MX370110A/MX269910A
LTE TDD IQproducer

MG3710A
Vector Signal Generator

MS2690A/MS2691A/MS2692A/MS2830A
Signal Analyzer
MG3710A Vector Signal Generator
MS269xA-020, MS2830A-020/021 Vector Signal Generator option for MS269xA/MS2830A Signal Analyzer

MX370110A/MX269910A LTE TDD IQproducer

**NEW**
MX370110A-001/MX269910A-001 LTE-Advanced TDD Option

* MX370110A-001 supports MG3700A Vector Signal Generator

Product Introduction

MG3710A Vector Signal Generator
MS269xA Signal Analyzer
MS2830A Signal Analyzer

Version 2.00

ANRITSU CORPORATION
What is LTE TDD IQproducer?

The LTE TDD IQproducer is PC software for generating waveform patterns in compliance with the 3GPP LTE TDD specifications in the 3GPP TS36.211, TS36.212 and TS36.213 standards. The MX370108A-001 LTE-Advanced TDD option supports simple generation of carrier aggregation signals added by 3GPP Rel. 10. Additionally, clustered SC-FDMA signals can be generated at Uplink. The software runs under the Windows OS installed in the MG3710A, MS2690A/91A/92A-020, and MS2830A-020/021. It outputs modulation signals by selecting generated waveform patterns.

- Generating waveform patterns using LTE TDD IQproducer => The main frame requires a license.
  The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed SG cannot output signals because it does not recognize the waveform patterns.

- Generating waveform patterns using EDA Tools (C, MATLAB, Microwave Office) => Free license

* MATLAB® is a registered trademark of The MathWorks, Inc.
* Windows® is a registered trademark of Microsoft Corporation in the USA and other countries.

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Slide 2

MX370110A/MX269910A-E-L-1
**What is LTE TDD IQproducer?**

**NEW**

**MX370110A-001 LTE-Advanced TDD Option: for MG3710A**  
**MX269910A-001 LTE-Advanced TDD Option: for MS269xA-020, MS2830A-020/021**

The MX370108A-001 LTE-Advanced TDD option supports simple generation of carrier aggregation signals added by 3GPP Rel. 10. Additionally, clustered SC-FDMA signals can be generated at Uplink.

### Example of Vector Signal Generator series LTE-Advanced Carrier Aggregation Function

<table>
<thead>
<tr>
<th>Carrier Aggregation Mode</th>
<th>Vector Signal Generator Series</th>
<th>Vector Signal Generator</th>
<th>Vector Signal Generator Option for Signal Analyzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-band contiguous Carrier Aggregation,</td>
<td>MG3710A*1</td>
<td>MG3700A*1</td>
<td>MS2690A series Opt. 020*2</td>
</tr>
<tr>
<td>Intra-band non-contiguous Carrier Aggregation</td>
<td>(1 unit)</td>
<td>(1 unit)</td>
<td>(1 unit)</td>
</tr>
<tr>
<td>Inter-band non-contiguous Carrier Aggregation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>(2 RF 1 unit*3, or 1 RF 2 units)</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*1: MX370110A LTE TDD IQproducer and MX370110A-001 LTE-Advanced TDD Option installed.  
*2: MX269910A LTE TDD IQproducer and MX269910A-001 LTE-Advanced TDD Option installed.  
*3: MG3710A-062(2.7GHz)/064(4GHz)/066(6GHz) 2nd RF Option installed.
What is LTE TDD IQproducer?

**NEW**

MX370110A-001 LTE-Advanced TDD Option: for MG3710A

- **MG3710A Vector Signal Generator**
  - One Unit Supports Carrier Aggregation Modes -
  The MG3710A supports an upper frequency limit of 6 GHz and an internal RF modulation bandwidth of 120MHz as well as up to two RF output connectors.
  As a result, one unit supports LTE-Advanced carrier aggregation modes.

Example: MG3710A Supports Carrier Aggregation

- Intra-band contiguous Carrier Aggregation
- Intra-band non-contiguous Carrier Aggregation
- Inter-band non-contiguous Carrier Aggregation

MG3710A | Band A | 1 port
--------+--------+-------
MG3710A | Band A | 1 port
MG3710A | Band A | 2 port
Features—LTE TDD IQproducer

- Easy Setup Screen
- Normal Setup Screen
- Normal Setup Screen: Easy Setup Parameter
- Frame Structure Display for Channel Allocation and OFDM Symbol Power Confirmation
- Supports Spatial Multiplexing and Tx Diversity
- Generates PRACH Signals
LTE TDD IQproducer supports two setting screens: “Easy Setup Screen” and “Normal Setup Screen”.

● Easy Setup Screen

● Normal Setup Screen

*Read the “MX3701xxA IQproducer” and “MX269xxxA series Software” Brochure for detail parameter setting range.
Easy Setup Screen

Because it is limited to major parameters, it generates waveform patterns using simple operation. Moreover, touch-panel operation is supported when IQproducer is executed on the MG3710A.

Use “Normal Setup function” for detailed parameter settings.

E-UTRA Test Models by Signal Type

FRC (UL) by Signal Type

Easy Setup Screen (Example: FRC_UL)
Carrier Aggregation Mode
- Intra-band
- Inter-band

Component Carrier
- Intra-band
  - Component Carrier: #0 to #4
- Inter-band
  - Band: #0, #1
  - Component Carrier: #0 to #4

[Setup Item]
- Status, Bandwidth, Cell ID, Gain
- Frequency Offset, Phase, Delay

Test Type
- E-UTRA Test Models

FRC (UL) Setup Screen
- FRC(UL) Test Models Setup Screen
  - Bandwidth, 5MHz, Cell ID, Roll-Off Length, Ts, Filter, Ideal

E-UTRA Test Models Setup Screen
- 3GPP TS 36.114 V9.0.0 (2009-05)
  - Bandwidth, 5MHz, Cell ID

LTE-Advanced Easy Setup Screen (Example: FRC(UL) Test Modes)
Normal Setup Screen

Generates test model and RMC (Reference Measurement Channel) waveform patterns used for LTE base station TRx tests and FRC (Fixed Reference Channel) waveform patterns used for LTE UE TRx tests.

Displays PHY/MAC parameter items as tree

Channels Generated by MX370110A LTE TDD IQproducer

Downlink
- Cell-specific Reference Signal
- Primary Synchronization Signal
- Secondary Synchronization Signal
- PBCH (Physical Broadcast Channel)
- PCFICH (Physical Control Format Indicator Channel)
- PDCCH (Physical Downlink Control Channel)
- PDSCH (Physical Downlink Shared Channel)
- PHICH (Physical Hybrid-ARQ Indicator Channel)

Uplink
- PUCCH (Physical Uplink Control Channel)
- PUSCH (Physical Uplink Shared Channel)
- Demodulation Reference Signal for PUCCH/PUSCH
- Random Access Preamble
- PRACH (Physical Random Access Channel)

Sets common parameters in tree view

Sets Common parameter

Displays setting conditions, such as errors

*Read the “MX3701xxA IQproducer” and “MX269xxxA series Software” Brochure for detail parameter setting range.

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Normal Setup Screen: Easy Setup Parameter

Using Easy Setup Menu sets typical parameter values as a batch for 3GPP-defined test signals. Change only the required parts to use.

Select 3GPP-defined test signals

Batch setting of each parameter for selected tests

The Easy Setup Menu sets typical parameter values for 3GPP-defined test signals as a batch.
Normal Setup Screen: Easy Setup Parameter

**BS Test / E-UTRA Test Models**

- **E-TM1.1**
  - **BW = 1.4MHz**
- **E-TM1.2**
  - **BW = 3MHz**
- **E-TM2**
  - **BW = 5MHz**
- **E-TM3.1**
  - **BW = 10MHz**
- **E-TM3.2**
  - **BW = 15MHz**
- **E-TM3.3**
  - **BW = 20MHz**

**BS Test / FRC**

- **FRC(QPSK, R=1/3)**
  - **BW = 5MHz**
- **FRC(16QAM, R=2/3)**
  - **BW = 10MHz**
- **A1-1**
- **A1-2**
- **A1-3**
  - **BW = 5MHz**
- **A1-4**
- **A1-5**
  - **BW = 15MHz**
  - **BW = 20MHz**
Subframe Type

Displays the Subframe type. "D" indicates Downlink Subframe, "U" indicates Uplink Subframe, and "S" indicates Special Subframe. Downlink Subframe is displayed when Downlink/Uplink is set to Downlink, Uplink Subframe is displayed when Downlink/Uplink is set to Uplink.

Example) Uplink, Configuration = 3
Normal Setup Screen: LTE-Advanced

This screen is used to set detailed parameters, such as the carrier aggregation mode and component carriers for LTE-Advanced waveforms.

Carrier Aggregation Mode

**Intra-band**
- Component Carrier #0 to #4

**Inter-band**
- Band #0, #1
- Component Carrier #0 to #4

*Read the “MX3701xxA IQproducer” and “MX269xxxA series Software” Brochure for detail parameter setting range.*
Normal Setup Screen: LTE-Advanced Easy Setup Parameter

Selecting target signals at the Easy Setup Parameter function of the Normal Setup Screen supports batch setting of parameters matching component carriers with standards.

Example: FRC Setup

Select Component Carrier Screen

Simple operation by selecting target signals and component carriers as batch

*Read the “MX3701xxA IQproducer” and “MX269xxxA series Software” Brochure for detail parameter setting range.
Frame Structure Screen

Clicking the [Frame Structure] icon opens the Frame Structure screen. It is useful for checking the power of each OFDM symbol and channel allocation status and.

**Frame Structure Screen (LTE)**

- Displays relative level with OFDM Symbol with maximum power as 0 dB
- Y-axis: OFDM Symbol Power
- X-axis: Time (OFDM Symbol units)

**Frame Structure Screen (LTE-Advanced)**

- Graphical display of allocation of each channel
  - Y-axis: Frequency (Resource Block units)
  - X-axis: Time (OFDM Symbol units)
Supports Spatial Multiplexing and Tx Diversity

MIMO signal parameters (Spatial Multiplexing/Tx Diversity) for downlink can be set by setting the number of received antennas to 2 or 4 at the Common Parameter Setting screen.

**Number of Antennas parameter setting**

<table>
<thead>
<tr>
<th>Common</th>
<th>System</th>
<th>Test Model</th>
<th>Test Model Version</th>
<th>Number of Antennas</th>
<th>Diversity Method</th>
<th>Precoding Method</th>
<th>Number of Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSPA</td>
<td>LTE</td>
<td>OFF</td>
<td>6.144 V9.0.0(2009-05)</td>
<td>1</td>
<td>Spatial Multiplexing</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Spatial Multiplexing</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Spatial Multiplexing</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Diversity Method parameter setting**

<table>
<thead>
<tr>
<th>Common</th>
<th>System</th>
<th>Test Model</th>
<th>Test Model Version</th>
<th>Number of Antennas</th>
<th>Diversity Method</th>
<th>Precoding Method</th>
<th>Number of Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTE</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Spatial Multiplexing</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Spatial Multiplexing</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Spatial Multiplexing</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Spatial Multiplexing (Example of two antennas)**

- Transmitter: Tx0, Tx1
- Receiver: Rx0, Rx1
- Coverage: Channel capacity and data rate doubled

**Tx Diversity (Example of two antennas)**

- Transmitter: Tx0, Tx1
- Receiver: Rx0
- Coverage: Coverage at cell edge upgraded by improving reliability for fading signals and lowering available SNR
PRACH Setting

PRACH signal parameters for frequency hopping and power ramping can be set when PRACH is selected at Uplink Parameter Setting.

### PRACH Parameter Setting

<table>
<thead>
<tr>
<th>Uplink</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Type</td>
<td>Data Transmission</td>
</tr>
<tr>
<td>DMRS Parameters</td>
<td>Data Transmission</td>
</tr>
<tr>
<td>PUCCH Parameters</td>
<td>PRACH</td>
</tr>
</tbody>
</table>

**PRACH**

- **Frequency** (RB units)
- **Power**
- **Time** (OFDM Symbol units)
Waveform Generation: Calculation

After setting parameters, click the [Calculation] icon to generate the waveform pattern.

Generates waveform pattern

Generates waveform pattern

File export destination folder

Name of waveform pattern package: 31 characters max.

Name of waveform pattern file: 20 characters max.

Comment on screen

38 characters max. per line
Calculation & Load & Play

After setting parameters, click the [Calculation] icon to generate the waveform pattern.

**Calculation:**
Generates a waveform pattern after parameters are set.

**Calculation & Load:**
After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.

**Calculation & Play:**
After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.
File size of waveform patterns

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

<table>
<thead>
<tr>
<th>Items</th>
<th>Combinations of Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory 64M samples</td>
<td>None</td>
</tr>
<tr>
<td>Memory 64M samples × 2</td>
<td>Option 48 and Option 78</td>
</tr>
<tr>
<td>Memory 256M samples</td>
<td>Option 45 or Option 75</td>
</tr>
<tr>
<td>Memory 256M samples × 2</td>
<td>Option 45 and Option 48 or Option 75 and Option 78</td>
</tr>
<tr>
<td>Memory 1024M samples</td>
<td>Option 46 or Option 76</td>
</tr>
<tr>
<td>Memory 1024M samples × 2</td>
<td>Option 46 and Option 48 or Option 76 and Option 78</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Items</th>
<th>Maximum Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory 64M samples</td>
<td>64M samples</td>
</tr>
<tr>
<td>Memory 64M samples × 2 (With Option 48, 78)</td>
<td>128M samples</td>
</tr>
<tr>
<td>Memory 256M samples</td>
<td>256M samples</td>
</tr>
<tr>
<td>Memory 256M samples × 2 (With Option 48, 78)</td>
<td>512M samples</td>
</tr>
<tr>
<td>Memory 1024M samples</td>
<td>512M samples</td>
</tr>
<tr>
<td>Memory 1024M samples × 2 (With Option 48, 78)</td>
<td>512M samples</td>
</tr>
</tbody>
</table>
File size of waveform patterns

**MS2830A:**

Select whether the ARB memory expansion option 256Msamples is installed.

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Items</th>
<th>ARB Memory Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS2830A</td>
<td>With Option27 (Memory 256M samples)</td>
<td>1 GB</td>
</tr>
<tr>
<td></td>
<td>Without Option27 (Memory 256M samples)</td>
<td>256 MB</td>
</tr>
</tbody>
</table>

**MS269xA:**

ARB Memory Expansion (option) is not available for MS269xA. Only Memory 256M samples, 1 GB is available.
Note