

MX283027A-002
Bluetooth Test Software
Operation Manual
Operation

Fourth Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided within the MS2830 Signal Analyzer Operation Manual Mainframe Operation. Please also refer to this document before using the equipment.
- Keep this manual with the equipment.

ANRITSU CORPORATION

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

DANGER  This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING  This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION  This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MX283027A-002
Bluetooth Test Software
Operation Manual Operation

24 June 2011 (First Edition)
17 February 2012 (Fourth Edition)

Copyright © 2011-2012, ANRITSU CORPORATION.

All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.

The contents of this manual may be changed without prior notice.

Printed in Japan

Equipment Certificate

Anritsu Corporation guarantees that this equipment was inspected at shipment and meets the published specifications.

Anritsu Warranty

- During the warranty period, Anritsu Corporation will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is 6 months from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Software End-User License Agreement (EULA)

Please read this Software End-User License Agreement (hereafter this EULA) carefully before using (includes executing, copying, registering, etc.) this software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment). By reading this EULA and using this software, you are agreeing to be bound by the terms of its contents and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu-specified equipment (hereafter Equipment) for the purposes set out in this EULA.

1. Grant of License and Limitations

1. Regardless of whether this Software was purchased from or provided free-of-charge by Anritsu, you agree not to rent, lease, lend, or otherwise distribute this Software to third parties and further agree not to disassemble, recompile, reverse engineer, modify, or create derivative works of this Software.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer this software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for personal injury, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, arising out of or related to your use or inability to use this Software.

3. Limitation of Liability

- a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.
 - i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
 - ii) If this Software is used in conjunction with other non-Anritsu-approved software.
 - iii) Recovery of lost or damaged data.
 - iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
 - v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.
- b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.
- c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.

4. Export Restrictions

You may not use or otherwise export or re-export directly or indirectly this Software except as authorized by Japanese and United States law. In particular, this software may not be exported or re-exported (a) into any Japanese or US embargoed countries or (b) to anyone on the Japanese or US Treasury Department's list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. By using this Software, you warrant that you are not located in any such country or on any such list. You also agree that you will not use this Software for any purposes prohibited by Japanese and US law, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction.

5. Termination

Anritsu shall deem this EULA terminated if you violate any conditions described herein. This EULA shall also be terminated if the conditions herein cannot be continued for any good reason, such as violation of copyrights, patents, or other laws and ordinances.

6. Reparations

If Anritsu suffers any loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

7. Responsibility after Termination

Upon termination of this EULA in accordance with item 5, you shall cease all use of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

8. Dispute Resolution

If matters of dispute or items not covered by this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

9. Court of Jurisdiction

This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

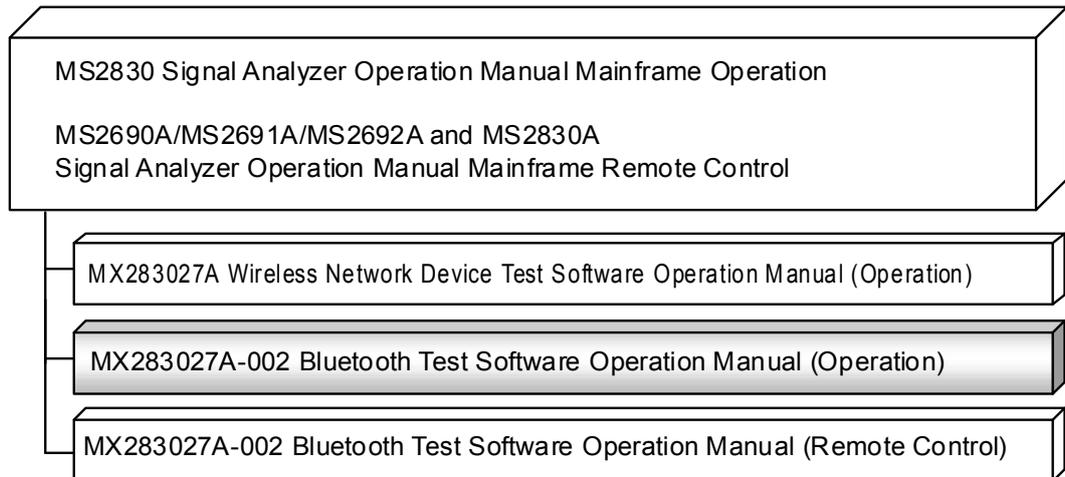
Cautions against computer virus infection

- Copying files and data
Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software
Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
Ensure that the network has sufficient anti-virus security protection in place.

About This Manual

■ Associated Documents

The operation manuals for the MX283027A-002 Bluetooth Test Software are comprised as shown in the figure below.



- Signal Analyzer Operation Manual (Mainframe Operation)
- Signal Analyzer Operation Manual (Mainframe Remote Control)
Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe
- Wireless Network Device Test Software Operation Manual (Operation)
This describes basic operations and functions of the Wireless Network Device Test Software.
- Bluetooth Test Software Operation Manual (Operation) <This document>
This describes basic operations and functions of the Bluetooth Test Software.
- Bluetooth Test Software Operation Manual (Remote Control)
This document describes the remote operation of Bluetooth Test Software.

Convention Used in This Manual

In this document,  indicates a panel key.

Table of Contents

For Safety	iii
About This Manual.....	I
Chapter 1 Outline	1-1
1.1 Product Overview	1-2
1.2 Product Composition	1-3
1.3 Specifications.....	1-4
Chapter 2 Preparation.....	2-1
2.1 Part Names	2-2
2.2 Signal Path Setup	2-10
2.3 Application Startup and Selection.....	2-12
2.4 Initialization and Calibration.....	2-13
2.4.1 Initialization	2-13
2.4.2 Calibration.....	2-13
Chapter 3 Measurement	3-2
3.1 Basic Operation	3-2
3.2 Setting Frequency.....	3-4
3.3 Setting Level	3-6
3.4 Setting Common Items	3-8
3.5 Setting Measurement Items.....	3-11
3.6 Setting Trigger	3-30
3.7 Measurement Result.....	3-32

Chapter 4 Performance Test	4-1
4.1 Overview of Performance Test	4-2
4.2 Performance Test Items	4-3
Appendix A Error Messages.....	A-1
Appendix B Default Value List	B-1
Appendix C List of Measurement Functions..	C-1
Index	Index-1

1
2
3
4
Appendix
Index

Chapter 1 Outline

This section provides an overview and describes the product configuration of the MX283027A-002 Bluetooth Test Software.

1.1	Product Overview	1-2
1.2	Product Composition	1-3
	1.2.1 Standard composition.....	1-3
	1.2.2 Applicable parts	1-3
1.3	Specifications.....	1-4

1.1 Product Overview

The MS2830A Signal Analyzer (hereinafter referred to as “this instrument”) enables high-speed, high-accuracy, and simple measurement of the transmission characteristics of base stations and mobile stations for various types of mobile communications. The MS2830A is equipped with high-performance signal analyzer and spectrum analyzer functions as standard, with optional measurement software allowing modulation analysis functionality supporting various digital modulation modes.

The MX283027A-002 Bluetooth Test Software (this software hereafter) is an option for performing TRx tests of Basic Rate (BR), Enhanced Data Rate (EDR), and Bluetooth Low Energy (BLE). To perform a transmission test with MX283027A-002, EUT must be measured in Tx Mode.

Note:

In order to use MX283027A-002, the following are required:

- MX283027A Wireless Network Device Test Software
- MS2830A-005/105 Analysis Bandwidth Extension to 31.25 MHz and MS2830A-006/106 Analysis Bandwidth 10 MHz

Note:

In MS2830A-040, only measurements up to 3.6 GHz are supported.

The MX283027A-002 supports the following measurements.

- Modulation Characteristics Measurement
- Output Power Measurement
- ICFT (Initial Carrier Frequency Tolerance)
- Carrier Frequency Drift
- EDR Relative Transmit Power
- EDR Carrier Frequency Stability and Accuracy
- EDR Differential Phase Encoding
- BLE Modulation Characteristics Measurement
- BLE Output Power Measurement
- BLE Differential Phase Encoding

1.2 Product Composition

1.2.1 Standard composition

Table 1.2.2-1 lists the application parts for the MX283027A-002.

Table 1.2.1-1 Standard composition

Item	Model/Symbol	Product name	Q'ty	Remarks
Application	MX283027A-002	Bluetooth Test Software	1	
Accessories	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Applicable parts

Table 1.2.2-1 lists the application parts for the MX283027A-002.

Table 1.2.2-1 Applicable Parts

Model/Symbol	Product name	Remarks
W3516AE	MX283027A-002 Bluetooth Wireless Network Device Test Software Operation Manual (Operation)	English, Printed Version
W3517AE	MX283027A-002 Bluetooth Wireless Network Device Test Software Operation Manual (Remote Control)	English, Printed Version

1.3 Specifications

Table 1.3-1 lists the specifications for the MX283027A-002.

Nominal values are not guaranteed.

When MS2830A is used, this software's specification is specified by the condition below, unless otherwise noted.

Attenuator Mode: Mechanical Atten Only

Table 1.3-1 Specifications

Item	Specifications
Transmission characteristics test	
Target signal	Basic Rate/Bluetooth Low Energy
Modulation/Frequency measurement	
Measurement frequency range	2402 to 2480 MHz (Channel No.: 0 to 78)
Measured level range	-15 to +30 dBm
Initial carrier frequency tolerance	After CAL execution at 18° to 28°C Packet type: DH1, DH3, DH5, BLE Reference Packet Payload data: All Measurement range: 0 to ±100 kHz (Nominal) Measurement accuracy: ± (accuracy of reference frequency × carrier frequency + 2 kHz)
Modulation characteristics	After CAL execution at 18° to 28°C Packet type: DH1, DH3, DH5, BLE Reference Packet Payload data: 0xF0, 0x0F, 0xAA, 0x55 Frequency deviation measurement accuracy: ±1 kHz (Nominal)
Carrier frequency drift	After CAL execution at 18° to 28°C Packet type: DH1, DH3, DH5, BLE Reference Packet Payload data: 0xAA, 0x55 Measurement accuracy: ±2 kHz (Nominal)
Transmission power	After CAL execution, input at 18° to 28°C, the signal measured is within the measurement level range and less than or equal to Input Level. Measurement accuracy: ±0.6 dB Excluding noise floor effects and impedance mismatch errors

Table 1.3-1 Specifications (Continued)

Item	Specifications
Target signal	Enhanced data rate
Modulation/Frequency measurement	
Measurement frequency range	2402 to 2480 MHz (Channel No.: 0 to 78)
Measured level range	-15 to +30 dBm
EDR modulation accuracy	After CAL execution at 18° to 28°C Packet type: 2-DH1, 2-DH3, 2-DH5, 3-DH1, 3-DH3, 3-DH5 Payload data: All DEVm floor: ≤ 1.2 % rms
EDR carrier frequency stability	After CAL execution at 18° to 28°C Packet type: 2-DH1, 2-DH3, 2-DH5, 3-DH1, 3-DH3, 3-DH5 Payload data: All Measurement accuracy: \pm (accuracy of reference frequency \times carrier frequency + 2 kHz)
Transmission power	After CAL execution at 18° to 28°C, input attenuator ≥ 10 dB, The signal measured is within the measurement level range and less than or equal to Input Level. Measurement accuracy: ± 0.6 dB Excluding noise floor effects and impedance mismatch errors

Chapter 2 Preparation

This chapter describes the preparations required for using the application you are using. Refer to *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* for common features of the MS2830A not included in this manual.

2.1	Part Names	2-2
	2.1.1 Front panel	2-2
	2.1.2 Rear panel	2-8
2.2	Signal Path Setup	2-11
2.3	Application Startup and Selection.....	2-12
	2.3.1 Launching application.....	2-12
	2.3.2 Selecting application.....	2-12
2.4	Initialization and Calibration.....	2-13
	2.4.1 Initialization.....	2-13
	2.4.2 Calibration	2-13

2.1 Part Names

This section describes the panel keys for operating this application and connectors used to connect external devices. For general points of caution, refer to *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*.

2.1.1 Front panel

This section describes the front-panel keys and connectors.

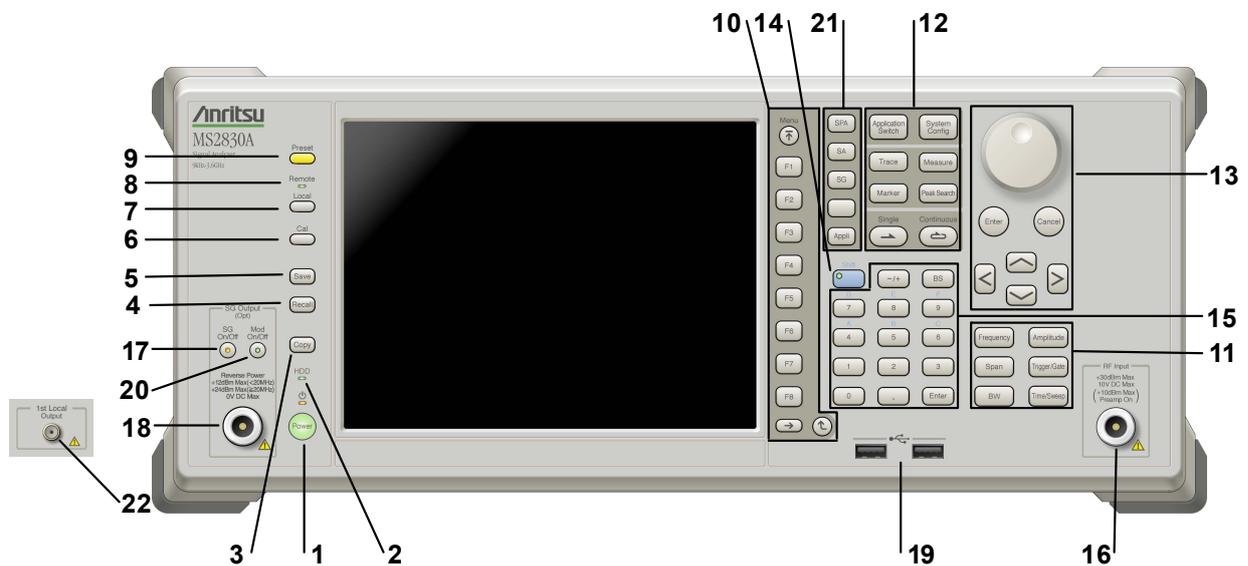


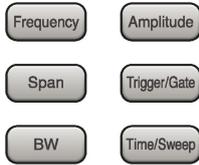
Figure 2.1.1-1 Front panel

- 1  Power switch
Press to switch between the standby state (AC power supplied) and power-on state. The Power lamp  lights orange at Standby and green at Power On. Press the power switch for about 2 seconds.
- 2  HDD
Hard disk access lamp
Lights when accessing the internal hard disk
- 3  Copy
Copy key
Press to capture display screen and save to file.
- 4  Recall
Recall key
Press to recall parameter file.

- 5  Save key
Press to save parameter file.
- 6  Cal key
Press to display the Calibration menu.
- 7  Local key
Press to return to local operation from remote control via GPIB, Ethernet, or USB (B), and enable panel settings.
- 8  Remote lamp
Lights when in remote-control state.
- 9  Preset key
Press to display the Preset menu. Resets parameters to initial settings.
- 10  Function keys
Selects or configures function menu displayed on the right of the screen. The function menu is provided in multiple pages and layers.
The number on the bottom of the screen indicates the menu page number.

 -  Next key
Press to go to the next page.
 -  Back key
Press to go back to the previous layer within the function menu.
 -  Top key
Press to go back to the uppermost (top) layer.

11



Main function keys 1

Press to set or execute main functions.

Executable functions vary with the current application.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

 Press to set frequency parameters.

 Press to set level parameters.

 No function is assigned to this key.

 Press to set trigger parameters

 No function is assigned to this key.

 Press to set measurement item parameters.

12



Main function keys 2

Press to set or execute main functions.

Executable functions vary with the current application.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

 Press to switch application.

 Press to display Configuration screen.

 Press to set the trace items or to switch the operation window.

 Press to set measurement item parameters.

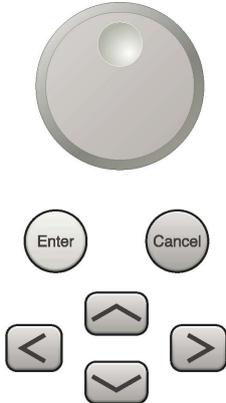
 Use when switching graph marker operation.

 Press to set parameters related to the peak search function.

 Press to start single measurement.

 Press to start continuous measurements.

13

**Rotary knob/Cursor keys/Enter key/Cancel key**

The rotary knob and cursor keys select display items or change settings.

Press  to set the entered or selected data.

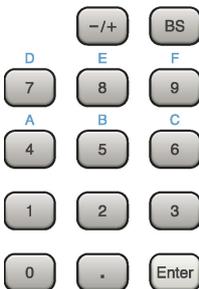
 Press  to cancel input or selected data.

14

**Shift key**

Operates keys with functions in blue characters on panel. Press the Shift key so the key lamp is green and then press the target key.

15

**Numeric keypad**

Enters numbers on parameter setup screens.

Press  to delete the last entered digit or character.

[A] to [F] can be entered by pressing keys  to  while the Shift key lamp  is green.

16



RF Input

RF Input connector

Inputs RF signal.

17



SG On/Off

RF Output Control key

Press  to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The RF output control key lamp lights orange when the RF signal output is set to On.

This is not available when the Option 044/045 is installed.

18

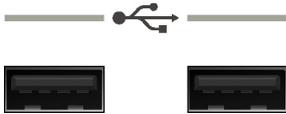
SG Output(Opt)



RF Output connector

Outputs RF signal, when the Vector Signal Generator option is installed. This is not available when the Option 044/045 is installed.

19



USB connector (type A)

Connect the accessory USB keyboard, mouse or USB memory.

20



Modulation control key

Press  to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. When modulation is on, the key lamp lights up green.

This is not available when the Option 044/045 is installed.

21

**Application key**

Press to switch between applications.

**SPA key**

Press to display the Spectrum Analyzer main screen.

**SA key**

Press to display the Signal Analyzer main screen, when Option 005/105 and 006/106 are installed.

**SG key**

Press to display the Signal Analyzer main screen, when Vector Signal Generator option is installed.

**Blank key**

Not used.

**Appli key**

When Auto is specified, the application selected by using the Application Switch is displayed. When Manual is specified, the pre-specified Application is displayed. For details, refer to 3.5.4 “Changing application layout” in *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*.

22

**1st Local Output connector**

This is available when the Option 044/045 is installed.

Supplies local signal and bias current to the external mixer, and receives the IF signal with its frequency converted.

2.1.2 Rear panel

This section describes the rear-panel connectors.

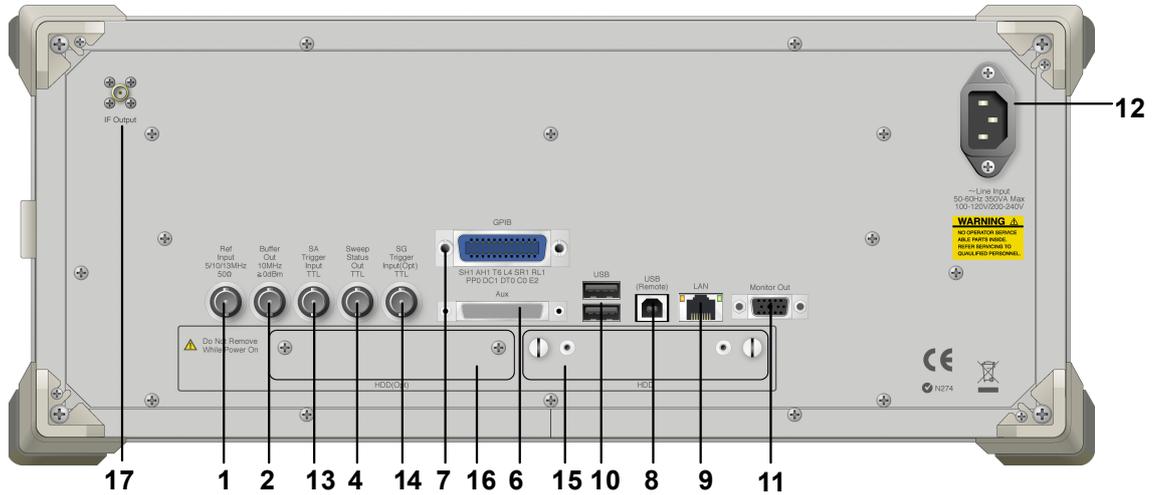


Figure 2.1.2-1 Rear panel

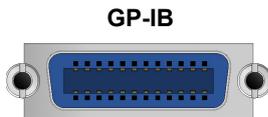
- | | |
|---|---|
| <p>1 Ref Input
5/10/13MHz
50Ω</p>  | <p>Ref Input connector (reference frequency signal input connector)
Inputs external reference frequency signal (5 MHz/10 MHz/13 MHz). It is for inputting reference frequency signals with higher accuracy than the instrument's internal reference signal, or for synchronizing the frequency of the mainframe to that of other equipment.</p> |
| <p>2 Buffer Out
10MHz
≥0dBm</p>  | <p>Buffer Out connector (reference frequency signal output connector)
Outputs the internal reference frequency signal (10 MHz)It is for synchronizing frequencies between other equipment and the mainframe.</p> |
| <p>4 Sweep Status Out
TTL</p>  | <p>Sweep Status Out connector
Outputs signal when internal measurement is performed or measurement data is obtained.</p> |

6

**AUX connector**

This is a complex connector for inputting an error rate measurement signal and inputting a baseband clock reference signal of the Vector Signal Generator (optional). See Table 2.1.2-1 for the internal pin assignment of the AUX connector.

7

**GP-IB connector**

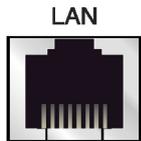
For external control via GPIB

8

**USB connector (type B)**

For external control via USB

9

**Ethernet connector**

Connects PC or Ethernet network.

10

**USB connector (type A)**

Used to connect a USB keyboard or mouse or the USB memory supplied.

11

**Monitor Out connector**

Connects external display.

12

**AC inlet**

Supplies power

- 13 SA Trigger Input TTL
 SA Trigger Input connector
 This is a BNC connector used to input the external trigger signal (TTL) for the SPA or SA application.



- 14 SG Trigger Input(TTL) TTL
 SG Trigger Input connector
 This is a BNC connector used to input the external trigger signal (TTL) for the vector signal generator option.



- 15 HDD
 HDD slot
 This is a standard hard disk slot.

- 16 HDD (Opt)
 HDD slot for Option
 This is a hard disk slot for the options.

Table 2.1.2-1 AUX connector

Function	Pin Number	Signal Name
SG	13	MARKER1
	11	GND
	38	MARKER2
	36	GND
	39	MARKER3
	16	GND
	42	PULS_MOD
	41	GND
	22	BB_REF_CLK
	20	GND

Do not connect anything to connectors not listed in Table 2.1.2-1, because they are interface connectors provided for device maintenance.

- 17 IF Output connector
 Monitor output of the internal IF signal.
 This is available when the Option 044/045 is installed.



2.2 Signal Path Setup

As shown in Figure 2.2-1, connect the mainframe and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector.

CAUTION

Do not input a signal that has an excessive level to MS2830A.



Figure 2.2-1 Signal path setup example

Set the 5 MHz/10 MHz/13 MHz reference signal from external sources, as required.



Reference frequency signal

Figure 2.2-2 External signal input

2.3 Application Startup and Selection

To use this application, it is necessary to load (start up) and select the application.

2.3.1 Launching application

The application startup procedure is described below.

Note:

The XXX indicates the application name currently in use.

■ Procedure

1. Press  to display the Configuration screen.
2. Press  (Application Switch Settings) to display the Application Switch Registration screen.
3. Press  (Load Application Select), and move the cursor to “XXX” in the Unloaded Applications list.
 - If “XXX” is displayed in the **Loaded Applications** list, this means that the application is already loaded.
 - If “XXX” appears in neither the **Loaded Applications** nor **Unloaded Applications** list, this means that the application has not been installed.
4. Press  (Set) to load the application. If “XXX” is displayed in the **Loaded Applications list**, this means that the application is already loaded.

2.3.2 Selecting application

The selection procedure is described below.

■ Procedure

1. Press  to display the Application Switch menu.
2. Press the menu function key displaying “XXX”.
 - The application can also be selected with mouse, by clicking “XXX” on the task bar.

2.4 Initialization and Calibration

This section describes the parameter settings and the preparations required before starting measurement.

2.4.1 Initialization

After selecting this application, first perform initialization. Initialization should be performed in order to return the settable parameters to their default settings.

The initialization procedure is as follows.

■ Procedure

1. Press  to display the Preset function menu.
2. Press  (Preset).

2.4.2 Calibration

Perform calibration before measurement. Calibration sets the level accuracy frequency characteristics for the input level to flat, and adjusts level accuracy deviation caused by internal temperature fluctuations. Calibration should be performed when first performing measurement after turning on power, or if beginning measurement when there is a difference in ambient temperature from the last time calibration was performed.

■ Procedure

1. Press  to display the Application Cal function menu.
2. Press  (SIGANA All).

For details on calibration functionality only executable with the MS2830A, refer to *MS2690A/MS2691A/MS2692A Signal Analyzer Operation Manual (Mainframe Operation)*.

Chapter 3 Measurement

This section describes the measurement function, the parameter contents and the setting methods for this application. Measurement parameters can be set and measurement can be performed only by using a remote command. For details about how to set the parameters described in this chapter and how to perform measurement, see the *MX283027A-002 Bluetooth Test Software Operation Manual (Remote Control)*.

3.1	Basic Operation	3-2
3.1.1	Screen layout.....	3-2
3.1.2	Performing measurement.....	3-3
3.2	Setting Frequency.....	3-4
3.3	Setting Level	3-6
3.4	Setting Common Items	3-8
3.5	Setting Measurement Items.....	3-11
3.5.1	Transmit power (Output Power)	3-11
3.5.2	Modulation characteristics.....	3-13
3.5.3	ICFT (Initial Carrier Frequency Tolerance).....	3-17
3.5.4	Carrier Frequency Drift.....	3-19
3.5.5	EDR Carrier Freq Stability and Mod Accuracy.....	3-21
3.5.6	EDR Relative Transmit Power.....	3-26
3.5.7	EDR Differential Phase Encoding	3-28
3.6	Setting Trigger	3-30
3.7	Measurement Result.....	3-32
3.7.1	Output Power measurement result.....	3-34
3.7.2	Modulation Characteristics measurement result.....	3-36
3.7.3	ICFT measurement result.....	3-43
3.7.4	Carrier Frequency Drift measurement result..	3-44
3.7.5	EDR Carrier Freq Stability and Mod Accuracy measurement result.....	3-47
3.7.6	EDR Relative Transmit Power measurement result.....	3-52
3.7.7	EDR Differential Phase Encoding measurement result.....	3-55
3.7.8	Demodulation data measurement result	3-56

3.1 Basic Operation

3.1.1 Screen layout

This section describes the screen layout of this application.

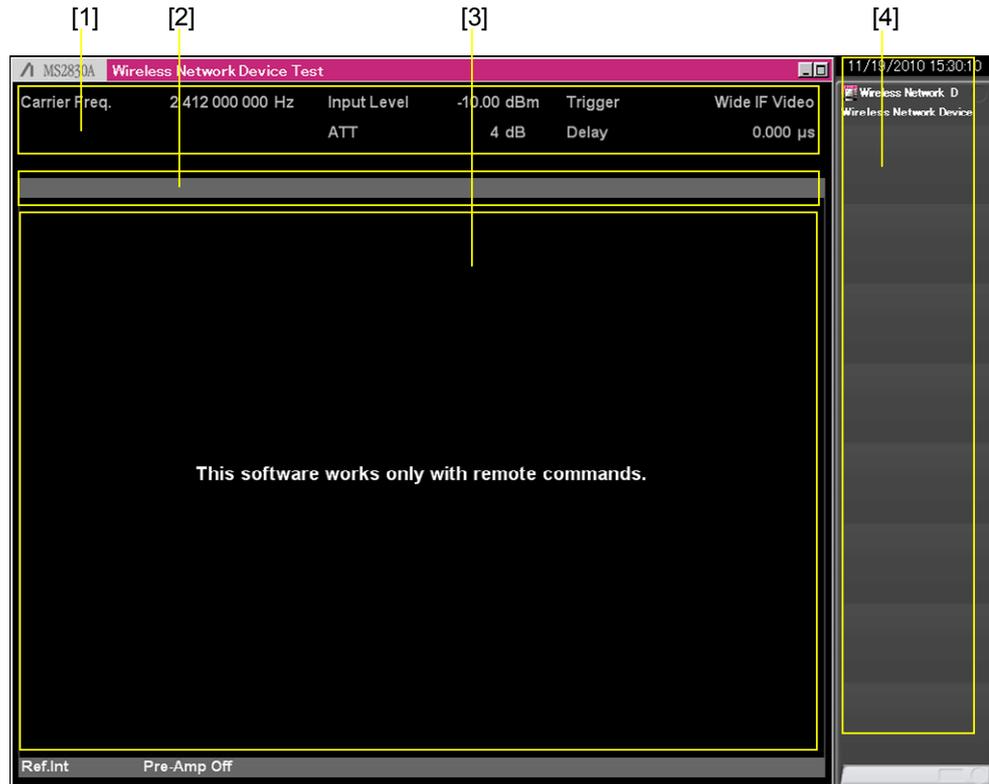


Figure 3.1.1-1 Screen layout

- [1] Measurement parameter
Displays the specified parameter.
- [2] Status message
Displays signal status.
- [3] Result window
No result is displayed with this application.
- [4] Function menu
Displays the functions executable with function keys.
Use this to save measurement results.

3.1.2 Performing measurement

There are two measurement modes: single and continuous. Measurement is performed once in the single measurement mode, and continuously in the continuous measurement mode.

Table 3.1.2-1 Measurement Mode Items

Item	Function
Single Measurement	Items are measured only for the measurement count (Storage Count) before measurement is stopped. If storage operation such as averaging is not performed, this application performs a single measurement and stops.
Continuous Measurement	The selected measurement items are continuously measured for the measurement count (Storage Count).

Single Measurement

■ Summary

After capturing an input signal based upon the settings of Burst Interval, the selected measurement items are measured only for the measurement count (Storage Count) before measurement is stopped.

■ Remote command

```
:INITiate:MODE:SINGLE
```

Continuous Measurement

■ Summary

Following capture of an input signal based on the settings of Burst Interval, the selected measurement items are continuously measured for the measurement count (Storage Count), and this procedure is repeated. Measurement will continue even after changing parameters or window display. Measurement will be stopped if another application is selected.

■ Remote Command

```
:INITiate:CONTinuous OFF|ON|0|1  
:INITiate:MODE:CONTinuous
```

3.2 Setting Frequency

Configures settings related to frequency.

Table 3.2-1 Frequency Setting Items

Item	Function
Carrier Frequency	Sets a carrier frequency.
Channel Number	Sets the carrier frequency by channel number.

Carrier Frequency

■ Summary

Sets a carrier frequency.

■ Setting range

100 MHz to the upper limit of the main unit

■ Remote command

`[:SENSe] :FREQuency:CENTer <freq>`

Channel Number

■ Summary

Sets the carrier frequency by channel number.

■ Setting range

0 to 78

$f = (2402 + k) \text{ MHz}$

f : Carrier Frequency, k : Channel Number

See Table 3.2-2.

■ Remote command

`[:SENSe] :BT:CHANnel <integer>`

Table 3.2-2 Channel Number and Carrier Frequency

Channel number	Center frequency [MHz]	Channel number	Center frequency [MHz]
0	2402	40	2442
1	2403	41	2443
2	2404
3	2405	75	2477
...	...	76	2478
38	2440	77	2479
39	2441	78	2480

3.3 Setting Level

Configures settings related to level.

Table 3.3-1 Level Settings Items

Item	Function
Input Level	Sets the input level from the target DUT.
Level Offset State	This turns on/off the Offset function.
Level Offset Value	This sets the level correction coefficient.

Input Level

■ Summary

Sets the input level from the target DUT.

■ Setting range

(-60.00+Offset Value) to (30.00+Offset Value) dBm

■ Remote command

`[:SENSe] :POWer [:RF] :RANGe :ILEVel <real>`

Level Offset State

■ Summary

This turns on/off the Offset function.

■ Options

ON | 1 Enables the offset function.

OFF | 0 Disables the offset function.

■ Remote command

`:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet:ST
ATe OFF|ON|0|1`

Level Offset Value

■ Summary

This sets the level correction coefficient.

■ Setting range

-99.99 to 99.99 dB

■ Setting example

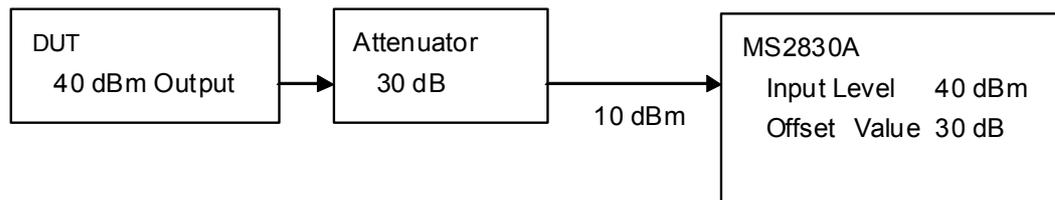


Figure 3.3-1 Input level and offset level setting example

■ Remote command

```
:DISPlay:WINDow[1]:TRACe:Y[:SCALe]:RLEVel:OFFSet  
<rel_power>
```

3.4 Setting Common Items

This section describes the settings for the common items.

Table 3.4-1 Common Setting Items

Item	Function
Standard	Selects the communication standard of the measured signal.
Power Class	Sets the power class.
Packet Type	Sets the packet type of input signal.
Burst Interval	Burst Interval of the target signal.
Access Address	Sets the access address.
Burst Threshold	Sets Burst Threshold level for burst detection.

Standard

■ Summary

Selects the communication standard of the measured signal.

■ Options

- BR Analyze as Basic Rate signal
- EDR Analyze as Enhanced Data Rate signal
- BLE Analyze as Bluetooth Low Energy signal

■ Remote command

```
[ :SENSe ] :BT:RADio:STANdard <mode>
```

Power Class

■ Summary

Sets the Power Class that automatically specifies Average Power Upper Limit, which is the limit value for Output Power measurement.

■ Options

- PC1 Sets the value to 20.00 dBm, which is the limit value of Power Class 1.
- PC2 Sets the value to 4.00 dBm, which is the limit value of Power Class 2.
- PC3 Sets the value to 0.00 dBm, which is the limit value of Power Class 3.

■ Remote command

```
[ :SENSe ] :BT:PCLass <mode>
```

Packet Type**■ Summary**

Sets the packet type of input signal. When BLE is selected for the standard, it is analyzed as BLE signal irrespective of this setting.

■ Options

When Standard is BR:

- DH1 Analyzes an input signal as DH1 (BR signal).
- DH3 Analyzes an input signal as DH3 (BR signal).
- DH5 Analyzes an input signal as DH5 (BR signal).

When Standard is EDR:

- 2DH1 Analyzes an input signal as 2-DH1 ($\pi/4$ -DQPSK signal).
- 2DH3 Analyzes an input signal as 2-DH3 ($\pi/4$ -DQPSK signal).
- 2DH5 Analyzes an input signal as 2-DH5 ($\pi/4$ -DQPSK signal).
- 3DH1 Analyzes an input signal as 3-DH1 ($\pi/8$ DPSK signal).
- 3DH3 Analyzes an input signal as 3-DH3 (8DPSK signal).
- 3DH5 Analyzes an input signal as 3-DH5 (8DPSK signal).

No restriction by standard:

- AUTO Analyzes an input signal automatically.

■ Remote command

```
[ :SENSe ] :BT:PTYPE <mode>
```

Burst Interval**■ Summary**

Sets the burst interval to determine the capture length used for measurement.

■ Setting range

Minimum value 200

Maximum value The smaller value of the two: "100000" or "the longest T which is Storage Count \times T \leq 2000 ms"

Unit μ s

■ Remote command

```
[ :SENSe ] :BT:CAPTURE:BURSt:INTerval <real>
```

Access Address

■ Summary

Sets Access Address used for BLE signal synchronization.

■ Setting range

Minimum value 0x00000000

Maximum value 0xFFFFFFFF

■ Remote command

[:SENSe] :BT:BLE:AADDRESS <integer>

Burst Threshold

■ Summary

Sets Burst Threshold level for burst detection. The threshold level based on the floor noise level of captured signal is set here.

■ Setting range

0 to 60 dB

■ Remote command

[:SENSe] :BT:CAPTURE:BURSt:THREShold <integer>

3.5 Setting Measurement Items

Sets measurement items.

3.5.1 Transmit power (Output Power)

Set up transmission power measurement. See also 3.7.1 “Output Power measurement result”.

Table 3.5.1-1 Transmit Output Power Setting Items

Item	Function
Output Power	Sets the Output Power measurement to On/Off.
Storage Mode	Sets the storage mode in Output Power measurement to On/Off.
Storage Count	Sets the averaged count of burst signals to be measured during Output Power measurement.
Limit	Sets limit value for Output Power measurement.

3

Measurement

Output Power

■ Summary

Sets the Output Power measurement to On/Off.

■ Options

- ON | 1 Performs the Output Power measurement.
- OFF | 0 Does not perform the Output Power measurement.

■ Remote command

[:SENSe] :BT:TXPower [:STATe] OFF | ON | 0 | 1

Storage Mode

■ Summary

Sets the storage mode in Output Power measurement.

■ Options

- ON | 1 Perform averaging the number of times specified by Storage Count.
- OFF | 0 Do not perform averaging.

■ Remote command

[:SENSe] :BT:TXPower:AVERage [:STATe] OFF | ON | 0 | 1

Note:

This setting is applied to the items that belong to Output Power measurement.

Storage Count

■ Summary

Sets the number of burst signals to be measured during Output Power measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: “200” or “the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ”.

■ Remote command

```
[ :SENSe ] :BT :TXPower :AVERage :COUNT <integer>
```

Note:

This setting is applied to the items that belong to Output Power measurement.

Average Power Upper Limit

■ Summary

Sets the upper limit for Average Power.

■ Setting range

-100.0 to +100.0 dBm

■ Remote command

```
[ :SENSe ] :BT :TXPower :LIMit [ :UPPer ] :DATA <real>
```

Average Power Lower Limit

■ Summary

Sets the lower limit for Average Power.

■ Setting range

-100.0 to +100.0 dBm

■ Remote command

```
[ :SENSe ] :BT :TXPower :LIMit :LOWer :DATA <real>
```

Peak Power Upper Limit

■ Summary

Sets the upper limit for Peak Power.

■ Setting range

-100.0 to +100.0 dBm

■ Remote command

```
[ :SENSe ] :BT :TXPower :LIMit [ :UPPer ] :PEAK <real>
```

3.5.2 Modulation characteristics

Configures the modulation characteristics measurement settings. See also 3.7.2 “Modulation Characteristics measurement result”.

Table 3.5.2-1 Modulation Characteristics Setting Items

Item	Function
Modulation characteristics	Sets the Modulation characteristics measurement to On/Off.
Storage Mode	Sets the storage mode in Modulation characteristics measurement to On/Off.
Storage Count	This sets the averaging count for modulation characteristics measurement.
Hold Result	Sets whether to hold the result of modulation characteristics measurement.
Limits	Sets limit value for modulation characteristics measurement.

Modulation Characteristics

■ Summary

Sets the Modulation characteristics measurement to On/Off.

Modulation characteristics measurement is used to measure frequency deviations.

■ Options

ON | 1 Performs the modulation characteristics measurement.

OFF | 0 Does not perform the modulation characteristics measurement.

■ Remote command

```
[ :SENSe ] :BT :MChar [ :STATe ] OFF | ON | 0 | 1
```

Storage Mode

■ Summary

Sets the storage mode in modulation characteristics measurement to On/Off.

■ Options

ON | 1 Perform averaging the number of times specified by Storage Count.

OFF | 0 Do not perform averaging.

■ Remote command

`[:SENSe] :BT :MChar :AVERage [:STATe] OFF | ON | 0 | 1`

Note:

This setting is applied to the items that belong to modulation characteristics measurement.

Storage Count

■ Summary

This sets the averaging count for modulation characteristics measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: "200" or "the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ".

■ Remote command

`[:SENSe] :BT :MChar :AVERage :COUNT <integer>`

Note:

This setting is applied to the items that belong to modulation characteristics measurement.

Hold Result

■ Summary

Sets whether to hold (DF1, DF2) or clear (OFF) the measurement result of $\Delta f1$ and $\Delta f2$.

Hold Result is a function used to hold the measurement result of the specified item.

The measurement items, Delta f2 Avg/Delta f1 Avg Ratio, are calculated from the measurement results of $\Delta f2$ Avg and $\Delta f1$ Avg. Since $\Delta f2$ Avg and $\Delta f1$ Avg cannot be calculated at once, measurement should be performed twice. The result of Delta f2 Avg/Delta f1 Avg Ratio can be calculated by selecting and holding the measurement result of either $\Delta f2$ Avg or $\Delta f1$ Avg using Hold Result, and then performing the other measurement.

■ Options

DF1	Hold the value of $\Delta f1$ Avg.
DF2	Hold the value of $\Delta f2$ Avg.
OFF	Measures by clearing the value of $\Delta f1$ Avg and $\Delta f2$ Avg.

■ Remote command

```
[ :SENSe ] :BT :MCHar :HRESult <mode>
```

Delta f1 Average Upper Limit

■ Summary

Sets the upper limit for $\Delta f1$ Average.

■ Setting range

0 to 500 kHz

■ Remote command

```
[ :SENSe ] :BT :MCHar :LIMit :DF1 [ :UPPer ] :DATA <freq>
```

Delta f1 Average Lower Limit

■ Summary

Sets the lower limit for $\Delta f1$ Average.

■ Setting range

0 to 500 kHz

■ Remote command

`[:SENSe] :BT:MCHar:LIMit:DF1:LOWer:DATA <freq>`

Delta f2 Max Lower Limit

■ Summary

Sets the lower limit for $\Delta f2$ Max.

■ Setting range

0 to 500 kHz

■ Remote command

`[:SENSe] :BT:MCHar:LIMit:DF2:LOWer:PEAK <freq>`

Delta f2 Average / Delta f1 Average Lower Limit

■ Summary

Sets the lower limit for $\Delta f2$ Average/ $\Delta f1$ Average.

■ Setting range

0.0 to 1.0

■ Remote command

`[:SENSe] :BT:MCHar:LIMit:DFRatio:LOWer:DATA <real>`

3.5.3 ICFT (Initial Carrier Frequency Tolerance)

Configures the ICFT (Initial Carrier Frequency Tolerance) measurement settings. See also 3.7.3 “ICFT measurement result”.

Table 3.5.3-1 ICFT Setting Items

Item	Function
ICFT	Sets the ICFT measurement to On/Off.
Storage Mode	This sets the averaging count for ICFT measurement to On/Off.
Storage Count	This sets the averaging count for ICFT measurement.
Limit	Sets the limit for ICFT.

3

Measurement

ICFT

■ Summary

Sets the ICFT measurement to On/Off.

■ Options

- ON | 1 Performs the ICFT measurement.
- OFF | 0 Does not perform the ICFT measurement.

■ Remote command

```
[ :SENSE ] :BT:ICFT [ :STATe ] OFF | ON | 0 | 1
```

Storage Mode

■ Summary

This sets the averaging count for ICFT measurement to On/Off.

■ Options

- ON | 1 Perform averaging the number of times specified by Storage Count.
- OFF | 0 Do not perform averaging.

■ Remote command

```
[ :SENSE ] :BT:ICFT:AVERAge [ :STATe ] OFF | ON | 0 | 1
```

Note:

This setting is applied to the items that belong to ICFT measurement.

Storage Count

■ Summary

This sets the averaging count for ICFT measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: “200” or “the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ”.

■ Remote command

```
[ :SENSe ] :BT:ICFT:AVERAge:COUNT <integer>
```

Note:

This setting is applied to the items that belong to ICFT measurement.

ICFT Upper Limit

■ Summary

Sets the upper limit for ICFT.

■ Setting range

0.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:ICFT:LIMit [ :UPPer ] :DATA <real>
```

3.5.4 Carrier Frequency Drift

Configures the Carrier Frequency Drift measurement settings. See also 3.7.4 “Carrier Frequency Drift measurement result”.

Table 3.5.4-1 Carrier Frequency Drift Setting Items

Item	Function
Carrier Frequency Drift	Sets the Carrier Frequency Drift measurement to On/Off.
Storage Mode	This sets the averaging count for Carrier Frequency Drift measurement to On/Off.
Storage Count	This sets the averaging count for Carrier Frequency Drift measurement.
Limit	Sets the limit for Carrier Frequency Drift.

Carrier Frequency Drift

■ Summary

Sets the Carrier Frequency Drift measurement to On/Off.

■ Options

- ON | 1 Performs the Carrier Frequency Drift measurement.
- OFF | 0 Does not perform the Carrier Frequency Drift measurement.

■ Remote command

```
[ :SENSe ] :BT:CFDRift [ :STATe ] OFF | ON | 0 | 1
```

Storage Mode

■ Summary

This sets the averaging count for Carrier Frequency Drift measurement to On/Off.

■ Options

- ON | 1 Perform averaging the number of times specified by Storage Count.
- OFF | 0 Do not perform averaging.

■ Remote command

```
[ :SENSe ] :BT:CFDRift:AVERage [ :STATe ] OFF | ON | 0 | 1
```

Note:

This setting is applied to the items that belong to Carrier Frequency Drift measurement.

Storage Count

■ Summary

This sets the averaging count for Carrier Frequency Drift measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: “200” or “the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ”.

■ Remote command

```
[ :SENSe ] :BT:CFDRift:AVERage:COUNT <integer>
```

Note:

This setting is applied to the items that belong to Carrier Frequency Drift measurement.

Carrier Frequency Drift Upper Limit

■ Summary

Sets the upper limit for Carrier Frequency Drift.

■ Setting range

–500.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:CFDRift:LIMit[:UPPer]:DATA <real>
```

Max Drift Rate Upper Limit

■ Summary

Sets the upper limit for Max Drift Rate.

■ Setting range

0.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:CFDRift:LIMit[:UPPer]:PEAK <real>
```

3.5.5 EDR Carrier Freq Stability and Mod Accuracy

Configures the EDR Carrier Freq Stability and Mod Accuracy measurement settings. See also 3.7.5 “EDR Carrier Freq Stability and Mod Accuracy measurement result”.

Table 3.5.5-1 EDR Carrier Freq Stability and Mod Accuracy Setting Items

Item	Function
EDR Carrier Freq Stability and Mod Accuracy	Sets the EDR Carrier Freq Stability and Mod Accuracy measurement to On/Off.
Storage Mode	Sets the EDR Carrier Freq Stability and Mod Accuracy measurement to On/Off.
Storage Count	This sets the averaging count for EDR Carrier Freq Stability and Mod Accuracy measurement.
Limit	Sets the limit for EDR Carrier Freq Stability and Mod Accuracy.

3

Measurement

EDR Carrier Freq Stability and Mod Accuracy

■ Summary

Sets the EDR Carrier Freq Stability and Mod Accuracy measurement to On/Off.

■ Options

ON | 1 Performs the EDR Carrier Freq Stability and Mod Accuracy measurement.

OFF | 0 Does not perform the EDR Carrier Freq Stability and Mod Accuracy measurement.

■ Remote command

[:SENSE] :BT:EDR:DEVM[:STATe] OFF | ON | 0 | 1

Storage Mode

■ Summary

Sets the EDR Carrier Freq Stability and Mod Accuracy measurement to On/Off.

■ Options

ON | 1 Perform averaging the number of times specified by Storage Count.

OFF | 0 Do not perform averaging.

■ Remote command

[:SENSe] :BT:EDR:DEVM:AVERAge [:STATe] OFF | ON | 0 | 1

Note:

This setting is applied to the items that belong to EDR Carrier Freq Stability and Mod Accuracy measurement.

Storage Count

■ Summary

This sets the averaging count for EDR Carrier Freq Stability and Mod Accuracy measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: "200" or "the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ".

■ Remote command

[:SENSe] :BT:EDR:DEVM:AVERAge:COUNT <integer>

Note:

This setting is applied to the items that belong to EDR Carrier Freq Stability and Mod Accuracy measurement.

Total Frequency Error Upper Limit**■ Summary**

Sets the upper limit for Total Frequency Error ($\omega_i + \omega_0$).

■ Setting range

0.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :FERRor:TOTal  
<real>
```

Block Frequency Error Upper Limit**■ Summary**

Sets the upper limit for Block Frequency Error (ω_0).

■ Setting range

0.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :FERRor:BLOCK  
<real>
```

Initial Frequency Error Upper Limit**■ Summary**

Sets the upper limit for Initial Frequency Error (ω_i).

■ Setting range

0.0 to 500.0 kHz

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :FERRor:INITial  
<real>
```

RMS DEVM DQPSK Upper Limit

■ Summary

Sets the upper limit for RMS DEVM DQPSK.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :DQPSk:DATA <real>
```

RMS DEVM 8DPSK Upper Limit

■ Summary

Sets the upper limit for RMS DEVM 8DPSK.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :8DPSk:DATA <real>
```

Peak DEVM DQPSK Upper Limit

■ Summary

Sets the upper limit for Peak DEVM DQPSK.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :DQPSk:PEAK <real>
```

Peak DEVM 8DPSK Upper Limit**■ Summary**

Sets the upper limit for Peak DEVM 8DPSK.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :8DPSk:PEAK <real>
```

99% DEVM DQPSK Upper Limit**■ Summary**

Sets the upper limit for 99% DEVM for EDR modulation (%) when the modulation mode is set to DQPSK. 99% DEVM for EDR modulation (%) indicates the DEVM value that 99% or more of the measured symbols fall within. When this value exceeds 99% DEVM DQPSK Upper Limit, the test result will be Fail.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :DQPSk:99Percent  
<real>
```

99% DEVM 8DPSK Upper Limit**■ Summary**

Sets the upper limit for 99% DEVM for EDR modulation (%) when the modulation mode is set to 8DPSK. 99% DEVM for EDR modulation (%) indicates the DEVM value that 99% or more of the measured symbols fall within. When this value exceeds 99% DEVM 8DPSK Upper Limit, the test result will be Fail.

■ Setting range

0.0 to 100.0 %

■ Remote command

```
[ :SENSe ] :BT:EDR:DEVM:LIMit [ :UPPer ] :8DPSk:99Percent  
<real>
```

3.5.6 EDR Relative Transmit Power

Configures the EDR Relative Transmit Power measurement settings. See also 3.7.6 “EDR Relative Transmit Power measurement result”.

Table 3.5.6-1 EDR Relative Transmit Power Setting Items

Item	Function
EDR Relative Transmit Power	Sets the EDR Relative Transmit Power measurement settings to On/Off.
Storage Mode	This sets the averaging count for EDR Relative Transmit Power to On/Off.
Storage Count	This sets the averaging count for EDR Relative Transmit Power measurement.
Limit	Sets the limit for EDR Relative Transmit Power.

EDR Relative Transmit Power

■ Summary

Sets the EDR Relative Transmit Power measurement settings to On/Off.

■ Options

- ON | 1 Performs EDR Relative Transmit Power measurement.
- OFF | 0 Does not perform EDR Relative Transmit Power measurement.

■ Remote command

[:SENSe] :BT:EDR:TXPower:RELative [:STATe] OFF|ON|0|1

Storage Mode

■ Summary

This sets the averaging count for EDR Relative Transmit Power to On/Off.

■ Options

- ON | 1 Perform averaging the number of times specified by Storage Count.
- OFF | 0 Do not perform averaging.

■ Remote command

[:SENSe] :BT:EDR:TXPower:RELative:AVERAge [:STATe]
OFF|ON|0|1

Note:

This setting is applied to the items that belong to EDR Relative Transmit Power measurement.

Storage Count**■ Summary**

This sets the averaging count for EDR Relative Transmit Power measurement.

■ Setting range

Minimum value 2

Maximum value The smaller value of the two: “200” or “the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ”.

■ Remote command

```
[ :SENSe ] :BT:EDR:TXPower:RELative:AVErAge:COUNT  
<integer>
```

Note:

This setting is applied to the items that belong to EDR Relative Transmit Power measurement.

EDR Relative Transmit Power Upper Limit**■ Summary**

Sets the upper limit for EDR Relative Transmit Power.

■ Setting range

–100.0 to 100.0 dB

■ Remote command

```
[ :SENSe ] :BT:EDR:TXPower:RELative:LIMit[:UPPer]:DATA  
<real>
```

EDR Relative Transmit Power Lower Limit**■ Summary**

Sets the lower limit for EDR Relative Transmit Power.

■ Setting range

–100.0 to 100.0 dB

■ Remote command

```
[ :SENSe ] :BT:EDR:TXPower:RELative:LIMit:LOWer:DATA  
<real>
```

3.5.7 EDR Differential Phase Encoding

Configures the EDR Differential Phase Encoding measurement settings. See also 3.7.7 “EDR Differential Phase Encoding measurement result”.

Table 3.5.7-1 EDR Differential Phase Encoding Setting Items

Item	Function
EDR Differential Phase Encoding	Sets the EDR Differential Phase Encoding measurement settings to On/Off.
Storage Mode	This sets the averaging count for EDR Differential Phase Encoding to On/Off.
Storage Count	This sets the averaging count for EDR Differential Phase Encoding measurement.
Limit	Sets the limit for EDR Differential Phase Encoding.

EDR Differential Phase Encoding

■ Summary

Sets the EDR Differential Phase Encoding measurement settings to On/Off.

■ Options

- ON | 1 Performs the EDR Differential Phase Encoding measurement.
- OFF | 0 Does not perform the EDR Differential Phase Encoding measurement.

■ Remote command

[:SENSe] :BT:EDR:DPHase [:STATe]

Storage Mode

■ Summary

This sets the averaging count for EDR Differential Phase Encoding to On/Off.

■ Options

- ON | 1 Perform averaging the number of times specified by Storage Count.
- OFF | 0 Do not perform averaging.

■ Remote command

[:SENSe] :BT:EDR:DPHase:AVERage [:STATe] OFF | ON | 0 | 1

Note:

This setting is applied to the items that belong to EDR Differential Phase Encoding measurement.

Storage Count■ **Summary**

This sets the averaging count for EDR Differential Phase Encoding measurement.

■ **Setting range**

Minimum value 2

Maximum value The smaller value of the two: “200” or “the biggest n which is $n \times \text{Burst Interval} \leq 2000 \text{ ms}$ ”.

■ **Remote command**

```
[ :SENSe ] :BT:EDR:DPHase:AVERage:COUNT <integer>
```

Note:

This setting is applied to the items that belong to EDR Differential Phase Encoding measurement.

PER Upper Limit■ **Summary**

Sets the upper limit for PER.

■ **Setting range**

0.0 to 100.0 %

■ **Remote command**

```
[ :SENSe ] :BT:EDR:DPHase:LIMit [ :UPPer ] :PER <real>
```

3.6 Setting Trigger

Configures settings of a trigger.

Table 3.6-1 Trigger Setting Items

Item	Function
Trigger Switch	This sets the trigger synchronization On/Off.
Trigger Source	This sets the trigger source.
Trigger Slope	Sets the trigger polarity.
Wide IF Trigger Level	Sets the trigger Level for the Wide IF trigger
Trigger Delay	Sets the trigger delay.

Trigger Switch

■ Summary

This sets the trigger synchronization On/Off.

■ Options

ON|1 Enables the trigger function.
 OFF|0 Disables the trigger function.

■ Remote command

:TRIGger[:SEQuence][:STATe] OFF|ON|0|1

Trigger Source

■ Summary

This sets the trigger source.

■ Options

EXTernal Measurement starts with external trigger signal input.
 IMMEDIATE Free run
 SG Starts measurement by the timing of internal Vector Signal Generator option. This can be selected only when the Vector Signal Generator option is installed.
 WIF|RFBurst Measurement starts upon Wideband IF detection (Wide IF Video).

■ Remote command

:TRIGger[:SEQuence]:SOURce <mode>

Trigger Slope

■ Summary

Sets the trigger polarity.

■ Options

POSitive	Synchronizes with rising edge of the trigger.
NEGative	Synchronizes with falling edge of the trigger.

■ Remote command

```
TRIGger[:SEquence]:SLOPe <mode>
```

Wide IF Trigger Level

■ Summary

Sets the trigger Level for the Wide IF trigger

■ Setting range

-60 to 50 dBm

■ Remote command

```
:TRIGger[:SEquence]:WIF|:RFBurst:LEVel:ABSolute  
<ampl>
```

Trigger Delay

■ Summary

Sets the trigger delay.

■ Setting range

-2 to +2 s

■ Remote command

```
:TRIGger[:SEquence]:DELay <time>
```

3.7 Measurement Result

Executing measurement and querying the measurement result are performed using the Batch measurement function.

Table 3.7-1 Functions for executing measurement and querying the result

Item	Function
Configure	Selects Bluetooth Batch measurement function.
Initiate	Executes Bluetooth Batch measurement function.
Fetch	Queries the result of Bluetooth Batch measurement function.
Read/Measure	Performs Bluetooth Batch measurement (single measurement) once with the current settings, and then queries the measured result.

Configure

■ **Summary**

Selects Bluetooth Batch measurement function.

■ **Remote command**

:CONFigure:BT

Note:

No measurement is made.

Initiate

■ **Summary**

Executes Bluetooth Batch measurement function.

■ **Remote command**

:INITiate:BT

Fetch

■ **Summary**

Queries the result of Bluetooth Batch measurement function.

■ **Setting range**

1 or omitted Displays all items

2 to 9 Displays specified items only.

■ **Remote command**

:FETCh:BT[n]?

Note:

“-999.0” is returned when no measurement is made or an error occurs.

Read/Measure

■ Summary

Performs Bluetooth Batch measurement (single measurement) once with the current settings, and then queries the measured result.

■ Setting range

1 or omitted	Displays all items
2 to 9	Displays specified items only.

■ Remote command

:READ:BT [n] ?
:MEASure:BT [n] ?

Note:

“-999.0” is returned when no measurement is made or an error occurs.

3.7.1 Output Power measurement result

Displays Output Power measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average, minimum and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.1-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if `n` of each command is specified as 1 or 2, or omitted.

Table 3.7.1-1 Response for Output Power Result Query

No. n=1, omitted	No. n=2	Response
1	1	GFSK Power Avg (Average) (dBm)
2	2	GFSK Power Avg (Max) (dBm)
3	3	GFSK Power Avg (Min) (dBm)
4	4	GFSK Power Peak (dBm)
5	5	Pass/Fail flag of GFSK Power Avg (Max/Min)
6	6	Pass/Fail flag of GFSK Power Peak
7	7	Count of Output Power Measurements

GFSK Power Avg (Average) (dBm)

■ Summary

Returns the average power for the GFSK part of the packet. When storage mode is On, the average value of multiple packets is returned.

GFSK Power Avg (Max) (dBm)

■ Summary

Returns the average power for the GFSK part of the packet. When storage mode is On, the maximum value of multiple packets is returned.

GFSK Power Avg (Min) (dBm)

■ Summary

Returns the average power for the GFSK part of the packet. When storage mode is On, the minimum value of multiple packets is returned.

GFSK Power Peak (dBm)

■ Summary

Returns the peak power for the GFSK part of the packet. When storage mode is On, the maximum value of multiple packets is returned.

Pass/Fail flag of GFSK Power Avg (Max/Min)

■ Summary

Returns the result of Pass/Fail judgment of GFSK Power Avg (Max) and GFSK Power Avg (Min) performed for the limit values specified by Average Power Upper Limit and Average Power Lower Limit.

Pass/Fail flag of GFSK Power Peak

■ Summary

Returns the result of Pass/Fail judgment of GFSK Power Peak performed for the limit values specified by Average Power Upper Limit and Average Power Lower Limit.

Count of Output Power Measurements

■ Summary

Returns the number of packets measured in Output Power measurement.

3.7.2 Modulation Characteristics measurement result

Displays Modulation Characteristics measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average, minimum and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.2-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if n of each command is specified as 1 or 3, or omitted.

Measurement is only made when Standard is set to BR or BLE.

Table 3.7.2-1 Response for Modulation Characteristics Result Query

No. n=1, omitted	No. n=3	Response
8	1	Delta f1 Avg (Average) (Hz)
9	2	Delta f1 Avg (Max) (Hz)
10	3	Delta f1 Avg (Min) (Hz)
11	4	Delta f2 Avg (Average) (Hz)
12	5	Delta f1 Max (Max) (Hz)
13	6	Delta f1 Max (Min) (Hz)
14	7	Delta f2 Max (Max) (Hz)
15	8	Delta f2 Max (Min) (Hz)
16	9	Delta f2 Max > Lower Limit (%)
17	10	Delta f2 Avg/Delta f1 Avg
18	11	Pass/Fail flag of Delta f1 Avg (Average)
19	12	Pass/Fail flag of Delta f1 Avg (Max/Min)
20	13	Pass/Fail flag of Delta f2 Max > Lower Limit
21	14	Pass/Fail flag of Delta f2 Avg/Delta f1 Avg
22	15	Count of Delta f1 Measurements
23	16	Count of Delta f2 Measurements

Delta f1 Avg (Average) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern of “11110000” or “00001111”, and returns the average value of the average differential frequency.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency values for the second, third, sixth, and seventh bit and the average frequency value. Finally, the average value of frequency values for the bits is returned.

When storage mode is On, the average value of multiple packets is returned. If Hold Result is set to $\Delta f1$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f1 Avg (Max) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern of “11110000” or “00001111”, and returns the average value of the average differential frequency.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency values for the second, third, sixth, and seventh bit and the average frequency value. Finally, the average value of frequency values for the bits is returned.

When storage mode is On, the maximum value of multiple packets is returned.

If Hold Result is set to $\Delta f1$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f1 Avg (Min) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern of “11110000” or “00001111”, and returns the average value of the average differential frequency.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency values for the second, third, sixth, and seventh bit and the average frequency value. Finally, the average value of frequency values for the bits is returned.

When storage mode is On, the minimum value of multiple packets is returned.

If Hold Result is set to $\Delta f1$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f2 Avg (Average) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern of “10101010” or “01010101”, and returns the average value of the average differential frequency.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency value for each bit and the average frequency value. Finally, the average value of differential frequency values for the bits is returned.

When storage mode is On, the average value of multiple packets is returned.

If Hold Result is set to $\Delta f2$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f1 Max (Max) (Hz)**■ Summary**

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern, “11110000” or “00001111”, and returns the measurement result.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency values for the second, third, sixth, and seventh bit and the average frequency value. Finally, the maximum value of frequency values for the bits is returned.

When storage mode is On, the maximum value of multiple packets is returned.

If Hold Result is set to $\Delta f1$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f1 Max (Min) (Hz)**■ Summary**

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern, “11110000” or “00001111”, and returns the measurement result.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency values for the second, third, sixth, and seventh bit and the average frequency value. Finally, the maximum value of frequency values for the bits is returned.

When storage mode is On, the minimum value of multiple packets is returned.

If Hold Result is set to $\Delta f1$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f2 Max (Max) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern, “10101010” or “01010101”, and returns the measurement result.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency value for each bit and the average frequency value. Finally, the maximum value of differential frequency values for the bits is returned.

When storage mode is On, the maximum value of multiple packets is returned.

If Hold Result is set to $\Delta f2$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f2 Max (Min) (Hz)

■ Summary

Performs measurement only when the payload data for the measurement target signal is a repeated bit pattern, “10101010” or “01010101”, and returns the measurement result.

Details of Measurement: First, the average frequency values for eight bits are calculated. Then the differential frequency value for each bit is calculated from frequency value for each bit and the average frequency value. Finally, the maximum value of differential frequency values for the bits is returned.

When storage mode is On, the minimum value of multiple packets is returned.

If Hold Result is set to $\Delta f2$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f2 Max > Lower Limit (%)

■ Summary

Returns the percentage of Delta f2 Max results that exceeds Delta f2 Max Lower Limit. If Hold Result is set to $\Delta f2$, the measured value is not updated, and the previously measured value is retained. The value is retained even if the previous measurement result is an invalid value.

Delta f2 Avg/Delta f1 Avg**■ Summary**

Returns the calculation result of Delta f2 Ave (Average) divided by Delta f1 Ave (Average). A valid value is returned only when the Hold Result function is used to obtain both Delta f2 Ave (Average) and Delta f1 Ave (Average) at the same time.

Pass/Fail flag of Delta f1 Avg (Average)**■ Summary**

Returns the result of Pass/Fail judgment of Delta f1 Avg (Average) performed for the limit values specified by Delta f1 Average Upper Limit and Delta f1 Average Lower Limit.

Pass/Fail flag of Delta f1 Avg (Max/Min)**■ Summary**

Returns the result of Pass/Fail judgment of Delta f1 Avg (Max) and Delta f1 Avg (Min) performed for the limit values specified by Delta f1 Average Upper Limit and Delta f1 Average Lower Limit. Fail is returned when either Delta f1 Avg (Max) or Delta f1 Avg (Min) is judged as Fail.

Pass/Fail flag of Delta f2 Max > Lower Limit**■ Summary**

Returns Fail when Delta f2 Max > Lower Limit (%) falls below 99.9 %.

Pass/Fail flag of Delta f2 Avg/Delta f1 Avg**■ Summary**

Returns the result of Pass/Fail judgment of Delta f2 Avg/Delta f1 Avg performed for the limit values specified by Delta f2 Average/Delta f1 Average Lower Limit.

Count of Delta f1 Measurements

■ Summary

Returns the number of packets measured in $\Delta f1$ measurement.

Count of Delta f2 Measurements

■ Summary

Returns the number of packets measured in $\Delta f2$ measurement.

3.7.3 ICFT measurement result

Displays ICFT (Initial Center Frequency Tolerance) measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.3-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if `n` of each command is specified as 1 or 4, or omitted.

Table 3.7.3-1 Response for Modulation Characteristics Result Query

No. n=1, omitted	No. n=4	Response
24	1	ICFT (Average) (Hz)
25	2	ICFT (Max) (Hz)
26	3	Pass/Fail flag of ICFT (Average)
27	4	Pass/Fail flag of ICFT (Max)
28	5	Count of ICFT Measurements

ICFT (Average) (Hz)

■ Summary

Returns the ICFT measured value. When storage mode is On, the average value of multiple packets is returned.

ICFT (Max) (Hz)

■ Summary

Returns the ICFT measured value. When storage mode is On, the maximum value of multiple packets is returned.

Pass/Fail flag of ICFT (Average)

■ Summary

Returns the result of Pass/Fail judgment of ICFT (Average) performed for the limit value specified by ICFT Upper Limit.

Pass/Fail flag of ICFT (Max)

■ Summary

Returns the result of Pass/Fail judgment of ICFT (Max) performed for the limit value specified by ICFT Upper Limit.

Count of ICFT Measurements

■ Summary

Returns the number of packets measured in ICFT measurement.

3.7.4 Carrier Frequency Drift measurement result

Displays Carrier Frequency Drift measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.4-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if n of each command is specified as 1 or 5, or omitted.

Performs measurement only when Standard is set to BR or BLE and the payload data for the measurement target signal is a repeated bit pattern of “10101010” or “01010101”.

Table 3.7.4-1 Response for Carrier Frequency Drift Result Query

No. n=1, omitted	No. n=5	Response
29	1	Frequency Drift (Average) (Hz)
30	2	Frequency Drift (Max) (Hz)
31	3	Max Drift Rate (Hz)
32	4	Pass/Fail flag of Frequency Drift (Average)
33	5	Pass/Fail flag of Frequency Drift (Max)
34	6	Pass/Fail flag of Max Drift Rate
35	7	Count of Frequency Drift Measurements

Frequency Drift (Average) (Hz)

■ Summary

Measures the differential frequency per 10 bits of payload field against the average frequency measured from 4 bits of preamble, and returns the average of the differential frequency values. The measurement is performed per packet, but when storage mode is On, the average value of multiple packets is returned.

Frequency Drift (Max) (Hz)

■ Summary

Measures the differential frequency per 10 bits of payload field against the average frequency measured from 4 bits of preamble, and returns the average of the differential frequency values. The measurement is performed per packet, but when storage mode is On, the maximum value of multiple packets is returned.

Max Drift Rate (Hz)

■ Summary

In the payload field, average frequency values are calculated for two arbitrary 10-bit groups that are 50 μ s apart from each other, and the maximum difference of the average frequency values of the two groups is returned.

Pass/Fail flag of Frequency Drift (Average)

■ Summary

Returns the result of Pass/Fail judgment of Frequency Drift (Average) performed for the limit value specified by Drift Upper Limit.

Pass/Fail flag of Frequency Drift (Max)

■ Summary

Returns the result of Pass/Fail judgment of Frequency Drift (Max) performed for the limit value specified by Drift Upper Limit.

Pass/Fail flag of Max Drift Rate

■ Summary

Returns the result of Pass/Fail judgment of Max drift Rate performed for the limit value specified by Max Drift Rate Limit.

Count of Frequency Drift Measurements

■ Summary

Returns the number of packets measured in Carrier Frequency Drift measurement.

3.7.5 EDR Carrier Freq Stability and Mod Accuracy measurement result

Displays EDR Carrier Freq Stability and Mod Accuracy measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.5-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if `n` of each command is specified as 1 or 6, or omitted.

Measurement is only made when Standard is set to EDR.

Table 3.7.5-1 Response for EDR Carrier Freq Stability and Mod Accuracy Measurement Result Query

No. n=1, omitted	No. n=6	Response
36	1	Freq Error i (Average) (Hz)
37	2	Freq Error i (Max) (Hz)
38	3	Freq Error 0 (Average) (Hz)
39	4	Freq Error 0 (Max) (Hz)
40	5	Freq Error i+0 (Average) (Hz)
41	6	Freq Error i+0 (Max) (Hz)
42	7	RMS DEVM (Average) (%)
43	8	RMS DEVM (Max) (%)
44	9	Peak DEVM (Max) (%)
45	10	99% DEVM for EDR modulation (%)
46	11	Pass/Fail flag of Freq Error i (Average)
47	12	Pass/Fail flag of Freq Error i (Max)
48	13	Pass/Fail flag of Freq Error 0 (Average)
49	14	Pass/Fail flag of Freq Error 0 (Max)
50	15	Pass/Fail flag of Freq Error i+0 (Average)
51	16	Pass/Fail flag of Freq Error i+0 (Max)
52	17	Pass/Fail flag of RMS DEVM (Average)
53	18	Pass/Fail flag of RMS DEVM (Max)
54	19	Pass/Fail flag of Peak DEVM (Max)
55	20	Pass/Fail flag of 99% DEVM for EDR modulation
56	21	Count of DEVM Measurement Blocks

Freq Error i (Average) (Hz)

■ Summary

Returns the Initial Frequency Error value measured from the GFSK part of the packet. When storage mode is On, the average value of multiple packets is returned.

Freq Error i (Max) (Hz)

■ Summary

Returns the Initial Frequency Error value measured from the GFSK part of the packet. When storage mode is On, the maximum value of multiple packets is returned.

Freq Error 0 (Average) (Hz)

■ Summary

Divides the part of the packet between Synchronization Symbol and Payload CRC Symbol into 50 μ s blocks, and returns the average value of the frequency error values calculated from the blocks. When storage mode is On, the average value of multiple packets is returned.

Freq Error 0 (Max) (Hz)

■ Summary

Divides the part of the packet between Synchronization Symbol and Payload CRC Symbol into 50 μ s blocks, and returns the average value of the frequency error values calculated from the blocks. When storage mode is On, the maximum value of multiple packets is returned.

Freq Error i+0 (Average) (Hz)

■ Summary

Returns the average value for the sums of Freq Error i and Freq Error 0 calculated for every 50 μ s blocks. When storage mode is On, the average value of multiple packets is returned.

Freq Error i+0 (Max) (Hz)

■ Summary

Returns the average value for the sums of Freq Error i and Freq Error 0 calculated for every 50 μ s blocks. When storage mode is On, the maximum value of multiple packets is returned.

RMS DEVM (Average) (%)**■ Summary**

Divides the part of the packet between Synchronization Symbol and Payload CRC Symbol into 50 μ s blocks, and returns the root mean square value of DEVMS calculated from the blocks. When storage mode is On, the average value of multiple packets is returned.

RMS DEVM (Max) (%)**■ Summary**

Divides the part of the packet between Synchronization Symbol and Payload CRC Symbol into 50 μ s blocks, and returns the root mean square value of DEVMS calculated from the blocks. When storage mode is On, the maximum value of multiple packets is returned.

Peak DEVM (Max) (%)**■ Summary**

Divides the part of the packet between Synchronization Symbol and Payload CRC Symbol into 50 μ s blocks, and returns the maximum value of DEVMS calculated from the blocks. When storage mode is On, the maximum value of multiple packets is returned.

99% DEVM for EDR modulation (%)**■ Summary**

Returns the DEVM value that 99 % or more of the symbols measured between Synchronization Symbol and Payload CRC Symbol of the packets falls below. When storage mode is On, the measurement result for the symbols contained in all measured packets is returned.

Pass/Fail flag of Freq Error i (Average)**■ Summary**

Returns the result of Pass/Fail judgment of Freq Error i (Average) performed for the limit value specified by Initial Frequency Error Upper Limit.

Pass/Fail flag of Freq Error i (Max)**■ Summary**

Returns the result of Pass/Fail judgment of Freq Error i (Max) performed for the limit value specified by Initial Frequency Error Upper Limit.

Pass/Fail flag of Freq Error 0 (Average)**■ Summary**

Returns the result of Pass/Fail judgment of Freq Error 0 (Average) performed for the limit value specified by Block Frequency Error Upper Limit.

Pass/Fail flag of Freq Error 0 (Max)

■ Summary

Returns the result of Pass/Fail judgment of Freq Error 0 (Max) performed for the limit value specified by Block Frequency Error Upper Limit.

Pass/Fail flag of Freq Error i+0 (Average)

■ Summary

Returns the result of Pass/Fail judgment of Freq Error 0+i (Average) performed for the limit value specified by Total Frequency Error Upper Limit.

Pass/Fail flag of Freq Error i+0 (Max)

■ Summary

Returns the result of Pass/Fail judgment of Freq Error 0+i (Max) performed for the limit value specified by Total Frequency Error Upper Limit.

Pass/Fail flag of RMS DEVM (Average)

■ Summary

When the measurement target signal is DQPSK, returns the result of Pass/Fail judgment of RMS DEVM (Average) performed for the limit value specified by RMS DEVM DQPSK Upper Limit.
When the measurement target signal is 8DPSK, returns the result of Pass/Fail judgment of RMS DEVM (Average) performed for the limit value specified by RMS DEVM 8DPSK Upper Limit.

Pass/Fail flag of RMS DEVM (Max)

■ Summary

When the measurement target signal is DQPSK, returns the result of Pass/Fail judgment of RMS DEVM (Max) performed for the limit value specified by RMS DEVM DQPSK Upper Limit.
When the measurement target signal is 8DPSK, returns the result of Pass/Fail judgment of RMS DEVM (Max) performed for the limit value specified by RMS DEVM 8DPSK Upper Limit.

Pass/Fail flag of Peak DEVM (Max)

■ Summary

When the measurement target signal is DQPSK, returns the result of Pass/Fail judgment of Peak DEVM (Max) performed for the limit value specified by Peak DEVM DQPSK Upper Limit.

When the measurement target signal is 8DPSK, returns the result of Pass/Fail judgment of Peak DEVM (Max) performed for the limit value specified by Peak DEVM 8DPSK Upper Limit.

Pass/Fail flag of 99% DEVM for EDR modulation

■ Summary

When the measurement target signal is DQPSK, returns the result of Pass/Fail judgment of 99% DEVM for EDR modulation performed for the limit value specified by 99% DEVM DQPSK Upper Limit.

When the measurement target signal is 8DPSK, returns the result of Pass/Fail judgment of 99% DEVM for EDR modulation performed for the limit value specified by 99% DEVM 8DPSK Upper Limit.

Count of DEVM Measurement Blocks

■ Summary

Returns the number of packets measured in EDR Carrier Freq Stability and Mod Accuracy.

3.7.6 EDR Relative Transmit Power measurement result

Displays EDR Relative Transmit Power measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average, minimum and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.6-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if n of each command is specified as 1 or 7, or omitted.

Measurement is only made when Standard is set to EDR.

Table 3.7.6-1 Response for EDR Relative Transmit Power Measurement Result Query

No. n=1, omitted	No. n=7	Response
57	1	GFSK Avg Power (Average) (dBm)
58	2	GFSK Avg Power (Max) (dBm)
59	3	GFSK Avg Power (Min) (dBm)
60	4	DPSK Avg Power (Average) (dBm)
61	5	DPSK Avg Power (Max) (dBm)
62	6	DPSK Avg Power (Min) (dBm)
63	7	Relative Power (DPSK Avg Power – GFSK Avg Power) (Average) (dB)
64	8	Relative Power (DPSK Avg Power – GFSK Avg Power) (Max) (dB)
65	9	Relative Power (DPSK Avg Power – GFSK Avg Power) (Min) (dB)
66	10	Pass/Fail flag of Relative Power (Max/Min)
67	11	Count of EDR Relative Transmit Power Measurement

GFSK Avg Power (Average) (dBm)**■ Summary**

Returns the average value of the average power for the GFSK part of the packet. When storage mode is On, the average value of multiple packets is returned.

GFSK Avg Power (Max) (dBm)**■ Summary**

Returns the maximum value of the average power for the GFSK part of the packet. When storage mode is On, the maximum value of multiple packets is returned.

GFSK Avg Power (Min) (dBm)**■ Summary**

Returns the minimum value of the average power for the GFSK part of the packet. When storage mode is On, the maximum value of multiple packets is returned.

DPSK Avg Power (Average) (dBm)**■ Summary**

When the measurement target signal is DPSK, returns the average value of the average power for the DPSK part.

DPSK Avg Power (Max) (dBm)**■ Summary**

When the measurement target signal is DPSK, returns the maximum value of the average power for the DPSK part.

DPSK Avg Power (Min) (dBm)**■ Summary**

When the measurement target signal is DPSK, returns the minimum value of the average power for the DPSK part.

Relative Power (DPSK Avg Power – GFSK Avg Power) (Average) (dB)**■ Summary**

Returns the average difference between DPSK Avg Power and GFSK Avg Power. When storage mode is On, the average value of multiple packets is returned.

Relative Power (DPSK Avg Power – GFSK Avg Power) (Max) (dB)

■ Summary

Returns the maximum difference between DPSK Avg Power and GFSK Avg Power. When storage mode is On, the maximum value of multiple packets is returned.

Relative Power (DPSK Avg Power – GFSK Avg Power) (Min) (dB)

■ Summary

Returns the minimum difference between DPSK Avg Power and GFSK Avg Power. When storage mode is On, the maximum value of multiple packets is returned.

Pass/Fail flag of Relative Power (Max/Min)

■ Summary

Returns the result of Pass/Fail judgment of Relative Power (DPSK Avg Power – GFSK Avg Power) (Max) and Relative Power (DPSK Avg Power – GFSK Avg Power) (Min) performed for the limit values specified by EDR Relative Transmit Power Upper Limit and EDR Relative Transmit Power Lower Limit.

Count of EDR Relative Transmit Power Measurement

■ Summary

Returns the number of packets measured in EDR Relative Transmit Power measurement.

3.7.7 EDR Differential Phase Encoding measurement result

Displays EDR Differential Phase Encoding measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and the average and maximum of the analysis results are displayed if the mode is enabled (On).

Table 3.7.7-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if `n` of each command is specified as 1 or 8, or omitted.

Measurement is only made when Standard is set to EDR.

Table 3.7.7-1 Response for EDR Differential Phase Encoding Result Query

No. n=1, omitted	No. n=8	Response
68	1	BER (%)
69	2	Bit Errors
70	3	PER (%)
71	4	Pass/Fail flag of PER
72	5	Count of PER Measurement

BER (%)

■ Summary

Returns Bit Error Rate. When storage mode is On, Bit Error Rate is calculated from all the target packets.

Bit Errors

■ Summary

Returns the number of bits resulted in an error. When storage mode is On, the total value of the bits that resulted in an error is calculated from all the target packets.

PER (%)

■ Summary

Returns Packet Error Rate.

Pass/Fail flag of PER

■ Summary

Returns the result of Pass/Fail judgment of PER performed for the limit value specified by PER Limit.

Count of PER Measurement

■ Summary

Returns the number of packets measured in EDR Differential Phase Encoding measurement.

3.7.8 Demodulation data measurement result

Displays demodulation data measurement result. The result of each analysis is displayed if the storage mode is disabled (Off), and last measured packet analysis results are displayed if the mode is enabled (On). Table 3.7.8-1 lists the responses that are returned when the query command `:FETCh:BT[n]?`, `:READ:BT[n]?`, or `:MEASure:BT[n]?` is issued if n of each command is specified as 1 or 9, or omitted.

Table 3.7.8-1 Response for Demodulation Data Result Query

No. n=1, omitted	No. n=9	Response
73	1	Packet Type
74	2	Payload Length (bytes)
75	3	Payload

Packet Type

■ Summary

Returns Packet Type obtained from the measurement result. When storage mode is On, the Packet Type for the last measured packet is returned.

Payload Length (bytes)

■ Summary

Returns Payload Length obtained from the measurement result. When storage mode is On, the Payload Length for the last measured packet is returned.

Payload

■ Summary

Returns Payload obtained from the measurement result. When storage mode is On, the Payload Length for the last measured packet is returned.

Chapter 4 Performance Test

This chapter describes the measurement devices, setup methods, and performance test procedures required for performing performance tests as preventive maintenance of the MS2830A.

4.1	Overview of Performance Test	4-2
4.1.1	Performance test	4-2
4.2	Performance Test Items	4-3
4.2.1	Testing methods	4-3

4.1 Overview of Performance Test

4.1.1 Performance test

Performance tests are performed as part of preventive maintenance in order to prevent degradation of the performance of the MS2830A.

Use performance tests when required for acceptance inspection, routine inspection and performance verification after repairs. Use performance tests when necessary for acceptance inspection, routine inspection and performance verification after repairs. Also perform the following performance tests for acceptance inspection, routine inspection and performance verification after repairs.

- Transmission power

Perform items deemed critical at regular intervals as preventive maintenance. A cycle for routine tests of once or twice a year is recommended.

If items that do not meet the required level are detected during performance testing, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

4.2 Performance Test Items

Warm up the device to be tested and the measuring instruments for at least 30 minutes except if specified otherwise, in order to stabilize them sufficiently before running performance tests. Maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures and with little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity and other problems.

4.2.1 Testing methods

- (1) Test target standards
 - Transmission power
- (2) Measuring instrument for tests
 - Vector signal generator
 - Power meter Unnecessary if signal source has sufficient transmitter power accuracy
- (3) Setups

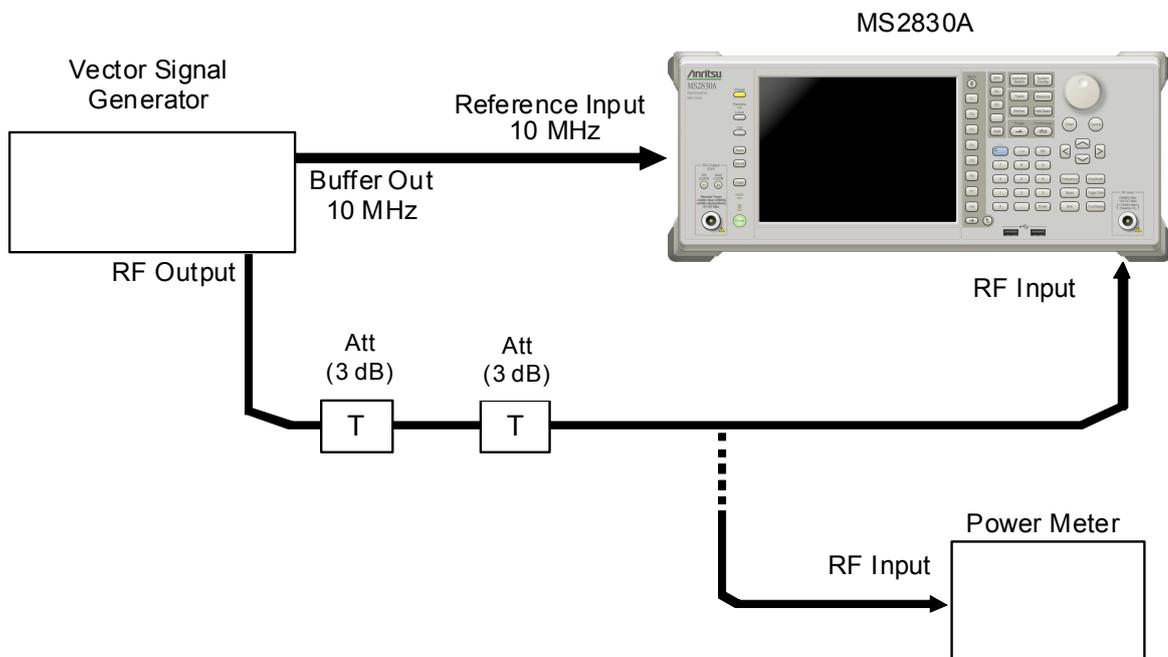


Figure 4.2.1-1 Performance Test

(4) Test Procedure

(a) Signal source adjustment

1. Input the 10 MHz reference signal output from the signal generator to the Reference Input connector.
2. Output a Bluetooth modulation signal from the vector signal generator.
3. Input the vector signal generator output signal into the power meter and measure the power. (Calibration value)

(b) Settings of the main unit

1. Turn on the power switch on the front panel and then wait until the internal temperature stabilizes (approx. 1.5 hours after the temperature in the thermostatic bath stabilizes).
2. Press , then press the menu function key displaying the character string **Wireless Network Device Test**.
3. Press .
4. Press  (Preset) to initialize.
5. Press .
6. Press  (SIGANA All) to perform calibration.
7. Press  (Close).
8. Specify the frequency output from the vector signal generator by using the `[:SENSe] :FREQuency:CENTer <freq>` command.
9. Specify the measurement result displayed on the power meter by using the `[:SENSe] :POWer [:RF] :RANGe:ILEVel <real>` command.
10. Set the Bluetooth standard by using the `[:SENSe] :BT:RADio:STANdard <mode>` command, select Bluetooth Batch measurement function by the `:CONFIgure:BT` command. Enable the Output Power measurement by the `[:SENSe] :BT:TXPower [:STATe] ON` command, and set Average to On by the `[:SENSe] :BT:TXPower:AVERage [:STATe] ON` command.
11. Specify the measurement count by using the `[:SENSe] :BT:TXPower:AVERage:COUNt <integer>` command.
12. Start measurement by sending the `:MEASure:BT [n] ?` command.
13. Confirm that the Output Power value is within the specifications.

(5) Test results

Table 4.2.1-1 Output Power (Bluetooth: Basic Rate)

Freq. [Hz]	Calibration value [dBm]	Measured value [dBm]	Min. specification value [dB]	Result	Max. specification value [dB]
				Measured value – Calibration value [dB]	
2402 M			-0.6		+0.6
2480 M			-0.6		+0.6

Table 4.2.1-2 Output Power (Bluetooth: Enhanced Data Rate)

Freq. [Hz]	Calibration value [dBm]	Measured value [dBm]	Min. specification value [dB]	Result	Max. specification value [dB]
				Measured value – Calibration value [dB]	
2402 M			-0.6		+0.6
2480 M			-0.6		+0.6

Table 4.2.1-3 Output Power (Bluetooth: Bluetooth Low Energy)

Freq. [Hz]	Calibration value [dBm]	Measured value [dBm]	Min. specification value [dB]	Result	Max. specification value [dB]
				Measured value – Calibration value [dB]	
2402 M			-0.6		+0.6
2480 M			-0.6		+0.6

Appendix A Error Messages

Table A-1 Error Messages

Message	Description
Out of range.	—
Not available if not Vector Signal Generator option	Operation is invalid without Vector Signal Generator option.
Cannot find device.	The specified device could not be found.
No file to read.	—
File read error.	—
File format error.	—
Write error.	—

Appendix B Default Value List

Frequency		
Carrier Frequency		2.402 GHz
Channel Number		0
Amplitude		
Input Level		-10.00 dBm
Offset		Off
Offset Value		0.00 dB
System Setting		
Standard		BR
Power Class		PC2
Packet Type		AUTO
Burst Interval		3000 μ s
Access Address		0x00000000
Burst Threshold		30 dB
Common Setting		
Continuous Measurement		Off
Trigger Switch		Off
Trigger Source		Wideband IF
detection		
Trigger Slope		Positive
Trigger Delay		0s
Wide IF Trigger Level		-20 dBm
Measure (Modulation Analysis)		
Modulation Characteristics		On
Storage Mode		Off
Storage Count		10
Hold Result		Off
Delta f1 Average Upper Limit		175 kHz
Delta f1 Average Lower Limit		145 kHz
Delta f2 Max Lower Limit		115 kHz
Delta f2 Average / Delta f1 Average Lower Limit		0.8
Output Power		
Transmit Power Measurement		Off
Storage Mode		Off
Storage Count		10
Average Power Upper Limit		PC1: 20.0 dBm PC2: 4.0 dBm PC3: 0.0 dBm

Appendix B Default Value List

Average Power Lower Limit	PC1: 20.0 dBm PC2: 4.0 dBm PC3: 0.0 dBm
Peak Power Upper Limit	- 6 dBm
ICFT	
Occupied Bandwidth Measurement	Off
Storage Mode	Average
Storage Count	10
ICFT Limit	75.0 kHz
Carrier Frequency Drift	
Carrier Frequency Drift	Off
Storage Mode	Off
Storage Count	10
Frequency Drift Upper Limit	25.0 kHz
Max Drift Rate Limit	20.0 kHz
EDR Relative Transmit Power	
EDR Relative Transmit Power	Off
Storage Mode	Off
Storage Count	10
EDR Relative Transmit Power Upper Limit	1.0 dB
EDR Relative Transmit Power Lower Limit	-4.0 dB
EDR Carrier Freq Stability and Mod Accuracy	
EDR Carrier Freq Stability and Mod Accuracy	Off
Storage Mode	Off
Storage Count	10
Total Frequency Error Limit	75.0 kHz
Block Frequency Error Limit	10.0 kHz
Initial Frequency Error Limit	75.0 kHz
RMS DEVM DQPSK Limit	20.0 %
RMS DEVM 8DPSK Limit	13.0 %
Peak DEVM DQPSK Limit	35.0 %
Peak DEVM 8DPSK Limit	25.0 %
99% DEVM DQPSK Limit	30.0 %
99% DEVM 8DPSK Limit	20.0 %
EDR Differential Phase Encoding	
EDR Differential Phase Encoding	Off
Storage Mode	Off
Storage Count	100
PER Limit	1.0 %

Accessory	
Title	On,
“Wireless Network Device”	

Appendix C List of Measurement Functions

This appendix provides information about the measurement items supported in MX283027A-002.

In MX283027A-002, the measurement items defined in BLUETOOTH TEST SPECIFICATION correspond to the following measurement functions.

Table C-1 IEEE 802.15.1

Measurement Item Code	Test Item	Measurement Function	Remarks
TRM/CA/01/C	Output Power	Output Power	
TRM/CA/07/C	Modulation Characteristics	Modulation Characteristics	
TRM/CA/08/C	Initial Carrier Frequency Tolerance	ICFT	
TRM/CA/09/C	Carrier Frequency Drift	Carrier Frequency Drift	
TRM/CA/10/C	EDR Relative Transmit Power	EDR Relative Transmit Power	
TRM/CA/11/C	EDR Carrier Frequency Stability and Modulation Accuracy	EDR Carrier Frequency Stability and Modulation Accuracy	
TRM/CA/12/C	EDR Differential Phase Encoding	EDR Differential Phase Encoding	
TRM-LE/CA/01/C	Output power at NOC	Output Power	
TRM-LE/CA/02/C	Output power at EOC	Output Power	
TRM-LE/CA/05/C	Modulation Characteristics	Modulation Characteristics	
TRM-LE/CA/06/C	Carrier frequency offset and drift at NOC	ICFT / Carrier Frequency Drift	
TRM-LE/CA/07/C	Carrier frequency offset and drift at EOC	ICFT / Carrier Frequency Drift	

References are to page numbers.

9

- 99% DEVM 8DPSK Limit..... 3-25
- 99% DEVM DQPSK Upper Limit 3-25
- 99% DEVM for EDR modulation..... 3-49

A

- AC inlet..... 2-8
- Access Address..... 3-10
- Anritsu Corporation Contact..... iii
- Anritsu Warranty iii
- Applicable parts..... 1-3
- Application key..... 2-6
- Application Switch 2-12
- AUX connector..... 2-8
- Average Power Lower Limit 3-12
- Average Power Upper Limit 3-12

B

- Back key..... 2-3
- BER 3-55
- Bit Errors..... 3-55
- Block Frequency Error Limit 3-23
- Buffer Out connector..... 2-7
- Burst Interval..... 3-9
- Burst Threshold 3-10

C

- Cal key 2-3
- Cancel key..... 2-5
- Carrier Frequency..... 3-4
- Carrier Frequency Drift..... 3-19
- Carrier Frequency Drift Upper Limit..... 3-20
- Channel Number..... 3-4
- Configure 3-32
- Continuous measurement..... 3-3
- Copy key..... 2-2
- Count of Delta f1 Measurements 3-42
- Count of Delta f2 Measurements 3-42
- Count of DEVM Measurement Blocks 3-51
- Count of EDR Relative Transmit Power
Measurement 3-54
- Count of Frequency Drift Measurements 3-46

- Count of ICFT Measurements 3-43
- Count of Output Power Measurements 3-35
- Count of PER Measurement 3-55
- Cursor keys 2-5

D

- Delta f1 Average Lower Limit..... 3-16
- Delta f1 Average Upper Limit..... 3-15
- Delta f1 Avg..... 3-37
- Delta f1 Max 3-39
- Delta f2 Average / Delta f1 Average Lower Limit
..... 3-16
- Delta f2 Avg..... 3-38
- Delta f2 Avg/Delta f1 Avg 3-41
- Delta f2 Max 3-40
- Delta f2 Max > Lower Limit 3-40
- Delta f2 Max Lower Limit..... 3-16
- DPSK Avg Power 3-53

E

- EDR Carrier Freq Stability and Mod Accuracy
..... 3-21
- EDR Differential Phase Encoding..... 3-28
- EDR Relative Transmit Power 3-26
- EDR Relative Transmit Power Lower Limit 3-27
- EDR Relative Transmit Power Upper Limit 3-27
- Enter key/..... 2-5
- Equipment Certificate..... iii
- Error Messages..... A-1
- Ethernet 2-3
- Ethernet connector 2-8

F

- Freq Error 0 3-48
- Freq Error i..... 3-48
- Freq Error i+0..... 3-48
- Frequency Drift 3-45
- Front panel 2-2
- Function keys..... 2-3
- Function menu..... 3-2

G

- GFSK Avg Power 3-53

Index

GFSK Power Avg 3-34
GFSK Power Peak 3-34
GPIB 2-3
GPIB connector 2-8

H

Hard disk access lamp 2-2
HDD slot 2-9
Hold Result 3-15

I

ICFT 3-17, 3-43
ICFT Limit 3-18
Initial Frequency Error Limit 3-23
Input Level 3-6

L

Level Offset State 3-6
Level Offset Value 3-7
Load Application Select 2-12
Local key 2-3

M

Main function keys 2-4
Max Drift Rate 3-45
Max Drift Rate Limit 3-20
Measurement parameter 3-2
Modulation Characteristics 3-13
Modulation control key 2-6
Monitor Out connector 2-8

N

Next key 2-3
Notes On Export Management iv
Numeric keypad 2-5

O

Output Power 3-11

P

Packet Type 3-9, 3-56
Pass/Fail flag of 99% DEVM for EDR
 modulation 3-51
Pass/Fail flag of Delta f1 Avg 3-41
Pass/Fail flag of Delta f2 Avg/Delta f1 Avg .. 3-41

Pass/Fail flag of Delta f2 Max > Lower Limit
 3-41
Pass/Fail flag of Freq Error 0 3-50
Pass/Fail flag of Freq Error i 3-49
Pass/Fail flag of Freq Error i+0 3-50
Pass/Fail flag of Frequency Drift 3-45
Pass/Fail flag of GFSK Power Avg 3-35
Pass/Fail flag of GFSK Power Peak 3-35
Pass/Fail flag of ICFT 3-43
Pass/Fail flag of Max Drift Rate 3-45
Pass/Fail flag of Peak DEVM 3-51
Pass/Fail flag of PER 3-55
Pass/Fail flag of Relative Power (Max/Min) 3-54
Pass/Fail flag of RMS DEVM 3-50
Payload 3-56
Payload Length 3-56
Peak DEVM 3-49
Peak DEVM 8DPSK Limit 3-25
Peak DEVM DQPSK Upper Limit 3-24
Peak Power Upper Limit 3-12
PER 3-55
PER Limit 3-29
Performance test 4-2
Power Class 3-8
Power switch 2-2
Preset key 2-3
Product Composition 1-3

R

Rear panel 2-7
Recall key 2-2
Ref Input connector 2-7
reference frequency signal 2-7
Relative Power 3-53
Remote lamp 2-3
Result window 3-2
RF Input connector 2-5
RF Output connector 2-6
RF Output Control key 2-5
RMS DEVM 3-49
RMS DEVM 8DPSK Limit 3-24
RMS DEVM DQPSK Limit 3-24
Rotary knob 2-5

S

SA Trigger Input connector.....	2-9
Save key.....	2-3
SG Trigger Input connector.....	2-9
Shift key.....	2-5
Single measurement.....	3-3
Software End-User License Agreement (EULA)	v
Specifications.....	1-4
Standard.....	3-8
Status message.....	3-2
Storage Count.. 3-12, 3-14, 3-18, 3-20, 3-22, 3-27, 3-29, 3-32, 3-33	
Storage Mode.. 3-11, 3-14, 3-17, 3-19, 3-22, 3-26, 3-28, 3-32	
Sweep Status Out connector.....	2-7

T

Top key.....	2-3
Total Frequency Error Limit.....	3-23
Trigger Delay.....	3-31
Trigger Slope.....	3-31
Trigger Source.....	3-30
Trigger Switch.....	3-30

U

USB connector	
type A.....	2-6, 2-8
type B.....	2-8

W

Wide IF Trigger Level.....	3-31
----------------------------	------

