MS2840A Signal Analyzer Operation Manual Mainframe Operation

22nd Edition

For safety and warning information, please read this manual before attempting to use the equipment. Keep this manual with the equipment.

ANRITSU CORPORATION

Safety Symbols

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

death if not performed properly.

Symbols used in manual



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

This indicates a very dangerous procedure that could result in serious injury or



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

Safety Symbols Used on Equipment and in Manual

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



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

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

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

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

These indicate that the marked part should be recycled.

MS2840A

Signal Analyzer Operation Manual Mainframe Operation

- 14 March 2016 (First Edition)
- 24 March 2023 (22nd Edition)

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The operational instructions of this manual may be changed without prior notice. Printed in Japan

▲ DANGER

Replacing Battery



• When replacing the battery, use the specified battery and insert it with the correct polarity. If the wrong battery is used, or if the battery is inserted with reversed polarity, there is a risk of explosion causing severe injury or death.

Battery Disposal

 DO NOT expose batteries to heat or fire. This is dangerous and can result in explosions or fire. Heating batteries may cause them to leak or explode.



▲ WARNING

- ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the advice in the operation manual is not followed, there is a risk of personal injury or reduced equipment performance. The alert mark shown on the left may also be used with other marks and descriptions to indicate other dangers.
- Overvoltage Category
 This equipment complies with overvoltage category II defined in IEC 61010. DO NOT connect this equipment to the power supply of overvoltage category III or IV.
- Electric Shock
 To ensure that the equipment is grounded, always use the supplied 3-pin power cord, and insert the plug into an outlet with a ground terminal. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock or causing damage to the internal components.

Repair

WARNING NO OPERATOR SERVICE-ABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. Only qualified service personnel with a knowledge of electrical fire and shock hazards should service this equipment. This equipment cannot be repaired by the operator. DO NOT attempt to remove the equipment covers or unit covers or to disassemble internal components. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Calibration



• The performance-guarantee seal verifies the integrity of the equipment. To ensure the continued integrity of the equipment, only Anritsu service personnel, or service personnel of an Anritsu sales representative, should break this seal to repair or calibrate the equipment. Be careful not to break the seal by opening the equipment or unit covers. If the performance-guarantee seal is broken by you or a third party, the performance of the equipment cannot be guaranteed.

Falling Over

• This equipment should always be positioned in the correct manner. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.

Always set up the equipment in a position where the power switch can be reached without difficulty.

DO NOT short the battery terminals and never attempt to disassemble the battery or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak. This fluid is poisonous.

DO NOT touch the battery fluid, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly with clean water.

LCD

 This equipment uses a Liquid Crystal Display (LCD). DO NOT subject the equipment to excessive force or drop it. If the LCD is subjected to strong mechanical shock, it may break and liquid may leak. This liquid is very caustic and poisonous.

DO NOT touch it, ingest it, or get in your eyes. If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly with soap and water.

Cleaning

- Always remove the main power cable from the power outlet before cleaning dust around the power supply and fan.
 - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
 - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

Check Terminal



• Never input a signal of more than the indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

▲ CAUTION

Replacing Memory Back-up Battery	This equipment uses a Poly-carbon monofluoride lithium battery to backup the memory. This battery must be replaced by service personnel when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.
	Note: The battery used in this equipment has a maximum useful life of 7 years. It should be replaced before this period has elapsed.
External Storage Media	This equipment uses USB flash drive as external storage media for storing data and programs.
	If this media is mishandled or becomes faulty, important data may be lost. It is recommended to periodically back up all important data and programs to protect them from being lost accidentally.
	Anritsu will not be held responsible for lost data.
	 Pay careful attention to the following points. Never remove the USB flash drive from the equipment while it is being accessed. The USB flash drive may be damaged by static electric charges. Anritsu has thoroughly tested all external storage media shipped with this equipment. Users should note that external storage media not
	shipped with this equipment may not have been tested by Anritsu, thus Anritsu cannot guarantee the performance or suitability of such media.

▲ CAUTION

SSD	The equipment is equipped with an internal SSD from which, as with any SSD, data may be lost under certain conditions. It is recommended to periodically back up all important data and programs to protect them from being lost accidentally. <u>Anritsu will not be held responsible for lost data.</u>
	 To reduce the possibility of data loss, particular attention should be given to the following points. The equipment should only be used within the recommend temperature range, and should not be used in locations where the temperature may fluctuate suddenly. Always follow the guidelines to ensure that the equipment is set up in the specified manner. Always ensure that the fans at the rear and side of the equipment are not blocked or obstructed in any way. Exercise care not to bang or shake the equipment whilst the power is on. Never disconnect the mains power at the plug or cut the power at the breaker with the equipment turned on.
Use in a Residential Environment	This equipment is designed for an industrial environment. In a residential environment, this equipment may cause radio interference in which case the user may be required to take adequate measures.
Use in Corrosive Atmospheres	Exposure to corrosive gases such as hydrogen sulfide, sulfurous acid, and hydrogen chloride will cause faults and failures. Note that some organic solvents release corrosive gases.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories, including the National Institute of Advanced Industrial Science and Technology, and the National Institute of Information and Communications Technology, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within one year after shipment due to a manufacturing fault, and software bug fixes will be performed in accordance with the separate Software End-User License Agreement, provide, however, that Anritsu Corporation will deem this warranty void when:

- The fault is outside the scope of the warranty conditions separately described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster, including fire, wind or flood, earthquake, lightning strike, or volcanic ash, etc.
- The fault is due to damage caused by acts of destruction, including civil disturbance, riot, or war, etc.
- The fault is due to explosion, accident, or breakdown of any other machinery, facility, or plant, etc.
- The fault is due to use of non-specified peripheral or applied equipment or parts, or consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.
- The fault is due to use in unusual environments^(Note).
- The fault is due to activities or ingress of living organisms, such as insects, spiders, fungus, pollen, or seeds.

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

Anritsu Corporation shall assume no liability for damage or financial loss of the customer due to the use of or a failure to use this equipment, unless the damage or loss is caused due to Anritsu Corporation's intentional or gross negligence.

Note:

For the purpose of this Warranty, "unusual environments" means use:

- In places of direct sunlight
- In dusty places
- Outdoors
- In liquids, such as water, oil, or organic solvents, and medical fluids, or places where these liquids may adhere
- In salty air or in place chemically active gases (sulfur dioxide, hydrogen sulfide, chlorine, ammonia, nitrogen dioxide, or hydrogen chloride etc.) are present
- In places where high-intensity static electric charges or electromagnetic fields are present
- In places where abnormal power voltages (high or low) or instantaneous power failures occur
- In places where condensation occurs
- In the presence of lubricating oil mists
- In places at an altitude of more than 2,000 m
- In the presence of frequent vibration or mechanical shock, such as in cars, ships, or airplanes

Anritsu Corporation Contact

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

Also, the Anritsu website provides you with contact information and a contact form.

Notes On Export Management

- We assume no responsibility if this product and the attached power cord are re-exported and used without our approval since they may not comply with the safety standards, etc., of specific countries.
- This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

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

https://www.anritsu.com/support/export-procedures.

When you dispose of the products or manuals subject to export control, they must be physically destroyed or shredded so as not to be unlawfully used for military purpose.

Trademark and Registered Trademark

IQproducer[™] is a registered trademark of Anritsu Corporation in the United States and/or other countries.

Lifetime of Parts

The life span of certain parts used in this instrument is determined by the operating time or the power-on time. Due consideration should be given to the life spans of these parts when performing continuous operation over an extended period. These parts must be replaced at the customer's expense even if within the guaranteed period described in Warranty at the beginning of this manual. For details on life span, refer to the corresponding section in this manual.

Example: Display backlight, internal SSD, removable SSD,

connector for SSD, cooling fan

Crossed-out Wheeled Bin Symbol

Equipment marked with the Crossed-out Wheeled Bin Symbol complies with council directive 2012/19/EU (the "WEEE Directive") in European Union.



For Products placed on the EU market after August 13, 2005, please contact your local Anritsu representative at the end of the product's useful life to arrange disposal in accordance with your initial contract and the local law.

Software End-User License Agreement (EULA)

lease carefully read and accept this Software End-User License Agreement (hereafter this EULA) before using (includes executing, copying, installing, registering, etc.) this Software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment, etc.). By using this Software, you shall be deemed to have agreed to be bound by the terms of this EULA, and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu specified equipment (hereafter Equipment) for the purposes set out in this EULA.

Article 1. Grant of License and Limitations

- 1. You may not sell, transfer, rent, lease, lend, disclose, sublicense, or otherwise distribute this Software to third parties, whether or not paid therefor.
- 2. You may make one copy of this Software for backup purposes only.
- 3. You are not permitted to reverse engineer, disassemble, decompile, modify or create derivative works of this Software.
- 4. This EULA allows you to install one copy of this Software on one piece of Equipment.

Article 2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for direct, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, and damages claimed by third parties, arising out of or related to your use or inability to use this Software, unless the damages are caused due to Anritsu's intentional or gross negligence.

Article 3. Limitation of Liability

 If a fault (bug) is discovered in this Software, making this Software unable to operate as described in the operation manual or specifications even though you have used this Software as described in the manual, Anritsu shall at its own discretion, fix the bug, or replace the software, or suggest a workaround, free-of-charge, provided, however, that the faults caused by the following items and any of your lost or damaged data whatsoever shall be excluded from repair and the warranty.

- i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
- ii) If this Software has been used in conjunction with other non-Anritsu-approved software.
- iii) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
- iv) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, or any devices other than this Equipment, etc.
- 2. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs or replacement by Anritsu engineers necessitated by the above faults shall be borne by you.
- 3. The warranty period for faults listed in Section 1 of this Article shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair or replacement, whichever is longer.

Article 4. Export Restrictions

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

Article 5. Change of Terms

Anritsu may change without your approval the terms of this EULA if the changes are for the benefit of general customers, or are reasonable in light of the purpose of this EULA and circumstances of the changes. At the time of change, Anritsu will inform you of those changes and its effective date, as a general rule 45 days, in advance on its website, or in writing or by e-mail.

Article 6. Termination

 Anritsu may terminate this EULA immediately if you violate any conditions described herein. This EULA shall also be terminated immediately by Anritsu if there is any good reason that it is deemed difficult to continue this EULA, such as your violation of Anritsu copyrights, patents, etc. or any laws and ordinances, or if it turns out that you belong to an antisocial organization or has a socially inappropriate relationship with members of such organization.

 You and Anritsu may terminate this EULA by a written notice to the other party 30 days in advance.

Article 7. Damages

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

Article 8. Responsibility after Termination Upon termination of this EULA in accordance with Article 6, you shall cease all uses of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

Article 9. Negotiation for Dispute Resolution

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

Article 10. Governing Law and Court of Jurisdiction

This EULA shall be governed by and interpreted in accordance with the laws of Japan without regard to the principles of the conflict of laws thereof, and any disputes arising from or in relation to this EULA that cannot be resolved by negotiation described in Article 9 shall be subject to and be settled by the exclusive agreed jurisdiction of the Tokyo District Court of Japan.

Revision History:

February 29th, 2020 December 17th, 2021

Using VISA Driver for Remote Control of This Equipment

When controlling this measuring equipment remotely using the Ethernet port, a VISA*1 driver must be installed in the PC controller. We recommend using NI-VISA^{™*2} from National Instruments[™] (NI hereafter) as the VISA driver.

Although a license is generally required to use NI-VISA[™], the licensed NI-VISA[™] driver is provided free-of-charge for use when performing remote control (Note) of this measuring equipment.

The NI-VISA[™] driver can be downloaded from the NI website at:

https://www.ni.com

Be sure to comply with the NI license agreement for the usage and license scope.

Be sure to uninstall the NI-VISA[™] driver when disposing of this measuring equipment or transferring it to a third party, etc., when ceasing to use NI-VISA[™], or upon completion of the contract term when using this equipment on a rental contract.

(Notes)

Although the NI-VISA[™] driver itself can be downloaded free-of-charge from the web, an implementation license is required for legal reasons when some requirements are not met. (Check the NI web page for the detailed requirements.)

If these requirements are not met, permission is not granted to use NI hardware and software and an NI implementation license must be purchased. However, since this measuring equipment incorporates NI hardware (GPIB ASIC), the NI-VISA[™] driver can be downloaded and used free-of-charge.

Glossary of Terms:

*1: VISA: Virtual Instrument Software Architecture I/O software specification for remote control of measuring instruments using interfaces such as GPIB, Ethernet, USB, etc.
*2: NI-VISA™

World de facto standard I/O software interface developed by NI and standardized by the VXI Plug&Play Alliance.

Trademarks:

- National Instruments[™], NI[™], NI-VISA[™] and National Instruments Corporation are all trademarks of National Instruments Corporation.

Cautions Against Computer Virus Infection

- Copying files and data
 Only files that have been provided directly from Anritsu or generated
 using Anritsu equipment should be copied to the instrument.
 All other required files should be transferred by means of USB flash
 drive or CompactFlash media after undergoing a thorough virus
 check.
- Adding software
 Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections Ensure that the network has sufficient anti-virus security protection in place.
- Protection against malware (malicious software such as viruses). This equipment runs on Windows Operating System.
 - To connect this equipment to network, the following is advised.
 - Activate Firewall.
 - Install important updates of Windows.
 - Use antivirus software.

CE Conformity Marking

Anritsu affixes the CE conformity marking on the following product in accordance with the Decision 768/2008/EC to indicate that it conforms to the EMC, LVD, and RoHS directive of the European Union (EU).

CE marking

(6

1. Product Model

Model:

MS2840A Signal Analyzer

2. Applied Directive

- EMC: Directive 2014/30/EU
- LVD: Directive 2014/35/EU
- RoHS: Directive 2011/65/EU, (EU) 2015/863

3. Applied Standards

• EMC: Emission: EN 61326-1: 2013 (Class A) Immunity: EN 61326-1: 2013 (Table 2)

	Performance Criteria*
IEC 61000-4-2 (ESD)	В
IEC 61000-4-3 (EMF)	А
IEC 61000-4-4 (Burst)	В
IEC 61000-4-5 (Surge)	В
IEC 61000-4-6 (CRF)	А
IEC 61000-4-8 (RPFMF)	А
IEC 61000-4-11 (V dip/short)	B, C

- *: Performance Criteria
 - A: The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

- B: The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
- C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Harmonic current emissions: EN 61000-3-2: 2014 (Class A equipment)

- LVD: EN 61010-1: 2010 +A1:2019 (Pollution Degree 2)
- RoHS: EN IEC 63000:2018 (Category 9)

If the third digit of the serial number is "7", the product complies with Directive 2011/65/EU as amended by (EU) 2015/863.

(Pb,Cd,Cr6+,Hg,PBB,PBDE,DEHP,BBP,DBP,DIBP) If the third digit of the serial number is "6", the product complies with Directive 2011/65/EU. (Pb,Cd,Cr6+,Hg,PBB,PBDE)



Country:

81829 München, Germany

UKCA Marking

Anritsu affixes the UKCA marking on the following product in accordance with the guidance to indicate that it conforms to the EMC, LVD, and RoHS regulations in the United Kingdom.

UKCA marking

UK CA

1. Product Model

Model: MS2840A Signal Analyzer

2. Applied Regulations

EMC: S.I. 2016 No. 1091 LVD: S.I. 2016 No. 1101 RoHS: S.I. 2012 No. 3032

3. Applied Standards

- EMC: Emission: EN 61326-1: 2013 (Class A) Immunity: EN 61326-1: 2013 (Table 2)
- LVD: EN 61010-1: 2010 +A1:2019 (Pollution Degree 2)
- RoHS: EN IEC 63000: 2018 (Category 9)

4. Contact

Name: ANRITSU EMEA Ltd. Address, city: 200 Capability Green, Luton Bedfordshire, LU1 3LU Country: United Kingdom

RCM Conformity Marking

Anritsu affixes the RCM mark on the following product in accordance with the regulation to indicate that it conforms to the EMC framework of Australia/New Zealand.

RCM marking



- 1. Product Model Model: MS2840A Signal Analyzer
- 2. Applied Standards

EMC: Emission:

EN 61326-1: 2013 (Class A equipment)

About Eco label



The label shown on the left is attached to Anritsu products meeting our environmental standards.

Details about this label and the environmental standards are available on the Anritsu website at <u>https://www.anritsu.com/</u>

About This Manual

Associated Documents

The operation manual configuration of the MS2840A Signal Analyzer is shown below.



- Signal Analyzer Operation Manual (Mainframe) < This document>
- Signal Analyzer Operation Manual (Mainframe Remote Control) Description of basic operations, maintenance procedures, common functions and common remote functions of the mainframe
- Signal Analyzer Operation Manual (Signal Analyzer Function)
- Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)

Description of basic operations, functions and remote functions of the signal analyzer

- Signal Analyzer Operation Manual (Spectrum Analyzer Function)
- Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)

Description of basic operations, functions and remote functions of the spectrum analyzer

- Signal Analyzer Operation Manual (Phase Noise Measurement Function)
- Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control)

Description of basic operations, common functions and common remote functions of the Phase Noise Measurement function

In this document, _____ indicates a panel key.

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Chapter 1 Overview

This chapter provides an overview of the MS2840A Signal Analyzer and product configuration.

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	(MS2840A-014/114)1-82

1.1 Product Overview

The MS2840A Signal Analyzer ("the MS2840A" hereafter) is a spectrum analyzer to which options such as real-time signal analysis and vector modulation analysis can be added.

The MS2840A enables high-speed and high-accuracy signal processing of wide-ranging analyses at full-span, a characteristic of conventional sweep-type spectrum analyzers, using a digital IF block. In addition, the FFT process (high-speed Fourier conversion) realizes high-speed spectrum analysis and simultaneous analysis on frequency and time axes not possible with conventional sweep-type spectrum analyzers. Also, added option enables recording of the RF input signal as digital data (digitize function). It can be used in a variety of applications from research and development to manufacturing thanks to its characteristics.

The key features are listed below:

- Wide frequency band (3.6 GHz/6 GHz/26.5 GHz/44.5 GHz)
- Wide analysis bandwidth (Option 006/106: 10 MHz, Option 005/105/009/109: 31.25 MHz, Option 077/177: 62.5 MHz, Option 078/178: 125 MHz)
- High dynamic range
- High-speed measurement
- High-speed, high-accuracy signal analysis using digital IF
- Enables time-continuous analysis of loaded data
- Large-capacity waveform memory and digitization function that records RF signals without missing (when option 006/106/005/105/009/109/077/177/078/178 is used)
- BER Measurement function (when option 026/126 is used)
- Rich measurement functions

The MS2840A is equipped with the hardware product made by National Instruments and comes with the license for NI-VISA. NI-VISA can be used for the purpose of controlling the MS2840A.

1

1.2 Product Configuration

1.2.1 Standard configuration

Table 1.2.1-1 lists the standard configuration. At unpacking, check that all items are included. Contact an Anritsu Service and Sales office if any parts are missing or damaged.

Items	Model	Product name	Q'ty	Remarks
Unit	MS2840A	Signal Analyzer	1	_
Accessories	_	Power cord	1	
	P0031A	USB memory	1	1 GB or more
	Z0541A	USB Mouse	1	_
	Installation DVD-R			
	MX269000A	Standard Software	1	Installed
	_	Operation Manual	1 set	

Table 1.2.1-1 Standard Configuration

1.2.2 Options

Table 1.2.2-1 through Table 1.2.2-2 list the options. They are sold separately.

Note:

There is a risk of losing the data when adding additional option(s), so **back up the data** stored on the SSD, in advance. Anritsu is not responsible for any loss of data.

Option Number	Product Name	Remarks
MS2840A-040	3.6 GHz Signal Analyzer	9 kHz to 3.6 GHz
MS2840A-041	6 GHz Signal Analyzer	9 kHz to 6 GHz
MS2840A-044	26.5 GHz Signal Analyzer	9 kHz to 26.5 GHz
MS2840A-046	44.5 GHz Signal Analyzer	9 kHz to 44.5 GHz
MS2840A-001	Rubidium Reference Oscillator	See Table 1.3.1-1 "Internal
MS2840A-101	Rubidium Reference Oscillator Retrofit	reference oscillator".
MS2840A-002	High Stability Reference Oscillator	1
MS2840A-102	High Stability Reference Oscillator, Retrofit	1
MS2840A-037	Rubidium Reference Oscillator	Discontinued
MS2840A-137	Rubidium Reference Oscillator Retrofit]
MS2840A-005	Analysis Bandwidth Extension to 31.25 MHz	Extends Analysis Bandwidth to 31.25 MHz
		Standard option for MS2840A-040/041/044
MS2840A-006	Analysis Bandwidth 10 MHz	Analysis bandwidth: Max. 10 MHz
		Standard option
MS2840A-008	Preamplifier	100 kHz to 3.6 GHz
MS2840A-108	Preamplifier, Retrofit	(With MS2840A-040)
		100 kHz to 6 GHz (With MS2840A-041/044/046)
MS2840A-009	Bandwidth Extension to 31.25 MHz for	Extends Analysis Bandwidth to
	Millimeter-wave	31.25 MHz
		Standard option for MS2840A-046

Table 1.2.2-1 Additional Options at/after shipment

1

Chapter 1 Overview

Option Number	Product Name	Remarks
MS2840A-010	Phase Noise Measurement Function	10 MHz to Upper frequency limit
MS2840A-110	Phase Noise Measurement Function, Retrofit	
MS2840A-011	Secondary SSD	
MS2840A-111	Secondary SSD, Retrofit	
MS2840A-014	Removable SSD, Win10	
MS2840A-114	Removable SSD, Win10 Retrofit	
MS2840A-016	Precompliance EMI Function	
MS2840A-116	Precompliance EMI Function Retrofit	
MS2840A-017	Noise Figure Measurement Function	
MS2840A-117	Noise Figure Measurement Function Retrofit	
MS2840A-019	2dB Step Attenuator for Millimeter-wave	
MS2840A-119	2dB Step Attenuator for Millimeter-wave Retrofit	
MS2840A-020	3.6 GHz Vector Signal Generator	250 kHz to 3.6 GHz
MS2840A-120	3.6 GHz Vector Signal Generator, Retrofit	
MS2840A-021	6 GHz Vector Signal Generator	250 kHz to 6 GHz
MS2840A-121	6 GHz Vector Signal Generator, Retrofit	
MS2840A-022	Low Power Extension for Vector Signal Generator	Lower setting limit of output signal level: –136 dBm
MS2840A-122	Low Power Extension for Vector Signal Generator, Retrofit	
MS2840A-026	BER Measurement function	
MS2840A-126	BER Measurement function, Retrofit	
MS2840A-027	ARB Memory Upgrade 256 MSample for Vector Signal Generator	
MS2840A-127	ARB Memory Upgrade 256 MSample for Vector Signal Generator, Retrofit	
MS2840A-028	AWGN	
MS2840A-128	AWGN, Retrofit	
MS2840A-029	Analog Function Extension for Vector Signal Generator	
MS2840A-129	Analog Function Extension for Vector Signal Generator Retrofit	
MS2840A-051	Noise Floor Reduction	
MS2840A-151	Noise Floor Reduction Retrofit	
MS2840A-066	Low Phase Noise Performance	
MS2840A-166	Low Phase Noise Performance, Retrofit	

Table 1.2.2-1 Additional Options at/after shipment (Cont'd)

1.2 Product Configuration

Option Number	Product Name	Remarks	
MS2840A-067	Microwave Preselector Bypass	With MS2840A-044/046 installed	
MS2840A-167	Microwave Preselector Bypass, Retrofit		
MS2840A-068	Microwave Preamplifier	100 kHz to 44.5 GHz (With MS2840-046 installed)	
MS2840A-168	Microwave Preamplifier, Retrofit	(with MS2840-046 Installed)	
MS2840A-069	26.5GHz Microwave Preamplifier	100 kHz to 26.5 GHz	
MS2840A-169	26.5GHz Microwave Preamplifier, Retrofit	(With MS2840A-044 installed)	
MS2840A-077	Analysis Bandwidth Extension to 62.5 MHz	Extends Analysis Bandwidth to 62.5 MHz	
MS2840A-177	Analysis Bandwidth Extension to 62.5 MHz, Retrofit		
MS2840A-078	Analysis Bandwidth Extension to 125 MHz	Extends Analysis Bandwidth to 125 MHz	
MS2840A-178	Analysis Bandwidth Extension to 125 MHz, Retrofit		
MS2840A-182	CPU/Windows10 Upgrade, Retrofit	Upgrade CPU and OS to Windows 10	
MS2840A-088	3.6GHz Analog Signal Generator		
MS2840A-188	3.6GHz Analog Signal Generator Retrofit		
MS2840A-189	Vector Function Extension for Analog Signal Generator Retrofit		

Table 1.2.2-1	Additional Options at/af	ter shipment (Cont'd)
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Table 1.2.2-2 Optional Warranty Extension (MS2840A)

Option Number	Product Name	Remarks
MS2840A-ES210	2-year Warranty Service	
MS2840A-ES310	3-year Warranty Service	
MS2840A-ES510	5-year Warranty Service	—

1.2.3 Applicable Parts

Table 1.2.3-1 lists the application parts. They are sold separately.

Model Number	Product Name	Remarks	
W3812AE	MS2840A Signal Analyzer Operation Manual (Mainframe Operation)	Printed version	
W2851AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control)	Printed version	
W3335AE	MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)	Printed version	
W2853AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Remote Control)	Printed version	
W3336AE	MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)	Printed version	
W2855AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Remote Control)	Printed version	
W3117AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Phase Noise Measurement Function Operation)	Printed version	
W3118AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Phase Noise Measurement Function Remote Control)	Printed version	
W3337AE	MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (Operation)	Printed version	
W3338AE	MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (Remote Control)	Printed version	
W2914AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (IQproducer™)	Printed version	
W2929AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A Signal Analyzer Vector Signal Generator Operation Manual (Standard Waveform Pattern)	Printed version	

Table 1.2.3-1 Applicable Parts
1.2 Product Configuration

Model Number	Product Name	Remarks
K240B	Power divider (K connector)	DC to 26.5 GHz, 50 Ω K-J, 1Wmax
MA1612A	FOUR-PORT Junction PAD	5 MHz to 3 GHz, N-J
MP752A	TERMINATION	Discontinued DC to 12.4 GHz, 50 Ω N-P
J1755A	Termination	DC to 18 GHz, 50 Ω N-P
MA24106A	USB Power Sensor	50 MHz to 6 GHz, with USB/Mini B cable (Refer to Appendix D)
J0576B	Coaxial Cord	Approx. 1 m length (N-P, 5D-2W, N-P)
m J0576D	Coaxial Cord	Approx. 2 m length (N-P, 5D-2W, N-P)
J0127A	Coaxial Cord	Approx. 1 m length (BNC-P, RG58A/U, BNC-P)
J0127B	Coaxial Cord	Approx. 2 m length (BNC-P, RG58A/U, BNC-P)
J0127C	Coaxial Cord	Approx. 0.5 m length (BNC-P, RG58A/U, BNC-P)
J0322A	Coaxial Cord	DC to 18 GHz, approx. 0.5 m length (SMA-P, 50 Ω SUCOFLEX104, SMA-P)
J0322B	Coaxial Cord	DC to 18 GHz, approx. 1 m length (SMA-P, 50 Ω SUCOFLEX104, SMA-P)
J0322C	Coaxial Cord	DC to 18 GHz, approx. 1.5 m length (SMA-P, 50 Ω SUCOFLEX104, SMA-P)
J0322D	Coaxial Cord	DC to 18 GHz, approx. 2 m length (SMA-P, 50 Ω SUCOFLEX104, SMA-P)
J1398A	N-SMA ADAPTOR	DC to 26.5 GHz, 50 Ω N-P, SMA-J
J0911	Coaxial cord, 1.0 M (for 40 GHz)	DC to 40 GHz, approx. 1 m length (SF102A, 11K254/11K254/1.0M)
J0912	Coaxial cord, 0.5 M (for 40 GHz)	DC to 40 GHz, approx. 0.5 m length (SF102A, 11K254/11K254/0.5M)
41KC-3	Fixed attenuator, 3 dB	DC to 40 GHz, 3 dB
28K50A	Coaxial Termination	DC to 40 GHz, 50 Ω K-P
28N50-2	Coaxial Termination	DC to 18 GHz, 50 Ω N-P

Table 1.2.3-1 Applicable Parts (Cont'd)

Model Number	Product Name	Remarks
J1261A	Ethernet cable (shield type)	Straight cable, 1 m
J1261B	Ethernet cable (shield type)	Straight cable, 3 m
J1261C	Ethernet cable (shield type)	Crossover cable, 1 m
J1261D	Ethernet cable (shield type)	Crossover cable, 3 m
J0008	GPIB cable, 2.0 m	Approx. 2 m length
J1487A	AUX conversion adapter	Discontinued AUX \rightarrow BNC For vector signal generator option
J1556A	AUX conversion adapter	AUX → BNC For vector signal generator option and BER measurement function option
B0635A	Rack Mount Kit	
B0636A	Carrying case	Discontinued Protective cover, casters
B0636C	Carrying case	Protective cover, casters
Z0975A	Keyboard (USB)	
34AKNF50	Ruggedized K-To-Type N Female Adapter	DC to 20 GHz, SWR: 1.25

Table 1.2.3-1	Applicable Parts	(Cont'd)
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1.2.4 Application Software

For the latest information on the application software, either visit the MS2840A page on Anritsu website or contact an Anritsu Service and Sales office.

Application software is sold separately.

Anritsu website: <u>https://www.anritsu.com/</u>

1.3.1 Mainframe (MS2840A)

Table 1.3.1-1 through Table 1.3.1-3 show the specifications.

The following specification values are those under the conditions after 30-min warm-up at stable ambient temperature.

Typical values are only for reference and are not guaranteed.

Nominal values are not guaranteed.

The following conditions should apply (unless otherwise noted):

Auto Sweep Time Select:	Normal
Auto Swp Type Rules:	Swept Only
Switching Speed mode:	Normal (Best Phase Noise)
Attenuator Mode:	Mechanical Atten Only

The specifications of the Signal Analyzer function are values at the center frequency if not specified.

1

ltem		Specifi	ication
Frequency	I		
Frequency range	9 kHz to 3.6 GHz 9 kHz to 6 GHz 9 kHz to 26.5 GHz 9 kHz to 44.5 GHz	(MS2840. (MS2840. (MS2840. (MS2840.	A-040) A-041) A-044) A-046)
Frequency band	With MS2840A-040/041 ir	stalled.	
configuration		Band	Mixer harmonic order [N]
	9 kHz to 4000 MHz	0	1
	3500 MHz to 4400 MHz	1	1/2
	4300 MHz to 6100 MHz	1	1
	With MS2840A-044/046 in	nstalled,	
		Band	Mixer harmonic order [N]
	$9 \mathrm{kHz}$ to $4000 \mathrm{MHz}$	0	1
	$3500 \mathrm{~MHz}$ to $4400 \mathrm{~MHz}$	1	1/2
	4300 MHz to 6000 MHz	1	1
	3900 MHz to 8000 MHz	3	1
	7900 MHz to 10575 MHz	4	1
	10475 MHz to 12200 MHz	5	2
	12100 MHz to 18400 MHz	6	2
	18300 MHz to 26600 MHz	7	4
	26500 MHz to 42100 MHz	8	4
	42000 MHz to 44500 MHz	9	8
Preselector range	Frequency Band Mode: No 4 GHz to 6 GHz	ormal (MS2840	A-041)
	Frequency Band Mode [:] Sp 3.5 GHz to 6 GHz	ourious (MS2840.	A-041)
	Frequency Band Mode: No 4 GHz to 26.5 GHz	ormal (MS2840)	A-044)
	Frequency Band Mode: Sp 3 5 GHz to 26 5 GHz	ourious (MS2840	A-044)
	Frequency Band Mode: No 4 GHz to 44.5 GHz	ormal (MS2840	A-046)
	Frequency Band Mode: Sp	urious	A 0.40)
The second state	5.5 GHZ to 44.5 GHZ	UM52840.	A-040/
rrequency settings	100 MIL 4. 9 7 CH		
Settable range	-100 MHz to 3.7 GHz 100 MHz to 6.1 CHz		(MS2840A-040) (MS2840A-041)
	-100 MHz to 97.0 GHz		(MS2840A-041) (MS2840A-044)
	-100 MHz to 45 GHz		(MS2840A-046)
Resolution	1 Hz		

Table 1.3.1-1 Specifications for Mainframe

Specifications *1.3*

1

Item	Specification	
Internal reference oscillator	With MS2840A-040/041 installed,	
	Without MS2840A-001/101/002/102/037/137 installed,	0
Aging rate	$\pm 1 imes 10^{-6}$ /year)ve
Temperature characteristics	$\pm 2.5 \times 10^{-6} (0 \text{ to } 50 \text{ °C})$	rviev
Frequency accuracy at the initial calibration	$\pm 1 \times 10^{-6}$ (18 to 28 °C, 1 hour after power-on)	~
	With MS2840A-002/102 installed,	
Activation characteristics	Based on frequency 24 hours after power-on, at 23 °C $\pm 5 \times 10^{-7}$ (2 minutes after power-on) $\pm 5 \times 10^{-8}$ (5 minutes after power-on)	
Aging rate	$\pm 1 imes 10^{-7}$ /year	
Temperature characteristics	$\pm 2 imes 10^{-8}$ (0 to 50 °C)	
Frequency accuracy at the initial calibration	$\pm 2.2 \times 10^{-8}$ (18 to 28 °C, 1 hour after power-on)	
	With MS2840A-044/046 installed,	
Activation characteristics	Based on frequency 24 hours after power-on, at 23 °C ±5 × 10 ⁻⁷ (2 minutes after power-on) ±5 × 10 ⁻⁸ (5 minutes after power-on)	
Aging rate	$\pm 1 \times 10^{-7}$ /year	
Temperature characteristics	$\pm 2 \times 10^{-8}$ (0 to 50 °C)	
Frequency accuracy at the initial calibration	$\pm 2.2 \times 10^{-8}$ (18 to 28 °C, 1 hour after power-on)	
	With MS2840A-040/041/044/046 installed,	
	With MS2840A-001/101 installed,	
Activation characteristics	Based on frequency 24 hours after power-on, at 23 °C $\pm 1 \times 10^{-9}$ (7 minutes after power-on)	
Aging rate	$\pm 1 imes 10^{-10}$ /month, $\pm 1 imes 10^{-9}$ /year	
Temperature characteristics	$\pm 1 imes 10^{-9}$ (0 to 50 °C)	
Frequency accuracy at the initial calibration	$\pm 1 \times 10^{-10}$ (18 to 28 °C, 1 hour after power-on)	
	With MS2840A-037/137 installed,	
Activation characteristics	Based on frequency 24 hours after power-on, at 23 °C $\pm 1 \times 10^{-9}$ (15 minutes after power-on)	
Aging rate	$\pm 1 imes 10^{-10}$ /month, $\pm 1 imes 10^{-9}$ /year	
Temperature characteristics	$\pm 1 imes 10^{-9}$ (0 to 50 °C)	
Frequency accuracy at the initial calibration	$\pm 1 \times 10^{-10}$ (18 to 28 °C, 1 hour after power-on)	

 Table 1.3.1-1
 Specifications for Mainframe (Cont'd)

ltem	Speci	fication
Single side band noise	At 18 to 28 °C, 1000 MHz, spectrum analyzer function Switching Speed mode: Normal (Best Phase Noise)	
	(Frequency offset) 10 Hz 100 Hz 1 kHz 10 kHz 10 kHz 1 MHz 10 MHz *: Without MS2840A-001/101/037/1 With MS2840A-066/166 installed a Center frequency: 500 MHz, and SI at the temperature of 18 to 28 °C	$\begin{array}{ll} (\text{Single side band noise}) \\ -80 \ dBc/Hz & \text{Nominal*} \\ -92 \ dBc/Hz & \text{Nominal*} \\ -117 \ dBc/Hz & \text{Nominal*} \\ -123 \ dBc/Hz \\ -123 \ dBc/Hz \\ -135 \ dBc/Hz \\ -148 \ dBc/Hz & \text{Nominal} \\ 137 \ and \ With \ 002/102. \\ nd \ operating \ (066/166: \ Enabled, \\ PAN \leq 1 \ MHz \ as \ spectrum \ analyzer) \end{array}$
	(Frequency Offset) 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	(Single side band noise) –98 dBc/Hz Nominal –122 dBc/Hz –133 dBc/Hz –133 dBc/Hz –148 dBc/Hz Nominal
Spurious caused by the local frequency	$\begin{array}{l} 10 \ \mathrm{MHz} < \mathrm{frequency} \leq 1 \ \mathrm{GHz} \\ 3 \ \mathrm{kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 100 \ \mathrm{kHz} \\ 100 \ \mathrm{kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm{Frequency} > 1 \ \mathrm{GHz} \\ \mathrm{(Frequency offset)} \\ 3 \ \mathrm{kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 100 \ \mathrm{kHz} \\ 100 \ \mathrm{kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm{100 \ kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm{100 \ kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm{100 \ kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm{MHz} \\ \mathrm{100 \ kHz} \leq \mathrm{Freq.} \ \mathrm{offset} < 10 \ \mathrm{MHz} \\ \mathrm$	 -70 [dBc] Nominal -75 [dBc] Nominal Spurious -70 + 20 ×log(f) [dBc] Nominal*² -75 + 20 ×log(N) [dBc] Nominal*² ency [GHz], N: Mixing order

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

Specifications *1.3*

1

ltem	Specification
Amplitude	
Measurement range	Without MS2840A-008/108/068/168/069/169 or with Preamplifier turned off Average noise level up to +30 dBm With MS2840A-008/108/068/168/069/169 and Preamplifier turned on Average noise level up to +10 dBm
Maximum input level	With MS2840A-040/041 installed,
Continuous wave average power DC	Without MS2840A-008/108 or with Preamplifier turned off: +30 dBm (Input attenuator ≥ 10 dB) +20 dBm (Input attenuator = 0 dB) ±10 Vdc
Continuous wave average power	With MS2840A-008/108 and Preamplifier turned on: +10 dBm (Input attenuator = 0 dB)
DC	$\pm 10 \; \mathrm{Vdc}$
	With MS2840A-044/046 installed,
	Without MS2840A-008/108/068/168/069/169 or with Preamplifier turned off:
Continuous wave average power DC	+30 dBm (Input attenuator ≥ 10 dB) +20 dBm (Input attenuator = 0 dB) ±0 Vdc
Continuous wave average power	With MS2840A-008/108/068/168/069/169 and Preamplifier turned on: +10 dBm (Input attenuator = 0 dB)
DC	±0 Vdc
Input attenuator	With MS2840A-040/041/044 installed,
	U to 6U dB, 2 dB steps
	With MS2840A-046 Installed, Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Normal, and Stop frequency ≤ 6 GHz. or Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Spurious, and Stop frequency ≤ 4 GHz. or MS2840A-019/119 installed 0 to 60 dB, 2 dB steps
	Attenuator Mode: M-ATT Only. or Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Normal, and Stop frequency > 6 GHz. or Attenuator Mode: E-ATT Combined Mode, Frequency Band Mode: Spurious, and Stop frequency > 4 GHz. 0 to 60 dB, 10 dB steps

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

ltem	Specification	
Input attenuator switching	Based on input attenuator 10 dB, at 18 to 28 °C	
error	Without $MS2840A$ -008/108/068/168/069/169 or with Preamplifier	
	turned off:	
	$\pm 0.20 \text{ dB} (10 \text{ to } 60 \text{ dB})$	
	$(300 \text{ kHz} \le \text{frequency} < 4 \text{ GHz}, \text{ Frequency Band Mode}: \text{Normal})$	
	(300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)	
	$\pm 0.75 \text{ dB} (10 \text{ to } 60 \text{ dB})$	
	(4 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal)	
	$(3.5 \text{ GHz} \le \text{frequency} \le 13.8 \text{ GHz}, \text{ Frequency Band Mode}: \text{Spurious})$	
	±0.80 dB (10 to 60 dB)	
	$(13.8 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$	
	±1.0 dB (10 to 60 dB)	
	$(26.5 \text{ GHz} < \text{frequency} \le 40 \text{ GHz})$	
	$\pm 1.0 \text{ dB typ.}(10 \text{ to } 60 \text{ dB})$	
	$(40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz})$	
Reference level		
Setting range	Log scale: -120 to +50 dBm or equivalent value (Signal Analyzer Mode)	
	–130 to +50 dBm or equivalent value (Spectrum Analyzer Mode)	
	Linear scale: 22.4 µV to 70.7 V or equivalent value (Signal Analyzer Mode)	
	70.7 nV to 70.7 V or equivalent value (Spectrum Analyzer Mode)	
	Resolution: 0.01 dB or equivalent level	
Unit	Log scale: dBm, dBµV, dBmV, dBµV (emf), dBµV/m, V, W	
	Linear scale: V	

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

1

Overview

ltem	Specification
Linearity error	Without MS2840A-051/151 or with Noise Floor Reduction turned off. Without MS2840A-008/108/068/168/069/169 or with Preamplifier turned off:
	 Excluding the noise floor effect ±0.07 dB (mixer input level ≤ -20 dBm) ±0.10 dB (mixer input level ≤ -10 dBm) With MS2840A-008/108/068/168/069/169 and with Preamplifier turned on: Excluding the noise floor effect ±0.07 dB (Preamplifier Input Level ≤ -40 dBm)
	±0.10 dB (Preamplifier Input Level ≤ -30 dBm) When Attenuator Mode is E-ATT Combined: Without MS2840A-008/108/068/168/069/169 and with Preamplifier turned off:
	Excluding the noise floor effect $\pm 0.07 \text{ dB}$ (mixer input level $\leq -20 \text{ dBm}$, RF Input Level $\leq -10 \text{ dBm}$) $\pm 0.10 \text{ dB}$ (mixer input level $\leq -10 \text{ dBm}$, RF Input Level $\leq -10 \text{ dBm}$) $\pm 0.07 \text{ dB}$ Nominal
	(mixer input level ≤ -20 dBm, 9 kHz \leq frequency ≤ 300 MHz, RF input level $\leq +5$ dBm)
	(mixer input level ≤ -20 dBm, 300 MHz < frequency ≤ 6 GHz, RF input level $\leq +20$ dBm) ± 0.10 dB Nominal
	(mixer input level \leq -10 dBm, 9 kHz \leq frequency \leq 300 MHz, RF input level \leq +5 dBm)
	(mixer input level \leq -10 dBm, 300 MHz < frequency \leq 6 GHz, RF input level \leq +20 dBm)

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

ltem	Specification
RF frequency	At 18 to 28 °C, input attenuator = 10 dB,
characteristics	With MS2840A-040/041,
	and without MS2840A-008/108, or with Preamplifier turned off,
	and without MS2840A-066/166, or with MS2840A-066/166 turned off:
	$\pm 1.0 \text{ dB}$
	(9 kHz ≤ frequency < 300 kHz)
	$\pm 0.35 \text{ dB}$
	$(300 \text{ kHz} \le \text{frequency} < 50 \text{ MHz})$
	$\pm 0.35 \text{ dB}$
	$(50 \text{ MHz} \le \text{frequency} < 4 \text{ GHz}, \text{Frequency Band Mode}: \text{Normal})$
	$(50 \text{ MHz} \le \text{frequency} < 3.5 \text{ GHz}, \text{ Frequency Band Mode: Spurious})$
	$\pm 1.50 \text{ dB}$
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode Normal})$
	$(5.5 \text{ GHz} \le \text{Irequency} \le 6 \text{ GHz}, \text{ Frequency Band Model Spurious})$
	with MS2840A-040/041, and MS2840A-008/108, or with Preamplifier turned off
	and without $MS2840A \cdot 066/166$ or with $MS2840A \cdot 066/166$ turned on:
	$\pm 10 \mathrm{dB}$
	(9 kHz < frequency < 300 kHz)
	$\pm 0.35 \text{ dB}$
	$(300 \text{ kHz} \le \text{frequency} < 50 \text{ MHz})$
	$\pm 0.35 \text{ dB}$
	$(50 \text{ MHz} \le \text{frequency} < 3 \text{ GHz})$
	±1.50 dB
	$(3 \text{ GHz} \leq \text{frequency} \leq 3.7 \text{ GHz})$
	With MS2840A-040/041,
	and with MS2840A-008/108, and with Preamplifier turned on,
	and without MS2840A-066/166, or with MS2840A-066/166 turned off
	$\pm 1.0 \text{dB}$
	$(100 \text{ kHz} \le \text{irequency} < 300 \text{ kHz})$
	±0.65 aB (300 kHz < frequency < 4 GHz, Frequency Band Mode' Normal)
	$(300 \text{ kHz} \le \text{frequency} < 3.5 \text{ GHz}$. Frequency Band Mode: Spurious)
	$\pm 1.8 \text{ dB}$
	(4 GHz < frequency < 6 GHz, Frequency Band Mode: Normal)
	$(3.5 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}, \text{ Frequency Band Mode}$: Spurious)
	With MS2840A-040/041,
	and with MS2840A-008/108, and with Preamplifier turned on,
	and without MS2840A-066/166, or with MS2840A-066/166 turned on:
	±1.0 dB
	$(100 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})$
	$\pm 0.65 \text{ dB}$
	$(300 \text{ kHz} \le \text{frequency} < 3 \text{ GHz})$
	$\pm 1.8 \text{ dB}$
	$(3 \text{ GHz} \le \text{frequency} \le 3.7 \text{ GHz})$

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

1

ltem	Specification
Item RF frequency characteristics (Cont'd)	SpecificationWith MS2840A-044/046,Without MS2840A-008/108/068/168/069/169, or with Preamplifierturned off,Without MS2840A-067/167 or with Microwave Preselector Bypassturned off and after Preselector Auto Tune is done: $\pm 1.0 \text{ dB}$ (9 kHz \leq frequency < 300 kHz)
	(40 G11Z \sim if equency \geq 44.0 GftZ/

 Table 1.3.1-1
 Specifications for Mainframe (Cont'd)

ltem	Specification
RF frequency characteristics (Cont'd)	With MS2840A-044/046, and with MS2840A-008/108, and with Preamplifier turned on: ±1.0 dB (100 kHz ≤ frequency < 300 kHz) ±0.65 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±1.8 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious)
	With MS2840A-044/046, and with MS2840A-068/168/069/169, with Preamplifier turned on, Without MS2840A-067/167 or with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done: $\pm 1.0 \text{ dB}$ (100 kHz \leq frequency < 300 kHz) $\pm 0.65 \text{ dB}$ (300 kHz \leq frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz \leq frequency < 3.5 GHz, Frequency Band Mode: Spurious) $\pm 1.8 \text{ dB}$ (4 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz \leq frequency \leq 13.8 GHz, Frequency Band Mode: Normal)
	$\begin{array}{l} (13.8 \ \mathrm{GHz} < \mathrm{frequency} \leq 26.5 \ \mathrm{GHz}) \\ \pm 3.50 \ \mathrm{dB} \\ (26.5 \ \mathrm{GHz} < \mathrm{frequency} \leq 40 \ \mathrm{GHz}) \\ \pm 3.50 \ \mathrm{dB} \ \mathrm{Nominal} \\ (40 \ \mathrm{GHz} < \mathrm{frequency} \leq 44.5 \ \mathrm{GHz}) \end{array}$

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

1

Item	Specification
1 dB gain compression	With MS2840A-040/041 installed,
	Without MS2840A-008/108 or with Preamplifier turned off:
	At mixer input level
	\geq +3 dBm
	(300 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal) (300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	\geq +3 dBm
	(4 GHz < frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious)
	With MS2840A-008/108 and Preamplifier turned on:
	At Preamplifier input level
	$\geq -15 \text{ dBm Nominal}$
	$(300 \text{ MHz} \le \text{frequency} \le 6 \text{ GHz})$
	With MS2840A-044/046 installed,
	Without MS2840A-008/108/068/168/069/169 or with Preamplifier
	turned off:
	At mixer input level
	$\geq +3 \text{ dBm}$
	$(300 \text{ MHz} \le \text{Irequency} \le 4 \text{ GHz}, \text{ Frequency Band Mode} \cdot \text{Normal})$
	>+3 dBm
	(3.5 GHz < frequency < 4 GHz, Frequency Band Mode: Spurious)
	$\geq 0 \text{ dBm}$ (4 GHz < frequency $\leq 13.5 \text{ GHz}$)
	$\geq -1 \text{ dBm}$ (13.5 GHz < frequency $\leq 26.5 \text{ GHz}$)
	$\geq -1 \text{ dBm}$ Nominal (26.5 GHz < frequency $\leq 40 \text{ GHz}$)
	With MS2840A-068/168/069/169 and Preamplifier turned on:
	At Preamplifier input level
	$\geq -15 \text{ dBm}$ Nominal (300 MHz \leq frequency $\leq 4 \text{ GHz}$)
	$\geq -21 \text{ dBm}$ Nominal (4 GHz < frequency $\leq 13.5 \text{ GHz}$)
	$\geq -21 \text{ dBm}$ Nominal (13.5 GHz < frequency $\leq 26.5 \text{ GHz}$)
	$\geq -21 \text{ dBm}$ Nominal (26.5 GHz < frequency $\leq 40 \text{ GHz}$)

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

ltem	Specification
Spurious response	
Second harmonic wave	With MS2840A-040/041 installed,
distortion	Without MS2840A-008/108 or with Preamplifier turned off:
	At mixer input level = -30 dBm
	Harmonics [dBc] SHI [dBm]
	$\leq -60 \qquad \geq +30$
	$(10 \text{ MHz} \le \text{Input frequency} \le 300 \text{ MHz})$
	$\leq -65 \qquad \geq +35$
	$(300 \text{ MHz} < \text{Input frequency} \le 1 \text{ GHz})$
	$\leq -65 \geq +35$
	(1 GHz < Input frequency \leq 2 GHz)
	At mixer input level = -20 dBm
	Harmonics [dBc] SHI [dBm]
	$\leq -80 \geq +60$
	(2 GHz < Input frequency \leq 3 GHz, Frequency Band Mode: Normal)
	$\leq -80 \qquad \geq +60$
	$(1.75 \text{ GHz} \le \text{Input frequency} \le 3 \text{ GHz},$
	Frequency Band Mode: Spurious)
	With MS2840A-008/108 and with Preamplifier turned on:
	At preamplifier input level = -45 dBm
	Harmonics [dBc] SHI [dBm]
	≤ -50 Nominal $\geq +5$ Nominal
	$(10 \text{ MHz} \le \text{frequency} \le 300 \text{ MHz})$
	≤ -55 Nominal $\geq +10$ Nominal
	$(300 \text{ MHz} < \text{frequency} \le 3 \text{ GHz})$
	With MS2840A-044/046 installed,
	Without MS2840A-008/108/068/168/069/169 and MS2840A-067/167:
	At mixer input level = -30 dBm
	Harmonics [dBc] SHI [dBm]
	$\leq -60 \geq +30$
	$(10 \text{ MHz} \le \text{Input frequency} \le 300 \text{ MHz})$
	$\leq -65 \qquad \geq +35$
	$(300 \text{ MHz} < \text{Input irequency} \le 1 \text{ GHz})$
	≥ -00 $\geq +30$ (1 CHz < Input frequency < 2 CHz Everyonay Pand Mode' Normal)
	(1 G112 \times input irequency ≥ 2 G112, Frequency Dana Mode. Normal) < $-65 \qquad > \pm 35$
	$\leq -00 \leq 100$ (1 GHz < Input frequency < 1.75 GHz
	Frequency Band Mode: Spurious)

 Table 1.3.1-1
 Specifications for Mainframe (Cont'd)

1

ltem	Specification	
Second harmonic wave	At mixer input level = -20 dBm	
distortion (Cont'd)	Harmonics [dBc] SHI [dBm]	
	$\leq -80 \qquad \geq +60$	
	(2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal)	
	$\leq -80 \qquad \geq +60$	
	$(1.75 \text{ GHz} \leq \text{Input frequency} \leq 2 \text{ GHz},$	
	Frequency Band Mode: Spurious)	
	At mixer input level = -10 dBm	
	$\leq -80 \geq +70$	
	$(2 \text{ GHz} < \text{Input frequency} \le 3 \text{ GHz},$ Frequency Band Mode: Spurious)	
	~ 00	
	$ \geq -90 \qquad \geq 700 $ $ (3 \text{ GHz} < \text{Input frequency} < 13.25 \text{ GHz}) $	
	< 00 Nominal $>\pm 80$ Nominal	
	≤ -90 Nominal $\geq +80$ Nominal (13.25 GHz < Input frequency < 22.25 GHz)	
	$\frac{(15.25 \text{ GHz} \times \text{Input frequency} \le 22.25 \text{ GHz})}{\text{With } MS2840A \cdot 0.44/0.46 \text{ installed}}$	
	With $MS2840A 044/040$ instance, With $MS2840A - 008/108/068/168/069/169$ and with Preamplifier	
	turned off:	
	Or with MS2840A-067/167 and with Microwave Preselector Bypass	
	turned off:	
	At mixer input level = -30 dBm	
	Harmonics [dBc] SHI [dBm]	
	$\leq -60 \geq +30$	
	(10 MHz \leq frequency \leq 300 MHz)	
	≤ -65 $\geq +35$	
	$(300 \text{ MHz} < \text{frequency} \le 1 \text{ GHz})$	
	$\leq -65 \qquad \geq +35$	
	(1 GHz < frequency ≤ 2 GHz, Frequency Band Mode: Normal)	
	$\leq -65 \geq +35$	
	(1 GHz < frequency < 1.75 GHz, Frequency Band Mode: Spurious)	
	At mixer input level = -20 dBm	
	Harmonics [dBc] SHI [dBm]	
	≤ -80 $\geq +60$ (9 CHz \leq Input fragment ≤ 2 CHz. Fragment Dan d Made: Neurol)	
	$(2 \text{ GHz} < \text{Input irequency} \le 3 \text{ GHz}, \text{ Frequency Band Mode} \cdot \text{Normal})$	
	$\leq -80 \qquad \geq +60$	
	$(1.75 \text{ GHz} \le \text{Input frequency} \le 2 \text{ GHz},$ Frequency Band Mode: Spurious)	
	At mixer input level = 10 dBm	
	At mixer input level -10 dBm < -70 $> +60$	
	(2 GHz < Input frequency < 3 GHz)	
	Frequency Band Mode: Spurious)	
	<-70 >+60	
	$(3 \text{ GHz} < \text{Input frequency} \le 13.25 \text{ GHz})$	
	≤ -70 Nominal $\geq +60$ Nominal	
	$(13.25 \text{ GHz} < \text{Input frequency} \le 22.25 \text{ GHz})$	

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

ltem	Specification	
Second harmonic wave	With MS2840A-044/046 installed,	
distortion (Cont'd)	With MS2840A-008/108/068/168/069/169 and with Preamplifier turned on:	
	Or with MS2840A-067/167 and with Microwave Preselector Bypass turned off:	
	At mixer input level = -45 dBm Harmonics [dBc] SHI [dBm] ≤ -50 Nominal ≥ +5 Nominal (10 MHz < Input frequency < 300 MHz)	
	≤ -55 Nominal $\geq +10$ Nominal (300 MHz < Input frequency ≤ 2 GHz)	
	≤ -45 Nominal ≥ 0 Nominal (2 GHz < Input frequency ≤ 13.25 GHz)	
	≤ -40 Nominal ≥ -5 Nominal	
	$(13.25 \text{ GHz} < \text{Input frequency} \le 22.25 \text{ GHz})$	
	When Attenuator Mode is E-ATT Combined: Without MS2840A-008/108/068/168/069/169 and with Preamplifier turned off:	
	At mixer input level = -30 dBm Harmonics [dBc] SHI [dBm]	
	$\leq -60 \geq +30$	
	(10 MHz \leq Input frequency \leq 300 MHz, RF input level \leq -5 dBm)	
	$\leq -65 \geq +35$	
	$(300 \text{ MHz} < \text{Input frequency} \le 1 \text{ GHz}, \text{RF input level} \le -5 \text{ dBm})$	
	≤ -65 $\geq +35$	
	$(1 \text{ GHz} < \text{Input frequency} \le 2 \text{ GHz},$	
	Frequency band Mode. Normal, KF input level $\leq \pm 5$ dBm/ (1 GHz < Input frequency < 1.75 GHz	
	Frequency Band Mode: Spurious, RF input level \leq +5 dBm)	
	At mixer input level = -20 dBm	
	Harmonics [dBc] SHI [dBm]	
	$\leq -80 \qquad \geq +60$	
	$(2 \text{ GHz} < \text{Input frequency} \le 3 \text{ GHz},)$	
	Frequency Band Mode: Normal, RF input level \leq +5 dBm)	
	$(1.75 \text{ GHz} \le \text{Input frequency} \le 3 \text{ GHz},$	
	Frequency Band Mode: Spurious, RF input level \leq +5 dBm)	

Table 1.3.1-1 Specifications for Mainframe (Cont'd)

Specifications *1.3*

Item	Specification	
Second harmonic wave distortion (Cont'd)	At mixer input level = -30 dBm Harmonics [dBc] SHI [dBm] $\leq -60 \text{ Nominal} \geq +30 \text{ Nominal}$ (10 MHz \leq Input frequency $\leq 300 \text{ MHz}$, RF input level $\leq 0 \text{ dBm}$) $\leq -65 \text{ Nominal} \geq +35 \text{ Nominal}$ (300 MHz $<$ Input frequency $\leq 1 \text{ GHz}$, RF input level $\leq +15 \text{ dBm}$) $\leq -65 \text{ Nominal} \geq +35 \text{ Nominal}$ (1 GHz $<$ Input frequency $\leq 2 \text{ GHz}$, Frequency Band Mode: Normal, RF input level $\leq +15 \text{ dBm}$) (1 GHz $<$ Input frequency $< 1.75 \text{ GHz}$, Frequency Band Mode: Spurious, RF input level $\leq +15 \text{ dBm}$)	Overview
	At mixer input level = -20 dBm Harmonics [dBc] SHI [dBm] ≤ -80 Nominal ≥ +60 Nominal (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal, -5 dBm <rf +15="" dbm)<br="" input="" level="" ≤="">(1.75 GHz ≤ Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious, -5 dBm<rf +15="" dbm)<br="" input="" level="" ≤="">SHI: Second Harmonic Intercent</rf></rf>	
Residual response	Frequency >1 MHz, Input attenuator = 0 dB, at 50 Ω terminator	
·····	(With MS2840A-077/177/078/178 installed, excluding Bandwidth > 31.25 MHz.)	
	$1 \text{ MHz} \leq \text{frequency} \leq 1 \text{ GHz} \leq -100 \text{ dBm}$	
	$6 \text{ GHz} \le \text{frequency} \le 13.5 \text{ GHz} \le -90 \text{ dBm typ.}$	
	13.6 GHz < frequency < 26.5 GHz < -90 dBm Nominal	
	$26.5 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz} \le -80 \text{ dBm Nominal.}$	
Connector		
RF input		
Connector	With MS2840A-040/041/044,	
	Front panel, N-J, 50 Ω	
	VSWR: Input attenuator ≥10 dB, 18 to 28 °C	
	≤ 1.2 (Nominal) (40 MHz \leq frequency ≤ 3 GHz)	
	≤ 1.3 (Nominal) (3 GHz \leq frequency ≤ 4 GHz) ≤ 1.5 (Nominal) (4 GHz \leq frequency ≤ 6 GHz)	
	≤ 1.6 (Nominal) (4 GHz < frequency ≤ 0 GHz) ≤ 1.6 (Nominal) (6 GHz < frequency ≤ 13.6 GHz)	
	≤ 1.9 (Nominal) (13.6 GHz < frequency ≤ 26.5 GHz)	
	With MS2840A-046,	
	Front panel, N-J, 50 Ω	
	VSWR: Input attenuator ≥ 10 dB, 18 to 28 °C	
	≤ 1.2 (Nominal) (40 MHz \leq frequency ≤ 3 GHz)	
	\geq 1.3 (Nominal) (5 GHz < frequency \leq 6 GHz) < 1.3 (Nominal) (6 GHz < frequency < 13 6 GHz)	
	< 1.4 (Nominal) (13.6 GHz < frequency ≤ 15.0 GHz)	
	≤ 1.6 (Nominal) (26.5 GHz < frequency ≤ 40 GHz)	
	\leq 1.6 (Reference value with the V-K converter mounted and included) (40 GHz < frequency \leq 44.5 GHz)	

 Table 1.3.1-1
 Specifications for Mainframe (Cont'd)

Item	Specification
RF output	This is available when MS2840A-020/120/021/121 is installed.
Connector	Front panel, N-J, 50 Ω (Nominal value)
	Refer to MS2830A/MS2840A Signal Analyzer Vector Signal Generator
	Operation Manual Operation.
1st Local Output	This is available when MS2840A-044/046 is installed.
	Connector for External Mixer
Output	Local signal: Frequency 5 to 10 GHz, output level ≥ 10 dBm typ.
Taraat	Blas current: Range 0.0 to 20.0 mA/ Resolution 0.1 mA
Input	IF signal. Frequency 1875 MHZ
Connector	Front panel, SMA-J, 50 Q (Nominal)
External reference input	
Connector	Rear panel, BNC-J, 50 Ω (Nominal)
Frequency	5 MHz/10 MHz/13 MHz
Operating range	±1 ppm
Input Level	$-15 \text{ dBm} \le \text{level} \le +20 \text{ dBm}, 50 \Omega \text{ (AC coupling)}$
Reference signal output	
Connector	Rear panel, BNC-J, 50 Ω (Nominal value)
Frequency	10 MHz
Output Level	$\geq 0 \text{ dBm}$ (AC coupling)
Sweep Status Output	
Connector	Rear panel, BNC-J
Output Level	TTL level (high level at sweep or waveform acquisition)
SA Trigger Input	
Connector	Rear panel, BNC-J
Input Level	TTL level
SG Trigger Input	Available with MS2840A-020/120/021/121 installed.
Connector	Rear panel, BNC-J
Input Level	TTL level
External controls	Control from external controller (except power)
Ethernet	
(10/100/1000Base-T)	
Connector	Connector Rear panel, RJ-45
GPIB	
Connector	IEEE488.2 compatible
Interface function	Rear panel, IEEE488 bus connector
	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
USB (B)	
Connector	USB2.0 compatible
	Rear panel, USB-B connector

Table 1.3.1-1	Specifications	for Mainframe	(Cont'd)
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Item	Specification
USB	Used to connect the USB power sensor or to connect a USB flash drive for saving and reading the files (parameters, waveforms, screen copies, etc.).
Connector	USB 2.0 compatible
	USB-A connector (2 ports on front panel, 2 ports on rear panel)
Monitor Output	
Connector	Rear panel, VGA compatibility, mini D-SUB 15 pin
Aux	Used for the input/output of an auxiliary device.
Connector	Rear panel, 50 pins (DX10A-50S equivalent part)
IF Output	This is available when MS2840A-044/046 is installed.
	Outputs the signal for the 1st IF output connector before band filtering.
Connector	Rear panel, SMA-J, 50 Ω (Nominal)
Output frequency	1875 MHz
Gain	-10 dB (Nominal, ATT = 0 dB, at 10 GHz input frequency)
Connector for Noise Source	This is available when MS2840A-017/117 is installed.
Connector	Rear panel, BNC-J
Output voltage range	+28 V±0.5 V, Pulsed
Display	XGA color LCD (Resolution: 1024×768)
	Size: 8.4" (213 mm diagonal)
External Mixer	This is available when MS2840A-044/046 is installed.
Frequency	Frequency range: 26.5 to 325 GHz
Frequency band	Band Frequency range Mixing order
configuration	Band VHP 50.0 to 75.0 GHz 8+
	Band EHP 60.0 to 90.0 GHz 12–
	Band A $20.0 \text{ to } 40.0 \text{ GHz}$ 4^+
	Band U 40.0 to 60.0 GHz $6+$
	Band V 50.0 to 75.0 GHz 8+
	Band E 60.0 to 90.0 GHz 9+
	Band W 75.0 to 110.0 GHz 11+
	Band F 90.0 to 140.0 GHz 14+
	Band D 110.0 to 170.0 GHz 17+
	Band G 140.0 to 220.0 GHz 22+
	Band I 170.0 to 260.0 GHz 26^+
Amplitudo	Setting range of mixer conversion loss 0 to 00.0 dP
Ampitude	Maximum input loval Depends on Fyternal Mixor
	Augusta noise level Depends on External Mixer
	Frequency response. Depends on External Mixer
Innert/Outerst	Applicable mixer Two port mixer or by
Input/Output	Lecal frequency 5 to 10 CHz
	Local frequency 0 to 10 GHZ
	IF irequency 1875 MHz

ont'd)

ltem	Specification
Overall Specifications	
Mass, Weight	
Dimensions	177 mm (h) × 426 mm (w) × 390 mm (d) (excluding protrusions)
Weight	≤ 14.5 kg (with MS2840A-040/041 and MS2840A-020/021 options installed; excludes all other options)
	≤ 15.3 kg (with MS2840A-044/046 installed; excludes all other options)
Power Supply	
Voltage	Rated Voltage: AC 100 to 120 V or 200 to 240 V
Frequency	50 to 60 Hz
Power consumption	\leq 350 VA (including all options, maximum value)
	140 VA Nominal (With MS2840A-040/041 installed, excluding other options)
	220 VA Nominal (With MS2840A-040/041, -020/021 and -022 installed, excluding other options) 220 VA Nominal
	(With MS2840A-044/046 installed, excluding other options)
Temperature	
Operating temperature	0 to 50 °C
Storage temperature	-20 to +60 °C
Environment Performance	
Conducted emission	Conforms to EN 61326-1
Radiated emission	Conforms to EN 61326-1
Harmonic current emission	Conforms to EN 61000-3-2
Electrostatic discharge	Conforms to EN 61326-1
Electromagnetic field immunity	Conforms to EN 61326-1
Fast transient/burst	Conforms to EN 61326-1
Surge	Conforms to EN 61326-1
Conducted RF	Conforms to EN 61326-1
Power frequency magnetic field	Conforms to EN 61326-1
Voltage dips/short interruption	Conforms to EN 61326-1

1

Overview

ltem	Specification
Common	
Function	Displays the waveforms of Spectrum, Power vs Time, and others from the data obtained for certain amount of time.
Trace mode	Spectrum, Power vs Time, Frequency vs Time, CCDF, Spectrogram, Phase vs Time, No Trace
Bandwidth	Specifies the capture analysis bandwidth from the center frequency 1 kHz to 10 MHz (1-2.5-5 sequence) (With MS2840A-006/106)
	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz (With MS2840A-005/105 or MS2840A-009/109 installed.)
	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz (With MS2840A-077/177 installed.)
	1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz, 100 MHz, 125 MHz (With MS2840A-078/178 installed.)
Sampling rate	Automatically set depending on analysis bandwidth
	2 kHz to 20 MHz (1-2-5 sequence) (With MS2840A-006/106)
	2 kHz to 50 MHz (1-2-5 sequence) (With MS2840A-005/105, MS2840A-009/109 installed.)
	2 kHz to 100 MHz (1-2-5 sequence) (With MS2840A-077/177 installed.)
	2 kHz to 200 MHz (1-2-5 sequence) (With MS2840A-078/178 installed.)

Table 1.3.1-2 Specifications for Signal Analyzer Function

ltem	Specification		
Capture time			
Capture Time Length	Sets the capture time length		
Minimum capture time:	2 μs to 50 ms (determined depending on analysis bandwidth)		
Maximum capture time:	2 to 2000 s (determined depending on analysis bandwidth)		
Setting mode	Auto, Manual		
	(With MS2840A-077/177/078/178 not installed or Bandwidth \leq 31.25 MHz.)		
Capture Time Length	Sets the capture time length.		
Minimum capture time:	1 μs		
Maximum capture time:	500 ms		
Setting mode	Auto, Manual		
	(With MS2840A-077/177 installed and Bandwidth > 31.25 MHz.)		
Capture Time Length	Sets the capture time length.		
Minimum capture time:	500 ns to 1 μs (determined depending on analysis bandwidth)		
Maximum capture time:	500 ms		
Setting mode	Auto, Manual		
	(With MS2840A-078/178 installed and Bandwidth > 31.25 MHz.)		
Trigger			
Trigger mode	Free Run (Trig Off), Video, Wide IF Video, Frame, External (TTL) SG Marker (With MS2840A-020/120/021/121)		
ADC resolution	16 bits		
	(With MS2840A-077/177/078/178 not installed or Bandwidth ≤ 31.25 MHz.)		
Spectrum indicator function			
Function overview	Displays the spectrum for arbitrary time length and frequency range in the acquired waveform data.		
Analysis time range			
Analysis Start Time	Sets analysis start time position from beginning of waveform data.		
Analysis Time Length	Sets analysis time span.		
Setting mode	Auto, Manual		

Item	Specification	
Frequency	Center frequency and SPAN can be set within the frequency range in waveform data.	
Frequency settings		9
	0 MHz to 3.6 GHz (MS2840A-040)	/er
	0 MHz to 6 GHz (MS2840A-041)	2 2
	0 MHz to 26.5 GHz (MS2840A-044)	ew
	0 MHz to 44.5 GHz (MS2840A-046)	
	(With MS2840A-077/177/078/178 not installed or Bandwidth ≤ 31.25 MHz.)	
	300 MHz to 3.6 GHz (MS2840A-040)	
	300 MHz to 6 GHz (MS2840A-041)	
	(With MS2840A-077/177/078/178 installed and Bandwidth > 31.25 MHz.)	
	300 MHz to 6 GHz (MS2840A-044)	
	300 MHz to 6 GHz (MS2840A-046)	
	(With MS2840A-077/177/078/178 installed but MS2840A-067/167 not installed and Bandwidth > 31.25 MHz.)	
	300 MHz to 26.5 GHz (MS2840A-044)	
	300 MHz to 44.5 GHz (MS2840A-046)	
	(With MS2840A-07771777078/178 and MS2840A-0677167 installed and Bandwidth > 31.25 MHz)	
Display frequency accuracy	$\pm [Indicator frequency \times reference frequency accuracy \pm SPAN]$	
Display nequency accuracy	\pm Indicator frequency × reference frequency accuracy + SPAN frequency × reference frequency accuracy + RBW × 0.05 + 2 × N +	
	SPAN frequency / (Trace point count -1)] Hz	
	N: Mixer harmonic order	
Resolution bandwidth (RBW)		
Setting range	1 Hz to 1 MHz (1-3 sequence)	
Selectivity	y (-60 dB/-3 dB) 4.5:1, Nominal	
	(With MS2840A-077/177/078/178 not installed or Bandwidth ≤ 31.25	
	MHz.)	
Setting range	3 kHz to 3 MHz (1-3 sequence)	
Selectivity	/ (-60 dB/-3 dB) 4.5:1, Nominal	
	(With MS2840A-077/177 installed and Bandwidth > 31.25 MHz.)	
Setting range	3 kHz to 10 MHz (1-3 sequence)	
Selectivity	y (-60 dB/-3 dB) 4.5:1, Nominal	
	(With MS2840A-078/178 installed and Bandwidth > 31.25 MHz.)	

Table 1.3.1-2 Specifications for Signal Analyzer Function (Cont'd)

Item	Specification
Absolute amplitude accuracy	At 18 to 28 °C, RBW = Auto, Time Detection = Average, Marker Result = Integration or Peak (Accuracy), Center frequency, CW, excluding the noise floor effect
	With Preamplifier turned off: Input attenuator ≥ 10 dB, Mixer input level ≤ −10 dBm
	With Preamplifier turned on:
	Input attenuator = 10 dB, preamplifier input level \leq -30 dBm
	With MS2840A-040/041 installed, Without MS2840A-008/108 or with Preamplifier turned off, and Without MS2840A-066/166 or with MS2840A-066/166 turned off: ±0.5 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3 5 GHz, Frequency Band Mode: Spurious)
	$\pm 1.8 \text{ dB}$ $(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{ Frequency Band Mode: Normal})$ $(3.5 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{ Frequency Band Mode: Spurious})$
	Without MS2840A-008/108 or with Preamplifier turned off, and With MS2840A-066/166 or with MS2840A-066/166 turned on: ±0.5 dB
	$(300 \text{ kHz} \le \text{frequency} < 3 \text{ GHz})$
	$\pm 1.0 \text{ dB}$ (3 GHz \leq frequency $\leq 3.7 \text{ GHz}$)
	With MS2840A-008/108 and with Preamplifier turned on, and Without MS2840A-066/166 or with MS2840A-066/166 turned off: +1.0 dB
	(300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	±1.8 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious)
	With MS2840A-008/108 and with Preamplifier turned on, and With MS2840A-066/166 and with MS2840A-066/166 turned on: ±1.0 dB
	$(300 \text{ kHz} \le \text{frequency} < 3 \text{ GHz})$
	$\pm 1.8 \text{ dB}$ (3 GHz \leq frequency $\leq 3.7 \text{ GHz}$)

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

1

Item	Specification
Absolute amplitude accuracy (Cont'd)	With MS2840A-044/046 installed, Without MS2840A-068/168/069/169 or with Preamplifier turned off: ±0.5 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±1.8 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious) ±1.8 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±1.8 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±3.0 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.5 dB Nominal
	 (40 GHz < frequency ≤ 44.5 GHz) With MS2840A-044/046 installed, With MS2840A-068/168/069/169 and Preamplifier turned on: ±1.0 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±1.8 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious) ±2.0 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±3.0 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±4.0 dB (26.5 GHz < frequency ≤ 40 GHz) ±4.0 dB Nominal (40 GHz < frequency ≤ 44.5 GHz) The absolute amplitude accuracy is calculated from an RSS (root summed square) error of the RF frequency characteristics, linear error and input attenuator switching error.

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

ltem	Specification
In-band frequency	With MS2840A-040/041 installed
characteristics	With MS2840A-077/177/078/178 not installed or Bandwidth ≤ 31.25
	MHz, On the basis of a level of the center frequency, at 18 to 28 °C
	Without MS2840A-066/166, or with MS2840A-066/166 turned off:
	in center frequency ±10 MHz ±0.31 dB
	(30 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal) (30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	With MS2840A-066/166 and operating,
	in center frequency ±10 MHz ±0.31 dB
	(30 MHz ≤ frequency ≤ 3.7 GHz, Frequency Band Mode: Normal) (30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	With MS2840A-044/046 installed
	With MS2840A-067/167/068/168/077/177/078/178 not installed or Bandwidth \leq 31.25 MHz, On the basis of a level of the center frequency, at 18 to 28 °C
	in center frequency ±10 MHz ±0.31 dB
	(30 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal) (30 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	See section 1.3.18 "Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option
	(MS2840A-077/177/078/178)" for "With MS2840A-077/177/078/178, Bandwidth > 31.25 MHz".

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

ltem	Specificatio	on
Display average noise level	At 18 to 28 °C, Time Detection = Average, input attenuator = 0 dB	
	With MS2840A-040/041 installed	
	Without MS2840A-066/166,	
	Without MS2840A-008/108 or with Pre	eamplifier turned off:
	100 kHz	–131.5 [dBm/Hz]
	1 MHz	–141.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–150.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–148.5 [dBm/Hz]
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–146.5 [dBm/Hz]
	With MS2840A-041	
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–143.5 [dBm/Hz]
	Without MS2840A-066/166,	
	With MS2840A-008/108 or with Pream	plifier turned on:
	100 kHz	–144.5 [dBm/Hz] Nominal
	1 MHz	–153.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–163.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	-162.5 [dBm/Hz]
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–161.5 [dBm/Hz]
	With MS2840A-041, Frequency Bar	nd Mode: Normal
	$3.5 \text{ GHz} \leq \text{frequency} \leq 4 \text{ GHz}$	–158.5 [dBm/Hz]
	With MS2840A-041, Frequency Bar	nd Mode: Spurious
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–158.5 [dBm/Hz]
	With MS2840A-041	
	$4 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}$	–158.5 [dBm/Hz]
	With MS2840A-066/166 installed	
	Without MS2840A-008/108 or with Pre	eamplifier turned off:
	100 kHz	–130.5 [dBm/Hz]
	1 MHz	–140.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	-149.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–147.5 [dBm/Hz]
	$2.4~\mathrm{GHz} \leq \mathrm{frequency} \leq 3.5~\mathrm{GHz}$	–144.5 [dBm/Hz]
	With MS2840A-041 installed	
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-141.5 [dBm/Hz]

Table 1.3.1-2 Specifications for Signal Analyzer Function (Cont'd)

Item	Specificati	on
Display average noise level	With MS2840A-066/166 and with MS2840A-066/166 turned off, With MS2840A-008/108 and with Preamplifier turned op:	
	$\begin{array}{l} 100 \ \mathrm{kHz} \\ 1 \ \mathrm{MHz} \\ 30 \ \mathrm{MHz} \leq \mathrm{frequency} < 1 \ \mathrm{GHz} \\ 1 \ \mathrm{GHz} \leq \mathrm{frequency} < 2 \ \mathrm{GHz} \\ 2 \ \mathrm{GHz} \leq \mathrm{frequency} \leq 3.5 \ \mathrm{GHz} \end{array}$	-143.5 [dBm/Hz] Nominal -152.5 [dBm/Hz] -162.5 [dBm/Hz] -161.5 [dBm/Hz] -159.5 [dBm/Hz]
	With MS2840A-041 installed, Freq 3.5 GHz < frequency ≤ 4 GHz With MS2840A-041 installed, Freq 3.5 GHz < frequency < 4 GHz	uency Band Mode: Normal –155.5 [dBm/Hz] uency Band Mode: Spurious –155.5 [dBm/Hz]
	With MS2840A-041 installed, 4 GHz < frequency \leq 6 GHz With MS2840A-066/166 and with ,MS With MS2840A-008/108 and with Pre-	–155.5 [dBm/Hz] 2840A-066/166 turned on, amplifier turned on:
	100 kHz 1 MHz 30 MHz \leq frequency $<$ 1 GHz 1 GHz \leq frequency $<$ 2 GHz 2 GHz \leq frequency \leq 3.5 GHz 3.5 GHz $<$ frequency \leq 3.7 GHz	-143.5 [dBm/Hz] Nominal -152.5 [dBm/Hz] -159.5 [dBm/Hz] -158.5 [dBm/Hz] -155.5 [dBm/Hz] -151.5 [dBm/Hz]

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

1

Item	Specification	า
Display average noise level (Cont'd)	With MS2840A-044/046 installed, Without MS2840A-067/167/068/168/069/169 or with Preamplifier turned off, Frequency Band Mode: Normal	
	100 kHz	-131.5 [dBm/Hz]
	1 MHz	-141.5 [dBm/Hz]
	30 MHz < frequency < 1 GHz	-150.5 [dBm/Hz]
	1 GHz < frequency < 2.4 GHz	-147.5 [dBm/Hz]
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	$-144.5 \left[dBm/Hz \right]$
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-141.5 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-141.5 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-148.5 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-146.5 [dBm/Hz]
	18.3 GHz < frequency ≤ 26.5 GHz With MS2840A-046	–143.5 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	–143.5 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-141.5 [dBm/Hz]
	$40 \text{ GHz} \leq \text{frequency} \leq 44.5 \text{ GHz}$	–137.5 [dBm/Hz]
	Without MS2840A-067/167 and with Ms with Preamplifier turned off. Frequency	S2840A-068/168/069/169, and Z Band Mode: Normal
	100 kHz	-131.5 [dBm/Hz]
	1 MHz	-141.5 [dBm/Hz]
	30 MHz < frequency < 1 GHz	-150.5 [dBm/Hz]
	1 GHz < frequency < 2.4 GHz	-147.5 [dBm/Hz]
	2.4 GHz < frequency < 3.5 GHz	-144.5 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-141.5 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-141.5 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-144.5 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-142.5 [dBm/Hz]
	$18.3 \mathrm{~GHz} < \mathrm{frequency} \le 26.5 \mathrm{~GHz}$	–138.5 [dBm/Hz]
	With MS2840A-046	
	$26.5 \mathrm{GHz} < \mathrm{frequency} \leq 34 \mathrm{GHz}$	–138.5 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-132.5 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	$-129.5 \left[dBm/Hz \right]$
	With MS2840A-067/167	
	See section 1.3.15 "Microwave Presel (MS2840A-067/167)".	lector Bypass Option

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

ltem	Specificatio	n
Display average noise level (Cont'd)	Without MS2840A-067/167 and with MS2840A-068/168/069/169, and with Preamplifier turned on, Frequency Band Mode: Normal	
	100 kHz	–144.5 [dBm/Hz] Nominal
	1 MHz	–153.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–163.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	–161.5 [dBm/Hz]
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	$-160.5 \left[dBm/Hz \right]$
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–157.5 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–157.5 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-160.5 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–160.5 [dBm/Hz]
	With MS2840A-044 installed	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–154.5 [dBm/Hz]
	With MS2840A-046 installed	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–157.5 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	–157.5 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-154.5 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–146.5 [dBm/Hz]
	With MS2840A-046 installed,	
	With MS2840A-019/119	
	See section 1.3.21 "2dB Step Attenu	ator for Millimeter-wave
	Option (MS2840A-019/119)".	

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

1

Overview

ltem	Specification	
Measurement function		
Adjacent Channel Power Measurement (ACP)		
Reference	Span Total, Carrier Total, Both Sides of Carriers or Carrier Select	
Adjacent channel specification	$3 \text{ channels} \times 2$	
Channel Power		
Absolute value	dBm, dBm/Hz	
measurement		
Occupied Bandwidth (OBW)	N% of Power method, X dB Down method	
Power vs Time Display Function		
Function overview	Indicates time changes of power for captured waveform data.	
Analysis time range		
Analysis Start Time	Sets analysis start time position from beginning of waveform data.	
Analysis Time Length	Sets analysis time span.	
Setting mode	Auto, Manual	
Resolution bandwidth		
Filter type	Rect, Gaussian, Nyquist, Root Nyquist, Off (default: Off)	
Roll-off rate setting	0.01 to 1 (settable for Nyquist and Root Nyquist)	
Filter frequency offset	Filter center frequency can be set within frequency band of waveform data.	
Peak to Peak measurement	Measured using AM Depth or marker function. +Peak, –Peak, (P-P)/2, Average	
Burst Average Power	Measures average power of burst signal.	

Table 1.3.1-2 Specifications for Signal Analyzer Function (Cont'd)

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Item	Specification			
Frequency vs Time Display Function				
Function overview	Displays frequency time fluctuations of input signal from captured waveform data.			
Analysis time range				
Analysis Start Time	Sets analysis start time position from beginning of waveform data.			
Analysis Time Length	Sets analysis time span.			
Setting mode	Auto, Manual			
Operating level range	-17 to $+30$ dBm (Input attenuator ≥ 10 dB)			
Frequency (vertical axis)				
	Center frequency and SPAN can be set within the frequency range in waveform data			
Display frequency range Input frequency range	Selectable from 1/25, 1/10, 1/5 and 1/2 of analysis bandwidth 10 MHz to 6 GHz			
Display frequency accuracy				
	Input level = −17 to +30 dBm, SPAN ≤ 31.25 MHz, scale = SPAN/25: At CW input ±(reference oscillator accuracy × center frequency + indicator frequency range × 0.01) Hz			
Peak to Peak measurement	Measured using FM Depth or marker function. +Peak, –Peak, (P-P)/2, Average			
FM CW measurement	Measures the following items after detecting chirp signals automatically or specifying the range by marker. FM Error Peak, FM Error RMS, Chirp Deviation, Chirp Rate, Chirp Length			
CCDF Display Function				
Function overview	Displays CCDF and APD of waveform data captured at specific time.			
Analysis time range				
Analysis Start Time	Sets analysis start time position from beginning of waveform data.			
Analysis Time Length	Sets analysis time span.			
Setting mode	Auto, Manual			
Display	Graphically displays CCDF and APD.			
Histogram resolution	n 0.01 dB			
Numerical value	Average Power, Max Power, Crest Factor			
Resolution Bandwidth				
Filter type	Rectangle, Off (default: Off)			
Filter frequency offset	Filter center frequency can be set within frequency band of waveform data.			

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

Specifications *1.3*

1

Item	Specification			
Spectrogram Display Function				
Function overview	Displays the spectrum for selected time length in the acquired waveform data.			
Analysis time range				
Analysis Start Time	Sets analysis start time position from beginning of waveform data.			
Analysis Time Length	Sets analysis time span.			
Setting mode	Auto, Manual			
Frequency	Center frequency and SPAN can be set within the frequency range waveform data.			
Resolution bandwidth (RBW)				
Setting range	1 Hz to 1 MHz (1-3 sequence)			
Selectivity	(–60 dB/–3 dB) 4.5:1, Nominal value			
Digitize function				
Function overview	Capable of outputting captured waveform data to internal SSD or external device			
Waveform data				
Format	I, Q (32-bit Float Binary format)			
Level	$\sqrt{(I^2 + Q^2)} = 1 \text{ at } 0 \text{ dBm input}$			
Level accuracy	Same as absolute amplitude accuracy of signal analyzer			
External output	Capable of outputting to external PC through Ethernet			

Table 1.3.1-2 Specifications for Signal Analyzer Function (Cont'd)

Item	Specification			
Replay Function				
Function overview	Analyzes traces of saved waveform data			
Conditions for measurable waveform data	I, Q (Binary format)			
Conditions for measurable	SPAN	Sampling rate		
waveform data	1 kHz	2 m kHz		
	$2.5~\mathrm{kHz}$	$5 \mathrm{kHz}$		
	$5~\mathrm{kHz}$	10 kHz		
	10 kHz	$25 \mathrm{kHz}$		
	$25~\mathrm{kHz}$	$50 \mathrm{kHz}$		
	$50 \mathrm{~kHz}$	100 kHz		
	100 kHz	200 kHz		
	$250~\mathrm{kHz}$	$500 \mathrm{~kHz}$		
	$500 \mathrm{~kHz}$	1 MHz		
	$1 \mathrm{MHz}$	$2 \mathrm{~MHz}$		
	$2.5~\mathrm{MHz}$	$5 \mathrm{~MHz}$		
	$5~\mathrm{MHz}$	$10 \mathrm{~MHz}$		
	$10 \mathrm{~MHz}$	$20 \mathrm{~MHz}$		
	$18.6 \mathrm{~MHz}$	$20 \mathrm{~MHz}$		
	$20~\mathrm{MHz}$	$25 \mathrm{~MHz}$		
	$25~\mathrm{MHz}$	$50 \mathrm{~MHz}$		
	$31.25 \mathrm{~MHz}$	$50 \mathrm{~MHz}$		
	$50 \mathrm{~MHz}$	$100 \mathrm{~MHz}$		
	$62.5~\mathrm{MHz}$	$100 \mathrm{~MHz}$		
	$100 \mathrm{~MHz}$	$200 \mathrm{~MHz}$		
	$125 \mathrm{~MHz}$	$200 \mathrm{~MHz}$		

Table 1.3.1-2 Specifications for Signal Analyzer Function (Cont'd)

1

ltem	Specification				
Combinations of SPAN and	SPAN	Minimum	Capture Sample		
minimum capture sample	1 kHz	74000	(37 s)		
	$2.5~\mathrm{kHz}$	160000	(32 s)		
	$5~\mathrm{kHz}$	310000	(31 s)		
	$10 \mathrm{~kHz}$	610000	(30.5 s)		
	$25~\mathrm{kHz}$	730000	(14.6 s)		
	$50~\mathrm{kHz}$	730000	(7.3 s)		
	$100 \mathrm{~kHz}$	730000	(3.65 s)		
	$250 \mathrm{~kHz}$	730000	(1.46 s)		
	$500 \mathrm{~kHz}$	730000	(730 ms)		
	1 MHz	730000	(365 ms)		
	$2.5 \mathrm{~MHz}$	730000	(146 ms)		
	5 MHz	730000	(73 ms)		
	10 MHz	730000	(36.5 ms)		
	18.6 MHz	730000	(36.5 ms)		
	20 MHz	730000	(29.2 ms)		
	25 MHz	730000	(14.6 ms)		
	31.25 MHz	730000	(14.6 ms)		
	50 MHz	730000	(7.3 ms)		
	62.5 MHz	730000	(7.3 ms)		
	100 MHz 195 MHz	730000	(3.65 ms)		
	120 MIIIZ	730000	(3.65 ms)		
Phase vs Time					
Function overview	Displays the phase time fluctuation of the input signal in the acquired				
	waveform data.				
Analysis Time Range					
Available Mode	Auto, Manual				
Analysis Start Time	Sets analysis start time position from beginning of waveform data.				
Analysis Time Length	Sets analysis time span.				
Phase (Vertical Axis)					
Display Mode	Wrap, Unwrap				
Phase Display Range	0.01 deg./div to 200 Gdeg./div				
Offset	-100 to 100 Mdeg.				

 Table 1.3.1-2
 Specifications for Signal Analyzer Function (Cont'd)

ltem	Specification		
Frequency			
SPAN			
Range	0 Hz, 300 Hz to 3.6 GHz (MS2840A-040)		
	0 Hz, 300 Hz to 6 GHz (MS2840A-041)		
	0 Hz, 300 Hz to 1 MHz (MS2840A-066/166 turned on)		
	0 Hz, 300 Hz to 26.5 GHz (MS2840A-044)		
	0 Hz, 300 Hz to 44.5 GHz (MS2840A-046)		
Resolution	2 Hz		
SPAN accuracy	± 0.2 % When number of trace points = 10001		
Display frequency accuracy	\pm [Indicator frequency × reference frequency accuracy + SPAN		
	frequency × SPAN accuracy + RBW × $0.05 + 2 \times N + SPAN$		
	frequency/(Trace point count–1)] Hz		
	N is Mixing order		
Resolution bandwidth			
(RBW)			
Settable range	1 Hz to 3 MHz (1-3 sequence),		
	500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz		
	Only when MS2840A-005/105/009/109 is installed.		
	20 MHz, 31.25 MHz		
	1 Hz to 10 Hz: Not available when SPAN = 0 Hz		
	31.25 MHz: Available when SPAN = 0 Hz		
Selectivity	(-60 dB/-3 dB) 4.5:1, Nominal value, when 1 Hz to 10 MHz is set.		
Video bandwidth (VBW)			
Setting range	1 Hz to 10 MHz (1-3 sequence), 5 kHz, off		
VBW mode	Video Average/Power Average		

 Table 1.3.1-3
 Specifications for spectrum analyzer function
1

Overview

Item	Specificatio	on
Amplitude		
Display average noise level	At 18 to 28 °C, Detector = Sample, VBW = attenuator 0 dB, With MS2840A-040/041,	= 1 Hz (Video Average), Input
	Without MS2840A-066/166,	
	Without MS2840A-008/108 or with Pre	eamplifier turned off
	$9 \text{ kHz} \leq \text{frequency} < 100 \text{ kHz}$	–120 [dBm/Hz]
	$100 \text{ kHz} \leq \text{frequency} < 1 \text{ MHz}$	–134 [dBm/Hz]
	$1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz}$	–144 [dBm/Hz]
	$10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz}$	–150 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–153 [dBm/Hz]
	$1 \text{ GHz} \le \text{frequency} < 2.4 \text{ GHz}$	-151 [dBm/Hz]
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–149 [dBm/Hz]
	With MS2840A-041,	
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–146 [dBm/Hz]
	Without MS2840A-066/166,	
	With MS2840A-008/108 and with Prea	mplifier turned on
	100 kHz	–147 [dBm/Hz] Nominal
	1 MHz	–156 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–166 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	$-165 \left[dBm/Hz \right]$
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$ With MS2840A-041,	–164 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-161 [dBm/Hz]
	With MS2840A-041,	
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–161 [dBm/Hz]
	With MS2840A-066/166, and Without MS2840A-008/108 or with Pro-	amplifier turned off
	$9 \text{ kHz} \leq \text{frequency} \leq 100 \text{ kHz}$	$-120 \left[dBm/Hz \right]$
	$5 \text{ KHz} \le \text{frequency} < 100 \text{ KHz}$ 100 kHz < frequency < 1 MHz	-120 [dBm/Hz]
	$1 \text{ MHz} \le \text{frequency} \le 10 \text{ MHz}$	-143 [dBm/Hz]
	10 MHz < frequency < 30 MHz	$-149 \left[dBm/Hz \right]$
	30 MHz < frequency < 1 GHz	$-152 \left[dBm/Hz \right]$
	1 GHz < frequency < 2.4 GHz	$-150 \left[dBm/Hz \right]$
	$2.4 \text{ GHz} \le \text{frequency} \le 3.5 \text{ GHz}$	$-147 \left[dBm/Hz \right]$
	With MS2840A-041 installed	
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-144 [dBm/Hz]

Table 1.3.1-3 Specifications for spectrum analyzer function (Cont'd)

1-45

ltem	Specification	
Display average noise level	At 18 to 28 °C, Detector = Sample, VBW = 1 Hz (Video Average), Input	
(Cont'd)	attenuator 0 dB,	
	With MS2840A-066/166, with MS2840A-066/166 turned off,	
	With MS2840A-008/108 and with Pream	nplifier turned on:
	100 kHz	–146 [dBm/Hz] Nominal
	1 MHz	-155 [dBm/Hz]
	$30 \text{ MHz} \le \text{frequency} < 1 \text{ GHz}$	-165 [dBm/Hz]
	$1 \text{ GHz} \le \text{frequency} < 2 \text{ GHz}$	-164 [dBm/Hz]
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$ With MS28404-041 installed	–162 [dBm/Hz]
	35 GHz < frequency < 4 GHz	-158 [dBm/Hz]
	With $MS2840A-041$ installed	
	$4 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}$	-158 [dBm/Hz]
	+ GHZ (hequency _ 0 GHZ	
	With MS2840A-066/166, with MS2840A	A-066/166 turned on,
	With MS2840A-008/108 and with Prear	nplifier turned on-
	100 kHz	-146 [dBm/Hz] Nominal
		-155 [dBm/Hz]
	$30 \text{ MHz} \le \text{trequency} < 1 \text{ GHz}$	-162 [dBm/Hz]
	$1 \text{ GHz} \le \text{frequency} < 2 \text{ GHz}$	-161 [dBm/Hz]
	$2 \text{ GHz} \le \text{frequency} \le 3.5 \text{ GHz}$	-158 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 3.7 \text{ GHz}$	–154 [dBm/Hz]
	With MS2840A-044/046 installed,	
	Without MS2840A-067/167/068/168/069	9/169.
	Frequency Band Mode: Normal	
	$9 \text{ kHz} \le \text{frequency} < 100 \text{ kHz}$	–120 [dBm/Hz]
	$100 \text{ kHz} \leq \text{frequency} < 1 \text{ MHz}$	–134 [dBm/Hz]
	$1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz}$	-144 [dBm/Hz]
	$10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz}$	–150 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–153 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–150 [dBm/Hz]
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–147 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–144 [dBm/Hz]
	4 GHz < frequency ≤6 GHz	-144 [dBm/Hz]
	6 GHz < frequency ≤13.5 GHz	–151 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-149 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \leq 26.5 \text{ GHz}$	–146 [dBm/Hz]
	With MS2840A-046,	
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-146 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-144 [dBm/Hz]
	40 GHz < frequency ≤44.5 GHz	-140 [dBm/Hz]

Table 1.3.1-3	Specifications for s	pectrum analy	yzer function	(Cont'd)
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ltem	Specification	n
Display average noise level (Cont'd)	Without MS2840A-067/167, with MS28- with Preamplifier turned off.	40A-068/168/069/169, and
	Frequency Band Mode: Normal	
	$9 \text{ kHz} \le \text{frequency} < 100 \text{ kHz}$	–120 [dBm/Hz]
	100 kHz ≤ frequency < 1 MHz	–134 [dBm/Hz]
	$1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz}$	-144 [dBm/Hz]
	$10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz}$	-150 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–153 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	-150 [dBm/Hz]
	$2.4~\mathrm{GHz} \leq \mathrm{frequency} \leq 3.5~\mathrm{GHz}$	-147 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–144 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–144 [dBm/Hz]
	$6 \text{ GHz} \leq \text{frequency} \leq 13.5 \text{ GHz}$	–147 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–145 [dBm/Hz]
	$18.3 \mathrm{~GHz} < \mathrm{frequency} \le 26.5 \mathrm{~GHz}$	–141 [dBm/Hz]
	With MS2840A-046	
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-141 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–135 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–132 [dBm/Hz]

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

1

ltem	Specification	
Display average noise level (Cont'd)	Without MS2840A-067/167, with MS2840A-068/168/069/169 and with Preamplifier turned on.	
	Frequency Band Mode: Normal	
	100 kHz	–147 [dBm/Hz] Nominal
	1 MHz	–156 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–166 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	–164 [dBm/Hz]
	$2 \mathrm{~GHz} \leq \mathrm{frequency} \leq 3.5 \mathrm{~GHz}$	–163 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–160 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	$-160 \left[dBm/Hz \right]$
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–163 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–163 [dBm/Hz]
	With MS2840A-044	
	$18.3 \text{ GHz} \leq \text{frequency} \leq 26.5 \text{ GHz}$	–157 [dBm/Hz]
	With MS2840A-046	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–160 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	–160 [dBm/Hz]
	$34 \text{ GHz} \leq \text{frequency} \leq 40 \text{ GHz}$	–157 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–149 [dBm/Hz]
	With MS2840A-067/167	
	See section 1.3.15 "Microwave Prese	lector Bypass Option
	(MS2840A-067/167)".	
	With MS2840A-046 installed,	
	With MS2840A-019/119	
	See section 1.3.21 "2dB Step Attenua	ator for Millimeter-wave
	Option (MS2840A-019/119)".	

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

Specifications *1.3*

1

ltem	Specification	
Absolute amplitude	At 18 to 28 °C, Auto Sweep Time Select = Normal,	
accuracy	$30 \text{ Hz} \le \text{RBW} \le 1 \text{ MHz}$, Detection = Positive, Without	
	MS2840A-051/151 or with Noise Floor Reduction turned off, CW,	Ov V
	excluding the noise floor effect, and not when FF'T is being executed	er
	(displayed on the screen).	vie
	With Preamplifier turned off:	W
	Input attenuator $\geq 10 \text{ dB}$, Miyon input level $\leq -10 \text{ dBm}$	
	With Progmalifier turned on:	
	With rreamplifier turned on Input stronget $= 10 \text{ dB}$ proceeding input level $< 30 \text{ dBm}$	
	Input attenuator -10 ub, preampliner input level ≤ -50 ubin,	
	With MS2840A-040/041 installed,	
	Without MS2840A-008/108 or with Preamplifier turned off,	
	and without MS2840A-066/166 or with MS2840A-066/166 turned of 10.7 JB	
	±0.5 dB (200 kHz < frequency < 4 CHz, Frequency Rend Mode: Normal)	
	$(300 \text{ kHz} \le \text{frequency} < 3.5 \text{ GHz}$, Frequency Band Mode: Normal) $(300 \text{ kHz} \le \text{frequency} < 3.5 \text{ GHz}$, Frequency Band Mode: Spurious)	
	+1.8 dB	
	(4 GHz < frequency < 6 GHz, Frequency Band Mode: Normal)	
	$(3.5 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}: \text{Spurious})$	
	Without MS2840A-008/108 or with Preamplifier turned off.	
	and with MS2840A-066/166 and with MS2840A-066/166 turned on:	
	$\pm 0.5~\mathrm{dB}$	
	$(300 \text{ kHz} \le \text{frequency} < 3 \text{ GHz})$	
	$\pm 1.8 \text{ dB}$	
	$(3 \text{ GHz} \le \text{frequency} \le 3.7 \text{ GHz})$	
	With MS2840A-008/108 and with Preamplifier turned on,	
	and without MS2840A-066/166 or with MS2840A-066/166 turned off:	
	±1.0 dB	
	$(300 \text{ kHz} \le \text{frequency} < 4 \text{ GHz}, \text{Frequency Band Mode: Normal})$	
	$(300 \text{ kHz} \le \text{frequency} < 3.5 \text{ GHz}, \text{ Frequency Band Mode: Spurious})$	
	$\pm 1.8 \text{ dB}$	
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}, \text{Normal})$	
	With MS2840A-008/108 and with Decoupling at two days	
	with $MS2840A$ -066/166 and with $MS2840A$ -066/166 turned on,	
	$+10 \mathrm{dB}$	
	(300 kHz < frequency < 3 GHz)	
	+1.8 dB	
	(3 GHz < frequency < 3.7 GHz)	

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

ltem	Specification
Absolute amplitude	With MS2840A-044/046 installed,
accuracy (Cont'd)	Without MS2840A-068/168/069/169 or with Preamplifier turned off
	$\pm 0.5 \text{ dB}$
	(300 kHz ≤frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	±1.8 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious)
	±1.8 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)
	±3.0 dB
	$(13.8 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$
	$\pm 3.0 \text{ dB}$ (26.5 GHz < frequency $\leq 40 \text{ GHz}$)
	±3.5 dB Nominal
	$(40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz})$
	With MS2840A-068/168/069/169 and with Preamplifier turned on
	±1.0 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	±1.8 dB
	(4 GHz \leq frequency \leq 6 GHz, Frequency Band Mode: Normal) (3.5 GHz \leq frequency \leq 4 GHz, Frequency Band Mode: Spurious)
	±2.0 dB
	(6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)
	$\pm 3.0 \text{ dB}$ (13.8 GHz < frequency < 26.5 GHz)
	$(13.6 \text{ GHz} < \text{frequency} \le 20.5 \text{ GHz})$ +4.0 dB
	(26.5 GHz < frequency < 40 GHz)
	$\pm 4.0 \text{ dB}$ Nominal
	$(40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz})$
	The absolute amplitude accuracy is calculated from an RSS (root
	summed square) error of the RF frequency characteristics, linearity
	error and input attenuator switching error.

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

er turned off: Bm (per wave) and Band Mode: Normal) y Band Mode: and Mode: Normal) and Mode: Spurious) amplifier turned on -45 dBm (per wave) kHz: Band Mode: Normal)

Table 1.3.1-3 Specifications for spectrum analyzer function (Cont'd)

1-51

Item	Specification
Two-tone third-order intermodulation distortion (Cont'd)	Attenuator Mode = E-ATT Combined, Without MS2840A-008/108/068/168/069/169, or with Preamplifier turned off:
	At 18 to 28 °C, with mixer input level = -15 dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30 kHz:
	≤ –54 dBc (TOI = +12 dBm) (30 MHz ≤ frequency < 300 MHz, RF input level ≤ –5 dBm)
	≤ –62 dBc (TOI = +16 dBm) (300 MHz ≤ frequency < 1 GHz, RF input level ≤ –5 dBm)
	≤ -62 dBc (TOI = +16 dBm) (1 GHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal, BE input level < +5 dBm)
	(1 GHz \leq frequency $<$ 3.5 GHz, Frequency Band Mode: Spurious, RF input level \leq +5 dBm)
	≤ -60 dBc (TOI = +15 dBm) (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal, RF input level ≤ +5 dBm) (2.5 GHz ≤ frequence ≤ 6 GHz Frequency Band Mode: Creation
	(3.5 GHz \leq frequency \leq 6 GHz, Frequency Band Mode. Spurious, RF input level \leq +5 dBm)
	\leq -54 dBc (TOI = +12 dBm) Nominal (30 MHz \leq frequency < 300 MHz, -5 dBm < RF input level \leq 0 dBm)
	\leq -62 dBc (TOI = +16 dBm) Nominal (300 MHz \leq frequency < 3.5 GHz, -5 dBm < RF input level \leq +15 dBm)
	$\leq -60 \text{ dBc} \text{ (TOI} = +15 \text{ dBm) Nominal}$
	(3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal, -5 dBm < RF input level ≤ +15 dBm)

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

1

Overview

Item	Specification
Two-tone third-order	With MS2840A-044/046 installed
intermodulation distortion (Cont'd)	Without MS2840A-068/168/069/169 or with Preamplifier turned off, At 18 to 28 °C, with mixer input level = -15 dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30 kHz:
	$\leq -54 \text{ dBc} (\text{TOI} = +12 \text{ dBm})$
	$(30 \text{ MHz} \le \text{frequency} < 300 \text{ MHz})$
	≤ –62 dBc (TOI = +16 dBm) (300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
	$\leq -60 \text{ dBc} (\text{TOI} = +15 \text{ dBm})$
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}: \text{Normal})$
	$\leq -56 \text{ dBc (TOI = +13 dBm)}$
	$(3.5 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{ Frequency Band Mode} \text{ Spurious})$
	$\leq -56 \text{ dBc} (101 = +13 \text{ dBm})$ (6 GHz \leq frequency $\leq 13.5 \text{ GHz}$)
	< -56 dBe (TOI = +13 dBm)
	(13.5 GHz < frequency < 26.5 GHz)
	$\leq -56 \text{ dBc}$ (TOI = +13 dBm) Nominal
	$(26.5 \text{ GHz} < \text{frequency} \le 40 \text{ GHz})$ With MS2840A-046 installed
	With MS2840A-044/046 installed
	With MS2840A-067/167 and with Microwave Preselector Bypass
	Preamplifier turned on, At 18 to 28 °C, with Preamplifier input level $= -45$ dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30
	kHz:
	$\leq -73 \text{ dBc} (\text{TOI} = -8.5 \text{ dBm}) \text{ Nominal}$
	$(30 \text{ MHz} \le \text{frequency} < 300 \text{ MHz})$
	$\leq -78 \text{ dBc}$ (TOI = -6 dBm) Nominal (200 MHz \leq frequency $\leq 700 \text{ MHz}$)
	$(500 \text{ MHz} \le \text{frequency} \le 700 \text{ MHz})$
	(700 MHz < frequency < 4 GHz, Frequency Band Mode: Normal) (700 MHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious)
	\leq -78 dBc (TOI = -6 dBm) Nominal
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}; \text{Normal})$
	$(3.5 \text{ GHz} \le \text{frequency} \le 4 \text{ GHz}, \text{Frequency Band Mode}; \text{Spurious})$
	$\leq -70 \text{ dBc}$ (TOI = -10 dBm) Nominal (C CUL \leq frequencies $\leq 12.5 \text{ CUL}$ Frequencies Band Market N = 1)
	(6 GHz < frequency < 13.5 GHz, Frequency Band Mode: Normal) (4 GHz < frequency < 13.5 GHz, Frequency Band Mode: Spurious)
	< -70 dBc (TOI = $-10 dBm$) Nominal
	$(13.5 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$
	$\leq -70 \text{ dBc} (\text{TOI} = -10 \text{ dBm}) \text{ Nominal}$
	$(26.5 \text{ GHz} < \text{frequency} \le 40 \text{ GHz})$ With MS2840A-046 installed

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

ltem	Specification
Two-tone third-order intermodulation distortion (Cont'd)	When Attenuator Mode is E-ATT Combined Without MS2840A-008/108/068/168/069/169 and with Preamplifier turned off, at 18 to 28 °C, with mixer input level = -15 dBm (per wave) and using > 300 kHz separation, at RBW < 30 kHz
	$\leq -54 \text{ dBc} (\text{TOI} = +12 \text{ dBm})$ (30 MHz \leq frequency $<$ 300 MHz, RF input level $\leq -5 \text{ dBm}$) $\leq -62 \text{ dBc} (\text{TOI} = +16 \text{ dBm})$ (300 MHz \leq frequency $\leq 1 \text{ GHz}$, RF input level $\leq -5 \text{ dBm}$)
	≤ -62 dBc (TOI = +16 dBm) (1 GHz < frequency < 4 GHz, Frequency Band Mode: Normal, RF input level ≤ +5 dBm,)
	(1 GHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious, RF input level ≤ +5 dBm)
	≤ –60 dBc (TOI = +15 dBm) (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal, RF input level ≤ +5 dBm)
	≤–56 dBc (TOI = +13 dBm) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious, RF input level ≤ +5 dBm)
	\leq -54 dBc (TOI = +12 dBm) Nominal (30 MHz \leq frequency < 300 MHz, -5 dBm < RF input level \leq 0 dBm)
	≤ -62 dBc (TOI = +16 dBm) Nominal (300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal, -5 dBm < RF input level ≤ +15 dBm)
	(300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious, -5 dBm < RF input level ≤ +15 dBm)
	≤ -60 dBc (TOI = +15 dBm) Nominal (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal, -5 dBm < RF input level ≤ +15 dBm)
	≤ –56 dBc (TOI = +13 dBm) Nominal (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious, –5 dBm < RF input level ≤ +15 dBm)

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

Item	Specification	
Image response	With MS2840A-040/041 installed,	
	Frequency Band Mode: Normal	
	$\leq -70 \; \mathrm{dBc}$	
	$(10 \text{ MHz} \le \text{frequency} < 4 \text{ GHz})$	er
	$\leq -55 \text{ dBc}$	VIe
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz})$	×
	With MS2840A-066/166 installed and operating (066/166: Enabled,	
	Center frequency: 3.7 GHz or less, and SPAN \leq 1 MHz as spectrum analyzer).	
	≤ -10 dBc (This is generated at "input signal + 150 MHz".)	
	$(110 \text{ MHz} \le \text{frequency} < 3.7 \text{ GHz})$	
	With MS2840A-044/046 installed,	
	Frequency Band Mode: Normal	
	When MS2840A-067/167 is NOT installed	
	$\leq -70 \text{ dBc}$	
	$(10 \text{ MHz} \le \text{frequency} < 4 \text{ GHz})$	
	$\leq -55 \mathrm{dBc}$	
	$(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz})$	
	$\leq -70 \text{ dBc}$ (6 CHz < frequency < 13.5 CHz)	
	$(0.0112 < \text{frequency} \le 13.5.0112)$	
	≤ -70 dBc (13.5 GHz < frequency < 26.5 GHz)	
	< -70 dBc Nominal	
	$(26.5 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz})$	
Multiple Response	With MS2840A-040/041 installed,	1
-	With MS2840A-066/166 installed and operating (066/166: Enabled,	
	Center frequency: 3.7 GHz or less, and SPAN \leq 1 MHz as spectrum	
	analyzer), and Mixer input level: –15 dBm.	
	≤ -10 dBc Nominal	
	$(110 \text{ MHz} < \text{frequency} \le 3.7 \text{ GHz})$	

 Table 1.3.1-3
 Specifications for spectrum analyzer function (Cont'd)

Item	Specification	
Sweep		
Sweep mode	Single, Continuous	
Sweep time		
Setting range	1 ms to 1000 s (SPAN \ge 300 Hz)	
	$1 \ \mu s \text{ to } 1000 \ s \ (SPAN = 0 \ Hz)$	
Detection mode	Pos&Neg, Positive Peak, Sample, Negative Peak, RMS	
CISPR detector	With MS2840A-040/041 installed,	
	Quasi-Peak, CISPR-AVG, RMS-AVG	
The number of trace points	When $SPAN > 30 \text{ GHz}$: 5001 to 30001	
	When $500 \text{ MHz} < \text{SPAN} < 30 \text{ GHz}$:	
	1001 to 30001	
	When 100 MHz < SPAN < 500 MHz:	
	101 to 30001	
	When 300 Hz \leq SPAN \leq 100 MHz and Sweep Time > 10 s:	
	101 to 30001	
	When $300 \text{ Hz} \le \text{SPAN} \le 100 \text{ MHz}$ and Sweep Time $\le 10 \text{ s}^{:}$	
	$\frac{11 \text{ to } 30001}{\text{ ML}}$	
	When $SPAN = 0$ Hz and Sweep 11me> 10 s. 101 to 30001	
	When SPAN = 0 Hz and Sweep Time $\leq 10 \text{ s}$:	
	11 to 30001	
	Resolution: 1 point	
Scale		
Log indicator	10div/12div : 0.1 to 20 dB/div, 1-2-5 sequence	
Lin indicator	10div : 1 to 10 %/div, 1-2-5 sequence	
Trigger function		
Trigger mode	Free Run (Trig Off), Video, Wide IF Video, External, Frame	
	SG Marker (With MS2840A-020/120/021/121)	
Gate function		
Gate mode	Off, Wide IF Video, External, Frame	
	SG Marker (With MS2840A-020/120/021/121)	

Table 1.3.1-3	Specifications for spectrum analyzer function (Cont'd)	
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Item	Specification
Measurement function	
Adjacent Channel Power Measurement (ACP)	
Reference	Span Total, Carrier Total, Both Sides of Carriers or Carrier Select
Adjacent channel specification	3 channels × 2 (Normal Mode) 8 channels × 2 (Advanced Mode)
Burst arrange	Indicates average power of specified time in the time domain mode.
Channel Power	
Absolute value measurement	dBm, dBm/Hz
Occupied Bandwidth (OBW)	N% of Power method, X dB Down method
Spectrum Emission Mask (SEM)	Peak/Margin measurement: Pass/fail judgment is performed by Peak/Margin measurement.
Spurious Emission	Worst/Peaks measurement: Pass/fail judgment is performed by Worst/Peaks measurement
Frequency counter	
Counter accuracy	$\begin{array}{l} \pm (marker \ frequency \times reference \ frequency \ accuracy + (0.1 \times N/Gate \\ Time[s])) \ Hz) \\ at \ SPAN \leq 1 \ MHz, \ RBW = 1 \ kHz, \ S/N \geq 50 \ dB, \ Gate \ Time \geq 100 \ ms \\ Mixer \ harmonic \ order \ [N] \end{array}$
Two-tone third-order intermodulation distortion	Measures IM3 and TOI from two-tone signal.

Table 1.3.1-3 Specifications for spectrum analyzer function (Cont'd)

1

1.3.2 Rubidium Reference Oscillator Option (MS2840A-001/101)

 Table 1.3.2-1
 Rubidium Reference Oscillator Specifications

Items	Specifications
Function and Performance	See Table 1.3.1-1, "Internal reference oscillator".

1.3.3 High Stability Reference Oscillator Option (MS2840A-002/102)

Table 1.3.3-1 High Stability Reference Oscillator Option Specifications

Item	Specification
Function and Performance	See Table 1.3.1-1, "Internal reference oscillator".
Others	This option is not available when MS2840A-044/046 is installed.

1.3.4 Analysis Bandwidth Extension to 31.25 MHz Option (MS2840A-005/105)

Table 1.3.4-1 Analysis Bandwidth Extension to 31.25 MHz Option Specifications

ltem	Specification
Function and Performance	Standard option for MS2840A-040/041/044
	Function to analyze 31.25 MHz bandwidth
Others	This option is not available when MS2840A-046 is installed.

1.3.5 Analysis Bandwidth Extension to 10 MHz Option (MS2840A-006/106)

Table 1.3.5-1 Analysis Bandwidth Extension to 10 MHz Option Specifications

Item	Specification
Function and Performance	Standard option
	Function to analyze 10 MHz bandwidth

1

Overview

1.3.6 Preamplifier Option (MS2840A-008/108)

Table 1.3.6-1 lists the specifications for the preamplifier.

The following specification values are those under the conditions after 30-min warm-up at stable ambient temperature. Typical values are only for reference and are not guaranteed.

Item	Specification
Frequency	·
Frequency range	100 kHz to 3.6 GHz (With MS2840A-040)
	100 kHz to 6 GHz (With MS2840A-041/044/046)
Amplitude	
Measurement range	See Table 1.3.1-1, "Measurement range".
Maximum input level	See Table 1.3.1-1, "Maximum input level".
Display average noise level	See Table 1.3.1-2, "Display average noise level".
(Signal Analyzer function)	
Display average noise level	See Table 1.3.1-3, "Display average noise level".
(Spectrum analyzer	
function)	
RF Frequency	See Table 1.3.1-1, "RF frequency characteristics".
Characteristics	
Input attenuator switching error	See Table 1.3.1-1, "Input attenuator switching error".
Linearity error	See Table 1.3.1-1, "Linearity error".
Second harmonic wave	See Table 1.3.1-1, "Second harmonic wave distortion".
distortion	
1 dB gain compression	See Table 1.3.1-1, "1 dB gain compression".
Two-tone third-order	See Table 1.3.1-3, "Two-tone third-order intermodulation distortion".
intermodulation distortion	
Others	Cannot install simultaneously with MS2840A-068/168/069/169.

Table 1.3.6-1 Pre	eamplifier Option	Specifications
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1.3.7 Bandwidth Extension to 31.25 MHz for Millimeter-wave Option (MS2840A-009/109)

Table 1.3.7-1 Bandwidth Extension to 31.25 MHz for Millimeter-wave Specifications

ltem	Specification
Application	Standard option for MS2840A-046
	Extends the analysis bandwidth to 31.25 MHz in signal analyzer mode.
Others	This option is available when MS2840A-046 is installed.

1.3.8 Phase Noise Measurement Function Option (MS2840A-010/110)

 Table 1.3.8-1
 Phase Noise Measurement Function Option Specifications

ltem	Specification
Function	Displays the phase noise characteristics on a logarithmic scale.
Frequency	Refer to <i>MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A</i> <i>Signal Analyzer Operation Manual Phase Noise Measurement</i> <i>Function Operation.</i>

1.3.9 Secondary SSD Option (MS2840A-011/111)

Table 1.3.9-1 Secondary SSD Option Specifications

ltem	Specification
Application	Removable SSD for storing user data
	Insert into the Secondary HDD/SSD slot on the back panel to use.
	Figure 3.1.1-2 Rear panel "16 Secondary HDD/SSD slot"

1.3.10 Precompliance EMI Function Option (MS2840A-016/116)

 Table 1.3.10-1
 Precompliance EMI Function Option Specifications

ltem	Specification
Function	Adds the Detection Mode and the Resolution Bandwidth for EMI measurement to the Spectrum Analyzer function.
Detection Mode (CISPR Detector)	Quasi-Peak, CISPR-AVG, RMS-AVG
Resolution Bandwidth (CISPR RBW)	200 Hz (6 dB BW), 9 kHz (6 dB BW), 120 kHz (6 dB BW), 1 MHz (Impulse)

1.3.11 Noise Figure Measurement Function Option (MS2840A-017/117)

ltem	Specification
Function	Adds the function to measure Noise Figure, Noise Factor, Gain and Y factor.
Frequency	Refer to
Noise Figure	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A
Gain	Signal Analyzer Operation Manual Noise Figure Measurement
Resolution Bandwidth	Function Operation.

Table 1.3.11-1 Noise Figure Measurement Function Option Specification

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1.3.12 BER Measurement Function Option (MS2840A-026/126)

Item	Specification	
Connector	Rear panel Aux connector	
Input level	TTL level	
Input signal	Data, Clock, Enable	
Input bit rate	100 bps to 10 Mbps	
Measurable patterns	PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, repetition of 01 PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix UserDefine (4096 bits max.)	
	 PN signal: No error has been detected for (PN stage count × 2) bits PNFix signal: Synchronization with the PN signal is established if no error has been detected for (PN stage count × 2) bits. Next the guale and synchronization of the PNFix 	
Synchronization establishing condition	signal are established if no error has been detected for PN stage count bits beginning with the start bit of the PNFix signal.	
	ALL0, ALL1, repetition of 01: No error has been detected for 10 bits.	
	UserDefine: No error has been detected for 8 to 1024 bits (variable).	
	The start bit used for synchronization detection can also be selected.	
Re-synchronization judgment condition	x/y (Resynchronization is executed if x bits out of y bits are errors.) y (Measurement bit count): Selected from 500 bits, 5000 bits, and 50000 bits	
	x (Error bit count out of y bits): 1 to y/2 bits	
Measurable bit count	$\leq 2^{32}-1$ bits	
Measurable error bit count	$\leq 2^{31}-1$ bits	
Measurement termination condition	Measurement bit count, measurement error bit count	
Auto Resync function	Can be switched between enable/disable.	
Count operation at resynchronization	Can be selected from Count Clear and Count Keep.	
Measurement mode	Continuous, Single, Endless	
Display	Status, Error, Error Rate, Error Count, SyncLoss Count Measurement bit count	
Polarity reversal function	Data, Clock, and Enable polarities can be reversed.	
Measured value clear function	It is possible to clear the measured values to 0 while retaining synchronization during BER measurement, and start the measurement again from 0.	

Table 1.3.12-1	BER Measurement	Function O	ption S	pecifications
			P	poonioanono

1.3.13 Analog Function Extension for Vector Signal Generator Option (MS2840A-029/129)

Table 1.3.13-1 Analog Function Extension for Vector Signal Generator Option Specifications

ltem	Specification
Application	Adds the analog signal generator function to MS2840A-020/120/021/121 vector signal generator option (with 022/122)

1.3.14 Low Phase Noise Performance Option (MS2840A-066/166)

Summary:

The SSB phase noise is improved for RF input signals by provision of an internal dedicated frequency converter.

Near-carrier phase noise is reduced by installing the Low Phase Noise option (MS2830A-066/166) and turning On the Low Phase Noise option function.

Excellent SSB phase noise performance of MS2840A-066/166:

MS2840A-066/166 is much superior to our previous model in SSB phase noise performance. The target of our previous model was limited to narrow-band radio devices (radio devices for professional use) and digital TV broadcast transmitters. However, the MS2840A-066/166 with the improved performance can target not only the above devices, but also built-in oscillators which needed special phase noise measuring instruments to measure.

Example of Improvement:

The Low Phase Noise Performance option brings the following improvements.

- Allows near-carrier spurious measurement.
- The adjacent channel power (ACP) measurement is performed with accuracy because noise power over the adjacent channel is reduced.
- S/N and EVM are improved due to reduced residual FM. Additionally, installing the Phase Noise Measurement option (MS2840A-010) allows the following measurements.
- Phase noise characteristics of an oscillator.
- Calculation of residual FM and jitter using the marker.

Precautions when Low Phase Noise option enabled (On). The operation principle of the frequency converter is generation of a spurious response at a specific frequency. As a result, sometimes it is better not to use, such as when measuring spurious.

When the DUT signal frequency is known, when the MS2840A Rx frequency is set to 35 MHz beyond that frequency, measurement can be made as if the Low Phase Noise Function is Off (disabled) because the spurious response cannot be observed.

However, even if the DUT signal frequency is unknown, measurement can be made after setting the Low Phase Noise Function to Off (disabled) and verifying the presence of a response at about the same level (in other words, confirming that the observed signal has the correct response).

The spurious responses are as follows:

(1) Image Response

This response is generated when a signal with frequency fin is input to the MS2840A RF input connector and the MS2840A Rx frequency is set to fin -150 MHz, and more than 110 MHz (with MS2840A-066/166). The generated level is about -20 dBc.

(2) Multiple Response

This response is generated when a signal with frequency fin is input to the MS2840A RF input connector and the MS2840A Rx frequency is set to (fin \pm 75 MHz)/N – 75 MHz (N = 1,2,3 ...),and more than 110 MHz (with MS2840A-066/166). The generated level is about –10 dBc.

1

Overview

ltem	Specification
Frequency	
Frequency Range	9 kHz to 3.7 GHz
	9 kHz to 3.5 GHz (Frequency Band Mode: Spurious)
SPAN	1 kHz to 31.25 MHz (Signal Analyzer function)
	300 Hz to 1 MHz (Spectrum Analyzer function)
Single side band noise	See Table 1.3.1-1, "Single side band noise".
Resolution bandwidth	See Table 1.3.1-3, "Specifications for spectrum analyzer function,
(RBW)	Resolution bandwidth (RBW)".
Amplitude	
Display average noise level	See Table 1.3.1-2, "Specifications for Signal Analyzer Function, Display
(Signal Analyzer function)	average noise level".
Display average noise level	See Table 1.3.1-3, "Specifications for spectrum analyzer function,
(Spectrum analyzer	Display average noise level".
function)	
Spurious Response	
Image response	See Table 1.3.1-3, "Specifications for spectrum analyzer function, Image
	response".
Multiple response	See Table 1.3.1-3, "Specifications for spectrum analyzer function,
	Multiple response".
Others	This option is not available when MS2840A-044/046 is installed.

Table 1.3.14-1 Low Phase Noise Performance Option Specifications

1-65

1.3.15 Microwave Preselector Bypass Option (MS2840A-067/167)

Summary:

By bypassing the preselector (image response elimination filter), the RF frequency characteristics and the in-band frequency

characteristics are improved, and level accuracy improvement can be achieved.

Notes on default values when this option is installed:

To improve the in-band frequency characteristics, the default value is set to On for the Signal Analyzer function, and is always set to On for all other applications.

To avoid measuring the image signals generated internally, the default value is set to Off for the Spectrum Analyzer function.

Item	Specification	
Intended Use	Bypasses the preselector to improve the RF frequency characteristics and the in-band frequency characteristics.	
	When this function is set to On, the image response elimination filter is bypassed. Therefore, this function is not appropriate for image response recention and spurious measurement	
Function and performance		
Frequency		
Frequency range	4 GHz to 26.5 GHz (MS2840A-044) 4 GHz to 44.5 GHz (MS2840A-046)	
Amplitude		
RF frequency characteristics	At 18 to 28 °C, input attenuator = 10 dB,	
	With Microwave Preselector Bypass turned on,	
	Without MS2840A-068/168/069/169 or with Preamplifier turned off:	
	±1.00 dB (6 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)	
	±1.50 dB (13.8 GHz < frequency ≤ 26.5 GHz)	
	$\pm 2.00 \text{ dB}$ (26.5 GHz < frequency $\leq 40 \text{ GHz}$)	
	±2.00 dB typ. (40 GHz < frequency < 44.5 GHz)	

Table 1.3.15-1 Microwave Preselector Bypass Option Specifications

Specifications *1.3*

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Item	Specification	1
RF frequency	With Microwave Preselector Bypass turned on,	
characteristics (Cont'd)	With MS2840A-068/168/069/169 or with Preamplifier turned on:	
	±1.8 dB (6 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)	Overvie
	$\pm 2.50 \text{ dB}$ (13.8 GHz < frequency $\leq 26.5 \text{ GHz}$)	¥
	$\pm 3.00 \text{ dB}$ (26.5 GHz < frequency $\leq 40 \text{ GHz}$)	
	$\pm 3.00 \text{ dB Nominal}$ (40 GHz < frequency $\leq 44.5 \text{ GHz}$)	
Display average noise level	At 18 to 28 °C, Detector = Sample, VBW = 1 Hz (Video Average) At input attenuator 0 dB, If Frequency < 6 GHz, the specifications are the same as those in the	
	state without MS2840A-067/167. Refer to Table 1.3.1-3 "Specifications for spectrum analyzer function:	
	Display average noise level."	
	Irrespective of Microwave Preselector Bypass turned on/off,	
	Without MS2840A-068/168/069/169 installed,	
	With MS2840A-044/046,	
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} -147 \text{ [dBm/Hz]}$	
	$13.5 \text{ GHz} \le \text{frequency} \le 18.3 \text{ GHz} - 145 \text{ [dBm/Hz]}$	
	$18.3 \text{ GHz} < \text{Irequency} \le 26.3 \text{ GHz} - 141 \text{ [dBm/Hz]}$	
	With MS2840A-046, $26.5 \text{ CHz} \leq \text{frequency} \leq 24 \text{ CHz} = 141 \text{ [dPm/Hz]}$	
	$20.5 \text{ GHz} < \text{frequency} \le 54 \text{ GHz} = -141 \text{ [uDm/Hz]}$ $34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz} = -135 \text{ [dBm/Hz]}$	
	$40 \text{ GHz} < \text{frequency} \le 40 \text{ GHz} = -130 \text{ [dBm/Hz]}$	
	With MS2840A-068/168/069/169 or with Preamplifier turned off:	
	With MS2840A-044/046.	
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} -142 \text{ [dBm/Hz]}$	
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} - 140 \text{ [dBm/Hz]}$	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} - 136 \text{ [dBm/Hz]}$	
	With MS2840A-046,	
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz} -136 \text{ [dBm/Hz]}$	
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz} -131 \text{ [dBm/Hz]}$	
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz} -128 \text{ [dBm/Hz]}$	

 Table 1.3.15-1
 Microwave Preselector Bypass Option Specifications (Cont'd)

ltem	Specification
Display average noise level	With Microwave Preselector Bypass turned on,
(Cont'd)	With MS2840A-068/168/069/169 and with Preamplifier turned on:
	With MS2840A-044,
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} -158 \text{ [dBm/Hz]}$
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} - 157 \text{ [dBm/Hz]}$
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} - 152 \text{ [dBm/Hz]}$
	With MS2840A-046,
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} - 161 \text{ [dBm/Hz]}$
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} - 161 \text{ [dBm/Hz]}$
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} - 156 \text{ [dBm/Hz]}$
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz} -152 \text{ [dBm/Hz]}$
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz} -151 \text{ [dBm/Hz]}$
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz} -143 \text{ [dBm/Hz]}$
	With Microwave Preselector Bypass turned off,
	With MS2840A-068/168/069/169 and with Preamplifier turned on:
	With MS2840A-044,
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} - 162 \text{ [dBm/Hz]}$
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} - 160 \text{ [dBm/Hz]}$
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} - 159 \text{ [dBm/Hz]}$
	With MS2840A-046,
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz} - 164 \text{ [dBm/Hz]}$
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} - 164 \text{ [dBm/Hz]}$
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} - 159 \text{ [dBm/Hz]}$
	$26.5 \text{ GHz} \leq \text{trequency} \leq 34 \text{ GHz} = -157 \text{ [dBm/Hz]}$
	$34 \text{ GHz} \le \text{frequency} \le 40 \text{ GHz} = -155 \text{ [dBm/Hz]}$
	$40 \text{ GHz} < \text{Irequency} \le 44.0 \text{ GHz} -146 [dbm/Hz]$
	With MS2840A-019/119
	See section 1.3.21 "2dB Step Attenuator for Millimeter-wave Option
	(MS2840A-019/119)".
Image response	With MS2840A-067/167 and Microwave Preselector Bypass turned off,
	$-60 \text{ dBc} (6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz})$
	$-60 \text{ dBc} (13.5 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$
	With MS2840A-067/167 and Microwave Preselector Bypass turned on,
	Generated at the frequency at the distance of $1875 \text{ MHz} \times 2$
	0 dBc Nominal (4 GHz \leq frequency \leq 26.5 GHz)
	0 dBc Nominal (26.5 GHz < frequency \leq 44.5 GHz)

 Table 1.3.15-1
 Microwave Preselector Bypass Option Specifications (Cont'd)

1.3.16 Microwave Preamplifier Option (MS2840A-068/168)

This option amplifies signal prior to 1st mixer to enhance sensitivity.

This option is the wideband version of Preamplifier Option (MS2840A-008/108), and can be used on the application software in a similar way.

Item	Specification
Frequency	
Frequency range	100 kHz to 44.5 GHz
Amplitude	
Measurement range	See Table 1.3.1-1, "Measurement range".
Maximum input level	See Table 1.3.1-1, "Specifications for Mainframe, Maximum input level".
Display average noise level (Signal Analyzer function)	See Table 1.3.1-2, "Specifications for Signal Analyzer Function, Display average noise level".
Display average noise level (Spectrum analyzer function)	See Table 1.3.1-3, "Display average noise level".
RF Frequency Characteristics	See Table 1.3.1-1, "Specifications for Mainframe, RF frequency characteristics".
Input attenuator switching error	See Table 1.3.1-1, "Specifications for Mainframe, Input attenuator switching error".
Linearity error	See Table 1.3.1-1, "Specifications for Mainframe, Linearity error".
Second harmonic wave distortion	See Table 1.3.1-1, "Specifications for Mainframe, Second harmonic wave distortion".
1 dB gain compression	See Table 1.3.1-1, "Specifications for Mainframe, 1 dB gain compression".
Two-tone third-order intermodulation distortion	See Table 1.3.1-3, "Specifications for spectrum analyzer function, Two-tone third-order intermodulation distortion".
Others	Cannot install simultaneously with MS2840A-008/108. Dedicated option for MS2840A-046. Cannot be installed to MS2840A-040/041/044.

Table 1.3.16-1 Microwave Preamplifier Option Specifications

1.3.17 26.5GHz Microwave Preamplifier Option (MS2840A-069/169)

This option amplifies signal prior to 1st mixer to enhance sensitivity.

This option is the wideband version of Preamplifier Option (MS2840A-008/108), and can be used on the application software in a similar way.

ltem	Specification
Frequency	
Frequency range	100 kHz to 26.5 GHz
Amplitude	
Measurement range	See Table 1.3.1-1, "Measurement range".
Maximum input level	See Table 1.3.1-1, "Specifications for Mainframe, Maximum input level".
Display average noise level (Signal Analyzer function)	See Table 1.3.1-2, "Specifications for Signal Analyzer Function, Display average noise level".
Display average noise level (Spectrum analyzer function)	See Table 1.3.1-3, "Display average noise level".
RF Frequency Characteristics	See Table 1.3.1-1, "Specifications for Mainframe, RF frequency characteristics".
Input attenuator switching error	See Table 1.3.1-1, "Specifications for Mainframe, Input attenuator switching error".
Linearity error	See Table 1.3.1-1, "Specifications for Mainframe, Linearity error".
Second harmonic wave distortion	See Table 1.3.1-1, "Specifications for Mainframe, Second harmonic wave distortion".
1 dB gain compression	See Table 1.3.1-1, "Specifications for Mainframe, 1 dB gain compression".
Two-tone third-order intermodulation distortion	See Table 1.3.1-3, "Specifications for spectrum analyzer function, Two-tone third-order intermodulation distortion".
Others	Cannot install simultaneously with MS2840A-008/108. Dedicated option for MS2840A-044. Cannot be installed to MS2840A-040/041/046.

Table 1.3.17-1 26.5GHz Microwave Preamplifier Option Specifications

1.3.18 Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option (MS2840A-077/177/078/178)

Table 1.3.18-1	Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option S	pecifications

ltem	Specification	
Model, Name	MS2840A-077 Analysis Bandwidth Extension to 62.5 MHz	
	MS2840A-177 Analysis Bandwidth Extension to 62.5 MHz Retrofit	
	MS2840A-078 Analysis Bandwidth Extension to 125 MHz	
	MS2840A-178 Analysis Bandwidth Extension to 125 MHz Retrofit	
Application	Extends the analysis bandwidth to 62.5 MHz/125 MHz in single analyzer mode by bypassing a bandwidth-limiting filter such as a preselector and performing fast sampling. On the other hand, because an image response is received due to bypassing the image response elimination filter, this is not adequate for measuring spurious or out-of-analysis-band signals and analyzing signals.	
Bandwidth	See Table 1.3.1-2, "Specifications for signal analyzer function, Bandwidth".	
Sampling rate	See Table 1.3.1-2, "Specifications for signal analyzer function, Sampling rate".	
Capture time	See Table 1.3.1-2, "Specifications for signal analyzer function, Capture time".	
Resolution bandwidth	See Table 1.3.1-2, "Specifications for signal analyzer function, Resolution bandwidth".	
ADC resolution	14 bits	
Frequency settings	See Table 1.3.1-2, "Specifications for signal analyzer function, Frequency settings".	

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ltem	Specification		
Display average noise level	At 18 to 28 °C, Time Detection = Average, input attenuator = 0 dB		
	With MS2840A-040/041 installed		
	With MS2840A-077/177/078/178, Band	lwidth > 31.25 MHz	
	Without MS2840A-066/166,		
	Without MS2840A-008/108 or with MS	S2840A-008/108 and	
	Preamplifier turned off,		
	$300 \text{ MHz} \le \text{frequency} < 1 \text{ GHz}$	-146.5 [dBm/Hz]	
	$1 \text{ GHz} \le \text{frequency} < 2.4 \text{ GHz}$	-144.5 [dBm/Hz]	
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–142.5 [dBm/Hz]	
	With MS2840A-041		
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-139.5 [dBm/Hz]	
	With MS2840A-077/177/078/178, Band	1width > 31.25 MHz	
	Without MS2840A-066/166, With MS2840A-008/108 and Procent	fion turned on	
	with MS2840A-008/108, and Freamph		
	$300 \text{ MHz} \le \text{frequency} \le 1 \text{ GHz}$	$-160 \left[dBm/Hz \right]$ 150 $\left[dBm/Hz \right]$	
	$2 \text{ GHz} \leq \text{frequency} \leq 2 \text{ GHz}$	$-159 \left[\text{(dBm/Hz)} \right]$	
	$2 \text{ GHZ} \leq \text{frequency} \leq 5.5 \text{ GHZ}$		
	With $MS2040A^{-}041$ 3.5 GHz < frequency < 6 GHz	$-153 \left[dBm/Hz \right]$	
	5.5 GHZ < frequency <u>s</u> 0 GHZ	-105 [uDii/112]	
	With MS2840A-077/177/078/178 Bandwidth > 31.25 MHz		
	With MS2840A-066/166.		
	Without MS2840A-008/108, or with M	thout MS2840A-008/108, or with MS2840A-008/108 and	
	Preamplifier turned off		
	$300 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	-143.5 [dBm/Hz]	
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–141.5 [dBm/Hz]	
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–138.5 [dBm/Hz]	
	With MS2840A-041		
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–135.5 [dBm/Hz]	
	With MS2840A-077/177/078/178, Band	lwidth > 31.25 MHz	
	With MS2840A-066/166,		
With MS2840A-008/108 and Preamplifier turned of		fier turned on	
	$300 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	$-157 \left[dBm/Hz \right]$	
	$1 \text{ GHz} \le \text{frequency} < 2 \text{ GHz}$	-156 [dBm/Hz]	
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–153 [dBm/Hz]	
	With MS2840A-041		
	$3.5 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–148 [dBm/Hz]	

 Table 1.3.18-1
 Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option Specifications (Cont'd)

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Overview

Item	Specification		
Display average noise level	With MS2840A-044/046 installed		
(Cont'd)	With MS2840A-077/177/078/178, Bandwidth > 31.25 MHz		
	Without MS2840A-008/108/068/168/069/169 or with		
	MS2840A-008/108/068/168/069/169 and Preamplifier turned off,		
	300 MHz ≤ frequency < 1 GHz	–146.5 [dBm/Hz]	
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–143.5 [dBm/Hz]	
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–140.5 [dBm/Hz]	
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–137.5 [dBm/Hz]	
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–137.5 [dBm/Hz]	
	With MS2840A-077/177/078/178, Bandw	m vidth > 31.25~MHz	
	With MS2840A-008/108/068/168/069/169	9 and Preamplifier turned on,	
	$300 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–160 [dBm/Hz]	
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	–158 [dBm/Hz]	
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–156 [dBm/Hz]	
	$3.5 \mathrm{~GHz} < \mathrm{frequency} \le 4 \mathrm{~GHz}$	–151 [dBm/Hz]	
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–151 [dBm/Hz]	
	With MS2840A-077/177/078/178 and MS2840A-067/167,		
	Bandwidth > 31.25 MHz,		
	Without MS2840A-068/168/069/169,		
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–137.5 [dBm/Hz]	
	$13.5 \text{ GHz} \leq \text{frequency} \leq 18.3 \text{ GHz}$	–135.5 [dBm/Hz]	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz} $ $-131.$		
	With MS2840A-046		
	$26.5 \mathrm{~GHz} \leq \mathrm{frequency} \leq 34 \mathrm{~GHz}$	–131.5 [dBm/Hz]	
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	$-125.5 \left[dBm/Hz \right]$	
	$40 \text{ GHz} \leq \text{frequency} \leq 44.5 \text{ GHz}$	–122.5 [dBm/Hz]	
	With MS2840A-077/177/078/178 and MS2840A-067/167,		
	Bandwidth > 31.25 MHz,		
	With MS2840A-068/168/069/169, and Preamplifier turned off,		
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–132.5 [dBm/Hz]	
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–130.5 [dBm/Hz]	
	$18.3 \mathrm{~GHz} < \mathrm{frequency} \le 26.5 \mathrm{~GHz}$	–126.5 [dBm/Hz]	
	With MS2840A-046		
	$26.5 \mathrm{~GHz}$ < frequency $\leq 34 \mathrm{~GHz}$	$-126.5 \left[dBm/Hz \right]$	
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–121.5 [dBm/Hz]	
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–118.5 [dBm/Hz]	

Table 1.3.18-1 Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option Specifications (Cont'd)

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ltem	Specification		
Display average noise level	With MS2840A-044/046 installed		
(Cont'd)	With MS2840A-077/177/078/178 and MS2840A-067/167,		
	Bandwidth > 31.25 MHz,		
	With MS2840A-044		
	With MS2840A-069/169 and Preamp	lifier turned on,	
	$6 \text{ GHz} \leq \text{frequency} \leq 13.5 \text{ GHz}$	–151 [dBm/Hz]	
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz} \qquad -150 \text{ [dBm/Hz]}$		
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–146 [dBm/Hz]	
	With MS2840A-046		
	With MS2840A-068/168 and Preamp	lifier turned on,	
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-153 [dBm/Hz]	
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-153 [dBm/Hz]	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	-149 [dBm/Hz]	
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-149 [dBm/Hz]	
	$54 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-140 [dBm/Hz] -140 [dBm/Hz]	
	$400112 < frequency \le 44.50112$	-140 [ubiii/112]	
	Conception 1.2.21 "2dD Ston Attenuator for Millimeter more		
	See section 1.3.21 "2dB Step Attenuator for Millimeter-wave Option (MS2840A-019/119)"		
Image response	With MS2840A-077/177 installed and Bandwidth > 31.25 MHz		
image response	To be generated at a frequency that is 200 MHz away		
	0 dBe Nominal (300 MHz < frequency < 44.5 GHz)		
	With MS2840A-077/177/078/178 and MS2840A-067/167 installed and		
	Bandwidth > 31.25 MHz.	offit offitor instance and	
	To be generated at a frequency that is 1	$875 \text{ MHz} \times 2 \text{ away}.$	
	0 dBc Nominal (6 GHz < frequency < 44.5 GHz)		
RF frequency	See Table 1.3.1-1. "Specifications for Mainframe, RF frequency		
characteristics	characteristics".		
Linearity error	See Table 1.3.1-1, "Specifications for Mainframe, Linearity error".		
Others			

Table 1.3.18-1 Analysis Bandwidth Extension to 62.5 MHz/125 MHz Option Specifications (Cont'd)

1.3.19 3.6GHz Analog Signal Generator Option (MS2840A-088/188)

Table 1.3.19-1 3.6GHz Analog Signal Generator Option Specifications

Item	Specification	
Application	Adds the analog signal generator function to MS2840A.	

1.3.20 Vector Function Extension for Analog Signal Generator Option (MS2840A-189)

Table 1.3.20-1 Vector Function Extension for Analog Signal Generator Option Specifications

ltem	Specification
Application	Adds the vector modulation function to MS2840A-088/188.

1.3.21 2dB Step Attenuator for Millimeter-wave Option (MS2840A-019/119)

Specification		
MS2840A-019 2dB Step Attenuator for 2	Millimeter-wave	
MS2840A-119 2dB Step Attenuator for 2	Millimeter-wave Retrofit	
Sets the resolution of the Step Attenuator (mechanical) from standard		
See Table 1.3.1-1, "Specifications for Main	nframe, Input attenuator".	
At 18 to 28 °C, Time Detection = Average, With MS2840A-046 and MS2840A-019/11 Without MS2840A-067/167/068/168 100 kHz 1 MHz 30 MHz \leq frequency $<$ 1 GHz 1 GHz \leq frequency $<$ 2.4 GHz 2.4 GHz \leq frequency \leq 3.5 GHz 3.5 GHz $<$ frequency \leq 4 GHz 4 GHz \leq frequency \leq 6 GHz 6 GHz $<$ frequency \leq 13.5 GHz 13.5 GHz $<$ frequency \leq 18.3 GHz 18.3 GHz $<$ frequency \leq 26.5 GHz 26.5 GHz $<$ frequency \leq 40 GHz 34 GHz $<$ frequency \leq 40 GHz	input attenuator = 0 dB 9 installed -131.5 [dBm/Hz] -141.5 [dBm/Hz] -150.5 [dBm/Hz] -147.5 [dBm/Hz] -144.5 [dBm/Hz] -141.5 [dBm/Hz] -141.5 [dBm/Hz] -146.5 [dBm/Hz] -143.5 [dBm/Hz] -143.5 [dBm/Hz] -139.5 [dBm/Hz]	
	$\label{eq:specification} \begin{array}{ c c } \textbf{Specification} \\ \textbf{MS2840A-019} & 2dB \ \text{Step} \ \text{Attenuator for} \\ \textbf{MS2840A-119} & 2dB \ \text{Step} \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{Sets the resolution of the Step \ \text{Attenuator for} \\ \textbf{MS2840A-046 \ 44.5 \ GHz} \\ \textbf{Sets the resolution for \ Main \ MS2840A-046 \ 44.5 \ \text{GHz} \\ \textbf{1 \ MHz} \\ \textbf{30 \ MHz \le frequency \le 13.5 \ GHz} \\ \textbf{1 \ MHz} \\ \textbf{30 \ MHz \le frequency \le 13.5 \ GHz} \\ \textbf{34 \ GHz < frequency \le 34 \ GHz} \\ \textbf{34 \ GHz < frequency \le 40 \ GHz} \\ \textbf{34 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz < frequency \le 44.5 \ GHz} \\ \textbf{40 \ GHz = frequency \le 44.5 \ GHz} \\ 40 \ GH$	

Table 1.3.21-1	2dB Step Attenuator for Millimeter-wave	Option	Specifications
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ltem	Specification	
Display average noise level	Without MS2840A-067/167, with MS2840A-068/168, and	
Signal Analyzer function	Preamplifier turned off	
(Cont'd)	100 kHz	–131.5 [dBm/Hz]
	1 MHz	–141.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–150.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	–147.5 [dBm/Hz]
	$2.4 \mathrm{~GHz} \leq \mathrm{frequency} \leq 3.5 \mathrm{~GHz}$	–144.5 [dBm/Hz]
	$3.5 \text{ GHz} \leq \text{frequency} \leq 4 \text{ GHz}$	–141.5 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–141.5 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–144.5 [dBm/Hz]
	$13.5 \mathrm{~GHz}$ < frequency $\leq 18.3 \mathrm{~GHz}$	–142.5 [dBm/Hz]
	$18.3 \text{ GHz} \leq \text{frequency} \leq 26.5 \text{ GHz}$	–138.5 [dBm/Hz]
	$26.5 \mathrm{~GHz} < \mathrm{frequency} \le 34 \mathrm{~GHz}$	–137.5 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–132.5 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–127.5 [dBm/Hz]
	Without MS2840A-067/167, with MS28	40A-068/168, and
	Preamplifier turned on	
	100 kHz	–144.5 [dBm/Hz] Nominal
	1 MHz	–153.5 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	-163.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	-161.5 [dBm/Hz]
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	-160.5 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-157.5 [dBm/Hz]
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	-157.5 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-160.5 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-160.5 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	-157.5 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-156.5 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-153.5 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–146.5 [dBm/Hz]
	With MS2840A-077/177/078/178, and B	andwidth > 31.25 MHz
	Without MS2840A-008/108/068/168, or	with
	MS2840A-008/108/068/168, and Preamp	olifier turned off:
	$300 \text{ MHz} \le \text{frequency} < 1 \text{ GHz}$	-145.5 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	-142.5 [dBm/Hz]
	$2.4 \text{ GHz} \le \text{frequency} \le 3.5 \text{ GHz}$	-140.5 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-137.5 [dBm/Hz]
	$4 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}$	-137.5 [dBm/Hz]

 Table 1.3.21-1
 2dB Step Attenuator for Millimeter-wave Option Specifications (Cont'd)

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Overview

Item	Specification		
Display average noise level	With MS2840A-077/177/078/178, Bandwidth > 31.25 MHz, with MS2840A-008/108/068/168, and Proceedings to the set		
Signal Analyzer function	MIS2840A-008/108/068/168, and Pream]	pinner turned on.	
(Cont d)	$300 \text{ MHz} \le \text{frequency} < 1 \text{ GHz}$	-160 [dBm/Hz]	
	$1 \text{ GHz} \le \text{frequency} < 2 \text{ GHz}$	-158 [dBm/Hz]	
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	-156 [dBm/Hz]	
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-151 [dBm/Hz]	
	$4 \text{ GHz} < \text{frequency} \le 6 \text{ GHz}$	–151 [dBm/Hz]	
	With MS2840A-077/177/078/178, with I	MS2840A-067/167.	
	Bandwidth > 31.25 MHz, and without M	MS2840A-068/168:	
	6 GHz < frequency < 13 5 GHz	-137.5 [dBm/Hz]	
	13.5 GHz < frequency < 18.3 GHz	-135.5 [dBm/Hz]	
	18.3 GHz < frequency < 26.5 GHz	-131.5 [dBm/Hz]	
	$26.5 \text{ GHz} \leq \text{frequency} \leq 34 \text{ GHz}$	-130.5 [dBm/Hz]	
	$20.5 \text{ GHz} < \text{frequency} \le 54 \text{ GHz}$	-130.5 [dBm/Hz]	
	$40 \text{ GHz} \leq \text{frequency} \leq 40 \text{ GHz}$	-125.5 [dBm/Hz]	
	$400112 < \text{frequency} \le 44.00112$	-119.9 [uDii/112]	
	With MS2840A-077/177/078/178, with MS2840A-067/167,		
	Bandwidth > 31.25 MHz, with MS2840A-068/168, and Preamplifier turned off:		
	6 GHz < frequency < 13.5 GHz	-132.5 [dBm/Hz]	
	13.5 GHz < frequency < 18.3 GHz	-130.5 [dBm/Hz]	
	18.3 GHz < frequency < 26.5 GHz	-126.5 [dBm/Hz]	
	$26.5 \text{ GHz} \leq \text{frequency} \leq 34 \text{ GHz}$	-125.5 [dBm/Hz]	
	34 GHz < frequency < 40 GHz	-121.5 [dBm/Hz]	
	40 GHz < frequency < 44.5 GHz	-115.5 [dBm/Hz]	
	io alle allequolog _ illo alle		
	With MS2840A-077/177/078/178, with MS2840A-067/167,		
	Bandwidth > 31.25 MHz, with MS2840A-068/168,		
	and Preamplifier turned on:		
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–153 [dBm/Hz]	
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–153 [dBm/Hz]	
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–149 [dBm/Hz]	
	26.5 GHz < frequency < 34 GHz	$-148 \left[dBm/Hz \right]$	
	34 GHz < frequency < 40 GHz	$-140 \left[dBm/Hz \right]$	
	40 GHz < frequency < 44.5 GHz	$-137 \left[dBm/Hz \right]$	

Table 1.3.21-1 2dB Step Attenuator for Millimeter-wave Option Specifications (Cont'd)

ltem	Specification	
Display average noise level	At 18 to 28 °C, Detector = Sample, VBW = 1 Hz (Video Average), Input	
Spectrum analyzer function	attenuator 0 dB,	
	With MS2840A-046 and MS2840A-019/11	9 installed,
	Without MS2840A-067/167/068/168, Fre	equency Band Mode: Normal
	9 kHz < frequency < 100 kHz	-120 [dBm/Hz]
	$100 \text{ kHz} \leq \text{frequency} < 1 \text{ MHz}$	-134 [dBm/Hz]
	$1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz}$	-144 [dBm/Hz]
	$10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz}$	-150 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–153 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	-150 [dBm/Hz]
	$2.4 \mathrm{~GHz} \le \mathrm{frequency} \le 3.5 \mathrm{~GHz}$	-147 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-144 [dBm/Hz]
	$4 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}$	-144 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-150 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	-149 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \leq 26.5 \text{ GHz}$	-146 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-146 [dBm/Hz]
	34 GHz < frequency ≤40 GHz	-142 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–137 [dBm/Hz]
	Without MS2840A-067/167, with MS284	40A-068/168. Preamplifier
	turned off, and Frequency Band Mode: Normal	
	9 kHz < frequency < 100 kHz	-120 [dBm/Hz]
	100 kHz < frequency < 1 MHz	$-134 \left[dBm/Hz \right]$
	$1 \text{ MHz} \le \text{frequency} \le 10 \text{ MHz}$	$-144 \left[dBm/Hz \right]$
	$10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz}$	-150 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–153 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz}$	-150 [dBm/Hz]
	$2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	-147 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	-144 [dBm/Hz]
	4 GHz < frequency ≤6 GHz	-144 [dBm/Hz]
	6 GHz < frequency ≤13.5 GHz	-146 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–145 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \leq 26.5 \text{ GHz}$	–141 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-140 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–135 [dBm/Hz]
	40 GHz < frequency ≤44.5 GHz	–130 [dBm/Hz]

 Table 1.3.21-1
 2dB Step Attenuator for Millimeter-wave Option Specifications (Cont'd)

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Overview

Item	Specification	
Display average noise level	Without MS2840A-067/167, with MS2840A-068/168, Preamplifier	
Spectrum analyzer function	turned on, and Frequency Band Mode: Normal	
(Cont'd)	100 kHz	–147 [dBm/Hz] Nominal
	1 MHz	–156 [dBm/Hz]
	$30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz}$	–166 [dBm/Hz]
	$1 \text{ GHz} \leq \text{frequency} < 2 \text{ GHz}$	-164 [dBm/Hz]
	$2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz}$	–163 [dBm/Hz]
	$3.5 \text{ GHz} < \text{frequency} \le 4 \text{ GHz}$	–160 [dBm/Hz]
	$4 \text{ GHz} \leq \text{frequency} \leq 6 \text{ GHz}$	–160 [dBm/Hz]
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	–163 [dBm/Hz]
	$13.5 \text{ GHz} \leq \text{frequency} \leq 18.3 \text{ GHz}$	–163 [dBm/Hz]
	$18.3 \text{ GHz} \leq \text{frequency} \leq 26.5 \text{ GHz}$	$-160 \left[dBm/Hz \right]$
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	–159 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–156 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–149 [dBm/Hz]
	With MS2840A-067/167, without MS2840A-068/168. Microwa	
	Preselector Bypass turned on/off, and Frequency Band Mode: Normal	
	6 GHz < frequency < 13.5 GHz	-147 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	$-145 \left[dBm/Hz \right]$
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	-141 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-140 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–135 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–129 [dBm/Hz]
	With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned off, Microwave Preselector Bypass turned on/off, and Frequency Band Mode: Normal	
	$6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$	-142 [dBm/Hz]
	$13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$	–140 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–136 [dBm/Hz]
	$26.5 \mathrm{~GHz} < \mathrm{frequency} \le 34 \mathrm{~GHz}$	–135 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	–131 [dBm/Hz]
	$40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–125 [dBm/Hz]
	With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, Microwave Preselector Bypass turned on, and Frequency	
	Band Mode: Normal	_
	$6 \mathrm{~GHz}$ < frequency $\leq 13.5 \mathrm{~GHz}$	–161 [dBm/Hz]
	$13.5 \mathrm{~GHz}$ < frequency $\leq 18.3 \mathrm{~GHz}$	–161 [dBm/Hz]
	$18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$	–156 [dBm/Hz]
	$26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$	-152 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	-151 [dBm/Hz]
	$40 \text{ GHz} \le \text{frequency} \le 44.5 \text{ GHz}$	-143 [dBm/Hz]

Table 1.3.21-1 2dB Step Attenuator for Millimeter-wave Option Specifications (Cont'd)

ltem	Specification	
Display average noise level Spectrum analyzer function (Cont'd)	With MS2840A-067/167, with MS2840A turned on, Microwave Preselector Bypa Band Mode: Normal $6 \text{ GHz} < \text{frequency} \le 13.5 \text{ GHz}$ $13.5 \text{ GHz} < \text{frequency} \le 18.3 \text{ GHz}$ $18.3 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz}$ $26.5 \text{ GHz} < \text{frequency} \le 34 \text{ GHz}$ $34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$	A-068/168, Preamplifier ss turned off, and Frequency -164 [dBm/Hz] -164 [dBm/Hz] -159 [dBm/Hz] -157 [dBm/Hz] -155 [dBm/Hz]
	$34 \text{ GHz} < \text{frequency} \le 40 \text{ GHz}$ $40 \text{ GHz} < \text{frequency} \le 44.5 \text{ GHz}$	–155 [dBm/Hz] –146 [dBm/Hz]

 Table 1.3.21-1
 2dB Step Attenuator for Millimeter-wave Option Specifications (Cont'd)
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Overview

1.3.22 Noise Floor Reduction Option (MS2840A-051/151)

ltem	Specification		
Model, Name	MS2840A-051 Noise Floor Reduction		
	MS2840A-151 Noise Floor Reduction Retrofit		
Application	When measuring signals using MS2840A Signal Analyzer either alone or with the external mixer connected, MS2840A-051/151 allow estimating the effects from noise floor of the devices and deducting the estimated effects from the actually measured results. This function is usable only for Spectrum Analyzer		
Noise Floor Reduction	Noise Floor Reduction is decided under the following conditions if not otherwise specified.		
	18 to 28 °C, Detector = Sample, RBW = 1 MHz, VBW = 1 Hz (Power Average), Input attenuator = 0 dB, 50 Ω termination, Preselector Manual Tune = 0 Hz and after Analyze Noise Floor is done:		
	This function measures the power per 1 Hz within each frequency band by the following settings. Center Frequency: (Center frequency of each frequency band $+ \pi \times 1000 \ 000$) Hz		
	Span: Bandwidth of each frequency band /10		
	When MS2840A-040/041 is installed,		
	MS2840A-066 is installed and Low Phase Noise is On, Center frequency = 2003.146093 MHz, Span = 1 MHz		
	Noise floor reduction = 11 dB Nominal		
	MS2840A-066 is not installed or Low Phase Noise = Off		
	Frequency Range Noise Floor Reduction		
	9 kHz to 4000 MHz 11 dB Nominal		
	3500 to 4400 MHz 11 dB Nominal		
	4300 to 6100 MHz 11 dB Nominal		

Table 1.3.22-1 Noise Floor Reduction Option Specifications

Chapter 1 Overview

ltem	Specification		
Noise Floor Reduction	When MS2840A-044/046 is installed:		
(Cont'd)	Without the external mixer		
	Frequency Range	Noise Floor Reduction	
	9 kHz to 4000 MHz	11 dB Nominal	
	3500 to 4400 MHz	11 dB Nominal	
	4300 to 6000 MHz	11 dB Nominal	
	3900 to 8000 MHz	7 dB Nominal	
	7900 to 10575 MHz	7 dB Nominal	
	10475 to $12200\ \mathrm{MHz}$	7 dB Nominal	
	12100 to 18400 MHz	7 dB Nominal	
	18300 to 26600 MHz	7 dB Nominal	
	26500 to 42100 MHz	7 dB Nominal	
	42000 to 44500MHz	7 dB Nominal	
	With the external mixer At Span:Bandwidth of each fr External Mixer Noise Floor is Noise Floor Reduction: 11 dB Note that Noise Floor Reduct	requency band/100 after Analyze s done by the external mixer. 5 Nominal tion depends on the external mixer.	

 Table 1.3.22-1
 Noise Floor Reduction Option Specifications (Cont'd)

1.3.23 Rubidium Reference Oscillator Option (MS2840A-037/137)

Table 1 3 23-1	Rubidium Reference Oscillator Specifications
	Rubialan Reference Obeniator Opecifications

Items	Specifications
Function and Performance	See Table 1.3.1-1, "Internal reference oscillator".

1.3.24 Removable SSD, Win10 Option (MS2840A-014/114)

Table 1.3.24-1 Removable SSD, Win10 Option Specifications

Items	Specifications		
Application	Removable SSD for storing user data of Windows 10 based products		
	User-installable and removable SSD		
	Insert into the Primary HDD/SSD slot on the back panel to use.		
	Figure 3.1.1-2 Rear panel "15 Primary HDD/SSD slot"		

Chapter 2 Before Use

This chapter describes items that you should know before using the MS2840A. Be sure to read this section at least once as it contains safety tips and cautions for avoiding failure during use.

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2.1 Installation Location

2.1.1 Installation orientation

Install the MS2840A horizontally or at an angle using the tilted legs as shown in Figure 2.1.1-1. Do not place objects on top of the MS2840A when tilted.



Figure 2.1.1-1 Installation orientation



If the MS2840A is not installed in a "OK" direction as above, a small shock may turn it over and harm the user.

2.1.2 Distance from surrounding objects

A fan is installed to the MS2840A to prevent the internal temperature from rising. Install the MS2840A in a location with the vents at least 10 cm away from walls, peripherals or other obstructions so as not to block the fan perimeter.



Figure 2.1.2-1 Distance from surrounding objects

2.1.3 Installation location conditions

Although the MS2840A operates at an ambient temperature of 0 to 50 °C, avoid using it in locations, such as the following, since it may cause failure.

- Locations with strong vibrations
- Humid and dusty locations
- Locations with direct sunlight
- Locations where there is the risk of exposure to active gases
- Locations where power voltage severely fluctuates

2

Before Use

2.2 Items to Check Before Use

2.2.1 Safety labels

To protect the safety of the user, the WARNING label shown in Figure 2.2.1-1 is affixed to the rear panel. Observe the instructions on the label.

NO OPERATOR SERVICE- ABLE PARTS INSIDE.	
REFER SERVICING TO	
QUALIFIED PERSONNEL.	

j,	
	WARNING
	THIS MEASURING EQUIPMENT IS A
	PRECISION ELECTRONIC DEVICE
-	THAT CONTAINS HAZARDOUS PARTS,
	AND THEREFORE MUST NOT BE
	SERVICED BY THE CUSTOMER.
	UNDER NO CIRCUMSTANCES
	DISASSEMBLE THIS EQUIPMENT.
	THIS EQUIPMENT MUST BE SERVICED
	ONLY BY QUALIFIED SERVICE
	PERSONNEL.
ł	

Figure 2.2.1-1 Warning labels

2.2.2 Input level and reverse power (when vector signal generator is installed) to RF Input

The MS2840A is not provided with over-power protection. Be careful not to apply the power to the RF Input connector as described below: For Option 040/041, without Option 008/108 installed, or with Preamplifier turned off:

+30 dBm Max (Input attenuator \geq 10 dB), ±10 Vdc Max For Option 040/041, with Option 008/108 installed, and with Preamplifier turned on:

+10 dBm Max (Input attenuator = 0 dB), ±10 Vdc Max

For Option 044/046, without Option 008/108/068/168/069/169 installed, or with Preamplifier turned off:

+30 dBm Max (Input attenuator \geq 10 dB), ±0 Vdc Max For Option 044/046, with Option 008/108/068/168/069/169 installed, and with Preamplifier turned on:

+10 dBm Max (Input attenuator = 0 dB), ± 0 Vdc Max There is no reverse power protection for the SG output connector when the Option 020/120/021/121 Vector Signal Generator Option is installed. Be careful not to apply reverse power to the SG Output connector as described below:

When Option 022/122 is NOT installed:

+12 dBm Max (<20 MHz), +24 dBm Max (≥20 MHz) When Option 022/122 is installed:

+18 dBm Max (<20 MHz), +30 dBm Max (≥20 MHz) In addition, do not apply DC voltage even when within the range described above.

2.2.3 Electrostatic

- Always use the supplied 3-pin power cord to ground both the MS2840A and DUT (included in test circuit). After confirming that both the MS2840A and DUT are grounded, use coaxial cables to connect them. NEVER connect the MS2840A and DUT without grounding, otherwise electrostatic discharge may damage the MS2840A.
- Do not touch the core conductor of the connector or bring it into contact with metal. Doing so may damage the input circuit of the MS2840A.



Do not touch the core conductor of the coaxial cable connected to the input connector or bring it into contact with metal.

Doing so may damage the input circuit of the MS2840A.



Do not touch the core conductor to the metal when connecting the coaxial cable to the connector.

Doing so may damage the input circuit of the MS2840A.



2.2.4 Notes on handling input connector and SG output connector (when vector signal generator is installed)

For Option 040/041, only connect N-type connector to RF Input and SG Output. For Option 044, only connect N-type connector to RF Input. For Option 046, only connect K-type connector to RF Input. Connecting a different connector will damage the connector.

2.2.5 USB memory stick

Note the orientation of the connection when using a USB memory stick. Plugging in a USB memory stick in the wrong direction may damage the connector.

2.3 Power Connection

This section describes the procedures for supplying power.

2.3.1 Power requirements

For normal operation of the MS2840A, observe the power voltage range described below.

Power source	Voltage range	Frequency
100 Vac system	100 to 120 V	50 to 60 Hz
200 Vac system	200 to 240 V	50 to 60 Hz

Operating voltage is within the range of +10 % to -15 % from the rated voltage (Max. 250 V).

Changeover between 100 and 200 V system is made automatically.

The maximum power consumption of the MS2840A is 350 VA. Provide sufficient power capacity.



Supplying power exceeding the above range may result in electrical shock, fire, failure, or malfunction.

2.3.2 Connecting power cord

Insert the power plug into a grounded outlet, and connect the other end to the power inlet on the rear panel. To ensure that the instrument is properly grounded, always use the supplied 3-pin power cord.

Always connect the instrument to a properly grounded outlet. Do not use the instrument with an extension cord or transformer that does not have a ground wire.

If the instrument is connected to an ungrounded outlet, there is a risk of receiving a fatal electric shock. In addition, the peripheral devices connected to the instrument may be damaged.

Unless otherwise specified, the signal-connector ground terminal, like an external conductor of the coaxial connector, of the instrument is properly grounded when connecting the power cord to a grounded outlet. Connect the ground terminal of DUT to a ground having the same potential before connecting with the instrument. Failure to do so may result in an electric shock, fire, failure, or malfunction.

If an emergency arises causing the instrument to fail or malfunction, disconnect the instrument from the power supply by disconnecting either end of the power cord.

When installing the instrument, place the instrument so that an operator may easily connect or disconnect the power cord from the power inlet and outlet. Moreover, DO NOT fix the power cord around the plug and the power inlet with a holding clamp or similar device.

If the instrument is mounted in a rack, a power switch for the rack or a circuit breaker may be used for power disconnection.

It should be noted that, the power switch on the front panel of the instrument is a standby switch, and cannot be used to cut the main power.

Chapter 3 Common Operations

This chapter describes items to be understood before actually operating the MS2840A, including part names, basic parameter setting methods, modulation operation method and useful functions.

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Chapter 3 Common Operations

3.1 Part Names

3.1.1 Part names

Front Panel

This section describes the keys and connectors located on the front panel.



Figure 3.1.1-1 Front Panel

1	Power	Power Switch Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2840A is under operation. The Power lamp $\stackrel{(1)}{=}$ lights up orange in the standby state, and lights up green in the Power On state. Press the power switch for a reasonably long duration (for about two seconds).
2	SSD	SSD access lamp Lights up when the MS2840A internal SSD is being accessed.
3	Сору	Copy key Press to capture a screen image from the display and save it to a file.
4	Recall	Recall key Press to recall a parameter file.

3

5	Save	Save key Press to save a parameter file.			
6	Cal	Cal key Press to display the calibration execution menu.			
7	Local	Local key Press to return to local operation from remote control operation through GPIB, Ethernet or USB (B), and enable panel settings.			
8	Remote	Remote lamp Lights up wi	Remote lamp Lights up when the MS2840A is in a remote control state.		
9	Preset	Preset key Resets parameters to their initial settings.			
10	Menu F1 F2 F3 F4	Function keys Used for selecting or executing function menu displayed on the right of the screen. The function menu contents are provided in multiple pages and layers. The number on the bottom of the screen indicates the menu page number.			
	F6 F6	\rightarrow	Next key Press to go to the next page.		
	F7 F8 → €		Back key Press to go back to the previous layer within the function menu.		
		Menu	Top key Press to go back to the uppermost (top) layer.		

Chapter 3 Common Operations



Main function keys 1

Used to set or execute main functions of the MS2840A. Executable functions vary depending on the application currently selected.

Frequency Press to set parameters related to frequency.



Press to set parameters related to level.







Press to set parameters related to RBW/VBW.

Press to set parameters related to trigger.

Press to set parameters related to frequency span.



[Time/Sweep] Press to set parameters related to Time/Sweep.

Main function keys 2

Used to set or execute main functions of the MS2840A. Executable functions vary depending on the application currently selected.



Press to switch an application.



Press to display the Configuration screen.



Press to set parameters related to trace.







Press to set parameters related to the marker function. Peak Search Press to set parameters related to the peak search function.



Press to start a single measurement.



Press to start continuous measurements.







Rotary knob/Cursor keys/Enter key/Cancel key

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



Pressing (Enter) fixes the entered or selected data.

Pressing (Cancel) cancels the entered or selected data.

Shift key

Used to operate any keys with functions described in blue characters on the panel. First press the Shift key, then press the target key when the Shift key lamp lights up green.



Numeric keypad

Used to enter numbers on parameter setup screens.

Pressing BS deletes the last entered digit or character.

Hexadecimal values [A] to [F] can be entered by pressing 4 to 4 when the Shift key lamp on lights up green.



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RF Input connector Inputs an RF signal. When Option 040/041/044 is installed: Type N connector

When Option 046 is installed: Type K connector

Chapter 3 Common Operations

17	SG On/Off	RF output control key If the Vector Signal Generator option is installed, pressing (On) or disables (Off) the RF signal output. The lamp of the RF output control key lights up orange when the RF signal output is set to On. This is not available when the Option 044/046 is installed.		
18	SG Output(Opt)	RF output connector Outputs an RF signal, when the vector signal generator option is installed. This is not available when the Option 044/046 is installed.		
19	• 	USB connector (type A) Used to connect a USB keyboard or mouse or the USB flash drive supplied with the MS2840A.		
20	Mod On/Off	Modulation control key When the vector signal generator option is installed, RF signal modulation can be turned on and off by pressing When modulation is on, the key lamp lights up green. This is not available when the Option 044/046 is installed.		
21	SPA SA SG Appli	Application key Press to switch	n between applications.	
		SPA	SPA key Press to display the Spectrum Analyzer main screen.	
		SA	SA key Press to display the Signal Analyzer main screen, when Option 005/105/006/106/009/109/077/177/078/178 is installed.	
		SG	SG key Press to display the Signal Analyzer main screen, when Vector Signal Generator option is installed.	
			Blank key Not used.	
		Appli	Appli key When Auto is specified, the application selected by using the Application Switch is displayed. When Manual is specified, the pre-specified Application is displayed. Refer to 3.5.4 "Changing application layout".	



1st Local Output connector

This is available when the Option 044/046 is installed.

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

Chapter 3 Common Operations

Rear panel

This section describes the connectors located on the rear panel.



Figure 3.1.1-2 Rear panel

Ref Input connector (reference frequency signal input connector) Inputs an external reference frequency signal (5 MHz/10 MHz/13 MHz). It is used for inputting reference frequency signals with accuracy higher than that of those inside the MS2840A, or for synchronizing the frequency of the MS2840A to that of other device.

Buffer Out connector (reference frequency signal output connector) Outputs the reference frequency signal (10 MHz) generated inside the MS2840A. It is used for synchronizing the frequencies between other devices and the MS2840A based on the reference frequency signal output from this connector.



Sweep Status Out connector

Outputs a signal that is enabled when an internal measurement is performed or measurement data is obtained.

≥0dBm

Ref Input

5/10/13MHz 50Ω

1



AUX connector

This is a complex connector for inputting a baseband clock reference signal of the Vector Signal Generator (optional), and BER Measurement function (optional). See Table 3.1.1-1 for the internal pin assignment of the AUX connector.

Function	Pin Number	Signal Name	
	24	BER_CLK	
	25	GND	
DFD	48	BER_EN	
DER	45	GND	C
	49	BER_DATA	OB
	50	GND	IB
	13	MARKER1	on
	11	GND	Cp
	38	MARKER2	era
	36	GND	atio
SC	39	MARKER3	ons
50	16	GND	01
	42	PULS_MOD	
	41	GND	
	22	BB_REF_CLK	
	20	GND	

Table 3.1.1-1 Pin assignment of AUX connector

Do not connect anything to connectors not listed in Table 3.1.1-1, because they are interface connectors provided for device maintenance.



GPIB connector

Used when controlling the MS2840A externally via GPIB.



USB connector (type B) Used when controlling the MS2840A externally via USB.



Ethernet connector Used for connecting to a personal computer (PC) or for Ethernet connection.

Chapter 3 Common Operations





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IF output connector Monitor output of the internal IF signal. This is available when the Option 044/046 is installed.

Noise Source connector Supply (+28V) of the Noise Source Drive.

This is available when the Option 017/117 is installed.

3.2 Turning Power On/Off

3.2.1 Turning power On

The following shows the procedure for turning the power On.

<Procedure>

- 1. Plug in the power cord jack side to the AC power inlet on the rear panel. Make sure it is plugged all the way in at this time.
- 2. Plug the power cord plug side to the AC power outlet. The MS2840A enters standby state and the power switch \bigcirc lamp lights up orange.
- 3. Press the power switch. The power lamp lights up green and startup begins.

Turning the power On starts Windows then the MS2840A software. The following startup screen is displayed during startup. Do not press the power switch while the startup screen is displayed. The software may not startup normally when the power switch is pressed.



Figure 3.2.1-1 Example of Startup Screen

3.2.2 Turning power Off

The following shows the procedure for turning the power Off.

When turning power Off using panel keys

<Procedure>

Press the power switch to close applications and start shutdown.
 The green power switch power lamp lights off, the
 lamp lights up orange, and the power is turned Off. The main power is On at this time.

Note:

Do not press the power switch for more than 4 seconds. Doing so will forcibly shut down the system during software closing processing.

When turning power Off using mouse connected to MS2840A

<Procedure>

Other than Windows 10

- Connect the supplied mouse to the MS2840A and open the Start Menu from the Windows Taskbar. Refer to 5.1.1 "Displaying Windows Desktop".
- 2. Select Shut down.
- Shutdown begins, the green power switch power lamp lights off, the begins and the power is turned Off. The main power is On at this time.

Windows 10

- Connect the supplied mouse to the MS2830A and open the Start Menu from the Windows Taskbar. Refer to 5.1.1 "Displaying Windows Desktop".
- 2. Select **Power**.
- 3. Select Shut down.
- Shutdown begins, the green power switch power lamp lights off, the lamp lights up orange, and the power is turned Off. The main power is On at this time.

Forced shutdown

<Procedure>

 Press the power switch for four seconds or more. The green power switch power lamp lights off, the power is turned Off.

Notes:

- Use forced shutdown as an emergency operation only when key, mouse, or keyboard operations are disabled. A failure may have occurred in the event the power cannot be turned Off even after pressing the power switch for 4 or more seconds. Unplug the power cord from the outlet and contact an Anritsu Service and Sales office or agent.
- Unplugging the power plug while accessing the SSD may result in SSD failures. Unplug the power plug when the power is turned Off.

3.3 Auto Calibration

An auto calibration function that uses an internal calibrating oscillator is provided to minimize measurement errors of the MS2840A.



- Do not input signals to RF input when calibrating. Correct calibration values cannot be obtained when the auto calibrating function is executed while signals are being input.
- Do not turn off the power while executing the auto calibration because it will cause a malfunction or a failure.

Press \bigcirc ^{Cal} (Cal) to display the Cal function menu.



Figure 3.3-1 Cal key

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Chapter 3 Common Operations

Function Key	Menu Display	Function
Page 1	Application Cal	Press Cal (Cal) to display
F1	SIGANA All	Executes all calibrations (Level Cal, Band Cal, Local Leak Suppression, Extra Band Cal) except Extra Band Cal.
F2	Level Cal	Executes level calibration.
F3	Band Cal	Executes analysis band calibration.
F4	Local Leak Suppression	Executes local leak suppression.
F6	Extra Band Cal	Executes band calibration within the current frequency.
$\mathbf{F7}$	Extra Band Cal Clear	Clears the calibration values obtained by Extra Band Cal to zero.
F8	Close	Returns to the application screen.
Page 2	Application Cal	Press $\stackrel{Cal}{\longrightarrow}$ (Cal), then press \bigcirc (more) to display.
F5	Analyze Noise Floor Clear	Clears the calibration values obtained by Analyze Noise Floor and Analyze External Mixer Noise Floor to zero.
F6	Analyze Noise Floor	Measures noise floor calibration values.
$\mathbf{F7}$	Analyze External Mixer Noise Floor	Measures noise floor calibration values when using the external mixer
F8	Close	Returns to the application screen.

Table 3.3-1 Cal function menu

Note:

Analyze Noise Floor Clear, Analyze Noise Floor, and Analyze External Mixer Noise Floor are displayed only when MS2840A-051/151 is installed.

The auto calibration function includes the following four functions and a function to execute (1) to (3) functions in a batch.

(1) Level calibration (Level Cal)

Calibrates reference level errors, RBW switching errors and input attenuator switching errors to minimize level measurement errors.

Example: Executing signal level calibration <Procedure>

- 1. Press $\overset{Cal}{\frown}$ (Cal).
- 2. Select $\boxed{F^2}$ (Level Cal).

(2) Analysis band calibration (Band Cal)

Calibrates the frequency flatness and phase characteristics within the analyzed band.

Example: Executing analysis band calibration

<Procedure>

- 1. Press \bigcirc Cal).
- 2. Select [3] (Band Cal).

(3) Local Leak Suppression

Executes calibration to suppress local leaks affecting low frequency and low level measurements.

Example: Suppressing local leaks using local leak suppression function <Procedure>

- 1. Press $\overset{Cal}{\frown}$ (Cal).
- 2. Select [14] (Local Leak Suppression).

The following are the steps to batch execute all calibration functions.

<Procedure>

- 1. Press \bigcirc^{Cal} (Cal).
- 2. Select F1 (SIGANAAll).

(4) Extra Band Cal

Executes band calibration within the current frequency.

Example: Executes band calibration within the current frequency. <Procedure>

- 1. Press \bigcirc (Cal).
- 2. Select 📧 (Extra Band Cal).

The calibration value is applied if both of the following conditions are met:

- The difference between "the center frequency at the time of executing Extra Band Cal" and "the set value for the current center frequency" is 100 kHz or less.
- Both of the center frequencies are on the same frequency band.

To activate Extra Band Cal, select any function other than Spectrum Analyzer, Signal Generator, BER Measurement, and Power Meter.

Extra Band Cal calibration values cannot be applied when Low Phase Noise is enabled. For Low Phase Noise, refer to 3.4.4 "System Settings".

Depending on the version of the software you install, the existing Extra Band Cal calibration values might be cleared when installing the software. When the software is installed successfully, execute Extra Band Cal to obtain calibration values again. For how to install the software, refer to 3.8.1 "Installing software".

(5) Extra Band Cal Clear

Clears the calibration values obtained by Extra Band Cal.

Example: Clearing the calibration values obtained by Extra Band Cal. <Procedure>

- 1. Press \bigcirc (Cal)
- 2. Select F7 (Extra Band Cal).

(6) Analyze Noise Floor Clear

Clears the noise floor calibration values obtained by Analyze Noise Floor and Analyze External Mixer Noise Floor to zero.

Example: Clearing the noise floor calibration values obtained by Analyze Noise Floor.

<Procedure>

- 1. Press \bigcirc^{Cal} (Cal).
- 2. Press \longrightarrow (more).
- 3 Select **F5** (Analyze Noise Floor Clear).

This function is available only when MS2840A-051/151 is installed and Spectrum Analyzer is selected.

(7) Analyze Noise Floor

Measures noise floor calibration values

Note:

It takes 20 to 30 minutes to acquire the noise floor calibration values. Do not power off or operate MS2840A when acquiring the calibration values.

Example: Obtaining noise floor calibration values to deduct from the measured results.

<Procedure>

- 1. Press \bigcirc^{Cal} (Cal).
- 2. Press \longrightarrow (more).
- 3 Select 📧 (Analyze Noise Floor).

This function is available only when MS2840A-051/151 is installed and Spectrum Analyzer is selected.

Estimates internal noise floor from the measured results using the calibration values obtained by Analyze Noise Floor in addition to the noise floor calibration values that are stored inside MS2840A at shipment. Then deducts the estimation from the measured results.

Terminate RF Input when obtaining the noise floor calibration values by Analyze Noise Floor.

Depending on the version of the software you install, the existing Analyze Noise Floor calibration values might be cleared when installing the software. When the software is installed successfully, execute Analyze Noise Floor to obtain calibration values again. For how to install the software, refer to 3.8.1 "Installing software". (8) Analyze External Mixer Noise Floor

Measures noise floor calibration values when using the external mixer

Note:

It takes 20 to 30 minutes to acquire the noise floor calibration values. Do not power off or operate MS2840A when acquiring the calibration values.

Example: Obtaining noise floor calibration values to deduct from the measured results when using the external mixer.

<Procedure>

- 1. Press $\overset{Cal}{\frown}$ (Cal).
- 2. Press \rightarrow (more).
- 3 Select 🗊 (Analyze External Mixer Noise Floor).

This function is available only when MS2840A-051/151 is installed and Spectrum Analyzer is selected.

The attempt of executing Analyze External Mixer Noise Floor fails when the external mixer is Off.

Terminate the input port of the external mixer when obtaining the noise floor calibration values by Analyze External Mixer Noise Floor.

Depending on the version of the software you install, the existing Analyze External Mixer Noise Floor calibration values might be cleared when installing the software. When the software is installed successfully, execute Analyze External Mixer Noise Floor to obtain calibration values again. For how to install the software, refer to 3.8.1 "Installing software".

3.4 Settings on Configuration Screen

MS2840A system settings, and settings for system information display and common application functions can be configured in the Configuration screen.



Press System to display the Configuration screen.

Figure 3.4-1 Configuration screen

Note:

When the firmware is updated, the settings will be the initial values. Refer to Appendix F "Initial Value List" for initial values.

3.4.1 Display description

The function menu in the Configuration screen consists of two pages, which can be toggled by pressing \bigcirc .

Function Key	Menu Display	Function
Page 1	Configuration	Press System to display.
F1	Interface Settings	Sets interface used for remote control. Mainframe Remote Control 1.3 "Interface Settings" 3.4.2 "Interface Settings"
F2	Copy Settings	Sets screen copy.
F3	System Settings	Turns on and off the buzzer sound and sets the reference frequency signal .
F4	Application Switch Settings	Sets loading/unloading of applications.
F5	System Information	Displays MS2840A system information.
F6	Option Information	Displays options installed in the MS2840A.
F7	File Operation	Sets file and data management.
F8	Close	Closes Configuration screen.
Page 2	Configuration	Press $\left[\begin{array}{c} \text{System} \\ \text{Config} \end{array} \right]$, then press \longrightarrow to display.
F1	Software Install	Sets software and license installation.
F3	Calibration Alert	Sets the calibration alert functions.
F4	Display Annotation	Turns on and off frequency and level display on the application screen. On: Display (default), Off: Hide
F6	Save&Recall Settings	Sets the mode for save and recall function.
F7	Correction	Sets settings related to Correction.
F8	Close	Closes Configuration screen.

 Table 3.4.1-1
 Configuration function menu

3.4.2 Interface Settings

Pressing [1] (Interface Settings) after [2016] displays the Interface Settings screen. GPIB, Ethernet and USB interface conditions used for remote control can be set in this screen. Select the item to be set with the cursor, and then press [17] (Set) to reflect the settings of that item.

Refer to Section 1.3 "Interface Settings" in the MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control) for details.

🎬 Parameter Setting	zs X
Interface Settings	Copy Settings System Settings
GPIB Settings	
Address	1 🚍
	[Min 0 to Max 30]
Ethernet Settings -	
DHCP	⊙On ©Off
IP Address	192 🗧 168 🗧 100 🗧 100 🗲
Subnet Mask	255 🛨 255 🛨 255 🛨 0 🗦
Default Gateway	🗄 🗄 🗄
Host Name	HOSTNAME
Raw Socket Port I	Number 49153 📑
 USB(B) Settings —	
Vendor ID	0x0B5B
Product ID	0x0006
Serial Number	6200871175
 Terminator Settings	
Terminator	CR/LF
Remote Language S	Settings
Language	Native
	Set Cancel

Figure 3.4.2-1 Interface Settings screen

3.4.3 Copy Settings

Pressing 2 (Copy Settings) after 3 displays the Copy Settings screen. Screen copy conditions can be set in this screen. Select the item to be set with the cursor, and then press 7 (Set) to reflect the settings of that item.

🙀 Parameter Settings			×
Interface Settings Copy Settings Sys	tem Se	ttings]
File Type Settings			
BMP Color			
• PNG			
Color Settings			
Normal			
File Name Settings			
Date + sequential number(00-99)			
◯ User~Specified Name			
Storage Place Settings			
(A)			
1			
Se	t	Ca	incel

Figure 3.4.3-1 Copy Settings screen

ltem	Description
File Type Settings	Selects the file format. BMP or PNG can be set.
Color Settings	Sets the screen copy color. Normal (same as screen display), Reverse, Monochrome, or Reversed monochrome can be selected.
File Name Settings	The file naming method can be selected from auto (date + sequence number) or random. This setting is applied also to determining name for parameters and waveform data saving file. 3.6.1 "Saving parameters and waveform data"
Storage Place Settings	The file save location can be selected
3.4.4 System Settings

Pressing [3] (System Settings) after system displays the System Settings screen. Select the item to be set with the cursor, and then press [7] (Set) to reflect the settings of that item.

👖 Parameter Settings 🗾			
Interface Settings Copy Settings System Settings			
Beep Sound Settings —			
© On			
● Off			
Reference Signal			
© Auto			
Fixed to Internal			
External Reference Frequency			
© 5MHz			
© 10MHz			
© 13MHz			
Attenuator Mode			
Electronic Atten Combined			
Mechanical Atten Only			
On f≤ 3.7GHz	(Frequency Band Mod	e:Sourious)	
● Off SPAN ≤ 1M	IHz (SPA)		
	Set	Cancel	

Figure 3.4.4-1 System Settings screen

Table 3.4.4-1	System Settings items
---------------	-----------------------

Item	Description
Beep Sound Setting	Sets the warning sound On/Off.
Reference Signal	Selects the reference frequency signal type. <u>Auto</u> Detects and automatically selects external reference signal input. Synchronizes the internal reference oscillator when an external input is not detected, and synchronizes to the external reference signal when an external input is detected. <u>Fixed to Internal</u>
	Uses the internal reference oscillator.

Item	Description
External Reference Frequency	Selects signal frequency, when using external reference signal as the signal source for reference frequency.
	Switches between Electronic attenuator (E-ATT) and Mechanical attenuator (M-ATT).*1
	Electronic Atten Combined : Mostly uses E-ATT with partial use of M-ATT.
	Mechanical Atten Only : Exclusively uses M-ATT.
Attenuator Mode	Note:
	When inputting a signal of -10 dBm or higher into the RF input port in the frequency of 10 MHz or lower (undefined in the E-ATT Combined standards), the signal may be distorted. When executing measurement in the frequency of 10 MHz or lower, use of "Mechanical Atten Only" is recommended.
	Sets Low Phase Noise option On/Off
Low Phase Noise*2	The setting range is displayed at the right side of the frame.

*1: The switching is made according to the table shown below.

*2: This is displayed when the MS2840A-066/166 Low Phase Noise Performance Option is installed.
Figure 3.4.4-1 is an example for other than MS2840A-040. For MS2840A-040, the setting range display is only for SPAN ≤1 MHz (SPA).

3.4 Settings on Configuration Screen

Option	Frequency*1	Electronic Atten Combined	Mechanical Atten Only
040	$\leq 6 \mathrm{~GHz}$	0 to 10 dB \rightarrow M-ATT	All M-ATT
041		12 to 40 dB \rightarrow E-ATT	
044		42 to 60 dB \rightarrow M-ATT	
	$> 6 \mathrm{GHz}$	All M-ATT	All M-ATT
046	$\leq 6 \ GHz^{*2}$	0, 10 dB \rightarrow M-ATT	All M-ATT
		12 to 40 dB \rightarrow E-ATT	
		50, 60 dB \rightarrow M-ATT	
	> 6 GHz*3	All M-ATT	All M-ATT

 Table 3.4.4-2
 Attenuator Mode switching

*1:	The following reference frequency is used:
	Spectrum analyzer mode: STOP frequency
	Signal analyzer mode: Center frequency

*2:	Spurious Mode:
	Stop frequency $\leq 4.1~\mathrm{GHz}$ and Start frequency $< 4~\mathrm{GHz}$

*3: Spurious Mode: Stop frequency > 4.1 GHz or Start frequency > 4 GHz

3.4.5 Application Switch Settings

Pressing 4 (Application Switch Settings) after displays the Application Switch Settings function menu. The loading/unloading of applications can be set from this menu. Select the item to be set with the cursor, and then press 7 (Set) to display the setting window of that item or start performing the setting.

Function Key	Menu Display	Function
F1	Load Application Select	Selects an application located in the Unloaded Applications frame to startup the selected application. 3.5.1 "Loading applications"
F2	Unload Application Select	Selects an application located in the Loaded Applications frame to end the selected application. 3.5.2 "Unloading applications"
F3	Position Change	Sets the loaded application anywhere on the Application Switch menu.
F7	Set	Displays the setting window for the items selected by pressing F1, F2, or F3, or starts performing the setting.
F8	Close	Returns to the Configuration screen.

 Table 3.4.5-1
 Application Switch Settings function menu

3.4.6 System Information

Pressing (System Information) after displays the System Information function menu. The MS2840A system information can be viewed from this menu. Pressing the function key corresponding to the system information to be viewed displays the window of the selected item.

Function Key	Menu Display	Function	
Page 1	System Information	Press System and then press F5 (System Information) to display.	
F1	System Information View	Displays the MS2840A product type, serial number, operating time, and attenuator switching counts. ATT_2DB (With MS2840A-046 and without MS2840A-019/119: No display) ATT_4DB (With MS2840A-046: No display) ATT_4aDB (With MS2840A-046 and MS2840A-019/119: Display) ATT_4bDB (With MS2840A-046 and MS2840A-019/119: Display) ATT_8DB (With MS2840A-046: No display) ATT_10DB ATT_16DB (With MS2840A-046: No display) ATT_20DB ATT_30DB (With MS2840A-046: Display)	
F2	Software Version View	Displays the version of the software installed in the MS2840A.	
F3	FPGA Version View	Displays the FPGA version for each board installed in the MS2840A.	
F4	Board Revision View	Displays the revisions of each board installed in the MS2840A. (Some boards are not displayed.)	
F5	Software License View	Displays the license of software installed in the MS2840A.	
F6	SG Wave License View	Displays the license of SG waveforms installed in the MS2840A (only when a vector signal generator is installed).	
Page 2	System Information	Press System, and then press 5 (System Information) to display.	
F1	System Reset	Initializes the system.	
F7	Information Save	Saves the MS2840A system information.	

 Table 3.4.6-1
 System Information function menu

3.4.7 Option Information

Pressing [6] (Option Information) after [3540m] displays the option screen. Information on options installed in the MS2840A can be viewed in this screen.

3.4.8 File Operation

Pressing 🔽 (File Operation) after Stand displays the File Operation function menu. Data files can be managed from this menu. Pressing the function key corresponding to the data file to be managed displays the setting window of that item.

Function Key	Menu Display	Function
F1	Device (D:)	Selects drive.
F2	Parameter Save Data	Manages save data for parameter settings file.
F3	Copy Data	Manages copied file data.
F4	Trace Data	Manages trace data.
F5	Digitizer Data	Manages digitized data.
F7	System Information	Manages system information.

Table 3.4.8-1 File Operation function menu

3.4.9 Software Install/Uninstall

Press , and then press \longrightarrow to move to page 2 of the Configuration function menu. Press \bigcirc (Software Install) to display the Software Install menu. Software can be installed and uninstalled to/from the MS2840A from this menu. Pressing the function key corresponding to the item to be set executes the selected item.

Refer to Section 3.8 "Installing and Uninstalling" for details.

3.4.10 Correction

When making measurements with a spectrum analyzer, it may be necessary to correct the error and gain of the measurement system. The following are examples of them:

- Frequency characteristics and loss of measurement cables
- Frequency characteristics and loss of pre-amplifier, etc. connected to RF input connector.
- When wanting to measure the field strength with an antenna or near-field probe connected (antenna factor correction).

In the cases above, Correction functions allow you to correct the error and gain.

You can input correction value via csv file or remote control operation. If inputting via csv file, refer to the Recall Correction Table. For details of remote command input, see "Correction Make Up" in Chapter 4 of the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Mainframe Remote Control.*

Correction

Press States, and then press \implies to move to page 2 of the Configuration function menu. Press $\boxed{17}$ (Correction) to display the Correction function menu. Those functions are used to set correction factors for frequency characteristics.

Function Key	Menu Display	Function
F1	Correction (On/Off)	Sets Correction to On/Off. When set to On, the level correction processing function is executed.
F2	Save Correction Table	Opens the Save Correction Table function menu.
F3	Recall Correction Table	Opens the Recall Correction Table function menu.
F8	Close	Returns to the Configuration menu.

	Table 3.4.10-1	Correction function menu
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Save Correction Table

Pressing 😰 (Save Correction Table) on Correction function menu displays Save Correction Table function menu. Those functions are used to save level frequency characteristics.

Function Key	Menu Display	Function
F1	Device (D:)	Selects the drive.
F7	Save Correction Table	Saves the level frequency characteristics. When File Name Setting is set to Data + sequential, the file is automatically named "Corr date_sequential number". The file is in CSV format and is saved in "[Selected drive]:\Anritsu Corporation\Signal Analyzer\User Data\Corrections\". Up to 1000 files can be saved in the folder.
F8	Close	Returns to the Configuration menu.

 Table 3.4.10-2
 Save Correction Table function menu

Recall Correction Table

Pressing 📑 (Recall Correction Table) on Correction function menu displays the Recall Correction Table function menu. Those functions are used to recall the saved level frequency characteristics.

Function Key	Menu Display	Function
F1	Device (D:)	Selects the drive.
F7	Recall Correction Table	Recalls the level frequency characteristics. A file is in CSV format.
F8	Close	Returns to the Configuration menu.

Table 3.4.10-3 Recall Correction Table function menu

A Correction file is in CSV format, as shown below. Signal levels can be corrected by sets of frequency and level in the Correction file. Also, the correction factors between Fa and Fb are calculated by the linear interpolation of log value at Fa and Fb.

Frequency (Hz),Level (dB) 0,0 980000000,1 1000000000,4 1200000000,1

Describe the frequency and level to be corrected within the following range for the CSV file.

Up to 4096 items of correction data can be set.

[Frequency] Range -1 to 400 GHz Resolution 1 Hz Set the unit in Hz.

[Level] Range -100 to 100 dB Resolution 0.001 dB

Operation when correction factors are entered

As shown in Figure 3.4.10-1, if the frequency range over which the correction factors are entered is from Fa to Fb, displayed frequency ranges lower than Fa or higher than Fb have correction factors applied. The correction factor for frequencies lower than Fa is the same as that (La) for Fa and the correction factor for frequencies higher than Fb is the same as that (Lb) for Fb. The correction factors between Fa and Fb are calculated by the linear interpolation of log value at Fa and Fb.



Figure 3.4.10-1 Operation When Correction Factors Are Entered

Correction factors apply to all the applications other than Signal Generator.

In Signal Analyzer functions, the correction factors of the center frequency are applied to all the trace data in the same span.

Executing the following functions initializes the correction factors. Installing application software does not initialize the correction factors.

- To execute System Reset.
- To execute the system recovery functions.

3.4.11 Display Annotation

When Display Annotation is OFF, the measurement target's frequency and level included in the frequency-related settings, level-related settings, marker values, and measurement results are hidden from the application screen to avoid being seen.

Press System and then press \longrightarrow . Switch On/Off the display by pressing (Display Annotation) on Page 2 of the Configuration function menu.

On Displays frequency and signal level. (Default)

Off Hides frequency and signal level.

Note:

When Display Annotation is Off, only applications that support Display Annotation function are displayed in the Application Switch menu.

3.4.12 Calibration Alert

Calibration Alert displays an alert when the temperature change or the elapsed time based on the last automatic calibration (SIGANA All) meets the trigger conditions. The trigger conditions for alerts, or temperature thresholds and elapsed time, can be specified.

Press Stem and then press \bigcirc . Pressing [3] (Calibration Alert) on Page 2 of the Configuration function menu displays the Calibration Alert function menu.

Function Key	ltem	Description
F1	Alert Mode	Specifies the trigger conditions for alerts.NoneNo alert occurs.TemperatureAn alert occurs when a temperature goesoutsides the specified thresholds based on theinternal temperature measured at the lastautomatic calibration (SIGANA All).Elapsed TimeAn alert occurs when the time passes longerthan the specified Elapsed Time since the lastautomatic calibration time (SIGANA All)BothAn alert occurs when either of temperaturechange or elapsed time meets the triggerconditions.
F2	Temperature	Specifies the temperature thresholds for alerts.Range0.5 to 50.0 °CResolution0.5 °CDefault2.0 °C
F3	Elapsed Time	Specifies the elapsed time for alerts.Range1 to 200 h (hours)Resolution1 h (hour)Default1 h (hour)

Table 3.4.12-1 Calibration Alert function menu

When the specified trigger conditions are met, an alert appears at upper part of the screen as Figure 3.4.12-1. An alert is released by executing automatic calibration (SIGANA All).

1 MS2840A S	oectrum Analyzer				Calibration (S	IGANA All)	required	_ 1
MKR - A	2.001 150 000 0	0 GHz	-25.96	dBm		100ki iz	SWT	1048 15ms
Referenc	e Level 0.00dBm		1			RMS	1001 p	oints
0.0 -10.0			-					Į

Figure 3.4.12-1 Alert Display

When Alert Mode is Both or Temperature, the alert remains displayed even after the internal temperature goes back to within the specified thresholds. The alert is released by executing automatic calibration (SIGANA All).

Notes:

- Even when the trigger conditions are met, no alert appears for the first 30 minutes after turning On the MS2840A, because it is the warm-up time.
- This function uses Windows date/time to monitor the elapsed time from the last automatic calibration (SIGANA All). An alert is not displayed at correct elapsed time when the Windows date/time is changed. Execute automatic calibration (SIGANA All) again if it is changed.
- For details of remote control commands to query status, refer to "Status of Calibration Alert" in Section 4.1 "Application Common Device Messages" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Mainframe Remote Control).*

3.5 Loading, Unloading, and Switching Applications

The following describes the procedures for loading, unloading and switching applications (signal analyzer, spectrum analyzer, etc.).

Loading applications refers to the setting of applications already installed to an execution state. Loaded applications are registered to the Application Switch menu and are in an operable state. In addition, these applications enter an execution state when the power is turned on after registration. At the factory default, all applications are installed thus in "loaded" state. However, application in excess of maximum number of loadable applications is listed as "Unloaded".

Unloading applications refers to the halting and ending of applications in an execution state. Unloaded applications are released from Application Switch menu registration and will not run until they are re-loaded.

Switching applications refers to the operation for selecting the applications to be operated from the applications in an execution state. You can select the target applications from the Application Switch menu.



- Applications registered to the Application Switch menu automatically enter an execution state when starting up the MS2840A. The more registered applications, the longer startup will take.
- In the event running applications are suddenly ended while operating Windows, press , turn the MS2840A power Off or shutdown Windows, and then turn the MS2840A power On again.
- When many applications are running simultaneously and the measurement software calls a measurement function from the signal or spectrum analyzer functions, sometimes the application may take a long time to switch. Reducing the number of simultaneously running applications by unloading them will help prevent this problem.

3.5.1 Loading applications

Applications can be loaded from the Configuration screen.

<Procedure>

- 1. After pressing with press (Application Switch Settings) to display the Application Switch Registration screen.
- Press [*] (Load Application Select), select the applications to be loaded from the applications displayed in "Unloaded Applications" at the bottom part of the screen, and then press [*] (Set).
 Press [*] (Load Application Select) once again, when an error message "Loading application failed" is displayed.



Figure 3.5.1-1 Application Switch Registration screen

- 1/31/2007 13:20:10 M Application Switch Registration ×I Configuration Application Switch Registration Loaded Applications Load Version 1.00.00 Name Signal Analyzer Туре MX269000A Pos P1 P1 P1 P1 P1 P1 P1 P2 Application Select - F1 - F2 - F3 - F4 - F5 - F6 - F7 - F1 - F2 - F3 - F4 - F5 - F6 - F7 UnLoad Application Selec Position Change Unloaded Applications Name Spectrum Analyzer Version 1.00.00 Туре MX269000A Set Close Close
- 3. When registered correctly, the selected applications will be displayed in "Loaded Applications" at the top part of the screen.

Figure 3.5.1-2 Application Switch Registration screen

4. Press restriction to display the Application Switch menu. Check that the loaded application is displayed in the menu. Select the application with the function key to operate the application.



Figure 3.5.1-3 Application Switch Menu screen

3.5.2 Unloading applications

Applications can be unloaded from the Configuration screen.

<Procedure>

- 1. After pressing with press 4 (Application Switch Settings) to display the Application Switch Registration screen.
- 2. Press [2] (Unload Application Select), select the application to be unloaded from the applications displayed in "Loaded Applications" at the top part of the screen with the cursor, and then press [7] (Set).

Application Sw	ritch Registration		×	1/31/2007 13:20:10
Applicati	on Switch Registration			Genfiguration Setting
Loaded Applica	ations			Load
Туре	Name	Version	Position	
MX269000A	Signal Analyzer	1.00.00	P1 - F1	Application Select
-	-	-	P1 - F2	
-			P1 - F3	UnLoad
-	-	-	P1 - F5	
-	-	-	P1 - F6	Application Select
-	-	-	P1 - F7	
-	-	-	P2 - F1	•
-	-	-	P2 - F2	Position Change
-	-	-	P2 - F3	
-	-		P2 - F4	
-	-	-	P2 - F6	
-	-	-	P2 - F7	
Unloaded Appl	ications		_	
Туре	Name	Version		
MX269000A	Spectrum Analyzer	1.00.00		
				Set
				Class
				Close
			Close	
			0.056	

Figure 3.5.2-1 Application Switch Registration screen

3. When ended correctly, the selected applications will be displayed in "Unloaded Applications" at the bottom part of the screen.

🖁 Application Swit	ch Registration		×	1/29/2007 18:23:30
Applicatio	on Switch Registration			Gonfiguration
Loaded Applica	tions			Load
Туре	Name	Version	Position	
-	-	-	P1 - F1	Application Select
-	=	-	P1 - F2	<u> </u>
-	-	-	P1 – F3	Ust and
-	-	-	P1 – F4	UnLoau
-	-	-	P1 - F5	Application Soloct
-	-	-	P1 - F6	Application Select
-	-	-	P1 - F7	
-	-	-	P2 - F1	
-	-	-	P2 - F2	Position Change
-	-	-	P2 - F3	1 osition onlange
-	-	-	P2 - F4	Δ
-	-	-	P2 - F5	
-	-	-	P2 - F6	
-	-	-	P2 - F7	
Unloaded Applic	ations			
Туре	Name	Version		
MX269000A	Spectrum Analyzer	1.00.00		
MX269000A	Signal Analyzer	1 00 00		
				Set
				A
				1
				Close
			Close	L

Figure 3.5.2-2 Application Switch Settings screen

3.5.3 Switching applications

Applications to be operated can be switched in the Application Switch menu.

Pressing Accentant displays the Application Switch menu. Pressing the function key corresponding to the application switches to the selected application screen.

If the [1] Application (Auto/Manual) setting is set to Auto as explained in "3.5.4 Changing application layout", the application you selected above is assigned. From the next time on, you can call up the application by only pressing the Appli key.

Note:

When Display Annotation is Off, only applications that support Display Annotation function are displayed in the Application Switch menu.



Figure 3.5.3-1 Application Switch menu

3.5.4 Changing application layout

The layout of applications can be changed as desired in the Application Switch menu. Set the application layout in the Configuration screen.

<Procedure>

- 1. After pressing (system), press (4 (Application Switch Settings) to display the Application Switch Registration screen.
- 2. Press S (Position Change) to display the Application Switch Function Position Edit screen. The Setting function menu is also displayed.

Note:

The arrangement in the Function Position area is the arrangement of the function keys displayed according to the Application Switch key.

The arrangement in the Application Key area is the same as the Application Key arrangement.

Table 3.5.4-1	Setting 1	function	menu
---------------	-----------	----------	------

Function Key	Menu Display	Function
F1	Application (Auto/Manual)	Auto: The setting of Application Key slot 5 is performed automatically, and an application is assigned to the Appli key automatically. 3.5.3 "Switching applications" Manual: The setting of Application Key slot 5 is performed manually, and the assignment of an application to the Appli key is fixed.
F7	Set	Finalizes the assignment of applications.
F8	Cancel	Returns to the Configuration screen.

3.5 Loading, Unloading, and Switching Applications

3. In the Function Position field, select the application whose layout is to be changed with the cursor, and then press (Enter).



Figure 3.5.4-1 Application Switch Function Position Edit screen

4. Select the new position from the slots in the Function Position area or slot 5 in the Application Key area using the cursor keys and press (Enter).

Note:

Slots 1, 2, and 3 in the Application Key area are automatically assigned to the Spectrum Analyzer, and Signal Analyzer, and Signal Generator applications in accordance with the application key display on the front panel. Slot 4 is not used.

Any application can be set for slot 5 and assigned to the (Appli) key.



5. After checking that the application is placed in the selected position, press [F7] (Set).

Figure 3.5.4-2 Application Switch Function Position Edit screen

3.6 Save and Recall Functions

This section describes the conditions for setting parameters to the internal SSD and USB flash drive (Parameter) and saving (Save) and recalling (Recall) of waveform data (Trace).

Note:

Use the USB flash drive supplied with the MS2840A. Using other USB flash drive may cause malfunction due to device incompatibility.

3.6.1 Saving parameters and waveform data

With the MS2840A, the current setting conditions and waveform data can be saved to the internal SSD or a USB flash drive.

Saving parameter settings

<Procedure>

- Press Save from the Configuration screen, Signal Analyzer screen, or Spectrum Analyzer screen to display the Save function menu shown in Table 3.6.1-1.
- Press [1] (Device) to change the save destination. When the Setting window is displayed, select the drive to be saved and then press [1] (Set) to set.
- 3. When the save destination has been determined, press [7] (Save Application). The save target will be all parameter setting conditions (Parameter) of the launched applications.

The parameter saving file will be output with the name "Param_date_ sequential number.xml." If a parameter is saved on the same date, the file is automatically named in the order "Param_date_000.xml," "Param_date_001.xml," "Param_date_002.xml" and so on. Parameter saves of up to "Param_date_999.xml" can be made.

A sequential number from 000 to 999 will be added to the file name.

To specify the file name, set User Specified Name in File Name Settings in Copy Settings. The parameter saving file name can be specified when saving.

3.4.3 "Copy Settings"

Files will be saved in the following directory of the save target drive specified in [1] (Device).

\Anritsu Corporation\Signal Analyzer\User Data\ Parameter Setting

Up to 1000 files can be saved in the folder.

Saving waveform data

<Procedure>

- 1. Press (Save) from the Signal Analyzer and Spectrum Analyzer screen to display the Save function menu shown in Table 3.6.1-1.
- Press [*] (Device) to change the save destination. When the Setting window is displayed, select the drive to be saved and then press [*7] (Set) to set.
- 3. When the save destination has been determined, press [5] (Save Waveform CSV DATA). The save target will be the waveform data (Trace).

Function Key	Menu Display	Function
F1	Device (D:)	Changes the saving destination.
F3	Save Limit	Displays the Save Limit function menu.
F4	Save on Event	Displays the Save on Event function menu.
F5	Save Waveform CSV DATA	Saves the displayed waveform data (Trace).
F7	Save Application	Saves the parameter setting conditions of all the launched applications.
F8	Close	Returns to the Configuration screen.

Table 3.6.1-1 Save function menu

A sequential number from 00 to 99 will be added to the file name. If a file with file number 99 is used, no more files can be saved.

To specify the file name, set User Specified Name in File Name Settings in Copy Settings. The waveform data file name can be specified when saving.

3.4.3 "Copy Settings"

Files will be saved in the following directory of the save target drive specified in [1] (Device). \Anritsu Corporation\Signal Analyzer\User Data\Trace Data

The maximum number of files in one folder is: Signal Analyzer: 1000 Spectrum Analyzer: 100

3.6.2 Recalling parameters

With the MS2840A, settings can be restored by loading saved setting conditions from the internal SSD or a USB flash drive.

Recalling parameter setting conditions only of applications to be operated using Application Switch <Procedure>

- 1. Press Recall from the Configuration, Signal Analyzer, or Spectrum Analyzer screen to display the Recall function menu shown in Table 3.6.2-1.
- Press [1] (Device) to change the location of saved parameter setting conditions. When the Setting window is displayed, select the drive in which parameter setting conditions are saved, and then press [7] (Set) to set.
- 3. Press 📧 (Recall Current Application) to display the Parameter Save Data List.
- 4. Select the parameter setting conditions to be recalled with the cursor, and then press [7] (Set) to recall parameter setting conditions to the application.

Recalling parameter setting conditions for all launched applications.

<Procedure>

- Press recall from the Configuration, Signal Analyzer or Spectrum Analyzer screen to display the Recall function menu shown in Table 3.6.2-1.
- 2. Press [1] (Device) to change the location of saved setting parameters. When the Setting window is displayed, select the drive in which setting parameters are saved, and then press [7] (Set) to set.
- 3. Press F (Recall all Application) to display the Parameter Save Data List.
- 4. Select the parameter setting conditions to be recalled with the cursor, and then press (Set) to recall the parameter setting conditions to all loaded applications.

Function Key	Menu Display	Function
F1	Device (D:)	Changes the saving destination.
F6	Recall Current Appli cation	Displays the Parameter Save Data List. This function is used to recall the parameter setting conditions of only the current application.
$\mathbf{F7}$	Recall all Application	Displays the Parameter Save Data List. This function is used to recall the parameter setting conditions of all the loaded applications.
F8	Close	Returns to the Configuration screen.

Table 3.6.2-1 Recall function menu

3.6.3 Screen copy

A displayed screen image can be saved to the internal SSD or a USB flash drive as a BMP or PNG formatted file.

The conditions for copying a screen image can be set in the Copy Settings screen. Refer to the following section for details.

3.4.3 "Copy Settings"

Executing screen copy

<Procedure>

- 1. Display the screen to be saved.
- Press Copy to save the screen image to the selected media in BMP or PNG format. A saved file name is displayed when saving is completed.

The image file will be output with the file name "Copy_Date_Sequence_Number.bmp". When screen copies are made on the same date, they are automatically named in an order as "Copy_Date_000.bmp", "Copy_Date_001.bmp", "Copy_Date_002.bmp", and so on. Screen copies of up to "Copy_Date_999.bmp" can be made. A sequential number from 000 to 999 will be added to the file name.

Files will be saved in the following directory of the save target drive specified in [1] (Device). \Anritsu Corporation\Signal Analyzer\User Data\Copy Files

Up to 1000 files can be saved in the folder.

3.6.4 Simple Save&Recall

This function allows parameter setting conditions to be recalled with little operations.

Enabling Simple Save&Recall

<Procedure>

- 1. Press [System] to display the Configuration screen.
- 2. Press \implies to display page 2 of the Configuration function menu.
- 3. Press 📧 (Save&Recall Settings) to display the Save&Recall Settings function menu in Figure 3.6.4-1.



Figure 3.6.4-1 Save&Recall Settings function menu

Table 3.6.4-1	Save&Recall Settin	ngs function menu
---------------	--------------------	-------------------

Menu Display	Description
Save&Recall Mode	Switches the Save&Recall mode. Set the Standard mode or Simple mode. Set the Standard mode or Simple mode. 3.6.1 "Saving parameters and waveform data" 3.6.2 "Recalling parameters"
Simple Save&Recall Name	Use this item to change the parameter name (file name) to be saved from the default setting in Simple mode.

Changing the parameter name (file name) to be saved from the default setting

Pressing [2] (Simple Save&Recall Name) in Figure 3.6.4-1 displays the Simple Save&Recall Name function menu in Figure 3.6.4-2. Up to ten parameter names can be registered in Simple mode.

The default parameter names are PRM_1 to PRM_10.

To change the parameter name, press the function key to be changed.



Figure 3.6.4-2 Simple Save&Recall Name function menu

Simple Save function

Pressing Save in Simple mode displays the Simple Save function menu in Figure 3.6.4-3.



Figure 3.6.4-3 Simple Save function menu

Parameter names set with the Simple Save&Recall Name function menu are displayed on the function keys.

When the Protect of the parameter saving file has been set to On (when set to Read-only), the relevant function key is grayed out, and if it is pressed, an error message is displayed.

The last saved date and time of the parameter saving file is displayed in the second line. If the corresponding parameter saving file does not exist, "***" is displayed on the function key.

In the example in Figure 3.6.4-3, the parameter name of PRM_2 has been changed to the parameter name of PTEST. Also, PRM_3 file has been set to Read-only.

Pressing the function key stores the parameter saving file with the parameter name displayed.

\Anritsu Corporation\Signal Analyzer\User Data\Parameter Setting

The parameter settings can be saved in Standard mode on Open Save Menu.

Simple Recall function

3.6.1 "Saving parameters and waveform data"

Pressing Real in Simple mode displays the Simple Recall function menu in Figure 3.6.4-4.



Figure 3.6.4-4 Simple Recall function menu

Parameter names set with the Simple Save&Recall Name function menu are displayed on the function keys.

The last saved date and time of the parameter saving file is displayed in the second line.

Pressing the function key executes Recall of the corresponding parameter saving file.

If the corresponding parameter saving file does not exist, the function key is grayed out, and if it is pressed, an error message is displayed.

The parameter settings can be recalled in Standard mode on Open Recall Menu.

3.6.2 "Recalling parameters"

3.7 Initializing

This section describes how to initialize settings.

3.7.1 Preset

Preset is a function for initializing application settings. Configuration screen settings are not initialized using this function. Similarly, there is no effect on user data saved to the internal SSD.

<Procedure>

- 1. Press $\stackrel{\text{Preset}}{\frown}$ to display the Preset function menu.
- 2. Press [1] (Preset) to initialize only applications to be operated using the Application Switch.
- 3. Press **[5]** (Preset All Application) to initialize all loaded applications.

Table 3.7.1-1Preset function menu

Function Key	Menu Display	Function
F1	Preset	Initializes only the application subject to operation by the Application Switch.
F3	Preselector Tune Preset	Sets the preselector peaking bias value to factory default. For details, refer to the following operation manuals*.
F5	Preset All Application	Initializes all the loaded applications.
F6	Reboot	Restarts the equipment.
$\overline{F8}$	Close	Closes the current menu.

- *: MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Signal Analyzer Function Operation)
 6.7 "Setting Preselector"
 - MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation) 7.8 "Preselector Tuning"
 - MX269017A Vector Modulation Analysis Software Operation Manual (Operation)

3.2.2 "Preselector function menu"

3.7.2 System Reset

System Reset is a function for initializing all installed applications and Configuration screen settings, and deleting all user data saved to the internal SSD.

Note:

User data deleted by executing this function cannot be recovered.

<Procedure>

- 1. Press (^{System} configuration screen.
- 2. Press ^[5] (System Information) and then press → to display page 2 of the System Information function menu.
- 3. Press 🗊 (System Reset) to execute System Reset.
- 4. The MS2840A restarts automatically when System Reset is completed.

Table 3.7.2-1	System Information function menu (2/2)
---------------	--

Function Key	Menu Display	Function
Page 2	System Information	Pressing System, then F5, and then \rightarrow displays page 2 of the System Information menu.
F1	System Reset	Initializes all the installed applications and the Configuration screen settings, and erases all the user data saved on the internal SSD. Erased user data cannot be recovered.
F7	Information Save	Saves the system information.

3.8 Installing and Uninstalling

This section describes the procedure for installing application software and licenses.

3.8.1 Installing software

Preparation for installing USB flash drive

<Procedure>

- 1. Connect the USB flash drive to the PC, and then insert the installation disk.
- 2. Select MS2840A Install from Install Software on the installation menu.
- 3. Specify the root directory of the connected USB flash drive on the installation directory specification window (e.g., "E:\" when the USB flash drive is drive E).
- Click **OK** to copy the installation data into the USB flash drive. The installation data is copied into the "E:\Anritsu Corporation\Signal Analyzer\Install" folder, when the USB flash drive is drive E.

Set the same folder configuration before the installation, in order to manually install by copying a set of the installation files in the USB flash drive and drive D.

Installing software

<Procedure>

- 1. Remove the peripheral devices from the USB ports of the MS2840A, other than mouse and keyboard.
- 2. Press verter to display the Configuration screen, and then press (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.1-1 is displayed. Press [1] (Install).
- 4. The installation selection menu is displayed. Insert the USB flash drive containing the purchased software data into the USB port of the MS2840A.

Note:

Do not insert any devices other than USB flash drive to the USB ports during installation.

5. Press [F1] (Software) to display the device selection window.

- 6. Select the USB flash drive containing the software with the cursor, and then press (Set). The versions of the already installed software (Installed Applications) and of the software to install (Installation Package on XX) are displayed. They cannot be selected and installed individually.
- When pressing [1] (Install), a message box asking "Do you install the application software?" is displayed. Press Yes to start installation.
- 8. The MS2840A restarts automatically when the installation is completed.



Figure 3.8.1-1 Software Install menu

Installing software licenses

<Procedure>

- Press Statem to display the Configuration function screen, and then press F1 (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.1-2 is displayed. Press [*] (Install).
- 3. The installation selection menu is displayed. Insert the USB flash drive containing the purchased software license data into the USB port of the MS2840A.
- 4. Press [53] (Software License) to display the device selection window.
- Select the USB flash drive containing the software license with the cursor, and then press (Set). The licenses already installed (Installed Licenses) and the licenses to install (Installation Licenses on XX) are displayed. Select licenses to install.
- 6. When pressing 🗊 (Install), a message box asking "Do you install the selected application software license?" is displayed. Press Yes to start installation.
- 7. The license becomes valid when the MS2840A is restarted after installation is completed.



Figure 3.8.1-2 Software Install menu
Installing waveform pattern licenses

- 1. Press state to display the Configuration screen, and then press (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.1-3 is displayed. Press [1] (Install).
- 3. The installation selection menu is displayed. Insert the USB flash drive containing the purchased waveform pattern license data into the USB port of the MS2840A.
- 4. Press [4] (SG Wave License) to display the device selection window.
- Select the USB flash drive containing the waveform pattern license with the cursor, and then press (Set). The licenses already installed (Installed Licenses) and the licenses to install (Installation Licenses on XX) are displayed. Select licenses to install.
- 6. When pressing [1] (Install), a message box asking "Do you install the selected SG Waveform license?" is displayed. Press Yes to start installation.
- 7. The license will be valid when the MS2840A is restarted after installation is completed.



Figure 3.8.1-3 Software Install menu

3.8.2 Uninstalling software

The Install screen must be displayed in order to uninstall software or license files from the MS2840A.

Uninstalling software

- 1. Press [Software] to display the Configuration screen, and then press [F] (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.2-1 is displayed. Press [52] (Uninstall).
- 3. The installation selection menu is displayed. Press F (Software).
- 4. The installed software list screen is displayed. Select the software to be uninstalled from the installed software with the cursor.
- 5. When pressing 🗈 (Uninstall), a message box asking "Do you uninstall the selected application software?" is displayed. Press Yes to start uninstallation.



Figure 3.8.2-1 Software Install menu

- 1. Press events to display the Configuration screen, and then press (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.2-2 is displayed. Press [2] (Uninstall).
- 3. The installation selection menu is displayed. Press 📧 (Software License).
- 4. The installed software license list screen is displayed. Select the software license to be uninstalled from the installed software licenses with the cursor.
- When pressing [13] (Uninstall), a message box asking "Do you uninstall the selected application software license?" is displayed. Press Yes to start uninstallation.



Figure 3.8.2-2 Software Install menu

Chapter 3 Common Operations

Uninstalling waveform pattern licenses

- 1. Press [System] to display the Configuration screen, and then press [F1] (Software Install) from page 2 of the Configuration function menu.
- The Software Install menu shown in Figure 3.8.2-3 is displayed. Press [52] (Uninstall).
- 3. The installation selection menu is displayed. Press 🖪 (SG Wave License).
- 4. The installed waveform pattern license list screen is displayed. Select the waveform pattern license to be uninstalled from the installed waveform pattern licenses with the cursor.
- 5. When pressing (Uninstall), a message box asking "Do you uninstall the selected SG Waveform license?" is displayed. Press Yes to start uninstallation.



Figure 3.8.2-3 Software Install menu

Chapter 4 Tutorial

This chapter describes the waveform display of the signal analyzer and spectrum analyzer.

4.1	Spectrum Analysis Using Signal Analyzer	
	4.1.1 Spectrum analysis	4-2
4.2	Spectrum Analysis Using Spectrum Analyzer	4-6
	4.2.1 Spectrum Analysis	4-6

4.1 Spectrum Analysis Using Signal Analyzer

Option 006/106 is required to use the signal analyzer function.

4.1.1 Spectrum analysis

This section describes the operation procedure for displaying input signal waveforms to the application screen of the signal analyzer.



Input signal

Figure 4.1.1-1 Front panel

Example: Input Signal: Frequency: 1 GHz (CW) Level: -10 dBm

- 1. Connect the input signal to the RF Input on the front panel of the MS2840A.
- Press System then F4 (Application Switch Settings) to display the 2. Application Switch Settings menu.
- Press 🛐 (Load Application Select) to select within the "Unload 3. Applications" column of the application with the cursor. Select "Signal Analyzer" here with the cursor, and then press [57] (Set).
- Check that "Signal Analyzer" is displayed within the "Loaded 4. Applications" column then press
- 5. Pressing the function key corresponding to the Signal Analyzer from the Application Switch Settings menu displays the application main screen of the Signal Analyzer.



Figure 4.1.1-2 Application main screen

Chapter 4 Tutorial

ltem	Description
[1]	This is the main function key of the signal analyzer. Basic parameter settings of the signal analyzer are configured here. Signal Analyzer Function Operation 2.1 "Display Description"
[2]	Displays signal waveforms.
[3]	Displays the center frequency, frequency span and other frequency parameters. Signal Analyzer Function Operation 2.2 "Setting Frequency"
[4]	Displays the reference level, input attenuator value and other level parameters. Signal Analyzer Function Operation 2.3 "Setting Level"
[5]	Displays the trigger source, trigger level and other trigger parameters. Signal Analyzer Function Operation 3.2 "Trigger Function"
[6]	Displays the start frequency. Signal Analyzer Function Operation 2.2.3 "Setting start frequency"
[7]	Displays the stop frequency. Signal Analyzer Function Operation
[8]	Displays the analysis start time, analysis time span, resolution bandwidth and other Spectrum trace parameters. Signal Analyzer Function Operation 4.2.1 "What is Spectrum trace?"
[9]	Displays marker values. Signal Analyzer Function Operation 4.2.9 "Setting marker search"
[10]	This is used as an indictor expressing an analysis progression rate.

 Table 4.1.1-1
 Display items for Signal Analyzer

- 6. Frequency settings must be changed to display the input signal in the waveform display screen. Press 📑 (Frequency).
- 7. Press [1] (Center Frequency) and then enter the desired frequency using the numeric keypad. The center frequency setup window is displayed.

📰 Signal Analyzer	×
Center	Hz
1	Set Cancel

Figure 4.1.1-3 Center frequency setup window

- Enter the center frequency then select the unit, from GHz, MHz, 8. kHz, and Hz.
 - Example: To set 1 GHz for the center frequency, press 1 and then F1 (GHz).

The waveform of the input signal is now displayed on the screen (see Figure 4.1.1-4).



Figure 4.1.1-4 Waveform display using Signal Analyzer

Refer to the MS2830A/MS2840A Signal Analyzer Operation Manual (Signal Analyzer Function Operation) for how to use the Signal Analyzer.

4.2 Spectrum Analysis Using Spectrum Analyzer

4.2.1 Spectrum Analysis

This section describes the operation procedure for displaying input signal waveforms to the application screen of the spectrum analyzer.



Input signal

Figure 4.2.1-1 Front panel

Example: Input Signal: Frequency: 1 GHz (CW) Level: -10 dBm

- 1. Connect the input signal to the RF Input on the front panel of the MS2840A.
- 2. Press then (4 (Application Switch Settings) to display the Application Switch Settings menu.
- 3. Press [1] (Load Application Select) to select within the "Unload Applications" column of the application with the cursor. Select "Spectrum Analyzer" here with the cursor, and then press [7] (Set).
- 4. Check that "Spectrum Analyzer" is displayed within the "Loaded Applications" column then press Application.
- 5. Pressing the function key corresponding to the Spectrum Analyzer from the Application Switch Settings menu displays the application main screen of the Spectrum Analyzer.

The application is shipped already loaded.

The application is set to start automatically at power startup.



Figure 4.2.1-2 Application main screen

Chapter 4 Tutorial

Item	Description
[1]	This is the main function key of the spectrum analyzer. Basic parameter settings of the spectrum analyzer are configured here.
	Spectrum Analyzer Function Operation
[2]	Displays signal waveforms.
[3]	Displays the start frequency. Spectrum Analyzer Function Operation 2.3.3 "Setting start frequency"
[4]	Displays the stop frequency. Spectrum Analyzer Function Operation 2.3.4 "Setting stop frequency"
[5]	Displays trace parameters. Spectrum Analyzer Function Operation
[6]	Displays the wave detection mode status. Spectrum Analyzer Function Operation 3.1.4 "Setting wave detection mode"
[7]	Displays the resolution bandwidth, video bandwidth, input attenuator and sweep time parameters. Spectrum Analyzer Function Operation 2.4.2 "Setting input attenuator" 2.5 "Setting RBW/VBW"
[8]	Displays marker values. Spectrum Analyzer Function Operation
[9]	Displays the reference level. Spectrum Analyzer Function Operation 2.4.1 "Setting reference level"
[10]	Displays the number of trace points Spectrum Analyzer Function Operation [3.3 "Setting Time/Sweep"

 Table 4.2.1-1
 Display items for Spectrum Analyzer

- Frequency settings must be changed to display the input signal to the waveform display screen. Press [1] (Frequency).
- 7. Press [1] (Center Frequency) and then enter the desired frequency using the numeric keypad. The center frequency setup window is displayed.

🕹 Spectrum Analyzer		
Center		
	÷ Hz	
	Set	Cancel

Figure 4.2.1-3 Center frequency setup window

8. Enter the center frequency then select the unit, from GHz, MHz, kHz, and Hz.

Example: To set 1 GHz for the center frequency, press 1 and then (F1) (GHz).

- Return to the main screen of the spectrum analyzer to change frequency span. Press ().
- 10. Press 🔁 (Span). Enter the desired frequency bandwidth using the numeric keypad.
- 11. Enter the frequency bandwidth then select the unit of the value.

The waveform of the input signal is now displayed on the screen (see Figure 4.2.1-4).



Figure 4.2.1-4 Waveform display using Spectrum Analyzer

Refer to the *MS2830A/MS2840A Signal Analyzer Operation Manual* (Spectrum Analyzer Function Operation) for how to use the Spectrum Analyzer.

Chapter 4 Tutorial

Chapter 5 System

The MS2840A uses one of the following Microsoft Windows (hereinafter, referred to as "Windows") as the operating system (hereinafter, OS).

- Windows Embedded Standard 7 64 bit ver. (hereinafter, WES 7)
- Windows 10 IoT 64 bit ver. (hereinafter, Win 10)

Settings for Windows and the system can be operated by connecting a mouse and a keyboard.

This section describes how to perform operations on Windows installed to the MS2840A and general notes.

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5.1 Setting Windows

The MS2840A is set to default settings at factory shipment so as to perform optimal measurements. Changing the Windows settings without instructions is outside the scope of operation warranty. In addition, performance may drop or functions may not operate correctly when Windows settings are changed. Carefully read the general notes of this section when changes to Windows settings are required.

When the system fails to operate correctly due to Windows operation, execute system recovery functions to restore the MS2840A to its status at factory shipment. See 5.3 "System Recovery Functions" for details.



The MS2840A operations are not guaranteed when the Windows settings are changed from the default shipment status without instructions.

Installing a program not recommended or admitted by Anritsu Corporation is prohibited by the license with Microsoft. However, it is the customer's responsibility to purchase, install, and operate antivirus software.



Performing system recovery will cause software installation (including updates) after factory shipment of the MS2840A and application settings to be lost. In addition, data (measurements, parameters, etc.) recorded by the customer may be deleted depending on the method to perform system recovery.

5.1.1 Displaying Windows Desktop

Connect a mouse and a keyboard to operate Windows. Use the USB mouse included as standard equipment and a compatible keyboard (USB).

The following are methods to display the Windows desktop. To display applications of the MS2840A again, press Argunation or select an application in the Windows Taskbar.

Show Windows desktop

Mouse

- Right-click anywhere on the screen, and click the **Show the Desktop** on the displayed list to displays the Windows desktop.
- Click the "Minimize" button located in the upper right corner of the application window of the MS2840A. Minimizing all applications displays the Windows desktop.

Keyboard

Pressing the Windows logo key + D minimizes all windows and displays the Windows desktop.

Show Start button

When the OS is WES 7 or Win 10

• On the Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar. The **Start** button or **Start** icon appears on the left side of the Windows taskbar.

Show Start menu

<u>Mouse</u>

• Click the **Start** button or **Start** icon to display the start menu.

Keyboard

• Press the **Windows logo key** 于 to display the start menu.

Show Control Panel

When the OS is WES 7

• Click the **Control Panel** in the start menu.

When the OS is Win 10

• Click Windows System > Control Panel in the W column of the app list displayed.

5.1.2 Setting Control Panel

Various Windows settings can be configured using the Control Panel. The following describes general notes on each setting. Although each setting can be configured without using the Control Panel, use these within the scope of the following restrictions.

The MS2840A may not operate normally when any other Windows settings are changed from the factory defaults.

Program and Hardware

- Do not delete the installed devices or update/delete the drivers.
- The MS2840A may not operate normally due to conflicts with device drivers when new hardware is added.
- Do not update or remove programs installed at the factory.
- Anritsu does not warrant operations of the MS2840A when programs not guaranteed are installed.

Windows Update

• Automatic updating of Windows is turned off at the factory. Refer to 5.4 "Windows Security Measures" for details.

Network Connection

- TCP/IP settings may change when the MS2840A is remote-controlled through Ethernet. For details, refer to the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A* Signal Analyzer Operation Manual (Mainframe Remote Control).
- The IP address is set to use DHCP before shipment from the factory. Ensure that the network administrator settings are appropriate when connecting the MS2840A to a network.

User Account

• Automatic login with the following settings is enabled at the factory. Do not change the User Account settings shown below.

Account Name	"ANRITSU"	
Password	(None)	(WES 7)
	"ANRITSU"	(Win 10)
Account Type	Computer Ad	lministrator

• New user accounts can be created. Specify "Computer Administrator" for the account type of the user account to be created. Applications will not start up normally with user accounts created using Limited (Power User).

<u>Security</u>

- Windows Firewall setting depends on the factory shipping date as show below.
 - Shipped in or before September 2018 Off
 - Shipped in or after October 2018 On

Refer to 5.4 "Windows Security Measures" for details.

When the setting is changed from Off to On, Firewall settings are set to Off at the factory. When settings are set to On, Windows Firewall displays a dialog box asking if you want to block the applications of the MS2840A at the next startup time. Be sure to click **Unblock**.

- Antivirus software is not installed at the factory. Anritsu strongly recommends installing antivirus software when connecting the MS2840A to a network. However, the MS2840A may not be remote-controlled through Ethernet if the function blocking external communications works.
- Security warnings are not displayed by factory default.

Date & Time

- You can change the date, time and time zone.
- Internet Time is set to Off by factory default. Operations may be affected; therefore, do not change this setting.

<u>Display</u>

- This setting must be changed when using an external monitor with connected to the VGA connector of the MS2840A. Refer to Section 5.1.3 "Using external display" for details.
- Operations may be affected by changing screen resolution, refresh rate or monitor power management or turning on the screen saver.

System

- The Computer Name can be changed. The factory default name is "SN" + "Serial Number".
- Do not change Hardware or Advanced settings.
- Do not enable the System Restore. Otherwise, the MS2840A may not operate normally.

Power Option

- The settings for the Auto Power Off function (Turn off Monitor) of the display can be changed.
- The Power Off function of the SSD (Turn off Hard Disks) is disabled (Never). Do not change this setting.
- Do not change power option settings other than those described above. The MS2840A will not operate normally after recovering from hibernation.

5.1.3 Using external display

An external display can be connected to the VGA connector on the rear side of the MS2840A, to display screens of the MS2840A and show multiple displays. The following describes the operation procedure for this function.



When the OS is WES 7(Intel® Graphics and Media)

Figure 5.1.3-1 Intel[®] Graphics and Media Control Panel

- 1. Connect the display to the VGA connector on the rear of the MS2840A.
- 2. Open the Intel[®] Graphics and Media Control Panel by the following method:
 - In Control Panel of Windows, launch the Intel[®] Graphics and Media.

3. Click **Basic Mode > OK > Display > Multiple Displays**, and change settings as shown below:

When not using an external display

- Operating Mode Single Display
- Primary Display Built-in Display (MS2840A display)

When using only an external display

- Operating Mode Single Display
- Primary Display (Connected external display)

When displaying the same content on each of the MS2840A display and external display

- Operating Mode Clone Display
- Primary Device Built-in Display (MS2840A display)
- Secondary Device (Connected external display)

When displaying with the MS2840A and external display connected

- Operating Mode Extended Desktop
- Primary Device Built-in Display (MS2840A display)
- Secondary Device (Connected external display)

When the OS is WES 7 (Intel® HD Graphics)

- 1. Connect the display to the VGA connector on the rear of the MS2840A.
- 2. Open the Intel[®] HD Graphics Control Panel by the following method:
 - In Control Panel of Windows, launch the Intel[®] HD Graphics.



Figure 5.1.3-2 Intel® HD Graphics Control Panel (WES 7)



3. Click the **Display** to expand the **Display** menu and select **Multiple Displays**.

Figure 5.1.3-3 Intel® HD Graphics Control Panel (WES 7, Display)

 Click Display > Multiple Displays, and change the settings as shown below:

When not using an external display

- Select Display Mode Single
- Select Active Displays Built-in Display (MS2840A display)

When using only an external display

- Select Display Mode Single
- Select Active Displays Monitor (Connected external display)

When displaying the same content on each of the MS2840A display and external display

- Select Display Mode Clone
- Select Active Displays Built-in Display, Monitor

When displaying with the MS2840A and external display connected

- Select Display Mode Extended
- Select Active Displays (1) Built-in Display, (2) Monitor

When the OS is Win 10 Intel[®] HD Graphics Control Panel (intel) Display Select Display Mode 1 **General Settings** Arrange Displays **Color Settings** Single Display Multiple Displays Clone Display ✔ Extended Desktop **Custom Resolutions** Select One or More Active Displays Primary Display Built-in Display Digital Display Select Profile Current Settings (+)

Figure 5.1.3-4 Intel[®] HD Graphics Control Panel

<Procedure>

- 1. Connect the display to the VGA connector on the rear of MS2840A.
- 2. Open the Intel[®] HD Graphics Control Panel by the following method:
 - Display the Windows desktop, right-click an empty area on the screen, and click the **Intel® Graphics Settings** on the displayed list.
- 3. Click **Display > Multiple Displays**, and then change the settings.

When not using an external display

- Select Display Mode Single Display
- Select One or More Active Displays

Built-in Display (MS2840A display)

When using only an external display

- Select Display Mode Single Display
 - Select One or More Active Displays

(Connected external display)

When displaying the same content on each of MS2840A display and external display

- Select Display Mode Clone Displays
- Select One or More Active Displays

Built-in Display (MS2840A display) (Connected external display) When displaying with MS2840A and external display connected

- Select Display Mode Extended Desktop
- Select One or More Active Displays
 - 1. Primary Display Built-in Display (MS2840A display) 2.
 - (Connected external display)



Turning the MS2840A power On when an external display is not connected to the VGA connector initializes to mainframe display only. When continuously using an external display, it is recommended to keep the external monitor connected for use.



Do not change the resolution, refresh rate or power management settings of the mainframe monitor.

5.1.4 General notes

The MS2840A operations are guaranteed provided it is in factory default settings. The following situations may affect the MS2840A operations.

• Install software that is not factory-installed and operate it on the MS2840A.

e.g.) Install antivirus software and execute virus scan.

• Enable or operate a Windows program service that is disabled or stopped at factory.

e.g.) Transfer files by FTP while the MS2840A is running.

In addition to the above, note the below.

• The MS2840A may not work properly when the registries are changed.

5.2 Storage Device Configuration

The MS2840A has a built-in SSD for storing the operating system, application software, user data, and the like.

The SSD of the MS2840A consists of the following partitions.

Volume C: System Disk

Windows, application software and files required for operation of the MS2840A are stored. The MS2840A may not operate normally when data required for operating the MS2840A are changed or deleted. Do not operate data of this volume at normal use.

Volume D: User Disk

This volume is used mainly for inputting files to and as the output destination for the application software of the MS2840A. Adding data to this volume or deleting data on it will not affect MS2840A operations.

A USB flash drive, used for installing application software and inputting or outputting data, is included as standard equipment with the MS2840A. The USB flash drive is recognized as Drive E at factory shipment.

Note the following items when operating MS2840A:

- Do not change the partition configuration. Doing so may affect system operation.
- Do not format the SSD of the MS2840A. Besides the above, data for system recovery is stored within this SSD. Recovery may become inoperable when the SSD is formatted.
- The volumes and folders described above are not set to be shared at factory shipment. Although sharing is an effective means for transferring data to and from an external PC, be mindful of security when connecting to a network.

5.3 System Recovery Functions

The MS2840A has system recovery functions to restore data on the SSD to the factory default. These functions can be used in the event of system instability.

When the OS is WES 7

The MS2840A comes with factory-installed recovery software, Pro or Paragon Drive Backup. To start the installed recovery software, start the MS2840A, and press the **F4** on the BIOS screen.

<Procedure>

- 1. Disconnect the MS2840A from the network if connected.
- 2. Connect the keyboard and mouse to the mainframe, and then turn the MS2840A power On. The BIOS screen will appear in a few seconds after (The message "Press F2 for System Utilities" appears at the bottom part of the screen).
- 3. Press the **F4** (not an on the front panel of the mainframe) while the screen in Step 2 is displayed.
- 4. Only when the screen displays the message "Press F4 to start recovery from Backup Capsule", press the **F4** again.
- 5. According to the software instructions on the screen, perform a system recovery.

Paragon Drive Backup

Refer to Section 5.3.1 "Paragon Drive Backup".

To execute these functions, understand the following items for their use.

- All applications and updates added after factory shipment will be lost. Additionally, all data recorded to Volume C will be restored to the factory default. Backup important data before executing these functions.
- The user data area of Volume D can be restored to the factory default depending on the function to be selected. So as not to lose important user data due to incorrect operations, it is recommended to backup data in Volume D before executing these functions.
- Data deleted by these functions cannot be restored.
- The backup data is saved to an unknown partition on the Disk 0. If the unknown partition is accidentally deleted, the backup data required for system recovery is deleted as well.

When the OS is Win 10

The MS2840A has the standard Windows system recovery functions. See 5.3.2 "Windows Backup" for the system recovery procedure.



To execute these functions, understand the following items for their use.

- All applications and updates added after factory shipment will be lost. Additionally, all data recorded to Volume C and D will be restored to the factory default. Backup important data before executing these functions.
- Unlike WES 7 and the Win 10 system recovery functions cannot restore only Volume C to the factory default. Data stored on both Volume C and D will be restored to the factory default.
- Data deleted by these functions cannot be restored.

5.3.1 Paragon Drive Backup

This subsection describes how to perform a system recovery with factory-installed recovery software "Paragon Drive Backup".

Type: Partition

This function restores only Volume C, in which Windows, application software, and files required for operations of the MS2840A are stored, to the factory default.

Type: Disk

This function restores Volume C and Volume D to the factory default. Although Volume D is mainly used as a storage area for user data, all data on Volume D will be erased.

<Procedure>

1. After the screen displaying "Drive Backup" appears, the following alternatives are displayed on the screen:

Normal Mode

Safe Mode

Select Normal Mode with the arrow keys, and then press the Enter.

- 2. When the menu screen appears in about a minute, double-click **Simple Restore Wizard**.
- 3. The Paragon Simple Restore Wizard appears, so click Next.
- 4. The following alternatives are displayed on the screen:

Type: Partition

Recovers only Volume C.

Type: Disk

Recovers Volumes C and D.

Double-click either of them, and then click Next.

5. When the confirmation screen appears, click **Yes** to start a system recovery. Then, the **Progress information** screen appears, and the recovery process starts.

Do not click **Cancel** when a system recovery is in progress. Although the required time for recovery varies depending on the conditions, it normally takes between 10 and 30 minutes. The progress of recovery is shown during recovery. Although the progress indicator may close during recovery, this is a normal operation.

- 6. Upon completion of the recovery process, click **Close**. (**Close** appears after the recovery process is completed.)
- When the completion screen appears, click Finish to return to the menu screen described in Step 5. Click Reboot the computer to reboot the MS2840A, or click Power off to turn the power Off.

5.3.2 Windows Backup

This subsection describes how to perform a system recovery when the installed OS is Win 10.

<Procedure>

- 1. Disconnect the MS2840A from the network if connected.
- 2. Connect the keyboard and mouse to the mainframe, and then turn the MS2840A power On.
- 3. While the Anritsu logo is displayed, press **F8** on the keyboard.
- 4. The boot options menu is launched. Select **Repair Your computer**, and then press the **Enter**.
- 5. The Choose an option appears, select Troubleshoot, and press Enter.
- 6 The **Troubleshoot** appears, select **Advanced options**, and press **Enter**.
- 7. The **Advanced options** appears, select **System Image Recovery**, and press **Enter**.
- 8. The System Image Recover appears, select ANRITSU, and press Enter.
- 9. When you are prompted to enter a password, enter "ANRITSU", and then click **Continue**.

Note:

If you have changed the password for your user account, use the new password.

- 10. The Select a system image backup appears, select Use the latest available system image (recommended), and click Next.
- 11. The **Choose additional restore options** appears, and click **Next** without any changes.
- 12. When "Your computer will be restored from the following system image:" appears, click **Finish**.
- 13. When the confirmation screen appears, click **Yes** to start a system recovery.

The Progress bar appears, and the recovery process starts. Do not click **Stop restore** when a system recovery is in progress. Although the required time for recovery varies depending on the conditions, it normally takes between 20 and 30 minutes.

14. After the system recovery is completed, the MS2840A restarts automatically, and Windows starts.

5.4 Windows Security Measures

To apply security measures described in this section, the MS2840A must run WES 7 or Win 10.

The following options upgrade the CPU and operating system. MS2840A-182: Upgrades to Win 10.

"C2" label is affixed on the rear panel of the MS2840A that runs on Win 10.

When connecting the MS2840A to a network, make sure the network is secure and protected from viruses. Additionally, it is recommended to take the following security measures to add protection against malware (malicious software such as viruses).

- Activating firewall
- Installing important Windows update programs
- Using antivirus software

The security measure settings condition of the MS2840A can be confirmed from the Control Panel of Windows.

When the OS is WES 7

- Use the mouse to right-click anywhere on the screen, and click Show the desktop to reveal the Windows desktop.
- Move the mouse pointer to the bottom of the screen to display the Windows taskbar. Click Start > Control Panel.
- Set "View by: Category" at the upper right of the Control Panel, click System and Security > Action Center.
- 4. Click Security, and confirm security measures settings condition.

When the OS is Win 10

- 1. Use the mouse to right-click anywhere on the screen, and click **Show the desktop** to reveal the Windows desktop.
- Move the mouse pointer to the bottom of the screen to display the Windows task bar. Click the Start icon to open the Start menu, and then click Windows System > Control Panel in the W column of the app list displayed.
- 3. Set "View by: Category" at the upper right of the Control Panel, click System and Security > Security and Maintenance.
- 4. Click Security, and confirm security measures settings condition.

Note:

Security warnings are not displayed by factory default.

If the MS2840A is connected to an external network like the Internet, there may be a risk of causing unexpected problems or suffering unexpected losses. Anritsu Corporation is not responsible for any losses caused by connecting it to a network.

Adding any options or repair may restore the Windows settings to factory default settings. In this case, reinstall Windows updates, turn the firewall on again, and reinstall antivirus software.

5.4.1 Activating Firewall

It is recommended to turn On the Windows firewall on the MS2840A.

When the OS is WES 7

Windows firewall On/Off setting (WES 7):

- 1. Use the mouse to right-click anywhere on the screen, and click Show the desktop to reveal the Windows desktop.
- 2. Move the mouse pointer to the bottom of the screen to display the Windows task bar. Click Start > Control Panel.
- 3. Set "View by: Category" at the upper right of the Control Panel, click System and Security > Windows Firewall to show Windows Firewall window.

Note:

Windows firewall might be turned off by default on the MS2840A released in or before September 2018.

4. Click Turn Windows Firewall on or off found in left side of Windows Firewall display.

🏐 🕤 🗢 🔐 🕨 Control Panel 🕨	System and Security Windows Firewall	-	49	Search Con 🔎
Control Panel Home	Help protect your computer with Win	dows Firewall		6
Allow a program or feature through Windows Firewall	Windows Firewall can help prevent hackers or malicious software from gaining access to your computer through the Internet or a network.			
Change notification settings	How does a firewall help protect my computer?	How does a firewall help protect my computer?		
Turn Windows Firewall on or	ewall on or What are network locations?			
Restore defaults	Home or work (private) netw	orks Not Connected (•	
Advanced settings	Public networks	Connected	•	
I roubleshoot my network	Networks in public places such as airports or co	ffee shops		
	Windows Firewall state:	On		
	Incoming connections:	Block all connections to programs that are not on th list of allowed programs	ie	
	Active public networks:	Unidentified network		
	Notification state:	Do not notify me when Windows Firewall blocks a new program		
See also				
Action Center				
Network and Sharing Center				

Figure 5.4.1-1 Windows Firewall display

5. Customize Settings display will be shown where Windows firewall On/Off settings can be changed.

Use the MS2840A with the following checkboxes Off (unchecked).

- Block all incoming connections, including those in the list of allowed programs
- Notify me when Windows Firewall blocks a new program



Figure 5.4.1-2 Customize Settings display

Confirmation and setting of allowed programs through Windows firewall (WES 7):

Even if Windows firewall is On, in order for the MS2840A to operate properly, it is necessary to set as allowed programs those that enable external communication from the MS2840A.

Note:

The factory default setting for allowed programs might not be set properly on the MS2840A released in or before September 2018.

1. Use the mouse to click **Allow a program or feature through Windows Firewall** found in left side of Windows Firewall display.



Figure 5.4.1-3 Windows Firewall display

2. Allowed Programs display will be shown where programs allowed through Windows firewall can be confirmed.

Confirm if **MS269xAAppMgr** is found and set to On (checked) under **Allowed programs and features**.

When no such information is displayed, it is necessary to add **MS269xAAppMgr**.



Figure 5.4.1-4 Allowed Programs display
Procedure to add MS269xA AppMgr when it is not registered (WES 7):

1. Use the mouse to click **Allow another program...** found in Allowed Programs display.



Figure 5.4.1-5 Allowed Programs display

2. Click Browse... to show Browse display of Add a Program.



Figure 5.4.1-6 Add a Program display

3. Browse display of Add a Program is shown.

Select C:\Anritsu\Signal Analyzer\Applications\AppMgr.exe, and click **Open**.

👷 Browse 🔀 🔀				
😋 🕞 🗸 🖌 Anritsu 🗸	Signal Analyzer 🝷 Applications 👻 🛛 👻	Search Applications	2	
Organize 🔻 New folder		8== -		
👉 Eavorites	Name ^	Date modified	Туре 🔺	
E Desktop	uireless Network Device Common	12/25/2017 2:17 PM	File folder	
🐌 Downloads	ULAN Common	2/26/2018 9:44 PM	File folder	
🔛 Recent Places	AMA	2/26/2018 9:15 PM	Applicatic	
	AppMgr	2/26/2018 8:37 PM	Applicatio	
Cibraries	Base5G	2/26/2018 9:22 PM	Applicatic	
Pictures	BerTester	2/26/2018 9:01 PM	Applicatic	
Videos	3 BootLoaderService	10/4/2017 8:22 PM	Applicatic	
	🔀 CDMA2000 Forwardlink	2/26/2018 9:11 PM	Applicatic	
👰 Computer	7 DSRC	10/29/2017 9:19 PM	Applicatic	
🔃 System Disk (C:)	M EVDO Forwardlink	2/26/2018 9:12 PM	Applicatic	
📷 SSD (D:)	55 GSM	2/26/2018 9:08 PM	Applicatic	
Constanting of the second	ST ISDBT	10/29/2017 9:33 PM	Applicatic	
Network	1			
File r	ame: AppMgr	Applications (*.exe;*.com	;*.icd) 🔻	
		Open C	ancel	

Figure 5.4.1-7 Browse display of Add a Program

4. In Add a Program display, select MS269xA AppMgr, and click Add.

Add a Program	×
Select the program you want to add, or click Browse to find one that is not listed, and then click OK.	
Programs:	
🚡 Create a System Repair Disc	1
SIntel® Management and Security Status	
🔁 Intel® Rapid Storage Technology	
MS269xA AppMgr	
Path: C:\Anritsu\Signal Analyzer\Applications\AppM Browse	
What are the risks of unblocking a program? You can choose which network location types to add this program to.	
Network location types Add Cancel	

Figure 5.4.1-8 Add a Program display

5. **MS269xAAppMgr** is added to **Allowed programs and features**. Confirm if **MS269xAAppMgr** is found and set to On (checked).



Figure 5.4.1-9 Allowed Programs display

When the OS is Win 10

Windows firewall On/Off setting (Win 10)

- 1. Use the mouse to right-click anywhere on the screen, and click **Show the desktop** to reveal the Windows desktop.
- Move the mouse pointer to the bottom of the screen to display the Windows task bar. Click the Start icon to open the Start menu, and then click Windows System > Control Panel in the W column of the app list displayed.
- Set "View by: Category" at the upper right of the Control Panel, click System and Security > Windows Defender Firewall to show Windows Defender Firewall window.

Note:

Windows firewall is on by factory default.

4. Click **Turn Windows Defender Firewall on or off** found in the left side of Windows Defender Firewall window.



Figure 5.4.1-10 Windows Defender Firewall Window

5. Customize Settings window will be shown where Windows firewall On/Off settings can be changed.

Use the MS2840A with the following checkboxes Off (unchecked).

- Block all incoming connections, including those in the list of allowed apps
- Notify me when Windows Firewall blocks a new app



Figure 5.4.1-11 Customize Settings Window

<u>Confirmation and setting of allowed programs through Windows firewall (Win 10)</u> Even if Windows firewall is On, in order for the MS2840A to operate properly, it is necessary to set as allowed programs those that enable external communication from the MS2840A.

1. Use the mouse to click Allow an app or feature through Windows Defender Firewall found in left side of Windows Defender Firewall window.

<i>_</i>	Windows Defender Firewall			-	Ø	×
-	🗧 🚽 👻 🛧 🍘 > Control Panel -> All Control Panel Items -> Windows Defender Firewall			~ ⋷	Search C	o ,P
	Control Panel Home	Help protect your PC with Window	ws Defender Firewall			
	Allow an app or feature through Windows Defender	Windows Defender Firewall can help preven through the Internet or a network.	t hackers or malicious software from gaining access to your PC			
-	Firewall	Private networks	Not connected 😔			
•	Change notification settings Turn Windows Defender Firewall on or off	Guest or public networks	Connected 🔗			
4	Restore defaults	Networks in public places such as airports	or coffee shops			
9	Advanced settings	Windows Defender Firewall state:	On			
	Troubleshoot my network	Incoming connections:	Block all connections to apps that are not on the list of allowed apps			
		Active public networks:	None			
		Notification state:	Notify me when Windows Defender Firewall blocks a new app			
	See also					
	Security and Maintenance					
	Network and Sharing Center					

Figure 5.4.1-12 Windows Defender Firewall Window

2. Allowed apps window will be shown where programs allowed through Windows firewall can be confirmed.

Confirm if **MS269xAAppMgr** is found and set to On (checked) under **Allowed apps and features**.

When no such information is displayed, it is necessary to add **MS269xAAppMgr**.



Figure 5.4.1-13 Allowed apps Window

Procedure to add MS269xA AppMgr when it is not registered (Win 10)

1. Use the mouse to click **Allow another app...** found in Allowed apps window.



Figure 5.4.1-14 Allowed apps Window

2. Add an app window is shown. Click Browse....

Add an app	×
Select the app you want to add, or click Browse to find one that is not listed, and then click OK.	
Apps:	
P <u>a</u> th: <u>B</u> rowse.	
What are the risks of unblocking an app?	
You can choose which network types to add this app to.	
Network types Add Cance	I

Figure 5.4.1-15 Add an app Window

 Browse window of Add an app is shown. Select C:\Anritsu\Signal Analyzer\Applications\AppMgr.exe, and click Open.

P Browse						×
← → ヾ ↑ <mark> </mark> «	< Loca	al Disk (C:) > Anritsu > Signal Analyzer	> Applications > 🗸 🗸	Ö Search App	lications ,	P
Organize 👻 New	folder					?
MS269xA	^	Name Avive Lommon	Date modified	Type	Size	
network		W-CDMA BS Common	4/18/2019 9:23 AM	File folder		
		WCDMA Downlink Common	4/18/2019 9:23 AM	File folder File folder		
Inis PC 3D Objects		WLAN Common	4/18/2019 9:23 AM	File folder		
Desktop		XG-PHS Common	4/18/2019 9:23 AM	File folder	1 260 VD	
🔮 Documents	11	Base5G.exe	2/12/2019 10:47 PM	Application	24 KB	
Downloads		BasebandInterface.exe	7/17/2014 1:00 PM	Application	24 KB	
Pictures		S& BootLoaderService.exe	10/21/2014 7:57 PM	Application Application	32 KB 60 KB	
🚆 Videos		CDMA2000 Forwardlink.exe	2/12/2019 11:02 PM	Application	24 KB	
🚛 Local Disk (C:)	~	DSRC.exe	2/12/2019 10:58 PM	Application	24 KB	
F	ile <u>n</u> ar	ne: AppMgr.exe		 Application 	ns (*.exe;*.com;*.icd)	~
				<u>O</u> pen	Cancel	٦

Figure 5.4.1-16 Browse Window of Add an app

4. In Add an app window select MS269xAAppMgr, and click Add.

Add an app		×
Select the ap listed, and th	p you want to add, or click Browse to find one that is not en click OK.	
Agps:		
MS269×	A AppMgr	
P <u>a</u> th:	C:\Anritsu\Signal Analyzer\Applications\AppM	
What are the	risks of unblocking an app?	
You can choos	e which network types to add this app to.	
Networ	k types Add Cance	1

Figure 5.4.1-17 Add an app Window

- 🗆 🗙 Allowed apps ← $ightarrow \uparrow \,
ho
ho$ Sontrol Panel » All Control Panel Items » Windows Defender Firewall » Allowed apps v Ö Search Co... 🔎 Allow apps to communicate through Windows Defender Firewall To add, change, or remove allowed apps and ports, click Change settings. What are the risks of allowing an app to communicate? Change settings Allowed apps and features: Anoved 5, Name Key Management Service Ø mDNS Media Center Extenders Ø Microsoft Content Microsoft family Features Ø MS269xA AppMor Public MS269xA AppMgr Mstarator QuickStart Netlogon Service Vetwork Discovery Performance Logs and Alerts Proximity Sharing Remote Assistance 9 0 9 9 9 Details... Re<u>m</u>ove Allow another app... OK Cancel

Confirm if MS269xA AppMgr is found and set to On (checked).

5. MS269xAAppMgr is added to Allowed apps and features.

Figure 5.4.1-18 Allowed apps Window

5 System

5.4.2 Installing Important Windows Update Programs (Windows Update)

It is necessary to regularly check for important Windows update programs and keep Windows up-to-date. However, the performance of the MS2840A could decrease while downloading and installing Windows updates. Turn off automatic updates in Windows. Instead, it is recommended to manually check for, download, and install new updates on a periodic basis, avoiding the operating hours of the MS2840A.

When the OS is WES 7

Windows Update setting and execution (WES 7):

- Use the mouse to right-click anywhere on the screen, and click Show the desktop to reveal the Windows desktop.
- 2. Move the mouse pointer to the bottom of the screen to display the Windows task bar. Click **Start > Control Panel**.
- Set "View by: Category" at the upper right of the Control Panel, click System and Security > Windows Update to show Windows Update display.
- 4. To turn off automatic updates, click **Change settings** found in left side of Windows Update display.



Figure 5.4.2-1 Windows Update display

5. Select [Never check for updates (not recommended)] in Important updates, then click **OK**.



Figure 5.4.2-2 Change settings display

 To check for newly available update programs (manual update), click Check for updates in Windows Update display.



Figure 5.4.2-3 Windows Update display (manual update)

7. When a new update program is found, download and install following the displayed instructions.

System

- 8. After Windows Update, if you are prompted to restart, shut down the MS2840A by pressing the Power button* and power it on by pressing the Power button again. "Restart" in the message does not mean "Restart Windows".
 - *: Do not hold down the Power button when shutting down.



Figure 5.4.2-4 Windows Update display (Restart now)

When the OS is Win 10

Windows Update setting and execution (Win 10)

- 1. Use the mouse to right-click anywhere on the screen, and click **Show the desktop** to reveal the Windows desktop.
- 2. Move the mouse pointer to the bottom of the screen to display the Windows task bar. Click the **Start** icon to open the Start menu, and then click **Settings** icon.
- 3. Click Update and Security to show Windows Update window.
- 4. To turn off automatic updates, select **Windows Update** found in left side of Windows Update window, and then click **Advanced options**.



Figure 5.4.2-5 Windows Update Window

5. Advanced options window will be shown.

Confirm if Automatically download updates. even over metered data connections (charges may apply) is set to Off.

← Settings	-	٥	×
Update options			^
Give me updates for other Microsoft products when I update Windows.			
Automatically download updates, even over metered data connections (charges may apply) Off			l
Update notifications			
Show a notification when your PC requires a restart to finish updating Off Off			
Pause updates			
Temporarily pause updates from being installed on this device for up to 35 days. When updates resume, this device will need to get th it can be paused again.	ie latest upda	tes befor	re
● Off			
Pausing now will pause updates until 6/11/2019.			
Figure 5.4.2-6 Advanced options Window			

 To check for newly available update programs (manual update), click Check for updates in Windows Update window.

← Settings	
命 Home	Windows Update
Find a setting	You're up to date Last checked: 2/25/2019, 2:06 PM
Update & Security	Check for updates
C Windows Update	Change active hours
凸 Delivery Optimization	View update history
Windows Security	Advanced options
T Backup	
Troubleshoot	Looking for info on the latest updates? Learn more
S Recovery	Related links
O Activation	Check Storage
泴 Find my device	OS build info

Figure 5.4.2-7 Windows Update Window (manual update)

- 7. When a new update program is found, download and install following the displayed instructions.
- 8. After Windows Update, if you are prompted to restart, shut down the MS2840A by pressing the Power button* and power it on by pressing the Power button again. "Restart" in the message does not mean "Restart Windows".
 - *: Do not hold down the Power button when shutting down.

5.4.3 Using Antivirus Software

It is recommended to install antivirus software on the MS2840A. However, if the antivirus software updates virus definition data automatically or runs full scan in the background, the performance of the MS2840A could decrease. Do not allow the software to execute them. Instead, it is recommended to manually run them on a periodic basis, avoiding the operating hours of the MS2840A.

The antivirus software that checked operation in the MS2840A is shown below.

• Trend Micro OfficeScan XG

Note:

Refer to the antivirus software operation manual for its installation and operation procedures. It is confirmed that no negative effects in the general usage of the MS2840A are caused by using the software mentioned above, however, we do not guarantee the behavior of all functions of this antivirus software and other software containing similar functions. Chapter 5 System

Chapter 6 Performance Test

This chapter describes measurement devices, setup methods, and performance test procedures required for performing performance tests as preventive maintenance of the MS2840A.

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6.1 Overview of Performance Test

6.1.1 Performance test

Performance tests are performed as part of preventive maintenance in order to prevent the performance of the MS2840A from being degraded before it occurs.

Use performance tests when required for acceptance inspection, routine inspection and performance verification after repairs. Perform items deemed critical at regular intervals as preventive maintenance. Perform the following performance tests for acceptance inspection, routine inspection and performance verification after repairs of the MS2840A.

- Display frequency accuracy
- Frequency span display accuracy
- Single sideband noise level
- RF frequency characteristics
- Display average noise level
- Second harmonic wave distortion

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

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

6.1.2 Performance test items and instruments used

Table 6.1.2-1 lists measuring instruments used or performance tests.

Test Items	Required Performance	Name of Recommended Device (Model Name)
Dianlas fragmanas accuracy	•Frequency range: 500 MHz to 31 GHz 1 Hz resolution available	Signal generator (MG3691C/94C)
Display frequency accuracy	• Output level range: –20 to 0 dBm 0.1 dB resolution available	With Option 004 or 005
Frequency span display	• Frequency range: 300 MHz to 40 GHz 1 Hz resolution available	Signal generator (MG3691C/94C)
accuracy	• Output level range: –20 to 0 dBm 0.1 dB resolution available	With Option 004 or 005
	• Frequency range: 1 GHz, 1 MHz offset 1 Hz resolution available	Signal generator (HP8665B Equivalent)
	• Output level range: –10 to 10 dBm 0.1 dB resolution available	
Cingle sidebourd units lowel	• SSB phase noise: –130 dBc/Hz or less (at 10 kHz offset)	
Single sideband noise level	• SSB phase noise: –130 dBc/Hz or less (at 100 kHz offset)	
	• SSB phase noise: –150 dBc/Hz or less (at 1 MHz offset)	
	• External reference input: (10 MHz) available	

Table 6.1.2-1 l	List of measuring instruments for performance test
-----------------	--

Performance Test

Chapter 6 Performance Test

Test Items	Required Performance	Name of Recommended Device (Model Name)
	 Frequency range: 10 MHz to 40 GHz 1 Hz resolution available Output level range: -20 to 0 dBm 	Signal generator (MG3710A) 6 GHz or less
RF frequency characteristics	0.1 dB resolution available	Signal generator (MG3694C) 6 GHz or more
	 Frequency range: 10 MHz to 40 GHz Measurement power range -67 to +20 	Power meter (ML2488B)
	dBm • Mainframe accuracy ±0.02 dB	Power sensor (MA2444D)
	 Frequency range: DC to 44.5 GHz VSWR: 1.2 or less 50 Q 	MS2840A-040/041/044 Standard terminator (28N50-2)
Display average noise level		MS2840A-046 Standard terminator (28K50)
	 Frequency range: 10 MHz to 22.25 GHz External reference input: (10 MHz) 	Signal generator (MG3710A) 6 GHz or less
Coord house or is more	 available Second harmonic wave: -30 dBc or less At 2x frequency of SC output: 	Signal generator (MG3694C) 6 GHz or more
Second harmonic wave distortion	Loss < 40 dB (LPF)	Low pass filter SLP-50+ : fc=55 MHz VLF-400 (+) : fc=560 MHz VLF-2250 (+) : fc=2575 MHz VLF-3000+ : fc=3600 MHz VLF-6000(+) : fc=6800 MHz VLF-6700+ : fc=7600 MHz

Table 6.1.2-1 List of measuring instruments for performance test (Cont'd)

6.2 Performance Test Items

Warm up the subject testing device and measuring instruments for at least 30 minutes except where directed, in order to stabilize them sufficiently before running performance tests. Demonstrating maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures, little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity or other problems.



Figure 6.2-1 Performance test

6.2.1 Display frequency accuracy

The known frequency which is the reference for the display frequency, is added to the MS2840A as shown in (3) then the center frequency and frequency span are set from the front panel. The difference between the read value of the marker display frequency (bold arrow in figure below) of the spectrum peak point and the setting value of the center frequency (same value as known reference frequency) is measured at this time.

The Swept Frequency Synthesizer uses the signal source phase-locked using the same accuracy as the 10 MHz reference oscillator of the MS2840A.

(1) Test target standards

MS2840A

- Display frequency accuracy:
 - \pm [Display frequency \times Reference frequency accuracy
 - + Span frequency \times Span accuracy + RBW \times 0.05
 - + $2 \times N$ + Span Frequency/(No. of trace points 1)] Hz
 - N indicates the mixing order (Refer to Table 1.3.1-1).

(2) Measuring instrument for tests

• Signal generator (MG3691C/94C)





Figure 6.2.1-1 Display frequency accuracy test

(4)	Notes	on	test
-----	-------	----	------

Set the output level of the MG3691C/94C to -20 to -10 dBm

- (5) Test procedure
- 1. Press for the MS2840A, and then select the Spectrum Analyzer.
- 2. Press $\stackrel{\text{Preset}}{\frown}$ of the MS2840A.
- 3. Press F1 (Preset) to perform Preset.
- 4. Press Frequency of the MS2840A to display the Frequency function menu.
- 5. Set the output frequency of the MG3691C/94C to the center frequency (500 MHz) shown in the Display Frequency Accuracy table of Appendix A.
- 6. Set the center frequency shown in the Display Frequency Accuracy table of Appendix A to the MS2840A.
- Set the frequency span (10 kHz) and the resolution bandwidth (300 Hz) corresponding to the center frequency (500 MHz) shown in the Display Frequency Accuracy table of Appendix A to the MS2840A.
- 8. Read the marker frequency value (MKR value) shown on the screen, then check whether this value is within the range of the maximum value and minimum value in the specified range shown in the Display Frequency Accuracy table of Appendix A.
- 9. Repeat Steps 5 to 8 for the center frequency and frequency span according to the center frequency and frequency span combination shown in the Display Frequency Accuracy table of Appendix A.

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Chapter 6 Performance Test

6.2.2 Frequency span display accuracy

Set to the signal generator the frequencies of the first div and ninth div from the left edge of the screen as shown in (3), and read their frequency difference to obtain the span accuracy.

- (1) Test target standards
- MS2840A
- Frequency span accuracy: ± 0.2 %
- (2) Measuring instrument for tests
 - Signal generator (MG3691C/94C)

(3) Setup



Figure 6.2.2-1 Frequency span display accuracy test

(4) Notes on test

Although the output level of the MG3691C/94C is not specified, set normally to -10 to 0 dBm.

(5) Test procedure

- 1. Press Argination of the MS2840A, and then select the Spectrum Analyzer.
- 2. Press $\stackrel{\text{Preset}}{\longrightarrow}$ of the MS2840A.
- 3. Press F (Preset) to perform Preset.
- 4. Connect the output of the MG3691C/94C to the RF input of the MS2840A.
- Set the frequency span (10 kHz) and center frequency (1.8 GHz) of the MS2840A from the Frequency Span Display Accuracy table of Appendix A.
- Set the output frequency of the MG3691C/94C to the frequency (1799.996 MHz) for f1 shown in the Frequency Span Display Accuracy table of Appendix A.
- 7. Measure the spectrum waveform peak frequency by using the marker function of the MS2840A. This frequency is set to f₁'.
- Set to the frequency of output frequency f₂ of the MG3691C/94C (1800.004 MHz), and then measure the spectrum waveform peak frequency by using the marker function. This frequency is set to f₂'.
- 9. Calculate $(f_2' f_1')/0.8$ /SPAN × 100 100 [%] then check whether it satisfies the specified range (minimum value to maximum value) shown in the Frequency Span Display Accuracy table of Appendix A.
- 10. Repeat Steps 5 to 9 for each frequency span of the center frequency shown in the Frequency Span Display Accuracy table of Appendix A.

6.2.3 Single sideband noise level

Set the resolution bandwidth to a specific value then input a signal with a single sideband noise level far smaller than the subject test device. Test how far the dB drops from the peak point for a noise level which is distanced by a specific frequency from the spectrum waveform peak point at this time.





(1) Test target standards

• Single sideband noise: At 18 to 28 °C, Spectrum analyzer function

- \leq –123 dBc/Hz (Frequency 1000 MHz, 10 kHz Offset)
- ≤ -123 dBc/Hz (Frequency 1000 MHz, 100 kHz Offset)
- ≤ -135 dBc/Hz (Frequency 1000 MHz, 1 MHz Offset)

With MS2840A-066/166, and MS2840A-066/166 active,

SPAN \leq 1 MHz when Spectrum analyzer function:

- \leq -122 dBc/Hz (Frequency 500 MHz, 1 kHz Offset)
- ≤ –133 dBc/Hz (Frequency 500 MHz, 10 kHz Offset)
- ≤ –133 dBc/Hz (Frequency 500 MHz, 100 kHz Offset)

(2) Measuring instrument for tests

• Signal generator (HP8665B Equivalent)

(3) Setup





(4) Notes on test					
	Perform the test at an ambient temperature of 18 to 28 $^{\circ}\mathrm{C}$ and after				
	warming up for at least 30 minutes.				
(5) Test procedure					
(0)	1.	Start the application Spectr	um Analyzer of the MS2840A.		
	2.	Press			
	3.	Press (Preset).			
	4.	Press $\overset{\text{Cal}}{\longrightarrow}$ and then (F1) (SIGANA All).			
	5.	Set 500 MHz, 0 dBm for the HP8665B.			
	6.	Set as follows for the MS2840A:			
		Reference level	0 dBm		
		Attenuator	0 dB		
		Center Frequency	1000 MHz		
		VBW mode	Power		
		Det mode	Sample		
		Auto Sweep Time Select	Normal		
		Auto Swp Type Rules	Swept Only		
		Trace points	1001		
		Marker Zone Width	100 Hz		
	7.	Set the following parameters according to the offset frequency (1 kHz) of the table "Single Sideband Noise Level" in Appendix A.			
		Span Frequency	$25 \mathrm{~kHz}$		
		RBW	1 kHz		
		VBW	1 Hz		

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8.	Set Marker to Normal and M	Iarker Result to Peak.		
9.	Set the center frequency of t adjust the HP8665B output MS2840A is 0 dBm±0.06 dB.	he Marker zone to 1000 MHz, and level so that the input level to the		
10.	After setting Marker to Delta, set Marker Result to Density.			
11.	Shift the center frequency of the Marker zone by -10 kHz and measure the single sideband noise level [p1] dBc/Hz.			
12.	Set the following parameters kHz) of the table "Single Sid Span Frequency RBW VBW	s according to the offset frequency (100 eband Noise Level" in Appendix A. 250 kHz 10 kHz 3 Hz		
13.	Set Marker to Normal and M 9 and 10.	Iarker Result to Peak, and perform Step		
14.	Shift the center frequency of measure the single sideband	f the Marker zone by –100 kHz and l noise level [p2] dBc/Hz.		
15.	Set the following parameters MHz) of the table "Single Sid Span Frequency RBW VBW	s according to the offset frequency (1 deband Noise Level" in Appendix A. 5 MHz 100 kHz 3 Hz		
16.	Set Marker to Normal, Mark and 10.	xer Result to Peak, and perform Step 9		
17.	Shift the center frequency of	f the Marker zone by –1 MHz and		

measure the single sideband noise level [p2] dBc/Hz.

6.2.4 RF frequency characteristics

Even if multiple signals with different frequencies and the same amplitude are input to a spectrum analyzer, the amplitude of each spectrum must be displayed equally on the screen. This section describes how to obtain the level deviation of the frequency for each band by inputting calibrated signals from an external device.

(1) Test target standards

• RF frequency characteristics

After CAL execution, 18 to 28 °C, input attenuator = 10 dB, Frequency Band Mode: Normal

MS2840A

With MS2840A-040/041 installed,

Without MS2840A-008/108 or with Preamplifier turned off,

and without MS2840A-066/166 or with Preamplifier turned off:

```
\pm 1.0 \text{ dB}
   (9 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})
   \pm 0.35 \text{ dB}
   (300 \text{ kHz} \le \text{frequency} < 50 \text{ MHz})
   \pm 0.35 \text{ dB}
   (50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
   (50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)
   \pm 1.50 \text{ dB}
   (4 GHz \leq frequency \leq 6 GHz, Frequency Band Mode: Normal)
   (3.5 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}: \text{Spurious})
With MS2840A-008/108 and Preamplifier turned on,
and without MS2840A-066/166 or with Preamplifier turned off:
   \pm 1.0 \text{ dB}
   (100 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})
   ±0.65 dB
   (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
```

(300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±1.8 dB

(4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious) With MS2840A-044/046 installed, Without MS2840A-008/108/068/168/069/169, or with Preamplifier turned off, Without MS2840A-067/167 or with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done: $\pm 1.0 \text{ dB}$ $(9 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})$ $\pm 0.35 \text{ dB}$ $(300 \text{ kHz} \le \text{frequency} < 50 \text{ MHz})$ ±0.35 dB (50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) $\pm 1.50 \text{ dB}$ $(4 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}; \text{Normal})$ $(3.5 \text{ GHz} \leq \text{frequency} \leq 4 \text{ GHz}, \text{ Frequency Band Mode}; \text{ Spurious})$ ±1.50 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) $(4 \text{ GHz} < \text{frequency} \le 13.8 \text{ GHz}, \text{ Frequency Band Mode}: \text{Spurious})$ $\pm 2.50 \text{ dB}$ $(13.8 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$ $\pm 2.50 \text{ dB}$ $(26.5 \text{ GHz} < \text{frequency} \le 40 \text{ GHz})$ With MS2840A-008/108 and Preamplifier turned on: ±1.0 dB $(100 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})$ ±0.65 dB (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) $\pm 1.8 \text{ dB}$ (4 GHz \leq frequency \leq 6 GHz, Frequency Band Mode: Normal) $(3.5 \text{ GHz} \le \text{frequency} \le 6 \text{ GHz}, \text{Frequency Band Mode}: \text{Spurious})$ With MS2840A-068/168/069/169, with Preamplifier turned on, Without MS2840A-067/167 or with Microwave Preselector Bypassturned off and after Preselector Auto Tune is done: $\pm 1.0 \text{ dB}$ $(100 \text{ kHz} \le \text{frequency} < 300 \text{ kHz})$ $\pm 0.65 \text{ dB}$ (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) $\pm 1.8 \text{ dB}$ (4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) $(3.5 \text{ GHz} \le \text{frequency} \le 13.8 \text{ GHz}, \text{Frequency Band Mode}: \text{Spurious})$ $\pm 2.50 \text{ dB}$ $(13.8 \text{ GHz} < \text{frequency} \le 26.5 \text{ GHz})$ ±3.50 dB $(26.5 \text{ GHz} < \text{frequency} \le 40 \text{ GHz})$



Figure 6.2.4-1 RF frequency characteristics test

(4) Notes on test

Perform the test at an ambient temperature of 18 to 28 °C and after warming up for at least 30 minutes.

Regarding the cable, attenuator, and conversion adapter, the applied parts below are recommended.

Cable:	J0912 Coaxial cord (for 40 GHz)
Attenuator:	41KC-3 Fixed Attenuator, 3 dB
Conversion adapter:	J1398A N-SMA ADAPTOR

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(5) Test procedure					
	(a)	Cal	ibrating the MG3	8710A	(MG3691C/94C) output level
		1.	Set the MG371	0A (M	G3691C/94C) as follows:
			OUTPUT FRE	\mathbf{Q}	10 MHz
			OUTPUT LEV	EL	-4 dBm
		2.	Connect the M	G3710	A (MG3691C/94C) output to the power
			sensor of the p	ower n	neter via the coaxial cable.
		3.	Check the pow	er met	er display.
		4.	Change the out to the center fr Characteristics using the powe becomes -10 dl the MG3710A (calibration val	tput fr requen s table er mete Bm ±0 (MG36 lue) or	requency of the MG3710A (MG3691C/94C) cy shown in the RF Frequency of Appendix A. Perform calibration by er so that the signal level at each frequency .06 dB, and then read the setting value on G91C/94C) and the indicated value in the power meter.
	(b)	Me	asuring RF frequ	iency c	haracteristics
		1.	Connect the M	G3710	A (MG3691C/94C) RF output to the RF
			input of the MS	S28404	A using the coaxial cable.
		2.	Start the appli	cation	Spectrum Analyzer of the $MS2840A$.
		3.	Press $\stackrel{\text{\tiny Preset}}{=}$ of the	he MS	2840A.
		4.	Press F1 (Pre	eset).	
		5.	Press $\overset{Cal}{\longrightarrow}$ and	then	[f] (SIGANA All).
		6.	Set as follows f	for the	MS2840A:
			Center Freq		10 MHz
			Span		0 Hz
			ATT		10 dB
			Reference Leve	el	-10 dBm
			RBW		100 Hz
			Sweep Time		50 ms
			Trace Point		1001
			Det Mode		RMS
		7.	Output the sign (MG3691C/940	nal (ca C) calib	llibration value) of the MG3710A orated in Step (a) 4 to the MS2840A.
		8.	Using the burst average measurement function, set the		
			following para	meters	s and measure the level.
			Start Time	$5 \mathrm{ms}$	
			Stop Time	45 ms	3

9.	Repeat the measurement, changing the frequency as shown in the RF Frequency Characteristics table of Appendix A.
10.	Calculate the RF frequency characteristics, using the calibration value of the MG3710A (MG3691C/94C) and the indicated value on the MS2840A. RF frequency characteristics = Indicated value on MS2840A – calibration value (indicated value on power meter)
11.	Set this instrument shown as below, only when Preamplifier option is installed:
	In the same way as shown in (a) Calibrating the MG3710A (MG3691C/94C) output level, perform calibration by using the power meter so that the signal level at each frequency becomes $-30 \text{ dBm} \pm 0.06 \text{ dB}.$
12.	Press Amplitude to display the amplitude menu, and then press (Pre-amp) to set the pre-amplitude settings to On.

Calculate RF frequency characteristic, according to steps 8 and 9.

Center Freq	$50 \mathrm{~MHz}$
Span	$0~{\rm Hz}$
ATT	10 dB
Reference Level	-30 dBm
RBW	$100 \mathrm{~Hz}$
Sweep Time	$50 \mathrm{ms}$
Trace Point	1001
Det Mode	RMS

6.2.5 Display average noise level

Internal noise evenly distributed in proportion to the resolution bandwidth across the entire measurement frequency band is referred to as the display average noise level.

(1) Test target standards

• Display average noise level: Spectrum analyzer function VBW = 1 Hz (Video Average), detection mode: Sample, input attenuator 0 dB, at 18 to 28 °C, Frequency Band Mode: Normal.

MS2840A

With MS2840A-040/041 installed,

Without MS2840A-066/166,

and without MS2840A-008/108 or with Preamplifier turned off:

- \leq –120 dBm/Hz (9 kHz \leq frequency < 100 kHz)
- \leq –134 dBm/Hz (100 kHz \leq frequency < 1 MHz)
- \leq -144 dBm/Hz (1 MHz \leq frequency < 10 MHz)
- \leq –150 dBm/Hz (10 MHz \leq frequency < 30 MHz)
- \leq -153 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq –151 dBm/Hz (1 GHz \leq frequency < 2.4 GHz)

 $\leq -149~dBm/Hz~(2.4~GHz \leq frequency \leq 3.5~GHz)$

MS2840A-041 installed,

 ≤ -146 dBm/Hz (3.5 GHz < frequency ≤ 6 GHz)

Without MS2840A-066/166,

with MS2840A-008/108, and Preamplifier turned on:

- \leq -156 dBm/Hz (1 MHz)
- \leq –166 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -165 dBm/Hz (1 GHz \leq frequency < 2 GHz)

 \leq -164 dBm/Hz (2 GHz \leq frequency \leq 3.5 GHz) MS2840A-041 installed,

 \leq -161 dBm/Hz (3.5 GHz < frequency \leq 4 GHz) MS2840A-041 installed

 \leq -161 dBm/Hz (4 GHz < frequency \leq 6 GHz)

With MS2840A-066/166,

and without MS2840A-008/108 or with Preamplifier turned off:

- \leq -120 dBm/Hz (9 kHz \leq frequency < 100 kHz)
- \leq -133 dBm/Hz (100 kHz \leq frequency < 1 MHz)
- \leq -143 dBm/Hz (1 MHz \leq frequency < 10 MHz)
- \leq -149 dBm/Hz (10 MHz \leq frequency < 30 MHz)
- \leq –152 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -150 dBm/Hz (1 GHz \leq frequency < 2.4 GHz)
- \leq -147 dBm/Hz (2.4 GHz \leq frequency < 3.5 GHz)

With MS2840A-041 installed:

 \leq -144 dBm/Hz (3.5 GHz < frequency \leq 6 GHz)

With MS2840A-066/166, with MS2840A-066/166 turned off, with MS2840A-008/108, and Preamplifier turned on:

 \leq -155 dBm/Hz (1 MHz)

- \leq -165 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -164 dBm/Hz (1 GHz \leq frequency < 2 GHz)
- \leq -162 dBm/Hz (2 GHz \leq frequency < 3.5 GHz)

With MS2840A-041 installed,

 \leq -158 dBm/Hz (3.5 GHz < frequency \leq 4 GHz)

With MS2840A-041 installed,

 \leq -158 dBm/Hz (4 GHz < frequency \leq 6 GHz)

With MS2840A-044/046 installed,

Without MS2840A-067/167/068/168/069/169:

- \leq -120 dBm/Hz (9 kHz \leq frequency < 100 kHz)
- \leq -134 dBm/Hz (100 kHz \leq frequency < 1 MHz)
- $\leq -144 \text{ dBm/Hz} (1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz})$
- $\leq -150 \text{ dBm/Hz} (10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz})$
- \leq -153 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -150 dBm/Hz (1 GHz \leq frequency < 2.4 GHz)
- \leq -147 dBm/Hz (2.4 GHz \leq frequency \leq 3.5 GHz)
- \leq -144 dBm/Hz (3.5 GHz < frequency \leq 4 GHz)
- \leq -144 dBm/Hz (4 GHz < frequency \leq 6 GHz)
- \leq -151 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -149 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -146 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

With MS2840A-046 installed,

- \leq -146 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- \leq -144 dBm/Hz (34 GHz < frequency \leq 40 GHz)
- \leq -140 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

Performance Test

Without MS2840A-067/167,

with MS2840A-068/168/069/169, and Preamplifier turned off:

- \leq -120 dBm/Hz (9 kHz \leq frequency < 100 kHz)
- \leq -134 dBm/Hz (100 kHz \leq frequency < 1 MHz)
- \leq -144 dBm/Hz (1 MHz \leq frequency < 10 MHz)
- \leq -150 dBm/Hz (10 MHz \leq frequency < 30 MHz)
- \leq -153 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -150 dBm/Hz (1 GHz \leq frequency < 2.4 GHz)
- $\leq -147~\mathrm{dBm/Hz}~(2.4~\mathrm{GHz} \leq \mathrm{frequency} \leq 3.5~\mathrm{GHz})$
- \leq -144 dBm/Hz (3.5 GHz < frequency \leq 4 GHz)
- \leq -144 dBm/Hz (4 GHz < frequency \leq 6 GHz)
- ≤ -147 dBm/Hz (6 GHz < frequency ≤ 13.5 GHz)
- \leq -145 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -141 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

With MS2840A-046 installed,

- \leq –141 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- \leq -135 dBm/Hz (34 GHz < frequency \leq 40 GHz)
- \leq -132 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

Without MS2840A-067/167,

with MS2840A-068/168/069/169, and Preamplifier turned on:

- \leq –156 dBm/Hz (1 MHz)
- \leq -166 dBm/Hz (30 MHz \leq frequency < 1 GHz)
- \leq -164 dBm/Hz (1 GHz \leq frequency < 2 GHz)
- \leq -163 dBm/Hz (2 GHz \leq frequency \leq 3.5 GHz)
- \leq -160 dBm/Hz (3.5 GHz < frequency \leq 4 GHz)
- \leq -160 dBm/Hz (4 GHz < frequency \leq 6 GHz)
- \leq -163 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -163 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)

With MS2840A-044 installed,

 \leq -157 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz) With MS2840A-046 installed,

- \leq -160 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)
- \leq –160 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- $\leq -157~\mathrm{dBm/Hz}~(34~\mathrm{GHz} < \mathrm{frequency} \leq 40~\mathrm{GHz})$
- \leq –149 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)
With MS2840A-067/167, without MS2840A-068/168/069/169, and Microwave Preselector Bypass turned on or off:

 \leq -147 dBm/Hz (6 GHz < frequency \leq 13.5 GHz) \leq -145 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)

 $\leq -141 \text{ dBm/Hz}$ (18.3 GHz < frequency $\leq 26.5 \text{ GHz}$)

With MS2840A-046 installed,

 \leq -141 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)

 \leq -135 dBm/Hz (34 GHz < frequency \leq 40 GHz)

 \leq -132 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168/069/169, Preamplifier turned off, and Microwave Preselector Bypass turned on or off:

 \leq -142 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)

 \leq -140 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)

 \leq -136 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

With MS2840A-046 installed,

- \leq -136 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- \leq -131 dBm/Hz (34 GHz < frequency \leq 40 GHz)

 \leq -128 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168/069/169, Preamplifier turned on, and Microwave Preselector Bypass turned on:

With MS2840A-044 installed,

- \leq -158 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -157 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- $\leq -152 \text{ dBm/Hz}$ (18.3 GHz < frequency $\leq 26.5 \text{ GHz}$)

With MS2840A-046 installed,

 \leq -161 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)

 \leq -161 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)

 $\leq -156~\mathrm{dBm/Hz}~(18.3~\mathrm{GHz} < \mathrm{frequency} \leq 26.5~\mathrm{GHz})$

 ≤ -152 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)

 \leq -151 dBm/Hz (34 GHz < frequency \leq 40 GHz)

 \leq -143 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168/069/169, Preamplifier turned on, and Microwave Preselector Bypass turned off:

With MS2840A-044 installed,

 ≤ -162 dBm/Hz (6 GHz < frequency ≤ 13.5 GHz)

 \leq -160 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)

 \leq –159 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

With MS2840A-046 installed,

 \leq -164 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)

- \leq -164 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -159 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

 \leq -157 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)

 \leq -155 dBm/Hz (34 GHz < frequency \leq 40 GHz) \leq -146 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-046, MS28470A-019/119 installed Without MS2840A-067/167/068/168:

> $\leq -120 \text{ dBm/Hz} (9 \text{ kHz} \leq \text{frequency} < 100 \text{ kHz})$ $\leq -134 \text{ dBm/Hz} (100 \text{ kHz} \leq \text{frequency} < 1 \text{ MHz})$ $\leq -144 \text{ dBm/Hz} (1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz})$ $\leq -150 \text{ dBm/Hz} (10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz})$ $\leq -153 \text{ dBm/Hz} (30 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz})$ $\leq -150 \text{ dBm/Hz} (1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz})$ $\leq -147 \text{ dBm/Hz} (2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz})$ $\leq -144 \text{ dBm/Hz} (3.5 \text{ GHz} < \text{frequency} \leq 4 \text{ GHz})$ $\leq -144 \text{ dBm/Hz} (4 \text{ GHz} < \text{frequency} \leq 6 \text{ GHz})$ $\leq -150 \text{ dBm/Hz} (6 \text{ GHz} < \text{frequency} \leq 13.5 \text{ GHz})$ $\leq -149 \text{ dBm/Hz} (13.5 \text{ GHz} < \text{frequency} \leq 18.3 \text{ GHz})$ $\leq -146 \text{ dBm/Hz} (18.3 \text{ GHz} < \text{frequency} \leq 34 \text{ GHz})$ $\leq -146 \text{ dBm/Hz} (34 \text{ GHz} < \text{frequency} \leq 40 \text{ GHz})$ $\leq -142 \text{ dBm/Hz} (34 \text{ GHz} < \text{frequency} \leq 40 \text{ GHz})$ $\leq -137 \text{ dBm/Hz} (40 \text{ GHz} < \text{frequency} \leq 44.5 \text{ GHz})$

Without MS2840A-067/167, with MS2840A-068/168, and Preamplifier turned off:

 $\leq -120 \text{ dBm/Hz} (9 \text{ kHz} \leq \text{frequency} < 100 \text{ kHz})$ $\leq -134 \text{ dBm/Hz} (100 \text{ kHz} \leq \text{frequency} < 1 \text{ MHz})$ $\leq -144 \text{ dBm/Hz} (1 \text{ MHz} \leq \text{frequency} < 10 \text{ MHz})$ $\leq -150 \text{ dBm/Hz} (10 \text{ MHz} \leq \text{frequency} < 30 \text{ MHz})$ $\leq -153 \text{ dBm/Hz} (30 \text{ MHz} \leq \text{frequency} < 1 \text{ GHz})$ $\leq -150 \text{ dBm/Hz} (1 \text{ GHz} \leq \text{frequency} < 2.4 \text{ GHz})$ $\leq -147 \text{ dBm/Hz} (2.4 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz})$ $\leq -144 \text{ dBm/Hz} (3.5 \text{ GHz} < \text{frequency} \leq 4 \text{ GHz})$ $\leq -144 \text{ dBm/Hz} (4 \text{ GHz} < \text{frequency} \leq 6 \text{ GHz})$ $\leq -146 \text{ dBm/Hz} (6 \text{ GHz} < \text{frequency} \leq 13.5 \text{ GHz})$ $\leq -145 \text{ dBm/Hz} (13.5 \text{ GHz} < \text{frequency} \leq 18.3 \text{ GHz})$ $\leq -141 \text{ dBm/Hz} (18.3 \text{ GHz} < \text{frequency} \leq 34 \text{ GHz})$ $\leq -140 \text{ dBm/Hz} (26.5 \text{ GHz} < \text{frequency} \leq 34 \text{ GHz})$ $\leq -135 \text{ dBm/Hz} (34 \text{ GHz} < \text{frequency} \leq 40 \text{ GHz})$

 \leq -130 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

Without MS2840A-067/167, with MS2840A-068/168, and Preamplifier turned on:

 \leq -156 dBm/Hz (1 MHz)

 \leq -166 dBm/Hz (30 MHz \leq frequency < 1 GHz)

```
\leq -164 dBm/Hz (1 GHz \leq frequency < 2 GHz)
```

- $\leq -163 \text{ dBm/Hz} (2 \text{ GHz} \leq \text{frequency} \leq 3.5 \text{ GHz})$
- \leq -160 dBm/Hz (3.5 GHz < frequency \leq 4 GHz) \leq -160 dBm/Hz (4 GHz < frequency \leq 6 GHz)
- ≤ -163 dBm/Hz (6 GHz < frequency ≤ 13.5 GHz)
- \leq -163 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -160 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)
- \leq -159 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- $\leq -156 \text{ dBm/Hz}$ (34 GHz < frequency $\leq 40 \text{ GHz}$)
- \leq -149 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, without MS2840A-068/168, and Microwave Preselector Bypass turned on/off:

- \leq -147 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- $\leq -145 \text{ dBm/Hz}$ (13.5 GHz < frequency $\leq 18.3 \text{ GHz}$)
- \leq -141 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)
- $\leq -140 \text{ dBm/Hz}$ (26.5 GHz < frequency $\leq 34 \text{ GHz}$)
- $\leq -135 \text{ dBm/Hz}$ (34 GHz < frequency $\leq 40 \text{ GHz}$)
- \leq -129 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned off, and Microwave Preselector Bypass turned on/off:

- \leq -142 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -140 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -136 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)
- \leq -135 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- \leq -131 dBm/Hz (34 GHz < frequency \leq 40 GHz)
- \leq -125 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned on:

- \leq -161 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -161 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq -156 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)
- \leq -152 dBm/Hz (26.5 GHz < frequency \leq 34 GHz)
- \leq -151 dBm/Hz (34 GHz < frequency \leq 40 GHz)
- \leq -143 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned off:

- \leq -164 dBm/Hz (6 GHz < frequency \leq 13.5 GHz)
- \leq -164 dBm/Hz (13.5 GHz < frequency \leq 18.3 GHz)
- \leq –159 dBm/Hz (18.3 GHz < frequency \leq 26.5 GHz)

- \leq -157 dBm/Hz (26.5 GHz < frequency \leq 34 GHz) \leq -155 dBm/Hz (34 GHz < frequency \leq 40 GHz)
- \leq -146 dBm/Hz (40 GHz < frequency \leq 44.5 GHz)

(2) Measuring instrument for tests

- Standard terminator (28N50-2)
 - (28N50-2) In case of MS2840A-040/041/044:
 (28K50) In case of MS2840A-046:

(3) Setup



Figure 6.2.5-1 Display average noise level

(4) Notes on test

Perform the test at an ambient temperature of 18 to 28 °C and after warming up for at least 30 minutes.

(5) Test procedure

- 1. Start the application Spectrum Analyzer of the MS2840A.
- 2. Press $\stackrel{\text{\tiny Preset}}{\longrightarrow}$ of the MS2840A.
- 3. Press [1] (Preset).
- 4. Press $\stackrel{Cal}{\longrightarrow}$ and then F1 (SIGANAAll).
- 5. Terminate the RF input with the standard terminator.
- 6. Set as follows for the MS2840A (time domain mode).

Center Freq	$100 \mathrm{kHz}$
Span	$0~{\rm Hz}$
Reference Level	-100 dBm
RBW	$1 \mathrm{kHz}$
VBW	$1 \mathrm{Hz}$
VBW Mode	Video
Attenuator	0 dB
Detection	Sample
Sweep Time	$1 \mathrm{s}$

- 7. Press Trace.
- 8. Press [4] (Trace-A Storage Mode) then select [4] (Average).
- 9. Press 🕑 to return to the original page.
- 10. Press **F7** (Storage Count).
- 11. Set the average count to 16 times.
- 12. Press (Single) to start averaging then wait until the sweep for an average count of 16 times is completed.
- 13. Using the burst average measurement function, set the Start Time and Stop Time parameters as follows and measure the level.

Start Time	100 ms
Stop Time	900 ms

- 14. The (Burst average measurement value [dBm] -30 dB) will be the display average noise level (dBm/Hz).
- 15. Set the center frequency according to the Display Average Noise Level table in Appendix A, then obtain the display average noise level according to Steps 7 to 14.
- 16. Set this instrument as shown below, only when Preamplifier option is installed:

Press Amplitude to display the amplitude menu, and then press (Pre-amp) to set the pre-amplifier settings to On.

Calculate the display average noise level, according to steps 11 to 15.

6.2.6 Second harmonic wave distortion

A harmonic wave is generated and displayed on the screen due to analyzer input mixer nonlinearity even when an input signal without harmonic wave distortion is applied to the spectrum analyzer.

The second harmonic wave level will be the highest among the harmonic waves displayed on this screen.

For the test method point, apply a distortion signal (at least 20 dB) lower than the internal harmonic wave of the MS2840A then measure the level difference between the fundamental wave and the second harmonic wave. In the event a low distortion signal source cannot be obtained, apply a low distortion signal to the MS2840A after passing through LPF.

(1) Test Target Standards

Second harmonic wave distortion

MS2840A

With MS2840A-040/041 installed,

Without MS2840A-008/108 or with Preamplifier turned off, and at Attenuator

Mode = Mechanical Atten Only

At mixer input level: -30 dBm:

- \leq -60 dBc (10 MHz \leq Input frequency \leq 300 MHz)
- \leq -65 dBc (300 MHz \leq Input frequency \leq 1 GHz)
- \leq -65 dBc (1 GHz < Input frequency \leq 2 GHz)
- At mixer input level: –20 dBm:
 - \leq -80 dBc (2 GHz < Input frequency \leq 3 GHz, Frequency Band Mode: Normal)
 - $\leq\!\!-80~\mathrm{dBc}$ ($1.75~\mathrm{GHz} \leq \mathrm{Input}$ frequency $\leq 3~\mathrm{GHz},$ Frequency Band Mode: Spurious)

With MS2840A-044/046

Without MS2840A-008/108/068/168/069/169 and without MS2840A-067/167, and at Attenuator Mode = Mechanical Atten Only:

At mixer input level -30 dBm

- \leq -60 dBc (10 MHz \leq Input frequency \leq 300 MHz)
- \leq -65 dBc (300 MHz < Input frequency \leq 1 GHz)
- $\leq -65~\mathrm{dBc}$ (1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal)
- ≤ -65 dBc (1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious)

At mixer input level -20 dBm

 $\leq -80~\mathrm{dBc}~(2~\mathrm{GHz} < \mathrm{Input}~\mathrm{frequency} \leq 3~\mathrm{GHz},$ Frequency Band Mode: Normal)

\leq -80 dBc (1.75 GHz \leq Input frequency \leq 2 GHz, Frequency Band
Mode: Spurious)
At mixer input level –10 dBm
\leq -80 dBc (2 GHz < Input frequency \leq 3 GHz, Frequency Band
Mode: Spurious)
\leq -90 dBc (3 GHz < Input frequency \leq 13.25 GHz)
With MS2840A-008/108/068/168/069/169 and with Preamplifier turned off,
or with MS2840A-067/167 and with Microwave Preselector Bypass
turned off and at Attenuator Mode = Mechanical Atten Only:
At mixer input level –30 dBm
\leq -60 dBc (10 MHz \leq Input frequency \leq 300 MHz)
\leq -65 dBc (300 MHz < Input frequency \leq 1 GHz)
\leq -65 dBc (1 GHz < Input frequency \leq 2 GHz, Frequency Band
Mode: Normal)
$\leq-65~\mathrm{dBc}$ (1 GHz < Input frequency ≤1.75 GHz, Frequency Band
Mode: Spurious)
At mixer input level –20 dBm
\leq -80 dBc (2 GHz < Input frequency \leq 3 GHz, Frequency Band
Mode: Normal)
$\leq -80 \text{ dBc} (1.75 \text{ GHz} \leq \text{Input frequency} \leq 2 \text{ GHz}, \text{ Frequency Band}$
Mode: Spurious)
At mixer input level –10 dBm
≤ -70 dBc (2 GHz < Input frequency ≤ 3 GHz, Frequency Band
Mode: Spurious)
\leq -70 dBc (3 GHz < Input frequency \leq 13.25 GHz)
or tests

(2) Measuring instrument for tests

•	Signal generator	(MG3710A)	6 GHz or less
		(MG3694C)	6 GHz or more

- LPF:

Items with 40 dB or higher attenuation at twice the frequency of the fundamental wave.

Chapter 6 Performance Test



Figure 6.2.6-1 Second harmonic wave distortion test

(4) Notes on test

Perform the test at an ambient temperature of 18 to 28 $^{\rm o}{\rm C}$ and after warming up for at least 30 minutes.

- (5) Test procedure
- 1. Start the application Spectrum Analyzer of the MS2840A.
- 2. Press \bigcirc of the MS2840A.
- 3. Press F1 (Preset).
- 4. Press $\stackrel{Cal}{\frown}$ then $\boxed{}$ (SIGANAAll).
- 5. Set as follows for the MS2840A:

Span	$50 \mathrm{kHz}$
RBW	$1 \mathrm{kHz}$
VBW	$1 \mathrm{kHz}$
Attenuator	10 dB
Det Mode	Positive
Sweep Time	$150 \mathrm{~ms}$

- 6. Set the output level of the MG3710A to -20 dBm.
- Connect LPF according to the Second Harmonic Wave Distortion table in Appendix A. If LPF attenuation is insufficient, use LPF in 2 stages.
- 8. Set the output frequency of the MG3710A and center frequency of the MS2840A, and reference level, according to the Second Harmonic Wave Distortion table in Appendix A.

- 9. Adjust the output level of the signal generator so as to get the peak point of the spectrum waveform into the range of ± 0.06 dB.
- 10. Press **measure** to perform a peak search. Set so as to include the signal trace peak point to the zone marker.
- Press Marker to display the Marker function menu, and then press
 (Delta) to set to the delta marker.



Figure 6.2.6-2 Fundamental wave

12. In order to display the second harmonic wave on the screen, set twice as much frequency as the center frequency. Delta marker level reading indicates the level difference between the fundamental wave and the second harmonic wave.

In the event the level difference is 80 dB or higher, set the reference level to -50 dBm. Check whether the setting value of the input attenuator is 10 dB.



Figure 6.2.6-3 Second harmonic wave

13. Repeat Steps 7 to 12, according to the Second Harmonic Wave Distortion table in Appendix A.

Chapter 7 Power Meter

This chapter describes basic operations of the power meter functions.

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7.1 Power Meter

You can connect a USB power sensor to the $\rm MS2840A$ and read the measurement values.

Preparation

For the setup procedure of the application software for this function, refer to Section 3.8 "Installing and Uninstalling" and Section 3.5 "Loading, Unloading, and Switching Applications."

The MS2840A can accept any USB power sensor in the following table, automatically recognize its model name, and automatically set the COM Port regardless of the USB Port to which the USB power sensor is connected.

Table 7.1-1 shows the models and specifications of compatible power sensors.

Model	Frequency	Resolution	Dynamic Range
MA24104A	600 MHz to 4 GHz	$1 \mathrm{kHz}$	+3 dBm to +51.76 dBm
MA24105A	$350 \mathrm{~MHz}$ to $4 \mathrm{~GHz}$	100 kHz	+3 dBm to +51.76 dBm
MA24106A	$50~\mathrm{MHz}$ to $6~\mathrm{GHz}$	$1 \mathrm{kHz}$	-40 dBm to +23 dBm
MA24108A	10 MHz to 8 GHz	100 kHz	-40 dBm to $+20 dBm$
MA24118A	10 MHz to 18 GHz	100 kHz	-40 dBm to +20 dBm
MA24126A	10 MHz to 26 GHz	100 kHz	-40 dBm to $+20 dBm$

Table 7.1-1 USB Power Sensors

Follow the procedure below to select a USB power meter function:

<Procedure>

- 1. Plug in the USB power sensor connector to the USB port of the MS2840A Signal Analyzer.
- 2. Press Application to display the Application Switch function menu.
- 3. Press the Power Meter function key.

You can select the application also by clicking the Power Meter icon on the task bar.

7.2 Display Description

Press (Application Switch function menu. Then, select the Power Meter, and you can display the power meter application main screen and the function menu.



Figure 7.2-1 Power meter application main screen

7

Chapter 7 Power Meter

No.	Display	Description
-		Application software name
1 Power Meter		The name of the synchronizing application is displayed in parentheses.
	COMxx	COM Port number (xx) to which the USB power
2	Dont	Appears when no LISP neuron sensor is connected.
	Port	Appears when no USB power sensor is connected.
3	MAXXXXA	Model of the connected USB power sensor.
	Model	Appears when no USB power sensor is connected.
4	Frequency	Calibration factor frequency setting.
	Auto	Input range: Auto
5	Low	Input range: Low input level
	High	Input range: High input level
		Measured power with offset level in dBm units.
6	Power [dBm]	This value is displayed in red in case of a device
		status error.
7	Relative Power [dB]	Relative power in dB units.
8	Power [W]	Measured power with offset level in W units.
9	Device Status Error	Appears in case of a power sensor error.*
	Measuring	Measurement is in progress.
10	COM Searching	USB power sensor search in progress.
	Stop	USB power sensor search stopped.
11	Not Zeroed	Zeroing not executed.
11	Zeroed	Zeroing executed.
		Sets the offset level value to be added to the
12	Offset	power sensor reading and turns on and off the
		offset function.
		Current count / Setting count of averaging.
13	Average	Appears when the Average is turned on.
		7.3.5 "Power Meter"
		Appears when no power sensor is connected or
14	Disconnect Info	the connected power sensor is not recognized by
		the mainframe. If the power sensor is connected,
		connect again.
	Aperture Mode	Valid aperture setting value is displayed
15 Aperture Time value aperture setting value is displaye		7 3 6 "Aperture Setting"
	Therefore Time	

 Table 7.2-1
 Parameters on the power meter application main screen

*: For detailed information on error causes and Error IDs, refer to Chapter 13-3 "STATUS?" in USB Power Sensors MA241xxA and PowerXpertTM User Guide.

7.3 Function Menu

Press $\overbrace{\widehat{e}}^{Menu}$ when the Power Meter function to display the Power Meter function menu.

Function Key	Menu Display	Function
F1	Frequency	Opens the Frequency function menu.
F2	Amplitude	Opens the Amplitude function menu.
F3	Aperture Setting	Opens the Aperture Setting function menu.
F4	Measure	Opens the Measure function menu.
F8	Accessory	Opens the Accessory function menu.

 Table 7.3-1
 Power Meter function menu

7.3.1 Setting the frequency

In the Frequency function menu, you can set the calibration factor frequency of the USB power sensor.

Press [1] (Frequency) in the Power Meter function menu to display the Frequency function menu.

Function Key	Menu Display	Function
F1	Frequency	Sets the calibration factor frequency of the power sensor.

 Table 7.3.1-1
 Frequency function menu

Press **F1** (Frequency) in the Frequency function menu or **Frequency** to display the Frequency dialog box, and then set the measurement frequency.

Table 7.3.1-2	USB Power Sensor

Model	Setting range	Resolution
Disconnected	10 MHz to 26 GHz	1 Hz
MA24104A	600 MHz to 4 GHz	$1 \mathrm{kHz}$
MA24105A	350 MHz to 4 GHz	100 kHz
MA24106A	50 MHz to 6 GHz	$1 \mathrm{kHz}$
MA24108A	10 MHz to 8 GHz	100 kHz
MA24118A	10 MHz to 18 GHz	$100 \mathrm{~kHz}$
MA24126A	10 MHz to 26 GHz	100 kHz

Note:

The values below resolutions are rounded.

7.3.2 Level setting

Press [2] (Amplitude) or Amplitude in the Power Meter function menu to display the Amplitude function menu.

Function Key	Menu Display	Function	
F1	Range	Opens the Range function menu.	
F7	Offset (On/Off)	Turns on and off the level offset function.	
F8	Offset Value	Sets the level offset value.	

Table 7.3.2-1 Amplitude function menu

Setting the range

Press [1] (Range) in the Amplitude function menu to display the Range function menu.

You can select the measurement range of the power sensor among Auto, High, and Low. (High and Low require manually setting.)

Note:

This parameter is always Auto when the model is MA24104A or MA24106A.

Table 7.3.2-2 F	Range function menu
-----------------	---------------------

Function Key	Menu Display	Function	
F1	Auto	Automatic setting (Default)	F
		When the model is MA24108A, MA24118A, or MA24126A:	JMCT
F2	Low	Input range≔40 dBm to −7 dBm	TAT
		When the model is MA24105A:	6
		Input range: +3 dBm to +38 dBm	E,
		When the model is MA24108A, MA24118A, or MA24126A:	
F3	High	Input range≔7 dBm to +20 dBm	
		When the model is MA24105A:	
		Input range: +38 dBm to +51.76 dBm	

Chapter 7 Power Meter

Setting the level offset

An arbitrary offset value is added to the measurement value, and their sum is displayed.

Press [7] (Offset) in the Amplitude function menu to turn on and off the addition of the offset value.

Offset: Level offset

On	Turns on the addition of the offset value.
Off	Turns off the addition of the offset value (Default).

Press [13] (Offset Value) in the Amplitude function menu to display the Offset Value dialog box, and then set the offset value.

Offset Value:Setting range and minimum resolution of level offsetSetting range-100.00 to 100.00 dBResolution0.01 dBDefault0.00 dB

When this function is used, the displayed power sensor value is offset with the value specified in the Offset Value dialog box. It is used when the path loss or gain from the MS2840A to DUT is corrected.

[Power sensor reading after offset]

= [Power sensor reading] + [Offset level]



Figure 7.3.2-1 Summary of offset level

7.3.3 Measure

Press [4] (Measure) or Measure in the Power Meter function menu to display the Measure function menu.

The Measure function menu items depend on whether the Power Meter application synchronizes with the other application or not.

When not synchronizing with any applications

Table 7.3.3-1 Measure function menu

Function Key	Menu Display	Function
F1	Power Meter	Opens the Power Meter function menu.

When synchronizing with the application

Function Key	Menu Display	Function
F1	Modulation Analysis	Displays the application software that is synchronizing.
F2	Power Meter	Opens the Power Meter function menu.

Application synchronization

Application synchronization refers to a state in which the Power Meter application is selected in the Measure function menu of the other measurement application software. In this case, the parameters such as Frequency are shared between 2 applications and do not require setting again when switching the applications.

Table 7.3.3-3	Items to be synchronized	between applications
---------------	--------------------------	----------------------

Application Software	Items to be synchronized	
	Frequency	Frequency
Vector Modulation	Offset	On/off state of the level offset function
Analysis	Offset Value	Level offset value

When the application synchronization is enabled, the title bar displays "Power Meter (Application name)."

7

7.3.4 Accessory

Press 🖪 (Accessory) in the Power Meter function menu to display the Accessory function menu.

 Table 7.3.4-1
 Accessory function menu

Function Key	Menu Display	Function
F1	Title	Sets the title character string.
F2	Title (On/Off)	Turns on and off the title character string display.

Setting the title

A title consisting of up to 32 characters can be displayed on the screen. (Up to 17 characters can be displayed on the top of the function menu. The maximum character length depends on characters.)

<Procedure>

- 1. Press [FB (Accessory) in the Power Meter function menu.
- Press [1] (Title) to display the character string input dialog box. Use the rotary knob to select the characters, and press [1] to enter them. When the title is entered, press [1] (Set).
- 3. Press [2] (Title On/Off) to select Off, and the title display is turned off.

7.3.5 Power Meter

Press F1 or F2 (Power Meter) in the Measure function menu.

In the Power Meter menu, you can set the measurement that is performed by using the USB power sensor.

Function Key	Menu Display	Function
F1	Average	Turns on and off the function of averaging the measurement results.
F2	Average Count	Sets the number of times the measurement results are averaged.
F3	Set Reference	Sets the "measurement value after offset and averaging" as the reference level of the relative power.
F6	Zero Sensor	Executes the zeroing of the USB power sensor.
F8	Back To Application	Appears only during application synchronization. Activates the synchronizing measurement application software.

Table 7 3 5-1	Power Meter	function menu
1 abie 7.3.3-1	LOMEI METEI	

Averaging

Press [1] (Average) in the Power Meter function menu to turn on and off the averaging function.

Average: Turns on and off the function of averaging .

- On Turns on the averaging function.
- Off Turns off the averaging function (Default).

Press 2 (Average Count) in the Power Meter function menu to display the Average Count dialog box, and then set the number of averaging times.

Averaging Count: Sets the number of averaging times.

Setting range	2 to 1000
Resolution	1
Default	10

Setting the reference level

Press [3] (Set Reference) in the Power Meter function menu to set the "measurement value after offset and averaging" as the reference level of the relative power.

Chapter 7 Power Meter

Zeroing the USB power sensor

Press 📧 (Zero Sensor) in the Power Meter function menu to execute the zeroing.

When you execute the function, a progress dialog box appears.

Please do not operate the MS2840A during the zeroing.

👑 Power Meter	
Sensor zero in progress.	
8 / 100	
=	1

Figure 7.3.5-1 "Power Meter zeroing" dialog box (Progress)

If the zeroing fails, the following dialog box appears.

Power Meter 🛛 🛛 🗙		
£	Sensor zero failed.	

Figure 7.3.5-2 "Power Meter zeroing" dialog box (Zeroing failed)

Zeroing the power sensor

<Procedure>

- 1. Plug in the USB power sensor connector to the USB port of the MS2840A.
- 2. Turn off the RF output of DUT (device under test).
- 3. Connect the RF Input connector of the power sensor to the RF output terminal of DUT.



Avoid excessive input levels when connecting the power sensor to DUT(device under test). The power sensor may be damaged depending on output levels of DUT.

4. Execute the Zero Sensor menu.

Activating the synchronizing application

Press [13] (Back To Application) in the Power Meter function menu to return to the synchronizing application software.

7.3.6 Aperture Setting

Press [3] (Aperture Setting) in the Power Meter function menu to display the Aperture Setting menu.

Refer to the "Aperture Time" section and the "Measurement Considerations" section of your power sensor chapter in USB Power Sensors MA241xxA and PowerXpert[™] User Guide for more details.

Function Key Menu Display Function		Function
F1	Aperture Time	Sets the Aperture Time. Available when MA24108A/MA24118A/MA24126A is connected.
F2	Aperture Mode	Sets the Aperture Mode. Available when MA24104A/MA24106A is connected.

Table 7.3.6-1 Aperture Setting function menu

The table below shows the ranges, resolutions, and defaults for Aperture Time.

Model	Range	Resolution	Default
Disconnected			
MA24104A	Disabled	Disabled	Disabled
MA24105A	Disabled	Disabled	Disabled
MA24106A	Disabled	Disabled	Disabled
MA24108A	0.01 to 300.00 ms	0.01 ms	20.00 ms
MA24118A	0.01 to 300.00 ms	0.01 ms	20.00 ms
MA24126A	0.01 to 300.00 ms	0.01 ms	20.00 ms

Table 7.3.6-2 Aperture Time

The table below shows the options and defaults for Aperture Mode.

Table 7.3.6-3 Aperture Mode

Model	Options	Default
Disconnected		
MA24104A	LAT, HAT	LAT
MA24105A	Disabled	Disabled
MA24106A	LAT, HAT	LAT
MA24108A	Disabled	Disabled
MA24118A	Disabled	Disabled
MA24126A	Disabled	Disabled

7.4 Initialization

7.4.1 Preset

Power Meter function is a kind of application. For the presetting procedure, refer to Section 3.7.1 "Preset."

7.4.2 Default value list

This section lists the default values	of the Pow	er Meter function.
Frequency	$1\mathrm{GHz}$	
Level Offset State	Off	
Level Offset Value	$0.00 \ dB$	
Average State	Off	
Average Count	10	
Reference Level	0.00 dBm	
Reference Level Set	Off	
Range	Auto	
Sensor Connected	Disconnec	eted
Sensor Model	Disconnec	eted
Aperture	LAT	(MA24104A, MA24106A)
	20.00 ms	(MA24108A, MA24118A,
		MA24126A)

Chapter 8 BER Measurement Function

This chapter describes the operation methods for the BER measurement function of the MS2840A-026/126.

Note:

This application is available only when MS2840A-026/126 is installed.

8.1	Outline of BER Measurement
8.2	Display Description
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8.9	Setting User-defined Pattern 8-34
8.10	Description of BER Measurement Operation

8.1 Outline of BER Measurement

The MS2840A-026/126 can measure the bit error rate (BER) of signals incoming from external systems. By pressing the Application Switch and then BER Test, the MS2840A-026/126 can be switched to BER measurement mode.

MS2840A BER Test		_ 🗆	2007/02/16 10:25:12
Data Type PN9	Count Mode Data	1000 Bit	Top Measure
Pit Longth	Dala		Start
Sync Position Start	Error	ВК	Measure Stop
Measure Mode Continuous			
Measure Information			Count Clear
Status Stop Synchronizing M Error BitError SyncLoss Cl	easuring ockError EnableErroi	r	
SyncLoss Count 0			
Error Rate 0.000E+	000	0.000%	Data Type PN9
Error Count	0 ,	0	Measure Mode
			Count Mode

Figure 8.1-1 BER function main screen

Features of the MS2840A-026/126 BER measurement function are as listed below:

Input signals Data, Clock, Enable (Polarity inversion is enabled.)

Input level TTL level

Measurement bit rate 100 bps to 10 Mbps

Measured pattern

PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, repetition of 01, PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, and user-defined patterns

Measurement bit count 1000 to 4294967295 bits (2³² - 1 bits)

Measurement error bit count

1 to 2147483647 bits ($2^{31} - 1$ bits)

The maximum value that can be set as the measurement error bit count is $(2^{31} - 1 \text{ bits})$. If Count Mode is set to Data, however, counting of the error bit count will continue even if $(2^{31} - 1 \text{ bits})$ is exceeded.

Operation modes

Auto Resync:	On, Off
Measure Mode:	Continuous, Single, Endless
Count Mode:	Data, Error

Synchronization conditions

Depends on the measurement pattern.

PN 9, 11, 15, 20, 23:	No errors occur for (PN stage count \times 2)
	consecutive bits
ALL0, ALL1, repetition of 01:	No errors occur for 10 consecutive bits
PN_Fix pattern:	See Section 8.8.
User-defined pattern:	No errors occur during the period that is
	set for synchronization judgment

Synchronization probability

The condition required for MS2840A-026/126 to synchronize with a PN signal is that no error occurs for (PN stage count \times 2) consecutive bits. The table below lists the probabilities that no error will occur for (PN stage count \times 2) consecutive bits for a PN signal that includes random errors. These probabilities thus can be referred to as the probabilities that the MS2840A-026/126 synchronizes with a PN signal at a certain error rate in one cycle.

 Table 8.1-1
 Probabilities that MS2840A-026/126 synchronizes with PN signal

PN stage counts Error rate of PN signal (%)	PN9	PN15	PN23
10	15.0	4.2	0.79
3	57.8	40.1	24.6
1	83.5	74.0	63.0
0.1	98.2	97.0	95.5

SyncLoss detection condition

The SyncLoss detection condition can be changed. However, SyncLoss detection is not executed if Auto Resync is set to Off.

8.2 Display Description

This section describes the BER measurement function display items.

Л N	AS2840A BER Test						
[1] Data Type	Data Type	PN9		Count Mode	Data		[2] Count Mode
	Pattern File			Data	1	000 Bit	
	Bit Length			Error		1 Bit	
	Sync Position	n Start					
	Sync Position	n Length					
[3] Measure Mode	Measure Mode	Continuous					
[4] Otatua	Measure Inform	ation					
[4] Status	Status Error	Stop Sync	chronizing N	leasuring <mark>)</mark> lookError En	ablaError		[5] Error
[6] SyncLoss Count	SyncLoss Co	unt 0	Syncloss C				
[7] Error Rate	Error Ra	ite ().000E+	000		0.000%	
[8] Error Count	Error Co	ount		0	ſ		[9] Measured bit
				/			

Figure 8.2-1 BER main screen

Chapter 8 BER Measurement Function

No.	Display	Description	
[1]	Data Type	 Displays the names of data selected on the list selection popup screen. Characters cannot be directly entered. Displays the data set on the data input screen. When User Pattern is selected in the data settings, parameters related to the loaded User Pattern are displayed. 1) Pattern File Displays the name of the loaded User Pattern. 2) Bit Length Displays the length (bit count) of the loaded User Pattern. 3) Sync Position Start Displays the bit at which synchronization of the User Pattern will be started. 4) Sync Position Length Displays the length (bit count) which is compared when synchronizing the User Pattern. 	
[2]	Count Mode	 Characters cannot be directly entered. The count mode set in the setup screen will be displayed. 1) Count Mode Displays the count mode set on the input screen. 2) Bit length Displays the bit length of Data and Error set on the input screen. 	
[3]	Measure Mode	Displays the measurement mode selected in the list selection popup screen. Characters cannot be directly entered. Displays the data set in the data setup screen.	

Table 8.2-1 Display items in BER measurement mode

8.2 Display Description

No.	Display	Description		
[4]	Status	Displays Stop, Synchronizing, and Measuring.		
[5]	Error	These messages light up when the following errors occur. BitError: Error bit occurrence SyncLoss: SyncLoss occurrence ClockError: Input clock signal failure EnableError: Input enable signal failure Displays OverflowDataCount or OverflowSyncLoss when the following errors occur. OverflowDataCount: The number of received bits exceeds the maximum value (2 ³² – 1 bits). OverflowSyncLoss: The number of SyncLoss errors exceeds the maximum value (65535).		
[6]	SyncLoss Count	Displays the number of SyncLoss errors.		

Table 8.2-2 Display items in Measure Information area

No.	Display	Description
[7]	Error Rate	Displays the error rate.
[8]	Error Count	Displays the error count.
[9]	Bit	Displays the number of measured bits.

Table 8.2-3 Error rate display

Error Rate display

Error Rate may be displayed in either floating-point form or fixed-point percentage, which complies with the following rules:

• Floating-point display

Rounding down to the 1/10000th digit from the maximum significant value, the digits up to the 1/1000th digit are displayed.

Example: For 0.00978495 \rightarrow Displayed as 9.785E-003.

• Fixed-point percentage display

The value is displayed in percentage. With the fourth digit of the fraction part rounded, the digits down to the third digit of the fraction part are displayed.

Example: For 0.00978495 \rightarrow Displayed as 0.978%.

If BER measurement has not yet been performed, the error rate, error count, and received bits count are all displayed as 0.

8.3 BER Measurement Function Menu

This section describes the main function menu on the BER measurement screen.



Figure 8.3-1 Main function menu

8-9

Chapter 8 BER Measurement Function

т	able 8.3-1 Top function menu
Menu Display	Function
Measure Start	Starts BER measurement.
Measure Stop	Stops BER measurement.
Count Clear	Clears the count operation.
Data Type	Selects the data type.
Measure Mode	Selects the BER measurement mode.
Count Mode	Selects the measurement termination condition and specifies the bit count. 8.5 "Performing BER Measurement"
Resync Condition	Sets the automatic resynchronization function. 58.6 "Setting Automatic Resynchronization Function"
BER Interface	Performs settings related to the BER measurement interface. 8.7 "Setting Input Interface"
PN_Fix Pattern	Sets PN fix.
User Defined Pattern	Displays the Pattern Load function menu.
8.4 Connecting MS2840A-026/126 to External System

To perform BER measurement, signals must be input from an external system. Signals can be input from the AUX connector on the rear panel.

Details of BER signal input

The following are signal pins used for BER measurement.

- BER_CLK Inputs a clock signal that is generated in sync with data.
- BER_DATA Inputs the data signal.
- BER_EN Inputs the gate (enable) signal.

Refer to Table 3.1.1-1 "AUX Connector" for details on pin assignment.



Figure 8.4-1 Input connector

If the enable signal is not used, set "Enable Active" to "Disable."

Change the settings of the MS2840A-026/126 in accordance with the specifications of the input signal.

8.7 "Setting Input Interface"

8.5 Performing BER Measurement

This function performs various BER measurement settings, and executes the measurement.

BER measurement

<Procedure>

- 1. Input the signals from the external system according to the instructions in Section 8.4 "Connecting MS2840A-026/126 to External System."
- Select the data type. Press [6] (Data Type) to display the Data Type selection window. Move the cursor to the pattern to be used for the measurement and press [7] (Set) to select a pattern.

🎇 BER Test		×
Data Type		
PN9 PN11 PN15 PN20 PN23 PN9Fix PN11Fix PN15Fix PN20Fix		
	Set	Cancel

Figure 8.5-1 Data Type selection window

The following patterns can be selected.

PN9, PN11, PN15, PN20, PN23, PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, ALL0, ALL1, ALT(0/1), UserDefine

ALT(0/1) indicates a repetition pattern of 0 and 1. For details on PN_Fix and UserDefine, refer to the following sections respectively:

8.8 "Setting PN_Fix Pattern"

3. Select BER measure mode. Press **F7** (Measure Mode) to display the Measurement Mode selection window. Move the cursor to the desired measurement mode and press **F7** (Set) to select it.

One of the following three types can be selected for the measurement mode:

Continuous	Performs the measurement continuously for the
	set bit count or set error bit count.
Single	Performs the measurement for the set bit count

or set error bit count.

Endless

Performs the measurement for 4294967295 bits.

Continuou	IS	 	
Single Endless			

Figure 8.5-2 Measure Mode selection window

Chapter 8 BER Measurement Function

When "Endless" is selected for the measurement mode, the count mode (Count Mode), data bit (Data), and the display of error bit (Error) setting items is darkened.

Data Type	PN9Fix		Count Mode	Data	
Pattern File			Data	1000	Bit
Bit Length			Error	1	Bit
Sync Positio	on Start				
Sync Positio	on Length				
Measure Mode	Continuous				
Figure 8.5	5-3 When	Single or	Continuous	s is select	ed
Figure 8.5	5-3 When	Single or	Continuous Count Mode	Data	ed
Figure 8.5 Data Type Pattern File	PN9Fix	Single or	Continuous Count Mode Data	Data 1000	ed Bit
Figure 8.5 Data Type Pattern File Bit Length	PN9Fix	Single or	Continuous Count Mode Data Error	Data 1000	ed Bit Bit
Figure 8.5 Data Type Pattern File Bit Length Sync Positi	PN9Fix	i Single or	Continuous Count Mode Data Error	Data 1000	ed Bit Bit
Figure 8.5 Data Type Pattern File Bit Length Sync Positi Sync Positi	PN9Fix PN9Fix on Start on Length	a Single or d	Continuous Count Mode Data Error	Data 1000	ed Bit Bit
Figure 8.5 Data Type Pattern File Bit Length Sync Positi Sync Positi Measure Mode	PN9Fix PN9Fix on Start on Length Endless	i Single or	Continuous Count Mode Data Error	Data 1000	ed Bit Bit
Figure 8.5 Data Type Pattern File Bit Length Sync Positi Sync Positi Measure Mode	PN9Fix PN9Fix on Start on Length Endless	i Single or	Continuous Count Mode Data Error	Data 1000	ed Bit Bit

4. Select the measurement termination condition. This item cannot be set when Endless is selected. Press [F8] (Count Mode) to display the Measurement termination condition setup window. Move the cursor to the desired measurement termination condition and press [F7] (Set) to select it. Either of the following two types can be selected for the measurement termination condition:

Count Mode		
Count Mode	Data	•
Data	1000	🗦 Bit
Error	1	🕂 Bit

Figure 8.5-5 Measurement termination condition selection window

5. Set the measurement bit count.

This item cannot be set when Endless is selected. When Count Mode is set to Data, the value in Data Bit can be changed. Set the measurement bit count using the numeric keypad, rotary knob, or \bigcirc \bigcirc . Then press \bigcirc (Set) to set the measurement bit count. The measurement is stopped when the accumulated measurement bit count reaches the set bit count. \rightarrow Go to Step 7.

8

🎇 BER Test		×
Count Mode		
Count Mode	Data	-
Data	1000	🕂 Bit
Error	1	🗄 Bit
	Set	Cancel

Figure 8.5-6 Measurement bit count setup window

Measurement bit count setting range: 1000 to 4294967295 bits

6. Set the measurement error bit count.

This item cannot be set when Endless is selected. When Count Mode is set to Error, the value in Error Bit can be changed. Specify the measurement error bit count using the numeric keypad, rotary knob, or O. Then press of (Set) to count the measurement error bit count. The measurement is stopped when the accumulated measurement error bit count reaches the set bit count.

		×
Count Mode		
Count Mode	Error	•
Data	1000	🗄 Bit
Error	1	🗄 Bit
	Set	Cancel

Figure 8.5-7 Measurement error bit count setup window

Measurement error bit count setting range: 1 to 2147483647 bits

 Configure settings for the automatic resynchronization function. The automatic resynchronization function can be enabled/disabled and the SyncLoss error judgment condition can be set. Refer to the following section for details on the settings.

8.6 "Setting Automatic Resynchronization Function"

8. Press the Fi (Measure Start) panel key to start BER measurement. If F2 (Measure Stop) is pressed while BER measurement is in progress, the operation is stopped.

Operation termination conditions differ depending on the operation mode.

Press ingle to perform BER measurement in Single measurement mode. Press ito perform BER measurement in Continuous measurement mode. If measurement is started using these panel keys, the BER measurement mode settings will be switched automatically.

 Table 8.5-1
 Operation termination conditions for BER measurement (Single measurement mode)

Auto Resync Count Mode	On	Off
Data	 The set measurement bit count is reached. The SyncLoss count reaches the maximum value (65535). 	• The set measurement bit count is reached.
Error	 The set measurement error bit count is reached. The measurement bit count reaches the maximum value (2³² – 1 bits). The SyncLoss count reaches the maximum value (65535). 	 The set measurement error bit count is reached. The measurement bit count reaches the maximum value (2³² – 1 bits).

Measurement is stopped when setting parameters (except for BER Interface).

If a condition listed in Table 8.5-1 above is met in the Continuous measurement mode, measurement is stopped once and then started again.

Measurement continues even if the view moves to another screen while BER measurement is in progress.

If the power is turned off while BER measurement is in progress, the measurement will remain stopped.

When measurement is started with a 10 Mbps signal, the upper limit of the measurement bit count is reached about 430 seconds (max.) later, and measurement is stopped.

BER measurement will be stopped if any of the following operations is performed when the MS2840A-077/177 Analysis Bandwidth Extension to 62.5 MHz, or MS2840A-078/178 Analysis Bandwidth Extension to 125 MHz is installed in the MS2840A.

- Switching the frequency span of the signal analyzer function to 31.25 MHz or less (lower) and to 50 MHz or more (upper).
- Switching the application to/from the spectrum analyzer function when the frequency span of the signal analyzer is set to 50 MHz or more.
- Switching the application to/from measurement software when the frequency span of the signal analyzer is set to 50 MHz or more.

Display in each BER measurement mode

The following figures show the difference in the measurement display among BER measurement modes. For the progress state and error rate display during measurement, see Figure 8.2-1 "BER main screen".

Measurement Mode: Continuous

The Measured result is not updated during measurement. When the measurement is completed, the measured result is updated and the measurement then starts again.



Figure 8.5-8 Measure Mode Continuous

Measure Mode: Single and Endless

The received bit count, error bit count, error rate are updated as needed during measurement. When the measurement is completed, the display update is stopped.





BER Measurement Function

Chapter 8 BER Measurement Function

	Note: The measurement res "synchronizing" and " alternately and repea input signals and rest	sults may not be displayed correctly when measuring" appear in the Status field tedly. In that case, check the settings and cart the measurement.
Count Clear operation		
	The operation when Fa (C The Count Clear operation is the measurement mode.	ount Clear) is pressed is described below. is disabled when Continuous is selected for
	During measurement (Synch The received bit count, error measurement while the syn Clear is executed during me of measurement is smaller to same applies to the error bit	ronizing or Measuring): r rate, and SyncLoss count are cleared during chronization state is held. Therefore, if Count easurement, the received bit count at the end chan the set measurement bit count. The t count.
	Example: Display when Cour	nt Clear is pressed when measuring 100000 bits
	[1] Start the measurement.	
	Measurement starts.	Measurement ends.
	+	Received bit display 35612 bits
	[2] Press Count Clear. The is 35612, however the	e count bit count when the switch is pressed display is 0 bits.
	Measurement starts.	Count Clear is pressed. Measurement ends.

[3] The total count bit count is 100000 bits upon measurement completion, however the display is 64388 bits (100000 – 35612).

í

.....

0 bits

Received bit display

.....

8.5 Performing BER Measurement



Figure 8.5-10 Count Clear operation

When measurement is stopped (Stop):

The received bit count, error rate, and progress state displays are cleared.

8.6 Setting Automatic Resynchronization Function

This section describes the settings for the automatic resynchronization function of BER measurement.

BER Test
Resync Condition
 — Auto Resync On
 — Threshold 200 ÷ Bit / 500 ▼Bit
 - at SyncLoss Count Clear
Set Cancel

Figure 8.6-1 Resync Condition setup screen

Setting procedure for automatic resynchronization function

Press [1] (Resync Condition) from page 2 of the main function menu to perform various settings for the automatic resynchronization function of BER measurement. Use the cursor to select the item to be set and press [1] (Set) to display the setting window associated with that item.

The following items can be set in this menu.

[1] Auto Resync

Sets the resynchronization operation when SyncLoss occurs.

- On SyncLoss is detected. Resynchronization is automatically performed when SyncLoss occurs.
- Off SyncLoss is not detected.

The following items are enabled only when Auto Resync is set to On.

[2] Threshold

Sets the SyncLoss detection conditions. When X bits out of Y bits are errors, it is judged as SyncLoss. The values of X and Y can be set here.

Setting range of X (numerator):1 to (Y/2) bitsSetting range of Y (denominator):500, 5000, 50000 bits

Any value within the setting range can be set for X, while one of the three preset value should be set for Y.

8.6 Setting Automatic Resynchronization Function

	[3] at SyncLoss Sets whether to	clear the measurement bit count when SyncLoss
	occurs. Count Clear Count Keep	Clears the measurement bit count to 0. Retains the measurement bit count.
Details of Auto Resync		
	The difference in ope described below.	eration when Auto Resync is set to On and Off is
	Auto Resync On If the number of occur synchronization is es measurement is stop Threshold is set to 2 500 bits is 200 or less being detected.	urred errors exceeds the set Threshold value when stablished, it is judged as SyncLoss, the oped, and resynchronization is executed. When 00/500 (default) and the number of error bits out of s, measurement can be performed without SyncLoss
	When measuring a s such as 200/500, can block errors occur du	ignal with a high error rate, a high Threshold value, be set to suppress the detection of SyncLoss when the to phasing.
	When measuring a s such as 50/500, can l detecting SyncLoss v	ignal with a low error rate, a low Threshold setting, be set to enable resynchronization by quickly when errors occur.
	Auto Resync Off SyncLoss is not dete high error rate is me interruption with th may be out of synch DUT side. In such a	cted during measurement. When a signal with a easured, the measurement is performed without is setting. Note, however, that the clock and data conization when the clock is not regenerated on the case, set Auto Resync to On for measurement.
	The correspondence and the recommende	between the error rate of the measurement target ed setting is shown in the table below.

Settings	AutoResync On		AutoPosync	
Error Rate of Measurement target	Threshold value: 50/500	Threshold value: 200/500	Off	
Lower than 0.3%	Optimum	Applicable	Applicable	
0.3% or Higher	Not recommended	Optimum	Applicable	
Optimum:	Most suitable	setting		

Table 8.6-1 Error rate of measurement target and recommended setting

ot recommended:	SyncLoss may occur freque	ently with this setting
Reference:		
Default Threshold	value of the MG3710A:	200/500
Threshold setting	value of the MP1201C:	200/512
Default Threshold	value of the MD6420A:	200/512
Threshold setting	value of the MT8820C (WCD	MA) BER function:
		23/64

Measurement is possible with this setting.

The differences between the Auto Resync operation supported in the MS2840A and the Auto Sync operation supported in the MP1201C and MD6420A are described below.

Details of Auto Resync operation

The details of the Auto Resync operation supported in the MS2840A are as follows.

Auto Resync On

Applicable:

Not recommended:

Synchronization is executed at the start of measurement, and the measurement is started when synchronization is established. If SyncLoss is detected during measurement, resynchronization is automatically executed.



Figure 8.6-2 Auto Resync On

Auto Resync Off

Synchronization is executed at the start of measurement, and the measurement is started when synchronization is established. SyncLoss is not detected during measurement.



Figure 8.6-3 Auto Resync Off

Details of Auto Sync operation

The Auto Sync operation supported in the MP1201C and MD6420A is as follows.

Auto Sync On

Synchronization is executed at the start of measurement, and the measurement is started when synchronization is established. If SyncLoss is detected during measurement, resynchronization is automatically executed.



Figure 8.6-4 Auto Sync On

Auto Sync Off

Measurement is performed on the assumption that synchronization is established at the start of measurement. SyncLoss is not detected during measurement.



Figure 8.6-5 Auto Sync Off

Note:

To obtain a BER curve, set Auto Sync to On so as to establish synchronization with superior S/N, and then switch Auto Sync to Off to change S/N and start the measurement.

8.7 Setting Input Interface

This section describes the settings of the input interface used for BER measurement. BER measurement will not stop even if this setting is changed.

🎇 BER Test	×	
BER Interface		
Clock Edge	Rise	
Data Polarity	Positive •	
Enable Active	Disable 🔹	
	Sat Canaal	

Figure 8.7-1 Input interface setup screen

Input interface setting procedure

Press F2 (BER Interface) from page 2 of the main function menu to set the input interface to be used for BER measurement. Use the cursor to select the item to be set and press F2 (Set) to display the setting window associated with that item. The settings for the input interface can be configured while continuing measurement.

The following items can be set in this menu.

• Clock Edge (Rise/Fall)

Switches the Clock signal detection edge between rising-edge detection and falling-edge detection.

- Data Polarity (Positive/Negative) Switches the logic of the Data signal between positive and negative logic.
- Enable Active (Disable/High/Low) Switches the logic of the Enable signal between unused, high active, and low active.

BER Measurement Function

8.8 Setting PN_Fix Pattern

Special PN patterns called PN_Fix patterns can be used for BER measurement.

Details of PN_Fix pattern

A PN_Fix pattern consists of a repetitive part of a PN pattern and a PN pattern shorter than one period.

N repetitions of PNx (N = 0, 1, 2, ...)



N: PNx repetition times

Figure 8.8-1 PN_Fix pattern

PN_Fix pattern setting procedure

To use a PN_Fix pattern, one of the following PN Fix patterns must be selected via Data Type selection.

PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix

After the PN Type has been selected, press 2 (PN_Fix Pattern) from page 2 of the main function menu to enable detailed settings for PN_Fix. Use the cursor to select the item to be set and set a value. The following items can be set in this menu.

- [1] PN Pattern Initial
 - Sets the initial bit pattern of the PN_Fix pattern.

🞇 BER Test	×
PN_FixPattern	
Data Type	PN9Fix
PN Pattern Initial	11111111
PN_Fix Pattern Length	96 🕂 Bit
	Set Cancel

Figure 8.8-2 PN Pattern Initial setup screen

- 1. Enter the initial bit pattern of the PN_Fix pattern. Enter the initial bit pattern in binary. Use the numeric key pad (only 0 and 1) to enter numeric values.
- 2. The settable bit count varies depending on the selected PN type: PN9Fix: 9 bits
 PN11Fix: 11 bits
 PN15Fix: 15 bits
 PN20Fix: 20 bits
 - PN23Fix: 23 bits
- [2] PN_Fix Pattern Length Specifies the length of the entire PN_Fix pattern.

🎇 BER Test	×
PN_Fix Pattern	
Data Type	PN9Fix
PN Pattern Initial	11111111
PN_Fix Pattern Length	96 ÷ Bit
	Set Cancel



8

Chapter 8 BER Measurement Function

Setting range:	96 to 134217728 bits
<note on="" pl<="" setting="" td=""><td>N_Fix></td></note>	N_Fix>
When the initial va	lue of PN_Fix is set to All0, the following signals
are output:	
PN9, PN11, PN20:	ALL0 signal
PN15, PN23:	ALL1 signal

Synchronization establishing condition for PN_Fix patterns

The synchronization establishing conditions for the PN_Fix pattern are described below.

In the description below, x is assumed as "PN stage count" (x = 9 for PN9).

Synchronization establishment is performed in the following three steps:

- [1] Synchronization with the PN pattern is established if no error is detected for $(x \times 2)$ bits.
- [2] The last bit of the PNxFix pattern is detected from the set initial bit pattern length of the PN pattern.
- [3] Synchronization with the entire PN_Fix pattern is established if no error is detected for x bits beginning with the head of the PN_Fix pattern.

An example of synchronization establishment with the PN9Fix pattern is shown below.





Figure 8.8-4 Example of synchronization establishment operation for PN9Fix pattern

Chapter 8 BER Measurement Function

PN_Fix pattern use example

A specific example of using a PN_Fix pattern is described below.

The following is described on the assumption that the frame format in a communication system is configured with fixed bits A (10 bits) and communication channels B (1000 bits) as shown in Figure 8.8-5 below. If PN9 is used for the communication channel, the bit count per frame (1000 bits) does not match the PN9 period (511 bits). In this event, therefore, a period of 511 frames is required to retain the continuity of the PN9 signal of the communication channel.

In the case of a signal generator that uses an arbitrary waveform generator such as the MS2840A, however, the number of patterns that can be stored in the waveform memory may decrease or exceed the capacity of the waveform memory if the number of samples of the waveform pattern becomes larger due to an increase in the number of frames, as described above.



Figure 8.8-5 PN9Fix pattern example

In such a case, use a signal with a short period, such as a two-frame period signal generated by IQproducerTM, and select "PNFix" for "Data Type" (see Figure 8.8-6 below). BER measurement can then be performed even for signals whose PN9 signal is discontinued in the middle of a frame, as shown in Figure 8.8-5 above.

Refer to the operation manual of each IQproducerTM for how to set the PN_Fix signal for the IQproducerTM.

Note, however, that the random nature of a pseudo random signal may partially be lost during measurement using a PN_Fix signal.

8.8 Setting PN_Fix Pattern



Figure 8.8-6 BER measurement using PN_Fix data

8

8.9 Setting User-defined Pattern

The MS2840A-026/126 allows the use of patterns created by the user (user-defined patterns) for BER measurement.

Details of user-defined pattern files

User-defined patterns are arbitrary binary sequences with 8 to 4096 bit length.



Figure 8.9-1 User-defined pattern

A user-defined pattern can be created in text file format using a PC. That file is then loaded from USB memory stick or the internal SSD of the MS2840A. Create the file as described below and set the extension as "bpn."

Table 8.9-1 shows the content that can be described in a user-defined pattern.

Character	Description
0, 1	Single-byte numbers. This portion is read as bit data. Numbers must be continuous using characters including spaces and line feeds.
Space	Single-byte space. These are used to make it easier to view bit data editing.
Line feed	CR/LF. This character is used to facilitate the view during bit data editing.
#	Single-byte sharp. Indicates comment lines.

Table 8.9-1 Content that can be described in user-defined pattern

The following shows examples of file content that can be loaded.

Example 1: #20070216 Marked by Anritsu Co. 0010 0111 0110 0011 0000 1111 0101 Example 2: #UserPattern Start 0000 0000 1111 1111 #mark001 0101 0101

#mark002 1111 1111 0000 0000

Chapter 8 BER Measurement Function

Displaying user-defined patterns

To use a user-defined pattern, select UserDefine for Data Type. The parameters for the loaded user-defined pattern will be displayed on the main screen. Blanks will be displayed if no user-defined pattern is loaded.



Figure 8.9-2 User-defined pattern parameter display

[1] Pattern File

Displays the name of the loaded user pattern.

- [2] Bit Length Displays the length (number of bits) of the loaded user pattern.
- [3] Sync Position Start Displays the bit at which synchronizing the user pattern is to be started.
- [4] Sync Position Length Displays a length (number of bits) to be compared with when synchronizing a user pattern.

User-defined pattern function menu

Select User Pattern for Data Type and press [2] (User Defined Pattern) from page 2 of the main function menu to display the user-defined pattern file function menu.



Figure 8.9-3 User-defined pattern function menu

Menu Display	Function	
User Pattern Detail	Performs settings related for synchronizing loaded user-defined patterns.	
Load User Pattern	Loads user-defined patterns from the USB memory stick or the internal SSD of the MS2840A.	
Device	Selects the media among the USB memory stick and internal SSD from which user-defined patterns are to be loaded.	

•• BER Measurement Function

Chapter 8 BER Measurement Function

Procedure for loading User-defined patterns

This section describes the procedure for loading user-defined patterns.

<Procedure>

 Press [5] (Device) to select among the USB memory stick and internal SSD, the device in which user-defined pattern files to be loaded are stored. Place user-defined pattern files in the root directory of the device.

🏭 B	ER Test			×
De	vice			
	(A·) (D:)			
	(E:) (F:) (G:) Data			
	(Q:)			
ļ				
		Set	Cancel	

Figure 8.9-4 Device selection window

2. Press [4] (Load User Pattern) to display the file selection window.

✓ MS2840A BER Test			×
User Pattern Files			
(D:) 15,103 Kbytes Free / 62,315 Kbytes Total			
Name	Date / Time	Size[KB]	Protect
1024bitTestPattern	2/13/2007 5:42:42 PM	1	Off
8bitTestPattern	2/13/2007 5:42:42 PM	1	Off
ErrorBitTestPattern01	2/13/2007 5:42:42 PM	1	Off
ErrorBitTestPattern02	2/13/2007 5:42:42 PM	1	Off
			Close
			Close

Figure 8.9-5 File selection window

- 3. Use the rotary knob or 🕢 💟 to select the user-defined pattern file to be loaded.
- Press F7 (Set) to load the selected user-defined pattern files.
 If F8 (Cancel) is pressed, loading of the user-defined pattern file is cancelled and the file selection window is closed.

Only files with extension ".bpn" are displayed in the file selection window.

User-defined pattern files must be placed in the root directory of the USB memory stick or internal SSD.

File names are displayed in ascending order for numbers and alphabetical characters.

Up to 100 files can be displayed in the file selection window. The 101st and subsequent files will not be displayed.

Up to 32 characters can be used for file names. Files with names consisting of 33 or more characters cannot be loaded.

If no user-defined pattern file exists in the media, the message "No file to read" will be displayed.

Either of the following messages will be displayed if the length of the user-defined pattern is out of the range supported by the MS2840A-026/126.

If shorter than 8 bits: "Bit pattern is too short." If longer than 4096 bits: "Bit pattern is too long."

The error message "Illegal character exists." will be displayed if the user-defined pattern file contains a character other than "0," "1," a line feed character, or "#."

Synchronization establishing condition setting for user-defined patterns

When the user-defined pattern is loaded, set the conditions for synchronization establishment.

Set the start bit and the length of the section to be used for judging the synchronization establishment. If no error is detected in the specified part, it is judged that synchronization is established.

<1> Start bit

Figure 8.9-6 Setting method for section judged for synchronization establishment

Example: Setting synchronization for a user-defined pattern <Procedure>

1. Press 🔳 (User Pattern Detail) from the user-defined pattern function menu to display the User Pattern Detail setting window.

🗱 BER Test		×	
User Pattern Detail			
File Name	8bitTestPattern		
Bit Length	8 Bit		
Sync Position Start	1 🗄 Bit		
Sync Position Lengt	h 32 🕂 Bit		
	Set Cancel		
-		_	

Figure 8.9-7 User pattern Detail setting window

2. Move the cursor to Sync Position Start and use the numeric key pad, rotary knob, or for synchronization establishment.

Range: 1 to the length of the user-defined pattern

 Move the cursor to Sync Position Length and use the numeric key pad, rotary knob, or to set the length of the section judged for synchronization establishment.

Range: 8 to 1024

8.10 Description of BER Measurement Operation

This section describes the BER measurement operation, from synchronization to measurement termination.

When Auto Resync is set to Off

The following flowchart summarizes BER measurement operation when Auto Resync is set to Off. In this mode, the error rate is checked immediately after synchronization in order to judge whether synchronization is correctly established. If the error rate is 30% or higher, it is judged as a synchronization failure, and re-synchronization is executed.





Figure 8.10-1 When Auto Resync is set to Off

BER Measurement Function

- *1: The error rate is not checked if the measurement is terminated with a measurement bit count of less than 1000 bits. The measured values may be incorrect in this event.
- *2: If the error rate when the measurement bit count reaches 1000 bits is 30% or higher, it is judged as a synchronization failure.
- *3: The measurement termination conditions are as follows:
 - The accumulated measurement bit count or measurement error bit count reaches the set bit count.
 - The measurement bit count exceeds the maximum value.
 - The number of SyncLoss errors exceeds the maximum value.

When Auto Resync is set to On

The following flowchart summarizes the BER measurement operation when Auto Resync is set to On. In this mode, resynchronization is automatically executed when SyncLoss occurs.


- *1: The SyncLoss condition check is not executed until the number of received bits reaches the number of bits set as the denominator of the SyncLoss threshold set in [Threshold] on the Resync Condition Setup screen. Therefore, it may take some time to start the count operation after synchronization is established.
- *2: Operation after SyncLoss occurrence is performed according to the setting specified in "at SyncLoss" on the Resync Condition Setup screen.
- *3: The measurement termination conditions are as follows:
 - The accumulated measurement bit count or measurement error bit count reaches the set bit count.
 - The measurement bit count exceeds the maximum value.
 - The number of SyncLoss errors exceeds the maximum value.

8

Chapter 9 Maintenance

This chapter describes cautions related to daily maintenance, storage, and shipping of the MS2840A, as well as the calibration procedure to be used as preventive maintenance.

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9.1 Daily Maintenance and Storage

9.1.1 Daily maintenance

Before daily maintenance of the MS2840A, be sure to turn the power off and unplug it from the AC outlet.

Panel surface dirt

When surface dirt is noticeable, after the MS2840A has been used in a dusty environment, or when the MS2840A has not been used for an extended period of time, wipe its surface with a cloth moistened in detergent and wrung enough.

Screen surface dirt

If the screen surface is dirty, first wipe it dry with a soft cloth. If the dirt persists, wipe the surface gently with a cloth dipped in detergent and wrung enough.

Loose screws

Use a Phillips screwdriver to tighten screws.

9.1.2 Precautions for long-term storage of MS2840A

Wipe off dust, fingerprint marks, stains, spots, etc. from the surface of the MS2840A before storing it. Also, avoid storing the MS2840A in the following places:

- Places that are exposed to direct sunlight
- Dusty places
- $\bullet\,$ Damp places where condensation may occur on the MS2840A surface
- Places where there the MS2840A may be corroded by active gases
- Places where the MS2840A may be oxidized
- Places having temperatures and relative humidity in the following ranges:

Temperature:	$-20\ {\rm ^oC}$ or lower, or 60 ${\rm ^oC}$ or higher
Humidity:	90 % or higher

Recommended storage conditions

It is recommended that the MS2840A be stored in a place that meets the ambient conditions suggested above, plus the following conditions, if it is not to be used for a long period of time:

- Temperature: 5 to 45 °C
- Humidity: 40 to 80 %
- Little temperature and humidity fluctuations within one day

9.1.3 Storing USB flash drive

Store a USB flash drive at a temperature of 4 to 53 °C and relative humidity of 8 to 90% (no condensation). Also, do not store it in places that are:

- Dusty and damp
- Close to magnetized items
- Exposed to direct sunlight
- Close to heat sources

9.1.4 Storing Removable SSD

For long-term storage of the Removable SSD, it is recommended that it be packed as it was purchased and be stored in a place that meets the following environment conditions.

- Temperature: 5 to 45 °C
- Humidity: 8 to 90 %
- Little temperature and humidity fluctuations within one day

Also, do not store it in places that are:

- Exposed to frequent vibrations or shocks
- Exposed to direct sunlight
- Close to heat sources

9.2 Repackaging and Transporting When Returning Product

The following describes cautions on transporting the MS2840A.

9.2.1 Repackaging

Repack the MS2840A in the packing material (box) in which it had been delivered. If the packing material has been scrapped or damaged, repack the MS2840A in the following manner:

- 1. Wrap the MS2840A in plastic or a similar material.
- 2. Procure a corrugated cardboard, wooden, or aluminum box large enough to pack in cushioning material around the MS2840A.
- 3. Place the MS2840A into the box. Then, pack in the cushioning material around the MS2840A so that the MS2840A does not move around in the box.
- 4. Secure the outside of the box with packaging cord, adhesive tape, bands, or other such implements.

9.2.2 Transporting

Avoiding as much vibrations as possible and satisfying the recommended storage conditions is recommended for transporting.

9.3 Calibration

9.3.1 Recomended calibration

Perform calibration as preventive maintenance to keep the MS2840A's performance from becoming degraded. Even if the MS2840A is functioning normally, calibrate it periodically to maintain its performance.

Calibrating the MS2840A once or twice a year is recommended. If the MS2840A fails to meet specifications after calibration, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the PDF version.



Before performing the calibration, allow the MS2840A and the equipment used for the performance test to warm up at least 30 minutes to allow them to fully stabilize. For optimal measuring accuracy, run the MS2840A at the temperature of 23±5°C), with low AC voltage fluctuation (100 to 120 Vac or 200 to 240 Vac), in an environment free from noise, vibration, dust, moisture, and other harmful ambient conditions.

9.3.2 Instruments used for calibrating MS2840A

Table 9.3.2-1 lists the measuring instruments used to calibrate the MS2840A.

Name of Recommended Device	Required Performance	Calibration Items	
Frequency counter	Capable of 1 GHz measurement	Reference oscillator frequency accuracy	INTG
Signal generator	Capable of outputting 1 GHz signal (Resolution: 0.01 Hz or higher)	Reference oscillator frequency accuracy	плепап
Frequency standard device	Standard radio receiver or device with equivalent capability (Accuracy: 1×10^{-11} order or better)	Reference oscillator frequency accuracy	Ce

Table 9.3.2-1 List of measuring instruments for calibration

9.3.3 Calibrating frequencies using frequency counter

Table 0 2 2 4

Use a frequency counter to calibrate the reference oscillator frequency. Use a frequency standard radio signal (signal synchronized with a standard radio signal or with a rubidium atom standard device) offering enough accuracy higher than the reference oscillator installed in the MS2840A.

Colibration anapifications

14516 5:5:5-1	calibration specificati	10113
Reference Oscillator	Aging Rate	Temperature
1 C	$\pm 1 \times 10$ flags	$10 $ $F_{\rm Y}$ $10 $ $f_{\rm C}$ (0)

Table 9.3.3-1	Calibration specifications

Reference Oscillator	Aging Rate	Temperature Stability
Internal reference oscillator	$\pm 1 \times 10^{-6}$ /year	$\pm 2.5 \times 10^{-6} \ensuremath{\left(0 \text{ to } 50 \ensuremath{^\circ C}\right)}$
Rubidium reference oscillator*1	$\pm 1 \times 10^{-10}$ /month	$\pm1{\times}10^{-9}$ (0 to 50 °C)
High Stability reference oscillator*2	$\pm 1 \times 10^{-7}$ /year	$\pm 2\times 10^{-8} \left(0 \text{ to } 50 \ ^\circ\text{C} \right)$

*1: Only when Rubidium reference oscillator (optional) is installed.

*2: Only when High Stability reference oscillator (optional) is installed.

Calibration procedure

The procedure for calibrating the frequency using a frequency counter is described below.



Figure 9.3.3-1 Connections for frequency calibration using frequency counter

- 1. Connect a 10 MHz signal output from the frequency standard device to the reference signal input connector (Reference In) of frequency counter.
- 2. Connect the reference signal output (Buffer Out) located on the rear panel of the MS2840A to the reference signal input connector (Reference In) of Signal Generator.
- 3. Connect the RF output connector 1 of signal generator to Input 1 connector of the frequency counter.
- 4. Set the frequency of signal generator to 1 GHz for output.
- 5. Set the measurement time of the frequency counter to 10 s and measure frequency.

When the frequency does not match, the MS2840A's reference oscillator should be adjusted.*

- To achieve synchronization, start the Signal Analyzer or the Spectrum Analyzer application. Then press (Accessory) from the Main function menu of the signal analyzer or the spectrum analyzer.
- 7. Press 📧 (Reference Clock) from the Accessory function menu.
- 8. From the Reference Clock function menu, press [1] (Reference Clock) then input adjustment values. The adjustment value can be set from 0 to 4095.
- 9. In practice, waveforms of the output frequency and reference frequency cannot be completely matched. Adjust so that frequency error is as small as possible.
- Perform a similar measurement after System Recovery.
 Re-adjustment is required when the frequency does not match.

9.4 Replacing SSD

Follow the procedure below to replace the MS2840A's internal SSD with the Removable SSD, Win10 (MS2840A-014/114).

If either or both of internal SSD (Primary SSD) and secondary SSD are faulty, contact an Anritsu Service and Sales office for factory repair.

Notes:

- Turn off the power to the MS2840A and disconnect the power vccplug from the outlet when replacing the SSD. Also, put the MS2840A on a flat horizontal bench top when working on it.
- Take care not to allow foreign matter to get in the SSD, nor to let the SSD get charged electrostatically or drop, when replacing. If the SSD is suspected of malfunctioning or being deformed, do not forcibly install it. Ignoring this may damage it.

<Replacement procedure>

1. Before replacing the internal SSD, create backups of saved waveform pattern and calibration files, and save them to the USB flash drive.

User data folder:

D: \Anritsu Corporation\Signal Analyzer\User Data

Calibration data folder:

C:\Anritsu\Signal Analyzer\System\Maintenance\Calibration Data\SA\ C:\Anritsu\Signal Analyzer\System\Maintenance\Calibration Data\SG\

- 2. On the rear panel, loosen two screws on the SSD ASSY with a flat head screwdriver.
- 3. Pull out the old SSD ASSY.
- 4. Insert the new SSD ASSY.
- 5. On the rear panel, tighten up the two screws on the SSD ASSY with a flat head screwdriver.

9.4 Replacing SSD



Figure 9.4-1 SSD ASSY Replacement

<Migrating backup data when returned from repair and calibration> The Removable SSD, Win10 (MS2840A-014/114) returned stores calibration files used for repair and calibration. Using the USB flash drive, copy the calibration files from the folder below to the SSD.

MS2840A:

C:\Anritsu\Signal Analyzer\System\Maintenance\Calibration Data\SA\ MS2840A (With Option 020/021 installed):

 $C:\Anritsu\Signal\Analyzer\System\Maintenance\Calibration\Data\SG\$

Performance Test Result Form

Test Location	Report No.		
	Date		
	Test person in charge		
Equipment Name: MS2840A Signal Analyz	zer		
Serial No.	Ambient temperature	°C	
Power frequency	Relative humidity	%	
Remarks			

Display Frequency Accuracy

Setting example					
Center freq [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Minimum [Hz]	Result	Maximum [Hz]
$500 \mathrm{~M}$	10 k	300	499999962		50000038
	200 k	3 k	499999428		500000572
	2 M	30 k	499994298		500005702
	$5 \mathrm{M}$	30 k	499987998		500012002
	10 M	100 k	499973998		500026002
	$20 \mathrm{M}$	100 k	499952998		500047002
	100 M	1 M	499739998		500260002
1800 M	10 k	300	1799999962		180000038
	200 k	3 k	1799999428		1800000572
	$2 \mathrm{M}$	30 k	1799994298		1800005702
	$5 \mathrm{M}$	30 k	1799987998		1800012002
	10 M	100 k	1799973998		1800026002
	20 M	100 k	1799952998		1800047002
	3600 M	3 M	1792289998		1807710002

Display frequency accuracy test, only for MS2840A-040/041

Display frequency accuracy test, only for MS2840A-041

Setting example					
Center freq [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Minimum [Hz]	Result	Maximum [Hz]
3000 M	10 k	300	2999999962		300000038
	100 k	3 k	2999999638		300000362
	$2 \mathrm{M}$	30 k	2999994298		3000005702
	$5 \mathrm{M}$	30 k	2999987998		3000012002
	10 M	100 k	2999973998		3000026002
	100 M	100 k	2999784998		3000215002
	6000 M	3 M	2987249998		3012750002

Setting example					
Center freq [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Minimum [Hz]	Result	Maximum [Hz]
500 M	10 k	300	499999962		50000038
	200 k	3 k	499999428		50000572
	$2 \mathrm{M}$	30 k	499994298		500005702
	$5 \mathrm{M}$	30 k	499987998		500012002
	10 M	100 k	499973998		500026002
	$20 \mathrm{M}$	100 k	499952998		500047002
	100 M	1 M	499739998		500260002
2000 M	10 k	300	1999999962		200000038
	200 k	3 k	1999999428		200000572
	$2 \mathrm{M}$	30 k	1999994298		2000005702
	$5 \mathrm{M}$	30 k	1999987998		2000012002
	10 M	100 k	1999973998		2000026002
	$20 \mathrm{M}$	100 k	1999952998		2000047002
	3600 M	3 M	1992289998		2007710002
$7150 \mathrm{~M}$	10 k	300	7149999962		7150000038
	100 k	3 k	7149999638		7150000362
	$2 \mathrm{M}$	30 k	7149994298		7150005702
	$5 \mathrm{M}$	30 k	7149987998		7150012002
	10 M	100 k	7149973998		7150026002
	100 M	100 k	7149784998		7150215002
	$4000 \mathrm{M}$	3 M	7141449998		7158550002
$14450 \mathrm{~M}$	10 k	300	14449999960		14450000040
	50 k	3 k	14449999741		14450000259
	$2 \mathrm{M}$	30 k	14449994296		14450005704
	$5 \mathrm{M}$	30 k	14449987996		14450012004
	10 M	100 k	14449973996		14450026004
	20 M	100 k	14449952996		14450047004
	7900 M	3 M	14433259996		14466740004

Display frequency accuracy test, only for MS2840A-044/046

Setting example					
Center freq [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Minimum [Hz]	Result	Maximum [Hz]
$22450~\mathrm{M}$	10 k	300	22449999956		22450000044
	200 k	3 k	22449999422		22450000578
	2 M	30 k	22449994292		22450005708
	$5 \mathrm{M}$	30 k	22449987992		22450012008
	10 M	100 k	22449973992		22450026008
	$20 \mathrm{M}$	100 k	22449952992		22450047008
	8100 M	1 M	22432839992		22467160008
$13250 \mathrm{~M}$	10 k	300	13249999960		13250000040
	200 k	3 k	13249999426		13250000574
	$2 \mathrm{M}$	30 k	13249994296		13250005704
	$5 \mathrm{M}$	30 k	13249987996		13250012004
	10 M	100 k	13249973996		13250026004
	20 M	100 k	13249952996		13250047004
	26500 M	3 M	13194199996		13305800004

Display frequency accuracy test, only for MS2840A-044

Display frequency accuracy test, only for MS2840A-046

	Setting exam	ple			
Center freq [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Minimum [Hz]	Result	Maximum [Hz]
$30250 \mathrm{M}$	10 k	300	30249999956		30250000044
	100 k	3 k	30249999632		30250000368
	$2 \mathrm{M}$	30 k	30249994292		30250005708
	$5 \mathrm{M}$	30 k	30249987992		30250012008
	10 M	100 k	30249973992		30250026008
	100 M	100 k	30249784992		30250215008
	$23700~\mathrm{M}$	3 M	30200079992		30299920008
22200 M	10 k	300	22199999956		22200000044
	100 k	3 k	22199999632		22200000368
	$2 \mathrm{M}$	30 k	22199994292		22200005708
	$5 \mathrm{M}$	30 k	22199987992		22200012008
	10 M	100 k	22199973992		22200026008
	100 M	100 k	22199784992		$2\overline{22200215008}$
	44400 M	3 M	22106609992		22293390008

Frequency Span Display Accuracy

		Settings for M		Measurement Results			
Center		Frequency	Signal G	Senerator	Min	$(f_{2'} - f_{1'})$	Max [%]
Freq [Hz]	RBW [Hz]	Span [Hz]	f₁ [Hz]	f ₂ [Hz]	[70]	/ 0.8 / SPAN × 100 – 100 [%]	
1800 M	300	10 k	1799996000	1800004000	-0.2		+0.2
	30 k	1 M	1799600000	1800400000	-0.2		+0.2
	100 k	10 M	1796000000	1804000000	-0.2		+0.2
	1 M	100 M	1760000000	1840000000	-0.2		+0.2
	3 M	3600 M	36000000	3240000000	-0.2		+0.2
3000 M	300	10 k	2999996000	3000004000	-0.2		+0.2
(MS2840A-	30 k	1 M	2999600000	3000400000	-0.2		+0.2
041	100 k	1 0 M	2996000000	3004000000	-0.2		+0.2
only)	1 M	100 M	296000000	3040000000	-0.2		+0.2
	3 M	6000 M	600000000	5400000000	-0.2		+0.2

MS2840A-040/041 frequency span display accuracy test

	<u> </u>	Settings for	MS2840A	-		Measurement Results	
Contor		Eroquoney	Signal G	enerator	Min	$(f_{2'} - f_{1'})$	Max
Freq [Hz]	RBW [Hz]	Span [Hz]	f₁ [Hz]	f ₂ [Hz]	[%]	/ 0.8 / SPAN × 100 – 100 [%]	[%]
2000 M	300	10 k	1999996000	2000004000	-0.2		+0.2
	30 k	$2 \mathrm{M}$	1999200000	2000800000	-0.2		+0.2
	100 k	$30 \mathrm{M}$	1988000000	2012000000	-0.2		+0.2
	1 M	$400 \mathrm{M}$	1840000000	2160000000	-0.2		+0.2
	3 M	4000 M	40000000	360000000	-0.2		+0.2
$7150 \mathrm{~M}$	300	10 k	7149996000	7150004000	-0.2		+0.2
	30 k	$2 \mathrm{M}$	7149200000	7150800000	-0.2		+0.2
	100 k	30 M	7138000000	7162000000	-0.2		+0.2
	1 M	400 M	6990000000	7310000000	-0.2		+0.2
	3 M	$6600 \mathrm{M}$	4510000000	979000000	-0.2		+0.2
$14450 \ \mathrm{M}$	300	10k	14449996000	14450004000	-0.2		+0.2
	30k	2M	14449200000	14450800000	-0.2		+0.2
	100k	30M	14438000000	14462000000	-0.2		+0.2
	1M	400M	14290000000	14610000000	-0.2		+0.2
	3M	7900M	11290000000	17610000000	-0.2		+0.2
MS2840A-04	4 only						
$22450 \mathrm{M}$	300	10k	22449996000	22450004000	-0.2		+0.2
	30k	2M	22449200000	22450800000	-0.2		+0.2
	100k	30M	22438000000	22462000000	-0.2		+0.2
	1M	400M	22290000000	22610000000	-0.2		+0.2
	3M	8100M	19210000000	25690000000	-0.2		+0.2
13250M	3M	26500M	290000000	2410000000	-0.2		+0.2
MS2840A-04	6 only						
30250M	300	10k	30249996000	30250004000	-0.2		+0.2
	30k	2M	30249200000	30250800000	-0.2		+0.2
	100k	30M	30238000000	30262000000	-0.2		+0.2
	1M	400M	3009000000	30410000000	-0.2		+0.2
	3M	23500M	20850000000	39650000000	-0.2		+0.2
22200M	3M	43000M	4440000000	39960000000	-0.2		+0.2

MS2840A-044/046 frequency span display accuracy test

Single Sideband Noise Level

	Settings for	or MS2840A					
Offset frequency [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Video bandwidth [Hz]	Result	Maximum [dBc/Hz]	Uncertainty [dB]	
10 k	$25~\mathrm{k}$	1 k	1		-123	+0.5	
100 k	$250 \mathrm{~k}$	10 k	3		-123	+0.5	
1 M	$2.5~\mathrm{M}$	100 k	3		-135	+0.5	

With MS2840A-066/166, and MS2840A-066/166 active. (SPAN $\leq 1~\mathrm{MHz})$

	Settings for	or MS2840A					
Offset frequency [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Video bandwidth [Hz]	Result	Maximum [dBc/Hz]	Uncertainty [dB]	
1 k	$2.5~\mathrm{k}$	100	3		-122	+0.5	
10 k	$25~\mathrm{k}$	1 k	3		-133	+0.5	
100 k	$250 \mathrm{~k}$	10 k	3		-133	+0.5	

■ RF Frequency Characteristics

Frequency Band Mode: Normal (MS2840A-040/041 only)

Without MS2840A-008/108 or with Preamplifier turned off, and without MS2840A-066/166 or MS2840A-066/166 turned off:

Erog	Calibration	Measured	Minima	Result	- Maximum [dB]	Uncontainty
[Hz]	value [dBm]	value value [dl [dBm] [dBm]	[dB]	Measured value – Calibration value [dB]		[dB]
10 M			-0.35		+0.35	±0.12
20 M			-0.35		+0.35	±0.12
50 M			-0.35		+0.35	±0.10
100 M			-0.35		+0.35	±0.10
200 M			-0.35		+0.35	±0.10
$500 \mathrm{M}$			-0.35		+0.35	±0.10
1 G			-0.35		+0.35	±0.10
2 G			-0.35		+0.35	±0.10
3 G			-0.35		+0.35	±0.10

Frequency Band Mode: Normal (MS2840A-041 only)

Without MS2840A-008/108 or with Preamplifier turned off:

4 G	-1.5	+1.5	±0.3
$5~\mathrm{G}$	-1.5	+1.5	±0.3
6 G	-1.5	+1.5	±0.3

Frequency Band Mode: Normal (MS2840A-040/041 only)

With MS2840A-008/108 and Preamplifier turned on, and without MS2840A-066/166 or MS2840A-066/166 turned off:

Erog	Calibration	Measured	Minimum	Result	Maximum	Uncontainty
[Hz]	value [dBm]	value [dBm]	[dB]	Measured value – Calibration value [dB]	[dB]	[dB]
50 M			-0.65		+0.65	± 0.15
100 M			-0.65		+0.65	± 0.15
200 M			-0.65		+0.65	± 0.15
500 M			-0.65		+0.65	± 0.15
1 G			-0.65		+0.65	± 0.15
2 G			-0.65		+0.65	± 0.15
3 G			-0.65		+0.65	±0.15

Frequency Band Mode: Normal (MS2840A-041 only)

With MS2840A-008/108 and Preamplifier turned on:

4 G	-1.8	+1.8	± 0.15
$5~{ m G}$	-1.8	+1.8	± 0.15
6 G	-1.8	+1.8	± 0.15

Result Measured Calibration Maximum Uncertainty Freq. Minimum Measured value value [Hz] value [dBm] [dB] [dB] [dB] **Calibration value** [dBm] [dB] ± 0.15 $10 \mathrm{M}$ -0.65+0.65 $20 \mathrm{M}$ -0.65+0.65 ± 0.15 $50 \mathrm{M}$ -0.65+0.65 ± 0.15 $100 \mathrm{M}$ -0.65+0.65 ± 0.15 $200 \mathrm{M}$ -0.65+0.65 ± 0.15 $500 \mathrm{M}$ -0.65+0.65 ± 0.15 $1 \mathrm{G}$ -0.65+0.65 ± 0.15 $2 \mathrm{G}$ ± 0.15 -0.65+0.65 $3~\mathrm{G}$ -0.65+0.65 ± 0.15 $4~\mathrm{G}$ -1.8+1.8 ± 0.15 $5~\mathrm{G}$ -1.8+1.8 ± 0.15 6 G -1.8+1.8 ± 0.15

Frequency Band Mode: Normal (MS2840A-044/046 only) With MS2840A-008/108 and Preamplifier turned on:

Frequency Band Mode: Normal (MS2840A-044/046 only)

With MS2840A-068/168/069/169 and Preamplifier turned on:

Without MS2840A-067/167, with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done:

		Manager		Result		
Freq. [Hz]	req. Calibration Incusuled Hz] value [dBm] value 10 M Incusuled value	Minimum [dB]	Measured value – Calibration value [dB]	Maximum [dB]	Uncertainty [dB]	
10 M			-0.65		+0.65	± 0.15
20 M			-0.65		+0.65	± 0.15
$50 \mathrm{M}$			-0.65		+0.65	± 0.15
100 M			-0.65		+0.65	± 0.15
200 M			-0.65		+0.65	± 0.15
$500 \mathrm{M}$			-0.65		+0.65	± 0.15
1 G			-0.65		+0.65	± 0.15
2 G			-0.65		+0.65	± 0.15
3 G			-0.65		+0.65	± 0.15
4 G			-1.8		+1.8	± 0.3
$5~{ m G}$			-1.8		+1.8	±0.3
6 G			-1.8		+1.8	± 0.3
6.01 G			-1.8		+1.8	±0.3
8 G			-1.8		+1.8	± 0.3
10 G			-1.8		+1.8	± 0.3
12 G			-1.8		+1.8	±0.3
$13.5~\mathrm{G}$			-1.8		+1.8	±0.3
15 G			-2.5		+2.5	±0.6
17 G			-2.5		+2.5	±0.6
20 G			-2.5		+2.5	±0.6
26.5 G			-2.5		+2.5	±0.6

Frequency Band Mode: Normal (MS2840A-046 only)

Without MS2840A-068/168 or with Preamplifier turned on:

Without MS2840A-067/167, with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done:

29 G	-3.0	+3.0	± 0.8
33 G	-3.0	+3.0	±0.8
40 G	-3.0	+3.0	±0.8

Frequency Band Mode: Normal (MS2840A-044/046 only)

Without MS2840A-068/168/069/169 or with Preamplifier turned off:

Without MS2840A-067/167, with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done:

Erog	Calibration	Measured	Minimum	Result	Movimum	Upoortointy	
[Hz]	Hz] [dBm] [dB	value [dBm]	[dB]	Measured value – Calibration value [dB]	[dB]	[dB]	
10 M			-0.35		+0.35	±0.12	
20 M			-0.35		+0.35	±0.12	
50 M			-0.35		+0.35	±0.12	
100 M			-0.35		+0.35	± 0.12	
200 M			-0.35		+0.35	±0.12	
$500 \mathrm{M}$			-0.35		+0.35	± 0.12	
1 G			-0.35		+0.35	± 0.12	
$2~{ m G}$			-0.35		+0.35	± 0.12	
3 G			-0.35		+0.35	± 0.12	
4 G			-1.5		+1.5	±0.3	
$5~{ m G}$			-1.5		+1.5	±0.3	
6 G			-1.5		+1.5	±0.3	
$6.01~{ m G}$			-1.5		+1.5	±0.3	
8 G			-1.5		+1.5	±0.3	
10 G			-1.5		+1.5	±0.3	
$12~{ m G}$			-1.5		+1.5	±0.3	
$13.5~\mathrm{G}$			-1.5		+1.5	±0.3	
15 G			-2.5		+2.5	± 0.5	
17 G			-2.5		+2.5	± 0.5	
20 G			-2.5		+2.5	±0.5	
$26.5 \mathrm{G}$			-2.5		+2.5	±0.5	

Frequency Band Mode: Normal (MS2840A-046 only)

Without MS2840A-068/168 or with Preamplifier turned off:

Without MS2840A-067/167, with Microwave Preselector Bypass turned off and after Preselector Auto Tune is done:

29 G	-2.5	+2.5	± 0.5
33 G	-2.5	+2.5	± 0.5
40 G	-2.5	+2.5	± 0.5

Display Average Noise Level

Frequency Band Mode: Normal (MS2840A-040/041 only) Without MS2840A-066/166, without MS2840A-008/108, and Preamplifier turned off:

Center freq [Hz]	Display Average Noise Level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-134
1 M		-144
10 M		-150
30 M		
99 M		-153
999 M		
$1999 \mathrm{~M}$		1 .
$2399~{\rm M}$		-101
$2999~{\rm M}$		-149
3999 M		
4999 M		-146
$5999~{ m M}$		

Note:

MS2840A-040: 9 kHz to 3600 MHz MS2840A-041: 9 kHz to 6000 MHz

Frequency Band Mode: Normal (MS2840A-040/041 only) Without MS2840A-066/166, with MS2840A-008/108, and Preamplifier turned on:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
1 M		-156
30 M		
99 M		-166
999 M		
$1999~{\rm M}$		-165
$2399~{\rm M}$		104
$2999~{\rm M}$		-164
$3999 \mathrm{M}$		-161
4999 M		101
$6000 \mathrm{M}$		-101

Note:

MS2840A-040: 100 kHz to 3600 MHz MS2840A-041: 100 kHz to 6000 MHz

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-133
1 M		-143
10 M		-149
30 M		
99 M		-152
999 M		
1999 M		150
2399 M		-100
2999 M		-147
3999 M		
4999 M		-144
5999 M		

Frequency Band Mode: Normal (MS2840A-040/041 only) With MS2840A-066/166, without MS2840A-008/108, and Preamplifier turned off:

Frequency Band Mode: Normal (MS2840A-040/041 only) With MS2840A-066/166, with MS2840A-066/166 turned off, with MS2840A-008/108, and Preamplifier turned on:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
1 M		-155
30 M		
99 M		-165
999 M		
1999 M		-164
2399 M		100
2999 M		-162
3999 M		-158
4999 M		150
6000 M		-198

Note:

MS2840A-040: 100 kHz to 3600 MHz MS2840A-041: 100 kHz to 6000 MHz

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-134
1 M		-144
10 M		-150
30 M		
99 M		-153
999 M		
1999 M		150
2399 M		-150
2999 M		-147
3999 M		-144
4999 M		144
5999 M		-144
6001 M		
8001 M		
9999 M		-151
11499 M		
13499 M		
18299 M		-146
26499 M		-146
33999 M		-146
39999 M		-144
44499 M		-140

Frequency Band Mode: Normal (MS2840A-044/046 only) Without MS2840A-067/167/068/168/069/169:

Note:

MS2840A-044: 9 kHz to 26500 MHz MS2840A-046: 9 kHz to 44500 MHz

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-134
1 M		-144
10 M		-150
30 M		
99 M		-153
999 M		
1999 M		150
$2399~{\rm M}$		-130
2999 M		-147
3999 M		-144
4999 M		144
$5999 { m ~M}$		-144
6001 M		
8001 M		
9999 M		-147
11499 M		
13499 M		
18299 M		-145
26499 M		
33999 M		-141
39999 M		-135
44499 M		-132

Frequency Band Mode: Normal (MS2840A-044/046 only) Without MS2840A-067/167, with MS2840A-068/168/069/169 and Preamplifier turned off:

Note:

MS2840A-044: 9 kHz to 26500 MHz MS2840A-046: 9 kHz to 44500 MHz

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
1 M		-156
30 M		
99 M		-166
999 M		
1999 M		-164
2399 M		169
2999 M		-105
3999 M		-160
4999 M		_160
5999 M		-100
6001 M		
8001 M		
9999 M		-163
11499 M		
13499 M		
18299 M		-163
$26499~\mathrm{M}$		-157

Frequency Band Mode: Normal (MS2840A-044 only) Without MS2840A-067/167, with MS2840A-069/169 a

4 0ablifior turbod

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
1 M		-156
30 M		
99 M		-166
999 M		
1999 M		-164
2399 M		109
2999 M		-103
3999 M		-160
4999 M		100
$5999~{ m M}$		-160
6001 M		
8001 M		
9999 M		-163
11499 M		
13499 M		
18299 M		-163
26499 M		-160
33999 M		-160
39999 M		-157
44499 M		-149

Frequency Band Mode: Normal (MS2840A-046 only) Without MS2840A-067/167, with MS2840A-068/168 and Preamplifier turned on:

Frequency Band Mode: Normal (MS2840A-044/046 only) With MS2840A-067/167 and without MS2840A-068/168/069/169:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
$6001 \mathrm{M}$		
8001 M		
$9999~\mathrm{M}$		-147
11499 M		
$13499~\mathrm{M}$		
$18299\mathrm{M}$		-145
$26499~{\rm M}$		-141
33999 M		-141
39999 M		-135
44499 M		-132

Note:

MS2840A-044: 100 kHz to 26500 MHz MS2840A-046: 100 kHz to 44500 MHz

Frequency Band Mode: Normal (MS2840A-044/046 only) With MS2840A-067/167, with MS2840A-068/168/069/169, and Preamplifier turned off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-142
11499 M		
13499 M		
18299 M		-140
26499 M		-136
33999 M		-136
39999 M		-131
44499 M		-128

Note:

MS2840A-044: 100 kHz to 26500 MHz MS2840A-046: 100 kHz to 44500 MHz

Frequency Band Mode: Normal (MS2840A-044 only)

With MS2840A-067/167, with MS2840A-069/169, Preamplifier turned on, and Microwave Preselector Bypass turned on:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-158
11499 M		
13499 M		
18299 M		-157
26499 M		-152

Frequency Band Mode: Normal (MS2840A-046 only) With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and

Microwave Preselector Bypass turned on:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-161
11499 M		
13499 M		
18299 M		-161
$26499~\mathrm{M}$		-156
33999 M		-152
39999 M		-151
44499 M		-143

Frequency Band Mode: Normal (MS2840A-044 only)

With MS2840A-067/167, with MS2840A-069/169, Preamplifier turned on, and Microwave Preselector Bypass turned off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-162
11499 M		
13499 M		
18299 M		-160
26499 M		-159

Frequency Band Mode: Normal (MS2840A-046 only)

With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
$6001 \mathrm{M}$		
8001 M		
9999 M		-164
11499 M		
13499 M		
18299 M		-164
$26499~{\rm M}$		-159
33999 M		-157
39999 M		-155
44499 M		-146

Appendix Appendix A

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-134
1 M		-144
10 M		-150
30 M		
99 M		-153
999 M		
1999 M		150
2399 M		-100
2999 M		-147
3999 M		-144
4999 M		144
$5999 { m M}$		-144
6001 M		
8001 M		
9999 M		-150
11499 M		
13499 M		
18299 M		-149
26499 M		-146
33999 M		-146
39999 M		-142
44499 M		-137

Frequency Band Mode: Normal (MS2840A-046, MS2840A-019/119 installed) Without MS2840A-067/167/068/168:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
9 k		-120
100 k		-134
1 M		-144
10 M		-150
30 M		
99 M		-153
999 M		
1999 M		150
2399 M		-150
2999 M		-147
3999 M		-144
4999 M		144
5999 M		-144
6001 M		
8001 M		
9999 M		-146
11499 M		
13499 M		
18299 M		-145
26499 M		
33999 M		
39999 M		-135
44499 M		-130

Frequency Band Mode: Normal (MS2840A-046, MS2840A-019/119 installed) Without MS2840A-067/167, with MS2840A-068/168, and Preamplifier turned off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
1 M		-156
30 M		
99 M		-166
999 M		
1999 M		-164
2399 M		109
2999 M		-105
3999 M		-160
4999 M		100
$5999~{ m M}$		-160
6001 M		
8001 M		
9999 M		-163
11499 M		
13499 M		
18299 M		-163
26499 M		-160
33999 M		-159
39999 M		-156
44499 M		-149

Frequency Band Mode: Normal (MS2840A-046, MS2840A-019/119 installed) Without MS2840A-067/167, with MS2840A-068/168, and Preamplifier turned on:

Frequency Band Mode: Normal (MS2840A-044/046, MS2840A-019/119 installed) With MS2840A-067/167, without MS2840A-068/168, and Microwave Preselector Bypass turned on/off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-147
11499 M		
$13499~\mathrm{M}$		
$18299~\mathrm{M}$		-145
$26499~{\rm M}$		-141
$33999 \mathrm{M}$		-140
39999 M		-135
$44499~\mathrm{M}$		-129

Frequency Band Mode: Normal (MS2840A-046, MS2840A-019/119 installed) With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned off, and Microwave Preselector Bypass turned on/off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-142
11499 M		
13499 M		
18299 M		-140
26499 M		-136
33999 M		-135
39999 M		-131
44499 M		-125

Frequency Band Mode: Normal (MS2840A-044/046, MS2840A-019/119 installed) With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned on:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
$6001 \mathrm{M}$		
8001 M		
$9999~{\rm M}$		-161
11499 M		
$13499 \mathrm{M}$		
$18299~\mathrm{M}$		-161
$26499\mathrm{M}$		-156
$33999 \mathrm{M}$		-152
39999 M		-151
44499 M		-143

Frequency Band Mode: Normal (MS2840A-046, MS2840A-019/119 installed) With MS2840A-067/167, with MS2840A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned off:

Center freq [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]
6001 M		
8001 M		
9999 M		-164
11499 M		
13499 M		
18299 M		-164
26499 M		-159
33999 M		-157
39999 M		-155
44499 M		-146
Second Harmonic Wave Distortion

MS2840A-040/041

Without MS2840A-008/108 or with Preamplifier turned off:

Settings for MS2840A			Desult			
Freq. [MHz]	Ref_Level [dBm]	Output level [dBm]	Applicable LPF	Result [dBc]	Maximum [dBc]	Uncertainty [dB]
51	-30	-20	SLP-50+		(Mixer Input level = -30 dBm) -60	+1.5
301	-30	-20	VLF-400 (+)		(Mixer Input level = -30 dBm)	+1.5
1751	-30	-20	VLF-2250 (+) (2-stage series)		-05	+1.5
2999	0	-10	VLF-3000 (+) (2-stage series)		(Mixer Input level = -20 dBm) -80	+3.0

Appendix A Performance Test Result Form

MS2840A-044/046

Without MS2840A-008/108/068/168/069/169 and without MS2840A-067/167:

Settings for MS2840A						
Freq. [MHz]	Ref_Level [dBm]	Output level [dBm]	Applicable LPF	Result [dBc]	Maximum [dBc]	Uncertainty [dB]
51	-30	-20	SLP-50+		(Mixer Input level = -30 dBm) -60	+1.5
301	-30	-20	VLF-400 (+)		(Mixer Input level =	+1.5
1751	-30	-20	VLF-2250 (+) (2-stage series)		-65	+1.5
2999	0	-10	VLF-3000 (+) (2-stage series)		(Mixer Input level = -20 dBm) -80	
5999	0	0	VLF-6000 (+) (2-stage series)		(Mixer Input level =	+3.0
6749	0	0	VLF-6700 (+) (2-stage series)		-90	+3.0

MS2840A-044/046

With MS2840A-068/168/069/169 or with Preamplifier turned off:

Or, with MS2840A-067/167 and Microwave Preselector Bypass turned off:

	Settings for MS2840A					
Freq. [MHz]	Ref_Level [dBm]	Output level [dBm]	Applicable LPF	[dBc]	Maximum [dBc]	Uncertainty [dB]
51	-30	-20	SLP-50+		(Mixer Input level = -30 dBm) -60	+1.5
301	-30	-20	VLF-400 (+)		(Mixer Input level	+1.5
1751	-30	-20	VLF–2250 (+) (2-stage series)		-65	+1.5
2999	0	-10	VLF–3000 (+) (2-stage series)		(Mixer Input level = -20 dBm) -80	+3.0
5999	0	0	VLF-6000 (+) (2-stage series)		(Mixer Input level	+3.0
6749	0	0	VLF-6700 (+) (2-stage series)		-70	+3.0

Appendix B Panel Keys and Keyboard Operations

Panel Key	USB Keyboard
Preset [Preset]	[Ctrl] + [Shift] + [R]
	[Ctrl] + [Shift] + [↑]
F1 [F1]	[F1]
F2 [F2]	[F2]
F3 [F3]	[F3]
F4 [F4]	[F4]
F5 [F5]	[F5]
F6 [F6]	[F6]
[F7] [F7]	[F7]
F8 [F8]	[F8]
(Eack)	$[Ctrl] + [Shift] + [\leftarrow]$
→ [More]	$[Ctrl] + [Shift] + [\rightarrow]$
Trace [Trace]	[Ctrl] + [Alt] + [V]
Measure [Measure]	[Ctrl] + [Alt] + [X]
Encoder [Right rotation]	Mouse wheel [Scroll for above]
Encoder [Left rotation]	Mouse wheel [Scroll for below]
	[↑]
\geq $[\rightarrow]$	$[\rightarrow]$
	[↓]
[←]	[←]
[Enter]	[Enter]

Table B-1 Correspondences between panel keys and keyboard operations

Appendix B	Panel Keys and Keyboard Operations
------------	------------------------------------

Panel Key	USB Keyboard
• [0]	[0]
1 [1]	[1]
2 [2]	[2]
3 [3]	[3]
4 [4]	[4]
5 [5]	[5]
6 [6]	[6]
7 [7]	[7]
® [8]	[8]
[9]	[9]
.]	[.]
<u> </u>	[-]
Shift] + [4]	[A]
Shift] + [5]	[B]
Shift [Shift] + [6]	[C]
Shift [Shift] + [7]	[D]
Shift [Shift] + [8]	[E]
Shift [Shift] + [9]	[F]
Cancel [Cancel]	[Esc]
BS [BS]	[Back Space]
Single [Single]	[Ctrl] + [Shift] + [F1]
Continuous [Continuous]	[Ctrl] + [Shift] + [F2]
Frequency [Frequency]	[Ctrl] + [Shift] + [0]
Span [Span]	[Ctrl] + [Shift] + [1]
Amplitude [Amplitude]	[Ctrl] + [Shift] + [2]
Marker [Marker]	[Ctrl] + [Shift] + [3]
BW [BW]	[Ctrl] + [Shift] + [4]
Trigger/Gate]	[Ctrl] + [Shift] + [5]
Time:Sweep]	[Ctrl] + [Shift] + [6]
Peak Search [Peak Search]	[Ctrl] + [Shift] + [7]
Save [Save]	[Ctrl] + [S]
Recall [Recall]	[Ctrl] + [O]
Copy [Copy]	[Ctrl] + [Shift] + [8]

Table B-1 Correspondences between panel keys and keyboard operations (Cont'd)

Appendix B Panel Keys and Keyboard Operations

Panel Key	USB Keyboard
Cal [Cal]	[Ctrl] + [Shift] + [9]
SPA [SPA]	Not available
SA [SA]	Not available
SG [SG]	Not available
Appli [Appli]	Not available

Table B-1 Correspondences between panel keys and keyboard operations (Cont'd)

Note:

The figure in [Ctrl] + [Shift] + "figure" cannot be entered by the numeric keypad.

Appendix C Virus Check Procedure (WES 7)

It is the customer's responsibility to purchase, install, and operate anti-virus software on the MS2840A. Follow the manual of the anti-virus software you purchased.

This document explains the procedure of virus scanning without installing any anti-virus software on the MS2840A. Virus scanning can be performed by assigning the equipment drives to network drives on an external computer on which anti-virus software is installed.

Even if network drives cannot be scanned using your software, scanning might be possible by dragging and dropping a network drive onto the anti-virus software icon in Windows Explorer.

C.1	Connecting External PC to MS2840AC-3
C.2	Checking IP address of MS2840AC-3
C.3	Configuring shared settingsC-4
C.4	Changing the user account for the equipmentC-5
C.5	Shared Settings for MS2840AC-8
C.6	Mounting the equipment drives to the external computer drivesC-10
C.7	Scanning for virusC-12
C.8	Unmounting the equipment drives from the external computer drivesC-12
C.9	Making the equipment drives unsharedC-12
C.10	Restoring the previous user account setting for the equipmentC-12
C.11	Enabling Simple File SharingC-13

Notes:

• Be sure to follow the procedure described in this document. If this procedure is not followed, not only will it not be possible to check for viruses, but the equipment might become unusable.

If the equipment runs abnormally after removing viruses, execute system recovery to restore all drives to the factory default settings. For the procedure, refer to Section 5.3 "System Recovery Functions".

After performing system recovery, the firmware might have to be upgraded to the latest version depending on when the equipment was released.

• Before using anti-virus software, be sure to check its usage and the license scope.

C.1 Connecting External PC to MS2840A

Connect MS2840A and the external PC with LAN cable.

For details about how to set up the network for the MS2840A, see Chapter 1 "Basics of Remote Control" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Main Frame, Remote Control).*

C.2 Checking IP address of MS2840A

If the IP address is automatically assigned upon establishing a DHCP connection, check the IP address by using the following procedure:

1. Display the MS2840A desktop.

To display the desktop, right-click anywhere on the screen and select **Show the Desktop**.

 Display the MS-DOS Prompt. Move a mouse downward on the MS2840A screen to display the task bar. Select Start > All Programs > Accessories > Command Prompt.



3. Enter the following:

ipconfig

The assigned IP address displays as shown.

Appendix C Virus Check Procedure (WES 7)



C.3 Configuring shared settings

Simple File Sharing is enabled for the equipment by default. If authentication is performed by way of a network while Simple File Sharing is enabled, the accessing user is regarded as having a Guest account and cannot access important folders and files such as the Windows folder. To avoid this, use the following procedure to temporarily disable Simple File Sharing.

- Move a mouse downward on the MS2840A screen to display the task bar. Click Start > Computer.
- 2. In Organize menu, click Folder and search options, and click View tab.
- 3. Advanced Settings list, turn off Use sharing Wizard (Recommended) check box.



4. Click **OK**.

C.4 Changing the user account for the equipment

This section describes how to change the user account used when the equipment drives are mounted to network drives.

- 1. From the Start menu, click **Control Panel**.
- 2. Click Administrative Tools from the Control Panel.

📴 All Cor	ntrol Panel Items		
00) 🔋 🛛 Control Panel 👻 All Contr	ol Panel Items 👻	- 5
Adjust	your computer's settings	View by: Large icons 🔻	<u>-</u>
			-
Þ	Action Center	(2) Administrative Tools	
	AutoPlay	Backup and Restore	
	BitLocker Drive Encryption	Color Management	
Ø	Credential Manager	Date and Time	
•	Default Programs	Desktop Gadgets	
1	Device Manager	Devices and Printers	

3. Click Computer Management.

🖗 Administrative Tools					
Contr	rol Panel 👻 All Control Panel Items 👻 Administrative Too	ols	- 🐼		
Organize 👻 💽 Open		:==	- 🗌 🕐		
🔶 Favorites 📥	Name *	Date modified	Туре 🔺		
🧾 Desktop	B Component Services	7/29/2015 5:14 AM	Shortcut		
Downloads (3)	🚼 Computer Management	7/29/2015 5:12 AM	Shortcut		
过 Recent Place	📷 Data Sources (ODBC)	7/29/2015 5:14 AM	Shortcut		
🚞 Libraries	🛃 Event Viewer	7/29/2015 5:14 AM	Shortcut		
Documents	🔝 Internet Information Services (IIS) 6.0 Mana	7/29/2015 5:13 AM	Shortcut		
J Music	📸 Internet Information Services (IIS) Manager	7/29/2015 5:13 AM	Shortcut		
E Pictures	🙈 iSCSI Initiator	7/29/2015 5:14 AM	Shortcut		
Videos	📩 Local Security Policy	7/29/2015 5:14 AM	Shortcut		
Constant I	Performance Monitor	7/29/2015 5:12 AM	Shortcut		
re Computer	🕮 Dviet Management	7/20/2015 E-12 AM	Chartout		

4. In Computer Management tree, click **Users** under **Local Users and Groups**.



5. Right click the user account **ANRITSU** to use, and click **Set Password...**



6. When the message below is shown, click **Proceed**.



C.4 Changing the user account for the equipment

7. Type "ANRITSU" for the password of the user account **ANRITSU**.

Set Password for ANRITSU
New password: (7)
Confirm password:
⚠️ If you click OK, the following will occur:
Your local user account will immediately lose access to all of its encrypted files, stored passwords, and personal security certificates.
If you click Cancel, the password will not be changed and no data loss will occur.
(8) OK Cancel

8. Confirm and click **OK**.

C.5 Shared Settings for MS2840A

- 1. From the **Start** menu, click **Computer**.
- 2. Right-click the C drive.
- 3. Click Share with > Advanced sharing.
- 4. Click the **Sharing** tab.

*	öystem Disk (C:) Properties		×		
	Security	Previous Versions	Quota	Customize Sharing		
	General Tools Hardware Sharing Network File and Folder Sharing C:\ C:\ Not Shared Network Path: Not Shared Share					
(5)	Advanced Sharing Set custom permissions, create multiple shares, and set other advanced sharing options. (5) Status Advanced Sharing					
	Password Protection People without a user account and password for this computer can access folders shared with everyone.					
	- S change (II	OK.	Cancel	Apply		

- 5. Click Advanced Sharing...
- 6. Turn off **Share this folder** check box to disable currently enabled folder sharing setting,

Advanced Sharing	X
Share this folder (6)	
Settings	
Share name:	
C	
Add Remove	
Limit the number of simultaneous users to:	
Comments:	
Permissions Caching	
(7) OK Cancel Apply	

- 7. Click **OK**
- 8. Sharing dialog box appears. Click Yes.



- 9. Turn on **Share this folder** check box.
- 10. Click **Permissions**.

Advanced Sharing	×
Share this folder (9)	
Settings	
Share name:	
C	
Add Remove	
Limit the number of simultaneous users to: 20	
Comments:	
(10)	
Permissions Caching	
OK Cancel Apply	

11. Turn on Allow check box of Full Control.

Permissions for C		×
Share Permissions		
Group or user names:		
Strain St		
	Add	Remove
Permissions for Everyone	Allow	Deny
Full Control Change Read	(11) 0 0	
Learn about access control and	permissions	
(12) ок	Cancel	Apply

- 12. Click **OK** to close the two dialog boxes respectively.
- 13. Repeat steps 2 to 12 to the D drive.

C.6 Mounting the equipment drives to the external computer drives

- 1. On the computer connected by way of the network (which is used to run the anti-virus software), mount (assign) all the shared drives of the MS2840A as network drives.
- On the PC, click Start > Computer.
 Right click Network on the Navigation window and click Map network drive...



3. Enter "The IP address of MS2840A + drive name" for the folder name.

Example When the IP address of the MS2840A is 192.168.0.1:

To mount the C drive, specify Y for Drive and $\underline{\192.168.0.1c}$ for Folder.

To mount the D drive, specify Z for Drive and $\underline{\192.168.0.1\d}$ for Folder.

🌀 🔏 Map I	Network Drive
What n Specify tł <u>D</u> rive: F <u>o</u> lder:	network folder would you like to map? ne drive letter for the connection and the folder that you want to connect to: 3) Y: Image: Connect to the connect the connect to the connect the connect to the connect the connect the connect to the connect the connect to the connect the connect to the connect the conne
	(5) <u>Finish</u> Cancel

- 4. Turn on **Connect using different credentials** check box.
- 5. Click **Finish.**
- 6. Enter "ANRITSU" for the User name, and also "ANRITSU" for the Password (as specified in C.4, Step 7).

Windows Securit	y 📃 🔀
Enter Netw Enter your pas	rork Password isword to connect to: 192.168.0.1
(6)	ANRITSU •••••• Domain: Remember my credentials
	(7) OK Cancel

- 7. Click **OK** > **Finish** to complete.
- 8. Repeat steps 2 to 7 to the D drive.

C.7 Scanning for virus

Scan the network drives mounted on the external computer for viruses.

C.8 Unmounting the equipment drives from the external computer drives

Right click **My Network Places** on the external PC, and select **Disconnect Network Drive**.

Unmount the two mapped drives.

C.9 Making the equipment drives unshared

- 1. From **Start** menu, click **Computer**.
- 2. Right-click the C drive.
- 3. Click Share with > Advanced sharing.
- 4. Click **Sharing** tab.
- 5. Click Advanced Sharing
- 6. Turn off **Share this folder** check box.
- 7. Click **OK**.
- 8. Sharing dialog box appears. Click Yes.
- 9. Repeat steps 2 to 8 to the D drive.

C.10 Restoring the previous user account setting for the equipment

The user account password has been changed in Section C.4 "Changing the user account for the equipment" for mounting the equipment drives to network drives of the external computer. Restore the password before change in the same way as it was changed. Note that no password is specified by default.

C.11 Enabling Simple File Sharing

Simple File Sharing has been disabled in Section C.3 "Configuring shared settings" for sharing drives. To restore the original settings, enable Simple File Sharing by using the following procedure:

- 1. On MS2840A, click Start > Computer.
- 2. In Organize menu, click Folder and search options, and click View tab.
- 3. From the Advanced Settings list, Turn on Use Sharing Wizard (Recommended) check box.



4. Click OK.

It is the customer's responsibility to purchase, install, and operate anti-virus software on the MS2840A. Follow the manual of the anti-virus software you purchased.

This document explains the procedure of virus scanning without installing any anti-virus software on the MS2840A. Virus scanning can be performed by assigning the equipment drives to network drives on an external computer on which anti-virus software is installed.

Even if network drives cannot be scanned using your software, scanning might be possible by dragging and dropping a network drive onto the anti-virus software icon in Windows Explorer.

D.1	Connecting External PC to MS2840AD-3
D.2	Checking IP address of MS2840AD-4
D.3	Configuring shared settingsD-5
D.4	Changing the user account for the equipmentD-7
D.5	Shared Settings for MS2840AD-11
D.6	Mounting the equipment drives to the external computer drivesD-14
D.7	Scanning for virusD-16
D.8	Unmounting the equipment drives from the external computer drivesD-16
D.9	Making the equipment drives unsharedD-16
D.10	Restoring the previous user account setting for the equipmentD-16
D.11	Enabling Simple File SharingD-17

Appendix Appendix D

Notes:

• Be sure to follow the procedure described in this document. If this procedure is not followed, not only will it not be possible to check for viruses, but the equipment might become unusable.

If the equipment runs abnormally after removing viruses, execute system recovery to restore all drives to the factory default settings. For the procedure, refer to Section 5.3 "System Recovery Functions".

After performing system recovery, the firmware might have to be upgraded to the latest version depending on when the equipment was released.

• Before using anti-virus software, be sure to check its usage and the license scope.

D.1 Connecting External PC to MS2840A

Connect MS2840A and the external PC with LAN cable.

For details about how to set up the network for the MS2840A, see Chapter 1 "Basics of Remote Control" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Main Frame, Remote Control).*

D.2 Checking IP address of MS2840A

If the IP address is automatically assigned upon establishing a DHCP connection, check the IP address by using the following procedure:

1. Display the MS2840A Windows desktop.

To display the Windows desktop, right-click anywhere on the screen and select **Show the Desktop**.

2. Display the MS-DOS Prompt. On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar.

Click the **Start** icon to open the Start menu, and then click **Windows System > Command Prompt** in the **W** column of the app list displayed.



3. Enter the following:

ipconfig

The assigned IP address displays as shown.

```
Command Prompt
Microsoft Windows [Version 10.0.17763.316]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Users\ANRITSU>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection:
    Connection-specific DNS Suffix .:
    Link-local IPv6 Address ....: fe80::5d34:cfd6:e136:c22%12
    IPv4 Address....: 192.168.20.3
    Subnet Mask .....: 255.255.255.0
    Default Gateway ....:
```

D.3 Configuring shared settings

Simple File Sharing is enabled for the equipment by default. If authentication is performed by way of a network while Simple File Sharing is enabled, the accessing user is regarded as having a Guest account and cannot access important folders and files such as the Windows folder. To avoid this, use the following procedure to temporarily disable Simple File Sharing.

1. On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar.

Right click the **Start** 🔚 icon, and then click **File Explorer**.



2. In File Explorer window, click View tab and then click Options.



Appendix D Virus Check Procedure (Windows 10)

3. In Folder Options dialog box, click View tab.

Advanced Settings list, turn off Use Sharing Wizard (Recommended) check box.

Folder Options	>
General View Search	
Folder views You can apply this view (such as Details or Icons) to all folders of this type. Apply to Folders Reset Folders	
Advanced settings: Show drive letters Show encrypted or compressed NTFS files in color Show pop-up description for folder and desktop items Show status bar Show status bar Show sync provider notifications Use Sharing Wizard (Recommended) (3) When typing into list view Automatically type into the Search Box Select the typed item in the view Navigation pane	^
Restore Defaults	
(4) OK Cancel App	ly

4. Click **OK**.

D.4 Changing the user account for the equipment

This section describes how to change the user account used when the equipment drives are mounted to network drives.

1. On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar.

Click the **Start** icon to open the Start menu, and then click **Windows System > Control Pane**l in the **W** column of the app list displayed.



2. Click Administrative Tools from the Control Panel.



Appendix D Virus Check Procedure (Windows 10)

🚈 i 🎴 📑 🛨 i		Manage Administrative	Tools	-	- 🗆	×
File Home	Share	View Shortcut Tools				~ 🕐
$\leftarrow \rightarrow \cdot \uparrow$	> Cor	ntrol Panel > All Control Panel Items > Admin	istrative Tools	~ Ū	Search Ad	<i>р</i>
	^	Name	Date modified	Туре	Size	^
A Quick access		🏇 Component Services (3)	9/15/2018 4:29 PM	Shortcut		2 KI
Desktop		🐕 Computer Management	9/15/2018 4:29 PM	Shortcut		2 KI
🕂 Downloads	. *	befragment and Optimize Drives	9/15/2018 4:29 PM	Shortcut		2 KI
🔮 Documents	*	🔚 Disk Cleanup	9/15/2018 4:29 PM	Shortcut		2 KI
📰 Pictures	*	🌆 Event Viewer	9/15/2018 4:29 PM	Shortcut		2 KI
dspComError	Repro	💦 Internet Information Services (IIS) Manag	ger 9/15/2018 4:29 PM	Shortcut		2 KI
MS269xA		👧 iSCSI Initiator	9/15/2018 4:29 PM	Shortcut		2 KI
network		📠 Local Security Policy	9/15/2018 4:29 PM	Shortcut		2 KI

3. Click **Computer Management** in the Administrative Tools window.

4. In Computer Management tree, click **Users** under **Local Users and Groups**.

🌆 Computer Management			
File Action View Help	?		
 Computer Management (Local W System Tools 	Name Raministrator NRITSU	Full Name ANRITSU	Description Built-in account for
 Shared Folders Shared Folders Local Users and Groups Groups 	🛃 DefaultAcco 🕵 Guest 🕵 WDAGUtility		A user account mai Built-in account foi A user account mai
 M Performance Device Manager Storage Disk Management Services and Applications 			

D.4 Changing the user account for the equipment

5. Right click the user account **ANRITSU** to use, and click **Set Password...**



6. When the message below is shown, click Proceed.

Set Pas:	sword for ANRITSU X			
	You are logged in as "ANRITSU". You have chosen to reset the password for your local user account.			
	Resetting this password might cause irreversible loss of information. For security reasons, Windows protects certain information by making it impossible to access if the password is reset.			
	This data loss will occur the next time you log off.			
	You should use this command only if you've forgotten the password and do not have a password reset disk. If you know the current password and want to change it, press CTRL+ALT+DELETE and click Change Password.			
	For additional information, click Help.			
	(6) Proceed Cancel Help			

Appendix D Virus Check Procedure (Windows 10)

7. Type "anritsu" for the password of the user account **ANRITSU**.

Set Password for ANRITSU	?	×	
New password: (7)			
Confirm password:			
If you click OK, the following will occur: Your local user account will immediately lose access encrypted files, stored passwords, and personal sec	s to all of its surity certific	ates.	
If you click Cancel, the password will not be changed and no data loss will occur.			
(8) OK Cancel			

8. Confirm and click **OK**.

D.5 Shared Settings for MS2840A

- On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar. Right click the Start icon, and then click File Explorer > This PC.
- 2. Right-click the C drive.
- 3. Click **Properties**.
- 4. Click the **Sharing** tab.

🥌 Local Disk (C:) Properties			×
Security	Previous Versio	ns	Quota	Customize
General	Tools	H	lardware	Sharing
Network File	and Folder Sharin t Shared	g		(4)
Network Pat Not Shared Share	h:			
Advanced SI Set custom p advanced st	haring permissions, create haring options. hced Sharing	e multi	ble shares, an	d set other
Password Protection People must have a user account and password for this computer to access shared folders. To change this setting, use the <u>Network and Sharing Center</u> .				
	OK		Cancel	Apply

5. Click Advanced Sharing...

6. Turn off **Share this folder** check box to disable currently enabled folder sharing setting.

Advanced Sharing	×
Share this folder (6)	
Settings	
S <u>h</u> are name:	
C	
Add Remove	
Limit the number of simultaneous users to: 20	
Comments:	
Permissions Caching	
(7) OK Cancel Apply	

- 7. Click **OK**.
- 8. Sharing dialog box appears. Click Yes.



- 9. Turn on **Share this folder** check box.
- 10. Click **Permissions**.

Advanced Sharing	<
Share this folder (9)	
Settings	
Share name:	
С	
Add Remove	
Limit the number of simultaneous users to: 20	
(10)	
Permissions	
OK Cancel Apply	

Fermissions for C		×
Share Permissions		
Group or user names:		
Serveryone		
	Add	Remove
Permissions for Everyone	Allow	Deny
Full Control	(11) 🔽	
Full Control Change	(11) 🔽	
Full Control Change Read	(11) 🔽 V	
Full Control Change Read	(11) 🔽 오	
Full Control Change Read	(11) 2 2	
Full Control Change Read	(11) 9 9	
Full Control Change Read	(11) 9 9	
Full Control Change Read	(11)	

11. Turn on Allow check box of Full Control.

- 12. Click **OK** to close the two dialog boxes respectively.
- 13. Repeat steps 3 to 12 to the D drive.

D.6 Mounting the equipment drives to the external computer drives

On the computer connected by way of the network (which is used to run the anti-virus software), mount (assign) all the shared drives of the MS2840A as network drives.

- Right click Start icon of the Windows taskbar on the external PC and then click File Explorer.
- 2. Right click **Network** on the Navigation window and click **Map network drive...**



3. Enter "The IP address of MS2840A + drive name" for the folder name.

Example When the IP address of the MS2840A is 192.168.20.3:

To mount the C drive, specify Y for Drive and $\192.168.20.3\c$ for Folder.

To mount the D drive, specify Z for Drive and $\192.168.20.3\d$ for Folder.

What ne	twork folder would you like to map?
Specify the	drive letter for the connection and the folder that you want to connect to:
Drive:	Y: (3)
Folder:	\\192.168.20.3\c
	Example: \\server\share
	Reconnect at sign-in
(4)	Connect using different credentials
	Connect to a Web site that you can use to store your documents and pictures.

- 4. Turn on **Connect using different credentials** check box.
- 5. Click **Finish.**
- 6. Enter "ANRITSU" for the User name, and "anritsu" for the Password (as specified in D.4, Step 7).

Foton a star de ser de stiele	
Enter network credentials	
Enter your credentials to connect to: 192.168.20.3	
ANRITSU (6)	
••••••	
Domain:	
Remember my credentials	
(7)	
OK Cancel	

(5) Finish

Cancel

- 7. Click **OK** > **Finish** to complete.
- 8. Repeat steps 2 to 7 to the D drive.

D.7 Scanning for virus

Scan the network drives mounted on the external computer for viruses.

D.8 Unmounting the equipment drives from the external computer drives

- 1. Right click **Start [**] icon of the Windows taskbar on the external PC and then click **File Explorer**.
- 2. Right click **Network** on the Navigation window and click **Disconnect network drive**.
- 3. Unmount the two mapped drives.

D.9 Making the equipment drives unshared

- On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar. Right click the Start icon, and then click File Explorer > This PC.
- 2. Right-click the C drive.
- 3. Click **Properties**.
- 4. Click **Sharing** tab.
- 5. Click Advanced Sharing
- 6. Turn off **Share this folder** check box.
- 7. Click **OK**.
- 8. Sharing dialog box appears. Click Yes.
- 9. Repeat steps 3 to 8 to the D drive.

D.10 Restoring the previous user account setting for the equipment

The user account password has been changed in Section D.4 "Changing the user account for the equipment" for mounting the equipment drives to network drives of the external computer. Restore the password before change in the same way as it was changed. Note that the password "ANRITSU" is specified by default.
D.11 Enabling Simple File Sharing

Simple File Sharing has been disabled in Section D.3 "Configuring shared settings" for sharing drives. To restore the original settings, enable Simple File Sharing by using the following procedure:

- On the MS2840A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar. Right click the Start icon, and then click File Explorer.
- 2. In File Explorer window, click View tab and then click Options.
- 3. In Folder Options dialog box, click View tab.

From the Advanced Settings list, Turn on Use Sharing Wizard (Recommended) check box.

Folder Options (3)	\times
General View Search	
Folder views You can apply this view (such as Details or Icons) to all folders of this type. Apply to Folders <u>R</u> eset Folders	
Advanced settings: Show vorve letters Show encrypted or compressed NTFS files in color Show pop-up description for folder and desktop items Show preview handlers in preview pane	
 ✓ Show status bar ✓ Show sync provider notifications ✓ Use check boxes to select items ✓ Use Sharing Wizard (Recommended) When typing into list view ○ Automatically type into the Search Box 	
Select the typed item in the view Navigation pane V	
Restore <u>D</u> efaults]
(4) OK Cancel Apply	

4. Click **OK**.

Appendix E Error Messages

Message	Description
Out of Range.	The settable range is exceeded.
This can't be used because it in Continuous Mode.	This function cannot be used because Continuous mode is selected for MeasureMode.
This can't be used because PNxFix isn't selected.	This function cannot be used because PN_Fix is selected for DataType.
This can't be used because user defined pattern isn't loaded.	This function cannot be used because a user-defined pattern file is not loaded.
This can't be used because user defined pattern isn't selected.	This function cannot be used because a user-defined pattern file is not selected.
No file to read.	No readable file can be found.
Bit pattern is too long.	Cannot be read because the user-defined pattern length is larger than 1024 bits.
Bit pattern is too short.	Cannot be read because the user-defined pattern length is smaller than 8 bits.
Illegal character exists.	Cannot be read because the user-defined pattern contains characters other than "0", "1", a line feed, or a comment marker.
This can't be used because Data is Invalid status.	This function cannot be used when Data is invalid.
This can't be used because MeasureMode is Invalid status.	This function cannot be used when MeasureMode is invalid.
This can't be used because CountMode is Invalid status.	This function cannot be used when CountMode is invalid.
This can't be used because AutoResync is Invalid status.	This function cannot be used when AutoResync is set to Off.
This can't be used because UserDefine isn't selected.	This function cannot be used when UserDefine is selected for Data Type.

Table E-1 BER function errors

Appendix F Initial Value List

<System Configuration>

Interface Settings	
GPIB Setting	
Address	1
Ethernet Settings	
DHCP	On
IP Address	
Subnet Mask	
Default Gateway	
Raw Socket Port Nu	mber 49153
Terminator Settings	
Terminator	CR/LF
Remote Language Settings	s
Language	Native
Copy Settings	
File Type Settings	BMP Color
Color Settings	Normal
File Name Settings	Data + sequential number (00-99
Storage Place Settings	(D:)
System Settings	
Beep Sound Settings	On
Reference Signal	Auto
External Reference Freque	ency 10 MHz
Attenuator Mode	Electronic Atten Combined
	(Only MS2840A-046 without
	MS2840A-019/119)
	Mechanical Atten Only
Low Phase Noise	On (Only with MS2840A-066/16
Calibration Alert	
Alert Mode	None
Temperature	2.0 °C
Elapsed Time	1 Hour
Display Annotation	On
Simple Save&Recall	
Save&Recall Mode	Std
Correction	
Correction (On/Off)	Off

Appendix F Initial Value List

<BER measurement functions>

Data type	PN9
Measurement termination condition	Data
Measurement mode	Continuous
Measurement bit count	1000 bits
Measurement bit error count	1 bit
Auto Resync	On
Threshold	200/500
at SyncLoss	Count Clear
PN Pattern Initial	ALL1
PN_Fix_Pattern Length	96 bits
Start bit of the section for judging	
synchronization establishment	1 bit
Length of the section for judging	
synchronization establishment	32 bits
User-defined pattern loading source	D drive
Data polarity	Positive
Clock polarity	Rise
Enable polarity	Disable

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