

**MX368035A
PHS Signal
Generation Software
(for MU368030A)
Operation Manual**

First Edition

**Read this manual before using the equipment.
To ensure that the equipment is used safely, read
the "For Safety" in the MG3681A Digital Modulation
Signal Generator Operation Manual first.
Keep this manual with the equipment.**

ANRITSU CORPORATION

MX368035A
PHS Signal Generation Software (For MU368030A)
Operation Manual

14 February 2003 (First Edition)

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1. Product Model

Software: MX368035A PHS Signal Generation Software

2. Applied Directive

EMC: Council Directive 89/336/EEC

LVD: Council Directive 73/23/EEC

3. Applied Standards

EMC: Emission: EN61326: 1997/A1: 1998 (Class A)

Immunity: EN61326: 1997/A1: 1998 (Annex A)

	Performance Criteria*
IEC61000-4-2 (ESD)	B
IEC61000-4-3 (EMF)	A
IEC61000-4-4 (Burst)	B
IEC61000-4-5 (Surge)	B
IEC61000-4-6 (CRF)	A
IEC61000-4-8 (RPFMF)	A
IEC61000-4-11 (V dip/short)	B

*: Performance Criteria

A: During testing normal performance within the specification limits.

B: During testing, temporary degradation, or loss of function or which is self-recovering.

Harmonic current emissions:

EN61000-3-2: 1995/A2: 1998 (Class A equipment)

LVD: EN61010-1: 1993/A2: 1995 (Installation Category II, Pollution Degree 2)

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C-tick marking



1. Product Model


Software: MX368035A PHS Signal Generation Software

2. Applied Standards

EMC: Emission:
AS/NZS 2064.1/2 (ISM, Group 1, Class A equipment)

About This Manual

This Operation Manual explains the outline, measurement examples, remote control and other aspects of MX368035A PHS Signal Generation Software. This software is designed to be installed in the MU368030A Universal Modulation Unit mounted on the MG3681A Digital Modulation Signal Generator.

 represents a panel key.

The MG3681A Digital Modulation Signal Generator Main Unit Operation Manual and the MU368030A Universal Modulation Unit Operation Manual are available as separate volumes.

Use it in conjunction with this Operation Manual.

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Section 1 Overview

This section describes the outline and product configuration of MX368035A PHS Signal Generation Software product and standard accessories.

1.1	Product Overview	1-2
1.2	Product Configuration	1-3

1.1 Product Overview

The MX368035A PHS Signal Generation Software (hereinafter, referred to as this software) is system software to be installed in the MU368030A Universal Modulation Unit.

To use this software, a Universal Modulation Unit must be mounted on the MG3681A Digital Modulation Signal Generator.

By installing this software, modulation signals conforming to RCR STD-28 standards can be generated.

1.2 Product Configuration

Standard configuration of the MX368035A is given in the table below. After unpacking, check that all items listed are included. If any items are missing or damaged, please contact Anritsu or one of our agencies.

Items	Model name/type	Product name	Quantity	Remarks
Main unit	MX368035A	PHS Signal Generation Software	1	Supplied for Compact Flash or ATA Flash card.
Accessories		PC card adapter	1	Supplied only for Compact Flash card
	W2167AE	Operation Manual	1	

Section 2 Operation Outline

This section describes basic screen contents and how to input auxiliary signals when mounting the MU368030A Universal Modulation Unit installed with this software onto the MG3681A.

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2.1 Screen Transitions

The screens are transitioned as shown below:

Press main function key **Digital Mod**.



Digital modulation setup screen

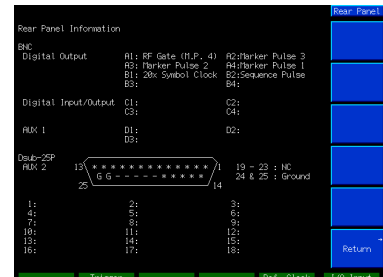


Press main function key **Config**.

Environment setup screen



Rear Panel Information screen



2.2 Setting Modulation Parameters

When the Digital Mod is pressed, the lamp goes on and the Main Screen appears. The basic parameters for digital modulation can be set on this screen. Setting items on the Main screen are shown below.



Main Screen

[1] Baseband

Outline: Selects On/Off for the operation of the Baseband Signal Generator Unit.

Selection Item: On/Off

[2] I/Q Mod.

Outline: Selects the I/Q signal source for orthogonal modulation. Selects “Int” to use the internal signal source for the I/Q signal (using this software), “Ext” to use the external input, or “Off” not to use orthogonal modulation.

Selection Item: Int/Ext/Off

[3] Pulse Mod.

Outline: Sets the modulation signal on the pulse modulator. Selects “Int” to use the control signal generated by this software or “Ext” to use the external input signal for pulse modulation regardless of modulation settings. Selects “Off” when pulse modulation is not executed.

Selection Item: Int/Ext/Off

- [4] System
 - Outline: Sets the system software. Select “PHS” to start this Software.
 - Selection Item: PHS
- [5] Pattern
 - Outline: Selects PHS modulation signal. Refer to Section 2.4 “Modulation Wave List” for selectable PHS modulation signals.
 - Selection Item: DWLINK/UPLINK/CONPN15/CONPN9
- [6] Trigger Source
 - Outline: The interior and exterior of transmission timing for modulation signals are switched. Refer to Section 2.4 “Switching Modulation Signal to be transmitted” for details.
 - Selection Item: Int/Start/Frame
- [7] Reference Clock
 - Outline: The interior and exterior of Reference Clock are switched. Select “Int” to generate Reference Clock in MG3681A. In the case of external input, select “Ext(TTL)” for external clock TTL or “Ext(AC)” for external clock AC(5 Vp-p).
 - Selection Item: Int/Ext(TTL)/Ext(AC)
- [8] Trigger Delay
 - Outline: Sets the delay of modulation transmission timing for the trigger signal input. Refer to Sections 3.3.5 in details.
 - Setting range 0 to 16777215
- [9] F3: Wave Data Restart
 - Outline: When Trigger Source = Start is set, press this key to resynchronize with the external trigger.
- [10] F5: Wave Data Download
 - Outline: Reads the modulation wave from the PC card and switches the modulation signal to be transmitted.

2.3 Switching Software

When other software in MG3681A is switched to this software, “No Data” on Pattern may be displayed. In this case, downloading of wave data is required to use this software.

Insert the MX368035A software-stored memory card to the PC card slot on the rear of the MG3681A. Then, press **F5** Wave Data Download on the Main screen. The selection window appears and UMU35P0.dli is displayed and, then, press **Set**.

Download is started by pressing **Set**. When it is completed, “File Import Complete” is displayed. Care should be taken not to power off under downloading.

2.4 Switching Modulation Signal to be transmitted

This software allows four types of modulation signals to be outputted: Down-TCH 1 slot, Up-TCH 1 slot and Continuous waves (PN15 and PN9). To switch the modulation signal to be transmitted, move the cursor to the “Pattern” and press **Set** on the Main in section 2.2 “Setting Modulation Parameters.” Selection window is displayed. Select the desired signal among the four types of modulation signals. Press **Set** to switch the waveform.

The following list shows the relationship of four types of modulation signals.

Modulation Wave List

No.	Modulation Signal	Pattern	Frame Format	Symbol Data	Synchronization by external trigger
0	Down-TCH 1 slot	DNLINK	Present	PN9	Possible
1	Up-TCH 1 slot	UPLINK	Present	PN9	Possible
2	Continuous wave PN15	CONPN15	Absent	PN15	Impossible
3	Continuous wave PN9	CONPN9	Absent	PN9	Impossible

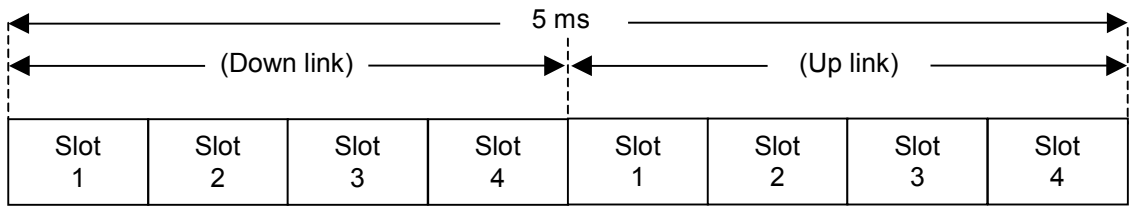
Section 3 Operation Details

This section describes details on PHS Signal Generation software operations, generated patterns, trigger functions and Auxiliary Signal Output.

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3.1 Frame Configuration

The PHS frames consist of 8 slots (Down 4 slots, Up 4 slots), and data is generated by setting this frame as a cycle. The slot to be transmitted is only slot 1 and none of the following slots 2 to 4 are transmitted. PN9 pseudo random patterns of TCH in slot are independent in each slot and continuous.



3.2 Slot Configuration

The slot has two types of Down and Up traffic channels. The scramble function is always OFF.

Up and Down traffic channels (Up and Down-TCH)

R	SS	PR	UW	CI	SA	TCH	CRC	G
4	2	6	16	4	16	160	16	16

R	: Ramp period for burst transient response	0 _H (4 bits)
SS	: Start symbol	2 _H (2 bits)
PR	: Preamble	19 _H (6 bits)
UW	: Synchronization word	Up link = E149 _H (16 bits) Down link = 3D4C _H (16 bits)
CI	: Channel identification	0 _H (4 bits)
SA	: SACCH	8000 _H (16 bits)
TCH	: Information channel	PN9-stage (Continuous in all transmitted slots)
CRC	: Cyclic redundancy check	CRC bits of CI, SA, TCH
G	: Guard period for burst transient response	0000 _H (16 bits)

3.3 Trigger Function

PHS software operates with 3 types of trigger modes: “Internal Trigger Mode”, “Start Trigger Mode” and “Frame Trigger Mode”.

3.3.1 Internal Trigger Mode

Use this mode when the transmission start timing for the modulation signal does not have to be externally synchronized.

With the MG3681A, the transmission starts automatically as soon as the modulation signal can be transmitted.

3.3.2 Start trigger mode

Use this mode when the transmission start timing synchronization for the modulation signal is externally controlled.

With the MG3681A, the start trigger input queue status is activated as soon as the modulation signal can be transmitted, and the transmission starts with a delay in trigger delay setting values when the start trigger is inputted.

Only the transmission start timing is synchronized, thus the modulation signal, like an internal trigger, continues to be transmitted.

Press F3 Wave Data Restart to resynchronize with the external trigger input in this mode.

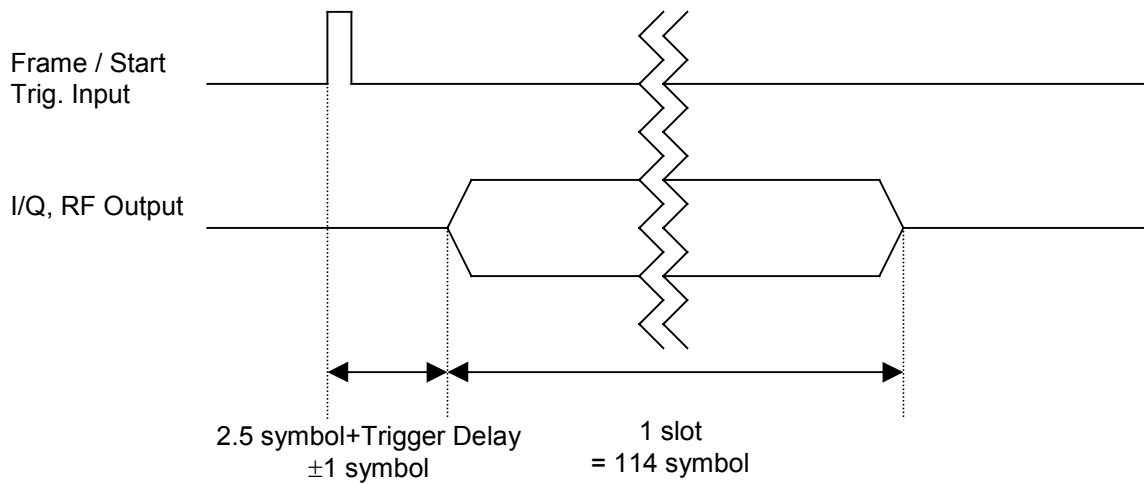
3.3.3 Frame trigger mode

Use this mode when the transmission timing is externally controlled for each burst.

With the MG3681A, the frame trigger input queue status is activated as soon as the modulation signal can be transmitted, and one burst is transmitted with a delay in trigger delay setting values at frame trigger input. It then returns to the frame trigger input queue status.

3.3.4 Timing for external trigger input and I/Q & RF output

The following shows the timing for front BNC2:Trigger input and I/Q & RF output.



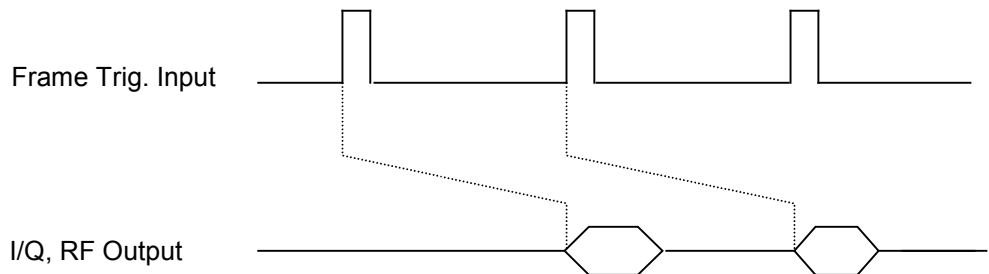
The minimum pulse width of external trigger is 10 nsec. Input the signal with a pulse width of 10 nsec. or more.

3.3.5 Synchronization with the Frame Trig. signal

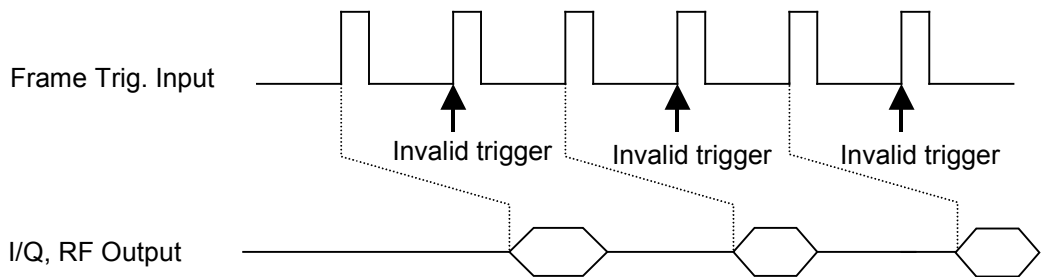
The burst signal is outputted 5msec behind the external trigger input signal by setting the MG3681A as shown below.

Trigger Source: Frame
Trigger Delay : 19149

Set the MG3681A as shown above. Input 5 msec cycle trigger signal from the outside and thus the signal can be outputted in synchronism with the Frame Trig. signal.



Set so that the error of trigger signal is 1 Symbol or less. When the period of the trigger signal is 1 symbol or less, invalid triggers are generated as shown below.



3.4 Outputting Auxiliary Signal.

The Frame Trigger (A4) and Sequence Pulse (B2) are outputted as the auxiliary signal from the BNC connector on the rear panel of the MG3681A.

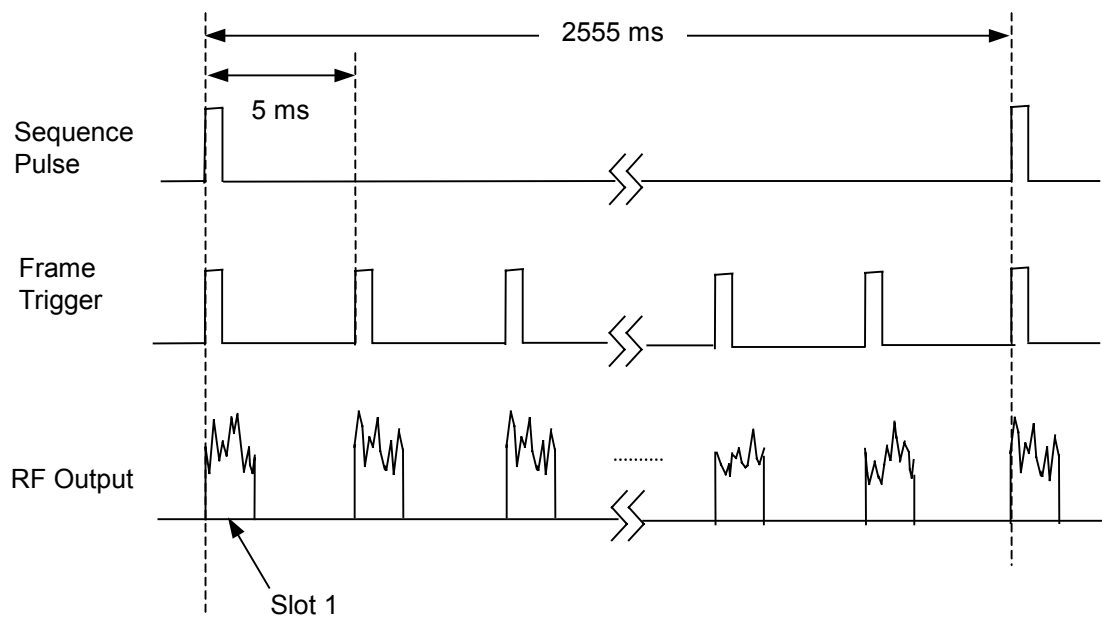
[1] Frame Trigger

A Frame Trigger is a pulse signal of TTL level with a 5 ms period.

[2] Sequence Pulse

Sequence Pulse is a signal of TTL level synchronized with 511 frame period and outputted from B2 connector on the rear panel.

When the burst signal is selected, output timings for Frame Trigger, Sequence Pulse and RF output are shown below.



Section 4 Measurement

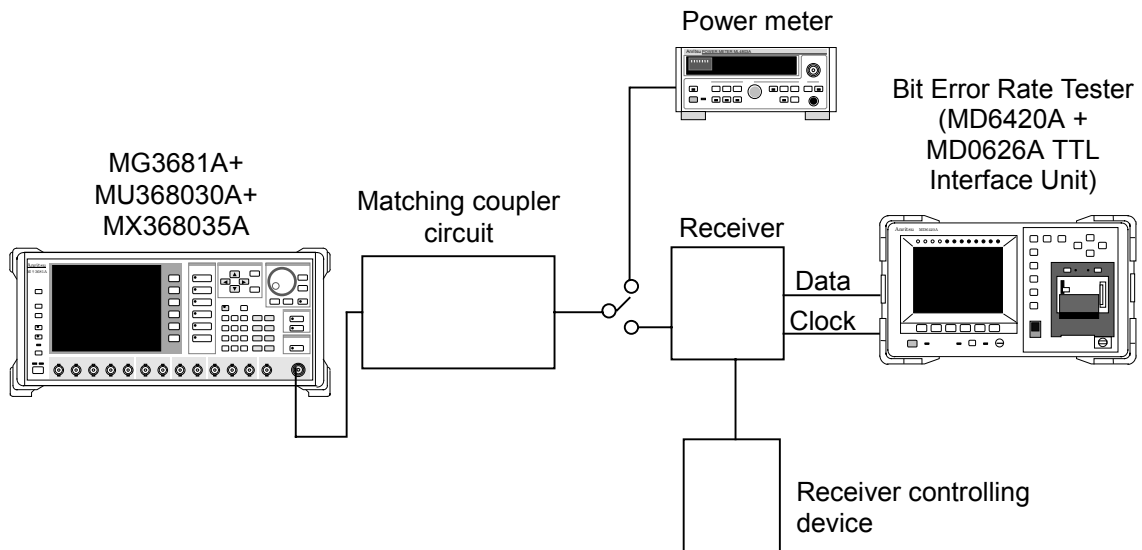
This section describes measurement for the bit error rate of the receiver and evaluation measurement for modulator and demodulator, with sample measurement using the PHS Signal Generation Software.

4.1	Measurement for the Bit Error Rate of the Receiver.....	4-2
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4.1 Measurement for the Bit Error Rate of the Receiver

This sub-section describes measurement for the bit error rate of the receiver when using the PHS Signal Generation Software. Here we describe receivers that can be set to reception mode by an external controller without using call processing. The Anritsu MD6420A Data Transmission Analyzer is used as the bit error measuring device in the example below.

Setup



Measurement procedure

- [1] Set frequency and output level of MG3681A to desired value.
- [2] Set the modulation method of MG3681A to "PHS".
- [3] Set the modulation pattern of MG3681A to a pattern that can be received by the receiver.
- [4] Connect the RF output of MG3681A to the power meter via matching coupler circuit. Adjust the output level of MG3681A so that the sensitivity test level can be obtained at the power meter.
- [5] Switch the output of the matching coupler circuit to the receiver.
- [6] Set the receiver to reception mode using the receiver controlling device.
- [7] Connect the demodulated data output and data clock of the receiver to the signal error rate measuring device.

4.1 Measurement for the Bit Error Rate of the Receiver

- [8] Connect the data and clock from the receiver to RD (Data) and RT (Clock) of the MD0626A (TTL Interface Unit) inserted into the rear panel of the MD6420A (bit error rate tester), respectively.
- [9] Set the reception timing for the MD6420A as follows.
 - RT (INV) mode when sampling data at the rising edge of the clock
 - RT mode when sampling data at the falling edge of the clock
- [10] Set the modulation pattern of the MD6420A to $2^9 - 1$ (PN9). However, the receiver should output the data in the TCH part of the traffic channel.
- [11] Press MEAS of the MD6420A (bit error rate tester) to start the bit error rate measurement.

Section 5 Remote Control

This section provides a list of GPIB device messages categorized by function and also describes in detail these device messages arranged in alphabetical order, when the MU368030A Universal Modulation Unit installed with the MX368035A PHS Signal Generation Software is mounted in the MG3681A Digital Modulation Signal Generator.

For further description of remote control, refer to Section 4 “Remote Control” in the MG3681A Main Unit Operation Manual.

5.1	List of Device Messages Categorized by Function ...	5-2
5.2	Details of Device Messages in Alphabetical Order....	5-4

5.1 List of Device Messages Categorized by Function

Command and query messages

The header portion of the command message is a reserved word represented by capital alphanumeric characters. The end of a query message header contains an interrogation mark (?). In the argument part of command and query messages, multiple arguments can be separated with a separator (.). Arguments are described below.

- [1] Capitals : Reserved word
- [2] Numerals : Reserved word
- [3] Small letters in argument part:
 - f (Frequency) : Numeric data (NR1, NR2, NR3)
 - Suffix code : GHZ, GZ, MHz, MZ, kHz, KZ, HZ
When the unit is omitted, HZ is assumed.

 - l (level) (relative value) : Numeric data (NR1, NR2, NR3 format)
 - Suffix code : dB
When the unit is omitted, dB is assumed.

 - n (integer without unit) : Numeric data (NR1 format)

 - r (real number without unit) :
 - Numeric data (NR2 format)

 - h (hexadecimal number without unit) :
 - Numeric data (hexadecimal number)

 - s (character string) : Alphanumeric characters enclosed in double quotation marks (“ ”) or single quotation marks (‘ ’).

5.1 List of Device Messages Categorized by Function

Device messages list

<Common>

Items	Device messages		
Control items	Command messages	Query messages	Response messages
I/Q Source Internal	MODE INT IQSRC INT	MODE? IQSRC?	MODE INT IQSRC INT
I/Q Source External	MODE EXT IQSRC EXT	MODE? IQSRC?	MODE EXT IQSRC EXT
I/Q Source OFF	MODE OFF IQSRC OFF	MODE? IQSRC?	MODE OFF IQSRC OFF
System PHS	SYS PHS	SYS?	SYS PHS
Baseband ON	BASEBAND ON	BASEBAND?	BASEBAND ON
Baseband OFF	BASEBAND OFF	BASEBAND?	BASEBAND OFF
PM INT	PMO INT	PMO?	PMO INT
PM EXT	PMO EXT ON	PMO?	PMO EXT
PM OFF	PMO OFF	PMO?	PMO OFF

<Modulation>

Items	Device messages		
Control items	Command messages	Query messages	Response messages
Wave Data Restart	DLRES	-	-
Pattern	PAT n n :0~3	PAT?	PAT n,s
Reference Clock Source	REFCLK INT	REFCLK?	REFCLK INT
Reference Clock Source	REFCLK EXT	REFCLK?	REFCLK EXT
Reference Clock Source	REFCLK EXT2	REFCLK?	REFCLK EXT2
Start Trigger Delay	STDLY n n :0~16777215	STDLY?	STDLY n
Start Trigger Source	STGS INT	STGS?	STGS INT
Start Trigger Source	STGS EXT	STGS?	STGS EXT
Start Trigger Source	STGS EXTSTA	STGS?	STGS EXTSTA
Start Trigger Source	STGS EXTFRM	STGS?	STGS EXTFRM

5.2 Details of Device Messages in Alphabetical Order

<Examples>

FREQ

	Frequency	
Function	Sets the frequency.	
Command message	FREQ a	There is a space between a command message and "a".
Value of a	-2.99975 to 3 GHZ : -2.99975 to 3 GHz -2999.75 to 3000 MHZ : -2999.75 to 3000 MHz -2999750 to 3000000 KHZ : -2999750 to 3000000 kHz -2999750000.00 to 3000000000 HZ : -2999750000.00 to 3000000000 Hz	Entered value Description of entered value
Query message	FREQ?	
Response message	FREQ a	
Example of use	FREQ 123MHZ	

BASEBAND

	Baseband (On/Off)
Function	Sets baseband On/Off.
Command message	BASEBAND a
Value of a	ON : Baseband On OFF : Baseband Off
Query message	BASEBAND?
Response message	BASEBAND a
Example of use	BASEBAND ON

D

DLRES

Wave Data Restart

Function	Resynchronizes with external trigger at start trigger mode.
Command Message	DLRES
Example of use	DLRES

IQSRC

I/Q Source

Function	Selects the modulation source for digital modulation.
Command message	IQSRC a
Value of a	INT : Internal (internal modulation unit) EXT : External (external input) OFF : I/Q modulation stop (only pulse modulation enabled)
Query message	IQSRC?
Response message	IQSRC a
Example of use	IQSRC INT

P

PAT

	Pattern
Function	Selects the modulation signal.
Command message	PAT n
Value of n	0 to 3
Query message	PAT?
Response message	PAT n, s
Restriction	n and s show the number and name of a modulation signal respectively. As for the modulation signal corresponding to the value of n and s, refer to section 2.3 “Modulation Wave List.”
Example of use	PAT 2

PMO

	Pulse-Modulation
Function	Sets On/Off and Internal/External of pulse modulation.
Command message	PMO a
Value of a	INT : Internal (generated with modulation unit) EXT, ON : External (uses external device) OFF : Off (signals always exist)
Query message	PMO?
Response message	PMO a
Example of use	PMO OFF

REFCLK

Reference Clock Source

Function	Selects the baseband reference timing (external or internal).
Command message	REFCLK a
Value of a	INT : Internal selection EXT : External (TTL) selection EXT2 : External 2 (AC: 5 Vp-p) selection
Query message	REFCLK?
Response message	REFCLK a
Example of use	REFCLK INT

S

STDLY

Start Trigger Delay

Function	Sets the RF signal output timing.
Command message	STDLY n
Value of n	0 to 16777215
Query message	STDLY?
Response message	STDLY n
Example of use	STDLY 10

STGS

Trigger Source

Function	Sets the Trigger Source.
Command message	STGS a
Value of a	INT : Internal trigger mode EXTSTA, EXT : Start trigger mode EXTFRM : Frame trigger mode
Query message	STGS?
Response message	STGS a
Example of use	STGS INT

SYS

	System
Function	Sets the digital modulation system.
Command message	SYS a
Value of a	NONE : Digital modulation system is not mounted. PHS : PHS Signal Generation Software
Query message	SYS?
Response message	SYS a
Example of use	SYS PHS

Section 6 Performance Test

This section describes the performance test when MX368035A PHS Signal Generation Software is installed on the MU368030A Universal Modulation Unit, which is mounted on the MG3681A Digital Modulation Signal Generator. In order to implement the performance test as preventive maintenance, information such as required measuring instrument, setup procedure, and test procedures are included.

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6.4	On/Off Ratio of Burst Wave	6-7

6.1 Performance Test

6.1.1 About the performance test

The performance test explained here is implemented as part of preventive maintenance against performance deterioration of the instrument. You are advised to implement a performance test whenever necessary, for examples, upon acceptance inspection, regular inspection, and post-repair performance confirmation. If you find an item, which does not meet specifications during a performance test, please contact Anritsu Corporation or one of our dealers.

The performance test consists of the following items:

- Modulation accuracy of RF output
- Output level accuracy
- On/Off ratio of the burst wave

Be sure to implement periodically the performance test for items considered important as preventive maintenance. We recommend that the performance inspection is executed regularly once or twice a year.

In addition, it is recommended that the results are summarized using the Appendix C “Performance Test Record.”

CAUTION

Unless otherwise specified, be sure to warm up the device to be tested and the measuring instruments for at least 30 minutes or over until they become stable, before implementing the performance test. To ensure the maximum measurement accuracy, we recommend that you observe the above as well as keeping the room temperature, limiting AC power voltage fluctuations to a minimum, and making sure that there are no problems with noise, vibration, dust, humidity or other environmental factors.

6.1.2 Instruments required for the performance test

A list of instruments required for the performance test is shown below.

Test Item	Recommended Instrument	Anritsu Model Name
Modulation accuracy of RF output	Transmitter Tester (with $\pi/4$ DQPSK analysis software)	MS8608A +MX860805A
Output level accuracy	Power meter	ML4803A
	Power sensor	MA4601A
On/Off ratio of burst wave	Spectrum Analyzer	MS2683A

6.2 Modulation Accuracy of RF Output

Test specifications

- EVM $\leq 1.8\%$ (rms)

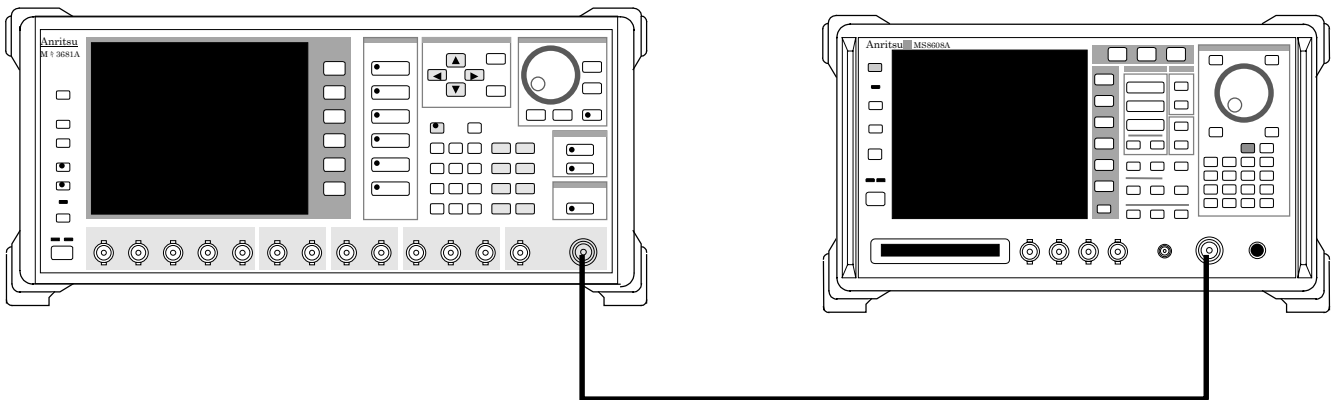
Conditions

RF output level	+5 dBm
Carrier frequency	100 to 2100 Hz
Level continuous mode	Off
Ambient Temperature	18 to 35°C

Test procedures

MG3681A
 +MU368030A (Universal Modulation Unit)
 +MX368035A (PHS Signal Generation Software)

MS8608A Digital Mobile Transmitter Tester)
 +MX860805A ($\pi/4$ DQPSK Measurement software)



- [1] Set the modulation parameter of MG3681A as shown below:

Preset	: -
Baseband	: On
I/Q Mod	: Int
Digital Modulation	: On
System	: PHS
Pattern	: Modulation signal to be measured

- [2] Set the frequency of MG3681A for the test frequency.
- [3] Set +5 dBm for the output level of MG3681A.
- [4] Set MS8608A for the setting of the modulation accuracy measurement. (Refer to the operation manual of MS8608A for details of the setting.)
- [5] Measure the modulation accuracy of RF modulation signal using MS8608A.

6.3 Output Level Accuracy

Test specifications

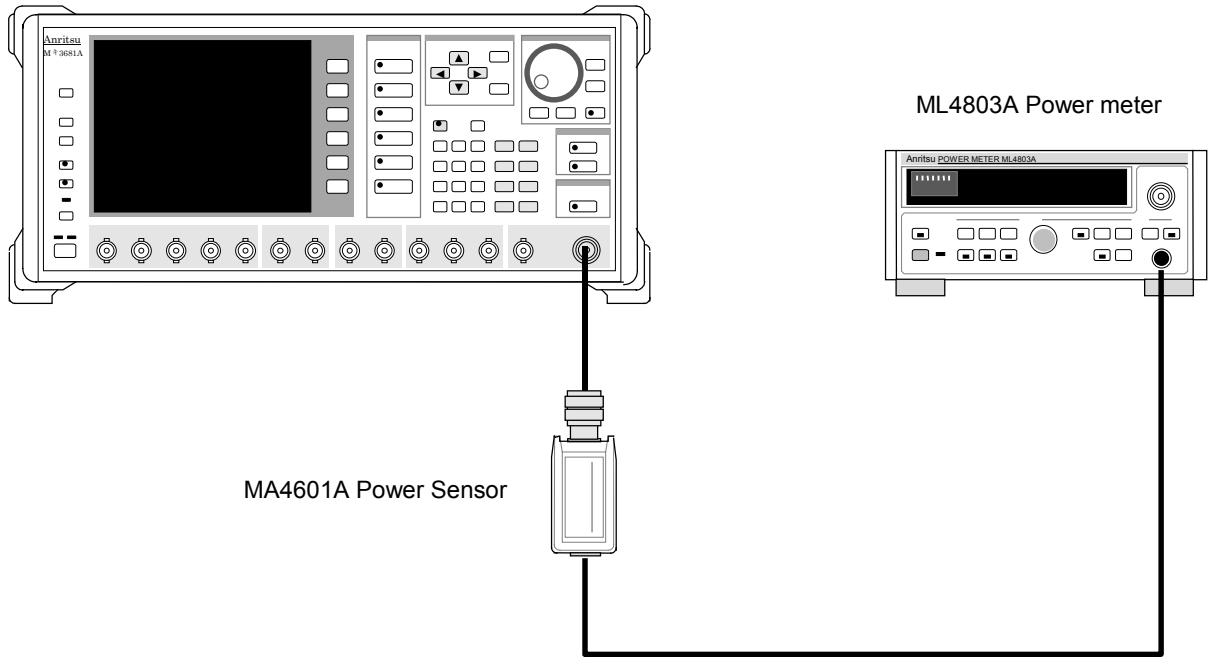
Difference between the output levels in the CW mode and the modulation mode. ± 1.0 dB

Conditions

RF output level	$\leq + 5$ dBm
Carrier frequency	10 to 3000 MHz
Level continuous mode	Off
Pattern	PN15/PN9

Test procedure

MG3681A
+ MU368030A (Universal Modulation Unit)
+ MX368035A (PHS Signal Generation Software)



[1] Set the modulation parameter of MG3681A as shown below:

- Preset : -
- Baseband : On
- I/Q Mod : Int
- Digital Modulation : On
- System : PHS
- Pattern : Modulation signal to be measured

- [2] Set RF output of MG3681A to Off.
- [3] Execute the zero calibration and sensor sensitivity calibration of power meter.
- [4] Set the output level of MG3681A as desired. (Measurable low-level in the above system depends on the sensitivity of the power meter.)
- [5] Set the calibration factor of power meter.
- [6] Set the Digital Modulation of MG3681A to OFF, and measure the output level of MG3681A when CW is set.
- [7] Set the Digital Modulation of MG3681A to ON, and measure the output level of MG3681A when modulation is in progress.
- [8] Confirm whether the difference between the measured values obtained from step 6 and 7 is within the specifications.

6.4 On/Off Ratio of Burst Wave

Test specifications

≥ 65 dB

Conditions

RF output level	+ 5 dB
Carrier wave frequency	100 to 3000 MHz
Level continuous mode	Off
Pattern	DNLINK/UPLINK

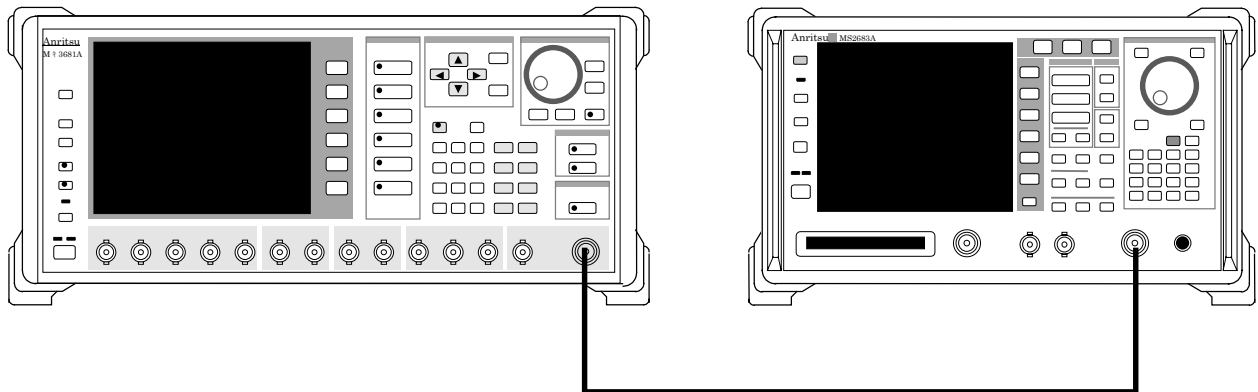
Test procedures

MG3681A

+ MU368030A (Universal Modulation Unit)

+ MX368035A (PHS Signal Generation Software)

MS2683A Spectrum Analyzer



- [1] Set the modulation parameter of MG3681A as follows.

Preset	: -
Baseband	: On
I/Q Mod	: Int
Digital Modulation	: On
System	: PHS
Pattern	: DNLINK, UPLINK

- [2] Set the frequency of the MG3681A equal to the test frequency.

- [3] Set the output level of the MG3681A to + 5 dBm

- [4] Set the following parameters after pressing the **Preset** of MS2683A. (For operation of MS2683A, refer to the MS2683A operation manual.)

Freq	: Value set in [2]
Ref Level	: + 10 dBm
SPAN	: 0 Hz
RBW	: 300 kHz
VBW	: 300 kHz
Time Span	: 5 ms
Trig Source	: Video
Trig Level	: -30 dB
Detection	: Average
Storage	: Average
Average Count	: 100

- [5] Observe the On/Off ratio of the output level in the time domain, and measure the level difference between the maximum and minimum values of the burst wave.

Appendix A Specifications

MX368035A PHS Signal Generation Software

Item		Specifications
Corresponding system / Modulation system		RCR STD-28 (PHS), $\pi/4$ DQPSK
Baseband Filter		Root-Nyquist, $\alpha=0.5$
Modulation data	DNLINK (Down signal)	Only down slot 1 is TCH. Slots 2 to 4 are transmitting off. TCH: Lay out the consecutive PN9.
	UPLINK (Up signal)	Only up slot 1 is TCH. Slots 2 to 4 are transmitting off. TCH: Lay out the consecutive PN9.
	CONTPN9	Slot format is absent. The consecutive PN9 is transmitted.
	CONTPN15	Slot format is absent. The consecutive PN15 is transmitted.
RF signal	Frequency range	10 to 3000 MHz
	Level accuracy	When CONTPN9/CONTPN15 is selected. Compared with CW output level. within 1.0 dB ($\leq +5$ dBm)
	Vector accuracy	100 to 2100 MHz, 18 to 35°C, +5 dBm $\leq 1.8\%$ (rms)
	Adjacent channel power	+5 dBm, PLLmode: NARROW, 100 to 1000, 1750 to 2500 MHz, RBW: 3 kHz, VBW: 10 kHz, detection mode: positive peak, when CONTPN9/CONTPN15 is selected ≤ -66 dBc (600 kHz offset, BW: 192 kHz), ≤ -69 dBc (900 kHz offset, BW:192 kHz) Excluding performance deterioration due to spurious emission of MG3681A main frame.
	Burst On/Off ratio	+5 dBm, when DNLINK/UPLINK is selected ≥ 65 dB
IQ signal	Output level	359 mV (rms)
Transmission speed	Symbol rate	192 ksps
	Transmission speed accuracy	Depends on the reference signal accuracy of MG3681A (excluding the external synchronization)
Auxiliary input signal		When DNLINK/UPLINK is selected, frame trigger signal input enabled.
Auxiliary output signal		Frame trigger output
Use firmware backup area		CPU: 137.3 kBytes, FPGA: 49.5 kBytes (MU368030A Universal Modulation Unit)

Appendix B List of Initial Value

Setting	Initial value
Digital Modulation Main Screen	
Pattern	0: DNLINK
Trigger Source	Int
Trigger Delay	0/20 sps (0.0000 sps)
Reference Clock	Int

Appendix C Performance Test Result Sheet

Test Location: _____ Report No. _____
 _____ Date _____
 _____ Person in charge of test _____

Model MG3681A Digital Modulation SG +
 MU368030A Universal Modulation Unit +
 MX368035A PHS Signal Generation

Serial No. _____ Ambient temperature _____ °C
 Power _____ Hz Relative humidity _____ %

Remarks:

Modulation accuracy of RF output (Section 6.2)

Setting Frequency	Result	Maximum specification value
10 MHz		1.8% (rms)
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		
1000 MHz		
1300 MHz		
1500 MHz		
1800 MHz		
2000 MHz		
2100 MHz		

Output level accuracy (Section 6.3)

Setting Frequency	Result	Maximum specification value
10 MHz		± 1.0 dB
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		
1000 MHz		
1300 MHz		
1500 MHz		
1800 MHz		
2000 MHz		
2100 MHz		

On/Off ratio of burst wave (Section 6.4)

Setting Frequency	Result	Maximum specification value
10 MHz		≥ 65 dB
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		
1000 MHz		
1300 MHz		
1500 MHz		
1800 MHz		
2000 MHz		
2100 MHz		

B

Burst 3-4, 3-6, 3-7

C

CRC 3-3

E

External trigger 2-4, 2-6, 3-5, 3-6

F

Frame 3-2, 3-7

Frame trigger 3-4, 5-10

Frame format 2-6

I

Internal trigger 3-4, 5-10

P

Pattern 2-4, 2-5, 2-6, 5-3, 5-8,
6-4, 6-6

PN15 2-6

PN9 2-6, 3-2

R

Reference Clock 2-4, 5-3, 5-9

S

Slot 2-6, 3-2, 3-3

Start trigger 3-4, 5-10

Synchronization word 3-3

T

TCH 3-3

Trigger delay 2-4, 3-4, 3-6, 5-3, 5-10

Trigger source 2-4, 3-6, 5-3, 5-10

U

UW 3-3

