

MX370103A

1xEV-DO IQproducer™

MG3700A
Vector Signal Generator

For MG3700A Vector Signal Generator

MX370103A

1xEV-DO IQproducer™

Product Introduction



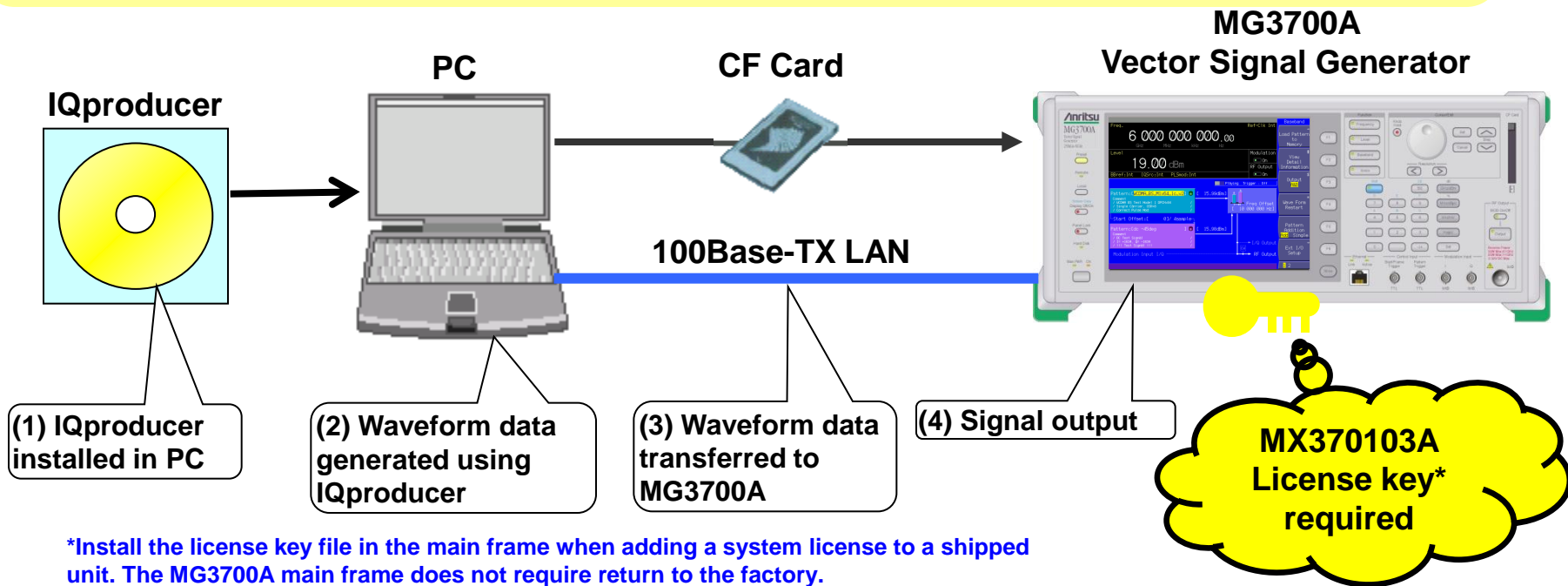
Version 4.00

ANRITSU CORPORATION

What is 1xEV-DO IQproducer?

MX370103A CDMA2000 1xEV-DO IQproducer is PC application software equipped with the graphical user interface for performing parameter setup and waveform pattern generation which meet the CDMA2000_1xEV-DO system (1xEV-DO forward and 1xEV-DO reverse). The generated waveform pattern can be downloaded in a MG3700A vector signal generator, and can output the base-band signal and RF signal of 1xEV-DO modulation using an arbitrary waveform generating function of MG3700A.

Moreover, in reverse, the multi-user signal which freely adjusts frequency, phase, level and delay can be generated.



Setup

Connect the MG3700A and PC as shown below.

Install IQproducer in the PC.

Install the MX370103A license key in the MG3700A.



IQproducer™ Operating Environment

CPU	Pentium III, 1 GHz or faster
Memory	≥ 512 Mbytes or more
HDD	≥ 5 Gbytes or more
Display	1024 x 768 pixels or more
OS	Windows2000^(R) Professional, Windows XP^(R)

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

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

Starting IQproducer

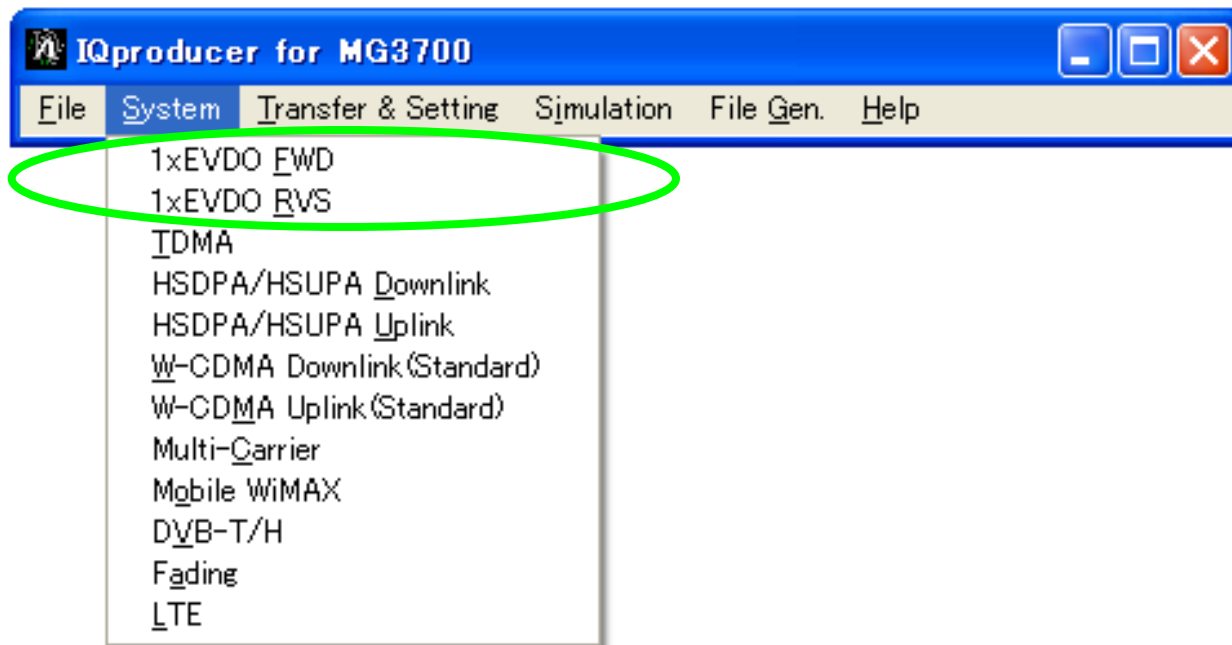
Start IQproducer as follows:

Start > Programs > Anritsu Corporation > IQproducer for MG3700A

IQproducer Main Screen

When IQproducer starts, the following screen is displayed.

Choose 1xEV-DO FWD/RVS from the [System] pull-down menu.



Forward: Main screen

The following screen will be displayed if 1xEV-DO_FWD is chosen in [System]. In forward, the multi-carrier signal (up to 9 carriers) and the Idle-Active integrated signal can be generated.

Forward Main screen: Carrier Edit sheet

1xEV-DO Forward IQ producer for MG3700

Carrier Edit | Multicarrier Composition | See Slide 9

Parameter file (2) Recall Parameter File (1) Save Parameter File

Common Parameters

(3) Wave Data Length 3 frames (4) Over Sampling 16

(6) Carrier 1 (7) Carrier Parameters Copy All Carrier (8) Execute (5) Default All

Carrier Parameters (Carrier 1)

TCH Parameters

(9) Data Rate 12: 2457.6kbps (1slot) 16QAM (13) MAC Index for Traffic Channel (16) RPC/RACH Parameters

(10) 1st frame Active(1)/Idle(0) 1111111111111111 TCH 1 5 TCH 2 6 See Slide 7

2nd frame Active(1)/Idle(0) 1111111111111111 TCH 3 7 TCH 4 8

3rd frame Active(1)/Idle(0) 1111111111111111 Initial Value of PN15 Reg (HEX)

4th frame Active(1)/Idle(0) 1111111111111111 Reg 1 7FFF Reg 2 387F

Offset Index 0 (12) TCH Data PN15 (11) Reg 3 3F80 Reg 4 3C07 (14) (15) Carrier Default

(17) Carrier Calculate

(18) FFT (19) CCDF (20) Transfer & Setting Wizard (21) Exit

(9) Data Rate

- 1: 38.4 kbps (16 slots)QPSK
- 2: 76.8 kbps (8 slots)QPSK
- 3: 153.6 kbps (4 slots) QPSK
- 4: 307.2 kbps (2 slots) QPSK
- 5: 614.4 kbps (1 slot) QPSK
- 6: 307.2 kbps (4 slots) QPSK
- 7: 614.4 kbps (2 slots) QPSK
- 8: 1228.8 kbps (1 slot) QPSK
- 9: 921.6 kbps (2 slots)8-PSK
- 10: 1843.2 kbps (1 slot) 8-PSK
- 11: 1228.8 kbps (2 slots)16QAM
- 12: 2457.6 kbps (1 slot) 16QAM
- 13: Idle Slot

Forward: The parameter setting range of a Carrier Edit sheet

(1) Save Parameter File

A parameter file is saved.

(2) Recall Parameter File

A parameter file is recalled.

(3) Wave Data Length

The number of frames can be specified up to a maximum of 4 frames. Only 3 frames can be specified when creating multi-carrier.

(4) Over Sampling: 4/8/16

It is over sampling rate of a waveform pattern.

(5) Default All

The setting value of all single carriers is returned to an initial value.

(6) Carrier: 1 to 9

The single carrier edited is chosen.

(7) Carrier Parameters Copy : Carrier 1 to Carrier 9/All

The contents of the specified single carrier are copied to other single carriers.

(8) Execute

The copy of (7) is performed.

(9) Data Rate

The data rate and transmitting slot of a single carrier to be created are set up.

(10) 1st to 4th Frame Active(1)/Idle(0)

Active/idle of a traffic channel are set up for every slot.

(11) TCH Data: All'0'/All'1'/PN15

The payload data of a traffic channel is set up.

(12) Offset Index: 0 to 511

PN_Offset_Index of the single carrier to be created is specified.

(13) TCH1 to TCH4: 5 to 63

MAC Index used for the scrambling sequence of a traffic channel and the Walsh cover of preamble is specified.

(14) Reg1 to Reg4: 0 to 7FFF, HEX

By changing the initial value of a shift register when setting TCH Data to PN15, offset can be added to PN15 series of each TCH.

(15) Carrier Default

The setting value of the specified single carrier is returned to an initial value.

(16) RPC/RA CH Parameters

The RPC/RA CH Parameters screen is opened.

(17) Carrier Calculate

The waveform pattern of nine single carriers is created in the current setting. Click the Multi-carrier Composition tab to open a Multi-carrier Composition sheet and create multi-carrier.

(18) FFT

The FFT graph screen is displayed. This screen shows a FFT-processed graph of the spectrum of the created waveform pattern data.

(19) CCDF

The CCDF graph screen is displayed. This screen shows a graph of CCDF of the created waveform pattern data.

(20) Transfer & Setting Wizard

The Transfer & Setting Wizard screen is displayed.

The three-step operation below is performed on this screen.

- Connection between a computer and MG3700A.

- Transmission of the waveform pattern data to MG3700A.

- Loading of the waveform pattern data to the arbitrary waveform memory of MG3700A.

(21) Exit

The software program is terminated.

Forward: RPC/RA CH parameters sheet

RPC/RA CH Parameters are set up on this screen.

The screenshot shows the 'Carrier 1 RPC/RA CH Parameters' configuration window. It includes a header bar with a title and a main area with several sections. Callouts (1) through (14) are placed over various UI elements:

- (1) Frame dropdown menu
- (2) Slot dropdown menu (set to 1)
- (3) RPC/RA Parameters Copy dropdown menu (set to All Frame)
- (4) Execute button
- (5) RPC/RA CH Parameters section header
- (6) CH Power input field (set to 0.000 dB)
- (7) RPC Bit input field (set to 0)
- (8) ON/OFF radio buttons (OFF is selected)
- (9) RPC/RA Bit dropdown menu (set to 0)
- (10) Channel Power All MACCH Value input field (set to 0.000)
- (11) ON/OFF dropdown menu (set to OFF)
- (12) Default button
- (13) Default All button
- (14) Normalize button

MAC Index	RPC Bit	CH Power	dB	ON	OFF
MAC Index 4	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 5	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 6	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 7	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 8	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 9	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 10	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 11	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 12	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 13	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>
MAC Index 14	0	0.000		<input type="radio"/>	<input checked="" type="radio"/>

Forward: The parameter setting range of a RPC/RA CH parameters sheet

(1) Frame

The frame edited can be chosen.

(2) Slot

The slot edited can be chosen.

(3) RPC/RA Parameters Copy: Slot 1 to Slot 16, All Slot, All frame

The parameter setting of a RPC/RA channel is copied to other slots.

(4)Execute

The copy of (3) is performed.

(5)RA Bit: 0 or 1

It is RA bit of RA channel.

(6)CH Power: -40dB to +40dB

It is the channel gain (relative value from a pilot channel) of a MAC channel.

(7)RPC Bit: 0 or 1

It is the RPC bit of a RPC channel.

(8)ON/OFF

ON/OFF of each MAC channel can be set up.

(9)RPC/RA Bit (Group Edit)

All specified RPC bits are set to 0 or 1.

All'0': Set all RPC bits in a slot to 0.

All'1': Set all RPC bits in a slot to 1.

(10)Channel Power (Group Edit)

The channel gain (relative value from a pilot channel) of the MAC channel in a slot is set up collectively.

(11)ON/OFF (Group Edit)

ON/OFF of the MAC channel in a slot is set up in a batch.

All'OFF': Turn OFF all MAC channels.

All'ON': Turn ON all MAC channels.

(12)Default

Only the specified slot is returned to the default state.

(13)Default All

The RPC/RA CH Parameters setting of the specified carrier is returned to the default state.

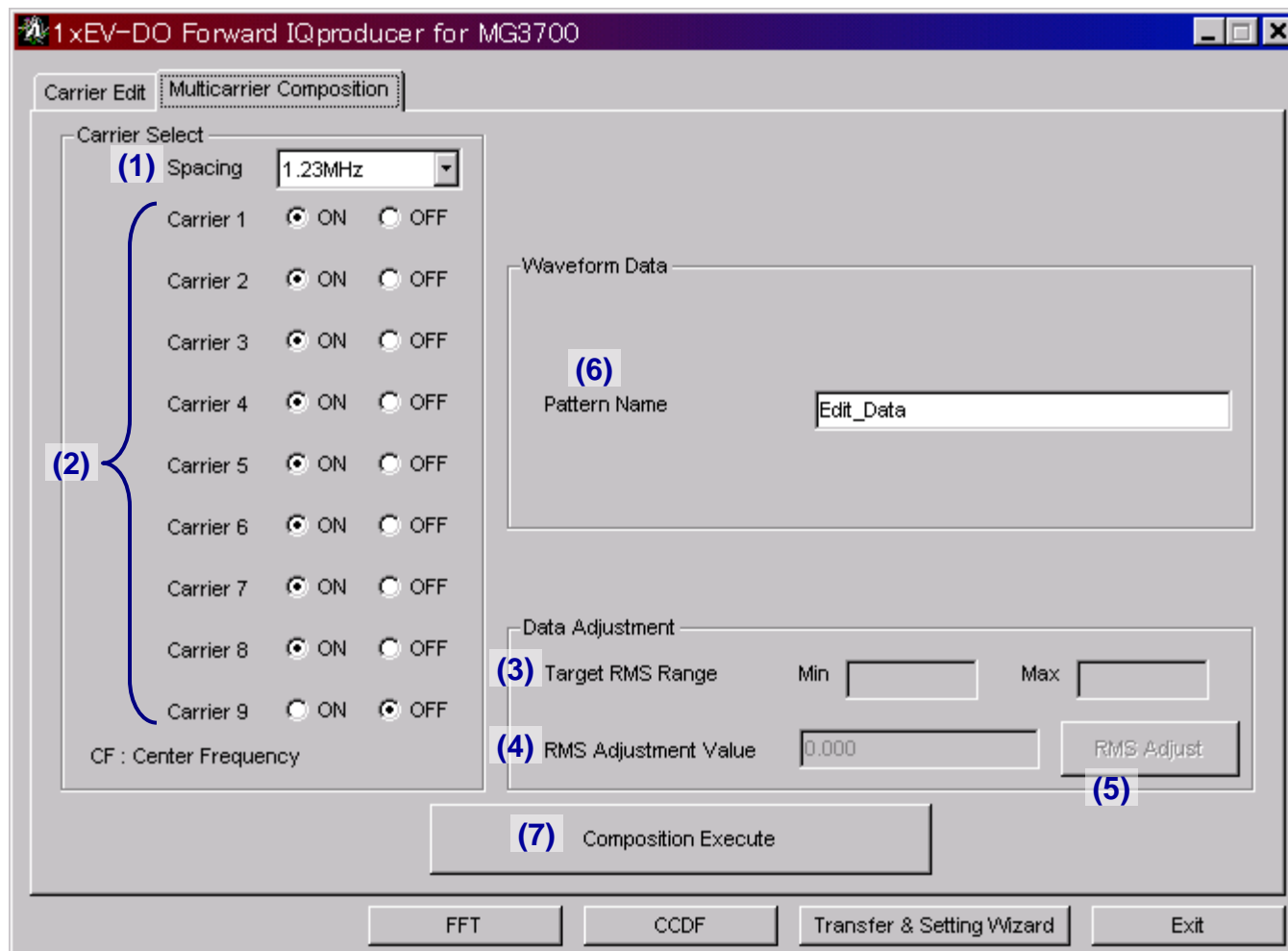
(14)Normalize

The channel gain of the RPC channel / RA channel of the specified slot is set in a batch according to the rate shown by a fraction.

The rate is set up by the equality on the left of the Normalize button. The numerator of the ratio of RA channel can be set up in the range of 1 to "denominator-1." Also, the denominator can be set up in the range of 2 to 99.

Forward: Multi carrier composition sheet

On this screen, waveform pattern creation of multi-carrier (single carrier) is performed using the waveform pattern of each single carrier created in Carrier Edit.



Forward: The parameter setting range of a Multi carrier composition sheet

(1) Spacing: 1.20/1.23/1.25MHz

The frequency interval between carriers is set up.

(2) Carrier Select

ON/OFF of the single carrier used for multi-carrier creation is set up.

(3) Target RMS Range

"RMS" means the RMS value of a waveform pattern.

(4) RMS Adjustment Value

The RMS value of multi-carrier (single carrier) waveform pattern is set up. Generally, the floor noise becomes lower although the modulation signal of output becomes more susceptible to distortion when the RMS value of a waveform pattern is increased. On the contrary, the floor noise becomes higher although the modulation signal of output becomes less susceptible to distortion when the RMS value is decreased.

(5) RMS Adjust

A click of this RMS Adjust button converts "the waveform pattern created by a click of the Composition Execute button" into "a waveform pattern with the closest RMS value to the value entered in RMS Adjustment Value."

(6) Pattern name

The file name of a waveform pattern is set up. (Up to 20 one-byte characters can be entered.)

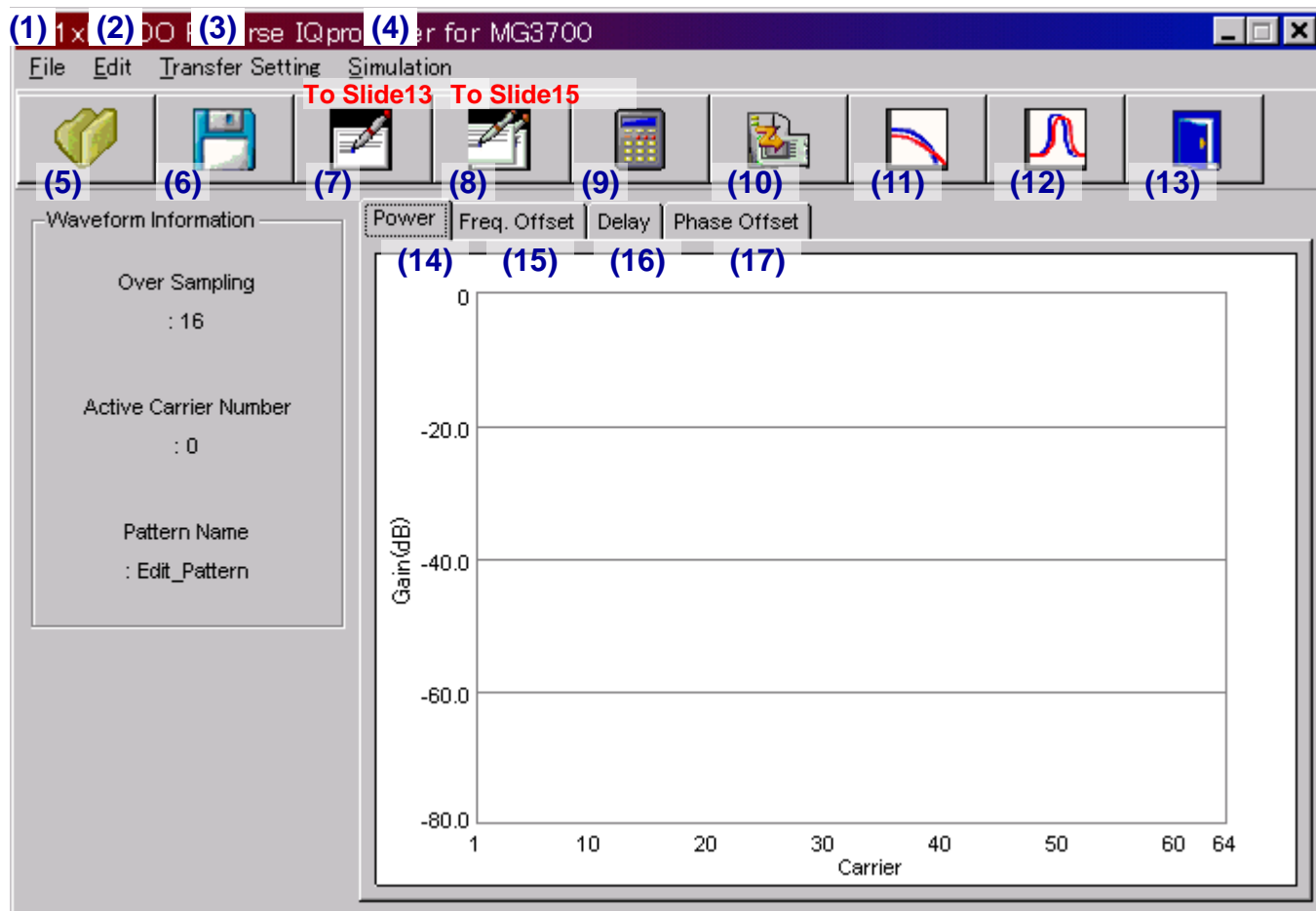
(7) Composition Execute

A waveform pattern is created. A wvd file and a wvi file are created as a waveform pattern.

Reverse: Main screen

The following screen will be displayed if 1xEV-DO RVS is chosen in [System]. Starting of each functional screen and the display of graph are performed.

Reverse Main screen:



Reverse: The parameter setting range of the Main screen

(1) File menu

Recall/Save of a parameter file and closing of application can be performed by choosing [Recall Parameter File], [Save parameter File] and [Exit].

(2) Edit menu

Starting of the Waveform Pattern Edit screen and starting of the Quick Edit screen can be performed.

(3) Transfer Setting menu

The Transfer & Setting Wizard screen can be started.

(4) Simulation menu

Starting of the CCDF Graph Monitor screen and starting of the FFT Graph Monitor screen can be performed.

(5) Recall Parameter File button

A Parameter File is recalled.

(6) Save Parameter File button

A Parameter File is saved.

(7) Edit Waveform Pattern button

The Edit Waveform Pattern screen to set up each carrier is displayed.

(8) Quick Edit button

The Quick Edit screen to set up each carrier is displayed.

(9) Calculate Waveform Pattern button

Creation of a waveform pattern is started based on the preset parameter.

(10) Transfer Setting Wizard button

The Transfer & Setting Wizard for waveform pattern transmission is started.

(11) CCDF Simulation button

Trace of the last-created waveform pattern is displayed on the CCDF Graph Monitor.

(12) FFT Simulation button

Trace of the last-created waveform pattern is displayed on the FFT Graph Monitor.

(13) Exit button

1xEV-DO Reverse IQproducer is terminated.

(14) Power graph

The power of the On carrier is displayed.

(15) Freq. Offset graph

The frequency offset of the On carrier is displayed.

(16) Delay graph

The delay of the On carrier is displayed.

(17) Phase Offset graph

The phase offset of the On carrier is displayed.

Reverse: Waveform Pattern Edit sheet

The modulation parameter of each carrier can be set up on this screen. The carrier number is displayed on the screen's left, and all carriers can be displayed and set up with the scroll bar on the screen's right.

The screenshot shows the 'Waveform Pattern Edit' dialog box with the following settings and callouts:

- (1) Over Sampling: 16
- (2) Pattern Name: Edit_Pattern
- (3) Carrier 1/64: checked
- (4) Long Code Mask: MI: 0x3FF0000000, MQ: 0x3FE0000001
- (5) Power: 0.000 dB
- (6) Frequency Offset: 0.000 MHz
- (7) Delay: 0 / 16 chip(= 0.000µs)
- (8) Phase Offset: 0.000 pi rad.
- (9) DRC CH: checked
- (10) Gain: 0.000 dB
- (11) DRC Symbol: 0000000000000000
- (12) DRCCover Symbol: 0000000000000000
- (13) ACK CH: checked
- (14) Gain: 0.000 dB
- (15) ACK CH bit: AAAAAAAAAAAAAAAAAA
- (16) Data CH: checked
- (17) Gain: 0.000 dB
- (18) Data Rate: 9.6kbps
- (19) Data: PN9fix
- (20) Initial LFSR: 1FF
- (21) RRI CH: RRI Symbol: 001
- (22) OK button
- (23) Cancel button

The dialog box also shows settings for Carrier 2/64, which are identical to Carrier 1/64.

Reverse: The parameter setting range of a Waveform Pattern Edit sheet

(1) Over Sampling : 4, 8, 16

These numbers mean the ratio of the sampling rate and the chip rate of a waveform pattern.

(2) Pattern Name : 1 to 20 characters

It is the file name of waveform pattern data.

(3) Carrier On/Off :Checked = On

On/Off of a carrier is set up.

(4) Long Code Mask : 0x0 to 0x3FFFFFFFFF (MI, MQ)

I and Q long code mask are set up.

(5) Power : -80.000 to 0.000 dB

The power of a carrier is set up.

(6) Frequency Offset : -5.000 to 5.000MHz

The frequency offset of a carrier is set up.

(7) Delay : 0 chip to 32768 chip

The delay of a carrier is set up.

(8) Phase Offset : 0.000 to 2.000 pi rad.

The phase offset of a carrier is set up.

(9) DRC CH On/Off :Checked = On

On/Off of a DRC channel is set up.

(10) DRC CH Gain : -80.000 to 20.000 dB

The channel gain of a DRC channel is set up.

(11) DRC Symbol :

0000000000000000 to FFFFFFFFFFFFFFFF (HEX)

DRC channel symbol data is set up in HEX.

(12) DRC Cover Symbol :

0000000000000000 to 7777777777777777 (OCT)

DRC cover symbol data is set up in OCT.

(13) ACK CH On/Off : Checked = On

On/Off of an ACK channel is set up.

(14) ACKCH Gain : -80.000 to 20.000 dB

The channel gain of an ACK channel is set up.

(15) ACKCH Bit : A(ACK), N(NACK), X(DTX)

An ACK channel bit is set up.

(16) Data CH On/Off

On/Off of a Data channel is set up.

(17) DataCH Gain : -80.000 to 20.000 dB

The channel gain of a Data channel is set up.

(18) Data Rate : 9.6, 19.2, 38.4, 76.8, 153.6kbps

The data rate of a Data channel is set up.

(19) Data : PN9fix, All '0', All '1'

The payload data of a Data channel is set up.

(20) Initial LFSR : 0 to 1FF(HEX)

When PN9fix is chosen for Data, the initial value of the shift register of PN9 generator is set up in HEX.

(21) RRI Symbol : 000 to 101(BIN)

A RRI symbol is set up in BIN.

(22) OK

The Waveform Pattern Edit screen is closed. The contents changed on the Waveform Pattern Edit screen are maintained.

(23) Cancel

The Waveform Pattern Edit screen is closed. The contents changed in Waveform Pattern Edit are canceled.

Reverse: Quick Edit sheet

The Quick Edit screen has the Uniformly Edit sheet and the Random Edit sheet. On the Uniformly Edit screen, multiple parameters of the specified carriers can be set up in a batch.

Uniformly Edit sheet :

The screenshot shows the 'Quick Edit' dialog box with the 'Uniformly Edit' tab selected. The 'Parameter Selection' section includes checkboxes for Carrier, Long Code Mask (MI: 0x, MQ: 0x), Power, Frequency Offset, Delay, Phase Offset, DRC CH, ACK CH, Data CH, and RRI CH. Each checked parameter has associated sub-options and input fields. The 'Edit Range' section at the bottom has the 'All' radio button selected, and the 'Apply' button is highlighted with a blue circle and the number 2. The 'OK' and 'Cancel' buttons are at the bottom.

(1) Edit Range

If the Apply button is clicked when the radio button of [All] is clicked on, setup will be performed for all carriers. Also, if the Apply button is clicked when the radio button of [Carrier Selection] is clicked on, setup will be performed for the carrier applicable to the conditions specified in the right edit box.

(2) Apply

The parameter of items checked in Parameter Selection is set up for the carrier specified in Edit Range.

Reverse: Quick Edit sheet

The Random Edit sheet offers batch setting of random values for multiple parameters of the specified carriers.

Random Edit sheet:

Quick Edit

Uniformly Edit Random Edit

Parameter Selection

Power Random

Delay Random

Phase Offset Random

DRC CH DRC Symbol Random

DRCCover Symbol Random

ACK CH ACK CH bit Random

Data CH Data Rate Random

Data Initial LFSR Random

RRI CH RRI Symbol Random

Edit Range (1)

All

Carrier Selection

(2) Apply

OK Cancel

(1) Edit Range

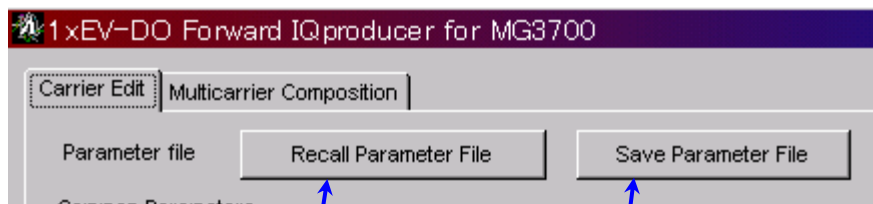
If the Apply button is clicked when the radio button of [All] is clicked on, setup will be performed for all carriers. Also, if the Apply button is clicked when the radio button of [Carrier Selection] is clicked on, setup will be performed for the carrier applicable to the conditions specified in the right edit box.

(2) Apply

The parameter of items checked in Parameter Selection is set up for the carrier specified in Edit Range.

Saving/Recalling Parameters

The numerical value and the setting of each item can be saved as a parameter file, and can be recalled.



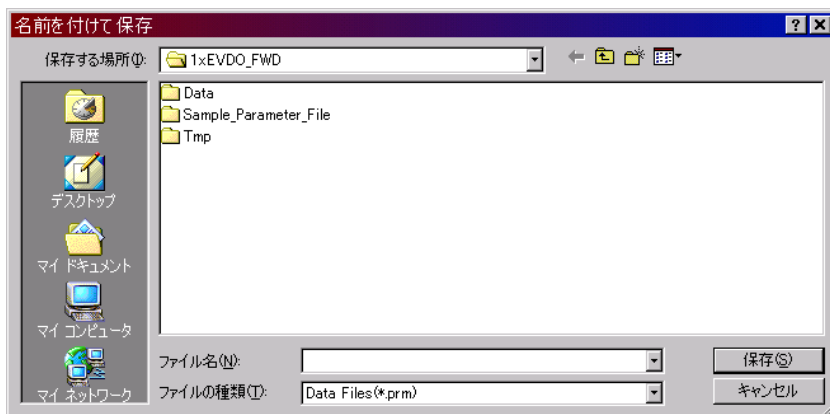
Recall

Save

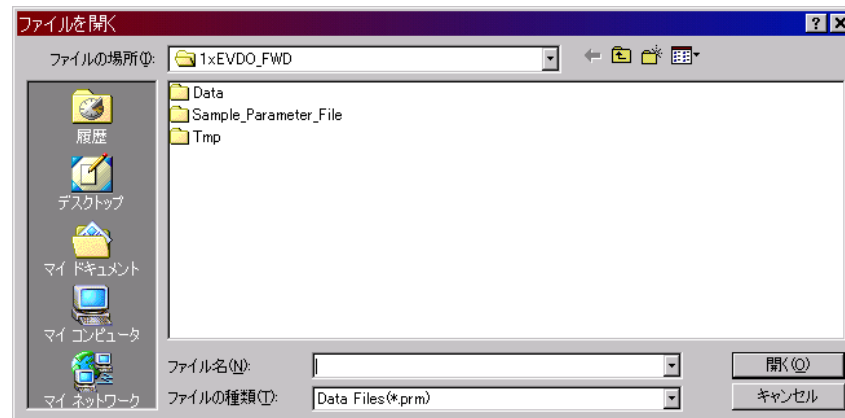


Recall

Save



File save screen

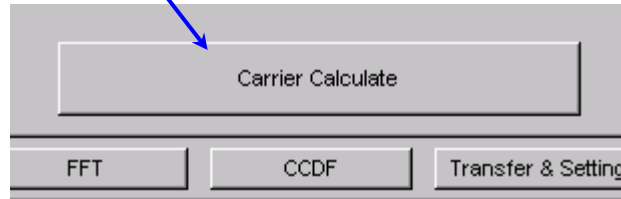


File recall screen

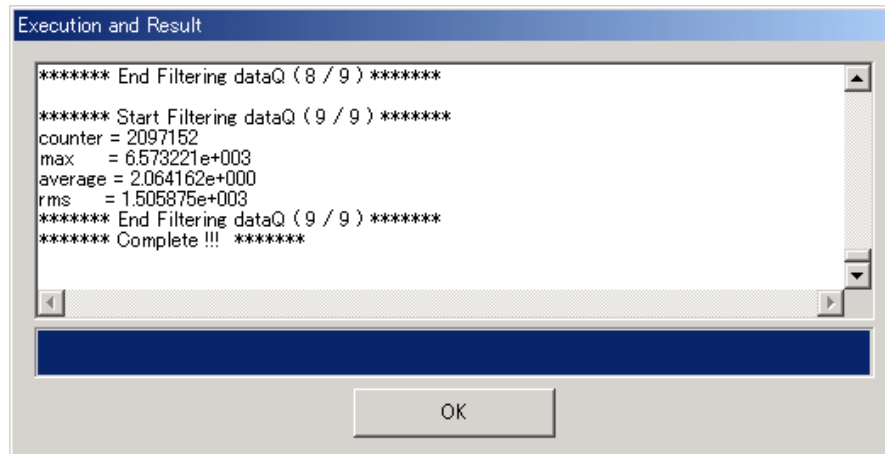
Generating Waveform: Calculation

Based on the preset parameter, the waveform pattern file for MG3700A is generated.

Calculation: Creates waveform pattern



Calculation: Creates waveform pattern



Execution of the above-mentioned "waveform pattern generation" displays the Execution and Result screen on the left.

Waveform generation is terminated when the message "Calculation Completed" appears on the Execution and Result screen.

A signal will be outputted when xxx.wvi and xxx.wvd of the generated file are transmitted to MG3700A and the waveform pattern file "xxx" is chosen in MG3700A.

(Reference) MG3700A waveform data Lineup

These waveform patterns are contained in the standard 1xEV-DO waveform pattern file of MG3700A.

(Please refer to the MX370x series software catalog for details.)

Access terminal (AT) receiver test
CDMA2000 1xEV-DO forward
Base band filter: IS-95SPEC +EQ
Data: PN15fix* (except 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
Base band 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

* PN sequence cut off for every packet is shown.
For this reason, PN sequence is discontinuous
between frames.

Ordering information

Model/Order No.	Name	Remarks	
— Mainframe —			
MG3700A	Vector Signal Generator		Required
— Options —			
MG3700A-002	Mechanical Attenuator	Standard Electron Attenuator is changed into Mechanical Attenuator.	
MG3700A-011	Upper Frequency 6 GHz	Standard “250 kHz to 3 GHz” is extended to “250 kHz to 6 GHz.”	
MG3700A-021	ARB Memory Upgrade 512 M sample	Standard “128 Msample/channel × 2” is extended to “256 Msample/channel × 2.”	Recommendation
MG3700A-031	High Speed BER Test Function	Standard “1 kbps to 20 Mbps” is extended to “100 bps to 120 Mbps.”	
— Softwares (License Key for IQproducer system) —			
MX370103A	1xEV-DO IQproducer		Required
— Optional accessories —			
W2495AE	MG3700A operation manual	Booklet	Recommendation 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	
W2505AE	MX370104A Multi-carrier IQproducer operation manual	Booklet	
J1261D	Ethernet Cable (Shield Type)	Cross, 3 m	Recommendation Required when PC connected directly to MG3700A by LAN.
Z0777	Standard waveform pattern upgrade kit	DVD set of pre-install wave form pattern of latest version	
G0141	HDD ASSY	Exchange HDD when built-in HDD break.	
J1277	IQ Output Conversion Adapter	Cable that converts IQ output connector (D-sub) of mainframe into BNC	Recommendation Converts IQ output connector on back of MG3700A from D-sub to BNC.

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