Measurement Guide

High Accuracy Power Meter

MS2090A Field Master Pro™
MS2080A Field Master™
MS2070A Field Master™

High Accuracy Power Meter	**Option 19**

Notes	Power Meter measurements require a supported Anritsu USB power sensor that is sold separately. Not all instrument models offer every option or every measurement within a given option. Refer to the Technical Data Sheet of your instrument for available options and supported measurements.

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

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Chapter 1 — General Information

1-1 Introduction

This measurement guide covers the Anritsu High Accuracy Power Meter (Option 19) calibration and setup measurements. Instruments with Option 19 and an appropriate Anritsu power sensor can be used to make high accuracy power measurements.

Related Manuals

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

http://www.anritsu.com/en-us/test-measurement/products/ms2080a

http://www.anritsu.com/en-us/test-measurement/products/ms2070a

Product Information, Compliance, and Safety

Read the Product Information, Compliance, and Safety Guide for important safety, legal, and regulatory notices before operating the equipment, PN: 10100-00069.

User Guide

For a complete overview of the instrument hardware and system functions, refer to your instrument user guide. The user guide provides information on the following topics:

- Listing of all related documentation such as measurement guides, programming and maintenance manuals.
- Instrument Care, maintenance and calibration
- External Connections to the top and side panels
- Power Requirements and Battery Information
- System settings such as Wi-Fi, GNSS/GPS, date/time, language settings, etc.
- Other advanced settings and tools such as file management, screenshot settings, port setup, and option configuration.
- Diagnostics and software updates

1-2 Option Description

This section provides a brief overview of the available options covered in this guide.

Note	Not all instrument models offer every option. Some options are available as a time-limited trial. For example, High Accuracy Power Meter is offered as a 90-day time-limited option by ordering Option 9019. 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 and activating time-limited options.

The High Accuracy Power Meter Option 19 uses an external USB power sensor (sold separately) to facilitate high accuracy power measurements using Field Master Series instruments as the host controller. Refer to Table 2-1, "Option 19 USB Power Sensors in Chapter 2.

1-3 Document Conventions

The following conventions are used throughout the instrument documentation set.

User Interface Navigation

The instrument user interface consists of menus, buttons, toolbars, and dialog boxes. Elements in navigation paths are separated as follows: MARKER > PEAK SEARCH > NEXT PEAK.

Illustrations

Screen-captured images contained in this document are provided as examples. The chapters included in this measurement guide provide information on advanced measurement features, instrument settings and menu overviews, for a featured option. The actual displays, screen menus, and measurement details may differ based on the instrument, model, firmware version, installed options, and current instrument settings.

1-4 Calibration and Verification

The instrument 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

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

Chapter 2 — High Accuracy Power Meter (Option 19)

2-1 Introduction

This chapter covers the Anritsu High Accuracy Power Meter (Option 19) measurements for in use with Field Master Series handheld instruments. Instruments with Option 19 and an appropriate Anritsu power sensor can be used to make high accuracy power measurements. This option provides accurate, true RMS measurements for both CW and complex digitally modulated signals. Table 2-1 lists the Option 19 compatible with Anritsu power sensors. This chapter provides a general overview of the instrument and its user interface.

Note	The Anritsu power sensor is not included with Option 19. A high accuracy power sensor must be purchased separately and the instrument must have compatible firmware that supports your installed sensor. Visit www.anritsu.com for details.

Table 2-1. Option 19 USB Power Sensors

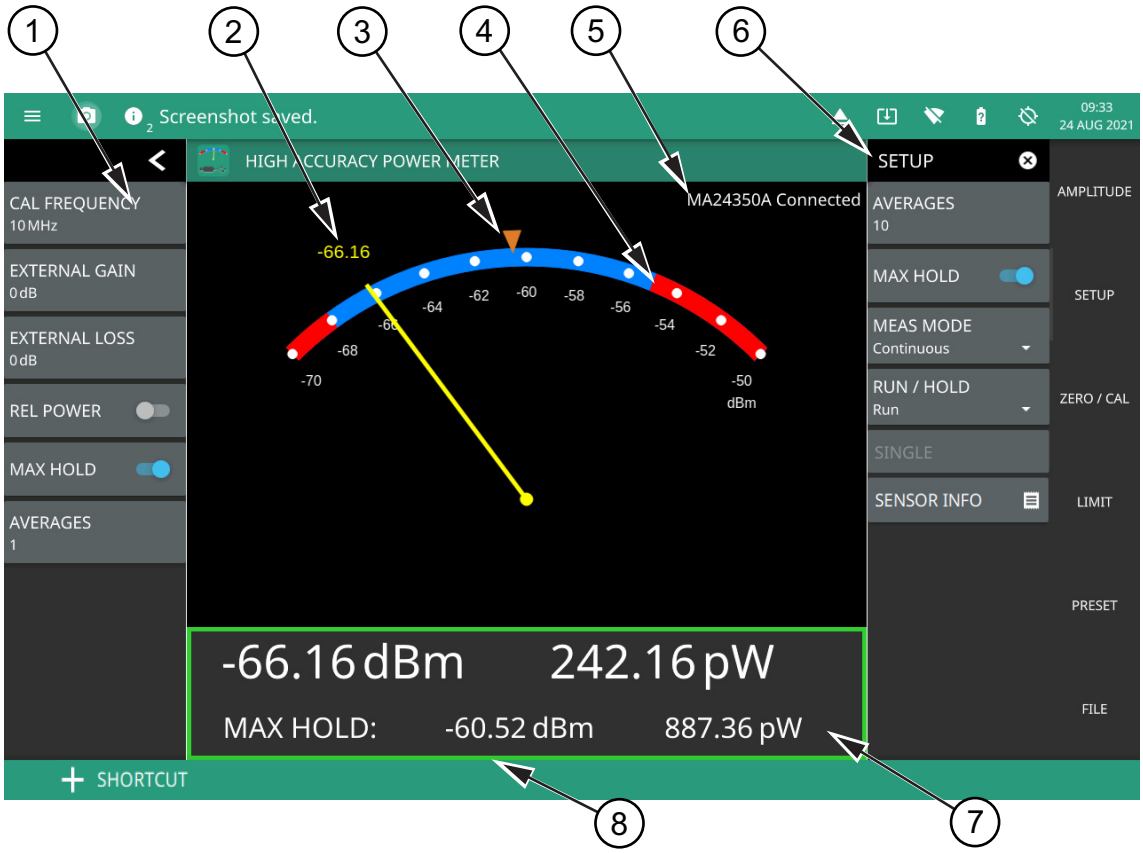
Model	Description	Frequency Range	Connector (50 Ω)	Data Sheet (for complete specifications)
MA24104A[a]	Inline High Power Sensor	600 MHz to 4 GHz	Type N(f)	11410-00483
MA24105A[b]	Inline Peak Power Sensor	350 MHz to 4 GHz	Type N(f)	11410-00621
MA24106A	High Accuracy RF Power Sensor	50 MHz to 6 GHz	Type N(m)	11410-00424
MA24108A	Microwave USB Power Sensor	10 MHz to 8 GHz	Type N(m)	11410-00504
MA24118A	Microwave USB Power Sensor	10 MHz to 18 GHz	Type N(m)	11410-00504
MA24126A	Microwave USB Power Sensor	10 MHz to 26 GHz	Type K(m)	11410-00504
MA24208A	Universal USB Power Sensor	10 MHz to 8 GHz	Type N(m)	11410-00841
MA24218A	Universal USB Power Sensor	10 MHz to 18 GHz	Type N(m)	11410-00841
MA24330A	Microwave CW USB Power Sensor	10 MHz to 33 GHz	Type K(m)	11410-00906
MA24340A	Microwave CW USB Power Sensor	10 MHz to 40 GHz	Type K(m)	11410-00906
MA24350A	Microwave CW USB Power Sensor	10 MHz to 50 GHz	Type V(m)	11410-00906

a. The MA24104A sensor is discontinued and is replaced by the MA24105A.

b. The MA24105A provides additional measurement capabilities.

2-2 High Accuracy Power Meter GUI Overview

This section illustrates the main graphical displays and SETUP menu presented for the high accuracy power meter. For a basic power measurement example, refer to Section 2-3 “General Measurement Setup” on page 2-4. For a general overview of the instrument and its user interface, refer to “Instrument Overview” chapter of user guide.

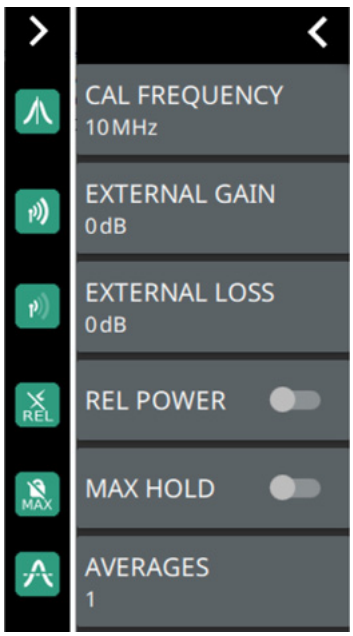


1. **Status Panel:** This menu provides quick access to common settings used for power meter measurements. Refer to “Status Panel” on page 2-3.
2. **Current Power Measurement:** The number displayed here is the current power measurement (in dBm or watts) or the current relative power in dB or percentage. The number here tracks the analog meter pointer.
3. **Max Hold Marker:** The marker here indicates the max hold value. The max hold value is also displayed in the table below the meter.
4. **Limits:** The red/blue transitions on the scale indicate the upper and lower limit values. When the pointer is in the blue region, the measurement is passing; when the pointer is in the red regions, the measurement is failing.
5. **Sensor Model:** The connected sensor model number and status is displayed here.
6. **SETUP Menu:** Provides access to the main measurement setup parameters.
7. **Measurement Table:** The data here shows the current and max hold power measurements in both dBm and watts, or relative power in dB and percent (%).
8. **Limit Pass/Fail:** The measurement table boarder is shown in red for failing measurements or green for passing measurements.

Figure 2-1. High Accuracy Power Meter Display

Status Panel

The status panel and features illustrated in this section are unique to the HIPM and to the particular measurement and view that is selected. Press the Chevron icon to collapse the status panel and view the corresponding minimized status panel.



CAL FREQUENCY: Sets the measurement frequency. The frequency value is sent to the power sensor to apply the appropriate calibration factor.

EXTERNAL GAIN: Press this submenu key to toggle relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. When ON, the message

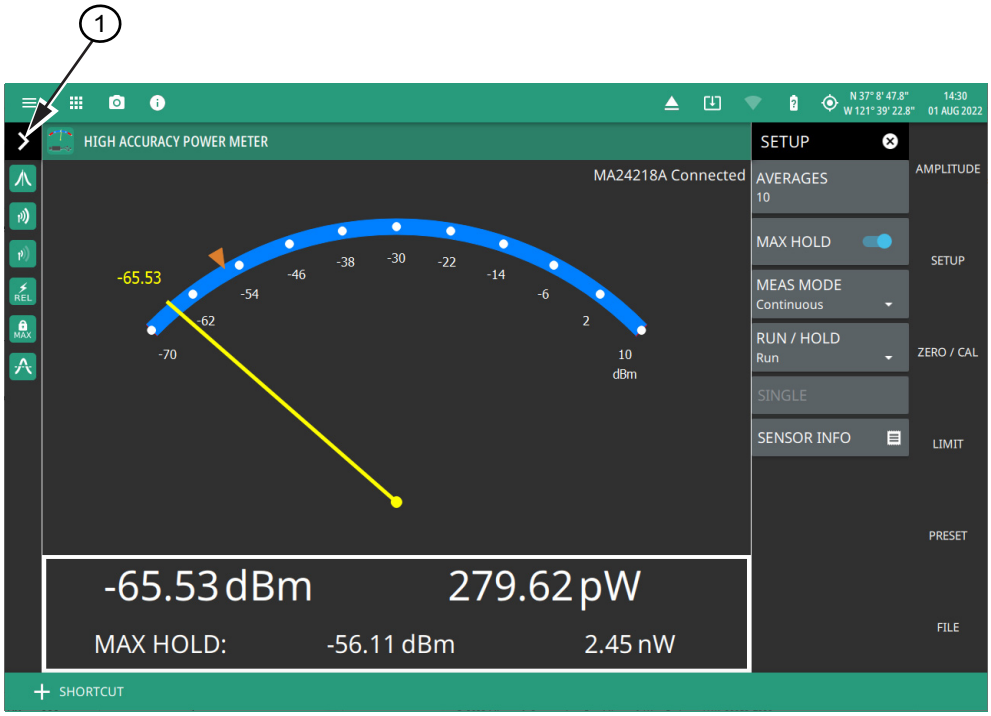
EXTERNAL LOSS: Press this submenu key to toggle relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. When ON, the message

REL POWER: Toggles relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. For example, if you are measuring a 10 dBm signal, and REL POWER is enabled, then a drop to 7 dBm will show as –3 dB and 50 %.

MAX HOLD: Max Hold retains the highest power level measurement.

AVERAGES: Sets the number of measurements to be averaged.

Figure 2-2. High Accuracy Power Meter Status Panel and minimized status panel



1. **Minimized Status Panel:** This menu provides quick access to common settings used for power meter measurements.

Figure 2-3. High Accuracy Power Meter Display with minimized status panel

2-3 General Measurement Setup

Field Master Series instruments display the power values in both dBm and Watts, and offers the following measurement features:

- Relative Power displays power changes with respect to a desired reference value in both dB and % (percent).
- Limit values can be turned on as needed to indicate if a measurement is within or outside specified limits.
- Averages provides a settable number of a running average count.
- Max Hold retains the highest power level measurement.
- External Gain and Loss setting allows power level compensation for passive losses (such as cable loss or attenuators) or active gains (such as RF power amplifiers).
- Zeroing the sensor improves accuracy by removing measured system noise. Refer to Table 2-2 for the power range in which accuracy is improved. Calibration factors can be used to correct both efficiency and mismatch loss.

Caution	Ensure the power level that you are measuring does not exceed the input rating of the power sensor being used or damage may result. Additional attenuators can be used to ensure that the power does not exceed the specified measurement range.

Table 2-2. Power Range for Improving Accuracy via Zeroing to Remove Noise

Sensor	Power Range
MA24104A	+3 dBm to +13 dBm
MA24106A, MA24108A, MA24118A, MA24126A	–30 dBm to –40 dBm
MA24208A, MA24218A	–45 dBm to –60 dBm
MA24330A, MA24340A, MA24350A	–50 dBm to –70 dBm

Example Measurement Setup

This measurement example uses an Anritsu MA24106A power sensor and an attenuator for a high power measurement.

1. Connect the USB cable between the sensor and your instrument. When the sensor is connected, a notification in the top toolbar will identify the sensor model number.
2. Press the On/Off key to turn on your instrument.
3. Select the High Accuracy Power Meter by touching the 9-dot icon or from the current measurement icon to display the available analyzers (see Figure 2-4). Select the HIPMUSB application, then touch the desired analyzer icon to load the new analyzer.

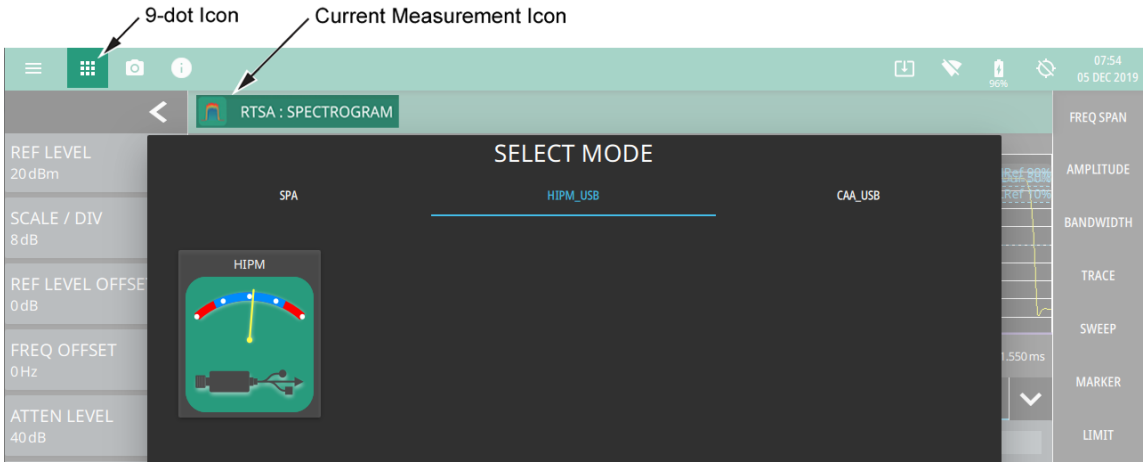


Figure 2-4. Example Analyzers

4. Open the Zero/Cal menu and enter the Cal Frequency, or press Signal Standards to select a particular standard. Calibration factors are stored in the power sensor for the corresponding measurement frequency.

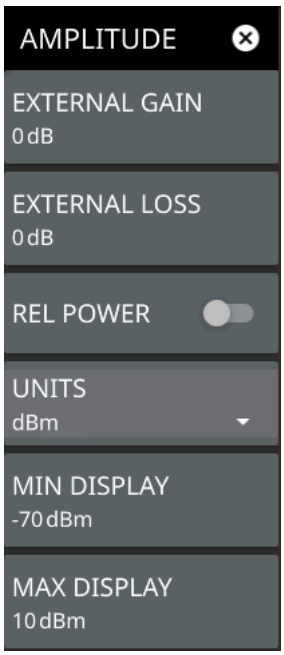
Note	When using a signal standard, the channel number is not required because the calibration factor frequencies are rounded to the nearest 500 MHz.

5. With sensor RF input connector disconnected from any other device, press Zero to zero the sensor. This step is recommended when making power measurements below –20 dBm.
6. Open the Amplitude menu and enter the EXTERNAL LOSS value of the attenuator.

Note	With no loss or gain offset, the maximum value for the display is the upper measurement range, which is +20 dBm. With an offset, such as with 10 dB of attenuation, the upper value can be set to +30 dBm. With an offset of xx dB, the upper value can be set to +20 dBm plus xx dB.

7. Connect the power sensor to the RF output of the device to measure and read the power level on the instrument display.

2-4 AMPLITUDE Menu



EXTERNAL GAIN: Press this submenu key to toggle relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. When ON, the message

EXTERNAL LOSS: Press this submenu key to toggle relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. When ON, the message

REL POWER: Toggles relative power On or Off. This measurement shows the relative level of the desired base power level input to your instrument. For example, if you are measuring a 10 dBm signal, and REL POWER is enabled, then a drop to 7 dBm will show as –3 dB and 50 %.

UNITS: Selects the measurement units of either dBm or watts.

MIN DISPLAY: Sets the minimum value of the analog scale

MAX DISPLAY: Sets the maximum value of the analog scale.

Figure 2-5. High Accuracy Power Meter AMPLITUDE Menu

2-5 SETUP Menu

AVERAGES: Sets the number of measurements to be averaged.

MAX HOLD: Sets the displayed measurement to show the maximum measured power when enabled, and places a marker on the scale at the maximum measured value. Note that changing any parameter resets this feature. If averaging is selected (AVERAGES > 1), then Max Hold displays the maximum value of non-averaged data.

MEAS MODE: Sets the measurement to Continuous or Single mode. Continuous will cycle through the average count continuously. Single will cycle through the average count just once and then switch to Hold mode. Single measurements must be triggered each time by using the Single button below.

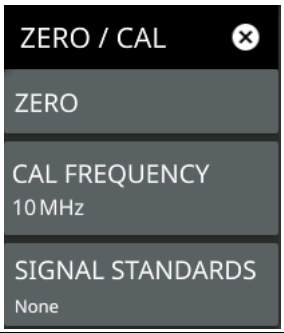
RUN/HOLD: Sets the current measurement to Run or Hold. In Run mode, the power meter takes measurements according to the MEAS MODE setting. In Hold mode, the power meter finished the current measurement and then stops measuring.

SINGLE: Triggers a measurement when the MEAS MODE is set to Single.

SENSOR INFO: Displays details of the power sensor connected to the analyzer.

Figure 2-6. High Accuracy Power Meter SETUP Menu

2-6 ZERO/CAL Menu



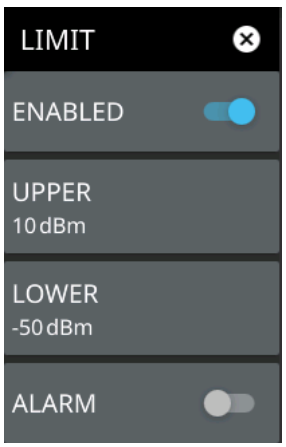
ZERO: With no power applied to the sensor and pressed On, the sensor is set to zero. This is recommended when making power measurements below –20 dBm.

CAL FREQUENCY: Sets the measurement frequency. The frequency value is sent to the power sensor to apply the appropriate calibration factor.

SIGNAL STANDARD: Opens a list of predefined signal standards.

Figure 2-7. High Accuracy Power Meter ZERO/CAL Menu

2-7 LIMIT Menu



ENABLED: Toggles limit testing On or Off. When limits are enabled, The border around the measurement data table shows green for a passing, and red for a failing, measurement.

UPPER: Sets the upper limit of the analog scale.

LOWER: Sets the lower limit of the analog scale.

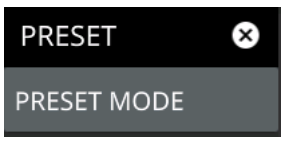
ALARM: Toggles an audible alarm when crossing a limit. Use the SETTINGS menu (from the three bar icon in the toolbar) to adjust the volume.

Figure 2-8. High Accuracy Power Meter LIMIT Menu

2-8 Presetting the Analyzer

The PRESET menu sets certain settings to the default state. Preset only affects the current analyzer settings. Preset does not affect user files or system settings such as networking settings. For other reset options, such as a complete factory reset of the instrument, refer to “Reset Settings” section in Instrument overview chapter of the instrument’s user guide. To recover from system software faults, refer to Appendix A, “Instrument Messages and Troubleshooting” chapter of the instrument’s user guide.

PRESET Menu



PRESET MODE: Presets all of the current analyzer settings to default values.

Figure 2-9. PRESET Menu

2-9 Saving and Recalling Measurements

The Field Master Series can save measurement setups, native trace and CSV trace data, and screenshots. You can recall setup and native trace files. For other file operations such as copy, move, and directory management, refer to “File Management” section of Instrument Overview chapter of the corresponding user guide.

Saving a Measurement

To save a measurement or setup, refer to Figure 2-10:

1. Press FILE > SAVE AS...
2. If desired, press the save location to change the destination.
3. Enter the desired file name using the touchscreen keyboard.
4. Select the type of file to save from the selection list.
5. Press SAVE to save the file.

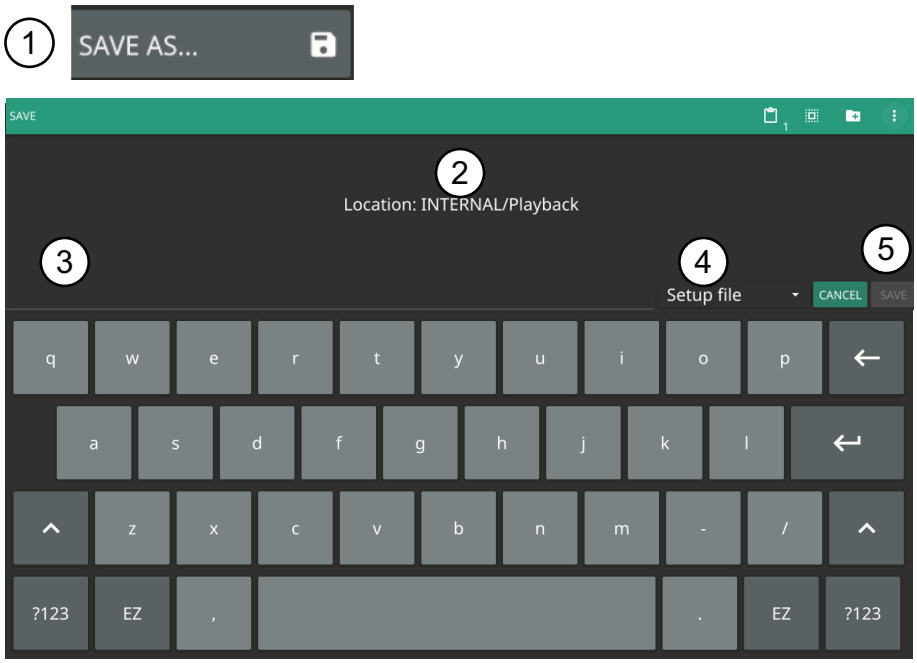


Figure 2-10. File Save Dialog

Once a file has been saved, the QUICK SAVE feature can be used to quickly save the same type of file with an incrementing number appended to the end of the original file name.

Recalling a Measurement

You can recall a saved setup and native trace measurement. When recalling a setup, the instrument setup and operating state will be restored as it was when the setup was saved. When recalling a trace measurement, the instrument setup and on-screen measurement data will be restored as it was when the trace data was saved.

To recall a measurement or setup, refer to Figure 2-11:

1. Press FILE > RECALL...
2. Select the file location.
3. Use the file type filter to shorten the list if needed.
4. Select the desired file from the displayed list.
5. Press OPEN to recall the file.

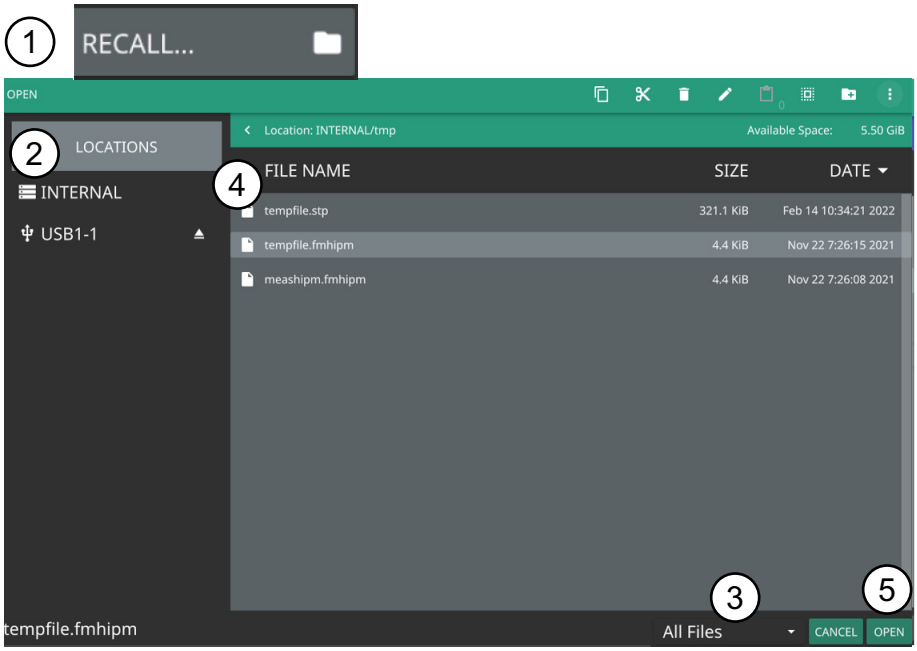
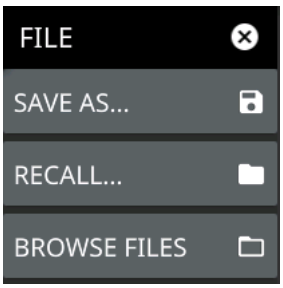


Figure 2-11. File Open Dialog

When a measurement is recalled, the measurement state will be set to hold. To restore active measurements, select SETUP > RUN/HOLD > Run.

FILE Menu



SAVE AS: Opens the Save dialog to manually enter a file location, enter a file name, and to set the file type to be saved. Depending on the selected measurement, you can save the following:

- Setup: Saves the current instrument setup (stp file type).
- Measurement: Saves the measurement point data and the current instrument setup (fmhipm file type).
- CSV: Saves the point data in comma separated value format (csv file type). This format is useful for further analysis using other software tools.
- Screenshot: Saves a screenshot of the current measurement (png file type).

RECALL: Opens the Recall File dialog to retrieve a file from a desired location. Only supported files will be displayed depending on the currently set measurement. When measurement point data is recalled, the instrument will change the settings to match the settings of the saved measurement. The data will be recalled with the measurement in Hold mode. To exit the recalled data, simply change the measurement mode back to Run from the SETUP menu.

BROWSE FILES: Opens “File Management” section of Instrument Overview chapter of the user guide

Figure 2-12. FILE Menu

Anritsu

10580-00492 C

Anritsu utilizes recycled paper and environmentally conscious inks and toner.

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