MX370114A/MX269914A
5G NR FDD sub-6GHz
IQproducer™
Operation Manual

Third 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 MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe), or MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation). Please also refer to them before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

Document No.: M-W4033AE-3.0

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 minor to moderate 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.

MX370114A/MX269914A
5G NR FDD sub-6GHz IQproducer™
Operation Manual

21 February 2020 (First Edition)
12 June 2026 (Third Edition)

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- 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.
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Revision History:

February 29th, 2020
December 17th, 2021
March 11th, 2024

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 flash drive 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 malware (malicious software such as viruses).
  This equipment runs on Windows Operating System.
  To connect this equipment to network, the following is advised.
  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

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 flash drive 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 flash drive and CF memory card).
- Connecting to network
  Connect your computer to the network that provides adequate protection against computer viruses.
- Protection against malware (malicious software such as viruses).
  To connect your computer to network, the following is advised.
  - Activate Firewall.
  - Install important updates of Windows.
  - Use antivirus software.

Cautions on Proper Operation of Software

This software may not operate normally if any of the following operations are performed on your computer:

- Simultaneously running any software other than that recommended or approved by Anritsu
- Closing the lid (Laptop computer)
- Turning on the screen saver function
- Turning on the battery-power saving function (Laptop computer)

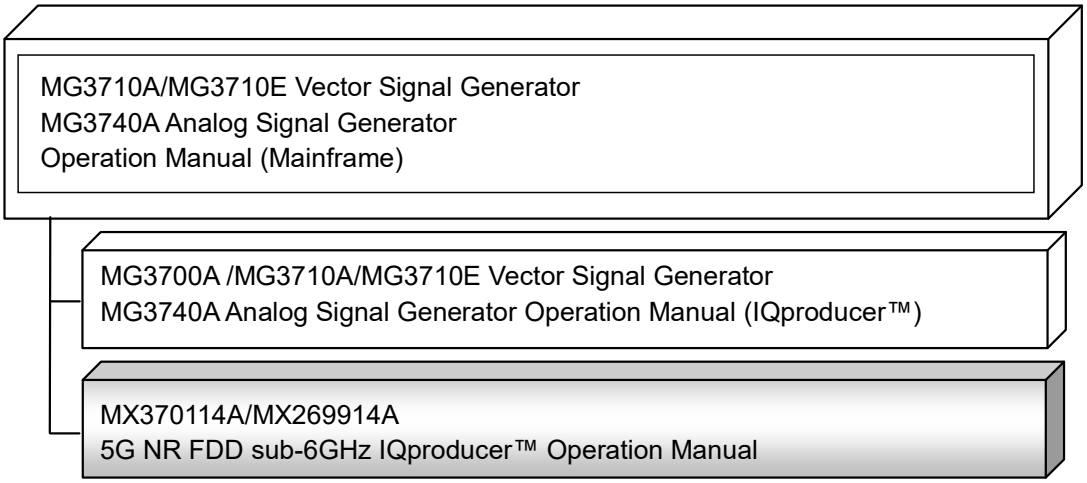
For how to turn off the functions, refer to the operation manual that came with your computer.

About This Manual

■Associated Documents

The operation manual configuration of the MX370114A/MX269914A 5G NR FDD sub-6GHz IQproducer™ is shown below.

■If using MG3710A or MG3710E:



- MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)

This describes basic operations, maintenance procedure, and remote functions of the MG3710A, MG3710E Vector Signal Generator and the MG3740A Analog Signal Generator.

- MG3700A/MG3710A/MG3710E 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.

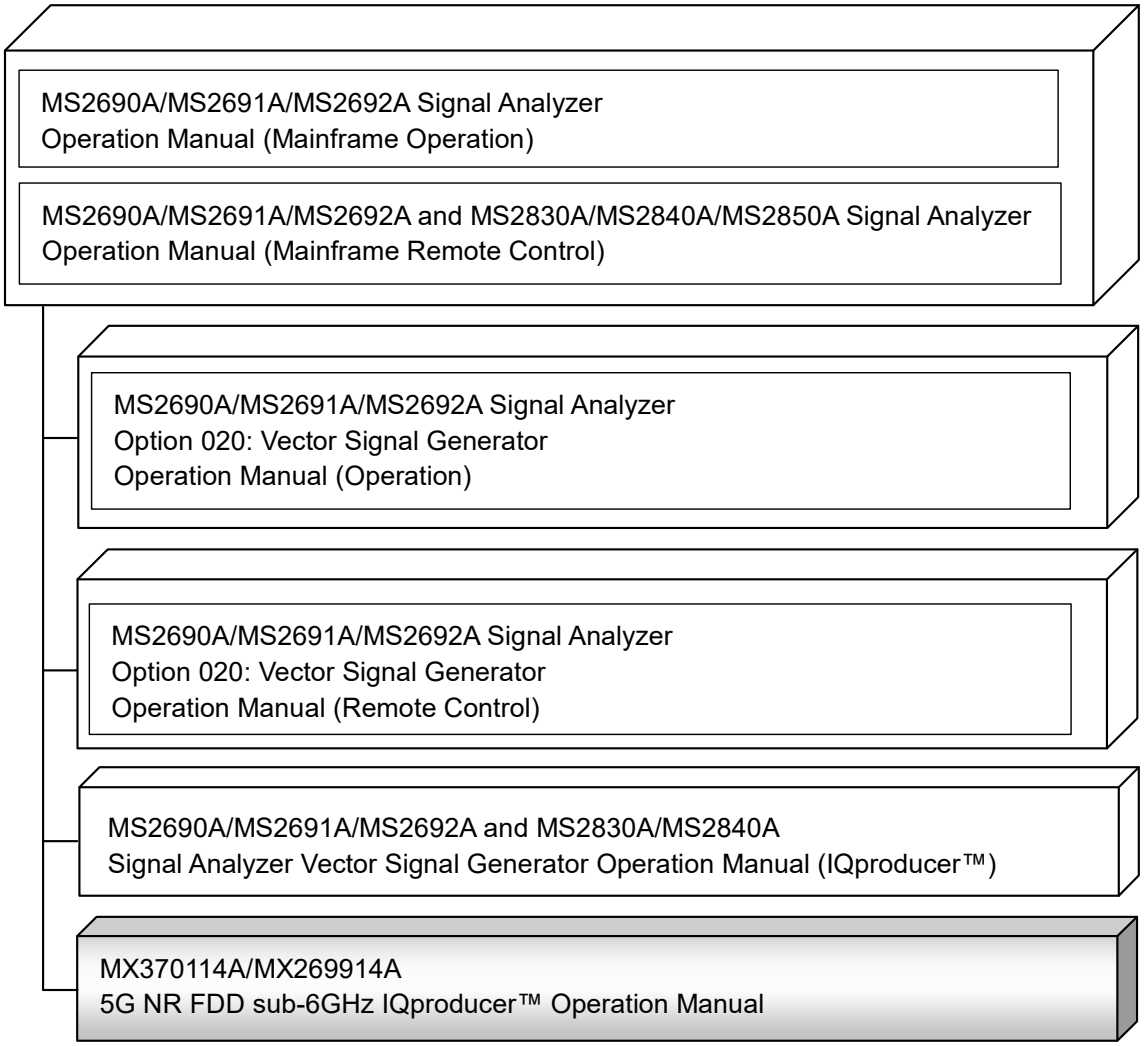
- 5G NR FDD sub-6GHz IQproducer™ Operation Manual (This document)

This describes basic operations and functions of the 5G NR FDD sub-6GHz IQproducer™.

Name Used in This Manual

In this manual, it is assumed that you use MG3710A unless otherwise noted. If you use MG3710E, read MG3710A as MG3710E.

■If using MS2690A/MS2691A/MS2692A:



- 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.

- MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A
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/MS2840A/MS2850A.

- 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.

- 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.

- MS2690A/MS2691A/MS2692A and MS2830A/MS2840A
Signal Analyzer 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.

- 5G NR FDD sub-6GHz IQproducer™ Operation Manual (This document)

This describes basic operations and functions of
the 5G NR FDD sub-6GHz IQproducer™.

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Chapter 1 Overview

This chapter provides an overview of the MX370114A/MX269914A 5G NR FDD sub-6GHz IQproducer™.

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1.1 Product Overview

MX370114A/MX269914A 5G NR FDD sub-6GHz IQproducer™ (hereinafter referred to as “this software”) is software used to generate waveform patterns conforming to the 3GPP 5G NR specifications. These are:

- TS 38.211 V15.6.0 (2019-06)
- TS 38.212 V15.6.0 (2019-06)
- TS 38.213 V15.6.0 (2019-06)

This software requires either of the following environment:

- MG3710A/MG3710E Vector Signal Generator
- MS2690A/MS2691A/MS2692A Signal Analyzer (hereinafter, “MS269xA”) with Vector Signal Generator option mounted
- Personal computer (hereinafter, “PC”)

This software generates waveform patterns that support the specifications of 3GPP 5G NR FDD sub-6GHz 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 MG3710A/MG3710E Vector Signal Generator , or an MS2690A/MS2691A/MS2692A 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	MG3710A/MG3710E	MS2690A MS2691A MS2692A
Software name	MX370114A	MX269914A
Maximum Size of Waveform Patterns*3	64 M sample 128 M sample 256 M sample 512 M sample	256 M sample
Transmission method of Waveform Patterns	LAN, USB flash drive and other external device*1	USB flash drive and other external device*1
Installation of this software to this equipment	Possible	Possible*2

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

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

*3: The following table shows the relationship between Maximum Size of Waveform Patterns and Options.

Table 1.2.1-2 Maximum Size of Waveform Patterns and Options

Maximum Size of Waveform Patterns	MG3710A/MG3710E-x48/x78	MG3710A/MG3710E-x45/x75	MG3710A/MG3710E-x46/x76
64 M sample	X	X	X
128 M sample	✓	X	X
256 M sample	X	✓	X
512 M sample	✓	✓	X
512 M sample	✓/X	✓/X	✓

✓: Installed, X: Not installed, ✓/X : Installed or Not installed

■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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*
  4.5 “File Conversion on Convert Screen”
- *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (IQproducer™)*
  4.5 “File Conversion on Convert Screen”

1.3 Abbreviation

Table 1.3-1 Abbreviation

Abbreviation	Description
CCE	Control channel element
CORESET	Control resource set
DCI	Downlink control information
DMRS	Demodulation reference signal
PBCH	Physical broadcast channel
PDCCH	Physical downlink control channel
PDSCH	Physical downlink shared channel
PSS	Primary synchronization signal
PTRS	Phase-tracking reference signal
PUCCH	Physical uplink control channel
PUSCH	Physical uplink shared channel
RB	Resource block
SCS	Subcarrier spacing
SSS	Secondary synchronization signal

Chapter 2 Preparation

This chapter describes the operating environment for this software.

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2.3.2 Starting Software: When installed on MG3710A/MG3710E 2-6
2.3.3 Exiting Software 2-8

2.1 Operating Environment

The following environment is required for operating this software on PC.

(1) PC that meets the following conditions

OS	Windows 7/Windows 10/Windows 11
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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*
  Chapter 2 “Installation”
- *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (IQproducer™)*
  Chapter 2 “Installation”

■Installing/Uninstalling IQproducer™ license file

For how to install license file to MG3710A/MG3710E, refer to the following manual:

- *MG3700A/MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*
  5.1 “Installing License File”

For how to uninstall license file from MG3710A/MG3710E, refer to each one of the following manuals:

- *MG3710A/MG3710E 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 with Vector Signal Generator option.

- *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual Mainframe Operation*
  3.8 “Installing and Uninstalling”

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 7. The screen image may differ slightly if not using Windows 7.

2.3.1 Starting Software: When installed on other than MG3710A/MG3710E

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 MG3700A, MG3740A, MS2830A, and MS2840A.
- 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™.

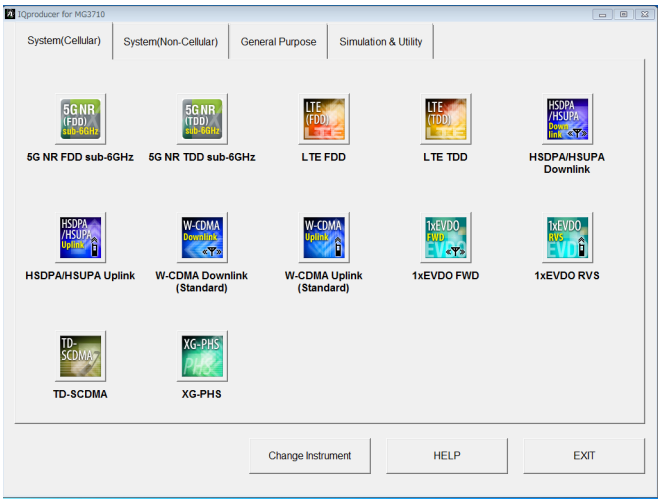

Figure 2.3.1-1 Common Platform Screen

4. Click the **System(Cellular)** tab on the common platform screen, to show the **System(Cellular)** selection screen that supports each telecommunication system.
5. When installed on other than MG3710A, click **5G NR FDD sub-6GHz** to display the Normal setup main screen. For details of the main screen, refer to Chapter 3 “Normal Setup Screen”.

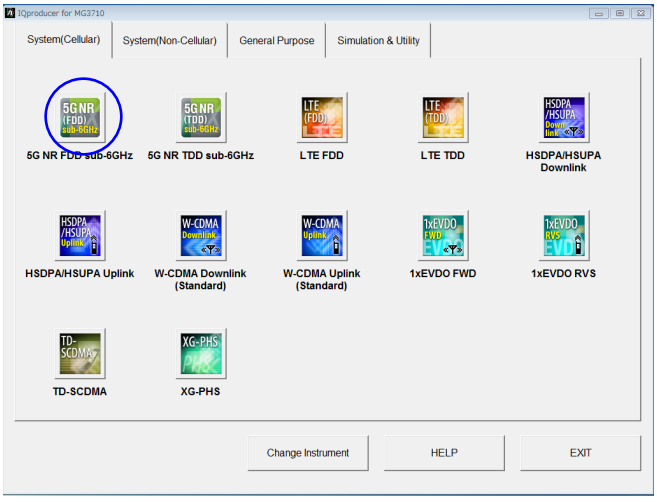

Figure 2.3.1-2 System(Cellular) Selection Screen

Note:

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/MG3710E

Start this software using the following procedure.

<Procedure>

1. Press IQpro on the MG3710A/MG3710E front panel to display the common platform screen.

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

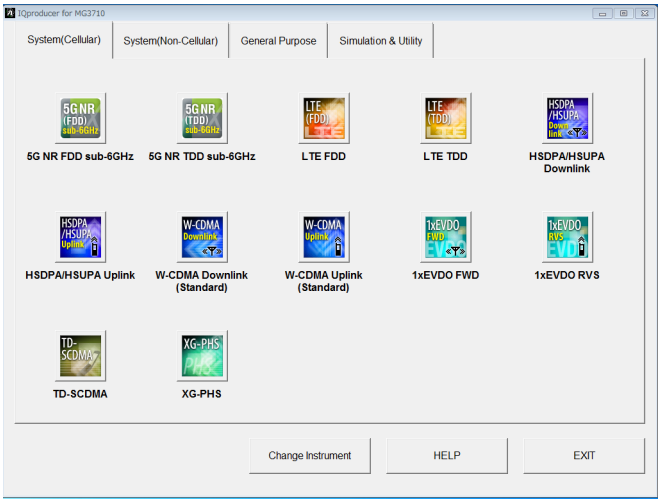

Figure 2.3.2-1 Common Platform Screen

2. Click the **System(Cellular)** tab on the common platform screen, to show the **System(Cellular)** selection screen that supports each telecommunication system.
3. When installed on MG3710A/MG3710E, click **5G NR FDD sub-6GHz** to display the main screen. For details of the main screen, refer to Chapter 3 “Normal Setup Screen”.

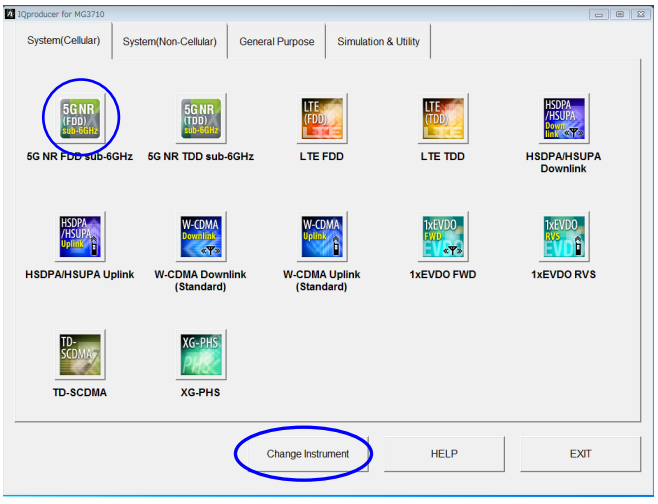

Figure 2.3.2-2 System(Cellular) Selection Screen

Note:

When this software is installed on MG3710A/MG3710E, **Change Instrument** displays instead of **Interface Settings**. Clicking **Interface Settings** displays the Interface Settings dialog box.

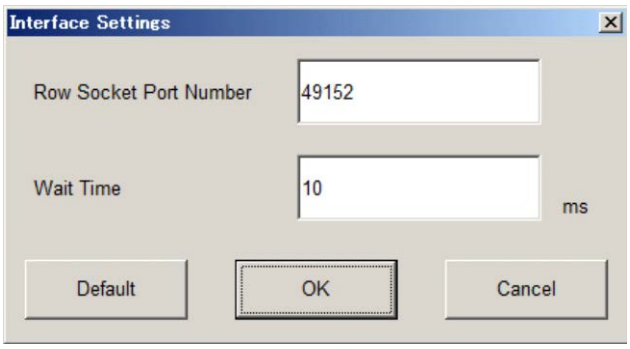

Figure 2.3.2-3 Interface Settings Dialog Box

Here, you can configure interface-related settings of IQproducer™ and MG3710A/MG3710E. To return to factory defaults, click **Default**.

- Row Socket Port Number

  Sets Row Socket port number. Set the same value as that for MG3710A/MG3710E.

- 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.

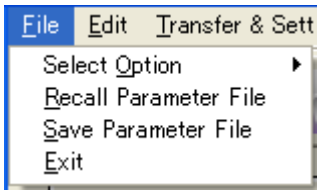

Figure 2.3.3-1 Exiting Software

The operation of the three screen buttons is explained below.

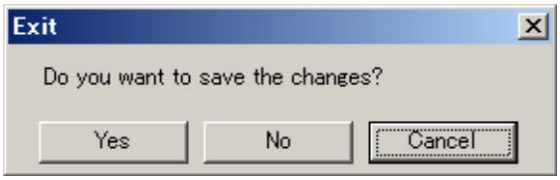

Figure 2.3.3-2 Exit Confirmation Dialog Box

- **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.

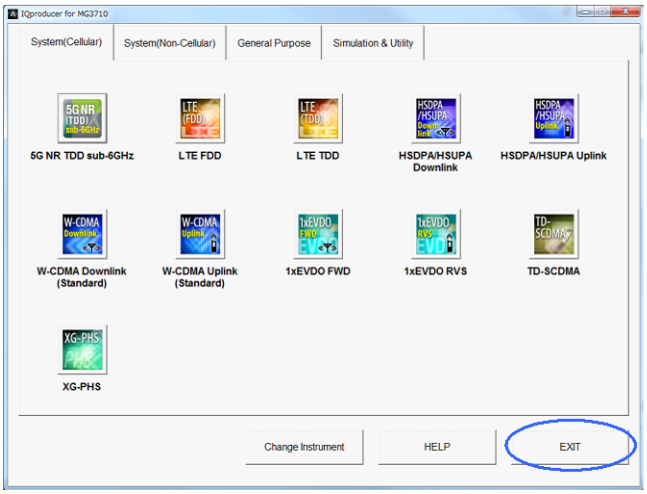

Figure 2.3.3-3 Exiting IQproducer™

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 MG3710A/MG3710E.
- The MS2690A/MS2691A/MS2692A functions are described as notes in each item.

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3.1 Screen Details

3.1.1 Menu and tool button

On common platform screen, click the **System(Cellular)** tab, and then select **5G NR FDD sub-6GHz** to display the Normal setup main screen.

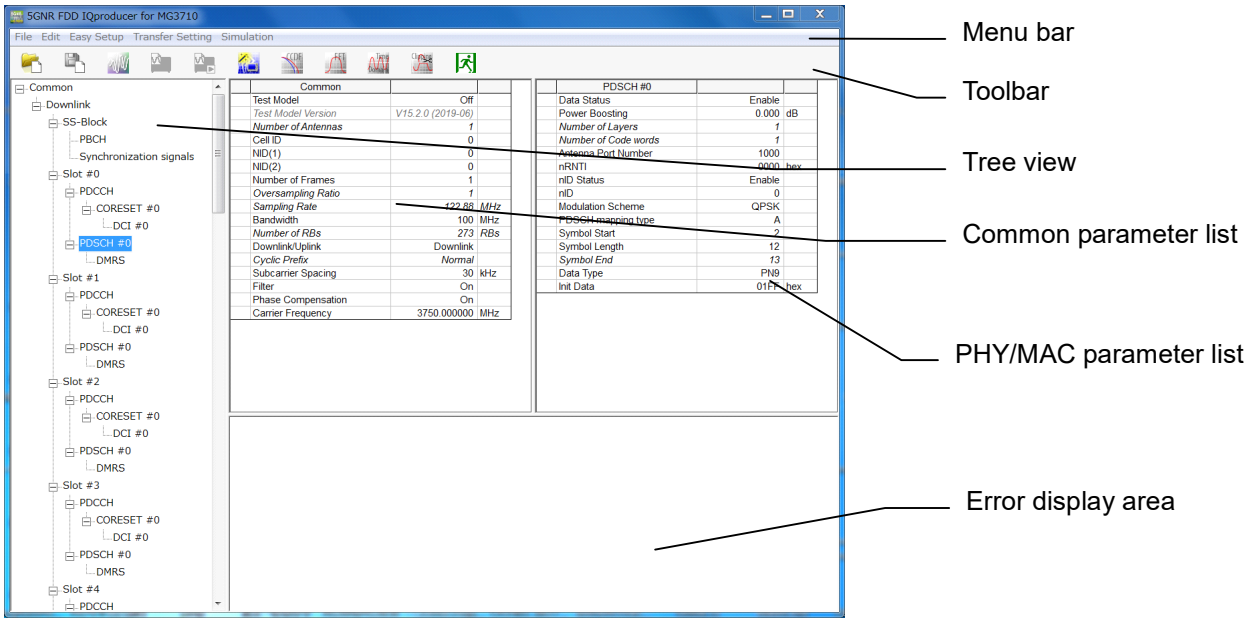


Figure 3.1.1-1 Normal Setup Main Screen

The following table shows the functions of Main screen.

Table 3.1.1-1 Functions of Main Screen

Item	Function
Menu bar	Displays the operation menu. Refer to 3.1.1.1 “Menu Bar”
Tool bar	Displays the icons with a functions. Refer to 3.1.1.2 “Tool bar”
Tree view	Displays the parameter in the hierarchy structure. Refer to 3.1.2 “Tree view”
Common Parameter list	Displays and edits the common parameters. Refer to 3.1.3 “Common Parameter”
PHY/MAC Parameter list	Displays and edits the PHY/MAC parameters. Refer to 3.1.4 “Downlink Parameter” Refer to 3.1.5 “Uplink Parameter”
Error display	Displays the error message Refer to Appendix A “Error message”

The following table shows the icons and screen functions of Main screen.

Table 3.1.1-2 Icons and screen functions of Main screen

Function	Operation
Minimizes the window	Click —.
Maximizes the window	Click □.
Terminates the Window	Click ×.
Expands and reduces the window	Drag the frame of window.
Changes the splitting position	Drag their boundaries to change the splitting position for the fields of the tree view, Common parameter list, PHY/MAC parameter list, and error display.
Opens and closes the item	Click + to open, or – to close at the leftmost symbol of each item in the tree view.

The following table shows the status of items in the PHY/MAC parameter list.

Table 3.1.1-3 Status of items in the PHY/MAC parameter list

Appearance	Status of Parameters
Black	Can be changed. The parameters are related to the generated waveforms in the current setting.
Black italic	Cannot be changed. The parameters are related to the generated waveforms in the current setting. The state of each item may change depending on the setting for other items.
Grayed out italic	Cannot be changed. The parameters are not related to the generated waveforms in the current setting. The state of each item may change depending on the setting for other items.

3.1.1.1 Menu bar

The following table shows the function of the menu bar.

Table 3.1.1.1-1 Menu bar

<table>
<tr><th>Item</th><th colspan="2">Options</th><th colspan="2">Description</th></tr>
<tr><td rowspan="9">File</td><td colspan="2">Select Option</td><td colspan="2">The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) are selected.
Notes:
• This function is available only when MG3710 is selected in the Select instrument screen. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable.
• ARB Memory Expansion (option) is not available for MS269xA. Only Memory 256M samples, 1 GB is available.</td></tr>
<tr><td></td><td>Combinations of Options</td><td>Maximum Size</td></tr>
<tr><td></td><td>Memory 64M samples</td><td>None</td><td>64M samples</td></tr>
<tr><td></td><td>Memory 64M samples x2
(With Option48,78)</td><td>Option 48 and Option 78</td><td>128M samples</td></tr>
<tr><td></td><td>Memory 256M samples</td><td>Option 45 or Option 75</td><td>256M samples</td></tr>
<tr><td></td><td>Memory 256M samples x2
(With Option48,78)</td><td>Option 45 and Option 48,
or Option 75 and Option 78</td><td>512M samples</td></tr>
<tr><td></td><td>Memory 1024M samples</td><td>Option 46 or Option 76</td><td>512M samples</td></tr>
<tr><td></td><td>Memory 1024M samples x2
(With Option48,78)</td><td>Option 46 and Option 48,
or Option 76 and Option 78</td><td>512M samples</td></tr>
<tr><td colspan="2">Recall Parameter File</td><td colspan="2">Loads the parameter files saved by the Save Parameter File menu.</td></tr>
<tr><td colspan="2">Save Parameter File</td><td colspan="2">Saves the current setting parameters to a file.</td></tr>
<tr><td colspan="2">Exit</td><td colspan="2">Exits from this software.</td></tr>
<tr><td rowspan="3">Edit</td><td colspan="2">Calculation</td><td colspan="2">Generates waveform patterns.</td></tr>
<tr><td colspan="2">Calculation & Load</td><td colspan="2">After waveform generation is finished, the created waveform pattern is loaded into the MG3710A/MG3710E waveform memory.
Note:
This function is available only when MG3710 is selected in the Select instrument screen.</td></tr>
<tr><td colspan="2">Calculation & Play</td><td colspan="2">After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A/MG3710E waveform memory.
Note:
This function is available only when MG3710 is selected in the Select instrument screen.</td></tr>
</table>

Table 3.1.1.1-1 Menu bar (Cont'd)

Item	Options	Description
Edit (Cont'd)	**Clipping**	Displays the **Clipping setting** screen. In this screen, clipping and filtering processing can be performed for a generated waveform pattern.
Easy Setup	**BS Test**	Sets the parameters of test models or FRC (Fixed Reference Channels) waveform generation that are defined in 3GPP TS 38.141-1 V15.2.0 (2019-06).
Transfer Setting	**Transfer Setting Wizard**	Displays the **Transfer Setting Wizard** screen. Every operation ranging from connecting the PC and MG3710A/MG3710E and transferring the waveform pattern to the MG3710A/MG3710E, to loading the waveform pattern into the MG3710A/MG3710E ARB memory is performed at this screen. ***Note:*** This function is available only when **MG3710** is selected in the **Select instrument** screen.
Simulation	**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.

3.1.1.2 Tool bar

The following table shows the function of the tool bar.

Table 3.1.1.2-1 Tool bar

Icon	Name	Description
	Recall Parameter File	Each icon performs the same operation as the option with the same name on the menu bar. Refer to Table 3.1.1.1-1 Menu bar
	Save Parameter File	
	Calculation	
	Calculation & Load	
	Calculation & Play	
	Transfer & Setting Wizard	
	CCDF	
	FFT	
	Time Domain	
	Clipping	
	Exit	

3.1.1.3 Screen transition

Figure 3.1.1.3-1 shows transition from the main screen that is displayed when the 5G NR FDD sub-6GHz 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.

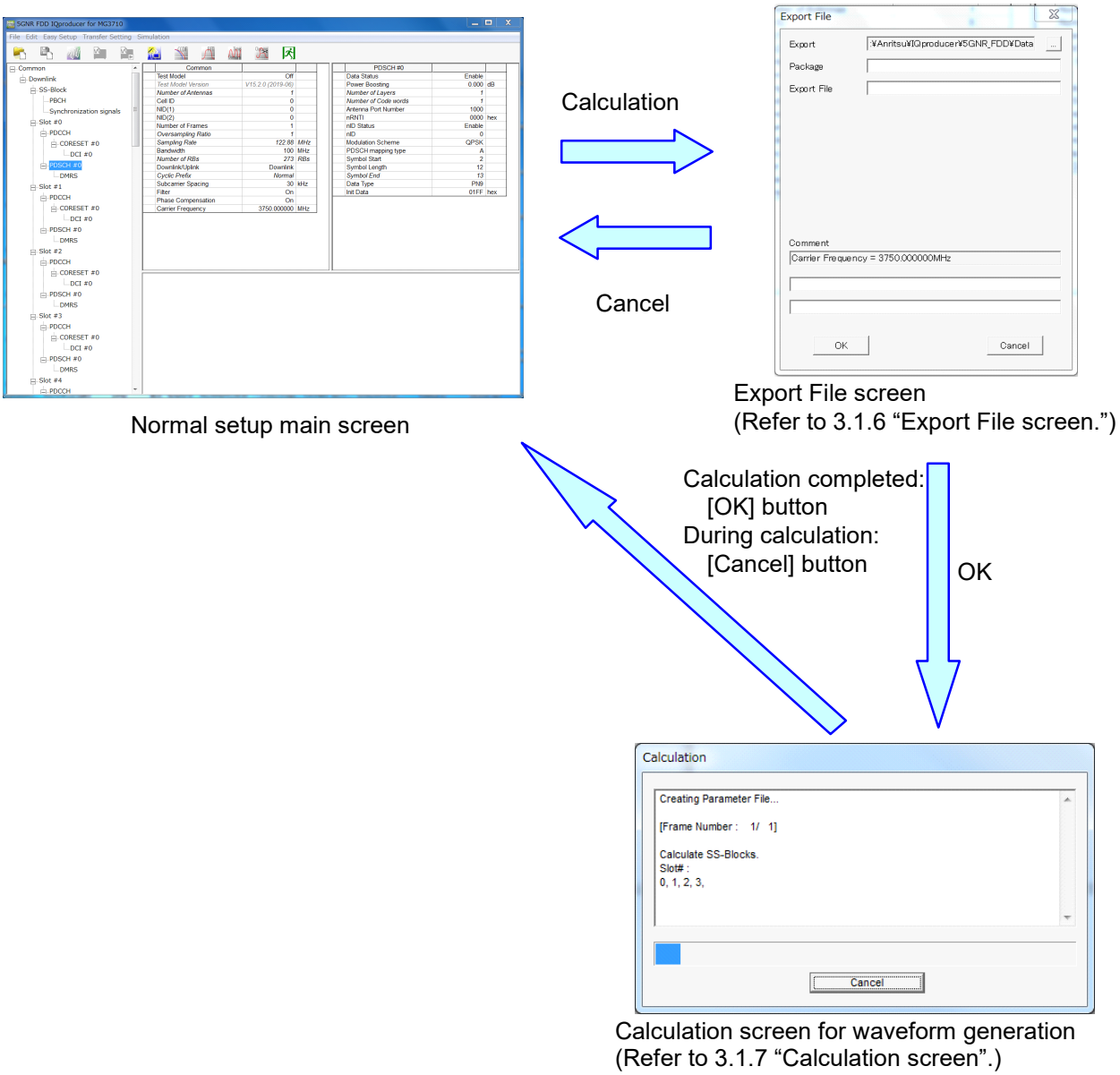


Figure 3.1.1.3-1 Screen transition

3.1.2 Tree view

The tree view displays the parameter that belongs to the waveform pattern to be created in the hierarchy structure.

- 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.

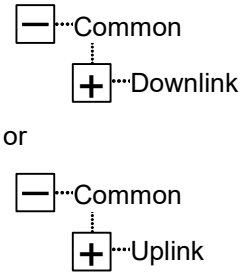


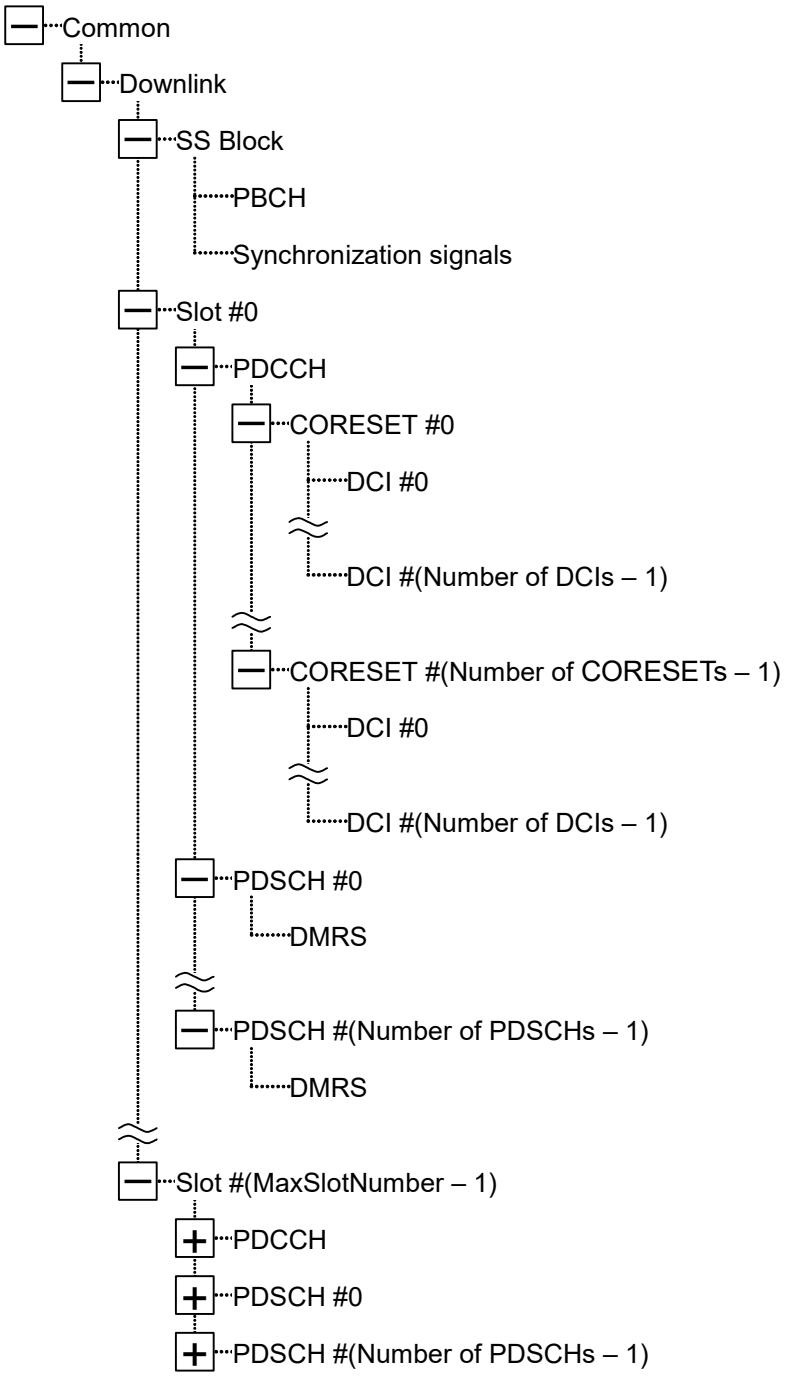
Table 3.1.2-1 Common Tree View

The following table shows the menu when the item is right-clicked in the tree view.

Table 3.1.2-1 Right-clicked menu of the item in the tree view

Example	Item	Function
Slot #0 to 19	Copy	Copies the parameters of the selected slot
	Paste	Applies the copied settings to the selected slot parameter.
	Paste all	Applies the copied settings to all slot parameters.

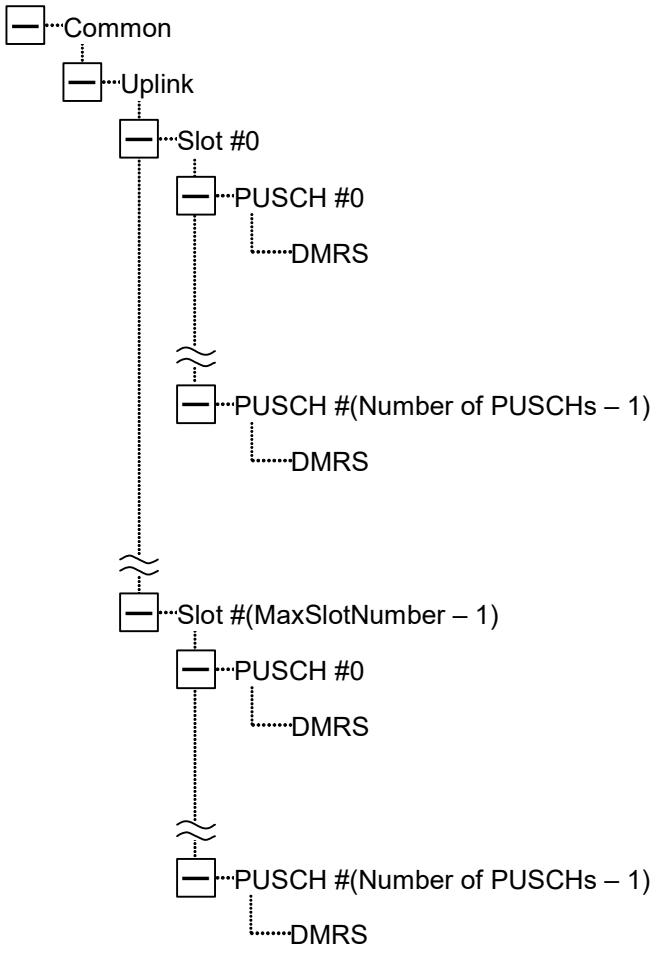
3.1.2.1 Downlink Tree view



Number of DCIs: 1 to 8
Number of CORESETs: 1 to 3
Number of PDSCHs: 1 to 8
MaxSlotNumber: Refer to Table 3.1.4.4-2

Figure 3.1.2.1-1 Downlink Tree View

3.1.2.2 Uplink Tree view



Number of PUSCHs: 1 to 8
MaxSlotNumber: Refer to Table 3.1.5.1-2

Figure 3.1.2.2-1 Uplink Tree View

3.1.3 Common Parameters

When **Common** is selected in the tree view, the following items are displayed in the Common parameter list. The following table shows the items in the Common parameters.

Table 3.1.3-1 Common Parameters

Item	Function
Common	
Test Model	Selects the Test Model. Options: Off (Default), NR-FR1-TM1.1, NR-FR1-TM1.2, NR-FR1-TM2, NR-FR1-TM2a, NR-FR1-TM3.1, NR-FR1-TM3.1a, NR-FR1-TM3.2, NR-FR1-TM3.3
Test Model Version	Selects the version of Test Model reference specification. Options: 38.141 V15.2.0 (2019-06) (Fixed)
Number of Antennas	Sets the number of antennas. Range: 1 (Fixed)
Cell ID	Sets the Cell ID. Range: 0 (Default) to 1007 Resolution: 1 Remarks: NID(1) and NID(2) are automatically calculated after specifying the Cell ID.
NID(1)	Sets the Physical-layer cell-identity group. Range: 0 to 335 Resolution: 1 Remarks: Cell ID is automatically calculated after specifying the NID(1).
NID(2)	Selects the Physical-layer identity. Options: 0 to 2 Resolution: 1 Remarks: Cell ID is automatically calculated after specifying the NID(2).

Table 3.1.3-1 Common Parameters (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Number of Frames</td><td>
Sets the number of frames to be generated.
Range: 1 to the maximum number of frames that can be stored in the waveform memory.
Resolution: 1
Remarks: Maximum number of frames = Maximum number of samples that can be stored in the waveform memory / number of samples per frame
If the size of waveform pattern exceeds 2 GB, the maximum number of samples that can be stored in 2 GB.
Maximum number of samples that can be stored in the waveform memory
<table>
<tr><th>Instrument</th><th colspan="2">Maximum Samples</th></tr>
<tr><td>MS269xA</td><td>256M samples:</td><td>256 M</td></tr>
<tr><td rowspan="6">MG3710A/MG3710E</td><td>64M samples:</td><td>64 M</td></tr>
<tr><td>64M × 2 samples:</td><td>128 M</td></tr>
<tr><td>256M samples:</td><td>256 M</td></tr>
<tr><td>256M × 2 samples:</td><td>512 M</td></tr>
<tr><td>1024M samples:</td><td>512 M</td></tr>
<tr><td>1024M × 2 samples:</td><td>512 M</td></tr>
</table>
Number of samples per frame
<table>
<tr><th>Bandwidth</th><th>Sample / Frame</th><th>Bandwidth</th><th>Sample / Frame</th></tr>
<tr><td>5 MHz</td><td>76800 × OSR*</td><td>50 MHz</td><td>614400 × OSR</td></tr>
<tr><td>10 MHz</td><td>153600 × OSR</td><td>60 MHz</td><td>1228800 × OSR</td></tr>
<tr><td>15 MHz</td><td>307200 × OSR</td><td>70 MHz</td><td>1228800 × OSR</td></tr>
<tr><td>20 MHz</td><td>307200 × OSR</td><td>80 MHz</td><td>1228800 × OSR</td></tr>
<tr><td>25 MHz</td><td>307200 × OSR</td><td>90 MHz</td><td>1228800 × OSR</td></tr>
<tr><td>30 MHz</td><td>614400 × OSR</td><td>100 MHz</td><td>1228800 × OSR</td></tr>
<tr><td>40 MHz</td><td>614400 × OSR</td><td></td><td></td></tr>
</table>
*: OSR: Oversampling Ratio
</td></tr>
<tr><td>Oversampling Ratio</td><td>
Selects the oversampling ratio.
Options: 1, 2, 4, 8
Remarks: The options are determined by the bandwidth.
<table>
<tr><th>Bandwidth (MHz)</th><th>Oversampling Ratio</th></tr>
<tr><td>5, 10</td><td>1, 2, 4, 8</td></tr>
<tr><td>15, 20, 25</td><td>1, 2, 4</td></tr>
<tr><td>30, 40, 50</td><td>1, 2</td></tr>
<tr><td>60, 70, 80, 90, 100</td><td>1</td></tr>
</table>
</td></tr>
</table>

Table 3.1.3-1 Common Parameters (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Sampling Rate</td><td>Displays the calculated value of sampling rate.
Range: Sampling rate =
FFT rate (MHz) × Oversampling ratio
Default: Depends on the default of Bandwidth.
Remarks: FFT rate (MHz)
<table>
<tr><th>Bandwidth (MHz)</th><th>FFT Rate (MHz)</th></tr>
<tr><td>5</td><td>7.68</td></tr>
<tr><td>10</td><td>15.36</td></tr>
<tr><td>15, 20, 25</td><td>30.72</td></tr>
<tr><td>30, 40, 50</td><td>61.44</td></tr>
<tr><td>60, 70, 80, 90, 100</td><td>122.88</td></tr>
</table></td></tr>
<tr><td>Bandwidth</td><td>Selects the system bandwidth.
Options: As in the following table
<table>
<tr><th>DL/UL</th><th>SCS</th><th>Bandwidth (MHz)</th></tr>
<tr><td rowspan="3">Downlink</td><td>15 kHz</td><td>5 (Default), 10, 15, 20, 25, 30, 40, 50</td></tr>
<tr><td>30 kHz</td><td>5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100</td></tr>
<tr><td>60 kHz</td><td>10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100</td></tr>
<tr><td rowspan="3">Uplink</td><td>15 kHz</td><td>5, 10, 15, 20, 25, 30, 40, 50</td></tr>
<tr><td>30 kHz</td><td>5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100</td></tr>
<tr><td>60 kHz</td><td>10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 100</td></tr>
</table>
Remarks: When the bandwidth falls out of range due to subcarrier spacing (SCS) change, it is set to the closest among valid values.</td></tr>
<tr><td>Number of RBs
(Max RB)</td><td>Displays the number of RBs for the current Bandwidth and Subcarrier Spacing.
Default: Depends on the default of Bandwidth.
Unit: RBs
<table>
<tr><th>Bandwidth (MHz)
SCS (kHz)</th><th>5</th><th>10</th><th>15</th><th>20</th><th>25</th><th>30</th><th>40</th></tr>
<tr><td>15</td><td>25</td><td>52</td><td>79</td><td>106</td><td>133</td><td>160</td><td>216</td></tr>
<tr><td>30</td><td>11</td><td>24</td><td>38</td><td>51</td><td>65</td><td>78</td><td>106</td></tr>
<tr><td>60</td><td>N/A</td><td>11</td><td>18</td><td>24</td><td>31</td><td>38</td><td>51</td></tr>
<tr><th>Bandwidth (MHz)
SCS (kHz)</th><th>50</th><th>60</th><th>70</th><th>80</th><th>90</th><th>100</th><th></th></tr>
<tr><td>15</td><td>270</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td></td></tr>
<tr><td>30</td><td>133</td><td>162</td><td>189</td><td>217</td><td>245</td><td>273</td><td></td></tr>
<tr><td>60</td><td>65</td><td>79</td><td>93</td><td>107</td><td>121</td><td>135</td><td></td></tr>
</table></td></tr>
</table>

Table 3.1.3-1 Common Parameters (Cont'd)

Item	Function
Downlink/Uplink	Selects downlink or uplink. Options: Downlink (Default), Uplink
Multiplexing Scheme	Selects CP-OFDM or DFT-s-OFDM for Uplink. Displays when Uplink is set. Options: CP-OFDM (Default), DFT-s-OFDM
Cyclic Prefix	Selects the Cyclic Prefix. Options: Normal (Fixed)
Subcarrier Spacing (SCS)	Selects the subcarrier spacing. Options: 15 kHz (Default), 30 kHz, 60 kHz
Filter	Selects whether to filter. Options: On, Off (Default)
Phase Compensation	Selects whether to perform the Phase Compensation. Options: On (Default), Off
Carrier Frequency	Sets the Carrier Frequency for performing the Phase Compensation. Range: 450 to 6000 MHz Resolution: 0.000001 MHz Default: 3750 MHz

3.1.4 Downlink Parameters

When **Downlink** is selected for **Downlink/Uplink** in the Common parameter list, **Downlink** is displayed under **Common** in the tree view.

When a **Downlink** is selected in the tree view, the Downlink parameters are displayed in the PHY/MAC parameter list. The following items are displayed as the Downlink parameters.

3.1.4.1 SS-Block

SS-Block parameters are the lower setting items of Downlink parameters.
When **SS-Block** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.4.1-1 SS-Block

Item	Function
Downlink	
SS-Block	
Data Status	Enables or disables the SS-Block. Options: Enable (Default), Disable Remarks: When **Disable** is selected, all the SS-Block parameters are disabled. When SCS is set to 60 kHz in the Common parameters, **Data Status** of SS-Block is fixed to **Disable**.
SS-Block Candidate	Selects the mapping pattern of SS-Block. Options: SCS = 15 kHz: A(L=4), A(L=8) (Default) SCS = 30 kHz: B(L=4), B(L=8) (Default), C(L=4), C(L=8) SCS = 60 kHz: Cannot be set.
SS-Block Transmission	Selects the On/Off for each SS Block. Options: On (Default), Off Remarks: The setting dialog box is displayed by double-clicked item. Refer to Figure 3.1.4.1-1 SS Block Transmission Dialog Box
SS-Block Set Burst period	Sets the SS-Block burst period. Options: 10 ms (Fixed)
SS-Block RB Offset	Sets the frequency offset of SS-Block in RB unit. Range: SS-Block Subcarrier Offset = 0: 0 to Max RB – 20 SS-Block Subcarrier Offset ≠ 0: 0 to Max RB – 20 – 1 Default: Floor(Max RB / 2) – 10
SS-Block Subcarrier Offset	Displays the RE (Resource Element) offset in RB of SS-Block. Range: 0 to 11 Default: Number of RBs is even number: 0 Number of RBs is odd number: 6

Table 3.1.4.1-1 SS-Block (Cont'd)

Item	Function
SS Subcarrier Spacing (SS-Block SCS)	Displays the subcarrier spacing of SS-Block. It is the same value as **SCS** in the Common parameters. Options: 15 kHz, 30 kHz Remarks: When **SCS** (Common parameter) is set to 60 kHz, the SS-Block parameters are all disabled.
Data Mapping	Selects whether to map the PDSCH data on the SS Block positions or not (null). Options: PDSCH (Fixed) Remarks: Available when **Data Status** is **Disable**, or when **SCS** (Common parameter) is set to other than **SS-Block SCS**. Unavailable when **SCS** is set to **SS Block SCS**.

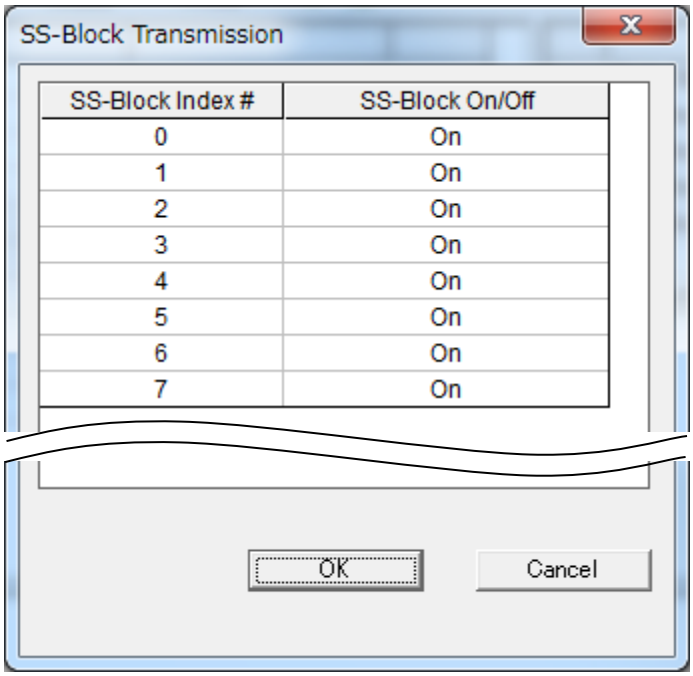


Figure 3.1.4.1-1 SS-Block Transmission Dialog Box

SS-Blocks can be set to On/Off on the SS-Block Transmission dialog box. All the SS-Block Indexes are On by default.

The SS-Block Indexes from #0 to # (Number of SS-Blocks – 1) can be set to On/Off on the list.

The number of SS-Blocks is decided by SS-Block candidate as shown in the following table.

Table 3.1.4.1-2 Number of SS-Blocks

SS-Block Candidate	Number of SS-Blocks
A(L=4)	4
A(L=8)	8
B(L=4)	4
B(L=8)	8
C(L=4)	4
C(L=8)	8

The PHY/MAC parameter list shows the On/Off statuses of the set SS Block Indexes in numeric order, separated by commas.
Example: On,On,On,On,Off,Off,Off,Off

3.1.4.2 PBCH

PBCH parameters are the lower setting items of SS-Block parameters. When **PBCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.4.2-1 PBCH

Item	Function
Downlink	
SS-Block	
PBCH	
Data Type (PBCH)	Sets the data type to be inserted into the PBCH. Options: PN9 (Default), PN15, User File, 16 bit repeat
Data Type User File	Sets the user file to be inserted into the PBCH. Remarks: This parameter is displayed only when **User File** is selected for **Data Type (PBCH)**. Select a user file on the file selection screen and load baseband signals. Refer to Appendix B User File Format.
Data Type Repeat Data	Sets the 16-bit repeat data to be inserted into the PBCH. Range: 0000 (Default) to FFFF Remarks: This parameter is displayed only when 16 bit repeat is selected for **Data Type (PBCH)**.
Init Data	Sets a initial value for PN data generation. Range: 0000 to 01FF (PN9), 7FFF (PN15) Default: 01FF Remarks: This parameter is displayed only when **PN9** or **PN15** is selected for **Data Type (PBCH)**.
PBCH Power Boosting	Sets the PBCH power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB
DMRS for PBCH	
DMRS Power Boosting	Sets the DMRS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB

3.1.4.3 Synchronization signals

Synchronization signals parameters are the lower setting items of SS-Block parameters.
When **Synchronization signals** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.4.3-1 Synchronization Signals

Item	Function
Downlink	
SS-Block	
Synchronization signals	
Primary synchronization signal	
PSS Power Boosting	Sets the PSS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB
Secondary synchronization signal	
SSS Power Boosting	Sets the SSS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB

3.1.4.4 Slot

Slot parameters are the lower setting items of Downlink parameters. When **Slot** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

The settings are the same for Slot #0 to #(MaxSlotNumber – 1).

Table 3.1.4.4-1 Slot

Item	Function
Downlink	
Slot #0 to #(MaxSlotNumber – 1)	MaxSlotNumber: Refer to Table 3.1.4.4-2
Number of PDSCHs	Sets the number of PDSCHs. Range: 1 (Default) to 8
RB arrangement	Sets the PDSCH allocation to RB. Range: PDSCH #0 to PDSCH #(Number of PDSCHs – 1) Default: All RB are PDSCH #0. Remarks: Double-click on RB arrangement displays the RB arrangement dialog box. Refer to Figure 3.1.4.4-1 RB arrangement Dialog Box

Table 3.1.4.4-2 MaxSlotNumber

Subcarrier Spacing	MaxSlotNumber
15 kHz	10
30 kHz	20
60 kHz	40

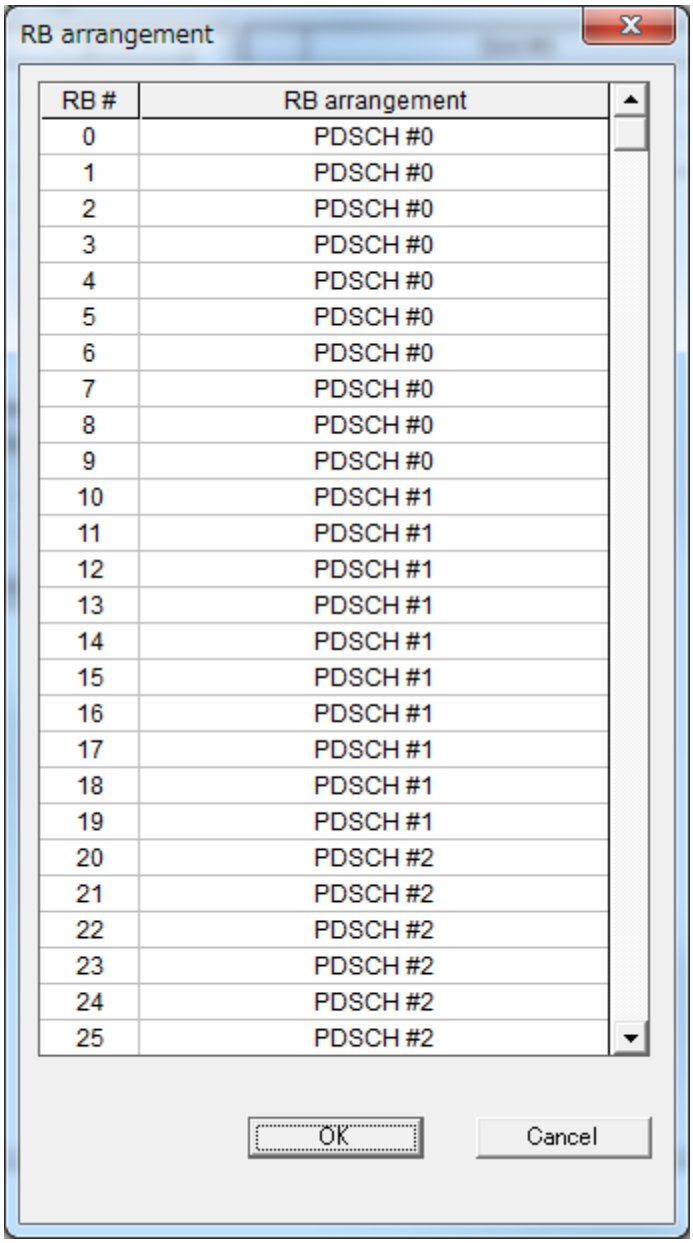


Figure 3.1.4.4-1 RB arrangement Dialog Box

Set PDSCH # in the RB arrangement listbox.

PDSCHs that can be set in the listbox are from PDSCH #0 to PDSCH #(Number of PDSCHs – 1).

The maximum value of RB is decided by SCS and BW.

Table 3.1.4.4-3 Maximum Value of RB

	BW (MHz)									
SCS (kHz)	**5**	**10**	**15**	**20**	**25**	**40**	**50**	**60**	**80**	**100**
15	25	52	79	106	133	216	270	N/A	N/A	N/A
30	11	24	38	51	65	106	133	162	217	273
60	N/A	11	18	24	31	51	65	79	107	135

All the PDSCHs in the listbox must be used.

The PHY/MAC parameter list displays the PDSCH numbers in ascending order of RBs, separated by commas.

3.1.4.5 PDCCH

PDCCH parameters are the lower setting item of Slot parameters. When **PDCCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.4.5-1 PDCCH

Item	Function
Downlink	
Slot #0 to #(MaxSlotNumber – 1)	
PDCCH	
Data Status	Enables or disables the PDCCH parameter. Options: Enable (Default), Disable Remarks: Can be set for each slot. When **Disable** is selected, all PDCCH parameters are disabled. Fixed to **Disable** when **PDSCH Mapping Type** is **B**.
Number of CORESETs	Sets the number of CORESETs. Options: 1 (Default) to 3
PDCCH ID Data Type	Selects the data type for PDCCH ID. Options: Cell ID (Default), User Defined
PDCCH ID	Sets the ID of PDCCH. Range: 0 (Default) to 65535 Remarks: Can be set when **PDCCH ID Data Type** is **User Defined.** Fixed to Cell ID when **PDCCH ID Data Type** is **Cell ID**.
nRNTI	Sets the nRNTI (Radio Network Temporary Identifier). Range: 0000 (Default) to FFFF Remarks: Can be set when **PDCCH ID Data Type** is **User Defined.** Unavailable when **PDCCH ID Data Type** is **Cell ID**.
Frequency Domain Resources	Sets the arrangement of CORESET in frequency direction. Range: Frequency Domain Resource #0 to 44 Remarks: The upper limit of Frequency Domain Resource is calculated by Number of RBs as below. Note that the maximum value is 44. Upper limit of Frequency Domain Resource = floor(Number of RBs / 6), where floor(x) is the function for finding the largest integer that does not exceed x. Double-click on **Frequency Domain Resources** displays the **Frequency Domain Resources** dialog box. Refer to Figure 3.1.4.5-1 Frequency Domain Resources Dialog Box
PDCCH Power Boosting	Sets the PDCCH power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB
DMRS for PDCCH	
DMRS Power Boosting	Sets the DMRS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB

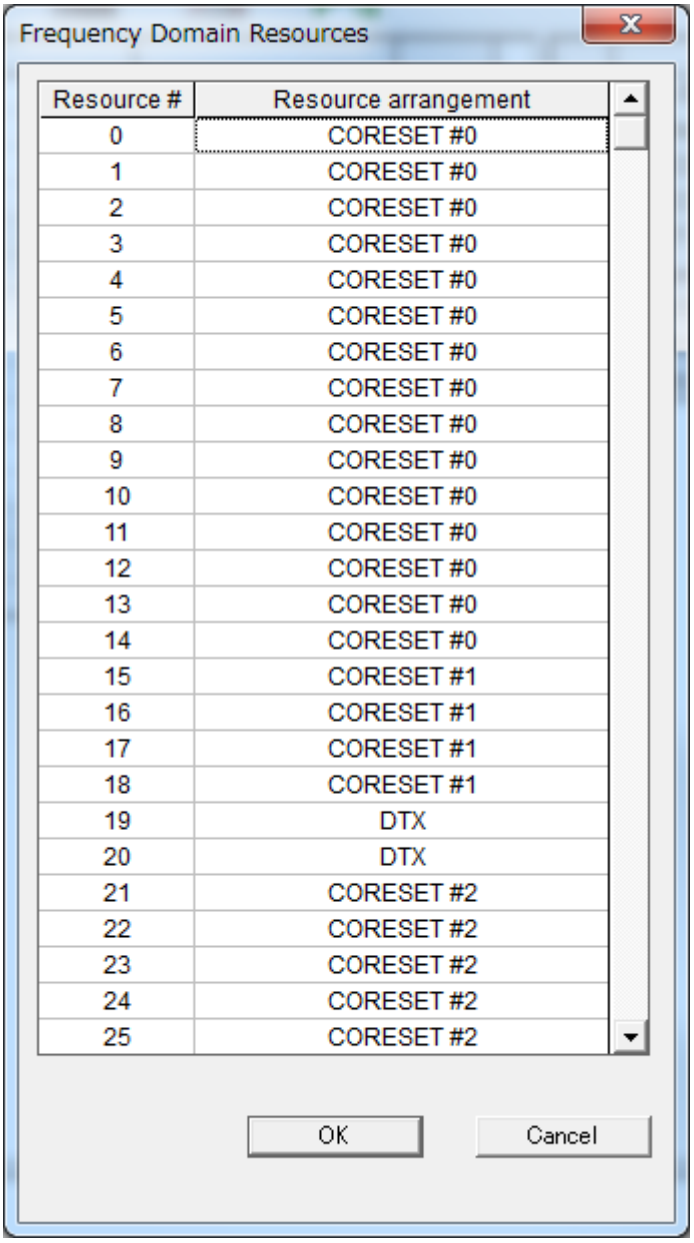


Figure 3.1.4.5-1 Frequency Domain Resources Dialog Box

Select **CORESET** or **DTX** from the pulldown menu in the listbox of Resource arrangement.

Not all the CORESETs and DTXs in the listbox need to be used.

The PHY/MAC parameter list displays the CORESET number or DTX in ascending order, separated by commas.
Example: 0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1,1,1,DTX,DTX,DTX,2,2,2

3.1.4.6 CORESET

CORESET parameters are the lower setting items of PDCCH parameters.
When **CORESET** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

The settings are the same for CORESET #0 to #(CORESET – 1).

Table 3.1.4.6-1 CORESET

Item	Function
Downlink	
Slot #0 to #(MaxSlotNumber – 1)	
PDCCH	
CORESET #0 to #(Number of CORESETs – 1) Number of CORESETs:1 to 3	
Start Symbol	Sets the start symbol of CORESET. Range: 0 (Fixed)
Number of Symbols	Selects the number of symbols in one CORESET. Options: 1 (Default) to 3
Number of DCIs	Sets the number of DCIs in one CORESET. Range: 1 (Default) to 8
Number of RBs In One CORESET	Displays the number of RBs per symbol in one CORESET. Range: Number of Symbols = 1: 6 Number of Symbols = 2: 3 Number of Symbols = 3: 2
Precoder Granularity	Sets the Precoder Granularity. Options: Same As REG-bundle, All Contiguous RBs (Default) Remarks: When set to **Same As REG-bundle**, the demodulation reference signal for PDCCH is mapped only in the range allocated to DCI in CORESET. When set to **All Contiguous RBs**, the demodulation reference signal for PDCCH is mapped in the entire CORESET.

3.1.4.7 DCI

DCI parameters are the lower setting items of CORESET parameters. When **DCI** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

The settings are the same for DCI #0 to #(Number of DCIs – 1).

Table 3.1.4.7-1 DCI

Item	Function
Downlink	
Slot #0 to #(MaxSlotNumber – 1)	
PDCCH	
CORESET #0 to #(Number of CORESETs – 1)	
DCI #0 to #(Number of DCIs – 1)	Number of DCIs:1 to 8
CORESET Number	Displays the corresponding CORESET number. Range: 0 to CORESET number – 1 Remark: Displays the CORESET number of upper layer DCI in hierarchy structure.
First CCE Index In CORESET	Sets the start number of CCE Index in CORESET. Range: 0 (Default) to Maximum CCE Index in CORESET
Aggregation Level	Selects a value for Aggregation Level. Options: 1 (Default), 2, 4, 8, 16
Data Type (DCI)	Selects data type to insert into DCI. Options: PN9 (Default), PN15, User File, 16 bit repeat
Data Type User File	Selects a user file to insert into DCI. Remark: Displayed when **Data Type (DCI)** is **User File**. Select a user file on the file selection screen and load baseband signals. Refer to Appendix B “User File Format”
Data Type Repeat Data	Sets data to repeat when **16 bit repeat** is selected for **Data Type**. Range: 0000 (Default) to FFFF Remark: Displayed when **Data Type (DCI)** is **16 bit repeat**.
Init Data	Sets a initial value for PN data generation. Range: 0000 to 01FF (PN9), 7FFF (PN15) Default: 01FF Remark: Displayed when **Data Type (DCI)** is **PN9** or **PN15**.

3.1.4.8 PDSCH

PDSCH parameters are the lower setting items of Slot parameters.
When **PDSCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.
The settings are the same for PDSCH #0 to #(Number of PDSCHs – 1).

Table 3.1.4.8-1 PDSCH

Item	Function
Downlink	
Slot #0 to #(MaxSlotNumber – 1)	
PDSCH #0 to #(Number of PDSCHs – 1)	Number of PDSCHs:1 to 8
Data Status	Enables or disables the PDSCH. Options: Enable (Default), Disable Remark: Can be set for each slot. When **Disable** is selected, all PDSCH parameters are disabled.
Power Boosting	Sets the PDSCH and DMRS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB Remark: Can be set for each slot.
Number of Layers	Selects a number of layers. Options: 1 (Fixed)
Number of Code words	Selects a number of code words. Options: 1 (Fixed)
Antenna Port Number	Selects the antenna port number. Options: 1000 (Default) to 1003: DMRS Configuration Type is Type1 1000 (Default) to 1005: DMRS Configuration Type is Type2 Remark: Can be set for each slot.
nRNTI	Sets nRNTI (Radio Network Temporary Identifier). Range: 0000 (Default) to FFFF Remark: Common among the slots of the same PDSCH #.
nID Status	Enables or disables nID. Options: Enable (Default), Disable Remark: Can be set for each slot.
nID	Sets nID. Range: 0 (Default) to 1023: nID Status is Enable Cell ID: nID Status is Disable Remark: Can be set for each slot.
Modulation Scheme	Selects the modulation scheme. Options: QPSK (Default), 16QAM, 64QAM, 256QAM Remark: Can be set for each slot.
PDSCH mapping type	Selects PDSCH mapping type. Options: A (Default), B Remark: Can be set for each slot.

Table 3.1.4.8-1 PDSCH (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Symbol Start</td><td>Selects PDSCH symbol start.
Options: As in the table below.
<table>
<tr><th>PDSCH mapping type</th><th>DMRS TypeA Position</th><th>Symbol Start</th></tr>
<tr><td>A</td><td>3</td><td>3 (Fixed)</td></tr>
<tr><td>A</td><td>2</td><td>0, 1, 2 (Default)</td></tr>
<tr><td>B</td><td>–</td><td>0 (Default) to 12</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>Symbol Length</td><td>Selects the PDSCH symbol length.
Options: As in the table below.
<table>
<tr><th>PDSCH mapping type</th><th>Symbol Length</th></tr>
<tr><td>A</td><td>3 to 14 – Symbol Start (Default)</td></tr>
<tr><td>B</td><td>2 (Default), 4, or 7
It should be under 14 – Symbol Start.</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>Symbol End</td><td>Displays PDSCH symbol end.
Display: Calculated by Symbol Length + Symbol Start – 1
Remark: Displays for each slot.</td></tr>
<tr><td>Data Type (PDSCH)</td><td>Selects data type to insert PDSCH.
Options: PN9 (Default), PN15, User File, 16 bit repeat
Remark: Common among the slots of the same PDSCH #.</td></tr>
<tr><td>Data Type User File</td><td>Selects a user file to insert into PDSCH.
Remark: Common among the slots of the same PDSCH #.
Displayed when Data Type (PDSCH) is User File.
Select a user file on the file selection screen and load baseband signals.
Refer to Appendix B “User File Format”.</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat when 16 bit repeat is selected for Data Type.
Range: 0000 (Default) to FFFF
Remark: Displayed when Data Type (PDSCH) is 16 bit repeat.</td></tr>
<tr><td>Init Data</td><td>Sets a initial value for PN data generation.
Range: 0000 to 01FF (PN9), 7FFF (PN15)
Default: 01FF
Remark: Common among the slots of the same PDSCH #.
Displayed when Data Type (PDSCH) is PN9 or PN15.</td></tr>
</table>

3.1.4.9 DMRS

DMRS parameters are lower setting items under the PDSCH parameters.
When **DMRS** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.4.9-1 DMRS

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Downlink</td><td></td></tr>
<tr><td>Slot #0 to #(MaxSlotNumber – 1)</td><td></td></tr>
<tr><td>PDSCH #0 to #(Number of PDSCHs – 1)</td><td></td></tr>
<tr><td>DMRS</td><td></td></tr>
<tr><td>nSCID</td><td>Sets nSCID.
Range: 0 (Default), 1
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Selects the data type for DMRS nSCID.
Options: Cell ID (Default), User Defined
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID.
Range: 0 (Default) to 65535
Remark: Can be set for each slot.
Can be set when DMRS nSCID Data Type is User Defined.
Fixed to Cell ID when DMRS nSCID Data Type is Cell ID.</td></tr>
<tr><td>DMRS Length</td><td>Selects the length of DMRS symbol.
Options: 1 (Fixed)</td></tr>
<tr><td>DMRS Additional Position</td><td>Selects additional positions of DMRS.
Options: 0 (Default), 1, 2, 3 (as in the table below)
<table>
<tr><th>PDSCH mapping type</th><th>Symbol Length</th><th>Options</th></tr>
<tr><td>A</td><td>≥ 3</td><td>0, 1, 2, 3</td></tr>
<tr><td>B</td><td>2, 4, 7</td><td>0, 1</td></tr>
<tr><td colspan="2">Other than the above</td><td>Unavailable</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS Configuration Type</td><td>Selects DMRS configuration type.
Options: 1 (Default), 2
Remark: Can be set for each slot.</td></tr>
</table>

Table 3.1.4.9-1 DMRS (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data into DMRS.
Range: As in the table below.
<table>
<tr><th>DMRS Configuration Type</th><th>DMRS Length</th><th>Number of Code words</th><th>Antenna Port Number</th><th>Range</th><th>Default</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1000</td><td>1, 2</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1001</td><td>1, 2</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1002</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1003</td><td>2</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1000</td><td>1, 2, 3</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1001</td><td>1, 2, 3</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1002</td><td>2, 3</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1003</td><td>2, 3</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1004</td><td>3</td><td>3</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1005</td><td>3</td><td>3</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS TypeA Position</td><td>Selects the DMRS l_0 position when PDSCH mapping type is A.
Options: 2, 3 (Default)
Remark: Can be set for each slot.
Can be set when PDSCH mapping type is A.</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets the DMRS power boosting for the ideal signal.
Range: –20.000 to 20.000 dB
Resolution: 0.001 dB
Default: 0.000 dB
Remark: Can be set for each slot.
Updated to a value as in the table below when Number of DMRS CDM groups without Data is set.
<table>
<tr><th>DMRS Configuration Type</th><th>Number of DMRS CDM Groups without Data</th><th>Power Boosting (dB)</th></tr>
<tr><td>1</td><td>1</td><td>0.000</td></tr>
<tr><td>1</td><td>2</td><td>3.000</td></tr>
<tr><td>2</td><td>1</td><td>0.000</td></tr>
<tr><td>2</td><td>2</td><td>3.000</td></tr>
<tr><td>2</td><td>3</td><td>4.770</td></tr>
</table></td></tr>
</table>

3.1.5 Uplink parameters

When **Downlink/Uplink** in the common parameter list is set to **Uplink**, **Uplink** is displayed under **Common** in the tree view.

When **Uplink** is selected in the tree view, the Uplink parameters are displayed in the PHY/MAC parameter list. The following sections explain the Uplink parameter items.

3.1.5.1 Slot

The Slot parameters are lower setting items of the Uplink parameters. When **Slot** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

The settings are the same for Slot #0 to #(MaxSlotNumber – 1).

Table 3.1.5.1-1 Slot

Item	Function
Uplink	
Slot #0 to #(MaxSlotNumber – 1)	MaxSlotNumber:As in Table 3.1.5.1-2.
Number of PUSCHs	Sets the number of PUSCH. Range: 1 (Default) to 8

Table 3.1.5.1-2 MaxSlotNumber

Subcarrier Spacing	MaxSlotNumber
15 kHz	10
30 kHz	20
60 kHz	40

3.1.5.2 PUSCH

The PUSCH parameters are lower setting items of the Slot parameters. When **PUSCH** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.5.2-1 PUSCH

Item	Function
Uplink	
Slot #0 to #(MaxSlotNumber – 1)	
PUSCH #0 to #(Number of PUSCHs – 1)	Number of PUSCHs: 1 to 8
Data Status	Enables or disables PUSCH parameters. Options: Enable (Default), Disable Remark: Can be set for each slot. When **Disable** is selected, all PUSCH parameters are disabled.
Power Boosting	Sets the PUSCH and DMRS power boosting for the ideal signal. Range: –20.000 to 20.000 dB Resolution: 0.001 dB Default: 0.000 dB Remark: Can be set for each slot.
Number of Layers	Selects a number of layers. Options: 1 (Fixed)
Number of Code words	Selects a number of code words. Options: 1 (Fixed)
Antenna Port Number	Selects the antenna port number. Options: 0 (Default) to 3: DMRS Configuration Type is Type1 0 (Default) to 5: DMRS Configuration Type is Type2 Remark: Can be set for each slot.
nRNTI	Sets nRNTI (Radio Network Temporary Identifier). Range: 0000 (Default) to FFFF Remark: Can be set for each slot.
nID Status	Enables or disables nID status. Options: Enable (Default), Disable Remark: Common among the slots of the same PUSCH #.
nID	Sets nID. Range: 0 (Default) to 1023: nID Status is Enable Cell ID: nID Status is Disable

Table 3.1.5.2-1 PUSCH (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>Modulation Scheme</td><td>Selects the modulation scheme.
Options: QPSK (Default), 16QAM, 64QAM, 256QAM, PI/2-BPSK
Remark: Can be set for each slot.
When Multiplexing Scheme is DFT-s-OFDM, PI/2 – BPSK can be selected.
When Data Type (PUSCH) is UL-SCH, a value is decided as in the table below and cannot be changed.
Refer to Table 3.1.5.3-2, Table 3.1.5.3-3</td></tr>
<tr><td>PUSCH mapping type</td><td>Selects PUSCH mapping type.
Options: A (Default), B
Remark: Can be set for each slot.</td></tr>
<tr><td>RB Start</td><td>Sets RB start of PUSCH.
Range: 0 (Default) to Max RB – 1
Remark: Can be set for each slot.</td></tr>
<tr><td>Number of RBs</td><td>Sets the number of RB from RB Start.
Range: 1 to Max RB – RB Start (Default)
Remark: Can be set for each slot.
When Multiplexing Scheme is DFT-s-OFDM, only RB that meets the following condition can be set.
Number of RBs = $2^{\alpha 2} \times 3^{\alpha 3} \times 5^{\alpha 5}$
($\alpha 2$, $\alpha 3$, and $\alpha 5$ are positive integers)</td></tr>
<tr><td>RB End</td><td>Displays RB end of PUSCH.</td></tr>
<tr><td>Symbol Start</td><td>Selects Symbol Start of PUSCH.
Options: As in the table below.
<table>
<tr><th>PUSCH mapping type</th><th>Symbol Start</th></tr>
<tr><td>A</td><td>0 (Fixed)</td></tr>
<tr><td>B</td><td>0 (Default) to 13</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>Symbol Length</td><td>Selects Symbol Length of PUSCH.
Options: As in the table below.
<table>
<tr><th>PUSCH mapping type</th><th>Symbol Length</th></tr>
<tr><td>A</td><td>4 to 14 – Symbol Start (Default)</td></tr>
<tr><td>B</td><td>1 to 14 – Symbol Start (Default)</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>Symbol End</td><td>Displays PUSCH symbol end.
Range: Calculated by Symbol Length + Symbol Start –1.
Remark: Displays for each slot.</td></tr>
<tr><td>Data Type (PUSCH)</td><td>Selects data to insert into PUSCH.
Options: PN9 (Default), PN15, User File, 16 bit repeat, UL-SCH
Remark: Common among the slots of the same PUSCH #.
When UL-SCH is selected, Modulation Scheme is invalid.
Refer to 3.1.5.3 “UL-SCH”.</td></tr>
</table>

Table 3.1.5.2-1 PUSCH (Cont'd)

Item	Function
Data Type User File	Selects a user file to insert into PUSCH. Remark: Common among the slots of the same PUSCH #. Displayed when **Data Type (PUSCH)** is **User File.** Select a user file on the file selection screen and load baseband signals. Refer to Appendix B "User File Format".
Data Type Repeat Data	Sets data to repeat when 16 bit repeat is selected for Data Type. Range: 0000 (Default) to FFFF Remark: Displayed when **Data Type (PUSCH)** is **16 bit repeat**.
Init Data	Sets a initial value for PN data generation. Range: 0000 to 01FF (PN9), 7FFF (PN15) Default: 01FF Remark: Common among the slots of the same PUSCH #. Displayed when **Data Type (PUSCH)** is **PN9** or **PN15**.

3.1.5.3 UL-SCH

When **PUSCH Data Type** is set to **UL-SCH**, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.5.3-1 UL-SCH

Item	Function
Uplink	
Slot #0 to #(MaxSlotNumber – 1)	
PUSCH #0 to #(Number of PUSCHs – 1) Number of PUSCHs: 1 to 8	
UL-SCH	
Rate Matching	Select what to use as rate matching. Options: FBRM (Fixed value) Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**.
MCS Index	Specify the MCS Index. Range: 0 (Default) to 27 (Table 1, 3), 28 (Table 2) Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**. Refer to Table 3.1.5.3-3
MCS Table	Selects a table to use as MCS Table. Options: 64QAM (Default), 256QAM Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**. Refer to Table 3.1.5.3-2
PI/2-BPSK Support	Selects whether to support PI/2-BPSK. Options: Enable, Disable (Default) Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH** and **Multiplexing Scheme** is **DFT-s-OFDM**. Refer to Table 3.1.5.3-3
Redundancy Version	Selects Redundancy Version. Options: 0 (Default), 1, 2, 3 Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**.
Transport Block Size	Sets the size of transport block. Range: 0 (Default) to a value according to PUSCH setting Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**. The maximum value changes according to PUSCH setting.
Data Type (UL-SCH)	Selects data to insert into UL-SCH. Options: PN9 (Default), PN15, User File, 16 bit repeat Remark: Displayed when **Data Type (PUSCH)** is **UL-SCH**.
Data Type User File	Selects a user file to insert into UL-SCH. Remark: Displayed when **Data Type (UL-SCH)** is **User File**. Select a user file on the file selection screen and load baseband signals. Refer to Appendix B “User File Format”
Data Type Repeat Data	Sets data to repeat when **16 bit repeat** is selected for **Data Type**. Range: 0000 (Default) to FFFF Remark: Displayed when **Data Type (UL-SCH)** is **16 bit repeat**
Init Data	Sets a initial value for PN data generation. Range: 0000 to 01FF (PN9), 7FFF (PN15) Default: 01FF Remark: Displayed when **Data Type (UL-SCH)** is **PN9** or **PN15**.

Table 3.1.5.3-2 Reference Table

Multiplexing Scheme	MCS Table	Reference Table	Standard Table (38.214)
CP-OFDM	256QAM	Table 3.1.5.3-3 Table 1	Table 5.1.3.1-2
CP-OFDM	64QAM	Table 3.1.5.3-3 Table 2	Table 5.1.3.1-1
DFT-s-OFDM	256QAM	Table 3.1.5.3-3 Table 1	Table 5.1.3.1-2
DFT-s-OFDM	64QAM	Table 3.1.5.3-3 Table 3	Table 6.1.4.1-1

Table 3.1.5.3-3 Modulation Scheme

<table>
<tr><th></th><th>Table 1</th><th>Table 2</th><th>Table 3</th></tr>
<tr><th>MCS Index</th><th>Modulation Scheme</th><th>Modulation Scheme</th><th>Modulation Scheme</th></tr>
<tr><td>0</td><td rowspan="5">QPSK</td><td rowspan="10">QPSK</td><td>q*</td></tr>
<tr><td>1</td><td rowspan="9">QPSK</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td><td rowspan="5">16QAM</td></tr>
<tr><td>6</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td><td rowspan="5">16QAM</td><td rowspan="5">16QAM</td></tr>
<tr><td>11</td><td rowspan="9">64QAM</td></tr>
<tr><td>12</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td></tr>
<tr><td>15</td><td rowspan="13">64QAM</td><td rowspan="13">64QAM</td></tr>
<tr><td>16</td></tr>
<tr><td>17</td></tr>
<tr><td>18</td></tr>
<tr><td>19</td></tr>
<tr><td>20</td><td rowspan="8">256QAM</td></tr>
<tr><td>21</td></tr>
<tr><td>22</td></tr>
<tr><td>23</td></tr>
<tr><td>24</td></tr>
<tr><td>25</td></tr>
<tr><td>26</td></tr>
<tr><td>27</td></tr>
<tr><td>28</td><td>–</td><td>–</td></tr>
</table>

*: • q = PI/2-BPSK PI/2-BPSK Support is Enable
• q = QPSK PI/2-BPSK Support is Disable

3.1.5.4 DMRS

The DMRS parameters are lower setting items of the PUSCH parameters.
When **DMRS** is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table 3.1.5.4-1 DMRS

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td colspan="2">Uplink</td></tr>
<tr><td colspan="2">Slot #0 to #(MaxSlotNumber – 1)</td></tr>
<tr><td colspan="2">PUSCH #0 to #(Number of PUSCHs – 1)　　Number of PUSCHs: 1 to 8</td></tr>
<tr><td colspan="2">DMRS</td></tr>
<tr><td>Group Hopping</td><td>Enables or disables Group Hopping.
Options:　Enable, Disable (Default)
Remark:　Displayed when Multiplexing Scheme is DFT-s-OFDM.</td></tr>
<tr><td>Sequence Hopping</td><td>Enables or disables Sequence Hopping.
Options:　Enable, Disable (Default)
Remark:　Displayed when Multiplexing Scheme is DFT-s-OFDM.
Fixed to Disable when Group Hopping is Enable.</td></tr>
<tr><td>PUSCH ID</td><td>Sets PUSCH ID.
Range:　0 (Default) to 1007
Remark:　Displayed when Multiplexing Scheme is DFT-s-OFDM.</td></tr>
<tr><td>nSCID</td><td>Selects nSCID.
Options:　0 (Default), 1
Remark:　Common among the slots of the same PUSCH #.
Fixed to 0 when DMRS nSCID Data Type is Cell ID.</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Selects DMRS nSCID Data Type.
Options:　Cell ID (Default), User Defined
Remark:　Common among the slots of the same PUSCH #.</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID.
Range:　0 (Default) to 65535
Remark:　Common among the slots of the same PUSCH #.
Can be set when DMRS nSCID Data Type is User Defined.
Fixed to Cell ID when DMRS nSCID Data Type is Cell ID.</td></tr>
<tr><td>DMRS Length</td><td>Selects DMRS symbol length.
Options:　1 (Fixed)</td></tr>
<tr><td>DMRS Additional Position</td><td>Selects the number of DMRS additional positions.
Options:　0 (Default), 1, 2, 3
<table>
<tr><th>PUSCH mapping type</th><th>Symbol End – Symbol Start</th><th>Options</th></tr>
<tr><td>A</td><td>≥ 3</td><td>0, 1, 2, 3</td></tr>
<tr><td>B</td><td>(Any value)</td><td>0, 1, 2, 3</td></tr>
<tr><td colspan="2">Other than the above</td><td>Unavailable</td></tr>
</table>
Remark:　Can be set for each slot.</td></tr>
</table>

Table 3.1.5.4-1 DMRS (Cont'd)

<table>
<tr><th>Item</th><th>Function</th></tr>
<tr><td>DMRS Configuration Type</td><td>Selects DMRS configuration type.
Options: 1 (Default), 2
Remark: Can be set for each slot.
When Multiplexing Scheme is DFT-s-OFDM, DMRS Configuration Type is fixed to 1.</td></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data into DMRS.
Range: As in the table below.
<table>
<tr><th>Multiplexing Scheme</th><th>DMRS Configuration Type</th><th>DMRS Length</th><th>Antenna Port Number</th><th>Range</th><th>Default</th></tr>
<tr><td rowspan="4">DFT-s-OFDM</td><td>1</td><td>1</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td rowspan="12">CP-OFDM</td><td>1</td><td>1</td><td>0</td><td>1, 2</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1, 2</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>1, 2, 3</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>1, 2, 3</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>2</td><td>2, 3</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>3</td><td>2, 3</td><td>2</td></tr>
<tr><td>2</td><td>1</td><td>4</td><td>3</td><td>3</td></tr>
<tr><td>2</td><td>1</td><td>5</td><td>3</td><td>3</td></tr>
</table>
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS TypeA Position</td><td>Selects the DMRS l_0 position when PUSCH mapping type is A.
Options: 2, 3 (Default)
Remark: Can be set for each slot.</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets the DMRS power boosting for the ideal signal.
Range: –20.000 to 20.000 dB
Resolution: 0.001 dB
Default: 0.000 dB
Remark: Can be set for each slot.
Updated to a value as in the table below when setting Number of DMRS CDM groups without Data.
<table>
<tr><th>DMRS Configuration Type</th><th>Number of DMRS CDM Groups without Data</th><th>Power Boosting (dB)</th></tr>
<tr><td>1</td><td>1</td><td>0.000</td></tr>
<tr><td>1</td><td>2</td><td>3.000</td></tr>
<tr><td>2</td><td>1</td><td>0.000</td></tr>
<tr><td>2</td><td>2</td><td>3.000</td></tr>
<tr><td>2</td><td>3</td><td>4.770</td></tr>
</table></td></tr>
</table>

3.1.6 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 export destination folder, package name, file name, and comment for the waveform pattern to be generated can be specified.

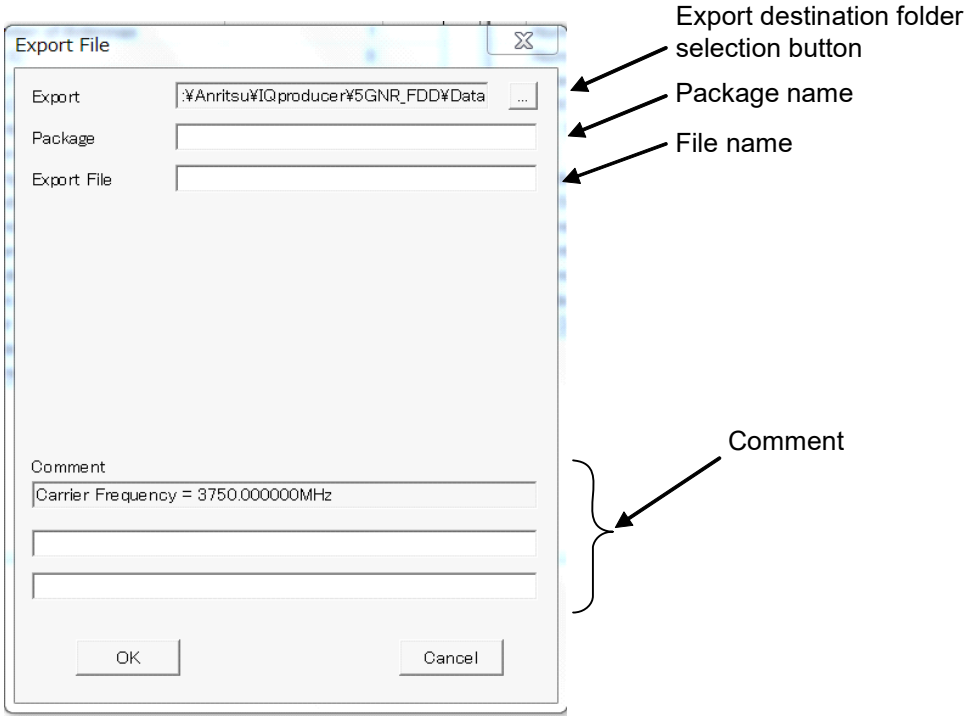


Figure 3.1.6-1 Export File screen

After setting the package name, file name, and comment for the waveform pattern to be generated, click **OK** on the Export File screen. The Calculation screen shown in Figure 3.1.7-1 is displayed and waveform pattern generation starts (the package name and file name must be set to start waveform pattern generation).

3.1.6.1 Export destination folder

Using the export destination folder selection button, set a destination folder in the Export Path field to output the waveform patterns created by this software.

The default destination folders are as in the table below.

Table 3.1.6.1-1 Default Export Destination Folder

Model with MX370114A	Select Instrument	Installed OS	Export Destination Folder
MG3710A/ MG3710E	MG3710	–	C:\Anritsu\MG3710A\ User Data\Waveform
MS269xA	MS269x	Windows Embedded Standard 7, Windows 10 ,Windows 11	C:\Anritsu\Signal Analyzer\ System\Waveform
		Other than the above	C:\Program Files\Anritsu Corporation\ Signal Analyzer\System\Waveform
PC	–	–	See the explanation below.

For PC, the waveform pattern files can be created into the export destination folder selected from the Browse for Folder screen.

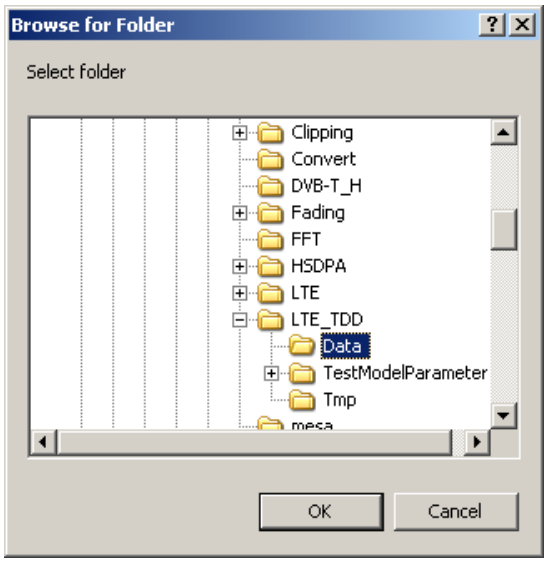


Figure 3.1.6.1-1 Browse for Folder screen

When the export destination folder is not selected, waveform pattern files are created in the "Data" folder under the folder where IQproducer™ is installed.
X:\IQproducer\5GNR_FDD\Data
("X:\IQproducer" indicates the folder where the IQproducer™ is installed.)

3.1.6.2 Package Name

Specify a package name in the **Package** textbox. Up to 31 one-byte characters can be used.
Invalid characters for Windows cannot be used.

3.1.6.3 File Name

Specify a file name in the **Export File Name** textbox. Up to 20 one-byte characters can be used. Only alphanumeric characters and the following symbols can be used:

! % & ( ) + = ‘ { } _ - ^ @ [ ]

3.1.6.4 Comment

Enter comments in the **Comment** textboxes. Up to 38 one-byte characters can be used for one textbox.

The first **Comment** textbox is read-only and displays characters as below.

When Phase Compensation is On:
“Carrier Frequency = (Common > Carrier Frequency value) MHz”

When Phase Compensation is Off:
“Phase Compensation = Off”

3.1.7 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 **Cancel**. When cancelled, it returns to the main screen.

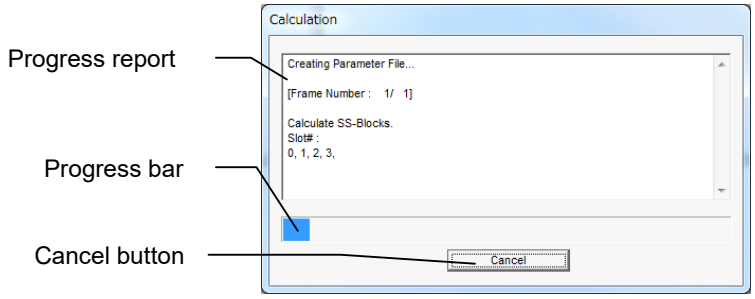


Figure 3.1.7-1 Calculation Screen (In Progress)

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.

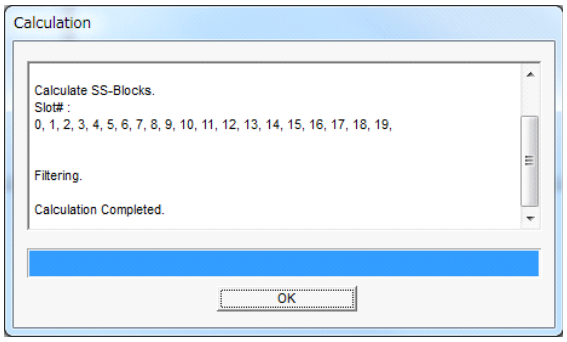


Figure 3.1.7-2 Calculation Screen (Completed)

Note:

When using this software on MG3710A/MG3710E, and selecting **Calculation & Load** or **Calculation & Play**, the waveform generation ends without displaying the above screen.

3.2 Waveform Pattern Generation Procedure

3.2.1 5G NR FDD sub-6GHz

This section describes the waveform pattern generation procedure when System in the common parameter list is set to **5GNR**.

3.2.1.1 Downlink

This section shows a procedure for creating a waveform pattern, using an 5G NR FDD sub-6GHz downlink waveform pattern as an example.

<Procedure>
Procedure for generating Downlink waveform

1. Start this software.
2. Set the common parameters as shown in Table 3.2.1.1-1. The parameters that are not shown below are used with their default values, or are automatically set according to other parameter settings.

Table 3.2.1.1-1 Settings for Common Parameters

Common	
Test Model	Off
Number of Antennas	1
Cell ID	0
NID(1)	0
NID(2)	0
Number of Frames	1
Oversampling Ratio	1
Sampling Rate	122.88
Bandwidth	100
Number of RBs (Max RB)	273
Downlink/Uplink	Downlink
Cyclic Prefix	Normal
Subcarrier Spacing (SCS)	30
Filter	On
Phase Compensation	On
Carrier Frequency	3750 MHz

3. Click **SS-Block** in **Downlink** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-2.

Table 3.2.1.1-2 Settings for SS-Block

SS-Block	
Data Status	Enable
SS-Block Candidate	B(L=8)
SS-Block Transmission	All On
SS-Block Set Burst period	10 ms
SS-Block RB Offset	126
SS-Block Subcarrier Offset	6
SS Subcarrier Spacing (SS Block SCS)	30 kHz

4. Click **PBCH** of **SS-Block** in **Downlink** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-3.

Table 3.2.1.1-3 Settings for PBCH

PBCH	
Data Type	PN9
Init Data	01FF
PBCH Power Boosting	0.000 dB
DMRS for PBCH	
DMRS Power Boosting	0.000 dB

5. Click **Synchronization signal** of **SS-Block** in **Downlink** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-4.

Table 3.2.1.1-4 Settings for Synchronization signal

Synchronization signal	
Primary synchronization signal	
PSS Power Boosting	0.000 dB
Secondary synchronization signal	
SSS Power Boosting	0.000 dB

6. Click **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-5.

Table 3.2.1.1-5 Settings for Slot #0

Slot #0	
Number of PDSCHs	1
RB arrangement	All PDSCH #0

7. Click **PDCCH** in **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-6.

Table 3.2.1.1-6 Settings for PDCCH

PDCCH	
Data Status	Enable
Number of CORESETs	1
PDCCH ID Data Type	Cell ID
PDCCH ID	0
nRNTI	0000
Frequency Domain Resources	Refer to the procedure 9.
PDCCH Power Boosting	0.000 dB
DMRS for PDCCH	
DMRS Power Boosting	0.000 dB

8. Click **CORESET #0** in **PDCCH** in **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-7.

Table 3.2.1.1-7 Settings for CORESET #0

CORESET #0	
Start Symbol	0
Number of Symbols	2
Number of DCIs	1
Number of RBs In One CORESET	3
Precoder Granularity	All Contiguous RBs

9. Double-click **RB arrangement** of **Slot #0** in the tree view and set CORESET #0 to Resource #0 as in Figure 3.2.1.1-1.

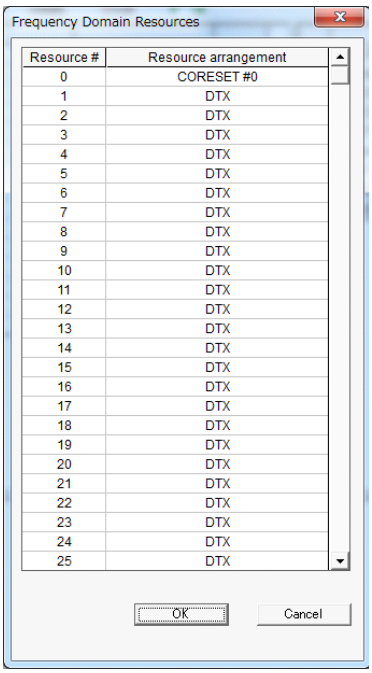


Figure 3.2.1.1-1 RB arrangement

10. Click **DCI #0** of **CORESET #0** in **PDCCH** in **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-8.

Table 3.2.1.1-8 Settings for DCI #0

DCI #0	
CORESET Number	0
First CCE Index In CORESET	0
Aggregation Level	2
Data Type	PN9
Init Data	01FF

11. Click **PDSCH #0** in **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-9.

Table 3.2.1.1-9 Settings for PDSCH #0

PDSCH #0	
Data Status	Enable
Power Boosting	0.000 dB
Number of Layers	1
Number of Code words	1
Antenna Port Number	1000
nRNTI	0000
nID Status	Enable
nID	0
Modulation Scheme	256QAM
PDSCH mapping type	A
Symbol Start	3
Symbol Length	11
Data Type	PN9
Init Data	01FF

12. Click **DMRS** in **PDSCH #0** in **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.1-10.

Table 3.2.1.1-10 Settings for DMRS

DMRS	
nSCID	0
DMRS nSCID Data Type	Cell ID
DMRS nSCID	0
DMRS Length	1
DMRS Additional Position	0
DMRS Configuration Type	1
Number of DMRS CDM groups without Data	2
DMRS Power Boosting	3.000 dB

13. Right-click **Slot #0** in the tree view and select **Copy**. Then, right-click one of **Slot #1** to **19** and select **Paste all**.
14. Click the **Calculation** to display the **Export File** screen. Enter "5GNR_FDD" and "Downlink_100MHz" for the **Package** and **Export File Name**, respectively. Then click **OK**.
15. The Calculation screen is displayed. After the calculation is completed, click **OK** to finish the waveform generation.
16. The following files are output in the folder specified in 3.1.6 "Export File screen": Downlink_100MHz.wvi, Downlink_100MHz.wvd

3.2.1.2 Uplink

This section shows a procedure to create a 5G NR FDD sub-6GHz uplink waveform pattern for example.

<Procedure>
Procedure for generating Uplink waveform

1. Start this software.
2. Set the common parameters as shown in Table 3.2.1.2-1. The parameters that are not shown below are used with their default values, or are automatically set according to other parameter settings.

Table 3.2.1.2-1 Settings for Common Parameters

Common	
Test Model	Off
Number of Antennas	1
Cell ID	0
NID(1)	0
NID(2)	0
Number of Frames	1
Oversampling Ratio	2
Sampling Rate	61.44
Bandwidth	20
Number of RBs (Max RB)	51
Downlink/Uplink	Uplink
Multiplexing Scheme	CP-OFDM
Cyclic Prefix	Normal
Subcarrier Spacing (SCS)	30
Filter	On
Phase Compensation	On
Carrier Frequency	3750 MHz

3. Click **Uplink** of **Slot #0** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.2-2.

Table 3.2.1.2-2 Settings for Uplink

Uplink	
Number of PUSCHs	1

4. Click **PUSCH** of **Slot #0** in **Uplink** in the tree view and set the PHY/MAC parameters as shown in Table 3.2.1.2-3.

Table 3.2.1.2-3 Settings for PUSCH

PUSCH	
Data Status	Enable
Power Boosting	0.000 dB
Number of Layers	1
Number of Code words	1
Antenna Port Number	0
nRNTI	0000
nID Status	Disable
nID	0
Modulation Scheme	QPSK
PUSCH mapping type	A
RB Start	0
Number of RBs	51
Symbol Start	0
Symbol Length	14
Data Type	UL-SCH

5. Set the PHY/MAC parameters of **UL-SCH** of **PUSCH** in **Slot #0** in **Uplink** in the tree view as shown in Table 3.2.1.2-4.

Table 3.2.1.2-4 Settings for UL-SCH

UL-SCH	
Rate Matching	FBRM
MCS Index	4
MCS Table	64QAM
Redundancy Version	0
Transport Block Size	4352
Data Type	PN9
Init Data	01FF

6. Set the PHY/MAC parameters of **DMRS** of **PUSCH** in **Slot #0** in **Uplink** in the tree view and as shown in Table 3.2.1.2-5.

Table 3.2.1.2-5 Settings for DMRS

DMRS	
nSCID	0
DMRS nSCID Data Type	Cell ID
DMRS nSCID	0
DMRS Length	1
DMRS Additional Position	1
DMRS Configuration Type	1
Number of DMRS CDM groups without Data	2
DMRS TypeA Position	2
DMRS Power Boosting	3.000 dB

7. Right-click **Slot #0** in the tree view and select **Copy**. Then, right-click one of **Slot #1** to **19,** and select **Paste all**.
8. Click the **Calculation** to display the **Export File** screen. Enter "5GNR_FDD" and "G-FR1-A1-5" for the **Package** and **Export File Name**, respectively. Then click **OK**.
9. The Calculation screen is displayed. After the calculation is completed, click **OK** to finish the waveform generation.
10. The following files are output in the folder specified in 3.1.6 "Export File screen": G-FR1-A1-5.wvi, G-FR1-A1-5.wvd

3.3 Saving/Reading Parameters

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

3.3.1 Saving a parameter file

When running on PC, or MS269xA

1. Select **Save Parameter File** from the **File** menu or click the tool button to display the parameter file saving screen.

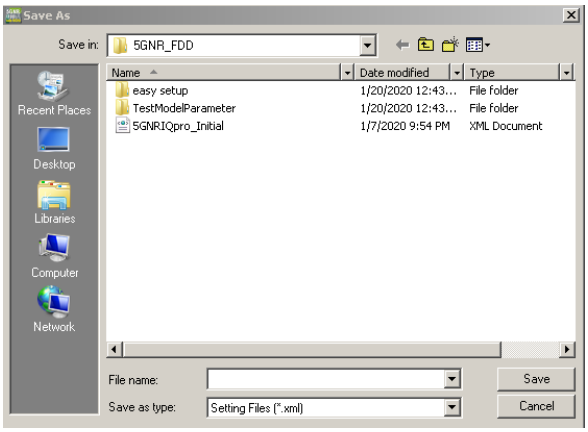


Figure 3.3.1-1 Parameter file saving screen

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/MG3710E

1. Click the **Save Parameter File** button in **File** menu or click the button to display the parameter file saving screen.

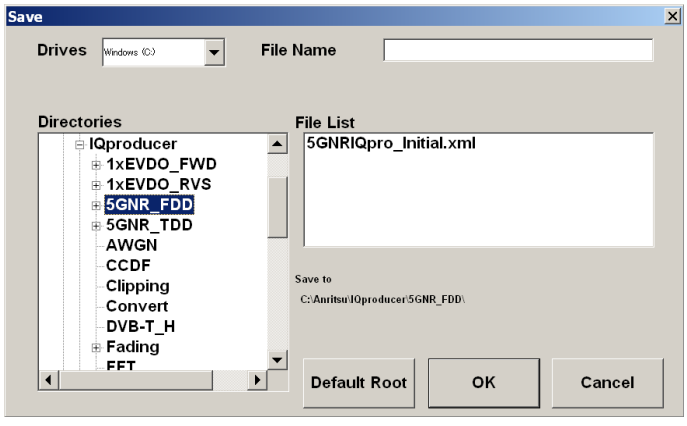


Figure 3.3.1-2 Parameter file saving screen (MG3710A/MG3710E)

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.

3.3.2 Reading a parameter file

When running on PC, or MS269xA

1. Select **Recall Parameter File** from the **File** menu or click the tool button to display the parameter file reading screen.

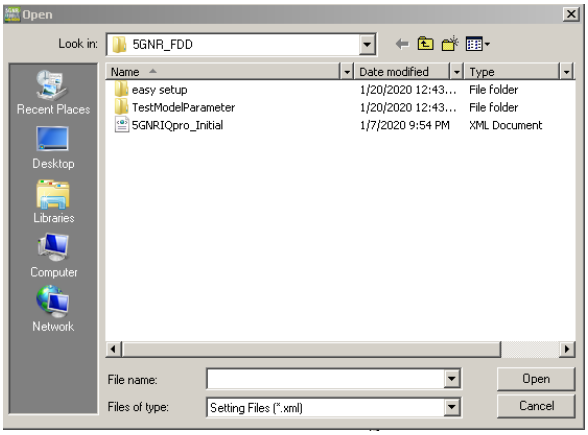


Figure 3.3.2-1 Parameter file reading screen

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/MG3710E

1. Select **Recall Parameter File** from the **File** menu or click the tool button to display the parameter file reading screen.

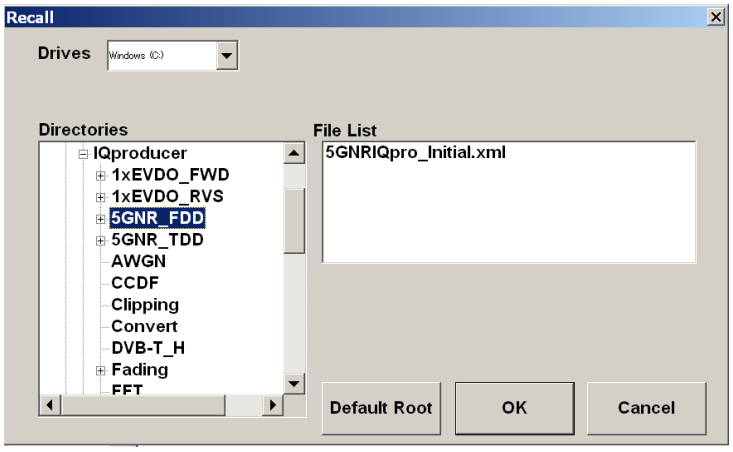


Figure 3.3.2-2 Parameter file reading screen (MG3710A/MG3710E)

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.

3.4 User File Reading Screen

When running on PC or MS269xA

1. When **User File** is selected for **Data Type** in the tree view, the user file reading screen as shown in is displayed.

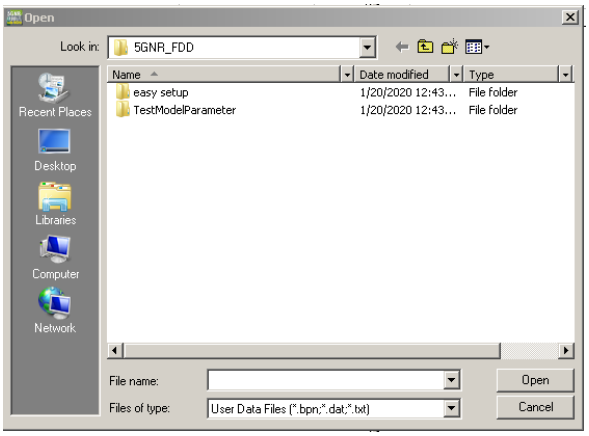


Figure 3.4-1 User file reading screen

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/MG3710E

1. When **User File** is selected for **Data Type** in the tree view, the user file reading screen is displayed.

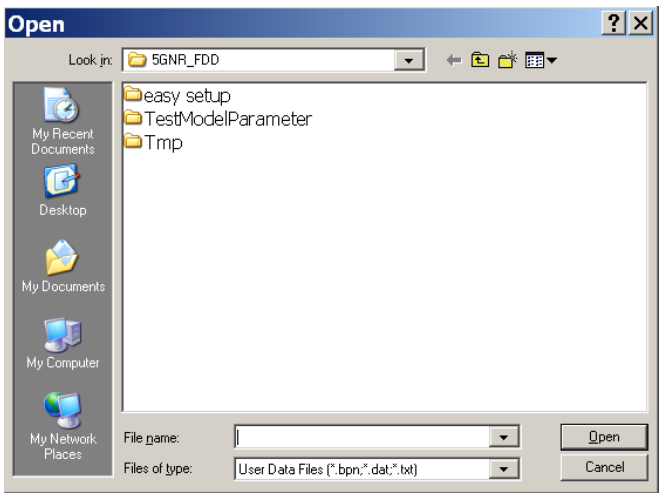


Figure 3.4-2 User file reading screen (MG3710A/MG3710E)

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.

3.5 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/MG3710A/MG3710E 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 and MS2830A/MS2840A Signal Analyzer 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 3.5-1 is displayed with the trace of the generated waveform pattern.

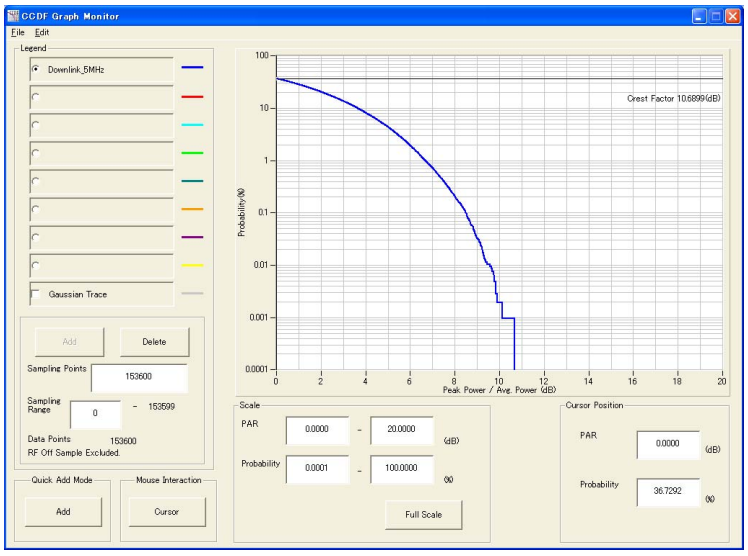


Figure 3.5-1 CCDF Graph Monitor screen

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 3.5-2 below appears:

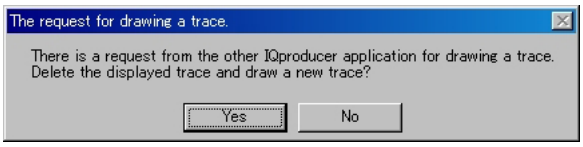


Figure 3.5-2 Confirmation message

Click **Yes**. The previous traces are deleted, 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 3.5-3 is displayed with the trace of the generated waveform pattern.

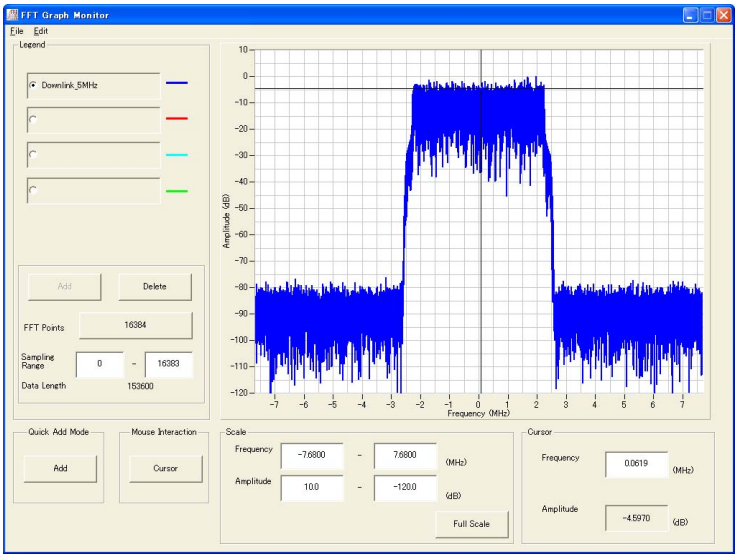


Figure 3.5-3 FFT Graph Monitor screen

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 3.5-4 below appears:

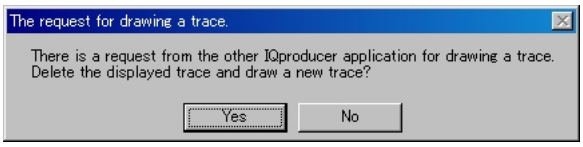


Figure 3.5-4 Confirmation message

Click **Yes**. The previous traces are deleted, 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 3.5-5 is displayed with the trace of the generated waveform pattern.

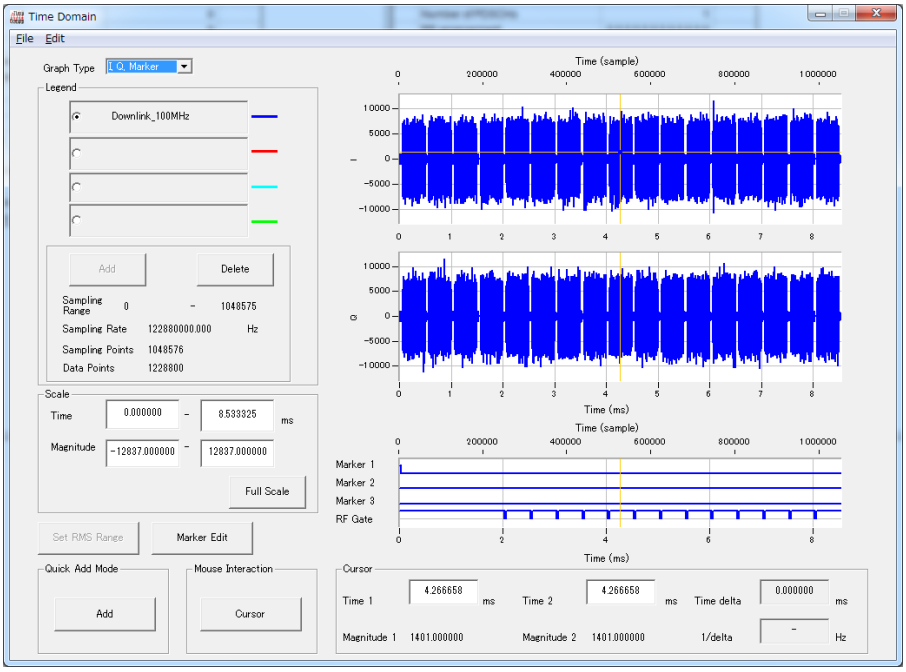


Figure 3.5-5 Time Domain screen

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 3.5-6 below appears:

Figure 3.5-6 Confirmation message

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

3.6 Auxiliary Signal Output

Select a waveform pattern generated by the 5G NR FDD sub-6GHz IQproducer™ on this equipment to output the marker that is synchronized with the RF signal as an auxiliary signal from the AUX on the rear panel of this equipment. 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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*
  4.13.12 “Marker edit function”
- *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (IQproducer™)*
  4.9.12 “Marker edit function”

As auxiliary signal, Frame Pulse (Connector 1) is output. Connector 2, 3 are not used.

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

For the error range of the auxiliary signals against the RF output, refer to each one of the following:

- *MG3700A/MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*
  4.5.6 “Input file format”
- *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer*
  Vector Signal Generator Operation Manual (IQproducer™)
  4.5.6 “Input file format”

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.

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5.1 For MG3710A/MG3710E

This section describes how to download a waveform pattern created for the MG3710A/MG3710E to the hard disk of the MG3710A/MG3710E 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:

- LAN
- External device such as USB flash drive

Note:

This operation is not necessary if you are using MG3710A/MG3710E and have generated waveform patterns on MG3710A/MG3710E.

■Transferring from PC via LAN (MG3710A/MG3710E)

Two IQproducer™ tools can be used to transfer a waveform pattern to the MG3710A/MG3710E 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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.
  Transferring a waveform pattern to the internal hard disk of the MG3710A/MG3710E, 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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.
  Specify the folder that contains the waveform pattern to transfer to the MG3710A/MG3710E in the PC-side tree of **Transfer & Setting Panel**.

■Transferring via external device such as USB flash drive (MG3710A/MG3710E)

For details about how to transfer a waveform pattern created using this software to the hard disk of the MG3710A/MG3710E, refer to Section 7.3.6 “Copying external waveform pattern: Copy” in the *MG3710A/MG3710E 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 MG3710A/MG3710E (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 MG3710A/MG3710E

A waveform pattern can be loaded into the waveform memory by using the instruction panel of the MG3710A/MG3710E or by using a remote command.

For operation using the front panel, refer below:

- Section 7.3.4 "Loading waveform pattern: Load" in the *MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

For operation using remote commands, refer below:

- Section 7.3.4 "Loading waveform pattern: Load" in the *MG3710A/MG3710E 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/MG3710E 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 MG3710A/MG3710E according to Section 5.1.2 “Loading to waveform memory”. A waveform pattern can be selected in the following two ways.

■Configuring using the MG3710A/MG3710E

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 7.3.5 “Selecting output waveform pattern: Select” in the *MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (Mainframe)*

For operation using remote commands, refer below:

- Section 7.3.5 “Selecting output waveform pattern: Select” in the *MG3710A/MG3710E 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/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual (IQproducer™)*.

5.2 For MS2690A/MS2691A/MS2692A

This section describes how to download a waveform pattern created for the MS269xA to the hard disk of the MS269xA 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 MS269xA, 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)*

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)*

For operation using remote commands, refer below:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: 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)*

For operation using remote commands, refer below:

- *MS2690A/MS2691A/MS2692A Signal Analyzer Option 020: 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
DCI #x and DCI #y overlap.	—
DCI #x is out of range in CORESET #y.	—
PUSCHs are overlapping.	The mappings of PUSCH #x and PUSCH #y are overlapping. (This error message is for PUSCH only. The same error does not happen to PDSCH.)
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.	—
Cannot open file.	—
Cannot read file.	—
Cannot read file("*s*").	—
Cannot write file.	—
Cannot write file("*s*").	—
Data size is too large.	—
Input a value that fulfills 2^a×3^b×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.	—
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.

A list of warning message is shown below.

Table A-2 Warning message

Warning Message	Description
Clipping was done.	—

Appendix B User File Format

This section shows example of the user file format 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.

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, 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

```
11111111100000111101111100010111001100100000100101001110110100011
11100111110011011000101010010001110001101101010111000100110001000
10000000001000010001100001001110010101011000011011110100110111
10010001010000101011010011111110110010010010110111111001001101010
01100110000000011000110010100011010010111111101000101100011101011
10001011001111000111110111010000011010110110111011100000101101011
11101010101000000101001010111100101110111000000111001110100100
11110101110101000100100001100111000010111101101100110100001110111
1110000
```

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.

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