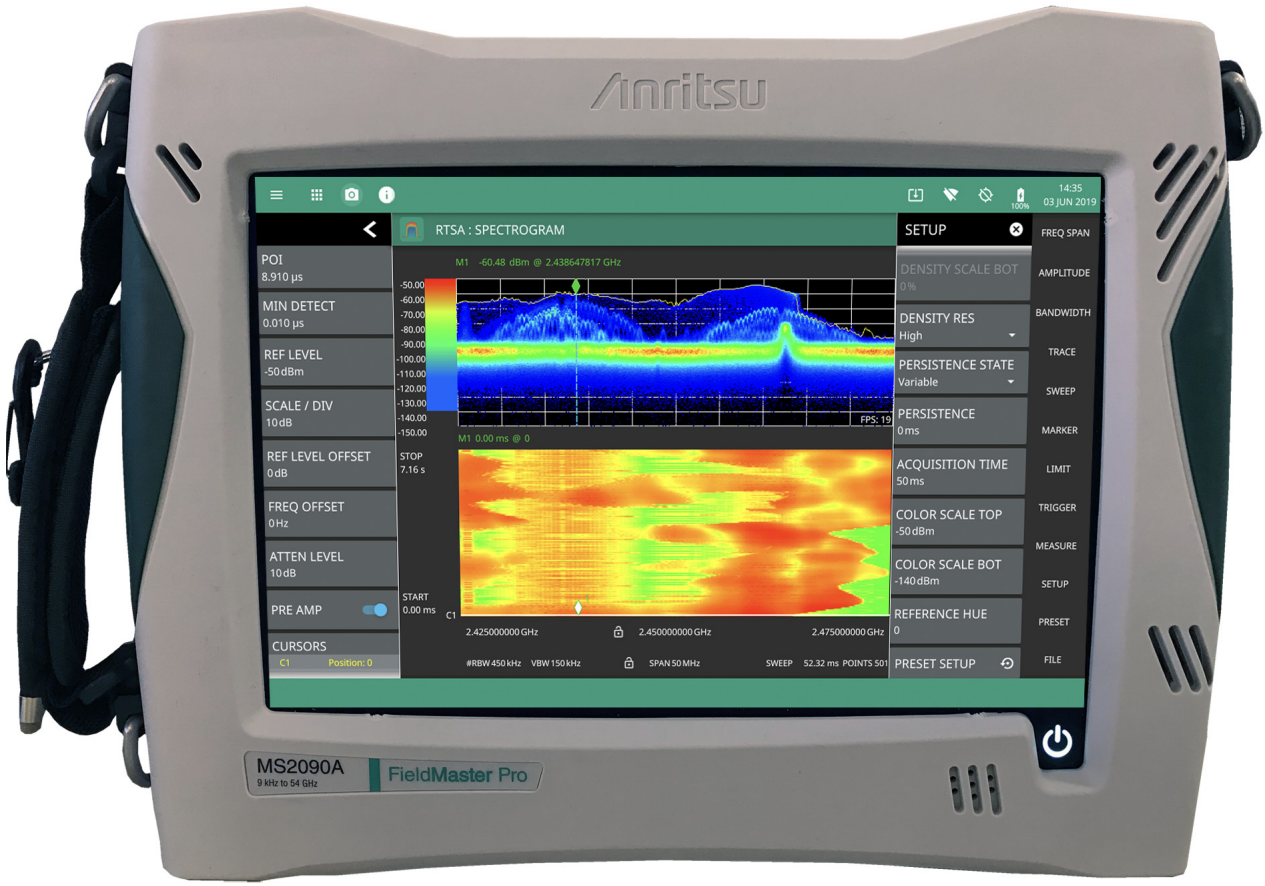
User Guide

Field Master Pro™ MS2090A

High-Performance Handheld Spectrum Analyzer

MS2090A-0709 9 kHz to 9 GHz (Option 709)
MS2090A-0714 9 kHz to 14 GHz (Option 714)
MS2090A-0720 9 kHz to 20 GHz (Option 720)
MS2090A-0726 9 kHz to 26.5 GHz (Option 726)
MS2090A-0732 9 kHz to 32 GHz (Option 732)
MS2090A-0743 9 kHz to 43.5 GHz (Option 743)
MS2090A-0754 9 kHz to 54 GHz (Option 754)



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Chapter 1 — General Information

1-1 Introduction

The MS2090A Field Master Pro User Guide covers all of the instrument functions and their use. This manual covers the instrument overview, connector panels, and other common features. Instrument notifications and troubleshooting information is covered in Appendix A. Remote programming is covered in the programming manual (PN: 10580-00445). Additionally, the MS2090A Field Master Pro offers Anritsu Remote and Report Tools (ARRT) software that replicates the instrument's user interface onto your PC/laptop screen. This allows the user to connect with the instrument via Ethernet connection or Wi-Fi. The ARRT software on the remote client facilitates the ability to recall data and perform on-screen measurement analysis without the need to physically access the instrument (refer to Appendix D, "ARRT Software").

Before You Begin

- Read the *Field Master Pro MS2090A Information, Compliance, and Safety Guide* (PN: 10100-00069) for important safety, legal, and regulatory notices before operating the equipment.
- Charge the instrument battery using the supplied battery charger until fully charged.

Note	The instrument may reboot when the battery charge level is low and external power is removed.

Additional Documentation

Table 1-1. Related Manuals

Document Part Number	Description
10100-00069	Product Information, Compliance, and Safety Notices
11410-01000	MS2090A Field Master Pro™ Technical Data Sheet
10580-00418	Vision™ MX280001A Spectrum Monitor Software
10580-00445	MS2090A Field Master Pro™ Programming Manual
10580-00447	Spectrum Analyzer Measurement Guide Interference Finder (Option 24) Zero Span IF Output (Option 89) Gated Sweep (Option 90) 150 MHz Analysis Bandwidth (Option 105) Coverage Mapping (Option 431) EMF Measurement (Option 444) AM/FM Modulation Measurement (Option 509)
10580-00448	150 MHz Analysis Bandwidth (Option 105) Real-Time Spectrum Analyzer (RTSA) Measurement Guide (Option 199) Interference Finder (Option 24) AM/FM Modulation Measurement (Option 509)
10580-00449	5GNR Measurement Guide (Option 888) GNSS Receiver (Option 31) Gated Sweep (Option 90) Coverage Mapping (Option 431)
10580-00450	LTE Signal Analyzer Measurement Guide (Option 883) Gated Sweep (Option 90) Coverage Mapping (Option 431)
10580-00451	Pulse Analyzer Measurement Guide (Option 421)
10580-00489	EMF Meter Measurement Guide (Option 445)
10580-00490	IQ Capture/Streaming Measurement Guide (Options 124/126 and Options 125/127)
10580-00492	High Accuracy Power Meter Measurement Guide (Option 19)
10580-00493	Cable and Antenna Analyzer Measurement Guide (Option 331)
10580-00501	WCDMA FDD Measurement Guide (Option 871)
10580-00504	Channel Scanner Measurement Guide (Option 27)

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

http://www.anritsu.com/en-US/test-measurement/products/ms2090a

Document Conventions

The following conventions are used throughout the MS2090A documentation set.

Instrument Identification

When identifying a frequency option for the MS2090A, that option number is appended after the model number; example: MS2090A-0709.

User Interface

The MS2090A user interface consists of menus, buttons, toolbars, and dialog boxes.

User Interface Navigation

Elements in navigation paths are separated as follows: MARKER > PEAK SEARCH > NEXT PEAK.

1-2 Instrument Description

The MS2090A Field Master Pro is a synthesizer-based handheld spectrum analyzer that provides quick and accurate measurement results. The instrument is designed for monitoring, measuring, and analyzing signal environments. Measurements can easily be made by using the main instrument functions: frequency, span, amplitude, and bandwidth. A 10.1" capacitive touchscreen enables fast, easy data entry.

Typical measurements include in-band interference and transmit spectrum analysis, plus cell site and 802.11a/b/g interference testing. Options are available for RF, advanced demodulation, and over-the-air (OTA) measurement. A full range of marker capabilities (such as peak, center, and delta functions) are provided for faster, more comprehensive analysis of displayed 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 on the instrument or on a USB memory device for later recall.

Note	Not all after-market USB drives are compatible with Field Master Pro. The USB drive must contain a single partition using either FAT32, exFAT, NTFS and ext4 file formats.

Available Models

Table 1-2 lists the frequency options available with the MS2090A Field Master Pro.

Table 1-2. Field Master Pro Frequency Options

Model	Frequency Range
MS2090A-0709	Spectrum Analyzer, 9 kHz to 9 GHz
MS2090A-0714	Spectrum Analyzer, 9 kHz to 14 GHz
MS2090A-0720	Spectrum Analyzer, 9 kHz to 20 GHz
MS2090A-0726	Spectrum Analyzer, 9 kHz to 26.5 GHz
MS2090A-0732	Spectrum Analyzer, 9 kHz to 32 GHz
MS2090A-0743	Spectrum Analyzer, 9 kHz to 43.5 GHz
MS2090A-0754	Spectrum Analyzer, 9 kHz to 54 GHz

Available Options

Available options for the Field Master Pro are listed in Table 1-3.

Table 1-3. Available Options

Option[a]	Description
MS2090A-0003	Time-domain Reflectometry Measurement
MS2090A-0006	Remove Wi-Fi and Bluetooth™
MS2090A-0017	Secure Communication
MS2090A-0019*	High Accuracy Power Meter (requires compatible USB power sensor, sold separately)
MS2090A-0024*	Interference Finder
MS2090A-0027*	Channel Scanner
MS2090A-0031*	GNSS Receiver (requires external GNSS antenna)
MS2090A-0089*	Zero Span IF Output
MS2090A-0090*	Gated Sweep
MS2090A-0103*	55 MHz Analysis Bandwidth
MS2090A-0104*	110 MHz Analysis Bandwidth
MS2090A-0124*	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set)
MS2090A-0125*	IQ Waveform Streaming (Includes MX280005A IQ Signal Master base feature set) (Requires Option 124)

Table 1-3. Available Options

Option[a]	Description
MS2090A-0126*	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set) (Non-Export Controlled)
MS2090A-0127*	IQ Waveform Streaming (Includes MX280005A IQ Signal Master base feature set) (Requires Option 126, Non-Export Controlled)
MS2090A-0128*	Vector Signal Analysis Enabled (requires Option 124 or 126; use with MX280005A)
MS2090A-0199*	Real-Time Spectrum Analysis (RTSA)
MS2090A-0331*	Cable and Antenna Analyzer (requires Site Master S331P analyzer, sold separately)
MS2090A-0400*	Enable Vision Monitor
MS2090A-0401*	Enable Vision Locate (requires Option 400)
MS2090A-0407*	Enable Vision High-Speed Port Scanner
MS2090A-0421*	Pulse Analyzer
MS2090A-0431*	Coverage Mapping (requires Option 31)
MS2090A-0444*	EMF Measurement (requires a compatible Anritsu isotropic antenna)
MS2090A-0445*	EMF Meter Enabled (requires 2000-1985-R isotropic EMF probe)
MS2090A-0509*	AM/FM Modulation Measurements
MS2090A-0871*	WCDMA FDD Measurements (requires Option 31)
MS2090A-0883*	LTE FDD/TDD Measurement (requires Option 31)
MS2090A-0888*	5GNR Downlink Measurements (requires Option 31)
MS2090A-xxxx-0097	Accredited Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.
MS2090A-xxxx-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.
MS2090A-xxxx-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.
*** Timed-Limited Options**	Options marked with an asterisk are offered as a 90-day time limited option by ordering as a -9xxx series option. For example, MS2090A-9888 is the 90-day time limited option for 5GNR FDD/TDD Measurements. The option start time begins when the user first activates the option.

a. xxxx is the frequency option number of the instrument.

Table 1-4. Supported Software

Model	Description
MX280001A	Vision™ Software
MX280005A	IQ Signal Master™ Vector Signal Analysis Software
MX280007A	Mobile InterferenceHunter™ Software
ARRT	Anritsu Remote and Report Tools

1-3 Instrument Care and Preventive Maintenance

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

Caution	To avoid damaging the display or case, do not use solvents or abrasive cleaners.

Ventilation and Cooling

The Field Master Pro provides active cooling of the internal components to prevent damage from overheating. The airflow vents on the edges and bottom of the instrument must be kept clear and unobstructed while the instrument is powered on. When using the Field Master Pro on a desktop or bench, the tilt bail can be used or the instrument can be placed flat on its back to facilitate increased airflow.

Caution	Do not operate or store the Field Master Pro in extreme environments. Refer to the instrument Technical Data Sheet for the specified operating and storage conditions.

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 N(f) connectors and the pins of the N(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 instrument, do not use pliers or a plain wrench to tighten the Type-N 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 instrument, 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 instrument. Connection of cables carrying an electrostatic potential, excess power, or excess voltage can damage the connector, the instrument, 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. Align and push connectors straight together. Do not twist or screw them together. A slight resistance can usually be felt as the center conductors mate.
3. 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.
4. 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.

   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 Field Master Pro, like other high performance instruments, is susceptible to electrostatic discharge (ESD) damage. Coaxial cables and antennas often build up a static charge, which (if allowed to discharge by connecting directly to the instrument without discharging the static charge) may damage the Field Master Pro input circuitry. Instrument operators must 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 Field Master Pro, it is recommended that any static charges that may be present be dissipated before connecting coaxial cables or antennas to the instrument. This may be as simple as temporarily attaching a short or load device to the cable or antenna prior to attaching to the Field Master Pro. 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 Field Master Pro 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. Accredited calibration to ISO17025 and ANSI/NCSL Z540-1 are available and can include a calibration certificate, test report, and uncertainty data. Contact Anritsu sales and service centers for more information.

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 — Instrument Overview

2-1 Introduction

This chapter provides an overview of the Anritsu MS2090A Field Master Pro. It describes the instrument hardware features, touch screen display, general system settings, GUI overview and instrument configurations, and the connector panels.

For detailed information on the instrument's user interface and functions, refer to the relevant measurement guide. See Chapter 1, "Additional Documentation"to find the list of measurement guides.

2-2 Instrument Front Panel

The Field Master Pro uses a touch screen for data input. The menus can vary depending on the current measurement configuration, installed options, and selected instrument function.

1. LCD Touch Screen Display
2. “Top Connector Panel” on page 2-3
3. Shoulder Strap D-Ring Mount
4. Fan Ventilation Ports
5. “Side Connector Panel” on page 2-5
6. Battery Cover (see “Replacing the Battery” on page 2-9)
7. Power LED/Button and Battery Charge LED (see Section 2-6 “Turning On the MS2090A Field Master Pro”)
8. Handle and Stylus

Figure 2-1. Front Panel Overview

2-3 Connector Panels

The MS2090A Field Master Pro 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 N, Type K, or Type V, depending on the frequency option that is installed. These are 50 Ω connectors. Type N connectors are female and Type K and V are male. Additional IO is provided with the SMA style connectors. The SMA connectors are 50 Ω female.

Note	Versions of the Field Master Pro that were manufactured before November 2021 featured SMB style connectors, which are 50 Ω slip-on connectors. Port functionality is the same with either connector.

Caution	To prevent damage to your instrument, 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). The recommended torque for Type N is 12 lbf·in (1.35 N·m or 135 N·cm).

Top Connector Panel

Figure 2-2 shows the top connector panel on the MS2090A.

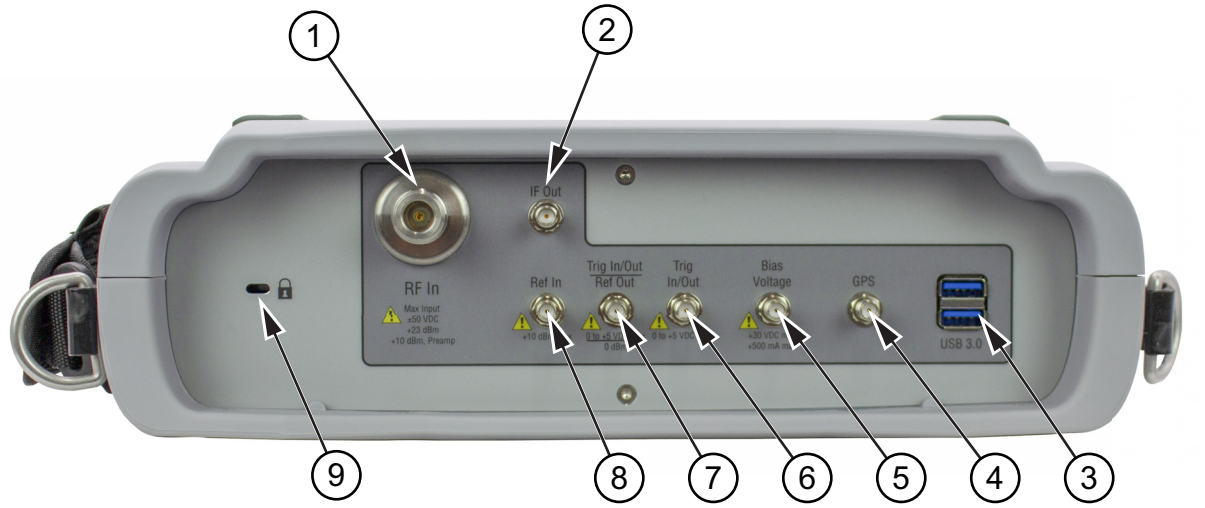


Figure 2-2. Top Connector Panel

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

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

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

To prevent damage to your instrument, 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 V is 8 lbf·in (0.9 N·m or 90 N·cm). The recommended torque for Type N is 12 lbf·in (1.35 N·m or 135 N·cm).

2. IF Out: This 50 Ω SMA connector provides internal IF output. The nominal frequency range is 325 MHz with FFT capture bandwidth ≤ 32 MHz and 300 MHz with FFT capture bandwidth = 100 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. Refer to spectrum analyzer measurement guide (10580-00447) for information about Zero Span IF Output (Option 89). To prevent damage to your instrument, do not use pliers or a wrench to tighten the connector.

3. USB Interface – Type A: The Field Master Pro has three Type A and one Type C USB connectors that accept USB storage devices for saving measurements, setup data, and screen images. Two connectors are located on the top panel and one is located on the side panel. To ensure the device or its data does not become corrupted, select the eject icon to eject (unmount) the USB device before it is unplugged from the USB port (see Section "Title bar" on page 2-13).

Note	The MS2090A is compatible with external USB memory devices that have an integrated keypad and are FIPS compliant using AES 256-bit encryption.

4. GPS Antenna Connector: The GPS port on the Field Master Pro is a 50 Ω female SMA connector. This connector also provides 5.0/3.3 VDC for an active GPS antenna. To prevent damage to your instrument, do not use pliers or a wrench to tighten the connector.

5. Bias Voltage: The bias voltage output port is a 50 Ω SMA connector. 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 instrument, do not use pliers or a wrench to tighten the connector.

6. Trigger In/Out: A TTL signal that is applied to the external trigger 50 Ω SMA input 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 displayed until the next trigger signal arrives. To prevent damage to your instrument, do not use pliers or a wrench to tighten the connector.

7. 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 connector that provides 10 MHz at approximately –7 dBm to 0 dBm. To prevent damage to your instrument, do not use pliers or a wrench to tighten the connector.

8. 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 instrument automatically selects the frequency reference in the following order of priority: external, GNSS (GPS), then the internal time base. To prevent damage to your instrument, do not use pliers or a wrench to tighten the connector.

9. Kensington® Lock (K-slot): Provides a slot that accepts Kensington style cable locks.

Side Connector Panel

Figure 2-3 shows the MS2090A side connector panel.

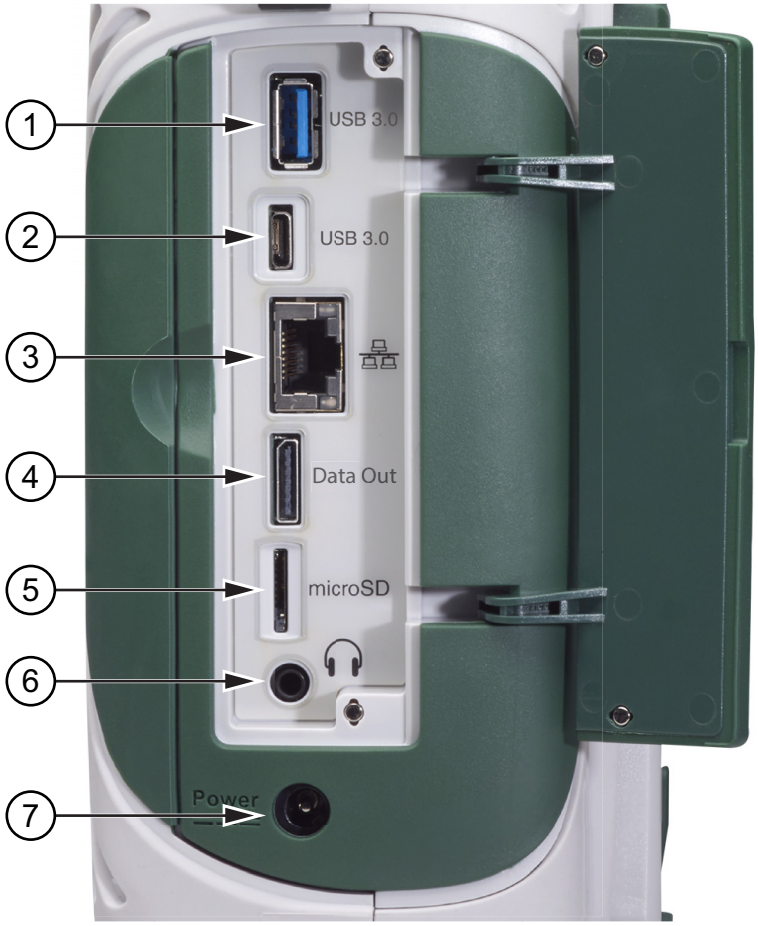


Figure 2-3. Side Connector Panel

Note	The MS2090A is compatible with external USB memory devices that have an integrated keypad and are FIPS compliant using AES 256-bit encryption.

1. USB Interface – Type A: The Field Master Pro has three Type A USB connectors that accept USB storage devices for saving measurements, setup data, and screen images. Two connectors are located on the top panel and one more is located on the side panel. To ensure the device or its data does not become corrupted, touch the eject icon to eject (unmount) the USB memory device before it is unplugged from the USB port (see Section "Title bar" on page 2-13).

2. USB Interface – Type C: The USB Type-C port is used to connect the Field Master Pro directly to a PC and provides a remote SCPI programming interface via USBTMC (USB Test and Measurement Class). Refer to the MS2090A programming manual for remote SCPI control setup and command.

3. LAN Connection: The RJ-45 connector is used to connect the Field Master Pro to a local area network or directly to a PC with an Ethernet crossover cable. See "Ethernet Connection" on page 2-30 for more details.

4. Data Out Port: The Data Out port is used for IQ Streaming. Refer to IQ Capture/Streaming measurement guide (10580-00490) for more information. This is a multi-purpose, hot pluggable input/output (I/O) interface.

5. MicroSD: The Micro Secure Digital slot is a small expansion slot located on the side panel. The slot accepts industry standard MicroSD storage cards and can be used for storing measurements, setup data, and screen images similar to USB storage devices.

Note	The MicroSD slot is currently not supported.

6. Headset Jack: The 3-wire headset jack provides audio output from the built-in sounds generated by the instrument. 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, 15 VDC, 5 A, center positive. The external power connector is used to power the unit and for battery charging. An orange blinking LED power button indicates that the instrument battery is being charged by the external charging unit. The indicator is a steady green when the battery is fully charged.

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.

Refer to "Turning On the MS2090A Field Master Pro" on page 2-10.

2-4 Tilt Bail Stand

The attached tilt bail can be used for desktop operation. The tilt bail provides a backward tilt for improved stability and air flow. To deploy the tilt bail, pull the bottom of the tilt bail away from the back of the instrument. To store the tilt bail, push the bottom of the bail towards the back of the instrument and snap the bail into the clips on the back of the instrument.

Figure 2-4. Tilt Bail Stand

2-5 Battery Information

The batteries that are supplied with the Field Master Pro may need charging before use. They can be charged using the provided AC-DC adapter. The batteries can be charged in the instrument or removed for charging using an optional battery charger (refer to the product technical data sheet for ordering information). The batteries are installed at the factory and can be replaced by the user. Refer to the next section for information on removing the batteries. Battery information and status is shown in "Battery" on page 2-51.

Caution	Use only Anritsu-approved batteries, adapters, and chargers with this instrument. If the adapter plug becomes hot to the touch during operation, discontinue use immediately. Anritsu Company recommends removing the battery for long-term storage of the instrument.

Note	The batteries will charge at a faster rate when the instrument is turned off. To prolong the useful battery life, the internal charging circuit monitors the battery temperature. Normal charging occurs when the battery temperature is between 0 °C and 45 °C. Charging is paused if the internal battery temperature is outside this range. In order to maintain the battery capacity and to keep the remaining capacity indicator (found in the "Battery" dialog) as accurate as possible, it's recommended to run the through a recalibration cycle on the external battery charger every three months. Refer to the product technical data sheet for ordering information.

Replacing the Battery

The battery can be replaced without the use of tools. The battery compartment door is located on the lower right side of the instrument (when you are facing the measurement display). To remove the battery:

1. Push in and slide the battery door tab to disengage it.
2. Remove the battery door.
3. Pull straight out on the lanyard to remove the battery pack from the instrument.

Note	When inserting the battery, the battery contacts should face up and slide in first. If the battery door does not close tightly, the battery may be inserted incorrectly.

Figure 2-5. Battery Removal

2-6 Turning On the MS2090A Field Master Pro

The Anritsu MS2090A Field Master Pro is capable of approximately two hours of continuous operation from a fully charged, field-replaceable battery (refer to "Battery Information" on page 2-8). The instrument can also be operated from a 15 VDC source (which will simultaneously charge the battery). This can be achieved with an Anritsu AC-DC adapter. Refer to the instrument Technical Data Sheet for more options and accessories.

To turn on the Field Master Pro, briefly touch the power button on the lower right of the touchscreen (see Figure 2-1 on page 2-2).

The Field Master Pro takes approximately 60 seconds to complete power-up and to load the instrument software. At the completion of this process, the instrument is ready for use.

Note	Keep the fan inlet and exhaust ports clear of obstructions at all times for proper ventilation and cooling of the instrument.

Power/Charge LED Indicators

The power/charge LED is integrated with the power button. The LED has the following indicators:

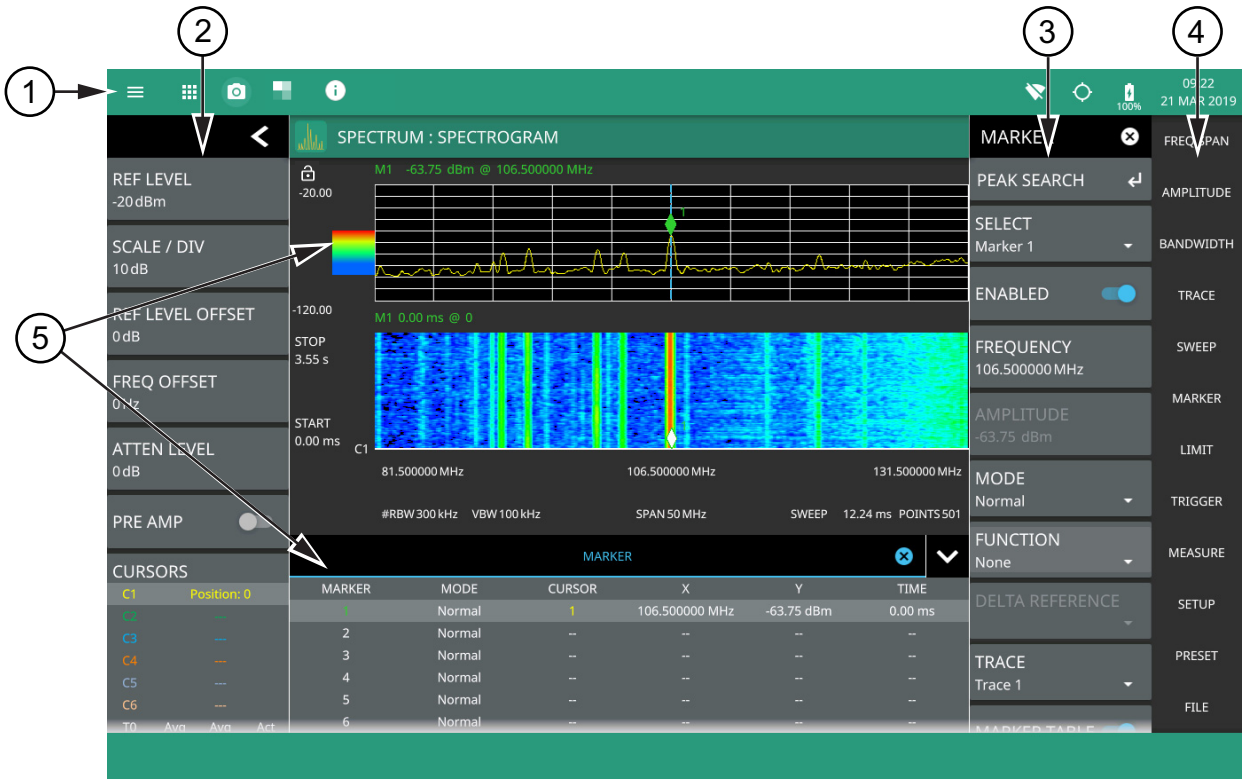
- Solid white when the instrument is on or booting up.
- Slowly blinks orange when the instrument is off and connected to an external power source, and the battery is charging.
- Solid green when the instrument is off and connected to an external power source, and the battery is fully charged.
- Solid red when the instrument is off and connected to an external power source, and the battery is NOT installed or has a fault.

Shutting Down and Restarting

To shut down or restart the instrument, briefly touch the power button (a shutdown dialog will be displayed), then select RESTART INSTRUMENT or POWER OFF. The current setup is saved when the instrument is shut down or is restarted. Once the instrument shuts down, it will either power off completely (if running on batteries) or it will go into a low power state (if running on external power).

2-7 GUI Overview

The MS2090A Field Master Pro software controls all instrument functions. The software runs locally on the instrument and primary operation is through the touch screen display. The figure below identifies the main display areas, which are each described in more detail later in this chapter.



1. The title bar provides quick access to system settings, measurement mode selection, informational dialogs, and screen capture.
2. The status and trace panel is used to show common settings and controls, and to provide trace and cursor information. The information displayed on this panel depends on the current measurement and view settings. Refer to the appropriate chapter in this guide for information about this panel.
3. Menus are used to configure measurement settings such as frequency, amplitude, and bandwidth, and to enable measurement modes and views such as Spectrogram view, OBW, ACP, and SEM measurements.
4. The main menu provides access to setting menus and other instrument controls.
5. The upper area typically displays graphical data such as spectrum trace and spectrogram plots. The lower area typically displays tabular measurement data such as marker data, demodulation results, or other measurement data depending on the selected measurement.

Figure 2-6. GUI Overview (sample display elements)

Operating the Touch Screen

Field Master Pro uses common touch gestures to achieve a variety of operations. These include interactions on hot areas by pressing, double pressing (or tapping), dragging, and pinching.

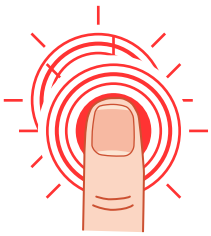
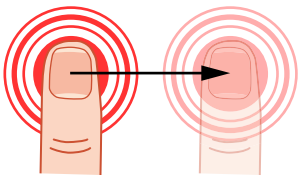
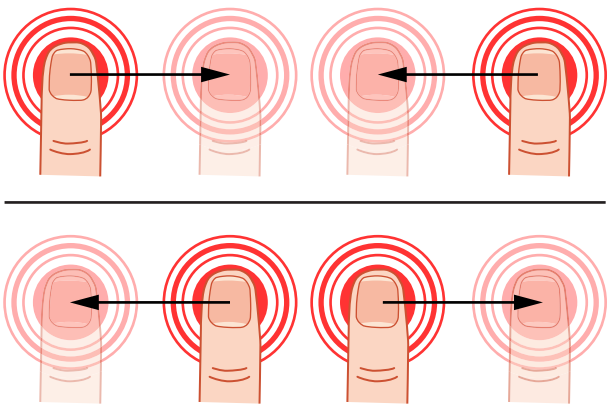
	**Single Press:** Most controls require a single press or tap. Touch the screen briefly and then release.
	**Double Press:** Some controls require a double press or tap. This action is similar to a double mouse click. If a second press is not detected in a certain time period, the action is dismissed or considered a single press.
	**Press and Drag:** Some items can be dragged to a new location. This action is accomplished by pressing and holding the item lightly while dragging it to a new location, then releasing. You can drag items such as markers, limit line nodes, and the center frequency by dragging the trace to the left or right.
	**Pinch:** Some items can be reduced or expanded. This action is accomplished by simultaneously pressing the item with two fingers and holding the item lightly when dragging the fingers in closer together or out farther apart, and then releasing. You can pinch items in or out, such as the frequency span by touching and holding the trace in two positions, and then dragging your fingers closer together to narrow the span or dragging your fingers farther apart to widen the span.

Figure 2-7. Touch Screen Gestures

Title bar

The tool bar is located at the top of the interface screen. It displays icons that provide access to information and user actions as described below. All of the icons are active and will open the appropriate menu or item when selected.

1. Select the 3-line icon to access the System Menu. System menu also shows the instrument model and serial number.
2. Select 9-dots icon is select the analyzer. Refer to Selecting the Applications/Modes section.
3. Select the CAMERA icon to capture a screenshot of the current display. The image file is saved in PNG format with the following naming scheme: screenshot_yymmdd_hhmmss.png (year, month, day, hour, minute, second). Using the Date Time Settings, you can set the screen capture region, color theme, annotations, and destination directory.
4. Select THEME icon to choose from the available display color themes.
5. Select NOTIFICATION icon to view the list of notifications generated by the instrument while making measurements or after taking a screenshot and so on. Refer to Appendix A chapter more information.
6. Select USB EJECT icon to eject (unmount) a USB memory device plugged to the USB port of the instrument. It is a best practice to select eject icon before unplugging a USB memory device from the port to avoid data corruption. Note that the eject icon is not displayed if a USB memory device is not connected. A similar icon can be accessed in Section 2-11 “FILES (File Management)” on page 2-48.
7. Select SOFTWARE UPDATE icon to install an updated version of the firmware package, when the instrument is connected to the Internet. Install the firmware update by connecting a USB memory device if there is no Internet connection. Refer to “Software Update” on page B-2.
8. Select wireless networking icon to view the list of Wi-Fi networks and network information. Refer to WiFi Settings for more information.
9. Select the BATTERY icon to view the MS2090A “Battery” under the DIAGNOSTIC menu. Refer to “Battery” on page 2-51
10. Select the GNSS RECEIVER icon to open the GNSS (GPS) Settings (Option 31). Toggle the SHOW IN TITLE BAR BUTTON to view latitude and longitude coordinates in the Title Bar.
11. Select on it to manually/automatically change date and time settings. Refer to “Date Time Settings” on page 2-37.

Figure 2-8. Title Bar

Common GUI Controls

In addition to the touch gestures described in the previous section, the following table lists the most common controls displayed in the toolbar of Field Master Pro.

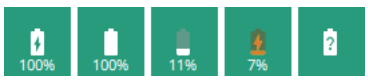
	The 3-line icon provides quick access to system information, settings, file management, and built-in diagnostic tools. Refer to Section 2-9 “System Menu” on page 2-22.
	The 9-dot icon provides access for selecting the analyzers. Refer to Section 2-8 “Selecting the Applications/Modes” on page 2-21.
	The camera icon will capture a screen image and save it to a file. Refer to “Date Time Settings” on page 2-37.
	The notification icon provides access to informational and error messages. If displayed, the number indicates the number of notifications. Refer to “Notifications Icon” on page 2-23 and Appendix A, “Instrument Notifications”.
	The Theme icon allows you to select from the list of available display color themes.
	The USB eject icon is displayed when the instrument detects one or more USB devices. Select this icon to eject the USB device, or presents a dialog to select which USB device to eject when more than one device is detected.
	The software update icon is displayed when the instrument detects a valid software package. Select this icon to open an updated dialog to select the software to install. Refer to Section B-4 “Software Update” on page B-2.
	The local host icon is displayed only on the MS2090A ARRT software when connected to the local host instead of an instrument. The icon is not functional. Refer to Appendix D, “ARRT Software”.
	The wireless networking icon shows connection status (no connection, weak connection, strong connection, connected to access point) and relative signal strength. Select this icon to open the Wi-Fi settings menu. Refer to “WiFi Settings” on page 2-32.
	The GNSS icon shows connection status (no connection, no fix, good fix, using last good fix). Select the icon ro open the GNSS (GPS) settings menu. Refer to “GNSS (GPS) Settings (Option 31)” on page 2-33 for detailed information.
	The battery icon shows the current battery charge percentage and indicates that the battery is charging with a lightning bolt. A question mark (?) indicates that the battery is not installed or has a malfunction. Selecting the icon opens the battery information dialog. Refer to “Battery” on page 2-51.
	The close icon is used to close menu windows and other dialogs.
	The chevron icon expands or collapses the status and table displays. A similar chevron on the virtual keyboard may be for capital letters or to scroll through key sets.
	Toggle icon either enables or disables the feature. When highlighted in blue, the item is enabled.
	The drop-down icon exposes a list of items from which to choose.
	The refresh icon restarts a process, such as a sweep or averaging count.
	The edit icon allows editing of a feature or label.

Figure 2-9. Common GUI Controls

	The enter icon accepts an entry. A similar icon is found on menu buttons to indicate an additional menu.
	Select the padlock icon next to center frequency on the graticule to change the frequency by dragging, when using a touch-screen enabled PC. Select the padlock icon next to SPAN to change the span by pinching, when using a touch-screen enabled PC. You can toggle on DRAG and PINCH options by selecting GESTURES in Frequency menu. Refer to GESTURES menu in the spectrum analyzer measurement guide (10580-00447). Reference Level padlock icon by default, locks the reference level that is accidentally prone to swiping when using a touch-screen enabled PC.
	Shortcut icon used to create a shortcut of a desired application from current settings or an existing setup file.

Figure 2-9. Common GUI Controls

Data Entry

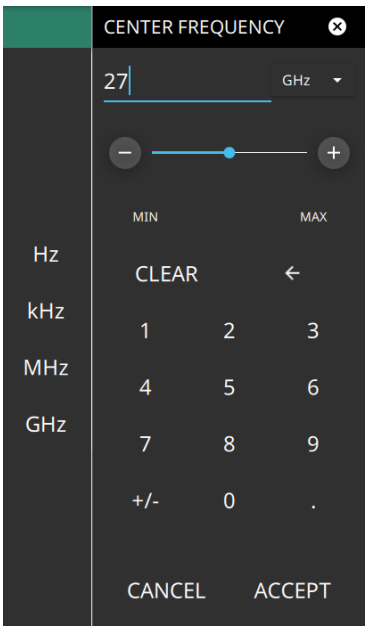
User input can be in the form of numeric values for instrument or measurement settings, selected values from a preset list, or alphanumeric text when entering file names, for example. To view or change a parameter value, access the appropriate menu or control, then enter data using the data entry control or attached physical keyboard. Some items can be accessed directly on the annotated display by selecting their value.

Invalid Entries

When setting parameters or entering other types of data, if an entry is out of range or is otherwise invalid, Field Master Pro will shade the background display and may provide a message indicating a valid range. In this case, clear or cancel the entry and enter a valid value or change the units by using either the drop-down selection next to the data entry window, or with the unit terminators to the left of the keypad.

Numeric Values

To modify a numeric parameter setting that is displayed on a menu or annotated field, select the item to make it active and to display the numeric keypad data entry control. Use the touch screen to enter or change the value.



The keypad typically provides controls to:

- Enter new values directly, such as frequency entries in Hz, kHz, MHz, or GHz. There are two places on the keypad to enter unit terminators when applicable, on left side pop-out that occurs as frequency keypad entries are selected, or on the top right corner drop-down of the entry field.
- Drag a parameter value within its settable range using a sliding control.
- Increment the parameter value up or down. At each end of the slider are plus (+) and minus (–) controls that increment the parameter value. Most parameters have a fixed increment, such as bandwidth that follows a 1:3:10 sequence and span that follows a 1:2:5:10 sequence. In the case of frequency, you can set a custom frequency step increment value. Once the entry is complete, select the desired unit or select ACCEPT to complete the entry.
- Set the parameter to the maximum or minimum possible value.
- CLEAR the entire entry.
- Left arrow to backspace and delete the entry
- CANCEL to terminate any entries made for that particular setting. Note that selecting the "X" to close the keypad is the same as selecting cancel. Selecting CANCEL will restore settings back to the state they were in before the keypad opened, even if changes from the +/- controls are already reflected in the data display.
- ACCEPT to operate with the settings displayed on the keypad.

Figure 2-10. Touchscreen Keypad

A physical keyboard connected via USB can also be used to enter values in a similar manner and the keyboard ENTER key used to accept the new value.

Selection Lists

Some parameters and instrument functions are selectable from a list. These list boxes display the available selections and value limits as applicable. Use the touch screen to scroll through the list and select the desired entry.

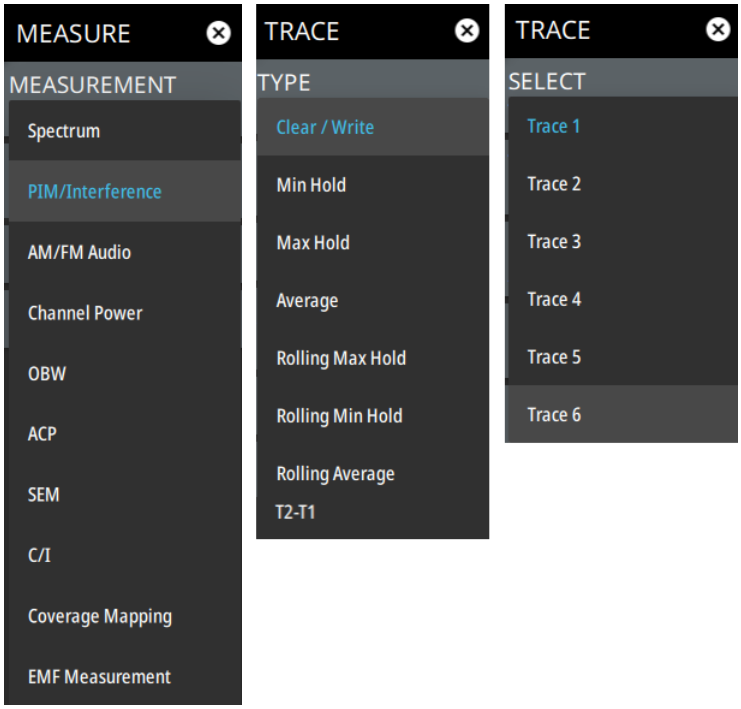
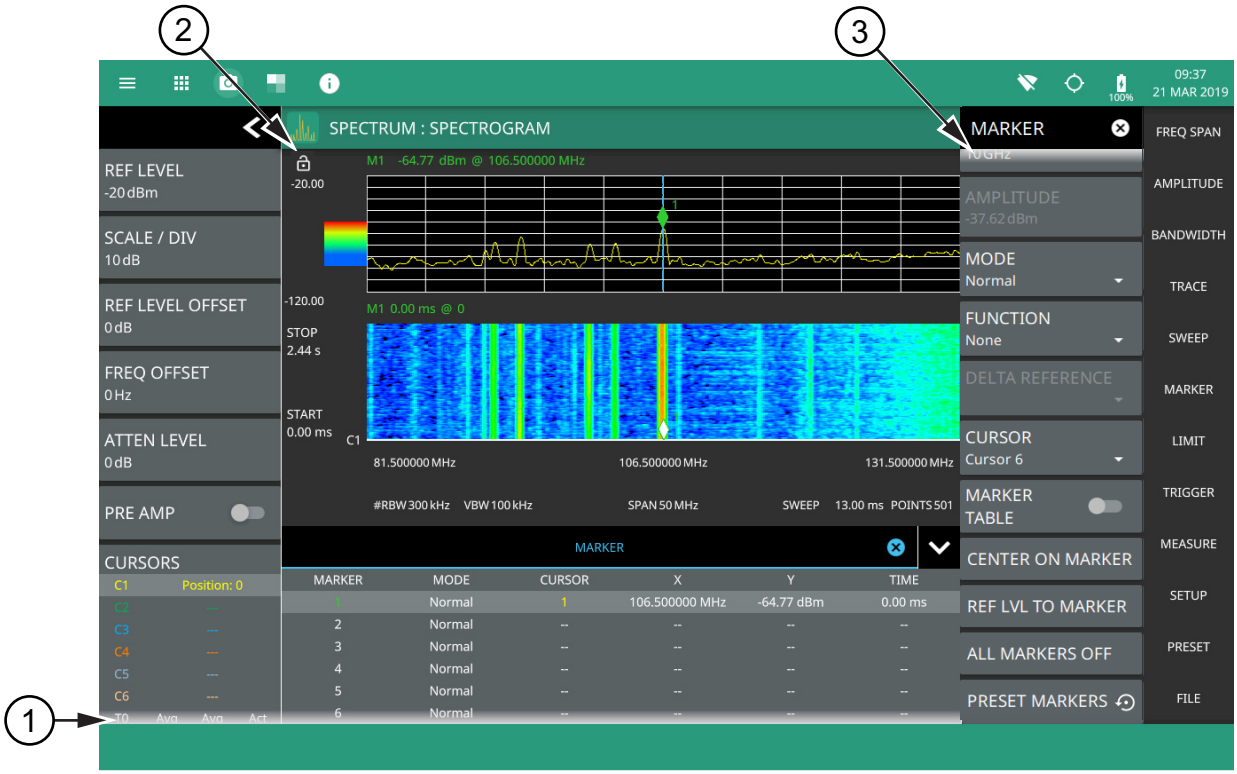


Figure 2-11. Selections Lits

To cancel the selection, touch somewhere else on the display or close the menu.

Scroll Indication

In some cases, menus, status panels, or other lists contain more information than can be displayed in the available area. In these cases, the top or bottom of the panel will have a fade-to-white appearance as shown below. You can scroll the control to move it up or down and expose the hidden information.



1. The fade-to-white at the bottom of the status panel and marker table here indicates that there is more information below the display area. The panel can be scrolled by dragging it upward to expose more information.
2. Reference Level Dragging lock icon is used to lock the reference level, so that any accident modification of the setup parameters can be avoided.
3. The fade-to-white at the top of the menu here indicates that there is more information above the display area. The menu can be scrolled by dragging it downward to expose the information.

Figure 2-12. Scroll Indication

Note	If the display is set to another color theme, the fade effect remains the same but the color may fade to a dark shade.

Text Entry and EZ Keyboard

When an instrument function requires you to enter text, such as entering an Ethernet hostname or IP address, a touch screen alphabetic keyboard is displayed. See Figure 2-13. Select the "?123" key to switch to the digits and symbols keyboard. Use the left arrow key (backspace) to delete the character to the left of the insertion point. The insertion point can be moved to a selected position in the data entry field. You can enable caps lock by double tapping the shift key.

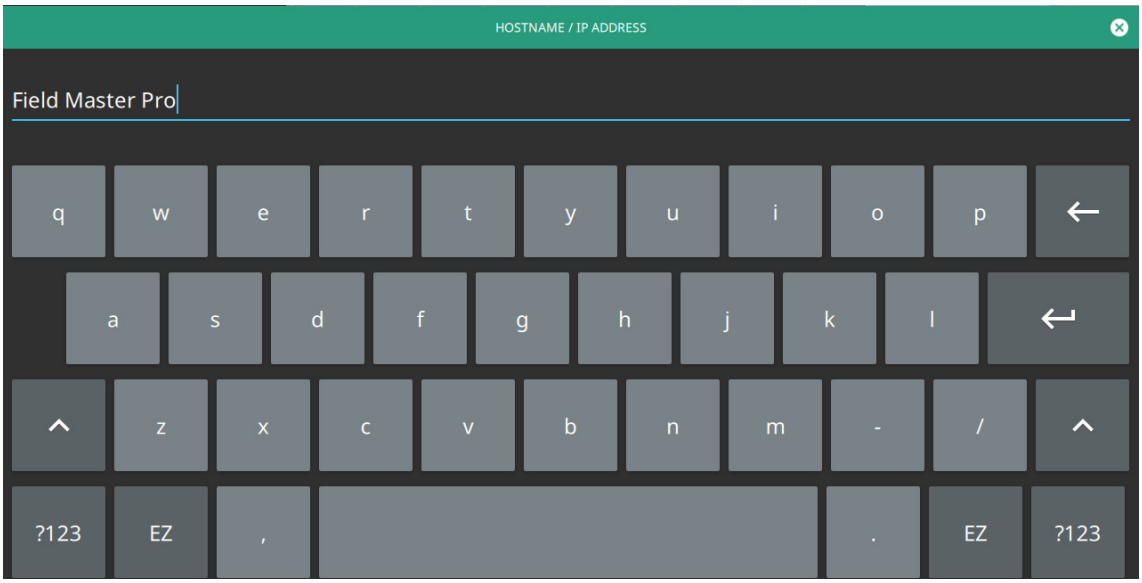


Figure 2-13. Touch Screen Keyboard

The EZ key switches to a configurable EZ keyboard, illustrated below.

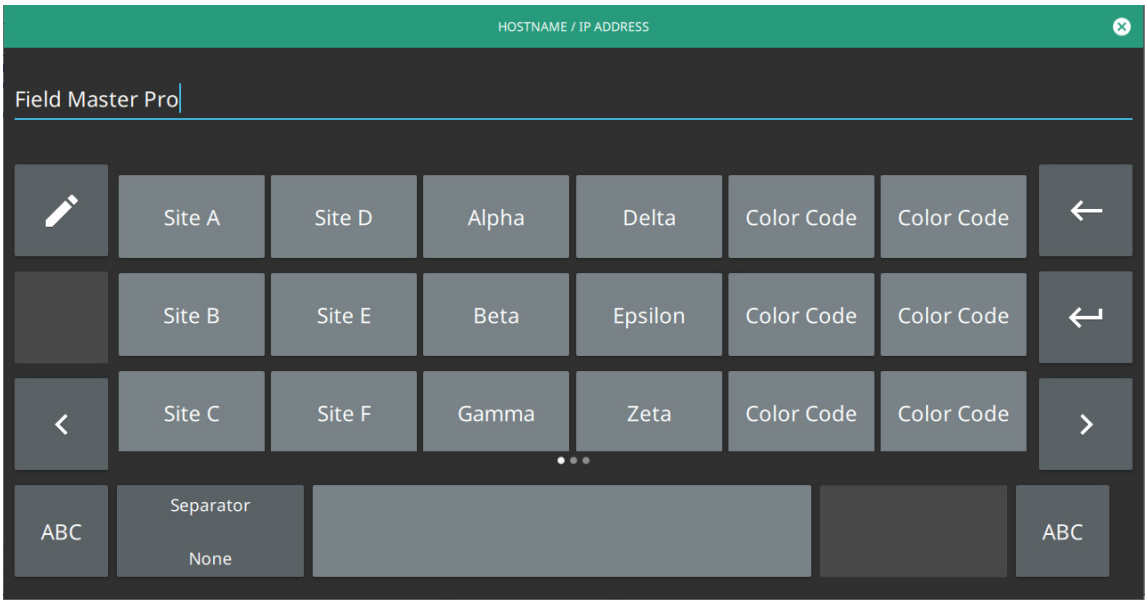


Figure 2-14. Touch Screen EZ Keyboard

Use the EZ keyboard to enter frequently used text strings with a single screen tap. The EZ keyboard is initially populated with default values. Each key enters the entire string as shown on the key. For convenience, you can set an automatic Separator character to be placed between each EZ key string.

To change a key's value:

1. Select the pencil (edit) key. The EZ keys will become highlighted.

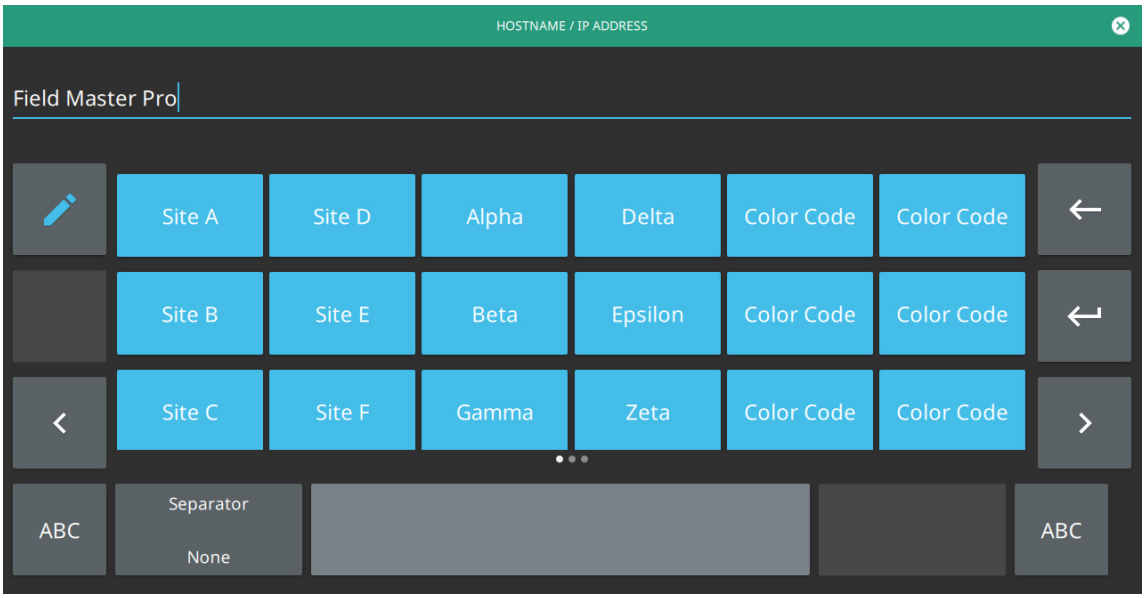


Figure 2-15. Touch Screen EZ Keyboard

2. Select the key to be edited. This will display the standard keyboard for entering a new EZ key value.

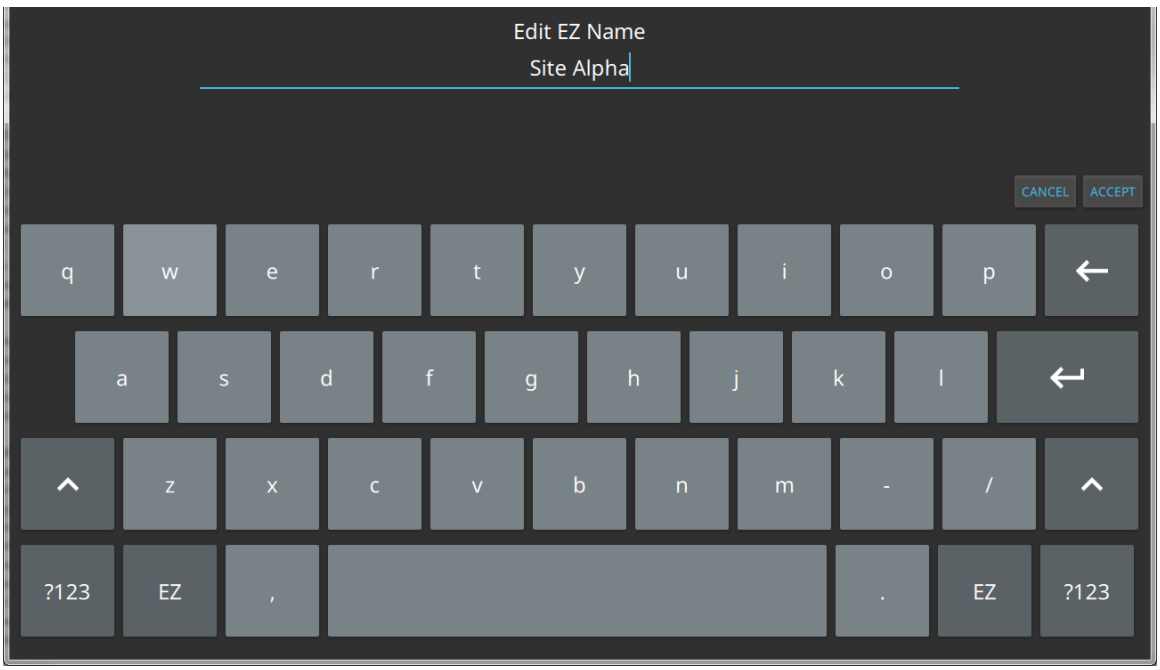


Figure 2-16. Touch Screen EZ Keyboard

3. Enter the new value, then select ACCEPT to assign the new value to the EZ key, or select CANCEL.

2-8 Selecting the Applications/Modes

The instrument applications are selected from the 9-dot icon or the current measurement icon. To select an application, press the 9-dot icon in the title bar or the current measurement icon to display the available applications and the corresponding modes, illustrated in Figure 2-17. Simply touch the desired icon to load the application or mode. The applications available for selection depend on the options that are installed and activated on your instrument. Some measurement modes and views are accessed via other measurement setup menus.

Note that not all applications/modes are included in all instruments. Refer to your instrument's technical data sheet.

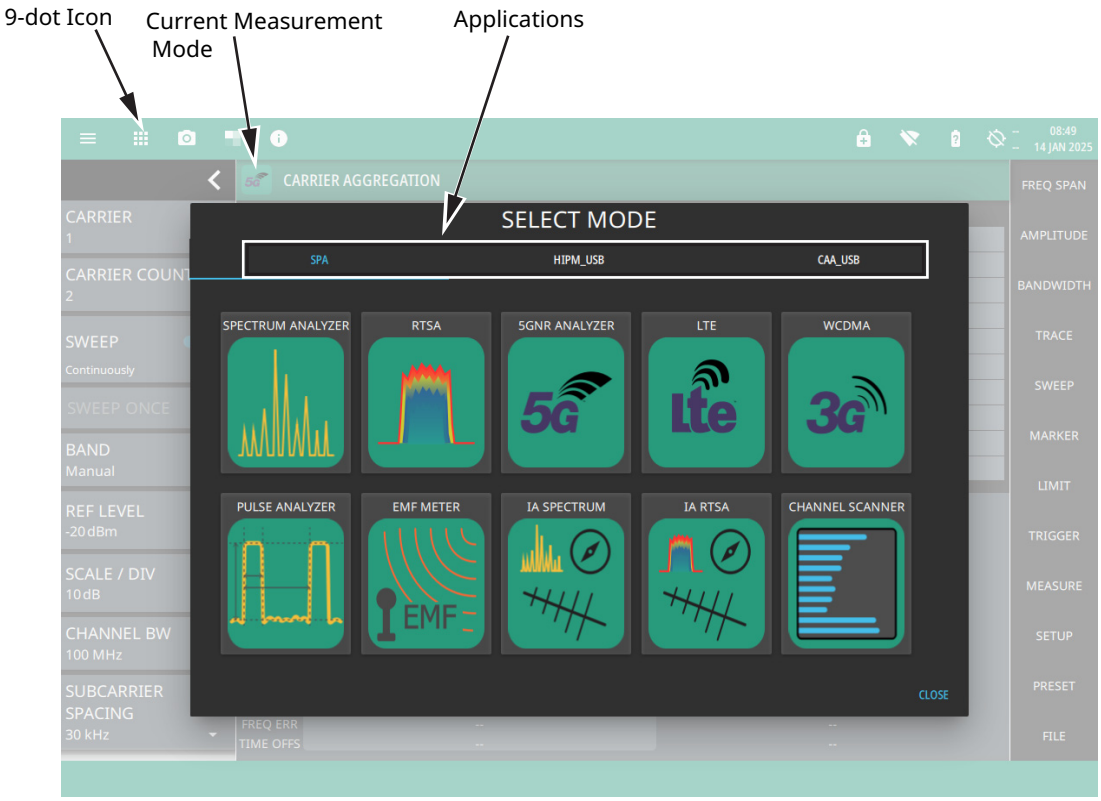
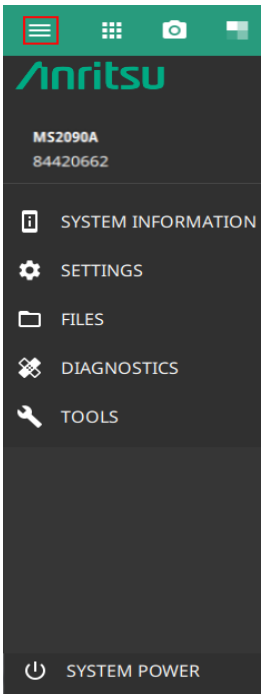


Figure 2-17. Instrument Applications and Modes

For detailed information on the selected application's user interface and setup functions, refer to the relevant measurement guide. See Chapter 1, "Additional Documentation" to find the list of the measurement guides.

2-9 System Menu



The System menu displays the instrument model and serial number. It consists of following menus:

SYSTEM INFORMATION: Opens the System Information Menu. Select SYSTEM INFORMATION menu to view instrument, software, and connectivity details.

SETTINGS: Opens the "Settings Menu" on page 2-23. Select SETTINGS menu to access all system level settings and controls.

FILES: Opens "FILES (File Management)" on page 2-48. Select FILES menu to open File Management screen. In file management screen you can manage the internal files or files saved on a USB memory device.

DIAGNOSTICS: Opens "Diagnostics Menu" on page 2-51. Select DIAGNOSTICS menu to view battery information, self test results, service mode and event log screens.

TOOLS: Opens "Tools Menu" on page 2-54.Select TOOLS menu to concatenate IQ streaming metadata files, get connected to the web, access Map Tool and access PDF reporting.

SYSTEM POWER: Select SYSTEM POWER menu to either RESTART or POWER OFF the instrument.

Figure 2-18. System Menu

System Information Menu

The System Information panel shows all information about the instrument hardware, software, and connectivity. From here you can also toggle the WEB UPDATES button to automatically install the latest software update when it is available on the Anritsu website. This functionality facilitates firmware updates within the last 24 hours, if the instrument is connected to the Internet.

If WEB UPDATES button is toggled off select the CHECK FOR UPDATES button to manually install the updates.

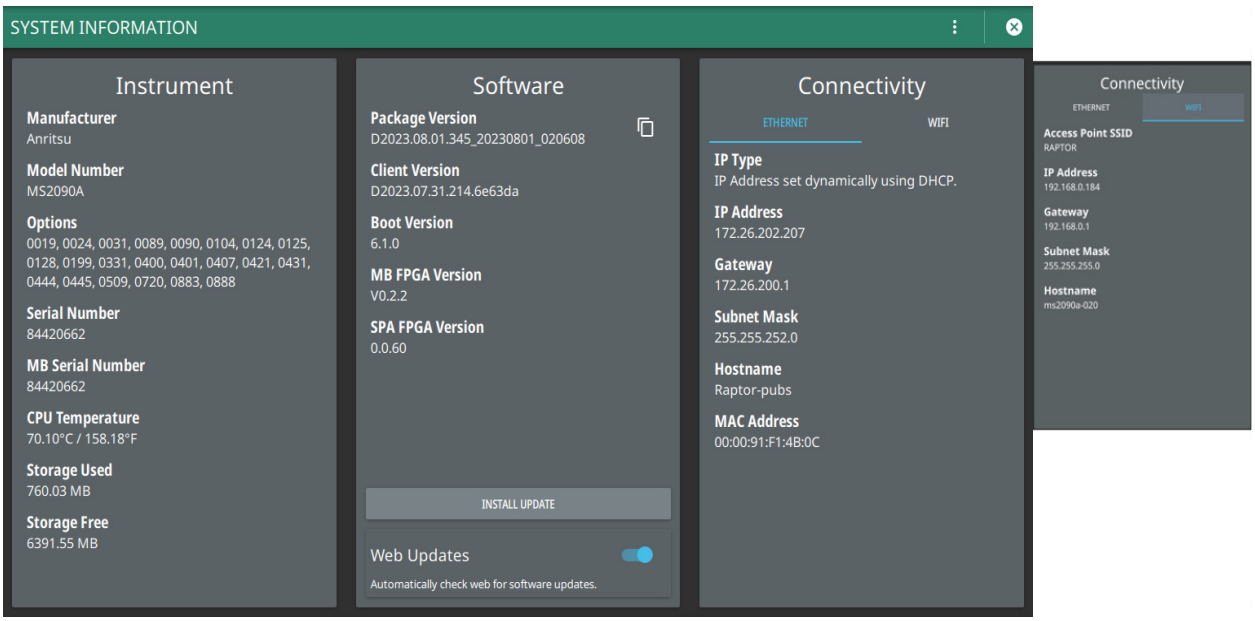


Figure 2-19. System Information Menu

Notifications Icon

Select Notifications icon to view all dynamic notifications of the instrument. These notifications consists of a mixture of informational, warning and errors messages. Refer to Appendix A, "Instrument Notifications" for detailed information.

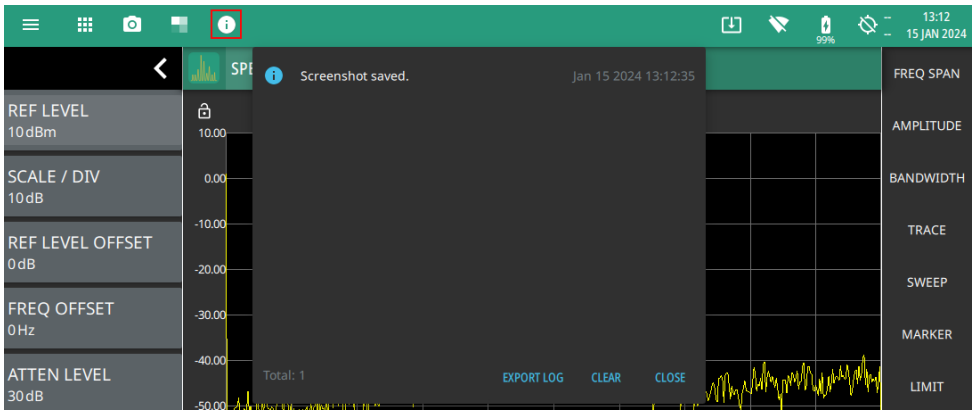
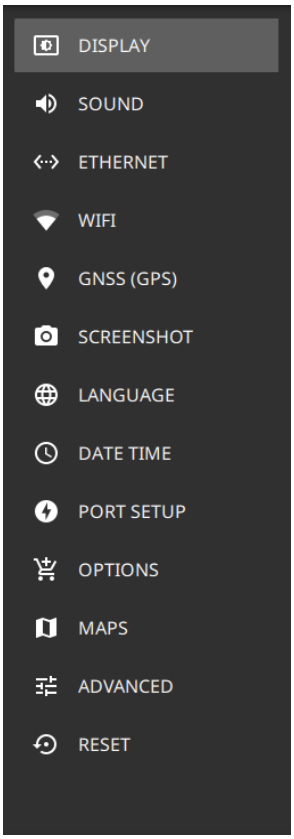


Figure 2-20. Notifications Icon

2-10 Settings Menu

The system settings menu provides access to all instrument system-level settings such as network, GNSS/GPS, date and time, and display.



DISPLAY: Opens the Display Settings.

SOUND: Opens the Sound Settings.

ETHERNET: Opens the Network Settings.

WIFI: Opens the WiFi Settings.

GNSS (GPS): Opens the GNSS (GPS) Settings (Option 31).

SCREENSHOT: Opens the Screenshot.

LANGUAGE: Opens the Language Settings.

DATE TIME: Opens the Date Time Settings.

PORT SETUP: Opens Port Setup.

OPTIONS: Opens the Options Settings.

MAPS: Opens the Maps Settings (Option 431).

ADVANCED: Opens the ADVANCED menu.

RESET: Opens the Reset Settings.

Figure 2-21. Settings Menu

Display Settings

The DISPLAY settings allow you to adjust the display brightness, choose the display color scheme and to view or hide shortcuts to the saved application settings.

Brightness

The BRIGHTNESS option consists of a slider to adjust the screen brightness, in addition to selecting the amount of idle time before the screen automatically dims to conserve battery life.

The DIM DISPLAY AFTER drop-down provides up to 15 minutes idle time settings. Or you can select NEVER option to keep the display illuminated for as long as the instrument remains powered on.

Note that DIM DISPLAY AFTER feature will only work if the instrument is running on the battery. This feature will not work if the unit is connected to the AC power supply.

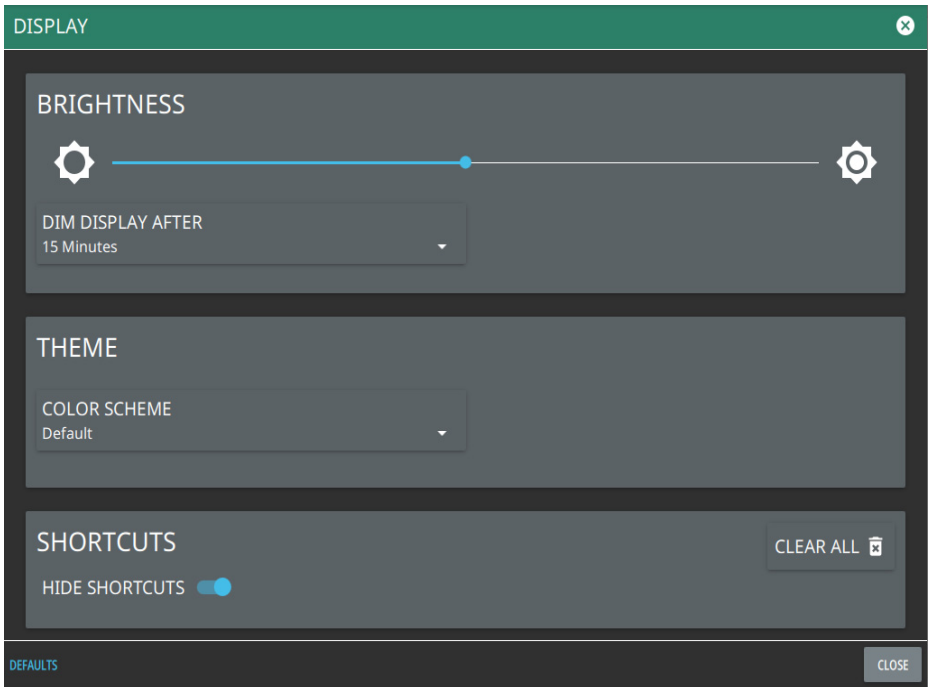


Figure 2-22. Display Settings

Theme

Under THEME option select COLOR SCHEME drop-down menu and select either Default, Light, Black on White or Night Vision to set the display color scheme of your choice. If the THEME is set to Light it may be more suitable for viewing in bright ambient conditions. But if the THEME is set to Night Vision it may be suitable for viewing in a poorly lit night time conditions.

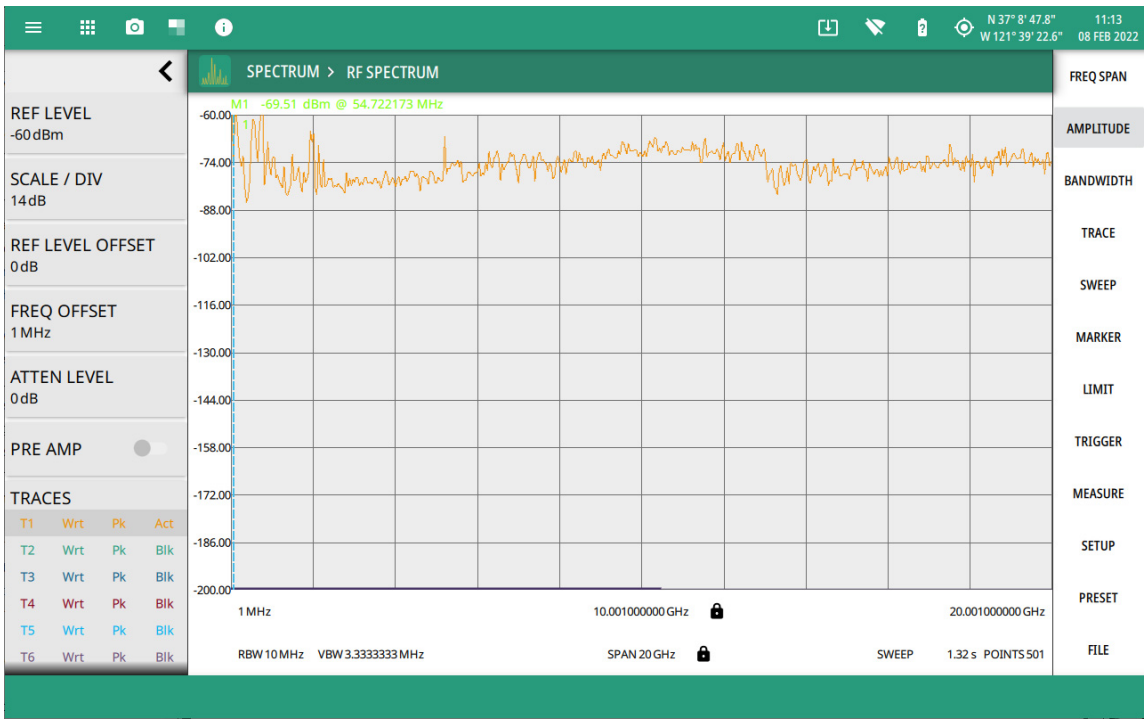


Figure 2-23. Light Theme Display

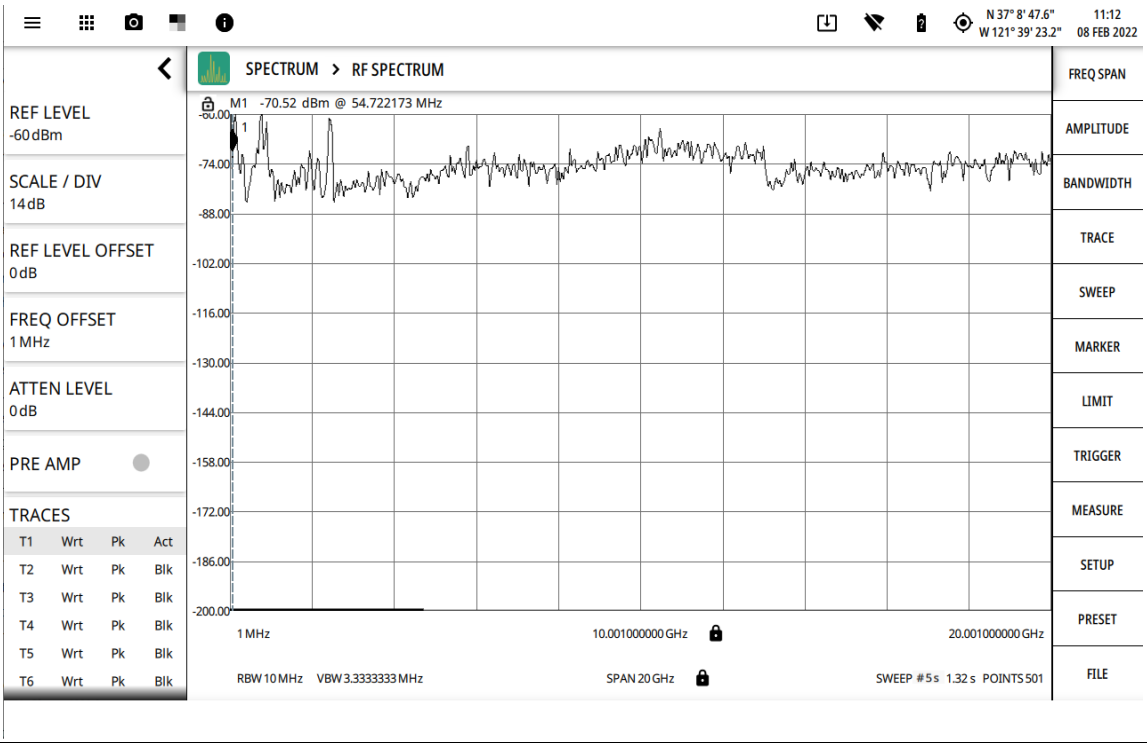


Figure 2-24. Black on White Theme Display

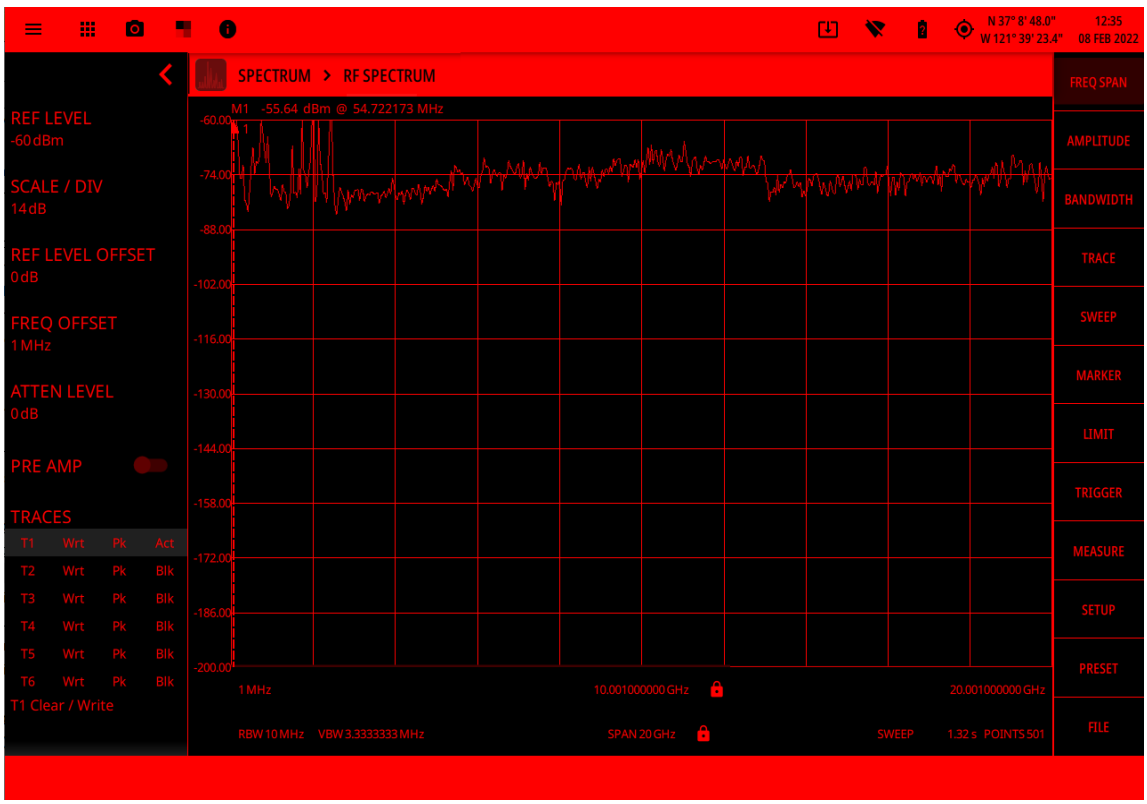


Figure 2-25. Night Vision Theme Display

Shortcuts

Under the SHORTCUTS option, toggle the HIDE SHORTCUTS button to view or hide the shortcuts.

Select + SHORTCUT button located at the bottom left of the display screen to create or save specific settings of an application.

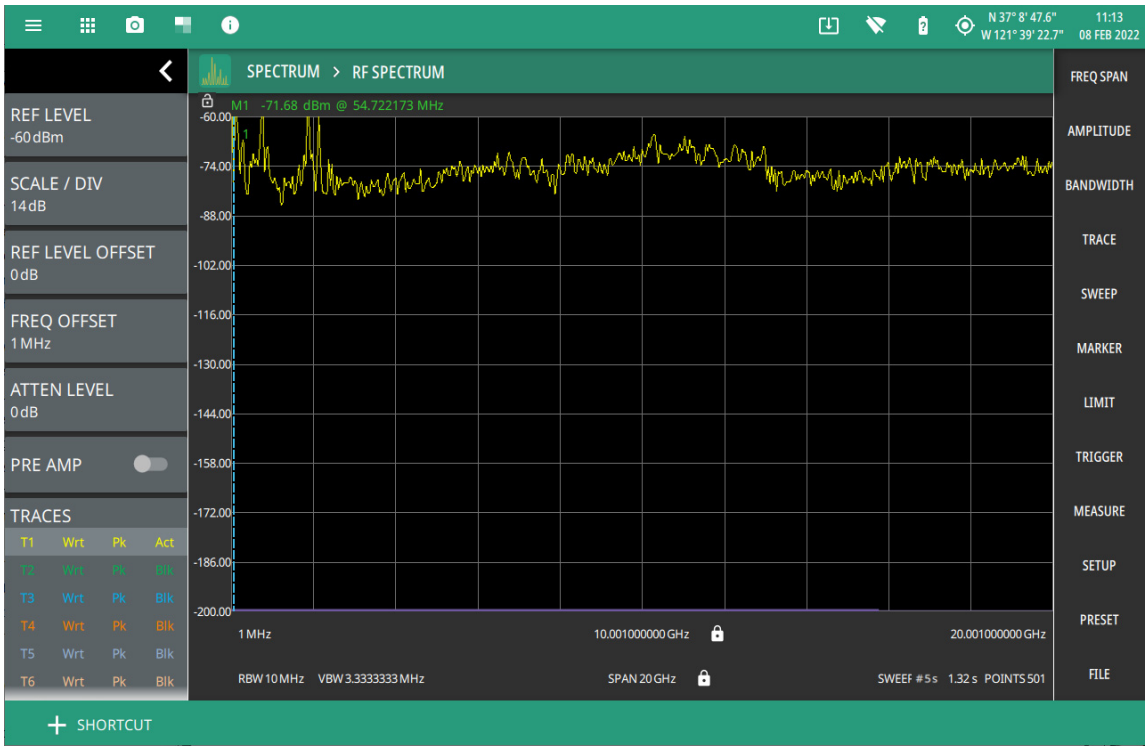


Figure 2-26. Shortcut Button

Follow the steps below to create/load/rename a shortcut:

1. Select +SHORTCUT button at the bottom left of the instrument display screen.

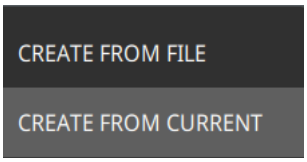


Figure 2-27. +Shortcut button

2. Select CREATE FROM FILE option to create a new shortcut from an already saved setup file.
3. Otherwise, select CREATE FROM CURRENT option to create a shortcut of the current (trace) settings of the instrument.
4. Enter the shortcut name which is optional, and select CONTINUE.

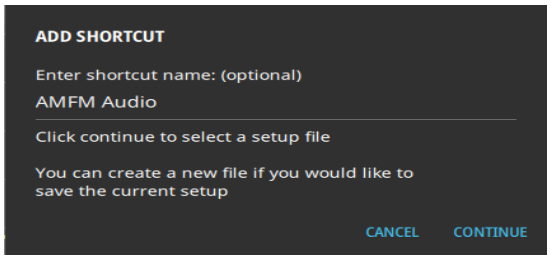


Figure 2-28. Add Shortcut Dialog

5. Enter a file name to save the current setup, and select SAVE.

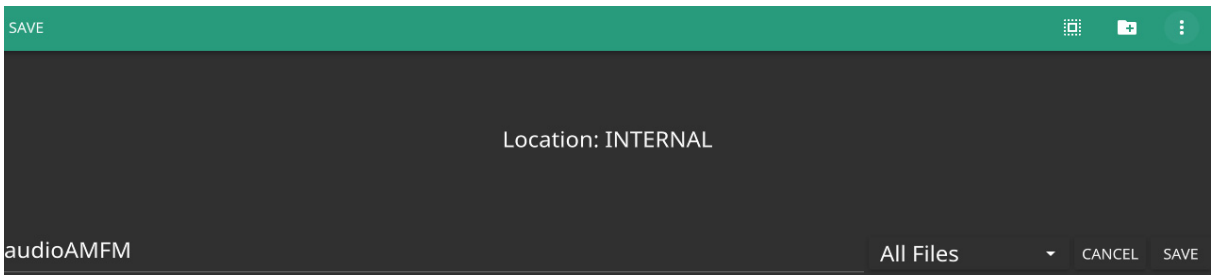


Figure 2-29. File Save As

6. Select the newly created shortcut to recall the saved setup file.

To delete all the shortcuts, select SYSTEM MENU (3-line icon), go to SETTINGS menu, select DISPLAY settings and select CLEAR ALL button at the bottom right of the instrument's display.

Figure 2-30. Recalled Setup File: Shortcut Button

Sound Settings

The SOUND settings allow you to adjust the SYSTEM VOLUME or MUTE ALL of the instrument sounds. The system volume may affect other volume settings found in various setup menus.

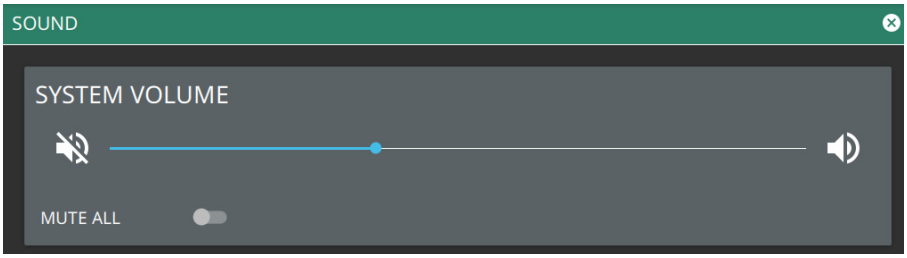


Figure 2-31. Sound Settings

Network Settings

The MS2090A uses Ethernet or WLAN (Wi-Fi) to communicate remotely with a controller. 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 Wi-Fi peer-to-peer) or through a network. The instrument software supports the TCP/IP raw socket network protocol.

Ethernet networking uses a bus or star topology in which all of the interfacing devices are connected to a central cable called the bus, or are connected to a hub. Ethernet uses *Carrier Sense Multiple Access/Collision Detection* (CSMA/CD) access method to handle simultaneous transmissions over the bus. This standard enables network devices to detect simultaneous data channel usage, called a *collision*, and provides for a contention protocol. When a network device detects a collision, the CSMA/CD standard dictates that the data is retransmitted after waiting a random amount of time. If a second collision is detected, the data is again retransmitted after waiting twice as long. This is known as exponential back off.

Wi-Fi uses a similar star topology in which all of the interfacing devices are connected to an access point. Wi-Fi uses *Carrier Sense Multiple Access/Collision Avoidance* (CSMA/CA) access method to handle simultaneous transmissions. CSMA/CA doesn't detect collisions but rather avoids them through the use of a control message. If the control message collides with another control message from another node, it means that the medium is not available for transmission and the back-off algorithm is applied before attempting another transmission.

The TCP/IP setup requires the following:

- IP Address: Every computer and electronic device in a TCP/IP network requires an IP address. An IPv4 address has four numbers (each between 0 and 255) separated by periods. For example: 128.111.122.42 is a valid IP address.
- Subnet Mask: The subnet mask distinguishes the portion of the IP address that is the network ID from the portion that is the station ID. The subnet mask 255.255.0.0, when applied to the IP address given above, would identify the network ID as 128.111 and the station ID as 122.42. All stations in the same local area network should have the same network ID, but different station IDs.
- Default Gateway: A TCP/IP network can have a gateway to communicate beyond the LAN identified by the network ID. A gateway is a computer or electronic device that is connected to two different networks and can move TCP/IP data from one network to the other. A single LAN that is not connected to another LAN requires a default gateway setting of 0.0.0.0. If you have a gateway, then the default gateway would be set to the appropriate value of your gateway.
- Ethernet Address: An Ethernet address, or *Media Access Control* (MAC) address, is a unique 48-bit value that identifies a network interface card to the rest of the network. Every network card has a unique Ethernet address permanently stored in its memory.
- Remote programming and operation between the instrument and remote program is accomplished via a TCP/IP raw socket connection to port 9001. The remote program must establish a TCP/IP raw socket connection at port 9001 to the MS2090A.

- The remote program may connect to the instrument IP address or to its HOSTNAME (Ethernet only). If using DHCP instead of a static IP, using the HOSTNAME may be more reliable for finding an instrument on a network.
- The instrument supports multicast DNS (mDNS). This allows a client that also supports mDNS to connect to the instrument using its hostname without needing to setup a local name server. To use mDNS add the .local top-level domain to the instrument hostname. For example, if the instrument's hostname is "AnritsuInstrument", an mDNS client could access the instrument with "AnritsuInstrument.local".
- You may need to contact your network administrator to ensure network security policies, anti-virus, and firewall settings do not block access to the controlling computer and its ports.

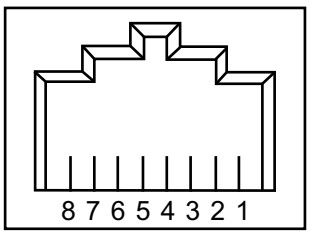
The MS2090A can be configured for *Dynamic Host Configuration Protocol* (DHCP), an Internet protocol that automates the process of setting IP addresses for devices that use TCP/IP, and is the most common method of configuring a device for network use.

To determine if a network is set up for DHCP, connect the instrument to the network and select DHCP protocol. Power cycle the instrument. If the network is set up for DHCP, the assigned IP address should be displayed in the network settings.

Ethernet Connection

Interface between the instrument and other devices on the network is via a category five (CAT-5) interface cable connected to a network. This cable uses four twisted pairs of insulated copper wires terminated into an RJ45 connector. CAT-5 cabling is capable of supporting frequencies up to 100 MHz and data transfer speeds up to 1 Gbps, which accommodates 1000Base-T, 100Base-T, and 10Base-T networks. CAT-5 cables are based on the EIA/TIA 568 Commercial Building Telecommunications Wiring Standard developed by the Electronics Industries Association. A pinout diagram is shown in Table 2-1.

Table 2-1. 8-pin Ethernet RJ45 Connector Pinout Diagram



Pin	Name	Description	Wire Color
1	TX+	Transmit data (> +3 volts)	White/Orange
2	TX–	Transmit data (< –3 volts)	Orange
3	RX+	Receive data (> +3 volts)	White/Green
4	–	Not used (common termination)	Blue
5	–	Not used (common termination)	White/Blue
6	RX–	Receive data (< –3 volts)	Green
7	–	Not used (common termination)	White/Brown
8	–	Not used (common termination)	Brown

Integrated into the RJ45 connector are two LEDs that illuminate as follows:

- LED 1 Off: 10 Mbit/s LAN connection
- LED 1 Orange: 100 Mbit/s LAN connection
- LED 1 Green: 1000 Mbit/s LAN connection
- LED 2 Amber/Yellow: On or blinking indicates LAN traffic

The instrument IP address and its HOSTNAME are set via the System menu (upper left corner) and accessing the ETHERNET or WIFI settings menu.

Note	Wi-Fi does not support connections using HOSTNAME; use IP addressing to establish a wireless network connection.

TCP/IP connectivity requires setting up the parameters described at the beginning of this section. The following is a brief overview of how to set up a general LAN connection on the MS2090A.

Note	You may need to consult your network documentation or network administrator for assistance in configuring your network setup.

Ethernet Settings

Refer to "Network Settings" on page 2-29 for general network setup and information.

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select ETHERNET to view the current network settings (IP address, HOSTNAME, etc.).

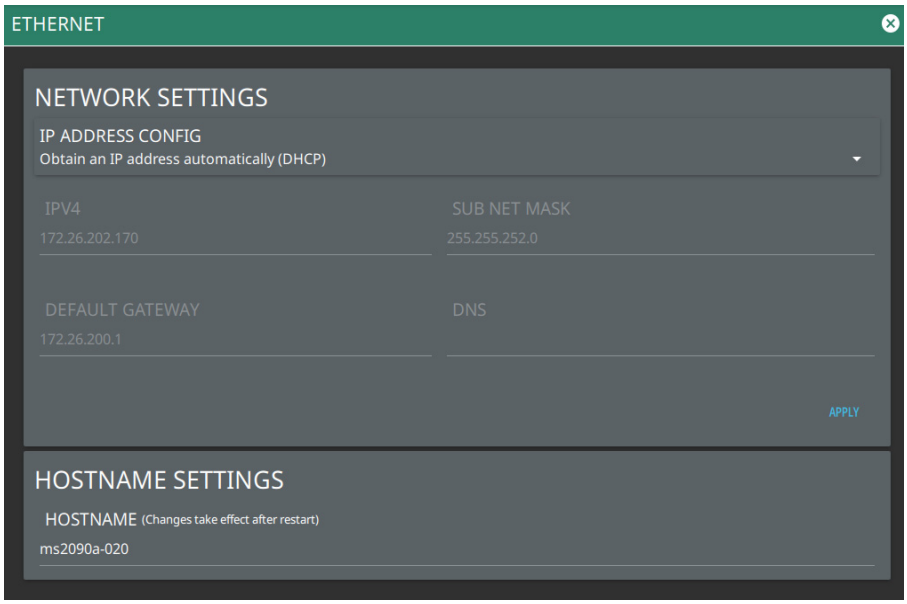


Figure 2-32. Ethernet Settings

The instrument IP address can be set automatically using DHCP or manually by entering the desired IP address, gateway address, and subnet mask.

Note	If an active Ethernet cable is connected to the instrument while it is turned on, a reboot may be required to establish a DHCP connection. If the port becomes inactive, verify that an active Ethernet cable is attached to the instrument, then cycle the instrument power off and on.

WiFi Settings

Refer to "Network Settings" on page 2-29 for general network setup and information.

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select WIFI to display the current network settings (IP address, HOSTNAME, etc.).

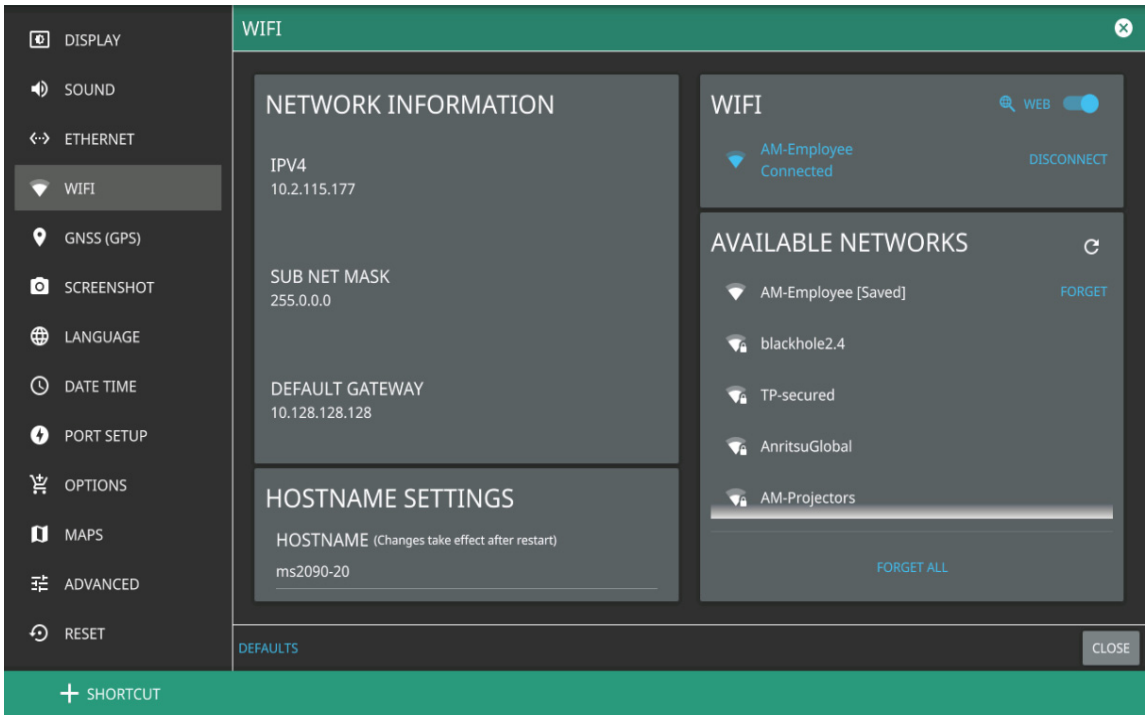


Figure 2-33. Wi-Fi Settings

The instrument IP, subnet mask, and gateway address are managed by the access point or wireless router.

Note	An active Wi-Fi connection to an access point must be established in order to enable DHCP. If Wi-Fi becomes inactive, cycle the instrument power off and on, then verify that the Wi-Fi device is connected to an access point. Field Master Pro is not able to connect to networks that require sign-in through web servers.

3. Enable the Wi-Fi radio by toggling it on from the right-side panel, then select an access point from the list.
4. When an access point is selected, the keyboard will display for you to enter the access point key (or password).
5. The access point will display below the toggle as the active connection.
6. Select WEB button to navigate to WEB to access the Internet. Refer to "WEB" on page 2-54 for more information.

GNSS (GPS) Settings (Option 31)

The MS2090A Field Master Pro is available with a built-in global positioning receiver feature (Option 31) that can provide latitude, longitude, altitude, and UTC timing information. This option also enhances frequency reference oscillator accuracy. When the global positioning receiver is actively locked to satellites, this information is saved with all saved measurements.

Note	The MS2090A Field Master Pro Data Sheet provides a list of the options and measurements that require GNSS Receiver (Option 31). In addition to having Option 31 installed, a GPS antenna is required. Refer to the instrument Technical Data Sheet for compatible GPS antennas.

The MS2090A supports the following global positioning satellite systems:

- **GPS:** The United States Global Positioning System (GPS). GPS is currently the world's most utilized satellite navigation system.
- **GNSS:** Global Navigation Satellite System, a term used worldwide. This term includes the combinations of GPS, GLONASS, BeiDou and Galileo. Accessing multiple satellites provides increased accuracy, redundancy, and availability at all times.

Activating the GNSS (GPS) Feature

Attach the GPS antenna to the GPS connector on the top of the instrument and follow the steps below:

1. Access the SYSTEM menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select GNSS (GPS) to open the GNSS (GPS) settings window.

Figure 2-34. GNSS (GPS) Settings

3. Activate the GNSS (GPS) by sliding the GNSS/GPS toggle button to on.
4. Select SEARCH MODE button to select the combination of the satellite systems.
5. Set ANTENNA VOLTAGE to 3.3 or 5.0 V.

6. When the GNSS (GPS) receiver has established a “good fix”, the GNSS (GPS) icon is displayed with a center dot and the following information is kept updated:
    - Fix status
    - Tracked satellites
    - Latitude
    - Longitude
    - Altitude
    - UTC timing information
    - Satellite Info
7. Toggling SHOW IN TITLE BAR shows the GNSS (GPS) coordinates in the Title bar at the top of the display.

After GNSS (GPS) location fix is attained, the internal reference oscillator begins to correct its frequency to match the GNSS (GPS) standard. After the internal frequency is adjusted to match the GNSS (GPS) standard, the status is indicated by GPS High Accuracy showing in the Status panel, which is displayed on the left side of the measurement display. When the GNSS (GPS) feature is not enabled, the reference source displays either “Internal Standard Accuracy” or a user-selected external reference frequency in the Status panel.

In order to acquire data from the GNSS (GPS) satellites, you must have line-of-sight to the satellites, or the antenna must be placed outside with no obstructions. If no GNSS (GPS) is connected for at least three days, the Frequency Reference annotation reads Int Std Accy.

Screenshot

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select SCREENSHOT to open the screenshot setup menu.

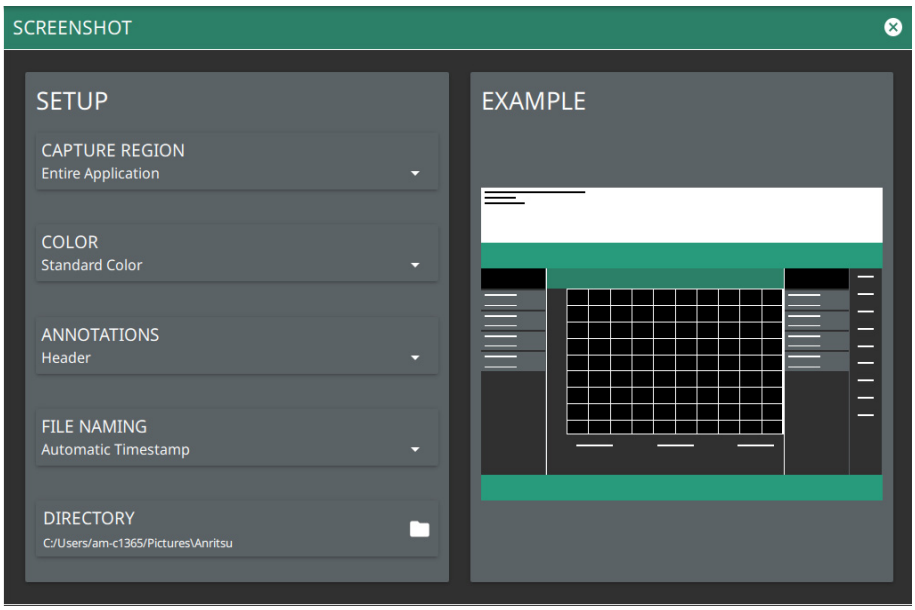


Figure 2-35. Screenshot Setup

Screenshot setup lets you configure the following:

- CAPTURE REGION: Captures entire window or graph area only.
- COLOR: Standard or printer-friendly.
- ANNOTATIONS: May be placed at top (header), bottom (footer) of captured image, or can be excluded (none).
- FILE NAMING: Saves a file with an automatic or manual time stamp.
- DIRECTORY: Directory path to destination folder where the file is to be saved.

Note Screenshots can be previewed on the instrument display from "FILES (File Management)" on page 2-48.

Language Settings

Follow the steps below to access language settings in order to change a selected display language:

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select LANGUAGE to open the language menu.

Note	If you select a different language, the primary menus and the screen annotation gets updated, but the keyboard used for file naming and similar tasks, notification messages and specific system menu names remain in the English language.

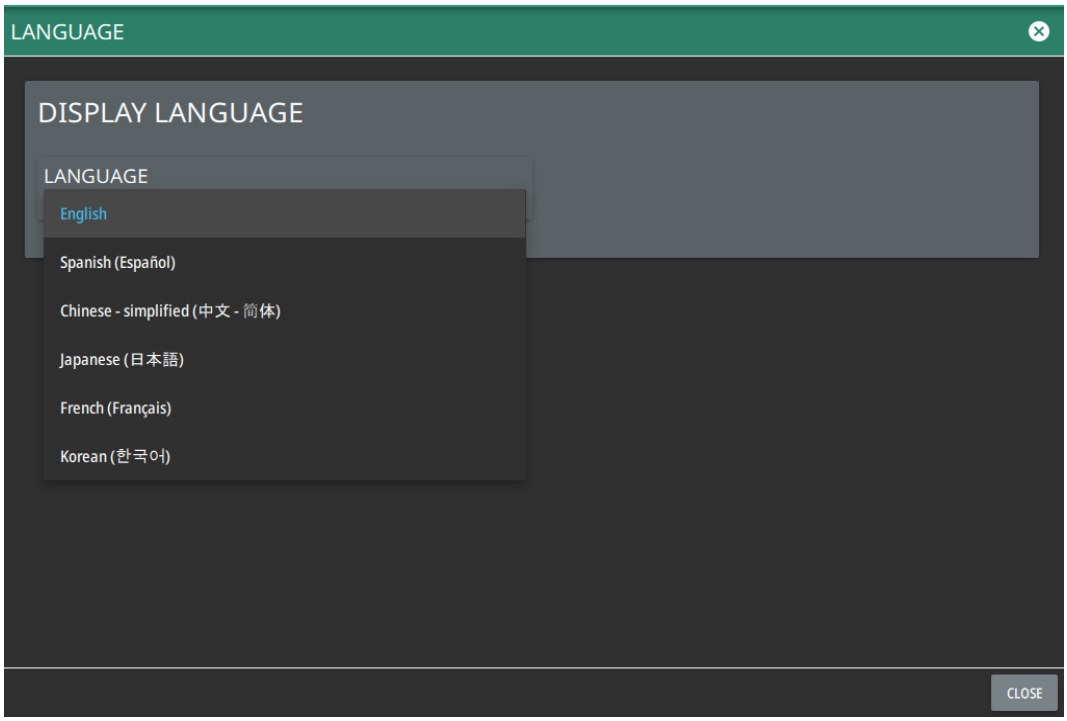


Figure 2-36. Language Settings

3. Select the LANGUAGE drop-down menu and select a desired display language as shown in the Figure 2-36.

Date Time Settings

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select DATE TIME to display the current date and time settings.

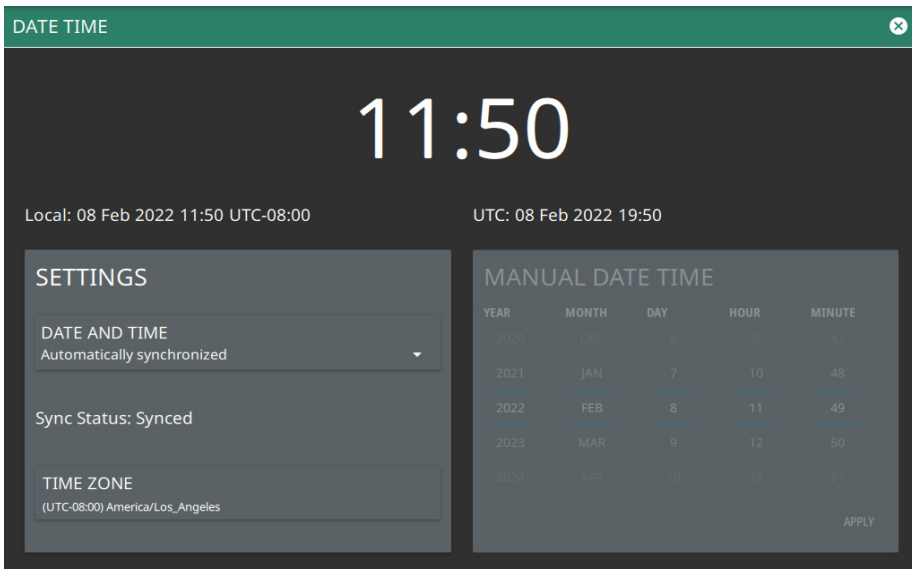


Figure 2-37. Date Time Settings

The Date Time setup lets you set the current date and time and the time zone.

- Date and Time: Manually set or automatically synchronized. When synchronized (Sync Status: Synced), the system uses the network time; if the instrument also has a GNSS (GPS) location fix, the system will determine and use the more accurate of the two, between network and GNSS (GPS) time. Select Manually set to activate the MANUAL DATE TIME window. Here you can scroll to a selectable year, month, day, hour, and minute.
- Time Zone: Lists the selectable time zones.

Port Setup

The Port Setup menu allows you to configure the external ports.

Bias Voltage

Bias Voltage setup provides controls to set the voltage level and to monitor the precise voltage and current, and trip state.

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select PORT SETUP to display the top panel bias voltage output settings.

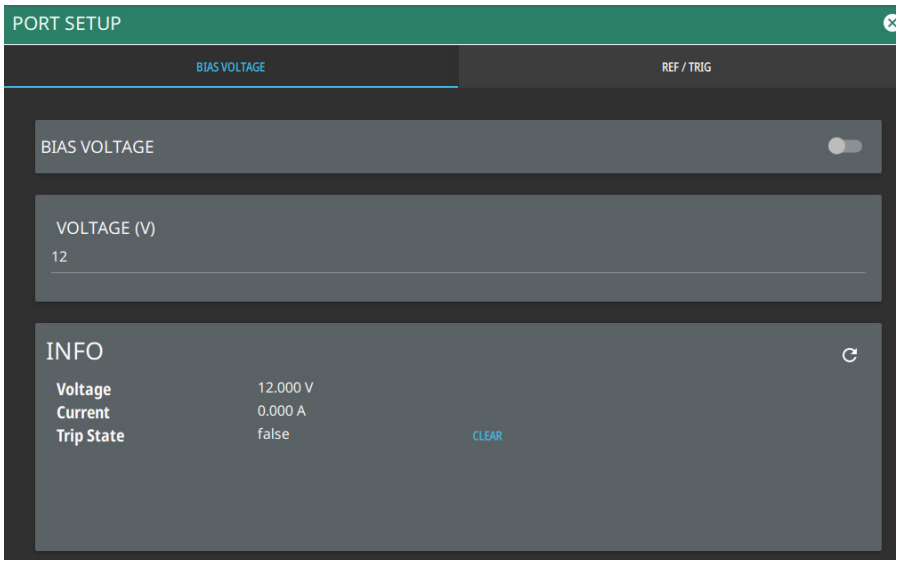


Figure 2-38. Bias Voltage Port Settings

3. Manually set the voltage in the range of 0 V to 34 V (note: stable output voltage setting is ≥ +1 V).
4. Toggle the bias voltage on or off.

Reference and Trigger

The reference and trigger setup provides controls to set the functionality of the configurable top panel reference and trigger ports.

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu, then select PORT SETUP > REF / TRIG to display the top panel reference and trigger port settings.

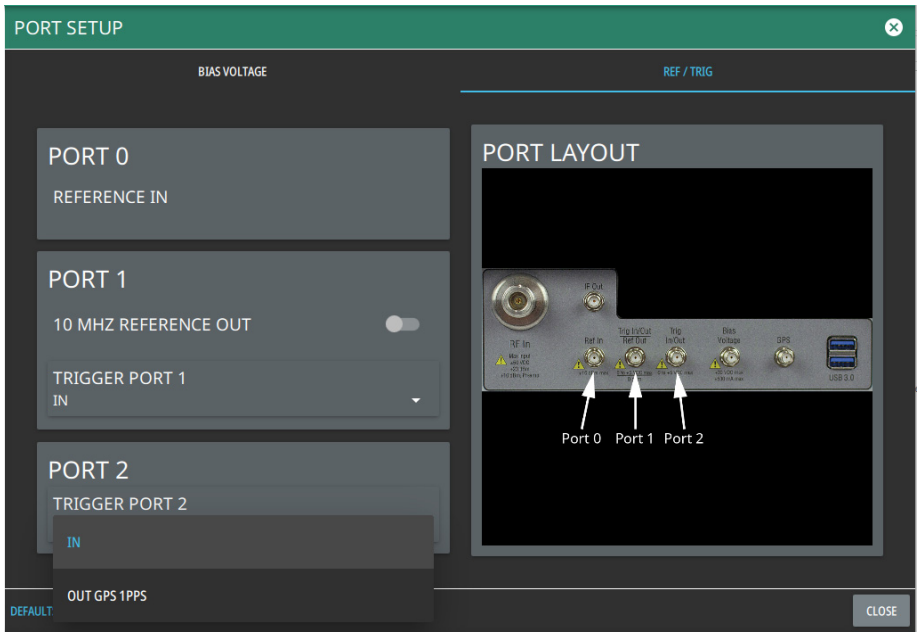


Figure 2-39. Reference/Trigger Port Settings

Note	PORT 0 is always a reference in port.

3. To set PORT 1 as a reference output, toggle 10 MHz REFERENCE OUT on. Otherwise, PORT 1 can be selected as a trigger input or trigger output by using the drop-down selection.
4. Use the drop-down selections to select PORT 2 as a trigger input or trigger output (GPS 1 PPS).

Options Settings

To view the installed and available options, follow the steps below:

1. Access the System menu (3-line icon in the upper left corner).
2. Navigate to SETTINGS to access the instrument settings menu.
3. Select OPTIONS to view the list of currently installed options in the left tab, and available options in the right tab. Time-limited options will show the expiration date in the EXPIRATION column.
4. Some options can be installed using only a software file. Others may require additional hardware. Contact your local sales or service representative for information on ordering or installing new options. Refer to Appendix B, "Upgrading Software Options" for more information.

Note	Not all instrument models offer every option. For example, Coverage Mapping Option (0431) is offered as a 90-day time limited option by ordering Option 9431. The option start time begins when the user first activates the option. Please refer to the Technical Data Sheet of your instrument for information on purchasing limited options

5. To upgrade your instrument with a specifically purchased option, select INSTALL OPTIONS FROM WEB to install options available on the web. Ensure that the unit is connected to the Internet.
6. Select ENABLE OPTIONS USING FILE to install options file saved in USB memory device.
7. Select SAVE CONFIG to export the config file to Anritsu.

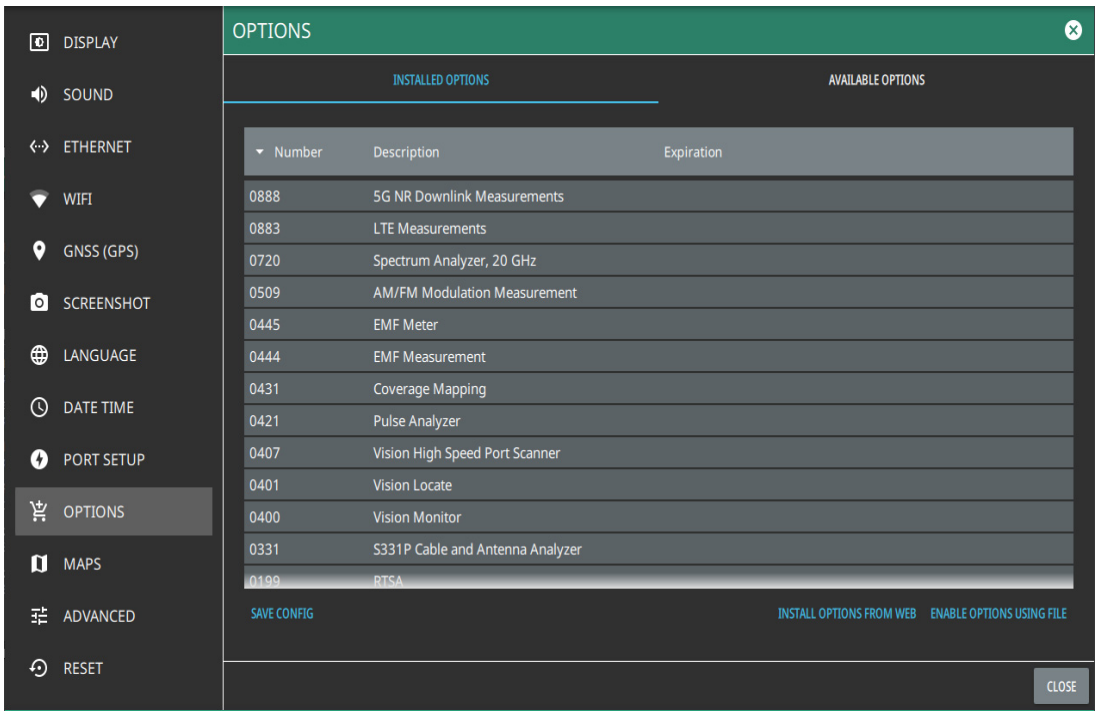


Figure 2-40. Options Settings

Caution	Once a time limited option is activated, the 90-day time period begins countdown and cannot be halted. Ensure you intend to activate the option before selecting Activate.

To activate the installed time-limited options select the ACTIVATE button to begin the 90-day trial.

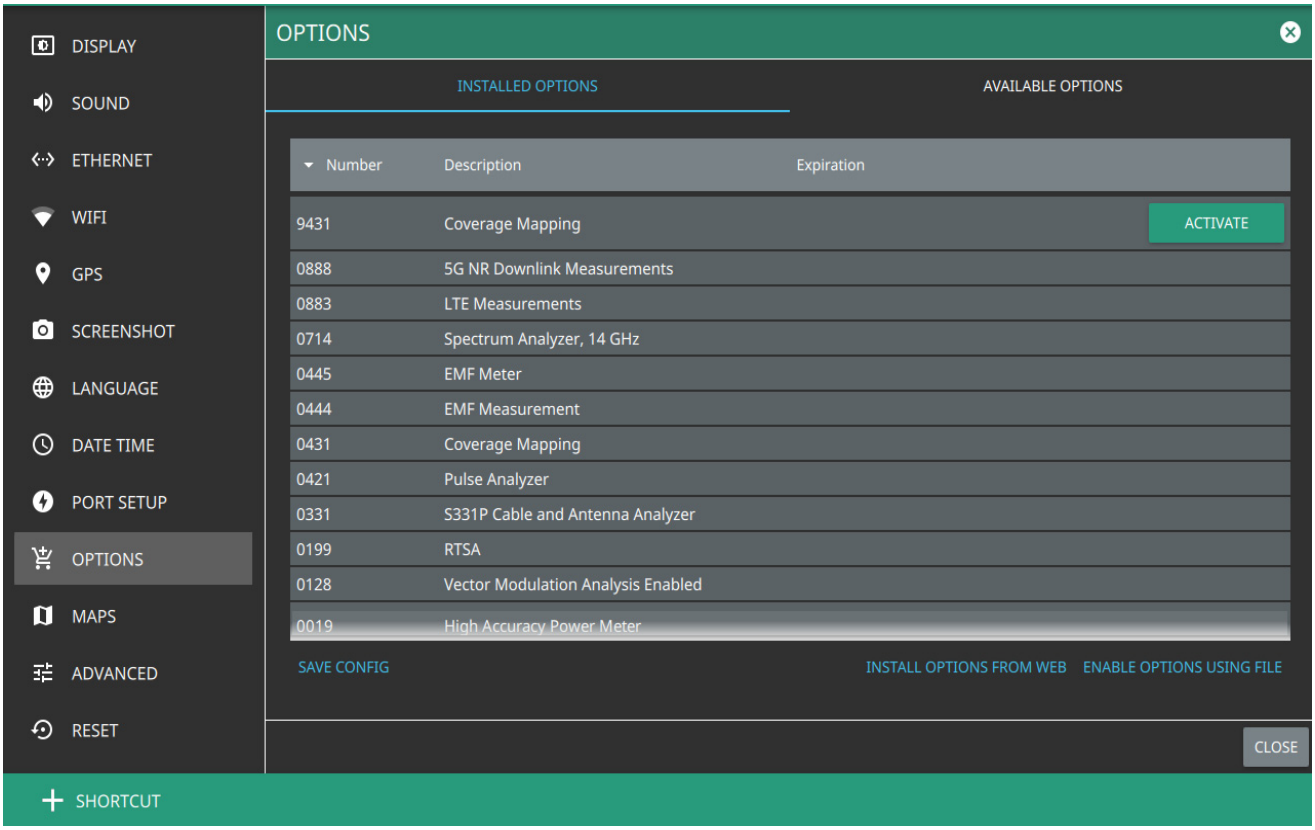


Figure 2-41. Options Settings

Maps Settings (Option 431)

Map settings are available when Option 431, Coverage Mapping is installed. Maps settings are used to delete map tiles from instrument memory. Refer to Coverage Mapping section in spectrum analyzer measurement guide (10580-00447).

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu.
3. Select MAPS to display the maps tile usage.
4. To free up internal storage space, delete loaded tiles using the DELETE TILES button. All tiles will be deleted.

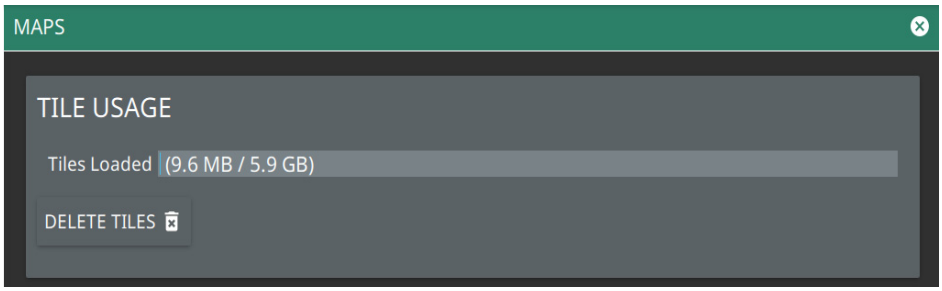


Figure 2-42. Maps Settings (Option 431)

ADVANCED

ADVANCED menu consists of ADVANCED SETTINGS, REMOTE LOCKOUT and NETWORK SECURITY tabs.

Advanced settings tab can be accessed

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu.
3. Select ADVANCED to access ADVANCED SETTINGS, REMOTE LOCKOUT AND NETWORK SECURITY tabs.

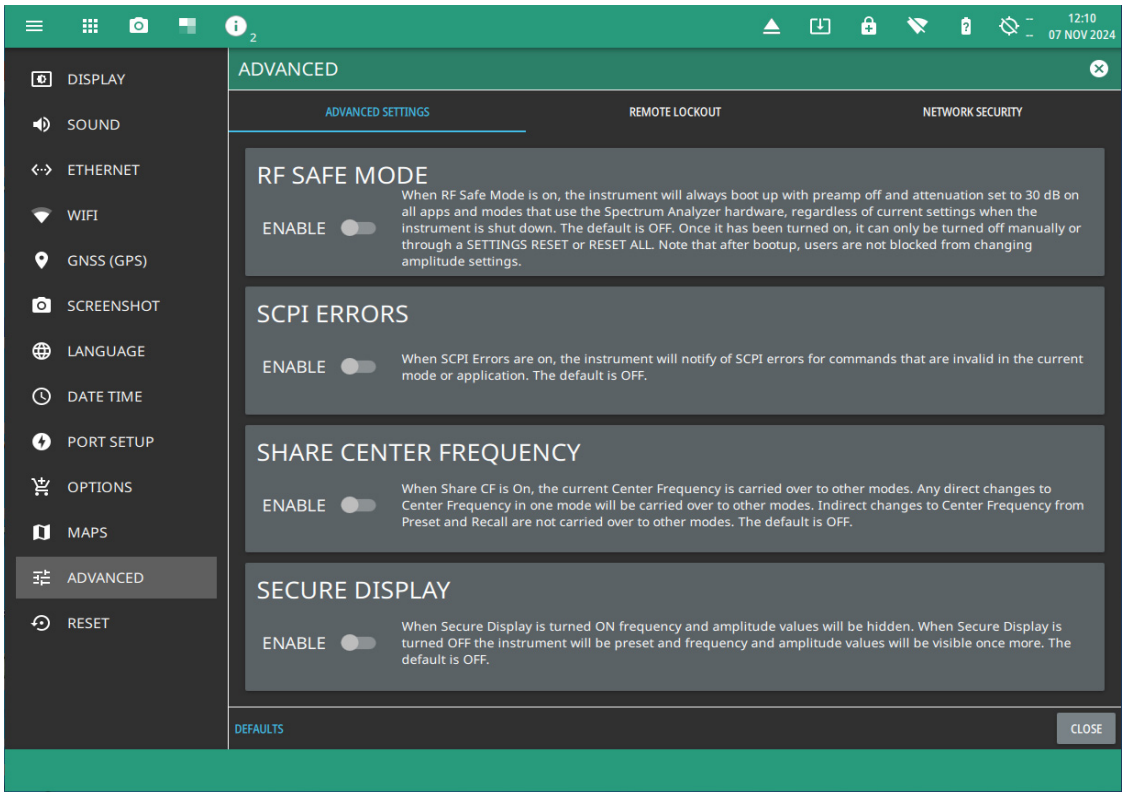


Figure 2-43. Advanced Settings

ADVANCED SETTINGS

Use advanced settings tab to enable/disable the following options:

- Toggle RF SAFE MODE on to protect the internal detection circuitry on boot-up.
- Toggle SCPI ERRORS on to get notified of the errors in the invalid SCPI commands.
- Toggle SHARE CENTER FREQUENCY on to maintain the changes in center frequency set directly in one mode consistent across all the modes. Note that any indirect changes via preset and recall are not carried over.
- Turn on SECURE DISPLAY toggle to enable secure data blanking. The frequency and amplitude values will be hidden and replaced with '#' symbols. Note that frequency and amplitude values will be blanked in markers and limits. Refer to Appendix C for detailed information.

Note	SHARE CENTER FREQUENCY section is disabled in CAAUSB and HIPM applications.

Note	SECURE DISPLAY toggle is only available in SPA and CAAUSB applications. Secure display section is not included in instruments without Option 7.

REMOTE LOCKOUT

Secure communication (Option 17) is not a time-limited option which creates a secure tunnel when connecting the instrument to a network. Refer to your product's technical data sheet to get the listed of encrypted ports. Use the REMOTE LOCKOUT tab to enable remote lockout and set remote password:

- Enable REMOTE LOCK toggle on your instrument to disconnect all remote clients.
- Set a remote password in order to connect the instrument with the remote client's ARRT software. The remote lockout feature is disabled by default and allows the remote connection to the instrument without any password authentication.
- Use SET REMOTE PASSWORD section to set a new remote password. Leave the CURRENT PASSWORD field empty if no password is currently set.
- Ensure to follow the password requirements, and press SET PASSWORD or SET PASSWORD AND LOCK options.

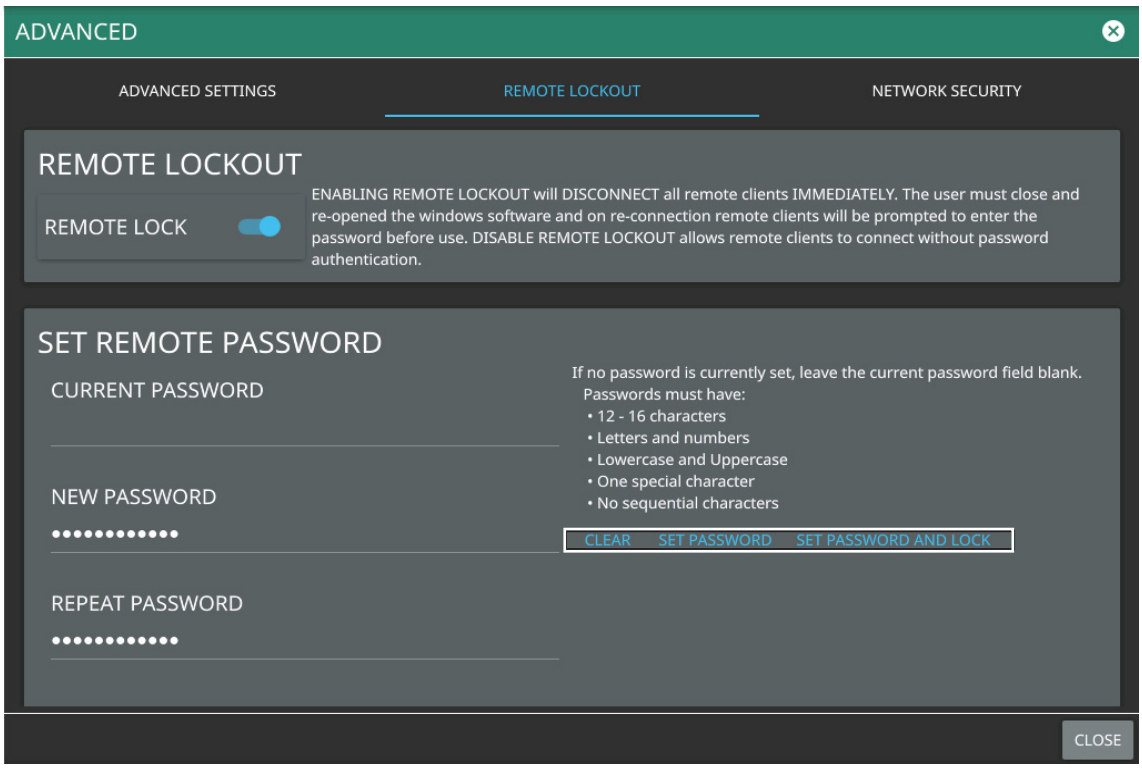


Figure 2-44. Remote Lockout

NETWORK SECURITY (Option 17)

Use network security tab to use a custom network certificate for additional security purposes:

- Press ADD CUSTOM CERTIFICATE to open the file manager and select an internally saved user specified RSA encryption PEM certificate and private key file instead of using an in-built network security certificate.
- Press SAVE PUBLIC KEY to save the Anritsu OpenSSL RSA public key to the PEM file.

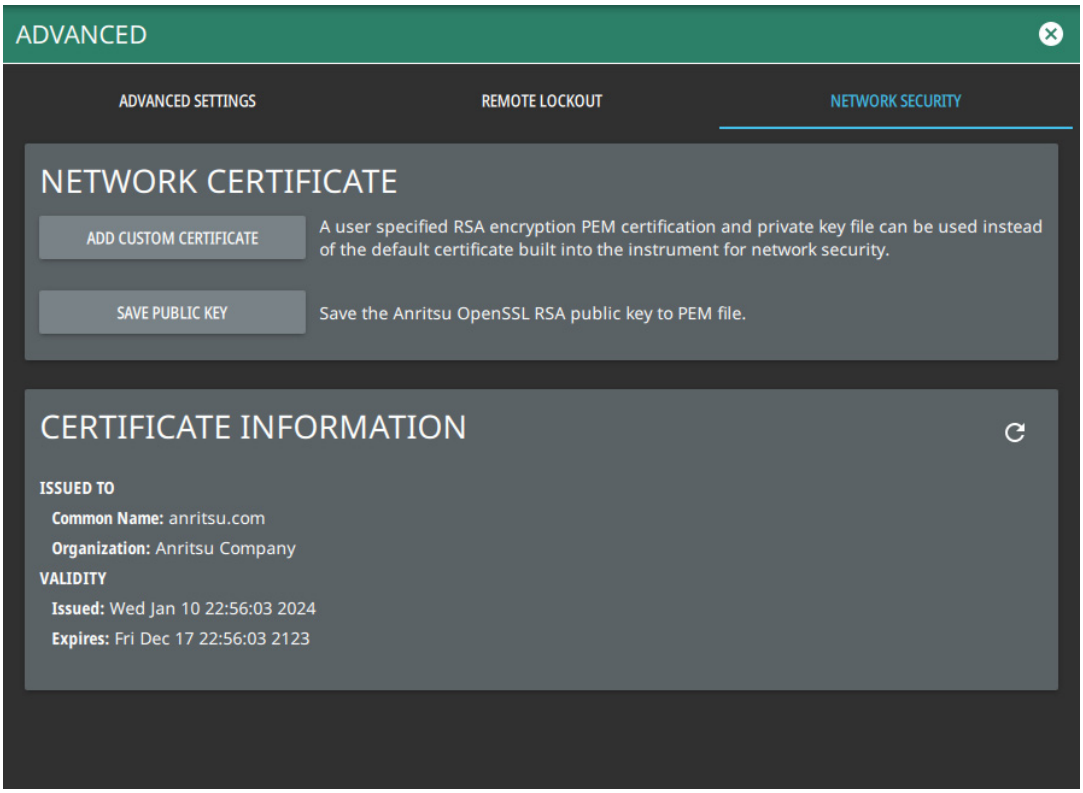


Figure 2-45. Network Security

Reset Settings

1. Access the System menu (3-line icon in the upper left corner).
2. Select SETTINGS to access the instrument settings menu.
3. Select RESET to open the Reset menu.

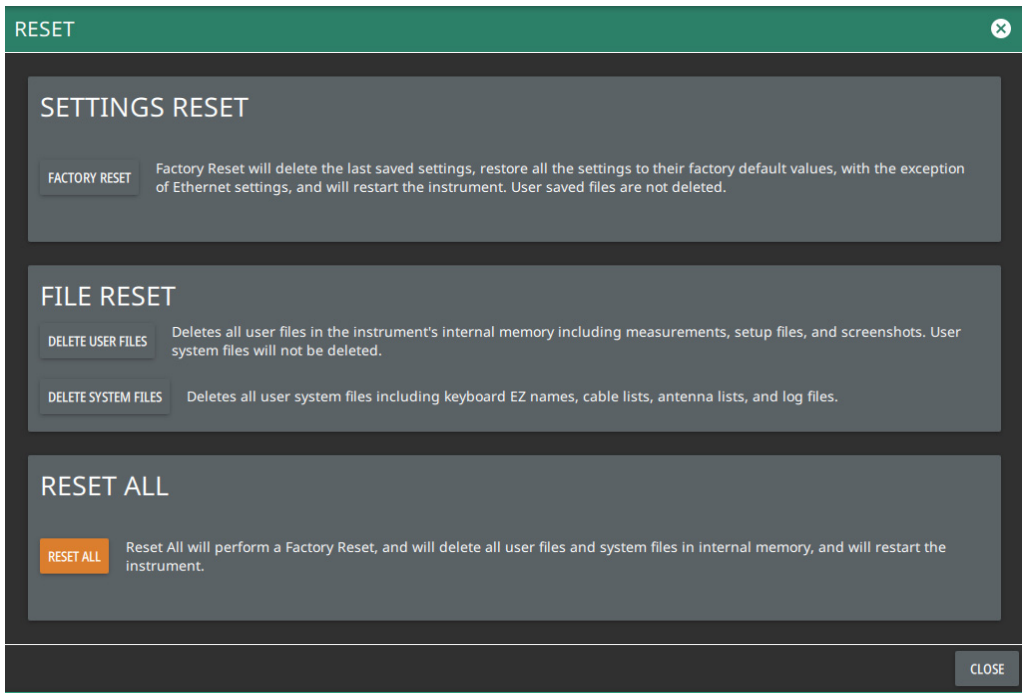


Figure 2-46. Reset Settings

The following reset options are available:

SETTINGS RESET

- FACTORY RESET: Restores the instrument to the factory default settings for all measurement modes and system settings, including language and the display and audio settings. Ethernet settings and user files are not affected. The instrument will automatically restart.

FILE RESET

- DELETE USER FILES: Deletes all user files from the instrument's internal memory, including measurement, setup, and screenshot files. System files are not affected.
- DELETE SYSTEM FILES: Deletes all user system files from the instrument's internal memory, including keyboard EZ names, cable and antenna lists, and log files. Other user files are not affected.

RESET ALL

- RESET ALL: Performs a Factory Reset as described above and deletes all user files and system files from the instrument's internal memory. The instrument will automatically restart.

2-11 FILES (File Management)

1. Access the System menu (3-line icon in the upper left corner).
2. Select FILES to access the instrument file management menu.

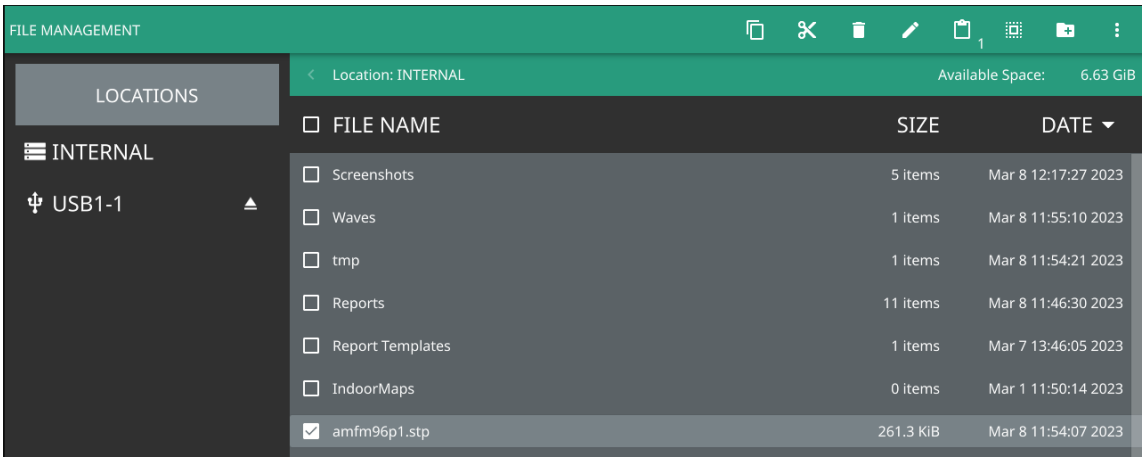


Figure 2-47. File Management Menu

File Locations

Displays the available memory locations. Select the location that you want to access and the available files will be displayed on the right side. You can select the column headers to change the sort order.

File Management Operations

All file operations are selected via the following icons:

3-Dots 	Use the 3-dots menu to refresh the displayed folder contents or to close the file management menus.
New Folder 	Use the New Folder icon to create a new directory in the current memory location. When selected, the virtual keyboard is displayed, allowing you to enter a new directory name.
Select 	The Select icon enables checkboxes next to your folder and file names. You can then select multiple files to move, copy, or delete.
Clipboard 	The Clipboard icon displays the number of items that you have selected and copied to the clipboard. Use this icon to paste the copied items to the destination folder.
Edit 	Use the Edit icon to change file or folder names. Select the item you wish to edit, then select Edit to display the virtual keyboard and edit the item's name.
Delete 	Use the Delete icon to remove files or folders from memory. Select the item you wish to delete, then select Delete to remove the item. **Caution:** The item will be permanently deleted and cannot be recovered.
Cut 	Use the Cut icon to move files or folders. Select the items you wish to move, then select Cut to store the items on the clipboard. Navigate to the new location and select the Clipboard icon to paste the items. The moved items are deleted from the source location.

Figure 2-48. File Management Icons (1 of 2)

Copy 	Use the Copy icon to select files and folders to copy to a new location. Select the items you wish to copy, then select Copy to store the items on the clipboard. Navigate to the new location and select the Clipboard icon to paste the items. Copies of the items remain in the source location.
USB Eject 	Use the USB Eject icon to properly dismount the USB memory device before removing it from the instrument port. Failing to properly eject the device could cause data corruption.

Figure 2-48. File Management Icons (2 of 2)

Previewing Screenshots

While in File Manager, you can preview screenshots on the instrument display simply by selecting the screenshot file name. While the preview is displayed, you can use the controls to:

- Cycle forward and backward through each screenshot in the directory.
- Rename the file by selecting RENAME, then use the keypad to enter a new filename.
- Delete the file by selecting DELETE and then confirming your choice.
- Copy the file, then close the preview dialog and navigate to the desired location, then select the Paste icon at the top of the File Manager.

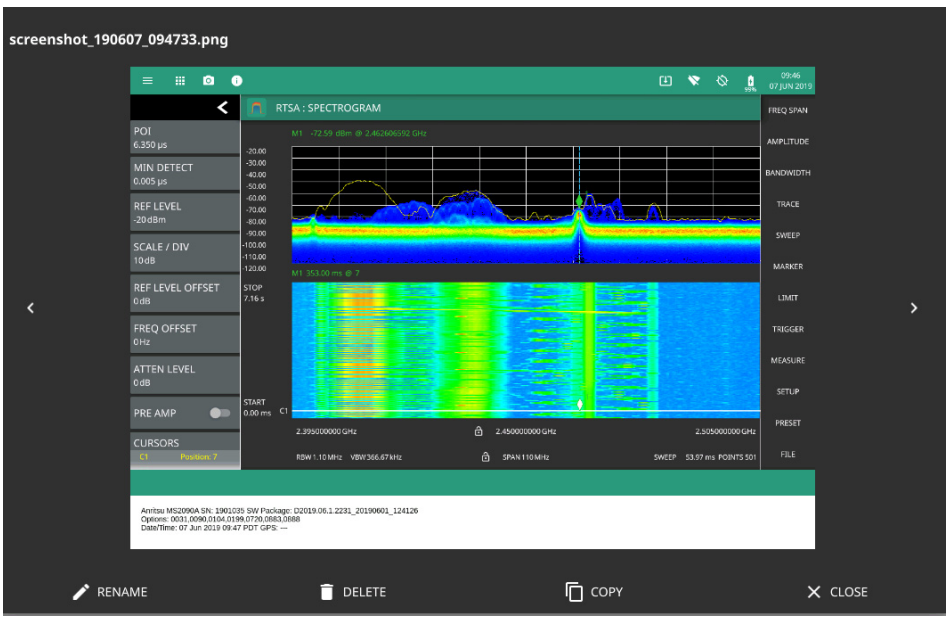


Figure 2-49. Screenshot Preview

Previewing PDF Reports

While in File Manager, you can preview PDF reports on the instrument display simply by selecting the PDF file saved to REPORTS folder. While the preview is displayed, you can use the controls to:

- Cycle forward and backward through each PDF report in the directory.
- Rename the file by selecting RENAME, then use the keypad to enter a new filename.
- Delete the file by selecting DELETE and then confirming your choice.
- Copy the file, then close the preview dialog and navigate to the desired location, then select the Paste icon at the top of the File Manager.

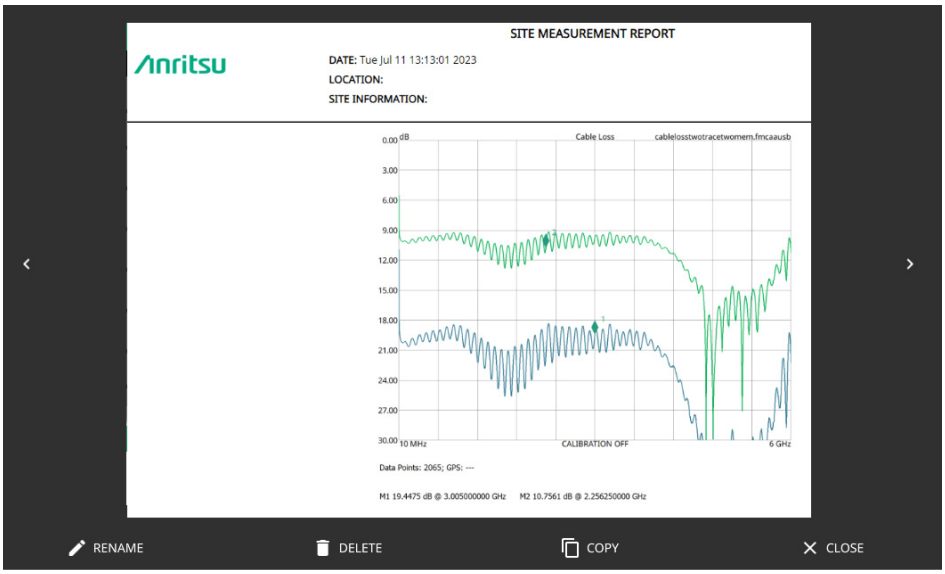


Figure 2-50. PDF Preview

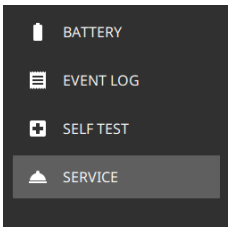
FTP Access

An FTP server has been included in the instrument to allow direct access to files stored on the instrument (or on a USB drive connected to the instrument) from a remote computer. To access the FTP server:

1. Connect the instrument to a network.
2. Use an FTP client of choice (such as Windows Explorer or File Explorer) and enter “ftp://” and the IP address of the instrument as the host. For example: ftp://172.155.1.2
3. Enter the user name: ftp
4. Enter the password: serial number of the instrument
   The serial number can be obtained from the System Information menu or through SCPI using the "*IDN?" command..

2-12 Diagnostics Menu

1. Select System menu.
2. Select DIAGNOSTICS menu to access the diagnostics options of the instrument. See Figure 2-51.



BATTERY: Displays the list of battery information. Refer to Battery section.

EVENT LOG: Saves log files in a USB memory device. Refer to Event Log section.

SELF TEST: Displays the list of self test results. Refer to Self Test section.

SERVICE: Enables service mode. Refer to Service Mode section.

Figure 2-51. Diagnostics Menu

Battery

This diagnostic option displays the information of the MS2090A battery consisting of BATTERY INFORMATION and ADVANCED sections.

The battery information consists of the following:

- Time To Empty:
- Relative Charge:
- Voltage:
- Current:

The relative charge indicates the charge level that the battery is capable of storing. The maximum charge shows the relative capacity of the battery compared to the design capacity. Advanced information can be expanded by selecting ADVANCED.

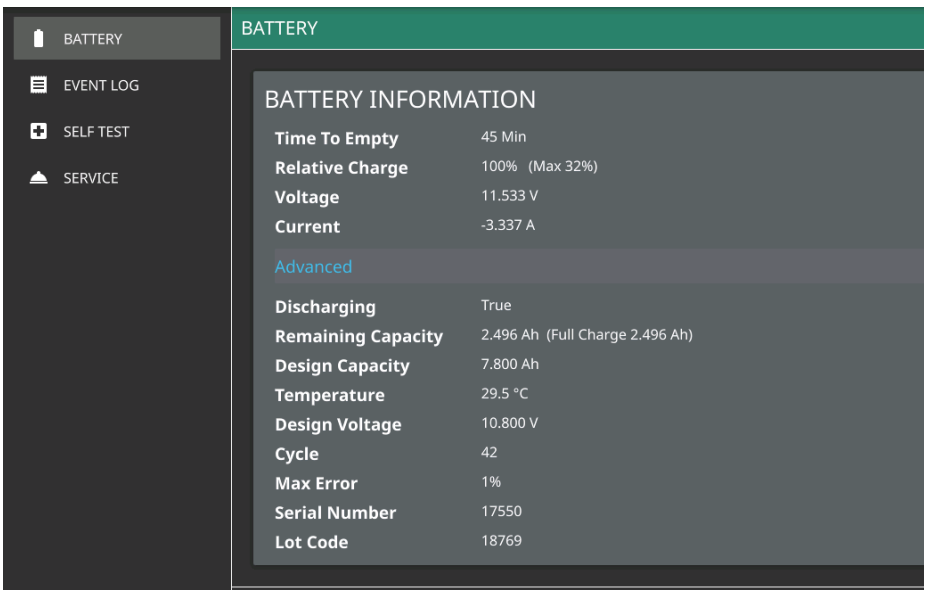


Figure 2-52. Battery Information

Event Log

The event log allows you to save the instrument notifications that are not displayed in the title bar. Select the SAVE button to copy the event log file into a USB memory device. This event log file is a binary file which is used by the customer service for troubleshooting purposes.

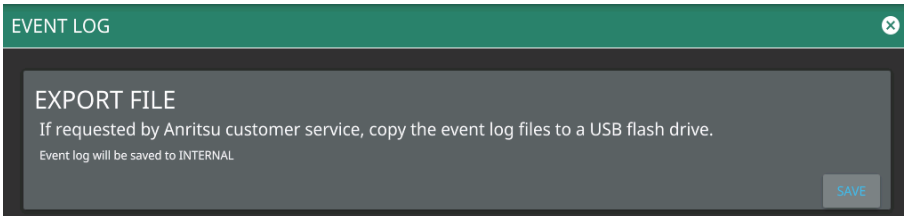


Figure 2-53. Event Log

Self Test

Self test is run when the self test feature is accessed. Basic system results are shown initially. The individual test result can be displayed with test data and a pass/fail status by selecting the desired system or application. The self test results can be saved to a file for future reference. Refer to Appendix A, "Instrument Notifications" for more information.

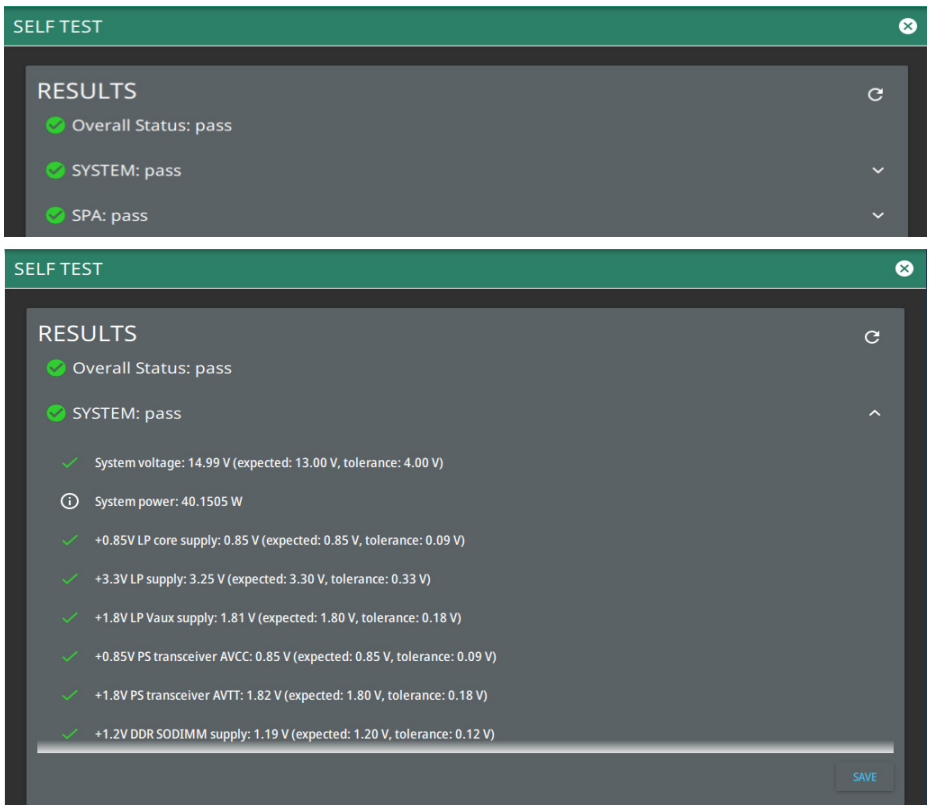


Figure 2-54. Self Test - SPA

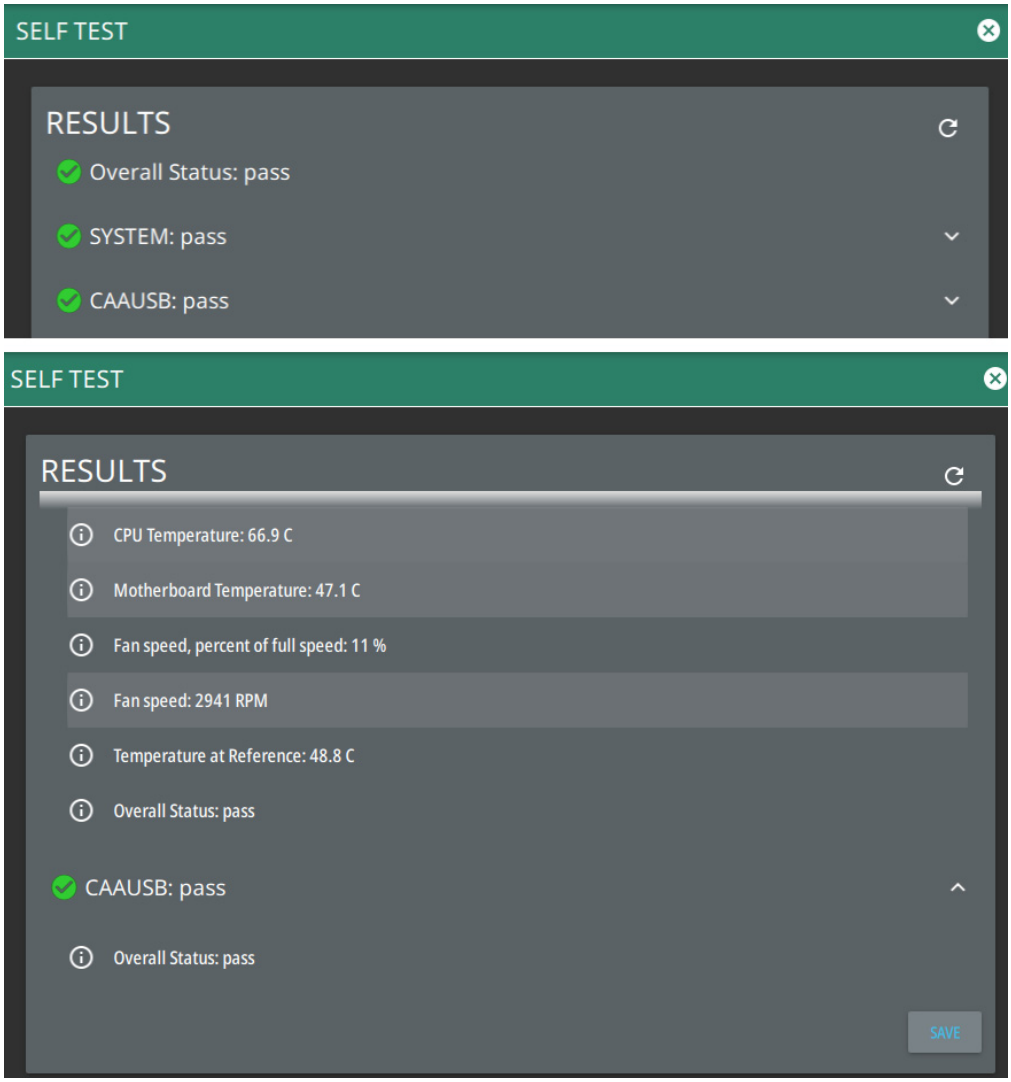


Figure 2-55. Self Test - CAAUSB

Service Mode

The service mode is for Anritsu customer service use only.

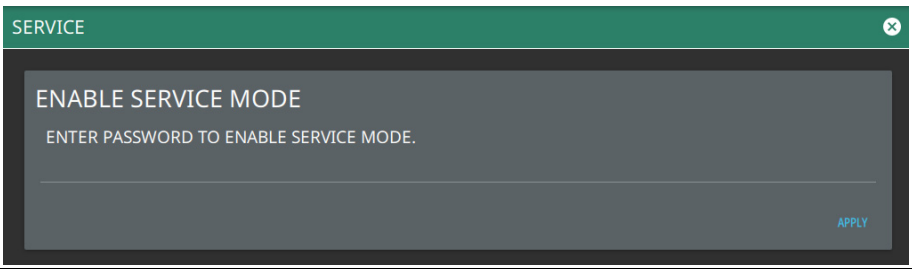
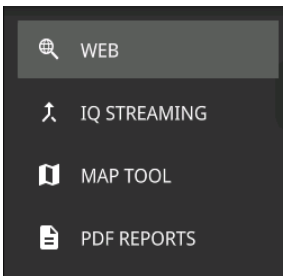


Figure 2-56. Service Mode

2-13 Tools Menu

1. Access the System menu (3-line icon in the upper left corner).
2. Select TOOLS to access the instrument tools menu, then select the tool menu that you wish to open.



WEB: Opens "WEB" tool.

IQ STREAMING: Opens "IQ Streaming" tool. Refer to IQ Capture/Streaming Measurement Guide (10580-00490) for detailed information.

MAP TOOL: Opens Map Tool. Refer to Coverage Mapping section of the Spectrum Analyzer Measurement Guide (10580-00447), for detailed information.

PDF REPORTS: Opens "PDF REPORTS" tool.

Figure 2-57. TOOLS Menu

WEB

By default, the WEB tool launches the Anritsu company website. It allows you to search for any information related to your product and/or browse the Internet.

You can perform the following actions using the default company website:

- Select Help icon to view your product's HELP set that includes the user documentation.
- Select the Home icon to visit the company website.
- Tap the Search icon to enter a keyword to search the company website.
- Select the Login icon to access your My Anritsu account or to create a new account.
- Select the Phone icon to contact the customer service, sales office or to learn more about Anritsu company.
- Select the Globe icon to choose the desired country/region.
- Select SUPPORT menu to access Training and Education link to learn more about your product.

.

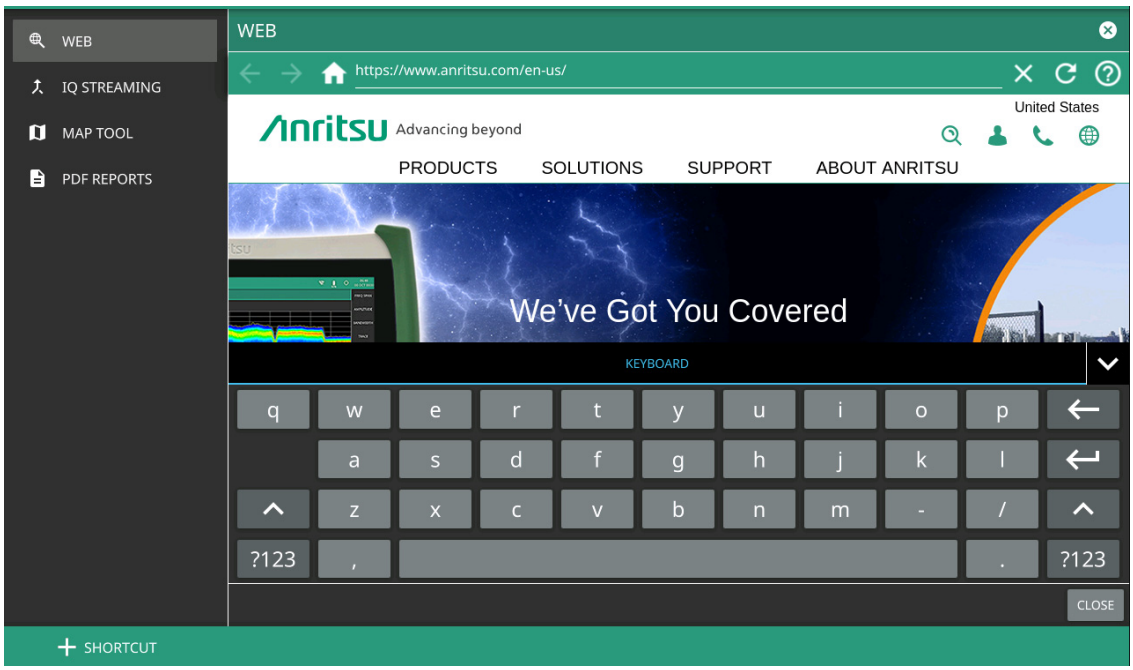


Figure 2-58. WEB Tool

IQ Streaming

The IQ STREAMING menu allows you to concatenate an existing IQ metadata file (.dgzm) with a session of IQ data files (.dgz) that were streamed to a USB device after the stream operation is complete. The data files must all come from the same stream session.

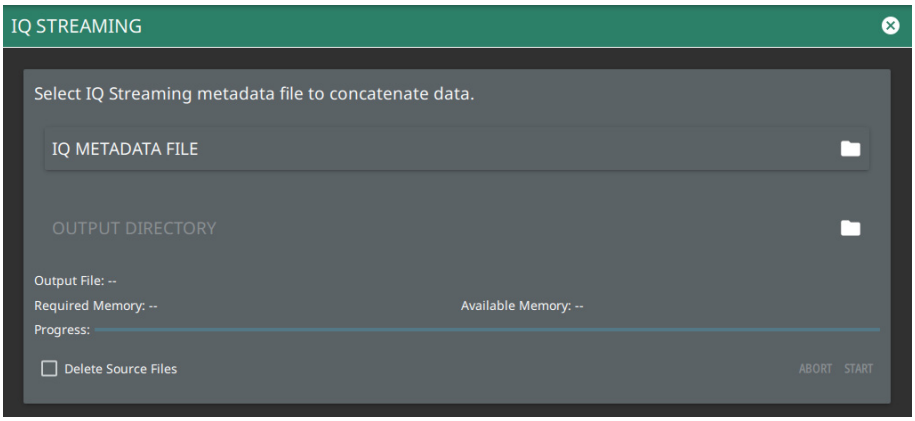


Figure 2-59. IQ STREAMING TOOL

1. Select IQ METADATA FILE and then select the file that you wish to concatenate with IQ data streams. All of the data stream files in the selected directory will get concatenated with the metadata file.
2. Select the OUTPUT DIRECTORY and select the destination to store the concatenated files. Check the DELETE SOURCE FILES box if source files need to be deleted.
3. Select START to begin the concatenation. The progress bar will indicate the relative progress.

Note	Concatenating files can be time consuming depending on the streaming parameters and time. The process can be much faster if performed on a PC using the remote user interface. Refer to Appendix D, “ARRT Software” for details on using this application.

PDF REPORTS

The PDF REPORTS tool allows the user to generate a PDF report or HTML report.

1. Select OPEN REPORT GENERATOR to open REPORT GENERATOR – CONFIG window.

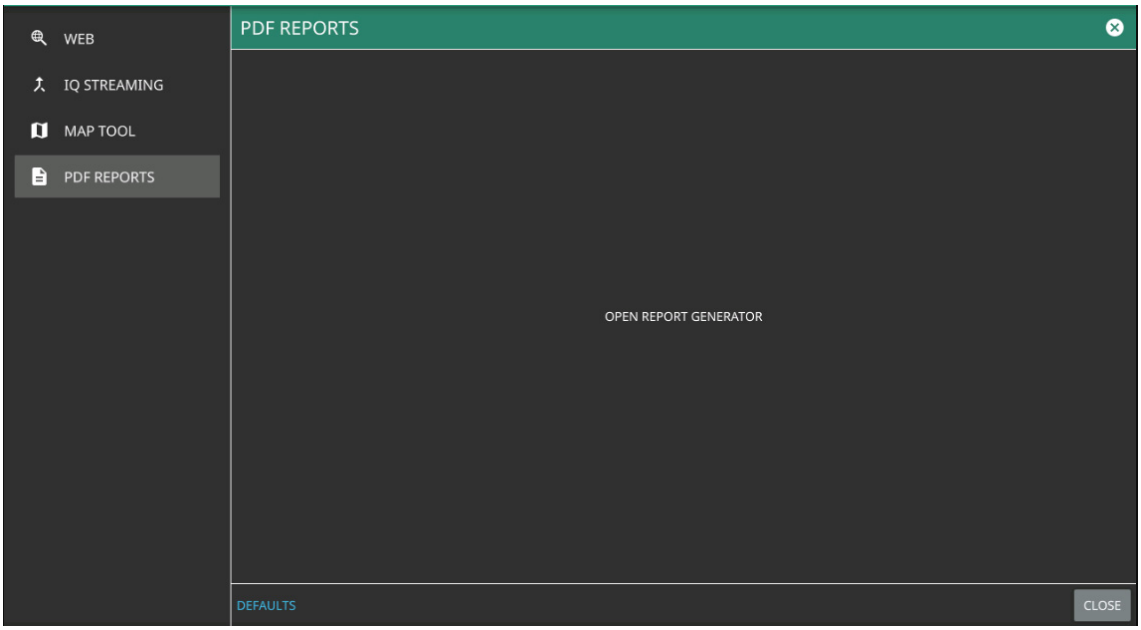


Figure 2-60. PDF Reports Tool

2. In REPORT GENERATOR – CONFIG window you can load a template to populate the given fields.
   - Select LOAD TEMPLATE to use a customized template
   - Select SAVE TEMPLATE to save the template.
   - Select REPORT NAME to enter the name of the report.
   - To have the traces in black and white, toggle on the BLACK & WHITE GRAPHS button.
   - Toggle off the following buttons to exclude the information from the generated report:
     - Work Order Number
     - Technician ID
     - Prepared By
     - Approved By
   - Select CLEAR TEMPLATE to delete the preloaded template.

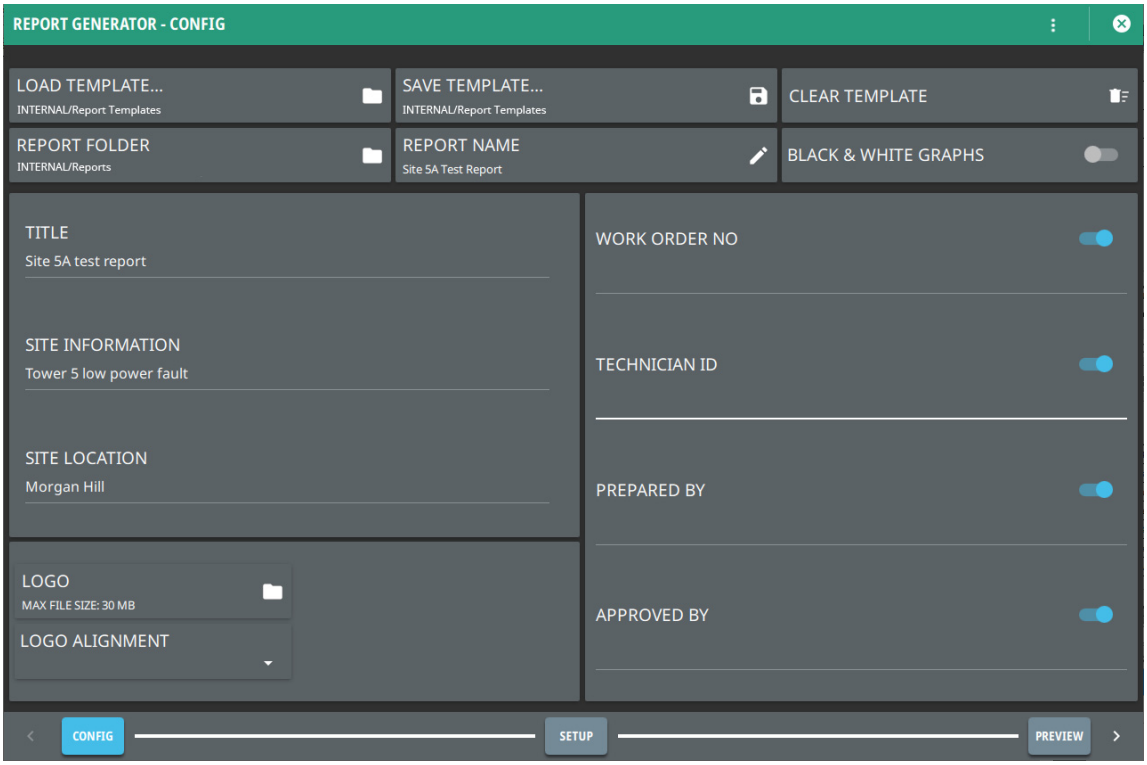


Figure 2-61. Report Generator - Config Window

3. Select SETUP button in the bottom to add setup or trace files in REPORT GENERATOR - SETUP window.
   - Select the blue + ADD FILE (S) button in the upper right to add image files (.png. jpeg, jpg, .fmcaausb) to the PDF report.
   - To delete a file select the minus button next to the file name, alternately select CLEAR ALL.
   - To include a specific note in your report, type the note into the text box located under the graph. Note that you need the select an image file before adding a note. Select SAVE NOTE button to save the note. Look for the green tick symbol in the lower right corner of the text box once the note is saved successfully.

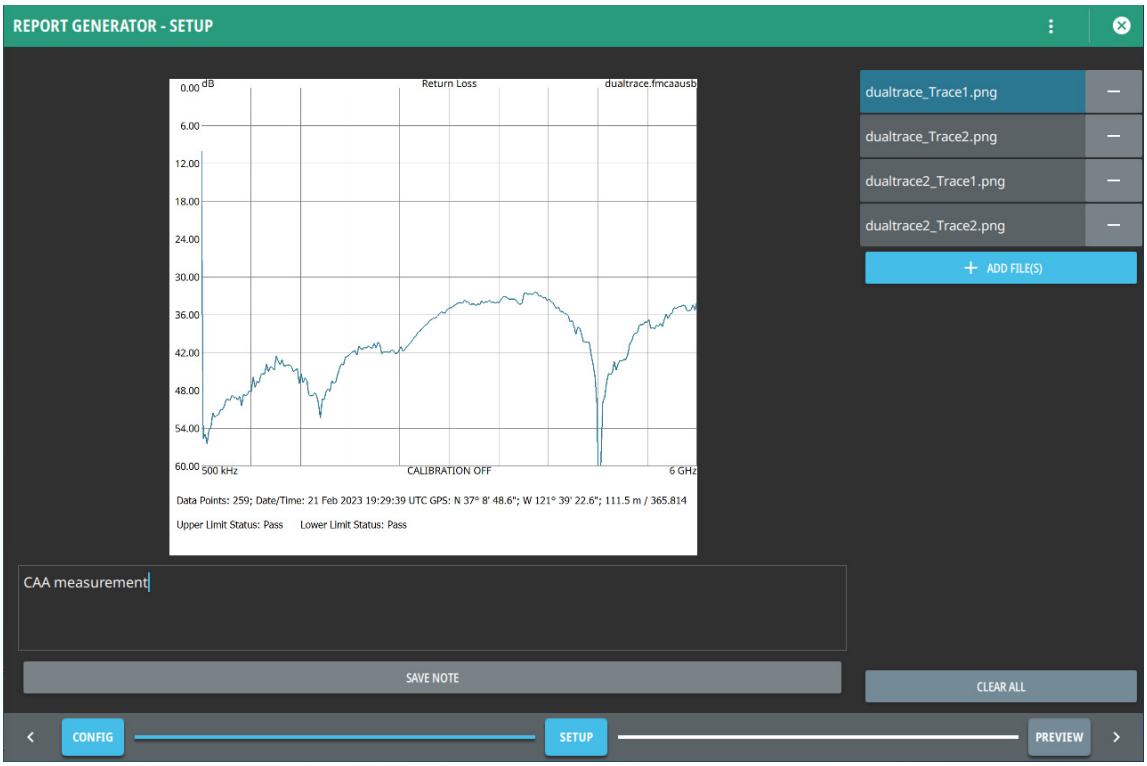


Figure 2-62. Report Generator - Setup Window

4. Select PREVIEW button to see the preview of the generated report in REPORT GENERATOR - PREVIEW window.

5. Select SAVE TO PDF button on the top to save the report internally in the REPORTS folder.
6. Select the 3-dot icon in the top right of the preview window to preview an internally saved HTML file or to capture a screenshot.
7. Select LOAD HTML PREVIEW to open FILE MANAGEMENT window. Select the HTML file and select OPEN button in the bottom right. If required, select SAVE TO PDF to save the HTML preview as a PDF file.

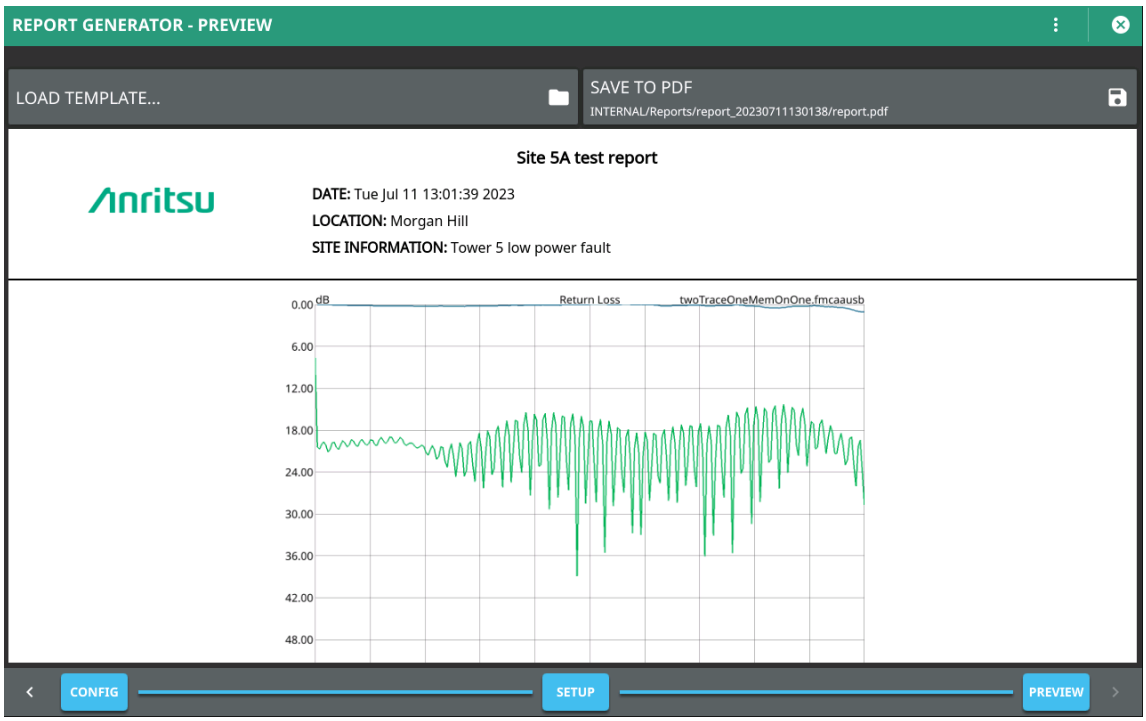


Figure 2-63. Report Generator - Preview Window

Appendix A — Instrument Notifications

A-1 Introduction

This appendix provides a list of instrument messages and their meaning and procedures for a full system recovery. If any error condition persists, contact your local Anritsu Service Center (http://www.anritsu.com/contact-us).

Field Master Pro displays the following message types:

- Self-Test Messages, indicating self-test pass or fail conditions.
- File Management Notifications, relating to the system (3-line) menu FILES actions.
- Informational Notifications, such as notification of a screen capture.
- Warning Notifications, such as an ADC over-range warning.
- Error Notifications, such as an internal instrument fault.

Messages have the following display characteristics:

- Transient messages appear briefly and then fade away.
- Persistent messages remain on the display and require user intervention to correct the condition.
- Some messages are logged but not displayed, such as messages in the event log.
- Messages may be displayed either in the Title bar or in a pop-up window.

A-2 Self-Test Messages

Field Master Pro has built-in diagnostics that allow you to run a built-in self test. The test results can be viewed on the screen and saved to a log file. To run self test, use the 3-line menu to access DIAGNOSTICS, then select SELF TEST and RUN SELF TEST. Below is a sample list of self tests with passing results:

```
TEST DATE: 2019-03-21 09:51:47 MDT


OVERALL STATUS : PASS


SYSTEM : OVERALL STATUS : PASS
  System voltage : 13.00 V, 4.00 V ,15.01 V  (PASS)
  System power : 32.2083 W
  External current : 2.50 A, 2.50 A ,2.32 A  (PASS)
  Battery current : 4.00 A, 4.00 A ,0.18 A  (PASS)
  +0.85V LP core supply : 0.85 V, 0.09 V ,0.85 V  (PASS)
  +3.3V LP supply : 3.30 V, 0.33 V ,3.25 V  (PASS)
  +1.8V LP Vaux supply : 1.80 V, 0.18 V ,1.82 V  (PASS)
  +1.8V LP IO supply : 1.80 V, 0.18 V ,1.81 V  (PASS)
  +0.85V FP core supply : 0.85 V, 0.09 V ,0.85 V  (PASS)
  +1.8V DDR PLL supply : 1.80 V, 0.18 V ,1.81 V  (PASS)
  +0.85V PS transceiver AVCC : 0.85 V, 0.09 V ,0.85 V  (PASS)
  +1.8V PS transceiver AVTT : 1.80 V, 0.18 V ,1.83 V  (PASS)
  +2.5V DDR SODIMM supply : 2.50 V, 0.25 V ,2.49 V  (PASS)
  +1.2V DDR SODIMM supply : 1.20 V, 0.12 V ,1.20 V  (PASS)
  +0.85V FPGA core supply : 0.85 V, 0.09 V ,0.86 V  (PASS)
  +0.9V transceiver AVCC supply : 0.90 V, 0.09 V ,0.90 V  (PASS)
  +1.2V transceiver AVTT supply : 1.20 V, 0.12 V ,1.21 V  (PASS)
  +1.0V Ethernet supply : 1.00 V, 0.10 V ,0.99 V  (PASS)
  +1.8V FPGA supply : 1.80 V, 0.18 V ,1.79 V  (PASS)
  +2.5V FPGA supply : 2.50 V, 0.25 V ,2.48 V  (PASS)
  +3.3V FPGA supply : 3.30 V, 0.33 V ,3.29 V  (PASS)
  +5.0V USB/misc supply : 5.00 V, 0.50 V ,5.00 V  (PASS)
  +3.9V analog supply : 3.90 V, 0.39 V ,3.96 V  (PASS)
  +5.7V analog supply : 5.70 V, 0.57 V ,5.67 V  (PASS)
  -5.7V analog supply : -5.70 V, 0.57 V ,-5.26 V  (PASS)
  +12.8V analog supply : 12.80 V, 1.28 V ,12.82 V  (PASS)
  +24.0V analog supply : 24.00 V, 2.40 V ,23.92 V  (PASS)
  Backlight voltage : 22.00 V, 4.40 V ,19.56 V  (PASS)
  Backlight current : 0.20 A, 0.20 A ,0.18 A  (PASS)
  12.0V for fan : 12.00 V, 1.20 V ,12.00 V  (PASS)
  CPU Temperature : 61.0 C
```

```
   Motherboard Temperature : 46.5 C
   Fan speed, percent of full speed : 7 %
   Fan speed : 2638 RPM
   Temperature at Reference : 45.3 C

SPA : OVERALL STATUS : PASS
   +12VG : 12.00 V, 1.20 V ,11.90 V  (PASS)
   +5V_PREAMP : 5.00 V, 0.50 V ,4.99 V  (PASS)
   +5VA : 5.00 V, 0.50 V ,5.02 V  (PASS)
   +5VG : 5.00 V, 0.50 V ,4.99 V  (PASS)
   +5VH : 5.00 V, 0.50 V ,5.02 V  (PASS)
   +5VI : 5.00 V, 0.50 V ,5.05 V  (PASS)
   +5V_VCO : 5.00 V, 0.50 V ,5.09 V  (PASS)
   +5VM : 5.00 V, 0.50 V ,5.01 V  (PASS)
   +5VP : 5.00 V, 0.50 V ,5.05 V  (PASS)
   +5V_SAW : 5.00 V, 0.50 V ,4.99 V  (PASS)
   +3V3_HBPA : 3.30 V, 0.33 V ,3.31 V  (PASS)
   +3V3_IF : 3.30 V, 0.33 V ,3.29 V  (PASS)
   +3V6 : 3.60 V, 0.36 V ,3.55 V  (PASS)
   +3V3_CAL : 3.30 V, 0.33 V ,3.36 V  (PASS)
   +3V3G : 3.30 V, 0.33 V ,3.33 V  (PASS)
   +3V3H : 3.30 V, 0.33 V ,3.29 V  (PASS)
   +3V3M : 3.30 V, 0.33 V ,3.32 V  (PASS)
   +3V3P : 3.30 V, 0.33 V ,3.33 V  (PASS)
   ADC_AVDD3_3V3 : 3.30 V, 0.33 V ,3.33 V  (PASS)
   +3V3IFA : 3.30 V, 0.33 V ,3.33 V  (PASS)
   +3V3DET : 3.30 V, 0.33 V ,3.35 V  (PASS)
   +3V3IFC : 3.30 V, 0.33 V ,3.37 V  (PASS)
   +3V3IFD : 3.30 V, 0.33 V ,3.35 V  (PASS)
   +3V3IF_OUT : 3.30 V, 0.33 V ,3.33 V  (PASS)
   SPARE : 0.00 V, 1.00 V ,0.00 V  (PASS)
   -5V : -5.00 V, 0.50 V ,-5.13 V  (PASS)
   +24VH : 24.00 V, 2.40 V ,24.18 V  (PASS)
   +3V3D : 3.30 V, 0.33 V ,3.27 V  (PASS)
   +2V5D : 2.50 V, 0.25 V ,2.50 V  (PASS)
   ADC_AVDD2_2V5 : 2.50 V, 0.25 V ,2.50 V  (PASS)
   ADC_AVDD1_1V25 : 1.25 V, 0.13 V ,1.25 V  (PASS)
   ADC_DRVDD_1V25 : 1.25 V, 0.13 V ,1.25 V  (PASS)
   DCM Not Available For This Option : 0.00 V, 0.00 V ,0.00 V  (PASS)
   Thermal Sensor 1 (Mid-band 1st IF) : 35.00 C, 90.00 C ,44.75 C  (PASS)
```

```
Thermal Sensor 2 (Mid-band 2nd IF) : 35.00 C, 90.00 C ,46.00 C  (PASS)
Thermal Sensor 3 (Low-band RF) : 35.00 C, 90.00 C ,42.00 C  (PASS)
DCM Temperature Not Available For This Option : 0.00 C, 0.00 C ,0.00 C  (PASS)
ADC Thermal Sensor : 35.00 C, 90.00 C ,39.93 C  (PASS)
```

If any self test fails, try resetting the instrument with a RESET ALL and reboot, and run the test again. If the condition persists, contact your local Anritsu Service Center (http://www.anritsu.com/contact-us).

A-3 File Management Notifications

File management functions (accessed by via System menu (3-line icon) > FILES) are used to organize, copy, and rename files. The following notifications are displayed in a persistent dialog when using the file manager features.

Cannot access File or Directory

User does not have permission to access the file or directory.

Cannot copy/move items: no write permission on folder

User does not have permission to access the file or directory.

Cannot move items: origin and destination folders are the same

When attempting to move a file to the same location.

Could not remove the directory/file

The file cannot be deleted.

Error creating new folder

A folder cannot be created.

File or Directory does not exist

When attempting to access a file or directory that does not exist.

Path or URL may not exist or cannot be read

The file location cannot be accessed.

Rename error

The file or directory cannot be renamed.

There is no space to copy

There is not enough space to copy the file.

A-4 Informational Notifications

Acquiring trace normalization data on next sweep

In Title bar, Not Logged, Transient

Audio must be turned on to record.

In Title bar, Not Logged, Transient

Audio file size too large, record duration truncated to current capacity.

Pop-up, Not Logged, Transient

Battery Over Charge Temperature.

In Title bar, Not Logged, Persistent

Cannot start measurement without a connected Antenna.

Cal method <Cal method name> requires <Cal Type>. Switching cal type to <Cal Type>

In Toolbar, Not Logged, Transient

In Title bar, Not Logged, Persistent

Calibration abort is not allowed.

In Title bar, Not Logged, Transient

Calibration temperature range exceeded. User cal has been disabled.

In Title bar, Not Logged, Transient

Cannot turn power cal on. <Reason>

In Toolbar, Not Logged, Transient. Reason can be either target power, source power or frequency being out of range.

Concatenation has been aborted.

When user aborts concatenation of streaming metadata files

Connecting to access point.

In Title bar, Not Logged, Persistent

Current USB Site Master model or serial number does not match active calibration settings. 1-Port ReadyCal will be applied.

Pop-up, Not Logged, Transient

Custom SEM File Imported

In Title bar, Logged, Transient

Channel list is full, maximum size of <60>

In Title bar, Not Logged, Transient

Density data not available in playback

In Title bar, Not Logged, Transient

Disconnecting from Wi-Fi Network

In Title bar, Not Logged, Transient

Disconnecting from Wi-Fi Network Failed.

In Title bar, Not Logged, Transient

External reference detected - switching reference source to external

In Title bar, Logged, Transient

External reference disconnected – switching reference source to GPS

In Title bar, Logged, Transient

External reference disconnected – switching reference source to internal

In Title bar, Logged, Transient

External reference disconnected – switching reference source to Internal High

In Title bar, Logged, Transient

File Does Not Exist

In Title bar, Not Logged, Transient

File Recall Failed

In Title bar, Not Logged, Transient

File Recalled Successfully

In Title bar, Not Logged, Transient

File Save Failed

In Title bar, Not Logged, Transient

File Saved Successfully

In Title bar, Not Logged, Transient

File successfully saved as: filename

When saving a file (e.g., trace, setup)

File <filename> import successfully

In Title bar, Not Logged, Transient. X represents the filename.

File <filename> export successfully

In Title bar, Not Logged, Transient. X represents the filename.

Frequency setting is outside sensor range. Measurement performance is not guaranteed outside the range of sensor. It is recommended to keep start and stop frequencies within range listed on sensor

Pop-up, Not Logged, Transient

The following options will expire in less than 24 hours (9xxx)

In Notifications bar

GPS reference detected - acquiring GPS

In Title bar, Logged, Transient

GPS reference acquired - switching reference source to GPS

In Title bar, Logged, Transient

GPS reference disconnected – switching reference source to Internal

In Title bar, Logged, Transient

GPS reference no longer available – switching reference source to Internal High

In Title bar, Logged, Transient

High RF Immunity is not allowed with Transmission (Ext) measurements

In Title bar, Logged, Transient

IF Gain Cal completed

In Title bar, Logged, Transient

Internal High reference no longer valid – switching frequency reference source to Internal

In Title bar, Logged, Transient

Internal High reference no longer valid – switching time reference source to Internal

In Title bar, Not Logged, Transient

Insufficient data. A map point is skipped. Setting a higher distance or increasing sweep time can help.

In Title bar, Not Logged, Persistent

Initializing the USB VNA...

In Title bar, Not Logged, Transient

Input greater than DMax: <value>

In Title bar, Not Logged, Transient. The value can be start or stop.

IQ STREAM - Sweep paused while IQ stream is in progress

In Title bar, Not Logged, Persistent

IQ CAPTURE - Sweep paused while IQ capture is in progress

In Title bar, Not Logged, Persistent

Language successfully updated to <Language Name>

In Title bar, Logged, Transient.

Language failed to update to <Language Name>

In Title bar, Logged, Transient.

Limit recall initiated

When a limit setup file is selected for recall.

Limits are not available for circular graphs

In Title bar, Not logged, Transient

Logging in csv stopped

In Title bar, Not logged, Transient

Measurement changed. Trace recording stopped

In Title bar, Logged, Transient

Measurement changed. Trace playback stopped

In Title bar, Logged, Transient

Measurement changed. Trace recording in csv stopped

In Title bar, Logged, Transient

Memory Full

Popup, Not Logged, Transient

Memory Full

In Title bar, Not Logged, Transient

Model and/or serial number of the device does not match calibration stored. 1-Port ReadyCal will be applied

In Title bar, Not Logged, Transient

<Model name of the sensor> USB Instacal connected

In Toolbar, Logged, Transient

<Model name of the sensor> USB Instacal disconnected

In Toolbar, Logged, Transient

Missing GPS data. Ensure good GPS fix or directional antenna connection

In Title bar, Not Logged, Persistent

New calibration type is not supported by <cal method>.Switching cal method to <cal method name>

In Title bar, Not Logged, Transient

No bearing from directional antenna. Check connection and try again

In Title bar, Not Logged, Transient

No USB CAA HW connected

In Title bar, Not Logged, Persistent. The user calibration may be turned off if CAA hardware is not connected.

No USB Site Master is detected. Please connect device to continue.

In Title bar, Not Logged, Transient

No application loaded. Factory reset required

In Title bar, Logged, Persistent

<Model> Sensor connected

In Title bar, Logged, Persistent

Outdoor mapping requires GNSS/GPS

In Title bar, Not Logged, Persistent

Options upgraded. Please restart the instrument to use new features

In Title bar, Not Logged, Transient

PCAL step in progress. Cannot run two cal step at a time

In Toolbar, Not Logged, Transient

Power Calibration in progress

In Toolbar, Not Logged, Persistent

Preset Completed

In Title bar, Not Logged, Transient

Presetting Instrument

In Title bar, Not Logged, Transient

Please wait. Acquiring magnetic data for directional antenna

In Title bar, Not Logged, Persistent

Point count limited to 4,001 with RF Immunity set to HIGH

In Title bar, Not Logged, Transient

Power Calibration in progress

In Toolbar, Not Logged, Persistent

Performing receiver cal is not allowed when power cal is not enabled.

In Toolbar, Not Logged, Transient

Power Calibration completed <value>

In Toolbar, Logged, Transient. Value can be success or failed

Power Calibration aborted

In Toolbar, Logged, Transient. Value can be success or failed

Rebooting Instrument

In Title bar, Not Logged, Transient

Rebooting instrument into Recovery mode

In Title bar, Not Logged, Transient

Recall initiated

When a file is selected for recall

Reset Completed

In Title bar, Logged, Transient

Resetting Instrument

In Title bar, Logged, Transient

Restoring calibration settings

In Title bar, Not Logged, Transient

Recording In Progress

In Title bar, Logged, Persistent

Recording Complete. File saved as <filename>

In Title bar, Logged, Transient

Remove any RF input signal to the external sensor

Pop-up, Not Logged, Transient

RF Attenuation Auto must be OFF or Reference Level must be below -40dBm to enable PreAmp

In Title bar, Logged, Transient

Successfully concatenated <N> files

When the concatenation of streaming metadata files is complete.

Successfully connected to access point

In Title bar, Not Logged, Transient

Screenshot saved

When saving a screenshot is successful

Scale adjusted to accommodate user change

In Title bar, Not logged, Transient

<Name of Setting> range adjusted to accommodate user change

In Title bar, Not logged, Transient. The setting can be distance, time and frequency.

Self test Passed

In Title bar, Logged, Transient

Self test Failed

In Title bar, Logged, Transient

Software update files found on USB

In Title bar, Not Logged, Transient

Sensor <model> is not supported

In Title bar, Logged, Transient

<Source> not within Power Cal range. Power cal has been disabled

In Toolbar, Not Logged, Transient. Source can be source power, target power or frequency

Sensor does not support target power setting.

In Title bar, Logged, Transient

Stopped saving sweeps after sweep complete

When the save on event triggers are disabled after end-of-sweep.

Stopped saving sweeps after limit crossing

When the save on event triggers are disabled after a limit fails.

Switching Thru device selection to User Offset

In Toolbar, Not Logged, Transient

Trace normalization ready

In Title bar, Not Logged, Transient

Trigger delay updated to minimum allowable value for selected bandwidth and bit format

In Title bar, Not Logged, Transient

Settings changed; clearing EMF results

In Title bar, Not Logged, Transient

The selected mode is not yet available

When an unavailable mode is selected.

Transmission (Ext. Sensor) measurement requires supported USB sensor

In Title bar, Not Logged, Persistent

USB drive <name> ejected

In Title bar, Not Logged, Transient

USB Power Sensor MA24xxxA detected

In Title bar, Logged, Transient, xxx represents the model number of the power sensor.

USB Power Sensor MA24xxxA disconnected

In Title bar, Logged, Transient, xxx represents the model number of the power sensor.

User cable list import successfully

In Title bar, Logged, Transient

X of Y requested channels created

In Title bar, Not Logged, Transient. X represents the number of user requested channels and Y indicates the total number of channels.

Zeroing. Please wait

In Title bar, Logged, Persistent

Zeroing <sensor>

In Title bar, Not Logged, Persistent

Zeroing Sensor ...

In Title bar, Logged, Persistent

Zeroing Sensor completed <completion state>

In Title bar, Logged, Transient. The completion state can be success or failure

No sensor connected

In Title bar, Not Logged, Persistent

USB sensor <model> detected

In Title bar, Logged, Transient

USB sensor is required for this calibration

In Title bar, Not Logged, Transient

USB sensor is required for this calibration. Connect sensor and retry

In Title bar, Not Logged, Transient

Warning: User Cal must be turned off before Cal TYPE can be changed

Pop-up, Not Logged, Transient

A-5 Warning Notifications

ADC Overrange

In Title bar, Logged, Persistent

Antenna information invalid. Attach directional antenna or switch to manual.

In Title bar, Not Logged, Persistent

Battery Fault

In Title bar, Logged, Transient

Battery level is critically low. Automatic shutdown is imminent

Popup, Logged, Persistent

Battery level low

Popup, Logged, Persistent

Battery Low warning

Pop-up Window, Logged, Persistent: Requires User Intervention

This message is sent once per low battery charge condition per boot cycle per charge cycle. A low battery charge condition is defined as the battery charge being at or below 10%.

Booted from backup SW slot. Reinstall SW to clear this message

Popup, Logged, Persistent

Could not read from input file. Please verify that the storage device is still accessible and try again

In Title bar, Not Logged, Transient

Could not create output file. Please verify that the device is accessible and can be written to

In Title bar, Not Logged, Transient

Cannot verify data integrity

In Toolbar, Not Logged, Transient

Channel Scanner CSV file failed to open

In Title bar, Logged, Transient

Current settings do not allow for simultaneous sweep and audio output

In Title bar, Not Logged, Persistent

Device transfer speed insufficient for gapless transfer at current BW/bit depth settings; some samples will be missed

In Title bar, Logged, Persistent

Error occurred during concatenation. Error code: <code>

Popup, Not Logged, Transient

Failed to recall limit

When the limit setup file selected for recall could not be accessed.

Failed to save file: filename

When any other error occurred while trying to save a file.

Failed to save screenshot. Device may be full.

When saving a screenshot fails.

IF Gain Calibration is off

In Title bar, Logged, Persistent

IF Shape Calibration is off

In Title bar, Logged, Persistent

Invalid frequency setup for this antenna

In Title bar, Logged, Transient

Limit recall initiated

When a limit setup file is selected for recall.

Maximum number of measurement points have been reached. To continue, save and clear current measurement points and start again.

In Title bar, Not Logged, Persistent

Not enough available space to save file: <filename>

When the entire file could not be written.

One or more shortcuts are no longer valid: <shortcut name>. File (s) cannot be found.

In Title bar, Logged, Persistent

Playback file corrupted, stopping playback

In Title bar, Logged, Transient

RBW changed: cannot be greater than IF bandwidth

In Title bar, Logged, Transient

Recall file does not exist

When the file selected for recall could not be accessed

Record CSV file failed to open

In Title bar, Logged, Transient

Reference Level Calibration is off

In Title bar, Logged, Persistent

Remote Lockout Warning: Warning Instrument Is Under Remote Control. Press “Return to Local” to exit remote control and enable on-screen

Popup, Not Logged, Persistent

Restart required for new settings to take effect.

Persistent. When hostname or options (in the Debug menu) are changed.

RF or Reference Level must be below <value> to enable PreAmp

In Title bar, Logged, Transient

Setting change detected; unloading playback file

In Title bar, Logged, Transient

Selected points is not valid with calibration applied, setting to nearest Cal point.

In Title bar, Logged, Transient

Save failed. File size exceeds save limits. Adjust setup and try again

In Title bar, Logged, Transient

Shutdown Battery Level Reached

Pop-up Window, Logged, Persistent: Requires User Intervention

Sent after a **Battery Low** warning. A shutdown will occur when the battery charge is or below 5%.

Shutdown Temperature Reached

Popup, Logged, Persistent

Simulated Test Signal data being displayed

In Title bar, Logged, Persistent

Spectrogram view not available

In Title bar, Logged, Transient

Segment gate length too short. Increase RBW or VBW setting for segments (X)

In Title bar, Logged, Persistent. X indicates the incorrect segments.

SSB frequency exceeds channel bandwidth

In Title bar, Not Logged, Persistent

TDD UL/DL common configuration invalid

In Title bar, Logged, Persistent

Temperature High Warning

In Title bar, Logged, Persistent

Triangulation line limit reached

In Title bar, Logged, Transient

The selected mode is not yet available.

When an unavailable mode is selected.

The ALC Cal Data is incorrect for the attached microwave module

In Title bar, Logged, Persistent

The following options will expire in less than 24 hours <Option Number>. Reboot required. The system will reboot at X.

In Title bar, Logged, Persistent. X denotes the date and time.

The following options have expired <Option Number>. Reboot required. The system will reboot at X

Popup, Logged, Transient. X denotes the date and time.

The following options have expired <Option Number>

In Title bar, Logged, Transient

The following options have expired <Option Number>

Popup, Logged, Transient

Quasi-peak detection selected. Sweep will be slower

In Title bar, Logged, Transient

Zero Span is not available

In Title bar, Logged, Transient

<Name of setting> <Value of setting> exceeds the min/max range <minimum value - maximum value>

In Title bar, Logged, Transient

<setting> value change is not allowed with calibration applied

In Title bar, Logged, Transient

Setting change is not allowed while a calibration is in progress

In Title bar, Logged, Transient

Setting change is not allowed with flex calibration

In Title bar, Logged, Transient

Unsupported parameters. Invalid measurement result.

In Title bar, Logged, Persistent

A-6 Error Notifications

Antenna disconnected. Terminating measurement

In Title bar, Logged, Transient

ALC Unlevel Error (X) @ Y Hz

In Title bar, Logged, Transient. X represents the ALC that failed and Y represents the specific frequency value at which the failure occurred.

Attempt to reboot instrument into Recovery mode failed

In Title bar, Logged, Transient

Cannot start measurement without a connected Antenna

In Title bar, Logged, Transient

Cannot set auto RBW ON due to exceeding IF bandwidth. RBW set to IF bandwidth

In Title bar, Not Logged, Transient

Command Error

In Title bar, Logged, Persistent

Could not lock to internal reference

In Title bar, Logged, Persistent

Could not lock to external reference - check connection and try again

In Title bar, Logged, Transient

Failed to connect to hardware

Persistent. When the connection to the hardware (server) could not be established.

Failed to import user cable list

In Title bar, Logged, Transient

Failed to recall limit

When the limit setup file selected for recall could not be accessed.

Failed to save file: filepath/filename

When any other error occurred while trying to save a file or when the connection to the hardware (server) is broken.

Failed to save screenshot. Device may be full.

When saving a screenshot fails.

HW communication problem: SPA app unloaded

In Title bar, Logged, Persistent

IQ capture complete. File saved

In Title bar, Logged, Transient

IQ capture file failed to save

In Title bar, Logged, Transient

IQ Capture Aborted

In Title bar, Logged, Transient

Model Mismatch. Shortcut Creation failed due to model mismatch. Model from file.

In Title bar, Logged, Transient

Not enough available space to save file: filepath/filename

When the entire file could not be written

Out of Range

In Title bar, Not Logged, Transient

Options upgrade failed due to <specific reason>

In Title bar, Logged, Transient

Options upgraded. Please restart the instrument to use new features.

In Title bar, Not Logged, Transient

Options <value> are not valid for the currently installed firmware version. The device might not function properly

In Title bar, Logged, Persistent

PLL Unlock Error (X)

In Title bar, Logged, Persistent. X represents either LO1, LO2, SLO or a combination of them.

PLL Unlock Error (X) @ Y Hz

In Title bar, Logged, Persistent. X represents the PLL that failed and Y represents the specific frequency value at which the failure occurred. The frequency range of Y is from 30,000.00 Hz to 54,000,000,000 Hz.

Query Error

In Title bar, Not Logged, Transient

Recall file does not exist

When the file selected for recall could not be accessed.

SPA FPGA Programming Error

In Title bar, Logged, Persistent

Self test failure:<error description for the self test failure>

In Title bar, Logged, Transient

Selftest failure:<error description of the selftest failure>

In Toolbar, Logged, Persistent

Setting mismatch; cannot display memory trace

In Title bar, Logged, Transient

To minimize distortion on higher level signals, please add external attenuation

In Title bar, Not Logged, Persistent

The selected custom mask is invalid

In Title bar, Logged, Transient

Trace playback not available

In Title bar, Logged, Transient

Trace recording not available

In Title bar, Logged, Transient

Trace has not been copied to memory

In Title bar, Logged, Transient

Unexpected software exception. Reboot required.

When the instrument software requires a reboot due to unknown error, Persistent

Options <value> are not valid. Running without any options

In Title bar, Not Logged, Persistent. This error may occur after a firmware update. Indicates that invalid option numbers were detected (<value> indicates the invalid option numbers).

Options listed <value> are not valid. Restored to previous options

In Title bar, Not Logged, Transient. This error may occur when upgrading options from an options upgrade file fails due to an invalid option configuration. The options will be restored to the previous options numbers.

Failed to upgrade options. Restored to previous options #

In Title bar, Not Logged, Transient. This error may occur when upgrading options from an options upgrade file fails due to an unknown reason. The options will be restored to the previous options numbers.

Zero Sensor Error, remove any RF input signal to the external sensor

In Title bar, Logged, Transient

Appendix B — Upgrading Software Options

B-1 Introduction

Upgrading software on MS2090A consists of two main steps:

1. Export and send the unit's configuration file to Anritsu.
2. Installing the new software license file provided by Anritsu

B-2 Exporting a Software Configuration File

Contact the Anritsu customer service representative and follow the steps below to purchase a software option:

1. Insert a FAT-32 formatted USB memory device into the instrument. If using the ARRT software, insert the USB memory device into the PC.
2. Open the System menu from the upper left 3-line icon.
3. Navigate to SETTINGS > OPTIONS menu.
4. Select SAVE CONFIG at the lower left of INSTALLED OPTIONS.
5. Save the configuration file to the USB memory device, preserving the default filename. Note that the config file will be saved in this format: MS2090A_XXXXXXX.config.
6. Email the config file to your Anritsu customer service representative.

B-3 Importing Software License

The instrument can be upgraded to software options in either of the two ways, Enable Options Using File and Install Options From Web:

1. Insert a FAT-32 formatted USB memory device into the instrument, if using the ARRT software insert the USB memory device into the PC.
2. After purchasing a software option from Anritsu, place the license file on the USB memory device in the top (root) level, not in any directory.
3. Open the System menu (3-line icon).
4. Navigate to SETTINGS > OPTIONS menu.
5. Select ENABLE OPTIONS USING FILE at the lower right of INSTALLED OPTIONS.

   The instrument will search for a valid options file on the USB memory device and apply the changes to the system.
6. Alternatively, to install any additionally purchased software options touch INSTALL OPTIONS FROM WEB, only when the instrument is connected to the Internet.
7. Reboot the instrument and verify all the applied changes.

Note	Go to www.anritsu.com to check for firmware and/or software updates for your instruments. Updating your instrument with the newest available version will install all the upgrades.

B-4 Software Update

To update your Anritsu instrument software, use a high quality USB memory device with at least 1 GB of free space and FAT32 file system format or update remotely:

1. Insert the USB memory device into your PC or laptop.
2. From a browser, go to your product's page:

   http://www.anritsu.com/en-US/test-measurement/products/ms2090a
3. On the product page, click DOWNLOADS.
4. Select the software update for your product and copy the downloaded software into the USB memory device.
5. Insert the USB memory device into the one of the MS2090A USB ports.
6. Alternatively, open the ARRT software on your PC or laptop, access SYSTEM menu and click SYSTEM INFORMATION.
7. Click UPDATE INSTRUMENY REMOTELY and select the locally saved software to update your instrument. See Figure B-2.

Installing the Software

1. Start the software update via one of the two ways below (see Figure B-1):
   - Access the upper left System Menu (3-line icon), then press SYSTEM INFORMATION > INSTALL UPDATE.
   - Select the software update icon from the "Title bar". Refer to Common GUI Controls for list of GUI icons.
2. Select the latest available update from the Available Updates drop-down and press INSTALL.
   - A dialog will appear stating Software Update in Progress.
3. When the installation is complete, see "Verify the Software Update".

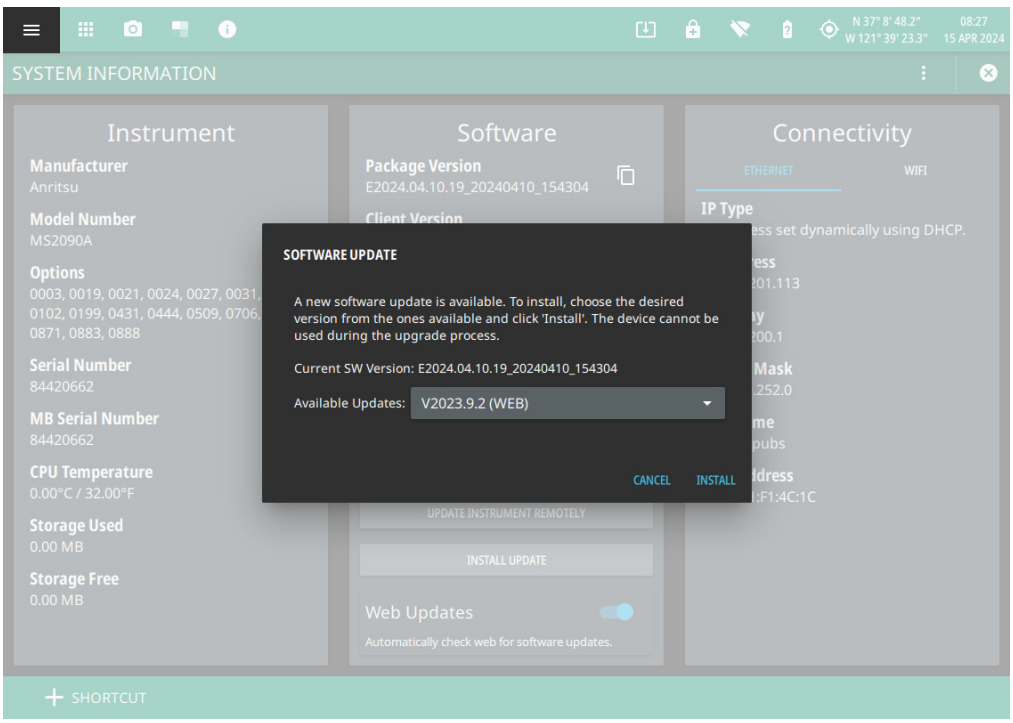


Figure B-1. Updating the Software

Verify the Software Update

1. Once the software update is complete, power off the MS2090A.
2. Power on the MS2090A.
3. Select the System menu icon (3-line icon) from the MS2090A to display the System Menu.
4. Select the System Information Menu menu (see Figure B-2).
5. Verify the software Package Version displayed is the most current version installed.

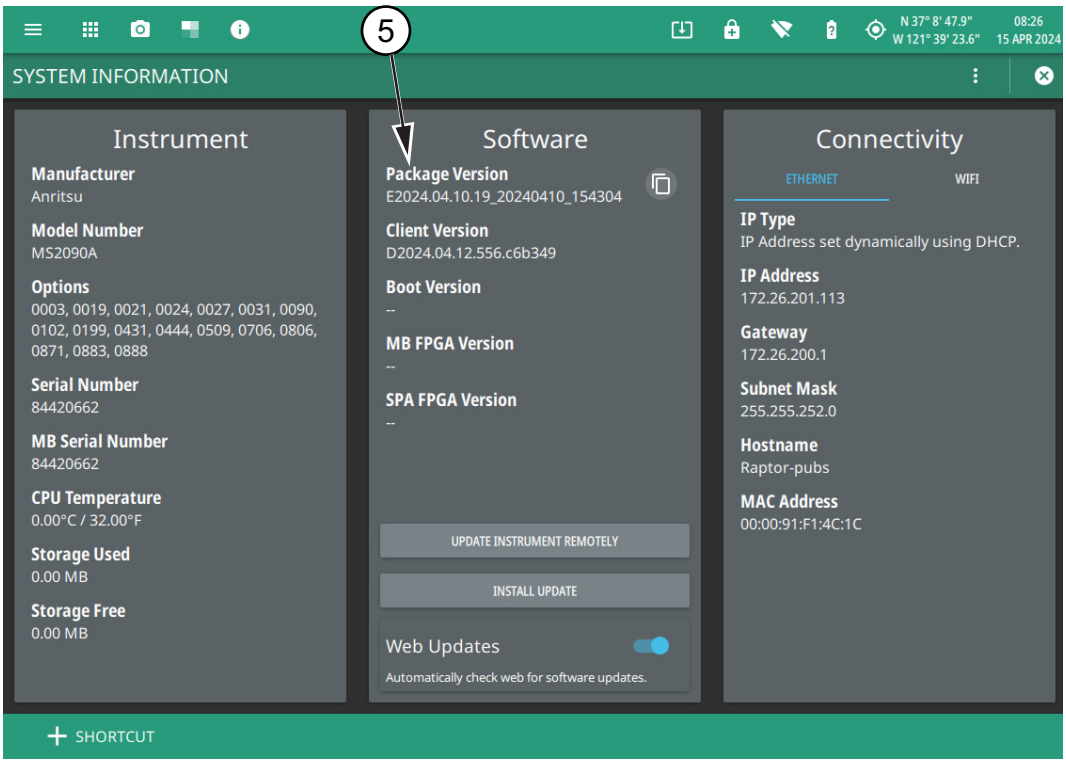


Figure B-2. System Information

Appendix C — Secure Data (Option 7)

C-1 Introduction

When equipped with Option 7, the MS2090A Field Master Pro provides for careful management of confidential data for both the setup parameters and the resulting measured data. Highly sophisticated systems and equipment have technical applications that must remain secure in their operations. The particular parameters that must remain secure usually involve operating frequencies and a variety of other setup configurations. To accommodate the measurements and yet preserve the data as confidential, Option 7 can be used to prevent any setup data or measured data from being stored on internal memory of the instrument.

Refer to "ADVANCED" on page 2-43 on how to turn on SECURE DISPLAY toggle. When the Secure Display toggle is turned on the data (setups, measurements, screenshots, etc.) cannot be stored in the internal memory of Field Master Pro, instead have to be stored using an external USB memory device. Note that both FILE menu (main menu) and FILES menu (System menu > FILES) will be disabled on the instruments installed with Option 7 unless a USB memory device is connected. The instrument is preset immediately when the SECURE DISPLAY toggle is turned off.

Caution	Note that even with Option 7 enabled, operating parameters (such as frequency range and power level that are set by the user) remain stored in the Field Master Pro EEPROM when the instrument is turned off. These parameters can be erased, however, via a Master Reset operation, as described in "Erase All User Files in Internal Memory" on page C-6.

C-2 Installing Secure Data Option 7

The user will be notified with the following messages after the Secure Data Option 7 is installed in your instrument:

1. Touch OK button to close the System Notification dialog.
2. Touch OPEN FILE MANAGER to save the files stored in the instrument's internal directory to an external USB memory device.

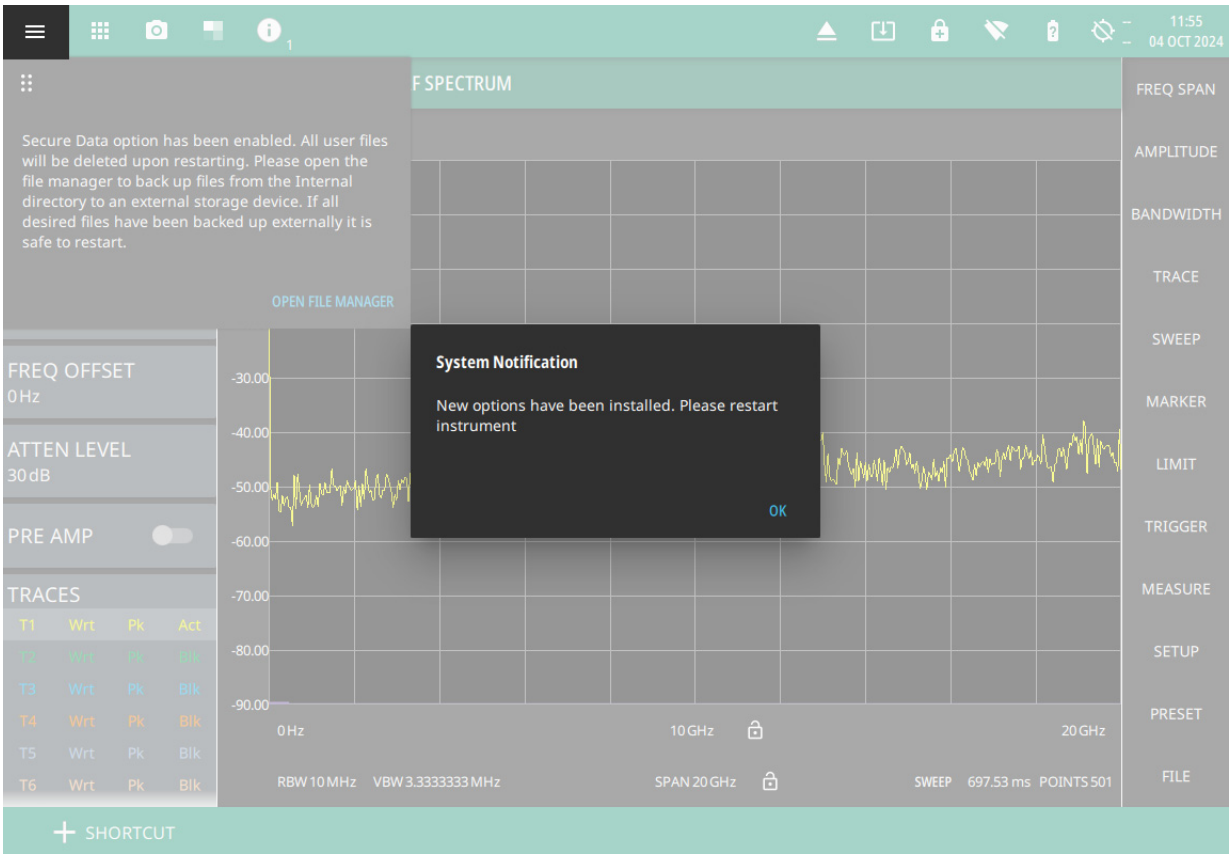


Figure C-1. System Notification Dialog

3. Connect an external USB memory device to any one of the USB ports of the instrument.

4. Press SELECT icon located on the top right side of the file manger to select all the internal files.
5. Press COPY icon and select USB1-1 directory and press PASTE icon to save all the files on the external memory device.

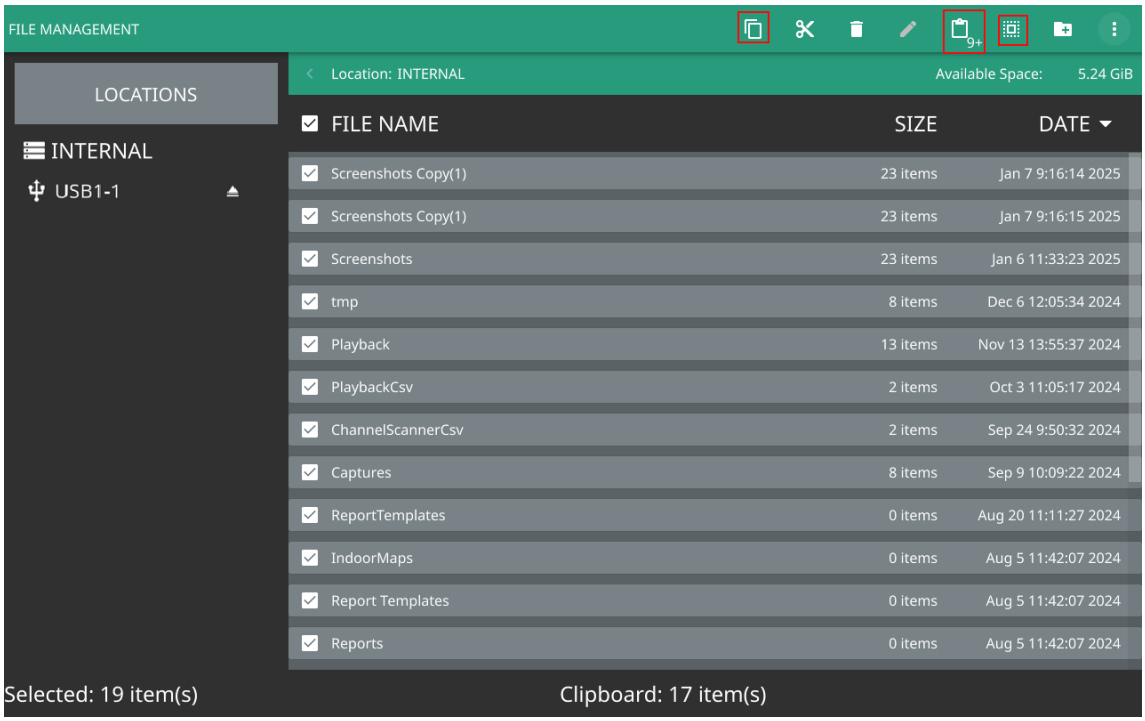


Figure C-2. File Manager

6. Go to System Menu > SYSTEM POWER > CONTINUE TO REBOOT> RESTART INSTRUMENT to finish rebooting the unit to complete enabling the Option 7.

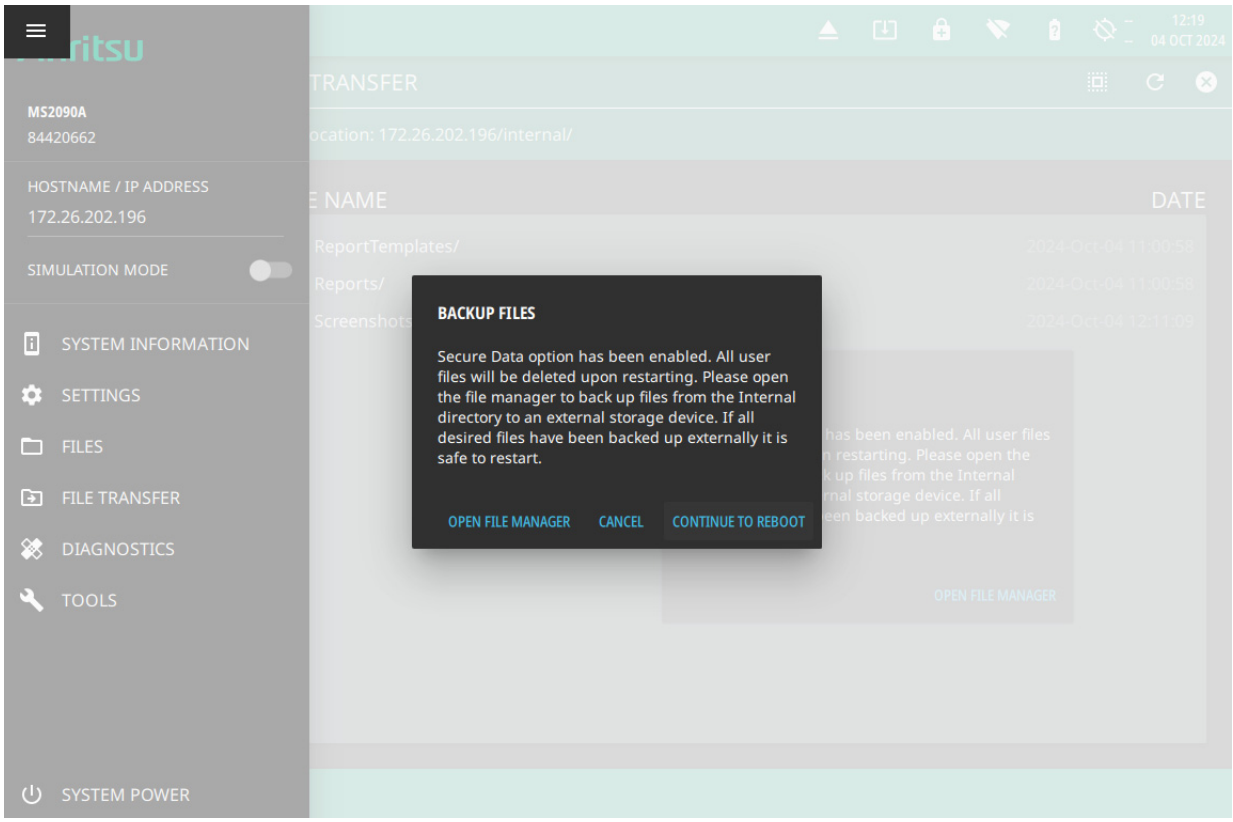


Figure C-3. Secure Data - Backup Files Dialog

Turning On Secure Display

To enable instrument's measurement data blanking go to System menu (3-line icon) > Settings > Advanced > Secure Display. Turn on the Secure Display toggle to hide the displayed frequency/amplitude/bandwidth values. Frequency values displayed on the screen and menus are replaced with ##.#### symbols as shown in Figure C-4.

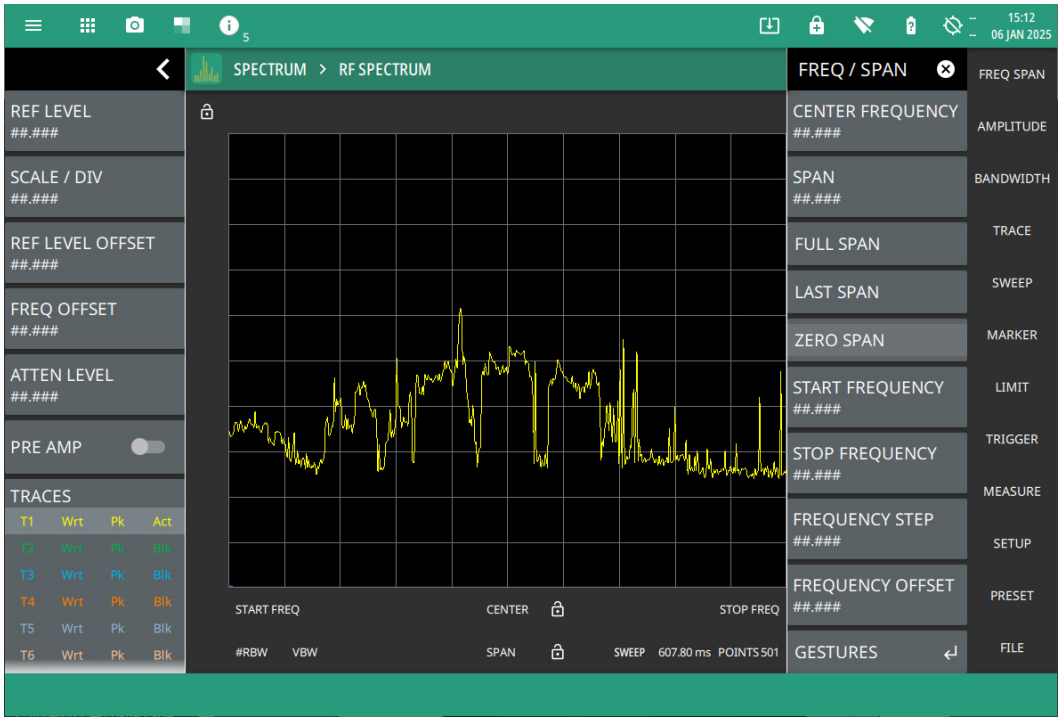


Figure C-4. Secure Display On - Frequency Blanking

The Secure Display toggle is turned off by default. After Secure Display is enabled the instrument user is **not able** to restore the frequency readouts. Option 7 is designed to ensure that user files and calibration files cannot be stored in the internal memory of the instrument.

Warning	Note that when Frequency Blanking is turned on, user files can still be stored and saved to an external USB drive, and that frequency information is not blanked in those files. Also, frequency information is not blanked from the SCPI commands that are used to remotely control the instrument.

C-3 Field Master Pro Memory Types

The instrument contains non-volatile disk-on-a-chip memory, EEPROM, and volatile DRAM memory. The instrument does not have a hard disk drive or any other type of volatile or non-volatile memory.

Disk-On-A-Chip (DOC): DOC is used for storage of instrument firmware, factory calibration information, user measurements, setups, and .jpg screen images. User information stored on the DOC is erased by the master reset process described below.

EEPROM: This memory stores the model number, serial number, and calibration data for the instrument. Also stored here are the user-set operating parameters such as frequency range. During the master reset process, all operating parameters stored in the EEPROM are set to standard factory default values.

RAM Memory: This is volatile memory used to store parameters needed for the normal operation of the instrument along with current measurements. This memory is reset whenever the instrument is restarted.

External USB Flash Drive (not included with the instrument): This memory may be selected as the destination for saved measurements and setups for the instrument. The user can also copy the contents of the internal disk-on-chip memory to the external flash memory for storage or data transfer. The external Flash USB can be reformatted or sanitized using software on a PC.

C-4 Erase All User Files in Internal Memory

Perform a Master Reset:

1. Turn the instrument on.
2. Access System menu > SETTINGS
3. Go to RESET > RESET ALL.

   A warning message will be displayed to warn the user that all settings will be returned to factory default values and all user files will be deleted. This is a standard file deletion and does not involve overwriting existing information.
4. Press the OK to complete the master reset.
5. The instrument will reboot and the reset is complete.

C-5 Recommended Usage in a Secure Environment

Set the instrument to save files to the external USB memory device, insert the external memory device and turn the instrument on. Notice that after inserting an memory device the FILE menu is enabled for usage. All the files will be saved onto the USB memory device by default.

Note	Not all USB memory devices are compatible with the instrument. Many drives come with a second partition that contains proprietary firmware. This partition must be removed. Only one partition is allowed. Refer to the individual manufacturer for instructions on how to remove it. Some drives can be made to work by reformatting them using the FAT32 format.

The following features will be disabled in instruments installed with secure data Option 7.

- Remote connections to ports 9001, 9002 and 240001 ports are disabled.
- Shortcuts feature is not support on ARRT and instrument
- PDF Reporting feature is disabled on the instrument but will be available on ARRT.
- Saving a setup file is disabled
- FTP, HTTP, USBTMC are disabled.
- You need to have option 0007 installed onto an instrument to recall a file that was saved on an instrument with option 0007 installed.

Appendix D — ARRT Software

D-1 Introduction

The Anritsu Remote and Report Tools (ARRT) software package is a combination of two software applications; Anritsu Remote Tool and Anritsu Report Tool.

The Anritsu Remote Tool provides remote access to a network connected instrument and displays the instrument's user interface, setup parameters, and live measurement data on the computer screen. The software also allows you to load measurement and setup data from saved files and then perform measurement analysis on the recalled traces, even when instrument hardware is not available or is not connected to the computer by using the Simulation Mode (refer to Section D-4 "Connecting to the MS2090A or Simulation Mode"). The user interface provides the same functionality when an instrument is connected with a few exceptions:

- File operations will interface with the PC file system rather than on the instrument and save on event operations will be saved to the instrument memory (refer to "FILES (File Management)" on page D-9).
- In Real Time Spectrum Analyzer (RTSA) mode, the display density is shown like that of the instrument.

Connecting to the Simulation Mode is like connecting to an instrument so there is no expectation of carrying over settings or trace data from one to the other. The Simulation Mode will include option controlled functionality with most options automatically enabled (refer to Section D-6 "Working with Simulation Mode").

The Anritsu Report Tool provides the capability of generating PDF reports and analyzing supported measurements by setting markers, limits, etc. Refer to Anritsu Report Tool User Guide (PN:10580-00505) for detailed information on how to use the software.

Note	Vector Network Analyzer (VNA) and Vector Voltmeter (VVM) measurements for example, .smvna and .smvvm are not supported by Anritsu Report Tool.

D-2 PC Configuration Requirements

The remote user interface application running on a computer as requires the following:

- Intel Core i5 Processor or higher
- 8 GB RAM
- Windows 10 or higher, 64-bit
- 1 GB Hard Disk
- Open GL (ES) 2.0 support
- 1280 x 800 resolution
- Ethernet or Wi-Fi (for connecting to Field Master Pro instrument)

D-3 Installation

1. Download the MS2090A software from the product page:

   http://www.anritsu.com/en-US/test-measurement/products/ms2090a

2. Launch the MS2090A executable file and follow the on-screen instructions after selecting YES to the User Account Control dialog.

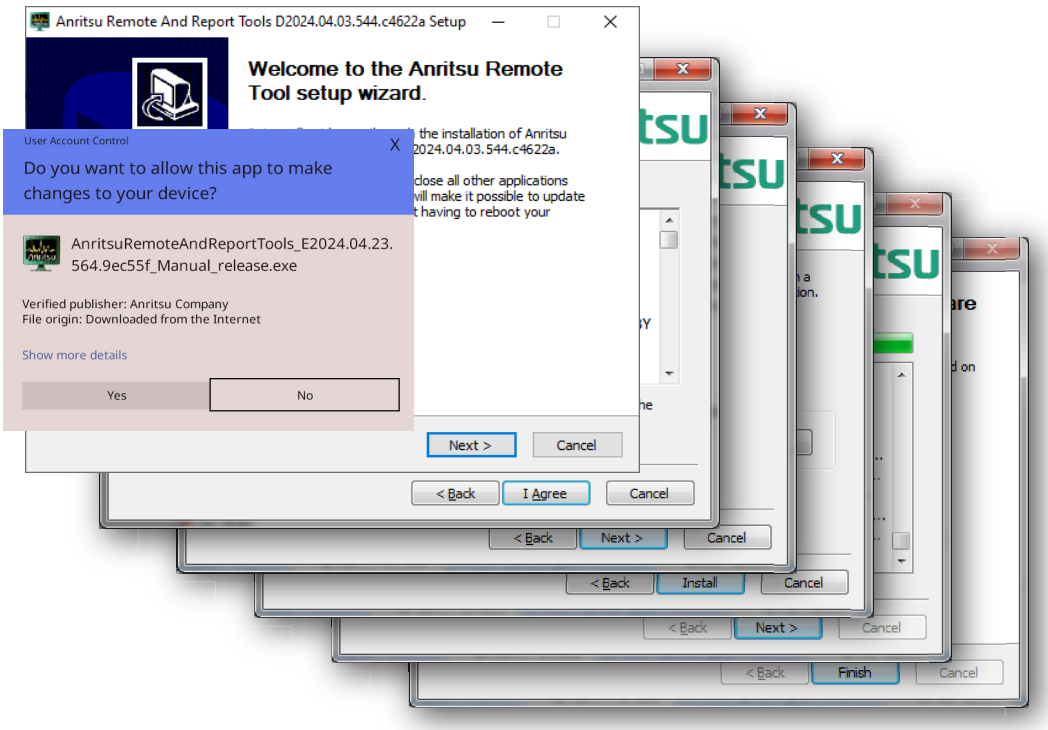


Figure D-1. ARRT Software Installation

D-4 Connecting to the MS2090A or Simulation Mode

Connecting to a networked instrument or to the simulation mode is established via the system menu. If connecting to an instrument, the instrument must first be connected to the network via Ethernet or Wi-Fi and the hostname/ IP address of the instrument must be known.

To view the instrument's hostname/IP address follow the steps below:

1. Access the System menu > SYSTEM INFORMATION on the instrument.
2. Open Anritsu Remote Tool software on your PC and enter either Hostname/IP address in the field provided under the INSTRUMENT tab. See Figure D-2.
3. Click CONNECT/RETRY button to get connected to the instrument
4. Alternatively, to get connected to simulation mode click SIMULATION tab. See Figure D-3.
5. Choose your instrument from the Simulation Mode drop-down list and click START button.

Note	Click ETHERNET SETTINGS to change network settings, if needed.

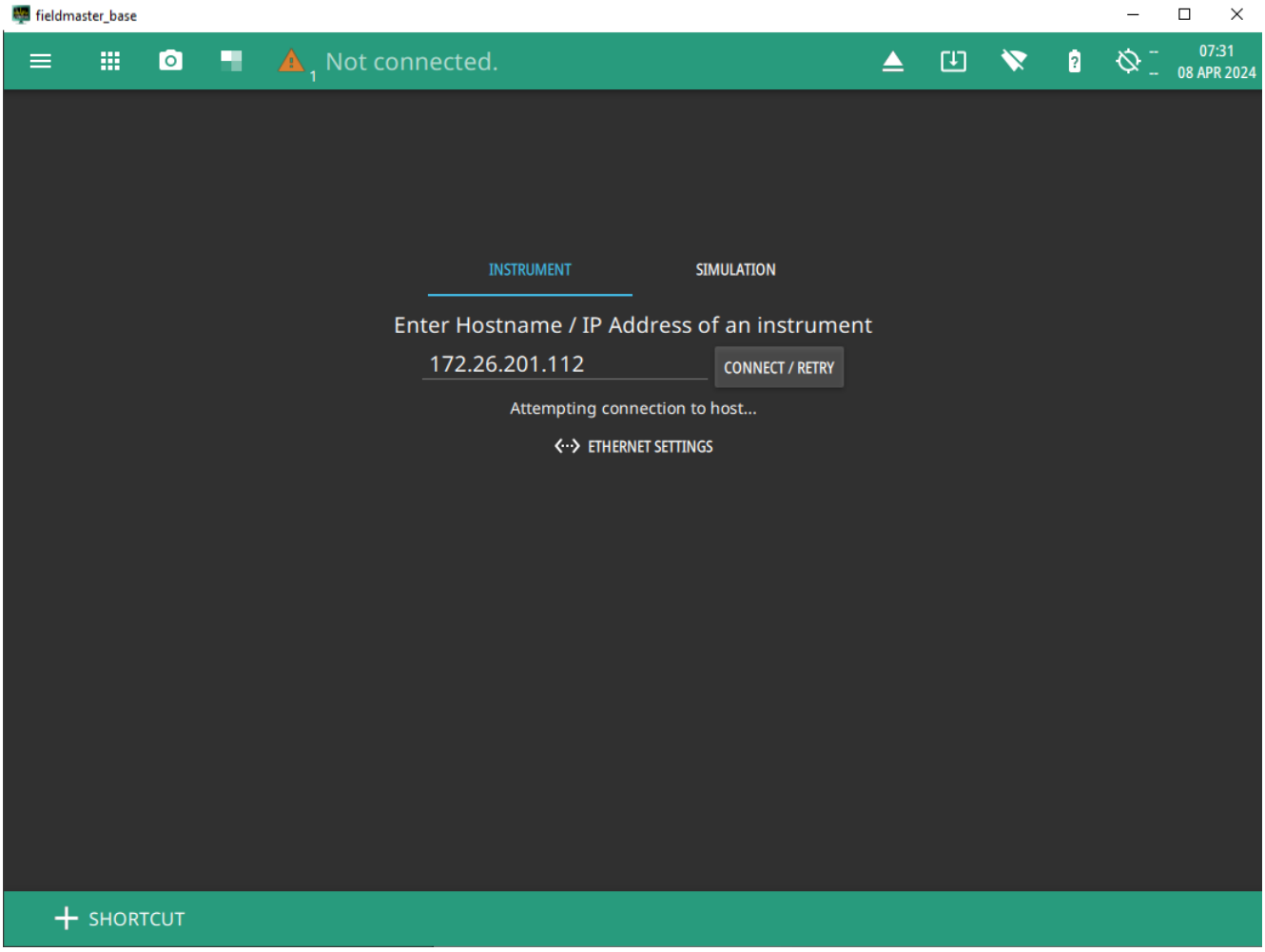


Figure D-2. Connecting to Instrument using Hostname/IP Address

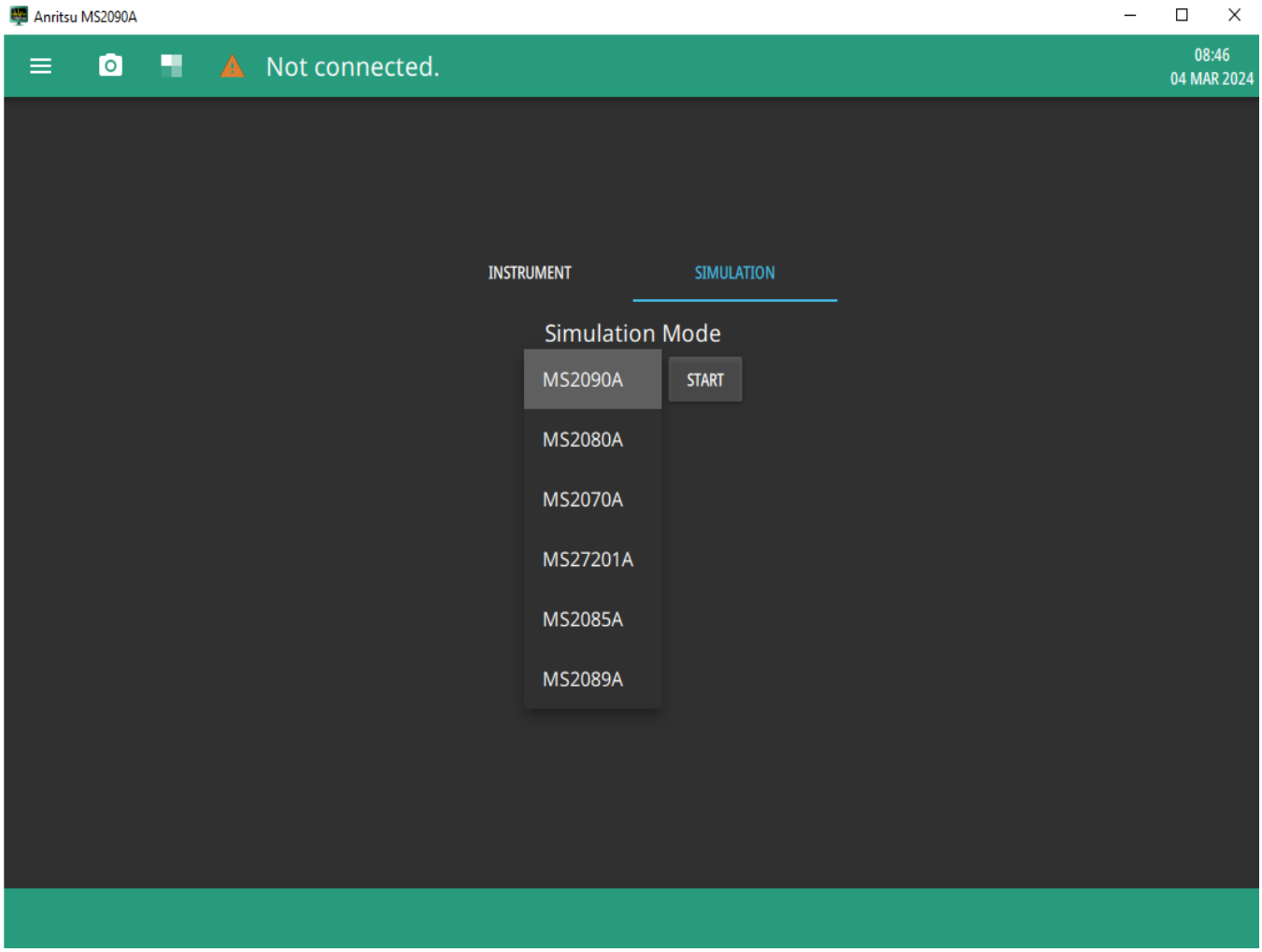
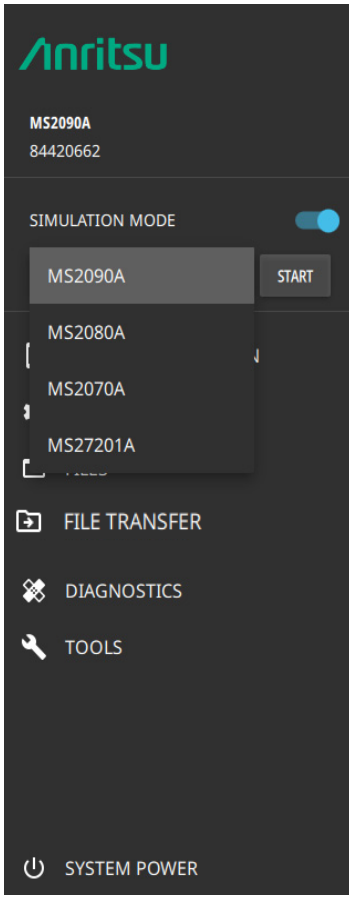


Figure D-3. Connecting to Simulation Mode

D-5 System Menu

Select the 3-line icon to access the system menu.



The System menu identifies the instrument model and serial number.

HOSTNAME/IP ADDRESS: Displayed only on the ARRT software. This field is used to enter the IP address or hostname of an instrument that is connected to the network.

When **SIMULATION MODE** is toggled on, the software will connect locally to provide some UI functionality. Toggle the simulation mode and select the product from the drop-down and click START button to get connected with the local host. Click STOP button to get disconnected.

Note that some of the system menus have limited functionality when the software is connected to the Simulation Mode. When connected to an instrument, refer to "System Menu" on page 2-22.

SYSTEM INFORMATION: Displays information about the instrument and software. Refer to "System Information" on page D-6.

SETTINGS: Provides access to setting the display color theme and screenshot capture settings (refer to "Display Settings" on page 2-24).

FILES: Opens the Windows file explorer. Refer to "FILES (File Management)" on page D-9.

FILE TRANSFER: Opens the "FILE TRANSFER" on page D-10.

DIAGNOSTICS: Opens "Diagnostics Menu" on page 2-51.

TOOLS: Opens the "Tools Menu" on page D-11.

SYSTEM POWER: Opens a dialog to RESTART or POWER OFF the instrument.

Figure D-4. System Menu

System Information

1. Access the System menu (3-line icon in the upper left corner).
2. Click SYSTEM INFORMATION.
3. Click UPDATE INSTRUMENT REMOTELY and choose the firmware file saved locally on your PC to update the instrument firmware remotely.

Note	Update Instrument Remotely option will be disabled on instruments installed with Secure Data Option 7.

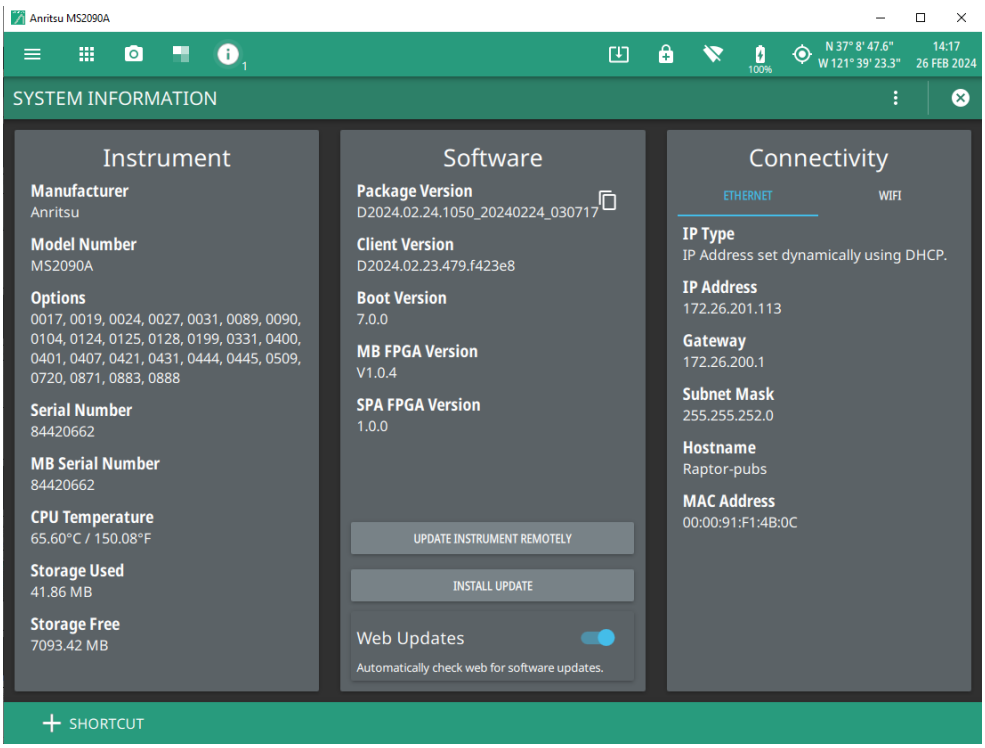


Figure D-5. System Information Menu

4. Click RESTART INSTRUMENT to complete the remote installation.

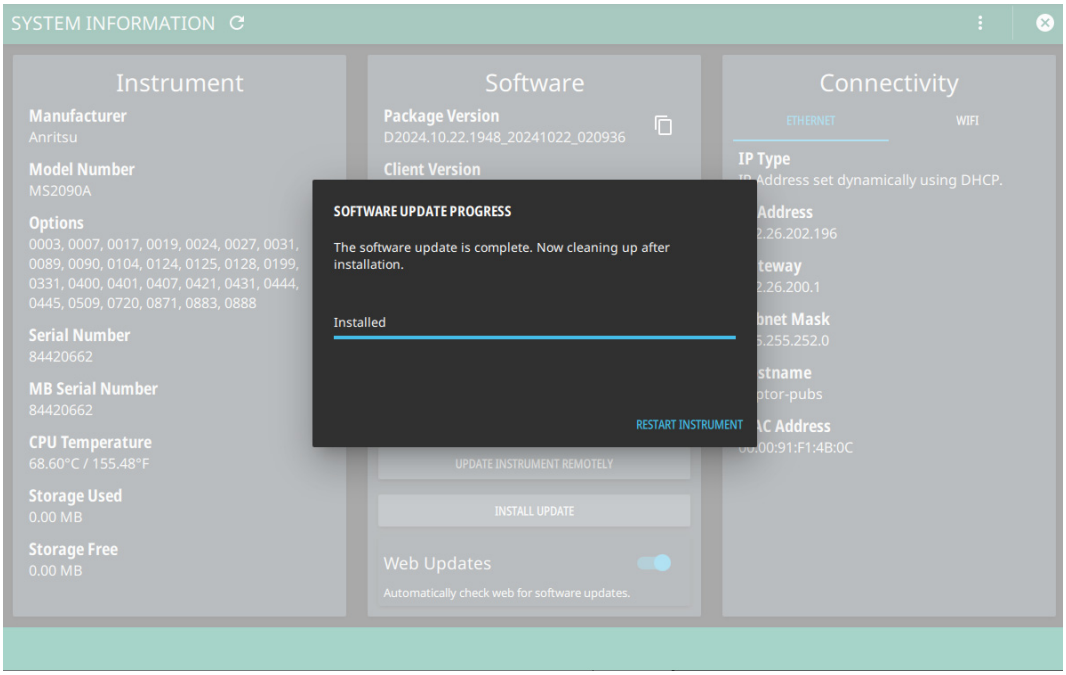


Figure D-6. System Information Menu - Restart Instrument

Connection Certificate Icon

To add a customized connection certificate from your PC follow the steps below:

1. Click the Connection Certificate icon on the title bar (see Figure D-7).
2. Click ADD CUSTOM CERT on the bottom to upload RSA encryption PEM certificate saved in your PC.

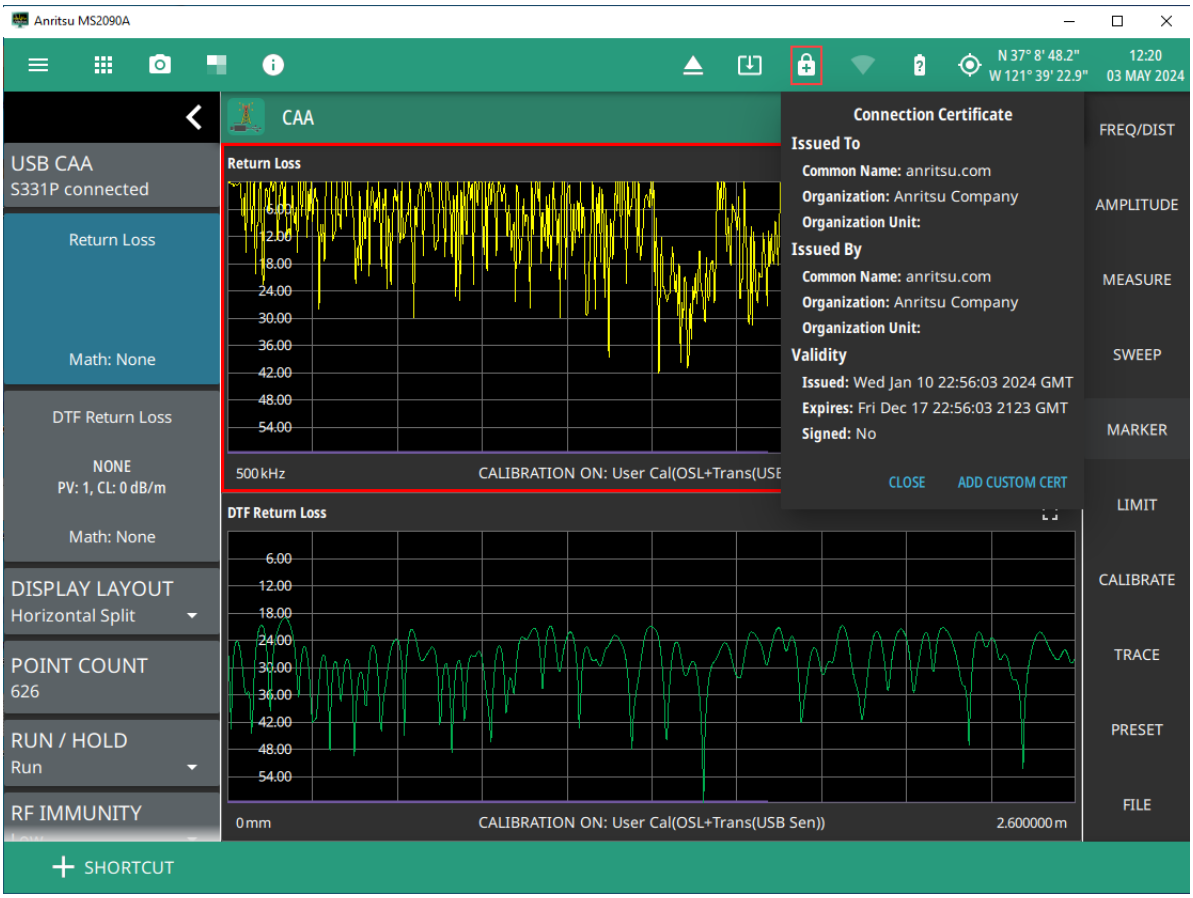


Figure D-7. Connection Certificate Icon

Note	The Connection Certificate icon is available only on Anritsu Remote Tool installed on the PC and not on the instrument.

FILES (File Management)

The Remote Tool's FILES menu is used for all file operations when connected to either an instrument or working in simulation mode. The FILES menu when accessed will launch Windows File Explorer and provides the similar capability as the FILE MANAGEMENT window on the instrument.

You can save, recall or open a file saved in your computer. Note that files cannot be recalled from or saved to the internal memory of the connected instrument. On the contrary, SAVE ON EVENT files will always be saved on the instrument and not on the PC. The FILES menu will be disabled on the instruments installed with Secure Data (Option 7). Connect an external USB memory device to one of the USB ports to save the Save On Event files because Option 7 disables the internal directory of the instrument by default.

1. Access the System menu (3-line icon in the upper left corner).
2. Click FILES to access the FILES menu.

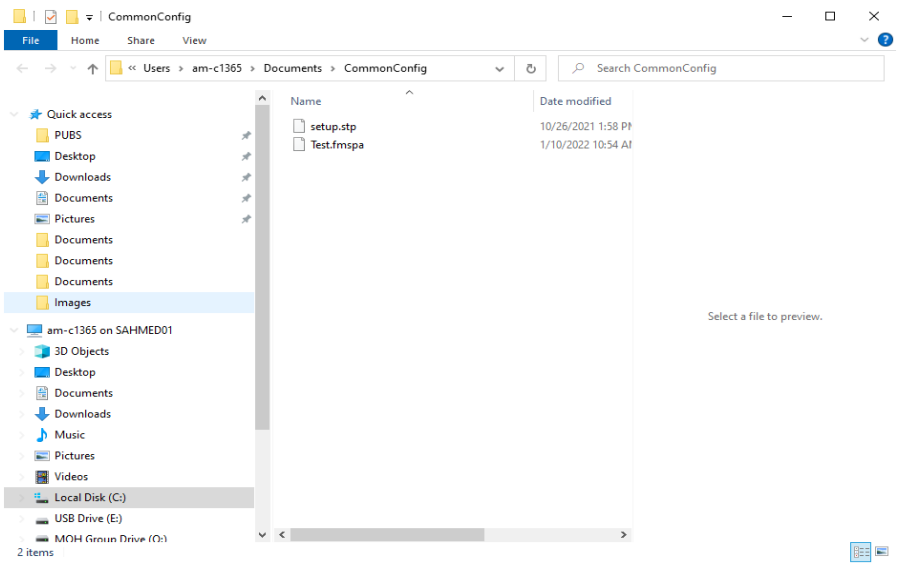


Figure D-8. Files Menu

FILE TRANSFER

File Transfer menu provides the capability of saving the instrument files to your local PC. You can transfer selected or all the files from instrument's internal directory to your computer. Follow the steps below to save the internal files:

1. Access the System menu (3-line icon in the upper left corner).
2. Click FILE TRANSFER to view the list of internally saved files for e.g. screenshots. See Figure D-9.
3. Click the desired file from the list to save it locally on to your computer.
4. To save multiple files, click the multi-select icon on the upper right and select the desired files as shown in the figure below.

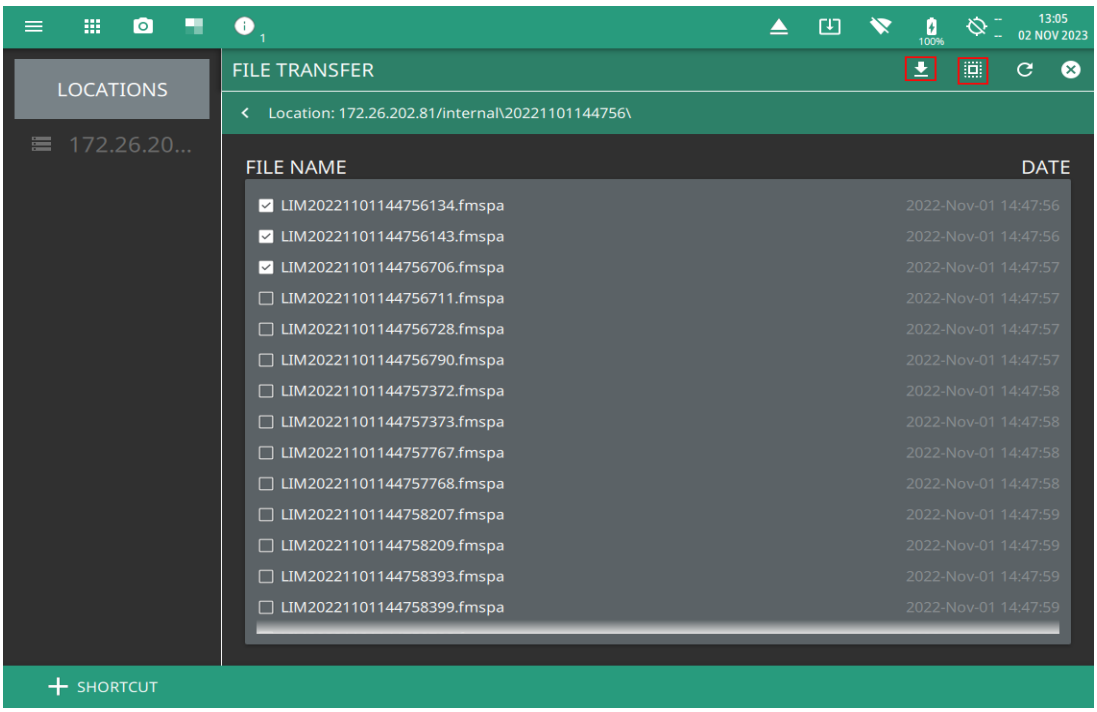
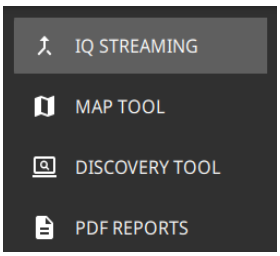


Figure D-9. File Transfer Menu

5. Click Download icon to open the Windows File Explorer and choose the desired location to save the files on your PC.

Tools Menu

1. Access the System menu (3-line icon in the upper left corner).
2. Click TOOLS to access the list of options as shown in Figure D-10.



IQ STREAMING: Opens IQ Streaming Tool. Refer to IQ Streaming Tools section of Spectrum Analyzer Measurement Guide (10580-00447).

MAP TOOL: Opens Map Tool. Refer to Map Tool section of Spectrum Analyzer spectrum analyzer measurement guide (10580-00447).

DISCOVERY TOOL: Opens "DISCOVERY TOOL" on page D-11.

PDF REPORTS: Facilitates report generation in a web browser. Click to open REPORT GENERATOR- PREVIEW window in the browser. Refer to "PDF REPORTS" on page 2-56 for information about report generation. You can either print or save a copy of the report in the PDF format.

Figure D-10. Tools Menu

DISCOVERY TOOL

The DISCOVERY TOOL displays all of the compatible units found on the local network. Select an instrument and then click CONNECT.

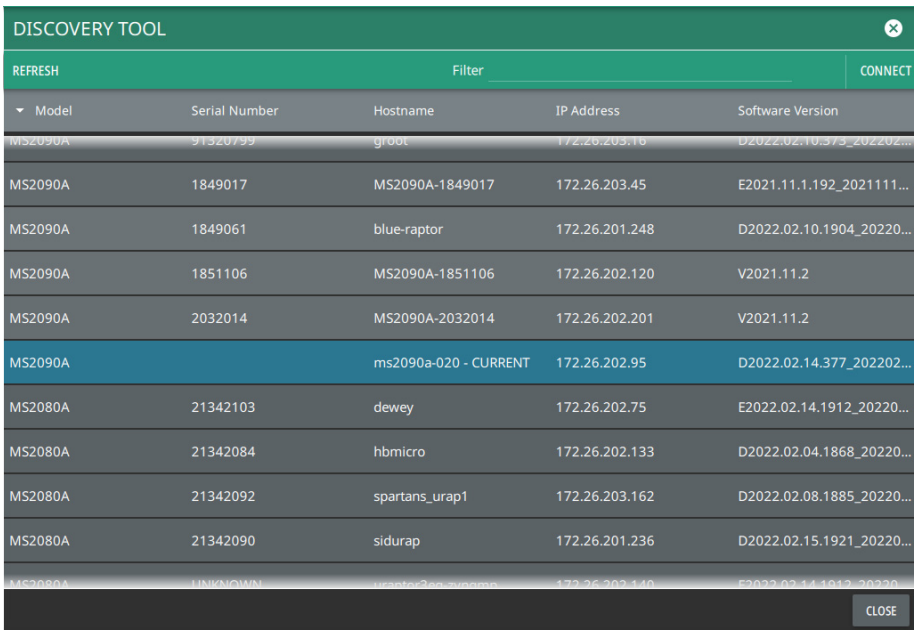


Figure D-11. Discovery Tool

D-6 Working with Simulation Mode

The Simulation Mode setting provides a simulated connection to the instrument hardware, but does not provide simulated data. When an instrument is not connected and the MS2090A software instead connects with the Simulation Mode, most of the menus are available and operate the same as they do on the instrument, but there are some differences as discussed in the following sections. In order to analyze measurement data, this data must first be acquired using instrument hardware and then saved locally to the PC or transferred to the PC from instrument storage at a later time.

Some notes and caveats when connected to the Simulation Mode:

- The ARRT software supports the following modes:
  - Spectrum Analyzer
  - RTSA
  - 5GNR Analyzer
  - LTE Analyzer
  - WCDMA Analyzer
  - Pulse Analyzer
  - EMF Meter
  - IA Spectrum
  - IA RTSA
  - Channel Scanner
  - HIPM_USB
  - CAA_USB
- The software must be set to the correct mode to recall a file for that mode. For example, to recall a .fm5gnr file, the 5G mode from the ARRT software must be selected first.
- Trace files will be recalled into a "HOLD" state, just like they would be on an instrument. This means that if the user changes the span, center frequency, or other settings that invalidate the data, all trace data will be cleared from the screen. The only way to get it back is to recall the trace again.
- Some buttons presented in the interface may not be applicable when connected to the Simulation Mode. Selecting them will have no effect.
- Measurements such as channel power or occupied bandwidth can be performed on recalled trace data, but the sweep must be set to Continuous. The same is true for evaluating the trace on a limit line.
- Measurements that change the span, such as SEM, are not functional unless the original file was saved while making an SEM measurement.

Measurement Setup Parameters

When recalling and analyzing measurement data, changing settings that would affect the data acquisition may cause the recalled data to be removed from the display. For example, you can change amplitude parameters, but you cannot change frequency parameters such as start/stop, span, and bandwidth parameters since there would be no data associated with those changed parameters. You can apply measurement features to the saved measurement data such as markers and limit lines and you can change many measurement and view settings. Opening a .fmxxxx measurement file when connected to the Simulation Mode will work basically the same as recalling a measurement on an instrument.

Below is a summary of menu behaviors when working with recalled measurement data and when connected to the Simulation Mode. Note that when connected to an instrument, the menus behave the same as on the instrument.

FREQ SPAN

Changes here suppress recalled data.

AMPLITUDE

Changes to REF LEVEL, SCALE/DIV, Y AXIS UNIT will change the graticule. PRE AMP and ATTEN LEVEL have no affect. All other changes will suppress recalled data.

BANDWIDTH

Changes here suppress recalled data.

TRACE

You can select different Traces or add Cursors if spectrogram data was captured. Most other trace settings have no affect.

SWEEP

You can recall GATED SWEEP and PWR VS TIME data, and you can change the GATE DELAY. Most other sweep settings have no affect.

MARKER

All marker measurements are available.

LIMIT

All limit line functions are available.

TRIGGER

Trigger functions have no affect.

MEASURE

Some measurements can be selected when the appropriate data is recalled. For example, a an Channel Power, OBW, and ACP measurements can be applied to a normal spectrum trace.

SETUP

Setup parameters for Channel Power, OBW, and ACP can be adjusted.

PRESET

Preset functions will preset the selected items and suppress recalled measurement data.

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