

Maintenance Manual

Spectrum Master™

MS2760A-0032, 9 kHz to 32 GHz

MS2760A-0044, 9 kHz to 44 GHz

MS2760A-0050, 9 kHz to 50 GHz

MS2760A-0070, 9 kHz to 70 GHz

MS2760A-0090, 9 kHz to 90 GHz

MS2760A-0110, 9 kHz to 110 GHz

The Anritsu logo is located in the bottom right corner of the page. It consists of the word "Anritsu" in a bold, blue, sans-serif font. The letter "A" is stylized with a diagonal slash through it.

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger



This indicates a risk from a very dangerous condition or procedure that could result in serious injury or death and possible loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Warning



This indicates a risk from a hazardous condition or procedure that could result in light-to-severe injury or loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Caution



This indicates a risk from a hazardous procedure that could result in loss related to equipment malfunction. Follow all precautions and procedures to minimize this risk.

Safety Symbols Used on Equipment and in Manuals

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* operating the equipment. Some or all of the following five symbols may or may not 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.



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



This indicates a compulsory safety precaution. The required 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.

For Safety

Warning



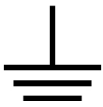
Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning



or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning



This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. 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.

Caution



Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Warning



This equipment is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and storing the battery in a leak-proof, plastic container. Follow the environmental storage requirements specified in the product data sheet.

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Chapter 1 — General Information

1-1 Introduction

This manual provides maintenance instructions for the Anritsu MS2760A Spectrum Masters. This manual includes:

- General information, including:
 - Lists of necessary test equipment to perform verification testing ([Table 1-1](#))
 - Replaceable parts list ([Table 1-2](#))
- Performance verification procedures in [Chapter 2, “Spectrum Analyzer Verification”](#)
- Troubleshooting procedures in [Chapter 3, “Troubleshooting”](#)
- Blank test records are included in [Appendix A](#). Copy the blank test records and use them to record measured values. These test records form a record of the performance of the MS2760A. Anritsu recommends making a copy of the blank test records to document the measurements each time a Performance Verification is performed. Continuing to document this process each time provides a detailed history of the instrument’s performance, allowing trends to be observed.

Familiarity with the basic operation of the MS2760A using the GUI software is assumed (for example, how to preset the instrument and set frequency, span, and RBW settings).

Note Before making any measurement, verify that all equipment has warmed up for at least 30 minutes.

1-2 Anritsu Customer Service Centers

For the latest service and sales information in your area, please visit the following URL:

<http://www.anritsu.com/contact-us>

Choose a country for regional contact information.

1-3 Recommended Test Equipment

The following test equipment listed in [Table 1-1](#) is recommended for use in testing and maintaining the MS2760A.

Table 1-1. Test Equipment Required for Verifying Spectrum Analyzer Functions

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 9 kHz to 70 GHz	Anritsu Model MG3697C with Options 2C/3/4/15D/22
Power Meter	Frequency 9 kHz to 44 GHz	Rohde and Schwarz, NRP40T (used for the 32 and 44 GHz models)
Power Meter	Frequency 9 kHz to 67 GHz	Rohde and Schwarz, NRP67T (used for the 50 and 70 GHz models)
Power Meter	Frequency 9 kHz to 110 GHz	Rohde and Schwarz, NRP110T (used for the 90 and 110 GHz Models)
110 GHz Multiplier (For 90 and 110 GHz models only)	Output 75 to 110 GHz	Norden ND75110G0P0
12 Volt DC Power Supply (Power supply for the 110 GHz Multiplier)	12 VDC Output	Keysight E3631A
50 Ohm Termination	K(f) connector, 50 ohms	Anritsu 28KF50A
50 Ohm Termination	V(f) connector, 50 ohms	Anritsu 28VF50D
50 Ohm Termination	W(f) connector, 50 ohms	Anritsu 28WF50

1-4 Replaceable Parts

The MS2760A has no internal components that are field replaceable. If the unit fails the verification testing, repairs can be performed at the local Anritsu Service Center. The following table provides the cable part numbers if replacements are needed.

Table 1-2. List of Replaceable Parts

Part Number	Description
2000-1859-R	USB Cable
2000-1605-R	BNC(m) to MMCX(m) Cable

Chapter 2 — Spectrum Analyzer Verification

2-1 Introduction

This chapter contains the following verification procedures:

- “Frequency Accuracy Verification” on page 2-3
- “Amplitude Accuracy Verification” on page 2-4
- “Single Side Band (SSB) Phase Noise Verification” on page 2-7
- “Spurious Response (Second Harmonic Distortion) Verification” on page 2-8
- “Residual Spurious Verification” on page 2-9
- “Input Related Spurs Verification” on page 2-10
- “Displayed Average Noise Level (DANL)” on page 2-11

PASS/FAIL Determination for Instrument Key Parameter Performance Tests



Figure 2-1 shows the rule that is used to determine the pass/fail status of test results that are associated with warranted specifications.

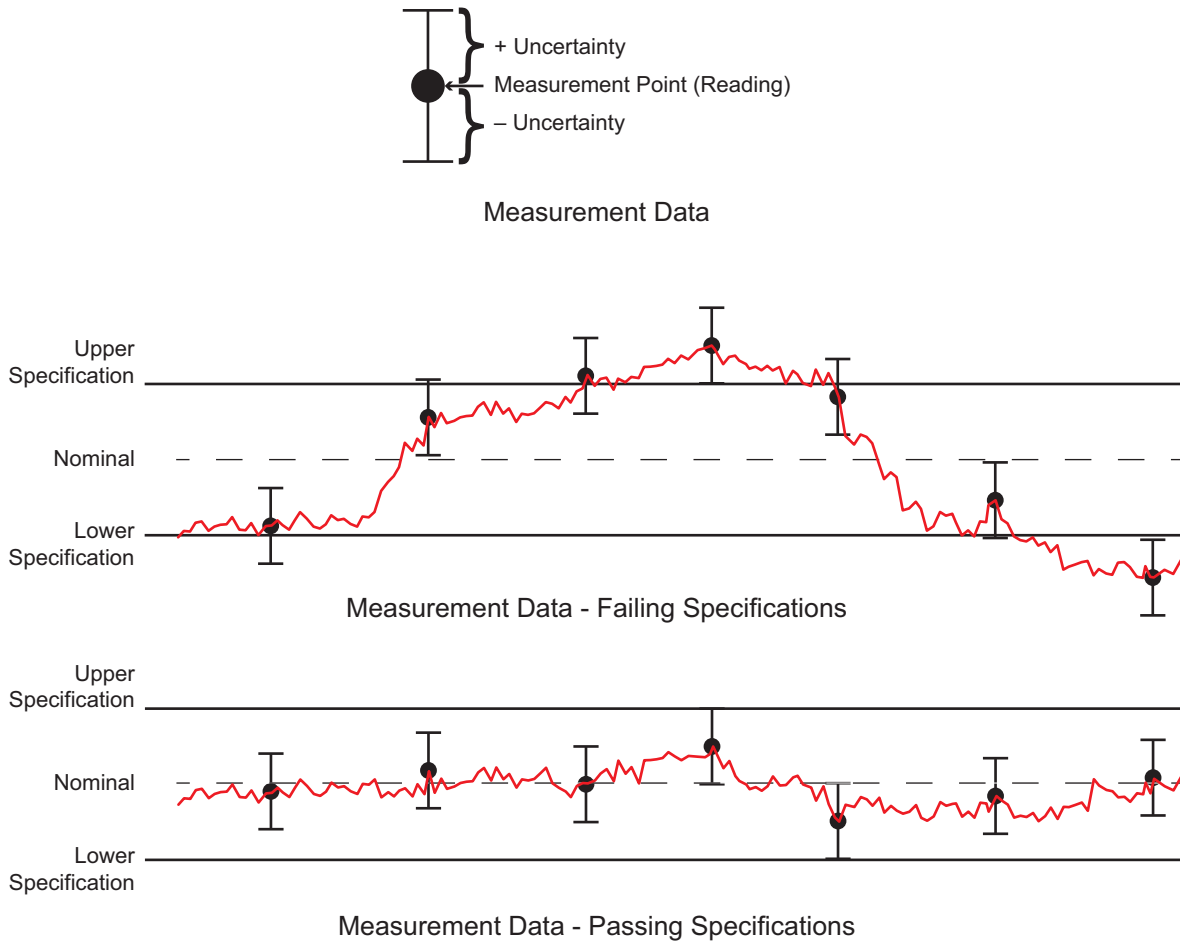


Figure 2-1. Pass/Fail Determination

The measurement uncertainty listed in each test record includes the best estimate of the errors contributed by the measurement, test equipment, standards, and other correction factors (for example, calibration factors and mismatch error) based on the suggested equipment, the equipment setup, and the prescribed test procedure. Most of the uncertainties are type-B per ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM).

2-2 Frequency Accuracy Verification

The following procedure is used to verify the frequency accuracy of the MS2760A.

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- 10 MHz Reference Standard

Frequency Accuracy Verification

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C.
2. Connect the output of the MG3697C to the RF In of the MS2760A.

Note Do not connect the external 10 MHz Reference to the MS2760A.
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3. Turn on the 10 MHz Reference Standard and the Anritsu MG3697C Synthesized Signal Source.
4. Set the MG3697C output to the frequency shown in the Frequency column of [Table A-1, “Frequency Accuracy” on page A-2](#), for the MS2760A model being tested.
5. Set the MG3697C RF Output Level to –10 dBm.
6. Preset the MS2760A.
7. Set the MS2760A center frequency to the frequency shown in the Frequency column of [Table A-1, “Frequency Accuracy” on page A-2](#), for the MS2760A model being tested.
8. Set the MS2760A span to 10 MHz.
9. Set the MS2760A display points to 4001.

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

10. On the MS2760A, perform a single sweep and then a peak search.
11. Record the measured frequency value in the Measured Value column of [Table A-1, “Frequency Accuracy” on page A-2](#).
12. Calculate the deviation which is the difference between the Measured Value and Expected Value, and record in the Deviation column of [Table A-1, “Frequency Accuracy” on page A-2](#).
13. Ensure Deviation \pm Uncertainty both are within the Specification.

2-3 Amplitude Accuracy Verification

The tests in this section verify the absolute amplitude accuracy of the MS2760A.

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- Rohde and Schwarz NRP40T Power Sensor (for MS2760A-0032 and MS2760A-0044)
- Rohde and Schwarz NRP67T Power Sensor (for MS2760A-0050 and MS2760A-0070)
- Rohde and Schwarz NRP110T Power Sensor (for MS2760A-0090 and MS2760A-0110)
- 110 GHz Frequency Multiplier (for MS2760A-0090 and MS2760A-0110 only)
- 12 VDC Power Supply (for 110 GHz Frequency Multiplier)
- 10 MHz Reference Standard

Level Accuracy Below 70 GHz at 0 dBm with IF Gain Off

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

2. Connect the NRP power sensor to the MG3697C, ensure the RF Output is off, and zero the sensor.
3. Set the MG3697C frequency to 100 MHz and power level to 0 dBm, turn on the RF Output.
4. Record the measured power in column “NRP Reading” in [Table A-2, “Amplitude Accuracy Below 70 GHz at 0 dBm with IF Gain Off” on page A-3.](#)
5. Repeat [Step 3](#) and [Step 4](#) for the remaining frequencies in [Table A-2.](#)
6. Turn off the RF Output, remove the NRP power sensor from the MG3697C, and attach the MS2760A to the MG3697C.
7. Preset the MS2760A.
8. Set the MS2760A frequency reference to External.
9. Set the MS2760A reference level to 10 dBm.
10. Set the MS2760A RBW to 10 kHz.
11. Set the MS2760A span to 1 MHz.
12. Set the MS2760A center frequency to 100 MHz.
13. Set the MG3697C frequency to 100 MHz and power level to 0 dBm, and turn on the RF Output.
14. On the MS2760A, perform a single sweep and then a peak search.
15. Record the value in column “MS2760A Reading” of [Table A-2, “Amplitude Accuracy Below 70 GHz at 0 dBm with IF Gain Off” on page A-3.](#)
16. Repeat [Step 12](#) through [Step 15](#) for the remaining frequencies in [Table A-2.](#)
17. In [Table A-2](#), subtract the MS2760A reading from the NRP reading and enter this value in the “Difference Between NRP and MS2760A” column for each frequency.
18. Ensure (Difference Between NRP and MS2760A) \pm (Uncertainty) both are within the Specification.

Level Accuracy Below 70 GHz at –20 dBm with IF Gain On

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.
2. Connect the NRP power sensor to the MG3697C and zero the sensor.
3. Set the MG3697C frequency to 100 MHz and power level to –20 dBm.
4. Record the measured power in column “NRP Reading” in [Table A-3, “Amplitude Accuracy Below 70 GHz at –20 dBm with IF Gain On” on page A-4](#).
5. Repeat [Step 3](#) and [Step 4](#) for the remaining frequencies in [Table A-3](#).
6. Remove the NRP power sensor from the MG3697C and attach the MS2760A to the MG3697C.
7. Preset the MS2760A.
8. Set the MS2760A frequency reference to External.
9. Set the MS2760A reference level to –10 dBm.
10. Set the MS2760A IF Gain to On.
11. Set the MS2760A RBW to 10 kHz.
12. Set the MS2760A span to 1 MHz.
13. Set the MS2760A center frequency to 100 MHz.
14. Set the MG3697C frequency to 100 MHz and power level to –20 dBm.
15. On the MS2760A, perform a single sweep and then a peak search.
16. Record the value in column “MA2760A Reading” of [Table A-3, “Amplitude Accuracy Below 70 GHz at –20 dBm with IF Gain On” on page A-4](#).
17. Repeat [Step 13](#) through [Step 16](#) for the remaining frequencies in [Table A-3](#).
18. In [Table A-3](#), subtract the MA2760A reading from the NRP reading and enter this value in the “Difference Between NRP and MA2760A” column for each frequency.
19. Ensure (Difference Between NRP and MS2760A) ± (Uncertainty) both are within the Specification.

Level Accuracy Above 70 GHz at –5 dBm with IF Gain Off (MS2760A-0090 and MS2760A-0110 only)

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

2. Connect the input of the Frequency Multiplier to the RF output of the MG3697C.
3. Apply the 12 volt DC power to the Frequency Multiplier.
4. Connect the NRP110T power sensor to the output of the frequency multiplier and zero the sensor.
5. Set the MG3697C frequency to 38 GHz, which provides 76 GHz at the output of the Frequency Multiplier.
6. Set the MG3697C power level to –5 dBm.
7. Record the measured power in column “NRP110T Reading” in [Table A-4, “Amplitude Accuracy Above 70 GHz at –5 dBm with IF Gain Off” on page A-6](#).
8. Repeat [Step 5](#) through [Step 7](#) for the remaining frequencies in [Table A-4](#).
9. Remove the NRP110T from the Frequency Multiplier and attach the MS2760A to the Frequency Multiplier.
10. Preset the MS2760A.
11. Set the MS2760A frequency reference to External.
12. Set the MS2760A reference level to 10 dBm.

13. Set the MS2760A RBW to 10 kHz.
14. Set the MS2760A span to 1 MHz.
15. Set the MS2760A center frequency to 76 GHz.
16. Set the MG3697C frequency to 38 GHz and power level to -5 dBm.
17. On the MS2760A, perform a single sweep and then a peak search.
18. Record the value in column “MA2760A Reading” of [Table A-4](#), “Amplitude Accuracy Above 70 GHz at -5 dBm with IF Gain Off” on [page A-6](#).
19. Repeat [Step 15](#) through [Step 18](#) for the remaining frequencies in [Table A-4](#).
20. In [Table A-4](#), subtract the MA2760A reading from the NRP reading and enter this value in the “Difference Between NRP and MA2760A” column for each frequency.
21. Ensure (Difference Between NRP and MS2760A) \pm (Uncertainty) both are within the Specification.

2-4 Single Side Band (SSB) Phase Noise Verification

This test is used to verify the single side band (SSB) phase noise of the MS2760A.

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- 10 MHz Reference Standard

SSB Phase Noise Verification

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.
2. Turn on the 10 MHz reference source and the Anritsu MG3697C Synthesized Signal Source.
3. Set the MG3697C frequency to 6.00 GHz and power level of -10 dBm.
4. Connect the output of the MG3697C to the RF In connector of MS2760A.

Note Allow the equipment to warm up for 30 minutes prior to taking measurements.

5. Preset the MS2760A.
6. Set the MS2760A frequency reference to External.
7. Set the MS2760A display points to 2001.
8. Set the MS2760A center frequency to 6 GHz.
9. Set the MS2760A span to 25 kHz.
10. Set the MS2760A RBW to 300 Hz.
11. Set the MS2760A VBW to 100 Hz.
12. On the MS2760A, turn on Marker 1 and perform a peak search.
13. On the MS2760A, turn on Marker 2 and then change the Mode to Delta Relative to Marker 1. Move Marker 2 to be 1 kHz offset from Marker 1.
14. Set the MS2760A reference level to -40 dBm.
15. Set the MS2760A IF Gain to On.
16. Record 10 amplitude measurements of Marker 2, average the 10 values, and then subtract 24.7 dB to get a per hertz (/Hz) value. Record this value in [Table A-5, “SSB Phase Noise Verification for MS2760A” on page A-7](#).
17. On the MS2760A, move Marker 2 to be 10 kHz offset from Marker 1 and repeat [Step 16](#).
18. Set the MS2760A RBW to 1000 Hz
19. Set the MS2760A VBW to 300 Hz
20. Set the MS2760A span to 250 kHz
21. On the MS2760A, move Marker 2 to be 100 kHz offset from Marker 1.
22. Record 10 amplitude measurements of Marker 2, average the 10 values, and subtract 30 dB to get a per hertz (/Hz) value. Record this value in [Table A-5, “SSB Phase Noise Verification for MS2760A” on page A-7](#).
23. Ensure (Calculated Value) \pm (Uncertainty) both are within the Specification.
24. Repeat this procedure with a source frequency and DUT center frequency of 30 GHz and 60 GHz, and record the measurements in [Table A-5, “SSB Phase Noise Verification for MS2760A” on page A-7](#).

2-5 Spurious Response (Second Harmonic Distortion) Verification

The following test is used to verify the input related spurious response of the MS2760A

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- 10 MHz Reference Standard

Spurious Response Verification

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.
2. Turn on the 10 MHz reference source and the Anritsu MG3697C Synthesized Signal Source.
3. Connect the MS2760A to the MG3697C.
4. Set the MG3697C frequency to 1 GHz, and power level to 0 dBm.

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

5. Preset the MS2760A.
6. Set the MS2760A frequency reference to External.
7. Set the MS2760A display points to 1001.
8. Set the MS2760A reference level to 10 dBm.
9. Set the MS2760A center frequency to 1 GHz.
10. Set the MS2760A span to 100 kHz.
11. Set the MS2760A RBW to 300 Hz.
12. Set the MS2760A VBW to 300 Hz.
13. On the MS2760A, perform a peak search and record the amplitude of the fundamental signal.
14. Set the MS2760A center frequency to 2 GHz.
15. Perform a peak search and record the amplitude of the harmonic signal.
16. Subtract the harmonic from the fundamental and record the value in [Table A-6, “Spurious Response \(Second Harmonic Distortion\)” on page A-8](#).
17. Set the MG3697C power level to -20 dBm.
18. Set the MS2760A center frequency to 1 GHz.
19. On the MS2760A, perform a peak search and record the amplitude of the fundamental signal.
20. Set the MS2760A reference level to -40 dBm.
21. Set the MS2760A IF gain to On.
22. Set the MS2760A center frequency to 2 GHz.
23. On the MS2760A, perform a peak search and record the amplitude of the harmonic signal.
24. Subtract the harmonic from the fundamental and record the value in [Table A-6, “Spurious Response \(Second Harmonic Distortion\)” on page A-8](#)
25. Ensure (2nd Harmonic Distortion) \pm (Uncertainty) both are within the Specification.

2-6 Residual Spurious Verification

The following test is used to verify the residual spurious response of the MS2760A.

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- 10 MHz Reference Standard

Residual Spurious Response Test with Pre Amp On

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

1. Ensure that no signal is applied to the RF input of the MS2760A and then preset the unit.
2. Set the MS2760A RBW to 1 kHz.
3. Set the MS2760A VBW to 1 kHz.
4. Set the MS2760A reference level to -40 dBm.
5. Set the MS2760A IF gain to On.
6. Set the MS2760A display points to 1001.
7. Set the MS2760A start frequency to 10 MHz and set the stop frequency to 32 GHz.
8. Set the MS2760A to perform a single sweep.
9. After the sweep is complete, perform a marker peak search and record the value in [Table A-7](#), “Residual Spurious with Pre Amp On” on page A-8.
10. Ensure (Measured Value) \pm (Uncertainty) both are within the Specification.
11. Repeat [Step 7](#) through [Step 10](#) for the remaining frequencies in [Table A-7](#).

2-7 Input Related Spurs Verification

The following test is used to verify input related spurs of the MS2760A.

Equipment Required

- Anritsu MG3697C Synthesized Signal Source
- 10 MHz Reference Standard

Input Related Spurs Verification

1. Connect the 10 MHz Reference to the 10 MHz REF IN on the Anritsu MG3697C and MS2760A.
2. Connect the MS2760A to the MG3697C.

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

3. Preset the MS2760A.
4. Set the MS2760A frequency reference to External.
5. Set the MS2760A display points to 1001.
6. Set the MS2760A RBW to 10 kHz.
7. Set the MS2760A VBW to 10 kHz.
8. Set the MS2760A center frequency to 31.5 MHz.
9. Set the MS2760A span to 1 MHz.
10. Set the MG3697C frequency to 31.5 MHz and power level to -10 dBm.
11. On the MS2760A, perform a peak search and record the level of the fundamental signal at 31.5 MHz.
12. Set the MS2760A start frequency to 3.5 MHz.
13. Set the MS2760A stop frequency to 26.4 MHz.
14. Set the MS2760A reference level to -40 dBm.
15. Set the MS2760A IF Gain to On.
16. Set the MS2760A sweep mode from Continuous to Single.
17. On the MS2760A, perform a peak search.
18. Subtract the level of the fundamental signal from [Step 11](#) from the level of the peak search from [Step 17](#) and record the value in [Table A-8, "Input Related Spurs" on page A-9](#).
19. Ensure (Measured Value) \pm (Uncertainty) both are within the Specification.
20. Repeat [Step 8](#) through [Step 19](#) for the remaining fundamental start and stop frequencies in [Table A-8](#).

2-8 Displayed Average Noise Level (DANL)

The following test is used to verify the Displayed Average Noise Level (DANL) of the MS2760A.

Equipment Required

- 50 Ohm Termination, 28KF50, for 32 and 44 GHz models
- 50 Ohm Termination, 28VF50D, for 50 and 70 GHz models
- 50 Ohm Termination, 28WF50, for 90 and 110 GHz models

Note Allow equipment to warm up for 30 minutes prior to taking measurements.

1. Attach the 50 Ohm termination to the RF input of the MS2760A and then preset the MS2760A.
2. Set the MS2760A Detector Type to RMS / Avg.
3. Set the MS2760A RBW to 100 kHz.
4. Set the MS2760A VBW to 30 kHz.
5. Set the MS2760A VBW / Average Type to Log.
6. Set the MS2760A display points to 4001.
7. Set the MS2760A reference level to -40 dBm.
8. Set the MS2760A IF Gain to On.
9. On the MS2760A, change the Sweep Mode from Continuous to Single.
10. Set MS2760A start frequency to 10 MHz and stop frequency to 644 MHz, and then press Restart to start the single sweep with these settings.
11. Allow the sweep to complete. Perform a peak search and subtract 50 dB from the reading to give the /Hz DANL result. Record the value in [Table A-9, “MS2760A DANL with IF Gain On” on page A-10](#).
12. Ensure (Calculated Value) \pm (Uncertainty) both are within the Specification.
13. Repeat [Step 10](#) and [Step 12](#) for the remaining start and stop frequencies in [Table A-9, “MS2760A DANL with IF Gain On” on page A-10](#).

Chapter 3 — Troubleshooting

3-1 Introduction

This chapter describes the primary troubleshooting operations that can be performed by all Anritsu Service Centers. Perform the troubleshooting suggestions in the order they are listed. Operators of the MS2760A should refer to the User Guide for troubleshooting help.

3-2 Connection Problems

The MS2760A GUI Software does not recognize the MS2760A:

1. Ensure the USB cable is properly connected between the PC and the MS2760A.
2. Ensure the USB port on the PC is USB version 3.0 or greater. USB 3.0 ports can be identified by either a “SS” marking next to the connector or the actual USB connector will be the color blue.

Note	It's possible that the MS2760A will be recognized by the PC when connected to a non-USB 3.0 port, but it will not function properly.
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3. Ensure the Anritsu Device Monitor (AnritsuDeviceMonitor.exe) is running on the PC connected to the MS2760A. When running, the program will be seen as the Anritsu logo within the system tray icons.
4. Ensure the green LED on the MS2760A is lit after plugging the unit into the USB 3.0 port. (This LED will not light if the Anritsu Device Monitor is not running.)

Appendix A — Test Records

This appendix provides test records that can be used to record the performance of the MS2760A. Anritsu Company recommends making a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, allowing trends to be observed.

MS2760A Firmware Rev: _____ Operator: _____ Date: _____

Serial Number: _____ Model Number: _____

Frequency Accuracy Verification

Table A-1. Frequency Accuracy

Model Tested	Frequency	Measured Value	Deviation	Uncertainty	Specification
MS2760A-0032	31 GHz	GHz	kHz	16 Hz (0.00052 ppm)	± 6.2kHz (± 0.2 ppm)
MS2760A-0044	39 GHz	GHz	kHz	20 Hz (0.00052 ppm)	± 7.8kHz (± 0.2 ppm)
MS2760A-0050	49 GHz	GHz	kHz	25 Hz (0.00052 ppm)	± 9.8kHz (± 0.2 ppm)
MS2760A-0070	67 GHz	GHz	kHz	35 Hz (0.00052 ppm)	± 13.8kHz (± 0.2 ppm)
MS2760A-0090	67 GHz	GHz	kHz	35 Hz (0.00052 ppm)	± 13.8kHz (± 0.2 ppm)
MS2760A-0110	67 GHz	GHz	kHz	35 Hz (0.00052 ppm)	± 13.8kHz (± 0.2 ppm)

Amplitude Accuracy Verification

Table A-2. Amplitude Accuracy Below 70 GHz at 0 dBm with IF Gain Off

Freq	MG3697C Level	NRP Reading (dBm)	MS2760A Reading (dBm)	Diff. between NRP and MS2760A (dB)	Uncertainty (dB)	Spec (dB)
MS2760A-0032 Models Only						
100 MHz	0 dBm				0.08	± 1.3
1 GHz	0 dBm				0.17	± 1.8
6 GHz	0 dBm				0.17	± 1.8
10 GHz	0 dBm				0.17	± 1.8
20 GHz	0 dBm				0.17	± 1.8
31.970 GHz	0 dBm				0.17	± 1.8
MS2760A-0044 Models Only						
100 MHz	0 dBm				0.08	± 1.3
1 GHz	0 dBm				0.17	± 1.8
6 GHz	0 dBm				0.17	± 1.8
10 GHz	0 dBm				0.17	± 1.8
20 GHz	0 dBm				0.17	± 1.8
30 GHz	0 dBm				0.17	± 1.8
39.970 GHz	0 dBm				0.17	± 1.8
MS2760A-0050 Models Only						
100 MHz	0 dBm				0.13	± 1.3
1 GHz	0 dBm				0.18	± 1.8
6 GHz	0 dBm				0.18	± 1.8
10 GHz	0 dBm				0.18	± 1.8
20 GHz	0 dBm				0.18	± 1.8
30 GHz	0 dBm				0.18	± 1.8
40 GHz	0 dBm				0.18	± 1.8
49.970 GHz	0 dBm				0.45	± 2.0
MS2760A-0070 Models Only						
100 MHz	0 dBm				0.13	± 1.3
1 GHz	0 dBm				0.18	± 1.8
6 GHz	0 dBm				0.18	± 1.8
10 GHz	0 dBm				0.18	± 1.8
20 GHz	0 dBm				0.18	± 1.8
30 GHz	0 dBm				0.18	± 1.8
40 GHz	0 dBm				0.18	± 1.8
50 GHz	0 dBm				0.45	± 2.0
60 GHz	0 dBm				0.45	± 2.0
67 GHz	0 dBm				0.45	± 2.0
MS2760A-0090 and -0110 Models						
100 MHz	0 dBm				0.22	± 1.3

Table A-2. Amplitude Accuracy Below 70 GHz at 0 dBm with IF Gain Off

Freq	MG3697C Level	NRP Reading (dBm)	MS2760A Reading (dBm)	Diff. between NRP and MS2760A (dB)	Uncertainty (dB)	Spec (dB)
1 GHz	0 dBm				0.22	± 1.8
6 GHz	0 dBm				0.22	± 1.8
10 GHz	0 dBm				0.22	± 1.8
20 GHz	0 dBm				0.22	± 1.8
30 GHz	0 dBm				0.22	± 1.8
40 GHz	0 dBm				0.22	± 1.8
50 GHz	0 dBm				0.50	± 2.0
60 GHz	0 dBm				0.50	± 2.0
67 GHz	0 dBm				0.50	± 2.0

Table A-3. Amplitude Accuracy Below 70 GHz at -20 dBm with IF Gain On

Freq	MG3697C Level	NRP Reading (dBm)	MS2760A Reading (dBm)	Diff. between NRP and MS2760A (dB)	Uncertainty (dB)	Spec (dB)
MS2760A-0032 Models Only						
100 MHz	-20 dBm				0.08	± 1.3
1 GHz	-20 dBm				0.17	± 1.8
6 GHz	-20 dBm				0.17	± 1.8
10 GHz	-20 dBm				0.17	± 1.8
20 GHz	-20 dBm				0.17	± 1.8
31.970 GHz	-20 dBm				0.17	± 1.8
MS2760A-0044 Models Only						
100 MHz	-20 dBm				0.08	± 1.3
1 GHz	-20 dBm				0.17	± 1.8
6 GHz	-20 dBm				0.17	± 1.8
10 GHz	-20 dBm				0.17	± 1.8
20 GHz	-20 dBm				0.17	± 1.8
30 GHz	-20 dBm				0.17	± 1.8
39.970 GHz	-20 dBm				0.17	± 1.8
MS2760A-0050 Models Only						
100 MHz	-20 dBm				0.13	± 1.3
1 GHz	-20 dBm				0.18	± 1.8
6 GHz	-20 dBm				0.18	± 1.8
10 GHz	-20 dBm				0.18	± 1.8
20 GHz	-20 dBm				0.18	± 1.8
30 GHz	-20 dBm				0.18	± 1.8

Table A-3. Amplitude Accuracy Below 70 GHz at -20 dBm with IF Gain On

Freq	MG3697C Level	NRP Reading (dBm)	MS2760A Reading (dBm)	Diff. between NRP and MS2760A (dB)	Uncertainty (dB)	Spec (dB)
40 GHz	-20 dBm				0.18	± 1.8
49.970 GHz	-20 dBm				0.45	± 2.0
MS2760A-0070 Models Only						
100 MHz	-20 dBm				0.13	± 1.3
1 GHz	-20 dBm				0.18	± 1.8
6 GHz	-20 dBm				0.18	± 1.8
10 GHz	-20 dBm				0.18	± 1.8
20 GHz	-20 dBm				0.18	± 1.8
30 GHz	-20 dBm				0.18	± 1.8
40 GHz	-20 dBm				0.18	± 1.8
50 GHz	-20 dBm				0.45	± 2.0
60 GHz	-20 dBm				0.45	± 2.0
67 GHz	-20 dBm				0.45	± 2.0
MS2760A-0090 and -0110 Models						
100 MHz	-20 dBm				0.22	± 1.3
1 GHz	-20 dBm				0.22	± 1.8
6 GHz	-20 dBm				0.22	± 1.8
10 GHz	-20 dBm				0.22	± 1.8
20 GHz	-20 dBm				0.22	± 1.8
30 GHz	-20 dBm				0.22	± 1.8
40 GHz	-20 dBm				0.22	± 1.8
50 GHz	-20 dBm				0.50	± 2.0
60 GHz	-20 dBm				0.50	± 2.0
67 GHz	-20 dBm				0.50	± 2.0

Table A-4. Amplitude Accuracy Above 70 GHz at -5 dBm with IF Gain Off

MG3697C Freq	Multiplier Output Freq	NRP110T Reading (dBm)	MS2760A Reading (dBm)	Diff. between NRP110T and MS2760A (dB)	Uncertainty (dB)	Spec (dB)
MS2760A-0090 and -0110 Models						
38 GHz	76 GHz				0.55	± 2.2
40 GHz	80 GHz				0.55	± 2.2
44.985 GHz	89.970 GHz				0.55	± 2.2
MS2760A-0110 Models Only						
47 GHz	94 GHz				1.05	± 2.5
50 GHz	100 GHz				1.05	± 2.5
54.985 GHz	109.970 GHz				1.05	± 2.5

Single Side Band (SSB) Phase Noise Verification

Table A-5. SSB Phase Noise Verification for MS2760A

Frequency	Offset	Measured Value (dBc/Hz)	Calculated Value (dBc/Hz)	Uncertainty (dB)	Specification (dBc/Hz)
MS2760A-0032, -0044, -0050, and -0070 Models					
6 GHz	1 kHz			1.74	≤ -80
6 GHz	10 kHz			1.09	≤ -95
6 GHz	100 kHz			0.69	≤ -95
30 GHz	1 kHz			1.47	≤ -66
30 GHz	10 kHz			1.08	≤ -81
30 GHz	100 kHz			0.79	≤ -81
MS2760A-0070 Models Only					
60 GHz	1 kHz			1.90	≤ -60
60 GHz	10 kHz			1.20	≤ -75
60 GHz	100 kHz			0.86	≤ -75
MS2760A-0090 and MS2760A-0110 Models					
6 GHz	1 kHz			0.33	≤ -80
6 GHz	10 kHz			0.44	≤ -95
6 GHz	100 kHz			0.35	≤ -95
30 GHz	1 kHz			0.51	≤ -66
30 GHz	10 kHz			0.51	≤ -81
30 GHz	100 kHz			0.44	≤ -81
60 GHz	1 kHz			0.61	≤ -60
60 GHz	10 kHz			0.49	≤ -75
60 GHz	100 kHz			0.35	≤ -75

Spurious Response (Second Harmonic Distortion) Verification

Table A-6. Spurious Response (Second Harmonic Distortion)

Frequency	Level	Measured Value (dBm)	2nd Harmonic Distortion (dBc)	Uncertainty (dB)	Specification (dBc)
1000 MHz	0 dBm				
2000 MHz	0 dBm			3.87	≤ -50
1000 MHz	-20 dBm				
2000 MHz	-20 dBm			6.49	≤ -60

Residual Spurious Verification

Table A-7. Residual Spurious with Pre Amp On

Start Freq.	Stop Freq.	Measured Values (dBm)	Uncertainty (dB)	Specification (dBm)
MS2760A-0032, -0044, -0050, and -0070 Models				
10 MHz	32 GHz		0.70	≤ -85 dBm
MS2760A-0044, -0050, and -0070 Models				
32 GHz	40 GHz		0.70	≤ -85 dBm
MS2760A-0050, and -0070 Models				
40 GHz	50 GHz		0.70	≤ -85 dBm
MS2760A-0070 Models Only				
50 GHz	67 GHz		0.70	≤ -85 dBm
MS2760A-0090 and -0110 Models				
10 MHz	70 GHz		1.56	≤ -85 dBm
70 GHz	90 GHz		1.56	≤ -84 dBm
MS2760A-0110 Models Only				
90 GHz	110 GHz		1.56	≤ -81 dBm

Input Related Spurs Verification

Table A-8. Input Related Spurs

Fundamental Freq.	Start SPA Freq.	Stop SPA Freq.	Measured Values (dBc)	Uncertainty (dB)	Specification (dBc)
MS2760A-0032, -0044, -0050, and -0070 Models					
31.5 MHz	3.5 MHz	26.4 MHz		2.20	≤ -60
70 MHz	24.5 MHz	31.5 MHz		1.15	≤ -50
133 MHz	31.5 MHz	38.5 MHz		1.00	≤ -50
217.5 MHz	189.5 MHz	210.5 MHz		2.20	≤ -60
182.5 MHz	189.5 MHz	210.5 MHz		2.20	≤ -60
3.430 GHz	759.5 MHz	780.5 MHz		0.19	≤ -40
4.970 GHz	759.5 MHz	780.5 MHz		0.17	≤ -40
7.630 GHz	759.5 MHz	780.5 MHz		0.22	≤ -40
4.970 GHz	899.5 MHz	920.5 MHz		0.19	≤ -40
6.790 GHz	899.5 MHz	920.5 MHz		2.20	≤ -40
MS2760A-0090 and -0110 Models					
31.5 MHz	3.5 MHz	26.4 MHz		1.12	≤ -60
70 MHz	24.5 MHz	31.5 MHz		0.43	≤ -50
133 MHz	31.5 MHz	38.5 MHz		0.29	≤ -50
217.5 MHz	189.5 MHz	210.5 MHz		1.12	≤ -60
182.5 MHz	189.5 MHz	210.5 MHz		1.12	≤ -60
3.430 GHz	759.5 MHz	780.5 MHz		0.23	≤ -40
4.970 GHz	759.5 MHz	780.5 MHz		0.23	≤ -40
7.630 GHz	759.5 MHz	780.5 MHz		0.17	≤ -40
4.970 GHz	899.5 MHz	920.5 MHz		0.20	≤ -40
6.790 GHz	899.5 MHz	920.5 MHz		1.12	≤ -40


Displayed Average Noise Level (DANL)

Table A-9. MS2760A DANL with IF Gain On

Start Freq	Stop Freq	RBW (kHz)	VBW (kHz)	Measured Value at 100 kHz RBW (dBm)	Calculated for 1 Hz RBW (dBm)	Uncertainty (dB)	Spec. (dBm)
MS2760A-0032, -0044, -0050, and -0070 Models							
10 MHz	644 MHz	100	30			0.34	≤ -131
644 MHz	4.0 GHz	100	30			0.45	≤ -136
4.0 GHz	32 GHz	100	30			0.45	≤ -131
MS2760A-0044, -0050 and -0070 Models							
32 GHz	40 GHz	100	30			0.45	≤ -131
MS2760A-0050 and -0070 Models							
40 GHz	50 GHz	100	30			0.60	≤ -128
MS2760A-0070 Models Only							
50 GHz	70 GHz	100	30			0.60	≤ -128
MS2760A-0090 and -0110 Models							
10 MHz	644 MHz	100	30			0.36	≤ -131
644 MHz	4.0 GHz	100	30			0.42	≤ -136
4.0 GHz	40 GHz	100	30			0.48	≤ -131
40 GHz	70 GHz	100	30			0.43	≤ -128
70 GHz	90 GHz	100	30			0.42	≤ -127
MS2760A-0110 Models Only							
90 GHz	110 GHz	100	30			0.40	≤ -124

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