MS2850A
Signal Analyzer
Operation Manual
Mainframe
Operation

18th Edition

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

ANRITSU CORPORATION

Document No.: M-W3920AE-18.0

Safety Symbols

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

Symbols used in manual

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

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

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

Safety Symbols Used on Equipment and in Manual

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

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

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

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

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

These indicate that the marked part should be recycled.

MS2850A
Signal Analyzer
Operation Manual Mainframe Operation

28 April 2017 (First Edition)
12 May 2023 (18th Edition)

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

For Safety

⚠ 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.

For Safety

⚠ WARNING

Repair

- 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.

For Safety

⚠ WARNING

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.

Battery Fluid

- 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.

For Safety

⚠ CAUTION

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.

- This is a heavy object. When lifting and moving this equipment, always work in a group of two or more, or use a pushcart. There is a risk of back injury, if this equipment is lifted or moved by one person.

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.

For Safety

⚠ 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.

For Safety

⚠ 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.
Anritsu will not be held responsible for lost data.

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.

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)

Please 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

1. 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

1. 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.
2. 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

1. Product Model

Model: MS2850A 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)	B
IEC 61000-4-3 (EMF)	A
IEC 61000-4-4 (Burst)	B
IEC 61000-4-5 (Surge)	B
IEC 61000-4-6 (CRF)	A
IEC 61000-4-8 (RPFMF)	A
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.

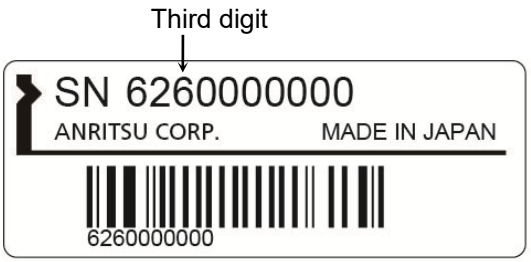
B: The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. 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)



Serial number example

4. Contact

Name:	Anritsu GmbH
Address, city:	Nemetschek Haus, Konrad-Zuse-Platz 1 81829 München,
Country:	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

1. Product Model

Model: MS2850A 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: MS2850A Signal Analyzer

2. Applied Standards

EMC: Emission: EN 61326-1: 2013 (Class A equipment)

About Eco label

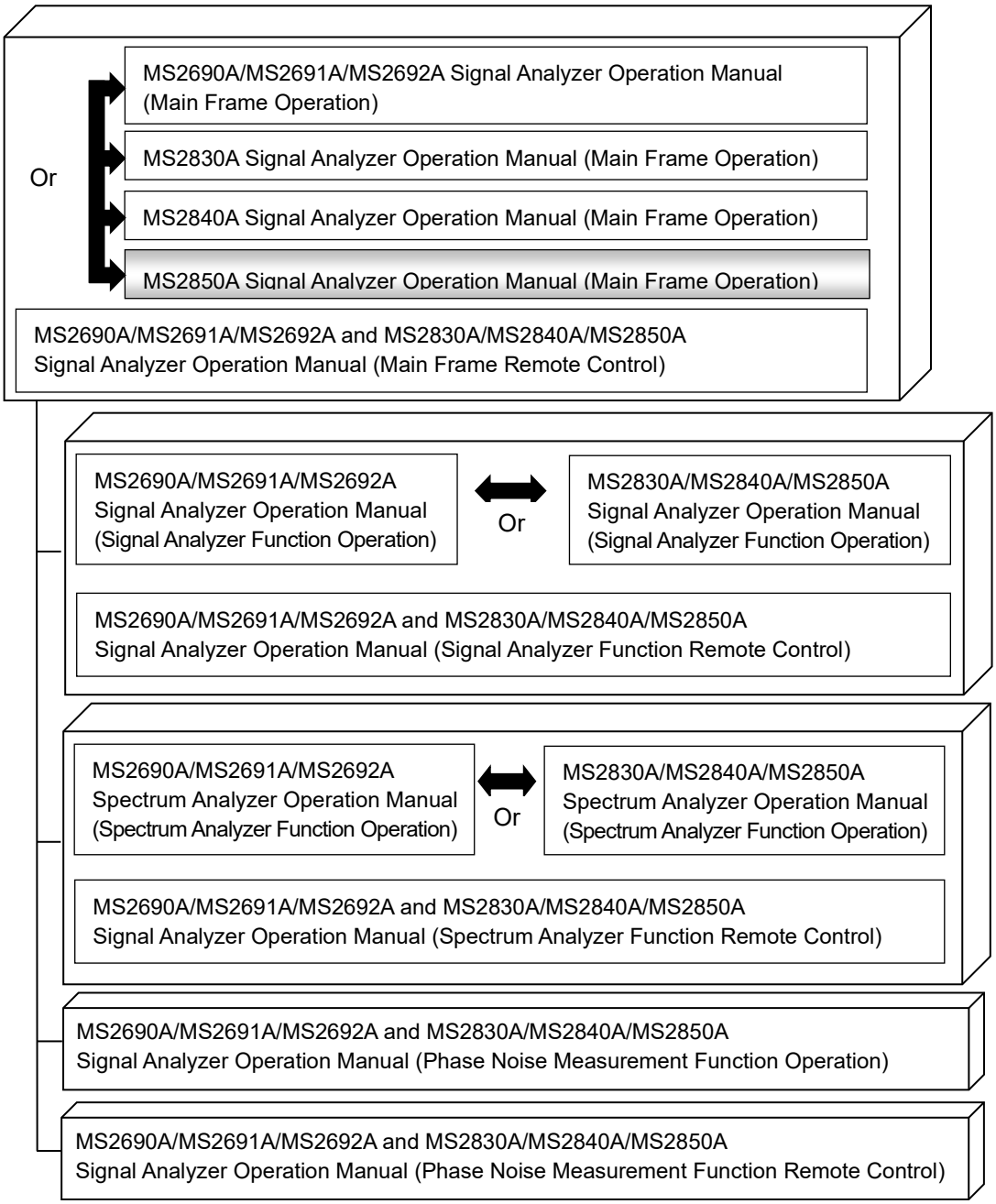
The label shown on the left is attached to Anritsu products meeting our environmental standards.

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

About This Manual

■ Associated Documents

The operation manual configuration of the MS2850A 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

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1.1 Product Overview

The MS2850A Signal Analyzer ("the MS2850A" hereafter) is a spectrum analyzer to which options such as real-time signal analysis and vector modulation analysis can be added.

The MS2850A 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, the MS2850A 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 (32 GHz/44.5 GHz)
- Wide analysis bandwidth Standard 032: 255 MHz,
  Option 033/133: 510 MHz
  Option 034/134: 1 GHz
- 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 standard 032 or option 033/133/034/134 is used)
- Rich measurement functions

The MS2850A 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 MS2850A.

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.

Table 1.2.1-1 Standard Configuration

Items	Model	Product name	Quantity	Remarks
Unit	MS2850A	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 Manuals	1 set	

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.

Table 1.2.2-1 Additional Options at/after shipment

Option Number	Product Name	Remarks
MS2850A-047	32 GHz Signal Analyzer	9 kHz to 32 GHz
MS2850A-046	44.5 GHz Signal Analyzer	9 kHz to 44.5 GHz
MS2850A-010	Phase Noise Measurement Function	10 MHz to Upper frequency limit
MS2850A-110	Phase Noise Measurement Function Retrofit	
MS2850A-011	Secondary Storage Device	
MS2850A-111	Secondary Storage Device Retrofit	
MS2850A-014	Removable SSD, Win10	
MS2850A-114	Removable SSD, Win10 Retrofit	
MS2850A-017	Noise Figure Measurement Function	
MS2850A-117	Noise Figure Measurement Function Retrofit	
MS2850A-032	Analysis Bandwidth 255MHz	Standard
MS2850A-033	Analysis Bandwidth Extension to 510MHz	
MS2850A-133	Analysis Bandwidth Extension to 510MHz Retrofit	
MS2850A-034	Analysis Bandwidth Extension to 1GHz	
MS2850A-134	Analysis Bandwidth Extension to 1GHz Retrofit	
MS2850A-051	Noise Floor Reduction	
MS2850A-151	Noise Floor Reduction Retrofit	
MS2850A-053	External Interface for High Speed Data Transfer PCIe	
MS2850A-153	External Interface for High Speed Data Transfer PCIe Retrofit	
MS2850A-054	External Interface for High Speed Data Transfer USB3.0	
MS2850A-154	External Interface for High Speed Data Transfer USB3.0 Retrofit	
MS2850A-067	Microwave Preselector Bypass	Standard
MS2850A-068	Microwave Preamplifier	
MS2850A-168	Microwave Preamplifier Retrofit	
MS2850A-072	Extended Specifications	
MS2850A-172	Extended Specifications Retrofit	
MS2850A-076	Low Second Harmonic Distortion	
MS2850A-176	Low Second Harmonic Distortion Retrofit	
MS2850A-182	CPU/Windows10 Upgrade Retrofit	Upgrade CPU and operating system to Windows 10.

Table 1.2.2-2 Optional Warranty Extension (MS2850A)

Option Number	Product Name	Remarks
MS2850A-ES210	2-year Warranty Service	—
MS2850A-ES310	3-year Warranty Service	—
MS2850A-ES510	5-year Warranty Service	—

1.2.3 Applicable Parts

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

Table 1.2.3-1 Applicable Parts

Model Number	Product Name	Remarks
W3920AE	MS2850A 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
W3655AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Noise Figure Measurement Function Operation)	Printed version
W3656AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Noise Figure Measurement Function Remote Control)	Printed version
W3950AW	MS2850A-053 External Interface for High Speed Data Transfer PCIe MS2850A-054 External Interface for High Speed Data Transfer USB3.0 Operation Manual	Printed version

Table 1.2.3-1 Applicable Parts (Cont'd)

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)
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

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
B0635A	Rack Mount Kit (EIA)	
B0636C	Carrying case	Protective cover, casters
B0637A	Rack Mount Kit (JIS)	
Z0975A	Keyboard (USB)	
34AKNF50	Ruggedized K-To-Type N Female Adapter	DC to 20 GHz, SWR: 1.25

1.2.4 Application Software

For the latest information on the application software, either visit the MS2850A page on Anritsu website or contact an Anritsu Service and Sales office.
Application software is sold separately.

Anritsu website: https://www.anritsu.com/

1.3 Specifications

1.3.1 Mainframe (MS2850A)

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
Calibration:	After executed

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

Table 1.3.1-1 Specifications for Mainframe

Item	Specification
Frequency	
Performance guarantee frequency range	Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: 9 kHz to 32 GHz (MS2850A-047) 9 kHz to 44.5 GHz (MS2850A-046) Signal Analyzer mode and Bandwidth > 31.25 MHz: 800 MHz to 32 GHz (MS2850A-047) 800 MHz to 44.5 GHz (MS2850A-046)
Frequency band configuration	Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: MS2850A-047/046 Band Mixer harmonic order [N] 9 kHz to 4000 MHz 0 1 3500 to 4400 MHz 1 1/2 4300 to 6000 MHz 2 1 3900 to 8000 MHz 3 1 7900 to 10575 MHz 4 1 10475 to 12200 MHz 5 2 12100 to 18400 MHz 6 2 18300 to 26600 MHz 7 4 MS2850A-047 Band Mixer harmonic order [N] 26500 to 32000 MHz 8 4 MS2850A-046 Band Mixer harmonic order [N] 26500 to 42100 MHz 8 4 42000 to 44500 MHz 9 8
	Signal Analyzer mode and Bandwidth > 31.25 MHz: MS2850A-047/046 Band Mixer harmonic order [N] 100 to 4200 MHz 0 1 4200 to 8000 MHz 2 1 8000 to 10575 MHz 4 2 10575 to 12200 MHz 5 2 12200 to 18500 MHz 6 2 18500 to 26400 MHz 7 4 MS2850A-047 Band Mixer harmonic order [N] 26400 to 32000 MHz 8 4 MS2850A-046 Band Mixer harmonic order [N] 26400 to 42100 MHz 8 4 42100 to 44500 MHz 9 8
Preselector range	MS2850A-047/046 > 4 GHz Frequency Band Mode: Normal ≥ 3.5 GHz Frequency Band Mode: Spurious

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

Item	Specification
Internal reference oscillator	
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	$\pm 1 \times 10^{-7}$/year
Temperature characteristics	$\pm 2 \times 10^{-8}$ (0 to 45 °C)
Frequency accuracy at the initial calibration	$\pm 2.2 \times 10^{-8}$ (18 to 28 °C, 1 hour after power-on)
Single side band noise	At 18 to 28 °C, 1000 MHz, Spectrum Analyzer mode (Frequency offset) (Single side band noise) 10 Hz –80 dBc/Hz Nominal 100 Hz –92 dBc/Hz Nominal 1 kHz –117 dBc/Hz Nominal 10 kHz –123 dBc/Hz 100 kHz –123 dBc/Hz 1 MHz –135 dBc/Hz 10 MHz –148 dBc/Hz Nominal
Spurious caused by the local frequency	10 MHz < frequency ≤ 1 GHz 3 kHz ≤ Freq. offset < 100 kHz –70 [dBc] Nominal 100 kHz ≤ Freq. offset < 10 MHz –75 [dBc] Nominal Frequency > 1 GHz (Frequency offset) Spurious 3 kHz ≤ Freq. offset < 100 kHz –70 + 20 × log(f) [dBc] Nominal* 100 kHz ≤ Freq. offset < 10 MHz –75 + 20 × log(N) [dBc] Nominal* *: f: Receiving frequency [GHz], N: Mixing order

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

Item	Specification
Amplitude	
Measurement range	Without MS2850A-068/168 or with Preamplifier turned off Average noise level up to +30 dBm With MS2850A-068/168 and Preamplifier turned on Average noise level up to +10 dBm
Maximum input level Continuous wave average power DC Continuous wave average power DC	Without MS2850A-068/168 or with Preamplifier turned off: +30 dBm (Input attenuator ≥ 10 dB) +20 dBm (Input attenuator = 0 dB) ±0 Vdc With MS2850A-068/168 and Preamplifier turned on: +10 dBm (Input attenuator = 0 dB) ±0 Vdc
Input attenuator	0 to 60 dB, 2 dB steps
Input attenuator switching error	Based on input attenuator 10 dB, Range 10 to 60 dB, at 18 to 28 °C Without MS2850A-068/168 or Preamplifier turned off: ±0.20 dB Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: (300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±0.30 dB Signal Analyzer mode and Bandwidth > 31.25 MHz: (800 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (800 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±0.75 dB (4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±0.80 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±1.0 dB (26.5 GHz < frequency ≤ 40 GHz) ±1.0 dB typ. (40 GHz < frequency ≤ 44.5 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)

Item	Specification
Linearity error	Spectrum Analyzer mode without MS2850A-051/151 or Noise Floor Reduction is Off, or Signal Analyzer mode, Bandwidth ≤ 31.25 MHz: Without MS2850A-068/168 or 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 MS2850A-068/168 and 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 MS2850A-068/168 and Preamplifier turned off: Excluding the noise floor effect ±0.07 dB (mixer input level ≤ –20 dBm, RF Input Level ≤ –10 dBm) ±0.10 dB (mixer input level ≤ –10 dBm, RF Input Level ≤ –10 dBm) ±0.07 dB Nominal (mixer input level ≤ –20 dBm, 9 kHz ≤ frequency ≤ 300 MHz, RF input level ≤ +5 dBm) (mixer input level ≤ –20 dBm, 300 MHz < frequency ≤ 6 GHz, RF input level ≤ +20 dBm) ±0.10 dB Nominal (mixer input level ≤ –10 dBm, 9 kHz ≤ frequency ≤ 300 MHz, RF input level ≤ +5 dBm) (mixer input level ≤ –10 dBm, 300 MHz < frequency ≤ 6 GHz, RF input level ≤ +20 dBm) When Signal Analyzer mode and Bandwidth > 31.25 MHz: Refer to Linearity error in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications

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

Item	Specification
RF frequency characteristics	At 18 to 28 °C, input attenuator = 10 dB, Without MS2850A-068/168 or Preamplifier turned off, Microwave Preselector Bypass turned off, and after Preselector Auto Tune is done: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: ±1.0 dB (9 kHz ≤ frequency < 300 kHz) ±0.35 dB (300 kHz ≤ frequency < 50 MHz) ±0.35 dB (50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ±1.50 dB (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious) ±1.50 dB (6 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±2.50 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±2.50 dB (26.5 GHz < frequency ≤ 40 GHz) ±2.50 dB typ. (40 GHz < frequency ≤ 44.5 GHz) Signal Analyzer mode, and Bandwidth > 31.25 MHz: ±0.45 dB (800 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (800 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

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

Item	Specification
RF frequency characteristics (Cont'd)	With MS2850A-068/168, Preamplifier turned on, Microwave Preselector Bypass turned off, and after Preselector Auto Tune is done: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: ±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 ≤ 13.8 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±2.50 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.50 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.50 dB Nominal (40 GHz < frequency ≤ 44.5 GHz) Signal Analyzer mode, and Bandwidth > 31.25 MHz: ±0.75 dB (800 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) (800 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) Microwave Preselector Bypass turned on: Refer to the RF frequency characteristics in Table 1.3.9-1 Microwave Preselector Bypass Option Specifications

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

Item	Specification
Spurious response	
Second harmonic wave distortion	Without MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off, and Microwave Preselector Bypass turned off: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: At mixer input level = –30 dBm Harmonics [dBc] SHI [dBm] ≤ –60 ≥ +30 (10 MHz ≤ Input frequency ≤ 300 MHz) ≤ –65 ≥ +35 (300 MHz < Input frequency ≤ 1 GHz) ≤ –65 ≥ +35 (1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal) ≤ –65 ≥ +35 (1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious) At mixer input level = –20 dBm Harmonics [dBc] SHI [dBm] ≤ –80 ≥ +60 (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal) ≤ –80 ≥ +60 (1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious) At mixer input level = –10 dBm Harmonics [dBc] SHI [dBm] ≤ –70 ≥ +60 (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious) ≤ –70 ≥ +60 (3 GHz < Input frequency ≤ 13.25 GHz) ≤ –70 Nominal ≥ +60 Nominal (13.25 GHz < Input frequency ≤ 22.25 GHz)

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

Item	Specification
Second harmonic wave distortion (Cont'd)	With MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off, and Microwave Preselector Bypass turned off: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: At mixer input level = –30 dBm Harmonics [dBc] SHI [dBm] ≤ –60 ≥ +30 (10 MHz ≤ frequency ≤ 300 MHz) ≤ –65 ≥ +35 (300 MHz < frequency ≤ 1 GHz) ≤ –65 ≥ +35 (1 GHz < frequency ≤ 2 GHz, Frequency Band Mode: Normal) ≤ –65 ≥ +35 (1 GHz < frequency < 1.75 GHz, Frequency Band Mode: Spurious) At mixer input level = –20 dBm Harmonics [dBc] SHI [dBm] ≤ –80 ≥ +60 (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal) ≤ –80 ≥ +60 (1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious) At mixer input level = –10 dBm Harmonics [dBc] SHI [dBm] ≤ –80 ≥ +70 (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious) ≤ –90 ≥ +80 (3 GHz < Input frequency ≤ 13.25 GHz) ≤ –90 Nominal ≥ +80 Nominal (13.25 GHz < Input frequency ≤ 22.25 GHz) With MS2850A-068/168, Preamplifier turned on, and 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 ≥ +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 GHz < Input frequency ≤ 22.25 GHz)

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

Item	Specification
Second harmonic wave distortion (Cont'd)	When Attenuator Mode is E-ATT Combined: Without MS2850A-068/168 or Preamplifier turned off: At mixer input level = –30 dBm Harmonics [dBc] SHI [dBm] ≤ –60 ≥ +30 (10 MHz ≤ Input frequency ≤ 300 MHz, RF input level ≤ –5 dBm) ≤ –65 ≥ +35 (300 MHz < Input frequency ≤ 1 GHz, RF input level ≤ –5 dBm) ≤ –65 ≥ +35 (1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal, RF input level ≤ +5 dBm) (1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious, RF input level ≤ +5 dBm) At mixer input level = –20 dBm Harmonics [dBc] SHI [dBm] ≤ –80 ≥ +60 (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal, RF input level ≤ +5 dBm) (1.75 GHz ≤ Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious, RF input level ≤ +5 dBm) At mixer input level = –30 dBm Harmonics [dBc] SHI [dBm] ≤ –60 Nominal ≥ +30 Nominal (10 MHz ≤ Input frequency ≤ 300 MHz, RF input level ≤ 0 dBm) ≤ –65 Nominal ≥ +35 Nominal (300 MHz < Input frequency ≤ 1 GHz, RF input level ≤ +15 dBm) ≤ –65 Nominal ≥ +35 Nominal (1 GHz < Input frequency ≤ 2 GHz, Frequency Band Mode: Normal, RF input level ≤ +15 dBm) (1 GHz < Input frequency < 1.75 GHz, Frequency Band Mode: Spurious, RF input level ≤ +15 dBm) 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 input level ≤ +15 dBm) (1.75 GHz ≤ Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious, –5 dBm < RF input level ≤ +15 dBm) SHI: Second Harmonic Intercept

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

Item	Specification
Residual response	Frequency ≥1 MHz, Input attenuator = 0 dB, at 50 Ω terminator Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: 1 MHz ≤ frequency ≤ 1 GHz ≤ –100 dBm 1 GHz < frequency ≤ 6 GHz ≤ –90 dBm typ. 6 GHz < frequency ≤ 13.5 GHz ≤ –90 dBm Nominal 13.6 GHz < frequency ≤ 26.5 GHz ≤ –90 dBm Nominal. 26.5 GHz < frequency ≤ 44.5 GHz ≤ –80 dBm Nominal.
Connector	
RF input	
Connector	Front panel, K-J, 50 Ω VSWR: Input attenuator ≥ 10 dB, 18 to 28 °C ≤ 1.2 (Nominal) (40 MHz ≤ frequency ≤ 3 GHz) ≤ 1.3 (Nominal) (3 GHz < frequency ≤ 6 GHz) ≤ 1.3 (Nominal) (6 GHz < frequency ≤ 13.6 GHz) ≤ 1.4 (Nominal) (13.6 GHz < frequency ≤ 26.5 GHz) ≤ 1.6 (Nominal) (26.5 GHz < frequency ≤ 40 GHz) ≤ 1.6 (Reference value with the V-K converter mounted and included) (40 GHz < frequency ≤ 44.5 GHz)
External Mixer	
Frequency	Frequency range: 26.5 to 325 GHz
Frequency band configuration	Band / Frequency range / Mixing order Band VHP 50.0 to 75.0 GHz 8+ Band EHP 60.0 to 90.0 GHz 12– Band A 26.5 to 40.0 GHz 4+ Band Q 33.0 to 50.0 GHz 5+ 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 Y 170.0 to 260.0 GHz 26+ Band J 220.0 to 325.0 GHz 33+
Amplitude	Setting range of mixer conversion loss: 0 to 99.9 dB Maximum input level: Depends on External Mixer Average noise level: Depends on External Mixer Frequency response: Depends on External Mixer
Input/Output	Applicable mixer: Two-port mixer only Local frequency: 5 to 10 GHz IF frequency: 1875 MHz: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz 1950 MHz: Signal Analyzer mode and Bandwidth > 31.25 MHz

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

Item	Specification
1st Local Output	Connector for External Mixer
Connector	Front panel, SMA-J, 50 Ω (Nominal)
Output	Local signal: Frequency 5 to 10 GHz, Output level ≥ 10 dBm typ. Bias current: Range 0.0 to 20.0 mA / Resolution 0.1 mA
Input	IF signal: Frequency 1875 MHz: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz Frequency 1950 MHz: Signal Analyzer mode and Bandwidth > 31.25 MHz
Ref Input	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 dBm ≤ level ≤ +20 dBm, 50 Ω (AC coupling)
Buffer Out	Reference signal output
Connector	Rear panel, BNC-J, 50 Ω (Nominal value)
Frequency	10 MHz
Output Level	≥ 0 dBm (AC coupling)
Sweep Status Out	
Connector	Rear panel, BNC-J
Output Level	TTL level (high level at sweep or waveform acquisition)
SA Trigger Input	Trigger Input 1
Connector	Rear panel, BNC-J
Input Level	TTL level
Trigger: Input 2	Trigger Input 2
Connector	Rear panel, BNC-J
Input Level	3.3 V LVCMOS
Trigger: Output 1, 2	Trigger Output 1, 2
Connector	2 ports on Rear panel, BNC-J
Input Level	3.3 V LVCMOS
Reserved (Future extensions)	
Connector	Rear panel, BNC-J
External controls	Control from external controller (except power)
Ethernet (10/100/1000Base-T)	
Connector	Connector Rear panel, RJ-45
GPIB	IEEE488.2 compatible
Connector	Rear panel, IEEE488 bus connector
Interface function	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
USB (B)	USB2.0 compatible
Connector	Rear panel, USB-B connector

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

Item	Specification
USB (A)	Used to connect an external USB device 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 (Future extensions)	
Connector	Rear panel, 50 pins (DX10A-50S equivalent part)
IF Output	Outputs the signal for the 1st IF output connector before band filtering.
Connector	Rear panel, SMA-J, 50 Ω (Nominal)
Output frequency	1875 MHz: Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz 1950 MHz: Signal Analyzer mode and Bandwidth > 31.25 MHz
Max Bandwidth (6 dB)	2.5 GHz Nominal
Gain	–10 dB (Nominal, ATT = 0 dB, at 10 GHz input frequency)
Noise Source	This is available when MS2850A-017/117 is installed. Connector for Noise Source
Connector	Rear panel, BNC-J
Output voltage range	+28 V±0.5 V, Pulsed
USB (B)	USB 3.0 compatible
Connector	Rear panel, USB-B connector
PCIe	PCIe Gen2 x8 compatible
Connector	Rear panel, PCIe connector
CAL Port (Future extensions)	
Connector	Rear panel, BNC-J
Display	XGA color LCD (Resolution: 1024 × 768) Size: 8.4" (213 mm diagonal)

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

Item	Specification
Overall Specifications	
Mass, Weight Dimensions Weight	 177 mm (h) × 426 mm (w) × 390 mm (d) (excluding protrusions) ≤ 21 kg (MS2850A-047 or 046, with all options)
Power Supply Voltage Frequency Power consumption	 Rated Voltage: AC 100 to 120 V or 200 to 240 V 50 to 60 Hz ≤ 500 VA (including all options, maximum value) 340 VA Nominal (MS2850A-047/046, with 067/068/032/033/034, , excluding other options)
Temperature Operating temperature Storage temperature	 0 to 45 °C –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

Table 1.3.1-2 Specifications for Signal Analyzer Function

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td colspan="2">Common</td></tr>
<tr><td>Performance guarantee frequency range</td><td>Bandwidth ≤ 31.25 MHz
MS2850A-047 9 kHz to 32 GHz
MS2850A-046 9 kHz to 44.5 GHz
Bandwidth > 31.25 MHz
MS2850A-047 800 MHz to 32 GHz
MS2850A-046 800 MHz to 44.5 GHz</td></tr>
<tr><td>Function</td><td>Displays the waveforms of Spectrum, Power vs Time, and others from the data obtained for certain amount of time.</td></tr>
<tr><td>Trace mode</td><td>Spectrum, Power vs Time, Frequency vs Time, CCDF, Spectrogram, Phase vs Time, No Trace</td></tr>
<tr><td>Span</td><td>Conditions for measurable waveform data, I, Q (Binary format)
<table>
<tr><th>Span</th><th>Sampling rate</th><th>Maximum capture time</th><th>Support options</th></tr>
<tr><td>1 kHz</td><td>2 kHz</td><td>2000 s</td><td rowspan="17">MS2850A-032/033/133/034/134</td></tr>
<tr><td>2.5 kHz</td><td>5 kHz</td><td>2000 s</td></tr>
<tr><td>5 kHz</td><td>10 kHz</td><td>2000 s</td></tr>
<tr><td>10 kHz</td><td>25 kHz</td><td>2000 s</td></tr>
<tr><td>25 kHz</td><td>50 kHz</td><td>2000 s</td></tr>
<tr><td>50 kHz</td><td>100 kHz</td><td>1000 s</td></tr>
<tr><td>100 kHz</td><td>200 kHz</td><td>500 s</td></tr>
<tr><td>250 kHz</td><td>500 kHz</td><td>200 s</td></tr>
<tr><td>500 kHz</td><td>1 MHz</td><td>100 s</td></tr>
<tr><td>1 MHz</td><td>2 MHz</td><td>50 s</td></tr>
<tr><td>2.5 MHz</td><td>5 MHz</td><td>20 s</td></tr>
<tr><td>5 MHz</td><td>10 MHz</td><td>10 s</td></tr>
<tr><td>10 MHz</td><td>20 MHz</td><td>5 s</td></tr>
<tr><td>25 MHz</td><td>50 MHz</td><td>2 s</td></tr>
<tr><td>31.25 MHz</td><td>50 MHz</td><td>2 s</td></tr>
<tr><td>50 MHz</td><td>81.25 MHz</td><td>48 s</td></tr>
<tr><td>62.5 MHz</td><td>81.25 MHz</td><td>48 s</td></tr>
<tr><td>100 MHz</td><td>162.5 MHz</td><td>24 s</td></tr>
<tr><td>125 MHz</td><td>162.5 MHz</td><td>24 s</td></tr>
<tr><td>255 MHz</td><td>325 MHz</td><td>12 s</td></tr>
<tr><td>510 MHz</td><td>650 MHz</td><td>6 s</td><td>MS2850A-033/133/034/134</td></tr>
<tr><td>1000 MHz</td><td>1300 MHz</td><td>3 s</td><td>MS2850A-034/134</td></tr>
</table></td></tr>
</table>

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

Item	Specification
Capture function	
Capture Time Length	Sets the Capture Time Length
Mode	Auto, Manual
Trigger	
Trigger mode	Free Run (Trig Off), Video, Wide IF Video, Frame, External (TTL)
ADC resolution	Bandwidth ≤ 31.25 MHz 16 bits Bandwidth > 31.25 MHz Refer to ADC resolution in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications.
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
Frequency	Center frequency and SPAN can be set within the frequency range in waveform data.
Frequency setting range	Bandwidth ≤ 31.25 MHz 0 MHz to 32 GHz (MS2850A-047) 0 MHz to 44.5 GHz (MS2850A-046) 50 ≤ Bandwidth ≤ 510 MHz 100 MHz to 32 GHz (MS2850A-047) 100 MHz to 44.5 GHz (MS2850A-046) Bandwidth = 1 GHz 4.2 to 32 GHz (MS2850A-047) 4.2 to 44.5 GHz (MS2850A-046)
Display frequency accuracy	± [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	Bandwidth ≤ 31.25 MHz 1 Hz to 1 MHz (1-3 sequence) 50 MHz ≤ Bandwidth ≤ 62.5 MHz 3 kHz to 3 MHz (1-3 sequence) Bandwidth ≥ 100 MHz 10 kHz to 10 MHz (1-3 sequence)
Selectivity	(–60 dB/–3 dB) 4.5:1, Nominal

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, Microwave Preselector Bypass turned off, 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 ≤ –30 dBm Without MS2850A-068/168 or Preamplifier turned off: Bandwidth ≤ 31.25 MHz ±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) ±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) Bandwidth > 31.25 MHz ±0.6 dB (800 MHz ≤ frequency < 4 GHz)

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

Item	Specification
Absolute amplitude accuracy (Cont'd)	With MS2850A-068/168 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: 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. Microwave Preselector Bypass turned on: Refer to the Absolute amplitude accuracy in Table 1.3.9-1 Microwave Preselector Bypass Option Specifications.
In-band frequency characteristics	On the basis of a level of the center frequency, at 18 to 28 °C, Bandwidth ≤ 31.25 MHz, after Extra band cal is done. 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 MS2850A-032/033/133/034/134 and Bandwidth > 31.25 MHz: Refer to the In-band frequency characteristics in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications.

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

Item	Specification
Display average noise level	At 18 to 28 °C, Time Detection = Average, Input attenuator = 0 dB, Bandwidth ≤ 31.25 MHz, at center frequency, excluding the residual response effect, Without MS2850A-068/168, without MS2850A-076/176, and Microwave Preselector Bypass turned on, off, Or without MS2850A-068/168, with MS2850A-076/176, and Microwave Preselector Bypass turned on, 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 GHz < frequency ≤ 4 GHz –141.5 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –141.5 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –143.5 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –141.5 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –137.5 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –137.5 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –133.5 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –127.5 [dBm/Hz] Nominal With MS2850A-068/168, Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned on, off, Or with MS2850A-068/168, Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned on, 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 GHz < frequency ≤ 4 GHz –141.5 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –141.5 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –139.5 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –137.5 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –133.5 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –132.5 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –128.5 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –122.5 [dBm/Hz] Nominal

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

Item	Specification
Display average noise level (Cont'd)	With MS2850A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned on Frequency Band Mode: Normal 100 kHz –147 [dBm/Hz] Nominal 1 MHz –153.5 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –163.5 [dBm/Hz] 1 GHz ≤ frequency < 2 GHz –161.5 [dBm/Hz] 2 GHz ≤ frequency ≤ 3.5 GHz –160.5 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –157.5 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –157.5 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –157.5 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –156.5 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –152.5 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –149.5 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –146.5 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –139.5 [dBm/Hz] Nominal With MS2850A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned off Frequency Band Mode: Normal 100 kHz –147 [dBm/Hz] Nominal 1 MHz –153.5 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –163.5 [dBm/Hz] 1 GHz ≤ frequency < 2 GHz –161.5 [dBm/Hz] 2 GHz ≤ frequency ≤ 3.5 GHz –160.5 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –157.5 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –157.5 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –160.5 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –159.5 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –156.5 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –153.5 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –150.5 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –142.5 [dBm/Hz] Nominal Without MS2850A-068/168 or Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned off: Frequency Band Mode: Normal 100 kHz –131.5 [dBm/Hz] Nominal 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 GHz < frequency ≤ 4 GHz –141.5 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –141.5 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –147.5 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –142.5 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –138.5 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –138.5 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –136.5 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –131.5 [dBm/Hz] Nominal With MS2850A-032/033/133/034/134, Bandwidth > 31.25 MHz Refer to the Display average noise level in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications.

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

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
Channel Power	
Absolute value measurement	dBm, dBm/Hz
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)

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 Analysis Time Length Setting mode	 Sets analysis start time position from beginning of waveform data. Sets analysis time span. Auto, Manual
Operating level range	–17 to +30 dBm (Input attenuator ≥ 10 dB)
Frequency (vertical axis) Display frequency range	 Center frequency and SPAN can be set within the frequency range in waveform data Selectable from 1/25, 1/10, 1/5 and 1/2 of analysis bandwidth
Display frequency accuracy	Bandwidth ≤ 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
CCDF Display Function	
Function overview	Displays CCDF and APD of waveform data captured at specific time.
Analysis time range Analysis Start Time Analysis Time Length Setting mode	 Sets analysis start time position from beginning of waveform data. Sets analysis time span. Auto, Manual
Display Histogram resolution Numerical value	Graphically displays CCDF and APD. 0.01 dB Average Power, Max Power, Crest Factor
Resolution Bandwidth Filter type Filter frequency offset	 Rectangle, Off (default: Off) Filter center frequency can be set within frequency band of waveform data.

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

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 Analysis Time Length Setting mode	 Sets analysis start time position from beginning of waveform data. Sets analysis time span. Auto, Manual
Frequency	Center frequency and SPAN can be set within the frequency range in waveform data.
Resolution bandwidth (RBW) Setting range Selectivity	 1 Hz to 1 MHz (1-3 sequence) (–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 Level Level accuracy	 File output I, Q (32-bit Float Binary format) Remote commands or reading out by Signal Analyzer Remote Control Library I, Q (ASCII format or 32-bit Float Binary format) $\sqrt{(I^2 + Q^2)} = 1$ at 0 dBm input Same as absolute amplitude accuracy of signal analyzer
External output	File output Capable of outputting to external PC through Ethernet Remote commands Capable of outputting to external PC through Ethernet, USB2.0, or GPIB Signal Analyzer Remote Control Library Capable of outputting to external PC through Ethernet, USB2.0, or GPIB.

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)
Combination of Span, Sampling rate, and Minimum capture sample	

Span	Sampling rate	Minimum capture sample		Support options
1 kHz	2 kHz	74000	(37 s)	MS2850A-032/033/133/034/134
2.5 kHz	5 kHz	160000	(32 s)	
5 kHz	10 kHz	310000	(31 s)	
10 kHz	25 kHz	610000	(30.5 s)	
25 kHz	50 kHz	730000	(14.6 s)	
50 kHz	100 kHz	730000	(7.3 s)	
100 kHz	200 kHz	730000	(3.65 s)	
250 kHz	500 kHz	730000	(1.46 s)	
500 kHz	1 MHz	730000	(730 ms)	
1 MHz	2 MHz	730000	(365 ms)	
2.5 MHz	5 MHz	730000	(146 ms)	
5 MHz	10 MHz	730000	(73 ms)	
10 MHz	20 MHz	730000	(36.5 ms)	
25 MHz	50 MHz	730000	(14.6 ms)	
31.25 MHz	50 MHz	730000	(14.6 ms)	
50 MHz	81.25 MHz	730000	(8.99 ms)	
62.5 MHz	81.25 MHz	730000	(8.99 ms)	
100 MHz	162.5 MHz	730000	(4.5 ms)	
125 MHz	162.5 MHz	730000	(4.5 ms)	
255 MHz	325 MHz	730000	(2.25 ms)	
510 MHz	650 MHz	730000	(1.13 ms)	MS2850A-033/133/034/134
1000 MHz	1300 MHz	730000	(562 μs)	MS2850A-034/134

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 1.3.1-3 Specifications for spectrum analyzer function

Item	Specification
Frequency	
Performance guarantee frequency range	MS2850A-047 9 kHz to 32 GHz MS2850A-046 9 kHz to 44.5 GHz
Frequency setting range Settable range Resolution	 MS2850A-047 –100 MHz to +32.5 GHz MS2850A-046 –100 MHz to +45 GHz 1 Hz
SPAN Range Resolution SPAN accuracy	 0 Hz, 300 Hz to 32 GHz (MS2850A-047) 0 Hz, 300 Hz to 44.5 GHz (MS2850A-046) 2 Hz ±0.2 % When number of trace points = 10001
Display frequency accuracy	± [Indicator frequency × reference frequency accuracy + SPAN frequency × SPAN accuracy + RBW × 0.05 + 2 × N + SPAN frequency / (Trace point count – 1)] Hz N is Mixing order
Resolution bandwidth (RBW) Settable range Selectivity	 1 Hz to 3 MHz (1-3 sequence), 500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz, 31.25 MHz 1 Hz to 10 Hz: Not available when SPAN = 0 Hz 31.25 MHz: Available when SPAN = 0 Hz (–60 dB/–3 dB) 4.5:1, Nominal value, when 1 Hz to 10 MHz is set.
Video bandwidth (VBW) Setting range VBW mode	 1 Hz to 10 MHz (1-3 sequence), 5 kHz, off Video Average/Power Average

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

Item	Specification
Amplitude	
Display average noise level	At 18 to 28 °C, Detector = Sample, VBW = 1 Hz (Video Average), Input attenuator 0 dB, Without MS2850A-068/168, without MS2850A-076/176, and Microwave Preselector Bypass turned on, off: Or without MS2850A-068/168, with MS2850A-076/176, and Microwave Preselector Bypass turned on: Frequency Band Mode: Normal 9 kHz ≤ frequency < 100 kHz –120 [dBm/Hz] 100 kHz ≤ frequency < 1 MHz –134 [dBm/Hz] 1 MHz ≤ frequency < 10 MHz –144 [dBm/Hz] 10 MHz ≤ frequency < 30 MHz –150 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –153 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –150 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –147 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –144 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –144 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –146 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –144 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –140 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –140 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –136 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –130 [dBm/Hz] Nominal
	With MS2850A-068/168, Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned on, off: Or with MS2850A-068/168, Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned on: Frequency Band Mode: Normal 9 kHz ≤ frequency < 100 kHz –120 [dBm/Hz] 100 kHz ≤ frequency < 1 MHz –134 [dBm/Hz] 1 MHz ≤ frequency < 10 MHz –144 [dBm/Hz] 10 MHz ≤ frequency < 30 MHz –150 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –153 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –150 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –147 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –144 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –144 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –142 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –140 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –136 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –135 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –131 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –125 [dBm/Hz] Nominal

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

Item	Specification
Display average noise level (Cont'd)	With MS2850A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned on: 100 kHz –147 [dBm/Hz] Nominal 1 MHz –156 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –166 [dBm/Hz] 1 GHz ≤ frequency < 2 GHz –164 [dBm/Hz] 2 GHz ≤ frequency ≤ 3.5 GHz –163 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –160 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –160 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –160 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –159 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –155 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –152 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –149 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –142 [dBm/Hz] Nominal With MS2850A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned off: Frequency Band Mode: Normal 100 kHz –147 [dBm/Hz] Nominal 1 MHz –156 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –166 [dBm/Hz] 1 GHz ≤ frequency < 2 GHz –164 [dBm/Hz] 2 GHz ≤ frequency ≤ 3.5 GHz –163 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –160 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –160 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –163 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –162 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –159 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –156 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –153 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –145 [dBm/Hz] Nominal Without MS2850A-068/168 or Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned off: Frequency Band Mode: Normal 9 kHz ≤ frequency < 100 kHz –120 [dBm/Hz] 100 kHz ≤ frequency < 1 MHz –134 [dBm/Hz] 1 MHz ≤ frequency < 10 MHz –144 [dBm/Hz] 10 MHz ≤ frequency < 30 MHz –150 [dBm/Hz] 30 MHz ≤ frequency < 1 GHz –153 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –150 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –147 [dBm/Hz] 3.5 GHz < frequency ≤ 4 GHz –144 [dBm/Hz] 4 GHz < frequency ≤ 6 GHz –144 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –147 [dBm/Hz] 13 GHz < frequency ≤ 18.3 GHz –145 [dBm/Hz] 18.3 GHz < frequency ≤ 26.5 GHz –141 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –141 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –139 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –134 [dBm/Hz] Nominal

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

Item	Specification
Absolute amplitude accuracy	At 18 to 28 °C, Auto Sweep Time Select = Normal, 30 Hz ≤ RBW ≤ 1 MHz, Detection = Positive, CW, Microwave Preselector Bypass turned off, Without MS2850A-051/151 or Noise Floor Reduction is Off: excluding the noise floor effect, and not when FFT is being executed (displayed on the screen). With Preamplifier turned off: Input attenuator ≥ 10 dB, Mixer input level ≤ –10 dBm With Preamplifier turned on: Input attenuator = 10 dB, Preamplifier input level ≤ –30 dBm, Without MS2850A-068/168 or 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) ±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 MS2850A-068/168 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: 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, linearity error and input attenuator switching error.

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

Item	Specification
1 dB gain compression	Without MS2850A-068/168 or Preamplifier turned off: At mixer input level ≥ +3 dBm (300 MHz ≤frequency < 4 GHz, Frequency Band Mode: Normal) (300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious) ≥ +3 dBm (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious) ≥ 0 dBm (4 GHz < frequency ≤ 13.5 GHz) ≥ –1 dBm (13.5 GHz < frequency ≤ 26.5 GHz) ≥ –1 dBm Nominal (26.5 GHz < frequency ≤ 40 GHz) Without MS2850A-068/168 or Preamplifier turned off: At preamplifier input level ≥ +15 dBm Nominal (300 MHz ≤ frequency ≤ 4 GHz) ≥ +21 dBm Nominal (4 GHz ≤ frequency ≤ 13.5 GHz) ≥ +21 dBm Nominal (13.5 GHz < frequency ≤ 26.5 GHz) ≥ +21 dBm Nominal (26.5 GHz < frequency ≤ 40 GHz)

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

Item	Specification
Spurious Response	
Two-tone third-order intermodulation distortion (Cont'd)	At 18 to 28 °C, with mixer input level = –15 dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30 kHz: Without MS2850A-068/168 or Preamplifier turned off, ≤ –54 dBc (TOI = +12 dBm) (30 MHz ≤ frequency < 300 MHz) ≤ –62 dBc (TOI = +16 dBm) (300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal) ≤ –60 dBc (TOI = +15 dBm) (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) ≤ –56 dBc (TOI = +13 dBm) (3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious) ≤ –56 dBc (TOI = +13 dBm) (6 GHz < frequency ≤ 13.5 GHz) ≤ –56 dBc (TOI = +13 dBm) (13.5 GHz < frequency ≤ 26.5 GHz) ≤ –56 dBc (TOI = +13 dBm) Nominal (26.5 GHz < frequency ≤ 40 GHz) At 18 to 28 °C, with Preamplifier input level = –45 dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30 kHz: With MS2850A-068/168 and Preamplifier turned on ≤ –73 dBc (TOI = –8.5 dBm) Nominal (30 MHz ≤ frequency < 300 MHz) ≤ –78 dBc (TOI = –6 dBm) Nominal (300 MHz ≤ frequency ≤ 700 MHz) ≤ –81 dBc (TOI = –4.5 dBm) Nominal (700 MHz < frequency < 4 GHz, Frequency Band Mode: Normal) (700 MHz < frequency < 3.5 GHz, Frequency Band Mode: Spurious) ≤ –78 dBc (TOI = –6 dBm) Nominal (4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal) (3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious) ≤ –70 dBc (TOI = –10 dBm) Nominal (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 GHz < frequency ≤ 26.5 GHz) ≤ –70 dBc (TOI = –10 dBm) Nominal (26.5 GHz < frequency ≤ 40 GHz)

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

Item	Specification
Two-tone third-order intermodulation distortion (Cont'd)	When Attenuator Mode is E-ATT Combined, At 18 to 28 °C, with mixer input level = –15 dBm (per wave) and using ≥ 300 kHz separation, at RBW ≤ 30 kHz Without MS2850A-068/168 or Preamplifier turned off, ≤ –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, 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) ≤ –54 dBc (TOI = +12 dBm) Nominal (30 MHz≤ frequency < 300 MHz, –5 dBm < RF input level ≤ 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	Microwave Preselector Bypass turned off, Frequency Band Mode: Normal ≤ –70 dBc (10 MHz ≤ frequency < 4 GHz) ≤ –55 dBc (4 GHz ≤ frequency ≤ 6 GHz) ≤ –70 dBc (6 GHz ≤ frequency < 13.5 GHz) ≤ –70 dBc (13.5 GHz ≤ frequency ≤ 26.5 GHz) ≤ –70 dBc Nominal (26.5 GHz ≤ frequency ≤ 44.5 GHz) Microwave Preselector Bypass turned on. Refer to the Image response in Table 1.3.9-1 Microwave Preselector Bypass Option Specifications With MS2850A-032/033/133/034/134 Refer to the Image response in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications
Sweep	
Sweep mode	Single, Continuous
Sweep time Setting range	 1 ms to 1000 s (SPAN ≥ 300 Hz) 1 μs to 1000 s (SPAN = 0 Hz)
Detection mode	Pos&Neg, Positive Peak, Sample, Negative Peak, RMS
The number of trace points	When SPAN > 30 GHz: 5001 to 30001 When 500 MHz < SPAN ≤ 30 GHz: 1001 to 30001 When 100 MHz < SPAN ≤ 500 MHz: 101 to 30001 When 300 Hz ≤ SPAN ≤ 100 MHz and Sweep Time > 10 s: 101 to 30001 When 300 Hz ≤ SPAN ≤ 100 MHz and Sweep Time ≤ 10 s: 11 to 30001 When SPAN = 0 Hz and Sweep Time > 10 s: 101 to 30001 When SPAN = 0 Hz and Sweep Time ≤ 10 s: 11 to 30001 Resolution: 1 point
Scale Log indicator Lin indicator	 10div/12div : 0.1 to 20 dB/div, 1-2-5 sequence 10div : 1 to 10 %/div, 1-2-5 sequence
Trigger function Trigger mode	 Free Run (Trig Off), Video, Wide IF Video, External, Frame
Gate function Gate mode	 Off, Wide IF Video, External, Frame

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

Item	Specification
Measurement function	
Adjacent Channel Power Measurement (ACP) Reference Adjacent channel specification	 Span Total, Carrier Total, Both Sides of Carriers or Carrier Select 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	 ± (marker frequency × reference frequency accuracy + (0.1 × N/Gate Time[s])) Hz) at SPAN ≤ 1 MHz, RBW = 1 kHz, S/N ≥ 50 dB, Gate Time ≥ 100 ms Mixer harmonic order [N]
Two-tone third-order intermodulation distortion	Measures IM3 and TOI from two-tone signal.

1.3.2 Phase Noise Measurement Function Option (MS2850A-010/110)

Table 1.3.2-1 Phase Noise Measurement Function Option Specifications

Item	Specification
Model, Name	MS2850A-010 Phase Noise Measurement Function MS2850A-110 Phase Noise Measurement Function Retrofit
Function	Displays the phase noise characteristics on a logarithmic scale.
Frequency	Refer to *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Phase Noise Measurement Function Operation.*

1.3.3 Secondary Storage Device Option (MS2850A-011/111)

Table 1.3.3-1 Secondary Storage Device Option Specifications

Item	Specification
Model, Name	MS2850A-011 Secondary Storage Device MS2850A-111 Secondary Storage Device Retrofit
Application	Removable SSD for storing user data Insert into the Secondary HDD/SSD slot on the back panel to use. Refer to Figure 3.1.2-1 Rear panel "16 Secondary SSD".

1.3.4 Noise Figure Measurement Function Option (MS2850A-017/117)

Table 1.3.4-1 Noise Figure Measurement Function Option Specifications

Item	Specification
Model, Name	MS2850A-017 Noise Figure Measurement Function MS2850A-117 Noise Figure Measurement Function Retrofit
Function	Adds the function to measure Noise Figure, Noise Factor, Gain and Y factor.
Frequency	Refer to *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual Noise Figure Measurement Function Operation.*
Noise Figure	
Gain	
Resolution Bandwidth	

1.3.5 Analysis Bandwidth Extension Option (MS2850A-032/033/133/034/134)

Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications

Item	Specification
Model, Name	MS2850A-032 Analysis Bandwidth 255 MHz (Standard) MS2850A-033 Analysis Bandwidth Extension to 510 MHz MS2850A-133 Analysis Bandwidth Extension to 510 MHz Retrofit MS2850A-034 Analysis Bandwidth Extension to 1 GHz MS2850A-134 Analysis Bandwidth Extension to 1 GHz Retrofit
Function	Extends the analysis bandwidth to 255 MHz/510 MHz/1 GHz in Signal Analyzer mode. This option is not suitable for spurious measurement or measurement and analysis of the signals including those outside the analysis band, because it bypasses the image response elimination filter in the frequencies of 4.2 GHz or higher.
Bandwidth	See Table 1.3.1-2, “Specifications for signal analyzer function, Span”.
Sampling rate	See Table 1.3.1-2, “Specifications for signal analyzer function, Span”.
Capture time	See Table 1.3.1-2, “Specifications for signal analyzer function, Span”.
Resolution bandwidth (RBW)	See Table 1.3.1-2, “Specifications for signal analyzer function, Resolution bandwidth (RBW)”.
ADC resolution	Bandwidth > 31.25 MHz, 12 bits
Frequency	
Frequency setting	Refer to the Frequency setting range in Table 1.3.1-2 Specifications for signal analyzer function.
Frequency band configuration	Refer to the Frequency band configuration in Table 1.3.1-1 Specifications for Mainframe.
Amplitude	
Absolute amplitude accuracy	Frequency < 4 GHz Refer to the Absolute amplitude accuracy in Table 1.3.1-2 Specifications for signal analyzer function. Frequency ≥ 4 GHz Refer to the Absolute amplitude accuracy in Table 1.3.9-1, Microwave Preselector Bypass Option Specifications.

Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications (Cont'd)

Item	Specification
Display average noise level	At 18 to 28 °C, Time Detection = Average, input attenuator = 0 dB, Bandwidth > 31.25 MHz, at center frequency, excluding the residual response effect, Without MS2850A-068/168, without MS2850A-076/176, Frequency Band Mode: Normal 800 MHz ≤ frequency < 1 GHz –142 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –141 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –140 [dBm/Hz] 3.5 GHz < frequency < 4.2 GHz –138 [dBm/Hz] 4.2 GHz ≤ frequency ≤4.6 GHz –138 [dBm/Hz] 4.6 GHz < frequency ≤ 6 GHz –142 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –141 [dBm/Hz] 13 GHz < frequency ≤ 17 GHz –141 [dBm/Hz] 17 GHz < frequency ≤ 18.5 GHz –139 [dBm/Hz] 18.5 GHz < frequency ≤ 26.5 GHz –139 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –138 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –137 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –130 [dBm/Hz] Nominal Without MS2850A-068/168, with MS2850A-076/176, Frequency Band Mode: Normal 800 MHz ≤ frequency < 1 GHz –142 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –141 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –140 [dBm/Hz] 3.5 GHz < frequency < 4.2 GHz –138 [dBm/Hz] 4.2 GHz ≤ frequency ≤ 4.6 GHz –137 [dBm/Hz] 4.6 GHz < frequency ≤ 6 GHz –141 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –140 [dBm/Hz] 13 GHz < frequency ≤ 17 GHz –140 [dBm/Hz] 17 GHz < frequency ≤ 18.5 GHz –137 [dBm/Hz] 18.5 GHz < frequency ≤ 26.5 GHz –137 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –136 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –135 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –130 [dBm/Hz] Nominal With MS2850A-068/168 and Preamplifier turned off, Frequency Band Mode: Normal 800 MHz ≤ frequency < 1 GHz –142 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –141 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –140 [dBm/Hz] 3.5 GHz < frequency < 4.2 GHz –138 [dBm/Hz] 4.2 GHz ≤ frequency ≤ 4.6 GHz –138 [dBm/Hz] 4.6 GHz < frequency ≤ 6 GHz –141 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –140 [dBm/Hz] 13 GHz < frequency ≤ 17 GHz –140 [dBm/Hz] 17 GHz < frequency ≤ 18.5 GHz –135 [dBm/Hz] 18.5 GHz < frequency ≤ 26.5 GHz –135 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –135 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –132 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –125 [dBm/Hz] Nominal

Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications (Cont'd)

Item	Specification
Display average noise level (Cont'd)	With MS2850A-068/168 and Preamplifier turned on, Frequency Band Mode: Normal 800 MHz ≤ frequency < 1 GHz –161 [dBm/Hz] 1 GHz ≤ frequency < 2.4 GHz –160 [dBm/Hz] 2.4 GHz ≤ frequency ≤ 3.5 GHz –159 [dBm/Hz] 3.5 GHz < frequency < 4.2 GHz –157 [dBm/Hz] 4.2 GHz ≤ frequency ≤ 4.6 GHz –155 [dBm/Hz] 4.6 GHz < frequency ≤ 6 GHz –155 [dBm/Hz] 6 GHz < frequency ≤ 13 GHz –155 [dBm/Hz] 13 GHz < frequency ≤ 17 GHz –155 [dBm/Hz] 17 GHz < frequency ≤ 18.5 GHz –152 [dBm/Hz] 18.5 GHz < frequency ≤ 26.5 GHz –152 [dBm/Hz] 26.5 GHz < frequency ≤ 34 GHz –150 [dBm/Hz] 34 GHz < frequency ≤ 40 GHz –146 [dBm/Hz] 40 GHz < frequency ≤ 44.5 GHz –138 [dBm/Hz] Nominal
In-band frequency characteristics	On the basis of a level of the center frequency, at 18 to 28 °C, Bandwidth ≤ 31.25 MHz. At center frequency ± 50 MHz: ±0.3 dB Nominal (4.2 GHz ≤ frequency < 5 GHz) ±0.3 dB Nominal (5 GHz ≤ frequency ≤ 18.5 GHz) ±0.3 dB Nominal (18.5 GHz < frequency ≤ 26.5 GHz) ±0.3 dB Nominal (26.5 GHz < frequency ≤ 32 GHz) ±0.3 dB Nominal (32 GHz < frequency ≤ 44.5 GHz) At center frequency ± 255 MHz: ±0.7 dB Nominal (4.2 GHz ≤ frequency < 5 GHz) At center frequency ± 500 MHz: ±0.7 dB Nominal (5 GHz ≤ frequency ≤ 18.5 GHz) ±1.0 dB Nominal (18.5 GHz < frequency ≤ 26.5 GHz) ±1.2 dB Nominal (26.5 GHz < frequency ≤ 32 GHz) ±1.25 dB Nominal (32 GHz < frequency ≤ 44.5 GHz)
In-band phase linearity	Deviation from the linear-phase characteristic Bandwidth > 31.25 MHz, Attenuator = 10 dB, Offset frequency ≤ Center frequency ± 500 MHz, Preamplifier turned off, Reference Level ≤ 0 dBm: 5° p-p Nominal (4.2 GHz ≤ frequency ≤ 5.14 GHz) 5° p-p Nominal (5.14 GHz < frequency ≤ 42.1 GHz) 6° p-p Nominal (42.1 GHz < frequency ≤ 44.5 GHz) Preamplifier turned on, Reference Level ≤ –20 dBm: 7° p-p Nominal. (4.2 GHz ≤ frequency ≤ 5.14 GHz) 6° p-p Nominal. (5.14 GHz < frequency ≤ 42.1 GHz) 6° p-p Nominal. (42.1 GHz < frequency ≤ 44.5 GHz)

Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications (Cont'd)

Item	Specification
Image response	Bandwidth > 31.25 MHz ≤ –60 dBc*1 (800 MHz ≤ frequency ≤ 4.2 GHz) ≤ 0 dBc Nominal*2 (4.2 GHz < frequency ≤ 44.5 GHz) ≤ –60 dBc*3 (4.2 GHz < frequency ≤ 44.5 GHz) *1: Generated at the frequency at the distance of (650 MHz ± BW/2) × 2 *2: Generated at the frequency at the distance of (1950 MHz ± BW/2) × 2 *3: Generated at the frequency at the distance of (650 MHz ± BW/2) × 2 BW: Input signal bandwidth
RF frequency characteristics	Frequency < 4 GHz Refer to the RF frequency characteristics in Table 1.3.1-1 Specifications for Mainframe. Frequency ≥ 4 GHz Refer to the RF frequency characteristics in Table 1.3.9-1, Microwave Preselector Bypass Option Specifications.
Linearity error	Without MS2850A-068/168 or Preamplifier turned off, excluding the noise floor effect, ±0.20 dB typ. (Mixer input level ≤ –10 dBm) With MS2850A-068/168, Preamplifier turned on, excluding the noise floor effect, ±0.20 dB typ. (Preamplifier input level ≤ –30 dBm)
ADC related Spurious Free Dynamic Range (SFDR)	Input level = ADC full scale – 14 dB at the center frequency Bandwidth > 31.25 MHz, In measurement bandwidth –60 dBc Nominal (800 MHz ≤ frequency < 4.2 GHz) –70 dBc Nominal (4.2 GHz ≤ frequency ≤ 44.5 GHz)
Others	
IF output Frequency Max bandwidth (6 dB) Gain	 1950 MHz Nominal 2.5 GHz Nominal –10 dB (Nominal, Input Attenuator = 0 dB, Input frequency = 10 GHz)

1.3.6 Noise Floor Reduction Option (MS2850A-051/151)

Table 1.3.6-1 Noise Floor Reduction Option Specifications

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Model, Name</td><td>MS2850A-051 Noise Floor Reduction
MS2850A-151 Noise Floor Reduction Retrofit</td></tr>
<tr><td>Application</td><td>When measuring signals using MS2850A either alone or with the external mixer connected, MS2850A-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.</td></tr>
<tr><td>Noise Floor Reduction</td><td>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:

Without the external mixer
<table>
<tr><th>Frequency Range</th><th>Noise Floor Reduction</th></tr>
<tr><td>9 kHz to 4000 MHz</td><td>11 dB Nominal</td></tr>
<tr><td>3500 to 4400 MHz</td><td>11 dB Nominal</td></tr>
<tr><td>4300 to 6000 MHz</td><td>11 dB Nominal</td></tr>
<tr><td>3900 to 8000 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>7900 to 10575 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>10475 to 12200 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>12100 to 18400 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>18300 to 26600 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>26500 to 42100 MHz</td><td>7 dB Nominal</td></tr>
<tr><td>42000 to 44500MHz</td><td>7 dB Nominal</td></tr>
</table>
With the external mixer
After Analyze External Mixer Noise Floor is done by the external mixer.

Noise Floor Reduction: 11 dB Nominal

Note that Noise Floor Reduction depends on the external mixer.</td></tr>
</table>

1.3.7 External Interface for High Speed Data Transfer PCIe Option (MS2850A-053/153)

Table 1.3.7-1 External Interface for High Speed Data Transfer PCIe Option Specifications

Item	Specification	
Model, Name	MS2850A-053	External Interface for High Speed Data Transfer PCIe
	MS2850A-153	External Interface for High Speed Data Transfer PCIe Retrofit
Function	This option transfers the digitized data captured by the MS2850A-032/033/133/034/134 to the external PC.	
Performance	Connect the MS2850A and the external PC with a standard PCIe cable, The data rates up to 4 GB/s are available for the communication between the external PC and the MS2850A PCIe back plane by PCIe Gen 2 x8 link.	

1.3.8 External Interface for High Speed Data Transfer USB3.0 Option (MS2850A-054/154)

Table 1.3.8-1 External Interface for High Speed Data Transfer USB3.0 Option Specifications

Item	Specification	
Model, Name	MS2850A-054	External Interface for High Speed Data Transfer USB3.0
	MS2850A-154	External Interface for High Speed Data Transfer USB3.0 Retrofit
Function	This option transfers the digitized data captured by the MS2850A-032/033/133/034/134 to the external PC.	
Performance	Connect the MS2850A and the external PC with a USB cable. The data rates up to 500 MB/s are available for the communication between the external PC and the MS2850A USB3.0 back plane by USB3.0.	

1.3.9 Microwave Preselector Bypass Option (MS2850A-067)

Table 1.3.9-1 Microwave Preselector Bypass Option Specifications

Item	Specification
Model, Name	MS2850A-067 Microwave Preselector Bypass
Function	Standard Option 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 reception and spurious measurement.
Default	Signal Analyzer mode: On (to improve frequency characteristics within band) Other application software: Fixed to On (to improve frequency characteristics within band) Spectrum Analyzer mode: Off (to avoid measuring internal image signal)
Function and performance	When Microwave Preselector Bypass is ON, the specifications are as below.
Frequency	
Frequency range	Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz : 4 to 32 GHz (MS2850A-047) 4 to 44.5 GHz (MS2850A-046) Signal Analyzer mode and Bandwidth > 31.25 MHz : 4.2 to 32 GHz (MS2850A-047) 4.2 to 44.5 GHz (MS2850A-046)

Table 1.3.9-1 Microwave Preselector Bypass Option Specifications (Cont'd)

Item	Specification
Amplitude	
Absolute amplitude accuracy	At 18 to 28 °C, Signal Analyzer mode, RBW = Auto, Time Detection = Average, Marker Result = Integration or Peak (Accuracy), Center frequency, CW, Microwave Preselector Bypass = ON, excluding the noise floor effect Preamplifier turned off, Input attenuator ≥ 10, Mixer input level ≤ –10 dBm Preamplifier turned on, Input attenuator = 10 dB, Preamplifier input level ≤ –30 dBm Without MS2850A-068/168 or Preamplifier turned off, and Bandwidth ≤ 31.25 MHz ±1.4 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±2.0 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±2.5 dB (26.5 GHz < frequency ≤ 40 GHz) ±2.5 dB Nominal (40 GHz < frequency ≤ 44.5 GHz) With MS2850A-068/168, Preamplifier turned on, and Bandwidth ≤ 31.25 MHz ±1.9 dB (6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±2.7 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.7 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.7 dB Nominal (40 GHz < frequency ≤ 44.5 GHz) Without MS2850A-068/168 or Preamplifier turned off, and Bandwidth > 31.25 MHz ±1.4 dB (4 GHz ≤ frequency ≤ 13.8 GHz) ±2.0 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±2.5 dB (26.5 GHz < frequency ≤ 40 GHz) ±2.5 dB Nominal (40 GHz < frequency ≤ 44.5 GHz)

Table 1.3.9-1 Microwave Preselector Bypass Option Specifications (Cont'd)

Item	Specification
Absolute amplitude accuracy (Cont'd)	With MS2850A-068/168, Preamplifier turned on, and Bandwidth > 31.25 MHz ±1.9 dB (4 GHz ≤ frequency ≤ 13.8 GHz) ±2.7 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.7 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.7 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.
RF frequency characteristics	At 18 to 28 °C, input attenuator = 10 dB, Microwave Preselector Bypass turned on, Without MS2850A-068/168 or Preamplifier turned off Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: ±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) ±2.00 dB (26.5 GHz < frequency ≤ 40 GHz) ±2.00 dB typ. (40 GHz < frequency ≤ 44.5 GHz) With MS2850A-068/168 and Preamplifier turned on Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: ±1.8 dB (6 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal) (4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious) ±2.50 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.00 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.00 dB Nominal (40 GHz < frequency ≤ 44.5 GHz)

Table 1.3.9-1 Microwave Preselector Bypass Option Specifications (Cont'd)

Item	Specification
RF frequency characteristics (Cont'd)	Without MS2850A-068/168 or Preamplifier turned off, and Signal Analyzer mode and Bandwidth > 31.25 MHz: ±1.0 dB (4 GHz ≤ frequency ≤ 13.8 GHz) ±1.5 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±2.0 dB (26.5 GHz < frequency ≤ 40 GHz) ±2.0 dB typ. (40 GHz < frequency ≤ 44.5 GHz) With MS2850A-068/168, Preamplifier turned on, Signal Analyzer mode, and Bandwidth > 31.25 MHz: ±1.8 dB (4 GHz ≤ frequency ≤ 13.8 GHz) ±2.5 dB (13.8 GHz < frequency ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < frequency ≤ 40 GHz) ±3.0 dB Nominal (40 GHz < frequency ≤ 44.5 GHz)
Display average noise level	Spectrum Analyzer mode: Refer to the Display average noise level in Table 1.3.1-3 Specifications for spectrum analyzer function Signal Analyzer mode and Bandwidth ≤ 31.25 MHz: Refer to the Display average noise level in Table 1.3.1-2 Specifications for Signal Analyzer Function Signal Analyzer mode and Bandwidth > 31.25 MHz: Refer to the Display average noise level in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications
Image response	Microwave Preselector Bypass turned on, Generated at the frequency at the distance of 1875 MHz × 2 0 dBc Nominal (6 GHz ≤ frequency ≤ 13.5 GHz) 0 dBc Nominal (13.5 GHz < frequency ≤ 26.5 GHz)

1.3.10 Microwave Preamplifier Option (MS2850A-068/168)

Table 1.3.10-1 Microwave Preamplifier Option Specifications

Item	Specification
Model, Name	MS2850A-068 Microwave Preamplifier MS2850A-168 Microwave Preamplifier Retrofit
Function	Amplifies signal prior to 1st mixer to enhance sensitivity.
Frequency	
Frequency range	100 kHz to 32 GHz (MS2850A-047) 100 kHz to 44.5 GHz (MS2850A-046)
Amplitude	
Measurement range	Refer to the Measurement range in Table 1.3.1-1 Specifications for Mainframe.
Maximum input level	Refer to the Maximum input level in Table 1.3.1-1 Specifications for Mainframe.
Display average noise level	Signal Analyzer mode and Bandwidth ≤ 31.25 MHz Refer to the Display average noise level in Table 1.3.1-2 Specifications for Signal Analyzer Function. Signal Analyzer mode and Bandwidth > 31.25 MHz Refer to the Display average noise level in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications. Spectrum Analyzer mode Refer to the Display average noise level in Table 1.3.1-3 Specifications for spectrum analyzer function.
RF Frequency Characteristics	Microwave Preselector Bypass turned off Refer to the RF Frequency Characteristics in Table 1.3.1-1 Specifications for Mainframe. Microwave Preselector Bypass turned on Refer to the RF Frequency Characteristics in Table 1.3.9-1 Microwave Preselector Bypass Option Specifications.
Input attenuator switching error	Refer to the Input attenuator switching error in Table 1.3.1-1 Specifications for Mainframe.
Linearity error	Refer to the Linearity error in Table 1.3.1-1 Specifications for Mainframe.
Second harmonic wave distortion	Refer to the Second harmonic wave distortion in Table 1.3.1-1 Specifications for Mainframe.
1 dB gain compression	Refer to the 1 dB gain compression in Table 1.3.1-1 Specifications for Mainframe.
Two-tone third-order intermodulation distortion	Refer to the Two-tone third-order intermodulation distortion in Table 1.3.1-3 Specifications for spectrum analyzer function.

1.3.11 Extended Specifications Option (MS2850A-072/172)

Table 1.3.11-1 Extended Specifications Option Specifications

Item	Specification
Model, Name	MS2850A-072 Extended Specifications MS2850A-172 Extended Specifications Retrofit
Function	Standardization of the following items: ● Frequency response in a certain 100 MHz range within bandwidth ● Phase linearity in a certain 100 MHz range within bandwidth ● RF input VSWR
Frequency response in a certain 100 MHz range within bandwidth	18 to 28 °C, Bandwidth ≥ 100 MHz, Preamplifier = Off, Input attenuator = 10 dB, Reference Level ≤ 0 dBm, Signal Analyzer mode, After the calibration As a reference level of a certain frequency f [Hz] within f±50 MHz in the range of [– (bandwidth – 100 MHz) / 2 to + (bandwidth – 100 MHz) / 2], Specification / Center Frequency ±1.6 dB (420 MHz ≤ frequency < 4.2 GHz) ±1.2 dB (4.2 GHz ≤ frequency ≤ 13.6 GHz) ±1.4 dB (13.6 GHz < frequency ≤ 26.5 GHz) ±1.6 dB (26.5 GHz < frequency ≤ 30 GHz) ±1.9 dB (30 GHz < frequency ≤ 39.5 GHz)
Phase linearity in a certain 100 MHz range within bandwidth	Bandwidth ≥ 100 MHz, Preamplifier = Off, Input attenuator = 10 dB, Reference Level ≤ 0 dBm, Signal Analyzer mode, After the calibration As a deviation from the phase linearity within f ± 50 MHz of a certain frequency: f [Hz] in the range of [– (bandwidth – 100 MHz)/2 to + (bandwidth – 100 MHz)/2], Release acceptance criteria* / Center Frequency ±3.1 degrees (420 MHz ≤ frequency ≤ 1.24 GHz) ±3.1 degrees (1.24 GHz < frequency < 4.2 GHz) ±3.5 degrees (4.2 GHz ≤ frequency ≤ 5.14 GHz) ±2.7 degrees (5.14 GHz < frequency ≤ 26.4 GHz) ±2.4 degrees (26.4 GHz < frequency ≤ 35 GHz) ±2.6 degrees (35 GHz < frequency ≤ 42.1 GHz) ±3.4 degrees (42.1 GHz < frequency ≤ 44.5 GHz) *: The criteria at the factory shipment. Tested at constant temperature within 18 to 28 °C. And the uncertainty is not included.
RF input Connector	Front panel, K-J, 50 Ω VSWR: Input attenuator ≥ 10 dB, 18 to 28 °C Specification / Frequency ≤ 1.3 (40 MHz ≤ frequency ≤ 3 GHz) ≤ 1.4 (3 GHz < frequency ≤ 6 GHz) ≤ 1.6 (6 GHz < frequency ≤ 13.6 GHz) ≤ 1.9 (13.6 GHz < frequency ≤ 26.5 GHz) ≤ 2.0 (26.5 GHz < frequency ≤ 40 GHz)

1.3.12 Low Second Harmonic Distortion Option (MS2850A-076/176)

Table 1.3.12-1 Low Second Harmonic Distortion Option Specifications

Item	Specification
Model, Name	MS2850A-076 Low Second Harmonic Distortion MS2850A-176 Low Second Harmonic Distortion Retrofit
Function	4 GHz ≤ frequency, Preamplifier turned off and Microwave Preselector Bypass turned off Improves the Display average noise level and the Second harmonic wave distortion.
Frequency	
Frequency range	Spectrum Analyzer mode, or Signal Analyzer mode and Bandwidth ≤ 31.25 MHz : 4 GHz to 32 GHz (MS2850A-047) 4 GHz to 44.5 GHz (MS2850A-046) Signal Analyzer mode and Bandwidth > 31.25 MHz : 4.2 GHz to 32 GHz (MS2850A-047) 4.2 GHz to 44.5 GHz (MS2850A-046)
Amplitude	
Measurement range	Refer to the Measurement range in Table 1.3.1-1 Specifications for Mainframe.
Maximum input level	Refer to the Maximum input level in Table 1.3.1-1 Specifications for Mainframe.
Display average noise level	Signal Analyzer mode and Bandwidth ≤ 31.25 MHz Refer to the Display average noise level in Table 1.3.1-2 Specifications for Signal Analyzer Function. Signal Analyzer mode and Bandwidth > 31.25 MHz Refer to the Display average noise level in Table 1.3.5-1 Analysis Bandwidth Extension Option Specifications. Spectrum Analyzer mode Refer to the Display average noise level in Table 1.3.1-3 Specifications for spectrum analyzer function.
RF Frequency Characteristics	Microwave Preselector Bypass turned off Refer to the RF Frequency Characteristics in Table 1.3.1-1 Specifications for Mainframe. Microwave Preselector Bypass turned on Refer to the RF Frequency Characteristics in Table 1.3.9-1 Microwave Preselector Bypass Option Specifications.
Input attenuator switching error	Refer to the Input attenuator switching error in Table 1.3.1-1 Specifications for Mainframe.
Linearity error	Refer to the Linearity error in Table 1.3.1-1 Specifications for Mainframe.

Table 1.3.12-1 Low Second Harmonic Distortion Option Specifications (Cont'd)

Item	Specification
Second harmonic wave distortion	Refer to the Second harmonic wave distortion in Table 1.3.1-1 Specifications for Mainframe.
1 dB gain compression	Refer to the 1 dB gain compression in Table 1.3.1-1 Specifications for Mainframe.
Two-tone third-order intermodulation distortion	Refer to the Two-tone third-order intermodulation distortion in Table 1.3.1-3 Specifications for spectrum analyzer function.

1.3.13 Removable SSD, Win10 Option (MS2850A-014/114)

Table 1.3.13-1 Removable SSD, Win10 Option Specifications

Item	Specification
Model, Name	MS2850A-014 Removable SSD, Win10 MS2850A-114 Removable SSD, Win10 Retrofit
Application	Removable SSD for storing user data of Windows 10 based products User-installable and removable SSD Used with inserted into the Primary SSD slot on the rear panel Refer to Figure 3.1.2-1 Rear panel "15 Primary SSD".

Chapter 2 Before Use

This chapter describes items that you should know before using the MS2850A. 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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2.1.2 Distance from surrounding objects 2-3
2.1.3 Installation location conditions 2-3
2.2 Items to Check Before Use 2-4
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2.1 Installation Location

2.1.1 Installation orientation

Install the MS2850A 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 MS2850A when tilted.

Figure 2.1.1-1 Installation orientation

⚠ CAUTION

If the MS2850A 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 MS2850A to prevent the internal temperature from rising. Install the MS2850A 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.

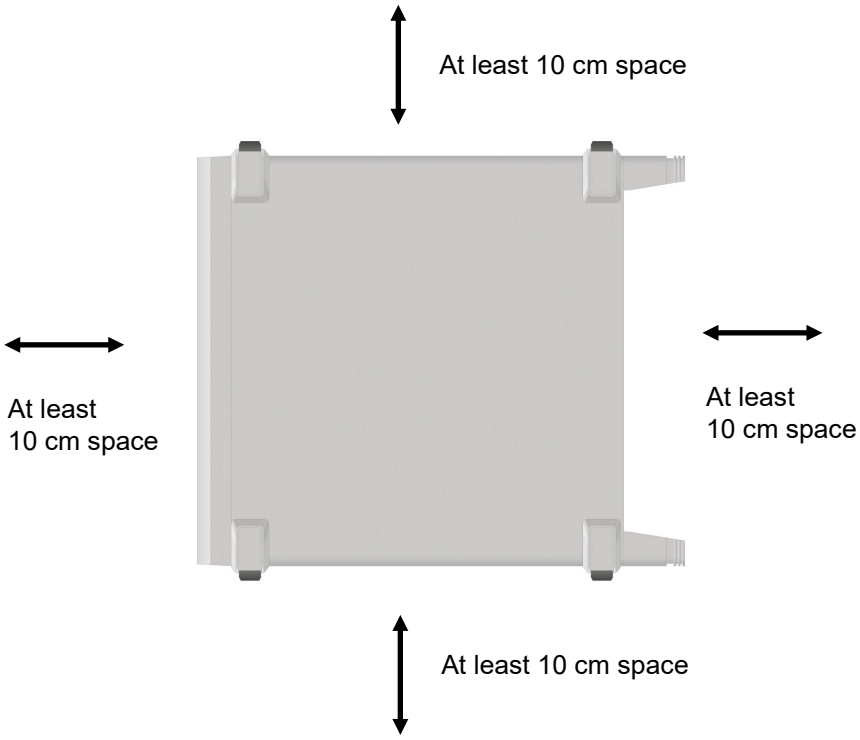


Figure 2.1.2-1 Distance from surrounding objects

2.1.3 Installation location conditions

Although the MS2850A operates at an ambient temperature of 0 to 45 °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

2.2 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.

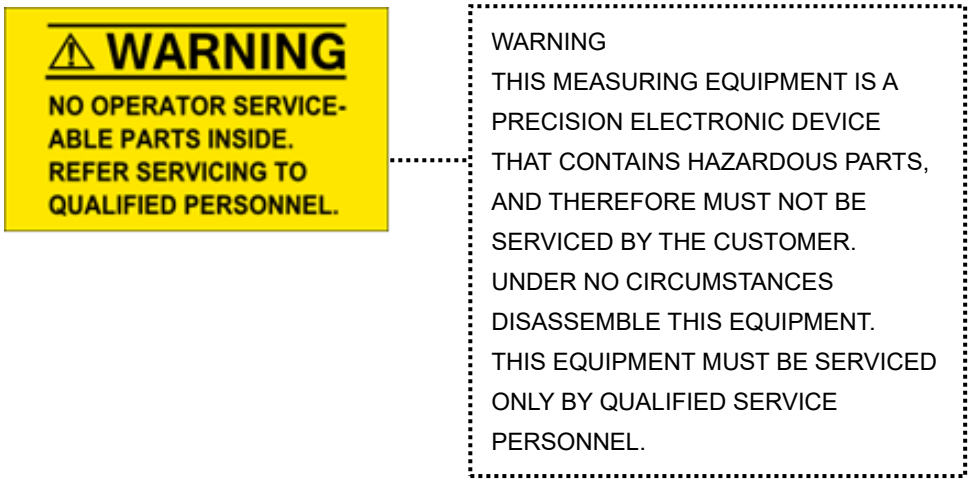


Figure 2.2.1-1 Warning labels

2.2.2 Input level to RF Input

The MS2850A is not provided with over-power protection. Be careful not to apply the power to the RF Input connector as described below:

Without Option 068/168 installed, or with Preamplifier turned off:
+30 dBm Max (Input attenuator ≥ 10 dB), ±0 Vdc Max
With Option 068/168 installed, and with Preamplifier turned on:
+10 dBm Max (Input attenuator = 0 dB), ±0 Vdc Max

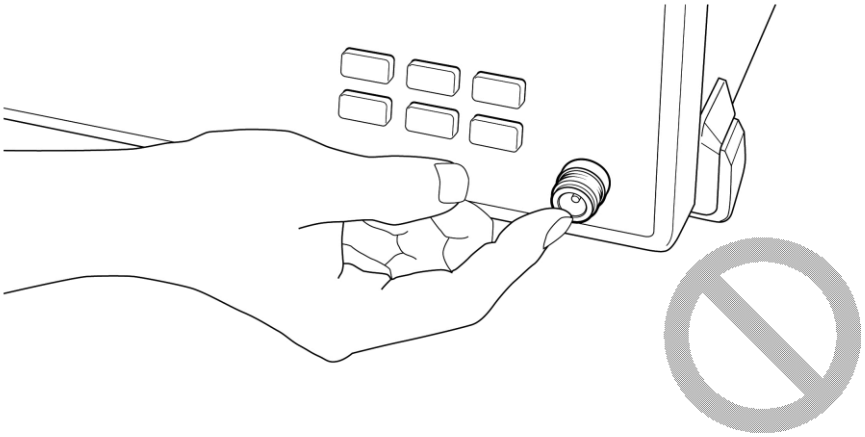
In addition, do not apply DC voltage even when within the range described above.

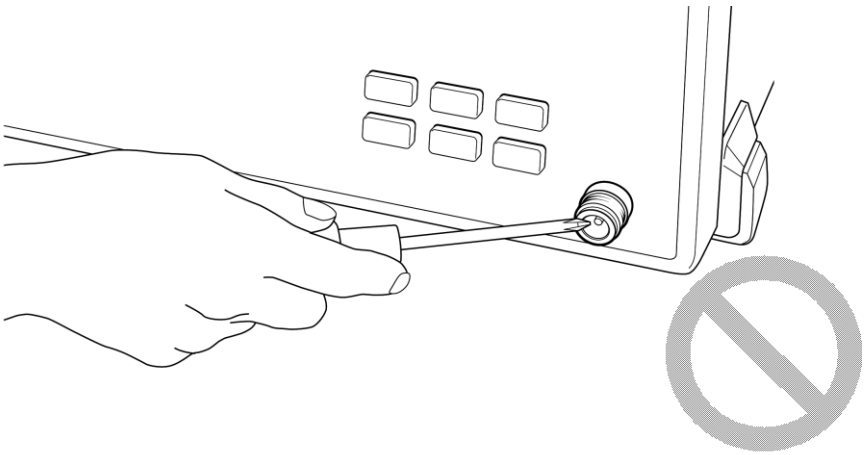
2.2.3 Electrostatic

⚠ CAUTION

- **Always use the supplied 3-pin power cord to ground both the MS2850A and DUT (included in test circuit). After confirming that both the MS2850A and DUT are grounded, use coaxial cables to connect them.**
  NEVER connect the MS2850A and DUT without grounding, otherwise electrostatic discharge may damage the MS2850A.

- **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 MS2850A.**

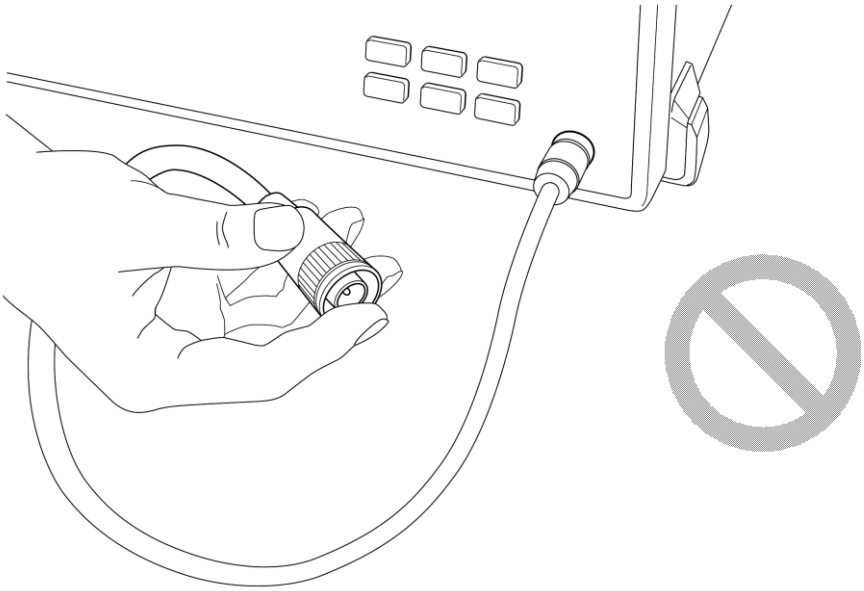




⚠ CAUTION

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

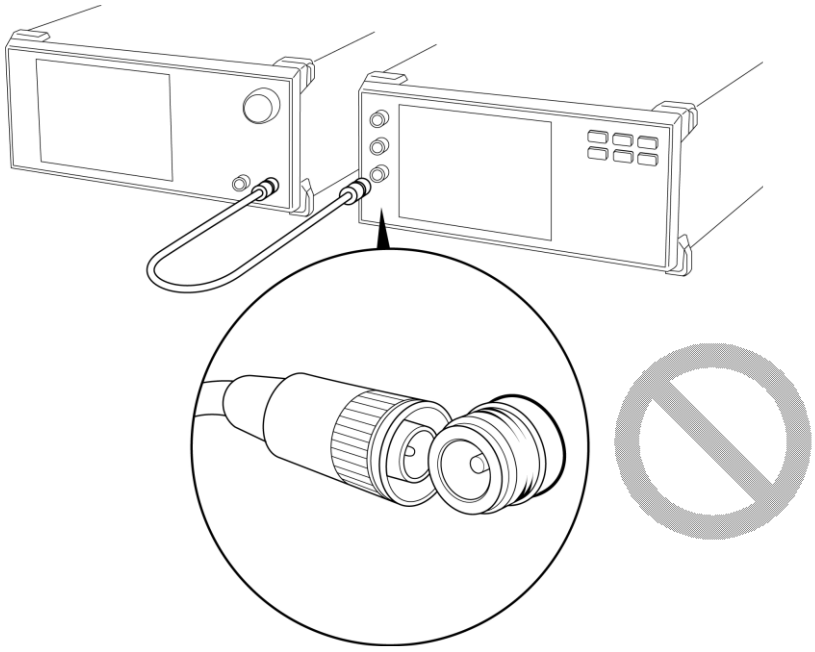
Doing so may damage the input circuit of the MS2850A.



⚠ CAUTION

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 MS2850A.



2.2.4 Notes on handling input connector

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 MS2850A, 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 MS2850A is 500 VA. Provide sufficient power capacity.

⚠ CAUTION

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.

⚠ WARNING

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.

⚠ CAUTION

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 MS2850A, including part names, basic parameter setting methods, modulation operation method and useful functions.

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3.1 Part Names

3.1.1 Front Panel

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

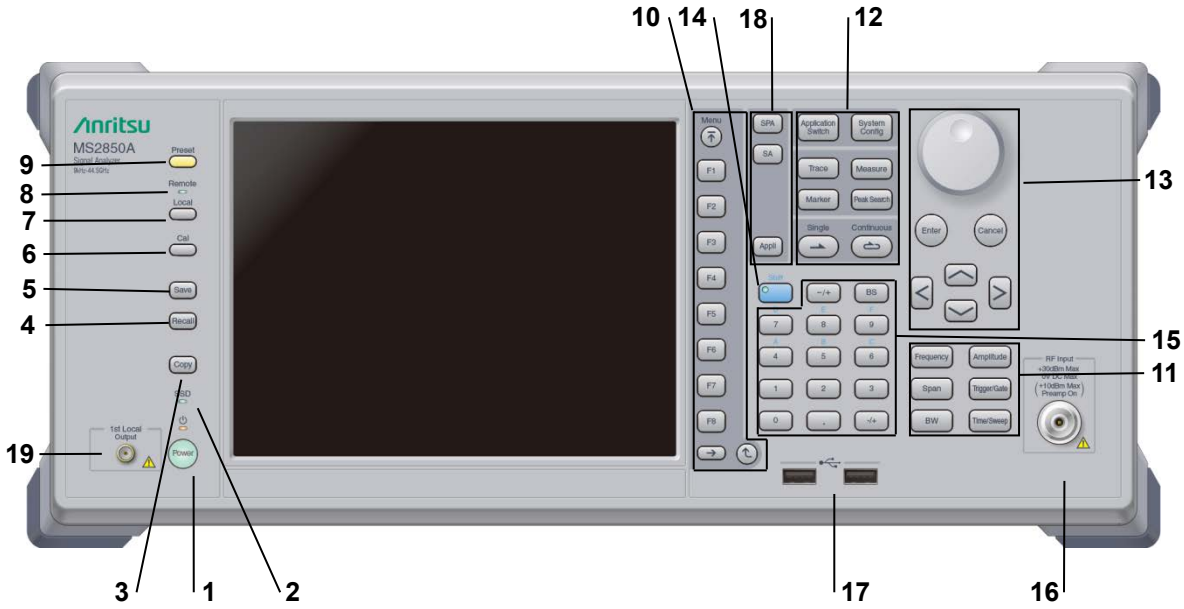


Figure 3.1.1-1 Front Panel

1

Power Switch

Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2850A is under operation. The Power lamp ⏻ 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 access lamp

Lights up when the MS2850A internal SSD is being accessed.

3

Copy key

Press to capture a screen image from the display and save it to a file.

4

Recall key

Press to recall a parameter file.

5

Save key
Press to save a parameter file.

6

Cal key
Press to display the calibration execution menu.

7

Local key
Press to return to local operation from remote control operation through GPIB, Ethernet or USB (B), and enable panel settings.

8

Remote lamp
Lights up when the MS2850A is in a remote control state.

9

Preset key
Resets parameters to their initial settings.

10

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.

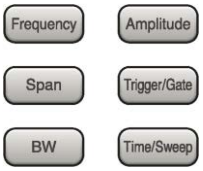
The number on the bottom of the screen indicates the menu page number.

Next key
Press to go to the next page.

Back key
Press to go back to the previous layer within the function menu.

Top key
Press to go back to the uppermost (top) layer.

11



Main function keys 1

Used to set or execute main functions of the MS2850A.
Executable functions vary depending on the application currently selected.

Press to set parameters related to frequency.

Press to set parameters related to level.

Press to set parameters related to frequency span.

Press to set parameters related to trigger.

Press to set parameters related to RBW/VBW.

Press to set parameters related to Time/Sweep.

12

Main function keys 2

Used to set or execute main functions of the MS2850A.
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 measurement function.

Press to set parameters related to the marker function.

Press to set parameters related to the peak search function.

Press to start a single measurement.

Press to start continuous measurements.

13

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.

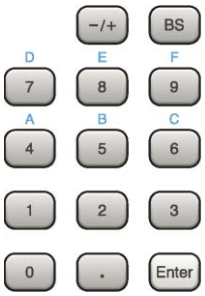
Pressing (Cancel) cancels the entered or selected data.

14

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.

15



Numeric keypad

Used to enter numbers on parameter setup screens.

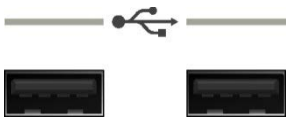
Pressing (BS) deletes the last entered digit or character.

Hexadecimal values [A] to [F] can be entered by pressing (4) to (9) when the Shift key lamp (Shift) lights up green.

16

RF Input connector

Type K connector

17 

USB connector (type A)

Used to connect a USB keyboard or mouse or the USB flash drive supplied with the MS2850A.

18

Application key

Press to switch between applications.

SPA key

Press to display the Spectrum Analyzer main screen.

SA key

Press to display the Signal Analyzer main screen.

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”.

19

1st Local Output connector

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

3.1.2 Rear Panel

This section describes the connectors located on the rear panel.

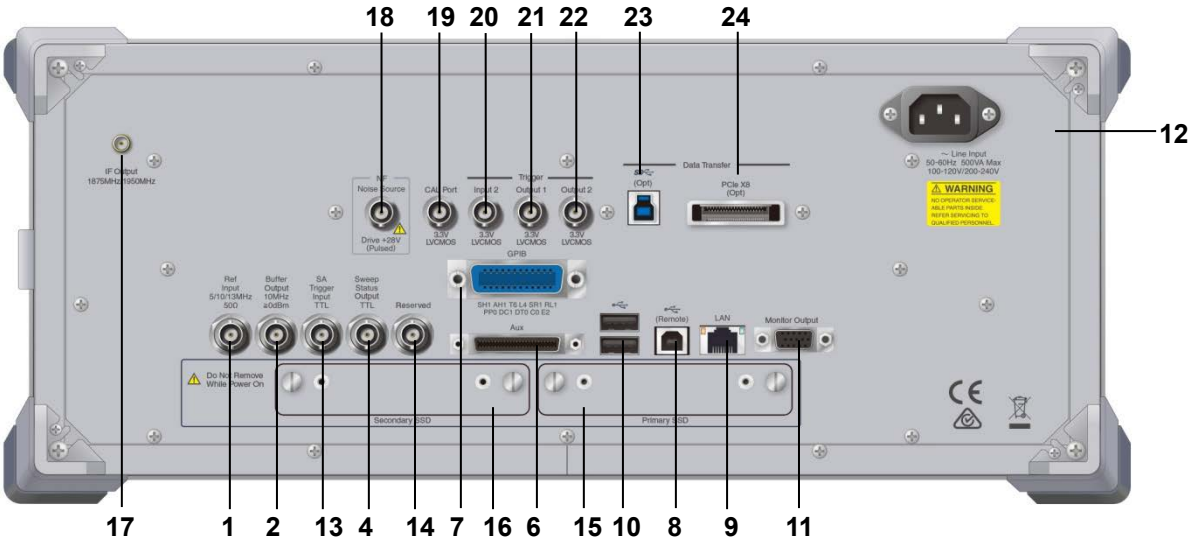


Figure 3.1.2-1 Rear panel

1

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 MS2850A, or for synchronizing the frequency of the MS2850A to that of other device.

2

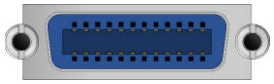
Buffer Out connector (reference frequency signal output connector)
Outputs the reference frequency signal (10 MHz) generated inside the MS2850A. It is used for synchronizing the frequencies between other devices and the MS2850A based on the reference frequency signal output from this connector.

4

Sweep Status Out connector
Outputs a signal that is enabled when an internal measurement is performed or measurement data is obtained.

6

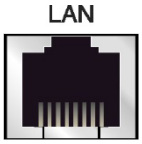
AUX connector
Leave the AUX connector open, because it is an interface for device maintenance.

7 

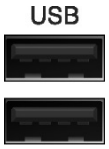
GPIB connector
Used when controlling the MS2850A externally via GPIB.

8

USB connector (type B)
Used when controlling the MS2850A externally via USB.

9 

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

10 

USB connectors (type A)
Used to connect a USB keyboard or mouse or the USB flash drive supplied with the MS2850A.

11

Monitor Out connector
Used for connection with an external display.

12

AC Power inlet
Used for supplying power.

13

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

14

Reserved (for future extension)

15 Primary SSD

Primary SSD slot
This is a SSD slot.

16 Secondary SSD

Secondary SSD slot
This is a SSD slot for the options.

17

IF output connector
Monitor output of the internal IF signal.

18

Noise Source connector
Supply (+28 V) of the Noise Source Drive.
This is available when the Option 017/117 is installed.

19

CAL Port connector (for future extension)

20

Trigger Input 2 connector
Inputs the external trigger signal (3.3 V LVCMOS) for SPA and SA applications.

21

Trigger Output 1 connector
Outputs the trigger signal (3.3 V LVCMOS) .

22

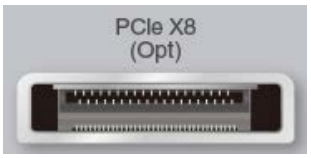
Trigger Output 2 connector
Outputs the trigger signal (3.3 V LVCMOS) .

23

USB 3.0 Type-B connector

Connector for MS2850A-054/154.

Refer to the *MS2850A-053 External Interface for High Speed Data Transfer PCIe MS2850A-054 External Interface for High Speed Data Transfer USB3.0 Operation Manual*.

24 

PCIe X8 connector

Connector for MS2850A-053/153.

Refer to the *MS2850A-053 External Interface for High Speed Data Transfer PCIe MS2850A-054 External Interface for High Speed Data Transfer USB3.0 Operation Manual*.

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 MS2850A enters standby state and the power switch 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 MS2850A 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 MS2850A

<Procedure>

Other than Windows 10

1. Connect the supplied mouse to the MS2850A and open the Start Menu from the Windows Taskbar.
   Refer to 5.1.1 “Displaying Windows Desktop”.
2. Select **Shut down**.
3. 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.

Windows 10

1. Connect the supplied mouse to the MS2850A and open the Start Menu from the Windows Taskbar.
   Refer to 5.1.1 “Displaying Windows Desktop”.
2. Select **Power.**
3. Select **Shut down**.
4. 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 ⏻ lamp lights up orange, and 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 MS2850A.

⚠ CAUTION

- **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 Cal (Cal) to display the Cal function menu.

Figure 3.3-1 Cal key

Table 3.3-1 Cal function menu

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.
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 Cal (Cal), then press → (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.
F7	Analyze External Mixer Noise Floor	Measures noise floor calibration values when using the external mixer
F8	Close	Returns to the application screen.

Note:

Analyze Noise Floor Clear, Analyze Noise Floor, and Analyze External Mixer Noise Floor are displayed only when MS2850A-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 Cal (Cal).
2. Select F2 (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 Cal (Cal).
2. Select F3 (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 Cal (Cal).
2. Select F4 (Local Leak Suppression).

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

<Procedure>

1. Press Cal (Cal).
2. Select F1 (SIGANA All).

(4) Extra Band Cal

Executes band calibration within the current frequency.

Example: Executes band calibration within the current frequency.

<Procedure>

1. Press Cal (Cal).
2. Select F6 (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 and Power Meter.

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 Cal (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 Cal (Cal).
2. Press → (more).
3. Select F5 (Analyze Noise Floor Clear).

This function is available only when MS2850A-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 MS2850A when acquiring the calibration values.

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

<Procedure>

1. Press Cal (Cal).
2. Press → (more).
3 Select F6 (Analyze Noise Floor).

This function is available only when MS2850A-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 MS2850A at shipment. Then deducts the estimation from the measured results.

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

(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 MS2850A 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 Cal (Cal).
2. Press → (more).
3 Select F7 (Analyze External Mixer Noise Floor).

This function is available only when MS2850A-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.

3.4 Settings on Configuration Screen

MS2850A system settings, and settings for system information display and common application functions can be configured in the Configuration screen.

Press System Config to display the Configuration screen.

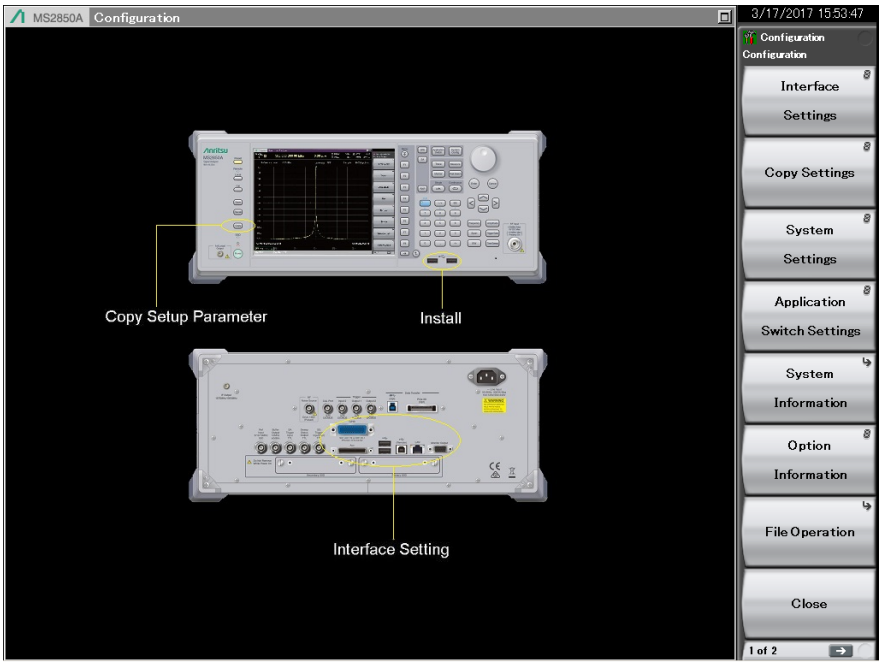


Figure 3.4-1 Configuration screen

Note:

When the firmware is updated, the settings will be the initial values. Refer to Appendix E “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 (→).

Table 3.4.1-1 Configuration function menu

Function Key	Menu Display	Function
Page 1	Configuration	Press System Config 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. 3.4.3 "Copy Settings"
F3	System Settings	Turns on and off the buzzer sound and sets the reference frequency signal . 3.4.4 "System Settings"
F4	Application Switch Settings	Sets loading/unloading of applications. 3.4.5 "Application Switch Settings"
F5	System Information	Displays MS2850A system information. 3.4.6 "System Information"
F6	Option Information	Displays options installed in the MS2850A. 3.4.7 "Option Information"
F7	File Operation	Sets file and data management. 3.4.8 "File Operation"
F8	Close	Closes Configuration screen.
Page 2	Configuration	Press System Config , then press (→) to display.
F1	Software Install	Sets software and license installation. 3.4.9 "Software Install/Uninstall"
F2	Convert Recall File	Converts a parameter file so that the MS2850A you are using can recall the parameter file, which was saved by another MS2850A consisting of different options. 3.4.13 "Convert Recall File"
F3	Calibration Alert	Sets the calibration alert functions. 3.4.12 "Calibration Alert"
F4	Display Annotation	Turns on and off frequency and level display on the application screen. On: Display (default), Off: Hide 3.4.11 "Display Annotation"
F6	Save&Recall Settings	Sets the mode for save and recall function. 3.6.4 "Simple Save&Recall"
F7	Correction	Sets settings related to Correction. 3.4.10 "Correction"
F8	Close	Closes Configuration screen.

3.4.2 Interface Settings

Pressing F1 (Interface Settings) after System Config 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 F7 (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.

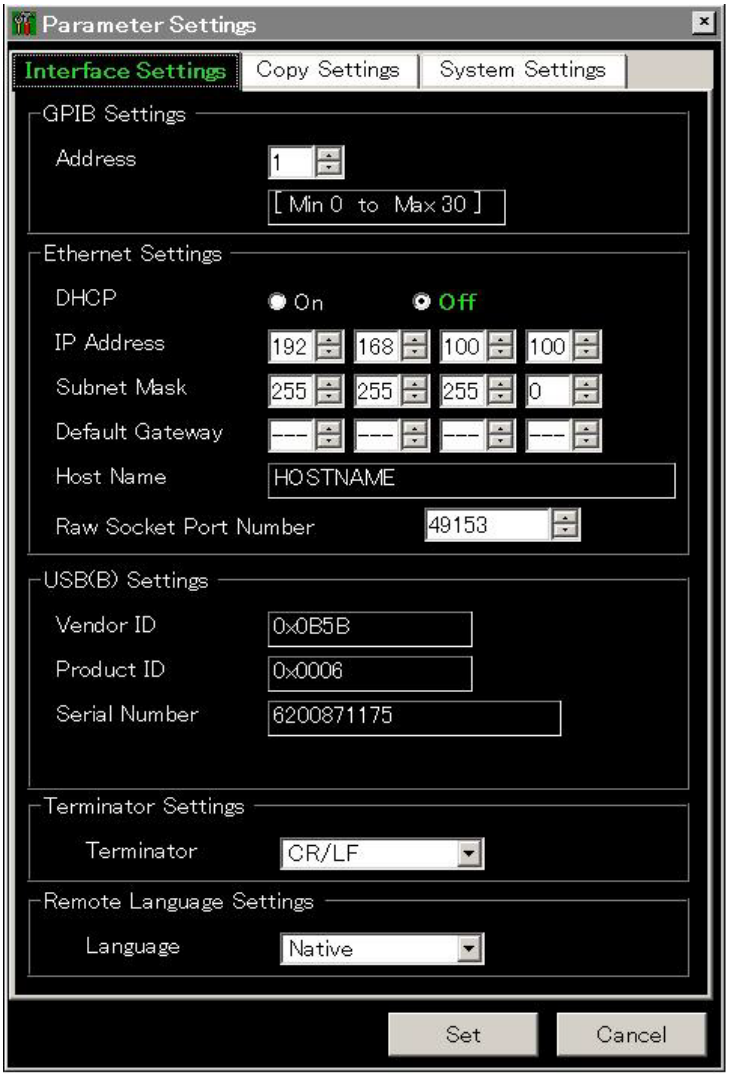


Figure 3.4.2-1 Interface Settings screen

3.4.3 Copy Settings

Pressing [F2] (Copy Settings) after [System Config] 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 [F7] (Set) to reflect the settings of that item.

Figure 3.4.3-1 Copy Settings screen

Table 3.4.3-1 Copy Settings items

Item	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 F3 (System Settings) after System Config displays the System Settings screen. Select the item to be set with the cursor, and then press F7 (Set) to reflect the settings of that item.

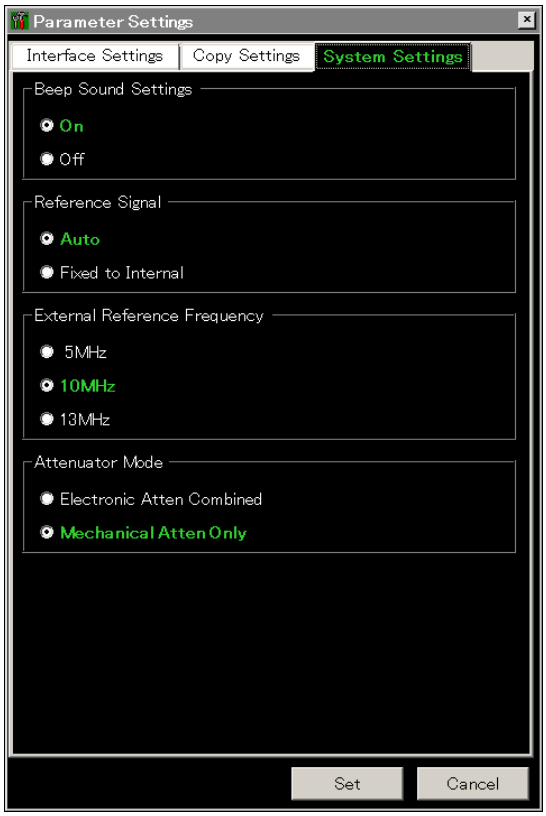


Figure 3.4.4-1 System Settings screen

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. Auto 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. Fixed to Internal Uses the internal reference oscillator.

Table 3.4.4-1 System Settings items (Cont'd)

Item	Description
External Reference Frequency	Selects signal frequency, when using external reference signal as the signal source for reference frequency.
Attenuator Mode	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. ***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.

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

Table 3.4.4-2 Attenuator Mode switching

Option	Frequency*1	Electronic Atten Combined	Mechanical Atten Only
047 046	≤ 6 GHz*2, *4	0 to 10 dB → M-ATT 12 to 38 dB → E-ATT*6 40 to 60 dB → M-ATT	All M-ATT
	> 6 GHz*3, *5	All M-ATT	All M-ATT

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

*2: Spurious Mode:
Stop frequency ≤ 4.1 GHz and Start frequency < 4 GHz

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

*4: Signal Analyzer Mode, Span > 31.25 MHz:
Frequency < 4.2 GHz

*5: Signal Analyzer Mode, Span > 31.25 MHz:
Frequency ≥ 4.2 GHz

*6: The attenuation is M-ATT up to 10 dB and the rest is E-ATT.

3.4.5 Application Switch Settings

Pressing F4 (Application Switch Settings) after System Config 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 F7 (Set) to display the setting window of that item or start performing the setting.

Table 3.4.5-1 Application Switch Settings function menu

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. ☞ 3.5.4 "Changing application layout"
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.

3.4.6 System Information

Pressing [F5] (System Information) after [System Config] displays the System Information function menu. The MS2850A 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.

Table 3.4.6-1 System Information function menu

Function Key	Menu Display	Function
Page 1	System Information	Press [System Config] and then press [F5] (System Information) to display.
F1	System Information View	Displays the MS2850A product type, serial number, operating time, attenuator switching counts, and mechanical relay switching counts. ATT_2DB ATT_4aDB ATT_4bDB ATT_10DB ATT_20DB ATT_30DB Z34-SW Z35-SW (Displays when MS2850A-076/176 is installed.)
F2	Software Version View	Displays the version of the software installed in the MS2850A.
F3	FPGA Version View	Displays the FPGA version for each board installed in the MS2850A.
F4	Board Revision View	Displays the revisions of each board installed in the MS2850A. (Some boards are not displayed.)
F5	Software License View	Displays the license of software installed in the MS2850A.
Page 2	System Information	Press [System Config], and then press [F5] (System Information) to display.
F1	System Reset	Initializes the system.
F7	Information Save	Saves the MS2850A system information.

3.4.7 Option Information

Pressing F6 (Option Information) after System Config displays the option screen. Information on options installed in the MS2850A can be viewed in this screen.

3.4.8 File Operation

Pressing F7 (File Operation) after System Config 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.

Table 3.4.8-1 File Operation function menu

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.

3.4.9 Software Install/Uninstall

Press System Config, and then press → to move to page 2 of the Configuration function menu. Press F1 (Software Install) to display the Software Install menu. Software can be installed and uninstalled to/from the MS2850A 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 System Config, and then press → to move to page 2 of the Configuration function menu. Press F7 (Correction) to display the Correction function menu. Those functions are used to set correction factors for frequency characteristics.

Table 3.4.10-1 Correction function menu

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.

Save Correction Table

Pressing F2 (Save Correction Table) on Correction function menu displays Save Correction Table function menu. Those functions are used to save level frequency characteristics.

Table 3.4.10-2 Save Correction Table function menu

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.

Recall Correction Table

Pressing F3 (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.

Table 3.4.10-3 Recall Correction Table function menu

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.

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.

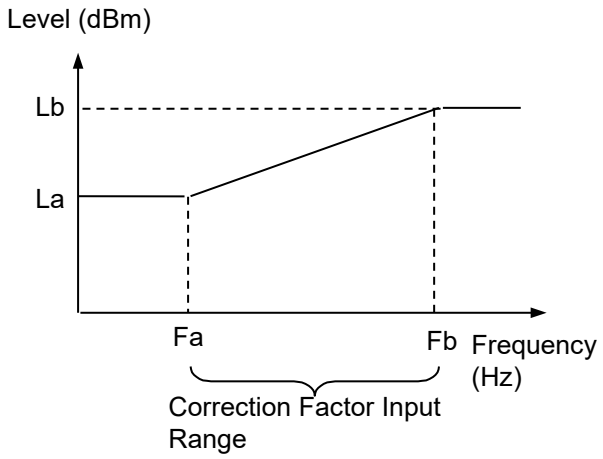


Figure 3.4.10-1 Operation When Correction Factors Are Entered

Correction factors apply to all the applications.

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 Config and then press →. Switch On/Off the display by pressing F4 (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 [System Config] and then press [→]. Pressing [F3] (Calibration Alert) on Page 2 of the Configuration function menu displays the Calibration Alert function menu.

Table 3.4.12-1 Calibration Alert function menu

Function Key	Item	Description
F1	Alert Mode	Specifies the trigger conditions for alerts. None No alert occurs. Temperature An alert occurs when a temperature goes outsides the specified thresholds based on the internal temperature measured at the last automatic calibration (SIGANA All). Elapsed Time An alert occurs when the time passes longer than the specified Elapsed Time since the last automatic calibration time (SIGANA All) Both An alert occurs when either of temperature change or elapsed time meets the trigger conditions.
F2	Temperature	Specifies the temperature thresholds for alerts. Range 0.5 to 50.0 °C Resolution 0.5 °C Default 2.0 °C
F3	Elapsed Time	Specifies the elapsed time for alerts. Range 1 to 200 h (hours) Resolution 1 h (hour) Default 1 h (hour)

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).

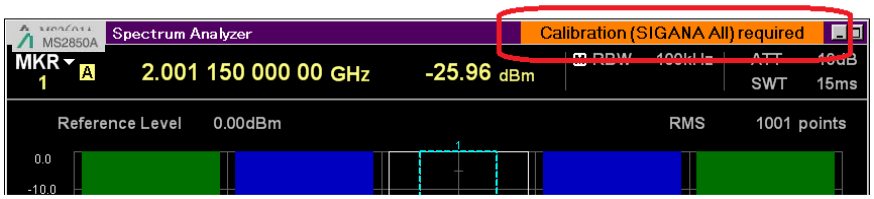


Figure 3.4.12-1 Alert Display

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 MS2850A, 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)*.

3.4.13 Convert Recall File

The Convert Recall File function converts a parameter file so that the MS2850A you are using can recall the parameter file, which was saved by another MS2850A consisting of different options. For parameter files, refer to 3.6.1"Saving parameters and waveform data" and 3.6.2 "Recalling parameters".

<Procedure>

1. Press [System Config], and then press [→] to move to page 2 of the Configuration function menu. Press [F2] (Convert Recall File) to display the Convert Recall File function menu explained in Table 3.4.13-1.
2. To select a location of the parameter file you want to convert, press [F1] (Device). When the Setting window is displayed, select the drive where the parameter file is saved, and then press [F7] (Set) to set.
3. Pressing [F7] (Select File) to display the Parameter Save Data List.
4. Select the parameter file you want to convert with the cursor, and then press [F7] (Convert) to convert the parameter file and save into a file that can be recalled on the MS2850A you are using. The converted parameter file is saved under a file name (original name appended by "_Conv"). The directory to save the converted parameter file is the same as that for the original file.

Notes:

- The file name of an original parameter file can be up to 227 characters in length. If an original parameter file has the file name of 28 or more characters, the file cannot be converted.
- If the pre-conversion parameter file includes any application(s) that cannot be used due to the difference of option configuration or license information by the MS2850A you are using, the application(s) will be excluded by conversion. The excluded applications and reasons for exclusion are saved in a log file. Each log file has the same file name as the post-conversion file, appended by the ".log" extension, and is saved to the same directory.
- Up to 1000 pre- and post-conversion files, excluding log files, can be saved in a folder.

Table 3.4.13-1 Convert Recall File Function Menu

Function Key	Menu Display	Function
F1	Device (D:)	Changes the location of the parameter file you want to recall.
F7	Select File	Displays the Parameter Save Data List.
F8	Close	Returns to the Configuration screen.

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.

⚠ CAUTION

- **Applications registered to the Application Switch menu automatically enter an execution state when starting up the MS2850A. The more registered applications, the longer startup will take.**
- **In the event running applications are suddenly ended while operating Windows, press Power, turn the MS2850A power Off or shutdown Windows, and then turn the MS2850A 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 System Config, press F4 (Application Switch Settings) to display the Application Switch Registration screen.
2. Press F1 (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 F7 (Set).
   Press F1 (Load Application Select) once again, when an error message "Loading application failed" is displayed.

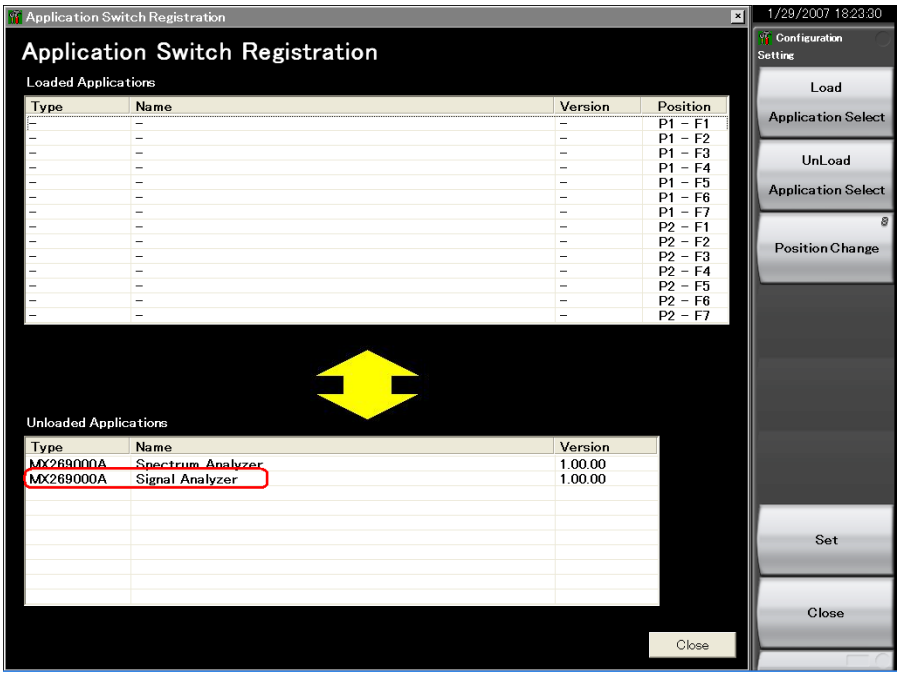


Figure 3.5.1-1 Application Switch Registration screen

3. When registered correctly, the selected applications will be displayed in “Loaded Applications” at the top part of the screen.

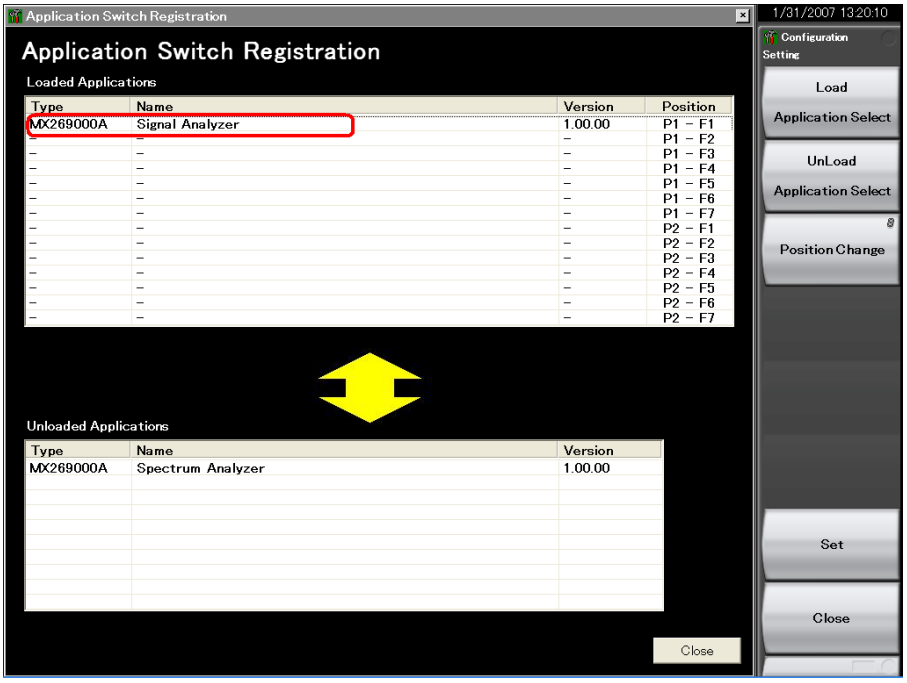


Figure 3.5.1-2 Application Switch Registration screen

4. Press 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 System Config, press F4 (Application Switch Settings) to display the Application Switch Registration screen.
2. Press F2 (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 F7 (Set).

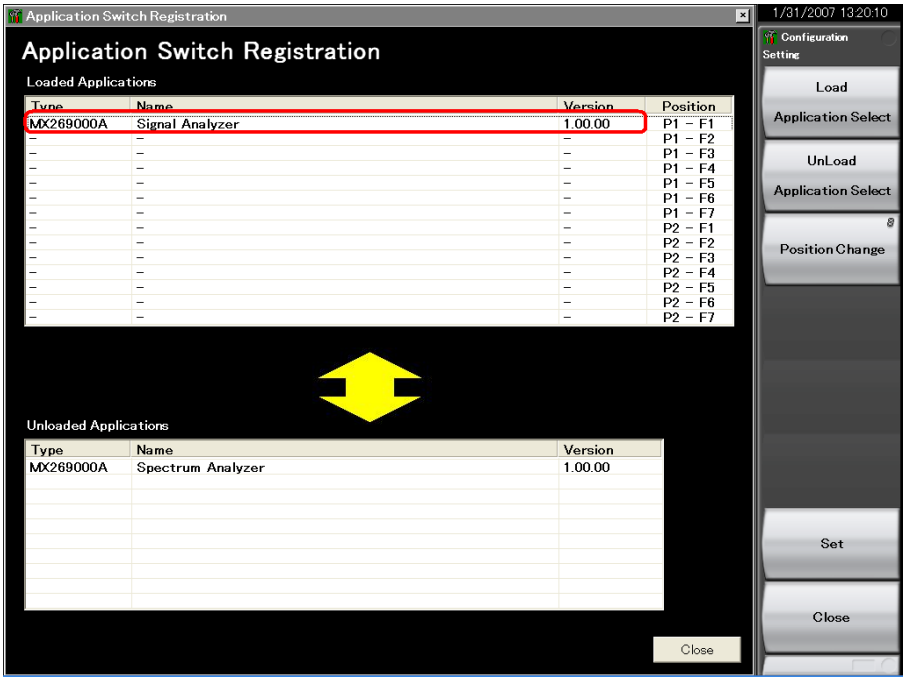


Figure 3.5.2-1 Application Switch Registration screen

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

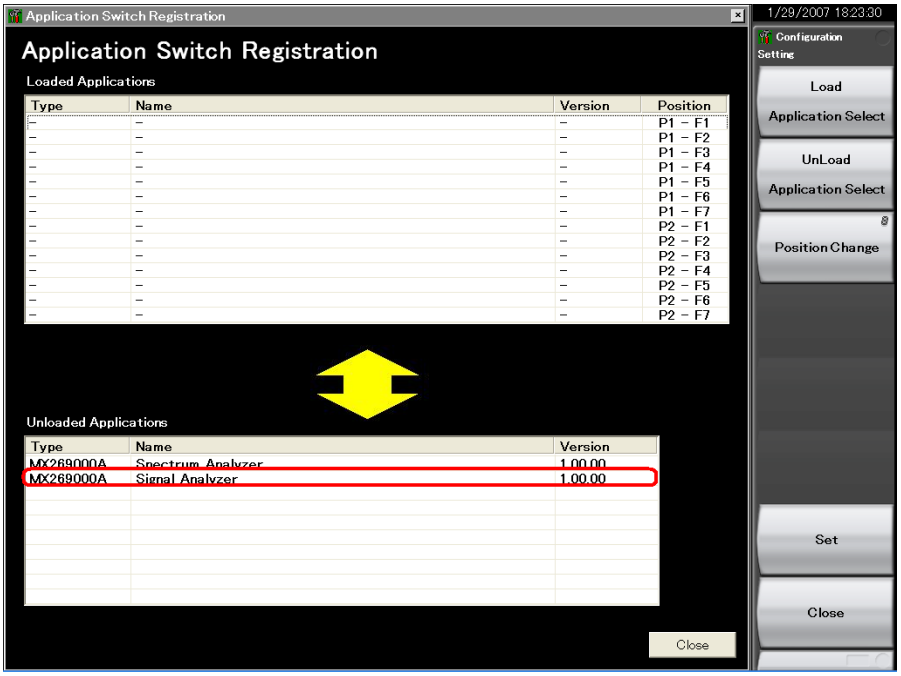


Figure 3.5.2-2 Application Switch Settings screen

3.5.3 Switching applications

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

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

If the [F1] 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 [Appli].

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 Config], press [F4] (Application Switch Settings) to display the Application Switch Registration screen.
2. Press [F3] (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 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. In the Function Position field, select the application whose layout is to be changed with the cursor, and then press Enter.

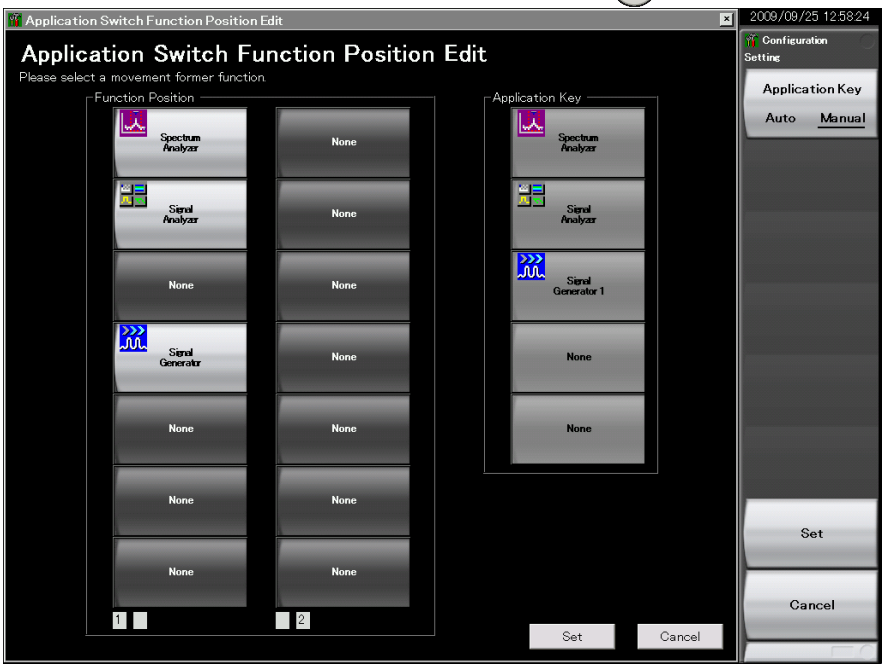


Figure 3.5.4-1 Application Switch Function Position Edit screen

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 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 MS2850A. Using other USB flash drive may cause malfunction due to device incompatibility.

3.6.1 Saving parameters and waveform data

With the MS2850A, the current setting conditions and waveform data can be saved to the internal SSD or a USB flash drive.

Saving parameter settings

<Procedure>

1. 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.
2. Press F1 (Device) to change the save destination. When the Setting window is displayed, select the drive to be saved and then press F7 (Set) to set.
3. When the save destination has been determined, press F7 (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 F1 (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.
2. Press F1 (Device) to change the save destination. When the Setting window is displayed, select the drive to be saved and then press F7 (Set) to set.
3. When the save destination has been determined, press F5 (Save Waveform CSV DATA). The save target will be the waveform data (Trace).

Table 3.6.1-1 Save function menu

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.

*: It is displayed only in the Spectrum Analyzer mode.

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 F1 (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

The MS2850A can restore settings by recalling saved parameters from the internal SSD or a USB flash drive. For how to recall the parameter file saved by another MS2850A consisting of different options, refer to 3.4.13 “Convert Recall File”.

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
2. Press F1 (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 F7 (Set) to set.
3. Press F6 (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 F7 (Set) to recall parameter setting conditions to the application.

Recalling parameter setting conditions for all launched applications.

<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.
2. Press F1 (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 F7 (Set) to set.
3. Press F7 (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 F7 (Set) to recall the parameter setting conditions to all loaded applications.

Table 3.6.2-1 Recall function menu

Function Key	Menu Display	Function
F1	Device (D:)	Changes the saving destination.
F3	Recall Limit*	Displays the Recall Limit function menu.
F4	Recall on Event*	Displays the Recall on Event function menu.
F6	Recall Current Application	Displays the Parameter Save Data List. This function is used to recall the parameter setting conditions of only the current application.
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.

*: It is displayed only in the Spectrum Analyzer mode.

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.
2. 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 F1 (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 Config to display the Configuration screen.
2. Press → to display page 2 of the Configuration function menu.
3. Press F6 (Save&Recall Settings) to display the Save&Recall Settings function menu in Figure 3.6.4-1.

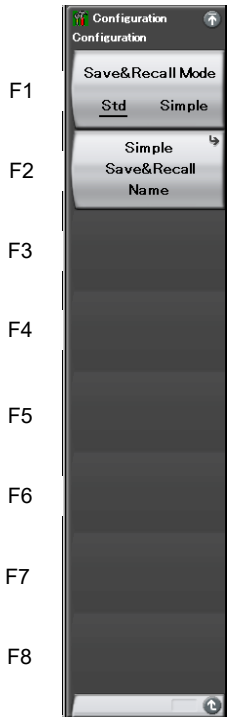


Figure 3.6.4-1 Save&Recall Settings function menu

Table 3.6.4-1 Save&Recall Settings function menu

Menu Display	Description
Save&Recall Mode	Switches the Save&Recall 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 F2 (Simple Save&Recall Name) in Figure 3.6.4-1displays 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.

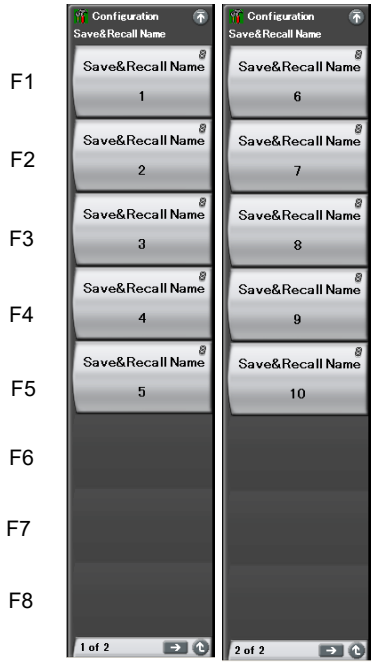


Figure 3.6.4-2 Simple Save&Recall Name function menu

Simple Save function

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

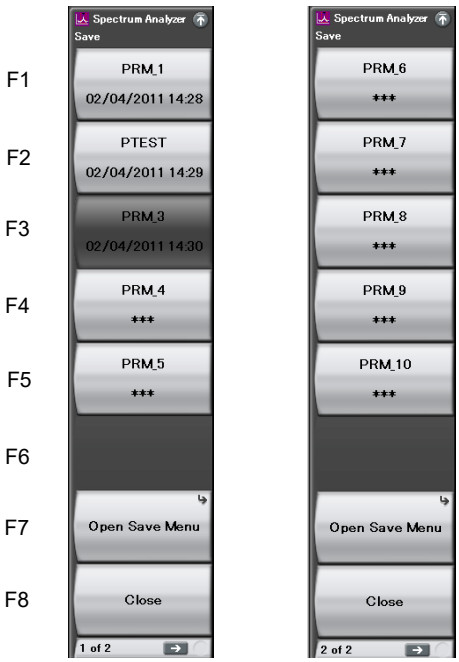


Figure 3.6.4-3 Simple Save function menu

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.

☞ 3.6.1 "Saving parameters and waveform data"

Simple Recall function

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

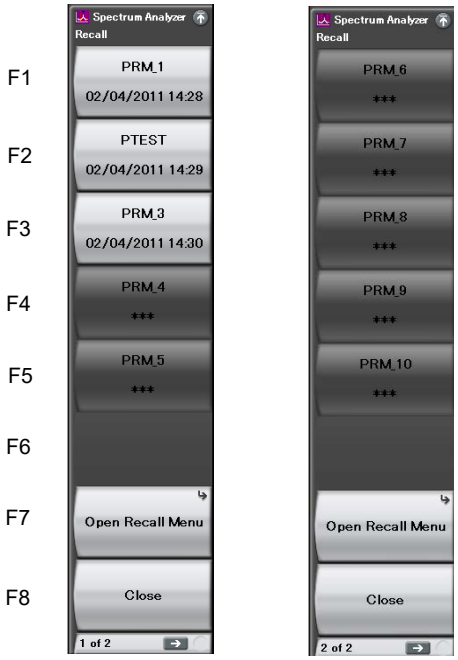


Figure 3.6.4-4 Simple Recall function menu

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 Preset to display the Preset function menu.
2. Press F1 (Preset) to initialize only applications to be operated using the Application Switch.
3. Press F5 (Preset All Application) to initialize all loaded applications.

Table 3.7.1-1 Preset 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.
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 Config] to display the Configuration screen.
2. Press [F5] (System Information) and then press [→] to display page 2 of the System Information function menu.
3. Press [F1] (System Reset) to execute System Reset.
4. The MS2850A 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 Config], then [F5], and then [→] 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 MS2850A 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).
4. 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 MS2850A, other than mouse and keyboard.
2. Press [System Config] to display the Configuration screen, and then press [F1] (Software Install) from page 2 of the Configuration function menu.
3. The Software Install menu shown in Figure 3.8.1-1 is displayed. Press [F1] (Install).
4. The installation selection menu is displayed. Insert the USB flash drive containing the purchased software data into the USB port of the MS2850A.

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 F7 (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.
7. When pressing F1 (Install), a message box asking "Do you install the application software?" is displayed. Press Yes to start installation.
8. The MS2850A restarts automatically when the installation is completed.

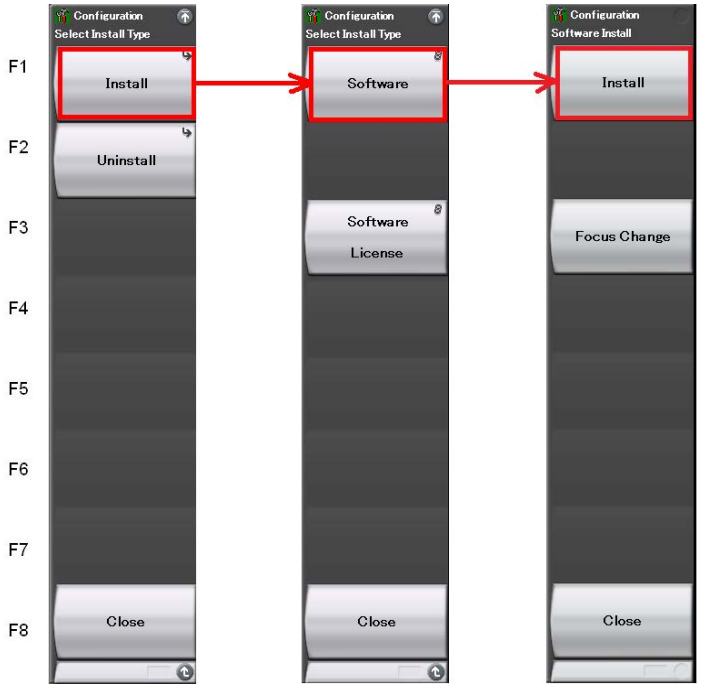


Figure 3.8.1-1 Software Install menu

Installing software licenses

<Procedure>

1. Press System Config to display the Configuration function screen, and then press F1 (Software Install) from page 2 of the Configuration function menu.
2. The Software Install menu shown in Figure 3.8.1-2 is displayed. Press F1 (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 MS2850A.
4. Press F3 (Software License) to display the device selection window.
5. Select the USB flash drive containing the software license with the cursor, and then press F7 (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 F1 (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 MS2850A is restarted after installation is completed.

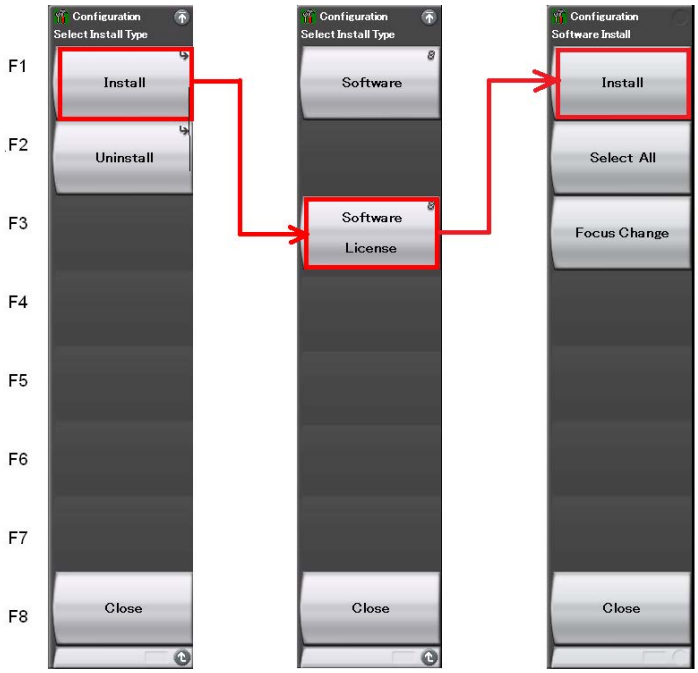


Figure 3.8.1-2 Software Install menu

3.8.2 Uninstalling software

The Install screen must be displayed in order to uninstall software or license files from the MS2850A.

Uninstalling software

<Procedure>

1. Press System Config to display the Configuration screen, and then press F1 (Software Install) from page 2 of the Configuration function menu.
2. The Software Install menu shown in Figure 3.8.2-1 is displayed. Press F2 (Uninstall).
3. The installation selection menu is displayed. Press F1 (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 F3 (Uninstall), a message box asking "Do you uninstall the selected application software?" is displayed. Press Yes to start uninstallation.

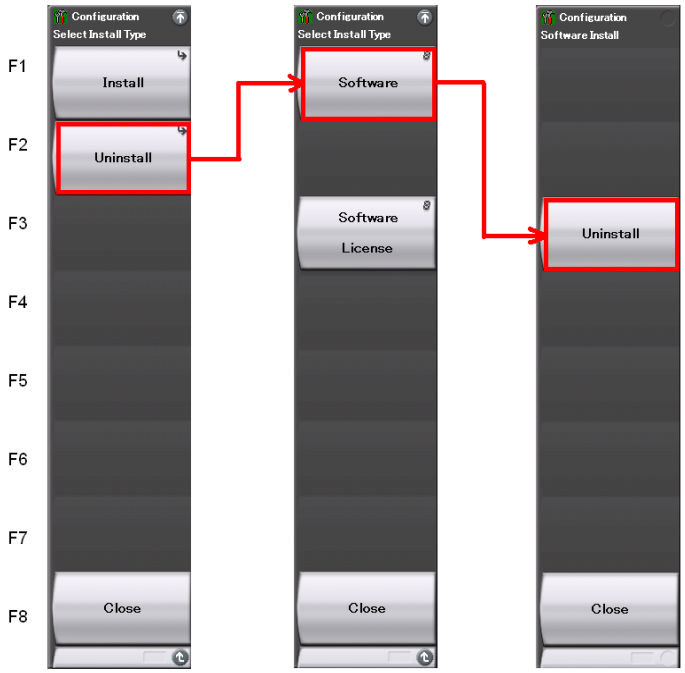


Figure 3.8.2-1 Software Install menu

Uninstalling software licenses

<Procedure>

1. Press System Config to display the Configuration screen, and then press F1 (Software Install) from page 2 of the Configuration function menu.
2. The Software Install menu shown in Figure 3.8.2-2 is displayed. Press F2 (Uninstall).
3. The installation selection menu is displayed. Press F3 (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.
5. When pressing F3 (Uninstall), a message box asking "Do you uninstall the selected application software license?" is displayed. Press **Yes** to start uninstallation.

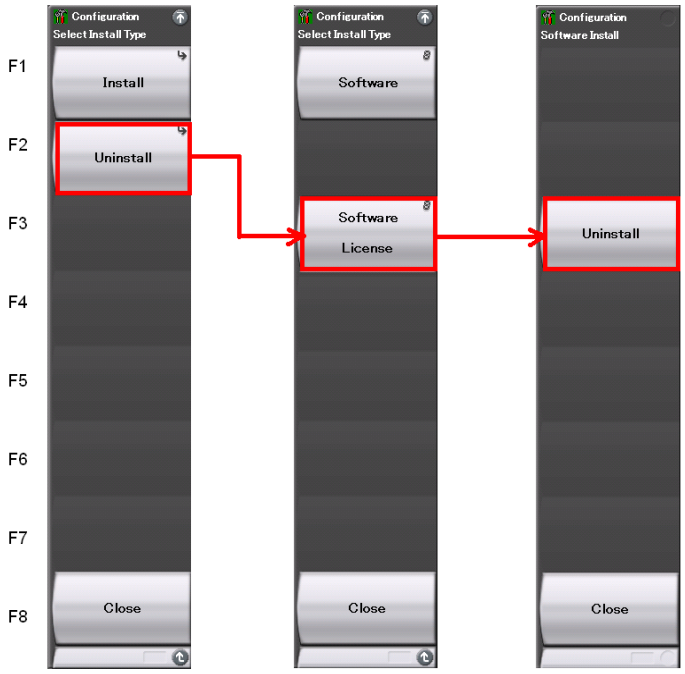


Figure 3.8.2-2 Software Install menu

Chapter 4 Tutorial

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

4.1 Spectrum Analysis Using Signal Analyzer 4-2
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

4.1.1 Spectrum analysis

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

Figure 4.1.1-1 Front panel

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

<Procedure>

1. Connect the input signal to the RF Input on the front panel of the MS2850A.
2. Press System Config then F4 (Application Switch Settings) to display the Application Switch Settings menu.
3. Press F1 (Load Application Select) to select within the "Unload Applications" column of the application with the cursor. Select "Signal Analyzer" here with the cursor, and then press F7 (Set).
4. Check that "Signal Analyzer" is displayed within the "Loaded Applications" column then press Application Switch.
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

Table 4.1.1-1 Display items for Signal Analyzer

Item	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* ☞ 2.2.4 "Setting stop frequency"
[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.

6. Frequency settings must be changed to display the input signal in the waveform display screen. Press F1 (Frequency).
7. Press F1 (Center Frequency) and then enter the desired frequency using the numeric keypad. The center frequency setup window is displayed.

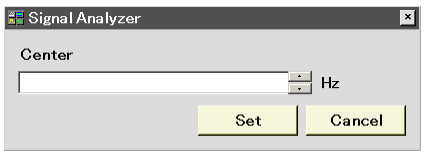


Figure 4.1.1-3 Center frequency setup window

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).

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

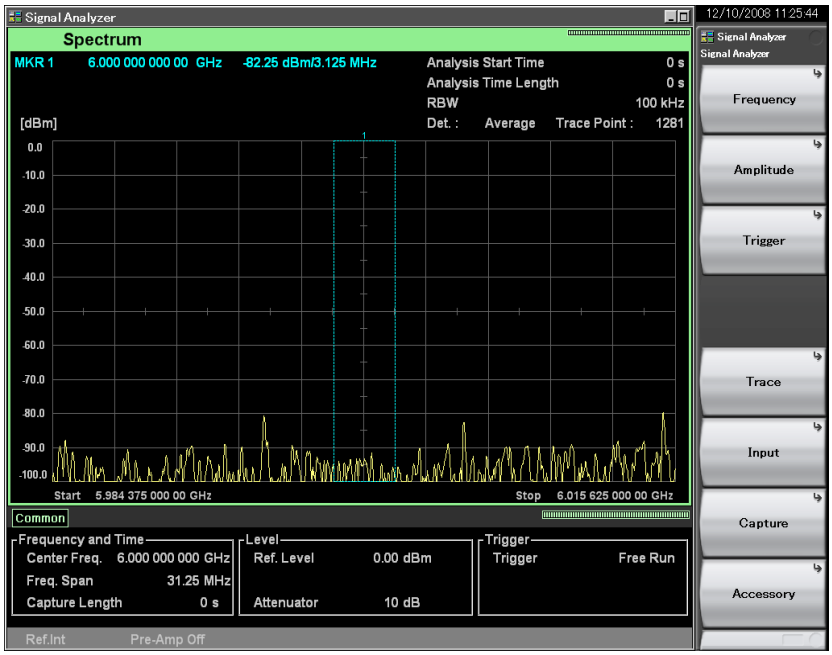


Figure 4.1.1-4 Waveform display using Signal Analyzer

Refer to the *MS2830A/MS2840A/MS2850A 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.

Figure 4.2.1-1 Front panel

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

<Procedure>

1. Connect the input signal to the RF Input on the front panel of the MS2850A.
2. Press [System Config] then [F4] (Application Switch Settings) to display the Application Switch Settings menu.
3. Press [F1] (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 [F7] (Set).
4. Check that "Spectrum Analyzer" is displayed within the "Loaded Applications" column then press [Application Switch].
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.

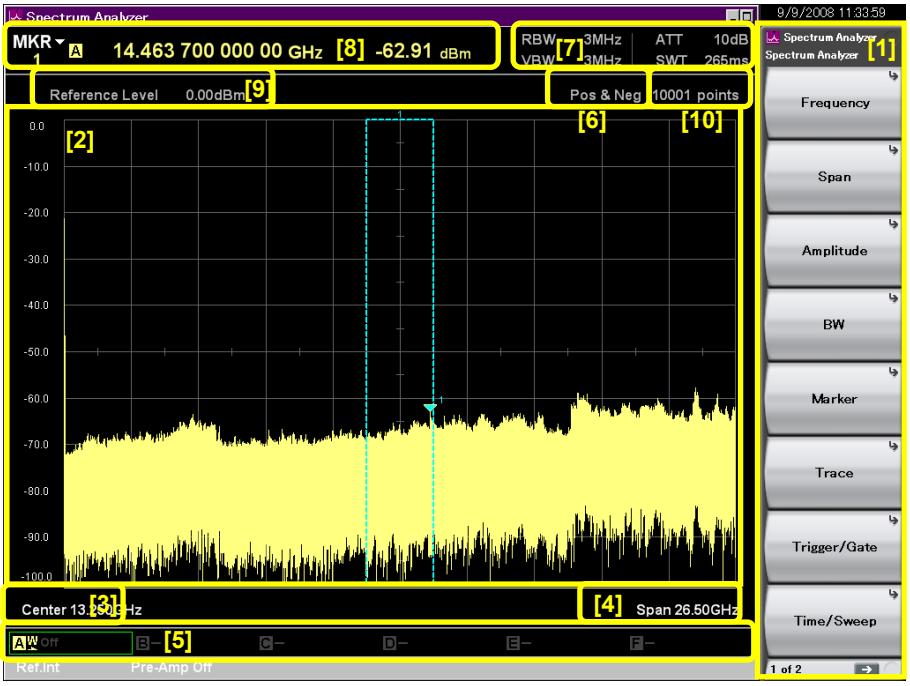


Figure 4.2.1-2 Application main screen

Table 4.2.1-1 Display items for Spectrum Analyzer

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* ☞ 2.1 "Display Description"
[2]	Displays signal waveforms.
[3]	Displays the center frequency. *Spectrum Analyzer Function Operation* ☞ 2.3.1 "Setting center frequency"
[4]	Displays the span frequency. *Spectrum Analyzer Function Operation* ☞ 2.3.2 "Setting frequency span"
[5]	Displays trace parameters. Spectrum Analyzer Function Operation ☞ Chapter 3 "Selecting Display Mode"
[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* ☞ 4.1 "Setting Marker"
[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"

6. Frequency settings must be changed to display the input signal to the waveform display screen. Press F1 (Frequency).
7. Press F1 (Center Frequency) and then enter the desired frequency using the numeric keypad. The center frequency setup window is displayed.

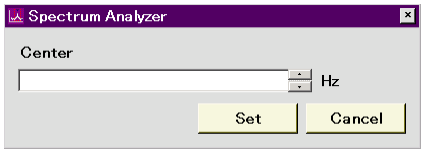


Figure 4.2.1-3 Center frequency setup window

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).

9. Return to the main screen of the spectrum analyzer to change frequency span. Press [Menu].

10. Press [F2] (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).

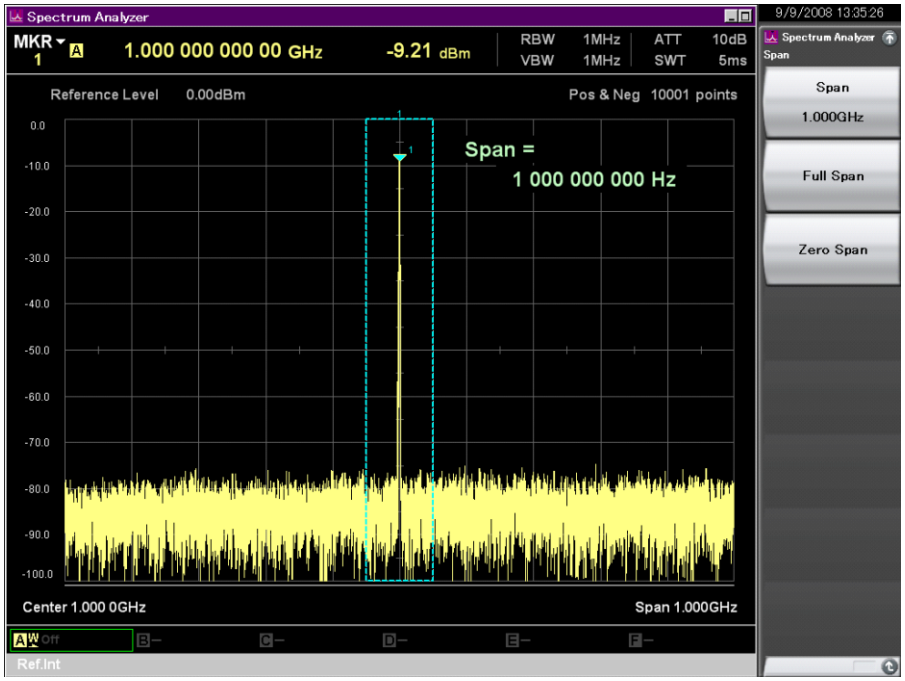


Figure 4.2.1-4 Waveform display using Spectrum Analyzer

Refer to the *MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Spectrum Analyzer Function Operation)* for how to use the Spectrum Analyzer.

Chapter 5 System

The MS2850A 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 MS2850A and general notes.

5.1 Setting Windows 5-2
5.1.1 Displaying Windows Desktop 5-3
5.1.2 Setting Control Panel 5-4
5.1.3 Using external display 5-6
5.1.4 General notes 5-9
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5.4.2 Installing Important Windows Update Programs (Windows Update) 5-31
5.4.3 Using Antivirus Software 5-36

5.1 Setting Windows

The MS2850A 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 MS2850A to its status at factory shipment. See 5.3 “System Recovery Functions” for details.

⚠ WARNING

The MS2850A 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.

⚠ WARNING

Performing system recovery will cause software installation (including updates) after factory shipment of the MS2850A 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 MS2850A again, press Application Switch 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 display the Windows desktop.
- Click the "Minimize" button located in the upper right corner of the application window of the MS2850A. 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

Mouse

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

Keyboard

- Press the **Windows logo key** 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 MS2850A 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 MS2850A 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 MS2850A 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 MS2850A 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 MS2850A 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 Administrator	

- 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).

Security

- 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 MS2850A 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 MS2850A to a network. However, the MS2850A 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.

Display

- This setting must be changed when using an external monitor with connected to the VGA connector of the MS2850A. 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 MS2850A 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 MS2850A 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 MS2850A, to display screens of the MS2850A and show multiple displays. The following describes the operation procedure for this function.

When the OS is WES 7

<Procedure>

1. Connect the display to the VGA connector on the rear of the MS2850A.
2. Open the Intel® HD Graphics Control Panel by the following method:
   - In Control Panel of Windows, launch the Intel® HD Graphics.

Figure 5.1.3-1 Intel® HD Graphics Control Panel (WES 7)

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

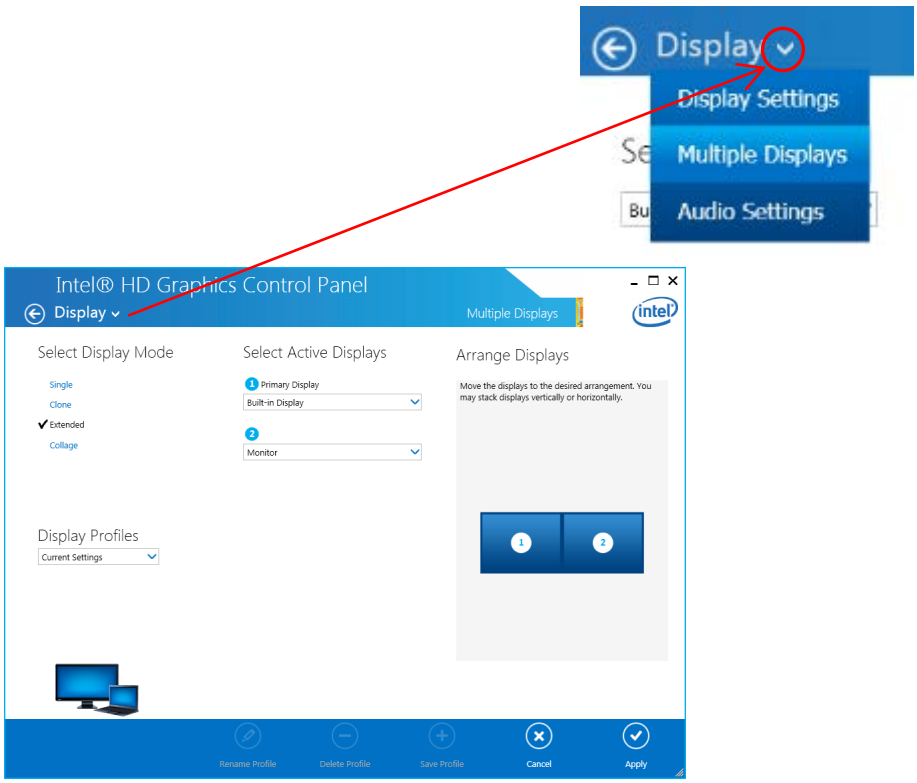

Figure 5.1.3-2 Intel® HD Graphics Control Panel (WES 7, Display)

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

<u>When not using an external display</u>

- Select Display Mode Single
- Select Active Displays Built-in Display (MS2850A display)

<u>When using only an external display</u>

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

<u>When displaying the same content on each of the MS2850A display and external display</u>

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

<u>When displaying with the MS2850A and external display connected</u>

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

When the OS is Win 10

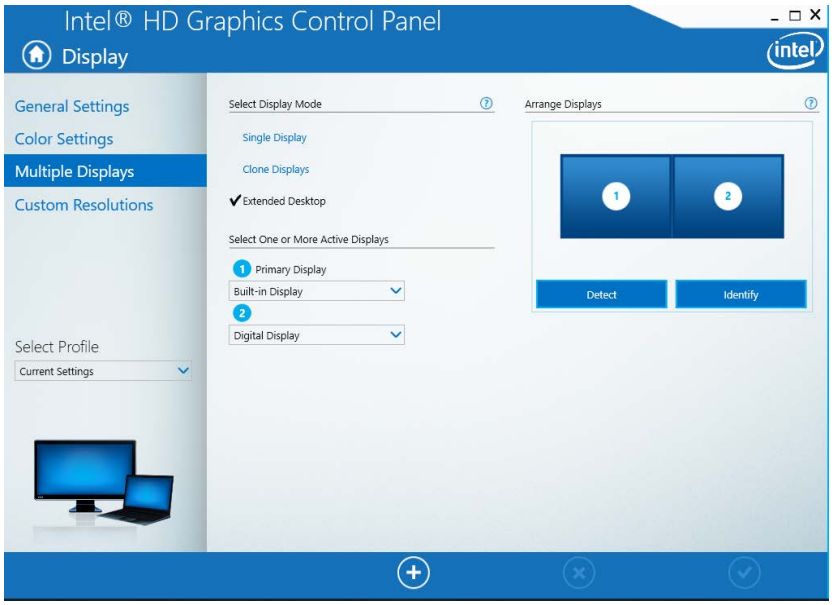

Figure 5.1.3-3 Intel® HD Graphics Control Panel (Win 10)

<Procedure>

1. Connect the display to the VGA connector on the rear of MS2850A.
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 (MS2850A 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 MS2850A display and external display
   - Select Display Mode Clone Displays
   - Select One or More Active Displays
     Built-in Display (MS2850A display)
     (Connected external display)

When displaying with MS2850A and external display connected

- Select Display Mode Extended Desktop
- Select One or More Active Displays
  1. Primary Display Built-in Display (MS2850A display)
  2. (Connected external display)

CAUTION

Turning the MS2850A 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.

CAUTION

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

5.1.4 General notes

The MS2850A operations are guaranteed provided it is in factory default settings. The following situations may affect the MS2850A operations.

- Install software that is not factory-installed and operate it on the MS2850A.
  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 MS2850A is running.

In addition to the above, note the below.

- The MS2850A may not work properly when the registries are changed.

5.2 Storage Device Configuration

The MS2850A has a built-in SSD for storing the operating system, application software, user data, and the like.

The SSD of the MS2850A consists of the following partitions.

Volume C: System Disk

Windows, application software and files required for operation of the MS2850A are stored. The MS2850A may not operate normally when data required for operating the MS2850A 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 MS2850A. Adding data to this volume or deleting data on it will not affect MS2850A operations.

A USB flash drive, used for installing application software and inputting or outputting data, is included as standard equipment with the MS2850A. The USB flash drive is recognized as Drive E at factory shipment.

Note the following items when operating MS2850A:

- Do not change the partition configuration. Doing so may affect system operation.
- Do not format the SSD of the MS2850A. 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 MS2850A 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 MS2850A comes with factory-installed recovery software, Pro or Paragon Drive Backup. To start the installed recovery software, start the MS2850A, and press the **F4** on the BIOS screen.

<Procedure>

1. Disconnect the MS2850A from the network if connected.
2. Connect the keyboard and mouse to the mainframe, and then turn the MS2850A 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 F4 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".

⚠ CAUTION

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 MS2850A has the standard Windows system recovery functions. See 5.3.2 “Windows Backup” for the system recovery procedure.

⚠ CAUTION

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 MS2850A 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** key.

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.)
7. When the completion screen appears, click **Finish** to return to the menu screen described in Step 5. Click **Reboot the computer** to reboot the MS2850A, 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 MS2850A from the network if connected.
2. Connect the keyboard and mouse to the mainframe, and then turn the MS2850A 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 MS2850A restarts automatically, and Windows starts.

5.4 Windows Security Measures

To apply security measures described in this section, the MS2850A must run WES 7 or Win 10.
The following options upgrade the CPU and operating system.

MS2850A-182: Upgrades to Win 10.

"C2" label is affixed on the rear panel of the MS2850A that runs on Win 10.

When connecting the MS2850A 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 MS2850A can be confirmed from the Control Panel of Windows.

When the OS is 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 taskbar. Click **Start** > **Control Panel**.
3. 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.
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 **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.

⚠ CAUTION

If the MS2850A 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.

⚠ CAUTION

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 MS2850A.

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 MS2850A released in or before September 2018.

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

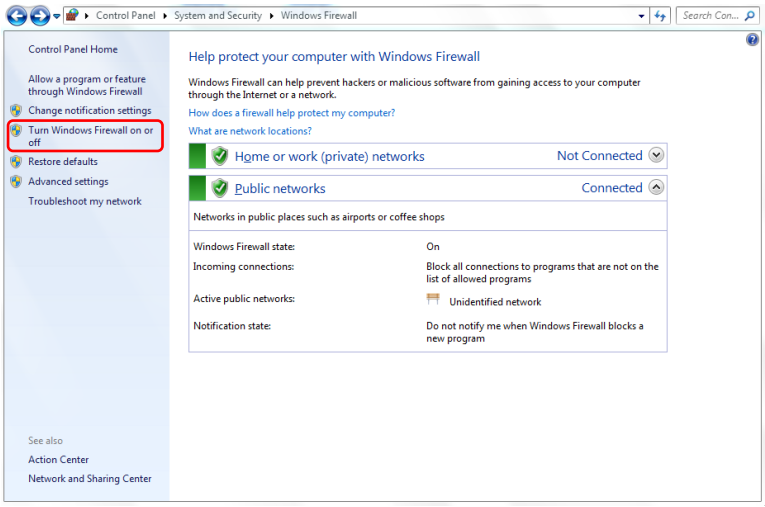

Figure 5.4.1-1 Windows Firewall display

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

   Use the MS2850A 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**

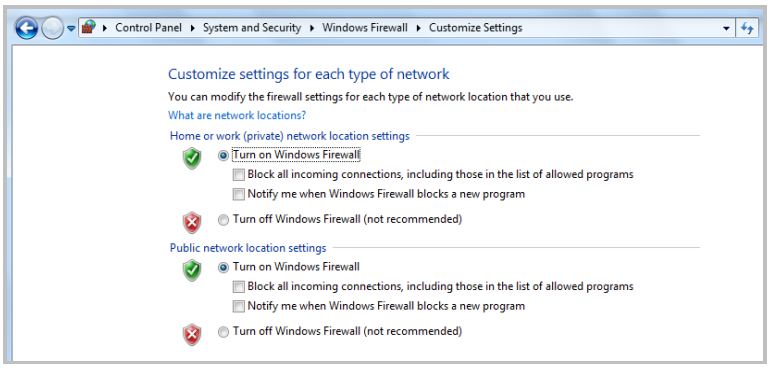

Figure 5.4.1-2 Customize Settings display

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

Even if Windows firewall is On, in order for the MS2850A to operate properly, it is necessary to set as allowed programs those that enable external communication from the MS2850A.

Note:

The factory default setting for allowed programs might not be set properly on the MS2850A 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.

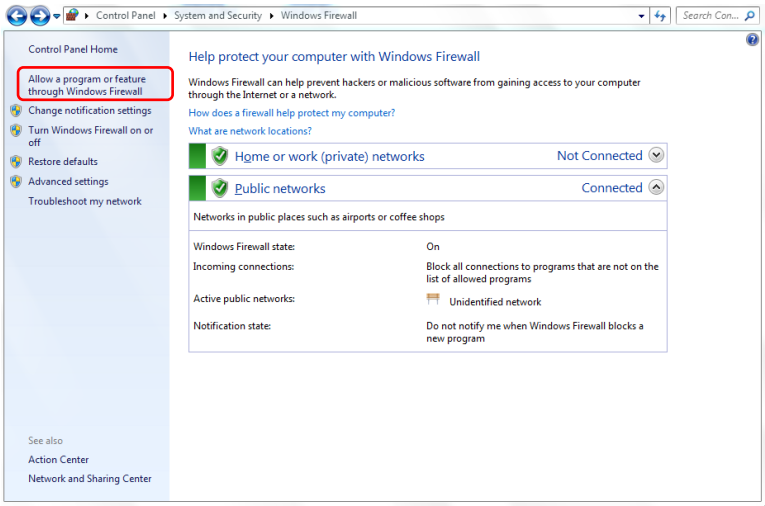

Figure 5.4.1-3 Windows Firewall display

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

   Confirm if **MS269xA AppMgr** is found and set to On (checked) under **Allowed programs and features**.

   When no such information is displayed, it is necessary to add **MS269xA AppMgr**.

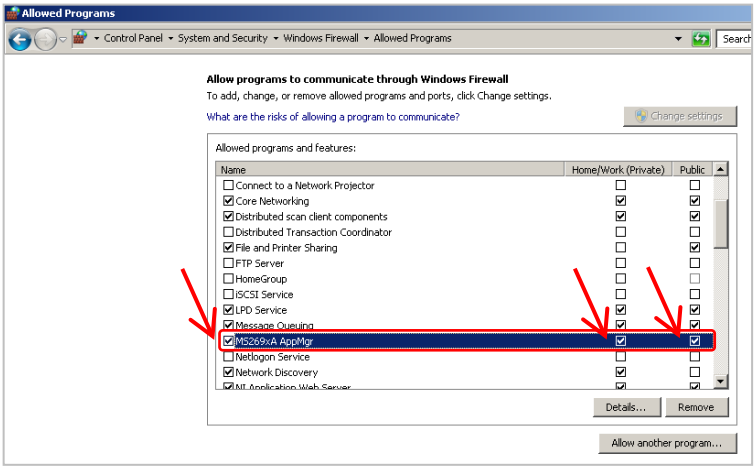

Figure 5.4.1-4 Allowed Programs display

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.

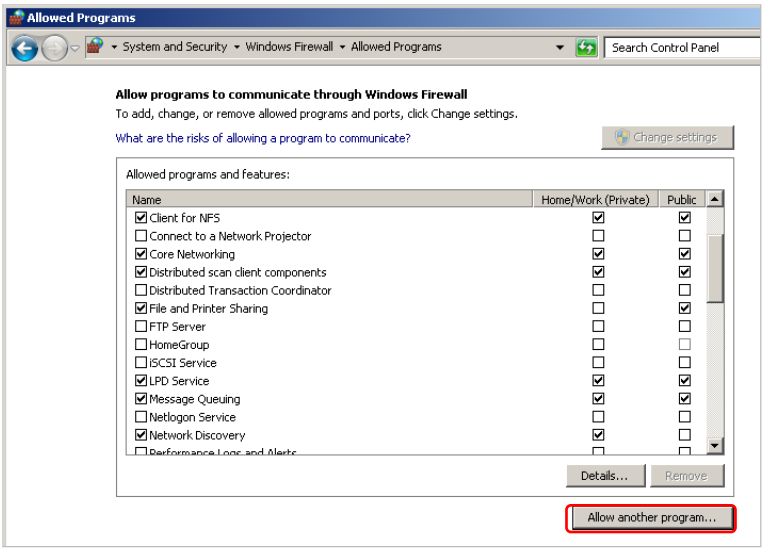

Figure 5.4.1-5 Allowed Programs display

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

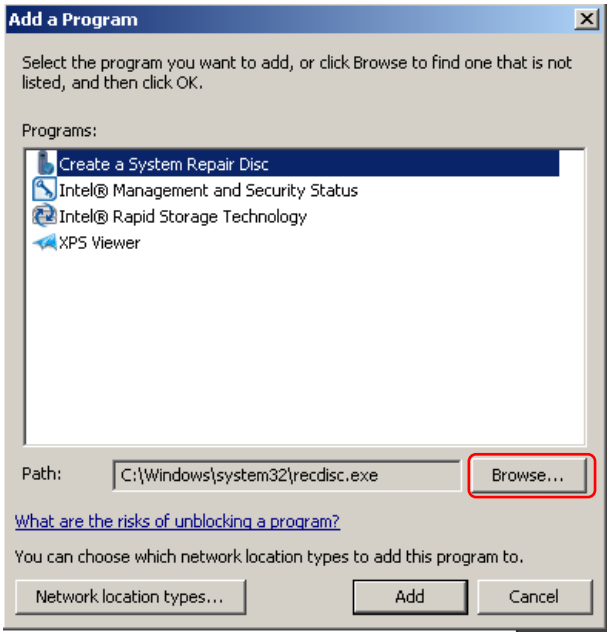

Figure 5.4.1-6 Add a Program display

3. Browse display of Add a Program is shown.

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

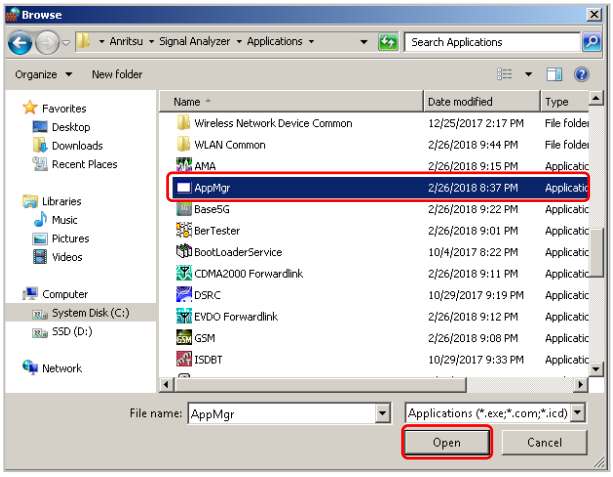

Figure 5.4.1-7 Browse display of Add a Program

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

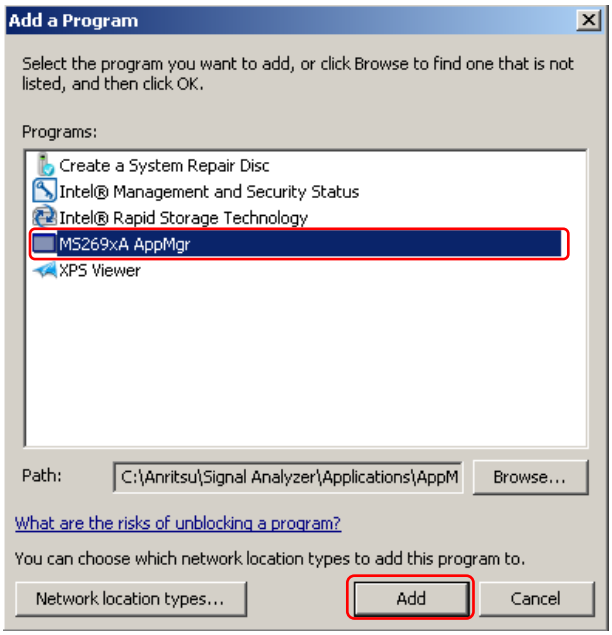

Figure 5.4.1-8 Add a Program display

5. **MS269xA AppMgr** is added to **Allowed programs and features**.

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

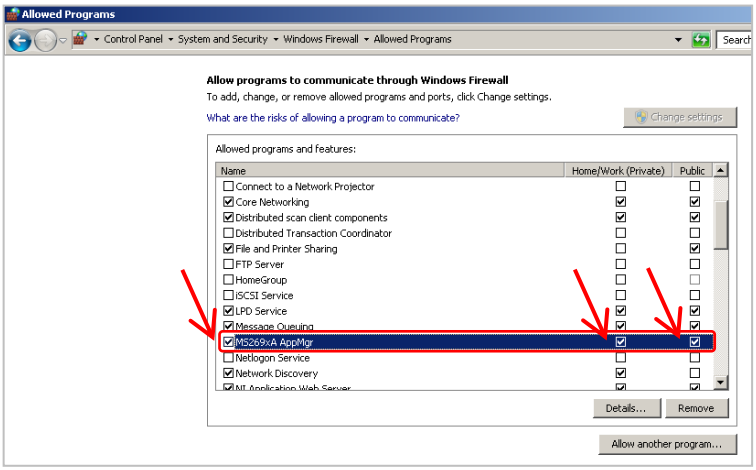

Figure 5.4.1-9 Allowed Programs display

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.
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 **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** > **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.

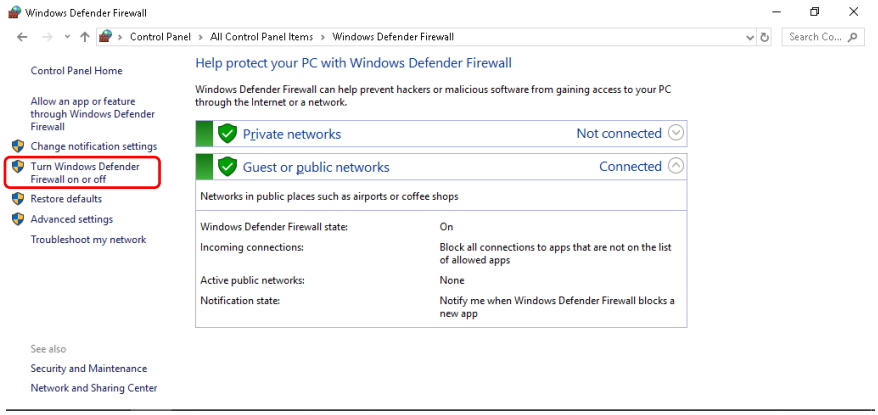

Figure 5.4.1-10 Windows Defender Firewall Window

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

   Use the MS2850A 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**

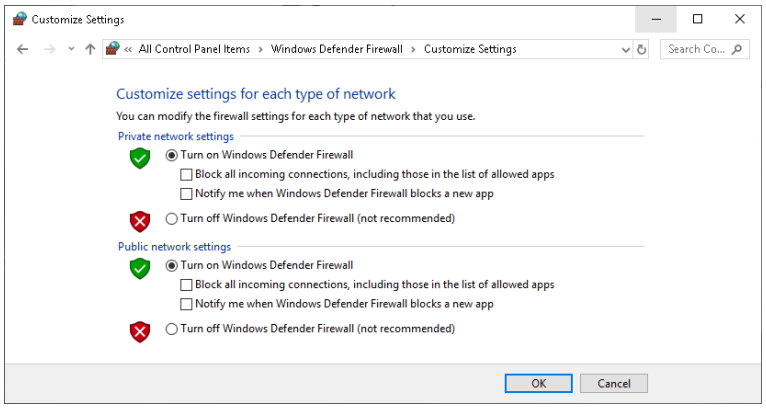

Figure 5.4.1-11 Customize Settings Window

Confirmation and setting of allowed programs through Windows firewall (Win 10)

Even if Windows firewall is On, in order for the MS2850A to operate properly, it is necessary to set as allowed programs those that enable external communication from the MS2850A.

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

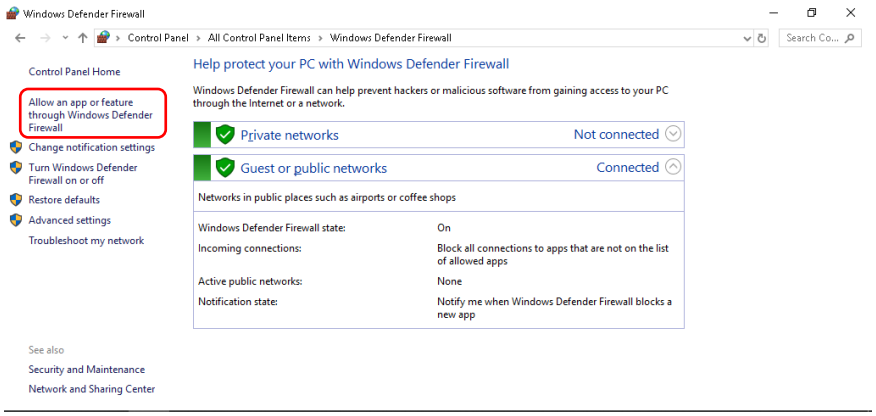

Figure 5.4.1-12 Windows Defender Firewall Window

2. Allowed apps window will be shown where programs allowed through Windows firewall can be confirmed.
   Confirm if **MS269xA AppMgr** is found and set to On (checked) under **Allowed apps and features**.

   When no such information is displayed, it is necessary to add **MS269xA AppMgr**.

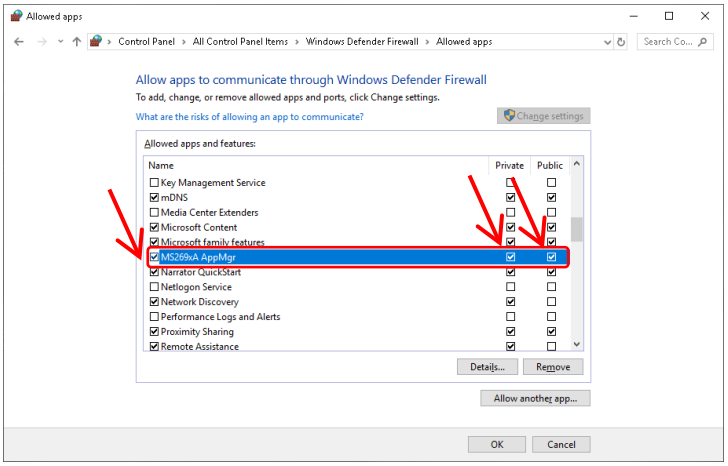

Figure 5.4.1-13 Allowed apps Window

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.

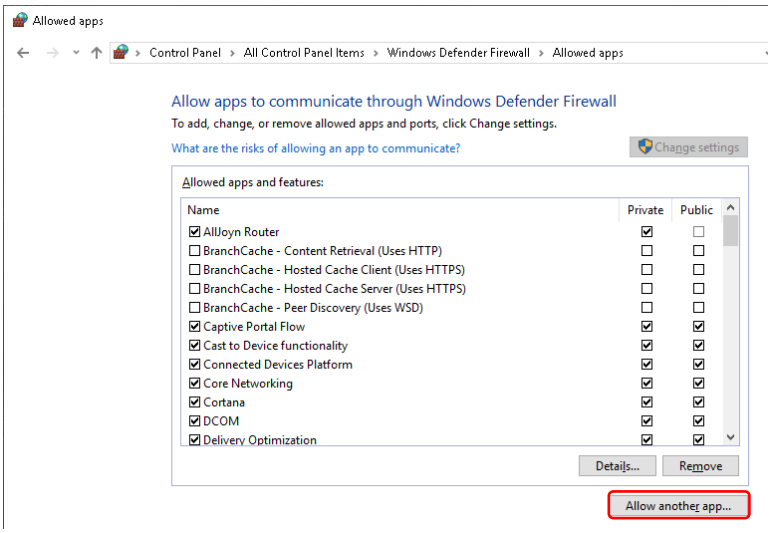

Figure 5.4.1-14 Allowed apps Window

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

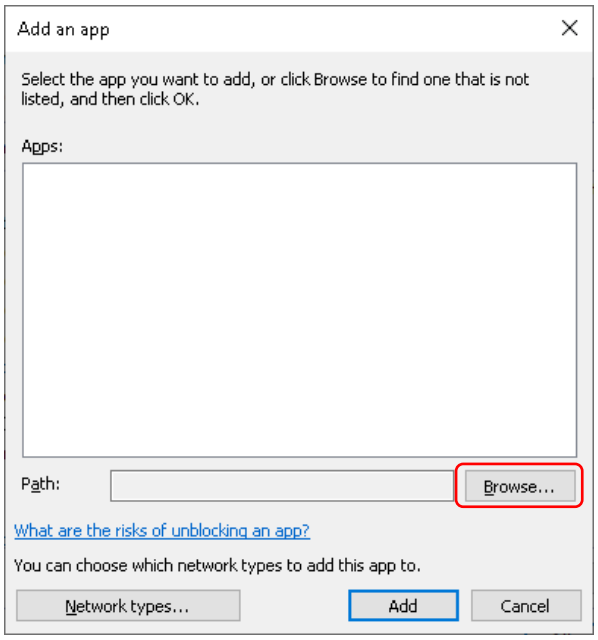

Figure 5.4.1-15 Add an app Window

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

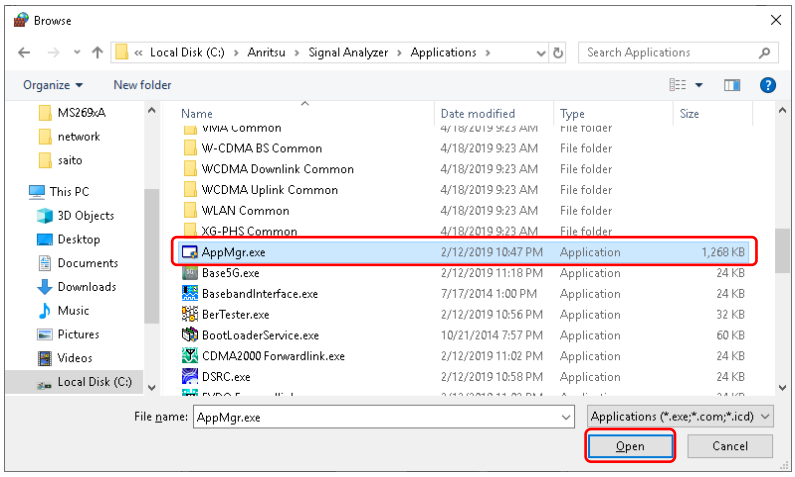

Figure 5.4.1-16 Browse Window of Add an app

4. In Add an app window select **MS269xA AppMgr**, and click **Add**.

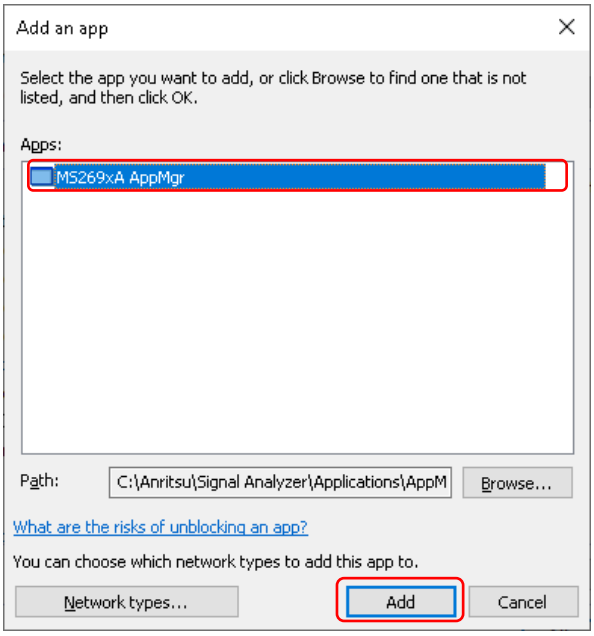

Figure 5.4.1-17 Add an app Window

5. **MS269xA AppMgr** is added to **Allowed apps and features**.
   Confirm if **MS269xA AppMgr** is found and set to On (checked).

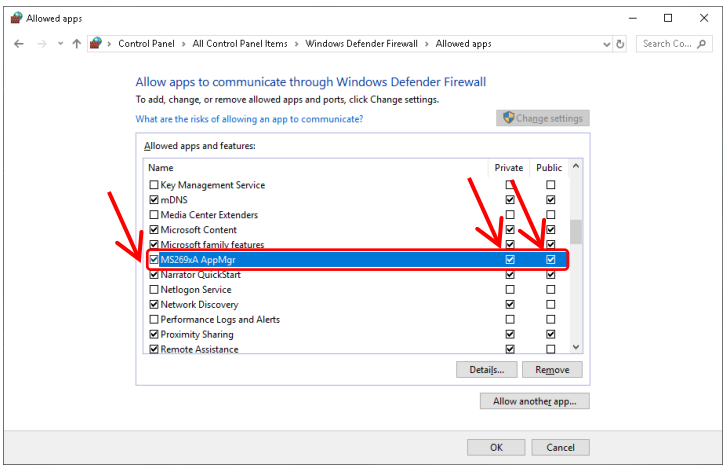

Figure 5.4.1-18 Allowed apps Window

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 MS2850A 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 MS2850A.

When the OS is WES 7

Windows Update setting and execution (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 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.

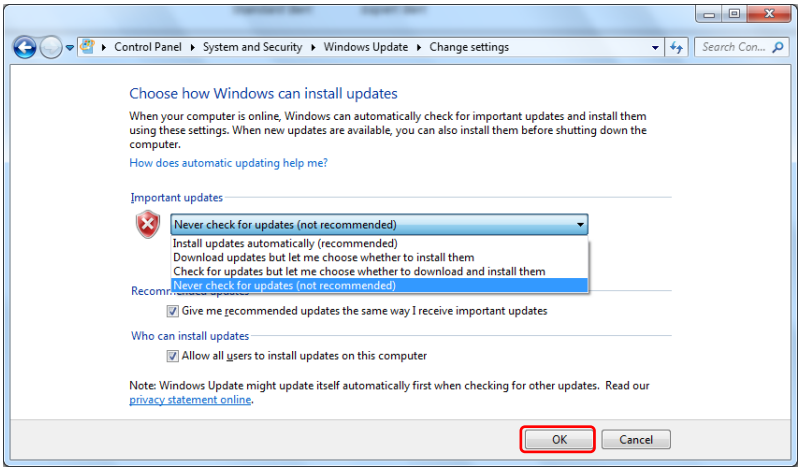

Figure 5.4.2-2 Change settings display

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

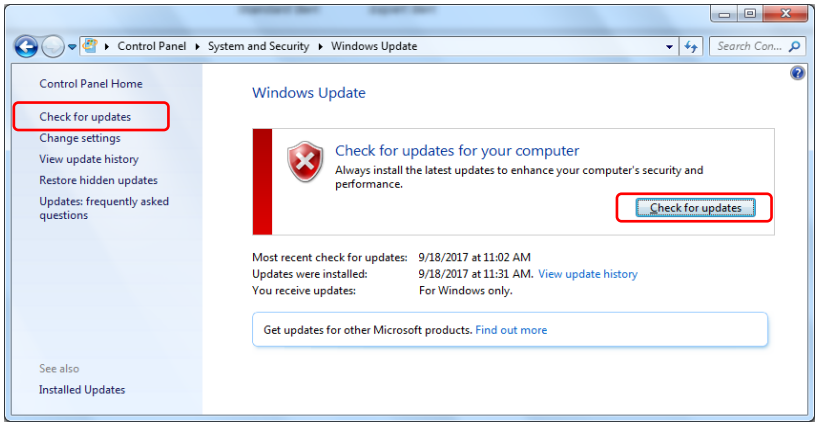

Figure 5.4.2-3 Windows Update display (manual update)

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

8. After Windows Update, if you are prompted to restart, shut down the MS2850A 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.

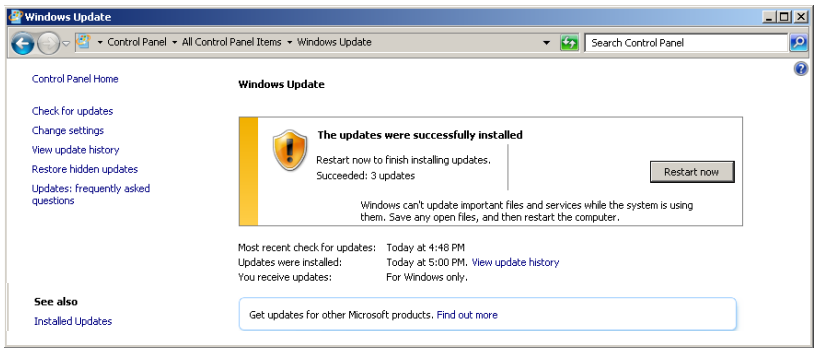

Figure 5.4.2-4 Windows Update display (Restart now)

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**.

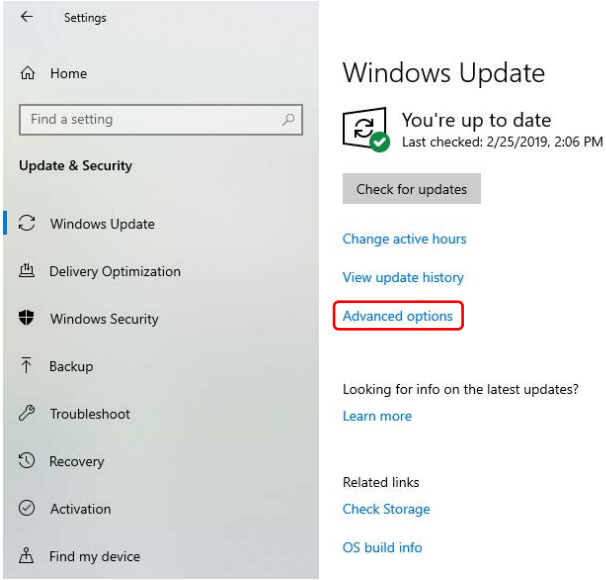

Figure 5.4.2-5 Windows Update Window

5. Advanced options window will be shown.
   Confirm if Automatically download updates even over metered data connections (charges may apply) is set to Off.

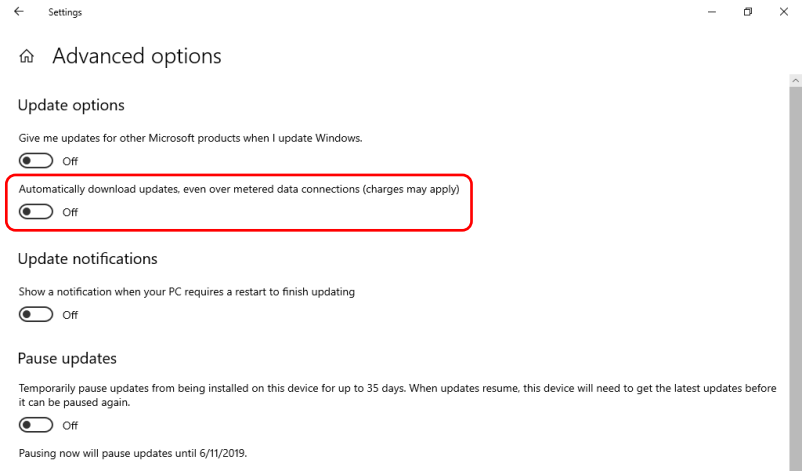

Figure 5.4.2-6 Advanced options Window

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

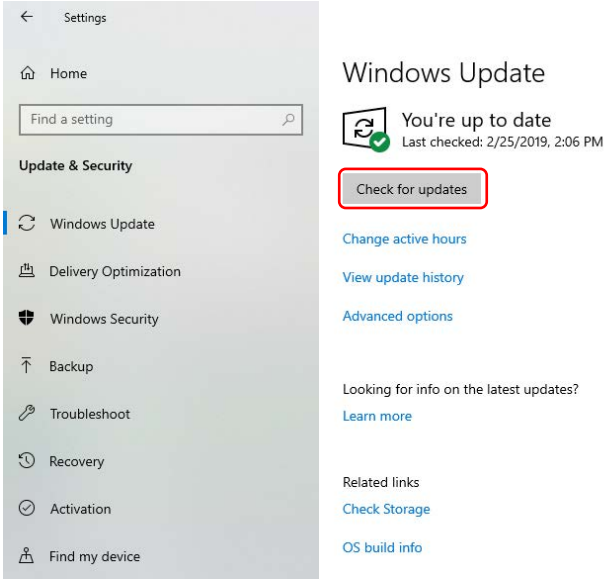

Figure 5.4.2-7 Windows Update Window (manual update)

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 MS2850A 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 MS2850A. However, if the antivirus software updates virus definition data automatically or runs full scan in the background, the performance of the MS2850A 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 MS2850A.

The antivirus software that checked operation in the MS2850A 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 MS2850A 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 6 Performance Test

This chapter describes measurement devices, setup methods, and performance test procedures required for performance tests as preventive maintenance of the MS2850A.

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6.2.3 Single sideband noise level 6-11
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6.1 Overview of Performance Test

6.1.1 Performance test

Performance tests are performed as parts of preventive maintenance in order to prevent the performance of the MS2850A from being degraded before use.

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 MS2850A.

- Display frequency accuracy
- Frequency span display accuracy
- Single sideband noise level
- RF frequency characteristics
- Display average noise level
- Second harmonic wave distortion
- In-band frequency characteristics
- Internal reference oscillator
- Input attenuator switching error
- 1 dB gain compression point
- Two-tone third-order intermodulation distortion
- Image responses

Perform items deemed critical at regular intervals as preventive maintenance. A 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).

For the performance tests of MS2850A-072 Extended Specifications, refer to the *MS2850A-072 Extended Specifications Operation Manual.*

6.1.2 Performance test items and instruments used

Table 6.1.2-1 lists measuring instruments for performance tests.

Table 6.1.2-1 List of measuring instruments for performance test

Test Items	Required Performance	Recommended instruments (Model Name)
Display frequency accuracy	• Frequency range: 500 MHz to 31 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 4 or 5)
Frequency span display accuracy	• Frequency range: 300 MHz to 40 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 4 or 5)
Single sideband noise level	• Frequency range: 1 GHz, 1 MHz offset 1 Hz resolution available • Output level range: –10 to 10 dBm 0.1 dB resolution available • SSB phase noise: –130 dBc/Hz or less (at 10 kHz offset) • 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	Signal generator (HP8665B Equivalent)

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

Test Items	Required Performance	Name of Recommended Device (Model Name)
RF frequency characteristics	• Frequency range: 10 MHz to 40 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3710A) 6 GHz or less
		Signal generator (MG3694C) 6 GHz or more
	• Frequency range: 10 MHz to 40 GHz • Measurement power range: –67 to +20 dBm • Mainframe accuracy: ±0.02 dB	Power meter (ML2488B)
		Power sensor (MA2442D) Power sensor (MA2444D)
Display average noise level	• Frequency range: DC to 44.5 GHz • VSWR: 1.2 or less • 50 Ω	MS2850A-047/046 Standard terminator (28K50)
Second harmonic wave distortion	• Frequency range: 10 MHz to 22.25 GHz • External reference input: (10 MHz) available • Second harmonic wave: –30 dBc or less • At twice the frequency of SG output: Loss < 40 dB (LPF)	Signal generator (MG3710A) 6 GHz or less
		Signal generator (MG3694C) 6 GHz or more
		Low pass filters
		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
In-band Frequency Characteristics	• Frequency range: 65 MHz to 4 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 4 or 5)
	• Frequency range: 65 MHz to 4 GHz • Measurement power range: –67 to +20 dBm • Mainframe accuracy: ±0.02 dB	Power meter (ML2488B)
		Power sensor (MA2444D)
Internal reference oscillator	• Frequency range: 10 MHz to 20 GHz	Frequency counter (MF2412C)
	• Frequency: 10 MHz, • Stability: < 5×10^{-12}	Frequency Standard 10 MHz (FS725)
	• Output frequency: 10 GHz • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C)

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

Test Items	Required Performance	Name of Recommended Device (Model Name)
Input attenuator switching error	• Frequency range: 10 MHz to 40 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 4)
1 dB gain compression point	• Frequency range: 10 MHz to 26.5 GHz 1 Hz resolution available • Output level range: –30 to +15 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 2B, 4, 15B)
	• Frequency range: 10 MHz to 40 GHz 1 Hz resolution available • Output level range: –30 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 2B, 4)
Two-tone third-order intermodulation distortion	• Frequency range: 10 MHz to 40 GHz 1 Hz resolution available • Output level range: –30 to +10 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 2B, 4)
Image responses	• Frequency range: 10 MHz to 40 GHz 1 Hz resolution available • Output level range: –20 to 0 dBm 0.1 dB resolution available	Signal generator (MG3694C with option 4)

6.2 Performance Test Items

Warm up the device under test and measuring instruments for at least 30 minutes except where directed, in order to stabilize them sufficiently before performance tests. In addition to them, performing tests under ambient temperatures, little AC power supply voltage fluctuations as well as the absence of noise, vibrations, dust, humidity or other problems are needed to demonstrate with maximum measurement accuracy.

Figure 6.2-1 Performance test

6.2.1 Display frequency accuracy

Add the known frequency, which is the reference for the display frequency, to the MS2850A as shown in (3). Then, set the center frequency and frequency span on the front panel. Measure the difference between the read value of the marker display frequency (bold arrow in the figure below) of the spectrum peak point and the setting value of the center frequency (same value as known reference frequency) 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 MS2850A.

(1) Test target standards

■ MS2850A

- Display frequency accuracy:

  ± [Display frequency × Reference frequency accuracy
  + Span frequency × Span accuracy + RBW × 0.05
  + 2 × N + Span Frequency / (No. of trace points – 1)] Hz

  N indicates the mixing order (Refer to Table 1.3.1-1).

(2) Measuring instruments for tests

- Signal generator (MG3694C)

(3) Setup

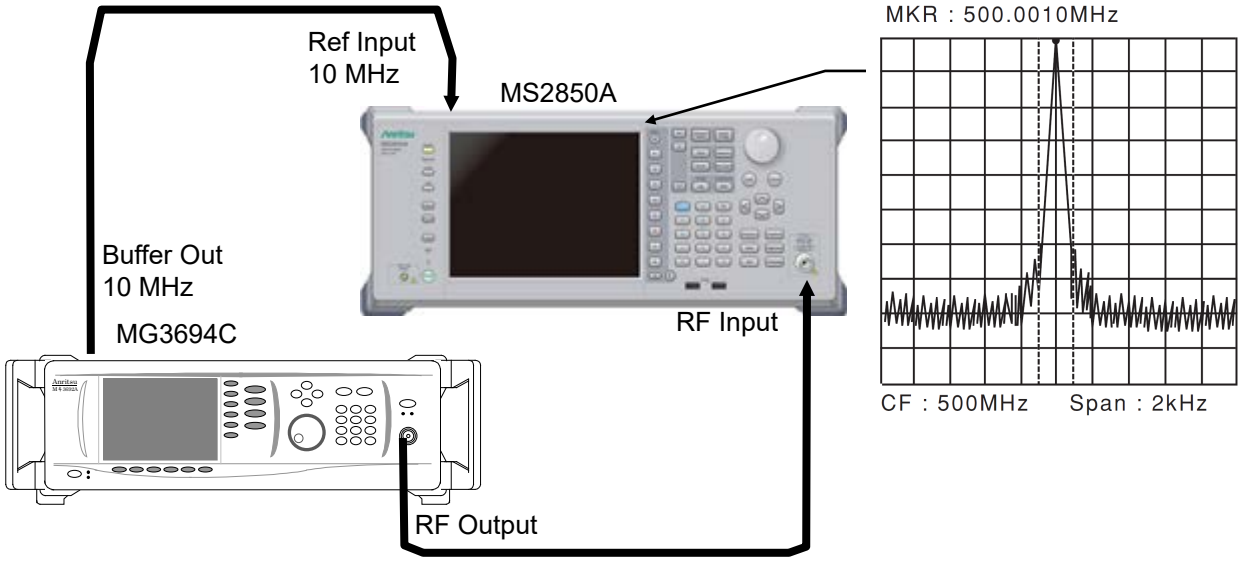


Figure 6.2.1-1 Display frequency accuracy test

(4) Notes on test

Set the output level of the MG3694C to –20 to –10 dBm

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset) to perform Preset.
4. Press [Frequency] of the MS2850A to display the Frequency function menu.
5. Set the output frequency of the MG3694C 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 MS2850A.
7. 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 MS2850A.
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 in accordance with the center frequency and frequency span combination shown in the Display Frequency Accuracy table of Appendix A.

6.2.2 Frequency span display accuracy

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

(1) Test target standards

■ MS2850A

- Frequency span accuracy: ±0.2 %

(2) Measuring instruments for tests

- Signal generator (MG3694C)

(3) Setup

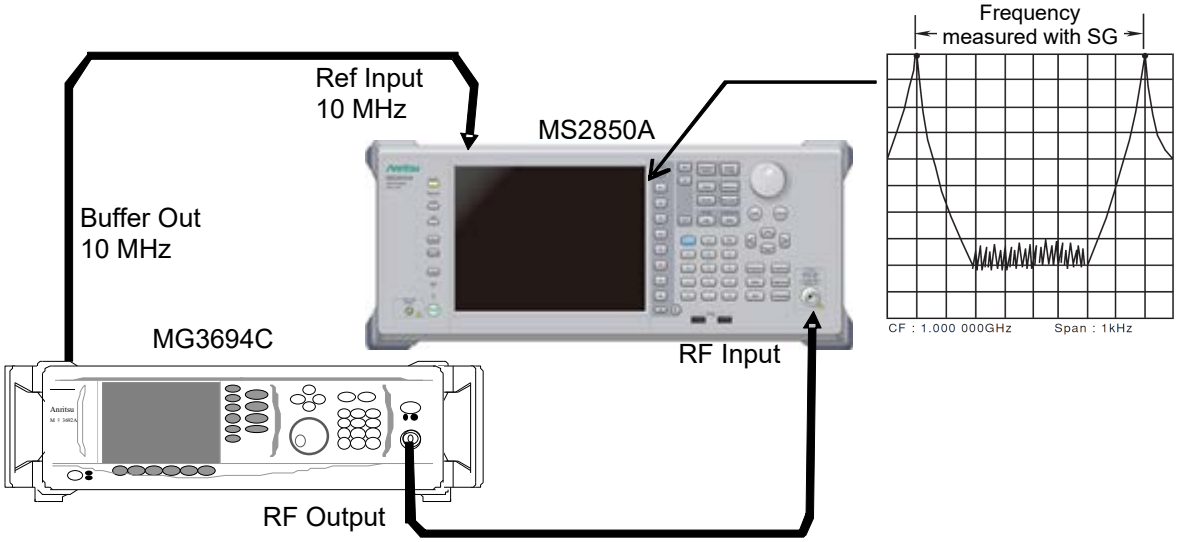


Figure 6.2.2-1 Frequency span display accuracy test

(4) Notes on test

The output level of the MG3694C is not specified. But, set regularly from –20 to –10 dBm.

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset) to perform Preset.
4. Connect the output of the MG3694C to the RF input of the MS2850A.
5. Set the RBW (300 Hz), frequency span (10 kHz) and center frequency (2 GHz) of the MS2850A referring the Frequency Span Display Accuracy table of Appendix A.
6. Set the output frequency of the MG3694C to the frequency (1999.996 MHz) for f_1 shown in the Frequency Span Display Accuracy table of Appendix A.
7. Measure the peak frequency of the spectrum using MS2850A's marker function. This frequency is set to f_1'.
8. Set the MG3694C output frequency to the one on f_2 (2000.004 MHz), and then measure the spectrum waveform peak frequency by using the marker function. This measured frequency is set to f_2'.
9. Calculate $(f_2' - f_1') / 0.8 / \text{SPAN} \times 100 - 100$ [%], then confirm 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 less than that the device under test generates. At that time, test how much the level drops in dB from the peak point for a noise level which is distanced by a specific frequency from the spectrum waveform peak point.

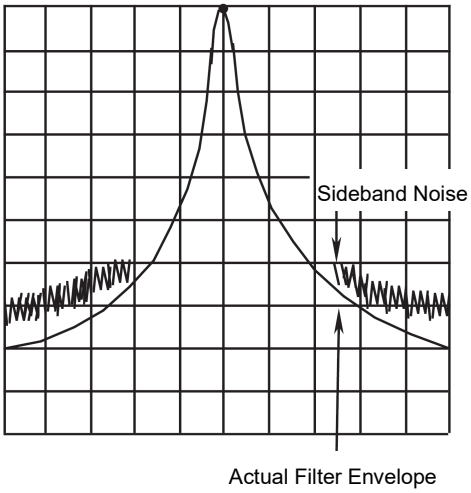


Figure 6.2.3-1 Single sideband noise level

(1) Test target standards

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

  ≤ –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)

(2) Measuring instruments for tests

- Signal generator (HP8665B or equivalent)

(3) Setup

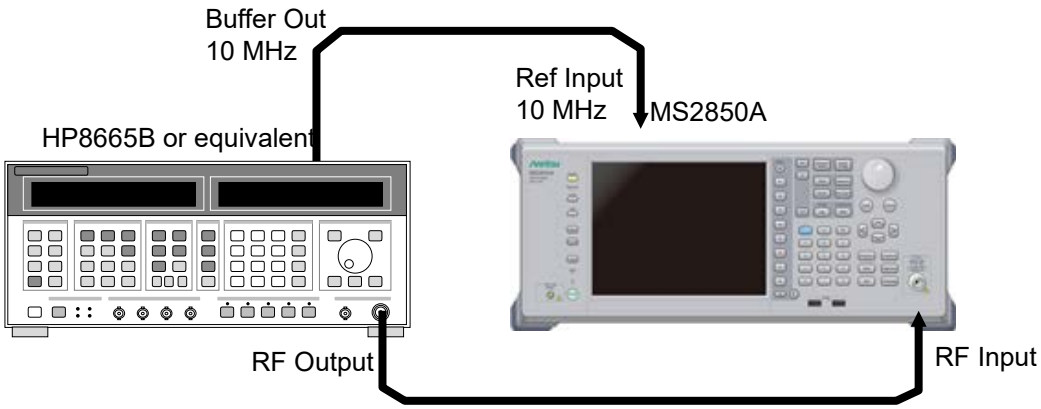


Figure 6.2.3-2 Signal sideband noise level

(4) Notes on test

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

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset].
3. Press [F1] (Preset).
4. Press [Cal] and then [F1] (SIGANA All).
5. Set 1000 MHz, 0 dBm for the HP8665B.
6. Set the MS2850A as follows:

Reference level:	0 dBm
Attenuator:	0 dB
Center Freq:	1000 MHz
Span:	2.5 kHz
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. Press [Single] (Single) to start measuring.
8. Press [Peak Search] to acquire Marker Level [MKL].
9. Adjust the output level of SG output to MKL = 0 dBm ± 0.1 dB.
10. Set the span, RBW, and VBW for 10 kHz offset frequency in accordance with the Single sideband Noise Level table in Appendix A.
11. Set Marker to Normal and Marker Result to Peak, and press [Peak Search].

12. Set Marker to Delta, then set Marker Result to Density.
13. Measure the single-sideband noise level,[p1] dBc/Hz, at the point that Center frequency of Marker zone is offset by +10 kHz.
14. Confirm the measurement result satisfies the specification described in Appendix A “Single-sideband noise”.
15. Repeat the procedure step 10 to 14 on the offset frequency described in Appendix A “Single-sideband noise”.

6.2.4 RF frequency characteristics

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

■ MS2850A

Without MS2850A-068/168 or Preamplifier turned off,
Microwave Preselector Bypass turned off,
and after Preselector Auto Tune is executed:
Spectrum analyzer mode,
or Signal analyzer mode and Bandwidth ≤ 31.25 MHz:

±1.0 dB
(9 kHz ≤ frequency < 300 kHz)

±0.35 dB
(300 kHz ≤ frequency < 50 MHz)

±0.35 dB
(50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
(50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

±1.50 dB
(4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal)
(3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious)

±1.50 dB
(6 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Normal)
(4 GHz < frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)

±2.50 dB
(13.8 GHz < frequency ≤ 26.5 GHz)

±2.50 dB
(26.5 GHz < frequency ≤ 40 GHz)

Signal analyzer mode, and Bandwidth > 31.25 MHz:

±0.45 dB
(50 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
(50 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

With MS2850A-068/168 and Preamplifier turned on,
Microwave Preselector Bypass turned off
and after Preselector Auto Tune is done:

Spectrum analyzer mode,
or Signal analyzer mode and Bandwidth ≤ 31.25 MHz:

±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 ≤ 13.8 GHz, Frequency Band Mode: Normal)
(3.5 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)

±2.50 dB
(13.8 GHz < frequency ≤ 26.5 GHz)

±3.50 dB
(26.5 GHz < frequency ≤ 40 GHz)

Signal analyzer mode and Bandwidth > 31.25 MHz:

±0.75 dB
(300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
(300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

(2) Measuring instruments for tests

● Signal generator	(MG3710A)	6 GHz or less
	(MG3694C)	6 GHz or more
● Power meter	(ML2488B)	
● Power sensor	(MA2442D)	6 GHz or less
	(MA2444D)	6 GHz or more

(3) Setup

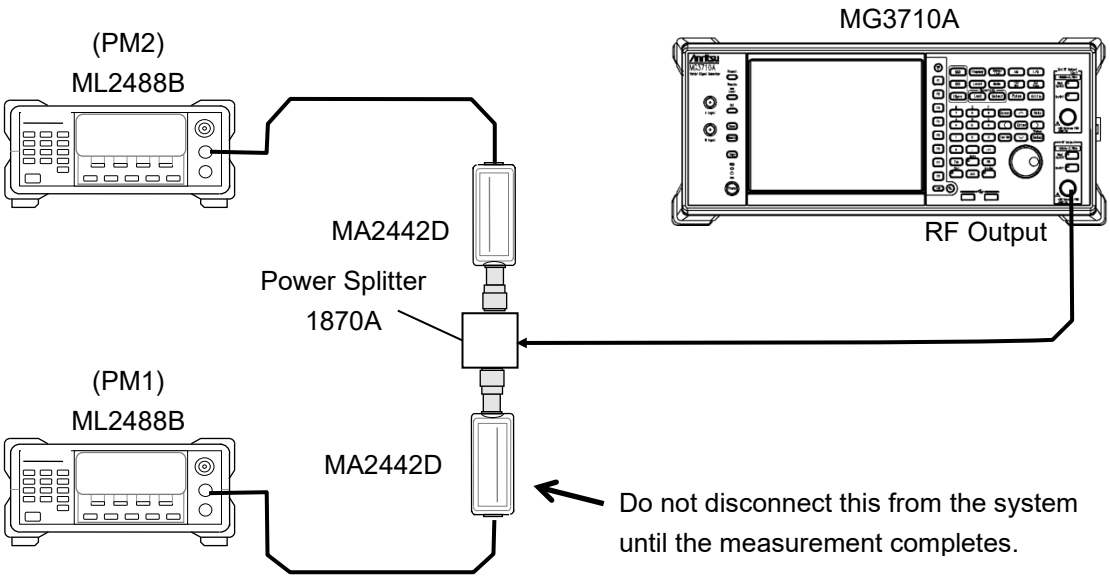


Figure 6.2.4-1 Calibration of Measurement System 1

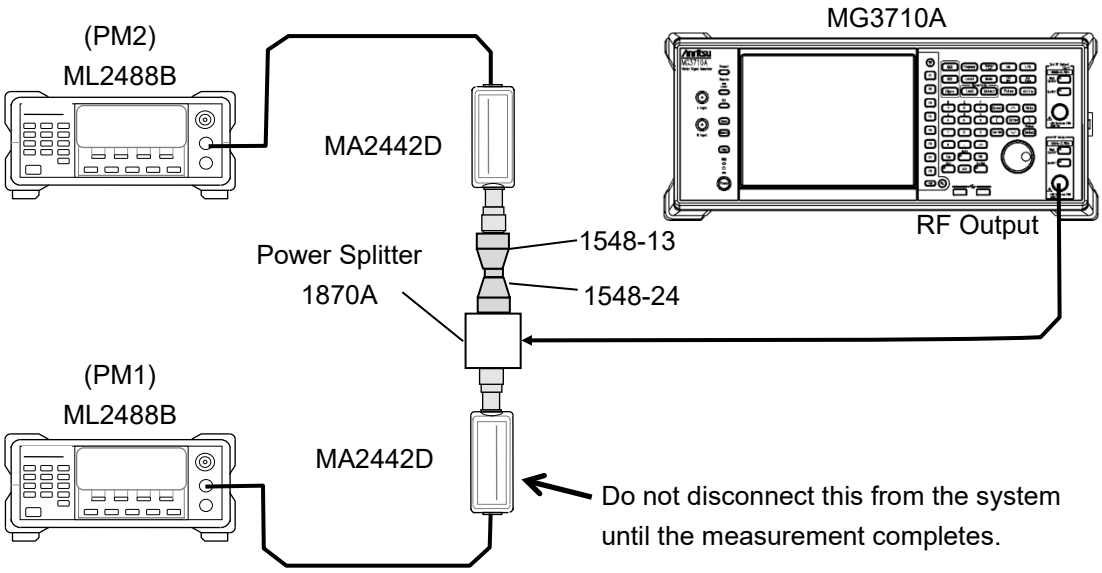


Figure 6.2.4-2 Calibration of Measurement System 2

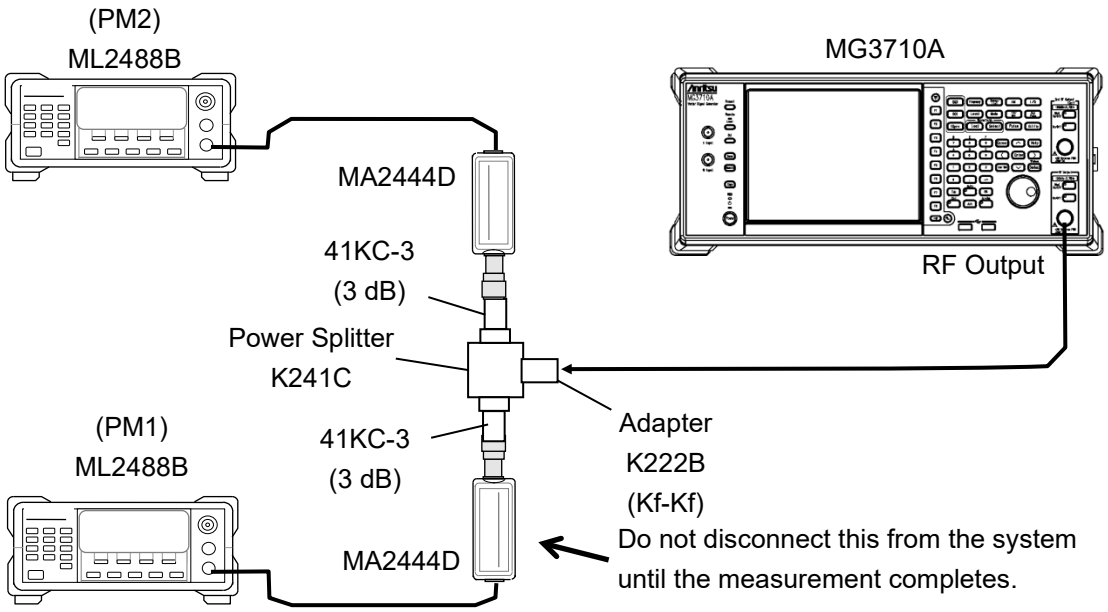


Figure 6.2.4-3 Calibration of Measurement System 3

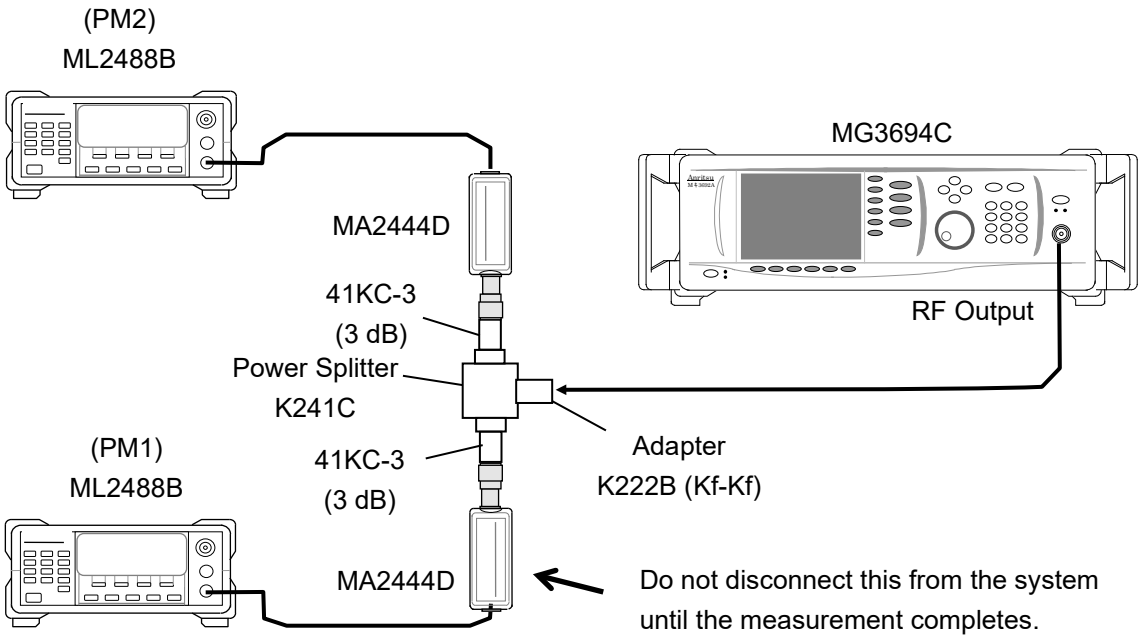


Figure 6.2.4-4 Calibration of Measurement System 4

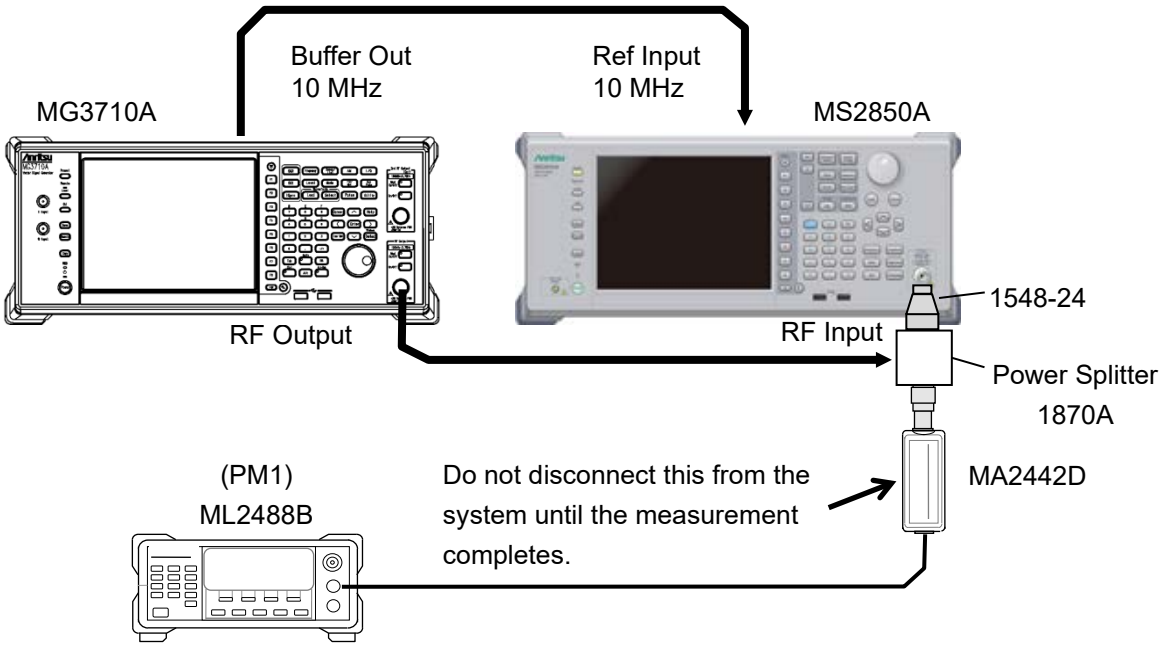


Figure 6.2.4-5 RF frequency characteristics test 1

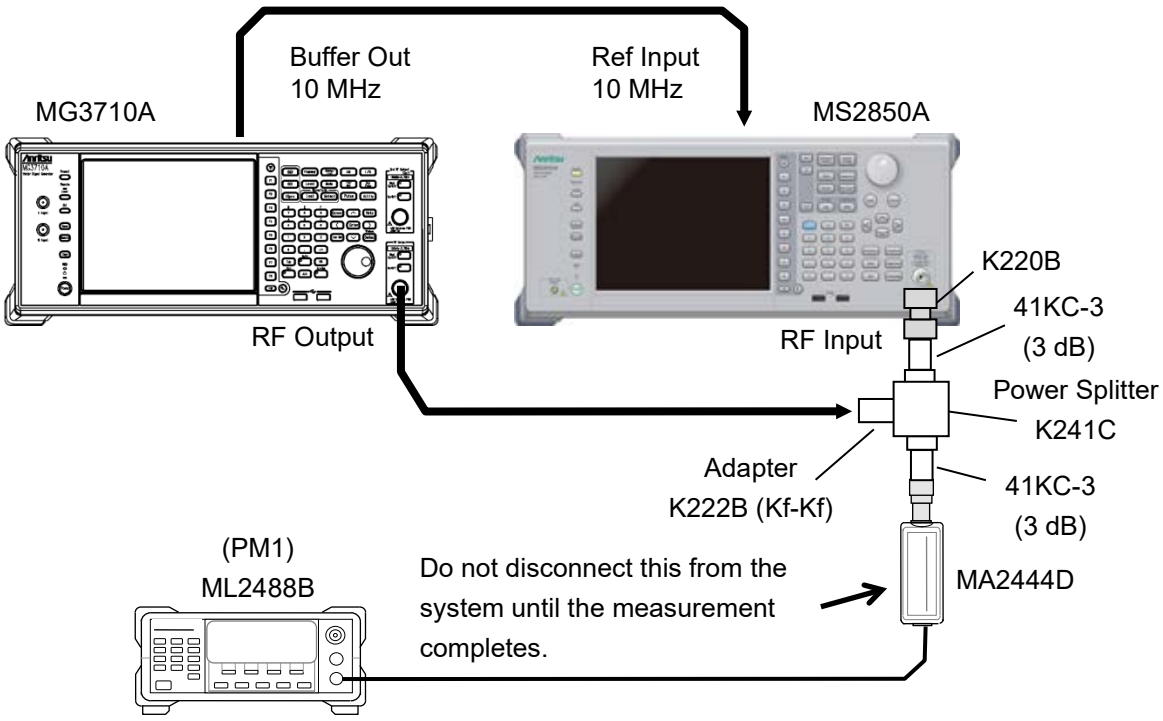


Figure 6.2.4-6 RF frequency characteristics test 2

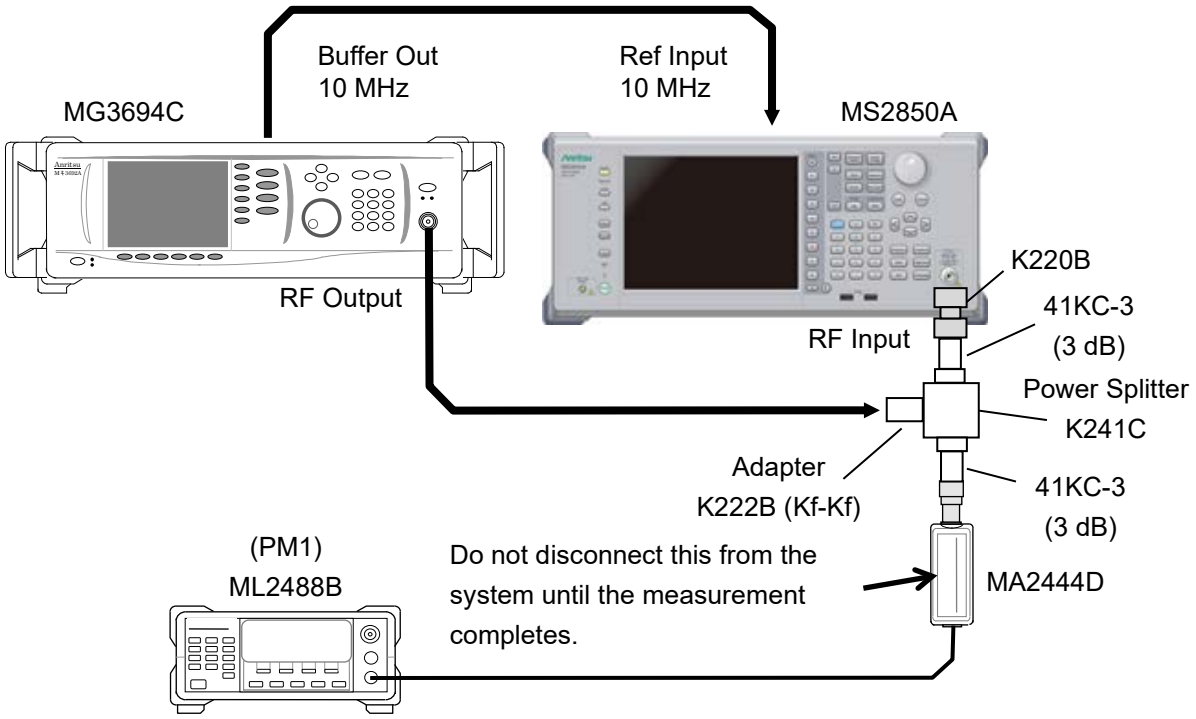


Figure 6.2.4-7 RF frequency characteristics test 3

(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, conversion adapter, and power splitter, the application parts below are recommended.

Cable:	J0912	COAXIAL CABLE,0.5M,FOR 40GHZ
Attenuator:	41KC-3	Fixed Attenuator 3 dB
Conversion adapter:	J1398A	N-SMA ADAPTOR
Conversion adapter:	1548-13	SMA(f)-N(f) ADAPTOR
Conversion adapter:	1548-24	SMA(m)-N(m) ADAPTOR
Conversion adapter:	K222B	K(f)-K(f) ADAPTOR
Conversion adapter:	K220B	K(m)-K(m) ADAPTOR
Power splitter:	1870A	N connector
Power splitter:	K241C	K connector

(5) Test procedure

(5-1) Spectrum Analyzer mode and Frequency ≤ 6 GHz. Or, Signal Analyzer mode, Bandwidth > 31.25 MHz and Frequency < 4 GHz.

(a) Calibration of Measurement System

1. Connect the equipment in reference to Figure 6.2.4-8.
2. Set the signal generator as follows:
   OUTPUT FREQ: 10 MHz
   OUTPUT LEVEL: –4 dBm
3. Set CAL Factor of the each power meter to 10 MHz.
4. Adjust SG output level as the measured value of the power meter PM2 becomes –10 dBm ± 0.1 dB.
5. Record the measured value of SG setting level, PM1 and PM2.
   Setting(CF) = SG setting level
   ReadLevA(CF) = measured value of PM2
   ReadLevB(CF) = measured value of PM1
6. Connect the equipment in reference to Figure 6.2.4-2.
7. Record the measured value of PM1 and PM2.
   ReadLevAConn(CF) = measured value of PM2
   ReadLevBConn(CF) = measured value of PM1
8. Record attenuation of connector (1548-24) with following calculation formula.
   ConnLoss(CF) = [{ReadLevA(CF) – ReadLevB(CF)}
   – {ReadLevAConn(CF) – ReadLevBConn(CF)}] / 2
9. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 2 to 8.

(b) RF frequency characteristics measurement (Spectrum Analyzer mode)

1. Connect the equipment in reference to Figure 6.2.4-5
2. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:

Center Freq:	10 MHz
Span:	0 Hz
ATT:	10 dB
Reference Level:	–10 dBm
Pre-Amp:	Off
RBW:	100 Hz
Sweep Time:	100 ms
Trace Point:	1001

Det Mode: RMS
Burst Average Power: On
Start Time: 10 ms
Stop Time: 90 ms

7. Set the signal generator as follows:
   OUTPUT FREQ: 10 MHz
   OUTPUT LEVEL: Setting (10 MHz) dBm
8. Set CAL Factor of the power meter to 10 MHz.
9. Sweep Single and record Burst Average Power as MeasData(CF).
10. Record the measured value of the power meter of MeasReadLevB(CF).
11. Calculate RF FreqRes (CF) using following formula.
    RFFreaRes(CF) = [{MeasData(CF) – ReadLevA(CF)}
    – {MeasReadLevB(CF) – ReadLevB(CF)} + ConnLoss(CF)]
12. Confirm the RF frequency characteristics satisfy the specification on Appendix A "RF frequency characteristics".
13. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 7 to 12.

(c) RF frequency characteristics measurement
(Signal Analyzer mode and Bandwidth > 31.25 MHz)

1. Connect the equipment shown on Figure 6.2.4-5
2. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:
   Center Freq: 800 MHz
   Span: 50 MHz
   ATT: 10 dB
   Reference Level: –10 dBm
   Pre-Amp: Off
   Time Length: 100 ms
   Time Detection: Average
   Trace Mode: Power vs. Time
   BW Type: Gaussian
   Band Width: 2 MHz
   Det Mode: RMS
   Burst Average Power: On

Marker1: 10 ms
Marker2: 90 ms

7. Measure in the same procedure with (b) step 7 to 13.

(5-2) Spectrum Analyzer mode, Frequency ≤ 6 GHz, and Preamplifier turned on. Or, Signal Analyzer mode, Bandwidth > 31.25 MHz, Frequency < 4 GHz, and Preamplifier turned on.

(a) Calibration of Measurement System

1. Connect the equipment in reference to Figure 6.2.4-3.
2. Set the signal generator as follows:
   OUTPUT FREQ: 10 MHz
   OUTPUT LEVEL: –24 dBm
3. Set CAL Factor of the each power meter to 10 MHz.
4. Adjust SG output level as the measured value of the power meter PM2 becomes –30 dBm ± 0.1 dB.
5. Record the measured value of SG setting level, PM1 and PM2.
   Setting(CF) = SG setting level
   ReadLevA(CF) = measured value of PM2
   ReadLevB(CF) = measured value of PM1
6. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 2 to 5.

(b) RF frequency characteristics measurement (Spectrum Analyzer mode)

1. Connect the equipment in reference to Figure 6.2.4-6.
2. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:
   Center Freq: 10 MHz
   Span: 0 Hz
   ATT: 10 dB
   Reference Level: –30 dBm
   Pre-Amp: On
   RBW: 100 Hz
   Sweep Time: 100 ms
   Trace Point: 1001
   Det Mode: RMS
   Burst Average Power: On
   Start Time: 10 ms
   Stop Time: 90 ms

7. Set the signal generator as follows:
   OUTPUT FREQ: 10 MHz
   OUTPUT LEVEL: Setting (10 MHz) dBm
8. Set CAL Factor of the power meter to 10 MHz.
9. Sweep Single and record Burst Average Power as MeasData(CF).
10. Record the measured value of the power meter of MeasReadLevB(CF).
11. Calculate RF FreqRes (CF) using following formula.

    RFFreaRes(CF) = [{MeasData(CF) – ReadLevA(CF)}
    – {MeasReadLevB(CF) – ReadLevB(CF)}]
12. Confirm the RF frequency characteristics satisfy the specification on Appendix A "RF frequency characteristics".
13. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 7 to 12.

(c) RF frequency characteristics measurement
(Signal Analyzer mode and Bandwidth > 31.25 MHz)

1. Connect the equipment in reference to Figure 6.2.4-6.
2. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:

Center Freq:	800 MHz
Span:	50 MHz
ATT:	10 dB
Reference Level:	–30 dBm
Pre-Amp:	On
Time Length:	100 ms
Time Detection:	Average
Trace Mode:	Power vs. Time
BW Type:	Gaussian
Band Width:	2 MHz
Det Mode:	RMS
Burst Average Power:	On
Marker1:	10 ms
Marker2:	90 ms

7. Measure in the same procedure with (b) step 7 to 13.

(5-3) Spectrum Analyzer mode and frequency > 6 GHz. Or, Signal Analyzer mode, Bandwidth > 31.25 MHz, and Frequency ≥ 4 GHz

(a) Calibration of Measurement System

1. Connect the equipment in reference to Figure 6.2.4-4.
2. Set the signal generator as follows:
   OUTPUT FREQ: 4000 MHz
   OUTPUT LEVEL: –4 dBm
3. Set CAL Factor of the each power meter to 4000 MHz.
4. Adjust SG level as the measured value of the power meter PM2 becomes –10 dBm ± 0.1 dB.
5. Record the measured value of SG setting level, PM1 and PM2.
   Setting(CF) = SG setting level
   ReadLevA(CF) = measured value of PM2
   ReadLevB(CF) = measured value of PM1
6. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 2 to 5 above.

(b) RF frequency characteristics measurement (Spectrum Analyzer mode)

1. Connect the equipment in reference to Figure 6.2.4-7.
2. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:
   Center Freq: 6010 MHz
   Span: 0 Hz
   ATT: 10 dB
   Reference Level: –10 dBm
   Pre-Amp: Off
   RBW: 100 Hz
   Sweep Time: 100 ms
   Trace Point: 1001
   Det Mode: RMS
   Burst Average Power: On
   Start Time: 10 ms
   Stop Time: 90 ms
7. Set the signal generator as follows:
   OUTPUT FREQ: 6010 MHz
   OUTPUT LEVEL: Setting (6010 MHz) dBm
8. Set CAL Factor of the power meter to 6010 MHz.
9. Perform Preselector Auto Tune of MS2850A.

(Accessory > Preselector > Preselector Auto Tune)

10. Sweep Single and record Burst Average Power as MeasData(CF).
11. Record the measured value of the power meter of MeasReadLevB(CF).
12. Calculate RF FreqRes(CF) using following formula.

    RFFreaRes(CF) = [{MeasData(CF) – ReadLevA(CF)}
    – {MeasReadLevB(CF) – ReadLevB(CF)}]

13. Confirm the RF frequency characteristics satisfy the specification on Appendix A "RF frequency characteristics" .
14. Change the frequency in accordance with the table in "Appendix A RF frequency characteristics" and repeat the procedure step 7 to 13.

(c) RF frequency characteristics measurement
(Signal Analyzer mode and Bandwidth > 31.25 MHz)

1. Connect the equipment in reference to Figure 6.2.4-7.
2. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:

Center Freq:	4000 MHz
Span:	50 MHz
ATT:	10 dB
Reference Level:	–10 dBm
Pre-Amp:	Off
Time Length:	100 ms
Time Detection:	Average
Trace Mode:	Power vs. Time
BW Type:	Gaussian
Band Width:	2 MHz
Det Mode:	RMS
Burst Average Power:	On
Marker1:	10 ms
Marker2:	90 ms

7. Measure in the same procedure with (b) step 7 to 13, but step 9 is not needed.

(5-4) Spectrum Analyzer mode, Frequency > 6 GHz and Preamplifier turned on. Or, Signal Analyzer mode, Bandwidth > 31.25 MHz, Frequency ≥ 4 GHz and Preamplifier turned on.

(a) Calibration of Measurement System

1. Connect the equipment in reference to Figure 6.2.4-4.
2. Set the signal generator as follows:
   OUTPUT FREQ: 4000 MHz
   OUTPUT LEVEL: –24 dBm
3. Set CAL Factor of the each power meter to 4000 MHz.
4. Adjust SG output level as the measured value of the power meter PM2 becomes –30 dBm ± 0.1dB.
5. Record the measured value of SG setting level, PM1 and PM2.
   Setting(CF) = SG setting level
   ReadLevA(CF) = measured value of PM2
   ReadLevB(CF) = measured value of PM1
6. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 2 to 5.

(b) RF frequency characteristics measurement (Spectrum Analyzer mode)

1. Connect the equipment in reference to Figure 6.2.4-7.
2. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:
   Center Freq: 6010 MHz
   Span: 0 Hz
   ATT: 10 dB
   Reference Level: –30 dBm
   Pre-Amp: On
   RBW: 100 Hz
   Sweep Time: 100 ms
   Trace Point: 1001
   Det Mode: RMS
   Burst Average Power: On
   Start Time: 10 ms
   Stop Time: 90 ms
7. Set the signal generator as follows:
   OUTPUT FREQ: 6010 MHz
   OUTPUT LEVEL: Setting (6010 MHz) dBm
8. Set CAL Factor of the power meter to 6010 MHz.

9. Perform Preselector Auto Tune of MS2850A.

   (Accessory > Preselector > Preselector Auto Tune)

10. Sweep Single and record Burst Average Power as MeasData(CF).

11. Record the measured value of the power meter of MeasReadLevB(CF).

12. Calculate RF FreqRes (CF) using following formula.

    RFFreaRes(CF) = [{MeasData(CF) – ReadLevA(CF)}
    – {MeasReadLevB(CF) – ReadLevB(CF)}]

13. Confirm the RF frequency characteristics satisfy the specification on Appendix A "RF frequency characteristics".

14. Change the frequency in accordance with the table in Appendix A "RF frequency characteristics" and repeat the procedure step 7 to 13.

(c) RF frequency characteristics measurement
(Signal Analyzer mode and Bandwidth > 31.25 MHz)

1. Connect the equipment in reference to Figure 6.2.4-7.
2. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
3. Press [Preset] of the MS2850A.
4. Press [F1] (Preset).
5. Press [Cal] and then [F1] (SIGANA All).
6. Set the MS2850A as follows:

Center Freq:	4000 MHz
Span:	50 MHz
ATT:	10 dB
Reference Level:	–30 dBm
Pre-Amp:	On
Time Length:	100 ms
Time Detection:	Average
Trace Mode:	Power vs. Time
BW Type:	Gaussian
Band Width:	2 MHz
Det Mode:	RMS
Burst Average Power:	On
Marker1:	10 ms
Marker2:	90 ms

7. Measure in the same procedure with (b) step 7 to 13 but step 9 is not needed.

6.2.5 Display average noise level

The internal noise that is evenly distributed in proportion to the resolution bandwidth over the entire measuring frequency range is called 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.

■ MS2850A

Without MS2850A-068/168, without MS2850A-076/176, and Microwave Preselector Bypass turned on or off:
Or without MS2850A-068/168, with MS2850A-076/176, and Microwave Preselector Bypass turned on:

≤ –120 dBm/Hz (9 kHz ≤ frequency < 100 kHz)
≤ –134 dBm/Hz (100 kHz ≤ frequency < 1 MHz)
≤ –144 dBm/Hz (1 MHz ≤ frequency < 10 MHz)
≤ –150 dBm/Hz (10 MHz ≤ frequency < 30 MHz)
≤ –153 dBm/Hz (30 MHz ≤ frequency < 1 GHz)
≤ –150 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –147 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –144 dBm/Hz (3.5 GHz < frequency ≤ 4 GHz)
≤ –144 dBm/Hz (4 GHz < frequency ≤ 6 GHz)
≤ –146 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –144 dBm/Hz (13 GHz < frequency ≤ 18.3 GHz)
≤ –140 dBm/Hz (18.3 GHz < frequency ≤ 26.5 GHz)
≤ –140 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –136 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

With MS2850A-068/168, Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned on or off:
Or with MS2850A-068/168, Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned on,

≤ –120 dBm/Hz (9 kHz ≤ frequency < 100 kHz)
≤ –134 dBm/Hz (100 kHz ≤ frequency < 1 MHz)
≤ –144 dBm/Hz (1 MHz ≤ frequency < 10 MHz)
≤ –150 dBm/Hz (10 MHz ≤ frequency < 30 MHz)
≤ –153 dBm/Hz (30 MHz ≤ frequency < 1 GHz)
≤ –150 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –147 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –144 dBm/Hz (3.5 GHz < frequency ≤ 4 GHz)
≤ –144 dBm/Hz (4 GHz < frequency ≤ 6 GHz)
≤ –142 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –140 dBm/Hz (13 GHz < frequency ≤ 18.3 GHz)
≤ –136 dBm/Hz (18.3 GHz < frequency ≤ 26.5 GHz)
≤ –135 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –131 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

With MS2850A-068/168, Preamplifier turned on,
and Microwave Preselector Bypass turned on:

≤ –156 dBm/Hz (1 MHz)
≤ –166 dBm/Hz (30 MHz ≤ frequency < 1 GHz)
≤ –164 dBm/Hz (1 GHz ≤ frequency < 2 GHz)
≤ –163 dBm/Hz (2 GHz ≤ frequency ≤ 3.5 GHz)
≤ –160 dBm/Hz (3.5 GHz < frequency ≤ 4 GHz)
≤ –160 dBm/Hz (4 GHz < frequency ≤ 6 GHz)
≤ –160 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –159 dBm/Hz (13 GHz < frequency ≤ 18.3 GHz)
≤ –155 dBm/Hz (18.3 GHz < frequency ≤ 26.5 GHz)
≤ –152 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –149 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

With MS2850A-068/168, Preamplifier turned on,
and Microwave Preselector Bypass turned off:

≤ –156 dBm/Hz (1 MHz)
≤ –166 dBm/Hz (30 MHz ≤ frequency < 1 GHz)
≤ –164 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –163 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –160 dBm/Hz (3.5 GHz < frequency ≤ 4 GHz)
≤ –160 dBm/Hz (4 GHz < frequency ≤ 6 GHz)
≤ –163 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –162 dBm/Hz (13 GHz < frequency ≤ 18.3 GHz)
≤ –159 dBm/Hz (18.3 GHz < frequency ≤ 26.5 GHz)
≤ –156 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –153 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

Without MS2850A-068/168 or Preamplifier turned off,
with MS2850A-076/176, and Microwave Preselector Bypass turned off:

≤ –120 dBm/Hz (9 kHz ≤ frequency < 100 kHz)
≤ –134 dBm/Hz (100 kHz ≤ frequency < 1 MHz)
≤ –144 dBm/Hz (1 MHz ≤ frequency < 10 MHz)
≤ –150 dBm/Hz (10 MHz ≤ frequency < 30 MHz)
≤ –153 dBm/Hz (30 MHz ≤ frequency < 1 GHz)
≤ –150 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –147 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –144 dBm/Hz (3.5 GHz < frequency ≤ 4 GHz)
≤ –144 dBm/Hz (4 GHz < frequency ≤ 6 GHz)
≤ –147 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –145 dBm/Hz (13 GHz < frequency ≤ 18.3 GHz)
≤ –141 dBm/Hz (18.3 GHz < frequency ≤ 26.5 GHz)
≤ –141 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –139 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

- Display average noise level: Signal analyzer mode
  At 18 to 28 °C, Time Detection = Average, Input Attenuator = 0 dB, Bandwidth > 31.25 MHz, at center frequency but excluding the influence of Residual responses.

■ MS2850A

Without MS2850A-068/168, without MS2850A-076/176, and Frequency Band Mode = Normal:

≤ –142 dBm/Hz (800 MHz ≤ frequency < 1 GHz)
≤ –141 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –140 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –138 dBm/Hz (3.5 GHz < frequency < 4.2 GHz)
≤ –138 dBm/Hz (4.2 GHz ≤ frequency ≤ 4.6 GHz)
≤ –142 dBm/Hz (4.6 GHz < frequency ≤ 6 GHz)
≤ –141 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –141 dBm/Hz (13 GHz < frequency ≤ 17 GHz)
≤ –139 dBm/Hz (17 GHz < frequency ≤ 18.5 GHz)
≤ –139 dBm/Hz (18.5 GHz < frequency ≤ 26.5 GHz)
≤ –138 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –137 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

Without MS2850A-068/168, with MS2850A-076/176, and Frequency Band Mode = Normal:

≤ –142 dBm/Hz (800 MHz ≤ frequency < 1 GHz)
≤ –141 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –140 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –138 dBm/Hz (3.5 GHz < frequency < 4.2 GHz)
≤ –137 dBm/Hz (4.2 GHz ≤ frequency ≤ 4.6 GHz)
≤ –141 dBm/Hz (4.6 GHz < frequency ≤ 6 GHz)
≤ –140 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –140 dBm/Hz (13 GHz < frequency ≤ 17 GHz)
≤ –137 dBm/Hz (17 GHz < frequency ≤ 18.5 GHz)
≤ –137 dBm/Hz (18.5 GHz < frequency ≤ 26.5 GHz)
≤ –136 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –135 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

With MS2850A-068/168, Preamplifier turned off,
and Frequency Band Mode = Normal:

≤ –142 dBm/Hz (800 MHz ≤ frequency < 1 GHz)
≤ –141 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –140 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –138 dBm/Hz (3.5 GHz < frequency < 4.2 GHz)
≤ –138 dBm/Hz (4.2 GHz ≤ frequency ≤ 4.6 GHz)
≤ –141 dBm/Hz (4.6 GHz < frequency ≤ 6 GHz)
≤ –140 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –140 dBm/Hz (13 GHz < frequency ≤ 17 GHz)
≤ –135 dBm/Hz (17 GHz < frequency ≤ 18.5 GHz)
≤ –135 dBm/Hz (18.5 GHz < frequency ≤ 26.5 GHz)
≤ –135 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –132 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

With MS2850A-068/168, Preamplifier turned on,
and Frequency Band Mode = Normal:

≤ –161 dBm/Hz (800 MHz ≤ frequency < 1 GHz)
≤ –160 dBm/Hz (1 GHz ≤ frequency < 2.4 GHz)
≤ –159 dBm/Hz (2.4 GHz ≤ frequency ≤ 3.5 GHz)
≤ –157 dBm/Hz (3.5 GHz < frequency < 4.2 GHz)
≤ –155 dBm/Hz (4.2 GHz ≤ frequency ≤ 4.6 GHz)
≤ –155 dBm/Hz (4.6 GHz < frequency ≤ 6 GHz)
≤ –155 dBm/Hz (6 GHz < frequency ≤ 13 GHz)
≤ –155 dBm/Hz (13 GHz < frequency ≤ 17 GHz)
≤ –152 dBm/Hz (17 GHz < frequency ≤ 18.5 GHz)
≤ –152 dBm/Hz (18.5 GHz < frequency ≤ 26.5 GHz)
≤ –150 dBm/Hz (26.5 GHz < frequency ≤ 34 GHz)
≤ –146 dBm/Hz (34 GHz < frequency ≤ 40 GHz)

(2) Measuring instruments for tests

- Standard terminator
  (28K50) MS2850A:

(3) Setup

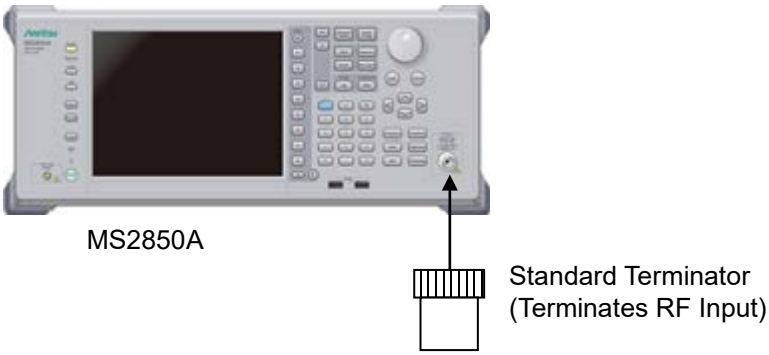


Figure 6.2.5-1 Display average noise level

(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. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Press [Cal] and then [F1] (SIGANA All).
5. Terminate the RF input with the standard terminator.
6. Set the MS2850A as follows (time domain mode).

Center Freq:	100 kHz
Span:	0 Hz
Reference Level:	–100 dBm
RBW:	1 kHz
VBW:	1 Hz
VBW Mode:	Video
Attenuator:	0 dB
Detection:	Sample
Sweep Time:	1 s

7. Press [Trace].
8. Press [F4] (Trace-A Storage Mode), then select [F4] (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] (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 in accordance with the Display Average Noise Level (Spectrum Analyzer Function) table in Appendix A, then obtain the display average noise level in accordance with 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 [F4] (Pre-amp) to set the pre-amplifier settings to On.
    Calculate the display average noise level, in accordance with steps 11 to 15.
17. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.

18. Press Preset .
19. Press F1 (Preset).
20. Set the MS2850A as follows.

Center Freq:	800 MHz
Reference Level:	–50 dBm
Attenuator:	0 dB
Span:	50 MHz
Analysis Time Length:	100 ms
Trace Mode:	Power vs Time
Burst Average Power:	On
BW Type:	Gaussian
Band Width:	10 MHz
Freq. Offset:	0 Hz

21. Press Single (Single) to start measuring, then wait until the measurement is completed.
22. The (Burst average measurement value [dBm] –70 dB) is the display average noise level (dBm/Hz).
23. Set the center frequency in accordance with the Display Average Noise Level (Signal Analyzer Function) table in Appendix A, then obtain the display average noise level in accordance with Steps 21 to 22.
24. Set this instrument as shown below, only when Preamplifier option is installed:
    Press Amplitude to display the amplitude menu, and then press F4 (Pre-amp) to set the pre-amplifier settings to On.
    Calculate the display average noise level, in accordance with steps 21 to 23.

6.2.6 Second harmonic wave distortion

Even if an signal without harmonic distortion is input to the spectrum analyzer, harmonics are generated and displayed on the screen due to the input mixer nonlinearity of the spectrum analyzer.

The second harmonic wave level is the highest among the harmonic waves displayed on this screen.

The point of the test method is to add a signal with lower distortion (at least 20 dB or more) than the MS2850A internal harmonic distortion to the MS2850A. Measure the level difference between the fundamental wave and the second harmonic. If a low distortion signal source cannot be obtained, it is possible to add a low distortion signal after passing through the LPF to the MS2850A.

(1) Test target standards

- Second harmonic wave distortion

■ MS2850A

Without MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off, and Microwave Preselector Bypass turned off:
Spectrum analyzer mode,
or Signal analyzer mode and Bandwidth ≤ 31.25 MHz:

At mixer input level –30 dBm
≤ –60 dBc (10 MHz ≤ Input frequency ≤ 300 MHz)
≤ –65 dBc (300 MHz < Input frequency ≤ 1 GHz)
≤ –65 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
≤ –80 dBc (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal)
≤ –80 dBc (1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious)

At mixer input level –10 dBm
≤ –70 dBc (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious)
≤ –70 dBc (3 GHz < Input frequency ≤ 13.25 GHz)

With MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off, and Microwave Preselector Bypass turned off,
Spectrum Analyzer mode,
or Signal Analyzer mode and bandwidth ≤ 31.25 MHz:

At mixer input level –30 dBm
≤ –60 dBc (10 MHz ≤ Input frequency ≤ 300 MHz)
≤ –65 dBc (300 MHz < Input frequency ≤ 1 GHz)
≤ –65 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
≤ –80 dBc (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Normal)
≤ –80 dBc (1.75 GHz ≤ Input frequency ≤ 2 GHz, Frequency Band Mode: Spurious)

At mixer input level –10 dBm
≤ –80 dBc (2 GHz < Input frequency ≤ 3 GHz, Frequency Band Mode: Spurious)
≤ –90 dBc (3 GHz < Input frequency ≤ 13.25 GHz)

(2) Measuring instruments 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.

(3) Setup

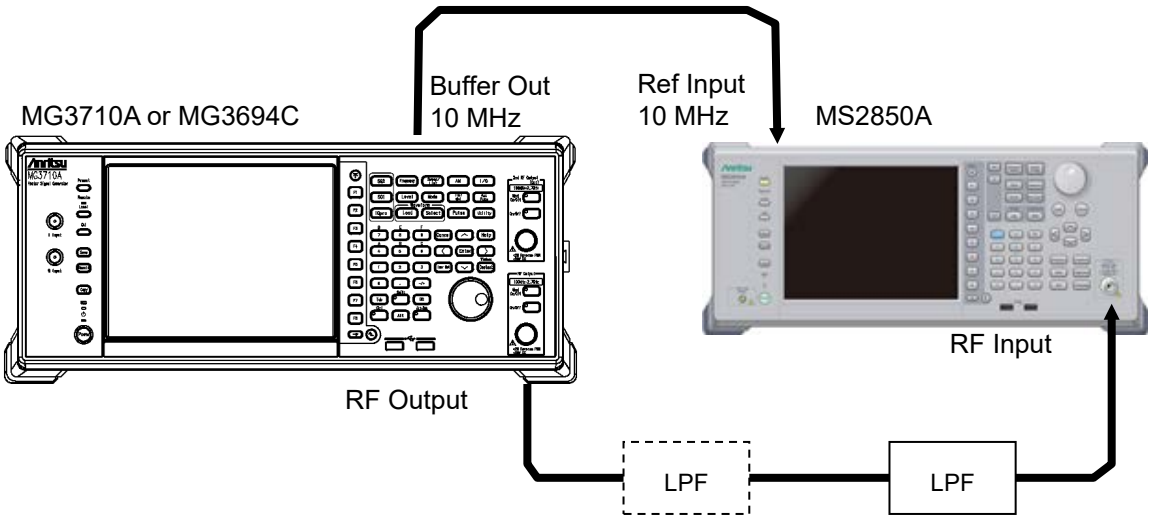


Figure 6.2.6-1 Second harmonic wave distortion test

(4) Notes on test

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

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Press [Cal], then [F1] (SIGANA All).
5. Set the MS2850A as follows:

Span:	50 kHz
RBW:	1 kHz
VBW:	1 kHz
Attenuator:	10 dB
Det Mode:	Positive
Sweep Time:	150 ms

6. Set the output level of the MG3710A to –20 dBm.
7. Connect LPF in accordance with the Second Harmonic Wave Distortion table in Appendix A. If the LPF attenuation is insufficient, use two pieces of the LPF.
8. Set the output frequency of the MG3710A and center frequency of the MS2850A, and reference level, in accordance with 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 ±0.1 dB.
10. Press [Peak Search] to perform peak search. Set so as to include the signal trace peak point in the zone marker.
11. Press [Marker] to display the Marker function menu, and then press [F3] (Delta) to choose the delta marker.

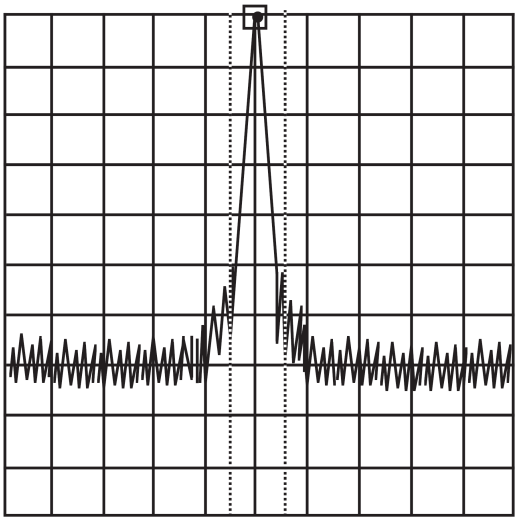


Figure 6.2.6-2 Fundamental wave

12. To display the second harmonic on the screen, set the frequency twice the center frequency. The value of the delta marker level indicates the level difference between the fundamental wave and the second harmonic.
    If the level difference is more than 80 dB, set Reference Level to -50 dBm. Confirm the input attenuator setting value is 10 dB.

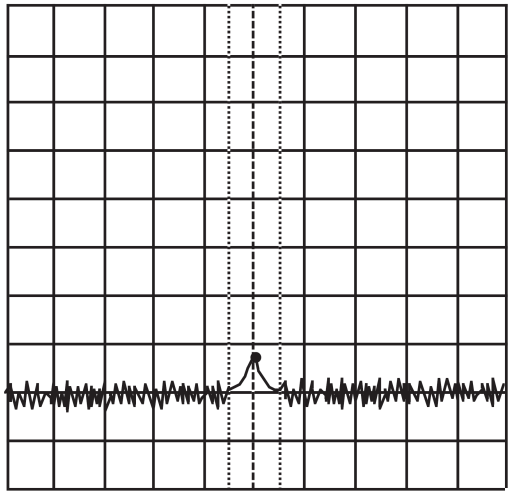


Figure 6.2.6-3 Second harmonic wave

13. Repeat Steps 7 to 12, in accordance with the Second Harmonic Wave Distortion table in Appendix A.

6.2.7 In-band Frequency Characteristics

Test Flatness of frequency characteristics in the bandwidth using Signal Analyzer mode.
Calculate the level deviation at the point that the frequency is ±5, ±10 MHz away from the center frequency with the reference level of the center frequency.

(1) Test target standards

With the reference level of the center frequency, at 18 to 28 °C,
Bandwidth ≤ 31.25 MHz, After Extra band Calibration.
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)

(2) Measuring instrument for tests

- Signal Generator (MG3694C)
- Power Meter (ML2488B)
- Power Sensor (MA2444D)

(3) Setup

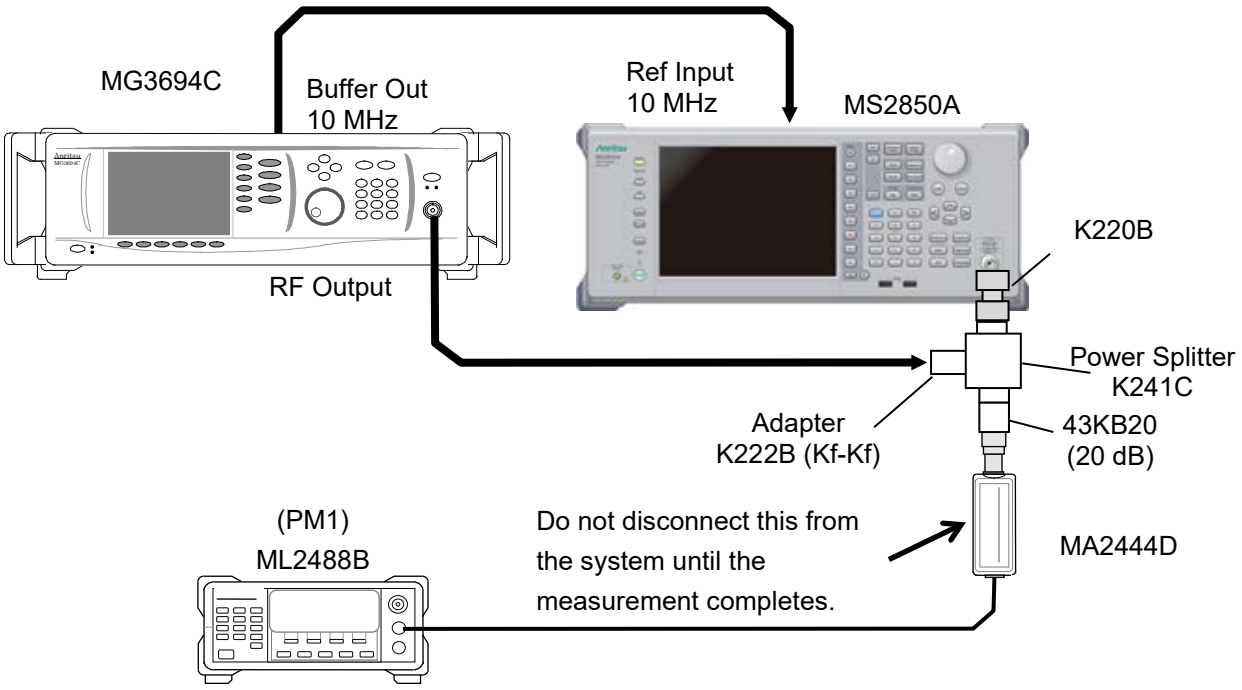


Figure 6.2.7-1 In-band Frequency Characteristics Test Setup

(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, power splitter and adapter, the application parts below are recommended.

Cable:	J0912	COAXIAL CABLE,0.5M,FOR 40GHZ
Attenuator:	43KB-20	20 dB Fixed Attenuator
Power Splitter:	K241C connector	
Conversion adapter:		K220B K(m)-K(m) ADAPTOR
Conversion adapter:		K222B K(f)-K(f) ADAPTOR

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
2. Press [Preset], and then the [F1] (Preset) .
3. Press the Cal key, and [F1] (SIGANA All) .
4. Set the MS2850A as follows:

Span:	31.25 MHz
Ref Level:	–10 dBm
RBW:	1 kHz
Input ATT:	10 dB
Marker Zone Width:	10 div

5. Set the center frequency of the MS2850A to 75 MHz.
6. Set the output of Signal Generator to 75 MHz CW with output of –6 dBm.
7. Adjust the output of Signal Generator so that the MS2850A level becomes –10 dBm ± 0.1 dB.
8. Record the reading PM1 on the power meter.
9. Press the [Single] of MS2850A, and record the marker level, MKL1.
10. Set the frequency of Signal Generator and Power Meter to 65 MHz (CF – 10 MHz).
11. Adjust the output of Signal Generator so that the MS2850A level becomes –10 dBm ± 0.1 dB.
12. Record the read value of the power meter to PM2.
13. Press the [Single], and then record the marker level MKL2.
14. Calculate the characteristic value using the following formula:

    P_Offset(–10 MHz) = (MKL2 – PM2) – (MKL1 – PM1)

15. Confirm that In-band Frequency Characteristics is within specification as shown on the test data sheet.
16. Repeat steps 11 through 16 for other offset frequency in Table 6.2.7-1.

17. Repeat steps 5 through 17 for the other center frequency in Table 6.2.7-1.

Table 6.2.7-1 In-band Frequency Characteristics

Center Frequency (MHz)	Offset Frequency (MHz)
75	–10
	–5
	+5
	+10
1000	–10
	–5
	+5
	+10
2000	–10
	–5
	+5
	+10
3900	–10
	–5
	+5
	+10

6.2.8 Internal reference oscillator

This test measures the correct frequency of 10 GHz signal with using a frequency counter. The frequency accuracy is calculated by the number of years or months from the last frequency reference adjustment.

(1) Test target standards

At 23 °C, with the frequency reference after 24 hours from when the power is turned on.

- Start-up characteristics
  $\pm 5 \times 10^{-7}$ (after 2 minutes from turning on the power)
  $\pm 5 \times 10^{-8}$ (after 5 minutes from turning on the power)
- Aging rate
  $\pm 1 \times 10^{-7}$/year
- Temperature stability:
  $\pm 2 \times 10^{-8}$ (0 to 45 °C)
- Frequency Accuracy at the time of initial calibration
  $\pm 2.2 \times 10^{-8}$ (18 to 28 °C, after 1 hour from turning on the power)

(2) Measuring instruments for tests

- Frequency counter (MF2412C)
- Frequency Standard 10 MHz (FS725)
- Signal Generator (MG3694C)

(3) Setup

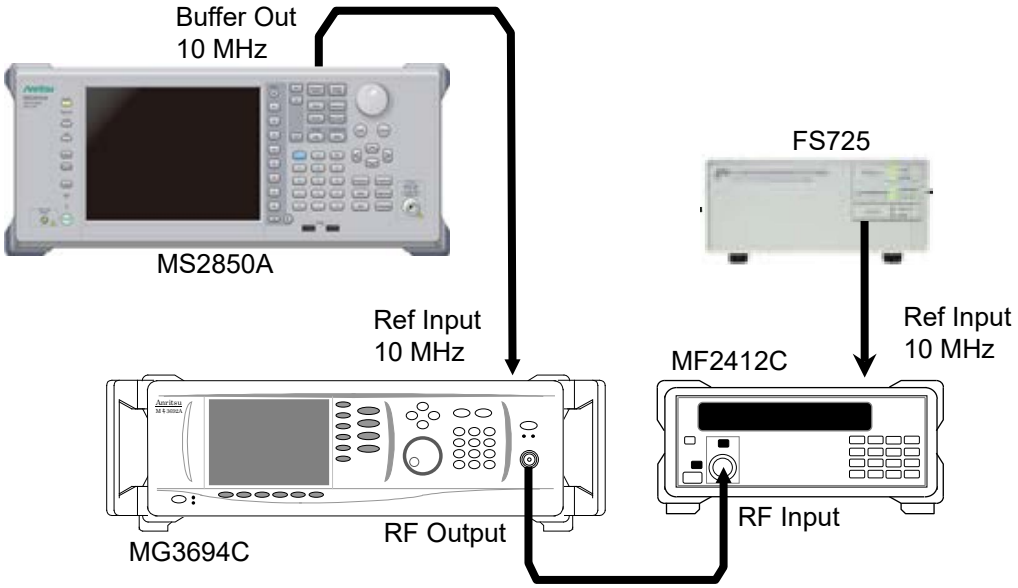


Figure 6.2.8-1 Internal reference oscillator

(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. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Connect the equipment in reference to Figure 6.2.8-1.
5. Set 10 GHz, –10 dBm and turn on RF output on the MG3694C.
6. Set resolution of MF2412C to 1Hz.
7. Calculate the Frequency Accuracy by the measurement result of MF2412C using the following formula.

   Frequency Accuracy (Hz) = Reading Frequency (GHz) – 10 (GHz)

6.2.9 Input attenuator switching error

This test measures the level error caused when input attenuator is changed. The test measures with the input reference attenuator of 10 dB.

(1) Test target standards

Conditions: with the reference of input attenuator = 10 dB, in the range of 10 to 60 dB, without MS2850A-068/168 or preamplifier is turned off.:

±0.20 dB
Spectrum analyzer mode,
or Signal analyzer mode and Bandwidth ≤ 31.25 MHz
(300 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
(300 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

±0.30 dB
Signal analyzer mode and Bandwidth > 31.25 MHz
(800 kHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)
(800 kHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

±0.75 dB
(4 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Normal)
(3.5 GHz ≤ frequency ≤ 13.8 GHz, Frequency Band Mode: Spurious)

±0.80 dB
(13.8 GHz < frequency ≤ 26.5 GHz)

±1.0 dB
(26.5 GHz < frequency ≤ 40 GHz)

(2) Measuring instruments for tests

- Signal Generator (MG3694C with option 4)

(3) Setup

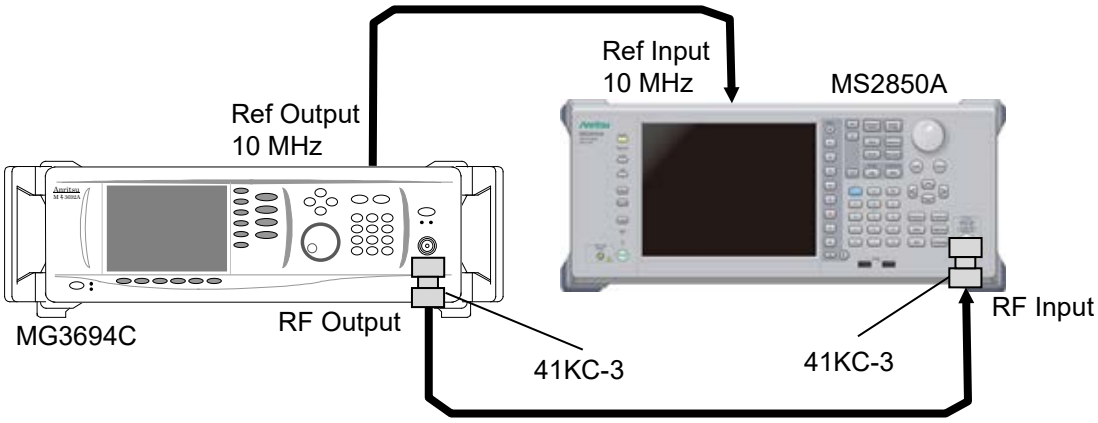


Figure 6.2.9-1 Input attenuator switching error

(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 attenuator, the application part below is recommended.

Attenuator: 41KC-3, 3 dB Fixed Attenuator

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Connect the equipment in reference to Figure 6.2.9-1.
5. Set the MS2850A as follows:

Attenuator Mode:	Mechanical Atten Only
DET Mode:	RMS
Sweep Time:	100 ms
Ref level:	–10 dBm
Input ATT:	10 dB
RBW:	30 Hz
VBW:	Auto
Span:	0 Hz
Burst Average Power:	On
Start Time:	10 ms
Stop Time:	90 ms

6. Set frequency of SG to F1+1kHz and set the level to –19 dBm in accordance with Figure 6.2.9-1, then turn on RF output.
7. Set center frequency of MS2850A to F1+1 kHz and set attenuator to 10 dB, then set Frequency Band Mode in accordance with Figure 6.2.9-1.
8. In the frequency within Preselector active range, perform Preselector Auto Tune.
   (Accessory > Preselector > Preselector Auto Tune)
9. Press [Single] to perform Single sweep.
10. Adjust SG level to set the measured value of Burst Average Power of MS2850A to –25 dBm ± 0.02 dB.
11. Record the measured value of Burst Average Power as “P1(F1,10dB)” by Single sweep.
12. Set the attenuator value every 10 dB from 20 dB to 50 dB, then record P1(F1, 20 dB) to P1(F1, 50 dB) by repeating step 11 above.
13. Adjust SG level to set the measured value for Burst Average Power of MS2850A to be –15 dBm ± 0.02 dB.
14. Record the measured value of Burst Average Power, and record the value as “P1_Ref(F1, 50 dB).”

15. Set input attenuator to 60 dB and record the measured value of Burst Average Power as "P1(F1, 60 dB)."
16. Calculate the Input attenuator switching error using the following formula.

    Attenuation ≤ 50 dB:
    Input attenuator switching error = P1(F1,ATT) – P1(F1, 10 dB)

    Attenuation ≥ 52 dB:
    Input attenuator switching error =
    P1(F1, ATT) – {P1_Ref(F1, 50 dB)-P1(F1, 50 dB) – P1(F1, 10 dB)}
17. Confirm the measurement result satisfies the specification described in Appendix A "Input attenuator switching error (Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz)"
18. Repeat the procedure Step 6 to 17 in accordance with Table 6.2.9-1.
19. Press [Application Switch] of the MS2850A, and then select the Signal Analyzer.
20. Press [Preset] of the MS2850A.
21. Press [F1] (Preset).
22. Set the MS2850A as follows:

Attenuator Mode:	Mechanical Atten Only
Ref level:	–10 dBm
Input ATT:	10 dB
Span:	50 MHz
Analysis Time Length:	10 ms
RBW:	3 kHz
Marker Result:	Integration
Marker Zone Width:	100 kHz

23. Set frequency of SG to F2 – 500 kHz and set the level to –2 dBm in accordance with Table 6.2.9-2, then turn on RF output.
24. Set center frequency of MS2850A to F2 – 500 kHz and set attenuator to 10 dB.
25. Press [Single] to perform Single sweep.
26. Adjust SG level to set the Marker value of MS2850A to –8 dBm ± 0.02 dB.
27. Record the Marker value as "P2(F2,10dB)" by Single sweep.
28. Set the attenuator value every 10 dB from 10 dB to 30 dB, then record P2(F2, 20 dB) to P2(F2, 30 dB) by repeating step 27 above.
29. Adjust SG level to set the Marker value of MS2850A to be +5 dBm ± 0.02 dB.
30. Record the Marker value, and record the value as "P2_Ref(F2, 30 dB)."

31. Set input attenuator to 40 dB and record the Marker value as "P2(F2, 40 dB)".
32. Set the attenuator value every 10 dB from 40 dB to 60 dB, then record P2(F2, 50 dB) to P2(F2, 60 dB) by repeating step 31 above.
33. Calculate the Input attenuator switching error using the following formula.

    Attenuation ≤ 30 dB:
    Input attenuator switching error = P2(F2,ATT) – P2(F2, 10 dB)

    Attenuation ≥ 32 dB:
    Input attenuator switching error =
    P2(F2, ATT) – {P2_Ref(F2, 50 dB)-P1(F2, 50 dB) – P1(F2, 10 dB)}
34. Confirm the measurement result satisfies the specification described in Appendix A "Input attenuator switching error (Signal analyzer mode and Bandwidth > 31.25 MHz)"
35. Repeat the procedure Step 23 to 34 in accordance with Table 6.2.9-2.

Table 6.2.9-1 Input attenuator switching error (Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz)

Frequency F1 [MHz]	Frequency Band Mode
50	Normal
400	
1000	
2000	
3999	
4001	
5999	
7000	
10000	
13799	
13801	
17000	
20000	
23000	
26599	
26601	
30000	
35000	
39999	
3501	Spurious
3999	
4001	

Table 6.2.9-2 Input attenuator switching error (Signal analyzer mode and Bandwidth > 31.25 MHz)

Frequency F2 [MHz]	Frequency Band Mode
800	Normal
1000	
2000	
3000	
4000	
4199	

6.2.10 1 dB gain compression point

Two CW signals are input to MS2850A using two signal generators. When the level is increased from one signal generator, the point where the level from the other signal generator is decreased by 1 dB is assumed to be 1 dB gain compression point.

(1) Test target standards

Without MS2850A-068/168 or Preamplifier turned off,
At mixer input level:

≥ +3 dBm
(300 MHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Normal)
(300 MHz ≤ frequency < 3.5 GHz, Frequency Band Mode: Spurious)

≥ +3 dBm
(3.5 GHz ≤ frequency ≤ 4 GHz, Frequency Band Mode: Spurious)

≥ 0 dBm
(4 GHz < frequency ≤ 13.5 GHz)

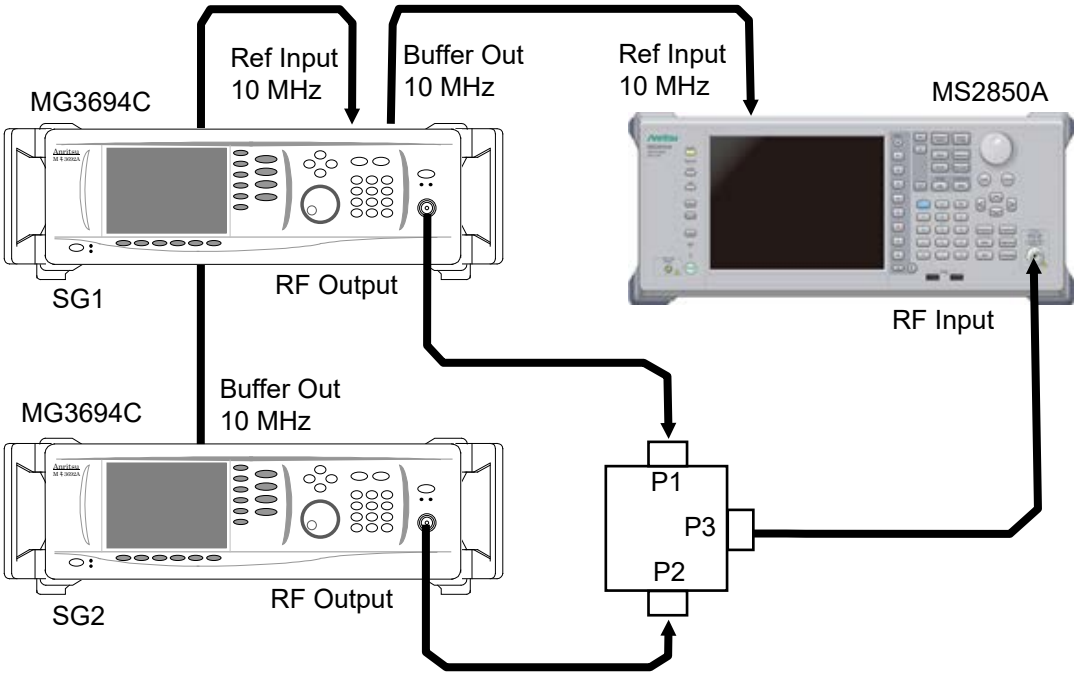
≥ –1 dBm
(13.5 GHz < frequency ≤ 26.5 GHz)

≥ –1 dBm Nominal
(26.5 GHz < frequency ≤ 40 GHz)

(2) Measuring instruments for tests

- Signal Generator SG1 (MG3694C with option 2B, 4, 15B)
- Signal Generator SG2 (MG3694C with option 2B, 4)

(3) Setup



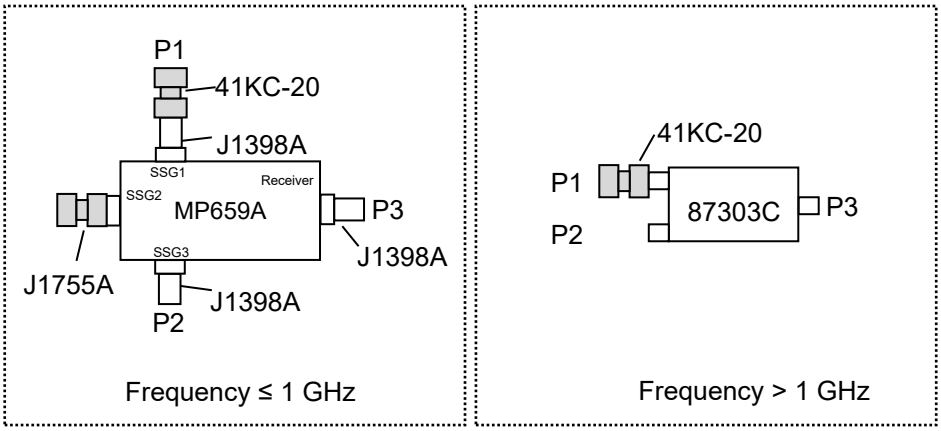


Figure 6.2.10-1 1 dB gain compression point

(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 attenuator, junction pad, power divider, adapter, and termination, the application parts below are recommended.

- Attenuator: 41KC-20 20 dB Fixed Attenuator
- Four-Port Junction Pad: MP659A f ≤ 1 GHz
- Power Divider: 87303C f > 1 GHz
- Conversion adapter: J1398A N(m)-SMA(f) Adapter
- Termination: J1755A 50 Ω (N)

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Connect the equipment in reference to Figure 6.2.10-1. Dependent on the Frequency, the measurement system will be different.
5. Set the MS2850A as follows:

DET Mode:	Positive
Sweep Time:	Auto
Ref level:	–30 dBm
Input ATT:	2 dB
RBW:	10 kHz
VBW:	3 kHz
Span:	20 kHz

6. Set the frequency of SG1 to F1 (Table 6.2.10-1) and set signal level (SG1_Lev) to –24 dBm, then turn on the RF output.
7. Set the frequency of SG2 to F2 (Table 6.2.10-1) and set signal level (SG2_Lev) to –10dBm, then turn off the RF output.
8. Set center frequency of MS2850A to F1.
9. Press [Single] and perform Single sweep. *
10. Press [Peak Search] and record Marker Level as MKL_F1.
11. Adjust output level of SG1 to set MKL_F1 to –30 dBm ± 0.1 dB.
12. Change Marker Mode to Delta.
13. Turn on the RF output of SG2.
14. Set output level of SG2 to SG2_Lev = SG2_Lev + 1 dB.
15. Perform Single sweep and record the value of Delta Maker (MKL_Delta). *
16. Repeat the procedure step 14 and 15 until MKL_Delta becomes > –1 dB.
17. Set output level of SG2 to SG2_Lev = SG2_Lev – 1.5 dB.
18. Set output level of SG2 to SG2_LEV + 0.1 dB.
19. Perform Single sweep and record the value of Delta Maker (MKL_Delta). *
20. Repeat the procedure step 18 and 19 until MKL_Delta becomes > –1 dB.
21. Set Marker Mode to Normal.
22. Set center frequency of MS2850A to F2.
23. Press [Single] and perform Single sweep.*
24. Press [Peak Search] and record Marker Level MKL_P1.

25. Calculate 1 dB Gain compression point using the following formula.

    1 dB Gain Compression = MKL_P1 – 2 dB (Input ATT)

26. Confirm the recorded value satisfies the specification described in Appendix A "1 dB Gain Compression Point"

27. Change the frequency in accordance with Table 6.2.10-1, and repeat the procedure step 6 to 26.

*: In the frequency within Preselector active range, perform Preselector Auto Tune.
(Accessory > Preselector > Preselector Auto Tune)

Table 6.2.10-1 1 dB gain compression point

Frequency [MHz] F1	Frequency [MHz] F2
301	304
2001	2004
3999	3996
4001	4004
5001	5004
8001	8004
12001	12004
13499	13496
13501	13504
14001	14004
18401	18404
20001	20004
26499	26496

6.2.11 Two-tone third-order intermodulation distortion

Input the CW signal (whose frequencies are F1 and F2 respectively) from the two signal generators to the MS2850A and measure the two-tone third-order intermodulation distortion appearing at (2 × F1 – F2) and (2 × F2 – F1).

(1) Test target standards

Mixer input level: –15 dBm (per wave),
Separation ≥ 300 kHz, RBW ≤ 30 kHz,
Without MS2850A-068/168 or Preamplifier turned off:

≤ –54 dBc (TOI = +12 dBm)
(30 MHz ≤ frequency < 300 MHz)

≤ –62 dBc (TOI = +16 dBm)
(300 MHz ≤ frequency < 4 GHz, Frequency Band Mode: Normal)

≤ –60 dBc (TOI = +15 dBm)
(4 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Normal)

≤ –56 dBc (TOI = +13 dBm)
(3.5 GHz ≤ frequency ≤ 6 GHz, Frequency Band Mode: Spurious)

≤ –56 dBc (TOI = +13 dBm)
(6 GHz < frequency ≤ 13.5 GHz)

≤ –56 dBc (TOI = +13 dBm)
(13.5 GHz < frequency ≤ 26.5 GHz)

≤ –56 dBc (TOI = +13 dBm) Nominal
(26.5 GHz < frequency ≤ 40 GHz)

(2) Measuring instruments for tests

- Signal Generator SG1 (MG3694C with option 2B, 4)
- Signal Generator SG2 (MG3694C with option 2B, 4)

(3) Setup

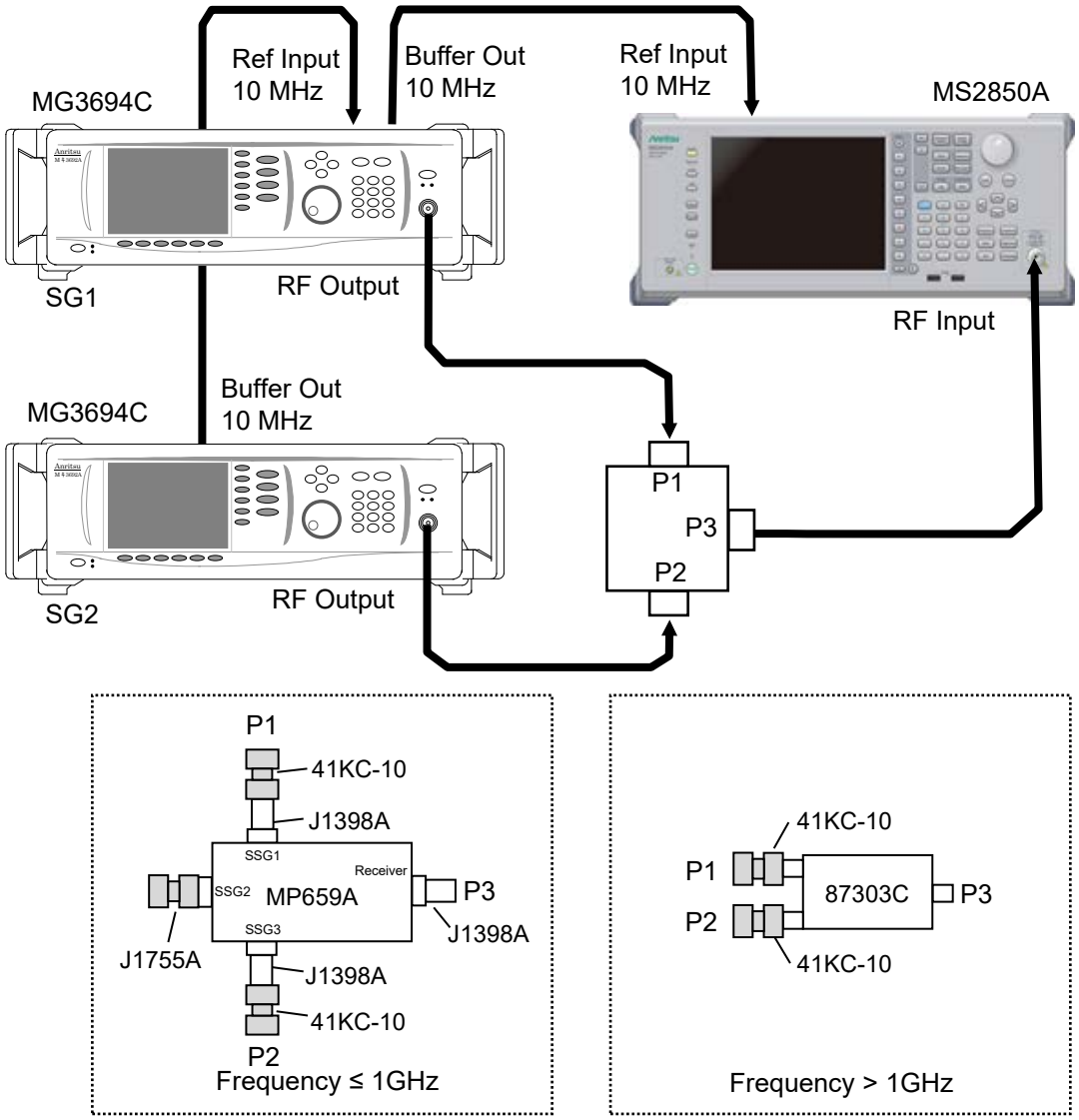


Figure 6.2.11-1 Two-tone third-order intermodulation distortion

(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 attenuator, junction pad, power divider, adapter, and termination, the application parts below are recommended.

- Attenuator: 41KC-10, 10 dB Fixed
- Four-Port Junction Pad: MP659A, f ≤ 1 GHz
- Power Divider: 87303C, f > 1 GHz
- Adapter: J1398A, N(m)-SMA(f)
- Termination; J1755A, 50 Ω (N)

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Connect the equipment in reference to Figure 6.2.11-1 Dependent on the Frequency, the measurement system will be different.
5. Set the MS2850A as follows:

DET Mode:	Positive
Sweep Time:	Auto
Auto Sweep time Mode:	Normal
Ref level:	–15 dBm
Input ATT:	0 dB
RBW:	30 Hz
VBW:	Auto
Span:	1 kHz
Attenuator Mode	Mechanical Atten Only

6. Set the frequency of SG1 to F1 (Table 6.2.11-1) and set signal level (SG1_Lev) to –9 dBm, then turn on the RF output.
7. Set the frequency of SG2 to F2 (Table 6.2.11-1) and set signal level (SG2_Lev) to –9 dBm, then turn off the RF output.
8. Set the center frequency of MS2850A to F1.
9. Press [Single] and perform Single sweep.*
10. Press [Peak Search] and record Marker Level as MKL_F1.
11. Adjust output level of SG1 to set MKL_F1 to –15 dBm ± 0.1 dB.
12. Turn off the RF output of SG1 and turn on RF output of SG2.
13. Set the center frequency of MS2850A to F2.
14. Press [Single] and perform Single sweep.*
15. Press [Peak Search] and record Marker Level as MKL_F2.
16. Adjust output level of SG2 to set MKL_F2 to –15 dBm ± 0.1 dB.
17. Turn on the RF output of both SG1 and SG2.

18. Set the center frequency of MS2850A to F1.
19. Press [Single] and perform Single sweep.*
20. Press [Peak Search] and set Marker Mode to Delta.
21. Set the center frequency of MS2850A to 2 × F1 – F2.
22. Press [Single] and perform Single sweep.*
23. Press [Peak Search] and record the value of Two-tone third-order intermodulation distortion (IMD3(2 × F1 – F2)).
24. Set the center frequency of MS2850A to F2.
25. Press [Single] and perform Single sweep.*
26. Press [Peak Search] and set Marker Mode to Delta.
27. Set the center frequency of MS2850A to 2 × F2 - F1.
28. Press [Single] and perform Single sweep.*
29. Press [Peak Search] and record the value of Two-tone third-order intermodulation distortion (IMD3(2 × F2 – F1)).
30. Confirm the recorded value of Two-tone third-order intermodulation distortion satisfies the specification described in Appendix A "Two-tone third-order intermodulation distortion."
31. Change the frequency in accordance with Table 6.2.11-1, and repeat the procedure step 6 to 29.

*: In the frequency within Preselector active range, perform Preselector Auto Tune before pressing [Single].
(Accessory > Preselector > Preselector Auto Tune)

Table 6.2.11-1 Two-tone third-order intermodulation distortion

Frequency [MHz] F1	Frequency [MHz] F2	Frequency [MHz] F1	Frequency [MHz] F2
31	31.31	5001	5001.31
101	101.31	5999	5999.31
299	299.31	6001	6001.31
301	301.31	8001	8001.31
1001	1001.31	14001	14001.31
2001	2001.31	16001	16001.31
3999	3999.31	20001	20001.31
4001	4001.31	26499	26499.31

6.2.12 Image responses

This measures the image response that appears when a signal is input into the image frequency band assumed from the frequency relationship inside the spectrum analyzer.

(1) Test target standards

Microwave Preselector Bypass = OFF,

Frequency Band Mode: Normal

≤ –70 dBc	(10 MHz ≤ frequency < 4 GHz)
≤ –55 dBc	(4 GHz ≤ frequency ≤ 6 GHz)
≤ –70 dBc	(6 GHz < frequency ≤ 13.5 GHz)
≤ –70 dBc	(13.5 GHz < frequency ≤ 26.5 GHz)

(2) Measuring instruments for tests

- Signal Generator (MG3694C with option 4)

(3) Setup

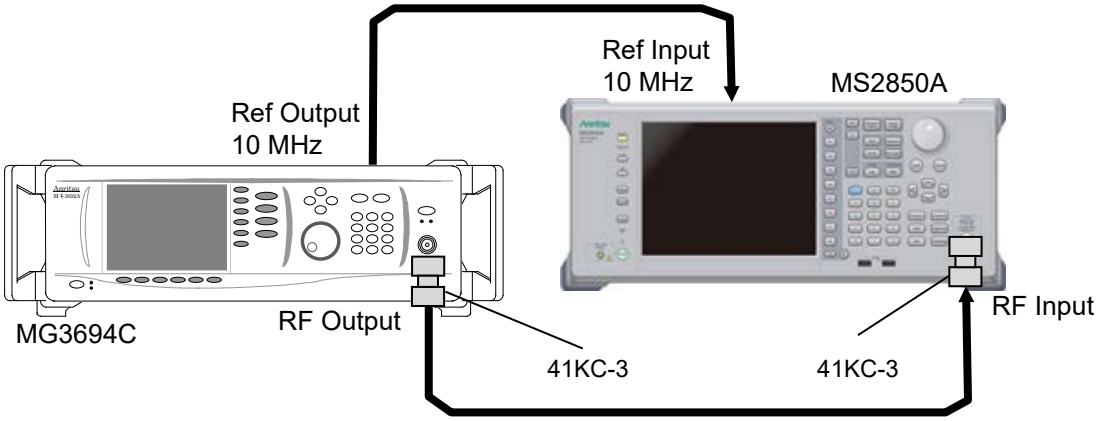


Figure 6.2.12-1 Image responses

(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 attenuator, the application parts below are recommended.

- Attenuator: 41KC-3, 3 dB Fixed Attenuator

(5) Test procedure

1. Press [Application Switch] of the MS2850A, and then select the Spectrum Analyzer.
2. Press [Preset] of the MS2850A.
3. Press [F1] (Preset).
4. Connect the equipment in reference to Figure 6.2.12-1.

5. Set the MS2850A as follows:

DET Mode:	Positive
Sweep Time:	Auto
Ref level:	–10 dBm
Span:	20 kHz
RBW:	300 Hz
VBW:	Auto

6. Set the frequency of SG to ImF1 (Table 6.2.12-1) and set the level to –4 dBm, then turn on the RF output.
7. Set the center frequency of MS2850A to ImF1.
8. Press Single and perform Single sweep. *
9. Press Peak Search and record Marker Level as MKL_ImF1
10. Adjust the RF output level of SG to set MKL_ImF1 to –10 dBm ± 0.1dB. SG setting level regards as SG_Lev this time.
11. Set the frequency of SG to F1.
12. Set the center frequency of MS2850A to F1.
13. Press Single and perform Single sweep.*
14. Press Peak Search and record Marker Level as MKL_F1.
15. Adjust the RF output level of SG to set MKL_F1 to –10 dBm ± 0.1 dB.
16. Set Marker Mode to Delta Marker.
17. Set the frequency of SG to ImF1 and set level of SG to SG_Lev.
18. Press Single and perform Single sweep.*
19. Press Peak Search and measure image responses.
20. Confirm the recorded value satisfies the specification described in Appendix A "Image Responses."
21. Change the frequency in accordance with Table 6.2.12-1, and repeat the procedure step 6 to 20.

*: In the frequency within Preselector active range, perform Preselector Auto Tune before pressing Single.
(Accessory > Preselector > Preselector Auto Tune)

Table 6.2.12-1 Image responses

Freq. F1 [MHz]	IF Freq. [MHz]	Image Freq. ImF1 [MHz]
3000	875.500488	1248.999024
3000	75.500488	2848.999024
4401	875.500488	6152.000976
22001	1875.500488	25752.00098

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 MS2850A 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 MS2850A 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.

Table 7.1-1 USB Power Sensors

Model	Frequency	Resolution	Dynamic Range
MA24104A	600 MHz to 4 GHz	1 kHz	+3 dBm to +51.76 dBm
MA24105A	350 MHz to 4 GHz	100 kHz	+3 dBm to +51.76 dBm
MA24106A	50 MHz to 6 GHz	1 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

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 MS2850A Signal Analyzer.
2. Press [Application Switch] 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 to display the Application Switch function menu. Then, select the Power Meter, and you can display the power meter application main screen and the function menu.

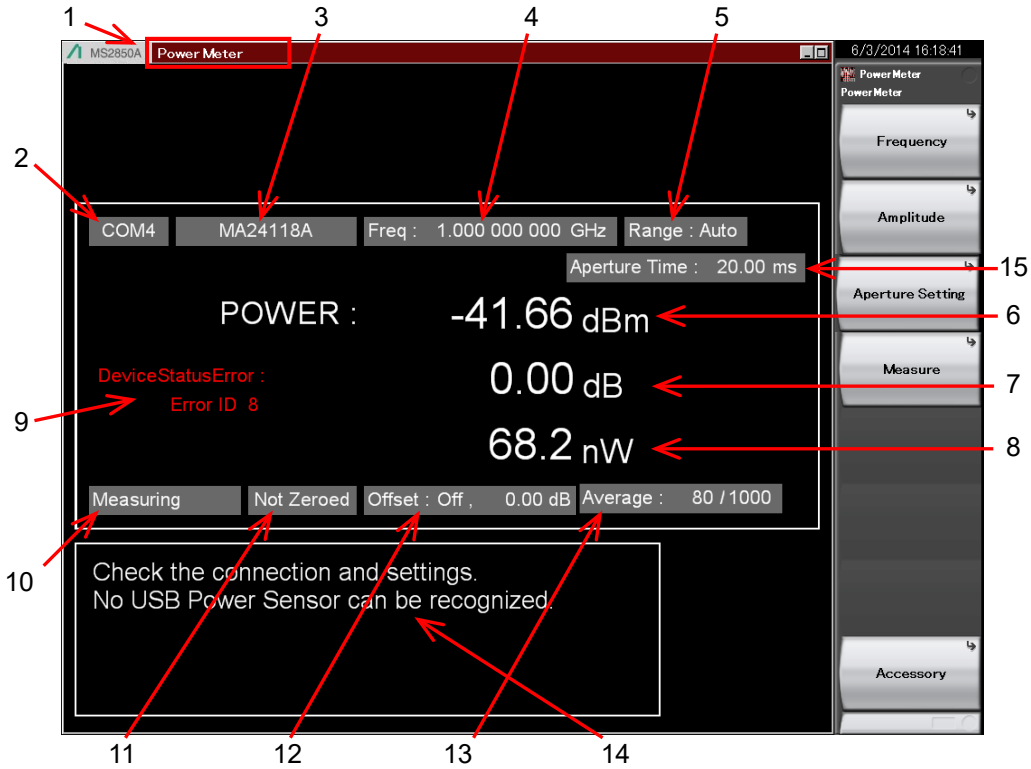

Figure 7.2-1 Power meter application main screen

Table 7.2-1 Parameters on the power meter application main screen

No.	Display	Description
1	Power Meter	Application software name The name of the synchronizing application is displayed in parentheses.
2	COMxx	COM Port number (xx) to which the USB power sensor is connected.
	Port	Appears when no USB power sensor is connected.
3	MAxxxxxA	Model of the connected USB power sensor.
	Model	Appears when no USB power sensor is connected.
4	Frequency	Calibration factor frequency setting.
5	Auto	Input range: Auto
	Low	Input range: Low input level
	High	Input range: High input level
6	Power [dBm]	Measured power with offset level in dBm units. 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.*
10	Measuring	Measurement is in progress.
	COM Searching	USB power sensor search in progress.
	Stop	USB power sensor search stopped.
11	Not Zeroed	Zeroing not executed.
	Zeroed	Zeroing executed.
12	Offset	Sets the offset level value to be added to the power sensor reading and turns on and off the offset function.
13	Average	Current count / Setting count of averaging. Appears when the Average is turned on. ☞ 7.3.5 “Power Meter”
14	Disconnect Info	Appears when no power sensor is connected or the connected power sensor is not recognized by the mainframe. If the power sensor is connected, disconnect it from the USB port and securely connect again.
15	Aperture Mode	Valid aperture setting value is displayed. ☞ 7.3.6 “Aperture Setting”
	Aperture Time	

*: For detailed information on error causes and Error IDs, refer to Chapter 13-3 “STATUS?” in *USB Power Sensors MA241xxA and PowerXpert™ User Guide*.

7.3 Function Menu

Press Menu when the Power Meter function to display the Power Meter function menu.

Table 7.3-1 Power Meter function menu

Function Key	Menu Display	Function
F1	Frequency	Opens the Frequency function menu. 7.3.1 "Setting the frequency"
F2	Amplitude	Opens the Amplitude function menu. 7.3.2 "Level setting"
F3	Aperture Setting	Opens the Aperture Setting function menu. 7.3.6 "Aperture Setting
F4	Measure	Opens the Measure function menu. 7.3.3 "Measure"
F8	Accessory	Opens the Accessory function menu. 7.3.4 "Accessory"

7.3.1 Setting the frequency

In the Frequency function menu, you can set the calibration factor frequency of the USB power sensor.

Press F1 (Frequency) in the Power Meter function menu to display the Frequency function menu.

Table 7.3.1-1 Frequency function menu

Function Key	Menu Display	Function
F1	Frequency	Sets the calibration factor frequency of the power sensor.

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 kHz
MA24105A	350 MHz to 4 GHz	100 kHz
MA24106A	50 MHz to 6 GHz	1 kHz
MA24108A	10 MHz to 8 GHz	100 kHz
MA24118A	10 MHz to 18 GHz	100 kHz
MA24126A	10 MHz to 26 GHz	100 kHz

Note:

The values below resolutions are rounded.

7.3.2 Level setting

Press F2 (Amplitude) or Amplitude in the Power Meter function menu to display the Amplitude function menu.

Table 7.3.2-1 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.

Setting the range

Press F1 (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 Range function menu

Function Key	Menu Display	Function
F1	Auto	Automatic setting (Default)
F2	Low	When the model is MA24108A, MA24118A, or MA24126A: Input range:–40 dBm to –7 dBm When the model is MA24105A: Input range: +3 dBm to +38 dBm
F3	High	When the model is MA24108A, MA24118A, or MA24126A: Input range:–7 dBm to +20 dBm When the model is MA24105A: Input range: +38 dBm to +51.76 dBm

Setting the level offset

An arbitrary offset value is added to the measurement value, and their sum is displayed.

Press F7 (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 F8 (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 offset

Setting range	–100.00 to 100.00 dB
Resolution	0.01 dB
Default	0.00 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 MS2850A to DUT is corrected.

[Power sensor reading after offset]
= [Power sensor reading] + [Offset level]

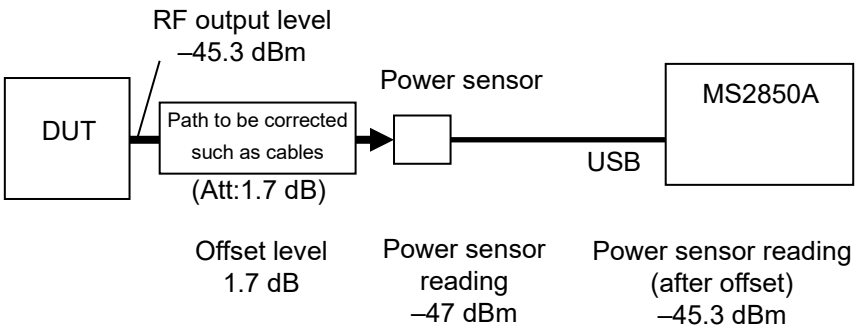

Figure 7.3.2-1 Summary of offset level

7.3.3 Measure

Press F4 (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. ☞ 7.3.5 "Power Meter"

When synchronizing with the application

Table 7.3.3-2 Measure function menu

Function Key	Menu Display	Function
F1	Modulation Analysis	Displays the application software that is synchronizing.
F2	Power Meter	Opens the Power Meter function menu. ☞ 7.3.5 "Power Meter"

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	
Vector Modulation Analysis	Frequency	Frequency
	Offset	On/off state of the level offset function
	Offset Value	Level offset value

When the application synchronization is enabled, the title bar displays "Power Meter (Application name)."

7.3.4 Accessory

Press F8 (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 F8 (Accessory) in the Power Meter function menu.
2. Press F1 (Title) to display the character string input dialog box. Use the rotary knob to select the characters, and press Enter to enter them. When the title is entered, press F7 (Set).
3. Press F2 (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.

Table 7.3.5-1 Power Meter function menu

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.

Averaging

Press F1 (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 F2 (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 F3 (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.

Zeroing the USB power sensor

Press F6 (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 MS2850A during the zeroing.

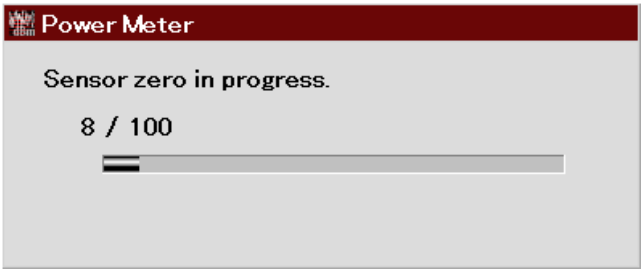

Figure 7.3.5-1 "Power Meter zeroing" dialog box (Progress)

If the zeroing fails, the following dialog box appears.

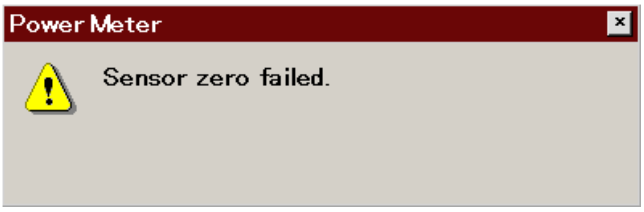

Figure 7.3.5-2 "Power Meter zeroing" dialog box (Zeroing failed)

Zeroing the power sensor

<Procedure>

1. Plug in the USB power sensor connector to the USB port of the MS2850A.
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.

⚠ CAUTION

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 F8 (Back To Application) in the Power Meter function menu to return to the synchronizing application software.

7.3.6 Aperture Setting

Press F3 (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.

Table 7.3.6-1 Aperture Setting function menu

Function Key	Menu Display	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.

The table below shows the ranges, resolutions, and defaults for Aperture Time.

Table 7.3.6-2 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

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 Power Meter function.

Frequency	1 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	Disconnected	
Sensor Model	Disconnected	
Aperture	LAT	(MA24104A, MA24106A)
	20.00 ms	(MA24108A, MA24118A, MA24126A)

Chapter 9 Maintenance

This chapter describes cautions related to daily maintenance, storage, and shipping of the MS2850A, 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 MS2850A, be sure to turn the power off and unplug it from the AC outlet.

Panel surface dirt

When surface dirt is noticeable, after the MS2850A has been used in a dusty environment, or when the MS2850A 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 MS2850A

Wipe off dust, fingerprint marks, stains, spots, etc. from the surface of the MS2850A before storing it. Also, avoid storing the MS2850A in these places:

- Places that are exposed to direct sunlight
- Dusty places
- Damp places where condensation may occur on the MS2850A surface
- Places where there the MS2850A may be corroded by active gases
- Places where the MS2850A may be oxidized
- Places having temperatures and relative humidity in the following ranges:
  Temperature: –20 °C or lower, or 60 °C or higher
  Humidity: 90 % or higher

Recommended storage conditions

It is recommended that the MS2850A 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 in a place at a temperature between 4 and 53 °C and at a 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 MS2850A.

9.2.1 Repackaging

Repack the MS2850A in the packing material (box) in which it had been delivered. If the packing material has been scrapped or damaged, repack the MS2850A in the following manner:

1. Wrap the MS2850A in plastic or a similar material.
2. Procure a corrugated cardboard, wooden, or aluminum box large enough to pack in cushioning material around the MS2850A.
3. Place the MS2850A into the box. Then, pack in the cushioning material around the MS2850A so that the MS2850A 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 Recommended calibration

Perform calibration as preventive maintenance to keep the MS2850A's performance from becoming degraded. Even if the MS2850A is functioning normally, calibrate it periodically to maintain its performance.

Calibrating the MS2850A once or twice a year is recommended. If the MS2850A 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.

⚠ CAUTION

Before performing the calibration, allow the MS2850A 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 MS2850A 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 MS2850A

Table 9.3.2-1 lists the measuring instruments used to calibrate the MS2850A.

Table 9.3.2-1 List of measuring instruments for calibration

Name of Recommended Device	Required Performance	Calibration Items
Frequency counter	Capable of 1 GHz measurement	Reference oscillator frequency accuracy
Signal generator	Capable of outputting 1 GHz signal (Resolution: 0.01 Hz or higher)	Reference oscillator frequency accuracy
Frequency standard device	Standard radio receiver or device with equivalent capability (Accuracy: 1×10^{-11} order or better)	Reference oscillator frequency accuracy

9.3.3 Calibrating frequencies using frequency counter

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 MS2850A.

Table 9.3.3-1 Calibration specifications

Reference Oscillator	Aging Rate	Temperature Stability
High Stability Reference Oscillator	$\pm 1 \times 10^{-7}$/year	$\pm 2 \times 10^{-8}$ (0 to 50 °C)

Calibration procedure

The procedure for calibrating the frequency using a frequency counter is described below.

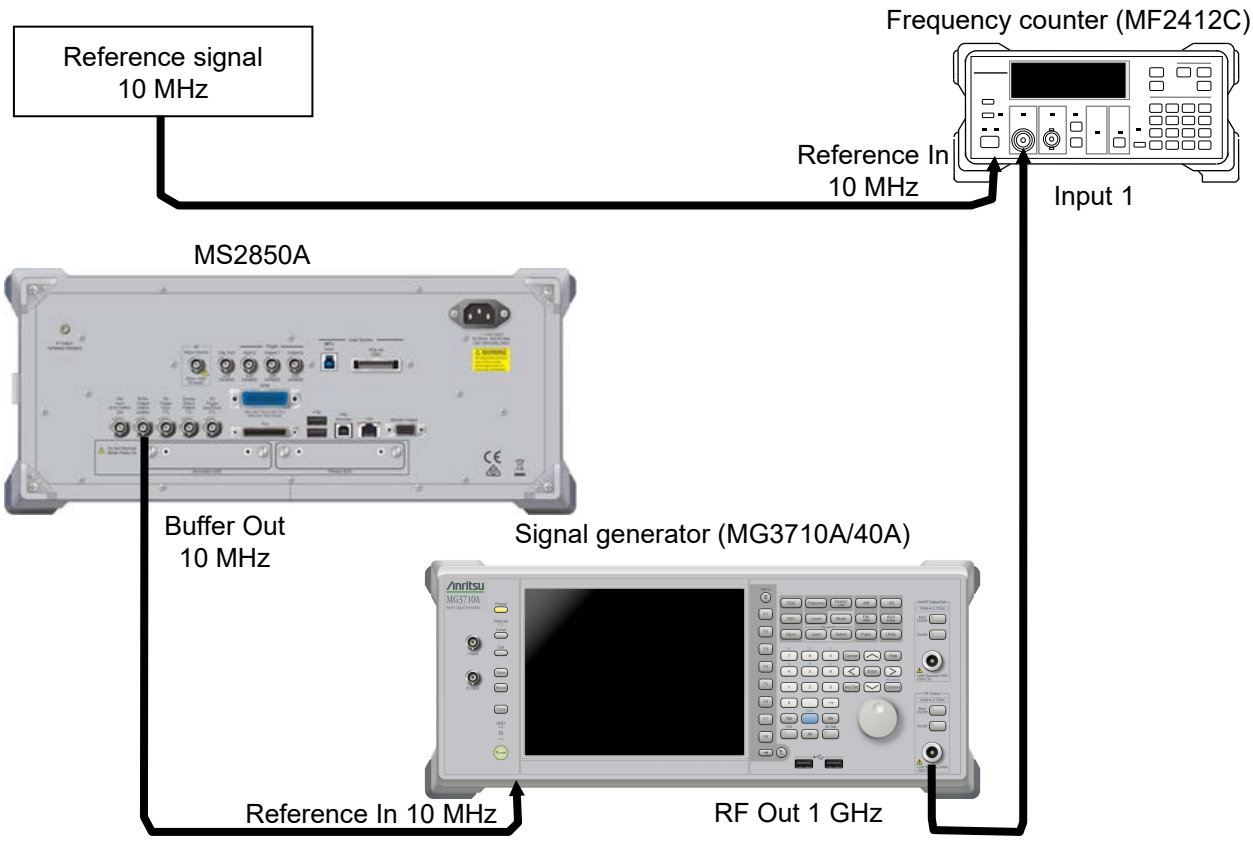

Figure 9.3.3-1 Connections for frequency calibration using frequency counter

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 MS2850A 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 MS2850A's reference oscillator should be adjusted.*

6. To achieve synchronization, start the Signal Analyzer or the Spectrum Analyzer application. Then press F8 (Accessory) from the Main function menu of the signal analyzer or the spectrum analyzer.
7. Press F6 (Reference Clock) from the Accessory function menu.
8. From the Reference Clock function menu, press F1 (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 MS2850A's internal SSD with the Removable SSD, Win10 (MS2850A-014/114).
If either or both of internal SSD (Primary SSD) and secondary SSD are faulty, contact an Anritsu Sales and Office for factory repair.

Notes:

- Turn off the power to the MS2850A and disconnect the power plug from the outlet when replacing the SSD. Also, put the MS2850A on a flat horizontal surface 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 File 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 the two screws on the SSD ASSY with a flat head screwdriver.

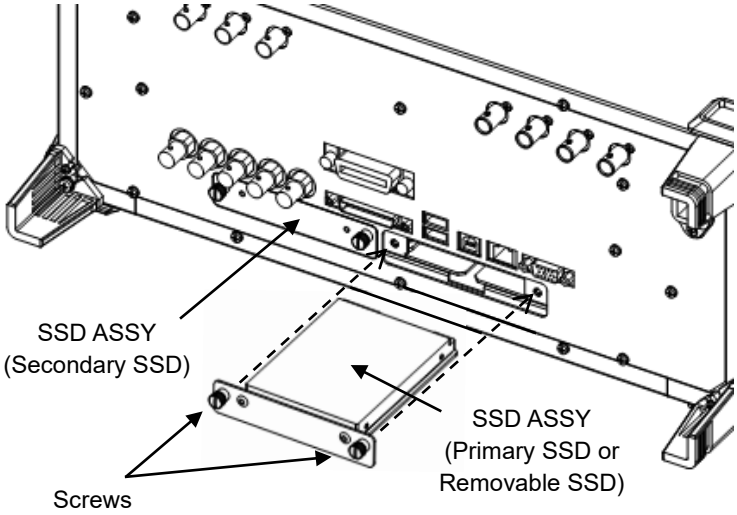

Figure 9.4-1 SSD ASSY Replacement

<Migrating backup data when returned from repair and calibration>
The Removable SSD, Win10 (MS2850A-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.

C:\Anritsu\Signal Analyzer\System\Maintenance\Calibration Data\SA\

Performance Test Result Form

Test Location		Report No.	
		Date	
		Test person in charge	

Equipment Name: MS2850A Signal Analyzer

Serial No.		Ambient temperature	°C
Power frequency		Relative humidity	%

Remarks

■ Display Frequency Accuracy

Display frequency accuracy test for MS2850A

Setting example			Minimum [Hz]	Result	Maximum [Hz]	Uncertainty [Hz]
Center freq. [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]				
500 M	10 k	300	499999962		500000038	1
	200 k	3 k	499999428		500000572	20
	2 M	30 k	499994298		500005702	200
	5 M	30 k	499987998		500012002	500
	10 M	100 k	499973998		500026002	1000
	20 M	100 k	499952998		500047002	2000
	100 M	1 M	499739998		500260002	10000
2000 M	10 k	300	1999999962		2000000038	1
	200 k	3 k	1999999428		2000000572	20
	2 M	30 k	1999994298		2000005702	200
	5 M	30 k	1999987998		2000012002	500
	10 M	100 k	1999973998		2000026002	1000
	20 M	100 k	1999952998		2000047002	2000
	4000 M	3 M	1991449998		2008550002	400000
7150 M	10 k	300	7149999962		7150000038	1
	100 k	3 k	7149999638		7150000362	10
	2 M	30 k	7149994298		7150005702	200
	5 M	30 k	7149987998		7150012002	500
	10 M	100 k	7149973998		7150026002	1000
	100 M	100 k	7149784998		7150215002	10000
	6500 M	3 M	7136199998		7163800002	650000
14450 M	10 k	300	14449999960		14450000040	1
	50 k	3 k	14449999741		14450000259	5
	2 M	30 k	14449994296		14450005704	200
	5 M	30 k	14449987996		14450012004	500
	10 M	100 k	14449973996		14450026004	1000
	20 M	100 k	14449952996		14450047004	2000
	7900 M	3 M	14433259996		14466740004	790000

Display frequency accuracy test, only for MS2850A-047

Setting example			Minimum [Hz]	Result	Maximum [Hz]	Uncertainty [Hz]
Center freq. [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]				
21750 M	10 k	300	21749999956		21750000044	1
	100 k	3 k	21749999632		21750000368	10
	2 M	30 k	21749994292		21750005708	200
	5 M	30 k	21749987992		21750012008	500
	10 M	100 k	21749973992		21750026008	1000
	100 M	100 k	21749784992		21750215008	10000
	20500 M	3 M	21706799992		21793200008	2050000
16000 M	10 k	300	15999999960		16000000040	1
	100 k	3 k	15999999636		16000000364	10
	2 M	30 k	15999994296		16000005704	200
	5 M	30 k	15999987996		16000012004	500
	10 M	100 k	15999973996		16000026004	1000
	100 M	100 k	15999784996		16000215004	10000
	32000 M	3 M	15932649996		16067350004	3200000

Display frequency accuracy test, only for MS2850A-046

Setting example			Minimum [Hz]	Result	Maximum [Hz]	Uncertainty [Hz]
Center freq. [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]				
30250 M	10 k	300	30249999956		30250000044	1
	100 k	3 k	30249999632		30250000368	10
	2 M	30 k	30249994292		30250005708	200
	5 M	30 k	30249987992		30250012008	500
	10 M	100 k	30249973992		30250026008	1000
	20 M	100 k	30249952992		30250047008	2000
	23700 M	3 M	30200079992		30299920008	2370000
22200 M	10 k	300	22199999956		22200000044	1
	100 k	3 k	22199999632		22200000368	10
	2 M	30 k	22199994292		22200005708	200
	5 M	30 k	22199987992		22200012008	500
	10 M	100 k	22199973992		22200026008	1000
	20 M	100 k	22199952992		22200047008	2000
	44400 M	3 M	22106609992		22293390008	4440000

■ Frequency Span Display Accuracy

MS2850A frequency span display accuracy test

Settings for MS2850A					Min [%]	Measurement Results	Max [%]	Uncertainty [%]
Center Freq. [Hz]	RBW [Hz]	Frequency Span [Hz]	Signal Generator			$(f_2' - f_1')$ / 0.8 / SPAN × 100 – 100 [%]		
			f_1 [Hz]	f_2 [Hz]				
2000 M	300	10 k	1999996000	2000004000	–0.2		+0.2	0.02
	10 k	2 M	1999200000	2000800000	–0.2		+0.2	0.02
	30 k	30 M	1988000000	2012000000	–0.2		+0.2	0.02
	1 M	400 M	1840000000	2160000000	–0.2		+0.2	0.02
	3 M	4000 M	400000000	3600000000	–0.2		+0.2	0.02
7150 M	300	10 k	7149996000	7150004000	–0.2		+0.2	0.02
	10 k	2 M	7149200000	7150800000	–0.2		+0.2	0.02
	30 k	30 M	7138000000	7162000000	–0.2		+0.2	0.02
	1 M	400 M	6990000000	7310000000	–0.2		+0.2	0.02
	3 M	6500 M	4550000000	9750000000	–0.2		+0.2	0.02
14450 M	300	10 k	14449996000	14450004000	–0.2		+0.2	0.02
	10 k	2 M	14449200000	14450800000	–0.2		+0.2	0.02
	30 k	30 M	14438000000	14462000000	–0.2		+0.2	0.02
	1 M	400 M	14290000000	14610000000	–0.2		+0.2	0.02
	3 M	7900 M	11290000000	17610000000	–0.2		+0.2	0.02
MS2850A-047 only								
21750 M	300	10 k	21749996000	21750004000	–0.2		+0.2	0.02
	10 k	2 M	21749200000	21750800000	–0.2		+0.2	0.02
	30 k	30 M	21738000000	21762000000	–0.2		+0.2	0.02
	1 M	400 M	21590000000	21910000000	–0.2		+0.2	0.02
	3 M	20500 M	13550000000	29950000000	–0.2		+0.2	0.02
16000 M	3 M	32000 M	3200000000	28800000000	–0.2		+0.2	0.02
MS2850A-046 only								
30250 M	300	10 k	30249996000	30250004000	–0.2		+0.2	0.02
	10 k	2 M	30249200000	30250800000	–0.2		+0.2	0.02
	30 k	30 M	30238000000	30262000000	–0.2		+0.2	0.02
	1 M	400 M	30090000000	30410000000	–0.2		+0.2	0.02
	3 M	23700 M	20770000000	39730000000	–0.2		+0.2	0.02
22200 M	3 M	44400 M	4440000000	39960000000	–0.2		+0.2	0.02

■ Single Sideband Noise Level

Center Frequency = 1 GHz, Spectrum analyzer mode

Settings for MS2850A				Result [dBc/Hz]	Maximum [dBc/Hz]	Uncertainty [dB]
Offset frequency [Hz]	Frequency span [Hz]	Resolution bandwidth [Hz]	Video bandwidth [Hz]			
10 k	25 k	1 k	1		–123	0.5
100 k	250 k	10 k	10		–123	0.5
1 M	4.1 M	100 k	10		–135	0.5

■ RF Frequency Characteristics

Frequency Band Mode: Normal
Without MS2850A-068/168 or Preamplifier turned off, Microwave Preselector Bypass turned off, and after Preselector Auto Tune is done:
Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz

Frequency [Hz]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [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 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
3.995 G	–0.35		+0.35	0.10
4 G	–1.5		+1.5	0.3
5 G	–1.5		+1.5	0.3
6 G	–1.5		+1.5	0.3
6.01 G	–1.5		+1.5	0.3
8.005 G	–1.5		+1.5	0.3
10.005 G	–1.5		+1.5	0.3
12.005 G	–1.5		+1.5	0.3
13.8 G	–1.5		+1.5	0.3
13.805 G	–2.5		+2.5	0.5
15.005 G	–2.5		+2.5	0.5
17.005 G	–2.5		+2.5	0.5
20.01 G	–2.5		+2.5	0.5
26.5 G	–2.5		+2.5	0.5
26.515 G	–2.5		+2.5	0.5
28 G	–2.5		+2.5	0.5
31.99 G	–2.5		+2.5	0.5
36 G	–2.5		+2.5	0.5
40 G	–2.5		+2.5	0.5

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168 and Preamplifier turned on, Microwave Preselector Bypass turned off, and after Preselector Auto Tune is done:
Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz

Frequency [Hz]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
10 M	–0.65		+0.65	0.15
20 M	–0.65		+0.65	0.15
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
3.995 G	–0.65		+0.65	0.15
4 G	–1.8		+1.8	0.3
5 G	–1.8		+1.8	0.3
6 G	–1.8		+1.8	0.3
6.01 G	–1.8		+1.8	0.3
8.005 G	–1.8		+1.8	0.3
10.005 G	–1.8		+1.8	0.3
12.005 G	–1.8		+1.8	0.3
13.8 G	–1.8		+1.8	0.3
13.805 G	–2.5		+2.5	0.5
15.005 G	–2.5		+2.5	0.5
17.005 G	–2.5		+2.5	0.5
20.01 G	–2.5		+2.5	0.5
26.5 G	–2.5		+2.5	0.5
26.515 G	–3.5		+3.5	0.5
28 G	–3.5		+3.5	0.5
31.99 G	–3.5		+3.5	0.5
36 G	–3.5		+3.5	0.5
40 G	–3.5		+3.5	0.5

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Without MS2850A-068/168 or Preamplifier turned off,
Signal analyzer mode and Bandwidth > 31.25 MHz

Frequency [Hz]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
800	–0.45		+0.45	0.1
1000	–0.45		+0.45	0.1
2000	–0.45		+0.45	0.1
3000	–0.45		+0.45	0.1
3995	–0.45		+0.45	0.1
4000	–1.0		+1.0	0.3
4185	–1.0		+1.0	0.3
4200	–1.0		+1.0	0.3
5010	–1.0		+1.0	0.3
6000	–1.0		+1.0	0.3
8010	–1.0		+1.0	0.3
10005	–1.0		+1.0	0.3
12000	–1.0		+1.0	0.3
13800	–1.0		+1.0	0.3
13815	–1.5		+1.5	0.5
15000	–1.5		+1.5	0.5
18000	–1.5		+1.5	0.5
20010	–1.5		+1.5	0.5
26490	–1.5		+1.5	0.5
26505	–2.0		+2.0	0.5
28005	–2.0		+2.0	0.5
31995	–2.0		+2.0	0.5
36000	–2.0		+2.0	0.5
40000	–2.0		+2.0	0.5

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

With MS2850A-068/168 and Preamplifier turned on,
Signal analyzer mode and Bandwidth > 31.25 MHz

Frequency [Hz]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
800	–0.75		+0.75	0.15
1000	–0.75		+0.75	0.15
2000	–0.75		+0.75	0.15
3000	–0.75		+0.75	0.15
3995	–0.75		+0.75	0.15
4000	–1.8		+1.8	0.3
4185	–1.8		+1.8	0.3
4200	–1.8		+1.8	0.3
5010	–1.8		+1.8	0.3
6000	–1.8		+1.8	0.3
8010	–1.8		+1.8	0.3
10005	–1.8		+1.8	0.3
12000	–1.8		+1.8	0.3
13800	–1.8		+1.8	0.3
13815	–2.5		+2.5	0.5
15000	–2.5		+2.5	0.5
18000	–2.5		+2.5	0.5
20010	–2.5		+2.5	0.5
26490	–2.5		+2.5	0.5
26505	–3.0		+3.0	0.5
28005	–3.0		+3.0	0.5
31995	–3.0		+3.0	0.5
36000	–3.0		+3.0	0.5
40000	–3.0		+3.0	0.5

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

■ Display Average Noise Level (Spectrum Analyzer Function)

Frequency Band Mode: Normal
Without MS2850A-068/168. without MS2850A-076/176, and Microwave Preselector Bypass turned on:
Or without MS2850A-068/168. with MS2850A-076/176, and Microwave Preselector Bypass turned on:

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
9 k		–120	0.2
100 k		–134	
999 k			
1 M		–144	
9.999 M			
10 M		–150	
29 M			
30 M		–153	
99 M			
999 M			
1999 M		–150	
2399 M			
2401 M		–147	
2999 M			
3499 M			
3501 M		–144	
3999 M			
4999 M			
5999 M			
6001 M		–146	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–144	
13499 M			
16001 M			
18299 M			
18301 M		–140	
22001 M			
26499 M			
26501 M			
32001 M			
33999 M			
34001 M		–136	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
Without MS2850A-068/168, without MS2850A-076/176, and Microwave Preselector Bypass turned off

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
9 k		–120	0.2
100 k		–134	
999 k			
1 M		–144	
9.999 M			
10 M		–150	
29 M			
30 M		–153	
99 M			
999 M			
1999 M		–150	
2399 M			
2401 M		–147	
2999 M			
3499 M			
3501 M		–144	
3999 M			
4999 M			
5999 M			
6001 M		–146	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–144	
13499 M			
16001 M			
18299 M			
18301 M		–140	
22001 M			
26499 M			
26501 M			
32001 M			
33999 M			
34001 M		–136	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168. Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned on:
Or with MS2850A-068/168. Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned on:

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
9 k		–120	0.2
100 k		–134	
999 k			
1 M		–144	
9.999 M			
10 M		–150	
29 M			
30 M		–153	
99 M			
999 M			
1999 M		–150	
2399 M			
2401 M		–147	
2999 M			
3499 M			
3501 M		–144	
3999 M			
4999 M			
5999 M			
6001 M		–142	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–140	
13499 M			
16001 M			
18299 M			
18301 M		–136	
22001 M			
26499 M			
26501 M		–135	
32001 M			
33999 M			
34001 M		–131	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168. Preamplifier turned off, without MS2850A-076/176, and Microwave Preselector Bypass turned off

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
9 k		–120	0.2
100 k		–134	
999 k			
1 M		–144	
9.999 M			
10 M		–150	
29 M			
30 M		–153	
99 M			
999 M			
1999 M		–150	
2399 M			
2401 M		–147	
2999 M			
3499 M			
3501 M		–144	
3999 M			
4999 M			
5999 M			
6001 M		–142	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–140	
13499 M			
16001 M			
18299 M			
18301 M		–136	
22001 M			
26499 M			
26501 M		–135	
32001 M			
33999 M			
34001 M		–131	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168, Preamplifier turned on, and Microwave Preselector Bypass turned on:

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
1 M		–156	0.2
30 M		–166	
99 M			
999 M			
1001 M		–164	
1999 M			
2001 M		–163	
2399 M			
2999 M			
3499 M			
3501 M		–160	
3999 M			
4999 M			
5999 M			
6001 M		–160	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–159	
13499 M			
16001 M			
18299 M			
18301 M		–155	
22001 M			
26499 M			
26501 M		–152	
32001 M			
33999 M			
34001 M		–149	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168. Preamplifier turned on, and Microwave Preselector Bypass turned off:

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
1 M		–156	0.2
30 M		–166	
99 M			
999 M			
1001 M		–164	
1999 M			
2001 M		–163	
2399 M			
2999 M			
3499 M			
3501 M		–160	
3999 M			
4999 M			
5999 M			
6001 M		–163	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–162	
13499 M			
16001 M			
18299 M			
18301 M		–159	
22001 M			
26499 M			
26501 M		–156	
32001 M			
33999 M			
34001 M		–153	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
Without MS2850A-068/168 or Preamplifier turned off, with MS2850A-076/176, and Microwave Preselector Bypass turned off:

Center freq. [Hz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
9 k		–120	0.2
100 k		–134	
999 k			
1 M		–144	
9.999 M			
10 M		–150	
29 M			
30 M		–153	
99 M			
999 M			
1999 M		–150	
2399 M			
2401 M		–147	
2999 M			
3499 M			
3501 M		–144	
3999 M			
4999 M			
5999 M			
6001 M		–147	
8001 M			
9999 M			
11499 M			
12999 M			
13001 M		–145	
13499 M			
16001 M			
18299 M			
18301 M		–141	
22001 M			
26499 M			
26501 M		–141	
32001 M			
33999 M			
34001 M		–139	
38001 M			
39999 M			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

■ Display Average Noise Level (Signal Analyzer Function)

Frequency Band Mode: Normal
Without MS2850A-068/168. without MS2850A-076/176:

Center freq. [MHz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
800		–142	0.2
999.9			
1000		–141	
2399.9			
2400		–140	
3500			
3500.1		–138	
4199.9			
4200		–138	
4600			
4600.1		–142	
6000			
6000.1		–141	
10000			
13000			
13000.1		–141	
17000			
17000.1		–139	
18500			
18500.1		–139	
22000			
26500			
26500.1		–138	
32000			
34000			
34000.1		–137	
38000			
40000			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
Without MS2850A-068/168. with MS2850A-076/176:

Center freq. [MHz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
800		–142	0.2
999.9			
1000		–141	
2399.9			
2400		–140	
3500			
3500.1		–138	
4199.9			
4200		–137	
4600			
4600.1		–141	
6000			
6000.1		–140	
10000			
13000			
13000.1		–140	
17000			
17000.1		–137	
18500			
18500.1		–137	
22000			
26500			
26500.1		–136	
32000			
34000			
34000.1		–135	
38000			
40000			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168. Preamplifier turned off:

Center freq. [MHz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
800		–142	0.2
999.9			
1000		–141	
2399.9			
2400		–140	
3500			
3500.1		–138	
4199.9			
4200		–138	
4600			
4600.1		–141	
6000			
6000.1		–140	
10000			
13000			
13000.1		–140	
17000			
17000.1		–135	
18500			
18500.1		–135	
22000			
26500			
26500.1		–135	
32000			
34000			
34000.1		–132	
38000			
40000			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

Frequency Band Mode: Normal
With MS2850A-068/168. Preamplifier turned on:

Center freq. [MHz]	Display average noise level [dBm/Hz]	Maximum [dBm/Hz]	Uncertainty [dB]
800		–161	0.2
999.9			
1000		–160	
2399.9			
2400		–159	
3500			
3500.1		–157	
4199.9			
4200		–155	
4600			
4600.1		–155	
6000			
6000.1		–155	
10000			
13000			
13000.1		–155	
17000			
17000.1		–152	
18500			
18500.1		–152	
22000			
26500			
26500.1		–150	
32000			
34000			
34000.1		–146	
38000			
40000			

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

■ Second Harmonic Wave Distortion

Without MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off,
and Microwave Preselector Bypass turned off,
Spectrum analyzer mode or Signal analyzer mode, and Bandwidth ≤ 31.25 MHz,
Attenuator Mode = Mechanical Atten Only

Settings for MS2850A				Result [dBc]	Maximum [dBc]	Uncertainty [dB]
Freq. [MHz]	Ref_Level [dBm]	Output level [dBm]	Applicable LPF			
51	–30	–20	SLP-50+		(Mixer Input level = –30 dBm) –60	1.5
301	–30	–20	VLF-400 (+)		(Mixer Input level = –30 dBm) –65	1.5
1999	–30	–20	VLF-2250 (+) (2-stage series)			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 = –10 dBm) –70	3.0
6749	0	0	VLF-6700 (+) (2-stage series)			3.0

With MS2850A-076/176, without MS2850A-068/168 or Preamplifier turned off,
and Microwave Preselector Bypass turned off,
Spectrum analyzer mode or Signal analyzer mode, and Bandwidth ≤ 31.25 MHz,
Attenuator Mode = Mechanical Atten Only

Settings for MS2850A				Result [dBc]	Maximum [dBc]	Uncertainty [dB]
Freq. [MHz]	Ref_Level [dBm]	Output level [dBm]	Applicable LPF			
51	–30	–20	SLP-50+		(Mixer Input level = –30 dBm) –60	1.5
301	–30	–20	VLF-400 (+)		(Mixer Input level = –30 dBm) –65	1.5
1999	–30	–20	VLF-2250 (+) (2-stage series)			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 = –10 dBm) –90	3.0
6749	0	0	VLF-6700 (+) (2-stage series)			3.0

■ In-band Frequency Characteristics

Center freq. [MHz]	Offset frequency [MHz]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
75	–10	–0.31		0.31	0.02
	–5				
	+5				
	+10				
1000	–10				
	–5				
	+5				
	+10				
2000	–10				
	–5				
	+5				
	+10				
3900	–10				
	–5				
	+5				
	+10				

■ Internal Reference Oscillator

Freq.[GHz]	Result [Hz]
10	

■ Input Attenuator Switching Error (Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz)

Freq. [MHz]	Band Mode	Attenuator [dB]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
50	Normal	20	–0.2		+0.2	0.11
		30				
		40				
		50				
		60				
400		20				
		30				
		40				
		50				
		60				
1000		20				
		30				
		40				
		50				
		60				
2000		20				
		30				
		40				
		50				
		60				
3999		20				
		30				
		40				
		50				
		60				
4001		20	–0.75		+0.75	0.25
		30				
		40				
		50				
		60				
5999		20				
		30				
		40				
		50				
		60				

Input Attenuator Switching Error (Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz) (Cont'd)

Freq. [MHz]	Band Mode	Attenuator [dB]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
7000	Normal	20	–0.75		+0.75	0.25
		30				
		40				
		50				
		60				
10000		20				
		30				
		40				
		50				
		60				
13799		20				
		30				
		40				
		50				
		60				
13801		20	–0.8		+0.8	0.3
		30				
		40				
		50				
		60				
17000		20				
		30				
		40				
		50				
		60				
20000		20				
		30				
		40				
		50				
		60				
23000		20				
		30				
		40				
		50				
		60				
26499		20				
		30				
		40				
		50				
		60				

Input Attenuator Switching Error (Spectrum analyzer mode, or Signal analyzer mode and Bandwidth ≤ 31.25 MHz) (Cont'd)

Freq. [MHz]	Band Mode	Attenuator [dB]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
26501	Normal	20	–1.0		+1.0	0.5
		30				
		40				
		50				
		60				
30000		20				
		30				
		40				
		50				
		60				
35000		20				
		30				
		40				
		50				
		60				
39999		20				
		30				
		40				
		50				
		60				
3501	Spurious	20	–0.75		+0.75	0.25
		30				
		40				
		50				
		60				
3999		20				
		30				
		40				
		50				
		60				
4001		20				
		30				
		40				
		50				
		60				

Note:

The upper limit of frequency is 32000 MHz for MS2850A-047.

■ Input Attenuator Switching Error (Signal analyzer mode and Bandwidth > 31.25 MHz)

Freq. [MHz]	Band Mode	Attenuator [dB]	Minimum [dB]	Result [dB]	Maximum [dB]	Uncertainty [dB]
800	Normal	20	–0.3		+0.3	0.11
		30				
		40				
		50				
		60				
1000		20				
		30				
		40				
		50				
		60				
2000		20				
		30				
		40				
		50				
		60				
3000		20				
		30				
		40				
		50				
		60				
4000		20	–0.75		+0.75	0.25
		30				
		40				
		50				
		60				
4199		20				
		30				
		40				
		50				
		60				

■ 1dB Gain Compression Point

Freq. [MHz]	Minimum [dBm]	Result [dBm]	Uncertainty [dB]
301	+3		1
2001			
3999			
4001	+0		2
5001			
8001			
12001			
13499			
13501	–1		3
14001			
18401			
20001			
26499			

■ Two-tone third-order intermodulation distortion

Frequency F1 [MHz]	Frequency F2 [MHz]	Result [dBc]		Maximum [dBc]	Uncertainty [dB]
		offset (2 × F1 – F2) MHz	offset (2 × F2 – F1) MHz		
31	31.31			–54	1
101	101.31				
299	299.31				
301	301.31			–62	1
1001	1001.31				
2001	2001.31				
3999	3999.31				
4001	4001.31			–60	3
5001	5001.31				
5999	5999.31				
6001	6001.31			–56	3
8001	8001.31				
14001	14001.31				
16001	16001.31				
20001	20001.31				
26499	26499.31				

■ Image Responses

Frequency F1 [MHz]	IF Frequency [MHz]	Image Frequency ImF1 [MHz]	Result [dBc]	Maximum [dBc]	Uncertainty [dB]
3000	875.500488	1248.999024		–70	2
3000	75.500488	2848.999024			
4401	875.500488	6152.000976		–55	
22001	1875.500488	25752.00098		–70	

Appendix B Panel Keys and Keyboard Operations

Table B-1 Correspondences between panel keys and keyboard operations

Panel Key	USB Keyboard
Preset [Preset]	[Ctrl] + [Shift] + [R]
Menu [Top]	[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]
[Back]	[Ctrl] + [Shift] + [←]
[More]	[Ctrl] + [Shift] + [→]
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]
[↑]	[↑]
[→]	[→]
[↓]	[↓]
[←]	[←]
Enter [Enter]	[Enter]

Table B-1 Correspondences between panel keys and keyboard operations (Cont'd)

Panel Key	USB Keyboard
[0]	[0]
[1]	[1]
[2]	[2]
[3]	[3]
[4]	[4]
[5]	[5]
[6]	[6]
[7]	[7]
[8]	[8]
[9]	[9]
[.]	[.]
[+/–]	[-]
[Shift] + [4]	[A]
[Shift] + [5]	[B]
[Shift] + [6]	[C]
[Shift] + [7]	[D]
[Shift] + [8]	[E]
[Shift] + [9]	[F]
[Cancel]	[Esc]
[BS]	[Back Space]
[Single]	[Ctrl] + [Shift] + [F1]
[Continuous]	[Ctrl] + [Shift] + [F2]
[Frequency]	[Ctrl] + [Shift] + [0]
[Span]	[Ctrl] + [Shift] + [1]
[Amplitude]	[Ctrl] + [Shift] + [2]
[Marker]	[Ctrl] + [Shift] + [3]
[BW]	[Ctrl] + [Shift] + [4]
[Trigger/Gate]	[Ctrl] + [Shift] + [5]
[Time/Sweep]	[Ctrl] + [Shift] + [6]
[Peak Search]	[Ctrl] + [Shift] + [7]
[Save]	[Ctrl] + [S]
[Recall]	[Ctrl] + [O]
[Copy]	[Ctrl] + [Shift] + [8]

Table B-1 Correspondences between panel keys and keyboard operations (Cont'd)

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

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 MS2850A. 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 MS2850A. 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.

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C.2 Checking IP address of MS2850A.....C-3

C.3 Configuring shared settings C-4

C.4 Changing the user account for the equipment.....C-5

C.5 Shared Settings for MS2850A C-8

C.6 Mounting the equipment drives to the external computer drives C-10

C.7 Scanning for virus C-12

C.8 Unmounting the equipment drives from the external computer drives C-12

C.9 Making the equipment drives unshared.....C-12

C.10 Restoring the previous user account setting for the equipment C-12

C.11 Enabling Simple File Sharing.....C-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 MS2850A

Connect MS2850A and the external PC with LAN cable.

For details about how to set up the network for the MS2850A, see Chapter 1 "Basics of Remote Control" in the *MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Signal Analyzer Operation Manual (Main Frame, Remote Control)*.

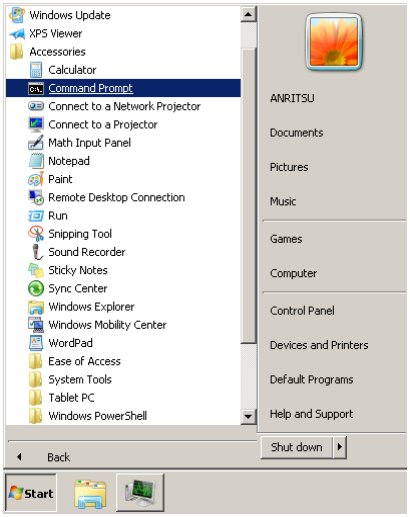
C.2 Checking IP address of MS2850A

If the IP address is automatically assigned upon establishing a DHCP connection, check the IP address by using the following procedure:

1. Display the MS2850A desktop.

   To display the desktop, right-click anywhere on the screen and select **Show the Desktop**.

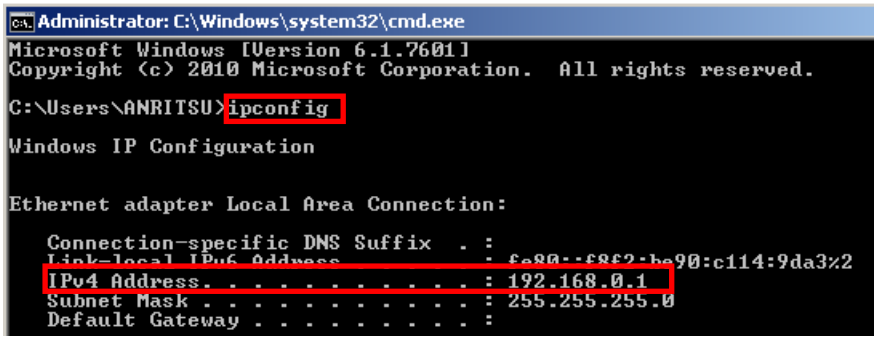
2. Display the MS-DOS Prompt. Move a mouse downward on the MS2850A screen to display the task bar. Select **Start** > **All Programs** > **Accessories** > **Command Prompt**.



3. Enter the following:

   `ipconfig`

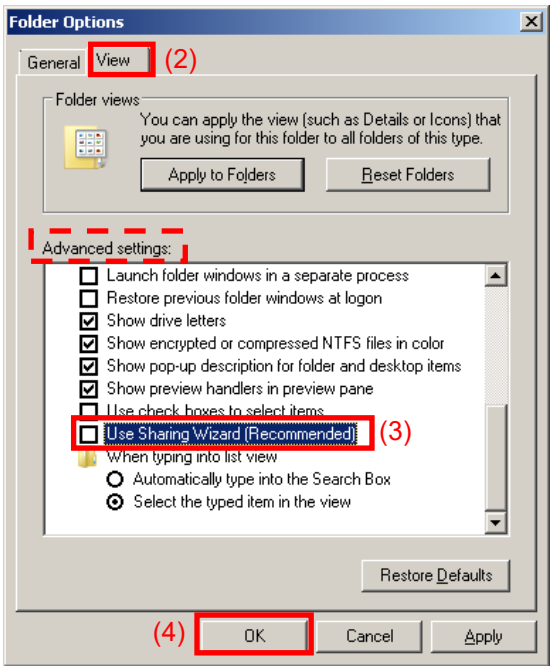
   The assigned IP address displays as shown.



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.

1. Move a mouse downward on the MS2850A 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**.

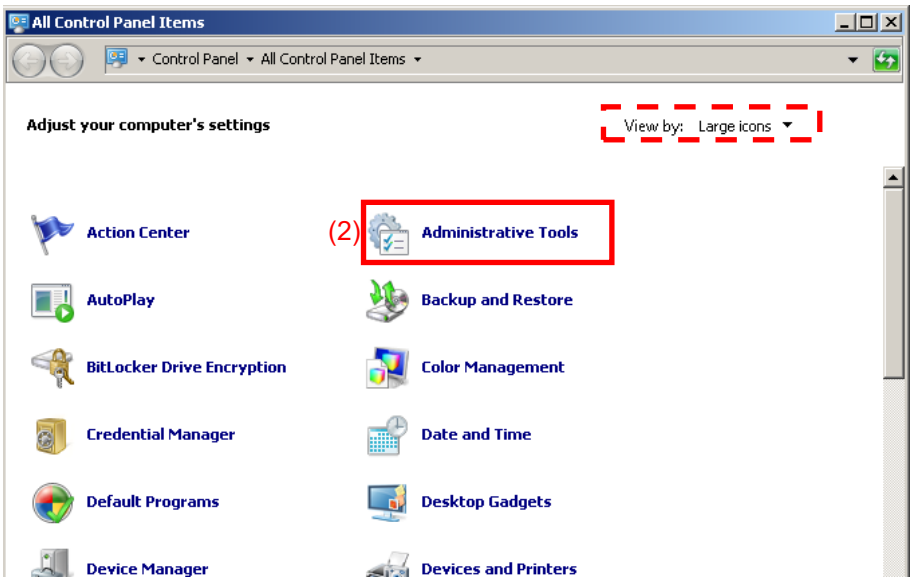


4. Click **OK**.

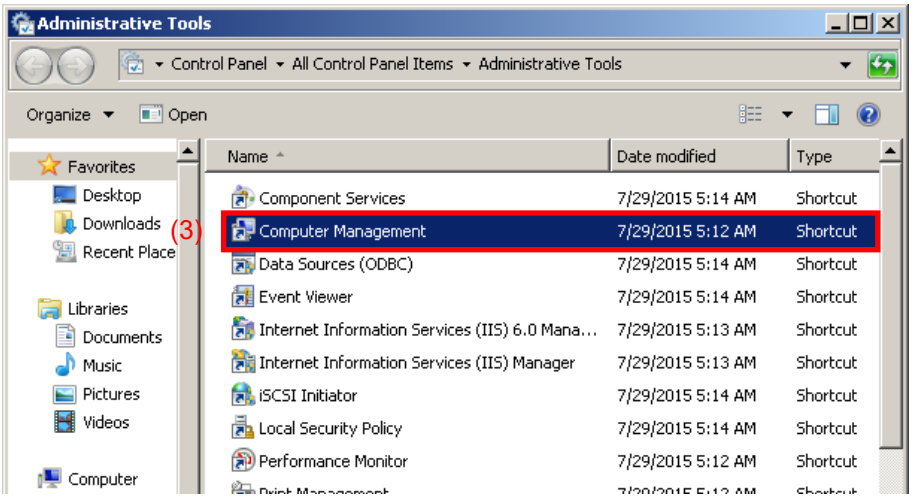
C.4 Changing the user account for the equipment

This section describes how to change the user account used when the equipment drives are mounted to network drives.

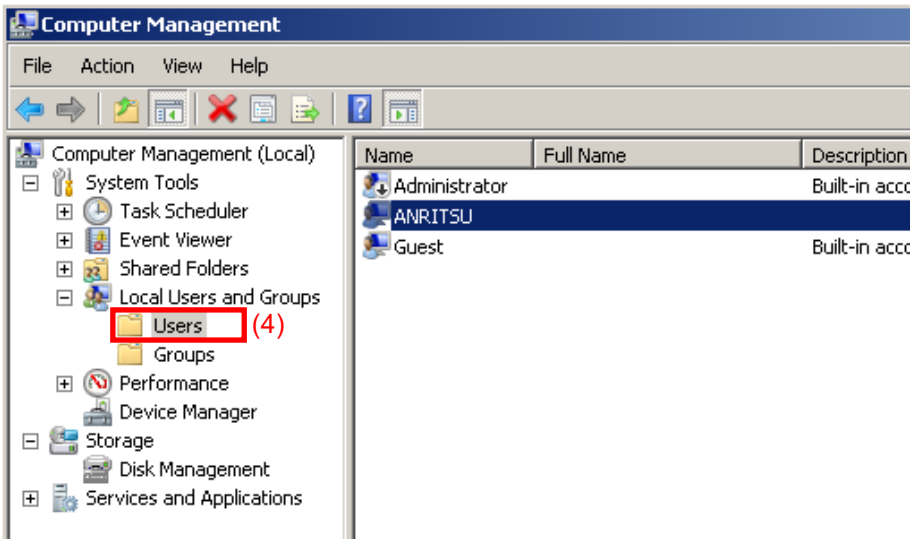
1. From the Start menu, click **Control Panel**.
2. Click **Administrative Tools** from the Control Panel.



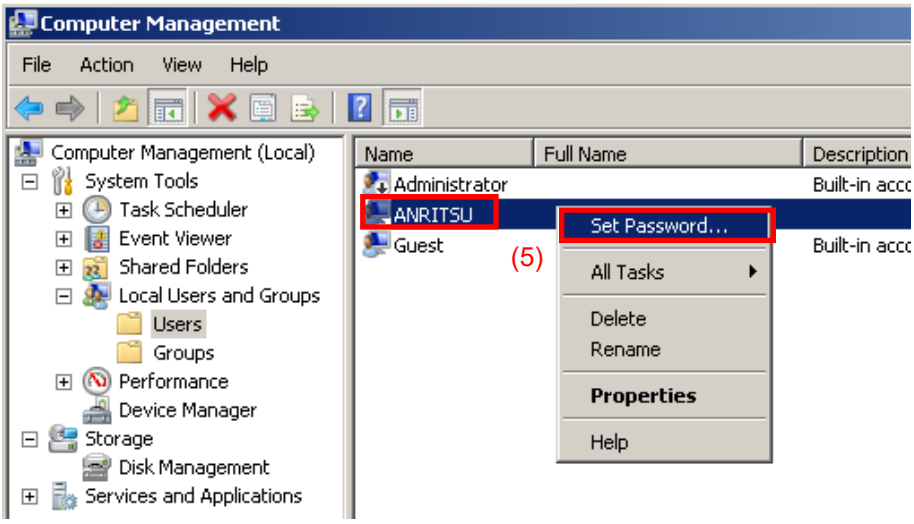
3. Click **Computer Management**.



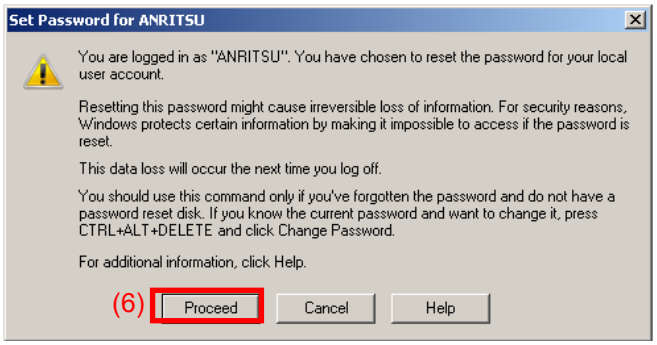
4. In Computer Management tree, click **Users** under **Local Users and Groups**.



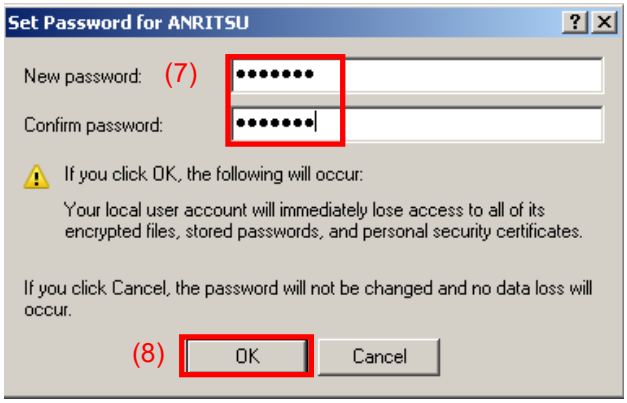
5. Right click the user account **ANRITSU** to use, and click **Set Password...**



6. When the message below is shown, click **Proceed**.



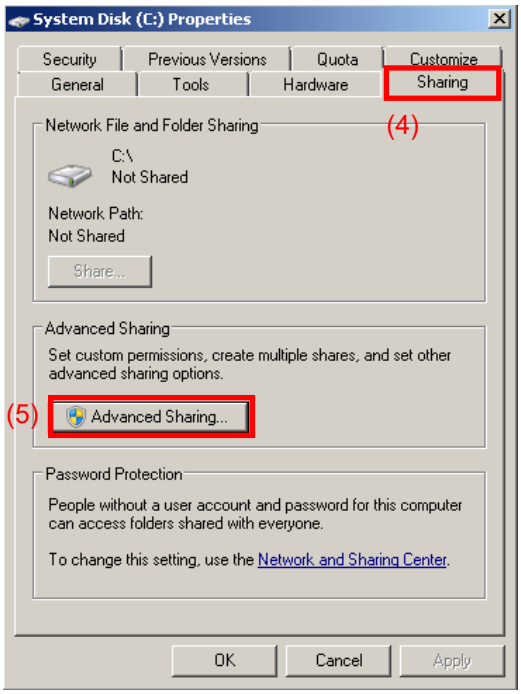
7. Type “ANRITSU” for the password of the user account **ANRITSU**.



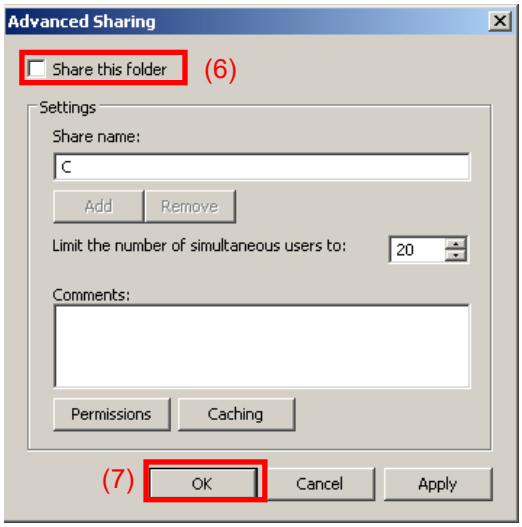
8. Confirm and click **OK**.

C.5 Shared Settings for MS2850A

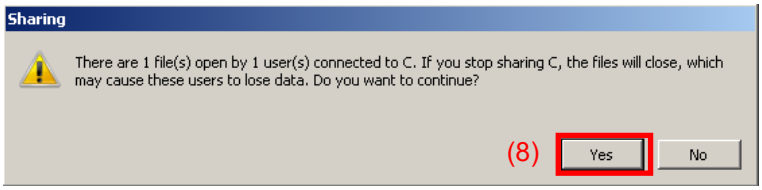
1. From the **Start** menu, click **Computer**.
2. Right-click the C drive.
3. Click **Share with** > **Advanced sharing**.
4. Click the **Sharing** tab.



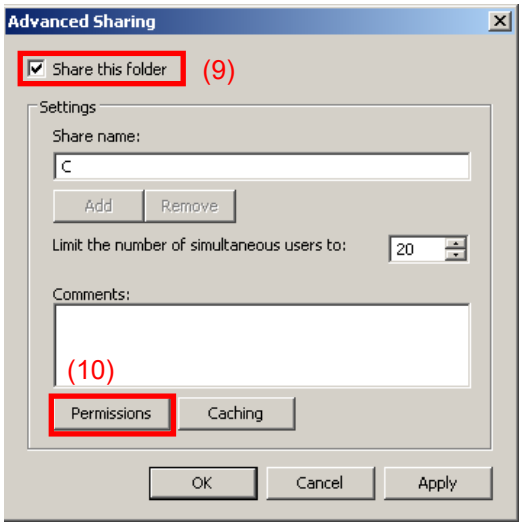
5. Click **Advanced Sharing…**
6. Turn off **Share this folder** check box to disable currently enabled folder sharing setting,



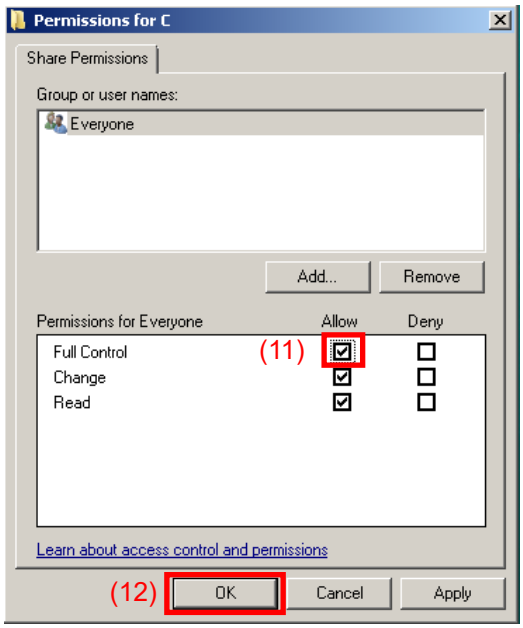
7. Click **OK**
8. **Sharing** dialog box appears. Click **Yes**.



9. Turn on **Share this folder** check box.
10. Click **Permissions**.



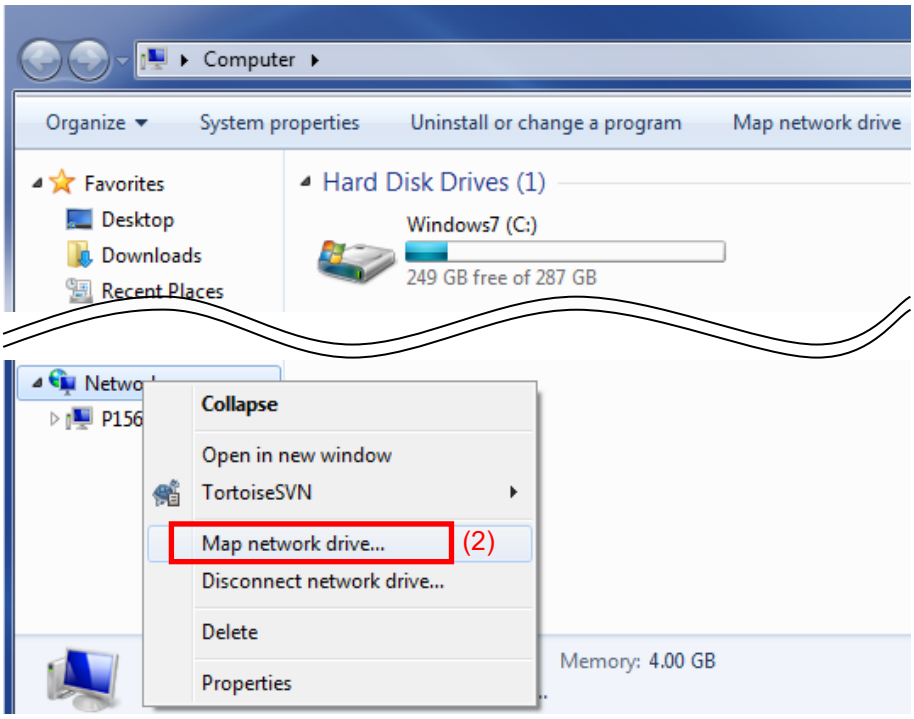
11. Turn on **Allow** check box of **Full Control**.



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 MS2850A as network drives.
2. On the PC, click **Start** > **Computer**.
   Right click **Network** on the Navigation window and click **Map network drive…**

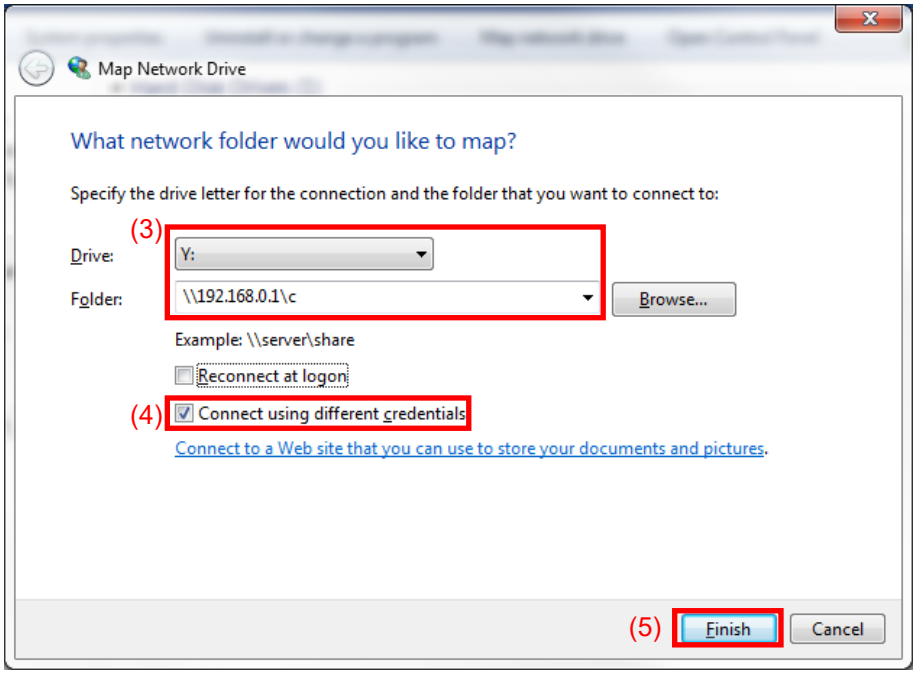


3. Enter "The IP address of MS2850A + drive name" for the folder name.

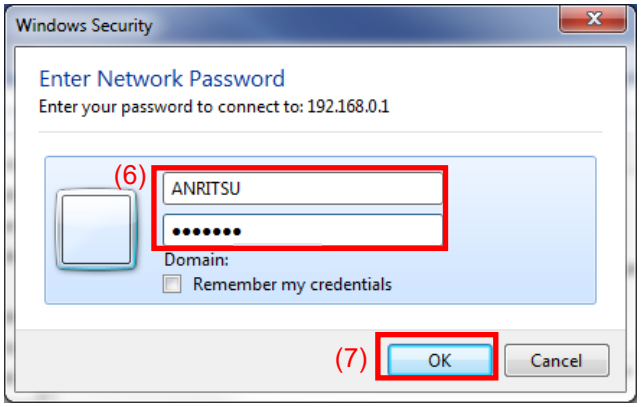
Example When the IP address of the MS2850A is 192.168.0.1:

To mount the C drive, specify Y for Drive and \\192.168.0.1\c for Folder.

To mount the D drive, specify Z for Drive and \\192.168.0.1\d for Folder.



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).



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.

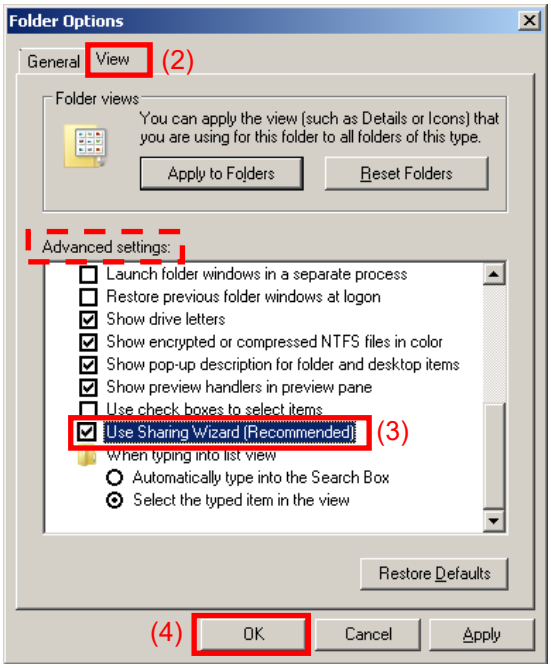
C.10 Restoring the previous user account setting for the equipment

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 MS2850A, 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**.

Appendix D Virus Check Procedure (Windows 10)

It is the customer's responsibility to purchase, install, and operate anti-virus software on the MS2850A. 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 MS2850A. 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 MS2850A D-3

D.2 Checking IP address of MS2850A.....D-4

D.3 Configuring shared settings D-5

D.4 Changing the user account for the equipment.....D-7

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D.6 Mounting the equipment drives to the external computer drives D-14

D.7 Scanning for virus D-16

D.8 Unmounting the equipment drives from the external computer drives D-16

D.9 Making the equipment drives unshared.....D-16

D.10 Restoring the previous user account setting for the equipment D-16

D.11 Enabling Simple File Sharing.....D-17

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 MS2850A

Connect MS2850A and the external PC with LAN cable.

For details about how to set up the network for the MS2850A, 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 MS2850A

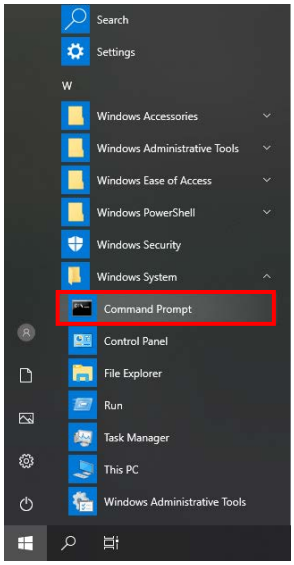
If the IP address is automatically assigned upon establishing a DHCP connection, check the IP address by using the following procedure:

1. Display the MS2850A 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 MS2850A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar.

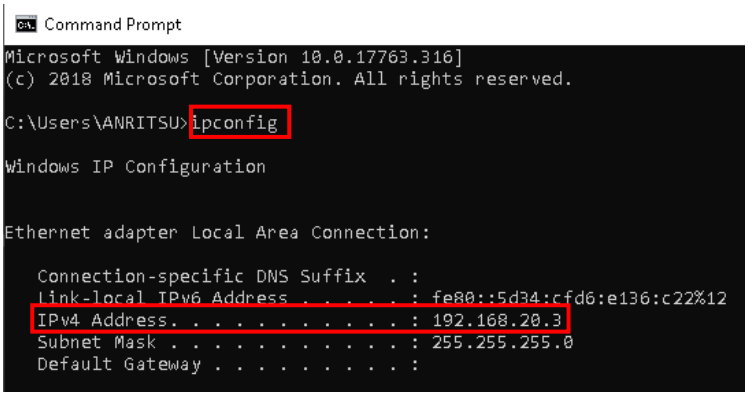
   Click the **Start** icon to open the Start menu, and then click **Windows System > Command Prompt** in the **W** column of the app list displayed.



3. Enter the following:

   `ipconfig`

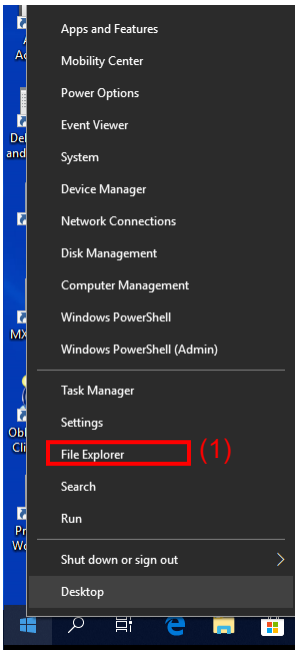
   The assigned IP address displays as shown.



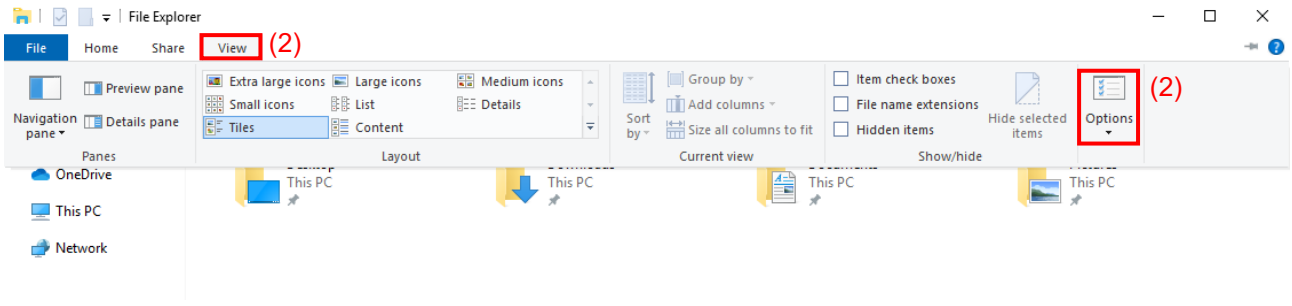
D.3 Configuring shared settings

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 MS2850A 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**.

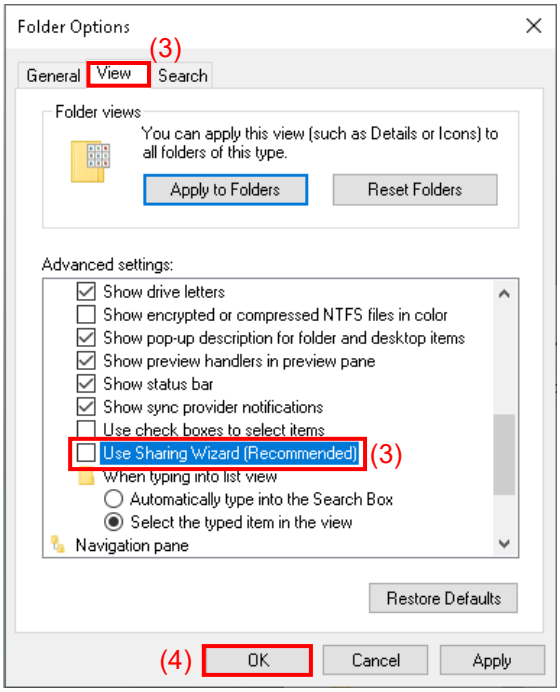


2. In **File Explorer** window, click **View** tab and then click **Options**.



3. In **Folder Options** dialog box, click **View** tab.

   Advanced Settings list, turn off **Use Sharing Wizard (Recommended) check box**.



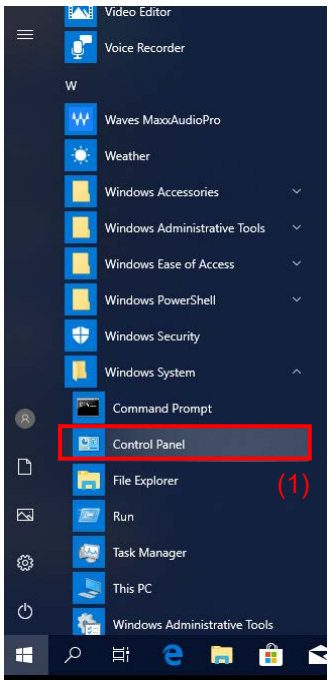
4. Click **OK**.

D.4 Changing the user account for the equipment

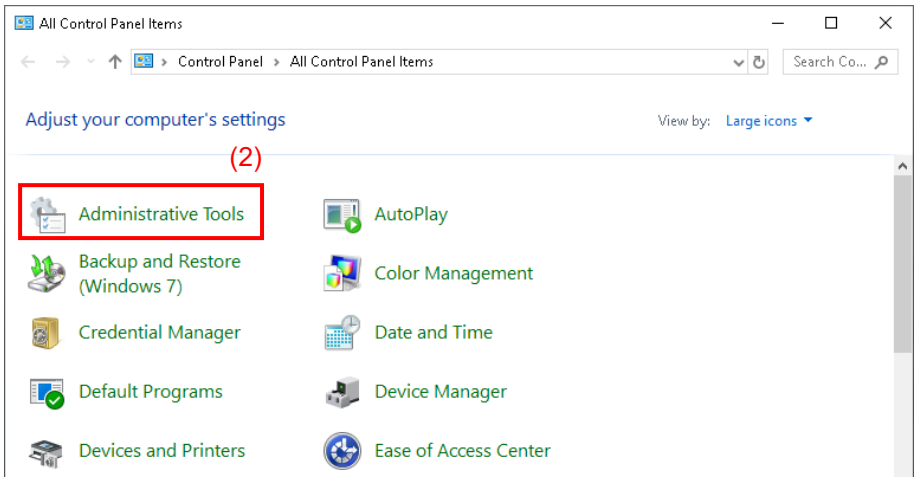
This section describes how to change the user account used when the equipment drives are mounted to network drives.

1. On the MS2850A Windows desktop, move the mouse pointer to the bottom of the screen to display the Windows taskbar.

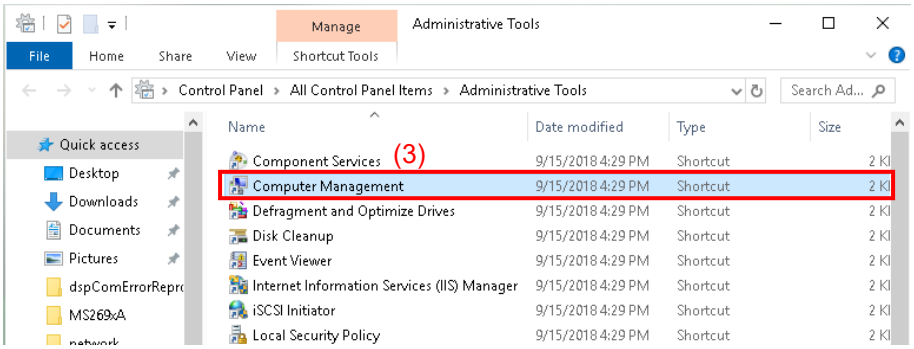
   Click the **Start** icon to open the Start menu, and then click **Windows System > Control Panel** in the **W** column of the app list displayed.



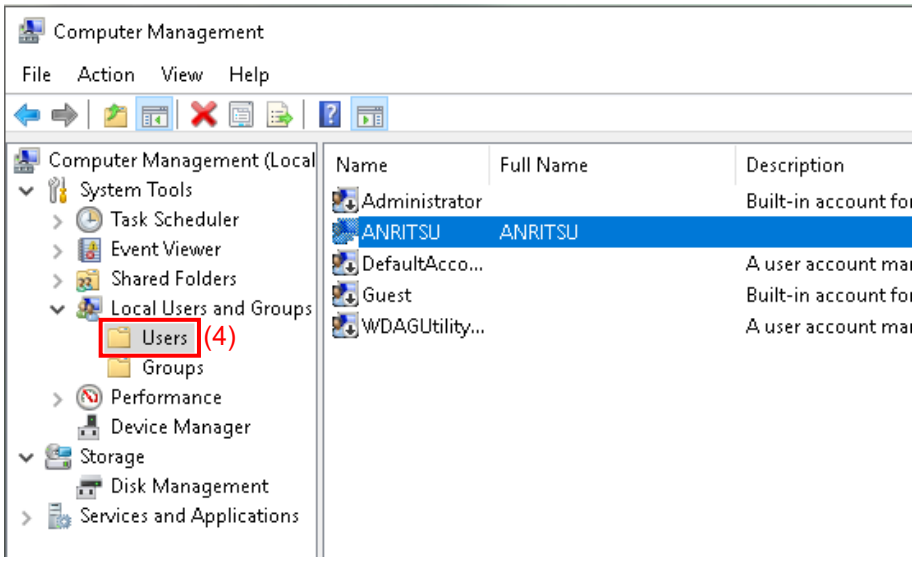
2. Click **Administrative Tools** from the Control Panel.



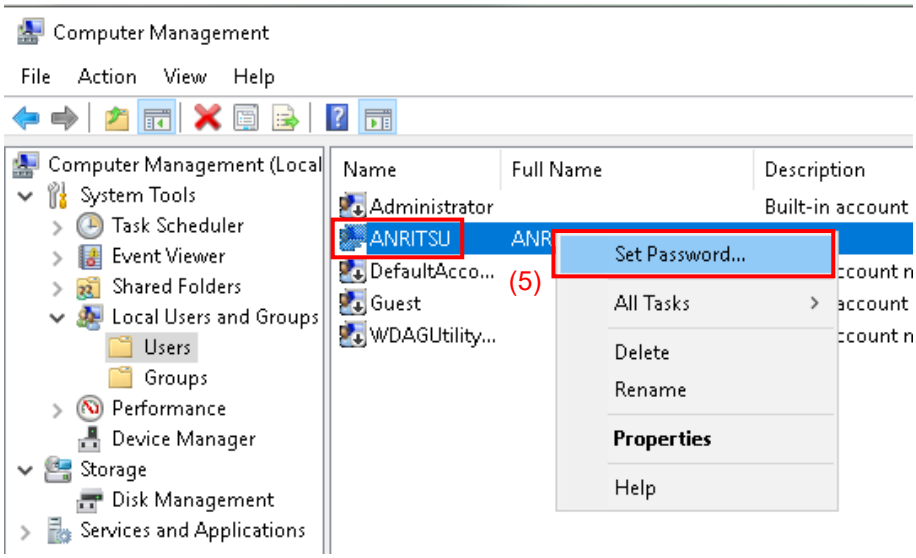
3. Click **Computer Management** in the Administrative Tools window.



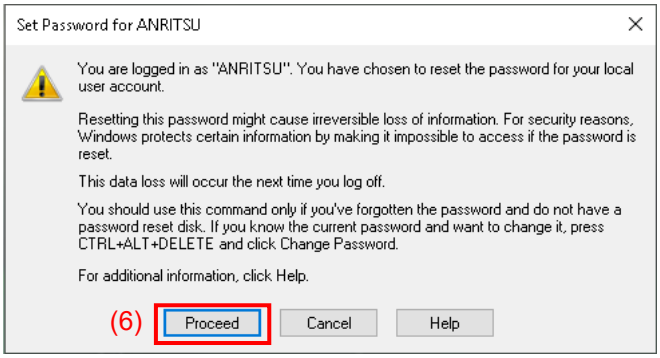
4. In Computer Management tree, click **Users** under **Local Users and Groups**.



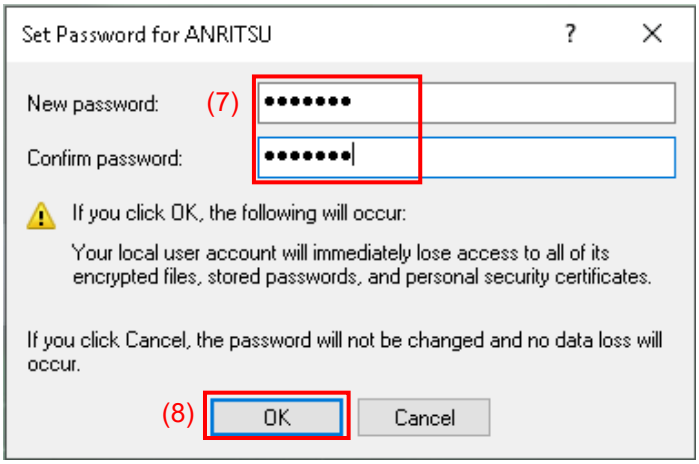
5. Right click the user account **ANRITSU** to use, and click **Set Password...**



6. When the message below is shown, click **Proceed**.



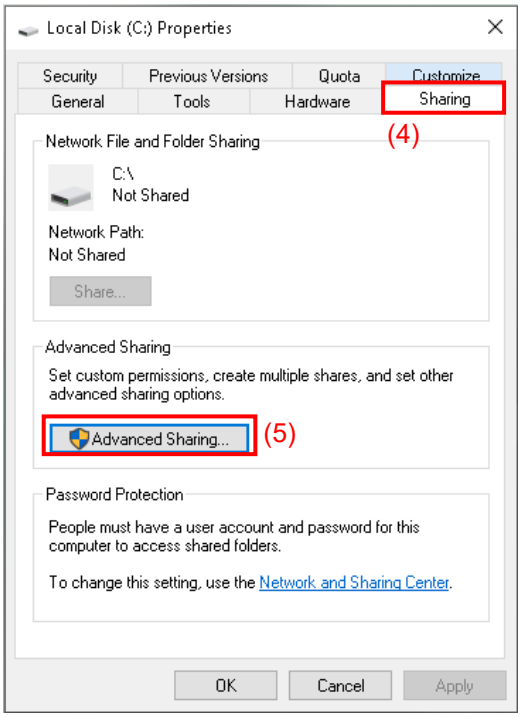
7. Type “anritsu” for the password of the user account **ANRITSU**.



8. Confirm and click **OK**.

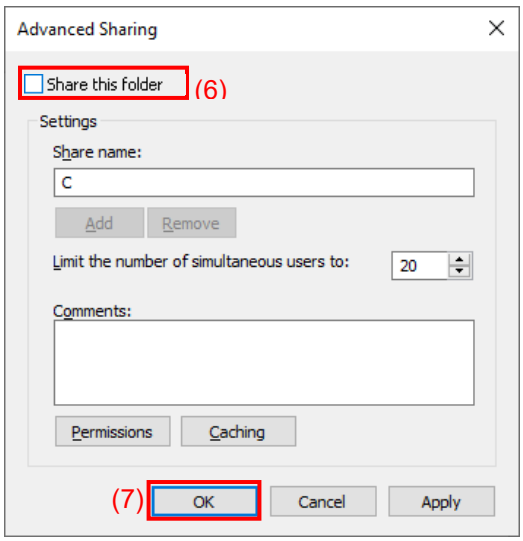
D.5 Shared Settings for MS2850A

1. On the MS2850A 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.

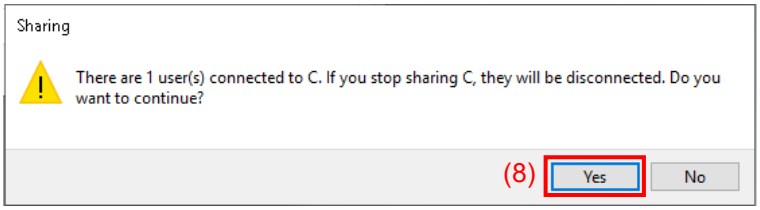


5. Click **Advanced Sharing...**

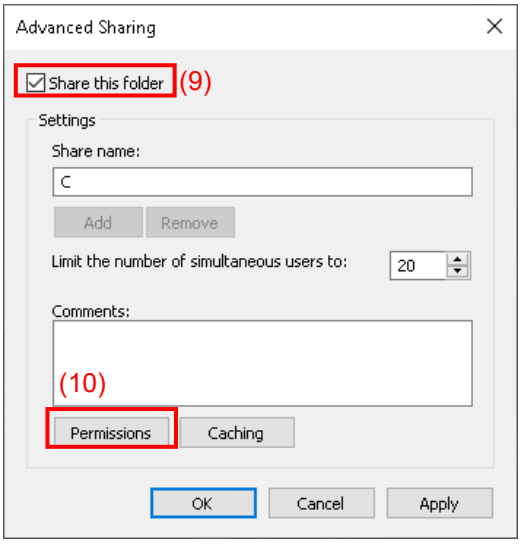
6. Turn off **Share this folder** check box to disable currently enabled folder sharing setting.



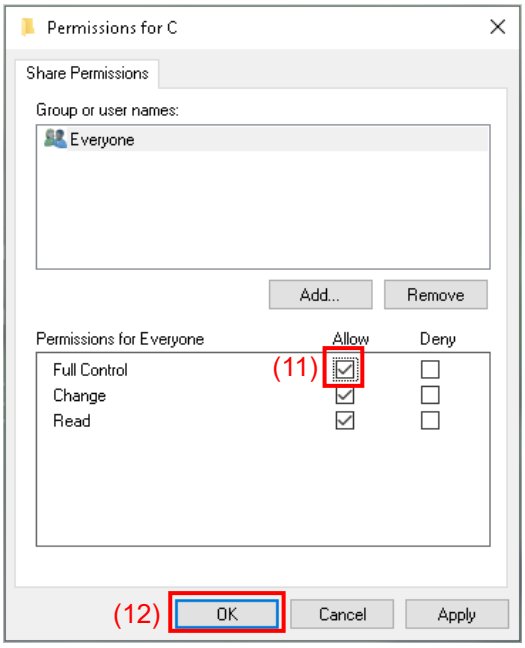
7. Click **OK**.
8. **Sharing** dialog box appears. Click **Yes**.



9. Turn on **Share this folder** check box.
10. Click **Permissions**.



11. Turn on **Allow** check box of **Full Control**.

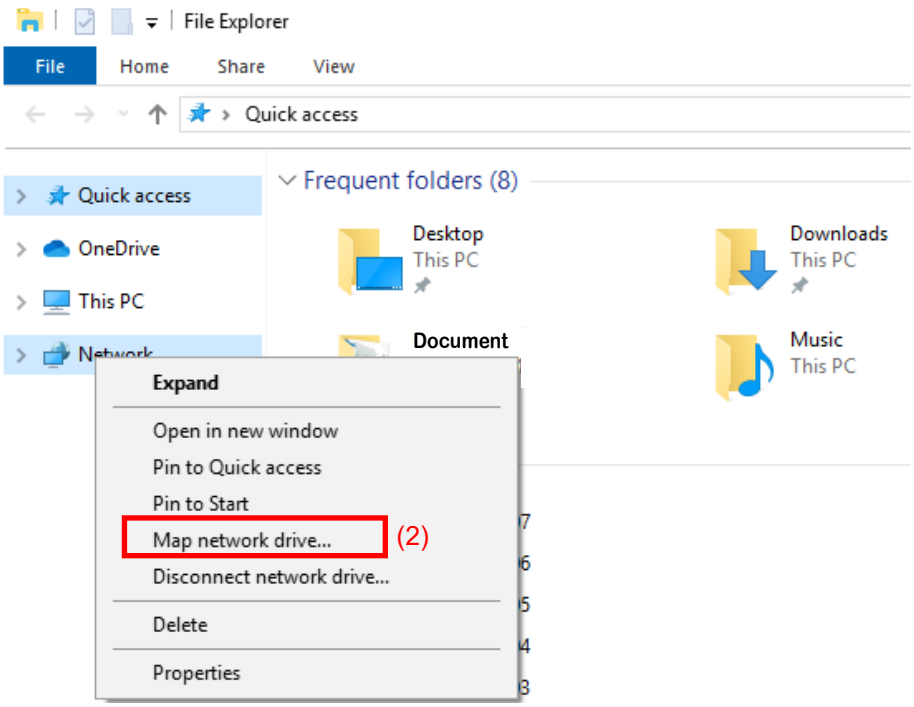


12. Click **OK** to close the two dialog boxes respectively.
13. Repeat steps 3 to 12 to the D drive.

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 MS2850A as network 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 **Map network drive...**

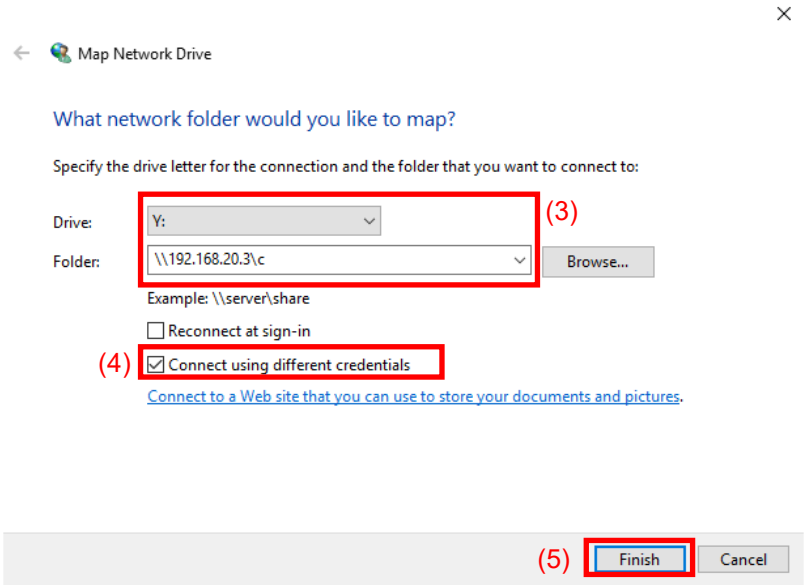


3. Enter "The IP address of MS2850A + drive name" for the folder name.

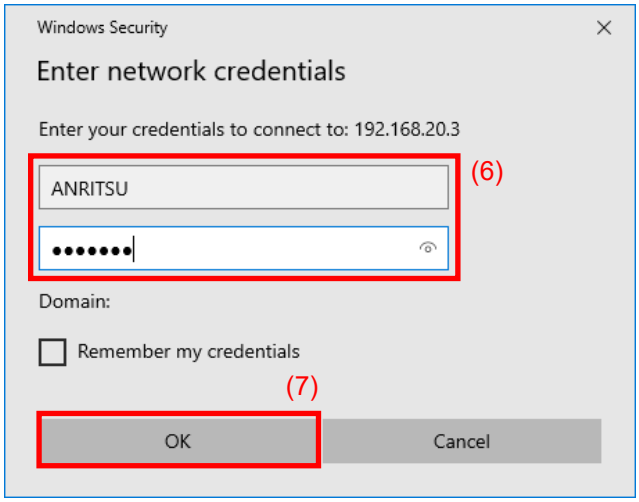
Example When the IP address of the MS2850A is 192.168.20.3:

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.



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).



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

1. On the MS2850A 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

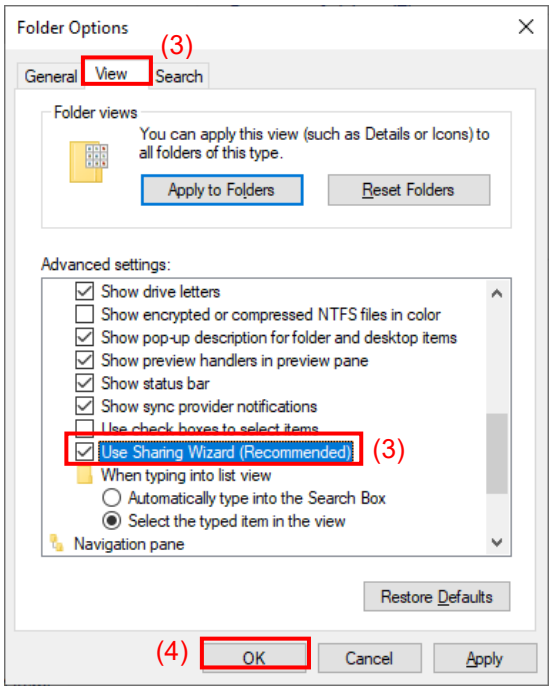
The user account password has been changed in Section D.4 “Changing the user account for the equipment” for mounting the equipment drives to network drives of the external computer. Restore the password before change in the same way as it was changed. Note that the password “ANRITSU” is specified by 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:

1. On the MS2850A 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.



4. Click **OK**.

Appendix E Initial Value List

<System Configuration>

Interface Settings	
GPIB Setting	
Address	1
Ethernet Settings	
DHCP	On
IP Address	--- --- --- ---
Subnet Mask	--- --- --- ---
Default Gateway	--- --- --- ---
Raw Socket Port Number	49153
Terminator Settings	
Terminator	CR/LF
Remote Language Settings	
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 Frequency	10 MHz
Attenuator Mode	Mechanical Atten Only
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

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