Product Introduction

# MX370105A
## Mobile WiMAX IQproducer™

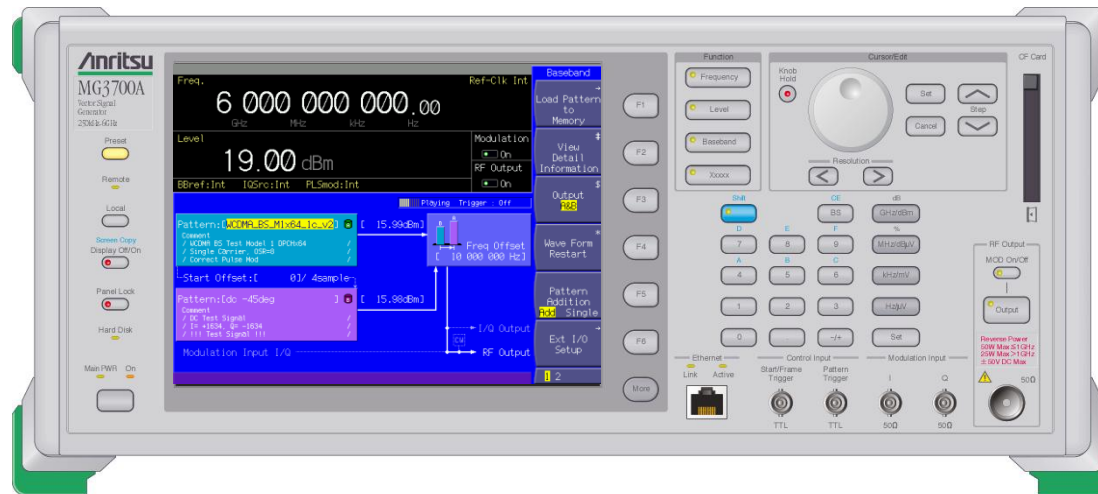## MG3700A
Vector Signal Generator

**/Inritsu**

**For MG3700A Vector Signal Generator**

# MX370105A
# Mobile WiMAX IQproducer™
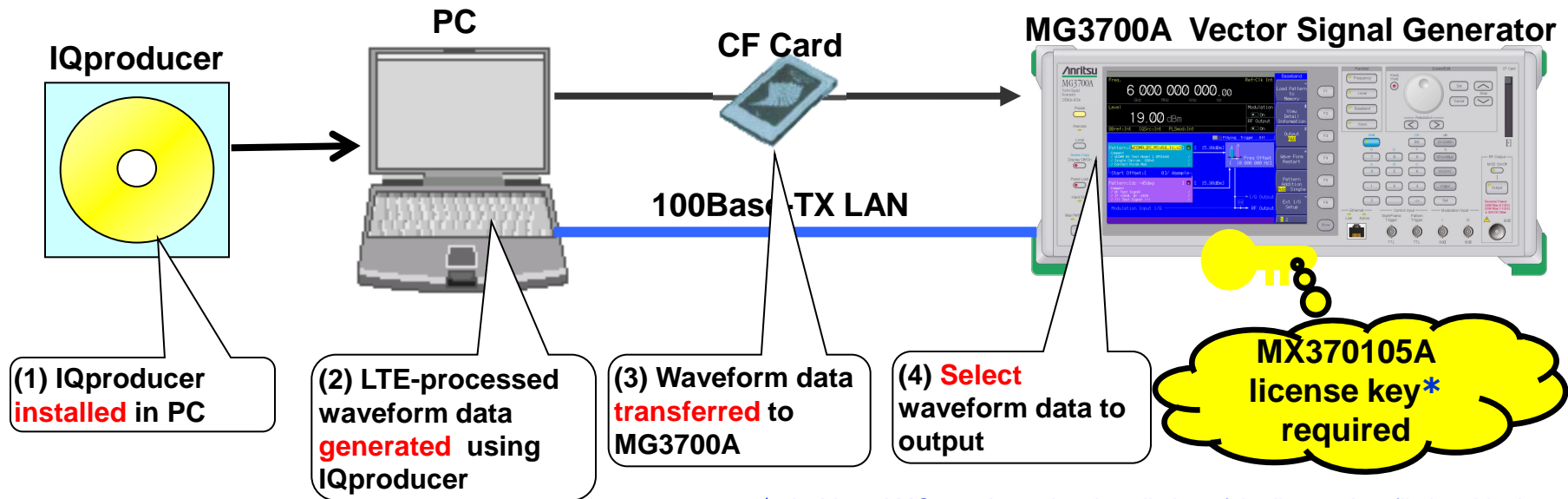# Product Introduction



**Version 6.00**

**Anritsu Corporation**

# What is Mobile WiMAX IQproducer?

The MX370105A Mobile WiMAX IQproducer™ is GUI-driven PC application software for setting parameters and generating waveform patterns in accordance with the IEEE 802.16e-2005 Wireless MAN-OFDMA MAC/PHY standards. The generated waveform patterns support IEEE802.16e 8.4.13 Receiver Requirement tests*.

*: Function tests (HO, etc.) that cannot be performed using a signal generator are excluded.

**PC**

**CF Card**

**MG3700A  Vector Signal Generator**

**IQproducer**

**100Base-TX LAN**

**(1) IQproducer installed in PC**

**(2) LTE-processed waveform data generated using IQproducer**

**(3) Waveform data transferred to MG3700A**

**(4) Select waveform data to output**

**MX370105A license key\* required**

*: A shipped MG3700A requires installation of the license key file but this does not require return to the Anritsu factory.

◆**Output Waveform patterns generated by using MX370105A => The main frame requires a license.**
**The IQproducer with unlicensed software will run on the PC to test waveform pattern generation but an unlicensed MG3700A cannot output signals because it does not recognize the waveform patterns.**
◆**Output waveform patterns generated by using EDA tool (C, MATLAB, Microwave Office, etc.) => Free license**

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# Mobile WiMAX IQproducer Features

- **Supports STC/MIMO (Matrix A/B)**
  - **Matrix A/B setting in burst units**
- **Supports Collaborative MIMO**
- **Supports multi-path generation**
  - **Number of paths and Delay, Gain and Phase for each path**
- **Easy Zone/Burst area setting at Segment Edit screen**
- **Versatile displays**
  - **CCDF display**
  - **Spectrum display**
  - **Time Domain display**
- **Easy and convenient Clipping and Filtering functions**

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# MG3700A Vector Signal Generator
# &
# MX370105A Mobile WiMAX IQproducer

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# IEEE802.16e Receiver Requirement Tests

**The IEEE802.16e measurement items in clause 8.4.13 are as follows:**

| Item | Measurement Item | Outline | Support | Advantage |
|------|------------------|---------|---------|-----------|
| 8.4.13.1.1 *1 | Receiver Sensitivity | - BER <10-6 <br> - AWGN Addition <br> - Repeated fixed pattern (SQPSK, S16QAM, S64QAM) defined for each modulation type used as payload data | Yes | - One MG3700A unit can generate wanted signal and AWGN <br> - BER can be measured for fixed data with BER option. |
| 8.4.13.1.2 *1 | MS Uplink transmit time tracking accuracy | - No BS closed-loop timing control <br> - Multi-path fading | Yes *2 | |
| 8.4.13.1.3 | MS Autonomous neighbor cell scanning | - FBSS (Fast BS Switching)/MS supported SHO | No *3 | |
| 8.4.13.2 *1 | Receiver adjacent and alternate channel rejection | - Reference sensitivity level +3 dB <br> - Adjacent channel*: 11/4 dB <br> - Non-adjacent channel*: 30/23 dB <br>     (*16QAM3/4/64QAM2/3) | Yes | One MG3700A unit can generate wanted signal and AWGN. |
| 8.4.13.3 *1 | Receiver max. input signal | -30 dBm | Yes | |
| 8.4.13.4 | Receiver max. signal tolerance | 0 dBm | Yes | |

*1: DUT must be in receive status (test mode)

*2: System-up required included DUT due to function tests

*3: Not supported for FBSS/SHO

**Features**

♦ **One MG3700A unit outputs both wanted and interference signals**

♦ **Supports BER Measurement using fixed pattern (SQPSK, S16QAM, S64QAM) for Rx sensitivity tests combined with high-speed BER measurement function option**
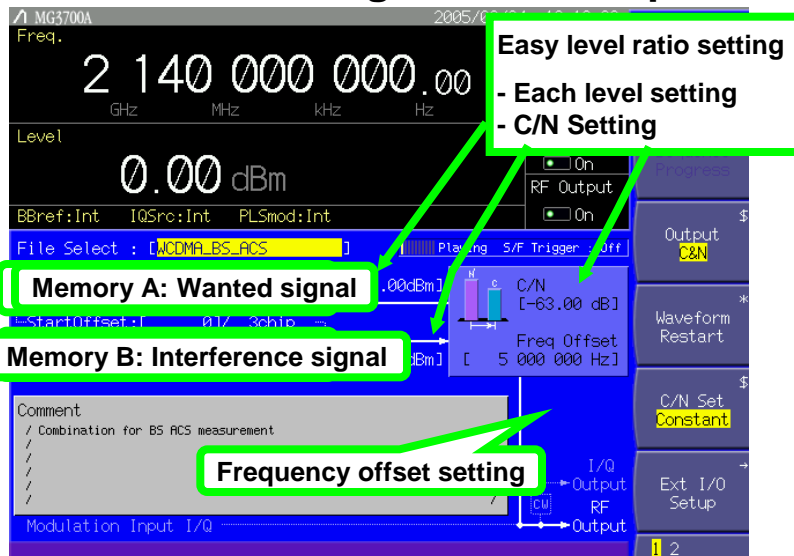
♦ **Supports STC/MIMO and Collaborative MIMO**

# [Feature 1] Wanted Signal + Interference Signal
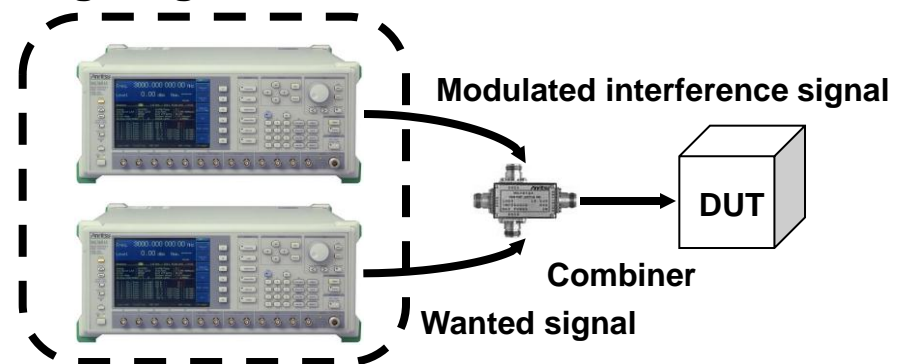
## Waveform combine function
### <Standard>

The MG3700A can output two signals from one unit by setting wanted and interference signals in each of two built-in arbitrary waveform memories.
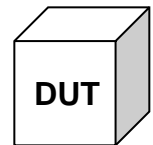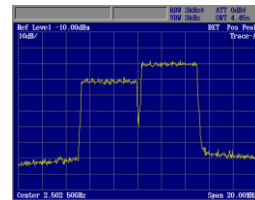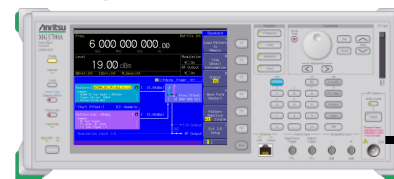
### MG3700A Setting Screen Sample



Easy level ratio setting
- Each level setting
- C/N Setting

Memory A: Wanted signal

Memory B: Interference signal

Frequency offset setting

♦ **Present system: Case with popular signal generator**



Modulated interference signal

DUT

Combiner

Wanted signal

♦ **MG3700A**

**MG3700A Vector Signal Generator**



**Wanted signal + Interference signal**

DUT

♦ **One MG3700A unit outputs two signals**
♦ **No external combiner**
♦ **Easy level adjustment**

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# [Feature 2] BER Measurement using Test Message (1/2)

**Create a waveform with a fixed pattern (test message) at the payload data for the Rx sensitivity test just by selecting a fixed pattern (SQPSK, S16QAM, S64QAM) at the MX370105A Mobile WiMAX IQproducer Data Type setting.**

## MX370105A Parameter Setting Screen

| DL-Burst #0 | | |
|---|---|---|
| OFDMA Symbol Offset | 3 | symbol |
| OFDMA Subchannel Offset | 0 | |
| Boosting | 0 | dB |
| No. OFDMA Symbols | 2 | symbol |
| No. Subchannels | 7 | |
| Repetition Coding Indication | No repetition | |
| FEC Code Type and Modulation Type | QPSK(CC)1/2 | |
| DL-Burst Data Type | 16 bit repeat ▼ | |
| DL-Burst Data Type Repeat Data | | hex |

16 bit repeat
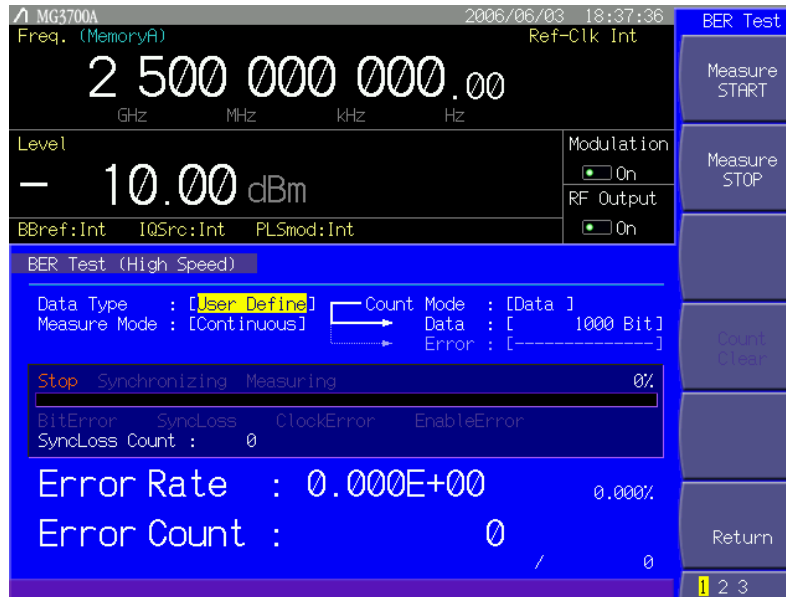PN9fix
PN15fix
S_QPSK
S_16QAM
S_64QAM
MAC PDU
User File

## Test Message

| $S_{QPSK}$ | 0xE4, 0xB1, 0xE1, 0xB4 |
|---|---|
| $S_{16QAM}$ | 0xA8, 0x20, 0xB9, 0x31, 0xEC, 0x64, 0xFD, 0x75 |
| $S_{64QAM}$ | 0xB6, 0x93, 0x49, 0xB2, 0x83, 0x08, 0x96, 0x11, 0x41, 0x92, 0x01, 0x00, 0xBA, 0xA3, 0x8A, 0x9A, 0x21, 0x82, 0xD7, 0x15, 0x51, 0xD3, 0x05, 0x10, 0xDB, 0x25, 0x92, 0xF7, 0x97, 0x59, 0xF3, 0x87, 0x18, 0xBE, 0xB3, 0xCB, 0x9E, 0x31, 0xC3, 0xDF, 0x35, 0xD3, 0xFB, 0xA7, 0x9A, 0xFF, 0xB7, 0xDB |

*0x means hexadecimal

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# [Feature 2] BER Measurement using Test Message (2/2)

**IEEE802.16e Rx sensitivity tests with fixed pattern can be performed using the MG3700A-031 High-Speed BER Measurement option.**

## MG3700A BER Measurement Screen



## MG3700A BER Setting Screen



User-defined pattern display

User-defined pattern information display

Synchronization establishment judgment position specification

Measurement using fixed patterns is performed by selecting User Define in Data Type. The BER measurement function parameters are set at the screen shown on the right.

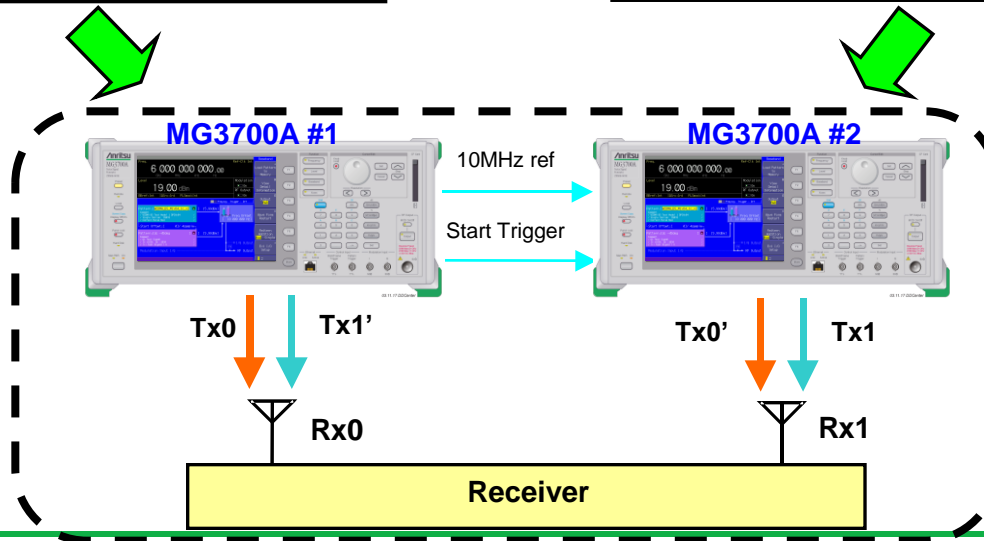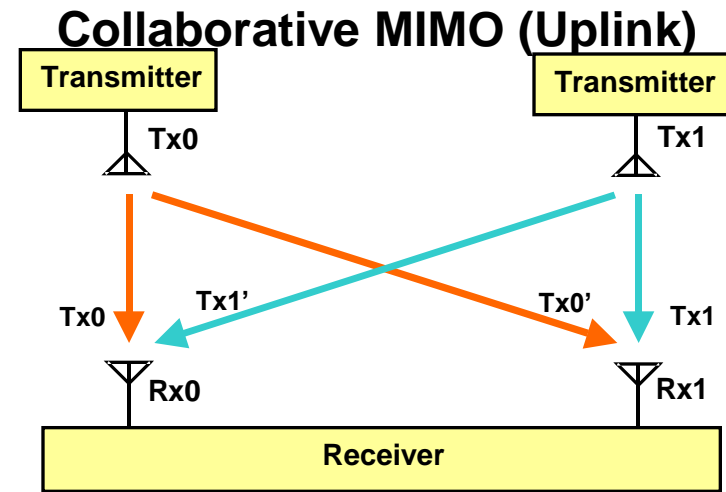♦ **IEEE802.16e compliant BER Tests compliant tests**
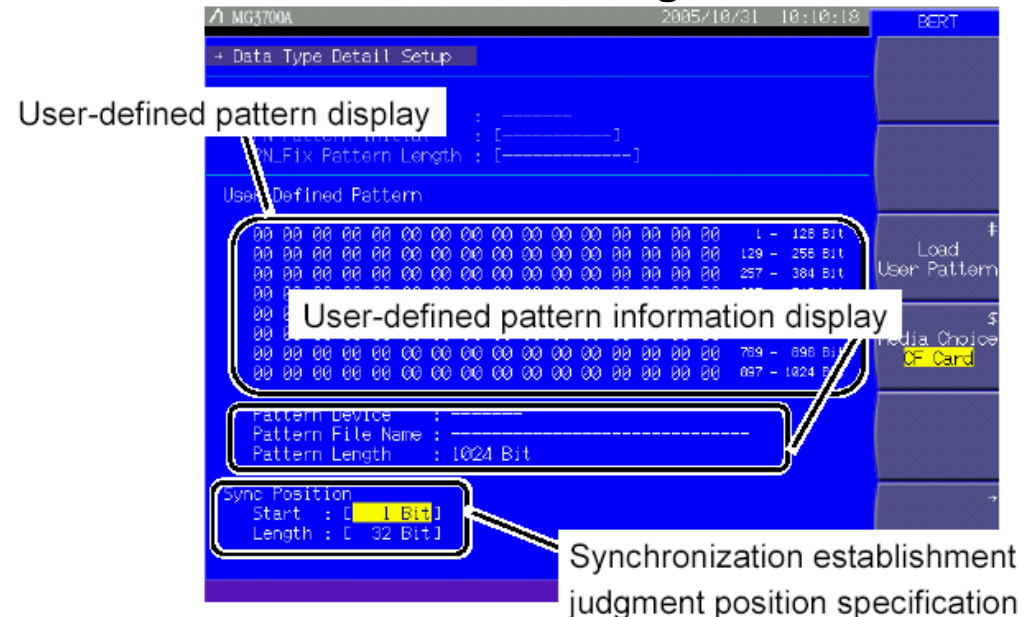
When F3: Load User Pattern is clicked, the pattern file is read from the CF card or main-frame hard disk. The pattern file format is described below:

- The file extension is .bpn.
- The file must be a binary text file.
- The number of characters (excluding LF) is 8 to 1024.

# [Feature 3] STC/MIMO, Collaborative MIMO Reception Measurement

Rx tests such as STC/MIMO and Collaborative MIMO can be performed by combining two MG3700A units.

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# Mobile WiMAX IQproducer Image
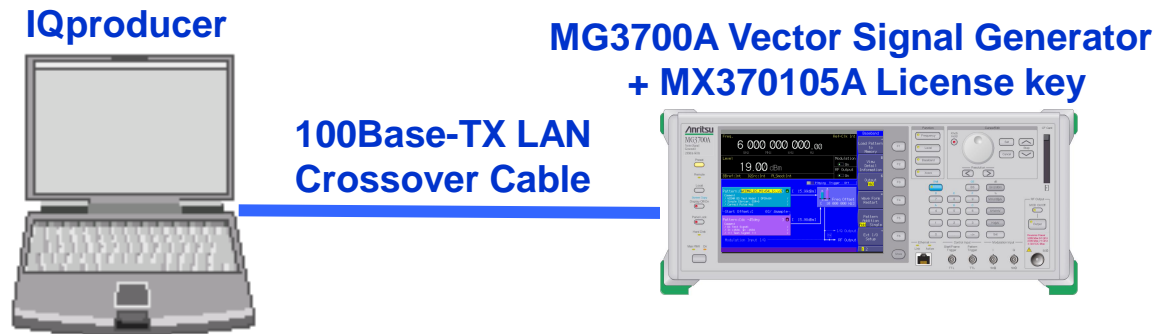
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# Setup

**(1) Install IQproducer in the PC.**

**(2) Install the MX370105A license key in the MG3700A.**

**(3) Connect the PC and MG3700A using a crossover cable.**



**IQproducer**

**MG3700A Vector Signal Generator
+ MX370105A License key**

**100Base-TX LAN
Crossover Cable**

**Mobile WiMAX IQproducer Operating Environment**

| CPU | Pentium III 1 GHz or faster |
|---|---|
| Memory | >512 MB |
| HDD | At installing: >5 GB<br>At generation of max. capacity waveform pattern (512 Msample × 2): >14 GB |
| Display | 1024 x 768 pixels min. |
| OS | Windows2000 Professional, Windows XP |

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

*Read the appended [LAN Connection] for the LAN connection method between the PC and MG3700A.
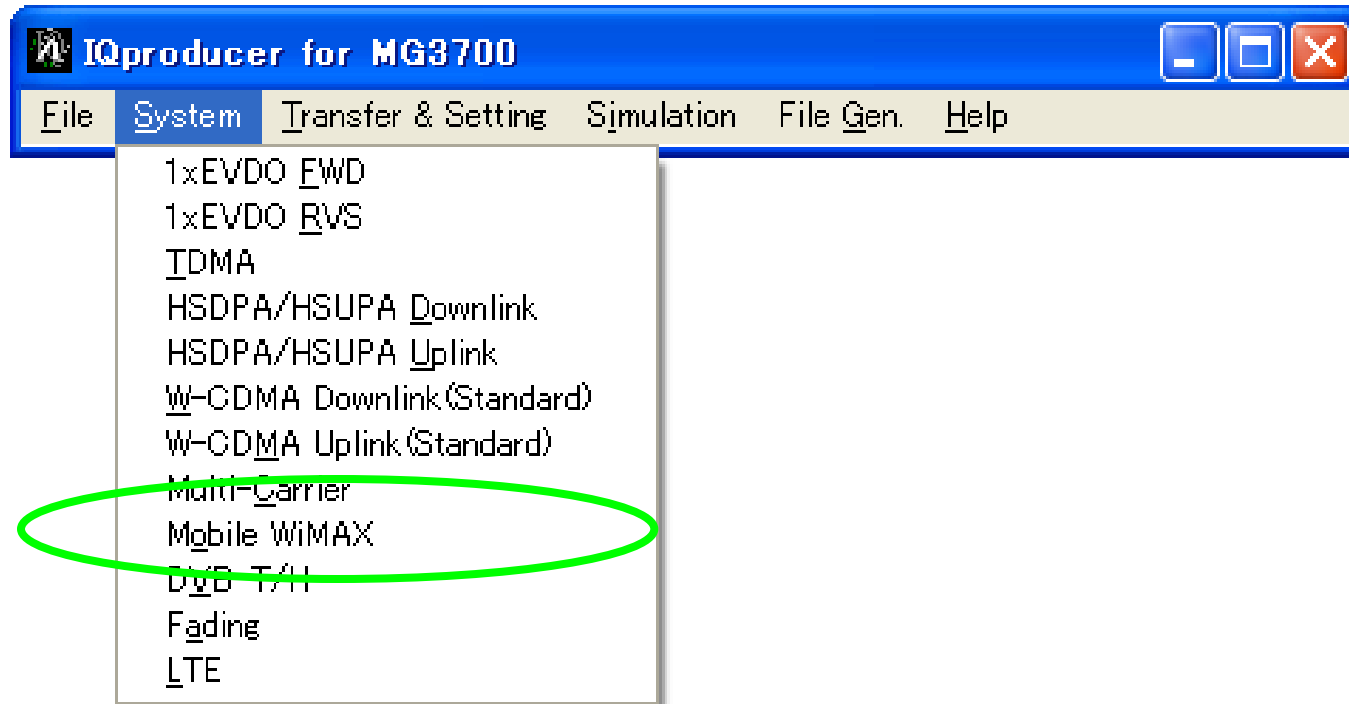
MX370105A-E-L-1

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# Starting IQproducer

Start IQproducer.
Start > Programs> Anritsu Corporation > IQproducer for MG3700A

# IQproducer Main Screen

When IQproducer starts, the following screen is displayed.
Choose Mobile WiMAX from the [System] pull-down menu.

# Editing Parameters: Main Screen

**When Mobile WiMAX is selected at [System], the following Main screen is displayed.**



**Shortcut to Segment Edit Screen:** This is for Easy MAP checking and editing using GUI.

**Tree view:** This tree displays PHY/MAC parameters.

**PHY/MAC Parameter Lists:** Details of Parameters for items selected at the Tree View or Segment Edit screen are set here.

**Error Display:** Setting errors, etc., are displayed here.

**Common Parameter List:** Common parameters are displayed here for setting parameters, such as PHY layers and filters.

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# Editing Parameters: Setting STC/MIMO Functions

**STC/MIMO (Matrix A/B) can be set at each Downlink signal Zone or Burst by setting Number of Tx Antennas to 2 at Common Parameter Setting.**

**Common Parameter Setting**

| Common | | |
|---|---|---|
| Number of Tx Antennas | 1 ▼ | |
| Number of Frames | 1 | |
| Initial Frame Number | 2 | hex |
| FFT size | 1024 | |
| G | 1/8 | |
| Oversampling Ratio | 2 | |
| Band Width | 10.00 | MHz |

*STC (Space Time Coding): Tx diversity technology for stabilizing communications in fading environment

**Zone Setting**

| Zone #1 | | |
|---|---|---|
| Data Status | Enable | |
| Permutation | PUSC | |
| Pilot Position | Hopping | |
| Dedicated Pilot | 0 | |
| Pilot Boosting | OFF | |
| STC/MIMO | 2 antenna matrixB vertical encoding ▼ | |
| OFDMA Symbol Offset | No transmit diversity | symbol |
| No. OFDMA Symbols | 2 antenna matrixA(STTD) | symbol |
| DL-PermBase | 2 antenna matrixB vertical encoding | |
| DL-Burst Number | 2 | |
| PRBS_ID | 0 | |

**Burst Setting**

| DL-Burst #0 | | |
|---|---|---|
| Data Status | Enable | |
| OFDMA Symbol Offset | 5 | symbol |
| OFDMA Subchannel Offset | 0 | |
| Boosting | 0 | dB |
| No. OFDMA Symbols | 10 | symbol |
| No. Subchannels | 7 | |
| Repetition Coding Indication | No repetition | |
| FEC Code Type and Modulation Type | QPSK(CTC)1/2 | |
| Inclusion MAP | Normal | |
| DL-Burst Data Type | 16 bit repeat | |
| DL-Burst Data Type Repeat Data | FFFF | hex |
| Matrix Indicator | matrix B ▼ | |
| | matrix A | |
| | matrix B | |

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# Editing Parameters: Collaborative MIMO Function

**Uplink signals supporting Collaborative MIMO can be generated by editing Pilot Pattern (A/B) for UL-Burst.**

## Pilot Pattern for Pattern A
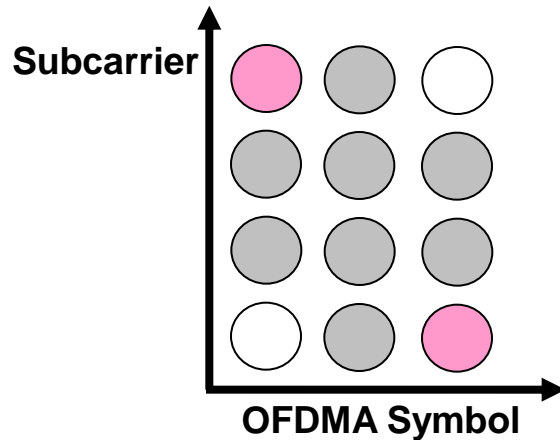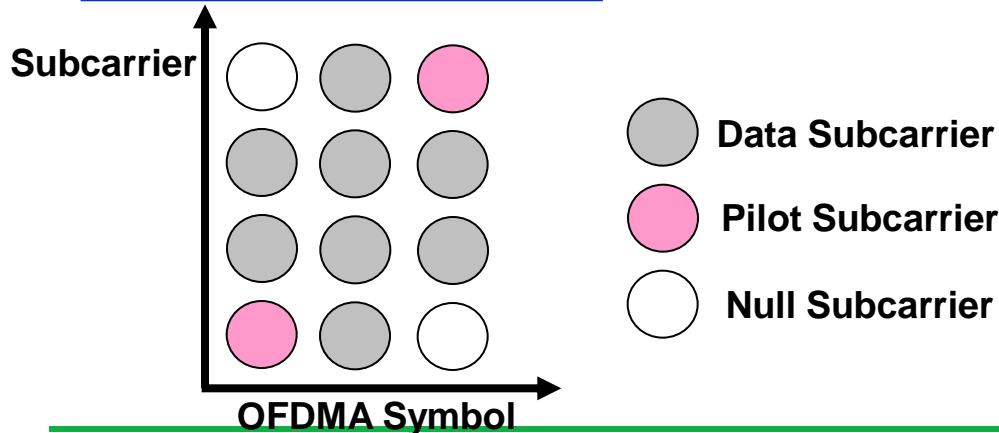


## UL-Burst Setting

| UL-Burst#0 | | |
|---|---|---|
| Data Status | Enable | |
| OFDMA Symbol Offset | 3 | symbol |
| OFDMA Subchannel Offset | 0 | |
| UL-Burst Duration | 3 | symbol |
| | 1 | slot |
| Burst Power Offset | 0.00 | dB |
| Pilot Pattern | Normal | |
| Repetition Coding Indication | Normal | |
| FEC Code Type and Modulation Type | Pattern A | |
| Inclusion MAP | Pattern B | |
| UL-Burst Data Type | PN9fix | |

## Pilot Pattern for Pattern B



⬤ Data Subcarrier

🔴 Pilot Subcarrier

⚪ Null Subcarrier

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# Editing Parameters: Multi-path Function Setting

Up to 20 multi-path signals can be generated with any Delay, Gain and Phase at the Multi-Path Setting Screen.

## Generating up to 20 multi-path multiplex signals



Tx Antenna 0
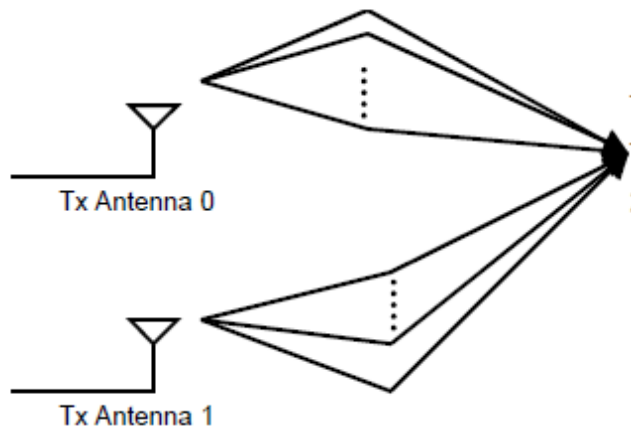
Tx Antenna 1

### Multi-Path Setting

| Segment | | | |
|---|---|---|---|
| Multi-Path Setting | | | |
| | Data Status | Enable | |
| **Tx Antenna 0** | | | |
| | Multi-Path Number | 3 | |
| | Delay (ns) | Gain (dB) | Phase (deg) |
| Path1 | 0.0 | 0.0 | 0.0 |
| Path2 | 0.0 | 0.0 | 0.0 |
| Path3 | 0.0 | 0.0 | 0.0 |
| **Tx Antenna 1** | | | |
| | Multi-Path Number | 20 | |
| | Delay (ns) | Gain (dB) | Phase (deg) |
| Path1 | 0.0 | 0.0 | 0.0 |
| Path2 | 0.0 | 0.0 | 0.0 |
| Path3 | 0.0 | 0.0 | |
| Path4 | 0.0 | | |
| Path5 | 0.0 | | |
| Path6 | 0.0 | | |
| Path7 | 0.0 | | |
| Path8 | 0.0 | 0.0 | 0.0 |
| Path9 | 0.0 | 0.0 | 0.0 |
| Path10 | 0.0 | 0.0 | 0.0 |
| Path11 | 0.0 | 0.0 | 0.0 |
| Path12 | 0.0 | 0.0 | 0.0 |
| Path13 | 0.0 | 0.0 | 0.0 |
| Path14 | 0.0 | 0.0 | 0.0 |
| Path15 | 0.0 | 0.0 | 0.0 |
| Path16 | 0.0 | 0.0 | 0.0 |
| Path17 | 0.0 | 0.0 | 0.0 |
| Path18 | 0.0 | 0.0 | 0.0 |
| Path19 | 0.0 | 0.0 | 0.0 |
| Path20 | 0.0 | 0.0 | 0.0 |

**Set Delay, Gain and Phase for each Tx Antenna 0 and 1**

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# Editing Parameters: Permutation Setting

**The following Permutation can be set at the Zone Setting Screen.**

**Segment Edit Screen**

**Downlink:**
- **PUSC**
- **PUSC (all SC)**
- **FUSC**
- AMC (6x1)
- AMC (3x2)
- **AMC (2x3)**
- AMC (1x6)

**Uplink:**
- **PUSC**
- **PUSC (w/o SC rotation)**
- AMC (6x1)
- AMC (3x2)
- **AMC (2x3)**
- AMC (1x6)



**Uplink Zone AMC(2x3)**

**Downlink Zone AMC(2x3)**

**Blue parts: Permutation required by system profile**

# Editing Parameters: Region Addition Setting

**Region such as Ranging, and Fast-Feedback can be added by setting the Uplink Zone parameter.**

Segment Edit Screen
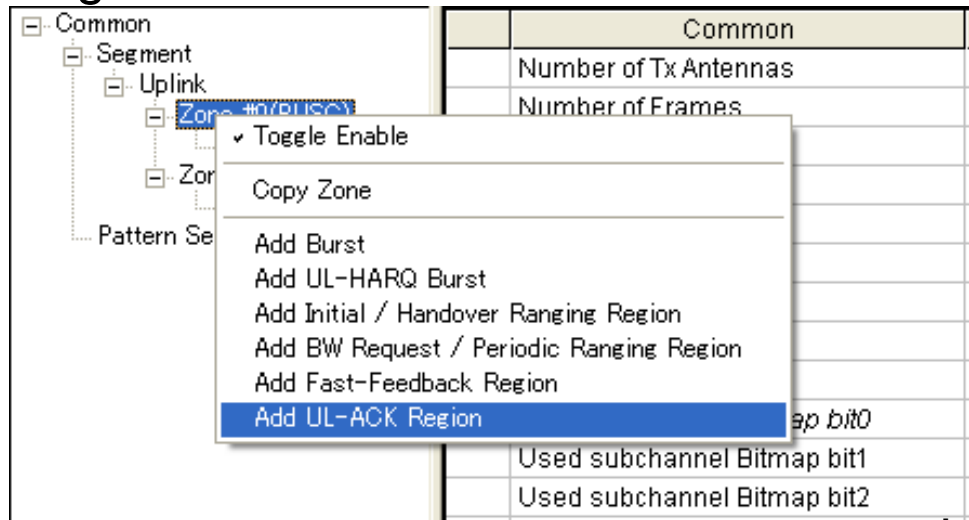


Segment Edit Screen
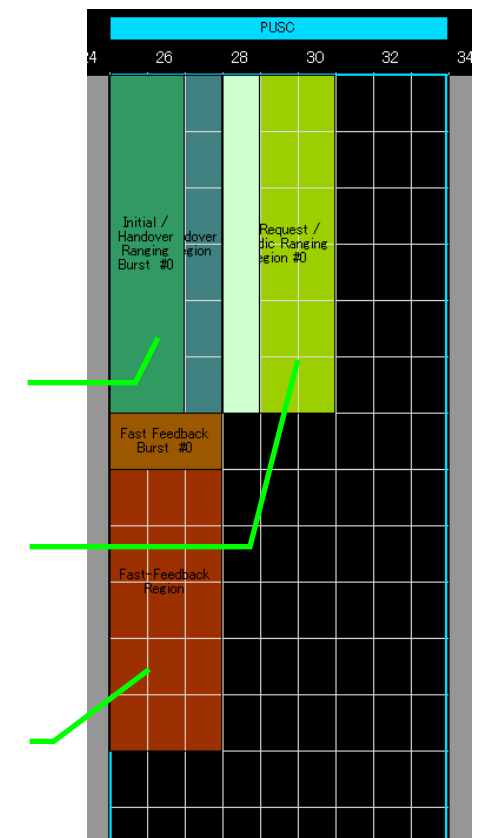
Initial/Handover
Ranging Region, Burst

BW Request/Periodic
Ranging Region, Burst

Fast-Feedback
Region, Burst

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# Editing Parameters: Easy Setup Function

**The Easy Setup function easily sets the number of Downlink/Uplink symbols provided by System Profile. The Uplink starting position can be set by automatic operation using this function.**

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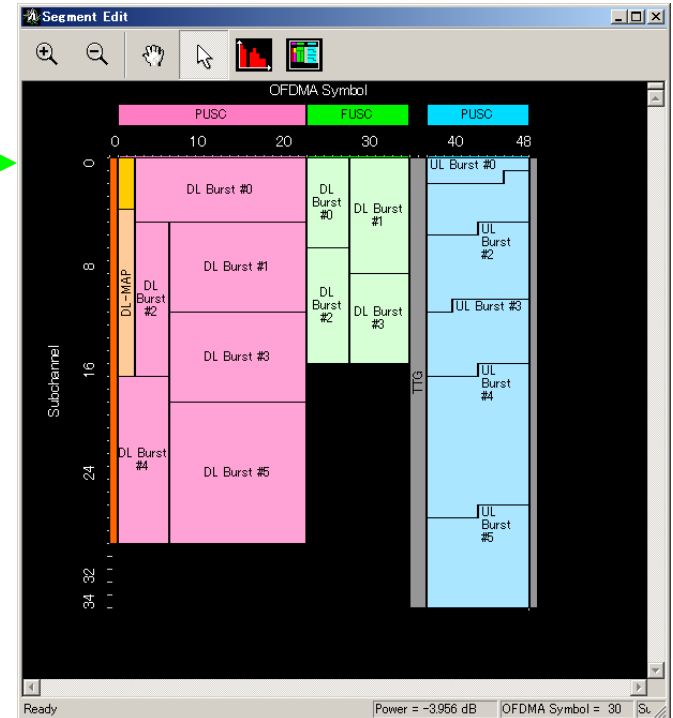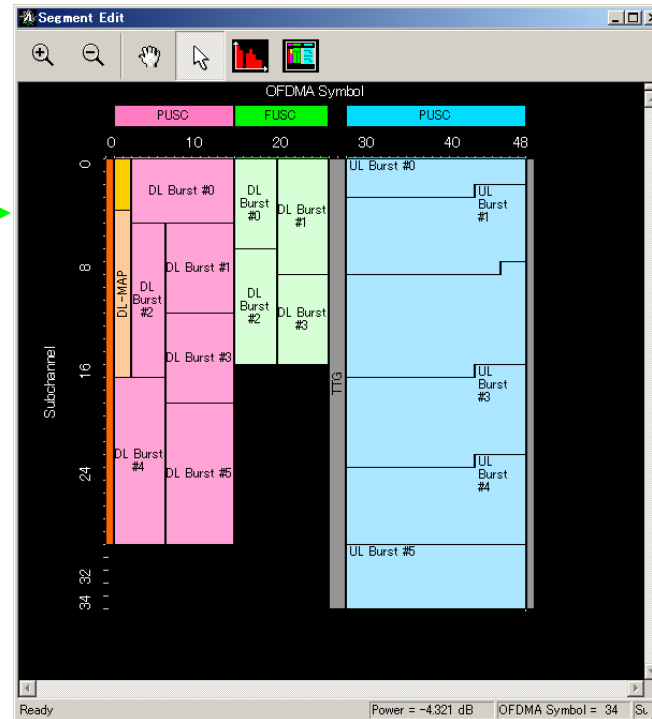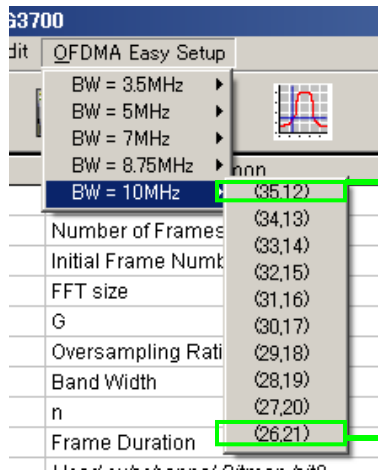
# Editing Parameters: Segment Edit Screen (1/4)

**<Excellent Operability 1>**

➢**Zone, Burst, etc., can be edited easily using the mouse cursor.**

**Segment Edit Screen**
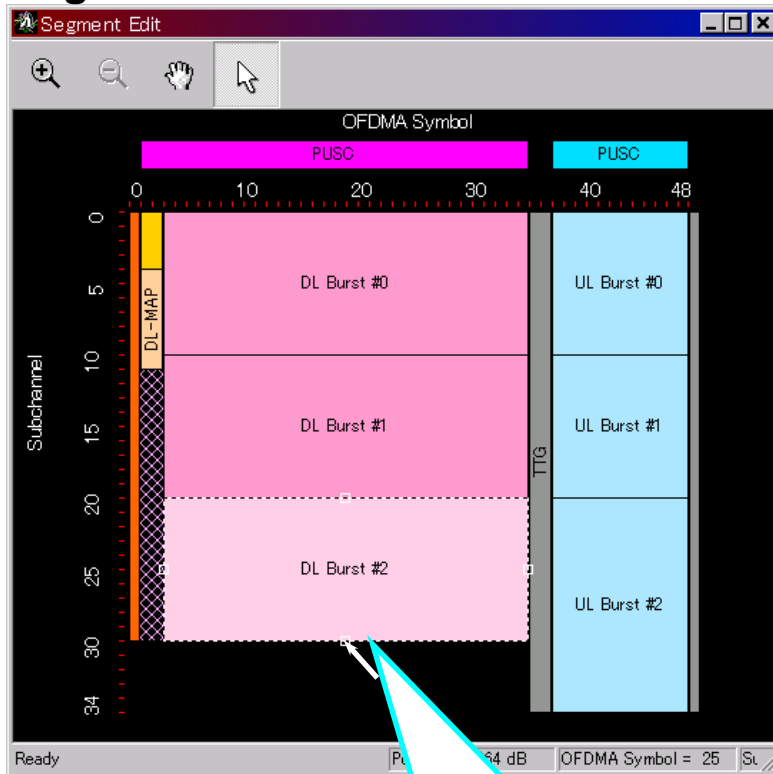


**Click with mouse.**

**Segment Edit Screen**
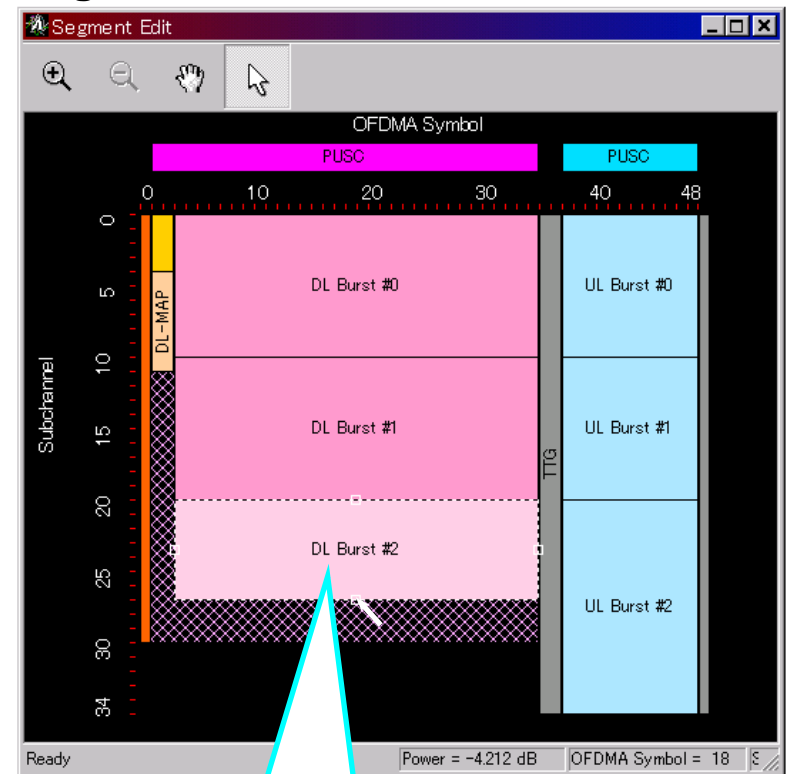


**Magnified/Reduced**

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# Editing Parameters: Segment Edit Screen (2/4)

<Excellent Operability 2>
The editing result is reflected in the Main screen parameters.

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# Editing Parameters: Segment Edit Screen (3/4)

## <Excellent Operability 3>

➢ **Parameters for the clicked area are displayed on the Main screen.**



**Click with mouse.**

**Parameters for selected item displayed on Main screen**

# Editing Parameters: Segment Edit Screen (4/4)

## <Excellent Operability 4>

➤ A Help pop-up screen about the area opens when pointed to using the mouse cursor.

**Segment Edit Screen**
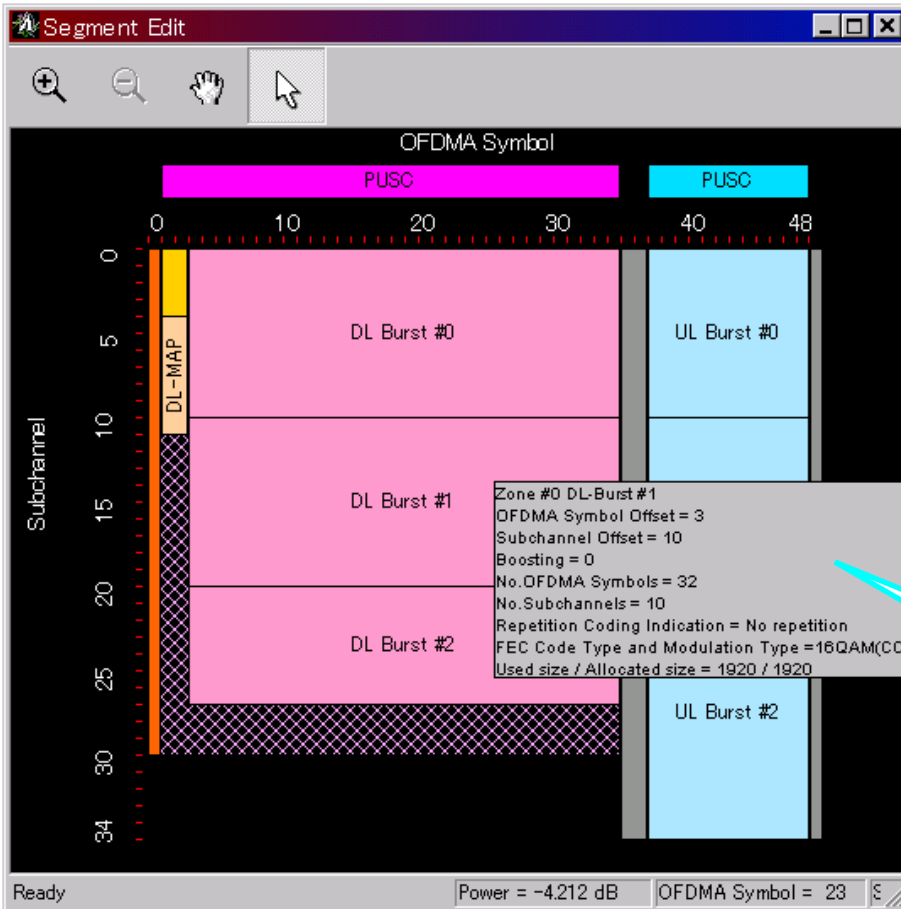


### How to display Help Pop-up

(1) Move the mouse cursor over the required position on the screen for a moment.

(2) Right-click the mouse, and select [Property] at the pop-up.
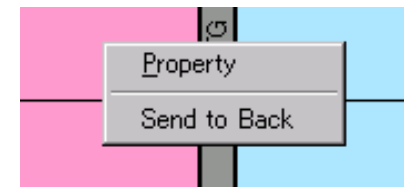
**Help Pop-up**

# Generating Waveform: Calculation

**Waveform patterns are generated by clicking the [Calculation] icon.**
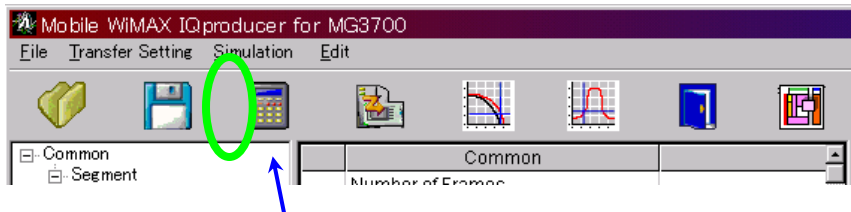


Calculation: Creates waveform pattern
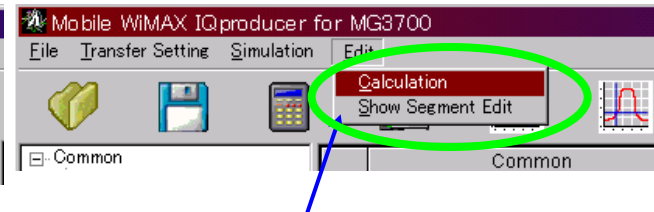
Calculation: Creates waveform pattern
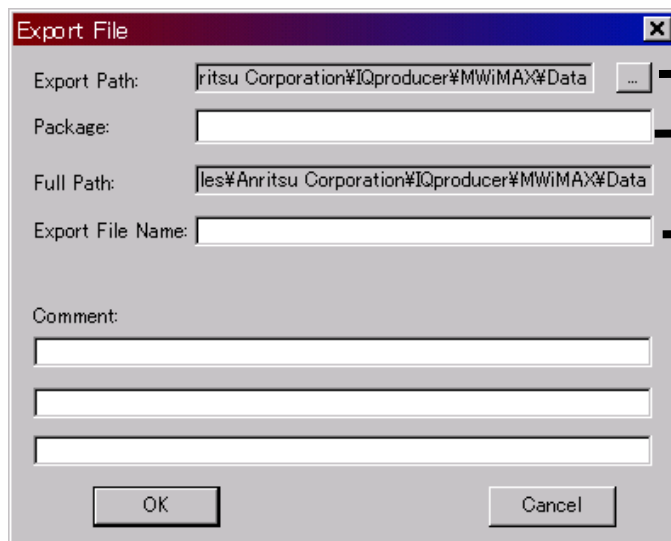


Specify output destination folder for waveform patterns.

Name of waveform pattern package: 31 characters max.

File name of waveform pattern: 20 characters max.

Comment on MG3700A screen: 38 characters max. per line

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

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# Transferring Waveform Pattern (1/2)

Connect the MG3700A and PC via a LAN.
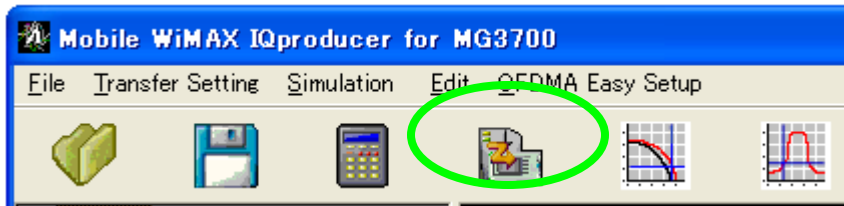


Transfer & Setting: Transfers waveform pattern



Transfer & Setting: Transfers waveform pattern
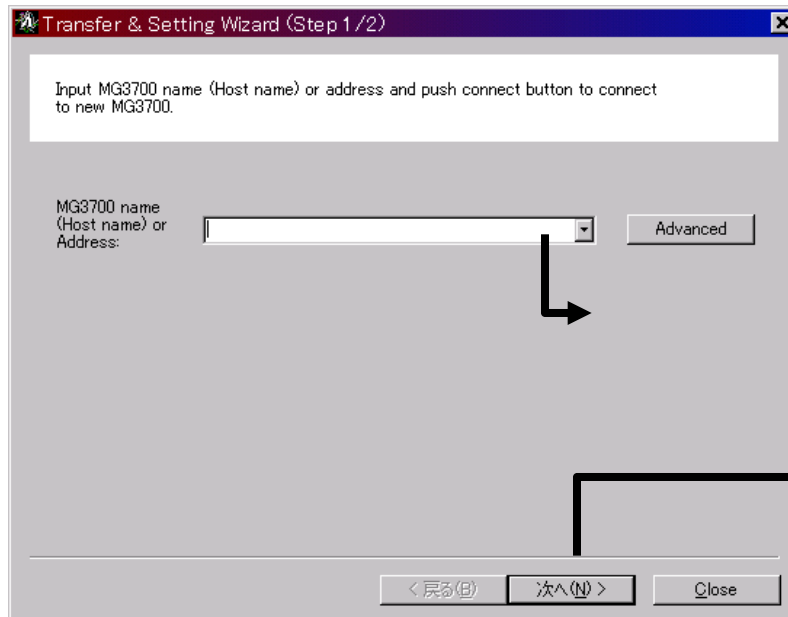


Input Host name or IP Address of MG3700A main frame.

Connect to LAN.

*Read the appended [LAN Connection] for the LAN connection method.

# Transferring Waveform Pattern (2/2)
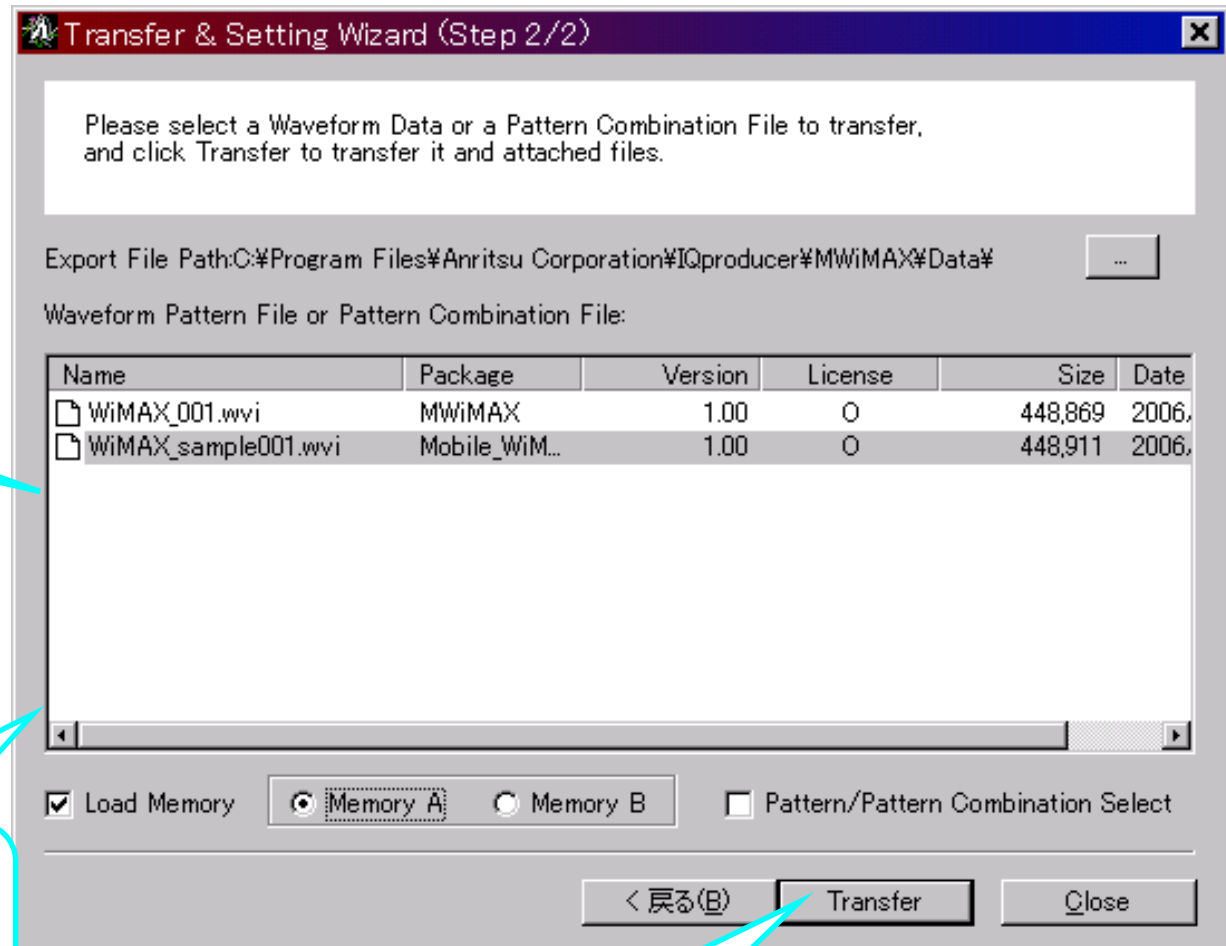
**Select waveform patterns saved on MG3700A hard disk.**

**Load waveform pattern into memory at same time as transfer.**

**Start transfer.**

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# Waveform Display Function: CCDF, FFT, Time Domain

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

**Easy comparison of generated waveform-pattern characteristics by simultaneous display of multiple patterns!**
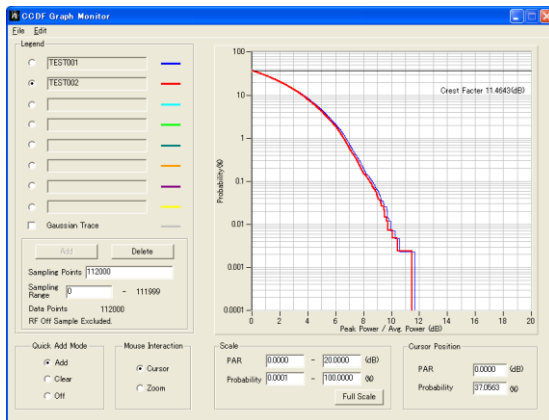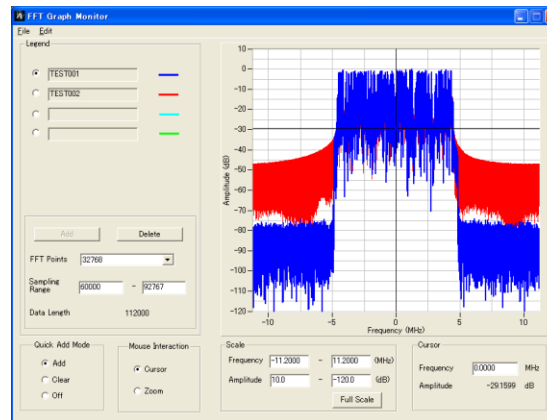
**CCDF**   **FFT**   **Time Domain**
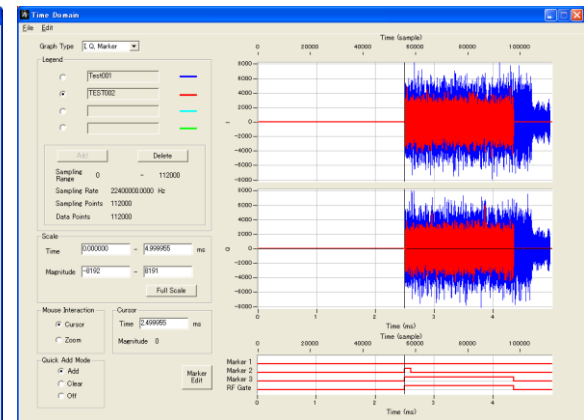
# Waveform Editing Function: Clipping & Filtering

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

## Easy Clipping and Filtering
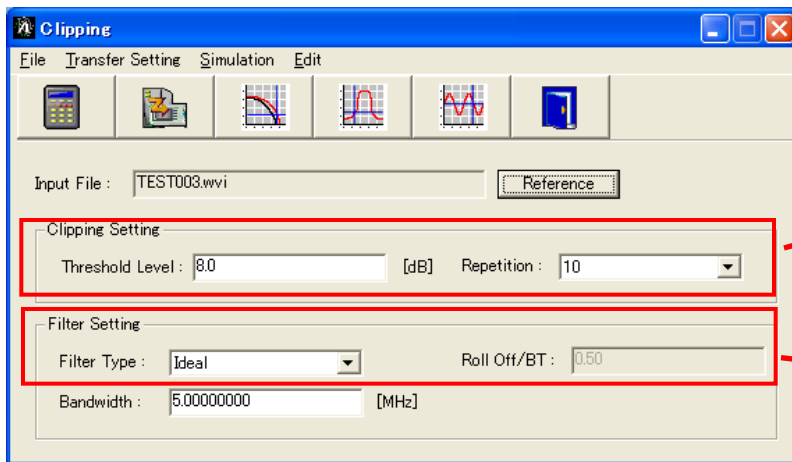


**Clipping**

**Filtering**
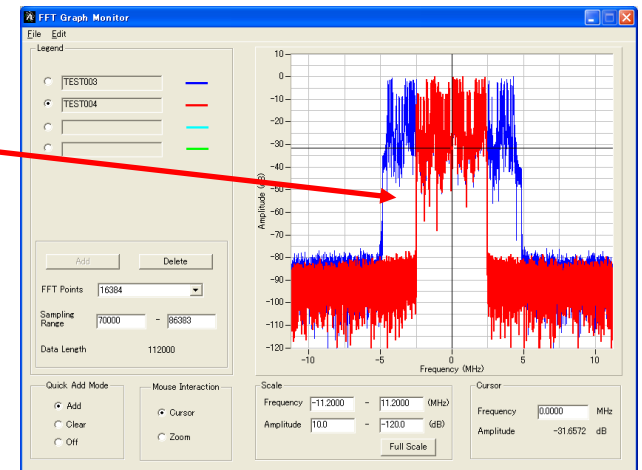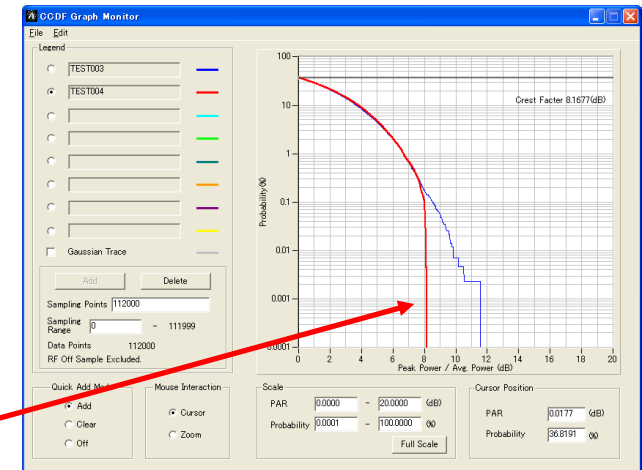
# Other: Saving/Recalling Parameters

**Values and settings for each item can be saved as a parameter file for recall.**



File Recall →

File Save →

File Recall
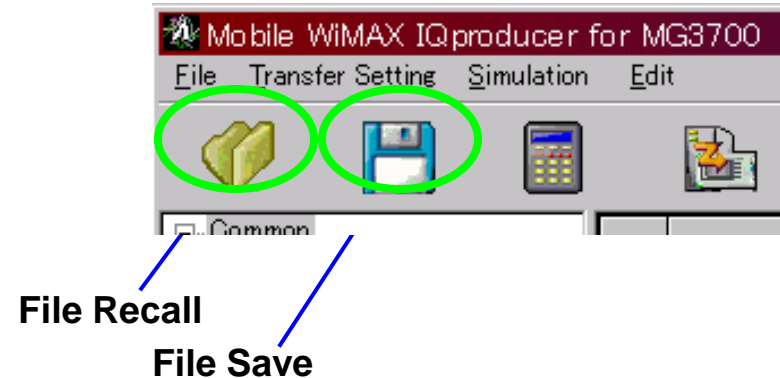
File Save

**File Saving Screen**
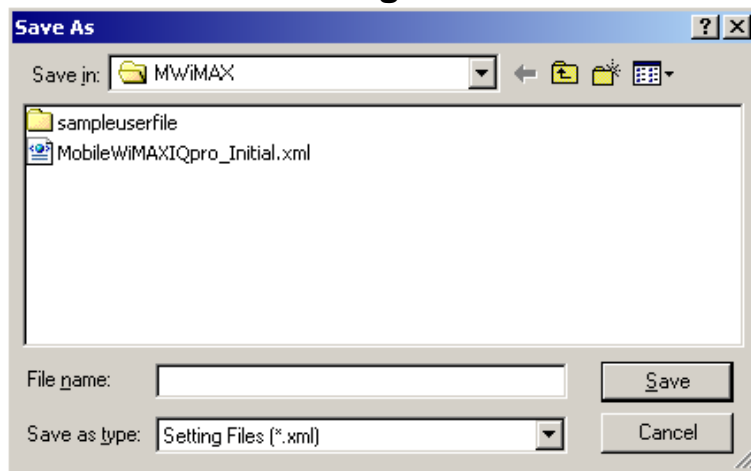
**File Recalling Screen**

# Appendix

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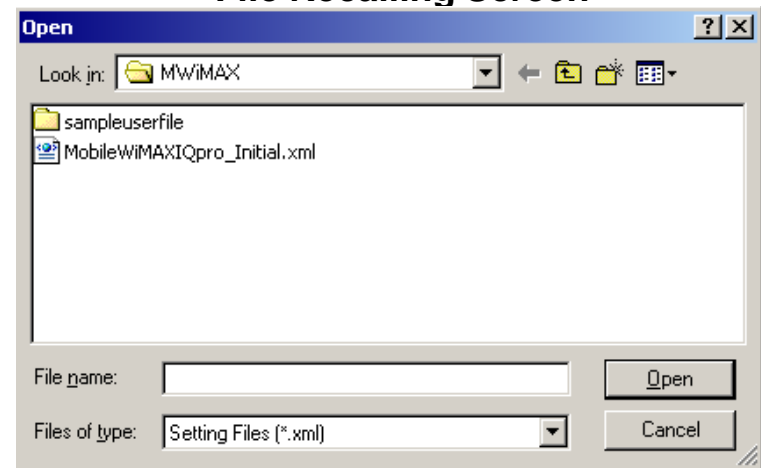
# Remarks on Two-Signal Add Function

**Common Parameter Setting Screen**

| | |
|---|---|
| G | 1/8 |
| Oversampling Ratio | 4 ▼ |
| Band Width | 2     MHz |
| n | 4 |
| Frame Duration | 8     ms |

**If BandWidth = waveform pattern generation of 10 MHz to 17.5 MHz, set Oversampling Ratio to 4 or 8.**

**If BandWidth = waveform pattern generation of 20 MHz to 28 MH, set Oversampling Ratio to 4.**

**\*When BandWidth is 10 MHz to 28 MHz, an Oversampling Ratio setting of  2 does not support the full frequency offset.**

**\*When BandWidth is 20 MHz to 28 MHz, the Oversampling Ratio cannot be set to 8.**

# Preparing for BER Measurement of Fixed Pattern

When binary data is copied to the text file and the extension is .bpn, it can be read using the MG3700A User File function.

**Test Message Data**

| SQPSK | |
|---|---|
| 11100100 | 0xE4, |
| 10110001 | 0xB1, |
| 11100001 | 0xE1, |
| 10110100 | 0xB4 |

| S16QAM | |
|---|---|
| 10101000 | 0xA8, |
| 00100000 | 0x20, |
| 10111001 | 0xB9, |
| 00110001 | 0x31, |
| 11101100 | 0xEC, |
| 01100100 | 0x64, |
| 11111101 | 0xFD, |
| 01110101 | 0x75 |

| S64QAM | |
|---|---|
| 10110110100100110100100110110010 | 0xB6, 0x93, 0x49, 0xB2, |
| 10000011000010001001011000010001 | 0x83, 0x08, 0x96, 0x11, |
| 01000001100100100000000100000000 | 0x41, 0x92, 0x01, 0x00, |
| 10111010101000111000101010011010 | 0xBA, 0xA3, 0x8A, 0x9A, |
| 00100001100000101101011100010101 | 0x21, 0x82, 0xD7, 0x15, |
| 01010001110100110000010100010000 | 0x51, 0xD3, 0x05, 0x10, |
| 11011011001001011001001011110111 | 0xDB, 0x25, 0x92, 0xF7, |
| 10010111010110011111001110000111 | 0x97, 0x59, 0xF3, 0x87, |
| 00011000101111010110011100101011 | 0x18, 0xBE, 0xB3, 0xCB, |
| 10011110001100011000011110111111 | 0x9E, 0x31, 0xC3, 0xDF, |
| 00110101101001111110110100111 | 0x35, 0xD3, 0xFB, 0xA7, |
| 10011010111111110110111111011011 | 0x9A, 0xFF, 0xB7, 0xDB |

**User-defined pattern files must be stored in one of the following folders:**
- **- Root directory of CF card**
- **- OPT_BER_PATTERN folder in CF card**
- **- OPT_BER_PATTERN folder in MG3700A hard disk**

**IQproducer is used when transferring data to the MG3700A hard disk.**
**Refer to the MG3700A Operation Manual (IQproducer) for details.**

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# High-Speed BER Measurement Option (1/3)

**Adding the High-Speed BER Measurement (MG3700A-031) option greatly improves the BER measurement functions by expanding the input bit rate range and user patterns.**

● **Comparison of standard and optional BER measurement functions**

| | MG3700A-031/131 High-Speed BER Measurement Function Option | Usage | Standard BER Measurement Function (Ver 2.02 or newer) |
|---|---|---|---|
| Input bit rate | **100 bps to 120 Mbps** | This can be used for WLAN and next-genenarion high-speed communications systems. | 1 Kbps to 20 Mbps |
| Data pattern | **PN9/11/15/20/23, All0s, All1s, 01,** PN9fix/11fix/15fix/20fix/23fix **, User Pattern** <br><br>**WiMAX fixed pattern is supported.** | PN*fix is a discontinuous PN data. BER measurement can be performed with a small waveform pattern using PN*fix even when the continuous data size is so large that it overflows the MG3700A memory, such as PNPN23. At User Pattern, a text-style bit stream (binary) file can be loaded into the data storage. It supports WiMAX where the voice data test or the fixed-pattern measurement is defined. | PN9, 11, 15, 20, 23, all0, all1, 0101 |
| Input threshold level | **Adjustable** | At "Auto Resync=OFF", measurement is performed at a higher error rate than the allowable rate of 1% in the production inspection process for conventional communication systems or R&D for W-CDMA, etc. Moreover, the option enables continuous measurement by adjusting the threshold level in accordance with the error frequency. | TTL |
| SyncLoss count function | **OK** | This can be used for continuous measurement even when synchronization loss occurs. | ---- |

# High-Speed BER Measurement Option (2/3)

● **Comparison of standard and optional BER measurement functions**

| Function | MG3700A-031/131 High Speed BER Measurement Function | Standard BER Test Funciton (Ver. 2.02 or later) |
|---|---|---|
| Input bit rate | 100 bps to 120 Mbps | 1 kbps to 20 Mbps |
| Measurable patterns | PN9/11/15/20/23, all0, all1, 01, PN9fix/11fix/15fix/20fix/23fix, UserDefine | PN9/11/15/20/23, all0, all1, 01 |
| Input threshold level | Adjustable (0.20 V to 3.00 V, 0.05 Vstep) | TTL |
| Input signal | Data, Clock, Enable ||
| Adjustable range of input timing | -1 to 15 clock ( Data/Enable is adjusted for input Clock.) | Reversible Data, Clock, and Enable polarities |
| Input impedance | 50 ohm , High impedance | Hi-Z |
| Measurable BER | 0% to 10% (Reference value. Changed by condition of communication system and data rate) (*1) | 0% to 1% (Reference value. Changed by condition of communication system and data rate) |
| Auto Resync | On, Off (At On, becomes SyncLoss at Threshold error detection and stops measurement. At Off, SynLoss detection not performed.) Threshold setting range: [numerator/denominator] Choose from denominator | On, Off (Threshold: 6 bit/64 bit) |
| Measurement mode | Single, Continuous, Endless ||
| Measurable count | Error bit: 1 to 2147483647 bits Bit count: 1000 to 4294967295 bits  (*3) | Time: <359999.0 sec (*2) Bit count: 1000 to 4294967295 bits |
| Display | Bit Error, SyncLoss, ClockError, Enable Error, SyncLoss Count, Overflow Data Count, Overflow Syncloss, Error Rate, Error Count | Bit Error, SyncLoss, ClockError, Enable Error, Error Rate, Error Count |
| Burst | No limitation | Supported by clock input detection |

*1: Random error generated BER 10% signals is about 10% possiblility to be error free with 22 bit continuity. The BER- 3% signals are about 51% possibility to be error free with 22 bit continuity.

*2: Measurement mode in standard BER equipment has "Time" setting. How ever, MG3700A-031/131 high-speed BER measurement function has not "Time" setting.

*3: If measuring at 120 Mbps signal, measurement stops by raching upper bit count at about 35.8 s.

# High-Speed BER Measurement Option (3/3)

● **Command compliance between high-speed BER measurement and standard built-in BER functions**

| Function | Command | Standard BER Measurement Function (Ver. 2.02 or later) | MG3700A-031/131 High Speed BER Test Funciton |
|---|---|---|---|
| **BER Measurement Commands** | | | |
| Clear BER Measurement Bit Count | BERCOUNTCLR | --- | Yes |
| SyncLoss Count | BERSYNCLOSS? | --- | Yes |
| BER Sync Loss Threshold | BERSYNCLOSSTHLD | --- | Yes |
| Set Count Operation at SyncLoss Detection | BERSYNCLOSSACT | --- | Yes |
| BER Stop Status | BERSTOPSTATUS? | --- | Yes |
| **Measurement condition** | | | |
| Set Measurement Termination Condition | BERCOUNTMODE | TIME DATBIT | DATABIT ERRORBIT |
| Set Measurement Time | BERTIME | Yes | --- |
| Set Measurement Error Bit Count | BERERRORBIT | --- | Yes |
| PN Type | BERTYPE | PN9 to 23, ALL0/1, ALT | PN9 to 23, ALL0/1, ALT, PN9Fix to PN23Fix, USERPATTERN |
| **I/F Setting** | | | |
| Set Data Signal Threshold Level | BERDATATHLD | --- | Yes |
| Set Clock Signal Threshold Level | BERCLKTHLD | --- | Yes |
| Set Enable Signal Threshold Level | BERENBLTHLD | --- | Yes |
| Data Delay | DERDATADELAY | --- | Yes |
| Enable Delay | BERENBLDELAY | --- | Yes |
| Input Impedance | BERINZ | --- | Yes |
| **PNFix pattern/User define pattern** | | | |
| Initial Value of PN Pattern Used in PN Fix | BERPNINITIAL | --- | Yes |
| Length of one Cycle of Pattern Used in PN Fix | BERPNFIXLENG | --- | Yes |
| BER Sync Start Position on User Pattern | BERSYNCSTARTPOS | --- | Yes |
| Specify Length of Part Used for Synchronization Judgement in User Defined Pattern | BERSYNCLENG | --- | Yes |
| Specify load of user Defined Patern | BERLOADMEDIA | --- | Yes |
| User Pattern File List | BERUSERPATLST? | --- | Yes |
| Load User Defined Pattern | BERLOADUSERPAT | --- | Yes |
| Present User Defined Pattern | BERUSERPAT? | --- | Yes |
| Present length of User Defined Pattern | BERUSERPATLENG? | --- | Yes |

# Parameter Setting Range: Common (1/2)

| Tree | Items | Setting Range | |
|---|---|---|---|
| Common | Number of Tx Antennas | 1, 2 | |
| | Number of Frames | 1 to Maximum number of Frame saved in memory | *2 |
| | Initial Frame Number | 000000 to FFFFFF (hex) | *2 |
| | 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 Bit 0 to Bit 5 | 1, 0:<br>When FFT Size = 128,512, bit 0/2/4 = 0.<br>When Segment Index = 0, bi t0 = 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) | *2 |
| | Uplink Allocation Subchannels Bitmaps | All Subchannels | |
| | DL AMC Allocated Physical Band Bitmap | FFT Size = 2048 000000000000 to FFFFFFFFFFFF<br>FFT Size = 1024 000000000000 to 000000FFFFFF<br>FFT Size = 512   000000000000 to 000000000FFF<br>FFT Size = 128   000000000000 to 000000000007 | |
| | Continuous OFDMA Symbols | 2 to maximum number of OFDMA Symbol in memory (2 symbol step): | *1 |
| | 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. | *1 |
| | Continuous Data Type Repeat Data | 0000 to FFFF (hex): Can be set when Continuous Data Type = 16 bit repeat | *1 |
| | Continuous Data Type User File | User File selected: Can be set when Continuous Data Type = User File | *1 |
| | Continuous Modulation Type | QPSK, 16QAM, 64QAM: Can be set when Frame Duration = Continuous | *1 |
| | TTG | Display only: Gap interval between Downlink and Uplink displayed | |
| | RTG | Display only: Gap interval between Uplink and Frame End dispayed | |
| | Subcarrier Spacing | Display only | |
| | Sampling Frequency | Display only: Depends on bandwidth, n (Sampling Factor), and Oversampling Ratio | |
| | Segment Index | 0, 1, 2 | *2 |
| | Preamble Index | <Table 1> | *2 |
| | Roll-off Length | 0 to 32 | |

**\*1: Available (Frame Duration = Continuous)**
**\*2: Not available (Frame Duration = Continuous)**

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# Parameter Setting Range: Common (2/2)

| Tree | Items | Setting Range | |
|---|---|---|---|
| Common | 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 | *2 |
| | Coding Indication | CC, CTC | *2 |
| | 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 Antenna 0, 1 | Multi-Path Number: 1 to 20<br>Delay: 0.0 to 10000.0 ns<br>Gain: –80.0 to 0.0 dB<br>Phase: 0.0° to 359.9° | |

**\*2: Not available (Frame Duration = Continuous)**

| Tree | Items | Setting Range |
|---|---|---|
| Downlink | Data Status | Enable, Disable |
| Preamble | Data Status | Enable, Disable |
| | Preamble Index | Display only: Set at Common. |
| | ID Cell | Display only: Depends on Preamble Index setting |
| Zone 0 to 7 | Data Status | Enable, Disable |
| | Permutation | PUSC, PUSC (all SC), FUSC, AMC (6x1), AMC (3x2), AMC (2x3), AMC (1x6) |
| | Pilot Position | Hopping, Center |
| | Dedicated Pilot | 0, 1 |
| | Pilot Boosting | OFF, ON |
| | STC/MIMO | No transmit diversity, 2 Antenna MatrixA (STTD), 2 Antenna MatrixB vertical encoding |
| | OFDMA Symbol Offset | <Zone#0> Display only<br><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)<br>2 to 254 symbol (when PUSC1 (all SC))<br>1 to 255 symbol (when FUSC)<br>1 to 255 symbol (when AMC (6x1))<br>2 to 254 symbol (when AMC (3x2))<br>3 to 255 symbol (when AMC (2x3))<br>6 to 252 symbol (when AMC (1x6)) |
| | 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 |

| Tree | | Items | Setting Range |
|---|---|---|---|
| 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 |
| | | 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. |

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# Parameter Setting Range: PHY/MAC Downlink (3/9)

| Tree | Items | Setting Range |
|---|---|---|
| SUB-DL-UL-MA | 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 ChCoding), 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 (6x1) Zone |
| | | (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3x2) Zone |
| | | (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2x3) Zone H115 |
| | | (OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1x6) |
| | OFDMA Subchannel Offset | 0 to 63 (when AMC (2X3), AMC (1x6) excluded) |
| | | 0 to 255 (when AMC (2X3), AMC (1x6)) |
| | 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 (6x1)) |
| | | 2 to 126 symbol (AMC (3x2)) |
| | | 3 to 93 symbol (when AMC (2x3)) |
| | | 6 to 90 symbol (when AMC (1x6)) |

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| Tree | | Items | Setting Range |
|---|---|---|---|
| DL-Burst 0 to 15 | | 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, <br> 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, <br> 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 Band 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 |

| Tree | | Items | Setting Range |
|---|---|---|---|
| | UCD | Data Status | Enable, Disable |
| | | UCD Offset | 0 to (Number of Frames – 1) |
| | | UCD Interval | 0 to Number of Frames |
| | | UCD Length | 0 to 2037 (without UCD Data Type = TLV) |
| | | | Display only (when UCD Data Type = TLV) |
| | | UCD Data Type | 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 |
| | | UL Allocated Subchannels Bitmap | Display only |
| | | HARQ Ack Delay for DL Burst | 00 to FF |
| | | UL AMC Allocated Physical Band 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 |

# Parameter Setting Range: PHY/MAC Downlink (7/9)

| Tree | | Items | Setting Range |
|---|---|---|---|
| | MAC PDU<br>0 to 31 | Data Status | Enable, Disable |
| | | MAC PDU Length | Display only |
| | | Payload Data Length | 0 to 2041 byte (when CI = No CRC)<br>0 to 2037 byte (when CI = With CRC)<br>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)<br>1 to 255 symbol with Preamble at Zone#0 (Select by odd symbol)<br>(OFDMA Symbol Offset at Zone) to 255 symbol when  PUSC Zone from Zone#1 to #7<br>(OFDMA Symbol Offset at Zone) to 255 symbol w<br>(OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6x1) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3x2) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2x3) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1x6) 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,<br>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,<br>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. |

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| Tree | Items | Setting Range |
|---|---|---|
| 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)<br>1 to 255 symbol with Preamble at Zone#0 (Can be selected by odd symbol)<br>(OFDMA Symbol Offset at Zone) to 255 symbol when PUSC Zone from Zone#1 to #7<br>(OFDMA Symbol Offset at Zone) to 255 symbol when PUSC (all SC) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when FUSC Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (6x1) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (3x2) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (2x3) Zone<br>(OFDMA Symbol Offset at Zone) to 255 symbol when AMC (1x6 |
| | OFDMA Subchannel Offset | 0 to (Number of Subchannel at Zone) |
| | Boosting | 0, ±3, ±6, ±9, −12 dB |
| | Rectangular Sub-Burst Indicator | 0, 1 |
| | No. OFDMA Symbols | 2 to 126 symbol (when PUSC)<br>2 to 126 symbol (when PUSC (all SC))<br>1 to 127 symbol (when FUSC)<br>1 to 127 symbol (when AMC (6x1))<br>2 to 126 symbol (when AMC (3x2))<br>3 to 126 symbol (when AMC (2x3))<br>6 to 126 symbol (when AMC (1x6)) |
| | 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) |

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# Parameter Setting Range: PHY/MAC Downlink (9/9)

| Tree | | Items | Setting Range |
|---|---|---|---|
| | 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 to 1 |
| | | No. SDMA layers | 1 to 4 |

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| Tree | | Items | Setting Range |
|---|---|---|---|
| Uplink | | Data Status | Enable, Disable |
| Zone 0 to 7 | | Data Status | Enable, Disable |
| | | Permutation | PUSC, PUSC (without SC rotation), AMC (6x1), AMC (3x2), AMC (2x3), AMC (1x6) |
| | | 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) <br> 3 to 255 symbol (when PUSC (without SC rotation)) <br> 1 to 255 symbol (when AMC (6x1)) <br> 2 to 254 symbol (when (AMC (3x2)) <br> 3 to 255 symbol (when AMC (2x3)) <br> 6 to 252 symbol (AMC (1x6)) |
| | | UL-PermBase | 0 to 69 |
| | | UL-Burst Number | 1 to 16 |
| | UL-Burst 0 to 15 | Data Status | Enable, Disable |
| | | ODFMA Symbol Offset | When PUSC Zone <br> (FDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol <br> When PUSC (without SC rotation) Zone <br> (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol <br> When AMC (6x1) Zone <br> (OFDMA Symbol Offset at Zone)) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol <br> When AMC (3x2) Zone <br> (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol <br><br> When AMC (2x3) Zone <br> (OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol <br> When AMC (1x6) Zone <br> (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) <br> 3 to 3069 symbol (when PUSC (without SC rotation)) <br> 1 to 1023 symbol (when AMC (6x1)) <br> 2 to 2046 symbol (when AMC (3x2)) <br> 3 to 3069 symbol (when AMC (2x3)) <br> 6 to 6138 symbol (when AMC (1x6)) |
| | | Burst Power Offset | −10.00 to F29910.00 dB |
| | | Pilot Pattern | Normal, PatternA, PatternB |
| | | 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, <br> 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, <br> 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 | **&lt;See MAC PDU on Downlink&gt;** | |

| Tree | | Items | Setting Range |
|---|---|---|---|
| UL-HARQ Burst | | Data Status | Enable, Disable |
| | | RCID_Type | Normal CID, RCID11, RCID7, RCID3 |
| | | OFDMA Symbol Offset | When PUSC Zone<br>(OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol<br>When PUSC (without SC rotation) Zone<br>(OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol<br>When AMC (6x1) Zone<br>(OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol<br>When AMC (3x2) Zone<br>(OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol<br>When AMC (2x3) Zone<br>(OFDMA Symbol Offset at Zone) to (OFDMA Symbol Offset at Zone + No. OFDMA Symbols at Zone) symbol<br>When AMC (1x6) Zone<br>(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,<br>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 |
| | | Num SDMA Layers | 0 to 3 |
| | | Pilot Pattern | PatternA, PatternB, PatternC, PatternD |
| | | ACID | 0 to 15 |
| | | AI_SN | 0, 1 |
| | | ACK Disable | 0, 1 |

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# Parameter Setting Range: PHY/MAC Uplink (3/6)

| Tree | | Items | Setting Range |
|---|---|---|---|
| Initial/Handover Ranging Region | | Data Status | Enable, Disable |
| | | OFDMA Symbol Offset | When PUSC Zone, (OFDMA Symbol Offset at Zone) to 255 symbol<br>When PUSC (without SC rotation) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol<br>When AMC (6x1) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol<br>When AMC (3x2) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol<br>When AMC (2x3) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol<br>When AMC (1x6) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol |
| | | OFDMA Subchannel Offset | 0 to 126 ((when PUSC, PUSC (without SC rotation))<br>0 to 120 (without PUSC, PUSC (without SC rotation)) |
| | | No. OFDMA Symbols | 3 to 126 symbol (when PUSC)<br>3 to 126 symbol (when PUSC (without SC rotation))<br>1 to 127 symbol (when AMC (6x1))<br>2 to 126 symbol (when AMC (3x2))<br>3 to 126 symbol (when AMC (2x3))<br>6 to 126 symbol (when AMC (1x6)) |
| | | No. Subchannels | 6 to 126 (when PUSC, PUSC (without SC rotation))<br>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<br>When Initial/Handover Ranging Symbols = 4, 0 to 252 symbol |
| | | OFDMA Subchannel Offset | 0 to 126 (when PUSC, PUSC (without SC rotation))<br>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 |

| Tree | | Items | Setting Range |
|---|---|---|---|
| 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 (6x1) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol |
| | | | When AMC (3x2) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol |
| | | | When AMC (2x3) Zone, (OFDMA Symbol Offset at Zone) to 255 symbol |
| | | | When AMC (1x6) 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 (6x1)) |
| | | | 2 to 126 symbol (when AMC (3x2)) |
| | | | 3 to 126 symbol (when AMC (2x3)) |
| | | | 6 to 126 symbol (when AMC (1x6)) |
| | | 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/Per+ D419iodic 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 |

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# Parameter Setting Range: PHY/MAC Uplink (5/6)

| 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 | 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 | –10.0 to 10.0 dB |
| | | Payload | ACK, NACK |

| Tree | | | Items | Setting Range |
|---|---|---|---|---|
| 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, Pseudorandom |
| | | | 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 <br> 0 to 47 when FFT Size = 1024 <br> 0 to 23 when FFT Size = 512 <br> 0 to 5 when FFT Size = 128 |
| | | | No. Frequency Bands | 1 to 96 when FFT Size = 2048 <br> 1 to 48 when FFT Size = 1024 <br> 1 to 24 when FFT Size = 512 <br> 1 to 6 when FFT Size = 128 |
| | | | Band Bit Map | 0 to FFF when FFT Size = 2048, 1024, 512 <br> 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 | 0, 1 |
| | | | Periodicity | Single, 1, 2, 4 |

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**Anritsu**

# Ordering Information

| Model/No. | Name | | Remarks | |
|---|---|---|---|---|
| **- Main Frame -** | | | | |
| MG3700A | Vector Signal Generator | | Required | |
| **- Options -** | | | | |
| MG3700A-002 | Mechanical Attenuator | Changes standard electronic attenuator to mechanical attenuator | | |
| MG3700A-011 | Upper Frequency 6 GHz | Extends standard 250 kHz to 3 GHz to 250 kHz to 6 GHz | Recommended | Not required for 2.3/2.5 GHz band; required for 3.5/5.8 GHz band |
| MG3700A-021 | ARB Memory Upgrade 512 M sample | Extends standard 128 Msamples/channel x 2 to 256 Msample/channel x 2 | Recommended | For instantaneous switching of waveform patterns in memory; larger capacity more useful when changing waveform patterns |
| MG3700A-031 | High-Speed BER Measurement | Upgrades standard built-in BER measurement function | Recommended | Required for IEEE-compliant BER measurement when using test messages |
| **- Software - (License for IQproducer System)** | | | | |
| MX370104A | Multi-carrier IQproducer | | Recommended | Required when creating multi-carrier signals. |
| MX370105A | Mobile WiMAX IQproducer | | Required | |
| **- Application Parts -** | | | | |
| W2495AE | MG3700A Operation Manual | Booklet | Recommended | The PDF manual is on the software CD. Order this when a booklet is required. |
| W2496AE | MG3700A IQproducer Operation Manual | Booklet | | |
| W2539AE | MG3700A Standard Waveform Pattern Operation Manual | Booklet | | |
| W2633AE | MX370104A Multi-carrier IQproducer Operation Manual | Booklet | | |
| W2734AE | MX370105A Mobile WiMAX IQproducer Operation Manual | Booklet | | |
| J1261D | Ethernet Cable (Shielded Type) | Crossover cable, 3 m | Recommended | Required when PC connected directly to MG3700A by LAN |
| Z0777 | Standard Waveform Pattern Upgrade Kit | DVD of latest preinstalled waveform patterns | | |
| G0141 | HDD ASSY | Spare HDD | | |
| J1277 | IQ Output Conversion Adapter | Converts IQ output connector (D-sub) to BNC | Recommended | |

# Note

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Specifications are subject to change without notice.

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