Product Introduction

MX370108A/MX269908A

LTE 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

MX370108A/MX269908A LTE IQproducer

MX370108A-001/MX269908A-001 LTE-Advanced FDD Option

* MX370108A-001 supports MG3700A Vector Signal Generator

Product Introduction

MG3710A
Vector Signal Generator

MS269xA
Signal Analyzer

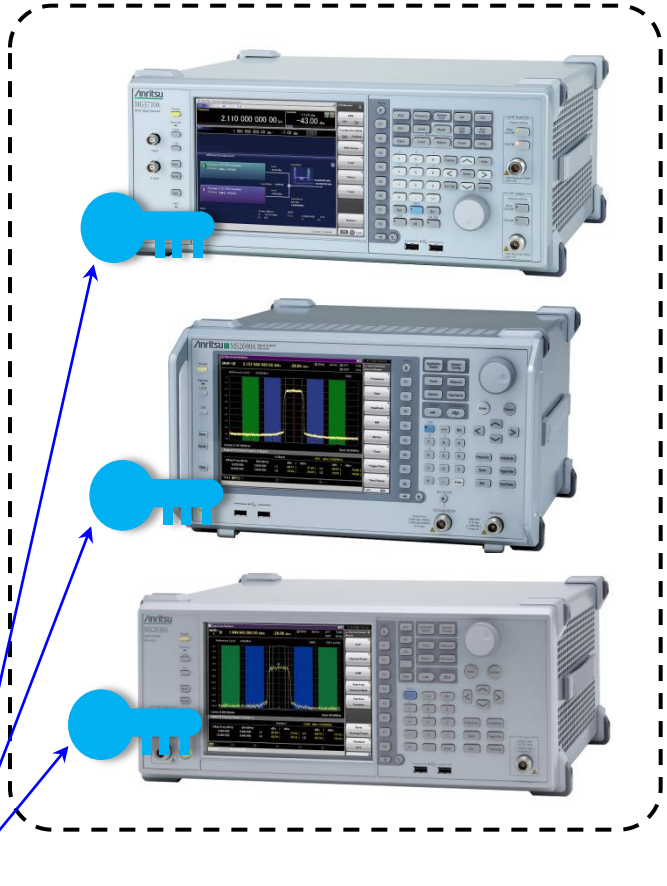
MS2830A
Signal Analyzer

Version 2.01

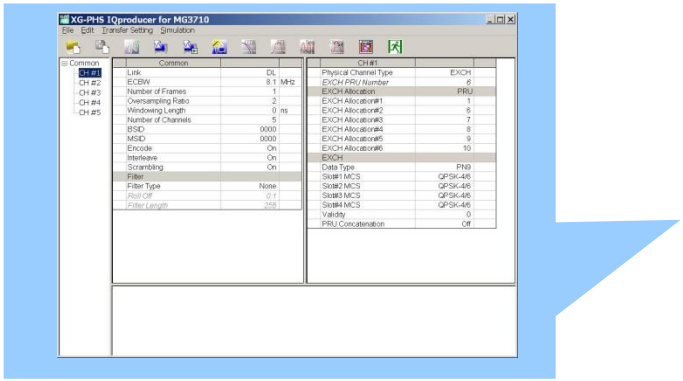
ANRITSU CORPORATION

What is LTE IQproducer?

The LTE IQproducer is PC software for generating waveform patterns in compliance with the 3GPP LTE FDD specifications in the 3GPP TS36.211, TS36.212, and TS36.213.
Installing the MX370108A-001 /MX269908A-001 LTE-Advanced FDD option supports output of signals in compliance with the LTE-Advanced FDD standards.
The software runs under Windows installed in the MG3710A, MS2690A/91A/92A-020, MS2830A-020/021. It outputs modulation signals by selecting generated waveform patterns.
The main frame requires a license.



LTE IQproducer



Install

- **Generating waveform patterns using LTE 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**

What is LTE IQproducer?

MX370108A-001 LTE-Advanced FDD Option: for MG3710A
MX269908A-001 LTE-Advanced FDD Option: for MS269xA-020, MS2830A-020/021

Installing the MX370108A-001 /MX269908A-001 supports output of signals in compliance with the LTE-Advanced FDD standards.

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

Vector Signal Generator Series / Carrier Aggregation Mode	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A*1	MG3700A*1	MS2690A series Opt. 020*2	MS2830A Opt. 020/021*2
Intra-band contiguous Carrier Aggregation, Intra-band non-contiguous Carrier Aggregation	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)
Inter-band non-contiguous Carrier Aggregation	✓ (2 RF 1 unit*3, or 1 RF 2 units)	✓ (2 units)	✓ (2 units)	✓ (2 units)

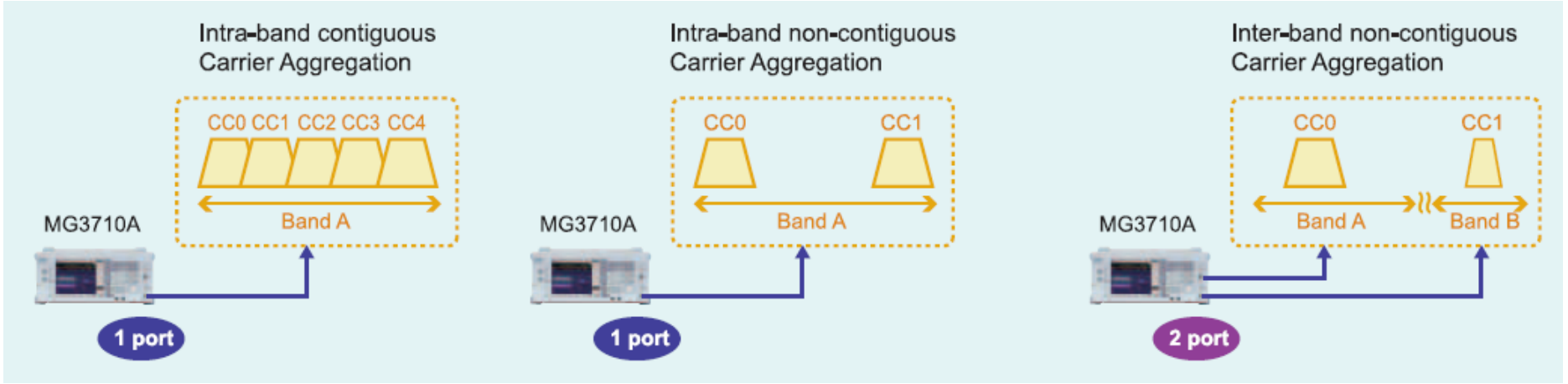
*1: MX370108A LTE IQproducer and MX370108A-001 LTE-Advanced FDD Option installed.
*2: MX269908A LTE IQproducer and MX269908A-001 LTE-Advanced FDD Option installed.
*3: MG3710A-062(2.7GHz)/064(4GHz)/066(6GHz) 2nd RF Option installed.

What is LTE IQproducer?

MX370108A-001 LTE-Advanced FDD 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 120 MHz 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



Features–LTE IQproducer

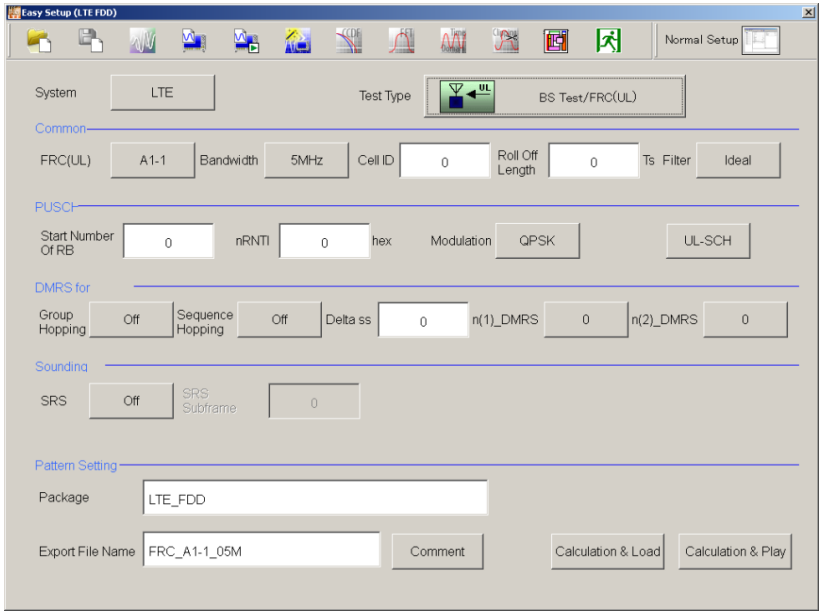
- Easy Setup
- Frame Structure Display for Channel Allocation and OFDM Symbol Power Confirmation
- Supports Spatial Multiplexing and Tx Diversity
- Generates Random Access Preamble Signals
- Sounding Reference Signal Setting
- Virtual Resource Block Type Setting
- Number of Antennas Setting
- UL Control Information Setting to UL-SCH
- Simple Parameter Setting
- Various Displays
  - CCDF
  - Spectrum
  - Time Domain
- Simple and Convenient Clipping/Filtering

Main Screen

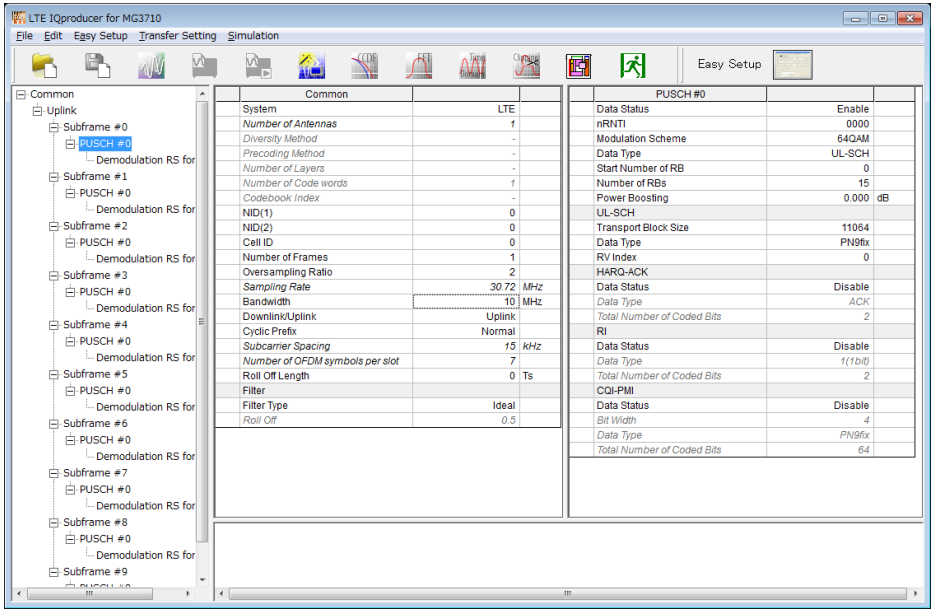
LTE IQproducer supports two setting screens:

“Easy Setup Screen” and “Normal Setup Screen”.

● Easy Setup Screen



●Normal Setup Screen

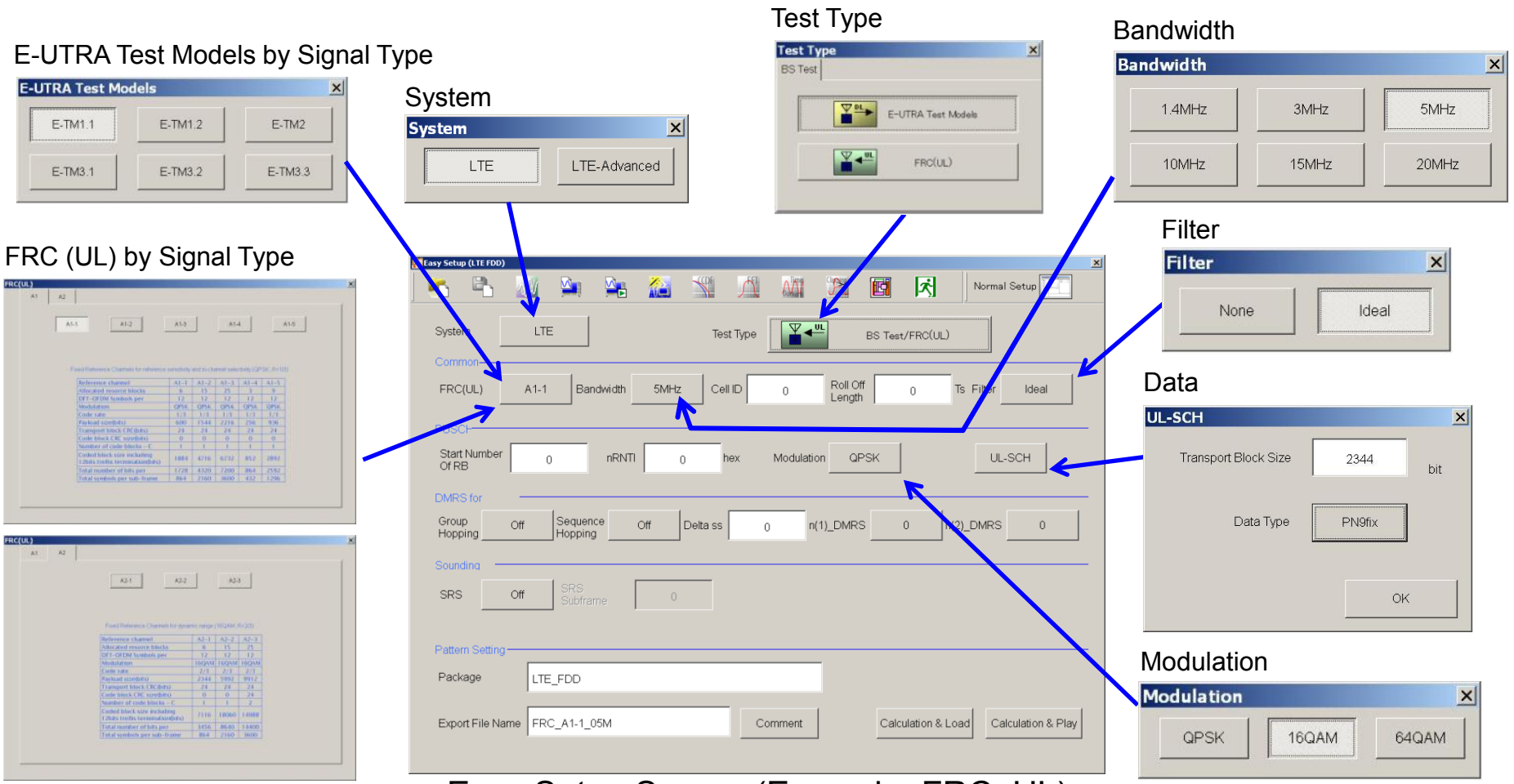


***Read the “MX3701xxA IQproducer” and “MX269xxxA series Software” Brochure for detail parameter setting range.**

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.

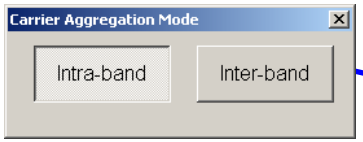
Use “Normal Setup function” for detailed parameter settings.



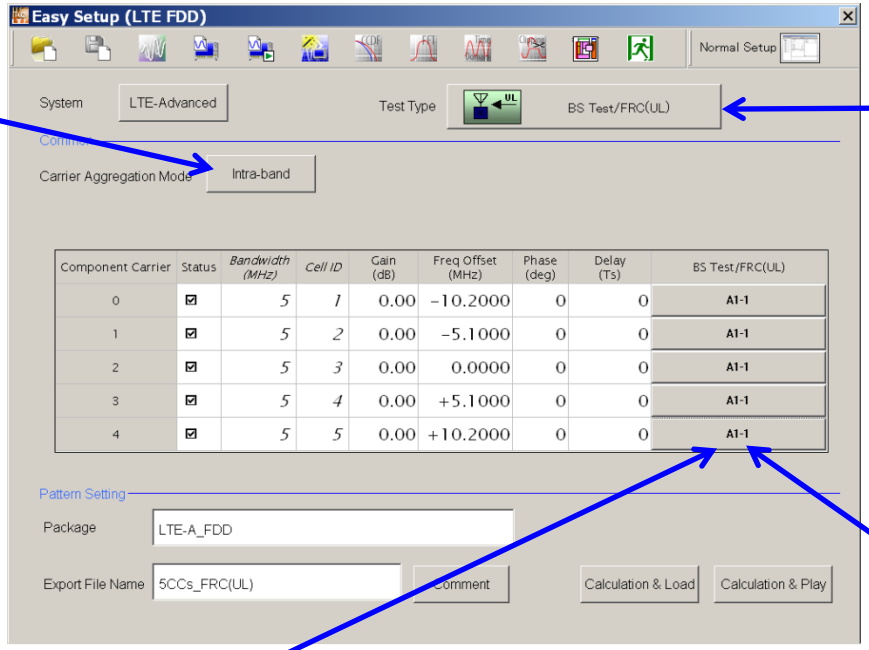
Easy Setup Screen (Example: FRC_UL)

Easy Setup Screen: LTE-Advanced

Carrier Aggregation Mode



Test Type

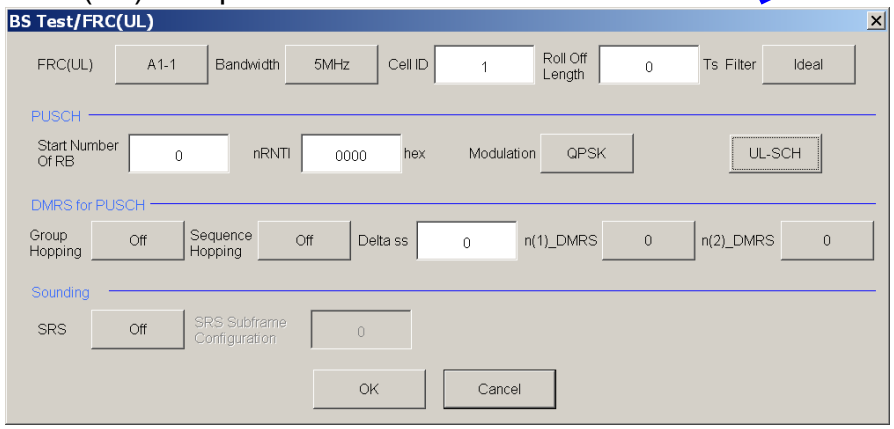


Component Carrier

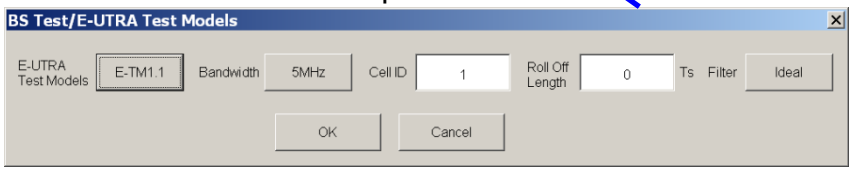
Intra-band
  Component Carrier: #0 to #4
Inter-band
  Band: #0, #1
  Component Carrier: #0 to #4

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

FRC (UL) Setup Screen



E-UTRA Test Models Setup Screen



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.

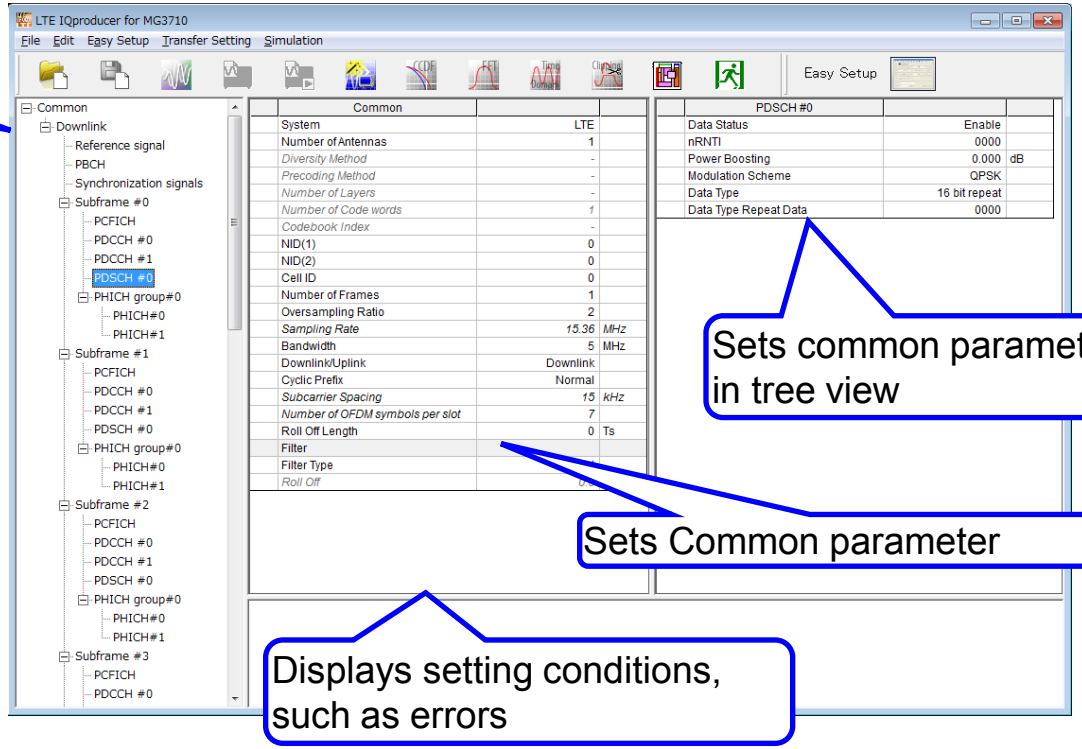
Displays PHY/MAC parameter items as tree

- **Generated Channels**

LTE Downlink
- Reference Signal
- Primary Synchronization Signal
- Secondary Synchronization Signal
- PBCH (P-BCH)
- PCFICH
- PDCCH (Downlink control channel information)
- PDSCH (DL-SCH)
- Subframe #0 to #9
- PHICH

LTE Uplink
- PUCCH (Uplink control channel information)
- PUSCH (UL-SCH)
- Demodulation RS for PUCCH/PUSCH
- Sounding RS
- Random Access Preamble
- Subframe #0 to #9

Normal Setup Screen



Sets common parameters in tree view

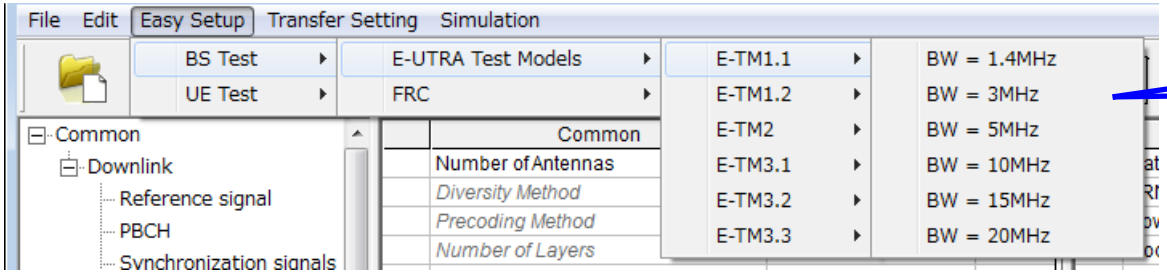
Sets Common parameter

Displays setting conditions, such as errors

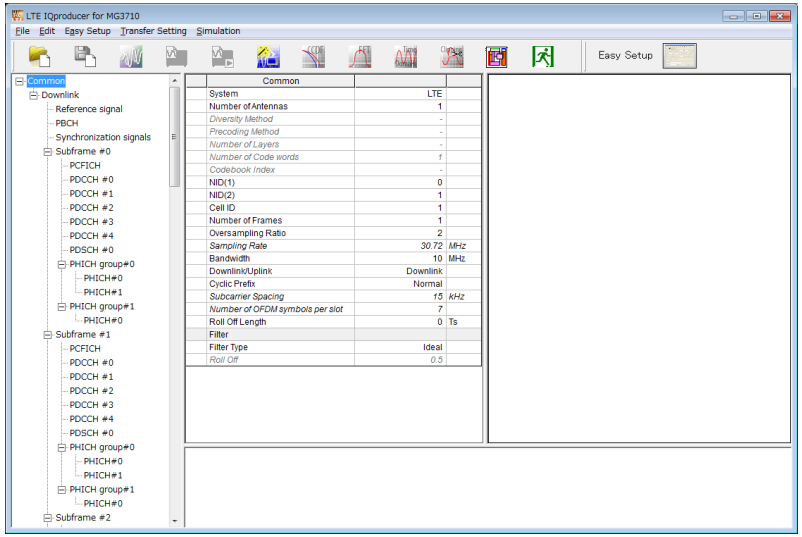
***Read the "MX3701xxA IQproducer" and "MX269xxxA series Software" Brochure for detail parameter setting range.**

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

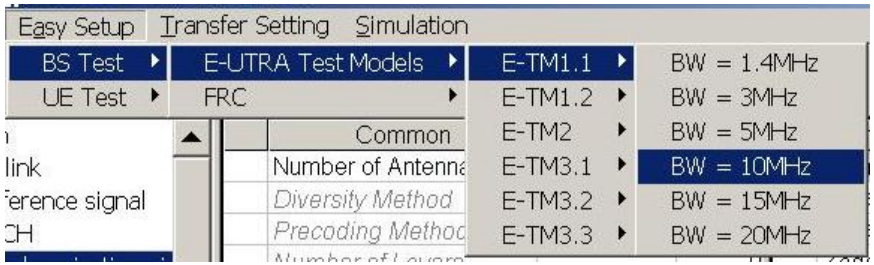


Batch setting of each parameter for selected tests

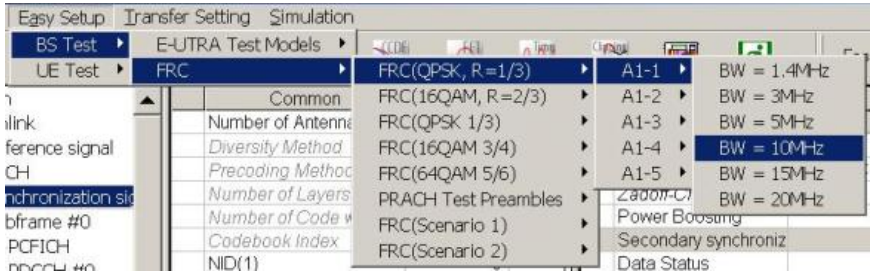
The Easy Setup Menu sets typical parameter values for 3GPP-defined test signals as a batch.

Normal Setup Screen: Easy Setup Parameter

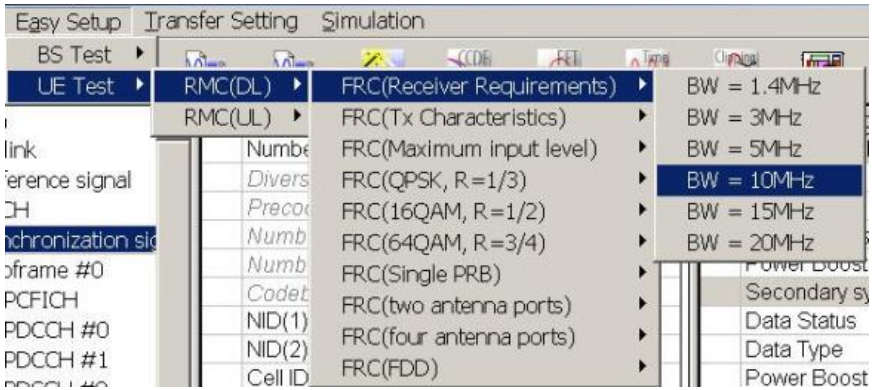
BS Test / E-UTRA Test Models



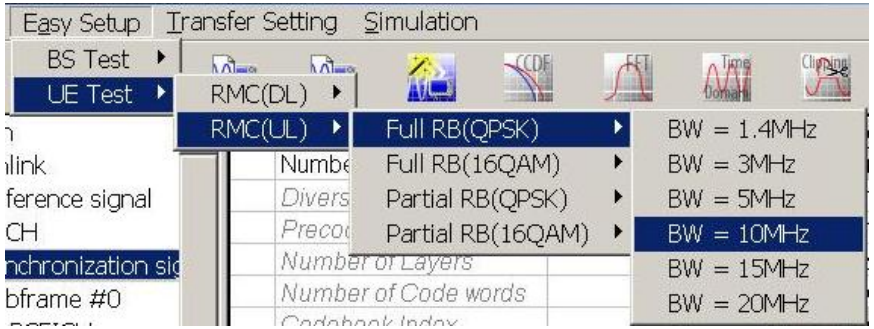
BS Test / FRC



UE Test / RMC(DL) / FRC



UE Test / RMC(UL)



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

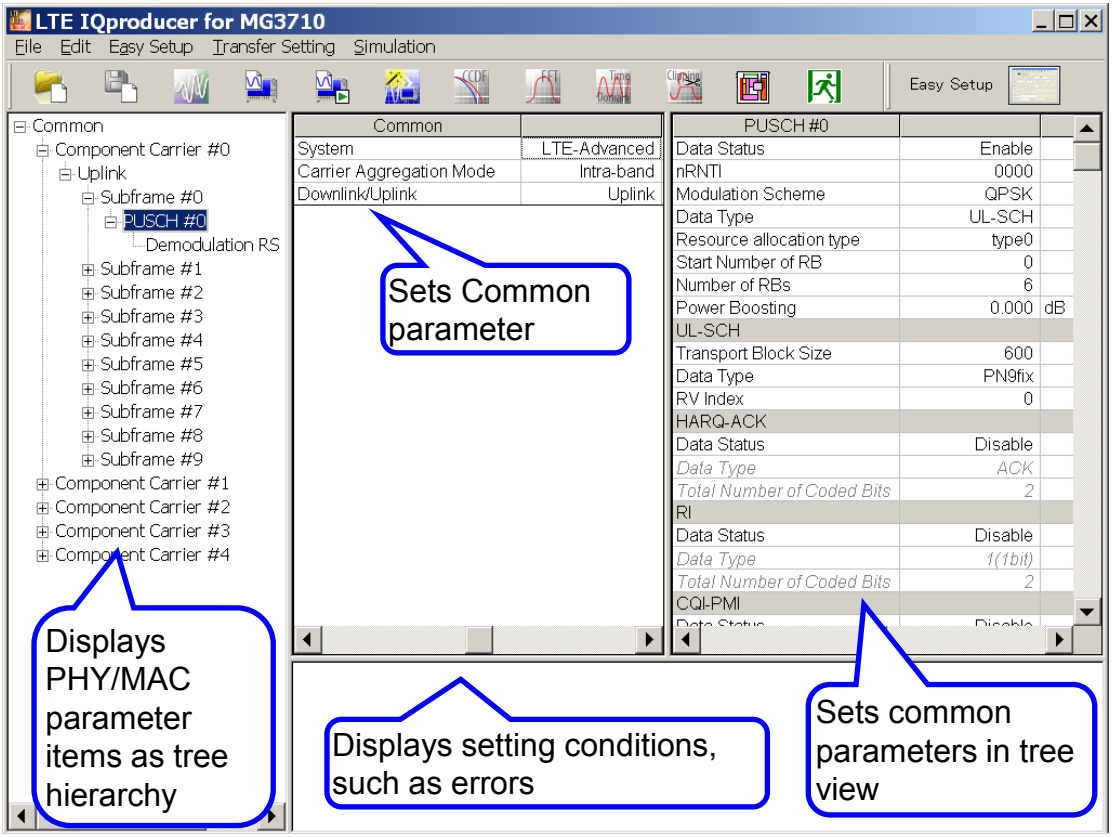
Inter-band
- Band #0, #1
- Component Carrier #0 to #4

Generated Channels

Downlink
- Reference Signal
- Primary Synchronization Signal
- Secondary Synchronization Signal
- PBCH (P-BCH)
- PCFICH
- PDCCH (Downlink control channel information)
- PDSCH (DL-SCH)
- Subframe #0 to #9
- PHICH

Uplink
- PUCCH (Uplink control channel information)
- PUSCH (UL-SCH)
- Demodulation RS for PUCCH/PUSCH
- Sounding RS
- Random Access Preamble
- Subframe #0 to #9

Normal Setup Screen

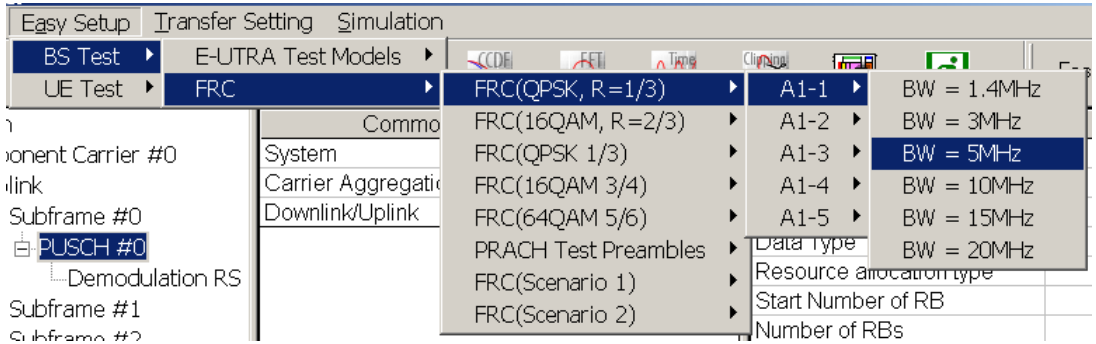


***Read the "MX3701xxA IQproducer" and "MX269xxxA series Software" Brochure for detail parameter setting range.**

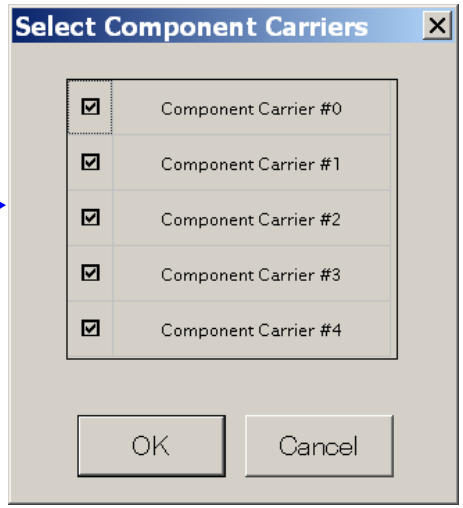
Normal Setup Screen: LTE-Advanced Easy Setup Parameter

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: E-UTRA Test Modes Setup



Select Component Carrier Screen



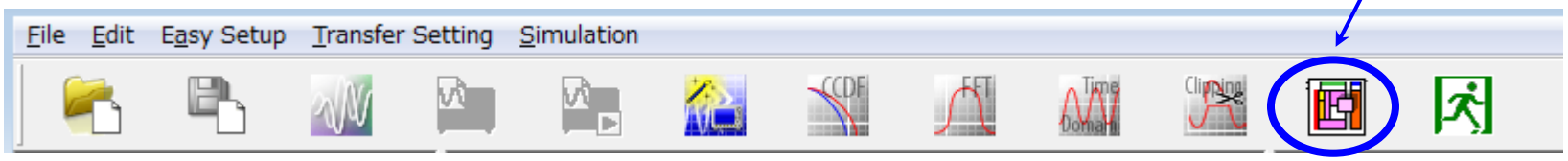
Simple operation by selecting target signals and component carriers as batch

***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.

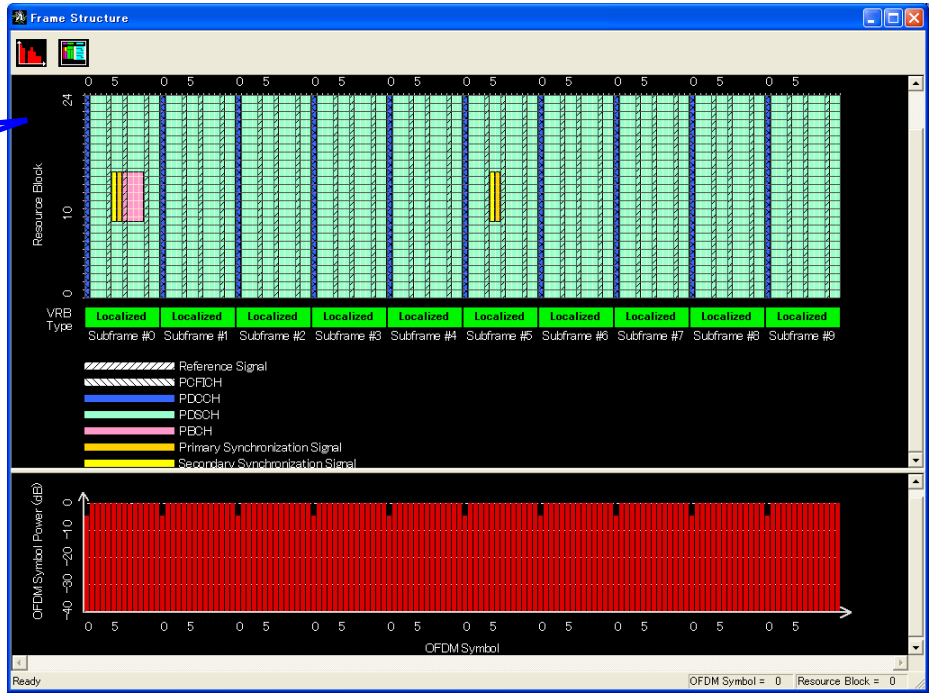
Frame Structure



Frame Structure Screen

Graphical display of allocation of each channel
Y-axis: Frequency (Resource Block units)
X-axis: Time (OFDM Symbol units)

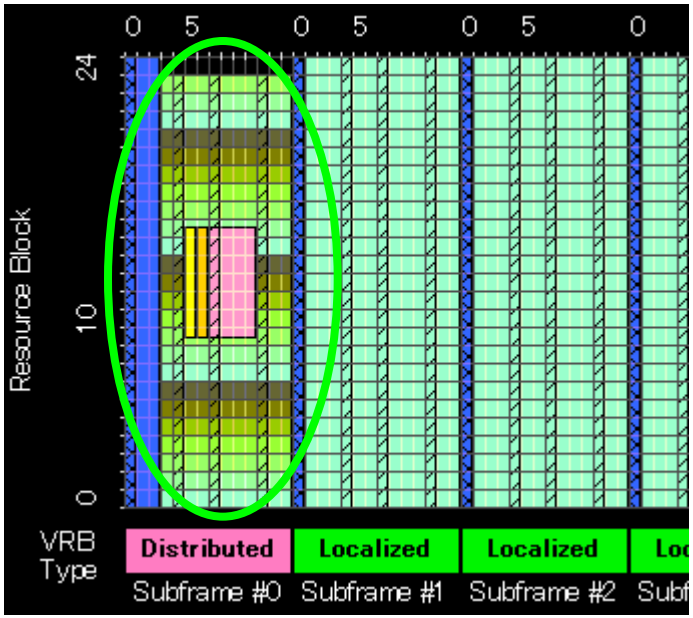
Displays relative level with OFDM Symbol with maximum power as 0 dB
Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)

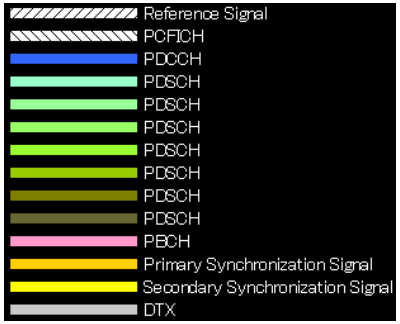


Frame Structure Screen (Channel Allocation)

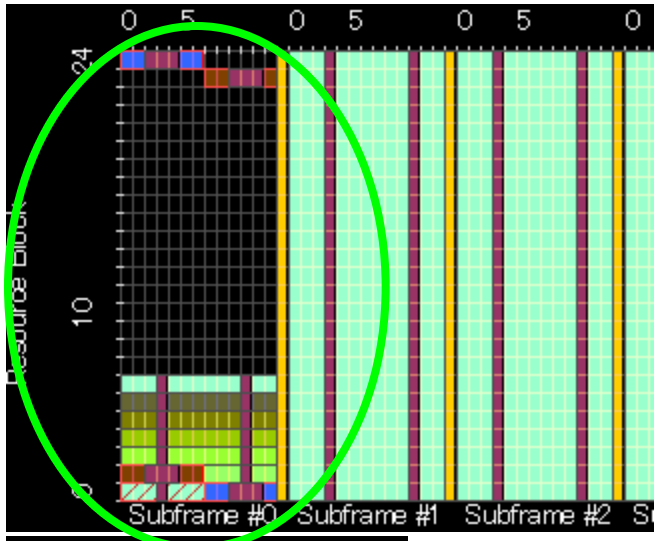
Any test pattern can be generated due to channel allocation of PDSCH, PUCCH and PUSCH in RB units.

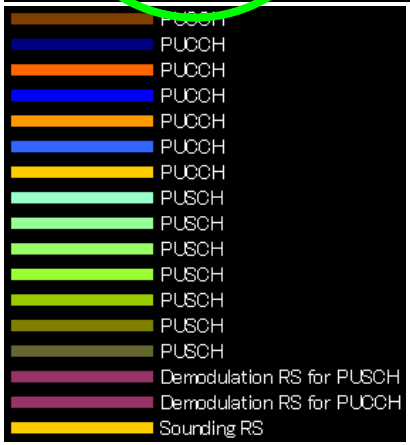
Downlink (PDSCH number: 25 at setting)





Uplink (PUCCH number: 8, PUSCH number: 8 at setting)





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.

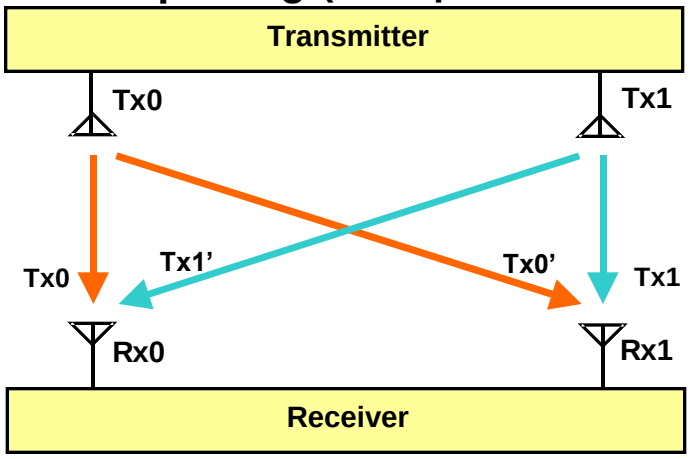
Number of Antennas parameter setting

Common	
Number of Antennas	1
Diversity Method	1
Precoding Method	2
Number of Layers	4
Number of Code words	
Codebook Index	-
NID(1)	0

Diversity Methodpa parameter setting

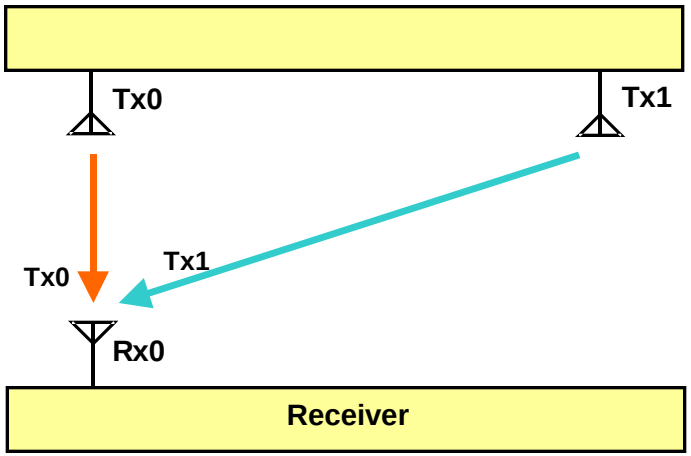
Common	
Number of Antennas	4
Diversity Method	Spatial Multiplexing
Precoding Method	Spatial Multiplexing
Number of Layers	Tx Diversity
Number of Code words	
Codebook Index	0
NID(1)	0

Spatial Multiplexing (Example of two antennas)



Channel capacity and data rate doubled

Tx Diversity (Example of two antennas)



Coverage at cell edge upgraded by improving reliability for fading signals and lowering available SNR

Random Access Preamble Setting

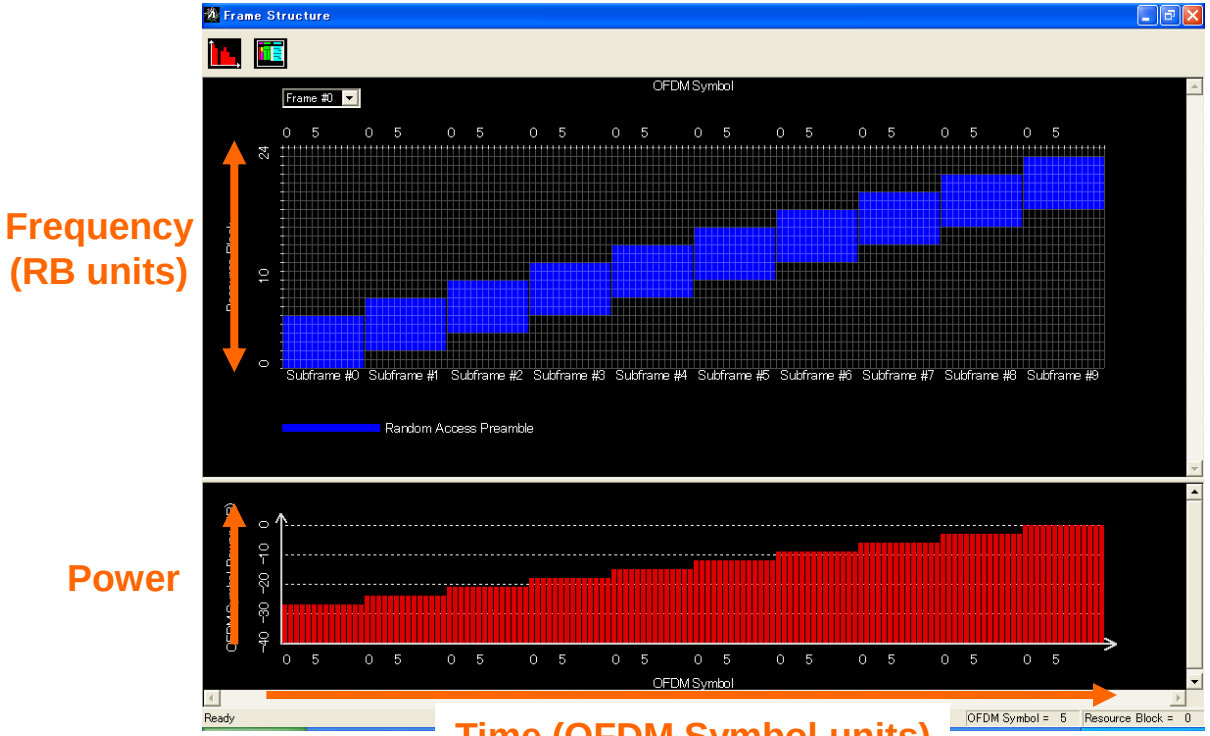
Random Access Preamble signal parameters for frequency hopping and power ramping can be set when Random Access Preamble is selected at Uplink Parameter Setting.

Random Access Preamble Parameter Setting

Uplink	
Data Transmission / Random Access Preamble	Random Access Preamble

Data Transmission
Random Access Preamble

Random Access Preamble



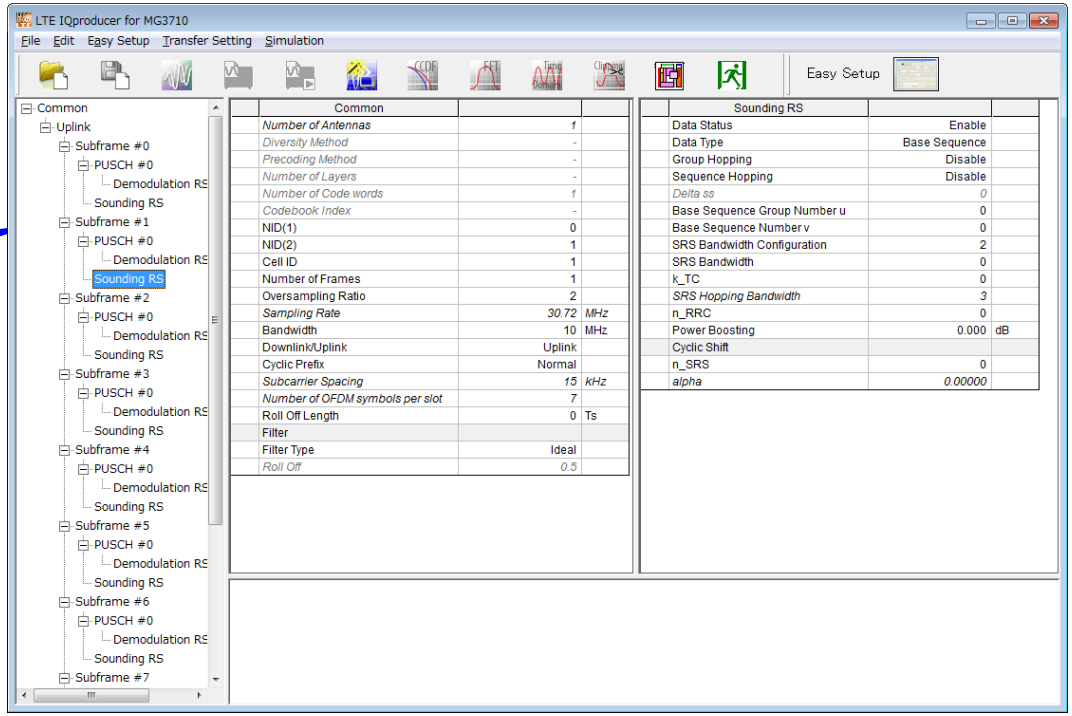
Sounding Reference Signal Setting

SRS (Sounding Reference Signal) ON with Uplink parameter setting sets Sounding RS parameters.

SRS Parameter Setting

	Uplink	
	Data Transmission / Random Access	Data Transmission
	PUCCH Parameters	
	delta PUCCH shift	1
	N_CS(1)	1
	N_RB(2)	1
	Sounding RS Parameters	
	SRS	OFF
	SRS Subframe Configuration	ON / OFF

Sets Sounding RS parameters per Subframe

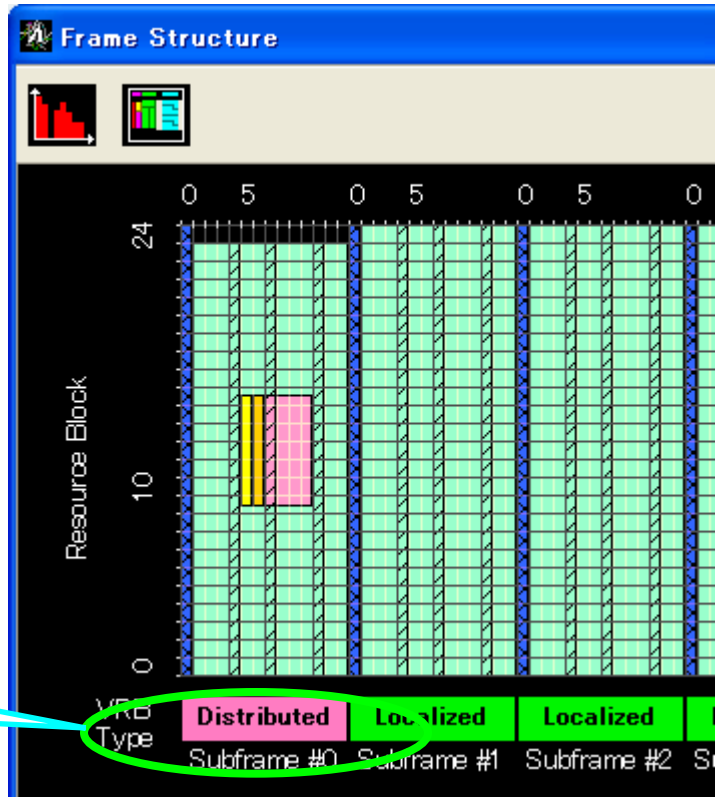


Virtual Resource Block Type Setting

Downlink signal Subframe #0 to #9 can select [Distributed] with Virtual Resource Block Type.

Virtual Resource Block Type Parameter Setting

Subframe #0	
Virtual Resource Block type	Localized
Number of PHICH Groups	Localized
Number of OFDM symbols for PDCCH	Distributed

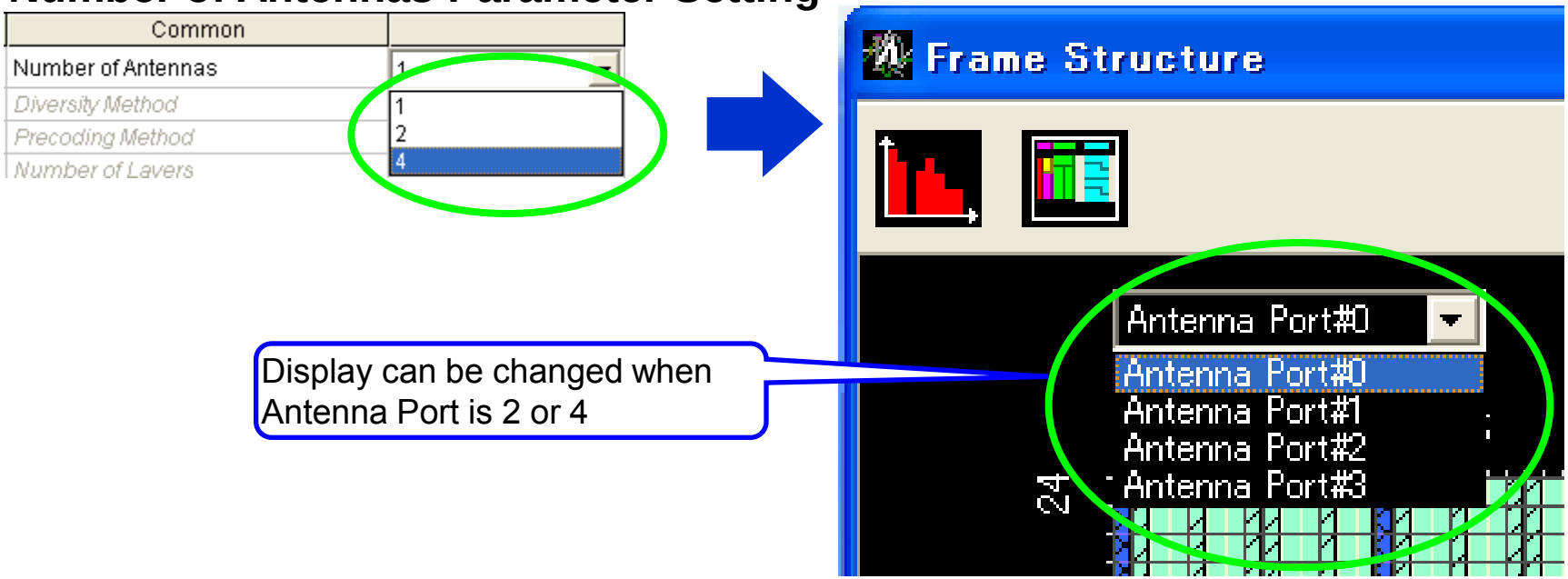


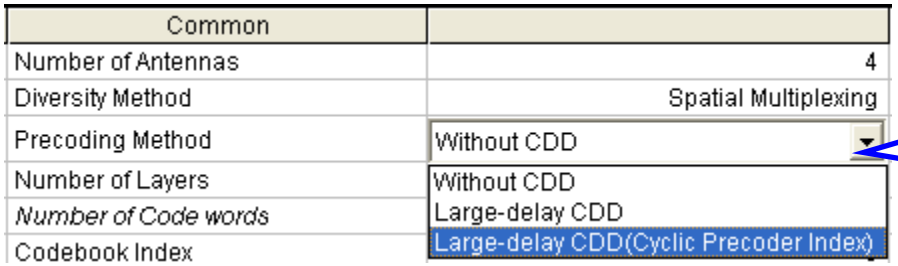
VRB Type changes to [Distributed]

Number of Antennas Setting

The Frame Structure display changes according to the Number of Antennas set using the Common parameter setting.

Number of Antennas Parameter Setting





Precoding Method can be set when Number of Antennas is 2 or 4.
Large-delay CDD Cyclic Precoder Index) can be set when Number of Antennas is 4.

UL Control Information Setting for UL-SCH

The UL-SCH UL Control Information (HARQ-ACK, RI, CQI-PMI) parameters are set at Uplink signal PUSCH #0 to #9.

Data Type Parameter Setting at PUSCH #0 to #9

PUSCH #0	
Data Status	Enable
nRNTI	0000
Modulation Scheme	QPSK
Data Type	PN9fix
Start Number of RB	
Number of RBs	
Power Boosting	

PN9fix
PN15fix
16 bit repeat
User File
UL-SCH

PUSCH #0		
Data Status	Enable	
nRNTI	0000	
Modulation Scheme	QPSK	
Data Type	UL-SCH	
Start Number of RB	0	
Number of RBs	25	
Power Boosting	0.000	dB
UL-SCH		
Transport Block Size	0	
Data Type	PN9fix	
RV Index	0	
HARQ-ACK		
Data Status	Enable	
Data Type	ACK	
Total Number of Coded Bits	2	
RI		
Data Status	Enable	
Data Type	1(1bit)	
Total Number of Coded Bits	2	
CQI-PMI		
Data Status	Enable	
Bit Width	4	
Data Type	PN9fix	
Total Number of Coded Bits	64	

HARQ-ACK, RI, CQI-PMI can be set when PUSCH Data Type is UL-SCH.

Simple Parameter Setting Function

n_cs is set automatically by setting the demodulation RS for PUSCH parameter.

n_cs Setting Parameter Setting

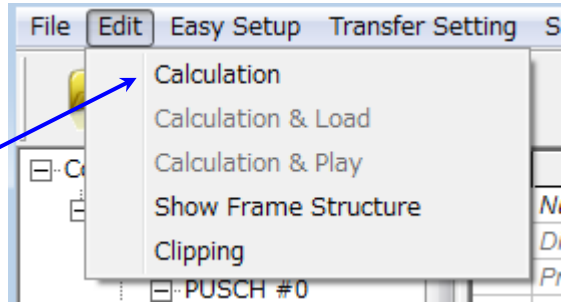
Demodulation RS for PUSCH	
Data Type	Base Sequence
Group Hopping	Disable
Sequence Hopping	Disable
Delta ss	0
Base Sequence Group Number u	0
Base Sequence Number v	0
n_cs Setting	Auto
n(1)_DMRS	Auto / Manual
n(2)_DMRS	

Demodulation RS for PUSCH		
Data Type	Base Sequence	
Group Hopping	Disable	
Sequence Hopping	Disable	
Delta ss	0	
Base Sequence Group Number u	0	
Base Sequence Number v	0	
n_cs Setting	Auto	
n(1)_DMRS	0	
n(2)_DMRS	0	
Cyclic Shift for 1st		
n_cs	*4*	
alpha	*2.09440*	
Cyclic Shift for 2nd		
n_cs	*10*	
alpha	*5.23599*	

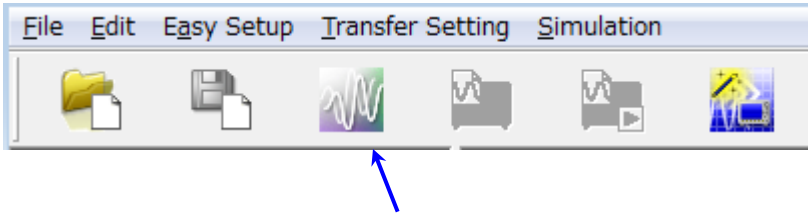
Cyclic Shift n_cs is set automatically.

Waveform Generation: Calculation

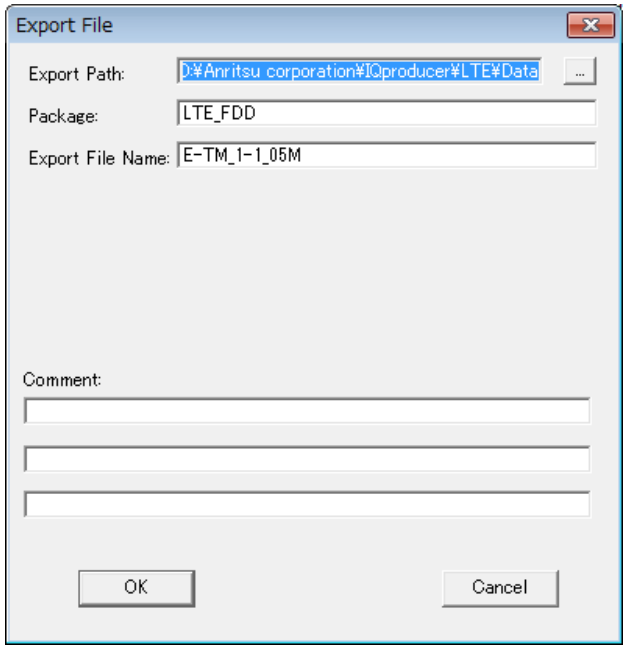
After setting parameters, click the [Calculation] icon to generate the waveform pattern.



Generates waveform pattern



Generates waveform pattern



File export destination folder

Name of waveform pattern package: 31 characters max.

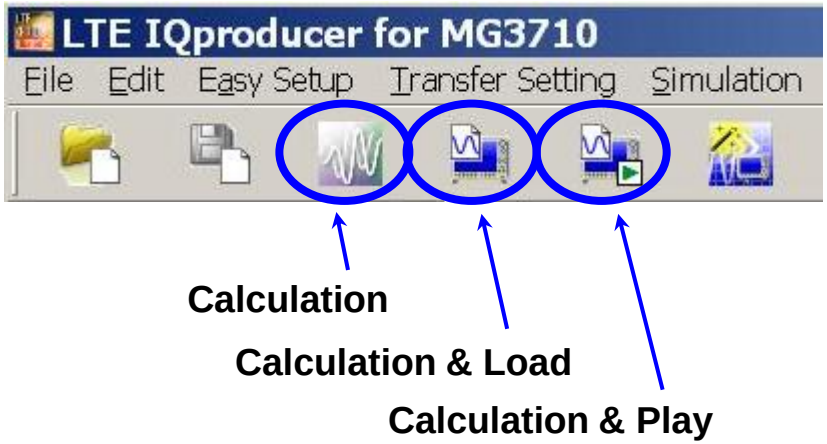
Name of waveform pattern file: 20 characters max.

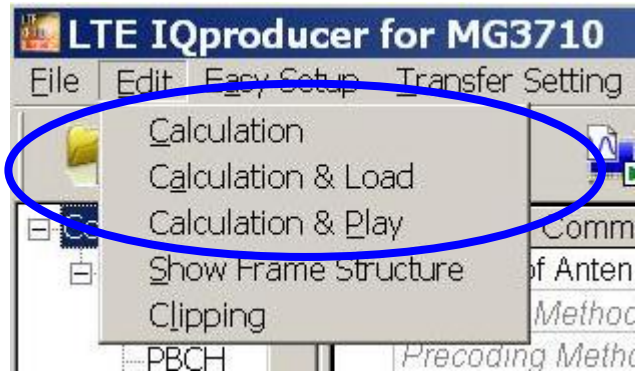
Comment on screen
38 characters max. per line

Calculation & Load & Play

MG3710A only

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





Calculation:

Generates a waveform pattern after parameters are set.
/Calculation/

Calculation & Load:

After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.
/Calculation/ > /Load/

Calculation & Play:

After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.
/Calculation/ > /Load/ > /Select/

File size of waveform patterns

MG3710A only

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.

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

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

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

File size of waveform patterns

MS269xA/MS2830A only

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.

Model	Items	ARB Memory Expansion
MS2830A	With Option27 (Memory 256M samples)	1 GB
	Without Option27 (Memory 256M samples)	256 MB

MS269xA:

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

Anritsu

Specifications are subject to change without notice.

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