Product Brochure

MG3700A Vector Signal Generator

MX370x series software

MX3701xxA IQproducer

MX370x Series Software

The MG3700A Vector Signal Generator features a 160 MHz high-speed ARB baseband generator, broadband vector modulation, and large-capacity ARB memory to support digital modulation signals used by most communication systems. Its excellent cost performance offers the ideal solution for generating signals used by the new and growing field of wireless broadband technology, as well as for mobile telecommunications systems and wireless LANs.
Because the MG3700A has a built-in ARB generator, signals are output easily just by selecting the waveform pattern matching the required communication system.

The following four categories of waveform patterns are supported:
- Standard waveform patterns
- Waveform patterns generated by optional MX3700xxA Waveform Pattern software
- Waveform patterns generated by optional MX3701xxA IQproducer software
- Waveform patterns converted from data generated by common signal-generation software

Each category contains multiple waveform pattern files each with preset parameters for each system.
These default waveform patterns are saved on the MG3700A hard disk for easy access, but other waveform patterns are supported using the IQproducer waveform generation software.
Parameters for the waveform for the target communication system are set using a GUI to a generate a waveform pattern file for the MG3700A. After the generated waveform pattern is downloaded to the MG3700A via LAN or CompactFlash (CF) card, the MG3700A outputs the signal just by choosing the waveform pattern file.
In addition, a user-generated custom IQ sample file in ASCII format created by common EDA (Electronic Design Automation) software such as MATLAB, can be converted into a custom waveform pattern file for the MG3700A.

Selection guide

	Communication system	Page	W-CDMA	HSDPA (Test Model5)	HSDPA/HSUPA	1xEV-DO	CDMA2000	GSM/EDGE	TD-SCDMA	Next-generation PHS (XGP)	Advanced-PHS	PHS	PDC	ETC/DSRC	Digital Broadcast (BS/CS/CATV/ISDB-T)	Digital Broadcast (DVB-T/H)	WLAN (IEEE802.11a/b/g)	WLAN (IEEE802.11n/p/a/b/g/j)	WLAN (IEEE802.11ac)	DFS (TELEC, FCC)	DFS (ETSI)	Mobile WiMAX (IEEE802.16e)	*Bluetooth*	GPS	TD-SCDMA	RCR STD-39	ARIB STD-T61/T79/T86	3GPP LTE (FDD)	3GPP LTE-Advanced (FDD)	3GPP LTE (TDD)	3GPP LTE-Advanced (TDD)
Waveform pattern*	Pre-installed		✓	✓		✓	✓	✓				✓	✓		✓		✓						✓	✓							
	MX370001A TD-SCDMA																								✓						
	MX370002A Public Radio System																									✓	✓				
	MX370073A DFS (TELEC, FCC)																			✓											
	MX370075A DFS (ETSI)																				✓										
IQproducer	Standard accessories AWGN	4																													
	Standard accessories W-CDMA	6	✓																												
	MX370101A HSDPA/HSUPA	8	✓		✓																										
	MX370102A TDMA	11									✓	✓	✓	✓												✓	✓				
	MX370103A CDMA2000 1xEV-DO	13				✓																									
	MX370104A Multi-carrier	15	Multi-carrier IQproducer is software that generates the multi carrier signal based on waveform pattern of various telecommunications systems.																												
	MX370105A Mobile WiMAX	17																				✓									
	MX370106A DVB-T/H	27														✓															
	MX370107A Fading	30	Fading IQproducer is software that generates the Fading signal based on waveform pattern of various telecommunication systems.																												
	MX370108A LTE FDD	33																										✓			
	MX370108A-001 LTE-Advanced FDD	33																											✓		
	MX370109A XG-PHS	48								✓																					
	MX370110A LTE TDD	51																												✓	
	MX370110A-001 LTE-Advanced TDD	51																													✓
	MX370111A WLAN	65																✓													
	MX370111A-001 802.11ac (80 MHz)	65																	✓												
	MX370112A TD-SCDMA	76							✓																						

*: Read the MX3700xxA Waveform Pattern series catalog.

- IQproducer™ is a trademark of Anritsu Corporation.
- MATLAB® is a registered trademark of The MathWorks, Inc.
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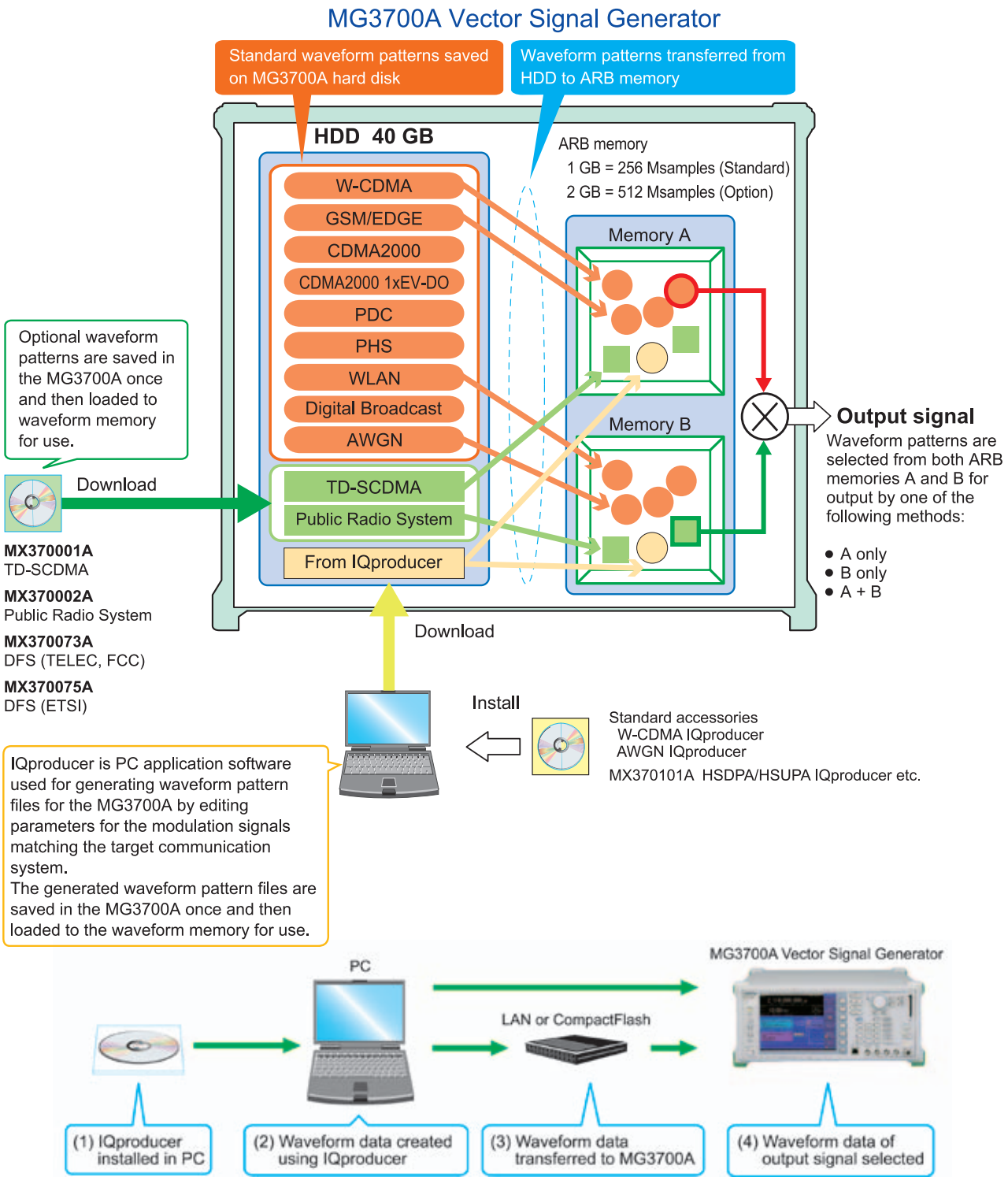


• IQproducer Operating Environment

OS	Windows 2000 Professional*1, Windows XP, Windows Vista*2, Windows 7 Enterprise (32-bit)*2, Windows 7 Professional (32-bit/64-bit)*2
CPU	Pentium III 1 GHz equivalent or faster
Memory	512 MB or more
Hard disk space	5 GB or more free space on 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 Msamples) waveform patterns.

∗1: Does not support IQproducer Version 13.00 and later
∗2: Supports IQproducer Version 12.00 and later

• Pentium® is registered trademarks of Intel Corporation or its subsidiaries in the USA and other countries.
• Windows® is a registered trademark of Microsoft Corporation in the USA and other countries.

Additive White Gaussian Noise (AWGN) IQproducer

Standard accessory

This GUI-based application software is used to generate AWGN waveform pattern files optimized for each communication system for the Dynamic Range Test, etc.
The AWGN waveform pattern file is created by setting the same bandwidth and sampling rate as the combined waveform pattern (Wanted Signal) and a multiplier of the Wanted Signal.
Specifying the combined waveform pattern (Wanted Signal) from the waveform pattern for the desired communication method automatically sets the Wanted Signal bandwidth and sampling rate.
The resultant AWGN waveform pattern and an existing waveform pattern can be combined, which is useful for measuring base-station dynamic range.

<Configurable Parameters>

(With Specified Wanted Signal)
AWGN BW/Wanted Signal BW ratio

(With Unspecified Wanted Signal)
Wanted Signal BW,
AWGN BW,
Sampling Rate

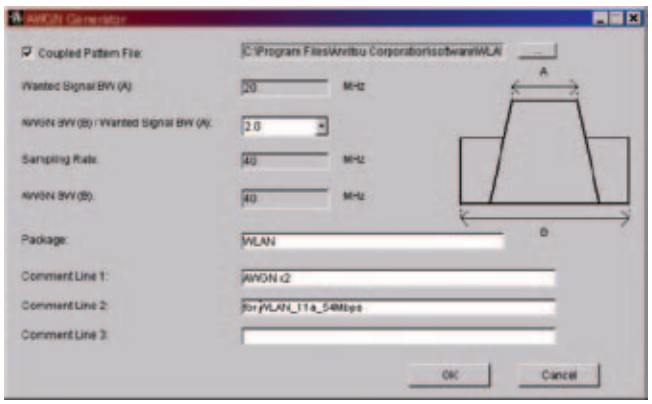
Main Parameter Settings
(1) Wanted Signal BW: Wanted Signal bandwidth
Setting range: 0.0010 MHz to 120.0000 MHz

(2) AWGN BW (B)/Wanted Signal BW (A):
Magnification of AWGN to Wanted Signal
Setting range: 1.0, 1.5, 2.0, 2.5

(3) Sampling Rate:
Setting range: 0.0200 MHz to 160.0000 MHz
Becomes same value as Wanted Signal

(4) AWGN BW (B): Bandwidth of AWGN
Calculated automatically from (1) and (2) with following limitation:
Limit range: 0.001 MHz to 20.000 MHz and Sampling rate/2 max.,
20.001 MHz to 120.000 MHz and Sampling rate max.

IQproducer Main Screen

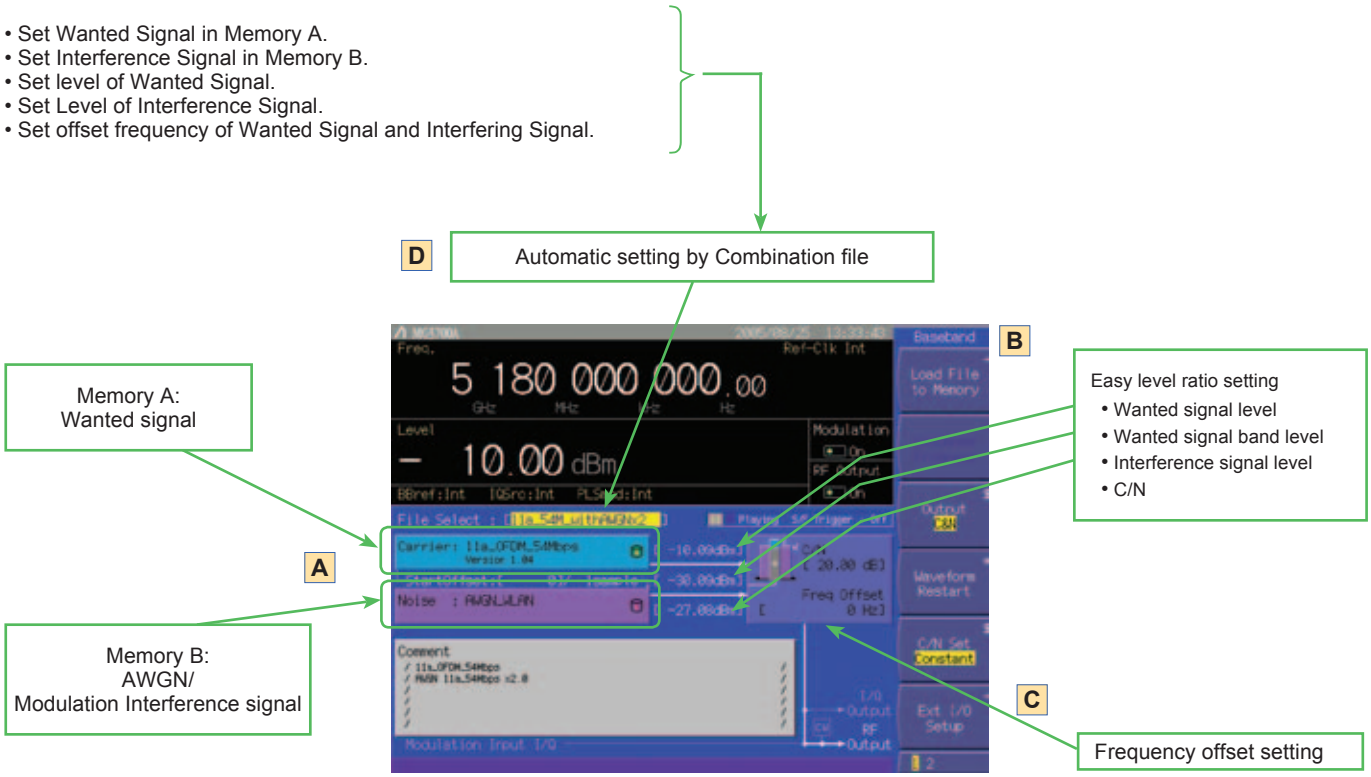


AWGN IQproducer Setting Screen

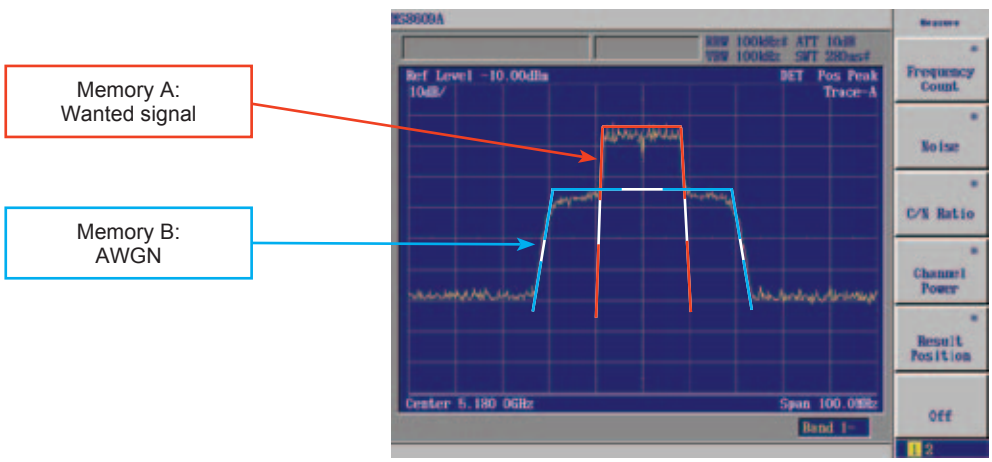
Because the MG3700A internal ARB memory can be partitioned in two, the Wanted Signal can be saved in one partition while the Interference Signal is saved in the other (Fig. A).
The two signals are output after combination in the MG3700A internal baseband block. The signal levels can be set independently and the C/N value can be set too (Fig. B).
In addition, the frequency offset of the Wanted Signal and Interference Signal can be set on-screen (Fig. C).
The built-in Combination function automatically sets the following (Fig. D):

- Set Wanted Signal in Memory A.
- Set Interference Signal in Memory B.
- Set level of Wanted Signal.
- Set Level of Interference Signal.
- Set offset frequency of Wanted Signal and Interfering Signal.

The Combination function supports full auto-setting of parameters for the Wanted Signal, Interference Signal, Level Ratio, and Frequency Offset simply by selecting the Combination File.
Each parameter can also be set separately on-screen after auto-setting, if necessary.
Combination files for W-CDMA_BS, PDC, and PHS are pre-installed on the MG3700A hard disk and the customer can customize these files as necessary using the bundled free tools.



WLAN Wanted Signal + AWGN



WLAN Wanted Signal + AWGN Spectrum

W-CDMA IQproducer

Standard accessory

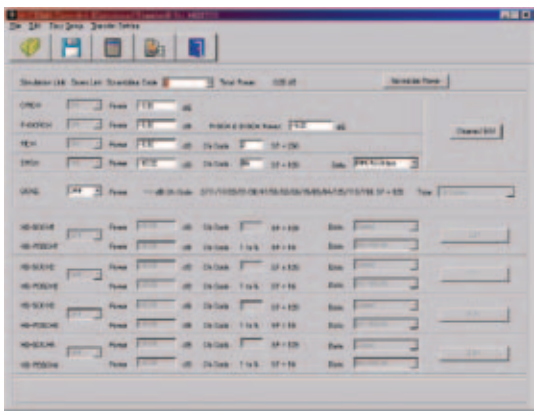
W-CDMA IQproducer is GUI-based, PC application software for generating waveform patterns used in W-CDMA Rx sensitivity measurement. Once created, the waveform pattern file is downloaded to the MG3700A hard drive.
Using the MG3700A, Vector Signal Generator functionality, the files are loaded, selected, and output as a modulated RF signal.
By changing the Scrambling Code Number and Channelization Code Number, waveform patterns can be created that support the evaluation of W-CDMA terminals.
If complete control of all W-CDMA parameters is required, the MX370101A HSDPA/HSUPA IQproducer software (sold separately) can be used. For details, see the MX370101A HSDPA/HSUPA IQproducer section of this document.

- Downlink Settings

Downlink sets parameters including Scrambling code, CPICH/P-CCPCH/PICH/DPCH power, Channelization code, DPCH_PhyCH TFCI and Timing Offset, and DPCH_TrCH Data to create the waveform pattern. (For details, see the Downlink Parameter Setting Range table described later.)
Additionally, the Downlink Easy Setup function supports the Reference Measurement Channel (RMC) items specified by 3GPP TS 25.101 and TS 25.104. Parameter setting is easy just by selecting the items to create the waveform pattern.

Easy Setup Items include:

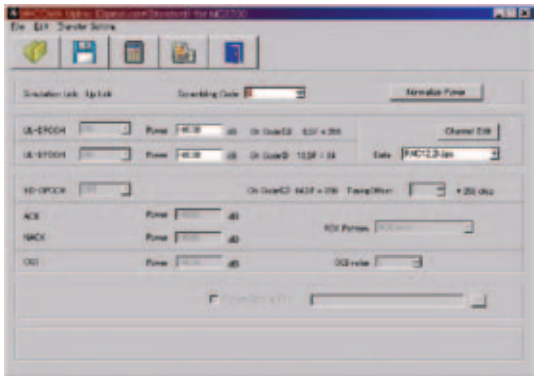
RMC: RMC 12.2 kbps (Rx test)
RMC 12.2 kbps (Performance test)
RMC 64 kbps (Performance test)
RMC 144 kbps (Performance test)
RMC 384 kbps (Performance test)



Downlink Main Screen

- Uplink Settings

Uplink sets parameters including Scrambling code, UL-DPCCH/UL-DPDCH power, DPCH_PhyCH TFCI and Timing Offset, and DPCH_TrCH Data to create the waveform pattern. (For details, see the Uplink Parameter Setting Range table described later.)



Uplink Main Screen

• Downlink Parameter Setting Range

Display		Setting range
Scrambling Code		0 to 8191
CPICH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
P-CCPCH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	P-SCH & S-SCH Power	−40.00 to 0.00 dB, Resolution 0.01 dB
PICH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	0 to 255
DPCH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	0 to SF −1 The spreading factor (SF) varies with the [Data] setting as follows: RMC 12.2 kbps = 128 RMC 64 kbps = 32 RMC 144 kbps = 16 RMC 384 kbps = 8 AMR1, AMR2, AMR3 = 128 ISDN = 32 384 kbps Packet = 8
	Data	RMC 12.2 kbps, RMC 64 kbps, RMC 144 kbps, RMC 384 kbps, AMR1, AMR2, AMR3, ISDN, 384 kbps Packet
OCNS	ON/OFF	ON or OFF
	Type	16 Codes
P-CCPCH Edit	SFN Cycle	Short or 4096
DPCH Edit (Phy CH)	TFCI	0 to 1023
	Timing Offset	0 to 149
DPCH Edit (TrCH Edit)	Data	PN9, PN9fix, PN15fix, 16bit repeat

• Uplink Parameter Setting Range

Display		Setting range
Scrambling Code		0 to 16777215
UL-DPCCH, UL-DPDCH	Power	−40.00 to 0.00 dB
	Data	RMC 12.2 kbps, RMC 64 kbps, RMC 144 kbps, RMC 384 kbps, AMR1, AMR2, AMR3, ISDN, 64 kbps Packet
DPCH Edit (Phy CH)	TFCI	0 to 1023
	Timing Offset	0 to 149
DPCH Edit (TrCH Edit)	Data	PN9, PN9fix, PN15fix, 16bit repeat
Channel Gain	Beta c	0 to 15
	Beta d	0 to 15

MX370101A HSDPA/HSUPA IQproducer

Optional

This optional GUI-based PC application software is used to set parameters and generate waveform patterns for 3GPP HSDPA (Uplink/Downlink) systems.
Once created, the waveform pattern file is downloaded to the MG3700A hard drive.
Using the MG3700A, Vector Signal Generator functionality, the files are loaded, selected, and output as a modulated RF signal.
The HS-PDSCH and HS-DPCCH parameters specified in TS 25.212 can be set.
The Downlink Easy Setup function assigns default values to some parameters and sets other items to typical values, making the creation of an accurate waveform pattern fast and easy.

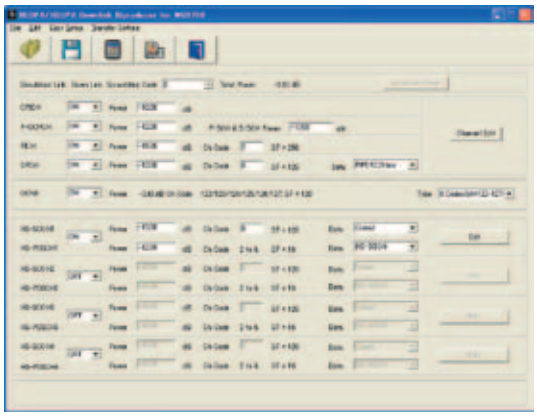
● Downlink Settings

Various downlink parameters can be set. (For details, see the Downlink Parameter Setting table described later.)
The Downlink Easy Setup function supports the HSDPA Fixed Reference Channel (FRC) items specified in 3GPP TS 25.101, and the Reference Measurement Channel (RMC) items specified in 3GPP TS 25.101 and TS 25.104.

Easy Setup Items include:

FRC: H-Set1 (QPSK), H-Set1 (16QAM), H-Set2 (QPSK), H-Set2 (16QAM), H-Set3 (QPSK), H-Set3 (16QAM), H-Set4, H-Set5

RMC: RMC 12.2 kbps (Rx test)
RMC 12.2 kbps (Performance test)
RMC 64 kbps (Performance test)
RMC 144 kbps (Performance test)
RMC 384 kbps (Performance test)

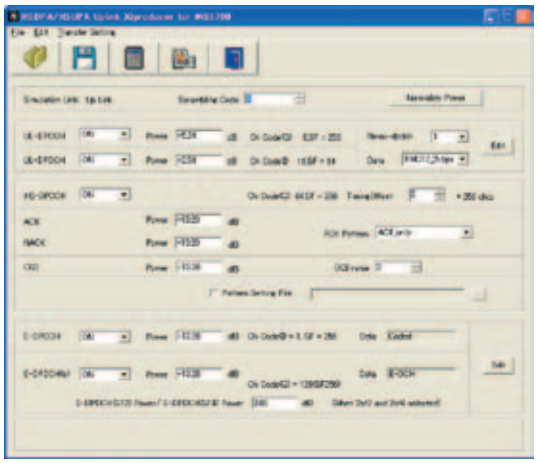


Downlink Main Screen

● Uplink Settings

Uplink sets parameters for UL-DPCCH/UL-DPDCH and HS-DPCCH channels and generates waveform patterns. (For details, see the Uplink Parameter Setting Range table described later).

HS-DPCCH (ACK, NACK, CQI)
UL-DPCCH
UL-DPDCH
E-DPCCH
E-DPDCH (s)



Uplink Main Screen

● Parameter Save/Recall

The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

• Downlink Parameter Setting Range

Display	Setting range	
Scrambling Code		0 to 8191
CPICH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
P-CCPCH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
PICH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	0 to 255
DPCH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	0 to SF −1 The spreading factor (SF) varies with the [Data] setting as follows: RMC 12.2 kbps = 128, RMC 64 kbps = 32, RMC 144 kbps = 16, RMC 384 kbps = 8, AMR1, AMR2, AMR3 = 128, ISDN = 32, 384 kbps Packet = 8
	Data	RMC 12.2 kbps, RMC 64 kbps, RMC 144 kbps, RMC 384 kbps, AMR1, AMR2, AMR3, ISDN, 384 kbps Packet, User Edit TrCH
OCNS	ON/OFF	ON or OFF
	Type	16 Codes or 6 Codes
HS-SCCH1/2/3/4	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB
	Channelization Code	0 to 127
	Data	PN9, PN9fix, PN15fix, 16bit repeat, Coded
HS-PDSCH1/2/3/4	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB
	Channelization Code	0 to 127
	Data	PN9, PN9fix, PN15fix, 16bit repeat, HS-DSCH ([PN9] can be set only when all four HSDPA channels are set to [OFF].)
P-CCPCH Edit	SFN Cycle	Short or 4096
DPCH Edit (Phy CH)	DPCH Data	PN9, PN9fix, PN15fix, 16bit repeat, TrCH
	TFCI	0 to 1023
	Spreading Factor	4, 8, 16, 32, 64, 128, 256, 512
	BER	0.0 to 100.0%
	Slot Format	#0 to #16
	Timing Offset	0 to 149
	TPC Edit	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 to 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111
DPCH Edit (TrCH Edit)	TrCH Number	1 to 8
	DTX	Fix/Flex
	Data	PN9, PN9fix, PN15fix, 16bit repeat
	TTI	10, 20, 40, 80 ms
	Max. TrBk Size	0 to 5000
	TrBk Size	0 to 5000
	Max TrBk Set No.	0 to 64
	TrBk Set No.	0 to 64
	CRC	0, 8, 12, 16, 24 bits
	Coder	CC1/2, CC1/3, TC
	RM attribute	1 to 256
	BER	0.0 to 100.0%
	BLER	0 to 100%
HSDPA transport channel (HS-SCCH, HS-PDSCH parameters)	Channelization Code Offset	1 to (16 − Number of Physical Channel Code)
	Number of Physical Channel Code	1 to (16 − Channelization Code Offset)
	Modulation	QPSK or 16QAM
	Transport Block Size Information	0 to 63
	RV Information	0 to 7
	UE Identity	0 to 65535
	CRC Error Insertion	Correct or Fail (CRC error of all)
	Number of HARQ Processes	0 to 8
	Virtual IR Buffer Size	800 to 304000 (Resolution 800)
	Payload Data	PN9, PN9fix, PN15fix, 16bit repeat
Transmitting Pattern Edit	HARQ Process Cycle	1 to 16 (Note ranges from 1 to 6 when PN9 set for Payload Data)
	Inter-TTI Distance	1 to 8
	TTI Start Offset	0 to 7
	Process Setting File	Used or Not used

MX370101A HSDPA/HSUPA IQproducer

Optional

- Uplink Parameter Setting Range

Display	Setting range	
Scrambling Code		0 to 16777215
UL-DPCCH, UL-DPDCH	Channel ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB
	Nmax-dpdch	0, 1
	Data	RMC 12.2 kbps, RMC 64 kbps, RMC 144 kbps, RMC 384 kbps, AMR1, AMR2, AMR3, ISDN, 64 kbps Packet, User Edit TrCH
HS-DPCCH	ON/OFF	ON or OFF
	Timing Offset	0 to 149
	ACK Power	−40.00 to 0.00 dB
	NACK Power	−40.00 to 0.00 dB
	CQI Power	−40.00 to 0.00 dB
	ACK Pattern	ACK_only, NACK_only, alt_ACK_NACK_DTX
	CQI value	0 to 30
	Pattern Setting File	Used or Not used
E-DPCCH, E-DPDCH	E-DPCCH ON/OFF	ON or OFF
	E-DPDCH ON/OFF	ON or OFF
	E-DPCCH Power	−40.00 to 0.00 dB
	E-DPDCH Power	−40.00 to 0.00 dB
	E-DPDCH (SF2) Power/ E-DPDCH (SF4) Power	−10.00 to +10.00 dB
DPCH Edit (Phy CH)	UL-DPDCH Data	PN9, PN9fix, PN15fix, 16bit repeat, TrCH
	TFCI	0 to 1023
	Spreading Factor	4, 8, 16, 32, 64, 128, 256
	BER	0.0 to 100.0% (Enabled when [Data] set to [PN9])
	Slot Format	#0 to #1 (Only enabled when [UL-DPDCH Data] set to [TrCH])
	Timing Offset	0 to 149
	TPC Edit	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 to 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111
DPCH Edit (TrCH Edit)	TrCH Number	1 to 8
	Data	PN9, PN9fix, PN15fix, 16bit repeat
	TTI	10, 20, 40, 80 ms
	Max. TrBk Size	0 to 5000
	TrBk Size	0 to 5000
	Max TrBk Set No.	0 to 64
	TrBk Set No.	0 to 64
	CRC	0, 8, 12, 16, 24 bits
	Coder	CC1/2, CC1/3, TC
	RM attribute	1 to 256
	BER	0.0 to 100.0% (Enabled when [Data] set to [PN9])
	BLER	0 to 100% (Enabled when [Data] set to [PN9])
E-DPDCH and E-DPCCH Edit (Phy CH)	HARQ Process Setting File	Common dialog opens when the check box is checked. HARQ Process Setting File can be selected.
	E-DPCCH Data	PN9, PN9fix, PN15fix, 16bit repeat, Coded
	E-DPDCH Data	PN9, PN9fix, PN15fix, 16bit repeat, E-DCH
	HS-DSCH Configured	Yes, No
	E-DPDCH Channel Codes	SF256, SF128, SF64, SF32, SF16, SF8, SF4, 2SF4, 2SF2, 2SF2, 2SF4
E-DPDCH and E-DPCCH Edit (Tr CH)	E-DCH TTI	2 ms, 10 ms
	Information Bit Payload	18 to 11484 (at E-DCH TTI = 2 ms) 18 to 20000 (at E-DCH TTI = 10 ms)
	E-DCH Payload Data	PN9, PN9fix, PN15fix, 16bit repeat
	E-TFCI Information	0 to 127
	RSN	0 to 3
	Pattern Length	Display only
	E-DCH RV Index	0 to 3
	CRC Error Insertion	Correct, Error
	"Happy" Bit	0, 1

MX370102A TDMA IQproducer

Optional

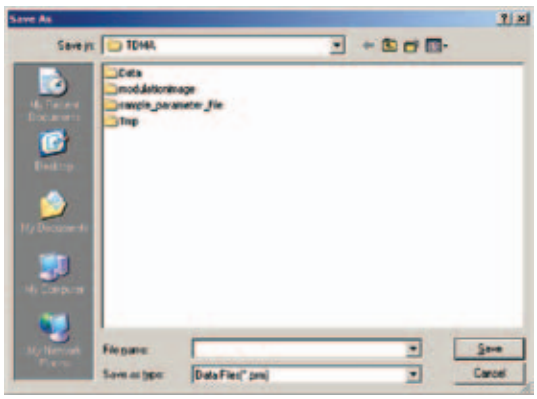
This optional GUI-based PC application software is used to set the parameters and generate waveform patterns for TDMA systems. Once created, the waveform pattern file is downloaded to the MG3700A hard drive.
Using the MG3700A, Vector Signal Generator functionality, the files are loaded, selected, and output as a modulated RF signal.
In addition to signals supporting PDC, PHS, ARIB STD-T61/T79/T86/T98/T102, Advanced-PHS, ETC and DSRC systems, signals for other systems can also be generated.

Main Screen

• Parameter Setting Items List

Setting	Parameter Setting Sheet		
	Burst	Continuous	No Format
Modulation	✓	✓	✓
Frame	✓	✓	–
Slot	✓	✓	–
Field	✓	✓	–
Data	–	–	✓
Filter	✓	✓	✓
Pattern Name	✓	✓	✓
Calculation	✓	✓	✓

• Parameter Save/Recall



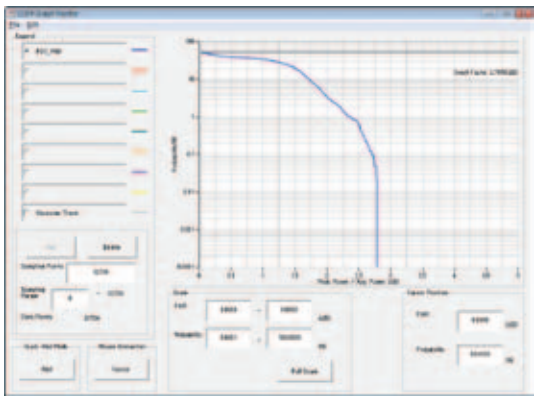
The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

• Graphical Simulation Displays

This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF) and Fast Fourier Transform (FFT) on the PC.
It is useful for checking or reviewing waveforms.

CCDF Graph

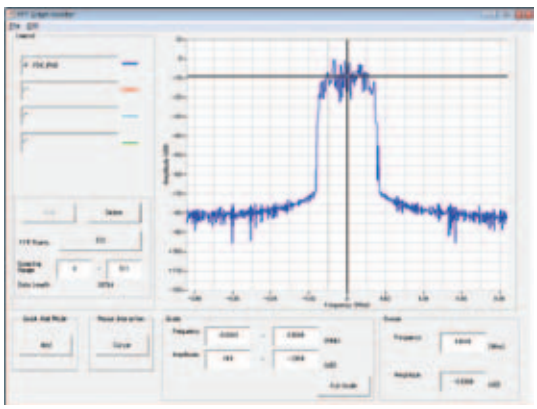
Up to eight generated waveform patterns can be read and displayed as CCDF graphs.



CCDF Graph Screen

FFT Graph

Up to four generated waveform patterns can be read and displayed as FFT graphs.



FFT Graph Screen

MX370102A TDMA IQproducer

Optional

● Parameter Setting Items List

Items	Display	Outline	Setting range
Modulation	Modulation Type (1st Modulation Type)	1st Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, O-QPSK, DQPSK, PI/4DQPSK, 8PSK*1, D8PSK*1, 16QAM*1, 32QAM*1, 64QAM*1, 256QAM*1, ASK, 2FSK, 4FSK
	Modulation Type (2nd Modulation Type)	2nd Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, DQPSK, PI/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 256QAM
	Symbol Rate	Symbol Rate	1 ksps to 80 Msps (can be set in the 1 sps units)
	Over Sampling	Over Sampling Rate	2, 3, 4, 8, 16, 32
	Sampling Rate	Sampling Rate	20 kHz to 160 MHz (The value of symbol rate x Over sampling rate is set automatically. However, when the Manchester code setting enabled, the value of symbol rate x oversampling rate × 2 is set automatically.)
	GSM	GSM Setting	Enable/disable automatic setting in accordance with GSM (Enabled when 8PSK or 2FSK set as modulation type)
	Modulation Index	Modulation Index	0.00 to 1.00 (for ASK), 0.20 to 10.00 (for 2FSK)
	Manchester Code	Manchester Code	The Manchester code is selected when this check box is selected, and NRZ is selected when this checkbox is cleared. NRZ is always selected for modulation types other than ASK.
	Maximum Frequency Deviation	Maximum Frequency Deviation	120 to 2100
Frame	Number of Frames	Frame number	1 to 4088, Auto
	Number of Slots per Frame	Slot numbers in one frame	1 to 20
Slot (Burst)	1, 24 field	Guard field	Set the number of bits listed in the separate table according to Modulation Type.
	2, 23 field	Ramp field	Set the number of bits listed in the separate table according to Modulation Type.
	3 to 22 field	Fixed (Fixed data) field	Set integer from 0 to 128.
	3 to 22 field	Data (PN9, PN15) field	Set integer from 0 to 1024.
	4 to 22 field	CRC (Cyclic Redundancy Check character) field	0, 8, 12, 16, 24, 32
Slot (Continuous)	1 to 24 field	Fixed (Fixed data) field	Set integer from 0 to 128.
	1 to 24 field	Data (PN9, PN15) field	Set integer from 0 to 1024.
	2 to 24 field	CRC (Cyclic Redundancy Check character) field	0, 8, 12, 16, 24, 32
Field (Burst/ Continuous)	Fixed	Sets hexadecimal fixed data	0 to maximum value of number of bits set
	CRC	Sets CRC calculation field as integer	1 to number of bits in field on left to CRC (except Guard and Ramp fields)
	Data Field	Selects continuous pattern	PN9, PN15, 16 bit Pattern, All 0, All 1, UserFile*2 Input any hexadecimal number for 16 bit Pattern.
Data (No Format)	Data	Selects continuous pattern	PN9, PN15, 16 bit Pattern, All 0, All 1, UserFile*2
Filter	Filter	Filter type	Nyquist, Root Nuquist, Gaussian, Gaussian2, Ideal Lowpass, None, ARIB STD-T98, ARIB STD-T102 Part1, Half-sine, User Defined Filter
	Roll Off/BT	Roll off rate/BT product	0.10 to 1.00 (When Nyquist/Root Nyquist/Gaussian is set.)
	Passband	Passband of filter	Fs/2, Fs/3, Fs/4, Fs/8, Fs/16, Fs/32 (This item is displayed and can be set only when Ideal Lowpass is set as the filter type. The setting range varies with the oversampling rate.)
	RMS	RMS value of waveform pattern data	651 to 4104
Pattern Name	Package	Package name	Within 31 characters
	Pattern Name	Waveform pattern file name	Within 20 characters
	Comment	Comment	Within 38 characters
Calculation	Starts waveform pattern data generation after setting parameters.		

∗1: Decimal numbers for each symbol point are changed by selecting a user file for IQ mapping.
∗2: When "UserFile" is set, the binary sequence is read from a text file. Up to 9,600,000 bits can be loaded and then modulated.

● Guard Field Setting Range

(1st/2nd) Modulation Type	Number of Bits in 1st Field	Number of Bits in 24th Field
BPSK, DBPSK, PI/2DBPSK, ASK, 2FSK	Integer between 0 and 9960	Integer between 0 and 9960
QPSK, O-QPSK, DQPSK, PI/4DQPSK, 4FSK	Multiples of 2 between 0 and 9960	Multiples of 2 between 0 and 9960
8PSK, D8PSK	Multiples of 3 between 0 and 9960	Multiples of 3 between 0 and 9960
16QAM	Multiples of 4 between 0 and 9960	Multiples of 4 between 0 and 9960
32QAM	Multiples of 5 between 0 and 9960	Multiples of 5 between 0 and 9960
64QAM	Multiples of 6 between 0 and 9960	Multiples of 6 between 0 and 9960
256QAM	Multiples of 8 between 0 and 9960	Multiples of 8 between 0 and 9960

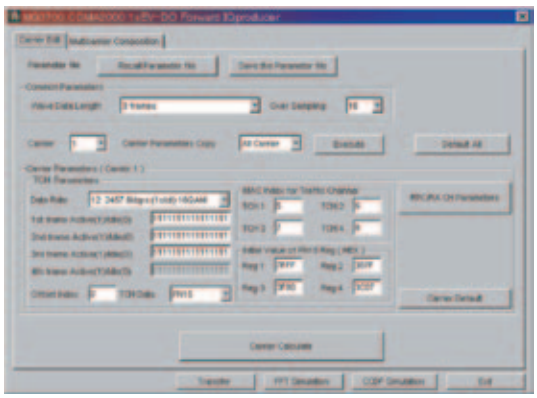
● Ramp Field Setting Range

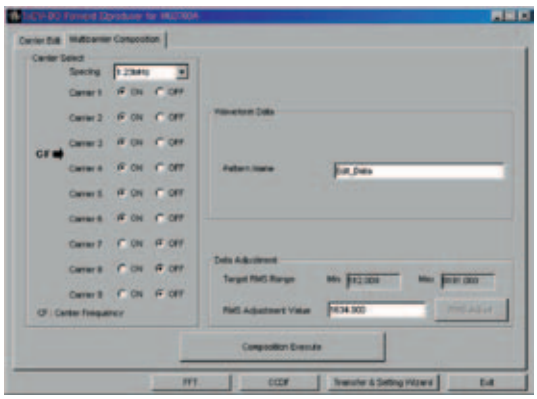
(1st/2nd) Modulation Type	Number of Bits
BPSK, DBPSK, PI/2DBPSK, ASK, 2FSK	Integer number between 1 and 16
QPSK, O-QPSK, DQPSK, PI/4DQPSK, 4FSK	Multiples of 2 between 2 and 32
8PSK, D8PSK	Multiples of 3 between 3 and 48
16QAM	Multiples of 4 between 4 and 64
32QAM	Multiples of 5 between 5 and 80
64QAM	Multiples of 6 between 6 and 96
256QAM	Multiples of 8 between 8 and 128

MX370103A CDMA2000 1xEV-DO IQproducer

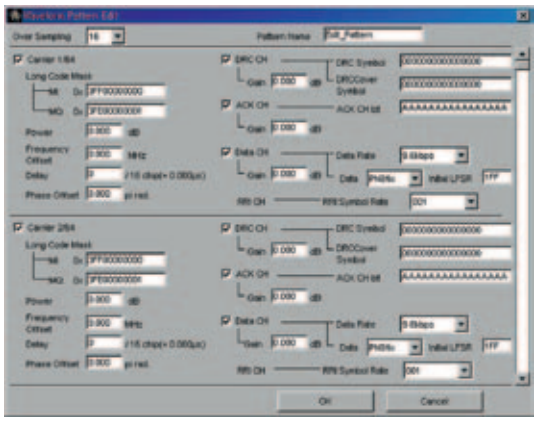
Optional

This optional GUI-based PC application software is used to set parameters and generate waveform pattern files for CDMA2000 1xEV-DO systems (1xEV-DO forward and 1xEV-DO Reverse). Once created, the waveform pattern file is downloaded to the MG3700A hard drive. Using the MG3700A, Vector Signal Generator functionality, the files are loaded, selected, and output as a modulated RF signal.
Forward generates multi-carrier signals for up to nine carriers and Idle and Active mixed signals.
Reverse generates multi-user signals with freely adjustable frequency, phase, level, and delay.





1xEV-DO Forward Setting Screen



1xEV-DO Reverse Setting Screen

- Parameter Save/Recall

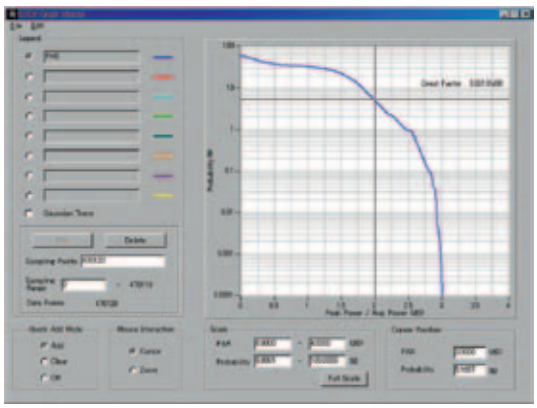
The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

- Graphical Simulation Displays

This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF) and Fast Fourier Transform (FFT) on the PC.
It is useful for checking or reviewing waveforms.

CCDF Graph

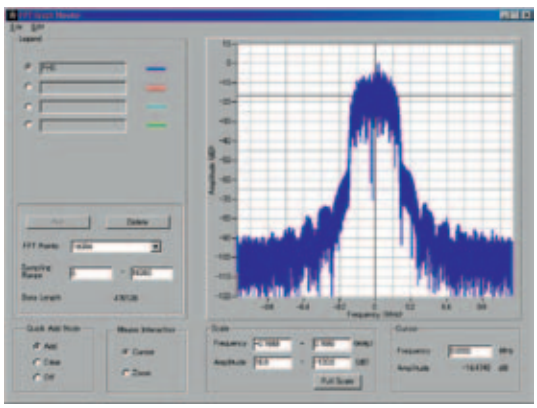
Up to eight generated waveform patterns can be read and displayed as CCDF graphs.



CCDF Graph Screen

FFT Graph

Up to four generated waveform patterns can be read and displayed as FFT graphs.



FFT Graph Screen

MX370103A CDMA2000 1xEV-DO IQproducer

Optional

● 1xEV-DO Forward Setting Range

Carrier Edit Sheet

Set the modulation parameters for single carriers (associated with carrier numbers 1 to 9) constituting the multi-carrier on the Carrier Edit sheet.

Display	Setting Range
Wave Data Length	Number of frames of generated waveform pattern. Specify up to 4 frames. Specify 3 frames when generating multi-carrier.
Over Sampling	Over sampling rate for waveform patterns. Set 4, 8, or 16.
Default All	Restores settings of all single carriers to initial values.
Carrier	Select single carrier to be edited from 1 to 9.
Carrier Parameters Copy	Specify single carrier where settings for currently-set single carrier to be copied (copy destination). Set Carrier 1 to Carrier 9 or All Carrier.
Execute	Copies settings of currently-set single carrier (corresponding to carrier number displayed in Carrier) to copy destination specified by Carrier Parameters Copy. Copied settings include contents of RPC/RA CH Parameter screen.
Data Rate	Set data rate and transmission slot for generated single carrier from following: 38.4 kbps (16 slots) QPSK, 76.8 kbps (8 slots) QPSK, 153.6 kbps (4 slots) QPSK, 307.2 kbps (2 slots) QPSK, 614.4 kbps (1 slot) QPSK, 307.2 kbps (4 slots) QPSK, 614.4 kbps (2 slots) QPSK, 1228.8 kbps (1 slot) QPSK, 921.6 kbps (2 slots) 8-PSK, 1843.2 kbps (1 slot) 8-PSK, 1228.8 kbps (2 slots) 16QAM, 2457.6 kbps (1 slot) 16QAM, Idle Slot
1st to 4th Frame Active (1)/Idle (0)	Set traffic channel active/idle for each slot.
TCH Data	Set traffic channel payload data. All '0': Sets payload data to all 0 s. All '1': Sets payload data to all 1 s. PN15: Sets payload data to discontinuous PN15 sequence. PN15 is continuous within a frame.
Offset Index	Specify PN Offset Index of generated single carrier from 0 to 511.
TCH1 to TCH4	Specify MAC Index used for scrambling sequence of traffic channel and preamble Walsh cover as integer from 5 to 63.
Reg1 to Reg4	Initial value of linear feedback shift register used to generate PN15 sequence when TCH Data set to PN15. Set hexadecimal number from 0 to 7FFF. The offset can be added to the PN15 sequence of each TCH by changing this initial value.
Carrier Default	Restores settings of single carrier currently set on screen to initial values. (The corresponding carrier number is displayed in Carrier.) The settings in the Carrier Parameters frame are restored to the initial values of the single carrier.
RPC/RA CH Parameters	Opens the RPC/RA CH Parameters screen setting parameters of RPC and RA channels.
Carrier Calculate	Generates waveform patterns for 9 single carriers with current settings. After clicking this button, the entire process on the Carrier Edit sheet is completed when "Complete" is displayed on the Execution and Result screen.

RPC/RA CH Parameters Sheet

Display	Setting Range
Frame	Selects frame where RPC and RA channels to be edited.
Slot	Selects slot where RPC and RA channels to be edited.
RA Bit	RA bit of RA channel. Set 0 or 1.
CH Power	Channel gain of MAC channel (relative value to pilot channel). Set from −40 to +40 dB.
RPC Bit	RPC bit of RPC channel. Set 0 or 1.
ON/OFF	Turns each MAC channel on/off.
Normalize	Sets all channel gains of RPC and RA channels in currently-set slot collectively to ratio expressed as fraction. The numerator of the RA channel ratio can be set from 1 to denominator −1. The denominator can be set from 2 to 99.

Multi-carrier Composition Sheet

Generates multi-carrier or single carrier waveform pattern from single carrier waveform patterns generated in Carrier Edit sheet

Display	Setting Range
Spacing	Sets frequency interval between carriers with consecutive carrier numbers from 1.20, 1.23, or 1.25 MHz.
Carrier Select	Turns on single carrier used to generate multi-carrier (or single carrier, if only one single carrier turned on with all others turned off) in single carrier generated in Carrier Edit sheet.
Target RMS Range	"RMS" indicates waveform pattern RMS value. Set the maximum value to "Max" when adjusting the waveform pattern RMS value.
RMS Adjustment Value	Sets RMS value of multi-carrier or single-carrier waveform pattern.
RMS Adjust	Converts waveform pattern generated by clicking Composition Execute button into waveform pattern with RMS value close to value input in RMS Adjustment Value.

● 1xEV-DO Reverse Setting Range

Display	Description	Setting Range
Over Sampling	Ratio of waveform pattern sampling rate and chip rate.	4, 8, 16
Carrier On/Off	Set carrier On/Off. On when checked.	On, Off
Long Code Mask	Set I and Q long code masks. MQ set automatically when MI set by user.	MI, MQ: 0x0 to 0x3FFFFFFFFF
Power	Set carrier power.	−80.000 to 0.000 dB
Frequency Offset	Set carrier frequency offset from center frequency setting of MG3700A.	−5.000 MHz to +5.000 MHz
Delay	Set carrier delay. The delay is the time interval from when a frame trigger is output from the rear panel of the MG3700A to when the first frame of the carrier is output.	0 to 32768 chip
Phase Offset	Set carrier phase offset.	0.000 to 2.000 π rad.
DRC CH On/Off	Set DRC channel On/Off. "On" when checked.	On, Off
DRC CH Gain	Set channel gain of DRC channel by value relative to pilot channel.	−80.000 to +20.000 dB
DRC Symbol	Set DRC channel symbol data in hexadecimal.	0000000000000000 to FFFFFFFFFFFFFFFF (HEX)
DRC Cover Symbol	Set DRC cover symbol data in octal.	0000000000000000 to 7777777777777777 (OCT)
ACK CH On/Off	Set ACK channel On/Off. "On" when checked.	On, Off
ACK CH Gain	Set channel gain of ACK channel by value relative to pilot channel.	−80.000 to +20.000 dB
ACK CH Bit	Set ACK channel bit.	A (ACK), N (NACK), X (DTX)
Data CH On/Off	Set Data channel On/Off. "On" when checked.	On, Off
Data CH Gain	Set channel gain of Data channel by value relative to pilot channel.	−80.000 to +20.000 dB
Data Rate	Set Data channel data rate.	9.6, 19.2, 38.4, 76.8, 153.6 kbps
Data	Set Data channel payload data. The "PN9fix" selection item specifies a discontinuous PN9 code sequence.	PN9fix, All '0', All '1'
Initial LFSR	When PN9fix set for Data, set initial value of PN9 generation shift register in hexadecimal.	0 to 1FF (HEX)
RRI Symbol	Set RRI symbol in binary.	000 to 101 (BIN)

MX370104A Multi-carrier IQproducer

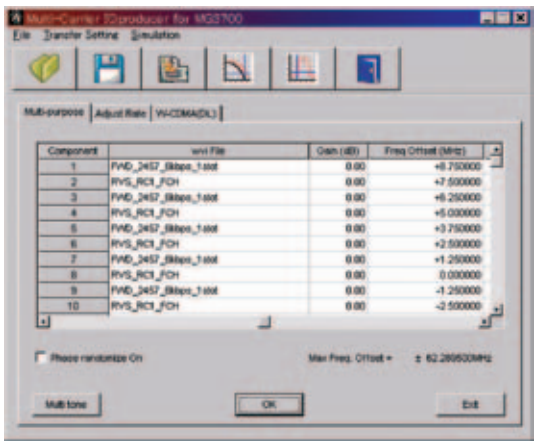
Optional

This GUI-driven PC application software is used to create a multi-carrier waveform pattern for modulated signals and tone signals of communications systems.
Once created, the waveform pattern file is downloaded to the MG3700A hard drive. Using the MG3700A, Vector Signal Generator functionality, the files are loaded, selected, and output as a multi-carrier RF signal.
W-CDMA downlink multi-carrier signals are supported as well as various types of clipping.

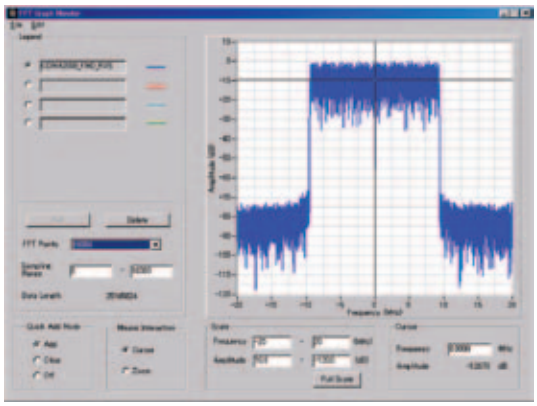
• Multi-purpose Function

By using the multi-carrier function, a signal with up to 32 carriers can be converted to a single waveform pattern. While it may not be possible to set 32 carriers due to the frequency offset and the waveform pattern, it is possible to create a waveform pattern with more than 32 carriers by combining multi-carrier waveform patterns.

Mixed CDMA2000 Forward and Reverse Signal



Multi-carrier Setting Screen



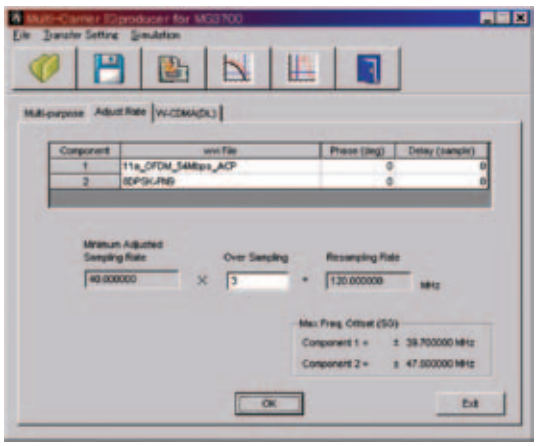
FFT Analysis Screen

• Adjust Rate Function

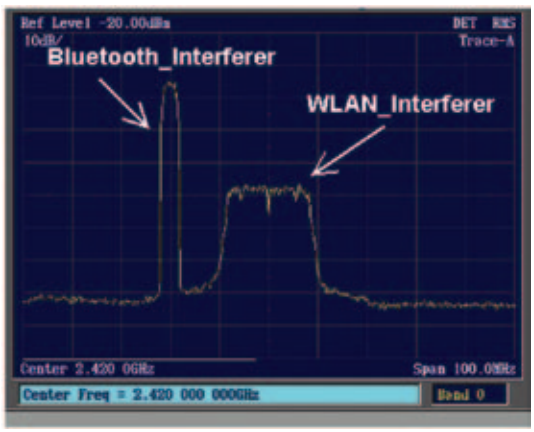
The Adjust Rate function converts two waveform patterns with different sampling rates into two waveforms patterns with the same sampling rate.
By using the MG3700A Two-signal Combining function, combining waveform patterns with different sampling rates causes the bandwidth to change because the waveform pattern in memory B is output at the sampling rate of the waveform pattern in memory

A. Using the Adjust Rate function, it is possible to combine the Wanted Signal and Interference Signal for various communication systems with the same sampling rate.
By matching the sampling rates of the two waveform patterns using this function, it is even possible to output a signal for different communication systems using the Two-signal Combining function.

WLAN and *Bluetooth* Sampling Rate Adjustment



Multi-carrier Setting Screen



FFT Analysis Screen

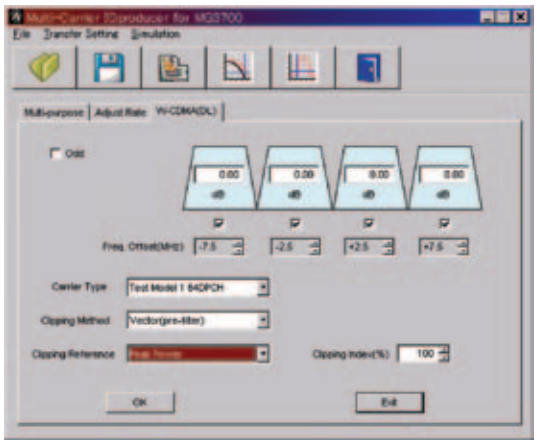
MX370104A Multi-carrier IQproducer

Optional

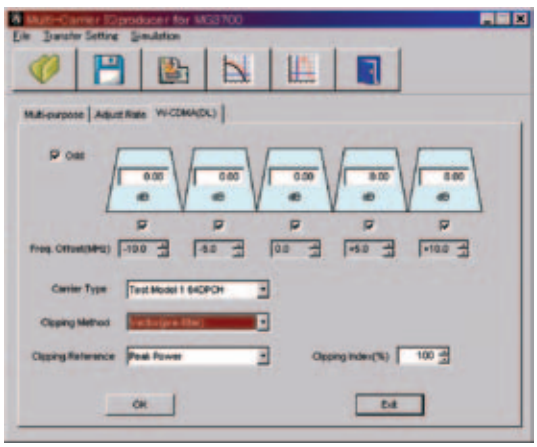
● W-CDMA (DL) Function

This function is used to create a waveform pattern by setting any of the 4 or 5 carriers of the W-CDMA Downlink ON/OFF, as well as by setting the Clipping Method, Clipping Reference Level, and Clipping Ratio.

• Clipping Method
  Non, Vector (pre-filter), Vector (post-filter),
  Scalar (pre-filter), Scalar (post-filter)
• Clipping Reference level
  Peak Power, RMS Power



Multi-carrier Setting Screen



Multi-carrier Setting Screen

MX370105A Mobile WiMAX IQproducer

Optional

This GUI-driven PC application software is used to set parameters and generate waveform patterns based on the IEEE 802.16e-2005 WirelessMAN-OFDMA standard. Signals that comply with this particular specification are also knows as mobile WiMAX signals. Once created, the waveform pattern file is downloaded to the MG3700A hard drive. The files are loaded, selected, and output as a modulated WiMAX signal. Permutation zones and user bursts are easy to configure in a frame using drop-and-drag functionality in a user-friendly GUI. Modulation, coding type, and coding rate can be set for each user burst. Most receiver tests described in IEEE 802.16e-2005 (Section 8.4.13, Receiver Requirement) can be performed except those functional tests requiring equipment other than a Signal Generator.

● Recommended Options

MG3700A-021 ARB Memory Upgrade 512 Msamples

The IEEE802.16e Receiver Requirement has an item for checking whether specifications are met by adding an Interference Signal to the Wanted Signal. This check requires two signals but by using the Two-signal Combine function, one MG3700A unit can output both the Wanted and Interference signals. In addition, if the memory is increased, several waveform patterns for different communication methods can be saved in memory for instant recall when required.

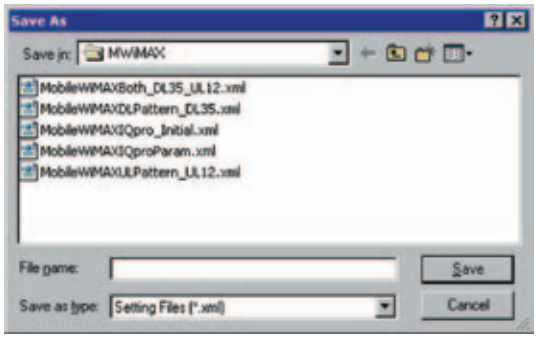
MG3700A-031 High-Speed BER Test Function

The IEEE802.16e Receiver Requirement has a BER measurement test that uses a Fixed pattern. The optional MG3700A-031 High-Speed BER test function* supports BER measurement using a Fixed pattern.

*: The standard BER function does not support Fixed-pattern measurement.

● Parameter Save/Recall

The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.



● Graphical Simulation Displays

Clipping, filtering, and checking can be performed for created waveform patterns by displaying CCDF, FFT, and Time Domain graphs.

CCDF Graph

Up to eight generated waveform patterns can be read and displayed as CCDF graphs.

FFT Graph

Up to four generated waveform patterns can be read and displayed as FFT graphs.

Time Domain Graph Display

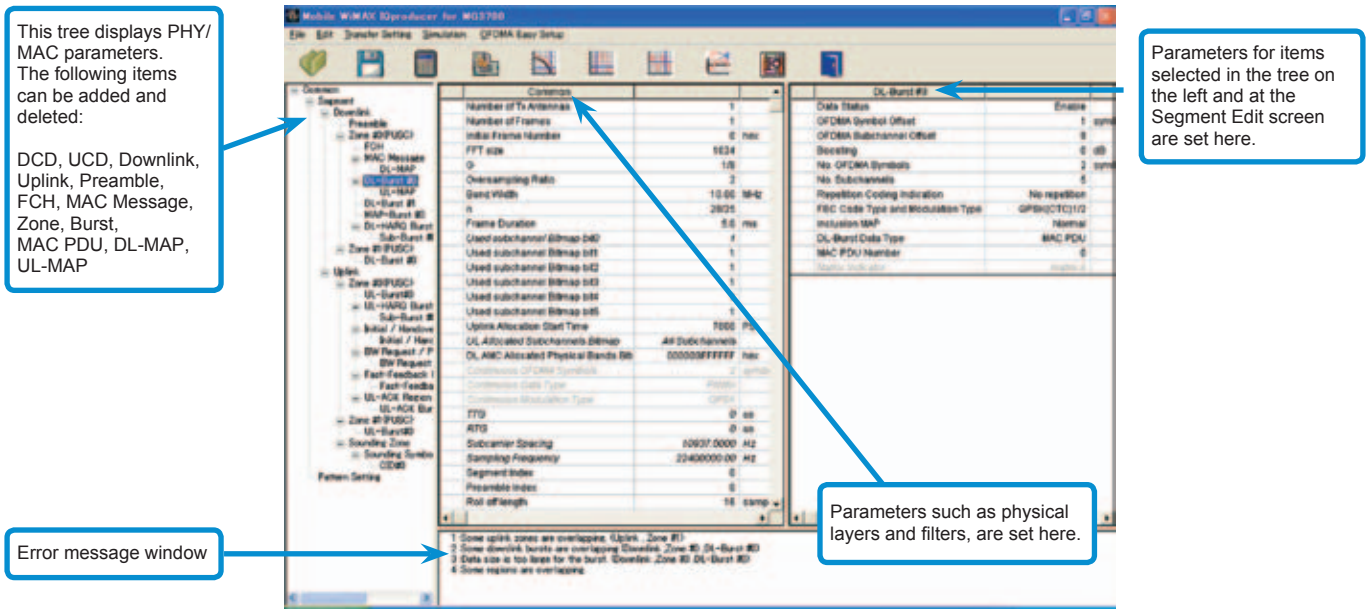
Up to four types of Time Domain graph can be displayed when reading created waveform patterns.

Clipping Function

Clipping and filtering can be performed for created waveform patterns.

MX370105A Mobile WiMAX IQproducer

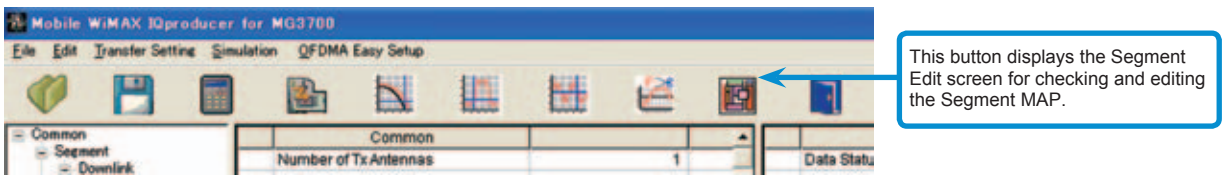
Optional



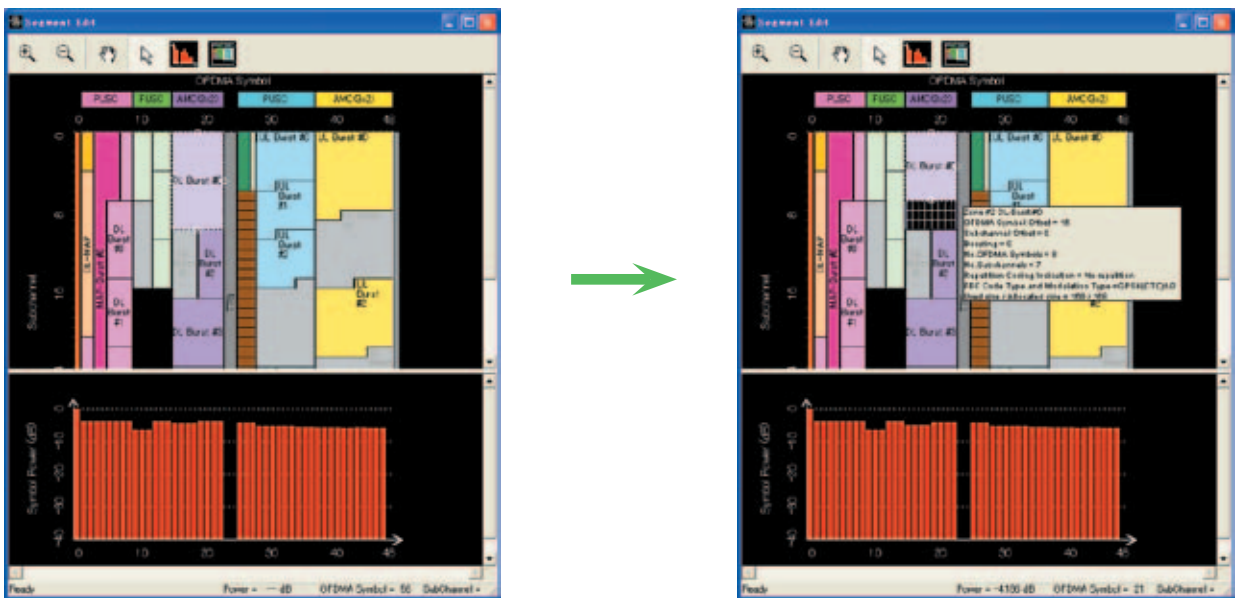
Mobile WiMAX IQproducer Main Screen

Excellent Operability: Segment Edit Screen

- The magnified or reduced Zone or Burst can be edited drop-and-drag techniques.
- The editing result is reflected in the Main screen parameters.
- An information window opens to describe parameters of any selected area.
- Parameters for the selected area are displayed on the Main screen.



Mobile WiMAX IQproducer Main Screen



Segment Edit Screen **Segment Edit Screen**

● Parameter Setting Items

Tree	Items	Setting Range	Frame Duration = Continuous
Common	Number of Tx Antennas	1, 2	
	Number of Frames	1 to Maximum number of Frame saved in memory	Can not be set.
	Initial Frame Number	000000 to FFFFFF (HEX)	Can not be set.
	FFT size	128, 512, 1024, 2048	
	G (CP Time Ratio)	1/4, 1/8, 1/16, 1/32	
	Oversampling Ratio	2, 4, 8	
	Bandwidth	1.25, 1.50, 1.75, 2.50, 3.00, 3.50, 5.00, 6.00, 7.00, 8.75, 10.00, 12.00, 14.00, 15.00, 17.50, 20.00, 24.00, 28.00 MHz	
	n (Sampling Factor)	8/7, 28/25	
	Frame Duration	2.0, 2.5, 4.0, 5.0, 8.0, 10.0, 12.5, 20.0 ms, Continuous	
	Used subchannel Bitmap bit0 to bit5	1, 0: When FFT Size = 128, 512, bit 0/2/4 = 0. When Segment Index = 0, bit0 = 1; when Segment Index = 1, bit 2 = 1, when Segment Index = 2, bit 4 = 1. Cannot be set when DL Use All SC Indicator = All.	
	Uplink Allocated Start Time	0 to Frame End PS (Cannot be set when neither of Downlink/Uplink not in tree)	Can not be set.
	Uplink Allocated Subchannels Bitmap	All Subchannels	
	DL AMC Allocated Physical Bands Bitmap	FFT Size = 2048 000000000000 to FFFFFFFFFFFF FFT Size = 1024 000000000000 to 000000FFFFFF FFT Size = 512 000000000000 to 000000000FFF FFT Size = 128 000000000000 to 000000000007	
	Continuous OFDMA Symbols	2 to maximum number of OFDMA Symbol in memory (2 symbol step):	Can be set
	Continuous Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File: Coding, and Randomization cannot be set at data selected here.	Can be set
	Continuous Data Type Repeat Data	0000 to FFFF (HEX): Can be set when Continuous Data Type = 16bit repeat	Can be set
	Continuous Data Type User File	User File selected: Can be set when Continuous Data Type = User File	Can be set
	Continuous Modulation Type	QPSK, 16QAM, 64QAM: Can be set when Frame Duration = Continuous	Can be set
	TTG	Display only: Gap interval between Downlink and Uplink displayed	
	RTG	Display only: Gap interval between Uplink and Frame End displayed	
	Subcarrier Spacing	Display only	
	Sampling Frequency	Display only: Depends on bandwidth, n (Sampling Factor), and Oversampling Ratio	
	Segment Index	0, 1, 2	Can not be set.
	Preamble Index	<Table 1>	Can not be set.
	Roll off length	0 to 32	
	Filter		
	Filter Type	Non, Gaussian, Root Nyquist, Nyquist, Ideal	
	Roll Off/BT	0.1 to 1.0: Cannot be set when Filter Type = Non, Ideal	
	Filter Length	1 to 1024: Cannot be set when Filter Type = Non, Ideal	
	DLFP		
	Repetition Coding Indication	No repetition, 2, 4, 6	Can not be set.
	Coding Indication	CC, CTC	Can not be set.
	DIUC Setting	Auto, Manual	
	DIUC List	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6	
	UIUC Setting	Auto, Manual	
	UIUC List	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6	
Segment	Multi-Path Setting	Enable, Disable	
	Tx Antenna0, 1	Multi-path Number: 1 to 20 Delay: 0.0 to 10000.0 ns Gain: –80.0 to 0.0 dB Phase: 0.0 to 359.9 deg.	

Table 1: Preamble Index Setting Range

When Segment Index = 0	When Segment Index = 1	When Segment Index = 2
0(IDcell=0), 1(IDcell=1), 2(IDcell=2), 3(IDcell=3), 4(IDcell=4), 5(IDcell=5), 6(IDcell=6), 7(IDcell=7), 8(IDcell=8), 9(IDcell=9), 10(IDcell=10), 11(IDcell=11), 12(IDcell=12), 13(IDcell=13), 14(IDcell=14), 15(IDcell=15), 16(IDcell=16), 17(IDcell=17), 18(IDcell=18), 19(IDcell=19), 20(IDcell=20), 21(IDcell=21), 22(IDcell=22), 23(IDcell=23), 24(IDcell=24), 25(IDcell=25), 26(IDcell=26), 27(IDcell=27), 28(IDcell=28), 29(IDcell=29), 30(IDcell=30), 31(IDcell=31), 96(IDcell=0), 99(IDcell=3), 102(IDcell=6), 105(IDcell=9), 108(IDcell=12), 111(IDcell=15)	32(IDcell=0), 33(IDcell=1), 34(IDcell=2), 35(IDcell=3), 36(IDcell=4), 37(IDcell=5), 38(IDcell=6), 39(IDcell=7), 40(IDcell=8), 41(IDcell=9), 42(IDcell=10), 43(IDcell=11), 44(IDcell=12), 45(IDcell=13), 46(IDcell=14), 47(IDcell=15), 48(IDcell=16), 49(IDcell=17), 50(IDcell=18), 51(IDcell=19), 52(IDcell=20), 53(IDcell=21), 54(IDcell=22), 55(IDcell=23), 56(IDcell=24), 57(IDcell=25), 58(IDcell=26), 59(IDcell=27), 60(IDcell=28), 61(IDcell=29), 62(IDcell=30), 63(IDcell=31), 97(IDcell=1), 100(IDcell=4), 103(IDcell=7), 106(IDcell=10), 109(IDcell=13), 112(IDcell=16)	64(IDcell=0), 65(IDcell=1), 66(IDcell=2), 67(IDcell=3), 68(IDcell=4), 69(IDcell=5), 70(IDcell=6), 71(IDcell=7), 72(IDcell=8), 73(IDcell=9), 74(IDcell=10), 75(IDcell=11), 76(IDcell=12), 77(IDcell=13), 78(IDcell=14), 79(IDcell=15), 80(IDcell=16), 81(IDcell=17), 82(IDcell=18), 83(IDcell=19), 84(IDcell=20), 85(IDcell=21), 86(IDcell=22), 87(IDcell=23), 88(IDcell=24), 89(IDcell=25), 90(IDcell=26), 91(IDcell=27), 92(IDcell=28), 93(IDcell=29), 94(IDcell=30), 95(IDcell=31), 98(IDcell=2), 101(IDcell=5), 104(IDcell=8), 107(IDcell=11), 110(IDcell=14), 113(IDcell=17)

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Optional

- PHY/MAC Parameter (Downlink) Setting Range

Tree	Items	Setting Range
Downlink	Data Status	Enable, Disable
Preamble	Data Status	Enable, Disable
	Preamble Index	Display only: Set at Common.
	IDcell	Display only: Depends on Preamble Index setting
Zone#0 to #7	Data Status	Enable, Disable
	Permutation	PUSC, PUSC (all SC), FUSC, AMC (6×1), AMC (3×2), AMC (2×3), AMC (1×6)
	Pilot Position	Hopping, Center
	Dedicated Pilot	0, 1
	Pilot Boosting	OFF, ON
	STC/MIMO	No transmit diversity, 2 Antenna Matrix A (STTD), 2 Antenna Matrix B vertical encoding
	OFDMA Symbol Offset	<Zone#0> Display only <Zone#1 to #7) 0 to 255 symbol (without Preamble), 1 to 255 symbol (with Preamble)
	No. OFDMA Symbols	2 to 254 symbol (when PUSC), 2 to 254 symbol (when PUSC1 (all SC)), 1 to 255 symbol (when FUSC), 1 to 255 symbol (when AMC (6×1)), 2 to 254 symbol (when AMC (3×2)), 3 to 255 symbol (when AMC (2×3)), 6 to 252 symbol (when AMC (1×6))
	DL-PermBase	0 to 31 (Cannot be set at Zone#0)
	DL-Burst Number	1 to 16
	PRBS_ID	0 to 3 (Cannot be set at Zone#0)
FCH	Data Status	Enable, Disable
	FCH Type	16bit repeat, PN9fix, PN15fix, DLFP, User File
	FCH Type Repeat Data	0000 to FFFF (HEX): Can be set when FCH Type = 16bit repeat
	FCH Type User File	User File selected: Can be set when FCH Type = User File
	Used subchannel Bitmap bit0 to 5	Display only: Set at Common
	Repetition Coding Indication	Display only: Set at Common
	Coding Indication	Display only: Set at Common
	DL-MAP Length	Display only: Set at DL-MAP
MAC Message	Data Status	Enable, Disable
DL-MAP	Data Status	Enable, Disable
	DL-MAP Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, DL-MAP, Compressed DL-MAP, User File
	DL-MAP Type Repeat Data	0000 to FFFF (HEX): Can be set DL-MAP Type = 16bit repeat
	DL-MAP Type User File	User File selected: Can be set when DL-MAP Type = User File
	DL-MAP Length	0 to 255 slot: The calculation value is displayed when DL-MAP Type = DL-MAP or Compressed DL-MAP. The length of DL-MAP can be set in other cases.
	DCD Count	0 to 255: Can be set when DL-MAP Type = DL-MAP or Compressed DL-MAP
	Base Station ID	0000 0000 0000 to FFFF FFFF FFFF (HEX): Can be set when DL-MAP Type = DL-MAP or Compressed DL-MAP
	DL-MAP PHY Synchronization Field	
	Frame Duration	Display only: Set at Common
	Initial Frame Number	Display only: Set at Common
	Zone# DL-MAP IE #	
	DIUC (Downlink Interval Usage Code)	0 to 12
	OFDMA Symbol Offset	Display only: Set at DL-Burst
	OFDMA Subchannel Offset	Display only: Set at DL-Burst
	Boosting	Display only: Set at DL-Burst
	No. OFDMA Symbol	Display only: Set at DL-Burst
	No. Subchannels	Display only: Set at DL-Burst
	Repetition Coding Indication	Display only: Set at DL-Burst
	Zone# STC/Zone switch IE	
	OFDMA Symbol Offset	Enable, Disable
	Permutation	Display only: Set at DL-Zone.
	DL Use All SC Indicator	Display only
	DL-PermBase	Display only: Set at DL-Zone.
SUB-DL-UL-MAP	Data Status	Enable, Disable
	OFDMA Symbol Offset	Display only
	OFDMA Subchannel Offset	Display only
	Length	Display only
	FEC Code Type and Modulation Type	<Table 2>
	Repetition Coding Indication	No repetition, 2, 4, 6
	RCID Type	Normal CID, RCID11, RCID7, RCID3
	HARQ ACK offset indicator	0, 1
	DL HARQ ACK offset	0 to 255
	UL HARQ ACK offset	DL IE Count
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 127

Tree	Items	Setting Range
DL-Burst 0 to 15	Data Status	Enable, Disable
	OFDMA Symbol Offset	<Table 3>
	OFDMA Subchannel Offset	0 to 63 (when AMC (2×3), AMC (1×6) excluded) 0 to 255 (when AMC (2×3), AMC (1×6))
	Boosting	−12, −9, −6, −3, 0, +3, +6, +9 dB
	No. OFDMA Symbols	2 to 126 symbol (when PUSC), 2 to 126 symbol (when PUSC (all SC)), 1 to 127 symbol (when FUSC), 1 to 127 symbol (when AMC (6×1)), 2 to 126 symbol (AMC (3×2)), 3 to 93 symbol (when AMC (2×3)), 6 to 90 symbol (when AMC (1×6))
	No. Subchannels	1 to 63
	Repetition Coding Indication	No repetition, 2, 4, 6: Can be set when FEC Code Type and Modulation Type = QPSK (CC) 1/2, QPSK (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, QPSK (No Ch Coding); no repetition fixed in other cases
	FEC Code Type and Modulation Type	<Table 2>
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
	DL-Burst Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	DL-Burst Data Type Repeat Data	0000 to FFFF (HEX): Can be set when DL-Burst Data Type = 16bit repeat
	DL-Burst Data Type User File	User File selected: Can be set when DL-Burst Data Type = User File
	MAC PDU Number	0 to 32
	Matrix Indicator	Matrix A, Matrix B
UL-MAP	Data Status	Enable, Disable
	UL-MAP Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, UL-MAP, Compressed UL-MAP, User File
	UL-MAP Type Repeat Data	0000 to FFFF (HEX): Can be set when UL-MAP Type = 16bit repeat
	UL-MAP Type User File	User File selected: Can be set when UL-MAP Type = User File
	UL-MAP Length	0 to 2037 byte: The calculation value is displayed when UL-MAP Type = UL-MAP or Compressed UL-MAP. The length of payload data for UL-MAP can be set in other cases.
	UCD Count	0 to 255: Can be set when UL-MAP Type = UL-MAP or Compressed UL-MAP
	Uplink Allocated Start Time	Display only: Set at Common
	Zone# UL-MAP IE #	
	CID	0 to 65535
	UIUC (Uplink Interval Usage Code)	1 to 10
	UL-Burst Duration	Display only: Set at UL-Burst.
	Repetition Coding Indication	Display only: Set at UL-Burst.
DCD	Data Status	Enable, Disable
	DCD Offset	0 to (Number of Frames −1)
	DCD Interval	0 to Number of Frames
	DCD Length	0 to 2037 (without DCD Data Type = TLV) Display only (when DCD Data Type = TLV)
	DCD Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File, TLV
	Configuration Change Count	0 to 255
	TLV encoded information	
	Frequency	0 to 6000000 kHz
	Base Station ID	000000000000 to FFFFFFFFFFFF
	MAC version	1 to 6
	BS EIRP	−32768 to +32767
	TTG	Display only
	RTG	Display only
	EIRxP_IR_MAX	−32768 to +32767
	HO Type Support	HO, MDHO, FBSS HO
	Paging Group ID	0000 to FFFF
	Trigger Type	0 to 3
	Trigger Function	0 to 6
	Trigger Action	1 to 3
	Trigger Value	00 to FF
	Trigger averaging Duration	0 to 255
	BS Restart Count	00 to FF
	Default RSSI and CINR averaging parameter	00 to FF
	DL AMC Allocated Physical Bands Bitmap	Display only
	Hysteresis margin	00 to FF
	Time to trigger duration	00 to FF
	DL-Burst Profile (DIUC = 0 to 12)	
	FEC Type	Display only

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Tree	Items	Setting Range
UCD	Data Status	Enable, Disable
	UCD Offset	0 to (Number of Frames −1)
	UCD Interval	0 to Number of Frames
	UCD Length	0 to 2037 (without UCD Data Type = TLV), Display only (when UCD Data Type = TLV)
	UCD Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File, TLV
	Configuration Change Count	0 to 255
	Ranging Backoff Start	0 to 255
	Ranging Backoff End	0 to 255
	Request Backoff Start	0 to 255
	Request Backoff End	0 to 255
	TLV encoded information	
	Frequency	0 to 6000000 kHz
	Contention-based Reservation Timeout	00 to FF
	Start of Ranging Coded Group	00 to FF
	Band AMC Allocated Threshold	00 to FF
	Band AMC Release Threshold	00 to FF
	Band AMC Allocated Timer	00 to FF
	Band AMC Release Timer	00 to FF
	Band AMC Status Reporting Max Period	00 to FF
	Band AMC Retry Timer	00 to FF
	Normalized C/N Override-2	0000000000000000 to FFFFFFFFFFFFFFFF
	Use CQICH Indication Flag	00 to FF
	Handover Ranging Code	00 to FF
	Initial Ranging Codes	00 to FF
	Initial Ranging Interval	00 to FF
	Tx Power Report	0000 to FFFF
	Normalized C/N for channel Sounding	00 to FF
	Initial Ranging Backoff Start	00 to FF
	Initial Ranging Backoff End	00 to FF
	Bandwidth request Backoff Start	00 to FF
	Bandwidth request Backoff End	00 to FF
	Permutation Base	00 to FF
	UL Allocated Subchannels Bitmap	Display only
	HARQ Ack Delay for DL burst	00 to FF
	UL AMC Allocated Physical Bands Bitmap	000000000000 to FFFFFFFFFFFF
	Size of CQICH-ID field	00 to FF
	Band-AMC entry average CINR	00 to FF
	HO ranging start	00 to FF
	HO ranging end	00 to FF
	Periodic Ranging Codes	00 to FF
	Bandwidth Request Codes	00 to FF
	Periodic Ranging Backoff Start	00 to FF
	Periodic Ranging Backoff End	00 to FF
	CQICH Band AMC Transition Delay	00 to FF
	UL-Burst Profile (UIUC = 1 to 10)	
	FEC Type	Display only
	Ranging Data ratio	00 to FF
MAC PDU 0 to 31	Data Status	Enable, Disable
	MAC PDU Length	Display only
	Payload Data Length	0 to 2041 byte (when CI = No CRC), 0 to 2037 byte (when CI = With CRC), 0 to 2047 byte (when CI = Without Header & CRC)
	CID (Connection Identifier)	0 to 65535
	CI	With CRC, No CRC, Without Header & CRC
	CRC Error Insertion	Correct, Error
	Payload Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
	Payload Type Repeat Data	0000 to FFFF: Can be set when Payload Type = 16bit repeat
	Payload Type User File	User File selected: Can be set when Payload Type = User File
MAP-Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	<Table 3>
	OFDMA Subchannel Offset	0 to (Number of Subchannel at Zone)
	Length	1 to 255 slot
	Repetition Coding Indication	No Repetition, 2, 4, 6
	FEC Code Type and Modulation Type	<Table 2>

Tree	Items	Setting Range
MAP-Burst	MAP-Burst Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	MAP-Burst Data Type Repeat Data	0000 to FFFF: Can be set when MAP-Burst Data Type = 16bit repeat
	MAP-Burst Data Type User File	User File selected: Can be set when MAP-Burst Data Type = User File
	MAC PDU Number	0 to 32: Display when MAP-Burst Data Type = MAC PDU.
DL-HARQ Burst	Data Status	Enable, Disable
	RCID_Type	Normal CID, RCID11, RCID7, RCID3
	OFDMA Symbol Offset	<Table 3>
	OFDMA Subchannel Offset	0 to (Number of Subchannel at Zone)
	Boosting	−12, −9, −6, −3, 0, +3, +6, +9 dB
	Rectangular Sub-Burst Indicator	0, 1
	No. OFDMA Symbols	2 to 126 symbol (when PUSC), 2 to 126 symbol (when PUSC (all SC)), 1 to 127 symbol (when FUSC), 1 to 127 symbol (when AMC (6×1)), 2 to 126 symbol (when AMC (3×2)), 3 to 126 symbol (when AMC (2×3)), 6 to 126 symbol (when AMC (1×6))
	No. Subchannels	1 to 127
	Mode	Chase HARQ, MIMO Chase HARQ
	N sub Burst	1 to 16
	N ACK Channel	0 to 15
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
Sub-Burst	Data Status	Enable, Disable
	CID	0 to 65535
	Sub-Burst Duration	1 to 1023
	Sub-Burst DIUC Indication	0, 1
	Repetition Coding Indication	No repetition, 2, 4, 6
	FEC Code Type and Modulation Type	<Table 2>
	Sub-Burst Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	Sub-Burst Data Type Repeat Data	0x0000 to 0xFFFF
	Sub-Burst Data Type User File	User File selected when Sub-Burst Data Type = User File
	MAC PDU Number	0 to 32
	MU Indicator	0, 1
	Dedicated MIMO DL Control Indicator	0, 1
	Matrix Indicator	Matrix A, Matrix B
	CRC Error Insertion	Correct, Error
	ACID	0 to 15
	AI_SN	0, 1
	ACK disable	0, 1
	Dedicated DL Control Indicator	00, 01, 10, 11
	Duration (d)	0 to 15
	Allocated Index	0 to 63
	Period (p)	0 to 7
	Frame Offset	0 to 7
	Dedicated DL Control IE	0 to 1
	No. SDMA layers	1 to 4

Table 2: FEC Code Type and Modulation Type Setting Range

QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)

Table 3: OFDMA Symbol Offset Setting Range

• 0 to 254 symbol without Preamble at Zone#0 (Select by even symbol.)
• 1 to 255 symbol with Preamble at Zone#0 (Select by odd symbol.)
• (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC Zone from Zone#1 to #7
• (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC (all SC) Zone
• (OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone
• (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6×1) Zone
• (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3×2) Zone
• (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2×3) Zone
• (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1×6) Zone

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Optional

● PHY/MAC Parameter (Uplink) Setting Range

Tree	Items	Setting Range
Uplink	Data Status	Enable, Disable
Zone 0 to 7	Data Status	Enable, Disable
	Permutation	PUSC, PUSC (without SC rotation), AMC (6×1), AMC (3×2), AMC (2×3), AMC (1×6)
	Pilot Position	Hopping, Center
	STC/MIMO	Display only
	OFDMA Symbol Offset	0 to 255 symbol (Zone#0 = 0)
	No. OFDMA Symbols	3 to 255 symbol (when PUSC), 3 to 255 symbol (when PUSC (without SC rotation)), 1 to 255 symbol (when AMC (6×1)), 2 to 254 symbol (when (AMC (3×2)), 3 to 255 symbol (when AMC (2×3)), 6 to 252 symbol (AMC (1×6))
	UL-PermBase	0 to 69
	UL-Burst Number	1 to 16
UL-Burst 0 to 15	Data Status	Enable, Disable
	ODFMA Symbol Offset	<Table 4>
	OFDMA Subchannel Offset	Subchannel −1 at 0 to Zone
	UL Burst Duration	3 to 3069 symbol (when PUSC), 3 to 3069 symbol (when PUSC (without SC rotation)), 1 to 1023 symbol (when AMC (6×1)), 2 to 2046 symbol (when AMC (3×2)), 3 to 3069 symbol (when AMC (2×3)), 6 to 6138 symbol (when AMC (1×6))
	Burst Power Offset	−10.00 to +10.00 dB
	Pilot Pattern	Normal, Pattern A, Pattern B
	Repetition Coding Indication	No repetition, 2, 4, 6: Can be set when FEC Code Type and Modulation Type = QPSK (CC) 1/2, QPSK (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, QPSK (No Ch Coding); no repetition fixed in other cases
	FEC Code Type and Modulation Type	<Table 5>
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
	UL-Burst Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	UL-Burst Data Type Repeat Data	0000 to FFFF: Can be set when UL-Burst Data Type = 16bit repeat
	UL-Burst Data Type User File	User File selected: Can be set when UL-Burst Data Type = User File
	MAC PDU Number	0 to 32
MAC PDU 0 to 31	<See MAC PDU on Downlink>	
UL-HARQ Burst	Data Status	Enable, Disable
	RCID_Type	Normal CID, RCID11, RCID7, RCID3
	OFDMA Symbol Offset	<Table 4>
	OFDMA Subchannel Offset	0 to (Subchannel number –1 at Zone)
	Mode	Chase HARQ (Display only)
	Allocated Start Indication	0, 1
	N sub Burst	1 to 16
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
Sub-Burst	Data Status	Enable, Disable
	CID	0 to 65535
	FEC Code Type and Modulation Type	<Table 5>
	Repetition Coding Indication	No repetition, 2, 4, 6
	Sub-Burst Duration	1 to 1023 slot
	Sub-Burst Data Type	16bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	Sub-Burst Data Type Repeat Data	0x0000 to 0xFFFF
	Sub-Burst Data Type User File	Display only when Sub-Burst Data Type = User File
	MAC PDU Number	0 to 32
	CRC Error Insertion	Correct, Error
	Dedicated UL Control Indicator	0, 1
	SDMA Control Info bit	0, 1
	Num SDMA layers	0 to 3
	Pilot Pattern	Pattern A, Pattern B, Pattern C, Pattern D
	ACID	0 to 15
	AI_SN	0, 1
	ACK disable	0, 1

Tree	Items	Setting Range
Initial/ Handover Ranging Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	<Table 6>
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	3 to 126 symbol (when PUSC), 3 to 126 symbol (when PUSC (without SC rotation)), 1 to 127 symbol (when AMC (6×1)), 2 to 126 symbol (when AMC (3×2)), 3 to 126 symbol (when AMC (2×3)), 6 to 126 symbol (when AMC (1×6))
	No. Subchannels	6 to 126 (when PUSC, PUSC (without SC rotation)) 8 to 120 (without PUSC, PUSC (without SC rotation))
	Initial/Handover Ranging Symbols	2, 4
	Initial/Handover Ranging Burst Number	1 to 16
	Ranging Region Combination	Non, Combine
	BW Request/Periodic Ranging Offset	0 to No. OFDMA Symbols at Initial/Handover Ranging Region
	BW Request/Periodic Ranging Symbols	1, 3
	BW Request/Periodic Ranging Burst Number	0 to 16
Initial/ Handover Ranging Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	• When Initial/Handover Ranging Symbols = 2, 0 to 254 symbol setting resolution = 2 • When Initial/Handover Ranging Symbols = 4, 0 to 252 symbol
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	−10.00 to +10.00 dB
	Ranging Code Number	0 to 255
BW Request/ Periodic Ranging Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	<Table 6>
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	3 to 126 symbol (when (PUSC)), 3 to 126 symbol (when PUSC (without SC rotation)), 1 to 127 symbol (when AMC (6×1)), 2 to 126 symbol (when AMC (3×2)), 3 to 126 symbol (when AMC (2×3)), 6 to 126 symbol (when AMC (1×6))
	No. Subchannels	6 to 126 (when PUSC, PUSC (without SC rotation)) 8 to 120 (without PUSC, PUSC (without SC rotation))
	BW Request/Periodic Ranging Symbols	1, 3
	BW Request/Periodic Ranging Burst Number	1 to 16
BW Request/ Periodic Ranging Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	−10.00 to +10.00 dB
	Ranging Code Number	0 to 255
Fast-Feedback Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	OFDMA Symbol Offset at Zone to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	3 to 126
	No. Subchannels	1 to 127
	Fast-Feedback Type	Display only
	Fast-Feedback Burst Number	1 to 32
Fast-Feedback Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	−10.00 to +10.00 dB
	Payload	000000 to 111111

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Optional

Tree	Items	Setting Range
UL-ACK Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	(OFDMA Symbol Offset at Zone) to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	3 to 126 symbol
	No. Subchannels	1 to 127
	UL-ACK Burst Number	1 to 32
UL-ACK Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Occupied half subchannel	even, odd
	UL-ACK Burst Power Offset	−10.0 to +10.0 dB
	Payload	ACK, NACK
Sounding Zone	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255 symbol
	No. OFDMA Symbols	1 to 8
	Sounding Type	Type A (Display only)
	Send Sounding Report Flag	0, 1
	Sounding Relevance Flag	0, 1
	Sounding Relevance	0, 1
	Include additional feedback	No additional feedback, Channel coefficients, Received pilot coefficients, Feedback message
	Shift Value	0 to 127
Sounding Symbol	Data Status	Enable, Disable
	Separability Type	All subcarriers, Decimated subcarriers
	Max. Cyclic Shift Index P	4, 8, 16, 32, 9, 18
	Decimated Value D	2, 4, 8, 16, 32, 64, 128, 5
	Decimated offset randomization	No randomization, Pseudo-randomly
	Sounding Symbol Index	1 to 8
	Number of CIDs	1 to 128
CID	Data Status	Enable, Disable
	Shorted Basic CID	0 to 4095
	Power Assignment Method	Equal power, Per subcarrier power limit, Total power limit
	Power Boost	No power boost, Power boost
	Multi-Antenna Flag	First antenna only, All antennas
	Allocated Mode	Normal, Band
	Start Frequency Band	0 to 95 (when FFT Size = 2048), 0 to 47 (when FFT Size = 1024), 0 to 23 (when FFT Size = 512), 0 to 5 (when FFT Size = 128)
	No. Frequency Bands	1 to 96 (when FFT Size = 2048), 1 to 48 (when FFT Size = 1024), 1 to 24 (when FFT Size = 512), 1 to 6 (when FFT Size = 128)
	Band Bitmap	0 to FFF (when FFT Size = 2048, 1024, 512), 0 to 7 (when FFT Size = 128)
	Sounding Relevance	0, 1
	Cyclic time shift index m	0 to (Max Cyclic Shift Index P−1 at Sounding Symbol that CID belongs to)
	Decimated Offset d	0 to (Decimated Value D−1 at Sounding Symbol that CID belongs to)
	Use same symbol for additional feedback	0, 1
	Periodicity	Single, 1, 2, 4

Table 4: OFDMA Symbol Offset Setting Range

When PUSC Zone, PUSC (without SC rotation) Zone, AMC (6×1) Zone, AMC (3×2) Zone, AMC (2×3) Zone, AMC (1×6) Zone: (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol

Table 5: FEC Code Type and Modulation Type Setting Range

QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)

Table 6: OFDMA Symbol Offset Setting Range

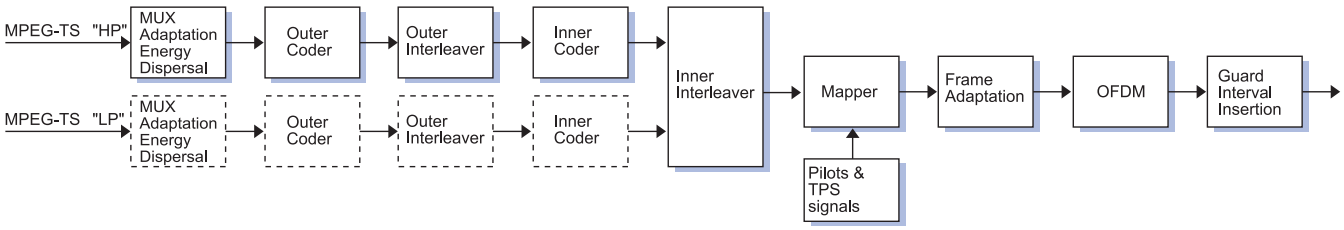
When PUSC Zone, PUSC (without SC rotation) Zone, AMC (6×1) Zone, AMC (3×2) Zone, AMC (2×3) Zone, AMC (1×6) Zone: (OFDMA Symbol Offset at Zone) to 255 symbol

MX370106A DVB-T/H IQproducer

Optional

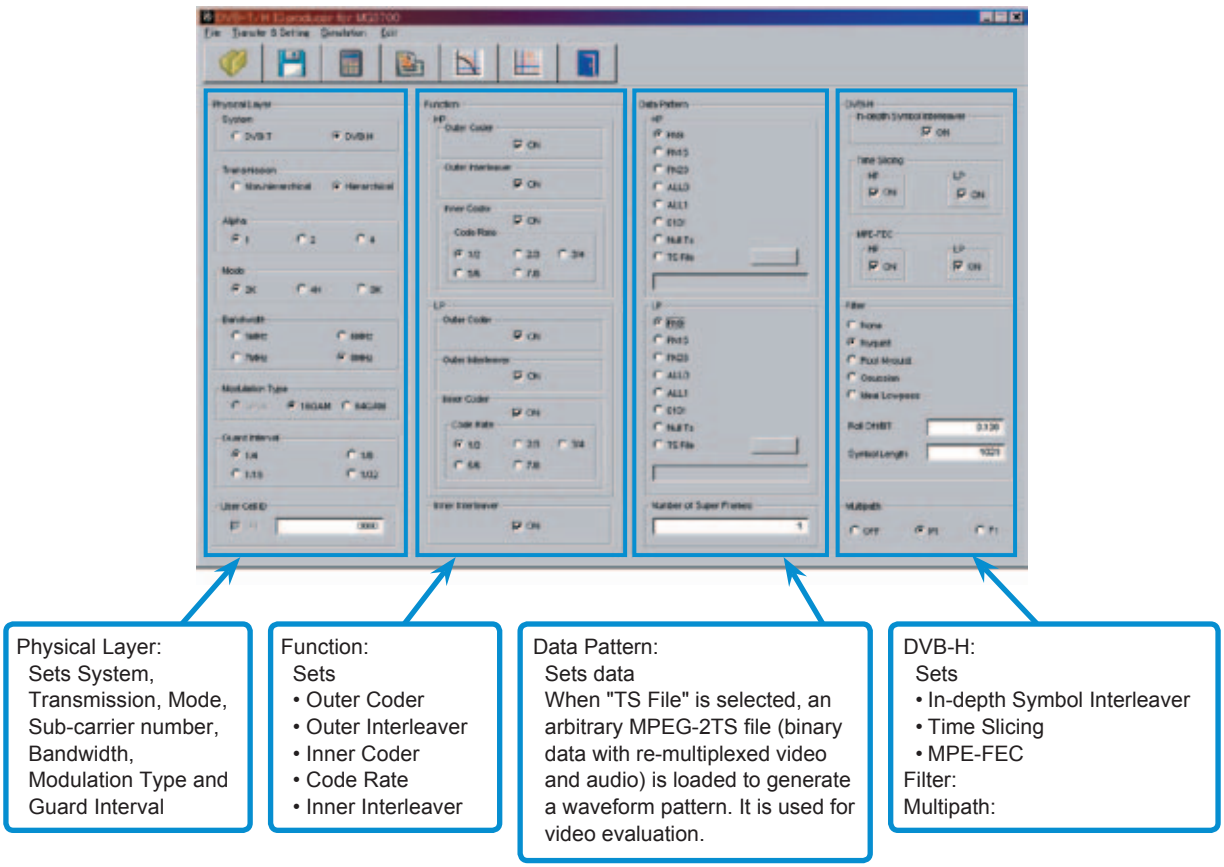
The MX370106A DVB-T/H IQproducer is GUI-driven PC application software supporting the ETSI EN 300 744 V1.5.1 (2004-11) Physical Layer standard. The generated waveform patterns are downloaded to the MG3700A and used to output DVB-T/H Modulation baseband signals and RF signals using the MG3700A ARB generation function.

This software processes the DVB-T/H Physical Layer shown in the Signal Generation Block Diagram below.
When all of Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are ON, the data selected by Data Pattern is input to the MPEG-TS part shown in the figure below.
When each function is turned OFF, all the blocks of the front side are turned OFF. The data selected by Data Pattern is inserted by jumping over blocks that are OFF.



● DVB-T/H IQproducer Main Screen

Parameters are set easily by selecting buttons on one screen.



● Recommended options

MG3700A-021 ARB Memory Upgrade 512 Msamples

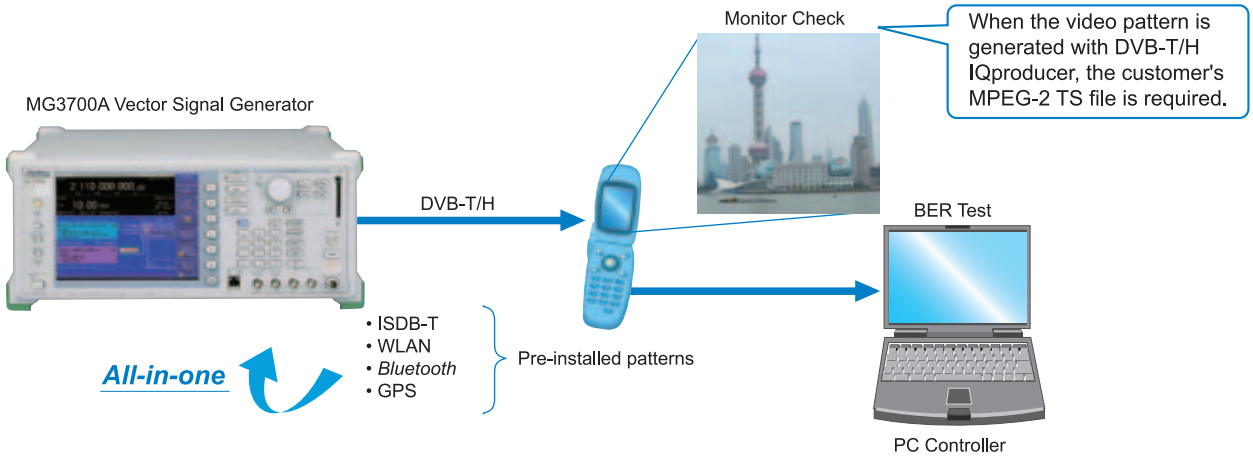
The DVB-T/H evaluation checks integrated operation from the signal input to the display by using the video file. The size of the video waveform pattern is very large and requires addition of the expanded memory option.

MX370106A DVB-T/H IQproducer

Optional

• DVB-T/H Measurement Image

The generated waveform pattern supports the following measurements.
(1) Visual check using video pattern — General check of signal received from antenna to output at monitor
(2) BER test based on ETSI TR 101 290 using module built into terminal — Receiver Sensitivity Test



• Parameter Save/Recall

The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

• Graphical Simulation Displays

This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF) and Fast Fourier Transform (FFT) on the PC.
It is useful for checking or reviewing waveforms.

CCDF Graph

Up to eight generated waveform patterns can be read and displayed as CCDF graphs.

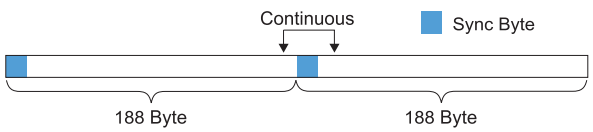
FFT Graph

Up to four generated waveform patterns can be read and displayed as FFT graphs.

• Parameter Setting Items

No.	Segment	Items	Setting Range	Restriction*1
1	Physical Layer	System	DVB-T, DVB-H	
2		Transmission	Non-hierarchical, Hierarchical	
3		Alpha	1, 2, 4	1: When No.2 = Non-hierarchical
4		Mode	(Sub-carrier of OFDM) 2K, 4K, 8K	"4K" cannot be set when No.1 = DVB-T.
5		Bandwidth	5, 6, 7, 8 MHz	"5 MHz" cannot be set when No.1 = DVB-T.
6		Modulation Type	QPSK, 16QAM, 64QAM	"QPSK" cannot be set when No.2 = Hierarchical
7		Guard Interval	1/4, 1/8, 1/16, 1/32	
8		User Cell ID	ON: 0000 to FFFF (HEX), OFF	"ON": When No.1 = DVB-H
9	Function	Outer Coder	ON, OFF	"LP" cannot be set when No.2 = Non-hierarchical. OFF: When No.10 = OFF
10		Outer Interleaver	ON, OFF	"LP" cannot be set when No.2 = Non-hierarchical. ON: When No.9 = ON OFF: When No.11 = OFF
11		Inner Coder	ON, OFF	"LP" cannot be set when No.2 = Non-hierarchical. ON: When No.10 = ON OFF: When No.13 = OFF
12		Code Rate	1/2, 2/3, 3/4, 5/6, 7/8	"LP" cannot be set when No.2 = Non-hierarchical. Cannot be set when No.11 = OFF
13		Inner Interleaver	ON, OFF	ON: When No.11 = ON
14	Data Pattern	(Data)	PN9, PN15, PN23, All 0, All 1, 0101, Null TS, TS File	"LP" cannot be set when No.2 = Non-hierarchical.
			When TS File is selected, the external TS file is read. The TS file is composed of several packets with 188 bytes/ packet. The first one byte of the packet becomes the Sync Byte and is set to 47 (HEX). If a TS file that does not follow the format of this TS data is selected, an error is displayed when the Calculation button is clicked. When all of "Outer Coder," "Outer Interleaver," "Inner Coder," and "Inner Interleaver" are set to ON, Sync Byte is set to the data of "PN9/PN15/PN23/All 0/All 1/0101". At this time, the continuity of data is kept between the "last data of the packet" and the "first data of the next packet except the Sync Byte." *2	
15		Number of Super Frames	1 to 384	(See following for details.)
16	DVB-H	In-depth Symbol Interleaver	ON, OFF	OFF: When No.1 = DVB-T OFF: When No.4 = 8K OFF: When No.13 = OFF
17		Time Slicing	ON, OFF: When Time Slicing = ON, the 49th bit of the TPS data is set to "1". When Data Pattern = TS File, Time Slicing processing is required in the selected TS file.	OFF: No.1 = DVB-T "LP" cannot be set when No.2 = Non-hierarchical.
18		MPE-FEC	ON, OFF: When MPE-FEC = ON, the 50th bit of the TPS data is set to "1". When Data Pattern = TS File, MPE-FEC processing is required in the selected TS file.	OFF: When No.1 = DVB-T "LP" cannot be set when No.2 = Non-hierarchical.
19	Filter	(Type)	None, Nyquist, Root Nyquist, Gaussian, Ideal Lowpass	
20		Roll Off/BT	0.100 to 1.000	Cannot be set when No.19 = None/Ideal Lowpass
21		Symbol Length	1 to 1023	Cannot be set when No.19 = None/Ideal Lowpass 1: When No.19 = None 1023: When No.19 = Ideal Lowpass
22	Multipath		OFF, F1, P1	

∗1: Other parameter setting conditions limited by setting range restrictions.
∗2: Packet continuity shown in following figure.



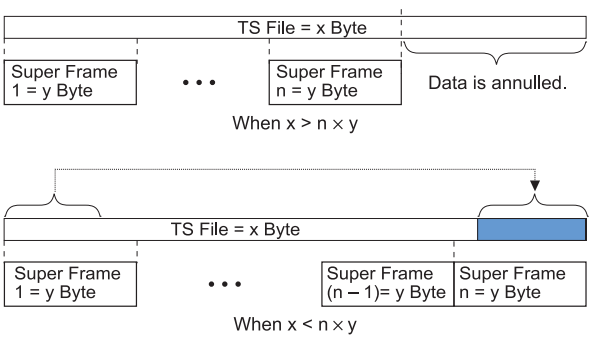
• Number of Super Frame Setting

The "Number of Super Frame" setting range changes according to the "Mode" setting and "MG3700A main frame memory option" as shown in the following table.

Maximum Number of Super Frame	Memory Option	Mode
384	With Option 021 (ARB Memory Upgrade 512 Msamples)	2 k
192		4 k
96		8 k
192	Without Option 021	2 k
96		4 k
48		8 k

The data selected by "Data Pattern" is annulled in the terminal of the final super frame set here.

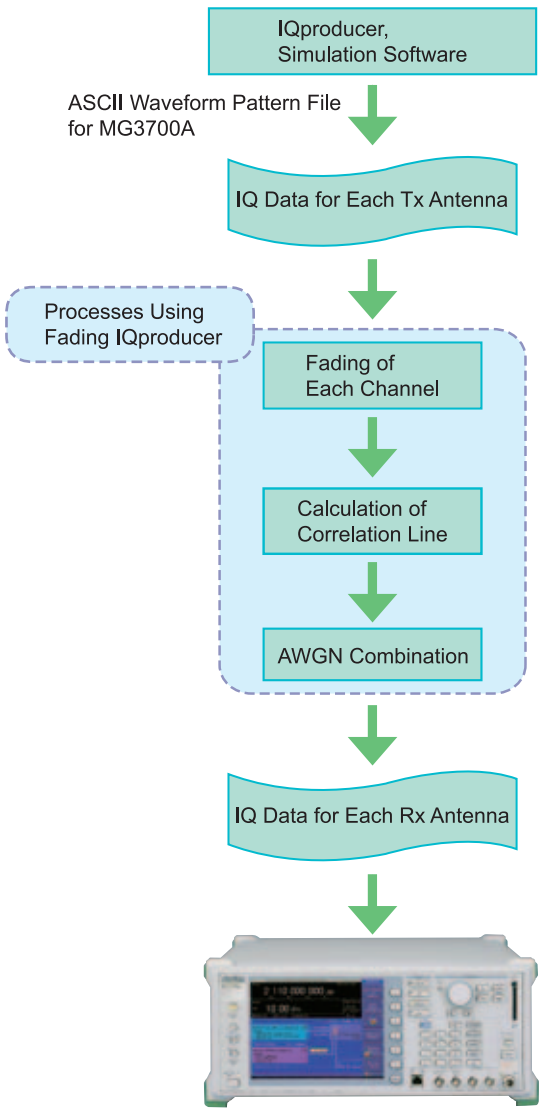
The data processing changes according to the "Size of TS File" and "Setting of Number of Super Frames" when TS File is selected at "Data Pattern". The TS File data is annulled when the "TS File data number" is greater than the "Data number equivalent to the set number of super frames." When the "TS File data number" is smaller than the "Data number equivalent to the set number of super frames", the same TS File data is repeated from the header.



MX370107A Fading IQproducer

Optional

The MX370107A Fading IQproducer is GUI-driven PC application software to set fading parameters and to generate waveform patterns by reading the waveform patterns for the MG3700A.
The generated waveform patterns are downloaded to the MG3700A and used to output fading baseband signals and RF signals using the MG3700A ARB generation function.
The MX370107A supports the processes inside the dotted line of the following block diagram (fading of each IQ channel, calculation of correlation line, AWGN combination).
Either waveform patterns created by another IQproducer or IQ data (ASCII) created by general simulation tools can be selected as the input data file.



MG3700A

● Recommended Options

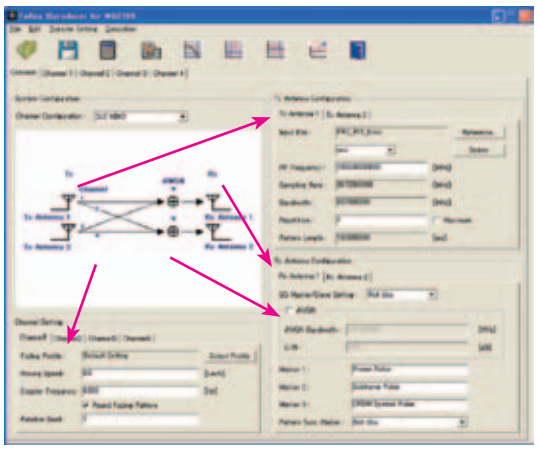
MG3700A-021 ARB Memory Upgrade 512 Msamples

Since the length of the fading waveform pattern is limited by the memory size, we recommend more memory.
The standard ARB memory of 1 GB can be extended to 2 GB as an option.

● Fading IQproducer Main Screen

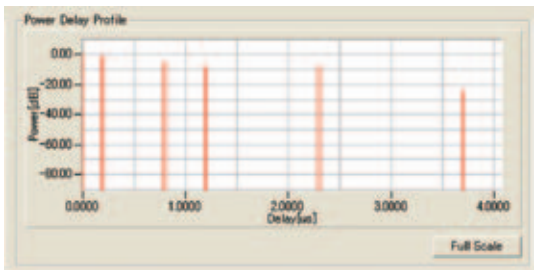
The Tx, Rx, Channel, and AWGN are set at the common screen shown on the right.
The channel configuration can be selected from 1×1 SISO to 4×4 MIMO.

Each channel path number (1 to 20), fading type, delay, and power is set at the Channel 1 to Channel 4 tabs.



Common Sheet Screen

The power delay profile graph on the channel screen displays delay on the horizontal axis and power on the vertical axis.



Power Delay Profile Graph

● Parameter Save/Recall

The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

● Graphical Simulation Displays

This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF) and Fast Fourier Transform (FFT) on the PC.
It is useful for checking or reviewing waveforms.

CCDF Graph

Up to eight generated waveform patterns can be read and displayed as CCDF graphs.

FFT Graph

Up to four generated waveform patterns can be read and displayed as FFT graphs.

Time Domain Graph

Up to four generated waveform patterns can be read and displayed as a Time Domain Graph.

Clipping Function

Clipping and filtering can be performed for created waveform patterns.

• Common Parameter Setting Range

Items	Outline	Setting Range
System Configuration		
Channel Configuration	Number of Input/Output antenna	1×1 SISO, 1×2 SIMO, 1×3 SIMO, 1×4 SIMO, 2×1 MISO, 2×2 MIMO, 2×3 MIMO, 2×4 MIMO, 3×1 MISO, 3×2 MIMO, 3×3 MIMO, 3×4 MIMO, 4×1 MISO, 4×2 MIMO, 4×3 MIMO, 4×4 MIMO
Tx Antenna Configuration		
Input File	Input pattern file	Display only
	Input file type	wvi, ASCII1, ASCII2, ASCII3
RF Frequency	Center frequency	0.25000000 to 6000.00000000 MHz, Resolution 0.00000001 MHz
Sampling Rate	Sampling Rate	When wvi file is selected: Display only When ASCII1/ASCII2/ASCII3 is selected: 0.02000000 to 160.00000000 MHz, Resolution 0.00000001 MHz
Bandwidth	Bandwidth of waveform pattern	When wvi file is selected: Display only When ASCII1/ASCII2/ASCII3 is selected: 0.02000000 to Sampling Rate MHz, Resolution 0.00000001 MHz
Repetition	Repetition number of waveform pattern	1 to maximum, Maximum (at maximum, waveform patterns repeated up to memory size)
Pattern Length	Pattern length of waveform pattern	Display only
Channel Setting		
Fading Profile	Display of Fading Profile	<Table 7>
Moving Speed	Moving Speed	0.0 to 5000.0 km/h, Resolution 0.1 km/h
Doppler Frequency	Doppler Frequency	0.000 to "Sampling Rate/2 or Following Equation: smaller" Resolution 0.001 Hz Equation: 5000 × 1000/3600 × [RF Frequency]/c (c: velocity of light)
Round Fading Pattern	Continuity of faded waveform pattern	With/Without check (setting check makes sequential)
Random Seed	Random seed for fading	1 to 255, Resolution 1
Rx Antenna Configuration		
SG Master/Slave Setting	Master/Slave setting when connecting two SG units at SIMO/MIMO	Not Use, Master, Slave
AWGN	ON/OFF	With check (= ON)/Without check (= OFF)
AWGN Bandwidth	AWGN Bandwidth	0.01000000 to Sampling Rate/2 MHz, Resolution 0.00000001 MHz
C/N	Setting of C/N	−40.00 to +40.00 dB, Resolution 0.01 dB
Marker1 to 3	Marker name	31 characters max
Pattern Sync Marker	Marker for output of Pattern Sync Marker	Not Use, Marker1, Marker2, Marker3

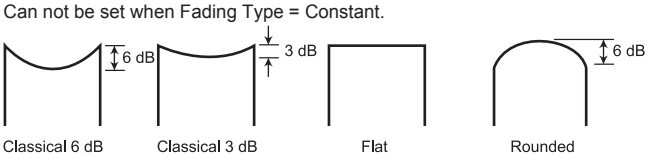
Table 7: Fading Profile Channel Model

System	Channel Model
GSM	Rural Area 6 tap, Rural Area 4 tap, Hilly Terrain 12 tap-1, Hilly Terrain 12 tap-2, Hilly Terrain 6 tap-1, Hilly Terrain 6 tap-2, Urban Area 12 tap-1, Urban Area 12 tap-2, Urban Area 6 tap-1, Urban Area 6 tap-2, Equalisation Test 6 tap, Typical small cell 2 tap
W-CDMA (MS)	Case1, Case2, Case3, Case4, Case5, Case6, Moving propagation, Birth-Death propagation, High Speed Train
W-CDMA (BS)	Case1, Case2, Case3, Case4, Moving propagation, Birth-Death propagation, High Speed Train
HSDPA	Case1, Case2, Case3, Case4, Case5, Case6, Case8, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
HSUPA	Case1, Case2, Case3, Case4, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
CDMA2000 (MS)	Case1, Case2, Case3, Case4, Case5, Case6
CDMA2000 (BS)	Case1, Case2, Case3, Case4
TD-SCDMA	Case1, Case2, Case3, ITU Pedestrian A, ITU Pedestrian B, ITU Vehicular A
1xEV-DO	Configuration1, Configuration2, Configuration3, Configuration4, Configuration5
WLAN	Model A, Model B, Model C, Model D, Model E
Mobile WiMAX	ITU Pedestrian B, ITU Vehicular A, Large delay spread
MIMO Mobile WiMAX	2×2 MIMO (ITU Pedestrian B, ITU Vehicular A, Large delay spread)
DVB-T	Typical Urban (TU6), Typical Rural Area (RA6)
LTE (MS)	EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz, High Speed Train
LTE (BS)	EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz, High Speed Train
MIMO LTE	1×2 SIMO (EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz) 2×2 MIMO (EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz) 4×2 MIMO (EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz) 4×4 MIMO (EPA 5 Hz, EVA 5 Hz, EVA 70 Hz, ETU 70 Hz, ETU 300 Hz)

MX370107A Fading IQproducer

Optional

● Channel 1 to 16 Parameter Setting Range

Items	Outline	Setting Range
Channel n parameters (n = 1 to 16)		
Input File	Input File	Display only
Fading Profile	Fading Profile	Display only
RF Frequency	Center Frequency	Display only
Sampling Rate	Sampling Rate	Display only
Bandwidth	Bandwidth of waveform pattern	Display only
Pattern Length	Pattern Length of waveform pattern	Display only
Path (1 to 20)		
Path	Display of Path No., ON/OFF	With check (= ON)/Without check (OFF)
Fading Type	Kinds of single path fading	Rayleigh, Rice, Constant Rayleigh: Environment in which many scattering waves arrive. The Rx level is changed according to the Rayleigh distribution. Rice: Environment in which many scattering and direct waves arrive. The Rx level is changed according to the Rice distribution. Constant: Rx level not changed
Delay	Delay	0.0000 to 2000.0000 µs, Resolution 0.0001 µs
Power	Power of path	−80.00 to 0.00 dB, Resolution 0.01 dB
Moving Speed	Moving Speed	0.0 to 5000.0 km/h, Resolution 0.1 km/h
Doppler Frequency	Doppler Frequency	0.000 to Sampling Rate/2 or smaller, Resolution 0.001 Hz Equation: 5000 × 1000/3600 × [RF Frequency]/c (c: velocity of light)
Rician K factor	Power ratio between direct wave and scattering wave	−40.00 to +40.00 dB, Resolution 0.01 dB Can be set when Fading Type = Rice.
Angle of Arrival	Direct wave arrival angle	0.0 to 180.0 deg., Resolution 0.1 deg. Can be set when Fading Type = Rice.
Phase Shift	Phase Shift	0.0 to 359.9 deg., Resolution 0.1 deg.
Spectrum Shape	Doppler spectrum shape	Classical 6 dB, Classical 3 dB, Flat, Rounded Can not be set when Fading Type = Constant. 
Correlation Setting	Setting correlation matrix	Edit, Not Use, Path number setting at Edit
Path Correlation Matrix	Path Correlation Matrix	−1.0000 −j1.0000 to 1.0000 +j1.0000 Resolution both real and imaginary parts = 0.0001 Set when Correlation Setting = Edit Only top-right elements of opposite angle can be edited

● Moving Propagation Parameter Setting Range

Can be set when "System Configuration = 1×1 SISO" and "Fading Profile = Moving Propagation".

Items	Outline	Setting Range
Power	Power of Path2	−80.00 to 0.00 dB, Resolution 0.01 dB
A (Offset)	Offset of Path2	0 to 500 µs, Resolution 1 µs
B (Variation)	Change of delay at Path 2	0 to 500 µs, Resolution 1 µs
Omega	Setting of Omega	0.00 to 1.00 Hz, Resolution 0.01 Hz

● Birth-Death propagation Parameter Setting Range

Can be set when "System Configuration = 1×1 SISO" and "Fading Profile = Birth-Death Propagation".

Items	Outline	Setting Range
Power	Power of path	−80.00 to 0.00 dB, Resolution 0.01 dB
Maximum Delay	Maximum Delay	1 to 400 µs, Resolution "Delay Resolution"
Delay Resolution	Delay Resolution	1 to Maximum Delay µs, Resolution 1 µs
Dwell time	Dwell time	0.001 to 200.000 ms, Resolution 0.001 ms
Path Alternate setting	Path Alternate setting	Random, Sequence Random: Path 1 and Path 2 switched randomly Sequence: Delay and path switched by setting sequence
Path	Path setting	1, 2, Termination Can be set when Path Alternate Setting = Sequence.
Delay	Delay of path	0 to Maximum Delay Enabled when Path Alternate = Sequence and previous element ≠ Termination

● High Speed Train Parameter Setting Range

Can be set when "System Configuration = 1×1 SISO" and "Fading Profile = High Speed Train".

Items	Outline	Setting Range
Ds	Setting of (the default value of the distance between BS and train) × 2	0 to 2000 m, Resolution: 1 m
Dmin	Setting of the distance between BS and rail	1 m to 100 m, Resolution: 1 m
Rician K factor	Power ratio between direct wave and scattering wave	−40.00 to +40.00 dB, Resolution: 0.01 dB
Moving Speed		0.0 to 5000.0 km/h, Resolution: 0.1 km/h
Maximum Doppler Frequency		0.000 to 2000.000 Hz, Resolution: 0.001 Hz

MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

The MX370108A LTE IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the LTE FDD specifications in the 3GPP TS 36.211, TS 36.212, and TS 36.213 standards.
Generates test model waveform patterns used for LTE base station Tx tests and FRC (Fixed Reference Channel) used for Rx tests.
LTE IQproducer supports two setting screens: “Easy Setup Screen” and “Normal Setup Screen”.

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

*: MBSFN reference signals, UE-specific reference signals, Positioning reference signals, CSI reference signals, and Physical Multicast Channel are not supported.

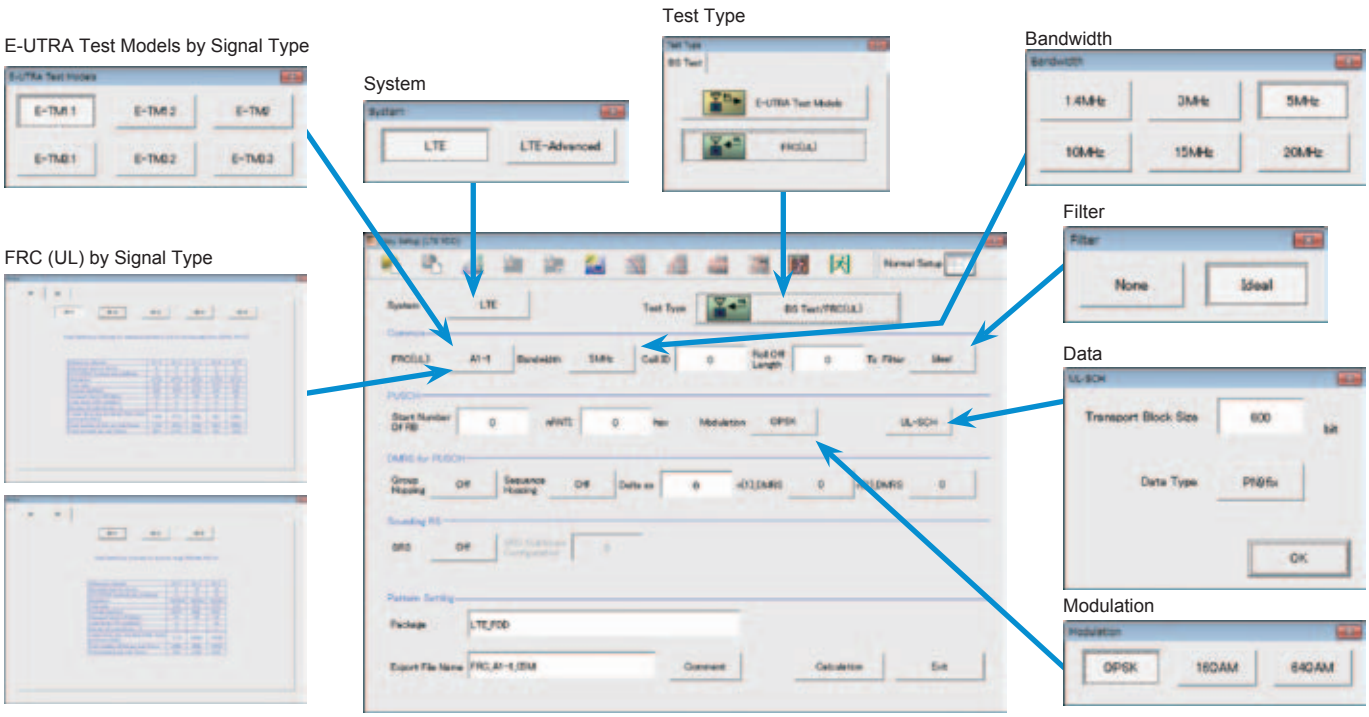
Channels Generated by MX370108A LTE IQproducer

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
- Sounding Reference Signal
- Random Access Preamble

● Easy Setup Screen

Waveform patterns can be generated easily because the main parameters are restricted to the Easy Setup screen.
Use “Normal Setup function” for detailed parameter settings.



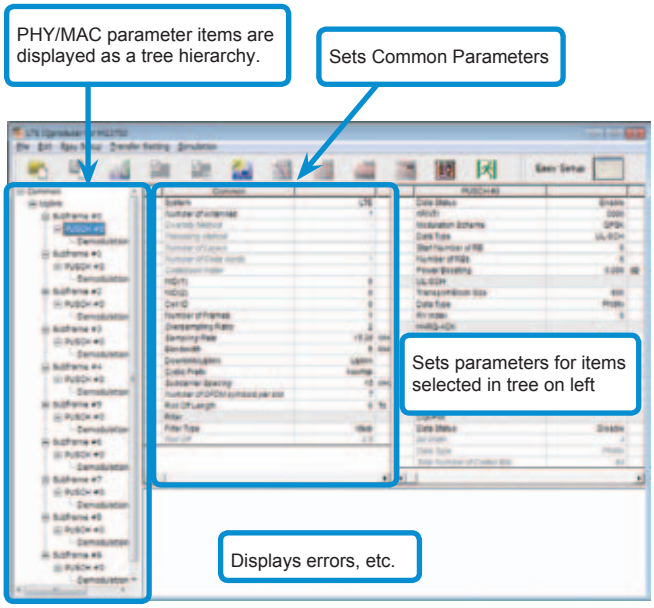
Easy Setup Screen (Example: FRC_UL)

MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

● Normal Setup Screen

Detailed parameters are set at the Normal Setup screen to generate waveform patterns.

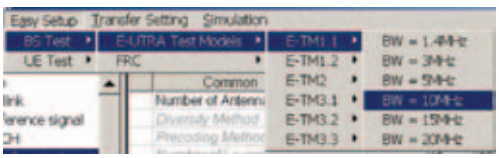


LTE IQproducer Setting Screen/Normal Setup Screen

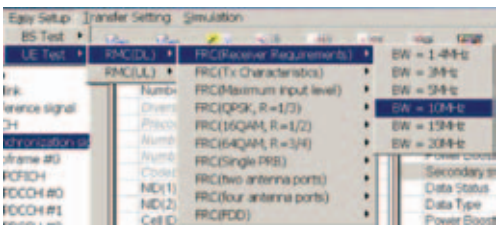
● Easy Setup Menu

3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

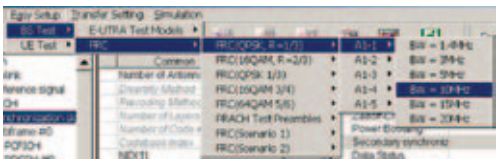
BS Test/E-UTRA Test Models



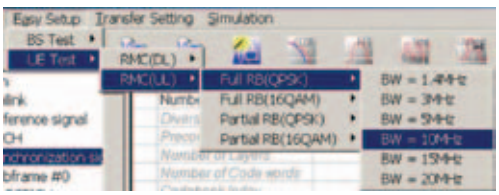
UE Test/RMC (DL)/FRC



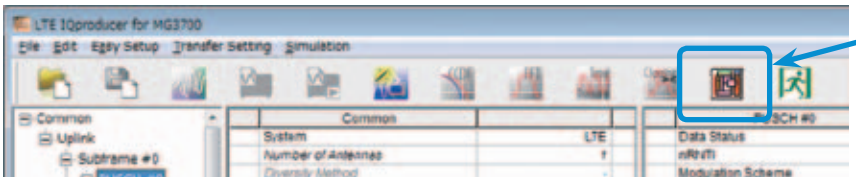
BS Test/FRC



UE Test/RMC (UL)



- Visual Check on Frame Structure Screen



Displays Frame Structure screen for confirming channel allocation status and power of each OFDM Symbol

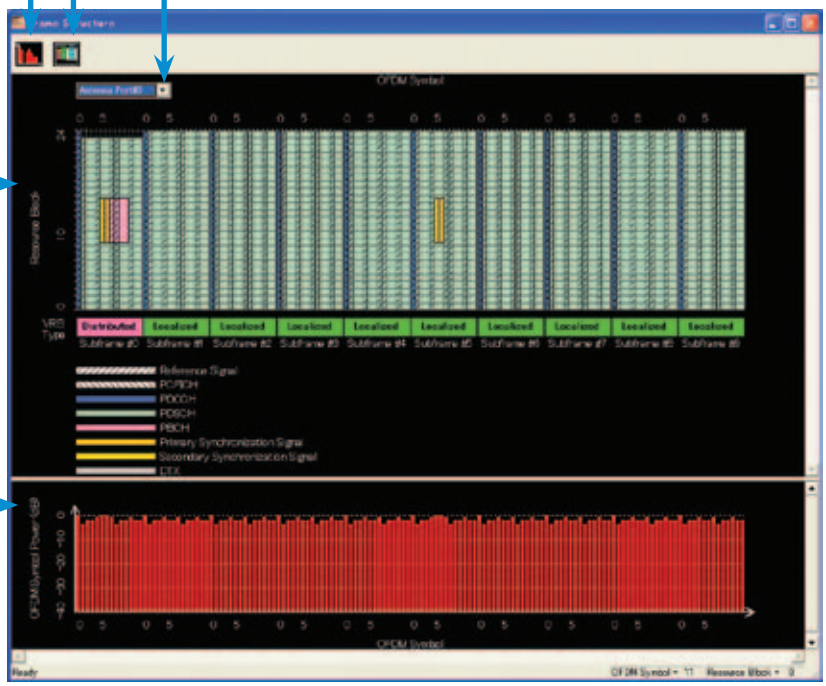
Power graph show/hide button

Full Scale button

Antenna Port select button

Display Resource Element allocation graphically with each channel color-coded.
Y-axis: Frequency (Resource Block units)
X-axis: Time (OFDM Symbol units)

Display power relative levels of OFDM Symbols with maximum power of 0 dB.
Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)



Frame Structure Screen (LTE)

Optional

MX370108A-001 LTE-Advanced FDD Option

Adding the MX370108A-001 LTE-Advanced FDD option to set LTE-Advanced system parameters supports generation of carrier aggregation signals added* by 3GPP Rel. 10.
Additionally, clustered SC-FDMA signals can be generated at Uplink.

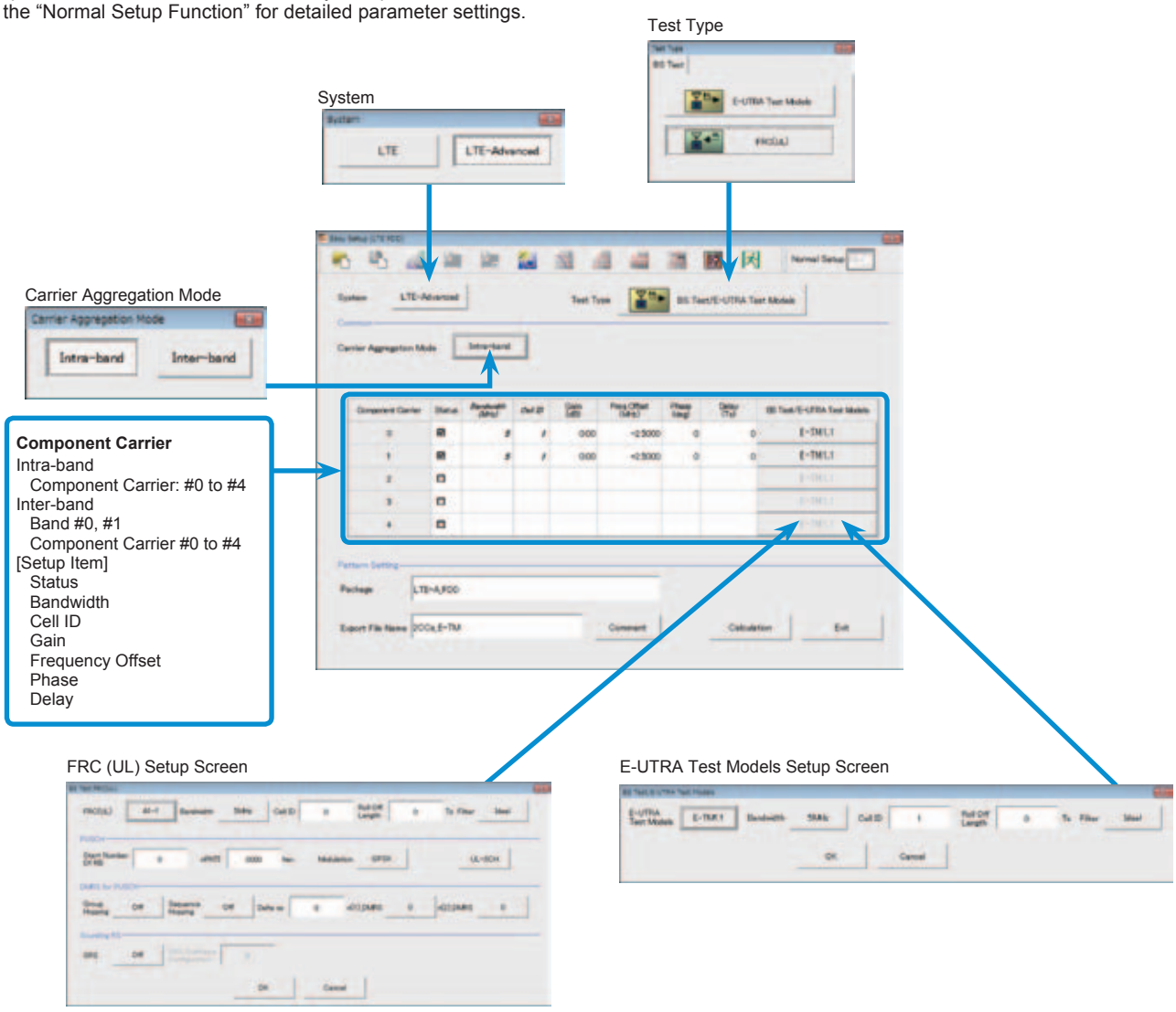
*: MBSFN reference signals, UE-specific reference signals, Positioning reference signals, CSI reference signals, and Physical Multicast Channel are not supported.

LTE-Advanced Setting Parameters

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

● Easy Setup Screen

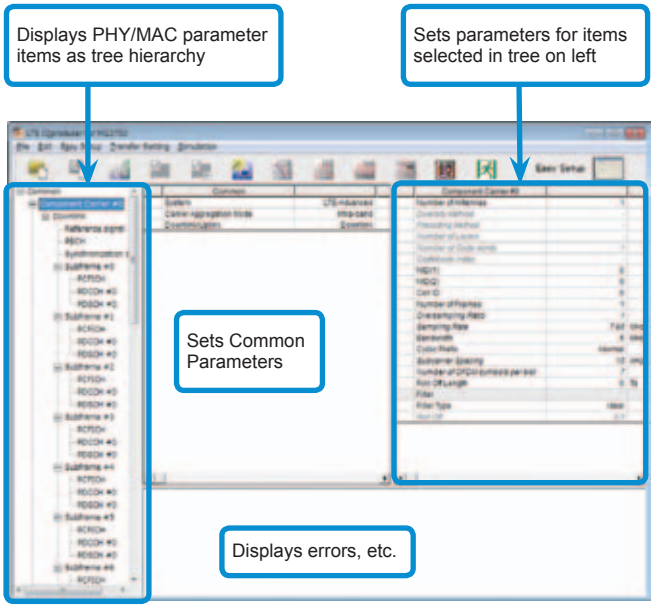
Waveform patterns can be generated easily by setting the band matching the carrier aggregation mode and component carrier because the main parameters are restricted to the Easy Setup screen.
Use the “Normal Setup Function” for detailed parameter settings.



LTE-Advanced Easy Setup Screen (Example: E-UTRA Test Models)

● Normal Setup Screen

Detailed parameters are set at the Normal Setup screen to generate waveform patterns.



LTE-Advanced Setting Screen/Normal Setup Screen

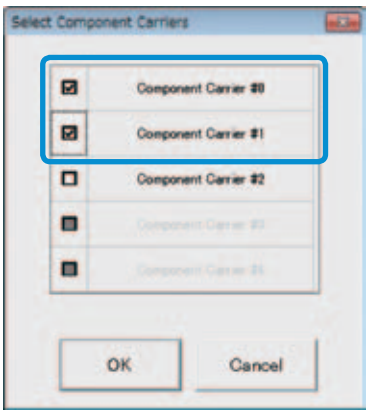
● Easy Setup Menu

3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

Example: E-UTRA Test Modes Setup

Simple operation by selecting target signals and component carriers as batch

Select Component Carrier Screen



● Example of Vector Signal Generator Series LTE-Advanced Carrier Aggregation Function

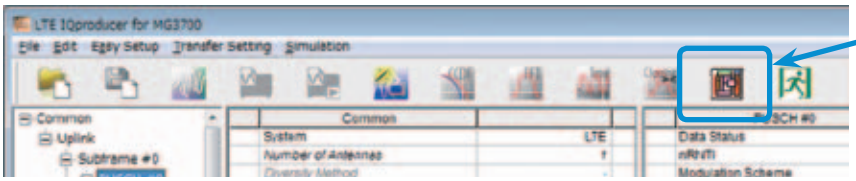
Vector Signal Generator Series / Carrier Aggregation Mode	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A	MG3700A	MS2690A series Opt. 020*1	MS2830A Opt. 020/021*1
Intra-band contiguous Carrier Aggregation, Intra-band non-contiguous Carrier Aggregation	✓ (1 unit)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

∗1: MX269908A LTE IQproducer and MX269908A-001 LTE-Advanced FDD Option installed.
∗2: MG3710A-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

- Visual Check on Frame Structure Screen



Displays Frame Structure screen for confirming channel allocation status and power of each OFDM Symbol

Power graph show/hide button

Full Scale button

Component Carrier select button

Band select button

Antenna Port select button

Display Resource Element allocation graphically with each channel color-coded.
Y-axis: Frequency (Resource Block units)
X-axis: Time (OFDM Symbol units)

Display power relative levels of OFDM Symbols with maximum power of 0 dB.
Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)

Frame Structure Screen (LTE-Advanced)

Easy Setup Screen (System = LTE)

● Test Type Setting Range

Display	Outline	Setting Range
Test Type	Sets the Test Type.	E-UTRA Test Models, FRC (UL)

● BS Test/E-UTRA Test Models Setting Range

Display	Outline	Setting Range
Common		
E-UTRA Test Models	Sets the E-UTRA Test Models.	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Bandwidth	Sets the system bandwidth.	1.4, 3, 5, 10, 15, 20 MHz
Cell ID	Sets the Cell ID.	0 to 503
Filter	Sets filter.	Ideal, None

● BS Test/FRC (UL) Setting Range

Display	Outline	Setting Range
Common		
FRC (UL)	Selects the setting items described in 3GPP TS 36.141 Annex A and automatically sets the parameters.	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3
Bandwidth	Sets the system bandwidth.	The settable bandwidth changes according to the selected FRC (UL).
Cell ID	Sets the Cell ID.	0 to 503
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol.	0 to 144
Filter	Sets the filter type.	Ideal, None
PUSCH		
Start Number of RB	Sets the start position of the RB to which the PUSCH is assigned.	Bandwidth = 1.4 MHz: 0 to (6-allocated resource block) Bandwidth = 3 MHz: 0 to (15-allocated resource block) Bandwidth = 5 MHz: 0 to (25-allocated resource block) Bandwidth = 10 MHz: 0 to (50-allocated resource block) Bandwidth = 15 MHz: 0 to (75-allocated resource block) Bandwidth = 20 MHz: 0 to (100-allocated resource block)
nRNTI	Sets the radio network temporary identifier.	0 to FFFF
Modulation	Sets the modulation mode.	QPSK, 16QAM, 64QAM
UL-SCH		
Transport Block Size	Sets the transport block size for UL-SCH.	0 to 86400
Data Type	Sets the Data type.	PN9fix, PN15fix, All0, All1
DMRS for PUSCH		
Group Hopping	Enables or disables group hopping.	Off, On
Sequence Hopping	Enables or disables Sequence Hopping.	Off, On
Delta ss	Sets Delta ss.	0 to 29
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
Sounding RS		
SRS	Enables or disables the Sounding RS parameter.	Off, On
SRS Subframe Configuration	Sets the SRS Subframe Configuration.	0 to 14

Easy Setup Screen (System = LTE-Advanced)

● Test Type Setting Range

Display	Outline	Setting Range
Test Type	Sets the Test Type	E-UTRA Test Models, FRC (UL)

● BS Test/E-UTRA Test Models Setting Range

Display	Outline	Setting Range
E-UTRA Test Models	Sets the E-UTRA Test Models	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Bandwidth	Sets the system bandwidth	1.4, 3, 5, 10, 15, 20MHz
Cell ID	Sets the Cell ID	0 to 503
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 144
Filter	Sets filter	Ideal, None

● BS Test/FRC (UL) Setting Range

Display	Outline	Setting Range
Common		
FRC (UL)	Selects the setting items described in 3GPP TS 36.141 Annex A and automatically sets the parameters	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3
Bandwidth	Sets the system bandwidth	The settable bandwidth changes according to the selected FRC (UL)
Cell ID	Sets the Cell ID	0 to 503
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 144
Filter	Sets the filter type	Ideal, None

MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

Display	Outline	Setting Range
PUSCH		
Start Number of RB	Sets the start position of the RB to which the PUSCH is assigned	Bandwidth = 1.4 MHz: 0 to (6-allocated resource block) Bandwidth = 3 MHz: 0 to (15-allocated resource block) Bandwidth = 5 MHz: 0 to (25-allocated resource block) Bandwidth = 10 MHz: 0 to (50-allocated resource block) Bandwidth = 15 MHz: 0 to (75-allocated resource block) Bandwidth = 20 MHz: 0 to (100-allocated resource block)
nRNTI	Sets the radio network temporary identifier	0 to FFFF
Modulation	Sets the modulation mode	QPSK, 16QAM, 64QAM
UL-SCH		
Transport Block Size	Sets the transport block size for UL-SCH	0 to 86400
Data Type	Sets the Data type	PN9fix, PN15fix, All0, All1
DMRS for PUSCH		
Group Hopping	Enables or disables group hopping	Off, On
Sequence Hopping	Enables or disables Sequence Hopping	Off, On
Delta ss	Sets Delta ss	0 to 29
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
Sounding RS		
SRS	Enables or disables the Sounding RS parameter	Off, On
SRS Subframe Configuration	Sets the SRS Subframe Configuration	0 to 14

● Carrier Aggregation Mode Setting Range

Display	Outline	Setting Range
Carrier Aggregation Mode	Sets the Carrier Aggregation Mode	Intra-band, Inter-band
Parameter		
Component Carrier	Displays the Component Carrier number	Display only
Status	Enables or disables the Component Carrier parameter	Check box selected, or cleared
Bandwidth	Displays the system bandwidth for the Component Carrier	Display only
Cell ID	Displays the cell ID for the Component Carrier	Display only
Gain	Sets the level ratio of Component Carrier	–80.00 to 0.00 [dB]
Freq.Offset	Sets the frequency offset	0 to ± (0.4 × Fs – 0.5 × Band) [MHz] Band: Changed depending on the Component Carrier# transmission system bandwidth (Bandwidth) Bandwidth [MHz] / Band [MHz]: 1.4 / 1.095; 3.0 / 2.715; 5.0 / 4.515; 10.0 / 9.015; 15.0 / 13.515; 20.0 / 18.015 Fs: 153.6 MHz (sampling rate)
Phase	Sets the initial phase of the Component Carrier	0 to 359 [deg.]
Delay	Sets delay of the Component Carrier	0 to 307200 [Ts]
BS Test Type	Sets the details of BS Test Type of Component Carriers	BS Test/E-UTRA Test Models, BS Test/FRC(UL)

● Pattern Setting Setting Range

Display	Outline	Setting Range
Package	Enters waveform pattern package name	Up to 31 single-byte English alphanumeric characters
Export File Name	Enters waveform pattern file name	Carrier Aggregation Mode = Intra-band : Up to 18 single-byte English alphanumeric characters Carrier Aggregation Mode = Inter-band : Up to 15 single-byte English alphanumeric characters
Comment	Inputs comments to the waveform pattern	Up to 38 single-byte English alphanumeric characters × 3 lines

Normal Setup Screen

Display	Outline	Setting Range
System	Switches 3GPP Systems	LTE, LTE-Advanced

● Common Parameter Setting Range (System = LTE)

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	Sets number of Code word	1, 2
Codebook index	Sets codebook index	When Number of Layers is 1: 0 to 3 When Number of Layers is 2: 0 to 2 When Number of Antennas is 4: 0 to 15
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
Over Sampling Ratio	Sets over sampling ratio	2, 4
Sampling Rate	Displays sampling rate	Display only: Auto-setting using Over Sampling Ratio and bandwidth
Bandwidth	Sets system bandwidth	1.4, 3.0, 5, 10, 15, 20 MHz*
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)

*: The 1.6 MHz 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 MHz or 3.2 MHz is specified cannot be read.

● Common Parameter Setting Range (System = LTE-Advanced)

Display	Outline	Setting Range
Carrier Aggregation Mode	Sets the Carrier Aggregation Mode	Intra-band, Inter-band
Downlink/Uplink	Sets downlink or uplink	Downlink, Uplink

● PHY/MAC Parameter Setting Range (LTE-Advanced)

Display	Outline	Setting Range
Carrier Aggregation		
Component Carrier	Displays the Component Carrier number	0 to 4
Status	Enables or disables the Component Carrier parameter	Check box selected, or cleared
Bandwidth	Displays the system bandwidth for the Component Carrier	Display only
Cell ID	Displays the Cell ID for the Component Carrier	Display only
Gain	Sets the level ratio of Component Carrier	–80.00 to 0.00 [dB]
Freq.Offset	Sets the frequency offset	0 to ± (0.4 × Fs – 0.5 × Band) [MHz] Band: Changed depending on the Component Carrier transmission system bandwidth (Bandwidth) Bandwidth [MHz] / Band [MHz]: 1.4 / 1.095; 3.0 / 2.715; 5.0 / 4.515; 10.0 / 9.015; 15.0 / 13.515; 20.0 / 18.015 Fs: 153.6 MHz (sampling rate)
Phase	Sets the initial phase of the Component Carrier	0 to 359 [deg.]
Delay	Sets delay of the Component Carrier	0 to 307200 [Ts]
Component Carrier		
Number of Antennas	Sets the number of antennas	1, 2, 4
Diversity Method	Sets the diversity method	Spatial Multiplexing, Tx Diversity
Precoding Method	Sets the precoding method	Without CDD, Large-delay CDD, Large-delay CDD (Cyclic Precoder Index)
Number of Layers	Sets the number of layers	1, 2, 3, 4
Number of Code words	Sets the number of code words	1, 2

Display	Outline	Setting Range
Codebook index	Sets the codebook index	When Number of Antennas is 2, the setting range varies according to Number of Layers as follows When Number of Layers is 1: 0 to 3 When Number of Layers is 2: 0 to 2 When Number of Layers is 4: 0 to 15
NID (1)	Sets the NID (1)	0 to 167
NID (2)	Sets the NID (2)	0, 1, 2
Cell ID	Sets the Cell ID	0 to 503
Number of Frames	Sets the number of frames to be generated	1 to the maximum number of frames that can be stored in the main unit's waveform memory
Over Sampling Ratio	Sets the oversampling ratio	1, 2, 4
Sampling Rate	Displays the sampling rate	Display only: automatically set according to the Oversampling Ratio and Bandwidth values
Bandwidth	Sets the system bandwidth	1.4, 3, 5, 10, 15, 20 MHz
Cyclic Prefix	Sets the cyclic prefix	Normal, Extended
Subcarrier Spacing	Displays the subcarrier spacing (interval)	Display only
Number of OFDM symbols per slot	Sets the number of OFDM symbols per slot	Display only
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 3152 Ts (Random Access Preamble) 0 to 144 Ts (Cyclic prefix = Normal) 0 to 512 Ts (Cyclic prefix = Extended)
Filter		
Filter Type	Sets the filter type	Nyquist, Root Nyquist, Ideal, None
Roll Off	Sets the roll-off factor	0.1 to 1.0

- PHY/MAC Parameter (Downlink) Setting Range

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, PN9fix, PN15fix, 16bit repeat, User File
Reference Signal Sequence Repeat Data	Sets 16bit repeat data installed in reference signal sequence	0000 to FFFF (only when reference signal sequence = 16bit 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 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 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	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, 16bit repeat, User File, BCCH
Data Type Repeat Data	Sets 16bit repeat data installed in BCH	0000 to FFFF (only when Data Type = 16bit 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 number of bits required for 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
PHICH duration	Displays the PHICH duration mapped to BCCH	Normal, Extended
Ng	Displays the Ng value mapped to BCCH	1/6, 1/2, 1, 2
SFN Offset	Sets the initial SFN value mapped to BCCH	0 to 1023
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 parameter	Disable, Enable
Data Type	Sets data type	Concatenated sequence, PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Power Boosting	Sets power boosting	–20.000 to +20.000 dB

Display	Outline	Setting Range
Subframe#0 to #9		
Virtual Resource Block type	Sets the Virtual Resource Block	Localized, Distributed
Gap	Sets Gap	1st Gap, 2nd Gap
Gap value	Sets Gap value	3 to 48
Number of VRBs	Displays the number of VRB	6 to 96
Number of PHICH Groups	Sets PHICH Groups in one subframe	Display only (determined by the combination of Bandwidth, Ng, and Cyclic Prefix. It is fixed to 0 when PHICH is Off.)
Number of OFDM symbols for PDCCH	Sets number of OFDM symbols for PDCCH	1 to 4
Total Number of CCEs	Display Total Number of CCE	Display only
Number of PDCCHs	Sets number of PDCCHs	1 to 64
CCE arrangement	Sets 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 the VRB arrangement	PDSCH#0 to (Number of VRBs – 1)
PCFICH		
Data Status	Enables/disables PCFICH parameter	Disable, Enable
Data Type	Sets data type	CFI codeword, PN9fix, PN15fix, 16bit repeat, User File
CFI	Sets CFI codeword type	1, 2, 3
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when 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 PDCCH format	0, 1, 2, 3
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DCI
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
DCI		
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Transport Block Size	Sets number of bits required for DCI	0 to 576
nRNTI	Sets Radio network temporary identifier	0000 to FFFF
PDSCH		
Data Status	Enables/disables PDSCH parameter	Disable, Enable
nRNTI	Sets Radio network temporary identifier	0000 to FFFF
Modulation Scheme	Sets modulation scheme	QPSK, 16QAM, 64QAM
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DL-SCH
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	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, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Transport Block Size	Sets number of bits required for DL-SCH	Changes max. value of setting range by number of Resource Blocks and the modulation scheme
UE Category	Sets UE Category	1, 2, 3, 4, 5
RV Index	Sets redundancy version index	0, 1, 2, 3
PHICH		
Data Status	Enable/disables PHICH parameter	Disable, Enable
PHICH Group number	Display PHICH Group number	Display only
Number of PHICHs	Sets Number of PHICHs	1 to 8 (Cyclic Prefix = Normal) 1 to 4 (Cyclic Prefix = Extended)
Power Boosting	Set power boosting	Display only
PHICH#0 to # (Number of PHICHs–1)		
Data Status	Enable/disable PHICH parameter	Disable, Enable
Orthogonal Sequence Index	Sets orthogonal sequence index	0 to 7 (When Cyclic Prefix = Normal) 0 to 3 (When Cyclic Prefix = Extended)
Data Type	Display data type	Display only: HI codeword
HI	Sets code word of HI (HARQ indicator)	000, 111
Power Boosting	Set power boosting	–20.000 to +20.000 dB

MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

● PHY/MAC Parameter (Uplink) Setting Range

Display	Outline	Setting Range
Uplink		
Data Transmission/Random Access Preamble	Selects Data Transmission or Random Access Preamble	Data Transmission/Random Access Preamble
DMRS Parameters	Sets the calculation method of Demodulation RS parameter.	Auto, Manual
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_RB(2), 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 the SRS Subframe Configuration	0 to 14
Subframe#0 to #9 (Data Transmission)		
Number of PUCCHs	Sets number of PUCCH	0, 1, 2, 3, 4, 5, 6, 7, 8
Number of PUSCHs	Sets number of PUSCH	0, 1, 2, 3, 4, 5, 6, 7, 8
PUCCH#0 to #7		
Data Status	Enables/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 Radio network temporary identifier	0000 to FFFF
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 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	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 number	0 fixed
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
UCI		
Transport Block Size	Sets transport block size of UCI	1 (When PUCCH format = 1a) 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 data type	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Demodulation RS for PUCCH		
Data Type	Sets data type	Base Sequence, User File
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Group Hopping	Enable/disable Group Hopping parameter	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
PUSCH#0 to #7		
Data Status	Enables/disables PUSCH parameter	Disable, Enable
nRNTI	Sets 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, UL-SCH
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Resource allocation type	Sets the Resource allocation type	type0, type1 When type1 is selected, Start Number of RB and Number of RBs cannot be set
Start Number of RB	Start position of RB	When Bandwidth is 1.4 MHz: 0 to 5 When Bandwidth is 3 MHz: 0 to 14 When Bandwidth is 5 MHz: 0 to 24 When Bandwidth is 10 MHz: 0 to 49 When Bandwidth is 15 MHz: 0 to 74 When Bandwidth is 20 MHz: 0 to 99
Number of RBs	Total number of RB	When Bandwidth is 1.4 MHz: 1 to 6 When Bandwidth is 3 MHz: 1 to 15 When Bandwidth is 5 MHz: 1 to 25 When Bandwidth is 10 MHz: 1 to 50 When Bandwidth is 15 MHz: 1 to 75 When Bandwidth is 20 MHz: 1 to 100

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>Start Number of RBG for 1st</td><td>Sets the start position of the RBG for 1st</td><td>The setting range varies depending on the Bandwidth setting as follows
<table>
<tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th></tr>
<tr><td>1.4 MHz (6)</td><td>1 to 4</td></tr>
<tr><td>3 MHz (15)</td><td>1 to 6</td></tr>
<tr><td>5 MHz (25)</td><td>1 to 11</td></tr>
<tr><td>10 MHz (50)</td><td>1 to 15</td></tr>
<tr><td>15 MHz (75)</td><td>1 to 17</td></tr>
<tr><td>20 MHz (100)</td><td>1 to 23</td></tr>
</table>
*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>End Number of RBG for 1st</td><td>Sets the end position of the RBG for 1st</td><td>The setting range varies depending on the Bandwidth setting as follows
<table>
<tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th><th>Default</th></tr>
<tr><td>1.4 MHz (6)</td><td>1 to 4</td><td>3</td></tr>
<tr><td>3 MHz (15)</td><td>1 to 6</td><td>3</td></tr>
<tr><td>5 MHz (25)</td><td>1 to 11</td><td>6</td></tr>
<tr><td>10 MHz (50)</td><td>1 to 15</td><td>8</td></tr>
<tr><td>15 MHz (75)</td><td>1 to 17</td><td>8</td></tr>
<tr><td>20 MHz (100)</td><td>1 to 23</td><td>12</td></tr>
</table>
*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>Start Number of RBG for 2nd</td><td>Sets the start position of the RBG for 2nd</td><td>The setting range varies depending on the Bandwidth setting as follows
<table>
<tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th><th>Default</th></tr>
<tr><td>1.4 MHz (6)</td><td>3 to 6</td><td>5</td></tr>
<tr><td>3 MHz (15)</td><td>3 to 8</td><td>5</td></tr>
<tr><td>5 MHz (25)</td><td>3 to 13</td><td>8</td></tr>
<tr><td>10 MHz (50)</td><td>3 to 17</td><td>10</td></tr>
<tr><td>15 MHz (75)</td><td>3 to 19</td><td>10</td></tr>
<tr><td>20 MHz (100)</td><td>3 to 25</td><td>14</td></tr>
</table>
*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>End Number of RBG for 2nd</td><td>Sets the end position of the RBG for 2nd</td><td>The setting range varies depending on the Bandwidth setting as follows
<table>
<tr><th>Bandwidth (Number of RBs)</th><th>Setting range</th><th>Default</th></tr>
<tr><td>1.4 MHz (6)</td><td>3 to 6</td><td>6</td></tr>
<tr><td>3 MHz (15)</td><td>3 to 8</td><td>8</td></tr>
<tr><td>5 MHz (25)</td><td>3 to 13</td><td>13</td></tr>
<tr><td>10 MHz (50)</td><td>3 to 17</td><td>17</td></tr>
<tr><td>15 MHz (75)</td><td>3 to 19</td><td>19</td></tr>
<tr><td>20 MHz (100)</td><td>3 to 25</td><td>25</td></tr>
</table></td></tr>
<tr><td>Power Boosting</td><td>Sets power boosting</td><td>–20.000 to +20.000 dB</td></tr>
<tr><td>UL-SCH</td><td></td><td></td></tr>
<tr><td>Transport Block Size</td><td>Sets transport block size of UL-SCH</td><td>Changes max. value of the setting range by number of Resource Blocks</td></tr>
<tr><td>Data Type</td><td>Sets mapping data type</td><td>PN9fix, PN15fix, 16bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16bit repeat data</td><td>0000 to FFFF (only when Data Type = 16bit repeat)</td></tr>
<tr><td>Data Type User File</td><td>Sets user file</td><td>Select any file (only when Data Type = User File)</td></tr>
<tr><td>RV Index</td><td>Sets redundancy version index</td><td>0, 1, 2, 3</td></tr>
<tr><td>HARQ-ACK</td><td></td><td></td></tr>
<tr><td>Data Status</td><td>This enables or disables HARQ-ACK</td><td>Disable, Enable</td></tr>
<tr><td>Data Type</td><td>Sets the Data type to be inserted into the HARQ-ACK</td><td>ACK, NACK, ACK-ACK, ACK-NACK, NACK-ACK, NACK-NACK</td></tr>
<tr><td>Total Number of Coded Bits</td><td>Sets the number of bits after HARQ-ACK encoding</td><td>0 to Number of RBs × 288</td></tr>
<tr><td>RI</td><td></td><td></td></tr>
<tr><td>Data Status</td><td>Enables or disables the RI</td><td>Disable, Enable</td></tr>
<tr><td>Data Type</td><td>Sets the Data type to be inserted into the RI</td><td>1 (1 bit), 2 (1 bit), 1 (2 bits), 2 (2 bits), 3 (2 bits), 4 (2 bits)</td></tr>
<tr><td>Total Number of Coded Bits</td><td>Sets the number of bits after RI encoding</td><td>0 to Number of RBs × 288</td></tr>
<tr><td>CQI/PMI</td><td></td><td></td></tr>
<tr><td>Data Status</td><td>Enables or disables the CQI/PMI</td><td>Disable, Enable</td></tr>
<tr><td>Data Type</td><td>Sets the Data type to be inserted into the CQI/PMI</td><td>PN9fix, PN15fix, 16bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets the 16bit repeat data to be inserted into the CQI/PMI</td><td>0000 to FFFF (only when Data Type = 16bit repeat)</td></tr>
<tr><td>Data Type User File</td><td>Sets the User type to be inserted into the CQI/PMI</td><td>Select any file (only when Data Type = User File)</td></tr>
<tr><td>Total Number of Coded Bits</td><td>Sets the number of bits after CQI/PMI encoding</td><td>0 to 86400</td></tr>
</table>

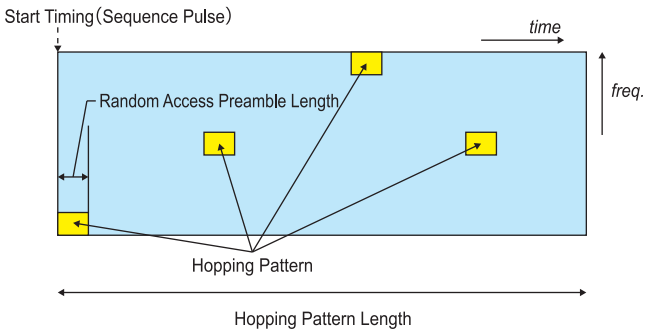
MX370108A LTE IQproducer
MX370108A-001 LTE-Advanced FDD Option

Optional

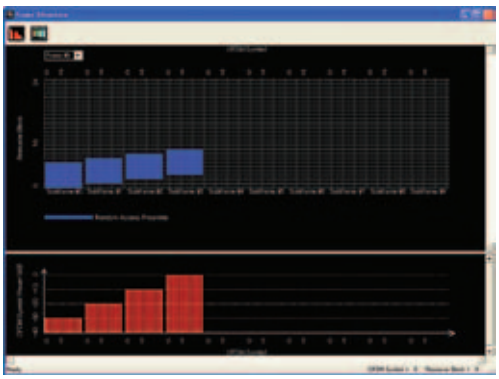
Display	Outline	Setting Range
Demodulation RS for PUSCH		
Data Type	Sets data installed in demodulation RS for PUSCH	Base Sequence, User File
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Group Hopping	Enable/disable Group Hopping parameter	Disable, Enable (only when Data Type = Base Sequence)
Sequence Hopping	Enables or disables Sequence Hopping	Disable, Enable
Delta ss	Sets Delta ss	0 to 29 (only when Data Type = Base Sequence)
Base Sequence Group Number u	Sets base sequence group number	0 to 29 (only when Data Type = Base Sequence)
Base Sequence Number v	Displays base sequence number	0, 1
Cyclic Shift		
n_cs Setting	Sets the Auto/Manual switching of 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	The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point. alpha = 2×pi×n_cs/12
Cyclic Shift 2nd slot		
n_cs	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	The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point. alpha = 2×pi×n_cs/12
Sounding RS		
Data Status	This enables or disables the Sounding RS parameter	Enable, Disable
Data Type	Sets the data to insert into Sounding RS	Base Sequence, User File
Data Type User File	This sets the user file to be inserted into Sounding RS	Select any file (only when Data Type = User File)
Group Hopping	Enables or disables group hopping	Disable, Enable (only when Data Type = 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 the base sequence group number	0 to 29 (only when Data Type = Base Sequence)
Base Sequence Number v	Sets the base sequence number	0, 1 (only when Data Type = Base Sequence)
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	3 fixed
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	The alpha value is calculated using the following equation, and the result is displayed to the 5th decimal point. alpha = 2×pi×n_SRS/8
Random Access Preamble		
PRACH Configuration	Sets transmission timing of PRACH	0 to 63 (Except 30, 46, 60, 61, 62)
Preamble Format	Displays preamble format	Display only
Data Type	Sets data type	Root Zadoff-Chu Sequence, User File
Data Type User File	Sets user file	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 length for random access preamble	Display only
Hopping Pattern Length	Sets frequency hopping pattern	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 Parameter Setting Range

Display	Setting Range
BS Test	
E-UTRA Test Models	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
FRC	FRC (QPSK, R = 1/3): A1-1, A1-2, A1-3, A1-4, A1-5 FRC (16QAM, R = 2/3): A2-1, A2-2, A2-3 FRC (QPSK 1/3): A3-1, A3-2, A3-3, A3-4, A3-5, A3-6, A3-7 FRC (16QAM 3/4): A4-1, A4-2, A4-3, A4-4, A4-5, A4-6, A4-7, A4-8 FRC (64QAM 5/6): A5-1, A5-2, A5-3, A5-4, A5-5, A5-6, A5-7 PRACH Test Preambles: A6-1 (Burst format0, 1, 2, 3), A6-2 (Burst format0, 1, 2, 3) FRC (Scenario 1): A7-1, A7-1 (SRS Option), A7-2, A7-2 (SRS Option), A7-3, A7-3 (SRS Option), A7-4, A7-4 (SRS Option), A7-5, A7-5 (SRS Option), A7-6, A7-6 (SRS Option) FRC (Scenario 2): A8-1, A8-1 (SRS Option), A8-2, A8-2 (SRS Option), A8-3, A8-3 (SRS Option), A8-4, A8-4 (SRS Option), A8-5, A8-5 (SRS Option), A8-6, A8-6 (SRS Option)
UE Test	
RMC (DL)	FRC (Receiver Requirements) FRC (Maximum input level): Category 1, Category 2, Category 3-5 FRC (Tx Characteristics) FRC (QPSK, R = 1/3): R.4 FDD, R.2 FDD FRC (16QAM, R = 1/2): R.3 FDD FRC (64QAM, R = 3/4): R.5 FDD, R.6 FDD, R.7 FDD, R.8 FDD, R.9 FDD FRC (Single PRB): R.0 FDD, R.1 FDD FRC (two antenna ports): R.10 FDD, R.11 FDD FRC (four antenna ports): R.12 FDD, R.13 FDD, R.14 FDD FRC (FDD): R.15 FDD, R.16 FDD, R.17 FDD
RMC (UL)	Full RB (QPSK), Full RB (16QAM), Partial RB (QPSK), Partial RB (16QAM)



Parameters for Random Access Preamble



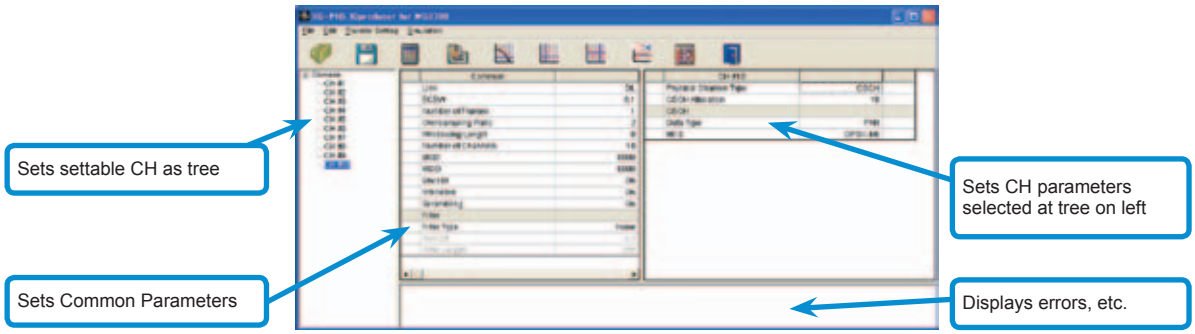
Random Access Preamble parameters setting

PRACH Configuration	: 0
Data Type	: Zadoff-Chu Sequence
Root Zadoff-Chu Sequence	: 1
Cyclic Shift Value	: 0
Hopping Pattern Length	: 1
Hopping Pattern	: RB#0, RB#1, RB#2, RB#3, OFF, OFF, OFF, OFF, OFF, OFF
Power Ramping Step Size	: 10.0 dB

MX370109A XG-PHS IQproducer

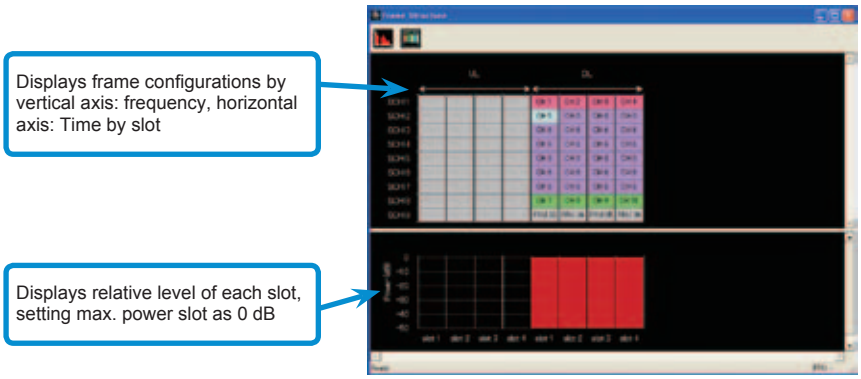
Optional

The MX370109A XG-PHS IQproducer is a PC application for generating downlink and uplink waveform patterns for next-generation PHS (XGP: eXtended Global Platform).
The generated waveform patterns are output using the MG3700A Vector Generator.



XG-PHS IQproducer Main Screen

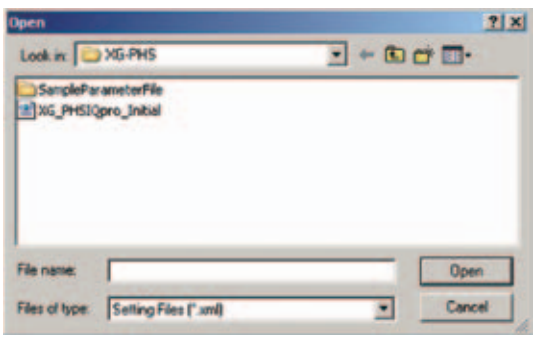
- Visual Check on Frame Structure Screen



Frame Structure Screen and Power Graph (Downlink Signal Generation)

- Parameter Save/Recall

The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.



- Graphical Simulation Displays

This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF), Fast Fourier Transform (FFT) and Time Domain graph on the PC. It is useful for checking or reviewing waveforms.

CCDF Graph
Up to eight generated waveform patterns can be read and displayed as CCDF graphs.

FFT Graph
Up to four generated waveform patterns can be read and displayed as FFT graphs.

Time Domain Graph
Up to four generated waveform patterns can be read and displayed as a Time Domain Graph.

Clipping Function
Clipping and filtering can be performed for created waveform patterns.

• Common Parameter Setting Range

Display	Outline	Setting Range
Common		
Link	Sets Uplink and Downlink signals	UL, DL
ECBW	Sets effective channel bandwidth	8.1, 9.0, 16.2, 17.1, 18.0 MHz
Number of Frames	Sets the number of frames to be generated	When Oversampling Ratio = 2 ECBW = 8.1, 9.0 MHz, 1 to 2796 ECBW = 16.2, 17.1, 18.0 MHz, 1 to 1398 When Oversampling Ratio = 4 ECBW = 8.1, 9.0 MHz, 1 to 1398 ECBW = 16.2, 17.1, 18.0 MHz, 1 to 699
Oversampling Ratio	Sets oversampling ratio	2, 4
Windowing Length	Sets windowing length	0 to 2000 ns
Filter Type	Sets filtering	Nyquist, Root Nyquist, Ideal, None
Roll Off	Sets roll-off ratio of filter	0.1 to 1.0
Filter Length	Sets number of filter taps	1 to 1024
Number of Channels	Sets channel number	ECBW = 8.1 MHz, 1 to 36 ECBW = 9.0 MHz, 1 to 40 ECBW = 16.2 MHz, 1 to 72 ECBW = 17.1 MHz, 1 to 76 ECBW = 18.0 MHz, 1 to 80
BSID	Sets ID for Base Station	0x0000 to 0x7FFF
MSID	Sets ID for Mobile Station	0x0000 to 0x7FFF
Scrambling	Sets ON/OFF for Scrambling	ON, OFF
Encode	Sets ON/OFF for Encode	ON, OFF
Interleave	Sets ON/OFF for Interleave	ON, OFF

• Physical Channel Parameter (Downlink/Uplink) Setting Range

Display	Outline	Setting Range
CCCH		
CCCH Allocation	Sets PRU number deploying CCCH	1 to 80
Physical Channel Data Type	Sets data inserted in CRC Calculation Area*2/Control Field*1	PN9, PN15, PN23, 16bit repeat, User File, Function Channel
Physical Channel 16bit repeat	Sets 16bit repeat data inserted in CRC Calculation Area*2/Control Field*1	0000 to FFFF
Physical Channel User File	Sets user file inserted in CRC Calculation Area*2/Control Field*1	Select any file
Function Channel Data Type	Sets data inserted in BCCH, SCCH or PCH	PN9, PN15, PN23, 16bit repeat, User File
Function Channel 16bit repeat	Sets 16bit repeat data inserted in BCCH or PCH	0000 to FFFF
Function Channel User File	Sets user file inserted in BCCH or PCH	Select any file
ANCH		
ANCH Allocation	Sets PRU number deploying ANCH	1 to 80
Physical Channel Data Type	Sets data inserted in CRC Calculation Area	PN9, PN15, PN23, 16bit repeat, User File, ECCH, ICCH
Physical Channel 16bit repeat	Sets 16bit repeat data inserted in CRC Calculation Area	0000 to FFFF
Physical Channel User File	Sets user file inserted in CRC Calculation Area	Select any file
RCH*1	Sets RCH value	0x00 to 0x7F
MAP Origin*2	Sets MAP start position	ECBW = 8.1 MHz, 0 to 8 ECBW = 9.0 MHz, 0 to 9 ECBW = 16.2 MHz, 0 to 17 ECBW = 17.1 MHz, 0 to 18 ECBW = 18.0 MHz, 0 to 19
MAP*2	Displays MAP value	0x000000000000000000 to 0x7FFFFFFFFFFFFFFFFF
SD*2	Sets Shift Direction	Stay, One Step Backward, Two Steps Forward, One Step Forward
ANCH PC	Sets ANCH Power Control value	0x0000 0000 to 0xFFFF FFFF
EXCH PC	Sets EXCH Power Control value	0x0000 0000 to 0xFFFF FFFF
PC*2	Sets Power Control value	0x0000 0000 to 0xFFFF FFFF
ACK	Sets ACK value	0x0 0000 0000 to 0xF FFFF FFFF
V	Sets Validity value	0 to 7F (DL), 0x0 0000 to 0xF FFFF (UL)
MI	Sets MI value	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
MR	Sets MR value	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
HC	Sets HARQ Cancel	0, 1
Function Channel Data Type	Sets data inserted in MAC Frame	PN9, PN15, PN23*2, 16bit repeat, User File
Function Channel 16bit repeat	Sets 16bit repeat data inserted in MAC Frame	0000 to FFFF
Function Channel User File	Sets user file inserted in MAC Frame	Select any file

MX370109A XG-PHS IQproducer

Optional

Display	Outline	Setting Range
EXCH		
EXCH PRU Number	Displays PRU number deploying EXCH	1 to 80
EXCH Allocation	Sets PRU deploying EXCH	ECBW = 8.1 MHz, 1 to 36 ECBW = 9.0 MHz, 1 to 40 ECBW = 16.2 MHz, 1 to 72 ECBW = 17.1 MHz, 1 to 76 ECBW = 18.0 MHz, 1 to 80
Physical Channel Data Type	Sets data inserted in CRC Calculation Area	PN9, PN15, PN23, 16bit repeat, User File, EDCH
Physical Channel 16bit repeat	Sets 16bit repeat data inserted in CRC Calculation Area	0000 to FFFF
Physical Channel User File	Sets data file inserted in CRC Calculation Area	Select any file
Function Channel Data Type	Sets data type inserted in MAC Frame*2/ Control Field*1	PN9, PN15, PN23*2, 16bit repeat, User File
Function Channel 16bit repeat	Sets 16bit repeat data inserted in MAC Frame*2/Control Field*1	0000 to FFFF
Function Channel User File	Sets user file inserted in MAC Frame*2/ Control Field*1	Select any file
MCS	Sets MCS	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
PRU Concatenation*2	Sets PRU Concatenation	ON, OFF
Validity	Sets effective PRU of EXCH	0 to EXCH PRU Number
CSCH		
CSCH Allocation	Sets PRU number deploying CSCH	1 to 80
Physical Channel Data Type	Sets data inserted in CRC Calculation Area	PN9, PN15, PN23, 16bit repeat, User File, TCH, CDCH
Physical Channel 16bit repeat	Sets 16bit repeat data inserted in CRC Calculation Area	0000 to FFFF
Physical Channel User File	Sets data file inserted in CRC Calculation Area	Select any file
MCS	Sets MCS	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
MI	Sets MI value	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
MR	Sets MR value	BPSK-1, BPSK-3/4, QPSK-1, QPSK-4/6, 16QAM-1, 16QAM-4/6, 64QAM-3/4, 64QAM-6/10, 256QAM-4/6, 256QAM-8/14
SD*2	Sets Shift Direction	Stay, One Step Backward, Two Steps Forward, One Step Forward
PC	Sets Power Control value	0x0000 0000 to 0xFFFF FFFF
ACK	Sets ACK value	0, 1
Function Channel Data Type	Sets type of data to be inserted into MAC Frame	PN9, PN15, PN23, 16bit repeat, User File
Function Channel 16bit repeat	Sets 16bit repeat data inserted in MAC Frame	0000 to FFFF
Function Channel User File	Sets user file inserted in MAC Frame	Select any file

∗1: UL only
∗2: DL only

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

The MX370110A LTE TDD IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the LTE TDD specifications in the 3GPP TS 36.211, TS 36.212, and TS 36.213 standards.
Generates test model waveform patterns used for LTE base station Tx tests and FRC (Fixed Reference Channel) used for Rx tests.
LTE TDD IQproducer supports two setting screens: “Easy Setup Screen” and “Normal Setup Screen”.

The MX370110A-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.

*: MBSFN reference signals, UE-specific reference signals, Positioning reference signals, CSI reference signals, Physical Multicast Channel, and Sounding Reference Signal are not supported.

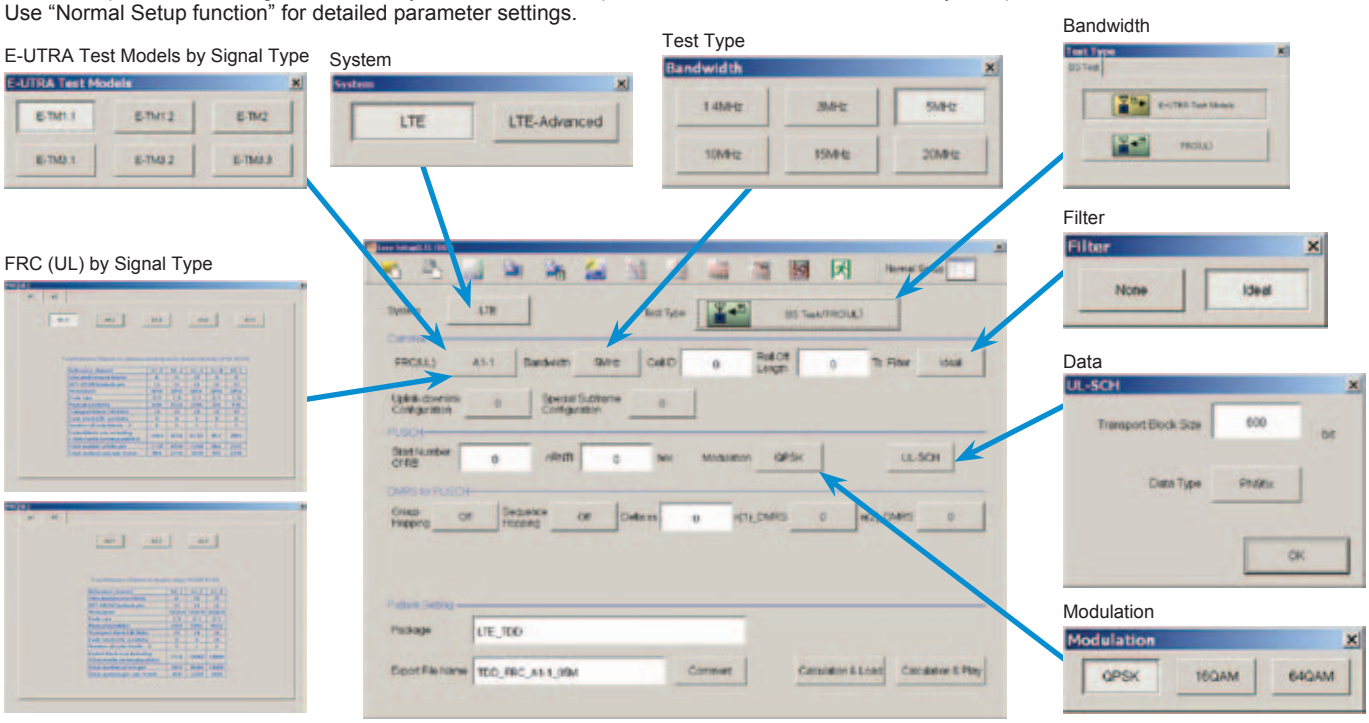
Channels Generated by MX370110A LTE TDD IQproducer

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
- PRACH (Physical Random Access Channel)

● Easy Setup Screen

Waveform patterns can be generated easily because the main parameters are restricted to the Easy Setup screen.
Use “Normal Setup function” for detailed parameter settings.



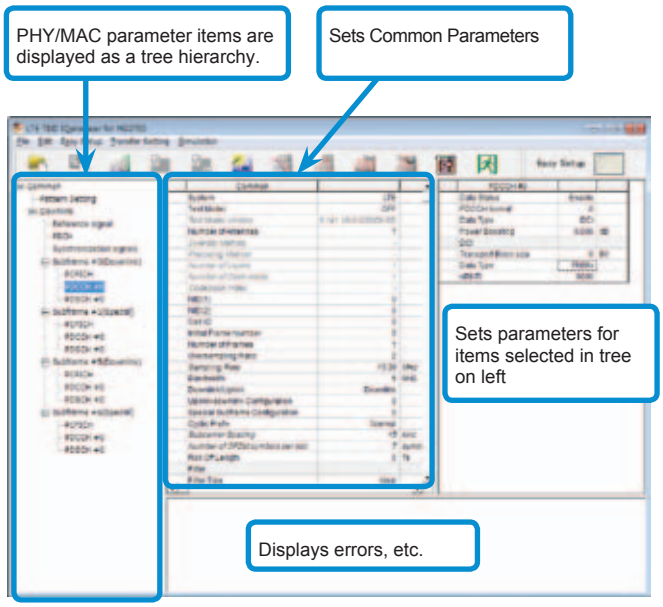
Easy Setup Screen (Example: FRC (UL))

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

● Normal Setup Screen

Detailed parameters are set at the Normal Setup screen to generate waveform patterns.

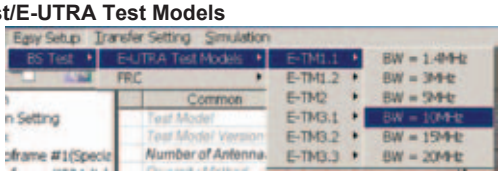


LTE TDD IQproducer Setting Screen/Normal Setup Screen

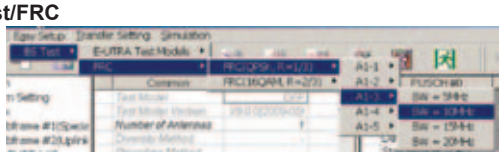
● Easy Setup Menu

3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

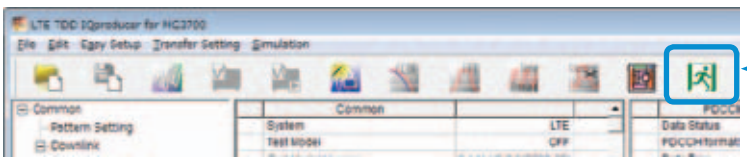
BS Test/E-UTRA Test Models



BS Test/FRC



● Visual Check at Frame Structure Screen



Displays Frame Structure screen for confirming channel allocation status and power of each OFDM Symbol

The Frame Structure Screen shows the resource element allocation graphically with each channel color-coded.

Y-axis: Frequency (Resource Block units)
X-axis: Time (OFDM Symbol units)

In the Full Scale display, one frame (Subframe#0 to 9) is displayed.
The zoom can be done by selecting the area with the cursor. When the Full Scale button is pushed, one frame is displayed. Moreover, when the cursor is set in each channel, and "Properties" is selected by right-clicking, information on the setting of the channel etc. is displayed.

The Power Graph shows the power relative levels of OFDM Symbols with maximum power of 0 dB.

Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)

Frame Structure Screen (LTE)

MX370110A-001 LTE-Advanced TDD Option

Adding the MX370110A-001 LTE-Advanced TDD option to set LTE-Advanced system parameters supports generation of carrier aggregation signals added* by 3GPP Rel. 10.
Additionally, clustered SC-FDMA signals can be generated at Uplink.

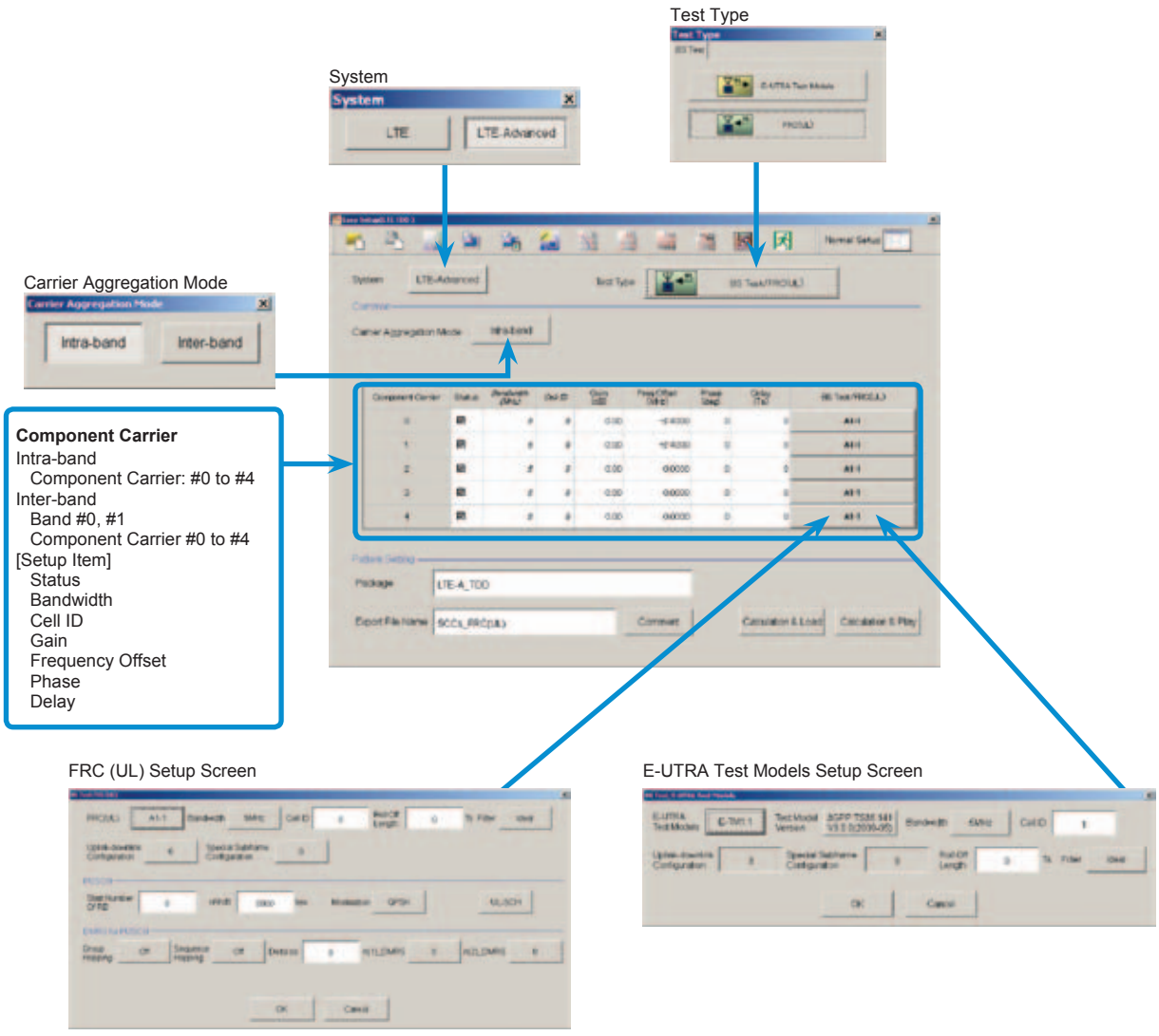
*: MBSFN reference signals, UE-specific reference signals, Positioning reference signals, CSI reference signals, Physical Multicast Channel, and Sounding Reference Signal are not supported.

LTE-Advanced Setting Parameters

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

● Easy Setup Screen

Waveform patterns can be generated easily by setting the band matching the carrier aggregation mode and component carrier because the main parameters are restricted to the Easy Setup screen.
Use the “Normal Setup Function” for detailed parameter settings.



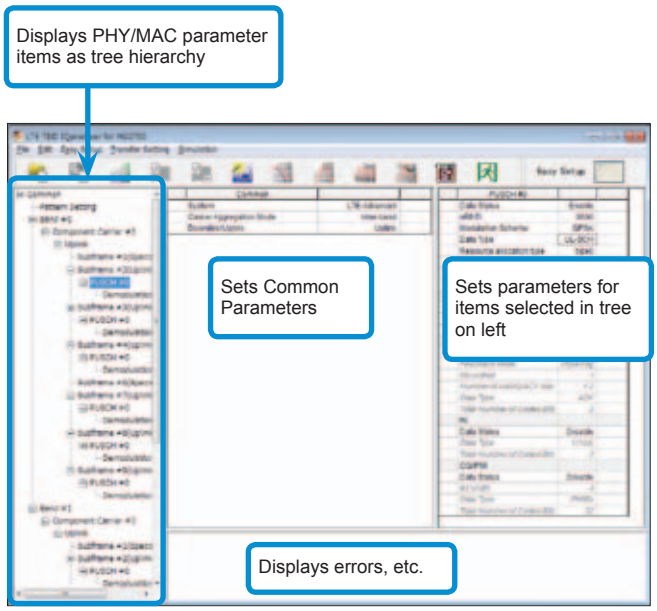
LTE-Advanced Easy Setup Screen (Example: FRC (UL) Test Type)

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

● Normal Setup Screen

Detailed parameters are set at the Normal Setup screen to generate waveform patterns.

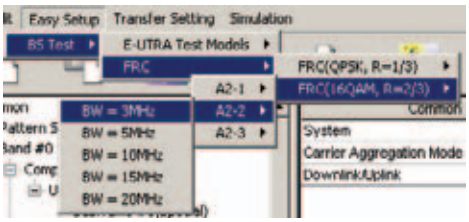


LTE-Advanced Setting Screen/Normal Setup Screen

● Easy Setup Menu

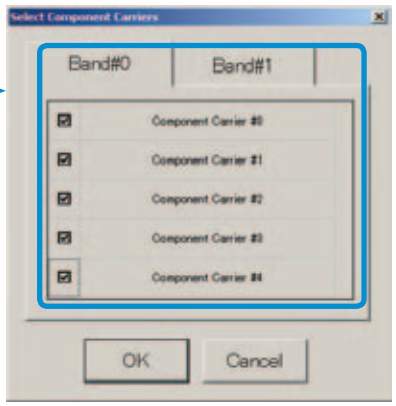
3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

Example: FRC Test Modes Setup



Simple operation by selecting target signals and component carriers as batch

Select Component Carrier Screen

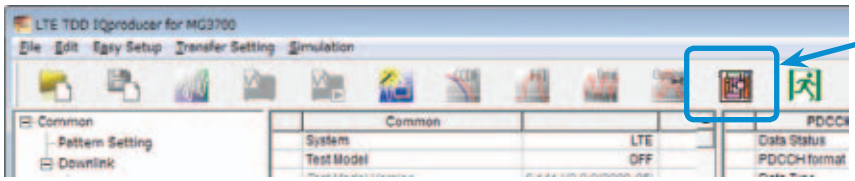


● Example of Vector Signal Generator Series LTE-Advanced Carrier Aggregation Function

Vector Signal Generator Series / Carrier Aggregation Mode	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A	MG3700A	MS2690A series Opt. 020*1	MS2830A Opt. 020/021*1
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*2, or 1 RF 2 units)	✓ (2 units)	✓ (2 units)	✓ (2 units)

∗1: MX269910A LTE TDD IQproducer and MX269910A-001 LTE-Advanced TDD Option installed.
∗2: MG3710A-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

- Visual Check on Frame Structure Screen

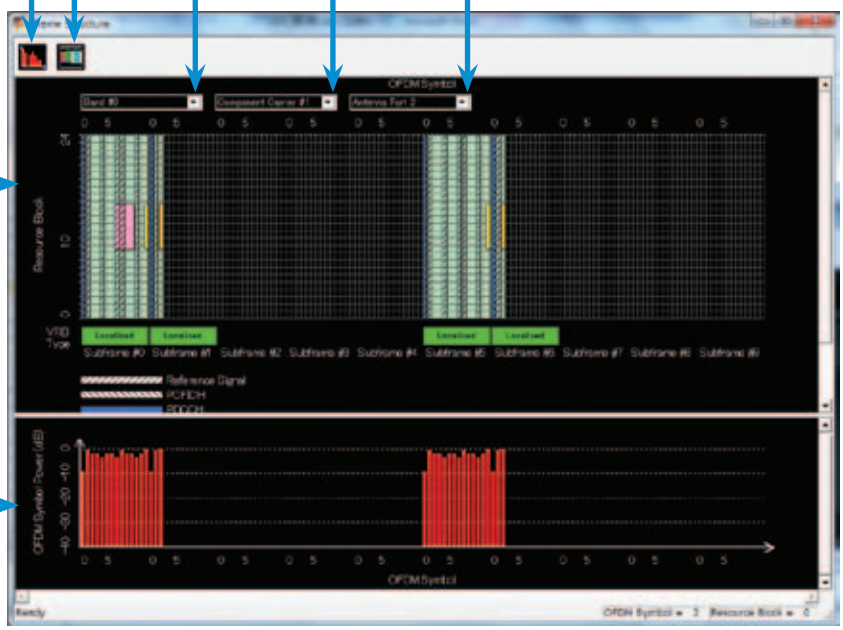


Displays Frame Structure screen for confirming channel allocation status and power of each OFDM Symbol

Power graph show/hide button
Full Scale button
Component Carrier select button
Band select button
Antenna Port select button

Display Resource Element allocation graphically with each channel color-coded.
Y-axis: Frequency (Resource Block units)
X-axis: Time (OFDM Symbol units)

Display power relative levels of OFDM Symbols with maximum power of 0 dB.
Y-axis: OFDM Symbol Power
X-axis: Time (OFDM Symbol units)



Frame Structure Screen (LTE-Advanced)

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

Easy Setup Screen

● Test Type Setting Range

Display	Outline	Setting Range
Test Type	Sets the Test Type.	E-UTRA Test Models, FRC (UL)

● BS Test/E-UTRA Test Models Setting Range

Display	Outline	Setting Range
Common		
E-UTRA Test Models	Sets the E-UTRA Test Models.	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Test Model Version	Sets the Test Model version of referred specifications.	3GPP TS 36.141 V8.2.0 (2009-03) 3GPP TS 36.141 V9.0.0 (2009-05)
Bandwidth	Sets the system bandwidth.	1.4, 3, 5, 10, 15, 20 MHz
Cell ID	Sets the Cell ID.	0 to 153
Uplink-downlink Configuration	Sets the Uplink-downlink Configuration.	3 fixed
Special Subframe Configuration	Sets the Special Subframe Configuration.	8 fixed
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol.	0 to 144
Filter	Sets filter.	Ideal, None

● BS Test/FRC (UL) Setting Range

Display	Outline	Setting Range
Common		
FRC (UL)	Selects the setting items described in 3GPP TS 36.141 Annex A and automatically sets the parameters.	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3
Bandwidth	Sets the system bandwidth.	The settable bandwidth changes according to the selected FRC (UL).
Cell ID	Sets the Cell ID.	0 to 503
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol.	0 to 144
Filter	Sets the filter type.	Ideal, None
Uplink-downlink configuration	Sets the Uplink-downlink Configuration.	0, 1, 2, 3, 4, 5, 6
Special Subframe Configuration	Sets the Special Subframe Configuration.	0 to 8
PUSCH		
Start Number of RB	Sets the start position of the RB to which the PUSCH is assigned.	Bandwidth = 1.4 MHz: 0 to (6-allocated resource block) Bandwidth = 3 MHz: 0 to (15-allocated resource block) Bandwidth = 5 MHz: 0 to (25-allocated resource block) Bandwidth = 10 MHz: 0 to (50-allocated resource block) Bandwidth = 15 MHz: 0 to (75-allocated resource block) Bandwidth = 20 MHz: 0 to (100-allocated resource block)
nRNTI	Sets the radio network temporary identifier.	0 to FFFF
Modulation	Sets the modulation mode.	QPSK, 16QAM, 64QAM
UL-SCH		
Transport Block Size	Sets the transport block size for UL-SCH.	0 to 86400
Data Type	Sets the Data type.	PN9fix, PN15fix, All0, All1
DMRS for PUSCH		
Group Hopping	Enables or disables group hopping.	Off, On
Sequence Hopping	Enables or disables Sequence Hopping.	Off, On
Delta ss	Sets Delta ss.	0 to 29
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

Easy Setup Screen (System = LTE-Advanced)

● Test Type Setting Range

Display	Outline	Setting Range
Test Type	Sets the Test Type	E-UTRA Test Models, FRC (UL)

● BS Test/E-UTRA Test Models Setting Range

Display	Outline	Setting Range
E-UTRA Test Models	Sets the E-UTRA Test Models	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Test Model Version	Sets the Test Model version of referred specifications.	3GPP TS 36.141 V8.2.0 (2009-03), 3GPP TS 36.141 V9.0.0 (2009-05)
Bandwidth	Sets the system bandwidth	1.4, 3, 5, 10, 15, 20 MHz
Cell ID	Sets the Cell ID	0 to 503
Uplink-downlink Configuration	Sets the Uplink-downlink configuration	When the Test Type is BS Test/E-UTRA Test Models, the setting is fixed to 3.
Special Subframe Configuration	Sets the Special Subframe configuration	When the Test Type is BS Test/E-UTRA Test Models, the setting is fixed to 8.
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 144
Filter	Sets filter	Ideal, None

● BS Test/FRC (UL) Setting Range

Display	Outline	Setting Range
Common		
FRC (UL)	Selects the setting items described in 3GPP TS 36.141 Annex A and automatically sets the parameters	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3
Bandwidth	Sets the system bandwidth	The settable bandwidth changes according to the selected FRC (UL)
Cell ID	Sets the Cell ID	0 to 503
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 144
Filter	Sets the filter type	Ideal, None
Uplink-downlink Configuration	Sets the Uplink-downlink configuration	0, 1, 2, 3, 4, 5, 6
Special Subframe Configuration	Sets the Special Subframe configuration	0 to 8
PUSCH		
Start Number of RB	Sets the start position of the RB to which the PUSCH is assigned	Bandwidth = 1.4 MHz: 0 to (6-allocated resource block) Bandwidth = 3 MHz: 0 to (15-allocated resource block) Bandwidth = 5 MHz: 0 to (25-allocated resource block) Bandwidth = 10 MHz: 0 to (50-allocated resource block) Bandwidth = 15 MHz: 0 to (75-allocated resource block) Bandwidth = 20 MHz: 0 to (100-allocated resource block)
nRNTI	Sets the radio network temporary identifier	0 to FFFF
Modulation	Sets the modulation mode	QPSK, 16QAM, 64QAM
UL-SCH		
Transport Block Size	Sets the transport block size for UL-SCH	0 to 86400
Data Type	Sets the Data type	PN9fix, PN15fix, All0, All1
DMRS for PUSCH		
Group Hopping	Enables or disables group hopping	Off, On
Sequence Hopping	Enables or disables Sequence Hopping	Off, On
Delta ss	Sets Delta ss	0 to 29
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

● Carrier Aggregation Mode Setting Range

Display	Outline	Setting Range
Carrier Aggregation Mode	Sets the Carrier Aggregation Mode	Intra-band, Inter-band
Parameter		
Component Carrier	Displays the Component Carrier number	Display only
Status	Enables or disables the Component Carrier parameter	Check box selected, or cleared
Bandwidth	Displays the system bandwidth for the Component Carrier	Display only
Cell ID	Displays the cell ID for the Component Carrier	Display only
Gain	Sets the level ratio of Component Carrier	–80.00 to 0.00 [dB]
Freq. Offset	Sets the frequency offset	0 to ± (0.4 × Fs – 0.5 × Band) [MHz] Band: Changed depending on the Component Carrier# transmission system bandwidth (Bandwidth) Bandwidth [MHz] / Band [MHz]: 1.4 / 1.095; 3.0 / 2.715; 5.0 / 4.515; 10.0 / 9.015; 15.0 / 13.515; 20.0 / 18.015 Fs: 153.6 MHz (sampling rate)
Phase	Sets the initial phase of the Component Carrier	0 to 359 [deg.]
Delay	Sets delay of the Component Carrier	0 to 307200 [Ts]
BS Test Type	Sets the details of BS Test Type of Component Carriers	BS Test/E-UTRA Test Models, BS Test/FRC(UL)

● Pattern Setting Setting Range

Display	Outline	Setting Range
Package	Enters waveform pattern package name	Up to 31 single-byte English alphanumeric characters
Export File Name	Enters waveform pattern file name	Carrier Aggregation Mode = Intra-band : Up to 18 single-byte English alphanumeric characters Carrier Aggregation Mode = Inter-band : Up to 15 single-byte English alphanumeric characters
Comment	Inputs comments to the waveform pattern	Up to 38 single-byte English alphanumeric characters × 3 lines

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

Normal Setup Screen

Display	Outline	Setting Range
System	Switches 3GPP Systems	LTE, LTE-Advanced

● Common Parameter Setting Range (System = LTE)

Display	Outline	Setting Range
Common		
Test Model	Sets test model	OFF, E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Test Model Version	Sets the Test Model version of referred specifications	3GPP TS 36.141 V8.2.0 (2009-03) 3GPP TS 36.141 V9.0.0 (2009-05)
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
Number of Layers	Sets number of layers	1, 2, 3, 4
Number of Code words	Sets number of code words	1, 2
Codebook Index	Sets codebook index	0 to 3 (When Number of Layers = 1) 0 to 2 (When Number of Layers = 2) 0 to 15 (When Number of Antennas = 4)
NID (1)	Sets physical-layer cell-identity group NID (1)	0 to 167
NID (2)	Sets physical-layer cell-identity group NID (2)	0, 1, 2
Cell ID	Sets cell ID	0 to 503
Number of Frames	Sets number of frames	1 to max. number of frames in memory
Oversampling Ratio	Sets over sampling ratio	2, 4
Sampling Rate	Displays sampling rate	1.92 × Over Sampling Ratio [MHz] (When Bandwidth = 1.4 MHz) 3.84 × Over Sampling Ratio [MHz] (When Bandwidth = 3 MHz) 7.68 × Over Sampling Ratio [MHz] (When Bandwidth = 5 MHz) 15.36 × Over Sampling Ratio [MHz] (When Bandwidth = 10 MHz) 15.36 × Over Sampling Ratio [MHz] (When Bandwidth = 15 MHz) 30.72 × Over Sampling Ratio [MHz] (When Bandwidth = 20 MHz)
Bandwidth	Sets system bandwidth	1.4, 3, 5, 10, 15, 20 MHz
Downlink/Uplink	Sets downlink/uplink settings	Downlink, Uplink
Uplink-downlink Configuration	Sets uplink-downlink Configuration	0, 1, 2, 3, 4, 5, 6
Special Subframe Configuration	Sets special subframe Configuration	0 to 8
Cyclic Prefix	Sets cyclic prefix	Normal, Extended
Subcarrier Spacing	Displays subcarrier spacing	15 kHz
Number of OFDM symbols per slot	Displays number of OFDM symbols per slot	7 Symbols (When Cyclic Prefix = Normal) 6 Symbols (When Cyclic Prefix = Extended)
Roll Off Length	Sets roll-off length for OFDM symbol	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)

● Common Parameter Setting Range (System = LTE-Advanced)

Display	Outline	Setting Range
Carrier Aggregation Mode	Sets the Carrier Aggregation Mode	Intra-band, Inter-band
Downlink/Uplink	Sets downlink or uplink	Downlink, Uplink

● PHY/MAC Parameter Setting Range (LTE-Advanced)

Display	Outline	Setting Range
Carrier Aggregation		
Component Carrier	Displays the Component Carrier number	0 to 4
Status	Enables or disables the Component Carrier parameter	Check box selected, or cleared
Bandwidth	Displays the system bandwidth for the Component Carrier	Display only
Cell ID	Displays the Cell ID for the Component Carrier	Display only
Gain	Sets the level ratio of Component Carrier	–80.00 to 0.00 [dB]
Freq. Offset	Sets the frequency offset	0 to ± (0.4 × Fs – 0.5 × Band) [MHz] Band: Changed depending on the Component Carrier transmission system bandwidth (Bandwidth) Fs: 153.6 MHz (sampling rate)
Phase	Sets the initial phase of the Component Carrier	0 to 359 [deg.]
Delay	Sets delay of the Component Carrier	0 to 307200 [Ts]

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

Display	Outline	Setting Range
Component Carrier		
Test Model	Sets the Test Model	OFF, E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Test Model Version	sets the Test Model version of referred specifications	3GPP TS 36.141 V8.2.0 (2009-03), 3GPP TS 36.141 V9.0.0 (2009-05)
Number of Antennas	Sets the number of antennas	1, 2, 4
Diversity Method	Sets the diversity method	Spatial Multiplexing, Tx Diversity
Precoding Method	Sets the precoding method	Without CDD, Large-delay CDD, Large-delay CDD (Cyclic Precoder Index)
Number of Layers	Sets the number of layers	1, 2, 3, 4
Number of Code words	Sets the number of code words	1, 2
Codebook index	Sets the codebook index	When Number of Antennas is 2, the setting range varies according to Number of Layers as follows Number of Layers is 1: 0 to 3 Number of Layers is 2: 0 to 2 When Number of Antennas is 4: 0 to 15
NID (1)	Sets the NID (1)	0 to 167
NID (2)	Sets the NID (2)	0, 1, 2
Cell ID	Sets the Cell ID	0 to 503
Number of Frames	Sets the number of frames to be generated	1 to the maximum number of frames that can be stored in the equipment's waveform memory
Over Sampling Ratio	Sets the oversampling ratio	1, 2, 4
Sampling Rate	Displays the sampling rate	Display only : It is automatically set according to the Oversampling Ratio and Bandwidth values
Bandwidth	Sets the system bandwidth	1.4, 3, 5, 10, 15, 20 MHz
Downlink/Uplink	Sets downlink or uplink	Downlink, Uplink
Uplink-downlink Configuration	Sets the Uplink-downlink Configuration	0, 1, 2, 3, 4, 5, 6
Special Subframe Configuration	Sets the Special Subframe Configuration	0 to 8
Cyclic Prefix	Sets the cyclic prefix	Normal, Extended
Subcarrier Spacing	Displays the subcarrier spacing (interval)	Display only
Number of OFDM symbols per slot	Sets the number of OFDM symbols per slot	Display only
Roll Off Length	Sets the length of the ramp time applied to the OFDM symbol	0 to 3152 Ts (in the case of Random Access Preamble) 0 to 144 Ts (when Cyclic prefix=Normal) 0 to 512 Ts (when Cyclic prefix=Extende) 432 Ts (in the case of PRACH)
Filter		
Filter Type	Sets the filter type	Nyquist, Root Nyquist, Ideal, None
Roll Off	Sets the roll-off factor	0.1 to 1.0

● Pattern Setting Parameter Setting Range

Display	Outline	Setting Range
Reference signal		
Package	Set package name of waveform pattern	31 characters or less
Export File Name	Set pattern name of waveform pattern	18 characters or less
Line1	Set comment of waveform pattern	38 characters or less
Line2	Set comment of waveform pattern	38 characters or less
Line3	Set comment of waveform pattern	38 characters or less

Table 1

Subframe	UL/DL Configuration						
	0	1	2	3	4	5	6
0	D	D	D	D	D	D	D
1	S	S	S	S	S	S	S
2	U	U	U	U	U	U	U
3	U	U	D	U	U	D	U
4	U	D	D	U	D	D	U
5	D	D	D	D	D	D	D
6	S	S	S	D	D	D	S
7	U	U	U	D	D	D	U
8	U	U	D	D	D	D	U
9	U	D	D	D	D	D	D

Table 2

UL/DL Configuration	Subframe turned "off"
0	–
1	0, 5
2	0, 1, 4, 5, 6, 9
3	1, 5, 6, 7
4	0, 1, 4, 5, 6, 7
5	0, 1, 3, 4, 5, 6, 7, 9
6	–

Optional

PHY/MAC Parameter (Downlink) Setting Range

Display	Outline	Setting Range
Downlink		
PHICH duration	Sets the PHICH area.	Normal, Extended
Ng	Sets the parameter (Ng) for determining the PHICH arrangement.	1/6, 1/2
Reference Signal		
Frequency Shift Value	Displays frequency shift	0, 1, 2, 3, 4, 5
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
PBCH		
Data Status	Enable/disables PBCH parameter	Disable, Enable
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, BCH
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	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, 16bit repeat, User File, BCCH
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Transport Block Size	Sets number of bits required for BCH	0 to 1920 bits (When Cyclic Prefix = Normal) 0 to 1728 bits (When Cyclic Prefix = Extended) When BCCH is selected for BCH Data Type, the setting is fixed to 24 bits.
DL Bandwidth	Displays data mapped to BCCH	n6 (When Bandwidth = 1.4 MHz) n15 (When Bandwidth = 3 MHz) n25 (When Bandwidth = 5 MHz) n50 (When Bandwidth = 10 MHz) n75 (When Bandwidth = 15 MHz) n100 (When Bandwidth = 20 MHz) This is only displayed when BCCH is selected for Data Type of BCH.
PHICH duration	Displays the PHICH duration mapped to BCCH	Normal, Extended This is only displayed when BCCH is selected for Data Type of BCH.
Ng	Displays the Ng value mapped to BCCH	1/6, 1/2, 1, 2 This is only displayed when BCCH is selected for Data Type of BCH.
Synchronization Signals		
Primary Synchronization Signal		
Data Status	Enable/disables primary synchronization signal parameter	Disable, Enable
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
Secondary Synchronization Signal		
Data Status	Enable/disables secondary synchronization signal parameter	Disable, Enable
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
Subframe #0 to #9		
Subframe Type	Display subframe type	<Table1> (Downlink, Uplink, Special)
Virtual Resource Block Type	Display virtual resource block type	Localized, Distributed
Gap	Sets Gap	1st Gap, 2nd Gap If Bandwidth is 1.4 MHz, 3 MHz, or 5 MHz, 1st Gap is displayed and Gap cannot be set. If Bandwidth is 10 MHz, 15 MHz, or 20 MHz, 1st Gap or 2nd Gap can be set.
Gap value	Displays Gap value	
Number of VRBs	Displays the number of VRB	
PHICH	Sets ON/OFF of PHICH	ON, OFF (Subframe in Table 2 is turned off by setting UL/DL Configuration)
Number of PHICH Groups	Displays number of PHICH groups in one subframe	
Number of OFDM symbols for PDCCH	Sets number of OFDM symbols for PDCCH	1 to 4 Symbol
Total Number of CCEs	Display total number of CCEs of control area in subframe	
Number of PDCCHs	Sets number of PDCCHs	1 to 64
CCE Arrangement	Sets 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 of PDSCH	PDSCH#0 to (Number of PDSCHs–1)
PCFICH		
Data Status	Enable/disables PCFICH parameter	Disable, Enable
Data Type	Sets data type	CFI codeword, PN9fix, PN15fix, 16bit repeat, User File
CFI	Sets CFI codeword type	1, 2, 3
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
PDCCH		
Data Status	Enable/disables PDCCH parameter	Disable, Enable
PDCCH format	Sets PDCCH format	0, 1, 2, 3
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DCI
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Power Boosting	Set power boosting	–20.000 to +20.000 dB

Display	Outline	Setting Range
DCI		
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Transport Block Size	Sets number of bits required for DCI	0 to 576
nRNTI	Sets radio network temporary identifier	0000 to FFFF
PDSCH		
Data Status	Enable/disables PDSCH parameter	Disable, Enable
nRNTI	Sets radio network temporary identifier	0000 to FFFF
Modulation Scheme	Sets modulation scheme	QPSK, 16QAM, 64QAM
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File, DL-SCH
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	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, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Transport Block Size	Sets number of bits required for DL-SCH	0 to 150000 bit
UE Category	Sets UE category	1, 2, 3, 4, 5
RV Index	Sets redundancy version index	0, 1, 2, 3
PHICH Group		
Data Status	Enable/disables PHICH parameter	Disable, Enable
Number of PHICHs	Sets number of PHICH	1 to 8 (Cyclic Prefix = Normal), 1 to 4 (Cyclic Prefix = Extended)
Power Boosting	Display power boosting of PHICH group	
PHICH #0 to # (Number of PHICHs–1)		
Data Status	Enable/disables PHICH parameter	Disable, Enable
Orthogonal Sequence Index	Sets orthogonal sequence index	0 to 7 (When Cyclic Prefix = Normal), 0 to 3 (When Cyclic Prefix = Extended)
Data Type	Display data type	HI
HI	Sets code word of HI (HARQ indicator)	000, 111
Power Boosting	Set power boosting	–20.000 to +20.000 dB

- PHY/MAC Parameter (Uplink) Setting Range

Display	Outline	Setting Range
Uplink		
Data Transmission/PRACH	Selects Data Transmission or PRACH	Data Transmission, PRACH
DMRS Parameters	Sets the calculation method of Demodulation RS parameter.	Auto, Manual
PUCCH Parameters		
Delta PUCCH shift	Sets delta PUCCH shift	1, 2, 3
N_CS(1)	Sets number of cyclic shift for PUCCH format 1/1a/1b	0 to 7
N_RB(2)	Sets number of resource block for PUCCH format 2/2a/2b	0 to 63
Subframe #0 to #9		
Subframe Type	Display subframe type	<Table 1> (Downlink, Uplink, Special)
Number of PUCCHs	Sets number of PUCCHs	0 to 8
Number of PUSCHs	Sets number of PUSCHs	0 to 8
PUCCH #0 to #7		
Data Status	Enables/disables PUCCH parameter	Disable, Enable
n(1)_PUCCH	Sets resource number of PUCCH 1/1a/1b	0 to 764
n(2)_PUCCH	Sets resource number of PUCCH 2/2a/2b	0 to 764
nRNTI	Sets radio network temporary identifier	0000 to FFFF
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 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Group Hopping	Sets enable/disables	Disable, Enable
Base Sequence Group Number u	Sets base sequence group number	0 to 29 When Group Hopping is enabled this parameter becomes invalid and cannot be set. When DMRS Parameters is Auto, only calculated value displays and nothing can be set.
Base Sequence Number v	Displays base sequence number	0 fixed
Power Boosting	Sets power boosting	–20.000 to +20.000 dB

MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td colspan="3">UCI</td></tr>
<tr><td>Transport Block Size</td><td>Sets transport block size of UCI</td><td>1 (When PUCCH format = 1a)
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)</td></tr>
<tr><td>Data Type</td><td>Sets data type</td><td>PN9fix, PN15fix, 16bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16bit repeat data</td><td>0000 to FFFF (only when Data Type = 16bit repeat)</td></tr>
<tr><td>Data Type User File</td><td>Sets user file</td><td>Select any file (only when Data Type = User File)</td></tr>
<tr><td colspan="3">Demodulation RS for PUCCH</td></tr>
<tr><td>Group Hopping</td><td>Sets enable/disables</td><td>Disable, Enable</td></tr>
<tr><td>Base Sequence Group Number u</td><td>Sets base sequence group number</td><td>0 to 29</td></tr>
<tr><td>Base Sequence Number v</td><td>Displays base sequence number</td><td>0 fixed</td></tr>
<tr><td colspan="3">PUSCH #0 to #7</td></tr>
<tr><td>Data Status</td><td>Enables/disables PUSCH parameter</td><td>Disable, Enable</td></tr>
<tr><td>nRNTI</td><td>Sets radio network temporary identifier</td><td>0000 to FFFF</td></tr>
<tr><td>Modulation Scheme</td><td>Sets the modulation scheme</td><td>QPSK, 16QAM, 64QAM</td></tr>
<tr><td>Data Type</td><td>Sets data type</td><td>PN9fix, PN15fix, 16bit repeat, User File, UL-SCH</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16bit repeat data</td><td>0000 to FFFF (only when Data Type = 16bit repeat)</td></tr>
<tr><td>Data Type User File</td><td>Sets user file</td><td>Select any file (only when Data Type = User File)</td></tr>
<tr><td>Resource allocation type</td><td>Sets the Resource allocation type</td><td>type0, type1</td></tr>
<tr><td>Start Number of RB</td><td>Start position of RB</td><td>0 to 5 (When Bandwidth = 1.4 MHz)
0 to 14 (When Bandwidth = 3 MHz)
0 to 24 (When Bandwidth = 5 MHz)
0 to 49 (When Bandwidth = 10 MHz)
0 to 74 (When Bandwidth = 15 MHz)
0 to 99 (When Bandwidth = 20 MHz)</td></tr>
<tr><td>Number of RBs</td><td>Total number of RB</td><td>1 to 6 (When Bandwidth = 1.4 MHz)
1 to 15 (When Bandwidth = 3 MHz)
1 to 25 (When Bandwidth = 5 MHz)
1 to 50 (When Bandwidth = 10 MHz)
1 to 75 (When Bandwidth = 15 MHz)
1 to 100 (When Bandwidth = 20 MHz)</td></tr>
<tr><td>Start Number of RBG for 1st</td><td>Sets the start position of the RBG for 1st</td><td>The setting range varies depending on the Bandwidth setting as follows
<table><tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th></tr><tr><td>1.4 MHz (6)</td><td>1 to 4</td></tr><tr><td>3 MHz (15)</td><td>1 to 6</td></tr><tr><td>5 MHz (25)</td><td>1 to 11</td></tr><tr><td>10 MHz (50)</td><td>1 to 15</td></tr><tr><td>15 MHz (75)</td><td>1 to 17</td></tr><tr><td>20 MHz (100)</td><td>1 to 23</td></tr></table>*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>End Number of RBG for 1st</td><td>Sets the end position of the RBG for 1st</td><td>The setting range varies depending on the Bandwidth setting as follows
<table><tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th><th>Default</th></tr><tr><td>1.4 MHz (6)</td><td>1 to 4</td><td>3</td></tr><tr><td>3 MHz (15)</td><td>1 to 6</td><td>3</td></tr><tr><td>5 MHz (25)</td><td>1 to 11</td><td>6</td></tr><tr><td>10 MHz (50)</td><td>1 to 15</td><td>8</td></tr><tr><td>15 MHz (75)</td><td>1 to 17</td><td>8</td></tr><tr><td>20 MHz (100)</td><td>1 to 23</td><td>12</td></tr></table>*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>Start Number of RBG for 2nd</td><td>Sets the start position of the RBG for 2nd</td><td>The setting range varies depending on the Bandwidth setting as follows
<table><tr><th>Bandwidth (Number of RBs)</th><th>Setting range*</th><th>Default</th></tr><tr><td>1.4 MHz (6)</td><td>3 to 6</td><td>5</td></tr><tr><td>3 MHz (15)</td><td>3 to 8</td><td>5</td></tr><tr><td>5 MHz (25)</td><td>3 to 13</td><td>8</td></tr><tr><td>10 MHz (50)</td><td>3 to 17</td><td>10</td></tr><tr><td>15 MHz (75)</td><td>3 to 19</td><td>10</td></tr><tr><td>20 MHz (100)</td><td>3 to 25</td><td>14</td></tr></table>*: The maximum value of the setting range is smaller than End Number of RBG for 1st + 1</td></tr>
<tr><td>End Number of RBG for 2nd</td><td>Sets the end position of the RBG for 2nd</td><td>The setting range varies depending on the Bandwidth setting as follows
<table><tr><th>Bandwidth (Number of RBs)</th><th>Setting range</th><th>Default</th></tr><tr><td>1.4 MHz (6)</td><td>3 to 6</td><td>6</td></tr><tr><td>3 MHz (15)</td><td>3 to 8</td><td>8</td></tr><tr><td>5 MHz (25)</td><td>3 to 13</td><td>13</td></tr><tr><td>10 MHz (50)</td><td>3 to 17</td><td>17</td></tr><tr><td>15 MHz (75)</td><td>3 to 19</td><td>19</td></tr><tr><td>20 MHz (100)</td><td>3 to 25</td><td>25</td></tr></table></td></tr>
<tr><td>Power Boosting</td><td>Set power boosting</td><td>–20.000 to +20.000 dB</td></tr>
</table>

Display	Outline	Setting Range
UL-SCH		
Transport Block Size	Sets transport block size of UL-SCH	0 to 86400
Data Type	Sets data type	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16bit repeat data	0000 to FFFF (only when Data Type = 16bit repeat)
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
RV Index	Sets redundancy version index	0, 1, 2, 3
HARQ-ACK		
Data Status	This 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 (1 bit), 2 (1 bit), 1 (2 bits), 2 (2 bits), 3 (2 bits), 4 (2 bits)
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, 16bit repeat, User File
Data Type Repeat Data	Sets the 16bit 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
Demodulation RS for PUSCH		
Group Hopping	Sets enable/disables	Disable, Enable
Sequence Hopping	Sets enable/disables	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 number	0, 1
Cyclic Shift 1st slot		
n_cs	Sets n_cs of first slot of demodulation RS	0 to 11
alpha	Sets cyclic shift of first slot of demodulation RS	Alpha is calculated by the following expression. Five digits below the decimal are displayed. alpha = 2×pi×n_cs/12
Cyclic Shift 2nd slot		
n_cs	Sets n_cs of second slot of demodulation RS	0 to 11
alpha	Sets cyclic shift of second slot of demodulation RS	Alpha is calculated by the following expression. Five digits below the decimal are displayed. alpha = 2×pi×n_cs/12
PRACH		
PRACH Configuration	Sets the transmission timing for PRACH	The settable values for PRACH Configuration are determined according to Uplink-downlink Configuration as the table below. However, the setup of PRACH Configuration from 48 to 57 is only available in the following conditions: Cyclic Prefix is Normal and Special Subframe Configuration is from 5 to 8, or Cyclic Prefix is Extended and Special Subframe Configuration is from 4 to 6.
Uplink-downlink Configuration	Settable values for PRACH Configuration	0 0 to 10, 12 to 18, 20 to 57 1 0 to 7, 9 to 12, 15 to 39, 48 to 57 2 0 to 4, 6, 9, 10, 12, 15, 16, 18, 48 to 57 3 0 to 9, 12 to 18, 20, 21, 23, 25 to 31, 33, 35 to 41, 43, 45 to 49, 51, 53 to 57 4 0 to 4, 6, 9, 10, 12, 15, 16, 18, 20, 21, 23, 25 to 31, 33, 35 to 39, 48, 49, 51, 53 to 57 5 0, 1, 3, 6, 9, 12, 15, 18, 48, 49, 51, 53 to 57 6 0 to 15, 18 to 41, 43, 45 to 57
Number of PRACH Resources	Displays the number of PRACH Resources	Depending on the PRACH Configuration
PRACH Resource #0 to #5		
Data Status	Enables or disables the PRACH Resource #	Disable, Enable
Preamble Format	Displays the Preamble Format which decides the length in the time axis of PRACH Resource #	Depending on the PRACH Configuration
Frequency Resource Index	Displays Frequency Resource Index which decides the position in the frequency axis of PRACH Resource #	Depending on the PRACH Configuration, Uplink-downlink Configuration, PRACH Resource#"
Transmit Frame	Displays Transmit Frame which decides the arrangement method of PRACH Resource# in the frame	Depending on the PRACH Configuration, Uplink-downlink Configuration, PRACH Resource#"
Subframe Number	Displays the subframe number that PRACH Resource# transmits	Depending on the PRACH Configuration, Uplink-downlink Configuration, PRACH Resource#"
Logical Root Sequence Number	Sets Logical Root Sequence Number that decides the value of Physical Root Sequence Number.	When Preamble Format is 0, 1, 2, 3: 0 to 837 When Preamble Format is 4: 0 to 137
Physical Root Sequence Number	Displays Physical Root Sequence Number used to calculate Cyclic Shift value	depending on the Logical Root Sequence Number
Cyclic Shift Set	Sets how to calculate Cyclic Shift value	Unrestricted, Restricted
v	Sets v value used to calculate Cyclic Shift value	0 to 63

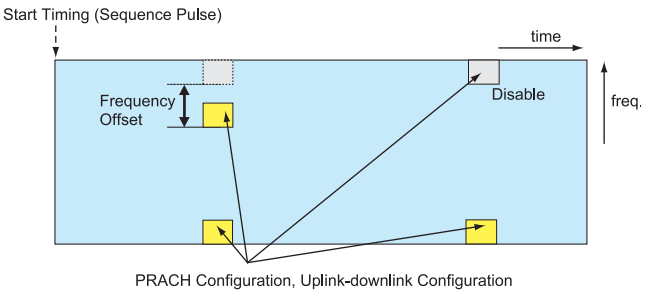
MX370110A LTE TDD IQproducer
MX370110A-001 LTE-Advanced TDD Option

Optional

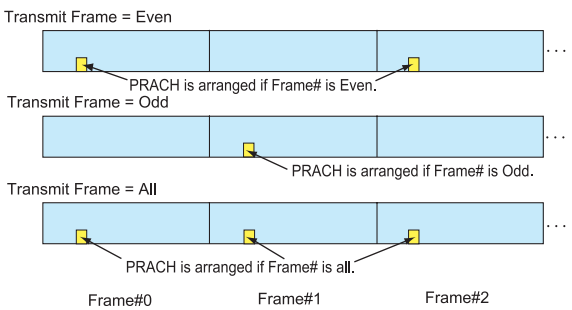
Display	Outline	Setting Range
Zero Correlation Zone Config	Sets Zero Correlation Zone Config used to calculate Cyclic Shift value	When Preamble Format is 0, 1, 2, 3 and Cyclic Shift Set is Unrestricted: 0 to 15 When Preamble Format is 0, 1, 2, 3 and Cyclic Shift Set is Restricted: 0 to 14 When Preamble Format is 4: 0 to 6
Cyclic Shift Value	Displays the Cyclic Shift Value	depending on the Cyclic Shift Set, v, Zero Correlation Zone Config, Logical Root Sequence Number.
Frequency Offset	Sets the Frequency Offset of the PRACH Resource #	When Bandwidth is 1.4 MHz 0 When Bandwidth is 3 MHz 0 to 9 When Bandwidth is 5 MHz 0 to 19 When Bandwidth is 10 MHz 0 to 44 When Bandwidth is 15 MHz 0 to 69 When Bandwidth is 20 MHz 0 to 94
Initial Power Boosting	Sets the initial power of PRACH Resource #	–10.000 to 10.000 [dB]
Power Ramping Step Size	Sets the amount of power to be increased each time a PRACH is transmitted	–10.000 to 10.000 [dB]

● Easy Setup Parameter Setting Range

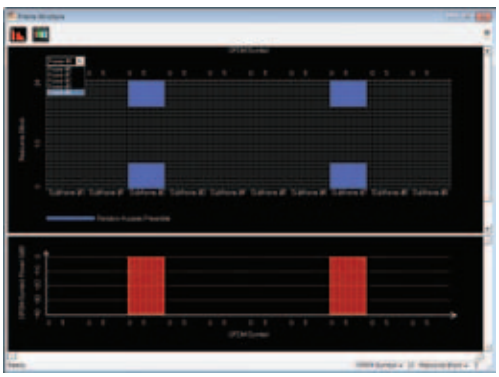
Display	Setting Range
BS Test	
E-UTRA Test Models	E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
FRC	FRC (QPSK, R = 1/3): A1-1, A1-2, A1-3, A1-4, A1-5 FRC (16QAM, R = 2/3): A2-1, A2-2, A2-3



PRACH Parameters



Configuration of PRACH Frame according to Transmit Frame



PRACH Parameter Settings

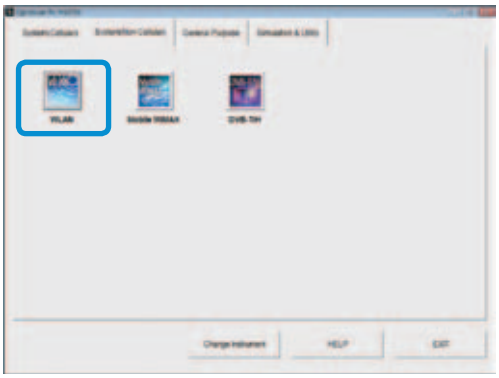
Common – Downlink/Uplink:	Uplink
Uplink – Transmission Type:	PRACH
Uplink – Uplink-downlink Configuration:	2
PRACH – Number of Frames:	5
PRACH – PRACH Configuration:	12

MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

The MX370111A WLAN IQproducer is PC application software with a GUI to generate IEEE Std 802.11-2007, IEEE Std 802.11n-2009 and IEEE802.11ac compliant waveform patterns.
Installing the MX370111A-001 802.11ac (80 MHz) option supports output of signals in compliance with IEEE802.11ac standards.

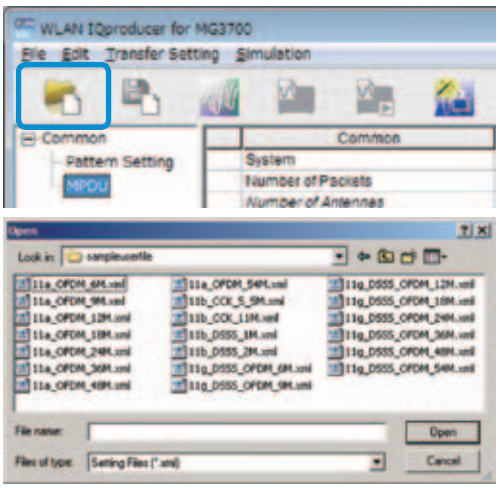
WLAN IQproducer supports two setting screens: “Easy Setup Screen” and “Normal Setup Screen”.



IQproducer Main Screen

- Sample Parameter File

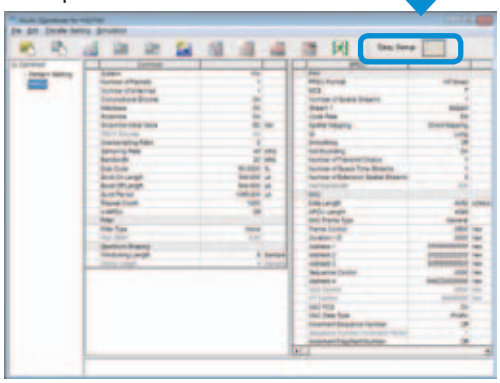
MX370111A supports some sample parameter files. First, a sample parameter file is read (Recall), and detailed editing as necessary helps cut the parameter setting workload.



Parameter Recall Screen

Easy Setup Screen

Normal Setup Screen

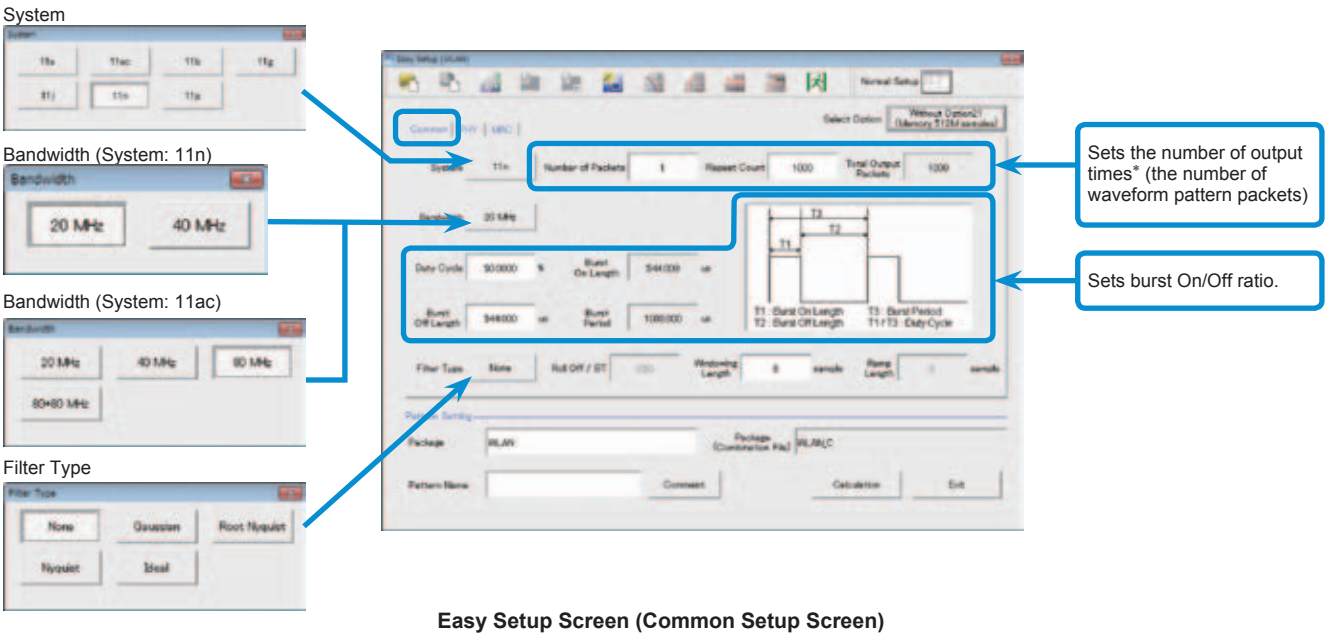


MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

● Easy Setup Screen

Because it is limited to major parameters, it generates waveform patterns using simple operation.
Use “Normal Setup function” for detailed parameter settings.



Easy Setup Screen (Common Setup Screen)

∗: PER (Packet Error Measurement), the number of waveform pattern packets is generated as [1] and the number of output times from the MG3700A main frame is set.
Example: Outputting 1000 packets
Number of Packets: 1
Repeat Count: 1000

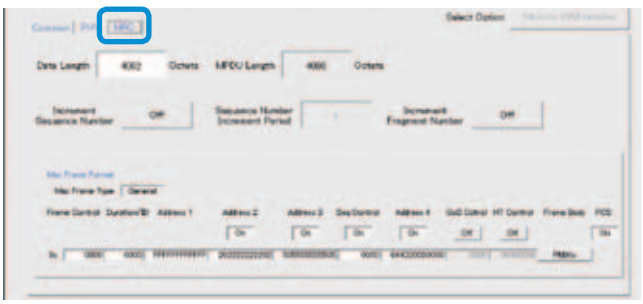
Ex.) System:11n: PPDU Format: HT Mixed/HT Greenfield

Ex.) System:11n: PPDU Format: Non-HT

Ex.) System: 11a/11b/11g/11j/11p

Ex.) System: 11ac

Easy Setup Screen (PHY Setup Screen)

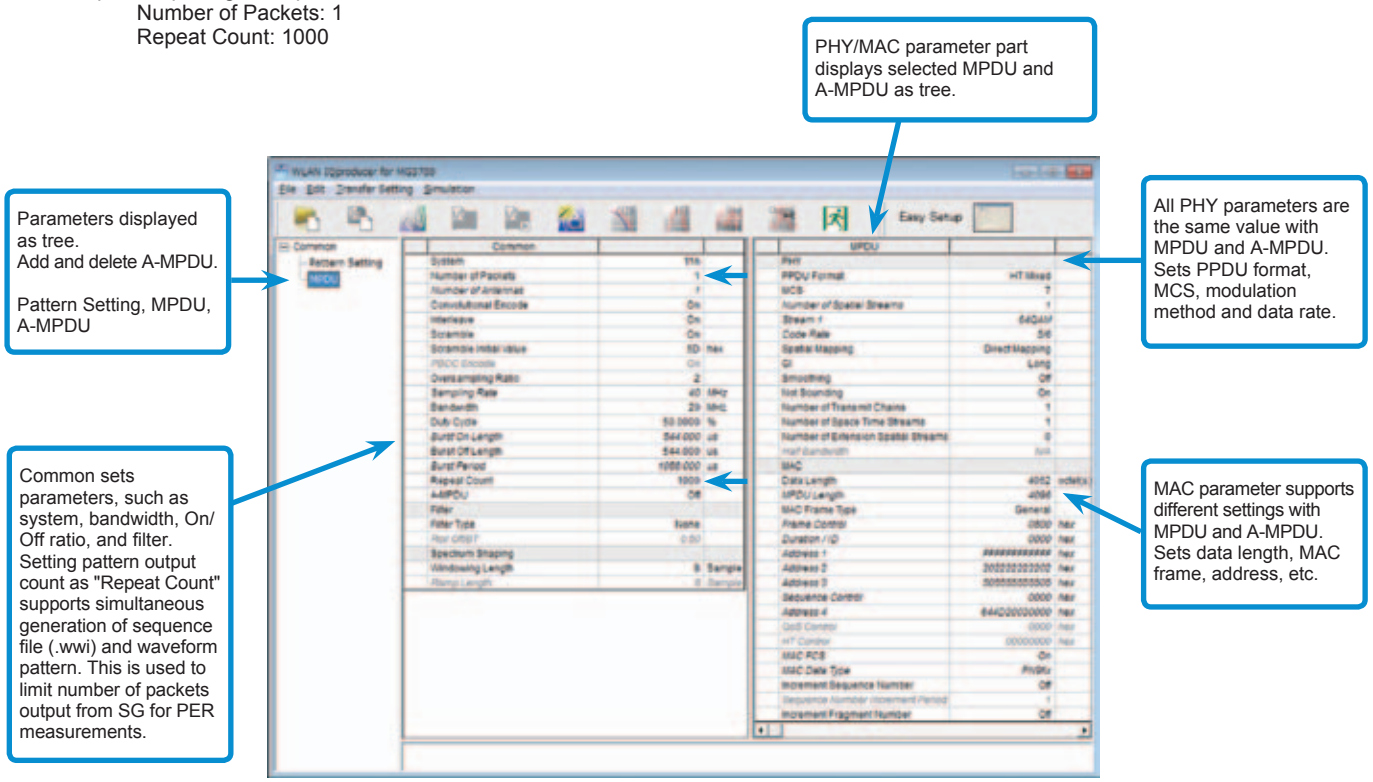


Easy Setup Screen (MAC Setup Screen)

● Normal Setup Screen (IEEE 802.11n/p/a/b/g/j)

Sets system, number of packets in one waveform pattern, On/Off ratio (Duty) and filter at Common sheet. At PER (Packet Error Measurement), the number of waveform pattern packets is generated as [1] and the number of output times from the MG3700A main frame is set.

Example: Outputting 1000 packets
Number of Packets: 1
Repeat Count: 1000



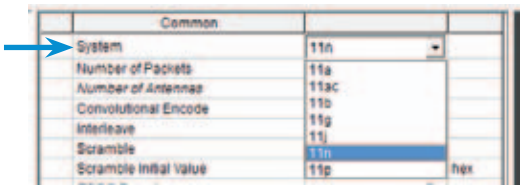
WLAN IQproducer Setting Screen

MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

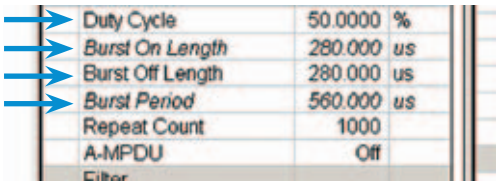
● System Setting

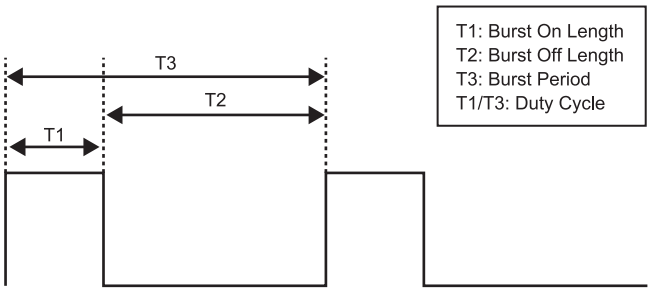
Selects and sets System.



● Duty Cycle Setting

Sets burst On/Off ratio according to Rx test conditions.
Sets Duty Cycle and Burst Off Length. Burst On Length is decided by Data Length settings of MAC parameter. Burst Period is decided by Duty Cycle and Burst Off Length settings.

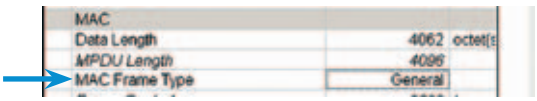




Burst On/Off Setting Image

● MAC Frame Type Selection

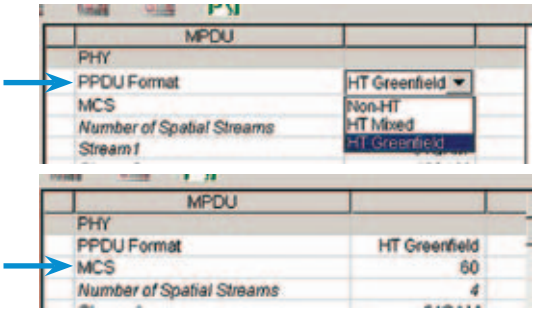
Clicking MAC Frame Type “General” displays MAC Frame format setting screen to set address information.
Match address of Rx equipment for Rx tests.



● PPDU Format Selection for IEEE802.11n Signals

Selects and sets following for IEEE802.11n signals:

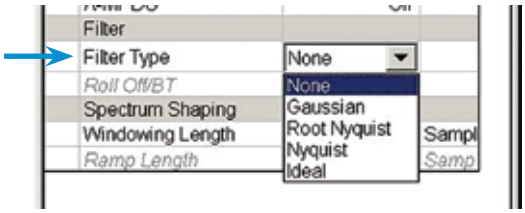
- PPDU format: Non-HT, HT Mixed, HT Greenfield
- MCS: 0 to 76



● Filter Selection

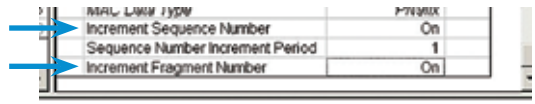
Sets waveform pattern filter conditions for system or Rx specifications.

- None, Gaussian, Root Nyquist, Nyquist, Ideal



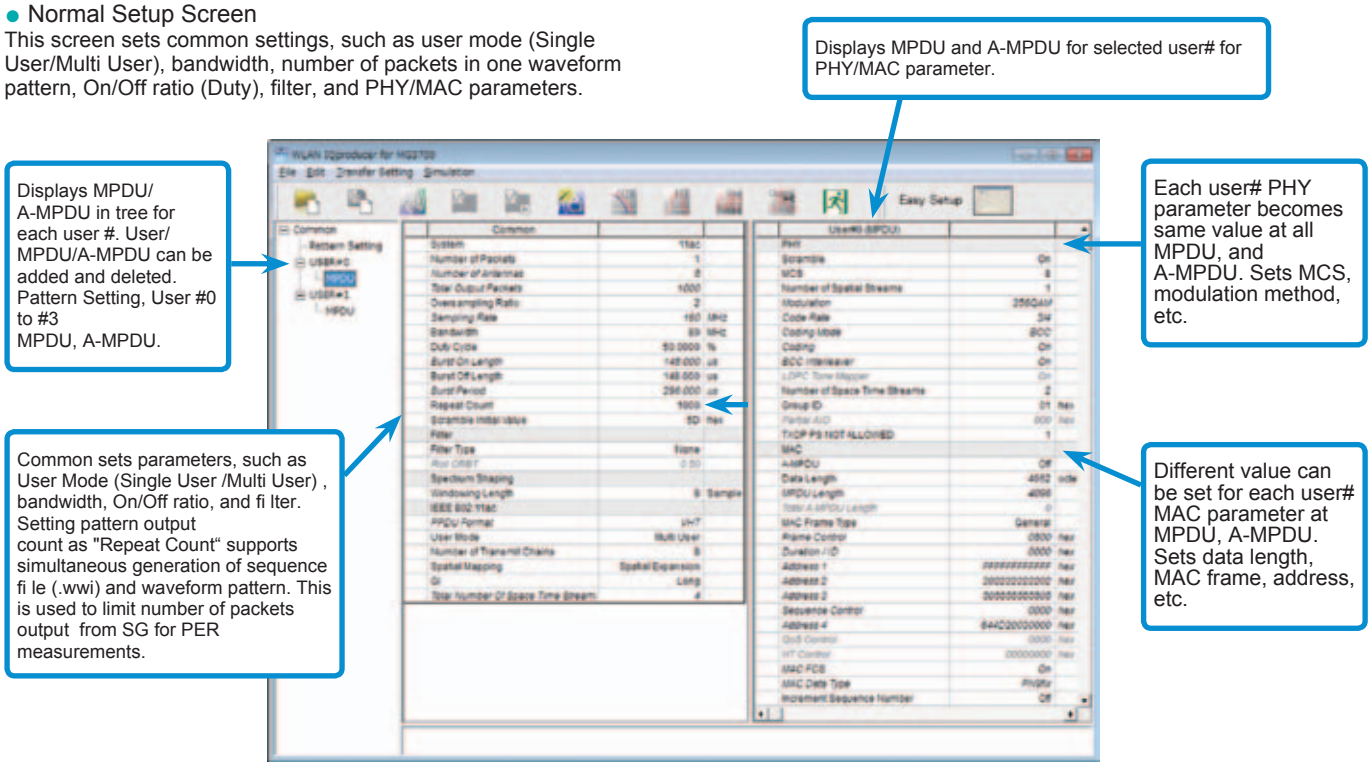
● Increment Selection

Select On/Off matching Rx test conditions.



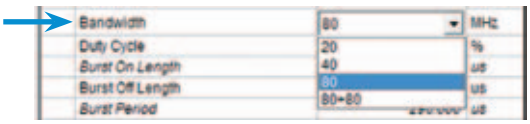
Normal Setup Screen

This screen sets common settings, such as user mode (Single User/Multi User), bandwidth, number of packets in one waveform pattern, On/Off ratio (Duty), filter, and PHY/MAC parameters.



Selects Bandwidth

Selects and sets following
20 MHz, 40 MHz, 80 MHz, 80 + 80 MHz

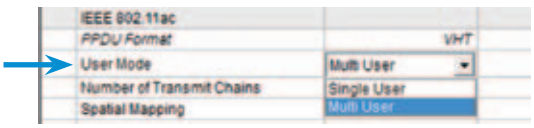


PPDU format

Fixes PPDU format to "VHT".

Selects User Mode

Selects and sets Single User/Multi User.
Sets up to four users from #0 to #3 at Multi User setting.

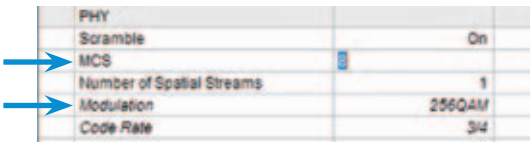


Sets Number of Transmit Chain

Setting range: 1 to 8

Sets MCS

Setting range: 0 to 9
Sets modulation method according to MCS setting.



Supported Vector Signal Generator Series IEEE802.11ac Signal Bandwidth

Vector Signal Generator Series / IEEE802.11ac Signal Bandwidth	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A*1	MG3700A*2	MS2690A series Opt. 020*3	MS2830A Opt. 020/021*3
20 MHz/40 MHz/80 MHz	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)
160 MHz	✓ (1 unit)	—	—	—
80 MHz + 80 MHz (non-contiguous)	✓ (2 RF 1 unit*4, or 1 RF 2 units)	✓ (2 units)	✓ (2 units)	✓ (2 units)

∗1: MX370111A WLAN IQproducer and MX370111A-002 802.11ac (160 MHz) Option installed.
∗2: MX370111A WLAN IQproducer and MX370111A-001 802.11ac (80 MHz) Option installed.
∗3: MX269911A WLAN IQproducer and MX269911A-001 802.11ac (80 MHz) Option installed.
∗4: MG3710A-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

Easy Setup Screen

● Common Parameter Setting Range

Display	Outline	Setting Range
Common		
System	Sets the system	11a, 11ac, 11b, 11g, 11j, 11n, 11p
Number of Packets	Sets the number of packets to be generated	1 to the maximum number of packets for the waveform memory
Repeat Count	Sets the repeat count of packet to be transmitted	1 to 65535
Total Output Packets	Displays the total number of packets (Number of Packets × Repeat Count)	
Bandwidth	Sets the bandwidth	System = 11a/11j: 20 MHz System = 11n: 20 MHz or 40 MHz System = 11p: 10 MHz System = 11ac: 20, 40, 80, 80 + 80 MHz Not available when System = 11b, 11g
Duty Cycle	Sets the On/Off ratio of the burst signal	0.1000 to 99.0000 [%] When setting Duty Cycle, Burst Off Length and Burst Period are automatically calculated. Also, when Burst On Length or Burst Off Length is changed, Duty Cycle is automatically calculated
Burst On Length	Displays the burst on length [us]	Displays the calculated value The calculated result is rounded to a multiple of 1/Sampling Rate [µs]
Burst Off Length	Sets the burst off length [us]	The setting range is decided by the maximum and minimum values of Duty Cycle and the calculated value of Burst On Length
Burst Period	Display the burst period [us]	Displays the calculated value
Filter Type	Sets the filter type	None, Gaussian, Root Nyquist, Nyquist, Ideal
Roll Off/BT	Sets the roll-off factor or BT product	0.1 to 1.00 (The setting is fixed when Filter Type is set to Ideal or None)
Windowing Length	Sets the windowing length	0 to 32 × Oversampling Rate: Available in the following conditions: System = 11a, 11j, 11p, 11n, 11ac System = 11g, and Frame Format = ERP-OFDM, DSSS-OFDM
Ramp Length	Sets the ramp length	0 to 16 × Oversampling Rate: Available in the following conditions: System = 11b System = 11g, and Frame Format = ERP-DSSS, ERP-CCK, ERP-PBCC

● PHY Parameter Setting Range

Display	Outline	Setting Range
PPDU Format	Sets the PPDU Format	System = 11n: Non-HT, HT-Mixed, and HT-Greenfield System = 11ac: VHT
MCS	Sets the MCS	System = 11n: 0 to 7 System = 11ac: 0 to 9 Available in the following conditions: System = 11n, and PPDU Format = HT Mixed, or HT Greenfield, or System = 11ac
Number of Spatial Streams	Sets the number of streams	
Data Rate	Sets the data rate	1, 2, 3, 4.5, 5.5, 6, 9, 11, 12, 18, 22, 24, 27, 33, 36, 48, 54 Not available in the following conditions: System = 11n, and PPDU Format = HT Mixed or HT Greenfield, or System = 11ac
Modulation	Displays the PSDU modulation method	BPSK, QPSK, 16QAM, 64QAM, DBPSK, DQPSK: Not available in the following conditions: System = 11b and Data Rate = 5.5, 11 Mbps System = 11g and Data Rate = 5.5, 11, 22, 33 Mbps System = 11n and PPDU Format = HT Mixed or HT Greenfield
High Rate Modulation	Sets the modulation method for direct sequence spread spectrum	CCK, PBCC: Available in the following conditions: System = 11b System = 11g and Frame Format = ERP-CCK, ERP-PBCC CCK, PBCC is selectable when Data Rate = 5.5 Mbps, 11 Mbps Only PBCC can be set when Data Rate = 22 Mbps, 33 Mbps
Code Rate	Displays the coding rate	1/2, 2/3, 3/4, 5/6 Not available in the following conditions: System = 11b System = 11g, and Data Rate = 1, 2, 5.5, 11, 22, 33 Mbps.
Preamble Type	Sets the preamble type	Long, Short: Available in the following conditions: System = 11b, System = 11g (Only Long can be set when System = 11g, Frame Format = ERP-DSSS, Data Rate = 1 Mbps) (Only Long can be set when System = 11g, and Frame Format = ERP-OFDM) (Only Long can be set when System = 11b, and Data Rate = 1 Mbps)
Frame Format	Sets the secondary modulation method for header and payload	ERP-OFDM, DSSS-OFDM, ERP-DSSS, ERP-CCK, ERP-PBCC: Available in the following conditions: System = 11g
GI	Sets the guard interval length	Short, Long: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield or System = 11ac
Coding Mode	Sets the coding mode	This function can be set in the following cases: System = 11ac

● MAC Parameter Setting Range

Display	Outline	Setting Range
Data Length	Sets the data length	System = 11a, 11b, 11g, 11j, 11p, or System = 11n and PPDU format = Non-HT: 1 to (4095–Diff) System = 11n, and PPDU Format = HT Mixed, or HT Greenfi eld: 1 to (65535–Diff) System = 11ac: 1 to (65535–Diff) Diff = Total Length (Mac Header + FCS) – (Sum of the MAC parameters set to Off in the Frame Format setting screen [octet(s)]) Total Length = 40 [octet(s)]
MPDU Length	Displays the MPDU length	System = 11a, 11b, 11g, 11j, 11p, or System = 11n and PPDU format = Non-HT: (Diff + 1) to 4095 System = 11n, and PPDU Format = HT Mixed, or HT Greenfi eld: (Diff+1) to 65535 System = 11n, and A-MPDU = ON: (Diff + 1) to 4095 System = 11ac: (Diff+1) to 65535 [octet(s)]
MAC Data Type	Sets the type of data assigned to the MAC frame body	PN9fix, PN15fix, 16bit repeat, User File
Frame Control	Sets the frame control	0x0000 to 0xFFFF
Duration/ID	Sets the Duration/ID	0x0000 to 0xFFFF
Address1/2/3/4	Sets the MAC Address1/2/3/4	0x0000 0000 0000 to 0xFFFF FFFF FFFF
Sequence Control	Sets the Sequence Control	0x0000 to 0xFFFF
QoS Control	Sets the QoS Control	0x0000 to 0xFFFF
HT Control	Sets the HT Control	0x0000 0000 to 0xFFFF FFFF
Increment Sequence Number	Sets whether to increment the sequence number	On, Off If set to On, the count-up operation starts from the upper 12 bits of the value specified for Sequence Control, incrementally at each interval specified by Sequence Number Increment Period
Sequence Number Increment Period	Sets the interval to increment the sequence number	1 to 15: This is available when Increment Sequence Number is set to On
Increment Fragment Number	Sets whether to increment the Fragment Number	On, Off If set to On, the count-up operation starts from the lower 4 bits of the value specified for Sequence Control, incrementally for each frame at each interval specified by Sequence Number Increment Period
FCS	Sets whether to enable the MAC check sum function	On, Off

Normal Setup Screen

● Common Parameter Setting Range

Display	Outline	Setting Range
Common		
System	Sets System standard	11a, 11ac, 11b, 11g, 11j, 11n, 11p

● Common Parameter Setting Range (System = other than 11ac)

Display	Outline	Setting Range
Common		
Number of Packets	Sets the number of packets to be generated	1 to the maximum capacity of waveform memory
Number of Antennas	Displays the number of antennas	1 to 4: Displays the value of Number of Transmit Chains in the following conditions: System = 11n, and PPDU Format = HT Mixed, or HT Greenfield The setting is fixed to 1 when the System is other than 11n.
Convolutional Encode	Enables/Disables convolutional encoding	On, Off
Interleave	Enables/Disables interleave processing	On, Off: This is available in the following conditions: System = 11a, 11j, 11n, 11p, System = 11g, and Frame Format = DSSS-OFDM/ERP-OFDM
Scramble	Enables/Disables scramble processing	On, Off
Scramble Initial Value	Sets the initial value of scramble processing	0x00 to 0x7F: Available only for System = 11a, 11n
PBCC Encode	Enables/Disables PBCC encoding	On, Off: This is available in the following conditions: System = 11b and High Rate Modulation = PBCC System = 11g and Frame Format = ERP-PBCC
Oversampling Ratio	Sets oversampling ratio	The setting range for each system is as follows: System = 11b: 4, 8 System = 11a, 11g, 11j, 11n, 11p : 2, 4, 8 System = 11g, Data Rate = 1, 2, 5.5, 11, 22, 33 Mbps : 4, 8 Note, however, that the setting range is 2 and 4 if System = 11n and Bandwidth = 40 MHz
Sampling Rate	Displays the sampling rate	System = 11a: 20 MHz × Oversampling Ratio System = 11b: 11 MHz × Oversampling Ratio System = 11g, Data Rate = 1, 2, 5.5, 11 Mbps: 11 MHz × Oversampling Ratio System = 11g, Data Rate = other than 1, 2, 5.5, 11 Mbps: 20 MHz × Oversampling Ratio System = 11j: 20 MHz × Oversampling Ratio System = 11n, Bandwidth = 20 MHz: 20 MHz × Oversampling Ratio System = 11n, Bandwidth = 40 MHz: 40 MHz × Oversampling Ratio System = 11p: 10 MHz × Oversampling Ratio
Bandwidth	Set bandwidth	System = 11p: 10 MHz System = 11a/11j: 20 MHz System = 11n: 20 MHz or 40 MHz Not available when System = 11b, 11g
Duty Cycle	Sets the On/Off ratio of the burst signal	0.1000 to 99.0000% When Duty Cycle is set, Burst Off Length and Burst Period is automatically calculated. When Burst On Length and Burst Off Length is changed, Duty Cycle is automatically calculated
Burst On Length	Displays Burst On Length [µs]	Displays the calculated value. The calculated result is rounded to a multiple of 1/Sampling Rate [µs]

MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

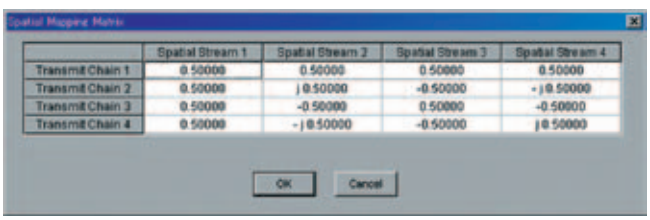
Display	Outline	Setting Range
Burst Off Length	Displays Burst Off Length [µs]	The setting range is decided by the maximum and minimum values of Duty Cycle and the calculated value of Burst On Length. When setting Burst Off Length, Duty Cycle and Burst Period are automatically calculated. Also, Burst Off Length is calculated from the values of Duty Cycle and Burst On Length as below. Burst Off Length = Burst On Length × (100.0 – Duty Cycle)/Duty Cycle
Burst Period	Displays Burst Period [µs]	Displays the calculated value
Repeat Count	Sets the repeat count of packet to be transmitted	1 to 65535
A-MPDU	Enables/Disables A-MPDU	On, Off: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Filter		
Filter Type	Sets the filter type	None, Gaussian, Root Nyquist, Nyquist, Ideal
Roll Off/BT	Sets the roll-off factor or BT product	0.01 to 1.00 (The setting is not available when Filter Type is set to Ideal or None)
Spectrum Shaping		
Windowing Length	Sets the windowing length	0 to 32 × Oversampling Rate: Available in the following conditions: System = 11a, 11j, 11p, 11n System = 11g, and when Frame Format is ERP-OFDM/DSSS-OFDM
Ramp Length	Sets the ramp length	0 to 16 × Oversampling Rate: Available in the following conditions: System = 11b System = 11g, and when Frame Format is ERP-DSSS/ERP-CCK/ERP-PBCC

● Common Parameter Setting Range (System = 11ac)

Display	Outline	Setting Range
Common		
Number of Packets	Sets the number of packets to be generated	1 to the maximum capacity of waveform memory
Number of Antennas	Displays the number of antennas	1 to 8
Total Output Packets	Displays the total number of packets (Number of Packets×Repeat Count)	
Oversampling Ratio	Sets the oversampling ratio	2, 4, 8 Bandwidth = 40 MHz: 2, 4 Bandwidth = 80 MHz/80 + 80 MHz: 2 only. Bandwidth = 160 MHz: invalid.
Sampling Rate	Displays sampling rate	Bandwidth MHz × Oversampling Ratio When the bandwidth is 160 MHz, the sampling rate is fixed to 200 MHz
Bandwidth	Sets the bandwidth	20, 40, 80, 80 + 80 MHz
Duty Cycle	Sets the On/Off ratio of the burst signal	0.1000 to 99.0000 [%] When setting Duty Cycle, Burst Off Length and Burst Period are automatically calculated. Also, when Burst On Length or Burst Off Length is changed, Duty Cycle is automatically calculated
Burst On Length	Displays Burst On Length [µs]	Displays the calculated value (The calculated result is rounded to a multiple of 1/ Sampling Rate [µs])
Burst Off Length	Displays Burst Off Length [µs]	The setting range is decided by the maximum and minimum values of Duty Cycle and the calculated value of Burst On Length. When setting Burst Off Length, Duty Cycle and Burst Period are automatically calculated. Also, Burst Off Length is calculated from the values of Duty Cycle and Burst On Length as below. Burst Off Length = Burst On Length × (100.0 – Duty Cycle)/Duty Cycle
Burst Period	Displays the burst period [µs]	Displays the calculated value
Repeat Count	Sets the repeat count of packet to be transmitted	1 to 65535
Scramble Initial Value	Sets the initial value of scramble processing	0x00 to 0x7F
Filter		
Filter Type	Sets the filter type	None, Gaussian, Root Nyquist, Nyquist, Ideal
Roll Off/BT	Sets the roll-off factor or BT product	0.01 to 1.00 (The setting is not available when Filter Type is set to Ideal or None)
Spectrum Shaping		
Windowing Length	Sets the windowing length	0 to 32 × Oversampling Rate The setting range is 0 to 32 when the bandwidth is 160 MHz
IEEE 802.11ac		
PPDU Format	Displays the PPDU format	VHT
User Mode	Sets the user mode	Single User, Multi User
Number of Transmit Chains	Sets the number of transmit chain	1 to 8 Number of Transmit Chains cannot be set to equal to or under Total Number of Space Time Streams
Spatial Mapping	Sets the spatial mapping	Direct Mapping, Spatial Expansion, Edit Mode This function can be used in the following cases: Direct Mapping is available only when Number of Space Time Streams matches Number of Transmit Chains. When Number of Transmit Chains is 1, only Direct Mapping is available
Edit Mode	Sets the value of Spatial Mapping Matrix	–1.00000 – j1.00000 to 1.00000 + j1.00000 The setting resolution is 0.00001 for both real and imaginary parts
Spatial Mapping Matrix	Sets the Spatial Mapping	Number of Transmit Chains: 1 to 8 Total Number of Space Time Streams: 1 to 8
GI	Sets the guard interval	Short, Long
Total Number of Space Time Streams	Displays the total number of space time stream	1 to 8 Displays the total number of space time streams under each User#

● PHY Parameter Setting Range (System = other than 11ac)

Display	Outline	Setting Range
PPDU Format	Sets the PPDU format	Non-HT, HT Mixed, HT Greenfield: Available in the following conditions: System = 11n
MCS	Sets the MCS	0 to 76: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield Details about the parameters when MCS is set are defined in IEEE 802.11n-2009 20.6
Number of Spatial Streams	Displays the number of spatial streams	1 to 4: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield The displayed value varies according to MCS
High Rate Modulation	Sets the modulation scheme during direct diffusion	CCK, PBCC: Available in the following conditions: System = 11b System = 11g, and Frame Format = ERP-CCK, ERP-PBCC CCK, PBCC is selectable when Data Rate = 5.5 Mbps, 11 Mbps. Only PBCC can be set when Data Rate = 22 Mbps, 33 Mbps
Modulation	Displays the PSDU modulation scheme	BPSK, QPSK, 16QAM, 64QAM, DBPSK, DQPSK: Not available in the following conditions: System = 11b and Data Rate = 5.5, 11 Mbps System = 11g and Data Rate = 5.5, 11, 22, 33 Mbps System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Code Rate	Displays the code rate	1/2, 2/3, 3/4, 5/6 System = 11b System = 11g, and Data Rate = 1, 2, 5.5, 11, 22, 33 Mbps. Display only when System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Data Rate	Sets the data rate	1, 2, 3, 4.5, 5.5, 6, 9, 11, 12, 18, 22, 24, 27, 33, 36, 48, 54 This setting is not available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Preamble Type	Sets the preamble type	Long, Short: Available in the following conditions: System = 11b, System = 11g (Only Long can be set when System = 11g, Frame Format = ERP-DSSS, Data Rate = 1 Mbps) (Only Long can be set when System = 11g, and Frame Format = ERP-OFDM) (Only Long can be set when System = 11b, and Data Rate = 1 Mbps)
Frame Format	Sets the secondary modulation scheme of the header and payload	ERP-OFDM, DSSS-OFDM, ERP-DSSS, ERP-CCK, ERP-PBCC: Available in the following conditions: System = 11g
Spatial Mapping	Sets the spatial mapping mode	Direct Mapping, Spatial Expansion, Edit Mode: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield (Direct Mapping is available only when: Number of Space Time Streams = Number of Transmit Chains) (Direct Mapping can be set only when: Number of Transmit Chains = 1)
Edit Mode	Sets spatial mapping matrix	–1.00000–j1.00000 to 1.00000+j1.00000 The setting resolution is 0.00001 for both real and imaginary parts
Spatial Mapping Matrix	Extends the stream from space time stream to transmit chains	Number of Transmit Chains 1 to 4 Number of Space Time Streams 1 to 3
GI	Sets the guard interval	Short, Long: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Smoothing	Enables/Disables smoothing processing	On, Off: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Not Sounding	Enables/Disables not sounding processing	On, Off: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Number of Transmit Chains	Sets number of transmit chains	1 to 4: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield A value equal to or greater than that set for Number of Space Time Streams can be set for Number of Transmit Chains
Number of Space Time Streams	Sets the number of space time streams	1 to 4: Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield A value equal to or greater than that set for Number of Spatial Streams can be set for Number of Space Time Streams
Number of Extension Spatial Streams	Sets number of extension spatial streams	0 to (Number of Transmit Chains–Number of Space Time Streams): Available in the following conditions: System = 11n and PPDU Format = HT Mixed, or HT Greenfield
Half Bandwidth	Sets the carrier arrangement when bandwidth = 40 MHz	Lower Mode, Upper Mode, N/A: This is available only when System = 11n and Bandwidth = 40 MHz (Only N/A can be set when in MCS32) (Only the lower 20 MHz of a 40 MHz channel is transmitted when Lower Mode is specified. N/A transmits 40 MHz channel as is) (Only the upper 20 MHz of a 40 MHz channel is transmitted when Upper Mode is specified. N/A transmits 40 MHz channel as is)



Edit Mode in Spatial Mapping

System = 11ac, System = 11n, PPDU Format = HT Mixed or HT Greenfield,
Can be set when Spatial Mapping = Edit Mode.

MX370111A WLAN IQproducer
MX370111A-001 802.11ac (80 MHz) Option

Optional

● PHY Parameter Setting Range (System = 11ac)

Display	Outline	Setting Range
Scramble	Enables/disables scramble processing	On, Off
MCS	Sets the MCS	0 to 9
Number of Spatial Streams	Sets the number of spatial streams	1 to 8 The setting range is 1 to 4 when the user mode is Multi User
Modulation	Displays the modulation scheme of PSDU	BPSK, QPSK, 16QAM, 64QAM, 256QAM The value depends on MCS
Code Rate	Displays the code rate	1/2, 2/3, 3/4, 5/6 The value depends on MCS
Coding	Sets of the coding is On or Off	Fixed to On for System = 11ac
Coding Mode	Sets the coding mode	Fixed to BCC for System = 11ac
BCC Interleaver	Enables/disables BCC Interleaver	Fixed to On for System = 11ac
LDPC Tone Mapper	Enables/disables LDPC Tone Mapper	On, Off Void for System = 11ac
Number of Space Time Streams	Sets the number of space time stream	The same value as Number of Spatial Stream, Number of Spatial Stream × 2 Number of Spatial Streams × 2 is settable only when Number of Spatial Streams × 2 ≤ Number of Transmit Chains. When the user mode is set to Multi User, Number of Spatial Streams × 2 is not settable unless Number of Spatial Streams ≤ 2 for each User#
Group ID	Sets the group ID	0x00, 0x3F (User Mode = Single User) 0x01 to 0x3E (User Mode = Multi User)
Partial AID	Sets Partial AID	0x000 to 0x1FF Void when User Mode = Multi User
TXOP PS NOT ALLOWED	Sets TXOP PS NOT ALLOWED	0, 1

● MAC Parameter Setting Range (System = other than 11ac)

Display	Outline	Setting Range
Data Length	Sets the data wavelength	System = 11a, 11b, 11g, 11j, 11p, or System = 11n and PPDU format = Non-HT: 1 to (4095–Diff) System = 11n, and PPDU Format = HT Mixed, or HT Greenfield: 1 to (65535–Diff) Diff refers to a value (octets) obtained by subtracting the value of Total Length (MAC header + FCS) from the total number of MAC parameters that are set to Off in the MAC Frame Format setting window. Total Length = 40 [octet (s)]
MPDU Length	Displays the MPDU length	System = 11a, 11b, 11g, 11j, 11p, or System = 11n and PPDU format = Non-HT: (Diff+1) to 4095 System = 11n, and PPDU Format = HT Mixed, or HT Greenfield: (Diff+1) to 65535 System = 11n, and A-MPDU = ON: (Diff+1) to 4095
MAC Frame Type	Sets the MAC Frame type	MAC information can be set (See diagram below)
MAC Data Type	Displays the type of data assigned to the MAC frame body	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets 16-bit data to be assigned to the MAC frame body	0x0000 to 0xFFFF (This parameter is displayed only when 16 bit repeat is selected for MAC Data Type)
Data Type User File	Sets a user file to be assigned to the MAC frame body	Any file can be selected (This parameter is displayed only when User File is selected for MAC Data Type)
Frame Control	Sets the frame control	0x0000 to 0xFFFF
Duration/ID	Sets the Duration/ID	0x0000 to 0xFFFF
Address1/2/3/4	Sets the address1/2/3/4	0x0000 0000 0000 to 0xFFFF FFFF FFFF
Sequence Control	Sets the sequence control	0x0000 to 0xFFFF
QoS Control	Sets the QoS control	0x0000 to 0xFFFF
HT Control	Sets the HT control	0x0000 0000 to 0xFFFF FFFF
MAC FCS	Enables/Disables the MAC FCS	On, Off
Increment Sequence Number	Enables/Disables the Increment sequence number	On, Off If set to On, the count-up operation starts from the upper 12 bits of the value specified for Sequence Control, incrementally at each interval specified by Sequence Number Increment Period
Sequence Number Increment Period	Sets the interval to count up the sequence number	1 to 15: This is available when Increment Sequence Number is set to On
Increment Fragment Number	Enables/Disables the Increment fragment number	On, Off If set to On, the count-up operation starts from the lower 4 bits of the value specified for Sequence Control, incrementally for each packet at each interval specified by Sequence Number Increment Period

MAC Frame Format Setting Screen

Opened by double-clicking MAC Frame Type [General] on MAC parameter setting screen

● MAC Parameter Setting Range (System = 11ac)

Display	Outline	Setting Range
A-MPDU	Enables/disables A-MPDU for each User#	On, Off If A-MPDU is set to Off in one A-MPDU#, all MPDU/A-MPDU# under other User#s are all set to Off
Data Length	Set the data length	1 to (65535 – Diff) (A-MPDU = Off) 1 to (16384 – Diff) (A-MPDU = On) Diff = Total Length(Mac Header + FCS) – (Sum of MAC parameters [octet(s)] that are Off on MAC Frame Format setting window.) Total Length = 40 [octet(s)]
MPDU Length	Displays the MPDU length	(Diff + 1) to 65535 (A-MPDU = Off) (Diff + 1) to 16384 (A-MPDU = On) When Oversampling Ratio = 8, Bandwidth = 20 MHz, MCS = 0, Number of Spatial Streams = 1, A-MPDU = Off: (Diff + 1) to 42500
Total A-MPDU Length	Displays the total A-MPDU Length directly under each User#	1 to 262140 Void when A-MPDU is Off
MAC Frame Type	Sets the type of MAC Frame	Sets the MAC information
MAC Data Type	Sets the data type to be inserted into Mac Frame body	PN9fix, PN15fix, 16bit repeat, User File
Data Type Repeat Data	Sets the 16 bit data to be inserted into Mac Frame body	0x0000 to 0xFFFF (This parameter is displayed only when 16 bit repeat is selected for MAC Data Type)
Data Type User File	Sets the user file to be inserted into Mac Frame body	Any file can be selected (This parameter is displayed only when User File is selected for MAC Data Type)
Frame Control	Sets the frame control	0x0000 to 0xFFFF
Duration/ID	Sets Duration/ID	0x0000 to 0xFFFF
Address1/2/3/4	Sets MAC Address1/2/3/4	0x0000 0000 0000 to 0xFFFF FFFF FFFF
Sequence Control	Sets the Sequence Control	0x0000 to 0xFFFF
QoS Control	Sets the QoS Control	0x0000 to 0xFFFF
HT Control	Sets the HT Control	0x0000 0000 to 0xFFFF FFFF
MAC FCS	Enables/disables the MAC FCS	On, Off
Increment Sequence Number	Enables/disables the Increment of Sequence Number	On, Off If the Increment of Sequence Number sets to On, the count-up operation starts from the upper 12 bits of the value specified for Sequence Control, incrementally at each interval specified by Sequence Number Increment Period
Sequence Number Increment Period	Sets the interval to count up the sequence number	1 to 15 This is available when Increment Sequence Number or Increment Fragment Number is set to On
Increment Fragment Number	Enables/disables the Increment Fragment Number	On, Off If Increment Fragment Number sets to On, the count-up operation starts from the lower 4 bits of the value specified for Sequence Control, incrementally for each packet at each interval specified by Sequence Number Increment Period

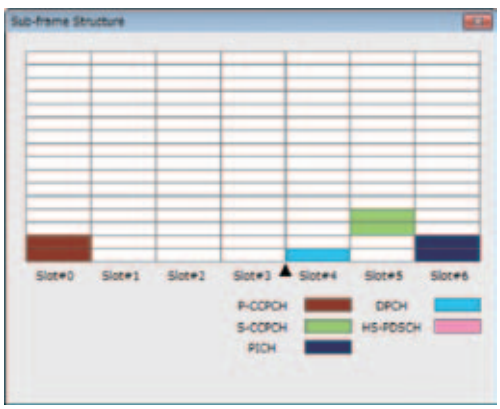
MX370112A TD-SCDMA IQproducer

Optional

MX370112A TD-SCDMA IQproducer is PC application software with a GUI for changing parameters and generating waveform patterns in compliance with TD-SCDMA specifications standardized by 3GPP TS 25.221, TS 25.222, TS 25.223, TS 25.105, TS 25.142 (supports TRx tests excluding performance tests).

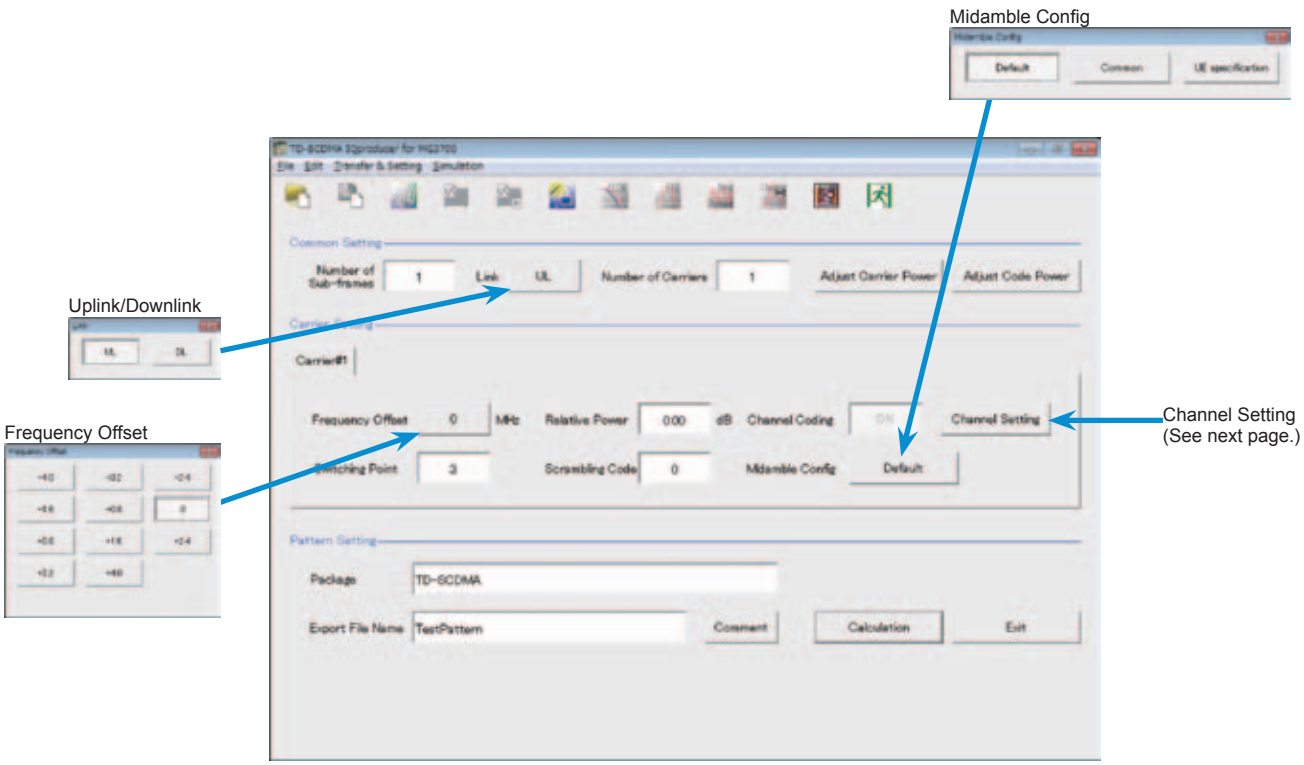
● Sub-frame Structure Screen

Displays RU (Resource Unit) for each channel in different colors.
Arranges in cells for 7 slots (for 1 Sub-frame) in RU units.
Horizontal axis: Time Slot, 7RU
Vertical axis: Channel Code, 16RU



● TD-SCDMA IQproducer Setting Screen

Supports both uplink and downlink and settings for up to 6 carriers.



TD-SCDMA IQproducer Setting Screen

• Channel Setting Screen

Sets channel parameters for carriers with different channel for uplink and downlink.

For Uplink
- UpPCH
- DPCH

For Downlink
- P-CCPCH
- S-CCPCH
- DwPCH
- PICH
- DPCH
- HS-PDSCH

Uplink/UpPCH

Uplink/DPCH

Downlink/P-CCPCH

Downlink/S-CCPCH

Downlink/DwPCH

Downlink/PICH

Downlink/DPCH

Downlink/HS-PDSCH

MX370112A TD-SCDMA IQproducer

Optional

• Common Setting

Display	Outline	Setting Range
Number of sub-frames	Sets the number of sub-frames	<Table 1>
Link	Sets DL or UL	UL, DL
Number of Carriers	Sets number of carriers	1 to 6
Adjust Carrier Power	Adjusts Relative Power of each Carrier so that the maximum value of Relative Power is 0.00 dB	
Adjust Code Power	Adjusts each Carrier so that the maximum value of the channel Power is 0.00 dB	

Table 1

	Memory Option	Without Option 21 (Memory 512 Msamples)	With Option 21 (Memory 512 Msamples)
MG3700A	1	10485	20971
	2	5242	10485
	3 to 6	2621	5242

• Carrier Setting

Display	Outline	Setting Range
Frequency Offset	Sets carrier frequency offset	–4.0, –3.2, –2.4, –1.6, –0.8, 0, +0.8, +1.6, +2.4, +3.2, +4.0 MHz The frequency offset range of selectable carrier varies according to the setting of Number of Carriers.
Relative Power	Sets the level ratio of selected carrier	0.00 to –40.00 dB, Resolution 0.01 dB
Channel Coding	Enables/disables channel coding	Link = DL: Off Link = UL: On You cannot change the parameter of this function with this version.
Switching Point	Sets a Switching Point position (switching timing between DL and UL)	1 to 6 (This is set after Time Slot with the same value.) When Link is DL, a value beyond Time Slot (later in time) where Channel is already allocated cannot be set to Switching Point. When Link is UL, a value smaller than Time Slot (earlier in time) where Channel is already allocated cannot be set to Switching Point.
Scrambling Code	Sets the scrambling code	0 to 127
Midamble Config	Displays the Midamble Config.	Default, Common, UE Specification

• Channel Setting

Display	Outline	Setting Range
When Link is DL		
P-CCPCH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Data Type	Sets the data type to be mapped to channel	PN9, PN15, All 0, All 1, User File
Midamble Config	Displays the Midamble Config.	The Midamble Config value set in Carrier Setting will be displayed.
Midamble K	Displays the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
SF	Displays the spreading factor	Display only
S-CCPCH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Time Slot	Sets the position of Time Slot to be allocated	0, 2 to 6
Data Type	Sets the data type to be mapped to channel	PN9, PN15, All 0, All 1, User File
Channel Code	Sets the Channelization Code	1 to 15
Midamble Config	Displays the Midamble Config.	The Midamble Config value set in Carrier Setting will be displayed.
Midamble K	Sets the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
SF	Displays the spreading factor	Display only
DwPCH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Sync-DL code	Sets the Sync-DL code	It is auto-calculated from the Scrambling Code of Carrier Setting.
PICH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Time Slot	Sets the position of Time Slot to be allocated	0, 2 to 6
Channel Code	Sets the Channelisation Code	1 to 15
Data Type	Sets the data type to be mapped to channel	PN9, PN15, All 0, All 1, User File
Midamble Config	Displays the Midamble Config.	The Midamble Config value set in Carrier Setting will be displayed.
Midamble K	Sets the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
SF	Displays the spreading factor	Display only

Display	Outline	Setting Range
DPCH		
Number of RMC	Sets the number of RMC	1 to 8
RMC	Sets the RMC number, which edits detailed parameter	1 to Number of RMC
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Time Slot	Sets the position of Time Slot to be allocated	0, 2 to 6
Channel Code	Sets the Channelisation Code	1 to SF
DTCH Data Type	Sets the data type to be mapped to channel	PN9, PN15, All 0, All 1, User File
SF	Sets the spreading factor	1, 16
Midamble Config	Displays the Midamble Config.	The Midamble Config value set in Carrier Setting will be displayed.
Midamble K	Sets the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
Number of DPCH per TS	Sets the number of DPCH per each time slot	1 to (SF – Channel Code + 1)
HS-PDSCH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Time Slot	Sets the position of Time Slot to be allocated	0, 2 to 6
Channel Code	Sets the Channelisation Code	1 to SF
Data Type	Sets the data type to be mapped to channel	PN9, PN15, All 0, All 1, User File
Midamble Config	Displays the Midamble Config.	The Midamble Config value set in Carrier Setting will be displayed.
Midamble K	Sets the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
Number of HS-PDSCH per TS	Sets the number of HS-PDSCH per each time slot	1 to SF
Number of TS	Sets the number of time slots that HS-PDSCH uses	1 to (6 – Switching Point)
SF	Sets the spreading factor	1, 16
Modulation	This sets the modulation method of HS-DPCH	QPSK, 16QAM, 64QAM
When Link is UL		
UpPCH		
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
Sync-UL code	Displays the Sync-UL code	floor (Scrambling Code / 4) × 8 to floor (Scrambling Code / 4) × 8 + 7 Where floor(x) is the function for finding the largest integer that does not exceed x.
DPCH		
Number of RMC	Sets the number of RMC	1 to 8
RMC	Sets the RMC number, which edits detailed parameter	1 to Number of RMC
State	Turns On/Off the channel	On, Off
Power	Sets channel power	0.00 to –40.00 dB, Resolution 0.01 dB
RMC Type	Sets the RMC type	12.2 kbps, 64 kbps, 144 kbps, 384 kbps 144 kps is available when the difference of Switching Point – (Time Slot –1) is 2 or more. 384 kps is available when the difference of Switching Point – (Time Slot –1) is 4 or more.
Time Slot	Sets the position of Time Slot to be allocated	1 to 6
Channel Code	Sets the Channelisation Code	1 to SF
DTCH Data Type	Sets the data type to be mapped to DTCH	PN9, PN15, All 0, All 1, User File
DTCH Rate Matching Attribute	Sets the Rate Matching attribute of DTCH	Display only
DCCH Data Type	Sets the data type to be mapped to DCCH	PN9, PN15, All 0, All 1, User File
DCCH Rate Matching Attribute	Displays the Rate Matching attribute of DCCH	Display only
SF	Displays the spreading factor	Display only
TFCI	Sets the TFCI (Transport Format Combination Indicator)	0 to 31
TPC	Sets the TPC (Transmitter Power Control)	Repeat 1010, Repeat 0101, All 0, All 1, User File
SS	Sets the synchronization shift parameter	Repeat 1010, Repeat 0101, All 0, All 1, User File
Midamble Config.	Displays the Midamble Config.	The Midamble Config. value set in Carrier Setting will be displayed.
Midamble K	Sets the Midamble K value	2, 4, 6, 8, 10, 12, 14, 16
UE spec shift	Sets the UE spec shift value	1 to Midamble K
Block Size	Sets the block size of information data	Display only

Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No.	Name	Remarks
MG3700A	**— Main frame —** Vector Signal Generator	
	— Standard accessories —	
	Power Cord: 1 pc	
J1276	LAN Straight Cable: 1 pc	10 cm, For U link connection on Rear panel
	CompactFlash: 1 pc	64 MB or more
J1254	CompactFlash Adapter: 1 pc	
Z0742	MG3700A CD-ROM: 1 pc	Main frame operation manual, IQproducer operation manual, Standard waveform operation manual, IQproducer software
	— Options —	
MG3700A-002	Mechanical Attenuator	Changes standard electronic attenuator to mechanical attenuator
MG3700A-011	Upper Frequency 6 GHz	250 kHz to 3 GHz extended to 250 kHz to 6 GHz
MG3700A-021	ARB Memory Upgrade 512 Msample	Extends standard 128 Msample/channel × 2 to 256 Msample/channel × 2
MG3700A-031	High Speed BER Test Function	Extends standard BER test function
MG3700A-102	Mechanical Attenuator Retrofit	Retrofitted to shipped MG3700A
MG3700A-103	Electronic Attenuator Retrofit	Retrofitted to shipped MG3700A
MG3700A-111	Upper Frequency 6 GHz Retrofit	Retrofitted to shipped MG3700A
MG3700A-121	ARB Memory Upgrade 512 Msample Retrofit	Retrofitted to shipped MG3700A
MG3700A-131	High Speed BER Test Function Retrofit	Retrofitted to shipped MG3700A
	— Maintenance service —	
MG3700A-ES210	Extended Warranty Service	2 years
MG3700A-ES310	Extended Warranty Service	3 years
MG3700A-ES510	Extended Warranty Service	5 years
	— Softwares (Waveform pattern) —	
MX370001A	TD-SCDMA Waveform Pattern	
MX370002A	Public Radio System Waveform Pattern	RCR STD-39, ARIB STD-T61/T79/T86
MX370073A	DFS Radar Pattern	WLAN 5.3/5.6 GHz band DFS tests (for TELEC and FCC)
MX370075A	DFS (ETSI) Waveform Pattern	WLAN 5.3/5.6 GHz DFS test (ETSI)
	— Softwares (License key for IQproducer system) —	
MX370101A	HSDPA/HSUPA IQproducer	
MX370102A	TDMA IQproducer	
MX370103A	CDMA2000 1xEV-DO IQproducer	
MX370104A	Multi-carrier IQproducer	
MX370105A	Mobile WiMAX IQproducer	
MX370106A	DVB-T/H IQproducer	
MX370107A	Fading IQproducer	
MX370108A	LTE IQproducer	
MX370108A-001	LTE-Advanced FDD Option	Requires MX370108A.
MX370109A	XG-PHS IQproducer	
MX370110A	LTE TDD IQproducer	
MX370110A-001	LTE-Advanced TDD Option	Requires MX370110A.
MX370111A	WLAN IQproducer	
MX370111A-001	802.11ac (80 MHz) Option	Requires MX370111A. Only for MG3700A.
MX370112A	TD-SCDMA IQproducer	
	— Optional accessories —	
Z0777	Standard Waveform Pattern Upgrade Kit	DVD 4 piece sets
W2495AE	MG3700A Operation Manual (Main Unit)	
W2496AE	MG3700A Operation Manual (IQproducer)	
W2539AE	MG3700A Operation Manual (Standard Waveform Pattern)	
W2533AE	MX370001A Operation Manual	TD-SCDMA Waveform Pattern
W3596AE	MX370073A Operation Manual	DFS Rader Pattern (TELEC and FCC)
W3597AE	MX370075A Operation Manual	DFS (ETSI) Waveform Pattern
W2503AE	MX370101A Operation Manual	HSDPA/HSUPA IQproducer
W2504AE	MX370102A Operation Manual	TDMA IQproducer
W2505AE	MX370103A Operation Manual	CDMA2000 1xEV-DO IQproducer
W2633AE	MX370104A Operation Manual	Multi-carrier IQproducer
W2734AE	MX370105A Operation Manual	Mobile WiMAX IQproducer
W2798AE	MX370106A Operation Manual	DVB-T/H IQproducer
W2995AE	MX370107A Operation Manual	Fading IQproducer
W3022AE	MX370108A Operation Manual	LTE IQproducer
W3152AE	MX370109A Operation Manual	XG-PHS IQproducer
W3221AE	MX370110A Operation Manual	LTE TDD IQproducer
W3488AE	MX370111A Operation Manual	WLAN IQproducer
W3582AE	MX370112A Operation Manual	TD-SCDMA IQproducer
G0141	HDD ASSY	Hard disk
K240B	Power Divider (K connector)	DC to 26.5 GHz, K-J, 50Ω, 1 Wmax
MA1612A	Four-port Junction Pad	5 MHz to 3 GHz, N-J
MP752A	Termination	DC to 12.4 GHz, 50Ω, N-P
MA2512A	Band Pass Filter	For W-CDMA, Pass band: 1.92 GHz to 2.17 GHz

Model/Order No.	Name	Remarks
J0576B	Coaxial Cord, 1.0 m	N-P · 5D-2W · N-P
J0576D	Coaxial Cord, 2.0 m	N-P · 5D-2W · N-P
J0127A	Coaxial Cord, 1.0 m	BNC-P · RG-58A/U · BNC-P
J0127B	Coaxial Cord, 2.0 m	BNC-P · RG-58A/U · BNC-P
J0127C	Coaxial Cord, 0.5 m	BNC-P · RG-58A/U · BNC-P
J0322A	Coaxial Cord, 0.5 m	SMA-P · SMA-P, DC to 18 GHz, 50Ω
J0322B	Coaxial Cord, 1.0 m	SMA-P · SMA-P, DC to 18 GHz, 50Ω
J0322C	Coaxial Cord, 1.5 m	SMA-P · SMA-P, DC to 18 GHz, 50Ω
J0322D	Coaxial Cord, 2.0 m	SMA-P · SMA-P, DC to 18 GHz, 50Ω
J0004	Coaxial Adapter	N-P · SMA-J Conversion Adapter, DC to 12.4 GHz
J1261B	Ethernet Cable (Shield Type)	Straight-through, 3 m
J1261D	Ethernet Cable (Shield Type)	Cross, 3 m
J0008	GPIB Cable, 2.0 m	
J1277	IQ Output Conversion Adapter	D-Sub/BNC
B0329C	Front Cover for 1MW 4U	
B0331C	Front Panel Handle Kit	2 pcs/set
B0332	Joint Plate	4 pcs/set
B0333C	Rack Mount Kit	EIA
B0334C	Hardtype Carrying Case	With Front cover and Casters

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Specifications are subject to change without notice.

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