Anritsu

MX370102A
TDMA IQproducer™

MG3700A
Vector Signal Generator

For MG3700A Vector Signal Generator

MX370102A
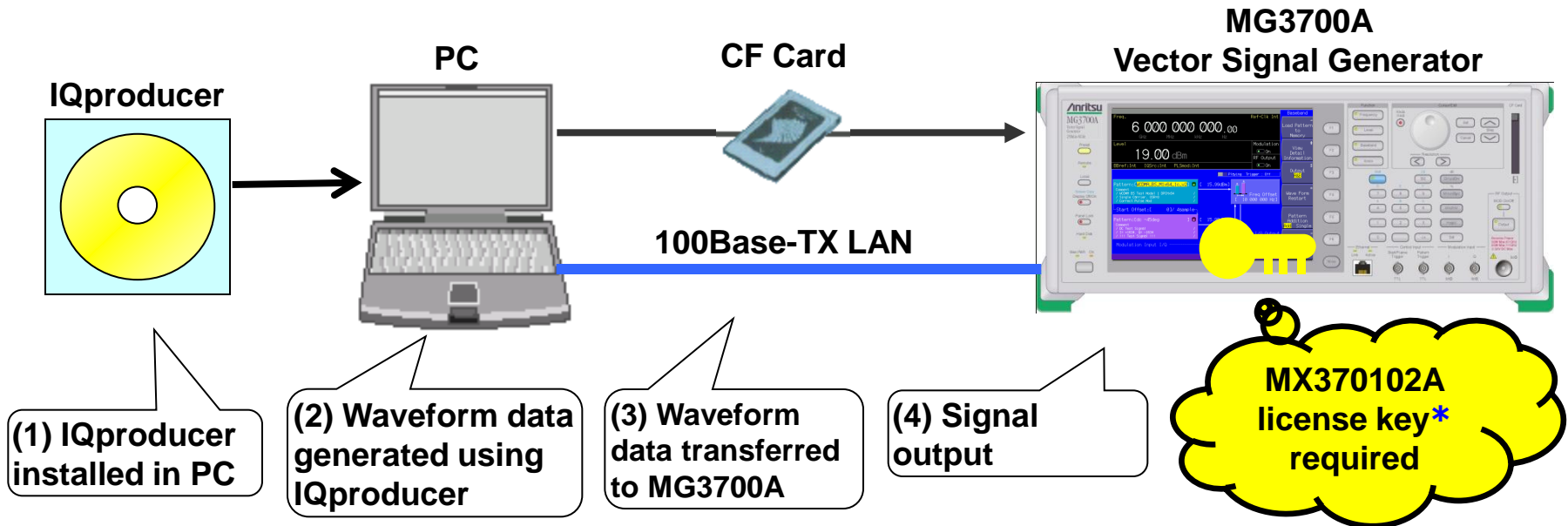# TDMA IQproducer™
Product Introduction

Version 9.00

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What is TDMA IQproducer?

MX370102A is **the PC software that enables to generate various waveform patterns** **complying with TDMA system.**
Parameters are set freely with the MX370102A software installed in a PC and the waveform patterns for MG3700A are generated. The generated waveform pattern can be transferred to the mainframe of MG3700A via a CF card or a LAN, and the MG3700A mainframe can output the desired signal by selecting a waveform pattern.

IQproducer

PC

CF Card

MG3700A
Vector Signal Generator

100Base-TX LAN

(1) IQproducer installed in PC

(2) Waveform data generated using IQproducer

(3) Waveform data transferred to MG3700A

(4) Signal output

MX370102A license key* required

*: Install the license key file in the main frame when adding a system license to a shipped unit. The MG3700A main frame does not require return to the factory.

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What is TDMA IQproducer?

TDMA IQproducer is the PC software that **enables to generate the waveform data freely** by the combination of [Modulation type], [Data] and [Filter] below. Refer to the following pages for other parameters.

Modulation type

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

Data

PN9
PN15
16-bit Pattern
ALL0
ALL1
UserFile

Note) PN20 and PN23 are not supported.

Filter

Nyquist
RootNyquist
Gaussian
Gaussian2
IdealLowpass
None
ARIB STD-T98
ARIB STD-T102Part1
Half-sine
User defined filter

- **Generating waveform patterns using MX3701xxA => The main frame requires a license.**
The 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.
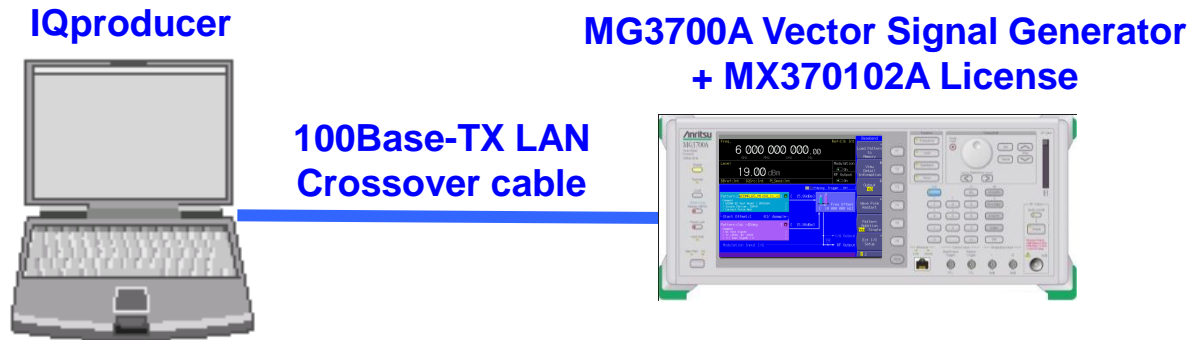- **Generating waveform patterns using EDA Tools (C, MATLAB, Microwave Office) => Free license**

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MX370102A-E-I-1

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Setup

Connect the MG3700A and PC as shown below.

Install IQproducer in the PC.

Install the MX370102A license key in the MG3700A.

IQproducer

MG3700A Vector Signal Generator + MX370102A License

100Base-TX LAN Crossover cable

*Refer to the appendix [IQproducer Upgrade Procedure] for the installation method of IQproducer.

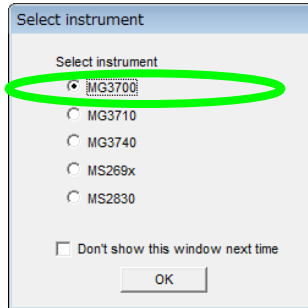*Refer to the appendix [Connection to LAN] for the LAN connection between a PC and the MG3700A.

Starting IQproducer

Start IQproducer as follows:
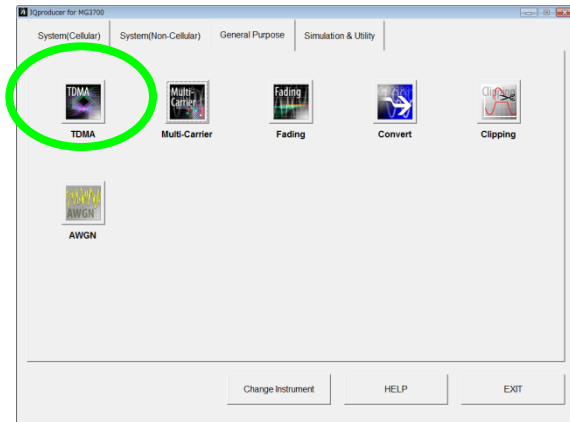**Start > Program > Anritsu Corporation > IQproducer**

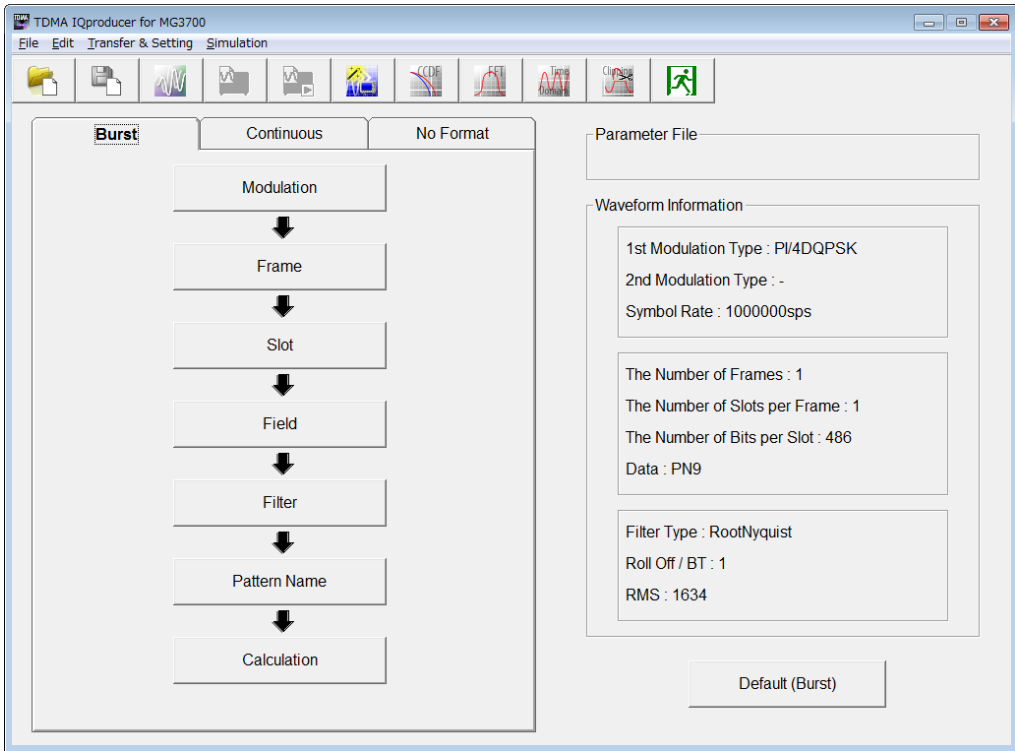# Select MG3700A

Select MG3700A and click [OK].

IQproducer Main Screen

The following screen is displayed when IQproducer starts.
Choose TDMA from the [General Purpose] pull-down menu.

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Main screen

When TDMA is selected, a main screen is displayed for parameter setting of [Modulation], [Frame], [Slot], [Field], [Data], [Filter], [Pattern Name] and [Calculation].
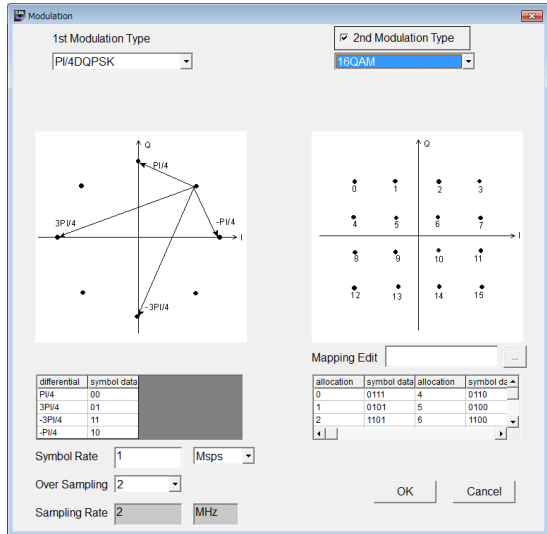

Also, setting item button varies depending on the parameter setting sheet. The relationship between item buttons and parameter setting sheets is as follows.

Item button	Parameter setting sheet		
	Burst	Continuous	No Format
Modulation	√	√	√
Frame	√	√	---
Slot	√	√	---
Field	√	√	---
Data	---	---	√
Filter	√	√	√
Pattern Name	√	√	√
Calculation	√	√	√

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Modulation

"Modulation" is an item for setting
"Modulation Type",
"Symbol Rate",
"Over Sampling",
"Sampling Rate",
"GSM",
"Modulation Index",
"Manchester Code",
and "Maximum frequency deviation".

Display	Outline	Setting range
Modulation Type (1st Modulation Type)	1st Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, O-QPSK, DQPSK, PI/4DQPSK, 8PSK*, D8PSK*, 16QAM*, 32QAM*, 64QAM*, 256QAM*, ASK, 2FSK, 4FSK* **(*: The decimal numbers corresponding to each symbol point can be changed by selecting a user file for IQ mapping.)**
Modulation Type (2nd Modulation Type)	2nd Modulation Type	BPSK, DBPSK, PI/2DBPSK, QPSK, DQPSK, PI/4DQPSK, 8PSK, D8PSK, 16QAM, 32QAM, 64QAM, 256QAM
Symbol Rate	Symbol Rate	1 ksps to 80 Msps (can be set in the 1 sps units)
Over Sampling	Over Sampling Rate	2, 3, 4, 8, 16, 32
Sampling Rate	Sampling Rate	20 kHz to 160 MHz (The value of *symbol rate x oversampling rate* is automatically set. When the Manchester code setting is enabled, however, the value of *symbol rate x oversampling rate x 2* is automatically set.)
GSM	Setting of GSM	Enable/disable the automatic setting in accordance with GSM. (When 8PSK or 2FSK is set for the modulation type, this function can be selected.)
Modulation Index	Modulation Index	0.00 to 1.00 (for ASK), 0.20 to 10.00 (for 2FSK)
Manchester Code	Manchester Code	The Manchester code is selected when this checkbox is selected, and NRZ is selected when this checkbox is cleared. NRZ is always selected for modulation types other than ASK.
Maximum frequency deviation	Maximum frequency deviation	120 to 2100 (When 4FSK is set for the modulation type, this function can be selected. Multiples of 3.)

Frame

"Frame" is an item for setting "The Number of Frames", "The Number of Slots per Frame" and the transmission state of a slot (ON or OFF). This item button is not included in "No Format".

Setting range: 1 to 4088, Auto

Setting range: 1 to 20

Transmission state (ON or OFF) is selected for a slot to be used.
It is impossible to set the transmission state to OFF for all slots that are used.
Transmission OFF slot is ALL1 in "Continuous".

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Slot (1/2)

"Slot" is an item for setting the slot format. This item button is not included in "No Format". "Slot" in "Burst" and "Slot"in "Continuous" vary.

The specified slot format is common in all transmission ON slots. One slot can be divided into 24 fields at max., and the number of bits in each field and the field type ("Guard", "Ramp", "Fixed", "Data", "CRC") are specified. The field in which 0 bit is specified is regarded as a nonexistent field. When the [Apply] button at the bottom of the screen is clicked after parameter setting, "Slot Format" diagram at the top of the screen is displayed according to the setting.

Slot (2/2)

Item	Display	Description	Setting range
Slot (Burst)	1st & 24th fields	Guard field	The number of bits in appendix is specified depending on the"Modulation Type".
	2nd & 23rd fields	Ramp field	The number of bits in appendix is specified depending on the"Modulation Type".
	3rd to 22nd fields	Fixed(fixed data) field	0 to 128 of integers is specified.
	3rd to 22nd fields	Data(PN9,PN15)field	0 to 1024 of integers is specified.
	4th to 22nd fields	CRC(cyclical redundancy check) field	0, 8, 12, 16, 24, 32
Slot (Continuous)	1st to 24th fields	Fixed(fixed data) field	0 to 128 of integers is specified.
	1st to 24th fields	Data(PN9,PN15)field	0 to 1024 of integers is specified.
	2nd to 24th fields	CRC(cyclical redundancy check) field	0, 8, 12, 16, 24, 32

Guard field

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

Ramp field

Modulatio Type	Number of bits
BPSK, DBPSK, PI/2DBPSK, ASK, 2FSK	Integers (1 to 16)
QPSK, O-QPSK, DQPSK, Pi/4DQPSK, 4FSK	Multiples of 2 (2 to 32)
8PSK, D8PSK	Multiples of 3 (3 to 48)
16QAM	Multiples of 4 (4 to 64)
32QAM	Multiples of 5 (5 to 80)
64QAM	Multiples of 6 (6 to 96)
256QAM	Multiples of 8 (8 to 128)

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Field (1/3)

"Field" is an item for setting the contents in each field of transmission ON slots. This item button is not included in "No Format".


Similarly to the slot parameter setting screen, the slot format diagram is displayed at the top of the screen and a slot to be specified can be selected from a combo box at the upper left. Field number, the number of bits in each field and field type are displayed in the middle of the screen. Text boxes are displayed next to "Fixed" field and "CRC" field. The content of "Data" field is specified in the setting area of "Data Field" under the slot format diagram.

Continuous pattern is selected from a combo box in the "Data Field" setting area. Only when "16-bit Pattern" is selected, a text box will appear in the "Data Field" setting area and any "16-bit Pattern" can be entered in hexadecimal.
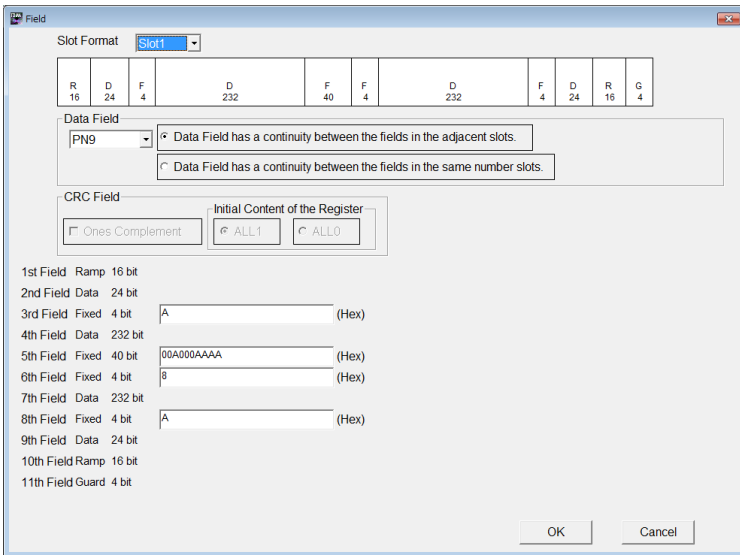
| Item	Display	Description	Setting range
Field (Burst/Continuous)	Slot Format	Select from the list box a slot whose field is to be set.	Slots whose transmission status is set to ON in the Frame setting screen (transmission-ON slots).
	Fixed	Fixed data is specified in hexadecimal.	0 ~ Max.value within the specified number of bits
	CRC	CRC calculation area is specified in integers.	1 ~ Total number of bits in the fields to the left of CRC (except the Guard and Ramp portion)
	Data Field	Continuous pattern is selected.	PN9, PN15, 16-bit Pattern, ALL0, ALL1, UserFile (Any hexadecimal number is entered in "16-bit Pattern".)

Field (2/3)
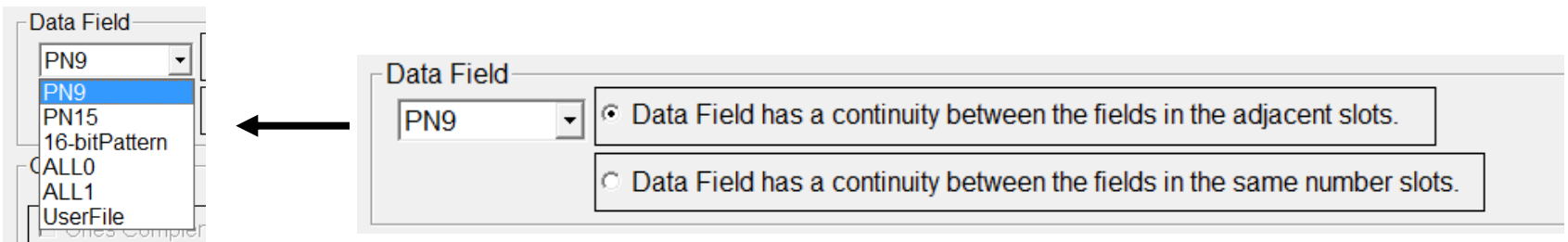
Data Field has a continuity between the fields in the adjacent slots.
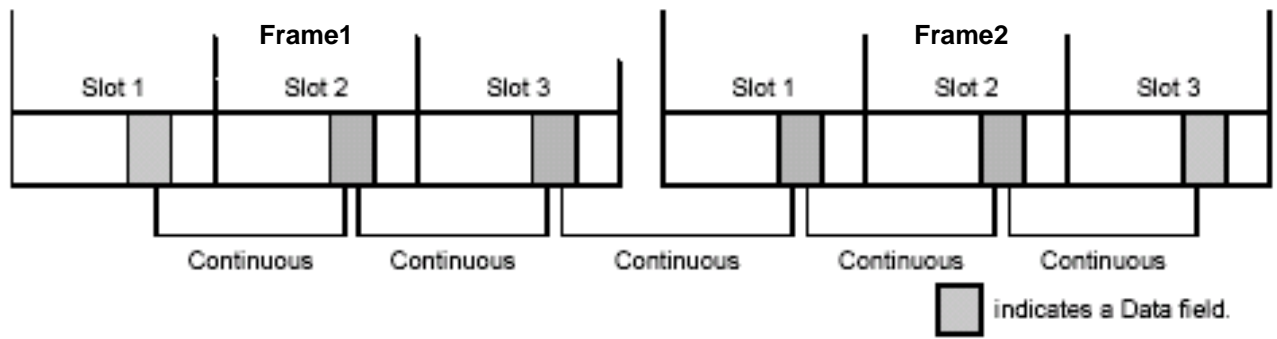
Data Field has a continuity between the fields in the same numbers slots.
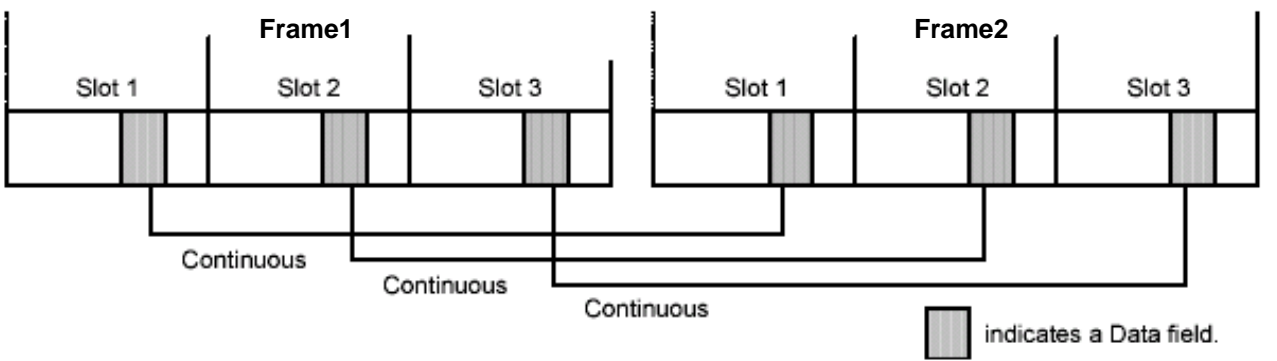
Field (3/3)
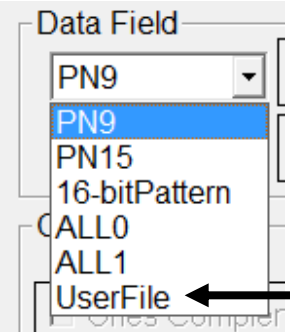
When "UserFile" is selected in the Data Field list box, a screen for selecting a user file for continuous pattern is displayed, enabling to load a user-defined bit string other than the provided selection items.
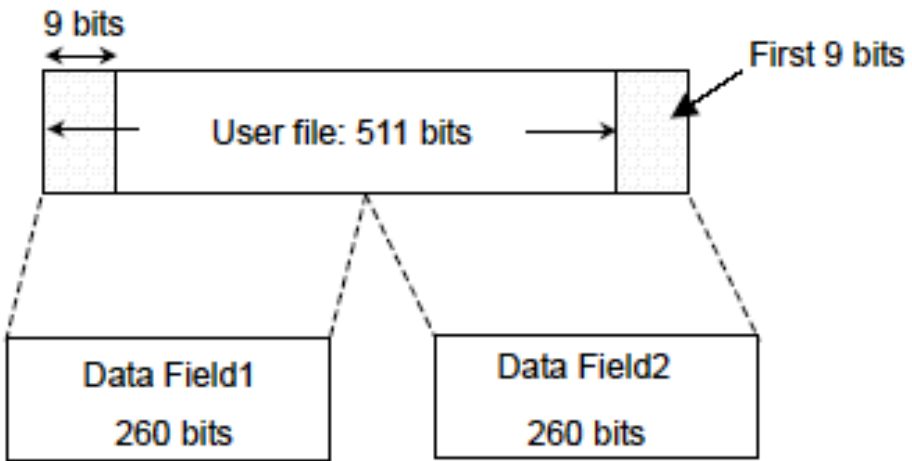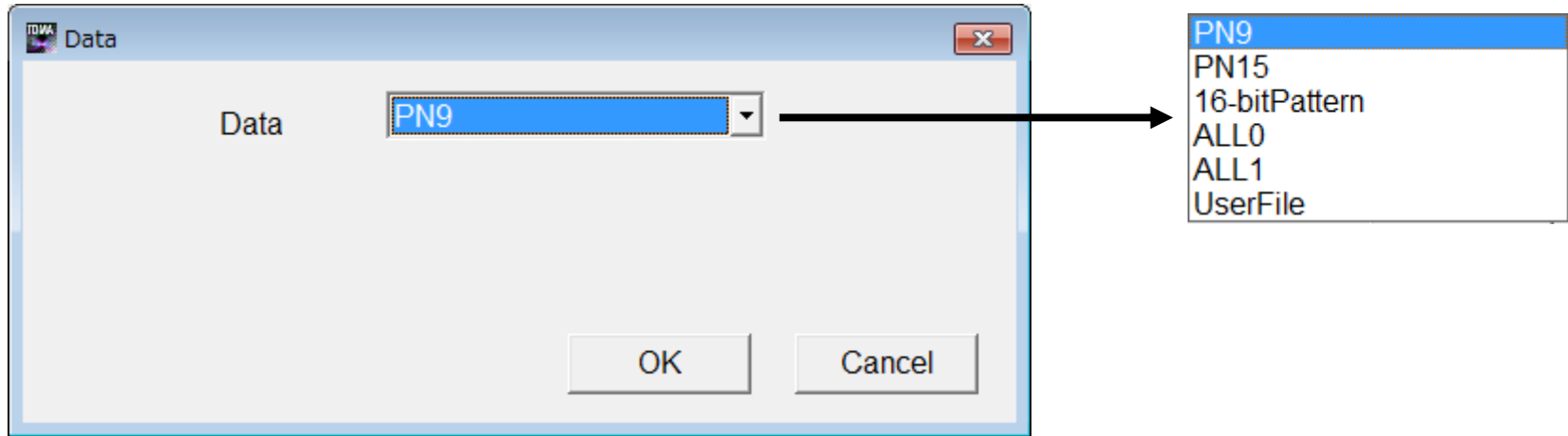

Fig.1

Describe binary sequences before modulation. Only 0, 1 and line feed characters can be used and any comma or space causes loading error. Up to 9600000 bits can be loaded. When the total number of bits in the Data Field exceeds the number of binary number bits in the user file, the rest are inserted from the top of the user file again, as shown in Fig_1. When the checkbox "Auto" is selected for the Number of Frames in the Frame setting screen and the continuous pattern is set to "UserFile" in the Data Field area of the Field setting screen, the number of frames is automatically set to 1 or a value that retains the phase continuity only.

Data

"Data" is an item for setting continuous patterns such as pseudo random patterns (PN9, PN15) in the "No Format" waveform pattern. This item button is not included in "Burst" and "Continuous".

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Filter (1/4)

Filter: (Depending on the Modulation Type setting)
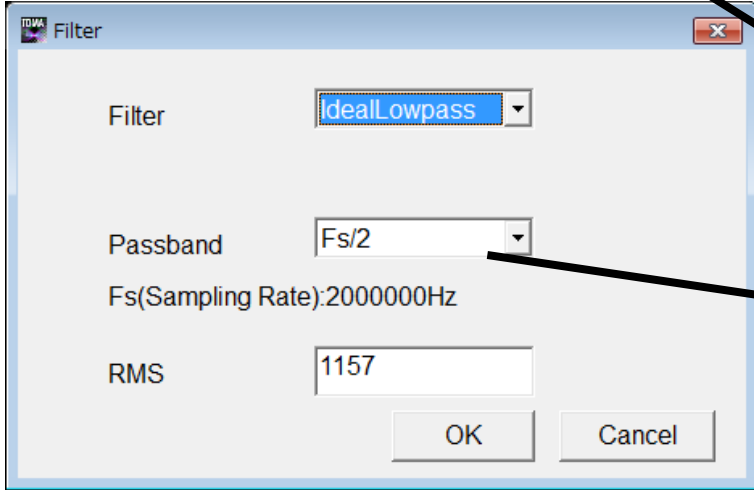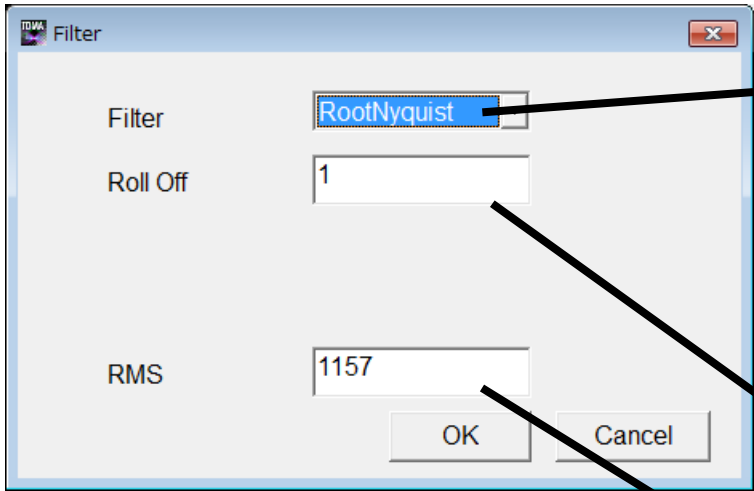
> **"Filter" is an item for setting filters.**

(O-QPSK)

```
Nyquist
RootNyquist
Gaussian
IdealLowpass
None
Half-sine
Gaussian2
User defined filter
```

(4FSK)

```
Nyquist
RootNyquist
Gaussian
IdealLowpass
None
ARIB STD-T98
ARIB STD-T102 Part1
Gaussian2
User defined filter
```

(excluding O-QPSK/4FSK)

```
Nyquist
RootNyquist
Gaussian
IdealLowpass
None
Gaussian2
User defined filter
```

Filter — RootNyquist

Roll Off — 1

RMS — 1157

OK   Cancel

Filter — IdealLowpass

Passband — Fs/2

Fs(Sampling Rate):2000000Hz

RMS — 1157

OK   Cancel

Roll-off rate of a filter:
0.10 to 1.00（When Nyquist/ RootNyquist/ Gaussian/ Gaussian2 is set.)
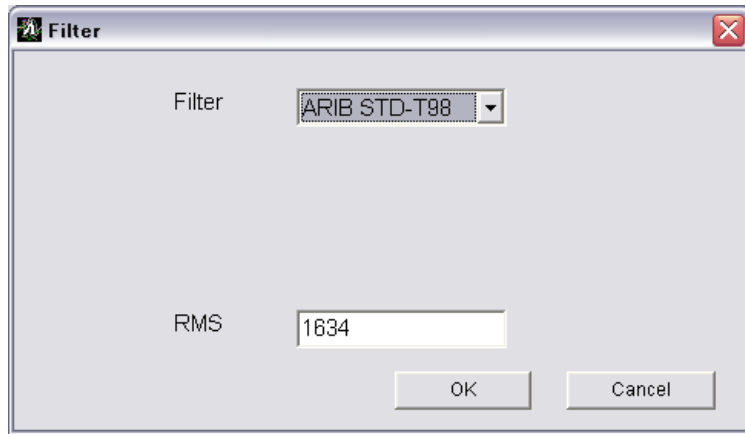
RMS value of a waveform pattern:
651 to 4104 (RF output level accuracy of this instrument is defined by RMS value between 1157 and 1634.)

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 for the filter type. The setting range varies depending on the oversampling rate.)

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Filter (2/4)

ARIB STD-T98/T102 can only be selected if 4FSK is specified for Modulation Type on the Modulation setting screen. The ARIB STD-T98/T102 filter is specified for the four-frequency shift keying of the ARIB STD-T98/T102 standards and has the configuration shown in the following figure.
Here, H(f) is the RootNyquist function, and P(f) is the sinc function (T98) or Gauusian function (T102).
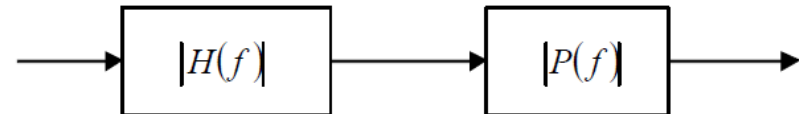
$$ \longrightarrow \boxed{|H(f)|} \longrightarrow \boxed{|P(f)|} \longrightarrow $$

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Filter (3/4)

The impulse response equation is different for Gaussian and Gaussian2.
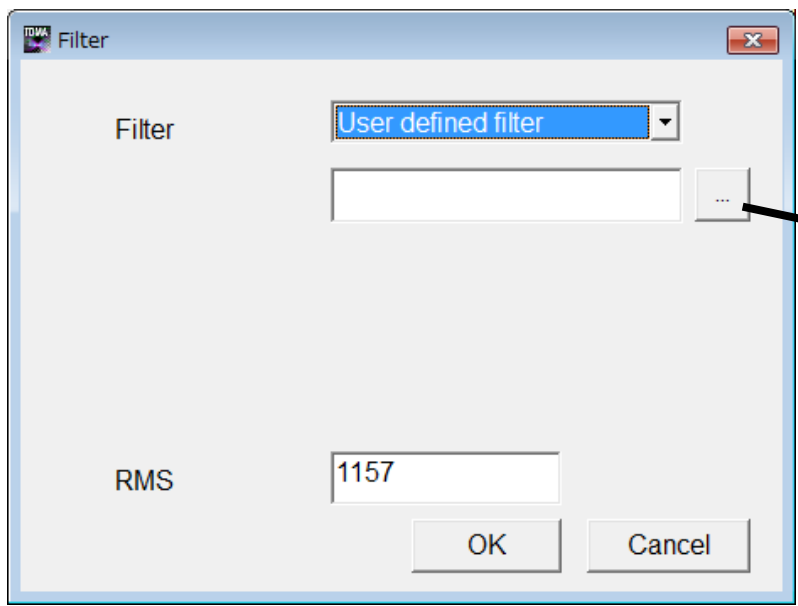Select according to the measurement conditions.

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Filter (4/4)

The User defined filter setting sets a user-created finite impulse response (FIR) filter file.

Select user file

The user file format:
-Each filter coefficient should be separated by an ASCII-format return key stroke. (Commas, spaces, and tabs are read as errors.)
-There must be a FIR filter coefficient string expressed as a time response (real number).
-The filter coefficient tap number must be an odd number from 1 to 1023.

User file setting example
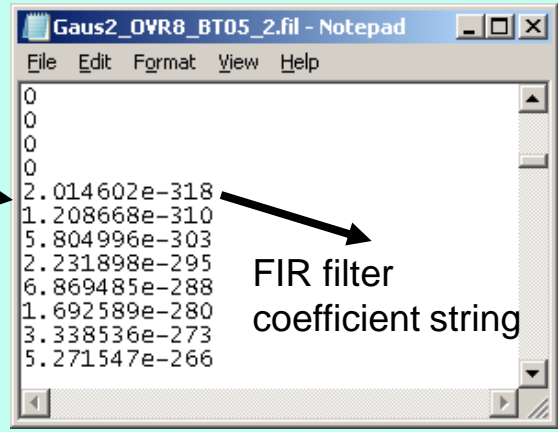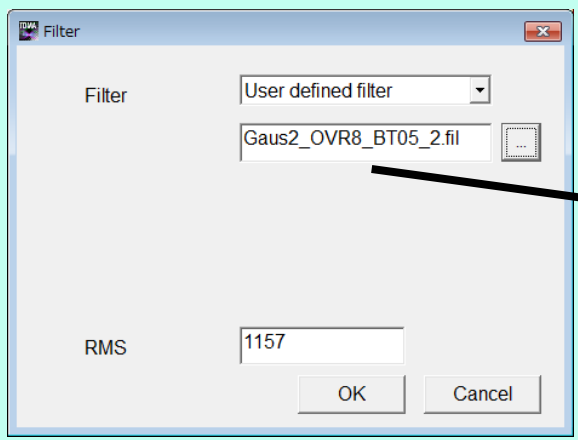
Line number: Odd number in range from 1 to 1023

FIR filter coefficient string

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Pattern Name

"Pattern Name" is an item for setting the file name of a waveform pattern.

Package name: 31 characters or less

File name of a waveform pattern: 20 characters or less

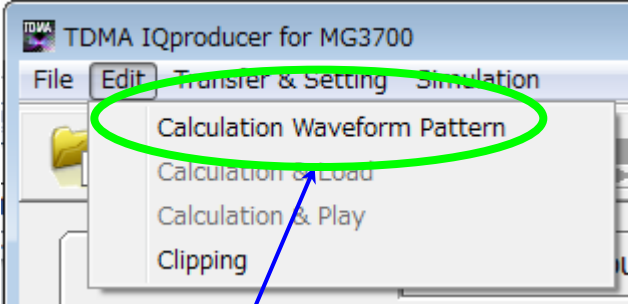Comment field that is displayed on the screen of this instrument: 38 characters or less

Generating Waveform: Calculation

Click the [Calculation] icon to start creation of the waveform pattern after setting the parameters.
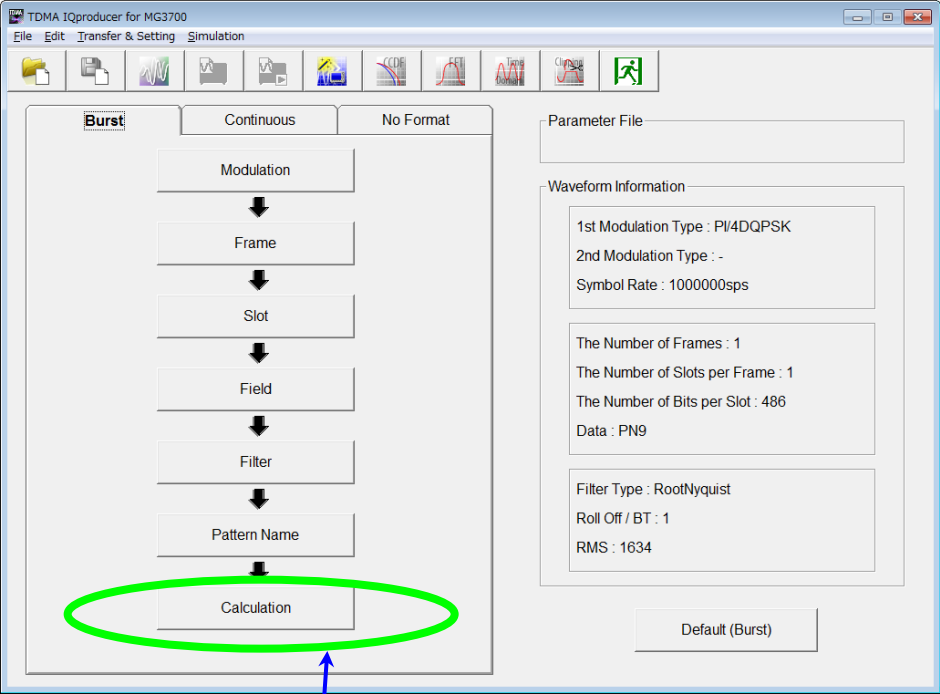
Calculation: Creates waveform pattern

Calculation: Creates waveform pattern
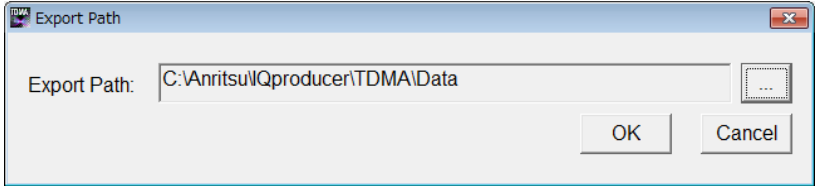
File export destination folder

Transferring Waveform Pattern

Connect the MG3700A and PC via a LAN.

TDMA IQproducer for MG3700

File   Edit   Transfer & Setting   Simulation

Transfer & Setting Wizard

TDMA IQproducer for MG3700

File   Edit   Transfer & Setting   Simulation

Transfer & Setting Wizard

Transfer & Setting Wizard

Transfer & Setting Wizard (Step 1/2)

Input instrument name (Host name) or address and push connect button to connect to new instrument.

Target instrument

MG3700   MG3710/40

Instrument name (Host name) or Address:

Advanced

〈 戻る(B)   次へ(N) 〉   Close
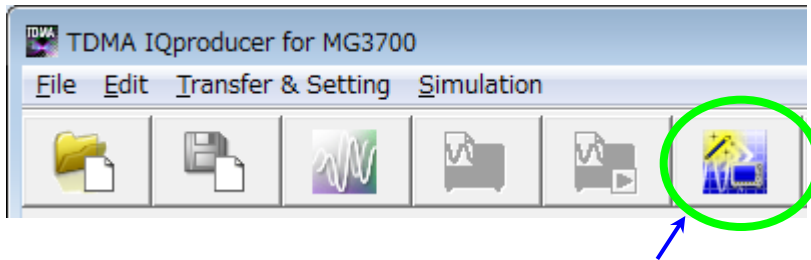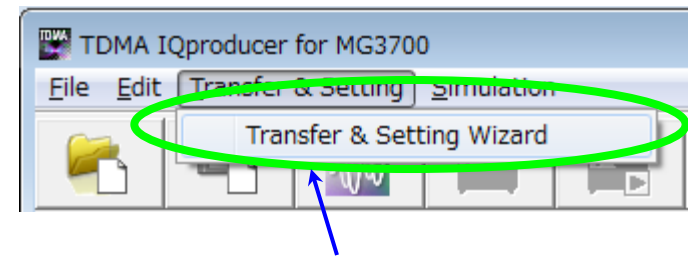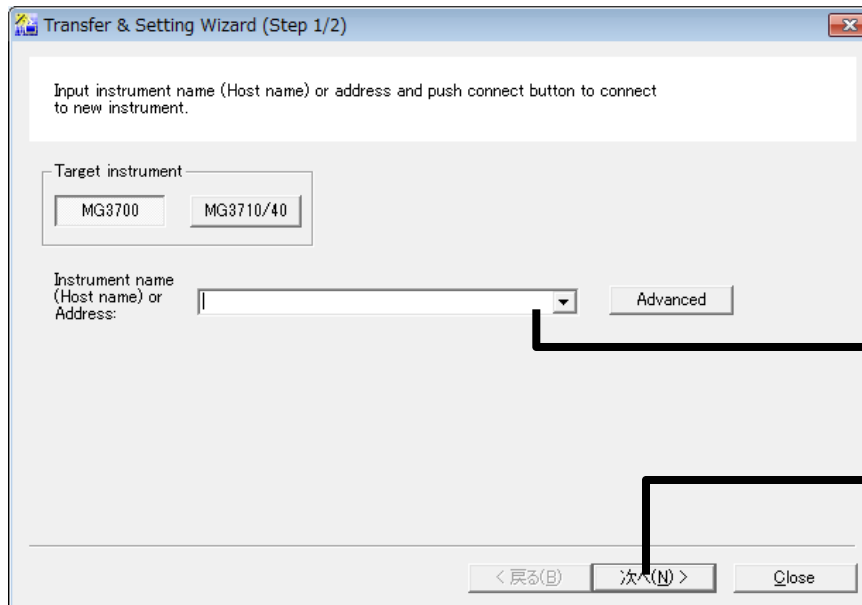
Input name or IP address of MG3700A.

Connects to LAN

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

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Transferring Waveform Pattern
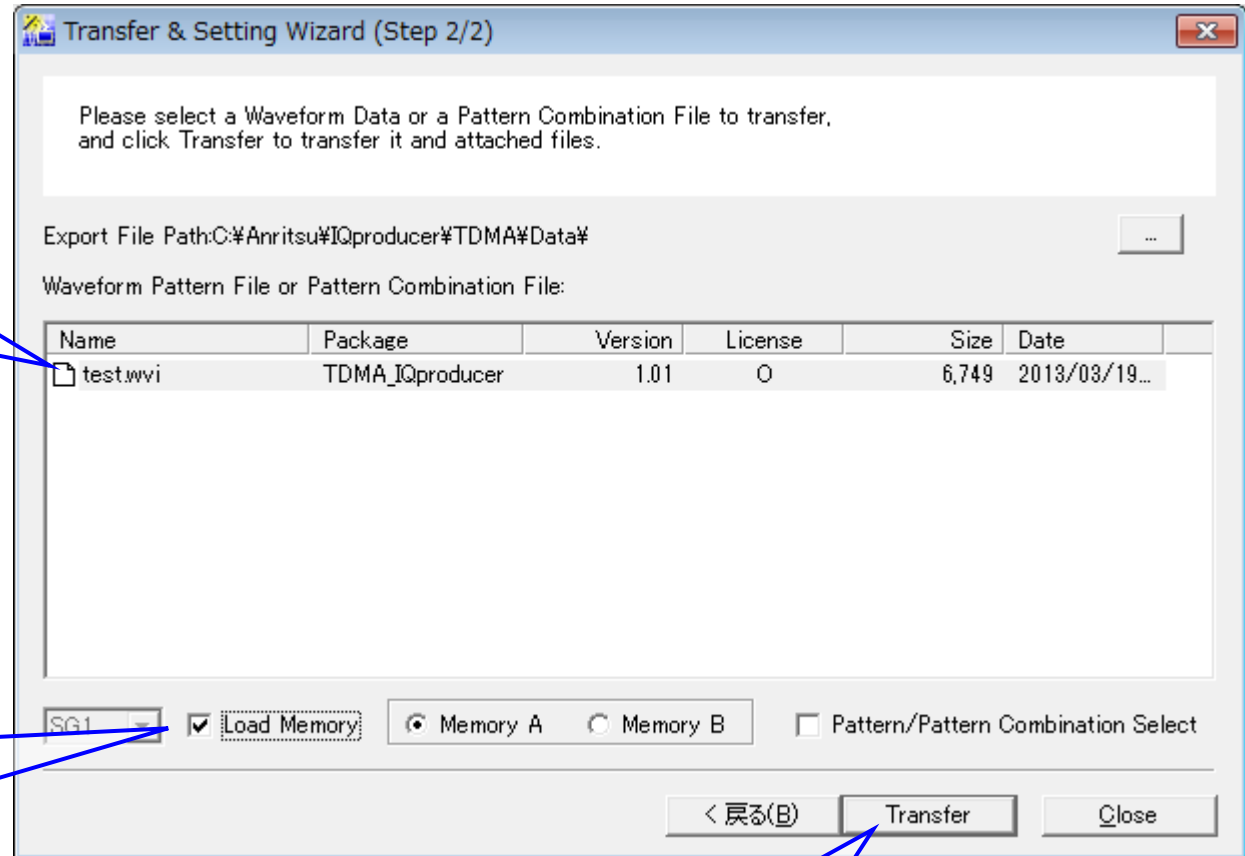
Select waveform pattern saved on MG3700A HDD.

Select when loading waveform pattern into memory at same time as transferring.

Starts transfer

Transfer & Setting Wizard (Step 2/2)

Please select a Waveform Data or a Pattern Combination File to transfer, and click Transfer to transfer it and attached files.

Export File Path:C:¥Anritsu¥IQproducer¥TDMA¥Data¥

Waveform Pattern File or Pattern Combination File:

Name	Package	Version	License	Size	Date
test.wvi	TDMA_IQproducer	1.01	O	6,749	2013/03/19...

SG1 ☑ Load Memory ⊙ Memory A ○ Memory B ☐ Pattern/Pattern Combination Select

< 戻る(B)   Transfer   Close

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[Merit] Wanted Signal + Interference Signal

Waveform combine function <Standard>

The MG3700A has two built-in arbitrary waveform memories for saving one waveform pattern each. The MG3700A can output the signal of either one of the memories, and can also combine and output both signals simultaneously.

<Present system>
Case with popular signal generator

Modulated interference signal

DUT

Combiner

Wanted signal

Easy level ratio setting
- Setting of each level
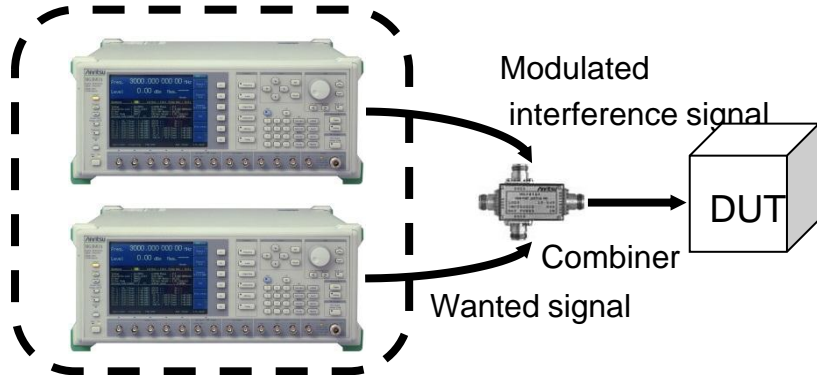- C/N setting

Memory A: Wanted signal

Memory B: Interference signal

Frequency offset
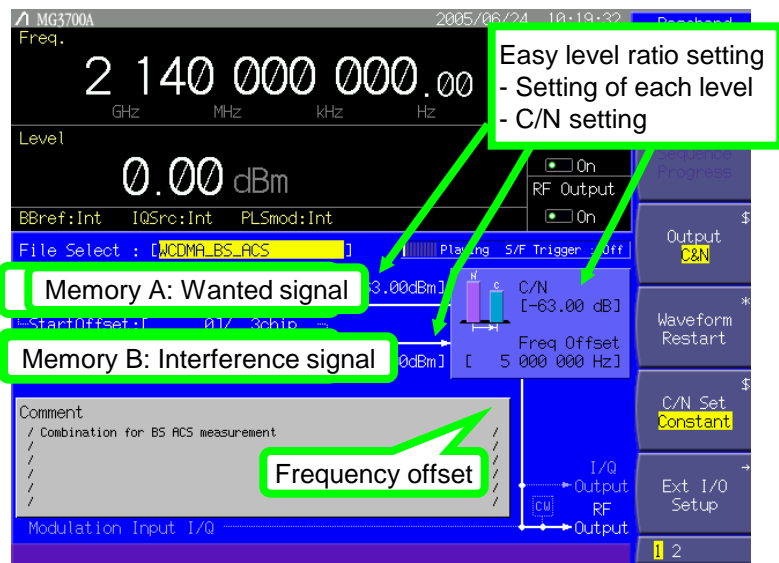
MG3700A Setting screen sample

MG3700A
MG3700A Vector Signal Generator

Wanted signal + Interference signal

DUT
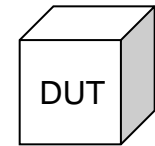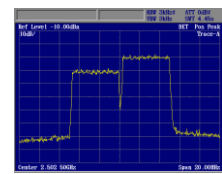
Merit 1: One MG3700A unit outputs two signals
Merit 2: No external combiner
Merit 3: Easy level adjustment

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Specifications are subject to change without notice.

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