MX370108A/MX269908A
LTE IQproducer™
Operation Manual

12th 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), MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe), MS2690A/MS2691A/ MS2692A Signal Analyzer Operation Manual (Mainframe Operation), or MS2830A Signal Analyzer Operation Manual (Mainframe Operation). Please also refer to either of these documents before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-W3022AE-12.0

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.

MX370108A/MX269908A
LTE IQproducer™
Operation Manual

22 October 2007 (First Edition)
30 September 2015 (12th 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.

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Software End-User License Agreement (EULA)

Please read this Software End-User License Agreement (hereafter this EULA) carefully before using (includes executing, copying, registering, etc.) this software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment). By reading this EULA and using this software, you are agreeing to be bound by the terms of its contents and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu-specified equipment (hereafter Equipment) for the purposes set out in this EULA.

1. Grant of License and Limitations

1. Regardless of whether this Software was purchased from or provided free-of-charge by Anritsu, you agree not to rent, lease, lend, or otherwise distribute this Software to third parties and further agree not to disassemble, recompile, reverse engineer, modify, or create derivative works of this Software.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer this software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for personal injury, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, arising out of or related to your use or inability to use this Software.

3. Limitation of Liability

a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.

   i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
   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.

b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.

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.

4. Export Restrictions

You may not use or otherwise export or re-export directly or indirectly this Software except as authorized by Japanese and United States law. In particular, this software may not be exported or re-exported (a) into any Japanese or US embargoed countries or (b) to anyone on the Japanese or US Treasury Department's list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. By using this Software, you warrant that you are not located in any such country or on any such list. You also agree that you will not use this Software for any purposes prohibited by Japanese and US law, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction.

5. Termination

Anritsu shall deem this EULA terminated if you violate any conditions described herein. This EULA shall also be terminated if the conditions herein cannot be continued for any good reason, such as violation of copyrights, patents, or other laws and ordinances.

6. Reparations

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.

7. Responsibility after Termination

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.

8. Dispute Resolution

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.

Cautions against computer virus infection

- Copying files and data
  Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
  All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software
  Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
  Ensure that the network has sufficient anti-virus security protection in place.

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.

CE Conformity Marking

Anritsu affixes the CE conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

1. Product Model

Software: MX370108A/MX269908A LTE IQproducer™

2. Applied Directive and Standards

When the MX370108A/MX269908A LTE IQproducer™ is installed in the MG3710A, MS2690A/MS2691A/MS2692A, or MS2830A, the applied directive and standards of this software conform to those of the MG3710A, MS2690A/MS2691A/MS2692A, or MS2830A main frame.

PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX370108A/MX269908A can be used with.

C-tick Conformity Marking

Anritsu affixes the C-tick mark on the following product(s) in accordance with the regulation to indicate that they conform to the EMC framework of Australia/New Zealand.

C-tick marking

1. Product Model

Software: MX370108A/MX269908A LTE IQproducer™

2. Applied Directive and Standards

When the MX370108A/MX269908A LTE IQproducer™ is installed in the MG3710A, MS2690A/MS2691A/MS2692A, or MS2830A, the applied directive and standards of this software conform to those of the MG3710A, MS2690A/MS2691A/MS2692A, or MS2830A main frame.

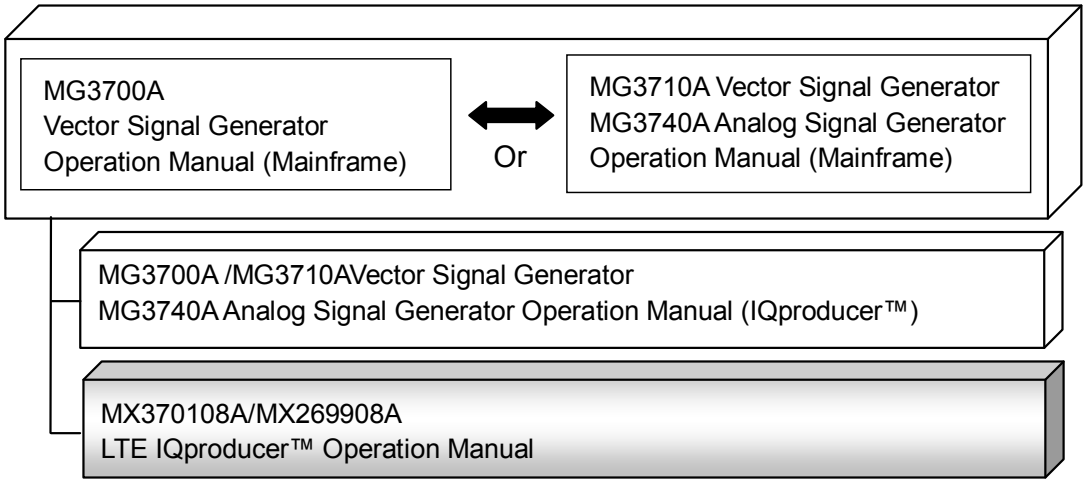
PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX370108A/MX269908A can be used with.

About This Manual

■Associated Documents

The operation manual configuration of the MX370108A/MX269908A LTE IQproducer™ is shown below.

■If using MG3700A or MG3710A:



- MG3700A Vector Signal Generator Operation Manual (Mainframe)

This describes basic operations, maintenance procedure, and remote functions of the MG3700A Vector Signal Generator.

Or

- MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

This describes basic operations, maintenance procedure, and remote functions of the MG3710A Vector Signal Generator and the MG3740A Analog Signal Generator .

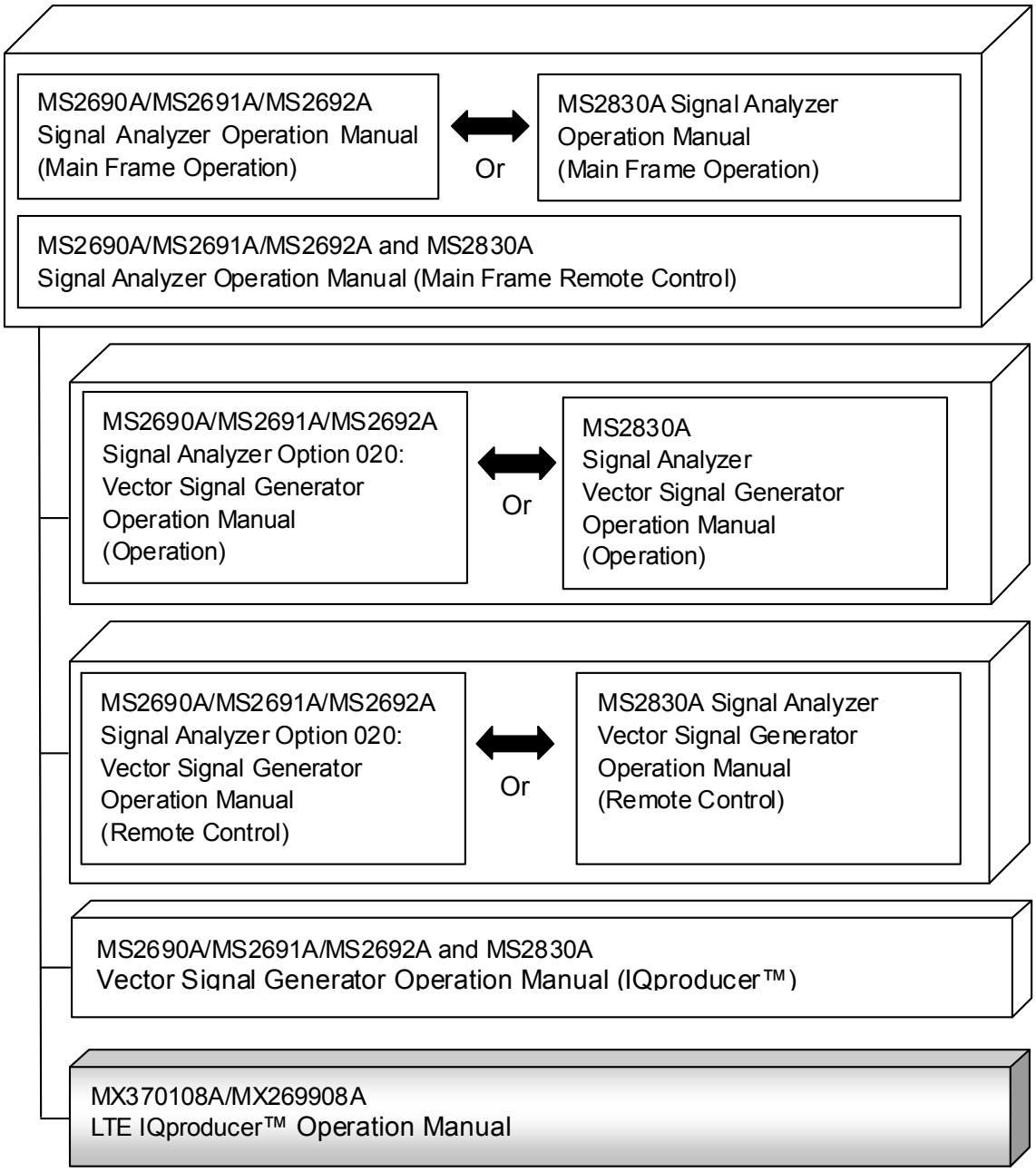
- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)

This describes the functions and how to use the IQproducer, which is Windows software for the Vector Signal Generator and the Analog Signal Generator .

- LTE IQproducer™ Operation Manual (This document)

This describes basic operations and functions of the LTE IQproducer™.

■If using MS2690A/MS2691A/MS2692A or MS2830A:



- MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe, Operation)

This describes basic operations, maintenance procedure, common functions and common remote functions of the MS2690A/MS2691A/MS2692A.

Or

- MS2830A Signal Analyzer Operation Manual (Mainframe, Operation)

This describes basic operations, maintenance procedure, common functions and common remote functions of the MS2830A.

- MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe, Remote Control)

These describe basic operations, maintenance procedure, common functions and common remote functions of the MS2690A/MS2691A/MS2692A or MS2830A.

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual, Operation

This describes the functions and how to use the Vector Signal Generator option.

Or

- MS2830A Vector Signal Generator Operation Manual, Operation

This describes the functions and how to use the Vector Signal Generator option.

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual, Remote Control

This describes how to remotely control the Vector Signal Generator option.

Or

- MS2830A Vector Signal Generator Operation Manual, Remote Control

This describes how to remotely control the Vector Signal Generator option.

- MS2690A/MS2691A/MS2692A and MS2830A Vector Signal Generator Operation Manual (IQproducer™)

This describes the functions and how to use the IQproducer, which is Windows software for the Vector Signal Generator option.

- LTE IQproducer™ Operation Manual (This document)

This describes basic operations and functions of the LTE IQproducer™.

Table of Contents

Chapter 1 Overview

This chapter provides an overview of the MX370108A/MX269908A LTE IQproducer™.

1.1 Product overview

MX370108A/MX269908A LTE IQproducer™ (hereinafter referred to as "this software") is software used to generate waveform patterns conforming to the 3GPP LTE FDD specifications. These are:

- TS36.211 V12.5.0 (2015-04)
- TS36.212 V12.4.0 (2015-04)
- v TS36.213 V8.7.0 (2009-05)

When the option (MX370108A/MX269908A-001) is installed, this software can generate waveform patterns conforming to the 3GPP LTE-Advanced FDD specifications. The MX370108A/MX269908A-001 is compliant with the following 3GPP specifications. These are:

- TS36.211 V12.5.0 (2015-04)
- TS36.212 V12.4.0 (2015-04)
- TS36.213 V10.4.0 (2011-12)

This software requires either of the following environment:

- MG3710A Vector Signal Generator
- MS2690A/MS2691A/MS2692A or MS2830A Signal Analyzer with Vector Signal Generator option mounted
- Personal computer (hereinafter, "PC")

This software generates waveform patterns that support the specifications of 3GPP LTE FDD / LTE-Advanced FDD with various characteristics. This is made possible by the editing/customizing of parameters according to its use.

A waveform pattern created by this software can be output using an RF signal after being downloaded into the MG3700A Vector Signal Generator ,MG3710A Vector Signal Generator , or an MS2690A/MS2691A/MS2692A or MS2830A Signal Analyzer with Vector Signal Generator option installed (collectively referred to as "mainframe", or "this equipment").

1.2 Product Composition

1.2.1 Restrictions

The following table lists the model name and specifications of this software according to the equipment.

Table 1.2.1-1 Restrictions

Mainframe / Restrictions	MG3700A	MG3710A	MS2690A MS2691A MS2692A	MS2830A
Software name	MX370108A		MX269908A	
Maximum Size of Waveform Patterns	256 M sample 512 M sample*1	64 M sample 128 M sample*5 256 M sample*6 512 M sample*7	256 M sample	64 M sample 256 M sample*4
Transmission method of Waveform Patterns	LAN, CompactFlash Card	External device such as LAN, USB memory*2	USB Memory and other external device *2	USB Memory and other external device *2
Installation of this software to this equipment	N/A	Possible	Possible *3	Possible *3

*1: The ARB memory expansion 512M sample (optional) must be installed into the MG3700A to use waveform patterns that exceed 256 M samples.

*2: Transferring waveform patterns is not required if the waveform patterns are created on the equipment using this software.

*3: Although this software can be installed and run in the MS2690A/MS2691A/MS2692A or MS2830A, the measurement functions of the MS2690A/MS2691A/MS2692A or MS2830A are not guaranteed while this software runs.

*4: The ARB memory expansion 256M sample (optional) must be installed into the Vector Signal Generator option to use waveform patterns that exceed 64 M samples.

*5: The Combination of Baseband Signal (optional) must be installed into the MG3710A to use waveform patterns of maximum 128 M samples.

*6: The ARB memory expansion 256M sample (optional) must be installed into the MG3710A to use waveform patterns of maximum 256 M samples.

*7: To use waveform patterns of maximum 512 M samples, either of the following must be installed into MG3710A:

- ARB memory expansion 1024 M sample (optional)
- ARB memory expansion 256 M (optional) and Combination of Baseband Signal (optional).

■Notes on waveform pattern conversion

The waveform patterns generated with this software varies according to the main unit type. If using the waveform pattern to the different main unit, you need to convert the waveform pattern.

For details about how to convert a waveform pattern, refer to each one of the following manuals.

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  4.5 "File Conversion on Convert Screen"
- MS2690A/MS2691A/MS2692A and MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  4.5 "File Conversion on Convert Screen"

1.2.2 Option

Tables 1.2.2-1 lists the option for this software. This is sold separately.

Table 1.2.2-1 Additional Option

Option No.	Product Name	Remarks
MX370108A/MX269908A-001	LTE-Advanced FDD Option	For restrictions, refer to Table 1.2.2-2.

Table 1.2.2-2 Restrictions of MX370108A/MX269908A-001

Mainframe / Restrictions	MG3700A	MG3710A	MS2690A MS2691A MS2692A	MS2830A
Intra-band contiguous Carrier Aggregation	✓	✓	✓	✓
Intra-band non-contiguous Carrier Aggregation	✓	✓	✓	✓
Inter-band non-contiguous Carrier Aggregation	N/A	✓*	N/A	N/A

*: Available only when the 2nd RF option (MG3710A-062/064/066/162/164/166) is installed.

Chapter 2 Preparation

This chapter describes the operating environment for this software.

2.1 Operating Environment

The following environment is required for operating this software.

(1) PC that meets the following conditions

OS	Windows XP/Windows Vista/Windows 7
CPU	Pentium III 1 GHz equivalent or faster
Memory	512 MB or more
Hard disk space	5 GB or more free space in the drive where this software is to be installed. The free hard disk space necessary to create waveform pattern varies depending on the waveform pattern size. The free disk space of 27 GB or greater is required to create four maximum (512 Msample) waveform patterns.

(2) If viewing on PC, displays with a resolution of 1024 × 768 pixels are best viewed using a small font setting.

2.2 Installation/Uninstallation

This software is included in the IQproducer™ installer. It is automatically installed by installing the IQproducer™ that is supplied with this equipment or this software. When using a waveform pattern created using this software in the equipment, the license file must be installed in advance.

■Installing/Uninstalling IQproducer™

For how to install and uninstall IQproducer™, refer to each of the following manuals:

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  Chapter 2 “Installation”
- MS2690A/MS2691A/MS2692A and MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  Chapter 2 “Installation”

■Installing/Uninstalling IQproducer™ license file

For how to install license file to MG3700A/MG3710A, refer to the following manual:

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  5.1 “Installing License File”

For how to uninstall license file from MG3700A/MG3710A, refer to each one of the following manuals:

- MG3700A Vector Signal Generator Operation Manual (Mainframe)
  3.10.10 “Install”
- MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)
  9.4.4 “Install”

Refer to the following manual for details of how to install/uninstall license file to MS2690A/MS2691A/MS2692A or MS2830A with Vector Signal Generator option.

- MS2690A/MS2691A/MS2692A and MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  2.2 “Installation/Uninstallation”

2.3 Starting up and exiting the software

This section explains how to start and stop this software.

Note:

The following explanation assumes the use of Windows XP. The screen image may differ slightly if not using Windows XP.

2.3.1 Starting Software: When installed on other than MG3710A

Start this software using the following procedure.
The example assumes that it is a PC operation.

<Procedure>

1. Click **Start** on the task bar, and point to **All Programs**. Next, point to **Anritsu Corporation**, point to **IQproducer**, and then click **IQproducer**.

2. When IQproducer™ starts, the **Select instrument** screen is displayed.

   On the **Select instrument** screen, select the model of the main unit that uses the waveform patterns created by IQproducer™.

Notes:

- This software does not support MG3740A.
- To hide this screen and to start with the selected mainframe's screen from the next time, select the **Don't show this window next time** check box.

3. The common platform screen is displayed when **OK** is clicked in the **Select instrument** screen.

   The common platform screen is a screen used to select each function of the IQproducer™.

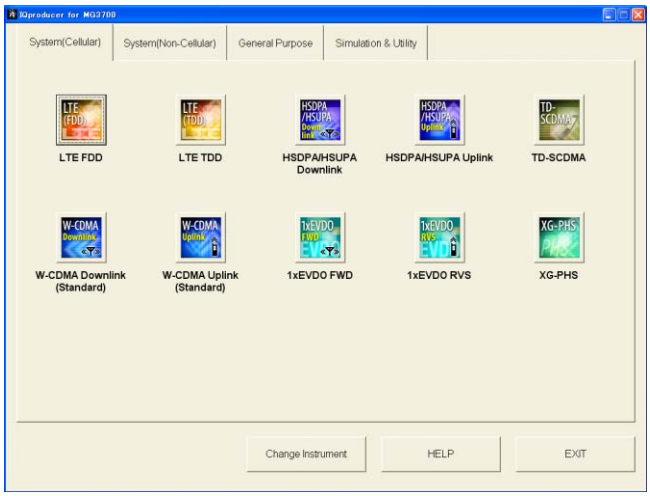


Figure 2.3.1-1 Common Platform Screen

4. Click the **System (Cellular)** tab on the common platform screen, to show the **System (Cellular)** selection screen that supports each telecommunication system.

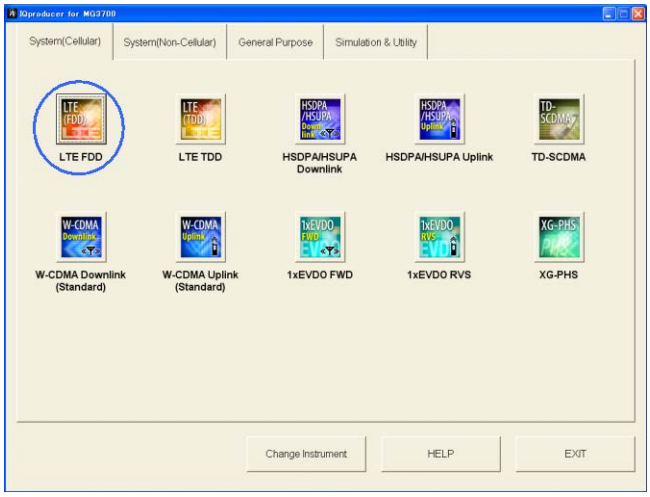


Figure 2.3.1-2 System (Cellular) Selection Screen

5. When installed on other than MG3710A, click **LTE (FDD)** to display the Normal setup main screen. For details of the main screen, refer to Chapter 3 “Normal Setup Screen” or Chapter 4 “Easy Setup Screen”.

Notes:

- When installed on MG3710A, click **LTE (FDD)** to display the Easy setup main screen.
- If Change Instrument is clicked, the Select instrument screen will appear each time the software is loaded.

2.3.2 Starting Software: When installed on MG3710A

Start this software using the following procedure.

<Procedure>

1. Press IQpro on the MG3710A front panel to display the common platform screen.

   The common platform screen is a screen used to select each function of the IQproducer™.

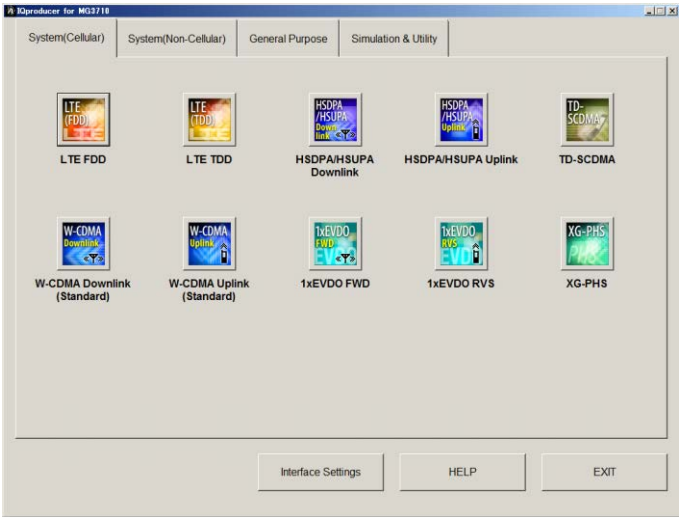


Figure 2.3.2-1 Common Platform Screen

2. Click the **System (Cellular)** tab on the common platform screen, to show the **System (Cellular)** selection screen that supports each telecommunication system.

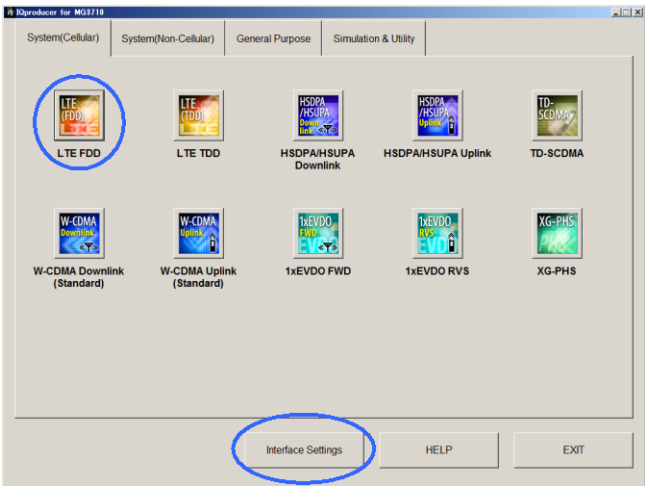


Figure 2.3.2-2 System (Cellular) Selection Screen

3. When installed on MG3710A, click **LTE (FDD)** to display the Easy setup main screen. For details of the main screen, refer to Chapter 3 “Normal Setup Screen” or Chapter 4 “Easy Setup Screen”.

Note:

When installed on other than MG3710A, click **LTE (FDD)** to display the Normal setup main screen.

Note:

When this software is installed on MG3710A, **Change Instrument** displays instead of **Interface Settings**. Clicking **Interface Settings** displays the Interface Setting dialog box.

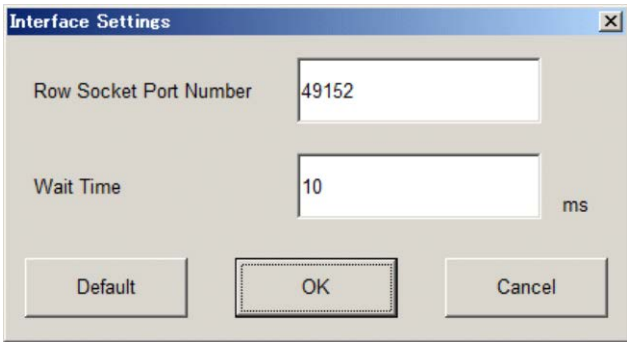


Figure 2.3.2-3 Interface Settings Dialog Box

Here, you can configure interface-related settings of IQproducer and MG3710A. To return to factory defaults, click **Default**.

- Row Socket Port Number

  Sets Row Socket port number. Set the same value as that for MG3710A.

- Wait Time

  Sets the wait time between commands.

2.3.3 Exiting Software

Stop this software using the following procedure.

■When exiting only this software

To exit only this software without closing the Common Platform screen, or other IQproducer™ tools, do one of these below:

- Click the Exit button ( ) on the tool bar.
- Select Exit from the File menu.
- Click the ☒ button on the upper right screen.

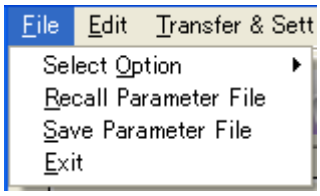


Figure 2.3.3-1 Exiting Software

The operation of the three screen buttons is explained below.

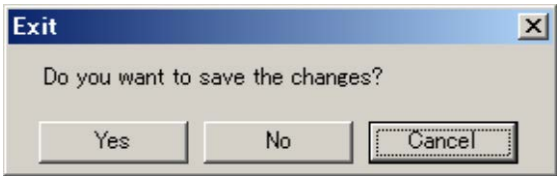


Figure 2.3.3-2 Exit Confirmation Window

- **Yes** Saves current parameters to file and stops this software.
- **No** Stops this software without saving current parameters to file.
- **Cancel** or ☒ Cancels the process and returns to the main screen.

When stopping this software using the **Yes** button, the saved parameters are read at the next start and reset for each parameter.

■When exiting entire IQproducer™ application

To exit all tools of 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.

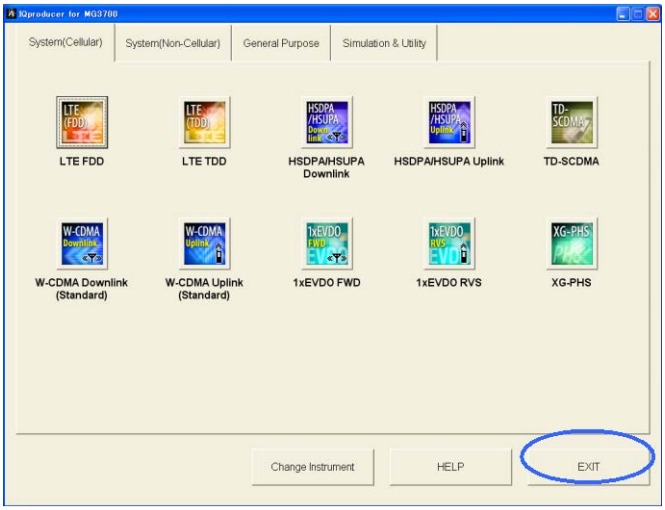


Figure 2.3.3-3 Exiting IQproducer™

Chapter 3 Normal Setup Screen

This chapter describes the detailed functions when this software is used on Normal Setup screen.

Notes:

- The examples and screens used throughout this chapter are based on the assumption that the IQproducer™ is activated with the MG3700A.
- The MG3710A, MS2690A/MS2691A/MS2692A, and MS2830A functions are described as notes in each item.

3.1 Screen Details

3.1.1 Menu and tool button

On common platform screen, select the **System (Cellular)** tab, and then select **LTE (FDD)** to display the Normal setup main screen.

The LTE FDD and LTE-Advanced can be switched with System in the common parameter list. For details, refer to Section 3.1.3 “Common parameter list”

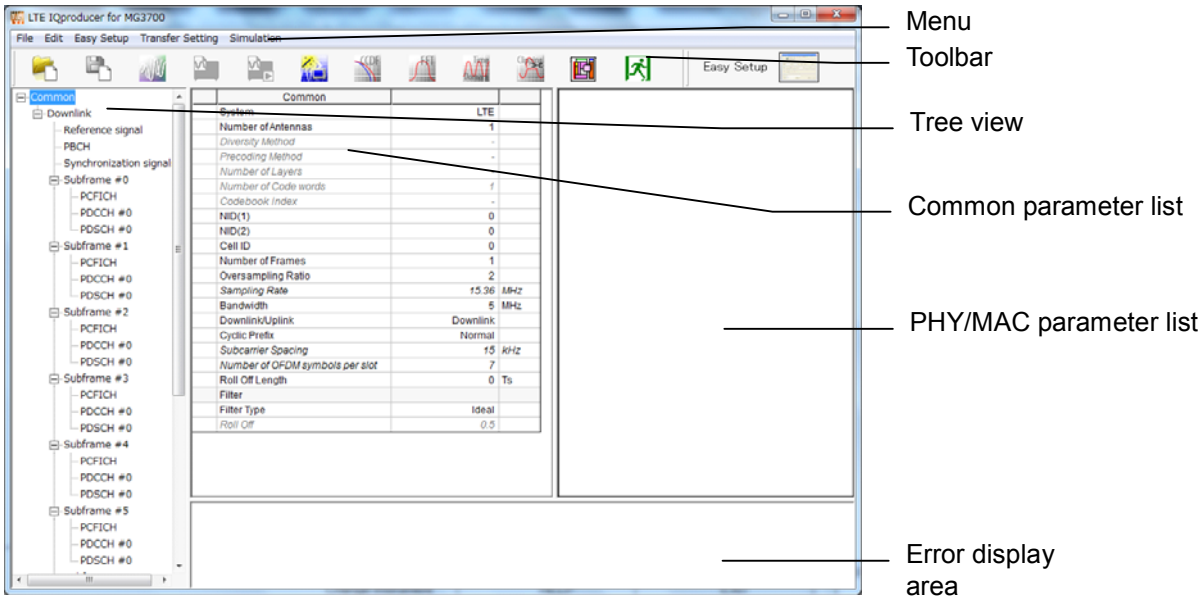


Figure 3.1.1-1 Normal Setup Main Screen

■ Basic operations of the main screen

- The window can be maximized, minimized, expanded, and reduced.
- For the fields of the tree view, common parameter list, PHY/MAC parameter list, and error display, splitting position can be changed by dragging their boundaries.
- The leftmost symbol of each item in the tree view is - when the integrated items are open, or + when they are closed. The state can be changed by clicking on the symbol.
- The items in italic cannot be changed. These items are automatically set. The state of each item may change depending on the setting for other items.
- The grayed out items indicate the parameters not related to the generated waveforms in the current setting and cannot be changed. The state of each item may change depending on the setting for other items.

■ Screen transition

Figure 3.1.1-2 shows transition from the main screen that is displayed when the LTE IQproducer™ is started up to other screens (Export File, Calculation, and Frame Structure screens). For details on each of the screens, refer to the sections shown below the corresponding screen.

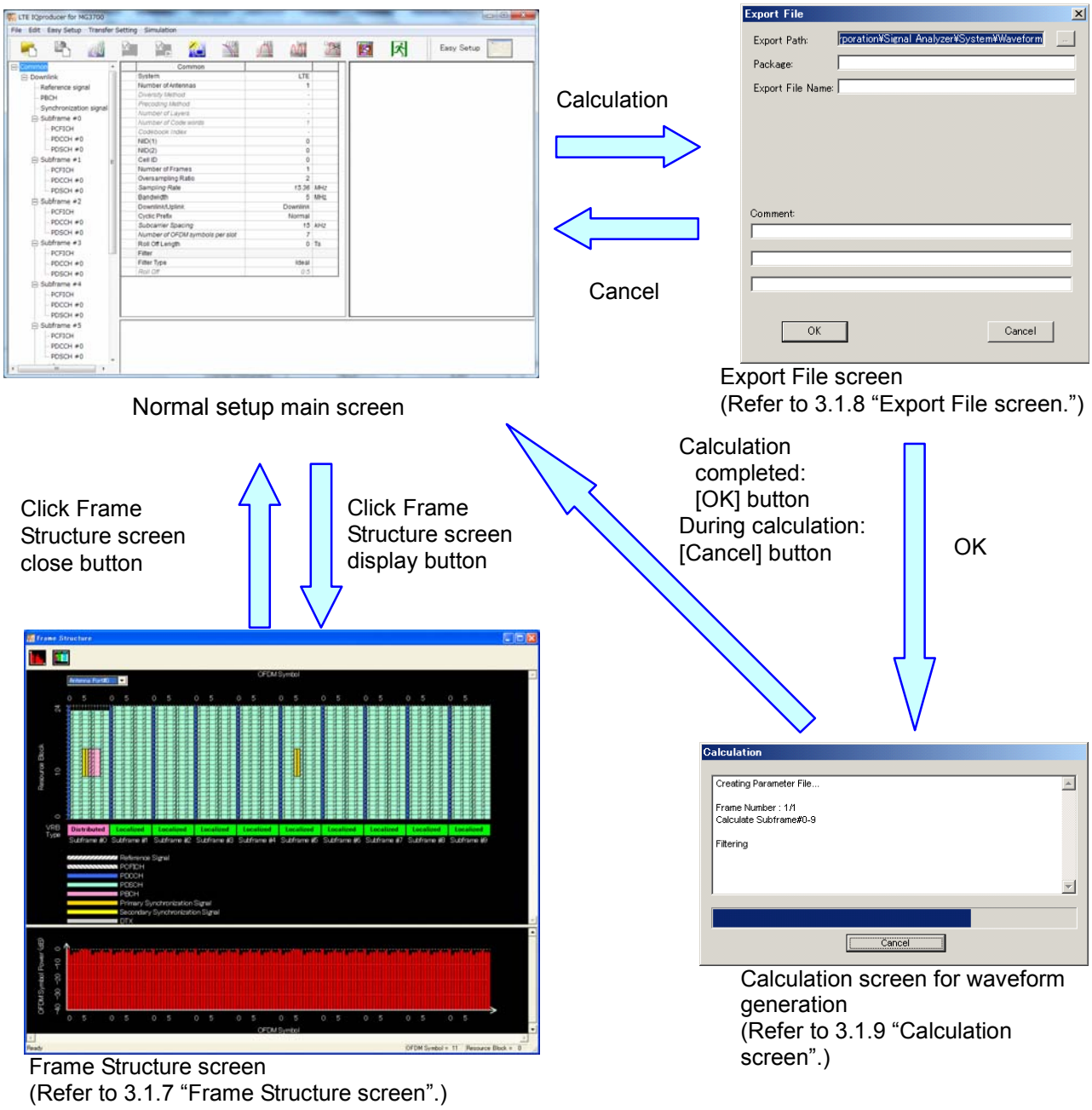


Figure 3.1.1-2 Screen Transition

■ **File** menu

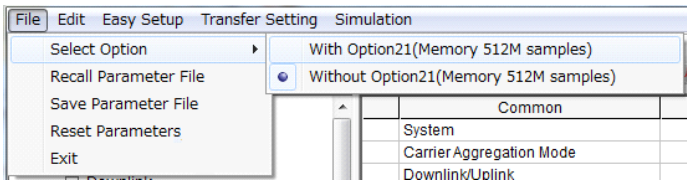


Figure 3.1.1-3 File Menu

- **Select Option**

Notes:

- This function is available only when **MG3700**, **MG3710** or **MS2830** is selected in the **Select instrument** screen.
- ARB Memory Expansion (option) is not available for MS269xA. Only Memory 256M samples, 1 GB is available.

■ When using MG3700A or MS2830A

Select whether the ARB memory expansion option 256Msamples is installed. Selecting **With Option21 (Memory 512M samples)/With Option27 (Memory 256M samples)** supports creation of larger waveform patterns. If the ARB memory expansion option is not installed, the generated waveform pattern may not be able to be used. Waveform patterns cannot be created with a size greater than 256Msamples or 64M samples when **Without Option21 (Memory 512M samples)/Without Option27 (Memory 256M samples)** is selected. Select either according to the presence of ARB memory expansion option.

Table 3.1.1-1 Available Options for MG3700A or MS2830A

Model	Items	ARB Memory Expansion
MG3700A	With Option21 (Memory 512M samples)	1 GB x 2 memory
	Without Option21 (Memory 512M samples):	512 MB × 2 Memories
MS2830A	With Option27 (Memory 256M samples)	1 GB
	Without Option27 (Memory 256M samples)	256 MB

■ When using MG3710A

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 combination of installed options based on the following setting items.

Table 3.1.1-2 Available Options for MG3710A

Items	Combinations of Options
Memory 64M samples	None
Memory 64M samples × 2 (With Option48, 78)	Option48 and Option 78
Memory 256M samples	Option45 or Option 75
Memory 256M samples × 2 (With Option48, 78)	Option 45 and Option 48 or Option 75 and Option 78
Memory 1024M samples	Option46 or Option 76
Memory 1024M samples × 2 (With Option48, 78)	Option 46 and Option 48 or Option 76 and Option 78

The maximum size of the generated waveform pattern for each of the setting items is shown below.

Table 3.1.1-3 Waveform Pattern Maximum Size

Items	Maximum Size
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option48, 78)	512M samples
Memory 1024M samples	512M samples
Memory 1024M samples × 2 (With Option48, 78)	512M samples

- **Recall Parameter File**

  Loads the parameter files saved by the Save Parameter File menu. When the parameter file is loaded, the settings when it was loaded are recovered.

- **Save Parameter File**

  Saves the current setting parameters to a file.

- **Reset Parameters**

  Resets the current parameter settings to defaults.

- **Exit**

  Exits from this Software.

■ **Edit** menu

Figure 3.1.1-4 Edit Menu

- **Calculation**

  Generates waveform patterns.

- **Calculation & Load**

  Note:

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

After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.

- **Calculation & Play**

  Note:

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

  After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.

- **Show Frame Structure**

  Displays the Frame Structure screen.

- **Clipping**

  Displays the Clipping setting screen. In this screen, clipping and filtering processing can be performed for a generated waveform pattern.

■ **Easy Setup** menu

Figure 3.1.1-5 Easy Setup Selection Screen

- **BS Test**

  This parameter can be set to generate a waveform of E-UTRA Test Models or FRC (Fixed Reference Channels) defined by 3GPP TS36.141 V8.3.0 (2009-05). For details of Easy Setup, refer to "Appendix D Easy Setup".

- **UE Test**

  This parameter can be set to generate a waveform of RMC (DL) (DL reference measurement channels) or RMC (UL) (UL reference measurement channels) defined by 3GPP TS36.101 V12.7.0 (2015-04). For details of Easy Setup, refer to "Appendix D Easy Setup".

- When LTE-Advanced is selected

  When System in the common parameter list is set to **LTE-Advanced**, after setting with **Easy Setup** menu, the Select Component Carriers screen is displayed (Figure 3.1.1-6 and 3.1.1-7).
  Selecting the selectable Component Carrier number check box reflects the parameters set by Easy Setup.
  For details of the Component Carriers, refer to Section 3.1.4 "PHY/MAC parameters (LTE-Advanced)".

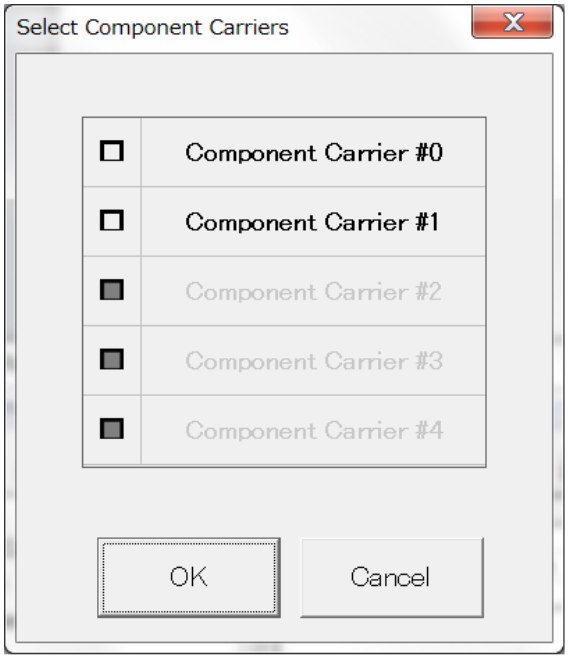


Figure 3.1.1-6 Select Component Carriers (Intra-band) Screen

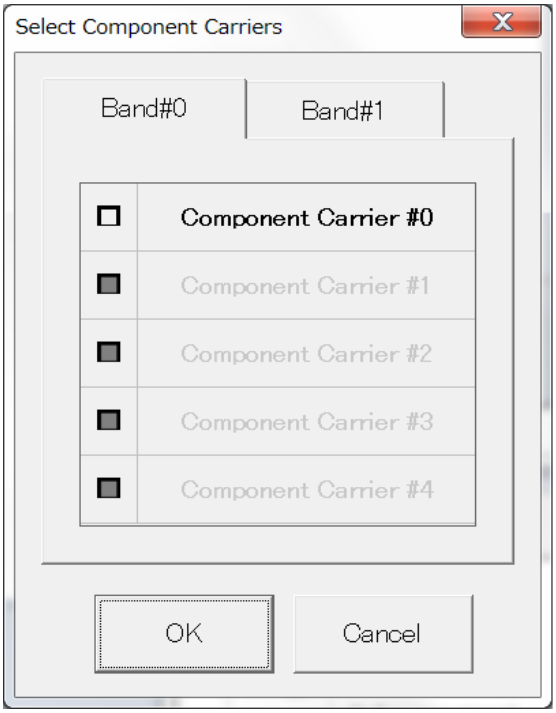


Figure 3.1.1-7 Select Component Carriers (Inter-band) Screen

■ **Transfer Setting** Menu

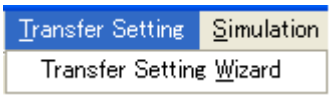


Figure 3.1.1-8 Transfer Setting Menu

- **Transfer Setting Wizard**

  Note:

  This function is available only when **MG3700** or **MG3710** is selected in the **Select instrument** screen.

  Displays the Transfer Setting Wizard screen. Every operation ranging from connecting the PC and MG3700A or MG3710A and transferring the waveform pattern to the MG3700A or MG3710A, to loading the waveform pattern into the MG3700A or MG3710A ARB memory is performed at this screen.

■ **Simulation** Menu

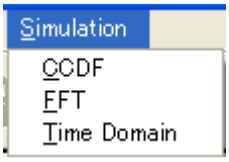


Figure 3.1.1-9 Simulation Menu

- **CCDF**

  Displays the CCDF Graph Monitor screen. In this screen, the CCDF of the generated waveform pattern is displayed in a graph.

- **FFT**

  Displays the FFT Graph Monitor screen. In this screen, the FFT-processed spectrum of the generated waveform pattern is displayed in a graph.

- **Time Domain**

  Displays the Time Domain screen. In this screen, the time domain waveform of a generated waveform pattern is displayed in a graph.

■ Tool buttons

Notes:

- Transfer & Setting Wizard is available only when **MG3700** or **MG3710** is selected in the **Select instrument** screen.
- Calculation & Load and Calculation & Play are available only when this software is used on MG3710A.


Recall Parameter File


Save Parameter File


Calculation


Calculation & Load


Calculation & Play


Transfer & Setting Wizard


CCDF


FFT


Time Domain


Clipping


Show Frame Structure


Exit

Clicking a tool button operates the same as the corresponding commands in the menu.

Easy Setup

Switches GUI to Easy Setup mode. For details refer to Chapter 4 “Easy Setup Screen”.

The setting for Normal Setup will be initialized when switched to Easy Setup mode.

3.1.2 Tree view

The tree view displays the parameter that belongs to the waveform pattern to be created in the hierarchy structure. Changing the item selected in the tree view changes items displayed in the common parameter list and PHY/MAC parameter list.

Note:

The tree view configuration differs between when **LTE** is selected and when **LTE-Advanced** is selected with System in the common parameter list.

3.1.2.1 Tree view (LTE)

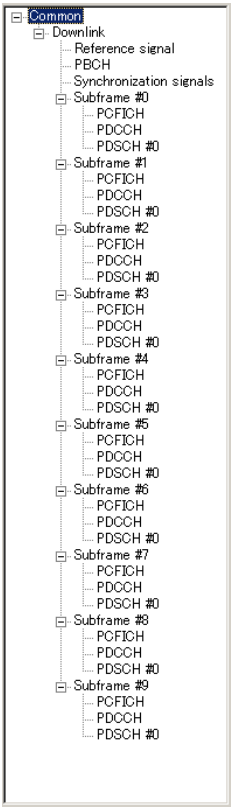


Figure 3.1.2.1-1 Tree View (LTE)

- The commands in the pop-up menu displayed when **Subframe #0** to **Subframe #9** is right-clicked are described below.

Copy:	Copies the parameters of the selected subframe.
Paste:	Applies the copied settings to the selected subframe parameter.
Paste all:	Applies the copied settings to the Subframe parameters #0 to #9.

- The PHY/MAC parameter list shows the parameter list for the items selected in the tree view.
- When Downlink/Uplink in the common parameter list is switched, the menu displayed in the tree view changes as well. Also, when Data Transmission/Random Access Preamble is switched for an uplink PHY/MAC parameter, the menu displayed in the tree view changes as well.

3.1.2.2 Tree View (LTE-Advanced)

When System in the common parameter list is set to **LTE-Advanced** and Carrier Aggregation Mode is **Intra-band**, the **Component Carrier** nodes are added below the **Common** node and above the **Downlink/Uplink** nodes in the tree view.

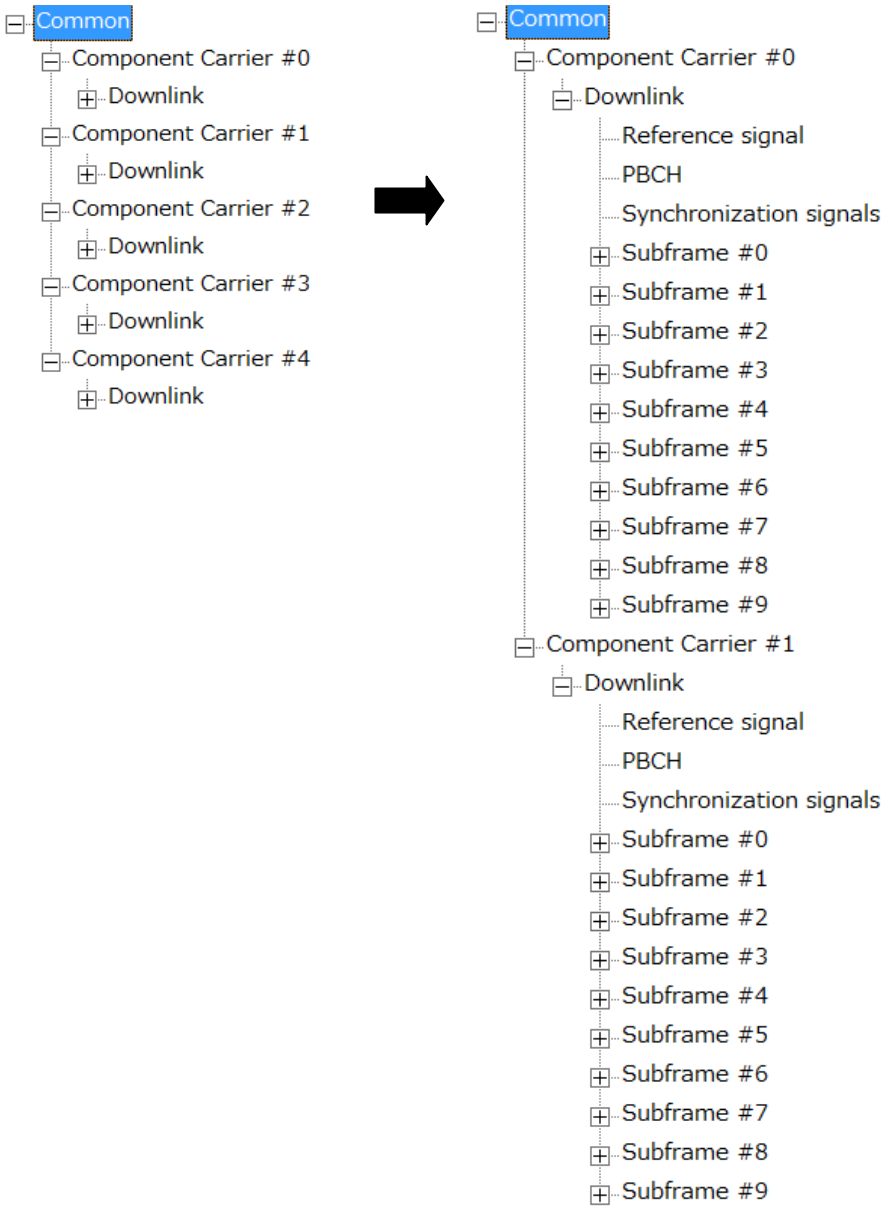


Figure 3.1.2.2-1 Tree View (LTE advanced, Carrier Aggregation Mode = Intra-band)

Carrier Aggregation Mode is **Inter-band**, the **Band** nodes are added respectively below the **Common** node and above the **Component Carrier #0** to **#4** nodes.

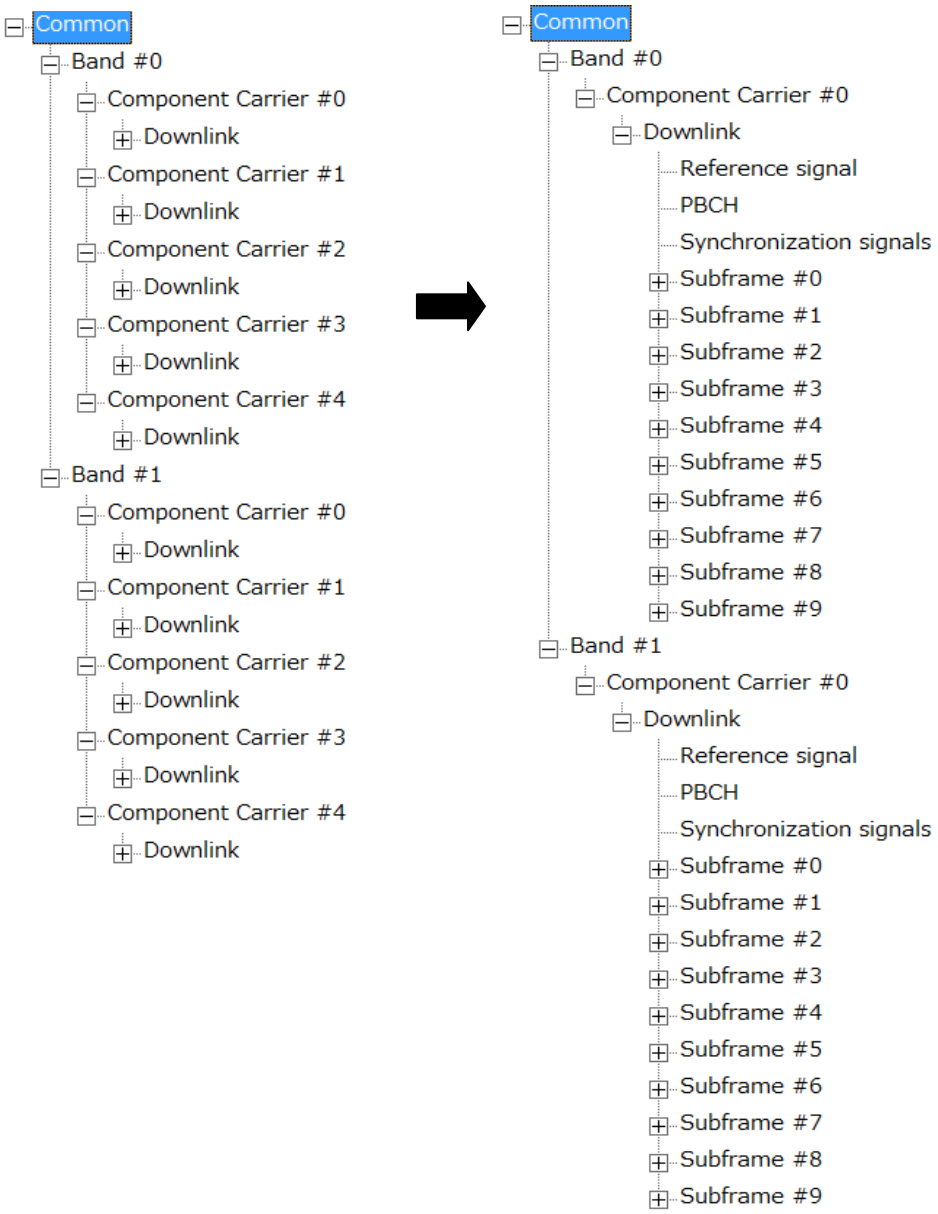


Figure 3.1.2.2-2 Tree View (LTE advanced, Carrier Aggregation Mode = Inter-band)

- The commands in the pop-up menu displayed when **Component Carrier #0** to **Component Carrier #4** is right-clicked are described below.

  Copy: Copies the parameters of the selected Component Carrier.
  Paste: Applies the copied settings to the selected Component Carrier parameter.
  Paste all: Applies the copied settings to the Component Carrier parameters #0 to #4.

Note:

Paste or Paste all cannot be set for Component Carriers with different Bands.

- The commands in the pop-up menu displayed when **Subframe #0** to **Subframe #9** is right-clicked are described below.

  Copy: Copies the parameters of the selected subframe.
  Paste: Applies the copied settings to the selected subframe parameter.
  Paste all: Applies the copied settings to the Subframe parameters #0 to #9.

- The PHY/MAC parameter list shows the parameter list for the items selected in the tree view.
- When Downlink/Uplink in the common parameter list is switched, the menu displayed in the tree view changes as well. Also, when Data Transmission/Random Access Preamble is switched for an uplink PHY/MAC parameter, the menu displayed in the tree view changes as well.
- When **Common** is selected in the tree view, the setting parameters are displayed in the PHY/MAC parameter list, which correspond to the Carrier Aggregation Mode.
  For details, refer to Section 3.1.4.1 “Carrier Aggregation”
- When **Component Carrier** is selected in the tree view, the setting parameters for Component Carrier are displayed in the PHY/MAC parameter list.
  For details, refer to Section 3.1.4.2 “Component Carrier”.

3.1.3 List of Common Parameter

The items displayed in the common parameter list are described below. The common parameter list includes parameters that need to be set. The common parameters are displayed under Common.

System

[Function] Switches 3GPP Systems.

[Default] LTE

[Setting range] LTE, LTE-Advanced

[Remarks] When the MX370108A/MX269908A-001 is installed, LTE-Advanced can be selected. Switching the System changes the common parameter list to be displayed.

3.1.3.1 List of Common Parameter (System = LTE)

Number of Antennas

[Function] Sets the number of antennas.

[Default] 1

[Setting range] 1, 2, 4

[Remarks] This parameter is fixed to 1 when Downlink/Uplink is set to Uplink.
When this parameter is set to 1, Diversity Method, Precoding Method, Number of Layers, Number of Code words, and Codebook index cannot be set.

Diversity Method

[Function] Sets the diversity method.

[Setting range] Spatial Multiplexing, Tx Diversity

[Remarks] This parameter cannot be set when Number of Antennas is set to 1.

Precoding Method

[Function] Sets the precoding method.

[Setting range] Without CDD, Large-delay CDD,
Large-delay CDD (Cyclic Precoder Index)

[Remarks] This parameter cannot be set when Number of Antennas is set to 1 or Diversity Method is set to Tx Diversity.
Large-delay CDD (Cyclic Precoder Index) can be set if Number of Antennas is 4 and Diversity Method is Spatial Multiplexing, and Codebook index is automatically set internally.

Number of Layers

[Function] Sets the number of layers.

[Setting range] 1, 2, 3, 4

[Remarks] This parameter cannot be set when Number of Antennas is set to 1 or Diversity Method is set to Tx Diversity. When Number of Antennas is set to 2, the settable range values are 1 or 2.

Number of Code words

[Function] Sets the number of code words.

[Setting range] 1, 2

[Remarks] When Number of Antennas is 4, Diversity Method is Spatial Multiplexing and Number of Layers is 2, the setting range is 1 or 2. Otherwise, the value is determined by Number of Antennas, Diversity Method, and Number of Layers and cannot be changed.

Codebook index

[Function] Sets the codebook index.

[Setting range] When Number of Antennas is 2, the setting range varies according to Number of Layers as follows.
Number of Layers is 1: 0 to 3
Number of Layers is 2: 0 to 2
When Number of Antennas is 4: 0 to 15

[Remarks] Not available when Number of Antennas is 1, Diversity Method is Tx Diversity or when Precoding Method is Large-delay CDD (Cyclic Precoder Index).

NID (1)

[Function] Sets the NID (1).

[Default] 0

[Setting range] 0 to 167

NID (2)

[Function] Sets the NID (2).

[Default] 0

[Setting range] 0, 1, 2

Cell ID

[Function] Sets the Cell ID.

[Default] 0

[Setting range] 0 to 503

[Remarks] This parameter is automatically set according to NID (1) and NID (2) as follows.
Cell ID = 3*NID (1) + NID (2)
When Cell ID is modified, NID (1) and NID (2) are automatically set.

Number of Frames

[Function] Sets the number of frames to be generated.

[Default] 1

[Setting range] 1 to the maximum number of frames that can be stored in the main unit's waveform memory.

[Resolution] 1

[Remarks] The maximum number of frames is determined as follows.
Maximum number of frames = Maximum number of samples that can be stored in the main unit's waveform memory / number of samples per frame

Maximum number of samples that can be stored in the memory:
512 × 1024 × 1024 samples when Select Option is With Option21
256 × 1024 × 1024 samples when Select Option is Without Option 21

Number of samples per frame:
19200 × Oversampling Ratio samples when Bandwidth is 1.4 MHz
38400 × Oversampling Ratio samples when Bandwidth is 3 MHz
76800 × Oversampling Ratio samples when Bandwidth is 5 MHz
153600 × Oversampling Ratio samples when Bandwidth is 10 MHz
153600 × Oversampling Ratio samples when Bandwidth is 15 MHz
307200 × Oversampling Ratio samples when Bandwidth is 20 MHz
Number of Frames is the same value as Hopping Pattern Length in the case of Random Access Preamble.

Oversampling Ratio

[Function] Sets the oversampling ratio.

[Default] 2

[Setting range] 1, 2, 4

[Remarks] It is recommended that you set the value of 2 or greater.
This parameter cannot be set to 1 and 4 in the case of Random Access Preamble.

Sampling Rate

[Function] Displays the sampling rate.
[Default] 15.36 [MHz]
[Remarks] This parameter cannot be set. It is automatically set according to the Oversampling Ratio and Bandwidth values.

Bandwidth

[Function] Sets the system bandwidth.
[Default] 5 [MHz]
[Setting range] 1.4, 3, 5, 10, 15, 20 [MHz]
[Remarks] The 1.6 and 3.2 MHz settings are not available for IQproducer Version 10.00 or later. In addition, parameter files for versions earlier than IQproducer Version 10.00 in which 1.6 or 3.2 MHz is specified cannot be read.

Downlink/Uplink

[Function] Sets downlink or uplink.
[Default] Downlink
[Setting range] Downlink, Uplink
[Remarks] When Downlink/Uplink is switched, the menu displayed in the tree view changes as well.

Cyclic Prefix

[Function] Sets the cyclic prefix.
[Default] Normal
[Setting range] Normal, Extended
[Remarks] This parameter is always set to Normal in the case of Random Access Preamble.

Subcarrier Spacing

[Function] Displays the subcarrier spacing (interval).
[Default] 15 [kHz]
[Remarks] This parameter is set to 1.25 [kHz] in the case of Random Access Preamble.

Number of OFDM symbols per slot

[Function] Sets the number of OFDM symbols per slot.
[Default] 7 [Symbol]
[Display range] 6, 7 [Symbol]
[Remarks] This parameter cannot be set.
When Cyclic Prefix is Normal: 7 [Symbol]
When Cyclic Prefix is Extended: 6 [Symbol]

Roll off length

[Function] Sets the length of the ramp time applied to the OFDM symbol.

[Default] 0 [Ts] (Ts = 1/ (15,000 × 2,048) seconds)

[Setting range] 0 to 3152 [Ts]

[Resolution] 1 [Ts]

[Remarks] Maximum settable value is 144 when Cyclic Prefix is set to Normal, 512 when Cyclic Prefix is set to Extended. Also, the maximum settable value is 3152 in the case of Random Access Preamble.

Filter

Filter Type

[Function] Sets the filter type.

[Default] Ideal

[Setting range] Nyquist, Root Nyquist, Ideal, None

[Remarks] This parameter is fixed to None in the case of Random Access Preamble.

Roll Off

[Function] Sets the roll-off factor.

[Default] 0.5

[Setting range] 0.1 to 1.0

[Resolution] 0.1

[Remarks] This parameter cannot be set when Filter Type is set to Ideal or None.

3.1.3.2 List of Common Parameter (System = LTE-Advanced)

Carrier Aggregation Mode

[Function] Sets the Carrier Aggregation Mode

[Setting range] Intra-band, Inter-band

[Remarks] This parameter is set to Intra-band in the case of Random Access Preamble.

Downlink/Uplink

[Function] Sets downlink or uplink.

[Default] Downlink

[Setting range] Downlink, Uplink

[Remarks] When Downlink/Uplink is switched, the menu displayed in the tree view changes as well.

3.1.4 PHY/MAC parameters (LTE-Advanced)

The items displayed in the PHY/MAC parameter list when **LTE Advanced** is selected for System in the common parameter list are described below.

3.1.4.1 Carrier Aggregation

When a **Common** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The items are not displayed in the case of Random Access Preamble.

Component Carrier

[Function] Displays the Component Carrier number.
[Display range] 0 to 4
[Remarks] When Carrier Aggregation Mode is Inter-band, Component Carrier number (#0 to #4) is displayed for Band#0 and Band#1, respectively.

Status

[Function] Enables or disables the Component Carrier parameter.
[Setting range] Check box selected, or cleared.
[Remarks] When Carrier Aggregation Mode is Intra-band, Component Carrier #0 and #1 check boxes are selected and others are cleared by default.
When Carrier Aggregation Mode is Inter-band, Component Carrier #0 check boxes for Band#0 and Band#1 are selected and others are cleared by default.

Bandwidth

[Function] Displays the system bandwidth for the Component Carrier.
[Default] 5 [MHz]
[Display range] 1.4, 3, 5, 10, 15, 20 [MHz]

Cell ID

[Function] Displays the Cell ID for the Component Carrier.
[Default] 0
[Display range] 0 to 503

Gain

[Function] Sets the level ratio of Component Carrier.
[Default] 0.00 [dB]
[Setting range] –80.00 to 0.00 [dB]
[Resolution] 0.01 [dB]
[Remarks] The level ratio is calculated based on the Component Carrier with the highest level among the Component Carriers.

Freq.Offset

[Function] Sets the frequency offset.

[Default] 0.0000 [MHz]

[Setting range] 0 to $\pm(0.4\times \mathrm{Fs} - 0.5\times \mathrm{Band})$ [MHz]

Band : Refer to Remarks.

Fs : 153.6 MHz (sampling rate)

[Resolution] 100 [Hz]

[Remarks] The transmission bandwidth (Band) within the setting range is changed as follows, depending on the Component Carrier system bandwidth (Bandwidth).

Table 3.1.4.1-1 Component Carrier Transmission System Bandwidth (Bandwidth) and Transmission Bandwidth (Band)

Bandwidth [MHz]	Band [MHz]
1.4	1.095
3.0	2.715
5.0	4.515
10.0	9.015
15.0	13.515
20.0	18.015

Phase

[Function] Sets the initial phase of the Component Carrier.

[Default] 0 [deg.]

[Setting range] 0 to 359 [deg.]

[Resolution] 1 [deg.]

Delay

[Function] Sets delay of the Component Carrier.

[Default] 0 [Ts]

[Setting range] 0 to 307200 [Ts]

[Resolution] 1 to 16

[Remarks] The resolution changes depending on the Bandwidth as follows. If numeric values other than the resolution are input, the values are changed to the resolution closest to the input values.

Table 3.1.4.1-2 Bandwidth versus Resolution of Delay

Bandwidth [MHz]	Resolution [Ts]	Setting example
1.4	16	0,16,32, …
3	8	0,8,16, …
5	4	0,4,8, …
10	2	0,2,4, …
15	2	0,2,4, …
20	1	0,1,2, …

3.1.4.2 Component Carrier

When **Component Carrier (#0 to #4)** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Changing the **Component Carrier (#0 to #4)** selection in the tree view switches the parameter list.

Number of Antennas

[Function] Sets the number of antennas.
[Default] 1
[Setting range] 1, 2, 4
[Remarks] This parameter is fixed to 1 when Downlink/Uplink is set to Uplink.
When this parameter is set to 1, Diversity Method, Precoding Method, Number of Layers, Number of Code words, and Codebook index cannot be set.
Setting Number of Antennas of one Component Carrier sets the same Number of Antennas to other Component Carriers of the same Band.

Diversity Method

[Function] Sets the diversity method.
[Setting range] Spatial Multiplexing, Tx Diversity
[Remarks] This parameter cannot be set when Number of Antennas is set to 1.

Precoding Method

[Function] Sets the precoding method.

[Setting range] Without CDD, Large-delay CDD, Large-delay CDD (Cyclic Precoder Index)

[Remarks] This parameter cannot be set when Number of Antennas is set to 1 or Diversity Method is set to Tx Diversity. Large-delay CDD(Cyclic Precoder Index) can be set if Number of Antennas is 4 and Diversity Method is Spatial Multiplexing, and Codebook index is automatically set internally.

Number of Layers

[Function] Sets the number of layers.

[Setting range] 1, 2, 3, 4

[Remarks] This parameter cannot be set when Number of Antennas is set to 1 or Diversity Method is set to Tx Diversity. When Number of Antennas is set to 2, the settable range values are 1 or 2.

Number of Code words

[Function] Sets the number of code words.

[Setting range] 1, 2

[Remarks] When Number of Antennas is 4, Diversity Method is Spatial Multiplexing and Number of Layers is 2, the setting range is 1 or 2. Otherwise, the value is determined by Number of Antennas, Diversity Method, and Number of Layers and cannot be changed.

Codebook index

[Function] Sets the codebook index.

[Setting range] When Number of Antennas is 2, the setting range varies according to Number of Layers as follows.
When Number of Layers is 1: 0 to 3
When Number of Layers is 2: 0 to 2
When Number of Antennas is 4: 0 to 15

[Remarks] Not available when Number of Antennas is 1, Diversity Method is Tx Diversity or when Precoding Method is Large-delay CDD (Cyclic Precoder Index).

NID (1)

[Function] Sets the NID (1).

[Default] 0

[Setting range] 0 to 167

NID (2)

[Function] Sets the NID (2).

[Default] 0

[Setting range] 0, 1, 2

Cell ID

[Function] Sets the Cell ID.

[Default] 0

[Setting range] 0 to 503

[Remarks] This parameter is automatically set according to NID (1) and NID (2) as follows.
Cell ID = 3 × NID (1) + NID (2)
When Cell ID is modified, NID (1) and NID (2) are automatically set.

Number of Frames

[Function] Sets the number of frames to be generated.

[Default] 1

[Setting range] 1 to the maximum number of frames that can be stored in the main unit's waveform memory.

[Resolution] 1

[Remarks] Setting Number of Frames of one Component Carrier sets the same Number of Frames to other Component Carriers of the same Band.

The maximum number of frames is determined as follows.
Maximum number of frames = Maximum number of samples that can be stored in the main unit's waveform memory / number of samples per frame

Maximum number of samples that can be stored in the memory:

512 × 1024 × 1024 samples when Select Option is With Option21

256 × 1024 × 1024 samples when Select Option is Without Option 21

Number of samples per frame:

19200 × Oversampling Ratio samples when Bandwidth is 1.4 MHz

38400 × Oversampling Ratio samples when Bandwidth is 3 MHz

76800 × Oversampling Ratio samples when Bandwidth is 5 MHz

153600 × Oversampling Ratio samples when Bandwidth is 10 MHz

153600 × Oversampling Ratio samples when Bandwidth is 15 MHz

307200 × Oversampling Ratio samples when Bandwidth is 20 MHz

Number of Frames is the same value as Hopping Pattern Length in the case of Random Access Preamble.

When two or more Component Carriers are enabled, Oversampling Ratio is determined as follows:

When Bandwidth is 1.4 MHz	80
When Bandwidth is 3 MHz	40
When Bandwidth is 5 MHz	20
When Bandwidth is 10 MHz	10
When Bandwidth is 15 MHz	10
When Bandwidth is 20 MHz	5

Oversampling Ratio

[Function] Sets the oversampling ratio.
[Default] 2
[Setting range] 1, 2, 4
[Remarks] It is recommended that you set the value of 2 or greater. This parameter cannot be set to 1 and 4 in the case of Random Access Preamble.
When two or more Component Carriers are enabled, Oversampling Ratio of each Component Carrier is fixed to 1.
When the Freq Offset setting for Component Carriers is set to other than 0.0000 [MHz], Oversampling Ratio of each Component Carrier is fixed to 1.

Sampling Rate

[Function] Displays the sampling rate.
[Default] 7.68 [MHz]
[Remarks] This parameter cannot be set. It is automatically set according to the Oversampling Ratio and Bandwidth values.

Bandwidth

[Function] Sets the system bandwidth.
[Default] 5 [MHz]
[Setting range] 1.4, 3, 5, 10, 15, 20 [MHz]
[Remarks] The 1.6 and 3.2 MHz settings are not available for IQproducer Version 10.00 or later. In addition, parameter files for versions earlier than IQproducer Version 10.00 in which 1.6 or 3.2 MHz is specified cannot be read.

Cyclic Prefix

[Function] Sets the cyclic prefix.
[Default] Normal
[Setting range] Normal, Extended
[Remarks] This parameter is always set to Normal in the case of Random Access Preamble.

Subcarrier Spacing

[Function] Displays the subcarrier spacing (interval).
[Default] 15 [kHz]
[Remarks] This parameter is set to 1.25 [kHz] in the case of Random Access Preamble.

Number of OFDM symbols per slot

[Function] Sets the number of OFDM symbols per slot.
[Default] 7 [Symbol]
[Display range] 6, 7 [Symbol]
[Remarks] This parameter cannot be set.
When Cyclic Prefix is Normal: 7 [Symbol]
When Cyclic Prefix is Extended: 6 [Symbol]

Roll off length

[Function] Sets the length of the ramp time applied to the OFDM symbol.
[Default] 0 [Ts] (Ts = 1/ (15,000 × 2,048) seconds)
[Setting range] 0 to 3152 [Ts]
[Resolution] 1 [Ts]
[Remarks] Maximum settable value is 144 when Cyclic Prefix is set to Normal, 512 when Cyclic Prefix is set to Extended. Also, the maximum settable value is 3152 in the case of Random Access Preamble.

Filter

Filter Type

[Function] Sets the filter type.
[Default] Ideal
[Setting range] Nyquist, Root Nyquist, Ideal, None
[Remarks] This parameter is fixed to None in the case of Random Access Preamble.

Roll Off

[Function] Sets the roll-off factor.
[Default] 0.5
[Setting range] 0.1 to 1.0
[Resolution] 0.1
[Remarks] This parameter cannot be set when Filter Type is set to Ideal or None.

3.1.5 PHY/MAC parameters (Downlink)

The items displayed in the PHY/MAC parameter list when **Downlink** is selected for Downlink/Uplink in the common parameter list are described below.

3.1.5.1 Downlink

When a **Downlink** is selected in the tree view, the following item is displayed in the PHY/MAC parameter list.

PHICH

[Function] Sets ON/OFF for PHICH.
[Default] OFF
[Setting range] ON, OFF
[Remarks] When Downlink/Uplink is set to Uplink, PHICH cannot be set to ON or OFF.

PHICH duration

[Function] Sets the PHICH area.
[Setting range] Normal, Extended
[Remarks] Available regardless of PHICH ON/OFF setting.

Ng

[Function] Sets the parameter (Ng) for determining the PHICH arrangement.
[Default] 1/6
[Setting range] 1/6, 1/2, 1, 2
[Remarks] Available regardless of PHICH ON/OFF setting.

3.1.5.2 Reference Signal

When **Reference signal** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Reference signal Sequence
[Function] Sets the data to be used for Reference signal Sequence.
[Default] Gold Sequence
[Setting range] Gold Sequence, PN9fix, PN15fix, 16 bit repeat, User File

Reference signal Sequence Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the Reference signal Sequence.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Reference signal Sequence.

Reference signal Sequence User File
[Function] Sets the user file to be inserted into the Reference signal Sequence.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Reference signal Sequence. Refer to the description of “Binary data” in Appendix B “User File Format” for details on the user file format.

Frequency Shift Value
[Function] Displays the amount of frequency shift.
[Default] 0000
[Display range] 0, 1, 2, 3, 4, 5
[Remarks] This parameter is automatically set according to NID (1) and NID (2) as follows.
Frequency Shift Value = (3*NID(1)+NID(2)) mod 6

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

3.1.5.3 PBCH

When **PBCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Data Status
[Function] Enables or disables the PBCH parameter.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PBCH parameters are disabled.

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, BCH

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the PBCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the user file to be inserted into the PBCH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of “Binary data” in Appendix B “User File Format” for details on the user file format.

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000[dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

BCH

When **BCH** is selected for Data Type of PBCH in the tree view, BCH can be set as the payload data of PBCH.

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, BCCH

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the BCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the user file to be inserted into the BCH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Transport Block Size
[Function] Displays the transport block size of BCH.
[Default] 24 [bit]
[Setting range] Maximum settable value is 1920 when Cyclic Prefix is Normal and 1728 when Cyclic Prefix is Extended.

DL Bandwidth
[Function] Displays data mapped to BCCH.
[Display range] n6, n15, n25, n50, n75, n100
[Remarks]

When Bandwidth is 1.4 MHz	n6
When Bandwidth is 3 MHz	n15
When Bandwidth is 5 MHz	n25
When Bandwidth is 10 MHz	n50
When Bandwidth is 15 MHz	n75
When Bandwidth is 20 MHz	n100

This is only displayed when BCCH is selected for Data Type of BCH.

PHICH duration

[Function] Displays the PHICH duration mapped to BCCH.

[Display range] Normal, Extended

[Remarks] This is only displayed when BCCH is selected for Data Type of BCH.

Ng

[Function] Displays the Ng value mapped to BCCH.

[Display range] 1/6, 1/2, 1, 2

[Remarks] This is only displayed when BCCH is selected for Data Type of BCH.

SFN Offset

[Function] Sets the initial SFN value mapped to BCCH.

[Default] 0

[Setting range] 0 to 1023

[Remarks] This is only displayed when BCCH is selected for Data Type of BCH.

3.1.5.4 Synchronization signals

When **Synchronization signal** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Primary synchronization signal

Data Status

[Function] Enables or disables the Primary synchronization signal parameter.

[Default] Enable

[Setting range] Disable, Enable

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port. For antenna ports for which Disable is selected, all parameters except Data Status are disabled.

Data Type

[Function] Sets the Data type.

[Default] Zadoff-Chu Sequence

[Setting range] Zadoff-chu Sequence, User File

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port.

Data Type User File

[Function] Sets the user file to be inserted into the Primary synchronization signal.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Complex data" in Appendix B "User File Format" for details on the user file format.

Zadoff-chu Sequence index u

[Function] Displays Zadoff-chu Sequence index u.

[Default] 25

[Remarks] This parameter is displayed when Zadoff-chu Sequence is selected for Data Type, and is automatically set according to NID (2) as follows.
If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port.

Table 3.1.5.4-1 Zadoff-chu Sequence Index

NID(2)	Zadoff-chu Sequence index u
0	25
1	29
2	34

Power Boosting

[Function] Sets the transmission power.

[Default] 0.000 [dB]

[Setting range] –20.000 to +20.000 [dB]

[Resolution] 0.001 [dB]

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port.

Secondary synchronization signal

Data Status

[Function] Enables or disables the Secondary synchronization signal parameter.

[Default] Enable

[Setting range] Disable, Enable

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port. For antenna ports for which Disable is selected, all parameters except Data Status are disabled.

Data Type

[Function] Sets the Data type.

[Default] Concatenated sequence

[Setting range] Concatenated sequence, PN9fix, PN15fix, 16 bit repeat, User File

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port.

Data Type Repeat Data

[Function] Sets the 16-bit repeat data to be inserted into the Secondary synchronization signal.

[Default] 0000

[Setting range] 0000 to FFFF

[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the Secondary synchronization signal.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Power Boosting

[Function] Sets the transmission power.

[Default] 0.000 [dB]

[Setting range] –20.000 to +20.000 [dB]

[Resolution] 0.001 [dB]

[Remarks] If Number of Antennas is set to 2 or 4, the settings are displayed for each antenna port.

3.1.5.5 Subframe #0 to #9

When **Subframe #0 to #9** is selected in the tree view, the following item is displayed in the PHY/MAC parameter list.

Virtual Resource Block type

[Function] Sets the virtual resource block type.
[Default] Localized
[Setting range] Localized, Distributed
[Remarks] If Virtual Resource Block type is Localized, Gap, Gap value, and Number of VRBs cannot be set.

Gap

[Function] Sets Gap.
[Default] 1st Gap
[Setting range] 1st Gap, 2nd Gap
[Remarks] If Bandwidth is 1.4 MHz, 3 MHz, or 5 MHz, 1st Gap is displayed and Gap cannot be set.
If Bandwidth is 10 MHz, 15 MHz, or 20 MHz, 1st Gap or 2nd Gap can be set.

Gap value

[Function] Sets Gap value.
[Setting range] 3 to 48

Number of VRBs

[Function] Displays the number of VRB.
[Setting range] 6 to 96

Number of PHICH Groups

[Function] Displays the number of PHICH groups per subframe.

[Remarks] This number is determined by the combination of Bandwidth, Ng, and Cyclic Prefix. This parameter is fixed to 0 when PHICH is OFF.

Table 3.1.5.5-1 Number of PHICH Groups

Bandwidth	Cyclic Prefix = Normal				Cyclic Prefix = Extended			
	Ng = 1/6	Ng = 1/2	Ng = 1	Ng = 2	Ng = 1/6	Ng = 1/2	Ng = 1	Ng = 2
1.4 MHz	1	1	1	2	2	2	2	4
3 MHz	1	1	2	4	2	2	4	8
5 MHz	1	2	4	7	2	4	8	14
10 MHz	2	4	7	13	4	8	14	26
15 MHz	2	5	10	19	4	10	20	38
20 MHz	3	7	13	25	6	14	26	50

Number of OFDM symbols for PDCCH

[Function] Sets the number of symbols for PDCCH.

[Default] 1 [Symbol]

[Setting range] 1 to 4 [Symbol]

[Remarks] Changing this parameter automatically changes the value of CFI of PCFICH.
This setting range is 2 to 4 symbols when the bandwidth is 1.4 and 1 to 3 symbols when the bandwidth is other than the above.
3 symbols or above can be set when PHICH duration is set to Extended.

Total Number of CCEs

[Function] Displays the number of CCEs in the controlled area in the subframe.

[Remarks] The value is determined by Bandwidth and Number of OFDM symbols for PDCCH and cannot be changed.

Number of PDCCHs

[Function] Sets the number of PDCCHs.

[Default] 1

[Setting range] 1 to 64

[Resolution] 1

[Remarks] The maximum value is the number of CCEs. However, the maximum value is 64 if there are more than 64 CCEs.

CCE arrangement

[Function] Sets the CCE arrangement.

[Setting range] PDCCH#0 to (Number of PDCCHs – 1), dummy

[Remarks] Double-clicking the parameter setting area displays the CCE arrangement setting window (shown in Figure 3.1.4.5-1). In this window, the PDCCH to be assigned to each CCE can be set. The number of CCEs to be assigned varies according to the PDCCH format.
PDCCHs which are not assigned are set to “dummy”.
PDCCHs which are not assigned are not mapped onto Resource Element even if the PDCCH parameter is set using the PHY/MAC parameter list.

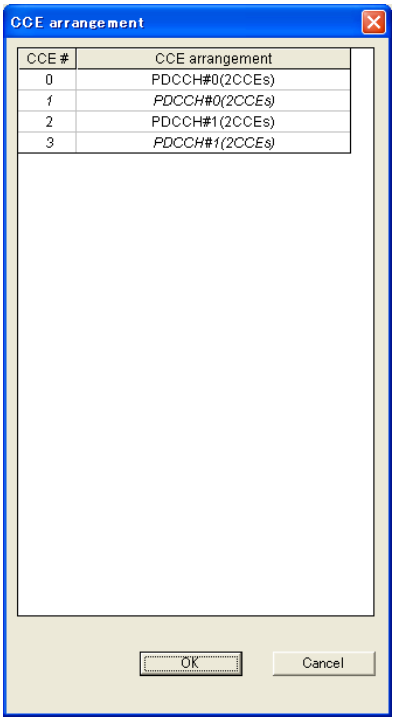


Figure 3.1.5.5-1 CCE arrangement setting window

Number of PDSCHs

[Function] Sets the number of PDSCHs.

[Default] 1

[Setting range] 1 to 64

[Resolution] 1

[Remarks] The setting range differs depending on the bandwidth.
The maximum settable value must be the total number of resource blocks for each bandwidth, but it is 64 if the total number of resource blocks exceeds 64.
Table 3.1.4.5-2 shows the total number of resource blocks for each bandwidth.

Table 3.1.5.5-2 Total number of resource blocks

Bandwidth	Total number of resource blocks
1.4 MHz	6
3 MHz	15
5 MHz	25
10 MHz	50
15 MHz	75
20 MHz	100

RB arrangement

[Function] Sets the RB arrangement.

[Setting range] PDSCH#0 to (Number of PDSCHs – 1)

[Remarks] Double-clicking the PHY/MAC parameter list area displays the RB arrangement setting window (see Figure 3.1.5.5-2). In this window, PDSCH can be assigned to each RB from the list box. Note that each PDSCH that can be selected from the list box must be assigned to at least one RB.

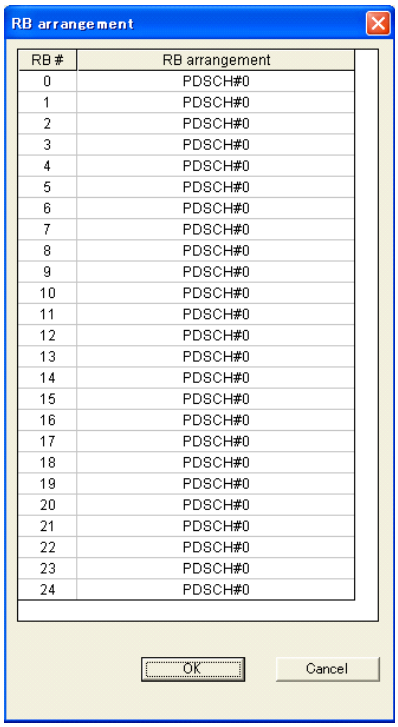


Figure 3.1.5.5-2 RB arrangement setting window

VRB arrangement

[Function] Sets the VRB arrangement.

[Setting range] PDSCH#0 to (Number of VRBs – 1)

[Remarks] This can be set if Virtual Resource Block type is Distributed.

When the settings in the parameter list are double clicked, the VRB arrangement setting window (shown in Figure 3.1.4.5-3) is displayed. In this window, PDSCH can be assigned to each VRB from the list box. Note that each PDSCH that can be selected from the list box must be assigned to at least one VRB.

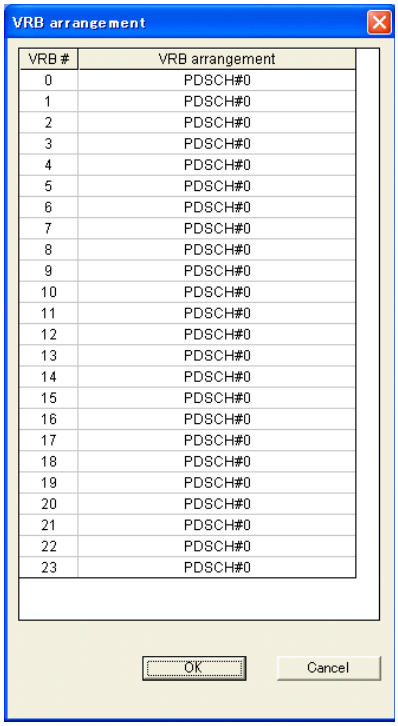


Figure 3.1.5.5-3 VRB arrangement setting window

3.1.5.6 PCFICH

When a **PCFICH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The setting items are common to Subframes #0 to #9.

Data Status

[Function] Enables or disables the PCFICH parameter.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PCFICH parameters are disabled.

Data Type

[Function] Sets the Data type.
[Default] CFI codeword
[Setting range] CFI codeword, PN9fix, PN15fix, 16 bit repeat, User File

CFI

[Function] Displays the CFI codeword type.
[Default] 1
[Display range] 1, 2, 3
[Remarks] This parameter is displayed only when CFI codeword is selected for Data Type.
It changes automatically according to Number of OFDM symbols for PDCCH of PDCCH.

Data Type Repeat Data

[Function] Sets the 16-bit repeat data to be inserted into the PCFICH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the PCFICH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of “Binary data” in Appendix B “User File Format” for details on the user file format.

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

3.1.5.7 PDCCH

When a **PDCCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The setting items are common to Subframes #0 to #9.

Data Status
[Function] Enables or disables the PDCCH parameter.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PDCCH parameters are disabled.

PDCCH format
[Function] Sets the PDCCH format.
[Default] 0
[Setting range] 0, 1, 2, 3
[Remarks] The number of CCEs for each PDCCH format is as follows.

Table 3.1.5.7-1 Number of CCEs

PDCCH format	Number of CCEs
0	1
1	2
2	4
3	8

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, DCI

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the PDCCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the user file to be inserted into the PDCCH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

DCI

When DCI is selected for Data Type of PDCCH, DCI can be set as the data of PDCCH.

Data Type
[Function] Sets the data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the DCI.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the user file to be inserted into the DCI.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Transport Block Size
[Function] Displays the transport block size of DCI.
[Default] 0 [bit]
[Setting range] 0 to 576

nRNTI
[Function] Sets the radio network temporary identifier.
[Default] 0000
[Setting range] 0000 to FFFF

3.1.5.8 PDSCH

When a **PDSCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The setting items are common to Subframes #0 to #9.

Data Status
[Function] Enables or disables the PDSCH.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PDSCH parameters are disabled.

nRNTI
[Function] Sets the radio network temporary identifier.
[Default] 0000
[Setting range] 0000 to FFFF

Modulation Scheme
[Function] Select the modulation scheme.
[Default] QPSK
[Setting range] QPSK, 16QAM, 64QAM, 256QAM

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, DL-SCH

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the PDSCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the PDSCH.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Power Boosting

[Function] Sets the transmission power.

[Default] 0.000 [dB]

[Setting range] –20.000 to +20.000 [dB]

[Resolution] 0.001 [dB]

DL-SCH

When **DL-SCH** is selected for Data Type of PDSCH, DL-SCH (q = 0) and DL-SCH (q = 1) can be selected as the data. q indicates Codeword.

Data Type

[Function] Sets the Data type.

[Default] PN9fix

[Setting range] PN9fix, PN15fix, 16 bit repeat, User File

Data Type Repeat Data

[Function] Sets the 16-bit repeat data to be inserted into the DL-SCH.

[Default] 0000

[Setting range] 0000 to FFFF

[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the DL-SCH.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Transport Block Size
[Function] Displays the transport block size of DL-SCH.
[Default] 0 [bit]
[Remarks] The maximum settable value changes depending on the number of resource blocks and modulation scheme.

UE Category
[Function] Sets the UE category.
[Default] 1
[Setting range] 1, 2, 3, 4, 5

RV index
[Function] Sets the redundancy version index.
[Default] 0
[Setting range] 0, 1, 2, 3

3.1.5.9 PHICH

Setting PHICH to **On** adds the PHICH items to the tree view, and selecting **PHICH group** in this tree view displays the following items in the PHY/MAC parameter list.

Data Status
[Function] Enables or disables the PHICH group.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] All of the PHICH group parameters are disabled when Disable is selected.

PHICH Group number
[Function] Displays the PHICH group number.

Number of PHICHs
[Function] Sets the number of PHICHs included in the PHICH group.
[Setting range] 1 to 8 (Cyclic Prefix = Normal)
1 to 4 (Cyclic Prefix = Extended)

Power Boosting
[Function] Displays the transmission power of the PHICH group.
[Remarks] This parameter displays the total transmission power of the PHICHs in the PHICH group.

PHICH #0 to # (Number of PHICHs – 1)

The following items are displayed in the PHY/MAC parameter list when the **PHICH** is selected in the tree view.

Data Status
[Function] Enables or disables the PHICH.
[Default] Enable
[Setting range] Disable, Enable

Orthogonal Sequence Index
[Function] Sets the orthogonal sequence.
[Setting range] 0 to 7 (Cyclic Prefix = Normal)
0 to 3 (Cyclic Prefix = Extended)
[Resolution] 1

Data Type
[Function] Displays type of PHICH data. This value is fixed to the HI code word.

HI
[Function] Sets the HI (HARQ indicator) code word.
[Default] 000
[Setting range] 000, 111

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

3.1.6 PHY/MAC parameters (Uplink)

The items displayed in the PHY/MAC parameter list when **Uplink** is selected for Downlink/Uplink in the common parameter list are described below.

3.1.6.1 Uplink

When an **Uplink** is selected in the tree view, the following item is displayed in the PHY/MAC parameter list.

Data Transmission/Random Access Preamble

[Function] Selects Data Transmission or Random Access Preamble.
[Default] Data Transmission
[Setting range] Data Transmission/Random Access Preamble
[Remarks] The tree view changes depending on the selection.
When System in the common parameter list is set to **LTE-Advanced**, Random Access Preamble can be set, only if Carrier Aggregation Mode is Intra-band and only Component Carrier #0 is enabled.

DMRS Parameters

[Function] Sets the calculation method of Demodulation RS parameter.
[Default] Auto
[Setting range] Auto, Manual

PUCCH Parameters

delta PUCCH shift

[Function] Sets the delta PUCCH shift.
[Default] 1
[Setting range] 1, 2, 3

N_CS(1)

[Function] Sets the value of N_CS(1), which is the number of cyclic shifts used in the PUCCH formats 1, 1a, and 1b.
[Default] 1
[Setting range] 0 to 7

N_RB(2)

[Function] Sets the value of N_CS(1), which is the number of resource blocks used in the PUCCH formats 2, 2a, and 2b.
[Default] 1
[Setting range] 0 to 63
[Remarks] The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.1-1 Setting Ranges for N_RB(2)

Bandwidth	Setting Ranges for N_RB(2)
1.4	0 to 6
3	0 to 15
5	0 to 25
10	0 to 50
15	0 to 63
20	0 to 63

Sounding RS Parameters

SRS

[Function] Sets SRS ON/OFF.
[Default] OFF
[Setting range] ON, OFF

SRS Subframe Configuration

[Function] Sets the SRS Subframe Configuration.
[Default] 0
[Setting range] 0 to 14
[Remarks] This parameter cannot be set, when SRS is OFF.
The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.1-2 SRS Subframe Configuration

SRS Subframe Configuration	Allocated Subframes
0	0, 1, 2, 3, 4, 5, 6, 7, 8, 9
1	0, 2, 4, 6, 8
2	1, 3, 5, 7, 9
3	0, 5
4	1, 6
5	2, 7
6	3, 8
7	0, 1, 5, 6
8	2, 3, 7, 8
9	0
10	1
11	2
12	3
13	0, 1, 2, 3, 4, 6, 8
14	0, 1, 2, 3, 4, 5, 6, 8

3.1.6.2 Subframe #0 to #9 (Data Transmission)

When **Subframe #0** to **Subframe #9** is selected in the tree view, the following item is displayed in the PHY/MAC parameter list.

Number of PUCCHs
[Function] Sets the number of PUCCH.
[Default] 0
[Setting range] 0 to 8

Number of PUSCHs
[Function] Sets the number of PUSCH.
[Default] 1
[Setting range] 0 to 8

3.1.6.3 PUCCH #0 to #7

When **PUCCH #0** to **PUCCH #7** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Data Status
[Function] Enables or disables the PUCCH.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PUCCH parameters except Data Status are disabled.

n(1)_PUCCH
[Function] Sets the resource number for PUCCH 1, 1a, and 1b.
[Default] 0
[Setting range] 0 to 764
[Remarks] The maximum value is determined based on the settings for Bandwidth, Cyclic Shift, N_CS(1), and N_RB(2).

n(2)_PUCCH
[Function] Sets the resource number for PUCCH 2, 2a, and 2b.
[Default] 0
[Setting range] 0 to 764
[Remarks] The maximum value is determined based on the settings for Bandwidth, Cyclic Shift, N_CS(1), and N_RB(2).

nRNTI
[Function] Sets the radio network temporary identifier.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This becomes available when PUCCH format is set to 2, 2a, or 2b.

PUCCH format
[Function] Sets the PUCCH format.
[Default] 1
[Setting range] 1, 1a, 1b, 2, 2a, 2b
[Remarks] 2a and 2b cannot be selected when Cyclic Prefix is Extended.
Note that, if SRS is enabled, 2, 2a, and 2b cannot be selected.

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, UCI
[Remarks] This parameter is displayed when the PUCCH format is set to 1.

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the PUCCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the user file to be inserted into the PUCCH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to Appendix B “User File Format” for details on the user file format.

Group Hopping
[Function] Enables or disables group hopping.
[Default] Disable
[Setting range] Disable, Enable

Base Sequence Group Number u
[Function] Sets the base sequence group number.
[Default] 0
[Setting range] 0 to 29
[Remarks] When Group Hopping is enabled this parameter becomes invalid and cannot be set.
When DMRS Parameters is Auto, only calculated value displays and nothing can be set.

Base Sequence Number v
[Function] Displays the base sequence number.
[Setting range] 0
[Remarks] The setting is always fixed to 0.

Power Boosting

[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

UCI

The following items are displayed when Data Type is set to UCI.

Transport Block Size

[Function] Sets the transport block size for UCI.
[Default] 0
[Setting range] When PUCCH Format is 1a: Fixed to 1
When PUCCH Format is 1b: Fixed to 2
When PUCCH Format is 2: 1 to 13
When PUCCH Format is 2a: 2 to 14
When PUCCH Format is 2b: 3 to 15

Data Type

[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File

Data Type Repeat Data

[Function] Sets the 16-bit repeat data to be inserted into the UCI.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the UCI.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to Appendix B “User File Format” for details on the user file format.

3.1.6.4 Demodulation RS for PUCCH

When **Demodulation RS for PUCCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Data Type
[Function] Sets the data to be inserted into the Demodulation RS for PUCCH.
[Default] Base Sequence
[Setting range] Base Sequence, User File

Data Type User File
[Function] Sets the user file to be inserted into the Demodulation RS for PUCCH.
[Setting range] An arbitrary file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Complex data" in Appendix B "User File Format" for details on the user file format.

Group Hopping
[Function] Enables or disables group hopping.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] This parameter is displayed when Data Type is Base Sequence.

Base Sequence Group Number u
[Function] Sets the base sequence group number.
[Default] 0
[Setting range] 0 to 29
[Remarks] This parameter can be set when Group Hopping is Disable.
When DMRS Parameters is Auto, only calculated value displays and nothing can be set.

Base Sequence Number v
[Function] Displays the base sequence group number.
[Default] 0
[Remarks] This cannot be changed from 0.

3.1.6.5 PUSCH #0 to #7

When **PUSCH #0** to **PUSCH #7** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Data Status
[Function] Enables or disables the PUSCH.
[Default] Enable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all PUSCH parameters, except for Start Number of RB and Number of RBs, are disabled.

nRNTI
[Function] Sets the radio network temporary identifier.
[Default] 0000
[Setting range] 0000 to FFFF

Modulation Scheme
[Function] Sets the modulation scheme.
[Default] QPSK
[Setting range] QPSK, 16QAM, 64QAM

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File, UL-SCH

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the PUSCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Resolution] 1
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to be inserted into the PUSCH.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Binary data" in Appendix B "User File Format" for details on the user file format.

Resource allocation type

[Function] Sets the Resource allocation type.

[Default] type0

[Setting range] type0, type1

[Remarks] This parameter is displayed when **System** in the common parameter list is set to **LTE-Advanced**.
Select type1 to set clustered PUSCH.
When type1 is selected, Start Number of RB and Number of RBs cannot be set.

Start Number of RB

[Function] Sets the start position of the RB to which the PUSCH is assigned.

[Default] 0

[Setting range] When Bandwidth is 1.4 MHz: 0 to 5
When Bandwidth is 3 MHz: 0 to 14
When Bandwidth is 5 MHz: 0 to 24
When Bandwidth is 10 MHz: 0 to 49
When Bandwidth is 15 MHz: 0 to 74
When Bandwidth is 20 MHz: 0 to 99

[Remarks] This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type0.

Number of RBs

[Function] Sets the number of RBs for which to allocate PUSCHs.

[Default] 25

The default value is 1 if a new PUSCH is added.

[Setting range] When Bandwidth is 1.4 MHz: 1 to 6

When Bandwidth is 3 MHz: 1 to 15

When Bandwidth is 5 MHz: 1 to 25

When Bandwidth is 10 MHz: 1 to 50

When Bandwidth is 15 MHz: 1 to 75

When Bandwidth is 20 MHz: 1 to 100

[Remarks] The setting must be a value that satisfies the following expression:

$2^a \times 3^b \times 5^c$ where a, b, and c are positive integers.

This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type0.

Note:

RBs to which PUSCH will be assigned may overlap in a subframe, depending on the settings of Start Number of RB and Number of RBs. In this event, "PUSCHs are overlapping." is displayed in the error display area and waveform pattern generation is disabled.

Start Number of RBG for 1st

[Function] Sets the start position of the RBG for 1st.

[Default] 1

[Setting range] The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.5-1 Setting Range of Start Number of RBG for 1st

Bandwidth (Number of RBs)	Setting range*
1.4 MHz (6)	1 to 4
3 MHz (15)	1 to 6
5 MHz (25)	1 to 11
10 MHz (50)	1 to 15
15 MHz (75)	1 to 17
20 MHz (100)	1 to 23

*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1.

[Remarks] This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type1.
The RBG Size (number of RBs to be mapped) for each bandwidth is as follows.

Table 3.1.6.5-2 Bandwidth versus RBG Size

Bandwidth (Number of RBs)	RBG Size
1.4 MHz (6)	1
3 MHz (15)	2
5 MHz (25)	2
10 MHz (50)	3
15 MHz (75)	4
20 MHz (100)	4

End Number of RBG for 1st

[Function] Sets the end position of the RBG for 1st.

[Default] The default varies depending on the Bandwidth setting as follows.

[Setting range] The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.5-3 Default and Setting Range of End Number of RBG for 1st

Bandwidth (Number of RBs)	Setting range*	Default
1.4 MHz (6)	1 to 4	3
3 MHz (15)	1 to 6	3
5 MHz (25)	1 to 11	6
10 MHz (50)	1 to 15	8
15 MHz (75)	1 to 17	8
20 MHz (100)	1 to 23	12

*: The maximum value of the setting range is smaller than End Number of RBG for 1st – 1.

[Remarks] This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type1.

Start Number of RBG for 2nd

[Function] Sets the start position of the RBG for 2nd.

[Default] The default varies depending on the Bandwidth setting as follows.

[Setting range] The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.5-4 Default and Setting Range of Start Number of RBG for 2nd

Bandwidth (Number of RBs)	Setting range*	Default
1.4 MHz (6)	3 to 6	5
3 MHz (15)	3 to 8	5
5 MHz (25)	3 to 13	8
10 MHz (50)	3 to 17	10
15 MHz (75)	3 to 19	10
20 MHz (100)	3 to 25	14

*: The maximum value of the setting range is smaller than End Number of RBG for 2nd + 1.

[Remarks] This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type1.

End Number of RBG for 2nd

[Function] Sets the end position of the RBG for 2nd.

[Default] The default varies depending on the Bandwidth setting as follows.

[Setting range] The setting range varies depending on the Bandwidth setting as follows.

Table 3.1.6.5-5 Default and Setting Range of End Number of RBG for 2nd

Bandwidth (Number of RBs)	Setting range	Default
1.4 MHz (6)	3 to 6	6
3 MHz (15)	3 to 8	8
5 MHz (25)	3 to 13	13
10 MHz (50)	3 to 17	17
15 MHz (75)	3 to 19	19
20 MHz (100)	3 to 25	25

[Remarks] This parameter can be set when **System** in the common parameter list is set to **LTE-Advanced and** Resource allocation type is type1.

Power Boosting

[Function] Sets the transmission power.

[Default] 0.000 [dB]

[Setting range] –20.000 to +20.000 [dB]

[Resolution] 0.001 [dB]

UL-SCH

When selecting **UL-SCH** for Data Type of PUSCH, UL-SCH can be set as the PUSCH data.

Transport Block Size

[Function] Sets the UL-SCH Transport Block size.

[Default] 0

[Setting range] 0 to 86400

[Setting range] The setting range varies depending on the PUSCH setting.

Data Type

[Function] Sets the data type.

[Default] PN9fix

[Setting range] PN9fix, PN15fix, 16 bit repeat, User File

Data Type Repeat Data

[Function] Sets the 16-bit repeat data to insert into UL-SCH.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only if 16 bit repeat is selected for Data Type.

Data Type User File

[Function] Sets the user file to insert into UL-SCH.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. For details about the user file format, refer to the description of "Binary data" in Appendix B "User File Format".

RV index

[Function] Sets the redundancy version index.
[Default] 0
[Setting range] 0, 1, 2, 3

HARQ-ACK

Data Status

[Function] This enables or disables HARQ-ACK.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, HARQ-ACK parameters are disabled.

Data Type

[Function] Sets the Data type to be inserted into the HARQ-ACK.
[Default] ACK
[Setting range] ACK, NACK, ACK-ACK, ACK-NACK, NACK-ACK, NACK-NACK

Total Number of Coded Bits

[Function] Sets the number of bits after HARQ-ACK encoding.
[Default] 2
[Setting range] 0 to Number of RBs×288

RI

Data Status
[Function] Enables or disables the RI.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, all RI parameters are disabled.

Data Type
[Function] Sets the Data type to be inserted into the RI.
[Default] 1(1bit)
[Setting range] 1(1bit), 2(1bit), 1(2bits), 2(2bits), 3(2bits), 4(2bits)

Total Number of Coded Bits
[Function] Sets the number of bits after RI encoding.
[Default] 2
[Setting range] 0 to Number of RBs×288

CQI/PMI

Data Status
[Function] Enables or disables the CQI/PMI.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] When Disable is selected, CQI/PMI parameters are disabled.

Data Type
[Function] Sets the Data type to be inserted into the CQI/PMI.
[Default] PN9fix
[Setting range] PN9fix, PN15fix, 16 bit repeat, User File

Data Type Repeat Data
[Function] Sets the 16-bit repeat data to be inserted into the CQI/PMI.
[Default] 0000
[Setting range] 0000 to FFFF
[Remarks] This parameter is displayed only when 16 bit repeat is selected for Data Type.

Data Type User File
[Function] Sets the User type to be inserted into the CQI/PMI.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to Appendix B “User File Format” for details on the user file format.

Total Number of Coded Bits

[Function] Sets the number of bits after CQI/PMI encoding.

[Default] 64

[Setting range] 0 to 86400

3.1.6.6 Demodulation RS for PUSCH

When **Demodulation RS for PUSCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Data Type

[Function] Sets the data to be inserted into the Demodulation RS for PUSCH.

[Default] Base Sequence

[Setting range] Base Sequence, User File

Data Type User File

[Function] Sets the user file to be inserted into the Demodulation RS for PUSCH.

[Setting range] Any file can be selected.

[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Complex data" in Appendix B "User File Format" for details on the user file format.

Group Hopping

[Function] Enables or disables group hopping.

[Default] Disable

[Setting range] Disable, Enable

[Remarks] This is displayed when Data Type is Base Sequence.

Sequence Hopping

[Function] Enables or disables Sequence Hopping.

[Default] Disable

[Setting range] Disable, Enable

[Remarks] This parameter is valid if Number of RBs is 6 or more for PUSCH. However, this parameter is invalid if Group Hopping is Enable.

Delta ss

[Function] Sets Delta ss.

[Default] 0

[Setting range] 0 to 29

[Remarks] This parameter can be set when n_cs Setting is set to Auto or when Group Hopping is set to Enable.

Base Sequence Group Number u

[Function] Sets the base sequence group number.
[Default] 0
[Setting range] 0 to 29
[Remarks] This parameter can be set when Group Hopping is Disable.
When DMRS Parameters is Auto, only calculated value displays and nothing can be set.

Base Sequence Number v

[Function] Sets the base sequence number.
[Default] 0
[Setting range] 0, 1
[Remarks] This parameter is fixed to 0 if Number of RBs is set to a value smaller than 6.
This parameter can be set to 0 or 1 if Number of RBs is 6 or more. However, this parameter cannot be set if Group Hopping is Enable. Also, this parameter is invalid if Sequence Hopping is Enable.

Cyclic Shift

n_cs Setting

[Function] Sets whether to automatically or manually switch the n_cs setting.
[Default] Auto
[Setting range] Auto, Manual

n(1)_DMRS

[Function] Sets the value used for automatic n_cs calculation.
[Default] 0
[Setting range] 0, 2, 3, 4, 6, 8, 9, 10
[Remarks] This is only displayed when n_cs Setting is Auto.

n(2)_DMRS

[Function] Sets the value used for automatic n_cs calculation.
[Default] 0
[Setting range] 0, 2, 3, 4, 6, 8, 9, 10
[Remarks] This is only displayed when n_cs Setting is Auto.

Cyclic Shift 1st slot

n_cs

[Function] Sets n_cs for the first slot of Demodulation RS.

[Default] 0

[Setting range] 0 to 11

[Remarks] When n_cs Setting is Auto, the calculated value is displayed and n_cs cannot be set.

alpha

[Function] Displays the cyclic shift of the first slot of Demodulation RS.

[Remarks] The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point.
alpha = 2*pi*n_cs/12

Cyclic Shift 2nd slot

n_cs

[Function] Sets n_cs for the second slot of Demodulation RS.

[Default] 0

[Setting range] 0 to 11

[Remarks] When n_cs Setting is Auto, the calculated value is displayed and n_cs cannot be set.

alpha

[Function] Displays the cyclic shift of the second slot of Demodulation RS.

[Remarks] The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point.
alpha = 2*pi*n_cs/12

3.1.6.7 Sounding RS

When SRS is set to **O**n, the Sounding RS item is added to the tree view, and, when **Sounding RS** is selected, the following items are displayed in the PHY/MAC parameter list.

Data Status
[Function] This enables or disables the Sounding RS parameter.
[Default] Enable
[Setting range] Enable, Disable
[Remarks] When Disable is selected, all Sounding RS parameters are disabled.

Data Type
[Function] Sets the data to insert into Sounding RS.
[Default] Base Sequence
[Setting range] Base Sequence, User File

Data Type User File
[Function] This sets the user file to be inserted into Sounding RS.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Complex data" in Appendix B "User File Format" for details on the user file format.

Group Hopping
[Function] Enables or disables group hopping.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] This parameter is displayed when Data Type is Base Sequence.

Sequence Hopping
[Function] Enables or disables Sequence Hopping.
[Default] Disable
[Setting range] Disable, Enable
[Remarks] This parameter can be set when Group Hopping is Disable. This parameter is not available when Group Hopping is Enable.
This parameter is displayed when Data Type is Base Sequence.

Delta ss

[Function] Sets Delta ss.

[Default] 0

[Setting range] 0 to 29

[Remarks] This parameter can be set when Group Hopping is Enable.
This parameter is displayed when Data Type is Base Sequence.

Base Sequence Group Number u

[Function] Sets the base sequence group number.

[Default] 0

[Setting range] 0 to 29

[Remarks] This parameter can be set when Group Hopping is Disable.
This parameter is displayed when Data Type is Base Sequence.

Base Sequence Number v

[Function] Sets the base sequence number.

[Default] 0

[Setting range] 0, 1

[Remarks] This parameter cannot be set if Group Hopping is Enable.
This parameter is invalid if Sequence Hopping is Enable.
This parameter is displayed when Data Type is Base Sequence.

SRS Bandwidth Configuration

[Function] This sets SRS Bandwidth Configuration.

[Default] 0

[Setting range] 0 to 7

[Remarks] An SRS Bandwidth Configuration setting for which SRS Bandwidth exceeds Channel Bandwidth cannot be specified.

SRS Bandwidth

[Function] This sets SRS Bandwidth.

[Default] 0

[Setting range] 0 to 3

k_TC

[Function] This sets Transmission Comb.

[Default] 0

[Setting range] 0, 1

SRS Hopping Bandwidth
[Function] This sets SRS Hopping Bandwidth.
[Default] 3
[Remarks] Fixed to 3.

n_RRC
[Function] This sets Frequency Domain Position.
[Default] 0
[Setting range] 0 to 23

Power Boosting
[Function] Sets the transmission power.
[Default] 0.000 [dB]
[Setting range] –20.000 to +20.000 [dB]
[Resolution] 0.001 [dB]

Cyclic Shift

n_SRS
[Function] This sets n_SRS.
[Default] 0
[Setting range] 0 to 7

alpha
[Function] This displays Cyclic Shift.
[Remarks] The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point.
alpha = 2*pi*n_SRS/8

3.1.6.8 Random Access Preamble

When **Random Access Preamble** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

PRACH Configuration
[Function] Sets the transmission timing for PRACH.
[Default] 0
[Setting range] 0 to 63 (30, 46, 60, 61, and 62 cannot be set.)

Preamble Format
[Function] Displays the Preamble Format.
[Default] 0
[Remarks] This setting cannot be changed.

Data Type
[Function] Sets the data to be inserted into the Random Access Preamble.
[Default] Root Zadoff-Chu Sequence
[Setting range] Root Zadoff-Chu Sequence, User File

Data Type User File
[Function] Sets the user file to be inserted into the Random Access Preamble.
[Setting range] Any file can be selected.
[Remarks] This parameter is displayed only when User File is selected for Data Type. Refer to the description of "Complex data" in Appendix B "User File Format" for details on the user file format.

Root Zadoff-Chu Sequence
[Function] Sets the Root Zadoff-Chu sequence.
[Default] 1
[Setting range] 1 to 839
[Resolution] 1
[Remarks] This parameter is displayed when Root Zadoff-Chu Sequence is selected for Data Type.

Cyclic Shift Value
[Function] Sets the cyclic shift value.
[Default] 0
[Setting range] 0 to 838
[Resolution] 1
[Remarks] This parameter is displayed when Root Zadoff-Chu Sequence is selected for Data Type.

Random Access Preamble Length

[Function] Displays the length of the random access preamble in milliseconds.

[Default] 0.903 [ms]

Hopping Pattern Length

[Function] Sets the number of cycles of the hopping pattern for the Random Access Preamble.

[Default] 1 frame

[Setting range] 1 to 10 frames

[Resolution] 1

[Remarks] The value of Hopping Pattern Length is the same as that of Number of Frames in the common parameters.

Hopping Pattern

[Function] Sets the frequency hopping pattern for the Random Access Preamble. This setting is configured in RB units, based on the lowest frequency in the transmission band set by Bandwidth.

[Default] 0

[Setting range] 0 to 94, OFF

[Resolution] 1

[Remarks] The number of hopping patterns that can be set in the list box depends on the Hopping Pattern Length settings, and is obtained from the following equation:

$$\text{Hopping Pattern Length} \times 10$$

Double-clicking the PHY/MAC parameter list area displays the Frequency Hopping Pattern setting window (see Figure 3.1.5.8-1). Set the frequency hopping pattern in this window. The range of settable RB# depends on the Bandwidth setting, as follows.
RB#0 to # (Total number of RBs for Bandwidth − 6)

The burst signal for the number in which Hopping Pattern is set to OFF is not output.

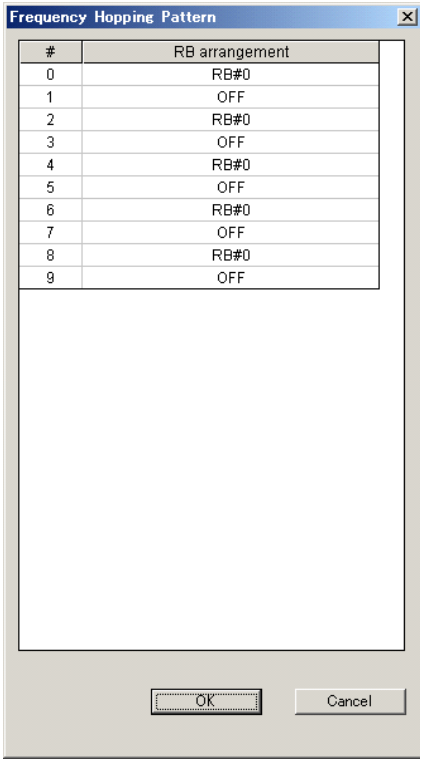


Figure 3.1.6.8-1 Frequency Hopping Pattern setting window

Power Ramping Step Size

[Function] Sets the amount of power to be increased each time a Random Access Preamble is transmitted.

[Default] 0.0 [dB]

[Setting range] 0.0 to 10.0 [dB]

[Resolution] 0.1 [dB]

3.1.7 Frame Structure screen

When Show Frame Structure is selected from the **Edit** menu or the  tool button is clicked on the main screen, the Frame Structure screen shown in Figure 3.1.7-1 is displayed. The Frame Structure screen displays a diagram showing which resource element is currently assigned for each of the channels. However, if Number of Antennas is 2 or 4, the Frame Structure and power graph for the antenna port selected using the Antenna Port selection button are displayed. Each channel is represented with a different color and on a UE basis for PDSCH and PUSCH. Also, a red frame indicates channels with which an error has occurred, such as when the same resource block is assigned to different uplink PUSCHs.

When System in the common parameter list is set to **LTE-Advanced**, the Frame Structure screen and Power graph screen displays the data, depending on how the Antenna Port select button, Band select button, and Component Carrier select button have been set.

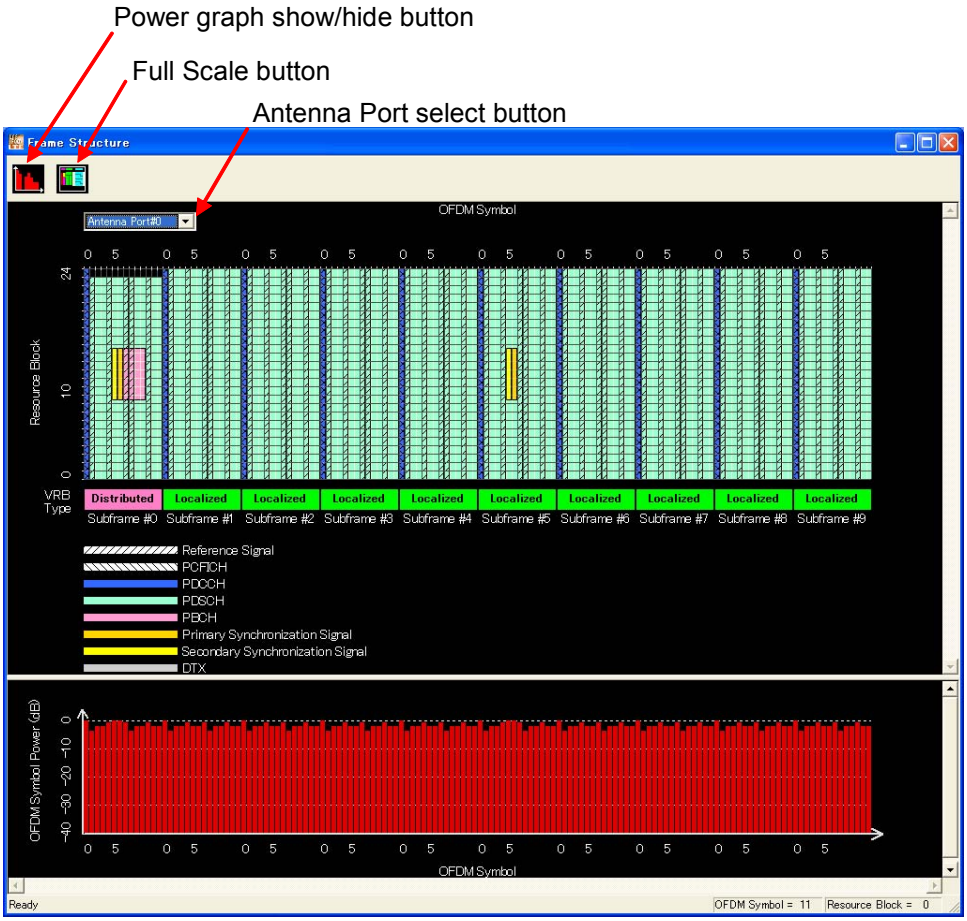


Figure 3.1.7-1 Frame Structure Screen and Power Graph

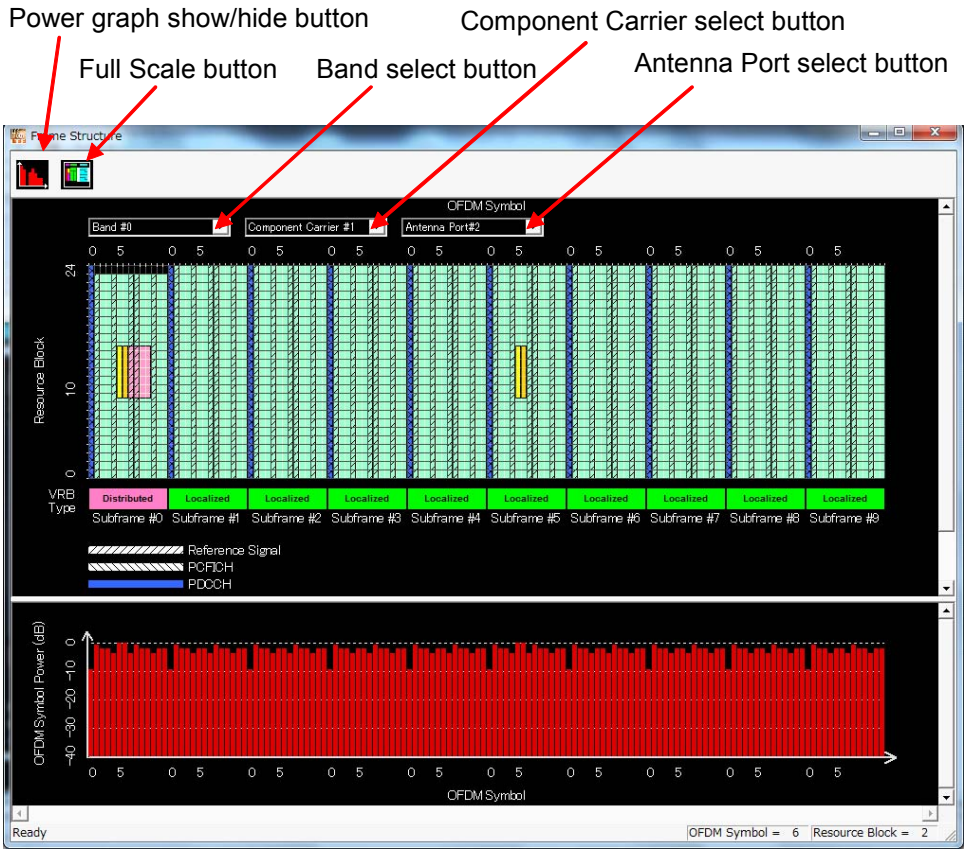


Figure 3.1.7-2 Frame Structure Screen and Power Graph (LTE-Advanced)

3.1.7.1 Frame Structure screen

On the Frame Structure screen, the vertical axis represents the frequency in resource block units, and the horizontal axis represents the time in OFDM symbol units. In the Full Scale mode, the structure of one frame (Subframes #0 to #9) is displayed, and the scale can be enlarged by selecting the desired area with the cursor (see Figure 3.1.7.1-1). Clicking the Full Scale button returns the scale to the original one-frame display. The settings and other information concerning each of the channels can be displayed by right-clicking the channel with the cursor and selecting **Properties** from the pop-up menu.

Power graph

The power graph can be shown and hidden by clicking the show/hide button on the upper left corner of the Frame Structure screen. The vertical axis of the power graph represents the power, relative to the OFDM Symbol at the maximum power that is given a value of 0 dB. The horizontal axis represents the time, in accordance with the time axis of the Frame Structure screen.

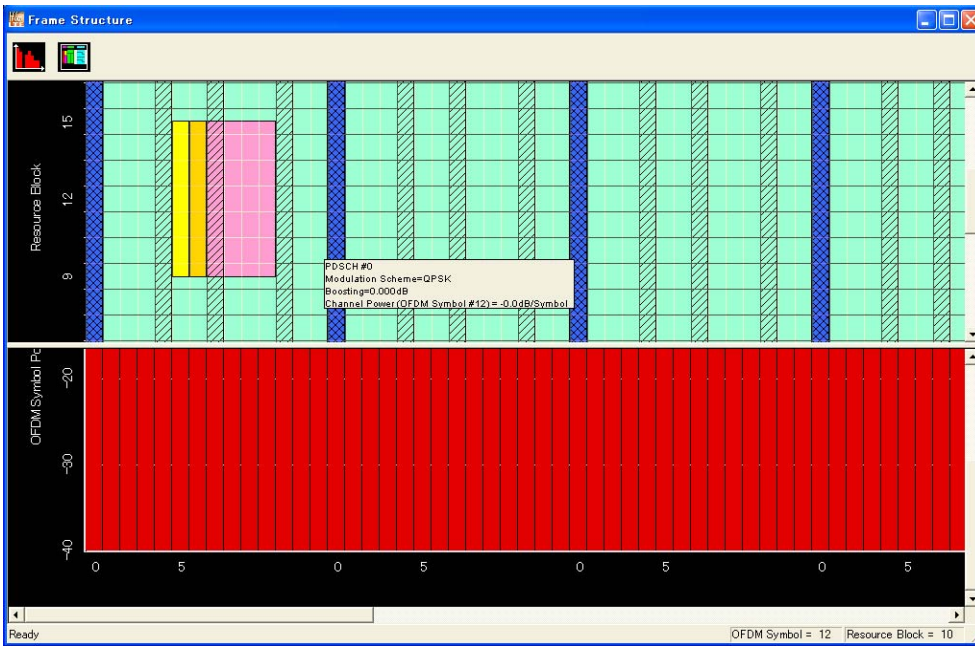


Figure 3.1.7.1-1 Enlarged Display of Frame Structure Screen

Random Access Preamble

The Frame Structure screen for the uplink Random Access Preamble is shown in Figure 3.1.7.1-2. The frame number can be selected from the drop-down list at the upper left of the screen.

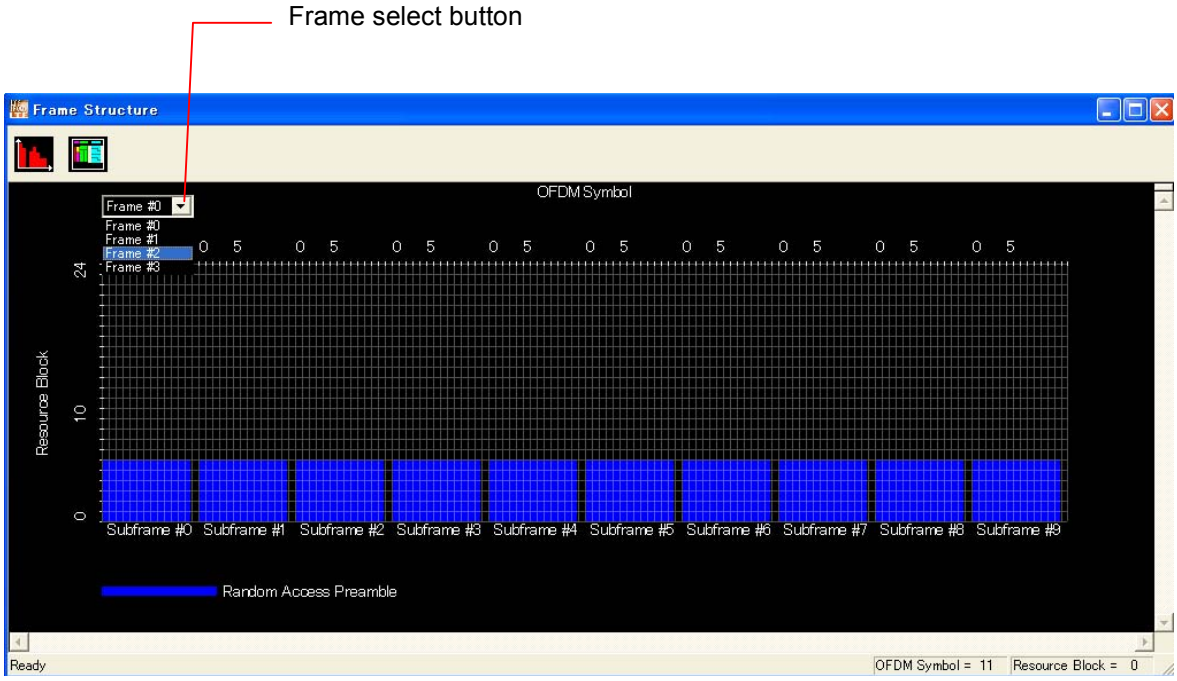


Figure 3.1.7.1-2 Random Access Preamble Setting Screen

3.1.8 Export File screen

When "Calculation" is selected from the **Edit** menu or the  tool button is clicked on the main screen, the Export File screen is displayed. The Export File screen is displayed when generating a waveform pattern. In this screen, the output destination folder, package name, file name, and comment for the waveform pattern to be generated can be specified.

Notes:

- The number of waveform patterns (Tx Antenna) to be generated and the setting items in the Export File screen change depending on the setting of Number of Antennas (refer to Figures. 3.1.8-1, 3.1.8-2, and 3.1.8-3).
  If Number of Antennas is set to 2 or more, the file to be generated has underscore and antenna number at its name end.
- When System in the common parameter list is set to **LTE-Advanced** and Carrier Aggregation Mode is set to Inter-band, the number of waveform patterns to be generated for one Tx Antenna is two. (Refer to Figure 3.1.8-4, 3.1.8-5, and 3.1.8-6.)
  When Carrier Aggregation Mode is set to Inter-band, each waveform pattern to be generated has "_B0" and "_B1" at its end by the band number.

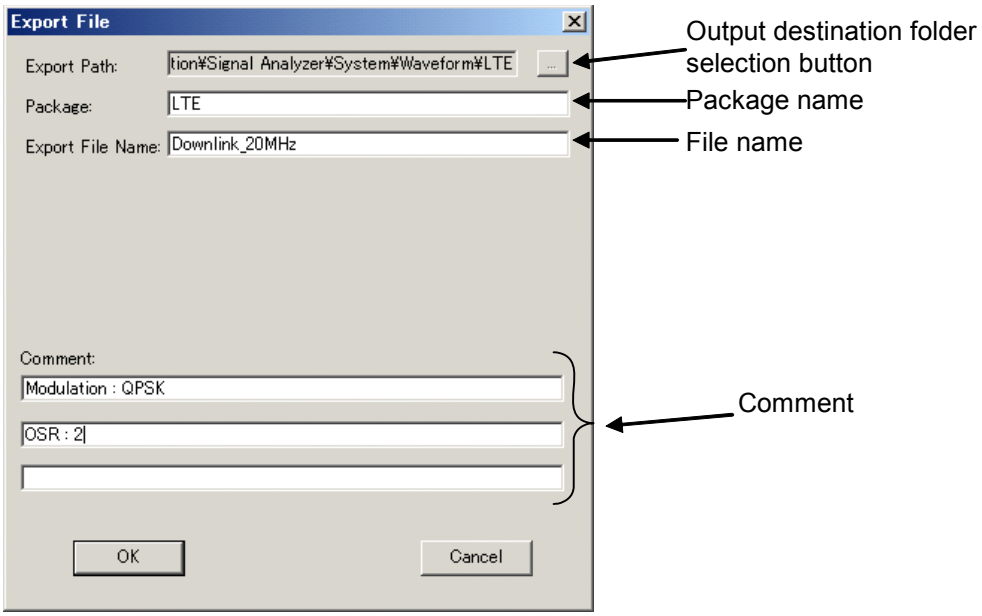


Figure 3.1.8-1 Export File Screen (When Number of Antennas = 1)

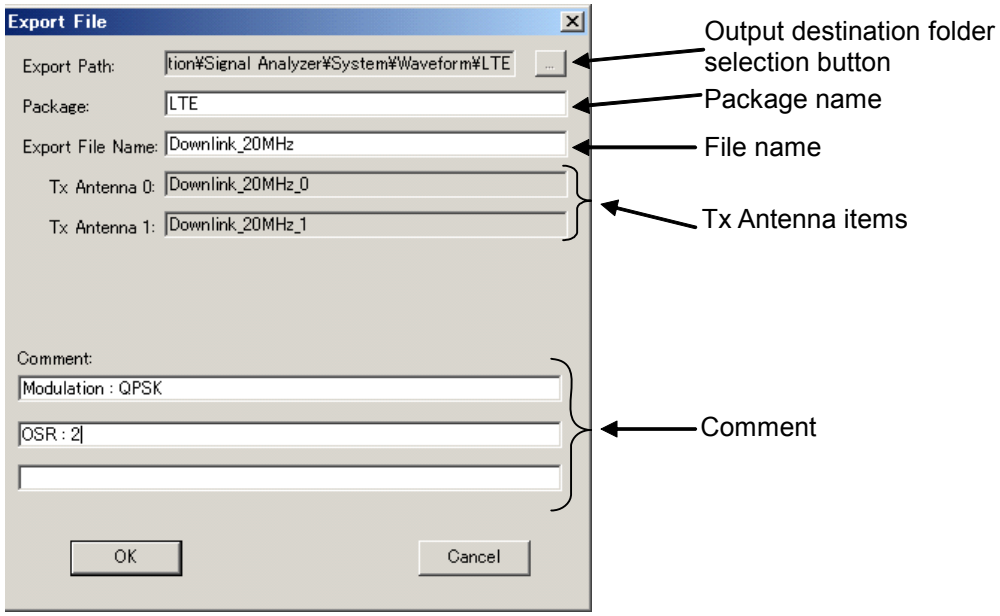


Figure 3.1.8-2 Export File Screen (When Number of Antennas = 2)

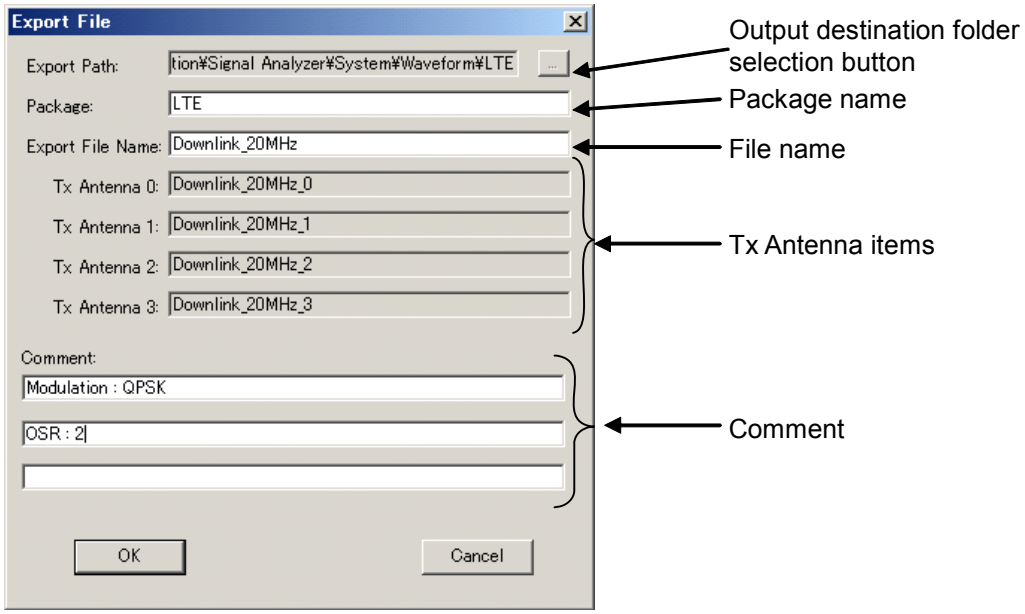


Figure 3.1.8-3 Export File Screen (When Number of Antennas = 4)

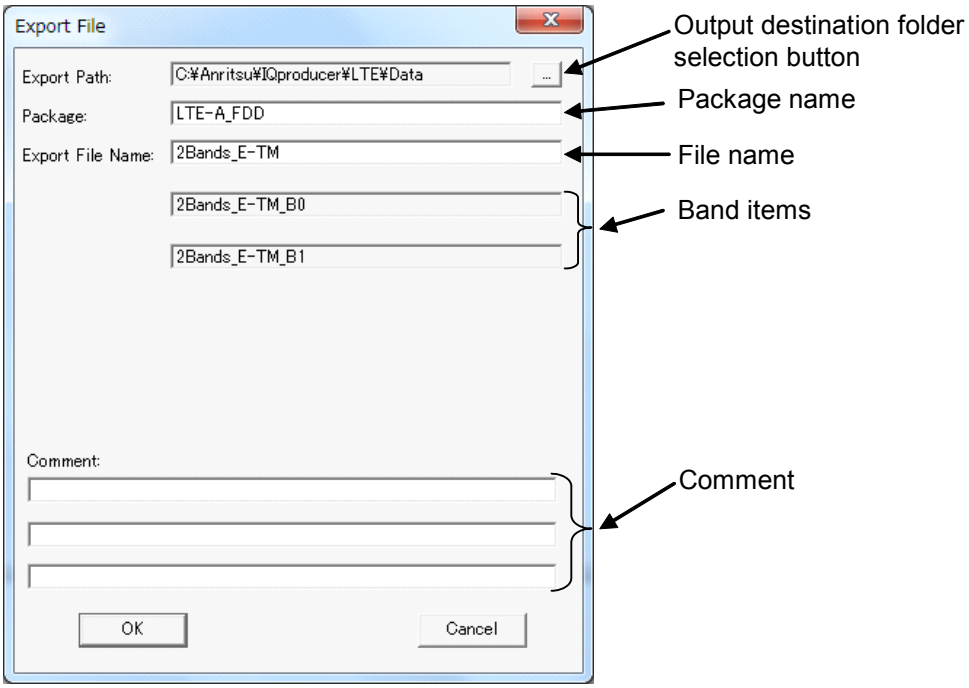


Figure 3.1.8-4 Export File Screen
(When Carrier Aggregation Mode = Inter-band and Number of Antennas = 1)

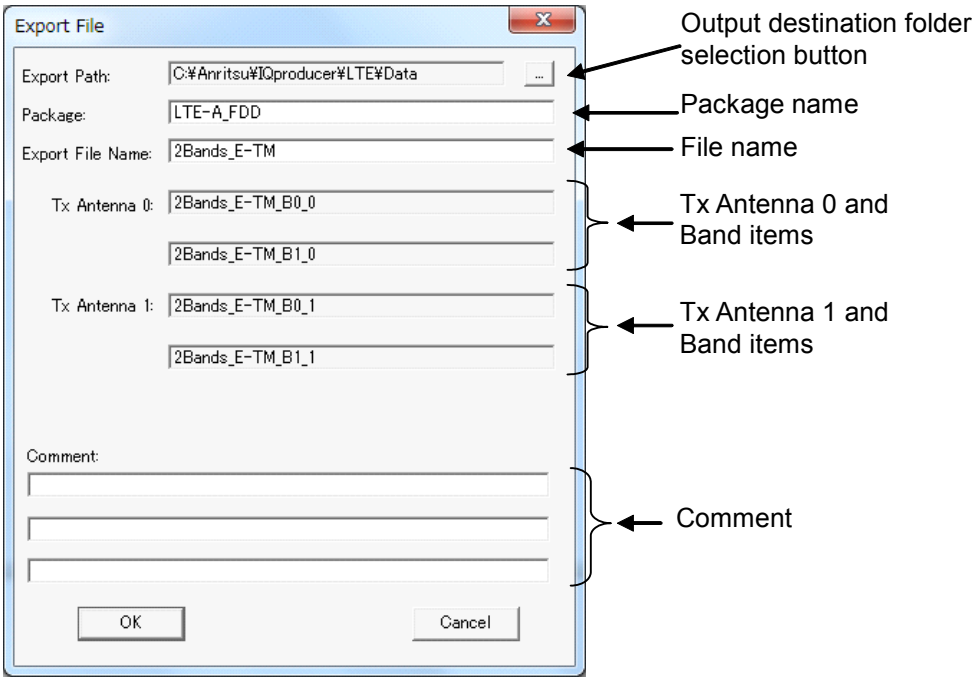


Figure 3.1.8-5 Export File Screen
(When Carrier Aggregation Mode = Inter-band and Number of Antennas = 2)

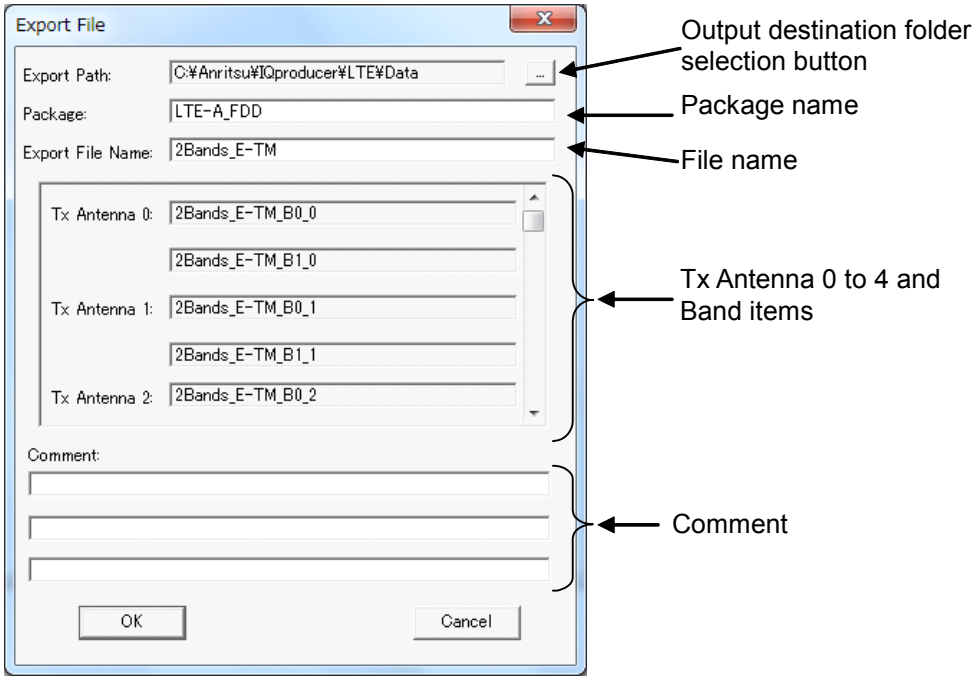


Figure 3.1.8-6 Export File Screen
(When Carrier Aggregation Mode = Inter-band and Number of Antennas = 2)

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

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

When the waveform pattern, package name, file name, and comment are set, click **OK** on the Export File screen. The Calculation screen shown in Figure 3.1.9-1 is displayed and waveform pattern generation starts (package name, and file name must be set to start waveform pattern generation).

When started with MS269x or MS2830A and when **MS269x** or **MS2830** is selected in the **Select instrument** screen, waveform pattern files generated by this application are saved in the following directory:
C:\Program Files\Anritsu Corporation\Signal Analyzer\System\Waveform

Installed OS	Export destination folder
Windows Embedded Standard 7	C:\Anitsu\Signal Analyzer\ System\Waveform
Other than above	C:\Program Files\Anritsu Corporation\ Signal Analyzer\System\Waveform

When used with MG3710A, the files are saved in the following directory:
C:\Anritsu\MG3710A\User Data\Waveform

In other cases, the output destination folder can be selected from the Browse for Folder screen shown in Figure 3.1.8-7, which is displayed by clicking the output destination folder selection button on the Export File screen.

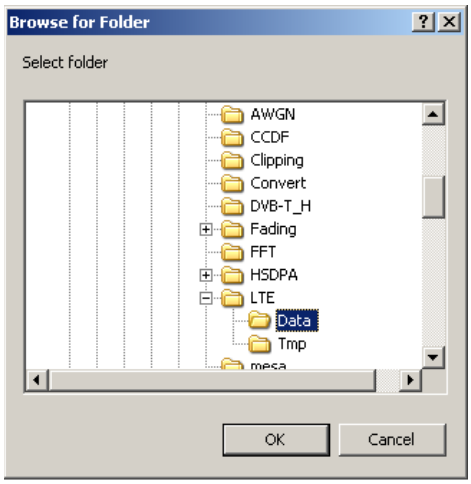


Figure 3.1.8-7 Browse for Folder Screen

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

X:\IQproducer\LTE \Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

3.1.9 Calculation screen

Clicking **Calculation & Load**, **Calculation & Play**, or the **OK** button on the Export File screen will start the waveform generation.

The Calculation screen is displayed while a waveform pattern is being generated. On this screen, the progress bar is displayed indicating the generation process of the waveform pattern and the progress of the waveform pattern generation. The generation of the waveform pattern can be stopped by clicking the **Cancel** button. When cancelled, it returns to the main screen.

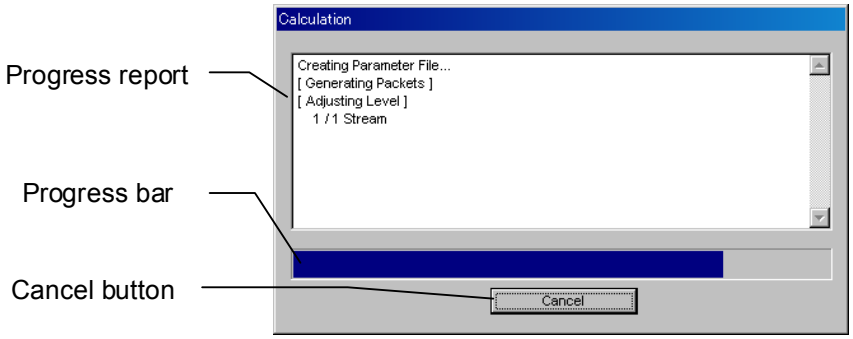


Figure 3.1.9-1 Calculation Screen (In Progress)

After waveform pattern generation is finished, the message "Calculation Completed." is displayed in the progress window and the **Cancel** button changes to the **OK** button.

When the generation is complete, you can return to the setting screen by clicking the **OK** button. After waveform generation, two files with .wvi and .wvd extension are output.

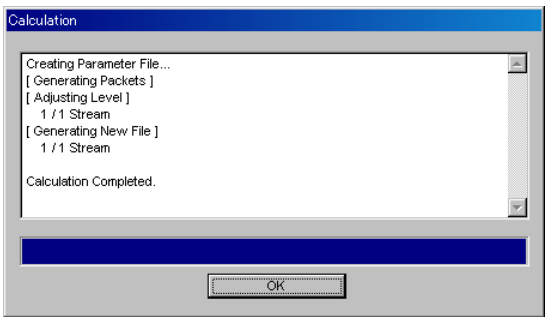


Figure 3.1.9-2 Calculation Screen (Completed)

Note:

When using this software on MG3710A, and selecting **Calculation & Load** or **Calculation & Play**, the waveform generation ends without displaying the above screen.

3.1.10 Calculation & Load

Note:

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

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

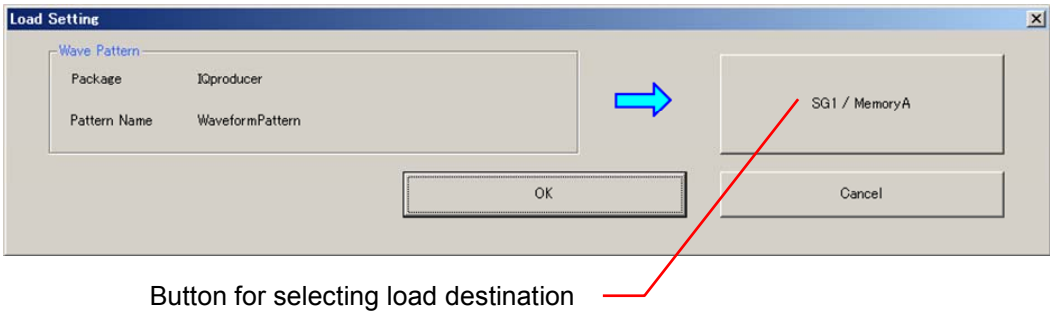


Figure 3.1.10-1 Load Setting Screen

When System in the common parameter list is set to **LTE-Advanced** and Carrier Aggregation Mode is set to Inter-band, selecting **Calculation & Load** displays the Load Setting screen as shown below after completion of waveform generation.

Note:

This function is available only when the 2nd RF (option) is installed

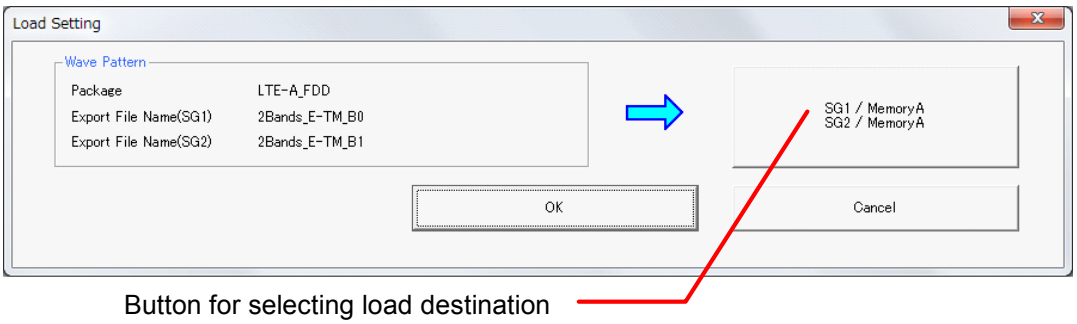


Figure 3.1.10-2 Load Setting Screen (Carrier Aggregation Mode = Inter-band)

The Select Memory screen appears when clicking the load destination in the Load Setting screen.

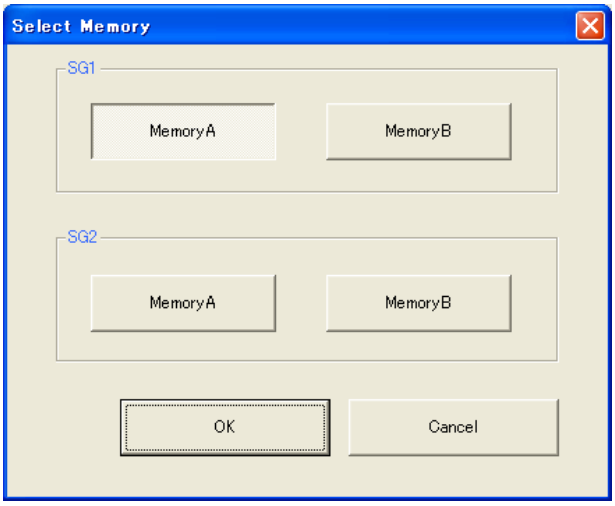


Figure 3.1.10-3 Select Memory Screen

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

Note:

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

3.1.11 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 RF (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.

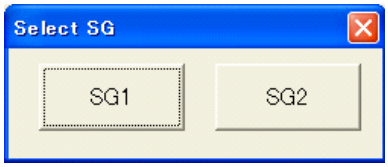


Figure 3.1.11-1 Select SG Screen

When System in the common parameter list is set to **LTE-Advanced** and Carrier Aggregation Mode is set to **Inter-band**, selecting **Calculation & Play** displays the SG Setting screen before starting waveform generation. In the SG Setting screen, Frequency and Amplitude for each SG1 and SG2 can be set.

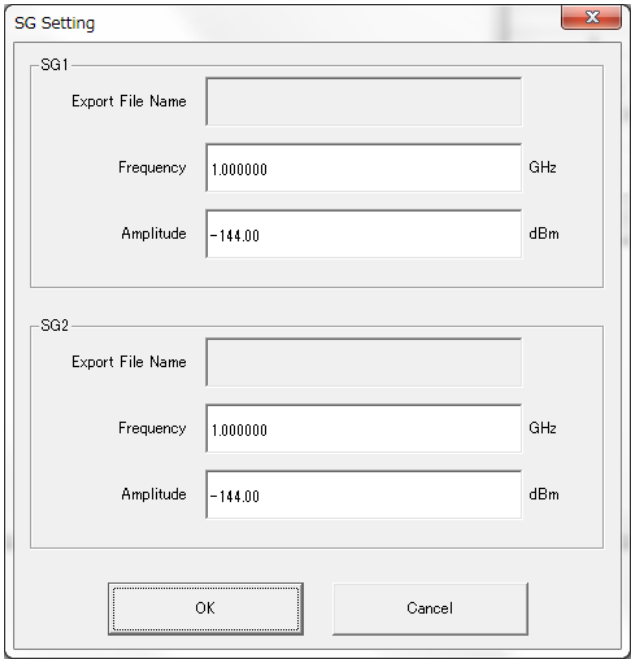


Figure 3.1.11-2 Select SG Screen

3.2 Random Access Preamble setting methods

This software can be used to generate a waveform pattern in which multiple random access preambles are transmitted while performing frequency hopping and power ramping. Random Access Preamble is transmitted from the subframe header and uses Hopping Pattern to set the subframe from which to start transmission. Random Access Preamble indicates the length of Random Access Preamble. Hopping Pattern Length indicates the number of cycles of the hopping pattern for the Random Access Preamble.

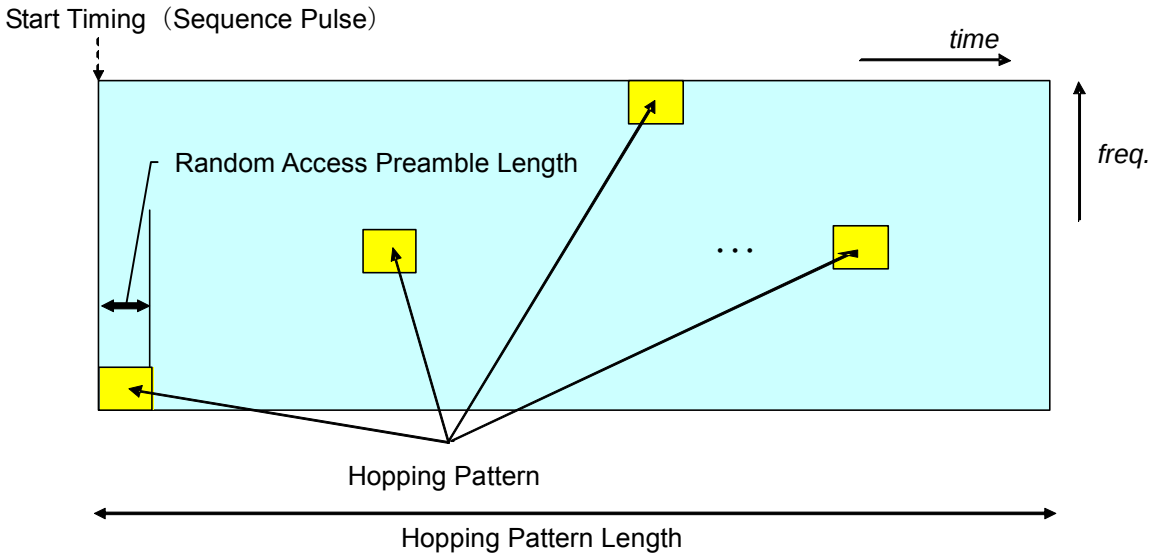


Figure 3.2-1 Parameters for Random Access Preamble

When a waveform pattern generated by the LTE IQproducer™ is output from the mainframe, it is usually output repeatedly. To output Random Access Preamble waveform pattern only once, refer to the information below.

Method for single output of Random Access Preamble waveform pattern

Activate the Combination File Edit function from the Transfer & Setting Panel screen, and then create a combination file with Sequence Repeat Mode set to Single. A waveform pattern can be transmitted a single time by using this combination file. For details, refer to 4.8 “Combining Waveform Patterns by Combination File Edit Function” in MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

3.3 Waveform Pattern Generation Procedure

3.3.1 LTE

This section describes the waveform pattern generation procedure when System in the common parameter list is set to **LTE**.

3.3.1.1 Downlink

This section describes the waveform pattern generation procedure, using as an example the LTE waveform pattern for which the parameters are set as shown in Table 3.3.1.1-1.

Table 3.3.1.1-1 Settings for Common Parameters

Common	
System	LTE
Number of Antennas	1
Cell ID	1
Number of Frames	1
Oversampling Ratio	2
Sampling Rate	15.36
Bandwidth	5
Downlink/Uplink	Downlink
Cyclic Prefix	Normal
Subcarrier Spacing	15
Number of OFDM symbols per slot	7
Roll off length	0
Filter	
Filter Type	Ideal

<Procedure>

<Procedure for generating Downlink waveform>

1. Start this software.
2. Set the common parameters as shown in Table 3.3.1.1-1.
3. Click **Downlink** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-2.

Table 3.3.1.1-2 Downlink Setting

Downlink	
PHICH	ON
PHICH duration	Normal
Ng	1/6

4. Click **Reference signal** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-3.

Table 3.3.1.1-3 Settings for Reference Signal

Reference Signal	
Reference signal Sequence	Gold Sequence
Frequency Shift Value	1
Power Boosting	0.000

5. Click **PBCH** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-4.

Table 3.3.1.1-4 Settings for PBCH

PBCH	
Data Status	Enable
Data Type	16 bit repeat
Data Type Repeat Data	0000
Power Boosting	0.000

6. Click **Synchronization signal** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-5

Table 3.3.1.1-5 Settings for Synchronization Signal

Synchronization signal	
Primary synchronization signal	
Data Status	Enable
Data Type	Zadoff-Chu Sequence
Zadoff-Chu sequence index u	29
Power Boosting	0.000
Secondary synchronization signal	
Data Status	Enable
Data Type	Concatenated sequence
Power Boosting	0.000

7. Click **Subframe #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-6. Set the CCE arrangement in step 10.

Table 3.3.1.1-6 Settings for Subframe #0

Subframe #0	
Virtual Resource Block type	Localized
Number of PHICH Groups	1
Number of OFDM Symbols for PDCCH	1
Total Number of CCEs	4
Number of PDCCHs	2
CCE arrangement	0, 0, 1, 1
Number of PDSCHs	1
RB arrangement	All PDSCH #0

8. Click **PCFICH** in Subframe #0 in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-7.

Table 3.3.1.1-7 Settings for PCFICH

PCFICH	
Data Status	Enable
Data Type	CFI codeword
CFI	1
Power Boosting	0.000

9. Click **PDCCH#0** and **PDCCH#1** in Subframe #0 in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-8.

Table 3.3.1.1-8 Settings for PDCCH

PDCCH	
Data Status	Enable
PDCCH format	1
Data Type	16 bit repeat
Data Type Repeat Data	0000
Power Boosting	1.880

10. Double-click the **CCE arrangement** dialog box for Subframe #0 in the tree view, and then specify the settings shown in Figure 3.3.1.1-1.

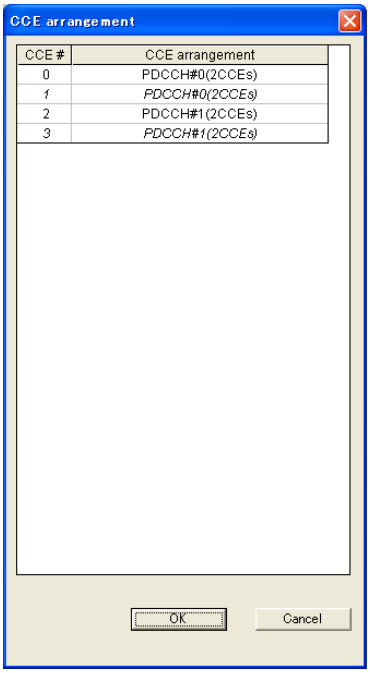


Figure 3.3.1.1-1 CCE arrangement setting

11. Click **PDSCH#0** in Subframe #0 in the tree view, and then set the PHY/MAC parameters as shown in Table 3.3.1.1-9.

Table 3.3.1.1-9 Settings for PDSCH

PDSCH	
Data Status	Enable
nRNTI	0000
Power Boosting	0.000
Modulation Scheme	QPSK
Data Type	16 bit repeat
Data Type Repeat Data	0000

12. Click **PHICH group #0** in Subframe #0 in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.1-10. The power boosting of the PHICH group is automatically calculated after specifying the settings in step 13.

Table 3.3.1.1-10 Settings for PHICH Group

PHICH group	
Data Status	Enable
PHICH Group number	0
Number of PHICHs	2
Power Boosting	0.000

13. Set the PHY/MAC parameters as listed in Table 3.3.1.1-11 by clicking **PHICH#0** in PHICH group#0 in the tree view of Subframe#0. Set **PHICH#1** as listed in Table 3.3.1.1-12.

Table 3.3.1.1-11 Settings for PHICH#0

PHICH#0	
Data Status	Enable
Orthogonal Sequence Index	0
Data Type	HI codeword
HI	000
Power Boosting	–3.010

Table 3.3.1.1-12 Settings for PHICH#1

PHICH#1	
Data Status	Enable
Orthogonal Sequence Index	4
Data Type	HI codeword
HI	000
Power Boosting	–3.010

14. Right-click **Subframe #0** in the tree view and select **Copy**. Then, right-click **Subframe #1** to **Subframe #9** and select **Paste**. Select **Paste all** to apply the same settings to all of Subframes #0 to #9.
15. Click the **Calculation** tool button to display the Export File screen. Enter LTE and Downlink_5MHz for the Package name and File name, respectively. Then click the **OK** button.
16. The Calculation screen is displayed and waveform pattern generation starts. After the calculation is completed, click the **OK** button to finish the waveform generation.
17. Check that Downlink_5MHz.wvi, Downlink_5MHz.wvd and Downlink_5MHz.xml are output to the following folder where this software is installed:
X:\IQproducer\LTE\Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed).

3.3.1.2 Uplink

This section describes the waveform pattern generation procedure, using as an example the LTE waveform pattern for which the parameters are set as shown in Table 3.3.1.2-1.

Table 3.3.1.2-1 Settings for Common Parameters

Common	
System	LTE
Number of Antennas	1
Cell ID	0
NID (2)	0
Number of Frames	1
Oversampling Ratio	2
Sampling Rate	15.36
Bandwidth	5
Downlink/Uplink	Uplink
Cyclic Prefix	Normal
Subcarrier Spacing	15
Number of OFDM symbols per slot	7
Roll Off Length	0
Filter	
Filter Type	Ideal

<Procedure>

<Procedure for generating Uplink waveform>

1. Start this software.
2. Set the common parameters as shown in Table 3.3.1.2-1.
3. Click **Uplink** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.2-2.

Table 3.3.1.2-2 Settings for Uplink

Uplink	
Data Transmission/Random Access Preamble	Data Transmission
delta PUCCH shift	1
N_CS(1)	1
N_RB(2)	1
SRS	OFF

4. Click **Subframe #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.2-3.

Table 3.3.1.2-3 Settings for Subframe #0

Subframe #0	
Number of PUCCHs	0
Number of PUSCHs	1

5. Click **PUSCH#0** in Subframe #0 in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.2-4.

Table 3.3.1.2-4 Settings for PUSCH #0

PUSCH #0	
Data Status	Enable
nRNRI	0000
Modulation Scheme	QPSK
Data Type	UL-SCH
Start Number of RB	0
Number of RBs	25
Power Boosting	0.000
UL-SCH	
Transport Block Size	2216
Data Type	PN9fix
RV Index	0
HARQ-ACK	
Data Status	Disable
RI	
Data Status	Disable
CQI/PMI	
Data Status	Disable

6. Click **Demodulation RS for PUSCH** in Subframe #0 in the tree view and set the PHY/MAC parameters as shown in Table 3.3.1.2-5.

Table 3.3.1.2-5 Demodulation RS for PUSCH setting

Demodulation RS for PUSCH	
Data Type	Base Sequence
Group Hopping	Disable
Sequence Hopping	Disable
Delta ss	0
Base Sequence Group Number u	0
Base Sequence Number v	0
n_cs Setting	Auto
n(1)_DMRS	0
n(1)_DMRS	0

7. Right-click **Subframe #0** in the tree view and select **Copy**. Then, right-click **Subframe #1** to **Subframe #9** and select **Paste**. Select **Paste all** to apply the same settings to all of Subframes #0 to #9.
8. Click the **Calculation** tool button to display the Export File screen. Enter LTE and Uplink_5MHz for the Package name and File name, respectively. Then click the **OK** button.
9. The Calculation screen is displayed and waveform pattern generation starts. After the calculation is completed, click the **OK** button to finish the waveform generation.
10. Check that Uplink_5MHz.wvi, Uplink_5MHz.wvd, and Uplink_5MHz.xml are output to the following folder where this software is installed:
X:\IQproducer\LTE\Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

3.3.2 LTE-Advanced

This section describes the waveform pattern generation procedure when System in the common parameter list is set to **LTE-Advanced**.

3.3.2.1 Carrier Aggregation

This section describes the waveform pattern generation procedure, using as an example the LTE-Advanced waveform pattern for which the parameters are set as shown in Table 3.3.2.1-1.

Table 3.3.2.1-1 Settings for Common Parameters

Common	
System	LTE-Advanced
Carrier Aggregation Mode	Intra-band
Downlink/Uplink	Downlink

<Procedure>

<Procedure for generating Carrier Aggregation waveform>

1. Start this software.
2. Set the common parameters as shown in Table 3.3.2.1-1.
3. Click **Common** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-2.

Table 3.3.2.1-2 Setting for Carrier Aggregation

Carrier Aggregation	
Component Carrier #0	
Status	On
Gain (dB)	0.000
Freq Offset (MHz)	–39.600
Phase (deg)	0
Delay (Ts)	0
Component Carrier #1	
Status	On
Gain (dB)	0.000
Freq Offset (MHz)	–19.800
Phase (deg)	0
Delay (Ts)	0
Component Carrier #2	
Status	On
Gain (dB)	0.000
Freq Offset (MHz)	0.000
Phase (deg)	0
Delay (Ts)	0
Component Carrier #3	
Status	On
Gain (dB)	0.000
Freq Offset (MHz)	19.800
Phase (deg)	0
Delay (Ts)	0
Component Carrier #4	
Status	On
Gain (dB)	0.000
Freq Offset (MHz)	39.600
Phase (deg)	0
Delay (Ts)	0

4. Click **Component Carrier#0** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-3.

Table 3.3.2.1-3 Setting for Component Carrier #0

Component Carrier #0	
Bandwidth	20
Cell ID	1

5. Click **Component Carrier#1** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-4.

Table 3.3.2.1-4 Setting for Component Carrier #1

Component Carrier #1	
Bandwidth	20
Cell ID	2

6. Click **Component Carrier#2** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-5.

Table 3.3.2.1-5 Setting for Component Carrier #2

Component Carrier #2	
Bandwidth	20
Cell ID	3

7. Click **Component Carrier#3** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-6.

Table 3.3.2.1-6 Setting for Component Carrier #3

Component Carrier #3	
Bandwidth	20
Cell ID	4

8. Click **Component Carrier#4** in the tree view and set the PHY/MAC parameters as shown in Table 3.3.2.1-7.

Table 3.3.2.1-7 Setting for Component Carrier #4

Component Carrier #4	
Bandwidth	20
Cell ID	5

9. Click the **Calculation** tool button to display the Export File screen. Enter LTE-A and 5CCs_20MHz for the Package name and File name, respectively. Then click the **OK** button.

10. The Calculation screen is displayed and waveform pattern generation starts. After the calculation is completed, click the **OK** button to finish the waveform generation.
11. Check that 5CCs_20MHz.wvi, 5CCs_20MHz.wvd and 5CCs_20MHz.xml are output to the following folder where this software is installed:
X:\IQproducer\LTE\Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

3.4 Saving/Reading Parameters

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

3.4.1 Saving a parameter file

When running on PC, MS2690A/MS2691A/MS2692A, or MS2830A

1. Select **Save Parameter File** from the **File** menu or click the tool button to open the Save As dialog box for a parameter file.

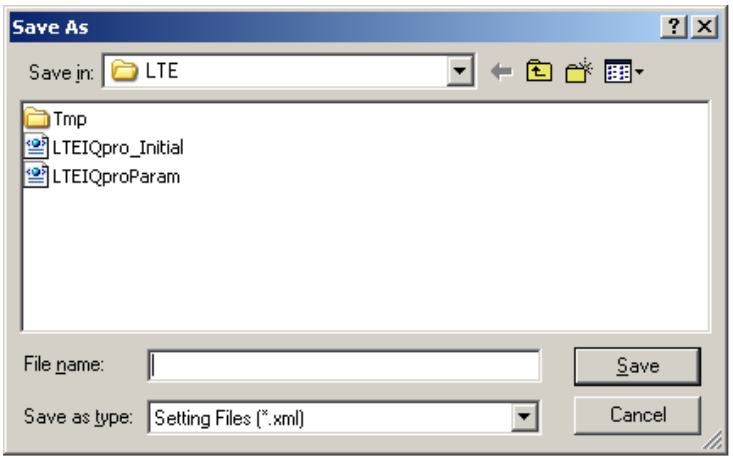


Figure 3.4.1-1 Save As Dialog Box

2. Specify **Save in**, enter a file name in the **File name** text box, and click **Save** to save the parameter file.

When running on MG3710A

1. Click the **Save Parameter File** button in **File** menu or click the button to open the Save dialog box.

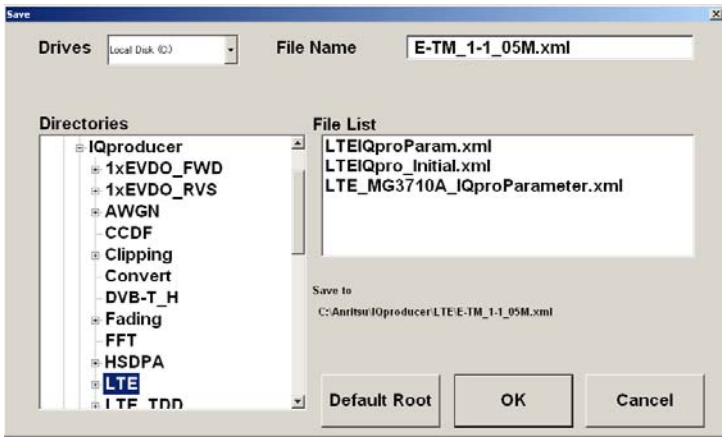


Figure 3.4.1-2 Save Dialog Box (MG3710A)

2. Select the folder to store the file in the **Directories** field, and then enter the name of the file using the **File Name** box. Click **OK** to save the parameter file. To initialize the setting in the **Directories** field, click the **Default Root** button.

3.4.2 Reading a parameter file

When running on PC, MS2690A/MS2691A/MS2692A, or MS2830A

1. Select **Recall Parameter File** from the **File** menu or click the  tool button to open the Open dialog box.

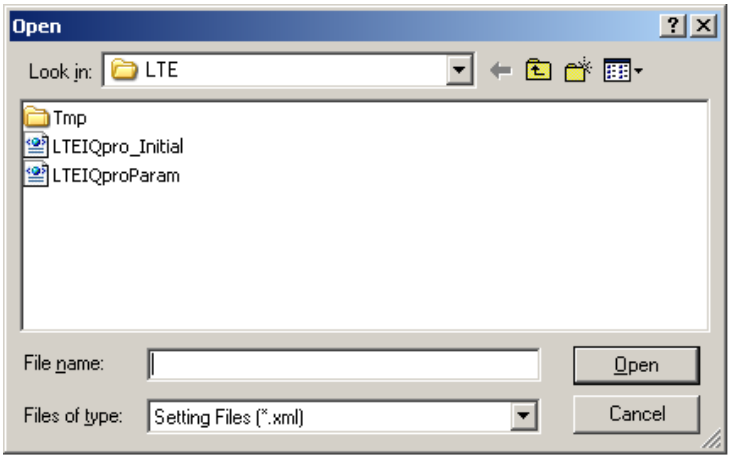


Figure 3.4.2-1 Open Dialog Box

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

When running on MG3710A

1. Select **Recall Parameter File** from the **File** menu or click the  tool button to open the Recall dialog box.

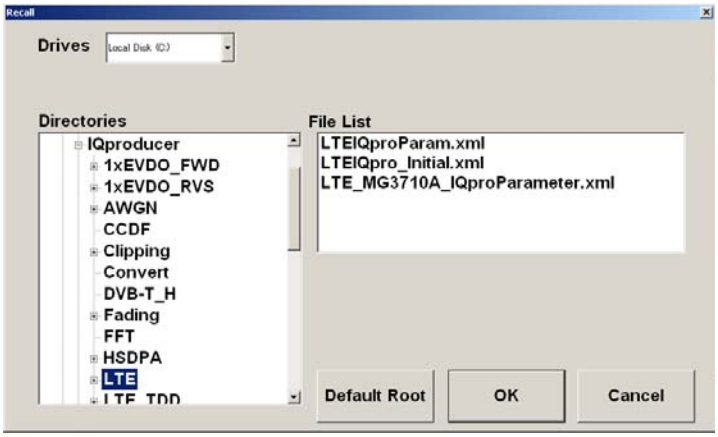


Figure 3.4.2-2 Recall Dialog Box (MG3710A)

2. Select the directory where the files to be loaded is stored in the **Directories** field. Click the desired file from the **File List**, and click **OK**. To initialize the setting in the **Directories** field, click the **Default Root** button.

3.5 User File Reading Screen

When running on PC, MS2690A/MS2691A/MS2692A, or MS2830A

1. When **User File** is selected for **Data Type** setting in the **Channel Setting** screen, the Open dialog box is displayed.

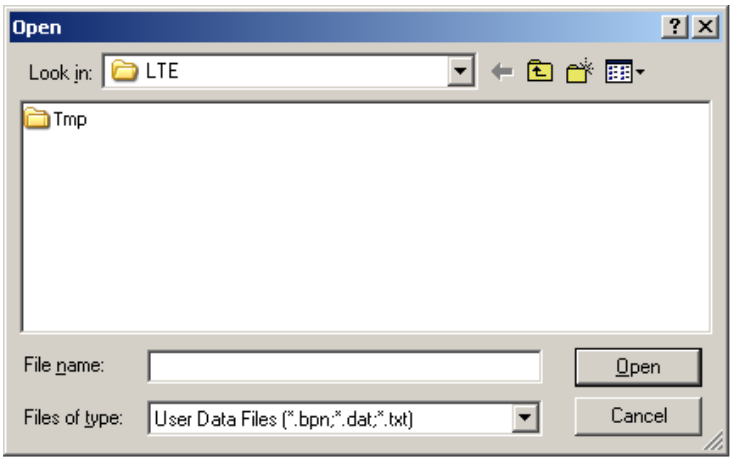


Figure 3.5-1 Open Dialog Box

2. Select a user file to be read from the file list, and then click **Open** to read the selected user file.

An error dialog box is displayed when an invalid file is selected. Refer to Appendix B “User File Format” for details on the user file format.

When running on MG3710A

1. When **User File** is selected for **Data Type** setting in the Channel Setting screen, the Recall dialog box is displayed.

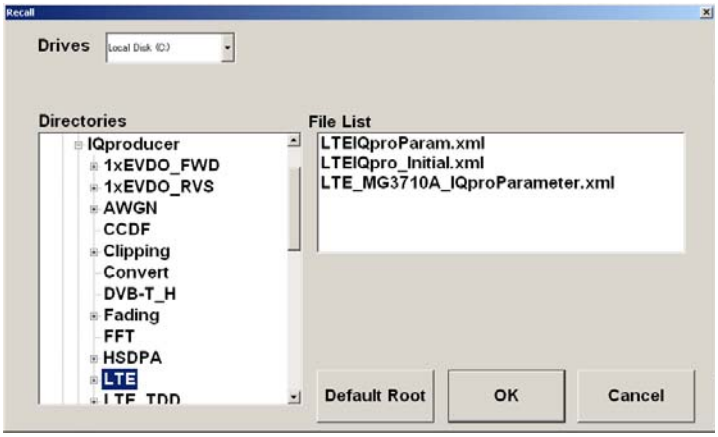


Figure 3.5-2 Recall dialog box (MG3710A)

2. Select the directory where the user files to be loaded is stored in the **Directories** field. Click the desired file from the **File List**, and click **OK**. To initialize the setting in the **Directories** field, click the **Default Root** button.

If an unsupported User File is selected, an error is displayed. Refer to Appendix B "User File Format" for details on the user file format.

3.6 Displaying Graph

The generated waveform pattern can be displayed in a CCDF, FFT, and Time Domain graph by using this software. For details of each graph display, refer to each one of the following:

- MG3700A/3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  4.3 “CCDF Graph Display”, 4.4 “FFT Graph Display”, 4.13 “Time Domain Graph Display”
- MS2690A/MS2691A/MS2692A or MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  4.3 “CCDF Graph Display”, 4.4 “FFT Graph Display”, 4.9 “Time Domain Graph Display”

Displaying CCDF graph

1. Generate a waveform pattern menu by executing “Calculation”.
2. Select **CCDF** from the **Simulation** menu or click the  tool button. The CCDF Graph Monitor screen shown in Figure 3.6-1 is displayed with the trace of the generated waveform pattern.

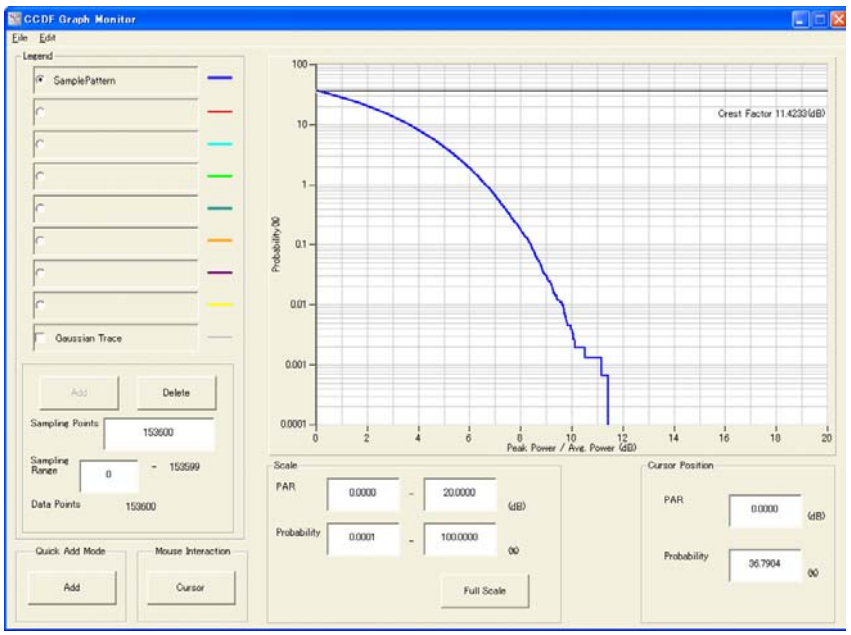


Figure 3.6-1 CCDF Graph Monitor Screen

When a waveform pattern is generated by changing parameters and executing “Calculation” while other traces are displayed in the CCDF Graph Monitor screen, the trace of the waveform pattern newly generated can be displayed in either of the following two methods:

- Displaying the new trace in the same screen as the previous traces
- Deleting the previous traces to display the new trace

Note:

The CCDF, FFT, and Time Domain graphs cannot be generated at the same time. When displaying one graph while another graph is being displayed, execute the graph generation of the former after that of the latter is completed.

■ Displaying the new trace in the same screen as the previous traces

1. Set **Add** for **Quick Add Mode** on the lower-left of the CCDF Graph Monitor screen.
2. Select **CCDF** from the **Simulation** menu or click the  tool button. The trace of the waveform pattern newly generated is additionally displayed in the CCDF Graph Monitor screen.
   Up to eight traces can be displayed by repeating this procedure.

■ When deleting the previous traces to display a new trace:

1. Set **Clear** for **Quick Add Mode** on the lower-left of the CCDF Graph Monitor screen.
2. Select **CCDF** from the **Simulation** menu or click the  tool button. The confirmation message shown in Figure 3.6-2 below appears:

Figure 3.6-2 Confirmation Message

Click the **Yes** button. The previous traces are deleted from the FFT Graph Monitor screen, and the trace of the waveform pattern newly generated is displayed.

Displaying FFT graph

1. Generate a waveform pattern by executing “Calculation”.
2. Select **FFT** from the **Simulation** menu or click the  tool button. The FFT Graph Monitor screen shown in Figure 3.6-3 is displayed with the trace of the generated waveform pattern.

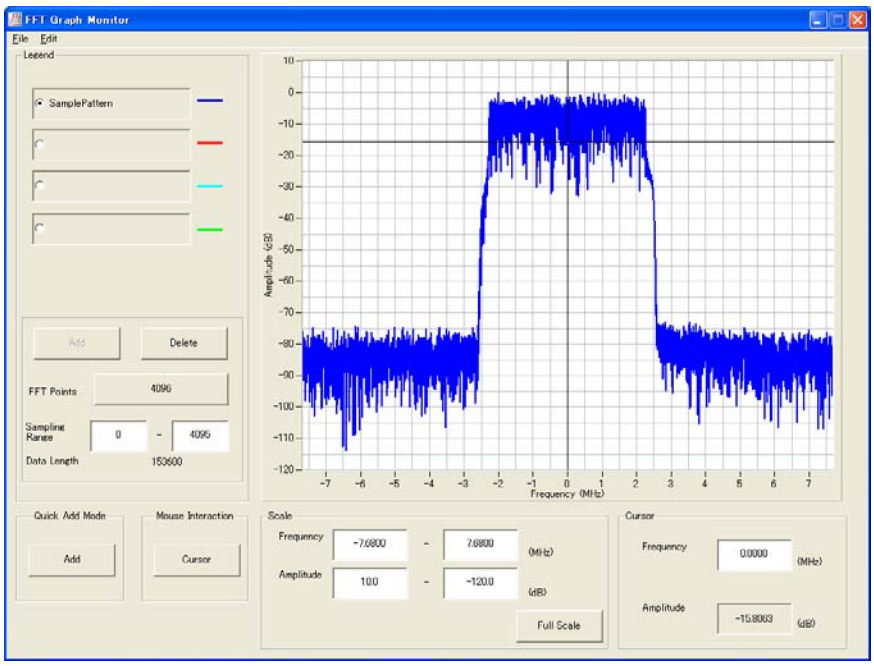


Figure 3.6-3 FFT Graph Monitor Screen

When a waveform pattern is generated by changing parameters and executing “Calculation” while other traces are displayed in the FFT Graph Monitor screen, the trace of the waveform pattern newly generated can be displayed in either of the following two methods:

- Displaying the new trace in the same screen as the previous traces
- Deleting the previous traces to display the new trace

Note:

The CCDF, FFT, and Time Domain graphs cannot be generated at the same time. When displaying one graph while another graph is being displayed, execute the graph generation of the former after that of the latter is completed.

■ Displaying the new trace in the same screen as the previous traces

1. Set **Add** for **Quick Add Mode** on the lower-left of the FFT Graph Monitor screen.
2. Select **FFT** from the **Simulation** menu or click the  tool button. The trace of the waveform pattern newly generated is additionally displayed in the FFT Graph Monitor screen.
   Up to four traces can be displayed by repeating this procedure.

■ When deleting the previous traces to display a new trace:

1. Set **Clear** for **Quick Add Mode** on the lower-left of the FFT Graph Monitor screen.
2. Select **FFT** from the **Simulation** menu or click the  tool button. The confirmation message shown in Figure 3.6-4 below appears:

Figure 3.6-4 Confirmation Message

Click the **Yes** button. The previous traces are deleted from the FFT Graph Monitor screen, and the trace of the waveform pattern newly generated is displayed.

Displaying the Time Domain graph

1. Generate a waveform pattern by executing “Calculation”.
2. Select **Time Domain** from the **Simulation** menu or click the tool button. The Time Domain Graph Monitor screen shown in Figure 3.6-5 is displayed with the trace of the generated waveform pattern.

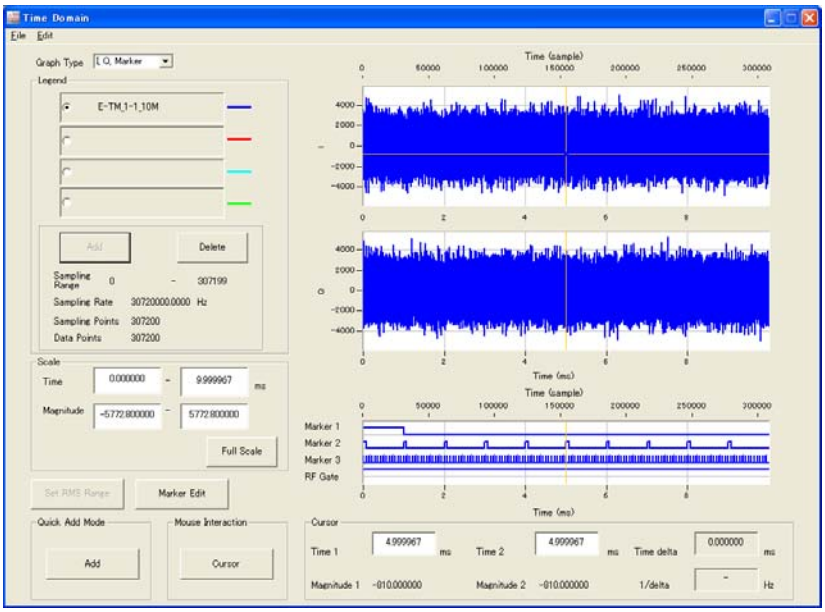


Figure 3.6-5 Time Domain Screen

When a waveform pattern is generated by changing parameters and executing “Calculation” while other traces are displayed in the Time Domain Graph Monitor screen, the trace of the waveform pattern newly generated can be displayed in either of the following two methods:

- Displaying the new trace in the same screen as the previous traces
- Deleting the previous traces to display the new trace

Note:

The CCDF, FFT, and Time Domain graphs cannot be generated at the same time. When displaying one graph while another graph is being displayed, execute the graph generation of the former after that of the latter is completed.

■ Displaying the new trace in the same screen as the previous traces

1. Set **Add** for **Quick Add Mode** on the lower-left of the Time Domain Graph Monitor screen.
2. Select **Time Domain** from the **Simulation** menu or click the  tool button. The trace of the waveform pattern newly generated is additionally displayed in the Time Domain Graph Monitor screen.
   Up to four traces can be displayed by repeating this procedure.

■ When deleting the previous traces to display a new trace:

1. Set **Clear** for **Quick Add Mode** on the lower-left of the Time Domain Graph Monitor screen.
2. Select **Time Domain** from the **Simulation** menu or click the  tool button. The confirmation message shown in Figure 3.6-6 below appears:

Figure 3.6-6 Confirmation Message

Click the **Yes** button. The previous traces are deleted, and the trace of the waveform pattern newly generated is displayed.

3.7 Auxiliary Signal Output

Select a waveform pattern generated by the LTE IQproducer™ on the main unit to output the marker that is synchronized with the RF signal as an auxiliary signal from the AUX Input/Output on the rear panel. Markers described below are automatically set for the waveform patterns when they are generated. By using the Marker edit function which is a peripheral function of the Time Domain graph, a waveform pattern can be generated with these markers edited.

For details of Marker Edit function, refer to each one of the following:

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  4.13.11 “Marker edit function”
- MS2690A/MS2691A/MS2692A or MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  4.9.12 “Marker edit function”

3.7.1 Downlink, Uplink

Frame Pulse (Connector 1), Subframe Pulse (Connector 2), and Symbol Pulse (Connector 3) are output.

The Marker information is not output correctly when System in the common parameter list is set to **LTE-Advanced** and Delay is added to the signal.

- Frame Pulse
  A pulse that is synchronized with the symbol at the beginning of the frame is output from Connector 1. Change Polarity for Marker 1 to change the signal polarity.
- Subframe Pulse
  A pulse that is synchronized with the symbol at the beginning of the subframe is output from Connector 2. Change Polarity for Marker 2 to change the signal polarity
- Symbol Pulse
  A pulse that is synchronized with the OFDM symbol of each subframe is output from Connector 3. Change Polarity for Marker 3 to change the signal polarity

For the error range of the auxiliary signals against the RF output, refer below:

- MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)
  4.5.6 “Input file format”
- MS2690A/MS2691A/MS2692A or MS2830A Vector Signal Generator Operation Manual (IQproducer™)
  4.5.6 “Input file format”

3.7.2 Random Access Preamble

Sequence Pulse (Connector 1) and RF Gate (Connector 2) are output.

- Sequence Pulse
  A pulse that is synchronized with the symbol at the beginning of the sequence is output from Connector 1. Change Polarity for Marker 1 to change the signal polarity.
- RF Gate
  Indicates burst ON/OFF status of the main unit's RF output when a burst wave is used as the waveform pattern. Correspondence between burst status and output signal status is shown below:
  Burst ON: High level
  Burst OFF: Low level
  The correspondences shown above apply to the case when Polarity for Marker 3 is set to Positive.
  These correspondences are reversed when Polarity is set to Negative.

Chapter 4 Easy Setup Screen

This chapter explains the Easy Setup screens that are displayed when this software is installed and running on the MG3710A. The Easy Setup screens support touch-panel operations.

Note:

In the operation explanations in this chapter, touching the touch panel and clicking the mouse are both described as “click”.

Though the Easy Setup screens can be used on other than the MG3710A, this chapter describes the Easy Setup screens on the MG3710A as examples.

4.1 Basic Operation

4.1.1 Data input method

The measurement item selections, numeric data, alphabetic characters, etc., are input at the panel displayed on the screen.
The displayed panel differs according to the input data type.

■Numeric keypad

Clicking the numeric input text box displays numeric input panel. The displayed keys, units and input range differ according to the data.

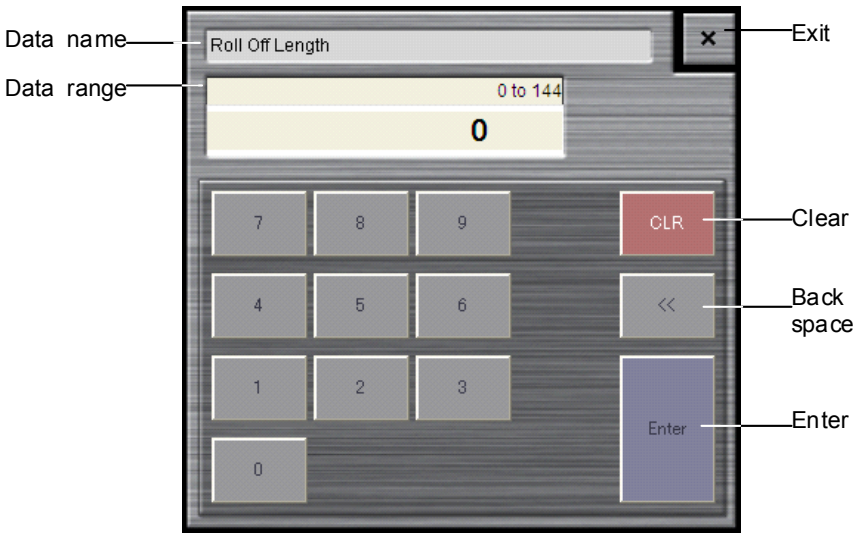


Figure 4.1.1-1 Numeric Keypad

■Software keyboard

Character data such as file names are input by clicking the character input text box. Characters are input by clicking the keys of the soft keyboard shown in Figure 4.1.1-2. Click the **Shift** + **Caps** keys to lock the keyboard; click them again to unlock the keyboard.

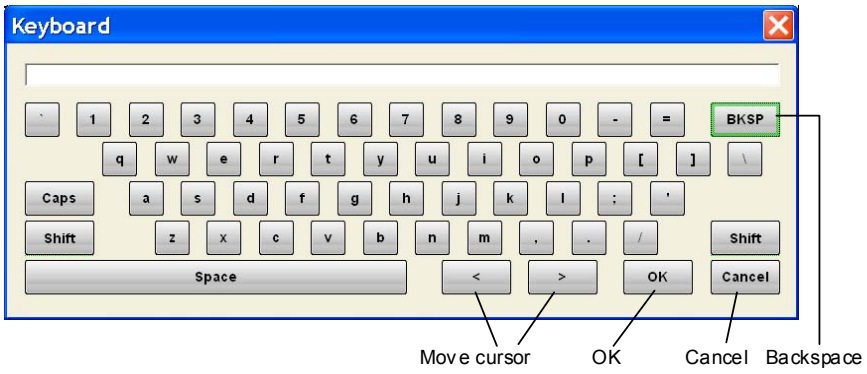


Figure 4.1.1-2 Software Keyboard

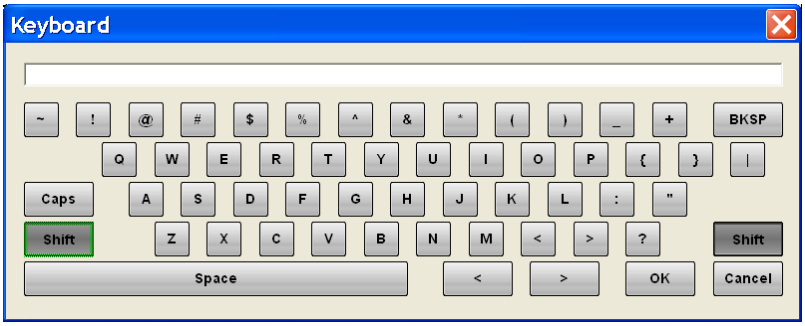


Figure 4.1.1-3 Software Keyboard (With Shift Key Locked)

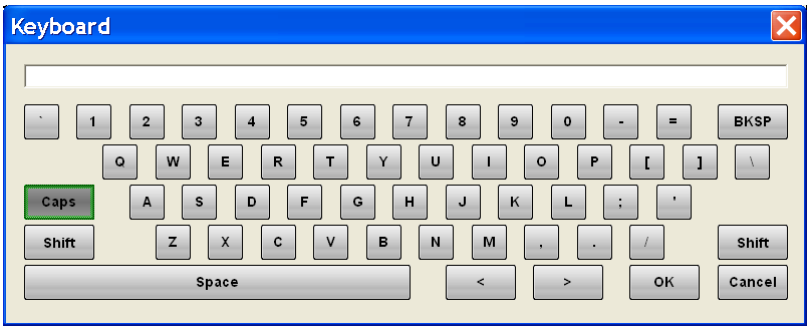


Figure 4.1.1-4 Software Keyboard (With Caps Key Locked)

4.2 Screen Details

4.2.1 Menu and Tool Buttons

On common platform screen, select the **System (Cellular)** tab, and then select **LTE (FDD)** to display the Easy setup main screen.

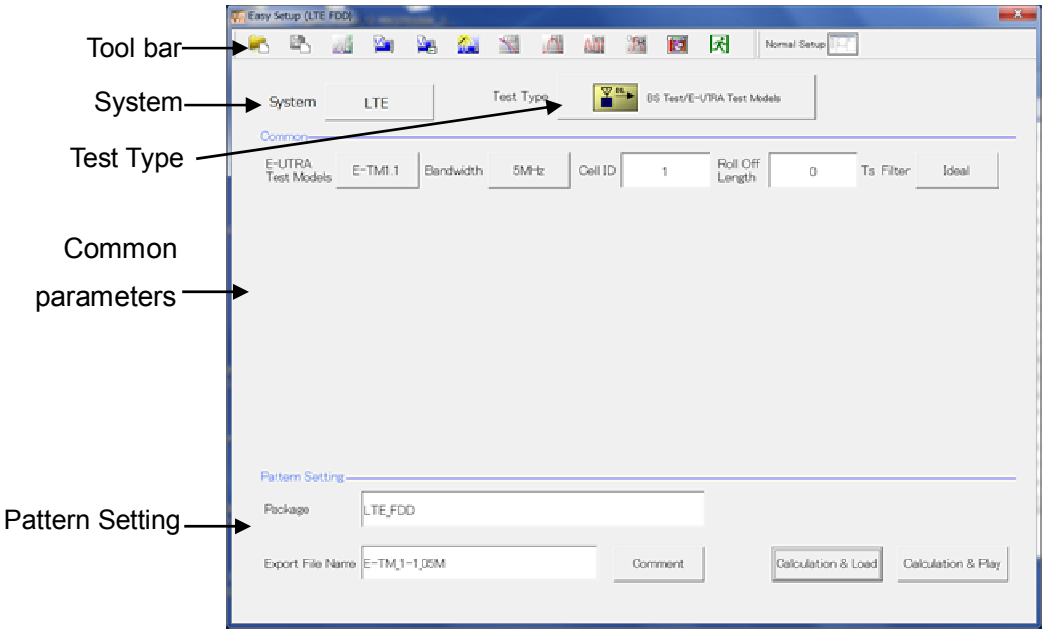


Figure 4.2.1-1 Easy Setup Main Screen

Note:

When this software is running on other than MG3710A, the **Calculation & Load** button in the **Pattern Setting** field changes to **Calculation**, and the **Calculation & Play** button changes to **Exit**, respectively.

Clicking the **System** button on the main screen displays the System selection screen where System can be switched with the **LTE** button or **LTE-Advanced** button.

Figure 4.2.1-2 System Selection Screen

System

[Function] Switches 3GPP Systems.

[Default] LTE

[Setting range] LTE, LTE-Advanced

[Remarks] When the MX370108A/MX269908A-001 is installed, LTE-Advanced can be selected. Switching the System changes the displayed common parameter list.

■Screen transition

The screen hierarchy from the Main screen to (Easy Setup) the sub-screens (Normal Setup and Calculation) after LTE FDD IQproducer starts is shown below.

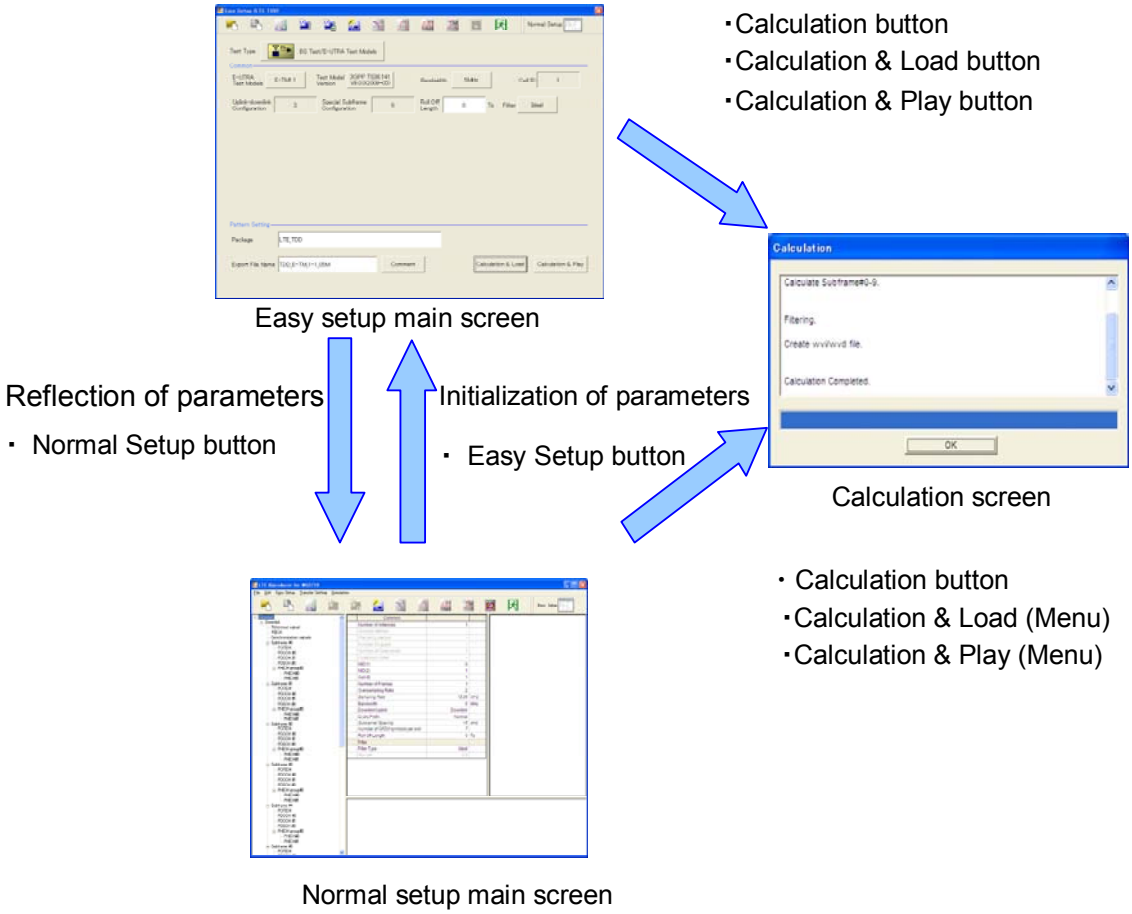


Figure 4.2.1-3 Screen Transition

4.2.2 Tool Bar

The tool bar ribbon at the top of the Main screen has various operation buttons.

Figure 4.2.2-1 Tool Bar

■Buttons on Tool Bar

Button	Name	Description
	Recall Parameter File	Displays Recall dialog for loading parameter file (Figure 4.2.2-2)
	Save Parameter File	Displays Save dialog for saving parameter file (Figure 4.2.2-3)
	Calculation	Performs waveform pattern generation.
	Calculation & Load	After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.
	Calculation & Play	After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.
	Transfer & Setting Wizard	Every operation ranging from connecting the PC and MG3700A/MG3710A and transferring the waveform pattern to the MG3700A/MG3710A, to loading the waveform pattern into the MG3700A/MG3710A ARB memory is performed at this screen.
	CCDF	Fetches CCDF graph screen and displays CCDF of created waveform pattern.
	FFT	Fetches FFT graph screen and displays spectrum of FFT transformed waveform data.
	Time Domain	Displays the Time Domain screen. In this screen, the time domain waveform of a generated waveform pattern is displayed in a graph.
	Clipping	Displays the Clipping setting screen. In this screen, clipping and filtering processing can be performed for a generated waveform pattern.
	Frame Structure	Displays created waveform pattern file channel mapping.
	Exit	Quits software.
	Normal Setup	Switches GUI to Normal Setup mode; for details of Normal Setup, refer to Chapter 3 Normal Setup Screen.

Note:

Transfer & Setting Wizard is available only when **MG3700** or **MG3710** is selected in the Select instrument screen.

Calculation & Load button, and Calculation & Play button become active only when operated on MG3710A.

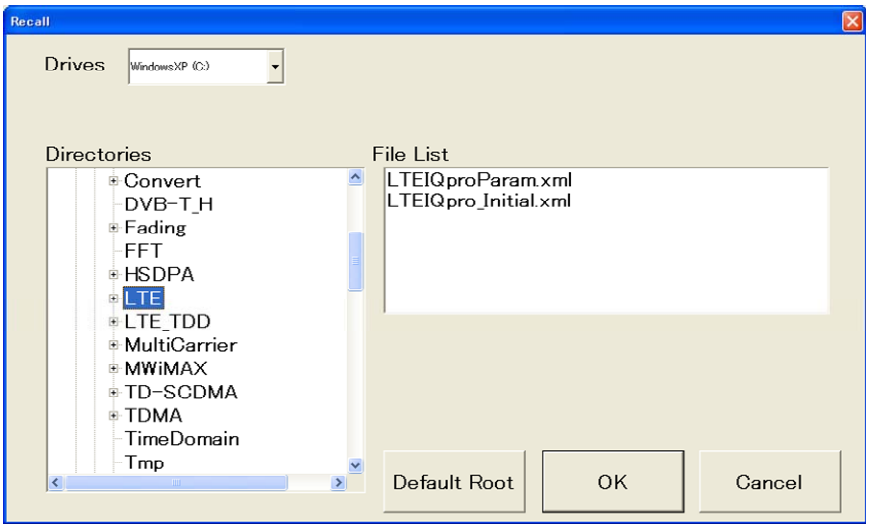


Figure 4.2.2-2 Recall Dialog Box

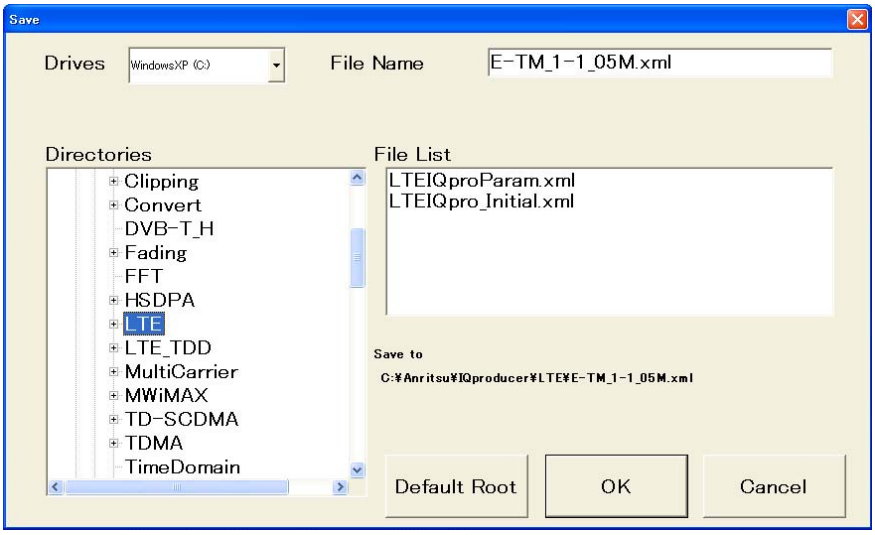


Figure 4.2.2-3 Save Dialog Box

Note:

The Normal Setup and Easy Setup parameter files are different. To read the Normal Setup parameter file on the Easy Setup screen, switch to the Normal Setup screen.

4.3 Waveform Creation Function Details (LTE)

This section describes the waveform creation function when **LTE** is selected with **System** button on the main screen.

4.3.1 Test Type

When the LTE FDD IQproducer is started and System is set to **LTE**, the BS Test/E-UTRA Test Models setting screen is displayed as the Main screen. Clicking **Test Type** displays the Test Type selection screen. Either **E-UTRA Test Models** or **FRC(UL)** can be selected. The screen switches to the relevant Test Type setting screen according to the clicked button.

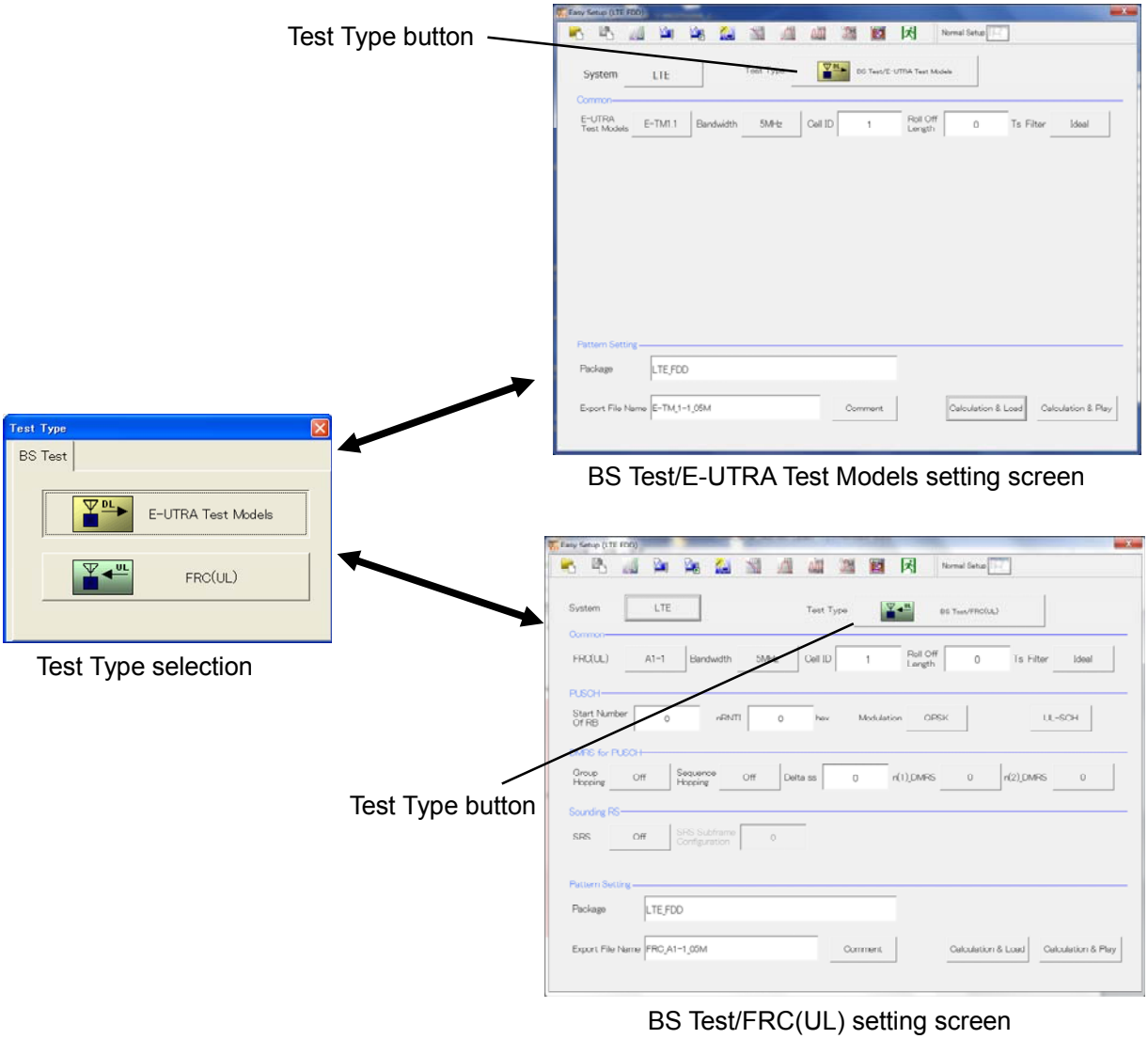


Figure 4.3.1-1 Test Type

Test Type

[Function] Sets the Test Type.

[Default] E-UTRA Test Models

[Options] E-UTRA Test Models, FRC (UL)

4.3.2 BS Test/E-UTRA Test Models

This screen is used to create the Test Model waveform pattern used by the LTE BS Tx test.

4.3.2.1 Common parameters

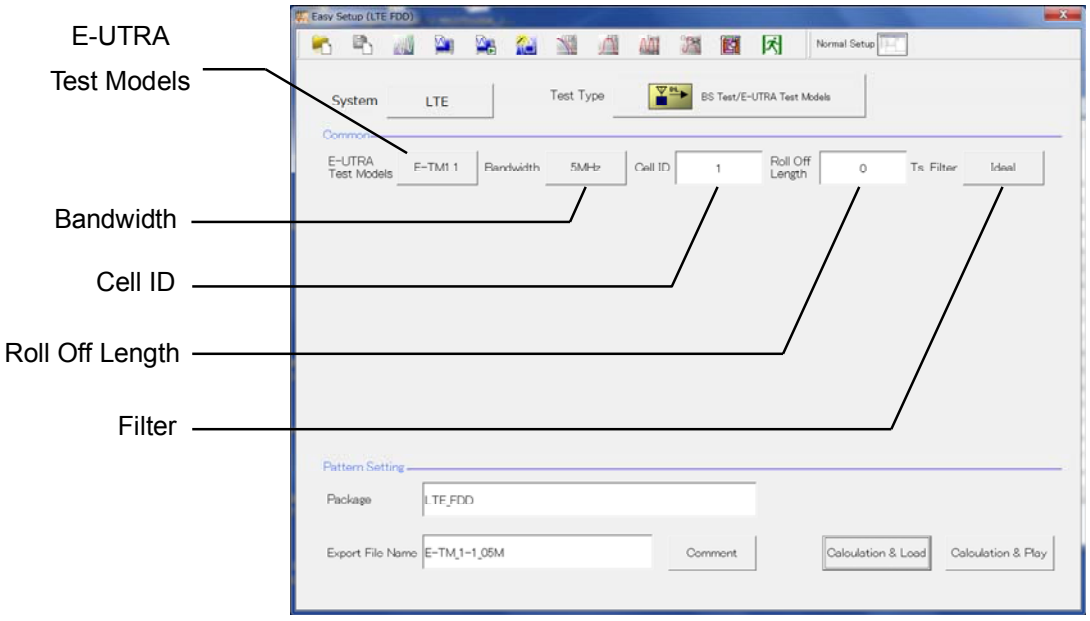


Figure 4.3.2.1-1 BS Test/E-UTRA Test Models Common Setting Screen

E-UTRA Test Models

[Function] Sets the E-UTRA Test Models.

[Default] E-TM1.1

[Options] E-TM1.1, E-TM1.2, E-TM2, E-TM2a, E-TM3.1, E-TM3.1a, E-TM3.2, E-TM3.3

[Remarks] Clicking **E-UTRA Test Models** displays the following dialog box. Click the relevant Test Model to change to it.

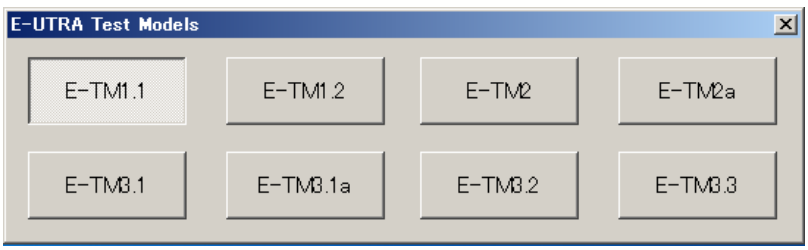


Figure 4.3.2.1-2 Test Models Selection Dialog Box

Bandwidth

[Function] Sets the system bandwidth.

[Default] 5 MHz

[Options] 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz

[Remarks] Clicking **Bandwidth** displays the following dialog box. Click the relevant Bandwidth to change to it.

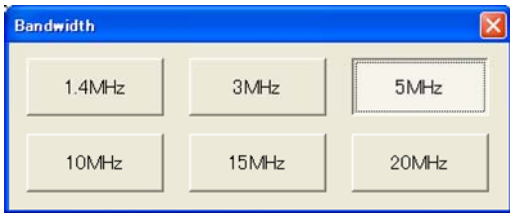


Figure 4.3.2.1-3 Bandwidth Selection Dialog Box

Cell ID

[Function] Sets the Cell ID.

[Default] 1

[Setting range] 0 to 503

Roll Off Length

[Function] Sets the length of the ramp time applied to the OFDM symbol.

[Default] 0 Ts

[Setting range] 0 to 144

[Remarks] In the Easy Setup mode, Cyclic Prefix is fixed to Normal and the maximum setting is 144.

Filter

[Function] Sets filter.

[Default] Ideal

[Options] Ideal, None

[Remarks] Clicking **Filter** displays the following dialog box. The filter type can be changed by selecting and clicking the filter type.

Figure 4.3.2.1-4 Filter Setting Dialog Box

4.3.2.2 Pattern Setting

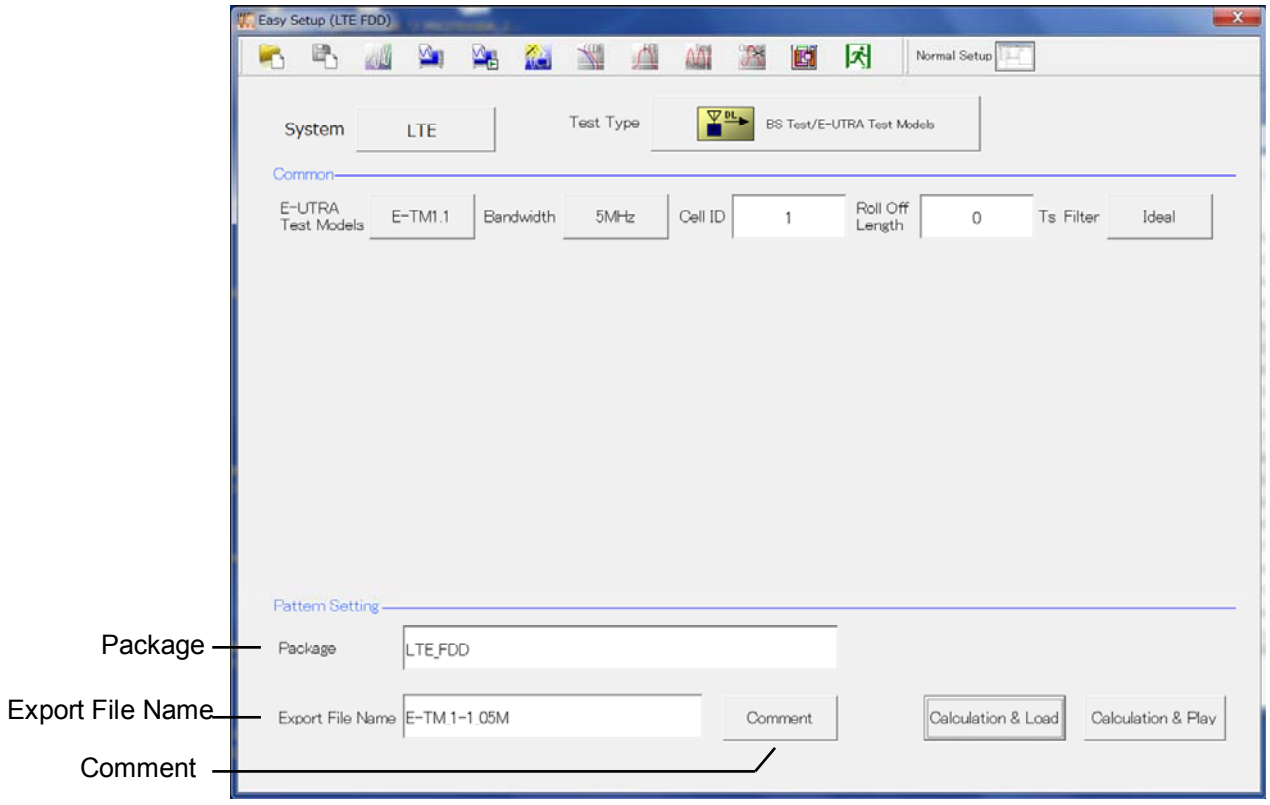


Figure 4.3.2.2-1 Pattern Setting Screen

Package

[Function] Enters waveform pattern package name.

[Default] LTE_FDD

[Setting range] Up to 31 single-byte English alphanumeric characters.

Export File Name

[Function] Enters waveform pattern file name.

[Default] E-TM_1-1_05M / FRC_A1_1_05M

[Setting range] Up to 18 single-byte English alphanumeric characters.

[Remarks] The file name depends on the selected parameter.

Comment

[Function] Inputs comments to the waveform pattern.

[Default] Blank

[Setting range] Up to 38 single-byte English alphanumeric characters × 3 lines.

[Remarks] Clicking **Comment** displays the following Comment dialog box. Input the comment and click **OK** to set the comment.

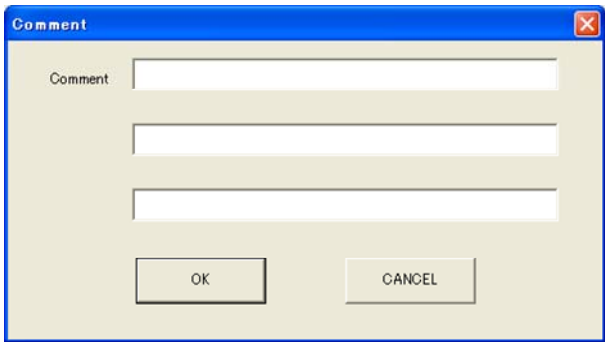


Figure 4.3.2.2-2 Comment Dialog Box

4.3.3 BS Test/FRC (UL)

This screen is used to create the FRC (Fixed Reference Channel) waveform pattern used by the LTE BS Rx test.

4.3.3.1 Common Parameters

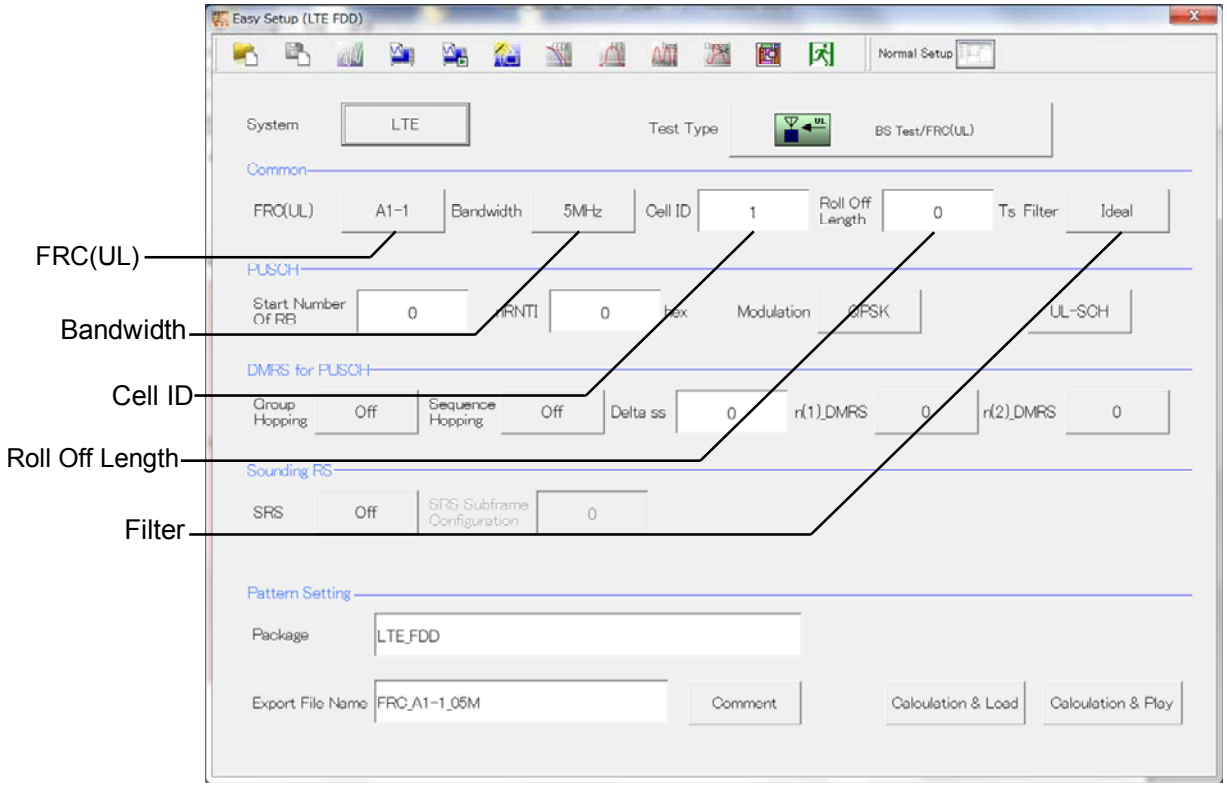


Figure 4.3.3.1-1 BS Test/FRC (UL) Common Parameter Setting Section

FRC(UL)

[Function] Selects the setting items described in 3GPP TS36.141 Annex A and automatically sets the parameters.

[Default] A1-1

[Options] A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3

[Remarks] Clicking the **FRC (UL)** button displays the following dialog screen. Clicking each button changes the FRC9 UL) type according to the list displayed for each button.

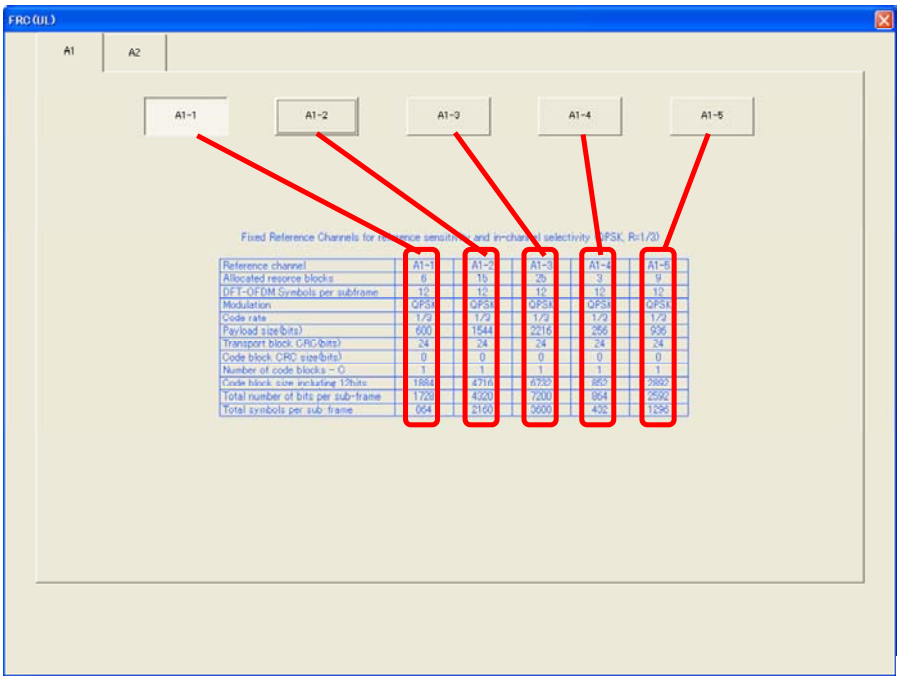


Figure 4.3.3.1-2 FRC (UL) Selection Dialog Box

Bandwidth

[Function] Sets the system bandwidth.

[Default] 5 MHz

[Options] Refer to table 4.3.3.1-1.

[Remarks] Clicking **Bandwidth** displays the following dialog box. Click the relevant Bandwidth to change to it.
The settable bandwidth changes according to the selected FRC (UL).

Figure 4.3.3.1-3 Bandwidth Selection Dialog Box

Table 4.3.3.1-1 Available Bandwidth

FRC(UL)	Available Bandwidth
A1-1	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-2	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-3	5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-4	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-5	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-1	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-2	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-3	5 MHz, 10 MHz, 15 MHz, 20 MHz

Cell ID

[Function] Sets the Cell ID.

[Default] 0

[Setting range] 0 to 503

Roll Off Length

[Function] Sets the length of the ramp time applied to the OFDM symbol.

[Default] 0 Ts

[Setting range] 0 to 144

[Remarks] In the Easy Setup mode, Cyclic Prefix is fixed to Normal and the maximum setting is 144.

Filter

[Function] Sets the filter type.

[Default] Ideal

[Options] Ideal, None

[Remarks] Clicking **Filter** displays the following dialog box. The filter type can be changed by selecting and clicking the filter type.

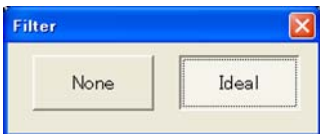


Figure 4.3.3.1-4 Filter Setting Dialog Box

4.3.3.2 PUSCH Parameters

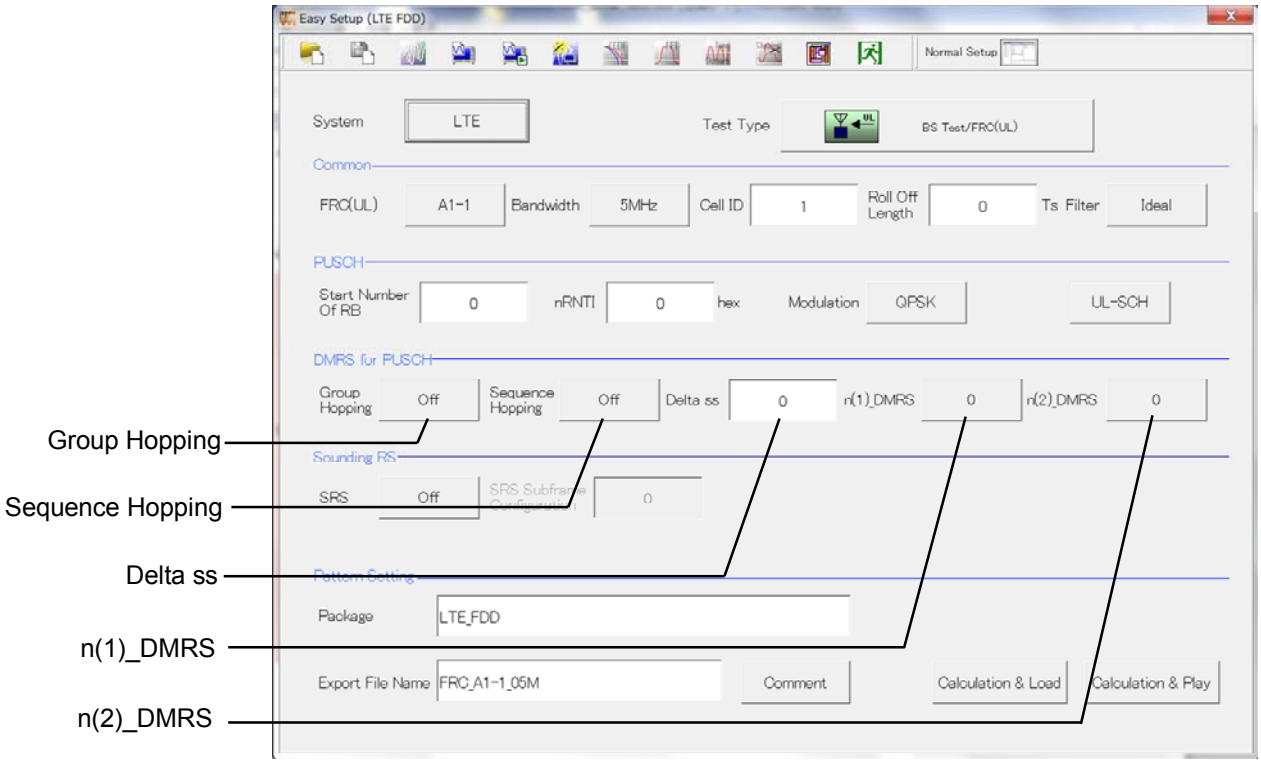


Figure 4.3.3.2-1 PUSCH Parameter Setting Section

Start Number of RB

[Function] Sets the start position of the RB to which the PUSCH is assigned.

[Default] 0

[Options] Bandwidth = 1.4 MHz: 0 to (6-allocated resource block)
Bandwidth = 3 MHz: 0 to (15-allocated resource block)
Bandwidth = 5 MHz: 0 to (25-allocated resource block)
Bandwidth = 10 MHz: 0 to (50-allocated resource block)
Bandwidth = 15 MHz: 0 to (75-allocated resource block)
Bandwidth = 20 MHz: 0 to (100-allocated resource block)

[Remarks] The Allocated resource block depends on FRC (UL). For details of Allocated resource block values, refer to the items in the FRC (UL) Selection Dialog Box in Figure 4.3.3.1-2.

nRNTI

[Function] Sets the radio network temporary identifier.

[Default] 0

[Setting range] 0 to FFFF

Modulation

[Function] Sets the modulation mode.

[Default] QPSK

[Options] QPSK, 16QAM, 64QAM

[Remarks] Clicking **Modulation** displays the following dialog box. The modulation method is changed by clicking the relevant button.

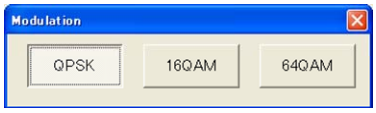


Figure 4.3.3.2-2 Modulation Setting Dialog Box

UL-SCH

Clicking **UL-SCH** displays the following dialog box.

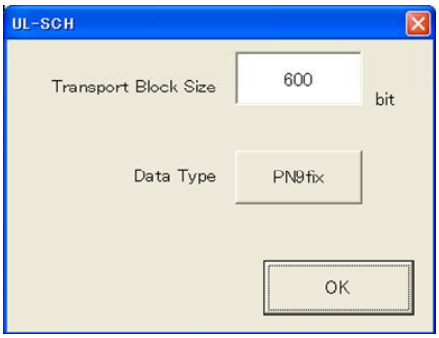


Figure 4.3.3.2-3 UL-SCH Setting Dialog Box

Transport Block Size

[Function] Sets the transport block size for UL-SCH.

[Default] The initial value changes according to the FRC (UL) setting, as shown below.

Table 4.3.3.2-1 Default of the Transport Block Size

FRC (UL) Setting	Default
A1-1	600
A1-2	1544
A1-3	2216
A1-4	256
A1-5	936
A2-1	2344
A2-2	5992
A2-3	9912

[Setting range] 0 to 86400
[Remarks] Since the PUSCH range is limited by the Resource Block allocation, errors may sometimes occur depending on the settings. If an error occurs, neither Calculation processing nor graph display is executed. In addition, the **UL-SCH** button and Transport Block Size display an error (red).

Data Type
[Function] Sets the Data type.
[Default] PN9fix
[Options] PN9fix, PN15fix, All0, All1
[Remarks] Clicking **Data Type** displays the following dialog box. The Data Type can be changed by clicking Data Type.

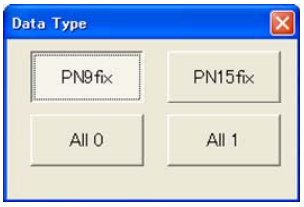


Figure 4.3.3.2-4 Data Type Setting Dialog Box

4.3.3.3 DMRS for PUSCH Parameters

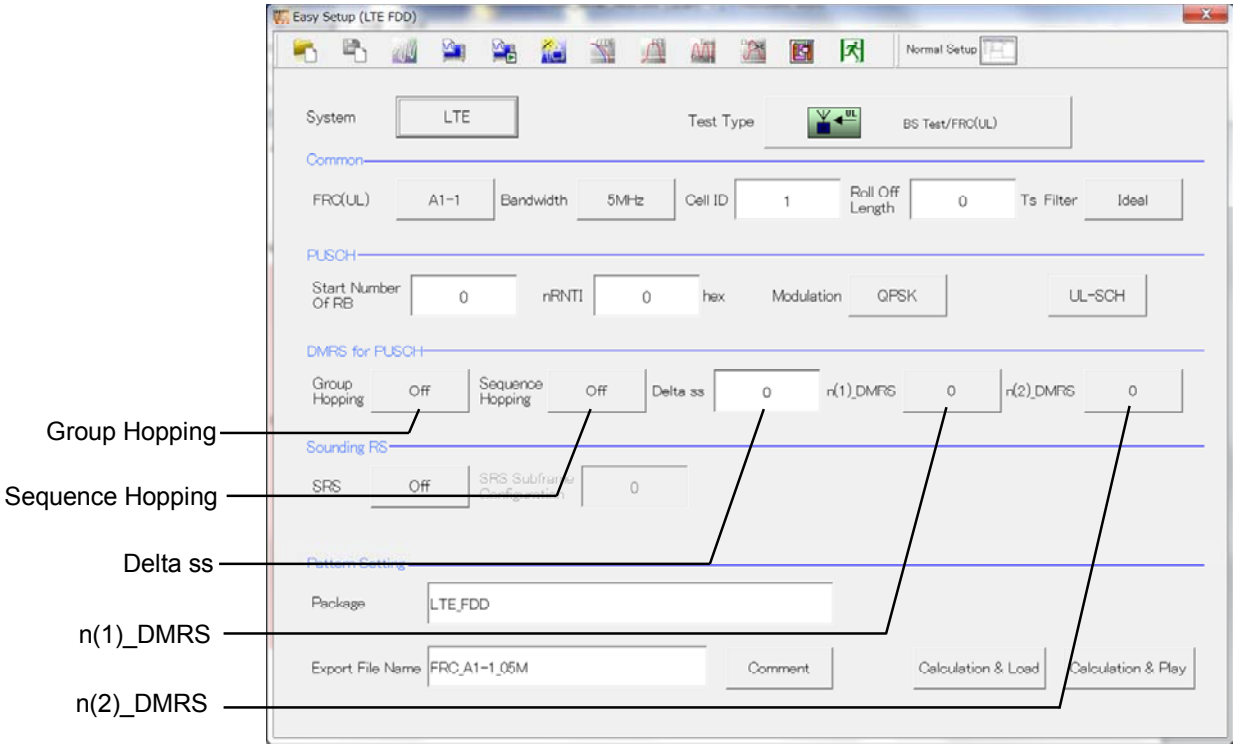


Figure 4.3.3.3-1 DMRS for PUSCH Parameter Setting Section

Group Hopping

[Function] Enables or disables group hopping.

[Default] Off

[Options] Off, On

[Remarks] Clicking **Group Hopping** On and Off.

Sequence Hopping

[Function] Enables or disables Sequence Hopping.

[Default] Off

[Options] Off, On

[Remarks] Clicking **Sequence Hopping** toggles Sequence Hopping On and Off. This parameter is not available when Group Hopping is Enable.

Delta ss

[Function] Sets Delta ss.

[Default] 0

[Setting range] 0 to 29

n(1)_DMRS

[Function] Sets the value used for automatic n_cs calculation.

[Default] 0

[Options] 0, 2, 3, 4, 6, 8, 9, 10

[Remarks] Clicking **n(1)_DMRS** displays the following dialog box. n(1)_DMRS can be changed by selecting and clicking n(1)_DMRS.

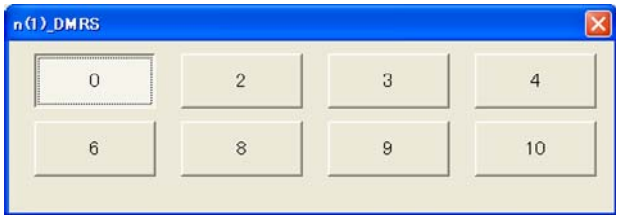


Figure 4.3.3.3-2 n(1)_DMRS Selection Dialog Box

n(2)_DMRS

[Function] Sets the value used for automatic n_cs calculation.

[Default] 0

[Options] 0, 2, 3, 4, 6, 8, 9, 10

[Remarks] Clicking **n(2)_DMRS** displays the following dialog box. n(2)_DMRS can be changed by selecting and clicking n(2)_DMRS.

Figure 4.3.3.3-3 n(2)_DMRS Selection Dialog Box

4.3.3.4 Sounding RS Parameters

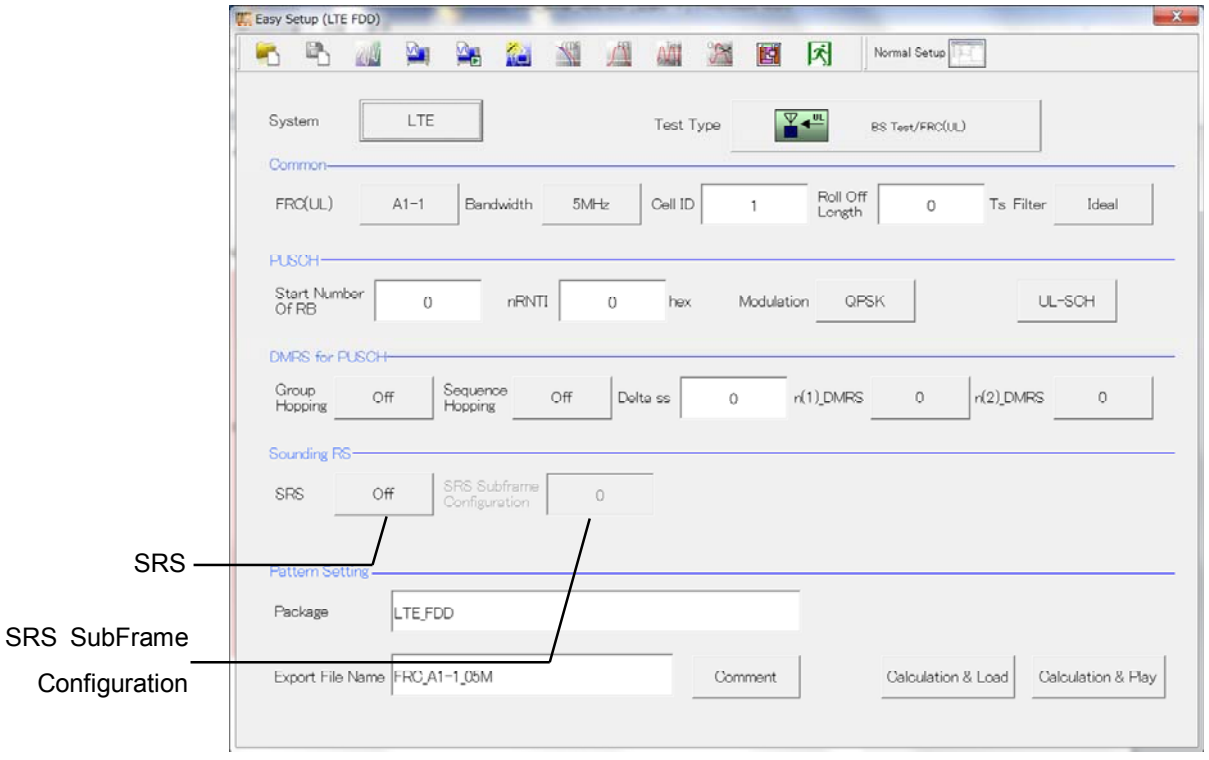


Figure 4.3.3.4-1 Sounding RS Parameter Setting Section

SRS

[Function] Enables or disables the Sounding RS parameter.

[Default] Off

[Options] Off, On

[Remarks] Click the **SRS** button to toggle between On/Off.

SRS Subframe Configuration

[Function] Sets the SRS Subframe Configuration.

[Default] 0

[Setting range] 0 to 14

[Remarks] This becomes active only when SRS is ON.

4.3.3.5 Pattern Setting

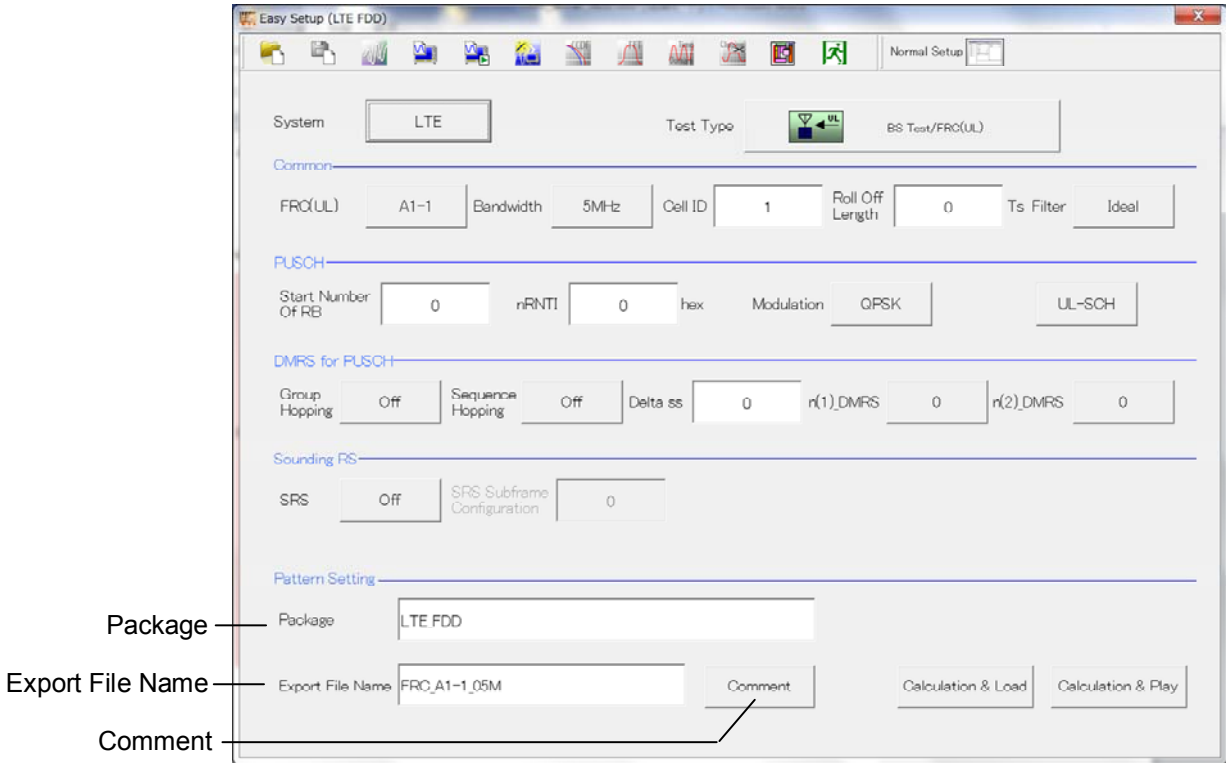


Figure 4.3.3.5-1 Pattern Setting Section

Package

[Function] Enters waveform pattern package name.

[Default] LTE_FDD

[Setting range] Up to 31 single-byte English alphanumeric characters.

Export File Name

[Function] Enters waveform pattern file name.

[Default] E-TM_1-1_05M / FRC_A1-1_05M

[Setting range] Up to 18 single-byte English alphanumeric characters.

[Remarks] The file name depends on the selected parameter.

Comment

[Function] Inputs comments to the waveform pattern.

[Default] Blank

[Setting range] Up to 38 single-byte English alphanumeric characters × 3 lines.

[Remarks] Clicking **Comment** displays the following Comment dialog box. Input the comment and click **OK** to set the comment.

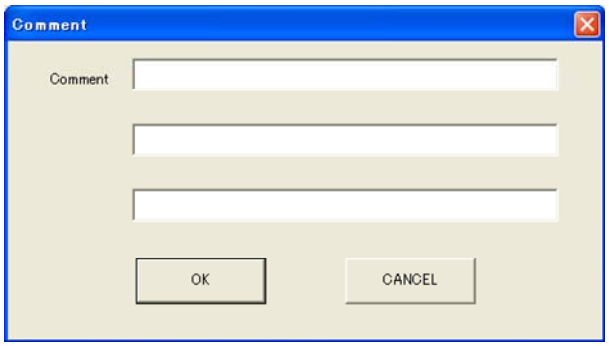


Figure 4.3.3.5-2 Comment Dialog Box

4.3.4 Calculation & Load

Note:

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

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

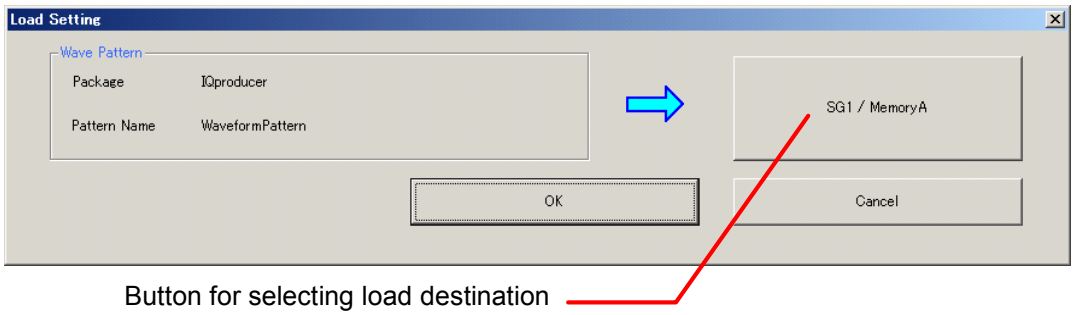


Figure 4.3.4-1 Load Setting Screen

The Select Memory screen will display after clicking the load destination in the Load Setting screen.

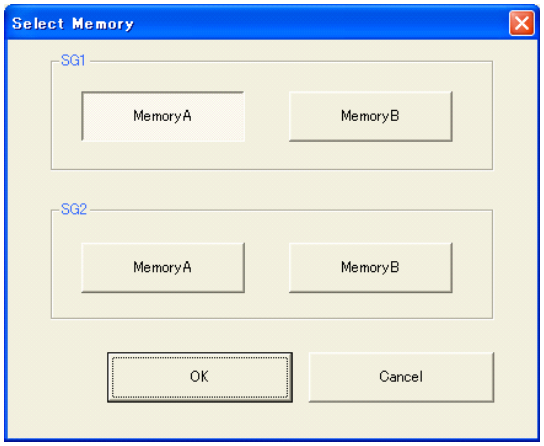


Figure 4.3.4-2 Select Memory Screen

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

Note:

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

4.3.5 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 RF (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.

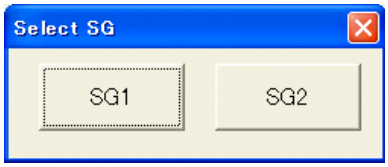


Figure 4.3.5-1 Select SG Screen

4.3.6 Frame Structure Screen

Clicking  on the tool bar ribbon of the Main screen displays the Frame Structure screen. For details, refer to section 3.1.7 “Frame Structure screen”.

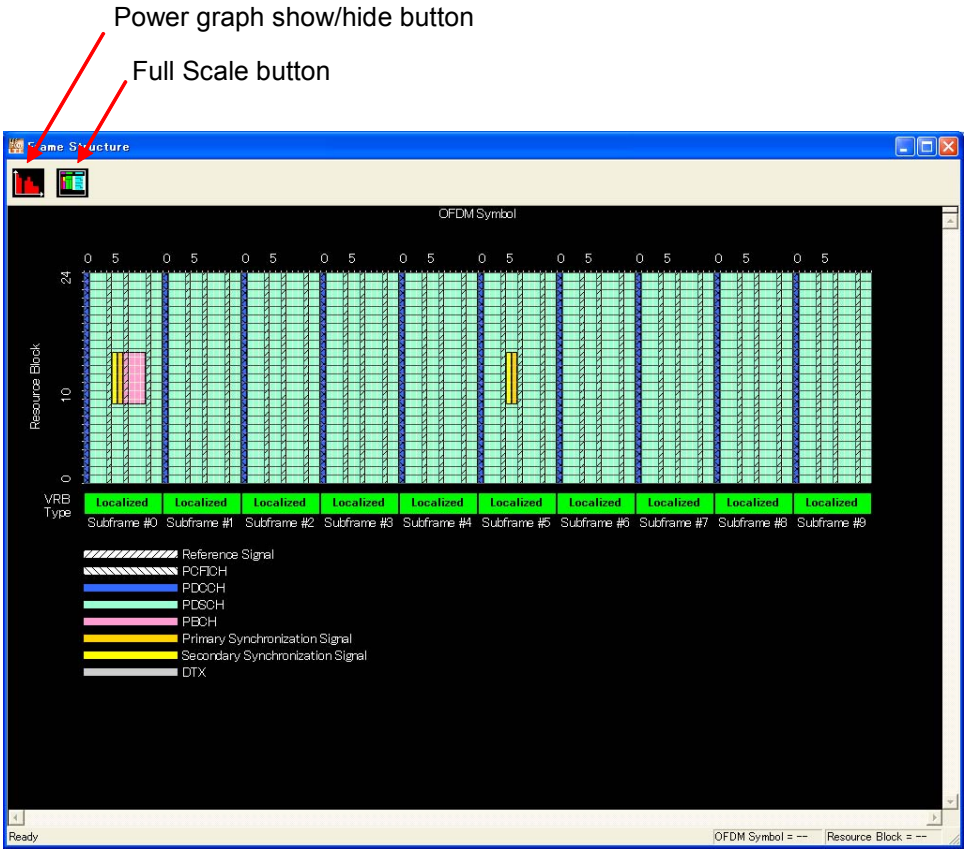


Figure 4.3.6-1 Frame Structure Screen

The following operations can be performed at the MG3710A touch panel.

- Boundary between Resource Block and OFDM Symbol Power
- Frame Structure zoom display

4.4 Waveform Creation Function Details (LTE-Advanced)

When LTE-Advanced is selected with the System button on the main screen, the Carrier Aggregation Mode = Intra-band Setting screen is displayed as the main screen.

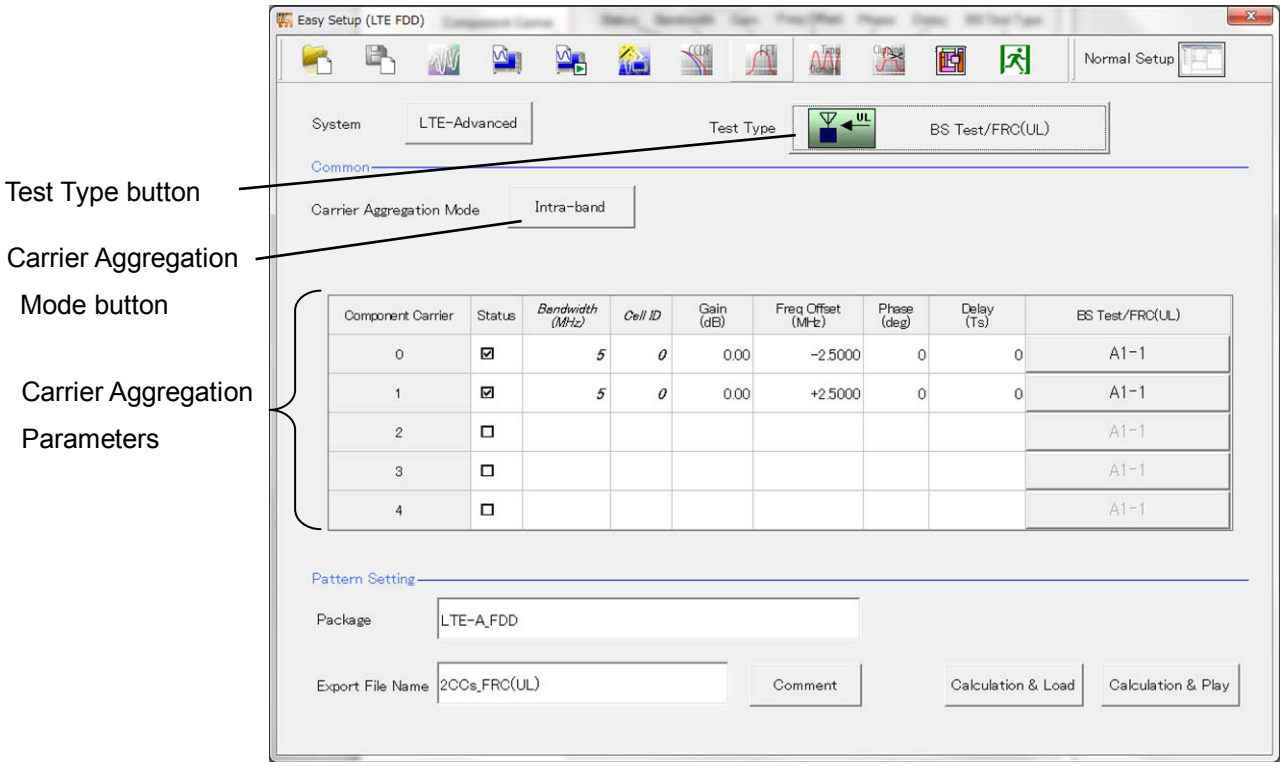


Figure 4.4-1 Main Screen (LTE-Advanced)

4.4.1 Test Type

Clicking **Test Type** on the main screen displays the Test Type selection screen. Either **E-UTRA Test Models** or **FRC(UL)** can be selected. The screen switches to the relevant Test Type setting screen according to the clicked button.

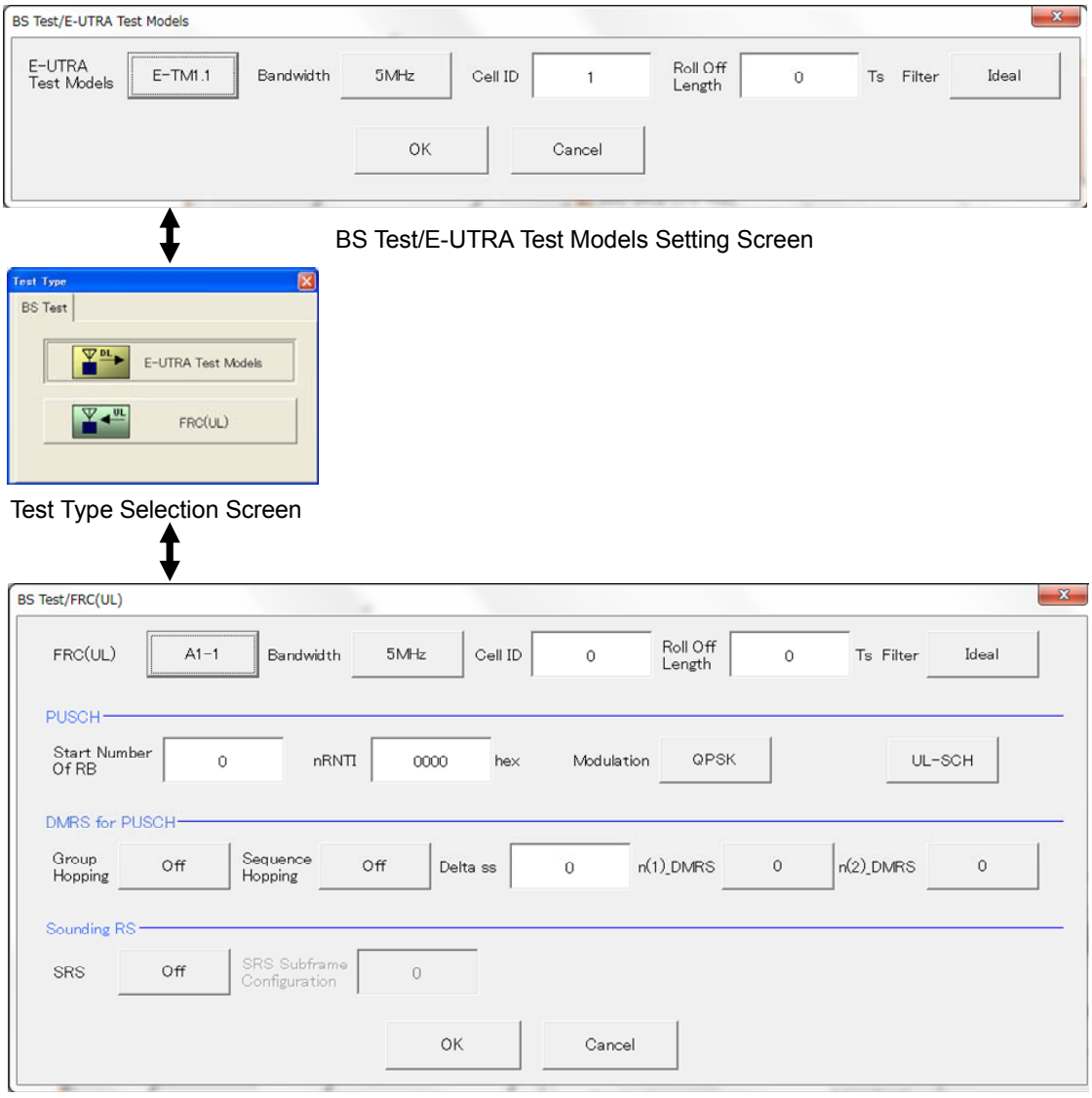


Figure 4.4.1-1 Test Type

Test Type

[Function] Sets the Test Type.

[Default] E-UTRA Test Models

[Options] E-UTRA Test Models, FRC (UL)

4.4.2 BS Test/E-UTRA Test Models

This screen is used to create the Test Model waveform pattern used by the LTE BS Tx test. To save the new settings, click **OK**. To cancel the settings and exit the screen, click **Cancel**.

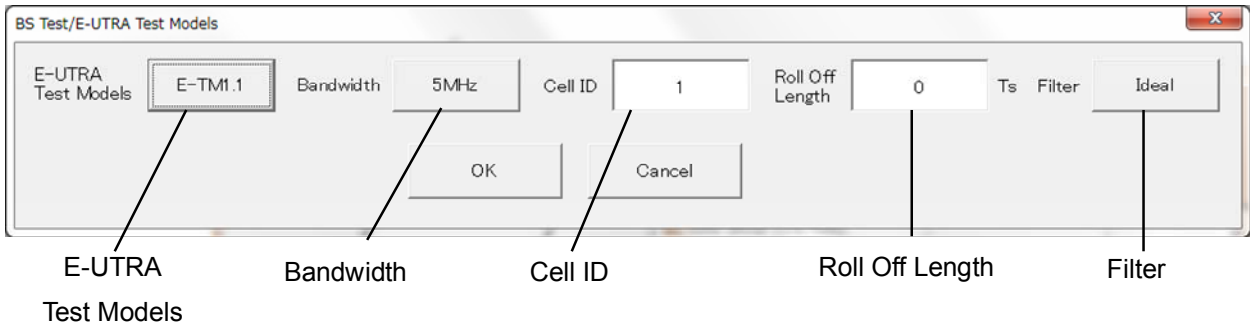


Figure 4.4.2-1 BS Test/E-UTRA Test Models Setting Screen

E-UTRA Test Models

[Function] Sets the E-UTRA Test Models.

[Default] E-TM1.1

[Options] E-TM1.1, E-TM1.2, E-TM2, E-TM2a, E-TM3.1, E-TM3.1a, E-TM3.2, E-TM3.3

[Remarks] Clicking **E-UTRA Test Models** displays the following dialog box. Click the relevant Test Model to change to it.

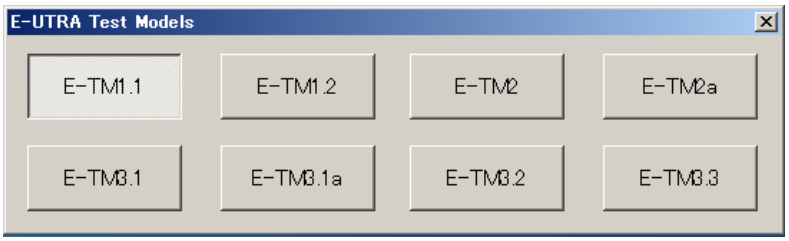


Figure 4.4.2-2 E-UTRA Test Models Selection Dialog Box

Bandwidth

[Function] Sets the system bandwidth.

[Default] 5 MHz

[Options] 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz

[Remarks] Clicking **Bandwidth** displays the following dialog box. Click the relevant Bandwidth to change to it.

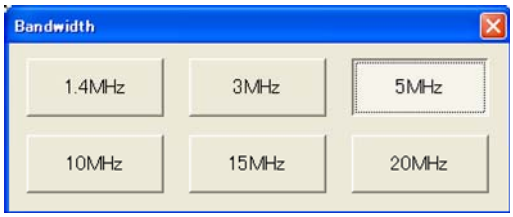


Figure 4.4.2-3 Bandwidth Selection Dialog Box

Cell ID

[Function] Sets the Cell ID.

[Default] 1

[Setting range] 0 to 503

Roll Off Length

[Function] Sets the length of the ramp time applied to the OFDM symbol.

[Default] 0 Ts

[Setting range] 0 to 144

[Remarks] In the Easy Setup mode, Cyclic Prefix is fixed to Normal and the maximum setting is 144.

Filter

[Function] Sets filter.

[Default] Ideal

[Options] Ideal, None

[Remarks] Clicking **Filter** displays the following dialog box. The filter type can be changed by selecting and clicking the filter type.

Figure 4.4.2-4 Filter Setting Dialog Box

4.4.3 BS Test/FRC(UL)

This screen is used to create the FRC (Fixed Reference Channel) waveform pattern used by the LTE BS Rx test. To save the new settings, click **OK**. To cancel the settings and exit the screen, click **Cancel**.

4.4.3.1 Common Parameters

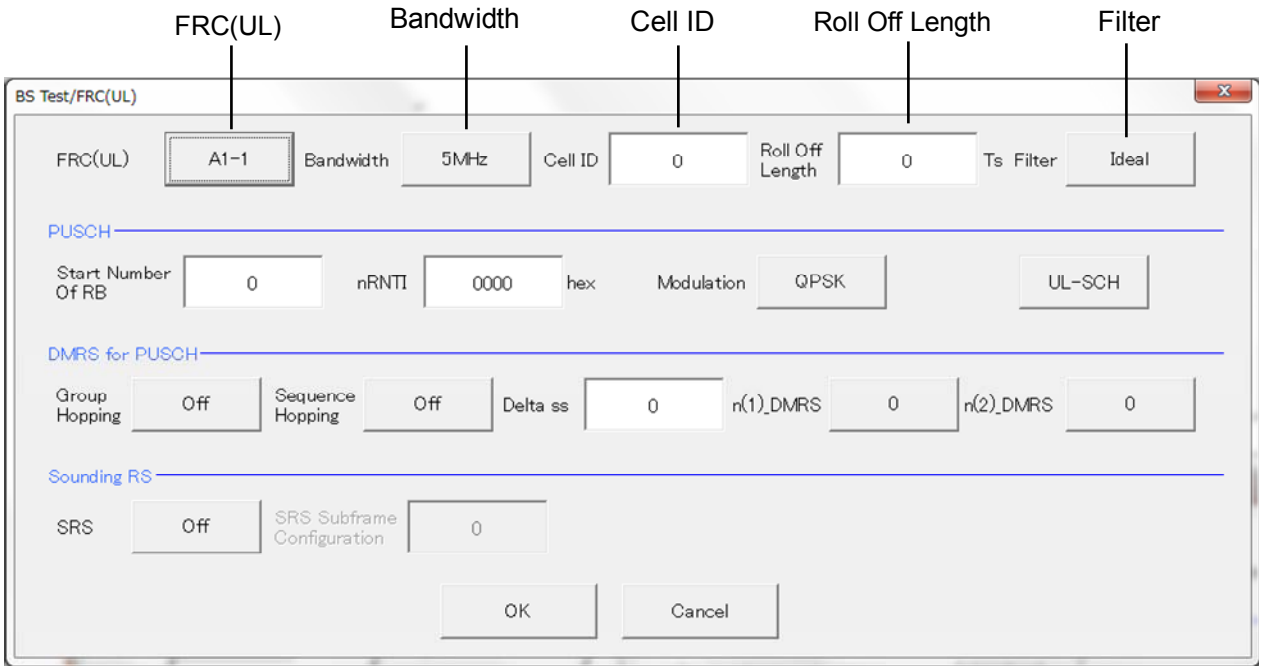


Figure 4.4.3.1-1 BS Test/FRC(UL) Common Parameter Setting Screen

FRC(UL)

[Function] Selects the setting items described in 3GPP TS36.141 Annex A and automatically sets the parameters.

[Default] A1-1

[Options] A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3

[Remarks] Clicking the **FRC (UL)** button displays the following dialog screen. Clicking each button changes the FRC9 UL) type according to the list displayed for each button.

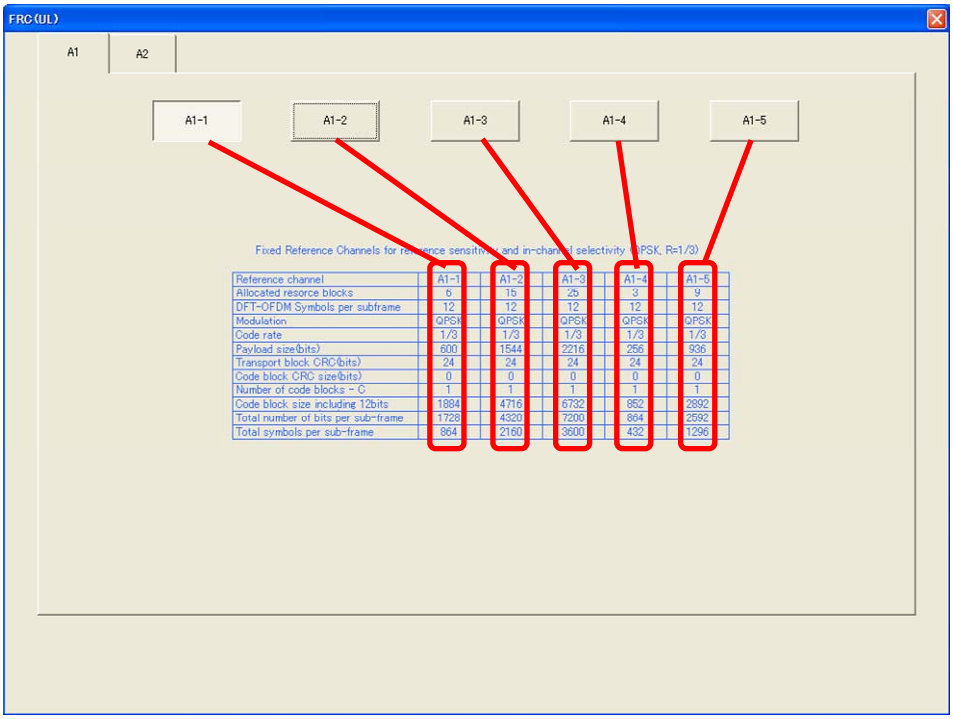


Figure 4.4.3.1-2 FRC (UL) Selection Dialog Box

Bandwidth

[Function] Sets the system bandwidth.

[Default] 5 MHz

[Options] Refer to table 4.4.3.1-1.

[Remarks] Clicking **Bandwidth** displays the following dialog box. Click the relevant Bandwidth to change to it. The settable bandwidth changes according to the selected FRC (UL).

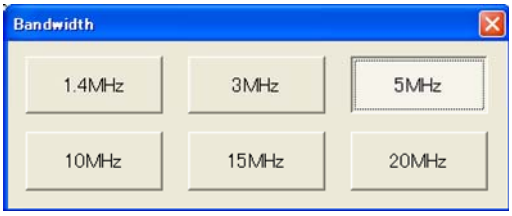


Figure 4.4.3.1-3 Bandwidth Selection Dialog Box

Table 4.4.3.1-1 Available Bandwidth

FRC(UL)	Available Bandwidth
A1-1	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-2	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-3	5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-4	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A1-5	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-1	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-2	3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
A2-3	5 MHz, 10 MHz, 15 MHz, 20 MHz

Cell ID

[Function] Sets the Cell ID.

[Default] 0

[Setting range] 0 to 503

Roll Off Length

[Function] Sets the length of the ramp time applied to the OFDM symbol.

[Default] 0 Ts

[Setting range] 0 to 144

[Remarks] In the Easy Setup mode, Cyclic Prefix is fixed to Normal and the maximum setting is 144.

Filter

[Function] Sets the filter type.

[Default] Ideal

[Options] Ideal, None

[Remarks] Clicking **Filter** displays the following dialog box. The filter type can be changed by selecting and clicking the filter type.

Figure 4.4.3.1-4 Filter Setting Dialog Box

4.4.3.2 PUSCH Parameters

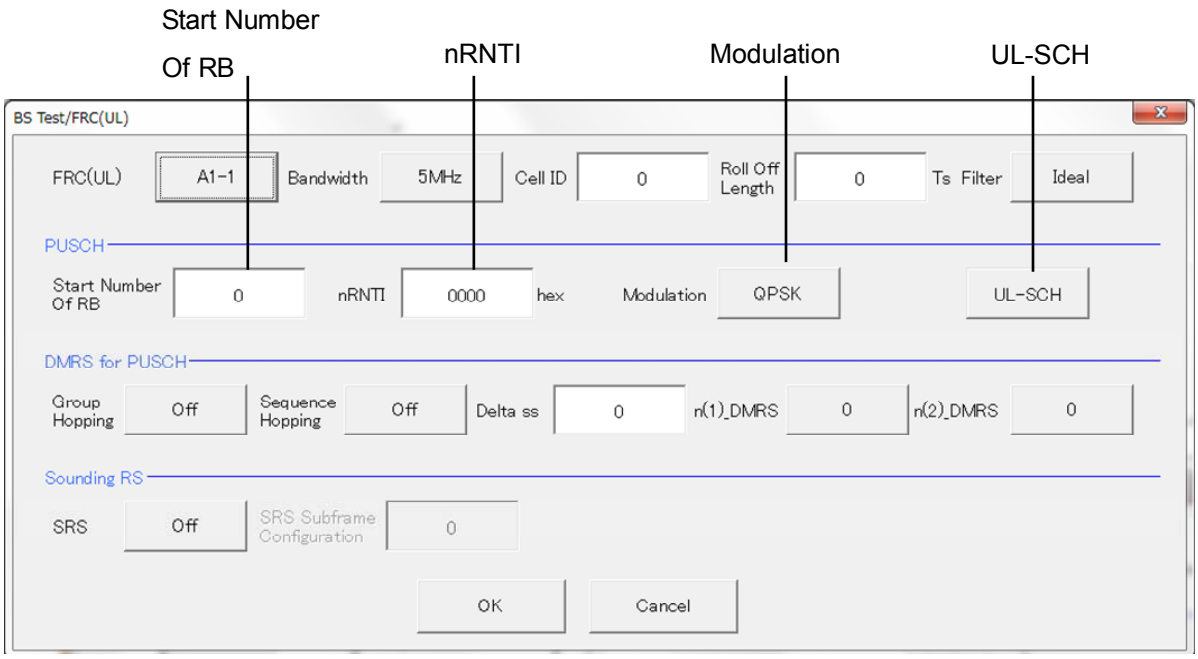


Figure 4.4.3.2-1 PUSCH Parameter Setting Screen

Start Number of RB

[Function] Sets the start position of the RB to which the PUSCH is assigned.

[Default] 0

[Options] Bandwidth = 1.4 MHz: 0 to (6–allocated resource block)
Bandwidth = 3 MHz: 0 to (15–allocated resource block)
Bandwidth = 5 MHz: 0 to (25–allocated resource block)
Bandwidth = 10 MHz: 0 to (50–allocated resource block)
Bandwidth = 15 MHz: 0 to (75–allocated resource block)
Bandwidth = 20 MHz: 0 to (100–allocated resource block)

[Remarks] The Allocated resource block depends on FRC (UL). For details of Allocated resource block values, refer to the items in the FRC (UL) Selection Dialog Box in Figure 4.4.3.2-2.

nRNTI

[Function] Sets the radio network temporary identifier.

[Default] 0

[Setting range] 0 to FFFF

Modulation

[Function] Sets the modulation mode.

[Default] QPSK

[Options] QPSK, 16QAM, 64QAM

[Remarks] Clicking **Modulation** displays the following dialog box. The modulation method is changed by clicking the relevant button.

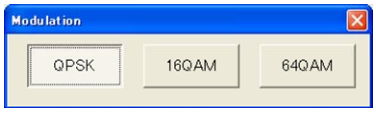


Figure 4.4.3.2-2 Modulation Setting Dialog Box

UL-SCH

Clicking **UL-SCH** displays the following dialog box.

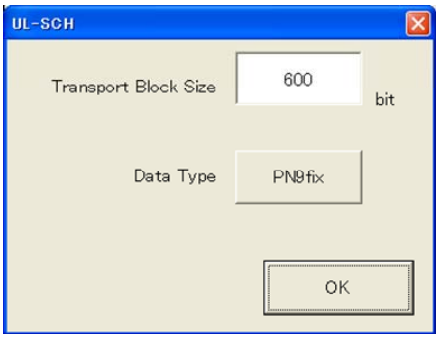


Figure 4.4.3.2-3 UL-SCH Setting Dialog Box

Transport Block Size

[Function] Sets the transport block size for UL-SCH.

[Default] The initial value changes according to the FRC (UL) setting, as shown below.

Table 4.4.3.2-1 Default of the Transport Block Size

FRC (UL) Setting	Default
A1-1	600
A1-2	1544
A1-3	2216
A1-4	256
A1-5	936
A2-1	2344
A2-2	5992
A2-3	9912

[Setting range] 0 to 86400

[Remarks] Since the PUSCH range is limited by the Resource Block allocation, errors may sometimes occur depending on the settings. If an error occurs, neither Calculation processing nor graph display is executed. In addition, the **UL-SCH** button and Transport Block Size display an error (red).

Data Type

[Function] Sets the Data type.

[Default] PN9fix

[Options] PN9fix, PN15fix, All0, All1

[Remarks] Clicking **Data Type** displays the following dialog box. The Data Type can be changed by clicking Data Type.

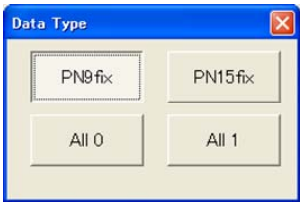


Figure 4.4.3.2-4 Data Type Setting Dialog Box

4.4.3.3 DMRS for PUSCH Parameters

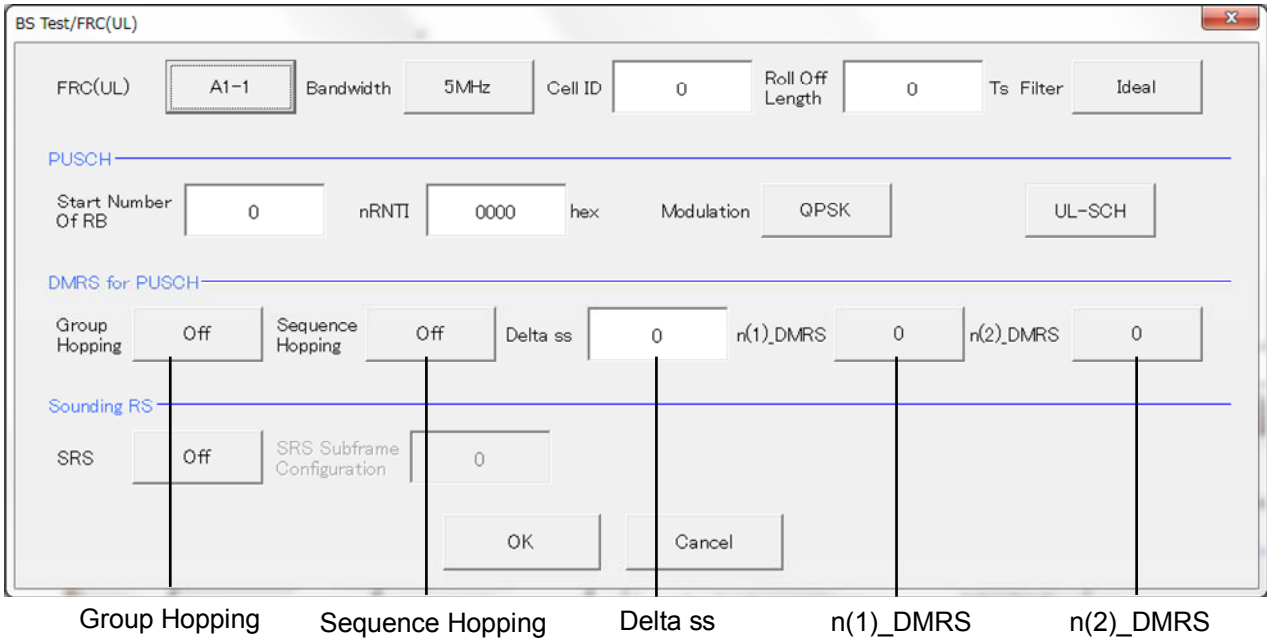


Figure 4.4.3.3-1 DMRS for PUSCH Parameters Setting Screen

Group Hopping

[Function] Enables or disables group hopping.

[Default] Off

[Options] Off, On

[Remarks] Clicking Group Hopping toggles **Group Hopping** On and Off.

Sequence Hopping

[Function] Enables or disables Sequence Hopping.

[Default] Off

[Options] Off, On

[Remarks] Clicking **Sequence Hopping** toggles Sequence Hopping On and Off. This parameter is not available when Group Hopping is Enable.

Delta ss

[Function] Sets Delta ss.

[Default] 0

[Setting range] 0 to 29

n(1)_DMRS

[Function] Sets the value used for automatic n_cs calculation.

[Default] 0

[Options] 0, 2, 3, 4, 6, 8, 9, 10

[Remarks] Clicking **n(1)_DMRS** displays the following dialog box. n(1)_DMRS can be changed by selecting and clicking n(1)_DMRS.

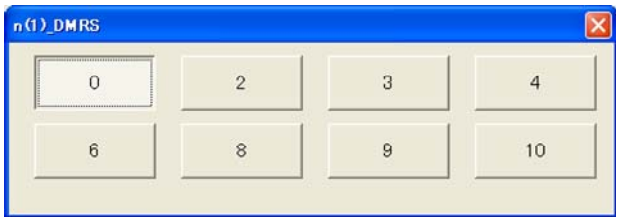


Figure 4.4.3.3-2 n(1)_DMRS Selection Dialog Box

n(2)_DMRS

[Function] Sets the value used for automatic n_cs calculation.

[Default] 0

[Options] 0, 2, 3, 4, 6, 8, 9, 10

[Remarks] Clicking **n(2)_DMRS** displays the following dialog box. n(2)_DMRS can be changed by selecting and clicking n(2)_DMRS.

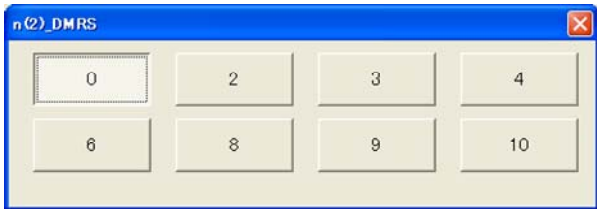


Figure 4.4.3.3-3 n(2)_DMRS Selection Dialog Box

4.4.3.4 Sounding RS Parameters

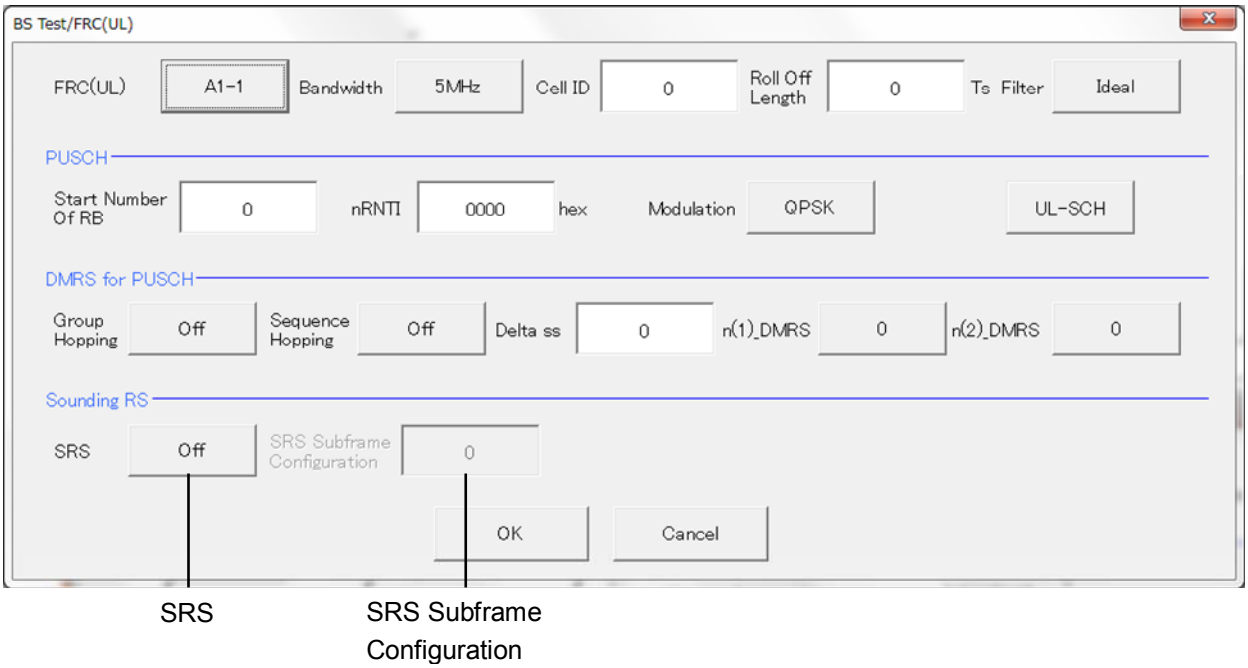


Figure 4.4.3.4-1 Sounding RS Parameters Setting Screen

SRS

[Function] Enables or disables the Sounding RS parameter.
[Default] Off
[Options] Off, On
[Remarks] Click the **SRS** button to toggle between On/Off.

SRS Subframe Configuration

[Function] Sets the SRS Subframe Configuration.
[Default] 0
[Setting range] 0 to 14
[Remarks] This becomes active only when SRS is ON.

4.4.4 Carrier Aggregation Mode

When the LTE FDD IQproducer is running and **LTE-Advanced** is selected with the **System** button, Carrier Aggregation Mode is displayed as the main screen for Intra-band. Clicking **Carrier Aggregation Mode** displays the Carrier Aggregation Mode selection screen. Either **Intra-band** or **Inter-band** can be selected. The screen switches to the relevant Carrier Aggregation Mode setting screen according to the clicked button.

Carrier Aggregation Mode

[Function] Sets the Carrier Aggregation Mode.
[Default] Intra-band
[Options] Intra-band, Inter-band

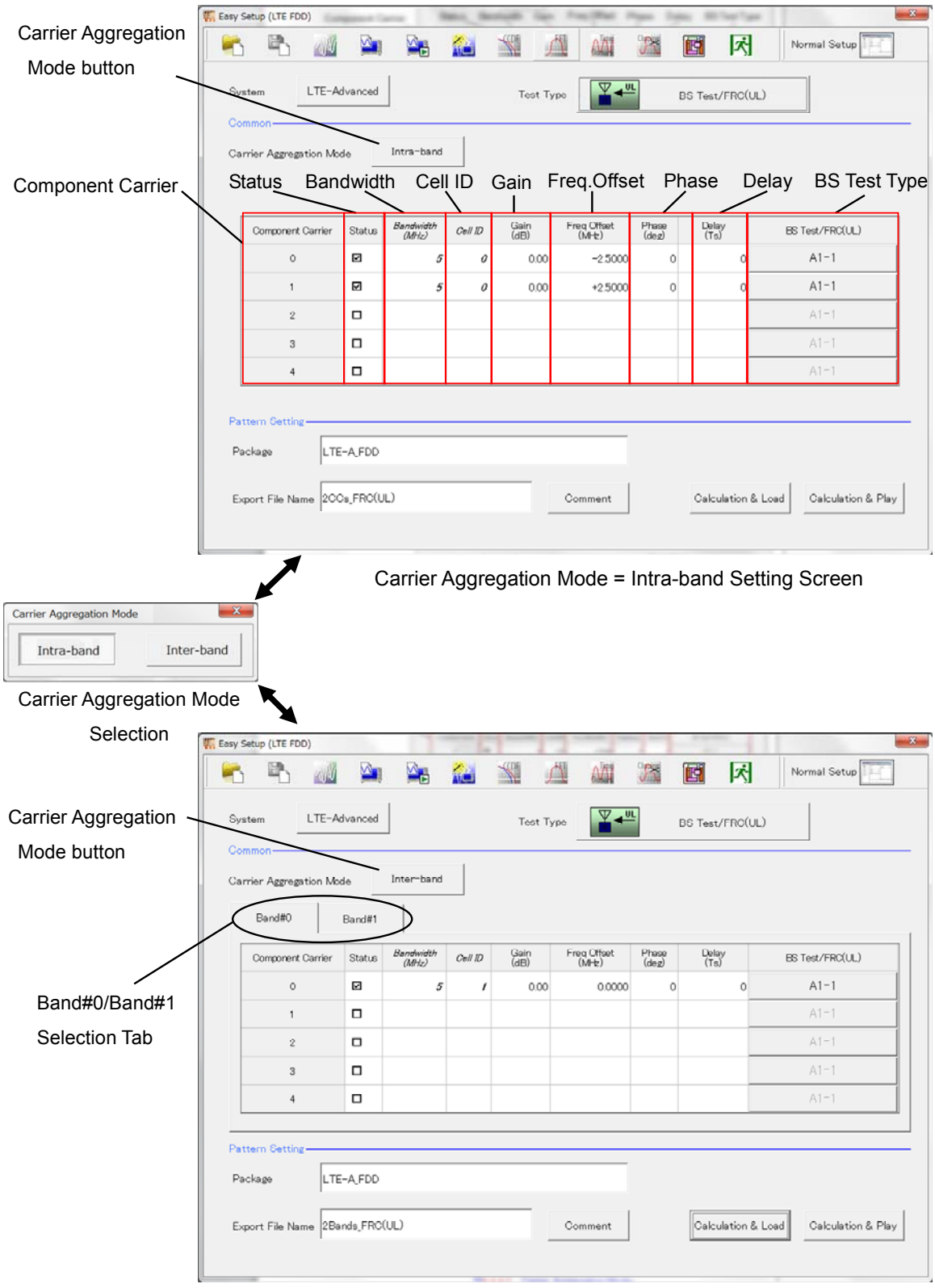


Figure 4.4.4-1 Carrier Aggregation Mode

4.4.4.1 Parameters

Component Carrier

[Function] Displays the Component Carrier number.

[Display range] 0 to 4

[Remarks] When Carrier Aggregation Mode is Inter-band, Component Carrier number (#0 to #4) is displayed for Band#0 and Band#1, respectively.

Status

[Function] Enables or disables the Component Carrier parameter.

[Setting range] Check box selected, or cleared.

[Remarks] When Carrier Aggregation Mode is Intra-band, Component Carrier #0 and #1 check boxes are selected and others are cleared by default.
When Carrier Aggregation Mode is Inter-band, Component Carrier #0 check boxes for Band#0 and Band#1 are selected and others are cleared by default.

Bandwidth

[Function] Displays the system bandwidth for the Component Carrier.

[Default] 5 [MHz]

[Display range] 1.4, 3, 5, 10, 15, 20 [MHz]

[Remarks] The bandwidth set with BS Test is displayed. This cannot be changed.

Cell ID

[Function] Displays the cell ID for the Component Carrier.

[Default] When Test Type is BS Test/E-UTRA TestModels: 0
When Test Type is BS Test/FRC(UL): 1

[Display range] 0 to 503

Gain

[Function] Sets the level ratio of Component Carrier.

[Default] 0.00 [dB]

[Setting range] –80.00 to 0.00 [dB]

[Resolution] 0.01 [dB]

[Remarks] Clicking **Gain** displays the numeric keypad where values can be input.

Freq.Offset

[Function] Sets the frequency offset.

[Setting range] 0 to $\pm(0.4\times Fs - 0.5\times Band)$ [MHz]

Band : Refer to Remarks.

Fs : 153.6 MHz (sampling rate)

[Resolution] 100 [Hz]

[Default] 0.0000 [MHz]

[Remarks] Clicking **Freq.Offset** displays the numeric keypad where values can be input.

The transmission bandwidth (Band) within the setting range is changed as follows, depending on the Component Carrier# transmission system bandwidth (Bandwidth).

Table 4.4.4.1-1 Bandwidth versus Band

Bandwidth [MHz]	Band [MHz]
1.4	1.095
3.0	2.715
5.0	4.515
10.0	9.015
15.0	13.515
20.0	18.015

Phase

[Function] Sets the initial phase of the Component Carrier.

[Default] 0 [deg.]

[Setting range] 0 to 359 [deg.]

[Resolution] 1 [deg.]

[Remarks] Clicking **Phase** displays the numeric keypad where values can be input.

Delay

[Function] Sets delay of the Component Carrier.

[Default] 0 [Ts]

[Setting range] 0 to 307200 [Ts]

[Resolution] 1 to 16

[Remarks] Clicking **Phase** displays the numeric keypad where values can be input.
The resolution changes depending on the Bandwidth as follows. If values other than the resolution are input, the values are changed to the resolution closest to the input values.

Table 4.4.4.2-1 Bandwidth versus Resolution of the Delay

Bandwidth [MHz]	Resolution [Ts]	Setting example
1.4	16	0,16,32, …
3	8	0,8,16, …
5	4	0,4,8, …
10	2	0,2,4, …
15	2	0,2,4, …
20	1	0,1,2, …

BS Test Type

[Function] Sets the details of BS Test Type of Component Carriers.

[Default] BS Test/E-UTRA Test Models

[Remarks] Clicking **BS Test Type** displays the screen shown in Figure 4.4.2-1 when BS Test/E-UTRA Test Models is selected for Test Type and displays the screen shown in Figure 4.4.3.1-1 when BS Test/FRC(UL) is selected for Test Type.
For details of Test Type, refer to Section 4.4.2 “BS Test/E-UTRA Test Models” and Section 4.4.3 “BS Test/FRC (UL)”.

4.4.5 Pattern Setting

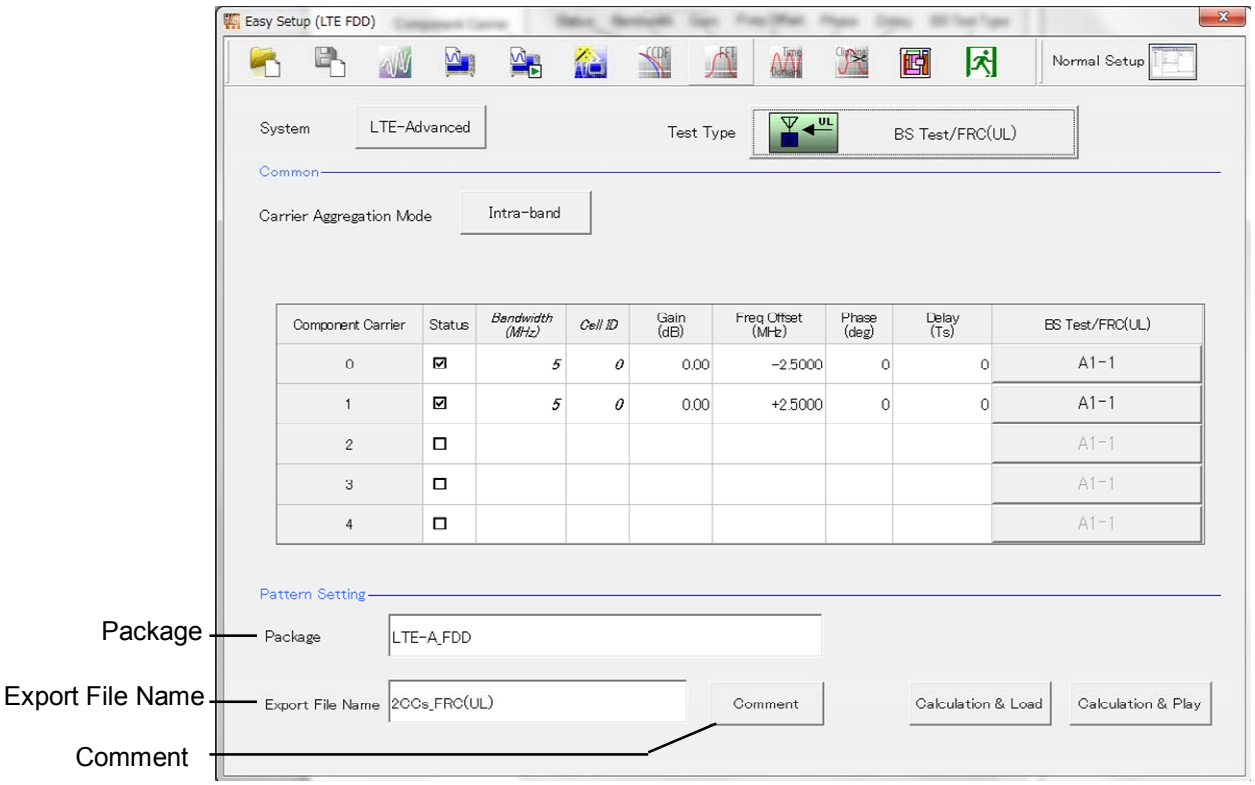


Figure 4.4.5-1 Pattern Setting Screen

Package

[Function] Enters waveform pattern package name.

[Default] LTE_FDD

[Setting range] Up to 31 single-byte English alphanumeric characters.

Export File Name

[Function] Enters waveform pattern file name.

[Default] The file name depends on the selected parameter.

・Carrier Aggregation Mode = Intra-band

Number of Component Carriers = n,

When BS Test Type = FRC(UL)

1CC_FRC(UL) n=1

nCCs_FRC(UL) n=2 to 5

Number of Component Carriers = n,

When BS Test Type = E-UTRA Test Models

1CC_E-TM n=1

nCCs_E-TM n=2 to 5

・Carrier Aggregation Mode = Inter-band
(n : number of Bands, # : Band number)
When BS Test Type = FRC(UL)
nBands_FRC(UL)_B#
When BS Test Type = E-UTRA Test Models
nBands_E-TM_B#

[Setting range] ・Carrier Aggregation Mode = Intra-band
Up to 18 single-byte English alphanumeric characters
・Carrier Aggregation Mode = Inter-band
Up to 15 single-byte English alphanumeric characters

Comment

[Function] Inputs comments to the waveform pattern.

[Default] Blank

[Setting range] Up to 38 single-byte English alphanumeric characters × 3 lines.

[Remarks] Clicking **Comment** displays the following Comment dialog box. Input the comment and click **OK** to set the comment.

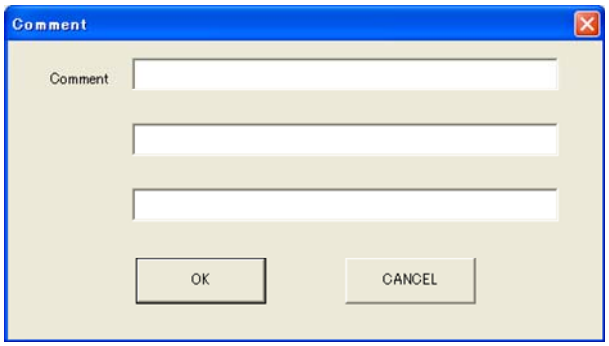


Figure 4.4.5-2 Comment Dialog Box

4.4.6 Calculation & Load

Note:

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

When the Carrier Aggregation Mode sets Inter-band and Calculation & Load is selected, the Load Setting screen will display after waveform generation.

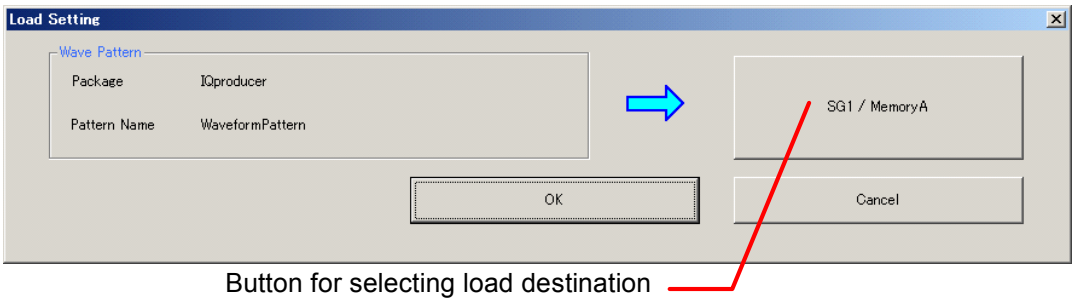


Figure 4.4.6-1 Load Setting Screen

When Carrier Aggregation Mode is set to Inter-band, selecting **Calculation & Load** displays the Load Setting screen as shown below after completion of waveform generation.
For Inter-band, two waveforms for SG1 and SG2 are output; therefore, two Export File Names are displayed.

Note:

This function is available only when the 2nd RF (option) is installed

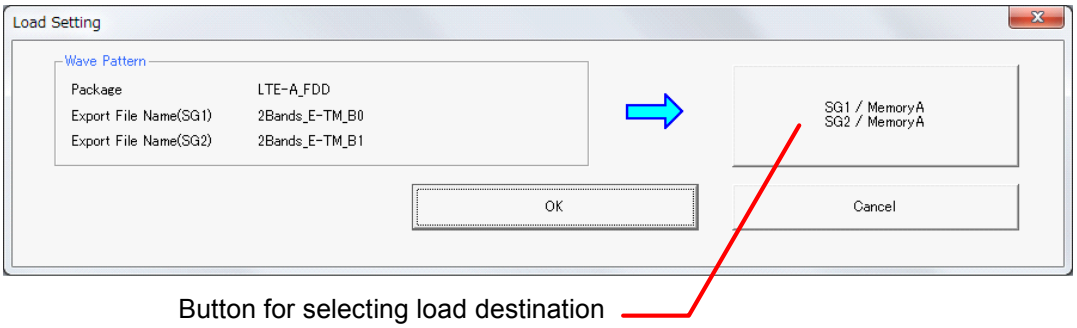


Figure 4.4.6-2 Load Setting Screen (Carrier Aggregation Mode = Inter-band)

The Select Memory screen will display after clicking the load destination in the Load Setting screen.

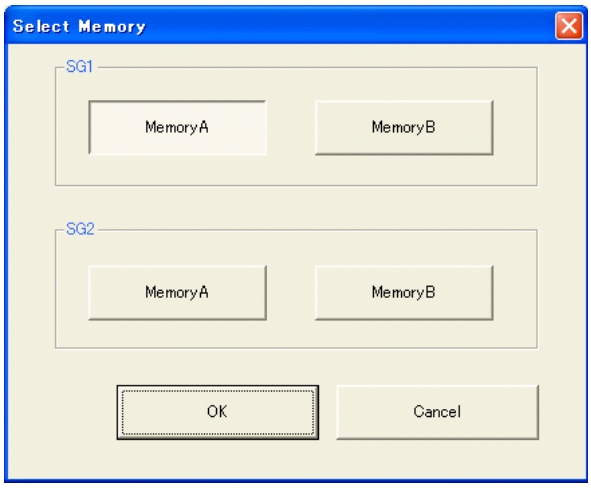


Figure 4.4.6-3 Select Memory Screen

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

Note:

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

4.4.7 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 RF (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.

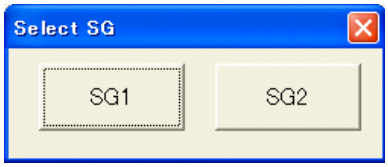


Figure 4.4.7-1 Select SG Screen

When Carrier Aggregation Mode is set to Inter-band, selecting **Calculation & Play** displays the SG Setting screen before starting waveform generation. In the SG Setting screen, Frequency and Amplitude for each SG1 and SG2 can be set.

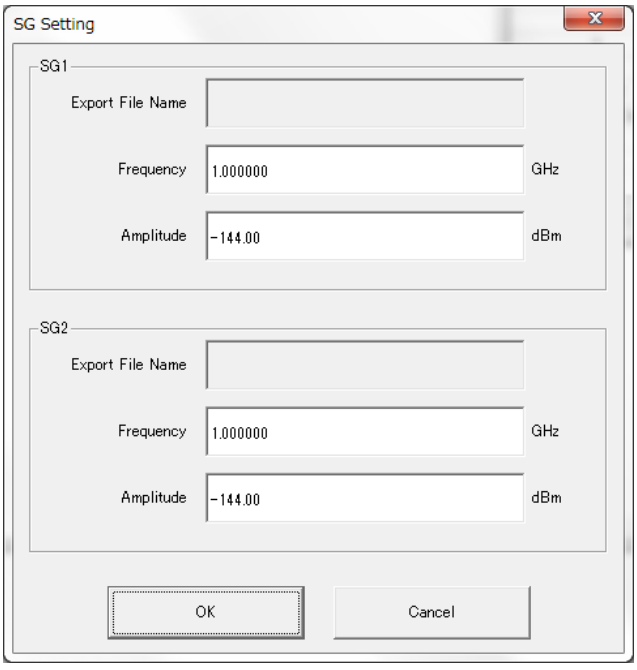


Figure 4.4.7-2 SG Setting Screen

4.4.8 Frame Structure Screen

Clicking  on the tool bar ribbon of the Main screen displays the Frame Structure screen. For details, refer to section 3.1.7 “Frame Structure screen”.

When **LTE-Advanced** is selected with the **System** button, the Frame Structure screen and Power graph screen displays the data, depending on how the Band select button and Component Carrier select button have been set.

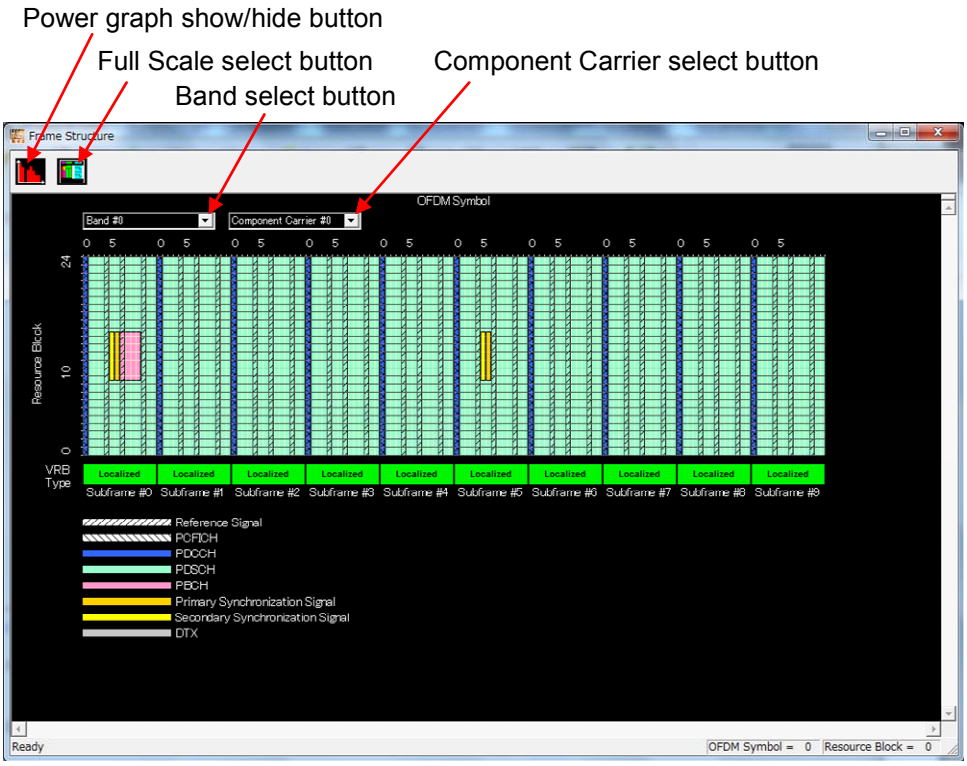


Figure 4.4.8-1 Frame Structure Screen

The following operations can be performed at the MG3710A touch panel.

- Boundary between Resource Block and OFDM Symbol Power
- Frame Structure zoom display

4.5 Graph Display

The generated waveform pattern can be displayed in a CCDF, FFT, and Time Domain graph by using this software.

To display CCDF graph:

(1) Generate a waveform pattern menu by executing “Calculation”.

(2) Click  on the tool bar to display the CCDF graph screen and the generated waveform pattern trace.

Displaying FFT graph

(1) Generate a waveform pattern menu by executing “Calculation”.

(2) Click  on the tool bar to display the FFT graph screen and the generated waveform pattern trace.

Displaying the Time Domain graph

(1) Generate a waveform pattern menu by executing “Calculation”.

(2) Click  on the tool bar to display the Time Domain graph screen and the generated waveform pattern trace.

For details of the graph screens, refer to sections 4.3 “CCDF Graph Display”, 4.4 “FFT Graph Display” and 4.13 “Time Domain Graph Display” in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™).

4.6 Auxiliary Signal Output

Select a waveform pattern generated by the LTE FDD IQproducer ™ on the mainframe to output the marker that is synchronized with the RF signal as an auxiliary signal from the AUX Input/Output on the rear panel of the mainframe. Markers described below are automatically set for the waveform patterns when they are generated. By using the Marker Edit function which is a peripheral function of the Time Domain graph, a waveform pattern can be generated with these markers edited. For Marker Edit function, refer to 4.13.12 "Marker edit function" in MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.

4.6.1 Downlink, Uplink

Frame Pulse, Subframe Pulse, and Symbol Pulse are output. When LTE-Advanced is selected for System, adding Delay to the signal does not output the Marker information correctly.

- Frame Pulse
  A pulse that is synchronized with the symbol at the beginning of the subframe is output.
- Subframe Pulse
  A pulse that is synchronized with the symbol at the beginning of the subframe is output.
- Symbol Pulse
  A pulse that is synchronized with the OFDM symbol of each subframe is output.

For the error range of the auxiliary signals against the RF output, refer to Section 4.5.6 "Input file format" in the MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™.

The following connectors output marker signal.

■ MG3700A
  Marker signal is output from the rear panel connector(s).

Table 4.6.1-1 MG3700A Marker Signal

Marker Signal	Connector	Polarity Change
Frame Pulse	Connector1	Marker 1 Polarity
Subframe Pulse	Connector2	Marker 2 Polarity
Symbol Pulse	Connector3	Marker 3 Polarity

■ MG3710A
Marker signal is output from the rear panel connector(s).
Output signal changes according to the MG3710A setting as below.

Table 4.6.1-2 MG3710A Marker Signal

Marker Signal	Output SG	Waveform memory	Signal name
Frame Pulse	SG1	Memory A	SG1 Marker1 A
		Memory B	SG1 Marker1 B
	SG2	Memory A	SG2 Marker1 A
		Memory B	SG2 Marker1 B
Subframe Pulse	SG1	Memory A	SG1 Marker2 A
		Memory B	SG1 Marker2 B
	SG2	Memory A	SG2 Marker2 A
		Memory B	SG2 Marker2 B
Symbol Pulse	SG1	Memory A	SG1 Marker3 A
		Memory B	SG1 Marker3 B
	SG2	Memory A	SG2 Marker3 A
		Memory B	SG2 Marker3 B

For how to configure marker signal and connector, refer to 7.4.2 “Route Output Connectors” in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).

4.6.2 Random Access Preamble

Sequence Pulse and RF Gate are output.

- Sequence Pulse
  A pulse that is synchronized with the symbol at the beginning of the sequence is output.

- RF Gate
  Indicates burst ON/OFF status of the mainframe's RF output when a burst wave is used as the waveform pattern. When Polarity is Positive, the output status and corresponding output signal is described as below.

Burst ON: High level

Burst OFF: Low level

These correspondences are reversed when Polarity is set to Negative.

The following connectors output marker signal.

■ MG3700A
Marker signal is output from the rear panel connector(s).

Table 4.6.2-1 MG3700A Marker Signal

Marker Signal	Connector	Polarity Change
Sequence Pulse	Connector1	Marker 1 Polarity
RF Gate	Connector2	Marker 2 Polarity

■ MG3710A
Marker signal is output from the rear panel connector(s).
Output signal changes according to the MG3710A setting as below.

Table 4.6.2-2 MG3710A Marker Signal

Marker Signal	Output SG	Waveform memory	Signal name
Sequence Pulse	SG1	Memory A	SG1 Marker1 A
		Memory B	SG1 Marker1 B
	SG2	Memory A	SG2 Marker1 A
		Memory B	SG2 Marker1 B
RF Gate	SG1	Memory A	SG1 Marker2 A
		Memory B	SG1 Marker2 B
	SG2	Memory A	SG2 Marker2 A
		Memory B	SG2 Marker2 B

For how to configure marker signal and connector, refer to 7.4.2 “Route Output Connectors” in MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe).

Chapter 5 How to Use Waveform Patterns

The following operations are required to output a modulated signal from this equipment using the waveform pattern generated by this software:

- Transferring waveform pattern to internal hard disk
- Loading waveform patterns from the hard disk to the waveform memory
- Selecting a waveform pattern to be output from this equipment

This chapter explains the details of these operations.

5.1 For MG3700A or MG3710A

This section describes how to download a waveform pattern created for the MG3700A/MG3710A to the hard disk of the MG3700A/MG3710A and output the pattern.

5.1.1 Transferring waveform pattern to internal hard disk

The waveform pattern created with this software can be transferred to the internal hard disk in the following ways:

Note:

This operation is not necessary if you are using MG3710A and have generated waveform patterns on MG3710A.

For MG3700A

- LAN
- CompactFlash Card

For MG3710A

- LAN
- External device such as USB Memory

■Transferring from PC via LAN (MG3700A, MG3710A)

Two IQproducer™ tools can be used to transfer a waveform pattern to the MG3700A/MG3710A via a LAN.

- Transfer & Setting Wizard
  Start this wizard by clicking the **Transfer & Setting Wizard** button of this software or by selecting **Simulation & Utility** tab → **Transfer & Setting Wizard** from the IQproducer™ after creating a waveform pattern. For details, refer to Section 4.7 "File Transfer and Loading to Memory Using Transfer & Setting Wizard" in the *MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.
  Transferring a waveform pattern to the internal hard disk of the MG3700A/MG3710A, loading the waveform from the hard disk to the waveform memory, and then outputting the waveform pattern can be done using this wizard.

- Transfer & Setting Panel
  This function is loaded by selecting **Transfer & Setting Panel** in the **Simulation & Utility** tab of the IQproducer™. For details, refer to Section 5.2 "Transferring Waveform Pattern" in the *MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual IQproducer™*.
  Specify the folder that contains the waveform pattern to transfer to the MG3700A/MG3710A in the PC-side tree of **Transfer & Setting Panel**.

■Transferring using a CF card (MG3700A)

Copy the waveform pattern (***.wvi and ***.wvd files) to be downloaded to the MG3700A to the root directory of a CF card.

Insert the CF card into the card slot on the front panel of the MG3700A, and then copy the file to the hard disk. For details about how to use a CF card to transfer a waveform pattern, refer to (1) Loading waveform file in memory in Section 3.5.2 of the *MG3700A Vector Signal Generator Operation Manual (Mainframe)*.

■Transferring via external device such as USB memory (MG3710A)

For details about how to transfer a waveform pattern created using this software to the hard disk of the MG3710A, refer to Section 7.3.6 "Copying external waveform pattern: Copy" in the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*.

5.1.2 Loading to Waveform Memory

To output a modulated signal using a waveform pattern, it is necessary to load the waveform pattern that was transferred to the internal hard disk of the MG3700A/MG3710A (described in Section 5.1.1 "Transferring waveform pattern to internal hard disk") to the waveform memory. A waveform pattern can be loaded into the waveform memory in the following two ways.

■Configuring using the mainframe

A waveform pattern can be loaded into the waveform memory by using the instruction panel of the MG3700A/MG3710A or by using a remote command.

For operation using the front panel, refer below:

- Section 3.5.2 (1) "Loading waveform file in memory" in the *MG3700A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*
- Section 7.3.4 "Loading waveform pattern: Load" in the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

For operation using remote commands, refer below:

- Chapter 4 "Remote Control" in the *MG3700A Vector Signal Generator Operation Manual (Mainframe)*
- Section 7.3.4 "Loading waveform pattern: Load" in the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

■Using Transfer & Setting Panel of IQproducer™

A waveform pattern can be loaded from the LAN-connected PC to the memory by using **Transfer & Setting Panel**, which can be opened from the **Simulation & Utility** tab. For details, refer to Section 4.6 "File Transfer and Loading to Memory Using Transfer & Setting Panel" in the *MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.

5.1.3 Selecting Waveform Pattern

Select a waveform pattern to use for modulation from the waveform patterns loaded into the waveform memory of the MG3700A/MG3710A according to Section 5.1.2 “Loading to waveform memory”. A waveform pattern can be selected in the following two ways.

■Configuring using the MG3700A/MG3710A

Waveform patterns to be used for modulation can be selected by operating the equipment panel or by using a remote command.

For operation using the front panel, refer below:

- Section 3.5.2 (4) “Outputting pattern loaded in Memory A for modulation in Edit mode” in the *MG3700A Vector Signal Generator Operation Manual (Mainframe)*
- Section 7.3.5 “Selecting output waveform pattern: Select” in the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

For operation using remote commands, refer below:

- Chapter 4 “Remote Control” in the *MG3700A Vector Signal Generator Operation Manual (Mainframe)*
- Section 7.3.5 “Selecting output waveform pattern: Select” in the *MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

■Using Transfer & Setting Panel of IQproducer™

A waveform pattern can be loaded from the LAN-connected PC to the memory, and also selected for modulation. This is done by using **Transfer & Setting Panel**, which can be opened from the **Simulation & Utility** tab. For details, refer to Section 4.6 “File Transfer and Loading to Memory Using Transfer & Setting Panel” in the *MG3700A/MG3710A Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.

5.2 For MS2690A/MS2691A/MS2692A or MS2830A

This section describes how to download a waveform pattern created for the MS2690A/MS2691A/MS2692A or MS2830A to the hard disk of the MS2690A/MS2691A/MS2692A or MS2830A and output the pattern.

5.2.1 Transferring waveform pattern to internal hard disk

For details about how to transfer a waveform pattern created using this software to the hard disk of the MS2690A/MS2691A/MS2692A or MS2830A, refer below:

- Section 2.4.4 "Copying waveform file(s) to hard disk" in the *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
- Section 2.4.4 "Copying waveform file(s) to hard disk" in the *MS2830A Signal Analyzer Vector Signal Generator Operation Manual (Operation)*

Note:

Transferring waveform patterns is not required if the patterns are created using this software.

5.2.2 Loading to Waveform Memory

In order to output a modulated signal using the waveform pattern, it is necessary to load the waveform patterns stored in the internal hard disk to the waveform memory.

■Loading to Waveform Memory

Waveform patterns can be loaded to waveform memories by operating the panel or by using a remote command.

For operation using the front panel, refer below:

- Section 2.4.1 "Loading waveform file in memory" in the *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
- Section 2.4.1 "Loading waveform pattern(s) to memory" in the *MS2830A Signal Analyzer Vector Signal Generator Operation Manual (Operation)*

For operation using remote commands, refer below:

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Remote Control)
- MS2830A Signal Analyzer Vector Signal Generator Operation Manual (Remote Control)

5.2.3 Selecting Waveform Pattern

Select waveform patterns to be used for modulation from those loaded in the waveform memory as described in Section 5.2.1 "Transferring waveform pattern to internal hard disk" above.

■Selecting waveform pattern

Waveform patterns to be used for modulation can be selected by operating the equipment panel or by using a remote command.

For operation using the front panel, refer below:

- Section 2.4.2 "Loading waveform file in memory" in the *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Operation)*
- Section 2.4.2 "Loading waveform pattern(s) to memory" in the *MS2830A Signal Analyzer Vector Signal Generator Operation Manual (Operation)*

For operation using remote commands, refer below:

- MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: Vector Signal Generator Operation Manual (Remote Control)
- MS2830A Signal Analyzer Vector Signal Generator Operation Manual (Remote Control)

Appendix A Error Messages

A list of error messages is shown below. In this list, *x*, n_1, and n_2 indicate a numeric value, and *s* indicates a character string.

Table A-1 Error messages

Error Message	Description
All component carriers are disabled.	—
All PDSCHs shown in the tree view must be assigned to one or more RBs.	—
Available memory is low.	—
Calculation cannot start because of setting error.	—
Calculation cannot start since all component carriers are disabled.	—
Cannot open file	—
Cannot read file	—
Cannot read file("*s*")	—
Cannot write file	—
Cannot write file("*s*").	—
Channel confliction has occurred between PUCCH and PUSCH.	—
Data size is too large.	—
Hopping pattern setting is OFF.	—
Input a value that fulfills $2^a \times 3^b \times 5^c$ where a, b, c is a set of non-negative integers.	—
Input Export File Name.	—
Input Package Name.	—
Invalid file format	When loading complex data, this message is also displayed if binary data is loaded by mistake.
Invalid value is set.	—
Operation disabled when 2nd vector SG (Opt-062, 064, 066) not installed.	—
PDCCH#n cannot be allocated in this CCE.	—
PUSCHs are overlapping.	—
The Setting value is out of range.("$s = x(n_1 - n_2)$")	The value of *x* set in parameter *s* is out of the setting range between n_1 and n_2.
This PDCCH Format value cannot be set.	—
There are no resource blocks that are available for use by PUCCH format 1/1a/1b transmission.	—
There are no resource blocks that are available for use by PUCCH format 2/2a/2b transmission.	—

A list of warning message is shown below.

Table A-2 Warning message

Warning Message	Description
Clipping was done.	—
By this operation, Oversampling Ratio is set to 2 and Filter Type is set to None.	—
There are some PDCCHs not allocated	—
PDCCH format was set to "0".	—
PUCCH format was set to "1".	—
Orthogonal Sequence Index was set to "0".	—
Do you want to reset all parameters?	—

Appendix B User File Format

This section shows examples of the two user file formats that can be used in this software. A user file must be a text file. It is not necessarily required to specify an extension to user files. Note that an error occurs if a user file that does not conform to the format is read.

Binary data
(Applicable for Reference signal, PBCH, Secondary synchronization signal, PCFICH, PDCCH, PDSCH, and PUSCH)

Be sure to write an unmodulated binary sequence into a user file. An error occurs if a user file that contains characters other than 0, 1, N (or n), line feed, comma, period, and space is read. All line feeds, commas, periods, and spaces in a user file are ignored when the user file is read. A user file format example is shown below.

User file format example

```
11111111100000111101111100010111001100100000100101001110110100011110011111001101100010101001000111000110110101011100010011000100010000000010000100011000010011100101010110000011011110100110111001000101000010101101001111111011001001001011011111110010011010100110011000000011000110010100011010010111111101000101100011101011000111100011110111010000011010110110111011000001011010111110101010100000010100101011110010111011100000011100111010010011110101110101000100100001100111000010111101101100110100001110111100000
```

0s and 1s in a user file are sequentially read from the leftmost of the first line.

When the number of data to be processed is larger than that in the user file, the user file is read again from the top. If the user file contains more data than that to be processed, data reading terminates halfway.

When N (or n) is read, the symbol data after modulation is 0.0 for both of I and Q phases. At this time, the number of N (or n) must equal the number of bits corresponding to one symbol at the modulation mode. When the modulation mode is 16QAM, for example, describing "1010NNN0110…" will be a format error; it must be described as "1010NNNN0110" in this event.

Complex data
(Applicable for Primary synchronization signal, Demodulation Reference signal, and Random Access Preamble)

Be sure to write into a user file real and imaginary numbers per line delimited by a comma, period or space. An error occurs if a user file that contains characters other than numeric values, line feed, comma, period, and space is read.
A user file format example is shown below.

User file format example

```
–0.0229359,0.010129
–0.0177825,0.0227244
–0.00361555,0.00508692
–0.00310226,–0.0155893
–0.0117066,–0.00189245
–0.00761086,0.00573888
0.00274695,–0.0218198
–0.00404612,–0.0198994
–0.0129794,0.0287021
```

The numeric values in a user file are sequentially read from the first line. When the number of data to be processed is larger than that in the user file, the user file is read again from the top. If the user file contains more data than that to be processed, data reading terminates halfway.

Appendix C Zadoff-Chu Sequence

For some channels, Zadoff-Chu Sequence can be selected in Data Type. The this software uses the following expression for calculating Zadoff-Chu Sequence:

$$z_r(k) = e^{-j\frac{\pi r k(k+1)}{N_{ZC}}}$$

$$k = 0,1,2,\ldots,N-1$$

Appendix D Easy Setup

Easy Setup can be used to set the test signal parameters designated for 3GPP in batch. This section describes the signal that can be configured using Easy Setup.

D.1 BS Test

The parameters described in 3GPP TS36.141 can be set by selecting the items included in the BS Test menu.

D.1.1 E-UTRA Test Models

Set the E-UTRA Test Models parameters described in chapter 6 of 3GPP TS36.141. For the E-TM1.1, E-TM1.2, E-TM2, E-TM2a, E-TM3.1, E-TM3.1a, E-TM3.2, and E-TM3.3 test models, Channel Bandwidth can be respectively set to 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, or 20 MHz. For details about the E-UTRA Test Models parameters, see chapter 6 of 3GPP TS36.141.

D.1.2 FRC

FRC(QPSK, R=1/3)

Set the parameters according to Fixed Reference Channels for reference sensitivity and in-channel selectivity (QPSK, R=1/3), which is described in Annex A.1 of 3GPP TS36.141. Reference Channel allocation is performed sequentially, starting with the lowest RB of Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-1 FRC (QPSK, R=1/3) parameter

Reference channel	A1-1	A1-2	A1-3	A1-4	A1-5
Allocated resource blocks	6	15	25	3	9
DFT-OFDM Symbols per subframe	12	12	12	12	12
Modulation	QPSK	QPSK	QPSK	QPSK	QPSK
Code rate	1/3	1/3	1/3	1/3	1/3
Transport Block Size (bits)	600	1544	2216	256	936
Transport block CRC (bits)	24	24	24	24	24
Code block CRC size (bits)	0	0	0	0	0
Number of code blocks - C	1	1	1	1	1
Coded block size including 12 bits trellis termination (bits)	1884	4716	6732	852	2892
Total number of bits per sub-frame	1728	4320	7200	864	2592
Total symbols per sub-frame	864	2160	3600	432	1296

FRC(16QAM, R=2/3)

Set the parameters according to Fixed Reference Channels for dynamic range (16QAM, R=2/3), which is described in Annex A.2 of 3GPP TS36.141. Reference Channel allocation is performed sequentially, starting with the lowest RB of Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-2 FRC (16QAM, R=2/3) parameter

Reference channel	A2-1	A2-2	A2-3
Allocated resource blocks	6	15	25
DFT-OFDM Symbols per subframe	12	12	12
Modulation	16QAM	16QAM	16QAM
Code rate	2/3	2/3	2/3
Transport Block Size (bits)	2344	5992	9912
Transport block CRC (bits)	24	24	24
Code block CRC size (bits)	0	0	24
Number of code blocks – C	1	1	2
Coded block size including 12 bits trellis termination (bits)	7116	18060	14988
Total number of bits per sub-frame	3456	8640	14400
Total symbols per sub-frame	864	2160	3600

FRC(QPSK 1/3)

Set the parameters according to Fixed Reference Channels for performance requirements (QPSK 1/3), which is described in Annex A.3 of 3GPP TS36.141. Reference Channel allocation is performed sequentially, starting with the lowest RB of Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-3 FRC (QPSK 1/3) parameter

Reference channel	A3-1	A3-2	A3-3	A3-4	A3-5	A3-6	A3-7
Allocated resource blocks	1	6	15	25	50	75	100
DFT-OFDM Symbols per subframe	12	12	12	12	12	12	12
Modulation	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Code rate	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Transport Block Size (bits)	104	600	1544	2216	5160	6712	10296
Transport block CRC (bits)	24	24	24	24	24	24	24
Code block CRC size (bits)	0	0	0	0	0	24	24
Number of code blocks - C	1	1	1	1	1	2	2
Coded block size including 12 bits trellis termination (bits)	396	1844	4716	6732	15564	10188	15564
Total number of bits per sub-frame	288	1728	4320	7200	14400	21600	28800
Total symbols per sub-frame	144	864	2160	3600	7200	10800	14400

FRC(16QAM 3/4)

Set the parameters according to Fixed Reference Channels for performance requirements (16QAM 3/4), which is described in Annex A.4 of 3GPP TS36.141. Reference Channel allocation is performed sequentially, starting with the lowest RB of Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-4 FRC (16QAM 3/4) parameter

Reference channel	A4-1	A4-2	A4-3	A4-4	A4-5	A4-6	A4-7	A4-8
Allocated resource blocks	1	1	6	15	25	50	75	100
DFT-OFDM Symbols per subframe	12	10	12	12	12	12	12	12
Modulation	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Code rate	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Transport Block Size (bits)	408	376	2600	6456	10680	21384	32856	43816
Transport block CRC (bits)	24	24	24	24	24	24	24	24
Code block CRC size (bits)	0	0	0	24	24	24	24	24
Number of code blocks - C	1	1	1	2	2	4	6	8
Coded block size including 12 bits trellis termination (bits)	1308	1212	7884	9804	16140	16140	16524	16524
Total number of bits per sub-frame	576	480	3456	8640	14400	28800	43200	57600
Total symbols per sub-frame	144	120	864	2160	3600	7200	10800	14400

FRC(64QAM 5/6)

Set the parameters according to Fixed Reference Channels for performance requirements (64QAM 5/6), which is described in Annex A.5 of 3GPP TS36.141. Reference Channel allocation is performed sequentially, starting with the lowest RB of Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-5 FRC (64QAM 5/6) parameter

Reference channel	A5-1	A5-2	A5-3	A5-4	A5-5	A5-6	A5-7
Allocated resource blocks	1	6	15	25	50	75	100
DFT-OFDM Symbols per subframe	12	12	12	12	12	12	12
Modulation	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Code rate	5/6	5/6	5/6	5/6	5/6	5/6	5/6
Transport Block Size (bits)	712	4392	11064	18336	36696	55056	75376
Transport block CRC (bits)	24	24	24	24	24	24	24
Code block CRC size (bits)	0	0	24	24	24	24	24
Number of code blocks - C	1	1	2	3	6	9	13
Coded block size including 12 bits trellis termination (bits)	2220	13260	16716	18444	18444	18444	17484
Total number of bits per sub-frame	864	5184	12960	21600	43200	64800	86400
Total symbols per sub-frame	144	864	2160	3600	7200	10800	14400

PRACH Test preambles

Set the parameters according to PRACH Test preambles, which is described in Annex A.6 of 3GPP TS36.141.PRACH allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.1.2-6 Test preambles for Normal Mode parameter

Burst format	Ncs	Logical sequence index	v
0	13	22	32
1	167	22	2
2	167	22	0
3	0	22	0

Table D.1.2-7 Test preambles for High speed Mode parameter

Burst format	Ncs	Logical sequence index	v
0	15	384	0
1	202	384	0
2	202	384	0
3	237	384	0

FRC (Scenario 1)

Set the parameters according to Fixed Reference Channels for UL timing adjustment (Scenario 1), which is described in Annex A.7 of 3GPP TS36.141."SRS Option" refers to a setting transmitted by SRS. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-8 FRC (Scenario 1) parameter

Reference channel	A7-1	A7-2	A7-3	A7-4	A7-5	A7-6
Allocated resource blocks	3	6	12	25	25	25
DFT-OFDM Symbols per subframe	12	12	12	12	12	12
Modulation	16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Code rate	3/4	3/4	3/4	3/4	3/4	3/4
Transport Block Size (bits)	1288	2600	5160	10680	10680	10680
Transport block CRC (bits)	24	24	24	24	24	24
Code block CRC size (bits)	0	0	0	24	24	24
Number of code blocks - C	1	1	1	2	2	2
Coded block size including 12 bits trellis termination (bits)	3948	7884	15564	16140	16140	16140
Total number of bits per sub-frame	1728	3456	6912	14400	14400	14400
Total symbols per sub-frame	432	864	1728	3600	3600	3600
SRS bandwidth configuration (See TS 36.211, 5.5.3) (Note 1)	7	5	3	2	5	2
SRS-Bandwidth b (See TS 36.211, 5.5.3) (Note 1, 2)	0	0	0	0	0	1
Note 1. The configuration of SRS is optional. Note 2. PUSCH resource blocks shall be included in SRS resource blocks						

FRC (Scenario 2)

Set the parameters according to Fixed Reference Channels for UL timing adjustment (Scenario 2), which is described in Annex A.8 of 3GPP TS36.141."SRS Option" refers to a setting transmitted by SRS. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth. It is not possible to specify a setting for which Allocated resource blocks exceeds the number of Channel Bandwidth resource blocks.

Table D.1.2-9 FRC (Scenario 2) parameter

Reference channel	A8-1	A8-2	A8-3	A8-4	A8-5	A8-6
Allocated resource blocks	3	6	12	25	25	25
DFT-OFDM Symbols per subframe	12	12	12	12	12	12
Modulation	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Code rate	1/3	1/3	1/3	1/3	1/3	1/3
Transport Block Size (bits)	256	600	1224	2216	2216	2216
Transport block CRC (bits)	24	24	24	24	24	24
Code block CRC size (bits)	0	0	0	0	0	0
Number of code blocks - C	1	1	1	1	1	1
Coded block size including 12 bits trellis termination (bits)	852	1884	3756	6732	6732	6732
Total number of bits per sub-frame	864	1728	3456	7200	7200	7200
Total symbols per sub-frame	432	864	1728	3600	3600	3600
SRS bandwidth configuration (See TS 36.211, 5.5.3) (Note 1)	7	5	3	2	5	2
SRS-Bandwidth b (See TS 36.211, 5.5.3) (Note 1, 2)	0	0	0	0	0	1
Note 1. The configuration of SRS is optional Note 2. PUSCH resource blocks shall be included in SRS resource blocks						

D.2 UE Test

The parameters described in 3GPP TS36.101 can be set by selecting the items included in the UE Test menu.

D.2.1 RMC(DL)

FRC(Receiver Requirements)

Set the physical channel parameters according to the Fixed Reference Channel for Receiver Requirements (FDD) description in Table A3.2-1 of 3GPP TS36.101.

Table D.2.1-1 FRC (Receiver Requirements) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	n/a	n/a	n/a	n/a	n/a	n/a
Maximum number of HARQ transmissions		1	1	1	1	1	1
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	1320	2216	4392	6712	8760
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	152	872	1800	4392	6712	8760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	1	1	1	2	2
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	3780	6300	13800	20700	27600
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	528	2940	5460	12960	19860	26760
Max. Throughput averaged over 1 frame	kbps	341.6	1143.2	1952.8	3952.8	6040.8	7884
UE Category		5	5	5	5	5	5
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz							

FRC (Tx Characteristics)

Set the physical channel parameters according to the Fixed Reference Channel for Receiver Requirements (FDD) description in Table A3.2A-1 of 3GPP TS36.521.

Table D.2.1-2 FRC (Tx Characteristics) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	4	8	16	25	30
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		(NOTE 2)	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	n/a	n/a	n/a	n/a	n/a	n/a
Maximum number of HARQ transmissions		1	1	1	1	1	1
Transport Block Size							
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	152	328	680	1384	2216	2264
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	1	1	1	1	1
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	1008	2016	4416	6900	8280
For Sub-Frame 5	Bits	1080	1008	2016	4416	6900	8280
For Sub-Frame 0	Bits	528	1008	2016	4416	6900	8280
Max. Throughput averaged over 1 frame	kbps	152	328	680	1384	2216	2664
UE Category		5	5	5	5	5	5
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz. Note 2: To ensure constant transport block size in 1.4 MHz, the code rate for subframes varies approx within {1/6 - 1/3}.							

FRC(Maximum input level, Category1)

Set the physical channel parameters according to the Fixed Reference Channel for Maximum input level for UE Category 1 (FDD) description in Table A.3.2-3a of 3GPP TS36.101. Character strings in parentheses indicate Channel Bandwidth.

Table D.2.1-3 FRC (Maximum input level, Category1) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks (see Note 2)		6	15	16 (Note 2)	16 (Note 2)	16 (Note 2)	16 (Note 2)
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes		n/a	n/a	n/a	n/a	n/a	n/a
Maximum number of HARQ transmissions		1	1	1	1	1	1
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	10296	10296	10296	10296
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	7480	9912	9912	9912
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	2	2	2	2	2
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	13824	13824	13824	13824
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	10008	13248	13248	13248
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	8984.8	9228	9228	9228
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz Note 2: In case of partial allocation, the unallocated RB-s are filled with OCNG. The total signal mean power and the power density over the channel bandwidth configuration i.e. for data (allocated RB-s) and OCNG (unallocated RB-s) remain the same as for full allocation.							

FRC(Maximum input level, Category2)

Set the physical channel parameters according to the Fixed Reference Channel for Maximum input level for UE Category 2 (FDD) description in Table A.3.2-3b of 3GPP TS36.101. Character strings in parentheses indicate Channel Bandwidth.

Table D.2.1-4 FRC (Maximum input level, Category2) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks (see Note 2)		6	15	25	50	75	80 (Note 2)
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes		n/a	n/a	n/a	n/a	n/a	n/a
Maximum number of HARQ transmissions		1	1	1	1	1	1
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	51024
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	12576	28336	45352	48936
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	2	3	5	8	9 8
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	69120
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	16380	38880	59580	64152
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	4571,3
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz Note 2: In case of partial allocation, the unallocated RB-s are filled with OCNG. The total signal mean power and the power density over the channel bandwidth configuration i.e. for data (allocated RB-s) and OCNG (unallocated RB-s) remain the same as for full allocation.							

FRC(Maximum input level, Category3-5)

Set the physical channel parameters according to the Fixed Reference Channel for Maximum input level for UE Category 3-5 (FDD) description in Table A.3.2-3 of 3GPP TS36.101. Character strings in parentheses indicate Channel Bandwidth.

Table D.2.1-5 FRC (Maximum input level, Category3-5) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes		n/a	n/a	n/a	n/a	n/a	n/a
Maximum number of HARQ transmissions		1	1	1	1	1	1
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	61664
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	12576	28336	45352	61664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	82800
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	16380	38880	59580	80280
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	55498
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(QPSK, R=1/3)

Set the physical channel parameters according to the Fixed Reference Channel QPSK R=1/3 description in Table A.3.3.1-1 of 3GPP TS36.101.

Table D.2.1-6 FRC (QPSK, R=1/3) parameter

Parameter	Unit	Value					
Reference channel		[R.4 FDD]			[R.2 FDD]		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6			50		
Allocated subframes per Radio Frame		10			10		
Modulation		QPSK			QPSK		
Target Coding Rate		1/3			1/3		
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408			4392		
For Sub-Frame 5	Bits	n/a			n/a		
For Sub-Frame 0	Bits	152			4392		
Number of Code Blocks per Sub-Frame		1			1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368			13800		
For Sub-Frame 5	Bits	n/a			n/a		
For Sub-Frame 0	Bits	528			12960		
Max. Throughput averaged over 1 frame	Mbps	0.342			3.953		
UE Category		5			5		
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(16QAM, R=1/2)

Set the physical channel parameters according to the Fixed Reference Channel 16QAM R=1/2 description in Table A.3.3.1-2 of 3GPP TS36.101.

Table D.2.1-7 RMC_DL_R3FDD parameter

Parameter	Unit	Value					
Reference channel					[R.3 FDD]		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					50		
Allocated subframes per Radio Frame					10		
Modulation					16QAM		
Target Coding Rate					1/2		
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				14112		
For Sub-Frame 5	Bits				n/a		
For Sub-Frame 0	Bits				12960		
Number of Code Blocks per Sub-Frame					3		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				27600		
For Sub-Frame 5	Bits				n/a		
For Sub-Frame 0	Bits				25920		
Max. Throughput averaged over 1 frame	Mbps				12.586		
UE Category					5		
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(64QAM, R=3/4)

Set the physical channel parameters according to the Fixed Reference Channel 64QAM R=3/4 description in Table A.3.3.1-3 of 3GPP TS36.101.

Table D.2.1-8 FRC (64QAM, R=3/4) parameter

Parameter	Unit	Value					
Reference channel			[R.5 FDD]	[R.6 FDD]	[R.7 FDD]	[R.8 FDD]	[R.9 FDD]
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks			15	25	50	75	100
Allocated subframes per Radio Frame			10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		8504	14112	30576	46888	61664
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		6456	12576	28336	45352	61664
Number of Code Blocks per Sub-Frame			2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		11340	18900	41400	62100	82800
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		8820	16380	38880	59580	80280
Max. Throughput averaged over 1 frame	Mbps		7.449	12.547	27.294	42.046	55.498
UE Category			5	5	5	5	5
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(Single PRB)

Set the physical channel parameters according to the Fixed Reference Channel Single PRB (Channel Edge) description in Table A.3.3.1-4 of 3GPP TS36.101.

Table D.2.1-9 FRC (Single PRB) parameter

Parameter	Unit	Value					
Reference channel			[R.0 FDD]		[R.1 FDD]		
Channel bandwidth	MHz	1.4	3	5	10/20	15	20
Allocated resource blocks			1		1		
Allocated subframes per Radio Frame			10		10		
Modulation			16QAM		16QAM		
Target Coding Rate			1/2		1/2		
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		224		256		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		224		256		
Number of Code Blocks per Sub-Frame			1		1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		504		552		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		504		552		
Max. Throughput averaged over 1 frame	Mbps		0.202		0.230		
UE Category			5		5		
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(two antenna ports)

Set the physical channel parameters according to the Fixed Reference Channel two antenna ports description in Table A.3.3.2.1-1 of 3GPP TS36.101. R.10 FDD and R.11 FDD are set to the 2 Antenna Transmit Diversity setting.

Table D.2.1-10 FRC (two antenna ports) parameter

Parameter	Unit	Value					
Reference channel			[R.10 FDD]	[R.11 FDD]			
Channel bandwidth	MHz		10	10			
Allocated resource blocks			50	50			
Allocated subframes per Radio Frame			10	10			
Modulation			QPSK	16QAM			
Target Coding Rate			1/3	1/2			
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		4392	12960			
For Sub-Frame 5	Bits		n/a	n/a			
For Sub-Frame 0	Bits		4392	12960			
Number of Code Blocks per Sub-Frame			1	3			
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		13200	26400			
For Sub-Frame 5	Bits		n/a	n/a			
For Sub-Frame 0	Bits		12384	24768			
Max. Throughput averaged over 1 frame	Mbps		3.953	11.664			
UE Category			5	5			
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(four antenna ports)

Set the physical channel parameters according to the Fixed Reference Channel four antenna ports description in Table A.3.3.2.2-1 of 3GPP TS36.101.R.12 FDD is set to the 4 Antenna Transmit Diversity setting, and R.13 FDD and R.14 FDD are set to the 4 Antenna Spatial Multiplexing setting.

Table D.2.1-11 FRC (four antenna ports) parameter

Parameter	Unit	Value					
Reference channel		[R.12 FDD]	[R.13 FDD]	[R.14 FDD]			
Channel bandwidth	MHz	1.4	10	10			
Allocated resource blocks		6	50	50			
Allocated subframes per Radio Frame		10	10	10			
Modulation		QPSK	QPSK	16QAM			
Target Coding Rate		1/3	1/3	1/2			
Transport Block Size							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	4392	12960			
For Sub-Frame 5	Bits	n/a	n/a	n/a			
For Sub-Frame 0	Bits	152	3624	11448			
Number of Code Blocks per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9		1	1	3			
For Sub-Frame 5		n/a	n/a	n/a			
For Sub-Frame 0		1	1	2			
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1248	12800	25600			
For Sub-Frame 5	Bits	n/a	n/a	n/a			
For Sub-Frame 0	Bits	480	12032	24064			
Max. Throughput averaged over 1 frame	Mbps	0.342	3.876	11.513			
UE Category		5	5	5			
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz							

FRC(FDD)

Set the physical channel parameters according to the Reference Channel FDD description in Table A.3.5.1-1 of 3GPP TS36.101.

Table D.2.1-12 FRC (FDD) parameter

Parameter	Unit	Value		
Reference channel		[R.15 FDD]	[R.16 FDD]	[R.17 FDD]
Number if transmitter antennas		1	2	4
Channel bandwidth	MHz	10	1.4	10
Number of OFDM symbols for PDCCH	symbols	2	2	2
Aggregation level	CCE	8	2	4
DCI Format		Format 1	Format 1	Format 2
Cell ID		0	0	0
Payload (without CRC)	Bits	31	32+1	46

D.2.2 RMC(UL)

Full RB(QPSK)

Set the parameters according to the Reference Channels for QPSK with full RB allocation description in Table A.2.2.1.1-1 of 3GPP TS36.101.

Table D.2.2-1 Full RB (QPSK) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per subframe		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6
Payload size	Bits	600	1544	2216	5160	4392	4584
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks - C		1	1	1	1	1	1
Code block CRC size	Bits	0	0	0	0	0	0
Total number of bits per sub-frame	Bits	1728	4320	7200	14400	21600	28800
Total symbols per sub-frame		864	2160	3600	7200	10800	14400
UE Category		5	5	5	5	5	5

Full RB(16QAM)

Set the parameters according to the Reference Channels for 16-QAM with full RB allocation description in Table A.2.2.1.2-1 of 3GPP TS36.101.

Table D.2.2-2 Full RB (16QAM) parameter

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per subframe		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks - C		1	1	1	4	4	4
Code block CRC size	Bits	0	0	0	24	24	24
Total number of bits per sub-frame	Bits	3456	8640	14400	28800	43200	57600
Total symbols per sub-frame		864	2160	3600	7200	10800	14400
UE Category		5	5	5	5	5	5

Partial RB(QPSK, BW=1.4MHz)

Set the parameters according to the Reference Channels for 1.4 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-1 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-3 Partial RB (QPSK, BW=1.4MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	1.4	1.4
Allocated resource blocks		1	5
DFT-OFDM Symbols per subframe		12	12
Modulation		QPSK	QPSK
Target Coding rate		1/3	1/3
Payload size	Bits	72	424
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	288	1440
Total symbols per sub-frame		144	720
UE Category		5	5

Partial RB(QPSK, BW=3MHz)

Set the parameters according to the Reference Channels for 3 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-2 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-4 Partial RB (QPSK, BW=3MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	3	3
Allocated resource blocks		1	4
DFT-OFDM Symbols per subframe		12	12
Modulation		QPSK	QPSK
Target Coding rate		1/3	1/3
Payload size	Bits	72	392
Transport block CRC	Bits	24	24
Number of code blocks – C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	288	1152
Total symbols per sub-frame		144	576
UE Category		5	5

Partial RB(QPSK, BW=5MHz)

Set the parameters according to the Reference Channels for 5 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-3 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-5 Partial RB (QPSK, BW=5MHz) parameter

Parameter	Unit	Value	Value	Value
Channel bandwidth	MHz	5	5	5
Allocated resource blocks		1	8	20
DFT-OFDM Symbols per subframe		12	12	12
Modulation		QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3
Payload size	Bits	72	808	1736
Transport block CRC	Bits	24	24	24
Number of code blocks – C		1	1	1
Code block CRC size	Bits	0	0	0
Total number of bits per sub-frame	Bits	288	2304	5760
Total symbols per sub-frame		144	1152	2880
UE Category		5	5	5

Partial RB(QPSK, BW=10MHz)

Set the parameters according to the Reference Channels for 10 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-4 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-6 Partial RB (QPSK, BW=10MHz) parameter

Parameter	Unit	Value	Value	Value	Value
Channel bandwidth	MHz	10	10	10	10
Allocated resource blocks		1	12	20	25
DFT-OFDM Symbols per subframe		12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3
Payload size	Bits	72	1224	1736	2216
Transport block CRC	Bits	24	24	24	24
Number of code blocks - C		1	1	1	1
Code block CRC size	Bits	0	0	0	0
Total number of bits per sub-frame	Bits	288	3456	5760	7200
Total symbols per sub-frame		144	1728	2880	3600
UE Category		5	5	5	5

Partial RB(QPSK, BW=15MHz)

Set the parameters according to the Reference Channels for 15 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-5 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-7 Partial RB (QPSK, BW=15MHz) parameter

Parameter	Unit	Value	Value	Value
Channel Bandwidth	MHz	15	15	15
Allocated resource blocks		1	16	50
DFT-OFDM Symbols per subframe		12	12	12
Modulation		QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3
Payload size	Bits	72	1384	5160
Transport block CRC	Bits	24	24	24
Number of code blocks - C		1	1	1
Code block CRC size	Bits	0	0	0
Total number of bits per sub-frame	Bits	288	4608	14400
Total symbols per sub-frame		144	2304	7200
UE Category		5	5	5

Partial RB(QPSK, BW=20MHz)

Set the parameters according to the Reference Channels for 20 MHz QPSK with partial RB allocation description in Table A.2.2.2.1-6 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-8 Partial RB (QPSK, BW=20MHz) parameter

Parameter	Unit	Value	Value	Value	Value	Value
Channel bandwidth	MHz	20	20	20	20	20
Allocated resource blocks		1	18	25	50	75
DFT-OFDM Symbols per subframe		12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/5
Payload size	Bits	72	1864	2216	5160	4392
Transport block CRC	Bits	24	24	24	24	24
Number of code blocks - C		1	1	1	1	1
Code block CRC size	Bits	0	0	0	0	0
Total number of bits per sub-frame	Bits	288	5184	7200	14400	21600
Total symbols per sub-frame		144	2592	3600	7200	10800
UE Category		5	5	5	5	5

Partial RB(16QAM, BW=1.4MHz)

Set the parameters according to the Reference Channels for 1.4 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-1 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-9 Partial RB (16QAM, BW=1.4MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	1.4	1.4
Allocated resource blocks		1	5
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	3/4
Payload size	Bits	408	2152
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	2880
Total symbols per sub-frame		144	720
UE Category		5	5

Partial RB(16QAM, BW=3MHz)

Set the parameters according to the Reference Channels for 3 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-2 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-10 Partial RB (16QAM, BW=3MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	3	3
Allocated resource blocks		1	4
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	3/4
Payload size	Bits	408	1736
Transport block CRC	Bits	24	24
Number of code blocks – C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	2304
Total symbols per sub-frame		144	576
UE Category		5	5

Partial RB(16QAM, BW=5MHz)

Set the parameters according to the Reference Channels for 5 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-3 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-11 Partial RB (16QAM, BW=5MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	5	5
Allocated resource blocks		1	8
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	3/4
Payload size	Bits	408	3496
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	4608
Total symbols per sub-frame		144	1152
UE Category		5	5

Partial RB(16QAM, BW=10MHz)

Set the parameters according to the Reference Channels for 10 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-4 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-12 Partial RB (16QAM, BW=10MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	10	10
Allocated resource blocks		1	12
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	3/4
Payload size	Bits	408	5160
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	6912
Total symbols per sub-frame		144	1728
UE Category		5	5

Partial RB(16QAM, BW=15MHz)

Set the parameters according to the Reference Channels for 15 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-5 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-13 Partial RB (16QAM, BW=15MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	15	15
Allocated resource blocks		1	16
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	1/2
Payload size	Bits	408	4584
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	9216
Total symbols per sub-frame		144	2304
UE Category		5	5

Partial RB(16QAM, BW=20MHz)

Set the parameters according to the Reference Channels for 20 MHz 16-QAM with partial RB allocation description in Table A.2.2.2.2-6 of 3GPP TS36.101. Reference Channel allocation is performed sequentially, starting with the lowest RB in Channel Bandwidth.

Table D.2.2-14 Partial RB (16QAM, BW=20MHz) parameter

Parameter	Unit	Value	Value
Channel bandwidth	MHz	20	20
Allocated resource blocks		1	18
DFT-OFDM Symbols per subframe		12	12
Modulation		16QAM	16QAM
Target Coding rate		3/4	1/2
Payload size	Bits	408	5160
Transport block CRC	Bits	24	24
Number of code blocks - C		1	1
Code block CRC size	Bits	0	0
Total number of bits per sub-frame	Bits	576	10368
Total symbols per sub-frame		144	2592
UE Category		5	5

Index

References are to page numbers.

S

T

U

W