Product Brochure

MS2690A/MS2691A/MS2692A Signal Analyzer
MS2690A-020/MS2691A-020/MS2692A-020 Vector Signal Generator Option
MS2830A Signal Analyzer
MS2830A-020/MS2830A-021 Vector Signal Generator Option

MX269xxxA series Software

MX2690xxA Waveform Pattern
MX2699xxA IQproducer

MX269xxxA series Software

MS269xA Signal Analyzer and MS2830A Signal Analyzer supports a built-in Vector Signal Generator. The addition of the MS269xA-020 or MS2830A-020/021, Vector Signal Generator option to the MS269xA or MS2830A Signal Analyzer creates a powerful one-box tester that can be configured to support various communication technologies. From R&D to the factory floor, this powerful combination of Signal Analyzer and Signal Generator can meet and exceed test and measurement needs. Files containing waveform patterns corresponding to either well-known standards or theoretical simulations can be loaded, selected, and played to create an endless number of waveforms.

Waveform patterns from various sources can be used by the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option.
These sources include:

• Data created by general signal generation software
IQ sample data files (in ASCII format) generated by common Electronic Design Automation (EDA) tools can be converted to waveform pattern files using the IQproducer conversion function.

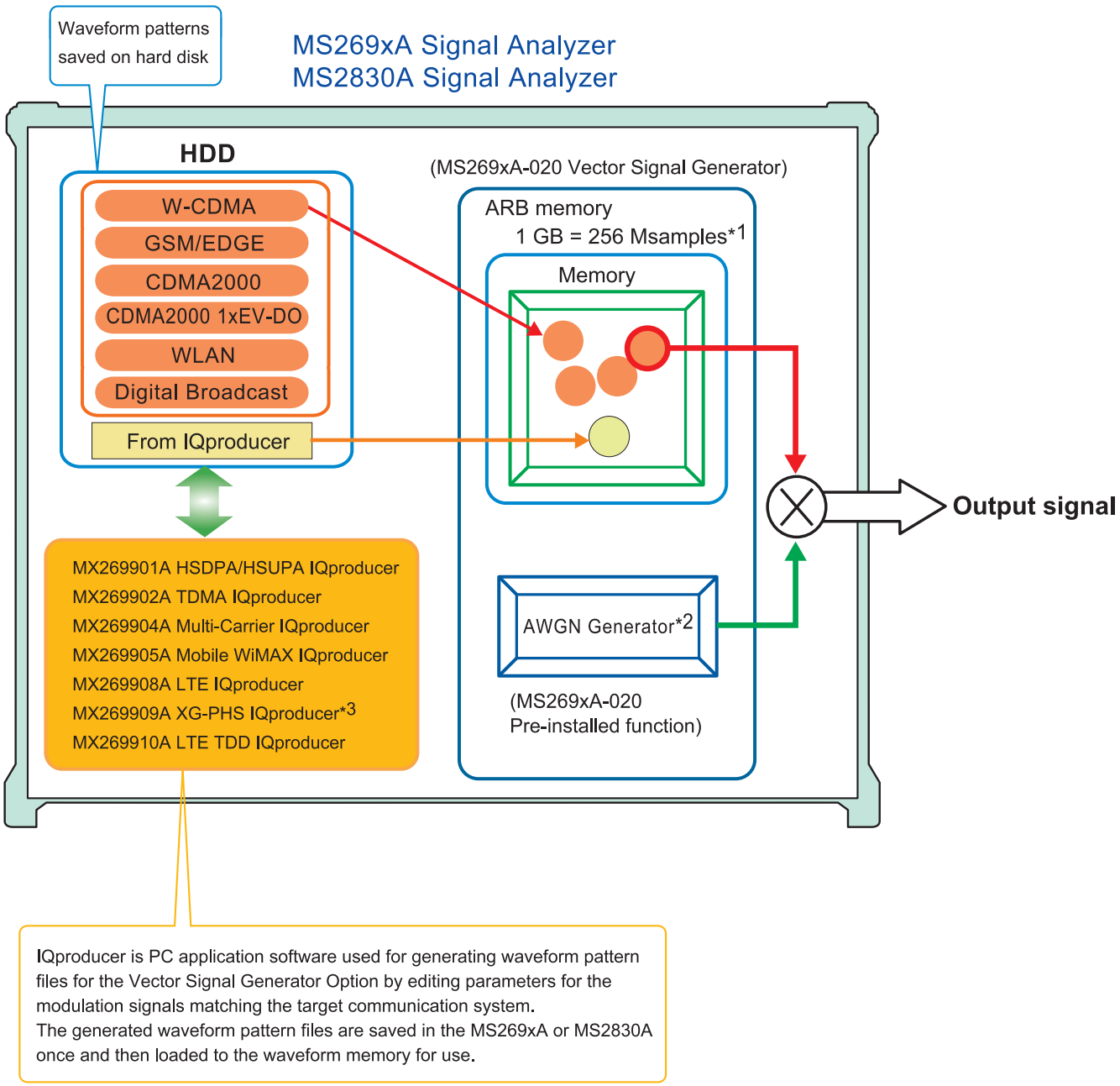
• Standard Built-in Waveform Patterns
Waveform patterns are pre-installed on the hard disk of MS269xA or MS2830A when the MS269xA-020 or MS2830A-020/021, Vector Signal Generator option is installed. These files include waveforms for W-CDMA, HSDPA (Test Model 5), GSM/EDGE, and AWGN (using the AWGN generator function).

• IQproducer Waveform Generation Software
The optional IQproducer waveform generation software provides standards-based waveforms. With complete flexibility, the user may use the waveforms as defined by the standard or modify them to suit the application.

Selection guide

Communication system		AWGN	W-CDMA	HSDPA (Test Model 5)	HSDPA/HSUPA	CDMA2000 1xEV-DO	CDMA2000	GSM/EDGE	Next-generation PHS (XGP)	Advanced-PHS	PHS	PDC	ETC/DSRC	Digital Broadcast (BS/CS/CATV/ISDB-T)	WLAN (IEEE802.11a/b/g)	Mobile WiMAX (IEEE802.16e)	*Bluetooth*	Multi-Carrier	3GPP LTE (FDD)	3GPP LTE (TDD)
Page		4	5, 14	5	16	8	9	10	38	19	19	19	19	11	12	22	13	21	33	41
AWGN generator		√																		
Waveform pattern	Preinstalled		√	√		√	√	√						√	√		√			
IQproducer	Standard accessories W-CDMA		√																	
	MX269901A HSDPA/HSUPA		√		√															
	MX269902A TDMA									√	√	√	√							
	MX269904A Multi-Carrier	Multi-carrier IQproducer is software that generates the multi-carrier signal based on waveform patterns of various telecommunications systems.																		
	MX269905A Mobile WiMAX															√				
	MX269908A LTE FDD																		√	
	MX269909A* XG-PHS								√											
	MX269910A LTE TDD																			√

∗: Only the MS269xA is supported.



∗1: The MS2830A-020/021 arbitrary waveform memory is 256 MB (64 Msamples).
Expansion to 1 GB (256 Msamples) requires the separate Vector Signal Generator MS2830A-027 ARB Memory Upgrade 256 MSa option.
∗2: The MS2830A-020/021 requires the separate MS2830A-028 AWGN option.
∗3: Only the MS269xA is supported.

• IQproducer Operating Environment

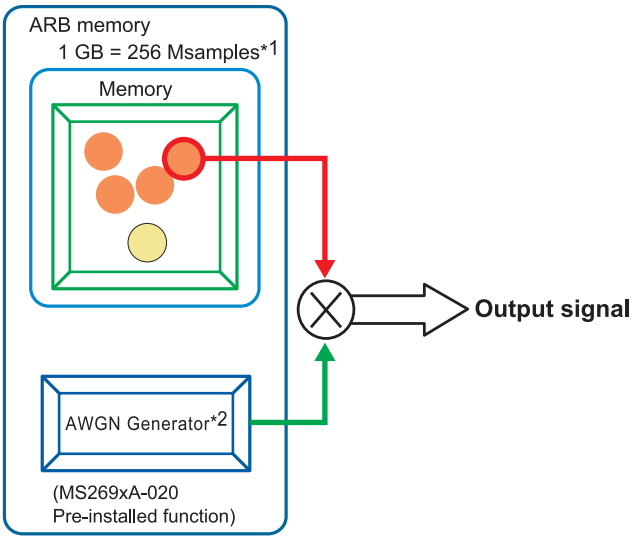
CPU	Pentium III 1 GHz or faster
Memory	≥ 512 MB
HDD	≥ 5 GB
Display	1024 × 768 pixels min.
OS	Windows 2000 Professional, Windows XP

Additive White Gaussian Noise (AWGN) Generator

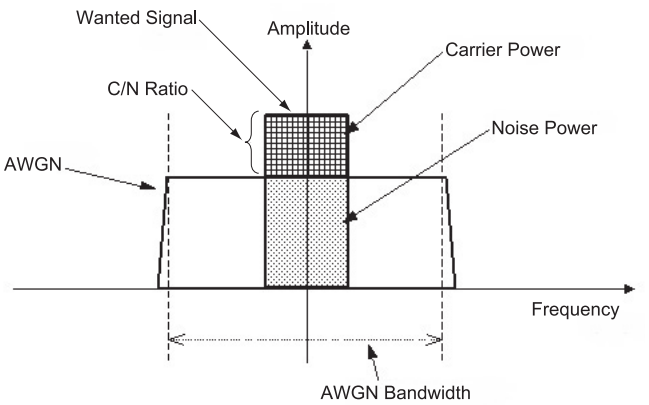
MS269xA-020: Pre-installed function MS2830A-020/021: Requires the separate MS2830A-028 AWGN option

The noise signal of the AWGN generator can be added to the wanted signal of the arbitrary waveform memory.

MS269xA-020 Vector Signal Generator



*1: The MS2830A-020/021 arbitrary waveform memory is 256 MB (64 Msamples).
Expansion to 1 GB (256 Msamples) requires the separate Vector Signal Generator MS2830A-027 ARB Memory Upgrade 256 MSa option.
*2: The MS2830A-020/021 requires the separate MS2830A-028 AWGN option.



Carrier Power: Output level of wanted signal
Noise Power: Output level value of AWGN converted by bandwidth of wanted signal (It is not displayed on the screen.)
C/N Ratio: Level ratio of Carrier Power and Noise Power.
Amplitude: Combination of wanted signal level and AWGN level.

• AWGN Bandwidth

The bandwidth of AWGN is the same as the sampling clock of the wanted signal.

Sample:
When the condition of the wanted signal is the following
- W-CDMA
- BW = 3.84 MHz
- Over sampling rate = 4

Calculation:
AWGN bandwidth
= 3.84 MHz × 4 = 15.36 MHz

• Parameter Setting Range

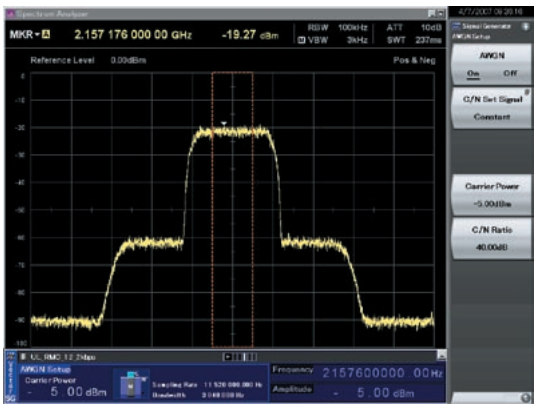
Display	Function
AWGN On/Off	On, Off
C/N Set Signal	Carrier, Noise, Constant Carrier: Noise Power is a fixed value. Carrier Power is set. Noise: Carrier Power is a fixed value. Noise Power is set. Constant: Amplitude is a fixed value. Level ratio of C/N is set.
Carrier Power	The output level of Carrier Power is set.
C/N Ratio	Level ratio of Carrier Power and converted Noise Power is set. –40 dB ≤ C/N Ratio ≤ +40 dB

• Condition of Parameter Setting Range

The parameter of the AWGN generator has the following restriction.
- –40 dB ≤C/N Ratio ≤+40 dB
- Amplitude ≤0 dBm

• AWGN Supports Dynamic Range Testing

The 3GPP specifications for testing receiver dynamic range require a AWGN + W-CDMA modulation signal.
The Internal AWGN generator can be used to produce the AWGN signal.



Wanted Signal + AWGN Output Waveform

W-CDMA Waveform Patterns

Standard

The following W-CDMA waveform patterns are installed on the internal hard disk when MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option is installed. Details for each pattern file is given on the next page.

- For Evaluating Base Station Transmitter Devices (TS 25.141 Test Model 1 to 4)
  - TestModel_1_16DPCH
  - TestModel_1_32DPCH
  - TestModel_1_64DPCH
  - TestModel_1_64×2_10M
  - TestModel_1_64×2_15M
  - TestModel_2
  - TestModel_3_16DPCH
  - TestModel_3_32DPCH
  - TestModel_4
  - TestModel_5_2HSPDSCH
  - TestModel_5_4HSPDSCH
  - TestModel_5_8HSPDSCH
  - TestModel_1_64DPCH×2
  - TestModel_1_64DPCH×3
  - TestModel_1_64DPCH×4
  - DL_CPICH
- For Testing BS Receiver Performance (TS 25.101/ 25.104 UL RMC 12.2 to 384 kbps)
  - UL_RMC_12_2kbps
  - UL_RMC_64kbps
  - UL_RMC_144kbps
  - UL_RMC_384kbps
  - UL_AMR_TFCS1
  - UL_AMR_TFCS2
  - UL_AMR_TFCS3
  - UL_ISDN
  - UL_64kbps_Packet
  - UL_Interfere
- For Evaluating UE Transmitter Devices (TS 25.101 A2.1)
  - UL_RMC_12_2kbps_TX
- For Testing UE Receiver Performance (TS 25.101 DL RMC 12.2 to 384 kbps)
  - DL_RMC_12_2kbps_RX
  - DL_RMC_12_2kbps
  - DL_RMC_12_2kbps_MIL
  - DL_RMC_64kbps
  - DL_RMC_144kbps
  - DL_RMC_384kbps
  - DL_AMR_TFCS1
  - DL_AMR_TFCS2
  - DL_AMR_TFCS3
  - DL_ISDN
  - DL_384kbps_Packet
  - DL_Interfere

Uplink and downlink W-CDMA modulation signals conforming to the 3GPP (FDD) standards can be output simply by selecting the waveform from the patterns on the internal hard disk without setting any complex 3GPP-compliant parameters.

W-CDMA Waveform Patterns

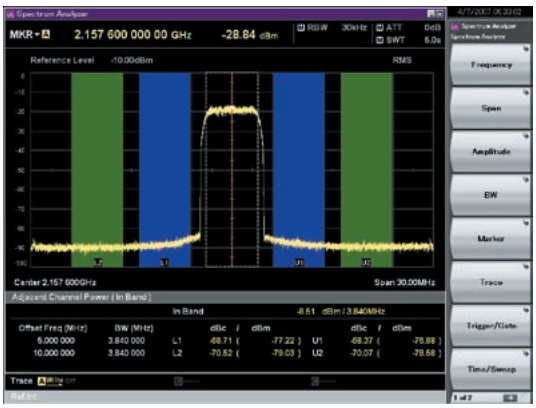
Standard

• W-CDMA Waveform Patterns List

Waveform Patterns	Uplink/ Downlink	Channel	3GPP (Release1999)	Evaluation
UL_RMC_12_2kbps*1	Uplink	DPCCH, DPDCH	TS25.141 A.2	BS RX Test
UL_RMC_64kbps*1		DPCCH, DPDCH	TS25.141 A.3	
UL_RMC_144kbps*1		DPCCH, DPDCH	TS25.141 A.4	
UL_RMC_384kbps*1		DPCCH, DPDCH	TS25.141 A.5	
UL_AMR_TFCS1*1		DPCCH, DPDCH	TS25.944 4.1.2	
UL_AMR_TFCS2*1		DPCCH, DPDCH		
UL_AMR_TFCS3*1		DPCCH, DPDCH		
UL_ISDN*1, *2		DPCCH, DPDCH		
UL_64kbps_Packet*1		DPCCH, DPDCH		
UL_Interfere		DPCCH, DPDCH	TS25.141 I	
UL_RMC_12_2kbps_TX*1		DPCCH, DPDCH	TS25.101 A.2.1	UE TX Device Test
DL_RMC_12_2kbps_RX*1	Downlink	P-CPICH, SCH, PICH, DPCH	TS25.101 A.3.1 TS25.101 C.3.1	UE RX Test
DL_RMC_12_2kbps_MIL*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_RMC_12_2kbps*1		P-CPICH, SCH, PICH, DPCH, OCNS	TS25.101 A.3.1 TS25.101 C.3.2	
DL_RMC_64kbps*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_RMC_144kbps*1		P-CPICH, SCH, PICH, DPCH, OCNS	TS25.101 A.3.3/C3.2	
DL_RMC_384kbps*1		P-CPICH, SCH, PICH, DPCH, OCNS	TS25.101 A.3.4/C3.2	
DL_AMR_TFCS1*1		P-CPICH, SCH, PICH, DPCH, OCNS	TS25.944 4.1.1.3 TS25.101 C.3.2	
DL_AMR_TFCS2*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_AMR_TFCS3*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_ISDN*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_384kbps_Packet*1		P-CPICH, SCH, PICH, DPCH, OCNS		
DL_Interfere		P-CPICH, P-CCPCH, SCH, PICH, OCNS	TS25.101 C.4	
DL_CPICH		P-CPICH	–	
TestModel_1_16DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 16DPCH	TS25.141 6.1.1	BS TX Device Test
TestModel_1_32DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 32DPCH		
TestModel_1_64DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		
TestModel_2		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 3DPCH		
TestModel_3_16DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 16DPCH		
TestModel_3_32DPCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 32DPCH		
TestModel_4		P-CCPCH, SCH		
TestModel_5_2HSPDSCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 6DPCH, HS-SCCH, 2HS-PDSCH		
TestModel_5_4HSPDSCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 14DPCH, HS-SCCH, 4HS-PDSCH		
TestModel_5_8HSPDSCH		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 30DPCH, HS-SCCH, 8HS-PDSCH		
TestModel_1_64DPCH×2*2		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		
TestModel_1_64DPCH×3*2		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		
TestModel_1_64DPCH×4*2		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		
TestModel_1_64×2_10M*2, *3		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		
TestModel_1_64×2_15M*2, *3		P-CPICH, P-CCPCH, SCH, PICH, S-CCPCH, 64DPCH		

∗1: For MS2830A: ARB Memory Upgrade 256 MSa option must be installed to use this waveform pattern.
∗2: ×2, ×3, and ×4 indicate multi-carrier 2, 3, and 4, respectively.
∗3: 10M and 15M indicate the multi-carrier interfrequency gap.

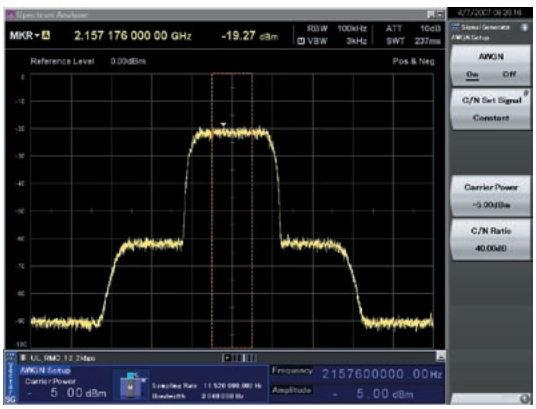
• Adjacent Channel Leakage Power Ratio (ACPR)
The ACPR is an important function for testing device distortion and receiver interference.



W-CDMA ACPR (Test Model 1, 64 DPCH, 1 Carrier) Waveform Pattern [Test_Model_1_64DPCH]

W-CDMA ACPR (Test Model 1, 64 DPCH, 4 Carrier) Waveform Pattern [Test_Model_1_64DPCH × 4]

• AWGN Supports Dynamic Range Testing
The 3GPP specifications for testing receiver dynamic range require a AWGN + W-CDMA modulation signal.
The Internal AWGN generator can be used to produce the AWGN signal.



Wanted Signal + AWGN Output Waveform

• Complementary Cumulative Distribution Function (CCDF)

CCDF (Test Model 1, 64 DPCH, 1 Carrier) Waveform Pattern [Test_Model_1_64DPCH]

CCDF (Test Model 1, 64 DPCH, 4 Carrier) Waveform Pattern [Test_Model_1_64DPCH × 4]

CDMA2000 1xEV-DO Waveform Patterns

Standard

The CDMA2000 1xEV-DO waveform patterns listed opposite are stored on the MS269xA or MS2830A internal hard disk.
The 3GPP2 signals specified for testing receivers and transmitters of CDMA2000 1xEV-DO access networks (base station) and access terminal (AT) are output by selecting one of the 13 forward and 10 reverse data rate patterns.

- Access Terminal (AT) Receiver Test
  CDMA2000 1xEV-DO forward
    Baseband filter: IS-95SPEC +EQ
    Data: PN15fix* (excluding FWD-Idle)
      FWD_38_4kbps_16slot
      FWD_76_8kbps_8slot
      FWD_153_6kbps_4slot
      FWD_307_2kbps_2slot
      FWD_614_4kbps_1slot
      FWD_307_2kbps_4slot
      FWD_614_4kbps_2slot
      FWD_1228_8kbps_1slot
      FWD_921_6kbps_2slot
      FWD_1843_2kbps_1slot
      FWD_1228_8kbps_2slot
      FWD_2457_6kbps_1slot
      FWD_Idle

- Access Network (AN) Receiver Test
  CDMA2000 1xEV-DO Reverse
    Baseband filter: IS-95SPEC
    Data: PN9fix*
      RVS_9_6kbps_RX
      RVS_19_2kbps_RX
      RVS_38_4kbps_RX
      RVS_76_8kbps_RX
      RVS_153_6kbps_RX
      RVS_9_6kbps_TX
      RVS_19_2kbps_TX
      RVS_38_4kbps_TX
      RVS_76_8kbps_RT
      RVS_153_6kbps_RT

*: This displays the delimited PN sequence for each packet. Therefore, the PN sequence is discontinuous between the end data of one packet and the header data of the next packet.

CDMA2000 Waveform Patterns

Standard

The CDMA2000 waveform patterns listed in the table below are stored on the MS269xA or MS2830A internal hard disk.
The 3GPP2 C.S0002-0-2-specified CDMA2000 modulation signals are output by selecting one of these CDMA2000 waveform patterns.
Reverse channel signals are output by channel coding (convolutional coding, etc.) 4-frame length PN9 fix*1 data, which is useful for measuring the Frame Error Rate (FER)*2 of base stations and evaluating devices.

∗1: Since the data length is not an integer multiple of the PN sequence length (511 bits for PN9), the PN sequence becomes discontinuous at the end.
∗2: This is the case when the timing signal and 1.2288 Mcps × 11 clock signal (or 5- or 10-MHz reference clock) can be input from the test target base station to the MS269xA or MS2830A in order to synchronize the frame start point and chip clock.

Waveform Patterns	System	Frame Coding	Symbol Data
RVS_RC1_FCH	CDMA2000 1XRTT RC1 Reverse	Coded	FCH 9.6 kbps
RVS_RC2_FCH	CDMA2000 1XRTT RC2 Reverse	Coded	FCH 14.4 kbps
RVS_RC3_FCH	CDMA2000 1XRTT RC3 Reverse	Coded	PICH, FCH 9.6 kbps
RVS_RC3_FCH_SCH	CDMA2000 1XRTT RC3 Reverse	Coded	PICH, FCH 9.6 kbps, SCH 9.6 kbps
RVS_RC3_DCCH	CDMA2000 1XRTT RC3 Reverse	Coded	PICH, DCCH 9.6 kbps
RVS_RC4_FCH	CDMA2000 1XRTT RC4 Reverse	Coded	PICH, FCH 14.4 kbps
FWD_RC1-2_9channel	CDMA2000 1XRTT RC1, RC2 Forward	Spreading only	PICH, SyncCH, PagingCH, FCH 19.2 kbps × 6
FWD_RC3-5_9channel	CDMA2000 1XRTT RC3, RC4, RC5 Forward	Spreading only	PICH, SyncCH, PagingCH, FCH 38.4 kbps × 6

Waveform Patterns		Walsh Code	Code Power	Data Rate	Data
RVS_RC1_FCH	R-FCH			9.6 kbps	PN9fix*
RVS_RC2_FCH	R-FCH			14.4 kbps	PN9fix*
RVS_RC3_FCH	R-PICH R-FCH	0 4	–5.278 dB –1.528 dB	N/A 9.6 kbps	All"0" PN9fix*
RVS_RC3_FCH_SCH	R-PICH R-FCH R-SCH	0 4 2	–7.5912 dB –3.8412 dB –3.8412 dB	N/A 9.6 kbps 9.6 kbps	All"0" PN9fix* PN9fix*
RVS_RC3_DCCH	R-PICH R-DCCH	0 8	–5.278 dB –1.528 dB	N/A 9.6 kbps	All"0" PN9fix*
RVS_RC4_FCH	R-PICH R-FCH	0 4	–5.278 dB –1.528 dB	N/A 14.4 kbps	All"0" PN9fix*
Waveform Patterns		**Walsh Code**	**Code Power**	**Symbol Rate**	**Symbol Data**
FWD_RC1-2_9channel	F-PICH F-SyncCH PagingCH F-FCH × 6	0 32 1 8–13	–7.0 dB –13.3 dB –7.3 dB –10.3 dB	N/A 4.8 kbps 19.2 kbps 19.2 kbps	All"0" PN9fix* PN9fix* PN9fix*
FWD_RC3-5_9channel	F-PICH F-SyncCH PagingCH F-FCH × 6	0 32 1 8–13	–7.0 dB –13.3 dB –7.3 dB –10.3 dB	N/A 4.8 kbps 19.2 kbps 38.4 kbps	All"0" PN9fix* PN9fix* PN9fix*

R-PICH (Reverse Pilot Channel)
R-FCH (Reverse Fundamental Channel)
R-SCH (Reverse Supplemental Channel)
R-DCCH (Reverse Dedicated Control Channel)
F-PICH (Forward Pilot Channel)
F-SyncCH (Forward Sync Channel)
PagingCH (Paging Channel)
F-FCH (Forward Fundamental Channel)

GSM/EDGE Waveform Patterns

Standard

The GSM/EDGE waveform patterns listed in the table below are installed on the internal hard disk when the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option is installed. Details for the pattern files are given below.
Signals for testing receivers and for evaluating devices in a GSM/EDGE system are output by selecting one of these GSM/EDGE waveform patterns.

• GMSK_PN9, 8PSK_PN9
PN9 data which doesn't have slot format is inserted.

• GMSK_TN0, 8PSK_TN0
PN9 data is inserted into the entire area of the slots, except the guard. The PN9 data in each slot is continuous.

• NB_GMSK, NB_ALL_GMSK, NB_8PSK, NB_ALL_8PSK
PN9 data is inserted into the normal burst encrypted bit area. The PN9 data in the slots is continuous.

• TCH_FS
Supports Speech channel at full rate (TCH/FS) specified in Section 3.1 of 3GPP TS05.03

• CS-1_1 (4)_SLOT (_4SLOT)
Supports packet data block type 1 (CS-4) and 4 (CS-1) specified in Section 5.1 of 3GPP TS05.03

• DL (UL)_MCS-1 (5, 9)_1SLOT (_4SLOT)
Supports packet data block types 5 (MCS-1), 9 (MCS-5), and 13 (MCS-9) specified in Section 5.1 of 3GPP TS05.03

Waveform Patterns	Uplink/Downlink	Data	Output Slot	Communications
GMSK_PN9	Uplink/Downlink	PN9*1	–	–
8PSK_PN9	Uplink/Downlink		–	–
GMSK_TN0	Uplink/Downlink	PN9*2	TN0	–
8PSK_TN0	Uplink/Downlink		TN0	–
NB_GMSK	Uplink/Downlink	PN9*3	TN0	GSM
NB_ALL_GMSK	Uplink/Downlink		All slots	
NB_8PSK	Uplink/Downlink		TN0	
NB_ALL_8PSK	Uplink/Downlink		All slots	
TCH_FS	Uplink/Downlink	PN9*4	TN0	
CS-1_1SLOT	Uplink/Downlink		TN0	
CS-4_1SLOT	Uplink/Downlink		TN0	
DL_MCS-1_1SLOT	Downlink		TN0	GPRS
UL_MCS-1_1SLOT	Uplink		TN0	
DL_MCS-5_1SLOT	Downlink		TN0	EDGE
UL_MCS-5_1SLOT	Uplink		TN0	
DL_MCS-9_1SLOT	Downlink		TN0	
UL_MCS-9_1SLOT	Uplink		TN0	
DL_MCS-9_4SLOT*5	Downlink		TN0, 1, 2, 3	
UL_MCS-9_4SLOT*5	Uplink		TN0, 1, 2, 3	

∗1: PN9 data is inserted into the entire area that does not have the slot format.
∗2: PN9 data is inserted into the entire area of the slots, except the guard.
∗3: PN9 data is inserted into the normal burst encrypted bit area.
∗4: The bit string channel-coded for PN9 data is inserted into the normal burst encrypted bit area.
∗5: For MS2830A: ARB Memory Upgrade 256 MSa option must be installed to use this waveform pattern.

Digital Broadcast Waveform Patterns

Standard

The BS/CS/CATV/ISDB-T waveform patterns listed in the table below are stored on the MS269xA or MS2830A internal hard disk and signals for testing devices are output by selecting one of these waveform patterns.
There is also a pattern for evaluating ISDB-T video and audio as well as for simple BER measurements.

Waveform Patterns	Outline		Parameter
BS_1ch	Physical layer waveform pattern of digital BS broadcast. For device evaluation.	1 channel PN23fix*1 Modulation only	Roll-off factor: 0.35 Nyquist Bandwidth: 28.86 MHz Modulation: QPSK
CS_1ch	Physical layer waveform pattern of digital CS broadcast. For device evaluation.		Roll-off factor: 0.35 Nyquist Bandwidth: 21.096 MHz Modulation: QPSK
CATV_AnnexC_1ch	Physical layer waveform pattern for CATV (ITU-T J83 Annex C). For device evaluation.		Roll-off factor: 0.13 Nyquist Bandwidth: 5.274 MHz Modulation: 64QAM
ISDBT_1layer_1ch	Physical layer waveform pattern for ISDB-T. For device evaluation.	1 channel PN23fix*1 Pilot Signal With TMCC	Mode: 3, GI: 1/8 A-Layer: 13seg, 64QAM
ISDBT_2layer_1ch			Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK B-Layer: 12seg, 64QAM
ISDBT_2layer_Coded	Waveform pattern for ISDB-T partial reception. For simple BER measurement. 4-frame waveform length.	1 channel For simple BER	Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 2 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 2
ISDBT_QPSK_1_2			Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 1/2, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 1
ISDBT_QPSK_2_3			Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 1
ISDBT_16QAM_1_2			Mode: 3, GI: 1/8 A-Layer: 1seg, 16QAM, CR = 1/2, TI = 0 B-Layer: 12seg, 64QAM, CR = 7/8, TI = 1
ISDBT_QPSK_2_3_TI4			Mode: 3, GI: 1/8 A-Layer: 1seg, QPSK, CR = 2/3, TI = 4 B-Layer: 12seg, 64QAM, CR = 3/4, TI = 2
ISDBTsb_QPSK_1_2	Waveform pattern for ISDB-Tsb partial reception*2. For simple BER measurement. 4-frame waveform length.	1 channel For simple BER	Mode: 3, GI: 1/8 A/B-Layer: QPSK, CR = 1/2, TI = 0 Seg#1 to #5: 8-segment concatenation transmission in 1-segment format Seg#6 to #8: 8-segment concatenation transmission in 3-segment format
ISDBTsb_QPSK_2_3			Mode: 3, GI: 1/8 A/B-Layer: QPSK, CR = 2/3, TI = 0 Seg#1 to #5: 8-segment concatenation transmission in 1-segment format Seg#6 to #8: 8-segment concatenation transmission in 3-segment format
ISDBTsb_16QAM_1_2			Mode: 3, GI: 1/8 A/B-Layer: 16QAM, CR = 1/2, TI = 0 Seg#1 to #5: 8-segment concatenation transmission in 1-segment format Seg#6 to #8: 8-segment concatenation transmission in 3-segment format

∗1: The PN sequence is discontinuous at the waveform pattern connection.
This cannot be used to measure BER (PN23) although it can be used for simple BER measurement.
∗2: It is not guaranteed that any receiver can receive a waveform with this length.

WLAN Waveform Patterns

Standard

The WLAN (IEEE802.11a/b/g) waveform patterns listed in the table below are stored on the MS269xA or MS2830A internal hard disk. Signals for testing the receiver and transmitter of a terminal or module can be output by selecting one of these patterns.
The waveform patterns shown below are the signals for one packet. When a waveform pattern is selected, the signal is output in an endless loop.

• IEEE_802.11a/802.11g (ERP-OFDM) Waveform Patterns List

Waveform Patterns	Data Rate (Mbps)	Modulation	Coding Rate	Coding Bits per Sub-carrier	Coding Bits per OFDM Symbol	Data Bits per OFDM Symbol
11a_OFDM_6Mbps	6	BPSK	1/2	1	48	24
11a_OFDM_9Mbps	9	BPSK	3/4	1	48	36
11a_OFDM_9Mbps_PN9*1	9	BPSK	3/4	1	48	36
11a_OFDM_12Mbps	12	QPSK	1/2	2	96	48
11a_OFDM_18Mbps	18	QPSK	3/4	2	96	72
11a_OFDM_18Mbps_PN9*1	18	QPSK	3/4	2	96	72
11a_OFDM_24Mbps	24	16-QAM	1/2	4	192	96
11a_OFDM_36Mbps	36	16-QAM	3/4	4	192	144
11a_OFDM_36Mbps_PN9*1	36	16-QAM	3/4	4	192	144
11a_OFDM_48Mbps	48	64-QAM	2/3	6	288	192
11a_OFDM_54Mbps	54	64-QAM	3/4	6	288	216
11a_OFDM_54Mbps_PN9*1	54	64-QAM	3/4	6	288	216
11a_OFDM_54Mbps_ACP*2	54	64-QAM	3/4	6	288	216

∗1: Continuous PN9 data between PSDUs
∗2: Improved ACPR

• IEEE_802.11b Waveform Patterns List

Waveform Patterns	Spreading, Coding	Modulation
11b_DSSS_1Mbps	DSSS, 11 chip Barker Code	DBPSK
11b_DSSS_2Mbps	DSSS, 11 chip Barker Code	DQPSK
11b_DSSS_2Mbps_PN9*1, *2	DSSS, 11 chip Barker Code	DQPSK
11b_CCK_5_5Mbps	CCK	DQPSK
11b_CCK_11Mbps	CCK	DQPSK
11b_CCK_11Mbps_PN9*2	CCK	DQPSK
11b_CCK_11Mbps_ACP*3	CCK	DQPSK

∗1: For MS2830A: ARB Memory Upgrade 256 MSa option must be installed to use this waveform pattern.
∗2: Continuous PN9 data between PSDUs
∗3: Improved ACPR

• IEEE_802.11g (DSSS-OFDM) Waveform Patterns List

Waveform Patterns	Data Rate (Mbps)	Modulation	Coding Rate	Coding Bits per Sub-carrier	Coding Bits per OFDM Symbol	Data Bits per OFDM Symbol
11g_DSSS_OFDM_6Mbps	6	BPSK	1/2	1	48	24
11g_DSSS_OFDM_9Mbps	9	BPSK	3/4	1	48	36
11g_DSSS_OFDM_12Mbps	12	QPSK	1/2	2	96	48
11g_DSSS_OFDM_18Mbps	18	QPSK	3/4	2	96	72
11g_DSSS_OFDM_24Mbps	24	16-QAM	1/2	4	192	96
11g_DSSS_OFDM_36Mbps	36	16-QAM	3/4	4	192	144
11g_DSSS_OFDM_48Mbps	48	64-QAM	2/3	6	288	192
11g_DSSS_OFDM_54Mbps	54	64-QAM	3/4	6	288	216

Bluetooth Waveform Patterns

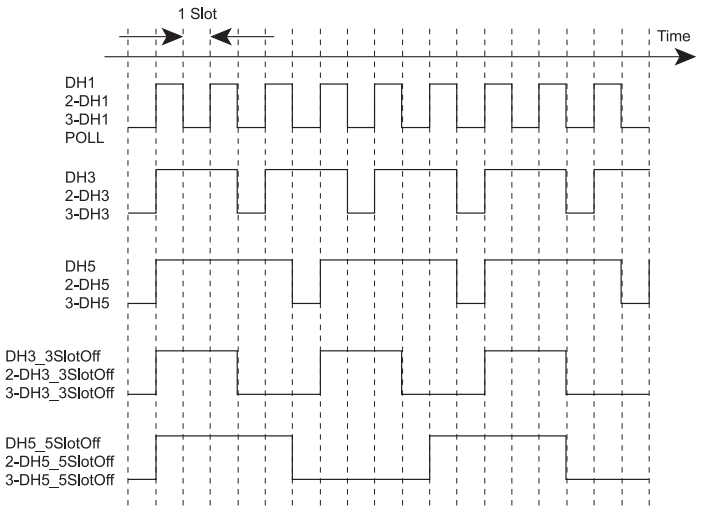
Standard

The *Bluetooth* waveform patterns listed in the table below are stored on the MS269xA or MS2830A internal hard disk. Selecting one of these waveform patterns outputs the best signal for the evaluation.

• POLL:
This is used for operation checks and PER measurement of mobile terminals with *Bluetooth*.

• No Packet Format (PN9, PN15):
This is used for BER measurement of mobile terminals and modules with *Bluetooth*.

• DH1, DH3, DH5:
This is used in combination with an external demodulator for loopback tests (no FEC) of mobile terminals and modules with *Bluetooth*.



Waveform Timing Chart

Waveform Patterns	Data Rate (Mbps)	Payload Modulation	Filter	Packet Type
DH1*1	1	GFSK*4	Gaussian*5	DH1
DH3*1	1	GFSK*4	Gaussian*5	DH3
DH5*1	1	GFSK*4	Gaussian*5	DH5
DH3_3SlotOff*1	1	GFSK*4	Gaussian*5	DH3
DH5_5SlotOff*1	1	GFSK*4	Gaussian*5	DH5
POLL	1	GFSK*4	Gaussian*5	POLL
2-DH1*1	2	π/4-DQPSK	Root Nyquist*6	2-DH1
2-DH3*1	2	π/4-DQPSK	Root Nyquist*6	2-DH3
2-DH5*1	2	π/4-DQPSK	Root Nyquist*6	2-DH5
2-DH3_3SlotOff*1	2	π/4-DQPSK	Root Nyquist*6	2-DH3
2-DH5_5SlotOff*1	2	π/4-DQPSK	Root Nyquist*6	2-DH5
3-DH1*1	3	8-DPSK	Root Nyquist*6	3-DH1
3-DH3*1	3	8-DPSK	Root Nyquist*6	3-DH3
3-DH5*1	3	8-DPSK	Root Nyquist*6	3-DH5
3-DH3_3SlotOff*1	3	8-DPSK	Root Nyquist*6	3-DH3
3-DH5_5SlotOff*1	3	8-DPSK	Root Nyquist*6	3-DH5
GFSK-PN9*2	1	GFSK*4	Gaussian*5	No packet format
GFSK-PN15*3	1	GFSK*4	Gaussian*5	No packet format
PI_4_DQPSK-PN9*2	2	π/4-DQPSK	Root Nyquist*6	No packet format
PI_4_DQPSK-PN15*3	2	π/4-DQPSK	Root Nyquist*6	No packet format
8DPSK-PN9*2	3	8-DPSK	Root Nyquist*6	No packet format
8DPSK-PN15*3	3	8-DPSK	Root Nyquist*6	No packet format

∗1: PN9 data is inserted into the payload body.
∗2: PN9 data is inserted into all areas that do not have a packet format.
∗3: PN15 data is inserted into all areas that do not have a packet format.
∗4: Modulation index = 0.32
∗5: Bandwidth time (BT) = 0.5
∗6: Roll-off rate β = 0.4

W-CDMA IQproducer

Standard accessory

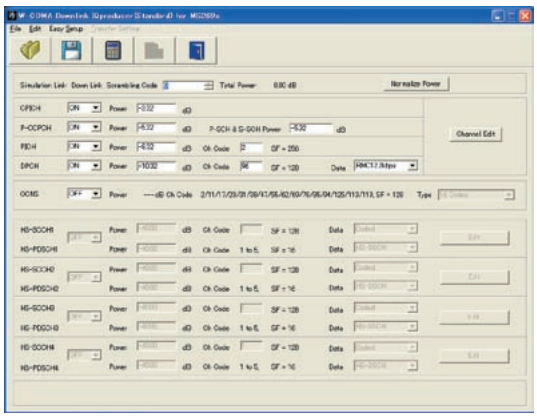
W-CDMA IQproducer is GUI-based, PC application software for generating waveform patterns used in W-CDMA Rx sensitivity measurement. Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated RF signal.
By changing the Scrambling Code Number and Channelization Code Number, waveform patterns can be created that support the evaluation of W-CDMA terminals.
If complete control of all W-CDMA parameters is required, the MX269901A HSDPA/HSUPA IQproducer software (sold separately) can be used. For details, see the MX269901A HSDPA/HSUPA IQproducer section of this document.

• Downlink Settings

Downlink sets parameters including Scrambling code, CPICH/ P-CCPCH/PICH/DPCH power, Channelization code, DPCH_ PhyCH TFCI and Timing Offset, and DPCH_TrCH Data to create the waveform pattern. (For details, see the Downlink Parameter Setting Range table described later.)
Additionally, the Downlink Easy Setup function supports the Reference Measurement Channel (RMC) items specified by 3GPP TS25.101 and TS25.104. Parameter setting is easy just by selecting the items to create the waveform pattern.

Easy Setup Items include:

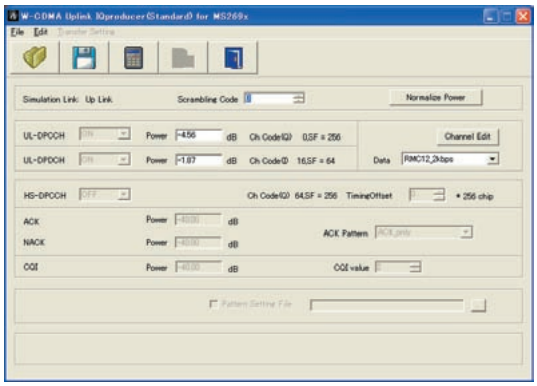
RMC 12.2 kbps (RX test)
RMC 12.2 kbps (Performance test)
RMC 64 kbps (Performance test)
RMC 144 kbps (Performance test)
RMC 384 kbps (Performance test)



Downlink Main Screen

• Uplink Settings

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



Uplink Main Screen

• Downlink Parameter Setting Range

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

• Uplink Parameter Setting Range

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

MX269901A HSDPA/HSUPA IQproducer

Optional

This optional GUI-based PC application software is used to set parameters and generate waveform patterns for 3GPP HSDPA/HSUPA (Uplink/Downlink) systems.
If complete control of all W-CDMA parameters is required, the MX269901A HSDPA/HSUPA IQproducer software (sold separately) can be used. For details, see the MX269901A HSDPA/HSUPA IQproducer section of this document.
Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated RF signal. The HS-PDSCH and HS-DPCCH parameters specified in TS25.212 can be set. The Downlink Easy Setup function assigns default values to some parameters and sets other items to typical values, making the creation of an accurate waveform pattern fast and easy.

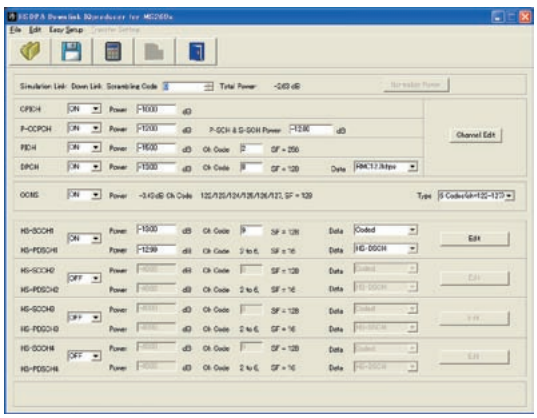
• Downlink Settings

Various downlink parameters can be set. (For details, see the Downlink Parameter Setting table described later.)
The Downlink Easy Setup function supports the HSDPA Fixed Reference Channel (FRC) items specified in 3GPP TS25.101, and the Reference Measurement Channel (RMC) items specified in 3GPP TS25.101 and TS25.104.

Easy Setup Items include:

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

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

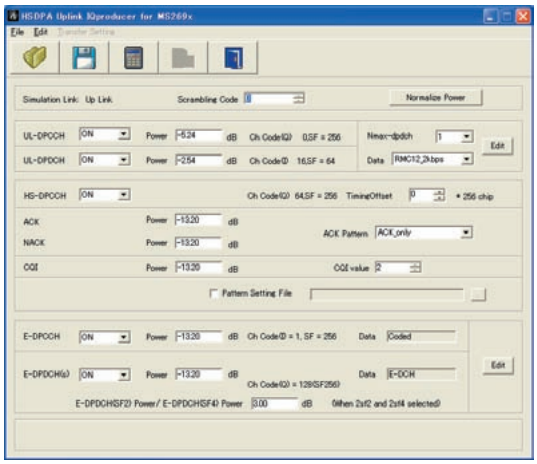


Downlink Main Screen

• Uplink Settings

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

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



Uplink Main Screen

• Parameter Save/Recall

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

• Downlink Parameter Setting Range

Display	Setting Range	
Scrambling Code		0 to 8191
CPICH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 dB, Resolution 0.01 dB
P-CCPCH	ON/OFF	ON or OFF
	Power	–40.00 to 0.00 dB, Resolution 0.01 dB
	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 • User Edit TrCH = Spreading Factor of 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 or 6 Codes (ch = 122 to 127) or 6 Codes (ch = 2 to 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	0 to 15
	Data	PN9, PN9fix, PN15fix, 16 bit repeat, HS-DSCH
P-CCPCH Edit	SFN Cycle	Short
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%
	Slot Format	#0 to #16
	Timing Offset	0 to 149
	TPC Edit	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 to 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111
DPCH Edit (TrCH Edit)	TrCH Number	1 to 8
	DTX	Fix/Flex
	Data	PN9, PN9fix, PN15fix, 16 bit repeat
	TTI	10, 20, 40, 80 ms
	Max. TrBk Size	0 to 5000
	TrBk Size	0 to 5000
	Max. TrBk Set No.	0 to 64
	TrBk Set No.	0 to 64
	CRC	0, 8, 12, 16, 24 bit
	Coder	CC1/2, CC1/3, TC
	RM attribute	1 to 256
	BER	0.0 to 100.0%
	BLER	0 to 100%
HSDPA transport channel (HS-SCCH, HS-PDSCH parameters)	Channelization Code Offset	1 to (16–Number of Physical Channel Code)
	Number of Physical Channel Code	1 to (16–Channelization Code Offset)
	Modulation	QPSK or 16QAM
	Transport Block Size Information	0 to 63
	RV Information	0 to 7
	UE Identity	0 to 65535
	CRC Error Insertion	Correct or Fail
	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	Used or Not used

Optional

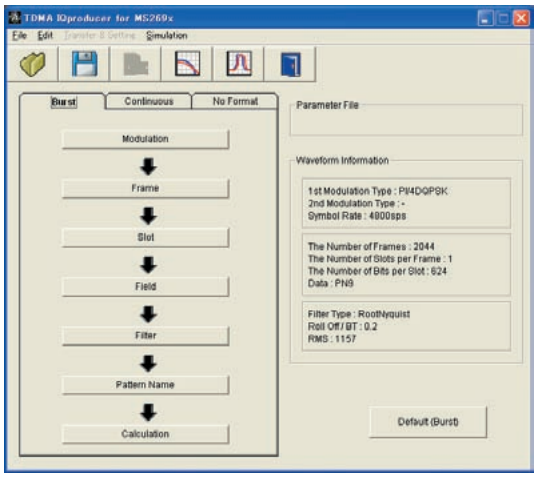
• Uplink Parameter Setting Range

Display	Setting Range	
Scrambling Code		0 to 16777215
UL-DPCCH, UL-DPDCH	Channel ON/OFF	ON or OFF
	Power	–40.00 to 0.00 dB, 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	Used or Not used
E-DPCCH, E-DPDCH	E-DPCCH ON/OFF	ON or OFF
	E-DPDCH ON/OFF	ON or OFF
	E-DPCCH Power	–40.00 to 0.00 dB, Resolution 0.01 dB
	E-DPDCH 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
	Spreading Factor	4, 8, 16, 32, 64, 128, 256
	BER	0.0 to 100.0% (Enabled when [Data] set to [PN9])
	Slot Format	#0 to #1
	Timing Offset	0 to 149
	TPC Edit	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 to 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111
DPCH Edit (TrCH Edit)	TrCH Number	1 to 8
	Data	PN9, PN9fix, PN15fix, 16 bit repeat
	TTI	10, 20, 40, 80 ms
	Max. TrBk Size	0 to 5000
	TrBk Size	0 to 5000
	Max. TrBk Set No.	0 to 64
	TrBk Set No.	0 to 64
	CRC	0, 8, 12, 16, 24 bit
	Coder	CC1/2, CC1/3, TC
	RM attribute	1 to 256
	BER	0.0 to 100.0% (Enabled when [Data] set to [PN9])
	BLER	0 to 100% (Enabled when [Data] set to [PN9])
E-DPDCH and E-DPCCH Edit (Phy CH)	HARQ Process Setting File	Common dialog opens when the check box is checked. HARQ Process Setting File can be selected.
	E-DPCCH Data	PN9, PN9fix, PN15fix, 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
E-DPDCH and E-DPCCH Edit (Tr CH)	E-DCH TTI	2, 10 ms
	Information Bit Payload	18 to 11484 (at E-DCH TTI = 2 ms) 18 to 20000 (at E-DCH TTI = 10 ms)
	E-DCH Payload Data	PN9, PN9fix, PN15fix, 16 bit repeat
	E-TFCI Information	0 to 127
	RSN	0 to 3
	Pattern Length	Display only
	E-DCH RV Index	0 to 3
	CRC Error Insertion	Correct, Error
	"Happy" Bit	0, 1

MX269902A TDMA IQproducer

Optional

This optional GUI-based PC application software is used to set the parameters and generate waveform patterns for TDMA systems. Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated RF signal. In addition to signals supporting PDC, PHS, ARIB STD-T61/T79/T86, Advanced-PHS, ETC and DSRC systems, signals for other systems can also be generated.

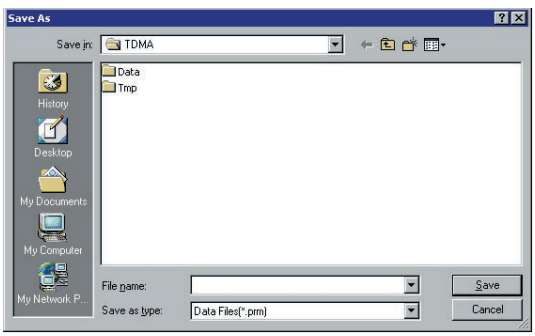


Main Screen

• Parameter Setting Items List

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

• Parameter Save/Recall



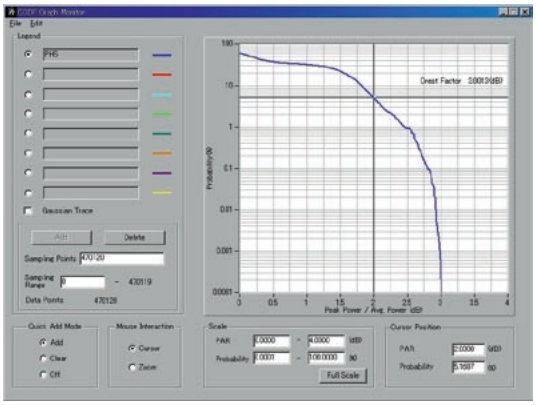
The numeric values and settings for each item can be saved in a parameter file. Enter the file name in the [File name] field and click the [Save] button to save the parameter file.
A saved parameter file is recalled by selecting it in the file list and clicking the [Open] button.

• Graphical Simulation Displays

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

CCDF Graph

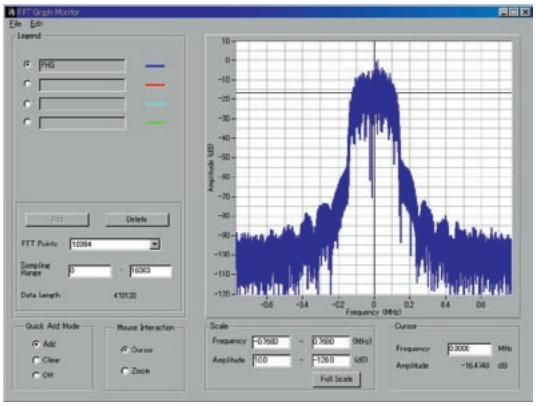
Up to eight generated waveform patterns can be read and displayed as CCDF graphs.



CCDF Graph Screen

FFT Graph

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



FFT Graph Screen

MX269902A TDMA IQproducer

Optional

• Parameter Setting Items List

Items	Display	Outline	Setting Range
Modulation	Modulation Type (1st Modulation Type)	1st Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, DQPSK, PI/4DQPSK, 8PSK*1, D8PSK*1, 16QAM*1, 32QAM*1, 64QAM*1, 256QAM*1, ASK, FSK
	Modulation Type (2nd Modulation Type)	2nd Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, DQPSK, PI/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 256QAM
	Symbol Rate	Symbol Rate	1 ksps to 80 Msps (can be set in the 1 sps units)
	Over Sampling	Over Sampling Rate	2, 3, 4, 8, 16, 32
	Sampling Rate	Sampling Rate	20 kHz to 160 MHz (The value of symbol rate × oversampling rate is set automatically. However, when the Manchester code setting enabled, the value of symbol rate × oversampling rate × 2 is set automatically.)
	GSM	GSM Setting	Enable/disable automatic setting in accordance with GSM (Enabled when 8PSK or FSK set as modulation type)
	Modulation Index	Modulation Index	0.00 to 1.00 (for ASK), 0.20 to 10.00 (for FSK)
	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.
Frame	The Number of Frames	Frame number	1 to 4088, Auto
	The Number of Slots per Frame	Slot numbers in one frame	1 to 20
Slot (Burst)	1, 24 field	Guard field	Set the number of bits listed in the separate table according to Modulation Type.
	2, 23 field	Ramp field	Set the number of bits listed in the separate table according to Modulation Type.
	3 to 22 field	Fixed (Fixed data) field	Set integer from 0 to 128.
	3 to 22 field	Data (PN9, PN15) field	Set integer from 0 to 1024.
	4 to 22 field	CRC (Cyclic Redundancy Check character) field	0, 8, 12, 16, 24, 32
Slot (Continuous)	1 to 24 field	Fixed (Fixed data) field	Set integer from 0 to 128.
	1 to 24 field	Data (PN9, PN15) field	Set integer from 0 to 1024.
	2 to 24 field	CRC (Cyclic Redundancy Check character) field	0, 8, 12, 16, 24, 32
Field (Burst/Continuous)	Fixed	Sets hexadecimal fixed data	0 to maximum value of number of bits set
	CRC	Sets CRC calculation field as integer	1 to number of bits in field on left to CRC (except Guard and Ramp fields)
	Data Field	Selects continuous pattern	PN9, PN15, 16 bit Pattern, 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
Filter	Filter	Filter type	Root Nyquist, Nyquist, Gaussian, IdealLowpass, None
	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 IdealLowpass is set as the filter type. The setting range varies with the oversampling rate.)
	RMS	RMS value of waveform pattern data	1157
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, FSK	Integer between 0 and 9960	Integer between 0 and 9960
QPSK, DQPSK, PI/4DQPSK	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, FSK	Integer number between 1 and 16
QPSK, DQPSK, PI/4DQPSK	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

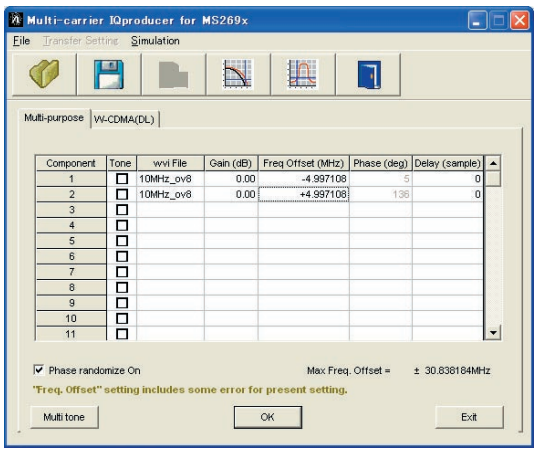
MX269904A Multi-Carrier IQproducer

Optional

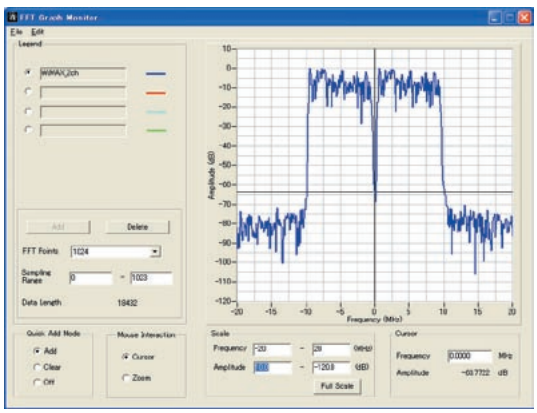
This GUI-driven PC application software is used to create a multi-carrier waveform pattern for modulated signals and tone signals of communications systems. Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a multi-carrier RF signal. W-CDMA downlink multi-carrier signals are supported as well as various types of clipping.

• Multi-purpose Function

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



Multi-carrier Setting Screen



FFT Analysis Screen

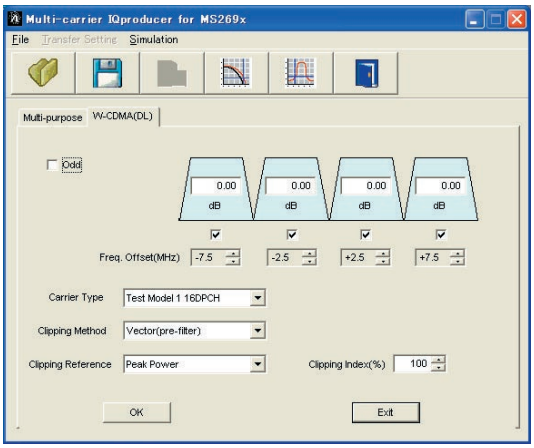
Ex) 10 MHz Bandwidth WiMAX × 2 carrier

• 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.

• Carrier Type

Test Model 1 16DPCH, Test Model 1 32DPCH,
Test Model 1 64DPCH,
Test Model 5 2HS-PDSCH, Test Model 5 4HS-PDSCH,
Test Model 5 8HS-PDSCH



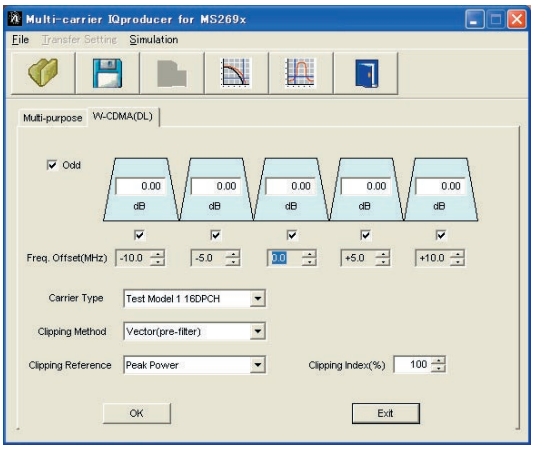
Multi-carrier Setting Screen

• Clipping Method

Non, Vector (pre-filter), Vector (post-filter),
Scalar (pre-filter), Scalar (post-filter)

• Clipping Reference level

Peak Power, RMS Power



Multi-carrier Setting Screen

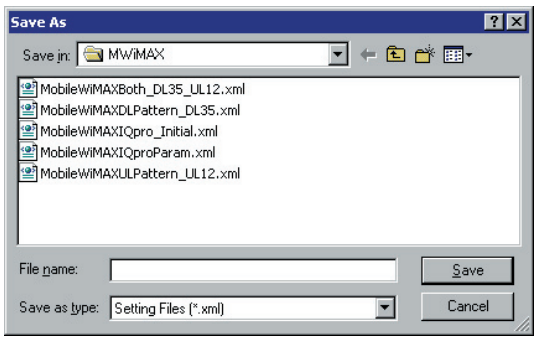
MX269905A Mobile WiMAX IQproducer

Optional

This GUI-driven PC application software is used to set parameters and generate waveform patterns based on the IEEE 802.16e-2005 WirelessMAN-OFDMA standard. Signals that comply with this particular specification are also knows as mobile WiMAX signals. Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated WiMAX signal. Permutation zones and user bursts are easy to configure in a frame using drop-and-drag functionality in a user-friendly GUI. Modulation, coding type, and coding rate can be set for each user burst. Most receiver tests described in IEEE 802.16e-2005 (Section 8.4.13, Receiver Requirement) can be performed except those functional tests requiring equipment other than a Signal Generator.

• Parameter Save/Recall

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



• Graphical Simulation Displays

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

CCDF Graph

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

FFT Graph

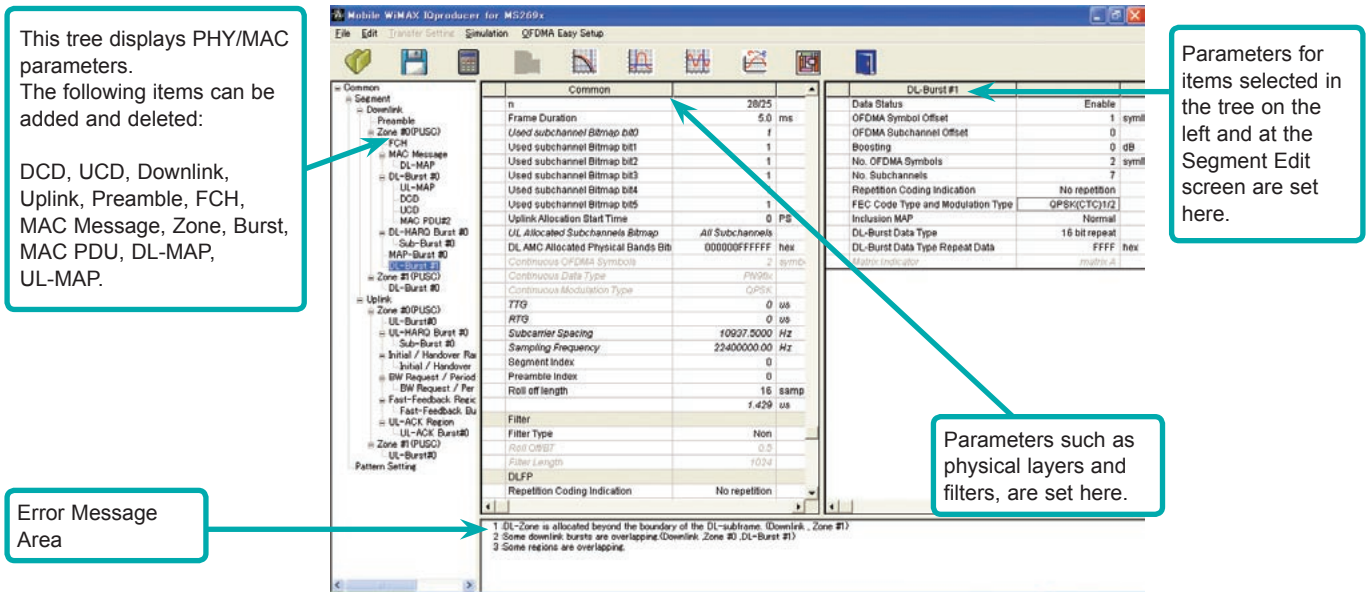
Up to four generated waveform patterns can be read and displayed as FFT graphs.

Time Domain Graph Display

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

Clipping Function

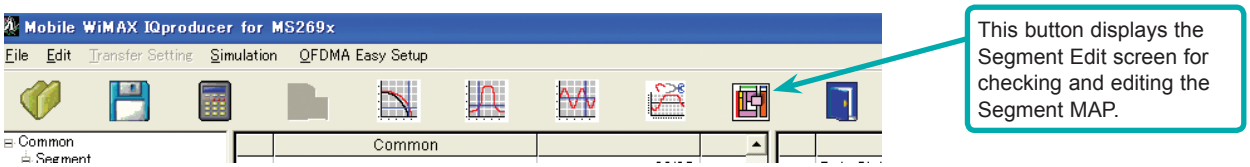
Clipping and filtering can be performed for created waveform patterns.



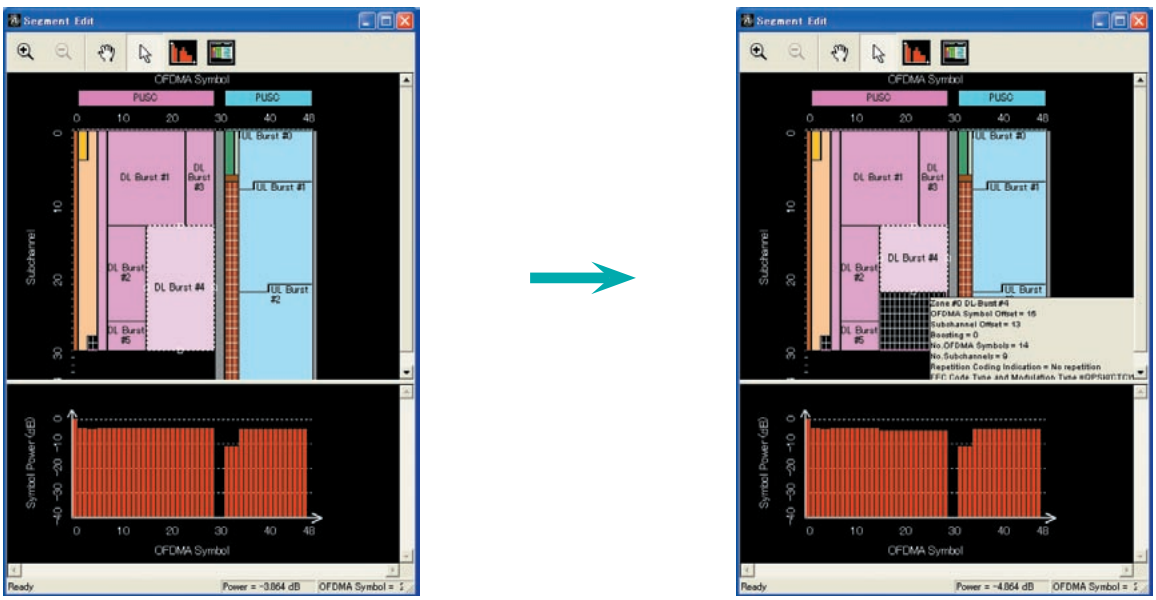
Mobile WiMAX IQproducer Main Screen

Excellent Operability: Segment Edit Screen

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



Mobile WiMAX IQproducer Main Screen



Segment Edit Screen **Segment Edit Screen**

Optional

• Common Parameter Setting Range

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

Table 1: Preamble Index Setting Range

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

• Downlink [PHY/MAC] Parameter Setting Range

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

Optional

Tree	Items	Setting Range
DL-MAP (Cont'd)	No. Subchannels	Display only: Set at DL-Burst
	Repetition Coding Indication	Display only: Set at DL-Burst
	Zone# STC/Zone switch IE	
	OFDMA Symbol Offset	Enable, Disable
	Permutation	Display only: Set at DL-Zone.
	DL Use All SC Indicator	Display only
	DL-PermBase	Display only: Set at DL-Zone.
SUB-DL-UL-MAP	Data Status	Enable, Disable
	OFDMA Symbol Offset	Display only
	OFDMA Subchannel Offset	Display only
	Length	Display only
	FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2,16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
	Repetition Coding Indication	No repetition, 2, 4, 6
	RCID Type	Normal CID, RCID11, RCID7, RCID3
	HARQ ACK offset indicator	0, 1
	DL HARQ ACK offset	0 to 255
	UL HARQ ACK offset	DL IE Count
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 127
DL-Burst 0 to 15	Data Status	Enable, Disable
	OFDMA Symbol Offset	• 0 to 254 symbol without Preamble at Zone#0 (Select by even symbol.) • 1 to 255 symbol with Preamble at Zone#0 (Select by odd symbol.) • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC Zone from Zone#1 to #7 • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC (all SC) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6 × 1) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3 × 2) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2 × 3) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1 × 6) Zone
	OFDMA Subchannel Offset	0 to 63 (when AMC (2 × 3), AMC (1 × 6) excluded) 0 to 255 (when AMC (2 × 3), AMC (1 × 6))
	Boosting	–12, –9, –6, –3, 0, +3, +6, +9 dB
	No. OFDMA Symbols	2 to 126 symbol (when PUSC) 2 to 126 symbol (when PUSC (all SC)) 1 to 127 symbol (when FUSC) 1 to 127 symbol (when AMC (6 × 1)) 2 to 126 symbol (AMC (3 × 2)) 3 to 93 symbol (when AMC (2 × 3)) 6 to 90 symbol (when AMC (1 × 6))
	No. Subchannels	1 to 63
	Repetition Coding Indication	No repetition, 2, 4, 6: Can be set when FEC Code Type and Modulation Type = QPSK (CC) 1/2, QPSK (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, QPSK (No Ch Coding); no repetition fixed in other cases
	FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
	DL-Burst Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	DL-Burst Data Type Repeat Data	0000 to FFFF (HEX): Can be set when DL-Burst Data Type = 16 bit repeat
	DL-Burst Data Type User File	User File selected: Can be set when DL-Burst Data Type = User File
	MAC PDU Number	0 to 32
	Matrix Indicator	Matrix A, Matrix B
UL-MAP	Data Status	Enable, Disable
	UL-MAP Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, UL-MAP, Compressed UL-MAP, User File
	UL-MAP Type Repeat Data	0000 to FFFF (HEX): Can be set when UL-MAP Type = 16 bit repeat
	UL-MAP Type User File	User File selected: Can be set when UL-MAP Type = User File
	UL-MAP Length	0 to 2037 byte: The calculation value is displayed when UL-MAP Type = UL-MAP or Compressed UL-MAP. The length of payload data for UL-MAP can be set in other cases.
	UCD Count	0 to 255: Can be set when UL-MAP Type = UL-MAP or Compressed UL-MAP
	Uplink Allocation Start Time	Display only: Set at Common
	Zone# UL-MAP IE#	
	CID	0 to 65535
	UIUC (Uplink Interval Usage Code)	1 to 10
	UL-Burst Duration	Display only: Set at UL-Burst.
	Repetition Coding Indication	Display only: Set at UL-Burst.

Tree	Items	Setting Range
DCD	Data Status	Enable, Disable
	DCD Offset	0 to (Number of Frames–1)
	DCD Interval	0 to Number of Frames
	DCD Length	0 to 2037 (without DCD Data Type = TLV) Display only (when DCD Data Type = TLV)
	DCD Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File, TLV
	Configuration Change Count	0 to 255
	TLV encoded information	
	Frequency	0 to 6000000 kHz
	Base Station ID	000000000000 to FFFFFFFFFFFF
	MAC version	1 to 6
	BS EIRP	–32768 to +32767
	TTG	Display only
	RTG	Display only
	EIRxP_IR_MAX	–32768 to +32767
	HO Type Support	HO, MDHO, FBSS HO
	Paging Group ID	0000 to FFFF
	Trigger Type	0 to 3
	Trigger Function	0 to 6
	Trigger Action	1 to 3
	Trigger Value	00 to FF
	Trigger averaging Duration	0 to 255
	BS Restart Count	00 to FF
	Default RSSI and CINR averaging parameter	00 to FF
	DL AMC Allocated Physical Bands Bitmap	Display only
	Hysteresis margin	00 to FF
	Time to trigger duration	00 to FF
	DL-Burst Profile (DIUC = 0 to 12)	
	FEC Type	Display only
UCD	Data Status	Enable, Disable
	UCD Offset	0 to (Number of Frames–1)
	UCD Interval	0 to Number of Frames
	UCD Length	0 to 2037 (without UCD Data Type = TLV) Display only (when UCD Data Type = TLV)
	UCD Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File, TLV
	Configuration Change Count	0 to 255
	Ranging Backoff Start	0 to 255
	Ranging Backoff End	0 to 255
	Request Backoff Start	0 to 255
	Request Backoff End	0 to 255
	TLV encoded information	
	Frequency	0 to 6000000 kHz
	Contention-based Reservation Timeout	00 to FF
	Start of Ranging Coded Group	00 to FF
	Band AMC Allocation Threshold	00 to FF
	Band AMC Release Threshold	00 to FF
	Band AMC Allocation Timer	00 to FF
	Band AMC Release Timer	00 to FF
	Band AMC Status Reporting Max Period	00 to FF
	Band AMC Retry Timer	00 to FF
	Normalized C/N Override-2	0000000000000000 to FFFFFFFFFFFFFFFF
	Use CQICH Indication Flag	00 to FF
	Handover Ranging Code	00 to FF
	Initial Ranging Codes	00 to FF
	Initial Ranging Interval	00 to FF
	Tx Power Report	0000 to FFFF
	Normalized C/N for channel Sounding	00 to FF
	Initial Ranging backoff start	00 to FF
	Initial Ranging backoff end	00 to FF
	Bandwidth request backoff start	00 to FF
	Bandwidth request backoff end	00 to FF
	Permutation Base	00 to FF

Optional

Tree		Items	Setting Range
	UCD (Cont'd)	UL Allocated Subchannels Bitmap	Display only
		HARQ Ack Delay for DL burst	00 to FF
		UL AMC Allocated Physical Bands Bitmap	000000000000 to FFFFFFFFFFFF
		Size of CQICH-ID field	00 to FF
		Band-AMC entry average CINR	00 to FF
		HO ranging start	00 to FF
		HO ranging end	00 to FF
		Periodic Ranging Codes	00 to FF
		Bandwidth Request Codes	00 to FF
		Periodic Ranging Backoff Start	00 to FF
		Periodic Ranging Backoff End	00 to FF
		CQICH Band AMC Transition Delay	00 to FF
		UL-Burst Profile (UIUC = 1 to 10)	
		FEC Type	Display only
		Ranging Data ratio	00 to FF
	MAC PDU 0 to 31	Data Status	Enable, Disable
		MAC PDU Length	Display only
		Payload Data Length	0 to 2041 byte (when CI = No CRC) 0 to 2037 byte (when CI = With CRC) 0 to 2047 byte (when CI = Without Header & CRC)
		CID (Connection Identifier)	0 to 65535
		CI	With CRC, No CRC, Without Header & CRC
		CRC Error Insertion	Correct, Error
		Payload Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
		Payload Type Repeat Data	0000 to FFFF: Can be set when Payload Type = 16 bit repeat
		Payload Type User File	User File selected: Can be set when Payload Type = User File
	MAP-Burst	Data Status	Enable, Disable
		OFDMA Symbol Offset	• 0 to 254 symbol without Preamble at Zone#0 (Select by even symbol) • 1 to 255 symbol with Preamble at Zone#0 (Select by odd symbol) • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC Zone from Zone#1 to #7 • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC (all SC) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6 × 1) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3 × 2) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2 × 3) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1 × 6) Zone
		OFDMA Subchannel Offset	0 to (number of Subchannel at Zone)
		Length	1 to 255 slot
		Repetition Coding Indication	No Repetition, 2, 4, 6
		FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
		MAP-Burst Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
		MAP-Burst Data Type Repeat Data	0000 to FFFF: Can be set when MAP-Burst Data Type = 16 bit repeat
		MAP-Burst Data Type User File	User File selected: Can be set when MAP-Burst Data Type = User File
		MAC PDU Number	0 to 32: Display when MAP-Burst Data Type = MAC PDU.
	DL-HARQ Burst	Data Status	Enable, Disable
		RCID_Type	Normal CID, RCID11, RCID7, RCID3
		OFDMA Symbol Offset	• 0 to 254 symbol without Preamble at Zone#0 (Can be selected by even symbol) • 1 to 255 symbol with Preamble at Zone#0 (Can be selected by odd symbol) • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC Zone from Zone#1 to #7 • (OFDMA Symbol Offset at Zone) to 255 symbol when PUSC (all SC) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6 × 1) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3 × 2) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2 × 3) Zone • (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1 × 6) Zone
		OFDMA Subchannel Offset	0 to (Number of Subchannel at Zone)
		Boosting	–12, –9, –6, –3, 0, +3, +6, +9 dB
		Rectangular Sub-Burst Indicator	0, 1

Tree	Items	Setting Range
DL-HARQ Burst (Cont'd)	No. OFDMA Symbols	2 to 126 symbol (when PUSC) 2 to 126 symbol (when PUSC (all SC)) 1 to 127 symbol (when FUSC) 1 to 127 symbol (when AMC (6 × 1)) 2 to 126 symbol (when AMC (3 × 2)) 3 to 126 symbol (when AMC (2 × 3)) 6 to 126 symbol (when AMC (1 × 6))
	No. Subchannels	1 to 127
	Mode	Chase HARQ, MIMO Chase HARQ
	N sub Burst	1 to 16
	N ACK Channel	0 to 15
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
Sub-Burst	Data Status	Enable, Disable
	CID	0 to 65535
	Sub-Burst Duration	1 to 1023
	Sub-Burst DIUC Indication	0, 1
	Repetition Coding Indication	No repetition, 2, 4, 6
	FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
	Sub-Burst Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	Sub-Burst Data Type Repeat Data	0x0000 to 0xFFFF
	Sub-Burst Data Type User File	User File selected when Sub-Burst Data Type = User File
	MAC PDU Number	0 to 32
	MU Indicator	0, 1
	Dedicated MIMO DL Control Indicator	0, 1
	Matrix Indicator	Matrix A, Matrix B
	CRC Error Insertion	Correct, Error
	ACID	0 to 15
	AI_SN	0, 1
	ACK disable	0, 1
	Dedicated DL Control Indicator	00, 01, 10, 11
	Duration (d)	0 to 15
	Allocation Index	0 to 63
	Period (p)	0 to 7
	Frame Offset	0 to 7
	Dedicated DL Control IE	0, 1
	No. SDMA layers	1 to 4

• Uplink [PHY/MAC] Parameter Setting Range

Tree	Items	Setting Range
Uplink	Data Status	Enable, Disable
Zone 0 to 7	Data Status	Enable, Disable
	Permutation	PUSC, PUSC (without SC rotation), AMC (6 × 1), AMC (3 × 2), AMC (2 × 3), AMC (1 × 6)
	Pilot Position	Hopping, Center
	STC/MIMO	Display only
	OFDMA Symbol Offset	0 to 255 symbol (Zone#0 = 0)
	No. OFDMA Symbols	3 to 255 symbol (when PUSC) 3 to 255 symbol (when PUSC (without SC rotation)) 1 to 255 symbol (when AMC (6 × 1)) 2 to 254 symbol (when (AMC (3 × 2)) 3 to 255 symbol (when AMC (2 × 3)) 6 to 252 symbol (AMC (1 × 6))
	UL-PermBase	0 to 69
	UL-Burst Number	1 to 16

Optional

Tree	Items	Setting Range
UL-Burst 0 to 15	Data Status	Enable, Disable
	ODFMA Symbol Offset	• When PUSC Zone (FDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When PUSC (without SC rotation) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (6 × 1) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (3 × 2) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (2 × 3) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (1 × 6) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + Zone No. OFDMA Symbols) symbol
	OFDMA Subchannel Offset	Subchannel–1 at 0 to Zone
	UL Burst Duration	3 to 3069 symbol (when PUSC) 3 to 3069 symbol (when PUSC (without SC rotation)) 1 to 1023 symbol (when AMC (6 × 1)) 2 to 2046 symbol (when AMC (3 × 2)) 3 to 3069 symbol (when AMC (2 × 3)) 6 to 6138 symbol (when AMC (1 × 6))
	Burst Power Offset	–10.00 to +10.00 dB
	Pilot Pattern	Normal, Pattern A, Pattern B
	Repetition Coding Indication	No repetition, 2, 4, 6: Can be set when FEC Code Type and Modulation Type = QPSK (CC) 1/2, QPSK (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, QPSK (No Ch Coding); no repetition fixed in other cases
	FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2, 16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
	UL-Burst Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	UL-Burst Data Type Repeat Data	0000 to FFFF: Can be set when UL-Burst Data Type = 16 bit repeat
	UL-Burst Data Type User File	User File selected: Can be set when UL-Burst Data Type = User File
	MAC PDU Number	0 to 32
MAC PDU 0 to 31	<See MAC PDU on Downlink>	
UL-HARQ Burst	Data Status	Enable, Disable
	RCID_Type	Normal CID, RCID11, RCID7, RCID3
	OFDMA Symbol Offset	• When PUSC Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When PUSC (without SC rotation) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (6 × 1) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (3 × 2) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (2 × 3) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol • When AMC (1 × 6) Zone (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol
	OFDMA Subchannel Offset	0 to (Subchannel number–1 at Zone)
	Mode	Chase HARQ (Display only)
	Allocation Start Indication	0, 1
	N sub Burst	1 to 16
	Inclusion MAP	Normal, SUB-DL-UL-MAP#n (n = 0 to 2)
Sub-Burst	Data Status	Enable, Disable
	CID	0 to 65535
	FEC Code Type and Modulation Type	QPSK (CC) 1/2, QPSK (CC) 3/4, 16QAM (CC) 1/2, 16QAM (CC) 3/4, 64QAM (CC) 1/2, 64QAM (CC) 2/3, 64QAM (CC) 3/4, QPSK (CTC) 1/2, QPSK (CTC) 3/4, 16QAM (CTC) 1/2,16QAM (CTC) 3/4, 64QAM (CTC) 1/2, 64QAM (CTC) 2/3, 64QAM (CTC) 3/4, 64QAM (CTC) 5/6, QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
	Repetition Coding Indication	No repetition, 2, 4, 6
	Sub-Burst Duration	1 to 1023 (slot)
	Sub-Burst Data Type	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
	Sub-Burst Data Type Repeat Data	0x0000 to 0xFFFF
	Sub-Burst Data Type User File	Display only when Sub-Burst Data Type = User File
	MAC PDU Number	0 to 32
	CRC Error Insertion	Correct, Error
	Dedicated UL Control Indicator	0, 1
	SDMA Control Info bit	0, 1

Tree	Items	Setting Range
Sub-Burst (Cont'd)	Num SDMA layers	0 to 3
	Pilot Pattern	Pattern A, Pattern B, Pattern C, Pattern D
	ACID	0 to 15
	AI_SN	0, 1
	ACK disable	0, 1
Initial/ Handover Ranging Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	• When PUSC Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When PUSC (without SC rotation) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (6 × 1) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (3 × 2) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (2 × 3) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (1 × 6) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	3 to 126 symbol (when PUSC) 3 to 126 symbol (when PUSC (without SC rotation)) 1 to 127 symbol (when AMC (6 × 1)) 2 to 126 symbol (when AMC (3 × 2)) 3 to 126 symbol (when AMC (2 × 3)) 6 to 126 symbol (when AMC (1 × 6))
	No. Subchannels	6 to 126 (when PUSC, PUSC (without SC rotation)) 8 to 120 (without PUSC, PUSC (without SC rotation))
	Initial/Handover Ranging Symbols	2, 4
	Initial/Handover Ranging Burst Number	1 to 16
	Ranging Region Combination	Non, Combine
	BW Request/Periodic Ranging Offset	0 to No. OFDMA Symbols at Initial/Handover Ranging Region
	BW Request/Periodic Ranging Symbols	1, 3
	BW Request/Periodic Ranging Burst Number	0 to 16
Initial/ Handover Ranging Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	• When Initial/Handover Ranging Symbols = 2, 0 to 254 symbol setting resolution = 2 • When Initial/Handover Ranging Symbols = 4, 0 to 252 symbol
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	–10.00 to +10.00 dB
	Ranging Code Number	0 to 255
BW Request/ Periodic Ranging Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	• When PUSC Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When PUSC (without SC rotation) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (6 × 1) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (3 × 2) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (2 × 3) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol • When AMC (1 × 6) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	3 to 126 symbol (when (PUSC)) 3 to 126 symbol (when PUSC (without SC rotation)) 1 to 127 symbol (when AMC (6 × 1)) 2 to 126 symbol (when AMC (3 × 2)) 3 to 126 symbol (when AMC (2 × 3)) 6 to 126 symbol (when AMC (1 × 6))
	No. Subchannels	6 to 126 (when PUSC, PUSC (without SC rotation)) 8 to 120 (without PUSC, PUSC (without SC rotation))
	BW Request/Periodic Ranging Symbols	1, 3
	BW Request/Periodic Ranging Burst Number	1 to 16
BW Request/ Periodic Ranging Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 126 (when PUSC, PUSC (without SC rotation)) 0 to 120 (without PUSC, PUSC (without SC rotation))
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	–10.00 to +10.00 dB
	Ranging Code Number	0 to 255

Optional

Tree	Items	Setting Range
Fast-Feedback Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	OFDMA Symbol Offset at Zone to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	3 to 126
	No. Subchannels	1 to 127
	Fast-Feedback Type	Display only
	Fast-Feedback Burst Number	1 to 32
Fast-Feedback Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Ranging Power Offset	–10.00 to +10.00 dB
	Payload	000000 to 111111
UL-ACK Region	Data Status	Enable, Disable
	OFDMA Symbol Offset	(OFDMA Symbol Offset at Zone) to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	3 to 126 symbol
	No. Subchannels	1 to 127
	UL-ACK Burst Number	1 to 32
UL-ACK Burst	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255 symbol
	OFDMA Subchannel Offset	0 to 127
	No. OFDMA Symbols	Display only
	No. Subchannels	Display only
	Occupied half subchannel	even, odd
	UL-ACK Burst Power Offset	–10.00 to +10.00 dB
	Payload	ACK, NACK
Sounding Zone	Data Status	Enable, Disable
	OFDMA Symbol Offset	0 to 255 symbol
	No. OFDMA Symbols	1 to 8
	Sounding Type	Type A (Display only)
	Send Sounding Report Flag	0, 1
	Sounding Relevance Flag	0, 1
	Sounding Relevance	0, 1
	Include additional feedback	No additional feedback, Channel coefficients, Received pilot coefficients, Feedback message
	Shift Value	0 to 127
Sounding Symbol	Data Status	Enable, Disable
	Separability Type	All subcarriers, Decimated subcarriers
	Max. Cyclic Shift Index P	4, 8, 16, 32, 9, 18
	Decimated Value D	2, 4, 8, 16, 32, 64, 128, 5
	Decimated offset randomization	No randomization, Pseudo-randomly
	Sounding Symbol Index	1 to 8
	Number of CIDs	1 to 128
CID	Data Status	Enable, Disable
	Shorted Basic CID	0 to 4095
	Power Assignment Method	Equal power, Per subcarrier power limit, Total power limit
	Power Boost	No power boost, Power boost
	Multi-Antenna Flag	First antenna only, All antennas
	Allocation Mode	Normal, Band
	Start Frequency Band	• 0 to 95 when FFT Size = 2048 • 0 to 47 when FFT Size = 1024 • 0 to 23 when FFT Size = 512 • 0 to 5 when FFT Size = 128
	No. Frequency Bands	• 1 to 96 when FFT Size = 2048 • 1 to 48 when FFT Size = 1024 • 1 to 24 when FFT Size = 512 • 1 to 6 when FFT Size = 128
	Band Bitmap	• 0 to FFF when FFT Size = 2048, 1024, 512 • 0 to 7 when FFT Size = 128
	Sounding Relevance	0, 1
	Cyclic time shift index m	0 to (Max Cyclic Shift Index P-1 at Sounding Symbol that CID belongs to)
	Decimated Offset d	0 to (Decimated Value D-1 at Sounding Symbol that CID belongs to)
	Use same symbol for additional feedback	0, 1
	Periodicity	Single, 1, 2, 4

MX269908A LTE IQproducer

Optional

The MX269908A LTE IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the 3GPP LTE FDD specifications in the 3GPP TS36.211, TS36.212, and TS25.814 standards.
Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated LTE signals.

Generated Channels
- LTE Downlink
  - Reference Signal
  - Primary Synchronization Signal
  - Secondary Synchronization Signal
  - PBCH (P-BCH)
  - PCFICH
  - PDCCH (Downlink control channel information)
  - PDSCH (DL-SCH)

- LTE Uplink
  - Reference Signal
  - PUCCH (Uplink control channel information)
  - PUSCH (UL-SCH)

- Parameter Save/Recall

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

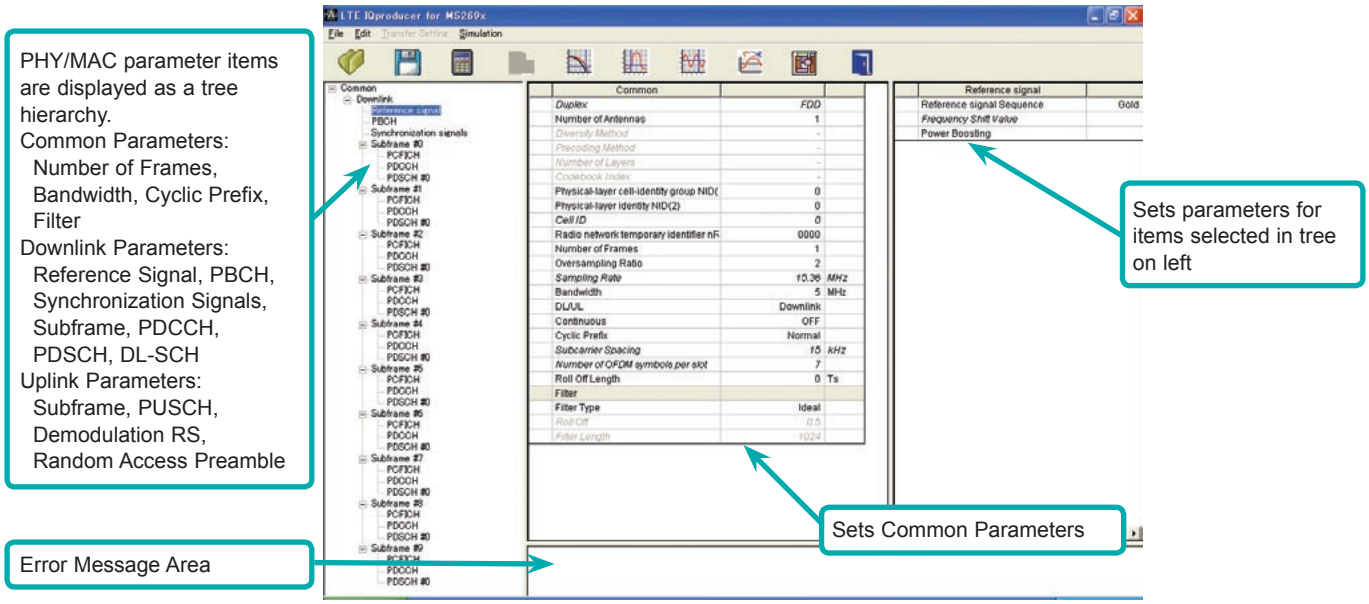
- Graphical Simulation Displays

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

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

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

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

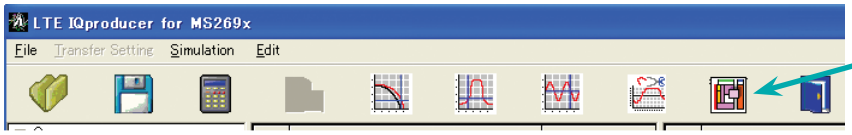


LTE IQproducer Main Screen

MX269908A LTE IQproducer

Optional

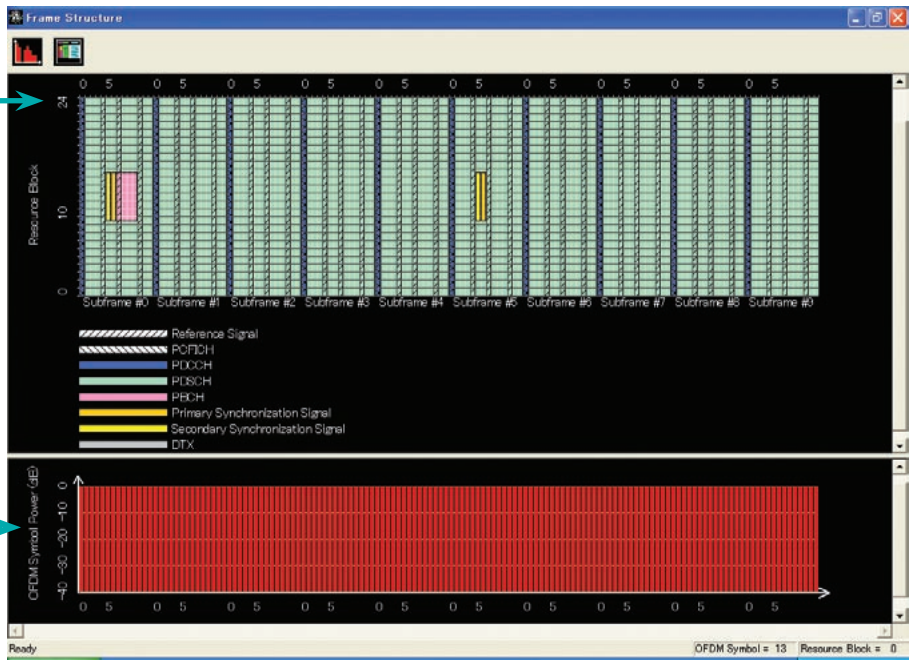
• Visual Check at Frame Structure Screen



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

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

• Common Parameter Setting Range

Display	Outline	Setting Range
Common		
Duplex	Displays duplex	Display only: FDD
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 word	1, 2
Codebook index	Sets codebook index	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
PHICH	Sets ON/OFF of PHICH	ON, OFF
Ng	Sets parameter (Ng) that decides the arrangement of PHICH	1/6, 1/2
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: Autosetting using oversampling ratio and bandwidth
Bandwidth	Sets system bandwidth	1.4, 1.6, 3.0, 3.2, 5, 10, 15, 20 MHz
DL/UL	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)
Filter Length	Set filter tap count in sample units	1 to 1024 (only enabled for Nyquist, Root Nyquist)

• PHY/MAC Parameter (Downlink) Setting Range

Display	Outline	Setting Range
Reference Signal		
Reference Signal Sequence	Sets data used as reference signal sequence	Gold Sequence, PN9, PN15, 16 bit repeat, User File
Reference Signal Sequence Repeat Data	Sets 16 bit repeat data installed in reference signal sequence	0000 to FFFF (only when reference signal sequence = 16 bit repeat)
Reference Signal Sequence User File	Sets user file installed in reference signal sequence	Select any file (only when random 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	PN9, PN15, 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	PN9, PN15, 16 bit repeat, User File
Data Type Repeat Data	Sets 16 bit repeat data installed in DCI	0000 to FFFF (only when Data Type = 16 bit repeat)
Data Type User File	Sets user file to install in BCH	Select any file.
Transport Block Size	Sets number of bits required for BCH	When Cyclic Prefix = Normal, Max. 1920 When Cyclic Prefix = Extended, Max. 1728
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, PN9, PN15, 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
Subframe#0 to #9		
Virtual Resource Block type	Display Virtual Resource Block	Localized
PHICH duration	Sets PHICH duration	Normal, Extended
Number of PHICH Groups	Sets PHICH Groups in one subframe	Display only
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 configuration	PDSCH#0 to Number of PDSCHs – 1
PCFICH		
Data Status	Enables/disables PCFICH parameter	Disable, Enable
Data Type	Sets data type	CFI codeword, PN9, PN15, 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	PN9, PN15, 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	PN9, PN15, 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
UE Identity	Sets UE identity	0000 to FFFF

Display	Outline	Setting Range
PDSCH		
Data Status	Enables/disables PDSCH 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	PN9, PN15, 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	PN9, PN15, 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
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

• PHY/MAC Parameter (Uplink) Setting Range

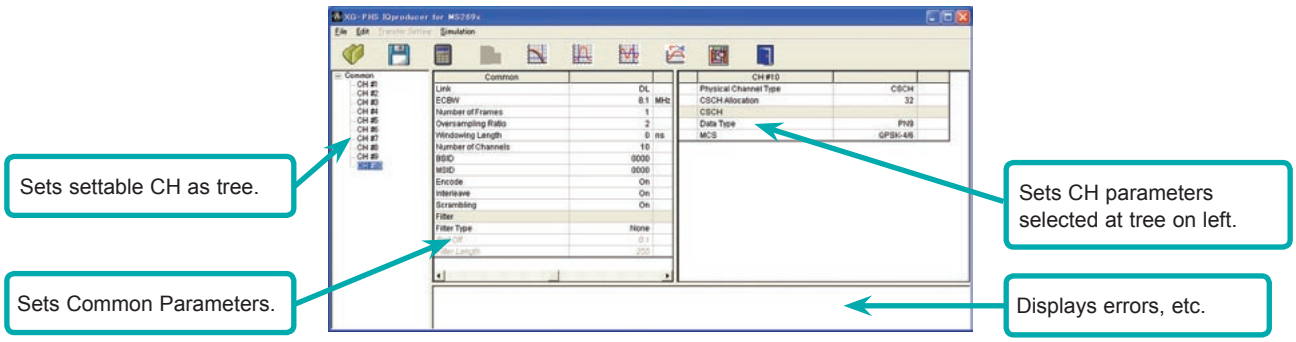
Display	Outline	Setting Range
Data Transmission/Random Access Preamble		
Data Transmission/Random Access Preamble	Sets data transmission and random access preamble	Data Transmission, Random Access Preamble
PUCCH shift	Sets PUCCH shift	1, 2, 3
PUCCH offset	Sets PUCCH offset	0, 1, 2
N	Set N	1 to 12
Subframe#0 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 Transmission)		
Data Status	Enables/disables PUCCH parameter	Disable, Enable
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	PN9, PN15, 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).
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0 fixed
Orthogonal Sequence Index	Sets orthogonal sequence index	0, 1, 2 (Displays only when PUCCH Format = 1, 1a, 1b)
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
Cyclic Shift		
n	Set n	0 to 35
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	PN9, PN15, 16bit 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).

Display	Outline	Setting Range
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
Orthogonal Sequence Index	Sets orthogonal sequence index	0, 1, 2
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0 Fixed
Cyclic Shift		
n	Displays n	0 to 35
PUSCH#0 to #7 (Data Transmission)		
Data Status	Enables/disables PUSCH parameter	Disable, Enable
nRNTI	Sets Radio network temporary identifier	0000 to FFFF
Modulation Scheme	Modulation system	QPSK, 16QAM, 64QAM
Data Type	Sets data type	PN9, PN15, 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).
Start Number of RB	Start position of RB	0 to 99
Number of RBs	Total number of RB	1 to 100
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
UL-SCH		
Transport Block Size	Sets transport block size of UL-SCH	Changes max. value of the setting range by number of Resource Blocks
Data Type	Sets mapping data type	PN9, PN15, 16 bit repeat, User File
Data Type Repeat Data	Sets 16bit 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 rebundancy version index	0, 1, 2, 3
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
Delta ss	Sets Delta ss	0 to 29
Base Sequence Group Number u	Sets base sequence group number	0 to 29
Base Sequence Number v	Displays base sequence group number	0, 1
Cyclic Shift		
n	Sets n for Cyclic Shift (α = 2*pi*n/12)	0 to 11
2*pi*n/12	Displays Cyclic Shift α	Display only
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

MX269909A XG-PHS IQproducer

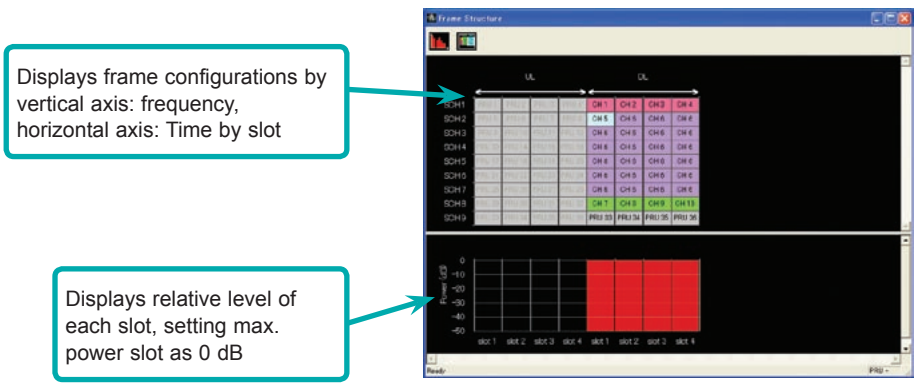
Optional MS269xA only

MX269909A XG-PHS IQproducer is a PC application for generating downlink and uplink waveform patterns for next-generation PHS (XGP: eXtended Global Platform).
The generated waveform patterns are output using the MS269xA-020 or MS2830A-020/021 Vector Signal Generator Option.



XG-PHS IQproducer Main Screen

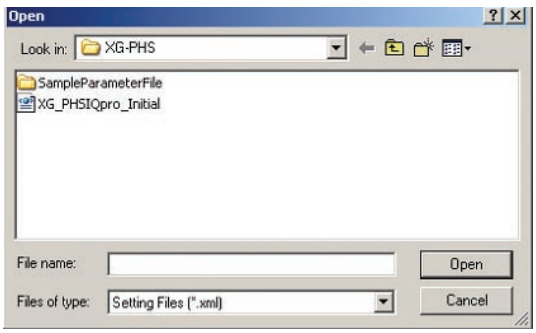
• Visual Check at Frame Structure Screen



Frame Structure Screen and Power Graph (Downlink Signal Generation)

• Parameter Save/Recall

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



• Graphical Simulation Displays

Checking, clipping and filtering of generated waveform patterns are performed by displaying CCDF, FFT and Time Domain graphs.

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

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

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

Clipping Function
Generated waveform patterns can be clipped and filtered.

• Common Parameter Setting Range

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

• Physical Channel Parameter (Downlink/Uplink) Setting Range

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

Optional

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

*1: UL only
*2: DL only

MX269910A LTE TDD IQproducer

Optional

The MX269910A LTE TDD IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the 3GPP LTE TDD specifications in the 3GPP TS36.211, TS36.212, TS36.213, and TS25.814 standards.
Once created, the waveform pattern file is downloaded to the MS269xA or MS2830A hard drive. Using the MS269xA-020 or MS2830A-020/021, Vector Signal Generator Option functionality, the files are loaded, selected, and output as a modulated LTE signals.

Generated Channels
- LTE Downlink
  - Reference Signal
  - Primary Synchronization Signal
  - Secondary Synchronization Signal
  - PBCH (P-BCH)
  - PDCCH (Downlink control channel information)
  - PDSCH (DL-SCH)

- LTE Uplink
  - Reference Signal
  - PUCCH (Uplink control channel information)
  - PUSCH (UL-SCH)

- Parameter Save/Recall

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

- Graphical Simulation Displays

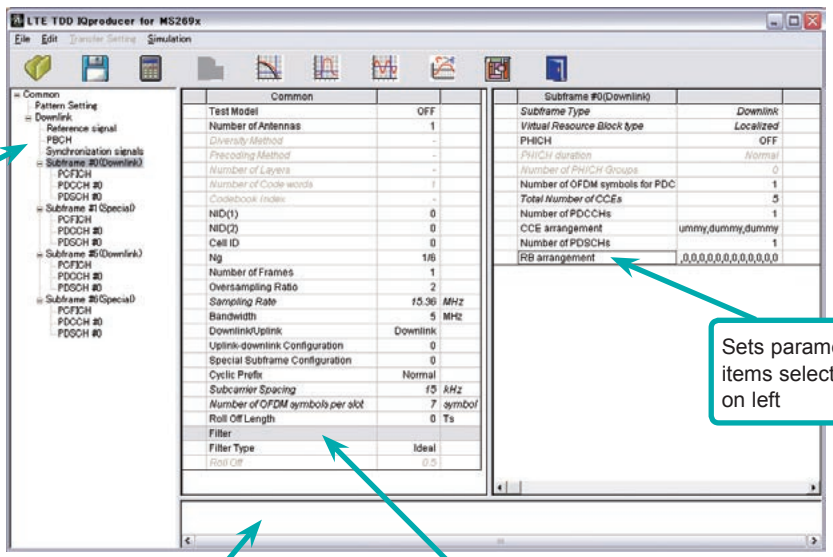
This function displays a generated waveform as a Complementary Cumulative Distribution Function (CCDF), Fast Fourier Transform (FFT) and Time Domain graph on the PC.
It is useful for checking or reviewing waveforms.

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

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

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

PHY/MAC parameter items are displayed as a tree hierarchy.
Common Parameters:
Test Model, Number of Antennas, Cell ID, Number of Frames, Band Width, Downlink/Uplink, Uplink-downlink Configuration, Cyclic Prefix, Filter
Downlink Parameters:
Reference Signal, PBCH, BCH, Synchronization signals, Subframe, PCFICH, PDCCH, DCI, PDSCH, DL-SCH, PHICH
Uplink Parameters:
Subframe, PUSCH, PUCCH, UCI, Demodulation RS, UL-SCH, Cyclic Shift

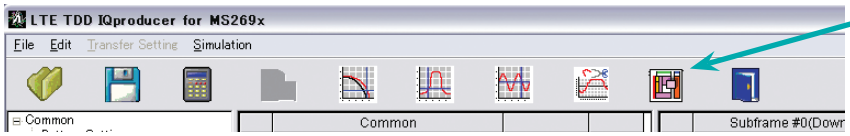


LTE TDD IQproducer Main Screen

MX269910A LTE TDD IQproducer

Optional

• Visual Check at Frame Structure Screen



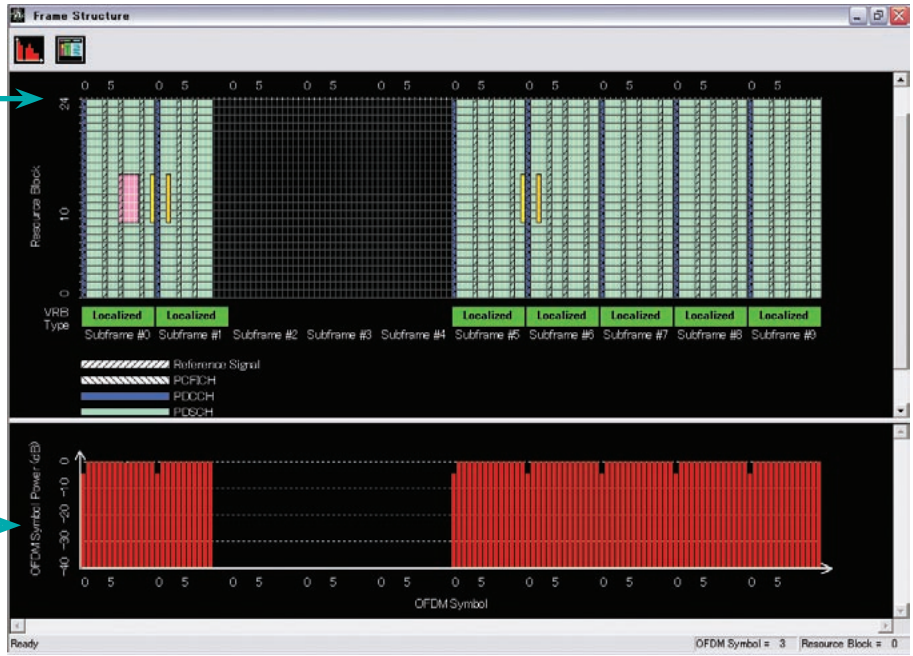
Displays Frame Structure screen for confirming channel allocation status and power of each OFDM Symbol

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)

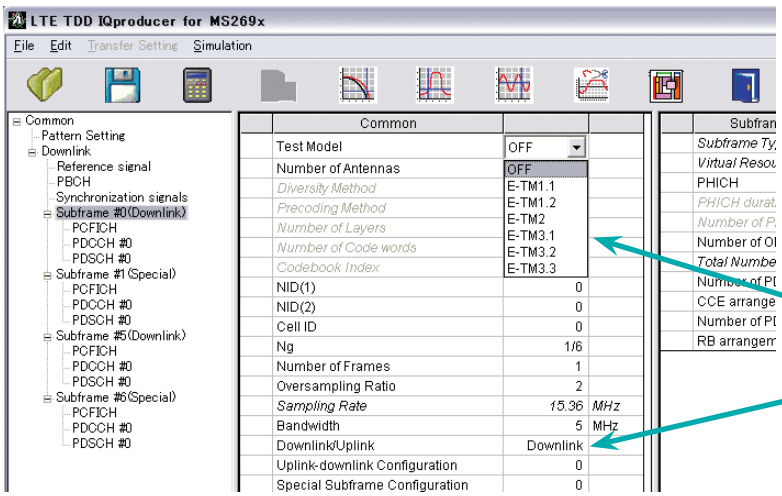
In the Full Scale display, one frame (Subframe #0 to 9) is displayed. The zoom can be done by selecting the area with the cursor. When the Full Scale button is pushed, one frame is displayed. Moreover, when the cursor is set in each channel, and "Properties" is selected by right-clicking, information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

• Easy Setup Items include for Test Model



The parameter of Test Model along the standard can be easily set only by selecting "Test Model" for Downlink. When the setting is "OFF", a detailed parameter can be arbitrarily set.

• Common Parameter Setting Range

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
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 identity NID (2)	0, 1, 2
Cell ID	Sets cell ID	0 to 503
Ng	Sets parameter (Ng) that decides the arrangement of PHICH	1/6, 1/2
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∗Oversampling Ratio [MHz] (When Bandwidth = 1.4 MHz) 3.84∗Oversampling Ratio [MHz] (When Bandwidth = 3 MHz) 7.68∗Oversampling Ratio [MHz] (When Bandwidth = 5 MHz) 15.36∗Oversampling Ratio [MHz] (When Bandwidth = 10 MHz) 15.36∗Oversampling Ratio [MHz] (When Bandwidth = 15 MHz) 30.72∗Oversampling 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 Symbol
Roll Off Length	Sets roll-off length for OFDM symbol	0 to 512 Ts
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)

• Pattern Setting Parameter Setting Range

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

Table 1

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

Table 2

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

Optional

• PHY/MAC Parameter (Downlink) Setting Range

Display	Outline	Setting Range
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
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 (When Cyclic Prefix = Normal), 0 to 1728 (When Cyclic Prefix = Extended)
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
PHICH	Sets ON/OFF of PHICH	ON, OFF (Subframe in Table 2 is turned off by setting UL/DL Configuration.)
PHICH duration	Sets PHICH duration	Normal, Extended
Number of PHICH Groups	Sets 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
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 system	QPSK, 16QAM, 64QAM
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		
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
Base Sequence Number v	Displays base sequence group number	0 fixed
Power Boosting	Sets power boosting	–20.000 to +20.000 dB
UCI		
Transport Block Size	Sets 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		
Group Hopping	Sets enable/disables	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	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).
Start Number of RB	Start position of RB	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)
Number of RBs	Total number of RB	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)
Power Boosting	Set power boosting	–20.000 to +20.000 dB
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
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 group number	0, 1
Cyclic Shift 1st slot		
n_cs	Sets ncs 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 ncs 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

Ordering Information

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

Model/Order No.	Name
	- Main frame -
MS2690A	Signal Analyzer (50 Hz to 6.0 GHz)
MS2691A	Signal Analyzer (50 Hz to 13.5 GHz)
MS2692A	Signal Analyzer (50 Hz to 26.5 GHz)
MS2830A-040	3.6 GHz Signal Analyzer (9 kHz to 3.6 GHz)
MS2830A-041	6 GHz Signal Analyzer (9 kHz to 6.0 GHz)
MS2830A-043	13.5 GHz Signal Analyzer (9 kHz to 13.5 GHz)
	- Vector Signal Generator option -
MS2690A-020	Vector Signal Generator (125 MHz to 6 GHz)
MS2691A-020	Vector Signal Generator (125 MHz to 6 GHz)
MS2692A-020	Vector Signal Generator (125 MHz to 6 GHz)
MS2830A-020	3.6 GHz Vector Signal Generator (250 kHz to 3 GHz)
MS2830A-021	6 GHz Vector Signal Generator (250 kHz to 6 GHz)
MS2830A-022	Low Power Extension for Vector Signal Generator
MS2830A-027	ARB Memory Upgrade 256 Msa for Vector Signal Generator
MS2830A-028	AWGN
	- Software options -
MX269901A	HSDPA/HSUPA IQproducer (CD-ROM, license and instruction manual)
MX269902A	TDMA IQproducer (CD-ROM, license and instruction manual)
MX269904A	Multi-Carrier IQproducer (CD-ROM, license and instruction manual)
MX269905A	Mobile WiMAX IQproducer (CD-ROM, license and instruction manual)
MX269908A	LTE IQproducer (CD-ROM, license and instruction manual)
MX269909A	XG-PHS IQproducer (CD-ROM, license and instruction manual) (MS269xA only)
MX269910A	LTE TDD IQproducer (CD-ROM, license and instruction manual)
	- Application parts -
W2915AE	MX269901A Operation Manual (Printed version)
W2916AE	MX269902A Operation Manual (Printed version)
W2917AE	MX269904A Operation Manual (Printed version)
W2918AE	MX269905A Operation Manual (Printed version)
W3023AE	MX269908A Operation Manual (Printed version)
W3153AE	MX269909A Operation Manual (Printed version) (MS269xA only)
W3221AE	MX269910A Operation Manual (Printed version)

Note

Anritsu

Specifications are subject to change without notice.

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