



**Agilent N9342C  
Handheld  
Spectrum Analyzer**

**User's Guide**



**Agilent Technologies**

# Notices

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## Software Revision

This guide is valid for A.01.00 revisions of the N9342C Handheld Spectrum Analyzer firmware.

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### Documentation Conventions:

1. A pair of curly brackets { } indicates a softkey. For example {Start} refers to the Start softkey.
2. A pair of square brackets [ ] indicates a hardkey. For example, [ENTER] refers to the ENTER hardkey.
3. "Analyzer" refers to Agilent N9342C handheld spectrum analyzer in the following chapters.
4. "DUT" refers to a device under test.



Agilent N9342C  
Handheld Spectrum Analyzer

# 1 Overview

The Agilent N9342C is a handheld spectrum analyzer with a frequency range of 100 kHz to 7.0 GHz, tunable to 9 kHz. It provides good usability and exceptional performance for installation and maintenance, spectrum monitoring, and on-site repair tasks. It provides several measurement modes for different applications. Each mode offers a set of automatic measurements that pre-configure the analyzer settings for ease of use.



# Introduction

The analyzer provides ultimate measurement flexibility in a package that is ruggedized for field environments and convenient for mobile applications.

## Functionality and Feature

The analyzer provides you with a comprehensive functionality set and measurement convenience, including:

- **Power Measurement**  
provides power measurement functionality on OBW (Occupied Bandwidth), channel power, and ACPR (Adjacent Channel Power Ratio).
- **Tracking Generator (Option TG7)**  
Provides an RF source for scalar network analysis.
- **Spectrum Monitor (Option SIM)**  
Provides the capability to analyze the stability of a signal over the time. The analyzer can be used to monitor the signal capturing performance or intermittent events over extended periods of time.
- **High-sensitivity Measurement (Option PA7)**  
Includes a 7 GHz pre-amplifier, enabling highly sensitivity measurements, this can be used to measure the low-level signals.
- **High Accuracy Power Measurement (Option PWM)**  
The N9342C supports Agilent U2000 series power sensors for high accuracy power measurement as a power meter.
- **User Data Sanitation (Option SEC)**  
Allows user to erase all customized files and data in analyzer for security.



- **Task Planner (Option TPN)**

Provides task planner function to integrate different measurements for test automation.

## Optimized Usability

The analyzer provides the enhanced usability:

- The **6.5-inch TFT colorful LCD screen** (640 × 480 pixels) enables you to read the scans easily and clearly both indoors and outdoors.
- The **arc-shaped handle** and **rugged rubber casing** ensure a comfortable and firm hold.
- **SCPI** remote control via USB, and LAN port.
- The **PC Software** available on N9342C Help kit CD provides further editing and data analysis functions.
- The **3-hour-time battery** provides continuous work time during field testing.
- The **light sensor** adjusts the display brightness according to the environment to save power.
- A **headphone jack** is provided on the top panel for the audio signal analysis and monitoring.
- Keys are **back-lit** to provide easy access in low-light conditions.
- **Built-in GPS**, with built-in GPS antenna (Option GPS) offers the GPS location for the field testing.

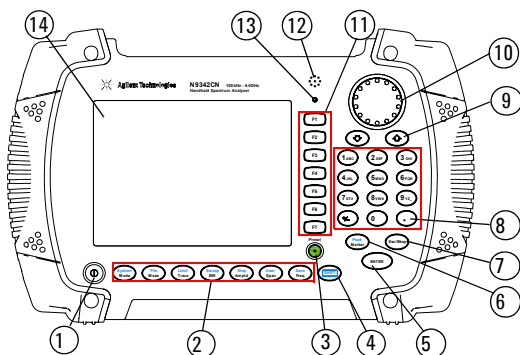
For the latest product information, please refer to the link below:

<http://www.agilent.com/find/n9342c>

For the latest upgrade information, please refer to the link below:

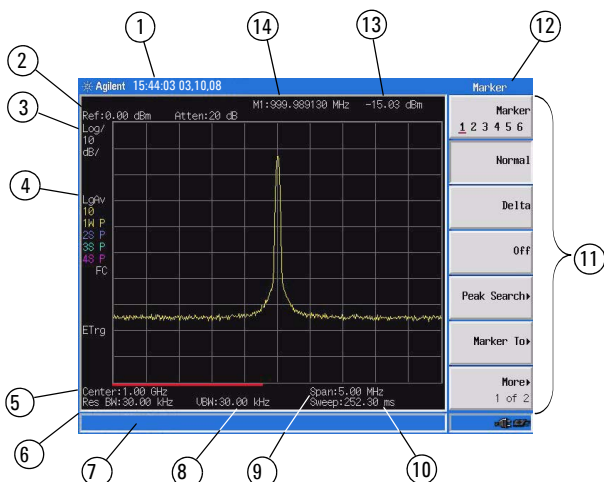
[http://www.agilent.com/find/sa\\_upgrades](http://www.agilent.com/find/sa_upgrades)

## Front Panel Overview



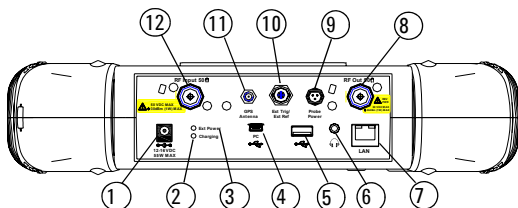
	Caption	Function
1	Power Switch	Toggles the analyzer between on and off
2	Function keys	Includes functional hardkeys for measurements.
3	Preset	Returns the analyzer to a known state and turns on/off the power save feature (press for 1 sec.)
4	<b>SHIFT</b>	Switches alternate upper function of the function keys and <b>Peak/Marker</b> hardkey.
5	Enter	Confirms a parameter selection or configuration
6	Peak/Marker	Activates the peak search or marker function
7	ESC/Bksp	Exits and closes the dialog box or clears the letter input as a back space key.
8	Alphanumeric keys	includes a positive/negative, a decimal point and ten alphanumeric keys
9	Arrow keys	Increases or decreases a parameter step by step
10	Knob	Selects the mode or edits a numerical parameter
11	Softkeys	Indicates current menu functions on the screen
12	Speaker	Actives in demodulation mode
13	Light Sensor	Adjusts the screen and hardkey back-light according to the environmental light.
14	Screen	Displays spectrum traces and status information

## Display Annotations



	Description	Associated Function Key
1	Time and Date	[System] > {Time/Date}
2	Reference Level	[Amptd]
3	Amplitude Scale	[Amptd] > {Scale/Div}
4	Detector Mode	[Trace] > {More} > {Detector}
5	Center Frequency	[Freq]
6	Resolution Bandwidth	[BW] > {RBW}
7	Display Status Line	Displays status and error messages.
8	Video Bandwidth	[BW] > {VBW}
9	Frequency Span	[Span]
10	Sweep Time	[Sweep] > {Sweep Time}
11	Softkey Menu	See key label description in the <a href="#">Key Reference</a> for more information.
12	Softkey Menu Title	Refers to the current activated function
13	Marker Amplitude	[Marker]
14	Marker Frequency	[Marker]

## Top Panel Overview



Items	Function
1 External DC power connector	Provides input for the DC power source via an AC-DC adapter, or Automotive type DC adapter.
2 LED indicator (Charging)	Lights (On) when the battery is charging
3 LED indicator	Lights (On) when external DC power is connected.
4 USB interface (Device)	Connects to a PC
5 USB interface (Host)	Connects to a USB memory stick or disk
6 Headphone	Connects to a headphone
7 LAN Interface	Connects to a PC for SCPI remote control
8 RF OUT Connector	The output for the built-in tracking generator. Enabled with Option TG7.
9 Probe Power	provides power for high- impedance AC probes or other accessories (+15 V, -12 V, 150 mA maximum).
10 EXT TRIG IN/REF IN (BNC, Female)	Connects to an external TTL signal or a 10 MHz reference signal. The TTL signal is used to trigger the analyzer's internal sweep
11 GPS Antenna Connector (Option)	Connect an Antenna for GPS application.
12 RF IN Connector (50 Ω)	Accepts an external input with a frequency range from 100 kHz to 7 GHz, tunable to 9 kHz.

## Instrument Markings



The **CE** mark indicates that the product complies with all relevant European Legal Directives.



The **CSA** mark is a registered trademark of the Canadian Standards Association.



The **C-Tick** mark is a registered trademark of the Australian Spectrum Management Agency.

**ISM1-A**

The ISM1-A symbol is indication of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4)

**ICES/NMB-001**

The ISM device complies with Canadian Interference-Causing Equipment Standard-001.



Indicates that the user must refer to specific instructions in User's Guide.



This symbol indicates a position of the instrument **power switch**.



Indicates that this product complies with the **WEEE Directive** (2002/96/EC) marking requirements. Do not dispose in domestic household waste. To return unwanted products, contact your local Agilent office, or refer to

<http://www.agilent.com/environment/product/>

## 1 Overview



**Agilent N9342C  
Handheld Spectrum Analyzer**

## **2 Getting Started**

Information on checking the analyzer when received, preparation for use, basic instrument use, familiarity with controls, defining preset conditions, updating firmware, and contacting Agilent Technologies.



### Checking Shipment and Order List

Check the shipment and order list when you receive the shipment.

- Inspect the shipping container for damages. Signs of damage may include a dented or torn shipping container or cushioning material that might indicate signs of unusual stress or compacting.
- Carefully remove the contents from the shipping container, and verify if the standard accessories and your ordered options are included in the shipment.
- For any questions, contact the Agilent Technologies Customer Contact Center (CCC). See “[Contact Agilent Technologies](#)” on page 122. For the latest service information please refer to: <http://www.agilent.com/find/assist>



## Power Requirements

The AC power supplied must meet the following requirements:

---

<b>Voltage:</b>	100 VAC to 240 VAC
<b>Frequency:</b>	47 to 63 Hz
<b>Power:</b>	Maximum 63 W

---

The AC/DC power supply charger adapter supplied with the analyzer is equipped with a three-wire power cord, in accordance with international safety standards. This power cord grounds the analyzer cabinet when it is connected to an appropriate power line outlet. The power cord appropriate to the original shipping location is included with the analyzer.

Various AC power cables are available from Agilent that are unique to specific geographic areas. You can order additional AC power cords that are appropriate for use in different areas. The AC Power Cord table provides a lists of the available AC power cords, the plug configurations, and identifies the geographic area in which each cable is typically used.

The detachable power cord is the product disconnecting device. It disconnects the main AC circuits from the DC supply. The front-panel switch is only a standby switch and does not disconnect the instrument from the AC LINE power.

## AC Power Cords

Plug Type	Cable Part Number	Plug <sup>a</sup> Description	For use in Country & Region
 <p>250V 10A</p>	8121-1703	BS 1363/A	Option 900 United Kingdom, Hong Kong, Singapore, Malaysia
 <p>250V 10A</p>	8120-0696	AS 3112:2000	Option 901 Australia, New Zealand
 <p>250V 16A</p>	8120-1692	IEC 83 C4	Option 902 Continental Europe, Korea, Indonesia, Italy, Russia
 <p>125V 10A</p>	8120-1521	CNS 10917-2 /NEMA 5-15P	Option 903 United States, Canada, Taiwan, Mexico
 <p>250V 10A</p>	8120-2296	SEV 1011	Option 906 Switzerland
 <p>230V 15A</p>	8120-4600	SABS 164-1	Option 917 South Africa, India
 <p>125V 15A</p>	8120-4754	JIS C8303	Option 918 Japan
 <p>250V 16A</p>	8120-5181	SI 32	Option 919 Israel
 <p>250V 10A</p>	8120-8377	GB 1002	Option 922 China

a. Plug description describes the plug only. The part number is for the complete cable assembly.

## Safety Considerations

Agilent has designed and tested the N9342C handheld spectrum analyzer for measurement, control and laboratory use in accordance with Safety Requirements IEC 61010-1: 2001, UL 61010-1 (2004), and CSA C22.2 No.61010-1-04. The tester is supplied in a safe condition. The N9342C is also designed for use in Installation Category II and Pollution Degree 2 per IEC 61010 and IEC 60664 respectively.

Read the following safety notices carefully before you start to use a N9342C handheld spectrum analyzer to ensure safe operation and to maintain the product in a safe condition.

**WARNING**

**Personal injury may result if the analyzer's cover is removed. There are no operator-serviceable parts inside. Always contact Agilent qualified personnel for service. Disconnect the product from all voltage sources while it is being opened.**

---

**WARNING**

**This product is a Safety Class I analyzer. The main plug should be inserted in a power socket outlet only if provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

---

**WARNING**

**Electrical shock may result when cleaning the analyzer with the power supply connected. Do not attempt to clean internally. Use a dry soft cloth to clean the outside case only.**

---

**WARNING**

**Always use the three-pin AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause personal injury and product damage.**

---

## 2 Getting Started

### WARNING

**Danger of explosion if the battery is incorrectly replaced. Replace only with the same type battery recommended. Do NOT dispose of batteries in a fire.**

**Do NOT place batteries in the trash. Batteries must be recycled or disposed of properly.**

---

### CAUTION

Recharge the battery only in the analyzer. If left unused, a fully charged battery will discharge itself over time.

Temperature extremes will affect the ability of the battery to charge. Allow the battery to cool down or warm up as necessary before use or charging.

Storing a battery in extreme hot or cold temperatures will reduce the capacity and lifetime of a battery. Battery storage is recommended at a temperature of less than 25°C.

Never use a damaged or worn-out adapter or battery. Charging the batteries internally, even while the analyzer is powered off, the analyzer may keep warm. To avoid overheating, always disconnect the analyzer from the AC adapter before storing the analyzer into the soft carrying case.

---

### CAUTION

Connect the automotive adapter to the power output connector for IT equipment, when charging the battery on your automotive.

---

### CAUTION

The VxWorks operating system requires full conformity to USB 1.1 or USB 2.0 standards from a USB disk. Not all the USB disk are built that way. If you have problems connecting a particular USB disk, please reboot the analyzer before inserting another USB stick.

---

### CAUTION

The analyzer cannot be used in the standard soft carrying case for more than 1 hours if the ambient temperature is higher than 35°C.

---

## Environmental Requirements

The N9342C is designed for use under the following conditions:

- Operating temperature:  
0°C to 40°C (using AC-DC adapter)  
-10°C to +50°C (using battery)
- Storage temperature: -40°C to +70°C
- Battery temperature: 0°C to 45°C
- Humidity: 85% ± 5%

## Electrical Requirements

The analyzer allows the use of either a lithium battery pack (internal), AC-DC adapter shipped with the analyzer, or optional automotive +12 VDC adapter for its power supply.

## Electrostatic Discharge (ESD) Precautions

This analyzer was constructed in an ESD protected environment. This is because most of the semiconductor devices used in this analyzer are susceptible to damage by static discharge.

Depending on the magnitude of the charge, device substrates can be punctured or destroyed by contact or proximity of a static charge. The result can cause degradation of device performance, early failure, or immediate destruction.

These charges are generated in numerous ways, such as simple contact, separation of materials, and normal motions of persons working with static sensitive devices.

When handling or servicing equipment containing static sensitive devices, adequate precautions must be taken to prevent device damage or destruction. Only those who are thoroughly familiar with industry accepted techniques for handling static sensitive devices should attempt to service circuitry with these devices.

# Working with Batteries

**CAUTION** Fully charge the battery first before using the analyzer.

## Installing a Battery



Step	Notes
1 Open the battery cover	Use a phillips type screwdriver, loosen the retaining screw, then pull the battery cover open.
2 Insert the battery	Observe correct battery polarity orientation when installing.
3 Close the battery cover	Push the cover closed, then re-fasten the cover with the retaining screw.

## Viewing the Battery Status

Determine the battery status using either of the following methods:

- Check the battery icon in the lower-right corner of the front-panel screen: it indicates the approximate level of charge.
- Press the gray button in the upper right corner of the battery. The number of lighted green LED indicates the percentage of the battery power.
- Press [**System**] > {**System Info**} > {**Show System**} > {**Page down**} to check the current battery information.

## Charging a Battery

You may charge the battery both in the tester and in the external battery charger (option BCG).

**CAUTION**

Connect the automotive adapter to the IT power outlet of your automobile (with option 1DC) for battery recharging.

---

- 1 Insert the battery in the analyzer.
- 2 Plug in the AC-DC adapter and switch on the external power.
- 3 The charge indicator lights, indicating that the battery is charging. When the battery is fully charged, the green charging indicator turns off.

During charging and discharging, the battery voltage, current, and temperature are monitored. If any of the monitored conditions exceed their safety limits, the battery will terminate any further charging or discharging until the error condition is corrected.

The charging time for a fully depleted battery, is approximately four hours.

### Powering the Analyzer on for the First Time

Insert the battery into the analyzer or connect the analyzer to an external power supply via the AC-DC adapter, then press the power switch on the front panel of your N9342C to power on the analyzer.

**CAUTION**

Use only the original AC-DC adapter or originally supplied battery for the power source.

The maximum RF input level of an average continuous power is 33 dBm (or  $\pm 50$  VDC signal input). Avoid connecting a signal into the analyzer that exceeds the maximum level.

---

Allow the analyzer to warm-up for 30 minutes before making a calibrated measurement. To meet its specifications, the analyzer must meet operating temperature conditions.



Install battery



Press Power Switch





## Preparation for Use

This section provides the basic system configuration which is frequently used before or after the measurement operation.

### Power On and Preset Settings

#### Selecting a preset type

Press **[SYS] > {PwrOn/Off Preset} > {Preset Type}** to choose the preset types. The analyzer has three types of preset setting for you to choose from:

**DFT** Restores the analyzer to its factory-defined settings. The factory default settings can be found, "[Factory Default Settings](#)" on page 20.

**User** Restores the analyzer to a user-defined setting. Refer to the descriptions as below.

**Last** Restores the analyzer to the last setting.

#### Saving a User-defined Preset

If you frequently use system settings that are not the factory defaults, refer to the following steps to create a user-defined system settings that can be easily recalled:

- 1 Set the analyzer parameters using the knob, the arrow keys, or the numeric keypad.
- 2 Press **[SYS] > {PwrOn/Off Preset} > {Save User}** to save the current parameters as the user preset setting.
- 3 Press **[SYS] > {PwrOn/Off Preset} > {Preset Type User}** to set the preset mode to user defined system setting.
- 4 Press **[Preset]**. The instrument will be set to the state you previously saved.

### Factory Default Settings

<b>Parameter</b>	<b>Default Setting</b>
Center Frequency	3.5 GHz
Start Frequency	0.0 Hz
Stop Frequency	7.0 GHz
Span	7.0 GHz
Reference Level	0.0 dBm
Attenuation	Auto (20 dB)
Scale/DIV	10 dB/DIV
Scale Type	Log
RBW	Auto (3 MHz)
VBW	Auto (3 MHz)
Average Type	Log Power
Sweep time	Auto
Sweep Mode	Normal
Trace 1	Clear write
Trace 2	Blank
Trace 3	Blank
Trace 4	Blank
Trace 1 Detection	Pos Peak
Trace 2 Detection	Pos Peak
Trace 3 Detection	Pos Peak
Trace 4 Detection	Pos Peak
Trace Average	All Off
Marker	All Off
Mode	Spectrum Analyzer

## Visual and Audio Adjustment

### Display Adjustment

Press **[System]** > **{Brightness}** > **{Brightness}** to toggle the screen brightness between **Auto** and **Man**. When it is set to **Auto**, the brightness adjusts according to the environment automatically with the built-in light sensor. When it is set to **Man**, you can set a fixed brightness value manually.

### Setting Button Backlight

Press **[System]** > **{Keypad Setting}** > **{BackLight}** to toggle the backlight button between **Auto** and **Man**. You can select the backlight brightness and the auto-off idle time in manual mode.

### Setting Key Beep

Press **[System]** > **{Key Settings}** > **{Beeper}** to activate the key beep function as an indicator of key operation.

## General System Settings

Provides the following system setting options:

### Time/Date

Press **[System]** > **{Time/Date}** to set the date and time of the analyzer.

The allowed input for the time is HHMMSS format, and YYYYMMDD format for the date.

### Power Saving

Press **[System]** > **{Screen Setting}** > **{Power Saving}** to select a power saving mode which turns off the LCD display after a user-defined idle time. Press any key to re-activate the LCD display after the LCD display power-saving mode has been triggered.

### Timed Power On/Off

Pressing **[System] > {Power On/Off Preset} > {Timed Pwr On}** or **{Timed Pwr Off}** sets the time switch to power on/off the N9342C in a user-defined time and date. This function requires the power supply to be connected or charged battery installed.

Press **{Repeat Mode Once/Everyday}** to set the N9342C boot up/off in the pre-saved time everyday. The pre-saved date is invalid in this mode.

### IP configuration

The N9342C supports LAN port connection for data transfer. Press **[System] > {Port Setting} > {IP Admin} > {IP Address Static}** to manually set the IP address, gateway and subnet mask with the proper LAN information. Or, just press **[System] > {Setting} > {IP Admin} > {IP Address DHCP}** to get the IP address in LAN dynamically according DHCP.

Press **{Apply}** to enable all the configurations you set.

### Ext Input

Toggles the channel for external input between **Ref** and **Trig**. **Ref** refers to a 10 MHz reference signal; **Trig** refers to a TTL signal.

#### External Reference (Ref)

Use the external reference function as follows:

- 1 Input a 10 MHz signal into the **EXT TRIG IN/REF IN** connector.
- 2 Press **[System] > {Port Setting} > {Ext Input Ref}** to enable the external reference signal input.

The analyzer then turns off its internal reference.

## External Trigger (Trig)

When an external TTL signal is used for the triggering function, the analyzer uses the inner reference as default.

Use the external trigger function as follows:

- 1 Press **[System]** > **{Port Setting}** > **{Ext Input Trig}** to enable the external TTL signal input.
- 2 Press **[SPAN]** > **{Zero Span}** to activate the **Trigger** function.
- 3 Access the associated softkeys to select the rising edge (**Ext Rise**) or the falling edge (**Ext Fall**) as the trigger threshold.

**NOTE**

The trace will halt in external trigger mode until the trigger threshold is met or the free run function is activated.

## Show System

Pressing **[System]** > **{System Info}** > **{Show system}** displays the following hardware, software, and battery information of the analyzer:

Machine Model	Battery Info
MCU Firmware Version	Name
DSP Firmware Version	Serial NO.
FPGA Firmware Version	Capacity
RF Firmware Version	Temperature
RF Module S/N	Charge Cycles
KeyBoard Module S/N	Voltage
This Run Time	Current
Temperature	Charge Status
Source Voltage	Remain Time
Power Source	Host ID

### Adding an Option

Pressing **[SYS] > {More} > {Service} > {Add Option}** brings up a dialog box for entering the option license code. Use the numeric keypad to input the option license code and then use the **[ENTER]** key as a terminator. If the analyzer recognizes the option license code, a message *“Option activated successfully”* will appear in the status line. Otherwise, a message *“Invalid option licence”* will appear in the status line.

Press **[System] > {System Info} > {Installed Options}** to view the installed options.

### Show Error

Pressing **[System] > {System Info} > {Error history}** accesses a list of the 30 most recent error messages. The most recent error will appear at the bottom of the list. If the error list is longer than 30 entries, the analyzer reports an error message [-350, Query overflow]. When in remote control, and the error list is greater than 30 entries, the error display is halted and a message at the bottom of the list informs the user that the number of errors exceeds 30.

For more information, refer to [“Error Messages”](#) on page 113.

### Perform a Time Base Calibration

The N9342C provides a manual calibration function to calibrate the time base. The analyzer should warm up for approximately 30 minutes before calibration.

When the calibration function is triggered, the current measurement is interrupted and a gauge displays on the LCD. The gauge simply indicates calibration action rather than calibration course, as the calibration time is unpredictable. When the

calibration is finished, the LCD displays a calibration, and the interrupted measurement restarts.

**NOTE**

Time base calibration takes only a short time when the inner temperature is stable. When the inner temperature is increasing, calibration takes a long period of time or will fail. If the input reference signal is abnormal, the calibration cycle will take a long and unpredictable time to exit, and the LCD displays an error message.

---

Please refer to the operation procedures below:

- 1 Use a BNC cable to connect a 10 MHz reference signal to the **EXT TRIG IN** connector.
- 2 Press [**System**] > {**More**} > {**Time Base EXT**} to initiate a calibration.

## Data Security

The N9342C offers the optional memory erase function for data security. Press [**System**] > {**More**} > {**Security**} > {**Erase Memory**} to erase all the user data in internal memory. Press Enter as a terminator to start the erase process immediately.

**CAUTION**

The memory erase process takes 15 minutes approximately. During the erase process, there must be a constant power supply to ensure the successful erase. If the erase process is interrupted, please reboot the instrument and erase memory again.

---

### Upgrading Firmware

Follow the steps below to update the firmware:

- 1 Download the latest N9342C firmware from [http://www.agilent.com/find/sa\\_upgrades](http://www.agilent.com/find/sa_upgrades)
- 2 Extract files to the root directory of a USB stick. You will see a folder named “N9342DATA” with file *Bappupgrade.hy*.
- 3 Insert the USB stick into the top panel USB connector.
- 4 Press [**System**] > {**More**} > {**Service**} > {**Upgrade Firmware**} to activate the updating procedure. Press **Enter** to upgrade the firmware. The analyzer will perform the update automatically.
- 5 Unplug the USB stick and restart the analyzer when message “All modules have been upgraded, please restart” is displayed.
- 6 Press [**System**] > {**System Info**} > {**Show System**} to find the updated MCU firmware version.

**CAUTION**

**In updating process, there must be a constant power supply to for at least 15 minutes. If power fails during the updating process it can cause damage to the instrument.**

---



## Making Basic Measurements

This section provides information on basic analyzer operations. It assumes that you are familiar with the front and top panel buttons and keys, and display annotations of your analyzer. If you are not, please refer to “[Front Panel Overview](#)” on page 4, “[Top Panel Overview](#)” on page 6, and “[Instrument Markings](#)” on page 7.

For more details on making measurements, please refer to “[Functions and Measurements](#)” on page 29”.

### Entering Data

When setting measurement parameters, there are several ways to enter or modify active function values:

#### 1 Using the Front Panel Knob

Increases or decreases the current value.

#### 2 Using the Arrow Keys

Increases or decreases the current value by the step unit defined.

Press **[Freq] > {CF Step}** to set the frequency by an auto-coupled step ( $\text{Step} = \text{Span}/10$ , when **{CF Step}** mode is set to **Auto**).

#### 3 Using the Numeric Keypad

Enters a specific value. Press a terminator key (either a specified unit softkey or **[ENTER]**) to confirm input.

#### 4 Using the Shift Hardkey

Press the blue shift key first, then press the function hardkeys to select the upper alternative function.

#### 5 Using the Enter Key

Terminates an entry or confirms a selection.

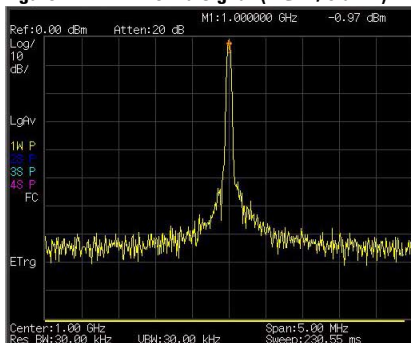
### Viewing a Signal on the Analyzer

- 1 Use a signal generator to generate a CW signal of 1.0 GHz, at a power level of 0.0 dBm.
- 2 Press **[System]** > **{PwrOn/Off Preset}** > **{Preset Type}** and select **DFT** to toggle the preset setting to the factory-defined status.
- 3 Press the green **[Preset]** key to restore the analyzer to its factory-defined setting.
- 4 Connect the generator's **RF OUT** connector to the analyzer's **RF IN** connector.
- 5 Press **[Freq]** > **1** > **{GHz}** to set the analyzer center frequency to 1 GHz.
- 6 Press **[Span]** > **5** > **{MHz}** to set the analyzer frequency span to 5 MHz.
- 7 Press **[Peak]** to place a marker (M1) at the highest peak (1 GHz) on the display.

The Marker amplitude and frequency values appear in the function block and in the upper-right corner of the screen.

Use the front-panel knob, arrow keys, or the softkeys in the Peak Search menu to move the marker and show the value of both frequency and amplitude displayed on the screen.

**Figure 2-1 View a signal (1 GHz, 0 dBm)**





Agilent N9342C  
Handheld Spectrum Analyzer

# 3 Functions and Measurements

## Measuring Multiple Signals

This section provides information on measuring multiple signals.

### Comparing Signals on the Same Screen

The N9342C can easily compare frequency and amplitude signal differences, for example, measuring radio or television signal spectra. The Delta Marker function allows two signals to be compared when both appear on the screen at the same time.

In the following example, a 50 MHz signal is used to measure frequency and amplitude differences between two signals on the same screen. The Delta Marker function is demonstrated in this example.

- 1 Press [**Preset**] to set the analyzer to the factory default setting.
- 2 Input a signal (0 dB, 50 MHz) to the **RF IN** connector of the analyzer.
- 3 Set the analyzer start frequency, stop frequency, and reference level to view the 50 MHz signal and its harmonics up to 100 MHz:
  - Press [**FREQ**] > **40** > {MHz}
  - Press [**FREQ**] > **110** > {MHz}
  - Press [**AMPTD**] > **0** > {dBm}
- 4 Press [**PEAK**] to place a marker on the highest peak on the display (50 MHz).

The {**Next Left PK**} and {**Next Right PK**} softkeys are available to move the marker from peak to peak.

- 5 Press [**Marker**] > {**Delta**} to anchor the first marker (labeled as M1) and activate a delta marker.

The label on the first marker now reads 1R, indicating that it is the reference point.

- 6 Move the second marker to another signal peak using the front panel knob. In this example the next peak is 100 MHz, a harmonic of the 50 MHz signal:

- Press **[Peak] > {Next Right PK}** or **{Next Left PK}**.

**NOTE**

To increase the resolution of the marker readings, turn on the frequency count function. For more information, please refer to [“Improving Frequency Resolution and Accuracy”](#) on page 40.

**Figure 3-2 Delta pair marker with signals (same screen)**



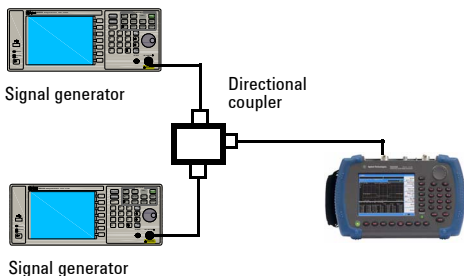
## Resolving Signals of Equal Amplitude

In this example a decrease in resolution bandwidth is used in combination with a decrease in video bandwidth to resolve two signals of equal amplitude with a frequency separation of 100 kHz.

Notice that the final RBW selected is the same width as the signal separation, while the VBW is slightly narrower than the RBW.

- 1 Connect two sources to the analyzer input as shown below.

**Figure 3-3 Setup for obtaining two signals**



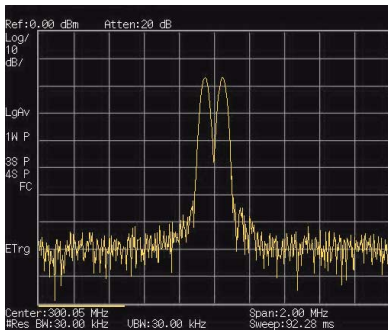
- 2 Set one source to 300 MHz. Set the frequency of the other source to 300.1 MHz. Set both source amplitudes to  $-20$  dBm.
- 3 Setup the analyzer to view the signals:
  - Press [PRESET]
  - Press [FREQ] > 300.05 > {MHz}
  - Press [SPAN] > 2 > {MHz}
  - Press [BW] > 30 > {kHz}

Use the knob or the arrow keys to further reduce the resolution bandwidth and better resolve the signals.

As you decrease the resolution bandwidth, you improve the resolution of the individual signals and it also increases the sweep timing. For fastest measurement times, use the widest possible resolution bandwidth.

Under factory preset conditions, the resolution bandwidth is coupled to the span.

**Figure 3-4 Resolving signals of equal amplitude**

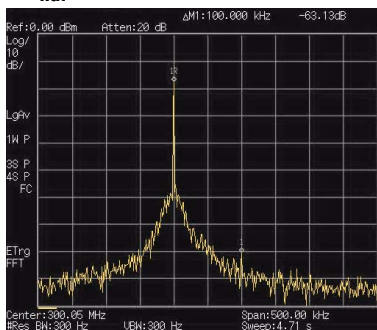


## Resolving Small Signals Hidden by Large Signals

This example uses narrow resolution bandwidths to resolve two input signals with a frequency separation of 50 kHz and an amplitude difference of 60 dB.

- 1 Connect two sources to the analyzer input connector as shown in [Figure 3-3](#) on page 32.
- 2 Set one source to 300 MHz at -10 dBm. Set the other source to 300.05 MHz at -70 dBm.
- 3 Set the analyzer as follows:
  - Press **[PRESET]**
  - Press **[FREQ] > 300.05 > {MHz}**
  - Press **[SPAN] > 500 > {kHz}**
  - Press **[BW] > 300 > {Hz}**
- 4 Reduce the resolution bandwidth filter to view the smaller hidden signal. Place a delta marker on the smaller signal:
  - Press **[Peak]**
  - Press **[MARKER] > {Delta}**
  - Press **[Peak] > {Next Right PK}** or **{Next Left PK}**

**Figure 3-5 Resolving a small signal hidden by a larger signal**





## Measuring a Low-Level Signal

This section provides information on measuring low-level signals and distinguishing them from spectrum noise. There are four techniques used to measure low-level signals.

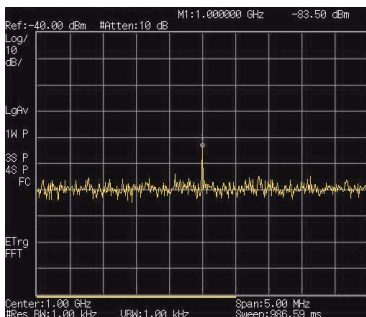
### Reducing Input Attenuation

The ability to measure a low-level signal is limited by internally generated noise in the spectrum analyzer.

The input attenuator affects the level of a signal passing through the analyzer. If a signal is very close to the noise floor, reducing input attenuation will bring the signal out of the noise.

- 1 Preset the analyzer:
- 2 Input a signal (1 GHz, -80 dBm) to **RF IN**.
- 3 Set the CF, span and reference level:
  - Press **[FREQ] > 1 > {GHz}**
  - Press **[SPAN] > 5 > {MHz}**
  - Press **[AMPTD] > -40 > {dBm}**
- 4 Move the desired peak (in this example, 1 GHz) to the center of the display:
  - Press **[Peak]**
  - Press **[MARKER] > {Marker To} > {To Center}**

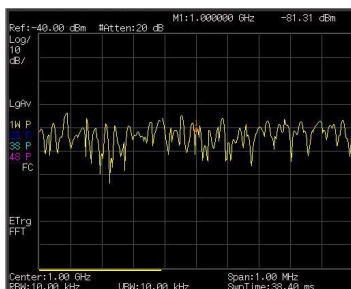
**Figure 3-6 A signal closer to the noise level (Atten: 10 dB)**



### 3 Functions and Measurements

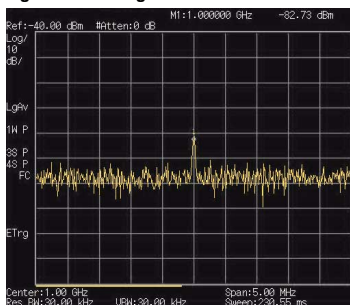
- 5 Reduce the span to 1 MHz and if necessary re-center the peak.
  - Press **[SPAN] > 1 > {MHz}**
- 6 Set the attenuation to 20 dB. Note that increasing the attenuation moves the noise floor closer to the signal level.
  - Press **[AMPTD] > {Attenuation} > 20 > {dB}**

**Figure 3-7 A signal closer to the noise level (Atten: 20 dB)**



- 7 Press **[AMPTD] > {Attenuation} > 0 > {dB}** to set the attenuation to 0 dB.

**Figure 3-8 A signal closer to the noise level (Atten: 0 dB)**



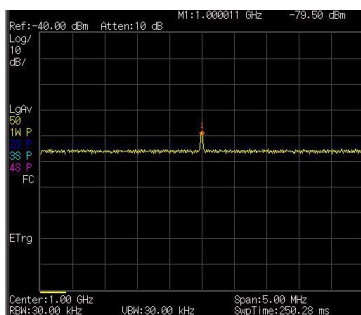
## Decreasing the Resolution Bandwidth

Resolution bandwidth settings affect the level of internal noise without affecting the amplitude level of continuous wave (CW) signals. Decreasing the RBW by a decade reduces the noise floor by 10 dB.

- 1 Refer to “Reducing Input Attenuation” on page 35, and follow steps 1, 2 and 3.
- 2 Decrease the resolution bandwidth:
  - Press **[BW]**, and toggle RBW setting to **Man (manual)**, then decrease the resolution bandwidth using the knob, the arrow keys or the numeric keypad.

The low level signal appears more clearly because the noise level is reduced.

**Figure 3-9** Decreasing resolution bandwidth

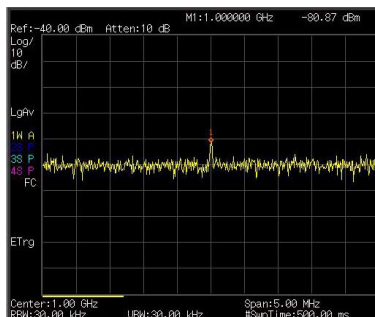


## Using the Average Detector and Increased Sweep Time

The analyzer's noise floor response may mask low-level signals. Selecting the instruments averaging detector and increasing the sweep time will smooth the noise and improve the signal's visibility. Slower sweep times are necessary to average noise variations.

- 1 Refer to "Reducing Input Attenuation" on page 35, and follow steps 1, 2, and 3.
- 2 Press [TRACE] > {More} > {Detector} > {Average} to select the average detector.
- 3 Press [Sweep] > {Sweep Time} to set the sweep time to 500 ms.  
Note how the noise appears to smooth out. The analyzer has more time to average the values for each of the displayed data points.
- 4 Press [BW] > {Avg Type} to change the average type.

Figure 3-10 Using the average detector



## Trace Averaging

Averaging is a digital process in which each trace point is averaged with the previous sweep's data average for the same trace point.

Selecting averaging, when the analyzer is auto coupled, changes the detection mode to sample, smoothing the displayed noise level.

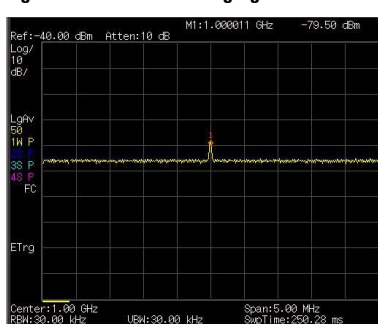
**NOTE**

This is a trace processing function and is not the same as using the average detector (as described on [page 38](#)).

- 1 Refer to the first procedure “[Reducing Input Attenuation](#)” on page 35, and follow steps 1, 2, and 3.
- 2 Press [TRACE] > {Average} (On) to turn average on.
- 3 Press 50 > [ENTER] to set the average number to 50.

As the averaging routine smooths the trace, low level signals become more visible.

**Figure 3-11 Trace averaging**



## Improving Frequency Resolution and Accuracy

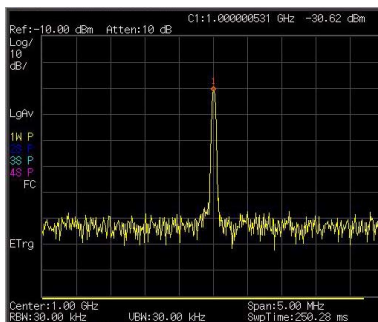
This section provides information on using the frequency counter to improve frequency resolution and accuracy.

**NOTE**

Marker count properly functions only on CW signals or discrete spectral components. The marker must be  $> 40$  dB above the displayed noise level.

- 1 Press **[PRESET]** (factory preset)
- 2 Input a signal (1 GHz,  $-30$  dBm) to the analyzer's **RF IN** connector.
- 3 Set the center frequency to 1 GHz and the span to 5 MHz.
- 4 Press **[MARKER] > {Function} > {Counter}** to turn the frequency counter on.
- 5 Move the marker by rotating the knob to a point half-way down the skirt of the signal response.
- 6 Press **[MARKER] > {Function} > {Normal}** to turn off the marker counter.

**Figure 3-12 Using the frequency counter**



## Making Distortion Measurements

This section provides information on measuring and identifying signal distortion.

### Identifying Analyzer Generated Distortion

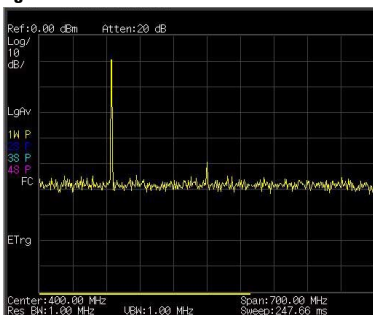
High level input signals may cause analyzer distortion products that could mask the real distortion present on the measured signal. Use trace and the RF attenuator to determine which signals, if any, may be internally generated distortion products.

In this example, a signal from a signal generator is used to determine whether the harmonic distortion products are generated by the analyzer.

- 1 Input a signal (200 MHz, -10 dBm) to the analyzer **RF IN** connector.
- 2 Set the analyzer center frequency and span:
  - Press **[Preset]** (factory preset)
  - Press **[Freq] > 400 > {MHz}**
  - Press **[Span] > 700 > {MHz}**

The signal produces harmonic distortion products (spaced 200 MHz from the original 200 MHz signal).

**Figure 3-13 Harmonic distortion**

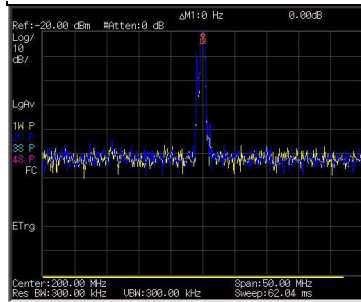


### 3 Functions and Measurements

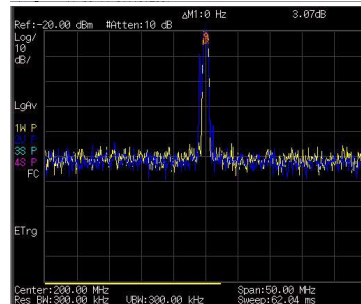
- 3 Change the center frequency to the value of the second (400 MHz) harmonic:
  - Press [**Peak**]
  - Press [**Marker**] > {**Marker To**} > {**To Center**}
- 4 Change the span to 50 MHz and re-center the signal:
  - Press [**Span**] > **50** > {**MHz**}
  - Press [**Peak**]
- 5 Set the attenuation to 0 dB:
  - Press [**Amptd**] > {**Attenuation**} > **0** > {**dB**}
  - Press [**Marker**] > {**Marker To**} > {**To Ref**}
- 6 To determine whether the harmonic distortion products are generated by the analyzer, first save the trace data in trace 2 as follows:
  - Press [**Trace**] > {**Trace (2)**}
  - Press [**Trace**] > {**Clear Write**}
- 7 Allow trace 2 to update (minimum two sweeps), then store the data from trace 2 and place a delta marker on the harmonic of trace 2:
  - Press [**Trace**] > {**View**}
  - Press [**Peak**]
  - Press [**Marker**] > {**Delta**}

The [Figure 3-14](#) shows the stored data in trace 2 and the measured data in trace 1. The Marker Delta indicator reads the difference in amplitude between the reference and active trace markers.



**Figure 3-14 Identifying Analyzer Distortion (0 dB atten)**


8 Press [AMPTD] > {Attenuation} > 10 > {dB} to increase the RF attenuation to 10 dB.

**Figure 3-15 Identifying Analyzer Distortion (10 dB atten)**


The marker readout comes from two sources:

- Increased input attenuation causes poorer signal-to-noise ratio. This causes the marker delta value to be positive.
- Reduced contribution of the analyzer circuits to the harmonic measurement causes the marker to be negative.

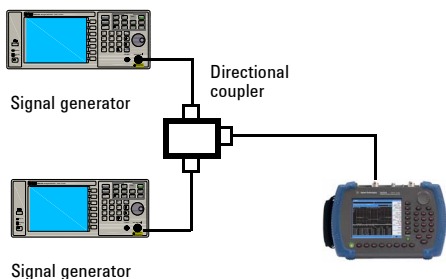
A large marker delta value readout indicates significant measurement errors. Set the input attenuator at a level to minimize the absolute value of marker delta.

## Third-Order Intermodulation Distortion

Two-tone, third-order intermodulation (TOI) distortion is a common test in communication systems. When two signals are present in a non-linear system, they may interact and create third-order intermodulation distortion products that are located close to the original signals. System components such as amplifiers and mixers generate these distortion products.

In this example we test a device for third-order intermodulation using markers. Two sources are used, one is set to 300 MHz and the other to 301 MHz.

- 1 Connect the equipment as shown in figure below.



This combination of signal generators and directional coupler (used as a combiner) results in a two-tone source with very low intermodulation distortion.

Although the distortion from this setup may be better than the specified performance of the analyzer, it is useful for determining the TOI performance of the source/analyzer combination.

After the performance of the source/analyzer combination has been verified, the DUT (device under test, for example, an amplifier) would be inserted between the directional coupler output and the analyzer input.

**NOTE**

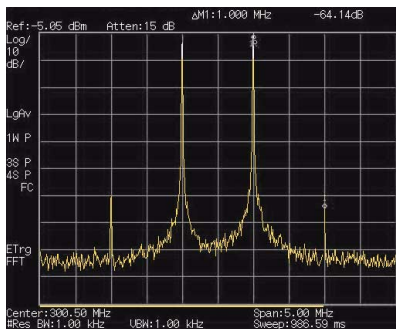
The coupler used should have a high isolation between the two input ports to limit the sources intermodulation.

- 2 Set one source (signal generator) to 300 MHz and the other source to 301 MHz. This will define the frequency separation at 1 MHz. Set both sources equal in amplitude, as measured by the analyzer. In this example, they are both set to -5 dBm.
- 3 Set the analyzer center frequency and span:
  - Press [**PRESET**] (Factory preset)
  - Press [**FREQ**] > **300.5** > {MHz}
  - Press [**SPAN**] > **5** > {MHz}
- 4 Reduce the RBW until the distortion products are visible:
  - Press [**BW**] > {RBW}, and reduce the RBW using the knob, the arrow keys or the numeric keypad.
- 5 Move the signal to the reference level:
  - Press [**Peak**]
  - Press [**MARKER**] > {Marker To} > {To Ref}
- 6 Reduce the RBW until the distortion products are visible:
  - Press [**BW**] > {RBW}, and reduce the RBW using the knob, the arrow keys or the numeric keypad.
- 7 Activate the second marker and place it on the peak of the distortion product (beside the test signal) using the **Next Peak**:
  - Press [**MARKER**] > {Delta}
  - Press [**Peak**] > {Next Left (Right) PK}

### 3 Functions and Measurements

- 8 Measure the other distortion product:
  - Press **[MARKER] > {Normal}**
  - Press **[Peak] > {Next Left (Right) Peak}**
- 9 Measure the difference between this test signal and the second distortion product.
  - Press **[MARKER] > {Normal}**
  - Press **[Peak] > {Next Left/Right Peak}**

**Figure 3-16** TOI test screen

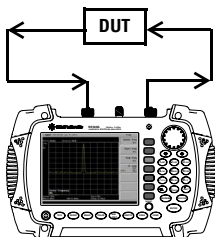


## Making a Stimulus Response Transmission Measurement

The procedure below describes how to use a built-in tracking generator to measure the rejection of a low pass filter, a type of transmission measurement.

- 1 To measure the rejection of a low pass filter, connect the equipment as shown below. A 370 MHz low-pass filter is used as a DUT in this example.

**Figure 3-17 Transmission Measurement Test Setup**



- 2 Press [**Preset**] to perform a factory preset.
- 3 Set the start and stop frequencies and resolution bandwidth:
  - Press [**FREQ**] > {**Start Freq**} > 100 > {**MHz**}
  - Press [**FREQ**] > {**Stop Freq**} > 1 > {**GHz**}
  - Press [**BW**] > {**RBW**} > 1 > {**MHz**}
- 4 Turn on the tracking generator and if necessary, set the output power to -10 dBm:
 

Press [**MODE**] > {**Track Generator**} > {**Amplitude (On)**} > -10 > {**dBm**}.

### CAUTION

Excessive signal input may damage the DUT. Do not exceed the maximum power that the device under test can tolerate.

### 3 Functions and Measurements

5 Press **[Sweep] > {Sweep Time (Auto)}** to put the sweep time into stimulus response auto coupled mode.

6 Increase the measurement sensitivity and smooth the noise:

Press **[BW] > {RBW} > 30 > {kHz}**

Press **[BW] > {VBW} > 30 > {kHz}**

A decrease in the displayed amplitude is caused by tracking error.

7 Connect the cable from the tracking generator output to the analyzer input. Store the frequency response in trace 4 and normalize:

Press **[MEAS] > {Normalize} > {Store Ref} (1 → 4) > {Normalize (On)}**

8 Reconnect the DUT to the analyzer and change the normalized reference position:

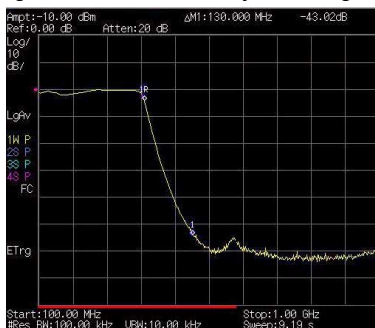
Press **[MEAS] > {Normalize} > {Norm Ref Posn} > 8 > [ENTER]**

9 Measure the rejection of the low-pass filter:

Press **[Marker] > {Normal} > 370 > MHz, {Delta} > 130 > {MHz}**

The marker readout displays the rejection of the filter at 130 MHz above the cutoff frequency of the low-pass filter.

**Figure 3-18 Measure the Rejection Range**



## Measuring Stop Band Attenuation of a Low-pass Filter

When measuring filter characteristics, it is useful to look at the stimulus response over a wide frequency range. Setting the analyzer x-axis (frequency) to display logarithmically provides this function. The following example uses the tracking generator to measure the stop band attenuation of a 370 MHz low pass filter.

- 1 Connect the DUT as shown in [Figure 3-17](#) on page 47. This example uses a 370 MHz low pass filter.
- 2 Press [**Preset**] to perform a factory preset.
- 3 Set the start and stop frequencies:
  - Press [**FREQ**] > {**Start Freq**} > **100** > {**MHz**}
  - Press [**FREQ**] > {**Stop Freq**} > **1** > {**GHz**}
  - Press [**AMPTD**] > {**Scale Type**} > {**Log**}
- 4 Press [**BW**] > **10** > {**kHz**} to set the resolution bandwidth to 10 kHz.

### CAUTION

Excessive signal input may damage the DUT. Do not exceed the maximum power that the device under test can tolerate.

- 5 Turn on the tracking generator and if necessary, set the output power to -10 dBm:
 

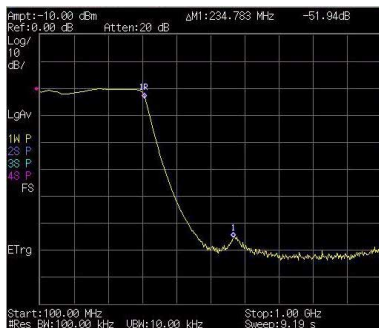
Press [**MODE**] > {**Track Generator**} > {**Amplitude (On)**} > **-10** > {**dBm**}.
- 6 Press [**Sweep**] > {**Sweep Time (Auto)**} to put the sweep time into stimulus response auto coupled mode. Adjust the reference level if necessary to place the signal on screen.
- 7 Connect the cable (but not the DUT) from the tracking generator output to the analyzer input. Store the frequency response into trace 4 and normalize:
 

Press [**MEAS**] > {**Normalize**} > {**Store Ref**} (**1** → **4**) > {**Normalize (On)**}

### 3 Functions and Measurements

- 8 Reconnect the DUT to the analyzer. Note that the units of the reference level have changed to dB, indicating that this is now a relative measurement.
- 9 To change the normalized reference position:  
Press [MEAS] > {Normalize} > {Norm Ref Posn} > 8 > [ENTER]
- 10 Place the reference marker at the specified cut-off frequency:  
Press [MARKER] > {Normal} > 370 > MHz
- 11 Set the 2nd marker as a delta frequency of 37 MHz:  
Press {Delta} > 37 > MHz
- 12 In this example, the attenuation over this frequency range is 19.16 dB/octave (one octave above the cutoff frequency).
- 13 Use the front-panel knob to place the marker at the highest peak in the stop band to determine the minimum stop band attenuation. In this example, the peak occurs at 600 MHz. The attenuation is 51.94 dB.

Figure 3-19 Minimum Stop Band Attenuation





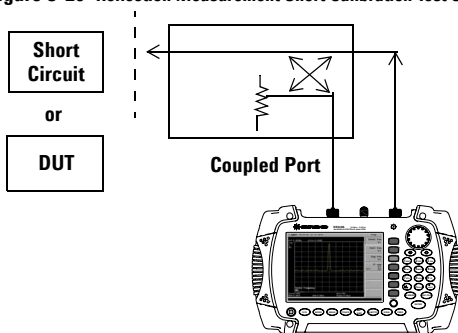
## Making a Reflection Calibration Measurement

The following procedure makes a reflection measurement using a coupler or directional bridge to measure the return loss of a filter. This example uses a 370 MHz low-pass filter as the DUT.

The calibration standard for reflection measurements is usually a short circuit connected at the reference plane (the point at which the DUT is connected). A short circuit has a reflection coefficient of 1 (0 dB return loss). It reflects all incident power and provides a convenient 0 dB reference.

- 1 Connect the DUT to the directional bridge or coupler as shown below. Terminate the unconnected port of the DUT.

**Figure 3-20 Reflection Measurement Short Calibration Test Setup**



**NOTE**

If possible, use a coupler or bridge with the correct test port connector types for both calibrating and measuring. For the best results, use the same adapter for the calibration and the measurement. Terminate the second port of a two port device.

- 2 Connect the tracking generator output of the analyzer to the directional bridge or coupler.
- 3 Connect the analyzer input to the coupled port of the directional bridge or coupler.

### 3 Functions and Measurements

- 4 Press [**Preset**] to perform a factory preset.
- 5 Turn on the tracking generator and if necessary, set the output power to  $-10$  dBm:  
Press [**MODE**] > {**Track Generator**} > {**Amplitude (On)**} > **-10** > {**dBm**}

#### CAUTION

Excessive signal input may damage the DUT. Do not exceed the maximum power that the device under test can tolerate.

- 6 Set the start and stop frequencies and RBW:
  - Press [**FREQ**] > {**Start Freq**} > **100** > {**MHz**}
  - Press [**FREQ**] > {**Stop Freq**} > **1** > {**GHz**}
  - Press [**BW**] > **1** > {**MHz**}
- 7 Replace the DUT with a short circuit.
- 8 Press [**MEAS**] > {**Normalize**} > {**Store Ref (1 → 4)**} > {**Normalize (On)**} to normalize the trace.  
This activates the trace 1 minus trace 4 function and displays the results in trace 1.  
The normalized trace or flat line represents 0 dB return loss. Normalization occurs with each sweep. Replace the short (cal device) with the DUT.

#### NOTE

Since the reference trace is stored in trace 4, changing trace 4 to **Clear Write** invalidates the normalization.

**Figure 3-21 Short Circuit Normalized**



## Measuring Return Loss Using the Reflection Calibration Routine

This procedure uses the reflection calibration routine in the previous procedure “[Making a Reflection Calibration Measurement](#)” on page 51, to calculate the return loss of the 370 MHz low-pass filter.

- 1 After calibrating the system with the above procedure, reconnect the filter in place of the short (cal device) without changing any analyzer settings.
- 2 Use the marker to read return loss. Position the marker with the front-panel knob to read the return loss at that frequency.

Rotate the knob to find the highest peak and the readout is the maximum return loss.

**Figure 3-22 Measuring the Return Loss of the Filter**



## Making an Average Power Measurement

Average power measurements provide a key metric in transmitter performance.

Base station transmit power must be set accurately to achieve optimal coverage in wireless networks. If the transmit power is set too high due to inaccurate power measurements, undesired interference can occur. If the transmit power is set too low, coverage gaps or holes may occur. Either case may affect system capacity and may translate into decreased revenue for service providers.

Average power can be measured for the channel of interest while the base station is active. All other channels should be inactive. Average power is a broadband measurement. If other signals are present the analyzer will also measure their power contributions.

#### CAUTION

The maximum power for the RF IN port and the RF OUT port of the analyzer is +20 dBm. The maximum power for the Power Sensor port is +24 dBm. When directly coupled to a base station, the test set can be damaged by excessive power applied to any of these three ports.

To prevent damage in most situations when directly coupling an analyzer to a base station, use a high power attenuator between the analyzer and the BTS.

---

The analyzer supports the U2000 Series USB power sensors.

The U2000 Series USB power sensors do not need manual calibration and zero routines performed. Calibration and zeroing are performed without removing the power sensor from the source, through internal zeroing. With internal zeroing of U2000 Series USB power sensors, there is no need to disconnect the sensor or power-off the DUT. The U2000 Series do not require 50 MHz reference signal calibration, allowing the factory calibration to ensure measurement accuracy. To ensure accuracy, users are recommended to perform

external zeroing for input signals below -30 dBm.

**NOTE**

If you suspect other signals may be present, it is recommended that you turn off all the other channels and measure average power only on the signal of interest.

Another option is to measure channel power (which is less accurate), that filters out all other channels (signals). You can measure channel power for CDMA using the CDMA Analyzer or CDMA Over Air tool. For other modulation formats, use their respective analyzers (that is, GSM, 1xEV-DO, or W-CDMA) or measure channel power using either the spectrum analyzer or the Channel Scanner tool.

---

**NOTE**

Connect the power meter as close as possible to the power amplifier/duplexer output. Do not use a coupled port. Sensors may not be as accurate at the power levels provided by coupled ports.

---

## Making a Basic Average Power Measurement

To make an average power measurement, connect the power sensor and cable, zero and calibrate the meter, before making a measurement.

Zeroing of the Power Meter will occur automatically:

- Every time the Power Meter function is used.
- When a 5 degree C. change in instrument temperature occurs.
- Whenever the power sensor is changed.
- Every 24 hours (min.).
- Before measuring low level signals -for example, 10 dB above the lowest specified power the power sensor is capable of.

Calibrate the Power Meter every time you cycle the power on and off.

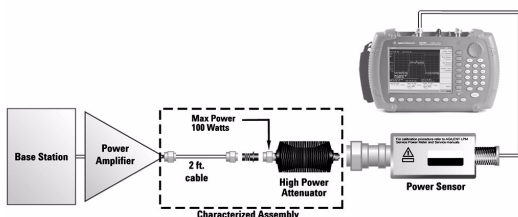
In most situations, you can press **{Zero}** to complete the two steps (zero and cal) together.

#### To Make a Basic Average Power Measurement

You can follow the steps below to make a basic average power measurement.

- 1 Press [**Preset**] to perform a factory preset.
- 2 Press [**MODE**] > {**Power Meter**} > [**ENTER**] to turn on the power meter.
- 3 Zero and calibrate the meter. Press {**Zeroing**} to make a Zero operation of the power sensor followed by a calibration operation.
- 4 Connect the power sensor to the power Ref 50 MHz port. The analyzer supports the U2000 Series power sensors.
- 5 Connect the external attenuation, if required, with the power sensor used.
- 6 Connect the power sensor to the signal to be measured. A typical Base Transceiver Station connection is after the output of the power amplifier and duplexer. The connection requires a 2 ft. cable and two Type-N barrel connectors, in addition to the power sensor and external attenuator.

**Figure 3-23 Connection with base station**



### Setting Power Meter Resolution

You can choose from four levels of Power Meter resolution. Higher resolutions provide more accuracy but slow the measurement speed.

- 1 Press **[Preset]** to perform a factory preset.
- 2 Press **[MODE] > {Power Meter} > [ENTER]** to turn on the power meter.
- 3 Press **{Meas Disp} > {Resolution}**. Select 1,2,3 or 4. The four options represent different resolution as follow:
  - [1] = 1
  - [2] = 0.1
  - [3] = 0.01
  - [4] = 0.001

### Setting the Power Meter's Top and Bottom End-Points

Setting the end points (Disk Range) close to the expected measurement value changes the sensitivity of the Power Meter scale resolution. This is an advantage in viewing small changes in power. However, this will not affect the overall range of the sensor.

- 1 Press **[Preset]** to perform a factory preset.
- 2 Press **[MODE] > {Power Meter} > [ENTER]** to turn on the power meter.
- 3 Press **{Meas Disp} > {Disp Range}** to access the end-points menu.
- 4 Press **{Top}** and enter the maximum scale value desired using the numeric keypad. Then press **{dBm}** to complete the setup.
- 5 Press **{Bottom}** and enter the minimum scale value desired using the numeric keypad. Then press **{dBm}** to complete the setup.

#### Setting the Power Meter's Upper and Lower Limits

The internal Power Meter can be configured to detect when a measurement has failed a user predefined upper and lower limits.

- 1 Press [**Preset**] to perform a factory preset.
- 2 Press [**MODE**] > {**Power Meter**} > [**ENTER**] to turn on the power meter.
- 3 Press {**Meas Setup**} > {**Limits**} to access the limits menu.
- 4 Press {**Limits**} to activate the limits function. Each time the softkey is pressed, the selected option changes.
- 5 Press {**Upper Limits**} and enter the high limit value using the numeric keypad. Then press {**dBm**} to complete the setup.  
Press {**Lower Limits**} and enter the low limit value using the numeric keypad. Then press {**dBm**} to complete the setup.

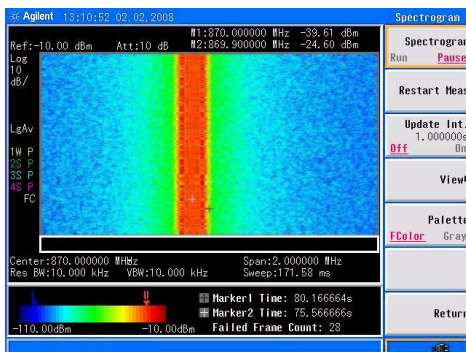


## Spectrum Monitor

The scrolling three-dimensional display is noted for its ability to track the frequency and power behavior over the time, particularly intermittent signals. Spectrum Monitor may be used to analyze the stability of a signal over the time, or to identify intermittent interference signals in communications systems.

The X-axis represents frequency, and amplitude is represented by color; red for a strong signal and blue for noise floor. The Y-axis represents time, with the trace from the newest sweep displayed at the bottom of the screen. Earlier traces move up toward the top with each new sweep. Two coupled markers allow the user to place a marker on any trace in the Spectrum Monitor and view the normal spectrum for the time of that sweep. The time interval between sweeps can be adjusted, and up to 1500 traces can be displayed and saved.

**Figure 3-24 Spectrum Monitor submenu screenshot**



Please refer to the procedures below to perform a Spectrum Monitor measurement.

- 1 Connect the Omni Antenna to RF IN connector.

### 3 Functions and Measurements

- 2 Set the center frequency and span.  
Press [**FREQ**], [**1.8052**], {**GHz**}, [**SPAN**], [**5**], {**MHz**}.
- 3 Turn on the Spectrum Monitor function.  
Press [**MEAS**], {**Spectrum Monitor**}.
- 4 Set the update interval time between two frames.  
Press {**Update Int. On**}, rotating the knob or pressing numeric keypads to set the update interval time.
- 5 Turn on Marker 1 and Marker 2.  
Press [**Marker**], {**State On**}, {**Marker (2)**}, {**State On**}.
- 6 Press {**Frequency**}, rotate knob to change the frequency of marker as you want.
- 7 Press [**Meas**], {**Spectrum Monitor**}, {**File Logging**}, {**Start Save**} to save Spectrogram data.

The spectrogram has been saved into a trace or CSV data file for your future use.

Please refer to “[Loading a file](#)” on page 66 to load the saved spectrogram trace file.

#### Spectrum Monitor Audio Alert

The spectrum monitor provides an audio alert with a frequency dependant on the different control parameters. This alert needs two markers to specify the measure channel. The **Band Power** of the channel specified by two markers is measured without the audio alert. The **Alert Limit** is set to specify the lowest band power that makes the buzzer beep.

Please refer to the procedures below to turn on the audio alert.

- 1 Press [**Meas**] > {**Spectrum Monitor**} to access into the spectrogram mode.
- 2 Press [**Marker**] > {**More**} > {**Audio Alert**} to enable the audio alert.

## Demodulating an FM Signal

This section demonstrates how to demodulate and listen to an FM signal using the built-in FM demodulator.

Using the built-in FM demodulator you can tune to an FM signal and view the results of the detector output as displayed in the time-domain.

Alternatively, the demodulated signal is also available as an audio output (to the speaker or headphone jack).

- 1 Perform a factory preset:

Press **[Preset]** (Factory Preset).

- 2 Use a signal source or an antenna for an FM signal to analyze. In this example the signal source is used transmitting at 300 MHz with FM deviation of 10 kHz and FM rate of 1 kHz.

### NOTE

If you are using a broadcast FM signal in the United States, for example, the FM channels are broadcasting between 87.7 MHz to 107.7 MHz. The optional preamplifier is essential for the broadcast FM signal demodulation.

- 3 Set the center frequency to the center of the FM signal (in this case 300 MHz):

Press **[FREQ] > 300 > {MHz}**.

- 4 Set the analyzer to zero span for time-domain analysis:

Press **[SPAN] > {Zero Span}**.

Press **[Sweep] > {Sweep Time} > 4 > {ms}**.

- 5 Turn off the input attenuation and turn on the optional pre-amplifier:

Press **[AMPTD] > {Attenuation} > 0 > {dB}**.

Press **{Preamp On}**

### 3 Functions and Measurements

- 6 Set the resolution bandwidth to capture the full bandwidth of the FM signal. To calculate the required bandwidth use

$$RBW = ((2 \times \text{Frequency Deviation}) + (2 \times \text{Modulation Rate}))$$

In our case the RBW should be:  $(2 \times 10 \text{ kHz}) + (2 \times 1 \text{ kHz}) = 22 \text{ kHz}$  With 1-3-10 sequence RBW selections, choose the next highest RBW of 30 kHz:

Press **[BW] > 30 > {kHz}**.

- 7 Turn on the FM demodulator:

Press **[Marker] > {Function} > {Demod} > {Demod Setting} > {Demod Type AM}**.

Listen to the FM audio signal.

Press **{Speaker Vol}**, rotate the knob.

Alternatively, you can also use the headphone jack.

## File Operation

Pressing **[File]** accesses a menu that allows you to manage file saving and loading.

### Viewing a file list

Refer to the following two steps to view a file list:

- 1 Select the directory to view.  
Press **[File]** > **{Directory}** > **{Media Type}** to toggle the displayed file list from internal memory, external **USB** memory stick or system memory.
- 2 Select the file type you wish to view.  
Press **[File]** > **{View FileType}** to select a file type.

### File Types

Each file type has a specific purpose as defined below:

- Trace (\*.DAT)  
A trace file records trace data and controls.
- Screen (\*.JPG)  
A screen file records graphic information of the current screen.
- State (\*.STA)  
A state file records the current controls and settings of the analyzer. Use this file type for saving test parameters for future recall, such as Frequency, Amplitude and BW settings.
- Limit (\*.LIM)  
A limit file records the limit settings. You can edit the limit file and transfer this file between the N9342CN and PC software.
- CSV (\*.CSV)  
A CSV file records the trace data and available for review on PC.
- Task Planner (\*.TPF)  
A task planner file contains the user-defined measurement tasks in sequence which make the test task easier in field test.

### 3 Functions and Measurements

- **Setup (\*.SET)**  
A setup file records the system setting information, such as language, date/time, and power saving mode. This file type is not used for test parameter setup information.
- **Standard (\*.STD)**  
A standard file contains the frequency range and corresponding parameters for a specific communication standard. It allows you to recall those default settings for the signal searching and testing in that range.
- **Amplitude Correction (\*.COR)**  
The amplitude correction file is used for trace amplitude offset compensation. You need edit and save the correction file on N9342 PC software.

## Saving a file

### NOTE

When a file is selected, you can edit the file name by pressing the numeric and alphabetic hardkeys on the right side of the analyzer's front panel.

Refer to the following three steps to save a file:

- 1 Press **[File]** > **{Directory}** > **{Media Type}** to select the file directory.
- 2 Press **[File]** > **{Save as}**, The pop-up window displays for your further setting.
- 3 Edit a file name.  
A file name can consist of letters and digits. A single key stroke on the numerical keypad inputs a digital number; and consecutive key stroke selects and inputs a letter.
- 4 Rotate the knob to choose the file type you need.
- 5 Press **[Enter]** to save the file.

When a file saving completes, the saved file will display in the file list..

### Quick Saving a File

Press **[Save]** to quickly save a trace or a screen to either the local memory or an external USB device, depending upon the setup of the save path.

Refer to the steps for saving a trace/screen:

- 1 Press **[File] > {Setup} > {Qsave Type}** to set the quick save file type.
- 2 Press **[File] > {Directory} > {Media Type}** to select the file directory.
- 3 Press **[Return], [Save]** to save a trace or a screen copy to the pre-defined memory. The trace or screen will be automatically assigned with a default file name. A trace will be assigned with a file name, such as *HYTRACE*, *HYTRACE\_1*, and consecutive decimal numbers appended to the alphabetic file name, such as *HYSCREEN*, *HYSCREEN\_1* and consecutive decimal numbers appended to the alphabetic file name.

### Saving a User State

The analyzer allows you to recall the frequently used state file with **[User]** hardkey. Please follow the steps below to create the user menu.

- 1 Follow the file saving procedure above to save a state file in internal memory.
  - 2 Rotate the knob to highlight the saved file.
  - 3 Press **[Files Operation] > {Copy to}**
  - 4 Rotate the knob to highlight the folder named *USER*. Press **{Browse Folder}** to access into this folder.
  - 5 Rotate the knob to highlight the folder named *State*. Press **{Browse Folder}** to access into this folder.
  - 6 Press **{Copy}** to copy the file into the *User/State* folder.
- The State file is available for your quick recall by pressing **[User]**.

#### Deleting a file

- 1 Press [**File**] > {**Directory**} > {**Media Type**} to select a directory.
- 2 Rotate the knob to highlight a file.
- 3 Press [**Return**] > {**File Operation**} > {**Delete**} to delete the selected file. The file will be deleted once user presses **Enter** to confirm deleting.

**CAUTION**

Once a file is deleted, it CANNOT be recovered. Carefully decide whether to delete a file before proceeding.

---

#### Loading a file

- 1 Press [**File**] > {**Directory**} > {**Media Type**} to select a directory.
- 2 Rotate the knob to highlight a file.
- 3 Press {**Recall**} to recall the saved file.

#### Loading a Task Planner File

Please refer to the following procedures to load a task planner file.

**NOTE**

The task planner file is created by the N9342 PC software. For the task planner saving and editing, please refer to the software online help for details.

---

- 1 Press [**Mode**] > {**Task Planner**} or [**File**] > {**View File-Type**} > {**TPF**} to view the task planner file list.
- 2 Rotate the knob to highlight the task planner file which you need.
- 3 Press {**Recall**} to load the task planner file. The measurement task will list in sequence.
- 4 Press {**Run**} to initiate the measurement in sequence.



For the automatic task, all the measurement tasks are executed automatically without interruption.

For the manual task, the program is pasued and releases a result report when each measurement is finished. The program will be continued once you input the next instruction. See [Figure 3-25](#).

For the manual-if-failed task, the measurement tasks are executed continuously unless there is a failed result.

**Figure 3-25 Task Measurement Result**



### **3 Functions and Measurements**



## 4 Key Reference

This chapter provides descriptions of the instrument hardkeys and softkey menu functionality, key access to softkey submenus, and instrument parameter control options.

Additional reference information is provided in the “[Menu Map](#)” on page 123.



### Amptd

Key access: **[Amptd]**

Activates the reference level function and access the associated softkeys to set functions that affect the way data on the vertical axis is displayed or corrected.

#### Ref level

Key access: **[AMPTD] > {Ref level}**

Activates the reference level function.

The reference level is the amplitude power or voltage represented by the top graticule on the display. Changing the value of the reference level changes the absolute amplitude level (in the selected amplitude units) of the top graticule line. To change the reference level, use the arrow keys, the knob, or the numeric keypad. Pressing any digit (0 through 9) on the numeric keypad brings up the terminator menu.

#### Attenuation

Key access: **[AMPTD] > {Attenuation}**

Toggles the input attenuation between **Auto** or **Man**.

The input attenuation ranges from 0 dB to 50 dB and allows you to set the attenuation level in 1 dB increments when attenuation is set to **Man**.

The input attenuator, normally coupled to the reference level control, reduces the power level of the analyzer input signal at the input mixer. The attenuator is recoupled when attenuation is set to **Auto**.

#### CAUTION

To prevent damage to the input mixer, do not exceed a power level of +33 dBm at the input. A granted power level for stable sensitive measurement is less than 20 dBm.

## Preamp

Key access: [AMPTD] > {Preamp}

Toggles the internal preamp between **On** and **Off**.

Preamp results in a correction being applied to compensate for the gain of the preamp at 20 dBm so that amplitude readings show the actual value at the input connector.

**NOTE**

When the preamp is on, a PA indication appears on the left side of the display.

---

The preamp is set to on in frequency bands from 100 kHz to 6 GHz, otherwise the correction is not applied even though the **PA** indication still appears.

## Scale/DIV

Key access: [AMPTD]

Sets the logarithmic units per vertical graticule division on the display.

**NOTE**

The Scale/Div function is only available when the Scale Type key is set to **Log**.

---

## Scale Type

Key access: [AMPTD] > {Scale Type}

Toggles the scale type of vertical graticule divisions between logarithmic and linear.

When Scale Type is set to **Log**, a logarithmic units is activated ranging from 1 to 10 dB per division.

When Scale Type is set to **Lin**, the vertical divisions are linearly scaled and the default amplitude units are volts. The top of the display is set to the reference-level value and the bottom graticule becomes zero volts. (Each division of the graticule is one-tenth of the reference level in volts.)

### Y Axis Units

Key access: [AMPTD] > {More} > {Y Axis Units}

Sets the amplitude units.

**NOTE**

Amplitude units are maintained for both logarithmic and linear modes depending on the Scale Type setting.

---

### HiSensitivity

Key access: [AMPTD] > {HiSensitivity}

Press this softkey **On** to set 0 dB attenuation, -50 dBm reference level and turn the pre-amplifier on. It's very helpful to observe the low-level signals with this settings.

### Ref Offset

Key access: [AMPTD] > {Ref Offset}

Adds an offset value which ranges from -327.6 dB to +327.6 dB, to the displayed reference level.

**NOTE**

Reference-level offsets are only entered by using the numeric keypad. Entering an offset does not affect the trace or the attenuation value.

---

Reference-level offsets are used when gain or loss occurs between a device under test and the analyzer input. Thus, the signal level measured by the analyzer may be referred to as the level at the input of an external amplitude conversion device. When an amplitude offset is entered, its value appears in the lower left corner of the display.

### Amp Correction

Key access: [AMPTD] > {More}

This softkey is a shortcut to load the amplitude correction files (\*.COR) which is located in User/Correction folder of internal memory. You need edit and save the correction file in N9342 PC Software.

## Display

### Grid Scale

Key access: [AMPTD] > {More}

Press this softkey to turn on the amplitude scale unit display on the left of the graticule. The unit determined by the {Y Axis Unit} softkey.

### Grid Scale

Key access: [Disp]

Press this softkey to turn on the amplitude scale unit display on the left of the graticule. The unit determined by the {Y Axis Unit} softkey.

### Display Line

Key access: [Disp]

Activates an adjustable horizontal line that is used as a visual reference line.

The display line, used for trace arithmetic, has amplitude values that correspond to its vertical position when compared to the reference level. The value of the display line appears in both the active function block and on the softkey. The arrow keys, knob, or numeric keypad may be used to adjust the display line. Pressing any digit, 0 through 9, on the numeric keypad brings up the selected terminator menu. To deactivate the Limit line, press **Display Line (Off)**.

### GPS Info

Key access: [Disp]

Toggles the GPS information display (longitude and latitude) on and off.

This softkey is only available with Option GPS installed.

### BW

Activates the bandwidth function and accesses the associated softkeys to control resolution bandwidth, video bandwidth.

### RBW

Key access: **[BW] > {RBW}**

Changes the 3 dB resolution bandwidth from 10 Hz to 3 MHz in a 1, 3, 10 sequence using the knob, step keys or the numeric keypad.

**NOTE**

If an unavailable bandwidth is entered using the numeric keypad, the closest available bandwidth in the 1, 3, 10 sequence is used.

---

As the resolution bandwidth is decreased, the sweep time is modified to maintain amplitude calibration. Resolution bandwidth is also related to span. As span is decreased, resolution bandwidth decreases. As the resolution bandwidth changes, the video bandwidth, if in auto couple mode, changes to maintain the VBW/RBW ratio.

**NOTE**

In non-zero span mode, the value of RBW is determined by whether the setting for RBW is Auto or Man (manual).

---

A “#” mark appears next to RBW on the display when it is not coupled.

### VBW

Key access: **[BW] > {VBW}**

Changes the analyzer post-detector filter from 1 Hz to 1 MHz in a 1, 3, 10 sequence using the knob, the step keys, or the numeric keypad.



As the video bandwidth is decreased, the sweep time is increased to maintain amplitude calibration.

**NOTE**

If an unavailable bandwidth entered using the numeric keypad, the closest available bandwidth in the 1, 3, 10 sequence is used.

---

## VBW/RBW

Key access: [BW] > {VBW/RBW}

Selects the ratio between the video and resolution bandwidths.

If signal responses near the noise level are visually masked by the noise, the ratio can be set to less than 1 to lower the noise. The knob and step keys change the ratio in a 1, 3, 10 sequence.

**NOTE**

When preset is set to default, or VBW/RBW is set to Auto, the ratio is set to 1.

---

## Avg Type

Key access: [BW] > {Avg Type}

Accesses the functions to automatically or manually choose from one of the following averaging type:

### Log Pwr

Key access: [BW] > {Avg Type} > {Log Pwr}

Averages the data as appropriate for the logarithmic scaled y-axis.

When average type is set to **Log Pwr**, "LgAv" appears on the left side of the display.

### **Pwr**

Key access: [BW] > {Avg Type} > {Power}

Converts the scale from logarithmic to linear power units, and then averages the power trace data.

With average type set to **Pwr**, “PAvg” appears on the left side of the display.

### **Voltage**

Key access: [BW] > {Avg Type} > {Voltage}

Averages the data as appropriate for the linearly scaled y-axis scale.

With average type set to **Voltage**, “VAvg” appears on the left side of the display.

There are actually four types of averaging processes within an N9342C. All, except VBW filtering, are affected by this setting. They are listed as follows:

- **Trace averaging**

Averages signal amplitudes on a trace-to-trace basis. (Press **Log Pwr** or **Pwr**)

- **Average detector**

Averages signal amplitudes during the time or frequency interval and represents the result as a single measurement point.

- **Noise marker**

Averages signal amplitudes across measurement points to reduce variations for noisy signals.

- **VBW filtering**

Performs a form of averaging of video signal.

## Sweep

Activates the sweep mode function and accesses associated softkeys to select the trace sweep functions.

### Sweep Time

Key access: [**Sweep**] > {**Sweep Time**}

Selects the sweep time for the analyzer to tune across the displayed frequency span (or, in zero span, the time the analyzer take to sweep the full screen).Inputs may be made using the knob, the arrow keys, or numeric keypad.

**NOTE**

Reducing the sweep time increases the sweep rate.

#### In non-zero spans

When the sweep time is auto-coupled, the analyzer selects the optimum (shortest) sweep time ranging from 10 ms to 1000 s. The auto selection is determined by three measurement settings:

- Frequency Span
- The selected Resolution Bandwidth
- The selected Video Bandwidth

Note that changing one of the three factors above will change the sweep time. The sweep time is in direct ratio to frequency span and is in reverse ratio to the selected resolution bandwidth and video bandwidth when auto-coupled.

**CAUTION**

With sweep time set to a value less than the minimum auto-coupled value, an annotation “Data out of range” appears in the active function block and the sweep time is automatically converted to the minimum auto-coupled value.

### In zero span

Auto-coupled does not function when in a zero span. The sweep time can only be set manually. The sweep time is selectable from 6 s to 200 s in zero span.

### In FFT Mode

In FFT mode, the sweep time default is auto-coupled. The submenu, sweep time is invalid in FFT mode.

## Sweep Type

Key access: [**Sweep**] > {**Sweep**}

Toggles the analyzer between the continuous sweep mode and the single sweep mode.

- **Sweep (Single)**

Puts the analyzer in a single sweep mode. In this mode, pressing [**Sweep**] > {**Single Sweep**} enables a sweep.

- **Sweep (Cont)**

Performs one sweep after another as soon as it is triggered. Pressing [**Preset**] (When Preset Type is set to **Default**) or turning the power on, sets the sweep mode to continuous sweep as default.

## Single Sweep

Key access: [**Sweep**] > {**Single Sweep**}

When the analyzer is in continuous sweep mode and not in a measurement mode ([**MEAS**] > **Measure Off**), pressing [**Sweep**] > {**Single Sweep**} will change the sweep setting to single sweep. It will then begin a sweep after the trigger conditions are met. If the analyzer is already in single sweep, pressing [**Sweep**] > {**Single Sweep**} will execute a new sweep as soon as the trigger condition is met.

If average is on ([TRACE] > {More} > {Average On}), pressing [Sweep] > {Single Sweep} will halt averaging of the current value, and then continue averaging from the current count number when a single sweep function triggers.

## Trigger

Key access: [Sweep] > {Trigger}

Accesses the menu of keys that allow you to select the trigger mode of the analyzer. This softkey is only available in zero span.

### Free Run

Key access: [Sweep] > {Trigger} > {Free Run}

New sweep starts as soon as possible after the current sweep ends. This is the default state of trigger mode.

### Video

Key access: [Sweep] > {Trigger} > {Video}

Activates the trigger condition that starts the next sweep if the detected RF envelope voltage rises to a level set by the video trigger level.

### Ext Rise

Key access: [Sweep] > {Trigger} > {External}

Activates the trigger condition that will start a sweep when the external voltage (connected to **EXT TRG IN** on the rear panel) passes through approximately 2 volts. The external trigger signal must be a 0 V to +5 V TTL signal.

## Sweep Setup

### Sweep Time Rule

Key access: **[Sweep] > {Sweep Setup}**

The analyzer provides two sweep time rules to meet the different sweep time requirements:

- **Speed**

Activates the default fast sweep time rule.

- **Accuracy**

Activates the normal sweep time rule to ensure the measurement accuracy.

Speed sweep time rule provides a fast measurement function that decreases the sweep time. Using Fast Sweep will decrease the measurement accuracy.

### Sweep Type

Key access: **[Sweep] > {Sweep Setup}**

Toggles the Sweep type between Sweep and FFT mode. The default setting is sweep mode.

## Enter

Hardkey function:

- Terminates data entry and enters into the analyzer numerical values keyed from numeric keypad on the front panel.
- Terminate filename entries.

## ESC/Bksp

This hardkey provides mainly two types of functions:

### Clear

- Clears any numeric entry and cancels the active function.
- Clears any title entry and cause the title to revert to the previous name.
- Clears input or output overloads
- Clears error messages from the status line along the bottom of the display.

### Association with other functions

Provides a permitted setting for triggering other functions such as:

- Activates **LIMIT** function for pass/fail judgements.
- Activates **SAVE** function for current trace saving.

#### CAUTION

When pressing [**ESC/Bksp**], the current parameter annotation in the lower left corner, which is an indicator of available settings of **Limit** and **Save**, disappears.

---

# Frequency

Activates the center frequency function, and accesses the menu of frequency functions. The center frequency, or start and stop frequency values appear below the graticule on the display.

**NOTE**

When changing both the center frequency and the span, change the frequency first since the span can be limited by the frequency value.

---

## Center Frequency

Key access: **[FREQ] > {Center Freq}**

Activates the center frequency function, which allows you to set the horizontal center of the display to a specified frequency.

## Start Frequency

Key access: **[FREQ] > {Start Freq}**

Sets the frequency at the left side of the graticule. The left and right sides of the graticule correspond to the start and stop frequencies. When these frequencies are activated, their values are displayed below the graticule in place of center frequency and span.

## Stop Frequency

Key access: **[FREQ] > {Stop Freq}**

Sets the frequency at the right side of the graticule. The left and right sides of the graticule correspond to the start and stop frequencies. When these frequencies are activated, their values are displayed below the graticule in place of center frequency and span.



## CF Step

Key access: [FREQ] > {CF Step}

Changes the step size for the center frequency function. Once a step size has been selected and the center frequency function is activated, the arrow keys change the center frequency by the step-size value. The step size function is useful for finding harmonics and sidebands beyond the current frequency span of the analyzer. When auto-coupled, the center size is set to one division (10 percent of the span).

## Channel Std.

Key access: [FREQ] > {Channel Std.}

The Channel Standard softkey is a shortcut to load a factory-preset standard file (\*.STD) which is located in system memory as default. The standard file list includes most communication protocol standards which is used in several countries. Please refer to "Loading a file" on page 67 for how to recall a file.

## Freq Offset

Key access: [FREQ] > {Freq Offset}

Allows you to input a frequency offset value that is added to the frequency readout of the marker, to account for frequency conversions external to the analyzer. Offset entries are added to all frequency readouts including marker, start frequency, and stop frequency. Offsets are not added to the span or frequency count readouts. Entering an offset does not affect the trace display.

## Marker

Accesses the marker control softkeys to select the type and number of markers. Markers are diamond-shaped characters that identify points of traces. Up to six pairs of markers may appear on the display simultaneously; only one pair can be controlled at a time. The marker that is controlled is called the “active” marker. Pressing **[MARKER]** activates the Normal menu key.

## Marker

Key access: **[MARKER]** > **{Marker}**

Selects one of the six possible markers. A marker that has already been selected will become active when it is turned on. If a marker has been turned on and assigned to a specific trace, it will become active on that trace if that marker is selected.

## Marker Trace

Key access: **[MARKER]** > **{More}** > **{Marker Trace}**

Activates a marker on the trace if there are no markers turned on. If a marker is currently active, press **Marker Trace** until **1**, **2**, **3**, or **4** is underlined. The active marker will be moved to the selected trace.

Selecting **Auto** will move the marker to the automatically selected trace. The selection order is to look for the lowest numbered trace in the following order of trace modes:

Clear write	Max hold
Min. hold	View

If there is no trace in any of these modes, it selects trace 1 as default.

## Mode

### Normal

Key access: [MARKER] > {Normal}

Activates a single frequency marker at the center of the active trace if a marker is not already displayed. If a marker is displayed before the **Normal** function is enabled, the marker is enabled at the position of the selected marker. The marker number is indicated above the marker. The knob and/or arrow keys move the marker left or right. If a value is entered from the numeric keypad, the marker is moved to the trace point nearest to that value. Annotation in the active function block and in the upper right corner indicates the frequency and amplitude of the marker (time and amplitude, if in zero span.) Pressing **Normal** turns off the **Delta** function and moves the active marker to the delta marker position.

### Delta

Key access: [MARKER] > {Delta}

Activates a second marker at the position of the first marker. (If no marker is present, two markers appear at the center of the display). The amplitude and frequency (or time) of the first marker is fixed. The marker number is indicated above the delta marker, and the same number is indicated with an R (for example, 1R) above the reference marker. Use the data controls to position the delta marker. Annotation in the active function block and in the upper-right corner of the display indicates the frequency (or time) and amplitude differences between the two markers. The markers will be turned off if the scale type is changed between log and linear.

**NOTE**

Pressing **Delta** again moves the reference marker to the active marker position, so you are allowed to make delta measurements from differing reference points without having to turn off the makers and begin again.

## 5 Key Reference

### NOTE

The delta marker function permits signal-to-noise measurements provided the signal is a single spectral component (sinusoid). Place a normal marker on the signal, press **Delta**, place the delta marker in the noise, and activate Marker Noise. The indicated amplitude indicates signal-to-noise/Hz.

---

### Delta Pair

Key access: [MARKER] > {Mode}

Enters a mode that allows adjustment of both the **Ref** (start) and **Delta** (stop) markers independently. Pressing **Delta Pair**, toggles between the reference and delta markers. The start marker number is indicated with a number and an R above the marker (for example, 1R) and the delta marker is indicated with a marker number. This mode is useful in functions such as **Band Power**.

### NOTE

Ref and Delta markers maintain their displayed x-axis location, but not their frequency values when you change a parameter that redefines the x-axis scale. Reset these markers when parameters such as Span or Center Freq are changed.

---

### Span Pair

Key access: [MARKER] > {Mode}

Enters a mode that allows adjustment of both the ref and delta markers. Pressing **Span Pair**, toggles between the span and center markers. The start marker number is indicated with a number and an R above the marker (for example, 1R) and the stop marker is indicated with a marker number. Adjusting the span changes the frequency difference between the two markers while maintaining the midpoint between the two markers at a fixed frequency. Changing the center changes the center point between the two markers while maintaining the frequency difference. This mode is useful in functions such as **Band Power**.

## Off

Key access: [MARKER] > {Mode}

Turns off the active function markers.

## Marker To

Accesses the following marker function menu keys:

- **To Center**

Key access: [MARKER] > {To Center}

Sets the center frequency of the analyzer to the marker frequency. In Delta mode, pressing [Marker] > {Marker To} > {To Center} sets the center frequency to the marker delta value. The function is not available in zero span.

- **To Start**

Key access: [MARKER] > {Marker To}

Changes the start frequency so that it is equal to the frequency of the active marker. In Delta mode, **To Start** sets the start frequency to the marker delta value. **To Start** is not available in zero span.

- **To Stop**

Key access: [MARKER] > {Marker To}

Changes the start frequency so that it is equal to the frequency of the active marker. In Delta mode, **To Stop** sets the stop frequency to the marker delta value. **To Stop** is not available in zero span.

- **To Reference**

Key access: [MARKER] > {Marker To}

Changes the reference level to the active marker value, moving the marked point to the reference level (top line of the graticule). In Delta mode, pressing [Marker] > {Marker To} > {To Reference} sets the reference level to the amplitude difference between the markers.

### Function

Key access: [MARKER] > {Function}

Accesses the following menu keys that allows you to change the active marker readout mode.

#### Normal

Activates the default readout mode.

#### Counter

Activates a frequency counter mode.

#### Noise

Activates a noise readout mode for evaluating power density.

#### Band Power

Indicates the power over that part of the trace between the reference and active markers.

#### Demod

Activates the demodulation mode.

#### Demod Setting

Accesses the menu keys to select **AM** demodulation, **FM** demodulation or demodulation **Off**. It also accesses the **Speaker Vol**, and **Delay Time** menu keys described below.

### Marker Table

Key access: [MARKER] > {Marker Table}

Compresses the graticule and displays the marker number, trace number, marker type, X axis value, and the amplitude in the table. demodulation. In zero span, demodulation is performed (and can be heard) throughout the sweep.

## Read Out

Key access: [MARKER] > {More} > {Read Out}

Accesses the following menu keys that allow you to change the active marker readout. This function is only available in non-zero span.

### Frequency

Sets the marker to **Frequency**. The default selection in non-zero spans, displays the absolute frequency of a normal marker or the frequency of the delta marker relative to the reference marker.

### Period

Sets the marker readout to **Period**. Displays the reciprocal of the above frequency.

### Time

ets the marker readout to **Time**. The default selection in zero span, displays the time interval between a normal marker and the start of the sweep or the time of the delta marker relative to the reference marker.

## All Off

Key access: [MARKER] > {More} > {All Off}

Turns off all of the markers, including markers used for signal track and demodulation. The marker annotation is also removed.

# Peak

Place a marker on the highest peak based on the setting of the search criteria as follows:

### Peak

Key access: [**Peak**]

Place a marker on the highest peak.

### Next Left Peak

Key access: [**Peak**] > {**Next Left PK**}

Moves the marker to the next peak to the left of the current marker. The signal peak must exceed the peak threshold value by the peak excursion value. If there is no peak to the right, the marker will not move and the **No Peak Found** error message will appear on the display.

### Next Right Peak

Moves the marker to the next peak to the right of the current marker. The signal peak must exceed the peak threshold value by the peak excursion value. If there is no peak to the right, the marker will not move and the **No Peak Found** error message will appear on the display.

Key access: [**Peak**] > {**Next Right PK**}

### Pk-Pk Search

Key access: [**Peak**] > {**Pk-Pk Search**}

Finds and displays the frequency (or time, if in zero span) and amplitude differences between the highest and lowest trace points.

### Continuous PK

Key access: [**Peak**] > {**Continuous Pk**}

When a marker is placed on a signal and **Continuous Pk (On)** is pressed, the marker will remain on the



signal even if the signal frequency changes, as long as the amplitude of the signal does not change by more than 3 dB from one sweep to another.

If the signal is lost, an attempt will be made to find it again and maintain the marker on the signal peak. If there are other signals on screen near the same amplitude, one of them may be found instead. Signals near 0 Hz cannot be maintained effectively, because they cannot be distinguished from the LO feedthrough, which is excluded by intent from the search algorithm.

### Peak Table

Key access: [Peak] > {More} > {Peak Table}

- **Peak Table**

Displays a list of up to ten signal peaks that is updated at the end of each sweep. The peaks can be sorted in order by descending amplitude or by ascending frequency. Peaks above or below the display line can be excluded from the table. The peak table function works with trace 1 only.

- **Export Table to CSV**

Press this softkey to save the current peak table to a CSV file for your data analysis on PC.

### Peak Criteria

Key access: [Peak] > {More} > {Peak Criteria}

Accesses the following menu keys.

- **Peak Threshold**

Sets the minimum amplitude of signals that the marker can identify as a peak.

- **Peak Excursion**

Sets the minimum amplitude variation of signals that the marker can identify as a peak.

- **Peak Type**

Toggles the peak search marker on highest peak and lowest peak.

# MEAS

Hardkey menu access.

In spectrum analysis mode, pressing **[MEAS]** brings up the menu for a suite of power measurements such as adjacent channel power, occupied bandwidth, and channel power.

## OBW

Occupied Bandwidth (OBW) integrates the power of the spectrum in the displayed green frame. The measurement defaults to 99% of the occupied bandwidth power.

Occupied bandwidth measurement are made in either single or continuous sweep mode.

### Selecting a Method

Press **[MEAS] > {OBW} > {Method}** to toggle the occupied bandwidth measurement mode between **percentage (%)** and **dBc**.

- Setting Percentage (%)

Press **{OBW} > {Method} > {Percent}** to edit the percentage of signal power used when determining the occupied bandwidth. Press **{%}** to set the percentage ranging from 10.00% to 99.99%.

- Setting dBc

Press **{OBW} > {Method} > {dBc}** to specify the power level used to determine the emission bandwidth as the number of dB down from the highest signal peak, within the occupied bandwidth span. This function is an independent calculation from the OBW calculation. The x dB bandwidth result is also called the emissions bandwidth (EBW). This sets the green frame (f1 and f2 are the two cross points of the signal and the pair of vertical lines of the displayed green frame) to your specified dB value below the maximum power, and compute the total power in the frame. The emission bandwidth is then calculated ranging from 0.1 dB to 100 dB (the default value is set to 26 dB).

## ACPR

The adjacent channel power ratio (ACPR) measures the power ratio between the main channel power and the adjacent channel power.

ACPR measures the total power (RMS voltage) in the specified channel. The measurement result reports the ratios of the two adjacent channel powers to the main channel power.

### Center Frequency

Key access: [MEAS] > {ACPR} > {Center Freq}

Sets the center frequency of the main channel power.

### Main Channel

Key access: [MEAS] > {ACPR} > {Main Channel}

Specifies the range of integration used in calculating the power in the main channel. Use the knob, the arrow keys, or the numeric keypad to set the bandwidth.

### Adjacent Channel

Key access: [MEAS] > {ACPR} > {Adj Channel}

Specifies the range of integration used in calculating the power in the adjacent channel. Use the knob, the arrow keys, or the numeric keypad to set the bandwidth.

### Channel Space

Key access: [MEAS] > {ACPR} > {Channel Space}

Sets the space value between the center frequency of main channel power and that of the adjacent channel power.

## Channel Power

Channel power function measures the power and power spectral density in the channel bandwidth specified. One pair of vertical lines of the displayed green frame indicates the edges of the channel bandwidth. The center frequency, reference level, and channel bandwidth must be set by the user. The power calculation method used to determine the channel power is a traditional method known as the integration bandwidth (IBW) method. A swept spectrum is used as the basis for this calculation. Therefore, it is important to set the resolution bandwidth correctly before making this measurement using the following formula:

$$RBW = k \times \frac{Span}{n}$$

Where k is a value between 1.2 and 4.0 and n is the number of trace points.

### Center Frequency

Key access: **[MEAS] > {Channel Power} > {Center Freq}**

Sets the center frequency of the display.

### Integration Bandwidth

Key access: **[MEAS] > {Channel Power} > {Int BW}**

Specifies the bandwidth of integration bandwidth, which can range from 100 Hz to 3 GHz to calculate the power in a channel. For example, set the main (center) channel bandwidth. The green frame indicates the integration bandwidth.

### Channel Bandwidth

Key access: **[MEAS] > {Channel Power} > {Channel BW}**

Sets the analyzer span for the channel power measurement using the knob, the arrow keys or the numeric keypad. Be sure the span is set between 1 and 10 times the integration bandwidth.

## Spectrum Monitor

### Spectrogram Run/Pause

Key access: [MEAS] > {Spectrum Monitor}

Toggles the spectrogram monitoring between **Run** and **Pause**.

### Restart Meas

Key access: [MEAS] > {Spectrum Monitor}

Resets the spectrogram display.

### Update Interval

Key access: [MEAS] > {Spectrum Monitor}

Enables you to set the interval of time to update data to 1 or more seconds. Or, you may set it to automatically determine the Update Interval that provides the maximum data collection speed.

A data sample is taken every time interval for display on the spectrogram. Increasing the update time allows data capturing over a longer period of time in the spectrogram.

### Spec View

Key access: [MEAS] > {Spectrum Monitor}

Enables you to view the details in the captured spectrogram. when the Spectrogram is running, Pressing {Spec View} pauses the running spectrogram.

Press {Home}/{End} to view the first /last spectrogram in cache.

Press {Playback} to playback the spectrogram process. The direction and the Update interval is changeable as your need.

### Palette

Key access: [MEAS]> {Spectrum Monitor}

Toggles the spectrogram color mode between full color and gray scale.

### Disp Mode

Key access: [MEAS]> {Spectrum Monitor}

Allows you to set the spectrogram display mode as trace, spectrogram or both trace and spectrogram.

### File Logging

Key access: [MEAS]> {Spectrum Monitor} > {File Logging}

Accesses the submenu for spectrogram file operation.

- **Start/Stop Save**

This softkey allow you to start or stop the automatic save function. Once the spectrogram measurement frames reached the file size set in the {File Size}, a file (\*.SPE or \*.CSV) will be automatically saved, and the spectrogram measurement will restart.

**NOTE**

The save process takes a few seconds to read from cache. During this period, the measurement is paused.

- **Timed Setting**

This submenu allows you to configure automatic time save function. You can set start date, time, stop date, time in this menu. Press {Timed Save On}, the analyzer will start the auto-saving function from the **Start Time**.

- **File Type**

Toggles the saved file type between trace and CSV.

- **File Path**

Allocate the path where the file is saved.

- **File Size**

Set the number of frames for the spectrogram trace file. The allowed input range is 200 to 1500 frames.

## MODE

Pressing [**Mode**] activates the softkey menus to select the measurement mode of your analyzer. The measurement modes are:

- Spectrum Analyzer
- Tracking Generator
- Power Meter

### Spectrum Analyzer

Key access: [**MODE**] > {**Spectrum Analyzer**}

Select the spectrum analyzer mode, and press [**ENTER**] to make the spectrum analysis and measurement.

### Tracking Generator

Key access: [**MODE**] > {**Tracking Generator**}

Select this mode, and press [**ENTER**] to make specified measurement with tracking generator. When selected, the Meas softkey menu for the tracking generator mode will appear.

#### Amplitude

Key access: [**MODE**] > {**Tracking Generator**} > {**Amplitude**}

Activates (**On**) or deactivates (**Off**) the output power of the tracking generator. The power level can then be adjusted using the numeric keypad, arrow keys, or knob. Pressing any digit, 0 through 9, on the numeric keypad brings up the selected terminator menu.

### CAUTION

Power-level sensitive devices connected to the tracking generator output may be accidentally damaged. This is because the actual source amplitude will be greater than the amplitude indicated on the analyzer, when the power sweep function is being used. The source amplitude value is used as the starting amplitude for a power sweep. The ending amplitude for a power sweep is higher than the source amplitude value and it may actually be set to values beyond specified output levels. Therefore, exercise caution when connecting a power-level sensitive device to the tracking generator output.

### NOTE

When Amplitude (Off) is selected, the output attenuation on the N9342C is set to the maximum attenuation.

### Amptd Step

Key access: [MODE] > {Tracking Generator }

Allows you to set the step size of the power level range of the tracking generator. The default setting is one vertical scale division when in a logarithmic amplitude scale.

### Amptd Offset

Key access: [MODE]>{Tracking Generator}

Offsets the displayed power of the tracking generator. Using the amplitude offset capability of the tracking generator allows you to take system losses or gains into account, thereby displaying the actual power delivered to the device under test.

### Normalize

Key access: [MODE]>{Tracking Generator }

- **Store Ref (1 → 4)**

Copies trace 1 into trace 4. **Store Ref (1 → 4)** must be pressed before pressing **Normalize (On)**. If **Normalize (On)** is pressed before **Store Ref (1 → 4)**,



the error message: *Store reference trace before turning on Normalize (On)* is displayed in the status line, however Normalize has been activate.

- **Normalize**

**Normalize(On)** activates the normalize function. On each sweep, the normalized trace (Trace 4) is subtracted from Trace 1 and the result is added to the normalized reference level. The display shows the result of the following calculation:

$$\text{Trace 1} - \text{Normalized Trace} + \text{Normalized Reference Level}$$

The trace data is normalized with respect to the normalized reference level, even if the value of the normalized reference level is changed. This function remains in effect on all subsequent sweeps until it is turned off.

**NOTE**

Segmented sweep is not available when **Normalize (On)** is selected. Trace 1 should be in clear write mode prior to setting normalize to on.

The normalize function is useful for applying correction data to a trace while making a stimulus response measurement using a tracking generator. Normalize will compensate for irregularities of the components used in the test setup, isolating the performance of the DUT. For example, connect the cables and use a thru line in place of the device (DUT) to be measured, between the tracking generator and the analyzer input. Notice that the frequency response is not perfectly flat, showing the response of the cables, as well as the flatness of both the tracking generator and the analyzer. Now press **Store Ref (1→ 4)**, **Normalize On**. Notice that the displayed trace is now flat, or normalized. The position of the normalized trace can now be moved to a different position on the display by changing the normalized reference position. This may be useful if the device to be tested has positive gain,

## 5 Key Reference

such as an amplifier. Now replace the thru line with the device under test, and an accurate measurement of the gain or loss can be made.

- **Norm Ref Lvl**

Sets the level (in dB) of the normalized reference.

- **Norm Ref Posn**

Offsets the displayed trace without affecting the instrument gain or attenuation settings. This allows the displayed trace to be moved without decreasing measurement accuracy.

- **Ref Trace**

Allows you to view or blank the reference trace on the display.

## Power Meter

Key access: [MODE] > {Power Meter}

Use the arrow keys to highlight the mode.

Select this mode, and press [ENTER] to make a measurement using the power meter function. When selected, the Power Meter softkey menu will be displayed and many of the instrument hardkeys will be disabled as they are not necessary for this mode.

### Zeroing

Key access: [MODE] > {Power Meter}

Access the associated Zeroing submenu.

- **Zeroing**

Make a Zero operation of the power sensor.

The U2000 Series USB Power Sensors have their sensor calibration tables stored in non-volatile memory which means that the reference calibration factor is automatically loaded upon power-up.

- **Zero Type**

Toggles the zeroing type of the Power Sensor between internal and external. When this type is set to **EXT**, pressing **Zeroing** will bring up a message which indicates the external signal need be pulled out. This setting is not affected by the preset in Power Meter menu.

## Meas Disp

Key access: [MODE] > {Power Meter}

Access the Meas Disp submenu for defining the display range and resolution while in Power Meter mode.

- **Disp Range**

Access the associated Disp Range submenu.

- **Auto Range**

Toggles the auto range function between On and Off. When the **Auto Range** is set to On, the Top and Bottom value of the power meter's display range will be set automatically according to the measurement data:

Top = Max. data + 0.5

Bottom = Min. data - 0.5

The default setting is Off.

- **Top**

Set the top value of the power meter' display range.

Range from (Bottom + 0.01) to 200 dBm.

The default value is 20 dBm.

- **Bottom**

Set the bottom value of the power meter' display range.

Range from -200 to (Top - 0.01) dBm.

The default value is -70 dBm.

- **Resolution**

Access the associated Resolution submenu.

When the measurement suffix is W or %, this parameter represents the number of significant digits. When the measurement suffix is dB or dBm, 1 through 4 represents 1, 0.1, 0.01, and 0.001 dB respectively.

The default value is 3.

- **Disp Mode**

Change the display mode between Meter and Chart.

The default mode is Meter.

- **Chart View**

Access the Chart View submenu. This soft key is disabled when the measurement is in process or if the display mode is set to Meter.

This submenu is used to view the measurement chart.

- **Home**

View the first 21 points of current measurement chart.

- **End**

View the lastest 21 points of current measurement chart.

- **Prev**

View the previous points of the chart.

- **Next**

View the next points of the chart.

- **Continue/Pause**

Continues or pauses the current measurement. When the measurement is in process, this softkey is displayed as “Pause”; when the measurement is paused, the softkey is displayed as “Continue”.

## Meas Setup

Key access: [MODE] > {Power Meter}

Accesses the Meas Disp submenu which is used to configure the measurement settings.

- **Freq**

Sets a frequency between 1 kHz and 90.0 GHz using the numeric keypad, arrow key or knob. If the frequency does not correspond directly to a frequency in the sensor calibration table, the power sensor calculates the calibration factor using linear interpolation.

- **Power Range**

Accesses the **Power Range** submenu.

- **Auto Range**

Enables and disable auto ranging. When auto ranging is ON, the power sensor selects the best measuring range for the measurement. When auto ranging is OFF, the power sensor remains in the current range and may be manually set by the user.

- **Range**

Selects the Lower or Upper of power ranges when the Auto Range is Off.

- **Limits**

Accesses the **Limits** submenu.

- **Limits**

Enables or disables the limit function.

- **Upper Limit**

Sets a value of the upper test limit for the current measurement. The units used are dependent on the current setting of power unit. When the measured power is greater than the value specified, a failure will be reported.

- **Lower Limit**

Sets the lower test limit value for the current measurement. The units used are dependent on the current setting of power unit. When the measured power is less than the value specified, a failure will be reported.

- **Limit Beep**

Enables or disables the limit beep.

- **Rel/Offset**

Accesses the **Rel/Offset** submenu.

- **Rel**

Enables the comparison of a measurement result to a reference value and sets a reference value on the current measured data.

- **Offset**

Sets a value of the display offset on the current measurement, and enable or disable the display offset. The display offset is applied to the measurement signal after any math calculation.

- **Average**

Accesses the **Average** submenu.

- **Average**

Enables or disables the **Average** function.

- **Avg Count**

Sets a value of the filter length and to set the average count value to be Auto or Manual.

The power sensor automatically sets the number of readings averaged together to satisfy most power measurements averaging requirements. The number of average readings depends on the resolution and the power level settings the power sensor is currently using.

- **Step Detect**

Enables or disables step detection. In AUTO filter mode, the average of the last four values entered into the filter is compared to the entire filter average. If the difference between the two

averages is greater than 12.5%, the digital filter is cleared. The filter will then start storing new measurement data. This feature shortens the filter time required when the input power changes substantially. Note that the result appears to settle faster, although true settling to the final value is unaffected.

- **Meas Interval**

Sets the interval time between two measurements. The default value is 100 ms.

### **Preset**

Key access: [MODE] > {Power Meter}

Sets the power meter softkey menu options to the preset conditions. For example, the upper and lower limits are set to their preset limit values.

# SPAN

This hardkey accesses the softkey submenu of span functions. Pressing **[SPAN]** allows you to change the frequency range. The frequency-span readout describes the total displayed frequency range. To determine frequency span per horizontal graticule division (when in linear frequency scale type), divide the frequency span by 10.

## Span

Key access: **[SPAN] > {Span}**

Enter a frequency span range value.

## Full

Key access: **[SPAN] > {Full}**

Changes the span to the full frequency range of the analyzer.

## Zero

Key access: **[SPAN] > {Zero}**

Changes the frequency span to zero. In this mode, the current center frequency is displayed in the time domain (the x axis is displayed in units of time), like a conventional oscilloscope.

## Last Span

Key access: **[SPAN] > {Last Span}**

Sets the span to the previous span setting.



## Trace

Accesses the trace keys to store and manipulate trace information. Each trace comprises a series of data points in which amplitude information is stored. The analyzer updates the data for any active trace with each successive sweep.

### Trace

Key access: [TRACE] > {Trace}

Selects the trace (1-4) for current use.

### Clear Write

Key access: [TRACE] > {Clear Write}

Erases any previously stored trace data and continuously updates the display during following sweeps of the analyzer. This function is activated for trace 1 at power on and factory preset.

### Max Hold

Key access: [TRACE] > {Max Hold}

Maintains the displayed maximum level for each trace point of the selected trace. A trace point is updated if a new maximum level is detected in successive sweeps.

**NOTE**

Changing the vertical scale (**Amplitude, Scale Type, Log or Line**), or pressing **PRESET**, or turning averaging on (**TRACE, Average (On)**) or switching widow in Zone Span restarts the held trace.

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### Minimum Hold

Key access: [TRACE] > {Min Hold}

Maintains the minimum level for each trace point of the selected trace, and updates each trace point if a new minimum level is detected in successive sweeps.

**NOTE**

Changing the vertical scale (**Amplitude, Scale Type, Log or Line**), or pressing **PRESET**, or turning averaging on (**TRACE, Average (On)**) or switching widow in Zone Span restarts the held trace.

---

### View

Key access: [TRACE] > {View}

Holds and displays the amplitude data of the selected trace. The trace register is not updated as the analyzer sweeps. If a trace is deactivated by pressing **Blank**, the stored trace data can be retrieved by pressing **View**.

### Blank

Key access: [TRACE] > {Blank}

Stores the amplitude data for the selected trace and removes it from the display. The selected trace register will not be updated as the analyzer sweeps. This function is activated for traces 2, 3 and 4 at power-on and **Factory Preset**.

### Detector

Key access: [TRACE] > {More} > {Detector}

Selects a specific detector type, or allows the system to auto select the appropriate detector for a measurement.

For every trace point displayed, there is a finite time during which the data for that point is collected. The analyzer has the ability to look at all

of the data evaluated during that time and present a single point of trace data based on the detector mode. We call the interval during which data for that trace point is being collected, the “bucket”. Thus a trace is more than a series of single points. It is actually a series of trace “buckets”. The data may be sampled many times within each bucket.

- **Normal**

Selects the maximum and minimum video signal values alternately. When selecting the normal detector, “N” appears in the upper-left corner.

- **Average**

Measures the average value of the amplitude across each trace interval (bucket). When **Average** is selected, “A” appears on the upper-left corner.

- **Pos Peak**

Obtains the maximum video signal between the last display point and the present display point and stores this value in memory. It is used primarily when measuring sinusoidal (spectral) components. When **Positive Peak** is selected, “P” appears in the upper-left corner.

- **Sample**

Primarily used to display noise (or noise-like) signals. It should not be used to measure the accurate amplitude of non noise-like signals.

In sample mode, the instantaneous signal value at the present display point is placed in memory. When Sample detector is selected, “S” appears in the upper-left corner of the display.

- **Neg Peak**

Similar to peak detector, but selects the minimum video signal value. Not to be used to measure the most accurate amplitude. When in **Negative Peak** mode, an “N” also appears in the upper-left corner.

## Average

Key access: [TRACE] > {More} > {Average}

Initiates a digital averaging routine that averages the trace points in a number of successive sweeps resulting in trace “smoothing”. Increasing the average number will further smooth the trace. For the information of the type of averaging please refer to “Avg Type” on page 75.

The average is restarted when any of the following occurs:

- A new average number is entered.
- Any related parameter (e.g., center frequency) is changed.

Press **Average (Off)** to turn off averaging.

The number of sweeps can only be set using the numeric keypad, not the knob or arrow keys.

## Average Dura.

Key access: [TRACE] > {More}

Initiates a digital averaging routine that averages the trace points in an average duration resulting in trace “smoothing”. Increasing the average duration will further smooth the trace. For the information of the type of averaging please refer to “Avg Type” on page 75.

The average is restarted when any of the following occurs:

- A new average duration is entered.
- Any related parameter (e.g., center frequency) is changed.
- {Avg Restart} is pressed

Press **Average Dura. (Off)** to turn off averaging.

## Limit

### Limit Type

Key access: [Limit] > {Limit Type}

Defines the limit you are editing as either an upper or lower limit. An upper limit fails if trace 1 exceeds the limit. A lower limit fails if trace 1 falls below the limit.

### Limit Line

Key access: [Limit] > {Limit Line}

Activates an adjustable horizontal line that is used as a visual reference line.

The limit line, used for trace arithmetic, has amplitude values that correspond to its vertical position when compared to the reference level. The value of the display line appears in both the active function block and on the left side of the display. The arrow keys, knob, or numeric keypad may be used to adjust the display line. Pressing any digit, 0 through 9, on the numeric keypad brings up the selected terminator menu. To deactivate the display line, press **Display Line (Off)**.

## Limits

Key access: [Limit] > {Limits}

Turns on the limit pattern function and turns off the limit line function simultaneously.

### Limits Edit

Key access: [Limit] > {Limits Edit}

Allows you to set a limit pattern for measurements.

You can edit limit points, limit table and limit offset for your limit pattern.

## 5 Key Reference

Press **X Axis Unit** to toggle the frequency domain or time domain before you set the parameter of limit point.

### Margin

Key access: [**Limit**] > {**Margin**}

Turns Margin On to set a limit line offset for the selected limit line. Either **Limit** or **Margin**, must be turned on for a limit test to work.

### Save Limits

Key access: [**Limit**] > {**Save Limits**}

Saves the parameters of the current limit pattern in a file (\*.LIM).

Enter the user defined filename using the numeric keypad and press [**ENTER**] as a terminator.

Number, alpha characters and underline are all valid components of a filename.

### Recall Limits

Key access: [**Limit**] > {**Recall Limits**}

Recalls files previously saved containing the limit parameters that may be frequently used for test purposes.



## 5 Error Messages

This chapter contains Error Message information and definitions used by the analyzer.

### Overview

If an improper operation occurs during the instrument configuration, a message will appear on the status line indicating the incident and the how the spectrum analyzer corrected the setting automatically. press [**System**] > {**System Info**} > {**Error History**} to read the specific descriptions of those messages.

### Example

In this example, a failure explanation is generally included with each error to further define its meaning. The instrument messages in this guide are listed numerically.

<Time>	<Code>	<Message>
07.01 15:48	[F] -330	No matched module
		This message indicates no matched measurement or mode found.
		<Explanation in manual>

**NOTE**

A symbol [F] at the beginning of an error message indicates this is an error caused by manual front panel operation. A symbol [R] at the beginning of an error message indicates this is an error caused by remote control mode.

---



## Error Message List

Please refer to the error messages list table as below to find the corresponding message description:

Error Code	Error Message	Description
0	No error	
-410	Query INTERRUPTED	Indicates that a condition causing an INTERRUPTED query occurred (see IEEE 488.2, 6.3.2.7)
-350	Query overflow	Indicates the SCPI remote interface error queue overflowed.
-321	Out of memory	Indicates an internal operation needed more memory than that was available.
-224	Illegal parameter value	Indicates you sent a parameter for this command that is NOT allowed.
-223	Too much data	Indicates a legal program data element of block, expression or string type was received that contained more data than the device could handle due to related device-specific requirements or memory.
-222	Data out of range	Indicates a legal data was parsed but could not be executed because of the interpreted value was outside the legal range defined by the analyzer. The displayed results may be clipped.
-220	No matched module	Indicates no matched measurement or mode found.
-200	Execution error	This is a generic execution error for devices that cannot detect more specific errors. The code indicates on those execution errors defined in IEEE 488.2, 11.5.1.1.4 has occurred.
-171	Invalid expression	Indicates the data element was invalid, for example, unmatched parentheses, or an illegal character.

## 5 Error Messages

Error Code	Error Message	Description
-144	Character data too long	Indicates the character data contained more than 12 characters. (see IEEE 488.2, 7.7.1.4)
764	Unable to save file	Indicates a failure occurred while saving a file. The file was not saved.
762	Unable to load file	Indicates a failure occurred while loading a file. The file was not loaded.
612	File NOT found	Indicates the analyzer could not find the specified file.
173	Lame package, please upgrade firmware	Indicates the current firmware is not mostly updated. The firmware needs upgrading.
172	Option install fail, invalid option licence	Indicates the option could not be installed, because of the invalid option licence.
171	File loaded	Indicates the file loading succeeded.
170	The menu is unavailable in this case	Indicates the memo is invalid in this case.
166	Marker counter opened in fast sweep	Indicates the counter's accuracy decreases when in fast sweep mode.
162	Cannot open fast sweep in this case	Indicates current settings do not allow you to open fast sweep. For example, currently in FFT, zero span, or any measurement in power suite does not allow fast sweep.
156	Incorrect alignment file on flash	Indicates an invalid alignment file.
153	RF EEPROM operate fail	Indicates an error when writing alignment file.
152	Alignment file oversize	Indicates the alignment file has error or invalid data.
151	DSP boot fail	Indicates the analyzer cannot process measurement currently, wait the analyzer to reboot. If analyzer froze, try to restart the analyzer.

Error Code	Error Message	Description
150	Mixer overload	Indicates the first mixer in danger. Either increase input attenuation or decrease the input signal level.
149	Mixer saturate	Indicates you need to either increase the input attenuation or decrease the input signal level.
147	Incorrect alignment data in EEPROM	Indicates invalid alignment data occurred.
143	Final IF overload	Indicates you need to either increase the input attenuation or decrease the input signal level.
138	USB device NOT ready	Indicates the USB device is not detected.
136	RBW limit to 30 kHz when in fast sweep	Indicates the analyzer automatically couple the RBW to 30 kHz when in fast sweep mode.
130	Meas uncal	Indicates the measurement is uncalibrated due to fast sweeping through a narrow RBW filter. Check the sweep time, span, and bandwidth settings, or use auto coupling.
119	RF Board Changed	Indicates the RF board was changed, the analyzer needs re-load the alignment data.
116	Cannot communicate with RF	Indicates the MCU cannot find the RF board.

## 5 Error Messages



## 6 Troubleshooting

This chapter includes information on how to check for a problem with your Agilent Technologies spectrum analyzer, and how to return it for service.

If you experience a problem or would like additional information about your analyzer, Agilent Technologies' worldwide organization is ready to provide the support you need.



### Check the basics

This section includes information on how to check for a problem with your Agilent spectrum analyzer, and how to return it for service.

If you experience a problem or would like additional information about your analyzer, Agilent Technologies' worldwide organization is ready to provide the support you need.

**WARNING** No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

---

- Before calling Agilent Technologies, or returning an analyzer for service, perform the quick checks listed below. This check may eliminate the problem.
- Is there power at the receptacle?
- Is the analyzer turned on? Listen for internal fan noise to determine if the analyzer cooling fan is running. Feel the rear side of the analyzer for air flow.
- If other equipment, cables, and connectors are being used with your spectrum analyzer, make sure they are connected properly and operating correctly.
- Review the measurement procedures being performed when the problem first appeared. Make sure all of the settings are correct.
- If the analyzer is not functioning as expected, return the analyzer to a known state by pressing **Preset (Default Preset Type)**.
- Is the measurement being performed, and the results that are expected, within the specifications and capabilities of the analyzer? Refer to the *Technical Overview* for your analyzer.
- Is the analyzer displaying an error message? If so, refer to “[Error Messages](#)” on page 113.

- To meet specifications, the analyzer must be aligned. For more information on how to align the analyzer, refer to “[Perform a Time Base Calibration](#)” on page 23.

**NOTE**

If the analyzer is still under warranty or is covered by a maintenance contract, it will be repaired under the terms of the warranty or plan (the warranty is located at the front of this manual).

If the analyzer is no longer under warranty or is not covered by an Agilent Technologies maintenance plan, Agilent Technologies will notify you of the cost of the repair after examining the analyzer.

---

If a problem persists, please contact the Agilent Technologies office for further information and service.

## Warranty and Service Options

Agilent N9342C handheld spectrum analyzer provides 1-year return-to-Agilent warranty as standard. Besides, we offers several optional maintenance plans to service your analyzer after the warranty has expired:

**R-51B-001-3C** extends this service to 3 years.

**R-50C-011-3** Agilent calibration upfront support plan, 3-year coverage.

The calibration cycle of N9342C Handheld spectrum analyzer is one year.

## Contact Agilent Technologies

Agilent has Sales and Service Offices around the world to provide you with complete support. Go to <http://www.agilent.com/find/assist> for help with:

- product selection, configuration, and purchases.
- technical and application assistance, and consulting.
- rental and leasing options, and refurbished equipment.
- repair, calibration, education and training.

If you do not have access to the internet, call the appropriate number shown below. Or contact your local Agilent Technologies Sales and Service Office.

<b>United States</b>	(tel) 800 829 4444 (fax) 800 829 4433
<b>Canada</b>	(tel) 877 894 4414 (fax) 800 746 4866
<b>Latin America</b>	(tel) +1 (305) 269 7500
<b>China</b>	(tel) 800 810 0189 (fax) 800 820 2816
<b>Korea</b>	(tel) 080 769 0800 (fax) 080 769 0900
<b>Japan</b>	(tel) +81 426 56 7832 (fax) +81 426 56 7840
<b>Taiwan</b>	(tel) 0800 047 866 (fax) 0800 286 331
<b>Europe</b>	(tel) +31 20 547 2111
<b>Australia</b>	(tel) 1 800 629 485 (fax) +61 (3) 9210 5947
<b>Other Asia Pacific Countries</b>	(tel) +65 6375 8100 (fax) +65 6755 0042 Email: <a href="mailto:tm_ap@agilent.com">tm_ap@agilent.com</a>



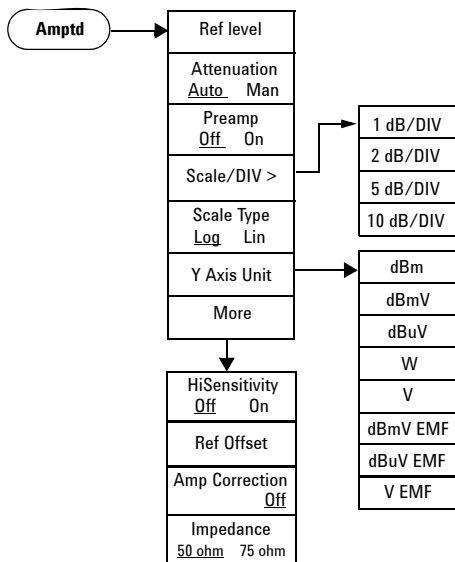


## 7 Menu Map

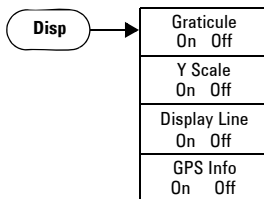
This chapter contains menu maps that visually present the menus and submenus that are accessed by pressing the Hardkeys and Softkey menu selections in the instrument. This is a quick reference guide for the experienced user.



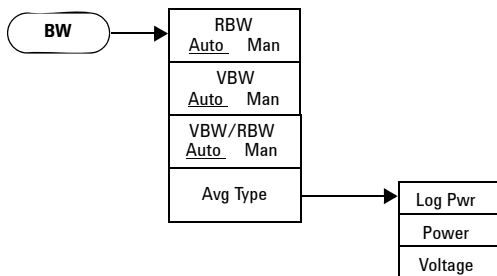
## Amptd



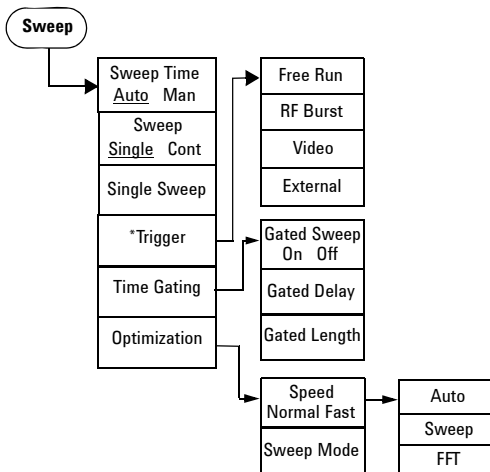
## Display



## BW

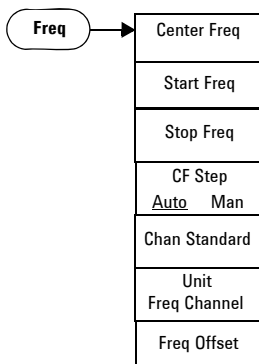


## Sweep

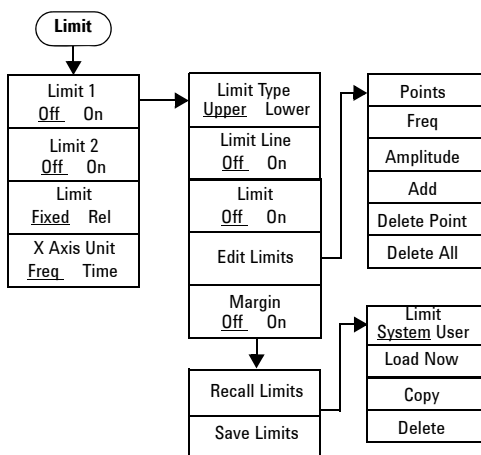


\*The trigger menu is available when span is set to zero span.

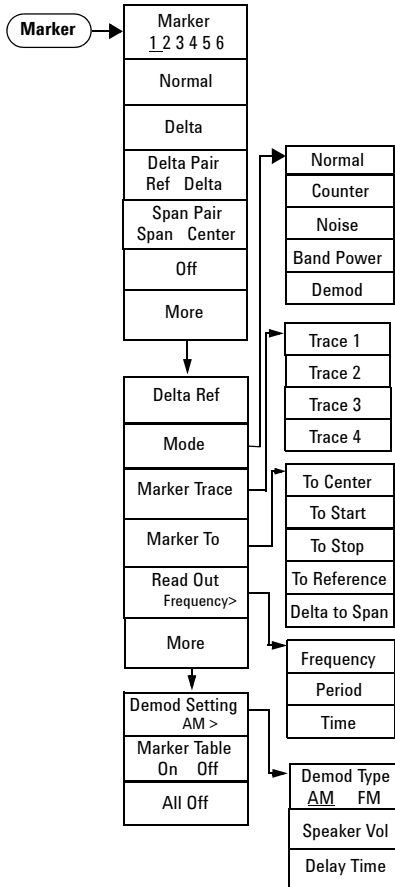
## FREQ



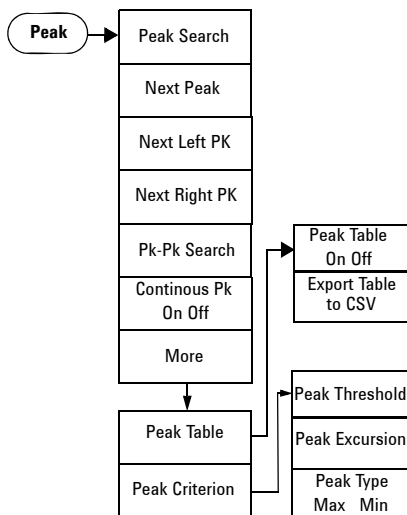
## Limit



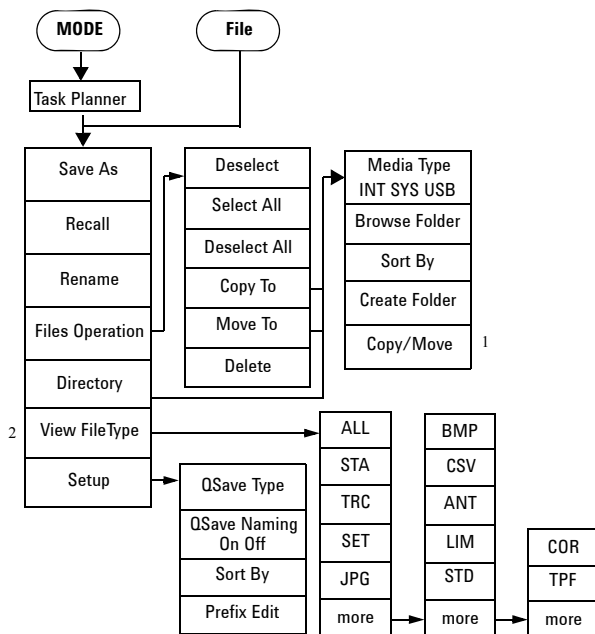
## Marker



## Peak



## File/Mode - Task Planner



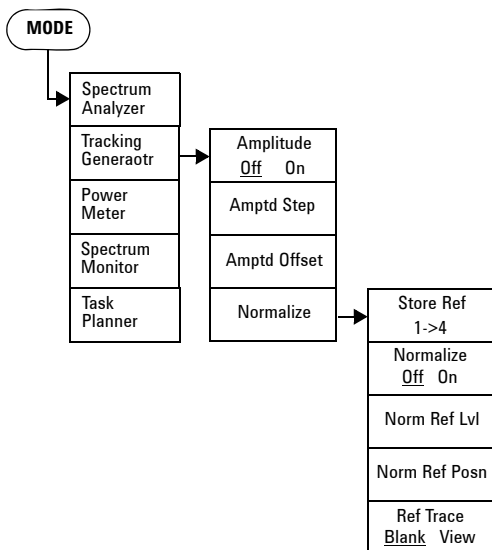
1

\*The softkey *Copy/Move* only exists in the submenu of *Copy To/Move To*.

2

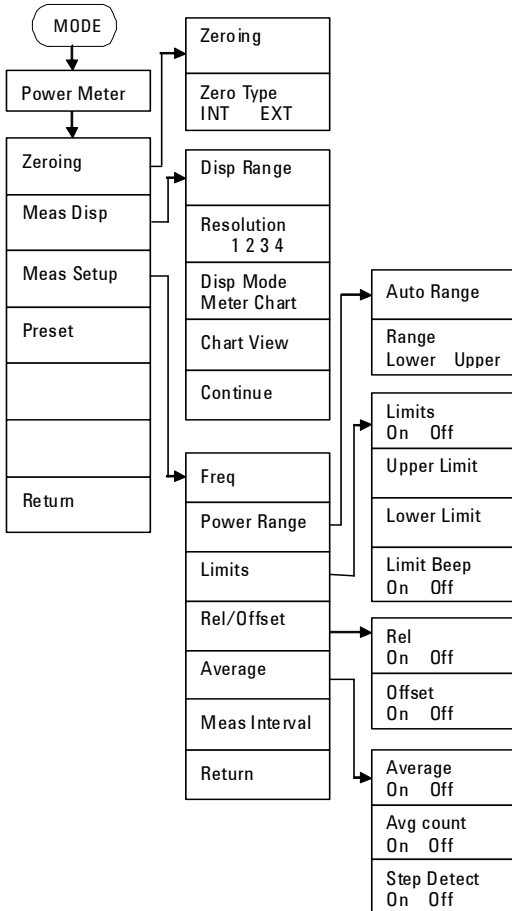
\*The softkey *View FileType* is fixed as TPF in Task Planner Mode.

## Mode - Tracking Generator

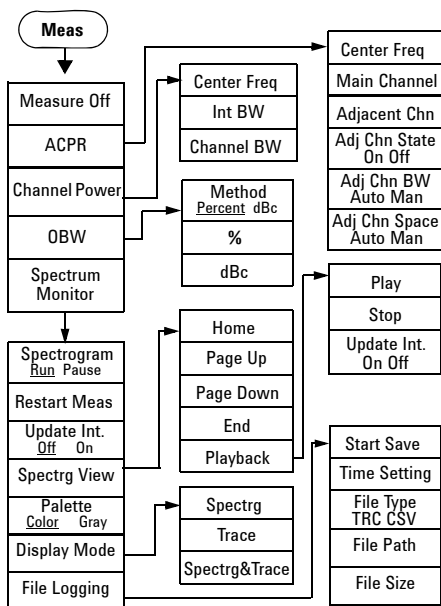




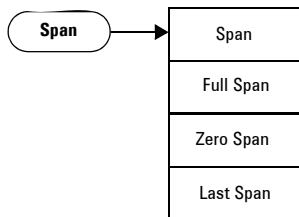
## Mode - Power Meter



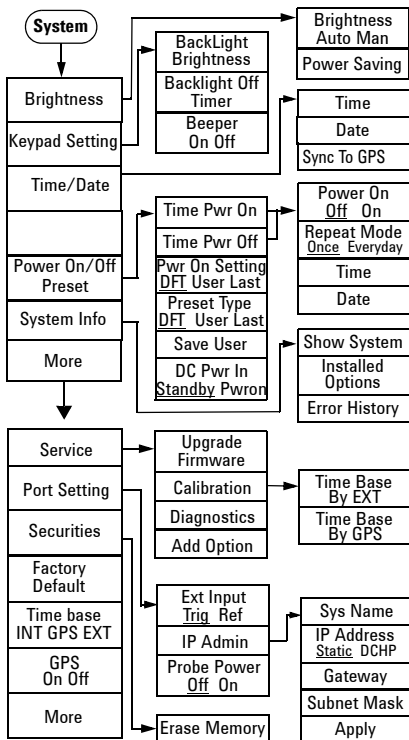
## Meas



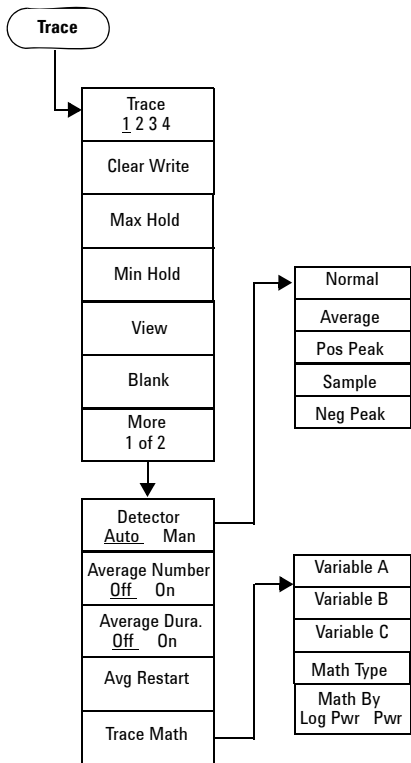
## Span



## System



# Trace



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