Anritsu Advancing beyond

Vector Signal Generator	MG3710A/MG3710E
Analog Signal Genereaor	MG3740A
Digital Modulation Option	MG3740A-020

MX370x series software

MX3701xxA IQproducer

The MG3710A/MG3710E Vector Signal Generator supports up to two RF output connectors each with two waveform memories.
One RF output connector can output two combined modulation signals, while two connectors can output four modulation signals. As a result, one MG3710A/MG3710E can output wanted + interference signals, wanted + delay signals, and multicarrier signals, which normally requires two vector signal generators, helping cut setup and operation times.
The MG3710A/MG3710E has a wide vector modulation bandwidth, large arbitrary waveform memory, and outputs digital modulation signals for major mobile communications technologies. Today's mobile communications are focused mainly on mobile telephones and wireless LAN and the MG3710A/MG3710E offers the ideal signal-generation functions and performance needed for the latest wideband wireless communications. The built-in arbitrary waveform generator outputs modulation signals simply by selecting the waveform pattern matching the required communication method.

The following four categories of waveform patterns are supported:

- Standard waveform patterns
- Waveform patterns generated by optional MX3700xxA/MX3710xxA 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 MG3710A/MG3710E 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 MG3710A/MG3710E. The embedded Windows application IQproducer saves generated arbitrary waveform pattern files to the internal hard disk and signals are output simply by selecting the waveform pattern. In addition, a user-generated custom IQ sample file in ASCII format created by common Electronic Design Automation (EDA) software such as MATLAB, can be converted into a custom waveform pattern file for the MG3710A/MG3710E.

Maximum Waveform Pattern Size and Required Options for Simultaneous Use

1stRF (Option 032/034/036)

Combination of Baseband Signal (Option 048)	ARB Memory Upgrade 256 Msample (Option 045) ARB Memory Upgrade 1024 Msample (Option 046)*3		
	W/O	With Option 045	With Option 046
W/O	64 Msamples × 1 pc	256 Msamples × 1 pc	1024 Msamples × 1 pc*1
With Option 048*2	64 Msamples × 2 pcs 128 Msamples × 1 pc	256 Msamples × 2 pcs 512 Msamples × 1 pc	1024 Msamples × 2 pcs*1

2ndRF (Option 062/064/066)

Combination of Baseband Signal (Option 078)	ARB Memory Upgrade 256 Msample (Option 075) ARB Memory Upgrade 1024 Msample (Option 076)*3		
	W/O	With Option 075	With Option 076
W/O	64 Msamples × 1 pc	256 Msamples × 1 pc	1024 Msamples × 1 pc*1
With Option 078*2	64 Msamples × 2 pcs 128 Msamples × 1 pc	256 Msamples × 2 pcs 512 Msamples × 1 pc	1024 Msamples × 2 pcs*1

*1: The maximum size per waveform pattern supported by the MG3710A/MG3710E varies with the IQproducer version.
*2: The Baseband Signal Combine option supports two ARB memories and can either set two different waveform patterns or combine them as one memory to support one large waveform pattern.
*3: Does not support MG3740A.

MG3740A with MG3740A-020 Digital Modulation Option supports the following two categories of waveform patterns are supported:

- Waveform patterns generated by optional MX3701xxA IQproducer software
  TDMA IQproducer MX370102A
  Fading IQproducer MX370107A
- Waveform patterns converted from data generated by common signal-generation software
- IQproducer Support Systems

Main frame support IQproducer

IQproducer Support Systems			MG3710A/MG3710E	MG3740A Digital Modulation Option (Option 020)
Standard Accessories	W-CDMA IQproducer		✓	—
	AWGN IQproducer		✓	—
Option	HSDPA/HSUPA IQproducer	MX370101A	✓	—
	TDMA IQproducer	MX370102A	✓	✓
	CDMA2000 1xEV-DO IQproducer	MX370103A	✓	—
	Multi-carrier IQproducer	MX370104A	✓	—
	DVB-T/H IQproducer	MX370106A	✓	—
	Fading IQproducer	MX370107A	✓	✓
	LTE IQproducer	MX370108A	✓	—
	LTE-Advanced FDD Option	MX370108A-001	✓	—
	LTE TDD IQproducer	MX370110A	✓	—
	LTE-Advanced TDD Option	MX370110A-001	✓	—
	WLAN IQproducer	MX370111A	✓	—
	802.11ac (160 MHz) Option	MX370111A-002	✓	—
	TD-SCDMA IQproducer	MX370112A	✓	—
	5G NR TDD sub-6 GHz IQproducer	MX370113A	✓	—
	5G NR FDD sub-6 GHz IQproducer	MX370114A	✓	—

MX370x Series Software

Selection Guide

Communication system		Page	5G NR TDD sub-6 GHz	5G NR FDD sub-6 GHz	LTE (FDD)	LTE-Advanced (FDD)	LTE (TDD)	LTE-Advanced (TDD)	W-CDMA	HSDPA (Test Model5)	HSDPA/HSUPA	1xEV-DO	CDMA2000	GSM/EDGE	TD-SCDMA	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 (FCC, Japan MIC)	DFS (ETSI)	Mobile WiMAX (IEEE802.16e)	Bluetooth	GPS, GLONASS, QZSS	RCR STD-39 ARIB STD-T61/T79/T86	ARIB STD-T98/T102/B54	APCO P25, NXDN, DMR, TETRA
Waveform pattern*1	MX371099A Preinstalled				✓		✓		✓	✓		✓	✓	✓			✓	✓		✓		✓					✓	✓	✓			
	MX370073B DFS (FCC, Japan MIC)																								✓						
	MX370075A DFS (ETSI)																									✓					
	MX371054A Interference Signal (LTE UE receiver test)				✓	✓	✓	✓																							
	MX371055A Interference Signal (5G UE receiver test)		✓	✓																											
IQproducer	Standard accessories AWGN	5																													
	Standard accessories W-CDMA	7							✓																						
	MX370101A HSDPA/HSUPA	9							✓		✓																				
	MX370102A TDMA	13														✓	✓	✓	✓											✓*5	✓*5	✓*6
	MX370103A CDMA2000 1xEV-DO	16										✓																				
	MX370104A Multi-carrier	20	Multi-carrier IQproducer is software that generates the multi carrier signal based on waveform pattern of various telecommunications systems.																													
	MX370106A DVB-T/H	25																			✓											
	MX370107A Fading	28	Fading IQproducer is software that generates the Fading signal based on waveform pattern of various telecommunication systems.																													
	MX370108A LTE FDD	32			✓																										
	MX370108A-001*2 LTE-Advanced FDD	32				✓																										
	MX370110A LTE TDD	48					✓																									
	MX370110A-001*3 LTE-Advanced TDD	48						✓																								
	MX370111A WLAN	63																					✓									
	MX370111A-002*4 802.11ac (160 MHz)	63																						✓								
	MX370112A TD-SCDMA	75													✓																	
	MX370113A 5G NR TDD sub-6 GHz	79	✓																													
	MX370114A 5G NR FDD sub-6 GHz	85		✓																												

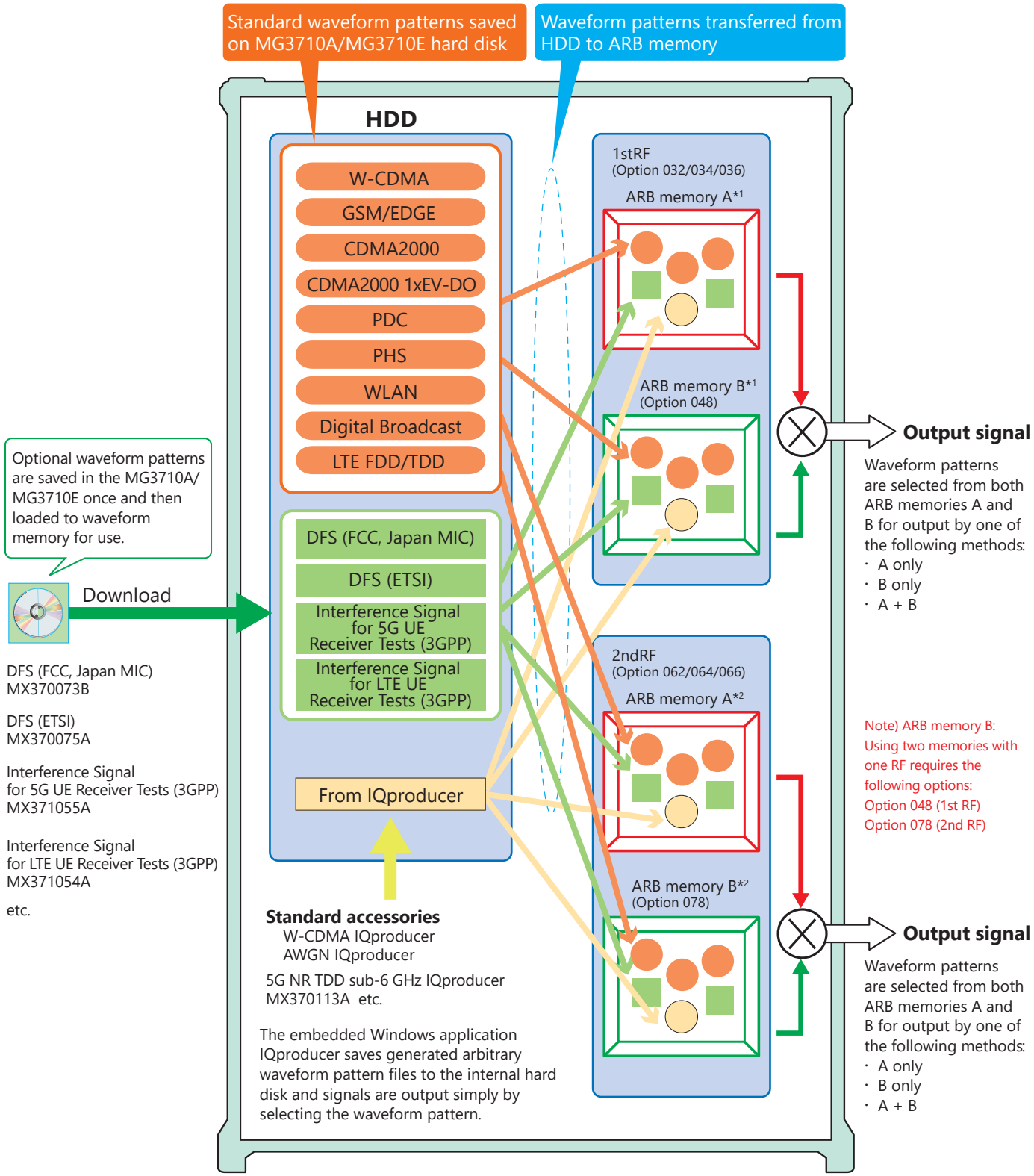
*1: Read the MX3700xxA Waveform Pattern series catalog.
*2: Requires MX370108A.
*3: Requires MX370110A.
*4: Requires MX370111A.
*5: Sample waveform patterns for each communication system can be downloaded from the Anritsu software download site (requires user and MG3740A product registration). <https: //my.anritsu.com/home>
*6: Sample waveform patterns for each communication system can be downloaded from the Anritsu software download site (requires user and MG3710A/MG3710E product registration). <https: //my.anritsu.com/home>

IQproducer Operating Environment

OS	Windows 2000 Professional*7, Windows XP*8, Windows Vista*9, Windows 7 Enterprise (32-bit)*8, Windows 7 Professional (32-bit/64-bit)*8, Windows 10*10
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.

*7: Does not support IQproducer Version 13.00 and later
*8: Supports IQproducer Version 12.00 and later
*9: Supports IQproducer Version 12.00 to Version 16.01
*10: Supports IQproducer Version 17.00 and later

Vector Signal Generator MG3710A/MG3710E



*1: 1stRF ARB memory size
256 MB × 1 pc = 64 Msamples (Std.)
1 GB × 1 pc = 256 Msamples × 1 pc (Option 045)
1 GB × 2 pcs = 256 Msamples × 2 pcs (Option 045 + Option 048)
4 GB × 1 pc = 1024 Msamples × 1 pc (Option 046)
4 GB × 2 pcs = 1024 Msamples × 2 pcs (Option 046 + Option 048)

*2: 2ndRF ARB memory size
256 MB × 1 pc = 64 Msamples (Std.)
1 GB × 1 pc = 256 Msamples × 1 pc (Option 075)
1 GB × 2 pcs = 256 Msamples × 2 pcs (Option 075 + Option 078)
4 GB × 1 pc = 1024 Msamples × 1 pc (Option 076)
4 GB × 2 pcs = 1024 Msamples × 2 pcs (Option 076 + Option 078)

Additive White Gaussian Noise (AWGN) IQproducer

Standard accessory **MG3710A/MG3710E**

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 (B)/Wanted Signal BW (A)

(With Unspecified Wanted Signal)
Wanted Signal BW,
AWGN BW (B)/Wanted Signal BW (A)
Sampling Rate

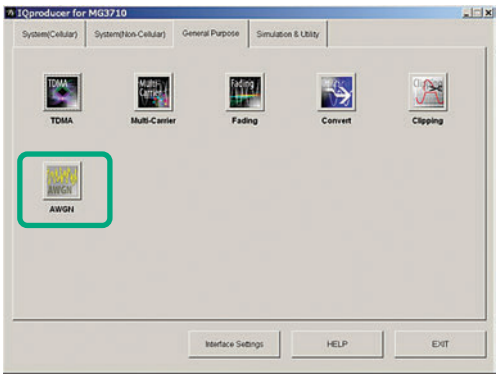
Main Parameter Settings

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

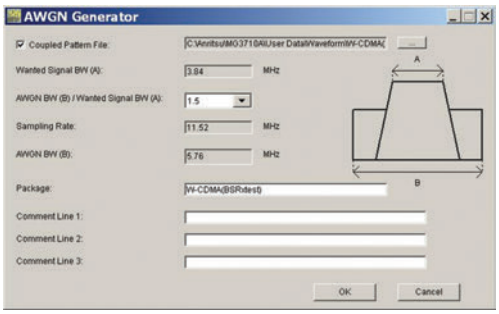
(2) AWGN BW (B)/Wanted Signal BW (A):
Magnification of AWGN to Wanted Signal
Setting range: 1.0, 1.5, 2.0, 2.5

(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
When 0.020 000 000 MHz ≤ Sampling Rate ≤ 20.000 000 000 MHz:
0.001 000 MHz ≤ AWGN BW (B) ≤ Sampling Rate/2
When Sampling Rate > 20.000 000 000 MHz:
0.001 000 MHz ≤ AWGN BW (B) ≤ Sampling Rate



IQproducer Main Screen



AWGN Setting Screen

AWGN IQproducer

Standard accessory | MG3710A/MG3710E

Adding the Baseband Signal Combine Option (Option 048/078) installs two arbitrary waveforms memories for one RF output to set a wanted signal and an interference signal (Figure A).
The two signals are output after combination in the MG3710A/MG3710E 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.

*: Requires following options:
MG3710A-048/MG3710E-048
1stRF Baseband Signal Combine Option (for 1stRF)
MG3710A-078/MG3710E-078
2ndRF Baseband Signal Combine Option (for 2ndRF)

D Automatic setting by Combination file

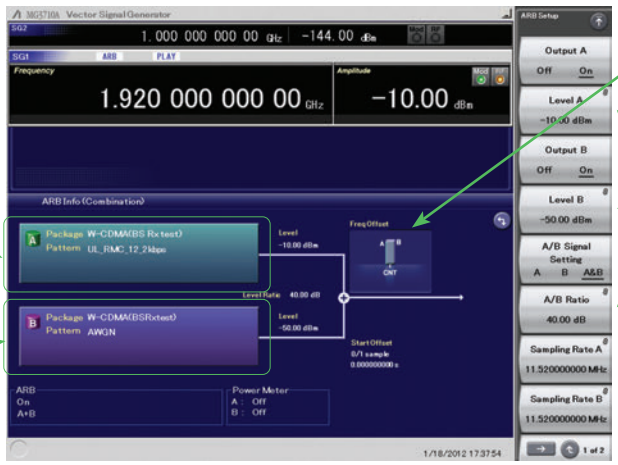
C Frequency offset setting

B Easy level ratio setting
- Wanted signal level
- Interference signal level
- C/N

A

Memory A: Wanted signal

Memory B: AWGN/ Modulation Interference signal



WLAN Wanted Signal + AWGN

Memory A: Wanted signal

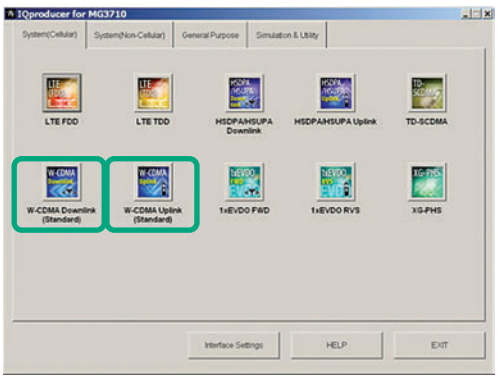
Memory B: AWGN

WLAN Wanted Signal + AWGN Spectrum

W-CDMA IQproducer

Standard accessory | MG3710A/MG3710E

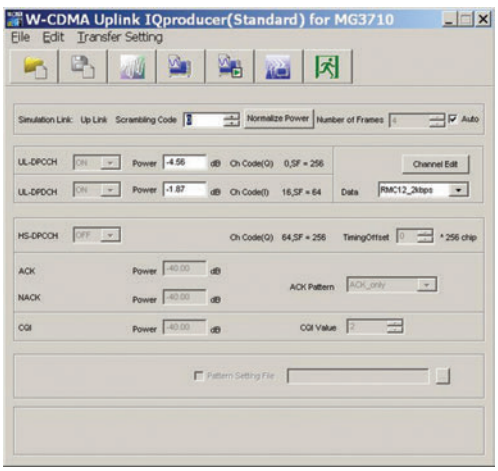
W-CDMA IQproducer is GUI-based, PC application software for generating waveform patterns used in W-CDMA Rx sensitivity measurement.
It edits the scrambling code number or channelization code number and generates the waveform patterns required for W-CDMA terminal evaluation.
If complete control of all 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.



IQproducer 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.)



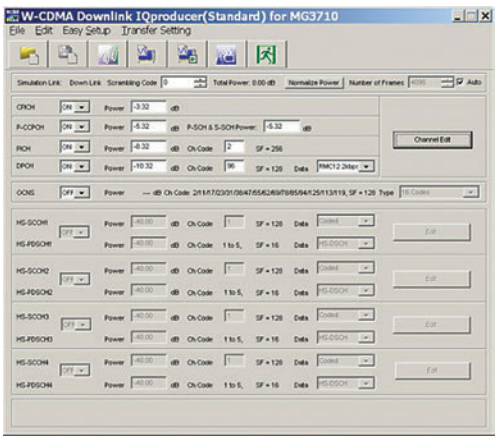
W-CDMA Uplink Setting Screen

Downlink Settings

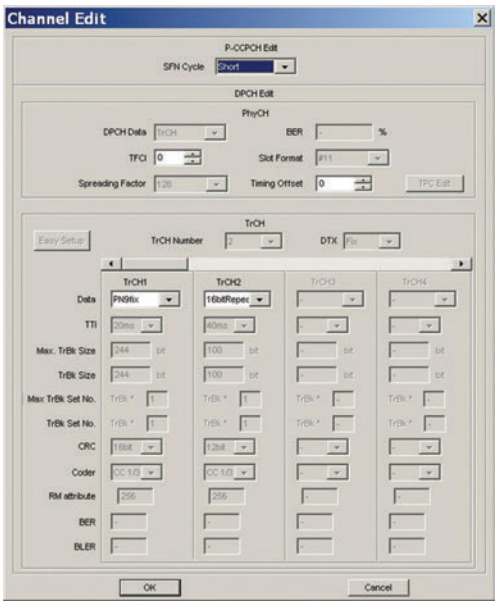
Downlink sets parameters including Scrambling code, CPICH/P-CCPCH/PICH/DPCH power, Channelization code, DPCH_PhyCH TFCI and Timing Offset, and DPCH_TrCH Data to create the waveform pattern. (For details, see the Downlink Parameter Setting Range table described later.)
Additionally, the Downlink Easy 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)



W-CDMA Downlink Setting Screen



W-CDMA Downlink/Channel Edit Screen

W-CDMA IQproducer

Standard accessory MG3710A/MG3710E

Downlink Parameter Setting Range

Display	Setting range	
Scrambling Code		0 to 8191
Number of Frame	Number of Frames	1 to the number of sufficient frames for the waveform memory
	Auto	Selected or cleared the check box
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, 16 bit repeat, User File

Uplink Parameter Setting Range

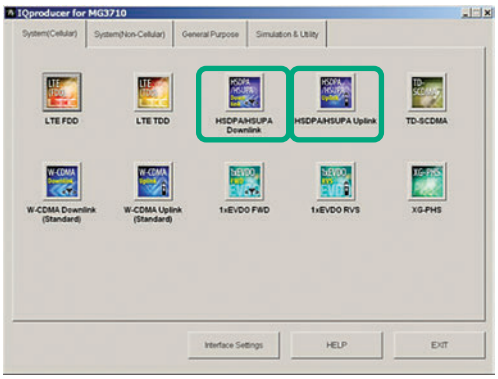
Display	Setting range	
Scrambling Code		0 to 16777215
Number of Frame	Number of Frames	1 to the number of sufficient frames for the waveform memory
	Auto	Selected or cleared the check box
UL-DPCCH, UL-DPDCH	Power	−40.00 to 0.00 dB
	Data	RMC 12.2 kbps, RMC 64 kbps, RMC 144 kbps, RMC 384 kbps, AMR1, AMR2, 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, 16 bit repeat, User File
Channel Gain	Beta c	0 to 15
	Beta d	0 to 15

HSDPA/HSUPA IQproducer MX370101A

Optional | MG3710A/MG3710E

This optional GUI-based PC application software is used to set parameters and generate waveform patterns for 3GPP HSDPA/HSUPA (Uplink/Downlink) systems.
Using the MG3710A/MG3710E, 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 MX370101A supports both downlink and uplink functions.



IQproducer Main Screen

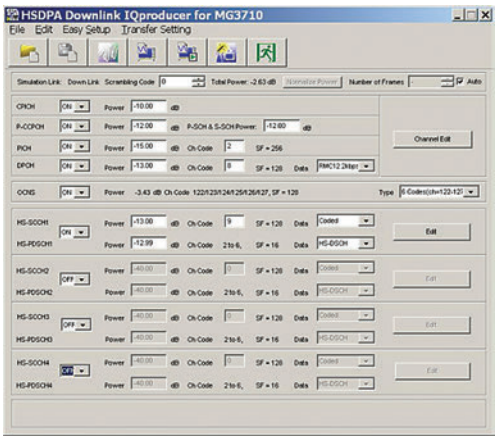
Downlink Settings

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)

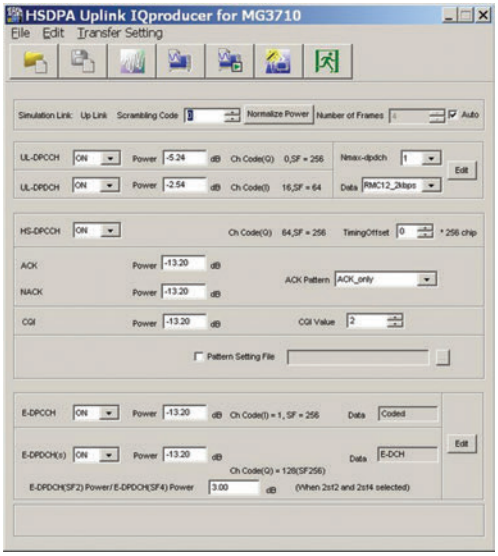


HSDPA Downlink Setting Screen

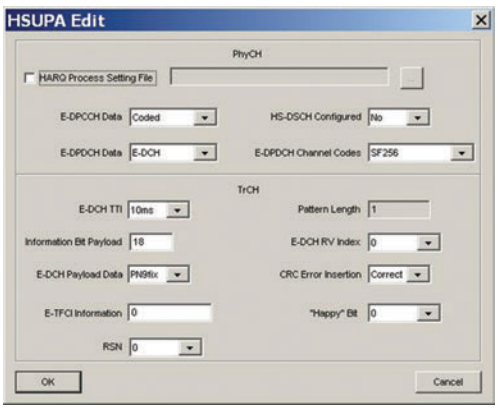
Uplink Settings

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)



HSDPA Uplink Setting Screen



HSDPA Uplink/HSUPA Edit Screen

HSDPA/HSUPA IQproducer MX370101A

Optional MG3710A/MG3710E

Downlink Parameter Setting Range

Display	Setting range	
Scrambling Code		0 to 8191
Number of Frames	Number of Frames	1 to the maximum number of frames for the waveform memory
	Auto	Check box selected or cleared
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 SF (spreading factor) varies depending on the setting of [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, User Edit TrCH = Spreading Factor set in the Channel Edit screen
	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, 6 Codes (ch = 122-127), 6 Codes (ch = 2-7)
HS-SCCH1/2/3/4	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	0 to 127
	Data	PN9, PN9fix, PN15fix, 16 bit repeat, Coded
HS-PDSCH1/2/3/4	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	Channelization Code	Displays Channelization Code
	Data	PN9, PN9fix, PN15fix, 16 bit repeat, HS-DSCH
P-CCPCH Edit	SFN Cycle	Short or 4096
DPCH Edit (Phy CH)	DPCH Data	PN9, PN9fix, PN15fix, 16 bit repeat, TrCH
	TFCI	0 to 1023
	Spreading Factor	4, 8, 16, 32, 64, 128, 256, 512
	BER	0.0 to 100.0%, Resolution 0.1%
	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)	TrCH Number	1 to 8
	DTX	Fix, Flex
	Data	PN9, PN9fix, PN15fix, 16 bit repeat, User File
	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%, Resolution 0.1%
	BLER	0 to 100%, Resolution 1%
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
	Number of HARQ Processes	0 to 8
	Virtual IR Buffer Size	800 to 304000
	Payload Data	PN9, PN9fix, PN15fix, 16 bit 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	Use or Not use

HSDPA/HSUPA IQproducer MX370101A

Optional MG3710A/MG3710E

Uplink Parameter Setting Range

Display	Setting range	
Scrambling Code		0 to 16777215
Number of Frames	Number of Frames	1 to the maximum number of frames for the waveform memory
	Auto	Check box selected or cleared
UL-DPCCH, UL-DPDCH	ON/OFF	ON or OFF
	Power	−40.00 to 0.00 dB, Resolution 0.01 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, Resolution 0.01 dB
	NACK Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	CQI Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	ACK Pattern	ACK_only, NACK_only, alt_ACK_NACK_DTX
	CQI value	0 to 30
	Pattern Setting File	Use or Not use
E-DPCCH, E-DPDCH	E-DPCCH ON/OFF	ON or OFF
	E-DPDCH (s) ON/OFF	ON or OFF
	E-DPCCH Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	E-DPDCH (s) Power	−40.00 to 0.00 dB, Resolution 0.01 dB
	E-DPDCH (SF2) Power/ E-DPDCH (SF4) Power	−10.00 to +10.00 dB, Resolution 0.01 dB
DPCH Edit (Phy CH)	UL-DPDCH Data	PN9, PN9fix, PN15fix, 16 bit repeat, TrCH
	TFCI	0 to 1023
	UL-DPDCH Spreading Factor	4, 8, 16, 32, 64, 128, 256
	BER	0.0 to 100.0% (Enabled when [Data] set to [PN9]), Resolution 0.1%
	UL-DPDCH Slot Format	#0 or #1
	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)	TrCH Number	1 to 8
	Data	PN9, PN9fix, PN15fix, 16 bit repeat, User File
	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]), Resolution 0.1%
	BLER	0 to 100% (Enabled when [Data] set to [PN9]), Resolution 1%
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, 16 bit repeat, Coded
	E-DPDCH Data	PN9, PN9fix, PN15fix, 16 bit repeat, E-DCH
	HS-DSCH Configured	Yes, No
	E-DPDCH Channel Codes	SF256, SF128, SF64, SF32, SF16, SF8, SF4, 2SF4, 2SF2, 2SF2and2SF4 (Note that 2SF2and2SF4 cannot be selected when Nmax-dpdch is set to 1, and SF256 and SF128 cannot be selected when E-DCH TTI is set to 2 ms)
E-DPDCH and E-DPCCH Edit (TrCH)	E-DCH TTI	2 ms, 10 ms
	Pattern Length	Display only ("5" is displayed when E-DCH TTI is set to 2 ms. "1" is displayed when E-DCH TTI is set to 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 RV Index	0 to 3
	E-DCH Payload Data	PN9, PN9fix, PN15fix, 16 bit repeat
	CRC Error Insertion	Correct, Error
	E-TFCI Information	0 to 127
	"Happy" Bit	0, 1
	RSN	0 to 3

HSDPA/HSUPA IQproducer MX370101A

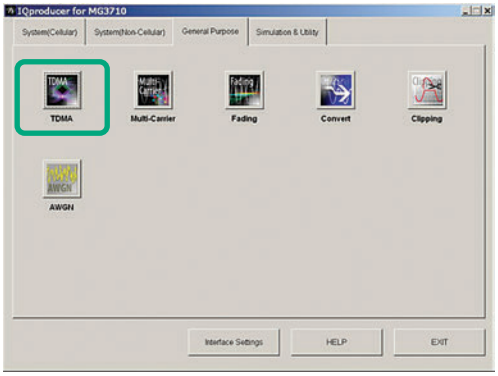
Optional MG3710A/MG3710E

Display	Setting range	
HARQ Process Setting File	E-DCH TTI	2 ms, 10 ms
	E-DPDCH ON/OFF	ON, OFF
	HS-DSCH Configured	Yes, No
	HARQ Process 1 Data to HARQ Process 8 Data	PN9, PN9fix, PN15fix, 16 bit repeat
	16 bit repeat value	0x0000 to 0xFFFF
	HARQ Process 1 RV (Data Retrans) to HARQ Process 8 RV (Data Retrans)	0, 1, 2, 3, 0 (Retrans), 1 (Retrans), 2 (Retrans), 3 (Retrans)
	E-DPDCH (s) Ch Codes	SF256, SF128, SF64, SF32, SF16, SF8, SF4, 2SF4, 2SF2, 2SF2and2SF4 (Note that 2SF2and2SF4 cannot be selected when HS-DSCH Configured is set to Yes, and SF256 and SF128 cannot be selected when E-DCH TTI is set to 2 ms)
	Information Bit Payload	1 to 11484 (when E-DCH TTI = 2 ms) 1 to 20000 (when E-DCH TTI = 10 ms)
	E-DPDCH (s) Gain	–20.00 to 20.00 dB, Resolution 0.01 dB
	SF2 E-DPDCH/SF4 E-DPDCH	–20.00 to 20.00 dB, Resolution 0.01 dB
	CRC Error Insertion	Correct, Error
	E-DPCCH ON/OFF	ON, OFF
	RSN Value	0 to 3
	E-TFCI Info.	0 to 127
	"Happy" Bit	0, 1
	E-DPCCH Gain Factor	–20.00 to 20.00 dB, Resolution 0.01 dB
	Pattern Length	1 to 2048
Channel Gain	DPCCH (Beta c)	0 (Switch Off) to 15 (1.0)
	DPDCH (Beta d)	0 (Switch Off) to 15 (1.0)
	Delta ACK (Beta hs/Beta c)	0 (5/15) to 8 (30/15)
	Delta NACK (Beta hs/Beta c)	0 (5/15) to 8 (30/15)
	Delta CQI (Beta hs/Beta c)	0 (5/15) to 8 (30/15)
	E-DPCCH (Beta ec/Beta c)	0 (5/15) to 8 (30/15)
	E-DPDCH (Beta ed, k/Beta c)	0 (5/15) to 29 (168/15)

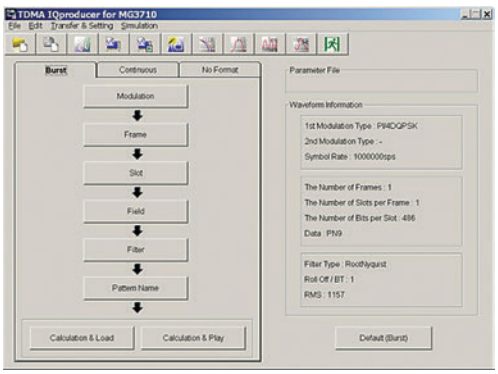
TDMA IQproducer MX370102A

Optional | MG3710A/MG3710E | MG3740A

TDMA IQproducer MX370102A is PC application software with a graphical user interface for generating waveform patterns with various digital modulations.
Either frame format (burst/continuous) signals or no format signals can be selected.



IQproducer Main Screen



TDMA IQproducer Setting Screen

Parameter Setting Items List

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

Burst: Burst signals with slot format
Continuous: Continuous signal with slot format
No Format: Signal without slot format

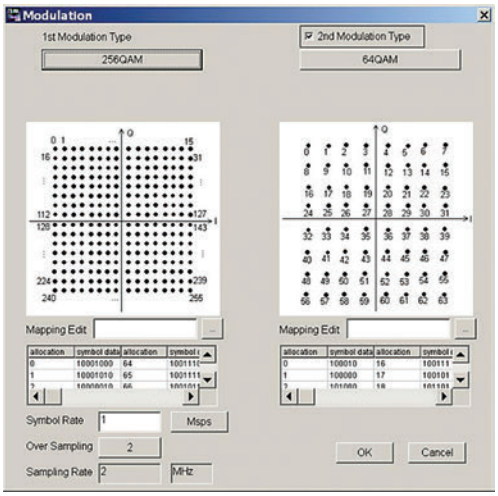
Modulation Setting

Sets modulation method, symbol rate and oversample ratio.

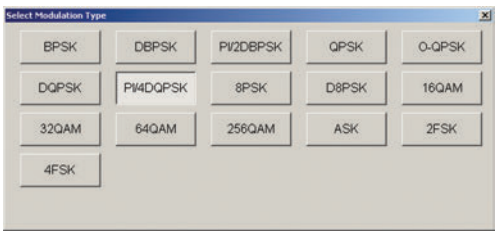
Modulation methods:
BPSK, DBPSK, PI/2DBPSK, QPSK, O-QPSK, DQPSK, PI/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 256QAM, ASK, 2FSK, 4FSK

Symbol rate: 1 ksps to 80 Msps [MG3710A/MG3710E]
1 ksps to 4 Msps [MG3740A*]

*: Requires MG3740A-020



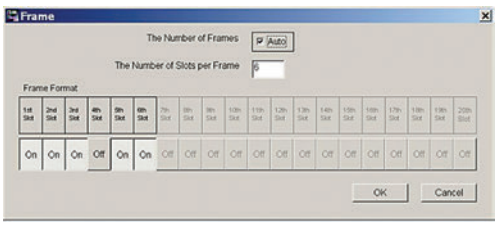
Modulation Screen



Modulation Type Select Screen

Frame Setting

Sets both slot number in one frame and slot Tx mode (On/Off) as well as frame number included in one waveform pattern.



Frame Screen

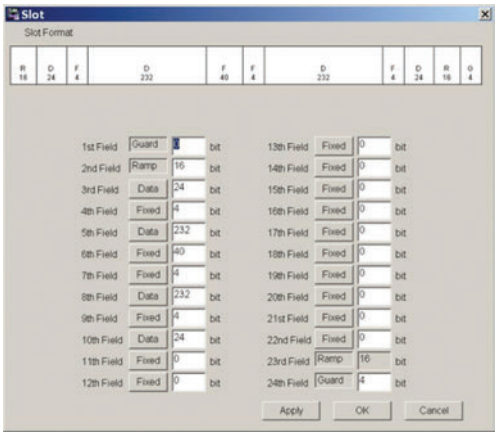
TDMA IQproducer MX370102A

Optional | MG3710A/MG3710E | MG3740A

Slot Setting

Sets slot format for communications system as well as synchronization word and data type (PN9, PN15, etc.) placement and bit length.

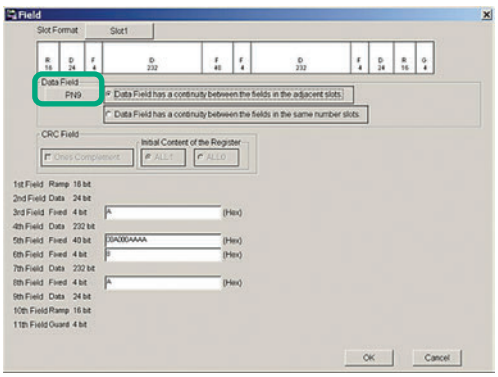
Targets: Guard, Ramp, Fixed, Data, CRC



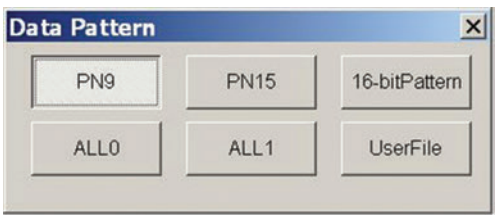
Slot Screen

Field/Data Setting

Sets bit information set on slot screen and specifies synchronization word and data type.



Field Screen

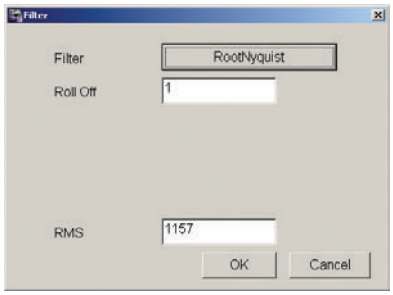


Data Pattern Select Screen

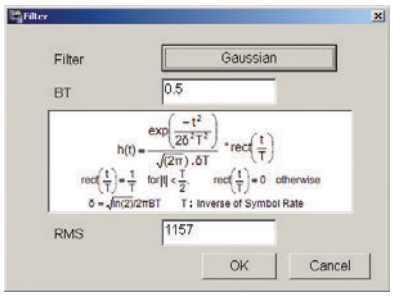
Filter Setting

Selects filter.

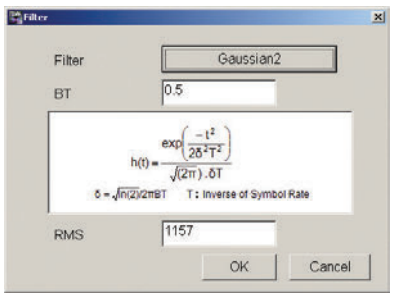
Targets: Nyquist, Root Nyquist, Gaussian, Ideal Lowpass, None, ARIB STD-T98, ARIB STD-T102 Part1, Half-sine



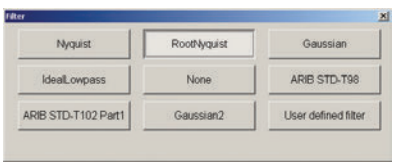
Filter Screen (Root Nyquist)



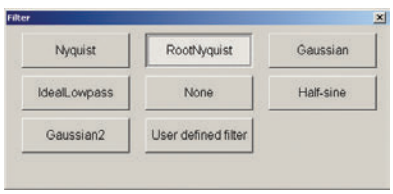
Filter Screen (Gaussian)



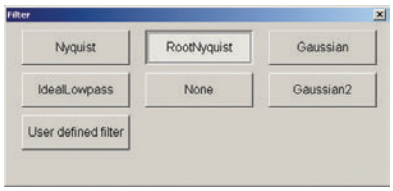
Filter Screen (Gaussian2)



Filter Select Screen (Modulation Method: 4FSK)



Filter Select Screen (Modulation Method: O-QPSK)



Filter Select Screen (Modulation Method: excluding 4FSK, O-QPSK)

TDMA IQproducer MX370102A

Optional | MG3710A/MG3710E | MG3740A

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*1
	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 [MG3710A/MG3710E], 1 ksps to 4 Msps [MG3740A] (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 [MG3710A/MG3710E], 20 kHz to 8 MHz [MG3740A] (The value of symbol rate × 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 checkbox 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 (Enabled when 4FSK set as modulation type. Only the multiple of 3 can be set.)
	Keep Phase continuity	Keep Phase continuity	This is available when parameter setting sheet is Continuous, No Format, and when modulation method is 2FSK, 4FSK.
Frame	Number of Frames	Frame number	1 to 32767, 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	The integer from 0 to 128.
	3 to 22 field	Data (PN9, PN15) field	The 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	The integer from 0 to 128.
	1 to 24 field	Data (PN9, PN15) field	The integer from 0 to 1024.
	2 to 24 field	CRC (Cyclic Redundancy Check character) field	0, 8, 12, 16, 24, 32
Field (Burst/Continuous)	Slot Format	Select from the list box	
	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, ALL0, ALL1, UserFile*2 Input any hexadecimal number for 16 bit Pattern.
Data (No Format)	Data	Selects continuous pattern	PN9, PN15, 16 bit Pattern, ALL0, ALL1, UserFile*2 Input any hexadecimal number for 16 bit Pattern.
Filter	Filter	Filter type	Nyquist, Root Nyquist, 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	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, 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

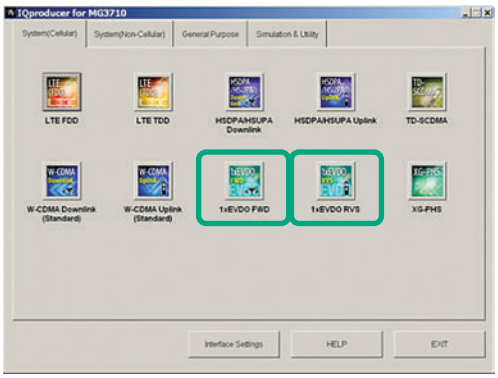
Ramp Field Setting Range

(1st/2nd) Modulation Type	Number of Bits
BPSK, DBPSK, PI/2DBPSK, ASK, 2FSK	Integer number between 1 and 16
QPSK, 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

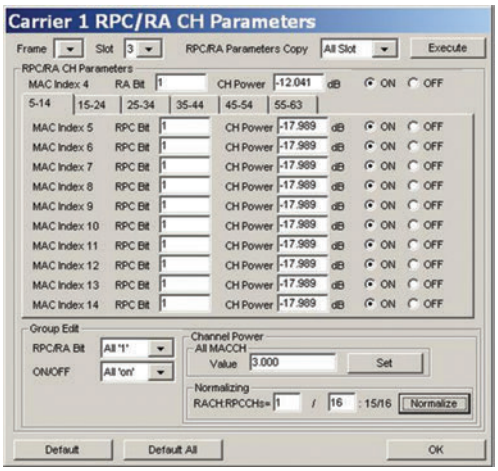
CDMA2000 1xEV-DO IQproducer MX370103A

Optional | MG3710A/MG3710E

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).
The MX370103A supports forward (FWD) and reverse (RVS) link functions.



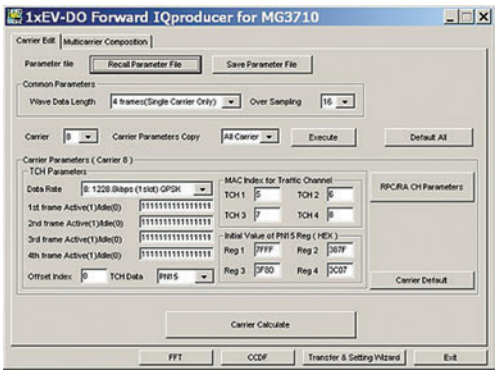
IQproducer Main Screen



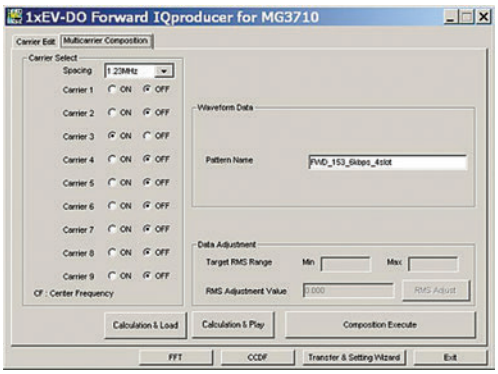
1xEV-DO Forward/
RPC/RA CH Parameter Sheet

Forward (FWD) Setting

Sets single carrier parameter as multi-carrier composition in Carrier Edit sheet of forward link.
The Multicarrier Composition sheet generates a multi-carrier waveform pattern for the single carrier set in Carrier Edit.



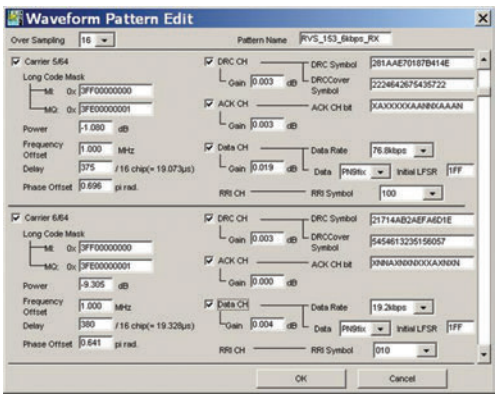
1xEV-DO Forward/Carrier Edit Sheet



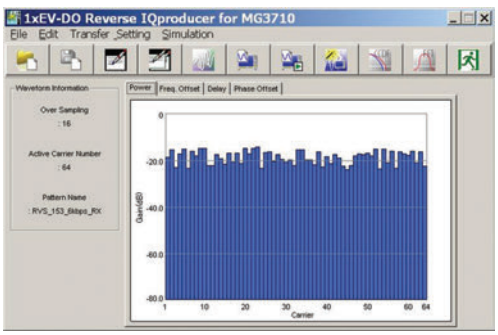
1xEV-DO Forward/Multicarrier Composition Sheet

Reverse (RVS) Setting

Waveform Pattern Edit sheet of reverse link sets parameters for carriers on one screen and generates multi-user signals with freely adjusted frequency, phase, level and delay.
Checks carrier power, frequency offset, delay and phase offset at editing on graph.



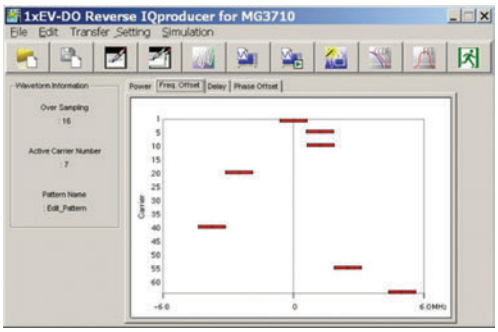
1xEV-DO Reverse/Waveform Pattern Edit Sheet



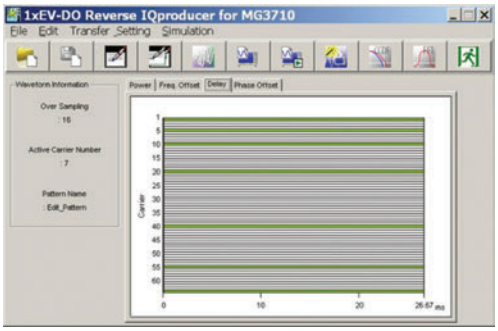
1xEV-DO Reverse/Graph Screen (Power)

CDMA2000 1xEV-DO IQproducer MX370103A

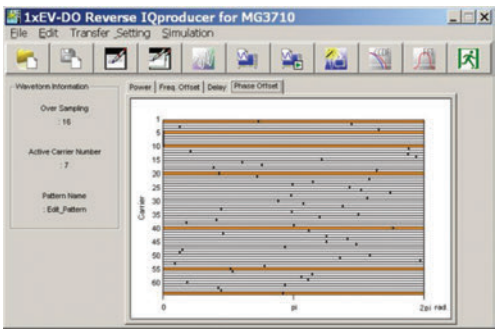
Optional | MG3710A/MG3710E



1xEV-DO Reverse/Graph Screen (Freq. Offset)



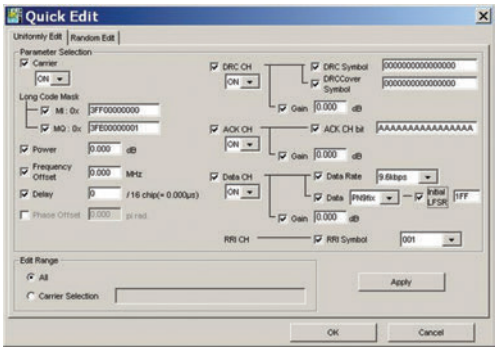
1xEV-DO Reverse/Graph Screen (Delay)



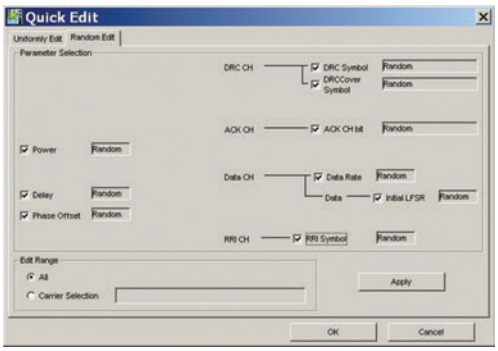
1xEV-DO Reverse/Graph Screen (Phase Offset)

Reverse (RVS) Quick Edit

Reverse link supports Uniformly Edit sheet and Random Edit sheet as Quick Edit function.
Uniformly Edit sheet specifies multiple carriers and sets multiple parameters to any value at one time.
Random Edit sheet specifies multiple carriers and sets multiple parameters to random values.



1xEV-DO Reverse/Quick Edit
Uniformly Edit Sheet



1xEV-DO Reverse/Quick Edit
Random Edit Sheet

Optional MG3710A/MG3710E

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 0000 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. 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.
RPC/RA Parameters Copy	The RPC/RA channel parameter settings of the current slot can be copied to other slots. The copy destination slot can be specified here, from Slot 1 to 16, ALL Slot, or All Frame.
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.
RPC/RA Bit (Group Edit)	All the RPC bits in the current slot can be set to 0 or 1.
Channel Power (Group Edit)	The channel gains (value relative to pilot channel) of all the MAC channels in the current slot can be set at once.
ON/OFF (Group Edit)	All the MAC channels in the current slot can be set to ON/OFF at once.
Default	Clicking this button restores the current slot to the initial state.
Default All	Clicking this button restores the RPC/RA CH Parameters settings of the current single carrier to the initial values.
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, 1.25, or 1.35 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 the RMS value of the waveform pattern in this event. Max: Indicates the maximum RMS value for waveform pattern RMS adjustment. Min: Indicates the minimum RMS value for waveform pattern RMS adjustment.
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.
Pattern Name	The pattern file name can be set within twenty 1-byte characters.

CDMA2000 1xEV-DO IQproducer MX370103A

Optional MG3710A/MG3710E

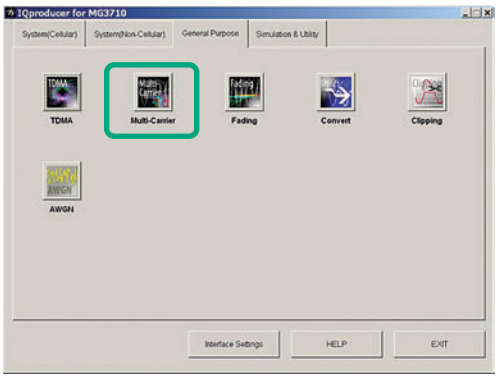
1xEV-DO Reverse Setting Range

Display	Description	Setting Range
Over Sampling	Ratio of waveform pattern sampling rate and chip rate.	4, 8, 16
Pattern Name	The waveform pattern file name.	Within 20 characters
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.	0x0 to 0x3FFFFFFFFF (MI, MQ)
Power	Set carrier power.	−80.000 to 0.000 dB
Frequency Offset	Set carrier frequency offset from center frequency setting of MG3710A/MG3710E.	−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 MG3710A/MG3710E 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 Rate	Set RRI symbol in binary.	000 to 101 (BIN)

Multi-carrier IQproducer MX370104A

Optional | MG3710A/MG3710E

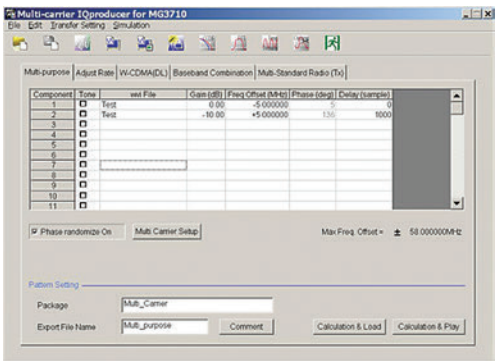
Multi-carrier IQproducer MX370104A is PC application software with five functions. It can generate multi-carrier waveform patterns for modulation signals and tone signals for communications systems as well as a combination file using the MG3710A/MG3710E Baseband Signal Combine function (with Option 048/078).



IQproducer Main Screen

Multi-purpose Function

Generates multi-carrier waveform patterns based on waveform patterns and tone signals for MG3710A/MG3710E. It generates signals with up to 32 carriers as one waveform pattern (Depending on the Freq. Offset and waveform pattern combination, sometimes signals for up to 32 carriers cannot be set.) Gain, frequency offset, initial phase and initial delay for carriers can be set too.

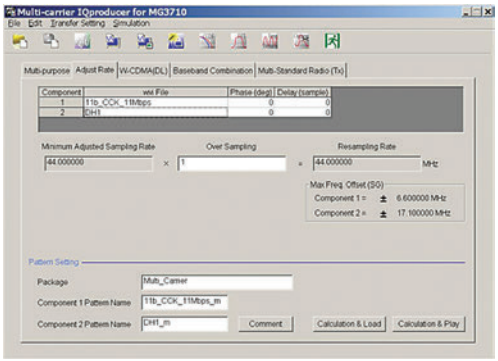


Multi-purpose Function

Adjust Rate Function

The Adjust Rate function converts two waveform patterns with different sampling rates into two waveforms patterns with the same sampling rate.
The initial phase and delay for two carriers can be set. Additionally, the baseband combine function (Option 048/078) converts the rates of the waveform pattern rates in memory A and B and combines them to match the sampling rate, helping reduce the Adjust rate setup time.

Note: In some cases, the baseband combine function and adjust rate function cannot combine the sampling rate depending on conditions.



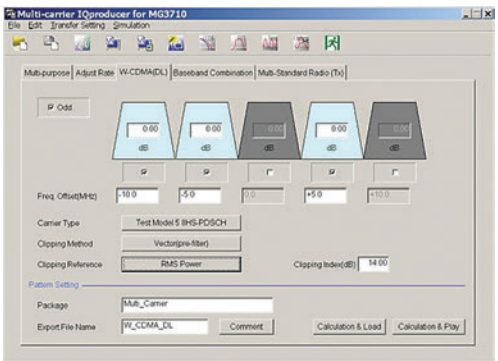
Adjust Rate Function

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



W-CDMA (DL) Function

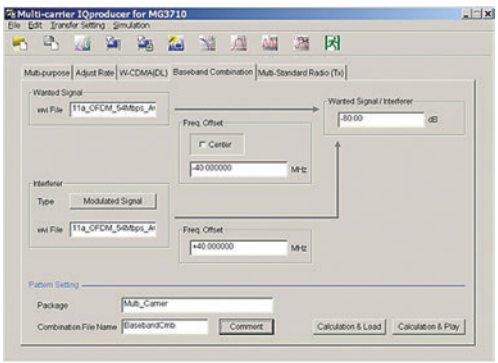
	Option necessary to use created patterns	
Multi-carrier IQproducer	Combination of Baseband Signal for 1stRF (Option 048) Combination of Baseband Signal for 2nddRF (Option 078)	AWGN for 1stRF (Option 049) AWGN for 2ndRF (Option 079)
Multi-purpose	—	—
Adjust Rate	Mandatory	—
W-CDMA (DL)	—	—
Baseband Combination	Mandatory	Mandatory
Multi-Standard Radio (Tx)	Mandatory	—

Multi-carrier IQproducer MX370104A

Optional | MG3710A/MG3710E

Baseband Combination Function

Creates combination file to use with baseband combine function (Option 048/078) that outputs two signals, such as wanted + interference signals from one RF port, and sets two waveform patterns, frequency offset and level ratio at the same time. Selecting a previously created combination file supports batch settings.
The modulation signal, AWGN, and tone signal can be selected as interference signals. The AWGN option (Option 049/079) is required to use AWGN.



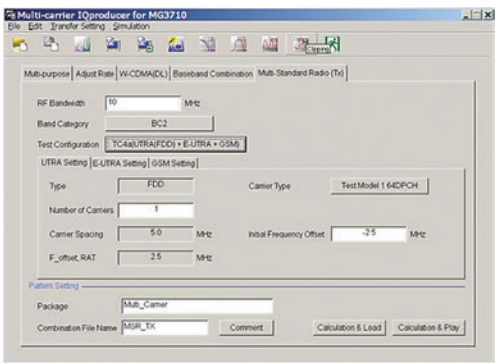
Baseband Combination Function

Multi-Standard Radio (Tx) Function

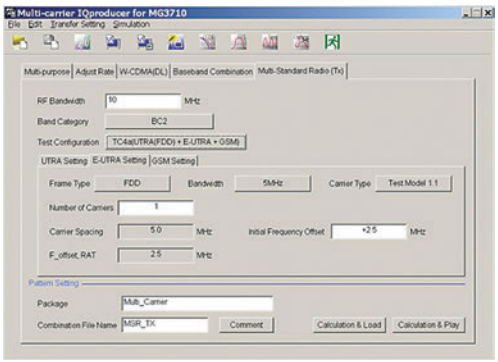
Generates W-CDMA · TD-SCDMA · LTE-FDD · LTE-TDD · GSM multi-carrier signals for evaluating Multi-Standard Radio Tx characteristics.
Using the baseband combine function (Option 048/078) outputs signals simultaneously from one RF connector.
However, use the 1stRF and 2ndRF options in combination if the frequency exceeds the RF bandwidth.

Test Configuration:

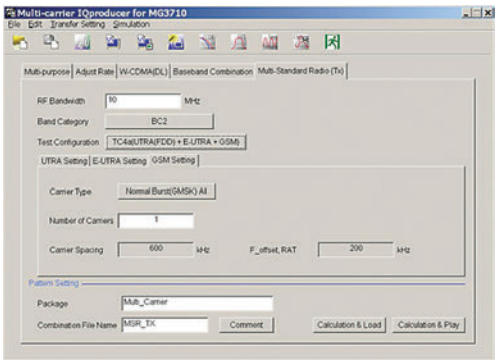
TC1a [UTRA (FDD) multi-carrier]
TC1b [UTRA (TDD) multi-carrier]
TC2 [E-UTRA multi-carrier]
TC3a [UTRA (FDD) + E-UTRA]
TC3b [UTRA (TDD) + E-UTRA]
TC4a [UTRA (FDD) + GSM]
TC4b [E-UTRA + GSM]
TC4c [UTRA (FDD) + E-UTRA + GSM]



Multi-Standard Radio (Tx) Function
UTRA Setting



Multi-Standard Radio (Tx) function
E-UTRA Setting



Multi-Standard Radio (Tx) function
GSM Setting

Table 1: Test Configuration by Band Category

Test Configuration	Band Category		
	BC1	BC2	BC3
TC1a (UTRA (FDD) multicarrier)	✓	✓	×
TC1b (UTRA (TDD) multicarrier)	×	×	✓
TC2 (E-UTRA multicarrier)	✓	✓	×
TC3a (UTRA (FDD) + E-UTRA)	✓	✓	×
TC3b (UTRA (TDD) + E-UTRA)	×	×	✓
TC4a (UTRA (FDD) + GSM)	×	✓	×
TC4b (E-UTRA + GSM)	×	✓	×
TC4c (UTRA (FDD) + E-UTRA + GSM)	×	✓	×

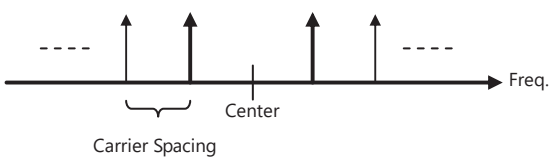
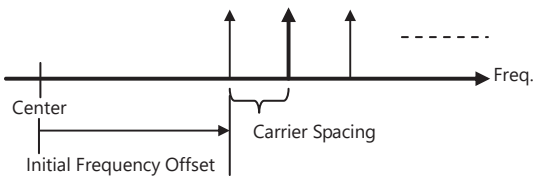
Table 2: Display Tab by Test Configuration

Test Configuration	Result Display Type		
	UTRA Setting	E-UTRA Setting	GSM Setting
TC1a (UTRA (FDD) multicarrier)	✓	×	×
TC1b (UTRA (TDD) multicarrier)	✓	×	×
TC2 (E-UTRA multicarrier)	×	✓	×
TC3a (UTRA (FDD) + E-UTRA)	✓	✓	×
TC3b (UTRA (TDD) + E-UTRA)	✓	✓	×
TC4a (UTRA (FDD) + GSM)	✓	×	✓
TC4b (E-UTRA + GSM)	×	✓	✓
TC4c (UTRA (FDD) + E-UTRA + GSM)	✓	✓	✓

Multi-carrier IQproducer MX370104A

Optional | MG3710A/MG3710E

Multi-purpose Setting Range

Items	Outline	Setting Range
Multi-purpose		
Tone	Selects whether to use the tone signal or the waveform pattern file for generating multi-carrier signals. When you select Tone, the wvi File text box is disabled, and you cannot select wvi File.	
wvi File	Selects/Deletes the waveform pattern file which will be the source for generating the multi-carrier signal to be set in Component.	
Component		
Gain	Sets the Gain of each Component.	0.00 to –80.00 dB, Resolution 0.01 dB
Freq. Offset	Sets the frequency offset of each Component.	0 to ±0.4 × Fs – 0.5 × BWmax (Fs represents a sampling frequency; BWmax represents all band.)
Phase	Sets the initial phase of each Component.	0 to 359 degree, Resolution 1 degree
Delay	Sets the initial delay of each Component.	0 to N-1 (N is the Data Points of the source wvi. file)
Common parameters among tabs		
Phase Randomize On	Randomize the phase of each carrier.	Entering a check enables the function. Then the value of Phase becomes invalid.
Max Freq. Offset	The maximum value of the available frequency offset	Displayed at the right bottom of the screen. You can set the frequency offset of each carrier within the range displayed in this Freq.Offset.
Multi Carrier Setup		
Tone	Sets the Tone signal in the carrier.	When selected: Tone signal, when cleared: wvi File
wvi File	Selects the wvi file to be used as the carrier.	
Carrier Allocation	Sets how to allocate carriers.	Symmetry/Series  **Symmetry Allocation**  **Series Allocation**
Initial Frequency Offset	Sets the first frequency offset for allocating carriers.	When Tone is selected: 0 to ±60 MHz, Resolution 1 Hz When Tone is cleared: 0 to ±(0.4 × Fs – 0.5 × BW) MHz (Fs: Sampling rate, BW: Bandwidth value in the wvi. file)
Carrier Spacing	Sets the frequency intervals of the signal to be generated in multi-carrier format.	When Tone is selected: 0.000001 MHz to 120 MHz, Resolution 1 Hz When Tone is cleared: 0 to ±(0.4 × Fs – 0.5 × BW) MHz (Fs: Sampling rate, BW: Bandwidth value in the wvi. file)
Carrier Number	Sets the number of the signals to be generated in multi-carrier format.	1 to 32 (The number of available signals to be set changes depending on the set value of Carrier Spacing.)
Power Step	Sets the level ratio of the signal to be generated in multi-carrier format.	–80.00 to 80.00 dB
Phase Step	Sets the amount of phase change of Component.	0 to 359 degree, Resolution 1 degree
Delay Step	Sets the amount of delay change of Component.	0 to N–1 (where N is Data Points of source wvi. file.)

Adjust Rate Setting Range

Items	Outline	Setting Range
Adjust Rate		
wvi File	Selects/Deletes the waveform pattern file which will be the source for generating the multi-carrier signal to be set in Component.	
Phase	Sets the initial phase of each Component.	0 to 359 degree, Resolution 1 degree
Delay	Sets the initial delay of each Component.	0 to N–1 (N is the Data Points of the source wvi. file.)
Over Sampling	Sets Over Sampling of the waveform.	1 to floor (160 MHz/Minimum Adjusted Sampling Rate) floor(x) is the function for finding the minimum integer that does not exceed x.

Multi-carrier IQproducer MX370104A

Optional MG3710A/MG3710E

W-CDMA (DL) Setting Range

Items	Outline	Setting Range
W-CDMA (DL)		
Carrier allocation	Select the carrier allocation	Selected/not selected
Carrier	Select the carrier to be output.	Enabled/disabled
Level	Set the level for each carrier to be output.	0.00 to –80.00 dB, Resolution 0.01 dB
Frequency offset	Set the frequency offset for each carrier to be output.	Frequency offset for each carrier ±1.0 MHz, Resolution 0.1 MHz
Carrier Type	Select the W-CDMA test model.	Test Model1 16DPCH, Test Model1 32DPCH, Test Model1 64DPCH, Test Model5 2HS-PDSCH, Test Model5 4HS-PDSCH, Test Model5 8HS-PDSCH
Clipping Method	Specify the clipping method.	Non, Vector (pre-filter), Vector (post-filter), Scalar (pre-filter), Scalar (post-filter)
Clipping Reference	Select the reference for clipping processing.	Peak Power, RMS Power
Clipping Index	When Clipping Method is not set to Non, input the ratio to the clipping reference.	When Clipping Reference is set to Peak Power: 0 to 100%, Resolution 1% When Clipping Reference is set to RMS Power, and Clipping Method = Vector (pre-filter), Vector (post-filter): 3.00 to 14.00 dB, Resolution 0.05 dB When Clipping Method = Scalar (pre-filter), Scalar (post-filter): 3.00 to 17.00 dB, Resolution 0.05 dB

Baseband Combination Setting Range

Items	Outline	Setting Range
Baseband Combination		
wvi File (Wanted Signal)	Selects/Deletes the waveform pattern file to be used as the wanted wave.	
Type (Interferer)	Modulated Signal	Modulated Signal is used as an interference signal.
	AWGN	AWGN is used as an interference signal.
	Tone	Tone is used as an interference waveform.
wvi File (Interferer)	Sets a waveform pattern file to be used as an interference waveform.	When Type is set to a parameter other than Modulated Signal, it is displayed as invalid.
Center Check box (Wanted Signal)	Sets whether or not to set Wanted Signal to the frequency set on the MG3710A/MG3710E.	
Freq Offset text box (Wanted Signal)	Sets the frequency offset of Wanted Signal.	0.000000 to ±(0.4 × Fs – 0.5 × BW) (Fs: Sampling rate, BW: Bandwidth value in the wvi. file)
Freq Offset text box (Interferer)	Sets the frequency offset of Interferer.	0.000000 to ±(0.4 × Fs – 0.5 × BW) (Fs: Sampling rate, BW: Bandwidth value in the wvi. file)
Wanted Signal/Interferer	Sets the level ratio of Wanted Signal and Interferer.	When it is other than Type = AWGN: 0.00 to ±80.00 dB When Type = AWGN: 0.00 to ±40.00 dB

Multi-Standard Radio (Tx) Setting Range

Items	Outline	Setting Range
Multi-Standard Radio (Tx)		
RF Bandwidth	Sets RF Bandwidth.	10 MHz to 120 MHz
Band Category	Set Band Category.	BC1, BC2, BC3
Test Configuration	Set Test Configuration.	<Table 1>
UTRA Setting, E-UTRA Setting, and GSM Setting tabs	The result display type of the tab depends on Test Configuration.	<Table 2>
UTRA Setting tab		
Type	Displays whether the type of the UTRA signal is FDD (W-CDMA) or TDD (TD-SCDMA).	When Band Category = BC1 and BC2: FDD When Band Category = BC3: TDD
Carrier Type	Selects the type of the UTRA signal.	When Type = FDD: Test Model1 16DPCH, Test Model1 32DPCH, Test Model1 64DPCH, Test Model4, Test Model5 2HS-PDSCH, Test Model5 4HS-PDSCH, Test Model5 8HS-PDSCH When Type = TDD: RMC 1Code, RMC 8Code, RMC 10Code
Number of Carriers	Sets the number of UTRA carriers.	The number of carriers not exceeding the bandwidth of 1 to RF Bandwidth
Carrier Spacing	Sets Carrier Spacing.	When Type is FDD: 5 MHz When Type is TDD: 1.6 MHz
Initial Frequency Offset	Sets Initial Frequency Offset.	0.0 to ±RF Bandwidth/2, Resolution 0.1 MHz
F_offset, RAT	Displays the F_offset, RAT values as specified in TS 37.141.	When Type is FDD: 2.5 MHz When Type is TDD: 1.0 MHz

Multi-carrier IQproducer MX370104A

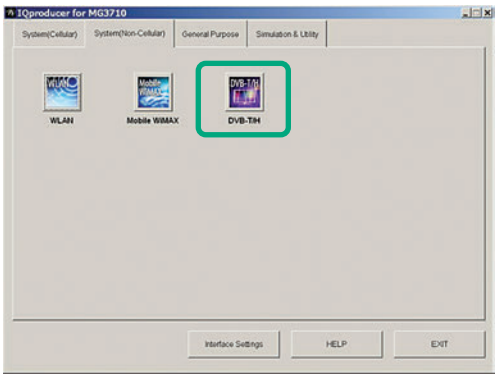
Optional MG3710A/MG3710E

<table>
<tr><th>Items</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>E-UTRA tab</td><td></td><td></td></tr>
<tr><td>Frame Type</td><td>Selects the Frame type (FDD or TDD) of E-UTRA.</td><td>FDD, TDD</td></tr>
<tr><td>Bandwidth</td><td>Selects Bandwidth of E-UTRA.</td><td>1.4, 3, 5, 10, 15, 20 MHz</td></tr>
<tr><td>Carrier Type</td><td>Selects the type (Test Model) of the E-UTRA signal.</td><td>Test Model1.1, Test Model1.2, Test Model2, Test Model3.1, Test Model3.2, Test Model3.3</td></tr>
<tr><td>Number of Carriers</td><td>Sets the number of E-UTRA carriers.</td><td>The number of carriers not exceeding the bandwidth of 1 to RF Bandwidth.</td></tr>
<tr><td>Carrier Spacing</td><td>Displays Carrier Spacing.</td><td></td></tr>
<tr><td>Initial Frequency Offset</td><td>Sets Initial Frequency Offset.</td><td>0.0 to ±RF Bandwidth/2, Resolution 0.1 MHz</td></tr>
<tr><td>F_offset, RAT</td><td>Displays the F_offset, RAT values as specified in TS 37.141.</td><td>The displayed value depends on the setting of Band Category and Bandwidth.
F_offset, RAT value
<table>
<tr><th rowspan="2">Band Category</th><th colspan="6">Bandwidth</th></tr>
<tr><th>1.4 MHz</th><th>3 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>BC1</td><td>0.9 MHz</td><td>1.7 MHz</td><td rowspan="3">2.5 MHz</td><td rowspan="3">5 MHz</td><td rowspan="3">7.5 MHz</td><td rowspan="3">10 MHz</td></tr>
<tr><td>BC2</td><td>0.7 MHz</td><td>1.5 MHz</td></tr>
<tr><td>BC3</td><td>0.9 MHz</td><td>1.7 MHz</td></tr>
</table></td></tr>
<tr><td>GSM Setting tab</td><td></td><td></td></tr>
<tr><td>Carrier Type</td><td>Selects the type of the GSM signal.</td><td>Normal Burst(GMSK) TN0, Normal Burst(GMSK) All, Normal Burst(8PSK) TN0, Normal Burst(8PSK) All</td></tr>
<tr><td>Number of Carriers</td><td>Sets the number of GSM carriers.</td><td>The number of carriers not exceeding the bandwidth of 1 to RF Bandwidth</td></tr>
<tr><td>Carrier Spacing</td><td>Displays Carrier Spacing.</td><td>600 kHz fixed</td></tr>
<tr><td>F_offset, RAT</td><td>Displays the F_offset, RAT values as specified in TS 37.141.</td><td>200 kHz fixed</td></tr>
</table>

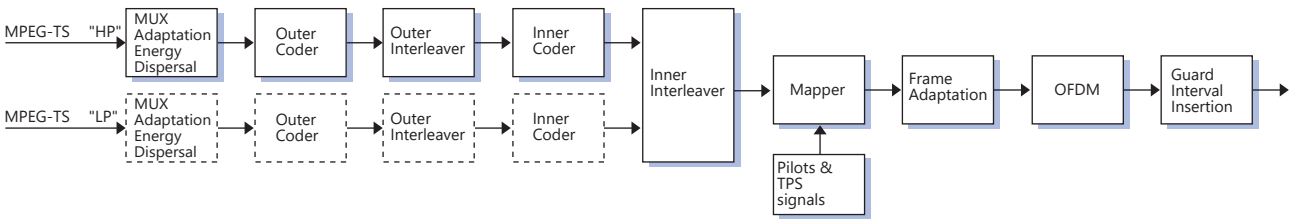
DVB-T/H IQproducer MX370106A

Optional | MG3710A/MG3710E

DVB-T/H IQproducer MX370106A is GUI-driven PC application software supporting the ETSI EN 300 744 V1.5.1 (2004-11) Physical Layer standard.
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.

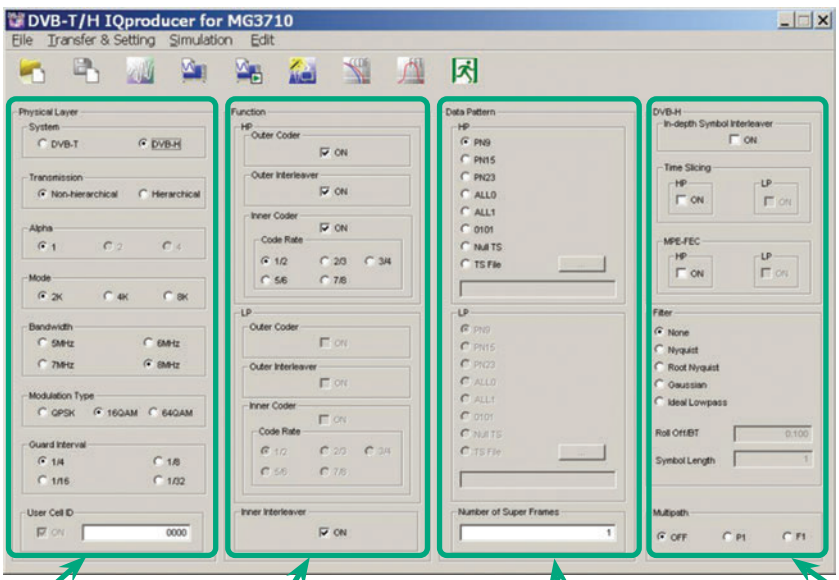


IQproducer Main Screen



DVB-T/H IQproducer Setting Screen

Parameters are set easily by selecting buttons on one screen.



Physical Layer:
Sets System, Transmission, Mode, Sub-carrier number, Bandwidth, Modulation Type and Guard Interval

Function:
Sets
- Outer Coder
- Outer Interleaver
- Inner Coder
- Code Rate
- Inner Interleaver

Data Pattern:
Sets data
When "TS File" is selected, an arbitrary MPEG-2TS file (binary data with re-multiplexed video and audio) is loaded to generate a waveform pattern. It is used for video evaluation.

DVB-H:
Sets
- In-depth Symbol Interleaver
- Time Slicing
- MPE-FEC

Filter:
Multipath:

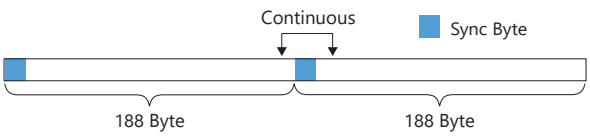
DVB-T/H IQproducer MX370106A

Optional MG3710A/MG3710E

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	2K, 4K, 8K (Sub-carrier of OFDM)	"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), 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, ALL0, ALL1, 0101, Null TS, TS File	"LP" cannot be set when No.2 = Non-hierarchical.
			When TS File is selected, a created TS (Transport Stream: binary data in which image data and voice data are multiplexed) data file can be loaded. TS data consists of two or more packets (1 packet = 188 bytes). The first byte of each packet is the Sync Byte, and is always 47 (hexadecimal). If a file that does not satisfy this TS data format is selected and the Calculation button is clicked, an error message will be displayed. The Sync Byte is also added to PN9, PN15, PN23, ALL0, ALL1, and 0101 data patterns when Outer Coder, Outer Interleaver, Inner Coder, and Inner Interleaver are all set to ON. At this time, the last data in a packet and the data following the Sync Byte in the next packet are continuous.*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.



Optional MG3710A/MG3710E

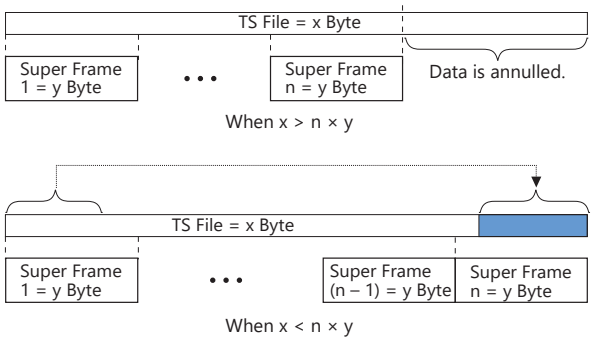
Number of Super Frame Setting

The "Number of Super Frame" setting range changes according to the "Mode" setting, "MG3710A/MG3710E main frame memory option" and "Combination of baseband signal option" as shown in the following table.

Maximum Number of Super Frames	Select Option	Mode
48	Memory 64 Msamples*1	2K
24		4K
12		8K
96	Memory 64 Msamples × 2*1 (With Combination of Baseband Signal Option)*4	2K
48		4K
24		8K
192	Memory 256 Msamples*2	2K
96		4K
48		8K
385	Memory 256 Msamples × 2*2 (With Combination of Baseband Signal Option)*4	2K
192		4K
96		8K
385	Memory 1024 Msamples*3	2K
192		4K
96		8K
385	Memory 1024 Msamples × 2*3 (With Combination of Baseband Signal Option)*4	2K
192		4K
96		8K

*1: Standard built-in memory size
*2: MG3710A-045/MG3710E-045
ARB Memory Upgrade 256 Msample for 1stRF
MG3710A-075/MG3710E-075
ARB Memory Upgrade 256 Msample for 2ndRF
*3: MG3710A-046/MG3710E-046
ARB Memory Upgrade 1024 Msample for 1stRF
MG3710A-076/MG3710E-076
ARB Memory Upgrade 1024 Msample for 2ndRF
*4: Supports two built-in ARB memories for one RF output (1stRF or 2ndRF) (one ARB memory as standard).
Combines two memories to support either two waveform patterns or large waveform pattern with upper limit size of 1024 Msamples.

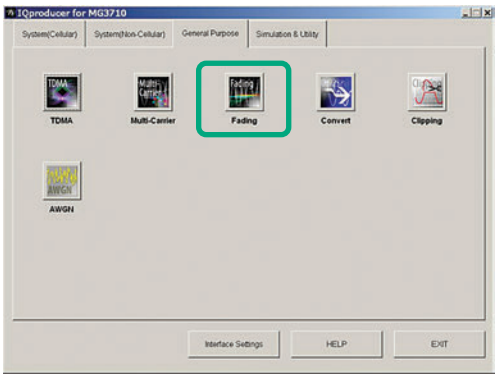
The data selected by "Data Pattern" is annulled in the terminal of the final super frame set here.
The data processing changes according to the "Size of TS File" and "Setting of Number of Super Frames" when TS File is selected at "Data Pattern". The TS File data is annulled when the "TS File data number" 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.



Fading IQproducer MX370107A

Optional | MG3710A/MG3710E | MG3740A

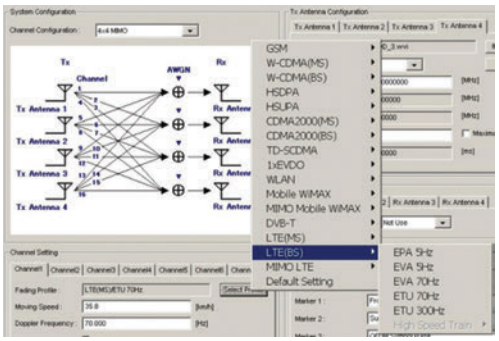
Fading IQproducer MX370107A is GUI-driven PC application software to set fading parameters and to generate waveform patterns by reading the waveform patterns for the MG3710A/MG3710E/MG3740A.
The MX370107A supports the fading of each IQ channel, calculation of correlation line, AWGN combination.
Either waveform patterns created by another IQproducer or IQ data (ASCII) created by general simulation tools can be selected as the input data file.



IQproducer Main Screen

Fading Profile Selection Function

Sets fading profile, movement speed, and Doppler frequency for channels. "Select Profile" has profiles for each system to batch set parameters with a single click. Set parameters can be edited at the Channel Setting screen.



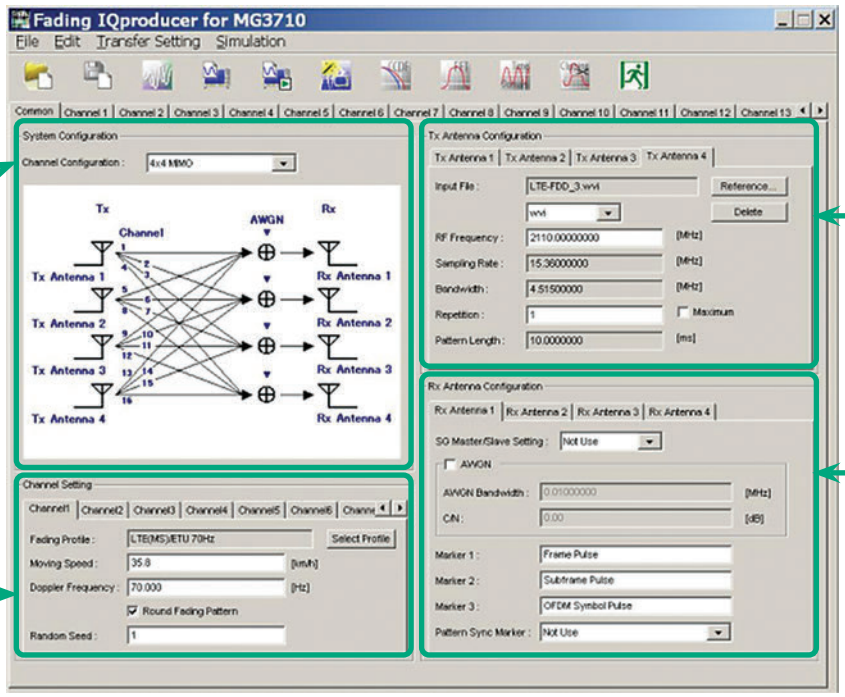
Select Profile
(Example: LTE_BS)

Fading IQproducer Setting 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.

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 MIMO
4×2 MIMO
4×3 MIMO
4×4 MIMO

Channel Setting:
Sets fading profile, movement speed, Doppler frequency for channels.



Tx Antenna Setting:
Sets Tx signals and can select waveform patterns or any IQ data (ASCII type) for the MG3710A/MG3710E.

Rx Antenna Setting:
Sets AWGN addition on/off and Primary/Secondary Rx.

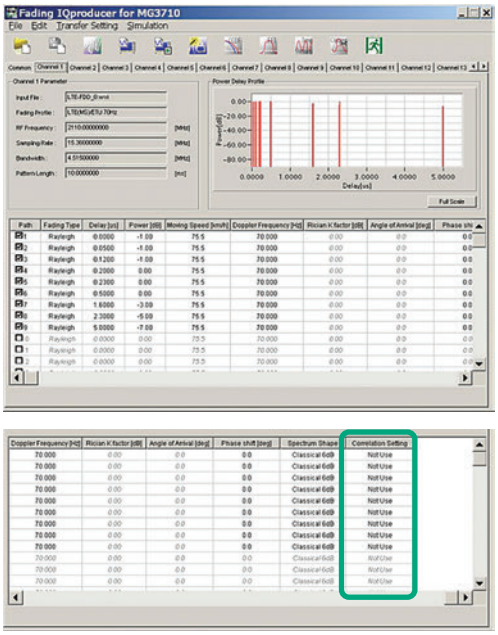
Fading IQproducer Setting Screen/Common Sheet

Fading IQproducer MX370107A

Optional | MG3710A/MG3710E | MG3740A

Channel Setting

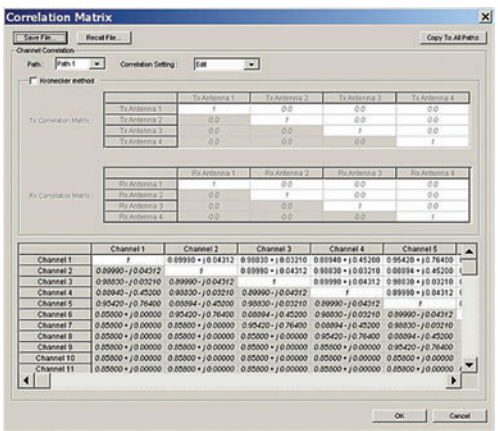
Channel tab sets max. 20 paths and parameter details for each channel to confirm level difference and delay on graph.



Channel Sheet

Correlation Matrix Setting

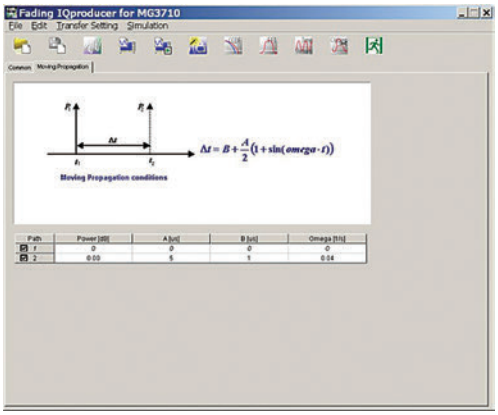
Parameter of Channel tab for all enabled paths. Automatically sets bottom left element so that top right and bottom left elements become complex conjugates where opposite components of Correlation Matrix form boundary.



Correlation Matrix Screen

Moving Propagation Setting

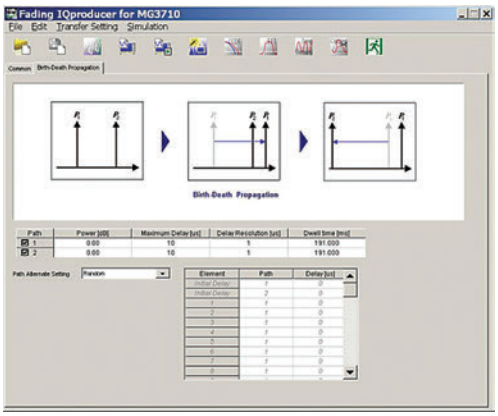
Can be set when:
"System Configuration = 1×1 SISO",
"Fading Profile = Moving Propagation (W-CDMA)"



Moving Propagation Screen

Birth-Death Propagation Setting

Can be set when:
"System Configuration = 1×1 SISO",
"Fading Profile = Birth-Death Propagation (W-CDMA)"



Birth-Death Propagation Screen

Fading IQproducer MX370107A

Optional MG3710A/MG3710E MG3740A

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 MHz to 160.00000000 MHz [MG3710A/MG3710E] 0.02000000 MHz to 8.00000000 MHz [MG3740A] 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 1>
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: Speed 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 Primary/Secondary Setting	Primary/Secondary setting when connecting two SG units at SIMO/MIMO	Not Use, Primary, Secondary (Secondary1 to Secondary3)
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

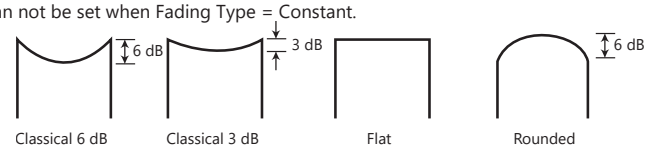
Table 1: Fading Profile Channel Model

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
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)

Fading IQproducer MX370107A

Optional | MG3710A/MG3710E | MG3740A

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 multiple scattering waves arrive. The Rx level is changed according to the Rayleigh distribution. Rice: Environment in which multiple 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	−1.00000 −j1.00000 to 1.00000 +j1.00000 Resolution both real and imaginary parts = 0.00001 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 alternated 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 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

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

Optional | MG3710A/MG3710E

LTE IQproducer MX370108A 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".

LTE-Advanced FDD Option MX370108A-001 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.

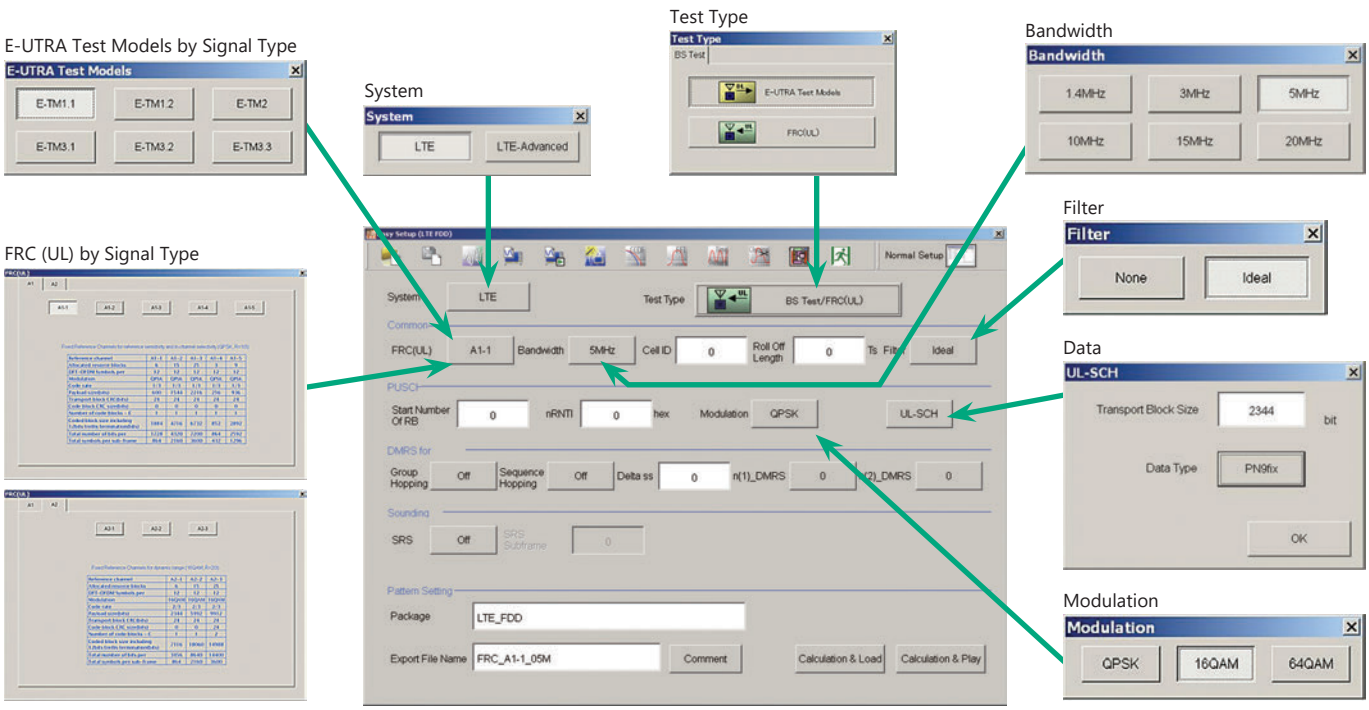
Channels Generated by MX370108A LTE IQproducer

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.



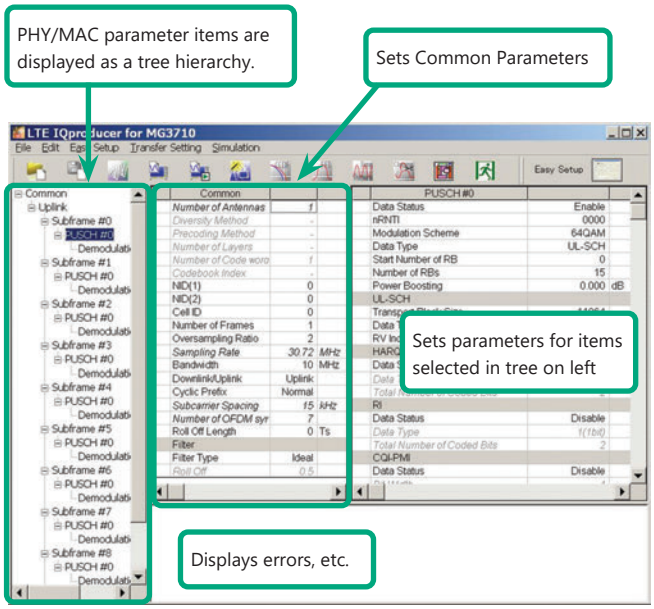
Easy Setup Screen (Example: FRC_UL)

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

Optional | MG3710A/MG3710E

Normal Setup Screen

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

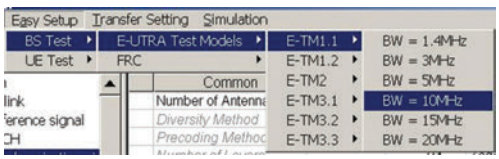


LTE IQproducer Setting Screen/Normal Setup Screen

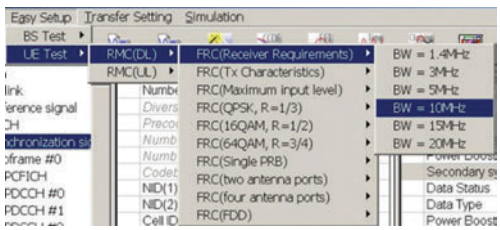
Easy Setup Menu

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

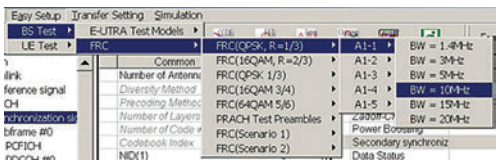
BS Test/E-UTRA Test Models



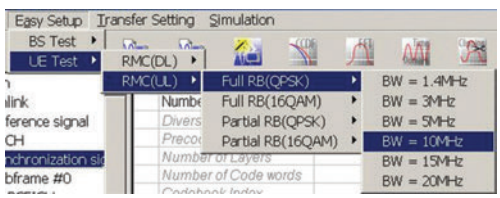
UE Test/RMC (DL)/FRC



BS Test/FRC



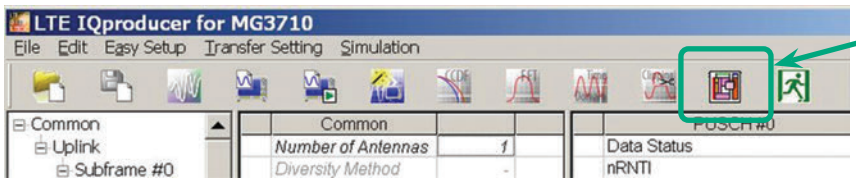
UE Test/RMC (UL)



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

Optional | MG3710A/MG3710E

Visual Check on Frame Structure Screen



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

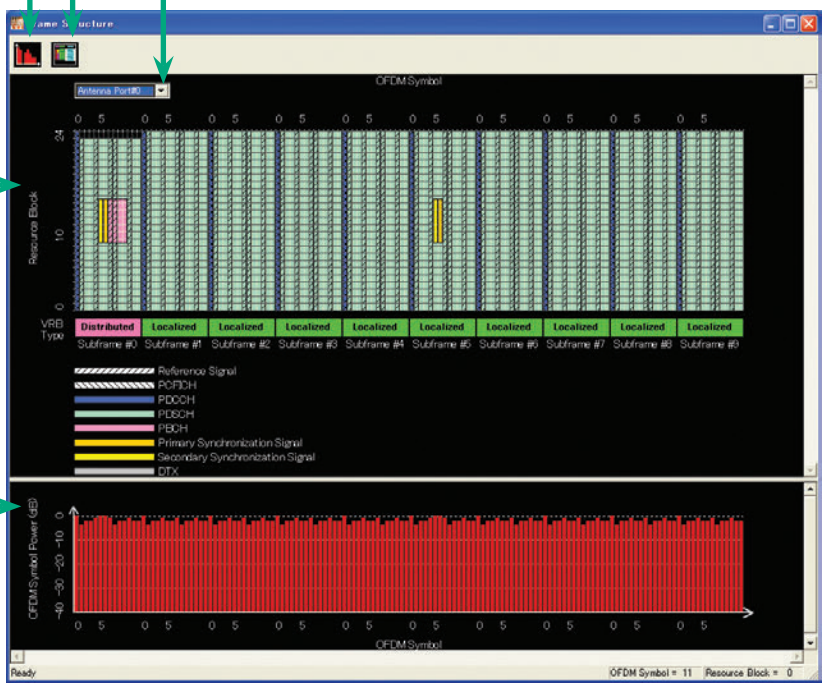
Power graph show/hide button

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 MG3710A/MG3710E

LTE-Advanced FDD Option MX370108A-001

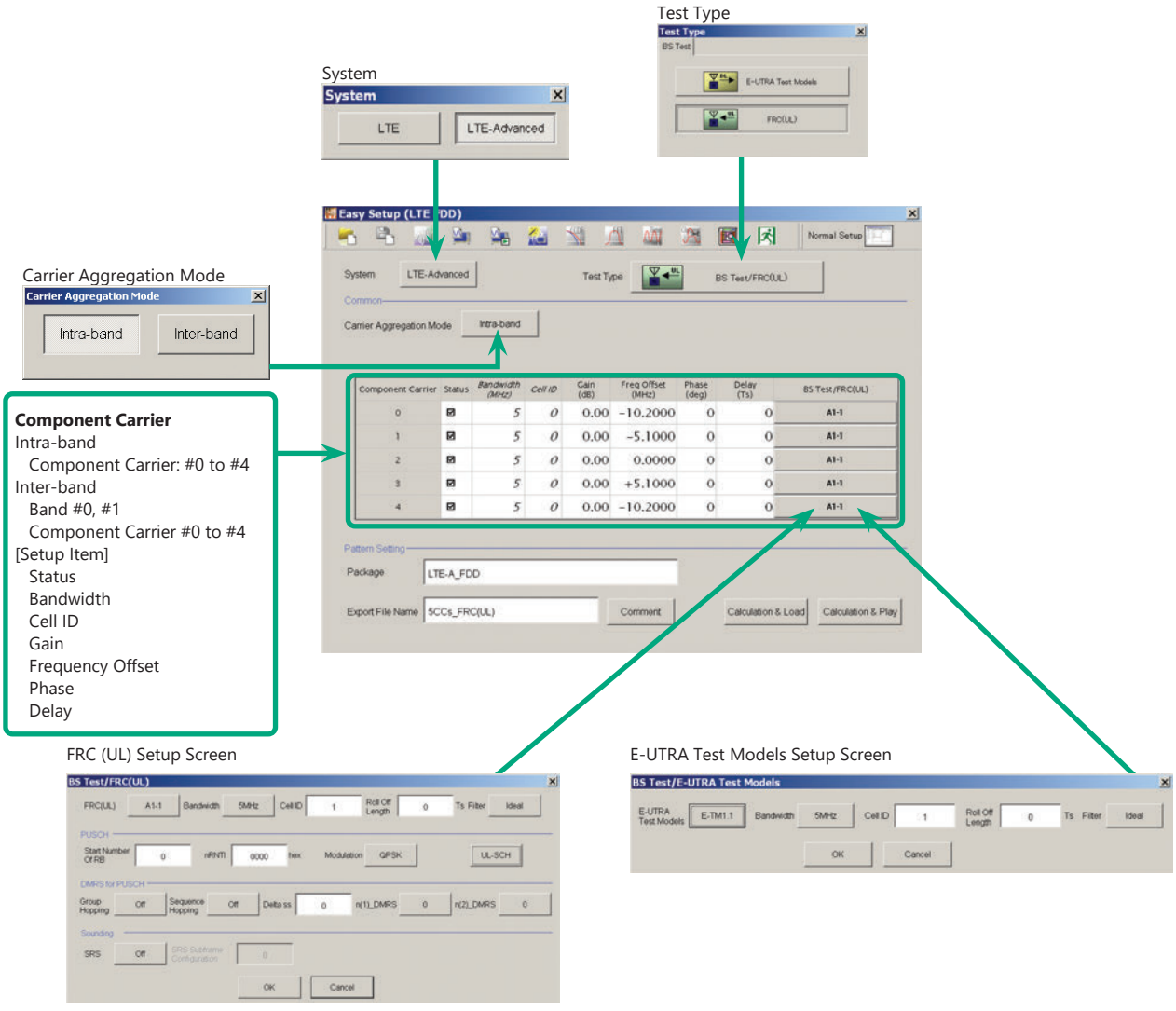
Adding LTE-Advanced FDD Option MX370108A-001 to set LTE-Advanced system parameters supports generation of carrier aggregation signals added* by 3GPP Rel. 10.
Additionally, clustered SC-FDMA signals can be generated at Uplink.

*: 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.



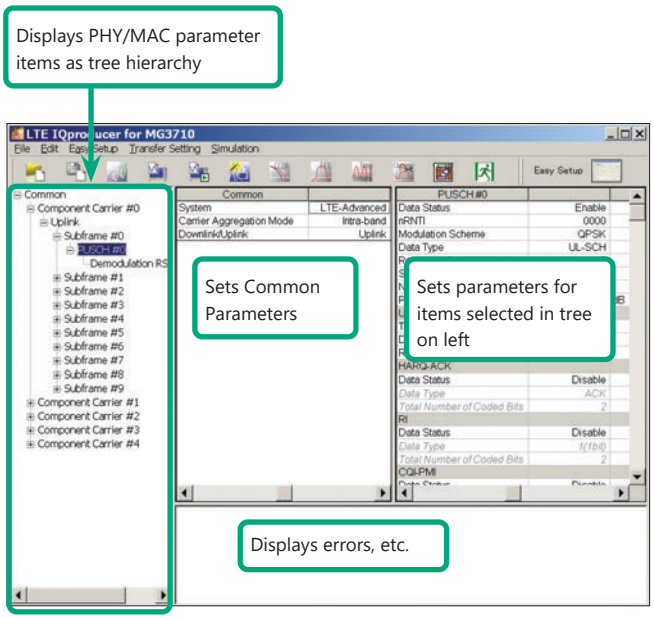
LTE-Advanced Easy Setup Screen (Example: FRC (UL) Test Models)

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

Optional | MG3710A/MG3710E

Normal Setup Screen

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

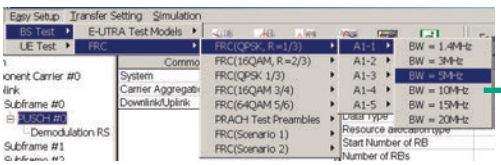


LTE-Advanced Setting Screen/Normal Setup Screen

Easy Setup Menu

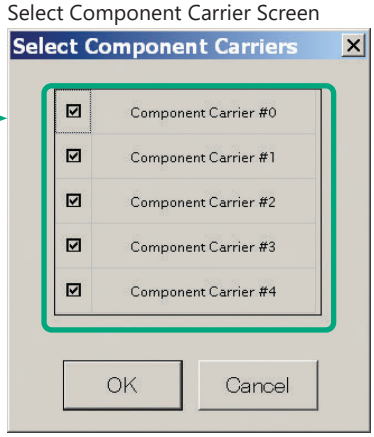
3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

Example: FRC Setup



Simple operation by selecting target signals and component carriers as batch

Select Component Carrier Screen



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

Optional | MG3710A/MG3710E

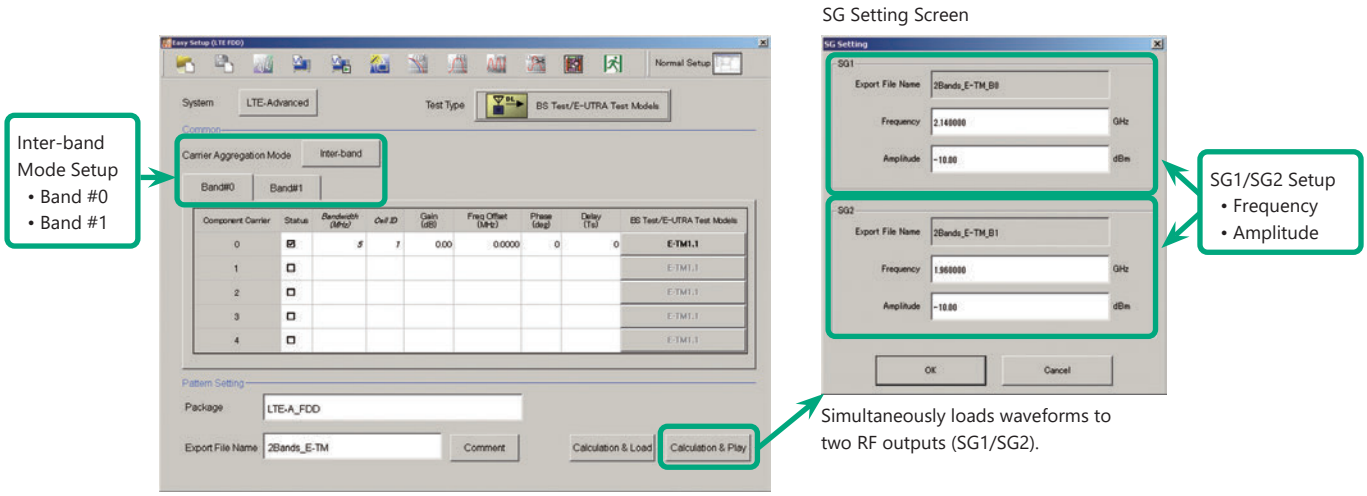
MG3710A/MG3710E Vector Signal Generator – One Unit Supports Carrier Aggregation Modes

The MG3710A/MG3710E supports an upper frequency limit of 6 GHz and an internal RF modulation bandwidth of 160 MHz*1/120 MHz as well as up to two RF output connectors*2.
As a result, one unit supports LTE-Advanced carrier aggregation modes.

Calculation & Play Function*3

After waveform generation is completed, the generated pattern is loaded into memory, selected and output from the MG3710A/MG3710E.
When the Carrier Aggregation Mode is set to Inter-band, the Calculation & Play function can be used to load waveforms to each RF output (SG1/SG2) of the MG3710A/MG3710E in which two RF outputs are installed*2.

*1: Can generate and output signals for 160-MHz bandwidth max. wireless LAN (IEEE802.11ac) and for 120-MHz bandwidth.
*2: With MG3710A-062/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option.
*3: This software is enabled only when used on the MG3710A/MG3710E.

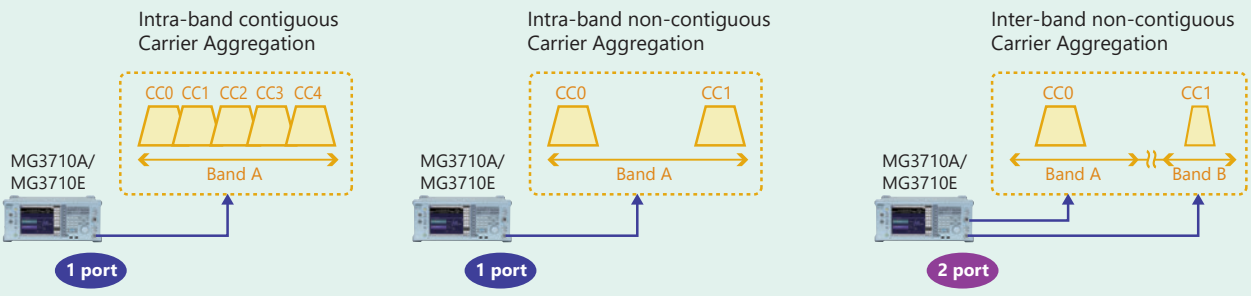


Example of Vector Signal Generator Series LTE-Advanced Carrier Aggregation Function

Carrier Aggregation Mode \ Vector Signal Generator Series	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A/MG3710E	MG3700A	MS2690A series Option 020*1	MS2830A Option 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: LTE IQproducer MX269908A and LTE-Advanced FDD Option MX269908A-001 installed.
*2: MG3710A-062/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

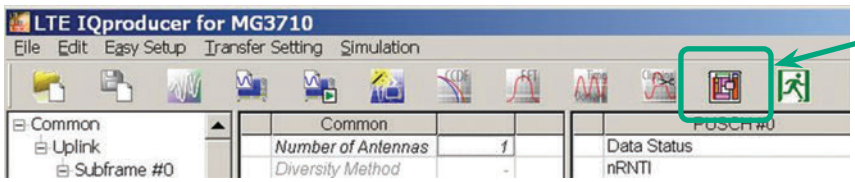
Example: MG3710A/MG3710E Supports Carrier Aggregation



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

Optional | MG3710A/MG3710E

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)

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

Optional MG3710A/MG3710E

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-TM2a, E-TM3.1, E-TM3.1a, 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-TM2a, E-TM3.1, E-TM3.1a, 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
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

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

Optional MG3710A/MG3710E

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

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

Optional MG3710A/MG3710E

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

Optional MG3710A/MG3710E

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, 16 bit repeat, User File
Reference Signal Sequence Repeat Data	Sets 16 bit repeat data installed in reference signal sequence	0000 to FFFF (only when reference signal sequence = 16 bit repeat)
Reference Signal Sequence User File	Sets user file installed in reference signal sequence	Select any file (only when reference signal sequence = User File)
Frequency Shift Value	Displays 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, 16 bit repeat, User File, BCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, BCCH
Data Type Repeat Data	Sets 16 bit repeat data installed in BCH	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to install in BCH	Select any file (only when Data Type = User File)
Transport Block Size	Sets 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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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

Optional MG3710A/MG3710E

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, 16 bit repeat, User File
CFI	Sets CFI codeword type	1, 2, 3
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, DCI
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 256QAM
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File, DL-SCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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

Optional MG3710A/MG3710E

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, 16 bit repeat, User File, UCI
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, UL-SCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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

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

Optional MG3710A/MG3710E

<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, 16 bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16 bit repeat data</td><td>0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets the 16 bit repeat data to be inserted into the CQI/PMI</td><td>0000 to FFFF (only when Data Type = 16 bit 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>

Optional MG3710A/MG3710E

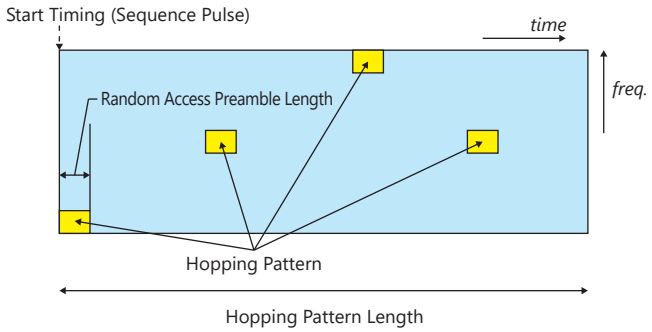
Display	Outline	Setting Range
Demodulation RS for PUSCH		
Data Type	Sets data installed in demodulation RS for PUSCH	Base Sequence, User File
Data Type User File	Sets user file	Select any file (only when Data Type = User File)
Group Hopping	Enable/disable Group Hopping parameter	Disable, Enable (only 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

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

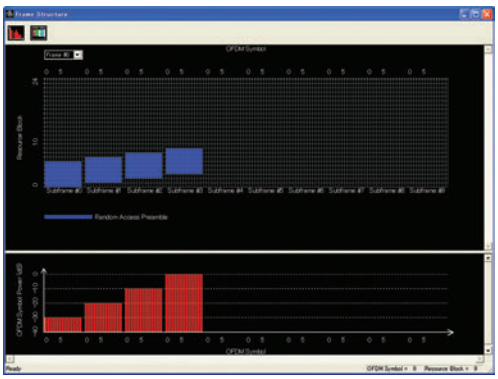
Optional　MG3710A/MG3710E

Easy Setup Parameter Setting Range

Display	Setting Range
BS Test	
E-UTRA Test Models	E-TM1.1, E-TM1.2, E-TM2, E-TM2a, E-TM3.1, E-TM3.1a, 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

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

Optional | MG3710A/MG3710E

LTE TDD IQproducer MX370110A 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".

LTE-Advanced TDD Option MX370110A-001 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.

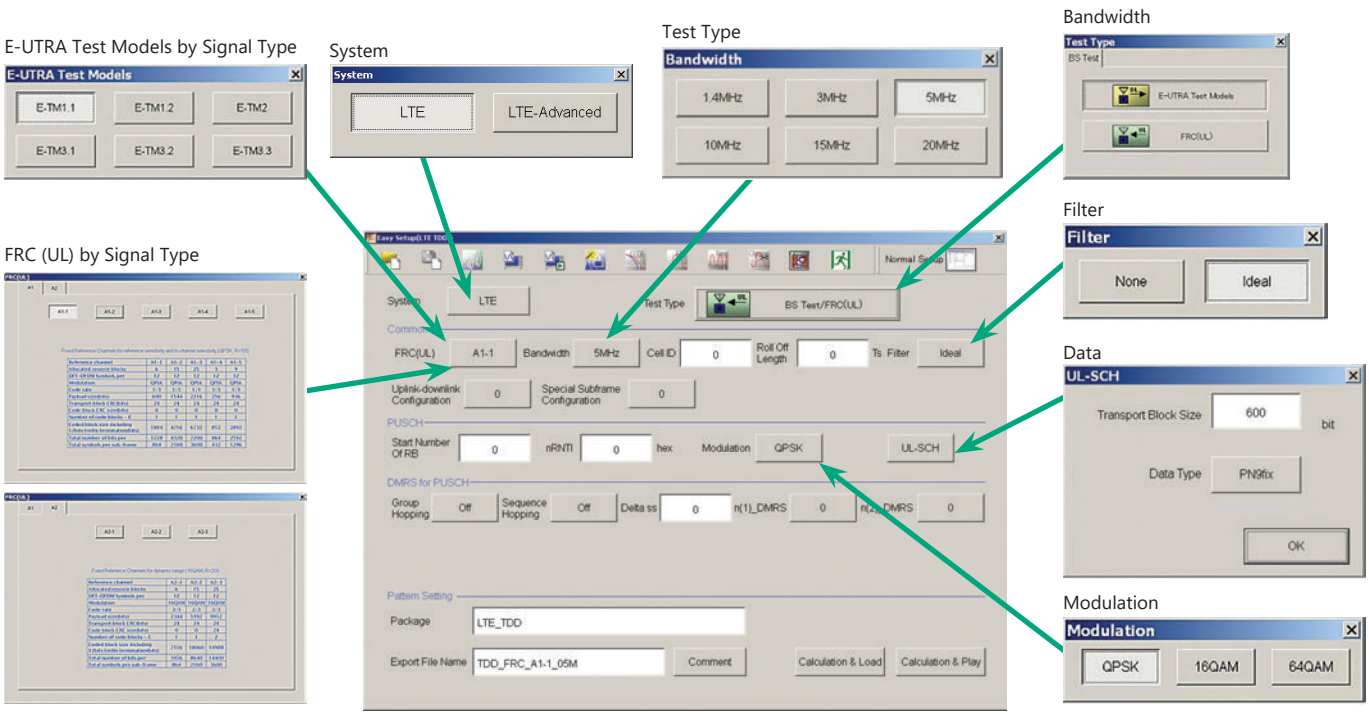
Channels Generated by LTE TDD IQproducer MX370110A

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.



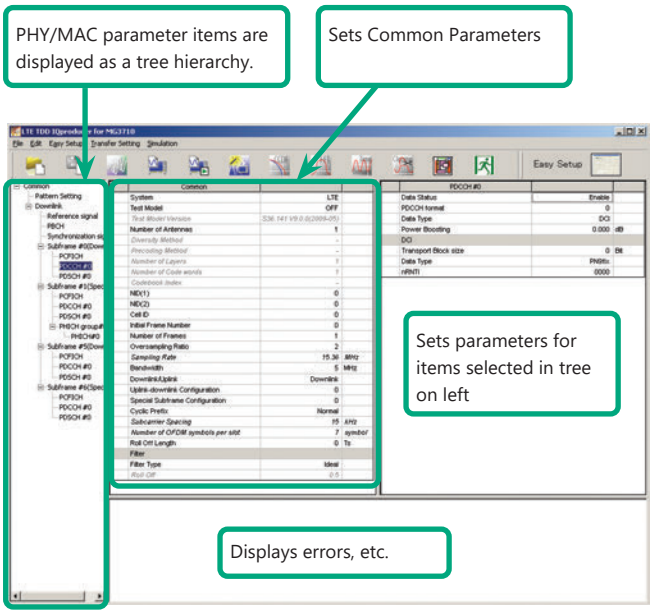
Easy Setup Screen (Example: FRC (UL))

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

Optional | MG3710A/MG3710E

Normal Setup Screen

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

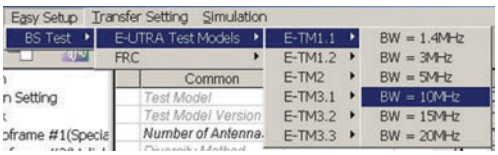


LTE TDD IQproducer Setting Screen/Normal Setup Screen

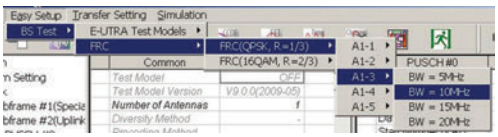
Easy Setup Menu

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

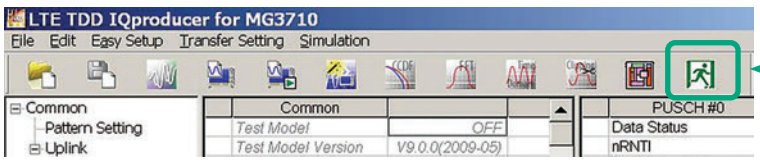
BS Test/E-UTRA Test Models



BS Test/FRC



Visual Check at Frame Structure Screen



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

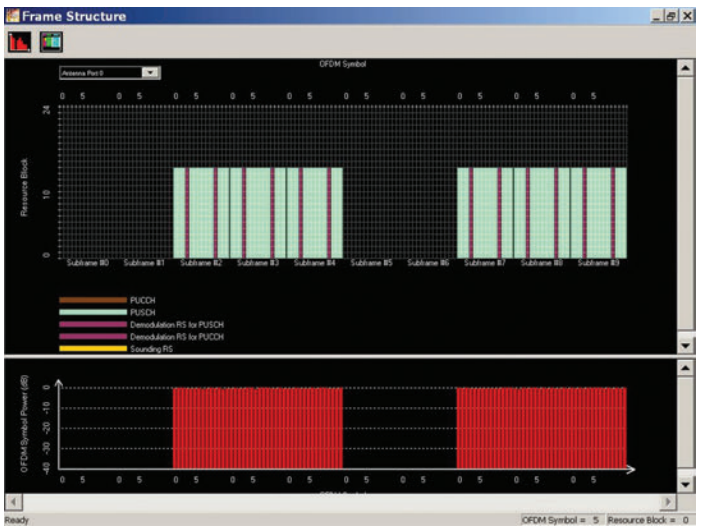
The Frame Structure Screen shows the resource element allocation graphically with each channel color-coded.

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)

Optional MG3710A/MG3710E

LTE-Advanced TDD Option MX370110A-001

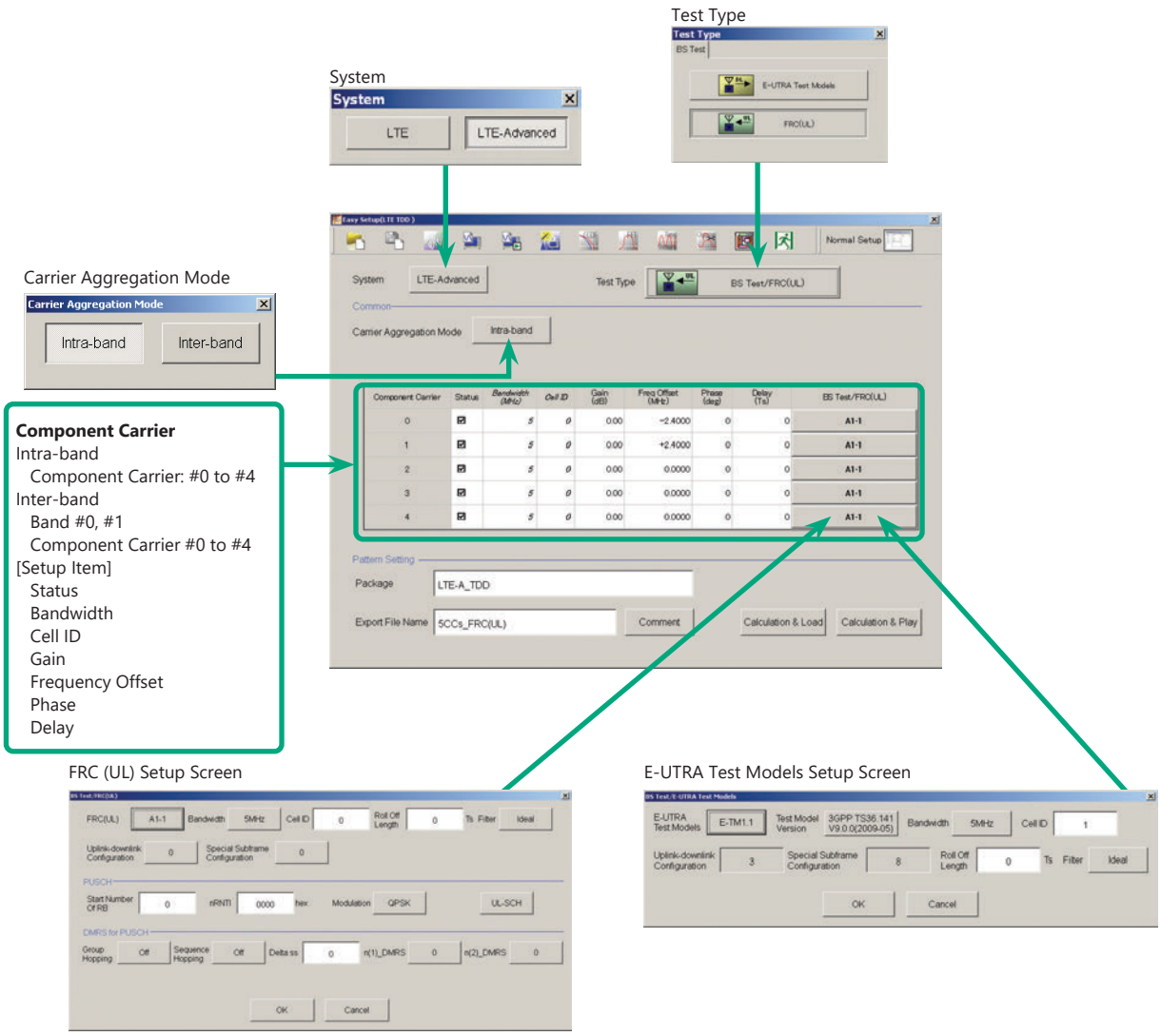
Adding LTE-Advanced TDD Option MX370110A-001 to set LTE-Advanced system parameters supports generation of carrier aggregation signals added* by 3GPP Rel. 10.
Additionally, clustered SC-FDMA signals can be generated at Uplink.

*: 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.



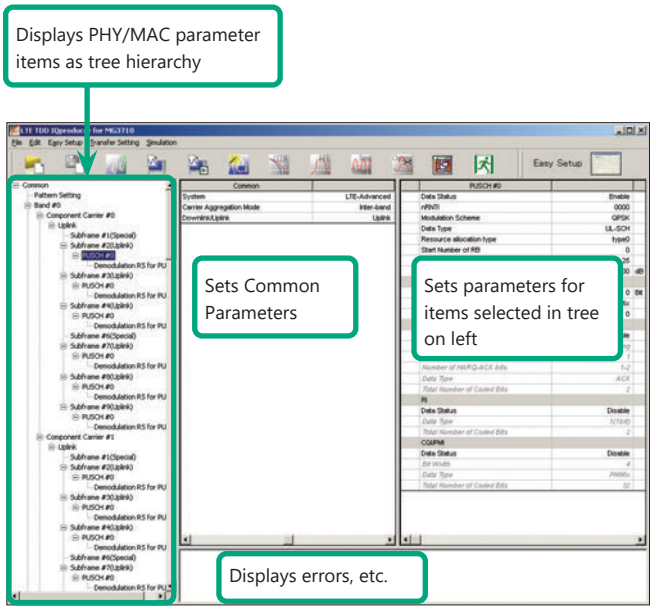
LTE-Advanced Easy Setup Screen (Example: FRC (UL) Test Type)

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

Optional | MG3710A/MG3710E

Normal Setup Screen

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

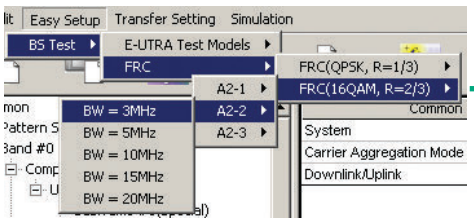


LTE-Advanced Setting Screen/Normal Setup Screen

Easy Setup Menu

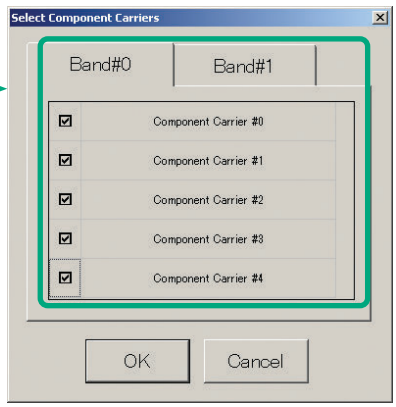
3GPP-defined test conditions can be selected from the Easy Setup menu tree to set values for the Normal Setup screen parameters.

Example: FRC Setup



Simple operation by selecting target signals and component carriers as batch

Select Component Carrier Screen



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

Optional | MG3710A/MG3710E

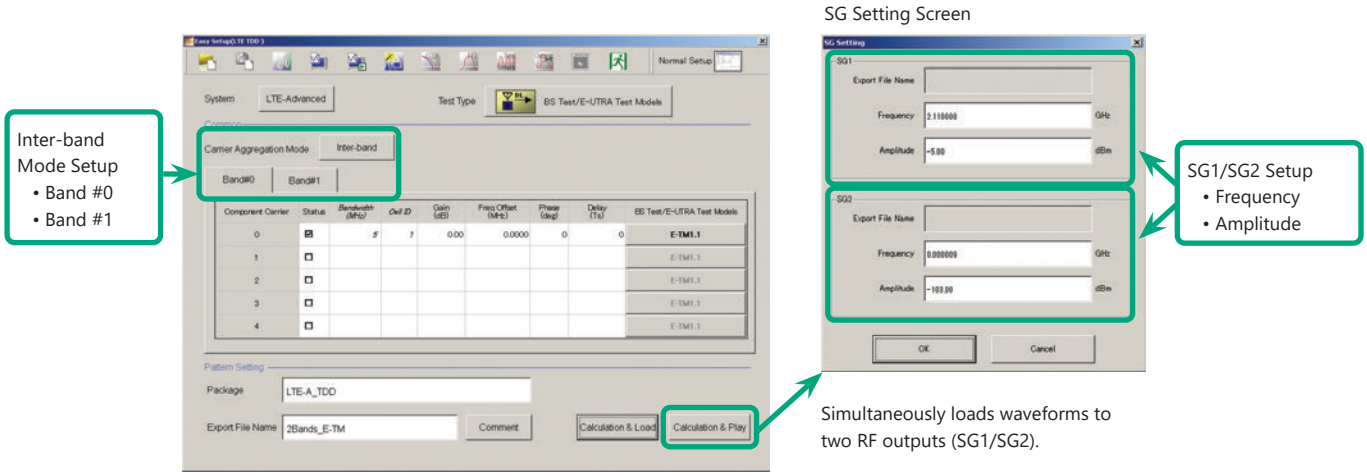
MG3710A/MG3710E Vector Signal Generator – One Unit Supports Carrier Aggregation Modes

The MG3710A/MG3710E supports an upper frequency limit of 6 GHz and an internal RF modulation bandwidth of 160 MHz*1/120 MHz as well as up to two RF output connectors*2.
As a result, one unit supports LTE-Advanced carrier aggregation modes.

Calculation & Play Function*3

After waveform generation is completed, the generated pattern is loaded into memory, selected and output from the MG3710A/MG3710E.
When the Carrier Aggregation Mode is set to Inter-band, the Calculation & Play function can be used to load waveforms to each RF output (SG1/SG2) of the MG3710A/MG3710E in which two RF outputs are installed*2.

*1: Can generate and output signals for 160-MHz bandwidth max. wireless LAN (IEEE802.11ac) and for 120-MHz bandwidth.
*2: With MG3710A-062/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option.
*3: This software is enabled only when used on the MG3710A/MG3710E.

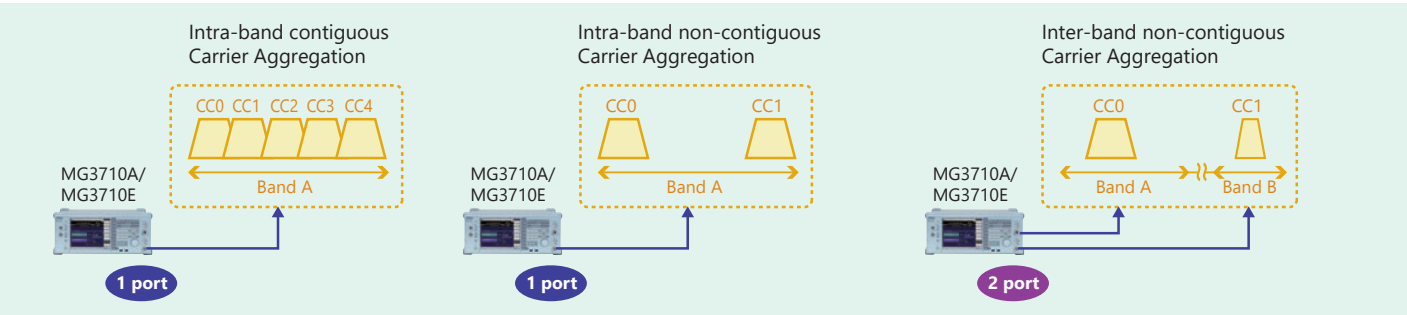


Example of Vector Signal Generator Series LTE-Advanced Carrier Aggregation Function

Vector Signal Generator Series / Carrier Aggregation Mode	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A/MG3710E	MG3700A	MS2690A series Option 020*1	MS2830A Option 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: LTE TDD IQproducer MX269910A and LTE-Advanced TDD Option MX269910A-001 installed.
*2: MG3710A-062/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

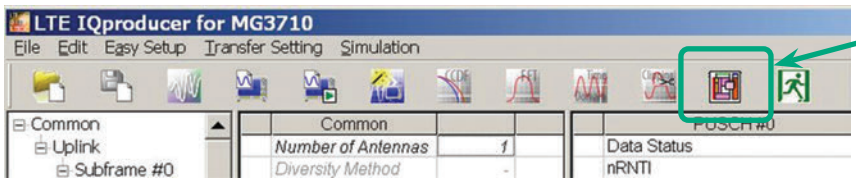
Example: MG3710A/MG3710E Supports Carrier Aggregation



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

Optional | MG3710A/MG3710E

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

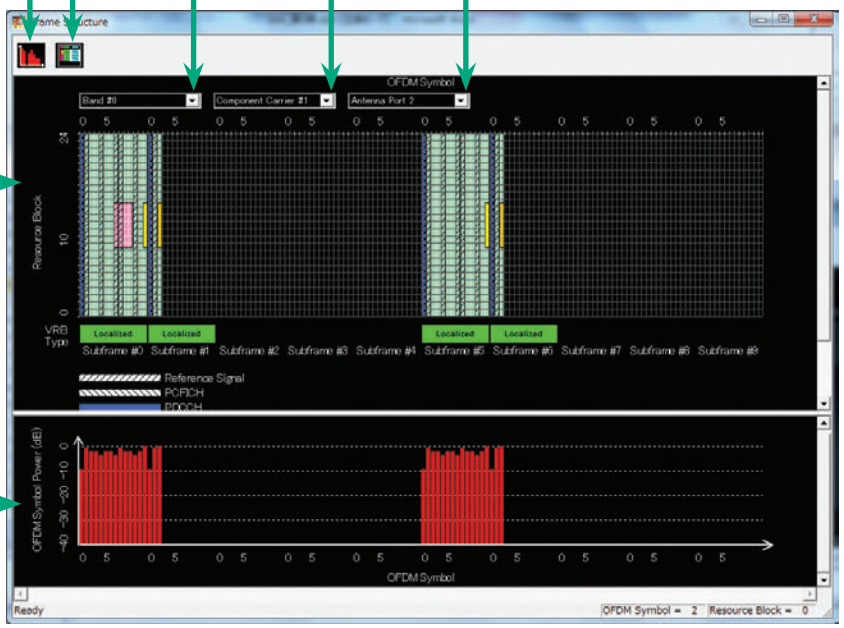
Component Carrier select button

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)

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

Optional MG3710A/MG3710E

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-TM2a, E-TM3.1, E-TM3.1a, 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-TM2a, E-TM3.1, E-TM3.1a, 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

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

Optional MG3710A/MG3710E

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

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

Optional MG3710A/MG3710E

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) 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]

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

Optional MG3710A/MG3710E

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 MG3710A/MG3710E

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, 16 bit repeat, User File, BCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, BCCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
CFI	Sets CFI codeword type	1, 2, 3
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, DCI
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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

Optional MG3710A/MG3710E

Display	Outline	Setting Range
DCI		
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 256QAM
Data Type	Sets data type	PN9fix, PN15fix, 16 bit repeat, User File, DL-SCH
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, UCI
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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

Optional MG3710A/MG3710E

<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, 16 bit repeat, User File</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16 bit repeat data</td><td>0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File, UL-SCH</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets 16 bit repeat data</td><td>0000 to FFFF (only when Data Type = 16 bit 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>

Optional MG3710A/MG3710E

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, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data	0000 to FFFF (only when Data Type = 16 bit 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, 16 bit repeat, User File
Data Type Repeat Data	Sets the 16 bit repeat data to be inserted into the CQI/PMI	0000 to FFFF (only when Data Type = 16 bit 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

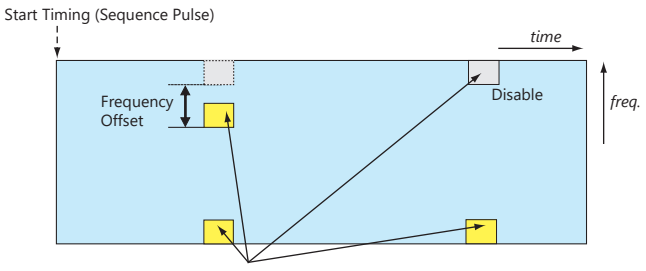
LTE TDD IQproducer MX370110A/LTE-Advanced TDD Option MX370110A-001

Optional MG3710A/MG3710E

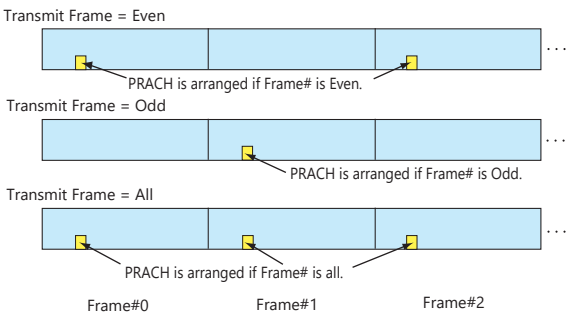
Display	Outline	Setting Range
Zero Correlation Zone Config	Sets Zero Correlation Zone Config used to calculate Cyclic Shift value	When Preamble Format is 0, 1, 2, 3 and Cyclic Shift Set is Unrestricted: 0 to 15 When Preamble Format is 0, 1, 2, 3 and Cyclic Shift Set is Restricted: 0 to 14 When Preamble 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-TM2a, E-TM3.1, E-TM3.1a, E-TM3.2, E-TM3.3
FRC	FRC (QPSK, R = 1/3): A1-1, A1-2, A1-3, A1-4, A1-5 FRC (QPSK, R = 1/3): A3-1, A3-2, A3-3, A3-4, A3-5, A3-6, A3-7 FRC (16QAM, R = 2/3): A2-1, A2-2, A2-3 FRC (16QAM, R = 3/4): A4-1, A4-2, A4-3, A4-4, A4-5, A4-6, A4-7, A4-8 FRC (64QAM, R = 5/6): A5-1, A5-2, A5-3, A5-4, A5-5, A5-6, A5-7 FRC (Scenario 1): A7-1, A7-2, A7-3, A7-4, A7-5, A7-6 (except SRS Option) FRC (Scenario 2): A8-1, A8-2, A8-3, A8-4, A8-5, A8-6 (except SRS Option)



PRACH Parameters



Configuration of PRACH Frame according to Transmit Frame

PRACH Parameter Settings

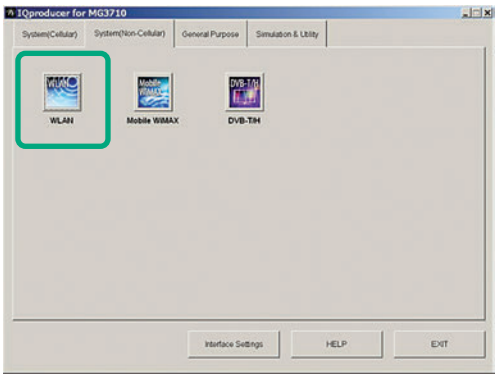
Common – Downlink/Uplink:	Uplink
Uplink – Transmission Type:	PRACH
Uplink – Uplink-downlink Configuration:	2
PRACH – Number of Frames:	5
PRACH – PRACH Configuration:	12

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

WLAN IQproducer MX370111A 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 802.11ac (160 MHz) Option MX370111A-001 supports output of signals in compliance with IEEE802.11ac standards.

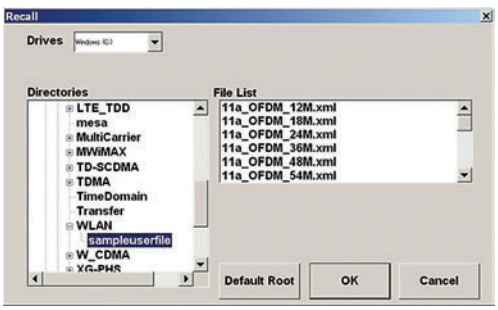
WLAN IQproducer supports two setting screens: “Easy Setup Screen” and “Normal Setup Screen”.



IQproducer Main Screen

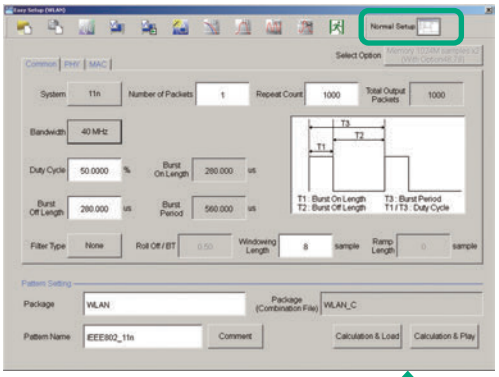
Sample Parameter File

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.

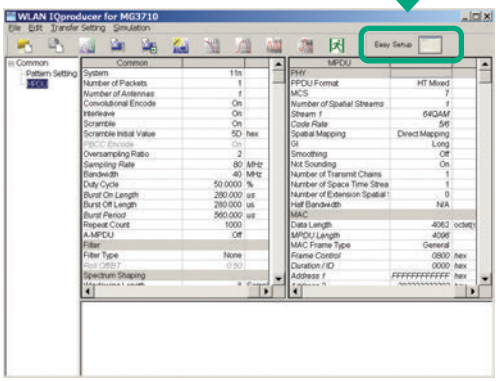


Parameter Recall Screen

Easy Setup Screen



Normal Setup Screen

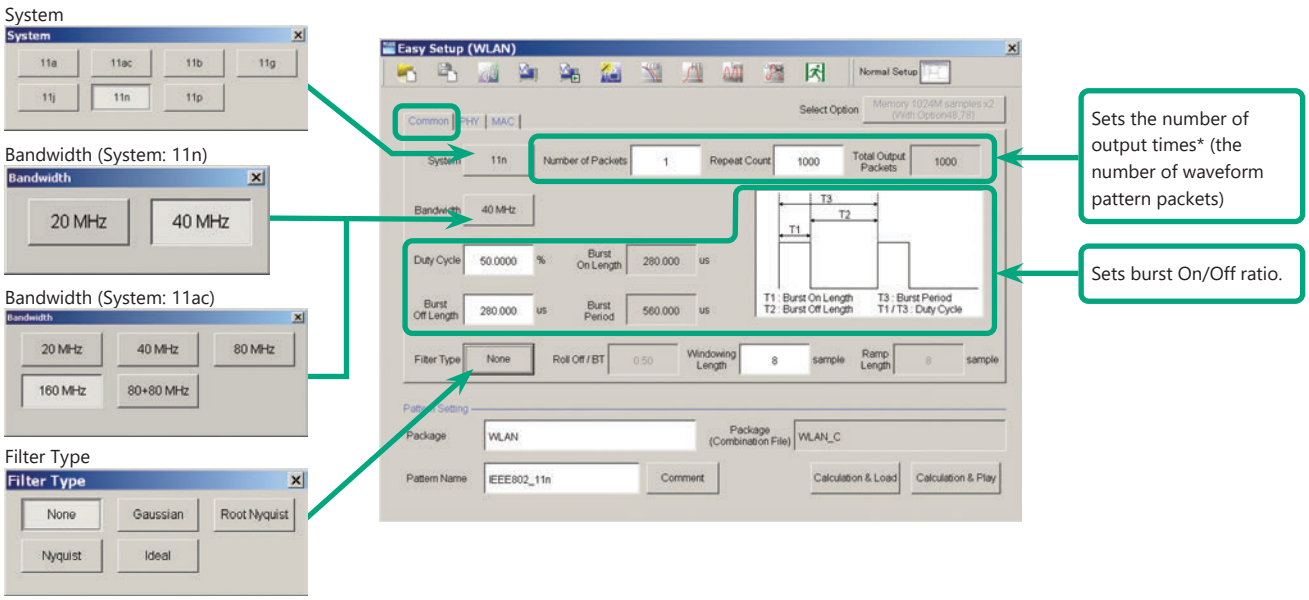


WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

Easy Setup Screen

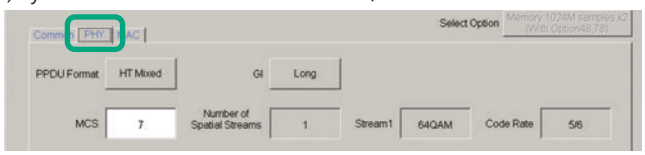
Because it is limited to major parameters, it generates waveform patterns using simple operation. Moreover, touch-panel operation is supported when IQproducer is executed on the MG3710A/MG3710E.
Use "Normal Setup function" for detailed parameter settings.



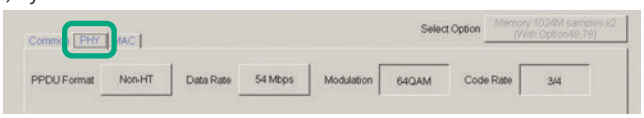
Easy Setup Screen (Common Setup Screen)

*: PER (Packet Error Measurement), the number of waveform pattern packets is generated as [1] and the number of output times from the MG3710A/MG3710E main frame is set.
Example: Outputting 1000 packets
Number of Packets: 1
Repeat Count: 1000

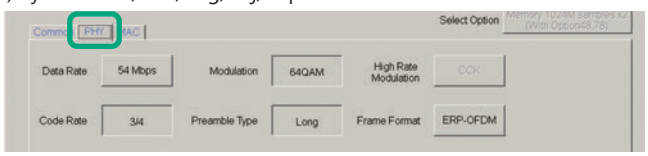
Ex.) System: 11n: PPDU Format: HT Mixed/HT Greenfield



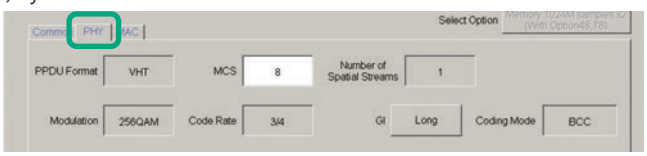
Ex.) System: 11n: PPDU Format: Non-HT



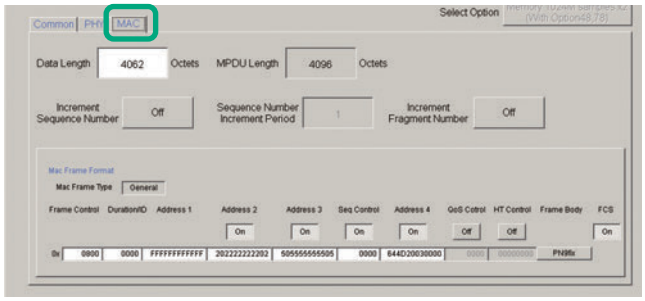
Ex.) System: 11a/11b/11g/11j/11p



Ex.) System: 11ac



Easy Setup Screen (PHY Setup Screen)



Easy Setup Screen (MAC Setup Screen)

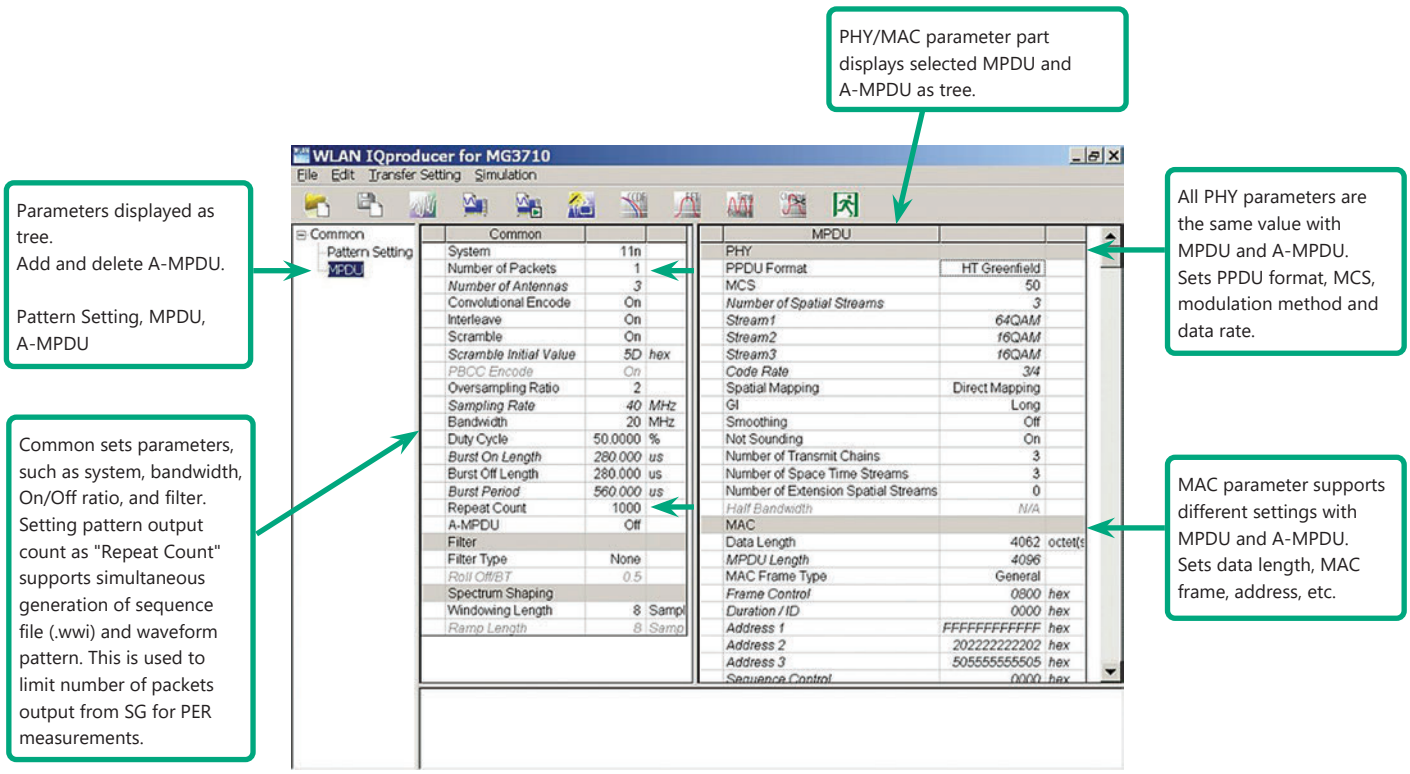
WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

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

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 MG3710A/MG3710E main frame is set.

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



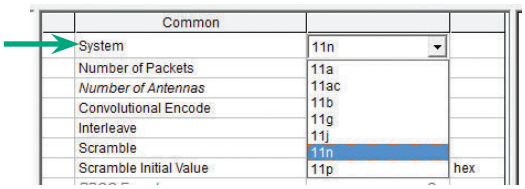
WLAN IQproducer Setting Screen

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

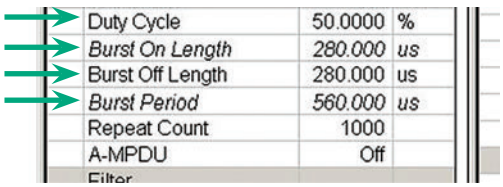
System Setting

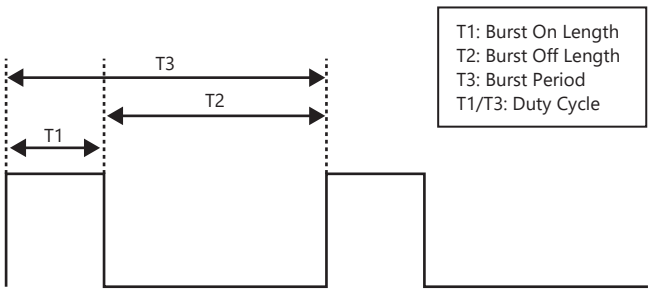
Selects and sets System.



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.



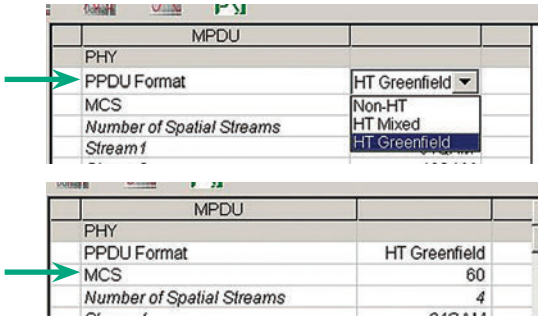


Burst On/Off Setting Image

PPDU Format Selection for IEEE802.11n Signals

Selects and sets following for IEEE802.11n signals:

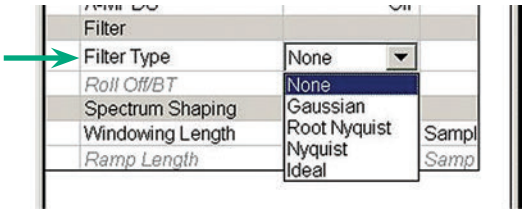
- PPDU format: Non-HT, HT Mixed, HT Greenfield
- MCS: 0 to 76



Filter Selection

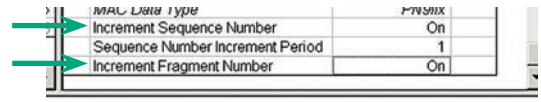
Sets waveform pattern filter conditions for system or Rx specifications.

- None, Gaussian, Root Nyquist, Nyquist, Ideal



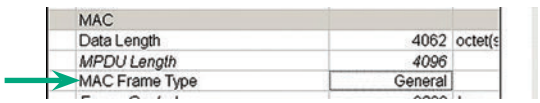
Increment Selection

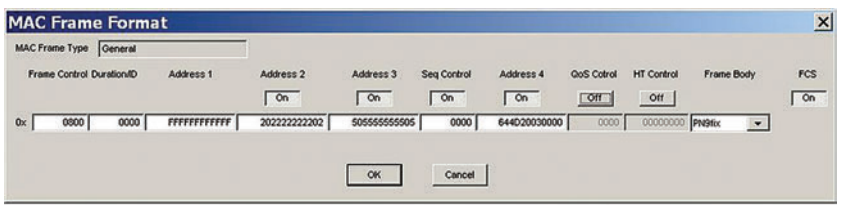
Select On/Off matching Rx test conditions.



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.



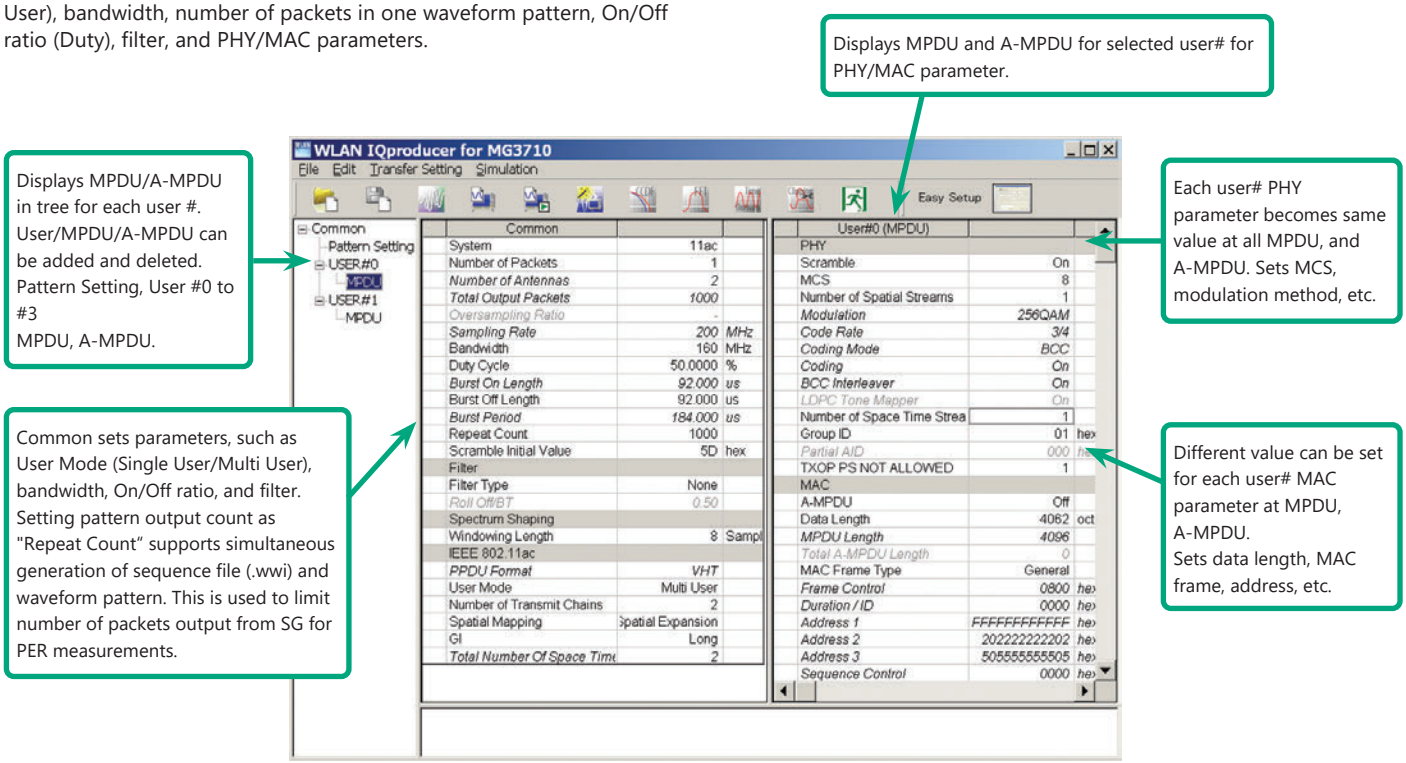


WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

Normal Setup Screen

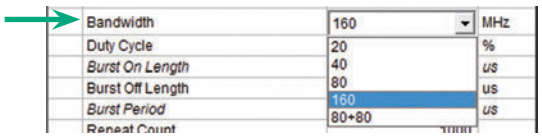
This screen sets common settings, such as user mode (Single User/Multi User), bandwidth, number of packets in one waveform pattern, On/Off ratio (Duty), filter, and PHY/MAC parameters.



Selects Bandwidth

Selects and sets following

20 MHz, 40 MHz, 80 MHz, 160 MHz, 80 + 80 MHz

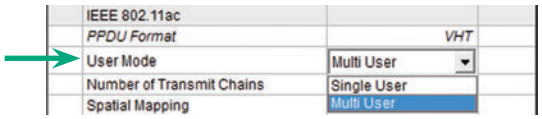


PPDU format

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.



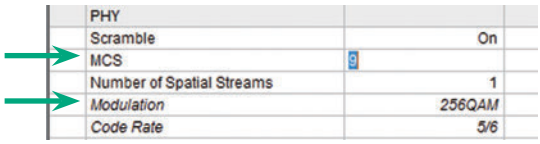
Sets Number of Transmit Chain

Setting range: 1 to 8

Sets MCS

Setting range: 0 to 9

Sets modulation method according to MCS setting.



WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

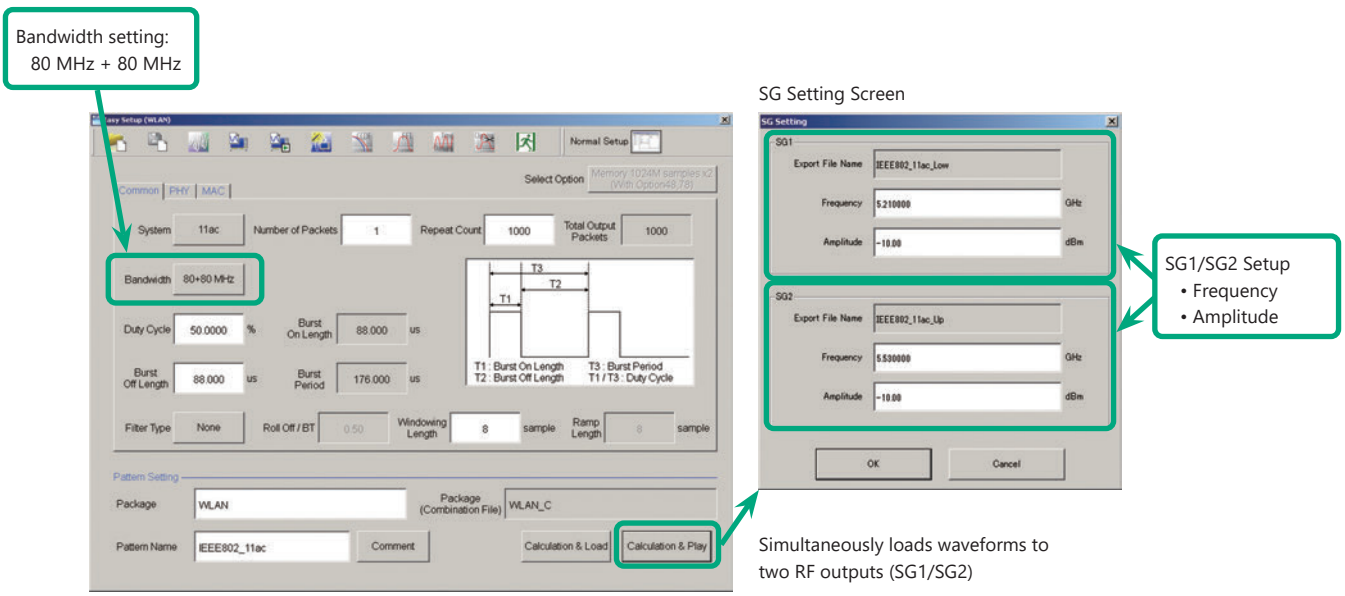
MG3710A/MG3710E Vector Signal Generator – One Unit Supports, All Bandwidth Configurations for IEEE802.11ac Signals.

The MG3710A/MG3710E supports a built-in baseband signal generator with an upper frequency limit of 6 GHz and an RF modulation bandwidth of 160 as well as up to two RF output connectors*1.
It enables one unit to support all bandwidth configurations for IEEE802.11ac signals.

Calculation & Play Function*2

After waveform generation is completed, the generated pattern is loaded into memory, selected and output from the MG3710A/MG3710E.
When the IEEE802.11ac signal bandwidth is set to "80 MHz + 80 MHz", the Calculation & Play function is used to load the waveforms simultaneously to the RF outputs (SG1/SG2) of the MG3710A/MG3710E in which two RF outputs have been installed.

*1: With MG3710A-062/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option.
*2: This software is enabled only when used on the MG3710A/MG3710E.



Supported Vector Signal Generator Series IEEE802.11ac Signal Bandwidth

Vector Signal Generator Series / Carrier Aggregation Mode	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A/MG3710E*1	MG3700A*2	MS2690A series Option 020*3	MS2830A Option 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/MG3710E-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2ndRF Option installed.

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional MG3710A/MG3710E

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 The setting is void if MS269x or MS2830 is selected in the Select instrument dialog box
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, 160, 80 + 80 MHz *160 MHz is not settable if MG3700A/MS2830A/MS269xA is selected in the Select instrument dialog box. 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

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional MG3710A/MG3710E

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, 16 bit 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]

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional MG3710A/MG3710E

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 This setting is void if MS269x or MS2830 is selected in the Select instrument dialog box
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)

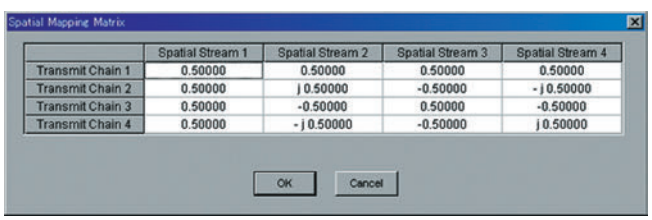
Display	Outline	Setting Range
Common		
Number of Packets	Sets the number of packets to be generated	1 to the maximum capacity of waveform memory
Number of Antennas	Displays the number of antennas	1 to 8
Total Output Packets	Displays the total number of packets (Number of Packets×Repeat Count)	
Oversampling 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, 160, 80 + 80 MHz 160 MHz is not settable if MG3700A, MS269x, or MS2830 is selected in the Select instrument dialog box
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 The setting is void if MS269x or MS2830 is selected in the Select instrument dialog box
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#

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional | MG3710A/MG3710E

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.

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional MG3710A/MG3710E

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, 16 bit 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

WLAN IQproducer MX370111A/802.11ac (160 MHz) Option MX370111A-002

Optional MG3710A/MG3710E

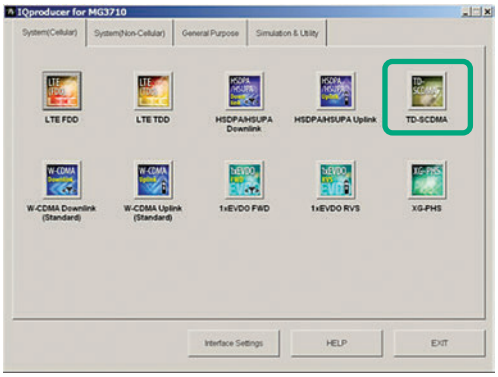
MAC Parameter Setting Range (System = 11ac)

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, 16 bit 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

TD-SCDMA IQproducer MX370112A

Optional | MG3710A/MG3710E

TD-SCDMA IQproducer MX370112A 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).

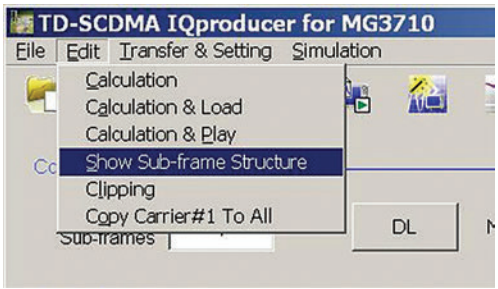


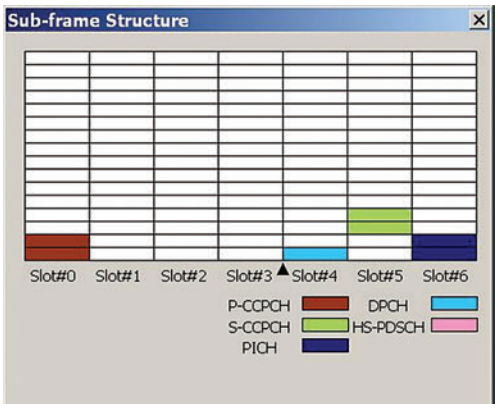
IQproducer Main Screen

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.

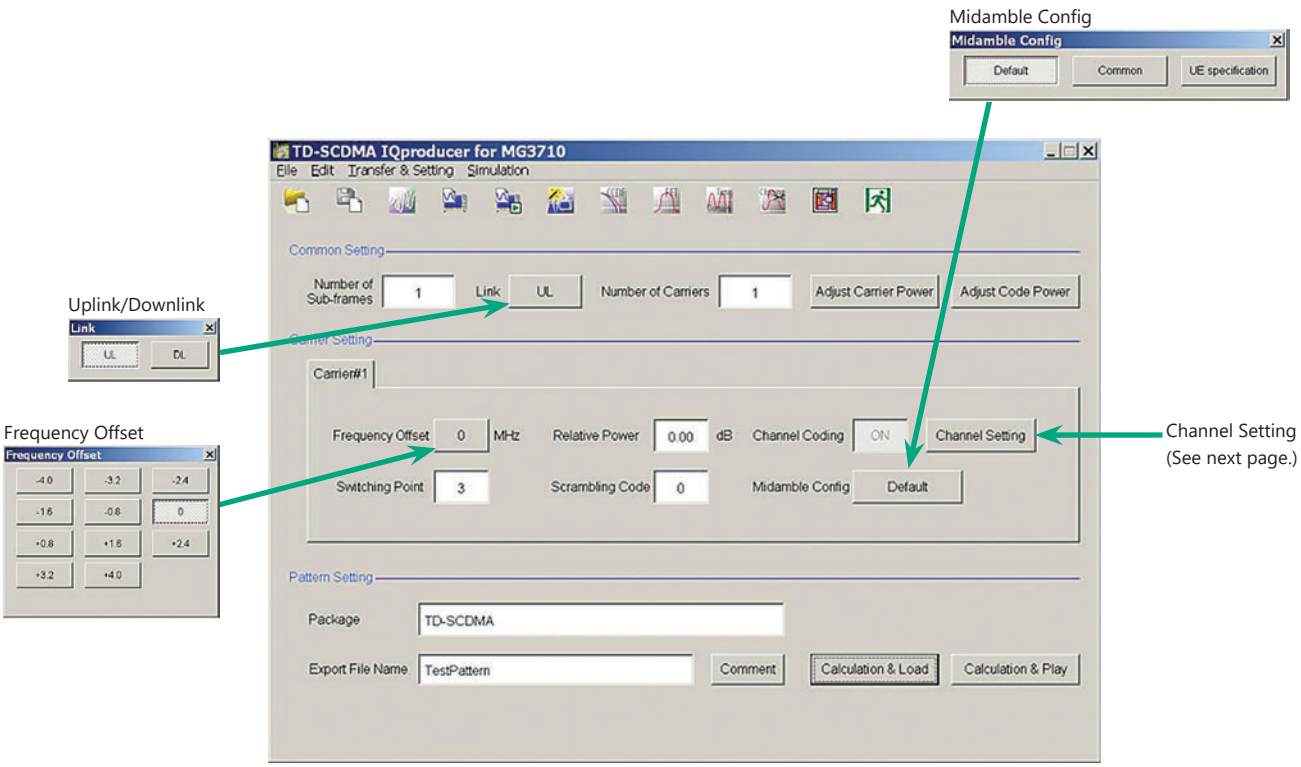
Horizontal axis: Time Slot, 7RU
Vertical axis: Channel Code, 16RU





TD-SCDMA IQproducer Setting Screen

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



TD-SCDMA IQproducer Setting Screen

TD-SCDMA IQproducer MX370112A

Optional MG3710A/MG3710E

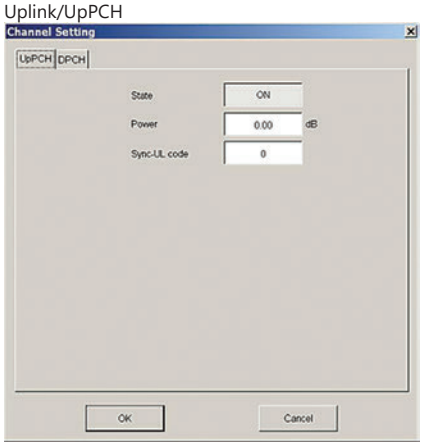
Channel Setting Screen

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

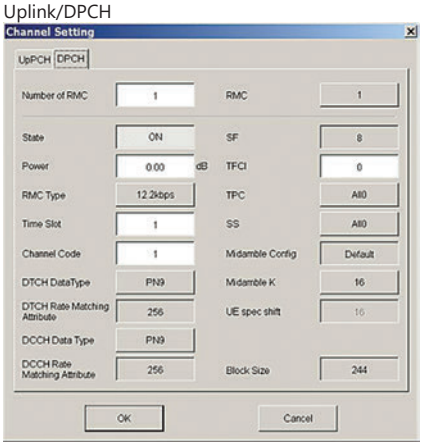
For uplink
- UpPCH
- DPCH

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

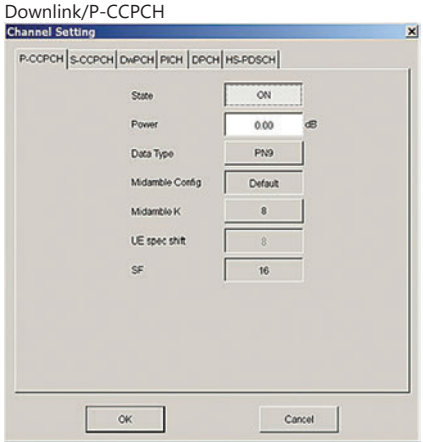
Uplink/UpPCH



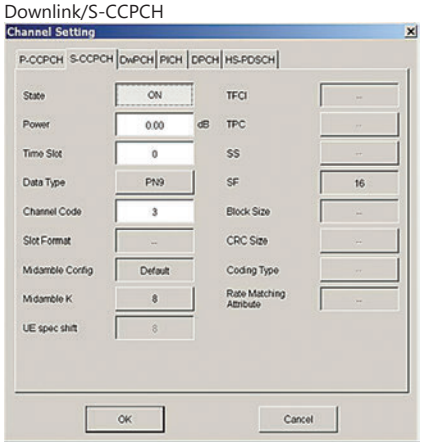
Uplink/DPCH



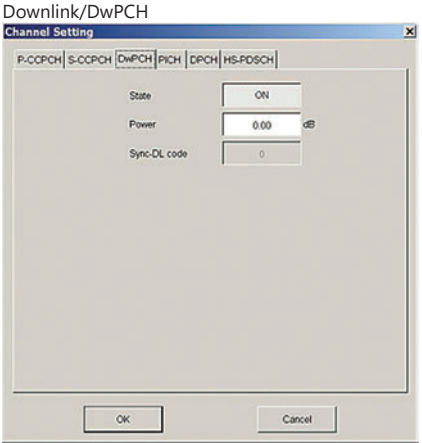
Downlink/P-CCPCH



Downlink/S-CCPCH

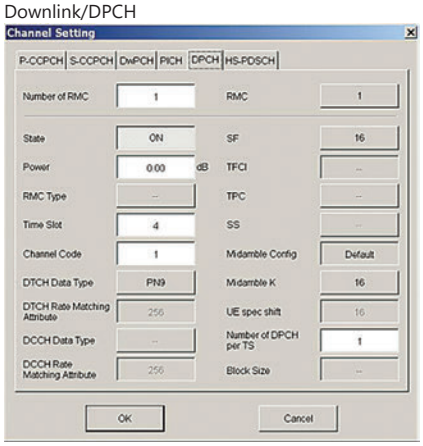


Downlink/DwPCH

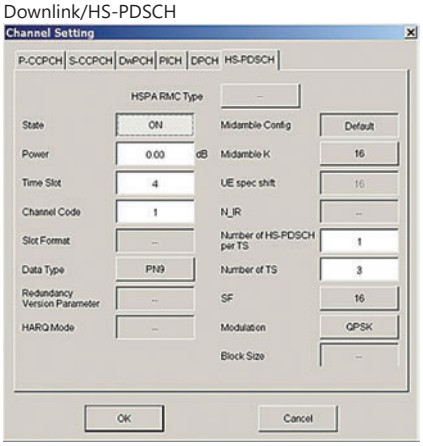


Downlink/PICH

Downlink/DPCH



Downlink/HS-PDSCH



TD-SCDMA IQproducer MX370112A

Optional MG3710A/MG3710E

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 Memory Option		With Option 45/75		With Option 46/76	
Combination of Baseband Signal Option	Without Option 48/78	With Option 48/78	Without Option 48/78	With Option 48/78	Without Option 48/78	With Option 48/78
Memory	64 Msamples	64 Msamples × 2	256 Msamples	256 Msamples × 2	1024 Msamples	1024 Msamples × 2
1	2621	5242	10485	20971	20971	20971
2	1310	2621	5242	10485	10485	10485
3 to 6	655	1310	2621	5242	5242	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, All0, All1, 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, All0, All1, 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, All0, All1, 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

TD-SCDMA IQproducer MX370112A

Optional MG3710A/MG3710E

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, All0, All1, 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, All0, All1, 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, All0, All1, 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, All0, All1, 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

5G NR TDD sub-6 GHz IQproducer MX370113A

Optional | MG3710A/MG3710E

5G NR TDD sub-6 GHz IQproducer MX370113A PC application software is for generating 3GPP TS 38.211, TS 38.212, and TS 38.213-compliant 5G NR sub-6 GHz (TDD) waveform patterns. It can be installed either in a PC or the MG3710A/MG3710E.
It generates Test Model waveform patterns used by the Tx test for 5G NR base stations (BS) as well as Fixed Reference Channel (FRC) waveform patterns used by the Rx test.
Parameters defined by 3GPP TS 38.141-1 (Ver. 15.2.0 2019-06) are set easily just by specifying test conditions from the Easy Setup menu.

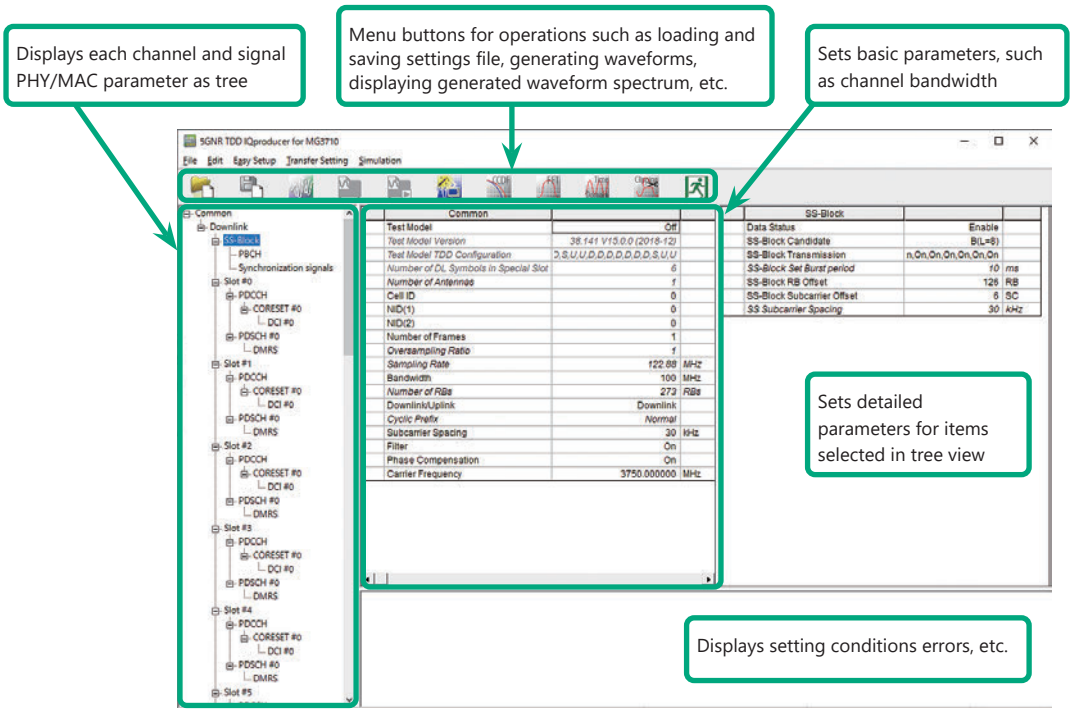
Channels Generated by MX370113A

For downlink
- PSS (Primary Synchronization Signal)
- SSS (Secondary Synchronization Signal)
- PBCH (Physical Broadcast Channel)
- Demodulation Reference Signal for PBCH
- PDCCH (Physical Downlink Control Channel)
- PDSCH (Physical Downlink Shared Channel)
- Demodulation Reference Signal for PDSCH/PDCCH

For uplink
- PUSCH (Physical Uplink Shared Channel)
- Demodulation Reference Signal for PUSCH

Setting Screen

Waveform patterns are generated by setting detailed parameters

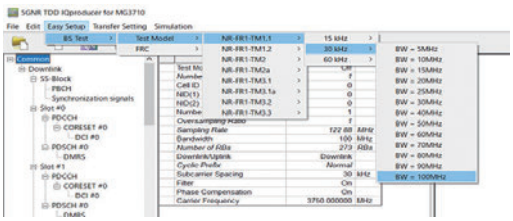


5G NR TDD sub-6 GHz IQproducer Setting Screen

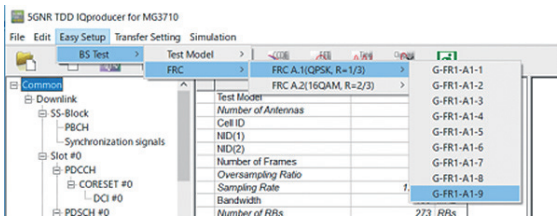
Easy Setup Menu

The Settings Screen parameter values are set by selecting the 3GPP-defined test conditions from the Easy Setup menu tree.

BS Test/Test Models



BS Test/FRC



Function Outline

Bandwidth	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
Subcarrier spacing	15 kHz, 30 kHz, 60 kHz
Downlink channels and signals	PDSCH, DMRS for PDSCH, PDCCH
Downlink SS-Block*	PBCH, PSS, SSS
Uplink channels and signals	PUSCH, DMRS for PUSCH
LDPC channel coding	UL-SCH
Support transform precoding (DFT-S-OFDM) and Pi/2-BPSK for PUSCH	✓
Uplink and downlink configuration with flexible subframe allocations	✓
Phase compensation for transmitted RF frequency	✓

*: Except in the case of Subcarrier Spacing: 60 kHz

Optional MG3710A/MG3710E

BS Test/FRC (UL) Setting Range

Common Parameter Setting Range

Display	Outline	Setting Range
Common		
Number of Antennas	Sets number of antennas	1
Test Model	Sets test model	off, NR-FR1-TM1.1, NR-FR1-TM1.2, NR-FR1-TM2, NR-FR1-TM2a, NR-FR1-TM3.1, NR-FR1-TM3.1a, NR-FR1-TM3.2, NR-FR1-TM3.3
Test Model Version	Sets Test Model Version	38.141 V15.2.0 (2019-06), 38.141 V15.0.0 (2018-12)
Test Model TDD Configuration	Sets Test Model Slot Configuration	Sets the following for each Slot D: Downlink U: Uplink S: Special
Number of DL Symbols in Special Slot	Sets number of Downlink Symbols in Special Slot	1 to 14
Cell ID	Sets Cell ID	0 to 1007
NID (1)	Sets Physical-layer cell-identity group	0 to 335
NID (2)	Sets Physical-layer identity	0 to 2
Number of Frames	Sets number of generated Frames	1 to Max. No. of Frames saved in waveform memory
Oversampling Ratio	Sets oversampling ratio	Bandwidth [MHz] / Oversampling Ratio 5, 10 / 1, 2, 4, 8 15, 20, 25 / 1, 2, 4 30, 40, 50 / 1, 2 60, 70, 80, 90, 100 / 1
Sampling Rate	Displays sampling rate	Display only: Set automatically from Oversampling Ratio and Bandwidth
Bandwidth	Sets system bandwidth	• Downlink SCS [kHz] / Bandwidth [MHz]: 5 10 15 20 25 30 40 50 60 70 80 90 100 15: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ — — — — — 30: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 60: — ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ • Uplink SCS [kHz] / Bandwidth [MHz]: 5 10 15 20 25 30 40 50 60 70 80 90 100 15: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ — — — — — 30: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 60: — ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ — ✓
Number of RBs	Displays number of RB (Max RB)	Display only: Set automatically from Bandwidth and Subcarrier Spacing
Downlink/Uplink	Sets Downlink/Uplink	Downlink, Uplink
Multiplexing Scheme	Sets Uplink OFDM modulation method	CP-OFDM, DFT-s-OFDM (Enabled at Uplink only)
Cyclic Prefix	Sets Cyclic Prefix	Normal
Subcarrier Spacing	Sets subcarrier spacing	15, 30, 60 kHz
Filter	Enables/disables filter	On, Off
Phase Compensation	Enables/disables phase compensation	On, Off
Carrier Frequency	Sets center frequency	450 MHz to 6000 MHz (Enabled at Phase Compensation: On only)

PHY/MAC Parameter (Downlink) Setting Range

Display	Outline	Setting Range
SS-Block		
Data Status	Enables/disables SS-Block	Disable, Enable
SS-Block Candidate	Sets SS-Block mapping pattern	SCS [kHz] / SS-Block Candidate 15: A (L = 4), A (L = 8) 30: B (L = 4), B (L = 8), C (L = 4), C (L = 8) 60: Disabled and cannot be set
SS-Block Transmission	Enables/disables SS-Block in SS-Block units	On, Off
SS-Block Set Burst period	Set SS-Block set burst period	10 ms
SS-Block RB Offset	Sets Offset for SS-Block frequency direction in RB units	When SS-Block Subcarrier Offset = 0: 0 to Max RB – 20 When SS-Block Subcarrier Offset ≠ 0: 0 to Max RB – 20 – 1
SS-Block Subcarrier Offset	Sets REW offset in SS-Block RB	0 to 11

Optional MG3710A/MG3710E

Display	Outline	Setting Range
SS Subcarrier Spacing	Sets SS-Block subcarrier spacing	SCS [kHz]: 15 – Same value as Common Subcarrier Spacing; 30 – Same value as Common Subcarrier Spacing; 60 – Excludes Data Mapping and disables all SS-Block parameters
Data Mapping	Sets whether to map or null PDSCH data at SS-Block position	PDSCH (Enable when Data Status = Disable, or when SCS = /SS-Block SCS selected at Common)
PBCH		
Data Type	Sets data inserted in PBCH	PN9, PN15, 16-bit repeat, User File
Data Type User File	Sets user file inserted in PBCH	Select User File (Displayed when Data Type = User File)
Data Type Repeat Data	Sets data to repeat	0000 to FFFF (Enabled only when Data Type = 16-bit repeat)
Init Data	Sets PN data generation default	0000 to FFFF (Enabled only when Data Type = PN9, PN15)
PBCH Power Boosting	Sets comparison of PBCH power with ideal signal	–20.000 to 20.000 [dB]
DMRS for PBCH		
DMRS Power Boosting	Sets comparison of DMRS power with ideal signal	–20.000 to 20.000 [dB]
Synchronization signals		
Primary synchronization signal		
PSS Power Boosting	Sets comparison of PSS power with ideal signal	–20.000 to 20.000 [dB]
Secondary synchronization signal		
SSS Power Boosting	Sets comparison of SSS power with ideal signal	–20.000 to 20.000 [dB]
Slot		
Data Status	Enables/disables slot	Enable, Disable
Number of PDSCHs	Sets number of PDSCH	1 to 8
RB arrangement	Sets PDSCH RB arrangement	PDSCH#0 to PDSCH# (Number of PDSCHs – 1)
PDCCH		
Data Status	Enables/disables PDCCH	Enable, Disable
Number of CORESETs	Sets number of CORESETs	1 to 3
PDCCH ID Data Type	Sets PDCCH ID data type	Cell ID, User Defined
PDCCH ID	Sets PDCCH ID	0 to FFFF
Frequency Domain Resources	Sets CORESET frequency domain arrangement	Frequency Domain Resource #0 to 44
PDCCH Power Boosting	Sets comparison of PDCCH power with ideal signal	–20.000 to 20.000 [dB]
DMRS for PDCCH		
DMRS Power Boosting	Sets comparison of DMRS power with ideal signal	–20.000 to 20.000 [dB]
CORESET		
Start Symbol	Sets CORESET start symbol	0
Number of Symbols	Sets number of CORESET symbols	1 to 3
Number of DCIs	Sets number of DCI	1 to 8
Number of RBs In One CORESET	Sets number of RBs per 1 symbol per 1 CORESET	Number of Symbol: 1 – 6; 2 – 3; 3 – 2 (Number of RBs In One CORESET)
Precoder Granularity	Sets Precoder Granularity	Same as REG-bundle, All Contiguous RBs
DCI		
CORESET Number	Displays supported number of CORESETs	Display only: 0 to Number of CORESET – 1
First CCE Index In CORESET	Sets first CCE Index number in CORESET	Max CCE Index in 0 to CORESET
Aggregation Level	Sets Aggregation Level	1, 2, 4, 8, 16
Data Type	Sets data inserted in DCI	PN9, PN15, 16 bit repeat, User File
Data Type User File	Sets user file inserted in PBCH	Select User File (Displayed only when Data Type = User File)
Data Type Repeat Data	Sets data to repeat	0000 to FFFF (Enabled only when Data Type = 16-bit repeat)
Init Data	Sets PN data creation default	0000 to FFFF (Enabled only when Data Type = PN9, PN15)
PDSCH		
Data Status	Enables/disables PDSCH	Enable, Disable
Power Boosting	Sets PDSCH and DMRS power ratio for ideal signal	–20.000 to 20.000 [dB]
Number of Layers	Sets Layer	1
Number of Code words	Sets Code words	1
Antenna Port Number	Sets antenna port number	1000 to 1005
nRNTI	Sets Radio Network Temporary Identifier	0000 to FFFF
nID Status	Enables/disables nID	Enable, Disable
nID	Sets nID	0 to 1023

Optional MG3710A/MG3710E

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>Modulation Scheme</td><td>Sets modulation method</td><td>QPSK, 16QAM, 64QAM, 256QAM</td></tr>
<tr><td>PDSCH mapping type</td><td>Sets PDSCH mapping type</td><td>A, B</td></tr>
<tr><td>Symbol Start</td><td>Sets PDSCH start symbol</td><td><table><tr><th>PDSCH mapping type</th><th>DMRS TypeA Position</th><th>Symbol Start</th></tr><tr><td rowspan="2">A</td><td>3</td><td>3</td></tr><tr><td>2</td><td>0, 1, 2</td></tr><tr><td>B</td><td>—</td><td>0 to 12</td></tr></table></td></tr>
<tr><td>Symbol Length</td><td>Sets PDSCH symbol length</td><td><table><tr><th>PDSCH mapping type</th><th>Symbol Length</th></tr><tr><td>A</td><td>3 to 14</td></tr><tr><td>B</td><td>2, 4, 7</td></tr></table></td></tr>
<tr><td>Symbol End</td><td>Displays PDSC end symbol</td><td>Display only: Set automatically using Symbol Length and Symbol Start</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in PDSCH</td><td>PN9, PN15, 16-bit repeat, User File</td></tr>
<tr><td>Data Type User File</td><td>Sets user file inserted in PDSCH</td><td>Select user file (Displayed only when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Displayed only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets default value for PN data generation</td><td>0000 to FFFF (Enabled when Data Type = PN9, PN15)</td></tr>
<tr><td colspan="3">DMRS</td></tr>
<tr><td>nSCID</td><td>Sets nSCID</td><td>0, 1</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Sets DMRS nSCID data type</td><td>Cell ID, User Defined</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID</td><td>0 to 65535</td></tr>
<tr><td>DMRS Length</td><td>Sets DMRS symbol</td><td>1</td></tr>
<tr><td>DMRS Additional Position</td><td>Sets DMRS additional position number</td><td><table><tr><th>PDSCH mapping type</th><th>Symbol End – Symbol Start</th><th>DMRS Additional Position</th></tr><tr><td>A</td><td>≥3</td><td>0, 1, 2, 3</td></tr><tr><td>B</td><td>2, 4, 6</td><td>0, 1</td></tr><tr><td colspan="2">Other than above</td><td>No setting</td></tr></table></td></tr>
<tr><td>DMRS Configuration Type</td><td>Sets DMRS configuration type</td><td>1, 2</td></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data between DMRS or not</td><td><table><tr><th>DMRS Configuration Type</th><th>Antenna Port Number</th><th>Number of DMRS CDM groups without Data</th></tr><tr><td>1</td><td>1000</td><td>1, 2</td></tr><tr><td>1</td><td>1001</td><td>1, 2</td></tr><tr><td>1</td><td>1002</td><td>2</td></tr><tr><td>1</td><td>1003</td><td>2</td></tr><tr><td>2</td><td>1000</td><td>1, 2, 3</td></tr><tr><td>2</td><td>1001</td><td>1, 2, 3</td></tr><tr><td>2</td><td>1002</td><td>2, 3</td></tr><tr><td>2</td><td>1003</td><td>2, 3</td></tr><tr><td>2</td><td>1004</td><td>3</td></tr><tr><td>2</td><td>1005</td><td>3</td></tr></table></td></tr>
<tr><td>DMRS TypeA Position</td><td>Sets DMRS l0 position</td><td>2, 3 (Displayed at PDSCH Mapping Type A)</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DMRS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
</table>

PHY/MAC Parameter (Uplink) Setting Range

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td colspan="3">Slot</td></tr>
<tr><td>Data Status</td><td>Enables/disables slot</td><td>Enable, Disable</td></tr>
<tr><td>Number of PUSCHs</td><td>Sets number of PUSCHs</td><td>1 to 8</td></tr>
<tr><td colspan="3">PUSCH</td></tr>
<tr><td>Data Status</td><td>Enables/disables PUSCH</td><td>Enable, Disable</td></tr>
<tr><td>Power Boosting</td><td>Sets PUSCH and DMRS power ratio for ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td>Number of Layers</td><td>Sets layer</td><td>1</td></tr>
<tr><td>Number of Code words</td><td>Sets Code Words</td><td>1</td></tr>
<tr><td>Antenna Port Number</td><td>Sets antenna port number</td><td><table><tr><th>DMRS Configuration Type</th><th>Antenna Port Number</th></tr><tr><td>Type1</td><td>0 to 3</td></tr><tr><td>Type2</td><td>0 to 5</td></tr></table></td></tr>
<tr><td>nRNTI</td><td>Sets Radio Network Temporary Identifier</td><td>0000 to FFFF</td></tr>
<tr><td>nID Status</td><td>Enables/disables nID</td><td>Enable, Disable</td></tr>
<tr><td>nID</td><td>Sets nID</td><td>0 to 1023</td></tr>
<tr><td>Modulation Scheme</td><td>Sets modulation type</td><td>QPSK, 16QAM, 64QAM, 256QAM, PI/2-BPSK</td></tr>
<tr><td>PUSCH mapping type</td><td>Sets PUSCH mapping type</td><td>A, B</td></tr>
<tr><td>RB Start</td><td>Sets PUSCH start RB</td><td>0 to Max. RB - 1</td></tr>
<tr><td>Number of RBs</td><td>Sets number of RBs from start RB</td><td>RB Start to Max. RB - 1</td></tr>
<tr><td>RB End</td><td>Displays PUSCH end RB</td><td>Display only: Set automatically using Number of RB and RB Start</td></tr>
</table>

Optional MG3710A/MG3710E

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>Symbol Start</td><td>Sets PUSCH start symbol</td><td><table><tr><th>PUSCH mapping type</th><th>Symbol Length</th></tr><tr><td>A</td><td>0</td></tr><tr><td>B</td><td>0 to 13</td></tr></table></td></tr>
<tr><td>Symbol Length</td><td>Sets PUSCH symbol length</td><td><table><tr><th>PUSCH mapping type</th><th>Symbol Length</th></tr><tr><td>A</td><td>4 to 14</td></tr><tr><td>B</td><td>1 to 14</td></tr></table></td></tr>
<tr><td>Symbol End</td><td>Displays PUSCH end symbol</td><td>Display only: Set automatically using Symbol Length and Symbol Start</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in PUSCH</td><td>PN9, PN15, 16-bit repeat, UL-SCH, User File</td></tr>
<tr><td>Data Type User File</td><td>Sets user file inserted in PUSCH</td><td>Select User File (Displayed when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Enabled only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets PN data generation initial value</td><td>0000 to FFFF (Enabled only when Data Type = PN9, PN15)</td></tr>
<tr><td>UL-SCH</td><td></td><td></td></tr>
<tr><td>Rate Matching</td><td>Sets Rate Matching</td><td>FBRM</td></tr>
<tr><td>MCS Index</td><td>Sets MCS Index value</td><td>0 to 27</td></tr>
<tr><td>MCS Table</td><td>Sets which table to use as MCS table</td><td>64QAM, 256QAM</td></tr>
<tr><td>PI/2-BPSK Support</td><td>Enables/disables PI/2-BPSK</td><td>Enable, Disable</td></tr>
<tr><td>Redundancy Version</td><td>Sets Redundancy version</td><td>0, 1, 2, 3</td></tr>
<tr><td>Transport Block Size</td><td>Sets Transport Block size</td><td>Value from 0 to PUSCH setting</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in UL-SCH</td><td>PN9, PN15, 16-bit repeat, User File (Enabled only when Data Type (PUSCH) = UL-SCH)</td></tr>
<tr><td>Data Type User File</td><td>Sets user file to insert in UL-SCH</td><td>Select User File (Displayed only when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Enabled only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets PN data generation default</td><td>0000 to FFFF (Enabled only when Data Type = PN9, PN15)</td></tr>
<tr><td>DMRS</td><td colspan="2"></td></tr>
<tr><td>Group Hopping</td><td>Enables/disables Group Hopping</td><td>Enable, Disable</td></tr>
<tr><td>Sequence Hopping</td><td>Enables/disable Sequence Hopping</td><td>Enable, Disable</td></tr>
<tr><td>PUSCH ID</td><td>Sets PUSCH ID</td><td>0 to 1007</td></tr>
<tr><td>nSCID</td><td>Sets nSCID</td><td>0, 1</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Sets DMRS nSCID data type</td><td>Cell ID, User Defined</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID</td><td>0 to 65535</td></tr>
<tr><td>DMRS Length</td><td>Sets DMRS symbol length</td><td>1</td></tr>
<tr><td>DMRS Additional Position</td><td>Sets DMRS additional position number</td><td><table><tr><th>PUSCH mapping type</th><th>Symbol End – Symbol Start</th><th>DMRS Additional Position</th></tr><tr><td>A</td><td>≥3</td><td>0, 1, 2, 3</td></tr><tr><td>B</td><td>2, 4, 6</td><td>0, 1</td></tr><tr><td colspan="2">Other than above</td><td>No setting</td></tr></table></td></tr>
<tr><td>DMRS Configuration Type</td><td>Sets DMRS configuration type</td><td>1, 2</td></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data between DMRS or not</td><td><table><tr><th>Multiplexing Scheme</th><th>DMRS Configuration Type</th><th>Antenna Port Number</th><th>Number of DMRS CDM groups without Data</th></tr><tr><td rowspan="4">DFT-s-OFDM</td><td>1</td><td>0</td><td>2</td></tr><tr><td>1</td><td>1</td><td>2</td></tr><tr><td>1</td><td>2</td><td>2</td></tr><tr><td>1</td><td>3</td><td>2</td></tr><tr><td rowspan="12">CP-OFDM</td><td>1</td><td>0</td><td>1, 2</td></tr><tr><td>1</td><td>1</td><td>1, 2</td></tr><tr><td>1</td><td>2</td><td>2</td></tr><tr><td>1</td><td>3</td><td>2</td></tr><tr><td>2</td><td>0</td><td>1, 2, 3</td></tr><tr><td>2</td><td>1</td><td>1, 2, 3</td></tr><tr><td>2</td><td>2</td><td>2, 3</td></tr><tr><td>2</td><td>3</td><td>2, 3</td></tr><tr><td>2</td><td>4</td><td>3</td></tr><tr><td>2</td><td>5</td><td>3</td></tr></table></td></tr>
<tr><td>DMRS TypeA Position</td><td>Sets DMRS l_0 position</td><td>2, 3 (Displayed at PUSCH Mapping Type A)</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DRMS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
</table>

5G NR FDD sub-6 GHz IQproducer MX370114A

Optional | MG3710A/MG3710E

5G NR FDD sub-6 GHz IQproducer MX370114A PC application software is for generating 3GPP TS 38.211, TS 38.212, and TS 38.213-compliant 5G NR sub-6 GHz (FDD) waveform patterns. It can be installed either in a PC or the MG3710A/MG3710E.
It generates Test Model waveform patterns used by the Tx test for 5G NR base stations (BS) as well as Fixed Reference Channel (FRC) waveform patterns used by the Rx test.
Parameters defined by 3GPP TS 38.141-1 (Ver. 15.2.0 2019-06) are set easily just by specifying test conditions from the Easy Setup menu.

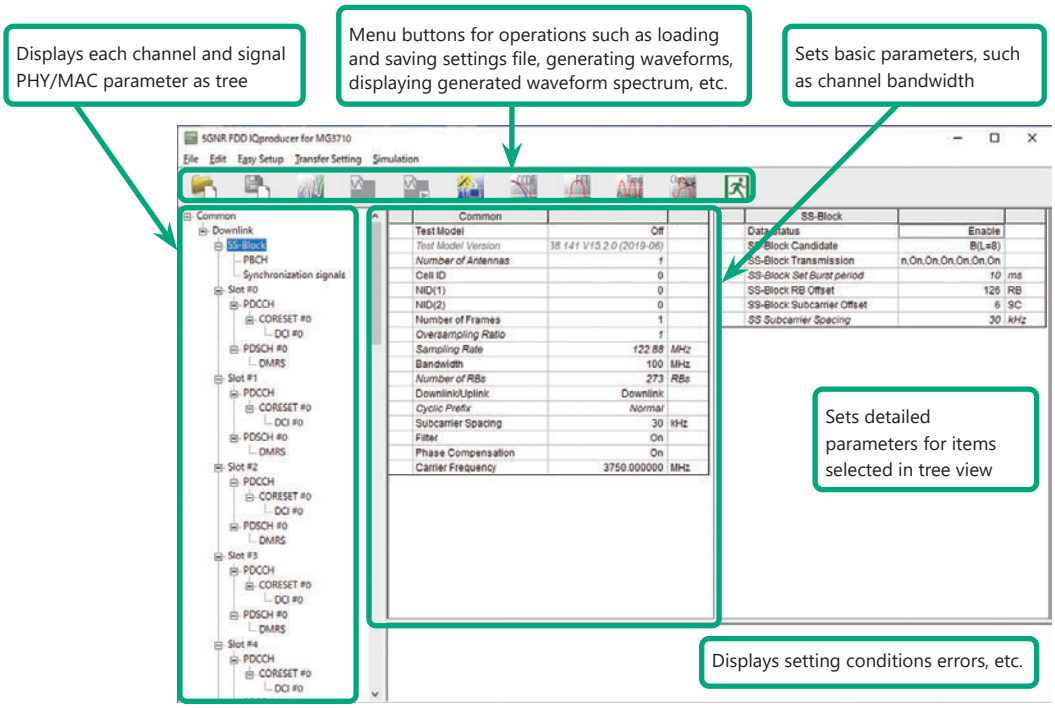
Channels Generated by MX370114A

For downlink
- PSS (Primary Synchronization Signal)
- SSS (Secondary Synchronization Signal)
- PBCH (Physical Broadcast Channel)
- Demodulation Reference Signal for PBCH
- PDCCH (Physical Downlink Control Channel)
- PDSCH (Physical Downlink Shared Channel)
- Demodulation Reference Signal for PDSCH/PDCCH

For uplink
- PUSCH (Physical Uplink Shared Channel)
- Demodulation Reference Signal for PUSCH

Setting Screen

Waveform patterns are generated by setting detailed parameters

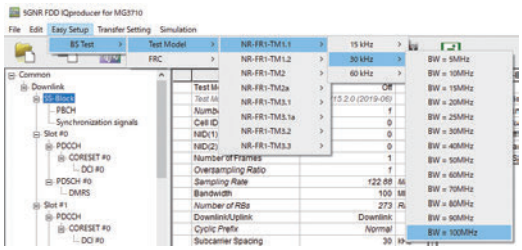


5G NR FDD sub-6 GHz IQproducer Setting Screen

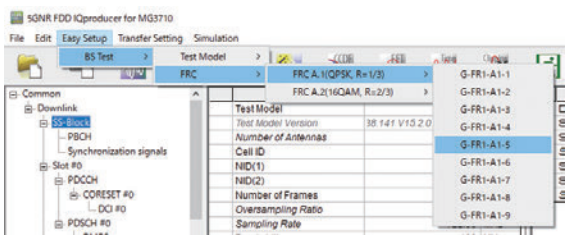
Easy Setup Menu

The Settings Screen parameter values are set by selecting the 3GPP-defined test conditions from the Easy Setup menu tree.

BS Test/Test Models



BS Test/FRC



Function Outline

Bandwidth	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz
Subcarrier spacing	15 kHz, 30 kHz, 60 kHz
Downlink channels and signals	PDSCH, DMRS for PDSCH, PDCCH
Downlink SS-Block*	PBCH, PSS, SSS
Uplink channels and signals	PUSCH, DMRS for PUSCH
LDPC channel coding	UL-SCH
Support transform precoding (DFT-S-OFDM) and Pi/2-BPSK for PUSCH	✓
Uplink and downlink configuration with flexible subframe allocations	✓
Phase compensation for transmitted RF frequency	✓

*: Except in the case of Subcarrier Spacing: 60 kHz

5G NR FDD sub-6 GHz IQproducer MX370114A

Optional MG3710A/MG3710E

BS Test/FRC (UL) Setting Range

Common Parameter Setting Range

Display	Outline	Setting Range
Common		
Number of Antennas	Sets number of antennas	1
Test Model	Sets test model	off, NR-FR1-TM1.1, NR-FR1-TM1.2, NR-FR1-TM2, NR-FR1-TM2a, NR-FR1-TM3.1, NR-FR1-TM3.1a, NR-FR1-TM3.2, NR-FR1-TM3.3
Test Model Version	Sets Test Model Version	38.141 V15.2.0 (2019-06)
Number of Antennas	Sets Number of Antennas	1
Cell ID	Sets Cell ID	0 to 1007
NID (1)	Sets Physical-layer cell-identity group	0 to 335
NID (2)	Sets Physical-layer identity	0 to 2
Number of Frames	Sets number of generated Frames	1 to Max. No. of Frames saved in waveform memory
Oversampling Ratio	Sets oversampling ratio	Bandwidth [MHz] / Oversampling Ratio 5, 10 / 1, 2, 4, 8 15, 20, 25 / 1, 2, 4 30, 40, 50 / 1, 2 60, 70, 80, 90, 100 / 1
Sampling Rate	Displays sampling rate	Display only: Set automatically from Oversampling Ratio and Bandwidth
Bandwidth	Sets system bandwidth	SCS [kHz] / Bandwidth [MHz] 15: 5 ✓, 10 ✓, 15 ✓, 20 ✓, 25 ✓, 30 ✓, 40 ✓, 50 ✓, 60 —, 70 —, 80 —, 90 —, 100 — 30: 5 ✓, 10 ✓, 15 ✓, 20 ✓, 25 ✓, 30 ✓, 40 ✓, 50 ✓, 60 ✓, 70 ✓, 80 ✓, 90 ✓, 100 ✓ 60: 5 —, 10 ✓, 15 ✓, 20 ✓, 25 ✓, 30 ✓, 40 ✓, 50 ✓, 60 ✓, 70 ✓, 80 ✓, 90 ✓, 100 ✓
Number of RBs	Displays number of RB (Max RB)	Display only: Set automatically from Bandwidth and Subcarrier Spacing
Downlink/Uplink	Sets Downlink/Uplink	Downlink, Uplink
Multiplexing Scheme	Sets Uplink OFDM modulation method	CP-OFDM, DFT-s-OFDM (Enabled at Uplink only)
Cyclic Prefix	Sets Cyclic Prefix	Normal
Subcarrier Spacing	Sets subcarrier spacing	15, 30, 60 kHz
Filter	Enables/disables filter	On, Off
Phase Compensation	Enables/disables phase compensation	On, Off
Carrier Frequency	Sets center frequency	450 MHz to 6000 MHz (Enabled at Phase Compensation: On only)

PHY/MAC Parameter (Downlink) Setting Range

Display	Outline	Setting Range
SS-Block		
Data Status	Enables/disables SS-Block	Disable, Enable
SS-Block Candidate	Sets SS-Block mapping pattern	SCS [kHz] / SS-Block Candidate 15: A (L = 4), A (L = 8) 30: B (L = 4), B (L = 8), C (L = 4), C (L = 8) 60: Disabled and cannot be set
SS-Block Transmission	Enables/disables SS-Block in SS-Block units	On, Off
SS-Block Set Burst period	Set SS-Block set burst period	10 ms
SS-Block RB Offset	Sets Offset for SS-Block frequency direction in RB units	When SS-Block Subcarrier Offset = 0: 0 to Max RB – 20 When SS-Block Subcarrier Offset ≠ 0: 0 to Max RB – 20 – 1
SS-Block Subcarrier Offset	Sets REW offset in SS-Block RB	0 to 11
SS Subcarrier Spacing	Sets SS-Block subcarrier spacing	SCS [kHz] / SS Subcarrier Spacing 15: Same value as Common Subcarrier Spacing 30: Same value as Common Subcarrier Spacing 60: Excludes Data Mapping and disables all SS-Block parameters
Data Mapping	Sets whether to map or null PDSCH data at SS-Block position	PDSCH (Enable when Data Status = Disable, or when SCS = /SS-Block SCS selected at Common)
PBCH		
Data Type	Sets data inserted in PBCH	PN9, PN15, 16-bit repeat, User File
Data Type User File	Sets user file inserted in PBCH	Select User File (Displayed when Data Type = User File)
Data Type Repeat Data	Sets data to repeat	0000 to FFFF (Enabled only when Data Type = 16-bit repeat)
Init Data	Sets PN data generation default	0000 to FFFF (Enabled only when Data Type = PN9, PN15)
PBCH Power Boosting	Sets comparison of PBCH power with ideal signal	–20.000 to 20.000 [dB]

Optional MG3710A/MG3710E

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>DMRS for PBCH</td><td></td><td></td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DMRS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td colspan="3">Synchronization signals</td></tr>
<tr><td>Primary synchronization signal</td><td></td><td></td></tr>
<tr><td>PSS Power Boosting</td><td>Sets comparison of PSS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td>Secondary synchronization signal</td><td></td><td></td></tr>
<tr><td>SSS Power Boosting</td><td>Sets comparison of SSS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td colspan="3">Slot</td></tr>
<tr><td>Data Status</td><td>Enables/disables slot</td><td>Enable, Disable</td></tr>
<tr><td>Number of PDSCHs</td><td>Sets number of PDSCH</td><td>1 to 8</td></tr>
<tr><td>RB arrangement</td><td>Sets PDSCH RB arrangement</td><td>PDSCH#0 to PDSCH# (Number of PDSCHs – 1)</td></tr>
<tr><td colspan="3">PDCCH</td></tr>
<tr><td>Data Status</td><td>Enables/disables PDCCH</td><td>Enable, Disable</td></tr>
<tr><td>Number of CORESETs</td><td>Sets number of CORESETs</td><td>1 to 3</td></tr>
<tr><td>PDCCH ID Data Type</td><td>Sets PDCCH ID data type</td><td>Cell ID, User Defined</td></tr>
<tr><td>PDCCH ID</td><td>Sets PDCCH ID</td><td>0 to FFFF</td></tr>
<tr><td>Frequency Domain Resources</td><td>Sets CORESET frequency domain arrangement</td><td>Frequency Domain Resource #0 to 44</td></tr>
<tr><td>PDCCH Power Boosting</td><td>Sets comparison of PDCCH power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td>DMRS for PDCCH</td><td></td><td></td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DMRS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td colspan="3">CORESET</td></tr>
<tr><td>Start Symbol</td><td>Sets CORESET start symbol</td><td>0</td></tr>
<tr><td>Number of Symbols</td><td>Sets number of CORESET symbols</td><td>1 to 3</td></tr>
<tr><td>Number of DCIs</td><td>Sets number of DCI</td><td>1 to 8</td></tr>
<tr><td>Number of RBs In One CORESET</td><td>Sets number of RBs per 1 symbol per 1 CORESET</td><td><table><tr><th colspan="2"></th><th>Number of RBs In One CORESET</th></tr><tr><td rowspan="3">Number of Symbol</td><td>1</td><td>6</td></tr><tr><td>2</td><td>3</td></tr><tr><td>3</td><td>2</td></tr></table></td></tr>
<tr><td>Precoder Granularity</td><td>Sets Precoder Granularity</td><td>Same as REG-bundle, All Contiguous RBs</td></tr>
<tr><td>DCI</td><td></td><td></td></tr>
<tr><td>CORESET Number</td><td>Displays supported number of CORESETs</td><td>Display only: 0 to Number of CORESET – 1</td></tr>
<tr><td>First CCE Index In CORESET</td><td>Sets first CCE Index number in CORESET</td><td>Max CCE Index in 0 to CORESET</td></tr>
<tr><td>Aggregation Level</td><td>Sets Aggregation Level</td><td>1, 2, 4, 8, 16</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in DCI</td><td>PN9, PN15, 16 bit repeat, User File</td></tr>
<tr><td>Data Type User File</td><td>Sets user file inserted in PBCH</td><td>Select User File (Displayed only when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Enabled only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets PN data creation default</td><td>0000 to FFFF (Enabled only when Data Type = PN9, PN15)</td></tr>
<tr><td colspan="3">PDSCH</td></tr>
<tr><td>Data Status</td><td>Enables/disables PDSCH</td><td>Enable, Disable</td></tr>
<tr><td>Power Boosting</td><td>Sets PDSCH and DMRS power ratio for ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td>Number of Layers</td><td>Sets Layer</td><td>1</td></tr>
<tr><td>Number of Code words</td><td>Sets Code words</td><td>1</td></tr>
<tr><td>Antenna Port Number</td><td>Sets antenna port number</td><td>1000 to 1005</td></tr>
<tr><td>nRNTI</td><td>Sets Radio Network Temporary Identifier</td><td>0000 to FFFF</td></tr>
<tr><td>nID Status</td><td>Enables/disables nID</td><td>Enable, Disable</td></tr>
<tr><td>nID</td><td>Sets nID</td><td>0 to 1023</td></tr>
<tr><td>Modulation Scheme</td><td>Sets modulation method</td><td>QPSK, 16QAM, 64QAM, 256QAM</td></tr>
<tr><td>PDSCH mapping type</td><td>Sets PDSCH mapping type</td><td>A, B</td></tr>
<tr><td>Symbol Start</td><td>Sets PDSCH start symbol</td><td><table><tr><th>PDSCH mapping type</th><th>DMRS TypeA Position</th><th>Symbol Start</th></tr><tr><td rowspan="2">A</td><td>3</td><td>3</td></tr><tr><td>2</td><td>0, 1, 2</td></tr><tr><td>B</td><td>—</td><td>0 to 12</td></tr></table></td></tr>
<tr><td>Symbol Length</td><td>Sets PDSCH symbol length</td><td><table><tr><th>PDSCH mapping type</th><th>Symbol Length</th></tr><tr><td>A</td><td>3 to 14</td></tr><tr><td>B</td><td>2, 4, 7</td></tr></table></td></tr>
<tr><td>Symbol End</td><td>Displays PDSC end symbol</td><td>Display only: Set automatically using Symbol Length and Symbol Start</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in PDSCH</td><td>PN9, PN15, 16-bit repeat, User File</td></tr>
</table>

Optional MG3710A/MG3710E

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>Data Type User File</td><td>Sets user file inserted in PDSCH</td><td>Select user file (Displayed only when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Displayed only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets default value for PN data generation</td><td>0000 to FFFF (Enabled when Data Type = PN9, PN15)</td></tr>
<tr><td colspan="3">DMRS</td></tr>
<tr><td>nSCID</td><td>Sets nSCID</td><td>0, 1</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Sets DMRS nSCID data type</td><td>Cell ID, User Defined</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID</td><td>0 to 65535</td></tr>
<tr><td>DMRS Length</td><td>Sets DMRS symbol</td><td>1</td></tr>
<tr><td>DMRS Additional Position</td><td>Sets DMRS additional position number</td><td>
<table>
<tr><th>PDSCH mapping type</th><th>Symbol End – Symbol Start</th><th>DMRS Additional Position</th></tr>
<tr><td>A</td><td>≥3</td><td>0, 1, 2, 3</td></tr>
<tr><td>B</td><td>2, 4, 6</td><td>0, 1</td></tr>
<tr><td colspan="2">Other than above</td><td>No setting</td></tr>
</table>
</td></tr>
<tr><td>DMRS Configuration Type</td><td>Sets DMRS configuration type</td><td>1, 2</td></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data between DMRS or not</td><td>
<table>
<tr><th>DMRS Configuration Type</th><th>Antenna Port Number</th><th>Number of DMRS CDM groups without Data</th></tr>
<tr><td>1</td><td>1000</td><td>1, 2</td></tr>
<tr><td>1</td><td>1001</td><td>1, 2</td></tr>
<tr><td>1</td><td>1002</td><td>2</td></tr>
<tr><td>1</td><td>1003</td><td>2</td></tr>
<tr><td>2</td><td>1000</td><td>1, 2, 3</td></tr>
<tr><td>2</td><td>1001</td><td>1, 2, 3</td></tr>
<tr><td>2</td><td>1002</td><td>2, 3</td></tr>
<tr><td>2</td><td>1003</td><td>2, 3</td></tr>
<tr><td>2</td><td>1004</td><td>3</td></tr>
<tr><td>2</td><td>1005</td><td>3</td></tr>
</table>
</td></tr>
<tr><td>DMRS TypeA Position</td><td>Sets DMRS l0 position</td><td>2, 3 (Displayed at PDSCH Mapping Type A)</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DMRS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
</table>

PHY/MAC Parameter (Uplink) Setting Range

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td colspan="3">Slot</td></tr>
<tr><td>Data Status</td><td>Enables/disables slot</td><td>Enable, Disable</td></tr>
<tr><td>Number of PUSCHs</td><td>Sets number of PUSCHs</td><td>1 to 8</td></tr>
<tr><td colspan="3">PUSCH</td></tr>
<tr><td>Data Status</td><td>Enables/disables PUSCH</td><td>Enable, Disable</td></tr>
<tr><td>Power Boosting</td><td>Sets PUSCH and DMRS power ratio for ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
<tr><td>Number of Layers</td><td>Sets layer</td><td>1</td></tr>
<tr><td>Number of Code words</td><td>Sets Code Words</td><td>1</td></tr>
<tr><td>Antenna Port Number</td><td>Sets antenna port number</td><td>
<table>
<tr><th>DMRS Configuration Type</th><th>Antenna Port Number</th></tr>
<tr><td>Type1</td><td>0 to 3</td></tr>
<tr><td>Type2</td><td>0 to 5</td></tr>
</table>
</td></tr>
<tr><td>nRNTI</td><td>Sets Radio Network Temporary Identifier</td><td>0000 to FFFF</td></tr>
<tr><td>nID Status</td><td>Enables/disables nID</td><td>Enable, Disable</td></tr>
<tr><td>nID</td><td>Sets nID</td><td>0 to 1023</td></tr>
<tr><td>Modulation Scheme</td><td>Sets modulation type</td><td>QPSK, 16QAM, 64QAM, 256QAM, PI/2-BPSK</td></tr>
<tr><td>PUSCH mapping type</td><td>Sets PUSCH mapping type</td><td>A, B</td></tr>
<tr><td>Symbol Start</td><td>Sets PUSCH start symbol</td><td>
<table>
<tr><th>PUSCH mapping type</th><th>Symbol Length</th></tr>
<tr><td>A</td><td>0</td></tr>
<tr><td>B</td><td>0 to 13</td></tr>
</table>
</td></tr>
<tr><td>Symbol Length</td><td>Sets PUSCH symbol length</td><td>
<table>
<tr><th>PUSCH mapping type</th><th>Symbol Length</th></tr>
<tr><td>A</td><td>4 to 14</td></tr>
<tr><td>B</td><td>1 to 14</td></tr>
</table>
</td></tr>
<tr><td>Symbol End</td><td>Displays PUSCH end symbol</td><td>Display only: Set automatically using Symbol Length and Symbol Start</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in PUSCH</td><td>PN9, PN15, 16-bit repeat, UL-SCH, User File</td></tr>
<tr><td>Data Type User File</td><td>Sets user file inserted in PUSCH</td><td>Select User File (Displayed when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Enabled only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets PN data generation initial value</td><td>0000 to FFFF (Enabled only when Data Type = PN9, PN15)</td></tr>
</table>

Optional MG3710A/MG3710E

<table>
<tr><th>Display</th><th>Outline</th><th>Setting Range</th></tr>
<tr><td>UL-SCH</td><td></td><td></td></tr>
<tr><td>Rate Matching</td><td>Sets Rate Matching</td><td>FBRM</td></tr>
<tr><td>MCS Index</td><td>Sets MCS Index value</td><td>0 to 27</td></tr>
<tr><td>MCS Table</td><td>Sets which table to use as MCS table</td><td>64QAM, 256QAM</td></tr>
<tr><td>PI/2-BPSK Support</td><td>Enables/disables PI/2-BPSK</td><td>Enable, Disable</td></tr>
<tr><td>Redundancy Version</td><td>Sets Redundancy version</td><td>0, 1, 2, 3</td></tr>
<tr><td>Transport Block Size</td><td>Sets Transport Block size</td><td>Value from 0 to PUSCH setting</td></tr>
<tr><td>Data Type</td><td>Sets data inserted in UL-SCH</td><td>PN9, PN15, 16-bit repeat, User File (Enabled only when Data Type (PUSCH) = UL-SCH)</td></tr>
<tr><td>Data Type User File</td><td>Sets user file to insert in UL-SCH</td><td>Select User File (Displayed only when Data Type = User File)</td></tr>
<tr><td>Data Type Repeat Data</td><td>Sets data to repeat</td><td>0000 to FFFF (Enabled only when Data Type = 16-bit repeat)</td></tr>
<tr><td>Init Data</td><td>Sets PN data generation default</td><td>0000 to FFFF (Enabled only when Data Type = PN9, PN15)</td></tr>
<tr><td>DMRS</td><td colspan="2"></td></tr>
<tr><td>Group Hopping</td><td>Enables/disables Group Hopping</td><td>Enable, Disable</td></tr>
<tr><td>Sequence Hopping</td><td>Enables/disable Sequence Hopping</td><td>Enable, Disable</td></tr>
<tr><td>PUSCH ID</td><td>Sets PUSCH ID</td><td>0 to 1007</td></tr>
<tr><td>nSCID</td><td>Sets nSCID</td><td>0, 1</td></tr>
<tr><td>DMRS nSCID Data Type</td><td>Sets DMRS nSCID data type</td><td>Cell ID, User Defined</td></tr>
<tr><td>DMRS nSCID</td><td>Sets DMRS nSCID</td><td>0 to 65535</td></tr>
<tr><td>DMRS Length</td><td>Sets DMRS symbol length</td><td>1</td></tr>
<tr><td>DMRS Additional Position</td><td>Sets DMRS additional position number</td><td>
<table>
<tr><th>PUSCH mapping type</th><th>Symbol End – Symbol Start</th><th>DMRS Additional Position</th></tr>
<tr><td>A</td><td>≥3</td><td>0, 1, 2, 3</td></tr>
<tr><td>B</td><td>2, 4, 6</td><td>0, 1</td></tr>
<tr><td colspan="2">Other than above</td><td>No setting</td></tr>
</table>
</td></tr>
<tr><td>DMRS Configuration Type</td><td>Sets DMRS configuration type</td><td>1, 2</td></tr>
<tr><td>Number of DMRS CDM groups without Data</td><td>Sets whether to insert data between DMRS or not</td><td>
<table>
<tr><th>Multiplexing Scheme</th><th>DMRS Configuration Type</th><th>Antenna Port Number</th><th>Number of DMRS CDM groups without Data</th></tr>
<tr><td rowspan="4">DFT-s-OFDM</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>2</td></tr>
<tr><td>1</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>3</td><td>2</td></tr>
<tr><td rowspan="10">CP-OFDM</td><td>1</td><td>0</td><td>1, 2</td></tr>
<tr><td>1</td><td>1</td><td>1, 2</td></tr>
<tr><td>1</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td>3</td><td>2</td></tr>
<tr><td>2</td><td>0</td><td>1, 2, 3</td></tr>
<tr><td>2</td><td>1</td><td>1, 2, 3</td></tr>
<tr><td>2</td><td>2</td><td>2, 3</td></tr>
<tr><td>2</td><td>3</td><td>2, 3</td></tr>
<tr><td>2</td><td>4</td><td>3</td></tr>
<tr><td>2</td><td>5</td><td>3</td></tr>
</table>
</td></tr>
<tr><td>DMRS TypeA Position</td><td>Sets DMRS l_0 position</td><td>2, 3 (Displayed at PUSCH Mapping Type A)</td></tr>
<tr><td>DMRS Power Boosting</td><td>Sets comparison of DRMS power with ideal signal</td><td>–20.000 to 20.000 [dB]</td></tr>
</table>

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.

MG3710E Main Frame and Hardware Options

Model/Order No.	Name	Remarks
	Main Frame	
MG3710E	Vector Signal Generator	
	Standard Accessories	
	Power Cord: 1 pc	
P0031A	USB Memory	USB2.0 Flash Driver, ≥256 MB
	Install CD-ROM	Operation manual (PDF) and application software (IQproducer)
	Options	
	(Common Parts)	
MG3710E-001	Rubidium Reference Oscillator	Select when ordering main frame, aging rate: ±1 × 10^{-10}/month
MG3710E-002	High Stability Reference Oscillator	Select when ordering main frame, aging rate: ±1 × 10^{-7}/year
MG3710E-011	2ndary HDD	Select when ordering main frame, spare HDD for saving user data without Windows OS
MG3710E-017	Universal Input/Output	Select when ordering main frame, Adds BNC connectors for following signals to rear panel of main frame, includes J1539A AUX Conversion Adapter (Baseband Reference Clock Input/Output, Sweep Output, Local Signal Input/Output)
MG3710E-021	BER Test Function	Select when ordering main frame, Built-in BER measurement, Bit Rate: 100 bps to 40 Mbps AUX Conversion Adapter J1539A required for Data/Clock/Enable signal input
MG3710E-101	Rubidium Reference Oscillator Retrofit	Retrofitted to shipped MG3710E
MG3710E-102	High Stability Reference Oscillator Retrofit	Retrofitted to shipped MG3710E
MG3710E-111	2ndary HDD Retrofit	Retrofitted to shipped MG3710E
MG3710E-117	Universal Input/Output Retrofit	Retrofitted to shipped MG3710E
MG3710E-121	BER Test Function Retrofit	Retrofitted to shipped MG3710E
	(For 1stRF)	
MG3710E-032	1stRF 100 kHz to 2.7 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3710E-034	1stRF 100 kHz to 4 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3710E-036	1stRF 100 kHz to 6 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3710E-041	High Power Extension for 1stRF	Select when ordering main frame, increases upper limit of output signal power setting range
MG3710E-042	Low Power Extension for 1stRF	Select when ordering main frame, increases lower limit of output signal power setting range
MG3710E-043	Reverse Power Protection for 1stRF	Select when ordering main frame, prevents damage caused by reverse input to output connector
MG3710E-045	ARB Memory Upgrade 256 Msample for 1stRF	Select when ordering main frame, expands ARB memory capacity
MG3710E-046	ARB Memory Upgrade 1024 Msample for 1stRF	Select when ordering main frame, expands ARB memory capacity
MG3710E-048	Combination of Baseband Signal for 1stRF	Select when ordering main frame, adds baseband combine function
MG3710E-049	AWGN for 1stRF	Select when ordering main frame, adds AWGN combine function
MG3710E-050	Additional Analog Modulation Input for 1stRF	Select when ordering main frame, Adds BNC connector for inputting external signals to rear panel of mainframe.
MG3710E-018	Analog IQ Input/Output	Select when ordering main frame, installs IQ input/output BNC connector in main frame
MG3710E-141	High Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-142	Low Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-143	Reverse Power Protection for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-145	ARB Memory Upgrade 256 Msample for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-146	ARB Memory Upgrade 1024 Msample for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-148	Combination of Baseband Signal for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-149	AWGN for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-150	Additional Analog Modulation Input for 1stRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-118	Analog IQ Input/Output Retrofit	Retrofitted to shipped MG3710E
	(For 2ndRF)	
MG3710E-062	2ndRF 100 kHz to 2.7 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3710E-064	2ndRF 100 kHz to 4 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3710E-066	2ndRF 100 kHz to 6 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3710E-071	High Power Extension for 2ndRF	Select when ordering main frame, increases upper limit of output signal power setting range
MG3710E-072	Low Power Extension for 2ndRF	Select when ordering main frame, increases lower limit of output signal power setting range
MG3710E-073	Reverse Power Protection for 2ndRF	Select when ordering main frame, prevents damage caused by reverse input to output connector
MG3710E-075	ARB Memory Upgrade 256 Msample for 2ndRF	Select when ordering main frame, expands ARB memory capacity
MG3710E-076	ARB Memory Upgrade 1024 Msample for 2ndRF	Select when ordering main frame, expands ARB memory capacity
MG3710E-078	Combination of Baseband Signal for 2ndRF	Select when ordering main frame, adds baseband combine function
MG3710E-079	AWGN for 2ndRF	Select when ordering main frame, adds AWGN combine function
MG3710E-080	Additional Analog Modulation Input for 2ndRF	Select when ordering main frame, Adds BNC connector for inputting external signals to rear panel of mainframe.
MG3710E-162	2ndRF 100 kHz to 2.7 GHz Retrofit	Retrofitted to shipped MG3710E when 2ndRF not installed
MG3710E-164	2ndRF 100 kHz to 4 GHz Retrofit	Retrofitted to shipped MG3710E when 2ndRF not installed
MG3710E-166	2ndRF 100 kHz to 6 GHz Retrofit	Retrofitted to shipped MG3710E when 2ndRF not installed
MG3710E-171	High Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-172	Low Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-173	Reverse Power Protection for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-175	ARB Memory Upgrade 256 Msample for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-176	ARB Memory Upgrade 1024 Msample for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-178	Combination of Baseband Signal for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-179	AWGN for 2ndRF Retrofit	Retrofitted to shipped MG3710E
MG3710E-180	Additional Analog Modulation Input for 2ndRF Retrofit	Retrofitted to shipped MG3710E
	Maintenance Service	
MG3710E-ES210	2 Years Extended Warranty Service	
MG3710E-ES310	3 Years Extended Warranty Service	
MG3710E-ES510	5 Years Extended Warranty Service	

Ordering Information

MG3710A Hardware Options

Model/Order No.	Name	Remarks
	Common Parts	
MG3710A-101	Rubidium Reference Oscillator Retrofit	Retrofitted to shipped MG3710A
MG3710A-102	High Stability Reference Oscillator Retrofit	Retrofitted to shipped MG3710A
MG3710A-111	2ndary HDD Retrofit	Retrofitted to shipped MG3710A
MG3710A-117	Universal Input/Output Retrofit	Retrofitted to shipped MG3710A
MG3710A-121	BER Test Function Retrofit	Retrofitted to shipped MG3710A
MG3710A-181	CPU/Windows7 Upgrade Retrofit	This option is for MG3710A units ordered until May 2018. It upgrades the currently installed CPU to a faster CPU and the OS to Windows 7(WES7). Due to OS license restrictions, this option is not applicable to MG3710A units in which MG3710A-313 Removable HDD (sales discontinued) is installed.
	For 1stRF	
MG3710A-141	High Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-142	Low Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-143	Reverse Power Protection for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-145	ARB Memory Upgrade 256 Msample for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-146	ARB Memory Upgrade 1024 Msample for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-148	Combination of Baseband Signal for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-149	AWGN for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-150	Additional Analog Modulation Input for 1stRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-118	Analog IQ Input/Output Retrofit	Retrofitted to shipped MG3710A
	For 2ndRF	
MG3710A-171	High Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-172	Low Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-173	Reverse Power Protection for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-175	ARB Memory Upgrade 256 Msample for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-176	ARB Memory Upgrade 1024 Msample for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-178	Combination of Baseband Signal for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-179	AWGN for 2ndRF Retrofit	Retrofitted to shipped MG3710A
MG3710A-180	Additional Analog Modulation Input for 2ndRF Retrofit	Retrofitted to shipped MG3710A

MG3740A Main Frame and Hardware Options

Model/Order No.	Name	Remarks
	Main Frame	
MG3740A	Analog Signal Generator	
	Standard Accessories	
	Power Cord: 1 pc	
P0031A	USB Memory	USB2.0 Flash Driver, ≥256 MB
	Install CD-ROM	Operation manual (PDF) and application software (IQproducer)
	Options	
	(Common Parts)	
MG3740A-001	Rubidium Reference Oscillator	Select when ordering main frame, aging rate: ±1 × 10^{-10}/month
MG3740A-002	High Stability Reference Oscillator	Select when ordering main frame, aging rate: ±1 × 10^{-7}/year
MG3740A-011	2ndary HDD	Select when ordering main frame, spare HDD for saving user data without Windows OS
MG3740A-017	Universal Input/Output	Select when ordering main frame, Adds BNC connectors for Sweep Output signal (only supports SG1) to rear panel of main frame, includes AUX Conversion Adapter J1539A
MG3740A-020	Digital Modulation	Select when ordering main frame, Built-in Digital Modulation function. Digital modulation Performance: - RF modulation bandwidth: 2 MHz - Sampling rate: 20 kHz to 8 MHz
MG3740A-021	BER Test Function	Select when ordering main frame, Built-in BER measurement, Bit Rate: 100 bps to 40 Mbps AUX Conversion Adapter J1539A required for Data/Clock/Enable signal input
MG3740A-101	Rubidium Reference Oscillator Retrofit	Retrofitted to shipped MG3740A
MG3740A-102	High Stability Reference Oscillator Retrofit	Retrofitted to shipped MG3740A
MG3740A-111	2ndary HDD Retrofit	Retrofitted to shipped MG3740A
MG3740A-117	Universal Input/Output Retrofit	Retrofitted to shipped MG3740A
MG3740A-120	Digital Modulation Retrofit	Retrofitted to shipped MG3740A
MG3740A-121	BER Test Function Retrofit	Retrofitted to shipped MG3740A
MG3740A-181	CPU/Windows7 Upgrade Retrofit	Retrofitted to shipped MG3740A This option is for MG3740A units ordered until May 2018. It upgrades the currently installed CPU to a faster CPU and the OS to Windows 7 (WES7). Due to OS license restrictions, this option is not applicable to MG3740A units in which Option 313 Removable HDD (sales discontinued) is installed.

Ordering Information

Model/Order No.	Name	Remarks
	(For 1stRF)	
MG3740A-032	1stRF 100 kHz to 2.7 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3740A-034	1stRF 100 kHz to 4 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3740A-036	1stRF 100 kHz to 6 GHz	Select when ordering main frame, select 1stRF frequency range, frequency cannot be changed after installation
MG3740A-041	High Power Extension for 1stRF	Select when ordering main frame, increases upper limit of output signal power setting range
MG3740A-042	Low Power Extension for 1stRF	Select when ordering main frame, increases lower limit of output signal power setting range
MG3740A-043	Reverse Power Protection for 1stRF	Select when ordering main frame, prevents damage caused by reverse input to output connector
MG3740A-045	ARB Memory Upgrade 256 Msample for 1stRF	Select when ordering main frame, expands ARB memory capacity. Requires MG3740A-020.
MG3740A-048	Combination of Baseband Signal for 1stRF	Select when ordering main frame, adds baseband combine function. Requires MG3740A-020.
MG3740A-050	Additional Analog Modulation Input for 1stRF	Select when ordering main frame, Adds BNC connector for inputting external signals to rear panel of mainframe.
MG3740A-141	High Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-142	Low Power Extension for 1stRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-143	Reverse Power Protection for 1stRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-145	ARB Memory Upgrade 256 Msample for 1stRF Retrofit	Retrofitted to shipped MG3740A. Requires MG3740A-020/120.
MG3740A-148	Combination of Baseband Signal for 1stRF Retrofit	Retrofitted to shipped MG3740A. Requires MG3740A-020/120.
MG3740A-150	Additional Analog Modulation Input for 1stRF Retrofit	Retrofitted to shipped MG3740A
	(For 2ndRF)	
MG3740A-062	2ndRF 100 kHz to 2.7 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3740A-064	2ndRF 100 kHz to 4 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3740A-066	2ndRF 100 kHz to 6 GHz	Select when ordering main frame, select 2ndRF frequency range, frequency cannot be changed after installation
MG3740A-071	High Power Extension for 2ndRF	Select when ordering main frame, increases upper limit of output signal power setting range
MG3740A-072	Low Power Extension for 2ndRF	Select when ordering main frame, increases lower limit of output signal power setting range
MG3740A-073	Reverse Power Protection for 2ndRF	Select when ordering main frame, prevents damage caused by reverse input to output connector
MG3740A-075	ARB Memory Upgrade 256 Msample for 2ndRF	Select when ordering main frame, expands ARB memory capacity. Requires MG3740A-020.
MG3740A-078	Combination of Baseband Signal for 2ndRF	Select when ordering main frame, adds baseband combine function. Requires MG3740A-020.
MG3740A-080	Additional Analog Modulation Input for 2ndRF	Select when ordering main frame, Adds BNC connector for inputting external signals to rear panel of mainframe.
MG3740A-162	2ndRF 100 kHz to 2.7 GHz Retrofit	Retrofitted to shipped MG3740A when 2ndRF not installed
MG3740A-164	2ndRF 100 kHz to 4 GHz Retrofit	Retrofitted to shipped MG3740A when 2ndRF not installed
MG3740A-166	2ndRF 100 kHz to 6 GHz Retrofit	Retrofitted to shipped MG3740A when 2ndRF not installed
MG3740A-171	High Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-172	Low Power Extension for 2ndRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-173	Reverse Power Protection for 2ndRF Retrofit	Retrofitted to shipped MG3740A
MG3740A-175	ARB Memory Upgrade 256 Msample for 2ndRF Retrofit	Retrofitted to shipped MG3740A. Requires MG3740A-020/120.
MG3740A-178	Combination of Baseband Signal for 2ndRF Retrofit	Retrofitted to shipped MG3740A. Requires MG3740A-020/120.
MG3740A-180	Additional Analog Modulation Input for 2ndRF Retrofit	Retrofitted to shipped MG3740A
	Maintenance Service	
MG3740A-ES210	2 Years Extended Warranty Service	
MG3740A-ES310	3 Years Extended Warranty Service	
MG3740A-ES510	5 Years Extended Warranty Service	

Software

Model/Order No.	Name	Remarks
	Waveform Pattern	(License for waveform patterns)
MX370073B	DFS Radar Pattern	For MG3710A/MG3710E, WLAN 5.3/5.6 GHz band DFS tests (for FCC and Japan MIC) waveform pattern, license for main frame, manual (PDF)
MX370075A	DFS (ETSI) Waveform Pattern	For MG3710A/MG3710E, WLAN 5.3/5.6 GHz DFS test (ETSI) waveform pattern, license for main frame, manual (PDF)
MX370084A	ISDB-Tmm Waveform Pattern	For MG3710A/MG3710E, ISDB-Tmm Waveform Patterns, license for main frame, manual (PDF)
MX371054A	Interference Waveform Pattern for LTE Receiver Test	For MG3710A/MG3710E, 3GPP-compliant modulated interference signal for LTE UE receiver sensitivity and throughput tests, license for main frame, manual (PDF)
MX371055A	Interference Waveform Pattern for 5G NR Receiver Test	For MG3710A/MG3710E, 3GPP-compliant modulated interference signal for 5G UE receiver sensitivity and throughput tests, license for main frame, manual (PDF)

Ordering Information

Model/Order No.	Name	Remarks
	IQproducer	(License for IQproducer)
MX370101A	HSDPA/HSUPA IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370102A	TDMA IQproducer	For MG3710A/MG3710E/MG3740A, IQproducer software, license for main frame, manual (PDF)
MX370103A	CDMA2000 1xEV-DO IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370104A	Multi-carrier IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370106A	DVB-T/H IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370107A	Fading IQproducer	For MG3710A/MG3710E/MG3740A, IQproducer software, license for main frame, manual (PDF)
MX370108A	LTE IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370108A-001	LTE-Advanced FDD Option	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF). Requires MX370108A.
MX370110A	LTE TDD IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370110A-001	LTE-Advanced TDD Option	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF). Requires MX370110A.
MX370111A	WLAN IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370111A-002	802.11ac (160 MHz) Option	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF). Requires MX370111A
MX370112A	TD-SCDMA IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370113A	5G NR TDD sub-6 GHz IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)
MX370114A	5G NR FDD sub-6 GHz IQproducer	For MG3710A/MG3710E, IQproducer software, license for main frame, manual (PDF)

Optional Accessories

Model/Order No.	Name	Remarks
W3580AE	MG3710E/MG3710A/MG3740A Operation Manual (Main Unit)	Booklet, for MG3710E/MG3710A/MG3740A Main Frame (Operation, Remote Control)
W2496AE	MG3710E/MG3710A/MG3740A Operation Manual (IQproducer)	Booklet, for IQproducer (Operation for Common Parts)
W3581AE	MG3710E/MG3710A Operation Manual (Pre-installed Waveform Patterns)	Booklet, for Pre-installed Waveform Patterns (Usage, Detailed Parameters)
W3986AE	MX370073B Operation Manual	Booklet, for DFS (for FCC and Japan MIC) Waveform Patterns
W3597AE	MX370075A Operation Manual	Booklet, for DFS (ETSI) Waveform Patterns
W3508AE	MX370084A Operation Manual	Booklet, for ISDB-Tmm Waveform Patterns
W4073AE	MX371054A Operation Manual	Booklet, for Interference Waveform Pattern for LTE Receiver Test
W4074AE	MX371055A Operation Manual	Booklet, for Interference Waveform Pattern for 5G NR Receiver Test
W2915AE	MX370101A Operation Manual	Booklet, for HSDPA/HSUPA IQproducer
W2916AE	MX370102A Operation Manual	Booklet, for TDMA IQproducer
W2505AE	MX370103A Operation Manual	Booklet, for CDMA2000 1xEV-DO IQproducer
W2917AE	MX370104A Operation Manual	Booklet, for Multi-carrier IQproducer
W2798AE	MX370106A Operation Manual	Booklet, for DVB-T/H IQproducer
W2995AE	MX370107A Operation Manual	Booklet, for Fading IQproducer
W3023AE	MX370108A Operation Manual	Booklet, for LTE IQproducer/LTE-Advanced FDD Option
W3221AE	MX370110A Operation Manual	Booklet, for LTE TDD IQproducer/LTE-Advanced TDD Option
W3488AE	MX370111A Operation Manual	Booklet, for WLAN IQproducer/802.11ac Option
W3582AE	MX370112A Operation Manual	Booklet, for TD-SCDMA IQproducer
W3984AE	MX370113A Operation Manual	Booklet, for 5G NR TDD sub-6 GHz IQproducer
W4033AE	MX370114A Operation Manual	Booklet, for 5G NR FDD sub-6 GHz IQproducer
J1539A	AUX Conversion Adapter	Converts MG3710E/MG3710A/MG3740A rear-panel AUX connector to BNC connector
Z1572A	Installation Kit	Required when retrofitting hardware options or installing IQproducer (MX3701xxA)
Z1594A	Standard Waveform Pattern for Backup	Latest MG3710E/MG3710A Pre-installed waveform pattern set for backup
MA24105A	Inline Peak Power Sensor	350 MHz to 4 GHz, Inline type, with USB A to micro-B Cable
MA24106A	USB Power Sensor	50 MHz to 6 GHz, with USB A to mini-B Cable
MA24108A	Microwave USB Power Sensor	10 MHz to 8 GHz, with USB A to micro-B Cable
MA24118A	Microwave USB Power Sensor	10 MHz to 18 GHz, with USB A to micro-B Cable
MA24126A	Microwave USB Power Sensor	10 MHz to 26 GHz, with USB A to micro-B Cable
K240B	Power Divider (K connector)	DC to 26.5 GHz, K-J, 50Ω, 1 Wmax

Ordering Information

Model/Order No.	Name	Remarks
MA1612A	Four-Port Junction Pad	5 MHz to 3 GHz, N-J
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)	Crossover, 3 m
J0008	GPIB Cable, 2.0 m	
B0635A	Rack Mount Kit	EIA
B0657A	Rack Mount Kit (JIS)	JIS
B0636C	Carrying Case	Hard Type. With Casters and Front Cover B0671A
B0671A	Front Cover for 1MW4U	
Z0975A	Keyboard (USB)	
Z0541A	USB Mouse	

MG3710A main frame was discontinued in June 2019. However, Retrofit hardware options above, MX3700xxA/B Waveform pattern and MX3701xxA IQproducer can be installed on the existing MG3710A.

The following option is installed as standard when ordering the MG3710E. It does not require a separate order.
MX371099A MG3710A Standard Waveform Pattern

Typical (typ.): Performance not warranted. Must products meet typical performance.
Nominal (nom.): Values not warranted. Included to facilitate application of product.
Measured (meas): Performance not warranted. Data actually measured by randomly selected measuring instruments.

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