Product Introduction

MX370102A/MX269902A

TDMA IQproducer

MG3710A
Vector Signal Generator

MS2690A/MS2691A/MS2692A/MS2830A
Signal Analyzer

MG3710A Vector Signal Generator

MS269xA-020, MS2830A-020/021 Vector Signal Generator option for MS269xA/MS2830A Signal Analyzer

MX370102A/MX269902A

TDMA IQproducer
Product Introduction

MG3710A
Vector Signal Generator

MS269xA
Signal Analyzer

MS2830A
Signal Analyzer

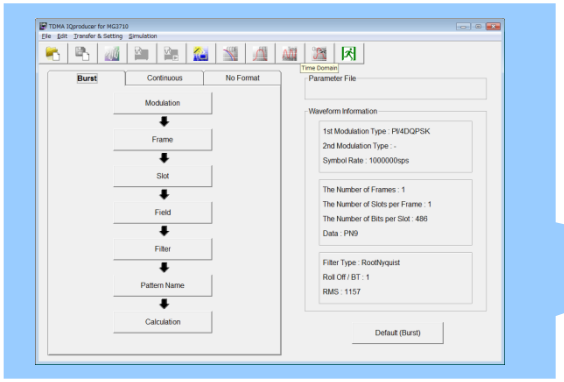
Version 3.00

ANRITSU CORPORATION

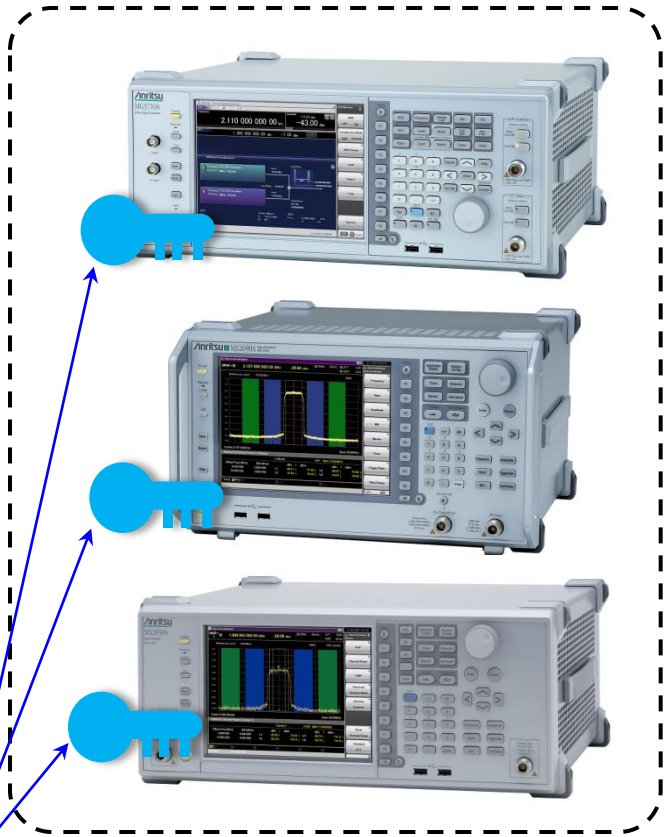
What is TDMA IQproducer?

TDMA IQproducer is PC software for generating TDMA waveform patterns. The software runs under Windows installed in the MG3710A, MS2690A/91A/92A-020 and MS2830A-020/021. It outputs modulation signals by selecting generated waveform patterns. A license is required for the main frame to output signals.

TDMA IQproducer



Install



- **Generating waveform patterns using TDMA IQproducer => The main frame requires a license.**
  The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed SG cannot output signals because it does not recognize the waveform patterns.
- **Generating waveform patterns using EDA Tools (C, MATLAB, Microwave Office) => Free license**

What is TDMA IQproducer?

TDMA IQproducer is PC software for generating waveform data by combining [Modulation type], [Data] and [Filter] shown below.

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.

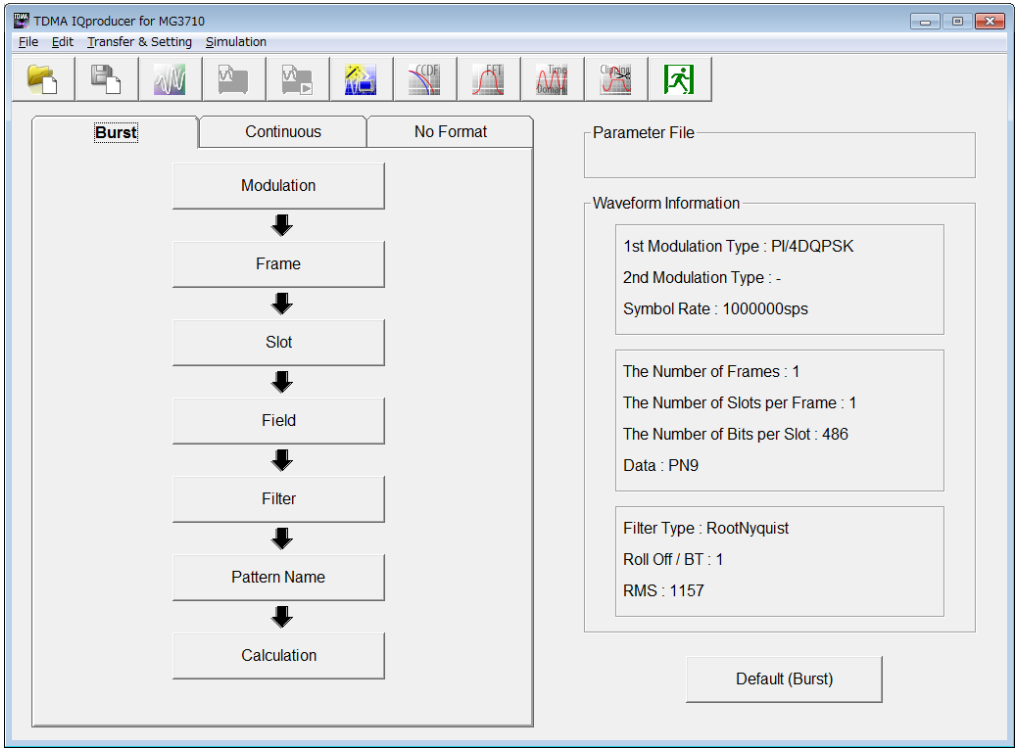
Filter

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

***Read the "MX3701xxA IQproducer" and "MX269xxxA series Software" brochure for detail parameter setting range.**

Parameter Editing: Main Screen

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

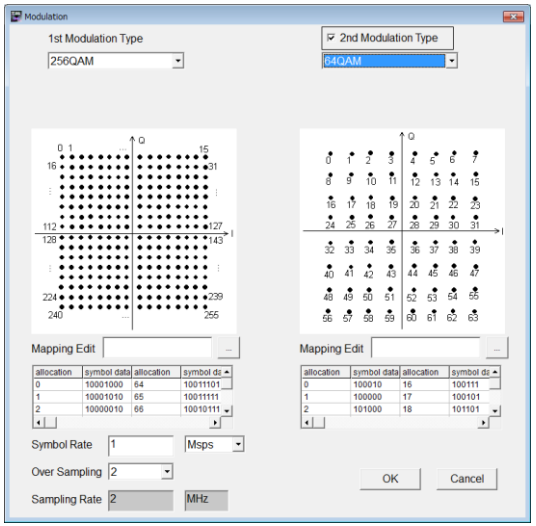


The setting buttons vary, depending on the parameter setting sheet. The relationship between item buttons and parameter setting sheets is as follows.

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

Modulation

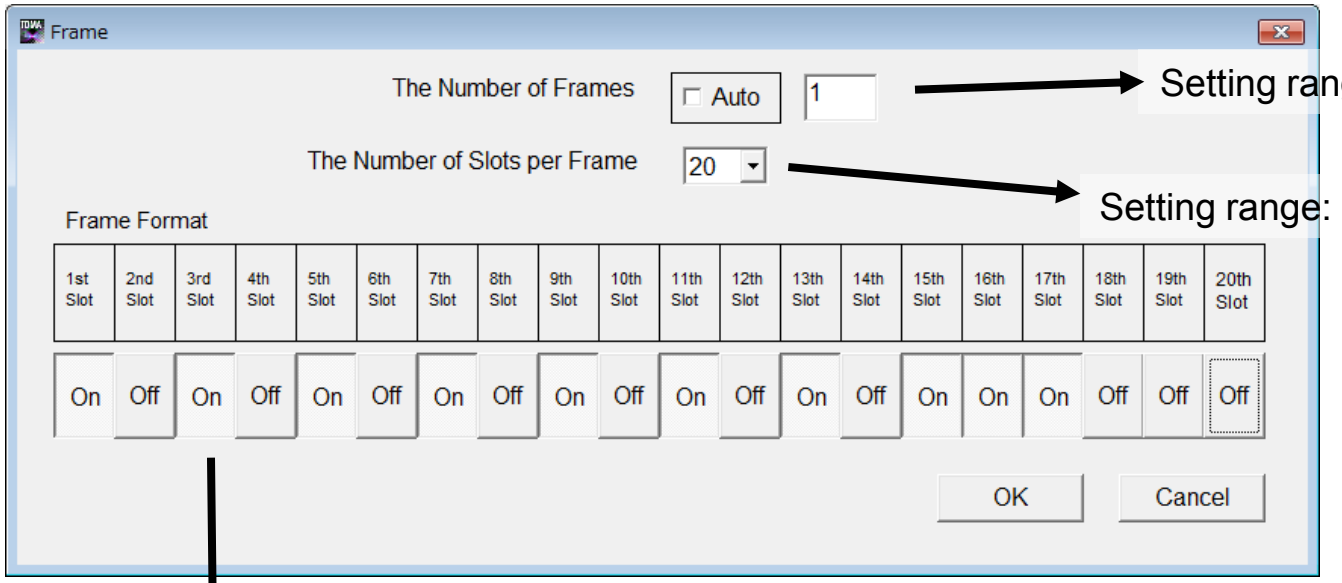
"Modulation" is an item for setting
"Modulation Type",
"Symbol Rate",
"Over Sampling",
"Sampling Rate",
"GSM",
"Modulation Index",
"Manchester Code",
and "Maximum frequency deviation".



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

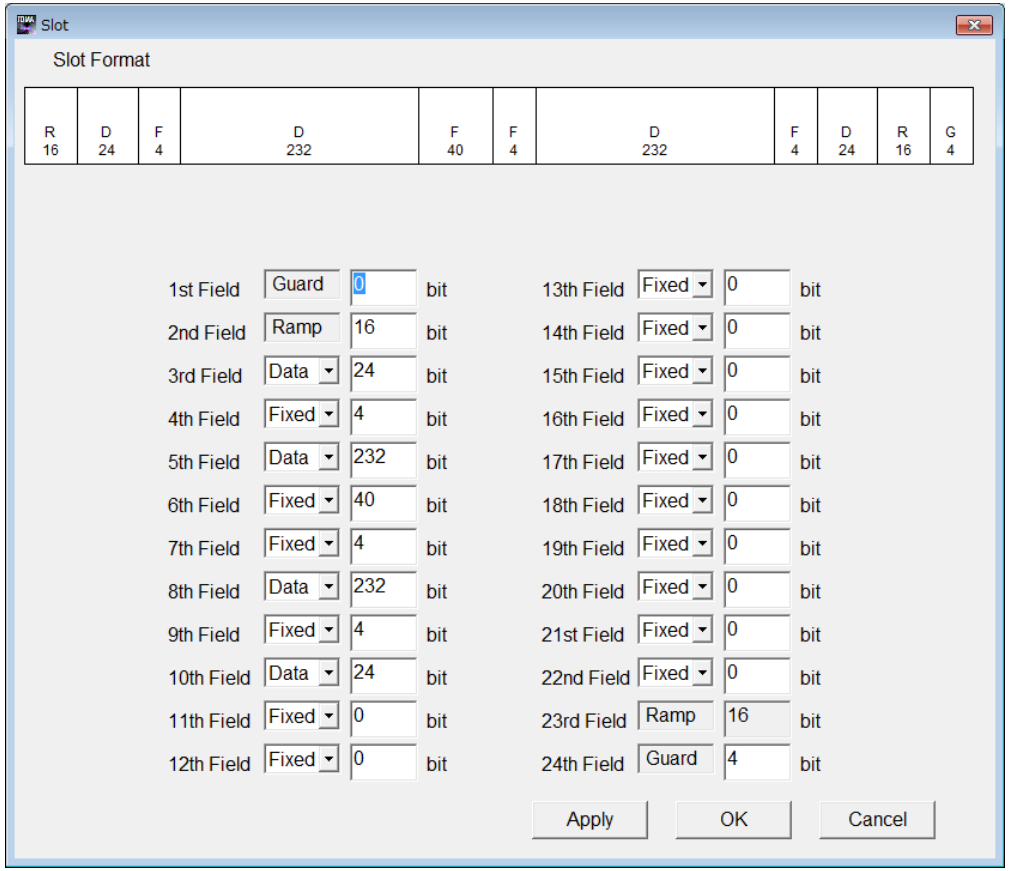
"Frame" is the item for setting "The Number of Frames," "The Number of Slots per Frame," and the slot transmission state (ON or OFF). This button is not displayed at "No Format".



Transmission state (ON or OFF) is selected for a slot to be used.
The transmission state cannot be set to OFF for all used slots.
Transmission OFF slot is ALL1 at "Continuous".

Slot (1/2)

“Slot” is the item for setting the slot format. This button is not displayed at “No Format”. “Slot” is different at “Burst” and “Continuous”.



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

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

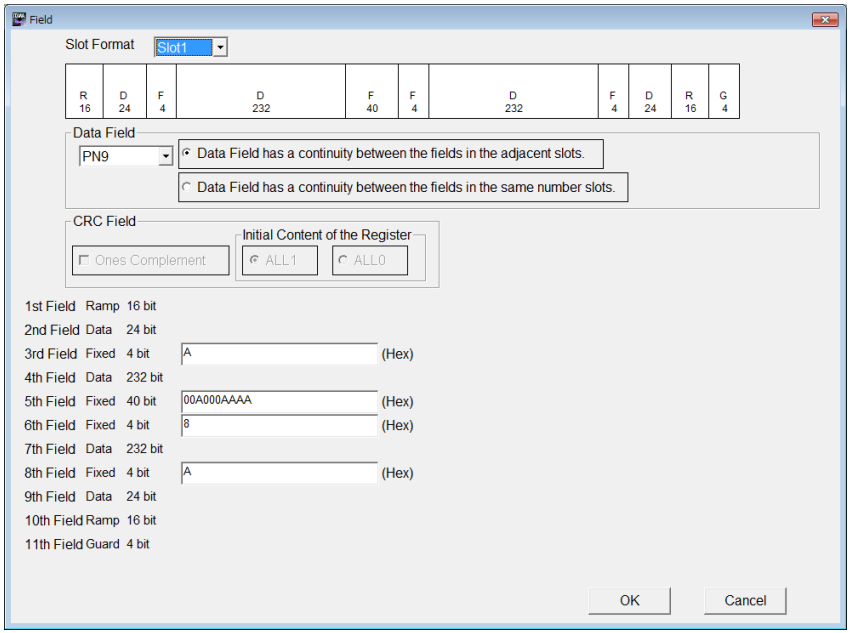
Modulation Type	Number of Bits in 1st Field	Number of Bits in 24th Field
BPSK, DBPSK, PI/2DBPSK, ASK, 2FSK	Integer number betw een 0 and 9960	Integer number betw een 0 and 9960
QPSK, O-QPSK, DQPSK, PI/4DQPSK, 4FSK	Multiples of 2 betw een 0 and 9960	Multiples of 2 betw een 0 and 9960
8PSK, D8PSK	Multiples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

Field (1/3)

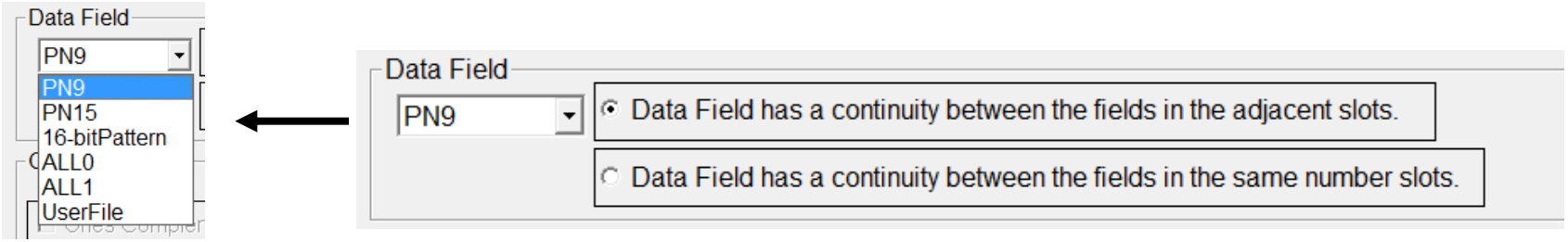
"Field" is the item for setting the contents in each field of transmission ON slots. This button is not displayed at "No Format".



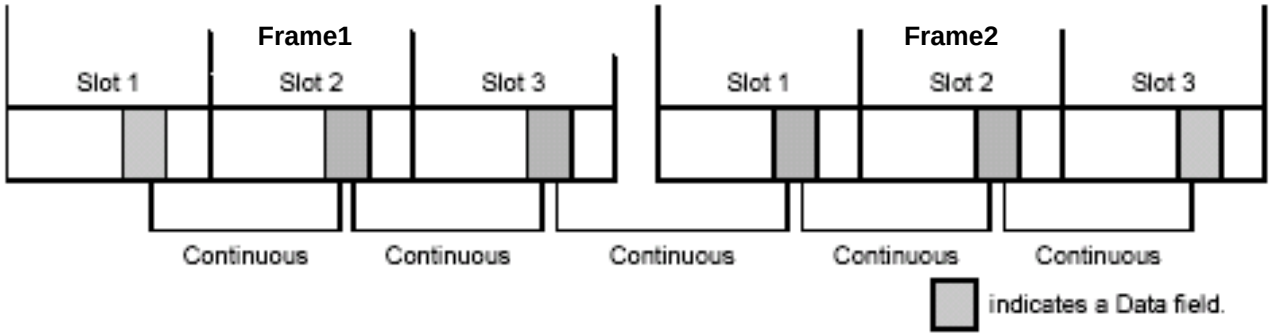
Like the slot parameter setting screen, the slot format diagram is displayed at the top of the screen and the slot to be specified is selected from a combo box at the top left. Field number, number of bits in each field, and field type are displayed in the screen middle. Text boxes are displayed next to the "Fixed" and "CRC" fields. The "Data" field content is specified in the "Data Field" setting area under the slot format diagram.
Continuous pattern is selected from a combo box in the "Data Field" setting area. When "16-bit Pattern" is selected, a text box is displayed 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".)

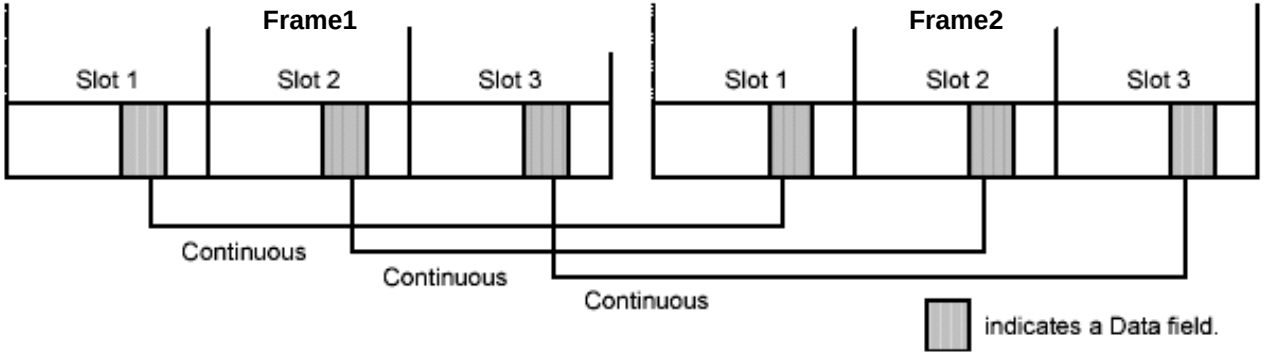
Field (2/3)



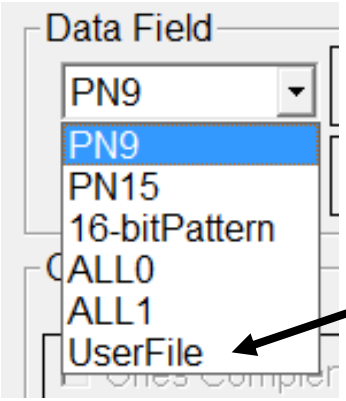
Data Field has a continuity between the fields in the adjacent slots.



Data Field has a continuity between the fields in the same number slots.



Field (3/3)



When “UserFile” is selected in the Data Field list box, a screen for selecting a user file for the continuous pattern is displayed, enabling loading of a user-defined bit string other than the provided selections.

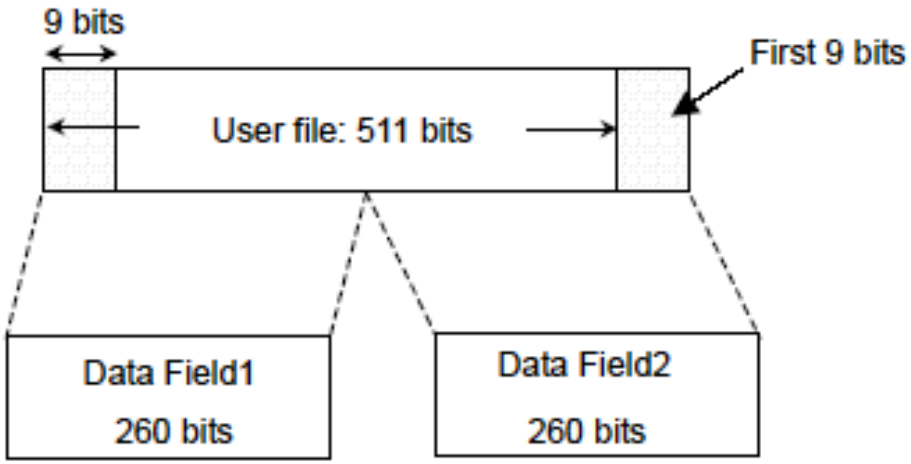
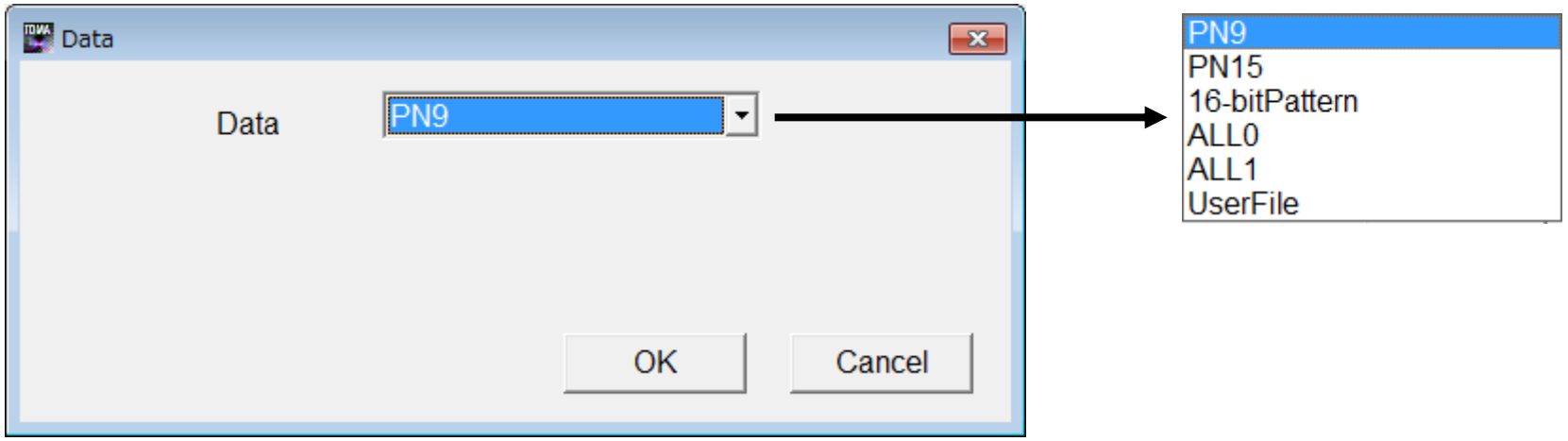


Fig_1

Describe binary sequences before modulation. Only 0, 1 and LF characters can be used; any comma or space causes a file loading error. Up to 9,600,000 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 “Auto” checkbox is selected for 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 set automatically to 1 or to a value that retains the phase continuity only.

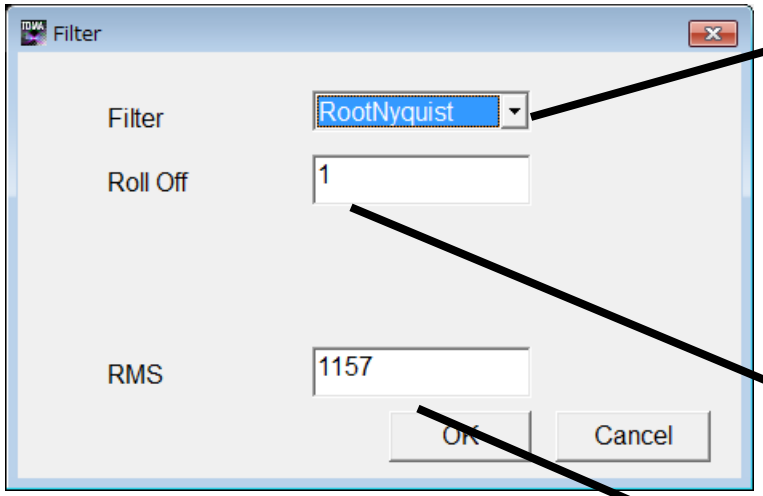
Data

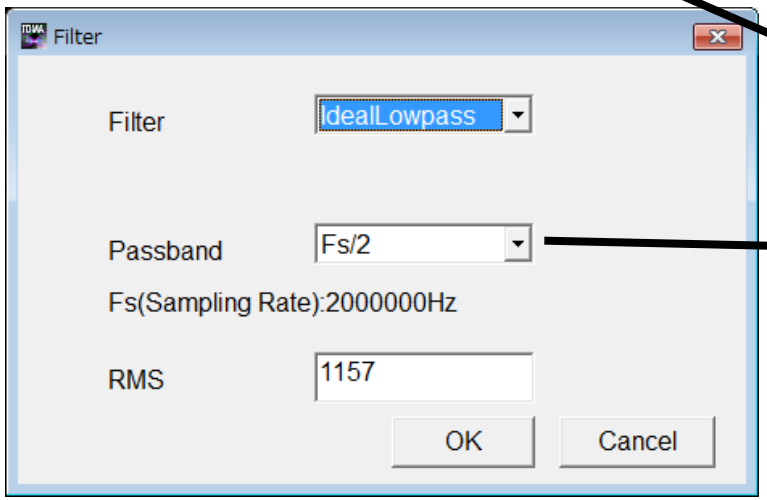
“Data” is the item for setting continuous patterns such as pseudorandom patterns (PN9, PN15) in the “No Format” waveform pattern. This button is not displayed at “Burst” or “Continuous”.



Filter (1/4)

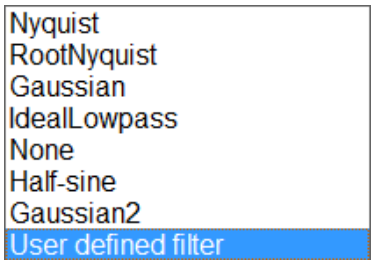
"Filter" is the item for setting filters.

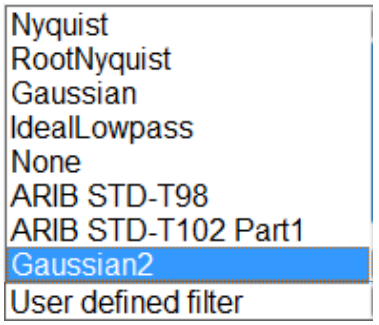




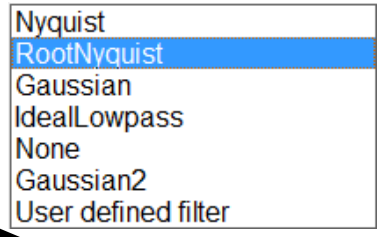
Filter: (Depending on the Modulation Type setting)

(O-QPSK)





(excluding O-QPSK/4FSK)

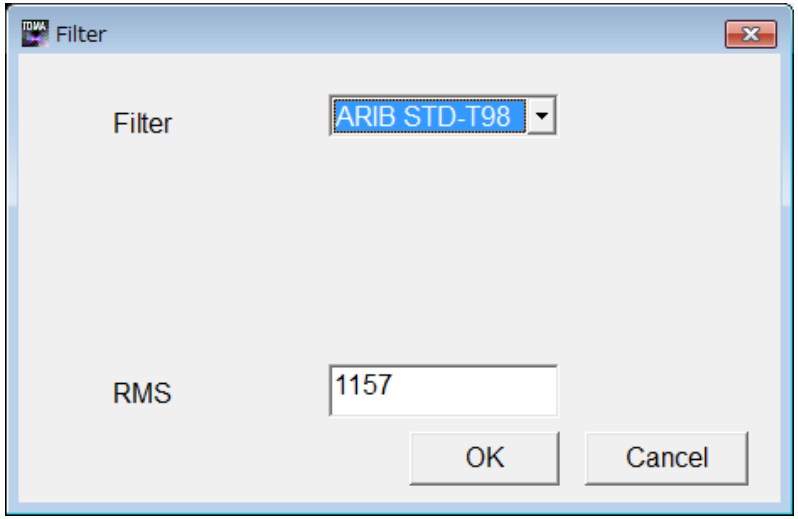


Filter roll-off rate:
0.10 to 1.00 (when Nyquist/ RootNyquist/Gaussian/Gaussian2 is set)

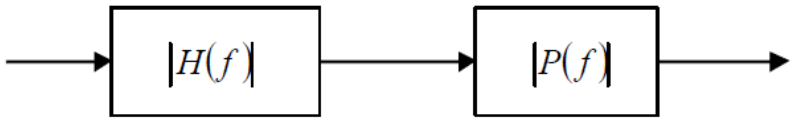
RMS value of waveform pattern

Filter passband:
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 with the oversampling rate.)

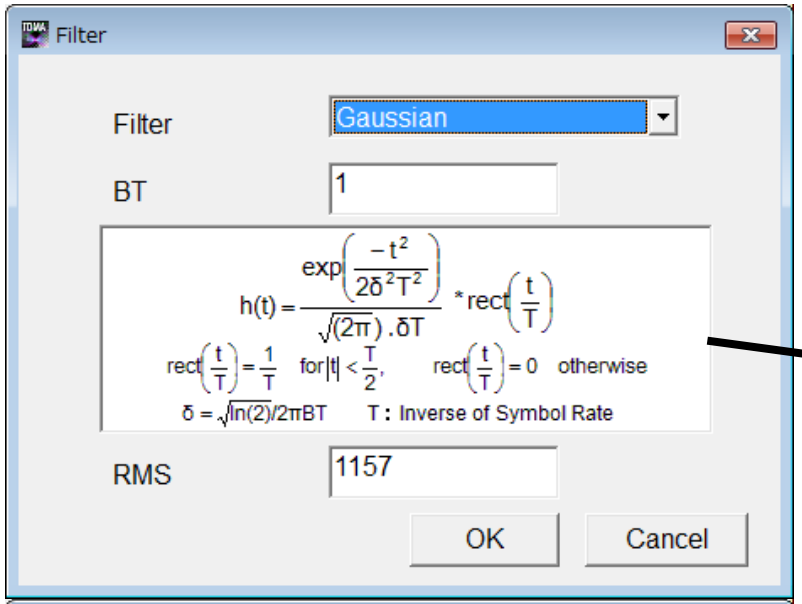
Filter (2/4)

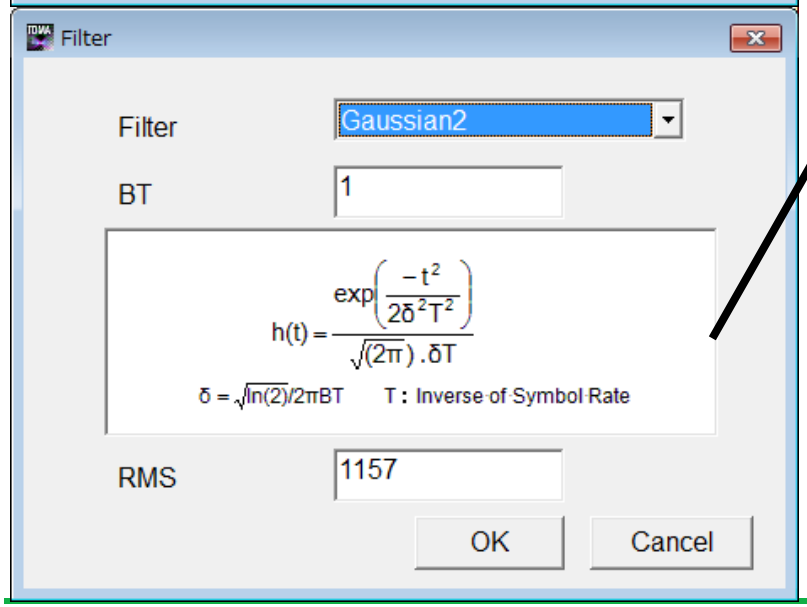


ARIB STD-T98/T102 can only be selected if 4FSK is specified for Modulation Type on the Modulation setting screen. The ARIB STD-T98/T102 filter is specified for the four-frequency shift keying of the ARIB STD-T98/T102 standards and has the configuration shown in the following figure.
Here, H(f) is the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



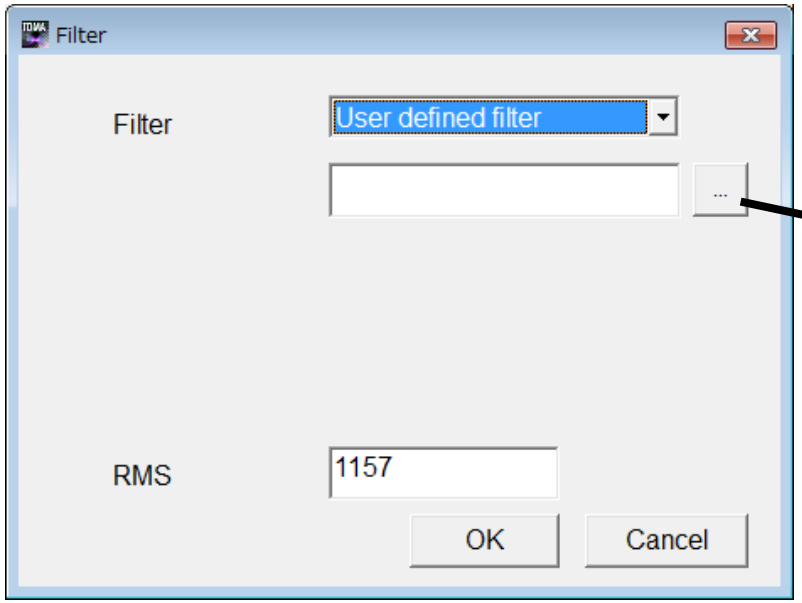
Filter (3/4)





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

Filter (4/4)

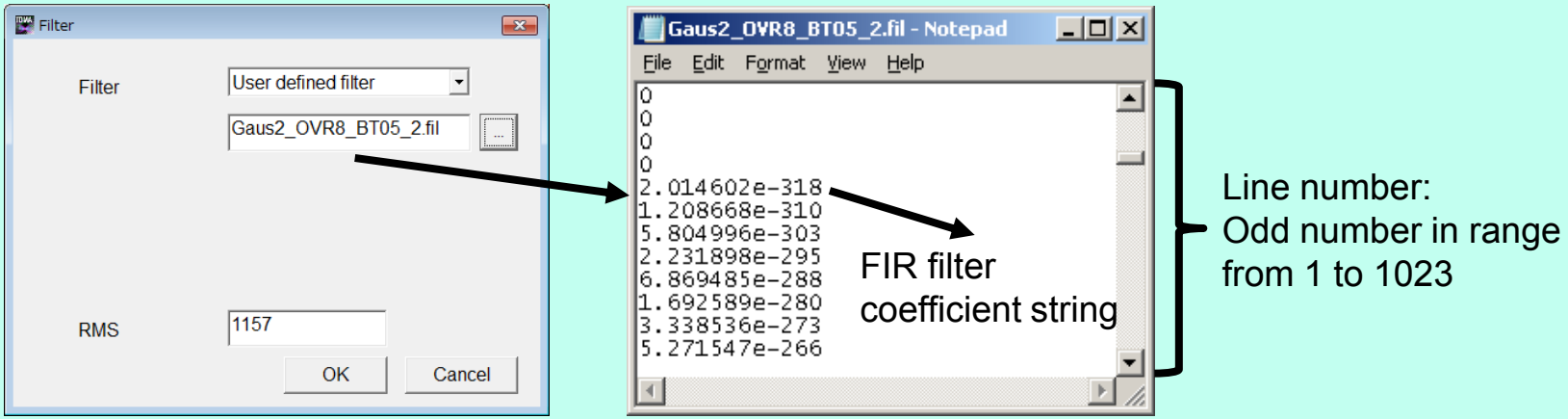


The User defined filter setting sets a user-created finite impulse response (FIR) filter file.

Select user file

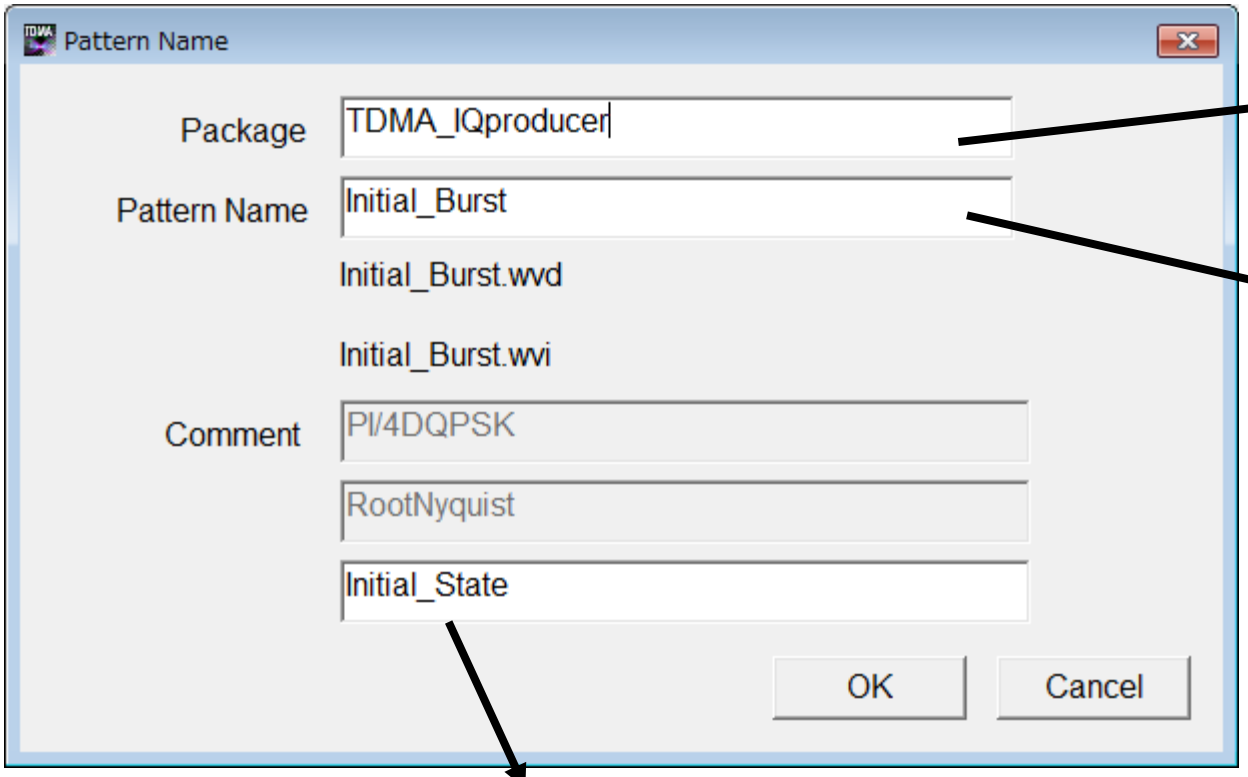
The user file format:
-Each filter coefficient should be separated by an ASCII-format return key stroke. (Commas, spaces, and tabs are read as errors.)
-There must be a FIR filter coefficient string expressed as a time response (real number).
-The filter coefficient tap number must be an odd number from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

User file setting example



Pattern Name

“Pattern Name” is the item for setting the waveform pattern file name.



Package name:
31 characters max.

Waveform pattern file name:
20 characters max.

Comment field displayed on instrument screen:
38 characters max.

Note

Anritsu

Specifications are subject to change without notice.

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