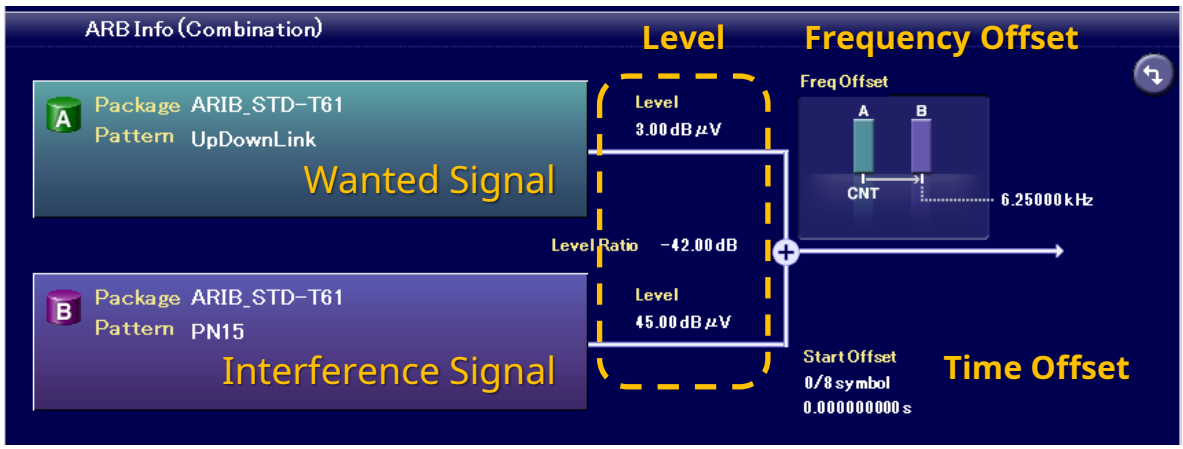
Anritsu envision : ensure

Combination of Baseband Signal Function Simple Operation Guide

Vector Signal Generator MG3710A/MG3710E
Analog Signal Generator MG3740A

This guide explains the dual signal combination method using the **Combination of Baseband Signal Function (Opt.048/078)** installed in the Vector Signal Generator MG3710A/MG3710E and Analog Signal Generator MG3740A (with Digital Modulation Option).



Example of Combination of Baseband Signal Function Setting Screen

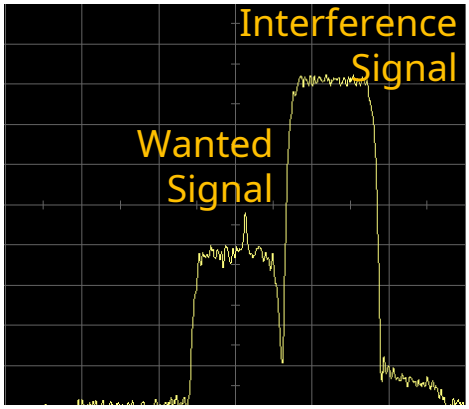
For more details, refer to the following operation manual.

MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual
Chapter 4 Frequency
Chapter 5 Output Level
Chapter 7 Modulation
7.3 Baseband Mode

Setting Wanted and Interference Signal Frequency Offset 1/5

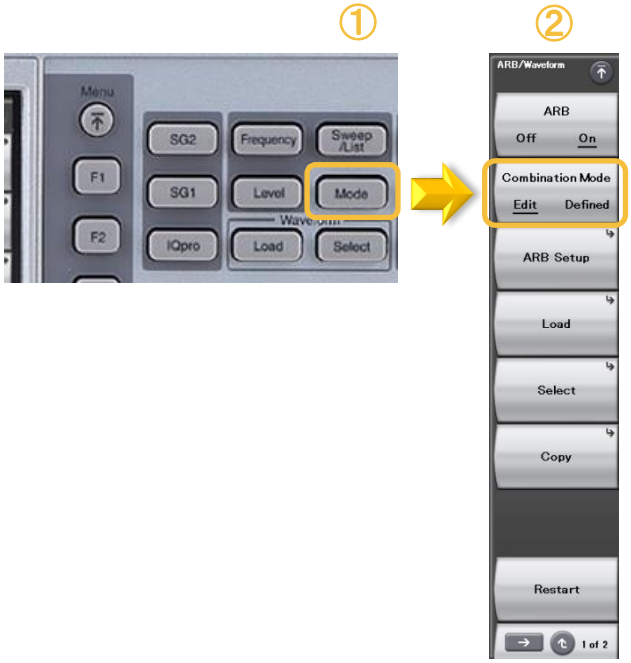
The assumed method for setting the Adjacent Channel Selectivity test using the following wanted and interference signal conditions is introduced as an example.
This manual describes the procedures for setting the wanted waveform in Memory A and the interference waveform in Memory B.

Communications Method	: ARIB STD-T61
Wanted Waveform	
Package Name	: ARIB_STD-T61
Pattern Name	: UpDownLink
Level	: 3 dBuV
Interference Waveform	
Package Name	: ARIB_STD-T61
Pattern Name	: PN15
Level	: 45 dBuV
Frequency Offset (B-A)	: +6.25 kHz
Level Ratio (A/B)	: –42 dB



Output Signal Image
(Example of Confirmation using Spectrum Analyzer)

[Operation Method] Enable (Edit) the baseband combination function.
① [Mode]
② [F2: Combination Mode] = Edit

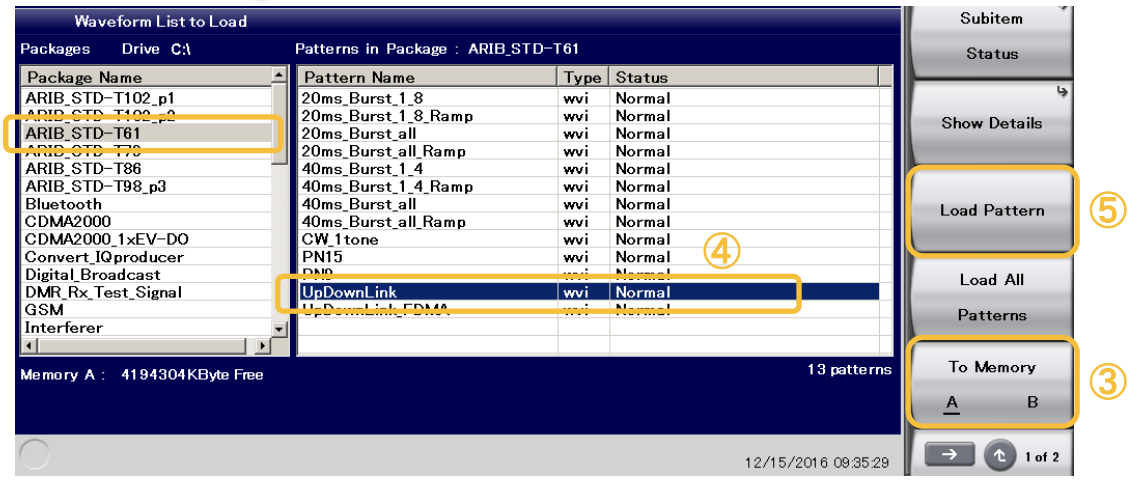


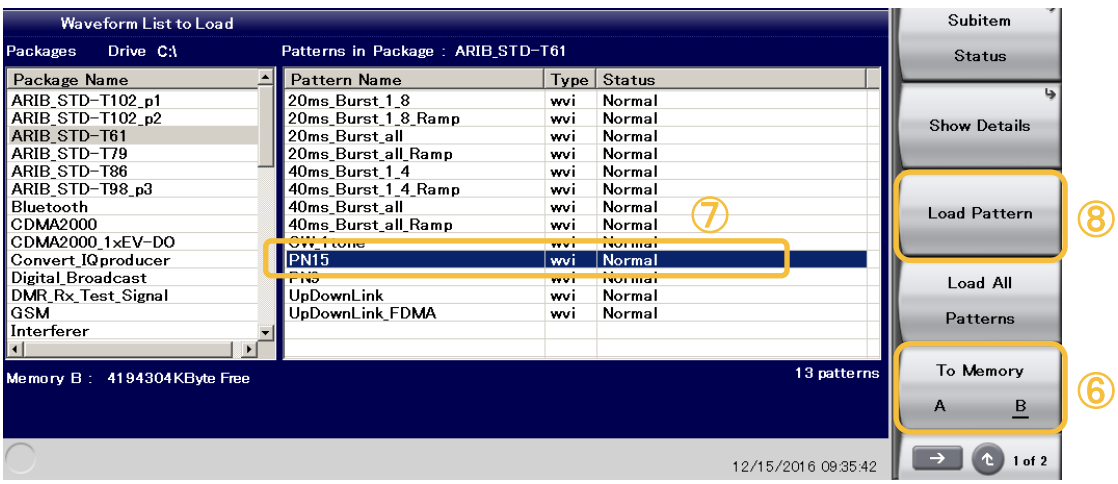
Setting Wanted and Interference Signal Frequency Offset 2/5

[Procedure] Load the waveform pattern.

① [Load]
② Select “ARIB_STD-T61” at “Package Name”.
③ [F8: To Memory] = A
④ Select “UpDownLink” at “Pattern Name”.
⑤ [F6: Load Pattern]
⑥ [F8: To Memory] = B
⑦ Select “PN15” at “Pattern Name”.
⑧ [F6: Load Pattern]

①





Setting Wanted and Interference Signal Frequency Offset 3/5

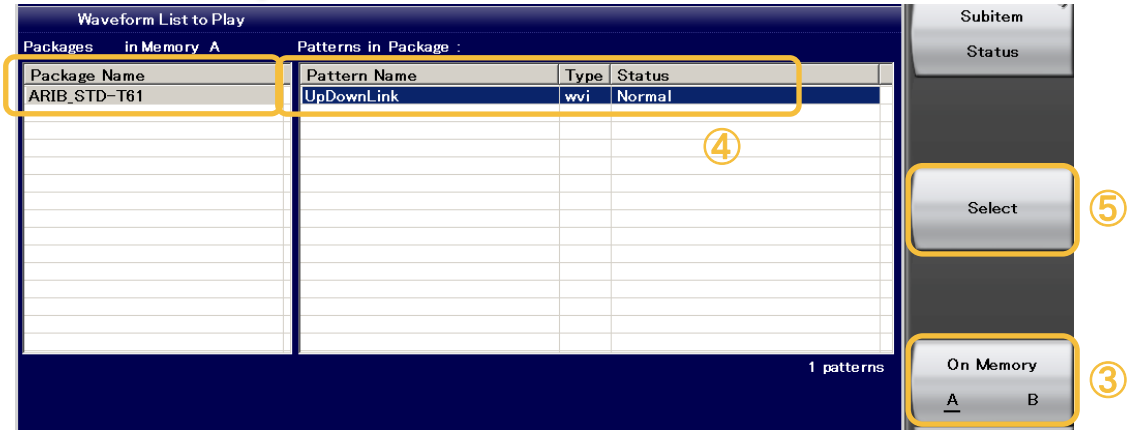
[Procedure] Select the waveform pattern.

① [Select]
② Select “ARIB_STD-T61”at “Package Name”
③ [F8: On Memory] = A
④ Select “UpDownLink” at “Pattern Name”.
⑤ [F6: Select]
⑥ [Select]
⑦ [F8: On Memory] = B
⑧ Select “PN15” at “Pattern Name”
⑨ [F6: Select]

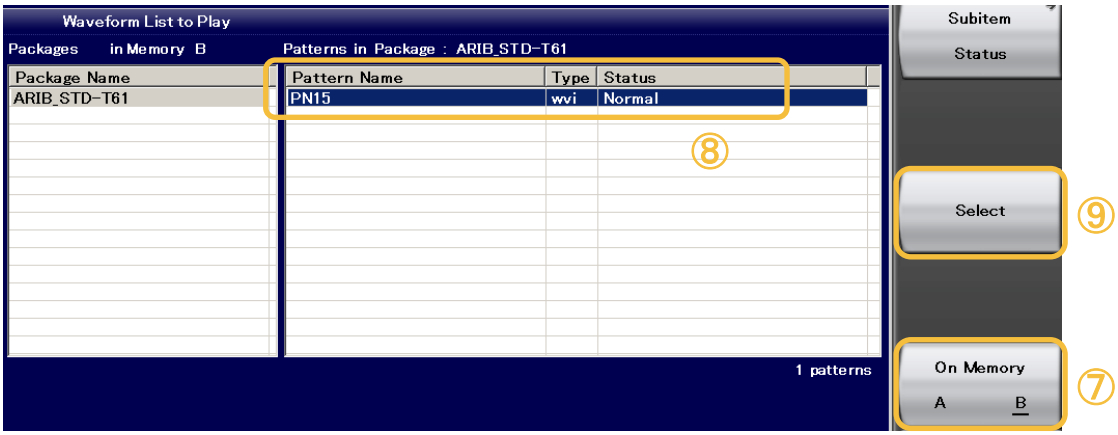
Memo:
As a different procedure, after pressing [Mode], Memory A/B, the Package and Pattern can be selected at the touch panel.

①⑥

Confirming Settings



② ④ ⑤ ③



⑧ ⑨ ⑦

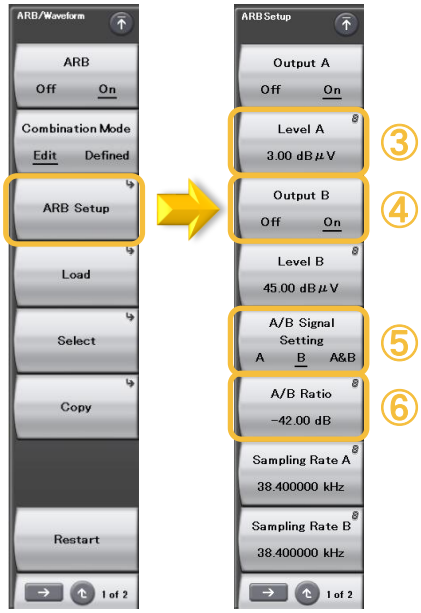
Setting Wanted and Interference Signal Frequency Offset 4/5

[Procedure] Set the levels.

① [Mode]
② [F3: ARB Setup]
③ Set the wanted waveform (Memory A) level. (Example: 3 dBuV)
[F2: Level A] = [3] [F2: dBuV]
④ Enable output of the interference waveform (Memory B).
[F3: Output B] = On
⑤ Set the interference waveform (Memory B) output to the relative value setting mode.
[F5: A/B Signal Setting] = B
⑥ Set the interference waveform (Memory B) output. (Example: –42 dBc)
[F6: A/B Ratio] = [–42] [F1: dB]

Memo:
In this case, when [F6: A/B Ratio] is changed, the level of the wanted waveform (Memory A) is fixed and the level of the interference waveform (Memory B) can be adjusted.
This function is useful at the Adjacent Channel Selectivity test.

①



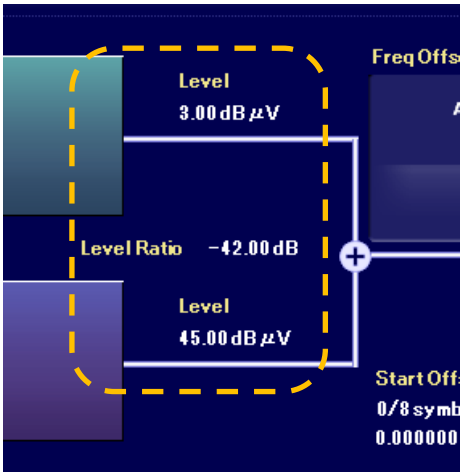
②

③ ← Wanted Waveform Level
Example: 3 dBuV

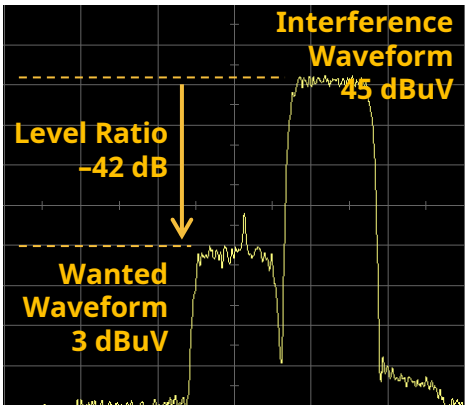
④

⑤ ← Interference Waveform Level
Example: 45 dBuV

⑥ ← Level Ratio (A/B)
Example: –42 dB



Confirming Settings



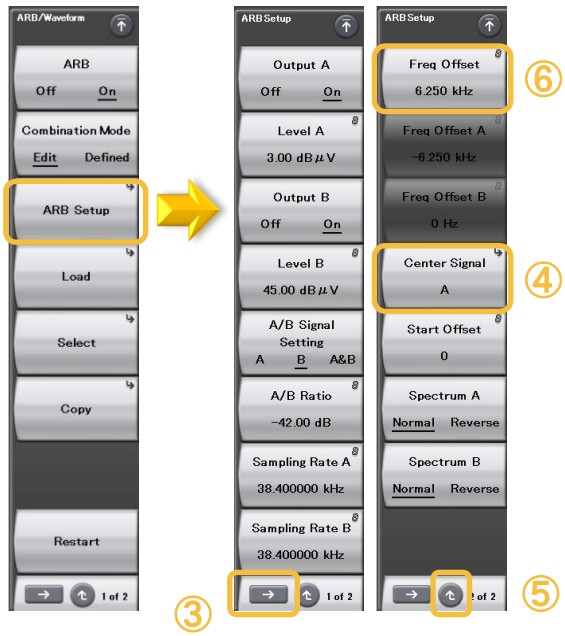
Output Level Image
(Example of Confirmation using Spectrum Analyzer)

Setting Wanted and Interference Signal Frequency Offset 5/5

[Procedure] Set the frequency offset.
① [Mode]
② [F3: ARB Setup]
③ [→] Page 2
④ Position the wanted waveform (Memory A) at the center frequency
[F4: Center Signal] > [F1: A]
⑤ Return to first level [↑].
⑥ Set the frequency offset. (Example: 6.25 kHz)
[F1: Freq Offset] = [6.25][F3: kHz]

Important Point:
Always set Center Signal to A first.
Generally, there is carrier leak with a signal generator. With these settings, the interference waveform (Memory B) output can include carrier leak so it has no effect on the wanted waveform (Memory A) Conversely, when setting the Center Signal to either B or Baseband DC, accurate measurement is impossible because carrier leak is included in the wanted waveform (Memory A) output.

①



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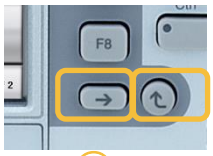
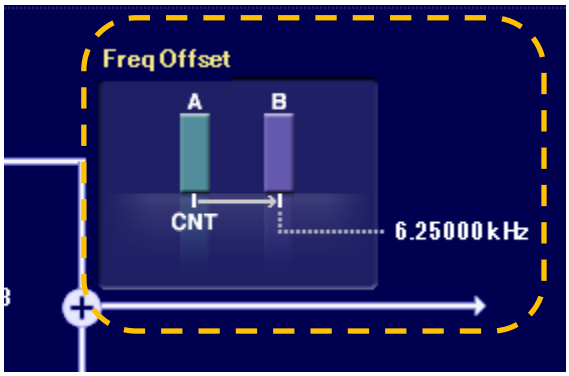


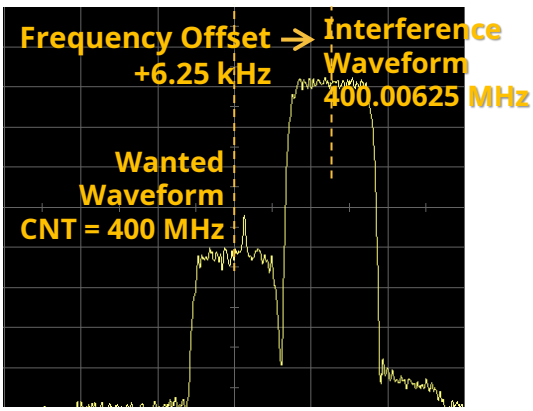
③ ⑤



Confirming Settings

Memo:
The signal with "CNT" displayed is positioned at Center. In this example, the interference waveform is positioned at the Center frequency 6.25 kHz positive side.

Example of Confirmation using Spectrum Analyzer
In the following example, the wanted waveform (Memory A) is at 400 MHz and the interference waveform is positioned at +6.25 kHz. The carrier leak is included in the Memory B side signal.



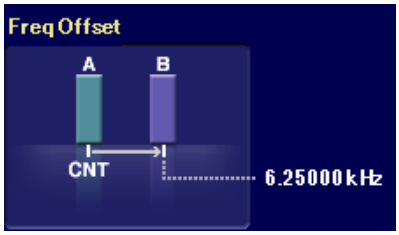
Frequency Arrangement Image
(Example of Confirmation using Spectrum Analyzer)

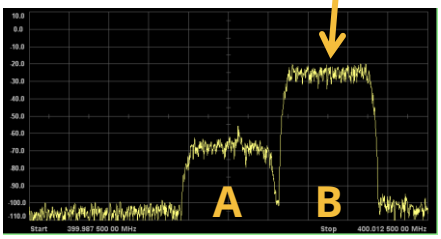
[Reference] Setting Center Signal and Positioning Carrier Leak

☐ At Center Signal = A

Example: Positioning Memory A at center frequency (Ex. 400 MHz) and Memory B at 6.25 kHz positive side.

Carrier leak in Memory B

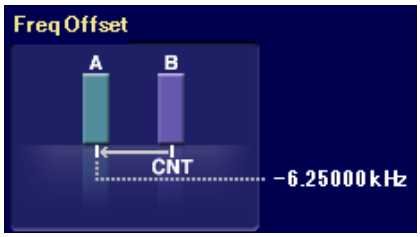


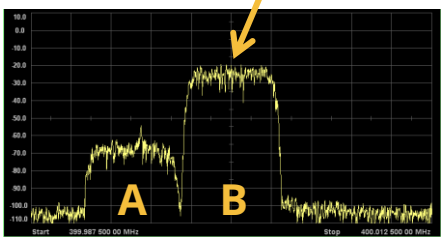


☐ At Center Signal = B

Example: Positioning Memory B at center frequency (Ex. 400 MHz) and Memory A at 6.25 kHz negative side.

Carrier leak in center frequency (Memory B)

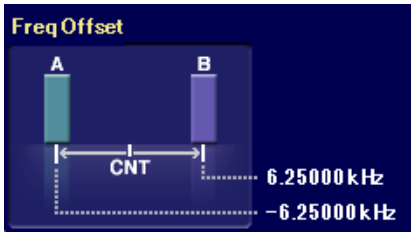


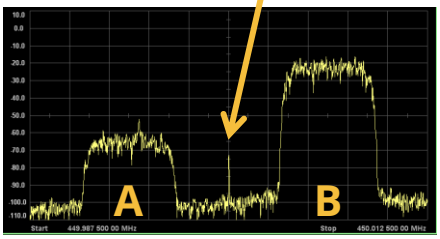


☐ At Center Signal = Baseband DC

Example: Positioning Memory A at 6.25 kHz negative side and Memory B at 6.25 kHz positive side relative to center frequency (Example: 400 MHz).

Carrier leak in center frequency





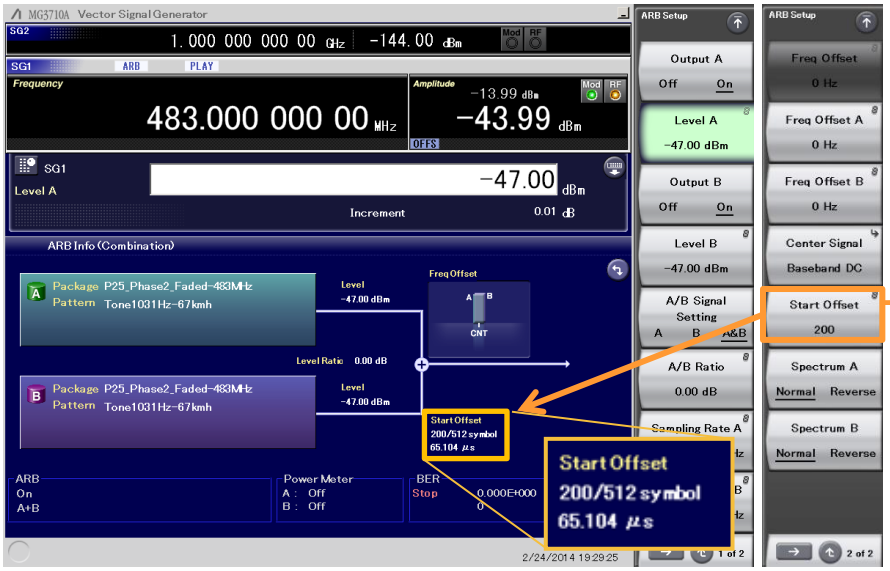
For details, refer to the following operation manual.

MG3710A/MG3710E Vector Signal Generator MG3740A Analog Signal Generator Operation Manual

7.3.3 ARB Setup

[Application Example] Setting Time Difference between Direct and Delayed Waveforms

The direct and delayed waveform setting is used for APCO-P25 and NXDN Signal Delay Spread Capability tests and when evaluating the DUT Rx characteristics under simulated multipath conditions.



P25 Phase2 Time Difference Setting Example

*The details are described in the Supplementary Explanation below.

The waveform pattern in the figure on the left can be set to a delay of 0.326 us per point. In this screen example, a delay of 65.1 us is set for 200 points.

1 point = 0.326 µs
200 points = 65.1 µs
^^^^^^^^^^^^^^^^^

Symbol Rate = 6000 sps
Oversampling = 512

1 s/6000 symbols ≒ 167 µs
167 µs/32 ≒ 5.2 µs
167 µs/512 ≒ 0.326 µs

Example of P25 Phase2 Signal Delay Spread Capability Test Setting Screen

Time Difference Setting = “Start Offset”:

The time difference for Memory B (Delay Time) is set based on Memory A.

The setting resolution differs according to the Memory B waveform pattern sampling rate.

The waveform pattern sampling rate is determined by the mathematical product of the symbol rate and oversampling. Since the former term is a fixed value for each communications system, the time difference (Delay Time) setting resolution becomes finer as the latter term becomes bigger.

[Supplementary Explanation]

When creating the P25 Phase2 waveform pattern using TDMA IQproducer (MX370102A), the P25 Phase2 symbol rate is 6000 sps; since the TDMA IQproducer oversampling upper limit is 32, the setting resolution is **167 us/32 ≒ 5.2 us.**

However, since the permissible value for the P25 Phase2 Signal Delay Spread Capability test is 35 us, 5.2 us cannot be described as sufficiently adequate resolution.

In this case, the sampling rate can be increased using the Adjust Rate function of the separately sold Multi-Carrier IQproducer (MX370104A) software. As shown in the above example figure, since the oversampling is 512 times, the resolution is **167 us/512 ≒ 0.326 us** and an adequate resolution can be achieved because about 1/100 of the permissible value can be set.

Additionally, although not mentioned in this guide, since a fading signal is used in the above-described test, the separately sold Fading IQproducer (MX370107A) can be used to create a Rayleigh fading waveform pattern.

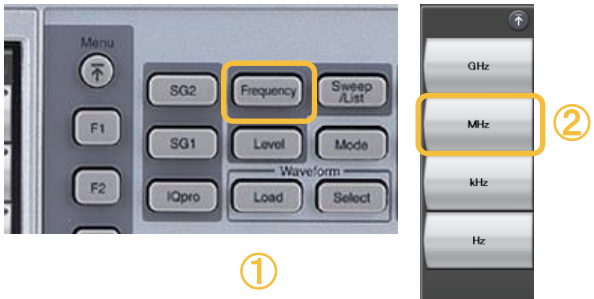
[Note]

The Multi-Carrier IQproducer (MX370104A) can be used with the MG3710A and MG3710E but not with the MG3740A.

The TDMA IQproducer (MX370102A) and Fading IQproducer (MX370107A) can be used with the MG3710A, MG3710E and MG3740A.
A license (charged) is required to use each of these solutions.

Setting Frequency and Level

[Procedure] Frequency (Example: 400 MHz)
① [Frequency]
② [400] [F2: MHz]



Memo:
The Center Signal frequency is set.

[Procedure] (Example: –10 dBm)
① [Level]
② Set [–10] and [F1: dBm] at ten keypad.

Memo:
The output level is adjusted while maintaining the Memory A/B level ratio. Use a spectrum analyzer, etc., when confirming the output waveform patterns from Memory A/B.

Enabling Modulation and Output (On)

[Procedure]
① [Mod On/Off] On = Green *Modulation enabled. No modulation at Off.
② [On/Off] On = Orange *Signal being output.

Recommended Equipment Configuration

This table lists the minimum recommended equipment configuration for using the **Combination of Baseband Signal Function (Opt.048/078)**. Other hardware and software may be required depending on the actual measurement environment and communications method.

Model		Name	Note
MG3710A/MG3710E		Vector Signal Generator	Main frame
	MG3740A	Analog Signal Generator	
	MG3740A-020	Digital Modulation	Adding the digital modulation function supports generation of digital modulation signals by outputting narrowband digital modulation signals.
MG3710A/MG3710E-032	MG3740A-032	1stRF 100 kHz to 2.7 GHz	Must install any one of these. 1stRF output of vector signal generator. Select one model with the required frequency range. The 1stRF frequency cannot be changed retroactively after ordering.
MG3710A/MG3710E-034	MG3740A-034	1stRF 100 kHz to 4 GHz	
MG3710A/MG3710E-036	MG3740A-036	1stRF 100 kHz to 6 GHz	
MG3710A/MG3710E-048	**MG3740A-048**	**Combination of Baseband Signal for 1stRF**	**Two internal ARB memories. Selects two waveform patterns per one RF output for setting mutual frequency offset, level offset, delay time, etc., to output 2 signals from 1 RF connector.**
MG3710A/MG3710E-062	MG3740A-062	2ndRF 100 kHz to 2.7 GHz	2ndRF output of vector signal generator. Select one model with the required frequency range. The 2ndRF frequency cannot be changed retroactively after ordering.
MG3710A/MG3710E-064	MG3740A-064	2ndRF 100 kHz to 4 GHz	
MG3710A/MG3710E-066	MG3740A-066	2ndRF 100 kHz to 6 GHz	
MG3710A/MG3710E-078	**MG3740A-078**	**Combination of Baseband Signal for 2ndRF**	**Two internal ARB memories. Selects two waveform patterns per one RF output for setting mutual frequency offset, level offset, delay time, etc., to output 2 signals from 1 RF connector.**

IQproducer

The IQproducer system provides an easy-to-use GUI for setting parameters according to each communications method. The parameter setting results file can be saved as a file for easy recall later.

Main units supporting IQproducer

IQproducer Support Systems		MG3740A (with Opt. 020)	MG3710A/MG3710E
Standard Accessories	W-CDMA IQproducer	—	✓
	AWGN IQproducer	—	✓
Options	MX370101A HSDPA/HSUPA IQproducer	—	✓
	MX370102A TDMA IQproducer	✓	✓
	MX370103A CDMA2000 1xEV-DO IQproducer	—	✓
	MX370104A Multi-carrier IQproducer	—	✓
	MX370106A DVB-T/H IQproducer	—	✓
	MX370107A Fading IQproducer	✓	✓
	MX370108A LTE IQproducer	—	✓
	MX370108A-001 LTE-Advanced FDD Option	—	✓
	MX370110A LTE TDD IQproducer	—	✓
	MX370110A-001 LTE-Advanced TDD Option	—	✓
	MX370111A WLAN IQproducer	—	✓
	MX370111A-002 802.11ac (160 MHz) Option	—	✓
	MX370112A TD-SCDMA IQproducer	—	✓
	MX370113A 5G NR TDD sub-6 GHz IQproducer	—	✓
	MX370114A 5G NR FDD sub-6 GHz IQproducer	—	✓

For detail, refer to the MX3701xxA IQproducer product brochure.

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