ADVANTEST CORPORATION

R3681 Series
Performance Test Guide

MANUAL NUMBER FOE-8440094E00

Applicable Models
R3681
R3671

First printing April 25, 2003
Printed in Japan

TABLE OF CONTENTS

1.	INTRODUCTION	1-1
1.1	About this Manual	1-1
1.2	Required Instruments	1-1
1.3	Calibration Period	1-2
1.4	Performance Verification Record Sheets	1-2
1.5	Conventions of Notation Used in This Document	1-3
1.6	Trademarks and Registered Trademarks	1-4
1.7	Other Manuals Pertaining to This Instrument	1-4
2.	PERFORMANCE VERIFICATION	2-1
2.1	Overview	2-1
2.1.1	Before Starting	2-1
2.1.2	Required Instruments	2-2
2.2	Performance Verification Procedure	2-5
2.2.1	Frequency Reference Stability	2-5
2.2.2	Calibration Signal Output Accuracy	2-8
2.2.3	Marker Frequency Counter Accuracy	2-9
2.2.4	Frequency Reading Accuracy	2-12
2.2.5	Residual FM	2-15
2.2.6	Frequency Span Accuracy	2-19
2.2.7	Signal Purity	2-22
2.2.8	Resolution Bandwidth Accuracy and Selectivity	2-25
2.2.9	Sweep Time Accuracy	2-29
2.2.10	Frequency Response	2-32
2.2.11	Input Attenuator Switching Error	2-39
2.2.12	Resolution Bandwidth Switching Uncertainity	2-43
2.2.13	Displayed Average Noise Level	2-46
2.2.14	1 dB Gain Compression	2-51
2.2.15	2nd Order Harmonic Distortion	2-57
2.2.16	Third Order Intermodulation Distortion	2-62
2.2.17	Image, Multiple, and Out-Of Band Responses	2-68
2.2.18	Residual Response	2-72
2.2.19	Coupling Level Accuracy	2-77
2.2.20	CCDF Dynamic Range	2-80
2.3	Performance Verification Record Sheets	2-84
2.3.1	Frequency Reference Stability	2-84
2.3.2	Calibration Signal Amplitude Accuracy	2-84
2.3.3	Marker Frequency Counter Accuracy	2-84
2.3.4	Frequency Reading Accuracy	2-85
2.3.5	Residual FM	2-85
2.3.6	Frequency Span Accuracy	2-86
2.3.7	Signal Purity	2-86
2.3.8	Resolution Bandwidth	2-87
2.3.9	Sweep Time Accuracy	2-89
2.3.10	Frequency Response	2-89
2.3.11	Input Attenuator Switching Error	2-97

2.3.12 Resolution Bandwidth Switching Uncertainity 2-100
2.3.13 Displayed Average Noise Level 2-101
2.3.14 1 dB Gain Compression 2-101
2.3.15 2nd Order Harmonic Distortion 2-102
2.3.16 Third Order Intermodulation Distortion 2-102
2.3.17 Image, Multiple, and Out-Of Band Responses 2-103
2.3.18 Residual Response 2-104
2.3.19 Coupling Level Accuracy 2-104
2.3.20 CCDF Dynamic Range 2-104

3. SPECIFICATIONS 3-1

3.1 R3681 Performance Specifications 3-2
3.1.1 Frequencies 3-2
3.1.2 Sweep 3-4
3.1.3 Amplitude 3-4
3.1.4 Amplitude Accuracy 3-5
3.1.5 Dynamic Range 3-7
3.1.6 Input and Output 3-9
3.1.7 General Specifications 3-10
3.2 R3671 Performance Specifications 3-11
3.2.1 Frequencies 3-11
3.2.2 Sweep 3-13
3.2.3 Amplitude 3-13
3.2.4 Amplitude Accuracy 3-14
3.2.5 Dynamic Range 3-16
3.2.6 Input and Output 3-18
3.2.7 General Specifications 3-19
3.3 Option 3-20
3.4 External Dimension Diagram 3-21

LIST OF ILLUSTRATIONS

No.	Title	Page
2-1	Frequency Stability Test Connection Diagram	2-6
2-2	Calibration Signal Output Accuracy Test Diagram	2-8
2-3	Marker Frequency Counter Accuracy Test	2-10
2-4	Frequency Reading Accuracy Test	2-12
2-5	Residual FM Test	2-16
2-6	Frequency Span Accuracy Test	2-19
2-7	Signal Purity Test	2-22
2-8	Resolution Bandwidth Accuracy and Selectivity Test	2-25
2-9	Sweep Time Accuracy Test	2-29
2-10	Frequency Response Test	2-33
2-11	Input Attenuator Switching Error Test	2-40
2-12	Test of Resolution Bandwidth Switching Uncertainity	2-43
2-13	Displayed Average Noise Level Test	2-47
2-14	1 dB Gain Compression Test	2-52
2-15	2nd Order Harmonic Distortion Test (with the Filter)	2-58
2-16	2nd Order Harmonic Distortion Test (without the Filter)	2-58
2-17	Third Order Intermodulation Distortion Test	2-63
2-18	Image, Multiple, and Out-Of Band Response Test	2-69
2-19	Residual Response Test	2-72
2-20	Coupling Level Accuracy Test	2-78
2-21	Connection 1 for Checking the CCDF Dynamic Range	2-81
2-22	Connection 2 for Checking the CCDF Dynamic Range	2-81

LIST OF TABLES

No.	Title	Page
2-1	Performance Verification List	2-1
2-2	Required Instruments List	2-3
2-3	Set Frequency List	2-11
2-4	Set Frequency List	2-14
2-5	Instrument Settings in the Frequency Span Accuracy Measurement (R3681)	2-21
2-6	Instrument Settings in the Frequency Span Accuracy Measurement (R3671)	2-21
2-7	Resolution Bandwidth Set Values	2-28
2-8	Sweep Time Accuracy Set Value	2-31
2-9	Center frequency Setting List	2-42
2-10	RBW Setting List	2-45
2-11	Center Frequency Setting List	2-48
2-12	Frequency Range Setting List	2-50

1. INTRODUCTION

This chapter describes the contents of this manual to help the user get the most out of the manual.

1.1 About this Manual

This manual is a performance test guide for the R3681 series signal analyzer.

The manual describes the procedure which is used to check whether the R3681 series signal analyzer performs according to its specifications.

This manual does not contain detailed descriptions of the operating methods and functions of the R3681 series signal analyzer. For information on the operating methods and functions, refer to the user's guide.

Contents of each chapter are as follows:

Chapter 1. INTRODUCTION	Describes the manual, instruments and information required to calibrate this instrument to help the user get the most out of the manual.
Chapter 2. PERFORMANCE VERIFICATION	Describes the performance test items and performance test procedures of this instrument. Performance test record sheets are provided in this chapter.
Chapter 3. SPECIFICATIONS	Describes the specifications of this instrument.

1.2 Required Instruments

Table 2-2 shows the instruments, which are required for the performance verification of this instrument.

The instruments, which are required in all tests, are listed. Instruments which are required for individual tests are also listed in each test. If the user's instruments meet the specifications described in Table 2-2, the instruments can be used instead of the recommended models.

1.3 Calibration Period

It is recommended that the performance is verified once a year to check whether the signal analyzer meets its specifications.

1.4 Performance Verification Record Sheets

The performance verification record sheets are provided at the end of Chapter 2 for users to record values, which are measured in each performance verification test.

The performance verification record sheets feature the test specifications and acceptable values.

Copy the sheets, enter all the test results, and keep the sheets as calibration test records.

These records can be used to trace gradual changes of the test results if using the instruments over a long period of time.

1.5 Conventions of Notation Used in This Document

In this document, panel keys, on-screen buttons and menus are represented by the following symbols:

On-panel hard keys

Sample	Represents an on-panel hard key labeled "Sample." Example: **START**, **STOP**

On-screen system menus

[Sample]	Represents an on-screen menu, tab, button or dialog box that is labeled "Sample" and that is selected or executed when touched. Example: **[File]** menu, **[Normal]** tab, **[Option]** button

On-screen function buttons

{Sample}	Represents an on-screen function button labeled "Sample." Example: **{FREQ}** button, **{SWEEP}** button

On-screen side menu

Sample	Represents an on-screen side menu key labeled "Sample." Example: **Center** key, **Span** key

On-screen system menu key operation

[File]→[Save As...]	Indicates a touch on the **[File]** menu followed by a choice of **[Save As...]**.

Sequential key operation

{FREQ}, **Center**	Indicates a touch on the **{FREQ}** button followed by a touch on the **Center** key.

Toggle key operation

ΔMarker On/Off (On)	Indicates a touch on the **ΔMarker On/Off** key to turn on the ΔMarker.

NOTE: ***Screen displays and diagrams such as external view of the main unit in this manual are those of the R3681 in the R3681 series.***

1.6 Trademarks and Registered Trademarks

- Microsoft® and Windows® are trademarks or registered trademarks of Microsoft Corporation in the United States and other countries.
- Other product and company names referenced herein are trademarks or registered trademarks of their respective owners.

1.7 Other Manuals Pertaining to This Instrument

Available manuals pertaining to this instrument include:

- User's Guide (Part Code: {ER3681SERIES/U}, English)

  Contains information prerequisite to using the R3681 Series Signal Analyzer, ranging from setup to basic operation, applied measurement, functionality, specifications, and maintenance.
- Programming Guide (Part Code: {ER3681SERIES/P}, English)

  Covers programming information to use the R3681 Series Signal Analyzer to automate measurement sequences, including a remote control overview, SCPI command references, and sample application programs.
- Performance Test Guide (Part Code: {ER3681SERIES/T}, English, this manual)

  Covers information necessary to verify the performance of the R3681 Series Signal Analyzer, including performance test procedures and specifications.

2. PERFORMANCE VERIFICATION

2.1 Overview

2.1.1 Before Starting

This chapter describes the performance verification procedure in order of the items listed in Table 2-1.

Table 2-1 Performance Verification List

Test No.	Test item	Applicable model
2.2.1	Frequency Reference Stability	
2.2.2	Calibration Signal Output Accuracy	
2.2.3	Marker Frequency Counter Accuracy	
2.2.4	Frequency Reading Accuracy	
2.2.5	Residual FM	
2.2.6	Frequency Span Accuracy	
2.2.7	Signal Purity	
2.2.8	Resolution Bandwidth Accuracy and Selectivity	
2.2.9	Sweep Time Accuracy	
2.2.10	Frequency Response	
2.2.11	Input Attenuator Switching Error	
2.2.12	Resolution Bandwidth Switching Uncertainity	
2.2.13	Displayed Average Noise Level	
2.2.14	1 dB Gain Compression	
2.2.15	2nd Order Harmonic Distortion	
2.2.16	Third Order Intermodulation Distortion	
2.2.17	Image, Multiple, and Out-Of Band Responses	
2.2.18	Residual Response	
2.2.19	Coupling Level Accuracy	
2.3.20	CCDF Dynamic Range	OPTION 11

2.1.2 Required Instruments

Table 2-2 shows a list of required instruments.

Instruments, which are required in all tests, are listed.

Instruments which are required for individual tests are also listed in each test.

If the user's instruments meet the specifications described in the table, these instruments can be used instead of the recommended models.

1. Test environment and conditions

   Conduct performance verification under the following conditions:

   - 20°C to 30°C environment, after turning on the power and warming-up for 30 minutes or more
   - After automatic calibration has been performed.

2. Required measurement instruments

   Table 2-2 shows the list of instruments which are required in all tests.

   Instruments which are required for individual tests are also listed in each test.

   If the user's instruments meet the specifications described in the table, these instruments can be used instead of the recommended models.

3. Performance verification period

   It is recommended that the performance is verified once a year to check whether the signal analyzer meets its specifications.

4. Performance verification sheets

   Performance verification sheets are provided at the end of this chapter for a user to record values, which are measured in each performance verification test.

   When conducting performance verification, it is recommended that copies of the sheets are used for the test results, and the sheets are kept as test records.

5. Notation used in the performance verification procedure

   The soft keys on the touch panel are mainly used to operate the signal analyzer.

   Notation of operations described in this chapter is as follows:

   - Continuous operations, when described, are separated by commas.
   - Notation used when switching settings such as On/Off or Auto/Man is described in the following examples:

     Example 1: To set Preamp to On: **Preamp (On)**

     Example 2: To set RBW to Man: **RBW (Man)**

Table 2-2 Required Instruments List (1 of 2)

Instrument	Specification	Recommended Model	Qty.
Frequency Standard	Output Frequency: 10 MHz Stability: 5×10^{-12} / day Output Impedance: 50 Ω Output Level: 1 Vp-p or more	R3031A ADVANTEST	1
Signal Generator	Frequency Range: 10 MHz to 40 GHz *1 Output Level: -50 dBm to +10 dBm Stability: 1×10^{-6} / year	SMP04 + B11 + B17 Rohde & Schwarz	1
Signal Generator	Frequency Range: 10 MHz to 20 GHz *1 Output Level: -50 dBm to +10 dBm Stability: 1×10^{-6} / year	SMP02 + B11 + B15 Rohde & Schwarz	1
Signal Generator	Frequency Range: 10 MHz to 2.5 GHz Output Level: -20 dBm to +10 dBm Residual SSB Phase noise 1 kHz offset <-115 dBc/Hz 10 kHz offset <-124 dBc/Hz 100 kHz offset <-130 dBc/Hz	8665B Option004 Agilent	1
Signal Generator	Frequency Range: 5 kHz to 1.5 GHz Output Level: -20 dBm to +10 dBm Pulse period: 40 μs to 45 s Pulse width: 20 μs to 1 s	SMT02 + B1 + B3 + B4 Rohde & Schwarz	1
Power Meter	Compatible with NRV series power sensors dB rerative mode Resolution 0.01 dB Reference Accuracy 0.9%	NRVS Rohde & Schwarz	1
Power Sensor	Frequency Range: 50 MHz to 40 GHz *1 Input Level: 1 μW to 100 mW Maximum SWR: 1.3 (40 GHz)	NRV-Z55 Rohde & Schwarz	1
Power Splitter	Frequency Range: 10 MHz to 40 GHz *1 Insertion Loss: 6 dB (nominal)	K241C Anritsu	1
Power Divider	Frequency Range: 5 MHz to 1000 MHz Isoration: Greater than 18 dB	PDML-20A-500 Merrimac	1
Power Divider	Frequency Range: 0.5 GHz to 18 GHz *1 Isoration: Greater than 18 dB	4426-2 Narda	1

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

Table 2-2 Required Instruments List (2 of 2)

Instrument	Specification		Recommended Model	Qty.
10dB Attenuator	Impedance: Attenuation: Connector:	50 Ω 10 dB K(m)-K(f) *2	41KC-10 Anritsu	1
RF Cable	Impedance: Connector: Length:	50 Ω K(m)-K(m) *2 Approx. 0.7 m	SF102 SUHNUR	3
RF Cable	Impedance: Connector: Length:	50 Ω BNC(m)-BNC(m) Approx. 0.3 m	A01037-0300 ADVANTEST	1
RF Cable	Impedance: Connector: Length:	50 Ω BNC(m)-BNC(m) Approx. 1.5 m	A01037-1500 ADVANTEST	2
Terminator	Impedance:	50 Ω	HRM-601D(02)	1
Adapter	Connector:	K(f)-K(f) *3	5A-SFF40(A) ADVANTEST	1
Adapter	Connector:	SMA(f)-SMA(f)	HRM-501 HIROSE	1
Adapter	Connector:	N(m)-SMA(f)	HRM-554S HIROSE	1
Adapter	Connector:	BNC(f)-SMA(m)	HRM-517(09) HIROSE	1
Adapter	Connector:	BNC-JA-JJJ	302-0024-6 HIROSE	1

*2: In the R3671, the SMA connector can be substituted for the K connector. However, the K(f) may be damaged easily if the SMA(m) is used.

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f). (Recommended Model: JUG-201A/U ADVANTEST)

2.2 Performance Verification Procedure

This section describes the performance verification procedure in order of the items listed in Table 2-1.

2.2.1 Frequency Reference Stability

[Overview]

This section describes how to check the frequency stability of the 10 MHz frequency reference oscillator (frequency reference error and aging rate).

The reference stability is the frequency stability after the power is turned on and 24 hours have passed at an ambient temperature of 25°C.

[Procedure]

1. Input a 1 GHz signal from the external signal generator and then read the frequency by using the frequency counter of this instrument.
2. After 24 hours, measure the measurement error by using the frequency counter to determine the frequency stability.
3. Obtain the aging rate per 24 hours (one day) from the frequency stability.

Use an external frequency source as the frequency source of the external signal generator.

[Specifications]

- Internal source

  Aging rate: $\pm 5 \times 10^{-8}$ /day, $\pm 5 \times 10^{-7}$ / year

  Temperature stability: $\pm 1 \times 10^{-7}$ (0°C to 40°C)

  Warm-up (Nominal): $\pm 5 \times 10^{-7}$ /1 minute

- OPTION22 High stability source

  Aging rate: $\pm 3 \times 10^{-10}$ /day, $\pm 2 \times 10^{-8}$ / year

  Temperature stability: $\pm 5 \times 10^{-9}$ (0°C to 40°C)

  Warm-up (Nominal): $\pm 1 \times 10^{-8}$ / 30 minutes
  $\pm 5 \times 10^{-9}$ / 60 minutes

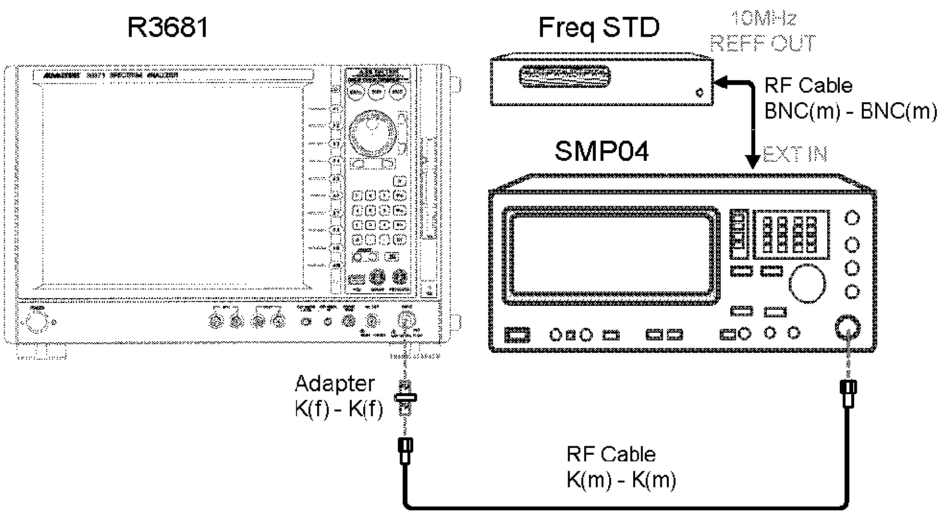
2.2.1 Frequency Reference Stability

[Required instruments]

Instrument	Quantity	Recommended model
Frequency source	1	R3031A
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-1 Frequency Stability Test Connection Diagram

[Test procedure]

1. Connect the instruments as shown in Figure 2-1.
2. Specify the signal generator setting as follows:
   Output frequency: 1 GHz
   Output level: -10 dBm
   Reference frequency signal: External
3. Turn this instrument power to ON.
4. Preset this instrument.
   Operation: PRESET

5. Set the center frequency to 1 GHz.
   Operation: **{FREQ}**, **Center**, **1**, and **GHz**

6. Set the frequency span to 1 MHz.
   Operation: **{SPAN}**, **Span**, **1**, and **MHz**

7. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**

8. Set the counter function to ON.
   Operation: **[MENU2]**, **{MEAS}**, and **Counter**

9. Run the analyzer for 24 hours.

- Checking the frequency reference error

10. After 24 hours, perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

11. Read the frequency displayed in the counter, substitute the value into the formula shown below to obtain the frequency reference error, and then enter the value into the performance verification sheet.

    Formula: Frequency reference error = (measured value in step 11 -1 GHz)/1 GHz

- Measuring the aging rate

12. After performing step 11 and 24 hours have passed, read the counter and enter the value into the performance verification sheet.

13. Ensure that the data entered in step 12 is within the specified range.

14. Substitute the value measured in step 10 and step 11 into the formula shown below to obtain the aging rate, then enter the aging rate into the performance verification sheet, and ensure that the value is within the specified range.

    Formula: Aging rate = (measured value in step 12 - measured value in step 11)/ measured value in step 11

2.2.2 Calibration Signal Output Accuracy

[Overview]

This section describes how to check whether the accuracy of the amplitude in this instrument calibration signal is within -10 dBm ± 0.2 dB.

[Specifications]

-10 dBm ± 0.2 dB

[Required instruments]

Instrument	Quantity	Recommended model
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
RF cable BNC(m)-BNC(m)	1	A01037-0300
Adapter BNC(f)-SMA(m)	1	HRM-517(09)
Adapter SMA(f)-SMA(f)	1	HRM-501

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

[Connection diagram]

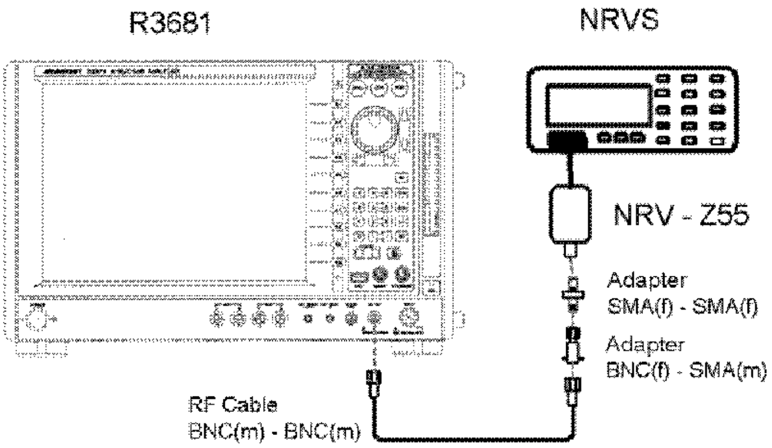


Figure 2-2 Calibration Signal Output Accuracy Test Diagram

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-2.

Setting measurement conditions

2. Adjust point 0 of the power sensor and power meter and perform calibration.
3. Set the power meter to the dBm display.
4. Set the calibration frequency of the power meter to 50 MHz.

Measuring the output level

5. Connect the power sensor as shown in the Figure 2-2.
6. Read the value on the power meter and then enter the value into the performance verification sheet.
7. Ensure that the value entered in step 6 is within the specified range.

2.2.3 Marker Frequency Counter Accuracy

[Overview]

This section describes how to read this instrument frequency and measure the marker frequency counter accuracy by inputting a signal of known frequency from the external signal generator.

When using a frequency that exceeds 5 GHz, the frequency must be tuned to the peak frequency of the pre-selector.

[Specifications]

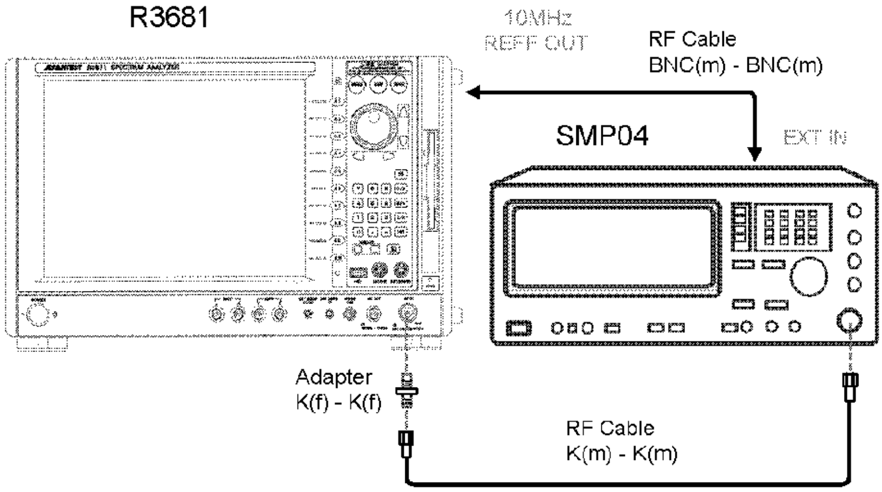
Marker frequency counter accuracy (SPAN $<$ 1 GHz : S/N $>$ 25 dB)
= ± (Marker frequency × frequency reference error +5 Hz × N + 1 LSD)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-3 Marker Frequency Counter Accuracy Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-3.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:
   Output frequency: 2 GHz
   Output level: -10 dBm
   Reference frequency signal: External

Setting this instrument

4. Set the center frequency to 2 GHz.
   Operation: **{FREQ}**, **Center**, **2**, and **GHz**

5. Set the frequency span to 1 MHz.
   Operation: **{SPAN}**, **Span**, **1**, and **MHz**

6. Set the counter function to ON.
   Operation: **[MENU2]**, **{MEAS}**, and **Counter**

7. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**

Measuring the marker frequency counter accuracy

8. Enter the reading frequency of the counter into the performance verification sheet.

9. Ensure that the data entered in step 8 is within the specified range.

10. Set the counter function to OFF.
    Operation: **[MENU2]**, **{MEAS}**, **Counter**, and **Counter Off**

Measuring the accuracy by using other frequency points

11. Repeat steps 3 to 10 by using the non-2 GHz frequencies described in Table 2-3. Note that when using a center frequency that exceeds 5 GHz, tune the pre-selector by following the operation below after setting the frequency span in step 5.
    Pre-selector tuning operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

Table 2-3 Set Frequency List

Center frequency	Signal generator Output frequency
2 GHz	2 GHz
5 GHz	5 GHz
11 GHz	11 GHz
22 GHz	22 GHz

2.2.4 Frequency Reading Accuracy

[Overview]

This section describes how to check the frequency reading accuracy by inputting a signal of known frequency from the signal generator.

[Specifications]

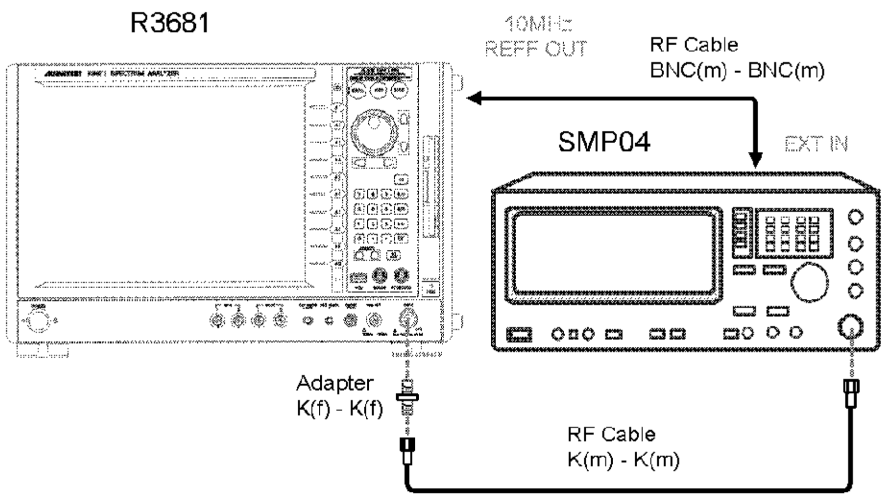
Frequency reading accuracy = ± (Marker frequency × frequency reference error + frequency span × frequency span accuracy + resolution bandwidth × 0.05 + 2 Hz)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-4 Frequency Reading Accuracy Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-4.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:
   Output frequency: 2 GHz
   Output level: -10 dBm
   Reference frequency signal: External

Setting this instrument

4. Set the center frequency to 2 GHz.
   Operation: **{FREQ}**, **Center**, **2**, and **GHz**
5. Set the frequency span to 1 MHz.
   Operation: **{SPAN}**, **Span**, **1**, and **MHz**
6. Set the resolution bandwidth to 10 kHz.
   Operation: **{BW}**, **RWB (Man)**, **1**, **0**, and **kHz**
7. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**
8. Read the value of the marker frequency and then enter the value into the performance verification sheet.
9. Ensure that the data entered in step 8 is within the specified range.
10. Repeat steps 3 to 9 according to the settings described in the performance verification sheet. Note that if the set frequency exceeds 3.5 G, tune the pre-selector by following the operation below before performing step 7.
    Pre-selector tuning operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

Table 2-4 Set Frequency List

The frequency measured by the R3671 is 13 GHz and lower.

Center frequency	Frequency span	Resolution bandwidth	Signal generator Output frequency
2 GHz	1 MHz	10 kHz	2 GHz
2 GHz	10 MHz	100 kHz	2 GHz
2 GHz	50 MHz	300 kHz	2 GHz
2 GHz	100 MHz	1 MHz	2 GHz
2 GHz	1 GHz	3 MHz	2 GHz
5 GHz	1 MHz	10 kHz	5 GHz
5 GHz	10 MHz	100 kHz	5 GHz
5 GHz	50 MHz	300 kHz	5 GHz
5 GHz	100 MHz	1 MHz	5 GHz
5 GHz	1 GHz	3 MHz	5 GHz
11 GHz	1 MHz	10 kHz	11 GHz
11 GHz	10 MHz	100 kHz	11 GHz
11 GHz	50 MHz	300 kHz	11 GHz
11 GHz	100 MHz	1 MHz	11 GHz
11 GHz	1 GHz	3 MHz	11 GHz
24 GHz	1 MHz	10 kHz	24 GHz
24 GHz	10 MHz	100 kHz	24 GHz
24 GHz	50 MHz	300 kHz	24 GHz
24 GHz	100 MHz	1 MHz	24 GHz
24 GHz	1 GHz	3 MHz	24 GHz

2.2.5 Residual FM

[Overview]

This section describes how to check the instability over a short period of time.

A stabilized signal is input and then the signal is measured by performing slope detection in the 0-span mode.

Residual FM can be obtained by multiplying the IF filter slope (Hz/dB) by the amplitude change of the measured signal.

[Specifications]

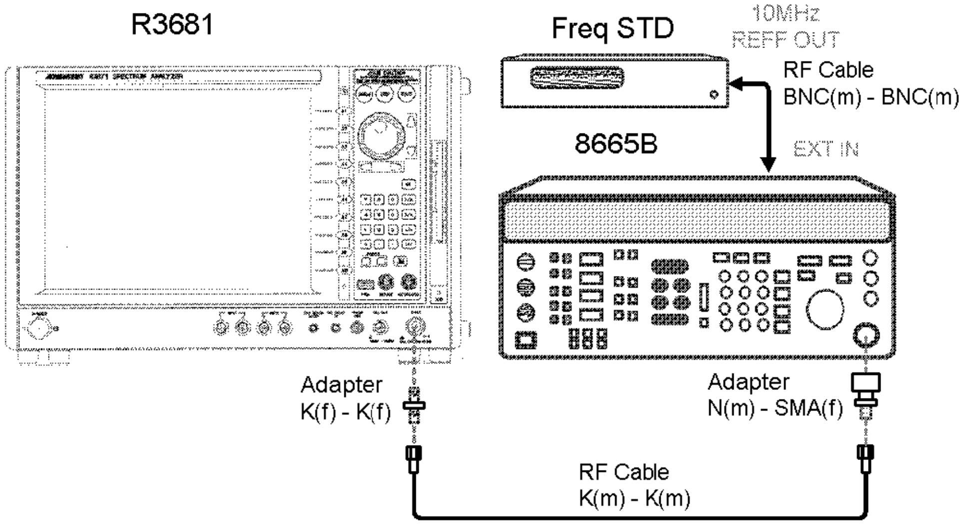
< (3 × N) Hz p-p / 100 ms

[Required instruments]

Instrument	Quantity	Recommended model
Frequency standard	1	R3031A
Signal generator *1	1	8665B Option004
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01
Adapter N(m)-SMA(f)	1	HRM-554S

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-5 Residual FM Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-5.

Setting the signal generator

2. Specify the signal generator setting as follows:
   Output frequency: 2.5 GHz
   Output level: -10 dBm
   Reference frequency signal: External

Initialization

3. Preset this instrument.
   Operation: **PRESET**

Measuring the IF filter slope

4. Set the center frequency to 2.5 GHz.
   Operation: **{FREQ}**, **Center**, **2**, **.**, **5**, and **GHz**

5. Set the span to 100 kHz.
   Operation: **{SPAN}**, **Span**, **1**, **0**, **0**, and **kHz**

6. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**

7. Set Signal Track to ON.
   Operation: **[MENU1]**, **{MKR}**, and **Signal Track (On)**

8. Set the sweep time to 100 msec.
   Operation: **[MENU1]**, **{SWEEP}**, **Sweep Time (Man)**, **1**, **0**, **0**, and **m**

9. Set the span to 10 kHz.
   Operation: **{SPAN}**, **Span**, **1**, **0**, and **kHz**

10. Set the RBW to 1 kHz.
    Operation: **{BW}**, **RWB (Man)**, **1**, and **kHz**

11. Set Signal Track to OFF.
    Operation: **[MENU1]**, **{MKR}**, and **Signal Track (Off)**

12. Set the Ref LEVEL to -5 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **5**, and **ENT**

13. Set the scale to 1 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**

14. Set the frequency span to 2 kHz.
    Operation: **{SPAN}**, **Span**, **2**, and **kHz**

15. Perform Peak→Ref.
    Operation: **[MENU1]**, **{MKR→}**, and **Peak→Ref**

16. Perform a SINGLE sweep.
    Operation: **SINGLE**

17. Set the Delta Marker mode.
    Operation: **[MENU1]**, **{MKR}**, and **Delta Marker**

18. Lower the marker frequency by using the rotary encoder or the ▲ ▼ keys to set the ΔMARKER reading value to -3 ±0.1 dB.

19. Set Fixed Marker to ON.
    Operation: **Fixed Marker** (On)

20. Lower the marker frequency by using the rotary encoder or the ▲ ▼ keys to set the marker reading value to -3 ±0.1 dB.

21. Obtain Slope from the ΔMARKER reading value by using the formula shown below and enter the value into the performance verification sheet.

    Formula: Slope = ΔMARKER frequency reading value/ ΔMARKER level reading value

Measuring the residual FM deviation

22. Set the marker to OFF.
    Operation: **[MENU1]**, **{MKR}**, and **Marker All Off**

23. Set the REPEAT sweep.
    Operation: **START**

24. Set Zero Span.
    Operation: **{SPAN}** and **Zero Span**

25. Set the VBW to 1 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**

26. Lower the center frequency gradually by using the rotary encoder or the ▲ ▼ keys to set the waveform to a point which is 6 divisions lower than the reference level.
    Operation: **{FREQ}**, **Center**, (rotary encoder or the ▲ ▼ keys)

27. Perform a SINGLE sweep.
    Operation: **SINGLE**

28. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

29. Set the Delta Marker to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **ΔMarker (On)**

30. Perform a minimum peak search.
    Operation: **[MENU1]**, **{SEARCH}**, and **Min Peak**

31. Enter the marker level reading value ΔLEVEL into the performance verification sheet.

Calculating the residual FM

32. Substitute the Slope value obtained in step 21 and the ΔLEVEL value measured in step 31 into the formula shown below to obtain the residual FM, then enter the value into the performance verification sheet.
    Formula: Residual FM [Hz] = Slope [Hz / dB] × ΔLevel [dB]

33. Ensure that the result obtained in step 32 is smaller than the value described in the specifications.

2.2.6 Frequency Span Accuracy

[Overview]

This section describes how to check the span accuracy by inputting signals, which are at the frequencies shown on the 1st and 9th divisions from the left of the screen, from the signal generator, and reading the frequency difference between these two frequencies by using the marker.

[Specifications]

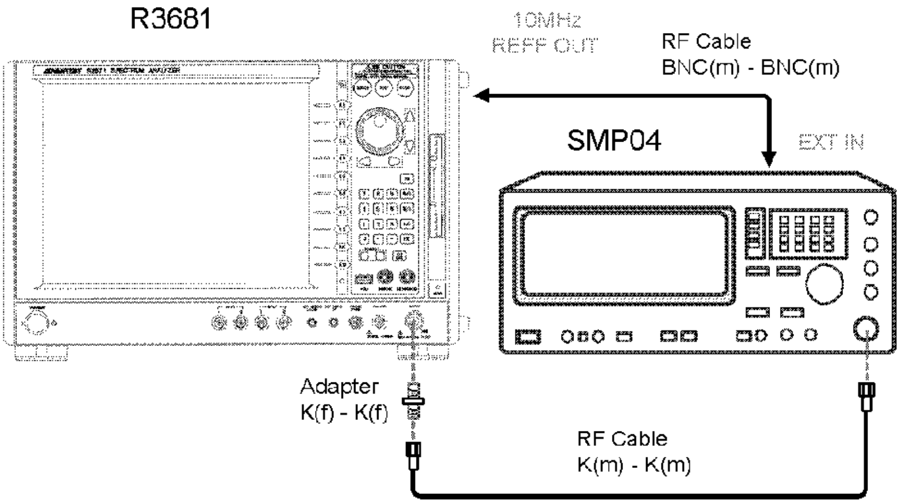
< ± 1% × Frequency span

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-6 Frequency Span Accuracy Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-6.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:
   Output level: -10 dBm
   Reference frequency signal: External

Setting this instrument

4. Set the center frequency of this instrument to 16 GHz.
   Operation: **{FREQ}**, **Center**, **1**, **6**, and **GHz**
5. Set the frequency span to 32 GHz.
   Operation: **{SPAN}**, **Span**, **3**, **2**, and **GHz**
6. Set Measuring Window to ON.
   Operation: **|MENU2|**, **{DISPLAY}**, **Meas Window**, and **Window** (On)
7. Set Window Position to 16 GHz.
   Operation: **Window Position**, **1**, **6**, and **GHz**
8. Set Window Width to 28.8 GHz.
   Operation: **Window Width**, **2**, **8**, **.**, **8**, and **GHz**
9. Set the output frequency of the signal generator to 3.2 GHz.
10. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**
11. Perform a peak search.
    Operation: **|MENU1|** and **{SEARCH}**
12. Set ΔMARKER.
    Operation: **|MENU1|**, **{MKR}**, **Delta Marker**, and **ΔMarker** (On)
13. Set the output frequency of the signal generator to 28.8 GHz.
14. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

15. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
16. Read the marker frequency and then enter the value into the performance verification sheet.
17. Ensure that the value entered in step 16 is within the specified range.
18. Repeat steps 4 to 16 by using the set frequencies described in Table 2-5.

Table 2-5 Instrument Settings in the Frequency Span Accuracy Measurement (R3681)

R3681 Setting				Signal Generator Setting	
Center frequency [Hz]	Frequency span [Hz]	Window Center [Hz]	Window Width [Hz]	Step 5 Setting [Hz]	Step 9 Setting [Hz]
16 G	32 G	16 G	28.8 G	3.2 G	28.8 G
16 G	10 G	16 G	9 G	12 G	20 G
16 G	1 G	16 G	900 M	15.6 G	16.4 G
16 G	100 M	16 G	90 M	15.96 G	16.04 G
16 G	10 M	16 G	9 M	15.996 G	16.004 G
16 G	1 M	16 G	900 k	15.9996 G	16.0004 G

Table 2-6 Instrument Settings in the Frequency Span Accuracy Measurement (R3671)

R3671 Setting				Signal Generator Setting	
Center frequency [Hz]	Frequency span [Hz]	Window Center [Hz]	Window Width [Hz]	Step 5 Setting [Hz]	Step 9 Setting [Hz]
6.5 G	13 G	6.5 G	11.7 G	1.3 G	11.7 G
6.5 G	10 G	6.5 G	9 G	2.5 G	10.5 G
6.5 G	1 G	6.5 G	900 M	6.1 G	6.9 G
6.5 G	100 M	6.5 G	90 M	6.46 G	6.54 G
6.5 G	10 M	6.5 G	9 M	6.496 G	6.504 G
6.5 G	1 M	6.5 G	900 k	6.4996 G	6.5004 G

2.2.7 Signal Purity

[Overview]

This section describes how to measure the signal purity of 10 kHz, 100 kHz, and 1 MHz offset signals at a center frequency of 800 MHz.

[Specifications]

Offset 10 kHz: < -120 dBc/Hz

Offset 100 kHz: < -120 dBc/Hz

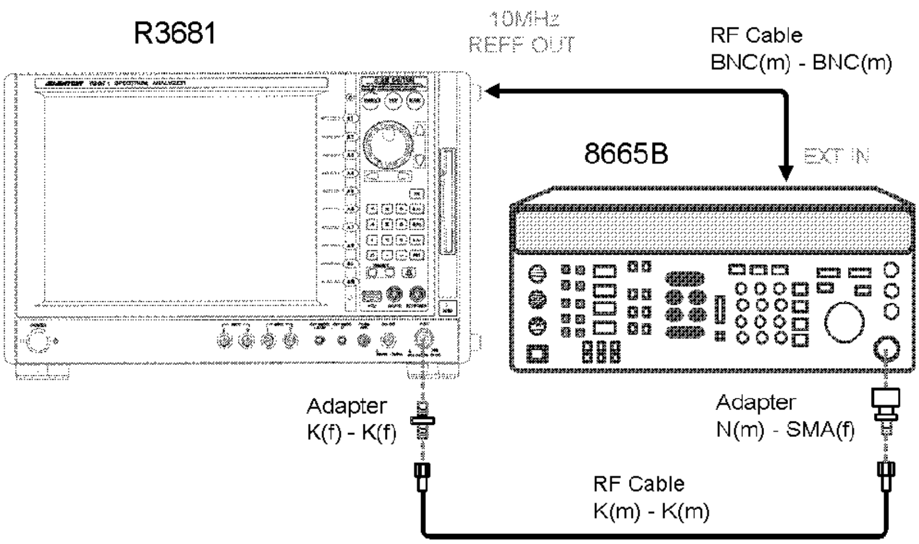
Offset 1 MHz: < -140 dBc/Hz

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	8665B Option004
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01
Adapter N(m)-SMA(f)	1	HRM-554S

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-7 Signal Purity Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-7.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:

Output frequency:	800 MHz
Output level:	-5 dBm
Reference frequency signal:	External

Setting this instrument

4. Set the center frequency to 800 MHz.
   Operation: **{FREQ}**, **Center**, **8**, **0**, **8**, and **MHz**

5. Set the frequency span to 25 kHz.
   Operation: **{SPAN}**, **Span**, **2**, **5**, and **kHz**

Measuring the signal purity

6. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**

7. Perform MKR→REF.
   Operation: **[MENU1]**, **{MKR→}**, and **Peak→Ref**

8. Perform a peak search.
   Operation: **[MENU1]** and **{SEARCH}**

9. Set the Noise/Hz measurement mode.
   Operation: **[MENU2]**, **{MEAS}**, and **Noise/Hz**

10. Set the Noise/X Hz to 1 Hz.
    Operation: **Noise/X Hz**, **1**, and **ENT**

11. Set the dBc/Hz mode.
    Operation: **dBc/Hz**

12. Set the offset value to 10 kHz.
    Operation: **1**, **0**, and **kHz**

13. Lower the reference level 20 dB.
    Operation: **{LEVEL}**, **Ref Level**, ▼, and ▼

14. Set the trace mode to Average and set the averaging count to 20.
    Operation: **[MENU1]**, **TRACE**, **Average**, **2**, **0**, and **ENT**

15. After averaging is complete, enter the marker Noise / 1 Hz reading value into the performance verification sheet.

16. Set the trace mode to Write.
    Operation: **[MENU1]**, **TRACE**, and **Write**

17. Set the REF LEVEL to 0 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **0**, and **ENT**

18. Set the marker to OFF.
    Operation: **[MENU1]**, **{MKR}**, and **Marker All Off**

19. Repeat steps 5 to 18 according to the settings in the table shown below.

Offset	Frequency span
10 kHz	25 kHz
100 kHz	250 kHz
1 MHz	2.5 MHz

2.2.8 Resolution Bandwidth Accuracy and Selectivity

[Overview]

This section describes how to check the accuracy and selectivity of the RBW 3 dB bandwidth.

Selectivity is determined by the ratio between the 3 dB attenuation width and 60 dB attenuation width of the RBW.

[Specifications]

Accuracy: ± 2% 1 Hz to 1 MHz

± 7% 2 MHz and 3 MHz

±15% 5 MHz and 10 MHz

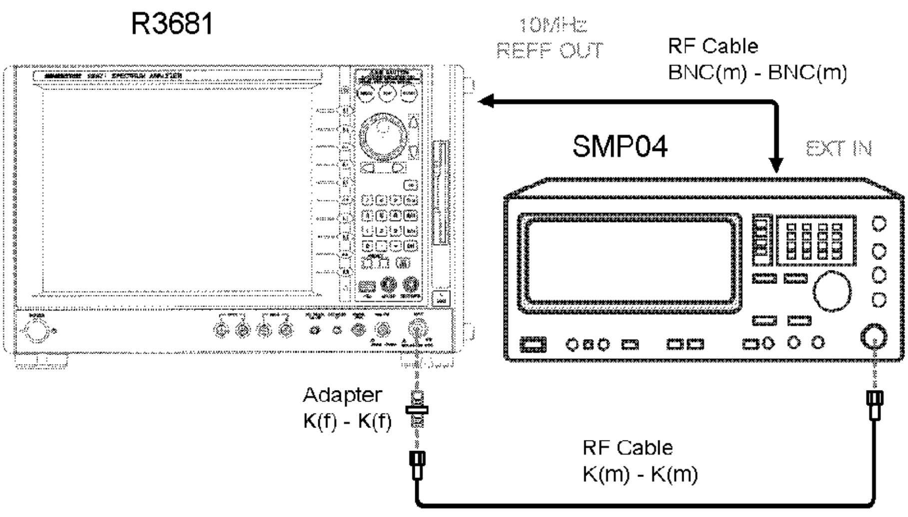
Selectivity: 6 : 1 (60 dB : 3 dB)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-8 Resolution Bandwidth Accuracy and Selectivity Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-8.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Measuring the 3 dB attenuation width

3. Specify the signal generator setting as follows:
   Output frequency: 100 MHz
   Output level: 0 dBm
   Reference frequency signal: External
4. Set the center frequency of this instrument to 100 MHz.
   Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **MHz**
5. Set the display scale to 1 dB/div.
   Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**
6. Set the Ref LEVEL to 0 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **0**, and **ENT**
7. Set the Trace Detector mode to SAMPLE.
   Operation: **[MENU1]**, **{TRACE}**, **Trace Detector**, and **Sample**
8. Set the video bandwidth to 1 kHz.
   Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**
9. Set the resolution bandwidth to 10 MHz.
   Operation: **{BW}**, **RWB (Man)**, **1**, **0**, and **MHz**
10. Set the frequency span to 20 MHz.
    Operation: **{SPAN}**, **Span**, **2**, **0**, and **MHz**
11. Set the sweep time to 50 msec.
    Operation: **[MENU1]**, **{SWEEP}**, **Sweep Time (Man)**, **5**, **0**, and **m**
12. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**
13. Set the XdB down mode to 3 dB.
    Operation: **[MENU2]**, **{MEAS}**, **X dB Down**, **X dB Down Level**, 3, and **ENT**

14. Set Peak X dB Down.
    Operation: **Peak X dB Down**

15. Set Cont Down to ON.
    Operation: **Cont Down** (On)

16. Perform a single sweep.
    Operation: **SINGLE**

17. Read the marker display frequency and ensure that the value is within the specified range.

18. Repeat steps 8 to 17 by using the resolution bandwidth set values described in the table shown below.

19. Set the marker display to OFF.
    Operation: **[MENU1]**, **{MKR}**, and **Marker All Off**

Measuring the 60 dB attenuation width

20. Set the display scale to 10 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, **0**, and **ENT**

21. Set the resolution bandwidth to 10 MHz.
    Operation: **{BW}**, **RWB (Man)**, **1**, **0**, and **MHz**

22. Set the frequency span to 100 MHz.
    Operation: **{SPAN}**, **Span**, **1**, **0**, **0**, and **MHz**

23. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

24. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

25. Set the X dB down mode to 60 dB.
    Operation: **[MENU2]**, **{MEAS}**, **X dB Down**, **X dB Down Level**, 6, 0, and **ENT**

26. Set Peak x dB down.
    Operation: **Peak X dB Down**

27. Set Cont down to ON.
    Operation: **Cont Down** (On)

28. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

29. Read the marker display frequency and substitute the value into the formula shown below to obtain the selectivity.

    Formula: Selectivity = (60 dB attenuation width / 3 dB attenuation width) : 1

30. Repeat steps 21 to 29 by using the resolution bandwidth set values described in Table 2-7.

Table 2-7 Resolution Bandwidth Set Values

Resolution bandwidth setting	3 dB width measurement Frequency span	60 dB width measurement Frequency span	Sweep time
10 MHz	20 MHz	100 MHz	50 msec
5 MHz	10 MHz	50 MHz	50 msec
3 MHz	5 MHz	30 MHz	50 msec
2 MHz	3 MHz	20 MHz	50 msec
1 MHz	2 MHz	10 MHz	50 msec
500 kHz	1 MHz	5 MHz	50 msec
300 kHz	500 kHz	3 MHz	50 msec
200 kHz	300 kHz	2 MHz	50 msec
100 kHz	200 kHz	1 MHz	50 msec
50 kHz	100 kHz	500 kHz	50 msec
30 kHz	50 kHz	300 kHz	50 msec
20 kHz	30 kHz	200 kHz	50 msec
10 kHz	20 kHz	100 kHz	50 msec
5 kHz	10 kHz	50 kHz	50 msec
3 kHz	5 kHz	30 kHz	50 msec
2 kHz	3 kHz	20 kHz	50 msec
1 kHz	2 kHz	10 kHz	50 msec
500 Hz	1 kHz	5 kHz	500 msec
300 Hz	500 Hz	3 kHz	500 msec
200 Hz	300 Hz	2 kHz	500 msec
100 Hz	200 Hz	1 kHz	1 sec
50 Hz	100 Hz	500 Hz	2 sec
30 Hz	50 Hz	300 Hz	10 sec
20 Hz	30 Hz	200 Hz	10 sec
10 Hz	20 Hz	100 Hz	10 sec
5 Hz	20 Hz	50 Hz	20 sec
3 Hz	20 Hz	30 Hz	20 sec
2 Hz	20 Hz	20 Hz	50 sec
1 Hz	20 Hz	20 Hz	150 sec

2.2.9 Sweep Time Accuracy

[Overview]

This section describes how to check the sweep time accuracy by displaying the square wave with the TIME DOMAIN.

[Specifications]

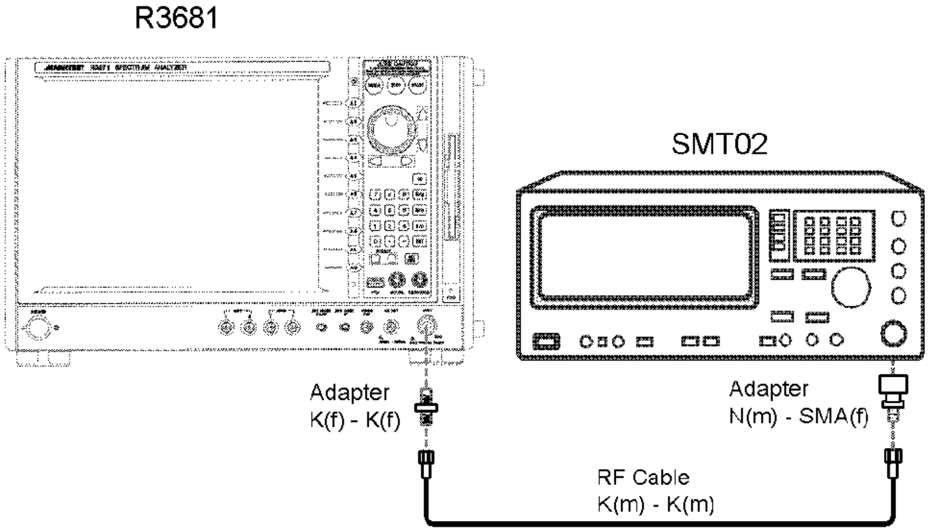
Sweep time accuracy: 2% of the set sweep time

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMT02
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01
Adapter N(m)-SMA(f)	1	HRM-554S

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-9 Sweep Time Accuracy Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-9.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:

Output frequency:	30 MHz
Output level:	0 dBm
Pulse:	ON
Pulse cycle:	900 nsec
Pulse width:	400 nsec

Setting this instrument

4. Set the center frequency to 30 MHz.
   Operation: **{FREQ}**, **Center**, **3**, **0**, and **MHz**
5. Set the frequency span to 0 MHz.
   Operation: **{SPAN}** and **Zero Span**
6. Set the Ref LEVEL to 0 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **0**, and **ENT**
7. Set the resolution bandwidth to 3 MHz.
   Operation: **{BW}**, **RBW (Man)**, **3**, and **MHz**
8. Set the video bandwidth to 3 MHz.
   Operation: **{BW}**, **VBW (Man)**, **3**, and **MHz**
9. Set the sweep time to 1 μsec.
   Operation: **{SWEEP}**, **Sweep Time (Man)**, **1**, and **μ**

Measuring the sweep time accuracy

10. Set the trigger mode to VIDEO.
    Operation: **{SWEEP}**, **Trigger Source**, and **Video**

11. Adjust the trigger level by using the rotary encoder or the ▲ ▼ keys to perform sweeps.
    Operation: Rotary encoder or the ▲ ▼ keys

12. Set Trigger Delay and set delay time to 850 nsec.
    Operation: **Return** , **Trigger Delay** , **8** , **5** , **0** , and **n**

13. Measure the time interval between the first rise time and second rise time by using the ΔMARKER mode.
    Operation: Rotary encoder or the ▲ ▼ keys

14. Ensure that the value entered in step 8 is within the specified range.

15. Repeat steps 2 to 9 by using the sweep time described in Table 2-8.

Table 2-8 Sweep Time Accuracy Set Value

Sweep time	Signal generator Pulse cycle	Signal generator Pulse width	Delay time
100 μsec	90 μsec	40 μsec	85 μsec
1 msec	900 μsec	400 μsec	850 μsec
10 msec	9 msec	4 msec	8.5 msec
100 msec	90 msec	40 msec	85 msec
1 sec	900 msec	400 msec	850 msec

2.2.10 Frequency Response

[Overview]

This section describes how to measure the frequency response when the Preamplifier is set to OFF or ON.

[Specifications]

Spectrum Analysis mode (The frequency measured by the R3671 is 13 GHz and lower.)

Preamplifier OFF

50 MHz to 2.6 GHz ± 0.4 dB

20 Hz to 3.5 GHz ± 1.0 dB

3.4 GHz to 7.5 GHz ± 1.5 dB

7.4 GHz to 15.4 GHz ± 2.0 dB

15.4 GHz to 32 GHz ± 2.5 dB

Preamplifier ON

50 MHz to 2.6 GHz ± 1.0 dB

100 kHz to 3.5 GHz ± 2.0 dB

[Required instruments]

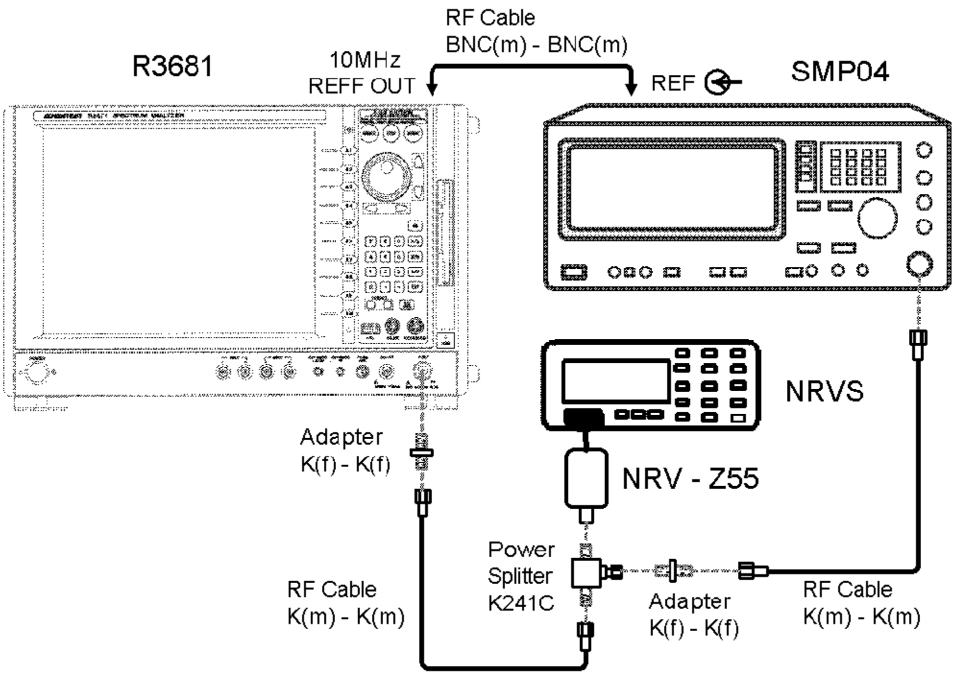
Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
Power splitter *1	1	K241C
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	2	SF102
Adapter K(f)-K(f) *3	2	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-10 Frequency Response Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-10.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform the calibration.
3. Set the power meter to the dBm display.

Initialization

4. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

5. Specify the signal generator setting as follows:

Output frequency:	50 MHz
Output level:	-10 dBm
Reference frequency input:	External

Setting this instrument

6. Set the spectrum analysis mode.
   Operation: **|Config|** and **|Spectrum Analyzer|**
7. Set the center frequency to 50 MHz.
   Operation: **{FREQ}**, **Center**, **5**, **0**, and **MHz**
8. Set the frequency span to 40 MHz.
   Operation: **{SPAN}**, **Span**, **4**, **0**, and **MHz**
9. Set the resolution bandwidth to 3 MHz.
   Operation: **{BW}**, **RBW (Man)**, **3**, and **MHz**
10. Set the video bandwidth to 1 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**
11. Set the input attenuator to 10 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and ENT
12. Set the display scale to 1 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, and ENT
13. Set the preamplifier to OFF.
    Operation: **{LEVEL}** and **Preamp (Off)**
14. Set the Ref LEVEL to -5 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **5**, and ENT
15. Set the continuous peak search to ON.
    Operation: **[MENU1|**, **{SEARCH}**, and **Cont Peak (On)**

Acquiring the frequency response reference level

16. Set the calibration frequency of the power meter to 50 MHz.
17. Adjust the output level of the signal generator to set marker display level to -10 dBm ± 0.09 dBm.
18. Set the power meter to the relative value display.

Setting in the 9 kHz to 3.5 GHz frequency range

19. Set the output frequency of the signal generator to 100 MHz.

20. Set the center frequency of this instrument to 100 MHz.
    Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **MHz**
21. Set the step size of the center frequency to 100 MHz.
    Operation: **CF Step Size** **(Man)**, **1**, **0**, **0**, and **MHz**.
22. Set the calibration frequency of the power meter to 100 MHz.
23. Adjust the output level of the signal generator to set the marker display level to -10 dBm ± 0.09 dBm.
24. Change the sign of the value displayed on the power meter and enter the value into the performance verification sheet.
25. Ensure that the value acquired in step 24 is within the specified range.
26. Repeat steps 19 to 25 up to the 3.5 GHz center frequency in 100 MHz increments.

Setting in the 3.5 GHz to 7.5 GHz frequency range

27. Set the output frequency of the signal generator to 3.6 GHz.
28. Set the center frequency of this instrument to 3.6 GHz.
    Operation: **{FREQ}**, **Center**, **3**, **.**, **6**, and **GHz**
29. Set the calibration frequency of the power meter to 3.6 GHz.
30. Tune the pre-selector.
    Operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**
31. Adjust the output level of the signal generator to set the marker display level to -10 dBm ± 0.09 dBm.
32. Change the sign of the value displayed on the power meter and enter the value into the performance verification sheet.
33. Ensure that the value acquired in step 32 is within the specified range.
34. Repeat steps 27 to 33 up to the 7.5 GHz center frequency in 100 MHz increment.

Setting in the 7.5 GHz to 15.4 GHz frequency range
(The frequency measured by the R3671 is 13 GHz and lower.)

35. Set the output frequency of the signal generator to 7.6 GHz.
36. Set the center frequency of this instrument to 7.6 GHz.
    Operation: **{FREQ}**, **Center**, **7**, **.**, **6**, and **GHz**
37. Set the step size of the center frequency to 200 MHz.
    Operation: **CF Step Size** **(Man)**, **2**, **0**, **0**, and **MHz**
38. Set the calibration frequency of the power meter to 7.6 GHz.
39. Tune the pre-selector.
    Operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

40. Adjust the output level of the signal generator to set the marker display level to -10 dBm ± 0.09 dBm.

41. Change the sign of the value displayed on the power meter and enter the value into the performance verification sheet.

42. Ensure that the value acquired in step 41 is within the specified range.

43. Repeat steps 35 to 42 up to the 15.4 GHz center frequency in 200 MHz increment.

Setting in the 15.4 GHz to 32 GHz frequency range
(The frequency measured by the R3671 is 13 GHz and lower.)

44. Set the output frequency of the signal generator to 15.6 GHz.

45. Set the center frequency of this instrument to 15.6 GHz.
Operation: **{FREQ}**, **Center**, **1**, **5**, **.**, **6**, and **GHz**

46. Set the calibration frequency of the power meter to 15.6 GHz.

47. Tune the pre-selector.
Operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

48. Adjust the output level of the signal generator to set the marker display level to -10 dBm ± 0.09 dBm.

49. Change the sign of the value displayed on the power meter and enter the value into the performance verification sheet.

50. Ensure that the value acquired in step 49 is within the specified range.

51. Repeat steps 44 to 50 up to the 32 GHz center frequency in 200 MHz increment.

Frequency response when the Preamplifier is set to ON

Initializing the power meter

52. Adjust point 0 of the power sensor and power meter and perform the calibration.

53. Set the power meter to the dBm display.

Initialization

54. Preset this instrument.
Operation: **PRESET**

Setting the signal generator

55. Specify the signal generator setting as follows:
    Output frequency: 50 MHz
    Output level: -20 dBm
    Reference frequency input: External

Setting this instrument

56. Set the center frequency to 50 MHz.
    Operation: **{FREQ}**, **Center**, **5**, **0**, and **MHz**
57. Set the step size of the center frequency to 100 MHz.
    Operation: **CF Step Size (Man)**, **1**, **0**, **0**, and **MHz**.
58. Set the frequency span to 40 MHz.
    Operation: **{SPAN}**, **Span**, **4**, **0**, and **MHz**
59. Set the resolution bandwidth to 3 MHz.
    Operation: **{BW}**, **RBW (Man)**, **3**, and **MHz**
60. Set the video bandwidth to 1 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**
61. Set the input attenuator to 10 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and **ENT**
62. Set the display scale to 1 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**
63. Set the preamplifier to ON.
    Operation: **{LEVEL}** and **Preamp (On)**
64. Set the Ref LEVEL to -15 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **5**, and **ENT**
65. Set the continuous peak search to ON.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (On)**

Acquiring the frequency response reference level

66. Set the calibration frequency of the power meter to 50 MHz.
67. Adjust the output level of the signal generator so that the marker display level is set to -20 dBm ± 0.09 dBm.
68. Set the power meter to the relative value display.

Setting in the 100 kHz to 3.5 GHz frequency range

69. Set the output frequency of the signal generator to 100 MHz.

70. Set the center frequency of this instrument to 100 MHz.
    Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **MHz**
71. Set the calibration frequency of the power meter to 100 MHz.
72. Adjust the output level of the signal generator to set the marker display level to -20 dBm ± 0.09 dBm.
73. Change the sign of the value displayed on the power meter and enter the value into the performance verification sheet.
74. Ensure that the value acquired in step 73 is within the specified range.
75. Repeat steps 69 to 74 up to the 3.5 GHz center frequency in 100 MHz increment.

2.2.11 Input Attenuator Switching Error

[Overview]

This section describes how to measure the input attenuator switching error of this instrument in all 75 dB settings.

[Specifications]

(The frequency measured by the R3671 is 13 GHz and lower.)

20 Hz to 8 GHz: < ±1.0 dB (5 dB to 50 dB)
< ±1.2 dB (55 dB to 75 dB)

8 GHz to 12 GHz: < ±1.3 dB (5 dB to 50 dB)
< ±1.7 dB (55 dB to 75 dB)

12 GHz to 20 GHz: < ±1.4 dB (5 dB to 50 dB)
< ±1.9 dB (55 dB to 75 dB)

20 GHz to 26.5 GHz: < ±1.8 dB (5 dB to 50 dB)
< ±2.5 dB (55 dB to 75 dB)

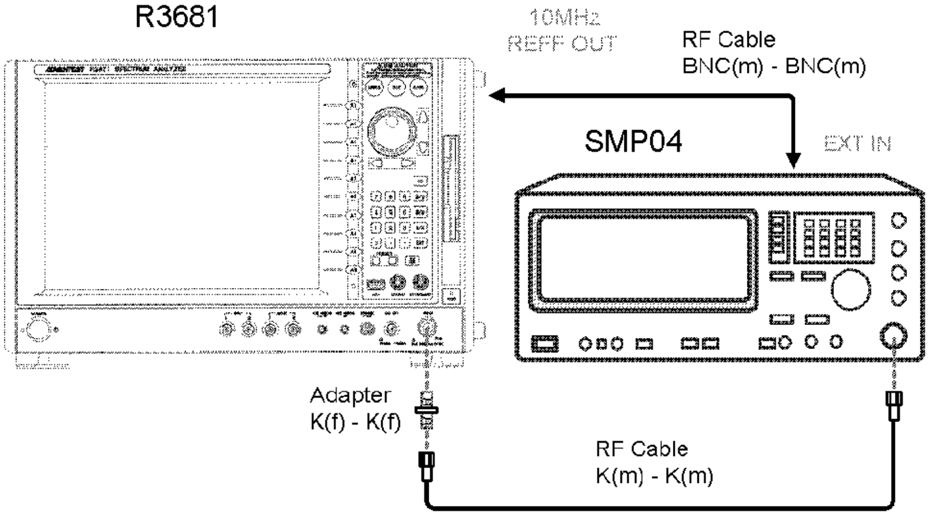
26.5 Hz to 32 GHz: < ±2.1 dB (5 dB to 50 dB)
< ±2.8 dB (55 dB to 75 dB)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-11 Input Attenuator Switching Error Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-11.

Initialization

2. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

3. Specify the signal generator setting as follows:
   Output frequency: 50 MHz
   Output level: -15 dBm
   Reference frequency signal: External

Setting this instrument

4. Set the center frequency to 50 MHz.
   Operation: **{FREQ}**, **Center**, **5**, **0**, and **MHz**

5. Set the frequency span to 1 kHz.
   Operation: **{SPAN}**, **Span**, **1**, and **kHz**

6. Set the resolution bandwidth to 500 Hz.
   Operation: **{BW}**, **RBW (Man)**, **5**, **0**, **0**, and **ENT**

7. Set the Ref LEVEL to -10 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **0**, and **ENT**

8. Set the display scale to 1 dB/div.
   Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**

9. Set the sweep time to 200 msec.
   Operation: **{SWEEP}**, **Sweep Time (Man)**, **2**, **0**, **0**, and **m**

10. Set Min ATT of the input attenuator to OFF.
    Operation: **{LEVEL}** and **Min ATT (Off)**

11. Set the input attenuator to 10 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and **ENT**

12. Set the Display Line to -15 dBm.
    Operation: **[MENU2]**, **{DISPLAY}**, **Display Line (On)**, **-**, **1**, **5**, and **ENT**

13. Set the reference of the marker reading level to the display line
    Operation: **[MENU1]**, **{MKR}**, **Reference Object**, and **|Disp Line|**

14. Set the continuous peak search to ON.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (On)**

15. Adjust the output level of the signal generator to set the marker level to 0 dB ±0.01 dB.

Measuring the switching error

16. Set ATT to 5 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **5**, and **ENT**

17. Read the marker level and change the sign of the value, and enter the value into the performance verification sheet.

18. Ensure that the value is within the specified range.

19. Repeat steps 16 to 18 by using the ATT values from 15 dB to 75 dB in 5 dB increments.

20. Repeat steps 3 to 19 by using each frequency described in Table 2-9.

Table 2-9 Center frequency Setting List

The frequency measured by the R3671 is 13 GHz and lower.

Center frequency	Signal generator Set frequency
50 MHz	50 MHz
5 GHz	5 GHz
10 GHz	10 GHz
17 GHz	17 GHz
23 GHz	23 GHz
30 GHz	30 GHz

2.2.12 Resolution Bandwidth Switching Uncertainity

[Overview]

This section describes how to check the resolution bandwidth switching uncertainity.

Based on the amplitude at a resolution bandwidth of 100 kHz, the switching error from 1 kHz to 10 MHz is measured by using steps 1, 2, 3, and 5.

[Specifications]

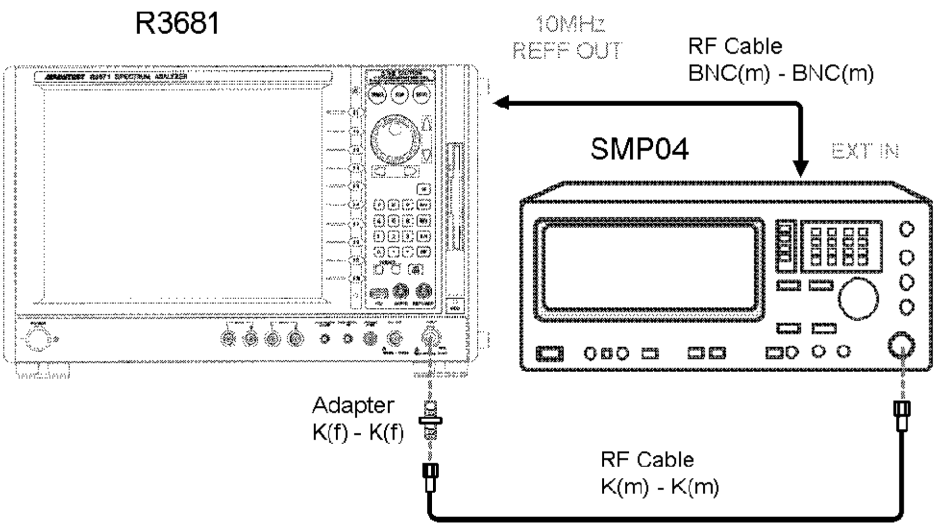
Switching error ±0.03 dB (1 Hz to 2 MHz)
±1.00 dB (3 MHz to 10MHz)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	1	SF102
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-12 Test of Resolution Bandwidth Switching Uncertainity

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-12.

Initialization

2. Preset this instrument.
   Operation: PRESET

Setting the signal generator

3. Specify the signal generator setting as follows:
   Output frequency: 100 MHz
   Output level: -5 dBm
   Reference frequency signal: External

Setting this instrument

4. Set the center frequency to 100 MHz.
   Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **MHz**
5. Set the display scale to 1 dB/div.
   Operation: **{LEVEL}**, **dB/div**, **1**, and ENT
6. Set the Ref LEVEL to 0 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **0**, and ENT
7. Set the Trace Detector mode to SAMPLE.
   Operation: **[MENU1]**, **TRACE**, **Trace Detector**, and **Sample**

Setting the switching error reference level

8. Set the resolution bandwidth to 100 kHz.
   Operation: **{BW}**, **RBW (Man)**, **1**, **0**, **0**, and **kHz**
9. Set the frequency span to 200 kHz.
   Operation: **{SPAN}**, **Span**, **2**, **0**, **0**, and **kHz**
10. Set SINGLE to perform a single sweep.
    Operation: SINGLE
11. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
12. Set ΔMARKER to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **ΔMarker (On)**

13. Set Fixed Marker to ON.
    Operation: **Fixed ΔMarker (On)**

Measuring the switching error

14. Set the resolution bandwidth to 10 MHz.
    Operation: **{BW}**, **RBW (Man)**, **1**, **0**, and **MHz**
15. Set the frequency span to 20 MHz.
    Operation: **{SPAN}**, **Span**, **2**, **0**, and **MHz**
16. Perform a single sweep.
    Operation: **SINGLE**
17. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
18. Read the marker display level and ensure that the value is within the specified range.
19. Repeat steps 14 to 18 by using each RBW described in Table 2-10.

Table 2-10 RBW Setting List

RBW setting [Hz]	Frequency span [Hz]
10 M	20 M
5 M	8 M
3 M	5 M
2 M	3 M
1 M	2 M
500 k	800 k
300 k	500 k
200 k	300 k
50 k	80 k
30 k	50 k
20 k	30 k
10 k	20 k
5 k	8 k
3 k	5 k
2 k	3 k
1 k	2 k

2.2.13 Displayed Average Noise Level

[Overview]

This section describes how to measure the displayed average noise level of the signal analyzer.

Measurement is performed under the following conditions: the input terminal is terminated, the input attenuator: 0 dB, RBW: normalized to 1 Hz, detector: sample, averaging: 20 times or more, and average type: video.

[Specifications]

Spectrum analysis mode (The frequency measured by the R3671 is 13 GHz and lower.)

Preamplifire off

100 Hz:	< -96 dBm
1 kHz:	< -119 dBm
10 kHz:	< -129 dBm
100 kHz:	< -130 dBm
1 MHz:	< -140 dBm
10 MHz to 1 GHz:	< -156 dBm
1 GHz to 2 GHz:	< -154 dBm
2 GHz to 2.5 GHz:	< -152 dBm
2.5 GHz to 3 GHz:	< -150 dBm
3 GHz to 3.5 GHz:	< -148 dBm
3.5 GHz to 7.5 GHz:	< -146 dBm
7.5 GHz to 15.4 GHz:	< -146 dBm
15.4 GHz to 26.5 GHz:	< -141 dBm
26.5 GHz to 32 GHz:	< -140 dBm

Preamplifire on

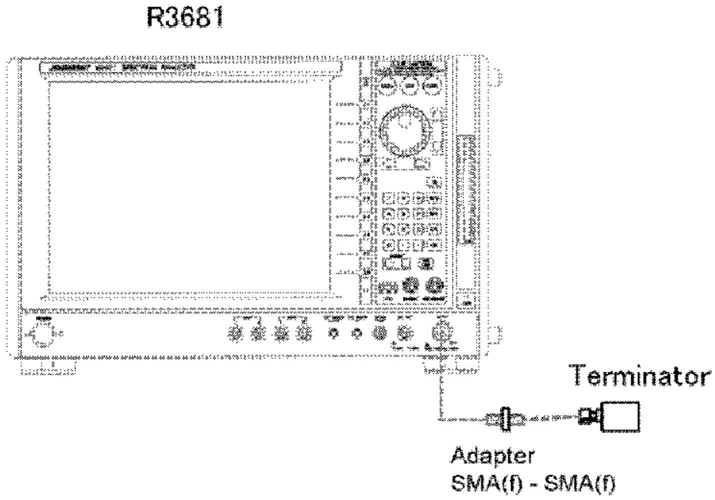
100 kHz:	< -136 dBm
1 MHz:	< -146 dBm
10 MHz to 1 GHz:	< -162 dBm
1 GHz to 2.5 GHz:	< -160 dBm
2.5 GHz to 3 GHz:	< -158 dBm
3 GHz to 3.5 GHz:	< -156 dBm

[Required instruments]

Instrument	Quantity	Recommended model
Adapter SMA(f)-SMA(f) *3	1	HRM-501
50 Ω terminator	1	HRM-601D(02)

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-13 Displayed Average Noise Level Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-13.

Setting and measurement method (10 kHz to 1 MHz)

2. Preset this instrument.
   Operation: **PRESET**

3. Set the frequency span to 0 Hz.
   Operation: **{SPAN}**, **Span**, and **Zero Span**

4. Set the resolution bandwidth to 1 kHz.
   Operation: **{BW}**, **RBW (Man)**, **1**, and **kHz**

5. Set the video bandwidth to 10 kHz.
   Operation: **{BW}**, **VBW (Man)**, **1**, **0** and **kHz**

6. Set the Trace Detector mode to SAMPLE.
   Operation: **[MENU1]**, **TRACE**, **Trace Detector**, and **Sample**

7. Set the average type to Video.
   Operation: **[MENU1]**, **TRACE**, **Average Type**, and **Video**

8. Set Min ATT of the input attenuator to OFF.
   Operation: **{LEVEL}** and **Min ATT (Off)**

9. Set the input attenuator to 0 dBm.
   Operation: **{LEVEL}**, **ATT (Man)**, **0**, and **ENT**

10. Set the Ref LEVEL to -90 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **9**, **0**, and **ENT**

11. Set the preamplifier to OFF.
    Operation: **{LEVEL}** and **Preamp (Off)**

12. Set the center frequency to 100 Hz.
    Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **ENT**

13. Set the sweep time to 200 msec.
    Operation: **|MENU1|**, **{SWEEP}**, **Sweep Time (Man)**, **2**, **0**, **0**, and **m**

14. Perform the averaging by setting the averaging count to 50.
    Operation: **|MENU1|**, **TRACE**, **Average**, **5**, **0**, and **ENT**

15. Read the marker level and then enter the value into the performance verification sheet.
    Operation: **|MENU1|** and **{MKR}**

16. Repeat steps 12 to 15 by using each frequency up to 1 MHz described in Table 2-11.

17. Set the preamplifier to ON.

18. Repeat steps 12 to 15 by using 100 kHz and 1 MHz center frequencies.

Table 2-11 Center Frequency Setting List

Mode	Preamplifire	Frequency
SPA	Off	100 Hz
		1 kHz
		10 kHz
		100 kHz
		1 MHz
	On	100 kHz
		1 MHz

Setting and measurement method
(10 MHz or higher. The frequency measured by the R3671 is 13 GHz and lower.)

19. Preset this instrument.
    Operation: **PRESET**

20. Set the Start frequency to 10 MHz.
    Operation: **{FREQ}**, **Start**, **1**, **0**, and **MHz**

21. Set the Stop frequency to 1 GHz.
    Operation: **Stop** , **1** , and **GHz**

22. Set the resolution bandwidth to 1 MHz.
    Operation: **{BW}**, **RBW (Man)**, **1** , and **MHz**

23. Set the video bandwidth to 1 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1** , and **kHz**

24. Set the Trace Detector mode to SAMPLE.
    Operation: **[MENU1]**, **TRACE** , **Trace Detector** , and **Sample**

25. Set Min ATT of the input attenuator to OFF.
    Operation: **{LEVEL}** and **Min ATT (Off)**

26. Set the input attenuator to 0 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **0** , and ENT

27. Set the Ref LEVEL to -50 dBm.
    Operation: **{LEVEL}**, **Ref Level** , **-** , **5** , **0** , and ENT

28. Set the preamplifier to OFF.
    Operation: **{LEVEL}** and **Preamp (Off)**

29. Perform a single sweep.
    Operation: SINGLE

30. Perform PEAK→CF.
    Operation: **[MENU1]**, **{MKR→}**, and **Peak→CF**

31. Set the frequency span to 100 MHz.
    Operation: **{SPAN}**, **Span** , **1** , **0** , **0** , and **MHz**

32. Set the resolution bandwidth to 100 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1** , **0** , **0** , and **kHz**

33. Set the video bandwidth to 200 Hz.
    Operation: **{BW}**, **VBW (Man)**, **2** , **0** , **0** , and ENT

34. Perform a single sweep.
    Operation: SINGLE

35. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

36. Perform MKR→CF.
    Operation: **[MENU1]**, **{MKR→}**, and **Marker→CF**

37. Set the sweep time to 200 msec.
    Operation: **[MENU1]**, **{SWEEP}**, **Sweep Time (Man)**, **2** , **0** , **0** , and m

38. Set the frequency span to 0 Hz.
    Operation: **{SPAN}** and **Zero Span**

39. Set the resolution bandwidth to 1 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1** , and **kHz**

40. Set the video bandwidth to 10 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, **0**, and **kHz**

41. Set the Ref LEVEL to -100 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **0**, **0**, and **ENT**

42. Perform the continuous sweep.
    Operation: **START**

43. Perform the averaging by setting the averaging count to 50.
    Operation: **[MENU1]**, **TRACE**, **Average**, **5**, **0**, and **ENT**

44. After averaging is complete, perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

45. Read the marker frequency and level, and then enter the value into the performance verification sheet.

46. Repeat steps 20 to 45 by using each frequency range described in Table 2-12 when the preamplifier is set to Off.

47. Repeat steps 20 to 27.

48. Set the preamplifier to ON.
    Operation: **{LEVEL}** and **Preamp (On)**

49. Repeat steps 29 to 45.

50. Repeat steps 47 to 49 by using each frequency range described in Table 2-12 when the preamplifier is set to On.

Table 2-12 Frequency Range Setting List

The frequency measured by the R3671 is 13 GHz and lower.

Mode	Preamplifire	Frequency	Start freq	Stop freq
SPA	Off	10 MHz to 1 GHz	10 MHz	1 GHz
		1 GHz to 2 GHz	1 GHz	2 GHz
		2 GHz to 2.5 GHz	2 GHz	2.5 GHz
		2.5 GHz to 3 GHz	2.5 GHz	3 GHz
		3 GHz to 3.5 GHz	3 GHz	3.5 GHz
		3.5 GHz to 7.5 GHz	3.5 GHz	7.5 GHz
		7.5 GHz to 15.4 GHz	7.5 GHz	15.4 GHz
		15.4 GHz to 26.5 GHz	15.4 GHz	26.5 GHz
		26.5 GHz to 32 GHz	26.5 GHz	32 GHz
	On	10 MHz to 1 GHz	10 MHz	1 GHz
		1 GHz to 2.5 GHz	1 GHz	2.5 GHz
		2.5 GHz to 3 GHz	2.5 GHz	3 GHz
		3 GHz to 3.5 GHz	3 GHz	3.5 GHz

2.2.14 1 dB Gain Compression

[Overview]

This section describes how to check the gain compression.

The gain compression is measured by using two signal generators to synthesize two signals with a 1 MHz difference, and inputting the signal into this instrument.

One of the signals is fixed at -30 dBm, and the other signal level is increased until the fixed signal level decreases by 1 dB. The input level to this instrument at this point is the gain compression level.

[Specifications]

(The frequency measured by the R3671 is 13 GHz and lower.)

Separation of the two signals: Resolution bandwidth × 15, 50 kHz min

10 MHz to 200 MHz: > +4 dBm

200 MHz to 3.5 GHz: > +7 dBm

3.5 GHz to 7.5 GHz: > -5 dBm

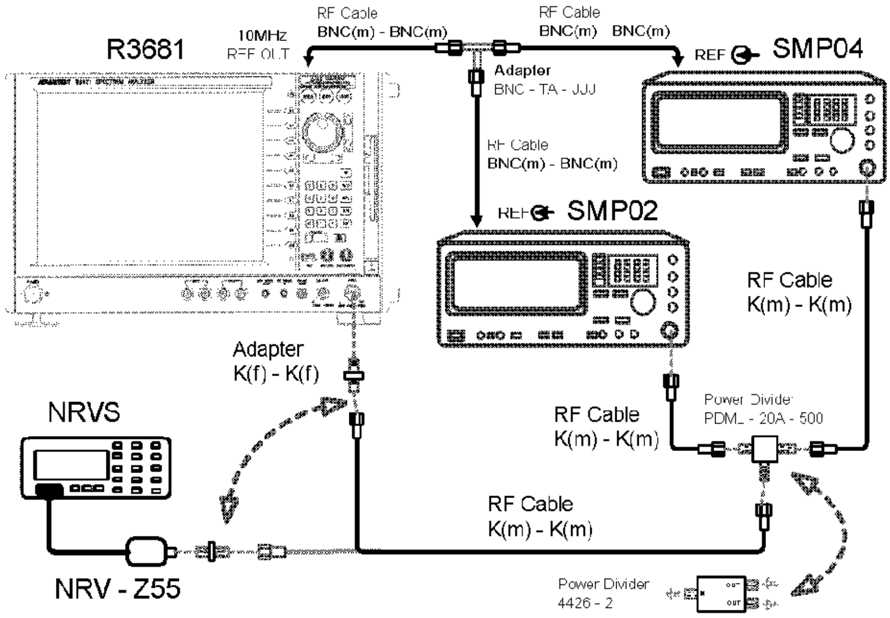
7.5 GHz to 32 GHz: > -3 dBm

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator 1 *1	1	SMP04
Signal generator 2 *1	1	SMP02
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
Power divider	1	PDML-20A-500
Power divider *1	1	4426-2
RF cable BNC(m)-BNC(m)	3	A01036-1500
RF cable K(m)-K(m) *2	3	SF102
Adapter BNC-TA-JJJ	1	302-0024-6
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*4: The frequency measured by the R3671 is 13 GHz and lower.

Figure 2-14 1 dB Gain Compression Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-14.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform the calibration.
3. Set the power meter to the dBm display.
4. Set the calibration frequency of the power meter to 100 MHz.

Initialization

5. Preset this instrument.
   Operation: **PRESET**

Setting signal generator 1

6. Specify the signal generator 1 setting as follows:
   Output frequency: 100 MHz
   Output level: -10 dBm

Setting signal generator 2

7. Specify the signal generator 2 setting as follows:
   Output frequency: 101 MHz
   Output level: -10 dBm

Setting this instrument

8. Set the center frequency to 100.5 MHz.
   Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, **.**, **5**, and **MHz**
9. Set the frequency span to 2 MHz.
   Operation: **{SPAN}**, **Span**, **2**, and **MHz**
10. Set the Ref LEVEL to -30 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **3**, **0**, and **ENT**
11. Set Min ATT of the input attenuator to OFF.
    Operation: **{LEVEL}** and **Min ATT (Off)**
12. Set the input attenuator to 0 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **0**, and **ENT**
13. Set the display scale to 1 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**

Measuring the 1 dB gain compression

14. Set the output of signal generator 2 to OFF.
15. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
16. Set the continuous peak search to ON.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (On)**
17. Adjust the output level of signal generator 1 to set the marker display level to -30 dBm ± 0.1 dBm.
18. Set the continuous peak search to OFF.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (Off)**
19. Set ΔMARKER to ON and Fixed ΔMarker to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **Fixed ΔMarker (On)**

20. Set the output of signal generator 2 to ON.
21. Adjust the output level of signal generator 2 to set the ΔMARKER display level to -1 dB ± 0.1 dB.
22. Set the output of signal generator 1 to OFF.
23. Remove the cable, which is connected to the RF input and connect it to the power sensor.
24. Enter the value on the power meter into the performance verification sheet.
25. Ensure that the entered level is within the specified range.
26. Repeat steps 4 to 24 by using 1.5 GHz and 2.4 GHz described in the table shown below.

Signal generator 1	Signal generator 2	Center frequency	Power meter
100 MHz	101 MHz	100.5 MHz	100 MHz
1.5 GHz	1.501 GHz	1.5005 GHz	1.5 GHz
2.4 GHz	2.401 GHz	2.4005 GHz	2.4 GHz

Setting the power meter

27. Set the calibration frequency of the power meter to 5 GHz.

Initialization

28. Preset this instrument.
    Operation: **PRESET**

Setting signal generator 1

29. Specify the signal generator 1 setting as follows:
    Output frequency: 5 GHz
    Output level: -35 dBm

Setting signal generator 2

30. Specify the signal generator 2 setting as follows:
    Output frequency: 5.001 GHz
    Output level: -10 dBm

Setting this instrument

31. Set the center frequency to 5.0005 GHz.
    Operation: **{FREQ}**, **Center**, **5**, **.**, **0**, **0**, **0**, **5**, and **GHz**

32. Set the frequency span to 2 MHz.
    Operation: **{SPAN}**, **Span**, **2**, and **MHz**

33. Set the Ref LEVEL to -30 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **3**, **0**, and **ENT**

34. Set MinATT of the input attenuator to OFF.
    Operation: **{LEVEL}** and **Min ATT (Off)**

35. Set the input attenuator to 0 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **0**, and **ENT**

36. Set the display scale to 1 dB/div.
    Operation: **{LEVEL}**, **dB/div**, **1**, and **ENT**

Tuning the pre-selector

37. Set the output of signal generator 2 to OFF.

38. Tune the pre-selector.
    Operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

Measuring the 1 dB gain compression

39. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

40. Set the continuous peak search to ON.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (On)**

41. Adjust the output level of signal generator 1 to set the marker display level to -30 dBm ±0.1 dBm.

42. Set the continuous peak search to OFF.
    Operation: **[MENU1]**, **{SEARCH}**, and **Cont Peak (Off)**

43. Set ΔMARKER to ON and Fixed ΔMarker to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **Fixed ΔMarker (On)**

44. Set the output of signal generator 2 to ON.

45. Adjust the output level of signal generator 2 to set the ΔMARKER display level to -1 dB ±0.1 dB.

46. Set the output of signal generator 1 to OFF.

47. Remove the cable, which is connected to the RF input and connect it to the power sensor.

48. Enter the value on the power meter into the performance verification sheet.

49. Ensure that the entered level is within the specified range.

50. Repeat steps 26 to 49 by using 7 GHz and 10 GHz described in the table shown below.

Signal generator 1	Signal generator 2	Center frequency	Power meter
5 GHz	5.001 GHz	5.0005 GHz	5 GHz
7 GHz	7.001 GHz	7.0005 GHz	7 GHz
10 GHz	10.001 GHz	10.0005 GHz	10 GHz

2.2.15 2nd Order Harmonic Distortion

[Overview]

This section describes how to check the 2nd order harmonic distortion, which occurs in this instrument, by inputting a distorted signal.

The 2nd order harmonic distortion is measured by inputting a signal from the signal generator into this instrument through the low pass filter.

The low pass filter is used to restrain the 2nd order harmonic distortion.

[Specifications]

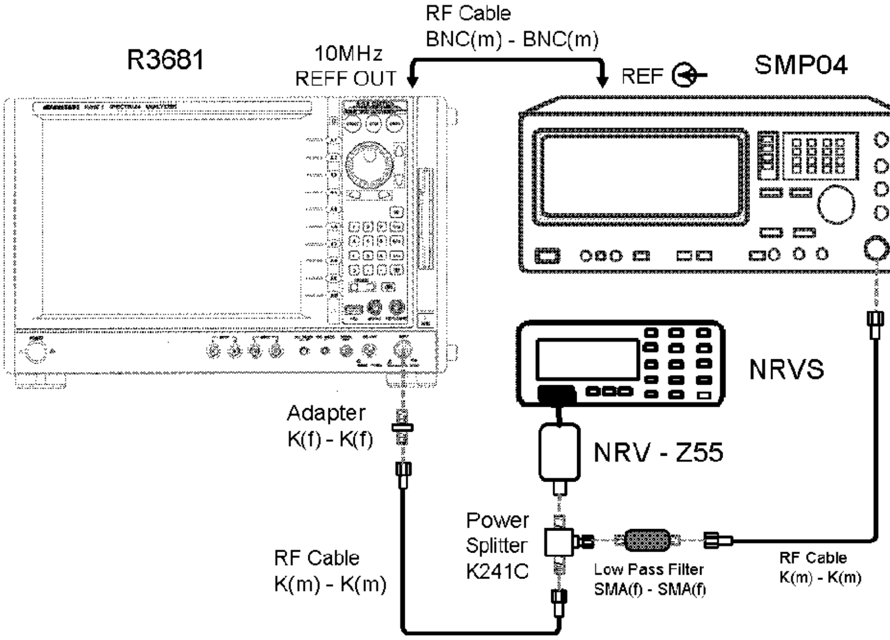
2nd order harmonic distortion: ≤ -60 dBc (10 MHz to 1.75 GHz, mixer input level -20 dBm)
≤ -90 dBc (> 1.75 GHz, mixed input level -10 dBm)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
Power splitter *1	1	K241C
Low pass filter	1	*4 RLC ELECTRONICS, INC.
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	2	SF102
Adapter K(f)-K(f) *3	2	JCF-DR001JX01

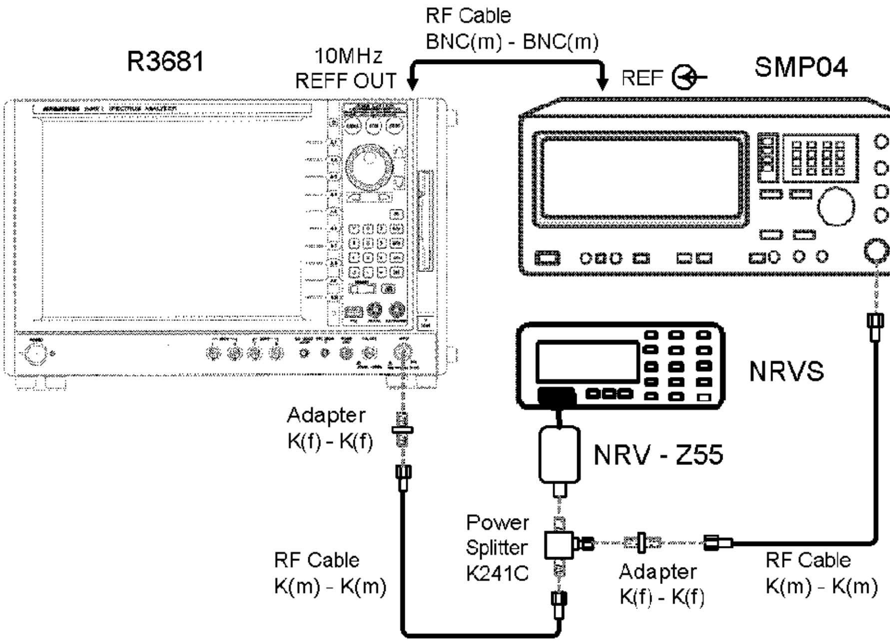
*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).
*4: Use the low pass filter as described below.
The connector type of the F-80 series is SMA(f)-SMA(f).
Insertion loss at 1.5 GHz: 2 dB or lower
Rejection at 3 GHz: 30 dB or higher

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-15 2nd Order Harmonic Distortion Test (with the Filter)



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-16 2nd Order Harmonic Distortion Test (without the Filter)

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-15.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform the calibration.
3. Set the power meter to the dBm display.
4. Set the calibration frequency of the power meter to 1.5 GHz.

Initialization

5. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

6. Specify the signal generator setting as follows:
   Output frequency: 1.5 GHz
   Output level: -10 dBm
   Reference frequency signal: External

Setting this instrument

7. Set the center frequency to 1.5 GHz.
   Operation: **{FREQ}**, **Center**, **1**, **.**, **5**, and **GHz**
8. Set the frequency span to 10 kHz.
   Operation: **{SPAN}**, **Span**, **1**, **0**, and **kHz**
9. Set the input attenuator to 10 dBm.
   Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and **ENT**
10. Set the Ref LEVEL to -10 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **0**, and **ENT**
11. Set the video bandwidth to 30 Hz.
    Operation: **{BW}**, **VBW (Man)**, **3**, **0**, and **Hz**
12. Adjust the output level of the signal generator to set the power meter display level to -10 dBm ±0.09 dBm.
13. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

14. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
15. Set Fixed MARKER to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **Fixed ΔMarker (On)**
16. Set the center frequency of this instrument to 3 GHz.
    Operation: **{FREQ}**, **Center**, **3**, and **GHz**.
17. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**
18. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
19. Read the ΔMARKER value and ensure that the value is within the specified range.
20. Perform the continuous sweep.
    Operation: **START**
21. Set the marker to OFF.
    Operation: **[MENU1]**, **{MKR}**, and **Marker All Off**

Fundamental frequency	Harmonic frequency
1.5 GHz	3.0 GHz

Changing the connection of the instruments

22. Change the connection of the instruments as shown in Figure 2-16. (Remove the low pass filter and connect the instruments by using the adapter K(f)-K(f).)

Setting the signal generator

23. Specify the signal generator setting as follows:

    Output frequency: 3.8 GHz

    Output level: -10 dBm

Setting this instrument

24. Set the center frequency to 3.8 GHz.
    Operation: **{FREQ}**, **Center**, **3**, **.**, **8**, and **GHz**
25. Set the frequency span to 500 kHz.
    Operation: **{SPAN}**, **Span**, **5**, **0**, **0**, and **kHz**
26. Tune the pre-selector.
    Operation: **{FREQ}**, **Presel Tune**, and **Auto Tune**

27. After the pre-selector is tuned, specify the signal generator setting as follows:

    Output frequency: 1.9 GHz

    Output level: 0 dBm

28. Set the calibration frequency of the power meter to 1.9 GHz.

29. Adjust the output level of the signal generator to set the power meter display level to 0 dBm ±0.09 dBm.

30. Set the center frequency to 1.9 GHz.
    Operation: **{FREQ}**, **Center**, **1**, **.**, **9**, and **GHz**

31. Set the frequency span to 1 kHz.
    Operation: **{SPAN}**, **Span**, **1**, and **kHz**

32. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

33. Set Fixed MARKER to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **Fixed ΔMarker (On)**

34. Set the center frequency to 3.8 GHz.
    Operation: **{FREQ}**, **Center**, **3**, **.**, **8**, and **GHz**

35. Set the Ref LEVEL to -40 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **4**, **0**, and ENT

36. Perform the averaging by setting the averaging count to 20.
    Operation: **[MENU1]**, **TRACE**, **Average**, **2**, **0**, and ENT.

37. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

38. Read the ΔMARKER value and ensure that the value is within the specified range.

2.2.16 Third Order Intermodulation Distortion

[Overview]

This section describes how to check the third order intermodulation distortion by measuring the third order distortion, which occurs when two signals are input.

[Specifications]

(The frequency measured by the R3671 is 13 GHz and lower.)

Mixer input level: -20 dBm, the frequency difference of the two signals: 25 kHz

10 MHz to 200 MHz: > +14 dBm

200 MHz to 500 MHz: > +17 dBm

500 MHz to 1 GHz: > +20 dBm

1 GHz to 2 GHz: > +21 dBm

2 GHz to 3.5 GHz: > +22 dBm

3.5 GHz to 7.5 GHz: > +5 dBm

7.5 GHz to 32 GHz: > +8 dBm

[Required instruments]

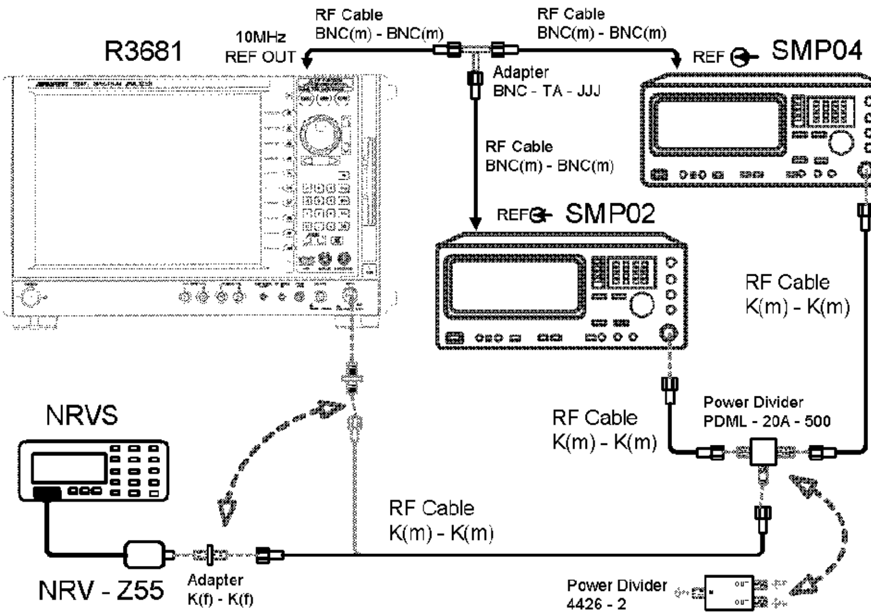
Instrument	Quantity	Recommended model
Signal generator 1 *1	1	SMP04
Signal generator 2 *1	1	SMP02
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
Power divider	1	PDML-20A-500
Power divider *1	1	4426-2
RF cable BNC(m)-BNC(m)	3	A01036-1500
RF cable K(m)-K(m) *2	3	SF102
Adapter BNC-TA-JJJ	1	302-0024-6
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-17 Third Order Intermodulation Distortion Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-17.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform the calibration.
3. Set the power meter to the dBm display.

Initialization

4. Preset this instrument.
   Operation: **PRESET**

Setting signal generator 1

5. Specify the signal generator 1 setting as follows:
   Output frequency: 99.9875 MHz
   Output level: -10 dBm

Setting signal generator 2

6. Specify the signal generator 2 setting as follows:
   Output frequency: 100.0125 MHz
   Output level: -10 dBm

Setting this instrument

7. Set the center frequency to 100 MHz.
   Operation: **{FREQ}**, **Center**, **1**, **0**, **0**, and **MHz**
8. Set the frequency span to 100 kHz.
   Operation: **{SPAN}**, **Span**, **1**, **0**, **0**, and **kHz**
9. Set the Ref LEVEL to -10 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **0**, and ENT
10. Set the resolution bandwidth to 1 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1**, and **kHz**
11. Set ADC Dither to ON.
    Operation: **{BW}**, and **ADC Dither (On)**
12. Set the video bandwidth to 10 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, **0**, and **kHz**
13. Set the input attenuator to 10 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and ENT

Adjusting the output level of signal generator 1 and 2

14. Set the calibration frequency of the power meter to 100 MHz.
15. Connect the power sensor to the RF cable.
16. Set the output of signal generator 2 to OFF.
17. Adjust the output level of signal generator 1 to set the power meter display level to -10 dBm ±0.1 dBm.
18. Set the output of signal generator 1 to OFF and the output of signal generator 2 to ON.
19. Adjust the output level of signal generator 2 to set the power meter display level to -10 dBm ±0.1 dBm.
20. Set the output of signal generator 1 to ON.
21. Remove the cable, which is connected to the power sensor and connect it to the RF input.

Measuring the third order intermodulation distortion

22. Perform the SINGLE sweep.
    Operation: **SINGLE**

23. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

24. Perform MKR→Ref.
    Operation: **[MENU1]**, **{MKR→}**, and **Marker→Ref**

25. Perform a single sweep.
    Operation: **SINGLE**

26. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

27. Set the Delta Marker to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker** , and **ΔMarker (On)**

28. Move the marker to the right third-order distortion peak to read the marker level.

29. Move the marker to the left third-order distortion peak to read the marker level.

30. The value, which is greater than the other, is the 2-signal 3rd order harmonic distortion when -20 dBm is input.

31. Repeat step 5 to step 29 by using the frequencies described in the table shown below.

    The frequency measured by the R3671 is 13 GHz and lower.

Signal generator 1	Signal generator 2	Center frequency	Power meter
99.9875 MHz	100.0125 MHz	100 MHz	100 MHz
299.9875 MHz	300.0125 MHz	300 MHz	300 MHz
799.9875 MHz	800.0125 MHz	800 MHz	800 MHz
1499.9875 MHz	1500.0125 MHz	1.5 GHz	1.5 GHz
2399.9875 MHz	2400.0125 MHz	2.4 GHz	2.4 GHz

Initialization

32. Preset this instrument.
    Operation: **PRESET**

Setting signal generator 1

33. Specify the signal generator 1 setting as follows:

    Output frequency: 4999.9875 MHz

    Output level: -10 dBm

Setting signal generator 2

34. Specify the signal generator 2 setting as follows:
    Output frequency: 5000.0125 MHz
    Output level: -10 dBm

Setting this instrument

35. Set the center frequency to 5 GHz.
    Operation: **{FREQ}**, **Center**, **5**, and **GHz**
36. Set the frequency span to 100 kHz.
    Operation: **{SPAN}**, **Span**, **1**, **0**, **0**, and **kHz**
37. Set the Ref LEVEL to -10 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **1**, **0**, and ENT
38. Set the resolution bandwidth to 1 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1**, and **kHz**
39. Set ADC Dither to ON.
    Operation: **{BW}**, and **ADC Dither (On)**
40. Set the video bandwidth to 10 Hz.
    Operation: **{BW}**, **VBW (Man)**, **1**, **0**, and ENT
41. Set the input attenuator to 10 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **1**, **0**, and ENT

Adjusting the output level of signal generator 1 and 2

42. Set the calibration frequency of the power meter to 5 GHz.
43. Remove the RF cable, which is connected to this instrument, and connect it to the power sensor.
44. Set the output of signal generator 2 to OFF.
45. Adjust the output level of signal generator 1 to set the power meter display level to -10 dBm ±0.1 dBm.
46. Set the output of signal generator 1 to OFF and the output of signal generator 2 to ON.
47. Adjust the output level of signal generator 2 to set the power meter display level to -10 dBm ±0.1 dBm.
48. Set the output of signal generator 1 to ON.
49. Remove the cable, which is connected to the power sensor, and connect it to the RF input of this instrument.

Tuning the pre-selector

50. Set the output of signal generator 2 to OFF.
51. Tune the pre-selector.
    Operation: **{FREQ}**, **Presel Tune** , and **Auto Tune**
52. After the pre-selector is tuned, set the output of signal generator 2 to ON.

Measuring the third order intermodulation distortion

53. Perform the SINGLE sweep.
    Operation: **SINGLE**
54. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
55. Perform MKR→Ref.
    Operation: **[MENU1]**, **{MKR→}**, and **Marker→Ref**
56. Perform a single sweep.
    Operation: **SINGLE**
57. After the sweep is complete, perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**
58. Set the Delta Marker to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker** , and **ΔMarker (On)**
59. Move the marker to the right third-order distortion peak to read the marker level.
    Operation: Rotate the data knob.
60. Move the marker to the left third-order distortion peak to read the marker level.
    Operation: Rotate the data knob.
61. The value, which is greater than the other, is the 2-signal 3rd order harmonic distortion when -20 dBm is input.
62. Repeat steps 32 to 59 by using the frequencies described in the table shown below.

Signal generator 1	Signal generator 2	Center frequency	Power meter
4999.9875 MHz	5000.0125 MHz	5 GHz	5 GHz
6999.9875 MHz	7000.0125 MHz	7 GHz	7 GHz
9999.9875 MHz	10000.0125 MHz	10 GHz	10 GHz

63. Substitute the absolute value of the 2-signal 3rd order harmonic distortion, which is obtained from the measurement, to the formula below to obtain the TOI.

    Formula: TOI [dBm] = -20 dBm + (the absolute value of the 2-signal 3rd order harmonic distortion) / 2

2.2.17 Image, Multiple, and Out-Of Band Responses

[Overview]

This section describes how to check the image, multiple, and out-of band responses.

[Specifications]

(The frequency measured by the R3671 is 13 GHz and lower.)

10 MHz to 15.4 GHz: < -75 dBc

15.4 GHz to 26.5 GHz: < -70 dBc

26.5 GHz to 32 GHz: < -65 dBc

[Required instruments]

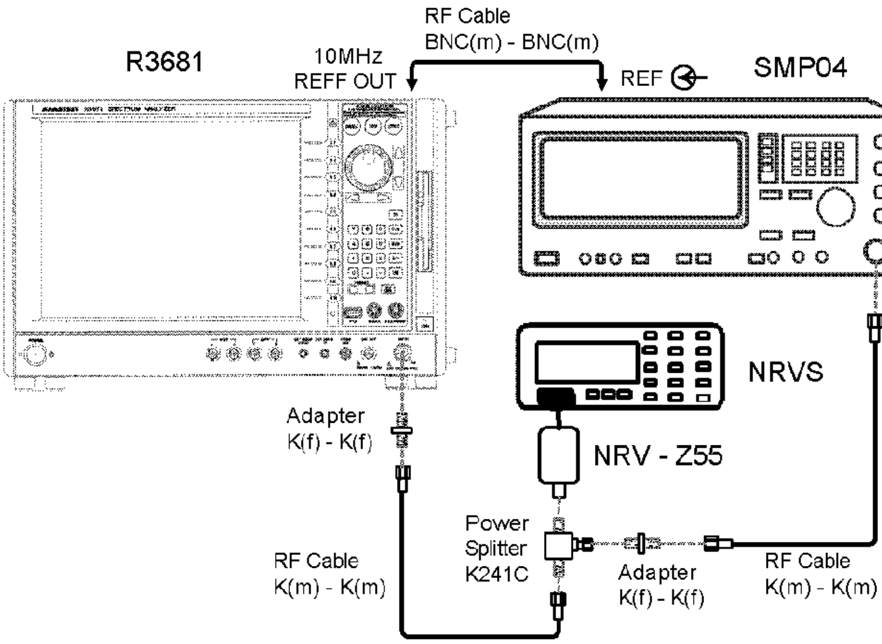
Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
Power splitter *1	1	K241C
RF cable BNC(m)-BNC(m)	1	A01036-1500
RF cable K(m)-K(m) *2	2	SF102
Adapter K(f)-K(f) *3	2	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-18 Image, Multiple, and Out-Of Band Response Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-18.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform the calibration.
3. Set the power meter to the dBm display.

Initialization

4. Preset this instrument.
   Operation: **PRESET**

Setting the signal generator

5. Specify the signal generator setting as follows:
   Output level: 0 dBm
   Reference frequency signal: External

Setting this instrument

6. Set the frequency span to 5 MHz.
   Operation: **{SPAN}**, **Span**, **5**, and **MHz**

7. Set the resolution bandwidth to 100 kHz.
   Operation: **{BW}**, **RBW (Man)**, **1**, **0**, **0**, and **kHz**

8. Set the video bandwidth to 1 kHz.
   Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**

Image, multiple, and out-of band responses test

9. Set the output frequency of the signal generator to 2 GHz.

10. Set the center frequency of this instrument to 2 GHz.
    Operation: **{FREQ}**, **Center**, **2**, and **GHz**

11. Set the calibration frequency of the power meter to 2 GHz.

12. Adjust the output level of the signal generator to set the power meter reading to 0 dBm ±0.1 dBm.

13. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

14. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

15. Set Fixed ΔMARKER to ON.
    Operation: **[MENU1]**, **{MKR}**, **Delta Marker**, and **Fixed ΔMarker (On)**

16. Perform the continuous sweep.
    Operation: **START**

17. Set the output frequency of the signal generator to 1.9572 GHz.

18. Set the calibration frequency of the power meter to 1.96 GHz.

19. Adjust the output level of the signal generator to set the power meter reading to 0 dBm ±0.1 dBm.

20. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

21. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

22. Read the delta marker reading value and ensure that the value is within the specified range.

23. Perform steps 6 to 22 by using the frequencies described in the table shown below. If the center frequency is set to 3.5 GHz or higher, tune the pre-selector after performing step 10.

The frequency measured by the R3671 is 13 GHz and lower.

Center frequency in step 9, 10, and 11 [GHz]	SMP04 output frequency in step 17 [GHz]	NRVS calibration frequency in step 18 [GHz]
2	1.9572	1.96
2	1.1572	1.16
2	10.8628	10.86
2	8.4314	8.43
5.5	6.3428	6.34
5.5	11.4214	11.42
5.5	17.3428	17.34
5.5	23.2642	23.26
12	12.8428	12.84
12	5.7893	5.79
12	18.2107	18.21
12	24.4214	24.42
24.4	25.2428	25.24
24.4	5.78395	5.78
24.4	11.9893	11.99
24.4	18.19465	18.19
28	28.8428	28.84
28	6.89465	6.89
28	13.7893	13.79
28	20.89465	20.89

2.2.18 Residual Response

[Overview]

This section describes how to measure the residual response when the Preamplifier is set to OFF or ON.

[Specifications]

(The frequency measured by the R3671 is 13 GHz and lower.)

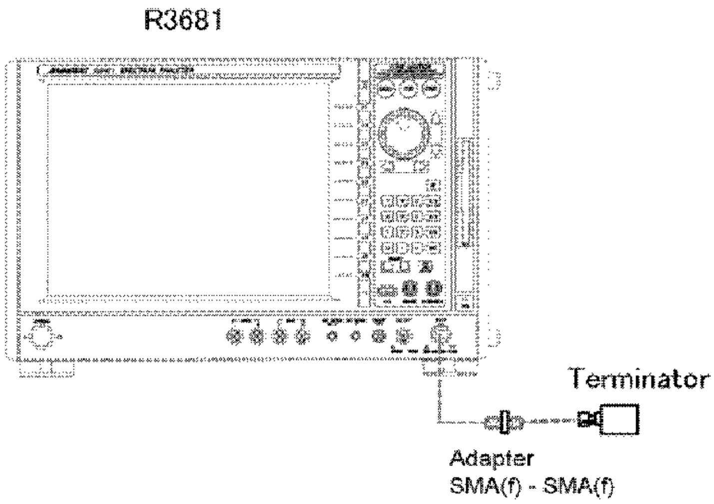
Preamplifire OFF	< -100 dBm	(1 MHz to 3.5 GHz)
	< -90 dBm	(3.5 GHz to 32 GHz)
Preamplifire ON	< -105 dBm	(1 MHz to 3.5 GHz)

[Required instruments]

Instrument	Quantity	Recommended model
Adapter SMA(f)-SMA(f) *3	1	HRM-501
50 Ω terminator	1	HRM-601D(02)

*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-19 Residual Response Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-19.

Measuring the residual response in the 1 MHz to 3.5 GHz frequency range

2. Set the center frequency to 2 MHz.
   Operation: **{FREQ}**, **Center**, **2**, and **MHz**
3. Set the frequency span to 2 MHz.
   Operation: **{SPAN}**, **Span**, **2**, and **MHz**
4. Set the CF step size to 1.9 MHz.
   Operation: **{FREQ}**, **CF Step Size**, **1**, **.**, **9**, and **MHz**
5. Set the resolution bandwidth to 3 kHz.
   Operation: **{BW}**, **RBW (Man)**, **3**, and **kHz**
6. Set the video bandwidth to 300 Hz.
   Operation: **{BW}**, **VBW (Man)**, **3**, **0**, **0**, and **Hz**
7. Set MinATT of the input attenuator to OFF.
   Operation: **{LEVEL}** and **Min ATT (Off)**
8. Set the input attenuator to 0 dBm.
   Operation: **{LEVEL}**, **ATT (Man)**, **0**, and **ENT**
9. Set the Ref LEVEL to -50 dBm.
   Operation: **{LEVEL}**, **Ref Level**, **-**, **5**, **0**, and **ENT**
10. Set the preamplifier to OFF.
    Operation: **{LEVEL}** and **Preamp (Off)**
11. Set the Display Line to -106 dBm (the specification value -1 dB).
    Operation: **[MENU2]**, **{DISPLAY}**, **Display Line (On)**, **-**, **1**, **0**, **6**, and **ENT**
12. Perform a single sweep.
    Operation: **SINGLE**

    The noise level must be at least 3 dB lower than the display line. If the noise level is close to the display line, narrow the frequency span and resolution bandwidth to reduce the noise level.

    If the frequency span is narrowed, set the CF step size to approximately 95% of the frequency span. If the setting is changed, perform a single sweep.

    Operation: **SINGLE**
13. Set the marker reference to the display line.
    Operation: **[MENU1]**, **{MKR}**, **Reference Object**, and **[Disp Line]**
    Close the dialog box.

14. Perform a peak search.
    Operation: **[MENU1]** and **{SEARCH}**

15. Read the marker frequency and level.

16. If the marker level is set to 0 dB or higher, perform a single sweep, and then perform a peak search and measure the frequency and level.

17. If the marker frequencies and levels in step 15 and step 16 are equivalent, a residual response may exist. Check the residual response by following steps 18 to 27. If the level is lower than 0 dB, follow the procedure from step 28.

18. Save the current setting by using the Save function.
    Operation: Click on **[File]** from the menu bar and then select **[Save Data...]**

19. Perform MKR→CF.
    Operation: **[MENU1]**, **{MKR→}**, and **Marker→CF**

20. Set the resolution bandwidth to 1 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1**, and **kHz**

21. Set the video bandwidth to 10 Hz.
    Operation: **{BW}**, **VBW (Man)**, **1**, **0**, and **ENT**

22. Set the frequency span to 50 kHz.
    Operation: **{SPAN}**, **Span**, **5**, **0**, and **kHz**

23. Set the marker reference object to No Reference.
    Operation: **[MENU1]**, **{MKR}**, **Reference Object**, and **[No Reference]**

24. Set SINGLE to perform a single sweep.
    Operation: **SINGLE**

25. Perform a peak search, and then enter the frequency and level into the performance verification sheet.
    Operation: **[MENU1]** and **{SEARCH}**

26. Ensure that the level entered in step 25 is within the specified range.

27. Use the Recall function to return the setting to the one saved in step 18.
    Operation: Click **[File]** from the menu bar and then select [Load Data...]

28. Increase the center frequency 1.9 MHz and repeat steps 3 to 17.
    Operation: **{FREQ}**, **Center**, and ▲

29. Repeat step 28 until the center frequency reaches 3.499 GHz or higher.

Measuring the residual response in the 3.5 GHz to 32 GHz frequency range
(The frequency measured by the R3671 is 13 GHz and lower.)

30. Set the center frequency to 3.525 GHz.
    Operation: **{FREQ}**, **Center**, **3**, **.**, **5**, **2**, **5**, and **GHz**

31. Set the frequency span to 50 MHz.
    Operation: **{SPAN}**, **Span**, **5**, **0**, and **MHz**

32. Set the resolution bandwidth to 30 kHz.
    Operation: **{BW}**, **RBW (Man)**, **3**, **0**, and **kHz**

33. Set the video bandwidth to 1 kHz.
    Operation: **{BW}**, **VBW (Man)**, **1**, and **kHz**

34. Set the CF step size to 47.5 MHz.
    Operation: **{FREQ}**, **CF Step Size**, **4**, **7**, **.**, **5**, and **MHz**

35. Set the Display Line to -91 dBm.
    Operation: **|MENU2|**, **{DISPLAY}**, **Display Line (On)**, **-**, **9**, **1**, and **ENT**

36. Perform the measurement in the same manner as in steps 12 to 17.

37. Increase the center frequency 47.5 MHz and repeat step 36.
    Operation: **{FREQ}**, **Center**, and ▲

38. Repeat step 37 until the center frequency reaches 31.975 GHz or higher.

Measuring the residual response in the 1 MHz to 3.5 GHz frequency range, and when the Preamplifier is set to ON

39. Set the center frequency to 2 MHz.
    Operation: **{FREQ}**, **Center**, **2**, and **MHz**

40. Set the frequency span to 2 MHz.
    Operation: **{SPAN}**, **Span**, **2**, and **MHz**

41. Set the CF step size to 1.9 MHz.
    Operation: **{FREQ}**, **CF Step Size**, **1**, **.**, **9**, and **MHz**

42. Set the resolution bandwidth to 3 kHz.
    Operation: **{BW}**, **RBW (Man)**, **3**, and **kHz**

43. Set the video bandwidth to 300 Hz.
    Operation: **{BW}**, **VBW (Man)**, **3**, **0**, **0**, and **ENT**

44. Set the input attenuator to 0 dBm.
    Operation: **{LEVEL}**, **ATT (Man)**, **0**, and **ENT**

45. Set the Ref LEVEL to -50 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **5**, **0**, and **ENT**

46. Set the preamplifier to ON.
    Operation: **{LEVEL}** and **Preamp (On)**

47. Set the Display Line to -101 dBm.
    Operation: **|MENU2|**, **{DISPLAY}**, **Display Line (On)**, **-**, **1**, **0**, **1**, and **ENT**

48. Perform the measurement in the same manner as in steps 12 to 17.

49. Increase the center frequency 1.9 MHz and repeat step 48.
    Operation: **{FREQ}**, **Center**, and ▲

50. Repeat step 49 until the center frequency reaches 3.499 GHz or higher.

2.2.19 Coupling Level Accuracy

[Overview]

This section describes how to check the coupling level accuracy of this instrument.

[Specifications]

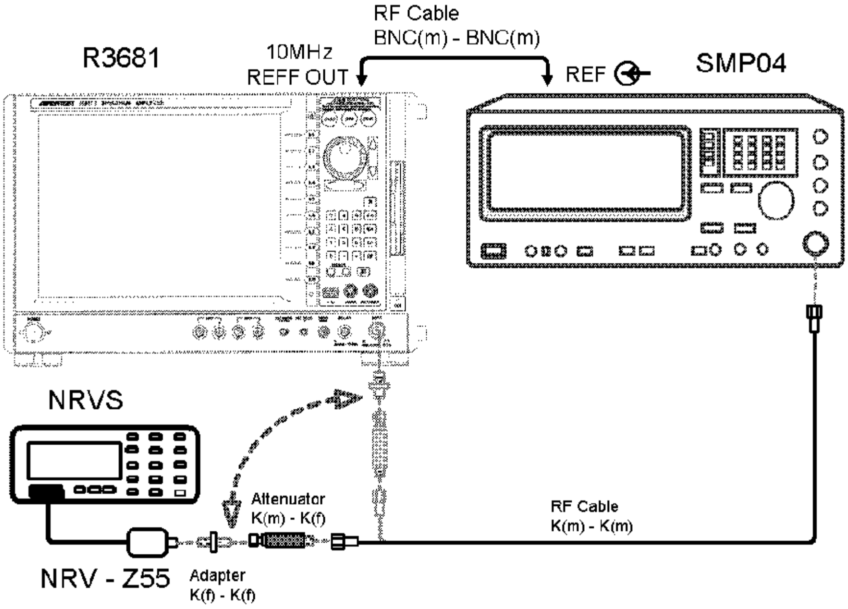
±0.3 dB (Frequency: 50 MHz, input attenuator: 10 dB, RBW: 100 kHz, temperature: 20 °C to 30 °C)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP04
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
10 dB attenuator *2	1	41KC-10
RF cable K(m)-K(m) *2	1	SF102
RF cable BNC(m)-BNC(m)	1	A01037-1500
Adapter K(f)-K(f) *3	1	JCF-DR001JX01

*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.
*2: In the R3671, the SMA connector can be substituted for the K connector.
However, the K(f) may be damaged easily if the SMA(m) is used.
*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-20 Coupling Level Accuracy Test

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-20.

Initializing the power meter

2. Adjust point 0 of the power sensor and power meter and perform calibration.
3. Set the power meter to the dBm display.
4. Set the calibration frequency of the power meter to 50 MHz.

Setting the signal generator

5. Specify the signal generator setting as follows:

   Output frequency: 50 MHz
   Output level: 0 dBm
   Reference frequency input: External

Initialization

6. Preset this instrument.
   Operation: **PRESET**

Measuring the output level

7. Connect the power sensor as shown in Figure 2-20.

8. Read the value on the power meter and then enter the value into the performance verification sheet.

Setting this instrument

9. Set the center frequency to 50 MHz.
   Operation: **{FREQ}**, **Center**, **5**, **0**, and **MHz**

10. Set the frequency span to 500 kHz.
    Operation: **{SPAN}**, **Span**, **5**, **0**, **0**, and **kHz**

11. Set the resolution bandwidth to 100 kHz.
    Operation: **{BW}**, **RBW (Man)**, **1**, **0**, **0**, and **kHz**

12. Set the video bandwidth to AUTO.
    Operation: **{BW}** and **VBW (Auto)**

13. Set the Ref LEVEL to -5 dBm.
    Operation: **{LEVEL}**, **Ref Level**, **-**, **5**, and **ENT**

14. Set the display scale to LINEAR.
    Operation: **{LEVEL}** and **Linear**

15. Set the scale unit to dBm.
    Operation: **{LEVEL}**, **Units**, and **dBm**

Measuring the coupling level accuracy

16. Remove the cable, which is connected to the power sensor and connect it to the RF input of this instrument.

17. Perform a peak search.
    Operation: **|MENU1|** and **{SEARCH}**

18. Enter the marker level into the performance verification sheet.

19. Obtain the difference between the power meter value and the marker level, and then ensure that the difference is within the specified range.

2.2.20 CCDF Dynamic Range

[Overview]

This section describes how to check the CCDF dynamic range.

[Specifications]

1 GHz: > 50 dB

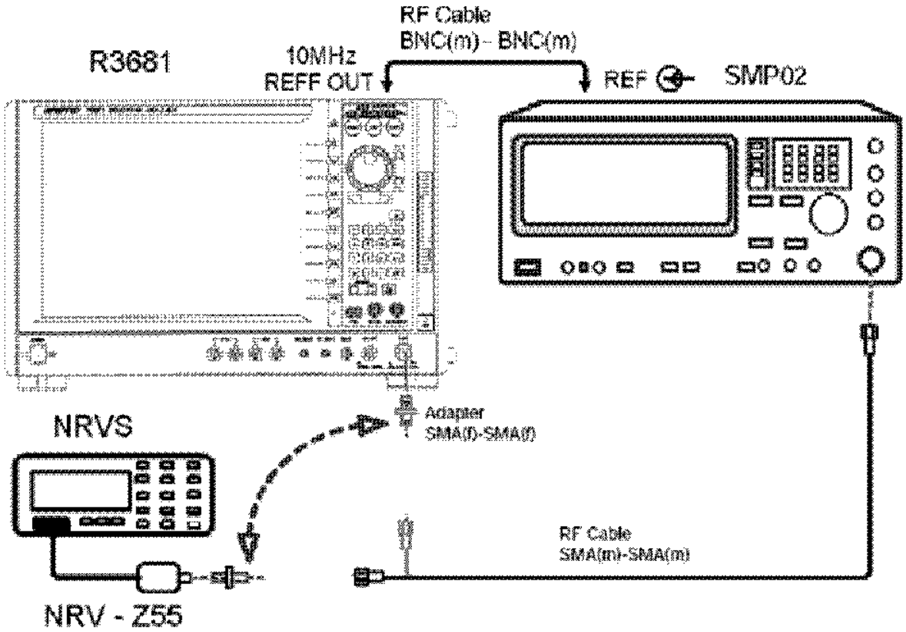
(Reference level: +5 dBm, Input attenuator: Auto, Temperature: 20°C to 30°C, Input signal: 1-GHz and +5-dBm CW)

[Required instruments]

Instrument	Quantity	Recommended model
Signal generator *1	1	SMP02
Power meter	1	NRVS
Power sensor *1	1	NRV-Z55
RF cable BNC(m)-BNC(m)	1	A01037-1500
RF cable SMA(m)-SMA(m)	1	Generic
Adapter SMA(f)-SMA(f)	1	HRM-501
50 Ω terminator	1	HRM-601D(02)

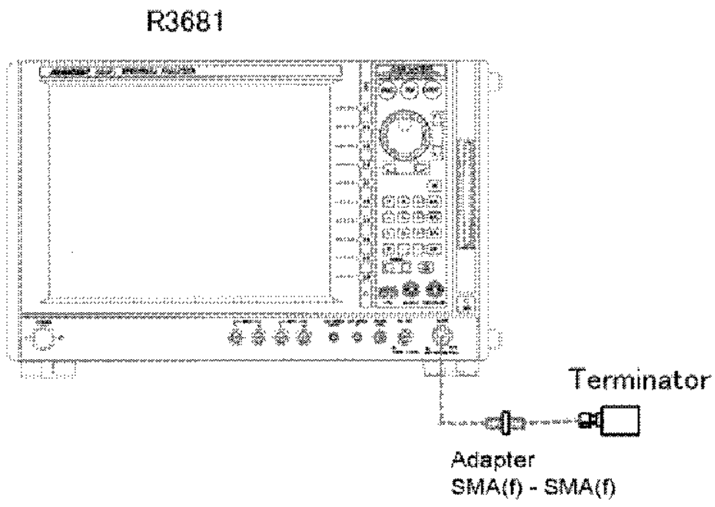
*1: In the R3671, the instrument whose maximum frequency is 13 GHz or higher can be used.

[Connection diagram]



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-21 Connection 1 for Checking the CCDF Dynamic Range



*3: In the R3671, N(m)-SMA(f) must be used instead of K(f)-K(f).

Figure 2-22 Connection 2 for Checking the CCDF Dynamic Range

[Test procedure]

Connecting the instruments

1. Connect the instruments as shown in Figure 2-21.

Initializing the power meter

2. Adjust the zero point of the power sensor and power meter, and then perform calibration.
3. Set the power meter to the dBm display.
4. Set the correction frequency of the power meter to 1 GHz.

Setting the signal generator

5. Specify the signal generator settings as follows:

   Output frequency: 1 GHz

   Reference frequency: EXTERNAL

Initializing the R3681

6. Preset the R3681.

   Operation: **PRESET**

Setting the output level of the signal generator

7. Connect the output of the signal generator and the power sensor by using the RF cable as shown in Figure 2-21.
8. Set the output level of the signal generator so that the power meter measured value is equal to +5.0 dBm.

Setting the R3681

9. Set the center frequency to 1 GHz.

   Operation: **{FREQ}**, **Center**, **1**, and **GHz**
10. Set the reference level to +5 dBm.

    Operation: **{LEVEL}**, **Ref Level**, **5**, and **ENT**
11. Set the input attenuator to Auto.

    Operation: **{LEVEL}**, **ATT**, and **Auto**
12. Set the CCDF RBW to 50 MHz.

    Operation: {MENU2}, {POWER}, **CCDF**, **CCDF RBW**, **5**, **0**, and **MHz**

Measuring the CCDF dynamic range

13. Remove the RF cable from the power sensor and connect it to the RF input of the R3681.
14. Enter the signal power value displayed on the R3681's CCDF measurement screen into the "signal power" column of the performance verification sheet.
15. Connect the 50-Ω terminator to the RF input of the R3681 as shown in Figure 2-22.
16. Enter the noise power value displayed on the R3681's CCDF measurement screen into the "noise power" column of the performance verification sheet.
17. Calculate a power difference between the signal power and the noise power and enter the power difference into the CCDF DR column of the performance verification sheet.
18. Check that the CCDF DR value is within the specification.

2.3 Performance Verification Record Sheets

2.3.1 Frequency Reference Stability

Internal frequency reference source

Item	Specification (Min.) [Hz]	Measured value [Hz]	Specification (Max.) [Hz]	Pass/ Fail
Frequency reference error	-5×10^{-7}		$+5 \times 10^{-7}$	
Reference error measurement after 24 hours				
Aging rate	-5×10^{-8}		$+5 \times 10^{-8}$	

OPTION22

Item	Specification (Min.) [Hz]	Measured value [Hz]	Specification (Max.) [Hz]	Pass/ Fail
Frequency reference error	-2×10^{-8}		$+2 \times 10^{-8}$	
Reference error measurement after 24 hours				
Aging rate	-3×10^{-10}		$+3 \times 10^{-10}$	

2.3.2 Calibration Signal Amplitude Accuracy

Setting [dBm]	Specification (Min.) [dBm]	Measured value [dBm]	Specification (Max.) [dBm]	Pass/ Fail
Frequency reference error	-10.20		-9.80	

2.3.3 Marker Frequency Counter Accuracy

The frequency measured by the R3671 is 13 GHz and lower.

Set frequency [GHz]	Specification (Min.) [Hz]	Measured value [Hz]	Specification (Max.) [Hz]	Pass/ Fail
2	1,999,999,994		2,000,000,006	
5	4,999,999,994		5,000,000,006	
11	10,999,999,989		11,000,000,011	
22	21,999,999,979		22,000,000,021	

2.3.4 Frequency Reading Accuracy

The frequency measured by the R3671 is 13 GHz and lower.

Set frequency	Frequency span [MHz]	Specification (Min.) [GHz]	Measured value [GHz]	Specification (Max.) [GHz]	Pass/ Fail
2	1	1.999989498		2.000010502	
2	10	1.999899498		2.000100502	
2	50	1.999499498		2.000500502	
2	100	1.998999498		2.001000502	
2	1000	1.989999498		2.010000502	
5	1	4.999989498		5.000010502	
5	10	4.999899498		5.000100502	
5	50	4.999499498		5.000500502	
5	100	4.998999498		5.001000502	
5	1000	4.989999498		5.010000502	
11	1	10.9999895		11.0000105	
11	10	10.9998995		11.0001005	
11	50	10.9994995		11.0005005	
11	100	10.9989995		11.0010005	
11	1000	10.9899995		11.0100005	
24	1	23.9999895		24.0000105	
24	10	23.9998995		24.0001005	
24	50	23.9994995		24.0005005	
24	100	23.9989995		24.0010005	
24	1000	23.9899995		24.0100005	

2.3.5 Residual FM

Slope	ΔLEVEL	Residual FM	Specification	Pass/ Fail
			≤ 3 Hz	

2.3.6 Frequency Span Accuracy

<R3681>

Set frequency [Hz]	Frequency span [Hz]	Specification (Min.) [Hz]	Measured value Δf [Hz]	Specification (Max.) [Hz]	Pass/ Fail
16 G	32 G	25.344 G		25.856 G	
16 G	10 G	7.92 G		8.08 G	
16 G	1 G	792 M		808 M	
16 G	100 M	79.2 M		80.8 M	
16 G	10 M	7.92 M		8.08 M	
16 G	1 M	792 k		808 k	

<R3671>

Set frequency [Hz]	Frequency span [Hz]	Specification (Min.) [Hz]	Measured value Δf [Hz]	Specification (Max.) [Hz]	Pass/ Fail
6.5 G	13 G	10.296 G		10.504 G	
6.5 G	10 G	7.92 G		8.08 G	
6.5 G	1 G	792 M		808 M	
6.5 G	100 M	79.2 M		80.8 M	
6.5 G	10 M	7.92 M		8.08 M	
6.5 G	1 M	792 k		808 k	

2.3.7 Signal Purity

Offset frequency	Measured value	Specification	Pass/ Fail
10 kHz		< -120 dBc/Hz	
100 kHz		< -120 dBc/Hz	
1 MHz		< -140 dBc/Hz	

2.3.8 Resolution Bandwidth

Accuracy

RBW setting [Hz]	Frequency span [Hz]	Specification (Min.) [Hz]	Measured value [Hz]	Specification (Max.) [Hz]	Pass/ Fail
10 M	20 M	8.5 M		11.50 M	
5 M	8 M	4.25 M		5.75 M	
3 M	5 M	2.79 M		3.21 M	
2 M	3 M	1.86 M		2.14 M	
1 M	2 M	980 k		1.02 M	
500 k	800 k	490 k		510 k	
300 k	500 k	294 k		306 k	
200 k	300 k	196 k		204 k	
100 k	200 k	98 k		102 k	
50 k	80 k	49 k		51 k	
30 k	50 k	29.4 k		30.6 k	
20 k	30 k	19.6 k		20.4 k	
10 k	20 k	9.8 k		10.2 k	
5 k	8 k	4.9 k		5.10 k	
3 k	5 k	2.94 k		3.06 k	
2 k	3 k	1.96 k		2.04 k	
1 k	2 k	980		1.02 k	
500	800	490		510	
300	500	294		306	
200	300	196		204	
100	200	98		102	
50	80	49.0		51.0	
30	50	29.4		30.6	
20	30	19.6		20.4	
10	20	9.8		10.2	
5	20	4.90		5.10	
3	20	2.94		3.06	
2	20	1.96		2.04	
1	20	0.98		1.02	

Selectivity

RBW setting [Hz]	Frequency span [Hz]	Measured value (60 dB : 3 dB)	Specification (Max.)	Pass/ Fail
10 M	100 M	: 1	6 : 1	
5 M	50 M	: 1	6 : 1	
3 M	30 M	: 1	6 : 1	
2 M	20 M	: 1	6 : 1	
1 M	10 M	: 1	6 : 1	
500 k	5 M	: 1	6 : 1	
300 k	3 M	: 1	6 : 1	
200 k	2 M	: 1	6 : 1	
100 k	1 M	: 1	6 : 1	
50 k	500 k	: 1	6 : 1	
30 k	300 k	: 1	6 : 1	
20 k	200 k	: 1	6 : 1	
10 k	100 k	: 1	6 : 1	
5 k	50 k	: 1	6 : 1	
3 k	30 k	: 1	6 : 1	
2 k	20 k	: 1	6 : 1	
1 k	10 k	: 1	6 : 1	
500	5 k	: 1	6 : 1	
300	3 k	: 1	6 : 1	
200	2 k	: 1	6 : 1	
100	1 k	: 1	6 : 1	
50	500	: 1	6 : 1	
30	300	: 1	6 : 1	
20	200	: 1	6 : 1	
10	100	: 1	6 : 1	
5	50	: 1	6 : 1	
3	30	: 1	6 : 1	
2	20	: 1	6 : 1	
1	20	: 1	6 : 1	

2.3.9 Sweep Time Accuracy

Sweep time	Specification (Min.)	Measured value	Specification (Max.)	Pass/ Fail
10 µsec	8.91 µsec		9.09 µsec	
100 µsec	89.1 µsec		90.9 µsec	
1 msec	891 µsec		909 µsec	
10 msec	8.91 msec		9.09 msec	
100 msec	89.1 msec		90.9 msec	
1 sec	891 msec		909 msec	

2.3.10 Frequency Response

Frequency response (up to 3.5 GHz)

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
Off	100	-0.4		0.4	
	200	-0.4		0.4	
	300	-0.4		0.4	
	400	-0.4		0.4	
	500	-0.4		0.4	
	600	-0.4		0.4	
	700	-0.4		0.4	
	800	-0.4		0.4	
	900	-0.4		0.4	
	1,000	-0.4		0.4	
	1,100	-0.4		0.4	
	1,200	-0.4		0.4	
	1,300	-0.4		0.4	
	1,400	-0.4		0.4	
	1,500	-0.4		0.4	
	1,600	-0.4		0.4	
	1,700	-0.4		0.4	
	1,800	-0.4		0.4	
	1,900	-0.4		0.4	
	2,000	-0.4		0.4	
	2,100	-0.4		0.4	

2.3.10 Frequency Response

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
Off	2,200	-0.4		0.4	
	2,300	-0.4		0.4	
	2,400	-0.4		0.4	
	2,500	-0.4		0.4	
	2,600	-0.4		0.4	
	2,700	-1.0		+1.0	
	2,800	-1.0		+1.0	
	2,900	-1.0		+1.0	
	3,000	-1.0		+1.0	
	3,100	-1.0		+1.0	
	3,200	-1.0		+1.0	
	3,300	-1.0		+1.0	
	3,400	-1.0		+1.0	
	3,500	-1.0		+1.0	

Frequency response (3.6 GHz to 7.5 GHz)

Preamplifire	Frequency [MHz]	Specification (Min.)	Measured value	Specification (Max.)	Pass/ Fail
Off	3600	-1.5		+1.5	
	3700	-1.5		+1.5	
	3800	-1.5		+1.5	
	3900	-1.5		+1.5	
	4000	-1.5		+1.5	
	4100	-1.5		+1.5	
	4,200	-1.5		+1.5	
	4,300	-1.5		+1.5	
	4,400	-1.5		+1.5	
	4,500	-1.5		+1.5	
	4,600	-1.5		+1.5	
	4,700	-1.5		+1.5	
	4,800	-1.5		+1.5	
	4,900	-1.5		+1.5	
	5,000	-1.5		+1.5	
	5,100	-1.5		+1.5	
	5,200	-1.5		+1.5	
	5,300	-1.5		+1.5	
	5,400	-1.5		+1.5	

Preamplifire	Frequency [MHz]	Specification (Min.)	Measured value	Specification (Max.)	Pass/ Fail
Off	5,500	-1.5		+1.5	
	5,600	-1.5		+1.5	
	5,700	-1.5		+1.5	
	5,800	-1.5		+1.5	
	5,900	-1.5		+1.5	
	6,000	-1.5		+1.5	
	6,100	-1.5		+1.5	
	6,200	-1.5		+1.5	
	6,300	-1.5		+1.5	
	6,400	-1.5		+1.5	
	6,500	-1.5		+1.5	
	6,600	-1.5		+1.5	
	6,700	-1.5		+1.5	
	6,800	-1.5		+1.5	
	6,900	-1.5		+1.5	
	7,000	-1.5		+1.5	
	7,100	-1.5		+1.5	
	7,200	-1.5		+1.5	
	7,300	-1.5		+1.5	
	7,400	-1.5		+1.5	
	7,500	-1.5		+1.5	

Frequency response (7.6 GHz to 15.4 GHz)

The frequency measured by the R3671 is 13 GHz and lower.

Preamplifire	Frequency [MHz]	Specification (Min.)	Measured value	Specification (Max.)	Pass/ Fail
Off	7,600	-2.0		+2.0	
	7,800	-2.0		+2.0	
	8,000	-2.0		+2.0	
	8,200	-2.0		+2.0	
	8,400	-2.0		+2.0	
	8,600	-2.0		+2.0	
	8,800	-2.0		+2.0	
	9,000	-2.0		+2.0	
	9,200	-2.0		+2.0	
	9,400	-2.0		+2.0	

2.3.10 Frequency Response

The frequency measured by the R3671 is 13 GHz and lower.

Preamplifire	Frequency [MHz]	Specification (Min.)	Measured value	Specification (Max.)	Pass/ Fail
Off	9,600	-2.0		+2.0	
	9,800	-2.0		+2.0	
	10,000	-2.0		+2.0	
	10,200	-2.0		+2.0	
	10,400	-2.0		+2.0	
	10,600	-2.0		+2.0	
	10,800	-2.0		+2.0	
	11,000	-2.0		+2.0	
	11,200	-2.0		+2.0	
	11,400	-2.0		+2.0	
	11,600	-2.0		+2.0	
	11,800	-2.0		+2.0	
	12,000	-2.0		+2.0	
	12,200	-2.0		+2.0	
	12,400	-2.0		+2.0	
	12,600	-2.0		+2.0	
	12,800	-2.0		+2.0	
	13,000	-2.0		+2.0	
	13,200	-2.0		+2.0	
	13,400	-2.0		+2.0	
	13,600	-2.0		+2.0	
	13,800	-2.0		+2.0	
	14,000	-2.0		+2.0	
	14,200	-2.0		+2.0	
	14,400	-2.0		+2.0	
	14,600	-2.0		+2.0	
	14,800	-2.0		+2.0	
	15,000	-2.0		+2.0	
	15,200	-2.0		+2.0	
	15,400	-2.0		+2.0	

Frequency response (15.6 GHz to 32 GHz)

The frequency measured by the R3671 is 13 GHz and lower.

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
Off	15,600	-2.5		+2.5	
	15,800	-2.5		+2.5	
	16,000	-2.5		+2.5	
	16,200	-2.5		+2.5	
	16,400	-2.5		+2.5	
	16,600	-2.5		+2.5	
	16,800	-2.5		+2.5	
	17,000	-2.5		+2.5	
	17,200	-2.5		+2.5	
	17,400	-2.5		+2.5	
	17,600	-2.5		+2.5	
	17,800	-2.5		+2.5	
	18,000	-2.5		+2.5	
	18,200	-2.5		+2.5	
	18,400	-2.5		+2.5	
	18,600	-2.5		+2.5	
	18,800	-2.5		+2.5	
	19,000	-2.5		+2.5	
	19,200	-2.5		+2.5	
	19,400	-2.5		+2.5	
	19,600	-2.5		+2.5	
	19,800	-2.5		+2.5	
	20,000	-2.5		+2.5	
	20,200	-2.5		+2.5	
	20,400	-2.5		+2.5	
	20,600	-2.5		+2.5	
	20,800	-2.5		+2.5	
	21,000	-2.5		+2.5	
	21,200	-2.5		+2.5	
	21,400	-2.5		+2.5	
	21,600	-2.5		+2.5	
	21,800	-2.5		+2.5	
	22,000	-2.5		+2.5	
	22,200	-2.5		+2.5	

2.3.10 Frequency Response

The frequency measured by the R3671 is 13 GHz and lower.

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
Off	22,400	-2.5		+2.5	
	22,600	-2.5		+2.5	
	22,800	-2.5		+2.5	
	23,000	-2.5		+2.5	
	23,200	-2.5		+2.5	
	23,400	-2.5		+2.5	
	23,600	-2.5		+2.5	
	23,800	-2.5		+2.5	
	24,000	-2.5		+2.5	
	24,200	-2.5		+2.5	
	24,400	-2.5		+2.5	
	24,600	-2.5		+2.5	
	24,800	-2.5		+2.5	
	25,000	-2.5		+2.5	
	25,200	-2.5		+2.5	
	25,400	-2.5		+2.5	
	25,600	-2.5		+2.5	
	25,800	-2.5		+2.5	
	26,000	-2.5		+2.5	
	26,200	-2.5		+2.5	
	26,400	-2.5		+2.5	
	26,600	-2.5		+2.5	
	26,800	-2.5		+2.5	
	27,000	-2.5		+2.5	
	27,200	-2.5		+2.5	
	27,400	-2.5		+2.5	
	27,600	-2.5		+2.5	
	27,800	-2.5		+2.5	
	28,000	-2.5		+2.5	
	28,200	-2.5		+2.5	
	28,400	-2.5		+2.5	
	28,600	-2.5		+2.5	
	28,800	-2.5		+2.5	
	29,000	-2.5		+2.5	
	29,200	-2.5		+2.5	

The frequency measured by the R3671 is 13 GHz and lower.

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
Off	29,400	-2.5		+2.5	
	29,600	-2.5		+2.5	
	29,800	-2.5		+2.5	
	30,000	-2.5		+2.5	
	30,200	-2.5		+2.5	
	30,400	-2.5		+2.5	
	30,600	-2.5		+2.5	
	30,800	-2.5		+2.5	
	31,000	-2.5		+2.5	
	31,200	-2.5		+2.5	
	31,400	-2.5		+2.5	
	31,600	-2.5		+2.5	
	31,800	-2.5		+2.5	
	32,000	-2.5		+2.5	

Frequency response (The preamplifier is set to ON.)

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
On	100	-1.0		+1.0	
	200	-1.0		+1.0	
	300	-1.0		+1.0	
	400	-1.0		+1.0	
	500	-1.0		+1.0	
	600	-1.0		+1.0	
	700	-1.0		+1.0	
	800	-1.0		+1.0	
	900	-1.0		+1.0	
	1,000	-1.0		+1.0	
	1,100	-1.0		+1.0	
	1,200	-1.0		+1.0	
	1,300	-1.0		+1.0	
	1,400	-1.0		+1.0	
	1,500	-1.0		+1.0	
	1,600	-1.0		+1.0	
	1,700	-1.0		+1.0	
	1,800	-1.0		+1.0	

2.3.10 Frequency Response

Preamplifire	Frequency [MHz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
On	1,900	-1.0		+1.0	
	2,000	-1.0		+1.0	
	2,100	-1.0		+1.0	
	2,200	-1.0		+1.0	
	2,300	-1.0		+1.0	
	2,400	-1.0		+1.0	
	2,500	-1.0		+1.0	
	2,600	-1.0		+1.0	
	2,700	-2.0		+2.0	
	2,800	-2.0		+2.0	
	2,900	-2.0		+2.0	
	3,000	-2.0		+2.0	
	3,100	-2.0		+2.0	
	3,200	-2.0		+2.0	
	3,300	-2.0		+2.0	
	3,400	-2.0		+2.0	
	3,500	-2.0		+2.0	

2.3.11 Input Attenuator Switching Error

Frequency: 50 MHz

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

Frequency: 5 GHz

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

2.3.11 Input Attenuator Switching Error

Frequency: 10 GHz

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

Frequency: 17 GHz

The frequency measured by the R3671 is 13 GHz and lower.

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

Frequency: 23 GHz

The frequency measured by the R3671 is 13 GHz and lower.

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

Frequency: 30 GHz

The frequency measured by the R3671 is 13 GHz and lower.

Input attenuator setting value	Switching Error Specification (Min.)	Switching Error Measured value	Switching Error Specification (Max.)	Pass/ Fail
5 dB	-0.2 dB		+0.2 dB	
15 dB	-0.2 dB		+0.2 dB	
20 dB	-0.2 dB		+0.2 dB	
25 dB	-0.2 dB		+0.2 dB	
30 dB	-0.2 dB		+0.2 dB	
35 dB	-0.2 dB		+0.2 dB	
40 dB	-0.2 dB		+0.2 dB	
45 dB	-0.2 dB		+0.2 dB	
50 dB	-0.2 dB		+0.2 dB	
55 dB	-0.2 dB		+0.2 dB	
60 dB	-0.2 dB		+0.2 dB	
65 dB	-0.2 dB		+0.2 dB	
70 dB	-0.2 dB		+0.2 dB	
75 dB	-0.2 dB		+0.2 dB	

2.3.12 Resolution Bandwidth Switching Uncertainity

RBW setting [Hz]	Frequency span [Hz]	Specification (Min.) [dB]	Measured value [dB]	Specification (Max.) [dB]	Pass/ Fail
10 M	20 M	-1.0		+1.0	
5 M	8 M	-1.0		+1.0	
3 M	5 M	-1.0		+1.0	
2 M	3 M	-1.0		+1.0	
1 M	2 M	-0.03		+0.03	
500 k	800 k	-0.03		+0.03	
300 k	500 k	-0.03		+0.03	
200 k	300 k	-0.03		+0.03	
100 k	200 k	-0.03		+0.03	
50 k	80 k	-0.03		+0.03	
30 k	50 k	-0.03		+0.03	
20 k	30 k	-0.03		+0.03	
10 k	20 k	-0.03		+0.03	
5 k	8 k	-0.03		+0.03	
3 k	5 k	-0.03		+0.03	
2 k	3 k	-0.03		+0.03	
1 k	2 k	-0.03		+0.03	

2.3.13 Displayed Average Noise Level

The frequency measured by the R3671 is 13 GHz and lower.

Mode	Preamplifire	Frequency [Hz]	Measurement Frequency	Measurement value level	Specification	Pass/ Fail
SPA	Off	100			< -96 dBm	
		1 k			< -119 dBm	
		10 k			< -129 dBm	
		100 k			< -130 dBm	
		1 M			< -140 dBm	
		10 M to 1 G			< -156 dBm	
		1 G to 2 G			< -154 dBm	
		2 G to 2.5 G			< -152 dBm	
		2.5 G to 3 G			< -150 dBm	
		3 G to 3.5 G			< -148 dBm	
		3.5 G to 7.5 G			< -146 dBm	
		7.5 G to 15.4 G			< -146 dBm	
		15.4 G to 26.5 G			< -141 dBm	
		26.5 G to 32 G			< -140 dBm	
	On	100 k			< -136 dBm	
		1 M			< -146 dBm	
		10 M to 1 G			< -162 dBm	
		1 G to 2.5 G			< -160 dBm	
		2.5 G to 3 G			< -158 dBm	
		3 G to 3.5 G			< -156 dBm	

2.3.14 1 dB Gain Compression

Center frequency	Measurement value	Specification	Pass/ Fail
100.5 MHz		> +4 dBm	
1.5005 GHz		> +7 dBm	
2.4005 GHz		> +7 dBm	
5.0005 GHz		> -5 dBm	
7.0005 GHz		> -5 dBm	
10.0005 GHz		> -3 dBm	

2.3.15 2nd Order Harmonic Distortion

Fundamental frequency	Harmonic frequency	Measurement value	Specification	Pass/ Fail
1.5 GHz	3.0 GHz		< -60 dBc	
1.9 GHz	3.8 GHz		< -90 dBc	

2.3.16 Third Order Intermodulation Distortion

Center frequency [MHz]	2-signal 3rd order harmonic distortion [dBc]	TOI [dBm]	Specification [dBm]	Pass/ Fail
100			> +12	
300			> +16	
800			> +20	
1,500			> +21	
2,400			> +22	
5,000			> +5	
7,000			> +5	
10,000			> +8	

2.3.17 Image, Multiple, and Out-Of Band Responses

The frequency measured by the R3671 is 13 GHz and lower.

Center frequency [GHz]	Signal generator Output frequency [GHz]	Measurement value [dBc]	Specification [dBc]	Pass/ Fail
2	1.9572		<-75	
2	1.1572		<-75	
2	10.8628		<-75	
2	8.4314		<-75	
5.5	6.3428		<-75	
5.5	11.4214		<-75	
5.5	17.3428		<-75	
5.5	23.2642		<-75	
12	12.8428		<-75	
12	5.7893		<-75	
12	18.2107		<-75	
12	24.4214		<-75	
24.4	25.2428		<-70	
24.4	5.78395		<-70	
24.4	11.9893		<-70	
24.4	18.19465		<-70	
28	28.8428		<-65	
28	6.89465		<-65	
28	13.7893		<-65	
28	20.89465		<-65	

2.3.18 Residual Response

The frequency measured by the R3671 is 13 GHz and lower.

Frequency range	Preamplifire	Measurement value	Specification	Pass/ Fail
1 MHz to 3.5 GHz	Off		< -100 dBc	
3.5 GHz to 32 GHz	Off		< -90 dBc	
1 MHz to 3.5 GHz	On		< -105 dBc	

2.3.19 Coupling Level Accuracy

Power meter [dBm]	Marker level [dBm]	Error [dB]	Specification [dB]	Pass/ Fail
			± 0.3	

2.3.20 CCDF Dynamic Range

Set frequency [GHz]	Signal power [dBm]	Noise power [dBm]	CCDF DR	Specification	Pass/ Fail
1				> 50 dB	

3. SPECIFICATIONS

This chapter describes the specifications of this instrument.

The performance of this instrument is guaranteed when used under the following conditions unless noted specially.

- The instrument is calibrated at regular calibration periods.
- The instrument has been warmed up for 30 minutes or more after power is turned on under the specified environmental conditions.
- Autocalibration has been performed.

The reference data is provided not to show you the guaranteed performance but to help you use this instrument efficiently. The data contains the following notations:

Specifications (spec.): Indicate the performance guaranteed by the product. The specifications are determined in consideration of possible irregularities of quality among individual products, inaccurate measurements at the time of calibration, and performance changes due to environmental factors.

Typical value (typ.): Indicates the average performance of the product. Possible irregularities of quality among individual products, inaccurate measurements at the time of calibration, and performance changes due to environmental factors are not considered.

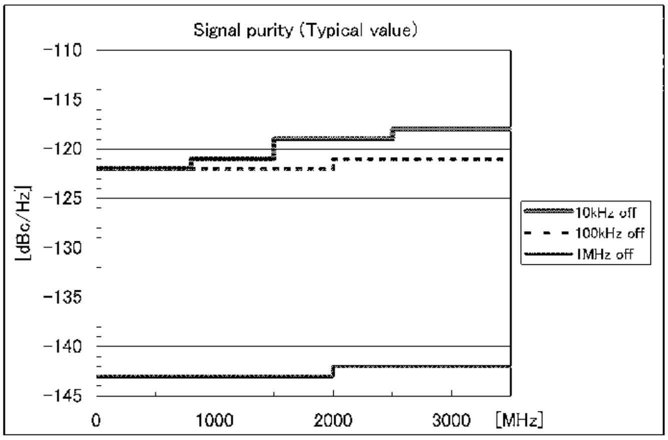
Nominal value (nom.): Indicates the general performance data of the product. Performance levels of the product are not meant.

3.1 R3681 Performance Specifications

3.1.1 Frequencies

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Frequency range
Spectrum analysis mode</td><td>
20 Hz to 32 GHz
<table>
<tr><th>Frequency band</th><th>Frequency band</th><th>HarmonicMixing mode (N)</th></tr>
<tr><td>20 Hz to 3.5 GHz</td><td>0</td><td>1-</td></tr>
<tr><td>3.4 GHz to 7.5 GHz</td><td>1</td><td>1-</td></tr>
<tr><td>7.4 GHz to 15.4 GHz</td><td>2</td><td>2-</td></tr>
<tr><td>15.2 GHz to 32.0 GHz</td><td>3</td><td>4-</td></tr>
<tr><td colspan="3">Bands 1 to 3 use a built-in YIG tuning pre-selector.</td></tr>
</table></td></tr>
<tr><td>Modulation analysis mode
(When modulation analysis option is set)</td><td>20 MHz to 6 GHz
<table>
<tr><th>Frequency band</th><th>Frequency band</th><th>Harmonic Mixing mode (N)</th></tr>
<tr><td>20 MHz to 3.5 GHz</td><td>0</td><td>1-</td></tr>
<tr><td>3.5 GHz to 6 GHz</td><td>1M</td><td>1-</td></tr>
<tr><td colspan="3">Band 1M bypasses the built-in YIG tuning pre-selector.</td></tr>
</table></td></tr>
<tr><td>Built-in pre-amplifier (Band 0 only)</td><td>100 kHz to 3.5 GHz Gain 20 dB (typical value)</td></tr>
<tr><td>Input coupling</td><td>DC</td></tr>
<tr><td>Internal frequency reference stability
Aging rate
Temperature stability

Warm-up time (nominal value)
Reference frequency error</td><td>
$\pm 5 \times 10^{-8}$/ day, $\pm 5 \times 10^{-7}$/ year
$\pm 1 \times 10^{-7}$ (Frequency at 25°C is used as the reference in the range of 5 to 40°C)
$\pm 5 \times 10^{-7}$/minute
± (Time elapsed from the latest factory calibration × aging rate + temperature stability)</td></tr>
<tr><td>Marker frequency counter
Accuracy
Resolution</td><td>(S/N > 50 dB)
± (Marker frequency × Frequency reference error + Residual FM)
0.01 Hz</td></tr>
<tr><td>Frequency reading accuracy</td><td>(Resolution bandwidth 1 Hz to 3 MHz)
± (Frequency reading × frequency reference error + span × span accuracy + resolution bandwidth × 0.1 + residual FM)</td></tr>
<tr><td>Frequency stability
Residual FM</td><td>(When internal reference frequency source is used)
≤ (3 Hz × N p-p)/100 ms</td></tr>
<tr><td>Frequency span
Range
Accuracy</td><td>
20 Hz to 32 GHz, 0 Hz (Zero span)
± 1% (200 Hz ≤ Span)
± 1 × N% (20 Hz ≤ Span < 200 Hz)</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Signal purity
(When internal reference frequency source is used)</td><td>At a frequency of 800 MHz
<table>
<tr><th>Offset</th><th>20°C to 30°C</th><th>5°C to 40°C</th></tr>
<tr><td>100 Hz</td><td>< -87 dBc/Hz</td><td>< -85 dBc/Hz</td></tr>
<tr><td>1 kHz</td><td>< -110 dBc/Hz</td><td>< -108 dBc/Hz</td></tr>
<tr><td>10 kHz</td><td>< -120 dBc/Hz</td><td>< -118 dBc/Hz</td></tr>
<tr><td>10 kHz (Typical value)</td><td>< -122 dBc/Hz</td><td></td></tr>
<tr><td>100 kHz</td><td>< -120 dBc/Hz</td><td>< -120 dBc/Hz</td></tr>
<tr><td>100 kHz (Typical value)</td><td>< -123 dBc/Hz</td><td></td></tr>
<tr><td>1 MHz</td><td>< -140 dBc/Hz</td><td>< -140 dBc/Hz</td></tr>
<tr><td>1 MHz (Typical value)</td><td>< -143 dBc/Hz</td><td></td></tr>
<tr><td>10 MHz</td><td>< -155 dBc/Hz</td><td>< -153 dBc/Hz</td></tr>
</table>


</td></tr>
<tr><td>Resolution bandwidth (RBW)
Range
Accuracy

Selectivity (60 dB/ 3 dB)</td><td>
1 Hz to 10 MHz (1, 2, 3, 5 sequence)
3 % : Resolution bandwidth 1Hz to 500 kHz
7 % : Resolution bandwidth 1 MHz to 3 MHz
12 % : Resolution bandwidth 5 MHz
20 % : Resolution bandwidth 10 MHz
< 6:1 (5:1, typ.)</td></tr>
<tr><td>Video bandwidth (VBW)
Range</td><td>
1 Hz to 10 MHz (1, 2, 3, 5 sequence)</td></tr>
</table>

3.1.2 Sweep

Item	Specifications
Sweep Sweep time setting range Zero span Span> 0 Hz Sweep time accuracy	 1 μs to 6000 s 10 ms to 2000 s ±2%
Sweep mode	Continuous, Single
Trigger function Trigger source Trigger delay setting range Resolution	 Free Run, Video, IF, Line External 1 (TTL level), External 2 (0 to 5 V, resolution: 20 mV) 100 ns to 1 s 100 ns
Gated sweep Gate delay Resolution Gate width Resolution Trigger source	 0 s to 1 s 100 ns 50 μs to 1 s 100 ns Free Run, IF, External 1, External 2, Link

3.1.3 Amplitude

Item	Specifications
Amplitude measurement range Preamplifier off Preamplifier on	 +30 dBm to displayed average noise level +20 dBm to displayed average noise level (band 0 only)
Maximum safe input level Average continuous power Preamplifier off Preamplifier on DC voltage	 +30 dBm (when input attenuator ≥ 10 dB) +13 dBm (when input attenuator ≥ 10 dB) 0 V (Do not apply DC power to signals.)
Input attenuator range	0 to 75 dB, 5 dB steps
Screen display range Log scale Linear scale	10 div. fixed 0.1 dB to 1 dB/div., 0.1 dB steps 1 dB to 20 dB/div., 1 dB steps 10%/div. of the reference level
Scale unit	dBm, dBmV, dBμV, dBμVemf, dBpW, W, V

Item	Specifications
Reference level set range Preamplifier off Log scale Linear scale Preamplifier on Log scale Linear scale	 -170 dBm to +60 dBm, 0.01 dB steps 707.1 pV to 223.6 V, approx. 1% steps -170 dBm to +30 dBm, 0.01 dB steps 707.1 pV to 7.071 V, approx. 1% steps
Trace	A maximum of 4
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average, Voltage Average

3.1.4 Amplitude Accuracy

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Calibration signal accuracy (50 MHz)
Amplitude
Accuracy</td><td>
-10 dBm
± 0.2 dB (20°C to 30°C), ±0.3 dB (0°C to 40°C)</td></tr>
<tr><td>Frequency response
Spectrum analysis mode
Preamplifier off</td><td>(After autocalibration, reference frequency 50 MHz, input attenuator 10 dB, after pre-selector peak adjustment)
<table>
<tr><th rowspan="2">Frequency</th><th colspan="2">Operating temperature range</th><th rowspan="2">Intraband flatness</th></tr>
<tr><th>20 to 30°C</th><th>5 to 40°C</th></tr>
<tr><td>50 MHz to 2.5 GHz</td><td>< ±0.4 dB</td><td>< ±0.9 dB</td><td>-</td></tr>
<tr><td>20 Hz to 3.5 GHz</td><td>< ±1.0 dB</td><td>< ±1.5 dB</td><td>-</td></tr>
<tr><td>3.5 GHz to 7.5 GHz</td><td>< ±1.5 dB</td><td>< ±3.5 dB</td><td>< ±1.5 dB</td></tr>
<tr><td>7.5 GHz to 15.4 GHz</td><td>< ±2.0 dB</td><td>< ±4.0 dB</td><td>< ±2.0 dB</td></tr>
<tr><td>15.4 GHz to 32.0 GHz</td><td>< ±2.5 dB</td><td>< ±4.5 dB</td><td>< ±2.5 dB</td></tr>
</table></td></tr>
<tr><td>Preamplifier on</td><td>
<table>
<tr><th rowspan="2">Frequency</th><th colspan="2">Operating temperature range</th></tr>
<tr><th>20 to 30°C</th><th>5 to 40°C</th></tr>
<tr><td>50 MHz to 2.6 GHz</td><td>< ±1.0 dB</td><td>< ±1.5 dB</td></tr>
<tr><td>100 kHz to 3.5 GHz</td><td>< ±2.0 dB</td><td>< ±2.5 dB</td></tr>
</table></td></tr>
</table>

3.1.4 Amplitude Accuracy

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Input attenuator switching error</td><td>(Attenuator: 10 dB reference)
<table>
<tr><th>Frequency range</th><th>Switching error</th></tr>
<tr><td>20 Hz to 8 GHz</td><td>< ±1.0 dB (5 dB to 50 dB)
< ±1.4 dB (55 dB to 75 dB)</td></tr>
<tr><td>8 GHz to 12 GHz</td><td>< ± 1.3 dB (5 dB to 50 dB)
< ±1.9 dB (55 dB to 75 dB)</td></tr>
<tr><td>12 GHz to 20 GHz</td><td>< ±1.4 dB (5 dB to 50 dB)
< ±2.1 dB (55 dB to 75 dB)</td></tr>
<tr><td>20 GHz to 26.5 GHz</td><td>< ±1.8 dB (5 dB to 50 dB)
< ±2.7 dB (55 dB to 75 dB)</td></tr>
<tr><td>26.5 GHz to 32 GHz</td><td>< ± 2.1 dB (5 dB to 50 dB)
< ± 3.8 dB (55 dB to 65 dB)</td></tr>
</table></td></tr>
<tr><td>Scale display error</td><td>(Mixer level: -20 dBm reference, mixer level -10 dBm to -50 dBm, temperature range 20°C to 30°C)
< ±0.13 dB</td></tr>
<tr><td>Resolution bandwidth switching uncertainty</td><td>(Resolution bandwidth: 100 kHz reference, after autocalibration, 10 dB/div. or less)
< ±0.05 dB (1 Hz to 3 MHz)
< ±0.3 dB (5 MHz to 10 MHz)</td></tr>
<tr><td>Coupling level accuracy</td><td>(After autocalibration, signal level -10 dBm to -50 dBm, preamplifier off, input attenuator 10 dB, RBW 100 kHz, temperature range 20°C to 30°C)
< ± (0.2 dB + frequency response + scale display error)</td></tr>
</table>

3.1.5 Dynamic Range

Item	Specifications
Displayed average noise level	(Input is terminated, input attenuator: 0 dB, RBW1 Hz, VBW1 Hz, detector: Sample, average more than 20 times, average type: Video, temperature range 20°C to 30°C. Add 2 dB in the temperature range 5°C to 40°C.)

Spectrum analysis mode

Preamplifier off

Frequency	Specification	Typical value
100 Hz	< -96 dBm	-115 dBm
1 kHz	< -119 dBm	-130 dBm
10 kHz	< -129 dBm	-140 dBm
100 kHz	< -130 dBm	-143 dBm
1 MHz	< -140 dBm	-150 dBm
10 MHz to 1 GHz	< -156 dBm	-158 dBm
1 GHz to 2 GHz	< -154 dBm	-156 dBm
2 GHz to 2.5 GHz	< -152 dBm	-154 dBm
2.5 GHz to 3 GHz	< -150 dBm	-152 dBm
3 GHz to 3.5 GHz	< -148 dBm	-150 dBm
3.5 GHz to 7.5 GHz	< -146 dBm	-149 dBm
7.5 GHz to 15.4 GHz	< -146 dBm	-149 dBm
15.4 GHz to 26.5 GHz	< -141 dBm	-144 dBm
26.5 GHz to 32 GHz	< -140 dBm	-143 dBm

Preamplifier on

Frequency	Specification	Typical value
100 kHz	< -136 dBm	155 dBm
1 MHz	< -146 dBm	-160 dBm
10 MHz to 1 GHz	< -162 dBm	-168 dBm
1 GHz to 2.5 GHz	< -160 dBm	-166 dBm
2.5 GHz to 3 GHz	< -158 dBm	-164 dBm
3 GHz to 3.5 GHz	< -156 dBm	-162 dBm

Item	Specifications
1 dB gain compression	(Separation: RBW × 15, 50 kHz min.)

Input frequency	Specification	Typical value
10 MHz to 200 MHz	> +2dBm	+5dBm
200 MHz to 3.5 GHz	> +7 dBm	+10 dBm
3.5 GHz to 7.5 GHz	> -5 dBm	-2 dBm
7.5 GHz to 32 GHz	> -3 dBm	+0 dBm

3.1.5 Dynamic Range

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>2nd order harmonic distortion</td><td>
<table>
<tr><th>Input frequency</th><th>Specification</th><th>Mixer level</th></tr>
<tr><td>10 MHz to 1.75 GHz</td><td>< -60 dBc</td><td>-20 dBm</td></tr>
<tr><td>> 1.75 GHz</td><td>< -90 dBc</td><td>-10 dBm</td></tr>
</table>
</td></tr>
<tr><td>3rd order intermodulation distortion (TOI)</td><td>(Mixer level: -20 dBm, separation: 25 kHz)
<table>
<tr><th>Input frequency</th><th>Specification</th><th>Typical value</th></tr>
<tr><td>10 MHz to 200 MHz</td><td>> +12 dBm</td><td>+16 dBm</td></tr>
<tr><td>200 MHz to 500 MHz</td><td>> +16 dBm</td><td>+20 dBm</td></tr>
<tr><td>500 MHz to 1 GHz</td><td>> +20 dBm</td><td>+24 dBm</td></tr>
<tr><td>1 GHz to 2 GHz</td><td>> +21 dBm</td><td>+25 dBm</td></tr>
<tr><td>2 GHz to 3.5 GHz</td><td>> +22 dBm</td><td>+26 dBm</td></tr>
<tr><td>3.5 GHz to 7.5 GHz</td><td>> +5 dBm</td><td>+10 dBm</td></tr>
<tr><td>7.5 GHz to 32 GHz</td><td>> +8 dBm</td><td>+12 dBm</td></tr>
</table>
</td></tr>
<tr><td>Image/multiple/out-band spurious</td><td>(Spectrum analysis mode)
<table>
<tr><th>Frequency</th><th>Specification</th></tr>
<tr><td>10 MHz to 15.4 GHz</td><td>< -70 dBc</td></tr>
<tr><td>15.4 GHz to 26.5 GHz</td><td>< -65 dBc</td></tr>
<tr><td>26.5 GHz to 32.0 GHz</td><td>< -60 dBc</td></tr>
</table>
</td></tr>
<tr><td>Residual spurious</td><td>(Spectrum analysis mode, no input, input terminated, input attenuator: 0 dB)
<table>
<tr><th></th><th>Frequency</th><th>Specification</th></tr>
<tr><td>Preamplifier on</td><td>1 MHz to 3.5 GHz</td><td>< -95 dBm</td></tr>
<tr><td rowspan="2">Preamplifier off</td><td>1 MHz to 3.5 GHz</td><td>< -90 dBm</td></tr>
<tr><td>3.5 GHz to 32.0 GHz</td><td>< -90 dBm</td></tr>
</table>
</td></tr>
</table>

3.1.6 Input and Output

Item	Specifications
RF input Connector Impedance VSWR	 K type (m), front panel 50 Ω(nominal value) Input attenuator ≥ 10 dB, at the set frequency <1.5:1 (<3.5 GHz) (nominal value) <2.0:1 (>3.5 GHz) (nominal value)
Calibration signal output Connector Impedance Frequency	 BNC (f), front panel 50 Ω (nominal value) 50 MHz
Probe power source Connector Output voltage	 4-pin connector, front panel ± 15 V, 150 mA (nominal value)
1st LO output Connector	When external mixer option is used SMA (f), front panel
421.4 MHz IF input Connector	When external mixer option is used SMA (f), front panel
I/Q input Connector Impedance Maximum input amplitude	 BNC (f), front panel 50 Ω (nominal value), AC/DC coupled 1.0 Vp-p (DC component ±0.5V)
External trigger input 1 Connector Impedance Trigger level	 BNC (f), rear panel 10 kΩ (nominal value), DC coupled TTL level
External trigger input 2 Connector Impedance Trigger level	 BNC (f), rear panel 10 kΩ (nominal value), DC coupled 0 V to 5 V
Trigger output Connector Amplitude	 BNC (f), rear panel TTL level
Frequency reference input Connector Impedance Frequency Amplitude	 BNC (f), rear panel 50 Ω (nominal value) 5 MHz to 20 MHz 0 dBm ±5 dB
10 MHz frequency reference output Connector Impedance Frequency Amplitude	 BNC (f), rear panel 50 Ω (nominal value) 10 MHz 0 dBm ±5 dB

Item	Specifications
21.4 MHz IF output	
Connector	BNC (f), rear panel
Impedance	50 Ω (nominal value)
Frequency	21.4 MHz
Amplitude	Mixer input level + 2 dB (typical value at 50 MHz)
I/O	
Keyboard	PS/2 101/106 keyboard, front panel
Mouse	PS/2 mouse, front panel
USB	Front panel
GP-IB	IEEE-488.2 compatible, rear panel
LAN port	10Base-T, protocol used: TCP/IP, rear panel
PRINTER port	Conforms to IEEE-1284-1994, rear panel
Signal for external indicator	15-pin D-SUB connector (VGA), rear panel

3.1.7 General Specifications

Item	Specifications
Operating environmental range	Ambient temperature: +5°C to +40°C Relative humidity: 80% or less (no condensation)
Storage environmental range	Ambient temperature: -20°C to +60°C Relative humidity: 80% or less (no condensation)
AC power input	AC100 V to 120 V, 50 Hz/60 Hz AC220 V to 240 V, 50 Hz/60 Hz (automatic switching between AC 100 V and AC 200 V sources)
Power consumption	500 VA or less Approx. 220 VA (except for options)
External dimensions	424 mm (W) × 266 mm (H) × 530 mm (D) (approx.)
Weight	Approx. 32 kg or less (except for options)

3.2 R3671 Performance Specifications

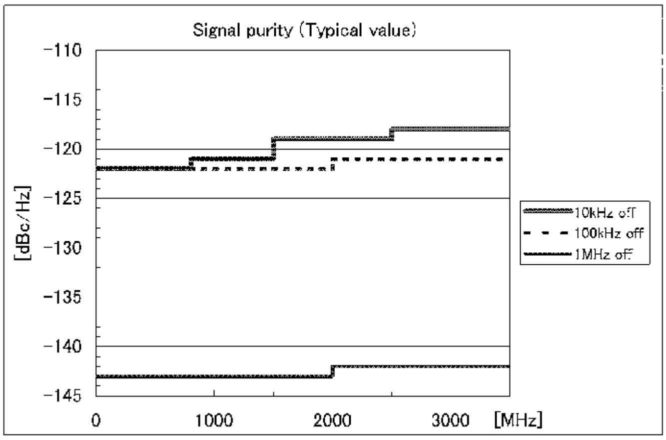
3.2.1 Frequencies

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Frequency range
Spectrum analysis mode</td><td>20 Hz to 13 GHz
<table>
<tr><th>Frequency band</th><th>Frequency band</th><th>HarmonicMixing mode (N)</th></tr>
<tr><td>20 Hz to 3.5 GHz</td><td>0</td><td>1-</td></tr>
<tr><td>3.4 GHz to 7.5 GHz</td><td>1</td><td>1-</td></tr>
<tr><td>7.4 GHz to 13 GHz</td><td>2</td><td>2-</td></tr>
<tr><td colspan="3">Bands 1 to 2 use a built-in YIG tuning pre-selector.</td></tr>
</table></td></tr>
<tr><td>Modulation analysis mode
(When modulation analysis option is set)</td><td>20 MHz to 6 GHz
<table>
<tr><th>Frequency band</th><th>Frequency band</th><th>Harmonic Mixing mode (N)</th></tr>
<tr><td>20 MHz to 3.5 GHz</td><td>0</td><td>1-</td></tr>
<tr><td>3.5 GHz to 6 GHz</td><td>1M</td><td>1-</td></tr>
<tr><td colspan="3">Band 1M bypasses the built-in YIG tuning pre-selector.</td></tr>
</table></td></tr>
<tr><td>Built-in pre-amplifier (Band 0 only)</td><td>100 kHz to 3.5 GHz Gain 20 dB (typical value)</td></tr>
<tr><td>Input coupling</td><td>DC</td></tr>
<tr><td>Internal frequency reference stability
Aging rate
Temperature stability

Warm-up time (nominal value)
Reference frequency error</td><td>
$\pm 5 \times 10^{-8}$/ day, $\pm 5 \times 10^{-7}$/ year
$\pm 1 \times 10^{-7}$ (Frequency at 25°C is used as the reference in the range of 5 to 40°C)
$\pm 5 \times 10^{-7}$/minute
± (Time elapsed from the latest factory calibration × aging rate + temperature stability)</td></tr>
<tr><td>Marker frequency counter
Accuracy
Resolution</td><td>(S/N > 50 dB)
± (Marker frequency × Frequency reference error + Residual FM)
0.01 Hz</td></tr>
<tr><td>Frequency reading accuracy</td><td>(Resolution bandwidth 1 Hz to 3 MHz)
± (Frequency reading × frequency reference error + span × span accuracy + resolution bandwidth × 0.1 + residual FM)</td></tr>
<tr><td>Frequency stability
Residual FM</td><td>(When internal reference frequency source is used)
≤ (3 Hz × N p-p)/100 ms</td></tr>
<tr><td>Frequency span
Range
Accuracy</td><td>
20 Hz to 13 GHz, 0 Hz (Zero span)
± 1% (200 Hz ≤ Span)
± 1 × N% (20 Hz ≤ Span < 200 Hz)</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Signal purity
(When internal reference frequency source is used)</td><td>At a frequency of 800 MHz

<table>
<tr><th>Offset</th><th>20°C to 30°C</th><th>5°C to 40°C</th></tr>
<tr><td>100 Hz</td><td>< -87 dBc/Hz</td><td>< -85 dBc/Hz</td></tr>
<tr><td>1 kHz</td><td>< -110 dBc/Hz</td><td>< -108 dBc/Hz</td></tr>
<tr><td>10 kHz</td><td>< -120 dBc/Hz</td><td>< -118 dBc/Hz</td></tr>
<tr><td>10 kHz (Typical value)</td><td>< -122 dBc/Hz</td><td></td></tr>
<tr><td>100 kHz</td><td>< -120 dBc/Hz</td><td>< -120 dBc/Hz</td></tr>
<tr><td>100 kHz (Typical value)</td><td>< -123 dBc/Hz</td><td></td></tr>
<tr><td>1 MHz</td><td>< -140 dBc/Hz</td><td>< -140 dBc/Hz</td></tr>
<tr><td>1 MHz (Typical value)</td><td>< -143 dBc/Hz</td><td></td></tr>
<tr><td>10 MHz</td><td>< -155 dBc/Hz</td><td>< -153 dBc/Hz</td></tr>
</table>



</td></tr>
<tr><td>Resolution bandwidth (RBW)
Range
Accuracy

Selectivity (60 dB/ 3 dB)</td><td>
1 Hz to 10 MHz (1, 2, 3, 5 sequence)
3 % : Resolution bandwidth 1Hz to 500 kHz
7 % : Resolution bandwidth 1 MHz to 3 MHz
12 % : Resolution bandwidth 5 MHz
20 % : Resolution bandwidth 10 MHz
< 6:1 (5:1, typ.)</td></tr>
<tr><td>Video bandwidth (VBW)
Range</td><td>
1 Hz to 10 MHz (1, 2, 3, 5 sequence)</td></tr>
</table>

3.2.2 Sweep

Item	Specifications
Sweep Sweep time setting range Zero span Span> 0 Hz Sweep time accuracy	 1 μs to 6000 s 10 ms to 2000 s ±2%
Sweep mode	Continuous, Single
Trigger function Trigger source Trigger delay setting range Resolution	 Free Run, Video, IF, Line External 1 (TTL level), External 2 (0 to 5 V, resolution: 20 mV) 100 ns to 1 s 100 ns
Gated sweep Gate delay Resolution Gate width Resolution Trigger source	 0 s to 1 s 100 ns 50 μs to 1 s 100 ns Free Run, IF, External 1, External 2, Link

3.2.3 Amplitude

Item	Specifications
Amplitude measurement range Preamplifier off Preamplifier on	 +30 dBm to displayed average noise level +20 dBm to displayed average noise level (band 0 only)
Maximum safe input level Average continuous power Preamplifier off Preamplifier on DC voltage	 +30 dBm (when input attenuator ≥ 10 dB) +13 dBm (when input attenuator ≥ 10 dB) 0 V (Do not apply DC power to signals.)
Input attenuator range	0 to 75 dB, 5 dB steps
Screen display range Log scale Linear scale	10 div. fixed 0.1 dB to 1 dB/div., 0.1 dB steps 1 dB to 20 dB/div., 1 dB steps 10%/div. of the reference level
Scale unit	dBm, dBmV, dBμV, dBμVemf, dBpW, W, V

Item	Specifications
Reference level set range Preamplifier off Log scale Linear scale Preamplifier on Log scale Linear scale	 -170 dBm to +60 dBm, 0.01 dB steps 707.1 pV to 223.6 V, approx. 1% steps -170 dBm to +30 dBm, 0.01 dB steps 707.1 pV to 7.071 V, approx. 1% steps
Trace	A maximum of 4
Detector mode	Normal, Positive Peak, Negative Peak, Sample, RMS, Video Average, Voltage Average

3.2.4 Amplitude Accuracy

Item	Specifications
Calibration signal accuracy (50 MHz) Amplitude Accuracy	 -10 dBm ± 0.2 dB (20°C to 30°C), ±0.3 dB (0°C to 40°C)
Frequency response Spectrum analysis mode Preamplifier off	(After autocalibration, reference frequency 50 MHz, input attenuator 10 dB, after pre-selector peak adjustment)

Preamplifier off:

Frequency	Operating temperature range		Intraband flatness
	20 to 30°C	5 to 40°C	
50 MHz to 2.5 GHz	< ±0.4 dB	< ±0.9 dB	-
20 Hz to 3.5 GHz	< ±1.0 dB	< ±1.5 dB	-
3.5 GHz to 7.5 GHz	< ±1.5 dB	< ±3.5 dB	< ±1.5 dB
7.5 GHz to 13 GHz	< ±2.0 dB	< ±4.0 dB	< ±2.0 dB

Preamplifier on

Frequency	Operating temperature range	
	20 to 30°C	5 to 40°C
50 MHz to 2.6 GHz	< ±1.0 dB	< ±1.5 dB
100 kHz to 3.5 GHz	< ±2.0 dB	< ±2.5 dB

Item	Specifications
Input attenuator switching error	(Attenuator: 10 dB reference)

Frequency range	Switching error
20 Hz to 8 GHz	< ±1.0 dB (5 dB to 50 dB) < ±1.4 dB (55 dB to 75 dB)
8 GHz to 12 GHz	< ± 1.3 dB (5 dB to 50 dB) < ±1.9 dB (55 dB to 75 dB)
12 GHz to 13 GHz	< ±1.4 dB (5 dB to 50 dB) < ±2.1 dB (55 dB to 75 dB)

Item	Specifications
Scale display error	(Mixer level: -20 dBm reference, mixer level -10 dBm to -50 dBm, temperature range 20°C to 30°C) < ±0.13 dB
Resolution bandwidth switching uncertainty	(Resolution bandwidth: 100 kHz reference, after autocalibration, 10 dB/div. or less) < ±0.05 dB (1 Hz to 3 MHz) < ±0.3 dB (5 MHz to 10 MHz)
Coupling level accuracy	(After autocalibration, signal level -10 dBm to -50 dBm, preamplifier off, input attenuator 10 dB, RBW 100 kHz, temperature range 20°C to 30°C) < ± (0.2 dB + frequency response + scale display error)

3.2.5 Dynamic Range

Item	Specifications
Displayed average noise level	(Input is terminated, input attenuator: 0 dB, RBW1 Hz, VBW1 Hz, detector: Sample, average more than 20 times, average type: Video, temperature range 20°C to 30°C. Add 2 dB in the temperature range 5°C to 40°C.)

Spectrum analysis mode

Preamplifier off

Frequency	Specification	Typical value
100 Hz	< -96 dBm	-115 dBm
1 kHz	< -119 dBm	-130 dBm
10 kHz	< -129 dBm	-140 dBm
100 kHz	< -130 dBm	-143 dBm
1 MHz	< -140 dBm	-150 dBm
10 MHz to 1 GHz	< -156 dBm	-158 dBm
1 GHz to 2 GHz	< -154 dBm	-156 dBm
2 GHz to 2.5 GHz	< -152 dBm	-154 dBm
2.5 GHz to 3 GHz	< -150 dBm	-152 dBm
3 GHz to 3.5 GHz	< -148 dBm	-150 dBm
3.5 GHz to 7.5 GHz	< -146 dBm	-149 dBm
7.5 GHz to 13 GHz	< -146 dBm	-149 dBm

Preamplifier on

Frequency	Specification	Typical value
100 kHz	< -136 dBm	155 dBm
1 MHz	< -146 dBm	-160 dBm
10 MHz to 1 GHz	< -162 dBm	-168 dBm
1 GHz to 2.5 GHz	< -160 dBm	-166 dBm
2.5 GHz to 3 GHz	< -158 dBm	-164 dBm
3 GHz to 3.5 GHz	< -156 dBm	-162 dBm

1 dB gain compression

(Separation: RBW × 15, 50 kHz min.)

Input frequency	Specification	Typical value
10 MHz to 200 MHz	> +2dBm	+5dBm
200 MHz to 3.5 GHz	> +7 dBm	+10 dBm
3.5 GHz to 7.5 GHz	> -5 dBm	-2 dBm
7.5 GHz to 13 GHz	> -3 dBm	+0 dBm

2nd order harmonic distortion

Input frequency	Specification	Mixer level
10 MHz to 1.75 GHz	< -60 dBc	-20 dBm
> 1.75 GHz	< -90 dBc	-10 dBm

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>3rd order intermodulation distortion (TOI)</td><td>(Mixer level: -20 dBm, separation: 25 kHz)
<table>
<tr><th>Input frequency</th><th>Specification</th><th>Typical value</th></tr>
<tr><td>10 MHz to 200 MHz</td><td>> +12 dBm</td><td>+16 dBm</td></tr>
<tr><td>200 MHz to 500 MHz</td><td>> +16 dBm</td><td>+20 dBm</td></tr>
<tr><td>500 MHz to 1 GHz</td><td>> +20 dBm</td><td>+24 dBm</td></tr>
<tr><td>1 GHz to 2 GHz</td><td>> +21 dBm</td><td>+25 dBm</td></tr>
<tr><td>2 GHz to 3.5 GHz</td><td>> +22 dBm</td><td>+26 dBm</td></tr>
<tr><td>3.5 GHz to 7.5 GHz</td><td>> +5 dBm</td><td>+10 dBm</td></tr>
<tr><td>7.5 GHz to 13 GHz</td><td>> +8 dBm</td><td>+12 dBm</td></tr>
</table></td></tr>
<tr><td>Image/multiple/out-band spurious</td><td>(Spectrum analysis mode)
<table>
<tr><th>Frequency</th><th>Specification</th></tr>
<tr><td>10 MHz to 13 GHz</td><td>< -70 dBc</td></tr>
</table></td></tr>
<tr><td>Residual spurious</td><td>(Spectrum analysis mode, no input, input terminated, input attenuator: 0 dB)
<table>
<tr><th></th><th>Frequency</th><th>Specification</th></tr>
<tr><td>Preamplifier on</td><td>1 MHz to 3.5 GHz</td><td>< -95 dBm</td></tr>
<tr><td rowspan="2">Preamplifier off</td><td>1 MHz to 3.5 GHz</td><td>< -90 dBm</td></tr>
<tr><td>3.5 GHz to 13 GHz</td><td>< -90 dBm</td></tr>
</table></td></tr>
</table>

3.2.6 Input and Output

Item	Specifications
RF input Connector Impedance VSWR	 N type (f), front panel 50 Ω(nominal value) Input attenuator ≥ 10 dB, at the set frequency <1.5:1 (<3.5 GHz) (nominal value) <2.0:1 (>3.5 GHz) (nominal value)
Calibration signal output Connector Impedance Frequency	 BNC (f), front panel 50 Ω (nominal value) 50 MHz
Probe power source Connector Output voltage	 4-pin connector, front panel ± 15 V, 150 mA (nominal value)
1st LO output Connector	When external mixer option is used SMA (f), front panel
421.4 MHz IF input Connector	When external mixer option is used SMA (f), front panel
I/Q input Connector Impedance Maximum input amplitude	 BNC (f), front panel 50 Ω (nominal value), AC/DC coupled 1.0 Vp-p (DC component ±0.5V)
External trigger input 1 Connector Impedance Trigger level	 BNC (f), rear panel 10 kΩ (nominal value), DC coupled TTL level
External trigger input 2 Connector Impedance Trigger level	 BNC (f), rear panel 10 kΩ (nominal value), DC coupled 0 V to 5 V
Trigger output Connector Amplitude	 BNC (f), rear panel TTL level
Frequency reference input Connector Impedance Frequency Amplitude	 BNC (f), rear panel 50 Ω (nominal value) 5 MHz to 20 MHz 0 dBm ±5 dB
10 MHz frequency reference output Connector Impedance Frequency Amplitude	 BNC (f), rear panel 50 Ω (nominal value) 10 MHz 0 dBm ±5 dB

Item	Specifications
21.4 MHz IF output	
Connector	BNC (f), rear panel
Impedance	50 Ω (nominal value)
Frequency	21.4 MHz
Amplitude	Mixer input level + 2 dB (typical value at 50 MHz)
I/O	
Keyboard	PS/2 101/106 keyboard, front panel
Mouse	PS/2 mouse, front panel
USB	Front panel
GP-IB	IEEE-488.2 compatible, rear panel
LAN port	10Base-T, protocol used: TCP/IP, rear panel
PRINTER port	Conforms to IEEE-1284-1994, rear panel
Signal for external indicator	15-pin D-SUB connector (VGA), rear panel

3.2.7 General Specifications

Item	Specifications
Operating environmental range	Ambient temperature: +5°C to +40°C Relative humidity: 80% or less (no condensation)
Storage environmental range	Ambient temperature: -20°C to +60°C Relative humidity: 80% or less (no condensation)
AC power input	AC100 V to 120 V, 50 Hz/60 Hz AC220 V to 240 V, 50 Hz/60 Hz (automatic switching between AC 100 V and AC 200 V sources)
Power consumption	500 VA or less Approx. 220 VA (except for options)
External dimensions	424 mm (W) × 266 mm (H) × 530 mm (D) (approx.)
Weight	Approx. 32 kg or less (except for options)

3.3 Option

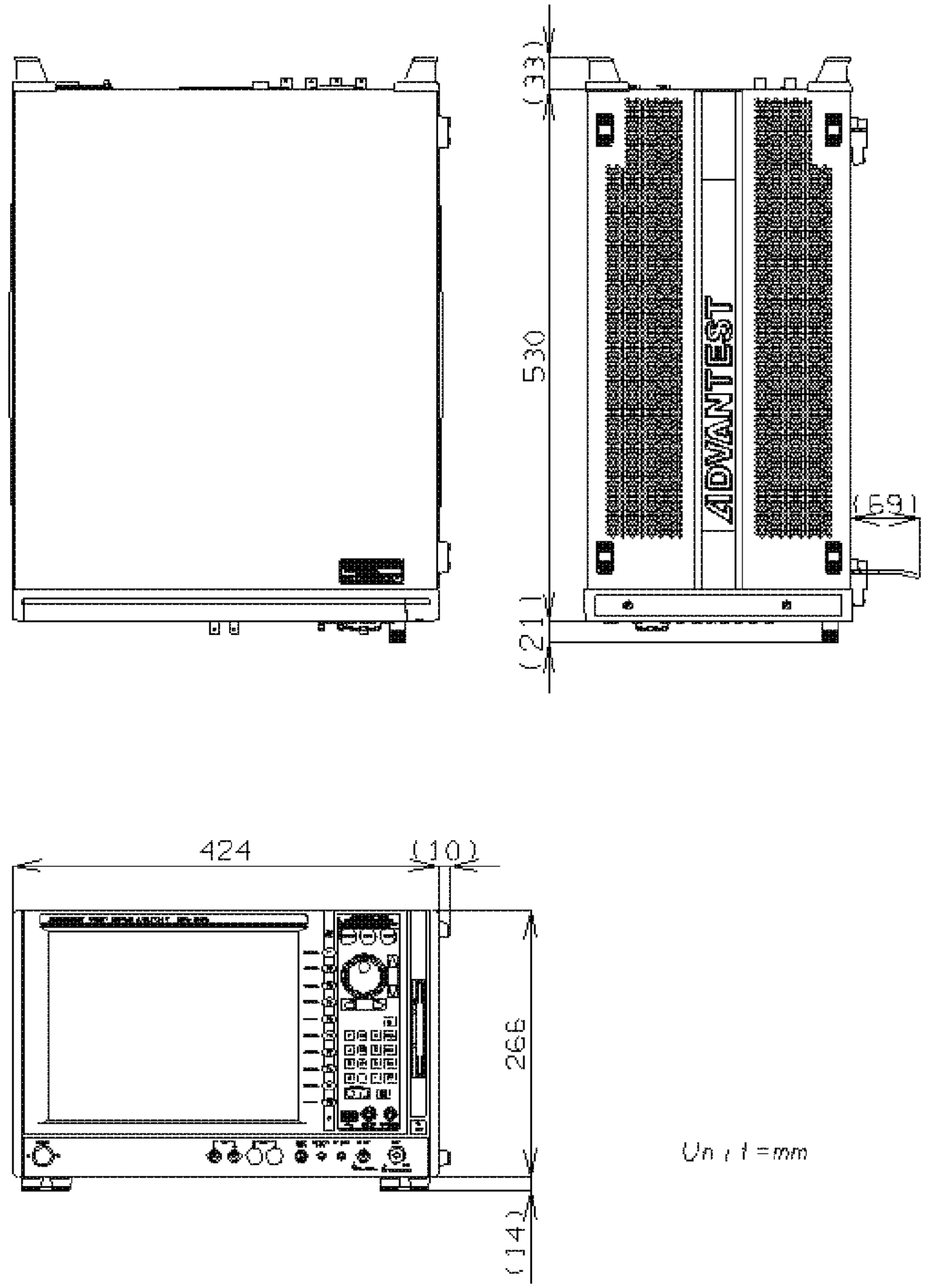
- OPTION 11 Wideband demodulator

Item	Specifications
Analysis frequency range	200 MHz to 6 GHz
Analysis resolution bandwidth (CCDF RBW)	50 MHz
Dynamic Range (CCDF RBW: 50 MHz)	(Center frequency: 1 GHz, Reference level: +5 dBm, Input attenuator: Auto, Temperature range: 20°C to 30°C, and the 1-GHz and +5-dBm CW signal is input.) > 50 dB

- OPTION 22 High stability frequency reference source

Item	Specifications
Frequency reference stability	
Aging rate	$\pm 3 \times 10^{-10}$/day, $\pm 2 \times 10^{-8}$/year
Temperature stability	$\pm 5 \times 10^{-9}$ (5 to 40°C, frequency at 25°C used as the reference)
Warm-up time (nominal value)	$\pm 1 \times 10^{-8}$/ 30 min $\pm 5 \times 10^{-9}$/ 60 min (frequency at 25°C, 24 hours after power on used as reference)
Frequency reference error	± (Time elapsed after the latest factory calibration × aging rate + temperature stability)

3.4 External Dimension Diagram



NOTE: ***This drawing shows external dimensions of this instrument.***
The difference in products and options used can cause a change in the appearance of the instrument.

IMPORTANT INFORMATION FOR ADVANTEST SOFTWARE

PLEASE READ CAREFULLY: This is an important notice for the software defined herein. Computer programs including any additions, modifications and updates thereof, operation manuals, and related materials provided by Advantest (hereafter referred to as "SOFTWARE"), included in or used with hardware produced by Advantest (hereafter referred to as "PRODUCTS").

SOFTWARE License

All rights in and to the SOFTWARE (including, but not limited to, copyright) shall be and remain vested in Advantest. Advantest hereby grants you a license to use the SOFTWARE only on or with Advantest PRODUCTS.

Restrictions

(1) You may not use the SOFTWARE for any purpose other than for the use of the PRODUCTS.
(2) You may not copy, modify, or change, all or any part of, the SOFTWARE without permission from Advantest.
(3) You may not reverse engineer, de-compile, or disassemble, all or any part of, the SOFTWARE.

Liability

Advantest shall have no liability (1) for any PRODUCT failures, which may arise out of any misuse (misuse is deemed to be use of the SOFTWARE for purposes other than it's intended use) of the SOFTWARE. (2) For any dispute between you and any third party for any reason whatsoever including, but not limited to, infringement of intellectual property rights.

LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.

2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.

3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.

4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:

   (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest 's instructions;

   (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);

   (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

   (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;

   (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);

   (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

   (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or

   (h) any negligent act or omission of the Purchaser or any third party other than Advantest.

5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

SALES & SUPPORT OFFICES

Advantest Korea Co., Ltd.
22BF, Kyobo KangNam Tower,
1303-22, Seocho-Dong, Seocho-Ku, Seoul #137-070, Korea
Phone: +82-2-532-7071
Fax: +82-2-532-7132

Advantest (Suzhou) Co., Ltd.
Shanghai Branch Office:
Bldg. 6D, NO.1188 Gumei Road, Shanghai, China 201102 P.R.C.
Phone: +86-21-6485-2725
Fax: +86-21-6485-2726

Shanghai Branch Office:
406/F, Ying Building, Quantum Plaza, No. 23 Zhi Chun Road,
Hai Dian District, Beijing,
China 100083
Phone: +86-10-8235-3377
Fax: +86-10-8235-6717

Advantest (Singapore) Pte. Ltd.
438A Alexandra Road, #08-03/06
Alexandra Technopark Singapore 119967
Phone: +65-6274-3100
Fax: +65-6274-4055

Advantest America, Inc.
3201 Scott Boulevard, Suite, Santa Clara, CA 95054, U.S.A
Phone: +1-408-988-7700
Fax: +1-408-987-0691

ROHDE & SCHWARZ Europe GmbH
Mühldorfstraße 15 D-81671 München, Germany
(P.O.B. 80 14 60 D-81614 München, Germany)
Phone: +49-89-4129-13711
Fax: +49-89-4129-13723

ADVANTEST

http://www.advantest.co.jp

ADVANTEST CORPORATION
Shin-Marunouchi Center Building, 1-6-2 Marunouchi, Chiyoda-ku, Tokyo 100-0005, Japan
Phone: +81-3-3214-7500