MX269050A
Extended Digitizing Software
Operation Manual
Operation

Second Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided within the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation). Please also refer to this document before using the equipment.
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ANRITSU CORPORATION

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These indicate that the marked part should be recycled.

MX269050A
Extended Digitizing Software
Operation Manual   Operation

25   August   2008 (First Edition)
30   March   2010 (Second Edition)

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CE marking

$C\epsilon$

1. Product Model

Software: MX269050A Extended Digitizing Software

2. Applied Directive and Standards

When the MX269050A Extended Digitizing Software is installed in the MS2690A/MS2691A/MS2692A, the applied directive and standards of this software conform to those of the MS2690A/MS2691A/MS2692A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX269050A can be used with.

C-tick Conformity Marking

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C-tick marking

✔N274

1. Product Model

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PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX269050A can be used with.

About This Manual

■ About this document

The operation manuals for the MX269050A Extended Digitizing Software are comprised as shown in the figure below.

```
MS2690A/MS2691A/MS2692A
Signal Analyzer Operation Manual (Mainframe Operation)
Signal Analyzer Operation Manual (Mainframe Remote Control)

    MX269050A Extended Digitizing Software Operation Manual (Operation)

    MX269050A Extended Digitizing Software Operation Manual (Remote Control)
```
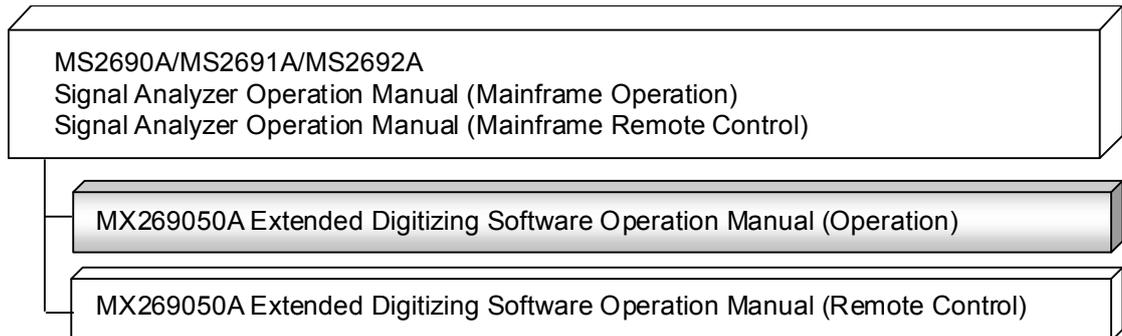
- Mainframe Operation
- Mainframe Remote Control

Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe

- MX269050A Extended Digitizing Software Operation Manual (Operation) <This document >

Description of operation method of the MX269050A Extended Digitizing Software

- MX269050A Extended Digitizing Software Operation Manual (Remote Control)

Description of remote control of the MX269050A Extended Digitizing Software

Table of Contents

1

2

3

4

Appendix

Index

III

IV.

Chapter 1   Overview

This chapter provides an overview and describes the product configuration of the MX269050A Extended Digitizing Software.

1

Overview

1.1 Product Overview

The MS2690A/MS2691A/MS2692A Signal Analyzer enables high-speed, high-accuracy, and simple measurements of transmission characteristics of base stations and mobile stations for various types of mobile communications. The MS2690A/MS2691A/MS2692A is equipped with high-performance signal analyzer and spectrum analyzer functions as standard, with optional measurement software allowing modulation analysis functionality supporting various digital modulation modes.

The MX269050A Extended Digitizing Software (hereinafter, referred to as "MX269050A") is a software option used to save continuous sampling data to an external HDD, allowing for long duration digitizing beyond the waveform memory size (1 GB) of the MS2690A/MS2691A/MS2692A. This function consists of software and an external HDD for saving data.

When using the MX269050A, it is necessary to have the MS269xA Option 050 HDD Digitizing Interface (hereinafter, referred to as "Option 050") and an external HDD equipped with an eSATA interface with an average writing speed of at least 120 MB/s.

In this document, "MS269xA" represents the MS2690A, MS2691A, and MS2692A.

1.2 Product Configuration

1.2.1 Standard composition

Table 1.2.1-1 lists the standard configuration of the MX269050A.

Table 1.2.1-1   Standard Composition

Item	Model/Symbol	Product Name	Quantity	Remarks
Application	MX269050A	Extended Digitizing Software	1	
Accessories	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

Option 050 and an external HDD equipped with an eSATA interface with an average writing speed of at least 120 MB/s must be provided separately.

1.2.2 Application parts

Table 1.2.2-1 lists the application parts of the MX269050A.

Table 1.2.2-1   Application Parts

Model/Symbol	Product Name	Remarks
W3108AE	MX269050A Extended Digitizing Software Operation Manual (Operation)	English, Printed Version
W3109AE	MX269050A Extended Digitizing Software Operation Manual (Remote Control)	English, Printed Version

1.3   Product Specifications

Table 1.3-1 lists the specifications for the MX269050A.

Table 1.3-1   Product Specifications

Item	Specification
Electrical performance	
Span frequency	100 kHz to 20 MHz (The maximum span frequency may be limited according to the recording speed and the available free space of the external HDD.)
Data capture format	Captures I-phase data and Q-phase data separately in 32-bit floating-point format at a span frequency of 100 kHz to 5 MHz. Captures I-phase data and Q-phase data separately in 16-bit fixed-point format at a span frequency of 10 to 20 MHz.
Recording time	5 seconds to 4 hours (The maximum recording time may be limited depending on the available free space of the external HDD.)
Trigger function	Free Run, Video, Wide IF, External, and SG Marker (when the MS2690A/MS2691A/MS2692A Option 020 Vector Signal Generator is installed)
Count mode	Specifies the repeated times of data capture. Setting range: 1 to 20 times (The maximum times may be limited depending on the available free space of the external HDD.)
Data save format	Saves I-phase data and Q-phase data separately in 32-bit floating-point format.
Resampling function	Converts the sampling rate for saving data.

Chapter 2   Preparation

This section describes the preparations required for using the MX269050A. Refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation) for common features of the MS2690A/MS2691A/MS2692A not included in this manual.

2

Preparation

2.1 Part Names

This section describes the MS2690A/MS2691A/MS2692A panel keys for operating the MS2690A/MS2691A/MS2692A and connectors used to for connect external devices. For general points of caution, refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation).

2.1.1 Front panel

This section describes the front-panel keys and connectors.
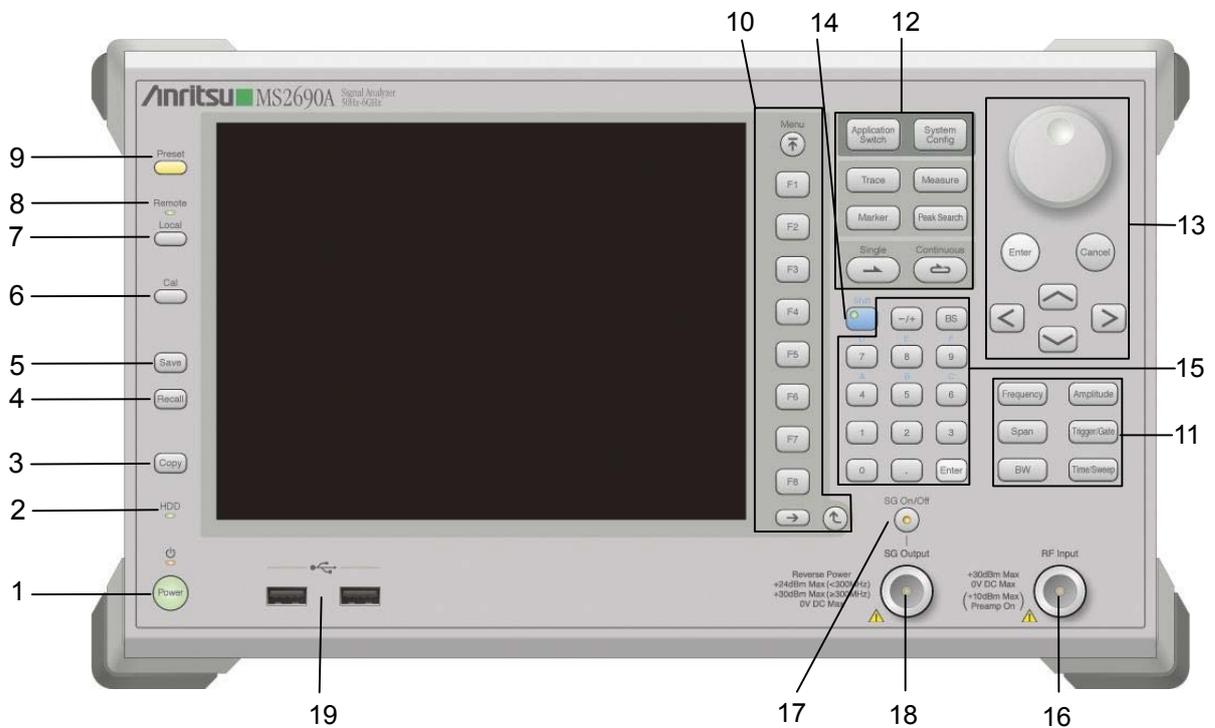
Figure 2.1.1-1 Front Panel
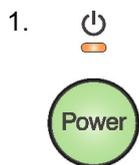
1. Power Switch

   Press to switch between the standby state (AC power supplied) and power-on state. The Power lamp is orange in the standby state, and the lamp is green in the power-on state. Press the power switch for about 2 seconds.

2. Hard disk access lamp

   Lights up when the internal hard disk of the MS2690A/MS2691A/ MS2692A is being accessed (also lights up when the external HDD is being accessed).

3.

Copy Key

Press to capture display screen and save to file.

4.

Recall Key

Press to recall parameter file.

5.

Save Key

Press to save parameter file.

6.

Cal key

Press to display calibration execution menu.

7.

Local Key

Press to return to local operation from remote control via GPIB, Ethernet, or USB (B), and enable panel settings.

8.

Remote Lamp

Lights when in remote-control state

9.

Preset Key

Resets parameters to initial settings

10.

Function keys

Select or execute function menu displayed on right of screen. The function menu contents are provided in multiple pages and layers.

Press → to fetch next function menu page. The menu page number is displayed at the bottom of the function menu screen (e.g., "1 of 2").

Sublayer menus may be displayed when a function menu is executed. Press ↺ to go up a layer, and press ⊼ to go back to the uppermost (top) layer.

2

Preparation

11.

Frequency Amplitude

Span Trigger/Gate

BW Time/Sweep

Main function keys 1

Set or execute main functions.
Executable functions vary with the current application.

Frequency Press to set frequency parameters.

Amplitude Press to set level parameters.

Span Press to set parameters related to frequency.

Trigger/Gate Press to set trigger parameters.

BW No function is assigned to this key.

Time/Sweep Press to set the length of time for capturing waveforms.

12.

Application Switch System Config

Trace Measure

Marker Peak Search

Single Continuous

Main function keys 2

Set or execute main functions.
Executable functions vary with the current application.

Application Switch Press to switch application.

System Config Press to display Configuration screen.

Trace No function is assigned to this key.

Measure Press to set measurement item parameters.

Marker No function is assigned to this key.

Peak Search No function is assigned to this key.

Single Press to start waveform capture for the set time and count.

Continuous No function is assigned to this key.

13. Rotary knob/Cursor keys/Enter key/Cancel key

The rotary knob and cursor keys select display items or change settings.

Press (Enter) to set the entered or selected data.

Press (Cancel) to cancel input or selected data.

14. Shift Key

Operates keys with functions in blue characters on panel. Press the Shift key so the key lamp is green and then press the target key.
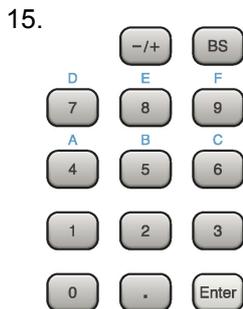
15. Numeric keypad

Enters numbers on parameter setup screens

Press (BS) to delete the last entered digit or character.

[A] to [F] can be entered by pressing keys (4) to (9) while the Shift key lamp (Shift) is green.
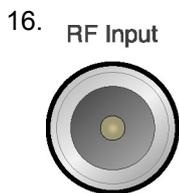
16. RF Input Connector

Inputs RF signal

17. RF Output Control Key

When the MS269xA Vector Signal Generator (Option 020) is installed, pressing (SG On/Off) enables (On) or disables (Off) the RF signal output. The RF output control key lamp lights orange when the RF signal output is set to On.

2
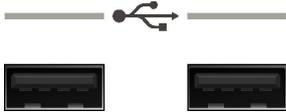
Preparation

18.
SG Output(Opt)

RF output connector (when Option 020 installed)

Outputs RF signal

19.

USB Connector (type A)

Connect the accessory USB keyboard, mouse or USB memory.

2.1.2 Rear panel

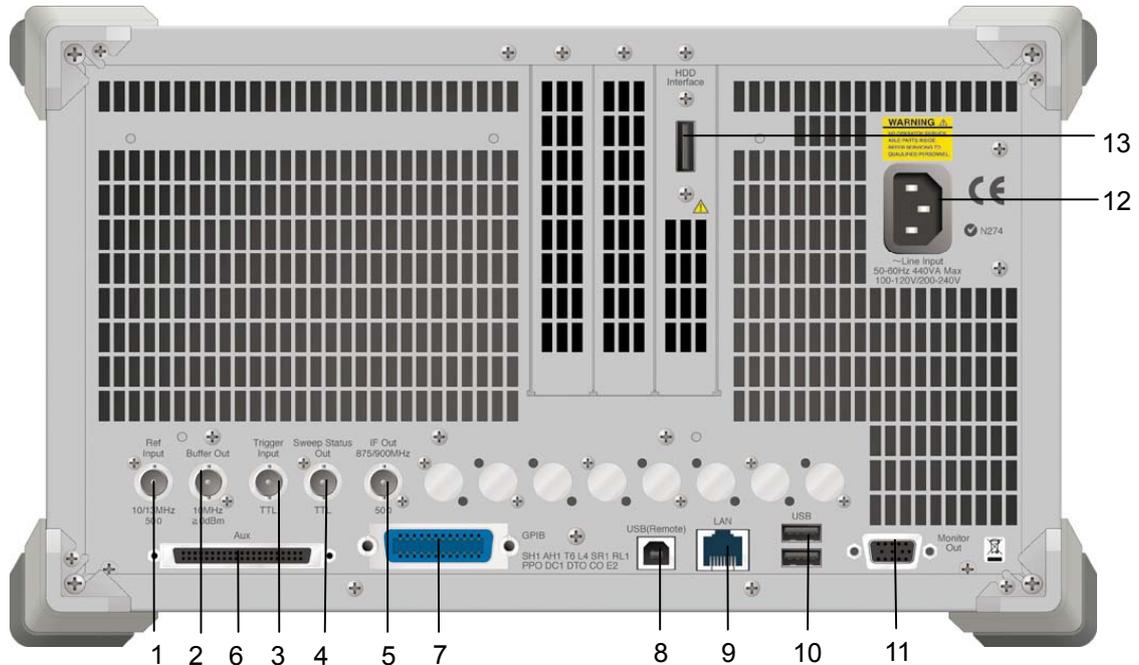This section describes the rear-panel connectors.

Figure 2.1.2-1 Rear Panel

1.

Ref
Input

Ref Input connector (reference frequency signal input connector)

Inputs external reference frequency signal (10/13 MHz). It is for inputting reference frequency signals with higher accuracy than the MS2690A/MS2691A/MS2692A internal reference signal, or for synchronizing the frequency of the MS2690A/MS2691A/MS2692A to that of other equipment.

2.

Buffer Out

Buffer Out connector (reference frequency signal output connector)

Outputs MS2690A/MS2691A/MS2692A internal reference frequency signal (10 MHz). It is for synchronizing frequencies between other equipment and the MS2690A/MS2691A/MS2692A.

3.

Trigger
Input

Trigger Input Connector

Inputs trigger signal from external device. Refer to the operation manual for each application when a trigger signal is input.

4. **Sweep Status Out**

Sweep Status Out Connector

Outputs to an external device a trigger signal that is externally input or internally generated in the MS2690A/MS2691A/MS2692A. It is for synchronizing frequencies between other equipment and the MS2690A/MS2691A/MS2692A. Note that the trigger signal to be output to the external device is slightly delayed due to internal processing.

5. **IF Out 875/900MHz**

IF Out Connector

Not used

6. **Aux**

AUX Connector

Not used

7.
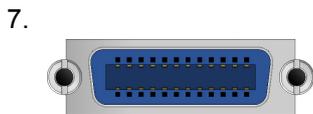
GPIB Connector

For external control via GPIB

8. **USB(Remote)**

USB Connector (type B)

For external control via USB

9. **LAN**
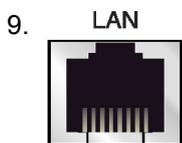
Ethernet Connector

Connects PC or Ethernet connection

10. **USB**

USB Connector (type A)

Used to connect a USB keyboard or mouse or the USB memory supplied.

11.

Monitor Out Connector

Connects external display

12.

~Line Input
50-60Hz 440VA Max
100-120V/200-240V

AC Inlet

Supplies power

2

13.

HDD
Interface

HDD Interface connector

Connects external HDD.

Do not insert or remove the eSATA cable while the MS2690A/MS2691A/ MS2692A is turned on. Otherwise, the device may be damaged.

2.2 Signal Path Setup

As shown in Figure 2.2-1, connect the MS2690A/MS2691A/MS2692A and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector. To prevent an excessive level signal from being input to the MS2690A/MS2691A/MS2692A, do not input the signal before setting the input level with the MX269050A.

RF Input

DUT

Figure 2.2-1   Signal Path Setup Example

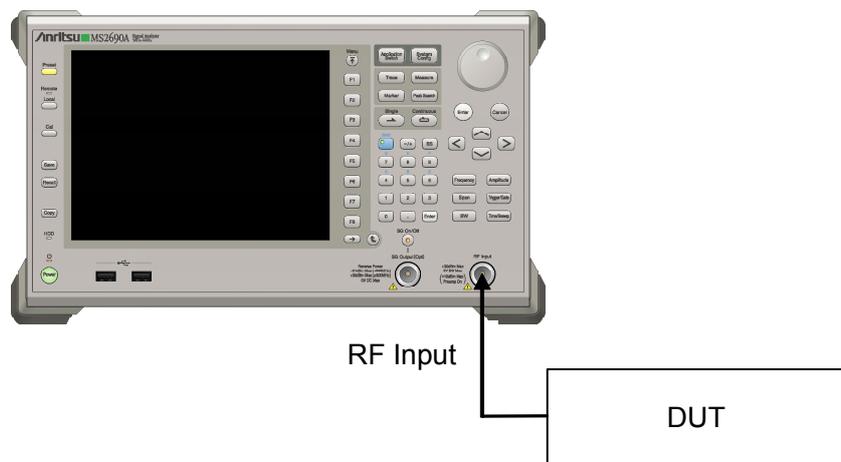When capturing digitizing data with SPAN set to 5 MHz, 10 MHz, 18.6 MHz or 20 MHz, the external HDD is recommended to be formatted. Prepare an external HDD equipped with an eSATA interface with an average writing speed of at least 120 MB/s. The SPAN range of the data that can be captured is determined depending on the average writing speed of the HDD. When the average writing speed is 100 MB/s, for example, set SPAN to 18.6 MHz or lower. The units other than the Signal Analyzer are recommended to be unloaded in order to stabilize the writing speed to the HDD. Also, be careful of the operating condition because the data transfer speed of the HDD is degraded when the operating ambient temperature is low.

Use NTFS format. Check that the MS2690A/MS2691A/MS2692A is turned off, and then connect an eSATA cable to the HDD Interface connector on the rear panel as shown in Figure 2.2-2. At this time, be careful of the orientation of the connector. Turn the HDD on and then turn on the MS2690A/MS2691A/MS2692A. Do not insert or remove the eSATA cable while the MS2690A/MS2691A/ MS2692A is turned on. Otherwise, the device may be damaged.

For the external HDD setup procedure and the formatting method in NTFS format, refer to the operation manual of the external HDD.

Set the 10/13 MHz reference signal and/or trigger signal paths from external sources, as required.

When using File Operation of the Configuration setting, set the external HDD to a drive other than drive E. If "MovetoUSB" is executed with the external HDD assigned to drive E, files are transferred to the external HDD.

For settings on the Configuration screen, refer to Section 3.4 "Settings on Configuration screen" in the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation).
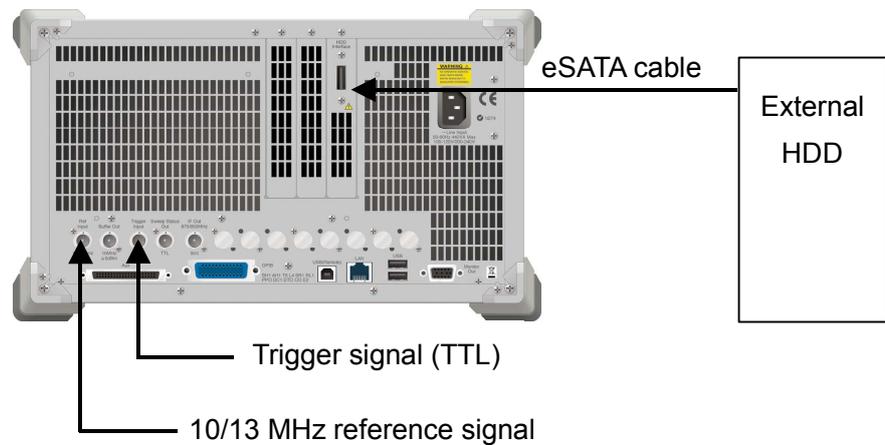

Figure 2.2-2   Setting External HDD and Inputting External Signals

2.3 Application Startup and Selection

To use the MX269050A, it is necessary to load (start up) and select the MX269050A.

2.3.1 Loading applications

The MX269050A startup procedure is described below.

\<Procedure\>
1. Press [System Config] to display the Configuration screen.
2. Press [F4] (Application Switch Settings) to display the Application Switch Registration screen.
3. Press [F1] (Load Application Select) and move the cursor on [Extended Digitizing] in the Unloaded Applications list.
If [Extended Digitizing] is displayed in the Loaded Applications list, this means that the MX269050A is already loaded.
If [Extended Digitizing] appears in neither the Loaded Applications nor Unloaded Applications list, this means that the MX269050A has not been installed.
4. Press [F7] (Set) to load the MX269050A. If [Extended Digitizing] is displayed in the Loaded Applications list, this means that the MX269050A is already loaded.

2.3.2 Selecting applications

The MX269050A selection procedure is described below.

\<Procedure\>
1. Press [Application Switch] to display the Application Switch menu.
2. Press the menu function key displaying Extended Digitizing].

The MX269050A can also be selected by clicking **Extended Digitizing** on the task bar.

2.4 Initialization and Calibration

This section describes preparations required before setting parameters or capturing waveforms with the MX269050A.

2.4.1 Initialization

After selecting the MX269050A, first perform initialization. Initialization should be performed in order to return the settable parameters to their initial value.

Note:

> When switch is made to another software application, the MX269050A keeps the parameter settings at that time. The parameter values that were last set will be applied when the MX269050A is selected next time.

The initialization procedure is as follows.

<Procedure>
1. Press ⬭ (Preset) to display the Preset function menu.
2. Press [F1] (Preset).

2.4.2 Calibration

Be sure to perform calibration before capturing waveforms. Calibration sets the level accuracy frequency characteristics for the input level to flat, and adjusts level accuracy deviation caused by internal temperature fluctuations. Perform calibration when capturing waveforms the first time after power-on, when executing a performance test of the MS2690A/MS2691A/MS2692A, or when the ambient temperature at the start of waveform capture differs from the last time calibration is performed.

<Procedure>
1. Press ⬭ (Cal) to display the Application Cal function menu.
2. Press [F1] (SIGANA All).

For details on calibration functionality only executable with the MS2690A/MS2691A/MS2692A, refer to the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation).

Chapter 3   Operation

This chapter describes the waveform capture function, IQ data save function, contents and setting method of the parameters.

3

Operation

3.1 Basic Operation

3.1.1 Screen layout

This section describes the screen layout of the MX269050A.
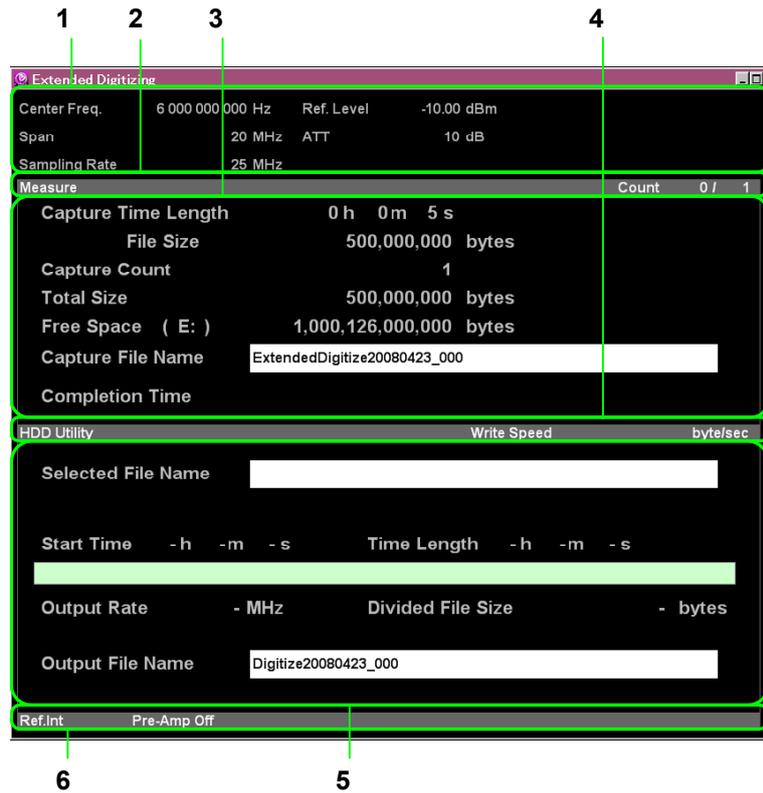
Figure 3.1.1-1   Screen Layout

1.   Parameter display window

Displays the set parameters.

Table 3.1.1-1   Parameter Display Window

Display Item		Description
Center Freq.		Center frequency
Ref. Level		Reference level
ATT		Attenuator value
Offset		Level correction coefficient (Not displayed when the offset function is off.)
Trigger	Video	Video trigger
	Wide IF Video	Wide IF video trigger
	External	External trigger
	SG Marker	SG marker trigger
	None	Not displayed when trigger synchronization is off.
Trigger Level		Displayed when Video or Wide IF Video is set for Trigger. Otherwise, not displayed.
Trigger Slope		Trigger polarity (Not displayed when trigger synchronization is off.)

2.   Measure status message

Displays the waveform capture state.

Table 3.1.1-2   Measure Status Message

Display Item		Description
Warm Up		Displayed according to warm-up condition
Level Over		Displayed when Level Over occurs
Capture Status		Waveform capture not started
	Capture End	Waveform capture completed successfully
	Capture Error	Waveform capture ended abnormally
	Capturing	Waveform capture in progress
	Trigger Wait…	Waiting for trigger
	Stopping	Stopping waveform capture
Count 1/20		Current capture count/Total capture count set

3.   Capture window
      Displays the set waveform capture parameters.

Table 3.1.1-3   Capture Window

Display Item	Description
Capture Time Length	Length of time for one waveform capture
File Size	File size for one waveform capture
Capture Count	Waveform capturing times
Total Size	Multiplication of set File Size and Capture Count
Free Space	Available free space in device
Capture File Name	Waveform capture data file name
Completion Time	Estimated completion time of waveform capture

The value of Total Size is displayed in red if Free Space is less than Total Size. Do not perform waveform capturing when Total Size is displayed in red. Otherwise, writing to a file may fail.
If waveform capturing is started with this condition, waveform data is captured and files are created until the disk capacity becomes full, but some created files may not be recognized by the HDD Utility. In this event, use Explorer or some other application to delete such files.

4.   HDD Utility status message
      Displays the writing speed to the HDD.

Table 3.1.1-4   HDD Utility Status Message

Display Item		Description
Write Speed	bytes/sec	Before start of digitizing
	80,000,000 bytes/sec	Sufficient speed
	60,000,000 bytes/sec	Insufficient speed

Writing speeds are defined as follows. The data transfer speed is displayed in blue when it is sufficient and in red when it is insufficient.

Table 3.1.1-5   Writing Speed

Span	Data Transfer Speed
100 kHz	1,600,000 bytes/sec
250 kHz	4,000,000 bytes/sec
500 kHz	8,000,000 bytes/sec
1 MHz	16,000,000 bytes/sec

Table 3.1.1-5   Writing Speed (Continued)

Span	Data Transfer Speed
2.5 MHz	40,000,000 bytes/sec
5 MHz	80,000,000 bytes/sec
10 MHz	80,000,000 bytes/sec
18.6 MHz	80,000,000 bytes/sec
20 MHz	100,000,000 bytes/sec

5. Save Captured Data window

Displays the set IQ data save parameters.

Table 3.1.1-6   Save Captured Data Window

Display Item	Description
Selected File Name	Data file name
Start Time	Start time for dividing IQ data
Time Length	Length of time for dividing IQ data
Output Rate	Sampling rate when IQ data is divided and saved
Divided File Size	File size of one file when IQ data is divided and saved
Output File Name	Data file name

6. Status message

Displays a message.

Table 3.1.1-7   Status Message

Display Item		Description
Reference Status	Ref.Int	Reference Internal state
	Ref.Ext	Reference External state
	Ref.Unlock	Reference Unlock state
Pre-Amp	Not displayed	No Pre-Amp option
	Pre-Amp On	Pre-Amp On state
	Pre-Amp Off	Pre-Amp Off state
Message	Buffer memory is full.	Buffer memory full state
	No device.	No memory device selected state
	Capacity over.	Disk full state

3.1.2   Main Function menu

This section describes the main function menu on the main screen.
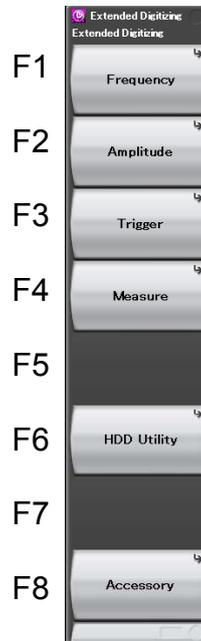
Figure 3.1.2-1   Main Function Menu

Table 3.1.2-1   Main Function Menu

Menu Display	Functions
Frequency	Sets frequency. 3.2 "Setting Frequency"
Amplitude	Sets level. 3.3 "Setting Level"
Trigger	Sets a trigger. 3.4 "Setting Trigger"
Measure	Sets Measure function. 3.5 "Setting Measure Function"
HDD Utility	Sets HDD Utility. 3.6 "Setting HDD Utility"
Accessory	Sets the other functions. 4.1 "Selecting Other Functions"

3.1.3   Executing waveform capture

Press ⏎ (Single) to start waveform capture.

Waveforms are captured for the set Capture Time Length and Capture Count, and then waveform capture stops.

Do not perform any operation other than pressing of [F8] (Stop) during waveform capture execution.

Press [F8] (Stop) to stop waveform capture in the middle of execution.

☞ 3.5.1 "Waveform capture function"

3

Operation

3.2 Setting Frequency

Press [F1] (Frequency) in the main function menu to display the Frequency function menu.

Otherwise, press [Frequency] to display the Frequency function menu in which the center frequency can be set.

Center Frequency
■ Summary

Sets the center frequency.

■ Setting range

0 Hz to upper limit depending on main unit

Span
■ Summary

Sets the band (span) frequency.

■ Setting range

100, 250, 500 kHz

1, 2.5, 5, 10, 18.6, 20 MHz

Frequency Band Mode
■ Summary

Sets the Frequency Band Mode to Normal or Spurious (only when Option 003 is installed).

■ Selection options

Normal	Sets normal mode (preselector lower limit of 6 GHz).
Spurious	Sets spurious mode (preselector lower limit of 3 GHz).

3.3 Setting Level

Configures settings related to level.

Press [F2] (Amplitude) in the main function menu to display the Amplitude function menu.

Otherwise, press [Amplitude] to display the Amplitude function menu in which the reference level can be set.

Reference Level
■ Summary

The reference level (upper end of amplitude scale) can be set.

■ Setting range

When Pre-Amp is On:
(−120.00 + Offset Value) to (30.00 + Offset Value) dBm
When Pre-Amp is Off:
(−120.00 + Offset Value) to (50.00 + Offset Value) dBm

Attenuator
■ Summary

Sets the ATT setting mode to Auto or Manual.

■ Selection options

Auto	ATT value is set automatically.
Manual	ATT value can be set manually.

Attenuator Value
■ Summary

Sets the ATT value.

■ Setting range

0 to 60 dB

Pre-Amp
■ Summary

Sets the Pre-Amp function On or Off (only when Option 008 is installed).

■ Selection options

On	Enables the Pre-Amp function.
Off	Disables the Pre-Amp function.

3

Operation

Offset

■ Summary

Turns the Offset function On/Off.

■ Selection options

On   Enables the offset function.

Off   Disables the offset function.

Offset Value

■ Summary

Sets the level offset coefficient.

■ Setting range

−99.99 to +99.99 dB

■ Setting example
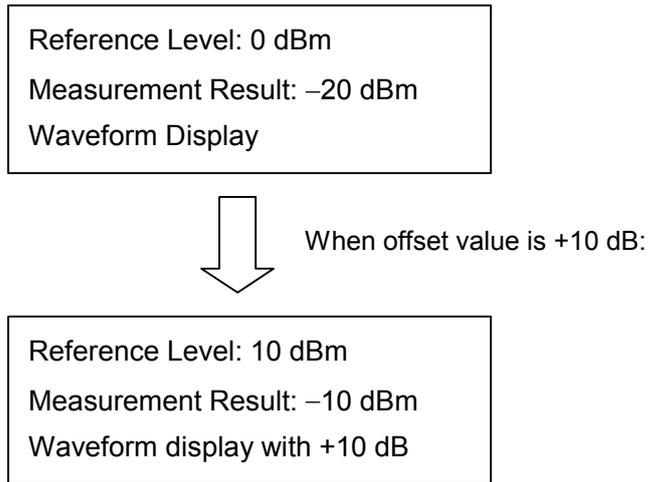
```
Reference Level: 0 dBm

Measurement Result: −20 dBm

Waveform Display
```

When offset value is +10 dB:

```
Reference Level: 10 dBm

Measurement Result: −10 dBm

Waveform display with +10 dB
```

Figure 3.3-1   Adding Offset Value

3.4 Setting Trigger

Performs the trigger-related settings.

Press [F3] (Trigger) in the main function menu or press [Trigger/Gate] to display the Trigger function menu. Trigger Delay is always set to 0.

Trigger Switch

■ Summary

This sets the trigger synchronization On/Off.

■ Selection options

On	Enables the trigger function.
Off	Disables the trigger function.

Trigger Source

■ Summary

This sets the trigger source.

■ Selection options

Video	Waveform capture starts in synchronization with the rise or fall of the waveform.
Wide IF Video	An IF signal with a wide passing band of about 50 MHz is detected, and waveform capture starts in synchronization with the rise or fall of the detected signal.
External	Waveform capture starts upon external trigger signal input from the trigger input connector.
SG Marker	Waveform capture starts upon SG marker signal output from Option 020 in the MS269xA (only when Option 020 is installed).

Trigger Slope

■ Summary

Sets the trigger polarity.

■ Selection options

Rise	Synchronizes with rising edge of the trigger.
Fall	Synchronizes with falling edge of the trigger.

3

Operation

Trigger Level (Video)

■ Summary

Sets the trigger level when Video is set for Trigger Source.

■ Setting range

(–150.00 + Offset Value) to (50.00 + Offset Value) dBm

Trigger Level (Wide IF Video)

■ Summary

Sets the trigger level when Wide IF Video is set for Trigger Source.

■ Setting range

(–60.00 + Offset Value) to (50.00 + Offset Value) dBm

3.5 Setting Measure Function

Used for setting related to the Measure function.
Press [F4] (Measure) in the main function menu or press [Measure] to display the Measure function menu.

3.5.1 Waveform capture function

Sets the waveform capture function. Press [F1] (Extended Digitizing) in the Measure function menu to display the Extended Digitizing function menu.

F1

F2

F3

F4

F5

F6

F7

F8

Figure 3.5.1-1   Extended Digitizing Function Menu

Table 3.5.1-1   Extended Digitizing Function Menu

Menu Display	Functions
Capture Time Length	Sets the length of time for capturing waveforms.
Capture Count	Sets the number of times waveforms are captured.
Capture File Name	Sets the waveform capture data file name.

Capture Time Length
■ Summary

Sets the waveform capture time length.

■ Setting range

5 to 14400 s

Capture Count
■ Summary

Sets the waveform capture count.

■ Setting range

1 to 20

Capture File Name
■ Summary

Sets the waveform capture data file name.

■ Setting range

Up to 29 characters

3.5.1.1 Capturing waveforms to external HDD

Captures to an external HDD the IQ data from the time in which the waveform capture function is executed.

Example: To capture IQ data
<Procedure>

1. Press `F1` (Device) in the HDD Utility function menu and set the device for which an external HDD is set.
2. Press `F1` (Capture Time Length) in the Extended Digitizing function menu and set the length of time for capturing waveforms.
3. Press `F2` (Capture Count) and set the waveform capturing times.
4. Press `F3` (Capture File Name) and set the data file name.
5. Press `Single` to start waveform capture.
6. Press `F8` (Stop) to stop waveform capture in the middle of execution.

Do not perform any operation other than pressing of `F8` (Stop) during waveform capture execution.

When `F8` (Stop) is pressed during waveform capture execution, data up until that time is captured.

When waveform capture processing is executed, the following files are created.

- [File Name]_[Capture Count].dgz
  Data file (binary format)
- [File Name]_[Capture Count].xml
  Data information file (XML format)

The IQ data row is saved to the data file.
The information on the IQ data is saved to the data information file.

If File Name is not set, the data file is automatically named in the format below.
ExtendedDigitize*Date_Sequence number*_[Capture Count]

The sequence number is incremented each time a waveform is captured.

The created files are stored in the following directory under the external HDD specified by `F1` (Device).
\Anritsu Corporation\Signal Analyzer\User Data\
DIGITIZED DATA\EXTENDED DIGITIZING\

Note：

> If the "File write error." error message appears frequently, restart the MS2690A/MS2691A/MS2692A.
>
> When "[E0021108]CommandDDR2Read Retry Error" message appears, restart the MS2690A/MS2691A/MS2692A. If the problem persists, contact an Anritsu Service and Sales office.

Example: To capture waveforms for one hour with SPAN of 10 MHz

<Procedure>

1. Press [Span].

2. After pressing [1] and [0], press [F2] (MHz) and set the frequency span to 10 MHz.

3. Press [↻] to return to the main function menu.

4. Press [F6] (HDD Utility).

5. Press [F1] (Device) and set the device for which the external HDD is set.

6. Press [↻] to return to the main function menu, and then press [F4] (Measure) or [Measure].

7. Press [F1] (Extended Digitizing).

8. Press [F1] (Capture Time Length) to set Capture to one hour (3600 seconds).

9. Return to the Extended Digitizing function menu, press [F2] (Capture Count), and set the waveform capture count to 1.

10. Press [Single →] and capture waveform.

Since Sampling Rate is set to 20 MHz and Data Type is set to Int16 in the above case, 80,000,000 bytes of IQ data are captured per second. Hence, 288,000,000,000 bytes are captured per hour.
IQ data is generated for every one waveform capture, resulting in creation of one data file of 288,000,000,000 bytes and one data information file.

3.5.1.2 Format of data information file

The information on the saved IQ data is recorded in the data information file. Table 3.5.1.2-1 shows the details of the recorded parameters.

Table 3.5.1.2-1 Format of Data Information File

Item	Description
CaptureDate	Data captured date in "DD/MM/YYYY" format
CaptureTime	Data captured time in "HH/MM/SS" format
FileName	Data file name
Format	Data format "Int16" when SPAN is 10 MHz or greater, otherwise "Float."
CaptureSample	Number of samples of the recorded data [samples]
Condition	Error status of the recorded data Normal: Normal state OverLoad: Overloaded state
TriggerPosition	Trigger generation position [samples] Fixed to 0.00.
CenterFrequency	Center frequency [Hz]
SpanFrequency	Frequency span [Hz]
SamplingClock	Sampling rate [Hz]
PreselectorBandMode	Normal: Normal mode Spurious: Spurious mode ☞ 3.2 "Setting Frequency"
ReferenceLevel	Reference level [dBm] Note that this value does not include the reference level offset.
AttenuatorLevel	Attenuator value [dB]
InternalGain	Internal gain value [dB] Fixed to "0.0" by an internal parameter.
PreAmp	Gain value obtained by 6 GHz preamp [dB]
IQReverse	IQ reverse setting. Fixed to "Normal."

3

Operation

Table 3.5.1.2-1   Format of Data Information File (Continued)

Item	Description
TriggerSwitch	Trigger On/Off setting FreeRun: Trigger is not used. Triggered: Trigger is used.
TriggerSource	Trigger source Video: Video trigger Wide IF Video: Wide IF video trigger External: External trigger SGMarker: SG marker trigger
TriggerLevel	Trigger level [dBm] Note that this value does not include the reference level offset.
TriggerDelay	Trigger delay time [s] Fixed to "0." Trigger delay time cannot be set.
IQReference0dBm	Reference IQ amplitude indicating 0 dBm
ExternalReferenceDisp	Reference signal information Ref.Int: Internal reference signal Ref.Ext: External reference signal Ref.Int Unlock: Internal reference signal is unlocked. Ref.Ext Unlock: External reference signal is unlocked.
CorrectionFactor	Correction value for Correction function [dB] Set to "0.000" when Correction function is Off.
Terminal	Signal input terminal Fixed to "RF."
ReferencePosition	0-second reference position indicated by point position in digitized data
TriggerSlope	Trigger Slope Rise: Synchronizes with rising edge of the trigger. Fall: Synchronizes with falling edge of the trigger.

3.5.1.3 Format of data file

Data files are created in binary format. When SPAN is 5 MHz or smaller, I-phase data and Q-phase data are chronologically recorded 4 bytes at a time from the start of the file, and when SPAN is 10 MHz or greater, I-phase data and Q-phase data are chronologically recorded 2 bytes at a time from the start of the file. The I-phase data and Q-phase data are recorded as a float type (IEEE real*) when SPAN is 5 MHz or smaller, and as an Int16 type when SPAN is 10 MHz or greater.

Start of file ➝

I-phase data 1	(4 bytes)
Q-phase data 1	(4 bytes)
I-phase data 2	(4 bytes)
Q-phase data 2	(4 bytes)
I-phase data 3	(4 bytes)
Q-phase data 3	(4 bytes)

⋮
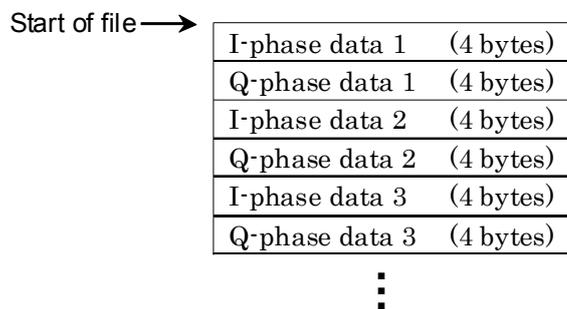
Figure 3.5.1.3-1   Format of Float Type Data File

Start of file ➝

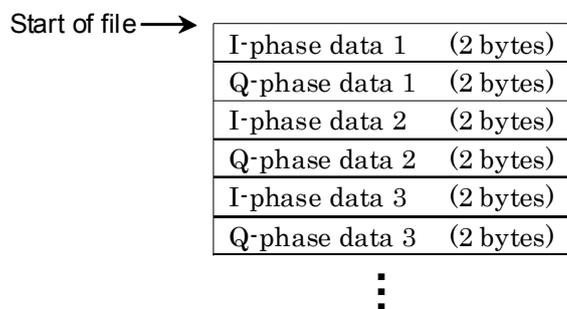|	
I-phase data 1	(2 bytes)
Q-phase data 1	(2 bytes)
I-phase data 2	(2 bytes)
Q-phase data 2	(2 bytes)
I-phase data 3	(2 bytes)
Q-phase data 3	(2 bytes)

⋮

Figure 3.5.1.3-2   Format of Int16 Type Data File

3

Operation

For Int16 type IQ data that is captured when SPAN is 10 MHz or greater, it is necessary to consider IQReference0dBm in the data information file. When using data captured in the external HDD as it is, divide all I-phase data and Q-phase data each by IQReference0dBm.

$$I = IPhaseData / \text{IQReference0dBm}$$

$$Q = QPhaseData / \text{IQReference0dBm}$$

The IQ data can be converted to power based on the following formula:

$$P = 10 Log_{10}\left(I^2 + Q^2\right)$$

where,
P: Power [dBm]
I: I-phase data
Q: Q-phase data

3.5.2 Channel power measurement (Channel Power)

Fetches the Channel Power function of the signal analyzer function. The frequency, level, and trigger settings are automatically applied to the corresponding parameters. While these functions are being fetched, the Recall Current Application described in Section 3.6.2 "Recalling parameters" of the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation) cannot be executed.

Channel Power
■ Summary

Fetches the Channel Power function of the signal analyzer function and measures the channel power with the parameter settings that are applied.

3

Operation

3.5.3　Burst average power measurement (Burst Average Power)

Fetches the Burst Average Power function of the signal analyzer function. The frequency, level, and trigger settings are automatically applied to the corresponding parameters. While these functions are being fetched, the Recall Current Application described in Section 3.6.2 "Recalling parameters" of the MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation) cannot be executed.

Burst Average Power
■ Summary

Fetches the Burst Average Power function of the signal analyzer function and measures the burst average power with the parameter settings that are applied.

3.6 Setting HDD Utility

Configures settings related to HDD Utility. Press [F6] (HDD Utility) to display the HDD Utility function menu.

F1
F2
F3
F4
F5
F6
F7
F8
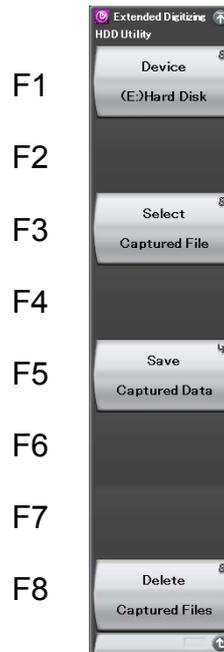
Figure 3.6-1   HDD Utility Function Menu

Table 3.6-1   HDD Utility Function Menu

Menu Display	Function
Device	Sets the external HDD for capturing waveform.
Select Captured File	Selects a data file for saving the captured IQ data.
Save Captured Data	Sets items for saving IQ data. ☞ 3.6.1 "IQ data save function"
Delete Captured File	Selects the IQ data to be selected.

Device

■ Summary

Sets the device for which the external HDD is set.

Select Captured File

■ Summary

Selects a data file for saving the captured IQ data into the external memory.

Delete Captured File

■ Summary

Deletes the selected IQ data.

3.6.1   IQ data save function

Sets the IQ data save function. Press ⬚F5 (Save Captured Data) in the HDD Utility function menu to display the Save Captured Data function menu.

Device

■ Summary

Sets the device in which the external memory is set.

Output File Name

■ Summary

Sets the data file name to be saved.

■ Setting range

Up to 27 characters

Output Rate

■ Summary

Sets the sampling rate of the IQ data to be saved.

■ Setting range

See the table below.

Table 3.6.1-1   Setting Range of Output Rate

Frequency Span	Sampling Rate at Capture	Output Rate		
		Minimum	Maximum	Resolution
100 kHz	200 kHz	100 kHz	200 kHz	1 Hz
250 kHz	500 kHz	200 kHz	500 kHz	1 Hz
500 kHz	1 MHz	500 kHz	1 MHz	10 Hz
1 MHz	2 MHz	1 MHz	2 MHz	10 Hz
2.5 MHz	5 MHz	2 MHz	5 MHz	10 Hz
5 MHz	10 MHz	5 MHz	10 MHz	100 Hz
10 MHz	20 MHz	10 MHz	20 MHz	100 Hz
18.6 MHz	20 MHz	10 MHz	20 MHz	100 Hz
20 MHz	25 MHz	12.5 MHz	25 MHz	100 Hz

Start Time

■ Summary

Sets the time to start saving of the selected IQ data.

■ Setting range

0 to ((Length of selected IQ data) − (Time Length value)) s

Time Length

■ Summary

Sets the length of time for saving the IQ data.

■ Setting range

1 to ((Length of selected IQ data) − (Start Time value)) s

Divided File Size

■ Summary

Sets the size of one file when IQ data is divided and saved.

■ Selection options

100,000,000 bytes	Sets the size of one file to about 95.4 Mbytes.
200,000,000 bytes	Sets the size of one file to about 190.7 Mbytes.
500,000,000 bytes	Sets the size of one file to about 476.8 Mbytes.
1000,000,000 bytes	Sets the size of one file to about 953.7 Mbytes.

Exec Output

■ Summary

Executes saving of IQ data.

3.6.1.1 Saving IQ data to external memory

Saves to an external memory the IQ data that is captured in the external HDD.

Example: To save IQ data
<Procedure>
1. Press [F3] (Select Captured File) in the HDD Utility function menu and select a data file for saving the captured IQ data.
2. Press [F5] (Save Captured Data).
3. Press [F1] (Device) in the Save Captured Data function menu and select the drive name of the save destination.
4. Press [F2] (Output File Name) and set the data file name.
5. Press [F3] (Output Rate) and set the sampling rate.
6. Press [F5] (Start Time) and set the save start position time.
7. Press [F6] (Time Length) and set the save time length.
8. Press [F7] (Divided File Size) and set the size of one file when IQ data is divided and saved.
9. Press [F8] (Exec Output) to save.

When save processing is executed, the following files are created.

- [File Name]_[Counter Number].dgz
  Data file (binary format)
- [File Name]_[Counter Number].xml
  Data information file (XML format)

The IQ data row is saved to the data file.
The information on the saved data is saved to the data information file.

If File Name is not set, the file is automatically named in the format below.
Digitize*Date*

Counter Number is the file size of all IQ data divided by the size set by [F7] (Divided File Size). The counter number ranges from 0 to 9999.

The saved files are stored in the following directory under the save destination drive specified by [F1] (Device) of the Save Captured Data function menu.
\Anritsu Corporation\Signal Analyzer\User Data\
DIGITIZED DATA\ EXTENDED DIGITIZING\

3

Operation

Example: To save into divided files the IQ data (which is captured for one hour with SPAN of 10 MHz (see Example in Section 3.5.1.1)) for 20 seconds after 10 minutes from the start of the IQ data, by lowering the sampling rate to 10 MHz and setting the size of one file to 100,000,000 bytes

<Procedure>

1.   Press `F6` (HDD Utility).

2.   Press `F3` (Select Captured File) and select a data file for saving the captured IQ data.

3.   Return to the HDD Utility function menu.

4.   Press `F5` (Save Captured Data).

5.   Press `F1` (Device) and select the drive name of the save destination.

6.   Press `F3` (Output Rate).

7.   Press `1` `0` and then press `F2` (MHz) to set the output rate to 10 MHz.

8.   Press `F5` (Start Time).

9.   After pressing `1` and `0`, press `F2` (Minute) and set the save start position time to 10 minutes.

10.   Press `F6` (Time Length).

11.   Press `2` `0`, and then press `F3` (Second) to set the capture time to 20 seconds.

12.   Press `F7` (Divided File Size).

13.   Press `F1` (100,000,000 bytes) and set the size of one file.

14.   Return to the Save Captured Data function main.

15.   Press `F8` (Exec Output) to save the IQ data.

Since Start Time is set to 10 minutes in the above case, the start of the IQ data saved in the external memory is the position at 48,000,000,0000 bytes from the start of the IQ data captured in the external HDD.
(Also note in the above case, however, that the position shifts by TriggerPosition because the sampling rate is changed.)
Since Time Length is set to 20 seconds, data of 1,600,000,000 bytes is cut out from the IQ data, and the resampling processing is then performed for that data to obtain the IQ data of 800,000,000 bytes in size.
The number of files becomes eight because File Size is set to 100,000,000 bytes.

When an HDD is used as the external memory and there is insufficient free space in the HDD, the message "The file is too large for the destination drive. Do you execute output?" is displayed before saving. Select **OK** or **Cancel** on the message window.

When a removable medium is used as the external memory and there is insufficient free space in the media, the message "The file is too large for the destination drive. If possible, insert a higher-capacity disk." is displayed before saving. Select **Retry** or **Cancel** on the message window.

3.6.1.2 Format of data information file

The information on the saved IQ data is recorded in the data information file. Table 3.6.1.2-1 shows the details of the recorded parameters.

Table 3.6.1.2-1   Format of Data Information File

Item	Description
CaptureDate	Date captured date in "DD/MM/YYYY" format
CaptureTime	Data captured time in "HH/MM/SS" format
FileName	Data file name
Format	Data format Fixed to "Float."
CaptureSample	Number of samples of the recorded data [samples]
Condition	Error status of the recorded data Normal: Normal state OverLoad: Overloaded state
TriggerPosition	Trigger generation position [samples] Position where the start of the recorded data is 0.
CenterFrequency	Center frequency [Hz]
SpanFrequency	Frequency span [Hz]
SamplingClock	Sampling rate [Hz]
PreselectorBandMode	Normal: Normal mode Spurious: Spurious mode ☞ 3.2 "Setting Frequency"
ReferenceLevel	Reference level [dBm] Note that this value does not include the reference level offset.
AttenuatorLevel	Attenuator value [dB]
InternalGain	Internal gain value [dB] Fixed to "0.0" by an internal parameter.
PreAmp	Gain value obtained by 6 GHz preamp [dB]
IQReverse	IQ reverse setting Fixed to "Normal."

3

Operation

Table 3.6.1.2-1   Format of Data Information File (Continued)

Item	Description
TriggerSwitch	Trigger On/Off setting FreeRun:　　　Trigger is not used. Triggered:　　　Trigger is used.
TriggerSource	Trigger source Video:　　　Video trigger Wide IF Video:　Wide IF video trigger External:　　External trigger SGMarker:　　SG marker trigger
TriggerLevel	Trigger level [dBm] Note that this value does not include the reference level offset.
TriggerDelay	Trigger delay time [s] It is the relative time from the trigger input position to the start point of the recorded data.
IQReference0dBm	Reference IQ amplitude indicating 0 dBm Fixed to 1.
ExternalReferenceDisp	Reference signal information Ref.Int:　　　Internal reference signal Ref.Ext:　　　External reference signal Ref.Int Unlock:　Internal reference signal is unlocked. Ref.Ext Unlock:　External reference signal is unlocked.
CorrectionFactor	Correction value for Correction function [dB] Set to "0.000" when Correction function is Off.
Terminal	Signal input terminal Fixed to "RF."
ReferencePosition	0-second reference position indicated by point position in digitized data
TriggerSlope	Trigger Slope Rise:　Synchronizes with rising edge of the trigger. Fall:　Synchronizes with falling edge of the trigger.

3.6.1.3 Format of data file

Data files are created in binary format. I-phase data and Q-phase data are chronologically recorded by 4 bytes at a time from the start of the file. The I-phase data and Q-phase data are recorded as a float type (IEEE real*4).

Start of file →

I-phase data 1	(4 bytes)
Q-phase data 1	(4 bytes)
I-phase data 2	(4 bytes)
Q-phase data 2	(4 bytes)
I-phase data 3	(4 bytes)
Q-phase data 3	(4 bytes)
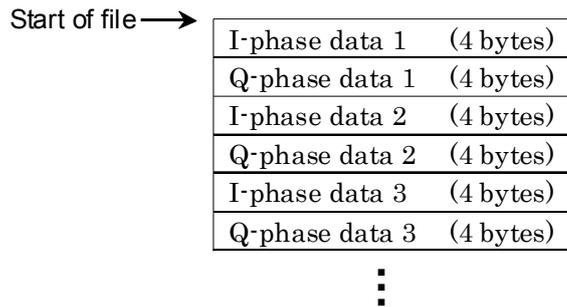
Figure 3.6.1.3-1　Format of Data File

The IQ data can be converted to power based on the following formula:

$$P = 10 Log_{10} \left(I^2 + Q^2 \right)$$

where,
P: Power [dBm]
I: I-phase data
Q: Q-phase data

3.7 Setting Analysis Time

Press [F1] (Capture Time Length) in the Extended Digitizing function menu, or press [F5] (Start Time) or [F6] (Time Length) in the Save Captured Data function menu of the HDD Utility function menu to set the respective time settings.

Figure 3.7-1   Time Setting Function Menus

Table 3.7-1   Time Setting Function Menus

Menu Display	Functions
Hour	Selects the hour.
Minute	Sets the minute.
Second	Sets the second.

Hour

■ Summary

Sets the hour.

■ Setting range[*]

0 to 4

■ Total time

Set value $\times$ 60 $\times$ 60

Minute

■ Summary

Sets the minute.

■ Setting range[*]

0 to 240

■ Total time

Set value $\times$ 60

Second

■ Summary

Sets the second.

■ Setting range[*]

0 to 14400

*: For the setting ranges of Capture Time Length, Start Time, and Time Length, refer to their respective sections.

☞ 3.6.1 "IQ data save function"

3

Operation

Example: To set four hours

<Procedure>

1.   Press ④ on the numeric keypad.

2.   Press [F1] (Hour) on the function menu.

Example: To set 1 hour 30 minutes (equivalent to 90 minutes or 1.5 hours)

<Procedure 1>

1.   Press ⑨ on the numeric keypad.

2.   Press ⓪ on the numeric keypad.

3.   Press [F2] (Minute) on the function menu.

<Procedure 2>

1.   Press ① on the numeric keypad.

2.   Press ⟨.⟩ on the numeric keypad.

3.   Press ⑤ on the numeric keypad.

4.   Press [F1] (Hour) on the function menu.

Example: To set 1 hour 30 minutes 10 seconds (equivalent to 5,410 seconds
          or approximately 1.5027 hours)

<Procedure 1>

1.   Press ⑤ on the numeric keypad.

2.   Press ④ on the numeric keypad.

3.   Press ① on the numeric keypad.

4.   Press ⓪ on the numeric keypad.

5.   Press [F3] (Second) or [F7] (Set) on the function menu.

<Procedure 2>

1.   Press ① on the numeric keypad.

2.   Press ⟨.⟩ on the numeric keypad.

3.   Press ⑤ on the numeric keypad.

4.   Press ⓪ on the numeric keypad.

5.   Press ② on the numeric keypad.

6.   Press ⑦ on the numeric keypad.

7.   Press [F1] (Hour) on the function menu.

Chapter 4 Other Functions

This chapter describes the other functions of the MX269050A.

4

Other Functions

4.1   Selecting Other Functions

Press [F8] (Accessory) on the function menu to display the Accessory function menu.
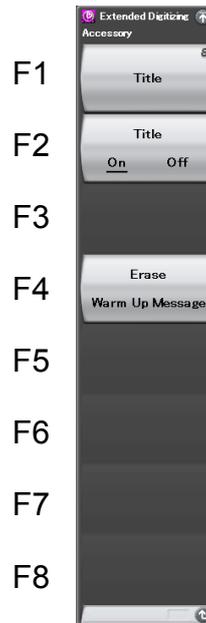
Figure 4.1-1   Accessory Function Menu

Table 4.1-1   Accessory Function Menu

Menu Display	Functions
Title	Sets the title character string. ☞ 4.2 "Setting Title"
Title (On/Off)	Sets the title character string to On/Off . ☞ 4.2 "Setting Title"
Erase Warm Up Message	Erases the warm-up message display. ☞ 4.3 "Erasing Warm-up Message"

4.2 Setting Title

A title of 32 or less characters can be displayed on the screen (up to 17 characters can be displayed on the top of the function menu).

\<Procedure\>

1.   Press [F8] (Accessory) on the main function menu.

2.   Press [F1] (Title) to display the entry screen for the character strings. Select the characters using the rotary knob and enter them using (Enter). Press [F7] (Set) after entering them.

3.   Select Off by pressing [F2] (Title) to set the title display to Off.
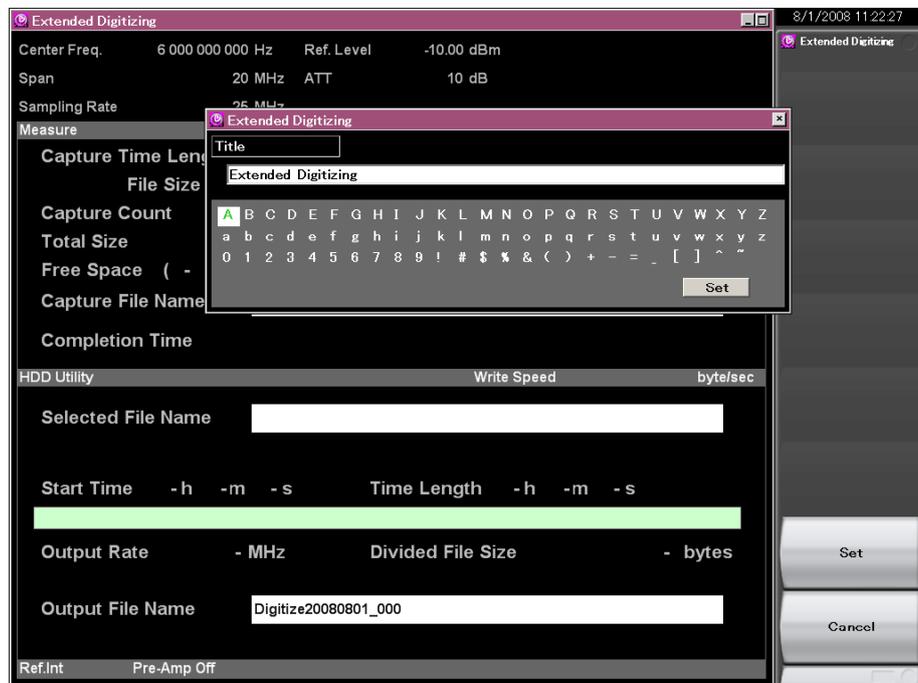
Figure 4.2-1   Setting Title

4.3 Erasing Warm-up Message

The warm-up message (█ Warm Up), which is displayed upon power-on and indicates that the level and frequency are not stable, can be erased.

<Procedure>

1.   Press ⌨F8 (Accessory) on the main function menu.

2.   Press ⌨F4 (Erase Warm Up Message) to erase the warm-up message.

Appendix

Appendix

Appendix A   Error Messages

Table A-1   Error Messages

Messages	Description
Out of range.	The settable range is exceeded.
Cannot find device.	No memory device can be found.
The file is too large for the destination drive.	The file size is too large and there is insufficient free space in the HDD device.
File read error.	An error has occurred while reading the file.
File write error.	An error has occurred while writing the file.
Please Load Signal Analyzer.	The signal analyzer application is not loaded.
Empty file name.	The file name is not set.
Empty title name.	The title is not set.
Not available during Save Captured Data.	This operation is invalid when Save Captured Data is being executed.
Not available if not device.	This operation is invalid when the device does not exist.
Not available if not selected file.	This operation is invalid when the selected file does not exist.
The file has not been selected.	No file is selected.
Can not set under 4 dB with Step Key and Encoder. Please Input with Numeric Key	Attenuation values smaller than 4 dB cannot be set with the encoder and step keys. Use the numeric keypad to enter a numeric value.
No device.	No memory device selected state.
Invalid character	—

Appendix B Default Value List

Frequency

    Carrier Frequency   6.000 GHz

    Span   20 MHz

    Frequency Band Mode   Normal

Amplitude

    Reference Level   −10.00 dBm

    Attenuator   Auto

    Attenuator Value   10dB

    Pre-Amp   Off

    Offset   Off

    Offset Value   0.00 dB

Trigger

    Trigger Switch   Off

    Trigger Source   Video

    Trigger Slope   Rise

    Trigger Level (Video)   −40 dBm

    Trigger Level (Wide If Video)   −20 dBm

Measure

    Extended Digitizing

        Capture Time Length   5 Second

        Capture Count   1

        Capture File Name   Extended Digitize

HDD Utility

    Device   –

    Select Captured File   –

    Save Captured Data   –

        Device   D

        File Name   Digitize

        Output Rate   –

        Start Time   –

        Time Length   –

        File Size   –

        Execute Output   –

    Delete Captured File   –

Accessory

    Title   Extended Digitizing

    Title   On

    Erase Warm up Message   –

T

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Index