Product Introduction

MX370111A/MX269911A

WLAN 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

MX370111A/MX269911A WLAN IQproducer

MX370111A-002 802.11ac (160MHz) Option
MX269911A-001 802.11ac (80MHz) Option

Product Introduction

* MG3700A Vector Signal Generator supports MX370111A-001 802.11ac (80MHz) Option.

MG3710A
Vector Signal Generator

MS269xA
Signal Analyzer

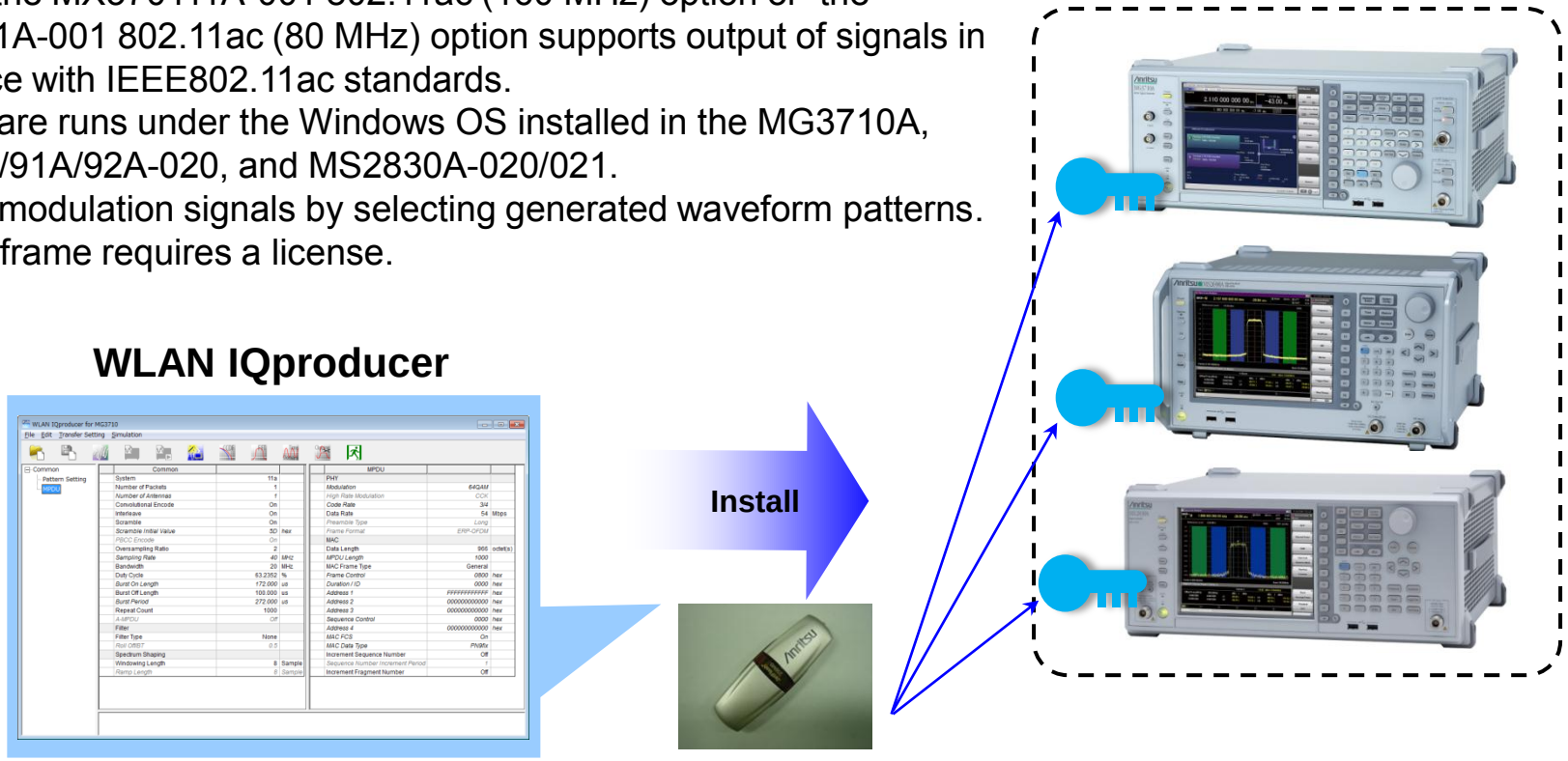
MS2830A
Signal Analyzer

Version 2.01

ANRITSU CORPORATION

What is WLAN IQproducer?

The WLAN IQproducer is PC software for generating waveform patterns in compliance with the IEEE Std 802.11-2007 and IEEE Std 802.11n-2009 standards.
Installing the MX370111A-001 802.11ac (160 MHz) option or the MX269911A-001 802.11ac (80 MHz) option supports output of signals in compliance with IEEE802.11ac standards.
The software runs under the Windows OS installed in the MG3710A, MS2690A/91A/92A-020, and MS2830A-020/021.
It outputs modulation signals by selecting generated waveform patterns.
The main frame requires a license.



- **Generating waveform patterns using WLAN 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 WLAN IQproducer?

MX370111A-002 802.11ac (160MHz) Option: for MG3710A
MX269911A-001 802.11ac (80MHz) Option: for MS269xA-020, MS2830A-020/021

Installing the MX370111A-001/MX269911A-001 supports output of signals in compliance with IEEE802.11ac standards.

Supported Vector Signal Generator Series IEEE802.11ac Signal bandwidth

Vector Signal Generator Series / IEEE802.11ac Signal Bandwidth	Vector Signal Generator		Vector Signal Generator Option for Signal Analyzer	
	MG3710A*1	MG3700A*2	MS2690A series Opt. 020*3	MS2830A Opt. 020/021*3
20 MHz/40 MHz/80 MHz	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)	✓ (1 unit)
160 MHz	✓ (1 unit)	—	—	—
80 MHz + 80 MHz (non-contiguous)	✓ (2 RF 1 unit*4, or 1 RF 2 units)	✓ (2 units)	✓ (2 units)	✓ (2 units)

∗1: MX370111A WLAN IQproducer and MX370111A-002 802.11ac (160 MHz) Option installed.
∗2: MX370111A WLAN IQproducer and MX370111A-001 802.11ac (80 MHz) Option installed.
∗3: MX269911A WLAN IQproducer and MX269911A-001 802.11ac (80 MHz) Option installed.
∗4: MG3710A-062 (2.7 GHz)/064 (4 GHz)/066 (6 GHz) 2nd RF Option installed.

- **MG3710A Vector Signal Generator**

  - One Unit Supports All Bandwidth Configurations for IEEE802.11ac Signals. -

  The MG3710A supports a built-in baseband signal generator with an upper frequency limit of 6 GHz and an RF modulation bandwidth of 160 MHz*/120 MHz as well as up to two RF output connectors.
  It enables one unit to support all bandwidth configurations for IEEE802.11ac signals.

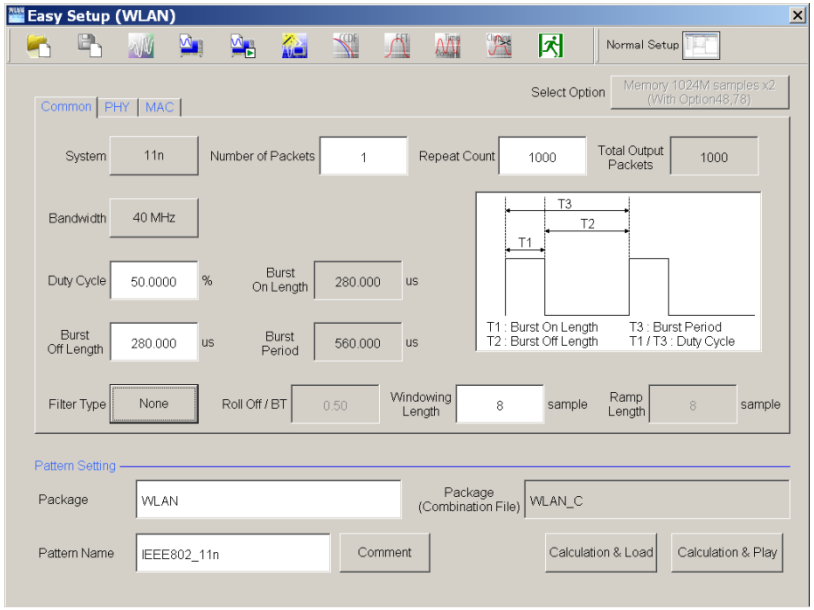
  *Can generate 160-MHz bandwidth signals (Wireless LAN IEEE802.11ac) only when using MX370111A WLAN IQproducer and MX370111A-002 802.11ac (160 MHz) option.

Main Screen

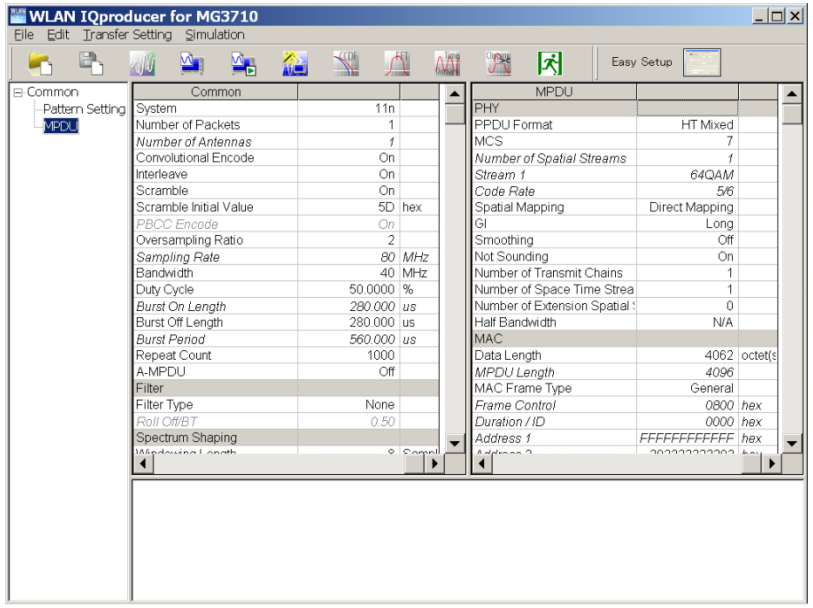
WLAN IQproducer supports two setting screens:

“Easy Setup Screen” and “Normal Setup Screen”.

● Easy Setup Screen



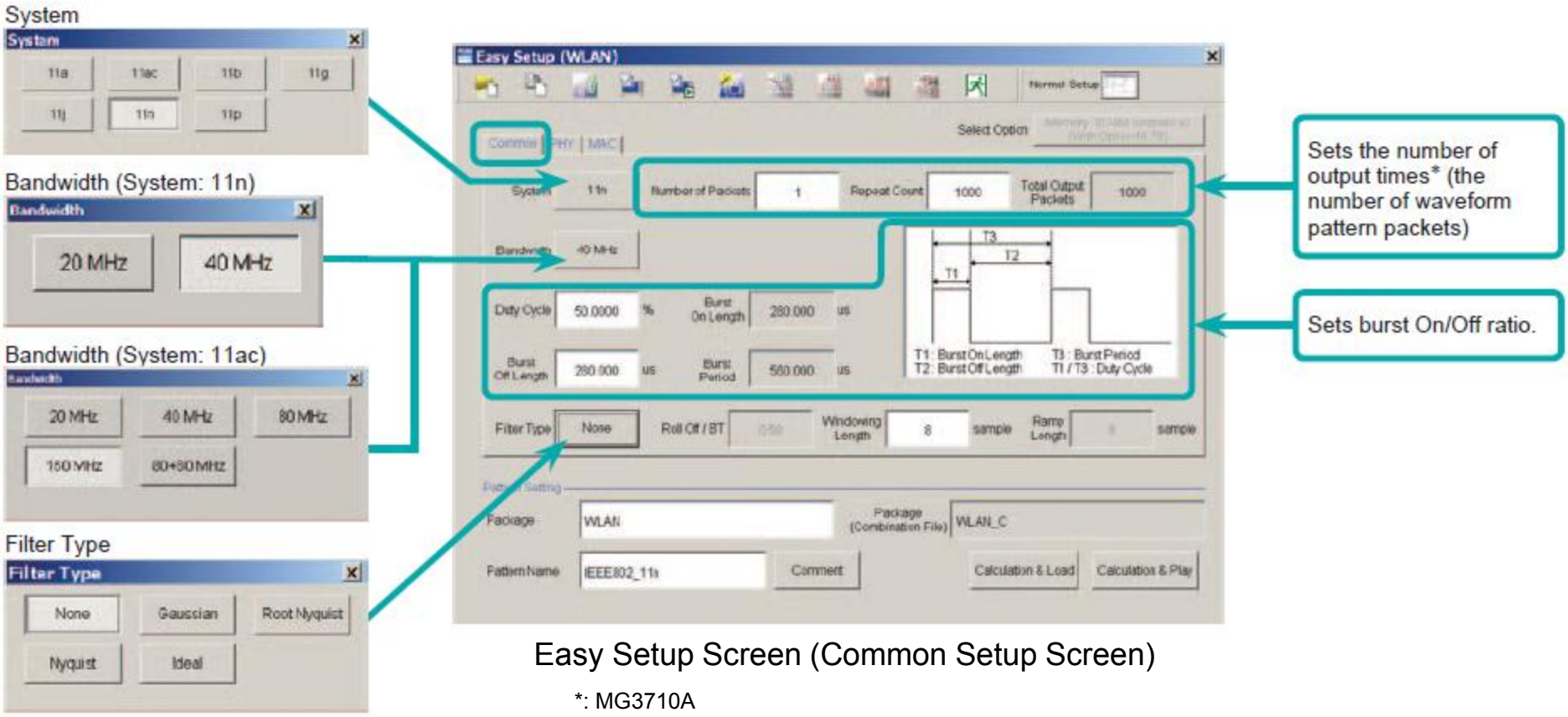
●Normal Setup Screen



Easy Setup Screen (1/2)

Because it is limited to major parameters, it generates waveform patterns using simple operation. Moreover, touch-panel operation is supported when IQproducer is executed on the MG3710A.

Use “Normal Setup function” for detailed parameter settings.



Easy Setup Screen (Common Setup Screen)

*: MG3710A
PER (Packet Error Measurement), the number of waveform pattern packets is generated as [1] and the number of output times from the MG3710A main frame is set.
Example: Outputting 1000 packets
Number of Packets: 1
Repeat Count: 1000

Easy Setup Screen (2/2)

Because it is limited to major parameters, it generates waveform patterns using simple operation. Moreover, touch-panel operation is supported when IQproducer is executed on the MG3710A.

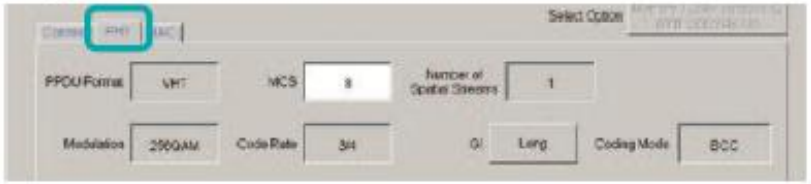
Use “Normal Setup function” for detailed parameter settings.

Ex.) System:11n: PPDU Format: HT Mixed/HT Greenfield

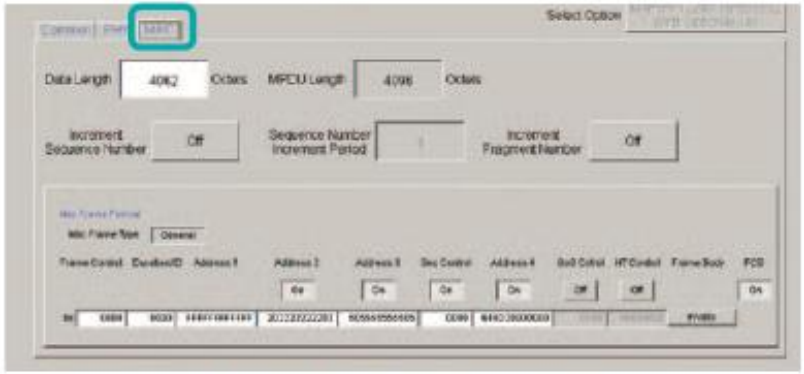
Ex.) System:11n: PPDU Format: Non-HT

Ex.) System: 11a/11b/11g/11j/11p

Ex.) System: 11ac



Easy Setup Screen (PHY Setup Screen)

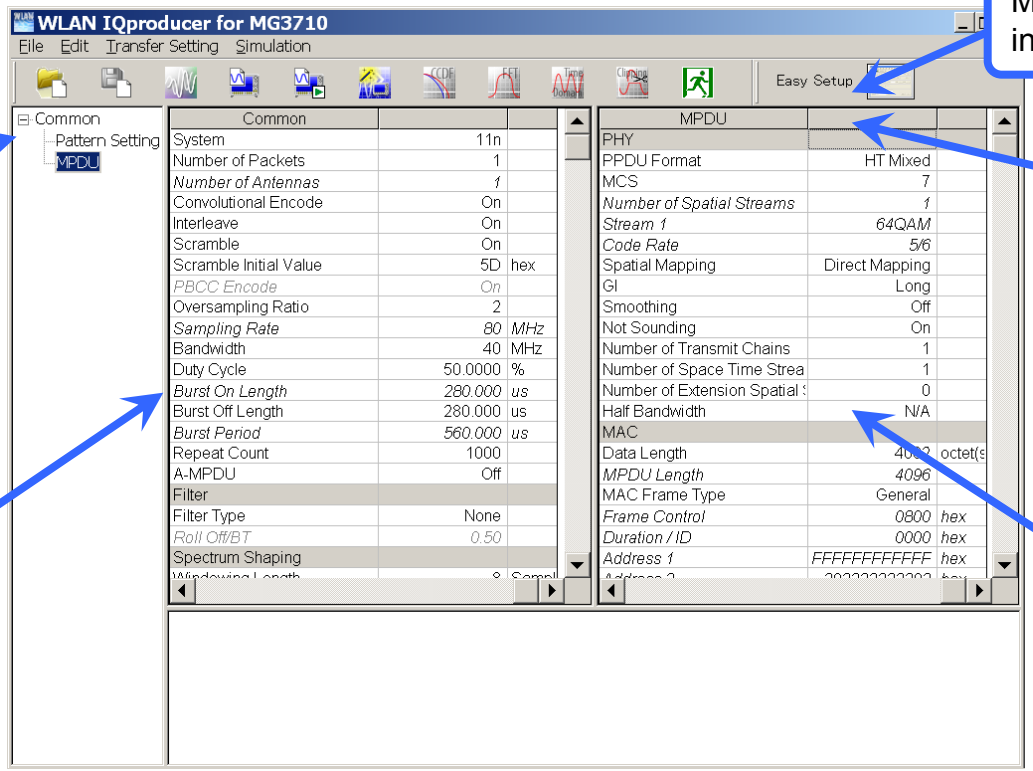


Easy Setup Screen (MAC Setup Screen)

Normal Setup Screen (Example: IEEE802.11a/b/g/n/j/p)

Sets system, number of packets in one waveform pattern, On/Off ratio (Duty) and filter at Common sheet.

Normal Setup Screen



PHY/MAC parameter displays MPDU and A-MPDU selected in the tree.

Parameter items are displayed as a tree hierarchy.
A-MPDU can be added and deleted.
Pattern Setting, MPDU, A-MPDU

PHY parameter sets the same value for all MPDU and A-MPDU.
It sets
PPDU Format, MCS, Modulation Method, Data Rate, etc.

Common sets parameters for
System, Bandwidth, ON/OFF Ratio and Filter, etc.

MAC parameter supports different settings for MPDU and A-MPDU.
It sets
Data Length, MAC frame, Address, etc.

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

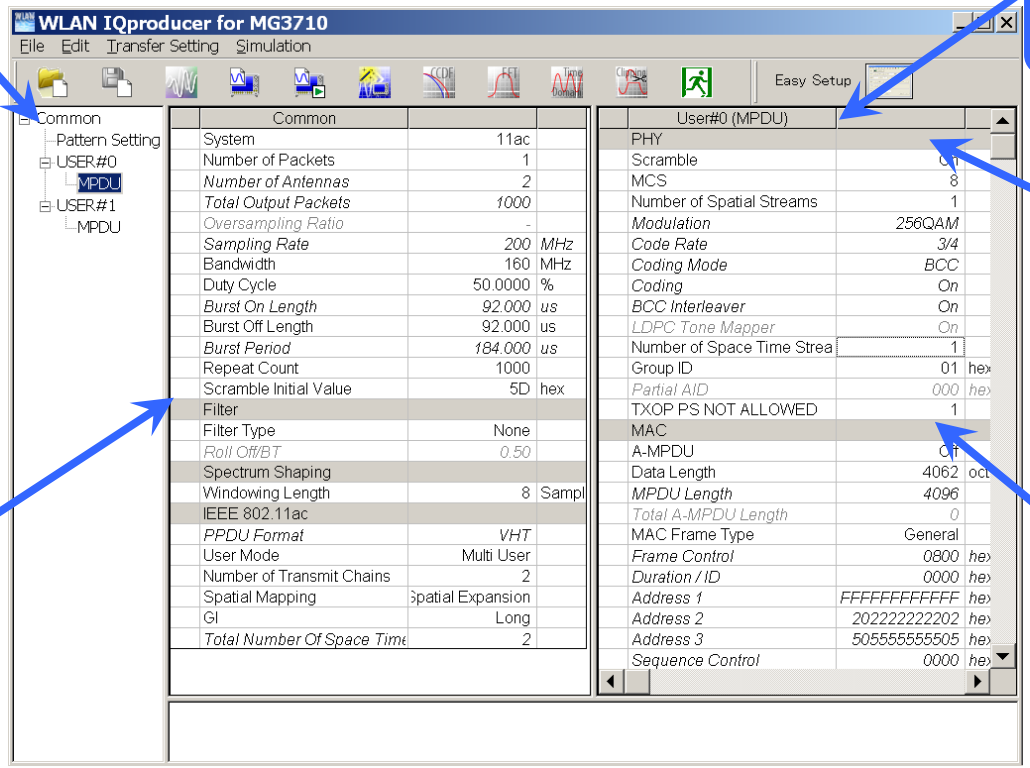
Normal Setup Screen (Example: IEEE802.11ac)

Sets system, number of packets in one waveform pattern, On/Off ratio (Duty) and filter at Common sheet.

Displays MPDU/ A-MPDU in tree for each user #. User/MPDU/A-MPDU can be added and deleted. **Pattern Setting, User #0 to #3 MPDU, A-MPDU.**

Common sets parameters, such as **User Mode (Single User /Multi User) , bandwidth, On/Off ratio (Duty), and filter.**

Normal Setup Screen



Displays **MPDU** and **A-MPDU** for **selected user#** for PHY/MAC parameter.

Each user# PHY parameter becomes same value at all MPDU, and A-MPDU. Sets **MCS, modulation method,** etc.

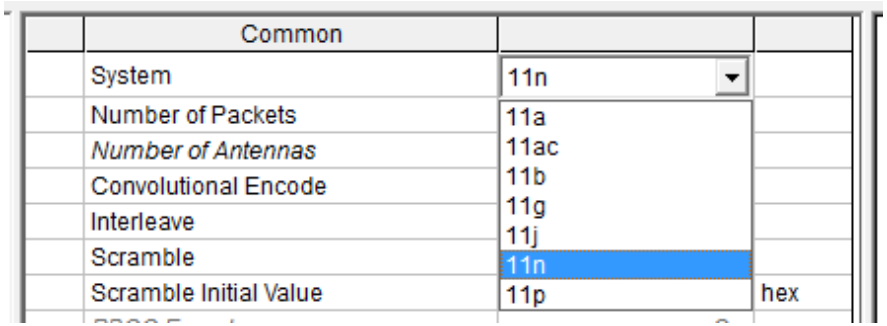
Different value can be set for **each user#** MAC parameter at MPDU, A-MPDU. Sets **data length, MAC frame, address,** etc.

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

Easy Setup for system parameter (1/8)

Just selecting “System” sets system parameters in accordance with the standards.

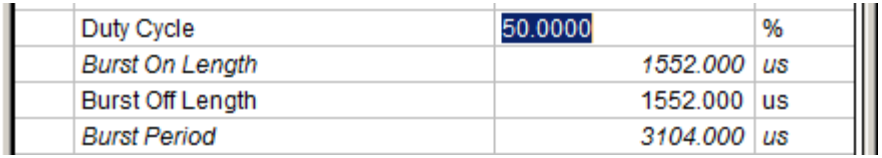
♦System Selection



Select system.

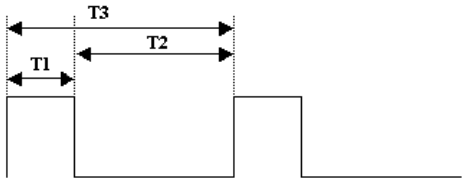
IEEE 802.11a / ac / b / g / j / n / p.

♦Duty Cycle Setting



Easy **Burst ON/OFF Ratio** setting.

This is the important Rx test item.
Consequently, it is useful when the ON/OFF ratio is standardized by the test specification.



T1 : Burst On Length
T2 : Burst Off Length
T3 : Burst Period
T1/T3 : Duty Cycle

Sets **Duty Cycle** and **Burst Off Length**.
Burst On Length is decided by the MAC parameter such as setting of Data Length, etc..
Burst Period is decided by the Duty Cycle and Burst Off Length settings.

Easy Setup for system parameter (2/8)

♦PHY Selection

Available options when System = 11a, 11j

Data Rate	Frame Format	Modulation	High Rate Modulation	Code Rate
6 Mbps	N/A	BPSK	N/A	1/2
9 Mbps		BPSK		3/4
12 Mbps		QPSK		1/2
18 Mbps		QPSK		3/4
24 Mbps		16QAM		1/2
36 Mbps		16QAM		3/4
48 Mbps		64QAM		2/3
54 Mbps		64QAM		3/4

Available options when System = 11b

Data Rate	Frame Format	Modulation	High Rate Modulation	Code Rate
1 Mbps	N/A	DBPSK	N/A	N/A
2 Mbps		DQPSK	N/A	
5.5 Mbps		N/A	CCK, PBCC	
11 Mbps		N/A	CCK, PBCC	

Available options when System = 11g

Data Rate	Frame Format	Modulation	High Rate Modulation	Code Rate
1 Mbps	ERP-DSSS	DBPSK	N/A	N/A
2 Mbps	ERP-DSSS	DQPSK	N/A	N/A
5.5 Mbps	ERP-CCK ERP-PBCC	N/A	CCK, PBCC	N/A
6 Mbps	ERP-OFDM, DSSS-OFDM	BPSK	N/A	1/2
9 Mbps	ERP-OFDM, DSSS-OFDM	BPSK	N/A	3/4
11 Mbps	ERP-CCK ERP-PBCC	N/A	CCK, PBCC	N/A
12 Mbps	ERP-OFDM, DSSS-OFDM	QPSK	N/A	1/2
18 Mbps	ERP-OFDM, DSSS-OFDM	QPSK	N/A	3/4
22 Mbps	ERP-PBCC	N/A	PBCC	N/A
24 Mbps	ERP-OFDM, DSSS-OFDM	16QAM	N/A	1/2
33 Mbps	ERP-PBCC	N/A	PBCC	N/A
36 Mbps	ERP-OFDM, DSSS-OFDM	16QAM	N/A	3/4
48 Mbps	ERP-OFDM, DSSS-OFDM	64QAM	N/A	2/3
54 Mbps	ERP-OFDM, DSSS-OFDM	64QAM	N/A	3/4

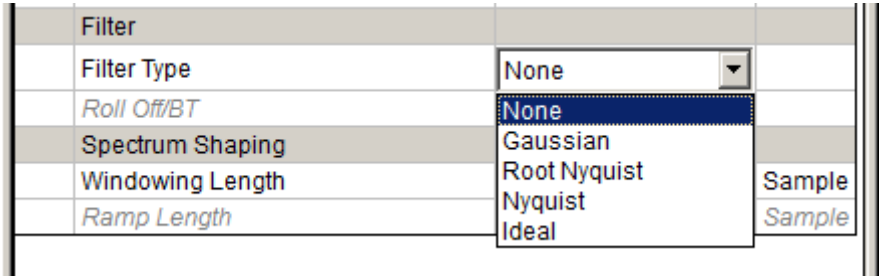
Easy Setup for system parameter (3/8)

♦PHY Selection

Available options when System = 11p

Data Rate	Frame Format	Modulation	High Rate Modulation	Code Rate
3 Mbps	N/A	BPSK	N/A	1/2
4.5 Mbps		BPSK		3/4
6 Mbps		QPSK		1/2
9 Mbps		QPSK		3/4
12 Mbps		16QAM		1/2
18 Mbps		16QAM		3/4
24 Mbps		64QAM		2/3
27 Mbps		64QAM		3/4

♦Filter Selection

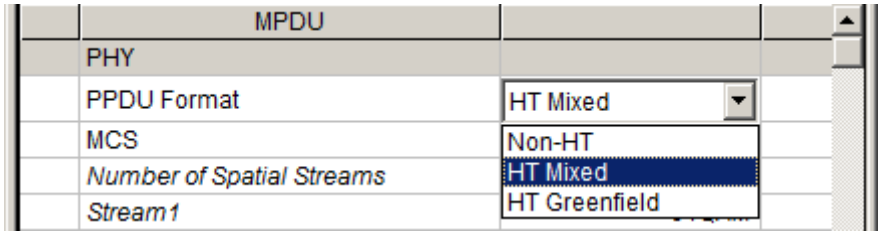


Select filter type.

- **None, Gaussian, Root Nyquist, Nyquist, Ideal**

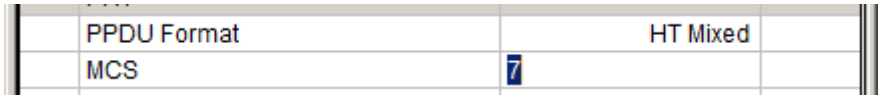
Easy Setup for system parameter (4/8)

♦PPDU format selection for IEEE802.11n signals

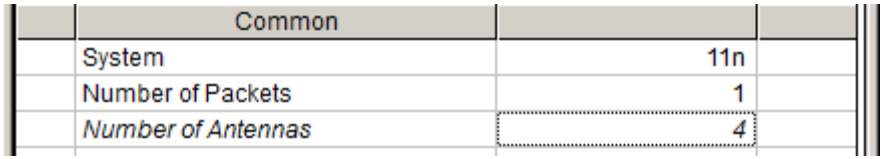


Selection and setting of IEEE802.11n for:

- **PPDU format: Non-HT, HT-Mixed, HT-Greenfield**
- **MCS: 0 to 76**



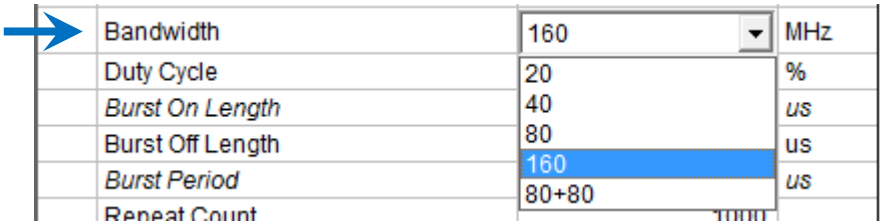
Parameters when MCS set defined in IEEE Std 802.11n-2009 Chapter 20.6.



Number of antenna decided depending on MCS setting.

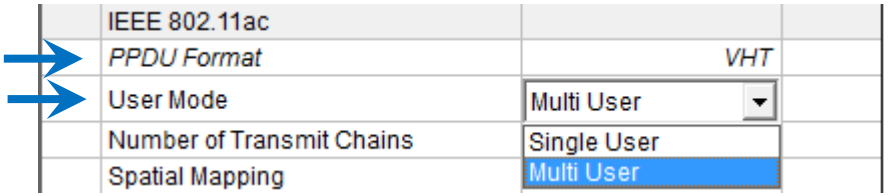
Easy Setup for system parameter (5/8)

♦Setting for IEEE802.11ac signals



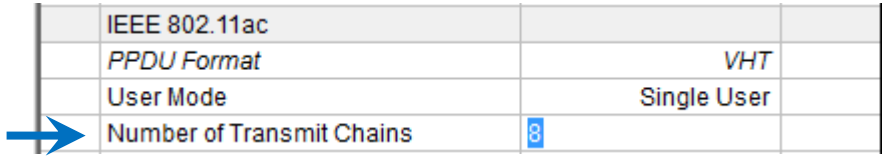
Bandwidth
- 20MHz, 40MHz, 80MHz, 160MHz*, 80+80MHz

*: 160 MHz is not settable if MG3700A, MS269x, or MS2830 is selected in the Select instrument dialog box.



PPDU format
- VHT

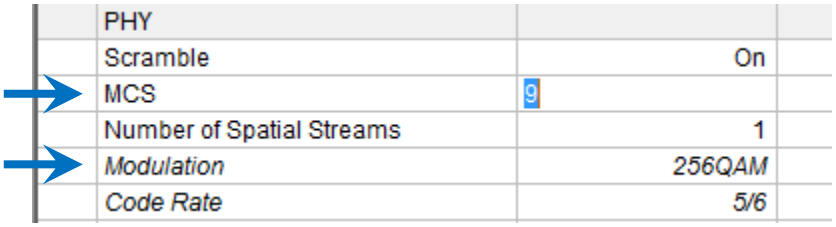
User Mode
- Single User, Multi User
When the user mode is set to Multi User, Up to four users from USER#0 to #3 can be set.



Number of Transmit Chain
- Setting range: 1 to 8

MCS
- Setting range: 0 to 9

Details about the parameters when MCS is set are defined in IEEE P802.11ac/D2.0, January 2012 22.5.



Modulation
- BPSK, QPSK, 16QAM, 64QAM, 256QAM
The value depends on MCS.

Easy Setup for system parameter (6/8)

♦Spatial Mapping selection for IEEE802.11n and 11ac signals

MPDU	
PHY	
PPDU Format	HT Mixed
MCS	50
Number of Spatial Streams	*3*
Stream1	*64QAM*
Stream2	*16QAM*
Stream3	*16QAM*
Code Rate	*3/4*
Spatial Mapping	Direct Mapping
GI	
Smoothing	
Not Sounding	
Number of Transmit Chains	3
Number of Space Time Streams	3
Number of Extension Spatial Streams	0
Half Bandwidth	*N/A*

Direct Mapping
Spatial Expansion
Edit Mode

IEEE 802.11ac	
PPDU Format	*VHT*
User Mode	Single User
Number of Transmit Chains	8
Spatial Mapping	Direct Mapping
GI	
Total Number Of Space Time Stream:	

Direct Mapping
Spatial Expansion
Edit Mode

Available in the following conditions:
- System=11n and PPDU Format = HT Mixed / HT Greenfield
- System=11ac

Direct Mapping is available only when:
"Number of Space Time Streams"
= "Number of Transmit Chains"

Direct Mapping can be set only when: Number of Transmit Chains=1

Spatial Mapping Matrix

	Spatial Stream 1	Spatial Stream 2	Spatial Stream 3	Spatial Stream 4
Transmit Chain 1	0.50000	0.50000	0.50000	0.50000
Transmit Chain 2	0.50000	j 0.50000	-0.50000	- j 0.50000
Transmit Chain 3	0.50000	-0.50000	0.50000	-0.50000
Transmit Chain 4	0.50000	- j 0.50000	-0.50000	j 0.50000

OK Cancel

If Edit Mode is selected for Spatial Mapping, one of the Spatial Mapping Matrix windows is displayed, on which the spatial mapping can be edited.
The number of elements on the matrix depends on the value set for Number of Transmit Chains.

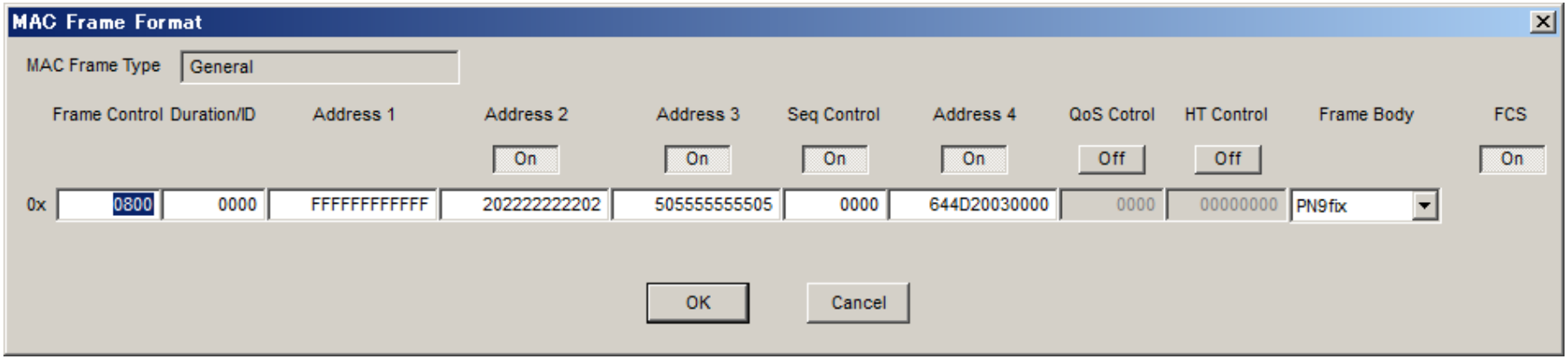
Easy Setup for system parameter (7/8)

♦MAC Frame Type Setting

	MAC		
	Data Length	4062	octet(s)
	MPDU Length	*4096*	
	MAC Frame Type	General	
	Frame Control	*0800*	*hex*

Sets MAC information

The address can change



♦Increment Setting

→	Increment Sequence Number	On	
	Sequence Number Increment Period	1	
→	Increment Fragment Number	On	

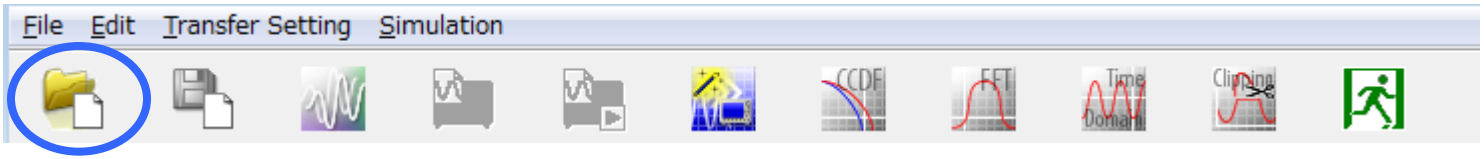
Sets Increment ON/OFF.

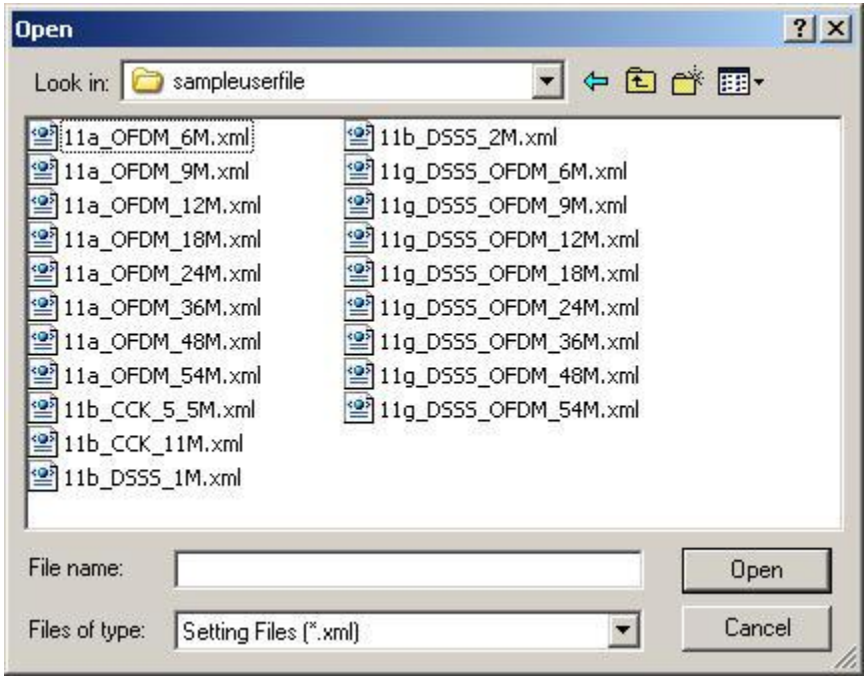
This is an important Rx test item.

Easy Setup for system parameter (8/8)

The same parameters as built into the IEEE 802.11a / b / g waveform pattern are provided as samples.

♦Recalling Sample Waveform Parameter



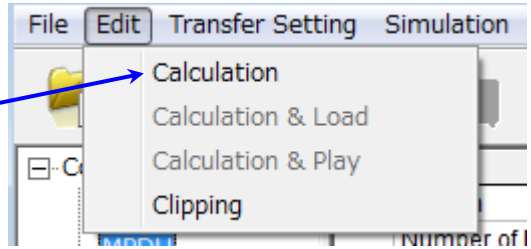


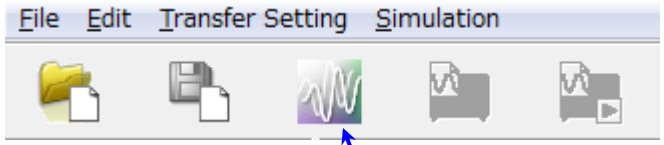
Recalling a sample parameter file cuts setting time.

Waveform Generation: Calculation

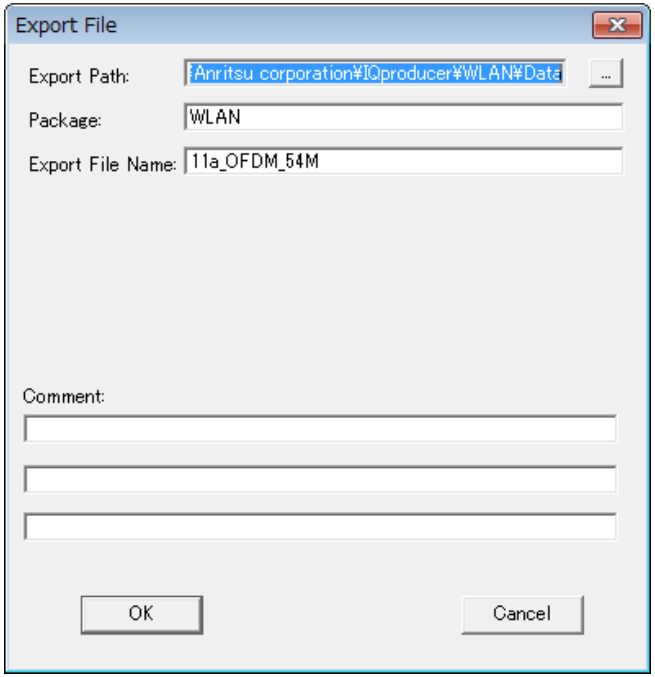
After setting parameters, click the [Calculation] icon to generate the waveform pattern.

Generates waveform pattern





Generates waveform pattern



File export destination folder

Name of waveform pattern package: 31 characters max.

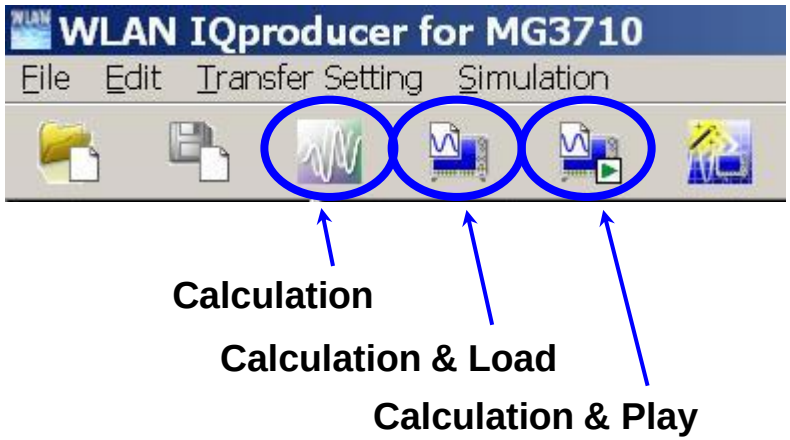
Name of waveform pattern file: 20 characters max.

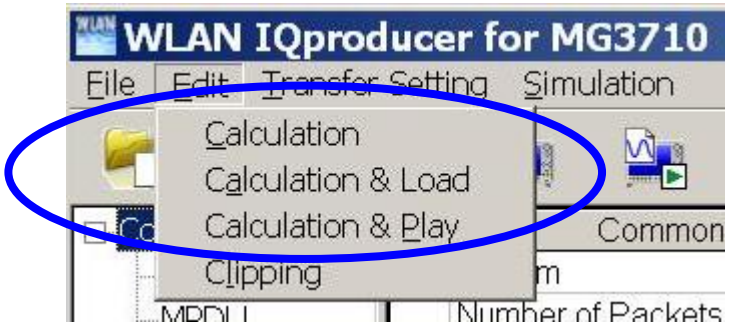
Comment on screen
38 characters max. per line

Calculation & Load & Play

MG3710A only

After setting parameters, click the [Calculation] icon to generate the waveform pattern.





Calculation:

Generates a waveform pattern after parameters are set.
/Calculation/

Calculation & Load:

After waveform generation is finished, the created waveform pattern is loaded into the MG3710A waveform memory.
/Calculation/ > /Load/

Calculation & Play:

After waveform generation is finished, the created waveform pattern is loaded and selected at the MG3710A waveform memory.
/Calculation/ > /Load/ > /Select/

File size of waveform patterns

MG3710A only

The presence/absence of the ARB Memory Expansion (option) and Baseband Signal Combination Function (option) is selected. Selecting the ARB Memory Expansion (option) and the Baseband Signal Combination Function (option) generates a bigger waveform pattern, while selecting the Baseband Signal Combination Function (option) generates a waveform pattern. If an uninstalled option is selected, sometimes the created waveform pattern may not be usable. Set the combination of installed options based on the following setting items.

Items	Combinations of Options
Memory 64M samples	None
Memory 64M samples × 2	Option48 and Option 78
Memory 256M samples	Option45 or Option 75
Memory 256M samples × 2	Option 45 and Option 48 or Option 75 and Option 78
Memory 1024M samples	Option46 or Option 76
Memory 1024M samples × 2	Option 46 and Option 48 or Option 76 and Option 78

The maximum size of the generated waveform pattern for each of the setting items is shown below.

Items	Maximum Size
Memory 64M samples	64M samples
Memory 64M samples × 2 (With Option48, 78)	128M samples
Memory 256M samples	256M samples
Memory 256M samples × 2 (With Option48, 78)	512M samples
Memory 1024M samples	512M samples
Memory 1024M samples × 2 (With Option48, 78)	512M samples

File size of waveform patterns

MS269xA/MS2830A only

MS2830A:

Select whether the ARB memory expansion option 256Msamples is installed.

Selecting With Option27 (Memory 256M samples) supports creation of larger waveform patterns. If the ARB memory expansion option is not installed, the generated waveform pattern may not be able to be used. Waveform patterns cannot be created with a size greater than 64M samples when Without Option27 (Memory 256M samples) is selected. Select either according to the presence of ARB memory expansion option.

Model	Items	ARB Memory Expansion
MS2830A	With Option27 (Memory 256M samples)	1 GB
	Without Option27 (Memory 256M samples)	256 MB

MS269xA:

ARB Memory Expansion (option) is not available for MS269xA. Only Memory 256M samples, 1 GB is available.

Vector Signal Generator Key Functions

Main Frame	Vector Signal Generator		Signal Analyzer		
	MG3710A		MS269xA	MS2830A	
	MG3710A-032/062	MG3710A-036/066	Vector Signal Generator Option		
			MS269xA-020	MS2830A-020	MS2830A-021
Frequency Range	100kHz to 2.7 GHz	100kHz to 6 GHz	125 MHz to 6 GHz	250 kHz to 3.6 GHz	250 kHz to 6 GHz
Wanted Signal	Yes		Yes	Yes	
Wanted + Interference Signals	Yes Combination of Baseband Signal (Opt.048/078)		No	No	
Wanted + AWGN	Yes AWGN (Opt.049/079) CN ratio < 40 dB		Yes Standard AWGN CN ratio ≤ 40 dB	Yes MS2830A-028 AWGN required. CN ratio ≤ 40 dB	
Packet Number Setting	Yes Sequence mode		No	Yes Frame count	
BER Measurement Function	Yes Input bit rate: 100 bps to 40 Mbps (Opt.021)		Yes Input bit rate: 100 bps to 10 Mbps (standard)	No	
Tx Characteristics Evaluation			Yes One unit supports Tx&Rx characteristics (MX269028A/ MX269028A-002 required)	Yes One unit supports Tx&Rx characteristics (MX269028A/ MX269028A-001 required)	

Note

Anritsu

Specifications are subject to change without notice.

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