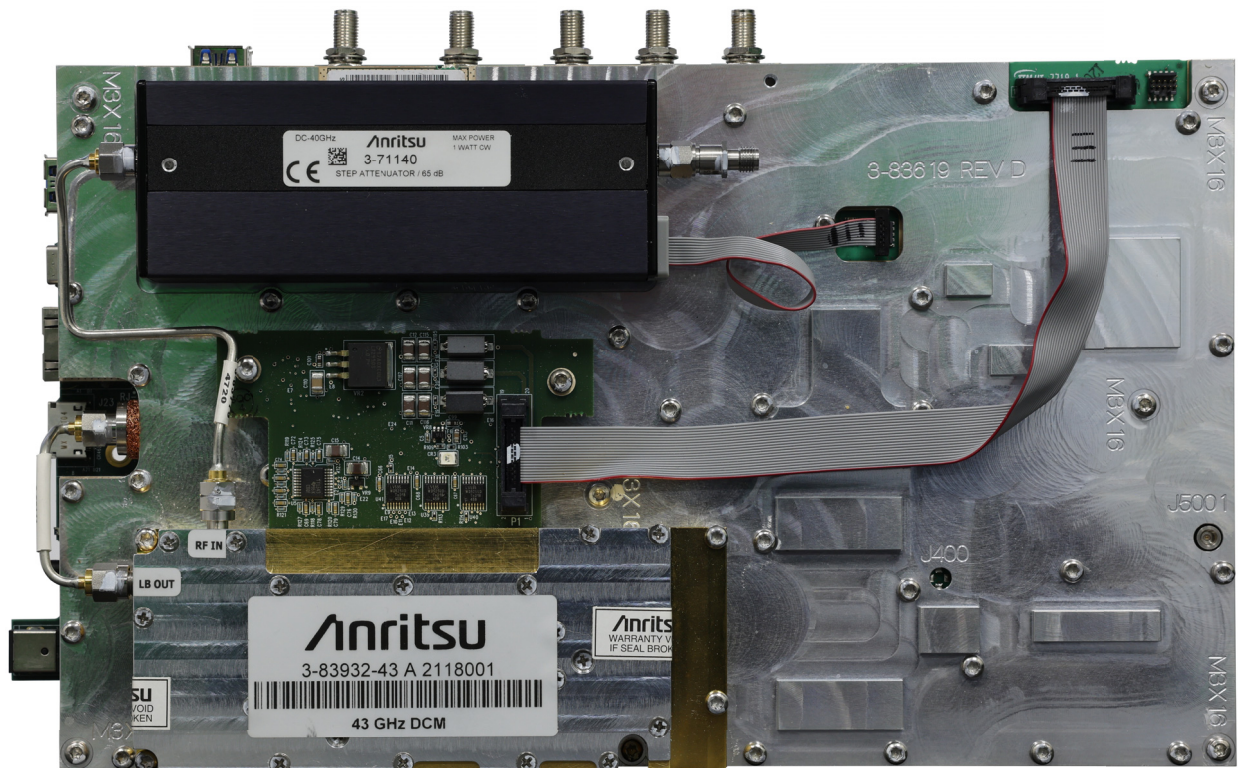


User Guide

Microwave Spectrum Monitor Module MS27200A

OEM Assembly for Custom System Integration



Anritsu

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Chapter 1 — General Information

1-1 Introduction

The MS27200A Microwave Spectrum Monitor Module (MSMM) User Guide covers the description of all connectors and interfaces. The system functions, supported measurements and other common features are controlled using SCPI commands only, refer to the programming manual (PN:10580-00481).

Before You Begin

Read the *Product Information, Compliance, and Safety Guide* (PN: 10100-00064) for important safety, legal, and regulatory notices before operating the equipment.

Additional Documentation

The MS27200A Microwave Spectrum Monitor Module (MSMM) is a subset of the MS27201A Remote Spectrum Monitor and shares many features depending on the configuration. The product documentation listed below can be referenced for product user information.

Table 1-1. Related Manuals

Document Part Number	Description
10100-00064	Product Information, Compliance, and Safety Notices
11410-02941	Microwave Spectrum Monitor Module Technical Data Sheet
10580-00416	Mobile InterferenceHunter (MIH) MX280007A User Guide
10580-00418	Vision™ MX280001A Spectrum Monitor Software User Guide
10580-00475	IQ Signal Master™ MX280005A Vector Signal Analysis Software User Guide
10580-00481	MS2720xA Programming Manual

For additional information and literature covering the product, visit the product page and select the Library tab:

<https://www.anritsu.com/en-us/test-measurement/products/ms27200a>

For more information and literature on IQ Signal Master Vector Signal Analysis Software, Vision monitoring software and Mobile InterferenceHunter, visit the product page and select the Library tab:

<https://www.anritsu.com/en-us/test-measurement/products/mx280005a>

<https://www.anritsu.com/en-us/test-measurement/products/mx280001a>

<https://www.anritsu.com/en-us/test-measurement/products/mx280007a>

1-2 Microwave Spectrum Monitor Module Description

The MS27200A MSMM is a synthesizer-based spectrum monitoring module that provides quick and accurate measurement results. The module is designed for monitoring, measuring, and analyzing signal environments. Measurements can easily be made by using the setups: frequency, span, amplitude, and bandwidth. A full range of marker capabilities (such as peak, center, and delta functions) are provided for faster, more comprehensive analysis of signals. Upper and lower multi-segmented limit lines are available to create quick, simple pass/fail measurements.

Time and date stamping of measurement data is automatic. The internal memory provides for the storage and recall of up to 1000 measurement setups and up to 1000 traces. Measurements and setups can be stored internally or on a USB memory device for later recall.

Note

Not all after-market USB memory devices are compatible with the MS27200A. The USB memory device must contain a single partition using FAT32, exFAT, NTFS, or ext4 file formats.

Available Models

[Table 1-2](#) lists the frequency options available with the MS27200A.

Table 1-2. MS27200A Frequency Options

Model	Frequency Range
MS27200A-0709	Spectrum Analyzer, 9 kHz to 9 GHz
MS27200A-0714	Spectrum Analyzer, 9 kHz to 14 GHz
MS27200A-0720	Spectrum Analyzer, 9 kHz to 20 GHz
MS27200A-0726	Spectrum Analyzer, 9 kHz to 26.5 GHz
MS27200A-0732	Spectrum Analyzer, 9 kHz to 32 GHz
MS27200A-0743	Spectrum Analyzer, 9 kHz to 43.5 GHz
MS27200A-0754	Spectrum Analyzer, 9 kHz to 54 GHz

Available Options

Available options for the MS27200A are listed in [Table 1-3](#).

Table 1-3. Available Options

Option ^a	Description
MS27200A-0017	Secure Communication
MS27200A-0027	Channel Scanner
MS27200A-0031	GNSS Receiver (requires GNSS antenna, sold separately)
MS27200A-0089	Zero Span IF Output
MS27200A-0090	Gated Sweep
MS27200A-0104	110 MHz Analysis Bandwidth
MS27200A-0124	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set)
MS27200A-0125	IQ Waveform Streaming (Includes MX280005A IQ Signal Master base feature set) (requires Option 124)
MS27200A-0126	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set) (Non-Export Controlled)
MS27200A-0127	IQ Waveform Streaming (Includes MX280005A IQ Signal Master base feature set) (requires Option 126, Non-Export Controlled)
MS27200A-0128	Enable Vector Signal Analysis (requires Option 124 or 126)
MS27200A-0199	Real-Time Spectrum Analysis (RTSA)
MS27200A-0400	Enable Vision Monitor

Table 1-3. Available Options

Option ^a	Description
MS27200A-0401	Enable Vision Locate (requires Option 400)
MS27200A-0407	Enable Vision High-Speed Port Scanner
MS27200A-0421	Pulse Analyzer
MS27200A-0509	AM/FM Modulation Measurements
MS27200A-0871	WCDMA FDD Measurements (requires Option 31)
MS27200A-0883	LTE FDD/TDD Measurement (requires Option 31)
MS27200A-0888	5G NR Downlink Measurements (requires Option 31)
MS27200A-xxxx-0097	Accredited Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.
MS27200A-xxxx-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.
MS27200A-xxxx-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.

a. xxxx is the frequency option number.

Table 1-4. Supported Software

Model	Description
MX280001A	Vision™ Spectrum Monitor Software
MX280005A	IQ Signal Master™ Vector Signal Analysis Software

1-3 Care and Preventive Maintenance

The care and preventive maintenance consist of proper operation in a suitable environment, occasional cleaning of the module, and inspecting and cleaning the RF connectors and all accessories before use. Use a soft, lint-free cloth dampened with water or water and a mild cleaning solution for cleaning.

Caution	To avoid damaging the assembly, do not use solvents or abrasive cleaners.
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Ventilation and Cooling

For proper operation within the specified operating temperature range, the CPU temperature should be maintained below 90°C. To monitor the CPU temperature, use the SCPI command :SYSTem:TEMPerature?. This command and all other SCPI commands can be found in the programming manual (PN -10580-00481).

Caution	Do not operate or store the Microwave Spectrum Monitor Module in extreme environments. Refer to the product Technical Data Sheet for the specified operating and storage conditions.
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Connector Care

Clean the RF connectors and center pins with a cotton swab dampened with denatured alcohol. Visually inspect the connectors. The fingers of the K(f) connector and the pins of the K(m) connectors should be unbroken and uniform in appearance. If you are unsure whether the connectors are undamaged, gauge the connectors to confirm that the dimensions are correct. Visually inspect the test port cable(s). The test port cable should be uniform in appearance and not stretched, kinked, dented, or broken.

To prevent damage to your module, do not use pliers or a plain wrench to tighten the Type-K and Type-V connectors. The recommended torque is 12 lbf · in to 15 lbf · in (1.36 N · m to 1.70 N · m). Inadequate torque settings can affect measurement accuracy. Over-tightening connectors can damage the cable, the connector, the module, or all of these items.

Visually inspect connectors for general wear, cleanliness, and for damage such as bent pins or connector rings. Repair or replace damaged connectors immediately. Dirty connectors can limit the accuracy of your measurements. Damaged connectors can harm the module. Connection of cables carrying an electrostatic potential, excess power, or excess voltage can damage the connector, the module, or both.

Connecting Procedure

1. Carefully align the connectors. The male connector center pin must slip concentrically into the contact fingers of the female connector.
2. To tighten, turn the connector nut, not the connector body. Major damage can occur to the center conductor and to the outer conductor if the connector body is twisted.
3. If you use a torque wrench, initially tighten by hand so that approximately 1/8 turn or 45 degrees of rotation remains for the final tightening with the torque wrench.
4. Relieve any side pressure on the connection (such as from long or heavy cables) in order to assure consistent torque. Use an open-end wrench to keep the connector body from turning while tightening with the torque wrench. Do not over-torque the connector.

Disconnecting Procedure

1. If a wrench is needed, use an open-end wrench to keep the connector body from turning while loosening with a second wrench.
2. Complete the disconnection by hand, turning only the connector nut.
3. Pull the connectors straight apart without twisting or bending.

ESD Caution

The Microwave Spectrum Monitor Module is susceptible to an electrostatic discharge (ESD) damage. The board often builds up a static charge, which if not discharged may damage the input circuitry. Make sure to be aware of the potential for ESD damage and take all necessary precautions.

Operators should exercise practices outlined within industry standards such as JEDEC-625 (EIA-625), MIL-HDBK-263, and MIL-STD-1686, which pertain to ESD and ESDS devices, equipment, and practices. Because these apply to the Microwave Spectrum Monitor Module, it is recommended that any static charges that may be present be dissipated. This may be as simple as temporarily attaching a short or load device to the cable or antenna prior to attaching to the Microwave Spectrum Monitor Module. It is important to remember that the operator may also carry a static charge that can cause damage. Following the practices outlined in the above standards will ensure a safe environment for both personnel and equipment.

1-4 Calibration and Verification

The Microwave Spectrum Monitor Module comes fully calibrated from the factory and there are no field-adjustable components. Anritsu recommends annual calibration and performance verification by local Anritsu service centers.

1-5 Contacting Anritsu for Sales and Service

To contact Anritsu, visit the following URL and select the services in your region:

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

Chapter 2 — Overview

2-1 Introduction

This chapter provides an overview of the Anritsu MS27200A. It describes the connectors and interfaces, and provides installation information and remote connection and configuration details. For information on using SCPI commands, refer to the programming manual (PN:10580-00481).

Note	All system functions, supported measurements, and other common features are controlled using SCPI commands only.
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2-2 Connector Panels

The MS27200A uses two connector panels to provide for all physical IO. These panels use a variety of connector types intended for their purpose.

RF Connectors

The main RF input connector is Type K or Type V depending on the frequency option that is installed. These are 50 Ω connectors. Type K and Type V are female. Additional IO ports are provided with female 50 Ω SMA connectors.

Caution	To prevent damaging the connectors, do not use pliers or a plain wrench to tighten the connectors. Do not overtighten the connector. The recommended torque for Type K and V is 8 lbf·in (0.9 N·m or 90 N·cm).
----------------	--

Front Panel

Figure 2-1 shows the front connector panel on the MS27200A.

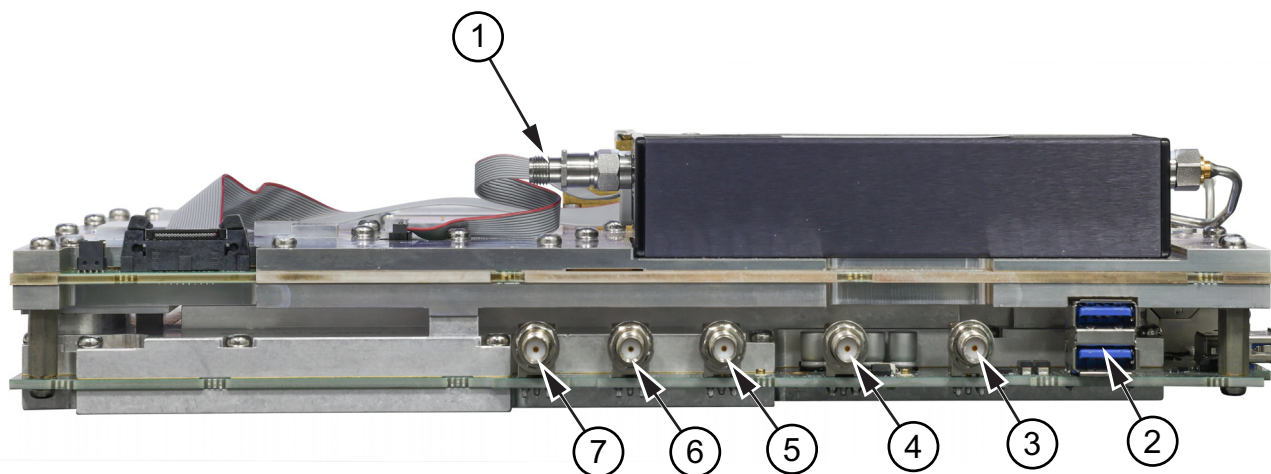


Figure 2-1. Front Panel Connectors

1. RF In Port: This is a 50 Ω connector of the following:

- Type K female with options 709, 714, and 720, 726, 732, and 743
- Type V female with option 754

Maximum Input: ± 50 VDC, +23 dBm, +13 dBm with Preamp On

To prevent damage to your module, do not try to mate incorrect connector types or use pliers or a plain wrench to tighten the connector. Do not overtighten the connector. The recommended torque for Type K and Type V is 8 lbf·in (0.9 N·m or 90 N·cm).

2. USB 3.0 Interface – Type A: The Microwave Spectrum Monitor Module has three Type A USB connectors; two are located on the front panel and the third is located on the side panel, that are compatible with USB storage devices for saving measurements, setup data, and screen images.

Note

The MS27200A is compatible with external USB memory devices that have an integrated keypad and are FIPS compliant using AES 256-bit encryption.

3. GNSS Antenna Connector: The GNSS antenna connector is type SMA female. This connector also provides 5.0/3.3 VDC for an active GNSS antenna. To prevent damage to your module, do not use pliers or a wrench to tighten the connector.

4. Bias Voltage: The bias voltage connection is type SMA female. The power supply is set up to provide 1 V to 34 V with a resolution of 0.1 V. The maximum current is 1 A, but with at total maximum power of 15 W. To prevent damage to your module, do not use pliers or a wrench to tighten the connector.

5. Trigger In/Out: A TTL signal that is applied to the external trigger 50 Ω SMA connector causes a single sweep to occur. In spectrum analysis, triggering is generally used in zero span, and triggering occurs on the rising edge of the signal. After the sweep is complete, the resultant trace is retained until the next trigger signal arrives. To prevent damage to your module, do not use pliers or a wrench to tighten the connector.

6. Trigger In/Out / Ref Out (10 MHz): This port can be configured as a trigger in/out as above or as a reference output. The reference output port is a 50 Ω SMA female connector that provides 10 MHz at approximately –7 dBm to 0 dBm. To prevent damage to your module, do not use pliers or a wrench to tighten the connector.

7. Ref In: The external reference input port is a 50 Ω SMA connector that provides for input of an external frequency reference. Refer to your technical data sheet for valid frequencies. The module automatically selects the frequency reference in the following order of priority: external, GNSS (GPS), then the internal time base. To prevent damage to your module, do not use pliers or a wrench to tighten the connector.

Side Panel

Figure 2-2 shows the side connector panel of the MS27200A.

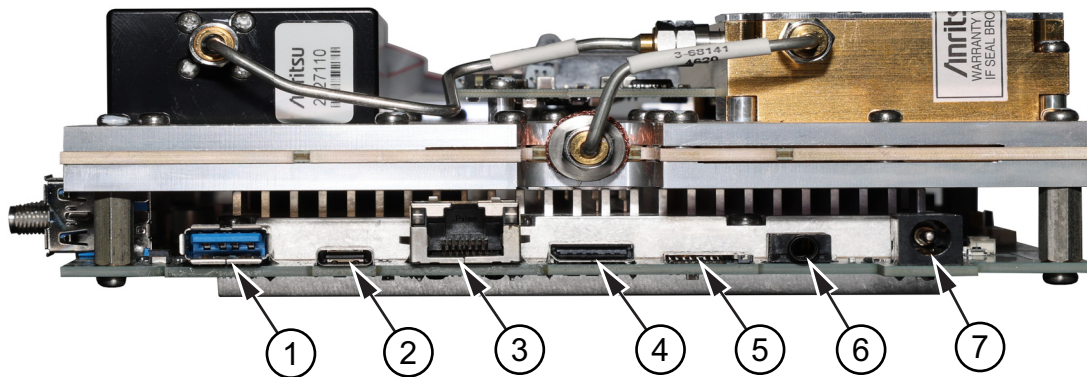


Figure 2-2. Side Panel Connectors

- 1. USB 3.0 Interface – Type A:** The Microwave Spectrum Monitor Module has one Type A USB connector in the side panel that accept USB storage devices for saving measurements, setup data, and screen images.
- 2. USB Interface – Type C:** The USB Type-C port is used to connect the Microwave Spectrum Monitor Module directly to a PC and provides a remote SCPI programming interface via USBTMC (USB Test and Measurement Class). Refer to the MS2720xA programming manual for remote SCPI control setup and commands.
- 3. LAN Connection:** The RJ-45 connector is used to connect the Microwave Spectrum Monitor Module to a local area network or directly to a PC with an Ethernet crossover cable.
- 4. Data Out Port:** The Data Out port is used for IQ Streaming. This is a multi-purpose, hot pluggable input/output (I/O) interface. Refer to your technical data sheet (PN:11410-02941) to find MA25101A IQ Streaming PCIe Kit specifications.
- 5. MicroSD:** The Micro Secure Digital (SD) slot is a small expansion slot located on the side panel. The slot accepts industry standard MicroSD storage cards.

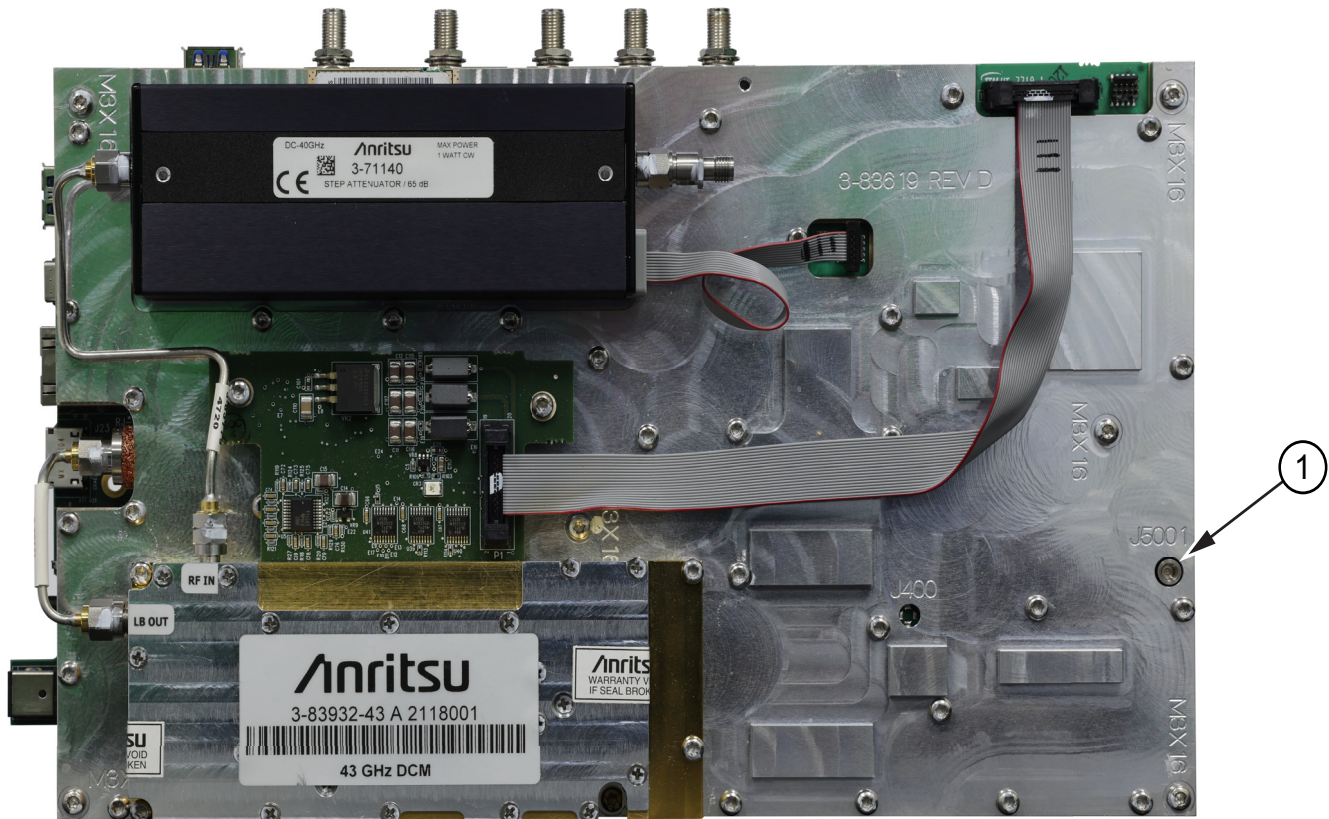
Note	The MicroSD slot is not supported currently.
-------------	--

- 6. Headset Jack:** The 3-wire headset jack provides audio output from the built-in sounds. The jack accepts a 3.5 mm 3-wire miniature phone plug such as those commonly used with cellular telephones.
- 7. External Power:** This is a 2.5 mm by 5.5 mm barrel connector, 14-16 VDC, 5 watts, center positive, used to power the assembly.

Warning	When using the AC-DC Adapter, always use a three-wire power cable that is connected to a three-wire power line outlet. If power is supplied without grounding the equipment in this manner, the user is at risk of receiving a severe or fatal electric shock.
----------------	--

IF Out

This 50 Ω SMP male connector provides internal IF output. The nominal frequency range is 325 MHz with FFT capture bandwidth $\leq$ to 32 MHz, and 300 MHz with FFT capture bandwidth $>$ 32 MHz. The nominal RF output level is -4 dBm with a 10 MHz, -20 dBm input, and with 0 dB input attenuation and preamp off. The spectrum can be inverted in certain RF input bands. To prevent damaging the connectors do not use pliers or a wrench to tighten the connector. The IF output is connected to J5001 shown at location 1 in [Figure 2-3](#).

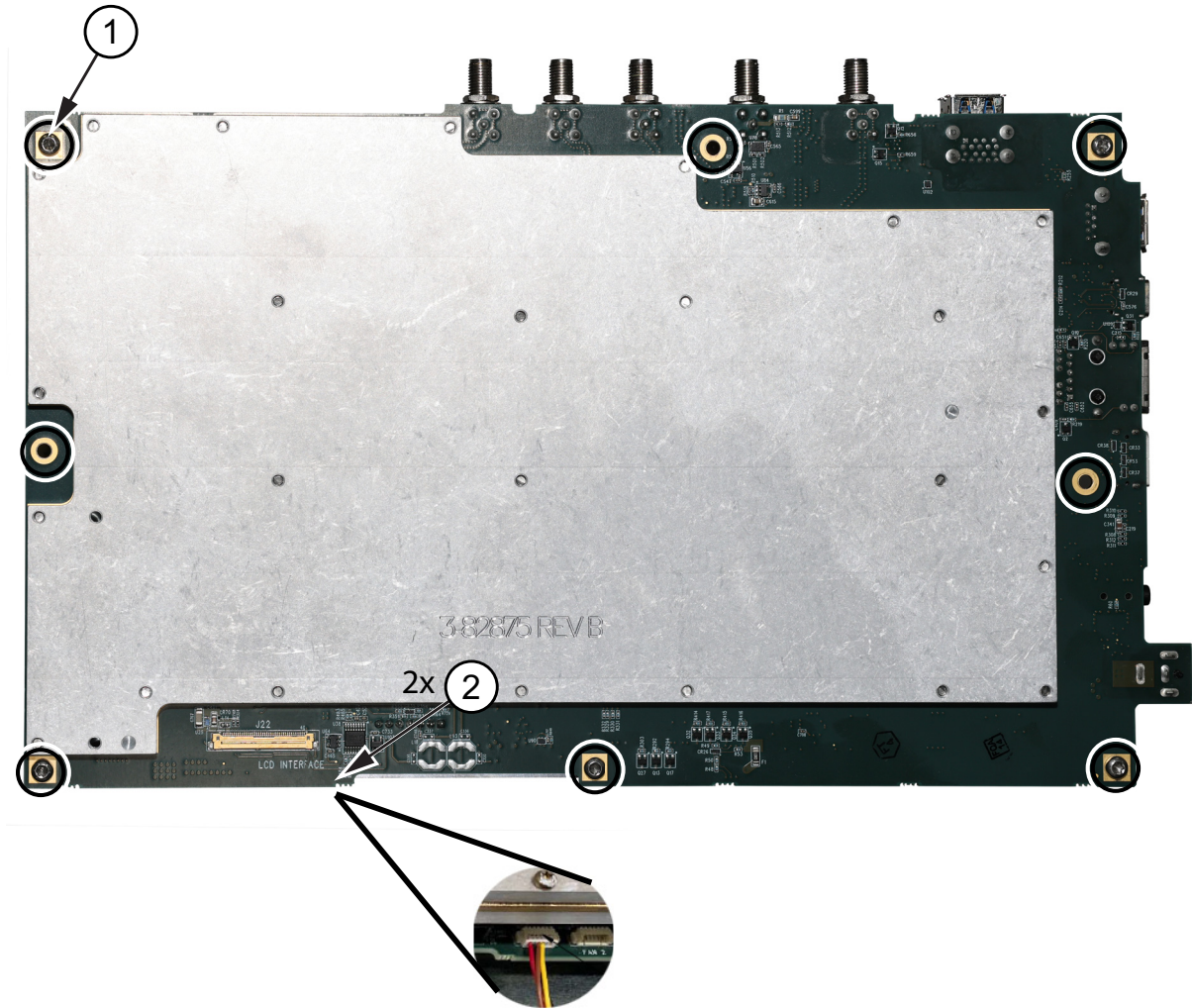


1. IF Out Port: 50 Ω SMP(m) Connector

Figure 2-3. IF Out Port

2-3 Installation

The MS27200A assembly is designed to be mounted using the eight locations shown at location 1. The assembly is equipped with two fan connectors to enable forced air ventilation sufficient to maintain CPU temperatures below 90°C shown at location 2 in [Figure 2-4](#).



1. Eight mounting locations
2. Two, 1.25mm (.049") fan connectors

Figure 2-4. MS27200A Installation - Mounting Locations and Fan Connector

2-4 Remote Connection and Configuration

To communicate with the MS27200A or to change its IP configuration, a PC or controller must be correctly set up to communicate with the module using SCPI commands via either the Ethernet or USBTMC (USB Type-C) port.

Ethernet Configuration

Most instrument functions (except power on/off) can be controlled via a network connection to a PC connected directly (with an Ethernet cross-over cable) or through a network. The product firmware supports the TCP/IP raw socket network protocol.

Static IP Configuration

The MS27200A is shipped with the following default static IP configuration:

- **DHCP:** OFF (Static IP Address)
- **Static IP Address:** 10.0.0.2
- **Subnet Mask:** 255.255.255.0
- **Default Gateway:** 10.0.0.1

If the IP address is unknown or has been changed, follow the steps below to retrieve the IP address using a USB memory device:

1. Insert a USB memory device into one of the Type-A USB ports of the module and wait approximately ten seconds for the module to write an ip.txt file. This file contains the network configuration.
2. Plug in the USB memory device into your PC, select the USB drive, and open ip.txt file to retrieve the IP address.

Dynamic IP Configuration

After the PC is properly configured with static IP and a good connection has been established, SCPI commands are used to configure the Ethernet settings to different values.

Caution

Consult with your network administrator when configuring the network interface to avoid potential loss of access or discovery of the device.

The following steps describe how to verify and set the Ethernet configuration through SCPI programming:

1. Using any SCPI client, send the *IDN? query command to your instrument IP address (10.0.0.2 default) on port 9001. Verify the response includes the model and serial numbers, and other information.

Note

If a response is not returned, try switching to a cross-over Ethernet cable and send the query command again. Ensure that your SCPI client has the termination character enabled: \n Line Feed (xA).

2. To configure the instrument for DHCP, send the following SCPI commands to your instrument IP address on port 9001:

```
SYSTem:COMMunicate:LAN:DHCP?
```

Queries the DHCP setting. The return value should be OFF if the instrument is currently configured for static IP.

```
SYSTem:COMMunicate:LAN:DHCP ON
```

Turns the DHCP setting ON. The setting is applied immediately upon sending the command.

3. Turning DHCP ON will change the IP address and the module must then be connected to a DHCP network to obtain a new IP address.

- Obtain the new IP by one of the following:

Use the Anritsu Discovery program to retrieve the new IP address (see “UDP Discovery Tool” on page 2-8 for instructions on using the discovery program)

Insert a USB memory device into one of the USB Type-A ports to retrieve the ip.txt file containing the IP address information.

- Send the *IDN? SCPI command to verify a connection has been established.

USBTCM Configuration

The USB Type-C port can be used for remotely controlling MS27200A via SCPI programming. For remote USB control, the PC or controller must be configured to communicate via USBTCM. The following example shows the use of NI Virtual Instrument Software Architecture (NI-VISA) installed on a PC that supports USBTCM (USB Test and Measurement Class) devices. Refer to <https://www.ni.com/visa/> for software downloads and installation instructions. The first time the instrument is connected to a PC, the normal USB device detection by the computer operating system takes place and SCIP commands can be sent via USB.

Using NI-VISA

The instructions below illustrate sending SCPI commands via USBTCM and Ethernet:

- On the PC, open NI-VISA VISA Interactive Control dialog:

For USB device connection, double-click the desired instrument resource.

For Ethernet device connection, enter the IP address and press Enter.

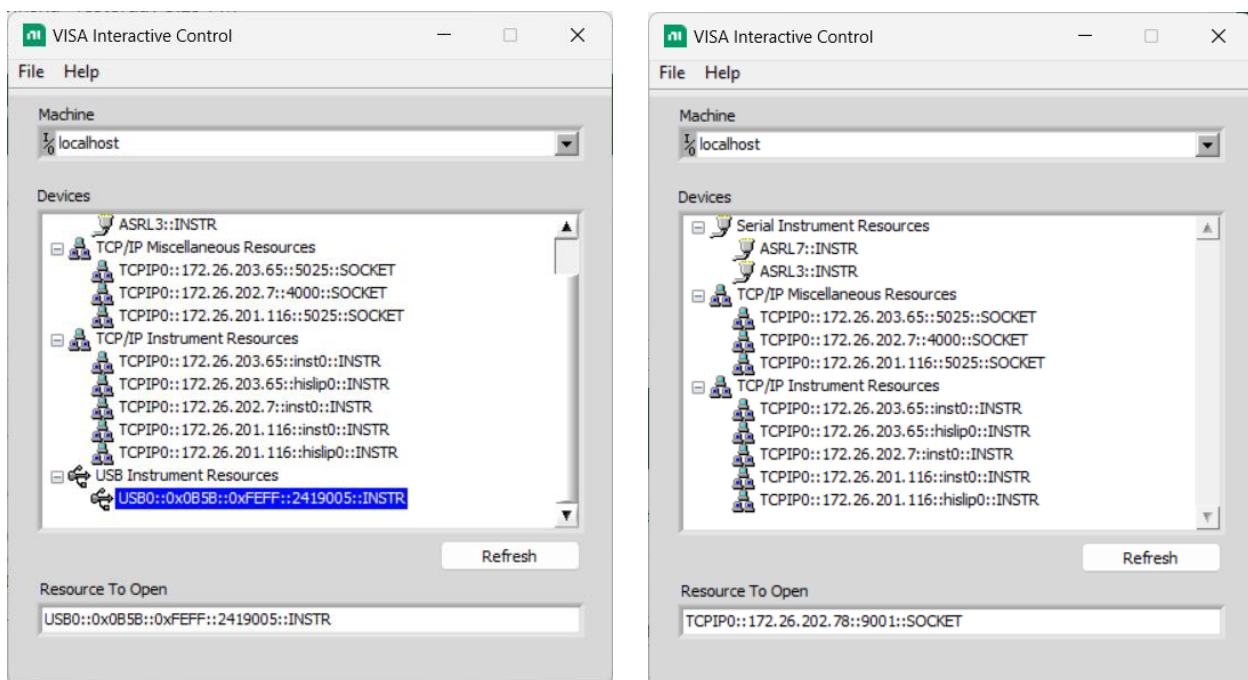


Figure 2-5. VISA Interactive Control Dialog - USBTCM (left); Ethernet (right)

2. Select Input/Output tab and enter the default *IDN?\n command and click Query.

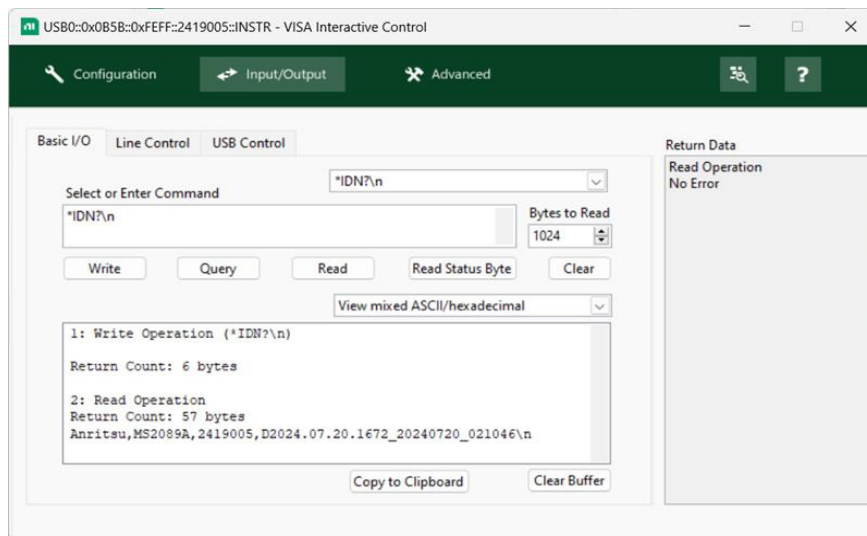


Figure 2-6. VISA Interactive Control - Input/Output Tab (USBTCM)

UDP Discovery Tool

The UDP Discovery Tool is a Windows application that will display a sortable list of available MS2720xA devices on the network. This tool provides the ability to find and filter devices by Hostname, Model number, Serial number, MAC address, Version number, or by IP Address. If needed, the tool also provides the ability to save the results of your search and to view a brief history of your searches for comparison.

<https://www.anritsu.com/en-US/test-measurement/support>

During the download process, a screen will appear as shown in [Figure 2-7](#).

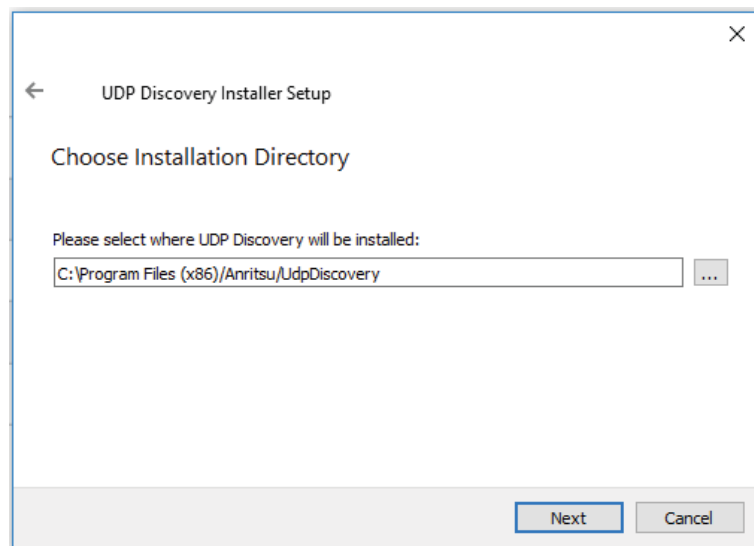
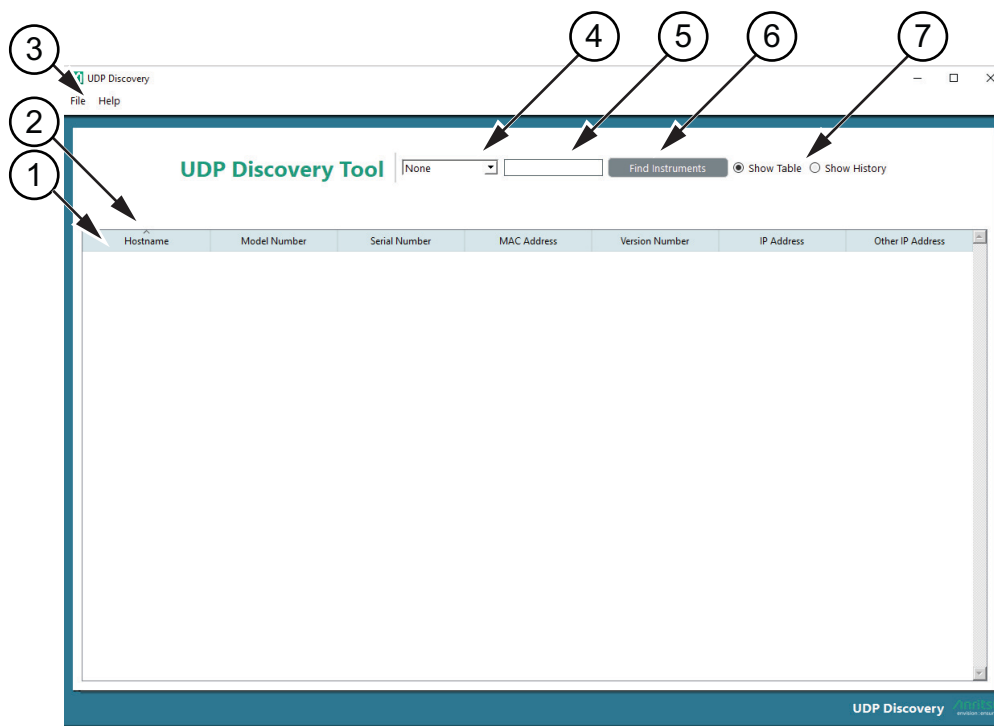


Figure 2-7. Installation Directory Default Location

When the download is complete, a user interface will appear as shown in [Figure 2-8](#).



1. Column Header
2. Column Filter Caret
3. Toolbar
4. Selection Filter List
5. Filter Entry Field
6. Find Instruments Bar
7. Display Type

Figure 2-8. UDP Discovery Tool User Interface

Communicating with the module

There could be many instruments already connected to the network. Use the selection filter to narrow the search results.

Select a filter method

1. Click the connection arrow to display the filter list box are shown in [Figure 2-9](#).

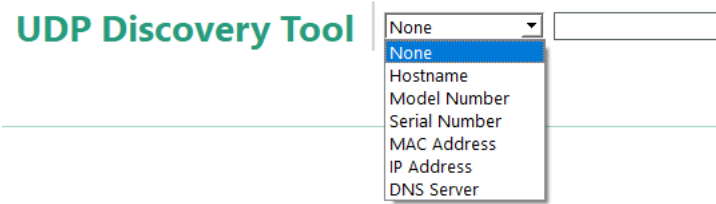


Figure 2-9. Filter List Box

2. Click a filter method from the list. The selections available are None, Hostname, Model Number, Serial Number, Mac Address, IP Address, IP Address, and DNS Server.

If a Hostname, Model Number, Serial Number, Mac Address, IP Address, IP Address, or DNS Server is not known, select None.

- None: All instruments attached to the local area network will be listed.
- Hostname: Host name of the probe
- Model Number: Model Number of the probe
- Serial Number: Serial Number of the probe
- MAC Address: Medium Access Control (MAC) address
- IP Address: Internet Protocol (IP) address
- DNS Server: Domain Name System (DNS) server

3. Click None to display an alphabetical listing of the inventoried instruments available to connect as shown in [Figure 2-10](#).

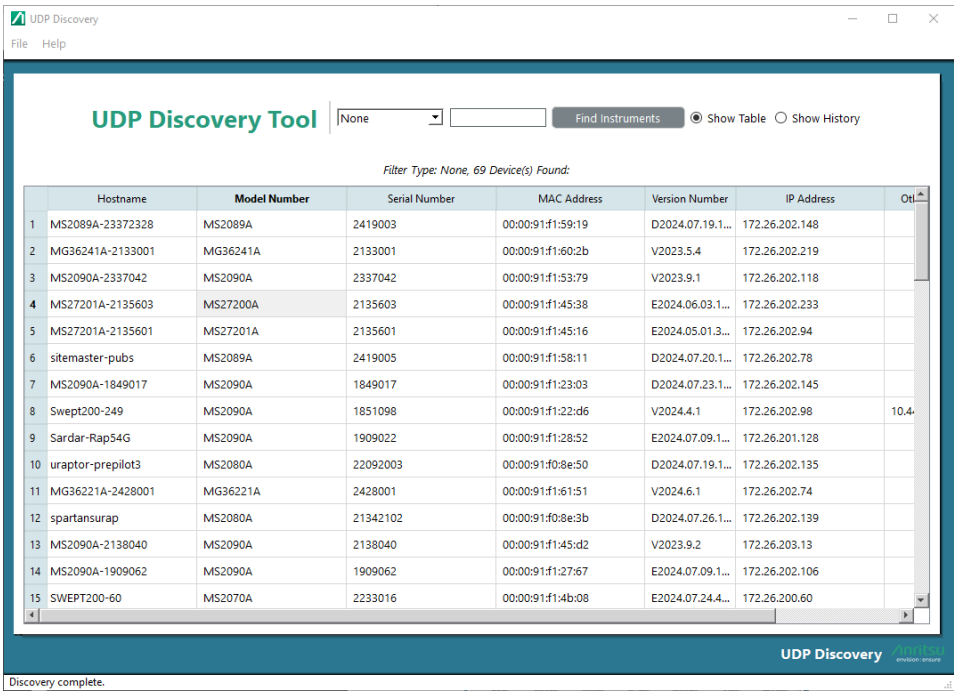


Figure 2-10. Displayed Instrument Inventory

Sorting the Listing

Selecting a column header displays a filter caret above column header as shown in [Figure 2-8](#). When the caret is clicked, the listing is sorted by the column in the direction the caret is pointing. Clicking the caret again reverses the caret direction and sorts the listing in reverse order.

Copy and Paste Example

In this example, refer to the listing in [Figure 2-10](#).

1. Click serial number 2135603.
2. Copy the serial number.
3. Paste the serial number in the box to the right of the filter list.
4. Click the Find Instruments bar. If the instrument is located, the instrument details will be displayed as shown in [Figure 2-11](#).

A status readout is displayed above the column headings. In this example, the readout is:

Filter Type: Serial Number, Filter Value: 1713003, 1 Device(s) Found:

If the device could not be found, the last section would read: *No Device Found*.

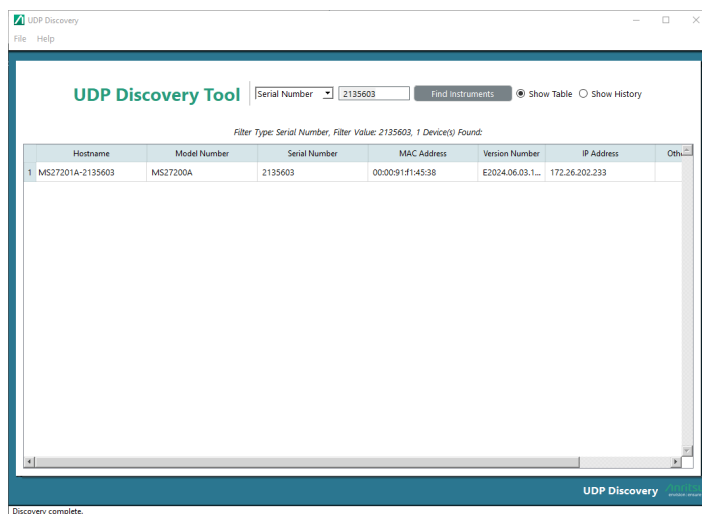


Figure 2-11. Locate Instrument

Connecting another device will erase the Show Table log and display the new device details. The previous erased device details will be available in the Show History log until the history details are erased. See [“Clearing the History”](#) on page 2-12.

User Interface Display Types

The selectable radio buttons provide the Show Table and Show History user interface connection display.

Show Table : Click this radio button to display the device connection details as shown in [Figure 2-11](#).

Show History : Click this radio button to display current and previous connection-activity details as shown in [Figure 2-12](#).

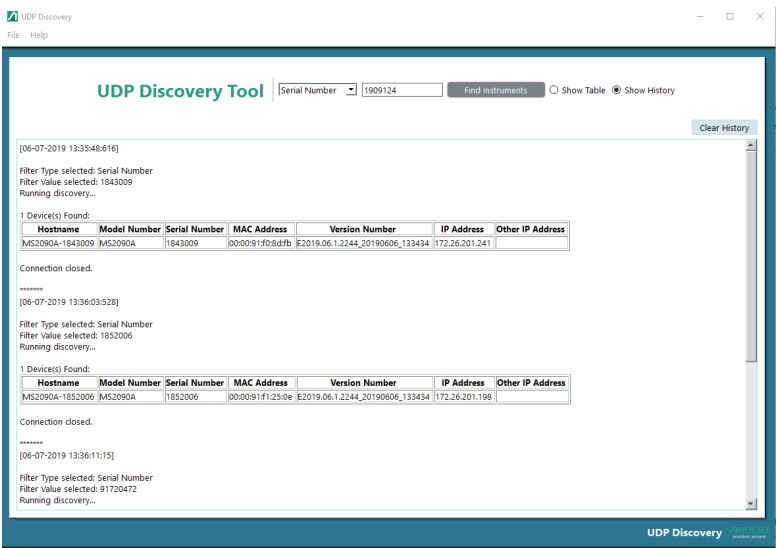


Figure 2-12. Show History

Clearing the History

Clear the Show History log by clicking the Clear History button or by clicking Clear Log from the Toolbar File menu.

- 1. Click Clear History will display the dialog shown in [Figure 2-13](#).

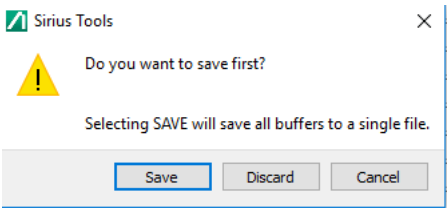


Figure 2-13. Clear History Dialog

- a. Click Save to save to a users selected location.
- b. Click Discard to remove the history contents without saving. The data will not be retrievable.
- c. Click Cancel to ignore the clear history request.

2. Click the File menu to display the menu as shown in [Figure 2-14](#).

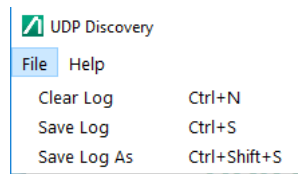


Figure 2-14. Clear History Using the File Menu

- a. Click **Clear Log** to remove the History contents without saving. The data will not be retrievable.
- b. Click **Save Log** to save to a users selected location. The location will be the same location selected from the **Save Log As** submenu.
- c. Click **Save Log As** to save to a users selected location.



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Anritsu utilizes recycled paper and environmentally conscious inks and toner.

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
<http://www.anritsu.com>