MX368034A
PDC PACKET 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.

Measurement Solutions

ANRITSU CORPORATION

MX368034A
PDC PACKET Software (For MU368030A)
Operation Manual

31 May 2002 (First Edition)

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About This Manual

This Operation Manual explains the outline, measurement examples, remote control and other aspects of MX368034A PDC PACKET Software. This software is designed to be installed in the MU368031A 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 MX368034A PDC PACKET Software product and standard accessories.

1.1 Product Overview

The MX368034A PDC PACKET 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-27 standards full dupley system packet transfer communication can be generated.

1.2 Product Configuration

Standard configuration of the MX368034A 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	Quan-tity	Remarks
Main unit	MX368034A	PDC PACKET Software	1	Supplied for Compact Flash or ATA Flash card.
Accessories		PC card adapter	1	Supplied only for Compact Flash card
	W2073AE	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.

2.1 Screen Transitions

The screens are transited as shown below:

Press main function key ⏺Digital Mod .

Digital modulation setup screen

Press main function key ⏺Config .

Environment setup screen
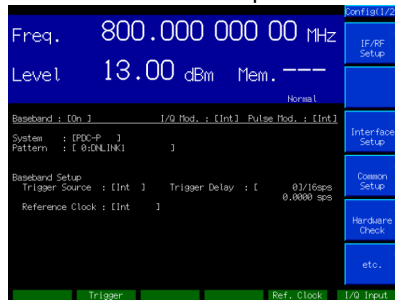
Rear Panel Information screen
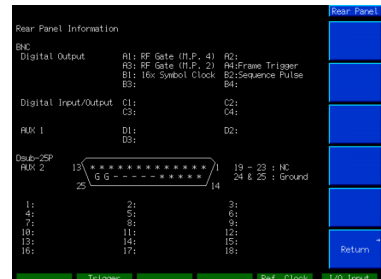
2.2   Setting Modulation Parameters

Pressing [•Digital Mod] causes the indicator LED to go on and the Main screen to appear.   Basic parameters related to digital modulation can be set on this screen.   This section describes settings for the Main screen.

[1] Baseband

Select On/Off for the operation of the Baseband Signal Generator Unit.

[2] I/Q Mod.

Select the I/Q signal source for orthogonal modulation.   Select "Int" to use the internal signal source for the I/Q signal (using this software) or "Ext" to use the external input.

Initial value: Int

[3] Pulse Mod.

Set the modulation signal on the pulse modulator.

Int: Selects the control signal generated by this software.

Ext: Uses the external input signal for pulse modulation regardless of modulation settings.

Off: No pulse modulation

[4] System

Set the system software.   Select "PDC-P" to start this software.

[5] Pattern

The output modulation signal appears.   Refer to 3.1 and 3.2 for details.   Refer to 2.4 for pattern switched.

DNLINK1:   Down-UPCH 1 Slot
DNLINK2:   Down-UPCH 2 Slots
DNLINK3:   Down-UPCH 3 Slots
UPLINK1:   Up-UPCH 1 Slot
Default Value: DNLINK1

[6] Trigger Source

The interior and exterior of transmission timing for modulation waves are switched.   Refer to 3.3 for details.

Int: Transmits modulation wave with asynchronous timing to exterior.

Start: Transmits modulation wave as start trigger for external signal.

Frame: Transmits modulation wave as frame trigger for external signal.

Default value: Initial value

[7] Trigger Delay

Set the modulation wave transmission timing delay as per the trigger signal to be input.   Refer to 3.3 for details.

Setting range: 0 to 16777215
Default value: 0

[8] Reference Clock

Int: Generates the reference clock inside MG3681A.

Ext (TTL) :   Inputs the reference clock externally (using the Ref. Clock connector).   At this time, set this connector to TTL mode.

Ext (AC) :   Same as Ext except that the Ref.   Clock connector mode should be set to AC (5 Vp-p).

[9] Wave Data Restart

Press this when setting Trigger Source = Start to resynchronize with the external trigger.

[10] Wave Data Download

The modulation wave is read by the PC card and the modulation signal to be transmitted is switched.   Refer to 2.4 for details.

2.3 Input Auxiliary Signal

An outline of the auxiliary and control signals to be input from the front of the MG3681A are described.

2.3.1 Input external trigger signal

The signal input to the No.2 "Trigger" digital signal input connector on the front panel of the MG3681A and the RF output timing can be synchronized. Refer to 3.3 for details.

2.3.2 Input external reference clock

The signal input to the No.5 "Ref. Clock" digital signal input connector on the front panel of the MG3681A and the internal reference clock of the baseband signal can be synchronized.

A 16x signal of the Symbol Rate (21 ksps) (i.e., 336 kHz) can be input as an external reference clock.

While both the RF and baseband are synchronized with the external input when 10/13 MHz Ref Input of the MG3681A is used, the RF signal remains in the synchronized status of the internal 10 MHz when this input is used. Set the input frequency of the external reference clock within a range +5% of 336 kHz.

The relationship of the external reference clock settings to the reference clock for the output signal is as shown in the following.

External Reference Clock Settings		Output Signal Reference Clock	
Reference Clock	10/13 MHz Ref Input	Baseband Signal	RF Signal
Int	Int	Internal Reference	Internal Reference
Int	Ext	Ext 10/13 MHz Ref Input	Ext 10/13 MHz Ref Input
Ext	Int	Ext Ref. Clock	Internal Reference
Ext	Ext	Ext Ref. Clock	Ext 10/13 MHz Ref Input

2.4 Switch the Modulation Signal to be Transmitted

This software allows four types of modulation waves to be output: Down-UPCH 1 to 3 slots and Up-UPCH 1 slot.   To switch the modulation wave to be transmitted, insert the memory card, where the attached MX368034A is saved, into the PC card slot on the back of the MG3681A. Then press [F5] (Wave Data Download) at the Digital Modulation Parameter Setting Screen.   The 4 modulation waves will appear in the selection window.   Select the modulation wave to be output to start the download.

The relation between file names and Patterns is shown below.

File Name	Pattern
UMU34D1:	DNLINK1
UMU34D2:	DNLINK2
UMU34D3:	DNLINK3
UMU34U1:	UPLINK1

```
Freq.        800.000 000 00 MHz

Level         13.00 dBm   Mem. ---
                                        Normal

Baseband : [On ]              I/Q Mod. : [Int] Pulse Mod. : [Int]

System    : [PDC-P   ]       UMU34D1 .DLI  Knob
Pattern   : [ 0:DNLINK1    ] UMU34D2 .DLI  Step
                             UMU34D3 .DLI  Cursor
                             UMU34U1 .DLI
Baseband Setup
  Trigger Source  : [Int  ]   Trigger Delay  : [      0]/16sps
                                                0.0000 sps
  Reference Clock : [Int    ]

          Trigger                      Ref. Clock  I/Q Input
```

When the download is completed, "File Import Complete" message is displayed.

The download time is about 12 minutes for Down-UPCH and 5 minutes for Up-UPCH.   Do not turn OFF the power during the download.

Section 3 Operation Details

This section describes details on PDC PACKET software operations, generated patterns, trigger functions and Auxiliary Signal Output.
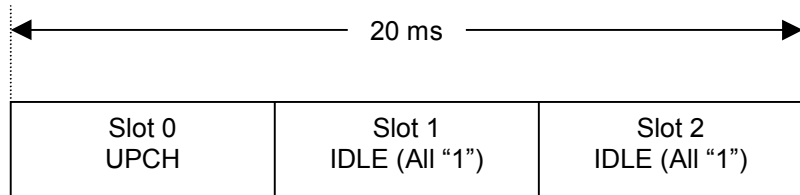
3.1   Frame Configuration

The frame configuration for the PDC PACKET software has 3 down slots (1, 2, 3) and 1 up slot transmission.   The TDMA frames for these consist of 3 slots, and data is generated by setting these frames as a cycle.

PN9 in the CAC part of the slots is continuous. For example, in the Down-UPCH 2 slot, the end of the CAC part for slot 0 and the beginning of the CAC part for slot 1 are continuous, while the end of the CAC part for slot 1 is continuous with the beginning of the CAC part for slot 0 of the next frame.

Down-UPCH 1 Slot transmission

◄─────────────── 20 ms ───────────────►		
Slot 0 UPCH	Slot 1 IDLE (All "1")	Slot 2 IDLE (All "1")

Down-UPCH 2 Slots transmission

◄─────────────── 20 ms ───────────────►		
Slot 0 UPCH	Slot 1 UPCH	Slot 2 IDLE (All "1")
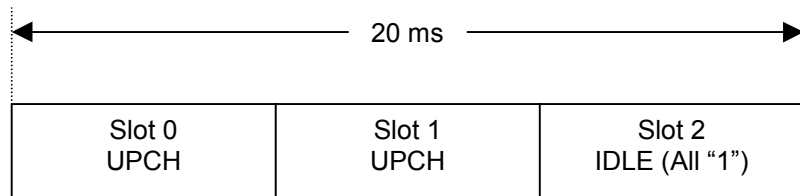
Down-UPCH 3 Slots transmission

◄─────────────── 20 ms ───────────────►		
Slot 0 UPCH	Slot 1 UPCH	Slot 2 UPCH

Up-UPCH 1 Slot transmission

◄─────────────── 20 ms ───────────────►		
Slot 0 UPCH	Slot 1 Transmission Off	Slot 2 Transmission Off
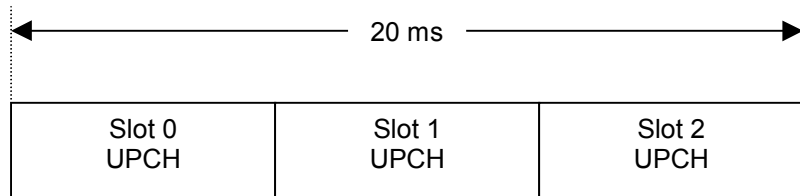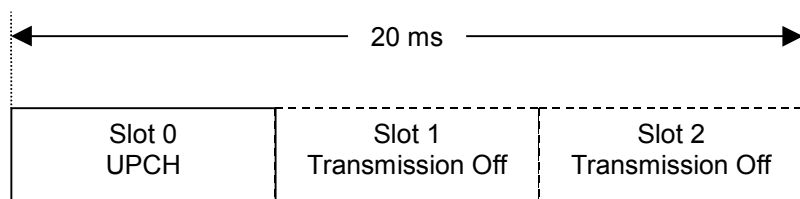
3.2 Slot Configuration

Slots have a down user packet channel as well as an up user packet channel. The scramble function is OFF.

3.2.1 Down user packet channel (DOWN-UPCH)

R 4	P 2	CAC 112	SW 20	CC 8	CAC 112	E 22

R	: Guard time for burst transient response	0_H (4 bit)
P	: Preamble	2_H (2 bit)
CAC	: Control signal (UPCH)	Pseudo random pattern PN 9-stage (Continuous between all transmitted slots)
SW	: Synchronization word	Slot 0 = $87A4B_H$ (20 bit)
		Slot 1 = $9D236_H$ (20 bit)
		Slot 2 = $81D75_H$ (20 bit)
CC	: Color code	00_H (8 bit)
E	: Collision control bit	$3FFFFF_H$ (22 bit)

3.2.2 Up User Packet Channel (UP UPCH）

R 4	P 2	CAC 112	SW 20	CC 8	CAC 116	G 18

R	: Guard period for burst transient response	0_H (4 bit)
P	: Preamble	2_H (2 bit)
CAC	: Control signal (UPCH)	Pseudo random pattern PN9-stage (Continuous between all transmitted slots)
SW	: Synchronization word	Slot 0 = $785B4_H$ (20 bit)
CC	: Color code	00_H (8 bit)
G	: Guard bit	00000_H (18 bit)

3.3   Trigger Function

PDC PACKET software operates with "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 wave does not have to be externally synchronized.
With the MG3681A, the transmission starts automatically as soon as the modulation wave can be transmitted.

3.3.2   Start trigger mode

Use this mode when the transmission start timing synchronization for the modulation wave is externally controlled.
With the MG3681A, the start trigger input queue status is activated as soon as the modulation wave can be transmitted, and the transmission starts with a delay in trigger delay set values when the start trigger is input.
Only the transmission start timing is synchronized, thus the modulation wave continues to be transmitted in the same way as the internal trigger mode.
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 wave can be transmitted, and one burst is transmitted with a delay in trigger delay set 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

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

Frame / Start
Trig.Input

I/Q, RF Output

3.7 Symbol + Trigger Delay
±0.1 Symbol

1 slot
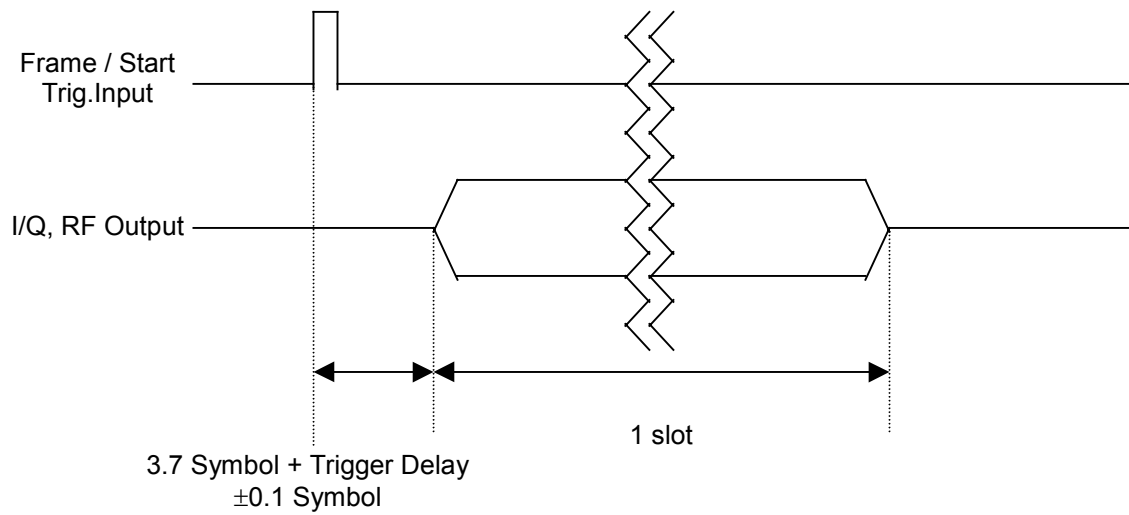
The minimum pulse width for the external trigger is 10 nsec. Input a signal for the pulse width of at least 10 nsec.

3.3.5 **Frame clock synchronization**

A burst wave with a 20 ms delay can be output from the external trigger input signal by setting MG3681A as follows.

Trigger Source: Frame
Trigger Delay: 6661

The Up UPCH can then be output with the same timing as the frame clock by setting this device as shown above and externally inputting a clock signal of 20 ms cycles.
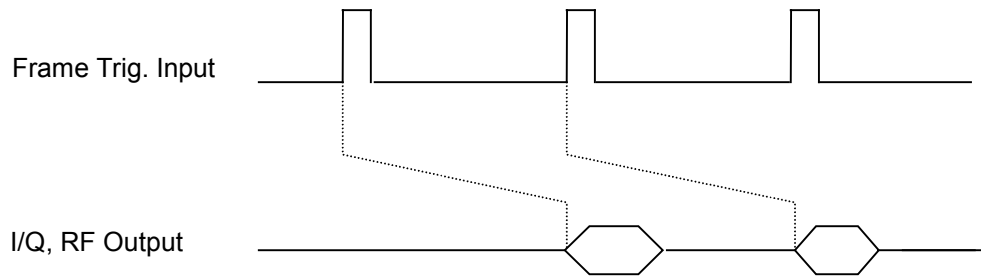
Set the error for the clock signal cycle to less than 1 symbol. An invalid trigger will be generated as shown below if more than 1 symbol is set at a shorter cycle spread.
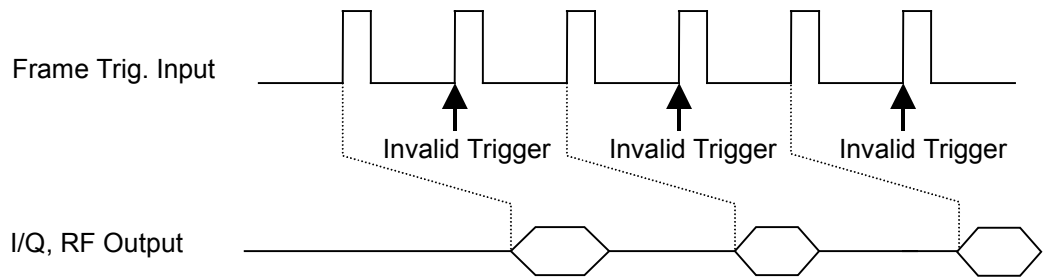
3.4 Auxiliary Signal Output

A Frame Trigger (A4) and Sequence Pulse (B2) are output from the BNC connector on the rear panel of the MG3681A as auxiliary signals.

・Frame Trigger

A Frame Trigger is a pulse signal in the TTL level synchronizing with the PDC sub-frame of 20 ms. The pulse width is a 1/16 symbol. The signal is output from the A4 connector on the rear panel.

・Sequence Pulse

A Sequence Pulse is a signal in the TTL level synchronizing with the cycle of 2044 sub-frames when Down is selected and with the cycle of 511 sub-frames when Up is selected. The pulse width is a 1/16 symbol. The signal is output from the B2 connector on the rear panel.

Output timings for Frame Trigger, Sequence Pulse and RF output when Down is selected are as shown below.
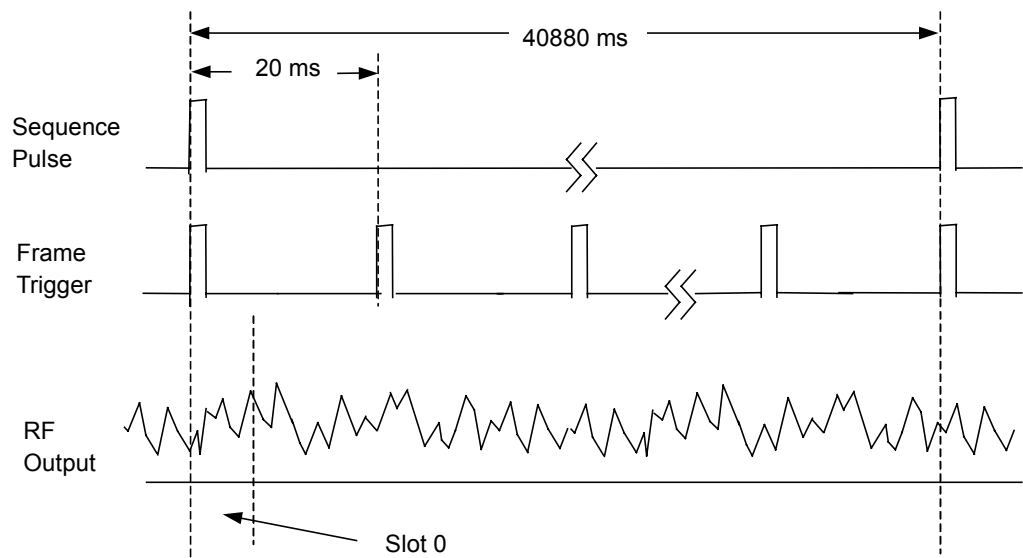
Output timings for Frame Trigger, Sequence Pulse and RF output when Up is selected are as shown below.
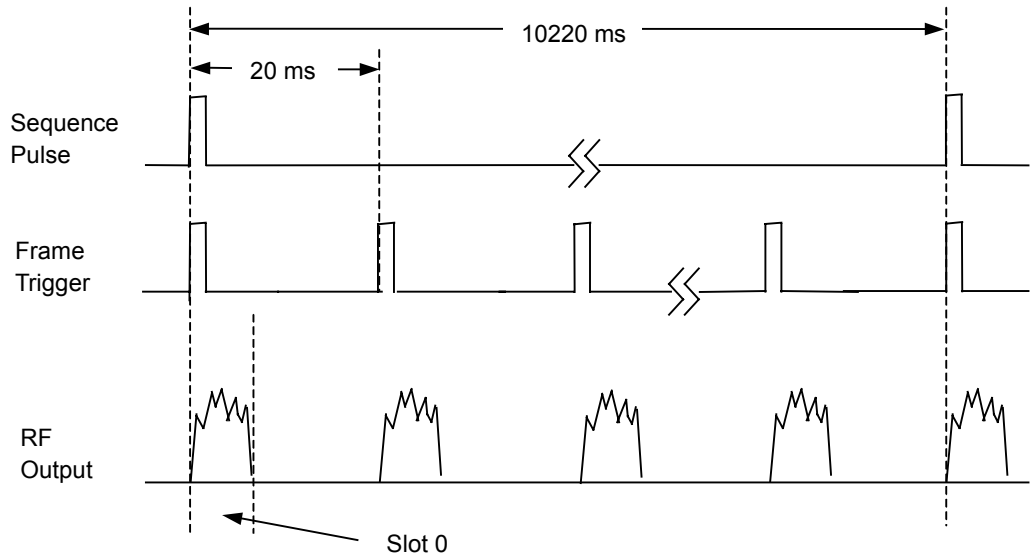
Section 4   Measurement

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

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 PDC PACKET 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
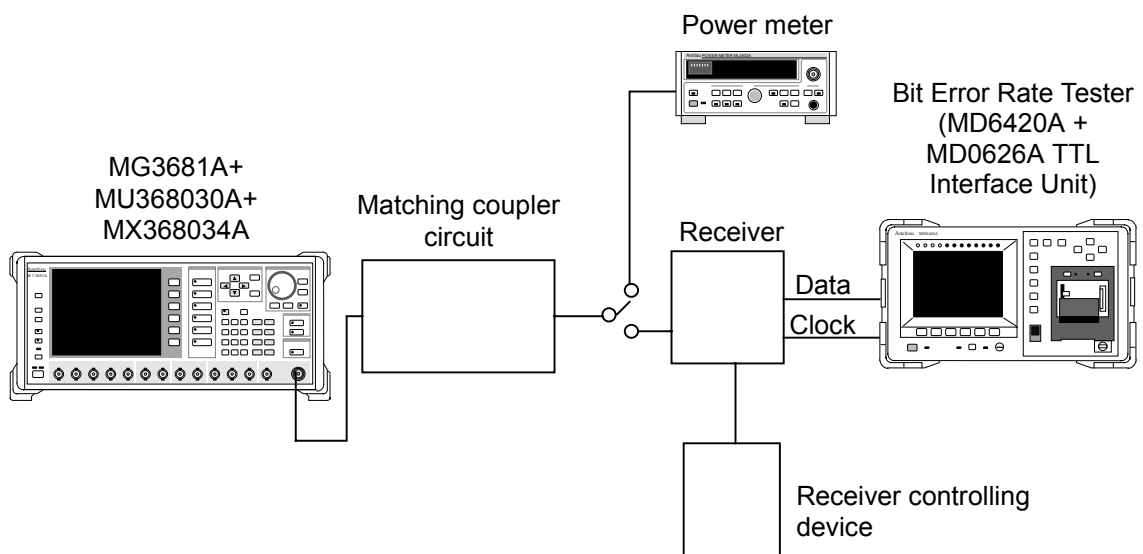
Measurement procedure

[1]   Set frequency and output level of MG3681A to desired value.

[2]   Set the modulation method of MG3681A to "PDC-P".

[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.

[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 CAC part of the user packet 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 MX368034A PDC PACKET 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

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 (' ').

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 PDC-P	SYS PDC-P	SYS?	SYS PDC-P
Baseband ON	BASEBAND ON	BASEBAND?	BASEBAND ON
Baseband OFF	BASEBAND OFF	BASEBAND?	BASEBAND OFF
PM ON	PMO ON	PMO?	PMO ON
PM OFF	PMO OFF	PMO?	PMO OFF

<Modulation>

Items	Device messages		
Control items	Command messages	Query messages	Response messages
Wave Data Restart	DLRES	–	–
Wave Data Download	DOWNLOAD n n: 0 to 3	–	–
Pattern	–	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 to 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 EXT
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".

> Entered value

> Description of entered value

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

Query message	FREQ?
Response message	FREQ a
Example	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	BASEBAND ON

D

DLRES

Wave Data Restart

Function   Resynchronizes with external trigger at start trigger mode.

Command Message   DLRES

Syntax Used   DLRES

DOWNLOAD

Wave Data Download

Function   Downloads modulated wave and switches modulation signal to be output.

Command Message   DOWNLOAD n

Value of n   None : UMU34D1
                      0   : UMU34D1
                      1   : UMU34D2
                      2   : UMU34D3
                      3   : UMU34U1

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   IQSRC INT

P

PAT

Pattern

Function	Checks the modulation signal currently being transmitted.
Query message	PAT?
Response message	PAT n, s
Value of n	0
Value of s	DNLINK1 : Down-UPCH 1 Slot DNLINK2 : Down-UPCH 2 Slots DNLINK3 : Down-UPCH 3 Slots UPLINK1: Up-UPCH 1 Slot
Example	PAT?

PMO

Pulse-Modulation

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

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: 5Vp-p) selection
Query message	REFCLK?
Response message	REFCLK a
Example	REFCLK INT

STDLY

Start Trigger delay amount

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	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	STGS INT

SYS

System

Function	Sets the digital modulation system.
Command message	SYS a
Value of a	NONE : Digital modulation system not mounted. PDC-P : PDC PACKET Software
Query message	SYS?
Response message	SYS a
Example	SYS PDC-P

Section 6   Performance Test

This section describes the performance test when MX368034A PDC PACKET 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.

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 π/4DQPSK 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
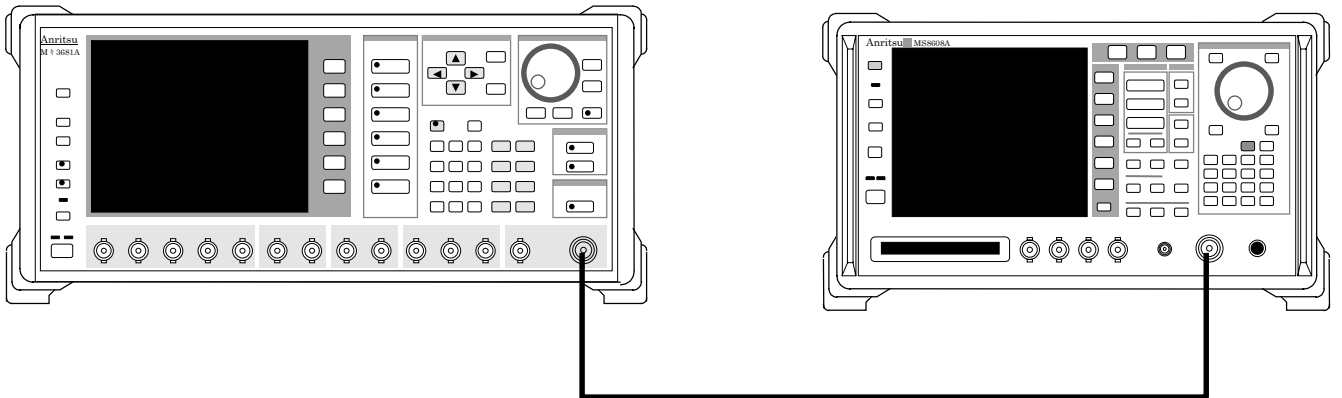
Test specifications

- EVM   ≤ 1.8% (rms)

Conditions

RF output level	+5 dBm
Carrier frequency	100 to 3000 Hz
Level continuous mode	Off

Test procedures

MG3681A
+MU368030A (Universal Modulation Unit)
+MX368034A (PDC PACKET Software)

MS8608A Digital Mobile Transmitter Tester)
+MX860805A (π/4DQPSKMeasurement software)

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

Preset	: –
Baseband	: On
I/Q Mod	: Int
Digital Modulation	: On
System	: PDC-P
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 measure-ment.   (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

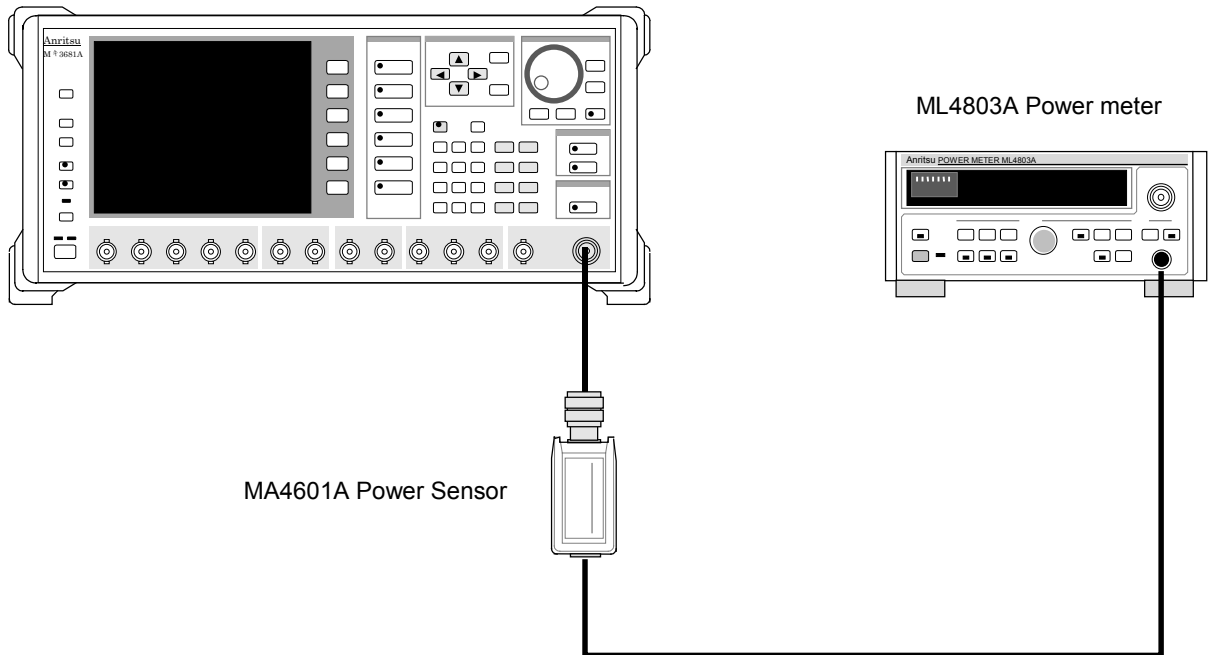Difference between the output levels in the CW mode and the modulation mode. $\pm$ 1.0 dB

Conditions

RF output level	$\leq$ + 5 dBm
Carrier frequency	10 to 3000 MHz
Level continuous mode	Off
Pattern	DNLINK1 to 3

Test procedure

MG3681A
+ MU368030A (Universal Modulation Unit)
+ MX368034A (PDC PACKET Software)

ML4803A Power meter

MA4601A Power Sensor

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

Preset	: –
Baseband	: On
I/Q Mod	: Int
Digital Modulation	: On
System	: PDC-P
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

$\geq$ 65 dB

Conditions

RF output level	+ 5 dB
Carrier wave frequency	100 to 2100 MHz
Level continuous mode	Off

Test procedures

MG3681A
+ MU368030A (Universal Modulation Unit)   MS2683A Spectrum Analyzer
+ MX368034A (PDC PACKET Software)
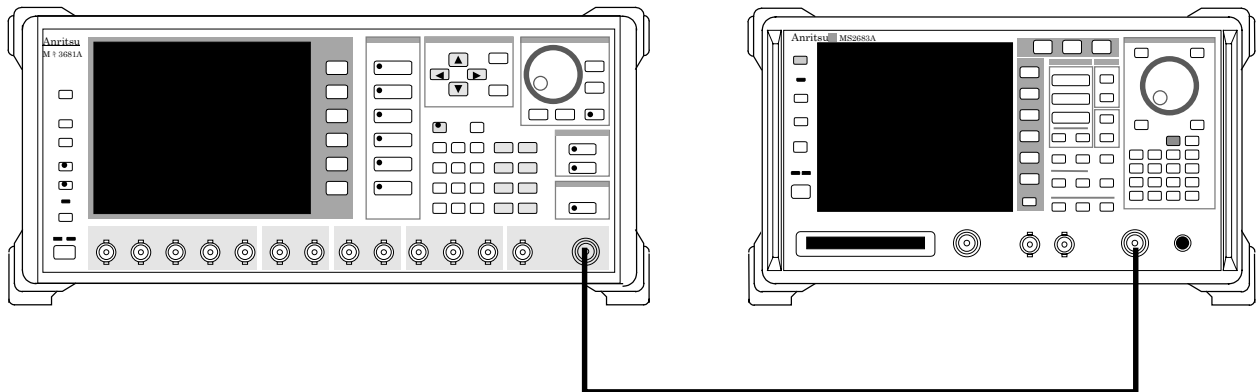
[1]   Set the modulation parameter of MG3681A as follows.

Preset	: –
Baseband	: On
I/Q Mod	: Int
Digital Modulation	: On
System	: PDC-P
Pattern	: UPLINK1

[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] key 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	: 30 kHz
VBW	: 30 kHz
Time Span	: 50 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

When installed in MU368030A mounted on MG3681A

Item		Specifications
Corresponding system		RCR STD-27 (PDC)
Modulation method		π/4DQPSK
Baseband filter		Root-Nyquist, α = 0.5
Modulation data	DNLINK1 (Down signal)	Only slot 0 is UPCH, Slot 1 and 2 are "all 1". UPCH: Lay out the PN9 data in the consecutive CAC areas. SW does not correspond to the super frame.
	DNLINK2 (Down signal)	Only slot 0 and 1 are UPCH, Slot 2 is "all 1". UPCH: Lay out the PN9 data in the consecutive CAC areas. SW does not correspond to the super frame.
	DNLINK3 (Down signal)	All slots (Slot 0, 1 and 2) are UPCH. UPCH: Lay out the PN9 data in the consecutive CAC areas. SW does not correspond to the super frame.
	UPLINK1 (Up signal)	Only slot 0 is UPCH, Slot 1 and 2 are "burst off". UPCH: Lay out the PN9 data in the consecutive CAC areas. SW does not correspond to the super frame.
RF signal	Frequency range	10 to 3000 MHz
	Level accuracy	Within ± 1.0 dB (≤ + 5 dBm) compared with CW level when the modulation data DNLINK1 to 3 is selected.
	Level range	– 143 to + 13 dBm
	Vector accuracy	≤ 1.8% (rms)
	Adjacent channel leakage power	For + 5 dBm output, PLL mode: normal, 100 to 1600 MHz, modulation data: DNLINK3, RBW: 1kHz, VBW: 3kHz, detection mode: POSITIVE PEAK ≤ – 63 dBc (50 kHz Offset, BW: 21 kHz) ≤ – 67 dBc (100 kHz Offset, BW: 21 kHz) However, deterioration of performance due to the spurious of the MG3681A main unit is excluded.
	Burst On/Off ratio	When the modulation data UPLINK1 is selected. ≥ 65 dB (Output level: + 5 dBm)
IQ signal	Output level	359 mV (rms)
Transmission speed	Symbol rate	21 ksps
	Transmission speed accuracy	Depends on the reference signal accuracy for the MG3681A (excluding the external synchronization)
Trigger input		Exterual frame trigger or start trigger input. The delay adjustment function of output (delay adjustment range: 0 to 16777215, resolution: symbol/16) against external trigger is available.
Used firmware backup area		CPU: 137.3 kByte, FPGA: 49.5 kByte (MU368030A Universal Modulation Unit)

Setting	Initial Value
Digital Modulation Main Screen	
Pattern	0:DNLINK3
Trigger Source	Int
Trigger Delay	0/16sps (0.0000sps)
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 +
                 MX368034A PDC PACKET Software

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		
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		1.8% (rms)
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		
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		± 1.0 dB
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		
50 MHz		
100 MHz		
300 MHz		
500 MHz		
800 MHz		≥ 65 dB
1000 MHz		
1300 MHz		
1500 MHz		
1800 MHz		
2000 MHz		
2100 MHz		