

MX370108A

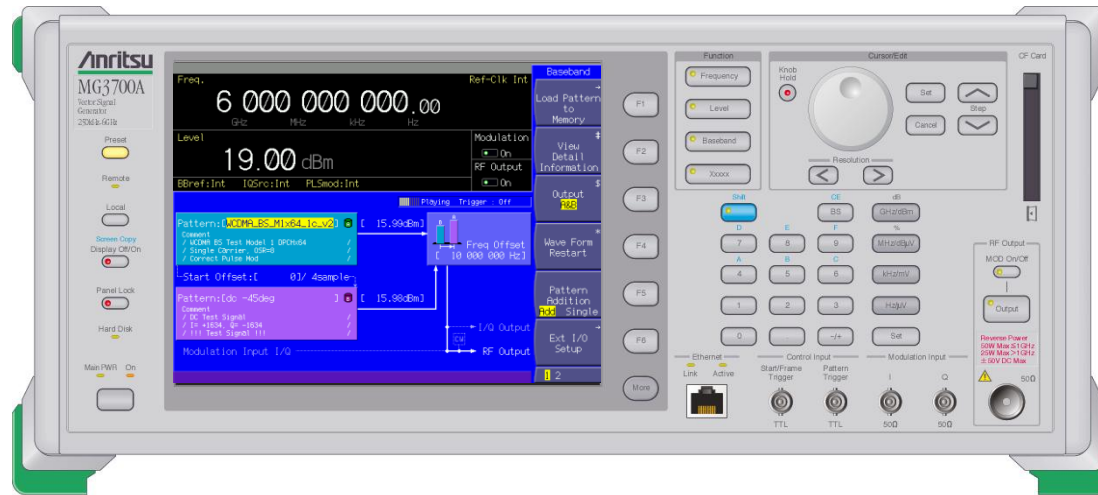
LTE IQproducer™

MG3700A

Vector Signal Generator

For MG3700A Vector Signal Generator

MX370108A LTE IQproducer™ Product Introduction (Version 4.00)



Anritsu Corporation

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

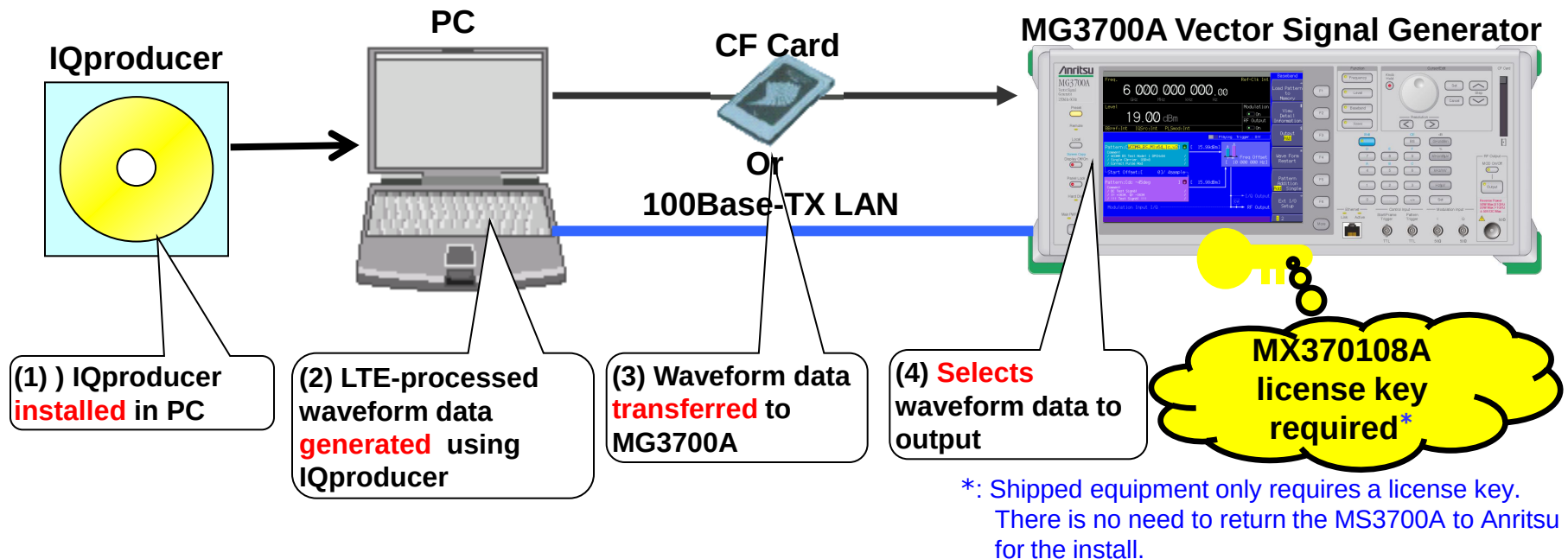
LTE IQproducer Operating Environment

CPU	Pentium III 1 GHz or faster
Memory	≥512 Mbytes
Hard Disk Free Space	Installation: ≥5 Gbytes Max. capacity (512 Msamples x 4) waveform pattern generation: ≥25 Gbytes
Display	1024×768 pixels or better
OS	Windows2000 Professional, Windows XP

What is LTE IQproducer?

The MX370108A LTE IQproducer™ is PC application software with a GUI for generating waveform patterns in compliance with the 3GPP TS36.211, TS36.212 and TS25.814 standards.

Signals are output by downloading the generated waveform pattern to the MG3700A Vector Signal Generator.



♦ Outputting waveform patterns using MX370108A => Main frame requires license

IQproducer with unlicensed software will run on the PC to test waveform pattern generation but an unlicensed MG3700A cannot output signals because it does not recognize the waveform patterns.

♦ Outputting waveform patterns using EDA tool (C language, MATLAB, Microwave Office, etc) => License not required

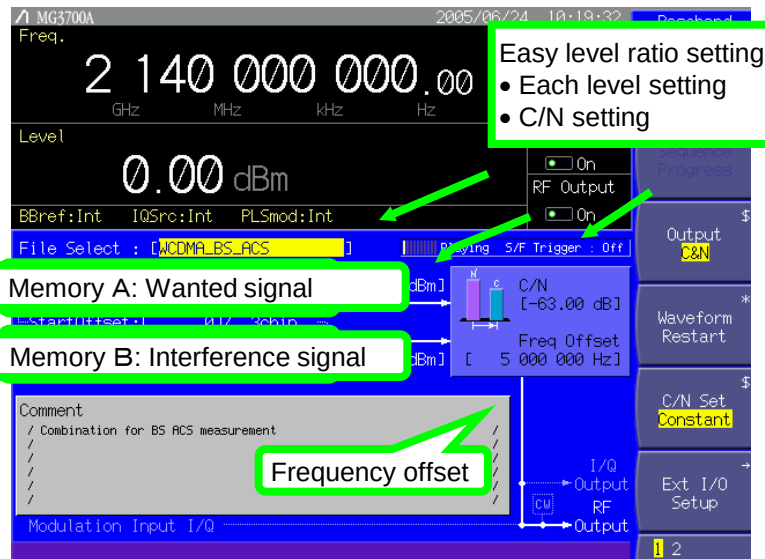
Features—MG3700A Vector Signal Generator

Two-Signal Combine Function

<Standard>

Because the MG3700A has two arbitrary waveform memories, two signals are output by setting the wanted and interference signal in each memory.

Example of MG3700A Setting Screen



TS36.141 BS Conformance Testing

7.4 In-channel selectivity

7.4.1 Definition and applicability

.....The interfering signal shall be an E-UTRA signal as specified in Annex C and shall be time aligned with the wanted signal.

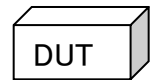
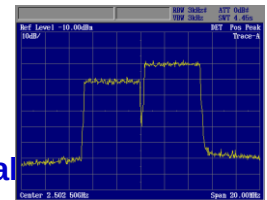
Two-signal combine function outputs both Wanted and Interference signals at same timing

◆ MG3700A Example

MG3700A

Vector Signal Generator

Wanted signal
+
Interference signal



- ◆ One SG output two signals
- ◆ No combiner
- ◆ Easy level adjustment

LTE IQproducer Operation Image

Setup

Starting IQproducer

Editing Parameters

- Easy Setup Menu
- Frame Structure Screen
- 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 for UL-SCH
- Simple Parameter Setting

Generating Waveforms

Transferring Waveform Patterns

Outputting Waveform Pattern: CCDF, FFT, Time Domain

Editing Waveforms: Clipping/Filtering

Others: Saving/Recalling Parameters

Slide 6

Slide 7

Slide 8-18

Slide 19

Slide 20-21

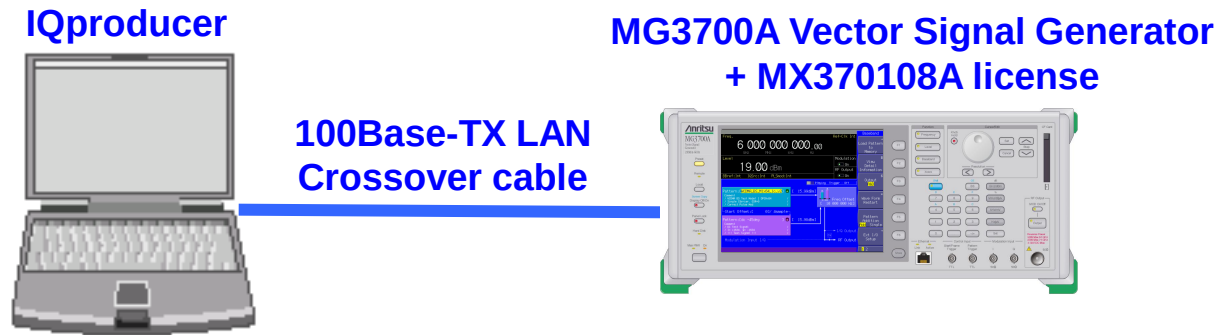
Slide 22

Slide 23

Slide 24

Setup

- (1) Install IQproducer in PC.
- (2) Install MX370108A license in MG3700A Vector Signal Generator.
- (3) Connect PC and MG3700A using crossover cable.



***Read the appended [IQproducer Upgrade Procedure] for the IQproducer installation method.**

***Read the appended [LAN connection] for the LAN connection method between the PC and MG3700A.**

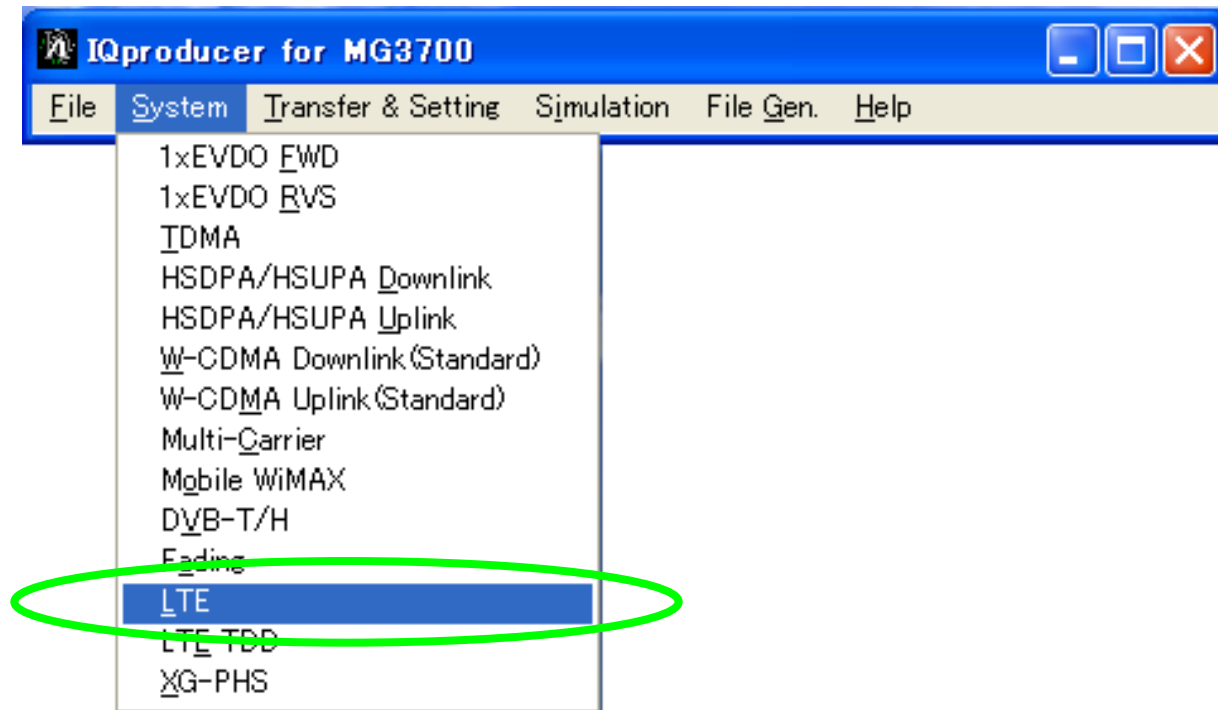
Starting IQproducer

Start IQproducer as follows:

Start > Programs > Anritsu Corporation > IQproducer for MG3700A

IQproducer Main Screen

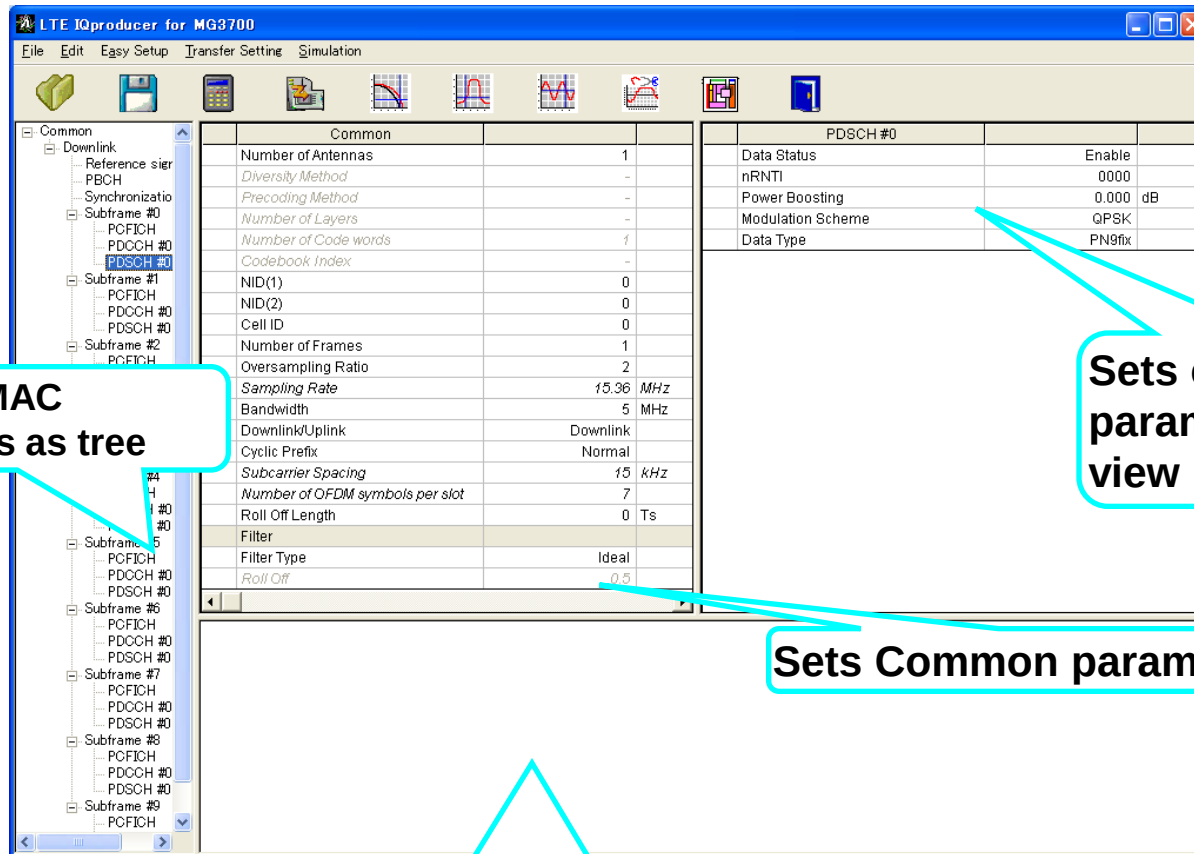
When IQproducer starts, the following screen is displayed.
Select LTE from the [System] pull-down menu.



Editing Parameters: Main Screen

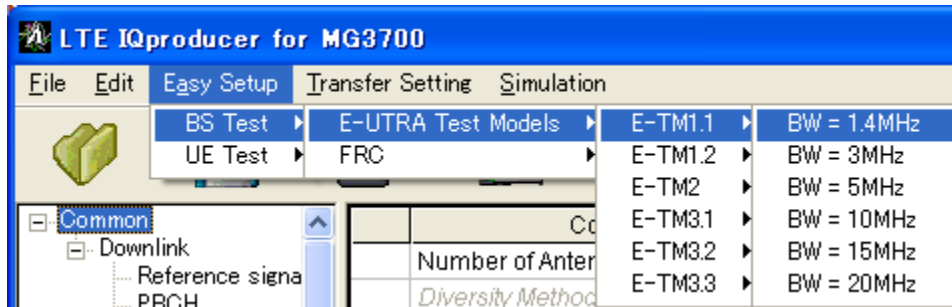
The following screen is displayed when LTE is selected from the [System] menu.

LTE IQproducer Main Display



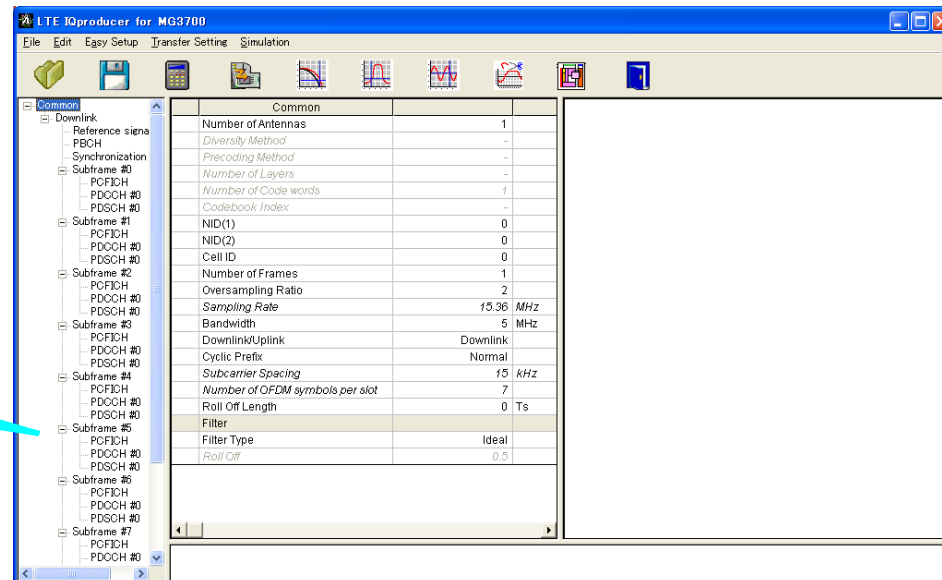
Editing Parameters: Easy Setup Menu

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

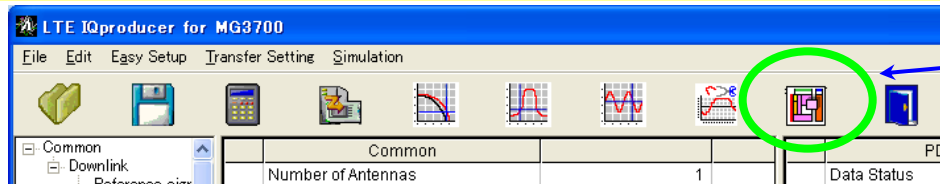
Batch setting of each parameter for selected tests



See the Appendix for signals set by the Easy Setup Menu. In addition, the Easy Setup Menu sets typical parameter values for 3GPP-defined test signals as a batch. See the operation manual for details.

Editing Parameters: 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.

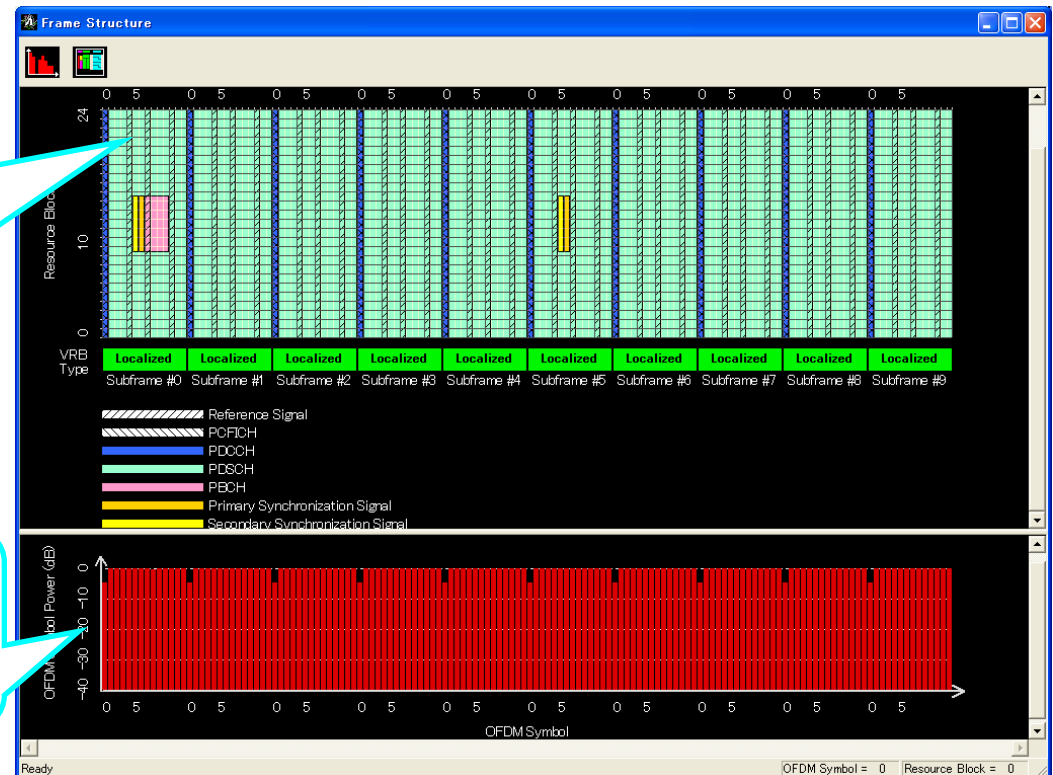


Frame Structure

Frame Structure Screen

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

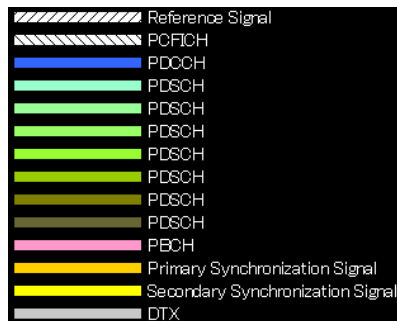
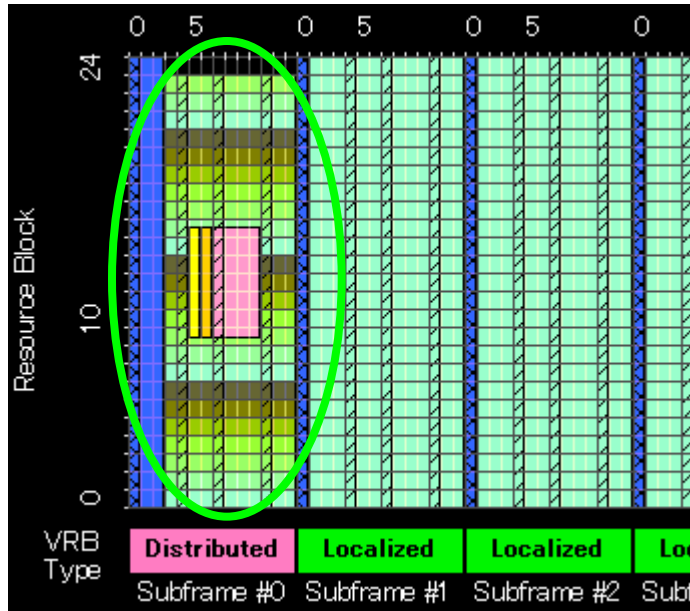
Displays relative level with OFDM Symbol with maximum power as 0 dB
Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)



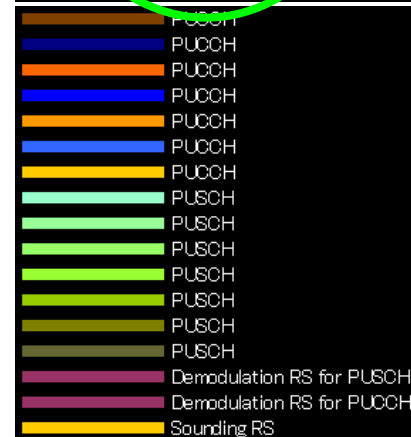
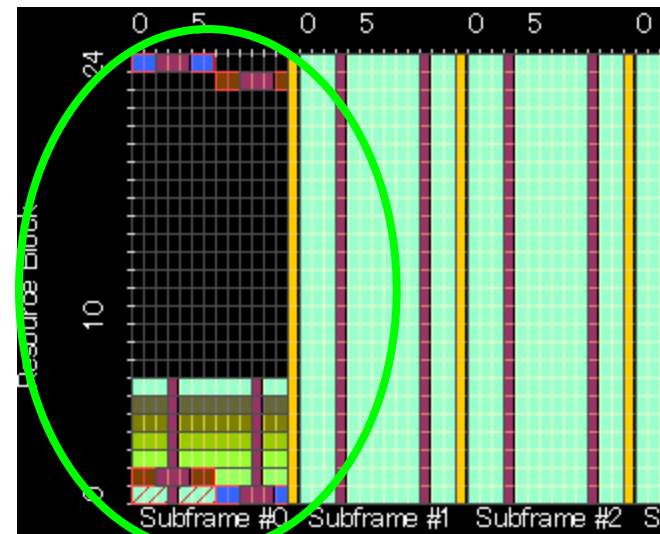
Editing Parameters: Frame Structure Screen (Channel Allocation)

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)



Editing Parameters: 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.

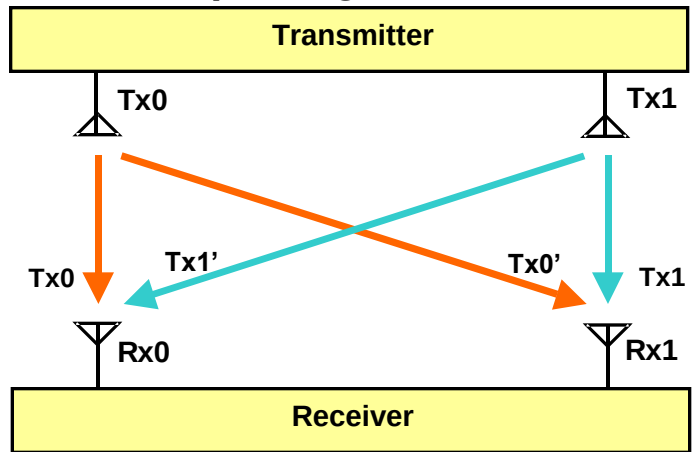
Number of Antennas parameter setting

Common		
Number of Antennas	1	
Diversity Method	1	
Precoding Method	2	
Number of Layers	4	
Number of Code words		1
Codebook Index		-
MIMO		n

Diversity Method parameter setting

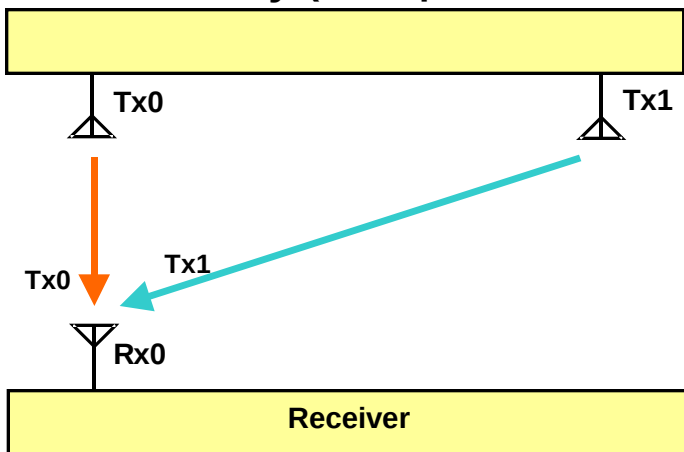
Common		
Number of Antennas	4	
Diversity Method	Spatial Multiplexing	
Precoding Method	Spatial Multiplexing	
Number of Layers	Tx Diversity	
Number of Code words		1
Codebook Index		0
MIMO		n

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

Editing Parameters: 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.

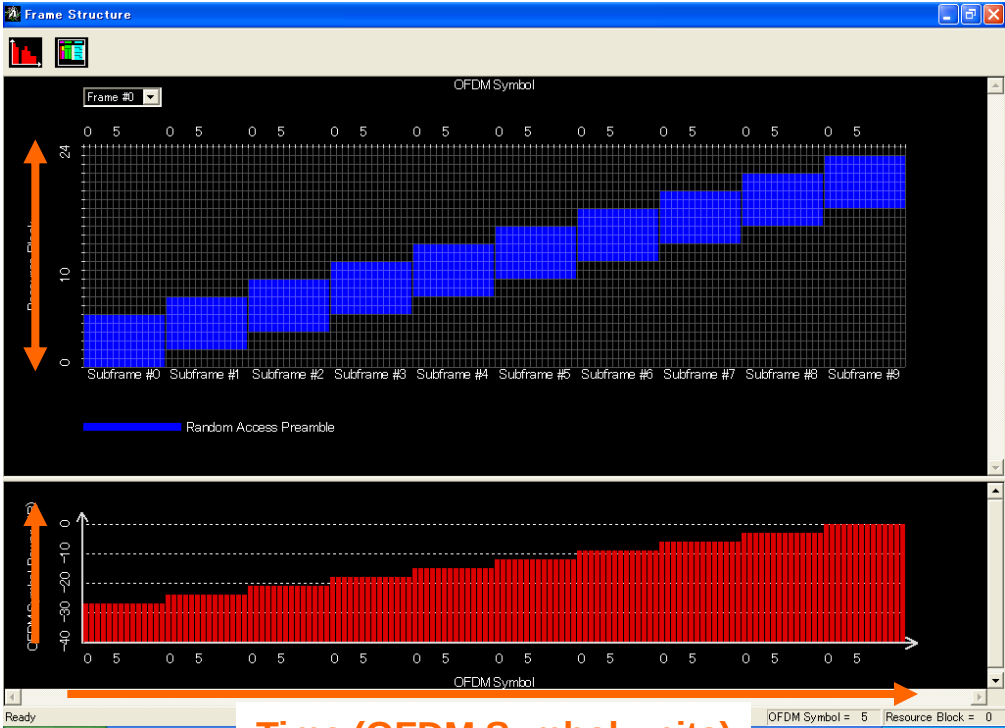
Random Access Preamble Parameter Setting

Uplink	
Data Transmission / Random Access Preamble	Random Access Preamble
	Data Transmission
	Random Access Preamble

Random Access Preamble

Frequency
(RB units)

Power



Time (OFDM Symbol units)

Editing Parameters: 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



LTE IQproducer for MG3700

File Edit Easy Setup Transfer Setting Simulation

Common

Uplink

- Subframe #0
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #1
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #2
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #3
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #4
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #5
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #6
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #7
 - PUSCH #0
 - Demodula
 - Sounding RS
- Subframe #8
 - PUSCH #0
 - Demodula
 - Sounding RS

Common

Number of Antennas	1
Diversity Method	-
Precoding Method	-
Number of Layers	-
Number of Code words	1
Codebook Index	-
NID(1)	0
NID(2)	0
Cell ID	0
Number of Frames	1
Oversampling Ratio	2
Sampling Rate	15.36 MHz
Bandwidth	5 MHz
Downlink/Uplink	Uplink
Cyclic Prefix	Normal
Subcarrier Spacing	15 kHz
Number of OFDM symbols per slot	7
Roll Off Length	0 Ts
Filter	
Filter Type	Ideal
Roll Off	0.5

Sounding RS

Data Status	Enable
Data Type	Base Sequence
Group Hopping	Disable
Sequence Hopping	Disable
Delta ss	0
Base Sequence Group Number u	0
Base Sequence Number v	0
SRS Bandwidth Configuration	2
SRS Bandwidth	0
k_TC	0
SRS Hopping Bandwidth	3
n_RRC	0
Power Boosting	0.000 dB
Cyclic Shift	
n_SRS	0
alpha	0.00000

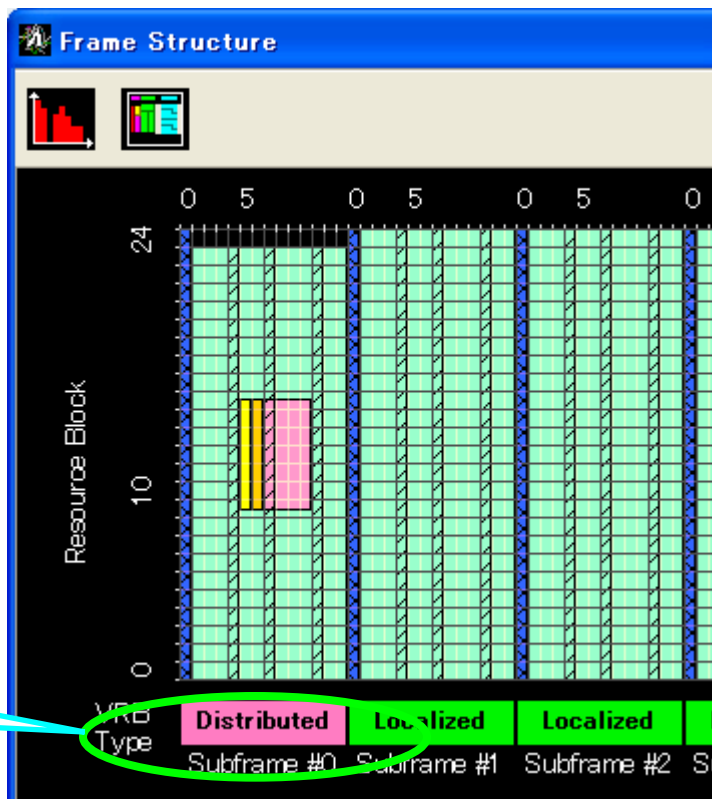
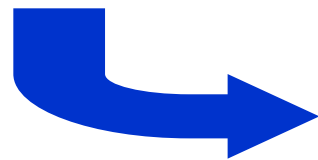
Sets Sounding RS parameters per Subframe

Editing Parameters: Virtual Resource Block Type Setting

Downlink signal Subframe #0~#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 PDSCH	Distributed



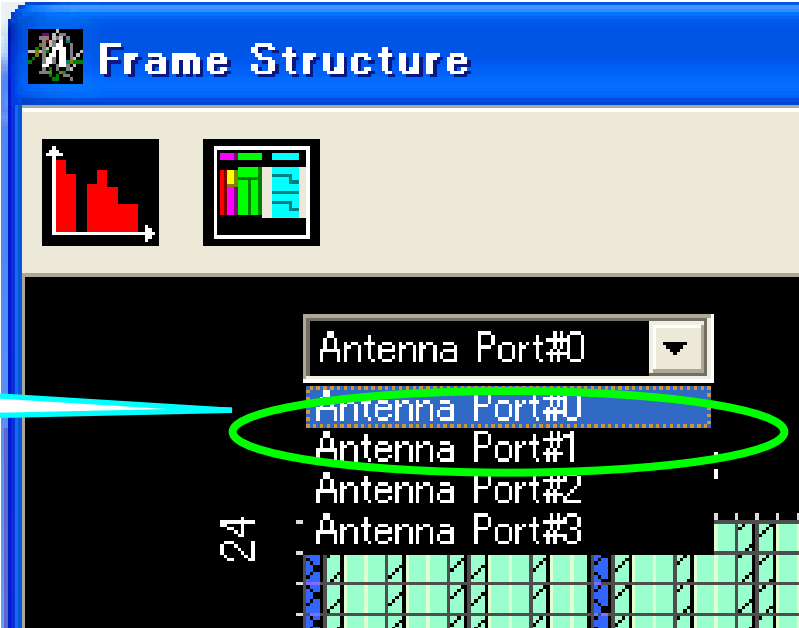
VRB Type changes to [Distributed]

Editing Parameters: 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

Common	
Number of Antennas	1
Diversity Method	1
Precoding Method	2
Number of Layers	4



Display can be changed when Antenna Port is 2 or 4

Common	
Number of Antennas	4
Diversity Method	Spatial Multiplexing
Precoding Method	Without CDD
Number of Layers	Without CDD
Number of Code words	Large-delay CDD
Codebook Index	Large-delay CDD(Cyclic Precoder Index)

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.

Editing Parameters: 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~#9.

Data Type Parameter Setting at PUSCH #0~#9

PUSCH #0	
Data Status	Enable
nRNTI	0000
Modulation Scheme	QPSK
Data Type	PN9fix
Start Number of RB	PN9fix
Number of RBs	PN15fix
Power Boosting	16 bit repeat

User File
UL-SCH



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

Editing Parameters: 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
n(2)_DMRS	Manual



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

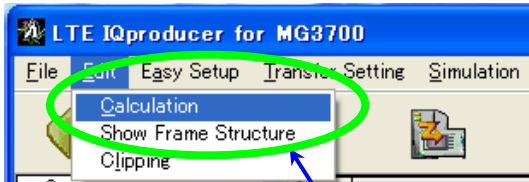
Cyclic Shift n_cs is set automatically.

Generating Waveforms: Calculation

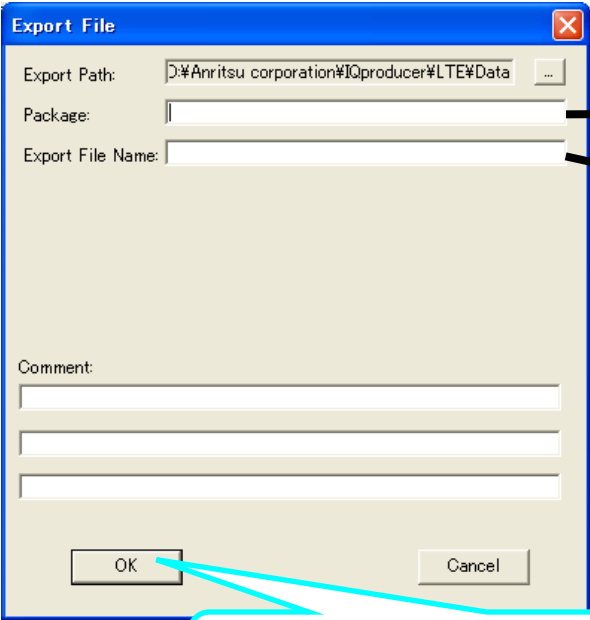
Clicking the [Calculation] icon starts creating waveform patterns.



Calculation: Creates waveform pattern



Calculation: Creates waveform pattern



Name of waveform pattern package:
31 characters max.

Name of waveform pattern file:
18 characters max.

Comment on MG3700A screen:
38 characters max. per line

Generate the waveform pattern by clicking the [OK] button.

Transferring Waveform Pattern (1/2)

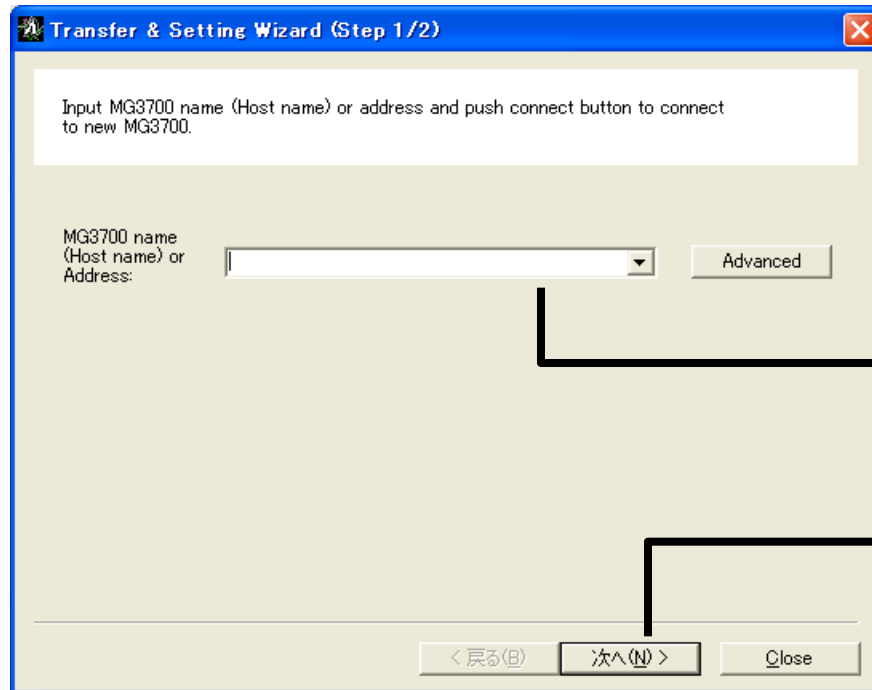
Connect the MG3700A and PC via a LAN.



Transfer & Setting: Waveform pattern Transfer



Transfer & Setting: Waveform pattern Transfer

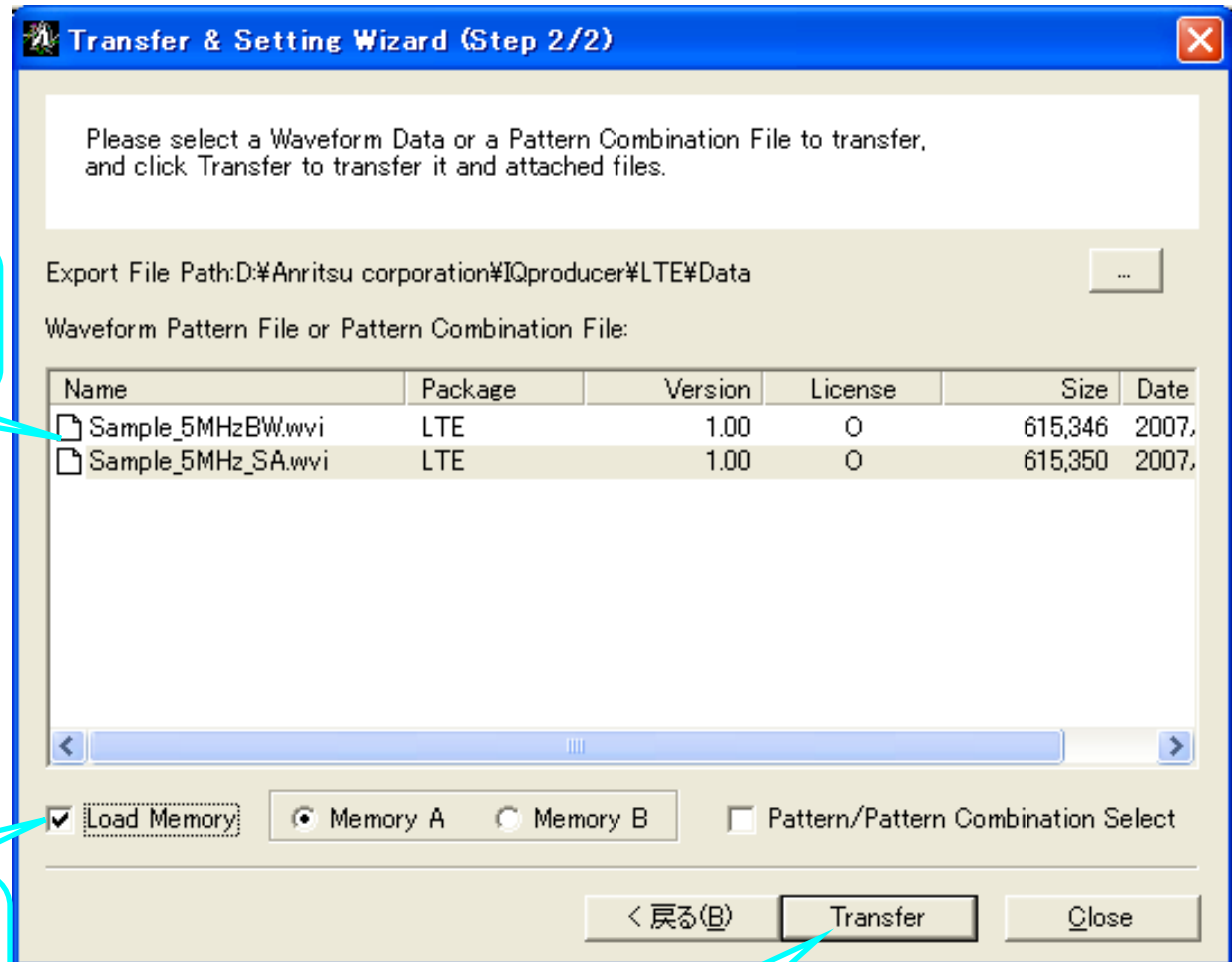


Input Host name or IP Address
of MG3700 main frame.

Connect to LAN.

*Read the appended [LAN connection] for details.

Transferring Waveform Pattern (2/2)



Select waveform pattern to transfer to HDD of MG3700A.

Select when loading waveform pattern into memory at same time as transferring.

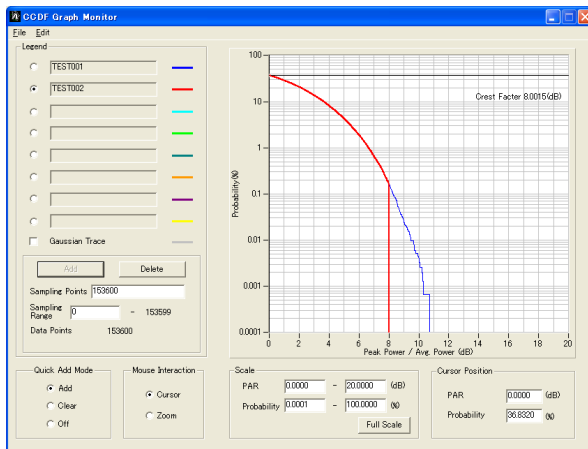
Start transfer.

Outputting Waveform Pattern: CCDF, FFT, Time Domain

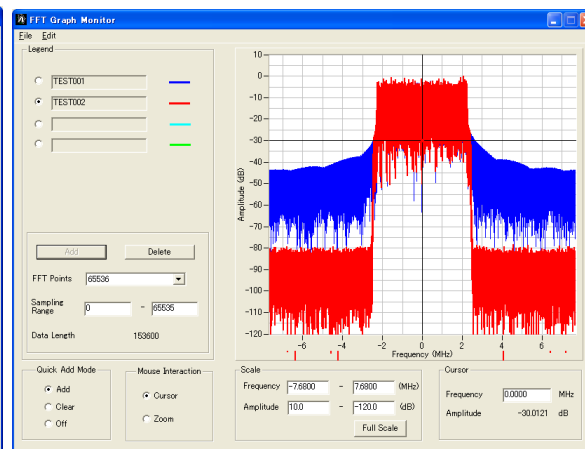
The characteristics of generated waveform patterns can be checked using various waveform displays (CCDF, FFT and Time Domain). Repeat work when intended characteristics are not obtained is cut because the signal PAPR and distortion can be grasped by preloading the waveform pattern in the SG.

Easy comparison of generated waveform-pattern characteristics by simultaneous display of multiple patterns!

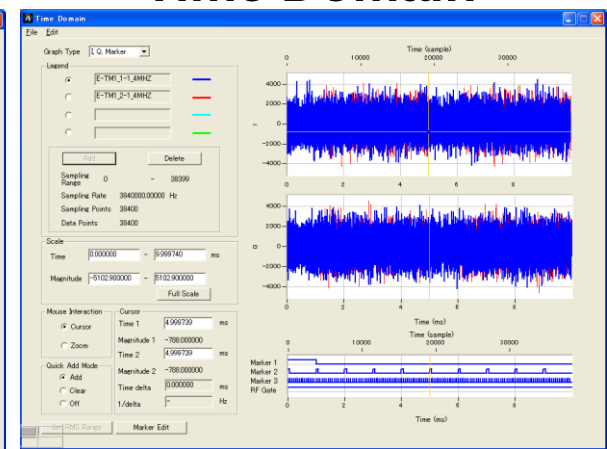
CCDF



FFT



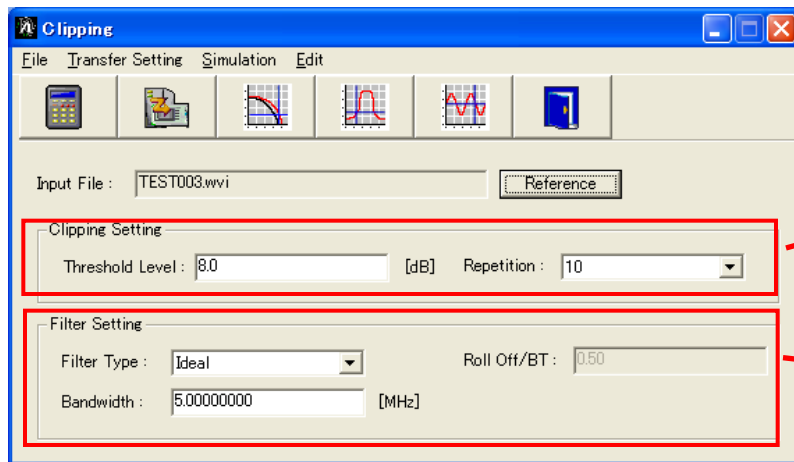
Time Domain



Waveform Editing Function: Clipping/Filtering Functions

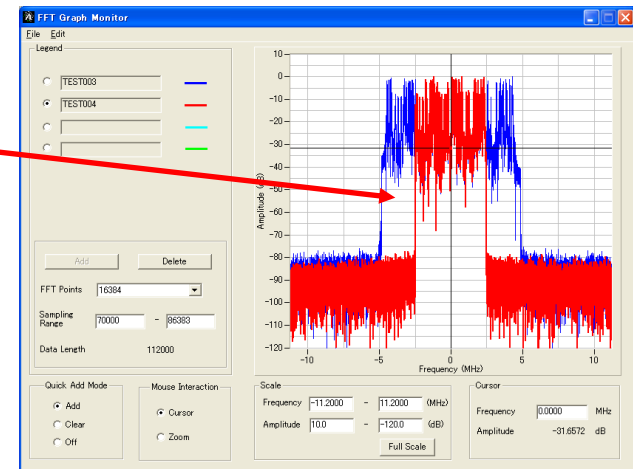
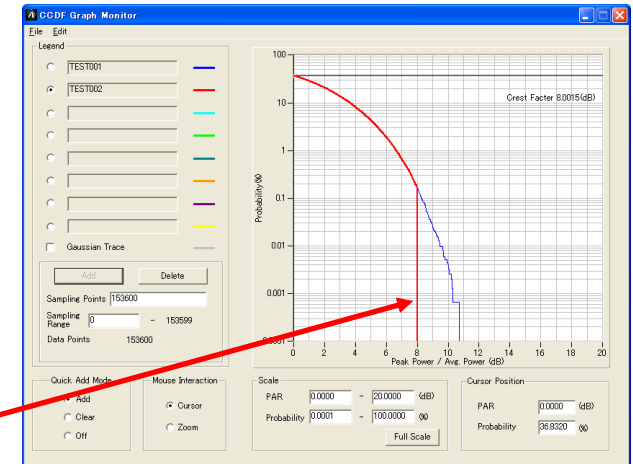
Generated waveform patterns can be easily clipped and filtered to generate test patterns with changed peak average power (PAPR) and distortion.

Easy Clipping and Filtering!



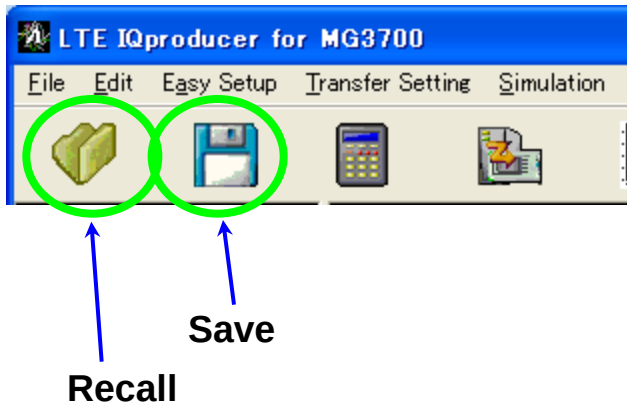
Clipping

Filtering

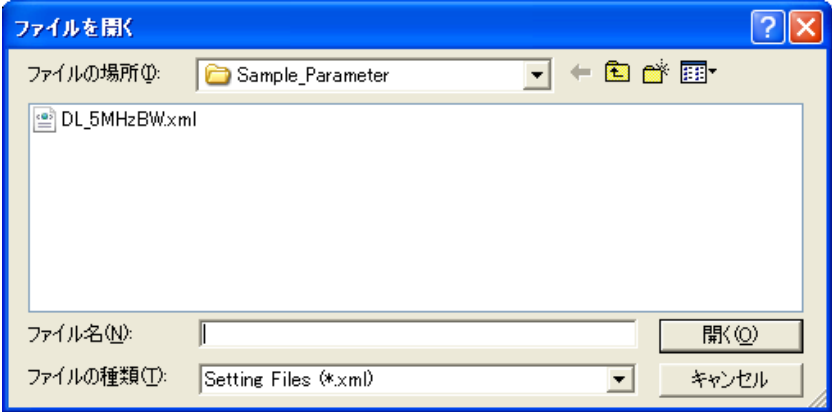


Others: Saving/Recalling Parameters

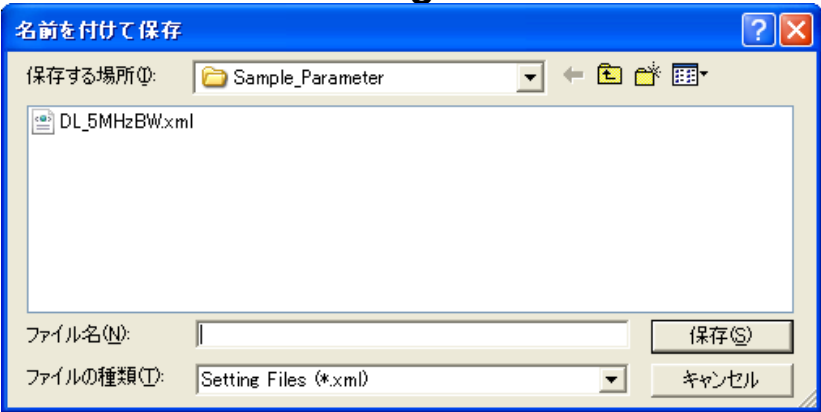
The numerical values and settings for each item can be saved as a parameter file for instant recall.



Recalling File



Saving File



Appendix

Parameter Setting Range_Common

Display	Outline	Setting Range
Common		
Number of Antennas	Sets number of antennas	1, 2, 4 (2 and 4 only at Downlink)
Diversity Method	Sets diversity method	Spatial Multiplexing, Tx Diversity
Precoding Method	Sets precoding method	Without CDD, Large-delay CDD, Large-delay CDD(Cyclic Precoder Index)
Number of Layers	Sets number of layers	1, 2, 3, 4
Number of Code words	Displays the number of code words	1, 2
Codebook Index	Sets codebook index	0 to 3 (when Number of Layers is 1) 0 to 2 (when Number of Layers is 2) 0 to 15 (when Number of Layers is 4)
Physical-layer Cell-identity Group NID (1)	Sets physical-layer cell-identity group NID (1)	0 to 167
Physical-layer Identity NID (2)	Sets physical-layer identity NID (2)	0, 1, 2
Cell ID	Displays cell ID	0 to 503
Number of Frames	Sets number of frames	1 to max. number of frames in memory
Oversampling Ratio	Sets oversampling ratio	2, 4
Sampling Rate	Displays sampling rate	Display only: Autosetting using oversampling ratio and bandwidth
Bandwidth	Sets system bandwidth	1.4, 3, 5, 10, 15, 20 MHz The 1.6 and 3.2 MHz settings are not available for IQproducer Version 10.00 or later. In addition, parameter files for versions earlier than IQproducer Version 10.00 in which 1.6 or 3.2 MHz is specified cannot be read.
Downlink/Uplink	Sets downlink/uplink settings	Downlink, Uplink
Cyclic Prefix	Sets cyclic prefix	Normal, Extended
Subcarrier Spacing	Displays subcarrier spacing	Display only
Number of OFDM symbols per Slot	Displays number of OFDM symbols per slot	7 (only when Cyclic Prefix = Normal), 6 (only when Cyclic Prefix = Extended)
Roll-off Length	Sets roll-off length for OFDM symbol	0 to 3152 Ts (when Random Access Preamble) 0 to 144 Ts (when Cyclic Prefix = Normal) 0 to 512 Ts (when Cyclic Prefix = Extended)
Filter		
Filter Type	Sets filter type	Nyquist, Root Nyquist, Ideal, None
Roll-off	Sets roll-off rate	0.1 to 1.0 (only enabled for Nyquist, Root Nyquist)

Parameter Setting Range_PHY/MAC Downlink (1/4)

Display	Outline	Setting Range
Downlink		
PHICH	Sets ON/OFF for PHICH	ON, OFF
PHICH duration	Sets the PHICH area	Normal, Extended
Ng	Sets the parameter (Ng) for determining the PHICH arrangement	1/6, 1/2, 1, 2
Reference Signal		
Reference Signal Sequence	Sets data used as reference signal sequence	Gold Sequence, PN9, PN15, 16 bit repeat, User File
Reference Signal Sequence Repeat Data	Sets 16 bit repeat data installed in reference signal sequence	0000 to FFFF (only when Reference signal Sequence = 16 bit repeat)
Reference Signal Sequence User File	Sets user file installed in reference signal sequence	Select any file. (only when Reference signal Sequence = User File)
Frequency Shift Value	Displays the amount of frequency shift	0, 1, 2, 3, 4, 5
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
PBCH		
Data Status	Enables/disables PBCH parameter	Disable, Enable
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, BCH
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PBCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PBCH	Select any file. (only when Data Type = User File)
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
BCH		
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File, BCCH
Data Type Repeat Data	Sets 16 bit repeat data installed in BCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to install in BCH	Select any file. (only when Data Type = User File)
Transport Block Size	Sets the transport block size of BCH	When Cyclic Prefix = Normal, Max. 1920 When Cyclic Prefix = Extended, Max. 1728
DL Bandwidth	Displays data mapped to BCCH	n6, n15, n25, n50, n75, n100 (only when Data Type = BCCH)
PHICH duration	Displays the PHICH duration mapped to BCCH	Normal, Extended (only when Data Type = BCCH)
Ng	Displays the Ng value mapped to BCCH	1/6, 1/2, 1, 2 (only when Data Type = BCCH)
SFN Offset	Sets the initial SFN value mapped to BCCH	0 ~ 1023 (only when Data Type = BCCH)

Parameter Setting Range_PHY/MAC Downlink (2/4)

Display	Outline	Setting Range
Synchronization Signals		
Primary Synchronization Signal		
Data Status	Enables/disables primary synchronization signal parameter	Disable, Enable
Data Type	Sets data type	Zadoff-Chu Sequence, User File
Data Type User File	Sets user file to install in primary synchronization signal	Select any file (only when Data Type = User File)
Zadoff-Chu Sequence Index u	Displays Zadoff-Chu Sequence index u	25, 29, 34
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
Secondary Synchronization Signal		
Data Status	Enables/disables secondary synchronization signal	Disable, Enable
Data Type	Sets data type	Concatenated sequence, PN9fix, PN15fix, 16 bit repeat, User
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the Secondary synchronization signal	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the Secondary synchronization signal	Select any file (only when Data Type = User File)
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
Sub-frame #0 ~ #9		
Virtual Resource Block type		Localized, Distributed
Gap		1st Gap, 2nd Gap
Gap value		3 to 48
Number of VRBs		6 to 96
Number of PHICH Groups		Display only
Number of OFDM symbols for PDCCH		1 to 4 Symbol
Total Number of CCEs		Display only
Number of PDCCHs		1 to 64
CCE arrangement		PDCCH#0 to (Number of PDCCHs - 1), dummy
Number of PDSCHs	Sets number of PDSCHs	1 to 64
RB Arrangement	Sets RB arrangement	PDSCH#0 to Number of PDSCHs - 1
VRB Arrangement	Sets VRB arrangement	PDSCH#0 to Number of VRBs - 1

Parameter Setting Range_PHY/MAC Downlink (3/4)

Display	Outline	Setting Range
PCFICH		
Data Status	Enables/disables PCFICH parameter	Disable, Enable
Data Type	Sets data type	CFI codew ord, PN9fix, PN15fix, 16 bit repeat, User File
CFI	Sets CFI codew ord type	1, 2, 3
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PCFICH	0000 to FFFF (only w hen Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PCFICH	Select any file (only w hen Data Type = User File).
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
PDCCH		
Data Status	Enables/disables PDCCH Parameter	Disable, Enable
PDCCH format	Sets the PDCCH format	0, 1, 2, 3
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DCI
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PDCCH	0000 to FFFF (only w hen Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PDCCH	Select any file (only w hen Data Type = User File).
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
DCI		
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the DCI	0000 to FFFF (only w hen Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the DCI	Select any file.
Transport Block Size	Sets the transport block size of DCI	0 to 576
nRNTI	Sets the radio network temporary identifier	0000 to FFFF

Parameter Setting Range_PHY/MAC Downlink (4/4)

Display	Outline	Setting Range
PDSCH		
Data Status	Enables/disables PDSCH parameter	Disable, Enable
nRNTI	Sets the radio network temporary identifier	0000 to FFFF
Modulation Scheme	Sets modulation system	QPSK, 16QAM, 64QAM
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DL-SCH
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PDSCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PDSCH	Select any file (only when Data Type = User File).
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
DL-SCH		
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the DL-SCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the DL-SCH	Select any file (only when Data Type = User File).
Transport Block Size	Sets the transport block size of DL-SCH	Changes max. value of setting range by number of Resource Blocks and modulation scheme
UE Category	Sets the UE Category	1, 2, 3, 4, 5
RV Index	Sets the redundancy version index	0, 1, 2, 3
PHICH		
Data Status	Enables or disables the PHICH Group	Disable, Enable
PHICH Group number	Displays the PHICH Group number	Display only
Number of PHICHs	Sets the number of PHICHs included in the PHICH group	1 to 8 (Cyclic prefix = Normal) 1 to 4 (Cyclic prefix = Extended)
Power Boosting	Displays the transmission power of the PHICH group	Displays the total transmission power of the PHICHs in the PHICH group
PHICH #0 ~ #(Number of PHICHs - 1)		
Data Status	Enables or disables the PHICH	Disable, Enable
Orthogonal Sequence Index	Sets the orthogonal sequence	0 to 7 (Cyclic prefix = Normal) 0 to 3 (Cyclic prefix = Extended)
Data Type	Displays the type of PHICH data	Fixed to the HI codeword
HI	Sets the HI(HARQ indicator) code word	000, 111
Power Boosting	Sets the transmission power	-20.000 to +20.000 dB

Parameter Setting Range_PHY/MAC Uplink (1/6)

Display	Outline	Setting Range
Uplink		
Data Transmission/Random Access Preamble	Sets data transmission and random access preamble	Data Transmission, Random Access Preamble
PUCCH Parameters		
Delta PUCCH shift	Sets Delta PUCCH shift	1, 2, 3
N_CS(1)	Sets the value of N_CS(1), which is the number of cyclic shifts used in the PUCCH formats 1, 1a, and 1b	0 to 7
N_RB(2)	Sets the value of N_CS(1), which is the number of resource blocks used in the PUCCH formats 2, 2a, and 2b	0 to 63
Sounding RS Parameters		
SRS	Sets SRS ON/OFF	ON, OFF
SRS Subframe Configuration	Sets SRS Subframe Configuration	0 to 14
Subframe #0 ~ #9 (Data Transmission)		
Number of PUCCHs	Sets number of PUCCH	0 to 8
Number of PUSCHs	Sets number of PUSCH	0 to 8

Parameter Setting Range_PHY/MAC Uplink (2/6)

Display	Outline	Setting Range
PUCCH #0 ~ #7		
Data Status	Enables and disables PUCCH parameter	Disable, Enable
n(1)_PUCCH	Sets the resource number for PUCCH 1, 1a, and 1b	0 to 764
n(2)_PUCCH	Sets the resource number for PUCCH 2, 2a, and 2b	0 to 764
nRNTI	Sets the Radio network temporary identifier	0000 to FFFF (Available when PUCCH format is set to 2, 2a, or 2b)
PUCCH Format	Sets PUCCH format	1, 1a, 1b, 2, 2a, 2b
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, UCI
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PUCCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PUCCH	Select any file (only when Data Type = User File).
Group Hopping	Enables or disables Group Hopping	Disable, Enable
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0 fixed
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
UCI		
Transport Block Size	Sets the transport block size for UCI	Fixed to 1 (When PUCCH Format = 1a) Fixed to 2 (When PUCCH Format = 1b) 1 to 13 (When PUCCH Format = 2) 2 to 14 (When PUCCH Format = 2a) 3 to 15 (When PUCCH Format = 2b)
Data Type	Sets the Data Type	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the UCI	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the UCI	Select any file (only when Data Type = User File).
Demodulation RS for PUCCH		
Data Type	Sets data to be inserted into the Demodulation RS for PUCCH	Base Sequence, User File
Data Type User File	Sets user file to be inserted into the Demodulation RS for PUCCH	Select any file (only when Data Type = User File).
Group Hopping	Enables or disables Group Hopping	Disable, Enable
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0 Fixed

Parameter Setting Range_PHY/MAC Uplink (3/6)

Display	Outline	Setting Range
PUSCH #0 ~ #7		
Data Status	Enables/disables PUSCH	Disable, Enable
nRNTI	Sets the Radio network temporary identifier	0000 to FFFF
Modulation Scheme	Sets the modulation scheme	QPSK, 16QAM, 64QAM
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File, UL-SCH
Data Type Repeat Data	Sets 16 bit repeat data to be inserted into the PUSCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to be inserted into the PUSCH	Select any file (only when Data Type = User File).
Start Number of RB	Start position of RB to which the PUSCH is assigned	0 to 99
Number of RBs	Total number of RBs to which to allocate PUSCHs	1 to 100
Power Boosting	Sets power boosting	-20.000 to +20.000 dB
UL-SCH		
Transport Block Size	Sets the UL-SCH Transport Block Size	0 to 86400
Data Type	Sets the Data Type	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets the 16 bit repeat data to be inserted into the UL-SCH	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file to be inserted into the UL-SCH	Select any file (only when Data Type = User File).
RV Index	Sets the redundancy version index	0, 1, 2, 3
HARQ-ACK		
Data Status	Enables or disables HARQ-ACK	Disable, Enable
Data Type	Sets the Data type to be inserted into the HARQ-ACK	ACK, NACK, ACK-ACK, ACK-NACK, NACK-ACK, NACK-NACK
Total Number of Coded Bits	Sets the number of bits after HARQ-ACK encoding	0 to Number of RBs×288
RI		
Data Status	Enables or disables the RI	Disable, Enable
Data Type	Sets the Data type to be inserted into the RI	1(1bit), 2(1bit), 1(2bits), 2(2bits), 3(2bits), 4(2bits)
Total Number of Coded Bits	Sets the number of bits after RI encoding	0 to Number of RBs×288
CQI/PMI		
Data Status	Enables or disables the CQI/PMI	Disable, Enable
Data Type	Sets the Data type to be inserted into the CQI/PMI	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets the 16 bit repeat data to be inserted into the CQI/PMI	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets the User type to be inserted into the CQI/PMI	Select any file (only when Data Type = User File).
Total Number of Coded Bits	Sets the number of bits after CQI/PMI encoding	0 to 86400

Parameter Setting Range_PHY/MAC Uplink (4/6)

Display	Outline	Setting Range
Demodulation RS for PUSCH		
Data Type	Sets data installed in demodulation RS for PUSCH	Base Sequence, User File
Data Type User File	Sets user file to be inserted into the Demodulation RS for PUSCH	Select any file (only when Data Type = User File).
Group Hopping	Enables or disables Group Hopping	Disable, Enable (When Data Type is Base Sequence)
Sequence Hopping	Enables or disables Sequence Hopping	Disable, Enable
Delta ss	Sets Delta ss	0 to 29
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0, 1
Cyclic Shift		
n_cs Setting	Sets whether to automatically or manually switch the n_cs setting	Auto, Manual
n(1)_DMRS	Sets the value used for automatic n_cs calculation	0, 2, 3, 4, 6, 8, 9, 10
n(2)_DMRS	Sets the value used for automatic n_cs calculation	0, 2, 3, 4, 6, 8, 9, 10
Cyclic Shift 1st slot		
n_cs	Sets n_cs for the first slot of Demodulation RS	0 to 11
alpha	Displays the cyclic shift of the first slot of Demodulation RS	Display only
Cyclic Shift 2nd slot		
n_cs	Sets n_cs for the second slot of Demodulation RS	0 to 11
alpha	Displays the cyclic shift of the second slot of Demodulation RS	Display only

Parameter Setting Range_PHY/MAC Uplink (5/6)

Display	Outline	Setting Range
Sounding RS		
Data Status	Enables or disables the Sounding RS parameter	Enable, Disable
Data Type	Sets the data to be inserted into the Sounding RS	Base Sequence, User File
Data Type User File	Sets the user file to be inserted into the Sounding RS	Select any file (only when Data Type = User File)
Group Hopping	Enables or disables Group Hopping	Disable, Enable (When Data Type is Base Sequence)
Sequence Hopping	Enables or disables Sequence Hopping	Disable, Enable
Delta ss	Sets Delta ss	0 to 29
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0, 1
SRS Bandwidth Configuration	Sets SRS Bandwidth Configuration	0 to 7
SRS Bandwidth	Sets SRS Bandwidth	0 to 3
k_TC	Sets Transmission Comb	0, 1
SRS Hopping Bandwidth	Sets SRS Hopping Bandwidth	Fixed to 3
n_RRC	Sets Frequency Domain Position	0 to 23
Power Boosting	Sets the transmission power	-20.000 to +20.000 dB
Cyclic Shift		
n_SRS	Sets n_SRS	0 to 7
alpha	Displays Cyclic Shift	Display only

Parameter Setting Range_PHY/MAC Uplink (6/6)

Display	Outline	Setting Range
Random Access Preamble		
PRACH Configuration	Sets the transmission timing for PRACH	0 to 63 (30, 46, 60, 61, and 62 cannot be set)
Preamble Format	Displays preamble format	Display only
Data Type	Sets data type to be inserted into the Random Access Preamble	Root Zadoff-Chu Sequence, User File
Data Type User File	Sets user file to be inserted into the Random Access Preamble	Select any file (only when Data Type = User File).
Root Zadoff-Chu Sequence	Sets Root Zadoff-Chu sequence	1 to 839 (only when Data Type = Root Zadoff-chu Sequence)
Cyclic Shift Value	Sets cyclic shift value	0 to 838 (only when Data Type = Root Zadoff-chu Sequence)
Random Access Preamble Length	Displays the length of the random access preamble in milliseconds	Display only
Hopping Pattern Length	Sets the number of cycles of the hopping pattern for the Random Access Preamble	1 to 10 frames
Hopping Pattern	Sets frequency hopping pattern for random access preamble in RB units	0 to 94, OFF
Power Ramping Step Size	Sets power increase step at each random access preamble transmission	0.0 to 10.0 dB

Easy Setup Parameters (1/3)

- BS Test

Downlink

Item	Details
E-UTRA Test Models	Sets to E – UTRA Test Models defined in 3GPP TS36.141 V8.3.0 (2009-05) Chapter 6. Channel Bandwidth=1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz can be set in each test model of E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3.

Uplink

Item	Details
FRC (QPSK, R=1/3)	Sets the parameter according to Fixed Reference Channels for reference sensitivity and in channel selectivity (QPSK, R=1/3) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.1
FRC (16QAM, R=2/3)	Sets the parameter according to Fixed Reference Channels for dynamic range (16QAM, R=2/3) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.2.
FRC (QPSK 1/3)	Sets the parameter according to Fixed Reference Channels for performance requirements (QPSK 1/3) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.3.
FRC (16QAM 3/4)	Sets the parameter according to Fixed Reference Channels for performance requirements (16QAM 3/4) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.4.
FRC (64QAM 5/6)	Sets the parameter according to Fixed Reference Channels for performance requirements (64QAM 5/6) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.5.
PRACH Test preambles	Sets the parameter according to PRACH Test preambles described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.6.
FRC (Scenario 1)	Sets the parameter according to Fixed Reference Channels for UL timing adjustment (Scenario 1) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.7.
FRC (Scenario 2)	Sets the parameter according to Fixed Reference Channels for UL timing adjustment (Scenario 2) described in 3GPP TS36.141 V8.3.0 (2009-05) Annex A.8.

Easy Setup Parameters (2/3)

- UE Test (1/2)

Downlink

Item	Details
FRC (Receiver Requirements)	Sets the physical channel parameter according to Fixed Reference Channel for Receiver Requirements (FDD) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.2-1.
FRC (Tx Characteristics)	Sets the physical channel parameter according to Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (FDD) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.2A-1.
FRC (Maximum input level, Category1)	Sets the physical channel parameter according to Fixed Reference Channel for Maximum input level for UE Category 1 (FDD) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.2-3a.
FRC (Maximum input level, Category2)	Sets the physical channel parameter according to Fixed Reference Channel for Maximum input level for UE Category 2 (FDD) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.2-3b.
FRC (Maximum input level, Category3-5)	Sets the physical channel parameter according to Fixed Reference Channel for Maximum input level for UE Category 3-5 (FDD) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.2-3.
FRC (QPSK, R=1/3)	Sets the physical channel parameter according to Fixed Reference Channel QPSK R=1/3 in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.1-1.
FRC (16QAM, R=1/2)	Sets the physical channel parameter according to Fixed Reference Channel 16QAM R=1/2 in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.1-2.
FRC (64QAM, R=3/4)	Sets the physical channel parameter according to Fixed Reference Channel 64QAM R=3/4 in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.1-3.
FRC (Single PRB)	Sets the physical channel parameter according to Fixed Reference Channel Single PRB (Channel Edge) in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.1-4.
FRC (two antenna ports)	Sets the physical channel parameter according to Fixed Reference Channel two antenna ports in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.2.1-1.
FRC (four antenna ports)	Sets the physical channel parameter according to Fixed Reference Channel four antenna ports in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.3.2.2-1.
FRC (FDD)	Sets the physical channel parameter according to Fixed Reference Channel FDD in 3GPP TS36.101 V8.6.0 (2009-06) Table A3.5.1-1.

Easy Setup Parameters (3/3)

- UE Test (2/2)

Uplink

Item	Details
Full RB (QPSK)	Sets the parameter according to Reference Channels for QPSK with full RB allocation described in 3GPP TS36.101 V8.6.0 (2009-06) Table A.2.2.1.1-1.
Full RB (16QAM)	Sets the parameter according to Reference Channels for 16QAM with full RB allocation described in 3GPP TS36.101 V8.6.0 (2009-06) Table A.2.2.1.2-1.
Partial RB (QPSK)	Sets the parameter according to Reference Channels for QPSK with partial RB allocation described in 3GPP TS36.101 V8.6.0 (2009-06) Table A.2.2.2.1-1 to A.2.2.2.1-6.
Partial RB (16QAM)	Sets the parameter according to Reference Channels for 16QAM with partial RB allocation described in 3GPP TS36.101 V8.6.0 (2009-06) Table A.2.2.2.2-1 to A.2.2.2.2-6.

Ordering Information

Model/ Order No.	Name	Remarks		
— Mainframe —				
MG3700A	Vector Signal Generator		Required	
— Options —				
MG3700A-002	Mechanical Attenuator	Standard Electron Attenuator is changed into Mechanical Attenuator.		
MG3700A-011	Upper Frequency 6 GHz	Standard “250 kHz to 3 GHz” is extended to “250 kHz to 6 GHz.”		
MG3700A-021	ARB Memory Upgrade 512 M sample	Standard “128 Msample/channel × 2” is extended to “256 Msample/channel × 2.”	Recommendation	
MG3700A-031	High Speed BER Test Function	Standard “1 kbps to 20 Mbps” is extended to “100 bps to 120 Mbps.”		
— Softwares (License Key for IQproducer system) —				
MX370108A	LTE IQproducer		Required	
— Optional accessories —				
W2495AW	MG3700A operation manual			
W2496AW	MG3700A IQproducer operation manual			
W2539AW	MG3700A standard waveform pattern operation manual			
W3022AW	MX370108A LTE IQproducer operation manual		Recommendation	The PDF manual is on the software CD. Order this when a booklet is required.
J1261D	Ethernet Cable (Shield Type)	Cross, 3 m	Recommendation	Required when PC connected directly to MG3700A by LAN.
Z0777	Standard waveform pattern upgrade kit	DVD set of pre-install wave form pattern of latest version		
G0141	HDD ASSY	Exchange HDD when built-in HDD break.		
J1277	IQ Output Conversion Adapter	Cable that converts IQ output connector (D-sub) of mainframe into BNC	Recommendation	Converts IQ output connector on back of MG3700A from D-sub to BNC.

• United States

Anritsu Company

1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• Canada

Anritsu Electronics Ltd.

700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• Brazil

Anritsu Eletrônica Ltda.

Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico

Anritsu Company, S.A. de C.V.

Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• United Kingdom

Anritsu EMEA Ltd.

200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France

Anritsu S.A.

12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• Germany

Anritsu GmbH

Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy

Anritsu S.r.l.

Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• Sweden

Anritsu AB

Borgarfjordsgatan 13A, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• Finland

Anritsu AB

Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• Denmark

Anritsu A/S (Service Assurance)

Anritsu AB (Test & Measurement)
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• Russia

Anritsu EMEA Ltd.

Representation Office in Russia

Tverskaya str. 16/2, bld. 1, 7th floor.
Russia, 125009, Moscow
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• United Arab Emirates

Anritsu EMEA Ltd.

Dubai Liaison Office

P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suit 701, 7th Floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

• India

Anritsu India Private Limited

2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• Singapore

Anritsu Pte. Ltd.

60 Alexandra Terrace, #02-08, The Comtech (Lobby A)
Singapore 118502
Phone: +65-6282-2400
Fax: +65-6282-2533

• P.R. China (Shanghai)

Anritsu (China) Co., Ltd.

Room 1715, Tower A CITY CENTER of Shanghai,
No.100 Zunyi Road, Chang Ning District,
Shanghai 200051, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

• P.R. China (Hong Kong)

Anritsu Company Ltd.

Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

• Japan

Anritsu Corporation

8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-1221
Fax: +81-46-296-1238

• Korea

Anritsu Corporation, Ltd.

502, 5FL H-Square N B/D, 681
Sampyeong-dong, Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-400 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

• Australia

Anritsu Pty. Ltd.

Unit 21/270 Ferntree Gully Road, Notting Hill,
Victoria 3168, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan

Anritsu Company Inc.

7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

Please Contact: