

- Write Protect ON
  WP:dat/abc001.dat,ON
- Write Protect OFF
  WP:dat/abc001.dat,OFF

6.9.24 File Management

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Reading Bitmap File	---	---	BMP?	Binary data <EOI>
2	Reading Portable Network Graphics File	---	---	PNG?	Binary data <EOI>
3	Reading Image File	---	---	GIMAG :String	Binary data <EOI>
4	Reading Data File	---	---	GDATA :String	Binary data <EOI>

6.9.25 Vertical Cursor

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	V-Cursor ON/OFF	VCURS*	ON|OFF	VCURS?	0 = OFF 1 = ON
2	V-Cursor Mode	VCMODE*	CSGL|CDUAL	VCMODE?	0 = Single 1 = Dual
3	V-Cursor Position	VCSETA* VCSETB*	Frequency, Time	VCSETA? VCSETB?	Frequency, Time
4	V-Cursor Result	---	---	VCRES?	CH1 Hor, Ver, CH2 Hor, Ver, Dlt Hor, Ver

6.9.26 Time Domain Analysis

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Time Domain Analysis	TDANA*	ON/OFF	TDANAON?	0:OFF, 1:ON
2	Analysis Offset	TDAOFS*	Time	TDAOFS?	Time
3	Analysis Window	TDATIM*	Time	TDATIM?	Time
4	Vertical Scale IQ	VSCLIQ*	Voltage	VSCLIQ?	Voltage
5	Vertical Scale Power	VSCLPWR*	Power	VSCLPWR?	Power
6	Vertical Scale Freq	VSCLFRE*	Frequency	VSCLFRE?	Frequency
7	Vertical Scale Phase	VSCLPHA*	Phase	VSCLPHA?	Phase
8	Vertical Scale FFT	VSCLFFT*	Level	VSCLFFT?	Level
9	Vertical Position IQ	VPOSIQ*	Position	VPOSIQ?	Position
10	Vertical Position Power	VPOSPWR*	Position	VPOSPWR?	Position
11	Vertical Position Freq	VPOSFRE*	Position	VPOSFRE?	Position
12	Vertical Position Phase	VPOSPHA*	Position	VPOSPHA?	Position
13	Vertical Position FFT	VPOSFFT*	Position	VPOSFFT?	Position
14	Measurement Function	TMEAS*	FRE/PHA/PWR/IQ/FFT	TMEAS?	0:FRE,1:PHA, 2:PWR,3:IQ,4:FFT

6.9.26 Time Domain Analysis

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
15	Capture Time	CAPTIM*	Time	CAPTIM?	Time
16	Capture BW	CAPBW*	Frequency	CAPBW?	Frequency
17	RBW	TDRB*	Frequency	TDRB?	Frequency
18	RBW Auto	TDBA[*]	[ON]|OFF	TDBA?	0 = OFF 1 = ON
19	Display Mode	TDDISP*	NORM|POSV| DUAL	TDDISP?	0=Normal, 1=Position View, 2=Dual Measure
20	Cross point Search Right	CRSPR	---	---	---
21	Cross point Search Left	CRSPL	---	---	---
22	Slope	CRSSLP*	UP|DN|ALL	CRSSLP?	0=Up,1=Down, 2=All
23	Threshold	THRIQ* THRPWR* THRFRE* THRPHA* THRFFT* THRESH*	Volt dBm Frequency Phase dBm ON|OFF	THRIQ? THRPWR? THRFRE? THRPHA? THRFFT? THRESHON?	Volt dBm Frequency Phase dBm 0=OFF,1=ON
24	Measures	DMEAS*	OFF/DTYP/ DTYN FREQ/ WIDP/WIDN/ HILO	DMEAS?	0:OFF, 1:Pos Duty, 2:Neg Duty, 3:Freq, 4:Pos Wid, 5:Neg Wid, 6: HILO
25	Measures Result	---	---	DMEASRES? SWINGRES?	Real H,L,S
26	Mkr to Analysis Offs	MKAO	---	---	---
27	Delta Mkr to Analysis Win	MTAW	---	---	---
28	Mkr to Vertical Pos	MKVP	---	---	---
29	Delta Mkr to scale/div	MTDIV	---	---	---
30	IQ Output Binary	---	---	IQB?	8 bytes x IQP (*1)
31	IQ Output Scale	---	---	IQS?	Real
32	IQ Output Points	---	---	IQP?	Points
33	IQ Sample Rate	---	---	IQR?	Frequency

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
34	ALL IQ Sample Points	---	---	IQPAL?	Points
35	Clear IQP value	---	---	---	---
36	Re-Calculation ON|OFF	RECALCON*	ON|OFF	RECALCON?	0 = OFF 1 = ON

(*1) IQP : Number of IQ Pair Sample Points

6.9.27 Config

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Title	LON*	/*String*/	LB?	String
2	Erase Title	LOF	---	---	---
3	10 MHz Internal Reference Signal Source	RFI	---	FREF?	0 = INT 1 = EXT 2 = XTL
4	10 MHz External Reference Signal Source	RFE			
5	Xtal	RFX			
6	Reference Signal Source	RF*	Frequency	RF?	Frequency
7	Input RF Connector	RFC*	RFC1|RFC2	RFC?	1 = RFC1(Lo input) 2 = RFC2(Hi input)
8	Screen Copy	HCOPY	---	---	---

6.9.28 Preset

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Preset	IP|*RST	---	---	---
2	Factory Init	SUPIP	---	---	---

6.9.29 GPIB

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Status Byte Clear	*CLS	---	---	---
2	STB Read	---	---	*STB?	Integer
3	SRE Read/Write	*SRE0*	Integer	*SRE?	Integer
4	ESR Read	---	---	*ESR?	Integer
5	ESE Read/Write	*ESE	Integer	*ESE?	Integer
6	OSR Read	---	---	OPREVT?	Integer
7	OSER Read	OPR*	Integer	OPR?	Integer
8	SRQ Interrupt ON	S0	---	---	---
9	SRQ Interrupt OFF	S1	---	---	---
10	SRQ status clear	S2	---	---	---
11	Delimiter CR LF EOI	DLIM0	---	---	---
12	Delimiter LF	DLIM1			
13	Delimiter EOI	DLIM2	---	---	---
14	Delimiter ;	DLIM5			
15	Local Lockout	LLO	---	---	---
16	Remote Control	REN	---	---	---
17	Local Control	GTL	---	---	---
18	Refresh Screen in Remote Control	SCRF[*]	[ON]|OFF	SCRF?	ON|OFF
19	Open Menus in Remote Control	MNRF[*]	[ON]|OFF	MNRF?	ON|OFF
20	Annotations	ANNOT[*]	[ON]|OFF	ANNOT?	ON|OFF
21	Access Channel CH1	X1	---	---	---
22	Access Channel CH2	X2	---	---	---

6.9.30 Others

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	Device ID Output	---	---	*IDN? ID?	Maker Name, Device Name, Serial No., Revision
2	Date Setting	SETDATE*	Date (YYMMDD)	SETDATE?	Date
3	Time Setting	SETTIME*	Time (HHMMSS)	SETTIME?	Time
4	Option List	---	---	*OPT?	Opt1,Opt2,..., Optn<DLM>
5	Option				
6	: High Stability	---	---	OPT20?	
7	: EMC Filter	---	---	OPT28?	
8	: TG -60 dBm	---	---	OPT76?	
9	: TG High Freq.	---	---	OPT77?	
10	Execute Self Test CH1	---	---	*TST?	Supply_Voltage, judge<DLM> Memory, judge<DLM> CPU_Registers, judge<DLM> RF_Registers, judge<DLM> RF_PLL_Lock, judge<DLM> LO_Registers, judge<DLM> LO_PLL_Lock, judge<DLM> AIF_Registers, judge<DLM> AIF_PLL_Lock, judge<DLM> TG_Registers, judge<DLM>* Temperature, judge<DLM> RBD_PLL_Lock, judge<DLM> LD_PLL_Lock, judge<DLM>

6.9.30 Others

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
11	Execute Self Test CH2	---	---	*TST?	Supply_Voltage, judge<DLM> Memory, judge<DLM> CPU_Registers,judge<DLM> RF_Registers, judge<DLM> RF_PLL_Lock, judge<DLM> LO_Registers, judge<DLM> LO_PLL_Lock, judge<DLM> AIF_Registers, judge<DLM> AIF_PLL_Lock, judge<DLM>
12	Error Number	---	---	ERRNO?	0 = No Error ≠ 0 = Error Code

*　TG Option

6.9.31 TG

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Argument Format	Code	Output Format
1	TG ON	TG	---	TG?	0 = OFF 1 = ON
2	TG OFF	TGF	---	---	---
3	TG Level	TGL*	Level	TGL?	Level
4	TG Frequency Offset	TGO[ON,]* TGO ON|OFF	Frequency	TGO? TGOON?	Frequency 0 = OFF 1 = ON
5	TG Level Offset	TGLO[ON,]* TGLO ON|OFF	DB	TGLO? TGLOON?	DB 0 = OFF 1 = ON
6	Capture Normalize Data Active Trace	CAPND	---	---	---
7	Normalize Correction Active Trace	NORM*	ON|OFF	NORM?	0 = OFF 1 = ON
8	Capture Normalize Data Trace (n = A|B|C)	<n>RX	---	---	---
9	Normalize Correction Trace (n = A|B|C)	<n>NORM*	ON|OFF	<n>NORM?	0 = OFF 1 = ON
10	Normalize Execute Active Trace	AR	---	---	---
11	Delta Reference Line	TGDLTRLN*	ON|OFF	TGDLTRLN?	0 = OFF 1 = ON
12	VSWR ON/OFF	VSWRON [*]	[ON]|OFF	VSWRON?	0 = OFF 1 = ON
13	VSWR Measurement Value	---	---	VSWR?	Real
14	VSWR Return Loss Value	---	---	VSWRLOSS?	DB (Real)

6.9.32 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

6.10 I/Q Data Output

6.10.1 IQB Data Output

Data output by IQB? is in Binary (32bit) format, and I and Q are alternately output.

Table 6-9 IQ-Pair data output (8xN bytes) of N obtained samples (0 to N-1)

Sample number	0		1		...		N-2		N-1	
IQB? Data	I0	Q0	I1	Q1	...	...	IN-2	QN-2	IN-1	QN-1
Size Bytes	4	4	4	4	4	4	4	4	4	4

Data output by IQB? shows a relative value between I and Q, and it can be used for phase angle calculation.

Data output by IQS? shows scaling data for absolute value conversion of I and Q Pairs.

Data output by IQPAL? shows the number of all I and Q Pairs which were captured.

Data output by IQP? shows the number of samples (N) of I and Q Pairs which is returned from the next-called IQB?.

Data output by IQR? shows a sampling frequency of I and Q Pairs.

IQPRST returns the IQP? value to the initial value.

Voltages (VIN and VQN) that correspond the Nth data (IN, QN) of I and Q output can be obtained by using the following equations.

VIN=IN × IQS [V]

VQN=QN × IQS [V]

Example: Obtain all IQ data items when the return value of IQPAL? is the 4.5M sample.

1. The first IQP? returns 2Mi, so obtain the 2M sample data by IQB?.
2. The second IQP? also returns 2Mi, so obtain the 2M sample data by IQB?.
3. The third IQP? returns 0.5Mi, so obtain the 0.5M sample data by IQB?.
4. The fourth IQP? returns 0, so the obtaining of data is complete.

Repeat IQB? to obtain all data items until IQP? returns 0.

Using the TS or IQPRST command returns to the initial state.

6.10.2 IQBSV Data Output

Data output by IQBSV? is in binary format. The header data section (24 bytes), and I and Q data (data output for IQB?) are output.

Table 6-10 IQBSV Data Output Format

	Header data size	
	IQR	
	IQP	
	IQS	4 bytes each: 24 bytes total
	Capture BW	
	Center Frequency	
Refer to Section 6.10.1, "IQB Data Output."	I0	
	Q0	
	I1	
	Q1	
	:	
	IN-2	
	QN-2	
	IN-1	
	QN-1	

6.11 Recalculation Operation Setting of Time Domain Analysis Using RECALCON

The time domain analysis function and the between-channel vector calculation analysis function recalculate/redisplay the measurement data recorded in this instrument when the analysis function is switched or the display range is changed in the RF signal record stop status. However, while operating under remote control, setting operations may became slow due to this recalculation function.

In this case, the setting operation speed can be improved by prohibiting the recalculation operation by using the RECALCON command.

Usage

RECALCON ON: Performs the recalculation operation. (Default setting)

RECALCON OFF: Prohibits the recalculation operation.

The recalculation operation setting that uses the RECALCON command is only valid during remote operation. If remote control is cancelled by a LOCAL key operation or GTL message, the status where recalculation operation is performed is set.

6.12 UNCAL Message, List of Error Messages, and Restrictions

6.12.1 How to Delete UNCAL Message for Partial FFT Analysis

The Partial FFT analysis uses time length data that is related to the Capture BW setting value (equal to the displayed frequency Span). If the data length required for FFT analysis is insufficient, the UNCAL message is displayed to show the displayed value may not be correct.

The UNCAL message is displayed if a relationship among each setting value of the FFT analysis data length, which is shown in the table in Chpter 5, "Menu Map and Function Description," Capture Time, and Analysis Offset does not satisfy the following equation.

FFT analysis data length. (Capture Time - Analysis Offset)

To delete the UNCAL message, perform either or both of the following (1) and (2).

1. Increase the Capture Time setting value.
2. Decrease the Analysis Offset setting value.

6.13 Multiple-Points Correction Using External Signal Sources

Multiple-points correction (Specific Span and InBand) is achieved by controlling an external signal source and this instrument from an external controller.

This method is applied to Section 5.2.13.1, "Power Ratio Phase Diff", Section 5.2.13.2, "Differential", and Section 5.2.13.4, "Math."

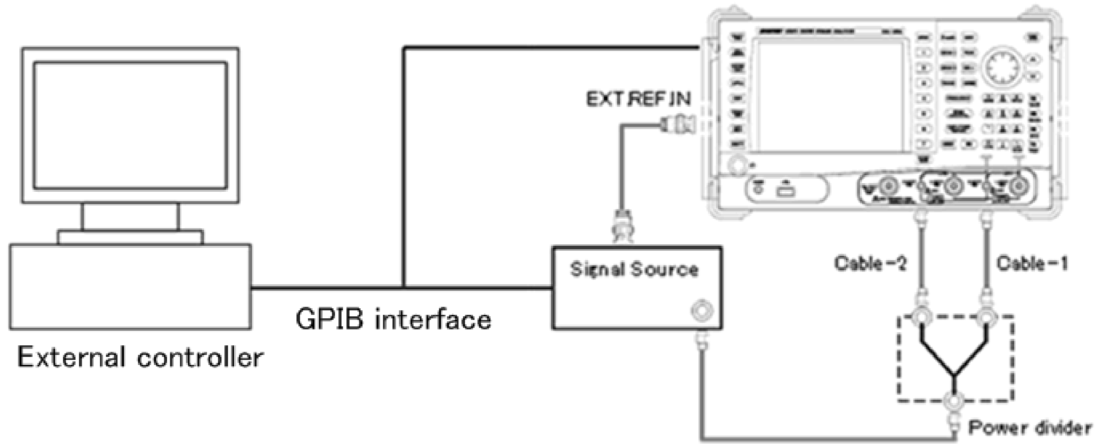


Figure 6-14 Correction Connection Using External Controller and External Signal Source (GPIB Interface)

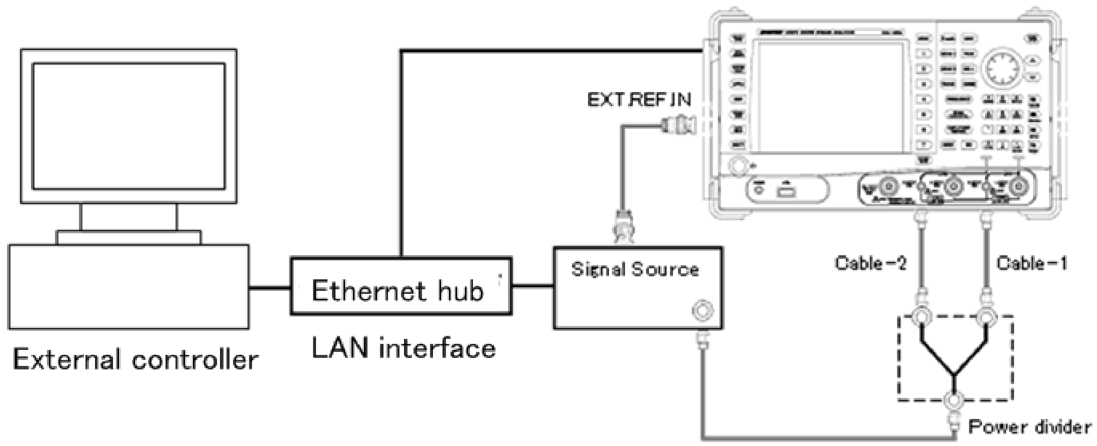


Figure 6-15 Correction Connection Using External Controller and External Signal Source (LAN Interface)

For the reference signal source of the frequency (EXT.REF.IN), press **SYSTEM**, ***Config***, ***Frequency Reference***, and ***Frequency Reference INT|EXT|XTL(EXT)***. The reference signal source of the frequency is set to EXT.

When using the LAN interface, connect this instrument via an external instrument such as an Ethernet hub which is used to connect instruments having two or more LAN interfaces. Use a straight cable for connection between the instruments. For more information, refer to Section 6.3, "LAN Remote Control System."

6.13.1 Remote Commands for Specific Span

No.	Function	Command (EXE, SET)		Query (GET)	
		Code	Arguments	Code	Output
1	Vector Correction Specific Span Initialize	VCFSEXTINIT	---	---	---
2	Vector Correction Specific Span Get Step Size	---	---	VCFSEXTSTPSZ?	Integer
3	Vector Correction Specific Span Set Index	VCFSEXTIDX*	Integer	---	---
4	Vector Correction Specific Span Get Correction Data	VCFSEXTEXE	---	---	---
5	Vector Correction Specific Span Finish	VCFSEXTFINISH	---	---	---
6	Vector Correction Specific Span Abort	VCFSEXTABORT	---	---	---

IMPORTANT: ***Specify the frequency within the following ranges:***
U3841: 1 MHz to 3 GHz
U3851: 1 MHz to 8 GHz
U3872: 1 MHz to 8 GHz (L-Input)
U3872: 10 MHz to 43 GHz (H-Input)

Specify Step Freq so that the range is
(Stop Freq - Start Freq)/1000 ≤ Step Freq ≤ 50 MHz. (Same setting in all models.).

Remote commands used to set frequencies (Start Freq, Stop Freq, and Step Freq) are as follows:

Function	Command (EXE, SET)		Query (GET)	
	Code	Arguments	Code	Output
Vector Correction Start Frequency	VCFA*	Frequency	VCFA?	Frequency
Vector Correction Stop Frequency	VCFB*	Frequency	VCFB?	Frequency
Vector Correction Step Frequency	VCFSTEP*	Frequency	VCFSTEP?	Frequency

6.13.2 Remote Commands for InBand

No.	Function	Command (EXE,SET)		Query (GET)	
		Code	Arguments	Code	Output
1	Vector Correction InBand Initialize	VCINBEXTINIT	---	---	---
2	Vector Correction InBand Get Step Size	---	---	VCINBEXTSTPSZ?	Integer
3	Vector Correction InBand Set Index	VCINBEXTIDX*	Integer	---	---
4	Vector Correction InBand Get Frequency Offset	---	---	VCINBEXTFO?	Fre-quency
5	Vector Correction InBand Get Correction Data	VCINBEXTEXE	---	---	---
6	Vector Correction InBand Finish	VCINBEXTFINISH	---	---	---
7	Vector Correction InBand Abort	VCINBEXTABORT	---	---	---

For an example program that executes multiple-points correction by controlling an external signal source and this instrument from an external controller, refer to Section 6.14.2, "Example Program for Correcting Multiple Points Using External Signal Source."

6.14 Example Remote Control Program

This chapter describes examples of programs which control the instrument by remote.

The example programs in this chapter use Microsoft Visual Basic 6.0 language (VB). If programming in any other language, change the description to that language.

The example program is explained, assuming that the GPIB bus controller used is a GPIB board produced by National Instruments (hereafter NI).

6.14.1 Basic Steps for GPIB Bus Control

The subsequent sections describe operations required for controlling the GPIB bus from Visual Basic 6.0 / Microsoft Visual Basic 2008 step by step.

For initialization of variables and definition of function routines that depend on Visual Basic 6.0 / Microsoft Visual Basic 2008, follow the notation rules for the Visual Basic 6.0 / Microsoft Visual Basic 2008 program.

6.14.1.1 Reading GPIB Control Library

To control the GPIB board manufactured by NI from a program written in Visual Basic 6.0 / Microsoft Visual Basic 2008 language, the VBIB-32.BAS file in which the GPIB communication interface for Visual Basic 6.0 / Microsoft Visual Basic 2008 provided by NI is described and the NIGLOBAL.BAS file and DLL file in which error and timeout values are defined must be incorporated in the Visual Basic 6.0 / Microsoft Visual Basic 2008 project.

6.14.1.2 Example Programs

Example 1 Master-resetting this instrument and setting the center frequency

Visual Basic 6.0

```
'**************************************************************************
'* Example 1 Setting the center frequency after resetting this instrument. *
'**************************************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    Call ibclr(u38)                         ' Performs a Device Clear.
    Call ibwrt(u38, "IP")                   ' preset
    Call ibwrt(u38, "CF 30MZ")              ' Sets the center frequency to 30 MHz.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '**************************************************************************
    '* Example 1 Setting the center frequency after resetting this instrument. *
    '**************************************************************************
    Sub Main()
        Dim str As String = Space(1)
        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)

        Call GpibDevice.Clear()                      ' Performs a Device Clear.
        System.Console.WriteLine("preset.")
        Call GpibDevice.Write("IP")                  ' preset.
        System.Console.WriteLine("Sets the center frequency to 30 MHz.")
        Call GpibDevice.Write("CF 30MZ")             ' Sets the center frequency to 30 MHz.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 2 Setting the start frequency to 300 kHz, setting the stop frequency to 800 kHz, and adding 50 kHz to the frequency offset

```
'**********************************************************
'* Example 2 Setting the start frequency to 300 kHz,      *
'*            setting the stop frequency to 800 kHz and *
'*              adding 50 kHz to the frequency offset.  *
'**********************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "FA 300KZ")              ' Sets the start frequency to 300 kHz.
    Call ibwrt(u38, "FB 800KZ")              ' Sets the stop frequency to 800 kHz.
    Call ibwrt(u38, "FO 50KZ")               ' Adds 50 kHz to the frequency offset.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_02
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

'*****************************************************************************************
********************************************
    '* Example 2 Setting the start frequency to 300 kHz, setting the stop frequency to 800
kHz and adding 50 kHz to the frequency offset. *

'*****************************************************************************************
********************************************
    Sub Main()
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()              ' Performs a Device Clear.
        System.Console.WriteLine("Sets the start frequency to 300 kHz.")
        Call GpibDevice.Write("FA 300KZ")    ' Sets the start frequency to 300 kHz.
        System.Console.WriteLine("Sets the stop frequency to 800 kHz.")
        Call GpibDevice.Write("FB 800KZ")    ' Sets the stop frequency to 800 kHz.
        System.Console.WriteLine("Adds 50 kHz to the frequency offset.")
        Call GpibDevice.Write("FO 50KZ")     ' Adds 50 kHz to the frequency offset.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 3 Setting the reference level to 87 dBμV (in 5 dB/div) and the RBW to 100 kHz

Visual Basic 6.0

```
'*************************************************************************************
'* Example 3 Setting the reference level to 87 dBμV (in 5 dB/div) and the RBW to 100 kHz *
'*************************************************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "AUNITS DBUV")           ' Sets the level unit to dBμV.
    Call ibwrt(u38, "RL 87DB")               ' Sets the reference level to 87 dB (μV).
    Call ibwrt(u38, "DD 5DB")                ' Sets the vertical scale to 5 dB/div.
    Call ibwrt(u38, "RB 100KZ")              ' Sets the RBW to 100 kHz.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_03
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

'*************************************************************************************
*
   '* Example 3 Setting the reference level to 87 dBμV (in 5 dB/div) and the RBW to 100 kHz. *

'*************************************************************************************
*
    Sub Main()
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                  ' Performs a Device Clear.
        System.Console.WriteLine("Sets the level unit to dBμV.")
        Call GpibDevice.Write("AUNITS DBUV")     ' Sets the level unit to dBμV.
        System.Console.WriteLine("Sets the reference level to 87 dB (μV).")
        Call GpibDevice.Write("RL 87DB")         ' Sets the reference level to 87 dB (μV).
        System.Console.WriteLine("Sets the vertical scale to 5 dB/div.")
        Call GpibDevice.Write("DD 5DB")          ' Sets the vertical scale to 5 dB/div.
        System.Console.WriteLine("Sets the RBW to 100 kHz.")
        GpibDevice.Write("RB 100KZ")             ' Sets the RBW to 100 kHz.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 4 Setting made by using variables

Visual Basic 6.0

```
'****************************************************
'* Example 4 Setting the instrument using variables *
'****************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer
    Dim A As String
    Dim B As String
    Dim C As String

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    A = "10"                                 ' Sets the character string.
    B = "2"
    C = "20"
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF " & A & "MZ")        ' Sets the center frequency to A MHz.
    Call ibwrt(u38, "SP " & B & "MZ")        ' Sets the span to B MHz.
    Call ibwrt(u38, "AT " & C & "DB")        ' Sets the ATT to C dB.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_04
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*****************************************************
    '* Example 4 Setting the instrument using variables. *
    '*****************************************************
    Sub Main()
        Dim A As String
        Dim B As String
        Dim C As String
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        A = "10"    ' Sets the character string.
        B = "2"
        C = "20"
        Call GpibDevice.Clear()                 ' Performs a Device Clear.
        System.Console.WriteLine("Sets the center frequency to A MHz.")
        Call GpibDevice.Write("CF " & A & "MZ") ' Sets the center frequency to A MHz.
        System.Console.WriteLine("Sets the span to B MHz.")
        Call GpibDevice.Write("SP " & B & "MZ") ' Sets the span to B MHz.
        System.Console.WriteLine("Sets the ATT to C dB.")
        Call GpibDevice.Write("AT " & C & "DB") ' Sets the ATT to C dB.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 5 Saving set values to Register 5 and recalling them from Register 5

Visual Basic 6.0

```
'*****************************************************************************
'* Example 5 Saving set values in Register 5 and recalling them from Register 5 *
'*****************************************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer
    Dim LabelBuff As String                  ' Defines the character string buffer for the

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    ' label
    LabelBuff = "/*Cross Domain Analyzer*/" ' Sets the label.
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF 30MZ")               ' Sets the parameter.
    Call ibwrt(u38, "SP 1MZ")
    Call ibwrt(u38, "DET POS")
    Call ibwrt(u38, "LON " & LabelBuff)      ' Sets the label.
    Call ibwrt(u38, "SV 5")                  ' Saves the data to Register 5.
    Call ibwrt(u38, "CF 1GZ")                ' Changes the set parameters.
    Call ibwrt(u38, "SP 200MZ")
    Call ibwrt(u38, "RC 5")                  ' Recalls the data from Register 5.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_05
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*****************************************************************************
    'Example 5 Saving set values in Register 5 and recalling them from Register 5. *
    '*****************************************************************************
    Sub Main()
        Dim LabelBuff As String ' Defines the character string buffer for the label.
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        LabelBuff = "/*Cross Domain Analyzer*/"     ' Sets the label.
        Call GpibDevice.Clear()                     ' Performs a Device Clear.
        System.Console.WriteLine("Sets the center frequency to 30 MHz.")
        Call GpibDevice.Write("CF 30MZ")            ' Sets the parameter.
        System.Console.WriteLine("Sets the span frequency to 1 MHz.")
        Call GpibDevice.Write("SP 1MZ")
        System.Console.WriteLine("Sets the detector mode trace A positive.")
        Call GpibDevice.Write("DET POS")
        System.Console.WriteLine("Sets the label.")
        Call GpibDevice.Write("LON " & LabelBuff)   ' Sets the label.
        System.Console.WriteLine("Saves the data to Register 5.")
        Call GpibDevice.Write("SV 5")               ' Saves the data to Register 5.
        System.Console.WriteLine("Sets the center frequency to 1 GHz.")
        Call GpibDevice.Write("CF 1GZ")             ' Changes the set parameters.
        System.Console.WriteLine("Sets the span frequency to 200 MHz.")
        Call GpibDevice.Write("SP 200MZ")
        System.Console.WriteLine("Recalls the data from Register 5.")
        Call GpibDevice.Write("RC 5")               ' Recalls the data from Register 5.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 6 Entering limit line1 in the table and turning limit line 1 on

Visual Basic 6.0

```
'*********************************************************************
'* Example 6 Enter Limit line1 in the table and turn Limit line 1 on *
'**********************************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "LMTADEL")               ' Clears the table used for Limit Line 1.
    Call ibwrt(u38, "AUNITS DBUV")           ' Sets the level unit to dBμV.
    Call ibwrt(u38, "LMTAINF 25MZ, 49.5DB")
    ' Enters data used by Limit Line 1.
    Call ibwrt(u38, "LMTAINF 35MZ, 49.5DB")
    Call ibwrt(u38, "LMTAINF 35MZ, 51.5DB")
    Call ibwrt(u38, "LMTAINF 55MZ, 51.5DB")
    Call ibwrt(u38, "LMTAINF 55MZ, 54.3DB")
    Call ibwrt(u38, "LMTAINF 65MZ, 54.3DB")
    Call ibwrt(u38, "LMTAINF 65MZ, 57.0DB")
    Call ibwrt(u38, "LMTAINF 68MZ, 57.0DB")
    Call ibwrt(u38, "LMTAINF 68MZ, 60.0DB")
    Call ibwrt(u38, "LMTAINF 75MZ, 60.0DB")
    Call ibwrt(u38, "LMTAINF 75MZ, 62.5DB")
    Call ibwrt(u38, "LMTAINF 82MZ, 62.5DB")
    Call ibwrt(u38, "LMTAINF 82MZ, 64.7DB")
    Call ibwrt(u38, "FA 0MZ")                ' Sets the start frequency to 0 MHz.
    Call ibwrt(u38, "FB 100MZ")              ' Sets the stop frequency to 100 MHz.
    Call ibwrt(u38, "LMTA ON")               ' Turns Limit line 1 on.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_06
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '**********************************************************************
    '* Example 6 Enter Limit line1 in the table and turn Limit line 1 on. *
    '**********************************************************************
    Sub Main()
        Dim str As String = Space(1)
        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()              ' Performs a device clear.
        Call GpibDevice.Write("LMTADEL")     ' Clears the table used for Limit Line 1.
        Call GpibDevice.Write("AUNITS DBUV") ' Sets the level unit to dBμV.
        ' Enters data used by Limit Line 1.
```

```
         System.Console.WriteLine("Sets the limit frequency to 25 MHz and limit level 49.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 25MZ, 49.5DB")
         System.Console.WriteLine("Sets the limit frequency to 35 MHz and limit level 49.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 35MZ, 49.5DB")
         System.Console.WriteLine("Sets the limit frequency to 35 MHz and limit level 51.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 35MZ, 51.5DB")
         System.Console.WriteLine("Sets the limit frequency to 55 MHz and limit level 51.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 55MZ, 51.5DB")
         System.Console.WriteLine("Sets the limit frequency to 55 MHz and limit level 54.3
dBμV.")
        Call GpibDevice.Write("LMTAINF 55MZ, 54.3DB")
         System.Console.WriteLine("Sets the limit frequency to 65 MHz and limit level 54.3
dBμV.")
        Call GpibDevice.Write("LMTAINF 65MZ, 54.3DB")
         System.Console.WriteLine("Sets the limit frequency to 65 MHz and limit level 57.0
dBμV.")
        Call GpibDevice.Write("LMTAINF 65MZ, 57.0DB")
         System.Console.WriteLine("Sets the limit frequency to 68 MHz and limit level 57.0
dBμV.")
        Call GpibDevice.Write("LMTAINF 68MZ, 57.0DB")
         System.Console.WriteLine("Sets the limit frequency to 68 MHz and limit level 60.0
dBμV.")
        Call GpibDevice.Write("LMTAINF 68MZ, 60.0DB")
         System.Console.WriteLine("Sets the limit frequency to 75 MHz and limit level 60.0
dBμV.")
        Call GpibDevice.Write("LMTAINF 75MZ, 60.0DB")
         System.Console.WriteLine("Sets the limit frequency to 75 MHz and limit level 62.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 75MZ, 62.5DB")
         System.Console.WriteLine("Sets the limit frequency to 82 MHz and limit level 62.5
dBμV.")
        Call GpibDevice.Write("LMTAINF 82MZ, 62.5DB")
         System.Console.WriteLine("Sets the limit frequency to 82 MHz and limit level 64.7
dBμV.")
        Call GpibDevice.Write("LMTAINF 82MZ, 64.7DB")
        System.Console.WriteLine("Sets the start frequency to 0 MHz.")
        Call GpibDevice.Write("FA 0MZ")         ' Sets the start frequency to 0 MHz.
        System.Console.WriteLine("Sets the stop frequency to 100 MHz.")
        Call GpibDevice.Write("FB 100MZ")       ' Sets the stop frequency to 100 MHz.
        System.Console.WriteLine("Turns Limit line 1 on.")
        Call GpibDevice.Write("LMTA ON")        ' Turns Limit line 1 on.

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

6.14.1.3 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.

Table 6-11 Data Output Format

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

Visual Basic 6.0

```
'*****************************************************
'* Example 1 Reading and displaying the marker level. *
'*****************************************************
Private Sub CmdReadMarkerLevel_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim sep As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF 30MZ")               ' Sets the parameter.
    Call ibwrt(u38, "SP 1MZ")
    Call ibwrt(u38, "MLN ON")                ' Marker ON
    Call ibwrt(u38, "MK 30MZ")               ' Sets the marker to 30 MHz.
    Call ibwrt(u38, "TS")
    Call ibwrt(u38, "ML?")                   ' Requests the value of the marker level.
    Rdbuff = Space(30)                       ' Allocates 30 bytes to the buffer area.
    Call ibrd(u38, Rdbuff)                   ' Reads the data (30 bytes Max.).
    sep = InStr(1, Rdbuff, vbCrLf, 0)
    ' Checks the number of character up to the delimiter.
    Label.Caption = "MarkerLevel = " & Left(Rdbuff, sep - 1)
    ' Displays the data on the screen.
    ' An example display:
    ' MarkerLevel = -88.1875
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*****************************************************
    '* Example 1 Reading and displaying the marker level. *
    '*****************************************************
    Sub Main()
        Dim Rdbuff As String
        Dim sep As Integer
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress,U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                 ' Performs a device clear.
        System.Console.WriteLine("Sets the center frequency to 30 MHz.")
        Call GpibDevice.Write("CF 30MZ")        ' Sets the parameter.
        System.Console.WriteLine("Sets the span frequency to 1 MHz.")
        Call GpibDevice.Write("SP 1MZ")
        System.Console.WriteLine("Marker ON.")
        Call GpibDevice.Write("MLN ON")         ' Marker ON.
        System.Console.WriteLine("Sets the marker to 30 MHz.")
        Call GpibDevice.Write("MK 30MZ")        ' Sets the marker to 30 MHz.
        System.Console.WriteLine("Single sweep.")
        Call GpibDevice.Write("TS")
        System.Console.WriteLine("Requests the value of the marker level.")
        Call GpibDevice.Write("ML?")            ' Requests the value of the marker
 level.
        Rdbuff = Space(30)                      ' Allocates 30 bytes to the buffer area.
        Rdbuff = GpibDevice.ReadString          ' Reads the data (30 bytes Max.).
         sep = InStr(1, Rdbuff, vbCr & vbLf, 0)   ' Checks the number of character up to the
delimiter.
        ' Displays the data on the screen.
        ' An example display:
        ' MarkerLevel = -88.1875
        System.Console.WriteLine("MarkerLevel = " & Left(Rdbuff, sep - 1))

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub
End Module
```

Example 2 Reading and displaying the center frequency

Visual Basic 6.0

```
'*******************************************************
'* Example 2 Reading and displaying the center frequency. *
'*******************************************************
Private Sub CmdReadCenterFreq_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim sep As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF?")                   ' Query command for the center frequency.
    Rdbuff = Space(30)                       ' Allocates 30 bytes to the buffer memory.
    Call ibrd(u38, Rdbuff)                   ' Reads the data (30 bytes Max.)
    sep = InStr(1, Rdbuff, vbCrLf, 0)       ' Checks the number of character to the delimiter.
    Label.Caption = "CenterFreq = " & Left(Rdbuff, sep - 1)
    ' Displays the data on the screen.
    ' An example display:
    ' CenterFreq = 30000000#
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_02
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*********************************************************
    '* Example 2 Reading and displaying the center frequency. *
    '*********************************************************
    Sub Main()
        Dim Rdbuff As String
        Dim sep As Integer
        Dim str As String = Space(1)

       GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                  ' Performs a Device Clear.
        System.Console.WriteLine("Query command for the center frequency.")
        Call GpibDevice.Write("CF?")             ' Query command for the center frequency.
        Rdbuff = Space(30)                       ' Allocates 30 bytes to the buffer memory.
        Rdbuff = GpibDevice.ReadString           ' Reads the data (30 bytes Max.)
         sep = InStr(1, Rdbuff, vbCr & vbLf, 0)   ' Checks the number of character to the
delimiter.
        ' Displays the data on the screen.
        System.Console.WriteLine("CenterFreq = " & Left(Rdbuff, sep - 1))

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 3 Reading and displaying the level and its display unit

Visual Basic 6.0

```
'*********************************************************************
'* Example 3 Reading the level and display unit and displaying them *
'*********************************************************************
Private Sub CmdReadRefLevel_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim sep As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "RL?")                   ' Query command for the reference level.
    Rdbuff = Space(30)                       ' Allocates 30 bytes to the buffer memory.
    Call ibrd(u38, Rdbuff)                   ' Reads the data from the spectrum analyzer.
   sep = InStr(1, Rdbuff, vbCrLf, 0)      ' Checks the number of characters to the delimiter.
    Label.Caption = "RefLevel = " & Left(Rdbuff, sep - 1)   ' Display the data on the screen.
    Call ibwrt(u38, "AUNITS?")               ' Requests the level unit.
    Rdbuff = Space(3)
    Call ibrd(u38, Rdbuff)
   sep = InStr(1, Rdbuff, vbCrLf, 0)      ' Checks the number of characters to the delimiter.
    Label.Caption = Label.Caption & 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#
    ' UNIT = 0
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_03
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

    '*******************************************************************
    '* Example 3 Reading the level and display unit and displaying them. *
    '*******************************************************************
    Sub Main()
        Dim Rdbuff As String
        Dim sep As Integer
        Dim tmp As String = Space(256)
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                 ' Performs a Device Clear.
        System.Console.WriteLine("Query command for the reference level.")
        Call GpibDevice.Write("RL?")            ' Query command for the reference level.
        Rdbuff = Space(30)                      ' Allocates 30 bytes to the buffer memory.
        Rdbuff = GpibDevice.ReadString          ' Reads the data from the U3800.
         sep = InStr(1, Rdbuff, vbCr & vbLf, 0)   ' Checks the number of characters to the
delimiter.
        tmp = "RefLevel = " & Left(Rdbuff, sep - 1)
        System.Console.WriteLine(tmp)
        ' Display the data on the screen.
        System.Console.WriteLine("Requests the level unit.")
        Call GpibDevice.Write("AUNITS?")        ' Requests the level unit.
        Rdbuff = Space(3)
        Rdbuff = GpibDevice.ReadString
         sep = InStr(1, Rdbuff, vbCr & vbLf, 0)   ' Checks the number of characters to the
delimiter.
       ' Displays the previous result, followed by a return mark and the most recent result.
        System.Console.WriteLine(tmp & vbCrLf & "UNIT = " & Left(Rdbuff, sep - 1))

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 4 Executing the 6 dB-down operation, reading the frequency and level, and displaying them

Visual Basic 6.0

```
'*****************************************************************************************
***********
'* Example 4 Executing the 6 dB-down operation, reading the frequency and level and displaying
them. *
'*****************************************************************************************
***********
Private Sub Cmd6dBDownOpe_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim sep As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF 30MZ")               ' Sets the parameter.
    Call ibwrt(u38, "SP 20MZ")
    Call ibwrt(u38, "MKBW 6DB")              ' Sets a 6 dB down measurement.
    Call ibwrt(u38, "PS")                    ' Executes the peak search.
    Call ibwrt(u38, "XDB")                   ' Performs the 6 dB down measurement.
   Call ibwrt(u38, "MFL?")             ' Requests the value of the marker level and frequency.
    Rdbuff = Space(50)                       ' Allocates the buffer memory space to 50 bytes.
    Call ibrd(u38, Rdbuff)                   ' Reads the data (50 bytes Max.) from the u3800.
   sep = InStr(1, Rdbuff, vbCrLf, 0)      ' Checks the number of characters to the delimiter.
    Label.Caption = "Marker Freq && Level = " & Left(Rdbuff, sep - 1)
    ' Displays the data on the screen.
    ' An example display:
    ' Marker Freq & Level = 200000#, 1.0234375
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_04
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

'*****************************************************************************************
***********
    '* Example 4 Executing the 6 dB-down operation, reading the frequency and level and dis-
playing them. *

'*****************************************************************************************
***********
    Sub Main()
        Dim Rdbuff As String
        Dim sep As Integer
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                 ' Performs a Device Clear.
        System.Console.WriteLine("Sets the center frequency to 30 MHz.")
        Call GpibDevice.Write("CF 30MZ")        ' Sets the parameter.
        System.Console.WriteLine("Sets the span frequency to 20 MHz.")
        Call GpibDevice.Write("SP 20MZ")
        System.Console.WriteLine("Sets a 6 dB down measurement.")
        Call GpibDevice.Write("MKBW 6DB")       ' Sets a 6 dB down measurement.
        System.Console.WriteLine("Executes the peak search.")
        Call GpibDevice.Write("PS")             ' Executes the peak search.
        System.Console.WriteLine("Performs the 6 dB down measurement.")
        Call GpibDevice.Write("XDB")            ' Performs the 6 dB down measurement.
        System.Console.WriteLine("Requests the value of the marker level and frequency. ")
        Call GpibDevice.Write("MFL?")           ' Requests the value of the marker level and
frequency.
       Rdbuff = Space(50)                      ' Allocates the buffer memory space to 50 bytes.
       Rdbuff = GpibDevice.ReadString          ' Reads the data (50 bytes Max.) from the U3800.
         sep = InStr(1, Rdbuff, vbCr & vbLf, 0)   ' Checks the number of characters to the
delimiter.
        ' Displays the data on the screen.
        ' An example display:
        ' Marker(Freq & Level = +200000.0, +1.0234375)
        System.Console.WriteLine("Marker Freq & Level = " & Left(Rdbuff, sep - 1))

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 5 Measuring and displaying OBW

Visual Basic 6.0

```
'**********************************************
'* Example 5 Measuring OBW and displaying it *
'**********************************************
Private Sub CmdMeasOBW_Click()
    Dim u38 As Integer
    Dim LENG1 As Integer, LENG2 As Integer
    Dim OBW As String
    Dim FC As String
    Dim Rdbuff As String

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "CF 30MZ")               ' Sends the command already set.
    Call ibwrt(u38, "SP 1MZ")
    Call ibwrt(u38, "MLN ON")                ' Marker ON
    Call ibwrt(u38, "MK 30MZ")
    Call ibwrt(u38, "OBWON ON")
    Call ibwrt(u38, "TS")
    Call ibwrt(u38, "OBW?")                  ' Sends the query command.
    Rdbuff = Space(60)                       ' Allocates the area to the read buffer.
    Call ibrd(u38, 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, vbCr, 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.
    Label.Caption = "OBW = " & OBW & vbCrLf & "Fc = " & FC & vbCrLf
    ' Displays the data on the screen.
    ' An example display:
    ' OBW = 981000#
    ' FC = 30002500#
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_05
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '**********************************************
    '* Example 5 Measuring OBW and displaying it. *
    '**********************************************
```

```
    Sub Main()
        Dim Rdbuff As String
        Dim LENG1 As Integer, LENG2 As Integer
        Dim OBW As String
        Dim FC As String
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()              ' Performs a Device Clear.
        System.Console.WriteLine("Sets the center frequency to 30 MHz.")
        Call GpibDevice.Write("CF 30MZ")     ' Sends the command already set.
        System.Console.WriteLine("Sets the span frequency to 1 MHz.")
        Call GpibDevice.Write("SP 1MZ")
        System.Console.WriteLine("Marker ON.")
        Call GpibDevice.Write("MLN ON")      ' Marker ON.
        System.Console.WriteLine("Sets the marker frequency to 30 MHz.")
        Call GpibDevice.Write("MK 30MZ")
        System.Console.WriteLine("OBW ON.")
        Call GpibDevice.Write("OBWON ON")
        System.Console.WriteLine("Single Sweep.")
        Call GpibDevice.Write("TS")
        System.Console.WriteLine("Sends the query OBW command.")
        Call GpibDevice.Write("OBW? ")   ' Sends the query command.
        Rdbuff = Space(60)               ' Allocates the area to the read buffer.
        Rdbuff = GpibDevice.ReadString   ' 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.
        LENG2 = InStr((LENG1 + 1), Rdbuff, vbCr, 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.
        ' Displays the data on the screen.
        ' An example display:
        ' OBW = +981000.0
        ' FC = +30002500.0
        System.Console.WriteLine("OBW = " & OBW & vbCr & vbLf & "Fc = " & FC & vbCr & vbLf)

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        str = System.Console.ReadLine
    End Sub

End Module
```

Example 6 Reading and displaying the first, second, and third largest peak level values of the signal

Visual Basic 6.0

```
'*******************************************************************
'* Example 6 Reading and displaying the three largest peak levels *
'*******************************************************************
Private Sub CmdPeakLevel_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim pk1, pk2, pk3 As String

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    Call ibclr(u38)                         ' Performs a Device Clear.
    Call ibwrt(u38, "CF 0MZ")               ' Applies the settings.
    Call ibwrt(u38, "SP 100MZ")
    Call ibwrt(u38, "TS")
    Call ibwrt(u38, "PS")                   ' Executes the peak search.
    Call ibwrt(u38, "ML?")                  ' Query command to search for the marker level
    Rdbuff = Space(25)                      ' Allocates the buffer memory.
    Call ibrd(u38, Rdbuff)                  ' Receives the output.
    pk1 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1)) ' Reads the data between the starting
point and the delimiter.
    Call ibwrt(u38, "NXP")                  ' Searches for the next peak.
    Call ibwrt(u38, "ML?")
    Rdbuff = Space(25)
    Call ibrd(u38, Rdbuff)
    pk2 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1)) ' Reads the data between the starting
point and the delimiter.
    Call ibwrt(u38, "NXP")
    Call ibwrt(u38, "ML?")
    Rdbuff = Space(25)
    Call ibrd(u38, Rdbuff)
    pk3 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1)) ' Reads the data between the starting
point and the delimiter.
    Label.Caption = "1st PK = " & pk1 & vbCrLf & "2nd PK = " & pk2 & vbCrLf & "3rd PK = " &
pk3 & vbCrLf
    ' Displays the data on the screen.
    ' An example display:
    ' 1 st PK = -85.5390625
    ' 2 nd PK = -70.046875
    ' 3 rd PK = -86.5546875
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Module MdlManualSample_06
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*********************************************************************
    '* Example 6 Reading and displaying the three largest peak levels.     *
    '*********************************************************************
    Sub Main()
        Dim Rdbuff As String
        Dim pk1 As String, pk2 As String, pk3 As String
        Dim str As String = Space(1)

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()          ' Performs a device clear.
        System.Console.WriteLine("Sets the center frequency to 0 MHz.")
        Call GpibDevice.Write("CF 0MZ") ' Applies the settings.
        System.Console.WriteLine("Sets the span frequency to 100 MHz.")
        Call GpibDevice.Write("SP 100MZ")
        System.Console.WriteLine("Single Sweep.")
        Call GpibDevice.Write("TS")
        System.Console.WriteLine("Executes the peak search.")
        Call GpibDevice.Write("PS")      ' Executes the peak search.
        System.Console.WriteLine("Requests the value of the marker level.")
        Call GpibDevice.Write("ML?")     ' Requests the value of the marker level.
        Rdbuff = Space(25)               ' Allocates the buffer memory.
        Rdbuff = GpibDevice.ReadString   ' Receives the output.
        pk1 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1))
        ' Reads the data between the starting point and the delimiter.
        System.Console.WriteLine("Searches for the next peak.")
        Call GpibDevice.Write("NXP")     ' Searches for the next peak.
        System.Console.WriteLine("Requests the value of the marker level.")
        Call GpibDevice.Write("ML?")
        Rdbuff = Space(25)
        Rdbuff = GpibDevice.ReadString
        pk2 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1))
        ' Reads the data between the starting point and the delimiter.
        System.Console.WriteLine("Searches for the next peak.")
        Call GpibDevice.Write("NXP")
        System.Console.WriteLine("Requests the value of the marker level.")
        Call GpibDevice.Write("ML?")
        Rdbuff = Space(25)
        Rdbuff = GpibDevice.ReadString
        pk3 = Left(Rdbuff, (InStr(1, Rdbuff, vbCr, 1) - 1))
        ' Reads the data between the starting point and the delimiter.
        ' Displays the data on the screen.
        ' An example display:
        ' 1st PK = -8.553906250000E+01
        ' 2:       nd(PK = -70.046875)
        ' 3rd PK = -8.655468750000E+01
```

```
        System.Console.WriteLine("1st PK = " & pk1 & vbCr & vbLf & "2nd PK = " & pk2 & vbCr
& vbLf & "3rd PK = " & pk3 & vbCr & vbLf)

        Call GpibDevice.Dispose()

        System.Console.WriteLine("Please push Enter key.")
        Str = System.Console.ReadLine

    End Sub

End Module
```

Example 7 Access channel example program

To set or read data to or from channels 1 and 2 by remote control, an active channel must be set. When setting only one command for the inactive channel, it can be done with two commands of “X2” and “command” by using the Access Channel command. The channel setting with the Access Channel command is applied to only one command that follows “X1” or “X2”.

Visual Basic 6.0

```
'*****************************
'* Example 7 Access Channel. *
'*****************************
Private Sub CmdReadMarkerFreq_Click()
    Dim u38 As Integer
    Dim Rdbuff1 As String, Rdbuff2 As String

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "IP")                    ' preset
    Call ibwrt(u38, "TSM")                   ' Sweeps both channels once
    Call ibwrt(u38, "PS")                    ' Peak search for channel 1
    Call ibwrt(u38, "X2;PS")                 ' Peak search for channel 2
    Rdbuff1 = Space(30)                      ' Allocates 30 bytes to the buffer area
    Rdbuff2 = Space(30)                      ' Allocates 30 bytes to the buffer area
    Call ibwrt(u38, "MF?")                   ' Reads the marker frequency of channel 1
    Call ibrd(u38, Rdbuff1)                  ' Reads data
    Call ibwrt(u38, "X2;MF?")                ' Reads the marker frequency of channel 2
    Call ibrd(u38, Rdbuff2)                  ' Reads data
    TextBox.Text = "CH1 Marker Freq = " & Trim(Rdbuff1) & "CH2 Marker Freq = " & Rdbuff2
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_07
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '****************************
    '* Example 7 Access Channel. *
    '****************************
   Private Sub CmdReadMarkerFreq_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdReadMarkerFreq.Click
        Dim Rdbuff1 As String = ""
        Dim Rdbuff2 As String = ""

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()              ' Performs a Device Clear.
        Call GpibDevice.Write("IP")          ' preset
        Call GpibDevice.Write("TSM")         ' Sweeps both channels once
        Call GpibDevice.Write("PS")          ' Peak search for channel 1
        Call GpibDevice.Write("X2;PS")       ' Peak search for channel 2
        Call GpibDevice.Write("MF?")         ' Reads the marker frequency of channel 1
        Rdbuff1 = GpibDevice.ReadString()    ' Reads data
        Call GpibDevice.Write("X2;MF?")      ' Reads the marker frequency of channel 2
        Rdbuff2 = GpibDevice.ReadString()    ' Reads data
       Me.RichTextBox.Text = "CH1 Marker Freq = " & Rdbuff1 & "CH2 Marker Freq = " & Rdbuff2
        Call GpibDevice.Dispose()
    End Sub
End Class
```

6.14.1.4 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).

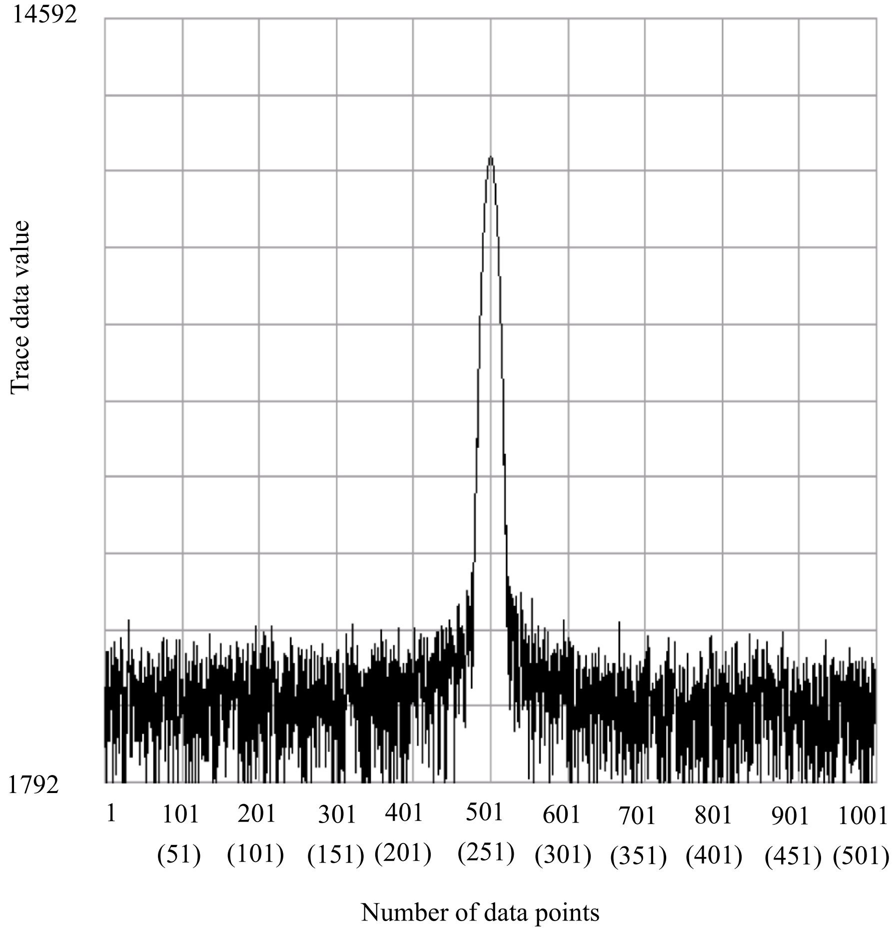


Figure 6-16 Relationship between the Screen Graticule and Trace Data

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 6-12 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 6-13 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 6-14 I/O Format (1 of 2)

<table>
<tr><th>I/O format</th><th colspan="3">Description</th></tr>
<tr><td rowspan="7">ASCII format</td><td colspan="3"><u>DDDDD</u> CR LF
↑ ↑
Delimiter
Data for one point

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</td><td>TAA</td><td>TAA?</td></tr>
<tr><td>Memory B</td><td>TAB</td><td>TAB?</td></tr>
<tr><td>Memory C</td><td>TAC</td><td>TAC?</td></tr>
<tr><td>Memory O</td><td>TAO</td><td>TAO?</td></tr>
<tr><td>Memory M</td><td>TAM</td><td>TAM?</td></tr>
</table>

Table 6-14 I/O Format (2 of 2)

<table>
<tr><th>I/O format</th><th colspan="3">Description</th></tr>
<tr><td rowspan="6">Binary format
16 bit-integer</td><td colspan="3">FORM1
DD DD .... DD DD + EOI
Delimiter
Low-order byte for 1st point
Low-order byte for 1001/501st point
High-order byte for 1st point
High-order byte for 1001/501st point

FORM2
DD DD .... DD DD + EOI
Delimiter
High-order byte for 1st point
High-order byte for 1001/501st point
Low-orderr byte for 1st point
Low-order byte for 1001/501st point

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>Memory A</td><td>TBA</td><td>TBA?</td></tr>
<tr><td>Memory B</td><td>TBB</td><td>TBB?</td></tr>
<tr><td>Memory C</td><td>TBC</td><td>TBC?</td></tr>
<tr><td>Memory O</td><td>TBO</td><td>TBO?</td></tr>
<tr><td>Memory M</td><td>TBM</td><td>TBM?</td></tr>
</table>

Table 6-15 Absolute Value Output Format

<table>
<tr><th>I/O format</th><th>Description</th></tr>
<tr><td>Binary format
32-bit floating point</td><td>FORM3
DD DD DD DD .... DD DD DD DD + EOI
Delimiter
Low-order byte for 1st point
Low-order byte for 1001/501st point
High-order byte for 1st point
High-order byte for 1001/501st point

For DDDDDDDD=12345678, data is output in order from 12345678.

FORM4
DD DD DD DD .... DD DD DD DD + EOI
Delimiter
High-order byte for 1st point
High-order byte for 1001/501st point
Low-order byte for 1st point
Low-order byte for 1001/501st point

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.
<table>
<tr><th></th><th></th><th>Output GPIB code</th></tr>
<tr><td>Memory A</td><td></td><td>TBA?</td></tr>
<tr><td>Memory B</td><td></td><td>TBB?</td></tr>
<tr><td>Memory C</td><td></td><td>TBC?</td></tr>
<tr><td>Memory O</td><td></td><td>TBO?</td></tr>
<tr><td>Memory M</td><td></td><td>TBM?</td></tr>
</table></td></tr>
</table>

Example 1 Reading the trace data in ASCII format

Visual Basic 6.0

```
'**************************************************
'* Example 1 Read the trace data in ASCII format. *
'**************************************************
Private Sub CmdReadTraceAscii_Click()
    Dim u38 As Integer
    Dim i As Integer
    Dim res As String
    Dim tr(1000) As String ' Allocates an array in the buffer for 1001 points.

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "DLIM0")                 ' CR LF EOI
    Call ibwrt(u38, "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(u38, tr(i))                ' Reads the data.
        ' Displays the data on the screen.
        res = res & "tr(" & Str(i) & ") = " & Left(tr(i), 5) & vbCrLf
        DoEvents
    Next i
    TextBox.Text = res
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '**************************************************
    '* Example 1 Read the trace data in ASCII format. *
    '**************************************************
   Private Sub CmdReadTraceAscii_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdReadTraceAscii.Click
        Dim res As String = ""
        Dim tr(1000) As String
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()             ' Performs a Device Clear.
        Call GpibDevice.Write("DLIM0")      ' Sets the delimiter to the CR, LF and EOI.
        Call GpibDevice.Write("TAA?")
        For i = 0 To 1000                   ' Repeats the operation for 1001 points.
            tr(i) = GpibDevice.ReadString   ' Reads the data.
            res = res & "tr(" & Str(i) & ") = " & Mid(tr(i), 1, 5) & vbCrLf
        Next
        ' Displays the data on the screen.
        Me.RichTextBox.Text = res

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 2 Reading the memory A data in binary format

Visual Basic 6.0

```
'*********************************************************
'* Example 2 Reading the memory A data in binary format. *
'*********************************************************
Private Sub CmdReadTraceBin_Click()
    Dim u38 As Integer
    Dim i As Integer
    Dim res As String
    Dim Rslt As Integer, tmp As Integer
    Dim tr(1000) As Integer                ' Allocates an array in the buffer for 1001

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    Call ibclr(u38)                        ' 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(u38, "DLIM2")               ' Sets the delimiter to EOI only.
    Call ibwrt(u38, "TBA?")                ' Requests Trace A in binary data.
    Call ibrdi(u38, 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
    TextBox.Text = res
    Call ibwrt(u38, "DLIM0")               ' Sets the delimiter to the CR, LF and EOI.
    Call ibconfig(0, IbcEndBitIsNormal, 1)
    Call ibwrt(u38, "FORM0")               ' Switches to FORM0.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_02
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '**********************************************************
    '* Example 2 Reading the memory A data in binary format. *
    '**********************************************************
    Private Sub CmdReadTraceBin_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdReadTraceBin.Click
        Dim res As String = ""
        Dim tmp_buf(1001 * 2) As Byte
        Dim tmp(2) As Byte
        Dim tr(1000) As UShort
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                          ' Performs a Device Clear.
        ' 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 GpibDevice.Write("DLIM2")                   ' Sets the delimiter to EOI only.
        Call GpibDevice.Write("TBA?")                    ' Requests Trace A in binary data.
        tmp_buf = GpibDevice.ReadByteArray(1001 * 2)     ' Reads 1001 points of binary data.
        For i = 0 To 1000                            ' Repeats the operation for 1001 points.
            tmp(1) = tmp_buf(i * 2)                      ' Swaps the high and low bites.
            tmp(0) = tmp_buf(i * 2 + 1)
            tr(i) = System.BitConverter.ToUInt16(tmp, 0)
            res = res & "tr(" & Str(i) & ") = " & Mid(tr(i), 1, 5) & vbCrLf
        Next
        Me.RichTextBox.Text = res
       GpibDevice.Write("DLIM0")                     ' Sets the delimiter to the CR, LF and EOI.

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 3 Entering data into memory A in ASCII format

Visual Basic 6.0

```
'**********************************************************
'* Example 3 Entering data into memory A in ASCII format *
'**********************************************************
Private Sub CmdTraceSetAscii_Click()
    Dim u38 As Integer
    Dim trdata(1000) As Integer
    Dim i As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    trdata(0) = 1792                        ' Creates a temporary test value used to test the
input (*).
    ' If measurement data exists, the steps between the place marked with (*) and this point
are not required.
    For i = 1 To 1000 Step 1
        trdata(i) = Str(Val(trdata(i - 1)) + 12)
        DoEvents
    Next i
    Call ibclr(u38)                          ' Performs a device clear.
    Call ibwrt(u38, "AB")                    ' Sets Trace A to BLANK.
    Call ibwrt(u38, "TAA")                   ' Sets Trace A in ASCII.
    For i = 0 To 1000 Step 1                 ' Repeats the operation for 1001 points.
        ' Sends the value after it has been converted to the ASCII data.
        Call ibwrt(u38, CStr(trdata(i)))
        DoEvents
    Next i
    Call ibwrt(u38, "AV")                    ' Sets Trace A to VIEW.
    Label.Caption = "Sets Trace A to VIEW."
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_03
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '****************************************************
    '* Example 3 Entering data into memory A in ASCII format *
    '****************************************************
    Private Sub CmdTraceSetAscii_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdTraceSetAscii.Click
        Dim trdata(1000) As UShort
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
      trdata(0) = 1792             ' Creates a temporary test value used to test the input (*).
        ' If measurement data exists, the steps between the place marked with (*) and this
point are not required.
        For i = 1 To 1000
            trdata(i) = Str(Val(trdata(i - 1) + 12))
        Next
        Call GpibDevice.Clear()         ' Performs a Device Clear.
        Call GpibDevice.Write("AB")     ' Sets Trace A to BLANK.
        Call GpibDevice.Write("TAA")    ' Sets Trace A in ASCII.
        For i = 0 To 1000               ' Repeats the operation for 1001 points.
            ' Sends the value after it has been converted to the ASCII data.
            GpibDevice.Write(CStr(trdata(i)))
        Next
        GpibDevice.Write("AV")          ' Sets Trace A to VIEW.
        Me.Label.Text = "Sets Trace A to VIEW."

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 4 FORM2 Reading the memory A data in binary 16-bit integer (order swap)

Visual Basic 6.0

```
'*********************************************************************************
'* Example 4 FORM2 Reading the memory A data in binary 16-bit integer (order swap). *
'*********************************************************************************
Private Sub CmdReadMemoryA_TraceSwap_Click()
    Dim u38 As Integer
    Dim tr(1000) As Integer              ' Allocates an array in the buffer for 1001 points.
    Dim i As Integer
    Dim res As String

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "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(u38, "DLIM2")                 ' Sets a delimiter to EOI only.
    Call ibwrt(u38, "TBA?")                  ' Requests Trace A in binary data.
    Call ibrdi(u38, 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
    TextBox.Text = res
    Call ibwrt(u38, "DLIM0")                 ' Sets the delimiter to the CR, LF and EOI.
    Call ibconfig(0, IbcEndBitIsNormal, 1)
    Call ibwrt(u38, "FORM0")                 ' Switches to FORM0.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_04
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*********************************************************************************
    '* Example 4 FORM2 Reading the memory A data in binary 16-bit integer (order swap). *
    '*********************************************************************************
    Private Sub CmdReadTraceA_TraceSwap_Click(ByVal sender As System.Object, ByVal e As Sys-
tem.EventArgs) Handles CmdReadTraceA_TraceSwap.Click
        Dim res As String = ""
        Dim tmp_buf(1001 * 2) As Byte
        Dim tr(1000) As UShort
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()         ' Performs a Device Clear.
        Call GpibDevice.Write("FORM2")  ' Switches to FORM2.
        Call GpibDevice.Write("DLIM2")  ' Sets a delimiter to EOI only.
        Call GpibDevice.Write("TBA?")   ' Requests Trace A in binary data.
        tmp_buf = GpibDevice.ReadByteArray(1001 * 2)    ' Reads 1001 points of binary data.
        For i = 0 To 1000
            tr(i) = System.BitConverter.ToUInt16(tmp_buf, i * 2)    ' Repeats the operation
for 1001 points.
            res = res & "tr(" & Str(i) & ") = " & Mid(tr(i), 1, 5) & vbCrLf
        Next
        Me.RichTextBox.Text = res
        GpibDevice.Write("DLIM0")       ' Sets the delimiter to the CR, LF and EOI.
        GpibDevice.Write("FORM0")       ' Switches to FORM0.

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 5 FORM3 Reading the memory A data in binary 32-bit floating point

Visual Basic 6.0

```
'****************************************************************************
'* Example 5 FORM3 Reading the memory A data in binary 32-bit floating point *
'****************************************************************************
Private Sub CmdReadTraceFloating_Click()
    Dim u38 As Integer
    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 ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)             ' Performs a Device Clear.
    Call ibwrt(u38, "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(u38, "DLIM2")    ' Sets a delimiter to EOI only.
    Call ibwrt(u38, "TBA?")     ' Requests Trace A in binary data.
    Call ibrd32(u38, 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
    TextBox.Text = res          ' Displays the data on the screen.
    Call ibwrt(u38, "DLIM0")    ' Sets the delimiter to the CR, LF and EOI.
    Call ibconfig(0, IbcEndBitIsNormal, 1)
    Call ibwrt(u38, "FORM0")    ' Switches to FORM0.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_05
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*************************************************************************
    '* Example 5 FORM3 Reading the memory A data in binary 32-bit floating point *
    '*************************************************************************
     Private Sub CmdReadTraceFloating_Click(ByVal sender As System.Object, ByVal e As Sys-
tem.EventArgs) Handles CmdReadTraceFloating.Click
        Dim res As String = ""
        Dim tmp_buf(1001 * 4) As Byte   ' Variable which stores converted allocates an array
in the buffer for 1001 points.
        Dim tmp(4) As Byte              ' Variable which swaps the high-order byte and low-
order byte
        Dim tr(1000) As Single          ' Allocates an array in the buffer for 1001 points.
32-bit floating point type
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()         ' Performs a Device Clear.
        Call GpibDevice.Write("FORM3")  ' Switches to FORM3.
        Call GpibDevice.Write("DLIM2")  ' Sets a delimiter to EOI only.
        Call GpibDevice.Write("TBA?")   ' Requests Trace A in binary data.
        ' Reads 1001 points of binary data. * 4 for four bytes.
        tmp_buf = GpibDevice.ReadByteArray(1001 * 4)
        For i = 0 To 1000
            tmp(3) = tmp_buf(i * 4)     ' Swaps the high and low orders.
            tmp(2) = tmp_buf(i * 4 + 1)
            tmp(1) = tmp_buf(i * 4 + 2)
            tmp(0) = tmp_buf(i * 4 + 3)
            tr(i) = System.BitConverter.ToSingle(tmp, 0)
            res = res & "tr(" & Str(i) & ") = " & Mid(tr(i), 1, 5) & vbCrLf
        Next
        Me.RichTextBox.Text = res       ' Displays the data on the screen.
        Call GpibDevice.Write("DLIM0")  ' Sets the delimiter to the CR, LF and EOI.
        Call GpibDevice.Write("FORM0")  ' Switches to FORM0.

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 6 FORM4 Reading the memory A data in binary 32-bit floating point (order swap)

Visual Basic 6.0

```
'*********************************************************************************************
*
'* Example 6 FORM4 Reading the memory A data in binary 32-bit floating point (order swap). *
'*********************************************************************************************
*
Private Sub CmdReadTraceFloatingOrderSwap_Click()
    Dim u38 As Integer
   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 ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    Call ibclr(u38)                         ' Performs a Device Clear.
    Call ibwrt(u38, "FORM4")                ' Switches to FORM4.
    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(u38, "DLIM2")                ' Sets a delimiter to EOI only.
    Call ibwrt(u38, "TBA?")                 ' Requests Trace A in binary data.
    Call ibrd32(u38, 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
        DoEvents
    Next i
    ' Displays the data on the screen.
    TextBox.Text = res
    Call ibwrt(u38, "DLIM0")                ' Sets the delimiter to the CR, LF and EOI.
    Call ibconfig(0, IbcEndBitIsNormal, 1)
    Call ibwrt(u38, "FORM0")                ' Switches to FORM0.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_06
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

'*****************************************************************************************
*
   '* Example 6 FORM4 Reading the memory A data in binary 32-bit floating point (order swap). *

'*****************************************************************************************
*
    Private Sub CmdReadTraceFloatingSwap_Click(ByVal sender As System.Object, ByVal e As Sys-
tem.EventArgs) Handles CmdReadTraceFloatingSwap.Click
        Dim res As String = ""
        Dim tmp_buf(1001 * 4) As Byte
        Dim tr(1000) As Single
        Dim i As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()         'Performs a Device Clear.
        Call GpibDevice.Write("FORM4")  ' Switches to FORM4.
        Call GpibDevice.Write("DLIM2")  ' Sets a delimiter to EOI only.
        Call GpibDevice.Write("TBA?")   ' Requests Trace A in binary data.
        ' Reads 1001 points of binary data. * 4 for four bytes.
        tmp_buf = GpibDevice.ReadByteArray(1001 * 4)
        For i = 0 To 1000               ' Repeats the operation for 1001 points.
            tr(i) = System.BitConverter.ToSingle(tmp_buf, i * 4)
            res = res & "tr(" & Str(i) & ") = " & Mid(tr(i), 1, 5) & vbCrLf
        Next
        ' Displays the data on the screen.
        Me.RichTextBox.Text = res
        Call GpibDevice.Write("DLIM0")  ' Sets the delimiter to the CR, LF and EOI.
        Call GpibDevice.Write("FORM0")  ' Switches to FORM0.

        Call GpibDevice.Dispose()
    End Sub
End Class
```

6.14.1.5 Example Program for Screen Image Output

Example 1 Outputting the current screen image as bitmap data and writing it to a file. Approximately 150 KB of data are output in the BMP format and approximately 5 KB of data are output in the PNG format.

Visual Basic 6.0

```
'******************************************************************************************
**
'* 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.                                                                       *
'******************************************************************************************
**
Private Sub CmdScreenImageOutput_Click()
    Dim u38 As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "DLIM2")                 ' Sets a delimiter to EOI only.
    Call ibwrt(u38, "BMP?")                  ' Requests bitmap data output.
    Call ibrdf(u38, "bitmap.bmp")            ' Writes bitmap data to a file.
    Call ibwrt(u38, "DLIM0")                 ' Returns delimiter setting to CR, LF and EOI.
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0

'*************************************************************************************
**
   '* 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.                                                                      *

'*************************************************************************************
**
     Private Sub CmdScreenImageOutput_Click(ByVal sender As System.Object, ByVal e As Sys-
tem.EventArgs) Handles CmdScreenImageOutput.Click

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                     ' Performs a device clear.
        Call GpibDevice.Write("DLIM2")              ' Sets a delimiter to EOI only.
        Call GpibDevice.Write("BMP?")               ' Requests bitmap data output.
        Call GpibDevice.ReadToFile("bitmap.bmp")    ' Writes bitmap data to a file.
      Call GpibDevice.Write("DLIM0")           ' Returns delimiter setting to CR, LF and EOI.

        Call GpibDevice.Dispose()
    End Sub
End Class
```

6.14.1.6 Example Program Which Uses the TS (Take Sweep) Command

Example 1 Performing ACP measurement and reading the measurement result (using the TS command)

Visual Basic 6.0

```
'****************************************************************************
'* Example 1 Setting the center frequency after resetting this instrument. *
'****************************************************************************
Private Sub CmdSetup_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    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 ibdev(0, 8, 0, T10s, 1, 0, u38)     ' Initialize
    Call ibclr(u38)                          ' Performs a Device Clear.
    Call ibwrt(u38, "SI")                    ' Sets the single mode.
    Call ibwrt(u38, "CF 1500MZ")             ' Sets the center frequency to 1500 MHz.
    Call ibwrt(u38, "SP 250KZ")              ' Sets the frequency span to 250 kHz.
    Call ibwrt(u38, "RB 1KZ")                ' Sets RBW to 1 kHz.
    Call ibwrt(u38, "VB 3KZ")                ' Sets VBW to 3 kHz.
    Call ibwrt(u38, "ST 5SC")                ' Sets the sweep time to 5 sec.
   Call ibwrt(u38, "CSBSDEL")            ' Clears the channel space and bandwidth previously
set.
    Call ibwrt(u38, "CSBSIN 50KZ,21KZ")      ' Sets CS to 50 kHz, and BS to 21 kHz.
    Call ibwrt(u38, "ACP ON")                ' Starts the ACP measurement.
    For j = 1 To 10 Step 1
        Call ibwrt(u38, "TS")                ' Executes one sweep.
        Call ibwrt(u38, "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(u38, 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(u38, 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.
            TextBox.Text = TextBox.Text & FrqL & "Hz;" & LvlL & vbCrLf
            TextBox.Text = TextBox.Text & FrqH & "Hz;" & LvlL & vbCrLf
```

```
        Next i
        DoEvents
    Next j
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '***************************************************************************
    '* Example 1 Setting the center frequency after resetting this instrument. *
    '***************************************************************************
    Private Sub CmdSetup_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles CmdSetup.Click
        Dim j, i As Integer
        Dim cnt As Integer
        Dim Rdbuff As String
        Dim str As String = Space(1)
        Dim sep1 As Integer, sep2 As Integer
        Dim LvlL As String
        Dim FrqH As String, FrqL As String

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                     ' Performs a device clear.
        Call GpibDevice.Write("SI")                 ' Sets the single mode.
        Call GpibDevice.Write("CF 1500MZ")          ' Sets the center frequency to 1500 MHz.
        Call GpibDevice.Write("SP 250KZ")           ' Sets the frequency span to 250 kHz.
        Call GpibDevice.Write("RB 1KZ")             ' Sets RBW to 1 kHz.
        Call GpibDevice.Write("VB 3KZ")             ' Sets VBW to 3 kHz.
        Call GpibDevice.Write("ST 5SC")             ' Sets the sweep time to 5 sec.
        Call GpibDevice.Write("CSBSDEL")            ' Clears the channel space and bandwidth
previously set.
        Call GpibDevice.Write("CSBSIN 50KZ,21KZ")   ' Sets CS to 50 kHz, and BS to 21 kHz.
        Call GpibDevice.Write("ACP ON")             ' Starts the ACP measurement.
        For j = 1 To 10 Step 1
            Call GpibDevice.Write("TS")             ' Executes one sweep.
          Call GpibDevice.Write("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.
            Rdbuff = GpibDevice.ReadString()        ' 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).
                Rdbuff = GpibDevice.ReadString()                ' Reads the data.
               sep1 = InStr(1, Rdbuff, ",", 0)                ' Searches for the first comma
starting from the top of the buffer.
                FrqL = Mid(Rdbuff, 1, 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.
                RichTextBox.Text = RichTextBox.Text & FrqL & "Hz;" & LvlL & vbCrLf
                RichTextBox.Text = RichTextBox.Text & FrqH & "Hz;" & LvlL & vbCrLf
                RichTextBox.Refresh()
            Next i
        Next

        Call GpibDevice.Dispose()
    End Sub
End Class
```

6.14.1.7 Example Programs Which Use the Status Byte

Example 1 Executing a single sweep and waiting for the completion of the sweep (when not using SRQ)

Visual Basic 6.0

```
'*************************************************************************************
'* Example 1 Execute a single sweep and wait until its finished (when not using SRQ). *
'*************************************************************************************
Private Sub CmdStatusByteChk_Click()
    Dim u38 As Integer
    Dim Rdbuff As String
    Dim state As Integer

    Call ibdev(0, 8, 0, T30s, 1, 0, u38)    ' Initialize
    Call ibclr(u38)                         ' Performs a Device Clear.
    Call ibwrt(u38, "SI")                   ' Turns the single sweep mode on.
    Call ibwrt(u38, "OPR8")                 ' Enables the sweep-end bit of the operation
    ' status register.
    Call ibwrt(u38, "*CLS")                 ' Clears the status byte.
    Label.Caption = "Sweep Start."
    Call ibwrt(u38, "SI")                   ' Begins sweeping.
    Do
        Call ibwrt(u38, "*STB?")            ' Requests the value of the status byte.
      Rdbuff = Space(8)               ' Reserve a maximum of 8 bytes including the delimiter.
        Call ibrd(u38, 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.
    Label.Caption = "Sweep End."
    Call ibonl(u38, 0)
End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_01
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    '*************************************************************************************
    '* Example 1 Execute a single sweep and wait until its finished (when not using SRQ). *
    '*************************************************************************************
    Private Sub CmdStatusByteChk_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdStatusByteChk.Click
        Dim Rdbuff As String
        Dim state As Integer

        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                 ' Performs a Device Clear.
        Call GpibDevice.Write("SI")             ' Turns the single sweep mode on.
        Call GpibDevice.Write("OPR8")           ' Enables the sweep-end bit of the operation
        Call GpibDevice.Write("*CLS")           ' Clears the status byte.
        Label.Text = "Sweep Start."
        Label.Refresh()
        Call GpibDevice.Write("SI")             ' Begins sweeping.
        Do
            Call GpibDevice.Write("*STB?")      ' Requests the value of the status byte.
            Rdbuff = Space(8)                   ' Reserve a maximum of 8 bytes including the
delimiter.
            Rdbuff = GpibDevice.ReadString      ' Reads the data.
          state = Val(Rdbuff)             ' Converts the character string into numeric values.
        Loop Until (state And 128)              ' Exits from the loop if the sweep-end bit is
set to 1.
        Label.Text = "Sweep End."
        Label.Refresh()

        Call GpibDevice.Dispose()
    End Sub
End Class
```

Example 2 Reading the peak frequency and level when the single sweep is completed (when using SRQ)

Visual Basic 6.0

```
'*****************************************************************************************
**********
'* Example 2 Reading the peak frequency and level at the end of a single sweep (when using
SRQ)     *
'*****************************************************************************************
**********
Private Sub CmdSrqWait_Click()
    Dim u38 As Integer
    Dim boardID As Integer
    Dim Rdbuff As String
    Dim res As Integer
    Dim CFLEV As String

    boardID = 0                                 ' Sets the board ID.
    Call ibdev(boardID, 8, 0, T30s, 1, 0, u38)  ' Initialize
    Call ibclr(u38)                             ' Performs a Device Clear.
    Call ibwrt(u38, "SI")                       ' Turns the single sweep mode on.
    Call ibwrt(u38, "*CLS")                     ' Clears the status byte.
    Call ibwrt(u38, "OPR 8")                   ' Enables the Sweep-end bit of the operation
    ' status register
    Call ibwrt(u38, "*SRE 128")                 ' Enables the Operation status bit of the
    ' status byte.
    Call ibwrt(u38, "S0")                       ' Specifies Send mode for the SRQ signal.
    Call ibwrt(u38, "SI")                       ' Begins sweeping.
    Call WaitSRQ(boardID, res)                  ' Waits until SRQ interruption occurs.
    Call ibrsp(u38, res)                        ' Executes serial polling.
    Call ibwrt(u38, "PS")                       ' Executes the peak search.
    Call ibwrt(u38, "MFL?")                    ' Request the values of the marker frequency
and level.
    Rdbuff = Space(43)                          ' Reserves 43 bytes.
    Call ibrd(u38, Rdbuff)                      ' Reads the data.
    CFLEV = Left(Rdbuff, InStr(1, Rdbuff, vbCr, 0) - 1)
    ' Display data on the screen and start a new line.
    TextBox.Text = TextBox.Text & "No. 1/1 Freq ,Level = " & CFLEV & vbCrLf
    Call ibonl(u38, 0)

End Sub
```

Microsoft Visual Basic 2008

```
Imports NationalInstruments.NI4882

Public Class frmManualSample_02
    Public Delegate Sub GetSrqNotifyDelegate(ByVal readText As String)
    Private GpibDevice As Device
    Private Const U38_GpibBoardId As Integer = 0
    Private Const U38_GpibAddress As Byte = 8
    Private Const U38_GpibSecondaryAddress As Byte = 0
    Private srqNotifyHandler As GetSrqNotifyDelegate
```

```
'*************************************************************************************
**********
    '* Example 2 Reading the peak frequency and level at the end of a single sweep (when using
SRQ)     *

'*************************************************************************************
**********
    Private Sub CmdSrqWait_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles CmdSrqWait.Click
        srqNotifyHandler = New GetSrqNotifyDelegate(AddressOf DispRsltData)
        GpibDevice = New Device(U38_GpibBoardId, U38_GpibAddress, U38_GpibSecondaryAddress)
        Call GpibDevice.Clear()                ' Performs a Device Clear.
        GpibDevice.Write("SI")                 ' Turns the single sweep mode on.
        GpibDevice.Write("*CLS")               ' Clears the status byte.
        GpibDevice.Write("OPR 8")              ' Enables the Sweep-end bit of the operation
        GpibDevice.Write("*SRE 128")           ' status register
        GpibDevice.Write("S0")                 ' status byte.
        GpibDevice.Write("SI")                 ' Begins sweeping.
        Try
                    GpibDevice.Notify(GpibStatusFlags.DeviceServiceRequest, New NotifyCall-
back(AddressOf GpibDeviceSrqNotify), "")
            GpibDevice.Write("SI")             ' Begins sweeping.
        Catch exp As Exception
            MessageBox.Show(exp.Message)
        End Try
    End Sub

    Private Sub GpibDeviceSrqNotify(ByVal sender As Object, ByVal e As NotifyData)
        Dim Rdbuff As String
        Dim sep As Integer
        Dim CFLEV As String

        Rdbuff = Space(43)                       ' Allocates 43 bytes to the buffer memory.
        Try
            GpibDevice.SerialPoll()
            GpibDevice.Write("PS")               ' Executes the peak search.
          GpibDevice.Write("MFL?")             ' Request the values of the marker frequency
and level.
            Rdbuff = GpibDevice.ReadString       ' Reads the data (30 bytes Max.)

            sep = InStr(1, Rdbuff, vbCr & vbLf, 0)  ' Checks the number of character to the
delimiter.
            CFLEV = "No.1/1 Freq,Level = " & Mid(Rdbuff, 1, InStr(Rdbuff, vbCr, 0) - 1)
            Invoke(srqNotifyHandler, New Object() {CFLEV})

            Call GpibDevice.Dispose()

        Catch exp As Exception
            MessageBox.Show(exp.Message)
        End Try
    End Sub

    Private Sub DispRsltData(ByVal disp_dt As String)
        ' Display data on the screen and start a new line.
        RichTextBox.Text = disp_dt
        RichTextBox.Refresh()
    End Sub
End Class
```

6.14.1.8 Program Examples Using the LAN

Common function from example 1 to 6

Visual Basic 6.0

```
'****************************************************************************
' Function name
'   SendDtFunc
' Argument
'   dt : transmission command. (string)
' Explanation
'   The transmission command of argument is transmitted to U3800 by TCP/IP.
' Return value
'   0           : Normal
'   0 Excluding: Error number
'****************************************************************************
Private Function SendDtFunc(dt As String) As Integer
    Dim ipErr As Long

    SendDtFunc = 0
    On Error GoTo ErrOcc
    ipErr = 0

    Me.tcpClient.SendData dt + vbLf

    If ipErr <> 0 Then
        SendDtFunc = 1
        Exit Function
    End If

    Exit Function

ErrOcc:
    ipErr = Err.Number
    Resume Next

End Function

'************************************************************
' Function name
'   ReceiveFunc
' Argument
'   dt : Receive data. (string)
' Explanation
'   It receive it from R3800 by TCP/IP in the argument.
' Return value
'   0           : Normal
'   0 Excluding: Error number
'************************************************************
```

```
Private Function ReceiveFunc(ByRef dt As String) As Integer
    Dim ipErr As Long

    ReceiveFunc = 0
    ipErr = 0
    On Error GoTo ErrRecv

    Do While (Me.tcpClient.BytesReceived = 0)
        DoEvents
    Loop
    Me.tcpClient.GetData dt
    Exit Function

ErrRecv:
    ipErr = Err.Number
    ReceiveFunc = ipErr
    Resume Next

End Function

Private Sub Form_Unload(Cancel As Integer)
    Dim ErrRet As Integer

    If tcpClient.State = sckClosed Then Exit Sub

    ErrRet = SendDtFunc("GTL" & vbLf)
    tcpClient.Close
End Sub
```

Microsoft Visual Basic 2008

```
Imports System.Net.Sockets

Public Class frmManualSample_xx
    Private client As TcpClient

    '*****************************************************************************
    ' Function name
    '   SendDtFunc
    ' Argument
    '   dt : transmission command. (string)
    ' Explanation
    '   The transmission command of argument is transmitted to U3800 by TCP/IP.
    ' Return value
    '   0          : Normal
    '   0 Excluding: Error number
    '*****************************************************************************
    Public Function SendDtFunc(ByVal dt As String) As Integer
        Try
            Dim stream As NetworkStream = client.GetStream()
          Dim send_buf() As Byte = System.Text.Encoding.ASCII.GetBytes(dt + ControlChars.CrLf
+ ControlChars.CrLf)
            stream.Write(send_buf, 0, send_buf.Length)
            SendDtFunc = 0
        Catch ex As Exception
            SendDtFunc = 1
        End Try
    End Function

    '*****************************************************************************
    ' Function name
    '   ReceiveFunc
    ' Argument
    '   dt : Receive data. (string)
    ' Explanation
    '   It receive it from U3800 by TCP/IP in the argument.
    ' Return value
    '   0          : Normal
    '   0 Excluding: Error number
    '*****************************************************************************
    Public Function ReceiveFunc(ByRef dt As String) As Integer
        Dim n As Integer
        Try
            Dim stream As NetworkStream = client.GetStream()
            Dim read_buf(4006) As Byte
            n = stream.Read(read_buf, 0, read_buf.Length)
            dt = System.Text.Encoding.Default.GetString(read_buf)
            ReceiveFunc = 0
        Catch ex As Exception
            ReceiveFunc = 1
        End Try
    End Function
```

```
    '**************************************************************************
    ' Function name
    '   QeryCmdFunc
    ' Argument
    '   dt : transmission command (character string)
    '   QryDt : Receive data area to transmission command (character string)
    ' Explanation
    '   The transmission command of argument is transmitted to U3800 by TCP/IP.
    '   The data reply to QryDt is stored and returned.
    ' Return value
    '   0           : Normal
    '   0 Excluding: Error number
    '**************************************************************************
    Public Function QeryCmdFunc(ByVal dt As String, ByRef QryDt As String) As Integer
        Dim n As Integer
        Try
            Dim stream As NetworkStream = client.GetStream()
          Dim send_buf() As Byte = System.Text.Encoding.ASCII.GetBytes(dt + ControlChars.CrLf
+ ControlChars.CrLf)
            stream.Write(send_buf, 0, send_buf.Length)
            Dim read_buf(4006) As Byte
            n = stream.Read(read_buf, 0, read_buf.Length)
            QryDt = System.Text.Encoding.Default.GetString(read_buf)
            n = InStr(QryDt, vbCr, vbBinaryCompare)
            QryDt = Mid(QryDt, 1, n)
            QeryCmdFunc = 0
        Catch ex As Exception
            QeryCmdFunc = 1
        End Try

    End Function

    Private Sub frmManualSample_xx_Disposed(ByVal sender As Object, ByVal e As System.Even-
tArgs) Handles Me.Disposed
        If client.Connected = True Then
            client.Close()
        End If
    End Sub

    Private Sub frmManualSample_xx_Load(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Me.Load
        client = New TcpClient
    End Sub
End Class
```

Example 1 Connection LAN Interface

Visual Basic 6.0

```
'***************************************
'* Example 1 Connection LAN Interface. *
'***************************************
Private Sub CmdLanConnect_Click()
    Dim Ini As String
    Dim ErrRet As Integer

    tcpClient.RemoteHost = "192.168.0.1"    ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol     ' Sets protocol to TCP
    tcpClient.RemotePort = 5025             ' Sets port no. 5025 of U38
    tcpClient.Connect                       ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)  ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)       ' Remote enable
End Sub
```

Microsoft Visual Basic 2008

```
Public Class frmManualSample_01
    Private client As TcpClient
    '***************************************
    '* Example 1 Connection LAN Interface. *
    '***************************************
     Private Sub CmdLanConnect_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdLanConnect.Click
       client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                      ' Remote enable
    End Sub
End Class
```

Example 2 Initialize U3800

Visual Basic 6.0

```
'******************************
'* Example 2 Initialize U3800. *
'******************************
Private Sub CmdInitialize_Click()
    Dim Ini As String
    Dim ErrRet As Integer

    tcpClient.RemoteHost = "192.168.0.1"    ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol     ' Sets protocol to TCP
    tcpClient.RemotePort = 5025             ' Sets port no. 5025 of U38
    tcpClient.Connect                       ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)  ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)       ' Remote enable

    Call InitU38                            ' Initialize U3800

End Sub

Public Sub InitU38()
    Dim ErrRet As Integer

    ErrRet = SendDtFunc("*CLS" & vbLf)  ' Resets status register
    ErrRet = SendDtFunc("*RST" & vbLf)  ' Resets this instrument
End Sub
```

Microsoft Visual Basic 2008

```
Public Class frmManualSample_02
    Private client As TcpClient

    '******************************
    '* Example 2 Initialize U3800. *
    '******************************
     Private Sub CmdInitialize_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdInitialize.Click
        client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                      ' Remote enable

        Call InitU38()                                  ' Initialize U3800
    End Sub

    Public Sub InitU38()
        Dim intRtn As Integer

        intRtn = SendDtFunc("*CLS") ' Resets status register
        intRtn = SendDtFunc("*RST") ' Resets this instrument
    End Sub
End Class
```

Example 3 Brief setting of U3800

Visual Basic 6.0

```
'************************************
'* Example 3 Brief setting of U3800 *
'* (Set Center freq. to 1.9984 GHz, *
'*  Span to 10 MHz and Reference    *
'*  level to 10 dBm).               *
'************************************
Private Sub CmdSetup_Click()
    Dim Ini As String
    Dim ErrRet As Integer

    tcpClient.RemoteHost = "192.168.0.1"    ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol     ' Sets protocol to TCP
    tcpClient.RemotePort = 5025             ' Sets port no. 5025 of U38
    tcpClient.Connect                       ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)  ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)       ' Remote enable

    Call U38Setting                         ' U3800 Setup
End Sub

Public Sub U38Setting()
    Dim ErrRet As Integer

    ErrRet = SendDtFunc("CF 1.9984GZ" & vbLf)
    ErrRet = SendDtFunc("SP 10MZ" & vbLf)
    ErrRet = SendDtFunc("RL 10DB" & vbLf)
End Sub
```

Microsoft Visual Basic 2008

```
Public Class frmManualSample_03
    Private client As TcpClient

    '***********************************
    '* Example 3 Brief setting of U3800 *
    '* (Set Center freq. to 1.9984 GHz, *
    '*  Span to 10 MHz and Reference    *
    '*  level to 10 dBm).               *
    '***********************************
     Private Sub CmdSetup_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles CmdSetup.Click
        client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                      ' Remote enable

        Call U38Setting()                               ' U3800 Setup
    End Sub

    Public Sub U38Setting()
        Dim intRtn As Integer

        intRtn = SendDtFunc("CF 1.9984 GZ")
        intRtn = SendDtFunc("SP 10MZ")
        intRtn = SendDtFunc("RL 10DB")
    End Sub
End Classc
```

Example 4 Read the setting value of U3800

Visual Basic 6.0

```
'*********************************************
'* Example 4 Read the setting value of U3800 *
'*********************************************
Private Sub CmdRead_Click()
    Dim Ini As String
    Dim ErrRet As Integer
    Dim CF As String
    Dim SP As String

    CF = Space(20)                      ' Prepares the text variable for read
    SP = Space(20)                      ' Prepares the text variable for read

    tcpClient.RemoteHost = "192.168.0.1"    ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol     ' Sets protocol to TCP
    tcpClient.RemotePort = 5025             ' Sets port no. 5025 of U38
    tcpClient.Connect                       ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)  ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)       ' Remote enable

    Call ReadU38Setting(CF, SP)             ' Read U3800
    Label.Caption = "Center freq.: " & CF & "Span freq.: " & SP
End Sub

Public Sub ReadU38Setting(ByRef CF As String, ByRef SP As String)
    Dim ErrRet As Integer

    ErrRet = SendDtFunc("CF?" & vbLf)   ' Reads request of center freq.
    ErrRet = ReceiveFunc(CF)            ' Reads setting value
    ErrRet = SendDtFunc("SP?" & vbLf)   ' Reads request of span freq.
    ErrRet = ReceiveFunc(SP)            ' Reads setting value
End Sub
```

Microsoft Visual Basic 2008

```
Public Class frmManualSample_04
    Private client As TcpClient

    '*********************************************
    '* Example 4 Read the setting value of U3800 *
    '*********************************************
     Private Sub CmdRead_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles CmdRead.Click
       client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer
        Dim CF As String = Space(20)
        Dim SP As String = Space(20)

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                      ' Remote enable

        Call ReadU38Setting(CF, SP)                     ' Read U3800
        Label.Text = "Center freq. = " & CF & "Span freq. = " & SP
    End Sub


    Public Sub ReadU38Setting(ByRef CF As String, ByRef SP As String)
        Dim intRtn As Integer

        intRtn = QeryCmdFunc("CF?", CF) ' Reads request of center freq.
        intRtn = QeryCmdFunc("SP?", SP) ' Reads request of span freq.
    End Sub
End Class
```

Example 5 Read signal level using the marker function

Visual Basic 6.0

```
'*********************************************************
'* Example 5 Read signal level using the marker function *
'*********************************************************
Private Sub CmdMarkerRead_Click()
    Dim Ini As String
    Dim ErrRet As Integer
    Dim MKFreq As String
    Dim MKLevel As String

    MKFreq = Space(20)                        ' Prepares the text variable for read
    MKLevel = Space(20)                       ' Prepares the text variable for read

    tcpClient.RemoteHost = "192.168.0.1"      ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol       ' Sets protocol to TCP
    tcpClient.RemotePort = 5025               ' Sets port no. 5025 of U38
    tcpClient.Connect                         ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)    ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)         ' Remote enable

    Call ReadMkrSignal(MKFreq, MKLevel)       ' Read U3800
    Label.Caption = "Marker freq.: " & MKFreq & "Level: " & MKLevel
End Sub

Public Sub ReadMkrSignal(ByRef MKFreq As String, ByRef MKLevel As String)
    Dim ErrRet As Integer

    ErrRet = SendDtFunc("MLN ON" & vbLf)      ' Turns on the marker
    ErrRet = SendDtFunc("PS" & vbLf)          ' Searches peak point of signal
    ErrRet = SendDtFunc("MF?" & vbLf)         ' Query the marker frequency
    ErrRet = ReceiveFunc(MKFreq)              ' Reads marker frequency
    ErrRet = SendDtFunc("ML?" & vbLf)         ' Query the marker level
    ErrRet = ReceiveFunc(MKLevel)             ' Reads marker level
End Sub
```

Microsoft Visual Basic 2008

```
Public Class frmManualSample_05
    Private client As TcpClient

    '*********************************************************
    '* Example 5 Read signal level using the marker function *
    '*********************************************************
     Private Sub CmdMarkerRead_Click(ByVal sender As System.Object, ByVal e As System.Even-
tArgs) Handles CmdMarkerRead.Click
        client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer
        Dim MKFreq As String = Space(20)
        Dim MKLevel As String = Space(20)

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                      ' Remote enable

        Call ReadU38Signal(MKFreq, MKLevel)             ' Read U3800
        Label.Text = "Marker freq.: " & MKFreq & "Level : " & MKLevel
    End Sub

    Public Sub ReadU38Signal(ByRef MKFreq As String, ByRef MKLevel As String)
        Dim intRtn As Integer

        intRtn = SendDtFunc("MLN ON")            ' Turns on the marker
        intRtn = SendDtFunc("PS")                ' Searches peak point of signal
        intRtn = QeryCmdFunc("MF?", MKFreq)      ' Query the marker frequency and Reads marker
frequency
       intRtn = QeryCmdFunc("ML?", MKLevel)    ' Query the marker level and Reads marker level
    End Sub
End Class
```

Example 6 Measure Adjacent Channel Power

Visual Basic 6.0

```
'*********************************************
'* Example 6 Measure Adjacent Channel Power *
'*********************************************
Private Declare Sub Sleep Lib "KERNEL32.DLL" (ByVal dwMilliseconds As Long)
Private Sub CmdAcpRead_Click()
    Dim Ini As String
    Dim ErrRet As Integer
    Dim ResultACP As String

    ResultACP = Space(200)                  ' Prepares the text variable for read

    tcpClient.RemoteHost = "192.168.0.1"    ' Sets IP Address of U38
    tcpClient.Protocol = sckTCPProtocol     ' Sets protocol to TCP
    tcpClient.RemotePort = 5025             ' Sets port no. 5025 of U38
    tcpClient.Connect                       ' Connects to U3800 port
    Do While (tcpClient.BytesReceived = 0)  ' Waits connection
        DoEvents
    Loop
    tcpClient.GetData Ini
    ErrRet = SendDtFunc("REN" & vbLf)       ' Remote enable

    Call MeasACP(ResultACP)                 ' Read U3800
    Label.Caption = "ACP results : " & ResultACP

End Sub

Public Sub MeasACP(ByRef ResultACP As String)
    Dim ErrRet As Integer
    Dim stb As String

    ErrRet = SendDtFunc("CF 2GZ" & vbLf)                ' Sets carrier freq.
    ErrRet = SendDtFunc("SP 25MZ" & vbLf)
    ErrRet = SendDtFunc("CSBSDEL" & vbLf)               ' Clears Channel Space param.
    ErrRet = SendDtFunc("ACPSCR CARR" & vbLf)           ' Sets ACP mode to Carrier
    ErrRet = SendDtFunc("CARRBS 3.84MHz" & vbLf)        ' Sets Channel Bandwidth
    ErrRet = SendDtFunc("CSBSIN 5MZ,3.84MZ" & vbLf)     ' Adj. Channel param.
    ErrRet = SendDtFunc("CSBSIN 10MZ,3.84MZ" & vbLf)    ' Adj. Channel param.
    ErrRet = SendDtFunc("ACPNQST ON" & vbLf)            ' Sets Nyq. Filter operation to on
    ErrRet = SendDtFunc("SYMRT 3.84MZ" & vbLf)          ' Sets Symbol rate of filter
    ErrRet = SendDtFunc("RFACT 0.22" & vbLf)            ' Sets Roll off factor of filter
    ErrRet = SendDtFunc("ACPTM 10" & vbLf)              ' Sets average times
    ErrRet = SendDtFunc("PMEASAVG ON" & vbLf)           ' Sets average func. to ON
    ErrRet = SendDtFunc("ACP" & vbLf)                   ' Starts measurement
    ErrRet = SendDtFunc("*CLS;OPR 16;*SRE 128" & vbLf)  ' Sets status byte
    stb = Space(10)
    Do
        ErrRet = SendDtFunc("*STB?" + vbLf)
        ErrRet = ReceiveFunc(stb)
        If CLng(Val(stb)) And 128 Then Exit Do
    Loop
    ErrRet = SendDtFunc("ACP?" + vbLf)
    Call Sleep(500)
    ErrRet = ReceiveFunc(ResultACP)                     ' Reads out all meas. results of ACP
End Sub
```

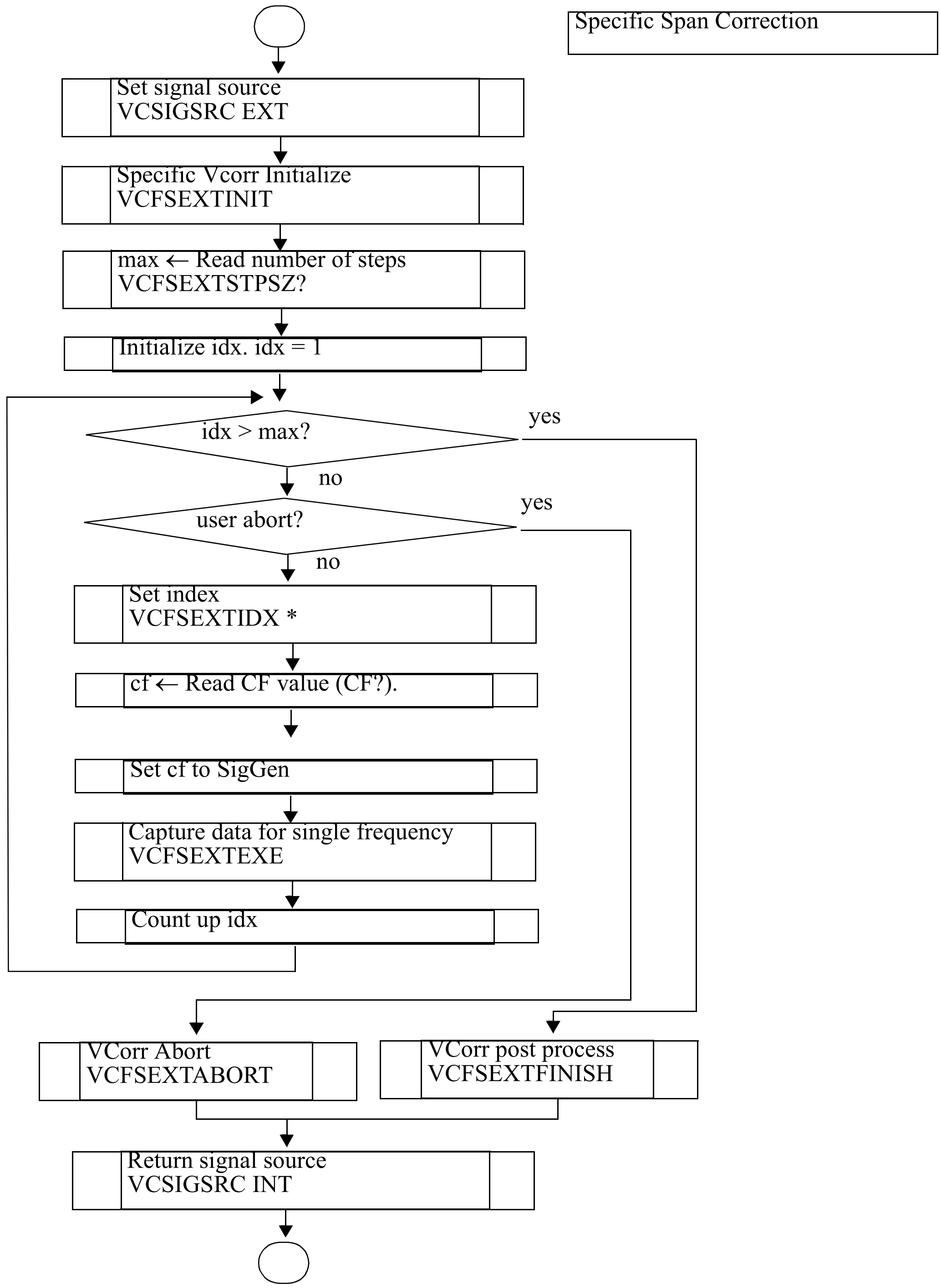
Microsoft Visual Basic 2008

```
Public Class frmManualSample_06
    Private client As TcpClient
    '*******************************************
    '* Example 6 Measure Adjacent Channel Power *
    '*******************************************
    Private Sub CmdAcpRead_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles CmdAcpRead.Click
        client.Connect("192.168.0.1", "5025")          ' Sets IP Address and port no. "5025"
of U38
        Dim steam As NetworkStream = client.GetStream() ' TCP Connects to U3800 port
        Dim read_buf(1000) As Byte
        Dim intRtn As Integer
        Dim ResultACP As String = Space(200)

        steam.Read(read_buf, 0, read_buf.Length)
        intRtn = SendDtFunc("REN")                       ' Remote enable

        Call MeasACP(ResultACP)                          ' Read U3800
        RichTextBox.Text = "ACP result : " & ResultACP
    End Sub

    Public Sub MeasACP(ByRef ResultACP As String)
        Dim intRtn As Integer
        Dim stb As String = Space(3)

        intRtn = SendDtFunc("CF 2GZ")                 ' Sets carrier freq.
        intRtn = SendDtFunc("SP 25MZ")
        intRtn = SendDtFunc("CSBSDEL")                ' Clears Channel Space param.
        intRtn = SendDtFunc("ACPSCR CARR")            ' Sets ACP mode to Carrier
        intRtn = SendDtFunc("CARRBS 3.84MHz")         ' Sets Channel Bandwidth
        intRtn = SendDtFunc("CSBSIN 5MZ,3.84MZ")      ' Adj. Channel param.
        intRtn = SendDtFunc("CSBSIN 10MZ,3.84MZ")     ' Adj. Channel param.
        intRtn = SendDtFunc("ACPNQST ON")             ' Sets Nyq. Filter operation to on
        intRtn = SendDtFunc("SYMRT 3.84MZ")           ' Sets Symbol rate of filter
        intRtn = SendDtFunc("RFACT 0.22")             ' Sets Roll off factor of filter
        intRtn = SendDtFunc("ACPTM 10")               ' Sets average times
        intRtn = SendDtFunc("PMEASAVG ON")            ' Sets average func. to ON
        intRtn = SendDtFunc("ACP")                    ' Starts measurement
        intRtn = SendDtFunc("*CLS;OPR 16;*SRE 128")   ' Sets status byte
        stb = Space(10)
        Do
            intRtn = QeryCmdFunc("*STB?", stb)
            If CLng(Val(stb)) And 128 Then Exit Do
        Loop
        intRtn = SendDtFunc("ACP?")
        System.Threading.Thread.Sleep(500)
        intRtn = ReceiveFunc(ResultACP)              ' Reads out all meas. results of ACP
    End Sub
End Class
```

6.14.2 Example Program for Correcting Multiple Points Using External Signal Source

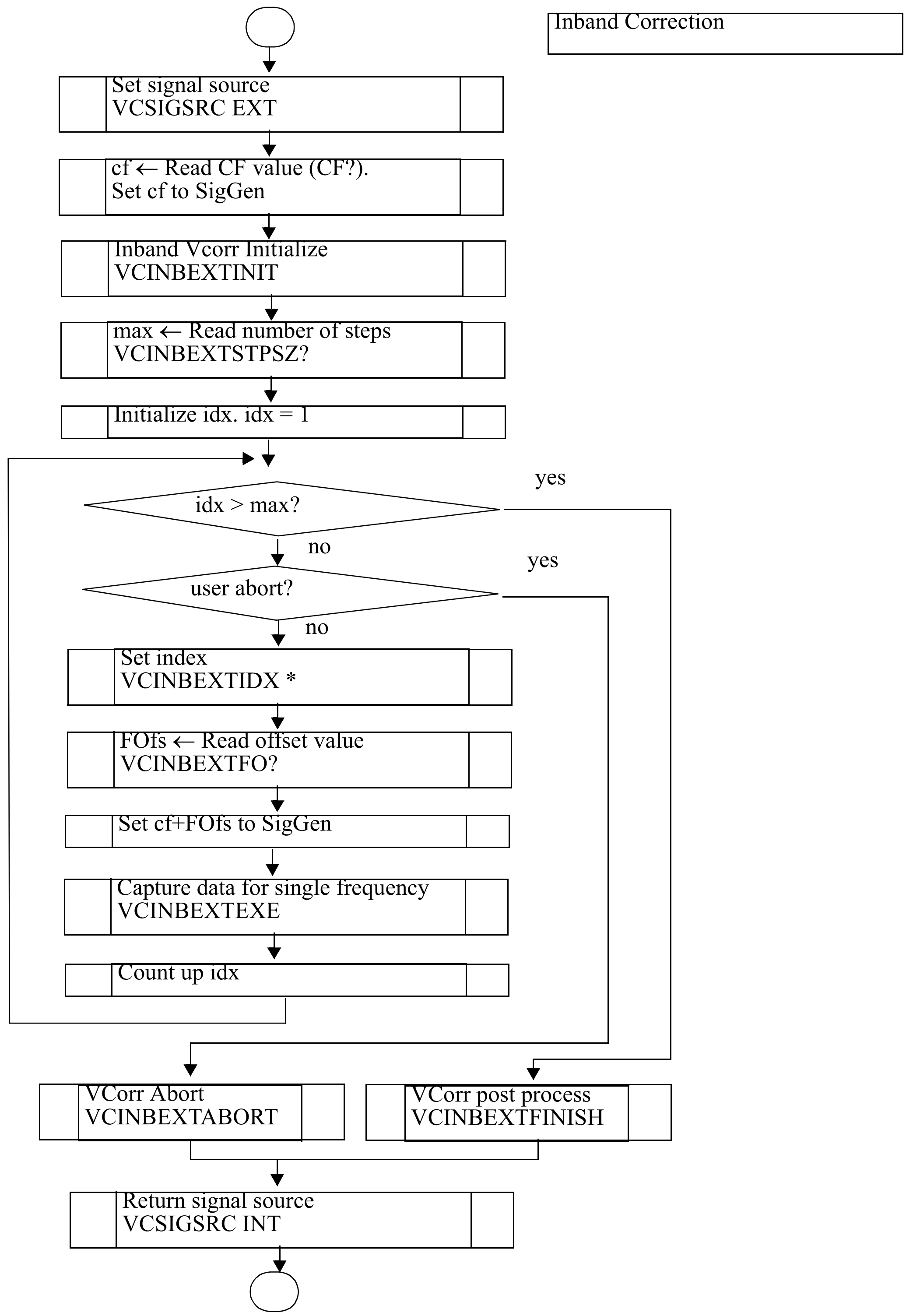
This section describes a program flow for remote control used to correct multiple points using an external signal source.

The following shows a flowchart of the remote control program used to perform Specific Span correction:



6.14.2 Example Program for Correcting Multiple Points Using External Signal Source

The following shows a flowchart of the remote control program used to perform Inband correction:



Examples 1 and 2 show GPIB and LAN versions of the program that contain these two correction functions.

The sample program can be downloaded from http://www.advantest.co.jp/products/emi/index.shtml.

Example 1 Multiple-points correction program GPIB version

- Required instruments
  E8257D (by Agilent) PSG analog signal generator 250kHz to 50GHz
- GPIB evaluation environment
  PC
  Microsoft Windows XP SP3 (32bit)
  Professional Ver 2002 (Japanese)
  GPIB I/F
  National Instruments GPIB Interfaces board
  GPIB control API DLL
  gpib-32.dll
  File version 2.5.2.49159
  GPIB API Shell
  Development language
  Microsoft Visual Basic 6.0(SP6)

```
'************************************************************
'* U3800 External SG Vector Correction Start               *
'*                                                          *
'* GPIB I/F                                                 *
'*   National Instruments GPIB Interfaces                   *
'*                                                          *
'* E8257D (Agilent) PSG Analog Signal Generator             *
'*   GPIB (SCIPI) Command                                   *
'*   SG_OUTPUT__CMD = "OUTP "                               *
'*   SG_OUT_ON__CMD = "ON"                                  *
'*   SG_OUT_OFF_CMD = "OFF"                                 *
'*   SG_OUT_LVL_CMD = "SOUR:POW "                           *
'*   SG_OUT_LVL_UNT = "DBM"                                 *
'*   SG_SET_FRQ_CMD = "SOUR:FREQ "                          *
'*   SG_SET_FRQ_UNT = "HZ"                                  *
'*                                                          *
'************************************************************
```

```
Private Sub CmdVCorrStart_Click()
    Dim err As Long
    Dim i As Long
    Dim buf As String
    Dim VCorr_TtlCnt As Long
    Dim strVCorr_TtlCnt As String
    Dim CentFreq As Double
    Dim OfstFreq As Double
    Dim strFreq As String

    Lbl_SG_Start_Freq.Caption = ""
    Lbl_SG_Step_Freq.Caption = ""
    Lbl_SG_End_Freq.Caption = ""
    Lbl_SG_Current_Freq.Caption = ""
    Lbl_Count.Caption = "/"

    Call GetSetting        ' U3800 & SG Setting acquisition of a Textbox.

    '*** GPIB ****
    GpibConnect = True
    If U38_GpibAddress > -1 And SG_GpibAddress > -1 _
                        And (U38_GpibAddress <> SG_GpibAddress) Then

        If OpenGpib(U38_GpibAddress) < 0 Then
            err = MsgBox("Can't open the GPIB address(" & CStr(U38_GpibAddress) & ").", _
                          vbOKOnly)
            GpibConnect = False
        End If
        If OpenGpib(SG_GpibAddress) < 0 Then
            err = MsgBox("Can't open the GPIB address(" & CStr(SG_GpibAddress) & ").", _
                          vbOKOnly)
            GpibConnect = False
        End If
    End If

    If GpibConnect = False Then Exit Sub

    err = PutGpib(U38_GpibAddress, "RFE")                   'RefClk=External
    err = PutGpib(U38_GpibAddress, "VCSIGSRC EXT")          'SigSrc EXT

    err = QryGpib(U38_GpibAddress, "CF?", buf)
    If err < 0 Then
        err = MsgBox("CF? query command error.", vbOKOnly)
        GoTo GpibOffline
    End If

    CentFreq = CDbl(buf)
    strFreq = CStr(CentFreq)
    Lbl_SG_Current_Freq.Caption = strFreq
    err = PutGpib(SG_GpibAddress, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
    Lbl_SG_Start_Freq.Caption = buf
```

```
'Set SG output on
err = PutGpib(SG_GpibAddress, SG_OUT_ON__CMD)

'Set SG output level
err = PutGpib(SG_GpibAddress, SG_OUT_LVL_CMD & CStr(SG_OutputLevel) & SG_OUT_LVL_UNT)
Call Sleep(500)

VCorrAbort = False

If Me.Opt_VCorr_Type1.value = True Then                     '*** Specific Span ***

    'Xmath 1.Power Ratio Phase Diff Execute ON/OFF
    err = QryGpib(U38_GpibAddress, "XPRPDON?", buf): i = CLng(buf)
    'Xmath 2.Differential Execute ON/OFF
    err = QryGpib(U38_GpibAddress, "XDIFFON?", buf): i = i + CLng(buf)
    'Xmath 4.Power Math Execute ON/OFF
    err = QryGpib(U38_GpibAddress, "XMATHON?", buf): i = i + CLng(buf)
    If i = 0 Then
        err = MsgBox("Xmath Function OFF.", vbOKOnly)
        GoTo GpibOffline
    End If

    err = PutGpib(U38_GpibAddress, "VCFSEXTINIT")         'Initialize Specific Span
                                                          'external SG
                                                          'vector correction.
    err = QryGpib(U38_GpibAddress, "VCFSEXTSTPSZ?", buf)  'Get Specific Span external
                                                          'SG vector correction
                                                          'total count.
    If err < 0 Then
        err = MsgBox("VCFSEXTSTPSZ? query command error.", vbOKOnly)
        Exit Sub
    End If
    VCorr_TtlCnt = CLng(buf)                        'External SG vector correction
                                                    'total count.
    strVCorr_TtlCnt = CStr(VCorr_TtlCnt)

    err = QryGpib(U38_GpibAddress, "VCFA?", buf)            'Start Freq.
    CentFreq = CDbl(buf)
    strFreq = CStr(CentFreq)
    err = PutGpib(SG_GpibAddress, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
    Call Sleep(1000)
    Lbl_SG_Start_Freq.Caption = buf
    err = QryGpib(U38_GpibAddress, "VCFB?", buf)            'Stop  Freq.
    Lbl_SG_End_Freq.Caption = buf
    err = QryGpib(U38_GpibAddress, "VCFSTEP?", buf)         'Step  Freq.
    Lbl_SG_Step_Freq.Caption = buf

    Lbl_Count.Caption = "0/" & strVCorr_TtlCnt
    Lbl_Count.Refresh
```

```
        For i = 1 To VCorr_TtlCnt
            If VCorrAbort = True Then Exit For
            err = PutGpib(U38_GpibAddress, "VCFSEXTIDX " & CStr(i))
            err = QryGpib(U38_GpibAddress, "CF?", buf)
            CentFreq = CDbl(buf)
            strFreq = CStr(CentFreq)
            Lbl_SG_Current_Freq.Caption = strFreq
            err = PutGpib(SG_GpibAddress, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
            Call Sleep(1000)
            err = PutGpib(U38_GpibAddress, "VCFSEXTEXE")
            Lbl_Count.Caption = CStr(i) & " / " & strVCorr_TtlCnt
            DoEvents
        Next i

        If VCorrAbort = False Then
            err = PutGpib(U38_GpibAddress, "VCFSEXTFINISH") 'End Specific Span
                                                             'vector correction.
        Else
            err = PutGpib(U38_GpibAddress, "VCFSEXTABORT")  'Abort Specific Span
                                                             'vector correction.
            err = PutGpib(U38_GpibAddress, "VCSIGSRC INT")  'SigSrc INT
        End If
    Else                                                       '*** InBand ***
        err = PutGpib(U38_GpibAddress, "VCINBEXTINIT")         'Initialize InBand external
                                                               'SG vector correction.
        err = QryGpib(U38_GpibAddress, "VCINBEXTSTPSZ?", buf)  'Get InBand external SG
                                                               'vector correction
                                                               'total count.
        If err < 0 Then
            err = MsgBox("VCINBEXTSTPSZ? query command error.", vbOKOnly)
            Exit Sub
        End If
        VCorr_TtlCnt = CLng(buf)        'External SG vector correction total count.
        strVCorr_TtlCnt = CStr(VCorr_TtlCnt)

        Lbl_Count.Caption = "0/" & strVCorr_TtlCnt
        Lbl_Count.Refresh

        For i = 1 To VCorr_TtlCnt
            If VCorrAbort = True Then Exit For
            err = PutGpib(U38_GpibAddress, "VCINBEXTIDX " & CStr(i))
            err = QryGpib(U38_GpibAddress, "VCINBEXTFO?", buf)
            OfstFreq = CDbl(buf)
            err = QryGpib(U38_GpibAddress, "CF?", buf)
            CentFreq = CDbl(buf)
            strFreq = CStr(CentFreq + OfstFreq)
            Lbl_SG_Current_Freq.Caption = strFreq
            err = PutGpib(SG_GpibAddress, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
            Call Sleep(1000)
            err = PutGpib(U38_GpibAddress, "VCINBEXTEXE")
            Lbl_Count.Caption = CStr(i) & " / " & strVCorr_TtlCnt
            DoEvents
        Next i
```

```
        If VCorrAbort = False Then
            err = PutGpib(U38_GpibAddress, "VCINBEXTFINISH")    'End InBand vector
                                                                'correction.
        Else
            err = PutGpib(U38_GpibAddress, "VCINBEXTABORT")     'Abort InBand vector
                                                                'correction.
            err = PutGpib(U38_GpibAddress, "VCSIGSRC INT")      'SigSrc INT
        End If
    End If

GpibOffline:
    Call CloseGpib(U38_GpibAddress)
    Call CloseGpib(SG_GpibAddress)

End Sub

'*********************************************
'* U3800 External SG Vector Correction Abort *
'*********************************************
Private Sub CmdVCorrAbort_Click()
    VCorrAbort = True
End Sub
```

Example 2   Multiple-points correction program LAN version

- Required instruments
  E8257D (by Agilent) PSG analog signal generator 250kHz to 50GHz
- LAN evaluation environment
  PC
  Microsoft Windows XP SP3 (32bit)
  Professional Ver 2002 (Japanese)
  Etherbet I/F
  3Com 3C920 Integrated Fast Ethernet Controller board
  TCP/IP control API DLL
  wsock32.dll
  File version 5.1.2600.5512
  Windows Socket 32-Bit DLL
  Development language
  Microsoft Visual Basic 6.0(SP6)

```
'************************************************************
'* U3800 External SG Vector Correction Start                *
'*                                                          *
'* Ethernet I/F                                             *
'*   3Com 3C920 Integrated Fast Ethernet Controller         *
'*                                                          *
'* E8257D (Agilent) PSG Analog Signal Generator             *
'*   GPIB (SCIPI) Command                                   *
'*   SG_OUTPUT__CMD = "OUTP "                               *
'*   SG_OUT_ON__CMD = "ON"                                  *
'*   SG_OUT_OFF_CMD = "OFF"                                 *
'*   SG_OUT_LVL_CMD = "SOUR:POW "                           *
'*   SG_OUT_LVL_UNT = "DBM"                                 *
'*   SG_SET_FRQ_CMD = "SOUR:FREQ "                          *
'*   SG_SET_FRQ_UNT = "HZ"                                  *
'*                                                          *
'************************************************************
Private Sub CmdVCorrStart_Click()
    Dim err As Long
    Dim i As Long
    Dim buf As String
    Dim VCorr_TtlCnt As Long
    Dim strVCorr_TtlCnt As String
    Dim CentFreq As Double
    Dim OfstFreq As Double
    Dim strFreq As String
```

```
Lbl_SG_Start_Freq.Caption = ""
Lbl_SG_Step_Freq.Caption = ""
Lbl_SG_End_Freq.Caption = ""
Lbl_SG_Current_Freq.Caption = ""
Lbl_Count.Caption = "/"

Call GetSetting        ' U3800 & SG Setting acquisition of a Textbox.

'*** TCP/IP ****
Call InitWinsock

TcpipConnect = True
If OpenSocket(U38_SockID, str_U38_TcpipAddress, U38_PortNo) < 0 Then
    err = MsgBox("Can't open the TCP/IP address(" & str_U38_TcpipAddress & ").", _
                 vbOKOnly)
    TcpipConnect = False
Else
    err = GetSocket(U38_SockID, buf)
    err = PutSocket(U38_SockID, "REN")
End If
If OpenSocket(SG_SockID, str_SG_TcpipAddress, SG_PortNo) < 0 Then
    err = MsgBox("Can't open the TCP/IP address(" & str_SG_TcpipAddress & ").", _
                 vbOKOnly)
    TcpipConnect = False
End If

If TcpipConnect = False Then Exit Sub

err = PutSocket(U38_SockID, "RFE")                              'RefClk=External
err = PutSocket(U38_SockID, "VCSIGSRC EXT")                     'SigSrc EXT

err = QrySocket(U38_SockID, "CF?", buf)
If err < 0 Then
    err = MsgBox("CF? query command error.", vbOKOnly)
    GoTo SocketClose
End If

CentFreq = CDbl(buf)
strFreq = CStr(CentFreq)
Lbl_SG_Current_Freq.Caption = strFreq
err = PutSocket(SG_SockID, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
Lbl_SG_Start_Freq.Caption = buf

'Set SG output on
err = PutSocket(SG_SockID, SG_OUT_ON__CMD)

'Set SG output level
err = PutSocket(SG_SockID, SG_OUT_LVL_CMD & CStr(SG_OutputLevel) & SG_OUT_LVL_UNT)
Call Sleep(500)

VCorrAbort = False
```

```
    If Me.Opt_VCorr_Type1.Value = True Then                      '*** Specific Span ***
        'Xmath 1.Power Ratio Phase Diff Execute ON/OFF
        err = QrySocket(U38_SockID, "XPRPDON?", buf): i = CLng(buf)
        'Xmath 2.Differential Execute ON/OFF
        err = QrySocket(U38_SockID, "XDIFFON?", buf): i = i + CLng(buf)
        'Xmath 4.Power Math Execute ON/OFF
        err = QrySocket(U38_SockID, "XMATHON?", buf): i = i + CLng(buf)
        If i = 0 Then
            err = MsgBox("Xmath Function OFF.", vbOKOnly)
            GoTo SocketClose
        End If

        err = PutSocket(U38_SockID, "VCFSEXTINIT")        'Initialize Specific Span
                                                           'external SG vector correction.
        err = QrySocket(U38_SockID, "VCFSEXTSTPSZ?", buf) 'Get Specific Span external SG
                                                           'vector correction total count.
        If err < 0 Then
            err = MsgBox("VCFSEXTSTPSZ? query command error.", vbOKOnly)
            Exit Sub
        End If

        VCorr_TtlCnt = CLng(buf)        'External SG vector correction total count.
        strVCorr_TtlCnt = CStr(VCorr_TtlCnt)

        err = QrySocket(U38_SockID, "VCFA?", buf)                    'Start Freq.
        CentFreq = CDbl(Trim(buf))
        strFreq = CStr(CentFreq)
        err = PutSocket(SG_SockID, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
        Call Sleep(1000)
        Lbl_SG_Start_Freq.Caption = Trim(buf)
        err = QrySocket(U38_SockID, "VCFB?", buf)                    'Stop  Freq.
        Lbl_SG_End_Freq.Caption = Trim(buf)
        err = QrySocket(U38_SockID, "VCFSTEP?", buf)                 'Step  Freq.
        Lbl_SG_Step_Freq.Caption = Trim(buf)

        Lbl_Count.Caption = "0/" & strVCorr_TtlCnt
        Lbl_Count.Refresh

        For i = 1 To VCorr_TtlCnt
            If VCorrAbort = True Then Exit For
            err = PutSocket(U38_SockID, "VCFSEXTIDX " & CStr(i))
            err = QrySocket(U38_SockID, "CF?", buf)
            CentFreq = CDbl(Trim(buf))
            strFreq = CStr(CentFreq)
            Lbl_SG_Current_Freq.Caption = strFreq
            err = PutSocket(SG_SockID, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
            Call Sleep(1000)
            err = PutSocket(U38_SockID, "VCFSEXTEXE")
            Lbl_Count.Caption = CStr(i) & " / " & strVCorr_TtlCnt
            DoEvents
        Next i
```

```
        If VCorrAbort = False Then
            err = PutSocket(U38_SockID, "VCFSEXTFINISH")    'End Specific Span
                                                            'vector correction.
        Else
            err = PutSocket(U38_SockID, "VCFSEXTABORT")     'Abort Specific Span
                                                            'vector correction.
            err = PutSocket(U38_SockID, "VCSIGSRC INT")     'SigSrc INT
        End If
    Else                                                    '*** InBand ***
        err = PutSocket(U38_SockID, "VCINBEXTINIT")         'Initialize InBand external
                                                            'SG vector correction.
        err = QrySocket(U38_SockID, "VCINBEXTSTPSZ?", buf)  'Get InBand external SG
                                                            'vector correction total count.
        If err < 0 Then
            err = MsgBox("VCINBEXTSTPSZ? query command error.", vbOKOnly)
            Exit Sub
        End If
        VCorr_TtlCnt = CLng(buf)        'External SG vector correction total count.
        strVCorr_TtlCnt = CStr(VCorr_TtlCnt)

        Lbl_Count.Caption = "0/" & strVCorr_TtlCnt
        Lbl_Count.Refresh

        For i = 1 To VCorr_TtlCnt
            If VCorrAbort = True Then Exit For
            err = PutSocket(U38_SockID, "VCINBEXTIDX " & CStr(i))
            err = QrySocket(U38_SockID, "VCINBEXTFO?", buf)
            OfstFreq = CDbl(Trim(buf))
            err = QrySocket(U38_SockID, "CF?", buf)
            CentFreq = CDbl(buf)
            Lbl_SG_Current_Freq.Caption = strFreq
            strFreq = CStr(CentFreq + OfstFreq)
            err = PutSocket(SG_SockID, SG_SET_FRQ_CMD & strFreq & SG_SET_FRQ_UNT)
            Call Sleep(1000)
            err = PutSocket(U38_SockID, "VCINBEXTEXE")
            Lbl_Count.Caption = CStr(i) & " / " & strVCorr_TtlCnt
            DoEvents
        Next i

        If VCorrAbort = False Then
            err = PutSocket(U38_SockID, "VCINBEXTFINISH")   'End InBand vector
                                                            'correction.
        Else
            err = PutSocket(U38_SockID, "VCINBEXTABORT")    'Abort InBand vector
                                                            'correction.
            err = PutSocket(U38_SockID, "VCSIGSRC INT")     'SigSrc INT
        End If
    End If
```

```
SocketClose:
    Call CloseConnect(U38_SockID)
    Call CloseConnect(SG_SockID)

    Call CloseWinsock

End Sub

'*********************************************
'* U3800 External SG Vector Correction Abort *
'*********************************************
Private Sub CmdVCorrAbort_Click()
    VCorrAbort = True
End Sub
```

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 U3841 Performance Specifications

7.1.1 Frequency

Description	Specifications
Frequency range Built-in preamp	9 kHz to 3 GHz 10 MHz to 3 GHz
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)
Frequency span Range Accuracy	 Zero span, 5 kHz to full span Frequency sweep 100 Hz to 40 MHz FFT, CBW step < ± 1% of frequency span
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 3 MHz (1, 3 sequence) 1 Hz to 400 kHz (FFT, CBW/100) ±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 Spectrum mode Sweep time accuracy	 50 μs to 1000 s 20 ms to 1000 s ±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 DC voltage	 +30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator ≥ 0 dB) Preamp On ±50 VDCmax
Input attenuator range	0 to 50 dB, 10 dB step
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

7.1.4 Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz) Frequency Amplitude Accuracy	 20 MHz -20 dBm ±0.3 dB
Total level accuracy	(After performing the automatic calibration, Signal level: -10 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 10MHz < 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 > -8 dBm Preamp Off > -25 dBm Preamp On
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 > 10 MHz, Preamp Off) < -80 dBm

7.1.6 Vector Analysis

Description	Specifications
IQ waveform record	
Measurement synchronization	Trigger synchronization, phase synchronization
Measurement bandwidth (CBW)	100 Hz to 30 MHz, 1, 3 step, 40 MHz
Sampling rate	500 Hz (CBW 100 Hz) to 65 MHz (CBW 40 MHz) IQ pair data
Time resolution	15.4 ns (CBW 40 MHz) to 2 ms (CBW 100 Hz) Sampling interval
Capture time	120 ms (CBW 40 MHz) to 1000 sec (CBW 100 Hz) In each channel (channels 1 and 2)
Balance between the channels	After calibration, frequency: 1 GHz, mixer input level: -30 dBm, preamp: off BW: 100 kHz/1 ms, CBW center
Amplitude	±2.0dB
Phase	±15deg

7.1.7 Input and Output

Description	Specifications
RF input	
Connector	Type-N (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	Input attenuator ≥ 10 dB, 10 MHz to 3 GHz < 1.5:1
Calibration signal output	
Connector	Type-N (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
External trigger output	
Connector	BNC (f) on the rear panel
BNC (f) on the rear panel	3.3 V (CMOS)
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Level	-2 dBm to +16 dBm
Frequency reference source output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Level	> 0dBm
IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	21.4 MHz, 97.5 MHz (Depends on RBW and CBW)
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 U3851 Performance Specifications

7.2.1 Frequency

Description	Specifications
Frequency range	9 kHz to 8 GHz
Frequency band	9 kHz to 3.1 GHz Band 0 3.0 GHz to 8 GHz Band 1
Built-in preamp	10 MHz to 8 GHz
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)
Frequency span	
Range	Zero span, 5 kHz to full span Frequency sweep 100 Hz to 40 MHz FFT, CBW step
Accuracy	< ± 1% of frequency span
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) 1 Hz to 400 kHz (FFT, CBW/100)
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 DC voltage	 +30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator ≥ 10 dB) Preamp On ±15 VDCmax
Input attenuator range	0 to 50 dB, 10 dB step
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average

7.2.4 Amplitude Accuracy

Description	Specifications
Calibration signal accuracy (20 MHz) Frequency Amplitude Accuracy	 20 MHz -20 dBm ±0.3 dB
Total level accuracy	(After performing the automatic calibration, Image Suppression Off, Signal level: -10 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 Band 0 Preamp Off -122 dBm + 1.2 f (GHz)dB Band 1 Preamp Off -138 dBm + 3 f (GHz)dB Band 0 Preamp On -139 dBm + 1.4 f (GHz)dB Band 1 Preamp On
1 dB gain compression	Frequency range 10 MHz to 8 GHz > -8 dBm Preamp Off > -25 dBm Preamp On
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, mixer input level: -30 dBm) < 60 dBc
Residual responses	(Frequency 10 MHz to 8 GHz) < -80 dBm Preamp Off

7.2.6 Vector Analysis

Description	Specifications
IQ waveform record	
Measurement synchronization	Trigger synchronization, phase synchronization
Measurement bandwidth (CBW)	100 Hz to 30 MHz, 1, 3 step, 40 MHz
Sampling rate	500 Hz (CBW 100 Hz) to 65 MHz (CBW 40 MHz) IQ pair data
Time resolution	15.4 ns (CBW 40 MHz) to 2 ms (CBW 100 Hz) Sampling interval
Capture time	120 ms (CBW 40 MHz) to 1000 sec (CBW 100 Hz) In each channel (channels 1 and 2)
Balance between the channels	After calibration, frequency: 1 GHz, mixer input level: -30 dBm, preamp: off BW: 100 kHz/1 ms, CBW center
Amplitude	±2.0dB
Phase	±15deg

7.2.7 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 (10 MHz to 3 GHz) < 2.0:1 (> 3.0 GHz)
Calibration signal output	
Connector	Type-N (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
External trigger output	
Connector	BNC (f) on the rear panel
Level	3.3 V (CMOS)
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Level	-2 dBm to +16 dBm
Frequency reference source output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Level	> 0dBm
IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	21.4 MHz, 97.5 MHz (Depends on RBW and CBW)
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 U3872 Performance Specifications

7.3.1 Frequency

Description	Specifications
Frequency range [L-Input]	9 kHz to 8 GHz
Frequency band	9 kHz to 3.1 GHz: Band 0
	3.0 GHz to 8 GHz: Band 1
Built-in preamp	10 MHz to 8 GHz
Frequency range [H-Input]	10 MHz to 43 GHz
Frequency band	10 MHz to 3.1 GHz Band 0 (N=1)
	3.0 GHz to 8.0 GHz Band 1 (N=1)
	7.8 GHz to 14.573 GHz Band 2 (N=2)
	14.4288 GHz to 28.0 GHz Band 3 (N=4)
	27.8 GHz to 43.0 GHz Band 4 (N=6)
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)
Frequency span	
Range	Zero span, 5 kHz to full span
	Frequency sweep 100 Hz to 40 MHz FFT, CBW step
Accuracy	< ± 1% of frequency span
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)
	1 Hz to 400 kHz (FFT, CBW/100)
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 [L-Input] [H-Input]	 Noise to +30 dBm Noise to +10 dBm
Maximum safe input level [L-Input] DC voltage [H-Input] DC voltage	 +30 dBm (Input attenuator ≥ 10 dB) Preamp Off +13 dBm (Input attenuator = 0 dB) Preamp On ±15 VDCmax +10 dBm (Input attenuator = 0 dB) ±25 VDCmax
Input attenuator range [L-Input] [H-Input]	 0 to 50 dB, 10 dB step 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 [L-Input] [H-Input]	 -140 dBm to +40 dBm -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 Amplitude Accuracy	 20 MHz -20 dBm ±0.3 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)
[L-Input]	±0.8 dB (Band 0) Frequency 10 MHz to 3.1 GHz ±1 dB (Band 1) Frequency 3.1 GHz to 8 GHz ±1.5 dB Frequency 9 kHz to 10 MHz
[H-Input]	±0.8 dB (Band 0) Frequency 10 MHz to 3.1 GHz ±1 dB (Band 1) Frequency 3.1 GHz to 8 GHz ±3.0 dB (Band 2) Frequency 7.8 GHz to 14.573 GHz ±3.5 dB (Band 3) Frequency 14.4288 GHz to 28.0 GHz ±4.5 dB (Band 4) Frequency 27.8 GHz to 43 GHz

7.3.5 Dynamic Range

Description	Specifications
Displayed average noise level	Frequency range > 10 MHz Ref level < -45 dBm RBW = 100 Hz
[L-Input]	-123 dBm + 2 f (GHz)dB Band 0 Preamplifier Off -122 dBm + 1.2 f (GHz)dB Band 1 Preamplifier Off -138 dBm + 3 f (GHz)dB(TBD) Band 0 Preamplifier On -139 dBm + 1.4 f (GHz)dB Band 1 Preamplifier On
[H-Input]	-121 dBm + 2 f (GHz)dB Band 0 -120 dBm + 1.5 f (GHz)dB Band 1 -111 dBm (-118 dBm typ.) Band 2 -109 dBm (-117 dBm typ.) Band 3 -105 dBm (-112 dBm typ.) Band 4
1 dB gain compression	Frequency range > 10 MHz > -8 dBm Preamp Off > -25 dBm Preamp On
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	(Mixer input level: -30 dBm, image suppression: on, span < 5 GHz) < -60 dBc
Residual responses	(Frequency range > 10 MHz) -80 dBm Preamp Off

7.3.6 Vector Analysis

Description	Specifications
IQ waveform record	
Measurement synchronization	Trigger synchronization, phase synchronization
Measurement bandwidth (CBW)	100 Hz to 30 MHz, 1, 3 step, 40 MHz
Sampling rate	500 Hz (CBW 100 Hz) to 65 MHz (CBW 40 MHz) IQ pair data
Time resolution	15.4 ns (CBW 40 MHz) to 2 ms (CBW 100 Hz) Sampling interval
Capture time	120 ms (CBW 40 MHz) to 1000 sec (CBW 100 Hz) In each channel (channels 1 and 2)
Balance between the channels	After calibration, frequency: 1 GHz, mixer input level: -30 dBm, preamp: off BW: 100 kHz/1 ms, CBW center
Amplitude	±2.0dB
Phase	±15deg

7.3.7 Input and Output

Description	Specifications
L-Input	
Connector	Type-N (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	< 1.7:1 (10 MHz to 3 GHz) Band 0 Input attenuator ≥ 10 dB < 2.0:1 (> 3.0 GHz) Band 1 Input attenuator ≥ 10 dB
H-Input	
Connector	Type-K (f) on the front panel
Impedance	50 Ω (nom.)
VSWR	1.7 : 1 (typ.) Band 0 Input attenuator ≥ 10 dB 2.0 : 1 (typ.) Band 1, Band 2, Band 3, Input attenuator ≥ 10 dB 2.5 : 1 (typ.) Band 4 Input attenuator ≥ 10 dB
Calibration signal output	
Connector	Type-N (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
External trigger output	
Connector	BNC (f) on the rear panel
Level	3.3 V (CMOS)
Frequency reference input	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Amplitude	-2 dBm to +16 dBm
Frequency reference source output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	10 MHz
Level	> 0dBm
IF output	
Connector	BNC (f) on the rear panel
Impedance	50 Ω (nom.)
Frequency	1.4 MHz, 97.5 MHz (Depends on RBW and CBW)
GPIB	IEEE-488 bus connector
USB-A	USB1.1 on the front and rear panels

Description	Specifications
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.)
Power consumption	150 VA or less
Dimensions	Approximately 308 mm (W) × 175 mm (H) × 339 mm (D) Approximately 337 mm (W) × 190 mm (H) × 437 mm (D) (Including the handle and feet)
Mass	Approximately 10 kg or less (without option)

7.5 Options

7.5.1 Option 20 High Stability Frequency Reference

Description	Specifications
Reference frequency stability Aging rate	$\pm 2 \times 10^{-8}$/ day, $\pm 1 \times 10^{-7}$/ year
Warm-up drift (nominal)	$\pm 5 \times 10^{-8}$ (+25°C, 10 minutes after turning the power on)
Temperature drift	$\pm 5 \times 10^{-8}$ (0 to +40°C, with reference to +25°C)

7.5.2 Option 28 EMC Filter

Description	Specifications
6 dB bandwidth Range Accuracy	 200 Hz, 9 kHz, 120 kHz, 1 MHz < ±10%
Detector mode	Normal, Positive peak, Negative peak, Sample, RMS, Average, QP

7.5.3 Option 76 3 GHz Tracking Generator

Description	Specifications
Frequency range	100 kHz to 3 GHz
Frequency offset Range Resolution Accuracy	 0 to 1 GHz 1 kHz ±300 Hz
Output level range	-5 to -60 dBm 0.5 dB step
TG leakage	≤ -80 dBm Input attenuator: 0 dB
Output impedance	50 Ω (nom.)
Maximum allowable input	+10 dBm, ±10 VDC

7.5.4 Option 77 6 GHz Tracking Generator

Item	Description
Frequency range	100 kHz to 6 GHz
Output level range	-5 to -30 dBm 0.5 dB step
TG leakage	≤-80 dBm input attenuator: 0 dB
Output impedence	50 Ω (nominal)
Maximum allowable input	±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
OPT20	High stability frequency reference source	
OPT28	EMC filter	
OPT76	Tracking generator (50 Ω, 3 GHz)	
OPT77	Tracking generator (50 Ω, 6 GHz)	Applies to the U3851 and U3872.

8.2 Accessories

Table 8-2 Accessories

Name	Product Code
50 Ω/ 75 Ω converter	ZT-130NC
Transit case	A129003
Power divider kit (8 GHz/SMA)	A199002
Power divider kit (40 GHz/K)	A199003
Rack mount kit (JIS)	A122004
Rack mount kit (EIA)	A124005
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
U3800 Series User's Guide in Japanese (printed document)	JU3800S
U3800 Series User's Guide in English (printed document)	EU3800S

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 AC power switch 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 nearest Advantest service company.

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)
Panel key switch Key switch with LED	10^6 operations 10^5 operations
LCD back light	50,000 hours
Rotary encoder	10^6 operations
Cooling fan	40,000 hours
Lithium battery cells for data backup	About 3 years
Mechanical relay (For input attenuator)	10^6 operations
Coaxial relay (Switch between L-INPUT and H-INPUT)	10^6 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.
0/23	WARNING	The selected trace is not available.
0/35	WARNING	The Quasi Peak setting became invalid.
0/36	WARNING	The Quasi Peak detector is not available. Please set EMC mode ON and RBW<1MHz
0/37	WARNING	The Quasi Peak detector is active. Please change it to other detector.
0/38	WARNING	The Time Domain Analysis is ON. Please change to OFF.
0/39	WARNING	The Negative Trigger Delay Time is not available. The Trigger Delay Time is set to 0sec.
0/40	WARNING	The Trigger Delay Time has been set to -Sweep or -Capture Time.
0/41	WARNING	The EMC Average setting became invalid.
0/42	WARNING	The Average detector of the other trace has been changed to EMC Average.
0/43	WARNING	The EMC Average detector of the other trace has been changed to Average.
0/44	WARNING	The EMC Average detector is not available. Please set EMC mode ON.
0/-97	ERROR	This functionality is not allowed on Overlay mode.
0/-98	ERROR	The selected trace is not allowed to do Normalize. Please change the active trace.
0/-99	ERROR	The TTL Trigger level is available only in EXTERNAL2 mode.
0/-100	ERROR	There is no normalization data available for the selected trace.
0/-114	ERROR	The ElectroMagnetic Compatibility option is required.

Error code	Type	Displayed Message
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/-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.
0/-126	ERROR	This functionality is not allowed on Graphical Zoom Mode. Please change the context mode.
0/-127	ERROR	This functionality is not allowed on multi-context Mode. Please change the context mode.
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/-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.
0/-142	ERROR	Impossible to execute recall functionality. The file is not compatible with this system version.
0/-145	ERROR	The TTL Trigger level is available only in EXTERNAL1 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/-151	ERROR	The Carrier Band Width is not available when Nyquist Filter is ON. Please change to OFF.
0/-152	ERROR	The Carrier Band Width is not available in FULL mode screen. Please change to CARR mode.

Error code	Type	Displayed Message
0/-153	ERROR	The ACP Power Measure is executed on Trace A. This trace is actually in blank mode. Please change to Write mode.
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.
0/-157	ERROR	The SEM table is empty.
0/-158	ERROR	Impossible to insert in the SEM table. Overlapping Band.
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.
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.
0/500	WARNING	The Analysis Window is out of range. (Analysis Offset + Analysis Window <= Capture Time)

Error code	Type	Displayed Message
0/501	WARNING	The Analysis Offset is out of range. (Analysis Offset + Analysis Window <= Capture Time)
0/502	WARNING	The Analysis Window is out of range. Analysis Offset + Analysis Window + Time Shift => Capture Time
0/503	WARNING	The Analysis Offset is out of range. Analysis Offset + Analysis Window + Time Shift => Capture Time
0/504	WARNING	The Time Shift is out of range. Analysis Offset + Analysis Window + Time Shift => Capture Time
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.
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.
3/17	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.
3/21	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.
3/31	ERROR	File %1 is improper.
3/500	WARNING	The Time Domain Analysis mode has been turned off.
3/501	WARNING	The Step Freq is out of range. (%1 Hz ≤ Step Freq ≤ 50 MHz)

Error code	Type	Displayed Message
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.
7/83	WARNING	Frequency Reference Unlocked
7/109	WARNING	FAN alarm

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? 1. Set it to 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?	**SYSTEM** , ***Frequency Reference***, ***INT*** ***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	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.	
4	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)

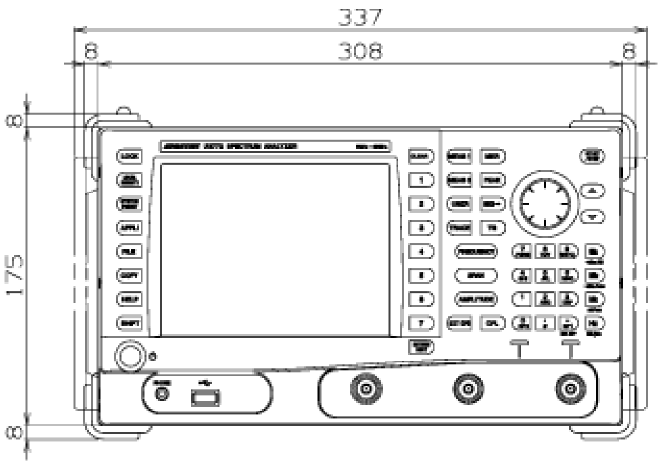
9.9 Product Disposal and Recycle

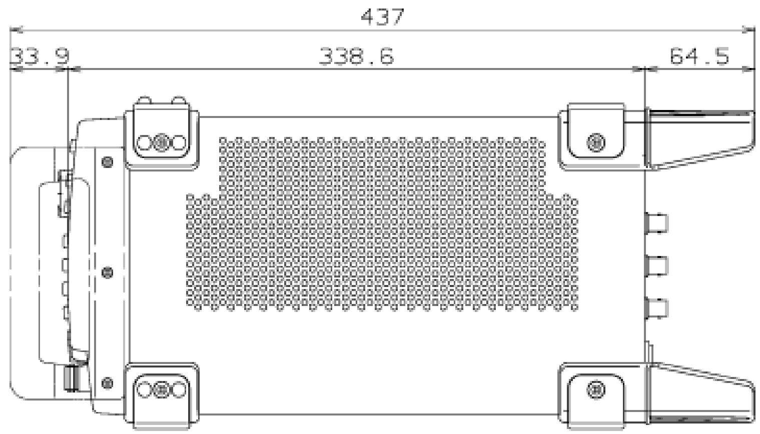
This product should be disposed of according to the regulations and laws that are established in your country and municipality.

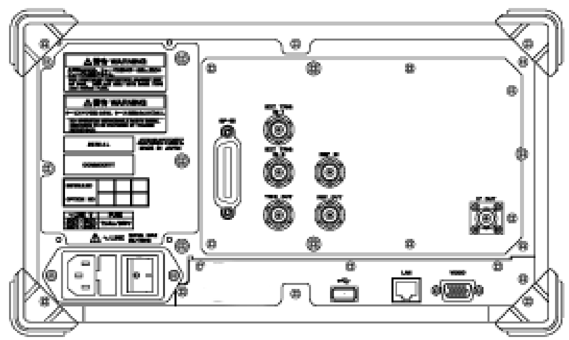
Before this product is disposed of, separately collect components shown in the table below to prevent the spread of substances, which may be harmful to the global environment, humans, and ecology.

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	BPL-035851	Lithium-ion battery
Printed circuit boards	Used	Panel	Printed circuit board
		Power supply	
		Board	
Toner cartridges	Not used	-	-
Plastic containing brominated flame retardants	Used	BEB-032400 BEG-032413 BEG-032415 BPL-035851 BPG-032412 BEG-036043 BPG-036392 BPL-037230 BPD-037335 BPC-037453 BPG-037466 BPG-037467	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
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

Substance/Component	Used/ Not used	Location	Parts and material
External electric cables	Used	Standard accessory	Power cable
			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	BEB-032400 BEG-032413 BEG-032415 BPL-035851 BPG-032412 BEG-036043 BPG-036392 BPL-037230 BPD-037335 BPC-037453 BPG-037466 BPG-037467 A199001 (Accessory)	Electronic components (Semiconductors, capacitors, inductors, resistors), electric components (Connectors)
Beryllium and Beryllium compounds	Used	BEG-032413 BPG-036392 Coaxial cable	Electric components (Switches, connectors)
Arsenic and Arsenic compounds	Used	BEG-032413 BEG-036043 BPL-035851	Module (Inverter), electronic components (GaAs)
Lead and Lead compounds	Used	BEB-032400 BEG-032413 BEG-032415 BPL-035851 BPG-032412 BEG-036043 BPG-036392 BPL-037230 BPD-037335 BPC-037453 BPG-037466 BPG-037467 A199001 (Accessory)	Electronic components mounted on the printed circuit board and lead solder used for mounting.
Vinyl chloride (PVC)	Used	Coaxial cable	PVC-material resin parts







MFA EXTERNAL VIEW

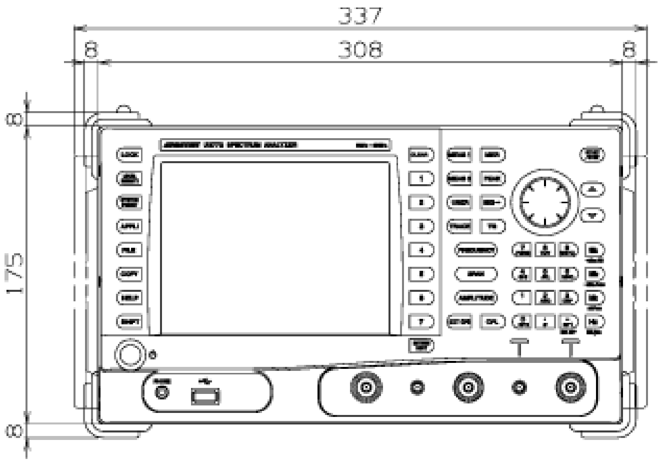
Unit:mm

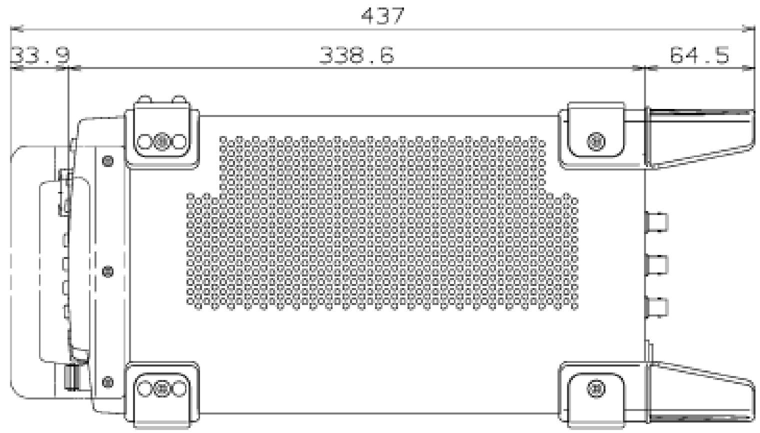
NOTE

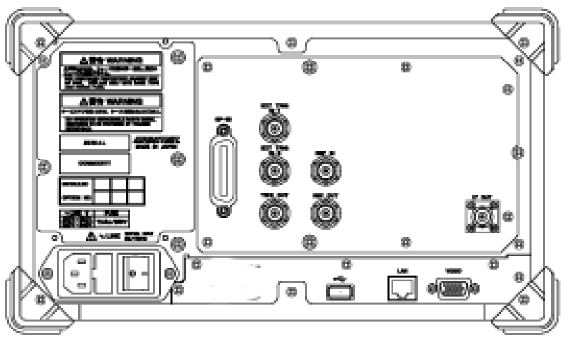
This drawing shows external dimensions of this instrument.

The difference in products and options used can cause a change in the appearance of the instrument.

U3841/U3851 Dimensional Outline Drawing







MFA EXTERNAL VIEW

Unit:mm

NOTE

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.

U3872 Dimensional Outline Drawing

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