MG3700A/MG3710A
Vector Signal Generator
MG3740A
Analog Signal Generator
Operation Manual
(IQproducer^{TM})

16th 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 MG3700A Vector Signal Generator Operation Manual (Mainframe) or MG3710A Vector Signal Generator / MG3740A Analog Signal Generator Operation Manual (Mainframe). Please also refer to this document before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

⚠ **DANGER** This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

⚠ **WARNING** This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

⚠ **CAUTION** This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MG3700A/MG3710A Vector Signal Generator
MG3740A Analog Signal Generator
Operation Manual (IQproducer^{TM})

1   November   2004 (First Edition)
13   May   2016 (16th Edition)

Equipment Certificate

Anritsu Corporation guarantees that this equipment was inspected at shipment and meets the published specifications.

Anritsu Warranty

- During the warranty period, Anritsu Corporation will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is 6 months from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

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In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information is available in a separate file (for the PDF version), and on the last page of this manual (for the printed version).

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    ii) If this Software is used in conjunction with other non-Anritsu-approved software.

    iii) Recovery of lost or damaged data.

    iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.

    v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.

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c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.

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If Anritsu suffers any loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

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Upon termination of this EULA in accordance with item 5, you shall cease all use of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

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If matters of dispute or items not covered by this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

9. Court of Jurisdiction

This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

Protection Against Computer Virus Infections

Prior to the software installation

Before installing this software or any other software recommended or approved by Anritsu, run a virus scan on your computer, including removable media (e.g. USB memory stick and CF memory card) you want to connect to your computer.

When using this software and connecting with the measuring instrument
- Copying files and data
  On your computer, do not save any copies other than the following:
  - Files and data provided by Anritsu
  - Files created by this software
  - Files specified in this document
  Before copying these files and/or data, run a virus scan, including removable media (e.g. USB memory stick and CF memory card).
- Connecting to network
  Connect your computer to the network that provides adequate protection against computer viruses.

Cautions on Proper Operation of Software

This software may not operate normally if any of the following operations are performed on your computer:
- Simultaneously running any software other than that recommended or approved by Anritsu
- Closing the lid (Laptop computer)
- Turning on the screen saver function
- Turning on the battery-power saving function (Laptop computer)

For how to turn off the functions, refer to the operation manual that came with your computer.

About This Manual

■ Composition of Operation Manuals

The operation manuals for the MG3700A Vector Signal Generator, the MG3710A Vector Signal Generator and the MG3740A Analog Signal Generator are comprised as shown in the figure below.
Details on the mainframe and the standard waveform pattern are provided in each operation manual separately. Read them when needed in addition to this manual.


```
┌──────────────────────────┬─────┬──────────────────────────┐
│ MG3700A Vector Signal    │ Or  │ MG3710A Vector Signal    │
│ Generator                │     │ Generator                │
│ Operation Manual         │     │ MG3740A Analog Signal    │
│ (Main frame)             │     │ Generator                │
│                          │     │ Operation Manual         │
│                          │     │ (Main frame)             │
└──────────────────────────┴─────┴──────────────────────────┘

   MG3700A/MG3710A Vector Signal Generator
   MG3740A Analog Signal Generator Operation Manual (IQproducer™)

   MG3700A/MG3710A Vector Signal Generator Operation Manual
   (Standard Waveform Pattern)

                                        IQproducer™ Operation Manuals
                                         for each communication system
```

■ Scope of This Manual

This manual mainly describes installation and operation methods of the MG3700A/MG3710A/MG3740A IQproducer™, which is Windows application software for the MG3700A/MG3710A Vector Signal Generator and the MG3740A Analog Signal Generator.
The installation method of this software is described in Chapter 2 "Installation," and the basic functions and the outline of operation are described in Chapter 4 "Operations for Each Function."

Table of Contents

IV.

This chapter provides an outline of the IQproducer™.

1.1 Outline of Product

The IQproducer™ (hereafter referred to as "IQproducer™ for MG3700A/MG3710A/MG3740A") is Windows application software used to generate a modulated waveform pattern to be used in the Vector Signal Generator MG3700A/MG3710A or the Analog Signal Generator MG3740A, which integrates an arbitrary waveform generator. The IQproducer™ for MG3700A/MG3710A/MG3740A also transfers the generated data to the MG3700A/MG3710A/MG3740A via LAN.

Note that it is required to purchase a license key corresponding to the serial number of your MG3700A/MG3710A/MG3740A when actually using a waveform file generated by the modulated waveform pattern generator IQproducer™ (hereafter, referred to as "signal generation application") corresponding to each communications system with the MG3700A/MG3710A/MG3740A.

The IQproducer™ for MG3700A/MG3710A/MG3740A also enables to display the Complimentary Cumulative Distribution Function (CCDF) results and Fast Fourier Transform (FFT) results of a generated modulated waveform pattern in graph. In addition, it can convert an ASCII-format waveform pattern generated by your signal generation application tool to a binary-format waveform pattern that can be used in the MG3700A/MG3710A/MG3740A.

This operation manual describes the functions of the IQproducer™ for MG3700A/MG3710A/MG3740A, except for the signal generation application.
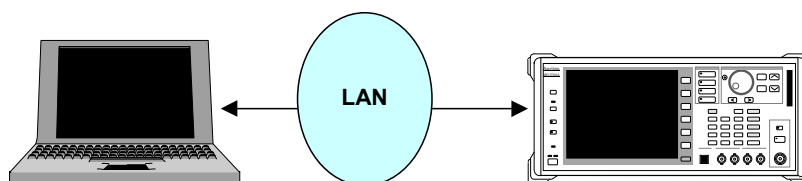

Figure 1.1-1   System configuration diagram

1.2 Outline of Functions

1.2.1 Signal generation application corresponding to communications system

Signal generation applications that generate modulation waveform patterns are provided for each communications system. For detailed information on the operations and functions of these applications, refer to the operation manual of each signal generation application.

1.2.2 CCDF graph display function

The IQproducer™ for MG3700A/MG3710A/MG3740A can read a modulation waveform pattern generated by each signal generation application and display it in the CCDF graph with up to eight traces.

The CCDF graph displayed on the screen can be printed out and saved into a CSV-format file.

1.2.3 FFT graph display function

The IQproducer™ for MG3700A/MG3710A/MG3740A can read a modulation waveform pattern generated by each signal generation application and display it in the FFT graph with up to four traces.

The FFT graph displayed on the screen can be printed out and saved into a CSV-format file.

1.2.4 File conversion function

The IQproducer™ for MG3700A/MG3710A/MG3740A can convert an ASCII-format waveform pattern generated by simulation software or other external software to a binary-format modulation waveform pattern file that can be used in the MG3700A/MG3710A/MG3740A.
It can convert a digitized file that is created by the MS2690A /MS2691A/MS2692A, MS2830A or MS2840A Signal Analyzer using the digitize function, and convert a waveform pattern for the MS269x, MS2830A or MS2840A into a binary-format modulation waveform pattern that can be used in the MG3700A/MG3710A/MG3740A. Conversely, a waveform pattern for the MG3700A/MG3710A/MG3740A can also be converted into a file that can be used in the MS2690A/MS2691A/MS2692A, MS2830A or MS2840A Signal Analyzer.

1.2.5 Transfer & Setting function

This is an application used to transfer waveform pattern files, screen copy images, log files, updating programs, etc., to the MG3700A/MG3710A/MG3740A via Ethernet.

The FTP function used to transfer files to the MG3700A/MG3710A/MG3740A and the MG3700A/MG3710A/MG3740A authentication function are included. It is also possible to load a waveform pattern saved in the MG3700A/MG3710A/MG3740A's hard disk to its waveform memory.

In addition, the usage condition of the MG3700A/MG3710A/MG3740A's waveform memory can be checked and defragmentation can be executed if necessary with this function.

1.2.6 Combination file edit function

This is a file creation function to define combinations of multiple waveform patterns to be allocated in the arbitrary waveform memory on the MG3700A/MG3710A/MG3740A.

This function enables definition of additional combinations of two waveform patterns as well as time-series switching among multiple waveform patterns while keeping signal synchronization.

1.2.7 AWGN waveform pattern generation function

This function enables generation of AWGN waveform patterns with any bandwidth.
By setting the sampling rate or bandwidth, this function generates AWGN waveform patterns that can be used in combination with existing waveform patterns.

1.2.8 Time domain graph display function

The IQproducer™ for MG3700A/MG3710A/MG3740A can read a modulation waveform pattern generated by each signal generation application and display it in the time domain graph, with up to four traces.

1.2.9 Clipping function

This function performs clipping processing for a waveform pattern generated by each signal generation application.

Chapter 2 Installation

This chapter describes how to install/uninstall the IQproducer™ for MG3700A/MG3710A/MG3740A in a PC.

2.1 Operating Environment

The IQproducer™ for MG3700A/MG3710A/MG3740A requires the
following environment.

Table 2.1-1   Operating environment

PC	
OS	Windows XP /Windows Vista/Windows7
CPU	PentiumIII 1 GHz equivalent or faster
Memory	512 MB or more
Hard disk free space	5 GB or more free space on the drive where this software is to be installed.
Peripheral device	
Display	Displays with a resolution of 1024 × 768 pixels are best viewed using a small font setting.

2.2   Installation and Uninstallation Procedure

The IQproducer™ for MG3700A/MG3710A/MG3740A can be installed interactively by activating the setup program.

If resident virus check programs are running on your PC, exit them before activating the IQproducer™ for MG3700A/MG3710A/MG3740A setup program, as well as other Windows applications in progress.

Note:

IF you upgrade the IQproducer™ for MG3700A/MG3710A/MG3740A after the version 3.00 (hereafter referred to as "new software") in PC in which the IQproducer™ for MG3700A/MG3710A/MG3740A before version 2.01 (hereafter referred to as "old software") is installed, please execute the setup file of the old software and uninstall it before executing the setup file of new software. However, if the short file name support was disabled on your Windows, old software cannot be uninstalled. In this case, instead of uninstalling the old software, execute the setup file of the new software and specify the installation folder of the old software for the Destination Folder, thereby installing the new software, while overwriting the old one.

Note:

Versions 12.00 and later of this software are installed in a different default destination folder than earlier versions. To install this software in the same folder as versions prior to 12.00, set the correct installation destination folder and then run the installer.

However, operation of this software is not assured if it is installed in the path C:\Program Files when using Windows Vista or Windows 7. When using Windows Vista or Windows 7, we recommend keeping Destination Folder as the default install destination.

Note:

This software of version 13.00 or later requires you to have installed Microsoft Visual C++ 2010 Redistributable Package (x86). In addition, this software of version 13.00 or later does not work on Windows2000.

> **Note:**
>
> When you run the setup program for IQproducer™ version 14.02 or later (hereafter referred to as "new software") on the PC to which IQproducer™ version 14.01 or earlier (hereafter referred to as "old software") has been installed, the automatic uninstallation of the old software starts.
> When the old software has been successfully uninstalled, the installation of the new software starts.

> **Note:**
>
> To downgrade from IQproducer™ version 14.02 or later (hereafter referred to as "new software") to IQproducer™ version 14.01 or earlier (hereafter referred to as "old software"), uninstall the new software before installing the old software.

2.2.1   Installation procedure

Install the IQproducer™ for MG3700A/MG3710A/MG3740A into your PC's hard disk with the following procedure.

Installation Procedure:

1) Double-click the SETUP.EXE file in the folder where the files of the IQproducer™ for MG3700A/MG3710A/MG3740A are stored.
When installing the IQproducer™ for MG3700A/MG3710A/MG3740A using the setup disk, double-click the SETUP.EXE file in the \IQproducer directory of the setup disk.

2) If Microsoft Visual C++ 2010 Redistributable Package (x86) is not installed to your PC, start the installation of the package.
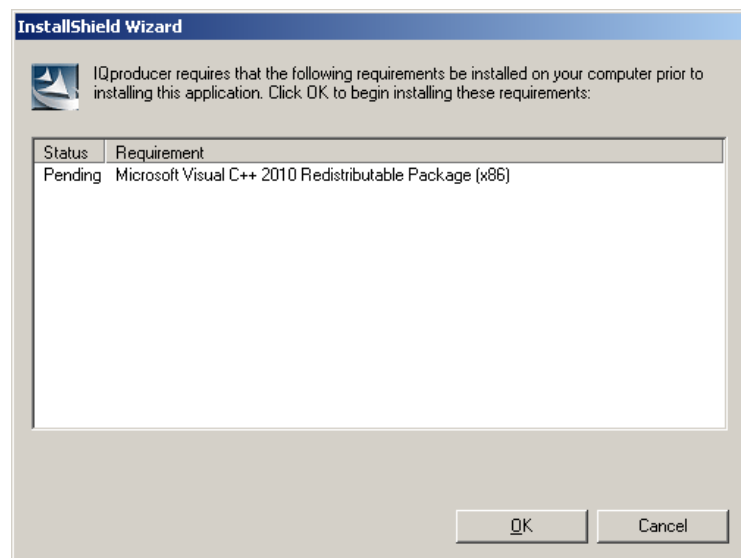
Figure 2.2.1-1   Installation of the Microsoft Visual C++2010 Redistributable Package

3)   When Microsoft Visual C++ 2010 Redistributable Package (x86) version 10.0.30319 or later has been already installed, the following confirmation message may appear. If you see the confirmation message, continue the installation.
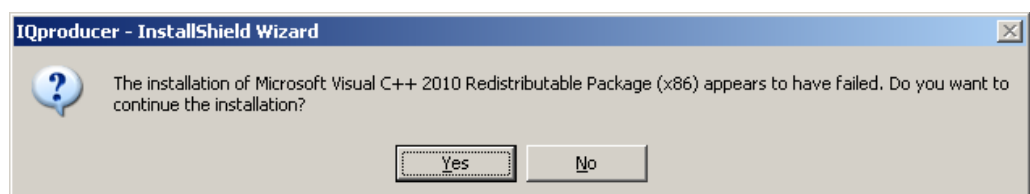
Figure 2.2.1-2   Confirmation Message That Appears When the New Version of Microsoft Visual C++2010 Redistributable Package Is Installed

To check the version information of Microsoft Visual C++ 2010 Redistributable Package (x86), click **Control Panel**, and then click **Uninstall a program**.

4) The IQproducer™ for MG3700A/MG3710A/MG3740A setup program starts. When **"Welcome to the InstallShield Wizard for IQproducer"** is displayed on the screen, click the **Next>** button.

5) The License Agreement screen is displayed. Read the license agreement terms, and click the **Yes** button if you agree with the contents.
    Note that the installation procedure will not continue unless you agree with the license agreement terms.

6) The directory path in which the software will be installed is displayed in the **Destination Folder** field.
    When changing the installation folder, click the **Browse…** button to open the directory change dialog box, and specify the desired folder. In this event, be sure to confirm that there is enough free space in the drive where the target folder belongs to. For free space, refer to Section 2.1 "Operating Environment."
    The IQproducer™ for MG3700A/MG3710A/MG3740A generates temporary data under the installation folder.

7) After specifying the installation folder, click the **Next>** button to display the folder for storing the program icon in the program folder selection window. It is also possible to change from this window the folder for storing the program icon. Click the **Next>** button to start installation.

8) When **"InstallShield Wizard Complete"** is displayed, click the **Finish** button.

2.2.2   Upgrade procedure

Follow the procedure below to upgrade the IQproducer™.

The upgrade process is run by double-clicking the SETUP.EXE file for the later version than the version currently installed on your PC.

<Procedure>

1.   Double-click the SETUP.EXE file in the folder where the IQproducer™ is stored. To install using the **<u>setup disk</u>** for the IQproducer™, double-click the SETUP.EXE file stored in the **\IQproducer** folder on the **<u>setup disk</u>**.

2.   The installation of Microsoft Visual C++ 2010 Redistributable Package (x86) begins in the same way as described in step 2 of 2.2.1 "Installation procedure". Follow step 2 of 2.2.1 "Installation procedure".

3.   Follow step 3 of 2.2.1 "Installation procedure".

4.   When you see the following message after the IQproducer™ setup program starts, click the **Yes** button:
     "The setup will perform an upgrade of 'IQproducer'. Do you want to continue?"

5.   When you see the following message, click the **Next** button to start upgrade:
     "Resuming the InstallShield Wizard for IQproducer"

6.   When you see the following message, click the **Finish** button:
     "Update Complete"

Note:

> If you double-click the SETUP.EXE file for the older version than the version currently installed on your PC, the setup process is cancelled and you will see the following message:
> "A later version of 'IQproducer' is already installed on this machine. The setup cannot continue."

2.2.3   Uninstallation procedure

Uninstall the IQproducer™ for MG3700A/MG3710A/MG3740A from your PC's hard disk with the following procedure.

Uninstallation Procedure:

1.   Click the **Start** button on the Windows task bar, point **Setting**, and click **Control Panel**.

2.   Double-click the **Add or Remove Programs** icon.

3.   On the **Change or Remove Programs** tab, click the **IQproducer** item in the **Currently Installed Programs** list to display it highlighted.

4.   Click the **Change/Remove** button.

5.   When the uninstall program starts, read the message, and click the **OK** button.

6.   A confirmation message may be displayed during uninstallation, asking whether to remove a shared file. Select **NO** unless it is not certain whether the indicated file is shared by any other programs. Some programs may not function correctly if a necessary shared file is removed inadvertently.

7.   When **"Uninstallation Complete"** is displayed, click the **Finish** button.

Note:

> If a shared file is removed, there is a possibility that other application programs may not function. Do not remove the shared file unless it is not certain whether the indicated file is shared or not.
> Even if a shared file is removed inadvertently, it may be restored by installing the IQproducer™ for MG3700A/MG3710A/MG3740A again.
> If the short file name support was disabled on your Windows, IQproducer™ for MG3700A/MG3710A/MG3740A before version 1.02 cannot be uninstalled.

Chapter 3 Basic Operations

This chapter describes the operations specifically important for operating the IQproducer™ for MG3700A/MG3710A/MG3740A on Windows.

3.1   Operations for Menu

3.1.1   Operations using mouse

Description for mouse operation

- •Point: To move a mouse and place the mouse pointer onto the operation target object.
- •Click: To press a mouse button and release it immediately. The button indicates a left button unless otherwise specified.
- •Double click: To click a mouse button twice quickly. The button indicates a left button unless otherwise specified.
- •Drag: To press a mouse button and then move the mouse while holding down the button. The button indicates a left button unless otherwise specified.
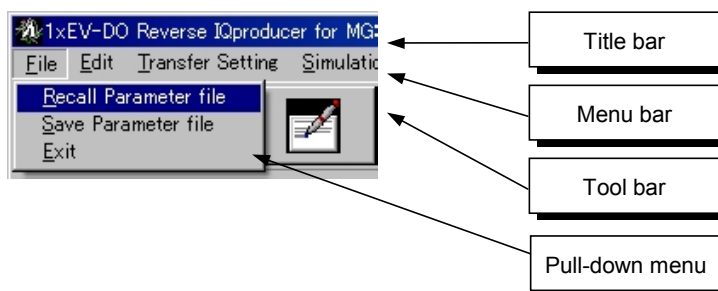
Figure 3.1.1-1   Screen explanation

1.   Click a menu on the menu bar (**File**, **Edit**, etc.) to display the pull-down menu.

2.   Select an item to be executed from the displayed pull-down menu, and click it.

3.1.2   Operations using keyboard

1.   Press ⌊ Alt ⌋.

2.   Select a menu on the menu bar using the right and left cursor keys (←/→), and press ⌊Enter⌋ or the down cursor key (↓) to display the pull-down menu.

3.1.3   Operations using up and down cursor keys

1.   Select an item to be executed using the up and down cursor keys
(↑/↓) and press Enter .
An item can also be selected by pressing the underscored character
in that item on the menu bar and pull-down menus. Such a key is
referred to as "accelerator key." For example, the accelerator key for
the **Recall Parameter file** item is R , and for **Exit**, E . When
selecting an item on the menu bar, however, it is necessary to
activate the menu bar (an item is highlighted when the menu bar is
activated) by pressing Alt .

3.2   Operations for Dialog Box

3.2.1   File Open/Save as…

Select a drive or folder.

Moves to the previous level directory.

Creates a new folder.

Switches the display style for the current drive/folder contents.

Displays the current drive/folder contents.

Specify a file type to display the specific type files only.

Enter a file name.
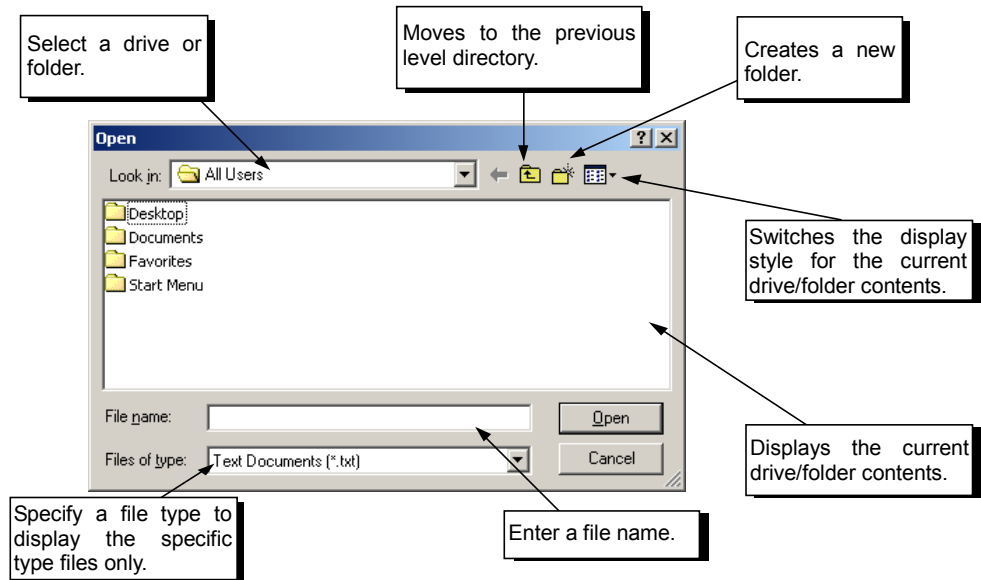
Figure 3.2.1-1   Dialog box

<Procedure>

1.   Select a drive or folder from the **Look in** box (for opening a file) or the **Save in** box (for saving a file).

For the mouse operation, click the **Look in** or **Save in** box to open the list of drives and folders. Select the target drive or folder from the list and click it to switch the display (the contents of the selected drive/folder are displayed).

For the keyboard operation, press ⌈Tab⌋ several times to highlight the **Look in** or **Save in** box, then press the up or down cursor key (↑/↓) to open the pull-down list of drives and folders. Use the cursor keys (↑/↓/←/→) to select the target drive or folder from the list and then press ⌈Enter⌋.

2.   Select a file type from the **Files of type** text box.

For the mouse operation, click the **Files of type** text box to open the list of file types. Select the target file type from the list and click it.

For the keyboard operation, press ⌈Tab⌋ several times to highlight the **Files of type** text box, then press the up or down cursor key (↑/↓) to open the pull-down list of file types. Use the cursor keys (↑/↓/←/→) to select the target file type from the list and then press ⌈Enter⌋.

3.   Enter into the **File name** box the name of a file to be opened or saved.

4.   When opening a file by the mouse operation, click the file to be opened from the displayed files. The name of the selected file is displayed in the **File name** text box. Click the **Open** button to open the selected file.
The contents of a folder can also be displayed in a similar manner. Click a folder and then click the **Open** button to open the contents of the selected folder.
When opening a file or folder by the keyboard operation, press ⎡Tab⎤ several times to move the cursor to the folder/file display field (highlighted when selected), and use the cursor keys (↑/↓/←/→) to select the file or folder to be opened. Then press ⎡Enter⎤ to open the selected file/folder.

5.   When saving a file with a specified name, highlight the **File name** text box by clicking it (mouse operation) or pressing ⎡Tab⎤ several times (keyboard operation).
Next, type the desired file name in the text box.
Then click the **Save** button (mouse operation) or press ⎡Enter⎤ (keyboard operation) to save the file with the specified name.

6.   The "Open" and "Save As" operations can be cancelled halfway. For the mouse operation, click the **Cancel** button. For the keyboard operation, press ⎡Tab⎤ several times to move the cursor to the **Cancel** button and press ⎡Enter⎤.

3.2.2   Entering numeric value and character string

1.   When entering a numeric value, click the desired numeric value entry text box using the mouse or move the cursor to the desired numeric value entry text box by pressing ⎡Tab⎤ several times. Enter a numeric value from the keyboard or numeric keypad. Then click the **OK** button using the mouse or press ⎡Enter⎤ to input (finalize) the entered value.

2.   When entering a character string, click the desired character string entry text box using the mouse or move the cursor to the desired character string entry text box by pressing ⎡Tab⎤ several times. Enter a character string from the keyboard. Then click the **OK** button using the mouse or press ⎡Enter⎤ to input (finalize) the entered character string.

3.   The numeric value/character string entry operation can be cancelled halfway. For the mouse operation, click the **Cancel** button. For the keyboard operation, move the cursor to the **Cancel** button by pressing ⎡Tab⎤ several times and press ⎡Enter⎤.

3.3 Using Touch Panel

Touch panel function comes exclusively for MG3710A/MG3740A.

Touch panel screen provides the same operation as a click of a mouse.

Button

Same operation as a click of a mouse

Numeric input

If numeric input box is touched while running on MG3710A/MG3740A, a numeric keypad will display.
Note that there is a numeric input text box without numeric keypad.

Touch the numeric text input box while running on MG3710A/MG3740A to display the numeric keypad.

Enter numeric value with the keypad.

Numeric keypad
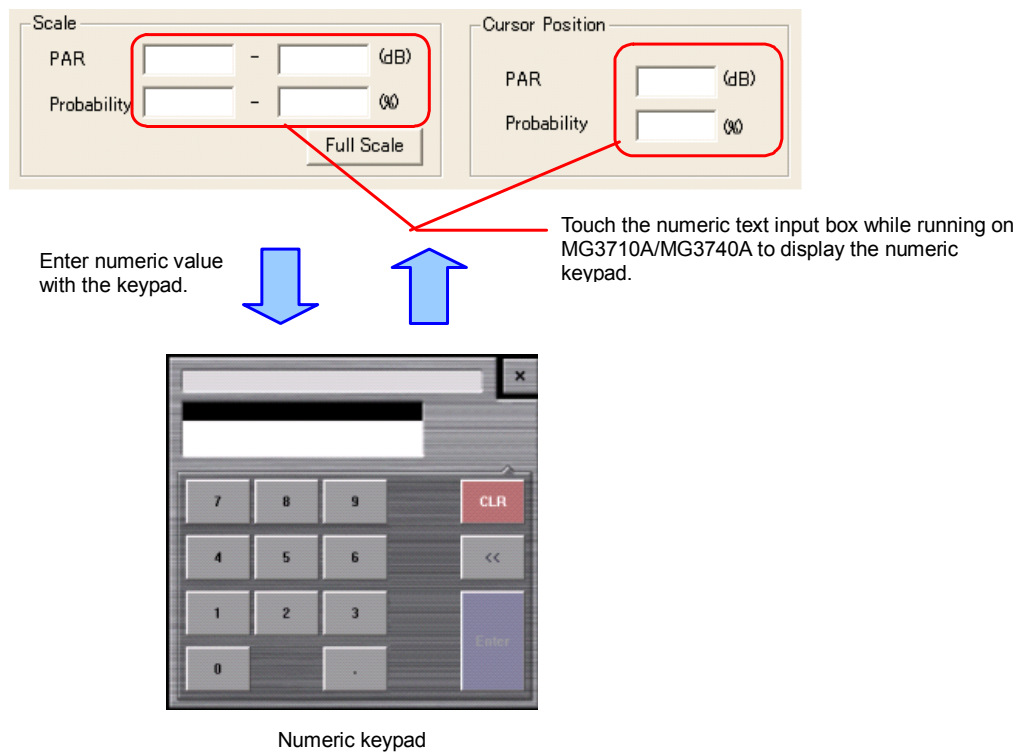
Figure 3.3-1   Numeric Input Using Touch Panel

Character input

If text input box is touched while running on MG3710A/MG3740A, a screen keyboard will display.

Note that there is a text input box without screen keyboard.

Once [Shift] and [Caps] is touched, it is locked and grayed out as: [Shift] [Caps]. Touching again will release the lock.

Move cursor   OK   Cancel   Backspace
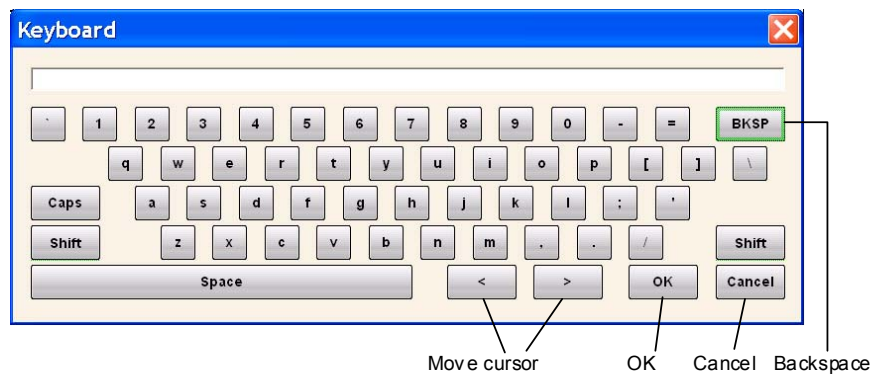
Chapter 4   Operations for Each Function

This chapter describes the items that the users should understand when actually operating the IQproducer™, including the names of parts in each screen, operations in the CCDF/FFT/time domain graph screens, file conversion settings in the Convert screen, and functions in the Transfer & Setting (data transfer) screens.

4.1 Starting/Exiting IQproducer^{TM}

4.1.1 Starting Software: When installed on PC

Start the IQproducer™ by following the procedures below.

\<Procedure>

1. Click the **Start** button on the Windows task bar, and select **Programs**. Then select **Anritsu Corporation** from the displayed program group and click **IQproducer**.
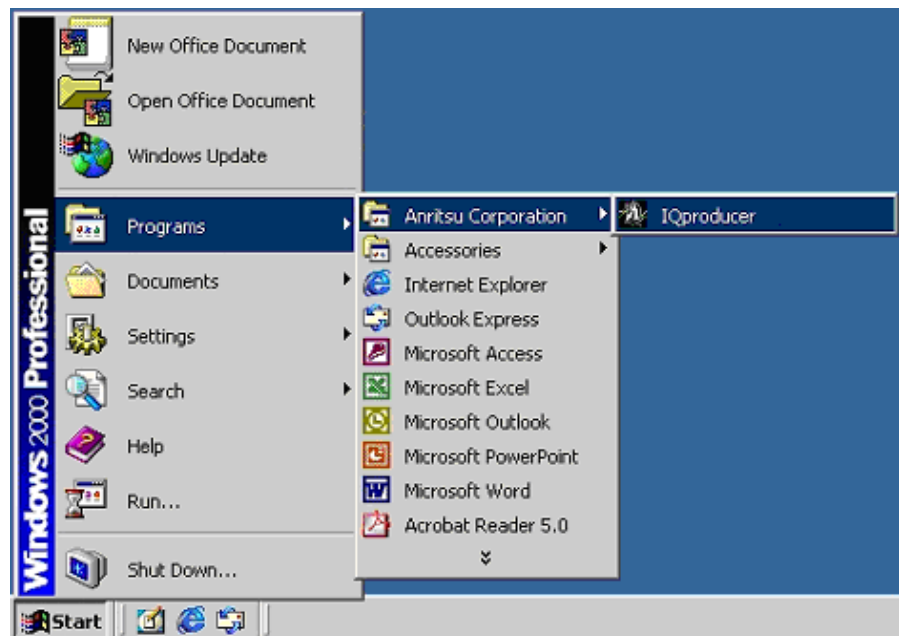
Figure 4.1.1-1   Program Selection Screen

2. When the IQproducer™ is started, the Select instrument window is displayed.

   From the Select instrument options, select the main unit model that will use the waveform patterns created by IQproducer™.

Notes:

- MG3740A requires the digital modulation option (020/120) to start IQproducer™.

- If you don't want to see the Select instrument window again, select the **Don't show this window next time** check box, and IQproducer™ will start for the selected model from the next startup without displaying the Select instrument window.

3. The common platform screen is displayed after starting up the IQproducer™.

 The common platform screen is a screen used to select each function of the IQproducer™.
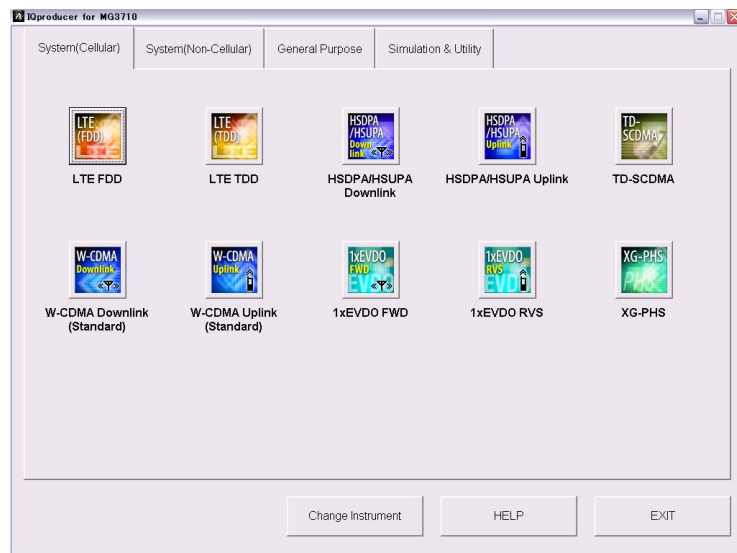
Figure 4.1.1-2 Common Platform Screen

4.1.2 Starting Software: When installed on MS2690A/MS2691A/MS2692A, MS2830A or MS2840A

Start the IQproducer™ by following the procedures below.

<Procedure>

1. Click **Start**, and point to **All Programs**. Point to **Anritsu Corporation** from the program group and click **IQproducer**.

Figure 4.1.2-1   Program Selection Screen

2. The further procedure is as same as that of 4.1.1 "Starting Software: When installed on PC".

4.1.3 Starting Software: When installed on MG3710A/MG3740A

Start the IQproducer™ by following the procedures below.

<Procedure>

1. Press [IQpro] on the MG3710A/MG3740A front panel.

Note:

> IQproducer™ starts only when the digital modulation option (020/120) is installed to MG3740A.

2. The common platform screen is displayed after starting up the IQproducer™.
   The common platform screen is a screen used to select each function of the IQproducer™.
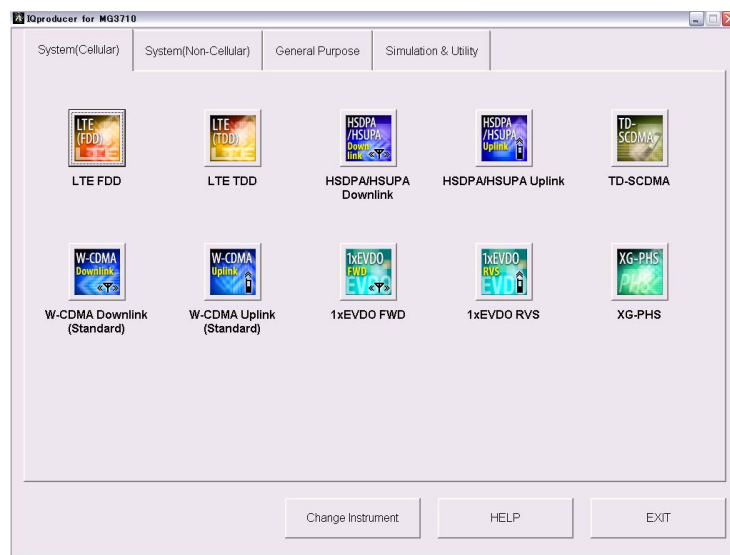

Figure 4.1.3-1 Common Platform Screen

4.1.4   Exiting Software

To exit IQproducer™ that are running, select **Exit** on the Common Platform Screen. In this case, a dialog is displayed to confirm stopping of each running tool.
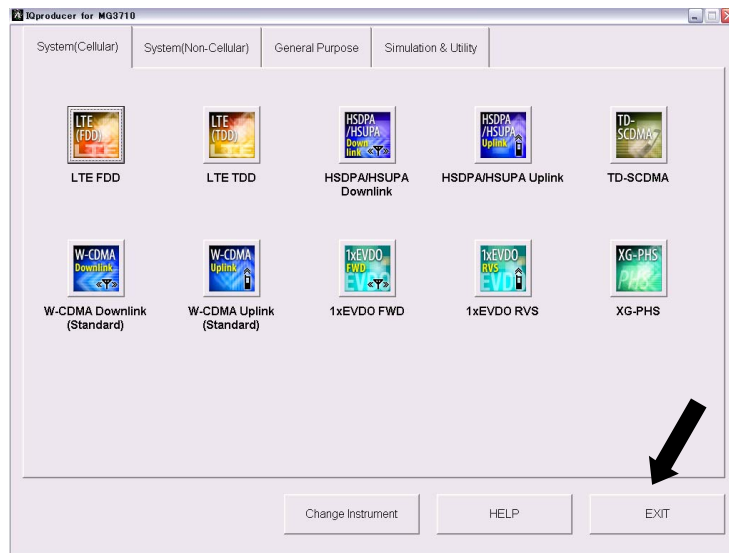

Figure 4.1.4-1   Exiting IQproducer™

4.2   Common Platform Screen

The common platform screen shown in Figure 4.2-1 below is displayed first after starting up the IQproducer™.

The common platform screen is a screen used to select each function of the IQproducer™. Only the menu bar for selecting a function is displayed in this screen.
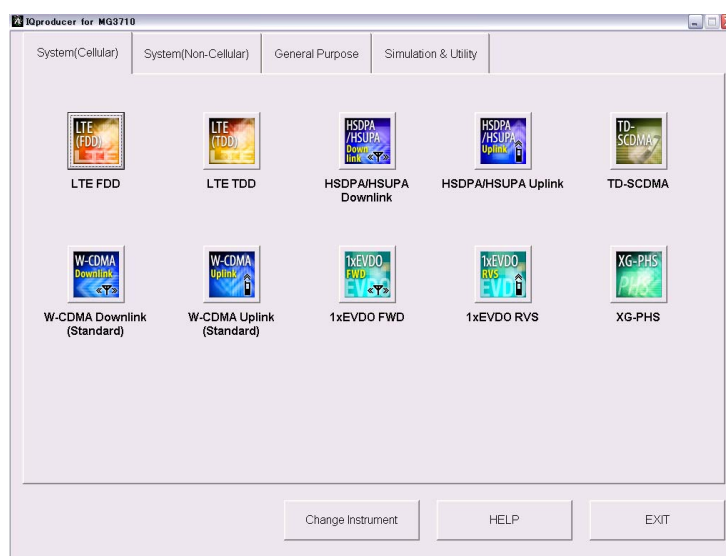
Figure 4.2.1 Common Platform Screen

■Description of items

(1)   System (Cellular) tab

Cellular system applications are displayed on the tabbed page. For detailed information about the signal generation applications, refer to the operation manual for each application.

The System(Cellular) tab does not appear when **MG3740A** is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

(2)   System (Non-Cellular) tab

Non-cellular system applications are displayed on the tabbed page. For detailed information about the signal generation applications, refer to the operation manual for each application.

The System(Non-Cellular) tab does not appear when **MG3740A** is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

(3) General Purpose tab
General purpose applications are displayed on the tabbed page. For detailed information about the signal generation applications, refer to the operation manual for each application.
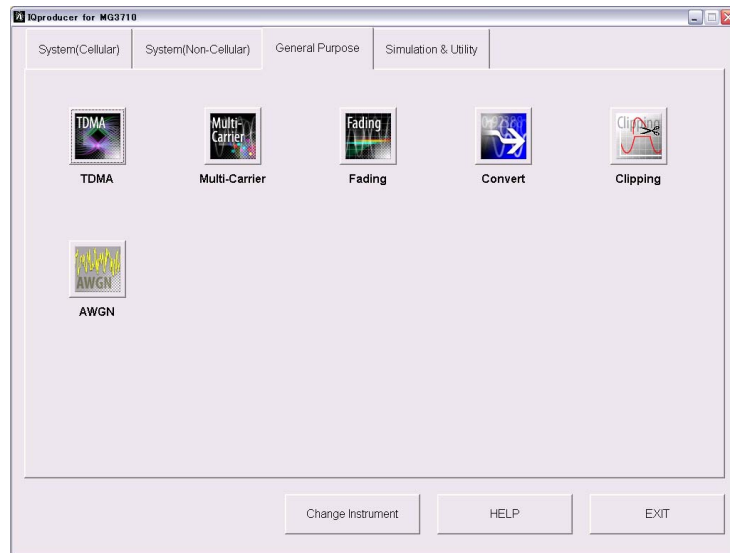
Figure 4.2-2 General Purpose Tab

1 TDMA

TDMA applications are displayed.
Waveform patterns corresponding to TDMA system specifications are created in this application.

2 Multi-Carrier

Multi-Carrier applications are displayed.
Modulated waveform patterns corresponding to Multi-Carrier system specifications are created in this application.

This is not displayed when **MG3740A** is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

3 Fading

Fading applications are displayed.
The fading operation is applied onto input waveforms to output the results.

4 Convert

The Convert screen is displayed.
In the Convert screen, ASCII-format waveform patterns generated by simulation software, digitized files created by the MS2690A/MS2691A/MS2692A, MS2830A or MS2840A using the digitize function, and waveform patterns formatted for the

MS269x, MS2830A or MS2840A can be converted into a file so as to be used in the mainframe. Conversely, a waveform pattern for the MG3700A/MG3710A/MG3740A can also be converted into a file that can be used in the MS2690A/MS2691A/MS2692A, MS2830A or MS2840A.

5   AWGN

The AWGN generation screen is displayed.
AWGN can be generated by setting the bandwidth and other parameters on the AWGN generation screen.

This is not displayed when **MG3740A** is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

6   Clipping

The Clipping setting screen is displayed.
Clipping processing can be performed in the Clipping setting screen, for a waveform pattern generated by each signal generation application.

(4) Simulation & Utility tab
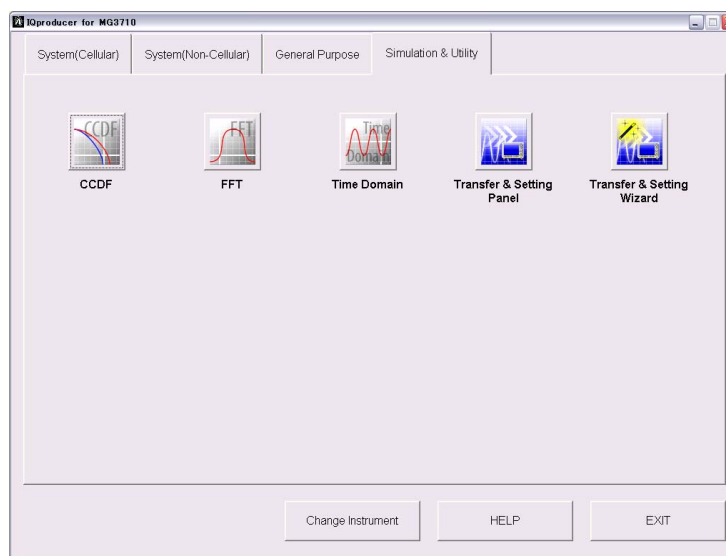Application menus of simulations and utilities are displayed on this tabbed page.

Figure 4.2-3   Simulation & Utility Tab

1   CCDF

The CCDF Graph Monitor screen is displayed.
The CCDF of a generated waveform pattern is displayed in a graph.

2   FFT

The FFT Graph Monitor screen is displayed.
The spectrum where FFT processing is performed for a
generated waveform pattern is displayed in a graph.

3   Time Domain

The time domain graph display screen is displayed.
The time domain waveform of a created waveform pattern can
be displayed in a graph.

4   Transfer & Setting Panel

The Transfer & Setting Panel screen is displayed.
File transfer between the mainframe and the PC connected via
Ethernet can be performed in this screen. This screen is used
when installing key files or transferring waveform patterns.

5   Transfer & Setting Wizard

The Transfer & Setting Wizard screen is displayed.
Connection between a PC and the mainframe, transfer of
waveform patterns to the mainframe, and loading of waveform
patterns to an arbitrary waveform memory of the mainframe
can be performed on this screen.

(5)   Change Instrument button

Provided to display the Select instrument window at the next
startup. A message is displayed indicating that the IQproducer™
must be restarted to change the target model.

(6)   HELP button

The version information of the IQproducer™ is displayed.

(7)   Exit button

Exits from this software. This menu also closes all the other screens
for IQproducer™ functions if displayed.

4.3 CCDF Graph Display

The Complementary Cumulative Distribution Function (CCDF) of a waveform pattern generated by a signal generation application can be displayed.

In a CCDF graph, the signal peak power / average power is displayed on the X axis, and on the Y axis, the cumulative probability that the peak power / average power of the signal is equal to or less than the value on the X axis is displayed. Distribution of peak powers of various modulation signals can be displayed in a screen. This screen is useful, for example, for estimating the output waveform distortion characteristics when a generated signal is input from the MG3700A/MG3710A/MG3740A to a power amplifier or other devices.

4.3.1 Activation

Select **CCDF** from the **Simulation & Utility** tab on the common platform screen.
The CCDF graph display screen is displayed separately.

4.3.2 CCDF graph display screen
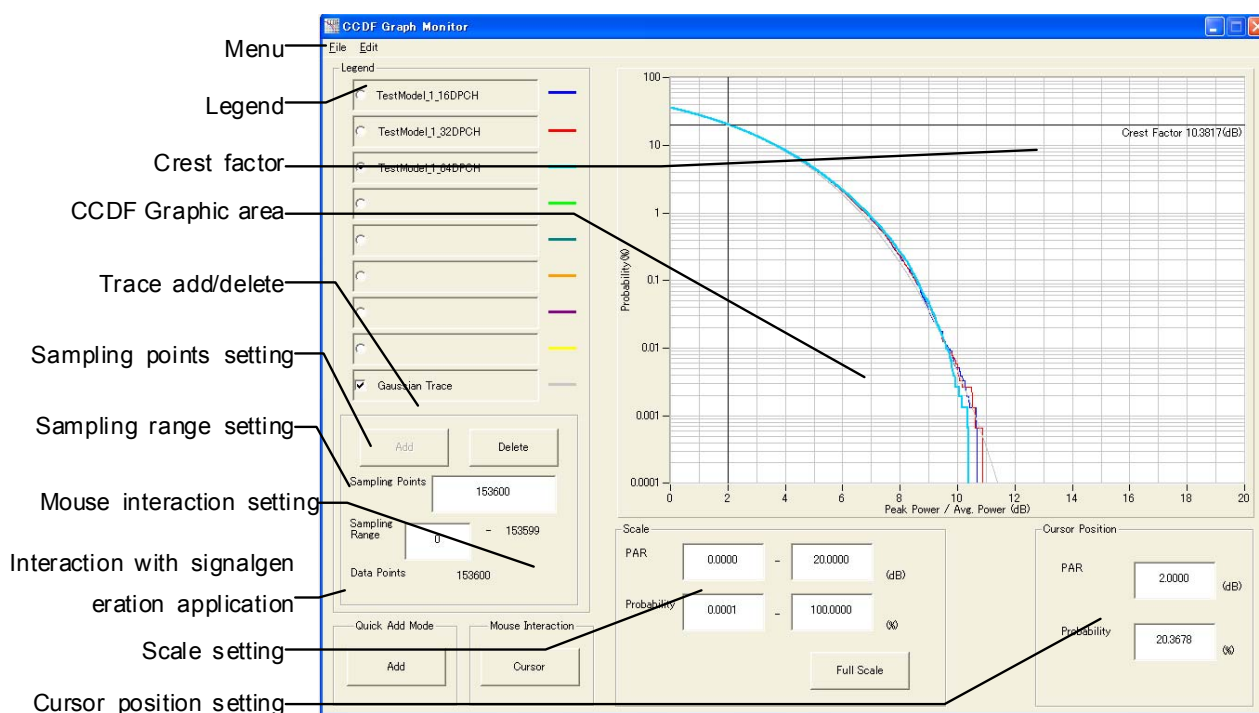

Figure 4.3.2-1   CCDF Graph Display Screen

■Description of items

(1)   Menu bar

Trace addition, graph print out, screen copy, graph data saving into a CSV format file, and CCDF graph display close can be executed.

(2)   Legend

File name display for an added trace, selection of a displayed trace, and selection of a trace to be added/deleted can be executed.

(3)   CCDF graph display area

The graphic display area for CCDF Graph cursor move and graph zoom-in display can be executed.

(4)   Crest Factor

The ratio between the peak value and RMS value of the selected trace is displayed.

(5)   Add/Delete (trace addition/deletion)

A trace can be added/deleted.

(6)   Sampling Points

The number of samples calculated by reading the selected trace is displayed. Different sampling points can be set by changing the value in this text box.

(7)   Sampling information display

The sampling range for the selected trace is displayed. A different sampling range can be set by changing the value in this text box.

(8)   Cursor Position

The current graph cursor position is displayed. The graph cursor position in the CCDF graph display area can be specified by entering a value in either PAR or Probability text box.

(9)   Quick Add Mode (interaction with signal generation application)

Settings for addition of a waveform pattern generated by a signal generation application to the CCDF graph display in conjunction with the signal generation application can be configured.

(10) Scale setting

The scale of the X and Y axes in the CCDF graph display area can be changed.

(11) Mouse Interaction

The mouse operation in the CCDF graph display area can be set to either the graph cursor move function or the zoom-in function.

4.3.3   CCDF graph display

A waveform pattern generated by a signal generation application of the IQproducer™ can be read and displayed in a CCDF graph.

■CCDF graph display procedure
<Procedure>
1. Click one of the option buttons in the **Legend** dialog box to select the trace color of the wave form pattern in the CCDF graphical area.
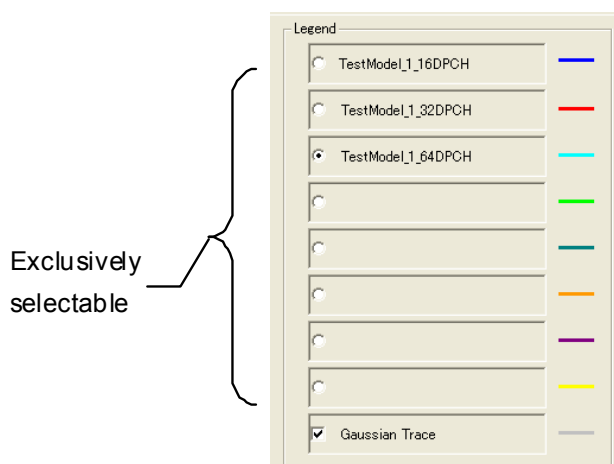

Figure 4.3.3-1   Legend Dialog Box

2. Click the **Add** button to display the Add Trace dialog box.

The **Add** button is disabled when any waveform pattern is already specified on the selected option button. In such case, delete the waveform pattern by clicking the **Delete** button, or select one of other option button.

Figure 4.3.3-2   Add Button

Otherwise, select **Add Trace** from the **File** menu.
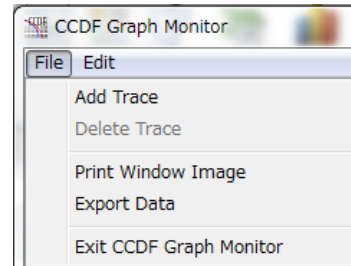
Figure 4.3.3-3   Add Trace Button on the File Menu

3.   Click the ⊡ button in the Add Trace screen, and select a waveform pattern for which a CCDF graph is displayed. Enter the Sampling Points and Sampling Range for the waveform to be shown on the CCDF graphic area. If the target area includes the RF Gate OFF area (RF output is set to off) at this time, the RF Gate OFF interval can be excluded from the CCDF graph display target by selecting the Exclude RF Output Off Sample check box.
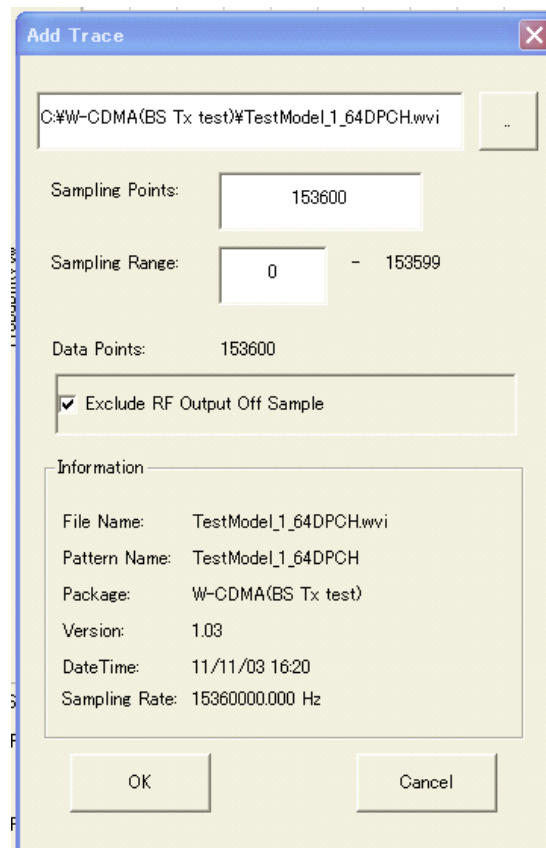
Figure 4.3.3-4   Add Trace Dialog Box

4. Click the **OK** button on the Add Trace screen to read the waveform pattern.
A graph calculation progress screen as shown below is displayed while reading the waveform pattern.
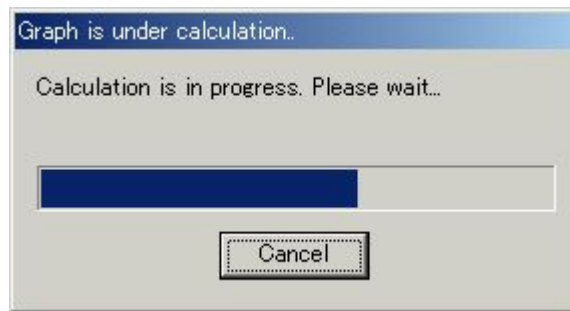
Figure 4.3.3-5   Graph Calculation Progress Screen

If the **Cancel** button is clicked during the graph calculation, the calculation is interrupted and waveform pattern reading is stopped. After the completion of the reading and calculations of the waveforms, the Graph calculation progress screen will be closed to display the CCDF graphic window. The trace in the selected color in the Legend dialog box will be indicated on the CCDF graphic window.

4.3.4 Deleting CCDF graph

The CCDF graph displayed in the screen can be deleted.

■CCDF graph display deleting procedure

<Procedure>

1. Click the option button in the **Legend** dialog box to select the trace to be deleted.

Figure 4.3.4-1 Legend Dialog Box

2. Click the **Delete** button.

Figure 4.3.4-2 Delete Button
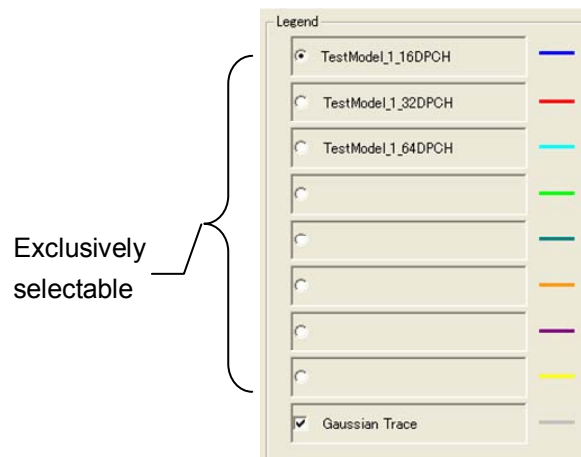
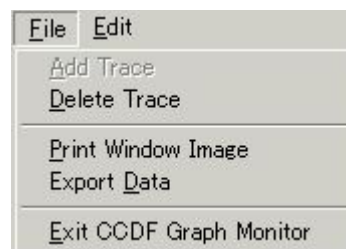Otherwise, select **Delete Trace** from the **File** menu.

Figure 4.3.4-3 Delete Trace Button on the File Menu

The trace selected in **Legend** is deleted. After deleting a trace, another waveform pattern can be selected for that item.

4.3.5   Displaying Gaussian trace

A Gaussian distribution trace can be displayed in the graph when the Gaussian Trace check box is checked. This is useful when comparing the Peak Power / Average Power distribution of the waveform pattern used with the Gaussian distribution.

Click to select the Gaussian Trace
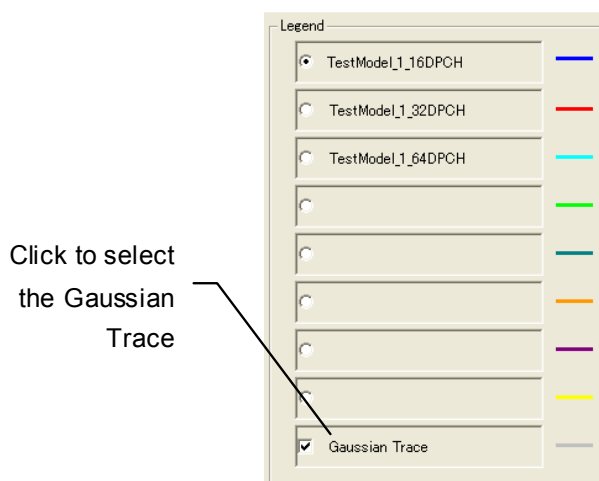
Figure 4.3.5-1   Gaussian Trace Check Box

4.3.6   Interaction with signal generation application (Quick Add Mode)

The method for adding a trace to the CCDF graph in conjunction with a signal generation application can be set and changed. This function is enabled only when the CCDF graph display function is activated. Click the **Quick Add Mode** button to display the Quick Add Mode dialog box.

Figure 4.3.6-1   Quick Add Mode Dialog Box

■When Add is selected:

A trace is added to the CCDF graph when **CCDF** is selected from the **Simulation** menu or the CCDF tool button is clicked after data generation by the signal generation application. Note that the FFT graph display will not be updated when the eight traces are all used.

■When Clear is selected:

A trace is deleted from the CCDF graph and the distribution of the generated waveform pattern is displayed when **CCDF** is selected from the **Simulation** menu or the CCDF tool button is clicked after data generation by the signal generation application.

■When Off is selected:

The CCDF graph display will not be updated even when CCDF is selected from the Simulation menu or the CCDF tool button is clicked after data generation by the signal generation application.

4.3.7   Mouse interaction selection in the CCDF graph display area (Mouse Interaction)

Graph cursor move or graph zoom-in is selected for a mouse dragging operation in the CCDF graph display area. Click the **Mouse Interaction** button to display the **Mouse Interaction** dialog box.

Cursor   The mouse is used to move the cursor.

Zoom   The mouse is used to set the zooming area.

Figure 4.3.7-1   Mouse Interaction Dialog Box

4.3.8   Moving graph cursor

The graph cursor displayed in the CCDF graph display area can be moved.

■Moving graph cursor using mouse

When the **Cursor** radio button is selected in **Mouse Interaction**, the black-line graph cursor is moved by dragging the mouse on the graph cursor in the CCDF graph display area.
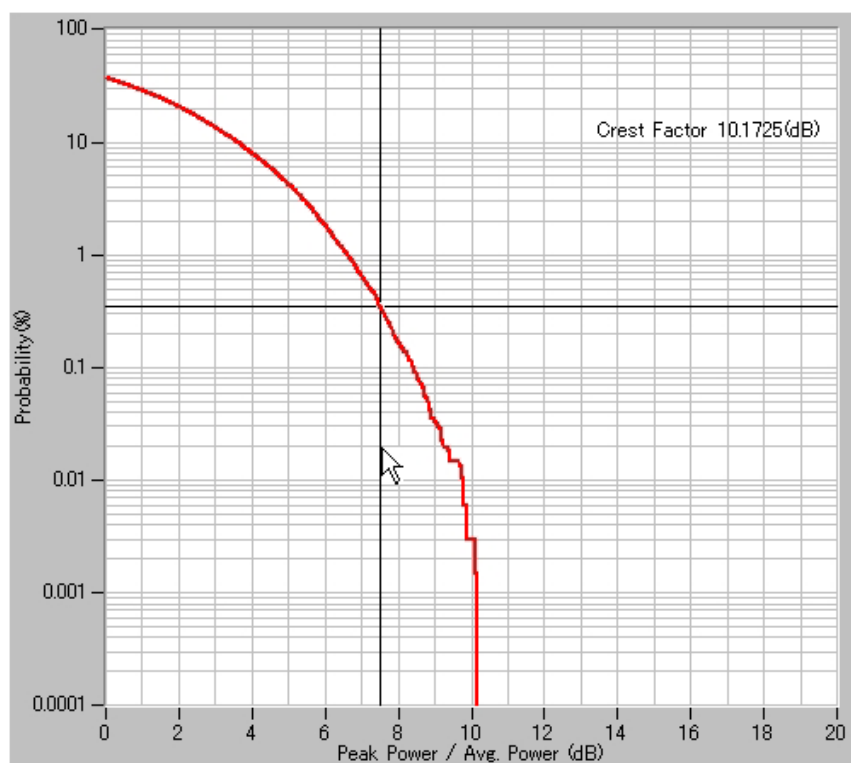
Figure 4.3.8-1   CCDF Graph Display Area

The contents displayed in **Cursor Position** in the CCDF graph display screen are updated as the graph cursor is moved.

■Moving graph cursor changing Cursor value

The black-line graph cursor is moved by changing the value of **Cursor Position** in the CCDF graph display screen.
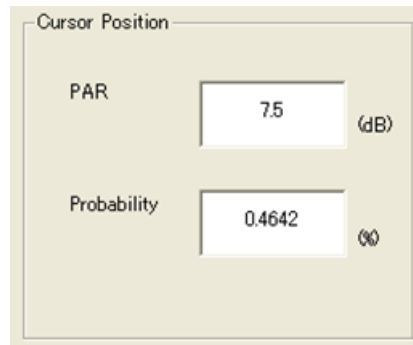
Figure 4.3.8-2   Cursor Position Dialog Box

<Procedure>

1.   When setting the graph cursor position by a Peak Power / Average Power value, click the **PAR** text box and enter a value.

2.   When setting the graph cursor position by a cumulative possibility, click the **Probability** text box and enter a value.

When the focus is moved to another control after changing the value in the PAR or Probability text box as shown in Step 1 or 2 above, the black-line graph cursor in the CCDF graph display area is moved.

4.3.9 Changing graph scale

The scale of the graph currently displayed can be changed.

■Changing graph display area scale

The display ranges for the X and Y axes in the CCDF graph display area are updated by changing the value(s) in the **Scale** field on the CCDF graph display screen.
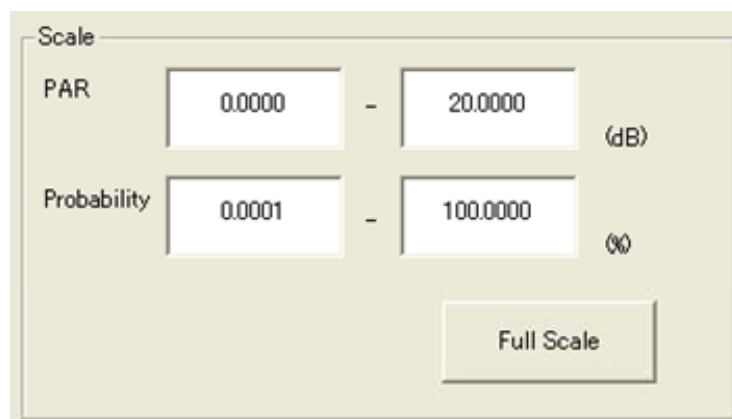
Figure 4.3.9-1   Scale Dialog Box

<Procedure>

1.   When changing the display range for the X axis, click the **PAR** text box and enter a value.

2.   When changing the display range for the Y axis, click the **Probability** text box and enter a value.

3.   When the **Full Scale** button is clicked, the scales for both axes are adjusted so that the entire CCDF curve is displayed.

When the focus is moved to another control after changing the value in the PAR text box as shown in Step 1 above, the scale for the X axis in the CCDF graph display area is updated.

Similarly, when the focus is moved after changing the value in the Probability text box as shown in Step 2 above, the scale for the Y axis in the CCDF graph display area is updated.
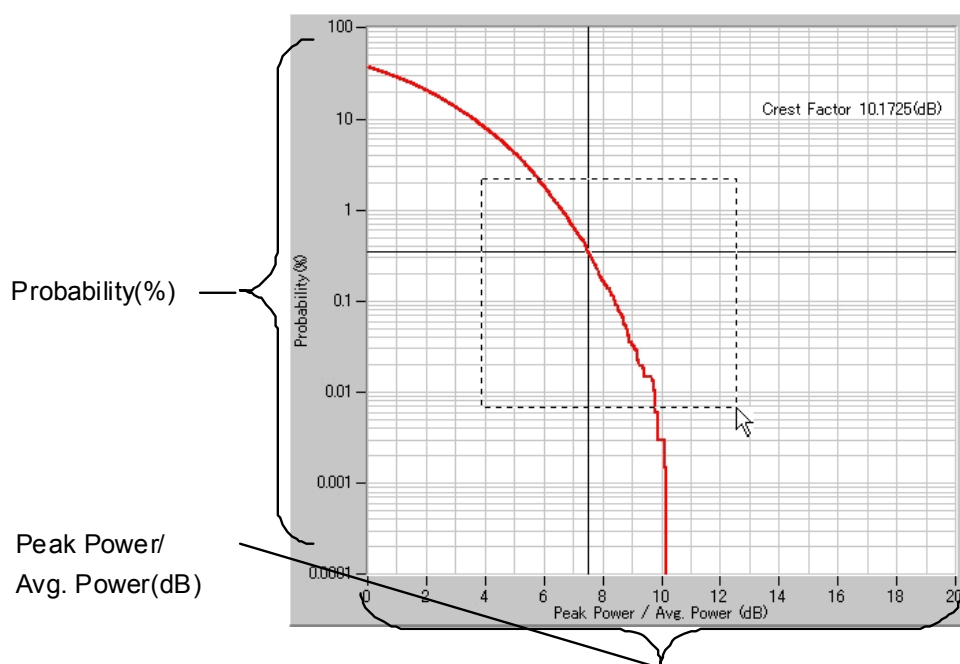
Figure 4.3.9-2 CCDF Graph Display Area

■Specifying display area by mouse operation
When **Zoom** is selected for **Mouse Interaction**, pointing and dragging an area in the graph enlarges the selected area (within the dotted rectangle).

4.3.10 Printing/saving graph data

■Printing out graph display screen

Select **Print Window Image** from the **File** menu to display the print screen.

Set the printer, printing range, number of copies, etc., in this screen, and print out the CCDF screen (entire of the window) from the printer.
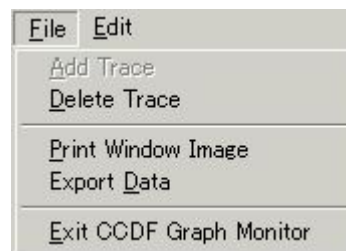
Figure 4.3.10-1   Print Window Image Button on the File Menu

■Outputting graph data to file

Select **Export Data** from the **File** menu to display the file save screen.

Set the saving destination, etc., in this screen, and click the **Save** button.

Lists of Peak per Average (dB) and Probability (%) are saved to a file in the CSV format (a text file format in which values are delimited by a comma).
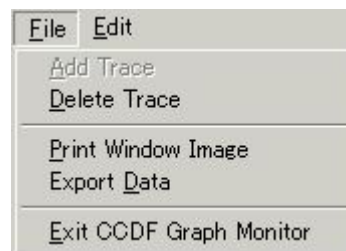
Figure 4.3.10-2   Export Data Button on the File Menu

■Copying graph image on screen

Select **Copy Graph Image** from the **Edit** menu to copy the current graph image on the screen to the clipboard.
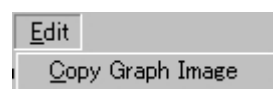
Figure 4.3.10-3   Copy Graph Image Button on the Edit Menu

4.4 FFT Graph Display

The Fast Fourier Transform (FFT) calculation results for a waveform pattern can be displayed in a graph. The Blackman-Harris window function is used.

4.4.1 Activation

Select **FFT** from the **Simulation & Utility** tab on the common platform screen.
The FFT graph display screen is displayed separately.

4.4.2 FFT graph display screen
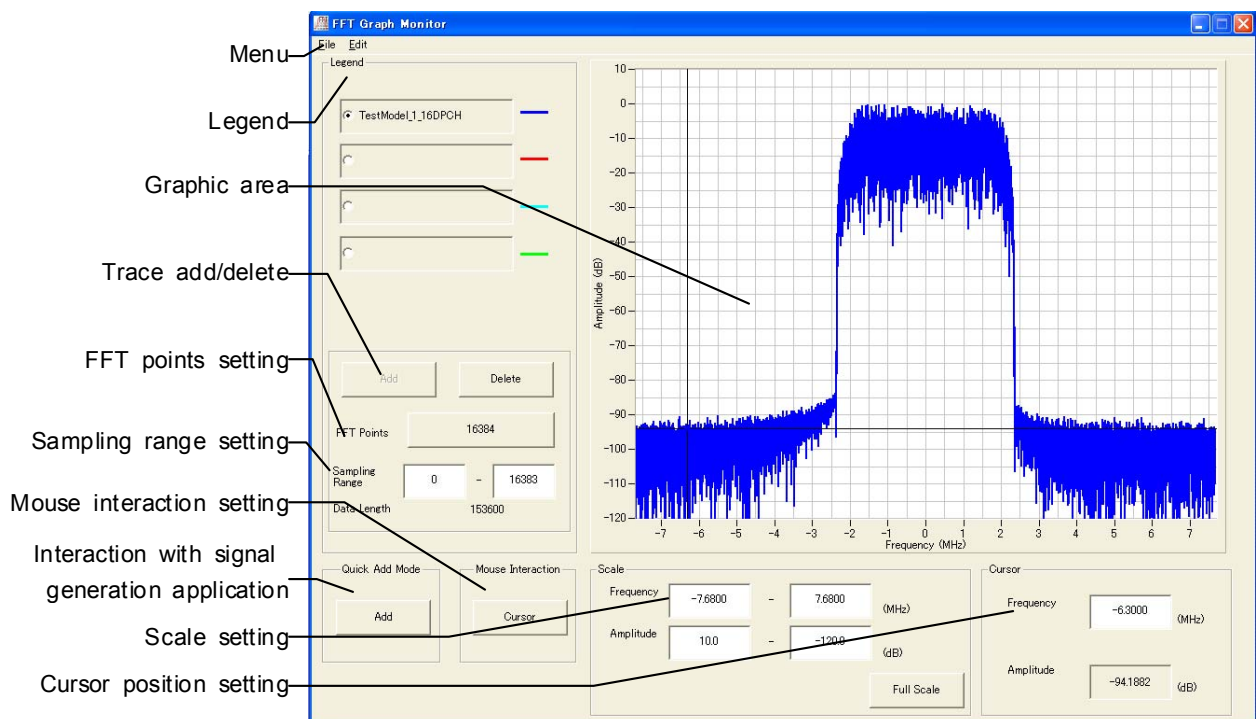
Figure 4.4.2-1   FFT Graph Display Screen

■Description of items

(1)   Menu bar

Trace addition, graph print out, screen copy, graph data saving into a CSV format file, and FFT graph display close can be executed.

(2)   Legend

File name display for an added trace, selection of a displayed trace, and selection of a trace to be added/deleted can be executed.

(3) Graph display area

The graphic display area for FFT Graph cursor move and graph zoom-in display can be executed.

(4) Add/Delete (trace addition/deletion)

A trace can be added/deleted.

(5) FFT Points

The number of points of the X axis in the FFT graph display area can be specified.

(6) Cursor Position

The graph cursor position in the FFT graph display area can be specified by entering a value in the Frequency text box.

(7) Quick Add Mode (interaction with signal generation application)

Settings for addition of a waveform pattern generated by a signal generation application to the FFT graph display in conjunction with the signal generation application can be configured.

(8) Scale setting

The scale of the X and Y axes in the FFT graph display area can be changed.

(9) Mouse Interaction

The mouse operation in the FFT graph display area can be set to either the graph cursor move function or the zoom-in function.

4.4.3   FFT graph display

A waveform pattern generated by a signal generation application of the IQproducer™ can be read and displayed in an FFT graph.

■FFT graph display procedure
<Procedure>

1. Click one of the option buttons in the **Legend** dialog box to select the trace color of the wave form pattern in the FFT graphical area.

Figure 4.4.3-1   Legend Dialog Box

2. Click the **FFT Points** button to display the **FFT Points** dialog box. Then, Select the number of points for FFT operation. Be sure to select a value smaller than the number of sample points of the selected waveform pattern.
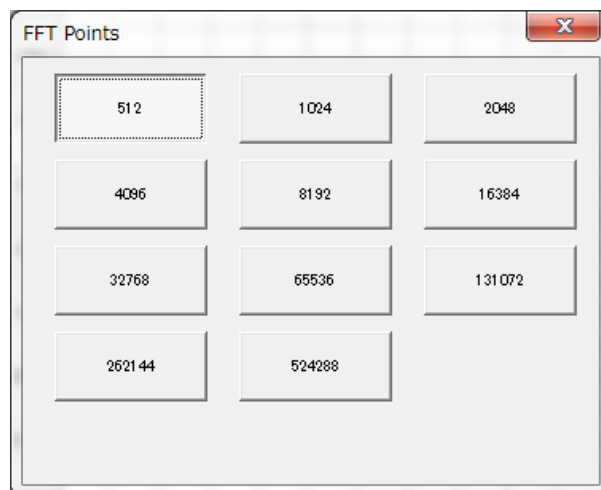
Figure 4.4.3-2   FFT Points Dialog Box

3.   Click the **Add** button to display the Add Trace dialog box.

The **Add** button is disabled when any waveform pattern is already specified on the selected option button. In such a case, delete the waveform pattern by clicking the Delete button, or select one of other option buttons.

Figure 4.4.3-3   Add Button

Otherwise, select **Add Trace** from the **File** menu.
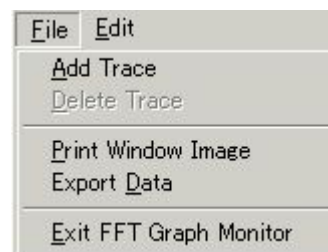
Figure 4.4.3-4   Add Trace Button on the File Menu

4.   Click the ⎡ ⋅ ⎤ button in the Add Trace screen, and select a waveform pattern for which a FFT graph is displayed.
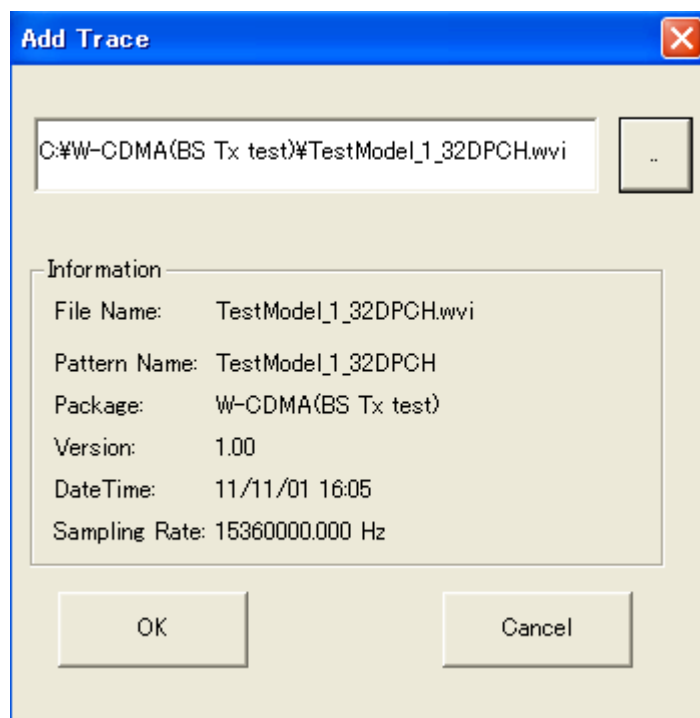
Figure 4.4.3-5   Add Trace Dialog Box

5. Click the **OK** button on the Add Trace screen to read the waveform pattern.
    When the graph calculation has completed, the FFT graph display screen is displayed again with a trace in the color selected in Legend. If a waveform pattern having a different sampling rate with that of the currently displayed waveform pattern is added, the current waveform pattern display disappears.

4.4.4   Deleting FFT graph

The FFT graph displayed in the screen can be deleted.

■Deleting FFT graph

<Procedure>

1. Click the option button in the **Legend** dialog box to select the trace to be deleted.
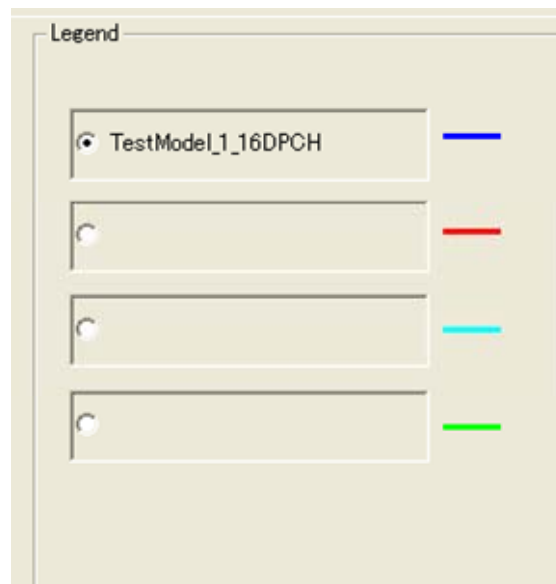
Figure 4.4.4-1   Legend Dialog Box

2. Click the **Delete** button.

Figure 4.4.4-2   Delete Button

Otherwise, select **Delete Trace** from the **File** menu.
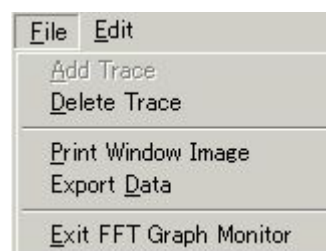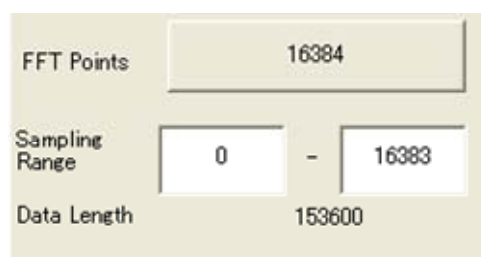
Figure 4.4.4-3   Delete Trace Button on the File Menu

The trace selected in **Legend** is deleted. After deleting a trace, another waveform pattern can be selected for that item.

4.4.5   Changing graph display area and axis plot interval

The plot interval of the X axis (frequency) on the FFT graph and the data range for FFT analysis can be changed.
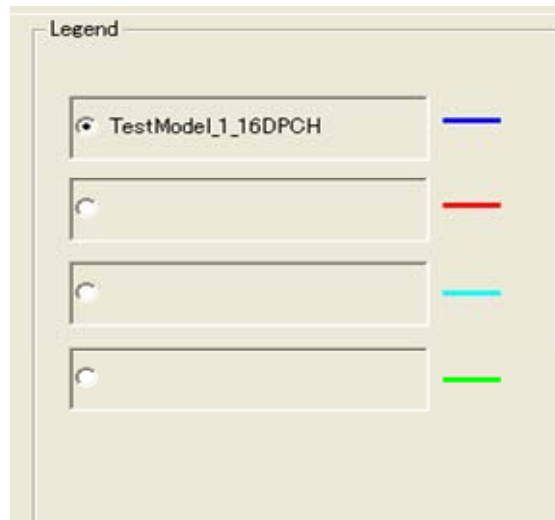

Figure 4.4.5-1   Parameter Entry Dialog Box

<Procedure>

1. Click the **FFT Points** button to display the **FFT Points** dialog box. Then, select the number of points for the FFT operation.
    When the focus is moved to another control after selecting the FFT Points value, the plot interval of the X axis in the graph display area is changed.

2. Click the **Sampling Range** text box and enter the Sampling Range value.
    When the focus is moved to another control after changing the Sampling Range value, the data range of the waveform pattern for FFT analysis is changed.

When the FFT Points value is changed, the new FFT Points value is applied to all the waveform patterns currently read. If the Sampling Range value has been set before changing the FFT Points value, it is cleared to "0" – "FFT Points – 1" after FFT Points value change.

4.4.6   Interaction with signal generation application (Quick Add Mode)

The method for updating the FFT graph display in conjunction with waveform pattern generation by a signal generation application can be set and changed. This function is enabled only when the FFT graph display function is activated. Click the **Quick Add Mode** button to display the **Quick Add Mode** dialog box.
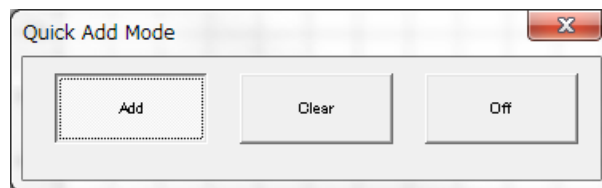
Figure 4.4.6-1   Quick Add Mode Dialog Box

■When Add is selected:

A trace is added to the FFT graph when **FFT** is selected from the **Simulation** menu or the FFT tool button is clicked after data generation by the signal generation application. Note that the FFT graph display will not be updated when the four traces are all used.

■When Clear is selected:

A trace is deleted from the FFT graph and the FFT analysis result of the generated data is displayed when **FFT** is selected from the **Simulation** menu or the FFT tool button is clicked after data generation by the signal generation application.

■When Off is selected:

The time domain graph display will not be updated even when Time Domain is selected from the Simulation menu or the Time Domain tool button is clicked after data generation by the signal generation application.

4.4.7   Mouse interaction selection in the CCDF graph display area (Mouse Interaction)

Graph cursor move or graph zoom-in is selected for a mouse dragging operation in the FFT graph display area. Click the **Mouse Interaction** button to display the **Mouse Interaction** dialog box.

Cursor   The mouse is used to move the cursor.

Zoom   The mouse is used to set the zooming area.
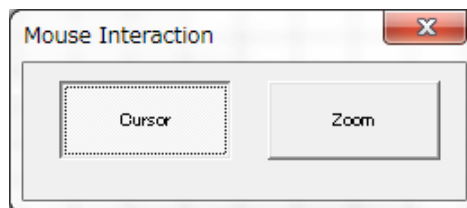
Figure 4.4.7-1   Mouse Interaction Dialog Box

4.4.8 Moving graph cursor

The graph cursor displayed in the FFT graph display area can be moved.

■Moving graph cursor using mouse

When the Cursor radio button is selected in Mouse Interaction, the black-line graph cursor is moved by dragging the mouse on the graph cursor in the FFT graph display area.
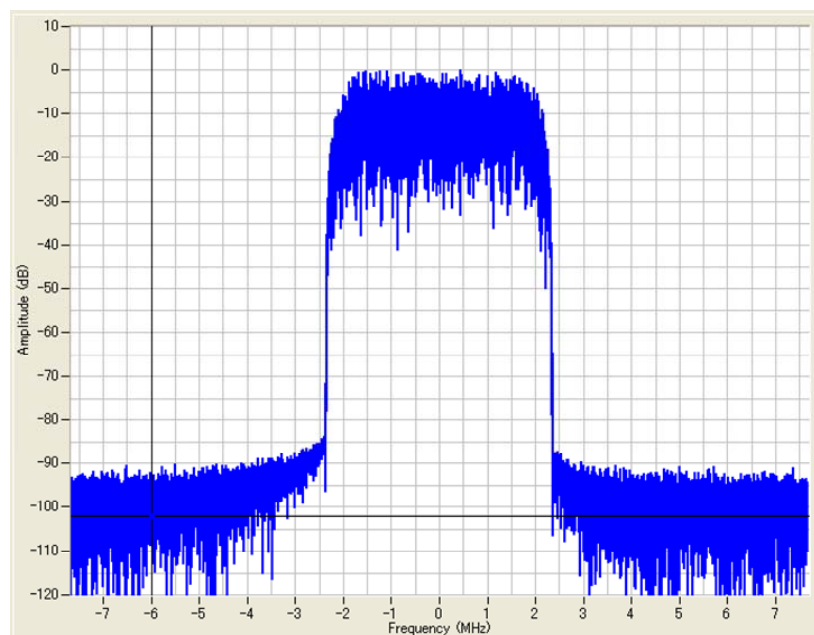
Figure 4.4.8-1   FFT Graph Display Area

The contents displayed in **Cursor** in the FFT graph display screen are updated as the graph cursor is moved.

■Moving graph cursor changing Cursor value

The black-line graph cursor is moved by changing the value of **Cursor** in the FFT graph display screen.

Figure 4.4.8-2   Cursor Dialog Box

Click the **Frequency** text box and enter the Frequency value.

When the focus is moved to another control after changing the Frequency value, the black-line graph cursor in the FFT graph display area is moved.

4.4.9   Changing graph scale

The scale of the graph currently displayed can be changed.

■Changing graph display area scale
The scales for the X and Y axes in the FFT graph display area are updated by changing the value(s) in the **Scale** field on the FFT graph display screen.
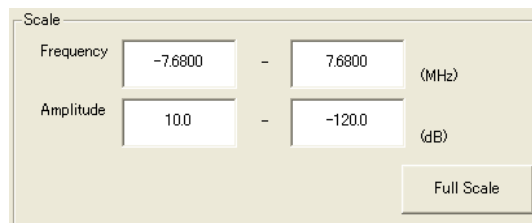
Figure 4.4.9-1   Scale Dialog Box

<Procedure>
1.   Click the **Frequency** text box and enter the Frequency value from the keyboard.
2.   Click the **Amplitude** text box and enter the Amplitude value.
3.   When the **Full Scale** button is clicked, the scales for both axes are adjusted so that the entire FFT graph is displayed.

When the focus is moved to another control after changing the value in the PAR text box as shown in Step 1 above, the scale for the X axis in the CCDF graph display area is updated.

Similarly, when the focus is moved after changing the value in the Probability text box as shown in Step 2 above, the scale for the Y axis in the CCDF graph display area is updated.
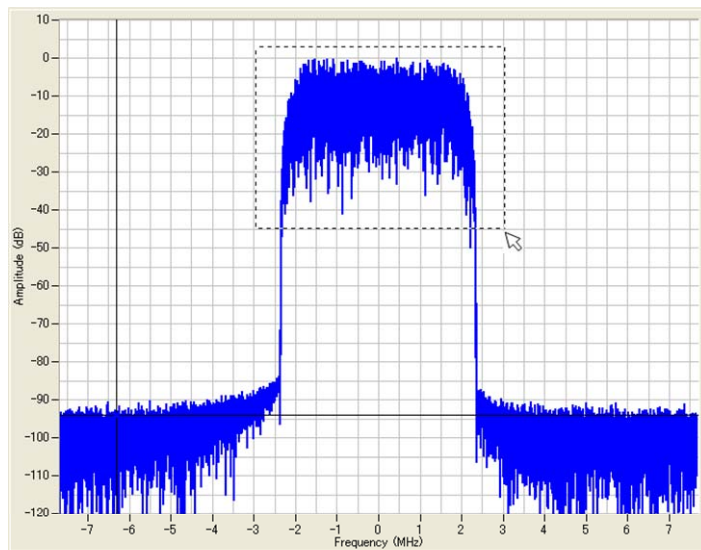
Figure 4.4.9-2   FFT Graph Display Area

■Specifying display area by mouse operation

When **Zoom** is selected for **Mouse Interaction**, pointing and dragging an area in the graph enlarges the selected area (within the dotted rectangle).

4.4.10 Printing/saving graph data

■Printing out graph display screen

Select **Print Window Image** from the **File** menu to display the print screen.

Set the printer, printing range, number of copies, etc., in this screen, and print out the FFT screen (entire of the window) from the printer.
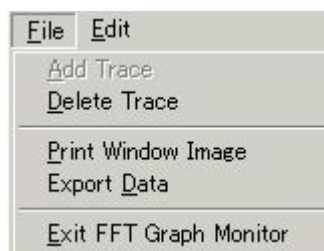
Figure 4.4.10-1   Print Window Image Button on the File Menu

■Outputting graph data to file

Select **Export Data** from the **File** menu to display the file save screen.
Set the saving destination, etc., in this screen, and click the **Save** button.
Lists of Peak per Average (dB) and Probability (%) are saved to a file in the CSV format (a text file format in which values are delimited by a comma).
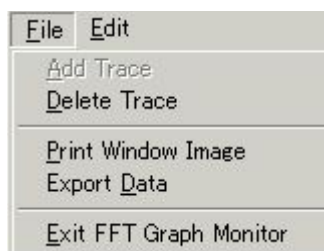
Figure 4.4.10-2   Export Data Button on the File Menu

■Copying graph image on screen

Select **Copy Graph Image** from the **Edit** menu to copy the current graph image on the screen to the clipboard.

Figure 4.4.10-3   Copy Graph Image Button on the Edit Menu

4.5 File Conversion on Convert Screen

ASCII-format waveform patterns generated by simulator software, digitized files created by the MS2690A/MS2691A/MS2692A, MS2830A or MS2840A Signal Analyzer using the digitize function, and waveform patterns formatted for the MS269x, MS2830A or MS2840A can be converted into a file so as to be used in the MG3700A/MG3710A/MG3740A. Conversely, a waveform pattern for the MG3700A/MG3710A/MG3740A can also be converted into a file that can be used in the MS2690A/MS2691A/MS2692A MS2830A or MS2840A Signal Analyzer. The output file consists of a waveform information file (text format file with the extension ".wvi") that stores the information related to the waveform pattern and a waveform data file (binary format file with the extension ".wvd").

When activated in MG3700 mode:

Select whether to enable/disable the ARB memory expansion option 512Msamples for the MG3700A. When With Option21 (Memory 512M samples) is selected, the maximum size of the waveform pattern is expanded. A waveform pattern exceeding 256 Msamples cannot be used when the ARB memory expansion option 512Msamples is not installed. Select either With Option21 or Without Option21 according to whether the ARB memory expansion option 512Msamples is installed in the MG3700A to be used or not.
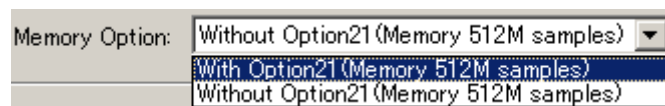
Figure 4.5-1   Memory Option Dialog Box

When activated in MG3710 mode:

The following functions are supported.
Whether the memory option is used can be selected.
The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set this parameter according to the available options for MG3710A shown in the following table.

Table 4.5-1   The Maximum Data Points Corresponding to Each Memory Option (MG3710A)

Memory Option Menu	Maximum data points
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option 48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option 48, 78)	512M samples
Memory 1024M samples	1024M samples
Memory 1024M samples × 2 (With Option 48, 78)	1024M samples

No manual setting is available when this software is hosted by the MG3710A, since it is set automatically.

When activated in MG3740 mode:

The following functions are supported.
Whether the memory option is used can be selected.
The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set this parameter according to the available options for MG3740A shown in the following table.

Table 4.5-2   The Maximum Data Points Corresponding to Each Memory Option (MG3740A)

Memory Option Menu	Maximum data points
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option 48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option 48, 78)	512M samples

No manual setting is available when this software is hosted by the MG3740A, since it is set automatically.

The waveform pattern bit width can be selected as 14, 15, or 16 bits. Changing the bit width can improve the dynamic range. In addition, the specifiable RMS value range and usable marker signals differ for each bit width as follows.

Table 4.5-3   Restrictions per Each Bit Width

Bit Width	Specifiable RMS Value Range	Usable Marker Signals
14 bit	1 to 8191	Marker 1 to 3, RF Gate
15 bit	1 to 16383	Marker 1, RF Gate
16 bit	1 to 32767	None

The specifiable bit widths differ for each conversion file format as follows.

Table 4.5-4   Available Bit Width per Each Input File Format

Input File Format	Selectable Bit Width
ASCII1	14/15/16 bit
ASCII2	15/16 bit
ASCII3	14/15 bit
MS269x/MS2830/MS2840 Digitizer	14/15/16 bit
MG3710/MG3740/MS269x/MS2830/MS2840 (to MG3700)	14 bit
MG3700/MS269x/MS2830/MS2840 (to MG3710)	14 bit
MG3700/MS269x/MS2830/MS2840 (to MG3740)	14 bit
MG3700/MG3710/MG3740/MS2830/MS2840 (to MS269x)	14 bit
MG3700/MG3710/MG3740/MS269x (to MS2830/MS2840)	14 bit

4.5.1   Activation

Click the **Convert** button on the **General Purpose** tabbed box in the Common Platform Screen.
The Convert screen is displayed separately.

4.5.2   Convert screen
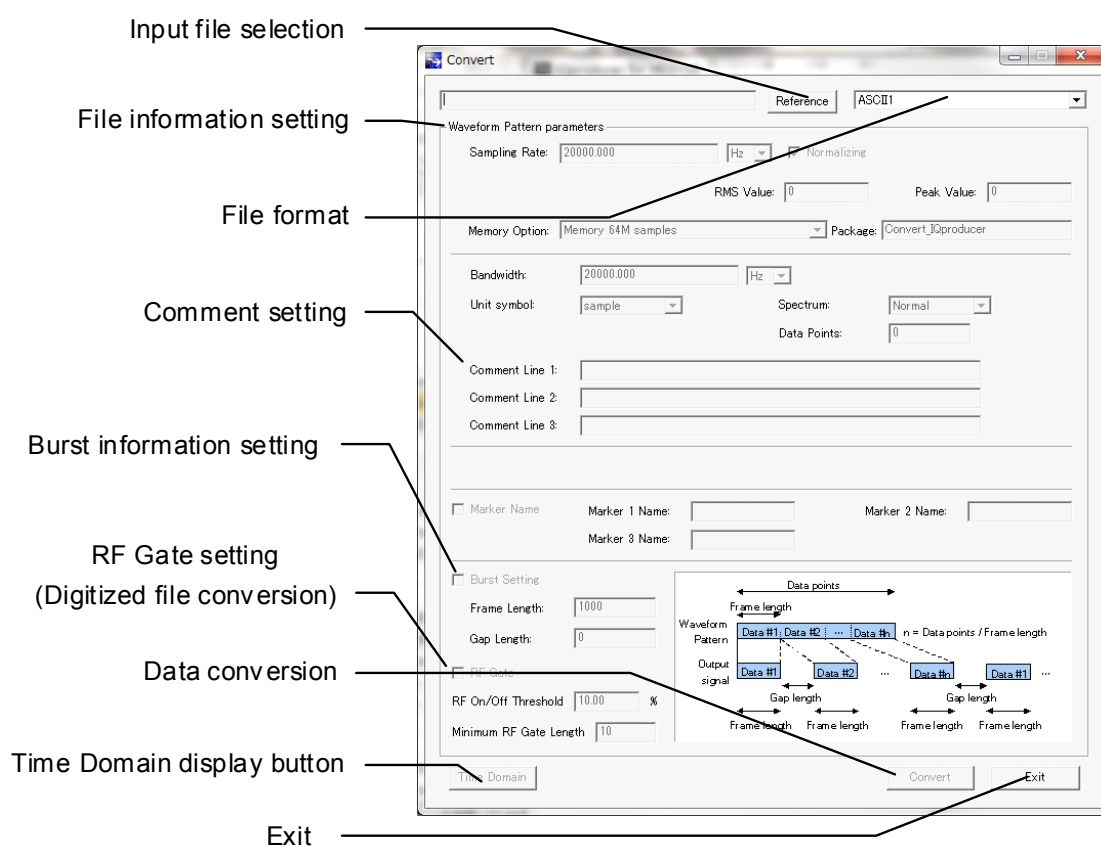
Figure 4.5.2-1   Convert Dialog Box for the MG3700A

Input file selection

File information setting

File format

Comment setting

Burst information setting

RF Gate setting
(Digitized file conversion)

Data conversion

Time Domain display button

Exit
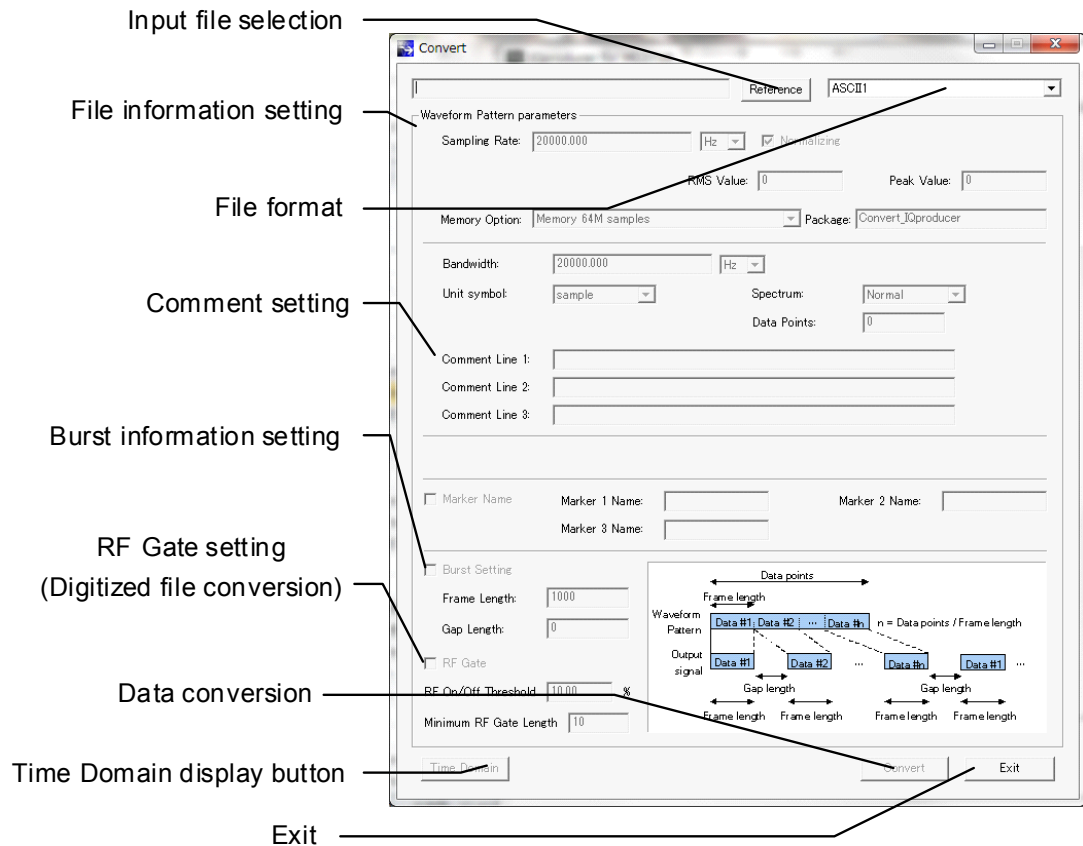
Figure 4.5.2-2   Convert Dialog Box for the MG3710A/MG3740A

■Description of items

(1) Input file selection
Click the **Reference** button and select a file to be input. Two or more files can be selected. The selected files are displayed in the left field. The number of files to be selected varies depending on the file format setting.

(2) File data setting
Set the data to be written in the waveform information file (.wvi format) of the waveform pattern to be generated.

(3) File format
The format of the file to be converted
ASCII1, ASCII2, ASCII3,
MS269x/MS2830/MS2840 Digitizer,
MG3710/MG3740/MS269x/MS2830/MS2840 (to MG3700),
MG3700/MS269x/MS2830/MS2840 (to MG3710),
MG3700/MS269x/MS2830/MS2840 (to MG3740),
MG3700/MG3710/MG3740/MS2830/MS2840 (to MS269x),
MG3700/MG3710/MG3740/MS269x (to MS2830/MS2840) are selectable.

(4)   Comment entry

Enter the comment.

(5)   Burst data setting

Set the Burst data. The Burst data includes Gap Length and Frame Length, and they should be set respectively. For a non-Burst continuous wave, set the number of samples per frame of the used communication system or "1" for Frame Length, and set "0" for Gap Length. When an external trigger is used, the waveform pattern output timing is determined based on this setting. For details on external trigger, refer to 3.5.4 "Outputting signal in sync with external trigger signal" in MG3700A Vector Signal Generator Operation Manual (Mainframe), or 7.4.1 "Route Input Connectors" in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).

(6)   RF Gate setting

Configures the RF gate settings. These parameters are enabled only when the file format is set to ASCII1, ASCII2, ASCII3, or MS269x/ MS2830A/MS2840A Digitizer. When the RF Gate checkbox is selected, RF Gate processing is performed during waveform pattern conversion for samples in which the I and Q values ($|I + jQ|$) of the input ASCII file or digitized file data are continuously at or below the threshold level. The threshold level can be set by entering the ratio to the waveform pattern peak value in the RF On/Off Threshold text box. The RF Gate is executed only for the samples in which the I and Q values less than the threshold level continue for longer than the value set in the Minimum RF Gate Length text box. Since the samples for which the RF Gate is executed are excluded for rms calculation during waveform pattern conversion, it is therefore possible to prevent underestimation of the rms value of the burst signal waveform pattern (accordingly, the output level in a burst-on interval can be kept under the specified RF output level)

(7)   Data conversion

Starts file conversion.

(8)   Exit

Ends the conversion process.

4.5.3   Input file selection

Select a file to be converted.

\<Procedure\>

1.   Click the ▼ button in the **File format** box to open a pull-down menu, and select the format of the file to be input.

2.   Click the **Reference** button to open the file dialog box, and select a file to be converted (conversion source file). The file selection dialog is displayed when selecting several files having the same file format. Select a data file displayed in the file type.

11aItxt, 11aQ.txt, Marker.txt	Reference	ASCII3 ▼

Figure 4.5.3-1   The File to be Converted Dialog Box

The number of files to be selected and the file type differ depending on the file format as follow:

ASCII1:   One file that contains I-phase data, Q-phase data, and marker data.

ASCII2:   Two files of I-phase data file and Q-phase data file.

ASCII3:   Three files of I-phase data file, Q-phase data file, and marker data file.

MS269x/MS2830/MS2840 Digitizer:

xml file, which is a digitized file created by the MS2690A/ MS2691A/MS2692A, MS2830A or MS2840A Signal Analyzer using the digitize function.

MG3710/MG3740/MS269x/MS2830/MS2840 (to MG3700):

Of the wvi and wvd files, which are waveform patterns for the MG3710A, MG3740A, MS269xA or MS2830A/MS2840A, respectively, select the wvi file.

MG3700/MS269x/MS2830 (to MG3710):

Of the wvi and wvd files, which are waveform patterns for the MG3700A, MS269xA or MS2830A/MS2840A, respectively, select the wvi file.

MG3700/MS269x/MS2830 (to MG3740):

Of the wvi and wvd files, which are waveform patterns for the MG3700A, MS269xA or MS2830AMS2840A, respectively, select the wvi file.

MG3700/MG3710/MG3740/MS2830 (to MS269x):

Of the wvi and wvd files, which are waveform patterns for the MG3700A, MG3710A, MG3740A or MS2830A/MS2840A, respectively, select the wvi file.

MG3700/MG3710/MG3740/MS269x (to MS2830/MS2840):

Of the wvi and wvd files, which are waveform patterns for the MG3700A, MG3710A, MG3740A or MS269xA, respectively, select the wvi file.

Click the **OK** button to finalize the input file selection.

Click the **Cancel** button to cancel the input file selection.

If the file format is changed in the **File format** box after selecting the input files, the current settings are cleared.

3 In the MG3710/MG3740 mode, the dialog box below for selecting the bit width appears after selecting the input file. Specify 14, 15, or 16 bits. However, the bit widths that can be specified depend on the selected file format as shown in Table 4.5-4.
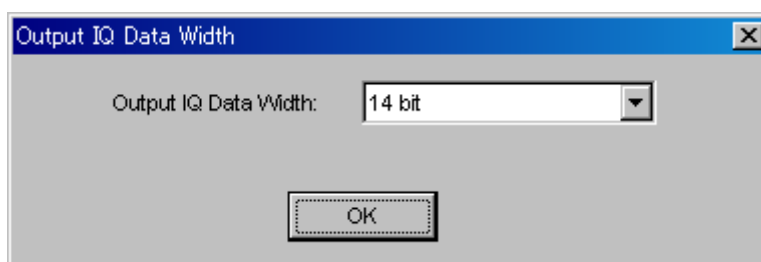
Figure 4.5.3-2 Output IQ Data Width Dialog Box

4 When the input files are selected, they are read and a dialog box appears displaying the maximum value, minimum value, RMS value and the number of data. In this dialog box, the edit boxes for setting the first and last samples are displayed only when MS269x/MS2830A/MS2840A Digitizer is selected for the file format. Use the edit boxes for setting the reading range.
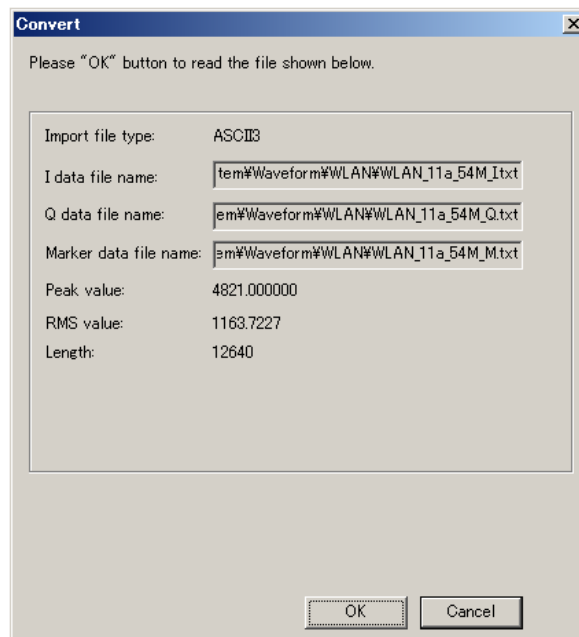
Figure 4.5.3-3   Input File Information Dialog Box

Click the **OK** button to finalize the input file selection.
Click the **Cancel** button to cancel the input file selection.

If the file format is changed in the **File format** box after selecting the input files, the current settings are cleared.

4.5.4 Editing data in Convert screen

The data to be written in the waveform information file of the waveform pattern to be generated can be edited by setting the parameters in the **Waveform Pattern parameters** field. Note that some parameters cannot be set depending on the file format.

■Setting sampling rate
<Procedure>
1. Click the **Sampling Rate** box and enter a sampling rate value to be set to the MG3700A/MG3710A/MG3740A. After the waveform pattern is selected by the MG3700A/MG3710A/MG3740A, the sampling rate can be changed to any value within the setting range when the selected waveform pattern is actually used. The sampling rate can be set from 20 kHz to 160 MHz.

Note:

When the IQproducer™ operates in the MG3740 mode, the setting range for the sampling rate is 20 kHz to 8 MHz.

2. Click the ▼ button on the right of the **Sampling Rate** box to open a pull-down menu, and select the unit of the sampling rate.
The unit can be set from Hz, kHz, and MHz.
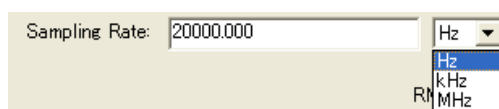
Figure 4.5.4-1 Sampling Rate Dialog Box

■Setting Low pass filter (Effective only for MG3700A)
Click the ▼ button on the **Low pass filter** pull-down combo box to select an analog low pass filter to be placed on the front end of the D/A converter output circuit. The analog low pass filter can be selected among the following variation.

The analog low pass filter can be selected among the following variation. 100 kHz, 300 kHz, 1 MHz, 3 MHz, 10 MHz, 30 MHz, 70 MHz, Through and Auto (The automatically optimized setting for the modulated bandwidth flatness and the image reduction ratio)
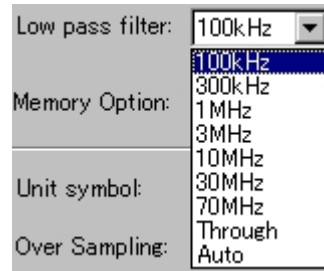
Figure 4.5.4-2   Low Pass Filter Dialog Box

■Setting Normalizing

To apply the RMS (Route Mean Square) value of the standard waveform pattern used by the MG3700A/MG3710A/MG3740A to the amplitude of the waveform pattern to be converted, click the **Normalizing** check box of the conversion source file to leave a checkmark (✔).
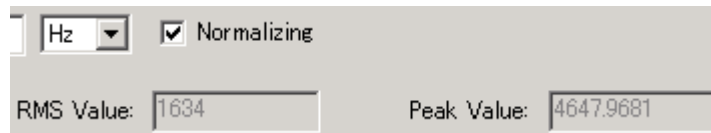
Figure 4.5.4-3   Normalizing Check Box

The RMS value of the standard waveform pattern used by the MG3700A/MG3710A/MG3740A Indicates the following RMS_I and RMS_Q:

$$RMS_I = \sqrt{\frac{1}{N} \sum_n I_n^2}$$

$$RMS_Q = \sqrt{\frac{1}{N} \sum_n Q_n^2}$$

$$RMS_{IQ} = \sqrt{\frac{1}{N} \sum_n (I_n^2 + Q_n^2)}$$

Where Σ is the sum of target waveform patterns except the samples of which RF output is set to OFF by RF Gate.

RMS_I indicates the RMS value for I phase, and RMS_Q indicates that for Q phase.

RMS_{IQ} indicates the RMS value of the I/Q vector when RMS_I and RMS_Q are as described above.

When this software is hosted by the MG3700A:

When Normalization is applied, the crest factor (Peak Power / RMS Power) becomes 14 dB if the signal output of the MG3700A is set within the level assurance range.

When this software is hosted by the MG3710A/MG3740A;

Table 4.5.4-1   The RMS Values of Typical Waveform Pattern per Each Bit Width

Bit Width	RMS_I	RMS_Q	RMS_{IQ}
14 bit	1157	1157	1636
15 bit	2314	2314	3272
16 bit	4628	4628	6545

RMS_I indicates the RMS value for I phase, and RMS_Q indicates that for Q phase.
RMS_{IQ} indicates the RMS value of the I/Q vector when RMS_I and RMS_Q are as described above.

When Normalization is selected, a crest factor (Peak Power/RMS Power) of 17 dB can be obtained if the signal output is set within the level assurance range.

■Setting RMS and Peak values
When reading a waveform pattern, the data is read from the conversion source file and the RMS and Peak values are calculated and displayed. Click the **RMS Value** box and enter an RMS value of the waveform after conversion to be actually used. The Peak value changes in conjunction with the RMS value. On the other hand, when the Peak value is set in the **Peak Value** box, the RMS value changes in conjunction with the RMS value.

Though the setting of Normalizing above is usually sufficient, this setting (adjustment) is also essential in the following purpose;
To output a large crest factor waveform,
To optimize the distortion, floor noise or carrier leak of modulated output signal.

The relationship between the characteristics of the MG3700A/MG3710A/ MG3740A and the RMS value is shown in Table 4.5.4-2 below:

Table 4.5.4-2   The Relation between the Major Waveform Factors and RMS Values

Items	RMS value (Larger)	RMS value (Smaller)
Signal distortion	Worse	Better
Floor noise	Better	Worse
Carrier leakage	Better	Worse

Figure 4.5.4-4   RMS Value Dialog Box

When this software is activated in the MG3700 mode;

The output-level performance-guaranteed upper limit value for the RMS value range and the upper limit setting level for RF output signal stable-distortion characteristics are shown in the Tables 4.5.4-3 and 4.5.4-4 below.

Table 4.5.4-3   The Maximum Guaranteed Output Level

Frequency	For standard composition	When a mechanical attenuator option is installed.
50 MHz ≤ f ≤ 3 GHz	$+2 + \chi$ dBm	$+7 + \chi$ dBm
3 GHz < f ≤ 6 GHz (if Upper limit frequency 6 GHz option is installed)	$-1 + \chi$ dBm	$+4 + \chi$ dBm

χ: RMS value (dB) = 20*log (RMS value/1634)   RMS value = 1157 to 1634

Table 4.5.4-4   Normalized Distortion Free Level of RF Output Signal

For standard composition	When a mechanical attenuator option is installed.
χ dBm	$+3 + \chi$ dBm

χ: RMS value (dB) = 20*log (RMS value/1634)

RMS value = 1157 to 1634

When this software is activated in the MG3710/MG3740 mode;

When reading a waveform pattern, the data is read from the conversion source file and the RMS and Peak values are calculated and displayed. Click the **RMS Value** text box, and then enter the RMS value of the post-conversion waveform that is actually used for this option. The Peak value changes in conjunction with the RMS value. On the other hand, if you click the **Peak Value** button to set the peak value, the RMS value is also correspondingly changed.
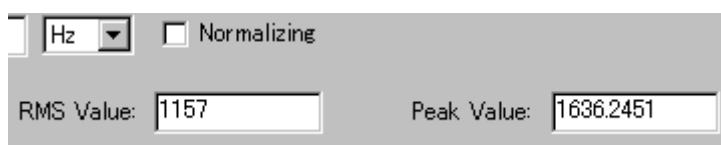
Figure 4.5.4-5   RMS Value Dialog Box

Normally, the Normalizing checkbox is selected and the RMS and Peak values are automatically specified, but the values can be manually specified to adjust the characteristics for signals that have a crest factor larger than 17 dB.

Note that the RF output level reliability for the MS2830A is specified assuming the following RMS values.

Table 4.5.4-5   RMS Setting Range of Guaranteed Output Level

Bit Width	RMS-value setting range
14 bit	819 to 1634
15 bit	1638 to 3269
16 bit	3276 to 6537

■Setting unit (available for ASCII1, ASCII2, ASCII3, and
                           MS269x/MS2830A/MS2840A Digitizer)
Click ▼ in the **Unit symbol** list box, and then select the unit.
sample, symbol, chip, or none can be selected as the unit.
This setting is applied to the screen display unit when the waveform pattern is used.

Figure 4.5.4-6   Unit Symbol Dialog Box

■Setting memory size

When this software is activated in the MG3700 mode;

Select whether to enable/disable the ARB memory expansion option 512Msamples for the MG3700A. When With Option21 (Memory 512M samples) is selected, the maximum size of the waveform pattern is expanded. A waveform pattern exceeding 256 Msamples cannot be used when the ARB memory expansion option 512Msamples is not installed. Select either With Option21 or Without Option21 according to whether the ARB memory expansion option 512Msamples is installed in the MG3700A to be used or not.
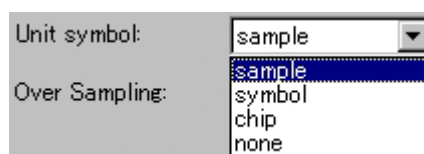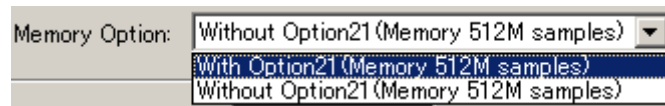

Figure 4.5.4-7   Memory Option Dialog Box

When this software is hosted by other than the MG3710A and activated in the MG3710 mode;

The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set this parameter according to the available options for MG3710A shown in the following table.

**Table 4.5.4-6   Memory Option Menu and Maximum Data Points
(MG3710A)**

Memory Option Menu	Maximum data points
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option 48, 78)	512M samples
Memory 1024M samples	1024M samples
Memory 1024M samples × 2 (With Option 48, 78)	1024M samples

No manual setting is available when this software is hosted by the MG3710A, since it is set automatically.

When this software is hosted by other than the MG3740A and activated in the MG3740 mode;

The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set this parameter according to the available options for MG3740A shown in the following table.

Table 4.5.4-7   Memory Option Menu and Maximum Data Points (MG3740A)

Memory Option Menu	Maximum data points
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option 48, 78)	512M samples

No manual setting is available when this software is hosted by the MG3740A, since it is set automatically.

■Setting package name

Enter the name of the package that is used to store the generated waveform patterns when transferring them to the MG3710A.
Up to 31 characters can be used for a package name.
Alphanumeric characters and the following symbols may be used:
! % & ( ) + = ` { } _ - ^ @ [ ]

Package: Convert_IQproducer

Figure 4.5.4-8   Package Dialog Box

■Setting Bandwidth (For MG3710A/MG3740A)

Set the bandwidth of waveform pattern. Enter the value in the **Bandwidth** dialog box. Then click the ▼ button in the **Bandwidth** dialog box to select the unit among Hz, kHz and MHz.
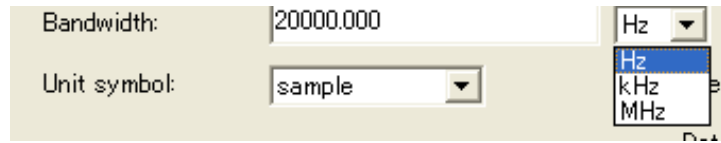
Figure 4.5.4-9   Bandwidth Dialog Box

■Selecting spectrum (available for ASCII1, ASCII2, ASCII3, and Digitizer)
Click the ▼ button on the right of the **Spectrum** box to open a
pull-down menu, and select the spectrum from Normal and Reverse.
When Reverse is selected, the phase of the RF modulated signal output is
reversed.
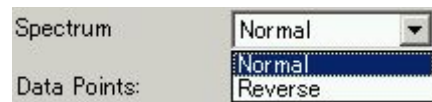
Figure 4.5.4-10   Spectrum Dialog Box

■Setting over sampling rate (available for ASCII1, ASCII2, ASCII3, and
Digitizer when in MG3710/MG3740 mode)
Set the over sampling rate for the waveform pattern to be input to
Convert. Click the **Over Sampling** box and enter a numeric value. For
example, to specify a sampling rate of 4 MHz for signals that have a
1-MHz symbol rate, enter "4".

Figure 4.5.4-11   Over Sampling Dialog Box

■Setting Data Points (available for ASCII1, ASCII2, and ASCII3)
The number of sample points of the read waveform pattern is displayed
in the **Data Points** box. Usually, this setting is not required to be changed.
In case of change, enter the value into the **Data Points** dialog box.

Figure 4.5.4-12   Data Points Dialog Box

When the number of sample points of the read waveform is less than
1000 points, the output pattern is repeated so that the number of output
patterns becomes 1000 points or more. When the number of sample
points of the read waveform is 99 points, for example, the output pattern
is repeated 11 times and a waveform pattern with 1089 points is output.

■Entering comments

Click the **Comment Line 1** box and enter a comment. The text entered here is displayed on the screen when the MG3700A/MG3710A/MG3740A selects the corresponding waveform. Leave this text box blank if unnecessary. The Comment Line 2 box is disabled until any comment is entered in the Comment Line 1 box. Similarly, the Comment Line 3 box is disabled until any comment is entered in the Comment Line 2 box.

Figure 4.5.4-13   Comment Line Dialog Box

■Specifying the detail file (In the MG3700 mode)

To specify a detail file, click the **Detail File** check box to leave a checkmark (✔). Then the input area and the **Reference** button become enabled. Click the input area and enter the directory of the target detail file directly, or click the **Reference** button to display the file dialog box and locate the target detail file.

The contents of the detail file selected here can be displayed on the screen when the MG3700A selects the corresponding waveform pattern.

Figure 4.5.4-14   Detail File Dialog Box

■Setting marker names
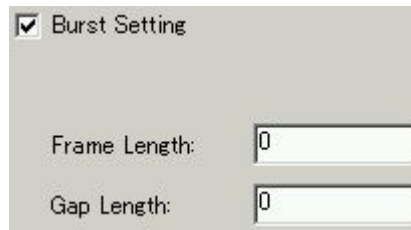
To set a marker name, click the **Marker Name** check box to leave a checkmark (✔).
Then the **Marker 1 Name**, **Marker 2 Name**, and **Marker 3 Name** boxes become enabled. Click an input area and enter a marker name. Note that these settings do not enable/disable the marker output. The contents of these settings are displayed on the screen.

Figure 4.5.4-15   Marker Name Dialog Box

■Setting Burst information

To set the Burst information, click the **Burst Setting** check box to leave a checkmark (✔). Then the **Frame Length** and **Gap Length** boxes become enabled. Click an input area and enter a numeric value to set Frame Length and/or Gap Length. Refer to Section 5.4 "Generating Waveform Pattern" for details.
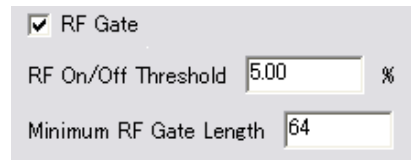
Figure 4.5.4-16   Burst Setting Dialog Box

■Configuring RF Gate settings (for digitized and ASCII file and file conversion)

To configure the **RF Gate** settings, click the RF Gate check box to leave a checkmark (✔). The **RF On/Off Threshold** and **Minimum RF Gate Length** boxes will then become enabled. Click an input area and enter a numeric value to set the RF On/Off threshold and minimum RF gate length.

Figure 4.5.4-17   RF Gate Dialog Box

4.5.5   Executing conversion

Set a file before conversion (conversion source file) and a file after conversion (conversion destination file) before executing conversion.

<Procedure>

1.   Click the **Convert** button to display the Export File screen shown in Figure 4.5.5-2 below.

Figure 4.5.5-1   Convert Execution Button
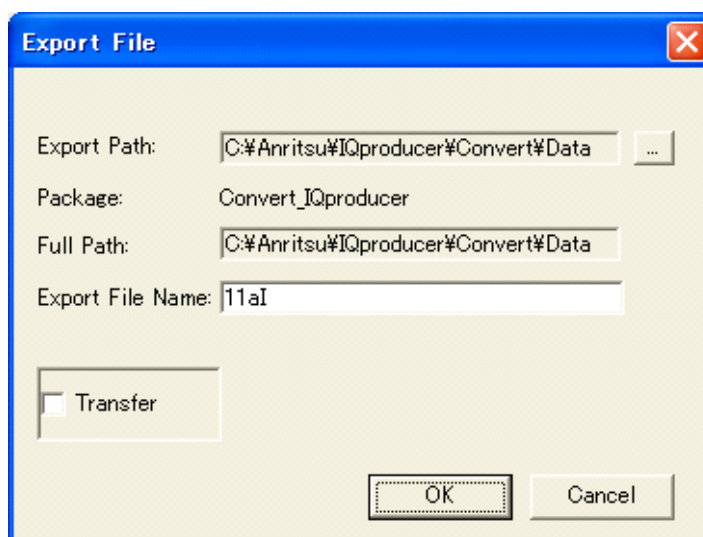
Figure 4.5.5-2   Export File Dialog Box (In MG3700 mode)
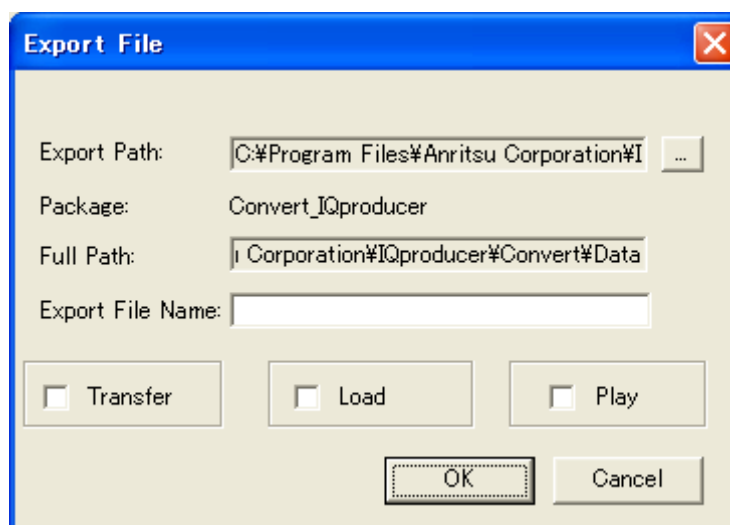
Figure 4.5.5-3   Export File Dialog Box (In MG3710/MG3740 mode)

2. Click [..] to open the folder selection screen and locate the output destination folder.
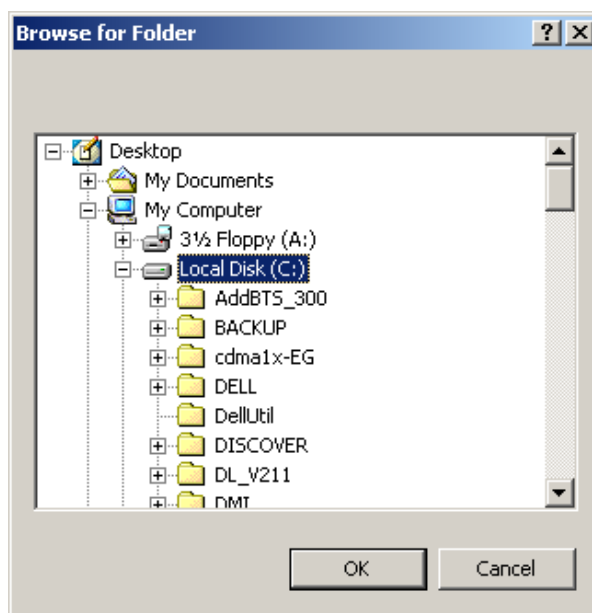
Figure 4.5.5-4   Program Selection Screen

The output destination of the waveform pattern is specified in Table 4.5.5-1 below.

Table 4.5.5-1   Waveform Pattern Output Destination

Host equipment of this software	Output destination
MG3710A MG3740A	C:\Anritsu\MG3710A\User Data\Waveform\"Package name" An output destination file other than the above can be assigned.
Hosted by PC in MG3710/MG3740 mode	Corresponding to the Export Path setting in the Export File dialog box
Other than the above	Corresponding to the Export Path setting in the Export File dialog box

3. Click the **Export File Name** box and enter the name of the file to be output.

4. Check one of the **Transfer**, **Load** or **Play** check box in Export File dialog box.

Table 4.5.5-2 Transfer, Load and Play Operations

Check box	Descriptions	Remarks
Transfer	Starts Transfer & Setting Wizard after waveform conversion Confirmation dialog after the waveform generation will not appear.	Available when executing in MG3700, MG3710 or MG3740 mode.
Load	Loads the waveform pattern, created as the result of waveform generation application, to the memory	Available when executing in MG3710A or MG3740A.
Play	Selects after loading the waveform pattern, created as the result of waveform generation application, to the memory	Available when executing in MG3710A or MG3740A.

4.   Click the **OK** button to start conversion. After this, if a clipping occurs during the conversion, the warning message "The waveform pattern to be generated will be above 8191 and be clipped." is displayed. If the **OK** button on the warning message dialog box is clicked at this time to continue the conversion as is, a waveform pattern for which clipping has been processed is generated.
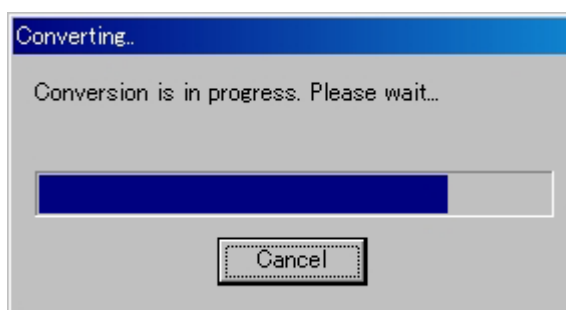
Figure 4.5.5-5 Convert Progress Screen

The Conversion executing screen is displayed from the start to the end of conversion.

5.   When conversion is completed, click the **OK** button to return to the Convert screen.

Two files of a file with the extension ".wvi" and a file with the extension ".wvd" are output and created in the file specified by the Export Path box after conversion.

4.5.6   Input file format

There are the following eight types of acceptable file for the Convert operation.

- ASCII1 format file
- ASCII2 format file
- ASCII3 format file
- The digitized file generated by the MS269x Digitizer (The digitizing capability of MS2690A/MS2691A/MS2692A, MS2830A or MS2840A signal analyzer)
- The waveform pattern formatted for MG3710A, MG3740A, MS269xA, MS2830A or MS2840A (MG3710/MG3740/MS269x/MS2830/MS2840 (to MG3700))
- The waveform pattern formatted for MG3700A, MS269xA MS2830A or MS2840A (MG3700/MS269x/MS2830/MS2840 (to MG3710))
- The waveform pattern formatted for MG3700A, MS269xA or MS2830A (MG3700/MS269x/MS2830/MS2840 (to MG3740))
- The waveform pattern formatted for MG3700A, MG3710A, MG3740A, MS2830A or MS2840A (MG3700/MG3710/MG3740/MS2830/MS2840 (to MS269x))
- The waveform pattern formatted for MG3700A, MG3710A, MG3740A, or MS269x
  (MG3700/MG3710/MG3740/MS269x (to MS2830/MS2840))
- This section describes the ASCII-format files.
- The following data are included in each of ASCII format files.

■I-phase data

This is in-phase component data of the waveform pattern

■Q-phase data

This is quadrature-phase component data of the waveform pattern

■Marker data
For MG3700A:
This data is used to output marker signals from the AUX Input/ Output connectors. There are three types of signal outputs: Marker 1, Marker 2, and Marker 3.
Each signal of this data outputs either of the following TTL value:

0 = LO level
1 = HI level
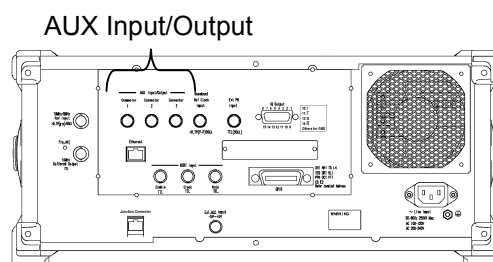
AUX Input/Output

Figure 4.5.6-1   MG3700A AUX Input/Output

For MG3710A/MG3740A:

This data is used to output marker signals from the Marker 1 and AUX connectors on the back panel. There are three types of signal outputs: Marker 1, Marker 2, and Marker 3.

Each signal of this data outputs either of the following TTL value:

0 = LO level
1 = HI level
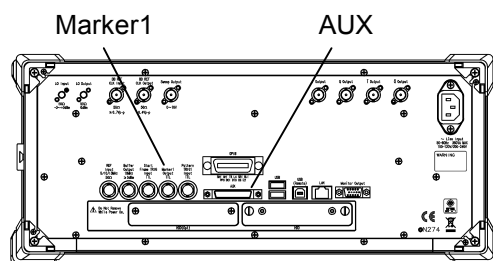
Marker1   AUX

Figure 4.5.6-2   MG3710A/MG3740A Marker1, AUX

The output signal is specified depending on the MG3710A/MG3740A settings as shown.

Table 4.5.6-1   MG3710A/MG3740A Marker Signal

Generating SG	Waveform memory	Signal name
SG1	Memory A	SG1 Marker1 A/ SG1 Marker2 A/ SG1 Marker3 A
SG1	Memory B	SG1 Marker1 B/ SG1 Marker2 B/ SG1 Marker3 B
SG2	Memory A	SG2 Marker1 A/ SG2 Marker2 A/ SG2 Marker3 A
SG2	Memory B	SG2 Marker1 B/ SG2 Marker2 B/ SG2 Marker3 B

For how to configure marker signal and connector setting, refer to 7.4.2 "Route Output Connectors" in MG3710A Vector Signal

Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).

When the MG3700A/MG3710A/MG3740A uses waveform patterns, the difference between the marker data output timing and the timing the MG3700A/MG3710A/MG3740A outputs the modulation data corresponding to the output marker data from the RF Output connector is adjusted to be within approx. ±1 sample.
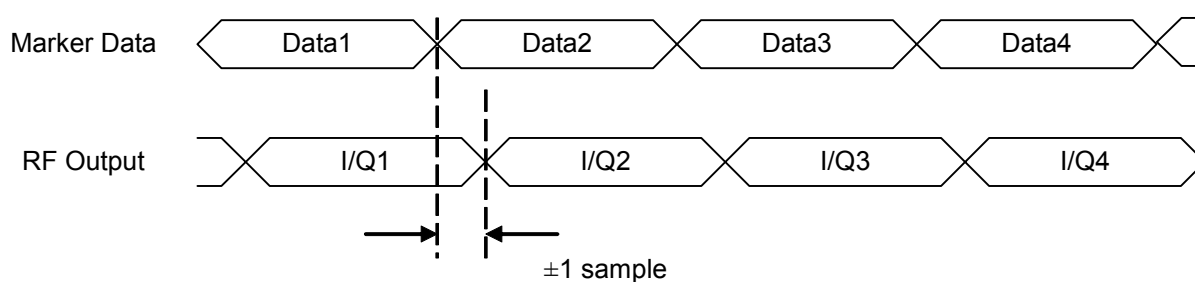
Figure 4.5.6-3   Marker Data and RF Output Timing

■RF Gate
This data is used to execute pulse modulation for the RF output when using a Burst wave such as TDMA.
Each signal of this data indicates as follows:

1= RF signal output On
0= RF signal output Off

The RF Gate data is adjusted by the internal delay circuit of the MG3700A/MG3710A/MG3740A so as to be input to the internal pulse modulator of the MG3700A/MG3710A/MG3740A at almost the same time when the IQ-phase data corresponding to the RF Gate data is input to the pulse modulator. The pulse modulation timing for the RF output can be adjusted, therefore, by applying RF Gate = 0 at the same position with the IQ-phase data where the RF signal is required to be Off.

When the data for both the I and Q phases are set to 0000h and the RF output is set to Off instead of using this bit (i.e., RF Gate data = 1), the On/Off power ratio of the RF output signal becomes smaller than that in the case using the RF Gate data. Therefore, when a larger On/Off power ratio is required, set the data for both the I and Q phases to 0 and then set the RF output to Off using the RF Gate data. Note that the sample for which RF output is set to Off using the RF Gate data is excluded from RMS value calculation/adjustment when reading input file or generating

waveform pattern file. Refer to Section 4.5.4 "Editing data in Convert screen" for details.

Figure 4.5.6-4   Waveform Pattern Generator Block Diagram and Output Signal Timing Chart of Mainframe

The following show the formats of ASCII1, ASCII2, and ASCII3 that can be input to Convert:

■ASCII 1

Waveform patterns before conversion are configured in one file. One line indicates one data. The data is delimited by a comma, in the order of I-phase data, Q-phase dat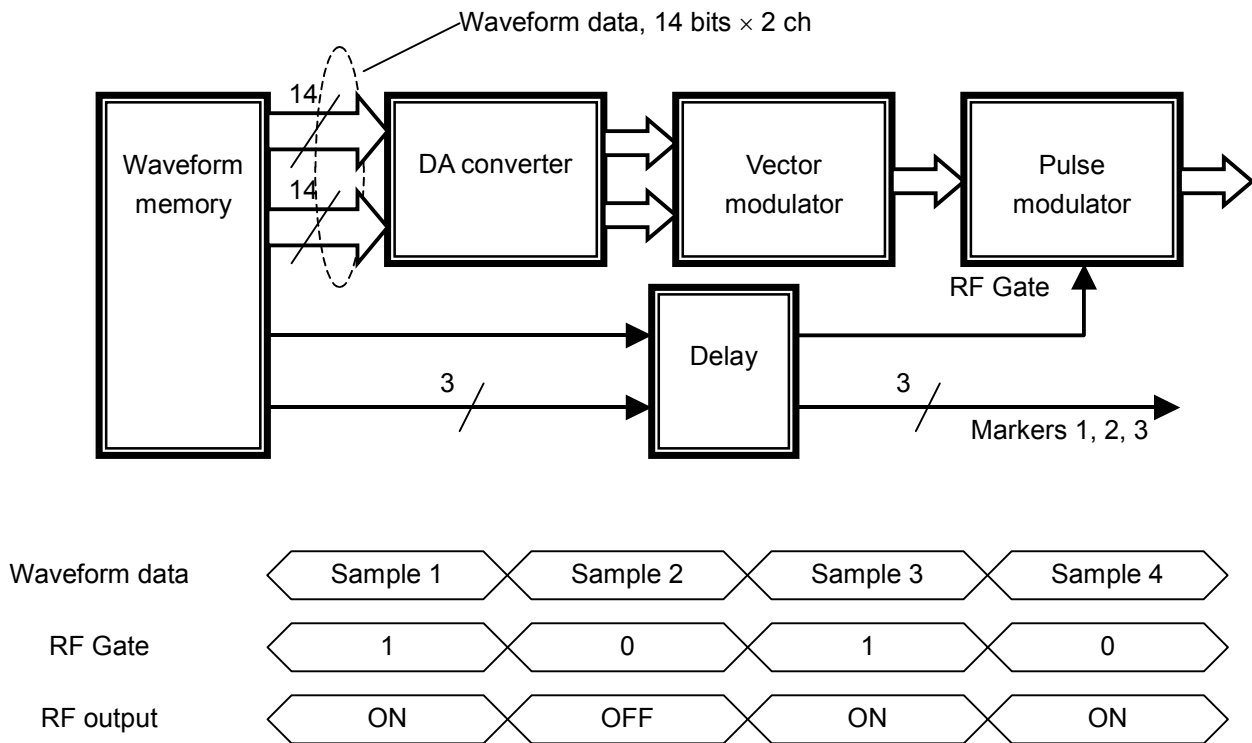a, Marker 1, Marker 2, Marker 3, and RF Gate. Set '0' or '1' for Markers 1 through 3 and RF Gate. Markers 1 through 3 and RF Gate can also be omitted. If omitted, '0 (LO level)' is applied to Markers 1 through 3 and '1 (RF Output On)' to RF Gate. A line starts with a character other than numeric, '+', or '–' is regarded as a comment line, and is ignored. In addition to displaying I-phase data and Q-phase data using decimal values, such data can be displayed using e or E and exponential notation (such as "2.0E+3").

```
// IQ Data
Comment Line
–0.214178, –0.984242
–0.187286, –1.245890
–0.073896, –1.368888
0.091758, –1.316199
–0.073896, –1.368888, 1          # Marker1 = 1 is output.
0.091758, –1.316199, 0, 1        # Marker2 = 1 is output.
0.248275, –1.089333, 0, 0, 1     # Marker3 = 1 is output.
0.331432, –0.729580, 0, 0, 0, 0  # RF output becomes Off.
0.331432, –0.729580, , 0, 0, 1   # Marker1 = 0 is output and RF output
becomes On.
…
```

■ASCII 2

Waveform patterns before conversion are configured in two files: I-phase data file and Q-phase data file. The file configuration is the same with that for ASCII3 except for the marker data file. In the ASCII2 format, Markers 1 through 3 are set to 0, RF Gate is set to 0, and all the marker outputs are '0.' And the RF outputs for all the samples of the waveform pattern are set to On, since the pulse modulation is disabled. In addition to displaying I-phase data and Q-phase data using decimal values, such data can be displayed using e or E and exponential notation (such as "2.0E+3").

■ASCII 3

Waveform patterns before conversion are configured in three files. The patterns are divided such that I-phase data is stored in the first file, Q-phase data in the second, and Marker 1 to 3 and RF Gate data in the third. Set '0' or '1' for Markers 1 through 3 and RF Gate. Markers 1 through 3 and RF Gate can also be omitted. If omitted, '0 (LO level)' is applied to Markers 1 through 3 and '1 (RF Output On)' to RF Gate.

In each file, the I-phase data, Q-phase data, and Markers 1 through 3 and RF Gate data are combined and described in one line delimited by <cr><lf> with the same line number. Therefore, when a comment line is added to the start of one of these files, it is necessary to adjust the number of lines among the files by adding a comment line or <cr><lf> to other files. An error occurs if the number of lines differs between the I-phase data and Q-phase data. If Markers 1 through 3 and RF Gate data exists in a line where I-phase and Q-phase data do not exist, it is regarded that line has no data. If the data line of a different file is described in a comment line in a certain file, that data line is ignored. A line starts with a character other than numeric, '+', or '–' is regarded as a comment line, and is ignored. In addition to displaying I-phase data and Q-phase data using decimal values, such data can be displayed using e or E and exponential notation (such as "2.0E+3").

File 1 (I-phase data)

// I Data
Comment Line
–0.214178
–0.187286
–0.073896
0.091758
0.248275
0.331432
…

File 2 (Q-phase data)

// Q Data   # Adjusting the line number since two comment lines are added in the I-phase data.
<cr><lf>
−0.984242
−1.245890
−1.368888
−1.316199
−1.089333
−0.729580
…

File 3 (Marker data)

<cr><lf>
<cr><lf>
<cr><lf>   # Markers 1 through 3 = 0 and RF Gate = 1 for the third and fourth lines.
<cr><lf>
1   # Corresponds to the fifth line data in the I-phase and Q-phase data.
0,1
0,0,1
1,0,0,1
…

4.5.7   Setting the RMS-value calculation range

By displaying the Time Domain screen from the Convert screen, the pre-conversion waveform pattern can be checked, the RMS-value calculation range can be set, and the RMS value of the read waveform can be recalculated.

However, the Time Domain screen can only be displayed if the file format is set to ASCII1, ASCII2, ASCII3, or MS269x/MS2830A/MS2840A Digitizer.

To display the Time Domain screen, click the **Time Domain** button.
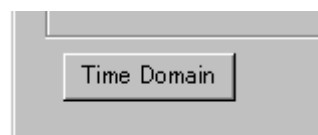
Figure 4.5.7-1   Time Domain Display Button

For details about using the Time Domain screen to specify the RMS-value calculation range, see Section 4.13.13 "Displaying the Time Domain screen from the Convert screen".

When the RMS-value calculation range is set, the RMS value for the waveform pattern is recalculated, and the value in the Peak Value text box is updated.
Using the above function makes it possible to prevent the ratio between the Peak value of a wave for which RF Gate is not set and the RMS value from being reduced as well as the resulting clipping.

Figure 4.5.7-2   RMS Value Calculation Range

4.6 File Transfer and Loading to Memory in Transfer & Setting Panel Screen

This function enables file transfer of waveform patterns to the MG3700A/MG3710A/MG3740A. The remote function is also provided, which loads and deletes the waveform pattern transferred to the MG3700A/MG3710A/MG3740A to/from the MG3700A/MG3710A/MG3740A memory.

4.6.1 Activation

Select **Transfer & Setting Panel** from the **Simulation & Utility** tab on the common platform screen.

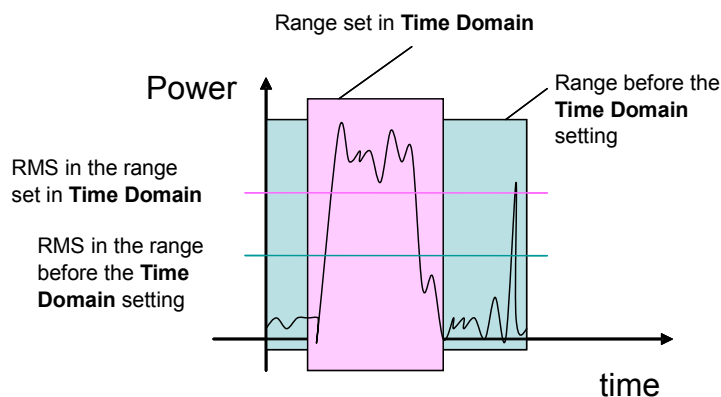When starting up Transfer & Setting, the **Connection to Instrument** screen is displayed. Selects the instrument type to be connected to the host in the **Target Instrument** dialog box and, also enter the host name or IP address for the Ethernet connection. Then click the **Connect** button to establish the connection.

Note:

If the MG3700A firmware version is 1.xx, the warning message "The MG3700A firmware version is 1.xx. Your version of IQproducer cannot connect with the version 1.xx of MG3700A normally. Please check Anritsu Download Support Site to upgrade MG3700A firmware." will be displayed. In this event, this software cannot be connected normally to the MG3700A. Upgrade the MG3700A firmware before starting connection (the latest firmware can be obtained from the download page linked to the MG3700A page on the Anritsu Web site).

For how to connect this equipment to network, refer to 4.2.3 "Connecting devices via Ethernet" in MG3700A Vector Signal Generator Operation Manual (Mainframe), or E.3.2 "Ethernet interface settings" in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).
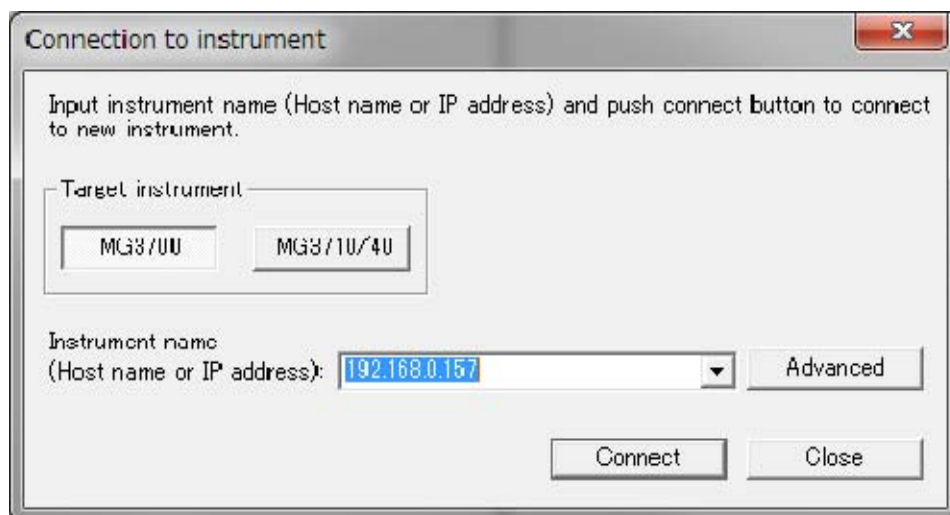
Figure 4.6.1-1   Connection to Instrument Dialog Box

When changing the network setting of the MG3700A/MG3710A/
MG3740A to DHCP Off and connecting the MG3700A/MG3710A/
MG3740A and PC using a LAN cross cable, restart the MG3700A/
MG3710A/MG3740A after network setting change before connecting a
LAN cross cable.

When the communication has been shut down 15 minutes or more while connecting to the MG3700A/MG3710A/MG3740A using the Transfer & Setting function, the IQproducer™ automatically disconnects the FTP port connection. However, if disconnection is processed due to the conditions shown above while waveform patterns are transferred, the waveform transfer is processed continuously and completed without interruption.

When the **Advanced** button is clicked, the Advanced screen is displayed where the following items can be set.
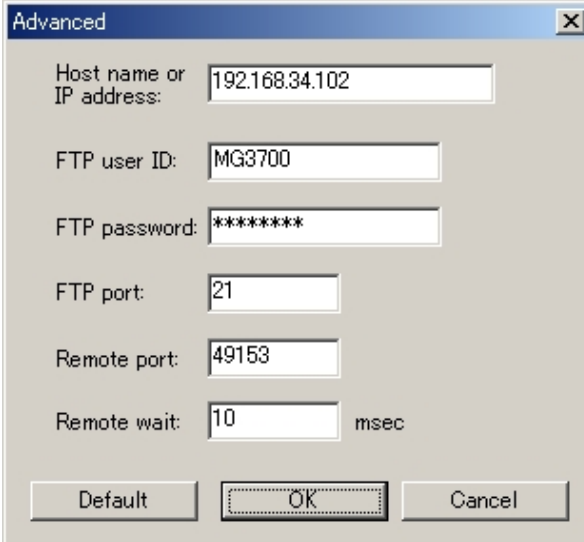
Figure 4.6.1-2   Advanced Dialog Box

(1)   Host name or IP address

Enter the host name or IP address of the mainframe to be connected.

(2)   FTP user ID

Enter the user name used in FTP login.

(3)   FTP password

Enter the password used in FTP login.

(4)   FTP port

Enter the port number used by FTP.

(5)   Remote port

Enter the port number of the remote used for authentication and memory loading.

(6)   Remote wait

Set the period between commands.

(7)   Default

Restores all the parameter settings to the default values when clicked.
The default values for each parameter are as follows:

Table 4.6.1-1   Default Values

Settings	MG3700A	MG3710A/MG3740A
User ID	MG3700	ANRITSU
password	password	anritsu
FTP port	21	21
Remote port	49153	49158
Remote wait	10 msec	10 msec

(8)   OK

Finalizes the settings and closes the screen when clicked.

(9)   Cancel

Cancels the settings and closes the screen when clicked.

Note:

Connection with the MG3700A/MG3710A/MG3740A is possible
when the parameters are set to the default values. Do not change
the parameters in the Advanced screen unless otherwise required.

4.6.2 Transfer & Setting Panel screen
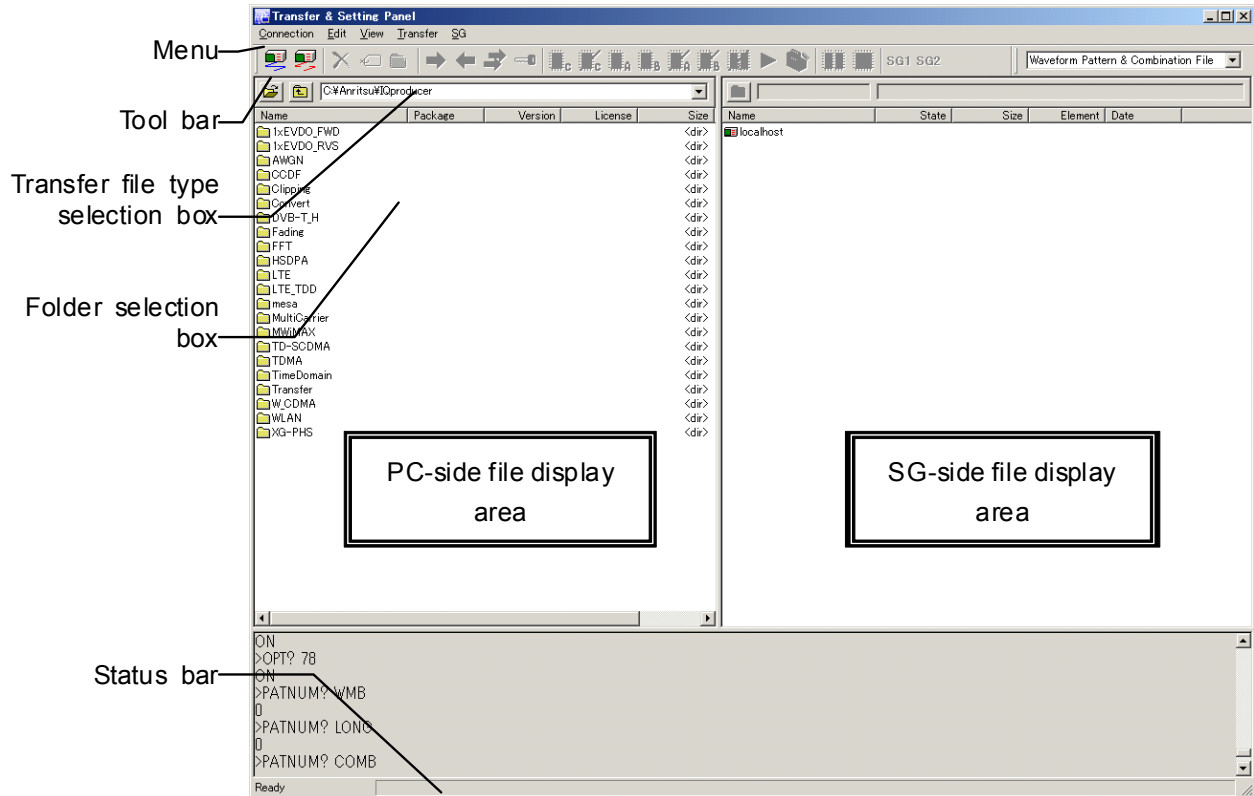
Figure 4.6.2-1 Transfer & Setting Screen

The Transfer & Setting Panel main screen consists of menu, tool bar, transfer file type selection box, folder selection box, PC-side file display area, SG-side file display area, logs, and status bar.

Right-clicking in the PC-/SG-side file display area opens a pop-up menu.

■Description of items

(1) Menu bar

Connection/disconnection to the network, termination of Transfer & Setting, deletion of files/folders in the PC side, creation of new folders, updating of file information, file transfer, and loading to memory can be executed.

(2) Tool bar

Equivalent function with (1) Menu above.

(3)   Selecting folder

Select a transfer source/destination folder in the PC.

(4)   PC-side file display area

Displays the information of the folders and files in the PC.

(5)   SG-side file display area

Displays the information of the folders and files stored in the internal hard disk of the MG3700A/MG3710A/MG3740A.

(6)   Transfer file type selection box

The type of the file to be transferred via FTP can be selected.

(7)   Status bar

Displays the free space and total space of the internal hard disk and waveform memories A and B of the current mainframe. Nothing is displayed when several mainframe units are selected.

4.6.3 Operation from menu and tool bar

The menu and tool bar on the Transfer & Setting Panel screen contain the following items.

(1) Connection
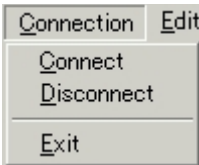
Figure 4.6.3-1   Connection Tabbed Dialog Box

<1>   Connect

Connects with the mainframe. The Connection dialog box is displayed when this item is selected. The contents of the connected MG3700A/MG3710A/ MG3740A are displayed in the SG-side file display area.

<2>   Disconnect

Disconnects the connection with the MG3700A/MG3710A/MG3740A currently connected. The Disconnection dialog box is displayed when this item is selected.

<3>   Exit

Closes the Transfer & Setting Panel screen.

(2) Edit
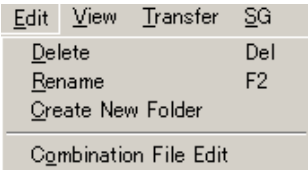
Figure 4.6.3-2   Edit Selection Screen

<1>   Delete

Deletes a file/folder selected in the PC-side file display area or a file selected in the SG-side file display area. The Delete dialog box shown in Figure 4.6.3-3 below is displayed when this item is selected.
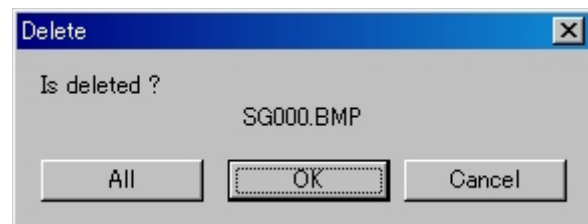
Figure 4.6.3-3   Delete Dialog Box

- All   Deletes all the selected files.
- OK   Deletes the selected file. The dialog box appears for each file for confirmation.
- Cancel Cancels the deletion of the selected combination file and the corresponding files.

When a combination file is selected for deletion, the Delete dialog box shown in Figure 4.6.3-4 below is displayed.
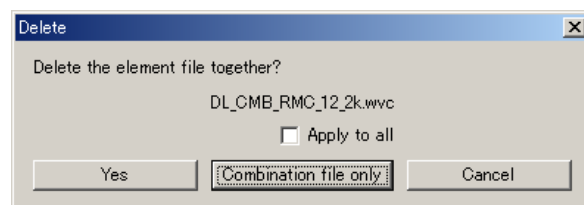
Figure 4.6.3-4   Delete Dialog Box

- Apply to all check box:
      The deleting operation will apply to all the selected combination files when this check box is selected.
- Yes   Also deletes the files that are selected by the selected combination file.
- Combination file only
      Deletes only the selected combination file.
- Cancel Cancels the deletion of the selected combination file and the corresponding files.

<2>   Rename

Change the name of a file/folder in the PC. The name change dialog box is displayed when this item is selected.

<3>   Create New Folder

Creates a new folder in the folder currently displayed in the PC-side file display area. The folder name input dialog box is displayed when this item is selected.

<4>   Combination File Edit

Opens the Combination File Edit screen. Refer to Section 4.8 "Combining Waveform Patterns by Combination File Edit Function" for details on this function.

(3)   View
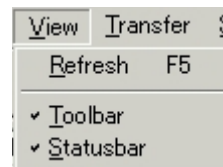
Figure 4.6.3-5   View Selection Screen

<1> Refresh

Updates the contents currently displayed in the PC-side file display area and SG-side file display area to the latest information.

<2> Toolbar

Toggles tool bar display/non-display. The tool bar is displayed in the Transfer & Setting Panel screen when a checkmark (✔) is added on the left.

<3> Status bar

Toggles status bar display/non-display. The status bar is displayed in the Transfer & Setting Panel screen when a checkmark (✔) is added on the left.

(4)   Transfer
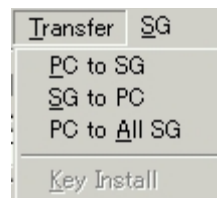
Figure 4.6.3-6   Transfer Tabbed Dialog Box

<1>   PC to SG

Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disk of the MG3700A/MG3710A/MG3740A selected in the SG-side file display area. The transfer destination folder is determined depending on the file type and the package name specified in the waveform pattern. When multiple folders are selected in the PC-side file display area, clicking this button transfers all waveform patterns and combination files in the selected folders.
During combination file transfer, all waveform patterns in the folder (excluding subfolders) selected in the combination file are transferred at the same time.

<2>   SG to PC

Transfers files selected in the SG-side file display area to the folder selected in the PC-side file display area.

<3>   PC to All SG

Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disks of all the connected mainframe units in the SG-side file display area. The transfer destination folder is determined depending on the file type and the package name specified in the waveform pattern.

<4>   Key Install

Transfers the license file to install it. When license file installation is completed, the license file in the internal hard disk of the MG3700A/MG3710A/MG3740A is deleted. This function is enabled when an authentication file (extension: .key) is selected in the PC-side file display area after specifying "Waveform Package License File" in the transfer file type selection box.

(5) SG
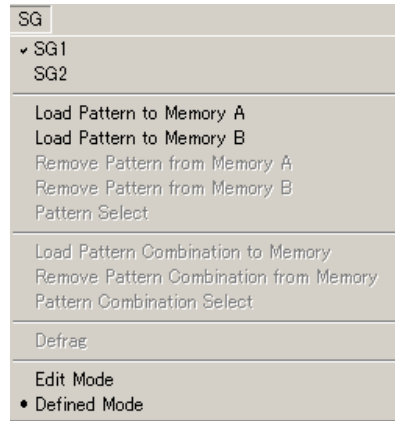
Figure 4.6.3-7   SG Selection Screen

SG1   <1>   SG1

Selects SG1 as the operation target.

Note:

This function is available only when MG3710A or MG3740A is connected.

SG2   <2>   SG2

Selects SG2 as the operation target.

Note:

This function is available only when MG3710A or MG3740A is connected.

<3>   Load Pattern to Memory A

In the SG-side file display area, loads the selected waveform pattern into the waveform memory A of the specified SG.

<4>   Load Pattern to Memory B

In the SG-side file display area, loads the selected waveform pattern into the wave memory A of the specified SG.

<5>   Remove Pattern from Memory A

In the SG-side file display area, removes the selected waveform pattern from the wave memory A of the specified SG.

<6>   Remove Pattern from Memory B

In the SG-side file display area, removes the selected waveform pattern from the wave memory B of the specified SG.

<7>   Pattern Select, Pattern Combination Select

In the SG-side file display area, selects a waveform pattern or combination files loaded into the waveform memory A or B as an output waveform pattern. A combination file can only be selected in the Defined mode.

The selected waveform pattern or combination file is output from the MG3700A/MG3710A/MG3740A when either of the following conditions is met:

- When IQ Source is Int and both RF Output and MOD On/Off are On

  →The waveform pattern is output from the RF output.

- When IQ Source is Int and I/Q Output are On

  →The waveform pattern is output from the IQ output.

<8>   Defrag

Executes defrag for the waveform memories A and B of the selected MG3700A (re-allocation of files in each memory). Note, however, that defrag is not operated when there is no need to execute defrag or when several MG3700A units are selected.

Note:
   This function is available only when MG3700A is connected.
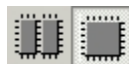
<9>   Edit Mode/Defined Mode

Changes the waveform pattern output mode of the selected SG. In the Defined Mode, one of the patterns or combination files loaded in the waveform memory A or B is selected as an output waveform pattern. In the Edit Mode, one output waveform pattern is selected from each waveform memory, and the selected two output waveform patterns are added to be output.

<10>   Load Pattern Combination to Memory

Loads the waveform patterns selected in the combination file that is selected in the SG-side file display area to the waveform memory A or B of the MG3700A/MG3710A/MG3740A.

<11>   Remove Pattern Combination from Memory

Removes the waveform patterns selected in the combination file that is selected in the SG-side file display area from the waveform memory A or B of the MG3700A/MG3710A/MG3740A.

<12>   Clear Memory

Removes all the waveform patterns loaded into the selected SG's waveform memories A and B.

If the waveform pattern having the same name already exists in the memory when loading a waveform pattern, the overwrite confirmation dialog box is displayed. The meaning of each selection item in this dialog box is as follows:

- Yes
  The waveform pattern is loaded in the target memory overwriting the existing waveform pattern in the memory.
- No
  The waveform pattern is not loaded, and the subsequent memory load processing is executed as required.
- Cancel Or
  The waveform pattern is not loaded, and the subsequent memory load processing is cancelled.

4.6.4   Selecting folder

Select a folder to be displayed in the PC-side file display area.

Figure 4.6.4-1   Selecting Folder

This screen contains the folder selection button, folder move button, and the current folder pass display/input box from the left.

(1)   Folder selection button

When this button is clicked, the folder selection dialog box displayed, in which a folder can be selected.
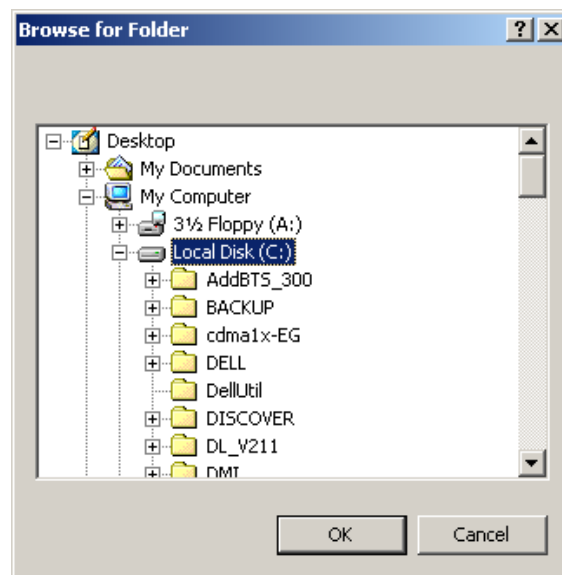
Figure 4.6.4-2   Folder Selection Dialog Box

(2)   Folder move button

When this button is clicked, the contents of the previous directory are displayed. When this button is clicked in the root directory, the drives connected to the PC are displayed in a list.

(3)   Current folder path display/input box

The path of the currently selected folder is displayed. Also, the display path can be changed by entering the folder path from the keyboard directly.

Click the ▼ button on the right to display a pull-down list, where up to 9 latest folders are displayed. If the entered folder does not exist, an error message appears and the contents of the folder before change are restored.

4.6.5 Selecting transfer file type
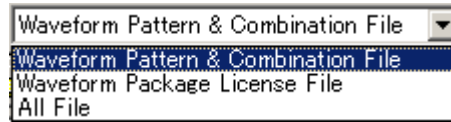
Figure 4.6.5-1   Selecting Transfer File Type

Select the type of the files to be transferred via FTP from the drop-down list.
Can be selected in the drop-down combo box.

The following file types are listed in the drop-down menu.

- Waveform Pattern & Combination File
- Waveform Package License File
- All File

When Waveform Pattern File or Waveform Package License File is selected, only the corresponding files that can be transferred are displayed in the PC-/SG-side file display areas.
When All File is selected, all the files are displayed.

4.6.6   SG-side file display area

The MG3700A/MG3710A/MG3740A units currently connected and the files corresponding to the file type selected in the transfer file type selection box are displayed in the SG-side file display area, on the right field of the Transfer & Setting Panel main screen.

Mainframe currently connected
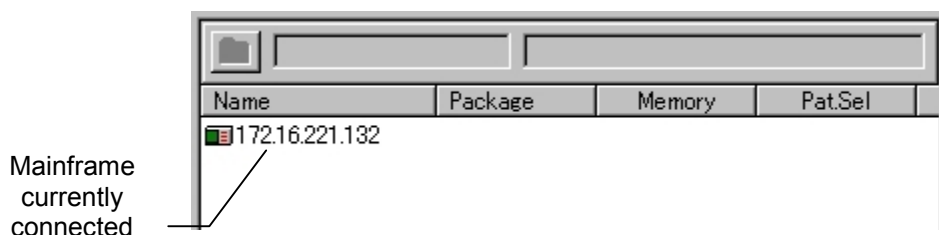
Figure 4.6.6-1   SG-side File Display Area

The following contents are displayed in the SG-side file display area:
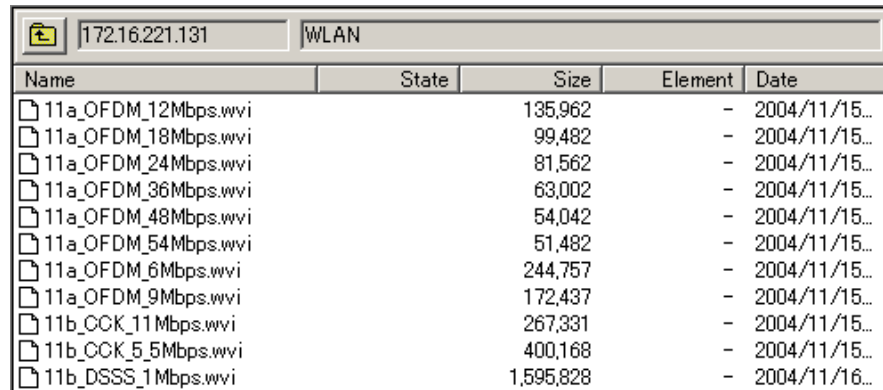
<1> MG3700A/MG3710A/MG3740A units currently connected

<2> The host names or IP addresses of the MG3700A/MG3710A/MG3740A units currently connected are displayed.

<3> The folders and files stored in the hard disk of each mainframe can be displayed by double-clicking the mainframe icon.
Only the files that have the extension of the specified file type are displayed.

<4> Information specific to each file type

<5> Right-clicking in the SG-side file display area opens the pop-up menu.

Details of the contents in the SG-side file display area are described below for each transfer file type.

(1) For waveform pattern and combination file

(when Waveform Pattern & Combination File is selected for transfer file type)

Figure 4.6.6-2   SG-Side File Display Area When Waveform Pattern & Combination File Is Selected

* Information of displayed files

- Name .... Indicates the file name of the waveform pattern
  Only the information files are indicated.

- State .... Displays the waveform pattern or pattern combination file loading status to an arbitrary waveform memory.
  "A" indicates that the waveform pattern/combination file is loaded to the arbitrary waveform memory A, and "B" indicates loading to the arbitrary waveform memory B. "A/B" indicates that the waveform pattern/combination file is loaded to both the arbitrary waveform memories A and B.
  "Mem loaded" indicates that the waveform pattern/combination file is loaded to the waveform memory A or B, and "Selected" indicates that it is selected for output.

- Size .... Displays the total size of the waveform information file and waveform data file in bytes.

- Element ...... Displays the number of waveform patterns selected in the combination file stored on the hard disk.
  For example, when four of the five waveform patterns used in a combination file are stored in the hard disk, "4/5" is displayed.

- Date ....Displays the latest file creation date between the waveform information file and waveform data file of the waveform pattern. For a combination file, its file creation date is displayed (no comparison is made).

When a waveform pattern is loaded to both the waveform memories A and B and that waveform pattern is selected as an output waveform pattern, it is output according to the waveform pattern output mode as follows:

- Defined Mode: The waveform pattern is output from the memory B.

- Edit Mode: The waveform pattern is output from both the memories A and B.

(2) For license file transfer

(when Waveform Package License File is selected for transfer file type)
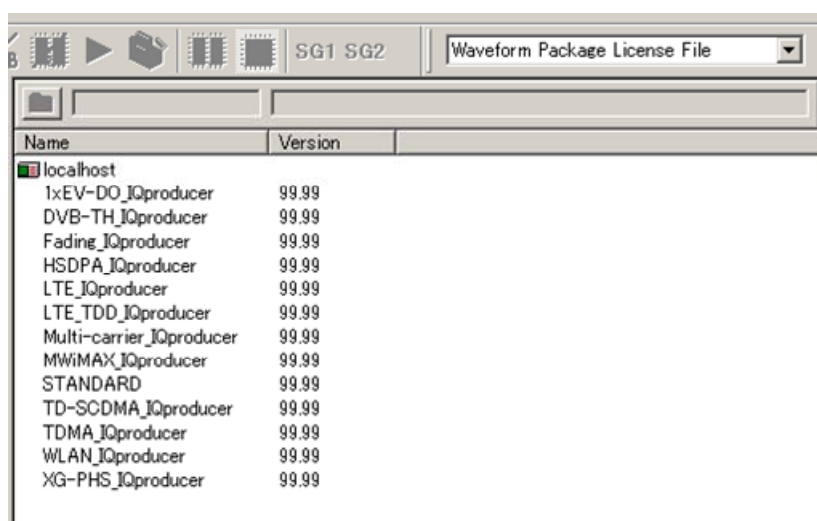
Figure 4.6.6-3   SG-Side File Display Area When Waveform Package License File Is Selected

* Information of displayed files

- Name ....Displays the names of licenses installed in the MG3700A/MG3710A/MG3740A.

- Version........Displays the versions of licenses installed in the MG3700A/MG3710A/MG3740A.

(3) For other file transfer types

(when All File is selected for transfer file type)

When the MG3700A is connected.
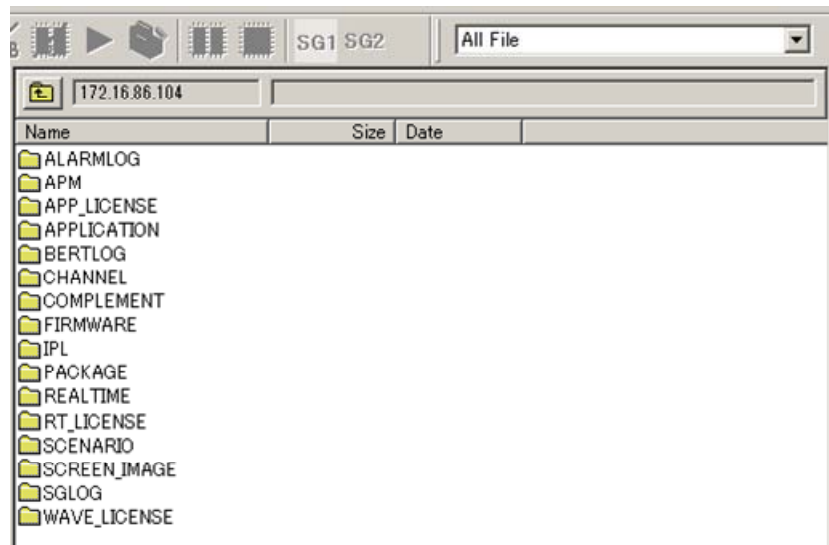
Figure 4.6.6-4   SG-side File Display Area View When MG3700A All File is selected <1>

The following files are stored in each folder:

- ALARMLOG................... Alarm indication log file
- APM............................... Saved parameter file
- APP_LICENSE.............. Not used
- APPLICATION .... Not used
- BERTLOG...................... BERT log file
- CHANNEL..................... Channel table file
- COMPLEMENT............. Correction value
- FIRMWARE .... MG3700A/MG3710A/MG3740A firmware file
- IPL................................ MG3700A/MG3710A/MG3740A IPL (Initial Program Loader) file
- PACKAGE...................... Waveform pattern
- REALTIME .... Not used
- RT_LICENSE .... Not used
- SCENARIO .... Scenario file
- SCREEN_IMAGE.......... Bitmap image file of screen copy
- SGLOG .... MG3700A/MG3710A/MG3740A log file
- WAVE_LICENSE........... Waveform pattern license file

When the MG3710A or MG3740A is connected.
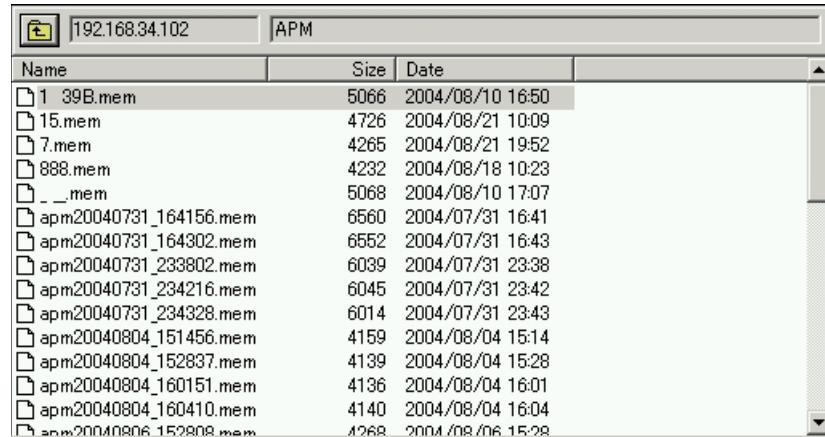
The following files are stored in each folder:

Figure 4.6.6-5   SG-side File Display Area View When
MG3710A/MG3740A All File Is Selected <1>

- Alarm History .... Alarm indication log file
- BERT BitPattern .... User defined pattern of BERT
- BERT Log .... BERT log file
- ChannelTable .... Channel table file
- Copy Files .... Image file of screen copy
- Corrections .... Correction file
- ListTable .... List Table file
- Parameter Setting .... Saved parameter file
- Waveform .... Waveform pattern

* Information of displayed files

**Figure 4.6.6-6   SG-side File Display Area View When
MG3710A/MG3740A All File Is Selected <2>**

- Name .... Displays the file names.
- Size .... Displays the file sizes.
- Date .... Displays the file creation dates.

4.6.7   Selection in SG-side file display area

Each file in the SG-side file display area can be selected by a click. Two
or more files can be selected by ⌈Ctrl⌉ + click (additional selection) and
⌈Shift⌉ + click (range selection).

When downloading files to the MG3700A/MG3710A/MG3740A, select a
file in the PC-side file display area and select an MG3700A/MG3710A/
MG3740A unit as the transfer destination in the SG-side file display
area.
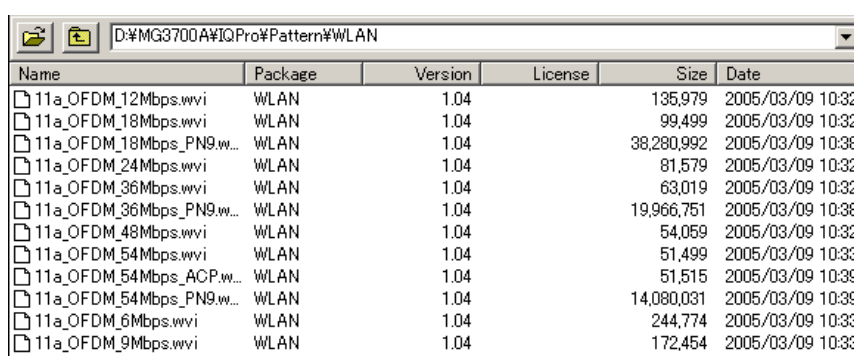
File uploading to the PC is possible when an MG3700A/MG3710A/
MG3740A unit or a file in it is selected.

4.6.8   PC-side file display area

The contents of the folder currently selected are listed in the PC-side file display area, on the left field of the Transfer & Setting Panel main screen.

The files and their information are displayed corresponding to the file type selected in the transfer file type selection box.

The contents in the PC-side file display area are displayed as follows:

Figure 4.6.8-1   PC-side File Display Area

- Only the files that have the extension of the specified file type are displayed.

- The information according to each transfer file type is displayed in the list column units.

- A folder is displayed with its name and created date, and <dir> is displayed for the Size column. The other columns are left blank.

- Right-clicking in the SG-side file display area opens the pop-up menu.

- If incomplete transfer is made with the file (such as waveform pattern) that consists of several files without having the data file set as an information file, that file is not displayed. When "All File" is selected in the transfer file type selection box, however, all the files are displayed.

Details of the contents in the PC-side file display area are described below for each transfer file type.

(1) For waveform pattern

(when Waveform Pattern & Combination File is selected for transfer file type)

Figure 4.6.8-2   PC-Side File Display Area When Waveform Pattern & Combination File Is Selected

* Information of displayed files

- Name .... Indicates the file name of the waveform. Only the information files are indicated.

- Package ...... Displays the names of the packages described in the information files.

- Version........ Displays the versions of waveform patterns.

- License........ The "O" sign is indicated on the waveform pattern of which license is installed in the mainframe selected in the SG-side file display area. A waveform pattern for which "O" is not displayed cannot be used even if it is transferred to the mainframe.

- Size .... Displays the total size of the information file and files specified by the information file.

- Date .... Displays the latest file creation date between the waveform information file and waveform data file of the waveform pattern. Transfer date/time to the MG3700A/MG3710A/MG3740A is used as file creation date.

(2)   For license file transfer

(when Waveform Package License File is selected for transfer file type)

Name	License	Version	SG	Size	Date
noise.key	noise	99.99	192.168.34.1...	384	2004/07/08 14:29

Figure 4.6.8-3   PC-Side File Display Area When Waveform Package License File Is Selected

* Information of displayed files

- Name .... Displays the file names.
- Package/License Name.. Displays the license names of the files. For waveform pattern authentication files, the package names are displayed and the column character strings are changed.
- Version........................... Displays the versions of licenses.
- SG .... Indicates the name of the mainframe for which the license is authenticated. Indicates the IP address or host name used when the mainframe is connected.
- Size .... Displays the license file sizes.
- Date .... Displays the file creation dates.

(3)   For other file transfer types
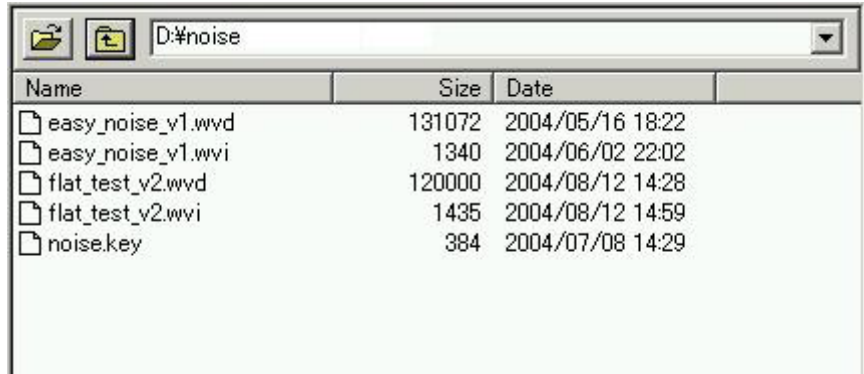
Figure 4.6.8-4   PC-side File Display Area View When All File Is Selected

* Information of displayed files

- Name .... Displays the file names.
- Size .... Displays the file sizes.
- Date .... Displays the file creation dates.

4.6.9   Selection in PC-side file display area

Each file in the PC-side file display area can be selected by a click. Two or more files can be selected by   Ctrl   + click (additional selection) and   Shift   + click (range selection).

Files that can be downloaded are those actually selected in the PC-side file display area only. The MG3700A/MG3710A/MG3740A specified as the transfer destination must be selected at this time.

4.6.10 Status display

Figure 4.6.10-1   Status Display

The status bar displays the following information of the MG3700A/MG3710A/MG3740A currently selected:

- Free space and total space of the internal hard disk
- Free space and total space of the waveform memories A and B

Note, however, that nothing is displayed when several mainframe units are selected.

Indicates the information of the target SG to be controlled when MG3710A or MG3740A is connected

4.6.11 Disconnection screen
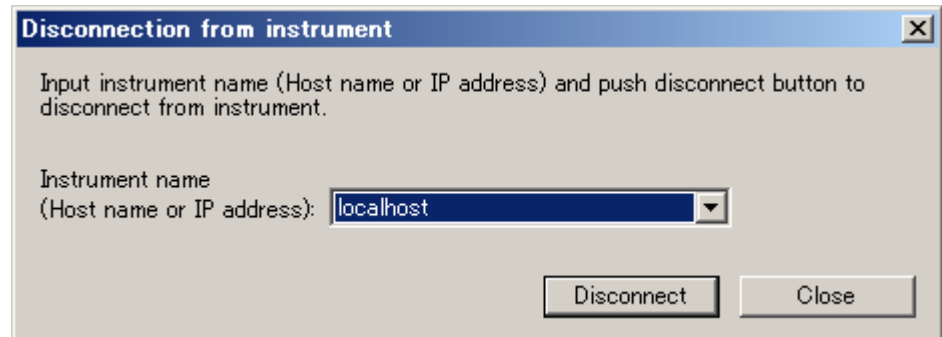
Figure 4.6.11-1   Disconnection Dialog Box

■Description of items

(1)   IP address/host name selection box

The IP addresses and host names of the
MG3700A/MG3710A/MG3740A units currently connected are
displayed in the pull-down list. Select the MG3700A/MG3710A/
MG3740A unit to be disconnected from this list.

(2)   Disconnect button

Click this button to disconnect the selected MG3700A/MG3710A/
MG3740A. The Disconnection screen remains displayed even after
disconnection.

(3)   Close button

Click this button to close the Disconnection screen.

4.6.12 Rename screen (for changing file name)
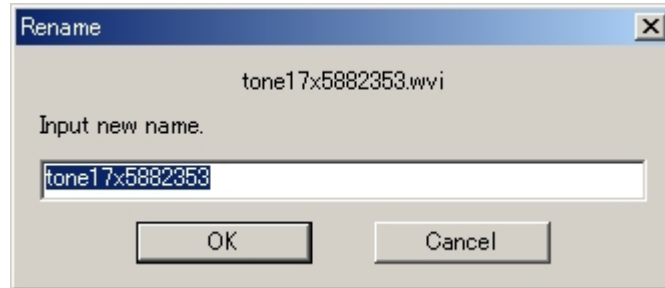
Figure 4.6.12-1   Rename Dialog Box

■Description of items

(1)   File name display/input text box

Displays the file name to be renamed. Enter a new file name.

(2)   OK button

Click this button to finalize the entered file name. When the entered file name contains an illegal character (restricted for file name by Windows), an error message is displayed. After the error message is closed, the new file name input edit is selected, prompting to retry.

(3)   Cancel button

Click this button to cancel renaming and close the Rename screen.

4.6.13 Create new folder screen (for inputting folder name)
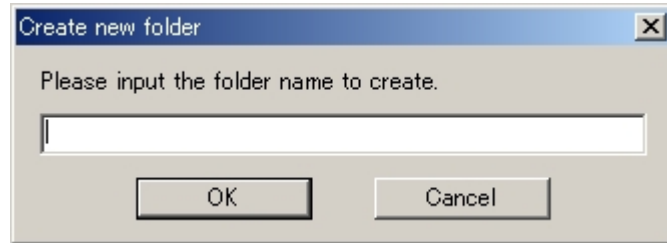
Figure 4.6.13-1   Create New Folder Dialog Box

■Description of items

(1)   Folder name input text box

Enter the name of the folder to be created.

(2)   OK button

Click this button to finalize the entered folder name. When the entered folder name contains an illegal character (restricted for folder name by Windows), an error message is displayed. After the error message is closed, the new folder name input edit is selected, prompting to retry.

(3)   Cancel button

Click this button to cancel folder creation and close the screen.

4.7 File Transfer and Loading to Memory Using Transfer & Setting Wizard

4.7.1 Activation

Select **Transfer & Setting Wizard** from the **Simulation & Utility** tab on the common platform screen.
The wizard dialog box is displayed in the newly opened window.

4.7.2 Transfer & Setting Wizard (Step 1/2) (Connection screen)
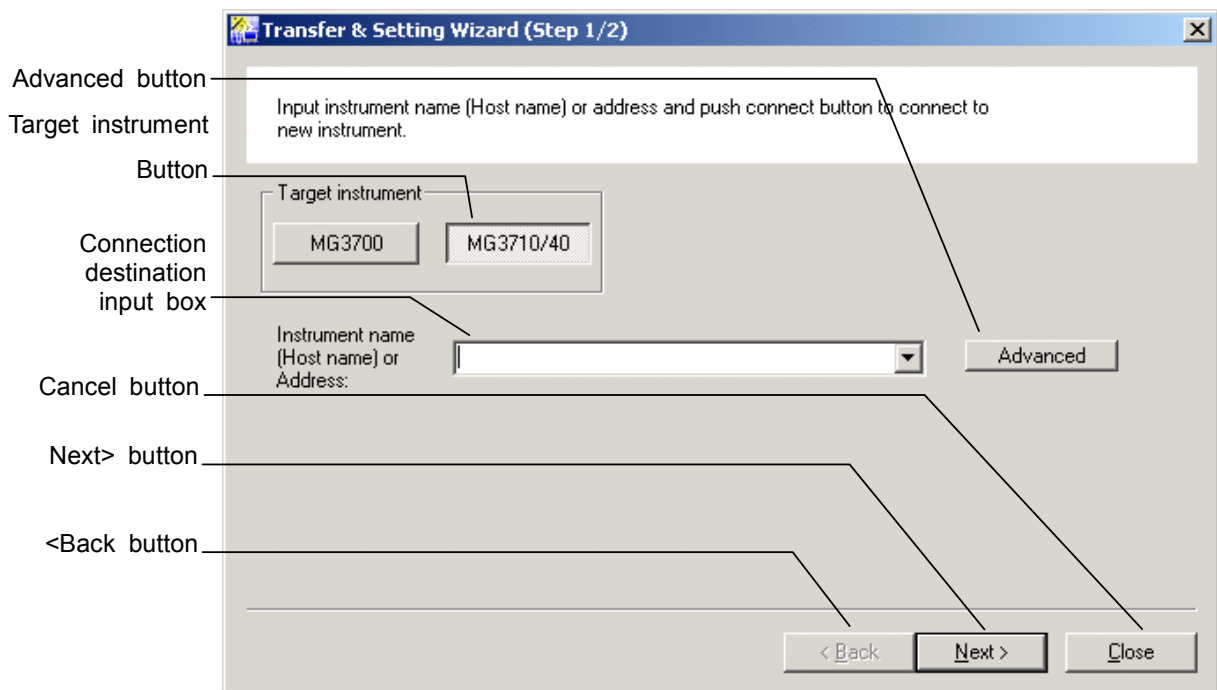
Figure 4.7.2-1 Connection Screen

The screen shown in Figure 4.7.2-1 below is displayed when the Transfer & Setting Wizard is activated.

■Description of items

(1) Target instrument button

Selects the target instrument to be connected from **MG3700** or **MG3710/40.**

(2) Connection destination input box

Enter the host name or IP address of the MG3700A/MG3710A/MG3740A to be connected (connection destination). When it is entered, the user ID, password, and port number necessary for connection are set with the default values. Up to 30 host names/IP addresses lately entered or updated are recorded and listed in the pull-down menu for selection. The host name/IP address of the MG3700A/MG3710A/MG3740A updated or connected lately is listed to the top of the pull-down menu. When a host name/IP address is selected from the pull-down list, connection is made in the network at that time.

(3) Advanced button

Click this button to display the **Advanced** screen.

(4) <Back button

This button is used to return to the previous screen. This button is disabled in this screen.

(5) Next> button

Click this button to start connection. When the connection is completed normally, the package selection screen is displayed. When the connection is failed, an error message is displayed and the screen remains displayed. If the MG3700A firmware version is 1.xx, the warning message "The MG3700A firmware version is 1.xx. Your version of IQproducer cannot connect with the version 1.xx of MG3700A normally. Please check Anritsu Download Support Site to upgrade MG3700A firmware." will be displayed. In this event, this software cannot be connected normally to the MG3700A. Upgrade the MG3700A firmware before starting connection (the latest firmware can be obtained from the download page linked to the MG3700A page on the Anritsu Web site).

(6) Cancel button

Click this button to cancel the wizard and closes the screen.

■Description of items on Advanced screen

Clicking the **Advanced** button displays the Advanced screen, in which the connection destination can be set in detail.
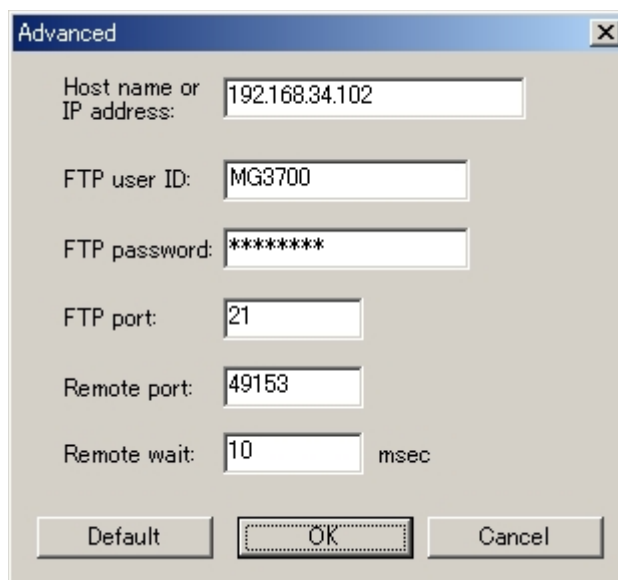
Figure 4.7.2-2　Advanced Dialog Box

(1)　Host name or IP address

　　Enter the host name or IP address of the mainframe to be connected

(2)　FTP user ID

　　Enter the user name used in FTP login.

(3)　FTP password

　　Enter the password used in FTP login.

(4)　FTP port

　　Enter the port number used by FTP.

(5)　Remote port

　　Enter the port number of the remote used for authentication and memory loading.

(6)　Remote wait

　　Set the period between commands.

(7)　Default

　　Restores all the parameter settings to the default values when clicked.
　　The default values for each parameter are as follows:

Table 4.7.2-1   Default Values

Settings	MG3700A	MG3710A/MG3740A
User ID	MG3700	ANRITSU
Password	password	anritsu
FTP port	21	21
Remote port	49153	49158
Remote wait	10 msec	10 msec

(8) OK

Finalizes the settings and closes the screen when clicked.

(9) Cancel

Cancels the settings and closes the screen when clicked.

Note:

Connection with the MG3700A/MG3710A/MG3740A is possible when the parameters are set to the default values. Do not change the parameters in the Advanced screen unless otherwise required.

4.7.3 Transfer & Setting Wizard (Step 2/2) (File selection&transfer screen)

When the Next> button on the Package selection screen is clicked, the screen shown in Figure 4.7.3-1 below is displayed.
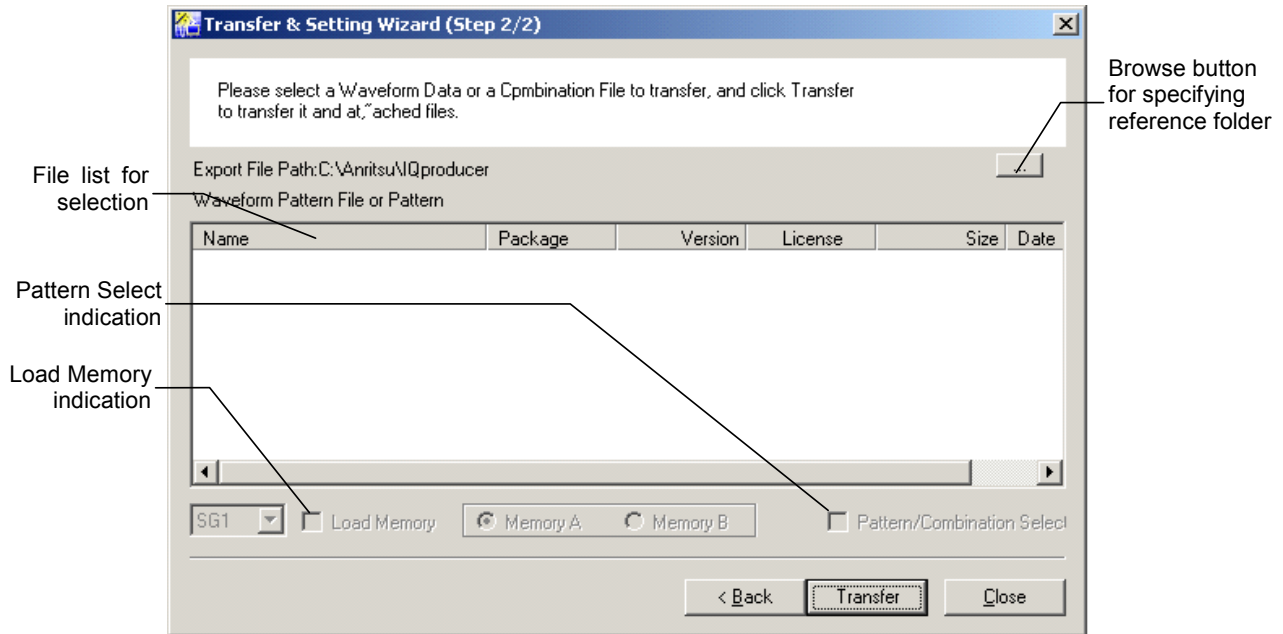
Figure 4.7.3-1   File Selection & Transfer Screen

■Description of items

(1) Browse button for specifying reference folder

Click this button to open a dialog box used for selecting the path of a reference folder. When the Transfer & Setting Wizard is activated, the folder in which the last waveform pattern was generated by an IQproducer waveform generation application is selected as the default reference folder.

(2) File list for selection

A list of waveform patterns and combination files that can be transferred is displayed. The displayed waveform patterns are stored in the data folder of the waveform generation application corresponding to the package selected in the Package selection screen.

The name, package, version, license, size, and created date of each file are displayed in the list. Click a file to select it. Since multiple selection is not supported, file transfer is operated for each file.

(3)   Selects SG only when MG3710A or MG3740A is connected

Selects the SG to which the waveform pattern is loaded or selected SG2 will be indicated only when the 2nd SG is installed on MG3710A/MG3740A.

(4)   Memory Load indication

Sets whether to load the transferred waveform pattern to the memory in the MG3700A/MG3710A/MG3740A. To load the waveform pattern to the memory at the same time with the transfer to the internal hard disk of the target MG3700A, check the Load Memory check box to leave a checkmark (✔), and then select the transfer destination from waveform memory A or B by clicking the corresponding radio button.

When a waveform pattern that is not supported by the license is selected, this function is disabled.

(5)   Pattern Select indication

When the transferred waveform pattern is set to be loaded to the memory, check this check box to select that file as an output waveform pattern.
The selected waveform pattern is output from the MG3700A/MG3710A/MG3740A when either of the following condition is met:

- The waveform pattern is output from RF output when **IQ Source** is set to **Int** and both **RF Output** and **MOD On/Off** are set to **On**.

- The waveform pattern is output from IQ output when **IQ Source** is set to **Int** and **I/Q Output** is set to **On**.

(6)   <Back button

Click this button to return to the previous screen (Package selection screen).

(7)   Transfer button

Click this button to transfer the selected waveform pattern to the internal hard disk of the MG3700A/MG3710A/MG3740A.
If the file to be transferred is not supported by the license of the MG3700A, the message "At least, "*SG1*" doesn't have a license of "MG3700A_No1". Please use after having installed the key file on "*SG1*"." is displayed.

*   *SG1* indicates the host name or IP address of the transfer destination mainframe and *MG3700A_No1* indicates the name of the file to be transferred.

(8)   Close button

Click this button to cancel the wizard and closes the screen.

4.8   Combining Waveform Patterns by Combination File Edit Function

Select waveform patterns stored on the PC or the hard disk inside the
MG3700A/MG3710A/MG3740A to set the waveform pattern combination
to be loaded to the two arbitrary waveform memories.
Moreover, a sequence operation can be set by setting repeat count, and so
on, for each of up to 200 waveform patterns loaded to memory A.
A combination file (.wvc) that defines the pattern combination created by
this function enables waveform pattern transfer or pattern combination
selection just by selecting a pattern.

4.8.1   Activation

Select **Combination File Edit** from the **Edit** menu on the Transfer &
Setting Panel screen.
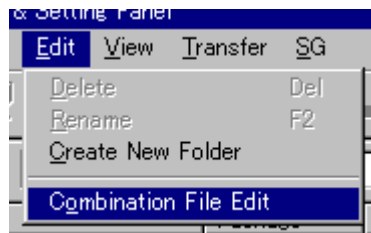
Figure 4.8.1-1   Screen When Combination File Edit Is Selected

The Combination File Edit screen is displayed separately.

4.8.2   Combination File Edit screen
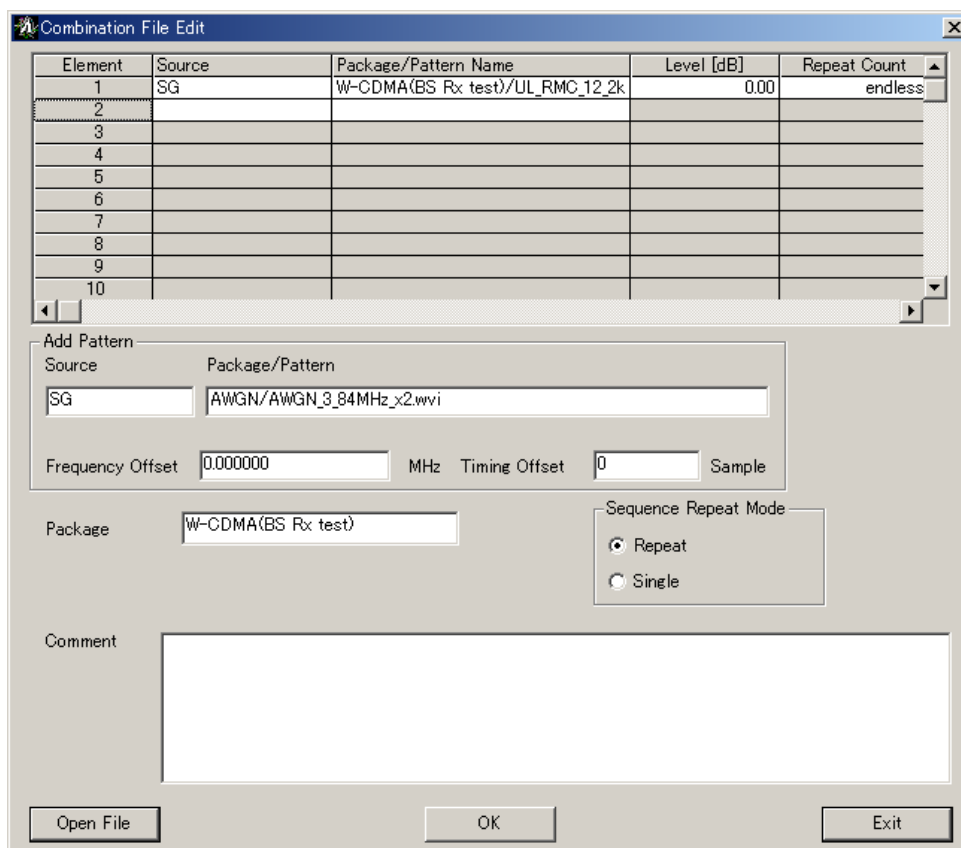
Figure 4.8.2-1   Combination File Edit Screen

■Description of items

(1)   Source

Displays whether the selected pattern belongs to the PC or SG.

(2)   Package/Pattern Name

Up to 200 waveform patterns to be used in memory A are selected.
Note that a waveform pattern whose size exceeds the capacity of memory A cannot be selected.
The following two waveform pattern selection methods are available:

- Double-click a wvi file on the PC- or SG-side in the Transfer & Setting Panel screen.

- Right-click on the selected element to open the pop-up menu. Select "Open wvi File" to select a file.   However, wvi files on the SG-side cannot be selected.

(3)   Level [dB]

  When Add Pattern is not selected:

Set the relative level ratio of each element to the set RF level value of the MG3700A/MG3710A/MG3740A in dB units. For example, when a combination file including an element for which the level is set to –3 dB is selected, while the RF output power of the MG3700A/MG3710A/MG3740A is set to 0 dBm, then the RF output power of the MG3700A/MG3710A/MG3740A when outputting the element becomes –3 dBm. The setting range is from –80 to 0 dB, with a resolution of 0.01 dB.

When Add Pattern is selected:

Set the level ratio for Add Pattern. The total power, of the Add Pattern and the Element with the maximum level ratio set, is the RF output power of the MG3700A/MG3710A/MG3740A. For example, if a combination file is selected when the RF output power of the MG3700A/MG3710A/MG3740A is set to 0 dBm, and the maximum set level ratio among the elements in the combination file is +3 dB, then the total output power when outputting this element becomes 0 dBm (Element power/Add Pattern power = +3 dB)Although the setting range when Add Pattern is selected is from –80 dB to +80 dB, the set values for all elements must be within 80 dB. The setting resolution is 0.01 dB. When AWGN is selected for Add Pattern, set the level by a power ratio within the system bandwidth that is determined depending on the communication system. In this event, it is required to set necessary parameters such as the AWGN sampling rate for the desired signal used by the element, in order to obtain correct outputs. Refer to Section 4.9 "Generating AWGN Waveform Pattern" for details.

(4)   Repeat Count

Set the repetition count for each waveform pattern. The setting range is from 0 to 65535. When 0 is input, this sets infinity. When infinity is set, the same waveform pattern is repeatedly output until any screen/remote operation is performed or Pattern Trigger is input.

(5)   Add Pattern (memory B pattern) selection
Select the waveform pattern to be used in memory B.
Note that a waveform pattern whose size exceeds the capacity of memory B cannot be selected.
The waveform pattern selection method is the same as that shown in "(2) Pattern" above.

Note:

The baseband signal synthesizer option is required to use Add Pattern.

(6) Frequency Offset

Set the output frequency offset for the waveform pattern selected as an element.

The setting range is as follows:

Fs: Sampling Rate

BW: The maximum modulation bandwidth of the selected element (defined in the wvi file of each pattern.)

n: The maximum integer within the range such that $Fs*2n$ does not exceed 160 MHz.

When $Fs \leq 20$ MHz:

$$\text{The maximum frequency offset} = \frac{(0.8*Fs*2^n - BW)}{2}$$

When $Fs > 20$ MHz:

$$\text{The maximum frequency offset} = \frac{(0.8*Fs - BW)}{2}$$

(7) Timing Offset

Set the differential delay from the top of the Element1 pattern to the start of the Add pattern output. The setting unit is one waveform pattern sample.

Setting range: 0 to "Element1 sample count – 1"

(8) Package

Set the package name to be stored during transfer to the MG3700A/MG3710A/MG3740A.

(9) Sequence Repeat Mode

When the waveform pattern of the last element registered in the list is output for the number of times set in Repeat Count, the sequence processing returns to the waveform pattern of the first element and is executed repeatedly. End of Sequence (signal with RF output OFF) is automatically added to the last element registered in the list. When the waveform pattern of the last element is output for the number of times set in Repeat Count, an End of Sequence (signal with RF output OFF) waveform pattern is selected, and the sequence processing ends without outputting any RF signals. Up to 199 elements can be set, excluding End of Sequence.

(10) Comment

Input comments that are displayed when selecting the combination file on the MG3700A/MG3710A/MG3740A. The input range is up to 7 lines × 82 rows.

(11) Open File

Open an existing combination file. Editing of a combination file opened by this function is possible, including the replacement of a waveform pattern of an element, and so on. Note that, for the waveform pattern selected when a combination file is opened by this function, the store destination folder name at transfer to the MG3700A/MG3710A/MG3740A is displayed in "Source/Package" on the Combination File Edit screen because its store source is unknown.

(12) OK

Start combination file creation.

(13) Exit

Cancels the settings and closes the Combination File Edit screen.

4.8.3 Waveform pattern operation

Details on waveform pattern operations in the Combination File Edit screen are explained below.

\<Waveform pattern selection - 1\>

1. Select an element for which a waveform pattern is to be selected. Elements after the last line where Pattern is selected cannot be selected. Multiple elements can be selected while pressing the Shift key.

2. Double-click the wvi file at the PC- or SG-side on the Transfer & Setting Panel screen. When multiple elements were selected in Step 1, the same waveform pattern is selected for each of the selected elements.
   When selecting a wvi file at the SG-side, connect the MG3700A/MG3710A/MG3740A on which the waveform pattern to be selected is stored to the PC in advance, on the Transfer & Setting Panel screen.

3. After selecting the waveform pattern, the element selected on the Combination File Edit screen moves to the next line.

\<Waveform pattern selection - 2\>

1. Select an element for which a waveform pattern is to be selected.

2. Select **Open wvi File** from the menu opened by right-clicking on the element. Waveform files stored on the MG3700A/MG3710A/ MG3740A cannot be selected by using this method.

3. Select the wvi file of the pattern to be used.
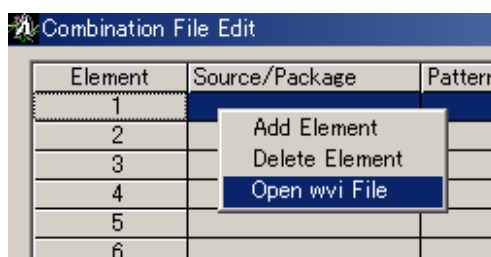
Figure 4.8.3-1   Selecting Open wvi File

\<Element deletion\>

1. Select an element to be deleted.

2. Select **Delete Element** from the menu opened by right-clicking on the element.
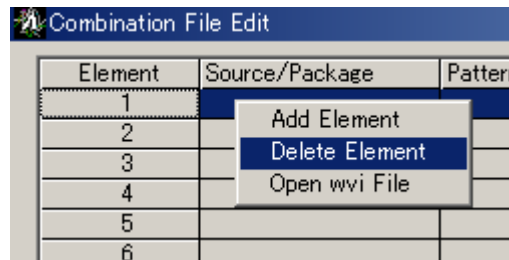
Figure 4.8.3-2   Selecting Delete Element

<Element addition>

1.   Select the Element line above the line to which an element is to be added.

2.   Select **Add Element** from the menu opened by right-clicking on the element.
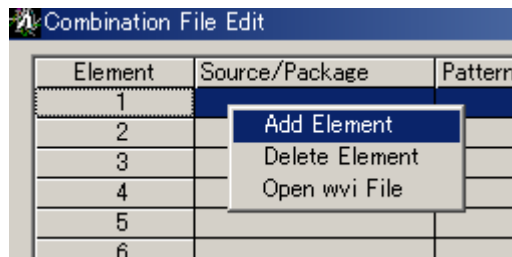
Figure 4.8.3-3   Selecting Add Element

4.8.4   Restriction on waveform pattern selection

Waveform patterns that can be selected within one combination file are restricted by their parameters (defined in the wvi file for each waveform pattern).

Details on the restriction are as follows:

<When all elements including Add have the same parameters>
- Sampling Rate (reading rate of each waveform pattern from the memory)
- Spectrum (relationship between I/Q signal and RF output phase)

<When all elements except Add have the same parameters>
- RMS value of waveform data
- Frame Length (Determined by the number of samples per frame of each waveform pattern, the communication system used, the over sample ratio of the waveform pattern, or the set value for Convert for a waveform pattern created by the customer.)
- Gap Length (Determined by the number of samples in the off period of the burst wave, or the set value for Convert for a waveform pattern created by the customer.)

<Restriction on the parameters in the wvi file when two or more waveform patterns are selected for element>
- An even number must be set for Frame Length and Gap Length.

4.8.5   Executing combination file creation

When combination file creation is started by clicking the **OK** button on the Combination File Edit screen, the Export File screen appears.
On this screen, set the file output path and input the filename.
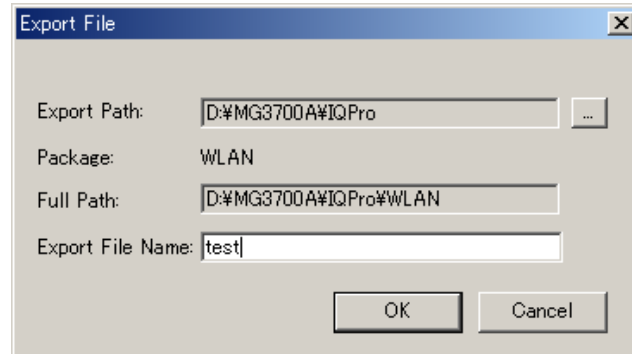
Figure 4.8.5-1   Export File Dialog Box

When the **OK** button is clicked after applying settings on the Export File screen, the following screen appears if a folder with the Package name set on the Combination File Edit screen is not found. Clicking the Yes button creates the folder automatically.
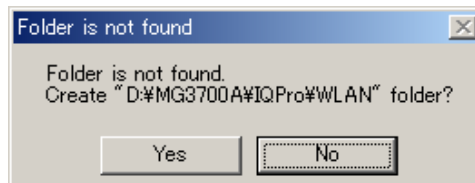
Figure 4.8.5-2   Folder Creation Requesting Dialog Box

The screen shown below appears before file creation starts. Click the **Yes** button to copy all waveform pattern files selected in the combination file stored on the PC-side to the combination file output destination folder. This operation enables batch transfer of the related waveform patterns when transferring the pattern combination file to the MG3700A/MG3710A/MG3740A hard disk.
For this operation, adequate free space for copying the waveform patterns is required on the drive where the combination file output destination folder exists.
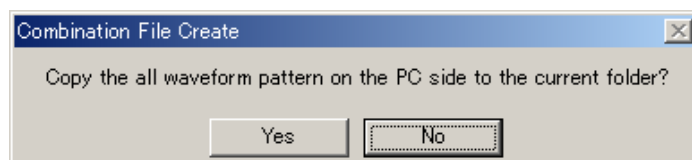
Figure 4.8.5-3   File Copy Confirming Dialog Box

4.8.6   Example of combination file creation

An example of combination file creation on the Combination File Edit screen is provided below.
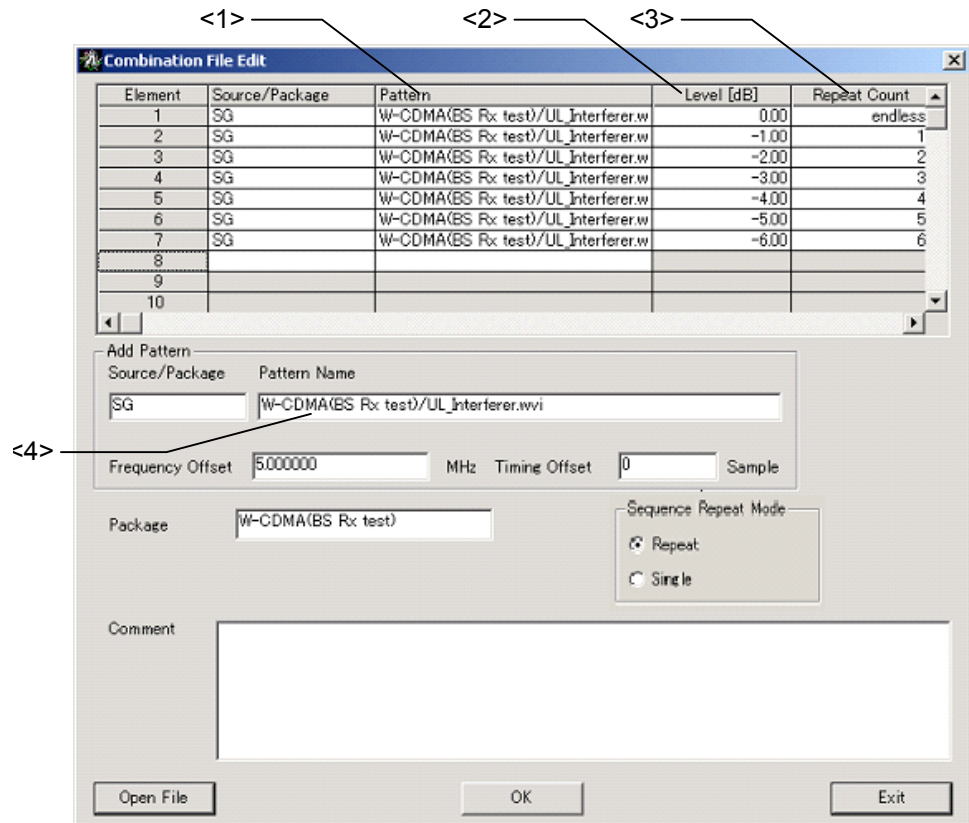
Figure 4.8.6-1   An Example of Combination File Creation

<1> Select a PC- or SG-side waveform pattern. In the above example, all selected waveform patterns are on the SG-side.

<2> Set the level for each element. Since Add Pattern is selected in the above example, the output power of the MG3700A/MG3710A/MG3740A thus becomes equal to the output power value set at the time of combination file selection when Element1 is output, and the power ratio between Element1 and Add Pattern becomes 0 dB.

<3> Set Repeat Count for each pattern. In this combination file, output is performed as follows:

Pattern Trigger or
Next Pattern

| Element 1
× ∞ | ... | Element 1
× ∞ | Element 2
× 1 time | Element 3
× 2 times | Element 4
× 3 times | Element 5
× 4 times | Element 6
× 5 times | Element 7
× 6 times |
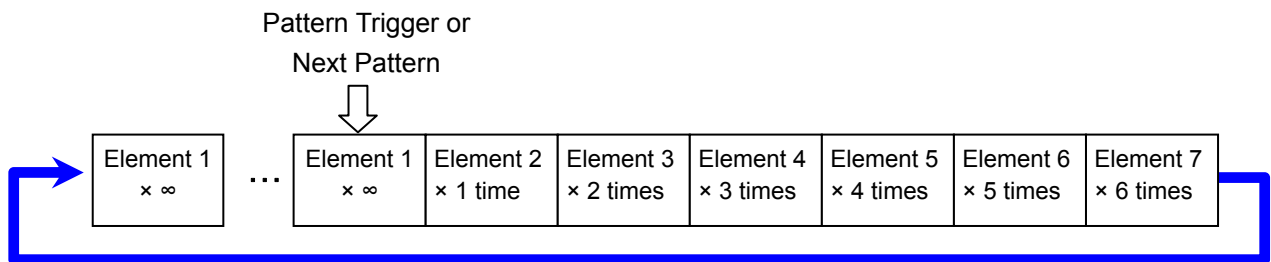
<4> The setting range of the frequency offset is determined by the waveform pattern sampling rate and bandwidth settings.

4.9 Generating AWGN Waveform Pattern

Generate the AWGN (Additive White Gaussian Noise) required for the dynamic range test. The AWGN waveform pattern file suitable for each communication system is generated by setting the bandwidth of the target wave to be added and the AWGN bandwidth magnification for the wave. A waveform pattern file consists of the waveform information file (a text file with the extension "wvi") that includes waveform pattern information and the waveform data file (a binary file with the extension "wvd").

Note:

> The AWGN waveform pattern generation function is not available when **MG3740A** is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

4.9.1 AWGN Generator setting screen

Select AWGN in the File Gen. menu. The screen shown in Figure 4.9.1-1 appears to perform settings for each parameter.
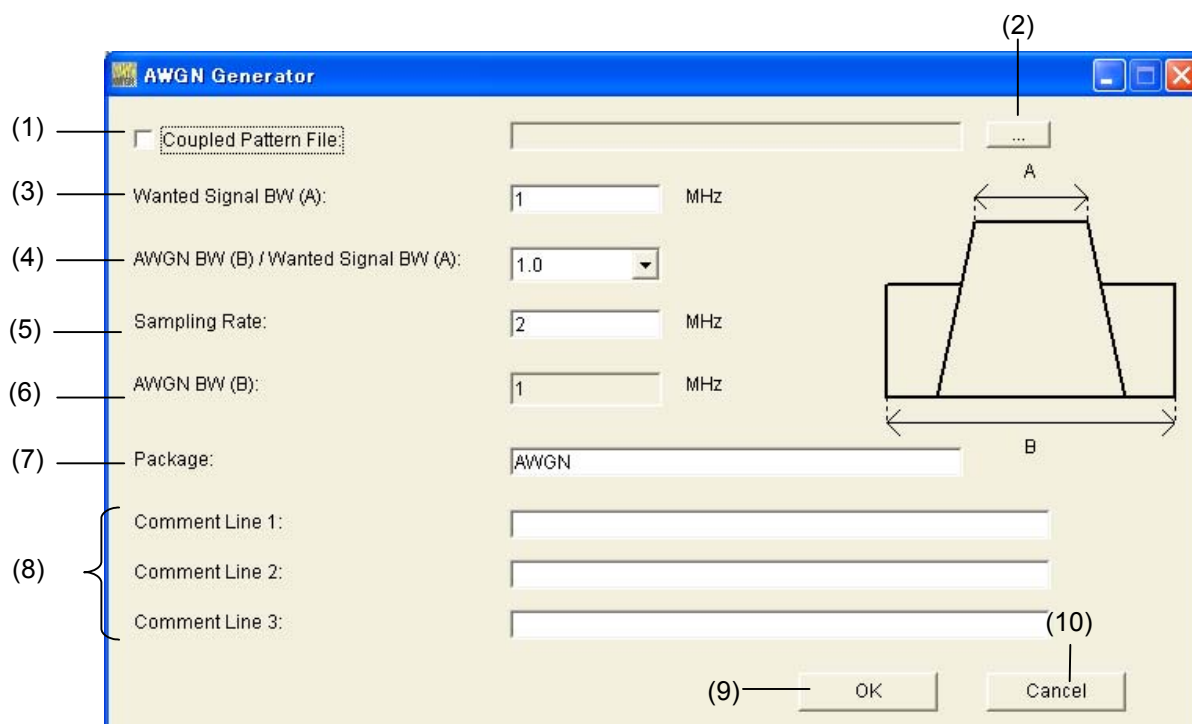
Figure 4.9.1-1 AWGN Generator Setting Screen

■Description of items

(1) Coupled Pattern File

Check this box to generate the waveform using information such as the target wave bandwidth.

(2) Browse button

Select the wvi file of the target wave.

(3) Wanted Signal BW (A)

Set the bandwidth (MHz) of the target wave.

Setting range: 0.001000 to 120.000000 MHz

(4) AWGN BW (B) / Wanted Signal BW (A)

Select the magnification of the AWGN bandwidth for the target wave.

Setting range: 1.0, 1.5, 2.0 or 2.5

(5) Sampling Rate

Set the sampling rate (MHz). Set the same sampling rate as that for the target wave, since the value is common to the target wave and AWGN.

Setting range: 0.020000000 to 160.000000000 MHz

(6) AWGN BW (B)

The AWGN bandwidth (MHz) is calculated using the values for (3) and (4). This item cannot be set by entering a value directly. In addition, the following restrictions apply.

Restricted range:

When $0.020000000 \leq$ Sampling Rate ≤ 20.000000000 MHz

$\qquad 0.001000 \leq$ AWGN BW (B) $\leq$ Sampling Rate/2

When Sampling Rate > 20.000000000 MHz:

$\qquad 0.001000 \leq$ AWGN BW (B) $\leq$ Sampling Rate/2

(7) Package

Enter the name of the package that is to be used to store the generated AWGN waveform pattern files. Up to 31 characters can be used for a package name. Alphanumeric characters and the following symbols may be used:
! % & ( ) + = ` { } _ - ^ @ [ ]

(8) Comment1 to Comment3

The comment entered here is displayed on the MG3700A/MG3710A screen. Up to 38 characters can be used for a package name. This can be left blank.

(9)   OK

Click this button to finish applying the settings. If the restrictions described in (6) are not fulfilled, an error display appears and the settings cannot be completed.

(10) Cancel

Click this button to cancel the settings and close the setting screen.

4.9.2   Setting method

Two setting methods are available: selecting the wvi file of the target wave, or setting all parameters.

■Selecting wvi file
<Procedure>

1.   Click the ⬜ button to select the wvi file of the waveform pattern that is to be used as the target waveform.

2.   The **Coupled Pattern File** check box is checked, and the full path of the selected wvi file is displayed in the **Coupled Pattern File** text box. The bandwidth and sampling rate of the target wave to be used are loaded into the **Wanted Signal BW (A)** and **Sampling Rate** text boxes. In the **Package** text box, the package name, in which the waveform pattern file of the target wave is stored, is loaded.

3.   Set values in the **AWGN BW (B) / Wanted Signal BW (A)**, **Package** and **Comment1 to Comment3** text boxes.

4.   Click the **OK** button to finish applying the settings.

■Setting all parameters
<Procedure>

1.   Click the **Coupled Pattern File** check box to uncheck it.

2.   Set each parameter.

3.   Click the **OK** button to finish applying the settings.

4.9.3 Generating waveform pattern

When the **OK** button is clicked on the setting screen to finish applying the parameter settings, the Export File screen shown in Figure 4.9.3-1 appears. Set the output destination and name of the waveform pattern file, and then execute waveform pattern generation.
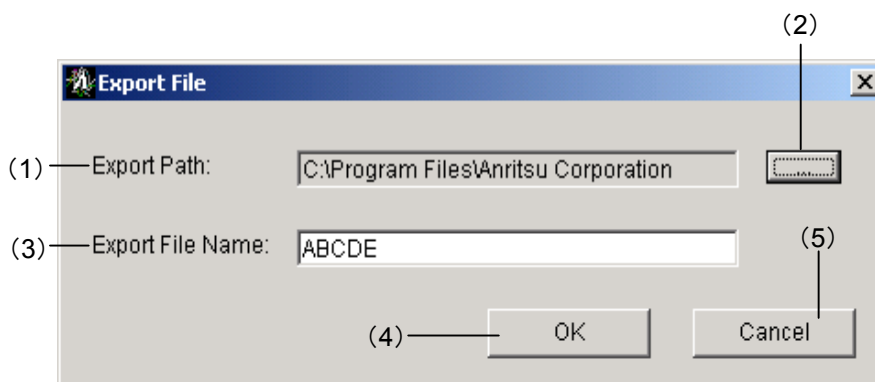
Figure 4.9.3-1 Export File Dialog Box

■Description of items

(1) Export Path

Set the AWGN waveform pattern file output destination.

Table 4.9.3-1 Waveform Pattern Output Destination

Host equipment of this software	Output destination
MG3710	C:\Anritsu\MG3710A\User Data\Waveform\"Package name" An output destination file other than the above can be assigned.
Hosted by PC in the MG3710A mode	Corresponding to the Export Path setting on the Export File dialog box
Other than the above	Corresponding to the Export Path setting on the Export File dialog box

(2) Browse button

Click this button to select the AWGN waveform pattern file output destination.

(3) Export File Name

Enter the name of the AWGN waveform pattern file to be generated (common to wvi and wvd files). Up to 20 characters can be used for a package name. Alphanumeric characters and the following symbols may be used:
! % & ( ) + = ` { } _ - ^ @ [ ]

(4) OK

Click this button to start waveform pattern generation.

(5) Cancel

Click this button to close the Export File screen and return to the setting screen.

<Procedure>

1. Set the AWGN waveform pattern file output destination. Click the �__ button to select the output destination.

2. The output destination of the AWGN waveform pattern file is displayed in the **Export Path**.

3. Set the AWGN waveform pattern file name in the **Export File Name** text box.

4. Click the **OK** button to start waveform pattern generation. Click the **Cancel** button to return to the setting screen.

5. When waveform pattern generation starts, the waveform generation execution screen shown in Figure 4.9.3-2 appears. When the **Cancel** button at the bottom of the screen is clicked, waveform generation stops and the setting screen are displayed again. After the completion of waveform creation ("Calculation Completed" message is indicated), click the **OK** button to close the AWGN Generator Setting Screen to display the setting screen.

6. The AWGN waveform pattern file is generated in the destination displayed in the Export Path text box, with the file name (common to wvi and wvd files) shown in the Export File Name text box.
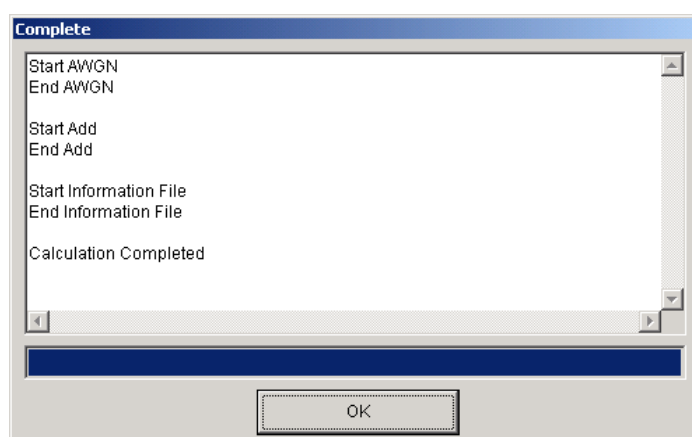
Figure 4.9.3-2   Waveform Generation Dialog Box

4.9.4   AWGN waveform pattern – simulation results

The spectrum of the AWGN waveform pattern generated with the
following settings and CCDF simulation results are as follows.
Wanted Signal BW (A): 1.23 MHz, AWGN BW (B) / Wanted Signal BW
(A): 1.5
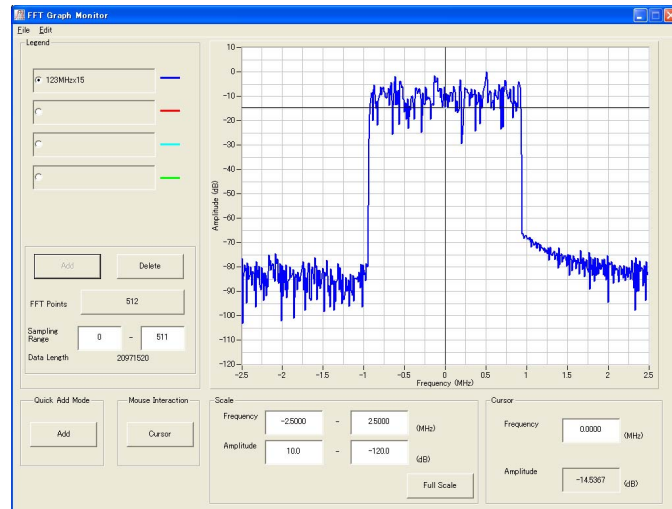
Figure 4.9.4-1   Spectrum
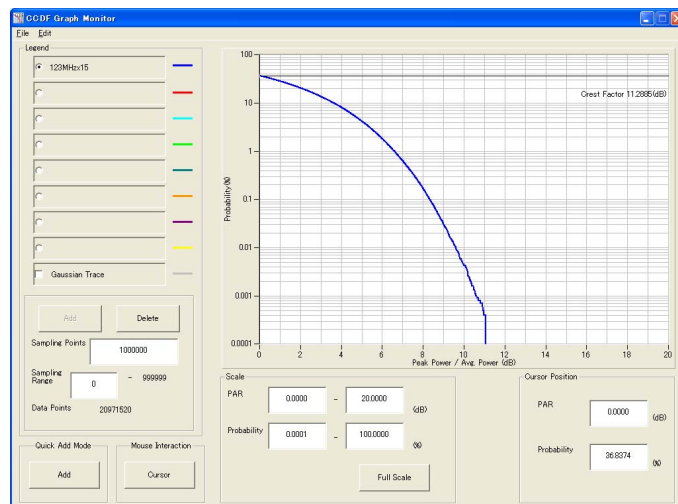
Figure 4.9.4-2   CCDF

4.10 W-CDMA Downlink Waveform Pattern Generation Function

This function enables the generation of a waveform pattern to be used in cases such a W-CDMA reception sensitivity test, by changing some W-CDMA-related parameters of the MX370101A HSDPA IQproducer. It is possible to change the scrambling code number and channelization code number for a waveform pattern that is provided as a standard waveform pattern.

Note:

The W-CDMA Downlink waveform pattern generation function is not available when MG3740A is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

4.10.1 Activation

Select **W-CDMA Downlink (Standard)** from the **System (Cellular)** tab on the common platform screen.
The W-CDMA Downlink setting screen is displayed separately.

4.10.2 W-CDMA Downlink setting screen
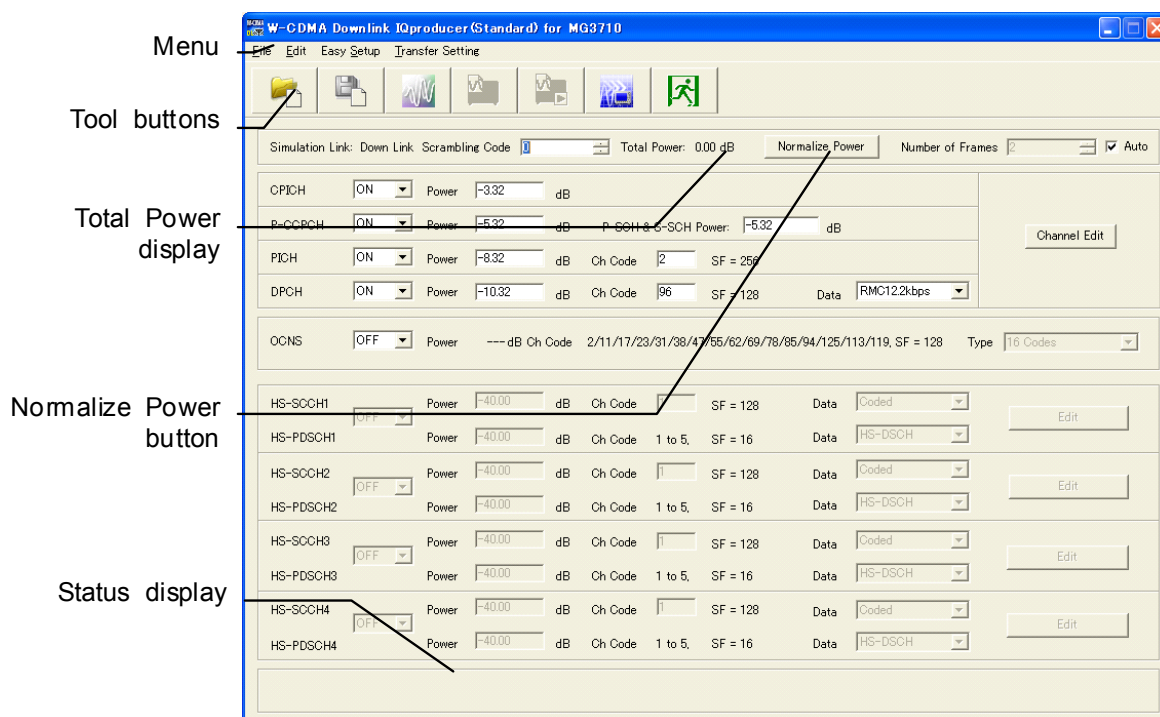
Figure 4.10.2-1 W-CDMA Downlink Setting Screen

■The File menu contains the following items.
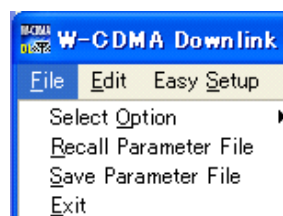
Figure 4.10.2-2   File Selection Screen

- **Select Option**

    When this software is activated in the MG3700 mode;

    Select whether to enable/disable the ARB memory expansion option 512Msamples for the MG3700A. When With Option21 is selected, the maximum size of the waveform pattern that can be generated is expanded. But if the ARB memory expansion option 512Msamples is not installed in this event, the generated waveform pattern may not be able to be used. Select either With Option21 or Without Option21 according to whether the ARB memory expansion option 512M samples is installed in the MG3700A to be used or not.

    With Option21 (Memory 512Msamples): 1 GB × 2 memories
    Without Option21 (Memory 512Msamples): 512 MB × 2 memories

    When this software is activated in the MG3710 mode;

    The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable.

    Set the Select Option according to the combination of the installed options on the MG3710A.

Table 4.10.2-1 Available Options for MG3710A

Select Option setting	Maximum Size of Waveform Patterns	Options implemented on the MG3710A	
		1st SG	2nd SG
Memory 64M samples	64Msample	None	None
Memory 64M samples × 2 (With Option 48, 78)	128Msample	048/148	078/178
Memory 256M samples	256Msample	045/145	075/175
Memory 256M samples × 2 (With Option 48, 78)	512Msample	045/145 048/148	075/175 078/178
Memory 1024M samples	512Msample	046/146	076/176
Memory 1024M samples × 2 (With Option 48, 78)	512Msample	046/146 048/148	076/176 078/178

- **Recall Parameter File**

  Sets the W-CDMA Downlink parameters according to the setting of the parameter files saved by Save Parameter File.

- **Save Parameter File**

  Saves the W-CDMA Downlink setting parameters to a file.

- **Exit**

  Exits the W-CDMA Downlink IQproducer.

■The Edit menu contains the following items.

Figure 4.10.2-3   Edit Selection Screen

- **Channel Edit**

  Displays the Channel Edit screen in which the P-CCPCH and DPCH parameters are set. This is the same operation with clicking the Channel Edit button on the screen.

- **Calculate Waveform Pattern**

  Starts waveform pattern generation based on the settings on the screen.
  The number of frames to be generated varies depending on the setting conditions for each channel, and the time required for generating a waveform pattern also varies accordingly. The number of frames to be generated is displayed on the calculation progress screen.
  Refer to Appendix B "Number of Frames to Be Generated" in the MX370101A HSDPA IQproducer Operation Manual for details on the number of frames to be generated in accordance with the downlink setting conditions.

  The configuration of the waveform pattern to be generated also varies; whether the waveform pattern uses only one memory or whether it uses two memories.
  When a normal waveform pattern is generated, two files with the extensions ".wvi" and ".wvd" are created. When transferring a waveform pattern or loading a waveform pattern to a memory, select the *.wvi file for the target waveform pattern.
  When a waveform pattern that uses the FIR filter of the mainframe is created, a file with the extension ".wvc" is created in addition to the *.wvi and *.wvd files. When transferring a waveform pattern or loading a waveform pattern to a memory, select the *.wvc file for the target waveform pattern. The settings for two memories are executed at once by this operation.
  Refer to Appendix B "Number of Frames to Be Generated" in the MX370101A HSDPA IQproducer Operation Manual for details about the classification of waveform patterns.

- **Calculation & Load** (Effective only when this software is hosted by the MG3710A)

  Creates the waveform to load it into the memory

- **Calculation & Play** (Effective only when this software is hosted by the MG3710A)

  Creates the waveform, load it into the memory and select it.

■The Easy Setup menu contains the following item.
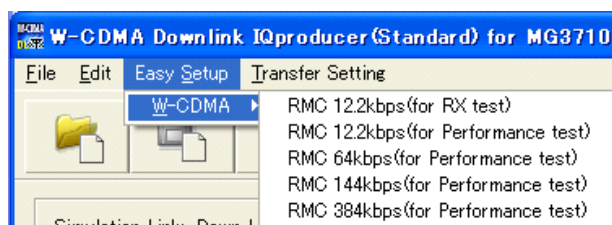
Figure 4.10.2-4　W-CDMA Dialog IN Easy Setup Tabbed Box

Selects the bit rate setting for Reference Measurement Channels (RMC) specified in 3GPP TS25.101, TS25.104.

RMC 12.2kbps (for RX test)
RMC 12.2kbps (for Performance test)
RMC 64kbps (for Performance test)
RMC 144kbps (for Performance test)
RMC 384kbps (for Performance test)

Table 4.10.2-2　Physical Channel Powers for RMC 12.2kbps (for RX test)

Physical Channel	Power ratio
P-CPICH	P-CPICH_Ec/DPCH_Ec = 7 dB
P-CCPCH	P-CCPCH_Ec/DPCH_Ec = 5 dB
SCH	SCH_Ec/DPCH_Ec = 5 dB
PICH	PICH_Ec/DPCH_Ec = 2 dB
DPCH	DPCH_Ec/Ior = −10.32 dB

Table 4.10.2-3 Physical Channel Powers for Channels Other Than RMC 12.2 kbps (for RX test)

Physical Channel		Power ratio
P-CPICH		P-CPICH_Ec/Ior = –10 dB
P-CCPCH		P-CCPCH_Ec/Ior = –12 dB
SCH		SCH_Ec/Ior = –12 dB
PICH		PICH_Ec/Ior = –15 dB
DPCH	12.2 kbps	DPCH_Ec/Ior = –16.6 dB
	64 kbps	DPCH_Ec/Ior = –12.8 dB
	144 kbps	DPCH_Ec/Ior = –9.8 dB
	384 kbps	DPCH_Ec/Ior = –5.5 dB
OCNS		The power where the total of all the channels including OCNS is 0 dB.

■The Transfer Setting menu contains the following item.

Figure 4.10.2-5 Transfer Setting Dialog Box

- **Transfer Setting Wizard**
  Transfer Setting Wizard window is displayed. Generated waveform patterns can be transferred to the MG3700A/MG3710A easily by performing operations on this screen.

■The following tool buttons are provided:

 Recall Parameter File

 Save Parameter File

 Calculation

 Calculation & Load

 Calculation & Play

 Transfer & Setting Wizard

 Exit

The function of each button is the same with the corresponding item in the **File** or **Edit** menu.

■Total Power display
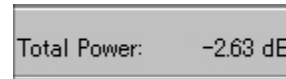
Figure 4.10.2-6   Total Power Display

The total power of the channels that are set to ON (excluding OCNS) is displayed in this field. If the total power displayed here is out of ±0.01 dB when OCNS is OFF, the warning message shown below is displayed during total power calculation, prompting to normalize the total power.
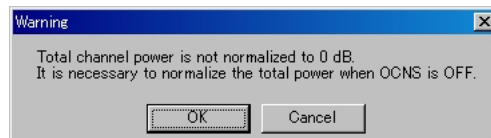
Figure 4.10.2-7   Warning Display

■Normalize Power button
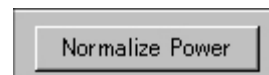
Figure 4.10.2-8   Normalize Power Button

This button is enabled when OCNS is OFF. When this button is clicked, the value displayed in Total Power is subtracted from the power of each channel that is set to ON. As a result, the total power is normalized to 0 dB while retaining the power ratio between channels.

■Status display
The status display on the bottom of the screen displays operation statuses such as a warning occurred during setting.

4.10.3 Details of setting parameters on W-CDMA Downlink setting screen

This section describes the details of the setting items on the W-CDMA Downlink setting screen.

Setting Item	Scrambling Code	
Functional Outline	Sets the downlink scrambling code number.	
Setting Parameters	**Setting range**	
	0 to 8191	
Details	The scrambling code set here is applied to the scramble of all the channels including CPICH, P-CCPCH, and PICH. Therefore, the primary scrambling code number should be set normally for this setting. The primary scrambling code number is expressed as follows: Primary scrambling code number = 16*i (i = 0 to 511)	

Setting Item	Number of Frame	
Functional Outline	Sets the number of frames to be created	
Setting Parameters	**Setting range**	
	Number of Frames	1 to the number of sufficient frames for the waveform memory
	Auto	Selected or cleared the check box
Details	Refer to Appendix B "Number of Frames to Be Generated" in the MX370101A HSDPA IQproducer Operation Manual for the number of sufficient frames for the waveform memory. When the Auto checkbox is selected, the number of sufficient frames is automatically calculated to create the waveform pattern.	

Setting Item	CPICH	
Functional Outline	Performs settings related to CPICH.	
Setting Parameters	**Setting range**	
	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 (dB), setting resolution: 0.01 dB
Details	The channelization code of the CPICH is fixed to 0.	

Setting Item	P-CCPCH	
Functional Outline	Performs settings related to P-CCPCH.	
Setting Parameters	**Setting range**	
	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 (dB), setting resolution: 0.01 dB
	P-SCH & S-SCH Power	–40.00 to 0.00 (dB), setting resolution: 0.01 dB
Details	The channelization code of the P-CCPCH is fixed to 1. BCH is mapped for P-CCPCH.	

Setting Item	PICH	
Functional Outline	Performs settings related to PICH.	
Setting Parameters	**Setting range**	
	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 (dB), setting resolution: 0.01 dB
	Channelization Code	0 to 255

Setting Item	DPCH	
Functional Outline	Performs settings related to Downlink DPCH.	
Setting Parameters	**Setting range**	
	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 (dB), setting resolution: 0.01 dB
	Channelization Code	0 to SF − 1 SF (spreading factor) varies depending on the setting of **Data** as follows: RMC 12.2 kbps = 128 RMC 64 kbps = 32 RMC 144 kbps = 16 RMC 384 kbps = 8 AMR1/AMR2/AMR3 = 128 ISDN = 32 384 kbps Packet = 8
	Data	RMC 12.2 kbps/RMC 64 kbps/RMC 144 kbps/RMC 384 kbps/AMR1/AMR2/AMR3/ISDN/384 kbps Packet
Details	The channel coding parameter of the DCH is set according to the standard format selected by **Data**. **RMC 12.2 kbps/RMC 64 kbps/RMC 144 kbps/RMC 384 kbps** Refer to 3GPP TS25.101 Annex A.3 DL reference measurement channel for details of these channels. See the next and subsequent pages for details of each parameter. **AMR1/AMR2/AMR3/ISDN** Refer to 3GPP TR25.944 4.1.1.3 Example for DCH for details of these channels. See the sections below for details of DTCH, DCCH, and Multiplexing. DTCH *AMR1: 4.1.1.3.1.2 Example for 12.2 kbps data (TFS = #1)* *AMR2: 4.1.1.3.1.2 Example for 12.2 kbps data (TFS = #2)* *AMR3: 4.1.1.3.1.2 Example for 12.2 kbps data (TFS = #3)* *ISDN: 4.1.1.3.1.6 Example for 64 kbps data* DCCH *AMR1/AMR2/AMR3/ISDN: 4.1.1.3.1.1 Example for 3.4 kbps data* Multiplexing *AMR1/AMR2/AMR3: 4.1.1.3.2.2 Example for multiplexing of 12.2 kbps data and 3.4 kbps data* *ISDN: 4.1.1.3.2.5 Example for multiplexing of 64 kbps data and 3.4 kbps data*	

◆DL_RMC_12_2kbps channel coding parameters

Table 4.10.3-1   DL Reference Measurement Channel 12.2 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	12.2
DPCH	ksps	30
Slot Format #i	–	11
TFCI	–	On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	14.7

Table 4.10.3-2   DL Reference Measurement Channel 12.2 kbps Transport Channel Parameters

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12

Figure 4.10.3-1　Channel Coding for DL Reference Measurement Channel 12.2 kbps

◆DL_RMC_64kbps channel coding parameters

Table 4.10.3-3   DL Reference Measurement Channel 64 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	64
DPCH	ksps	120
Slot Format #i	–	13
TFCI	–	On
Power offsets PO1, PO2 and PO3	dB	0
Repetition	%	2.9

Table 4.10.3-4   DL Reference Measurement Channel 64 kbps Transport Channel Parameters

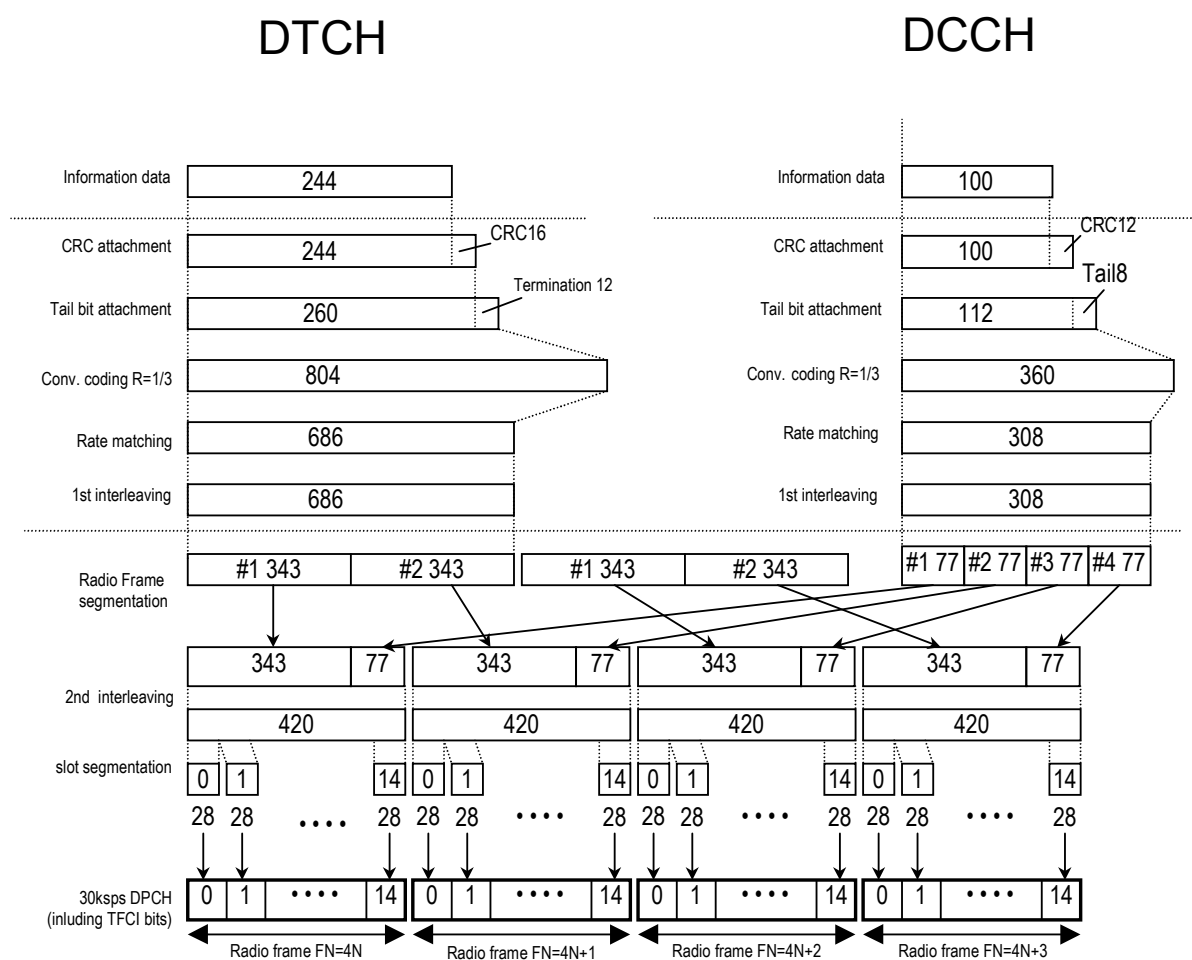| Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	1280	100
Transport Block Set Size	1280	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

Figure 4.10.3-2   Channel Coding for DL Reference Measurement Channel 64 kbps

◆DL_RMC_144kbps channel coding parameters

Table 4.10.3-5   DL Reference Measurement Channel 144 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	144
DPCH	ksps	240
Slot Format #i	–	14
TFCI	–	On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	2.7

Table 4.10.3-6   DL Reference Measurement Channel 144 kbps Transport Channel Parameters

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	2880	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

DTCH

DCCH

Information data	2880	
CRC attachment	2880	CRC16
Tail bit attachment	2896	
Turbo code R=1/3	8688	Termination 12
Rate matching	8464	
1st interleaving	8464	

Information data	100	
CRC attachment	100	CRC12
Tail bit attachment	112	Tail8
Conv. coding R=1/3	360	
Rate matching	352	
1st interleaving	352	

Radio Frame segmentation: #1 4232 #2 4232   #1 4232 #2 4232   #1 88 #2 88 #3 88 #4 88

4232 88   4232 88   4232 88   4232 88

2nd interleaving: 4320 4320 4320 4320

slot segmentation: 0 1 ... 14 0 1 ... 14 0 1 ... 14 0 1 ... 14

288 288 .... 288 288 288 .... 288 288 288 .... 288 288 288 288

240ksps DPCH (inluding TFCI bits): 0 1 .... 14 0 1 .... 14 0 1 .... 14 0 1 14

Radio frame FN=4N   Radio frame FN=4N+1   Radio frame FN=4N+2   Radio frame FN=4N+3
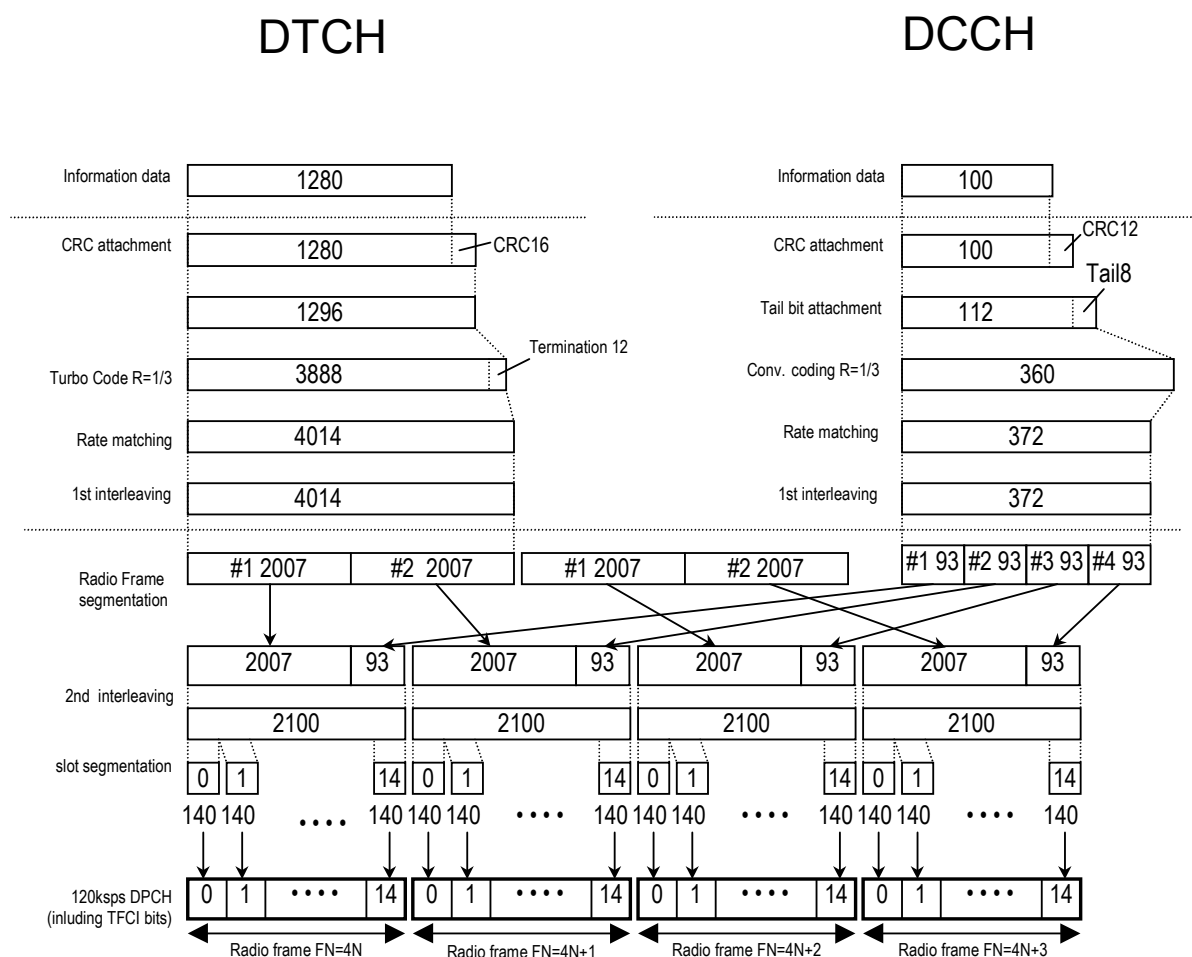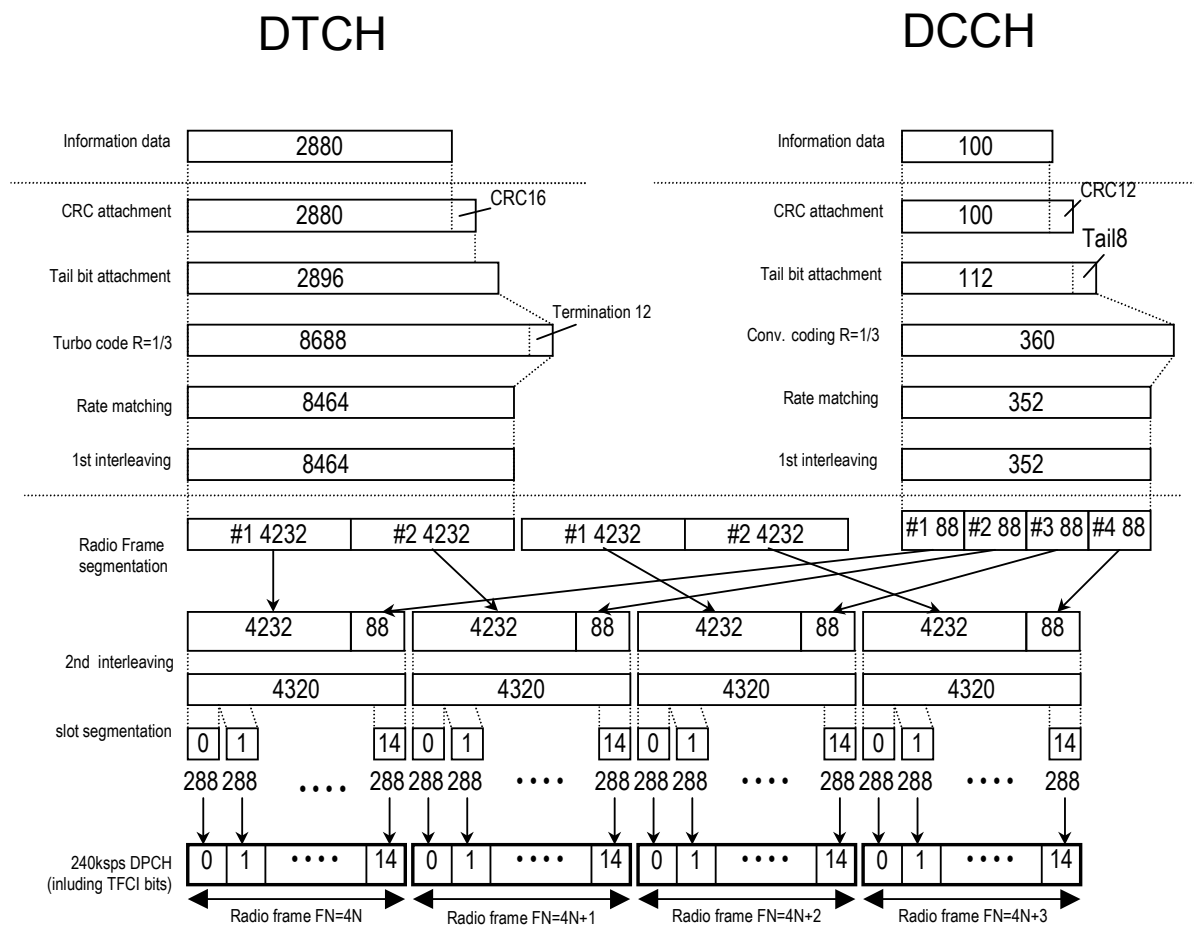
Figure 4.10.3-3   Channel Coding for DL Reference Measurement Channel 144 kbps

◆DL_RMC_384kbps channel coding parameters

Table 4.10.3-7   DL Reference Measurement Channel 384 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	384
DPCH	ksps	480
Slot Format # i	–	15
TFCI	–	On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	22

Table 4.10.3-8   DL Reference Measurement Channel 384 kbps Transport Channel Parameters

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	3840	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12
Position of TrCH in radio frame	fixed	Fixed
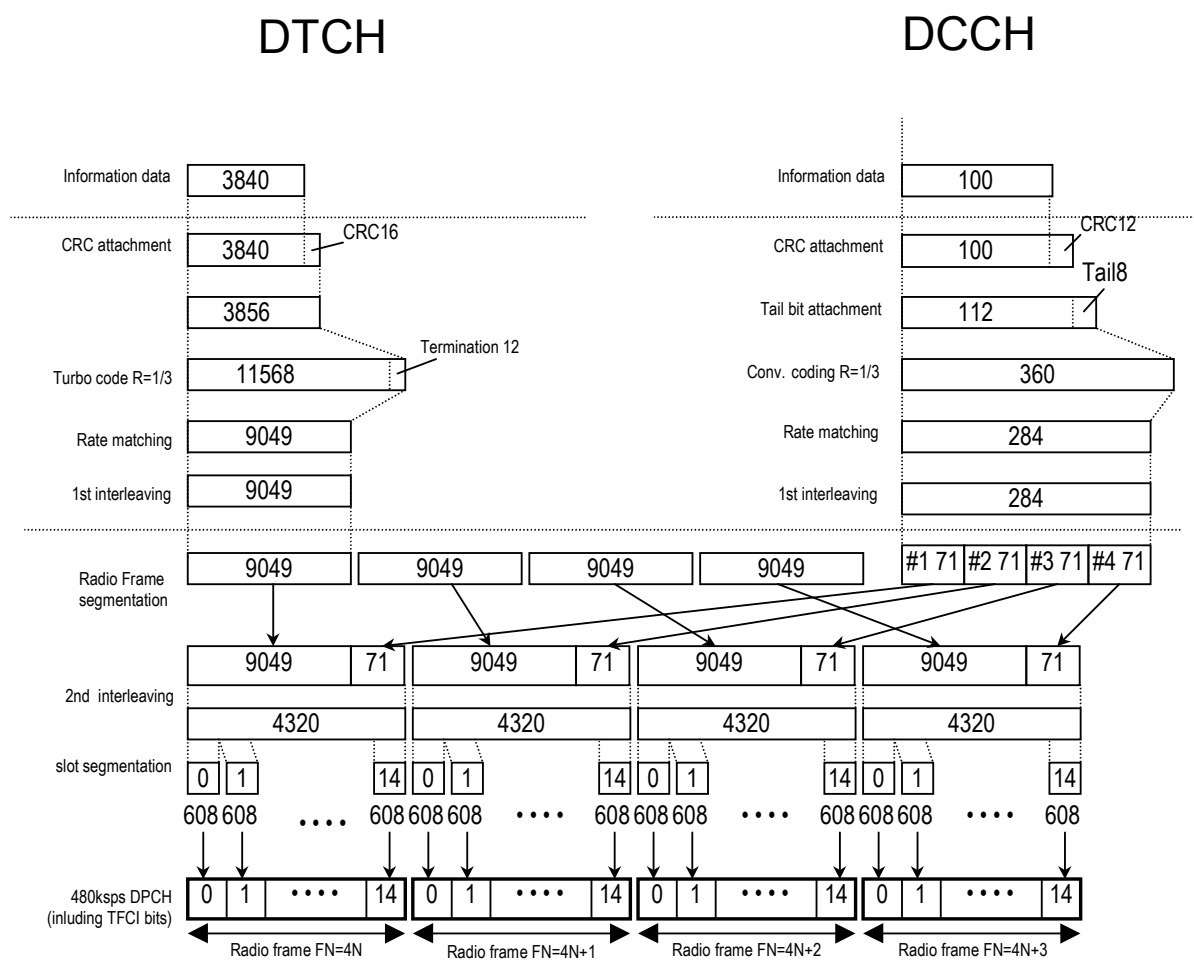
Figure 4.10.3-4   Channel Coding for DL Reference Measurement Channel 384 kbps

Setting Item	OCNS	
Functional Outline	Sets OCNS ON/OFF.	
Setting Parameters	**Setting range**	
	ON/OFF	ON or OFF
	Type	16 Codes
Details	When **OCNS** is set to **ON**, the power of OCNS (Orthogonal Channel Noise Simulator) is adjusted so that the total power of all the channels that are set to ON becomes 0 dB. When the total power of all the channels that are set to ON (excluding OCNS) exceeds 0 dB while **OCNS** is set to **ON**, an error occurs and data generation is cancelled. The total power of all the channels that are set to ON (excluding OCNS) is displayed in Total Power on the screen. To clear this error, set **OCNS** to **OFF** or attenuate the power of each channel. For example, when P-CCPCH, CPICH, and DPCH are set as follows, the total power of the channels except OCNS exceeds 0 dB. OCNS cannot be set to ON in this event, and it is regarded as an error. An error may occur when the actual total power exceeds 0 dB at the thousandth or later places that are not displayed, even if 0.00 dB is displayed in Total Power on the screen. P-CCPCH＝－3.00 dB CPICH＝－3.00 dB Total＞0.0 dB DPCH＝－3.00 dB OCNS＝? When **OCNS** is set to **OFF**, click the **Normalize Power** button to adjust the power of each channel so that the total power of all the channels becomes 0 dB while retaining the power ratio between channels. P-CCPCH＝－3.00 dB Normalize P-CCPCH＝－4.80 dB CPICH＝－3.00 dB ⟹ CPICH＝－4.80 dB DPCH＝－3.00 dB DPCH＝－4.80 dB

Details	OCNS consists of 16-channel (for Performance requirement) DPCH. The table below shows the parameters. Refer to 3GPP TS25.101 (Release 5) Table C.12 for details.

OCNS (16 channels)

Channelization Code at SF＝128	Relative Level Setting（dB）
2	－1
11	－3
17	－3
23	－5
31	－2
38	－4
47	－8
55	－7
62	－4
69	－6
78	－5
85	－9
94	－10
125	－8
113	－6
119	0

Displayed contents

An **OCNS** item **Power** displays the power of OCNS only. The total of the values of **Total Power** and **Power** of this **OCNS** is always 0 dB.

The Channelization Code and SF (spreading factor) used by OCNS are also displayed. |

4.10.4 Details of setting parameters on Channel Edit screen

When the **Channel Edit** button is clicked, the Channel Edit screen shown below is displayed. This section describes the details of the setting items on this screen.

Figure 4.10.4-1   Channel Edit Screen

■The OK and Cancel buttons are provided to close the Channel Edit screen after performing setting.

- When OK button is clicked:
  The Channel Edit screen is closed applying the settings.

- When Cancel button is clicked:
  The Channel Edit screen is closed ignoring the settings.

Setting Item	P-CCPCH Edit	
Functional Outline	Performs settings related to P-CCPCH.	
Setting Parameters	**Setting range**	
	SFN Cycle	Short or 4096
Details	Sets the cycle of SFN (System Frame Number) that is transmitted by BCH mapped to P-CCPCH. When **Short** is set, the cycle of SFN becomes a common multiple of the maximum TTI cycle. Also, the calculation time is reduced and the amount of data to be generated becomes smaller. Set this to **4096** to set the normal 4096-frame cycle.	

Setting Item	DPCH Edit (PhyCH)	
Functional Outline	Performs settings for DL-DPCH physical channels.	
Setting Parameters	**Setting range**	
	Timing Offset	0 to 149
	TFCI	0 to 1023

Setting Item	DPCH Edit (TrCH Edit)	
Functional Outline	Performs settings related to TrCH.	
Setting Parameters	**Setting range**	
	Data	PN9/PN9fix/PN15fix/16bitRepeat/User File
Details	Data Selects the data to be inserted to Information Data of the transport channel. **PN9fix/PN15fix** is PN9/PN15 data reset at the last data of a signal. The last data of a signal and the first data of the next signal are not continuous.	

4.10.5 Saving/reading parameters

This numeric values and settings for each item can be saved in a parameter file by using this software.

Saving parameter file

Figure 4.10.5-1   Parameter File Saving Dialog Box

(1) Select **Save Parameter File** from the **File** menu or click the [icon] tool button to display the parameter file saving screen shown in Figure 4.10.5-1 above.

(2) Enter a file name in the **File name** text box and click the **Save** button to save the parameter file.
When **Input Folder (I)** is not changed, the input folder and the name of the file are as follows;
X:\IQproducer\W_CDMA\ (Entered file name) .prm.
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)
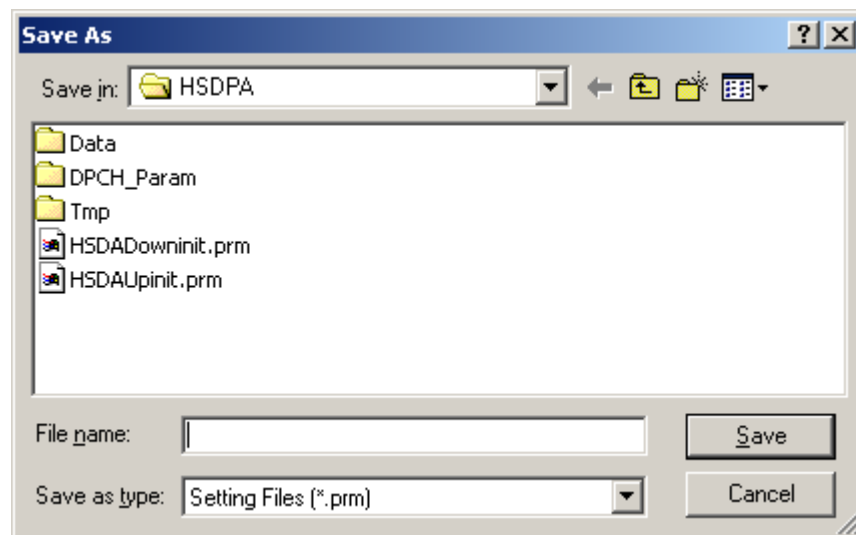
Reading parameter file
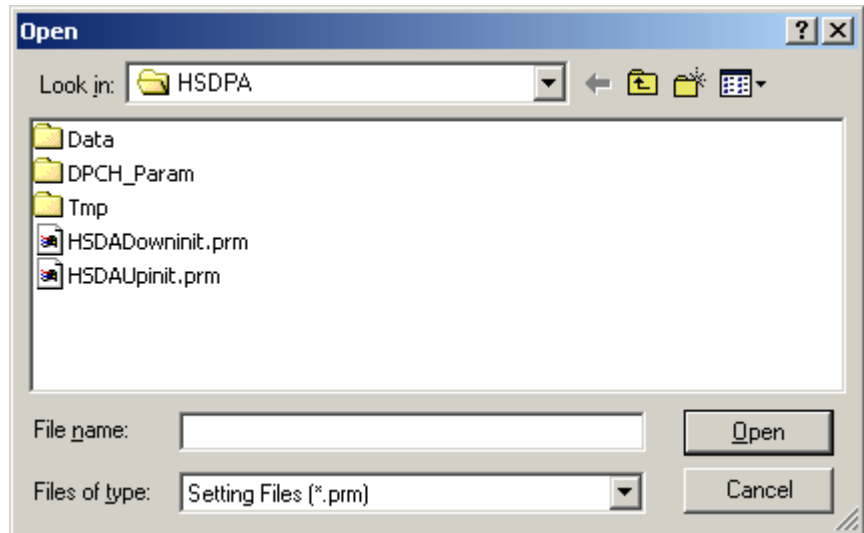
Figure 4.10.5-2   Parameter File Reading Dialog Box

(1)   Select **Recall Parameter File** from the **File** menu or click the [icon] tool button to display the parameter file reading screen shown in Figure 4.10.5-2 above.

(2)   Select a parameter file to be read from the file list, and then click the **Open** button to read the selected parameter file.

4.10.6 Generating waveform pattern file

A waveform pattern file to be used in the MG3700A/MG3710A can be generated based on the setting values. In the screen shown in Figure 4.10.6-2, the waveform pattern name and comments can be entered and whether to enable or disable the RRC filter can be set.

The number of frames to be generated varies depending on the setting conditions for each channel, and the time required for generating a waveform pattern also varies accordingly. The configuration of the waveform pattern to be generated also varies; whether the waveform pattern uses only one memory or whether it uses two memories. The baseband signal synthesizer option is required to use two memories.

(1)　Select **Calculate Waveform Pattern** from the **Edit** menu or click the 　 tool button.

At this time, the **Warning** dialog box shown below appears when **OCNS** is set to **OFF** and the value of **Total Power** is out of ±0.01 dB.
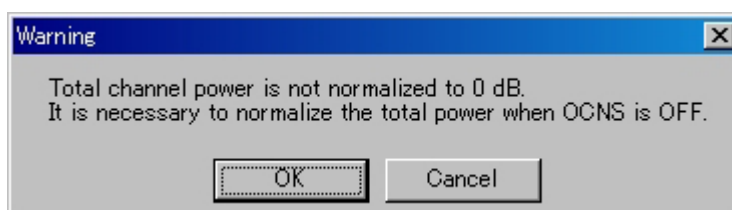
Figure 4.10.6-1　Warning Dialog Box

Click the OK button to normalize the Total Power and proceed with the next step.

(2)   The File Name Input screen is displayed.

File name display area

Output destination folder selection button

Package name input box

Output file name input box

Comment input box

RRC Filter Off checkbox
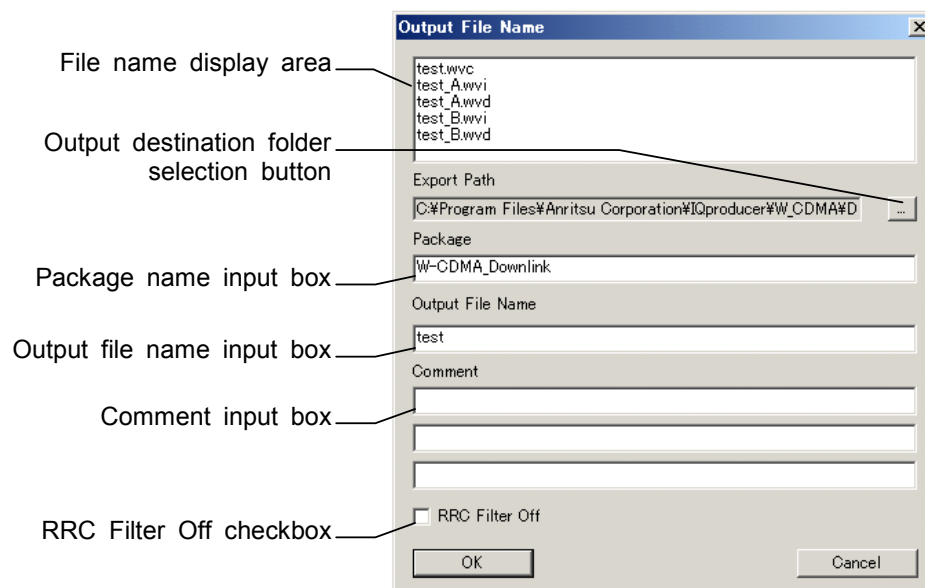
Figure 4.10.6-2   File Name Input Screen

Enter a package name in the package name input box within 31 characters.

Up to 31 characters can be used for a package name.

Enter a file name in the file name input box within 18 characters.

Up to 18 characters can be used for a file name.

1-byte alphanumeric characters and the following symbols can be used for a file name:

! % & ( ) + = ` { } _ - ^ @ [ ]

When a file name is entered, the file to be generated is displayed in the file name display area in the following format:

File name format:

test_A.wvi

> Extension: wvi…   Information file (text format)
>   wvd…   Data file (binary format)
> Target memory: A… Read from waveform memory A
>   B… Read from waveform memory B
> Entered file name

Enter a comment for the waveform pattern in a comment input box. Three comment input boxes are provided, and a comment can be entered in each line within 38 characters.

1-byte alphanumeric characters and symbols can be used for comments.

The contents of each comment are displayed on the screen when the corresponding waveform pattern is selected by the MG3700A/MG3710A. Leave the comment boxes blank if not necessary.

When the RRC Filter Off check box is selected, symbol data that does not pass through the RRC filter is generated as a waveform pattern. This check box needs not be selected under normal conditions.

(3)   Click the **OK** button to start waveform pattern file generation. The calculation progress screen is displayed during the file generation progressing.

Figure 4.10.6-3   Calculation Progress Screen

The file generation processing statuses are displayed in the dialog box.
The file generation progress status is indicated by the progress bar.

Clicking the output destination selection button displays the Browse for Folder screen shown in Figure 4.10.6-4. The output destination folder can be selected from this screen.
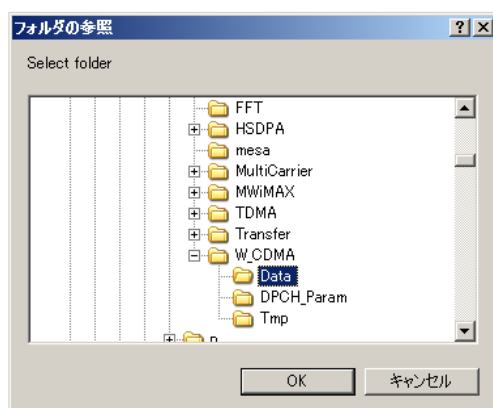
Figure 4.10.6-4   Browse for Folder Screen

When the output destination folder is not specified, waveform pattern files are saved in the following directory:

X:\IQproducer\W_CDMA\Data

(X:\IQproducer is the folder in which the IQproducer™ is installed.)

When this software is hosted by the MG3710A, the waveform will be stored in the following folder.

C:\Anritsu\MG3710A\User Data\Waveform\"Package name"

The output destination file can be changed from other than above.

> *Note:*
>
>   The waveform pattern generation of W-CDMA Downlink IQproducer and W-CDMA Uplink IQproducer can be exclusively executed. During the one is under execution, starting the other execution causes an error dialog indication. When you start a file generation, be sure to cancel the other file generation or to wait for its completion.

4.10.7 Calculation & Load

Note:

This function is available only when this software is used on MG3710A.

When **Calculation & Load** is selected, the Load Setting screen will display after waveform generation.

Load destination selection button

Figure 4.10.7-1   Load Setting Screen

The Select Memory screen will display after clicking the load destination in the Load Setting screen.
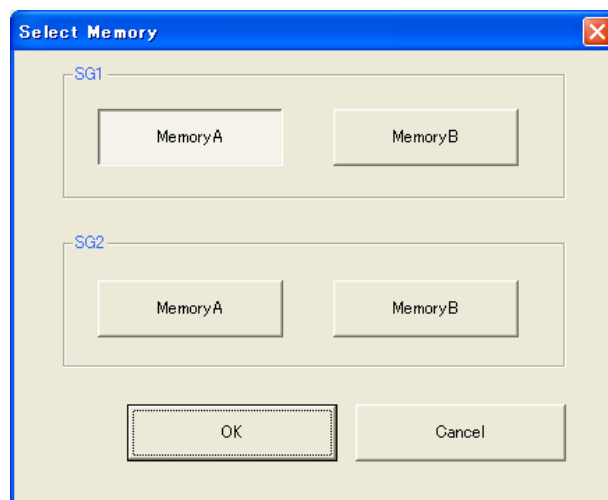
Figure 4.10.7-2   Select Memory Screen

After selecting the load destination of generated waveform in the Select Memory screen and pressing **OK**, the Load Setting screen will be shown again. Press **OK** in the Load Setting screen, and then the loading of waveform starts.

Notes:

- To exit this screen without loading the waveform pattern, click Cancel in the Load Setting screen.

- If the configuration of generated waveform pattern uses two memories, the Select SG screen is displayed as well as Calculation & Play.

4.10.8 Calculation & Play

Note:

This function is available only when this software is used on MG3710A.

When **Calculation & Play** is selected, after waveform creation is completed, the created waveform is loaded into memory, selected and output.

When the 2nd Vector Signal Generator (option) is installed, the Select SG screen is displayed before the start of waveform generation. This screen is used to select the signal generator for outputting the created waveform pattern.
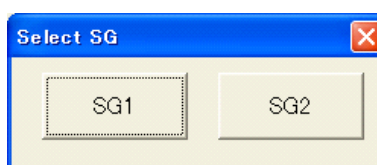
Figure 4.10.8-1   Select SG Screen

4.10.9 Auxiliary signal output

When the waveform pattern generated by the W-CDMA Downlink IQproducer is selected on the mainframe, a marker signal synchronized with the RF signal is also generated from the mainframe output connector.

MG3700A

The TTI Pulse is generated from AUX Input/Output Connector1 on the rear panel.

- TTI Pulse

  TTI interval pulse synchronized to the TTI header symbol is generated. Change Polarity for Marker 1 to change the signal polarity.

MG3710A

The marker signal is output from Marker 1 and AUX connector on the rear panel.

The output signal is specified depending on the MG3710A settings as shown in the Table 4.10.9-1.

Table 4.10.9-1   MG3710A Marker Signal

Generating SG	Waveform memory	Signal name
SG1	Memory A	SG1 Marker1 A
SG1	Memory B	SG1 Marker1 B
SG2	Memory A	SG2 Marker1 A
SG2	Memory B	SG2 Marker1 B

For how to configure marker signal and connector setting, refer to 7.4.2 "Route Output Connectors" in MG3710A Vector Signal Generator Operation Manual (Mainframe).

4.11 W-CDMA Uplink Waveform Pattern Generation Function

This function enables the generation of a waveform pattern to be used in cases such a W-CDMA reception sensitivity test, by changing some W-CDMA-related parameters of the MX370101A HSDPA IQproducer. It is possible to change the scrambling code number and channelization code number for a waveform pattern that is provided as a standard waveform pattern.

Note:

The W-CDMA Uplink waveform pattern generation function is not available when MG3740A is clicked in the Select Instrument window or the IQproducer™ is started on MG3740A.

4.11.1 Activation

Select **W-CDMA Uplink (Standard)** from the **System (Cellular) tab** on the common platform screen.
The W-CDMA Uplink setting screen is displayed separately.

4.11.2 W-CDMA Uplink setting screen
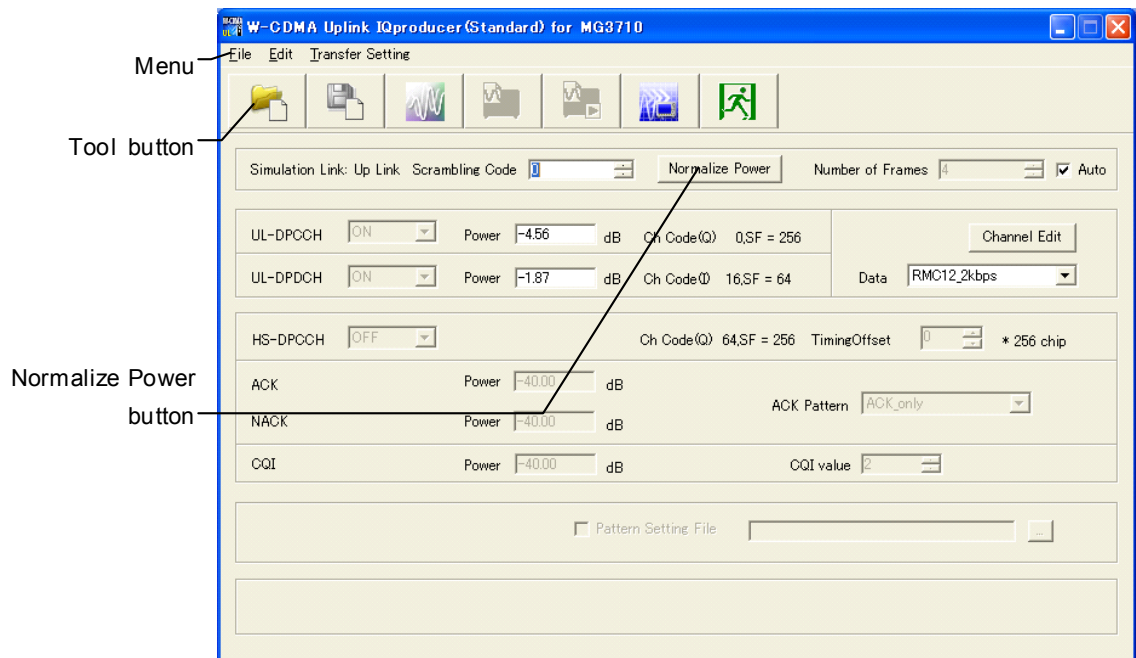
Figure 4.11.2-1   W-CDMA Uplink Setting Screen

■The **File** menu contains the following items.
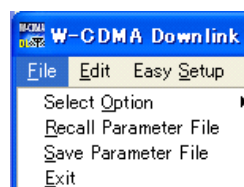
Figure 4.11.2-2   File Selection Screen

- **Select Option**

  When this software is activated in the MG3700 mode;

  Select whether to enable/disable the ARB memory expansion option 512Msamples for the MG3700A. When With Option21 is selected, the maximum size of the waveform pattern that can be generated is expanded. But if the ARB memory expansion option 512Msamples is not installed in this event, the generated waveform pattern may not be able to be used. Select either With Option21 or Without Option21 according to whether the ARB memory expansion option 512Msamples is installed in the MG3700A to be used or not.

  With Option21 (Memory 512Msamples): 1 GB × 2 memory
  Without Option21 (Memory 512Msamples): 512 MB × 2 memory

  When this software is activated in the MG3710 mode;
  The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable.

  Set the Select Option according to the combination of the installed options on the MG3710A.

Table 4.11.2-1   Available Options for MG3710A

Select Option setting	Maximum Size of Waveform Patterns	Options implemented on the MG3710A	
		1st SG	2nd SG
Memory 64M samples	64Msample	None	None
Memory 64M samples × 2 (With Option 48, 78)	128Msample	048/148	078/178
Memory 256M samples	256Msample	045/145	075/175
Memory 256M samples × 2 (With Option 48, 78)	512Msample	045/145 048/148	075/175 078/178
Memory 1024M samples	512Msample	046/146	076/176
Memory 1024M samples × 2 (With Option 48, 78)	512Msample	046/146 048/148	076/176 078/178

- **Recall Parameter File**
  Sets the W-CDMA Uplink parameters according to the setting of the parameter files saved by Save Parameter File.

- **Save Parameter File**
  Saves the W-CDMA Uplink setting parameters to a file.

- **Exit**
  Exits the W-CDMA Uplink IQproducer.

■The **Edit** menu contains the following items.
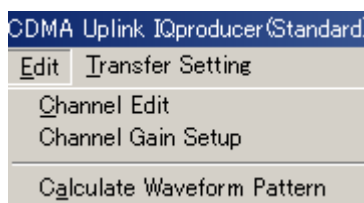
Figure 4.11.2-3   Edit Selection Screen

- **Channel Edit**
  Displays the Channel Edit screen in which the DPCH parameters are set. This is the same operation with clicking the **Channel Edit** button on the screen.

- **Channel Gain Setup**
  Displays the Channel Gain Setup screen in which the power of each channel can be set using βc and βd parameters. The setting of Power in the main screen is changed in accordance with the channel power set in this screen.

- **Calculation & Load** (Effective only when this software is hosted by the MG3710A)
  Creates the waveform to load it into the memory

- **Calculation & Play** (Effective only when this software is hosted by the MG3710A)
  Creates the waveform, load it into the memory and select it.

- **Calculate Waveform Pattern**
  Starts waveform pattern generation based on the settings on the screen.
  The number of frames to be generated varies depending on the setting conditions for each channel, and the time required for generating a waveform pattern also varies accordingly.
  The number of frames to be generated is displayed on the calculation progress screen.

■The **Transfer Setting** menu contains the following item.

Figure 4.11.2-4   Transfer Setting Dialog Box

- **Transfer Setting Wizard**
  Displays the Transfer Setting Wizard screen. Generated waveform patterns can be transferred to the MG3700A/MG3710A easily by performing operations on this screen.

■The following tool buttons are provided:

	Recall Parameter File
	Save Parameter File
	Calculation
	Calculation & Load
	Calculation & Play
	Transfer & Setting Wizard
	Exit

The function of each button is the same with the corresponding item in the **File** or **Edit** menu.

■Normalize Power button

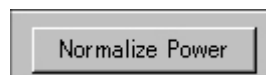
Figure 4.11.2-5   Normalize Power Button

When this button is clicked, the value displayed in Total Power is subtracted from the power of each channel that is set to ON. As a result, the total power is normalized to 0 dB while retaining the power ratio between channels. The total power value displayed in Total Power is calculated from the total power of all the channels that are set to ON.

Setting Item	Scrambling Code	
Functional Outline	Sets the scrambling code.	
Setting Parameters	**Setting range**	
	0 to 16777215	

Setting Item	Number of Frame	
Functional Outline	Sets the number of frames to be created	
Setting Parameters	**Setting range**	
	Number of Frames	1 to the number of sufficient frames for waveform memory
	Auto	Selected or cleared the check box
Details	Refer to Appendix B "Number of Frames to Be Generated" in the MX370101A HSDPA IQproducer Operation Manual for the number of sufficient frames for the waveform memory.	
	When the Auto checkbox is selected, the number of sufficient frames is automatically calculated to create the waveform pattern.	

Setting Item	UL-DPCCH, UL-DPDCH	
Functional Outline	Performs settings for DPCCH and DPDCH.	
Setting Parameters	**Setting range**	
	Power	−40.00 dB to 0 dB
	Data	RMC 12.2 kbps/RMC 64 kbps/RMC 144 kbps/
		RMC 384 kbps/AMR1/AMR2/AMR3/ISDN/64 kbps Packet/
Details	RMC 12.2 kbps/RMC 64 kbps/RMC 144 kbps/RMC 384 kbps	
	The channel coding parameter of the DCH is set according to the standard format selected by **Data**.	
	Refer to 3GPP TS25.104 Annex A UL reference measurement channel for details of these channels. See the next and subsequent pages for details of each parameter.	
	AMR1/AMR2/AMR3/ISDN	
	Refer to 3GPP TR25.944 4.1.2.2 Example for DCH for details of these channels. See the sections below for details of DTCH, DCCH, and Multiplexing.	
	DTCH	
	AMR1: 4.1.2.2.1.2 Example for 12.2 kbps data (TFS = #1)	
	AMR2: 4.1.2.2.1.2 Example for 12.2 kbps data (TFS = #2)	
	AMR3: 4.1.2.2.1.2 Example for 12.2 kbps data (TFS = #3)	
	ISDN: 4.1.2.2.1.6 Example for 64 kbps data	
	DCCH	
	AMR1/AMR2/AMR3/ISDN: 4.1.2.2.1.1 Example for 3.4 kbps data	
	Multiplexing	
	AMR1/AMR2/AMR3: 4.1.2.2.2.2 Example for multiplexing of 12.2 kbps data and 3.4 kbps data	
	ISDN: 4.1.2.2.2.5 Example for multiplexing of 64 kbps data and 3.4 kbps data	

◆UL_RMC_12_2kbps channel coding parameters

Table 4.11.2-2   UL Reference Measurement Channel 12.2 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	12.2
DPDCH	kbps	60
DPCCH	kbps	15
DPCCH Slot Format #i	–	0
DPCCH/DPDCH power ratio	dB	−2.69
TFCI	–	On
Repetition	%	22

Table 4.11.2-3   UL Reference Measurement Channel 12.2 kbps Transport Channel Parameters

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12

DTCH   DCCH

Information data | 244 | Information data | 100 |

                                  CRC16
CRC attachment | 244 | CRC attachment | 100 |
                                  Tail8   CRC12   Tail8
Tail bit attachment | 260 | Tail bit attachment | 112 |

Conv. coding R=1/3 | 804 | Conv. coding R=1/3 | 360 |

1st interleaving | 804 | 1st interleving | 360 |

Radio Frame | #1 402 | #2 402 | | 90 | 90 | 90 | 90 |
segmentation

Rate matching | #1 490 | #2 490 | | #1 490 | #2 490 | | 110 | 110 | 110 | 110 |

2nd interleaving | 490 | 110 | | 490 | 110 | | 490 | 110 | | 490 | 110 |

                  | 600 | | 600 | | 600 | | 600 |

slot segmentation | 1 | 2 | 15 | 1 | 2 | 15 | 1 | 2 | 15 | 1 | 2 | 15 |
                   40 40   40 40 40   40 40 40   40 40 40   40

60kbps DPDCH | 1 | 2 | •••• | 15 | 1 | 2 | •••• | 15 | 1 | 2 | •••• | 15 | 1 | 2 | •••• | 15 |

Radio frame FN=4N   Radio frame FN=4N+1   Radio frame FN=4N+2   Radio frame FN=4N+3
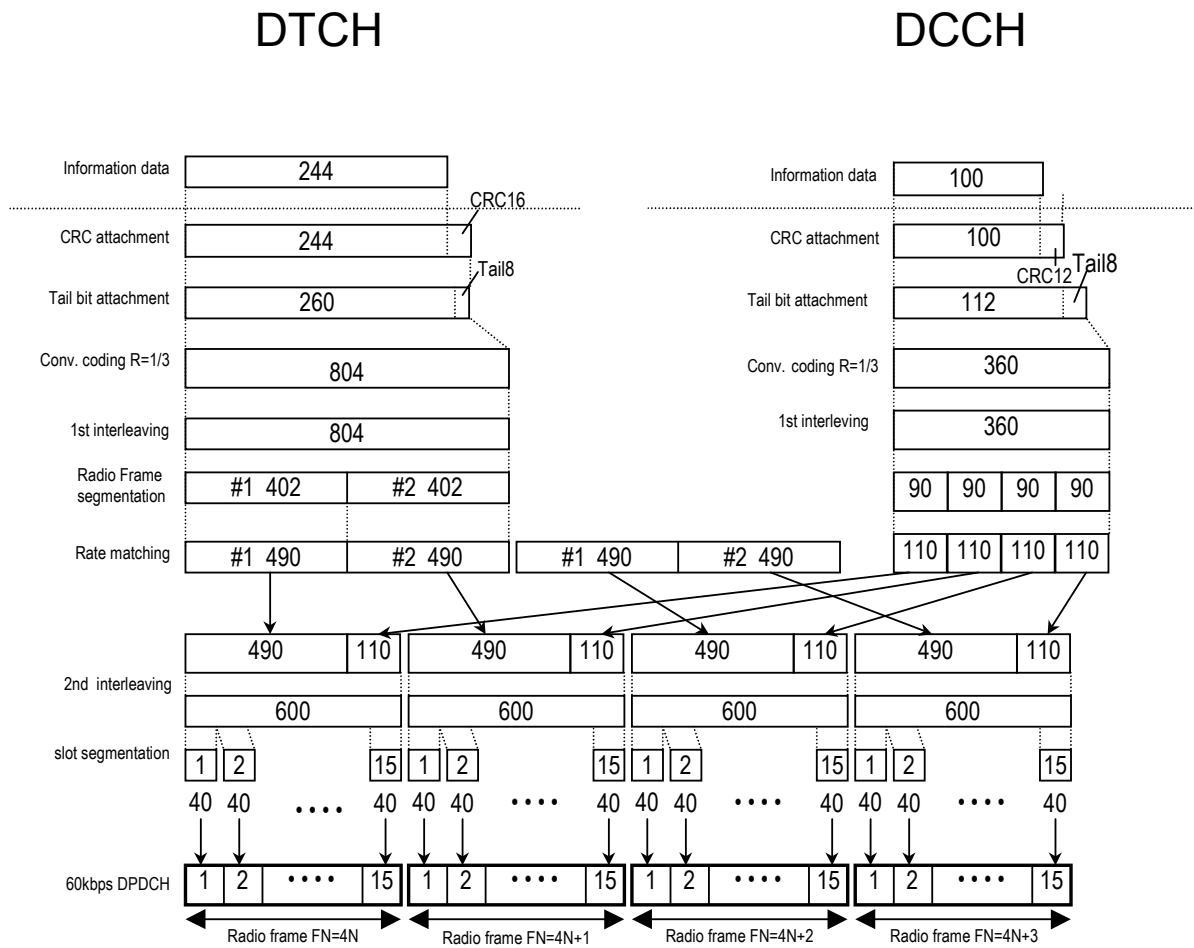
Figure 4.11.2-6   Channel Coding for UL Reference Measurement Channel 12.2 kbps

◆UL_RMC_64kbps channel coding parameters

Table 4.11.2-4   UL Reference Measurement Channel 64 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	64
DPDCH	kbps	240
DPCCH	kbps	15
DPCCH Slot Format #i	–	0
DPCCH/DPDCH power ratio	dB	−5.46
TFCI	–	On
Repetition	%	19

Table 4.11.2-5   UL Reference Measurement Channel 64 kbps Transport Channel Parameters

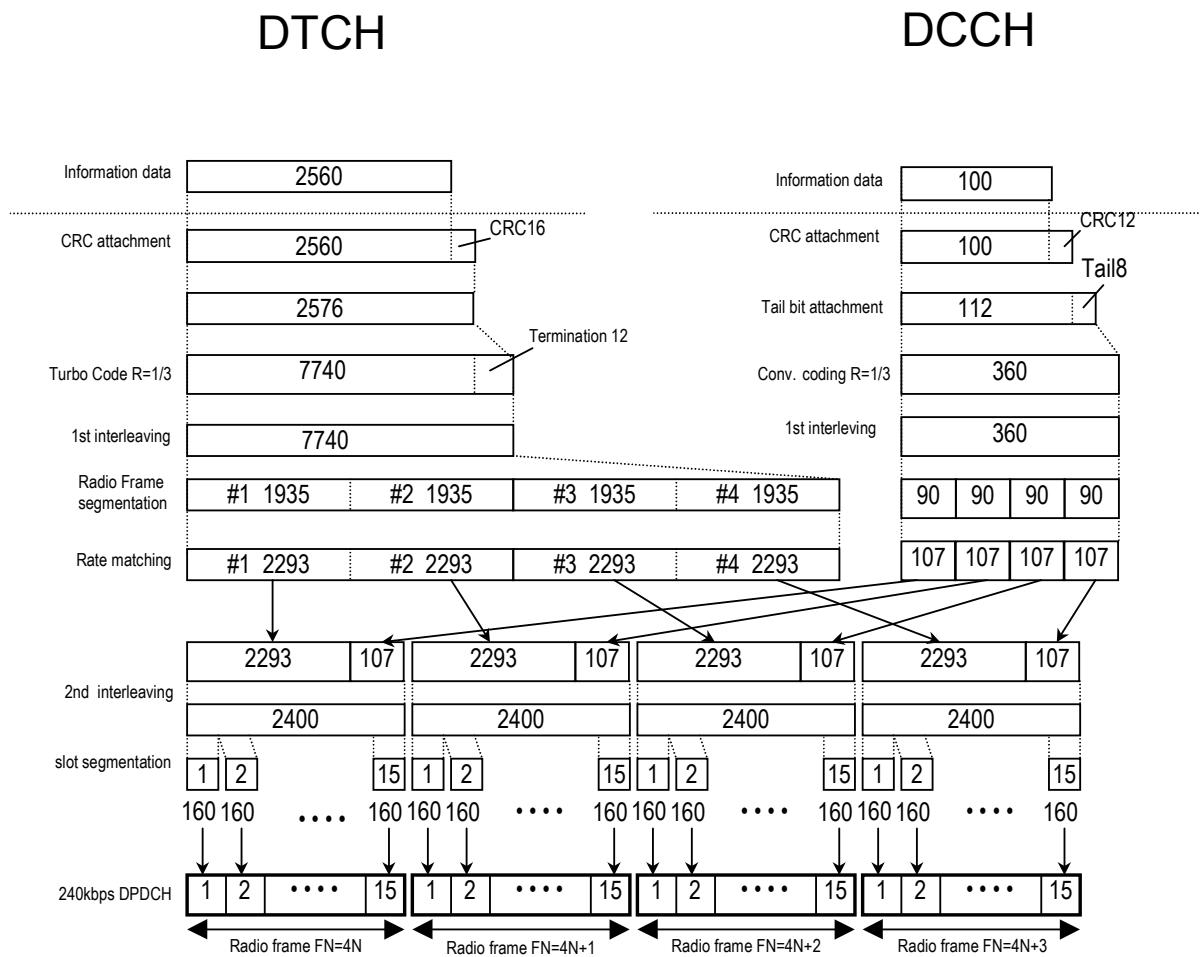| Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2560	100
Transport Block Set Size	2560	100
Transmission Time Interval	40 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12

Figure 4.11.2-7   Channel Coding for UL Reference Measurement Channel 64 kbps

◆UL_RMC_144kbps channel coding parameters

Table 4.11.2-6   UL Reference Measurement Channel 144 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	144
DPDCH	kbps	480
DPCCH	kbps	15
DPCCH Slot Format #i	–	0
DPCCH/DPDCH power ratio	dB	−9.54
TFCI	–	On
Repetition	%	8

Table 4.11.2-7   UL Reference Measurement Channel 144 kbps Transport Channel Parameters

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	5760	100
Transmission Time Interval	40 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12
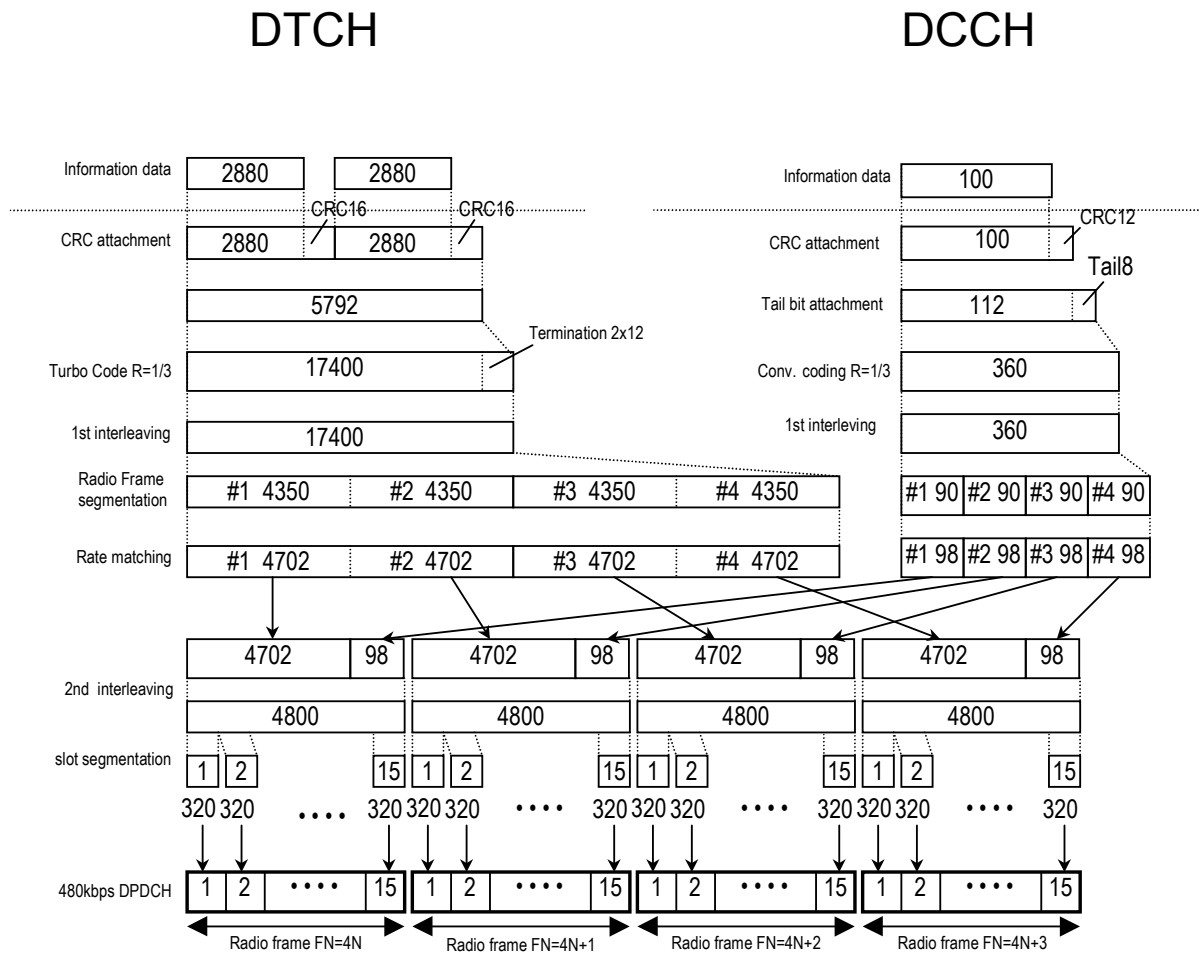
Figure 4.11.2-8   Channel Coding for UL Reference Measurement Channel 144 kbps

◆UL_RMC_384kbps channel coding parameters

Table 4.11.2-8   UL Reference Measurement Channel 384 kbps Physical Channel Parameters

Parameter	Unit	Level
Information bit rate	kbps	384
DPDCH	kbps	960
DPCCH	kbps	15
DPCCH Slot Format #i	–	0
DPCCH/DPDCH power ratio	dB	−9.54
TFCI	–	On
Puncturing	%	18

Table 4.11.2-9   UL Reference Measurement Channel 384 kbps Transport Channel Parameters

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	15360	100
Transmission Time Interval	40 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	16	12
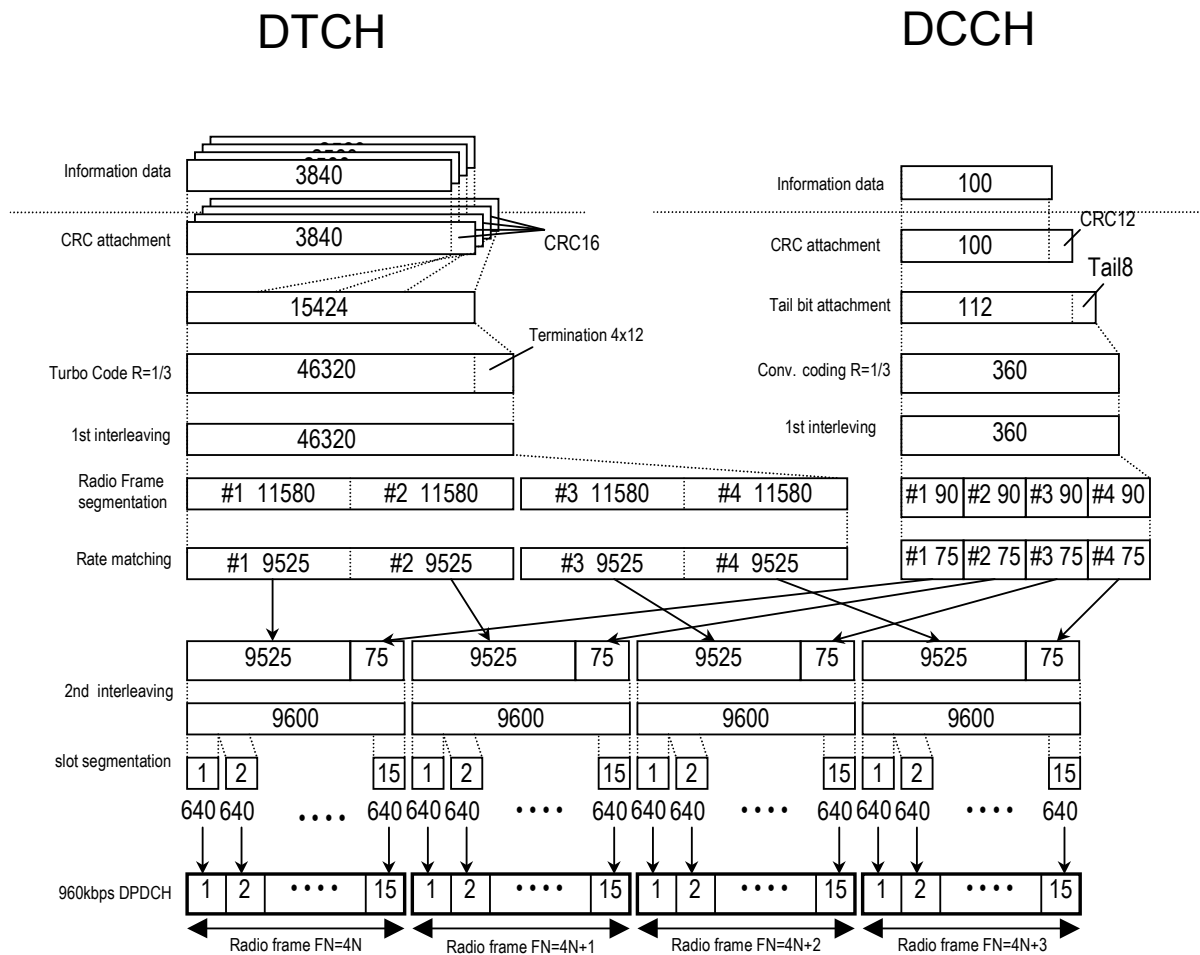
Figure 4.11.2-9   Channel Coding for UL Reference Measurement Channel 384 kbps

4.11.3 Channel Edit screen

When the **Channel Edit** button is clicked, the Channel Edit screen shown below is displayed. This section describes the details of the setting items on this screen.
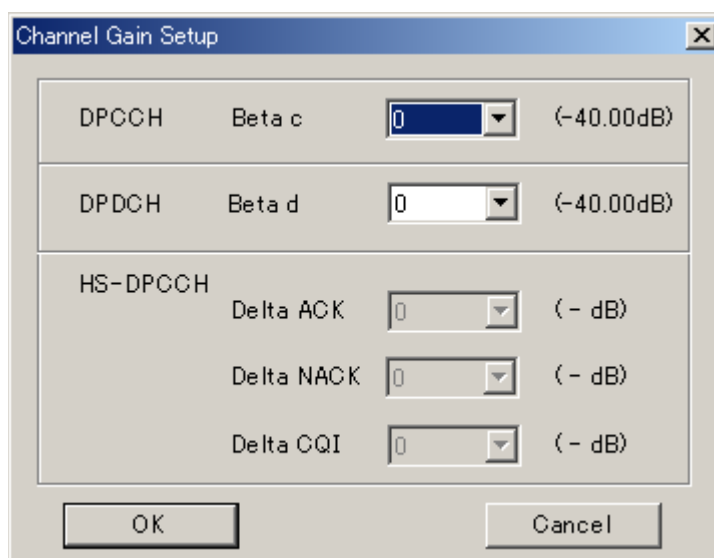

Figure 4.11.3-1   Channel Edit Screen

■The following buttons are provided to close the Channel Edit screen after configuring setting.

- When **OK** button is clicked:
  The Channel Edit screen is closed applying the settings.

- When **Cancel** button is clicked:
  The Channel Edit screen is closed ignoring the settings.

Setting Item	DPCH Edit (PhCH)	
Functional Outline	Performs settings related to UL-DPCH.	
Setting Parameters	**Setting range**	
	Timing Offset	0 to 149
	TFCI	0 to 1023

Setting Item	DPCH Edit (TrCH Edit)	
Functional Outline	Performs settings for TrCH of UL-DPCH.	
Setting Parameters	**Setting range**	
	Data	PN9/PN9fix/PN15fix/16bitRepeat/User File
Details	Data Selects the data to be inserted to Information Data of the transport channel. **PN9fix/PN15fix** is PN9/PN15 data reset at the last data of a signal. The last data of a signal and the first data of the next signal are not continuous.	

4.11.4 Channel Gain Setup screen

When the **Channel Gain Setup** is selected from the **Edit** menu, the Channel Gain Setup screen shown below is displayed. This section describes the details of the setting items on this screen.

Figure 4.11.4-1   Channel Gain Setup Screen

Setting Item	Channel Gain	
Functional Outline	Performs settings for each channel gain.	
Setting Parameters	**Setting range**	
	Beta c	0 to 15
	Beta d	0 to 15
Details	When the **OK** button is clicked after applying settings to close the Channel Gain Setup screen, the settings for each item are converted to (dB) units and displayed in the Channel Edit screen. When the **Cancel** button is clicked, the screen is closed without reflecting the settings for each item on the Channel Edit screen. However, the settings applied on this screen are maintained.	

Chapter 4 Operations for Each Function

4.11.5 Saving/reading parameters

This numeric values and settings for each item can be saved in a parameter file by using this software.
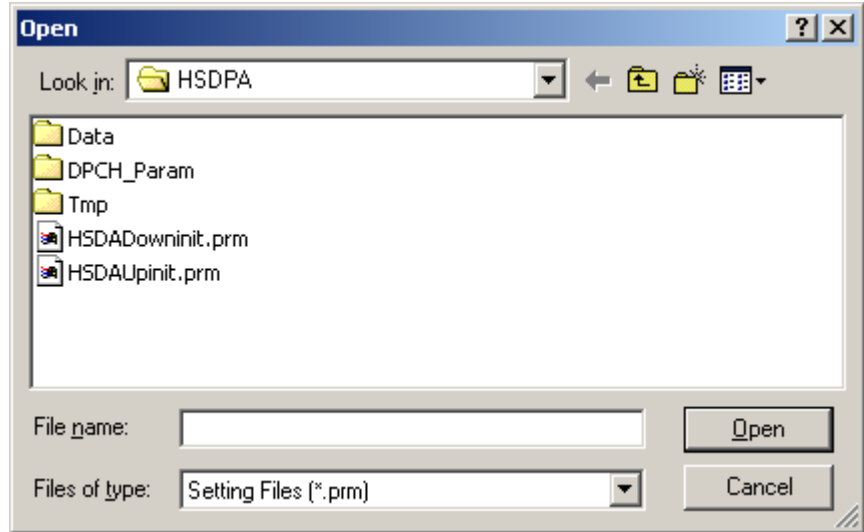
Saving parameter file
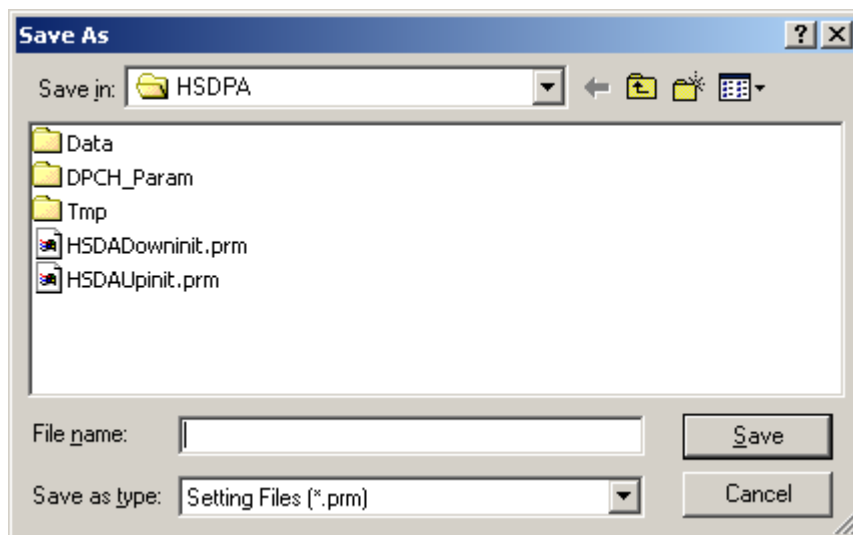
Figure 4.11.5-1 Parameter File Saving Dialog Box

(1) Select **Save Parameter File** from the **File** menu or click the [icon] tool button to display the parameter file saving screen shown in Figure 4.11.5-1 above.

(2) Enter a file name in the **File name** text box and click the **Save** button to save the parameter file.
When **Input Folder (I)** is not changed, the input folder and the name of the file are as follows;
X:\IQproducer\W_CDMA\ (Entered file name) .prm.
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

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Reading parameter file

Figure 4.11.5-2   Parameter File Reading Dialog Box

(1)   Select **Recall Parameter File** from the **File** menu or click the ![tool button]
tool button to display the parameter file reading screen shown in
Figure 4.11.5-2 above.

(2)   Select a parameter file to be read from the file list, and then click
the **Open** button to read the selected parameter file.

4.11.6 Generating waveform pattern file

A waveform pattern file to be used in the MG3700A/MG3710A can be
generated based on the setting values. In the screen shown in Figure
4.11.6-2, the waveform pattern name and comments can be entered and
whether to enable or disable the RRC filter can be set.
The number of frames to be generated varies depending on the setting
conditions for each channel, and the time required for generating a
waveform pattern also varies accordingly. The baseband signal
synthesizer option is required to use two memories.

(1)   Select **Calculate Waveform Parameter** from the **Edit** menu or click
the ![tool button] tool button.

At this time, the Warning message shown below appears when the total power is not normalized by clicking the **Normalize Power** button.
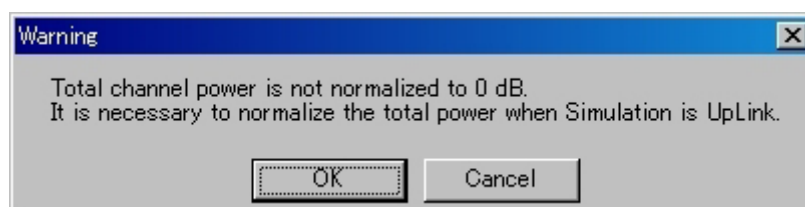

Figure 4.11.6-1   Warning message

Click the **OK** button to normalize the total power and proceed with the next step.

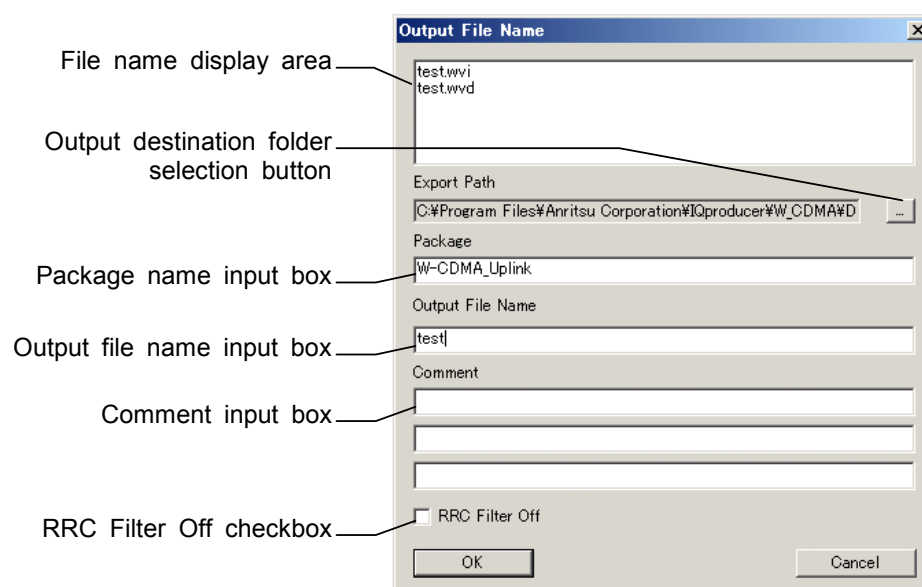(2)   The file name input screen is displayed.

Figure 4.11.6-2   File Name Input Screen

Enter a package name in the package name input box within 31 characters.
Up to 31 characters can be used for a package name.
Enter a file name in the file name input box within 18 characters.
Up to 18 characters can be used for a file name.
1-byte alphanumeric characters and the following symbols can be used for a file name:
! % & ( ) + = ` { } _ - ^ @ [ ]

When a file name is entered, the file to be generated is displayed in the file name display area in the following format:

File name format:

test_A.wvi

> Extension: wvi… Information file (text format)
> wvd… Data file (binary format)
> Target memory: A… Read from waveform memory A
> B… Read from waveform memory B
> Entered file name

Enter a comment for the waveform pattern in a comment input box. Three comment input boxes are provided, and a comment can be entered in each line within 38 characters.
1-byte alphanumeric characters and symbols can be used for comments.
The contents of each comment are displayed on the screen when the corresponding waveform pattern is selected by the MG3700A/MG3710A. Leave the comment boxes blank if not necessary.

When the RRC Filter Off check box is selected, symbol data that does not pass through the RRC filter is generated as a waveform pattern. This check box needs not be selected under normal conditions.

(3) Click the **OK** button to start waveform pattern file generation. The calculation progress screen is displayed during the file generation progressing.
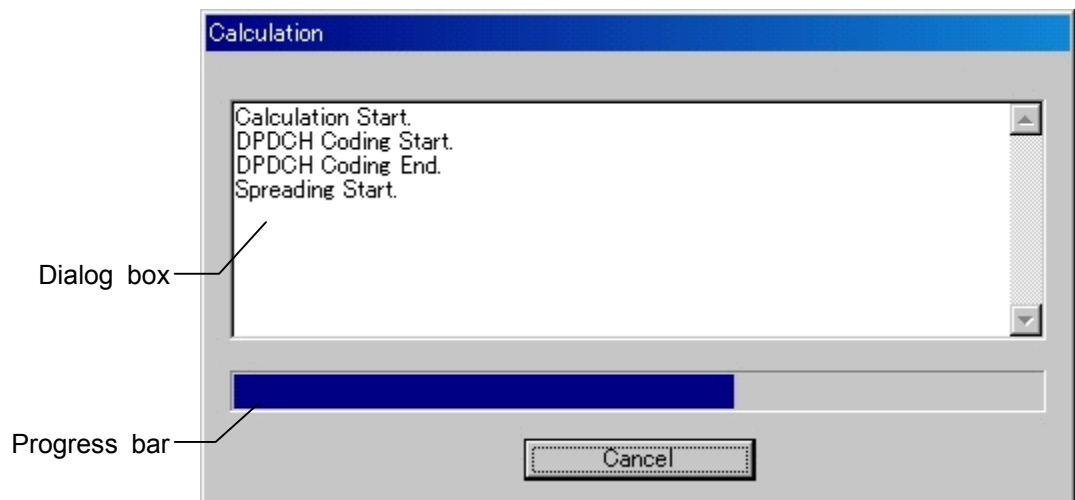

Figure 4.11.6-3 Calculation Progress Screen

The file generation processing statuses are displayed in the dialog box.

The file generation progress status is indicated by the progress bar. When the file is generated completely, the information about the generated waveform pattern file is displayed in the dialog box.

Clicking the output destination selection button displays the Browse for Folder screen shown in Figure 4.11.6-4. The output destination folder can be selected from this screen.
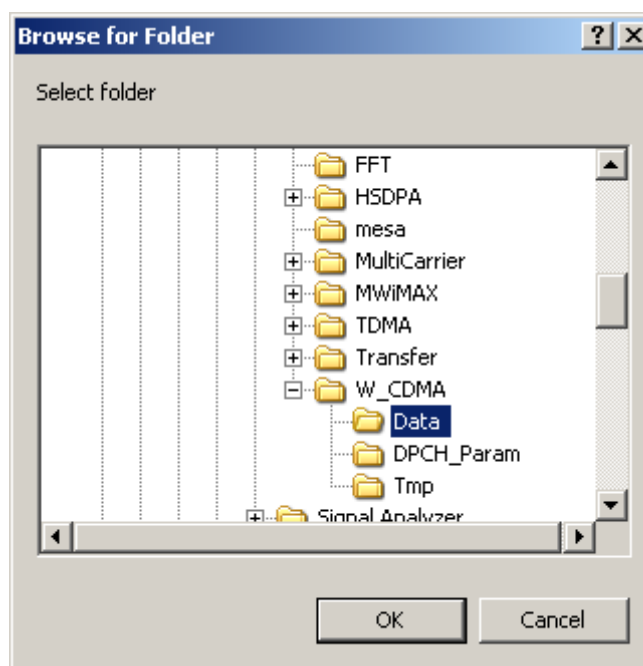

Figure 4.11.6-4   Browse for Folder Screen

When the output destination folder is not specified, waveform pattern files are saved in the following directory:

X:\IQproducer\W_CDMA\Data
(X:\IQproducer is the folder in which the IQproducer™ is installed.)

When this software is hosted by the MG3710A, the waveform will be stored in the following folder.

C:\Anritsu\MG3710A\User Data\Waveform\"Package name"

The output destination file can be changed from the above folder to another one.

Note:

The waveform pattern generation of W-CDMA Downlink IQproducer and W-CDMA Uplink IQproducer can be exclusively executed. During the one is under execution, starting the other execution causes an error dialog indication. When you start a file generation, be sure to cancel the other file generation or to wait for its completion.

4.11.7 Calculation & Load

Note:

> This function is available only when this software is used on MG3710A.
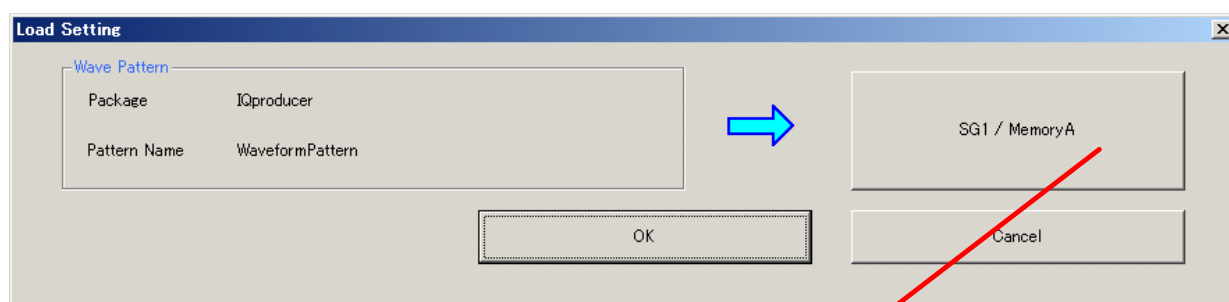
When **Calculation & Load** is selected, the Load Setting screen will display after waveform generation.

Figure 4.11.7-1 Load Setting Screen

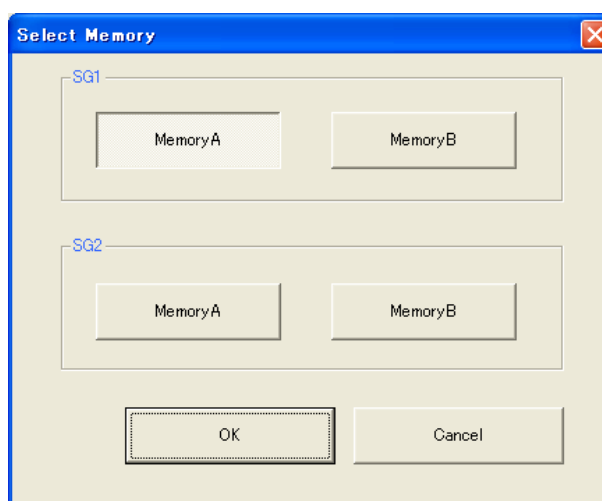The Select Memory screen will display after clicking the load destination in the Load Setting screen.

Figure 4.11.7-2 Select Memory Screen

After selecting the load destination of generated waveform in the Select Memory screen and pressing **OK**, the Load Setting screen will be shown again. Press **OK** in the Load Setting screen, and then the loading of waveform starts.

Notes:

- To exit this screen without loading the waveform pattern, click **Cancel** in the Load Setting screen.

- If the configuration of generated waveform pattern uses two memories, the Select SG screen is displayed as well as **Calculation & Play**.

4.11.8 Calculation & Play

Note:

This function is available only when this software is used on MG3710A.

When **Calculation & Play** is selected, after waveform creation is completed, the created waveform is loaded into memory, selected and output.

When the 2nd Vector Signal Generator (option) is installed, the Select SG screen is displayed before the start of waveform generation. This screen is used to select the signal generator for outputting the created waveform pattern.
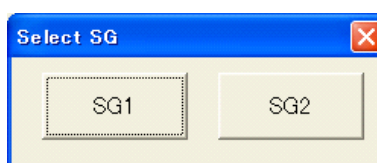

Figure 4.11.8-1   Select SG Screen

4.11.9 Auxiliary signal output

When the waveform pattern generated by the W-CDMA Uplink IQproducer is selected on the mainframe, a marker signal synchronized with the RF signal is also generated from the mainframe output connector.

MG3700A

The Frame Trigger signal is generated from the AUX Input/Output Connector1 on the rear panel.

- Frame Trigger
  The 10 ms interval pulse synchronized to the Frame header symbol is generated. Change Polarity for Marker 1 to change the signal polarity.

MG3710A

The marker signal is output from Marker 1 and AUX connector on the rear panel.

The output signal is specified depending on the MG3710A settings as shown in the Table 4.10.9-1.

Table 4.11.9-1 MG3710A Marker Signal

Generating SG	Waveform memory	Signal name
SG1	Memory A	SG1 Marker1 A
SG1	Memory B	SG1 Marker1 B
SG2	Memory A	SG2 Marker1 A
SG2	Memory B	SG2 Marker1 B

For how to configure marker signal and connector setting, refer to 7.4.2 "Route Output Connectors" in MG3710A Vector Signal Generator Operation Manual (Mainframe).

4.12 Help Screen

Click **Help** on the common platform screen described in section 4.2.
The version information of the IQproducer™ is displayed.
The following shows an example.

Figure 4.12-1   Version Display Screen

■Description of items
(1) **OK** button

Click this button to close the Version display screen.

4.13 Time Domain Graph Display

The waveform pattern generated in each signal generation application is indicated as a time domain waveform in the graphic display.

4.13.1 Activation

Select **Time Domain** from the **Simulation & Utility** tab on the common platform screen.
The time domain graph display screen is displayed separately.

4.13.2 Time domain graph display screen
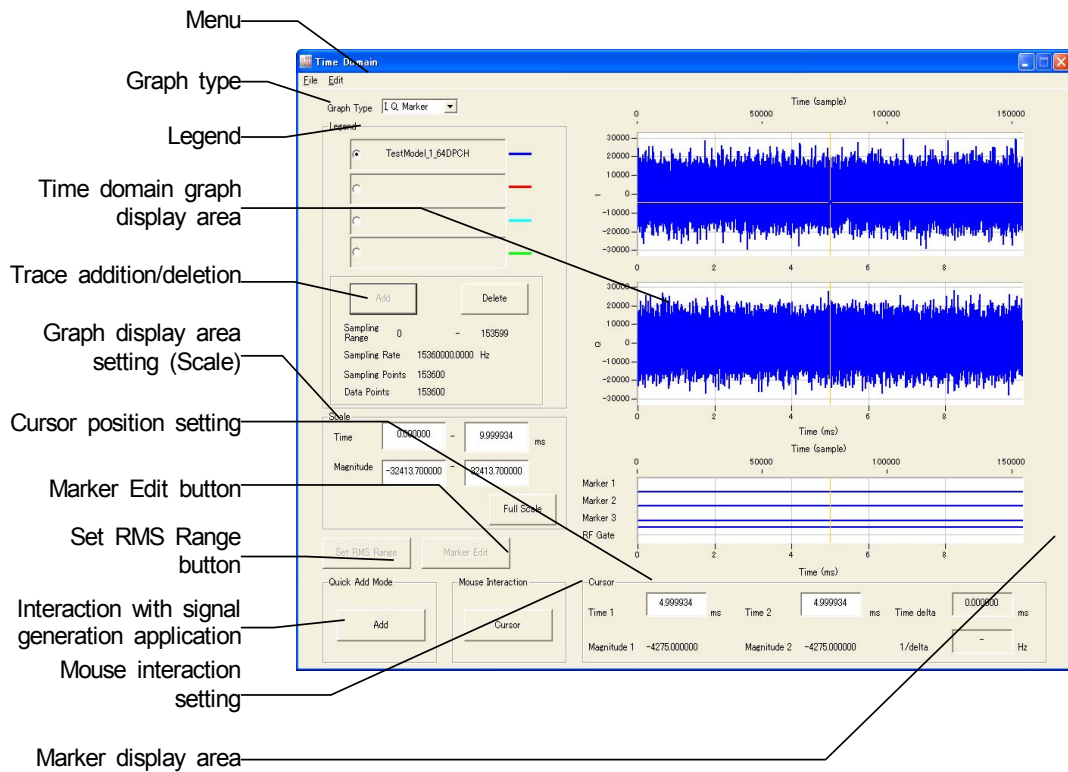
Figure 4.13.2-1   Time Domain Graph Display Screen

■Description of items

(1) Menu bar

Trace addition, trace deletion, Marker Edit dialog box open, and time domain graph display close can be executed.

(2) Graph type

The graph type can be selected from the drop-down list. Two graph types can be selected: "I, Q, Marker" and "Power, Marker".

(3) Legend

File name display for an added trace, selection of a displayed trace, and selection of a trace to be added/deleted can be executed.

(4) Graph display area

A time domain graph is displayed in this area. Graph cursor move and graph zoom-in display can be executed.

(5) Add/Delete (trace addition/deletion)

A trace can be added/deleted.

(6)   Cursor Position

The graph cursor position in the time domain graph display area can be specified by entering a value in the Time text box.

(7)   Mouse Interaction

The mouse operation in the time domain graph display area can be set to either the graph cursor move function or the zoom-in function.

(8)   Quick Add Mode (interaction with signal generation application)

Settings for displaying a trace of a waveform pattern generated by a signal generation application to the time domain display in conjunction with the signal generation application are configured.

(9)   Marker Edit (Marker Edit dialog box open)

Clicking this button opens the Marker Edit dialog box.

(10) Marker display area

The value of each marker is displayed in this area.

(11) Set RMS Range button

When the Time Domain screen is displayed from the Convert screen, this button is used to set the RMS-calculation range.

4.13.3 Displaying time domain graph by reading file

A waveform pattern generated by a signal generation application of the IQproducer™ can be read and displayed in a Time Domain graph.

■Time domain graph display using Add button
<Procedure>

1. Click one of the option buttons in the **Legend** dialog box to select the trace color of the waveform pattern in the CCDF graphical area.
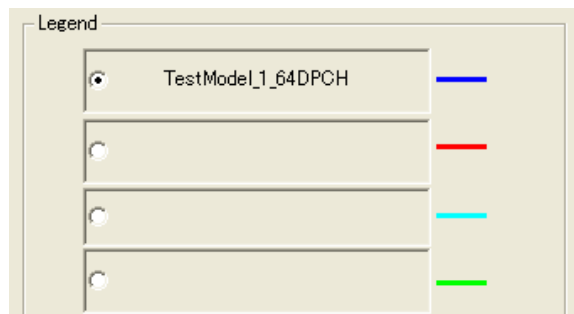

Figure 4.13.3-1　Legend Dialog Box

2. Click the **Add** button to display the Add Trace dialog box.

    The **Add** button is disabled when any other waveform pattern is already specified on the selected option button. In such a case, delete the waveform pattern by clicking the Delete button, or click one of other option button.

Figure 4.13.3-2　Add Button

Otherwise, select **Add Trace** from the **File** menu.
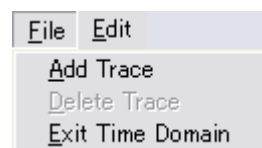
Figure 4.13.3-3　Add Trace Button on The File Menu

3. Click the [...] button in the Add Trace screen, and select a waveform pattern for which a time domain graph is displayed.
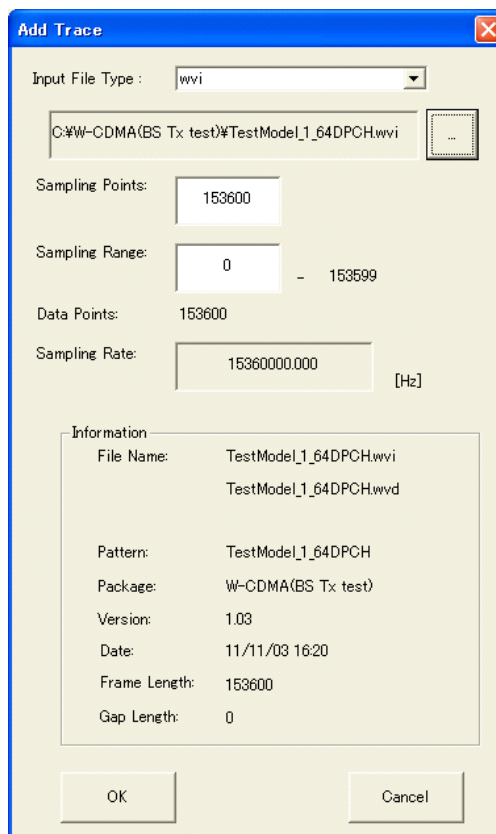

Figure 4.13.3-4   Add Trace Dialog Box

Waveform pattern files that have the formats below can be read. For details about the ASCII1, ASCII2, ASCII3, and MS269x/MS2830A/MS2840A Digitizer formats, see Section 4.5.6 "Input file format".

•ASCII1

•ASCII2

•ASCII3

•MS269x/MS2830A/MS2840A Digitizer

•wvi

Also, a maximum of 1 Msample (= 1,048,576 samples) can be read. When a waveform pattern is selected, either the data of the selected waveform pattern or "1 Msample" is displayed in the Sampling Points text box. The number of reading data can be changed by editing the value in the Sampling Points text box. Also, the waveform pattern reading start position can be specified by changing the value in the Sampling Range text box.

Click the **OK** button on the Add Trace screen to read the waveform pattern.
When the waveform pattern has been read completely, the time domain graph display screen is displayed again with a trace in the color selected in Legend. If the ASCII1, ASCII2, or ASCII3 format was selected for waveform pattern display, enter a value for Sampling Rate.

4.13.4 Deleting time domain graph

The time domain graph displayed in the screen can be deleted.

■Deleting time domain graph using Delete button
<Procedure>
1.   Click the option button in the **Legend** dialog box to select the trace to be deleted.
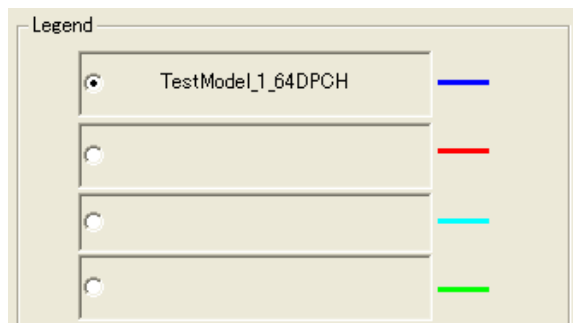
Figure 4.13.4-1   Legend Dialog Box

2.   Click the **Delete** button.
     Click the Delete button to delete the graph corresponding to the selection in the Legend field.

Figure 4.13.4-2   Delete Button

Otherwise, select **Delete Trace** from the **File** menu.

Figure 4.13.4-3   Delete Trace Button on the File Menu

4.13.5 Graph type

When "I, Q, Marker" is selected from the Graph Type drop-down list, the time domain waveform of the I-phase, Q-phase, and marker data of the selected waveform pattern is displayed. When "Power, Marker" is selected, the time domain waveform of the marker data and the power based on the rms value (written in the wvi file) of the selected waveform pattern is displayed.

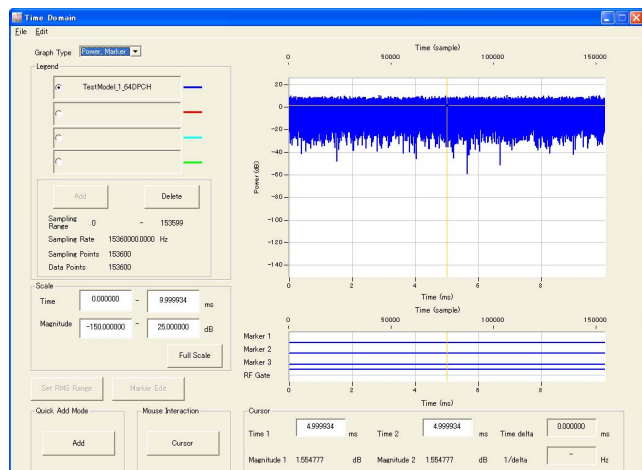**Graph Type
"I, Q, Marker"**
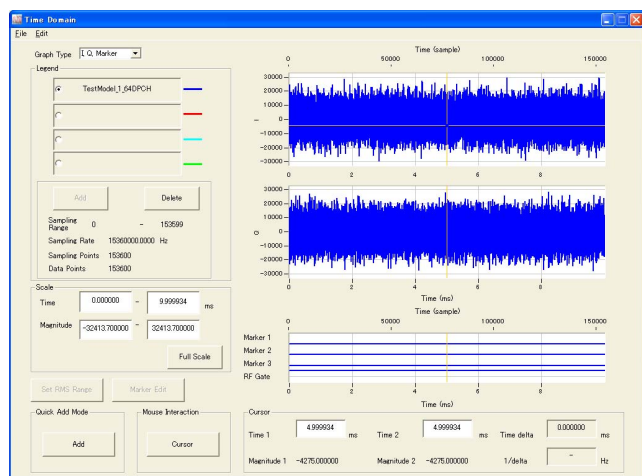
**Graph Type
"Power, Marker"**

Figure 4.13.5-1　Graph Type

4.13.6 Sampling information display

The reading start sample and the reading end sample are displayed for Sampling Range (the first sample is "0"). The sampling rate of the waveform pattern to be read is displayed for Sampling Rate. The number of read samples is displayed for Sampling Points. The data point of the reading target waveform pattern is displayed for Data Points. The sampling information on the trace selected by a radio button in the Legend field is displayed in the lower area of the Legend field.

Figure 4.13.6-1　Sampling Information Display

4.13.7 Mouse interaction selection in the CCDF graph display area (Mouse Interaction)

Graph cursor move or graph zoom-in can be selected for a mouse dragging operation in the time domain graph display area. Click the **Mouse Interaction** button to display the **Mouse Interaction** dialog box.

Cursor　　　The mouse is used to move the cursor.
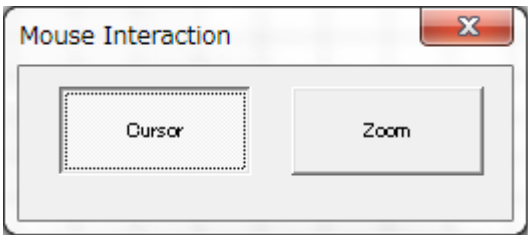
Zoom　　　The mouse is used to set the zooming area.

Figure 4.13.7-1　Mouse Interaction Dialog Box

4.13.8 Moving graph cursor

The graph cursor displayed in the time domain graph display area can be moved.

■Moving graph cursor using mouse

When the black-line or yellow-line cursor in the Time Domain graph display area is dragged, the cursor is moved.
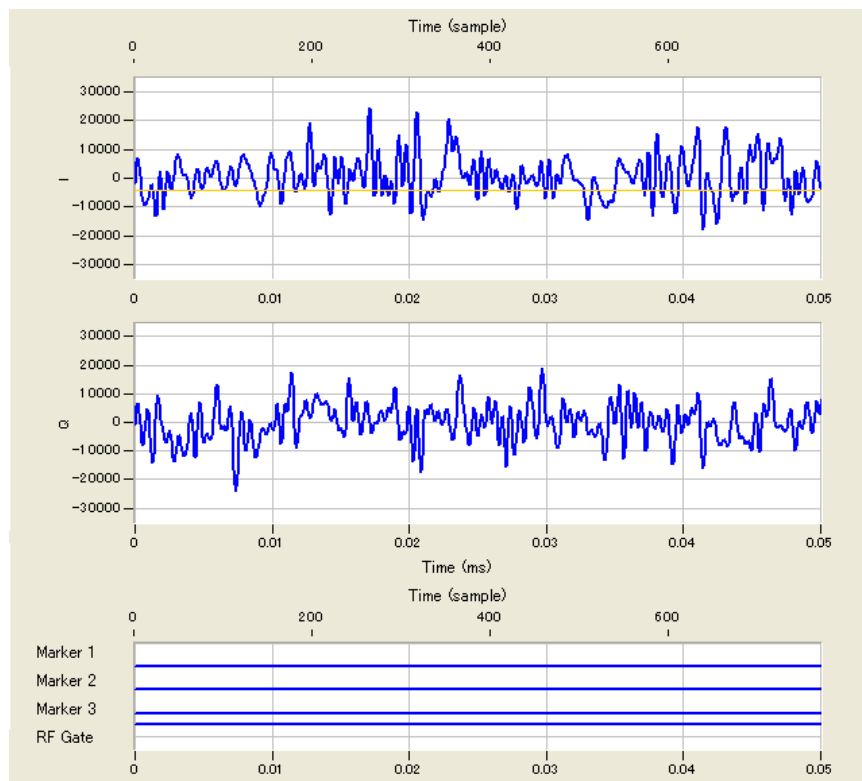

Figure 4.13.8-1   Time Domain Graph Display Area

The contents displayed in **Cursor** in the time domain graph display screen are updated as the graph cursor is moved.

■Moving graph cursor changing Cursor value

When the Time 1 value in the **Cursor** area of the Time Domain graph display screen is updated, the black-line cursor moves and the Magnitude 1 value is updated.

Similarly, when the Time 2 value is updated, the yellow-line cursor moves and the Magnitude 2 value is updated.

When the black-line or yellow-line cursor is moved by changing the Time 1 or Time 2 value, respectively, the Time delta and 1/delta values are updated. Time delta displays the result of subtracting the Time 1 value from the Time 2 value, and 1/delta displays the reciprocal of the Time delta value.

Figure 4.13.8-2　Cursor Dialog Box

4.13.9 Changing graph scale

The scale of the graph currently displayed can be changed.

■Changing graph display area scale

The scales for the time (X axis) and amplitude (Y axis) of the time domain graph display area are updated by changing the value(s) in the **Scale** field on the time domain graph display screen. The values set in the Time text boxes (X axis) indicate the range of the sampled data displayed in a graph, and 0.0 ms represents the start of that data.

Figure 4.13.9-1　Scale Dialog Box

<Procedure>

1. Click the **Time** text box and enter values to specify the time display range.

2. Click the **Magnitude** text box and enter values to specify the amplitude display range.

When the focus is moved to another control after changing the value in the PAR text box as shown in Step 1 above, the scale for the X axis in the CCDF graph display area is updated.

Similarly, when the focus is moved after changing the value in the Magnitude text box as shown in Step 2 above, the scale for the Y axis in the time domain graph display area is updated.

In addition, the scale of both axes can be adjusted to display the entire Time Domain graph by clicking the **Full Scale** button.
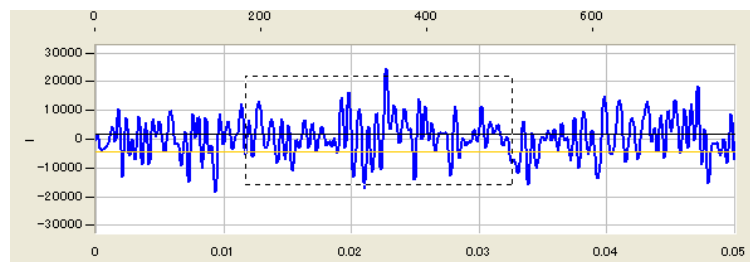

Figure 4.13.9-2   Graphic Range Control By Zooming Operation

■Specifying display area by mouse operation
When **Zoom** is selected for **Mouse Interaction**, pointing and dragging an area in the graph enlarges the selected area (within the dotted rectangle).

4.13.10 Values displayed on graph

This section describes how a trace on the I, Q, Power, and Marker graphs displays the data or marker of the waveform pattern, separately for each graph type.

■I and Q graphs

On the I and Q graphs (displayed when "I, Q, Marker" is selected from the Graph Type drop-down list), the sample values of the read waveform pattern are plotted and adjacent samples are connected by linear interpolation. Note that the sample-unit time scale above the I graph applies only to the trace selected by Legend, while the ms-unit time scale below the Q graph applies to any displayed traces.
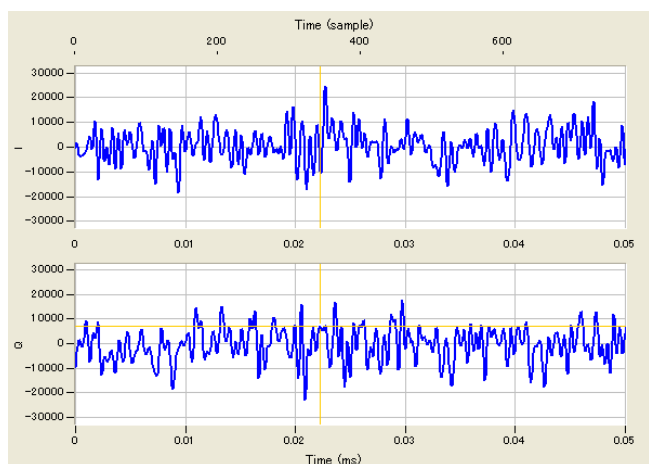

Figure 4.13.10-1   I, Q Graph

■Power graph

On the Power graph (displayed when "Power, Marker" is selected from the Graph Type drop-down list), the sample values of the read waveform pattern are plotted as power and adjacent samples are connected by linear interpolation.

If ASCII1, ASCII2, ASCII3, or wvi is selected as the file format for waveform pattern display, The X axis of the Power graph is displayed with the RMS value of the waveform pattern as 0 dB. When the MG3700A/MG3710A/MG3740A actually outputs a modulation signal, therefore, the output modulation signal is based on 0 dB of the Power graph.

MG3700A/MG3710A/MG3740A output level
= MG3700A/MG3710A/MG3740A display level + Level on Power graph

If MS269x/MS2830A/MS2840A Digitizer is selected as the file format for waveform pattern display, the level recorded in the digitized file is

displayed as is. Therefore, when the MS269xA/MS2830A/MS2840A is actually used to output a modulated signal, the output signal does not necessarily use the 0 dB in the Power graph as a reference.

Note that the sample-unit time scale above the I graph applies only to the trace selected by Legend, while the ms-unit time scale below the Q graph applies to any displayed traces.
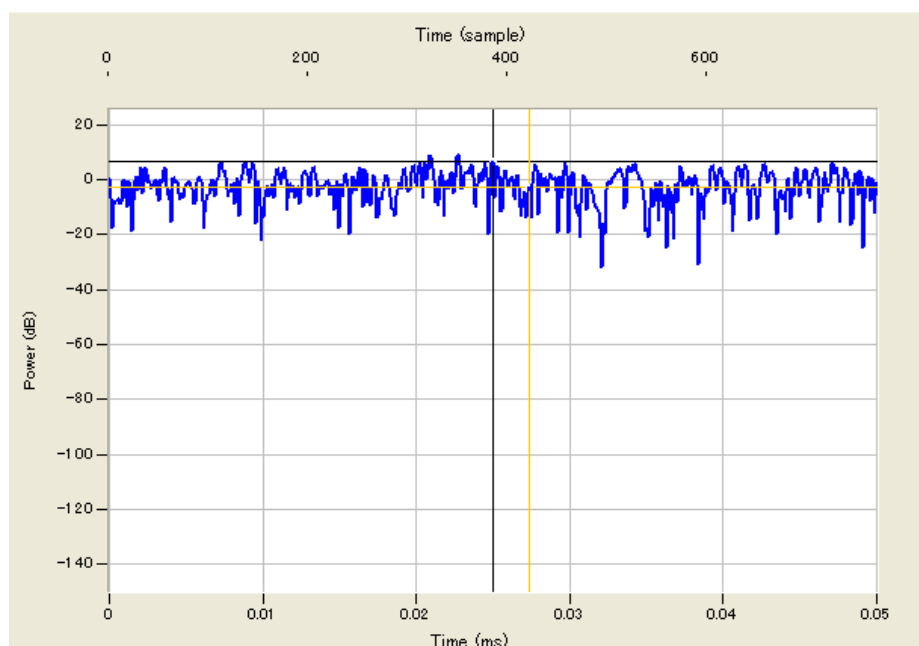

Figure 4.13.10-2   Power Graph

■Marker graph

On the Marker graph, Markers 1, 2, 3, and RF Gate of the samples of the trace selected by Legend are displayed. Marker graphs are traced in a staircase pattern, where a line is drawn from a plotted point to the right. At Sample 115200 in Figure 4.13.10-3, for example, Marker 1 is 0 (LO), Markers 2 and 3 are 1 (HI), and RF Gate is 1 (RF On). Note that the sample-unit time scale above the I graph applies only to the trace selected by Legend, while the ms-unit time scale below the Q graph applies to any displayed traces.
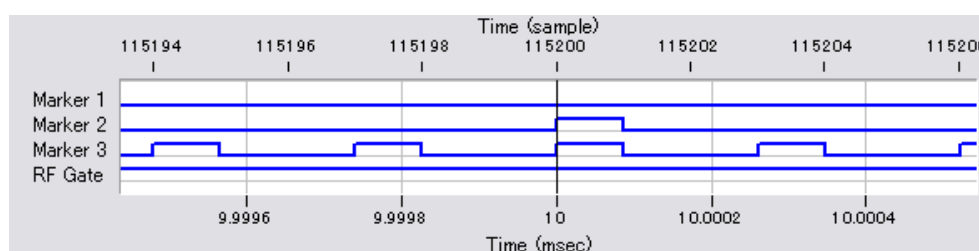

Figure 4.13.10-3   Marker Graph

4.13.11 Interaction with signal generation application (Quick Add Mode)

The method for updating the time domain graph display in conjunction with waveform pattern generation by a signal generation application can be set and changed. This function is enabled only when the time domain graph display function is activated. Click the **Quick Add Mode** button to display the **Quick Add Mode** dialog box.
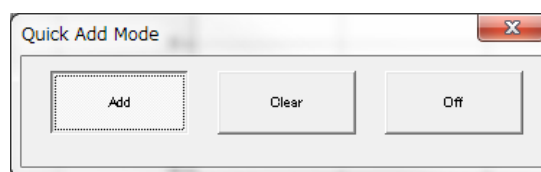

Figure 4.13.11-1   Quick Add Mode Dialog Box

■When Add is selected:

A trace is added to the time domain graph when Time Domain is selected from the **Simulation** menu or the **Time Domain** tool button is clicked after data generation by the signal generation application. Note that the FFT graph display will not be updated when the four traces are all used.

■When Clear is selected:

A trace is deleted from the time domain graph and the time domain graph of the generated data is displayed when Time Domain is selected from the **Simulation** menu or the **Time Domain** tool button is clicked after data generation by the signal generation application.

■When Off is selected:

The time domain graph display will not be updated even when Time Domain is selected from the Simulation menu or the Time Domain tool button is clicked after data generation by the signal generation application.

4.13.12   Marker edit function

A new waveform pattern can be created by reading an existing waveform pattern and editing the marker data and name with the marker edit function.

The marker edit function cannot be used if ASCII1, ASCII2, ASCII3, or MS269x/MS2830A/MS2840A Digitizer was selected as the file format for waveform pattern display.
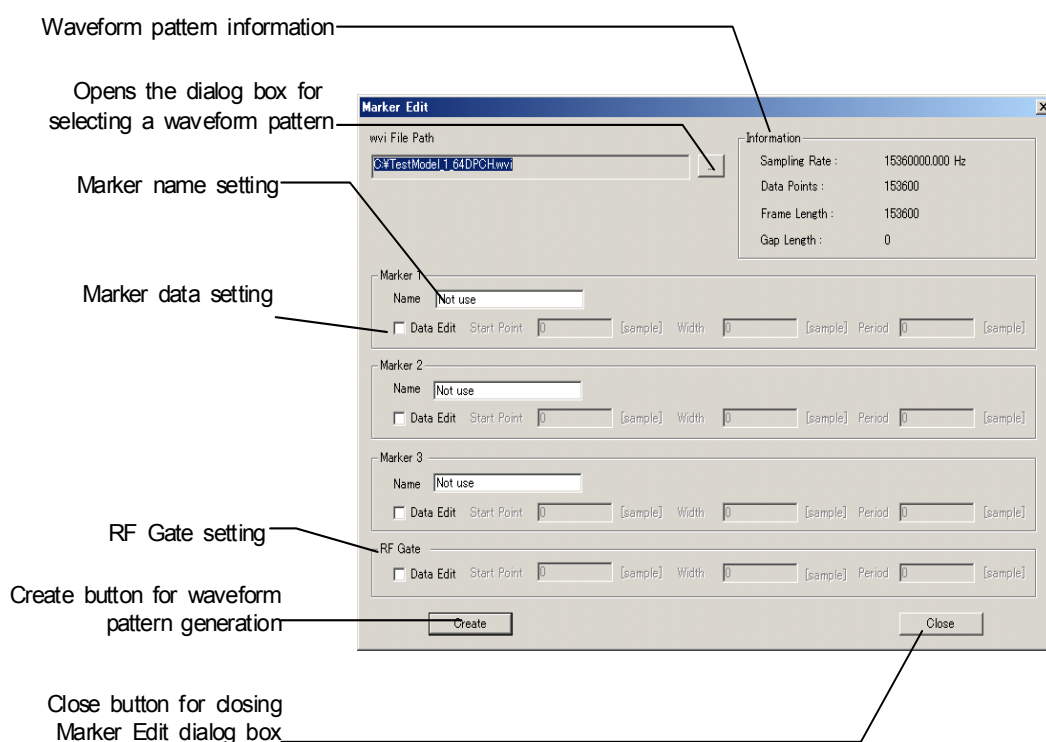

Figure 4.13.12-1   Marker Edit Dialog Box

■Description of items

(1)   Information

Information about the read waveform pattern is displayed.

(2)   Browse button for waveform pattern selection

Clicking this button displays the dialog box for selecting a waveform pattern to be read.

(3)   Marker name setting

The name of each marker can be specified.

(4)　Marker data setting

Select or clear the Data Edit check box to specify whether to edit the data of the corresponding marker. When it is cleared, marker data edit is disabled and the marker data of the read waveform pattern is used as is. When it is selected, marker data edit is enabled, and the marker data with the values set in the Start Point, Width, and Period text boxes are added to the new waveform pattern to be created.

Set the number of samples prior to the first marker signal output starting point to Start Point, the number of samples to output marker signals to Width, and the number of samples between the marker signal output starting points to Period.
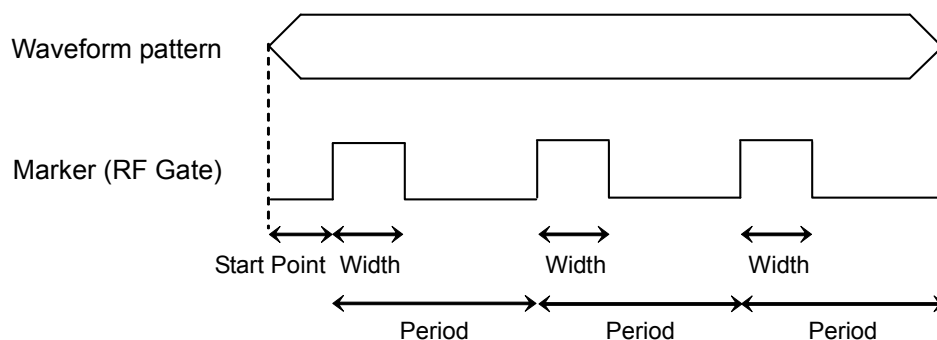

Figure 4.13.12-2　Setting Parameters of Marker and RF Gate Data

(5)　RF Gate setting

Select or clear the Data Edit check box to specify whether to edit the data of the corresponding marker. When it is cleared, RF Gate data edit is disabled and the RF Gate data of the read waveform pattern is used as is. When it is selected, RF Gate data edit is enabled, and the RF Gate data with the values set in the Start Point, Width, and Period text boxes are added to the new waveform pattern to be created.

Set the number of samples prior to the first marker signal output starting point to Start Point, the number of samples to output marker signals to Width, and the number of samples between the marker signal output starting points to Period.

(6)   Create button (for waveform pattern generation)

This button is used to create a new waveform pattern according to the parameters set in the Marker Edit dialog box. Click the Create button to display the Export File dialog box, and then specify the output folder, output waveform pattern name, and package name in this dialog box.

(7)   Close button (for closing Marker Edit dialog box)

Click this button to close the Marker Edit dialog box.

Refer to Section 4.5.6 "Input file format" for details on marker data and RF Gate data.

4.13.13　Displaying the Time Domain screen from the Convert screen

By displaying the Time Domain screen from the Convert screen, the pre-conversion waveform pattern can be checked and the range for RMS calculation during conversion can be specified.
However, when the Time Domain screen is displayed from the Convert screen, traces cannot be added or deleted.

On the Time Domain screen, to specify the RMS-calculation range used for waveform conversion on the Convert screen, use the black-line and yellow-line cursors.
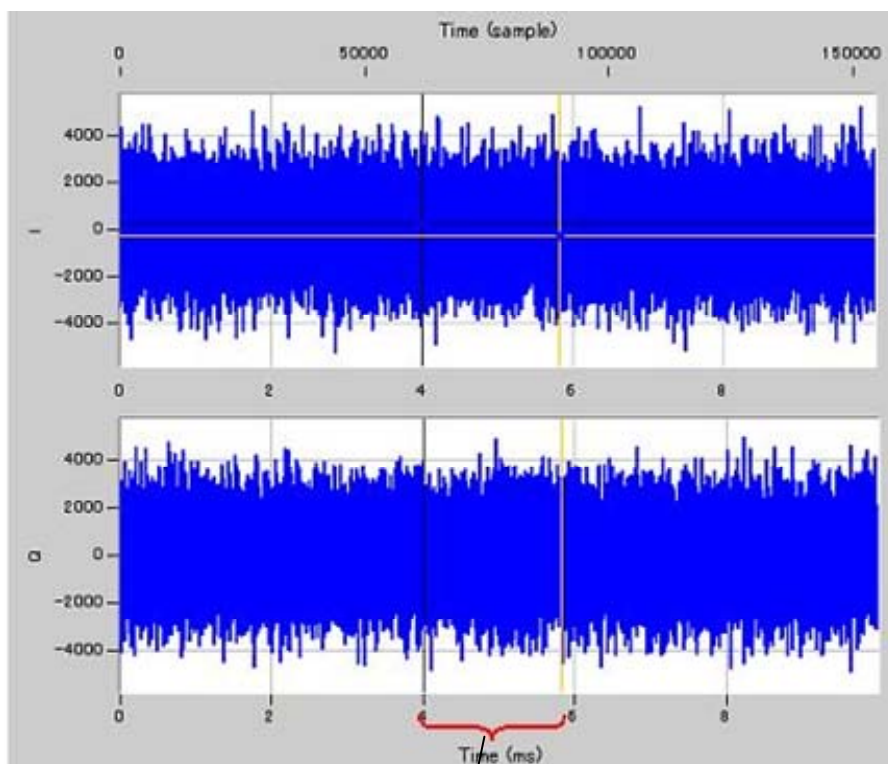
Calculate the RMS using this range.

Figure 4.13.13-1　RMS Value Calculation Range

After specifying the RMS-calculation range by using the black-line and yellow-line cursors, click the Set RMS Range button to specify the RMS-calculation range used when converting the waveform pattern on the Convert screen and close the Time Domain screen.

Figure 4.13.13-2　Set RMS Range Button

4.14 Clipping Function

This function performs clipping processing for a waveform pattern generated by each signal generation application. Filter, bandwidth, and number of repetition times must be set to generate a clipping-processed waveform pattern. The generated waveform pattern consists of a waveform information file (text format file with the extension ".wvi") that stores the information related to the waveform pattern and a waveform data file (binary format file with the extension ".wvd").

4.14.1 Activation

Select the **Clipping** Panel from the **General Purpose** tab on the common platform screen. The parameters related to clipping processing can be set in the Clipping setting screen.

4.14.2 Clipping setting screen

Sets each parameter of the clipping operation.
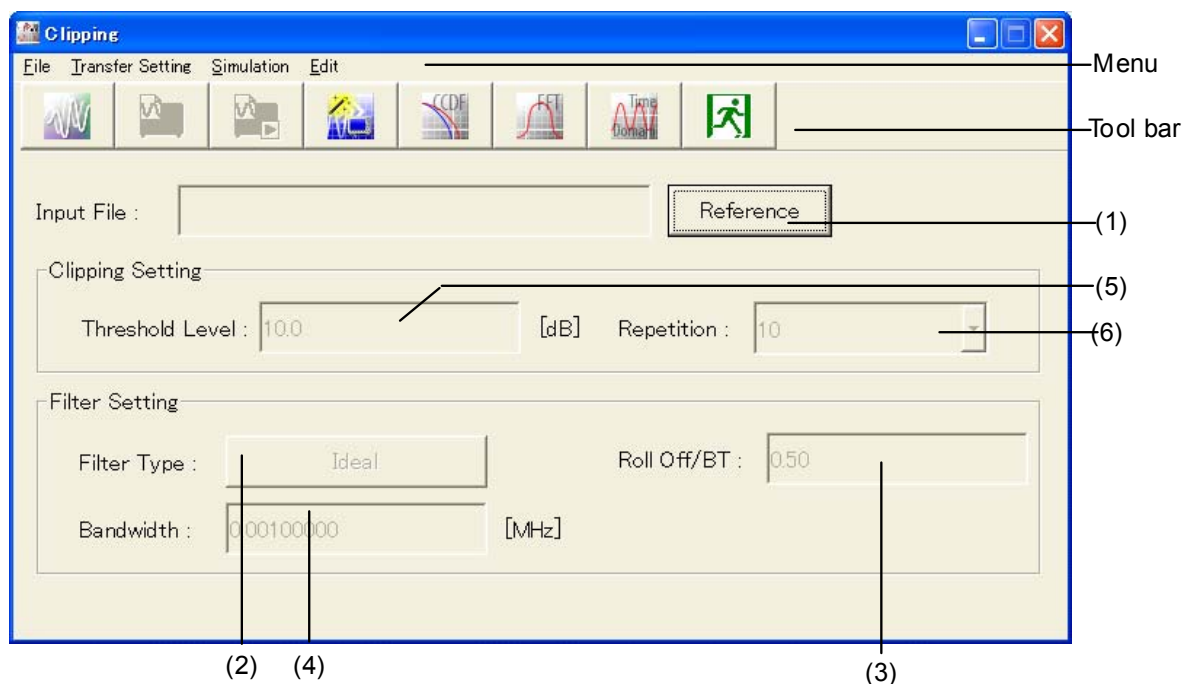

Figure 4.14.2-1   Clipping Dialog Box

■Menu bar

The following menus are provided on the menu bar.

- The **File** menu contains the following item.
  ・Exit

  Exits from this software.

- The **Transfer & Setting** menu contains the following item.
  ・Transfer Setting Wizard

  Displays the Transfer Setting Wizard screen. Connection between a PC and the mainframe, transfer of waveform patterns to the mainframe, and loading of waveform patterns to an arbitrary waveform memory of the mainframe can be performed on this screen.

- The **Simulation** menu contains the following items.
  ・CCDF

  Displays the CCDF Graph Monitor screen. The CCDF of a generated waveform pattern is displayed in a graph.

  ・FFT

  Displays the FFT Graph Monitor screen. The spectrum where FFT processing is performed for a generated waveform pattern is displayed in a graph.

  ・Time Domain

  Displays the time domain graph display screen. The time domain waveform of a generated waveform pattern can be displayed in a graph.

- The **Edit** menu contains the following item.
  ・Calculation

  Performs waveform pattern generation.

  ・Calculation & Load (Effective only when this software is hosted by the MG3710A/MG3740A)

  Creates the waveform to load it into the memory

  ・Calculation & Play (Effective only when this software is hosted by the MG3710A/MG3740A)

  Creates the waveform, load it into the memory and select it.

■Tool bar

The following tool buttons are provided on the tool bar. The function of each button is the same as the corresponding item in the menus.

	Calculation
	Calculation & Load
	Calculation & Play
	Transfer & Setting Wizard
	CCDF
	FFT
	Time Domain
	Exit

■Description of items

(1)   Browse button

Select the wvi file of the target waveform pattern.

(2)   Filter Type

Set the filter type. Selects the filter type from the **Filter Type** drop-down combo box.
Selectable items: Ideal, None, Nyquist, Root Nyquist, Gaussian
Default value: Ideal
Ideal is a low pass filter which ripple is less than 0.01 dB in the range from $-0.475 \times \text{Bandwidth}$ to $0.475 \times \text{Bandwidth}$ when the Sampling Rate/Bandwidth is not larger than 50.

(3)   Roll Off/BT

Set the roll off ratio. This is enabled when Filter Type is set to Nyquist, Root Nyquist, or Gaussian.
Setting range: 0.10 to 1.00
Setting resolution: 0.01
Default value: 0.50

(4)   Bandwidth

Set the bandwidth.
Setting range: From the smaller value among Sampling Rate / 1000 and 0.00100000 to Sampling Rate
Setting resolution: 0.00000001
Default value: The Bandwidth of the waveform pattern specified in the Input File

(5)　Threshold Level

Set the threshold level for clipping.
Setting range: 0.0 to 20.0
Setting resolution: 0.1
Default value: 10.0

(6)　Repetition

Set the number of times to repeat clipping and filtering.
Setting range: 1 to 20
Setting resolution: 1
Default value: 10

4.14.3 Setting method

<Procedure>

1. Click the [Reference] button to select the wvi file of the waveform pattern to be used. The full path of the selected wvi file is displayed in the **Input File** text box.

2. Set values in the **Filter Type**, **Roll Off/BT**, **Bandwidth**, **Threshold Level**, and **Repetition** text boxes.

3. Select **Calculation** from the **Edit** menu or click the [ ] button to complete setting.

4.14.4 Generating waveform pattern

When the parameter setting has been completed in the Clipping setting screen, select **Calculation** from the **Edit** menu or click the ▦ button to display the Export File screen shown in Figure 4.14.4-1. In this screen, set the waveform pattern export destination, package name, and file name, and then enter a comment (if necessary) to generate a clipping-processed waveform pattern. The Comment text box can be left blank for waveform pattern generation.
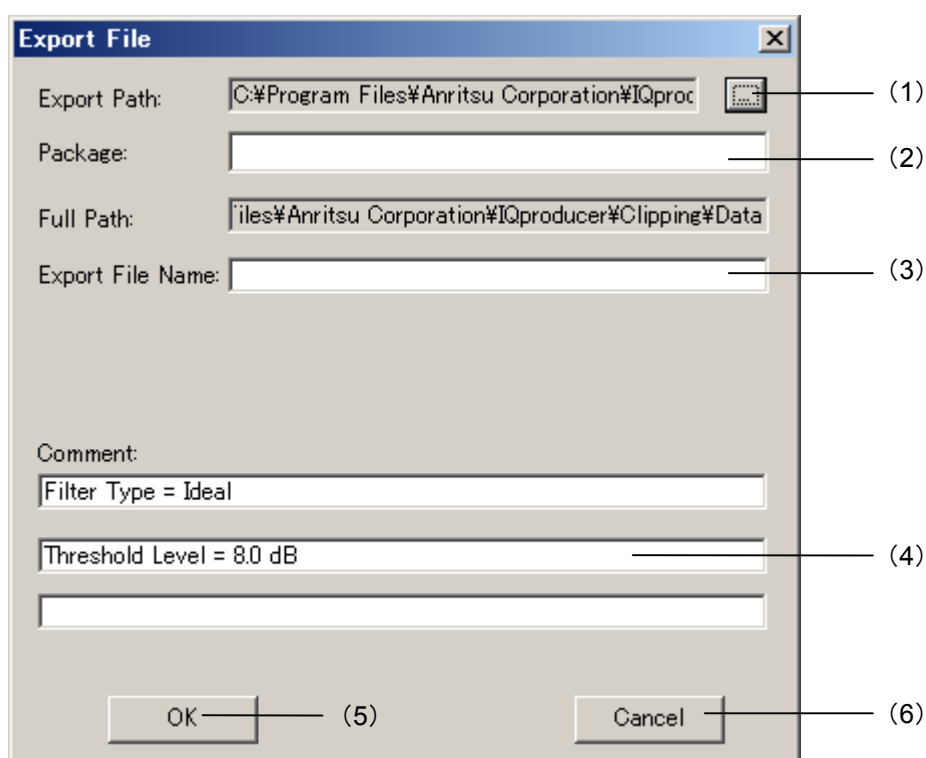

Figure 4.14.4-1   Export File Dialog Box

■Description of items

(1)   Browse button

Click this button to select the waveform pattern file output destination.
The waveform pattern file output destination folder is indicated in the **Export Path** text box.

(2)   Package Name

Enter the name of the package of the clipping-processed waveform pattern to be generated. Up to 31 characters can be used for a package name. Alphanumeric characters and the following symbols may be used:
! % & ( ) + = ` { } _ - ^ @ [ ]

(3)   Export File Name

Enter the name of the clipping-processed waveform pattern file to be generated (common to wvi and wvd files). Up to 20 characters can be used for a package name. The usable characters are the same as those for the package name.

(4)   Comment

The comment entered here is displayed in the Comment area on the MG3700A/MG3710A/MG3740A screen when the clipping-processed waveform pattern to be generated is output from the MG3700A/MG3710A/MG3740A. Up to 38 characters can be used for a package name.
When the Export File screen is displayed for the first time, the settings of Filter Type and Threshold Level are initially displayed in the upper and middle lines, respectively. Edit them, if necessary.

(5)   OK

Click this button to start waveform pattern generation.

(6)   Cancel

Click this button to close the Export File screen and return to the setting screen.

<Procedure>

1.   Set the clipping-processed waveform pattern output destination. Click [...] to select the output destination.

2.   The output destination of the clipping-processed waveform pattern file is displayed in the **Export Path** text box.

3.   Set the name of the package of the clipping-processed waveform pattern in the **Package** text box.

4.   Set the waveform pattern file name in the **Export File Name** text box.

5.   In the **Comment** text boxes, enter information on the clipping-processed waveform pattern to be displayed (if necessary).

6.   Click the **OK** button to start waveform pattern generation. Click the **Cancel** button to return to the setting screen.

7.   When waveform pattern generation starts, the waveform generation execution screen shown in Figure 4.14.4-2 appears. When the **Cancel** button at the bottom of the screen is clicked, waveform generation stops and the setting screen is displayed again. When waveform generation completes (when "Calculation Completed" is displayed), click the **OK** button to close the waveform generation screen and return to the setting screen.

Figure 4.14.4-2   Waveform Generation Executing Dialog Box

8. The clipping-processed waveform pattern file is generated in the
    destination specified in the **Export Path** text box, with the file name
    (common to wvi and wvd files) specified in the **Export File Name**
    text box.

4.14.5 Calculation & Load

Note:

This function is available only when this software is used on MG3710A/MG3740A.

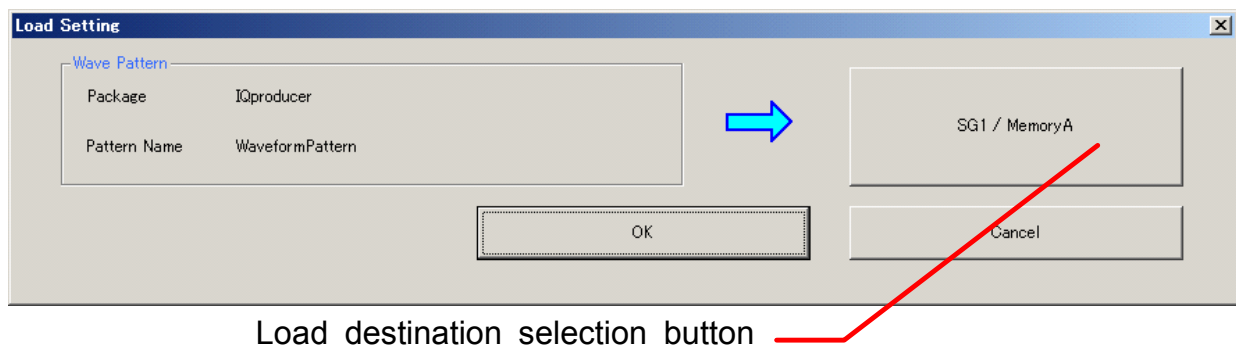When **Calculation & Load** is selected, the Load Setting screen will display after waveform generation.

Load destination selection button

Figure 4.14.5-1 Load Setting Screen

The Select Memory screen will display after clicking the load destination in the Load Setting screen.
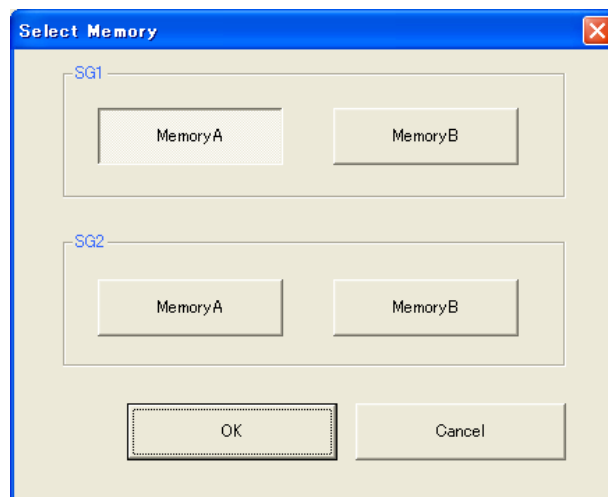

Figure 4.14.5-2 Select Memory Screen

After selecting the load destination of generated waveform in the Select Memory screen and pressing **OK**, the Load Setting screen will be shown again. Press **OK** in the Load Setting screen, and then the loading of waveform starts.

Note:

To exit this screen without loading the waveform pattern, click **Cancel** in the Load Setting screen.

4.14.6 Calculation & Play

Note:

This function is available only when this software is used on MG3710A/MG3740A.

When **Calculation & Play** is selected, after waveform creation is completed, the created waveform is loaded into memory, selected and output.

When the 2nd Vector Signal Generator (option) is installed, the Select SG screen is displayed before the start of waveform generation. This screen is used to select the signal generator for outputting the created waveform pattern.
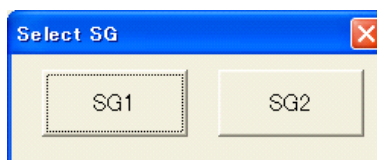

Figure 4.14.6-1　Select SG Screen

4.14.7 Clipping-processed waveform pattern simulation examples

This section provides a simulation example of the spectrum and CCDF graphs of the clipping-processed waveform pattern in Figures 4.14.7-1 and 4.14.7-2, respectively. The red line on Figure 4.14.7-2 indicates the CCDF graph before clipping.

Filter Type = Ideal

Bandwidth = 10.00000000 [MHz]
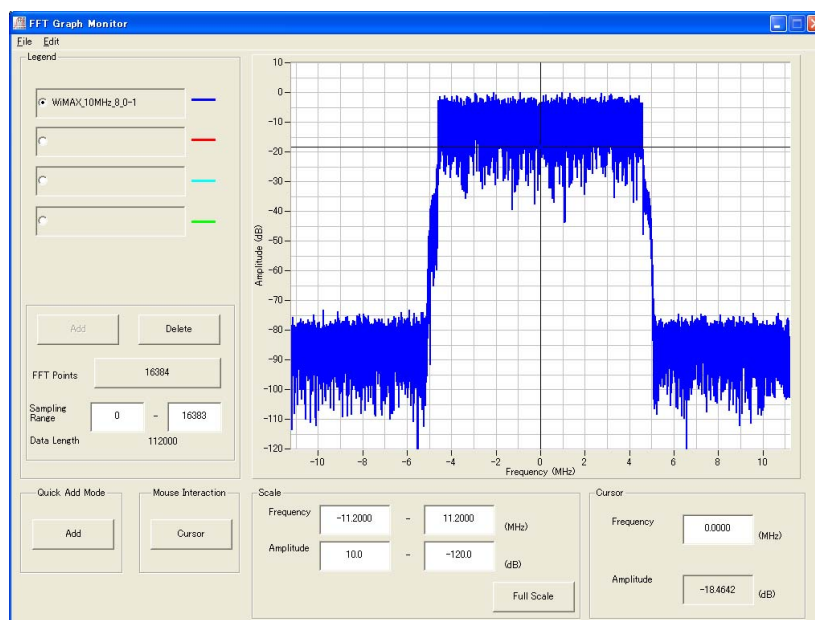
Threshold Level = 8.0

Repetition = 20

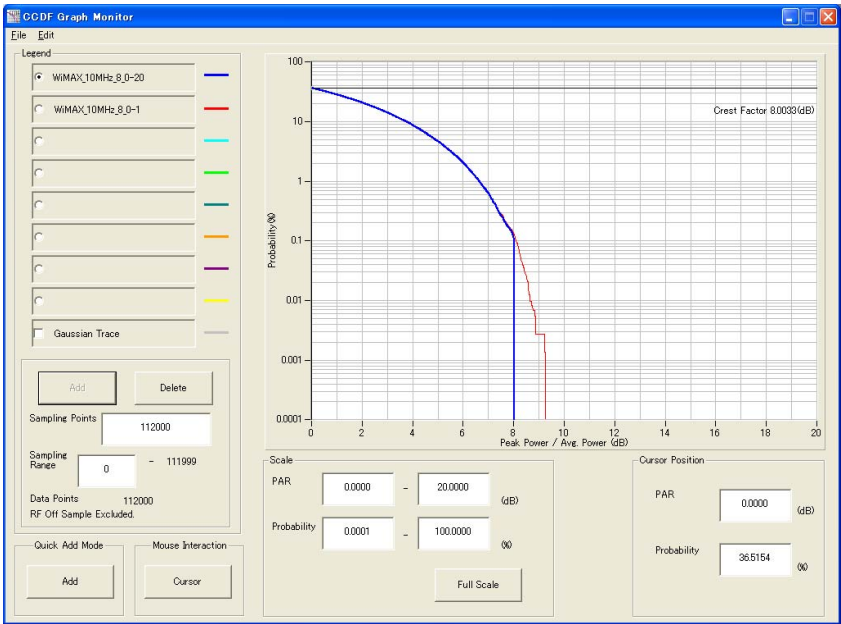**Figure 4.14.7-1   Clipping Processed Spectrum**

Figure 4.14.7-2   Clipping Processed CCDF Graph

4.14.8 Details of clipping processing

During clipping processing, clipping and filtering are performed repeatedly, as shown in Figure 4.14.8-1. The clipping processing clips the peaks that exceed Threshold Level, referencing on RMS_{IQ} as the basis (0 dB). Figure 4.14.8-2 shows a schematic diagram of the clipping processing at this time.

RMS_{IQ} that is used as the basis of the clipping processing is calculated from the following expression. When clipping and filtering are performed, RMS_{IQ} is calculated again, and the next clipping processing is performed based on the recalculated RMS_{IQ}.

$$\text{RMS}_{IQ} = \sqrt{\frac{1}{N}\sum_n \left(I_n^2 + Q_n^2\right)}$$

wherein, Σ is the sum of the target waveform patterns (excluding samples for which RF output is set to Off by the RF Gate setting)

Repeat this procedure according to the set Repetition number
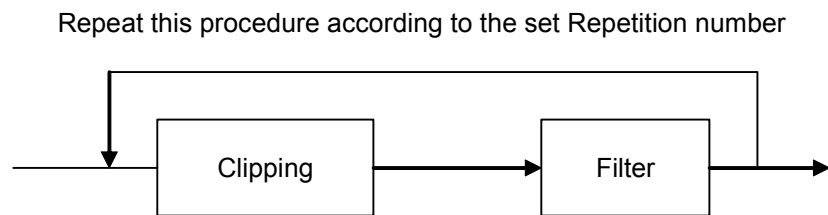

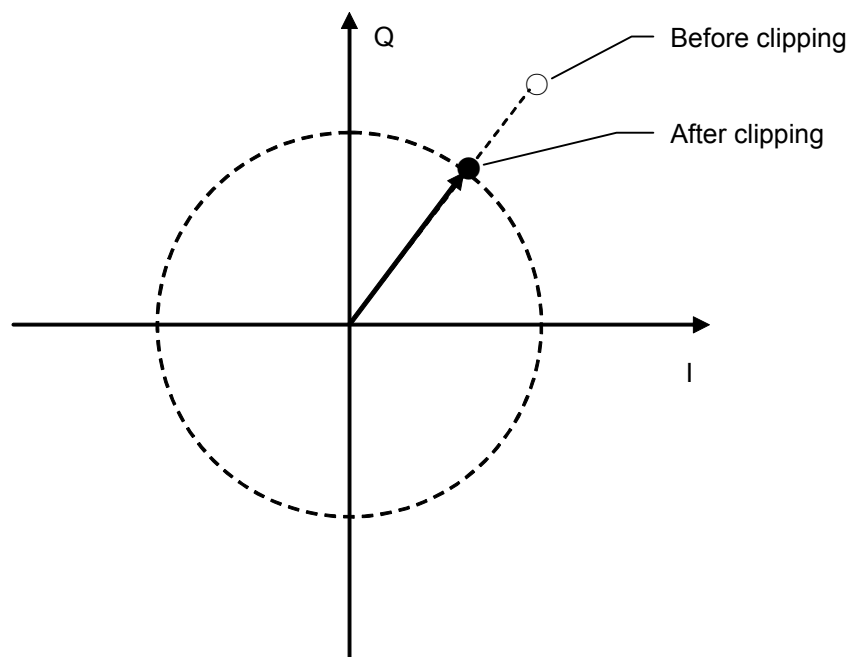**Figure 4.14.8-1 Clipping Process**

Figure 4.14.8-2 Schematic Diagram of Clipping Process

When filtering is performed after clipping, the peak becomes larger than that when only clipping is performed (see Figure 4.14.8-3), and the crest factor of the generated waveform pattern may exceed the level set by Threshold Level.　Figure 4.14.8-3 shows a simulation example of the CCDF graph where a waveform pattern is generated with Repetition = 1 and the other parameters are set the same as in Section 4.14.7 "Clipping-processed waveform pattern simulation examples."
For the sake of comparison, Figure 4.14.8-4 shows a CCDF simulation example where Repetition is changed to 1, 2, and 20. In this example, it can be seen that the crest factor comes closer to the level set by Threshold Level as the number of repetition times of clipping and filtering increases.
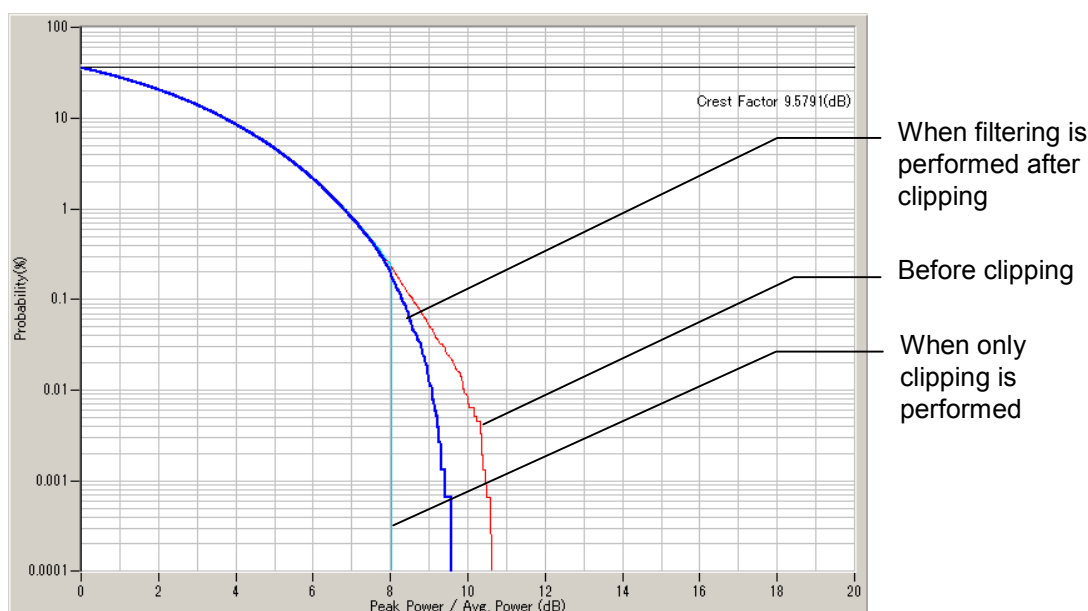
Figure 4.14.8-3　Clipping Method Result Comparison (when Repetition = 1)
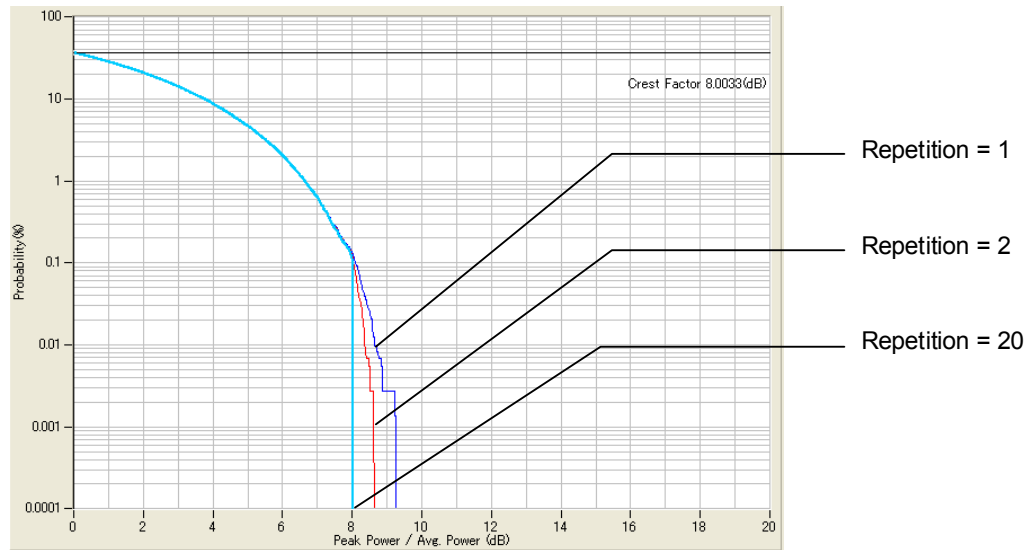
Figure 4.14.8-4   CCDF Graph When Changing Repetition

Chapter 5 Detail Description

This chapter describes in particular the operating procedures for important functions that pertain to the functions that can be operated by the IQproducer™ for MG3700A/MG3710A/MG3740A.

5.1　Installing License File

It is necessary to purchase the license of the signal generation applications according to the serial number of the MG3700A/MG3710A/MG3740A, and install the applications into the MG3700A/MG3710A/MG3740A to be used in advance so that the MG3700A/MG3710A/MG3740A can actually use the waveform patterns generated by the signal generation applications supported by the IQproducer™ for MG3700A/MG3710A/MG3740A.

The following show the license file installation method:

<Procedure>

1.　Start IQproducer™, select the **Simulation & Utility** tab and click **Transfer & Setting Panel**.

　　When the MG3700A/MG3710A/MG3740A and the PC are connected to the network, select **Connect** from the **Connection** menu or click the 　　 icon on the tool bar to open the Connection dialog box and connect the MG3700A/MG3710A/MG3740A and PC.

2.　Click 　 on the right of the transfer file type box to open the pull-down menu to select a file type. Select **Waveform Package License File** for license file transfer in this event. Then a list of the license files currently installed is displayed in the SG-side file display area.

3.　Select a license file to be transferred to the MG3700A/MG3710A/MG3740A from the PC-side file display area.
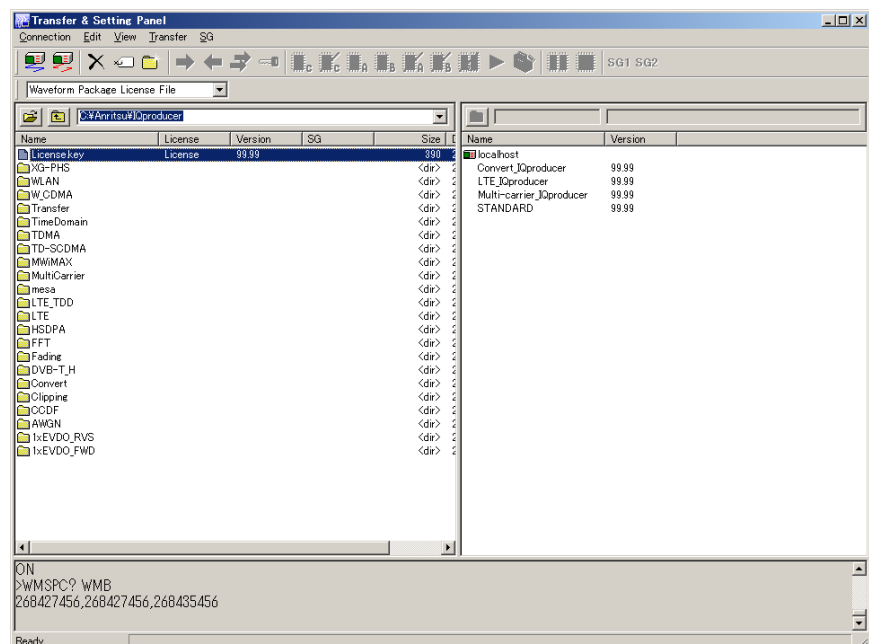

Figure 5.1-1　Selecting license file

4.   Select **Key Install** from the **Transfer** menu or click the ⌐◻ icon on
     the tool bar to start license file installation.
     The installed license files are displayed in the SG-side file display
     area after installation is completed.

Up to 100 license files can be installed into the MG3700A/MG3710A/
MG3740A.

5.2 Transferring Waveform Pattern

This section describes the procedure for transferring the waveform patterns generated by a signal generation application to the MG3700A/MG3710A/MG3740A on the Transfer & Setting Panel screen.

<Procedure>

1. Start IQproducer™, select the **Simulation & Utility** tab and click **Transfer & Setting Panel**. Select **Connect** from the **Connection** menu or click the ⬚ icon on the tool bar to open the Connection dialog box and connect the MG3700A/MG3710A/MG3740A and PC.

2. Click ▼ on the right of the transfer file type box to open the pull-down menu to select a file type. Select **Waveform Pattern File** for waveform pattern transfer in this event.
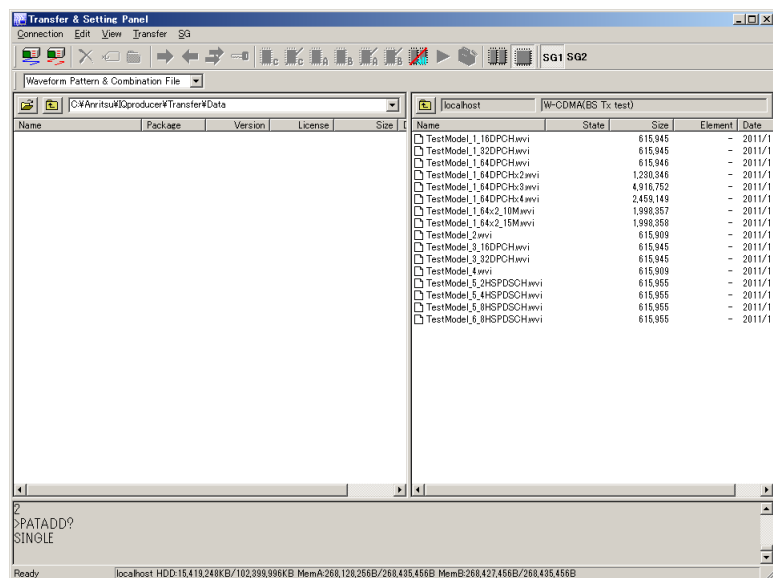
Figure 5.2-1   Selecting waveform pattern file

3. Select a waveform pattern file to be transferred to the MG3700A/MG3710A/MG3740A from the PC-side file display area. Two or more files can be selected by [Ctrl] + click (additional selection) and [Shift] + click (range selection).

4. Specify the MG3700A/MG3710A/MG3740A to which the waveform pattern file is transferred (transfer destination) from the SG-side file display area.
    When the MG3700A/MG3710A/MG3740A is specified, the capacity of its internal hard disk is displayed in the status bar on the bottom of the Transfer & Setting Panel screen.

5. Select **PC to SG** from the **Transfer** menu or click the ➡ icon on the tool bar to start waveform pattern file transfer. In this event, selecting **PC to All SG** from the **Transfer** menu or clicking the ➡ icon on the tool bar transfers the waveform pattern file to all the MG3700A/MG3710A/MG3740A connected to the PC.
The transferred waveform pattern file is stored in the folder (package) with the name specified in the **Package** box of the Convert screen.
Although a waveform pattern file that does not have a license can be transferred to the MG3700A/MG3710A/MG3740A, it is not allowed to load that file to the memory for use.

5.3 Transferring File from MG3700A/MG3710A/MG3740A to PC

This section describes the procedure for transferring screen copy images, log files, etc., created by the MG3700A/MG3710A/MG3740A to the PC on the Transfer & Setting Panel screen.

<Procedure>

1. Start IQproducer™, select the **Simulation & Utility** tab and click **Transfer & Setting Panel.** Select **Connect** from the **Connection** menu or click the ![icon] icon on the tool bar to open the Connection dialog box and connect the MG3700A/MG3710A/MG3740A and PC.

2. Click ![arrow] on the right of the transfer file type box to open the pull-down menu to select a file type. Select **All File** in this event.

3. Double-click the icon of the MG3700A/MG3710A/MG3740A specified as the transfer destination in the SG-side file display area. The following folders are displayed.

    If using MG3700A:
    *   ALARMLOG   Stores alarm display log files
    *   APM   Stores parameter saving files
    *   BERTLOG   Stores BER measured result log files
    *   CHANNEL   Stores channel table files
    *   PACKAGE   Stores packages and waveform pattern files
    *   SCREEN_IMAGE   Stores bitmap image files of screen copy
    *   WAVE_LICENSE   Stores waveform pattern license files
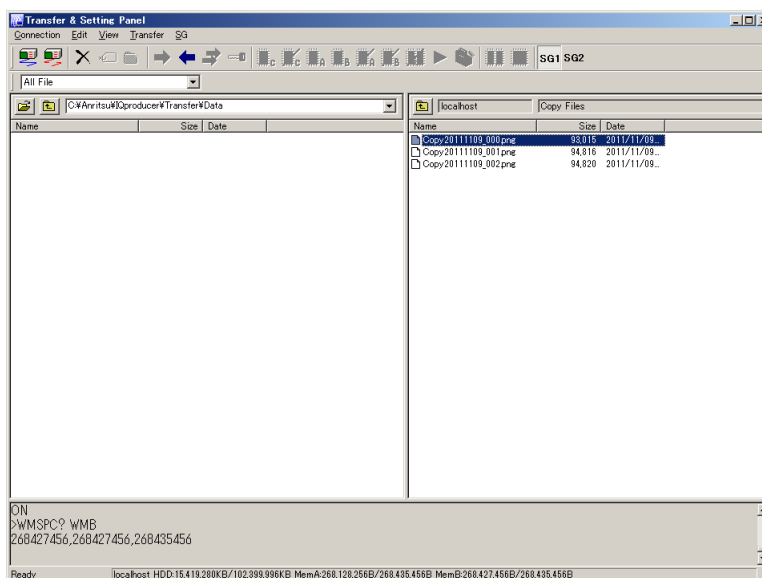
Figure 5.3-1   Selecting a file in SG-side file display area

If using MG3710A/MG3740A:

- Alarm History .... Alarm indication log file

- BERT BitPattern .... User defined pattern of BERT

- BERT Log .... BERT log file

- ChannelTable .... Channel table file

- Copy Files .... Image file of screen copy

- Corrections .... Correction file

- ListTable .... List Table file

- Parameter Setting .... Saved parameter file

- Waveform   Waveform pattern

4. Double-click the folder that contains the file to be copied in the SG-side file display area to display the contents, and select the target file. Two or more files can be selected by ⎡Ctrl⎤ + click (additional selection) and ⎡Shift⎤ + click (range selection).
    To return to the previous folder (upper directory), click the 🔼 icon on the top of the SG-side file display area.

5. Specify the folder to which the selected file is transferred (transfer destination) from the PC-side file display area.

6. Select **SG to PC** from the **Transfer** menu or click the ⬅ icon on the tool bar to start file transfer. The selected file is transferred to the folder opened in the PC-side file display area.
    In this event, the following overwrite confirmation dialog box is displayed if a file having the same name with that of the file to be transferred already exists in the transfer destination folder:
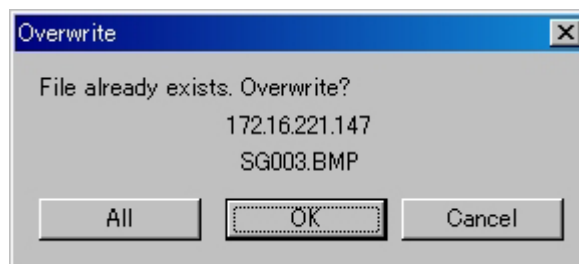
Figure 5.3-2   Overwrite confirmation dialog box

The meaning of each selection item in this dialog box is as follows:

- All: All the selected files are transferred overwriting the existing files having the same name.
- OK: The selected file is transferred overwriting the existing file having the same name. The overwrite confirmation dialog box is displayed each time when a file having the same name with that of the file to be transferred is found.
- Cancel: The selected file is not transferred, and the subsequent file transfer is cancelled.

The IQproducer™ for MG3700A/MG3710A/MG3740A does not support folder transfer. The data transfer is executed in file units.
Transfer date/time is used for the time stamp of the file transferred from the MG3700A/MG3710A/MG3740A to the PC.

5.4 Generating Waveform Pattern

This section describes a series of operations for converting an ASCII-format waveform pattern generated by external simulation software to a waveform pattern that can be used by the MG3700A/MG3710A/MG3740A using the Convert function of the IQproducer™ for MG3700A/MG3710A/MG3740A.

Refer to Section 4.5 "File Conversion on Convert Screen" for details of setting parameters.

<Procedure>

1. Click the **Reference** button and read the file to be converted.

2. The parameters related to the waveform pattern are enabled to be input after reading the waveform pattern file. Input these parameters as required according to the type and applications of the waveform pattern.

3. Set the sampling rate.
   The sampling rate indicates the speed of reading the waveform pattern from an arbitrary waveform memory in the MG3700A/MG3710A/MG3740A. Note that it is not the speed after processing the interpolator within the MG3700A/MG3710A/MG3740A.
   When reading a W-CDMA waveform pattern having the over sampling of ×4, for example, set the sampling rate as follows:
   3.84 Mcps × 4 = 15.36 MHz

4. Select the cut off frequency for the low-pass filter.

   This is available only for MG3700A.

   The low-pass filter, which is inserted in the analog baseband route, is used to remove an image component generated in the D/A converter output. When AUTO is set, the cut off frequency is automatically changed depending on the Sampling Rate setting as shown in Table 5.4-1 below.
   In Table 5.4-1, Interpolation indicates the scaling factor of the interpolator of the arbitrary waveform generator. Since the image components of the waveform pattern are raised to N-times frequency based on the interpolation factor (N), the sufficient attenuation of the image components can be assured by the low-pass filter. Also, employing the interpolator improves the frequency characteristics within the modulation band due to the 0 order hold of the D/A converter output.

Table 5.4-1   Low-pass filter settings

Sampling Rate (MHz)	Low pass Filter (MHz) (when Auto is set)		Interpolation
	Pattern Add	**Pattern single**	
150 <, ≤ 160	100	100	2
100 <, ≤ 150	70	70	2
50 <, ≤ 100	70	70	4
20 <, ≤ 50	70	70	8
12.5 <, ≤ 20	10	70	16
10 <, ≤ 12.5			32
6.25 <, ≤ 10	10	70	32
5 <, ≤ 6.25			64
3.125 <, ≤ 5	3	70	64
2.5 <, ≤ 3.125			128
1.5625 <, ≤ 2.5	1	70	128
1.25 <, ≤ 1.5625			256
0.78125 <, ≤ 1.25	0.3	70	256
0.625 <, ≤ 0.78125			512
0.390625 <, ≤ 0.625	0.3	70	512
0.3125 <, ≤ 0.390625			1024
0.1953125 <, ≤ 0.3125	0.1	70	1024
0.15625 <, ≤ 0.1953125			2048
0.09765625 <, ≤ 0.15625	0.1	70	2048
0.078125 <, ≤ 0.09765625			4096
0.04882813 <, ≤ 0.078125	0.1	70	4096
0.0390625 <, ≤ 0.04882813			8192
0.02441406 <, ≤ 0.0390625	0.1	70	8192
0.02 ≤, ≤ 0.02441406			16384

5. Set the RMS value after waveform pattern is converted.

When started with MG3700 mode, or when started with MG3710/ MG3740 mode and 14 bit width is selected:

Set a value from 651 to 1634 for the RMS value. Note, however, that the dynamic range of the output signal is deteriorated due to a quantization noise from the D/A converter or an analog noise added after D/A converter output when a smaller RMS value is set. When the peak amplitude of the converted waveform pattern becomes 8191 or higher, the peak of the waveform amplitude is held at 8191. The following condition should be met so as to output all the waveform information without cutting the peak signal:
8191 / RMS value > "Input waveform peak value / Input waveform RMS value"
When using a waveform pattern that has a lager "peak value / RMS

value", it is necessary to set a lower RMS value because a distortion is subject to occur in the base band and RF circuit in the MG3700A/MG3710A/MG3740A in this case. But if the RMS value is set too low, the floor noise characteristics are deteriorated as described below, though the distortion trouble is improved.
The accuracy of the RF output level of the MG3700A/MG3710A/ MG3740A is assured under the following condition. Set the RMS value within the following range when taking the RF output level accuracy into consideration.
$1157 \leq \text{RMS value} \leq 1634$

6. Set Memory Option.

    When started with MG3700A:

    Set Memory Option according to whether the ARB memory expansion option 512M samples is installed in the used MG3700A. The maximum number of waveform patterns that can be generated is determined depending on this setting.
    When With Option21 is set: Up to 512 Msamples
    When Without Option21 is set: Up to 256 Msamples

    When started with MG3710A:
    The menu will display as follows:
    Memory 64M samples
    Memory 64M samples × 2 (With Option48, 78)
    Memory 256M samples
    Memory 256M samples × 2 (With Option48, 78)
    Memory 1024M samples
    Memory 1024M samples × 2 (With Option48, 78)
    When started with MG3740A:
    The menu will display as follows:
    Memory 64M samples
    Memory 64M samples × 2 (With Option48, 78)
    Memory 256M samples
    Memory 256M samples × 2 (With Option48, 78)

7. Set Unit Symbol.
    Set the set unit for Trigger Delay and other parameters of the MG3700A/MG3710A/MG3740A. The set unit display for Trigger Delay is changed depending on this setting.

8. Set Over Sampling.
    Set the over sampling rate for the waveform pattern to be input. The over sampling rate should be set to the value shown in Table 5.4-2 or higher, according to the symbol rate (or chip rate) of the waveform to be generated. When a value lower than that shown in the table below is used, the image signal element may become –60 dB or more. The symbol rate is the output rate for the data that has been mapped in the physical channel of each communication system before the Route Nyquist processing is performed. The sampling rate is calculated by multiplying the symbol rate by the over sampling rate.

9. Set Bandwidth (For MG3710A/MG3740A)
    Set the bandwidth of waveform data.

Table 5.4-2   Over sampling rate setting

Symbol rate (symbol/sec)	Over sampling rate	Sampling rate (sample/sec)	LPF
10 k≤, ≤9.09 M	2.2	20 k≤, ≤20 M	AUTO
9.09 M<, ≤40 M	4	36.36 M<, ≤160 M	AUTO

10. Set Spectrum.
    The spectrum relationship between the IQ signal and RF signal may be reversed according to the modulator configuration of each communication system. Set Reverse for IS-95 and cdma2000.

11. Enter a comment.
    Enter a comment into the Comment Lines 1/2/3 if necessary. The character string entered here is displayed on the screen when the corresponding waveform is selected.

12. Specify Detail File. (Available only for MG3700A)
    Specify a detail file (text-format file) to be read if necessary. The selected detail file is stored into the MG3700A along with the waveform pattern, and its contents are displayed in Detail Information of the MG3700A screen when the corresponding waveform pattern is selected.
    The contents of a detail file must be described within 56 characters × 6 lines.

13. Set Marker Name.
    Set a name for Makers 1, 2, and/or 3 to be used if necessary. The marker output is displayed in the MG3700A/MG3710A/MG3740A screen with the name specified here when the corresponding waveform pattern is selected.

14. Set Burst Setting.

    The Burst Setting includes two settings: Frame Length and Gap Length. The input waveform pattern is divided into frames of the number of data set by Frame Length, and a gap (burst off period in which the burst wave is not output) of the number of data set by Gap Length is inserted between frames (see Figure 5.4-1).

    It is not necessary any longer to output the burst off period as a waveform pattern when using this setting. For example, when outputting only the first slot in the system where one frame consists of five slots, the memory length required for the waveform pattern is reduced to 1/5 of that when the Gap Frame setting is not used. When an external trigger signal is used, the Frame Length setting is also used to synchronize the external trigger and the signal output timing in the Vector Signal Generator option. For details on external trigger, refer to 3.5.4 "Outputting signal in sync with external trigger signal" in MG3700A Vector Signal Generator Operation Manual (Mainframe), or 7.4.1 "Route Input Connectors" in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe). Set Gap Length to 0 for continuous waves.
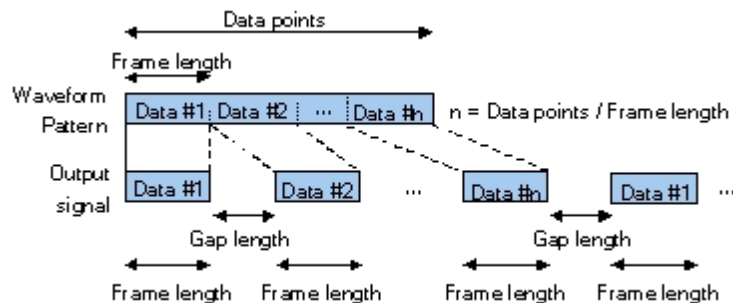

Figure 5.4-1   Frame Length and Gap Length Settings

15. Click the Convert button to start data conversion.
    The converted data output destination and file name are set, and waveform pattern generation is started.

Appendix A   Error Messages

A list of error messages is shown below.

Error Message	Description
Platform	
Application is not found from APPINFO Manager.	The application was not found from the application information.
Application is not found. ("*Activated application name*")	—
Application starting timeout. ("*Activated application name*")	—
Application termination timeout. ("*Application name*") Shutdown application?	—
IQproducer is already running.	—
("*Application name*") is already running.	—
Request shutdown was not completed. ("*Application name*")	—
Transfer & Setting	
The platform has been unusually ended.	—
The filename, directory name, or volume label syntax is incorrect.	—
Cannot create a file when that file already exists.	—
The MG3700A firmware version is 1.xx. Your version of IQproducer cannot connect with the version 1.xx of MG3700A normally. Please check Anritsu Download Support Site to upgrade MG3700A firmware.	The MG3700A firmware version is 1.xx, and your version of the IQproducer cannot properly connect to the MG3700A. Update the MG3700A firmware to enable the connection (download the latest firmware from the download page linked from the MG3700A page on the Anritsu Web site).
FTP connection error.	—
FTP connection lost.	The FTP communication has been shut down. This error message is also displayed when waveform files cannot be transferred from PC to SG because of insufficient disk space of the HDD on the SG.
FTP connection timeout.	—
FTP connection error.	—
FTP USER command error.	—
FTP User ID or FTP password is not corresponding between IQproducer and MG3700A.	—
FTP CWD command error.	—
FTP DELE command error.	—
FTP LIST command error.	—
FTP TYPE command error.	—
FTP RETR command error.	—
FTP STOR command error.	—
Can not open file.	—

Error Message	Description
Can not write file.	—
Can not read file.	—
Can't get a file list.	—
File not found.	—
Remote connect error.	—
Remote connection lost.	—
Remote connection timeout.	—
Remote connection error.	—
Remote *ESR? query error.	—
Remote ESR2? query error.	—
Remote ESR3? query error.	—
Remote *IDN? query error.	—
Remote HEAD? query error.	—
Remote ERRMSG? query error.	—
Remote WMSPC? query error.	—
Remote HDDSPC? query error.	—
Remote WVINSTMEDIA? query error.	—
Remote PATADD? query error.	—
Remote WVKEYNUM? query error.	—
Remote WVKEYNAME? query error.	—
Remote WVKEYVER? query error.	—
Remote PATNUM? query error.	—
Remote PATNAME? query error.	—
Remote LDPAT? query error.	—
Remote PAT? query error.	—
Remote WMOPT? query error.	—
Remote SCNNUM? query error.	—
Remote timeout.	—
These Waveform Files cannot be transferred because Waveform files in HDD exceed 100.	Waveform files cannot be transferred because more than 100 wvi/wvc files exist in the HDD/package on the SG.
Cannot load this file because of the shortage of memory space. Please delete some loaded files from memory to load this file.	—
It is the Combination file which cannot be used. "File name"	—
The total size of Element A/Element B/Add Pattern is over "Size."	—
Data width of the Waveform pattern which can be set as Add pattern is ("File name").	The data width of the element file to be added is not 16 bits.
Pattern "Pattern name" is used for the element more than 99 times.	—
The license is necessary.	—

Error Message	Description
The total size of the pattern used has exceeded the capacity of memory.	—
The Setting value is out of range. ("Parameter name = Current value Min to Max)")	—
The file that tries to be copied is an illegal format. ("File name")	—
Invalid file format. ("File name")	—
Can not read file.("File name")	—
Can not write file.("File name")	—
Invalid Waveform information file format. ("File name")	—
This file cannot be registered because of discrepancy with the parameter of the registered file. ("File name")	—
The Setting value invalid. ("File name")	—
Fail to copy file. ("File name")	—
Combination file cannot be made because the setting of the element is not correct.	—
CCDF	
Initialization error	—
Selection of an inaccurate file. ("File name")	—
Can not open file. ("File name")	—
Invalid file format. ("File name")	—
The data of a Wave-form file is unusual.	—
Can not write file. ("File name")	—
Can not read file.	—
A "IQProducer" is down. Application is shutdown.	—
Can not open the setting file. ("File name")	—
The Setting value is invalid ("Parameter name")	—
The Setting value is out of range ("Parameter name (minimum value – maximum value)")	—
There is a request from the other IQproducer application for drawing a trace. Delete the displayed trace and draw a new trace?	—
You have filled up all the trace available. Delete some traces, or set Quick Add Mode to clear before adding a trace.	—
There is no trace to output.	CSV output is impossible since no graph is displayed.

Error Message	Description
FFT	
Initialization error	—
Selection of an inaccurate file. ("File name")	—
Can not open file. ("File name")	—
Invalid file format. ("File name")	—
The data of a Wave-form file is unusual.	—
Can not write file. ("File name")	—
Can not read file.	—
A "IQProducer" is down. Application is shutdown.	—
Can not open the setting file. ("File name")	—
The Setting value is invalid ("Parameter name")	—
The Setting value is out of range ("Parameter name (minimum value – maximum value)")	—
The length of "FFT Points" is longer than that of the waveform data. Trace data couldn't be read. ("File name")	—
The length of "FFT Points" is longer than that of the waveform data. "FFT Points" was set as suitable value. ("File name")	—
Invalid parameter value.	—
There is a request from the other IQproducer application for drawing a trace. Delete the displayed trace and draw a new trace?	—
You have filled up all the trace available. Delete some traces, or set "Quick Add Mode" to "clear" before adding a trace."	—
There is no trace to output.	CSV output is impossible since no graph is displayed.
If the "FFT Points" is changed, all the trace displayed will be recalculated. Are you sure to change the "FFT Points"?	—
Sampling Rate is different. Do you clear the graph already displayed and display new graph?	—
If the "Sampling Range" is changed, all the trace displayed will be recalculated. Are you sure to change the "Sampling Range"?	—

Error Message	Description
Convert	
Initialization error	—
Selection of an inaccurate file. ("File name")	—
Can not open file. ("File name")	—
Invalid file format. ("File name")	—
The data of a Wave-form file is unusual.	—
Can not write file. ("File name")	—
Can not read file.	—
A "IQProducer" is down. Application is shutdown.	—
Can not open the setting file. ("File name")	—
The Setting value is invalid ("Parameter name")	—
The Setting value is out of range ("Parameter name (minimum value – maximum value)")	—
Can not create the output file. ("File name")	—
File not found. ("File name")	—
The detail area is maximum of 6 lines, 56 characters per line. ("File name")	—
Fail to copy the detail file. ("File name")	—
The read data is shorter than Data Points. ("File name")	Data conversion is impossible since the input file is smaller than the number of data points (Data Points).
The Data Points is too large. The Maximum Data Points is either 268435456 samples (without Option 11/31) or 536870912 samples (with Option 11/31).	—
When the Burst Setting checkbox is checked, The value of Frame Length must be equal or less than the value of Data Points.	—
The waveform pattern to be generated will be above 8191 and be clipped.	—
RMS value of waveform data is not in range 1.0 to 8191.0. RMS value will be changed.	—
The dgz file size are too large. The Maximum Data Points are 536870912 samples.	—
AWGN	
Out of range： "Parameter name" ("Setting range")	—
Can not open file.	—
Can not write file. ("File name")	—

Error Message	Description
W-CDMA Downlink/Uplink	
Initialization error	—
Selection of an inaccurate file. ("File name")	—
Can not open file. ("File name")	—
Invalid file format. ("File name")	—
The data of a Wave-form file is unusual.	—
Can not write file. ("File name")	—
Can not read file.	—
Can not open the parameter file. ("File name")	—
The Setting value is invalid "Parameter name"	—
The Setting value is out of range "(Parameter name (Min – Max.))"	—
Total channel power except OCNS is over 0 dB.	—
An initial parameter file was not able to be read.	—
All Channels are OFF.	—
Input File Name.	—
Value is set up at 800 steps.	—
DTCH information data is changed to the data truncated every one frame (PN9fix).	—
Total channel power is not normalized to 0 dB. It is necessary to normalize the total power when OCNS is OFF.	—
Total channel power is not normalized to 0 dB. It is necessary to normalize the total power when Simulation is UpLink.	—

Error Message	Description
Time Domain	
Initialization error	—
Selection of an inaccurate file. ("File name")	—
Can not open file. ("File name")	—
Invalid file format. ("File name")	—
The data of a Wave-form file is unusual.	—
Can not write file. ("File name")	—
Can not read file.	—
A "IQProducer" is down. Application is shutdown.	—
Can not open the setting file. ("File name")	—
The Setting value is invalid ("Parameter name")	—
The Setting value is out of range ("Parameter name (minimum value – maximum value)")	—
Invalid parameter value.	—
There is a request from the other IQproducer application for drawing a trace. Delete the displayed trace and draw a new trace?	—
You have filled up all the trace available. Delete some traces, or set "Quick Add Mode" to "clear" before adding a trace."	—
If the "Graph Type" is changed, all the trace displayed will be recalculated. Are you sure to change the "Graph Type"?	—
Marker edit function cannot be used because the selected file does not include marker signal.	If a 16-bit file is selected: The marker editing function cannot be used because the file does not include a marker signal.

Error Message	Description
Clipping	
Can not open file.	—
Can not write file.	—
Can not read file.	—
Input File is not selected.	—
The Setting value is out of range ("Parameter name (minimum value – maximum value)")	—
The Waveform data file is not generated.	—
Wrong pattern license.	—
This pattern cannot use. Because, "Internal FIR" is used.	—
The number of samples is over 512M samples.	—
Input Package Name.	—
Input Export File Name.	—
The data of ware-form file is unusual.	—
Exception error.	—
Waveform is not correct.	—

References are to page numbers.

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