

MX370104A/MX269904A

Multi-carrier IQproducer

MG3710A

Vector Signal Generator

MS269xA/MS2830A

Signal Analyzer

MG3710A Vector Signal Generator

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

**MX370104A/MX269904A
Multi-carrier IQproducer
Product Introduction**



**MG3710A
Vector Signal Generator**



**MS269xA
Signal Analyzer**



**MS2830A
Signal Analyzer**

Version 1.00

ANRITSU CORPORATION

What is Multi-carrier IQproducer?

Multi-carrier IQproducer is PC software for generating multi-carrier waveform patterns for modulation signals and tone signals for various communications methods.

The MG3710A supports five functions, including generation of combination files using the Baseband Signal Combine option (Opt-048/078 required).

Functions	Supported Models		
	MG3710A	MS269xA	MS2830A
Multi-purpose	Available	Available	Available
Adjust Rate	Available	---	---
W-CDMA (DL)	Available	Available	Available
Baseband Combination	Available	---	---
Multi-Standard Radio (Tx)	Available	---	---

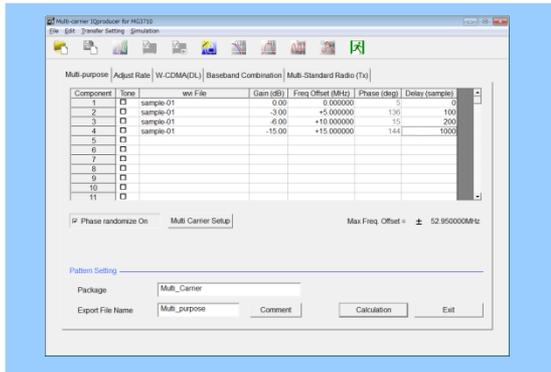
Functions	Option necessary to use created patterns	
	Combination Baseband Signal for 1stRF (Opt.048) Combination Baseband Signal for 2ndRF (Opt.078)	AWGN for 1stRF (Opt.049) AWGN for 2ndRF (Opt.079)
Multi-purpose	---	---
Adjust Rate	Mandatory	---
W-CDMA (DL)	---	---
Baseband Combination	Mandatory	Mandatory
Multi-Standard Radio (Tx)	Mandatory	---

*Required when combining AWGN generator signals

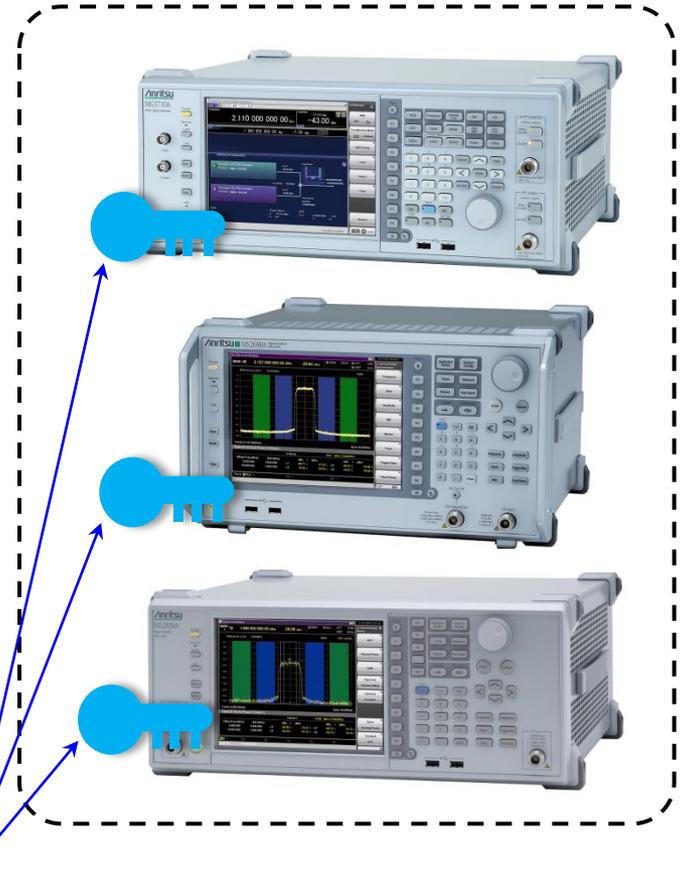
What is Multi-carrier IQproducer?

Multi-carrier IQproducer runs under Windows installed in the MG3710A, MS2690A/91A/92A-020 and MS2830A-020/021. It outputs modulation signals by selecting generated waveform patterns.

Multi-carrier IQproducer



Install

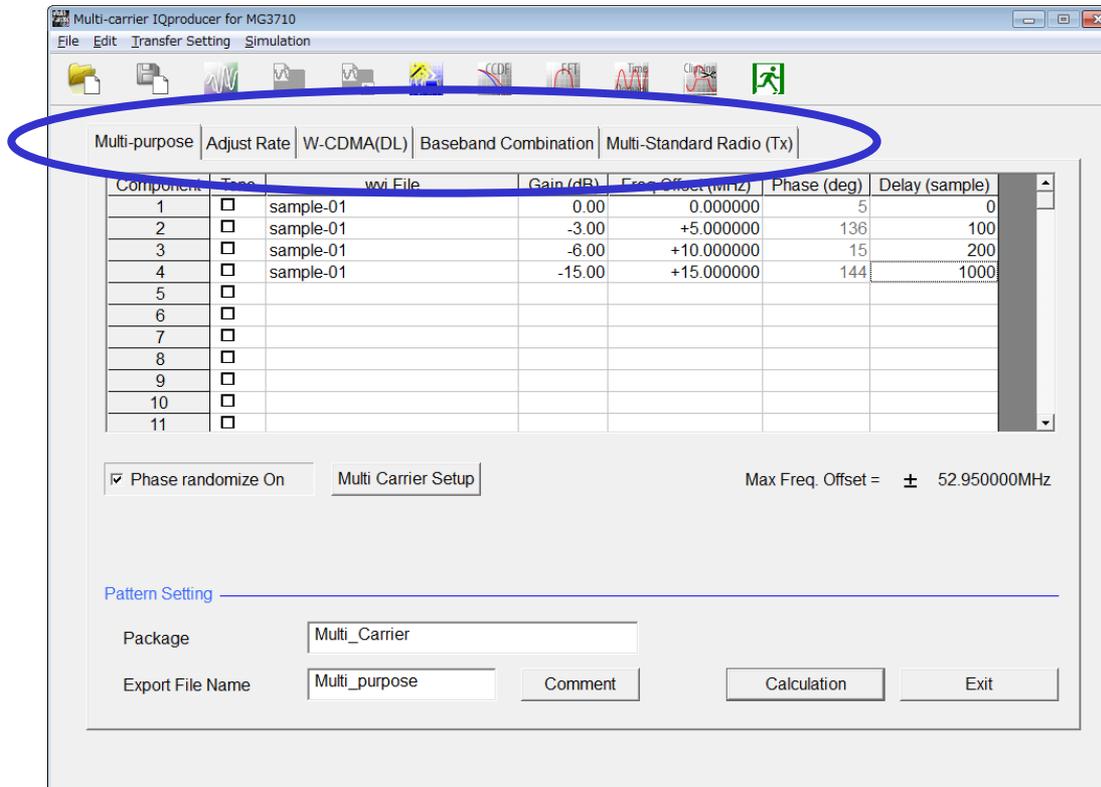


- **Generating waveform patterns using Multi-carrier IQproducer => [The main frame requires a license.](#)**
The unlicensed software will run on the PC to test waveform pattern generation but an unlicensed SG cannot output signals because it does not recognize the waveform patterns.
- **Generating waveform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

- MATLAB® is a registered trademark of The MathWorks, Inc.
- Windows® is a registered trademark of Microsoft Corporation in the USA and other countries.

Main screen

The main screen for selecting the “Multi-purpose”, “Adjust Rate”, “W-CDMA(DL)”, “Baseband Combination” and “Multi-Standard Radio” functions is displayed. Each parameter can be set from the screen by selecting each function.



Note: [Multi-purpose] and [W-CDMA(DL)] are supported only by the MS269xA and MS2830A.

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

Multi-purpose function

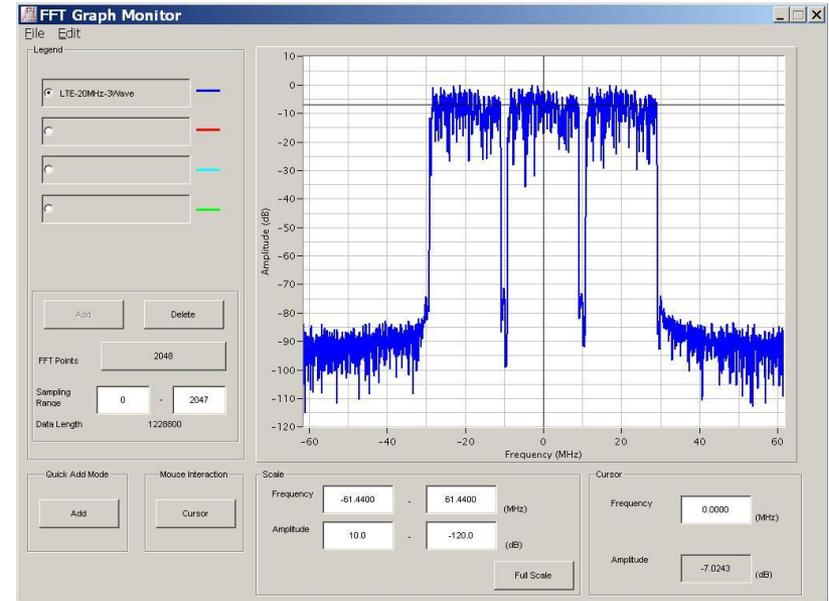
Generates multi-carrier waveform patterns based on waveform patterns and tone signals. It generates signals with up to 32 carriers as one waveform pattern (Depending on the Freq. Offset and waveform pattern combination, sometimes signals for up to 32 carriers cannot be set.) Gain, frequency offset, initial phase and initial delay for carriers can be set too.

Example) LTE FDD BW-20MHz x 3carriers

The screenshot shows the 'Multi-carrier IQproducer for MG3710' software interface. The main window is titled 'Multi-carrier IQproducer for MG3710' and has a menu bar with 'File', 'Edit', 'Transfer Setting', and 'Simulation'. Below the menu bar is a toolbar with various icons. The main area is divided into several sections:

- Multi-purpose** tab is selected, with sub-tabs for 'Adjust Rate', 'W-CDMA(DL)', 'Baseband Combination', and 'Multi-Standard Radio (Tx)'.
- A table with columns: Component, Tone, wv File, Gain (dB), Freq Offset (MHz), Phase (deg), and Delay (sample). The table contains three rows of data for components 1, 2, and 3.
- Buttons for 'Phase randomize On' and 'Multi Carrier Setup' are present.
- A 'Pattern Setting' section with a 'Package' field set to 'Multi_Carrier-TEST' and an 'Export File Name' field set to 'LTE-20MHz-3Wave'.
- Buttons for 'Calculation & Load' and 'Calculation & Play' are at the bottom.

Component	Tone	wv File	Gain (dB)	Freq Offset (MHz)	Phase (deg)	Delay (sample)
1	<input type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	+20.000000	5	0
2	<input type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	0.000000	136	0
3	<input type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	-20.000000	15	0
4	<input type="checkbox"/>					
5	<input type="checkbox"/>					
6	<input type="checkbox"/>					
7	<input type="checkbox"/>					
8	<input type="checkbox"/>					
9	<input type="checkbox"/>					
10	<input type="checkbox"/>					
11	<input type="checkbox"/>					



Multi-purpose function

First, set the Tone or wvi File parameters for each component.
Check the corresponding Tone checkbox to select Tone.
Next, set the Gain, Freq. Offset, Delay, and Phase parameters.

Component	Tone	wvi File	Gain (dB)	Freq Offset (MHz)	Phase (deg)	Delay (sample)
1	<input checked="" type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	+20.000000	5	0
2	<input checked="" type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	0.000000	136	0
3	<input checked="" type="checkbox"/>	E-TM_1-1_20M_FDD	0.00	-20.000000	15	0
4	<input type="checkbox"/>					
5	<input type="checkbox"/>					
6	<input type="checkbox"/>					
7	<input type="checkbox"/>					
8	<input type="checkbox"/>					
9	<input type="checkbox"/>					
10	<input type="checkbox"/>					
11	<input type="checkbox"/>					

Phase randomize On Multi Carrier Setup Max Freq. Offset = ± 40.144500MHz

See next page

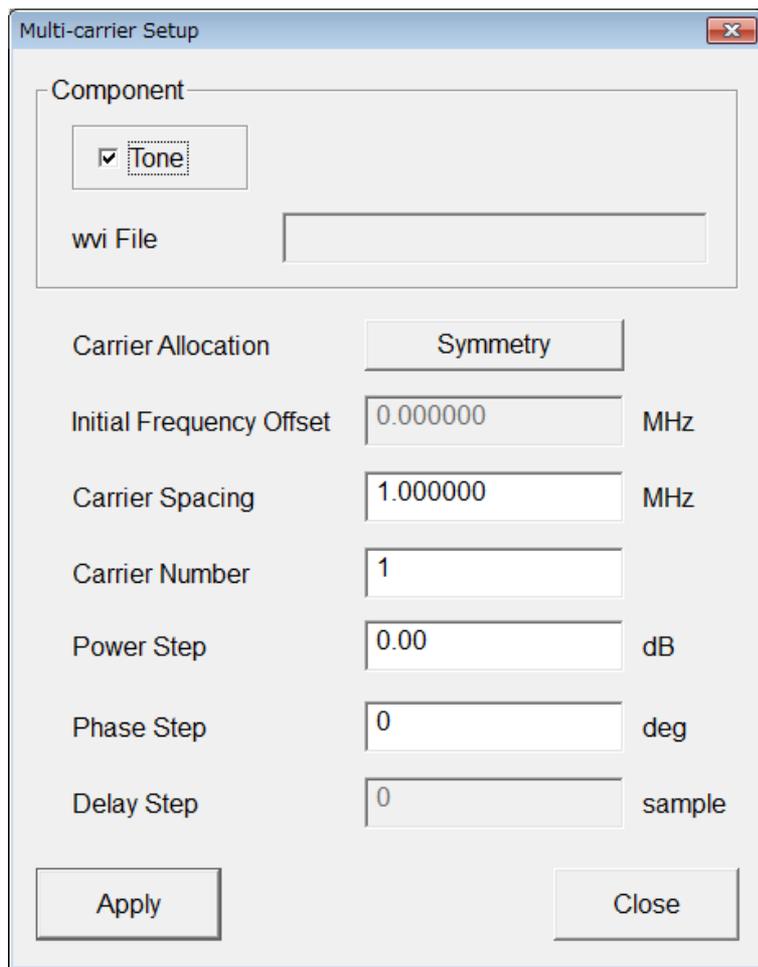
Pattern Setting

Package: Multi_Carrier-TEST

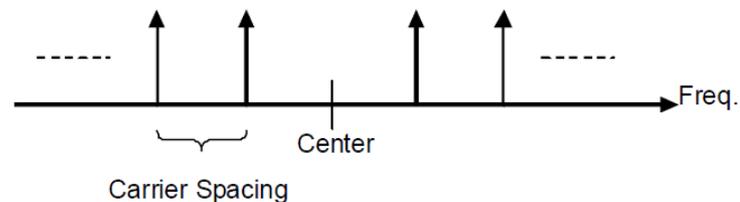
Export File Name: LTE-20MHz-3Wave Comment Calculation & Load Calculation & Play

Multi-purpose function

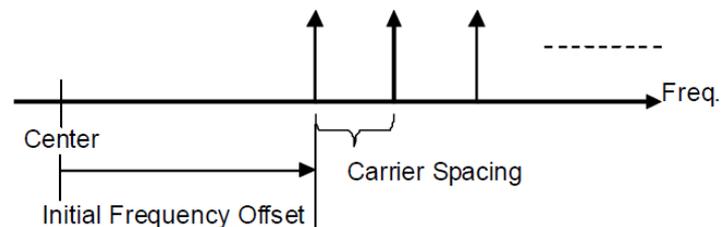
Multi-carrier Setup is the function to generate Tone signals or waveform pattern signals at given frequency intervals.



Carrier Allocation



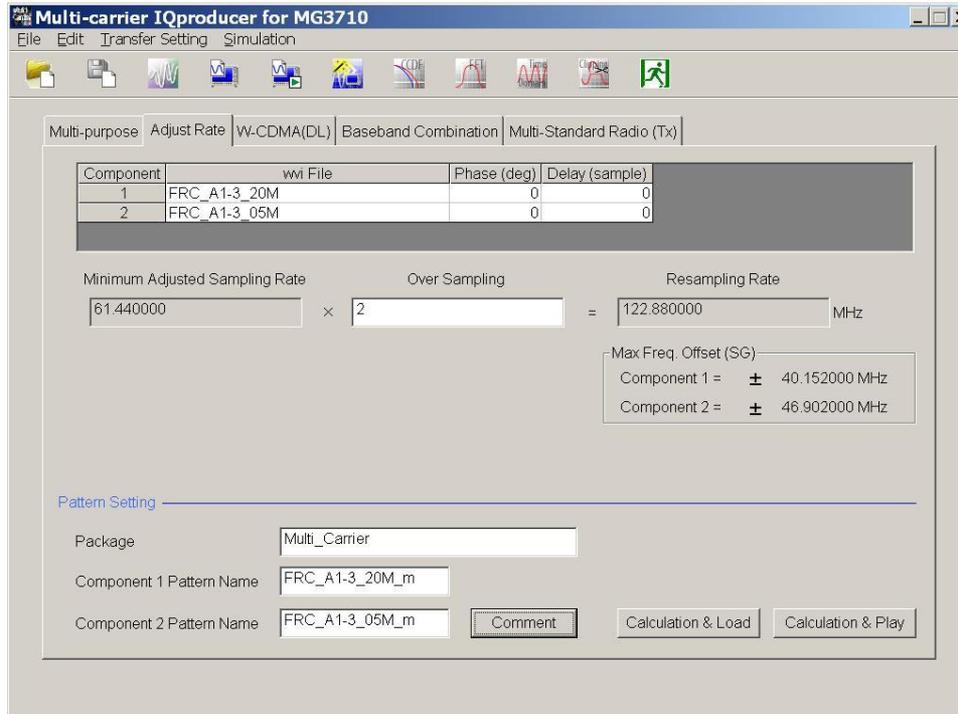
Symmetry Allocation



Series Allocation

Adjust Rate function

Converts two waveform patterns with different sampling rates into two waveforms patterns with same sampling rate. The initial phase and delay for two carriers can be set.



Note:

In some cases, the baseband combine function and adjust rate function cannot combine the sampling rate depending on conditions.

Additionally, the baseband combine function (Opt-048/078) converts the rates of the waveform pattern rates in memory A and B and combines them to match the sampling rate, helping reduce the Adjust rate setup time.

Over Sampling and Max Freq. Relationship of Offset (SG)

If you convert the sampling frequencies of the waveform patterns of Component1 and Component2 using this function, waveform patterns Component1_m and Component2_m having an identical sampling frequency (Resampling Rate) will be generated.

Resampling Rate displays the value obtained by multiplying Minimum Adjusted Sampling Rate by the set value of Over Sampling. Here, the Minimum Adjusted Sampling Rate is the minimum sampling frequency that can be converted by the sampling frequency conversion.

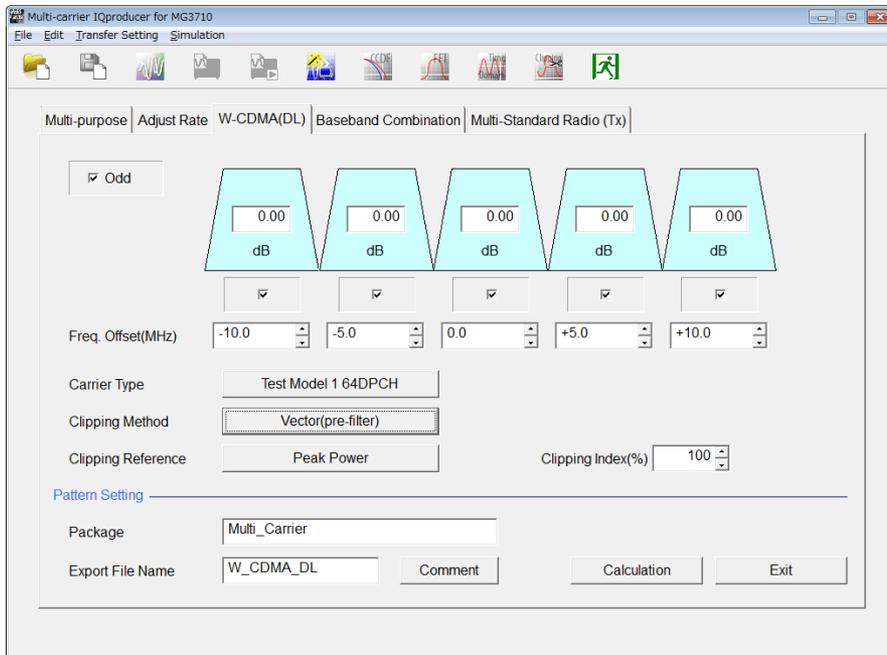
If using MG3710A:

The Max Freq. Offset (SG) is always ± 80 MHz.

However, sometimes signal dropouts and loopback distortion might occur when the output modulation frequency exceeds the equipment modulation band. When using frequency offset, ensure that the used frequency band does not exceed the modulation band.

W-CDMA (DL) function

This function is used to create a waveform pattern by setting any of the 4 or 5 carriers of the W-CDMA Downlink ON/OFF, as well as by setting the Clipping Method, Clipping Reference Level, and Clipping Ratio.



Carrier Type:

Test Model 1 16DPCH,
Test Model 1 32DPCH,
Test Model 1 64DPCH,
Test Model 5 2HS-PDSCH,
Test Model 5 4HS-PDSCH,
Test Model 5 8HS-PDSCH

Clipping Method:

Non,
Vector(pre-filter),
Vector(post-filter),
Scalar(pre-filter),
Scalar(post-filter)

Clipping Reference:

Peak Power,
RMS Power

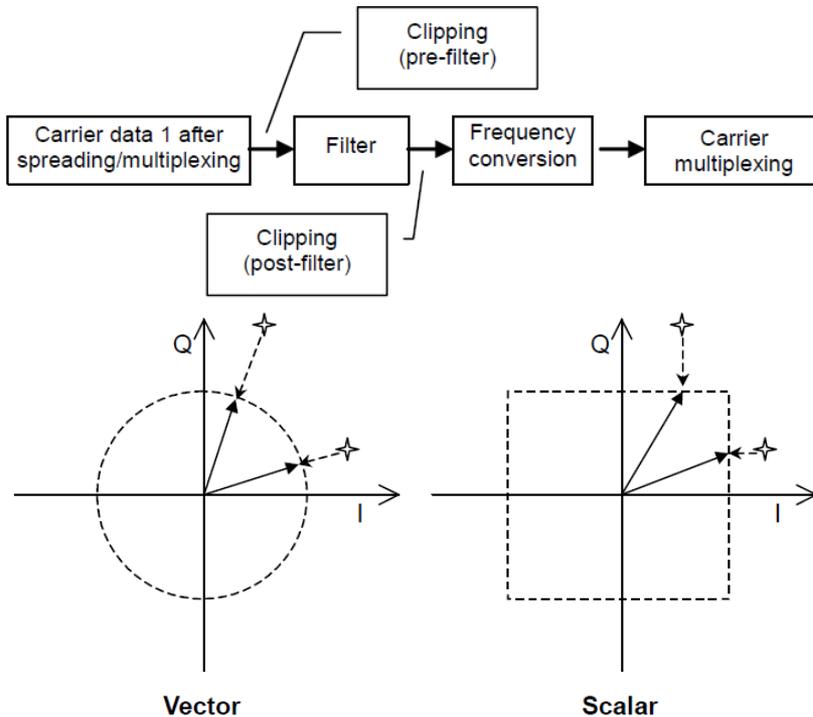
W-CDMA (DL) function

Clipping Method:

Specify the clipping method. As shown in Figure, both pre-filter and post-filter perform clipping before and after filtering. For Vector, the size of $\sqrt{I^2 + Q^2}$ is clipped using the set value. For Scalar, the sizes of I and Q are clipped using the set value. For Non, clipping is not performed.

Clipping Reference:

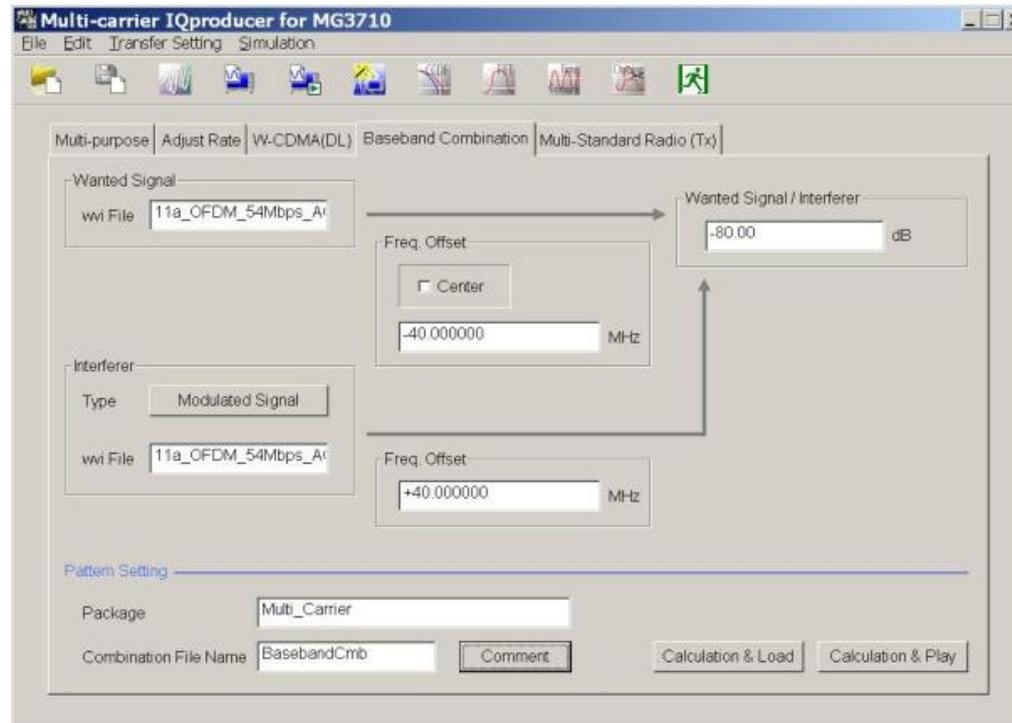
Select the reference for clipping processing. When Peak Power is selected, the maximum value of $\sqrt{I^2 + Q^2}$ is the reference (100%). When RMS Power is selected, the RMS value $\sqrt{I^2 + Q^2}$ of before clipping processing is the reference (0 dB).



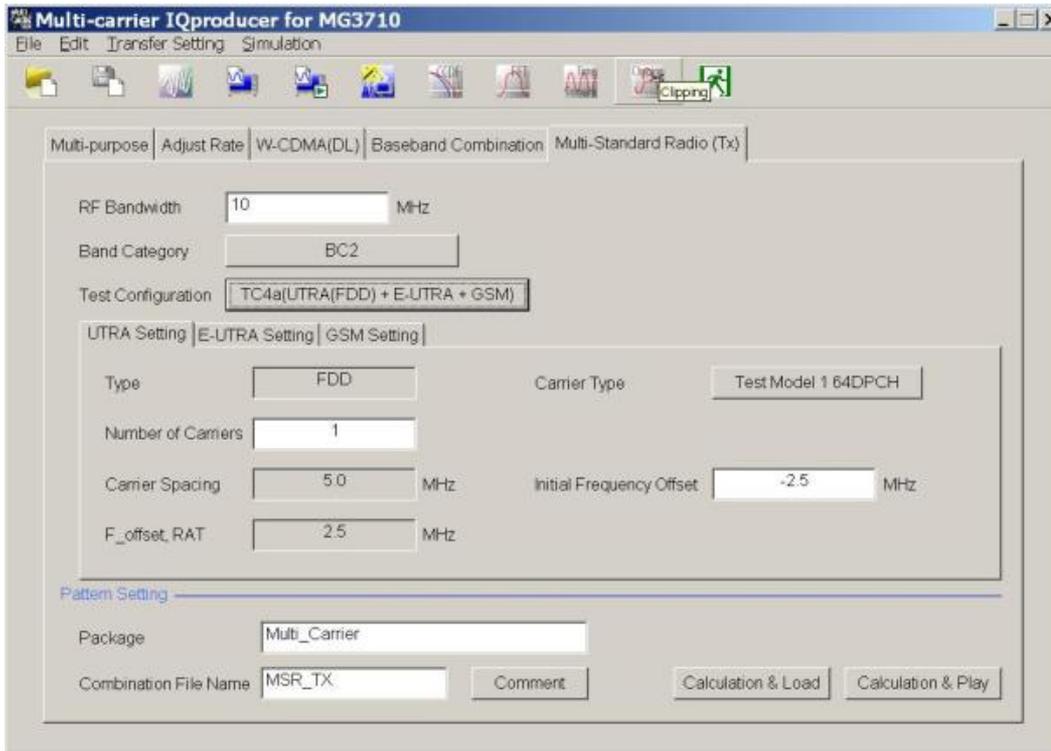
Baseband Combination function

MG3710A only

Creates combination file to use with baseband combine function (Opt-048/078) that outputs two signals, such as wanted + interference signals from one RF port, and sets two waveform patterns, frequency offset and level ratio at the same time. Selecting a previously created combination file supports batch settings. The modulation signal, AWGN, and tone signal can be selected as interference signals. The AWGN option (Opt-049/079) is required to use AWGN.



Generates W-CDMA·LTE-FDD·LTE-TDD·GSM multi-carrier signals for evaluating Multi-Standard Radio Tx characteristics. Using the baseband combine function (Opt-048/078) outputs signals simultaneously from one RF connector.



Multi-Standard Radio (Tx) Function

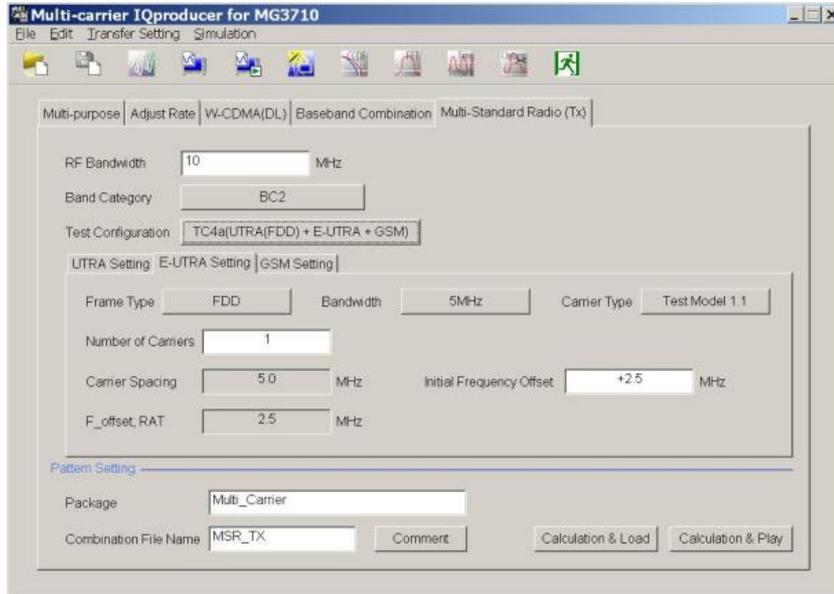
UTRA Setting

Test Configurations

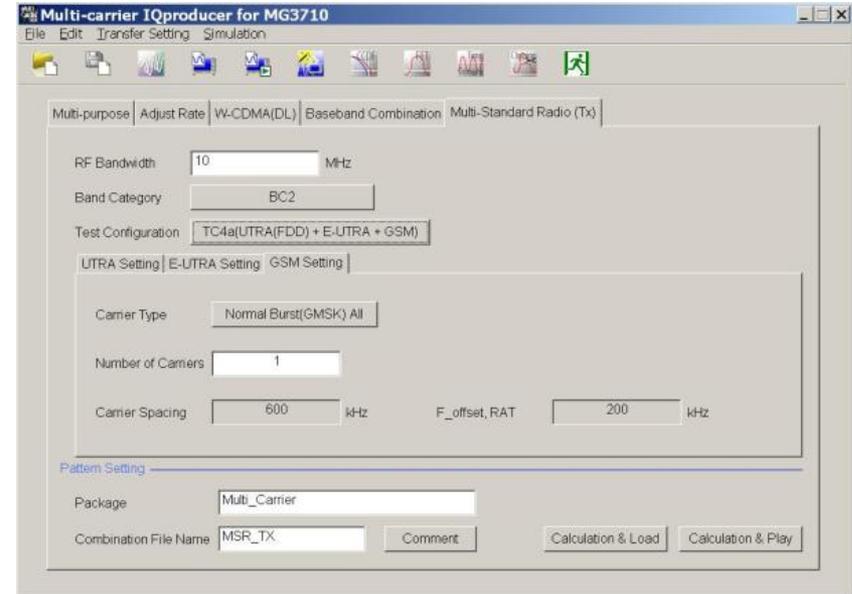
- TC1a [UTRA(FDD) multi-carrier]
- TC1b [UTRA(TDD) multi-carrier]
- TC2 [E-UTRA multi-carrier]
- TC3a [UTRA(FDD) + E-UTRA]
- TC3b [UTRA(TDD) + E-UTRA]
- TC4a [UTRA(FDD) + GSM]
- TC4b [E-UTRA + GSM]
- TC4c [UTRA(FDD) + E-UTRA + GSM]

Multi-Standard Radio function

MG3710A only



Multi-Standard Radio (Tx) function
E-UTRA Setting



Multi-Standard Radio (Tx) function
GSM Setting

Test Configuration	Band Category		
	BC1	BC2	BC3
TC1a (UTRA (FDD) multicarrier)	Yes	Yes	No
TC1b (UTRA (TDD) multicarrier)	No	No	Yes
TC2 (E-UTRA multicarrier)	Yes	Yes	No
TC3a (UTRA (FDD) + E-UTRA)	Yes	Yes	No
TC3b (UTRA (TDD) + E-UTRA)	No	No	Yes
TC4a (UTRA (FDD) + GSM)	No	Yes	No
TC4b (E-UTRA + GSM)	No	Yes	No
TC4c (UTRA (FDD) + E-UTRA + GSM)	No	Yes	No

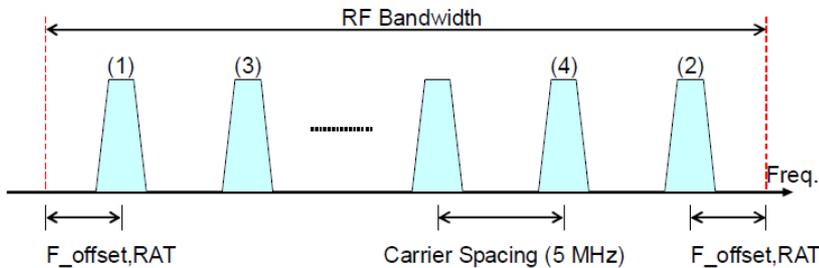
Test Configuration by Band Category

Test Configuration	Result display type		
	UTRA Setting	E-UTRA Setting	GSM Setting
TC1a (UTRA (FDD) multicarrier)	Yes	No	No
TC1b (UTRA (TDD) multicarrier)	Yes	No	No
TC2 (E-UTRA multicarrier)	No	Yes	No
TC3a (UTRA (FDD) + E-UTRA)	Yes	Yes	No
TC3b (UTRA (TDD) + E-UTRA)	Yes	Yes	No
TC4a (UTRA (FDD) + GSM)	Yes	No	Yes
TC4b (E-UTRA + GSM)	No	Yes	Yes
TC4c (UTRA (FDD) + E-UTRA + GSM)	Yes	Yes	Yes

Display Tab by Test Configuration

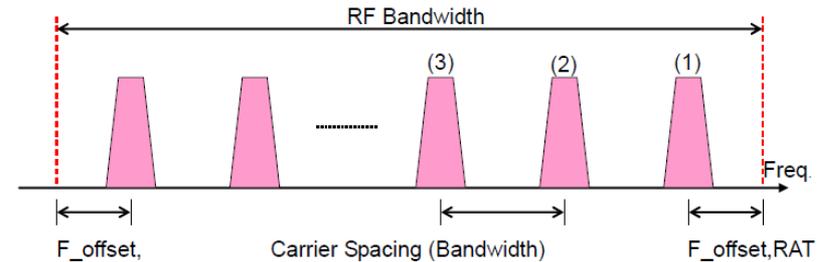
TC1a (UTRA(FDD) multicarrier)

TC1a (UTRA(FDD) multicarrier) is the UTRA FDD multi-carrier signal allocated as follows. The number of the allocatable carriers within RF Bandwidth is applied on this allocation. Carriers are allocated alternately; on the lowest position, the highest position, next to the lowest position, next to the highest position and so on as follows.



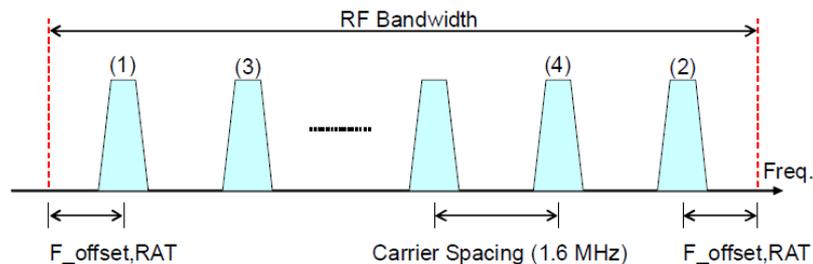
TC2 (E-UTRA multicarrier)

TC2 (E-UTRA multicarrier) is the multi-carrier signal consisting of E-UTRA and the carriers are allocated as follows. The number of the allocatable carriers within RF Bandwidth is applied on this allocation. Carriers are allocated sequentially from the highest position of RF Bandwidth.



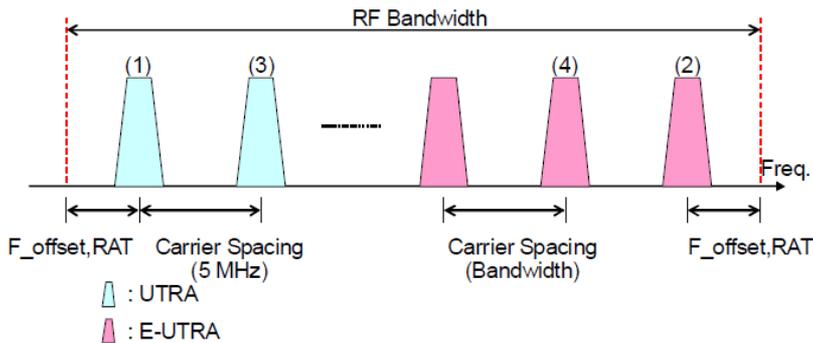
TC1b (UTRA(TDD) multicarrier)

TC1b (UTRA(TDD) multicarrier) is the TDD version of TC1a (UTRA (FDD) multicarrier). All the same except for $F_{offset, RAT}$, and Carrier Spacing.



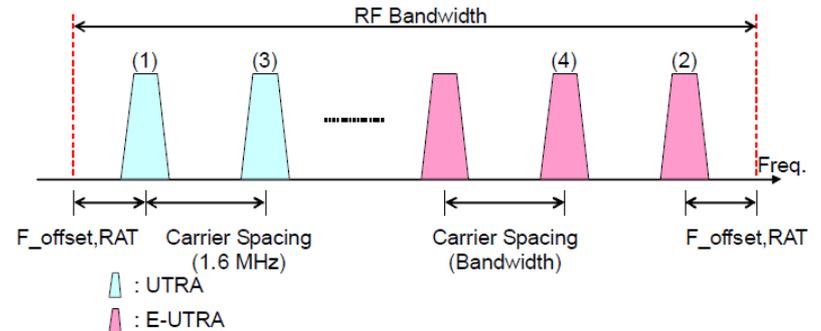
TC3a (UTRA(FDD) + E-UTRA)

TC3a (UTRA(FDD) + E-UTRA) is the multi-carrier signal consisting of UTRA FDD and E-UTRA and the carriers are allocated as follows. The number of the allocatable carriers within RF Bandwidth is applied on this allocation. UTRA FDD carriers are allocated from the Low side and E-UTRA carriers from the High side. Carriers are allocated alternately; on the lowest position, the highest position, next to the lowest position, next to the highest position and so on as follows.



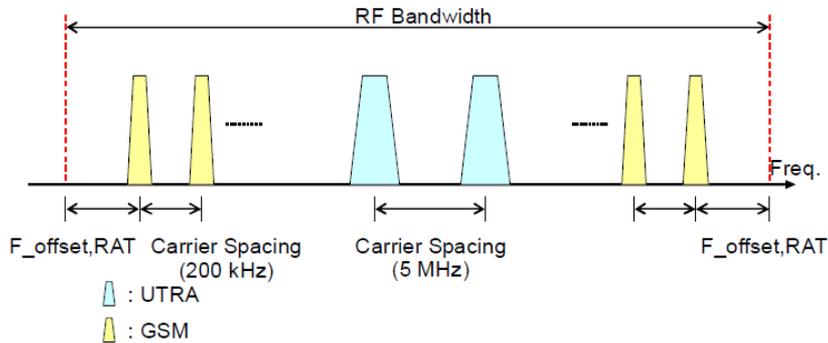
TC3b (UTRA(TDD) + E-UTRA)

TC3b (UTRA(TDD) + E-UTRA) is the TDD version of TC3a (UTRA(FDD) + E-UTRA). All the same except for F_offset, RAT and Carrier Spacing.



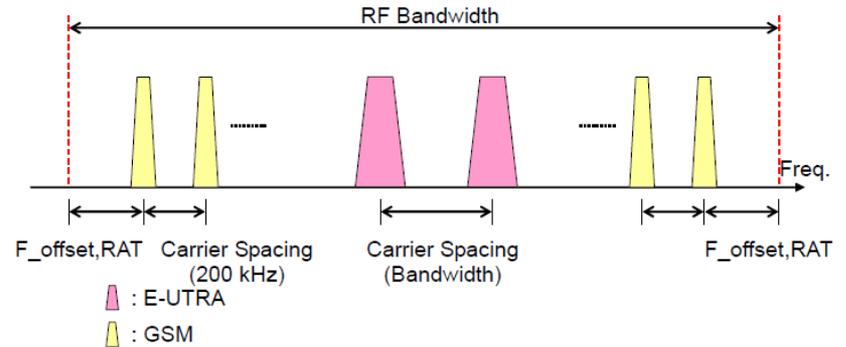
TC4a(UTRA (FDD) + GSM)

TC4a (UTRA (FDD) + GSM) is the multi-carrier signal consisting of UTRA FDD and GSM and the carriers are allocated as follows. GSM carriers are allocated on the Low and High sides and an UTRA FDD carrier at the center of RF Bandwidth. Then follows allocation of GSM carriers.



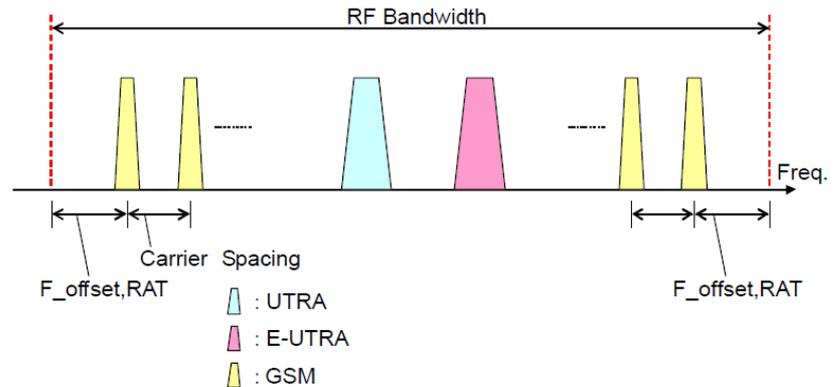
TC4b(E-UTRA + GSM)

TC4b (E-UTRA + GSM) is the multi-carrier signals consisting of E-UTRA and GSM and the carriers are allocated as follows. The GSM carriers are allocated on the Low and High sides and an E-UTRA carrier at the center of RF Bandwidth. Then follows allocation of GSM carriers.



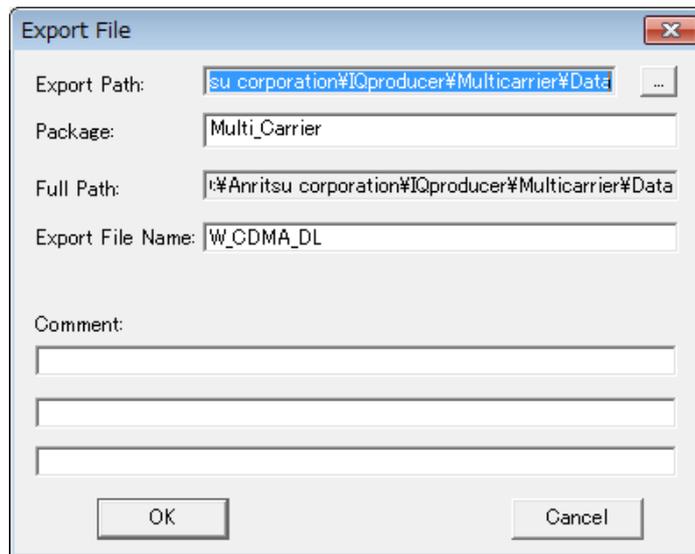
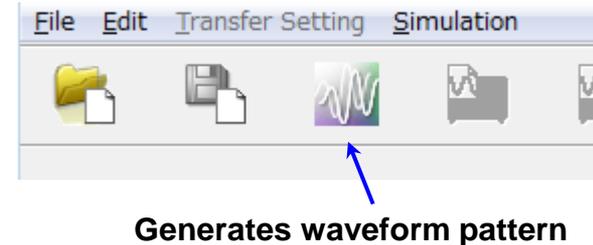
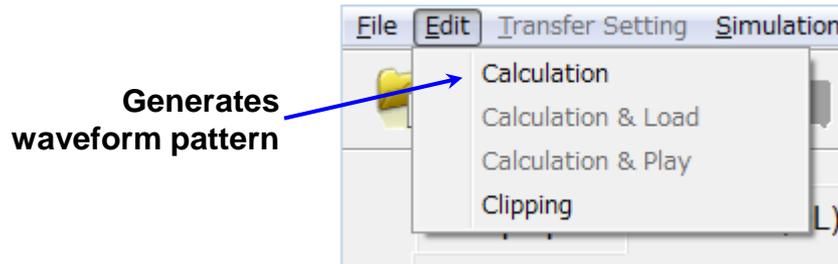
TC4c (UTRA(FDD) + E-UTRA + GSM)

TC4c (UTRA (FDD) + E-UTRA + GSM) is the multi-carrier signal consisting of UTRA, E-UTRA, and GSM and its carriers are allocated as follows. GSM carriers are allocated on the Low and High sides and an UTRA and an E-UTRA carriers at the center of RF Bandwidth. Then follows allocation of GSM carriers. The allocation of UTRA and E-UTRA is decided by setting the initial frequency offset portion of the carrier.



Waveform Generation: Calculation

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

Calculation & Load

Calculation & Play



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

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

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.

• **United States**

Anritsu Company

1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• **Canada**

Anritsu Electronics Ltd.

700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• **Brazil**

Anritsu Eletrônica Ltda.

Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• **Mexico**

Anritsu Company, S.A. de C.V.

Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• **United Kingdom**

Anritsu EMEA Ltd.

200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• **France**

Anritsu S.A.

12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• **Germany**

Anritsu GmbH

Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• **Italy**

Anritsu S.r.l.

Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• **Sweden**

Anritsu AB

Borgarfjordsgatan 13A, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• **Finland**

Anritsu AB

Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• **Denmark**

Anritsu A/S (Service Assurance)

Anritsu AB (Test & Measurement)

Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• **Russia**

Anritsu EMEA Ltd.

Representation Office in Russia

Tverskaya str. 16/2, bld. 1, 7th floor.

Russia, 125009, Moscow

Phone: +7-495-363-1694

Fax: +7-495-935-8962

• **United Arab Emirates**

Anritsu EMEA Ltd.

Dubai Liaison Office

P O Box 500413 - Dubai Internet City

Al Thuraya Building, Tower 1, Suit 701, 7th Floor

Dubai, United Arab Emirates

Phone: +971-4-3670352

Fax: +971-4-3688460

• **Singapore**

Anritsu Pte. Ltd.

60 Alexandra Terrace, #02-08, The Comtech (Lobby A)

Singapore 118502

Phone: +65-6282-2400

Fax: +65-6282-2533

• **India**

Anritsu Pte. Ltd.

India Branch Office

3rd Floor, Shri Lakshminarayan Niwas, #2726, 80 ft Road,

HAL 3rd Stage, Bangalore - 560 075, India

Phone: +91-80-4058-1300

Fax: +91-80-4058-1301

• **P.R. China (Shanghai)**

Anritsu (China) Co., Ltd.

Room 1715, Tower A CITY CENTER of Shanghai,

No.100 Zunyi Road, Chang Ning District,

Shanghai 200051, P.R. China

Phone: +86-21-6237-0898

Fax: +86-21-6237-0899

• **P.R. China (Hong Kong)**

Anritsu Company Ltd.

Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,

No. 1 Science Museum Road, Tsim Sha Tsui East,

Kowloon, Hong Kong, P.R. China

Phone: +852-2301-4980

Fax: +852-2301-3545

• **Japan**

Anritsu Corporation

8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan

Phone: +81-46-296-1221

Fax: +81-46-296-1238

• **Korea**

Anritsu Corporation, Ltd.

502, 5FL H-Square N B/D, 681

Sampyeong-dong, Bundang-gu, Seongnam-si,

Gyeonggi-do, 463-400 Korea

Phone: +82-31-696-7750

Fax: +82-31-696-7751

• **Australia**

Anritsu Pty. Ltd.

Unit 21/270 Ferntree Gully Road, Notting Hill,

Victoria 3168, Australia

Phone: +61-3-9558-8177

Fax: +61-3-9558-8255

• **Taiwan**

Anritsu Company Inc.

7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan

Phone: +886-2-8751-1816

Fax: +886-2-8751-1817

Please Contact: