Keysight U8903B Audio Analyzer

Performance audio analyzer

KEYSIGHT TECHNOLOGIES

User's Guide

Notices

Manual Part Number

U8903-90045

Edition

Edition 1, November 2014

Printed in Malaysia

Keysight Technologies
Bayan Lepas Free Industrial Zone,
11900 Penang, Malaysia

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CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

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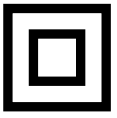
A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Alternating current (AC)
	Off (mains supply)		On (mains supply)
	Caution, risk of electric shock		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Earth (ground) terminal		Frame or chassis (ground) terminal
	Protective earth (ground) terminal		Equipment protected throughout by double insulation or reinforced insulation

Safety Considerations

Read the information below before using this instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards for design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

- Do not use the device if it is damaged. Before you use the device, inspect the casing. Look for cracks or missing plastic. Do not operate the device around explosive gas, vapor, or dust.
- Always use the device with the cables provided.
- Observe all markings on the device before establishing any connection.
- Turn off the device and application system power before connecting to the I/O terminals.
- When servicing the device, use only the specified replacement parts.
- Do not operate the device with the cover removed or loosened.
- Use only the power adapter provided by the manufacturer to avoid any unexpected hazards.
- This equipment is under measurement category as below:
  DO NOT CONNECT THE CABLE TO MAINS.

  Maximum working voltage: 200 Vp for altitude up to 3000 m
  Maximum transient voltage: 1210 V
- Do not measure more than the rated voltage (as marked on the device).

CAUTION

- If the device is used in a manner not specified by the manufacturer, the device protection may be impaired.
- Always use dry cloth to clean the device. Do not use ethyl alcohol or any other volatile liquid to clean the device.
- Do not permit any blockage of the ventilation holes of the device.

Environmental Conditions

The U8903B is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental condition	Requirement
Temperature	Operating condition – 0 °C to 55 °C Storage condition – –40 °C to 70 °C
Humidity	Operating condition – 50% to 95% RH at 40 °C (non-condensing) Storage condition – Up to 95% RH at 40 °C (non-condensing)
Altitude	Up to 3000 m
Pollution degree	2
Installation category	II
Measurement category	I (refer to "**Measurement Category**" on page 392)

Regulatory Information

The U8903B complies with the following safety and Electromagnetic Compatibility (EMC) compliances:

Safety compliance

- IEC 61010-1:2010/EN 61010-1:2010
- Canada: CAN/CSA-C22.2 No. 61010-1-12
- USA: ANSI/UL Std. No. 61010-1 (3rd Edition)

EMC compliance

- IEC 61326-1:2005/EN61326-1:2006
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004

Regulatory Markings

CE ICES/NMB-001 ISM GRP 1-A	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives. ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.	C US	The CSA mark is a registered trademark of the Canadian Standards Association.
	This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.		The RCM mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
 MSIP-REM-ATI-WCAUD8903B	This symbol is a South Korean Class A EMC Declaration. This is a Class A instrument suitable for professional use and in electromagnetic environment outside of the home.		This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.

Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit www.keysight.com/environment/product for more information.

Declaration of Conformity (DoC)

The Declaration of Conformity (DoC) for this instrument is available on the Keysight Web site. You can search the DoC by its product model or description at the Web address below.

http://www.keysight.com/go/conformity

NOTE If you are unable to search for the respective DoC, contact your local Keysight representative.

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1 Getting Started

This chapter teaches you how to set up the U8903B for the first time. A summary of all the features of the U8903B is also given.

Introduction

The U8903B is a digital signal processing (DSP)-based audio measurement system with a frequency measurement range of 10 Hz to 96 kHz or 1.5 MHz depending on the installed option. The U8903B basic configuration has two channels of analog audio generator and two channels of analog audio analyzer.

The standard option for the U8903B audio analyzer is Option STD. The U8903B can be further expanded with additional analog analyzer channels and digital audio interfaces like the AES3, SPDIF, and Digital Serial Interface (DSI). Refer to "**U8903B Options**" on page 33 for more information on the available U8903B options.

The U8903B is capable of performing a wide range of audio parameter measurements on both analog audio and digital audio interfaces. Up to four measurement functions can be performed simultaneously on the analog audio. Measurement functions can be performed simultaneously on the analog audio and digital audio interfaces such as analog audio + AES3/SPDIF, analog audio + DSI, and AES3/SPDIF + DSI. The U8903B also supports industrial standard instrument connectivity such as GPIB, USB, and LAN. In addition, the U8903B is equipped with frequency, phase, time, and FFT graph analysis, as well as sweep capability for frequency and amplitude.

The U8903B also allows you to create test sequences. Refer to **Chapter 7**, "Test Sequence Application" for more information.

To search for firmware updates for the U8903B, go to the Keysight U8903B firmware update Web site at www.keysight.com/find/audioanalyzer_firmware.

LXI Standard 1.4 Compliant Audio Analyzer

The U8903B audio analyzer is a LAN eXtension for Instrumentation (LXI) Standard 1.4 compliant (Standard Core) instrument, developed using LXI Technology. LXI is an instrument standard for devices that use the Ethernet (LAN) as their primary communication interface.

Hence, it is an easy-to-use instrument especially with the usage of an integrated Web browser that provides a convenient way to configure the instrument's functionality.

Installation and Configuration

Initial inspection

When you receive your U8903B, inspect the unit for any obvious damage such as broken terminals or cracks, dents, and scratches on the chassis that may occur during shipment. If any damage is found, notify the nearest Keysight Sales Office immediately.

Keep the original packaging in case the U8903B has to be returned to Keysight in the future. If you return the U8903B for service, attach a tag identifying the owner and model number. Also, include a brief description of the problem.

Ventilation

The U8903B can operate within the temperature range of 0 °C to 55 °C. The U8903B is cooled by drawing air through the sides and bottom at the front of the U8903B, and exhausting it through the ventilation holes on the sides and top at the rear of the U8903B. The U8903B must be installed in a location that allows sufficient space at the top, sides, and rear for adequate air circulation.

Rack mounting

The U8903B can be mounted in a standard 19-inch rack. Rackmount kits are available as Option 908. Support rails are also required for rack mounting. These are normally supplied with the rack and are not included with the rackmount options.

If you are installing an instrument on top of the U8903B, ensure that the instrument does not obstruct the ventilation holes at the top of the U8903B. If required, use a filler panel above the U8903B to ensure adequate space for air circulation.

Standard Shipped Items

Verify that you have received the following items. If anything is missing or damaged, please contact the nearest Keysight Sales Office.

- U8903B Audio Analyzer
- Power cord
- USB cable
- Certificate of Calibration
- Safety Notices

Optional Accessories

The following accessories are available for purchase separately.

Table 1-1 U8903B optional accessories

Option	Description
U8903B-101	Male BNC to male BNC cable (1.2 m)
U8903B-102	Male BNC to male RCA cable (2 m)
U8903B-103	Male XLR to female XLR cable (2 m)
U8903B-104	Digital serial interface cable
U8903B-105	Digital self-test kit, 25-pin D-SUB
U8903B-106	Male XLR to male BNC cable (0.26 m)
U8903B-107	Female XLR to male BNC cable (0.26 m)
U8903B-108	BNC accessory kit
U8903B-109	Rackmount kit

U8903B Options

Table 1-2 U8903B options

Option	Description
U8903B-STD	– 2 channels (analog generator) – 2 channels (analog analyzer)
U8903B-AN4	– 2 channels (analog generator) – 4 channels (analog analyzer)
U8903B-AN8	– 2 channels (analog generator) – 8 channels (analog analyzer)
U8903B-DGT	Digital audio card
U8903B-AUX	– 2 monitor outputs – 1 auxiliary output (DC)
N3431A	Wide bandwidth option - 1.5 MHz (fixed perpetual license). This is only available for channel 1 and channel 2 analog analyzer.
N3432A	Perceptual Objective Listening Quality Analysis (POLQA) measurement software (fixed perpetual license).
N3433A	POLQA and Perceptual Evaluation of Speech Quality (PESQ) measurements software (fixed perpetual license).
N3434A	AES3, SPDIF, and DSI digital audio interfaces (fixed perpetual license).
N3435A	AES3 and SPDIF digital audio interfaces (fixed perpetual license).
N3436A	DSI digital audio interface (fixed perpetual license).

Product at a Glance

Front panel

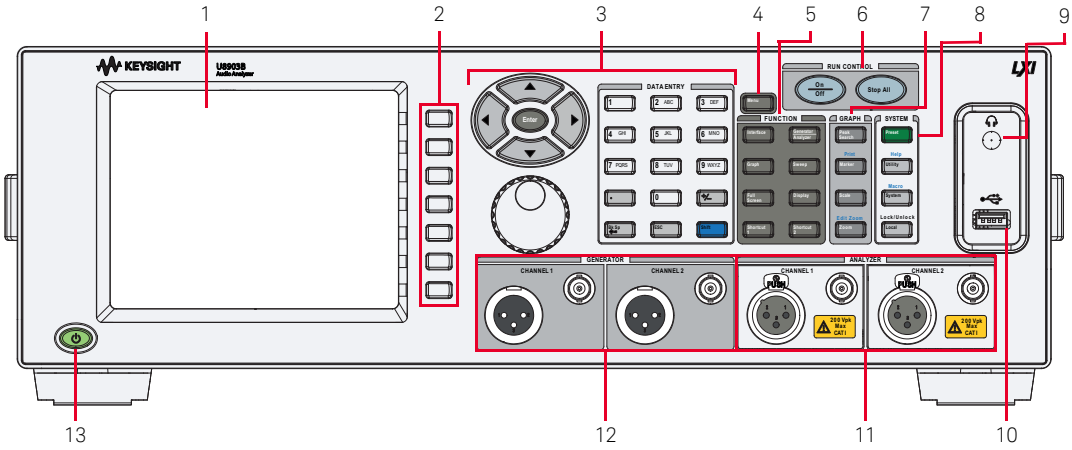


Figure 1-1 U8903B front panel

Table 1-3 U8903B front panel description

	Item	Description
1	LCD display	Provides information on the current function including status indicators, settings, and error messages. Refer to "**LCD display**" on page 38 for more information.
2	Softkeys 1 to 7	Activates the functions displayed on the LCD display next to the respective softkeys.
3	Navigation and DATA ENTRY panels	The navigation and DATA ENTRY panels consist of the arrow keys, Enter key, knob, and data entry keys. Refer to "**Navigation and DATA ENTRY Panels**" on page 52 for more information.
4	Menu key	Displays the available U8903B mode of operation. – Standard View – Test Seq App – HP8903B
5	FUNCTION panel	Enables access to the U8903B main functions.
6	Run control panel	Press **On/Off** to turn on or off signal generation or measurements for the selected generator or analyzer channel respectively. Press **On/Off** to start or stop the graph generation. Press **On/Off** to start or stop the sweep. Press **On/Off** to start or stop the test sequence. Press **Stop All** to stop all generator and test sequence operations. Refer to "**RUN CONTROL Panel**" on page 85 for more information.
7	GRAPH panel	Enables access to the U8903B commonly used graph functions. Refer to "**GRAPH Panel**" on page 61 for more information.

Table 1-3 U8903B front panel description (continued)

	Item	Description
8	SYSTEM panel	Enables access to the U8903B system functions. Refer to "**SYSTEM Panel**" on page 71 for more information.
9	Headphone jack	The headphone jack can be operated in stereo or mono mode. Refer to "**Input Configuration (Analog Analyzer)**" on page 206 for more information.
10	USB port	Allows an external USB flash storage to be connected to the U8903B.
11	Analog analyzer input	Receives analog audio signal using a female XLR input connector for balanced signal and a female BNC input connector for unbalanced signal. The input connectors are available for each channel.
12	Analog generator output	Outputs analog audio signal using a male XLR output connector for balanced signal and a female BNC output connector for unbalanced signal. The output connectors are available for each channel.
13	Power key	Turns on or off the U8903B.

Rear panel

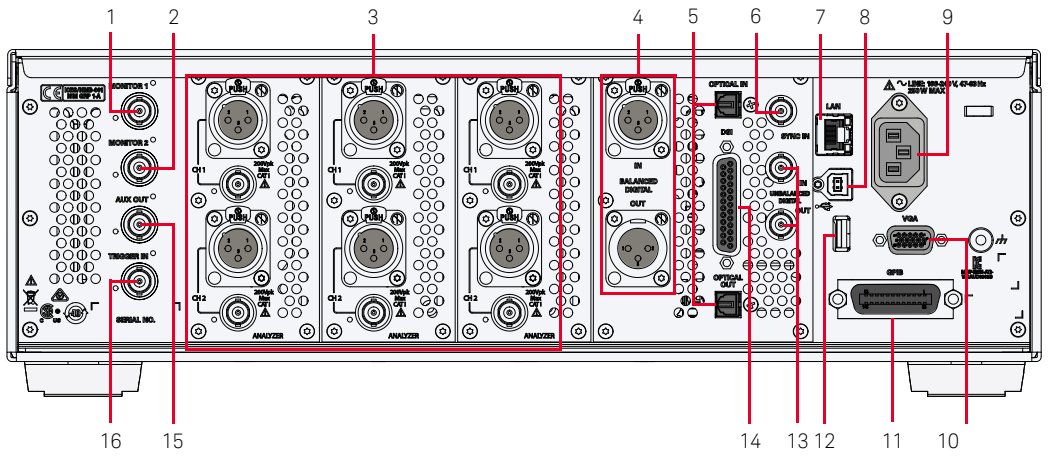


Figure 1-2 U8903B rear panel

Table 1-4 U8903B rear panel description

	Item	Description
1	Monitor 1	This is only applicable for option U8903B-AUX. Outputs a scaled signal of the analog analyzer channels 1, 3, 5, and 7 input signals. The scaled signal can then be connected to an external amplifier or other measurement instruments.
2	Monitor 2	This is only applicable for option U8903B-AUX. Outputs a scaled signal of the analog analyzer channels 2, 4, 6, and 8 input signals. The scaled signal can then be connected to an external amplifier or other measurement instruments.
3	Analog analyzer input (channels 3 to 8)	This is only applicable for options U8903B-AN4 and U8903B-AN6. Receives analog audio signal using a female XLR input connector for balanced input and a female BNC input connector for unbalanced input. There are up to 6 analog input channels available. The input connectors are available for each channel.
4	Digital analyzer input and output (AES3)	This is only applicable for option U8903B-DGT. Receives and outputs digital audio signal using a female XLR input connector and a male XLR output connector respectively.
5	Digital analyzer input and output (SPDIF)	This is only applicable for option U8903B-DGT. Receives and outputs digital audio signal using a TOSLINK input connector and a TOSLINK output connector respectively.
6	Sync in	This is only applicable for option U8903B-DGT. Receives an external sync in clock/frame signal using a female BNC input connector (for digital audio only).
7	LAN port	Allows the U8903B to be controlled remotely over the LAN interface.
8	USB port (type B)	Allows the U8903B to be controlled remotely over the USB interface.

Table 1-4 U8903B rear panel description (continued)

	Item	Description
9	AC power port	Connects to an AC line voltage.
10	VGA port	Allows an external monitor to be connected to the U8903B.
11	GPIB port	Allows the U8903B to be controlled remotely over the GPIB (General Purpose Interface Bus) interface.
12	USB port	Allows an external USB flash storage to be connected to the U8903B.
13	Digital analyzer input and output (AES3/SPDIF)	This is only applicable for option U8903B-DGT. Receives and outputs digital audio signal using a female BNC input connector and a female BNC output connector respectively.
14	Digital analyzer input and output (DSI)	This is only applicable for option U8903B-DGT. Receives and outputs digital audio signals using a 25-pin female D-SUB connector.
15	AUX port	This is only applicable for option U8903B-AUX. Outputs a variable DC voltage (0.5 V to 5.1 V, up to 100 mA). The AUX port can be used to power test devices, as a trigger, or control external hardware.
16	Trigger in	Receives an external TTL signal using a female BNC input connector for triggering operation. Triggering can occurs on either the positive or negative edge.

CAUTION

- Connect the TOSLINK cable straight into the TOSLINK connector.
- DO NOT force the cable in or connect at an angle. Failing to do so may cause damage to the TOSLINK connector.

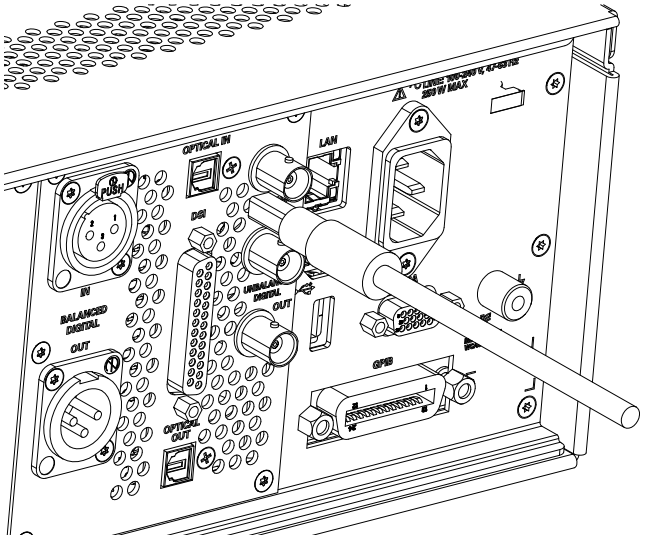


Figure 1-3 Connect the TOSLINK cable straight into the connector

LCD display

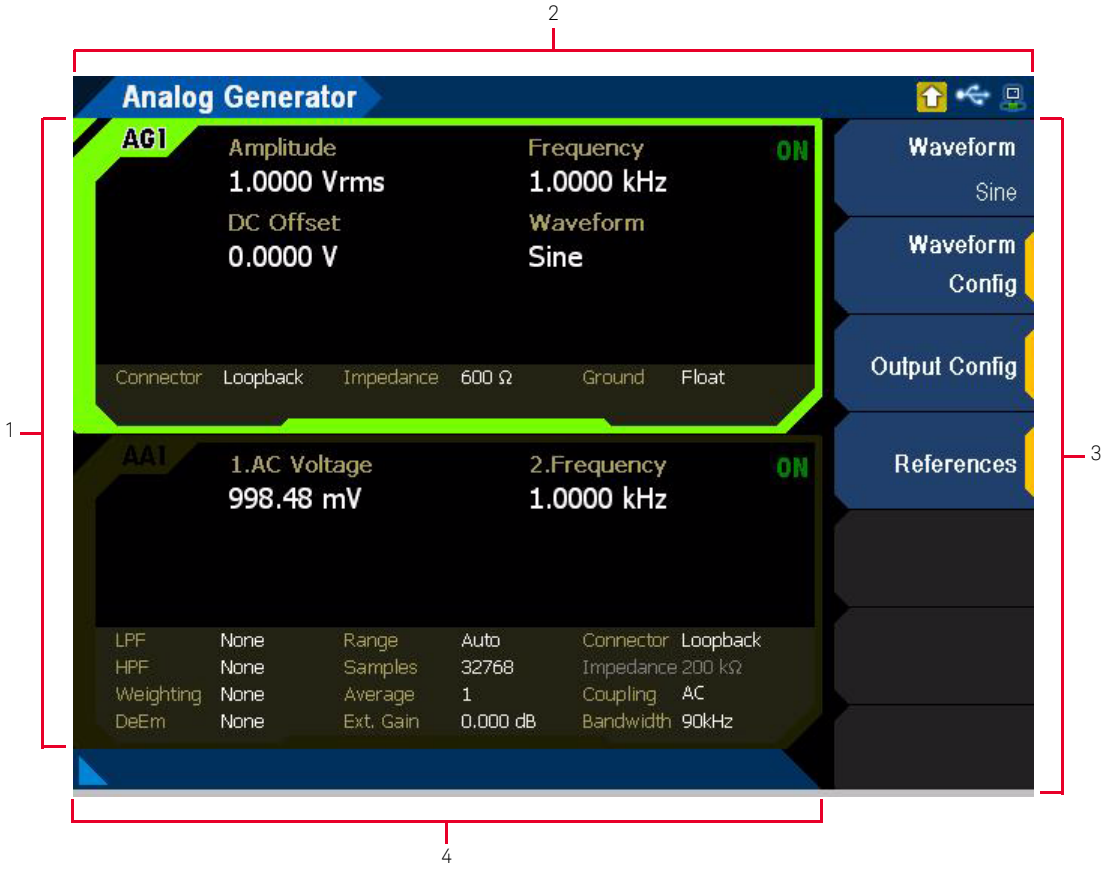


Figure 1-4 U8903B LCD display

Table 1-5 U8903B LCD display description

	Item	Description
1	Main display	Displays the available U8903B modes and functions. – AG1/AG2: Analog generator channel 1 or 2. – AA#: Analog analyzer channel (1, 2, 3, 4, 5, 6, 7, or 8). – DG1/DG2: Digital generator channel 1 or 2. – DA1/DA2: Digital analyzer channel 1 or 2.
2	Title bar	– Displays the name of the current active menu in the main display. – Displays the following icons. – LAN connected – LAN disconnected – LAN conncted with error – LXI front panel turned on – External USB flash storage connected – Shift function – Remote control mode – Front panel keys locked – Help mode – Warning – Fan(s) malfunctioned – Memory buffer
3	Softkeys panel	Displays a maximum of 7 softkey menu options for the selected panel.
4	Status bar	Displays the status of an action such as information, warning, or error messages.

NOTE Refer to "**Display mode**" on page 59 for more information on the U8903B display layout.

Getting Started

Power on the U8903B

Connect one end of the power cord to the U8903B rear panel AC power inlet and the other end to an AC voltage source. The U8903B will automatically adjust to the correct line voltage in the range of 100 VAC to 240 VAC.

Preset the U8903B

A preset will set the U8903B to a default state. It does not affect the I/O configuration, calibration data, system configurations (time, date, model number, and serial number), and license information. Refer to "**Appendix Q: DSI Input and Output Interface**" on page 517 for more information.

To preset the U8903B, you can perform either one of the following steps.

- Send the `*RST`, `SYSTem:PRESet`, `SYSTem:PRESet:TYPE`, or `SYSTem:RESet[:MODE]` SCPI command from the PC via the USB, GPIB, or LAN interface.
- Press 

on the SYSTEM panel.

NOTE For more information on preset, refer to "**SYSTEM Panel**" on page 71.

Access the help mode

The U8903B help mode provides you quick access to the operating information by displaying the description of all the front panel keys and current softkeys.

To activate or deactivate the U8903B help mode, press Shift on the DATA ENTRY panel and Help Utility on the SYSTEM panel.

NOTE When the U8903B help mode is activated, the front panel keys will not execute their normal functions when pressed.

An example of a help mode is shown in **Figure 1-5**. The help mode icon will appear at the top-right of the title bar. Refer to **Figure 1-5** for more information on the help mode icon. Press the front panel keys or the current menu page softkeys to display the respective information.

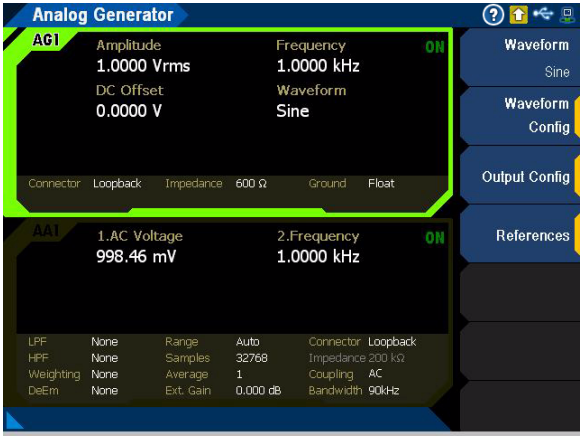


Figure 1-5 Help mode

Update the U8903B

The U8903B firmware update file can be obtained from the Keysight U8903B firmware update Web site at www.keysight.com/find/audioanalyzer_firmware.

Perform the following procedure to update the U8903B firmware.

1 Save the firmware update files in an external USB flash storage.

2 Connect the external USB flash storage to the U8903B.

3 Press Macro System on the SYSTEM panel.

4 From the System menu page, press the **Update** softkey. The Update menu page is displayed as shown in **Figure 1-6**.

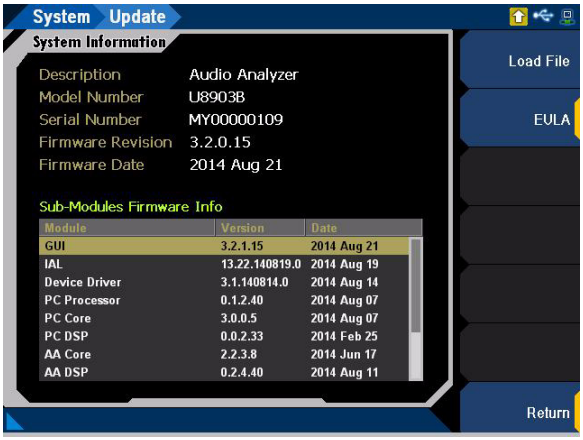


Figure 1-6 System > Update menu page

Table 1-6 System > Update menu page

Menu	Description
Load File	Press the **Load File** softkey to load the update files. The Recall menu page will be displayed to select the source location. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
EULA	Press the **EULA** softkey to display the U8903B EULA (End User License Agreement) page.

5 Press the **Load File** softkey and the recall menu page is displayed to enable you to select the source location.

6 Select the firmware file to be updated, and press the **Recall** softkey as shown in **Figure 1-7**. Refer to "**Recall**" on page 87 for more information on the Recall menu page.

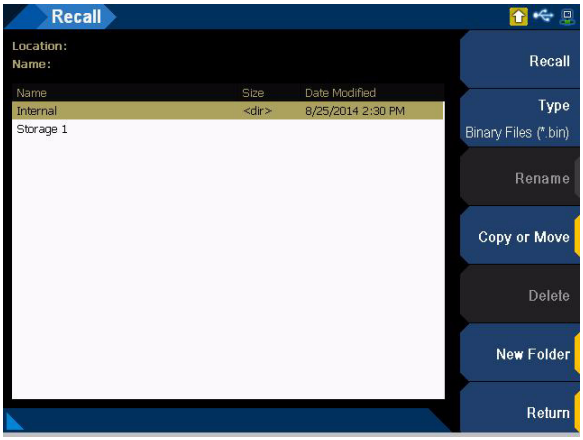


Figure 1-7 Recall menu page

NOTE The System menu page is only available in the Standard mode. Refer to "**Menu Key**" on page 54 for more information on the U8903B available modes.

CAUTION The firmware update process may take 20 minutes to 40 minutes to complete. DO NOT power off the U8903B.

Perform self-test

Perform the following procedure to run the U8903B self-test.

1 Press Macro System on the SYSTEM panel.

2 From the System menu page, press the **Service** softkey.

3 From the Service menu page, press the **Self-Test** softkey. The Self-Test menu page is displayed as shown in **Figure 1-8**.

4 Press the **Customize Test** softkey to select the desired tests.

5 Press the **Run Test** softkey to run the slected tests.

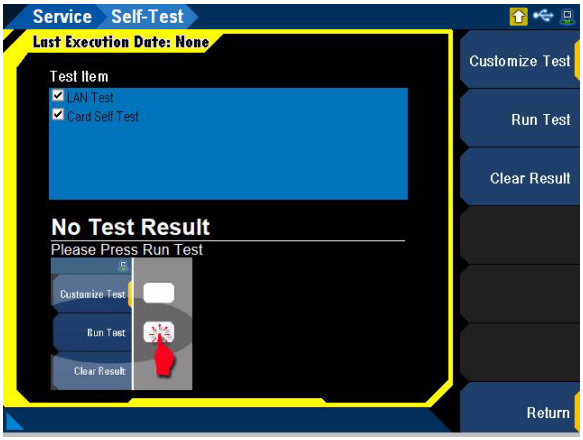


Figure 1-8 System > Service > Self-Test menu page

Table 1-7 System > Service > Self-Test menu page

Menu	Description
Customize Test	Press the **Customize** softkey to select or deselect the desired tests. – LAN Test – Card Self Test
Run Test	Press the **Run Test** softkey to run the selected tests.
Clear Result	Press the **Clear Result** softkey to clear the previous self-test results. The self-test results are saved in the system memory.

NOTE The System menu page is only available in the Standard mode. Refer to "**Menu Key**" on page 54 for more information on the U8903B available modes.

Add or remove U8903B options

Perform the following procedure to add U8903B options.

1 Press 

on the SYSTEM panel.

2 From the System menu page, press the **Service** softkey.

3 From the Service menu page, press the **Options** softkey. The Options menu page is displayed as shown in **Figure 1-9**.

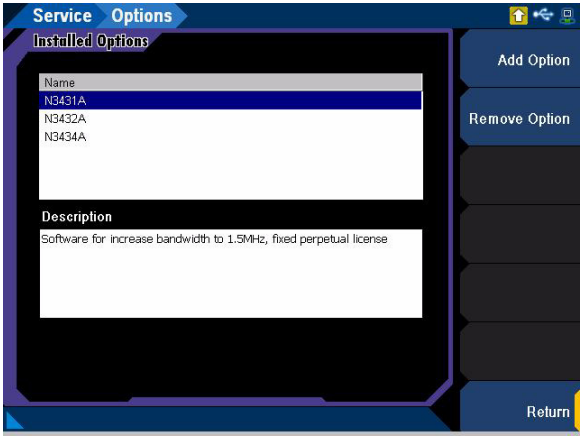


Figure 1-9 System > Service > Options menu page

Table 1-8 System > Service > Options menu page

Menu	Description
Add Option	Press the **Add Option** softkey to load the U8903B option file. The Recall menu page will be displayed to select the source location.
Remove Option	Press the **Remove Option** softkey to remove the selected U8903B option.

4 Press the **Add option** softkey and the Recall menu page is displayed to enable you to select the U8903B option file.

5 Select the U8903B option file to be loaded, and press the **Recall** softkey as shown in **Figure 1-10**.

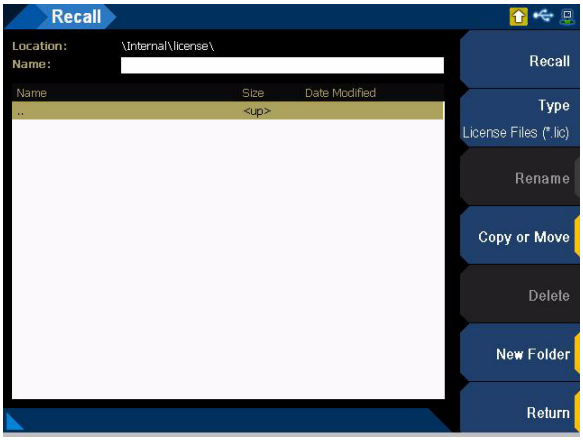


Figure 1-10 Recall menu page

NOTE Restart the U8903B after adding a new U8903B option file.

Perform the following procedure to remove U8903B options.

1 Select the U8903B option to be removed from the list.

2 Press the **Remove option** softkey to remove the U8903B option as shown in **Figure 1-9**.

NOTE The System menu page is only available in the Standard mode. Refer to "**Menu Key**" on page 54 for more information on the U8903B available modes.

2 Operation and Features

This chapter describes the test capabilities, key features, and the front panel operation of the U8903B.

Test Capabilities

The U8903B is capable of testing a broad range of audio-related devices and components for research and development, manufacturing, and quality assurance applications. Examples of the products that can be tested are listed follows.

- Multichannel home theater systems
- Audio amplifiers, as a complete product or at the component level
- Portable audio playback devices such as MP3 players
- Speakers (require third-party accessories such as microphones and power amplifiers)
- PC audio cards
- Audio components

The U8903B performs the following two basic functions.

- Audio signal generation
- Audio signal analysis

The U8903B basic configuration has two channels of analog generator and two channels of analog analyzer which enables the U8903B to test devices with stereo capability. The U8903B is also able to generate and analyze digital audio interfaces like AES3, SPDIF, and DSI with the available options as listed in “**U8903B Options**” on page 33.

U8903B Block Diagram

Analog audio interface

Signal generation

A simplified U8903B analog generator block diagram is shown as follows.

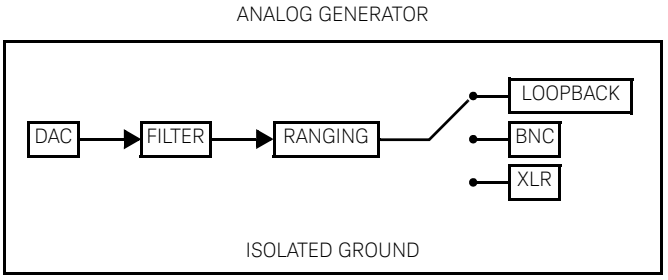


Figure 2-1 U8903B analog generator block diagram

The Digital Signal Processing (DSP) generates all the required waveforms, except for square wave, digitally. The digital waveform data is streamed realtime into the 24-bit Digital-to-Analog Converter (DAC) where it is converted to voltage and sent to the output conditioning block to be amplified or attenuated to the required amplitude. Finally, the waveform is routed through either the balanced (XLR) or unbalanced (BNC) output signal connectors to the Unit-Under-Test (UUT). The output can also be fully floating or have the output grounded to the instrument ground. There is also a loopback facility where the analog generator can be connected onto the systems internal analog bus and routed to the analog analyzer.

Measurement

A simplified U8903B analog analyzer block diagram is shown as follows.

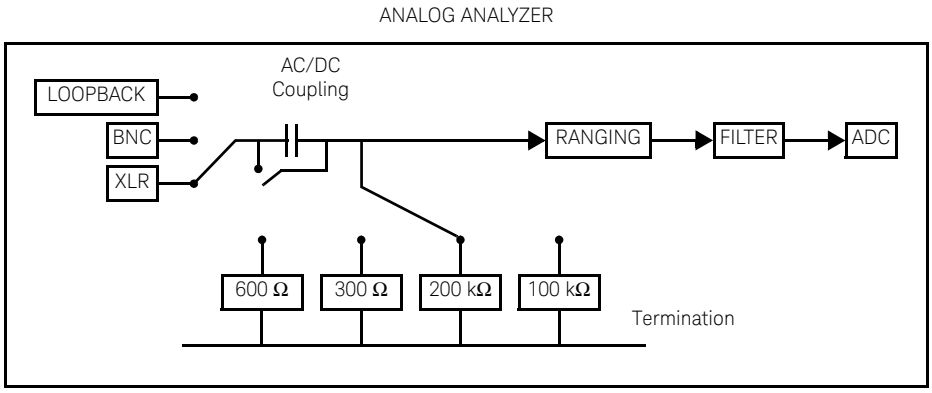


Figure 2-2 U8903B analog analyzer block diagram

An audio signal can enter the analog analyzer through either the balanced (XLR) or unbalanced (BNC) input signal connector. There is also a loopback facility where the analog generator can be connected onto the systems internal analog bus and routed to the analog analyzer.

From the input connector, the signal passes through the AC/DC coupling circuit. If AC coupling is selected, the DC component is blocked and only the AC component of the signal passes through. However, if DC coupling is selected, the entire signal passes through.

The attenuators, buffer, gain, and Common Mode Rejection (CMR) conditions the signal to as close to the full scale of the Analog-to-Digital converter (ADC) as possible, optimizing the measurement dynamic range.

There are two separate ADCs in the analog analyzer. The low bandwidth ADC is designed for best performance in the audio bandwidth and beyond. The high bandwidth ADC is designed to give high resolution measurements up to 1.5 MHz.

The default input impedance is 100 kΩ for unbalanced signals or 200 kΩ for balanced signals. Terminations of 600 Ω or 300 Ω can also be applied. The 600 Ω termination can tolerate up to 1.5 W and the 300 Ω termination can tolerate up to 3 W.

Digital audio interface

A simplified U8903B digital audio interface block diagram is shown as follows.

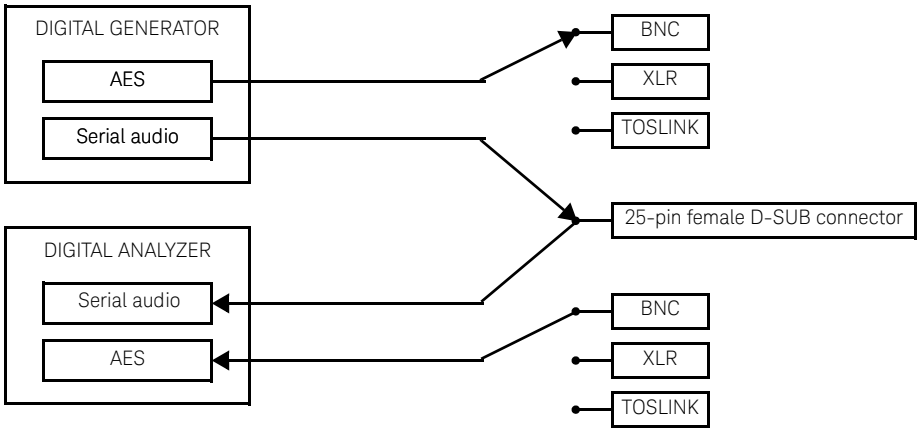


Figure 2-3 U8903B digital generator block diagram

Signal generation

The digital generator generates all the required waveforms digitally. The digital waveform data is then streamed to the serial audio transmitter for the DSI output, or to the AES transmitter for the balanced, unbalanced, and optical output. Finally, the waveform is routed through the Balanced (XLR), Unbalanced (BNC), Optical (TOSLINK), or digital serial interface (DSI) output signal connectors to the DUT.

Measurement

A digital audio signal can enter the digital analyzer through the Balanced (XLR), Unbalanced (BNC), optical (TOSLINK), or digital serial interface (DSI) input signal connector. For balanced, unbalanced, and optical input, the audio signal then passes through the AES receiver. For DSI input, the audio signal then passes through serial audio receiver. The audio signal is sent to the digital analyzer. Inside the digital analyzer, the digital signal can be optionally passed through a combination of up to five digital filters, one each from the low pass, high pass, weighting, deemphasis, and sample rate filter groups before sending it to the measurement section.

Navigation and DATA ENTRY Panels

The navigation and DATA ENTRY panels are used to navigate and set or modify the parameter values.

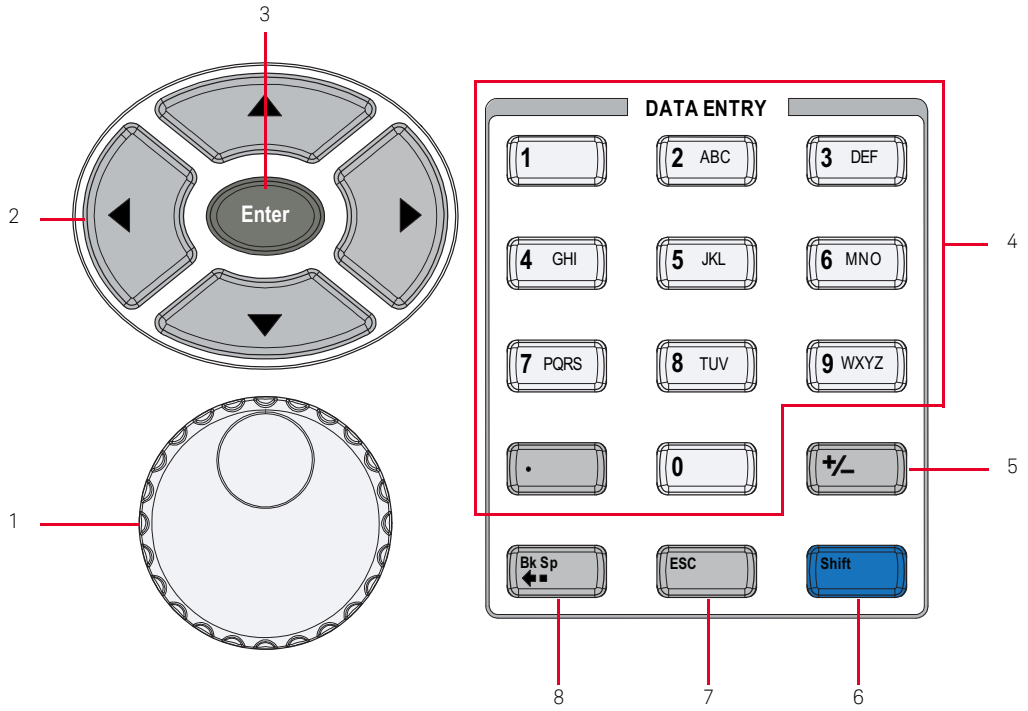


Figure 2-4 Navigation and DATA ENTRY panels

Table 2-1 Navigation and DATA ENTRY panels description

	Item	Description
1	Knob	Rotate the knob to increase or decrease a numeric value, change a highlighted digit or character, or step through lists or items in a row.
2	Arrow keys	Use the arrow keys to highlight or navigate the editable items on the LCD display for editing. In HP8903B mode, press the up and down arrow keys to increment/decrement the frequency and amplitude values.
3	Enter key	Press Enter to confirm an entry.
4	Numeric keys	Use the numeric keys to enter alphanumeric data by using the number keys and decimal point, or select the channel number. In DTMF single mode, press . to generate the '*' DTMF tone.

Table 2-1 Navigation and DATA ENTRY panels description (continued)

	Item	Description
5	Numeric sign key	Press  to specify a positive or negative value. For a negative value, press  to enter the negative sign before a numeric value. In DTMF single mode, press  to generate the '#' DTMF tone.
6	Shift key	Press  prior to pressing a shifted function key. The shifted functions are printed in Blue on top of the front panel keys. Refer to "**GRAPH Panel**" on page 61 and "**SYSTEM Panel**" on page 71 for more information.
7	Escape key	Press  to cancel a selected action.
8	Back space key	Press  to delete the character to the left of the cursor.

Menu Key

Press 

to display the list of available U8903B main modes of operation. Select the desired mode from the drop-down list as shown in **Figure 2-5**.

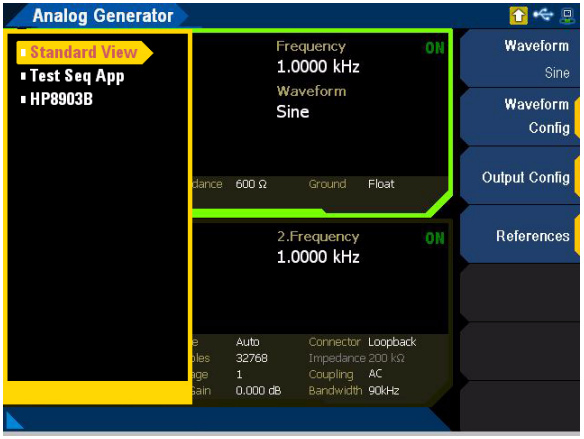


Figure 2-5 U8903B mode selection

The U8903B modes are listed as follows.

Table 2-2 U8903B modes description

Mode	Description
Standard View	The Standard View mode is the default mode for the U8903B. Refer to "**Standard View**" on page 55 for more information.
Test Seq App	Refer to "**Test Sequence Application (Test Seq App)**" on page 56 for more information.
HP8903B	Refer to "**HP8903B**" on page 56 for more information.

Standard View

Press 

and select **Standard View** to access the standard view menu page. In the standard view, you can perform signal analysis, graph analysis, sweep function, and system configurations. The Standard View mode is the default mode for the U8903B.

Signal analysis

Press 

on the FUNCTION panel to switch between audio generator or audio analyzer mode. Refer to **Chapter 3**, "Audio Generator Functions" and **Chapter 4**, "Audio Analyzer Measurement Functions" for more information on the respective configurations.

Graph analysis

Press 

on the FUNCTION panel to access the graph analysis mode. Refer to **Chapter 5**, "Graph Analysis" for more information on the graph analysis mode configurations.

Sweep function

Press 

on the FUNCTION panel to access the U8903B sweep parameter and the configurations. Refer to **Chapter 6**, "Sweep Function" for more information on the sweep configurations.

System configurations

Press 

on the SYSTEM panel to access the U8903B system configurations. You can view the error messages, configure I/O settings, update the U8903B, perform self-tests, configure the U8903B settings, configure the HP8903B mode settings, and others. Refer to “**System**” on page 75 for more information on the system configurations.

Test Sequence Application (Test Seq App)

Press 

and select **Test Seq App** to access the test sequence application mode. The test sequence application mode allows you to perform a series of automated measurements. Refer to **Chapter 7**, "Test Sequence Application" for more information.

HP8903B

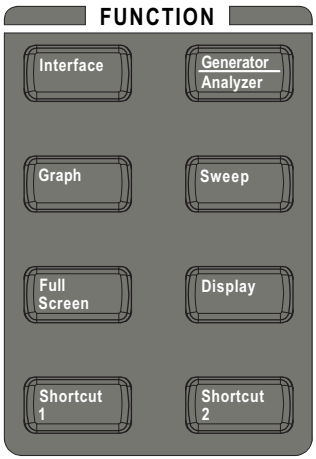
Press 

and select HP8903B to access the HP8903B mode. The HP8903B mode emulates the HP8903B audio analyzer behavior. Refer to **Chapter 8**, "HP8903B" for more information.

FUNCTION Panel

The FUNCTION panel provides quick access to the U8903B main functions.

Table 2-3 FUNCTION panel description

FUNCTION panel	Key	Description
	**Interface**	Press Interface to switch between the analog or digital interface.
	Generator|Analyzer	Press Generator Analyzer to switch between the generator or analyzer mode. Refer to **Chapter 3**, "Audio Generator Functions" and **Chapter 4**, "Audio Analyzer Measurement Functions" for more information.
	Graph	Press Graph to access the graph analysis mode. Refer to **Chapter 5**, "Graph Analysis" for more information.
	Sweep	Press Sweep to access the sweep function mode. Refer to **Chapter 6**, "Sweep Function" for more information.
	Full Screen	Press Full Screen to maximize the graph view to the full display size. This function is only applicable in the graph analysis mode. Refer to "**Full screen**" on page 58 for more information.
	Display	Press Display to switch among the 2-panel view, 4-panel view, or 10-panel view in the analyzer and generator mode. Press Display to switch between the single panel view and 2-panel view in the graph analysis mode. Refer to "**Display mode**" on page 59 for more information.
	Shortcut 1	Customizable shortcut key. Refer to **Table 2-19** for more information.
	Shortcut 2	Customizable shortcut key. Refer to **Table 2-19** for more information.

Full screen

NOTE The full screen function is only available in the graph analysis mode.

The full screen graph display is displayed as shown in **Figure 2-6**. To exit from the full screen graph display, press Full Screen.

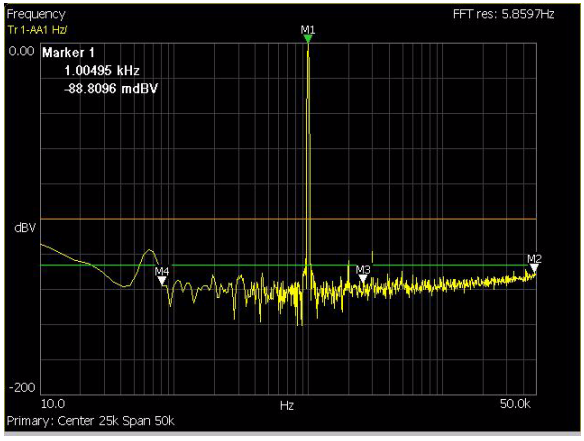


Figure 2-6 Full screen graph display

Display mode

The U8903B allows you to display up to ten panels on the main display in the analyzer and generator mode.

Figure 2-7 4-panel view

Figure 2-8 10-panel view

The U8903B allows you to display up to two panels on the main display in the graph analysis mode.

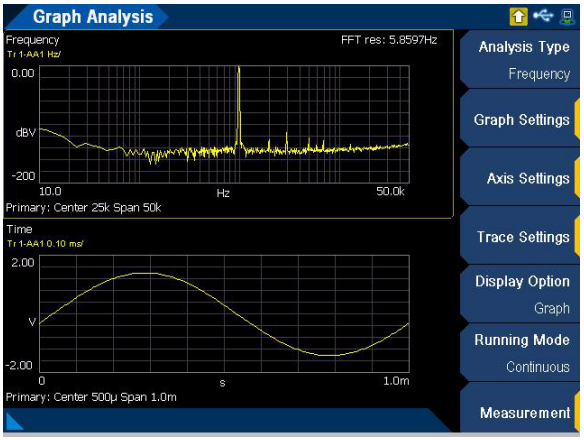


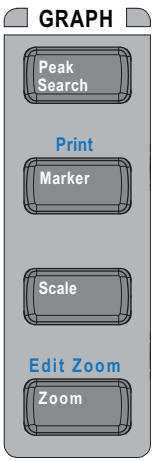
Figure 2-9 Graph analysis mode 2-panel view

GRAPH Panel

NOTE Some keys have a shifted function printed above the keys. Press Shift on the DATA ENTRY panel before pressing the desired key with the shifted function.

The graph panel provides quick access to the commonly used graph functions. Refer to **Chapter 5**, "Graph Analysis" for more information on the graph analysis mode.

Table 2-4 GRAPH panel description

GRAPH panel	Key	Description
	**Peak Search**	Press Peak Search to display the peak search menu page, and place the selected marker on the trace point at the maximum Y-axis value for the marker trace. Refer to "**Peak Search**" on page 62 for more information.
	Marker	Press Print Marker to access the marker softkeys that select the current and reference markers and turns them on and off. You may also move the markers, display the marker measurement data, and display the section of the graph based on the selected marker position. Refer to "**Marker**" on page 64 for more information.
	Print (Shift + Marker)	Press Shift and Print Marker to print the current display to a file. Refer to "**Save**" on page 86 for more information.
	Scale	Press Scale to perform autoscaling to automatically scale the display according to the signal, or to autoscale the X-axis or Y-axis. Refer to "**Scale**" on page 68 for more information.
	Zoom	Press Edit Zoom Zoom to magnify a section of the graph. Refer to "**Zoom**" on page 69 for more information.
	Edit Zoom (Shift + Zoom)	Press Shift and Edit Zoom Zoom to configure the section of the graph to be magnified. Refer to "**Edit zoom**" on page 70 for more information.

Peak Search

The Peak Search menu page allows you to define a specific threshold to determine which signals can be considered peaks, excluding the unwanted signals from the search. A peak can only qualify as a peak if there is a rising slope before the point and falling slope after the point. A minimum can only qualify as a minimum if there is a falling slope before the point and rising slope after the point.

NOTE The Peak Search menu page is only available in the graph analysis mode.

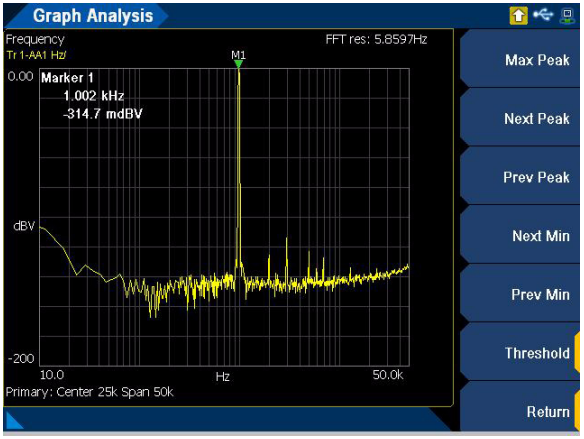


Figure 2-10 Peak Search menu page

Table 2-5 Save menu description

Menu	Description
Max Peak	Press the **Max Peak** softkey to search and move the active marker to the highest peak which is higher than the peak threshold value. If the active maker is off, the marker will be turned on before performing the maximum peak operation.
Next Peak	Press the **Next Peak** softkey to search and move the active marker to the next peak which is higher than the peak threshold value. If the active maker is off, the marker will be turned on before performing the next peak operation.
Prev Peak	Press the **Prev Peak** softkey to search and move the active marker to the previous peak which is higher than the peak threshold value. If the active maker is off, the marker will be turned on before performing the previous peak operation.
Next Min	Press the **Next Min** softkey to search and move the active marker to the previous peak which is lower than the minimum threshold value. If the active maker is off, the marker will be turned on before performing the next minimum operation.
Prev Min	Press the **Prev Min** softkey to search and move the active marker to the next peak which is lower than the minimum threshold value. If the active maker is off, the marker will be turned on before performing the previous minimum operation.
Threshold	Press the **Threshold** softkey to configure the peak search setting. Refer to "**Threshold**" on page 63 for more information.

Threshold

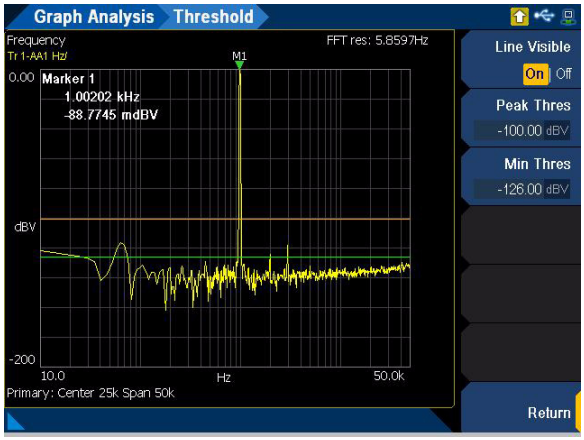


Figure 2-11 Peak Search > Threshold menu page

Table 2-6 Peak Search > Threshold menu description

Menu	Description
Line Visible	Press the **Line Visible** softkey to enable or disable the threshold line in the graph. The threshold line helps to determine the peak and minimum threshold. – Peak threshold (green line) – Minimum threshold (orange line)
Peak Thres	Press the **Peak Thres** softkey to set the peak threshold value. A peak has to be higher than the peak threshold value in order to be taken into consideration when a peak search is performed.
Min Thres	Press the **Min Thres** softkey to set the minimum threshold value. A minimum has to be lower than the minimum threshold value in order to be taken into consideration when a minimum search is performed.

Marker

The Marker menu page allows you to place a marker on the graph. A marker can be placed on a trace to allow the value of the trace at the marker point to be determined precisely. A total of up to 8 markers can be placed in the graph. You can also press the numeric keys (1 to 8) once to switch among the active markers, and press the numeric keys (1 to 8) twice to toggle the state of the selected marker.

NOTE The Marker menu page is only available in the graph analysis mode.

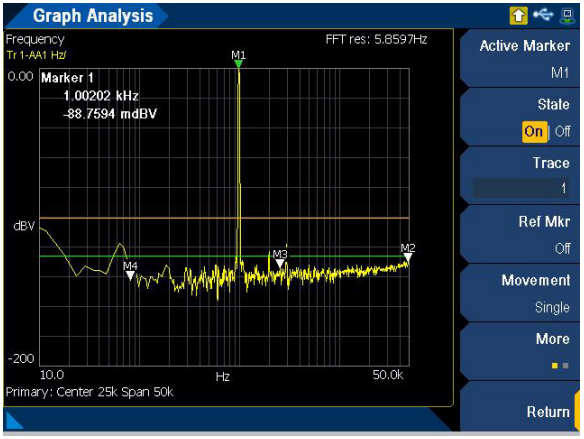


Figure 2-12 Marker menu page 1

Table 2-7 Marker menu description

Menu	Description
Active Marker	Press the **Active Marker** softkey to select the active marker number. The active marker is displayed in green, and the other markers are displayed in white. The active marker reference marker is displayed in red.
State	Press the **State** softkey to enable or disable the active marker.
Trace	Press the **Trace** softkey to select the trace number for the active marker.
Ref Mkr	Press the **Ref Mkr** softkey to select the reference marker number. The reference marker has to be specified to perform the delta marker calculations in the marker table. – OFF – M1 to M8

Table 2-7 Marker menu description (continued)

Menu	Description
Movement	Press the **Movement** softkey to select the marker movement type. – Single The active marker will move depending on the speed and direction of the knob being turned. – Pair The active marker will move with the reference marker. – Bin The active marker will move to the next/previous bin or pixel regardless of the speed of the knob. – Peak The active marker will move from peak to peak. This behavior is affected by the peak threshold settings. – Harmonic The active marker will move from harmonic to harmonic. This setting is only useful if the display option is changed to Harmonics.
Function	Press the **Function** softkey to select the marker function type. – None No marker function type is specified. – Slope The slope of the current marker. The beginning point and end point taken into account for the calculation is from the previous and subsequent point of the marker. – PSD The total power contained in each of the frequency bins in the band, and then dividing the result by the “effective bandwidth”.
Marker ->	Press the **Marker ->** softkey to perform automatic adjustment of the graph left and right values in reference to the current marker location. Refer to “**Marker ->**” on page 66 for more information.
Harmonics	Press the **Harmonics** softkey to place the markers on the harmonic values. Refer to “**Harmonics**” on page 67 for more information.
Rdg at Mkr	Press the **Rdg at Mkr** softkey to enable or disable the readings at the marker. You can choose to have the active marker readings to be at the top left corner of the graph, or at the marker location itself. When marker table is enabled, the marker readings at the marker location are automatically hidden.

Marker ->

The Marker -> menu page allows you to perform automatic adjustment of the graph left and right values in reference to the current marker location.

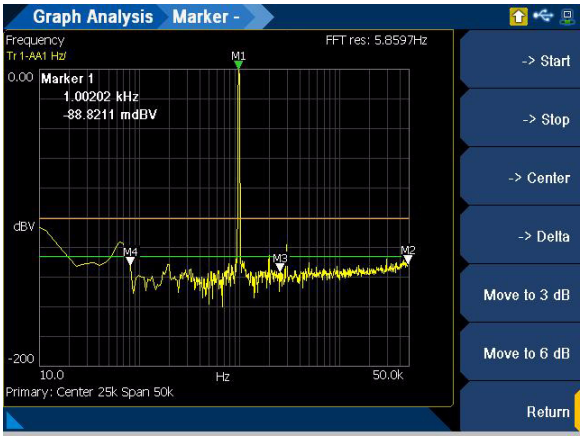


Figure 2-13 Marker > Marker - menu page

Table 2-8 Marker > Marker - menu description

Menu	Description
-> Start	Press the **-> Start** softkey to set the left value of the graph to the current marker location. The span is retained so the right value of the graph may be changed.
-> Stop	Press the **-> Stop** softkey to set the right value of the graph to the current marker location. The span is retained so the left value of the graph may be changed.
-> Center	Press the **-> Center** softkey to set the center value of the graph to the current marker location. The span is retained so the left and right values of the graph may be changed.
-> Delta	Press the **-> Delta** softkey to set the left and right values of the graph to the current marker and the reference marker location.
Move to 3 dB	Press the **Move to 3 dB** softkey to place the marker on the nearest –3 dB value data point.
Move to 6 dB	Press the **Move to 6 dB** softkey to place the marker on the nearest –6 dB value data point.

Harmonics

The Harmonics menu page allows you to place the markers on the harmonic values. The graph display option have to be in harmonic display view. All the markers will be used and placed in the selected trace.

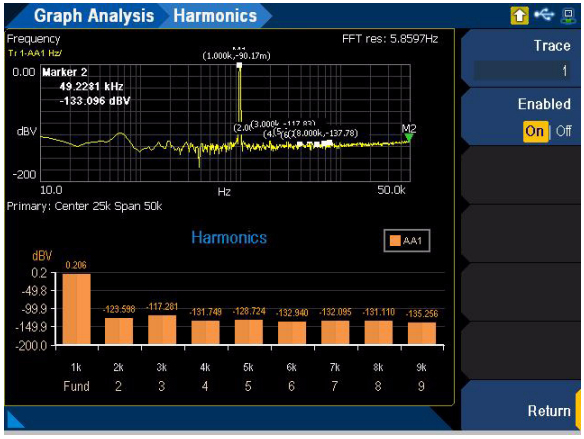


Figure 2-14 Marker > Harmonics menu page

Table 2-9 Marker > Harmonics menu description

Menu	Description
Trace	Press the **Trace** softkey to set the trace number to place the marker.
Enabled	Press the **Enabled** softkey to show or hide the markers.

Scale

The Scale menu page allows you to perform autoscaling to automatically scale the display according to the signal, or to autoscale the X-axis or Y-axis.

NOTE The Scale menu page is only available in the graph analysis mode.

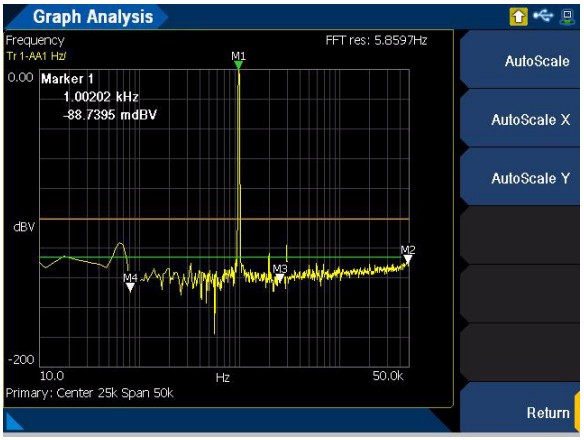


Figure 2-15 Scale menu page

Table 2-10 Save menu description

Menu	Description
AutoScale	Press the **AutoScale** softkey to perform autoscaling on the X-axis and Y-axis.
AutoScale X	Press the **AutoScale X** softkey to perform autoscaling on the X-axis by searching for the most optimum scale (left and right values) for the X-axis based on the data being displayed in the graph.
AutoScale Y	Press the **AutoScale Y** softkey to perform autoscaling on the Y-axis by searching for the most optimum scale (top and bottom values) for the Y-axis based on the data being displayed in the graph.

Zoom

The U8903B screen is split into two windows in the zoom view. The top window is a normal graph window, and the bottom window displays a magnified representation of the traces in the top window. The data in the bottom window will be more detailed due to the screen resolution difference between both windows. The magnified region is indicated by the region surrounded by the red border in the top window.

NOTE The zoom view is only available in the graph analysis mode.

The magnified graph display is displayed as shown in **Figure 2-16**.

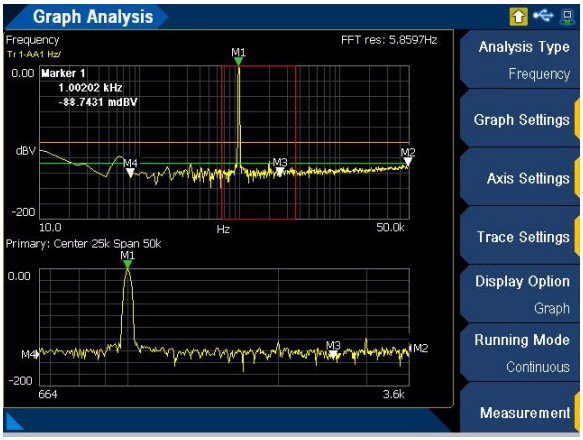


Figure 2-16 Magnified graph display

Edit zoom

To display the edit zoom mode in the zoom view, press Shift on the DATA ENTRY panel and Edit Zoom / Zoom on the GRAPH panel. Press the up or down arrow key to modify the stepping value and use the left and right arrow keys to move the red border region in the top window. To resize the red border region in the top window, rotate the knob.

The edit zoom mode is displayed as shown in **Figure 2-17**.

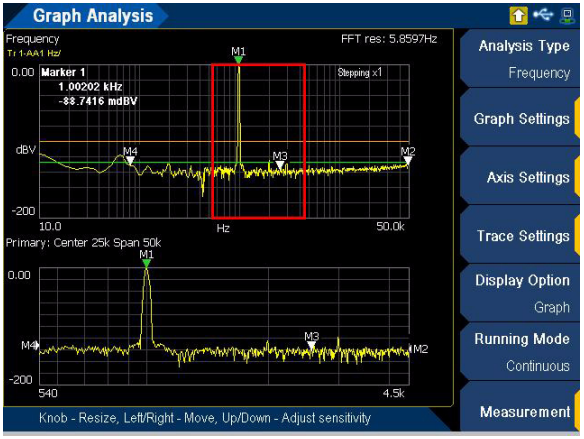


Figure 2-17 Magnified graph display

To exit the edit zoom mode, press Shift on the DATA ENTRY panel and Edit Zoom / Zoom on the GRAPH panel.

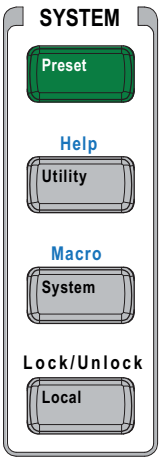
To exit the zoom view, press Edit Zoom / Zoom on the GRAPH panel.

SYSTEM Panel

NOTE Some keys have a shifted function printed above the keys. Press Shift on the DATA ENTRY panel before pressing the desired key with the shifted function.

The system panel provides access to some useful system functions.

Table 2-11 SYSTEM panel description

SYSTEM panel	Key	Description
	**Preset**	Press Preset to display the Preset menu page. Refer to "**Preset**" on page 72 for more information.
	Utility	Press Help Utility to display the Utility menu page. Refer to "**Utility**" on page 73 for more information.
	Help (Shift + Utility)	Press Shift and Help Utility to display the help mode page. Refer to "**Access the help mode**" on page 41 for more information.
	System	Press Macro System to display the System menu page. Refer to "**System**" on page 75 for more information.
	Macro (Shift + System)	Reserved for future expansion.
	Local	Press Lock/Unlock Local to switch from remote control mode to local mode. The front panel keys are locked in the remote mode. Refer to **Table 1-5** for more information on the remote control icon.
	Lock/Unlock	Press Lock/Unlock Local to lock or unlock the front panel keys in the local mode. A dialog box will pop-up for confirmation. Refer to **Table 1-5** for more information on the front panel keys locked icon.

Preset

A preset will set the U8903B to a default state. It does not affect the I/O configuration, calibration data, system configurations (time, date, model number, and serial number), and license information.

NOTE The Preset menu page is only available in the Standard View mode. Refer to "**Menu Key**" on page 54 for more information.

Figure 2-18 Preset menu page

Table 2-12 Preset menu description

Menu	Description
(Current mode)	Press the **(Current mode)** softkey to reset the current mode to its default settings. For example, resetting the analog generator will only reset all the generator settings while other modes settings remain unchanged. – Analog Analyzer Resetting the analog analyzer will also reset the analog generator loopback connector. – Analog Generator Resetting the analog generator will not reset the analog generator loopback connector. – Graph Analysis
Save User State	Press the **Save User State** softkey to save the current user state.
Mode	Press the **Mode** softkey to reset all modes to the default settings without deleting the user-defined files. All running operations such as auto query, sweep, and test sequence will be aborted.
To Factory Settings	Press the **To Factory Settings** softkey to reset the U8903B to the factory default settings, delete all the files saved in the internal flash memory (for example, state file, arbitrary waveform, test sequence project files, and so on), and reset the GUI state to the Standard View mode. If the HP8903B mode is turned on, the GUI state will remain at the HP8903B mode.
User State	Press the **User State** softkey to reset the U8903B to the previously saved user state.

Utility

The Utility menu page allows you to save the U8903B state to a file, or recall the U8903B state from a file.

NOTE The Utility menu page is only available in the Standard View mode. Refer to "**Menu Key**" on page 54 for more information.

For the generator and analyzer mode, the Utility menu page is displayed as shown in **Figure 2-19**.

Figure 2-19 Utility menu page (generator and analyzer mode)

Table 2-13 Utility menu description (generator and analyzer mode)

Menu	Description
Save Channel (x) (x) = current channel number	Press the **Save Channel (x)** softkey to save the current channel state to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Save (x) (x) = current mode	Press the **Save (x)** softkey to save the current mode state to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Recall	Press the **Recall** softkey to recall a saved U8903B state from a file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Copy To	Press the **Copy** to softkey to copy the current channel state to other channel(s).
Copy From	Press the **Copy From** softkey to copy other channel state to the current channel.

For the graph analysis mode, the Utility menu page is displayed as shown in **Figure 2-20**.

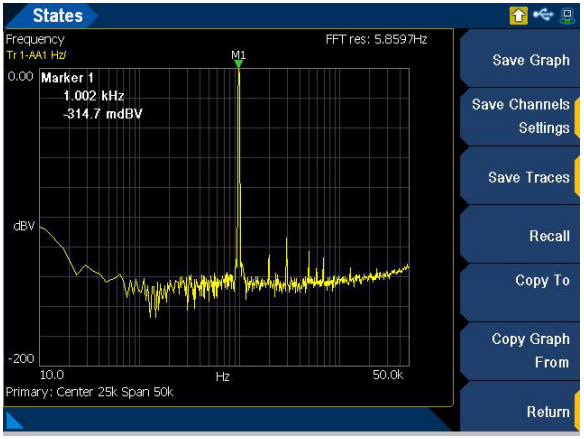


Figure 2-20 Utility menu page (graph analysis mode)

Table 2-14 Utility menu description (graph analysis mode)

Menu	Description
Save Graph	Press the **Save Graph** softkey to save the current graph state to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Save Channels Settings	Press the **Save Channels Settings** softkey to save the current channel graph state or all channels graph state to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Save Traces	Press the **Save Traces** softkey to save the current trace state, all traces state, axis settings state, all traces and axis settings states, or the current trace data to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Recall	Press the **Recall** softkey to load a trace from a CSV file into the active trace. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Copy To	Press the **Copy To** softkey to copy the current channel graph state to other channel(s).
Copy Graph From	Press the **Copy Graph From** softkey to copy other channel graph state to the current channel.

System

The System menu page allows you to view error messages, configure I/O settings, update the U8903B, perform self-tests, configure the U8903B settings, configure the HP8903B mode settings, and others.

NOTE The System menu page is only available in the Standard View mode. Refer to "**Menu Key**" on page 54 for more information.

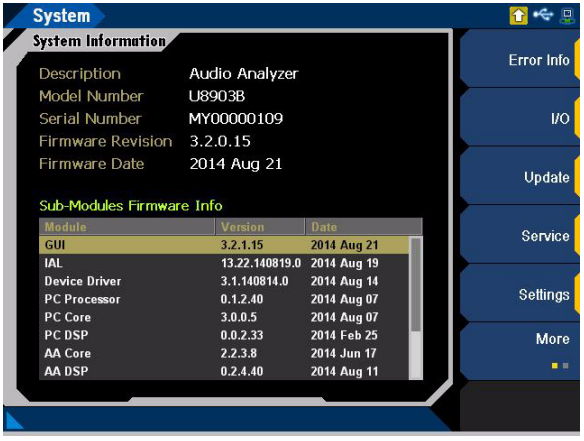


Figure 2-21 System menu page 1

Error Info

Press the **Error Info** softkey to display the Error Info menu page. The error messages will be listed in the error log viewing panel. The error messages are displayed in decending order where the latest error message is displayed at the top most of the list.

Figure 2-22 System > Error Info menu page (Error)

Table 2-15 Error Info menu description

Menu	Description
Load File	Press the **Load File** softkey to select the log file to be loaded in the error log viewing panel. The latest log file name is `EventLog_CE.xml`. The older log files are named as `EventLog_CE.<yyyyMMdd>_n.xml`, where `yyyy` = year, `MM` = month, `dd` = day, and `n` = version. The U8903B will keep the log files up to seven days.

I/O

Press the **I/O** softkey to display the I/O menu page.

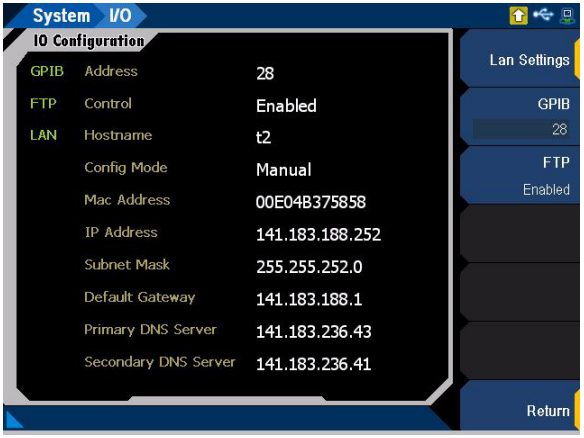


Figure 2-23 System > I/O menu page

Table 2-16 Utility menu description (generator and analyzer mode)

Menu	Description
LAN Settings	Press the **LAN Settings** softkey to configure the LAN settings. Refer to **Table 2-17** for more information.
GPIB	Press the **GPIB** softkey to set the desired GPIB address.
FTP	Press the **FTP** softkey to enable or disable the FTP control.

In the LAN Settings menu page, you can reset the LAN, change the hostname, and switch between automatic or manual configuration mode as shown in **Figure 2-24**.

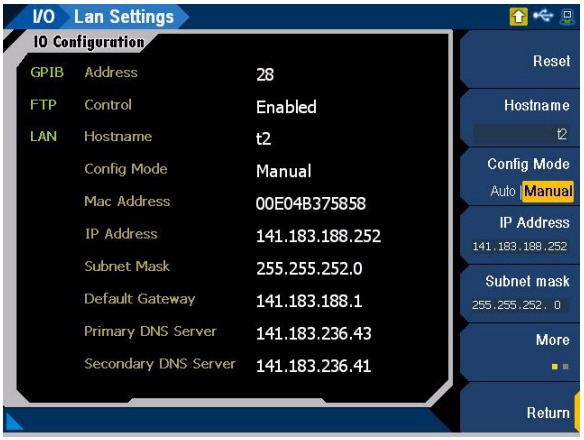


Figure 2-24 System > I/O > Lan Settings menu page 1

Table 2-17 System > I/O > LAN Settings menu description

Menu	Description
Reset	Press the **Reset** softkey to reset the LAN settings.
Hostname	Press the **Hostname** softkey to set the LAN hostname.
Config Mode	Press the **Config Mode** softkey to select the LAN configuration mode. – Auto – Manual
IP Address	Press the **IP Address** softkey to set the LAN IP address. This setting is only available when the LAN configuration mode is set to Manual.
Subnet mask	Press the **Subnet mask** softkey to set the LAN subnet mask address. This setting is only available when the LAN configuration mode is set to Manual.
Gateway	Press the **Gateway** softkey to set the LAN gateway address. This setting is only available when the LAN configuration mode is set to Manual.
DNS 1	Press the **DNS 1** softkey to set the LAN DNS 1 address. This setting is only available when the LAN configuration mode is set to Manual.
DNS 2	Press the **DNS 2** softkey to set the LAN DNS 2 address. This setting is only available when the LAN configuration mode is set to Manual.

Update

Refer to "**Update the U8903B**" on page 42.

Service

Press the **Service** softkey to display the Service menu page.

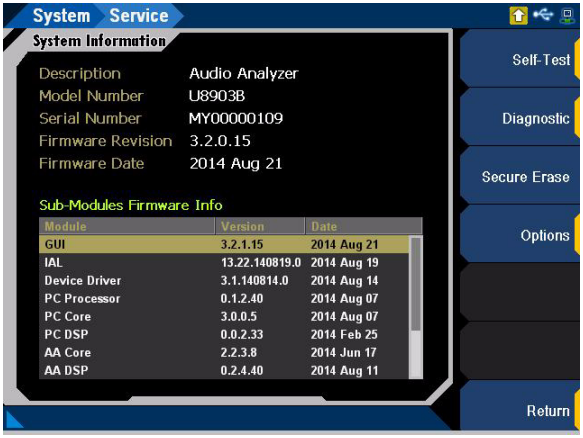


Figure 2-25 System > Service menu page

Table 2-18 System > Service menu description

Menu	Description
Self-Test	Press the **Self-Test** softkey to perform self-test. Refer to "**Perform self-test**" on page 44 for more information.
Diagnostics	Press the **Diagnostics** softkey to perform the front panel or display diagnostics test.
Secure Erase	Press the **Secure Erase** softkey to securely erase all the files saved in the internal flash memory (for example, state file, arbitrary waveform, test sequence project files, and so on), It does not affect the U8903B settings and license information.
Options	Press the **Options** softkey to display the installed U8903B options. You may also add or remove the U8903B options from the Options menu page. Refer to "**Add or remove U8903B options**" on page 45 for more information.

Settings

Press the **Settings** softkey to display the Settings menu page.

Figure 2-26 System > Settings menu page 1

Table 2-19 System > Settings menu description

Menu	Description
Date	Press the **Date** softkey to edit the date in dd/mm/yyyy format.
Time	Press the **Time** softkey to edit the current time in 24-hour format.
Brightness	Press the **Brightness** softkey to adjust the LCD display brightness value.
Key Sound	Press the **Key Sound** softkey to enable or disable the front panel key sound.
Help Language	Press the **Help Language** softkey to select the U8903B help language. – English (US) – Simp. Chinese – Japanese
Power Up State	Press the **Power Up State** softkey to select the power up state. – Last The U8903B will start up with the last saved settings. – Default The U8903B will start up with the factory default settings.
Shortcut 1	Press the **Shortcut 1** softkey to select a specific function to map the shortcut 1 key. – Error List Display the last 30 errors, warnings, or messages logged. – Auto-Scale Automatically scale the graph display.
Shortcut 2	Press the **Shortcut 2** softkey to select a specific function to map the shortcut 2 key. – Error List Display the last 30 errors, warnings, or messages logged. – Auto-Scale Automatically scale the graph display.

HP8903B Config

Press the **HP8903B Config** softkey to display the HP8903B Config menu page.

NOTE

- The HP8903B configuration settings will not be affected by any reset operation.
- Refer to **Chapter 8**, "HP8903B" for more information on the HP8903B mode.

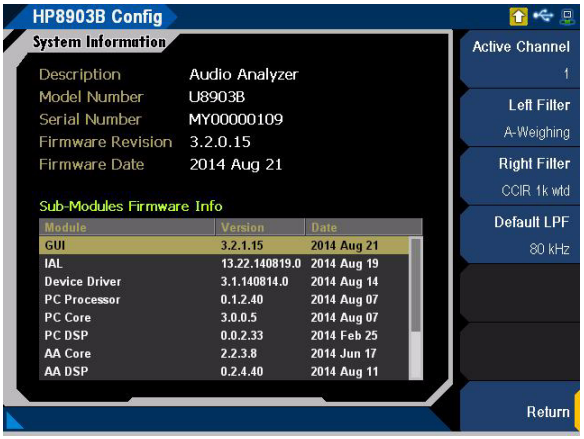


Figure 2-27 System > HP8903B Config menu page

Table 2-20 System > HP8903B Config menu description

Menu	Description
Active Channel	Press the **Active Channel** softkey to select the HP8903B active channel. – 1 – 2
Left Filter	Press the **Left Filter** softkey to select the left filter type. The left filter represents the filter on the left side of the HP8903B front panel. The HP8903B filter may be different according to the model and the purchased HP8903B option. The default left filter is None. – None – A-Weighing – CCIR 1k wtd – CCIR 2k wtd – C-Message – CCITT – 400 Hz

Table 2-20 System > HP8903B Config menu description (continued)

Menu	Description
Right Filter	Press the **Right Filter** softkey to select the right filter type. The right filter represents the filter on the right side of the HP8903B front panel. The HP8903B filter may be different according to the model and the purchased HP8903B option. The default right filter is None. – None – A-Weighting – CCIR 1k wtd – CCIR 2k wtd – C-Message – CCITT – 400 Hz
Default Filter	Press the **Default Filter** softkey to select the default filter for the HP8903B mode. The default filter is 80 kHz. – None – 30 kHz – 80 kHz

Fan & Temperature

Press the **Fan & Temperature** softkey to display the temperatures of the available cards and the speed of the three 80 mm fans in the U8903B. This menu page is for service usage only. Refer to the *U8903B Service Guide* for more information.

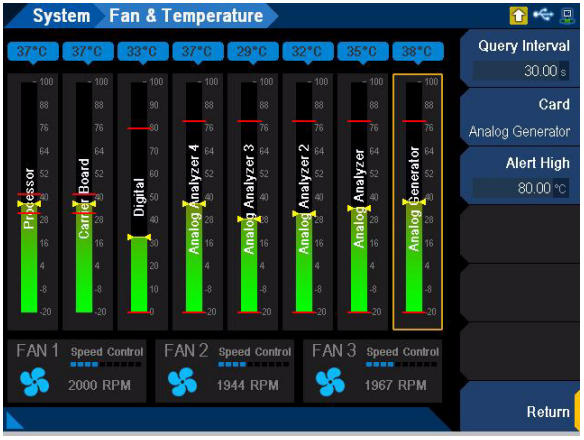


Figure 2-28 System > Fan & Temperature menu page

Aux Output

Press the **Aux Output** softkey to display the Aux Output menu page.

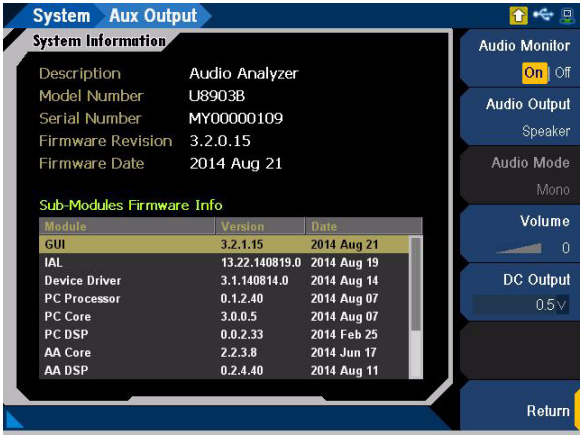


Figure 2-29 System > Aux Output menu page

Table 2-21 System > Aux Output menu description

Menu	Description
Audio Monitor	Press the **Audio Monitor** softkey to enable or disable the auxiliary audio monitor.
Audio Output	Press the **Audio Output** softkey to select the aux audio output type. – Speaker – Phone
Audio Mode	This is only available when Phone is selected as the audio output. Press the **Audio Mode** softkey to select the aux audio mode type. – Stereo – Mono
Volume	Press the **Volume** softkey to select the aux audio volume.
DC Output	Press the **DC Output** softkey to set the aux DC output value.

Board Info

Press the **Board Info** softkey to display the U8903B available cards information.

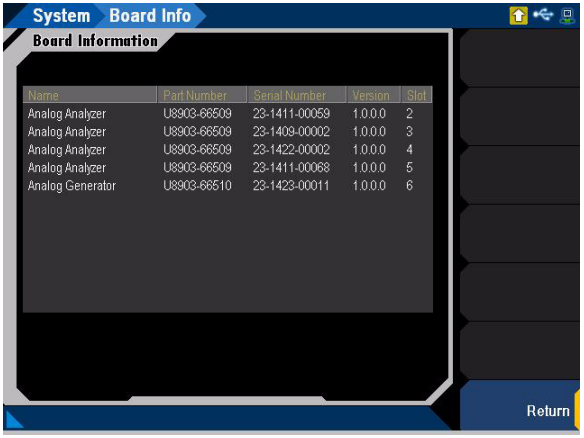


Figure 2-30 System > Board Info menu page

Legacy Sweep

Press the **Legacy Status** softkey to enable or disable the legacy sweep.

When the legacy sweep is enabled, sweep is limited to analog and the sweep channel for the analyzer and generator is paired. For example, analog generator channel 1 is measured by analog analyzer channel 1.

When legacy sweep is disabled, you can select multiple channels to be swept and the channels for generator and analyzer are not required to be paired.

RUN CONTROL Panel

The RUN CONTROL panel is used to start or stop signal generation, measurements, and test sequence operations.

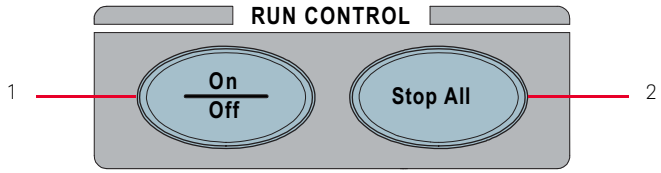


Figure 2-31 RUN CONTROL panel

Table 2-22 Navigation and DATA ENTRY panels description

	Key	Description
1	**On/Off**	Press On/Off to start or stop the signal generation or measurements for the selected generator or analyzer channel respectively. Press On/Off to start or stop the graph generation in the graph analysis mode. Press On/Off to start or stop the sweep in the sweep mode. Press On/Off to start or stop the test sequence in the test sequence application mode.
2	**Stop All**	Press On/Off to stop all generator, sweep, and test sequence operations.

Save and Recall

Save

The Save menu page allows you to save the U8903B state, graph analysis trace settings, sweep function points, or screen capture of the current display into a file.

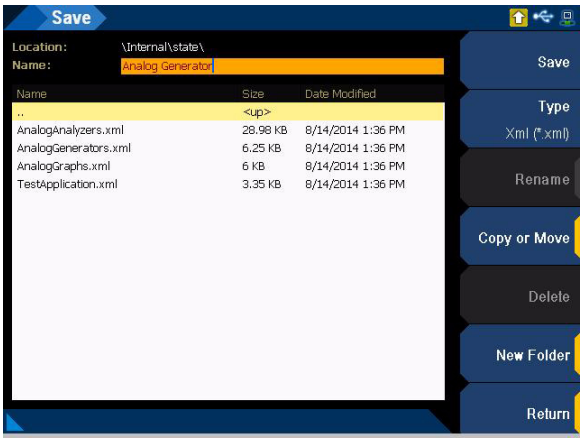


Figure 2-32 Save menu page

Table 2-23 Save menu description

Menu	Description
Save	Press the **Save** softkey to save the specific function to a file.
Type	Press the **Type** softkey to select the file type to be displayed on the current directory and to be saved into.
Rename	Press the **Rename** softkey to rename the selected file in the current directory.
Copy or Move	Press the **Copy or Move** softkey to copy or move the marked files to the selected folder.
Delete	Press the **Delete** softkey to delete the selected file in the current directory.
New Folder	Press the **New Folder** softkey to create a new folder in the current directory.

Select the '...' item at the list and press 

to move up a level from the current folder or to another directory. Use the arrow keys to navigate through the files or select the desired folder or file.

NOTE For the detailed procedure on renaming, copying, moving, and deleting files, please refer to "**Appendix Y: Procedure to Rename, Copy, Move, and Delete Files**" on page 548.

Recall

The Recall menu page allows you to recall the U8903B state, graph analysis trace settings, or sweep function points from a file.

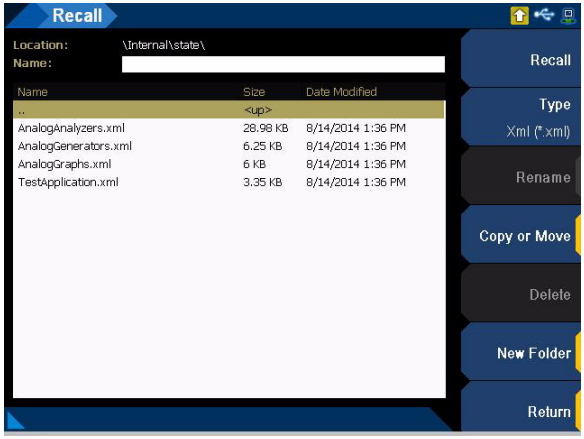


Figure 2-33 Recall menu page

Table 2-24 Save menu description

Menu	Description
Recall	Press the **Recall** softkey to recall the selected file.
Type	Press the **Type** softkey to select the file type to be displayed on the current directory.
Rename	Press the **Rename** softkey to rename the selected file in the current directory.
Copy or Move	Press the **Copy or Move** softkey to copy or move the marked files to the selected folder.
Delete	Press the **Delete** softkey to delete the selected file in the current directory.
New Folder	Press the **New Folder** softkey to create a new folder in the current directory.

Select the '...' item at the list and press 

to move up a level from the current folder or to another directory. Use the arrow keys to navigate through the files or select the desired folder or file.

NOTE For the detailed procedure on renaming, copying, moving, and deleting files, please refer to "**Appendix Y: Procedure to Rename, Copy, Move, and Delete Files**" on page 548.

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3 Audio Generator Functions

This chapter describes the U8903B audio generator functions and configurations.

Audio Generator

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode. The Analog Generator menu page and Digital Generator menu page are displayed as shown in **Figure 3-1** and **Figure 3-2** respectively.

Press Interface on the FUNCTION panel to switch between the analog and digital interface.

Press 1 or 2 ABC on the DATA ENTRY panel to switch to channel 1 or channel 2 respectively and start configuring the active channel.

Press On/Off on the RUN CONTROL panel to start or stop the signal generation for the selected generator channel.

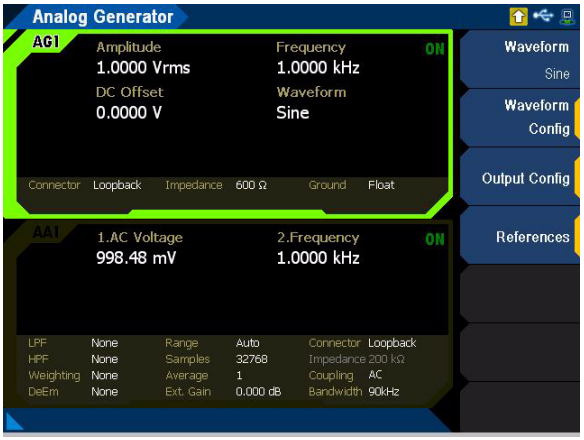

Figure 3-1 Analog Generator menu page

Table 3-1 Analog Generator menu description

Menu	Description
Waveform	Press the **Waveform** softkey to display the list of available analog generator waveform types. Select the desired waveform from the drop-down list.
Waveform Config	Press the **Waveform Config** softkey to set the current active waveform configuration such as frequency, amplitude, and others. Refer to "**Waveform Configuration**" on page 92 for more information.
Output Config	Press the **Output Config** softkey to set the output configurations such as the connector type, impedance, and others. Refer to "**Output Configuration (Analog Generator)**" on page 128 for more information.
References	Press the **References** softkey to configure the output references settings that are used in the unit conversion. Refer to "**References (Analog Generator)**" on page 147 for more information.

Figure 3-2 Digital Generator menu page

Table 3-2 Digital Generator menu description

Menu	Description
Waveform	Press the **Waveform** softkey to display the list of available analog generator waveform types. Select the desired waveform from the drop-down list.
Waveform Config	Press the **Waveform Config** softkey to set the current active waveform configuration such as frequency, amplitude, and others. Refer to "**Waveform Configuration**" on page 92 for more information.
Output Config	Press the **Output Config** softkey to set the output configurations such as the connector type, impedance, and others. Refer to "**Output Configuration (Digital Generator)**" on page 130 for more information.
DSI Config	Press the **DSI Config** softkey to set the DSI output configurations such as the format, resolution, and others. Refer to "**DSI Output Configuration (Digital Generator)**" on page 133 for more information.
AES3/SPDIF	Press the **AES3/SPDIF** softkey to set the AES3/SPDIF output configurations such as the level, resolution, and others. Refer to "**AES3/SPDIF Output Configuration (Digital Generator)**" on page 135 for more information.
References	Press the **References** softkey to configure the output references settings that are used in the unit conversion. Refer to "**References (Digital Generator)**" on page 148 for more information.

Waveform Configuration

Sine waveform

Sine waveform is the most basic and commonly used waveform in audio analysis.

Sine waveform mode is applicable for both analog and digital generator. The waveform configuration for sine waveform is displayed as shown in **Figure 3-3** and **Figure 3-4** for both the analog and digital generator respectively.

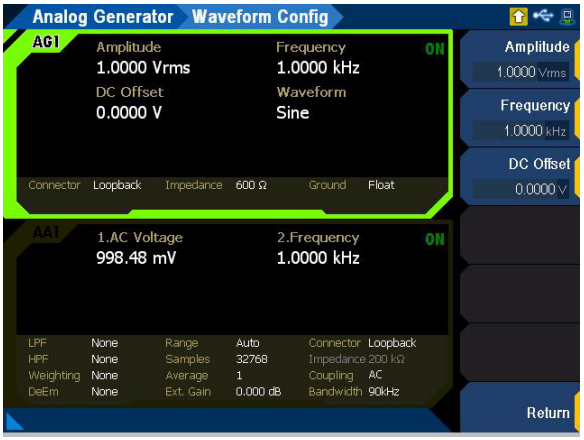

Figure 3-3 Analog Generator > Waveform Config menu page (sine waveform)

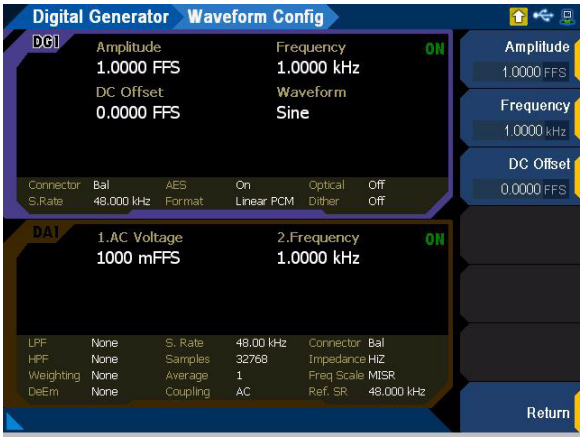

Figure 3-4 Digital Generator > Waveform Config menu page (sine waveform)

Table 3-3 Analog/Digital Generator > Waveform Config menu description (sine waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Frequency	Frequency refers to the reciprocal of the period of the signal.
DC Offset	DC offset refers to the DC component of the waveform.

Variable phase waveform

Variable phase waveform outputs a sine waveform on all channels. The waveforms on all channels share the same frequency; however their phase and amplitude can differ. Variable phase waveforms are useful for measuring the phase difference or timing skew between the channels of a multiple channel audio system. Variable phase waveform outputs a sine waveform at the selected frequency at both channel outputs with the channel 2 output phase varies from –180° to +179.99°, relative to the channel 1 output.

Variable phase waveform mode is applicable for both analog and digital generator. The waveform configuration for variable phase waveform is displayed as shown in **Figure 3-5** and **Figure 3-6** for both the analog and digital generator respectively.

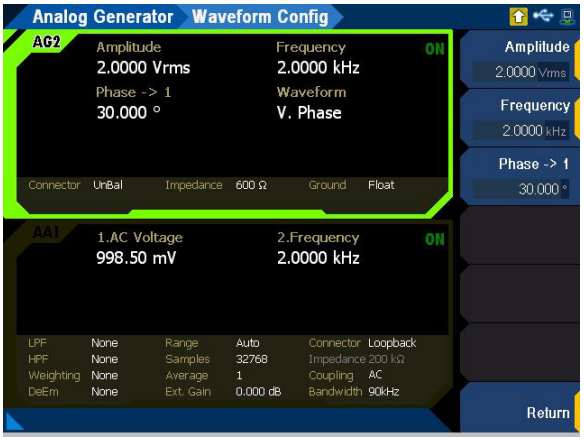

Figure 3-5 Analog Generator > Waveform Config menu page (variable phase waveform)

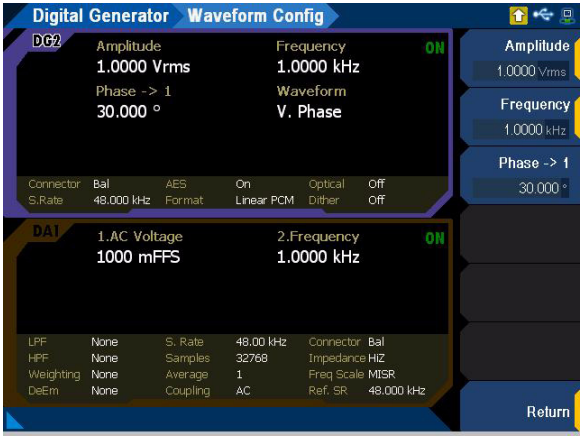

Figure 3-6 Digital Generator > Waveform Config menu page (variable phase waveform)

Table 3-4 Analog/Digital Generator > Waveform Config menu description (variable phase waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Frequency	Frequency refers to the reciprocal of the period of the signal.
Phase -> 1	This is only available when the analog generator is in channel 2. Phase -> 1 refers to the phase of the channel 2 sine waveform with reference to channel 1. A positive value will cause the channel 1 output to lead the channel 2 output. A negative value will cause the channel 2 output to lag the channel 1 output.

Dual waveform

Dual waveform allows you to generate a composite waveform that is the summation of two independent sine waveforms. Dual sine waveforms are useful in testing the intermodulation distortion characteristics of an audio system.

Dual waveform mode is applicable for both analog and digital generator. The waveform configuration for dual waveform is displayed as shown in **Figure 3-7** and **Figure 3-8** for both the analog and digital generator respectively.

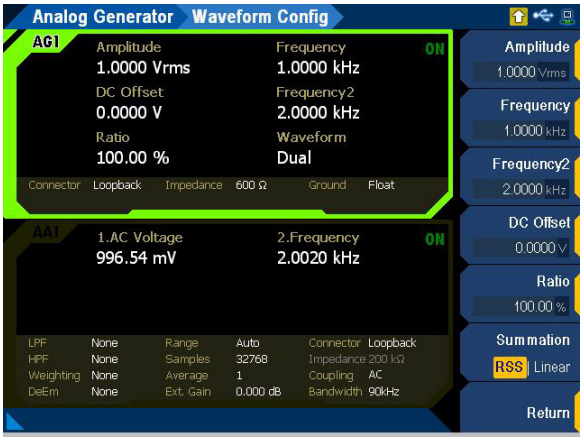

Figure 3-7 Analog Generator > Waveform Config menu page (dual waveform)

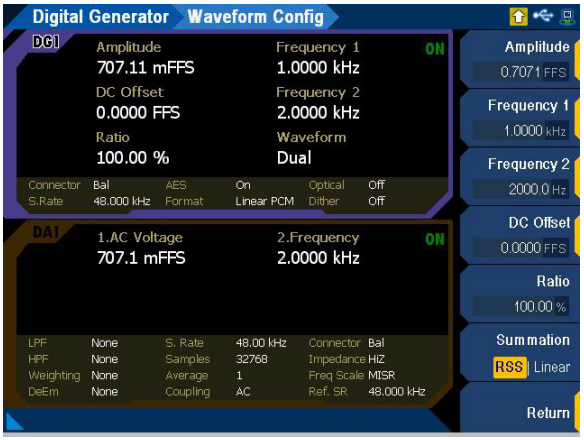

Figure 3-8 Digital Generator > Waveform Config menu page (dual waveform)

Table 3-5 Analog/Digital Generator > Waveform Config menu description (dual waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Frequency 1	Frequency 1 refers to the frequency for the first sine component.
Frequency 2	Frequency 2 refers to the frequency for the second sine component.
DC Offset	DC offset refers to the DC component of the waveform.
Ratio	Ratio refers to the amplitude ratio of the second sine component over the first sine component.
Summation	Summation refers to the method to sum up two levels. – RSS The amplitude displayed is the Root Sum Square (RSS) summation result of the two levels. The analyzer will read the same amplitude set at the generator regardless of tone ratio. – Linear The amplitude displayed is the linear summation result of the two levels. The level of each tone can be easily calculated back from the tone ratio.

SMPTE IMD waveforms (1:1/4:1/10:1)

SMPTE IMD is a signal which is the linear combination of two sine waveforms. The SMPTE IMD waveforms conform to the SMPTE standard RP120-1983 for testing intermodulation distortion. For SMPTE IMD 1:1, the lower frequency sine wave is linearly combined in 1:1 amplitude ratio with the upper frequency sine wave. For SMPTE IMD 4:1, the lower frequency sine wave is linearly combined in 4:1 amplitude ratio with the upper frequency sine wave. For SMPTE IMD 10:1, the lower frequency sine wave is linearly combined in 10:1 amplitude ratio with the upper frequency sine wave.

SMPTE IMD waveform mode is applicable for both analog and digital generator. The waveform configuration for SMPTE 1:1 waveform is displayed as shown in **Figure 3-9** and **Figure 3-10** for both the analog and digital generator respectively..

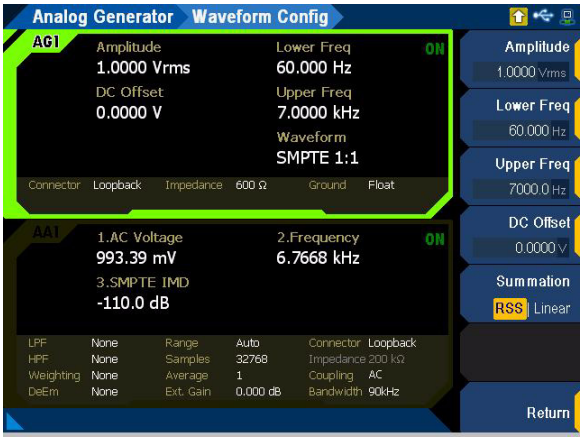

Figure 3-9 Analog Generator > Waveform Config menu page (SMPTE 1:1 waveform)

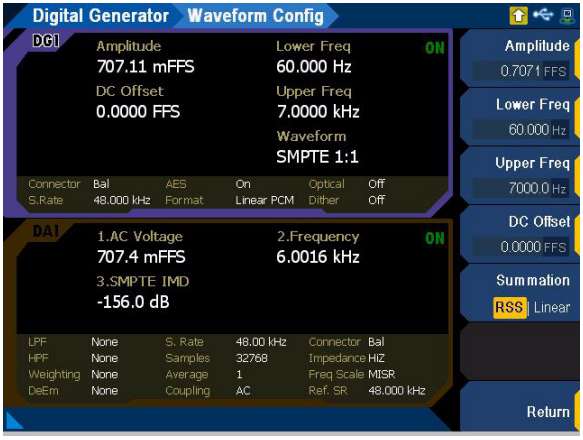

Figure 3-10 Digital Generator > Waveform Config menu page (SMPTE 1:1 waveform)

Table 3-6 Analog/Digital Generator > Waveform Config menu description (SMPTE IMD waveforms)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Lower Freq	Lower Freq refers to the lower frequency of the waveform. The lower and upper frequencies are differentiated by the amplitude ratio between the frequencies.
Upper Freq	Upper Freq refers to the upper frequency of the waveform. The lower and upper frequencies are differentiated by the amplitude ratio between the frequencies.
DC Offset	DC offset refers to the DC component of the waveform.
Summation	Summation refers to the method to sum up two levels. – RSS The amplitude displayed is the Root Sum Square (RSS) summation result of the two levels. The analyzer will read the same amplitude set at the generator regardless of tone ratio. – Linear The amplitude showed is the linear summation result of the two levels. The level of each tone can be easily calculated back from the tone ratio.

DFD IEC waveforms (IEC 60118/IEC 60268)

There are two predefined DFD dual tones waveforms comprising DFD IEC 60118 and DFD IEC 60268. The DFD IEC waveforms are similar to SMPTE IMD, except that the two tones have equal amplitude and are spaced closer together.

DFD waveform mode is applicable for both analog and digital generator. The waveform configuration for IEC 60118 waveform is displayed as shown in **Figure 3-11** and **Figure 3-12** for both the analog and digital generator respectively.

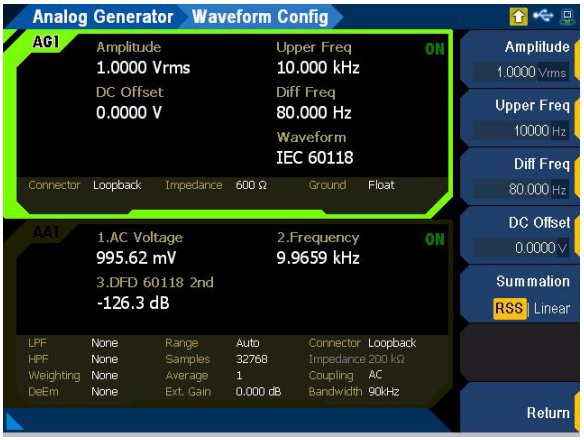

Figure 3-11 Analog Generator > Waveform Config menu page (IEC 60118 waveform)

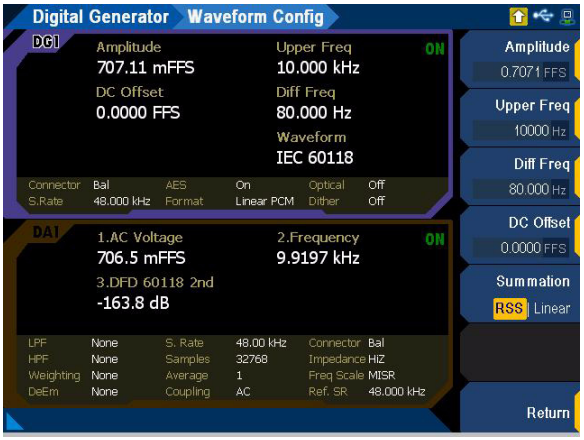

Figure 3-12 Digital Generator > Waveform Config menu page (IEC 60118 waveform)

Table 3-7 Analog/Digital Generator > Waveform Config menu description (IEC 60118 waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Upper Freq	Upper Freq refers to the upper frequency of the waveform.
Diff Freq	Diff Freq refers to the difference frequency of the waveform.
DC Offset	DC offset refers to the DC component of the waveform.
Summation	Summation refers to the method to sum up two levels. – RSS The amplitude displayed is the Root Sum Square (RSS) summation result of the two levels. The analyzer will read the same amplitude set at the generator regardless of the tone ratio. – Linear The amplitude showed is the linear summation result of the two levels. The level of each tone can be easily calculated back from the tone ratio.

The waveform configuration for IEC 60268 waveform is displayed as shown in **Figure 3-13** and **Figure 3-14** for both the analog and digital generator respectively.

Figure 3-13 Analog Generator > Waveform Config menu page (IEC 60268 waveform)

Figure 3-14 Digital Generator > Waveform Config menu page (IEC 60268 waveform)

Table 3-8 Analog/Digital Generator > Waveform Config menu description (IEC 60268 waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Center Freq	Center Freq refers to the center frequency of the waveform.
Diff Freq	Diff Freq refers to the difference frequency of the waveform.
DC Offset	DC offset refers to the DC component of the waveform.
Summation	Summation refers to the method to sum up two levels. – RSS The amplitude displayed is the Root Sum Square (RSS) summation result of the two levels. The analyzer will read the same amplitude set at the generator regardless of the tone ratio. – Linear The amplitude showed is the linear summation result of the two levels. The level of each tone can be easily calculated back from the tone ratio.

Gaussian noise

Gaussian noise is a random noise signal where the frequency components have a Gaussian distribution centered on a predetermined frequency value.

Gaussian noise mode is applicable for both analog and digital generator. The waveform configuration for Gaussian noise is displayed as shown in **Figure 3-15** and **Figure 3-16** for both the analog and digital generator respectively.

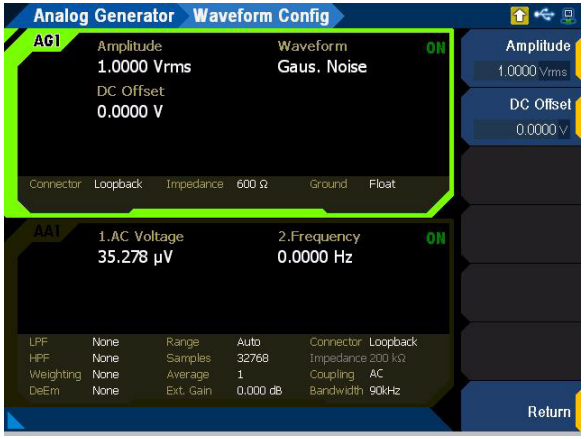

Figure 3-15 Analog Generator > Waveform Config menu page (Gaussian noise)

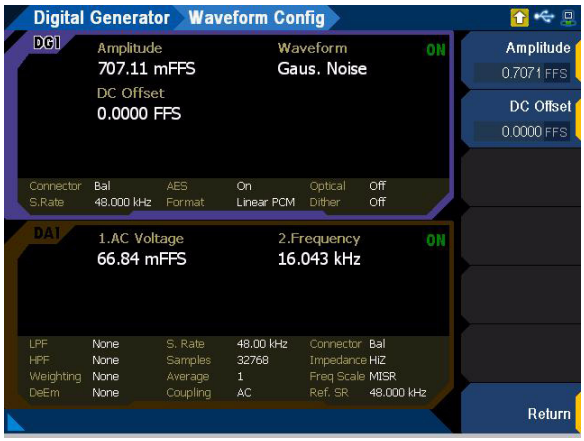

Figure 3-16 Digital Generator > Waveform Config menu page (Gaussian noise)

Table 3-9 Analog/Digital Generator > Waveform Config menu description (Gaussian noise)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
DC Offset	DC offset refers to the DC component of the waveform.

Rectangular noise

Rectangular noise is a noise signal based on Rectangular distribution.

Rectangular noise mode is applicable for both analog and digital generator. The waveform configuration for Rectangular noise is displayed as shown in **Figure 3-17** and **Figure 3-18** for both the analog and digital generator respectively.

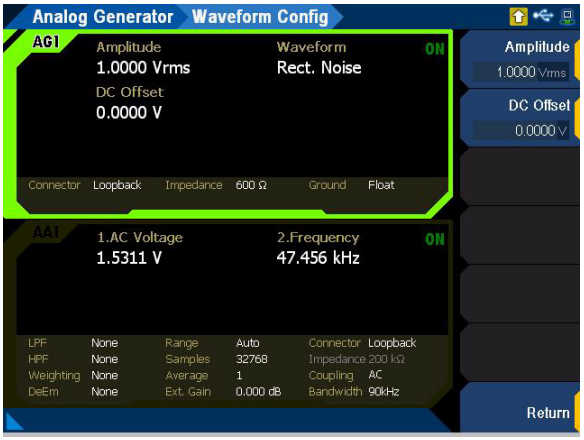

Figure 3-17 Analog Generator > Waveform Config menu page (Rectangular noise)

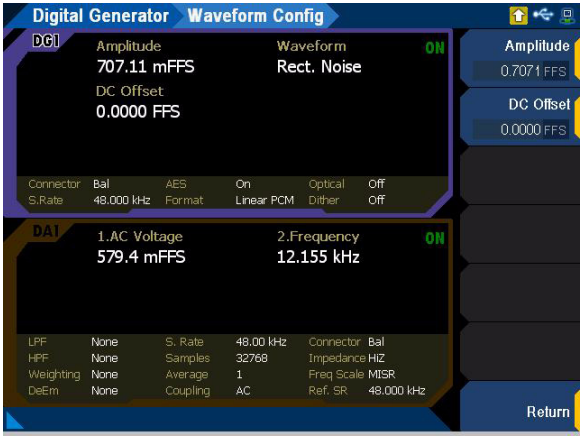

Figure 3-18 Digital Generator > Waveform Config menu page (Rectangular noise)

Table 3-10 Analog/Digital Generator > Waveform Config menu description (Rectangular noise)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
DC Offset	DC offset refers to the DC component of the waveform.

Triangular noise

Triangular noise mode is only applicable for the digital generator. The waveform configuration for triangular noise is displayed as shown in **Figure 3-19**.

Figure 3-19 Digital Generator > Waveform Config menu page (Triangular noise)

Table 3-11 Digital Generator > Waveform Config menu description (Triangular noise)

Menu	Description
Amplitude	Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
DC Offset	DC offset refers to the DC component of the waveform.

Pink noise

Pink noise is a noise signal that contains an equal sound pressure level in each octave band where the energy decreases as frequency increases.

Pink noise mode is applicable for both analog and digital generator. The waveform configuration for pink noise is displayed as shown in **Figure 3-20** and **Figure 3-21** for both the analog and digital generator respectively.

Figure 3-20 Analog Generator > Waveform Config menu page (Pink noise)

Figure 3-21 Digital Generator > Waveform Config menu page (Pink noise)

Table 3-12 Analog/Digital Generator > Waveform Config menu description (Pink noise)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak, while Vrms is equivalent to Vpeak/$\sqrt{2}$.
DC Offset	DC offset refers to the DC component of the waveform.

Square waveform

Square waveform is a waveform that ideally alternates regularly and instantaneously between two levels.

Square waveform mode is applicable for both analog and digital generator. The waveform configuration for square waveform is displayed as shown in **Figure 3-22** and **Figure 3-23** for both the analog and digital generator respectively.

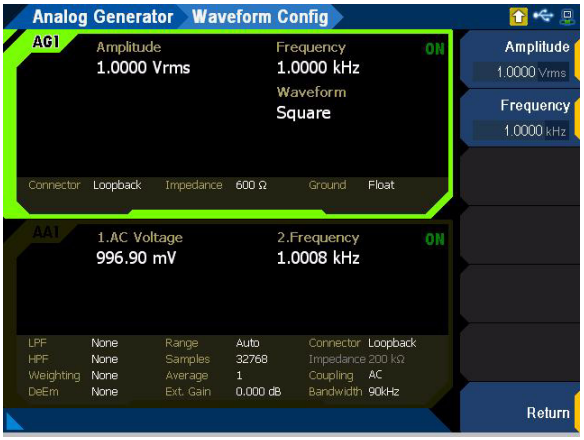

Figure 3-22 Analog Generator > Waveform Config menu page (square waveform)

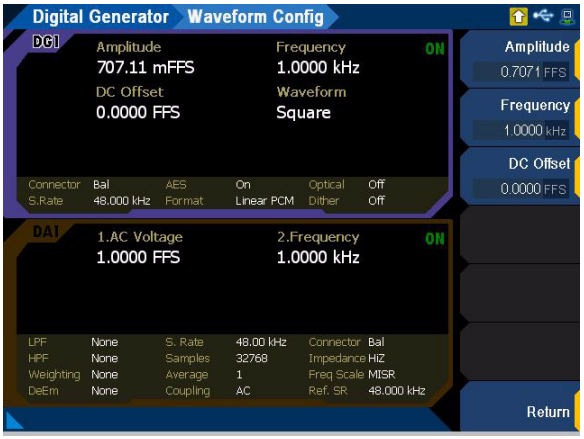

Figure 3-23 Digital Generator > Waveform Config menu page (square waveform)

Table 3-13 Analog/Digital Generator > Waveform Config menu description (square waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Frequency	Frequency refers to the frequency of the square waveform.
DC Offset	This is only available for the digital generator. DC offset refers to the DC component of the waveform.

DC signal

DC signal output is used when a low current DC supply is required. Examples include, biasing amplifiers or other similar circuitry.

DC signal mode is applicable for the analog generator only. The waveform configuration for DC signal is displayed as shown in **Figure 3-24**.

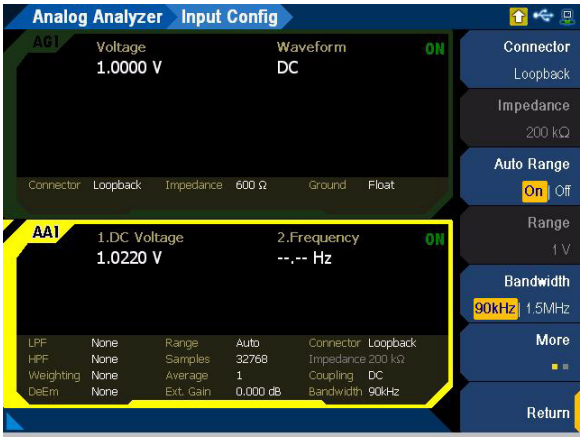

Figure 3-24 Analog Generator > Waveform Config menu page (DC signal)

Table 3-14 Analog Generator > Waveform Config menu description (DC signal)

Menu	Description
Voltage	Voltage refers to the amplitude of the composite signal.

Sine burst waveform

Sine burst waveform is usually a sine wave that is switched between two levels. Sine burst waveform mode is applicable for the digital generator only. The waveform configuration for sine burst waveform is displayed as shown in **Figure 3-25**.

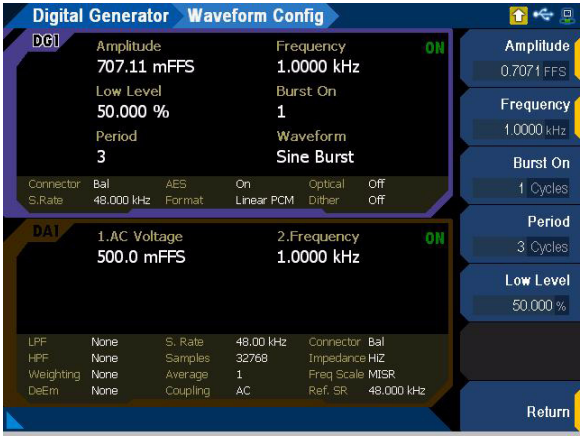

Figure 3-25 Digital Generator > Waveform Config menu page (sine burst)

Table 3-15 Digital Generator > Waveform Config menu description (sine burst)

Menu	Description
Amplitude	Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak, and Vrms is equivalent to Vpeak/√2.
Frequency	Frequency refers to the frequency for the first sine component.
Burst On	Burst on refers to the number of cycles at which the signal amplitude will be at the higher level. The burst on value must be less than the period value by one cycle.
Period	Period refers to the number of cycles from the beginning of one burst to the beginning of the next burst. The period value must be at least one cycle greater than the burst on.
Low Level	Low level refers to the amplitude ratio of Burst On over Burst Off.

Stereo waveform

Stereo waveform generates two independent sine waveforms for channel 1 and channel 2. Stereo waveform mode is applicable for the digital generator only. For analog generator, stereo waveform can be generated with a sinewave at two different channels. The waveform configuration for stereo waveform is displayed as shown in **Figure 3-26**.

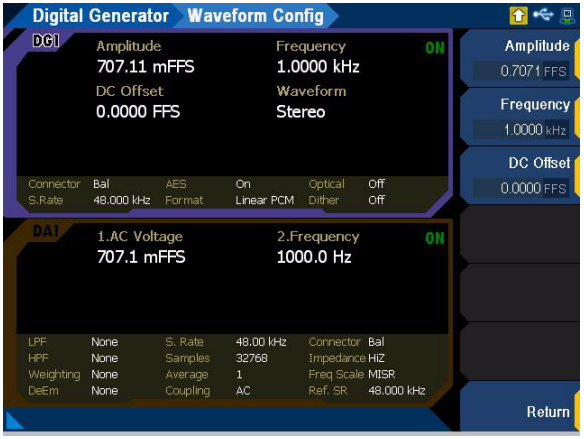

Figure 3-26 Digital Generator > Waveform Config menu page (stereo)

Table 3-16 Digital Generator > Waveform Config menu description (stereo)

Menu	Description
Amplitude	Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Frequency	Frequency refers to the frequency for the first sine component.
DC Offset	DC offset refers to the DC component of the waveform.

Monotonicity

Monotonicity waveform consists of a repeating square-wave staircase signal. The duration for each half cycle of the square wave is determined by the Samples/Step parameter.

Monotonicity waveform mode is applicable for the digital generator only. The waveform configuration for monotonicity waveform is displayed as shown in **Figure 3-27**.

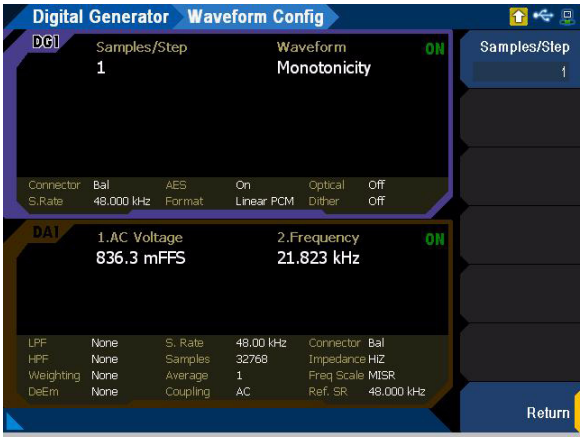

Figure 3-27 Digital Generator > Waveform Config menu page (monotonicity)

Table 3-17 Digital Generator > Waveform Config menu description (monotonicity)

Menu	Description
Samples/Step	Samples/step refers to the duration for each half cycle of the square wave.

Constant value waveform

Constant value mode outputs a continuous stream of data samples at the same fixed value. This mode helps in the investigation of data-dependent errors in digital systems. In order to repeat a specific error, a fixed value must be used.

Constant value waveform mode is applicable for the digital generator only. The waveform configuration for constant value waveform is displayed as shown in **Figure 3-28**.

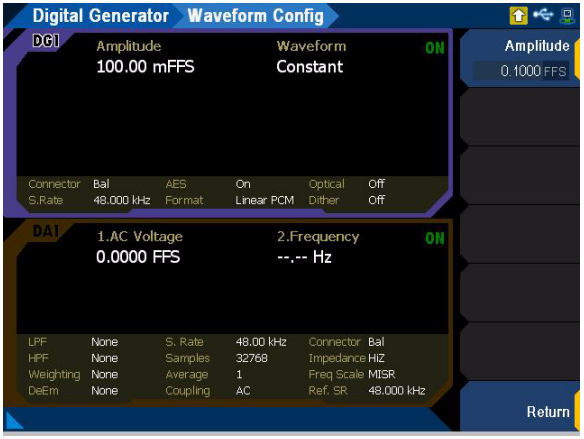

Figure 3-28 Digital Generator > Waveform Config menu page (constant)

Table 3-18 Digital Generator > Waveform Config menu description (constant)

Menu	Description
Amplitude	Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.

Walking zero

In walking zero waveform mode, one bit is set to 0 and the rest of the bits are set to 1. The bit 0 is continuously incremented from the least significant bit (LSB) to the most significant bit (MSB) and loops back to the LSB.

Walking zero waveform mode is applicable for the digital generator only. The waveform configuration for walking zero waveform is displayed as shown in **Figure 3-29**.

Figure 3-29 Digital Generator > Waveform Config menu page (walking zero)

Table 3-19 Digital Generator > Waveform Config menu description (walking zero)

Menu	Description
Samples/Step	Samples/step refers to the speed the single bit 0 is incremented.

Walking one

In walking one waveform mode, one bit is set to 1 and the rest of the bits are set to 0. The bit 1 is continuously incremented from the least significant bit (LSB) to the most significant bit (MSB) and loops back to the LSB.

Walking one waveform mode is applicable for the digital generator only. The waveform configuration for walking one waveform is displayed as shown in **Figure 3-30**.

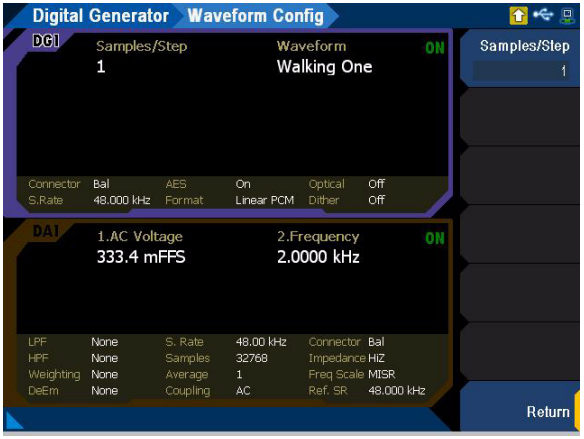

Figure 3-30 Digital Generator > Waveform Config menu page (walking one)

Table 3-20 Digital Generator > Waveform Config menu description (walking one)

Menu	Description
Samples/Step	Samples/step refers to the speed the single bit 1 is incremented.

Arbitrary waveform

You can load a properly formatted waveform file into the U8903B as a sequence of waveform samples. The samples are outputted at a fixed sampling rate of 192 kHz from the generator, in a continuous sequence. The waveform files must be in the `.arb` or `.wav` file type. For .wav file type, mono or stereo audio with 8, 16, or 24 bits per sample are supported.

Arbitrary waveform mode is applicable for both analog and digital generator. The waveform configuration for arbitrary waveform is displayed as shown in **Figure 3-31** and **Figure 3-32** for both the analog and digital generator respectively. Refer to "**Appendix O: Arbitrary File Format**" on page 512 for more information on the arbitrary waveform file format.

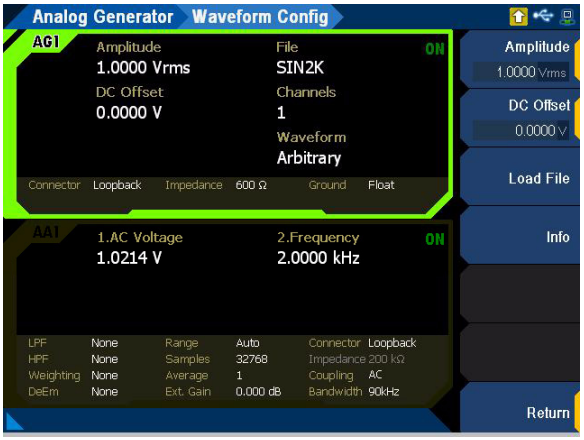

Figure 3-31 Analog Generator > Waveform Config menu page (arbitrary waveform)

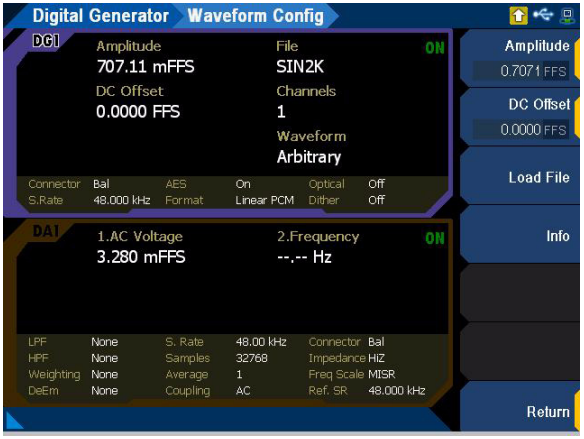

Figure 3-32 Digital Generator > Waveform Config menu page (arbitrary waveform)

Table 3-21 Analog/Digital Generator > Waveform Config menu description (arbitrary waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
DC Offset	DC offset refers to the DC component of the waveform.
Load File	Press the **Load File** softkey to load a waveform from a file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Info	Press the **Info** softkey to display the loaded waveform information.

Multitone waveform

Multitone waveform is a composite waveform that is a summation of multiple independent sine waveforms. This feature is useful in measuring different characteristics of audio devices from a single acquisition of audio data.

Multitone waveform mode is applicable for both analog and digital audio generator. The waveform configuration for multitone waveform is displayed as shown in **Figure 3-33** and **Figure 3-34** for both the analog and digital generator respectively.

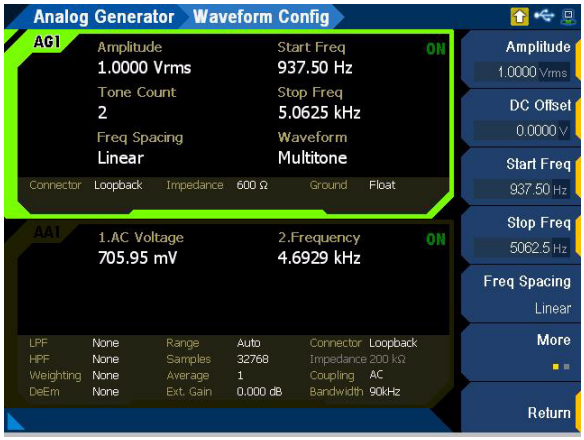

Figure 3-33 Analog Generator > Waveform Config menu page 1 (multitone waveform)

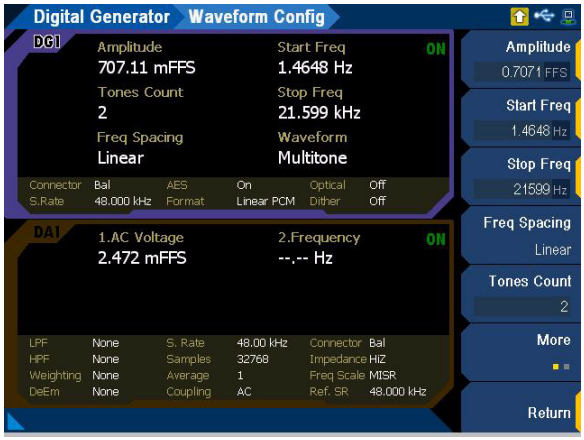

Figure 3-34 Digital Generator > Waveform Config menu page 1 (multitone waveform)

Table 3-22 Analog/Digital Generator > Waveform Config menu description (multitone waveform)

Menu	Description
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. Amplitude can be expressed as FFS, dBFS, or %FS for the digital generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
DC Offset	This is only available for the analog generator. DC offset refers to the DC component of the waveform.
Start Freq	Start Freq refers to the lowest frequency in the multitone waveform which is usually the frequency for the first tone.
Stop Freq	Stop Freq refers to the highest frequency in the multitone waveform which is usually the frequency for the last tone.
Freq Spacing	Freq Spacing refers to the frequency spacing between the tones. – Linear – Log – Custom
Tone Count	Tone Count refers to the number of signal frequency components. The maximum number of tones that can be generated is 60.
Length	Length refers to the waveform length that determines the number of samples used to create one iteration of the multitone waveform. Longer waveform length provides higher frequency resolution but will take more time to generate and process. – 1024 – 2048 – 4096 – 8192 – 16384 – 32768 – 65536
Custom	Press the **Custom** softkey to access the custom multitone menu page. You can set the frequency, amplitude, phase, and optimize the crest factor for each tone. Refer to "**Custom multitone**" on page 123 for more information on the custom multitone menu page.

Custom multitone

The custom multitone waveform configuration is displayed as shown in **Figure 3-35** and **Figure 3-36** for both the analog and digital generator respectively.

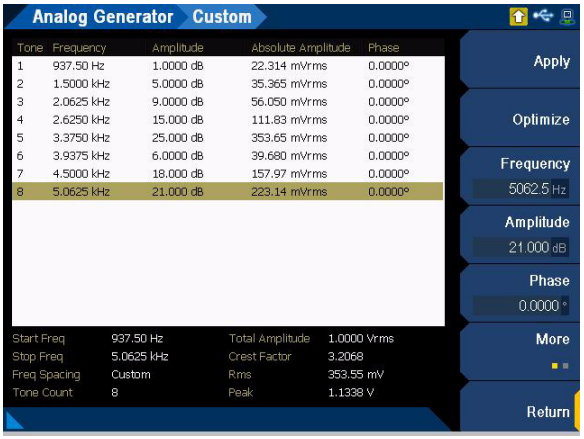

Figure 3-35 Analog Generator > Waveform Config > Custom menu page 1 (multitone waveform)

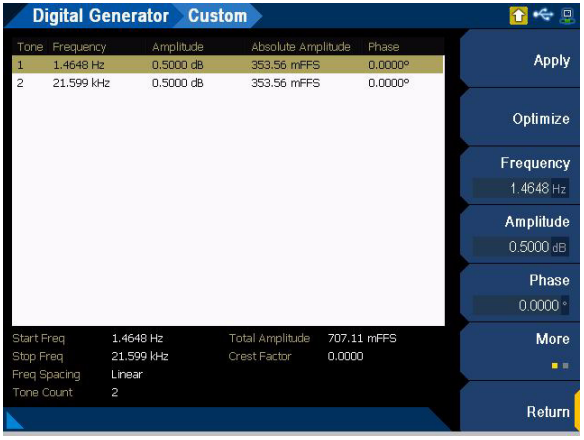

Figure 3-36 Digital Generator > Waveform Config > Custom menu page 1 (multitone waveform)

Table 3-23 Analog Generator > Waveform Config > Custom menu description (multitone waveform)

Menu	Description
Apply	Press the **Apply** softkey to apply the current setting on the selected tone for the custom multitone waveform.
Optimize	Press the **Optimize** softkey to optimize the crest factor for the custom multitone waveform.
Frequency	Press the **Frequency** softkey to set the frequency value for the custom multitone waveform.
Amplitude	Press the **Amplitude** softkey to set the amplitude value for the custom multitone waveform.
Phase	Press the **Phase** softkey to set the phase value for the custom multitone waveform.
Add Above	Press the **Add Above** softkey to add the tone above the selected tone for the custom multitone waveform.
Add Below	Press the **Add Below** softkey to add the tone below the selected tone for the custom multitone waveform.
Remove	Press the **Remove** softkey to remove the selected tone for the custom multitone waveform.
Clear	Press the **Clear** softkey to clear all the tones in the custom multitone waveform list.

Dual-Tone Multi-Frequency (DTMF)

Dual-Tone Multi-Frequency (DTMF), also known as touch-tone, is a system of signal tones used in telecommunications. Applications include voice mail, help desks, telephone banking, and others.

There are 12 DTMF signals where each of the signal is made up of two tones from the following selection:

- 697 Hz
- 770 Hz
- 852 Hz
- 941 Hz
- 1209 Hz
- 1336 Hz
- 1477 Hz

The tones are divided into two groups (low and high), and each DTMF signal uses one from each group. This prevents any harmonics from being misinterpreted as part of the signal. The waveform configuration for DTMF is displayed as shown in **Figure 3-37**.

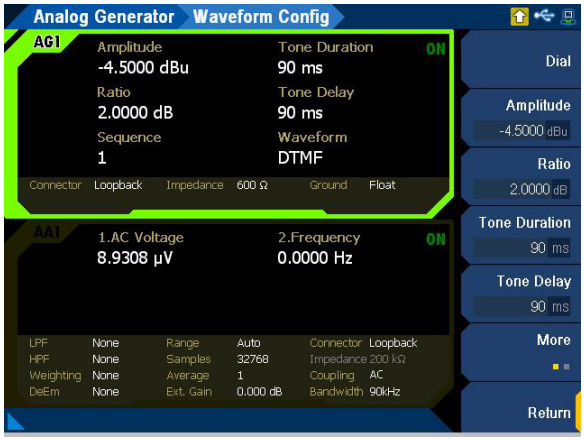

Figure 3-37 Analog Generator > Waveform Config menu page 1 (DTMF)

Table 3-24 Analog Generator > Waveform Config menu description (DTMF)

Menu	Description
Dial	Press **Dial** softkey to generate a single DTMF tone or modify the DTMF sequence. Refer to "**Dial**" on page 126 for more information.
Amplitude	Amplitude can be expressed as Vrms, Vpeak, Vpp, dBV, dBu, and dBm for the analog generator. For a perfect sine waveform without any DC offset, Vpp is twice Vpeak and Vrms is equivalent to Vpeak/√2.
Ratio	Ratio refers to the level difference between the high-frequency tone and low-frequency tone.
Tone Duration	Tone duration refers to the DTMF signal duration.
Tone Delay	Tone delay refers to the delay between two DTMF tones.
Pause Time	Pause Time refers to the interval time for the DTMF sequence.
Repeat	Press the **Repeat** softkey to enable or disable repeating the DTMF sequence.
Summation	Summation refers to the method to sum up two levels. – RSS The amplitude displayed is the Root Sum Square (RSS) summation result of the two levels. The analyzer will read the same amplitude set at generator regardless of tone ratio. – Linear The amplitude showed is the linear summation result of the two levels. The level of each tone can be easily calculated back from the tone ratio.

Dial

The dial mode allows you to generate a single DTMF tone or to modify the DTMF sequence. Press the **Mode** softkey to switch between Single or Sequence as the dial mode. Press the numeric keys on the DATA ENTRY panel to generate the respective DTMF tone as listed in **Table 3-26**. The Dial menu page is displayed as shown in **Figure 3-38**.

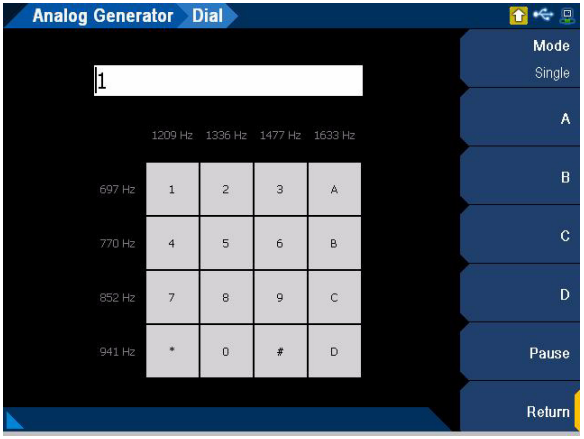

Figure 3-38 Dial menu page

Table 3-25 Dial menu page description

Menu	Description
Mode	Mode refers to the mode of operation for the dial mode. Single – You can dial a single DTMF tone using the numeric keys and A to D softkeys. Sequence – You can dial and modify the DTMF sequence.
A **B** **C** **D**	Single dial mode Press and hold the **A**, **B**, **C**, or **D** softkey to dial the A, B, C, or D tone respectively. Sequence dial mode Press the **A**, **B**, **C**, or **D** softkey to add the A tone to the DTMF sequence.
Pause	Pause refers to the pause to be added to the DTMF sequence. Press the **Pause** softkey to add a pause to the sequence in the form of a comma.

Table 3-26 DTMF tone mapping

DTMF tone	Description
0 to 9	Press the numeric keys on the DATA ENTRY panel to generate the DTMF 0 to 9 tones respectively.
*	Press  on the DATA ENTRY panel to generate the '*' DTMF tone.
#	Press  on the DATA ENTRY panel to generate the '#' DTMF tone.
A to D	Press the A to D softkeys to generate the DTMF A to D tones respectively.

Output Configuration (Analog Generator)

The output configuration for the analog generator is displayed as shown in **Figure 3-39**.

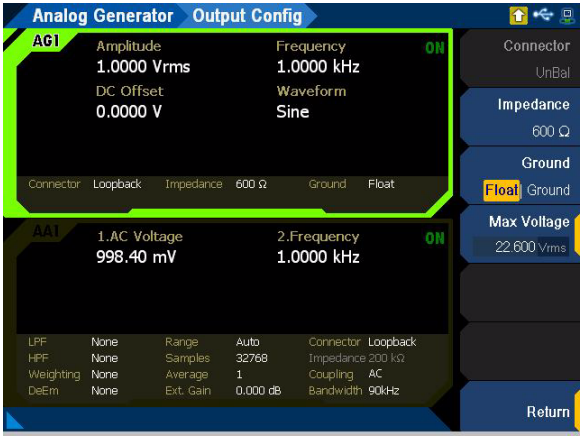

Figure 3-39 Analog Generator > Output Config menu page

Table 3-27 Analog Generator > Output Config menu description

Menu	Description
Connector	Press the **Connector** softkey to select the output connector type. – Bal Balanced mode outputs a pair of differential signals which are equal in amplitude but 180 degrees out of phase on the XLR positive and negative pins. – UnBal Unbalanced mode outputs a signal referenced to ground on the BNC output connector. – Com Common mode outputs a pair of equal amplitude and in-phase signals on the XLR positive and negative pins. The common mode test signal is applied to both pins 2 and 3 or the XLR connector, while pin 1 is connected to the return signal. – IEC60268 The common mode test signal is applied to both pins 2 and 3 or the XLR connector, while pin 1 is connected to the return signal. An additional 10 Ω output series resistance is added to pin 2 or 3.
Impedance	Press the **Impedance** softkey to select the output impedance value. For Bal, Com, and IEC60268 – 600 Ω – 100 Ω – 40 Ω For UnBal – 600 Ω – 50 Ω – 20 Ω

Table 3-27 Analog Generator > Output Config menu description (continued)

Menu	Description
IEC60268 10 Ω	Press the **IEC60268 10 Ω** softkey to select the additional 10 Ω output series resistance for pin 2 or 3 of the XLR connector in the common IEC60268 configuration. This setting is only available when the output connector type is set to IEC60268. – Pin2 Additional 10 Ω is added to pin 2. – Pin3 Additional 10 Ω is added to pin 3.
Ground	Press the **Ground** softkey to select the grounding type. – Float In the floating grounding type, the signal return line (XLR pin 1 for balanced output or BNC return for unbalanced output) is not grounded to the chassis earth and is “floating”. – Ground In the ground grounding type, the signal return line (XLR pin 1 for balanced output or BNC return for unbalanced output) is connected to the chassis earth.
Max Voltage	Press the **Max Voltage** softkey to set the maximum voltage. The maximum voltage value set will limit the maximum amplitude output from the generator and prevent any excessive high voltage values from damaging the device under test (DUT).

Output Configuration (Digital Generator)

The output configuration for the digital generator is displayed as shown in **Figure 3-40**.

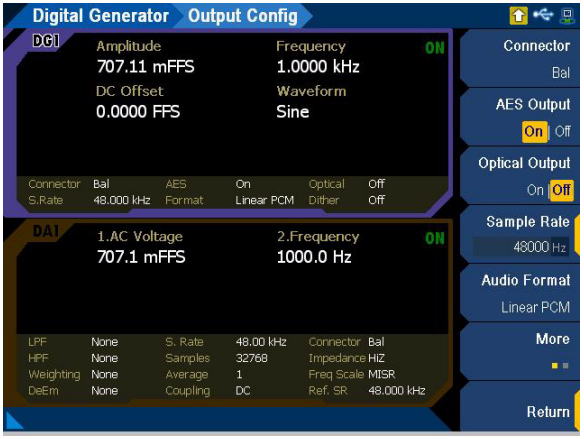

Figure 3-40 Digital Generator > Output Config menu page 1

Table 3-28 Digital Generator > Output Config menu description

Menu	Description
Connector	Press the **Connector** softkey to select the output connector type. – Bal Balanced mode outputs a digital signal on the XLR output connector at the U8903B rear panel. – UnBal Unbalanced mode outputs a digital signal on the BNC output connector at the U8903B rear panel.
AES Output	Press the **AES Output** softkey to enable or disable the AES output.
Optical Output	Press the **Optical Output** softkey to enable or disable the optical output.
Sample Rate	Press the **Sample Rate** softkey to set the sample rate value.
Audio Format	Press the **Audio Format** softkey to select the encoding audio format. – Linear PCM – A-Law – μ-Law
Dither	Press the **Dither** softkey to select the dither type. Dither is a noise component that can be superimposed on a signal. – Off – Rectangular – Triangular – Shaped
Ref Clock	Press the **Ref Clock** softkey to configure the reference clock settings. Refer to "**Reference clock**" on page 131 for more information.
Sync Clock	Press the **Sync Clock** softkey to configure the sync clock settings. Refer to "**Sync clock**" on page 132 for more information.

Reference clock

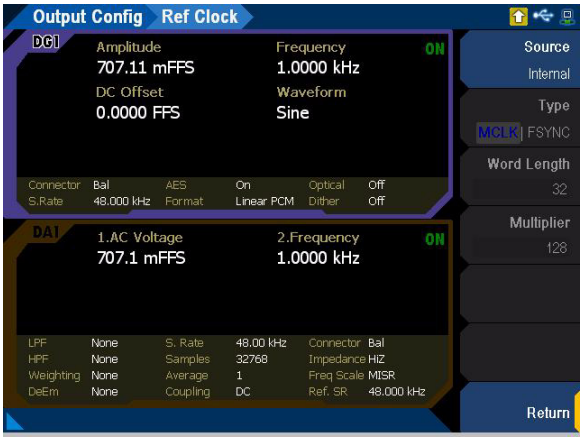

Figure 3-41 Digital Generator > Output Config > Ref Clock menu page

Table 3-29 Digital Generator > Output Config > Ref Clock menu description

Menu	Description
Source	Press the **Source** softkey to select the reference clock source. Refer to "**Appendix R: Digital System Clock Distribution Block Diagram**" on page 518 for more information on the system clock. – Internal – AES RCLK – External
Type	Press the **Type** softkey to select the external reference clock source. Refer to "**Appendix R: Digital System Clock Distribution Block Diagram**" on page 518 for more information on the system clock. – MCLK – FSYNC
Word Length	Press the **Word Length** softkey to set the external reference clock word length value. – 8 to 32
Multiplier	Press the **Multiplier** softkey to set the external reference clock multiplier value. The selection available in the external reference clock multiplier depends on the external reference clock word length.

Sync clock

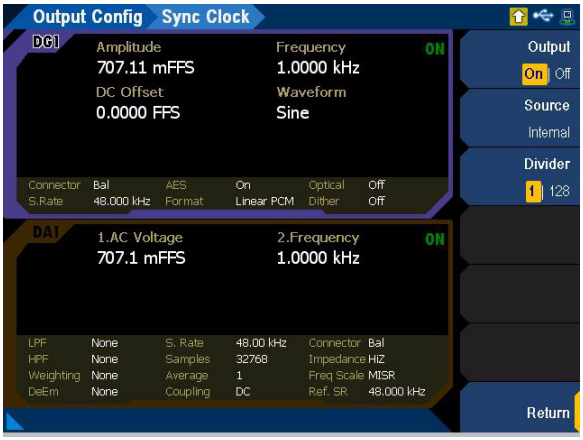

Figure 3-42 Digital Generator > Output Config > Sync Clock menu page

Table 3-30 Digital Generator > Output Config > Sync Clock menu description

Menu	Description
Output	Press the **Output** softkey to enable or disable the synchronous clock output.
Source	Press the **Source** softkey to select the synchronous clock source. Refer to "**Appendix R: Digital System Clock Distribution Block Diagram**" on page 518 for more information on the system clock. – Internal – AES RCLK – External
Divider	Press the **Divider** softkey to select the synchronous clock divider value. When the synchronous clock divider is set to 1, the synchronous clock is locked to 128 × sampling rate (bi-phase clock). When the synchronous clock divider is set to 128, the synchronous clock is divided by 128 which is equal to the sampling rate set at the U8903B. – 1 – 128

DSI Output Configuration (Digital Generator)

The DSI output configuration for the digital generator is displayed as shown in **Figure 3-43**.

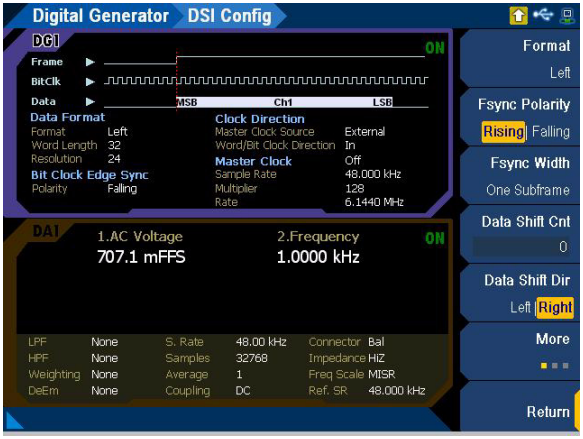

Figure 3-43 Digital Generator > DSI Config menu page 1

Table 3-31 Digital Generator > DSI Output Config menu description

Menu	Description
Voltage	Press the **Voltage** softkey to select the output voltage or set your desired output voltage. – 1.2 Vpp – 1.5 Vpp – 1.8 Vpp – 2.5 Vpp – 3 Vpp – 3.3 Vpp
Channels	Press the **Channels** softkey to select the number of channels. – 2 – 4 – 6 – 8 – 10 – 12 – 14 – 16
Format	Press the **Format** softkey to select the DSI output format. – Left – Right – I2S – DSP

Table 3-31 Digital Generator > DSI Output Config menu description (continued)

Menu	Description
Resolution	Press the **Resolution** softkey to set the audio resolution. – 8 to 24
BClk Edge	Press the **BClk Edge** softkey to select the clock edge type. – Rising – Falling
Fsync Polarity	Press the **Fsync Polarity** softkey to select the sync polarity. – Rising – Falling
Fsync Width	Press the **Fsync Width** softkey to select the sync width. – One Bit Clock – One Subframe – 50% Duty Cycle
Data Shift Cnt	Press the **Data Shift Cnt** softkey to set the data shift count value.
Data Shift Dir	Press the **Data Shift Dir** softkey to select the data shift direction. – Left – Right
Mclk Output	Press the **Mclk Output** softkey to enable or disable the master clock output.
Word Length	Press the **Word Length** softkey to set the master clock word length value. The word length cannot be less than the audio resolution. – 8 to 32
Multiplier	Press the **Multiplier** softkey to set the multiplier value.
Sample Rate	Press the **Sample Rate** softkey to set the sample rate value.

AES3/SPDIF Output Configuration (Digital Generator)

The AES3/SPDIF output configuration for the digital generator is displayed as shown in **Figure 3-44**.

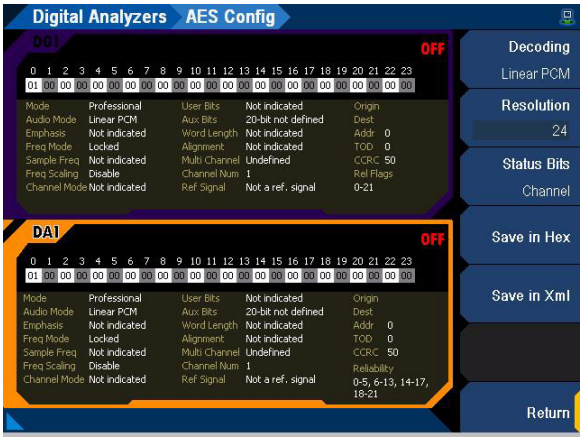

Figure 3-44 Digital Generator > AES Config menu page 1

Table 3-32 Digital Generator > AES Config menu description

Menu	Description
Level	Press the **Level** softkey to set the output voltage level.
Resolution	Press the **Resolution** softkey to set the audio resolution value. – 8 to 24
Validity Bit	Press the **Validity Bit** softkey to select the vailidty bit. – Set – Clear
Format	Press the **Format** softkey to select the AES3/SPDIF format. – Consumer – Professional
Status Bits	Press the **Status Bits** softkey to select the status bits type. – Channel – User
Edit Bits	Press the **Edit Bits** softkey to configure the bits according to the format selected. Refer to "**Edit Bits (Consumer format)**" on page 136 and "**Edit Bits (Professional format)**" on page 141 for more information.
Clear Bits	Press the **Clear Bits** softkey to clear all the bits.
Save File	Press the **Save File** softkey to save the bits to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Load File	Press the **Load File** softkey to load the bits from a file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.

Edit Bits (Consumer format)

The AES3/SPDIF bits configuration for the Consumer format is displayed as shown in **Figure 3-45**.

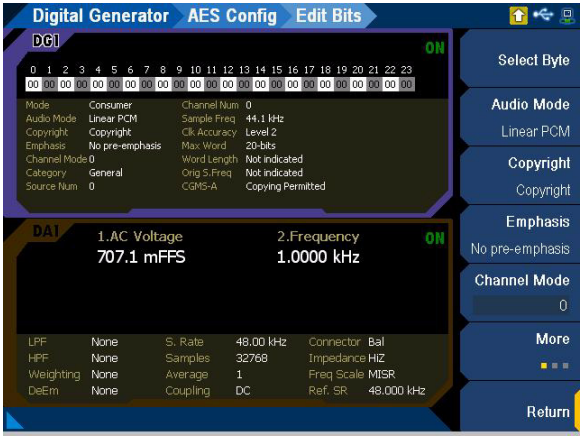

Figure 3-45 Digital Generator > AES Config > Edit Bits (Consumer format) menu page 1

Table 3-33 Digital Generator > AES Config > Edit Bits (Consumer format) menu description

Menu	Description
Select Byte	Press the **Select Byte** softkey to select the byte and edit the byte.
Audio Mode	Press the **Audio Mode** softkey to select the audio mode. – Non-Linear PCM – Linear PCM
Copyright	Press the **Copyright** softkey to select the copyright type. – Copyright – Non-copyright
Emphasis	Press the **Emphasis** softkey to select the emphasis type. – No pre-emphasis – 50/15 µs – Reserved 1 – Reserved 2
Channel Mode	Press the **Channel Mode** softkey to set the channel mode value. – 0 to 3

Table 3-33 Digital Generator > AES Config > Edit Bits (Consumer format) menu description (continued)

Menu	Description
Category	Press the **Category** softkey to select the category code type. – General – Laser Optical – D/D Converter – Magnetic – Digital Broadcast 1 – Digital Broadcast 2 – Musical Instrument – ADC Non Copyright – Solid State Memory – ADC Copyright – Experimental – Reserved 1 – Reserved 2
Source Num	Press the **Source Num** softkey to set the source number. – 0 to 15
Channel Num	Press the **Channel Num** softkey to set the channel number. – 0 to 15
Sample Freq	Press the **Sample Freq** softkey to select the sample frequency value. – Not indicated – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz – 768 kHz
Clk Accuracy	Press the **Clk Accuracy** softkey to select the clock accuracy type. – Level 1 – Level 2 – Level 3 – Reserved
Max Word Len	Press the **Max Word Len** softkey to select the maximum word length. – 24 bits – 20 bits

Table 3-33 Digital Generator > AES Config > Edit Bits (Consumer format) menu description (continued)

Menu	Description
Word Length	Press the **Word Length** softkey to select the word length. 24 bits maximum word length – Not indicated – 20 bits – 21 bits – 22 bits – 23 bits – 24 bits 20 bits maximum word length – Not indicated – 16 bits – 17 bits – 18 bits – 19 bits – 20 bits
Orig Samp	Press the **Orig Samp** softkey to select the original sample frequency value. – Not indicated – 8 kHz – 11.025 kHz – 12 kHz – 16 kHz – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz – Reserved 1 – Reserved 2
CGMA-A	Press the **CGMA-A** softkey to select the CGMA-A type. – Copying Permitted – Condition Not Used – One Generation Copy – Copying Denied

Table 3-34 AES3/SPDIF Consumer mode bit description

Bits	Label	Description		
0	Application mode	0: Consumer 1: Professional		
1	Non-audio	0: Audio data is linear PCM samples 1: Other than linear PCM samples		
2	Copyright	0: Asserted 1: Not asserted		
3 – 5	Emphasis	000: Emphasis not indicated 100: CD-type emphasis		
6 – 7	Channel status mode	00: Mode zero Other values reserved		
8 – 15	Category code	Bit 8 is LSB		
16 – 19	Source number	Bit 16 is LSB		
20 – 23	Channel number	Bit 20 is LSB		
24 – 27	Sampling frequency	0000: 44.1 kHz 0100: 48 kHz 1100: 32 kHz		
28 – 29	Clock accuracy	10: Level I, ±50 ppm 00: Level II, ±1000 ppm 01: Level III, variable pitch shifted		
30 – 31	Reserved			
32	Word length (field size)	0: Maximum length 20 bits 1: Maximum length 24 bits		
33 – 35	Word length		If bit 32 = 1	If bit 32 = 0
		000	Not indicated	Not indicated
		101	24 bits	20 bits
		001	23 bits	19 bits
		010	22 bits	18 bits
		011	21 bits	17 bits
		100	20 bits	16 bits

Table 3-34 AES3/SPDIF Consumer mode bit description (continued)

Bits	Label	Description
36 – 39	Original sampling frequency	1111: 44.1 kHz 1110: 88.2 kHz 1101: 22.05 kHz 1100: 176.4 kHz 1011: 48 kHz 1010: 96 kHz 1001: 24 kHz 1000: 192 kHz 0111: Reserved 0110: 8 kHz 0101: 11.025 kHz 0100: 12 kHz 0011: 32 kHz 0010: Reserved 0001: 16 kHz 0000: Not indicated
40 – 41	CGMS-A	00: Copying permitted 01: Condition not used 10: One generation copy 11: Copying denied
42 – 192	Reserved	

Edit Bits (Professional format)

The AES3/SPDIF bits configuration for the Professional format is displayed as shown in **Figure 3-45**.

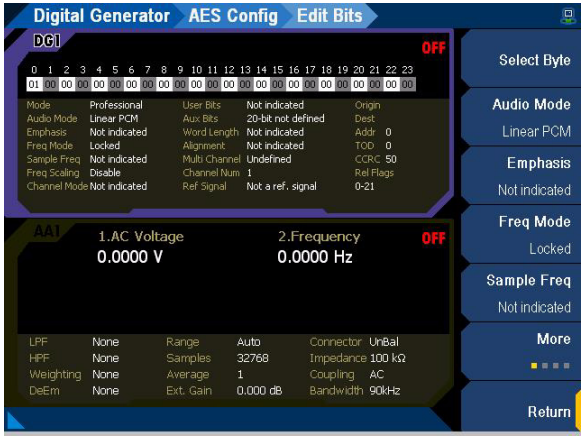

Figure 3-46 Digital Generator > AES Config > Edit Bits (Consumer format) menu page 1

Table 3-35 Digital Generator > AES Config > Edit Bits (Professional format) menu description

Menu	Description
Select Byte	Press the **Select Byte** softkey to select the byte and edit the byte.
Audio Mode	Press the **Audio Mode** softkey to select the audio mode. – Non-Linear PCM – Linear PCM
Emphasis	Press the **Emphasis** softkey to select the emphasis type. – Not indicated – No pre-emphasis – 50/15 µs – CCITT J.17
Freq Mode	Press the **Freq Mode** softkey to select the frequency mode. – Locked – Unlocked

Table 3-35 Digital Generator > AES Config > Edit Bits (Professional format) menu description (continued)

Menu	Description
Sample Freq	Press the **Sample Freq** softkey to select the sample frequency value. – Not indicated – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz
Freq Scaling	Press the **Freq Scaling** softkey to enable or disable frequency scaling.
Chan Mode	Press the **Chan Mode** softkey to select the channel mode. – Not indicated – 2-channel – Single channel – Primary-Secondary – Stereo – Reserved 1 – Reserved 2 – Mono Double Rate – Left Double Rate – Right Double Rate – Multichannel
User Bits	Press the **User Bits** softkey to select the user bits type. – Not indicated – 192-bit block – Reserved for AES18 – User defined – Reserved for Metadata – As in IEC60958-3
Aux Bits	Press the **Aux Bits** softkey to select the auxiliary bits. – 20-bit not defined – 24-bit main audio – 20-bit single – Reserved

Table 3-35 Digital Generator > AES Config > Edit Bits (Professional format) menu description (continued)

Menu	Description
Word Length	Press the **Word Length** softkey to select the word length. 24 bits maximum word length – Not indicated – 20 bits – 21 bits – 22 bits – 23 bits – 24 bits 20 bits maximum word length – Not indicated – 16 bits – 17 bits – 18 bits – 19 bits – 20 bits
Alignment	Press the **Alignment** softkey to select the alignment level. – Not Indicated – –18.06 dBFS – –20 dBFS – Reserved
Multi-Channel	Press the **Multi-Channel** softkey to select the multi-channel status. – Defined – Undefined
Multi-Ch Mode	This is only available when the multi-channel status is set to Defined. Press the **Multi-Ch Mode** softkey to select the multi-channel mode. – Mode 0 – Mode 1 – Mode 2 – Mode 3 – User Defined
Channel Num	Press the **Channel Num** softkey to set the channel number. – 1 to 16 (Defined multi-channel status) – 1 to 128 (Undefined multi-channel status)
Ref Signal	Press the **Ref Signal** softkey to select the reference signal type. – Not a ref. signal – Grade 1 – Grade 2 – Reserved
Channel Origin	Press the **Channel Origin** softkey to set the channel origin value (4 alphanumeric digit).
Channel Dest	Press the **Channel Dest** softkey to set the channel destination value (4 alphanumeric digit).
Local Addr	Press the **Local Addr** softkey to set the local address value. – 0 to 2^{32}–1

Table 3-35 Digital Generator > AES Config > Edit Bits (Professional format) menu description (continued)

Menu	Description
Time of Day	Press the **Time of Day** softkey to set the time of day. – 0 to 2^{32}–1
Rel Flags	Press the **Rel Flags** softkey to select the reliability flags. – 0-5 – 6-13 – 14-17 – 18-21

Table 3-36 AES3/SPDIF Professional mode bit description

Bits	Label	Description
0	Application mode	0: Consumer 1: Professional
1	Non-audio	0: Audio data is linear PCM samples 1: Other than linear PCM samples
2 – 4	Emphasis	000: Not indicated 100: No emphasis 110: CD-type emphasis 111: J-17 emphasis
5	Lock	0: Not indicated 1: Unlocked
6 – 7	Sampling frequency	00: Not indicated (or see byte 4) 10: 48 kHz 01: 44.1 kHz 11: 32 kHz
8 – 11	Channel mode	0000: Not indicated (default to 2 channels) 0001: 2 channels 0010: 1 channel (monophonic) 0011: Primary/secondary 0100: Stereo 0101: Reserved for user application 0110: Reserved for user application 0111: SCDSR (see byte 3 for ID) 1000: SCDSR (stereo left) 1001: SCDSR (stereo right) 1111: Multichannel (see byte 3 for ID) Single Channel Double Sample Rate (SCDSR)

Table 3-36 AES3/SPDIF Professional mode bit description (continued)

Bits	Label	Description		
12 – 15	User bit management	0000: Not indicated 0001: 192-bit block as in channel status 0010: As defined in AES18 0011: User-defined 0100: As in IEC60958-3 (consumer)		
16 – 18	Use of AUX sample word	0000: Not defined, audio maximum 20 bits 0001: Used for main audio, maximum 24 bits 0010: Used for coordination signal, audio maximum 20 bits 0011: User-defined		
19 – 21	Source word length		If maximum = 24 bits	If maximum = 20 bits
		000:	Not indicated	Not indicated
		001:	23 bits	19 bits
		010:	22 bits	18 bits
		011:	21 bits	17 bits
		100:	20 bits	16 bits
		101:	24 bits	20 bits
22 – 23	Alignment level	00: Not indicated 01: –20 dBFS 10: –18.06 dBFS		
24 – 31	Channel identification	If bit 31 = 0, then channel number is 1 plus the numeric value of bits 24 - 30. If bit 31 = 1, then bits 4 - 6 define a multichannel mode and bits 0 - 3 give the channel number within that mode.		
32 – 33	Digital Audio Reference Signal (DARS)	00: Not a DARS 01: DARS grade 1 (±1 ppm) 10: DARS grade 2 (±10 ppm)		
35 – 38	Sampling frequency	0000: Not indicated 1000: 24 kHz 0100: 96 kHz 1001: 22.05 kHz 0101: 88.2 kHz 1101: 176.4 kHz 1111: User defined		
39	Sampling frequency scaling	0: No scaling 1: Apply factor of 1/1.001 to value		
48 – 79	Alphanumeric channel origin	Four-character label using 7-bit ASCII with no parity. Bit 55, 63, 71, 79 = 0		
80 – 111	Alphanumeric channel destination	Four-character label using 7-bit ASCII with no parity. Bit 87, 95, 103, 111 = 0		
112 – 143	Local sample address code	32-bit binary number representing the sample count of the first sample of the channel status block		
144 – 175	Time of day code	32-bit binary number representing tiem source encoding in samples since midnight		

Table 3-36 AES3/SPDIF Professional mode bit description (continued)

Bits	Label	Description
176 – 183	Reliability flags	0: Data in byte range is reliable 1: Data in byte range is unreliable
184 – 191	CRCC	00000000: Not implemented nnnnnnnn: Error check code for bits 0 - 183

References (Analog Generator)

The output references for the analog generator is displayed as shown in **Figure 3-47**.

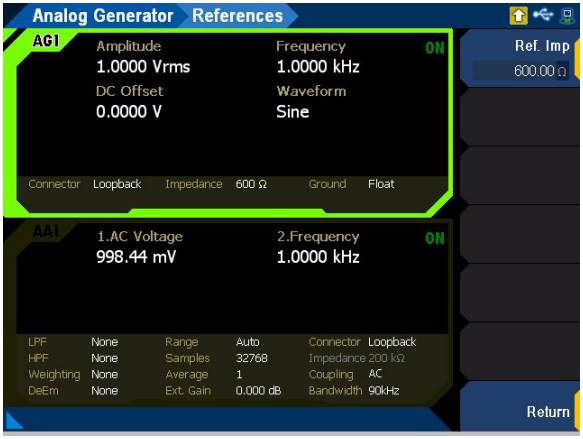

Figure 3-47 Analog Generator > References menu page

Table 3-37 Analog Generator > References menu description

Menu	Description
Ref. Imp	Press the **Ref. Imp** softkey to set the reference impedance for the unit conversion of dBm measurements.

References (Digital Generator)

The output references for the digital generator is displayed as shown in **Figure 3-48**.

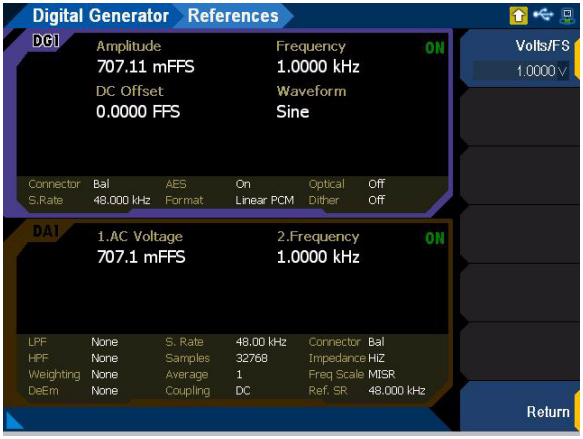

Figure 3-48 Digital Generator > References menu page

Table 3-38 Digital Generator > References menu description

Menu	Description
Volts/FS	Press the **Volts/FS** softkey to set the volts/FS reference for the analog output voltage (in Volts) of the DAC used when converted to digital full scale (1 FS). This is useful in DAC tests for the conversion of digital units to analog units.

4 Audio Analyzer Measurement Functions

This chapter describes the U8903B audio analyzer measurement functions and configurations.

Audio Analyzer

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode. The Analog Analyzer menu page and Digital Analyzer menu page are displayed as shown in **Figure 4-1** and **Figure 4-2** respectively.

Press Interface on the FUNCTION panel to switch between analog and digital interface.

Press 1 or 2 ABC on the DATA ENTRY panel to switch to channel 1 or channel 2 respectively and start configuring the active channel.

The U8903B can also be expanded with additional analog analyzer channels. Refer to "**U8903B Options**" on page 33 for more information.

Press On/Off on the RUN CONTROL panel to start or stop the measurements for the selected analyzer channel.

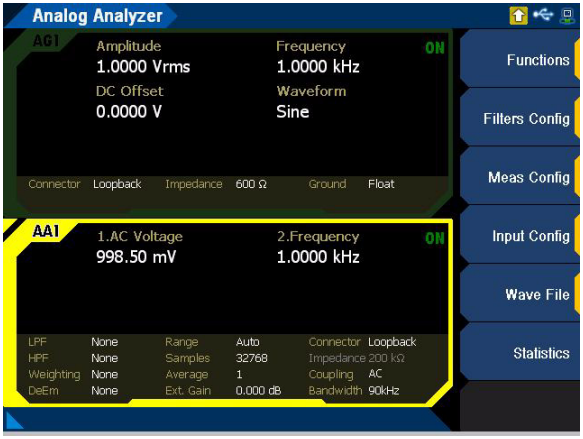

Figure 4-1 Analog Analyzer menu page

Table 4-1 Analog Analyzer menu description

Menu	Description
Functions	Press the **Functions** softkey to configure the analog analyzer functions. Refer to "**Functions**" on page 155 for more information.
Filters Config	Press the **Filters Config** to set the filters configuration. Refer to "**Filters Configuration (Analog Analyzer)**" on page 197 for more information.
Meas Config	Press the **Meas Config** to set the measurement configuration. Refer to "**Measurement Configuration (Analog Analyzer)**" on page 202 for more information.
Input Config	Press the **Input Config** softkey to set the input configuration. Refer to "**Input Configuration (Analog Analyzer)**" on page 206 for more information.
Wave File	Press the **Wave File** softkey to configure the wave file settings. Refer to "**Wave File (Analog Analyzer)**" on page 214 for more information.
Statistics	Press the **Statistics** softkey to configure the statistics settings. Refer to "**Statistics**" on page 215 for more information.

Figure 4-2 Digital Analyzer menu page (standard measurement mode)

Table 4-2 Digital Analyzer menu description

Menu	Description
Meas Mode	Press the **Meas Mode** softkey to select the measurement mode. Refer to "**Measurement mode**" on page 153 for more information. – Standard – Process Delay – BERT
Unit	This is only available when the measurement mode is BERT. Press the **Unit** softkey to select the unit for the BERT measurement mode. – Hex – Dec
Functions	This is only available when the measurement mode is Standard. Press the **Functions** softkey to configure the analog analyzer functions. Refer to "**Functions**" on page 155 for more information.
Filters Config	This is only available when the measurement mode is Standard. Press the **Filters Config** to set the filters configuration. Refer to "**Filters Configuration (Digital Analyzer)**" on page 200 for more information.
Meas Config	This is only available when the measurement mode is Standard. Press the **Meas Config** to set the measurement configuration. Refer to "**Measurement Configuration (Digital Analyzer)**" on page 204 for more information.
Input Config	Press the **Input Config** softkey to set the input configuration. Refer to "**Input Configuration (Digital Analyzer)**" on page 208 for more information.
DSI Config	Press the **DSI Config** softkey to set the DSI input configurations such as the format, resolution, and others. Refer to "**DSI Input Configuration (Digital Analyzer)**" on page 210 for more information.
AES/SPDIF	Press the **AES/SPDIF** softkey to set the AES3/SPDIF input configurations such as the decoding, resolution, and others. Refer to "**AES/SPDIF Input Configuration (Digital Analyzer)**" on page 212 for more information.
Bits Analysis	Press the **Bits Analysis** softkey to set the bits analysis configuration. Refer to "**Bits Analysis (Digital Analyzer)**" on page 213 for more information.
Statistics	Press the **Statistics** softkey to configure the statistics settings. Refer to "**Statistics**" on page 215 for more information.

Measurement mode

Standard

Standard mode is the default mode for the digital analyzer.

Process delay

The process delay measurement calculates the time difference between the output and input frames. A digital audio signal will have delay when the signal is transmitted through a DUT. The process delay measurement calculates the time difference between the first output frame signal and the first input frame signal. Due to the nature of measurements involving frame-to-frame delay, this measurement is only meant for the AES3 signal which has a unique frame pattern. Process delay mode allows you to view the process delay in seconds.

NOTE When the digital analyzer analysis mode is set to Process Delay, you are not allowed to perform any other types of measurements.

Figure 4-3 Digital Analyzer menu page (process delay measurement mode)

BERT (Bit Error Rate Test)

The BERT mode measurement will provide the total errors, total bits run, and bit error rate. This test will only be meaningful if the selected output and input connectors are the same type.

The U8903B is able to analyze all waveform types generated by the digital generator In BERT mode except for the following:

- Monotonicity
- Square wave with the frequency setting less than half the sampling rate
- Walking one or walking zero with the Sample per Step setting more than 1

NOTE If square wave for BERT analysis is needed, set the frequency of the square wave to be equal to half the sampling rate.

If walking one or walking zero for BERT analysis is needed, set the sample per step to be equal to 1.

NOTE When the digital analyzer measurement mode is set to BERT, you are not allowed to perform any other types of measurements.

Figure 4-4 Digital Analyzer menu page (BERT measurement mode)

Functions

The U8903B supports up to four functions to be measured in one single query. The function configuration for analog analyzer and digital analyzer are displayed as shown in **Figure 4-5** and **Figure 4-6**.

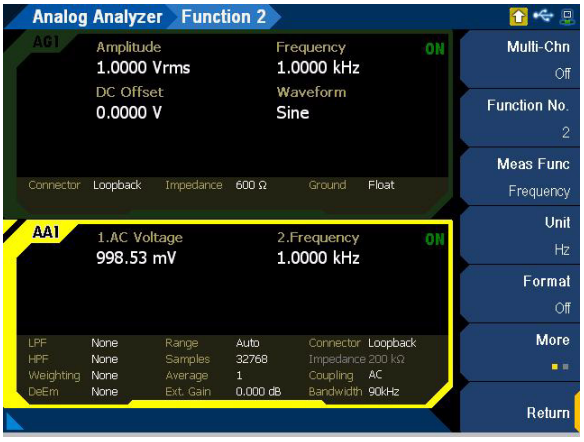

Figure 4-5 Analog Analyzer > Functions menu page 1

Figure 4-6 Digital Analyzer > Functions menu page 1

Table 4-3 Analog/Digital Analyzer > Functions menu description

Menu	Description
Multi-Chn	Press the **Multi-Chn** softkey to select the multichannel measurement mode. – Off The measurement functions are set independently across all channels. – Phase Refer to "**Phase Measurement**" on page 191 for the configuration. – X-Talk Refer to "**Crosstalk Measurement**" on page 194 for the configuration.
Function No.	Press the **Function No.** softkey to select the active function number to configure the settings.
Meas. Func.	Press the **Meas. Func.** softkey to display the list of available analyzer measurement function types. Select the desired measurement function from the drop-down list. Refer to "**Measurement Functions**" on page 157 for the respective measurement functions settings. This setting is only available when the multichannel mode is set to Off.

Measurement Functions

Frequency measurement

Frequency is a common and basic measurement function which is expressed in hertz (Hz). The U8903B uses software algorithm to detect the period of a repetitive waveform and the frequency is computed from the reciprocal of the period.

To obtain better accuracy and resolution, auto ranging should be enabled. For low-frequency signals, set a larger sample size to obtain better and more stable readings. Input filters can also be activated to remove unwanted high-frequency noise from the measured signal, allowing more stable readings.

Frequency measurement function mode is applicable for both analog and digital analyzer. The settings for frequency measurement are displayed as shown in **Figure 4-7** and **Figure 4-8** for both the analog and digital analyzer respectively.

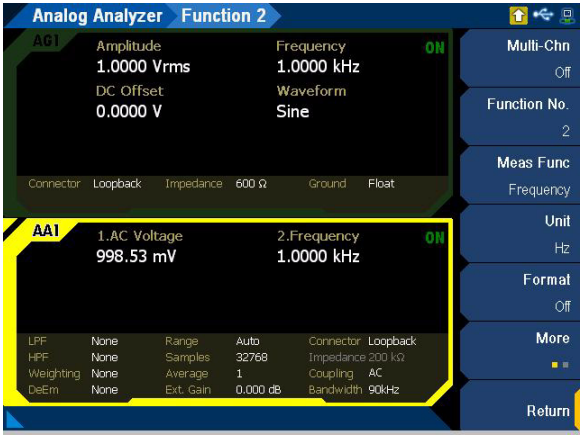

Figure 4-7 Analog Analyzer > Functions > Frequency menu page 1

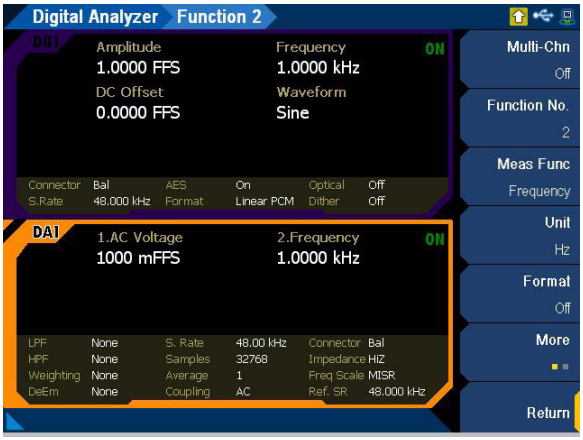

Figure 4-8 Digital Analyzer > Functions > Frequency menu page 1

Table 4-4 Analog/Digital Analyzer > Functions > Frequency menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – Hz – ΔHz
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference frequency from the measured frequency.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference frequency.
Ref. Freq	Press the **Ref. Freq** softkey to set the reference frequency.

AC voltage level measurement

NOTE Ensure that the input coupling is set to AC before measuring AC voltage level. Refer to "**Input Configuration (Analog Analyzer)**" on page 206 and "**Measurement Configuration (Digital Analyzer)**" on page 204 for more information.

AC voltage level measurement is the most common measurement function of an AC signal. The U8903B provides two types of AC level detection consisting of rms and peak-to-peak. When the rms detection method is selected, the AC voltage measurement is expressed as an rms value. Likewise, if the peak-to-peak detector is selected, the result is a peak-to-peak value.

As an example, for a 1 Vrms sine input signal, the display will show 1 V if the rms detector is selected. On the other hand, if the peak-to-peak detector is selected, the display will show 2.828 V (1.414 × 2).

AC voltage level measurement function mode is applicable for both analog and digital analyzer. The settings for AC voltage level measurement are displayed as shown in **Figure 4-9** and **Figure 4-10** for both the analog and digital analyzer respectively.

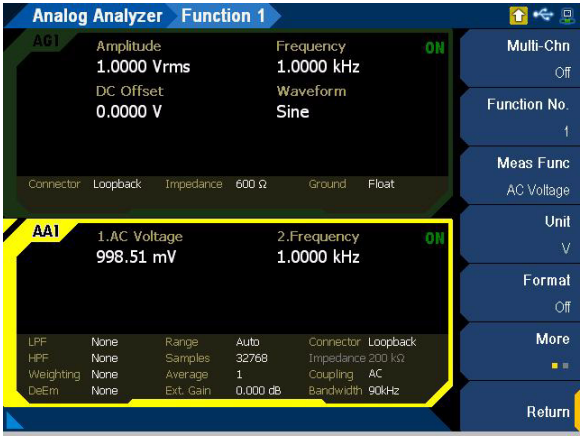

Figure 4-9 Analog Analyzer > Functions > AC Voltage menu page 1

Figure 4-10 Digital Analyzer > Functions > AC Voltage menu page 1

Table 4-5 Analog/Digital Analyzer > Functions > AC Voltage menu description

Menu	Description
	Press the **Unit** softkey to select the measurement unit. Analog Analyzer – dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x
Unit	Digital Analyzer – FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL

Table 4-5 Analog/Digital Analyzer > Functions > AC Voltage menu description (continued)

Menu	Description
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Logarithmic Selecting Logarithmic will return the measurement result by using the following formula: $20\log 10\left(\frac{\text{Measured rms voltage}}{\text{Reference level}}\right)$ The result is returned in unit dBr. – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x. – Delta Selecting Delta will return the meausrement result by deducting the reference level from the measured level. The result is returned in unit ΔV. This is only available for the analog analyzer.
Set to 0dB	This is only available for analog analyzer. Press the **Set to 0dB** softkey to store the measured level as the reference level, and set the measurement reading format to Logarithmic.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.
Ref. Imp	This is only available for the analog analyzer. Press the **Ref. Imp** softkey to set the reference impedance value. This setting is only available if the unit is set to W.
Volt/FS	This is only available for the digital analyzer. Press the **Volt/FS** softkey to set the volts/FS reference value.
Cal SPL	Press the **Cal SPL** softkey to set the calibrator level value. This setting is only available when the unit is set to dBSPL.
Detector	Press the **Detector** softkey to select the AC level detection type. – RMS – Pk-Pk

DC voltage level measurement

NOTE Ensure that the input coupling is set to DC before measuring DC voltage level. Refer to "**Input Configuration (Analog Analyzer)**" on page 206 and "**Measurement Configuration (Digital Analyzer)**" on page 204 for more information.

DC voltage levels are often encountered in audio equipment although they are not part of the audio signal, for example, bias voltages and outputs from AC-to-DC converters. DC voltage is expressed in volts (V). The input coupling must be set to DC for DC voltage level measurement.

DC voltage level measurement function mode is applicable for both analog and digital analyzer. The settings for DC voltage level measurement are displayed as shown in **Figure 4-11** and **Figure 4-12** for both the analog and digital analyzer respectively.

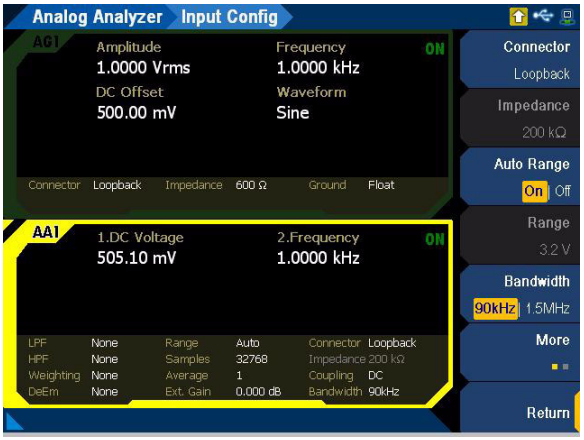

Figure 4-11 Analog Analyzer > Functions > DC Voltage menu page 1

Figure 4-12 Digital Analyzer > Functions > DC Voltage menu page 1

Table 4-6 Analog/Digital Analyzer > Functions > DC Voltage menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. Analog Analyzer – V – ΔV – x Digital Analayzer – FFS – V – Hex – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x. – Delta Selecting Delta will return the meausrement result by deducting the reference level from the measured level. The result is returned in unit ΔV. This is only available for the analog analyzer.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.

THD+N ratio and THD+N level measurements

Harmonic distortion on a spectrally pure signal is created by nonlinearities in the circuit through which it passes. The nonlinearities can arise in the transfer characteristics of an active device or by running the active device into saturation or cutoff. In most cases, distortion can be reduced by decreasing the signal level, applying filtering, or adding negative feedback.

According to Fourier mathematics, the nonlinear terms in the circuit transfer function give rise to harmonics of the signal. Therefore, the THD+N function provides a quantitative measurement of the quality of an audio signal or in other words, the purity of a signal.

The THD+N ratio is defined as the ratio of the square root of the sum of the squares of all the signal harmonics components and noise amplitude, relative to the total signal amplitude. The THD+N ratio can be computed as follows.

$$\text{THD+N ratio} = 20\,\text{Log}_{10}\left(\frac{\text{rms value of noise and distortion}}{\text{rms value of signal, noise, and distortion}}\right)$$

THD+N ratio measurement function mode is applicable for both analog and digital analyzer. The settings for THD+N ratio measurement are displayed as shown in **Figure 4-13** and **Figure 4-14** for both the analog and digital analyzer respectively.

Figure 4-13 Analog Analyzer > Functions > THD+N Ratio menu page 1

Figure 4-14 Digital Analyzer > Functions > THD+N Ratio menu page 1

Table 4-7 Analog/Digital Analyzer > Functions > THD+N Ratio menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x. – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB.
Set to 0dB	This is only available for analog analyzer. Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio value.
Precision	This is only available for digital analyzer. Press the **Precision** softkey to enable or disable the precision mode.

Table 4-7 Analog/Digital Analyzer > Functions > THD+N Ratio menu description (continued)

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

THD+N level is defined as the square root of the sum of the squares of all the signal harmonics components and noise amplitude, and it is expressed in Vrms. The THD+N level can be computed as follows.

THD+N Level = rms value of noise and distortion

THD+N level measurement function mode is applicable for both analog and digital analyzer. The settings for THD+N level measurement are displayed as shown in **Figure 4-15** and **Figure 4-16** for both the analog and digital analyzer respectively.

Figure 4-15 Analog Analyzer > Functions > THD+N Level menu page 1

Figure 4-16 Digital Analyzer > Functions > THD+N Level menu page 1

Table 4-8 Analog/Digital Analyzer > Functions > THD+N Level menu description

Menu	Description
	Press the **Unit** softkey to select the measurement unit. Analog Analyzer – dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x
Unit	Digital Analyzer – FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL

Table 4-8 Analog/Digital Analyzer > Functions > THD+N Level menu description (continued)

Menu	Description
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Logarithmic Selecting Logarithmic will return the measurement result by using the following formula: $20\log 10\left(\frac{\text{Measured rms voltage}}{\text{Reference level}}\right)$ The result is returned in unit dBr. – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x. – Delta Selecting Delta will return the meausrement result by deducting the reference level from the measured level. The result is returned in unit ΔV. This is only available for the analog analyzer.
Set to 0dB	This is only available for analog analyzer. Press the **Set to 0dB** softkey to store the measured level as the reference level, and set the measurement reading format to Logarithmic.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.
Ref. Imp	This is only available for the analog analyzer. Press the **Ref. Imp** softkey to set the reference impedance value. This setting is only available if the unit is set to W.
Volt/FS	This is only available for the digital analyzer. Press the **Volt/FS** softkey to set the volts/FS reference value.
Precision	This is only available for the digital analyzer. Press the **Precision** softkey to enable or disable the precision mode.
Cal SPL	Press the **Cal SPL** softkey to set the calibrator level value. This setting is only available when the unit is set to dBSPL.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

SINAD measurement

SINAD (Signal, Noise, and Distortion Ratio) is equal to the reciprocal of the distortion measurement. It is mostly used to determine the sensitivity of a communications receiver. The ratio computed in the SINAD measurement is shown as follows.

$$\text{SINAD} = 20\,\text{Log}\left(\frac{\text{rms value of signal, noise, and distortion}}{\text{rms value of noise and distortion}}\right)$$

SINAD measurement function mode is applicable for both analog and digital audio analyzer. The settings for SINAD measurement are displayed as shown in **Figure 4-17** and **Figure 4-18** for both the analog and digital analyzer respectively.

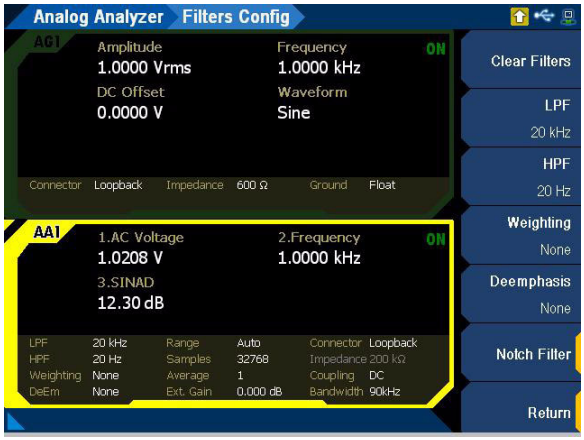

Figure 4-17 Analog Analyzer > Functions > SINAD menu page 1

Figure 4-18 Digital Analyzer > Functions > SINAD menu page 1

Table 4-9 Analog/Digital Analyzer > Functions > SINAD menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x. – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB.
Set to 0dB	This is only available for the analog analyzer. Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio value.
Precision	This is only available for the digital analyzer. Press the **Precision** softkey to enable or disable the precision mode.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

THD ratio and THD level measurements

THD (Total Harmonic Distortion) measures the selected harmonics amplitude that are generated due to the nonlinearity of the DUT and adding up the harmonics amplitude. The THD measurement will exclude any noise components that may be present in the DUT.

THD Ratio is defined as the ratio of the THD Level relative to the fundamental signal amplitude, and it is expressed in dB (default) or as a percentage. The THD Ratio can be computed as follows.

$$\text{THD ratio} = 20\,\text{Log}_{10}\left(\frac{\text{rms value of distortion}}{\text{rms value of signal and distortion}}\right)$$

THD+N Ratio measurement function mode is applicable for both analog and digital analyzer. The settings for THD ratio measurement are displayed as shown in **Figure 4-19** and **Figure 4-20** for both the analog and digital analyzer respectively.

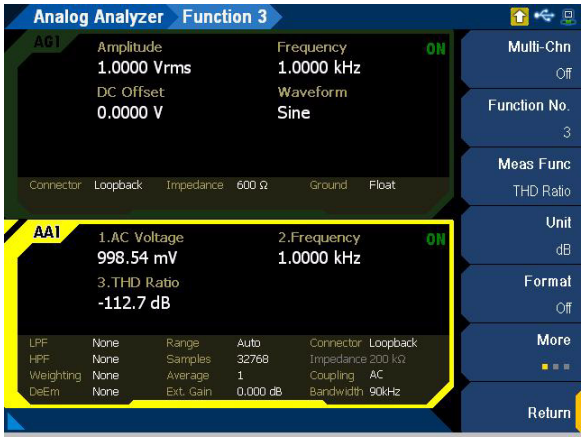

Figure 4-19 Analog Analyzer > Functions > THD Ratio menu page 1

Figure 4-20 Digital Analyzer > Functions > THD Ratio menu page 1

Table 4-10 Analog/Digital Analyzer > Functions > THD Ratio menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	This is only available for analog analyzer. Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio value.
Even Harmonic	Press the **Even Harmonic** softkey to display the even harmonics order selection. Press the Enter key on the navigation panel to select the desired even harmonics order, and press the **Even Harmonic** softkey again to confirm the selection. – ALL – 2 – 4 – 6 – 8

Table 4-10 Analog/Digital Analyzer > Functions > THD Ratio menu description (continued)

Menu	Description
Odd Harmonic	Press the **Odd Harmonic** softkey to display the odd harmonics order selection. Press the Enter key on the navigation panel to select the desired odd harmonics order, and press the **Odd Harmonic** softkey again to confirm the selection. – ALL – 3 – 5 – 7 – 9
Freq Lock	This is only available for analog analyzer. Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

THD Level is defined as the square root of the sum of the squares of all the signal harmonics components, and it is expressed in Vrms. The THD Level can be computed as follows.

THD Level = rms value of distortion

THD+N Level measurement function mode is applicable for both analog and digital analyzer. The settings for THD level measurement are displayed as shown in **Figure 4-21** and **Figure 4-22** for both the analog and digital analyzer respectively.

Figure 4-21 Analog Analyzer > Functions > THD level menu page 1

Figure 4-22 Digital Analyzer > Functions > THD level menu page 1

Table 4-11 Analog/Digital Analyzer > Functions > THD Level menu description

Menu	Description
	Press the **Unit** softkey to select the measurement unit. Analog Analyzer – dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x
Unit	Digital Analyzer – FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL

Table 4-11 Analog/Digital Analyzer > Functions > THD Level menu description (continued)

Menu	Description
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Logarithmic Selecting Logarithmic will return the measurement result by using the following formula: $20\log 10\left(\frac{\text{Measured rms voltage}}{\text{Reference level}}\right)$ The result is returned in unit dBr. – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x. – Delta Selecting Delta will return the meausrement result by deducting the reference level from the measured level. The result is returned in unit ΔV. This is only available for the analog analyzer.
Set to 0dB	This is only available for the analog analyzer. Press the **Set to 0dB** softkey to store the measured level as the reference level, and set the measurement reading format to Logarithmic.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.
Ref. Imp	This is only available for the analog analyzer. Press the **Ref. Imp** softkey to set the reference impedance value. This setting is only available if the unit is set to W.
Volt/FS	This is only available for the digital analyzer. Press the **Volt/FS** softkey to set the volts/FS reference value.
Precision	This is only available for the digital analyzer. Press the **Precision** softkey to enable or disable the precision mode.
Cal SPL	Press the **Cal SPL** softkey to set the calibrator level value. This setting is only available when the unit is set to dBSPL.
Even Harmonic	Press the **Even Harmonic** softkey to select the even harmonics. – ALL – 2 – 4 – 6 – 8
Odd Harmonic	Press the **Odd Harmonic** softkey to select the odd harmonics. – ALL – 3 – 5 – 7 – 9

Table 4-11 Analog/Digital Analyzer > Functions > THD Level menu description (continued)

Menu	Description
Freq Lock	This is only available for the analog analyzer. Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

SMPTE IMD measurements

The SMPTE IMD function provides a measure of the second and third order intermodulation distortion introduced by the DUT by injecting two pure tones (tone 1 and tone 2, where tone 1 is at a much lower frequency than tone 2, for example, 60 Hz and 7 kHz respectively) into the DUT. SMPTE IMD is expressed in dB (default) or as a percentage.

If tone 1 = f1 and tone 2 = f2, the following harmonics are considered.

- f2 – f1
- f2 + f1
- f2 – 2f1
- f2 + 2f1

The SMPTE IMD value is computed as the ratio of the sum of the intermodulation harmonics amplitude to the upper frequency tone amplitude. Refer to "**Dual waveform**" on page 96 for more information on generating dual tones for this measurement.

SMPTE IMD measurement function mode is applicable for both analog and digital analyzer. The settings for SMPTE IMD measurement are displayed as shown in **Figure 4-23** and **Figure 4-24** for both the analog and digital analyzer respectively.

Figure 4-23 Analog Analyzer > Functions > SMPTE IMD menu page 1

Figure 4-24 Digital Analyzer > Functions > SMPTE IMD menu page 1

Table 4-12 Analog/Digital Analyzer > Functions > SMPTE IMD menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	This is only available for the analog analyzer. Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio.

Table 4-12 Analog/Digital Analyzer > Functions > SMPTE IMD menu description (continued)

Menu	Description
Freq Lock	This is only available for the analog analyzer. Press the **Freq Lock** softkey to select the searching method for the upper and lower frequencies. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the upper and lower frequencies of the input signal based on the upper and lower frequencies of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the upper and lower frequency values by setting the searching method to Custom and setting the frequency value in **Upper Freq** and **Lower Freq**.
Upper Freq	Press the **Upper Freq** softkey to set the upper frequency value. This setting is only available when **Freq Lock** is set to Custom.
Lower Freq	Press the **Lower Freq** softkey to set the lower frequency value. This setting is only available when **Freq Lock** is set to Custom.

DFD measurements

The DFD measurement is similar to SMPTE IMD, except that the two tones in the stimulus signal are of equal amplitude and are spaced closer to each other (typically 19 kHz and 20 kHz). This measurement also allows you to select either the second or third order intermodulation distortion. The available DFD measurements are DFD 60268 2nd, DFD 60268 3rd, DFD 60118 2nd, or DFD 60118 3rd.

DFD measurement function mode is applicable for both analog and digital audio analyzer. The settings for DFD measurements are displayed as shown in **Figure 4-25** and **Figure 4-26** for both the analog and digital analyzer respectively.

Figure 4-25 Analog Analyzer > Functions > DFD 60268 2nd menu page 1

Figure 4-26 Digital Analyzer > Functions > DFD 60268 2nd menu page 1

Table 4-13 Analog/Digital Analyzer > Functions > DFD measurements menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	This is only available for the analog analyzer. Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio.

SNR measurement

SNR is defined as the ratio of the signal amplitude to noise amplitude. The U8903B implementation of the SNR measurement is a closed-loop configuration in which both the generator and the analyzer are used in the test setup. For example, channel 1 of the analog generator and analog analyer must be used together for this measurement.

SNR is further defined by the measurement bandwidth. The measurement bandwidth is specified by the filter selected for the audio analyzer. The SNR measurement is accomplished by an internal routine that alternatively switches the U8903B generator output on and off. When the U8903B output is in the off state, the U8903B output will be terminated at the DUT input.

The SNR result can be expressed in dB (default) or as a percentage. The SNR can be computed as follows.

$$\text{SNR} = 20\,\text{Log}_{10}\left(\frac{\text{rms value of signal}}{\text{rms value of noise}}\right)$$

SNR measurement function mode is applicable for analog analyzer only. The settings for SNR measurement are displayed as shown in **Figure 4-27**.

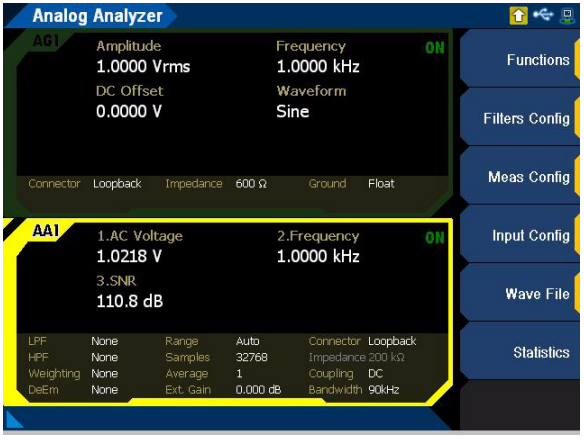

Figure 4-27 Analog Analyzer > Functions > SNR menu page 1

Table 4-14 Analog Analyzer > Functions > SNR menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	Press the **Set to 0dB** softkey to store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio.
SNR Delay	Press the **SNR Delay** softkey to set the SNR delay.

SNR (fast mode) measurement

SNR (fast mode) measurement is used to measure the ratio of signal amplitude over noise amplitude. The SNR (fast mode) measurement is a frequency domain calculation. This method is significantly faster than the standard SNR measurement, but it is not suitable for measuring very high SNR. The noise measurement is made by notching out the fundamental and harmonics from the frequency spectrum.

You can set the number of harmonics that will be removed in the computation. For example, if the harmonics count is 1, the fundamental frequency will only be notched. If the harmonics count is 3, the fundamental frequency and the first and second harmonics will be notched for the calculation.

The SNR (fast mode) can be computed as follows.

$$\text{SNR} = 20\,\text{Log}_{10}\left(\frac{\text{rms value of signal}}{\text{rms value of noise}}\right)$$

SNR (fast mode) measurement function mode is applicable for the analog analyzer only. The settings for SNR (fast mode) measurement are displayed as shown in **Figure 4-28**.

Figure 4-28 Analog Analyzer > Functions > SNR (Fast) menu page 1

Table 4-15 Analog Analyzer > Functions > SNR (Fast) menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	Press the **Set to 0dB** softkey to store the measured level or ratio as the reference value, and set the reading to refer to the stored reference value.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Harmonics	Press the **Harmonics** softkey to set the number of harmonics order to be removed.

J-test measurement

Jitter in a digital system is defined as the variation in time between the periodic samples. Jitter may occur during sampling process of the ADC and DAC and clock recovery process. It can also appear in the data pattern of the digital interface link.

J-test is an AES3 test signal that is developed to simulate the worst case data jitter in the digital signal and also to test the jitter susceptibility of the DAC. The J-test signal consists of a test tone with a frequency at 1/4 of the sampling rate (Fs) and a jitter signal with a frequency of 1/192 Fs. The J-test digital pattern to be transmitted is as follows:

C00000 C00000 400000 400000 x24
BFFFFF BFFFFF BFFFFF BFFFFF x24

The digital pattern will cause inter-symbol interference in the digital signal and stress the DAC clock recovery subsystem. You can measure the DAC system jitter performance by observing the analog output of the DAC in the FFT spectrum.

J-test measurement function mode is applicable for the analog analyzer only. The J-test measurement is displayed as shown in **Figure 4-29**.

Figure 4-29 Analog Analyzer > Functions > J-Test menu page

Positive peak measurement

Positive peak measurement function mode is a measurement of the greatest positive voltage level. Positive peak measurement function is applicable for the digital analyzer only. The positive peak measurement is displayed as shown in **Figure 4-30**.

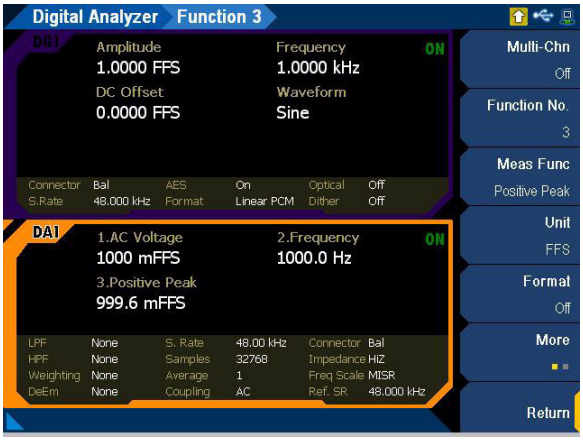

Figure 4-30 Digital Analyzer > Functions > Positive Peak menu page

Table 4-16 Digital Analyzer > Functions > Positive Peak menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL

Table 4-16 Digital Analyzer > Functions > Positive Peak menu description (continued)

Menu	Description
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Logarithmic Selecting Logarithmic will return the measurement result by using the following formula: $20\log 10\left(\frac{\text{Measured rms voltage}}{\text{Reference level}}\right)$ The result is returned in unit dBr. – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.
Volt/FS	Press the **Volt/FS** softkey to set the volts/FS reference value.

Negative peak measurement

Negative peak measurement function mode is a measurement of the greatest negative voltage level. Negative peak measurement function is applicable for the digital analyzer only. The negative peak measurement is displayed as shown in **Figure 4-31**.

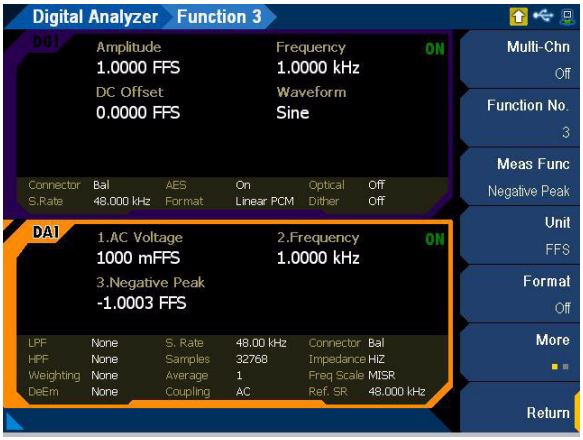

Figure 4-31 Digital Analyzer > Functions > Negative Peak menu page

Table 4-17 Digital Analyzer > Functions > Negative Peak menu description

Menu	Description
Unit	Press the **Unit** softkey to select the measurement unit. – FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL

Table 4-17 Digital Analyzer > Functions > Negative Peak menu description (continued)

Menu	Description
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Logarithmic Selecting Logarithmic will return the measurement result by using the following formula: $20\log 10\left(\frac{\text{Measured rms voltage}}{\text{Reference level}}\right)$ The result is returned in unit dBr. – Linear Selecting Linear will return the measurement result by dividing the measured level by the reference level. The result is returned in unit x.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference level.
Ref. Level	Press the **Ref. Level** softkey to set the reference level value. There is only one reference level for each channel.
Volt/FS	Press the **Volt/FS** softkey to set the volts/FS reference value.

Phase Measurement

Phase measurements are used to describe the positive or negative time offset in a periodic waveform cycle (such as a sine waveform), measured from a reference waveform. The reference is usually the same signal at a different point in the system, or a related signal in a different channel of the system. Phase is expressed in degrees (°).

Phase shift varies with frequency, and therefore, it is common to make phase measurements at several frequencies or to plot the phase response of a frequency sweep.

There are generally two types of phase measurements as follows.

- interchannel phase delay
- device phase response

To make an interchannel phase measurement, the signal level must be specified. Phase measurements are generally not level-sensitive, as long as the signal is well above the noise and below distortion.

For example, to test the interchannel phase delay of a stereo system, we inject a 1 Vrms, 1 kHz sine waveform using the same analog generator channel. The output of one channel is connected to the analog analyzer channel 1 while the other is connected to channel 2. Set the analog analyzer to measure phase. If channel 1 is set as the reference channel, the channel 2 result is the interchannel phase delay.

A phase response measurement compares the phase of the output signal of a DUT to the phase of the signal at its input. For example, a simple way to make this measurement is to use the analog analyzer channel 1 to measure the input, and use the analog analyzer channel 2 to measure the output.

The U8903B always uses channel 1 of the analog generator as the reference channel, while the selected analog analyzer channel becomes the reference channel for interchannel phase measurements.

Phase measurement function mode is applicable for both analog and digital audio analyzer. The settings for phase measurement are displayed as shown in **Figure 4-32** and **Figure 4-33** for both the analog and digital analyzer respectively.

NOTE Auto range will be disabled for phase measurement. Refer to "**Measurement Configuration (Analog Analyzer)**" on page 202 to set the input voltage range.

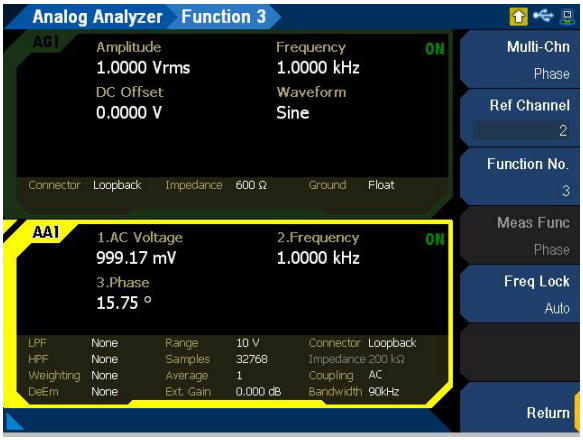

Figure 4-32 Analog Analyzer > Functions > Phase menu page

Figure 4-33 Digital Analyzer > Functions > Phase menu page

Table 4-18 Analog/Digital Analyzer > Functions > Phase menu description

Menu	Description
Ref. Channel	Press the **Ref. Channel** softkey to set the reference channel number.
Freq Lock	This is only available for the analog analyzer. Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Crosstalk Measurement

In audio systems with more than one channel, it is common for a signal in one channel to appear at the output of another channel at a reduced level. Crosstalk refers to this signal leakage across channels, and it is expressed in dB (default) or as a percentage.

Crosstalk is a measurement of the ratio of the signal amplitude in an unused channel relative to that of a channel driven with a signal. The unused channels should be grounded or set to an appropriate bias point. Crosstalk is largely due to capacitive coupling between the channel conductors in the device and generally varies with frequency. Crosstalk can be computed as follows.

$$\text{Crosstalk} = 20\,\text{Log}_{10}\left(\frac{\text{rms value of signal measured}}{\text{rms value of signal driven}}\right)$$

Phase measurement function mode is applicable for both analog and digital audio analyzer. The settings for crosstalk measurement are displayed as shown in **Figure 4-34** and **Figure 4-35** for both the analog and digital analyzer respectively.

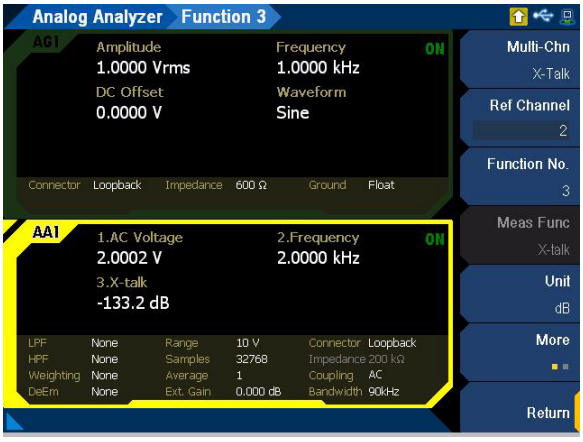

Figure 4-34 Analog Analyzer > Functions > X-Talk menu page 1

Figure 4-35 Digital Analyzer > Functions > X-Talk menu page 1

Table 4-19 Analog/Digital Analyzer > Functions > X-Talk menu description

Menu	Description
Ref. Channel	Press the **Ref. Channel** softkey to set the driven channel.
Unit	Press the **Unit** softkey to select the measurement unit. – dB – ΔdB – % – x
Format	Press the **Format** softkey to select the format of the returned measurement reading. – Off Selecting Off will return the measurement reading without any formatting (raw value). – Delta Selecting Delta will return the measurement result by deducting the reference ratio from the measured ratio. The result will be returned in unit ΔdB. – Linear Selecting Linear will return the measurement result by dividing the measured ratio by the reference ratio. The result is returned in unit x.
Set to 0dB	This is only available for the analog analyzer. Press the **Set to 0dB** softkey to store the measured level or ratio as the reference value, and set the reading to refer to the stored reference value.
Set result as ref. from	Press the **Set result as ref. from** softkey to store the measurement result from the selected channel as the reference ratio.
Ref. Ratio	Press the **Ref. Ratio** softkey to set the reference ratio.

Table 4-19 Analog/Digital Analyzer > Functions > X-Talk menu description (continued)

Menu	Description
Freq Lock	This is only available for the analog analyzer. Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. You can select the generator channel by setting the **Src Channel** in the **Meas. Config.** menu page. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Filters Configuration (Analog Analyzer)

Filters are used to bandwidth limit the input signals before applying a measurement function. The filter configuration for analog analyzer is displayed as shown in **Figure 4-36**.

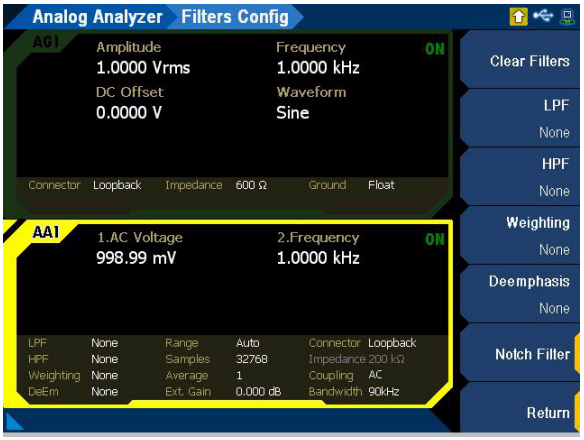

Figure 4-36 Analog Analyzer > Filter Config menu page

Table 4-20 Analog Analyzer > Filter Config menu description

Menu	Description
Clear Filters	Press the **Clear Filters** softkey to clear all the filter settings.
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)

Table 4-20 Analog Analyzer > Filter Config menu description (continued)

Menu	Description
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis value. – None – 50 µs – 75 µs – Custom
Notch Filter	Press the **Notch Filter** softkey to configure the notch filter settings. Refer to "**Notch Filter**" on page 199 for more information.

Notch Filter

Notch filter is used to remove the unwanted frequency component in the input signal. This setting is only applicable for THD+N and SINAD measurements.

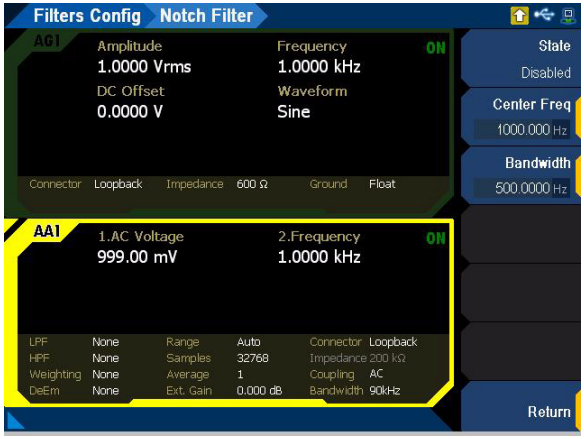

Figure 4-37 Analog Analyzer > Filter Config > Notch Filter menu page

Table 4-21 Analog Analyzer > Filter Config > Notch Filter menu description

Menu	Description
State	Press the **State** softkey to enable or disable the notch filter.
Center Freq	Press the **Center Freq** softkey to set the frequency of the component to be removed from the input signal.
Bandwidth	Press the **Bandwidth** softkey to set the bandwidth of the signal component to be removed.

Filters Configuration (Digital Analyzer)

Filters are used to bandwidth limit the input signals before applying a measurement function. The filter configuration for digital analyzer is displayed as shown in **Figure 4-38**.

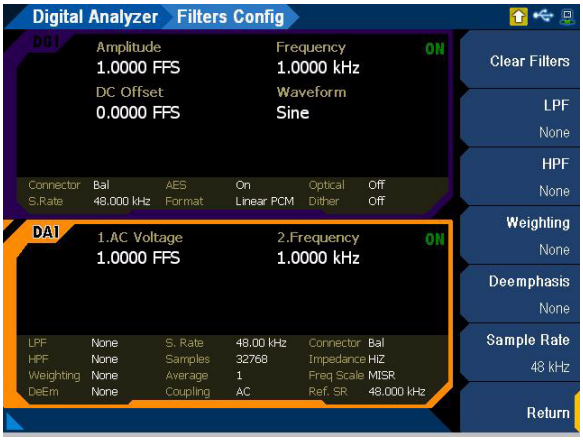

Figure 4-38 Digital Analyzer > Filter Config menu page

Table 4-22 Digital Analyzer > Filter Config menu description

Menu	Description
Clear Filters	Press the **Clear Filters** softkey to clear all the filter settings.
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 15 kHz – 20 kHz – 22 kHz – 30 kHz – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 20 Hz – 100 Hz – 400 Hz – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)

Table 4-22 Digital Analyzer > Filter Config menu description (continued)

Menu	Description
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom (Refer to "**Appendix P: User-defined Filter File Format**" on page 514 for more information.)
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis value. – None – 50 µs – 75 µs – Custom
Sample Rate	This is only available for digital analyzer. Press the **Sample Rate** softkey to select the sample rate. – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz

Measurement Configuration (Analog Analyzer)

The measurement configuration for analog analyzer is displayed as shown in **Figure 4-39**.

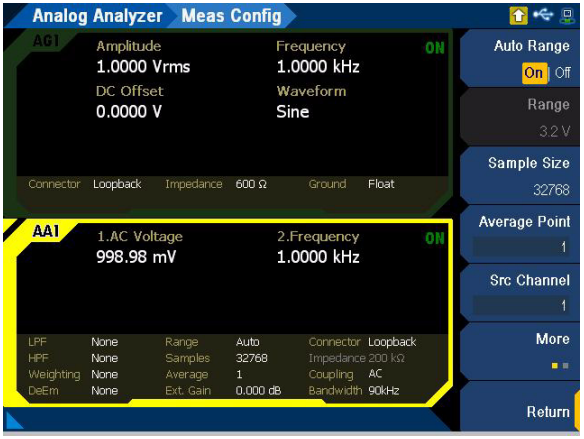

Figure 4-39 Analog Analyzer > Meas Config menu page 1

Table 4-23 Analog Analyzer > Meas Config menu description

Menu	Description
Auto Range	Press the **Auto Range** softkey to enable or disable auto range.
Range	Press the **Range** softkey to select the input voltage range. This setting is only available when the auto range is disabled. – 140 V – 100 V – 32 V – 10 V – 3.2 V – 1 V – 320 mV
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M

Table 4-23 Analog Analyzer > Meas Config menu description (continued)

Menu	Description
Average Points	Press the **Average Points** to set the number of measurement readings to be used for the moving average calculation. This is useful for noisy signal. Applying the average points will smooth out the fluctuations introduced by the noise that caused the inconsistencies in the measurement reading.
Src Channel	Press the **Src Channel** to select the internal generator channel as the reference channel used in the following situations. – For the result calculation in unit dBg. – For the frequencies searching algorithm when the frequency lock is set to Gen Lock.
Trigger	Press the **Trigger** softkey to configure the trigger settings. Refer to "**Trigger**" on page 205 for more information.

Measurement Configuration (Digital Analyzer)

The measurement configuration for digital analyzer is displayed as shown in **Figure 4-40**.

Figure 4-40 Digital Analyzer > Meas Config menu page

Table 4-24 Digital Analyzer > Meas Config menu description

Menu	Description
Coupling	Press the **Coupling** softkey to select the coupling type. – DC DC coupling allows both AC and DC input signals to pass through to the digital analyzer and to be measured down to 0 Hz. This setting should be selected when making DC voltage measurements. – AC AC coupling blocks the DC component of the input signal. This setting should be selected when you need to measure only the AC component of a signal. For example, when you are making rms or peak-to-peak voltage measurement.
Sample Size	Press the **Sample Size** softkey to select the sample size. The sample size is the number of data points acquired for the measurement. The higher the sample size, the higher the accuracy of the measurement result. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Average Points	Press the **Average Points** softkey to set the average points. Higher number of average points should be used when the analyzed data is noisy. – 1 to 20 points
Trigger	Press the **Trigger** softkey to configure the trigger settings. Refer to "**Trigger**" on page 205 for more information.

Trigger

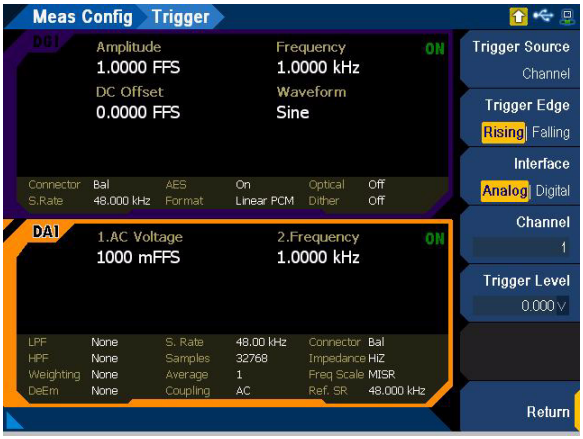

Figure 4-41 Digital Analyzer > Meas Config > Trigger menu page

Table 4-25 Digital Analyzer > Meas Config > Trigger menu description

Menu	Description
Trigger Source	Press the **Trigger Source** softkey to select the trigger source. The default trigger in is Free Run, where the analyzer triggers immediately after the previous data is acquired. If External trigger in is set, the analyzer waits for a trigger pulse on the Trigger In connector at the rear panel before acquiring the measurement data. – Free Run – External – Channel
Trigger Edge	This is only available when the trigger source is External or Channel. Press the **Trigger Edge** softkey to select the trigger edge type. – Rising – Falling
Interface	This is only available when the trigger source is Channel. Press the **Interface** softkey to select the trigger interface. – Analog – Digital
Channel	This is only available when the trigger source is Channel. Press the **Channel** softkey to set the channel number.
Trigger Level	This is only available when the trigger source is Channel. Press the **Trigger Level** softkey to set the trigger level.

Input Configuration (Analog Analyzer)

The input configuration for analog analyzer is displayed as shown in **Figure 4-42**.

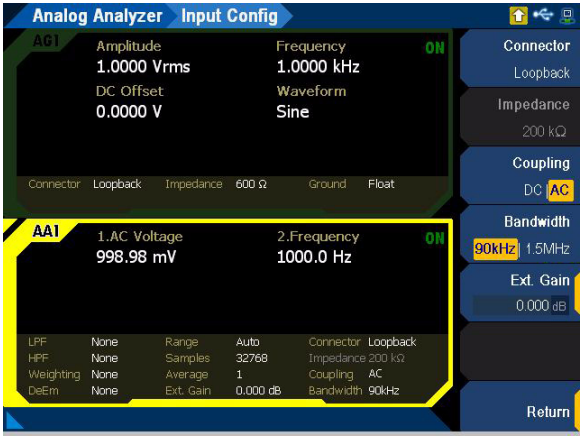

Figure 4-42 Analog Analyzer > Input Config menu page

Table 4-26 Analog Analyzer > Input Config menu description

Menu	Description
Connector	Press the **Connector** softkey to select the input connector type. – UnBal Unbalanced connector type routes the signal from the BNC input connector. The signal in the inner conductor of the coaxial connector is referenced to the ground for measurement. – Bal Balanced connector type routes the signal from the XLR input connectors in the front panel to the analog analyzer. The signals on the positive and negative pins of the XLR connector enter a differential amplifier where they are subtracted before passing on to the detector. – Loopback Loopback connector type routes the signal from the generator to the analyzer internally. The generator channel 1 signal will be routed to the analyzer odd channels (1, 3, 5, and 7), and the generator channel 2 signal will be routed to the analyzer even channels (2, 4, 6, and 8). For example, if you select Loopback in any of the analyzer odd channels, the output connector type of the generator channel 1 will automatically be set to Loopback.
Impedance	Press the **Impedance** softkey to select the input impedance value. This setting is only available when **Connector** is set to UnBal or Bal. – 100 kΩ (for UnBal) – 200 kΩ (for Bal) – 600 Ω – 300 Ω

Table 4-26 Analog Analyzer > Input Config menu description (continued)

Menu	Description
Coupling	Press the **Coupling** softkey to select the input coupling type. – DC DC coupling allows both the AC and DC analog input signals to pass through to the analog analyzer and to be measured down to 0 Hz. This setting should be selected when making DC voltage measurements. – AC AC coupling blocks the DC component of the analog input signal by switching a capacitor in series to the input path. This setting should be selected when you need to measure only the AC component of a signal. For example, use AC coupling when you are making an rms or peak-to-peak voltage measurement.
Bandwidth	Press the **Bandwidth** softkey to select the input bandwidth value. This setting is only available with Option N3431A. Refer to "**U8903B Options**" on page 33 for more information. – 90 kHz (This is the default setting with sampling rate of 192 kHz) – 1.5 MHz
Ext. Gain	Press the **Ext. Gain** softkey to set the input external gain value. The external gain can be set in the range of –60 dB to 60 dB. The default external gain is 0 dB. External gain is used to correct the effects of any external gain or loss that may be part of a measurement setup. For example, if an amplifier is part of a measurement setup, the external gain value is used to remove the effects of its gain. However, if an external attenuator is used in a high voltage measurement, the external gain value is used to correct the loss. The external gain value can be set in unit dB or x.

Input Configuration (Digital Analyzer)

The input configuration for digital analyzer is displayed as shown in **Figure 4-43**.

Figure 4-43 Digital Analyzer > Input Config menu page

Table 4-27 Digital Analyzer > Input Config menu description

Menu	Description
Connector	Press the **Connector** softkey to select the connector type. – UnBal Unbalanced connector type routes the digital signal from the BNC input connector at the rear panel to the digital analyzer. – Bal Balanced connector type routes the digital signal from the XLR input connectors in the rear panel to the digital analyzer. – Optical Optical connector type routes the digital signal from the TOSLINK input connector at the rear panel to the digital analyzer. – DSI DSI connector type routes the digital signal from the 25-pin female D-SUB connector at the rear panel to the digital analyzer.
Impedance	Press the **Impedance** softkey to select the input impedance. Unbalanced connector type – 75 Ω – HiZ Balanced connector type – 110 Ω – HiZ

Table 4-27 Digital Analyzer > Input Config menu description (continued)

Menu	Description
Freq Scaling	Press the **Freq Scaling** softkey to select the frequency scaling type. – MISR The frequency will track the incoming Word Clock and recover the audio at its original frequency. – Custom The audio signal frequency will be translated according to the reference sample rate value set in the Ref SR.
Ref SR	This is only available when frequency scaling is Custom. Press the **Ref SR** softkey to set the reference sample rate value.

DSI Input Configuration (Digital Analyzer)

The DSI input configuration for digital analyzer is displayed as shown in **Figure 4-44**.

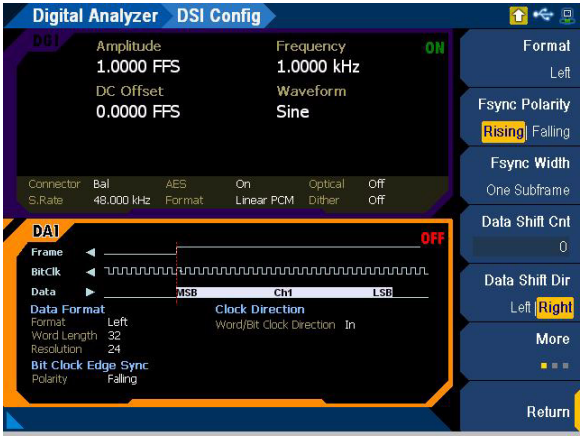

Figure 4-44 Digital Analyzer > DSI Config menu page 1

Table 4-28 Digital Analyzer > DSI Config menu description

Menu	Description
Format	Press the **Format** softkey to select the data format. – Left – Right – I2S – DSP
Fsync Polarity	This is only available when the format is Left or Right. Press the **Fsync Polarity** softkey to select the frame clock edge synchronization. – Rising (indicates the frame clock is high on the left channel of data) – Falling (indicates the frame clock is low on the left channel of data)
Fsync Width	This is only available when the format is Left or Right. Press the **Fsync Width** softkey to select the frame clock synchronization width. – One Bit Clock – One Subframe – 50% Duty Cycle
Data Shift Cnt	This is only available when the format is Left or Right. Press the **Data Shift Cnt** softkey to set the number for the data bits to be shifted in relative to the frame clock.
Data Shift Dir	This is only available when the format is Left or Right. Press the **Data Shift Dir** softkey to select the data shift direction. – Left – Right

Table 4-28 Digital Analyzer > DSI Config menu description (continued)

Menu	Description
Word Length	Press the **Word Length** softkey to set the word length value. The word length value must be greater than or equal to the audio resolution. – 8 to 32
Resolution	Press the **Resolution** softkey to set the audio resolution value. – 8 to 24
Decoding	Press the **Decoding** softkey to select the decoding format. – Linear PCM – A-Law – μ-Law
W/Bclk Dir	Press the **W/Bclk Dir** softkey to select the word/bit clock direction. – In – Out
Bit Clk Edge	Press the **Bit Clk Edge** softkey to select the bit clock edge. – Rising – Falling
Voltage	Press the **Voltage** softkey to select the input voltage value. – 1.2 Vpp – 1.5 Vpp – 1.8 Vpp – 2.5 Vpp – 3 Vpp – 3.3 Vpp – Custom

AES/SPDIF Input Configuration (Digital Analyzer)

The AES/SPDIF input configuration for digital analyzer is displayed as shown in **Figure 4-45**.

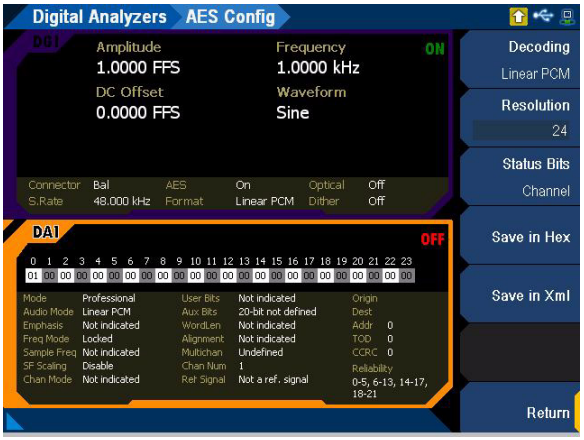

Figure 4-45 Digital Analyzer > AES Config menu page 1

Table 4-29 Digital Analyzer > AES Config menu description

Menu	Description
Decoding	Press the **Decoding** softkey to select the decoding format. – Linear PCM – A- Law – µ- Law
Resolution	Press the **Resolution** softkey to set the audio resolution value. – 8 to 24
Status Bits	Press the **Status Bits** softkey to select the status bits type. – Channel – User
Save in Hex	Press the **Save in Hex** softkey to save the status bits to a HEX file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Save in Xml	Press the **Save in Xml** softkey to save the status bits to an XML file. Refer to "**Save**" on page 86 for more information on the Save menu page.

Bits Analysis (Digital Analyzer)

The bits analysis menu page allows you to view the data of every single bit in each word of the embedded audio data in the digital signal. The bits analysis configuration for digital analyzer is displayed as shown in **Figure 4-46**.

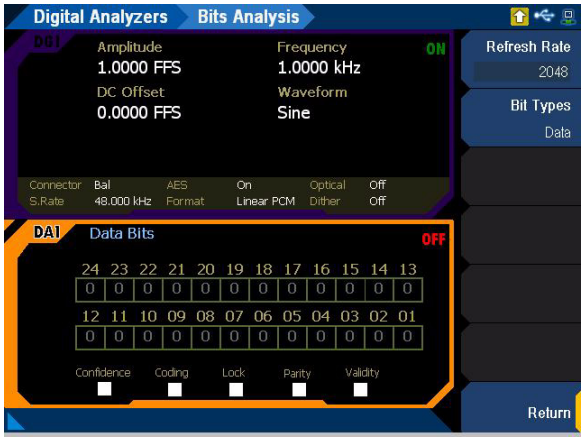

Figure 4-46 Digital Analyzer > Bits Analysis menu page 1

Table 4-30 Digital Analyzer > Bits Analysis menu description

Menu	Description
Refresh Rate	Press the **Refresh Rate** softkey to set the refresh rate. This is only applicable when the Bit Types is set to Active Bit.
Bit Types	Press the **Bit Types** softkey to select the bit type. – Data Data bits represents the data in a word of the embedded audio data of the digital signal at the time of the measurement. "1" indicates that the data is 1 at the particular bit, and "0" indicates that the data is 0 at the particular bit. – Active Active bits indicates bits that have changed state during the measurement period. "1" indicates bit has changed state, and "0" indicates no change.

Wave File (Analog Analyzer)

The U8903B allows you to record and save the input measurement signal into a wave file. The recorded wave file can be used as a test signal. The wave file settings for analog analyzer is displayed as shown in **Figure 4-47**.

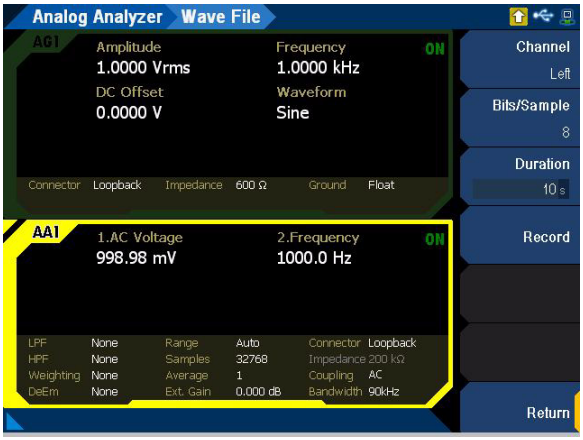

Figure 4-47 Analog Analyzer > Wave File menu page

Table 4-31 Analog Analyzer > Wave File menu description

Menu	Description
Channel	Press the **Channel** softkey to select the wave file channel type. – Left Selecting Left will record analog analyzer channel 1 signal into a mono wave file. – Right Selecting Right will record analog analyzer channel 2 signal into a mono wave file. – Stereo Selecting Stereo will record both analog analyzer channel 1 and channel 2 signals into a stereo wave file.
Bits/Sample	Press the **Bits/Sample** softkey to select the wave file number of bits per sample. – 8 – 16 – 24
Duration	Press the **Duration** softkey to set the recording duration of the wave file.
Record	Press the **Record** softkey to start recording and save the measurement into a wave file. Refer to "**Save**" on page 86 for more information on the Save menu page.

Statistics

The statistics settings for analog analyzer and digital analyzer is displayed as shown in **Figure 4-48** and **Figure 4-49** respectively.

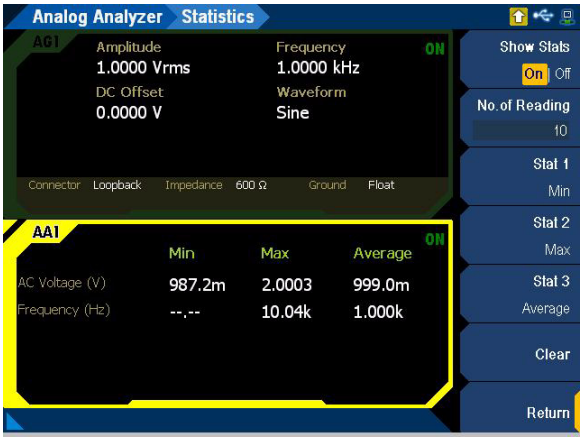

Figure 4-48 Analog Analyzer > Statistics menu page

Figure 4-49 Digital Analyzer > Statistics menu page

Table 4-32 Analog/Digital Analyzer > Statistics menu description

Menu	Description
Show Stats	Press the **Show Stats** softkey to enable or disable the statistics calculation.
No. of Reading	Press the **No. of Reading** softkey to set the number of readings used for the statistics calculation.
Stat 1 **Stat 2** **Stat 3**	Press the respective softkeys to select the statistics calculation type. The U8903B allows you to display three types of statistics data. – Min The minimum value obtained in the measurement. – Max The maximum value obtained in the measurement. – Average The calculated average value on the number of measurement readings captured. – Std Dev The calculated standard deviation value on the number of measurement readings captured. – ΔMinMax The difference between the maximum value and minimum value. The number of measurement readings is the value set in **No. Of Readings**.
Clear	Press the **Clear** softkey to reset the statistics results of the current analog analyzer.

5 Graph Analysis

This chapter describes the U8903B graph analysis configurations.

Graph Analysis

NOTE

- The U8903B graph analysis mode is only available in the Standard View mode. Refer to "**Menu Key**" on page 54 for more information.
- When the graph analysis mode is activated, all filters will be turned off.

The U8903B graph analysis mode displays a 2-dimensional graph of the signal. Press 

on the FUNCTION panel to access the graph analysis mode. The Graph Analysis menu page is displayed as shown in **Figure 5-1**.

Press 

on the RUN CONTROL panel to start or stop the graph analysis.

Refer to "**GRAPH Panel**" on page 61 for quick access to the commonly used graph functions.

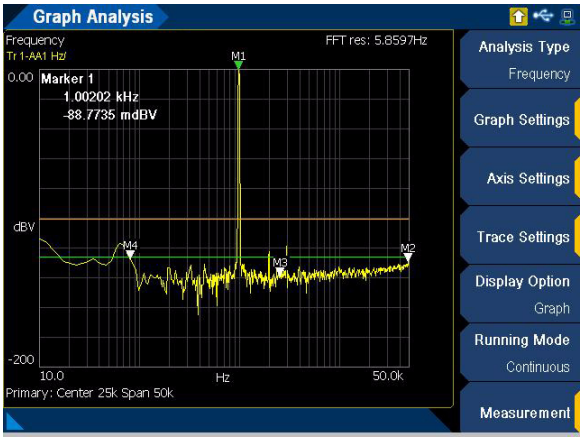

Figure 5-1 Graph Analysis menu page

Table 5-1 Graph Analysis menu description

Menu	Description
Analysis Type	Press the **Analysis Type** softkey to select graph analysis mode to be plotted on the current graph panel. – Frequency Frequency domain – Phase Phase magnitude – Time Time domain – PSD The total power contained in each of the frequency bins in the band, and then dividing the result by the "effective bandwidth".
Graph Settings	Press the **Graph Settings** softkey to configure the graph settings. Refer to "**Graph Settings**" on page 220 for more information.
Axis Settings	Press the **Axis Settings** softkey to configure the axis settings. Refer to "**Axis Settings**" on page 222 for more information.
Trace Settings	Press the **Trace Settings** softkey to configure the trace settings. Refer to "**Trace Settings**" on page 224 for more information.
Display Option	Press the **Display Option** softkey to select the graph analysis display option. Refer to "**Display Options**" on page 229 for more information. – Graph – Data Table – Marker Table – Statistics – Harmonics – Signal Analysis
Running Mode	Press the **Running Mode** softkey to select the graph analysis running mode. Continuous Single
Measurement	Press the **Measurement** softkey to configure the graph analysis measurement settings. Refer to "**Measurement Settings**" on page 234 for more information.

Graph Settings

The graph settings for graph analysis is displayed as shown in **Figure 5-2**.

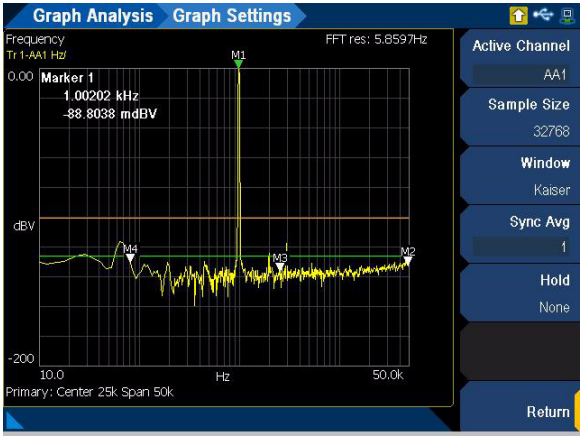

Figure 5-2 Graph Analysis > Graph Settings menu page

Table 5-2 Graph Analysis > Graph Settings menu description

Menu	Description
Active Channel	Press the **Active Channel** softkey to select the available active channel. The active channel determines the channel for the graph settings.
Sample Size	Press the **Sample Size** softkey to select the graph sample size value. The sample size affects the performance and quality of the analysis performed. For frequency domain measurements, the data returned is half of the current selected sample size. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M If the sample size of an analyzer card channel is set to 2M, the rest of the analyzer card channels sample size will be set to 2048. If the sample size of an analyzer card channel is set to 1M, the rest of the analyzer card channels sample size will be set to 262144 (if the initial sample size is more than 262144). If the sample size of an analyzer card channel is set to 52428, the rest of the analyzer card channels sample size will be set to 262144 (if the initial sample size is more than 262144).

Table 5-2 Graph Analysis > Graph Settings menu description (continued)

Menu	Description
Window	Press the **Window** softkey to select the window function to be applied to the data before the FFT process. The selected window function is dependent on the type of results needed from your measurements. Typically, the window function reduces the effect of spectral leakage that may occur when performing FFT analysis. – Rectangular – Hanning – Blackman – Rife-Vincent – Rife-Vincent 3 – Hamming – Flat Top – Kaiser
Sync Avg	Press the **Sync Avg** softkey to set the number of samples to be acquired and averaged before the FFT process is performed.
Hold	Press the **Hold** softkey to select the type of hold to be performed after the FFT process. – None If None is selected, the latest data will always be displayed. – Average The Average hold will average both the current and previous data. – Min The Min hold will compare the current data with the previous data and retains whichever value that is lower. – Max The Max hold will compare the current data with the previous data and retain whichever value that is higher.

Axis Settings

The axis settings for graph analysis is displayed as shown in **Figure 5-3**.

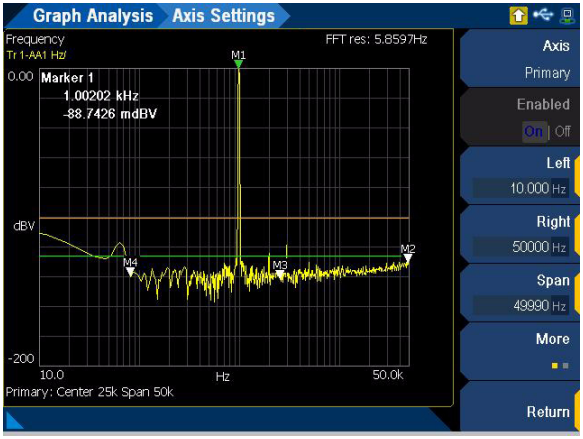

Figure 5-3 Graph Analysis > Axis Settings menu page 1

Table 5-3 Graph Analysis > Axis Settings menu description

Menu	Description
Axis	Press the **Axis** softkey to select the active axis to be configured. – Primary – Secondary
Enabled	Press the **Enabled** softkey to enable or disable the axis settings. This setting is only available when the axis type is secondary. If the axis type is primary, this setting is always set to On.
Left	Press the **Left** softkey to set the left axis limit value. If the value entered is more than the right value, the right value will automatically be set to a value of (Left + 10).
Right	Press the **Right** softkey to set the right axis limit value. If the value entered is more than the left value, the left value will automatically be set to a value of (Right – 10).
Span	Press the **Span** softkey to set the total X-axis span or total range to be monitored in the graph.
Center	Press the **Center** softkey to set the X-axis center point in the graph.
Top	Press the **Top** softkey to set the top axis limit value. If the value entered is less than the bottom value, the bottom value will automatically be set to a value of (Top – 10).
Bottom	Press the **Bottom** softkey to set the bottom axis limit value. If the value entered is more than the top value, the top value will automatically be set to a value of (Bottom + 10).

Table 5-3 Graph Analysis > Axis Settings menu description (continued)

Menu	Description
X-Scale	Press the **X-Scale** softkey to select the X-axis scale type. The left and right values must be more than 0 in order to use the log scale. – Linear – Log
Y-Scale	Press the **Y-Scale** softkey to select the Y-axis scale type. The bottom and top values must be more than 0 in order to use the log scale. – Linear – Log

Trace Settings

The trace settings for graph analysis is displayed as shown in **Figure 5-4**.

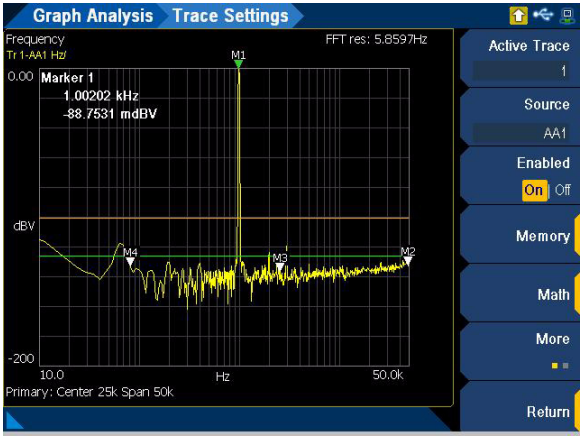

Figure 5-4 Graph Analysis > Trace Settings menu page 1

Table 5-4 Graph Analysis > Trace Settings menu description

Menu	Description
Active Trace	Press the **Active Trace** softkey to select the active trace number.
Source	Press the **Source** softkey to select data source of the active trace from the available channels, traces, files, and memory.
Enabled	Press the **Enabled** softkey to enable or disable the active trace data. You can also access this function by pressing the **Shift** key and the trace number key on the DATA ENTRY panel.
Memory	Press the **Memory** softkey to save or load a trace. Refer to "**Memory**" on page 226 for more information.
Math	Press the **Math** softkey to apply a math function. Refer to "**Math**" on page 227 for more information.
Unit	Press the **Unit** softkey to select the trace unit type. – V – dBV – dBu – W – dBm – dBSPL
Persistence	Press the **Persistence** softkey to configure the persistence settings. Refer to "**Persistence**" on page 228 for more information.

Table 5-4 Graph Analysis > Trace Settings menu description (continued)

Menu	Description
Axis	Press the **Axis** softkey to attach the active trace to the primary or secondary axis. The display of the active trace will reflect on the selected axis. – Primary – Secondary
Color	Press the **Color** softkey to select the color of the active trace. – Yellow – Cyan – White – Pink – Green – Orange – Red – Purple

Memory

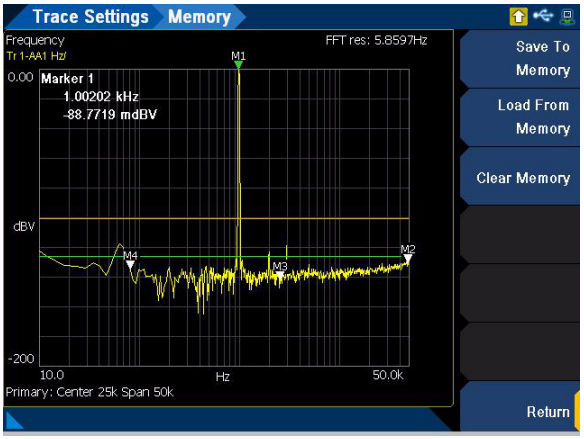

Figure 5-5 Graph Analysis > Trace Settings > Memory menu page

Table 5-5 Graph Analysis > Trace Settings > Memory menu description

Menu	Description
Save To Memory	Press the **Save To Memory** softkey to save the active trace to the memory buffer[a]. The trace in the memory buffer can be loaded into any other traces. The memory buffer icon will be displayed at the top of the display when there is a trace saved in the memory buffer as shown in **Table 1-5**.
Load From Memory	Press the **Load From Memory** softkey to load a trace from the memory buffer into the active trace. An error will be displayed if this softkey is pressed when there is no trace in the memory buffer.
Clear Memory	Press the **Clear Memory** softkey to clear the trace from the memory buffer.

[a] Files saved in the internal volatile memory will be erased after power cycle or reset (refer to "**Preset**" on page 72).

Math

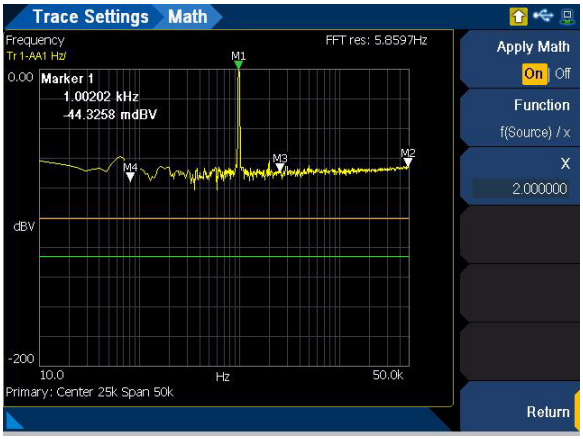

Figure 5-6 Graph Analysis > Trace Settings > Math menu page

Table 5-6 Graph Analysis > Trace Settings > Math menu description

Menu	Description
Apply Math	Press the **Apply Math** softkey to apply the corresponding math function to the trace data or turn off the math function.
Function	Press the **Function** softkey to select the math function to be applied on the active trace. – None – f(Source) + x – f(Source) - x – f(Source) * x – f(Source) / x
Variable	Press the **Variable** softkey to set the x value in the selected math function.

Persistence

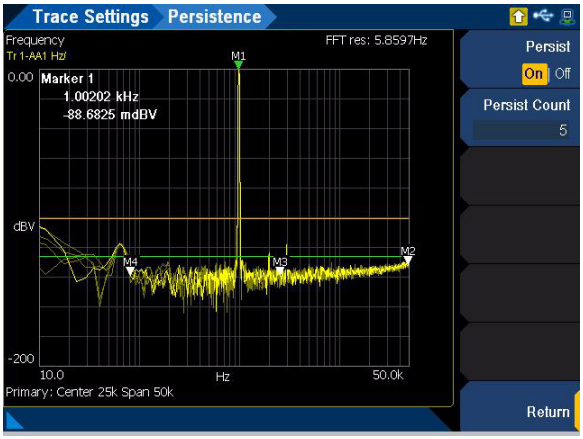

Figure 5-7 Graph Analysis > Trace Settings > Persistence menu page

Table 5-7 Graph Analysis > Trace Settings > Persistence menu description

Menu	Description
Persist	Press the **Persist** softkey to enable or disable persistence on the active trace. Persistence allows you to view the previous sets of trace data in the graph before they are removed. The previous trace data will be displayed in a lighter shade color of the active trace to distinguish between the previous and updated trace data.
Persist Count	Press the **Persist Count** softkey to set the number of previous sets of trace data to be displayed in the graph before they are removed. For example, a value of 5 indicates that up to a total of 5 previous sets of trace data will be displayed in the graph before they are removed. This setting is only available when persistence is enabled.

Display Options

Graph

Graph view is the default display option. In the graph view, the frequency, phase, and time domain analysis are performed. The graph view is displayed as shown in **Figure 5-8**.

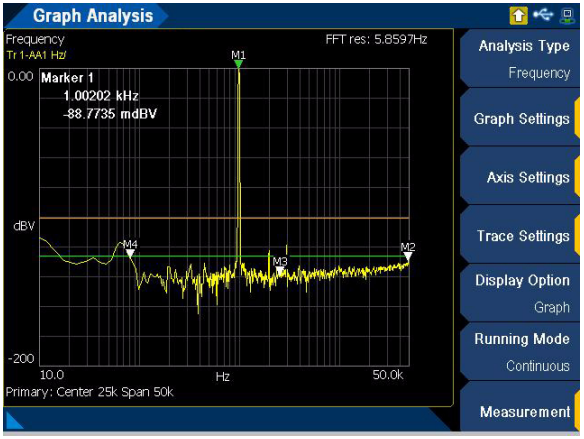

Figure 5-8 Graph Analysis > Display Option > Graph menu page

Data table

In the data table view, you can observe the individual data points in a table format with up to a maximum of four different traces without scrolling. The data table view is displayed as shown in **Figure 5-9**. Press the up or down arrow keys to scroll up or down the data points in the table.

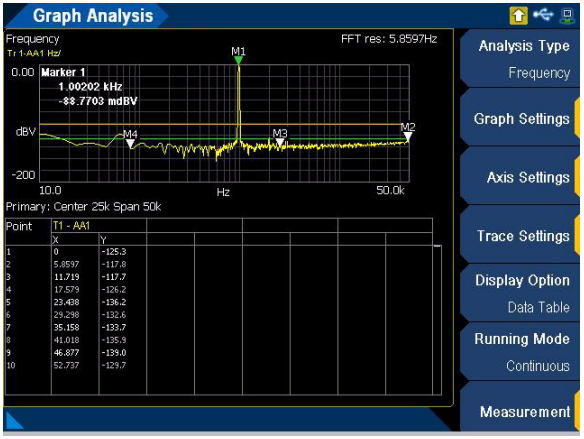

Figure 5-9 Graph Analysis > Display Option > DataTable menu page

Marker table

In the marker table view, you can observe the marker and cross-marker calculation information in a table format. The delta marker readings are also listed in the table. The marker table view is displayed as shown in **Figure 5-10**.

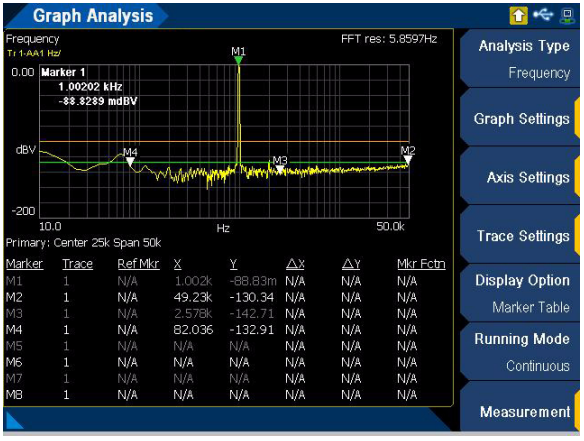

Figure 5-10 Graph Analysis > Display Option > Marker Table menu page

Statistics

In the statistics view, the typical statistics calculations are listed down. The available statistics functions are minimum, maximum, standard deviation, and average. The statistics view is displayed as shown in **Figure 5-11**.

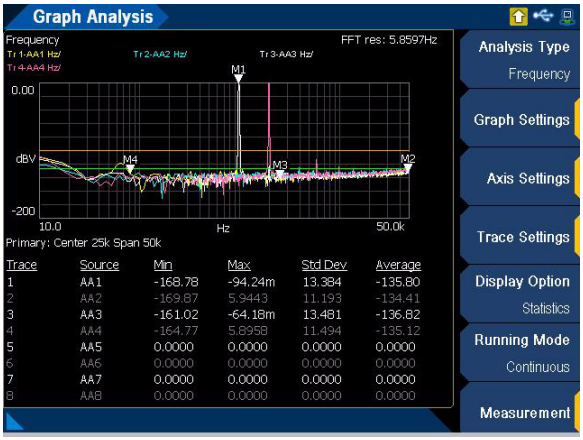

Figure 5-11 Graph Analysis > Display Option > Statistics menu page

Harmonics

In the harmonics view, you can view and perform harmonic analysis. Information such as the fundamental frequency amplitude and the respective harmonics can be observed in a bar chart. You can also observe the THD information for the individual channels. The harmonics display is displayed as shown in **Figure 5-12**.

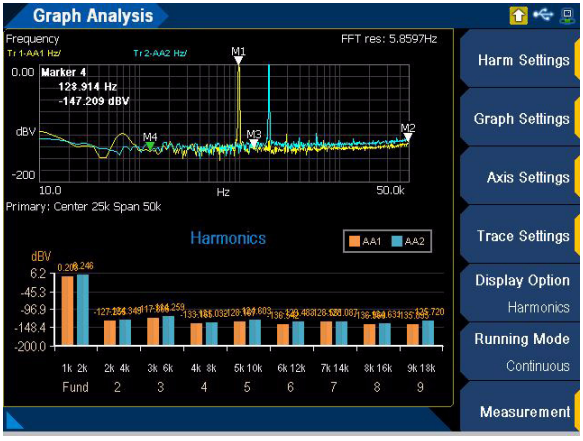

Figure 5-12 Graph Analysis > Display Option > Harmonics menu page

Press the **Harm Settings** softkey to configure the harmonics settings. This setting is only available when the graph analysis display option is Harmonics.

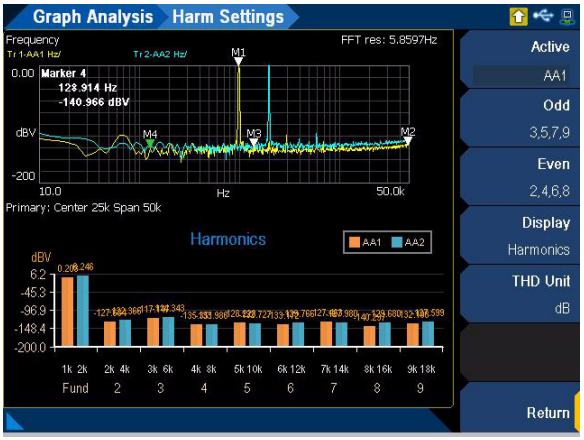

Figure 5-13 Graph Analysis > Harm Settings menu page (Harmonics display)

Table 5-8 Graph Analysis > Harm Settings menu description (Harmonics display)

Menu	Description
Active Channel	Press the **Active Channel** softkey to select the active channel.
Odd Harmonics	Press the **Odd Harmonics** softkey to select the odd harmonics. – ALL – 3 – 5 – 7 – 9
Even Harmonics	Press the **Even Harmonics** to select the even harmonics. – ALL – 2 – 4 – 6 – 8
Display	Press the **Display** softkey to select the type of harmonic analysis data to be displayed. – Harmonics – THD
THD unit	Press the **THD unit** softkey to select the unit for THD measurements. – dB – %

Signal analysis

In the signal analysis view, you can view the analyzer and generator channel information. The signal analysis display is displayed as shown in **Figure 5-14**.

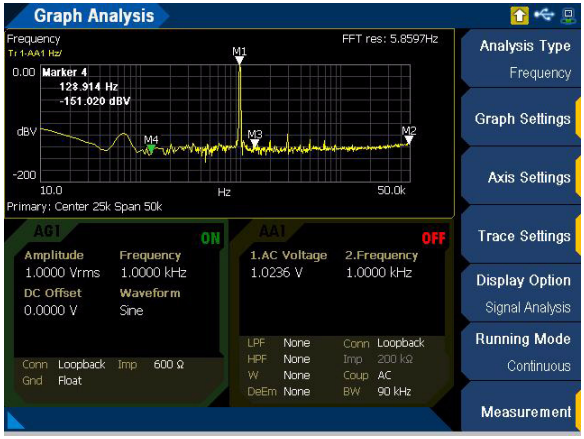

Figure 5-14 Graph Analysis > Display Option > Signal Analysis menu page

Measurement Settings

The U8903B allows you to observe up to two measurements running simultaneously in the graph analysis mode. The measurements will be displayed at the bottom of the graph. The measurement settings for graph analysis is displayed as shown in **Figure 5-15**.

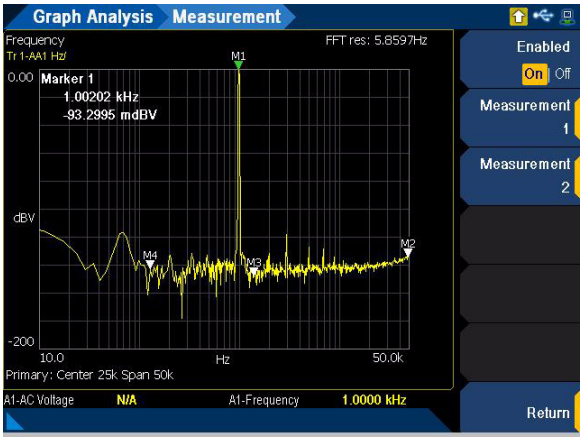

Figure 5-15 Graph Analysis > Measurement menu page

Table 5-9 Graph Analysis > Measurement menu description

Menu	Description
Enabled	Press the **Enabled** softkey to enable or disable the measurements in the graph. If measurement is not required, disable the measurements for better performance.
Measurement 1	Press the **Measurement 1** softkey to configure the measurement 1 parameters. Refer to "**Measurement 1/ Measurement 2**" on page 235 for more information.
Measurement 2	Press the **Measurement 2** softkey to configure the measurement 2 parameters. Refer to "**Measurement 1/ Measurement 2**" on page 235 for more information.

Measurement 1/Measurement 2

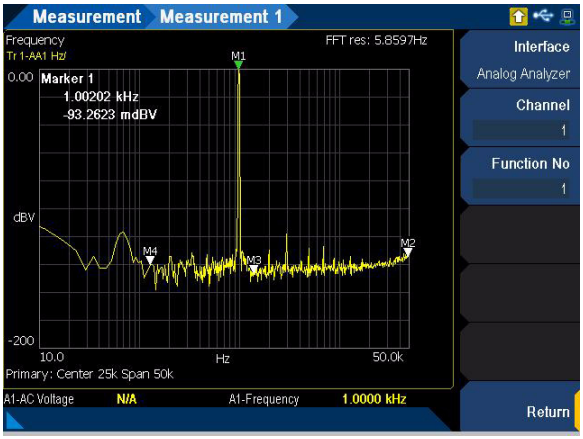

Figure 5-16 Graph Analysis > Measurement > Measurement 1 menu page

Table 5-10 Graph Analysis > Measurement > Measurement 1/Measurement 2 menu description

Menu	Description
Interface	Press the I**nterface** softkey to select the measurement interface type. – Analog Analyzer – Digital
Channel	Press the **Channel** softkey to select the desired channel to perform the measurement.
Function No	Press the **Function No** softkey to select the function to be displayed based on the function number (1 to 4). The function number corresponds to the respective measurement functions in the analyzer. The allowable measurement functions are as follows. – Frequency – DC voltage – THD ratio – THD level

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6 Sweep Function

This chapter describes the U8903B sweep parameter and the configurations.

Sweep Parameter

NOTE The U8903B sweep mode is only available in the Standard View mode. Refer to "**Menu Key**" on page 54 for more information.

The U8903B sweep mode allows you to perform sweeps and to display the results in a plot view. Press Sweep on the FUNCTION panel to access the sweep mode. The Sweep Parameter menu page is the default page and is displayed as shown in **Figure 6-1**.

There are three main panels on the Sweep Parameter menu page. The top panel displays the current sweep settings and the bottom panels display the audio generator and audio analyzer settings respectively. Press Interface on the FUNCTION panel to switch between analog and digital interface. Use the arrow keys to navigate among the panels.

Press On/Off on the RUN CONTROL panel to start or stop the sweep in the sweep mode.

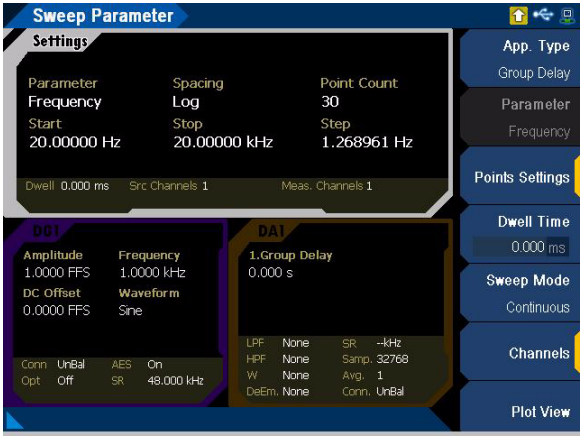

Figure 6-1 Sweep Parameter menu page

Table 6-1 Sweep Parameter menu description

Menu	Description
App. Type	Press the **App. Type** softkey to select the sweep application type. – Sweep – Group Delay This is only applicable for digital interface. Refer to "**Group Delay**" on page 240 for more information.
Parameter	This is only available when the sweep application type is Sweep. Press the **Parameter** softkey to select the sweep parameter type. The parameter selection depends on the waveform type set at the analog generator.
Points Settings	Press the **Points Settings** softkey to configure the sweep point parameters such as start, stop, step size, point count, and spacing. Refer to "**Points settings**" on page 241 for more information.
Dwell Time	Press the **Dwell Time** softkey to set the delay in ms for the generator to output the signal.
Sweep Mode	Press the **Sweep Mode** softkey to select the sweep mode. – Continuous Sweep all points. – Single Sweep point by point.
Channels	Press the **Channels** softkey to set the sweep channels. Refer to "**Sweep channels**" on page 242 for more information. This setting is only available when the legacy sweep is disabled.
Plot View	Press the **Plot View** softkey to display the Plot View menu page. Refer to "**Plot View**" on page 243 for more information.

Group Delay

Group delay is the difference of phase over the difference of the frequency. All signals are delayed when transiting through a device such as a filter, an amplifier, or a processor. This small delay is usually not a problem, but if the delay is different for different frequencies, and the signal is built up by more than one frequency, then the shape of the signal is distorted. The difference in delay for different frequencies is group delay.

Group delay is a useful measure of phase distortion. The variations in a group delay cause signal distortion, just as deviations from linear phase cause distortion. Group delay is calculated by differentiating the insertion phase response of the DUT versus frequency. Group delay is only meaningful when performing sweep.

The input signal is compared with the output signal to calculate the phase between the input and output signals. The phase for frequency 1 is then recorded. The output frequency is then shifted to frequency 2, and the phase is measured again. The result is a group delay value of (phase 1 – phase 2) / (frequency 1 – frequency 2). This measurement can be done for a series of frequency points to plot the group delay measurement graph which will show the linearity of the phase versus frequency plot.

Group Delay measurement function mode is only applicable for digital interface.

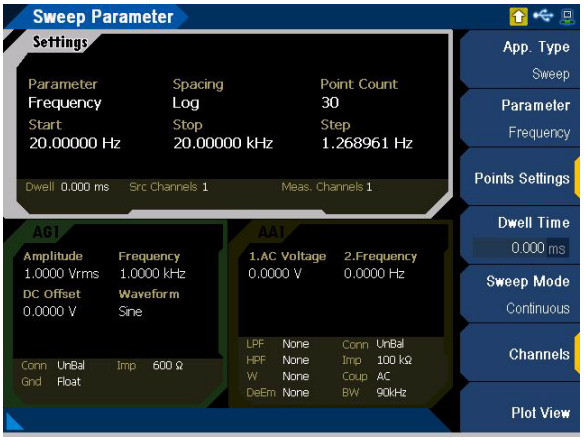

Figure 6-2 Sweep Parameter > App. Type > Group Delay menu page

Points settings

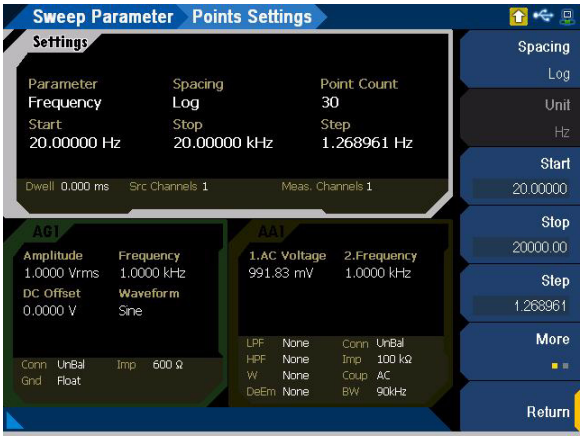

Figure 6-3 Sweep Parameter > Points Settings menu page 1

Table 6-2 Sweep Parameter > Points Settings menu description

Menu	Description
Spacing	Press the **Spacing** softkey to select the spacing type. – Log – Geometric series $\text{Step size} = 10^{\frac{\log 10\left(\frac{\text{Stop}}{\text{Start}}\right)}{(\text{Points}-1)}}$ – Linear – Arithmetic series $\text{Step size} = \frac{(\text{Start}-\text{Stop})}{(\text{Points}-1)}$ – Custom – Arbitrary spacing
Unit	Press the **Unit** softkey to select the sweep unit. This setting is only available when the sweep parameter is amplitude. – Vrms – dBV – Vp – Vpp – dBm – dBu – dBSPL
Start	Press the **Start** softkey to set the sweep start value. This setting is only available when the sweep spacing is Log or Linear.
Stop	Press the **Stop** softkey to set the sweep stop value. This setting is only available when the sweep spacing is Log or Linear.
Step	Press the **Step** softkey to set the sweep step value. Adjusting the sweep step value will change the sweep points value. This setting is only available when the sweep spacing is Log or Linear.

Table 6-2 Sweep Parameter > Points Settings menu description (continued)

Menu	Description
Points	Press the **Points** softkey to set the sweep points value. Adjusting the sweep points value will change the sweep step value. This setting is only available when the sweep spacing is Log or Linear.
Edit Points	Press the **Edit Points** softkey to configure the sweep points. Refer to "**Edit Points**" on page 246 for more information. If the sweep points are changed, the sweep spacing mode will be set to Custom.

Sweep channels

NOTE This setting is only available when the legacy sweep is disabled.

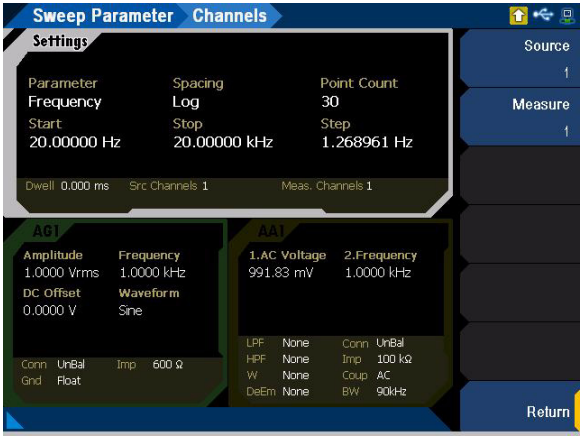

Figure 6-4 Sweep Parameter > Channels menu page

Table 6-3 Sweep Parameter > Channels menu description

Menu	Description
Source	Press the **Source** softkey to select the source channel(s).
Measure	Press the **Measure** softkey to select the measure channel(s). The available selection depends on the number of installed analog analyzer cards.

Plot View

The sweep plot view menu page is displayed as shown in **Figure 6-5**.

Press 

on the RUN CONTROL panel to start or stop the sweep in the sweep mode.

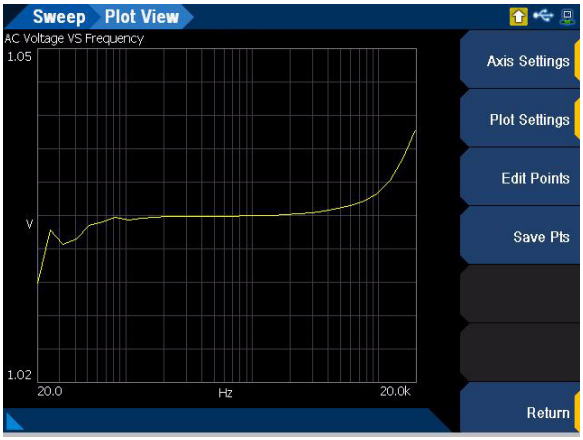

Figure 6-5 Sweep > Plot View menu page

Table 6-4 Sweep > Plot View menu description

Menu	Description
Axis Settings	Press the **Axis Settings** softkey to configure the sweep axis settings. Refer to "**Axis settings**" on page 244 for more information.
Plot Settings	Press the **Plot Settings** softkey to configure the sweep trace settings. Refer to "**Plot settings**" on page 245 for more information.
Edit Points	Press the **Edit Points** softkey to configure the sweep points. Refer to "**Edit Points**" on page 246 for more information.
Save Pts	Press the **Save Pts** softkey to save the sweep points to a file. Refer to "**Save**" on page 86 for the Save menu page.

Axis settings

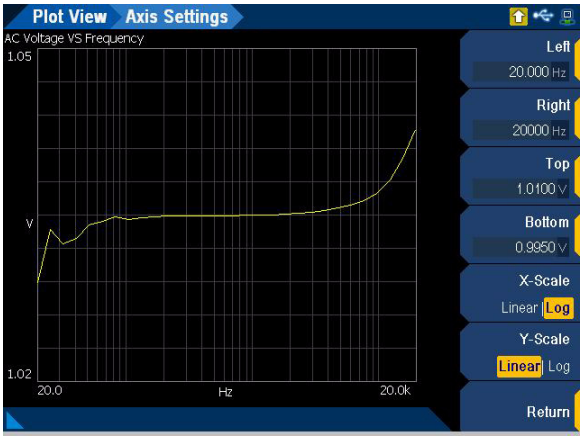

Figure 6-6 Sweep > Plot View > Axis Settings menu page

Table 6-5 Sweep > Plot View > Axis Settings menu description

Menu	Description
Left	Press the **Left** softkey to set the left axis value.
Right	Press the **Right** softkey to set the right axis value.
Top	Press the **Top** softkey to set the top axis value.
Bottom	Press the **Bottom** softkey to set the bottom axis value.
X-Scale	Press the **X-Scale** softkey to set the X-axis scale type. – Linear – Log
Y-Scale	Press the **Y-Scale** softkey to set the Y-axis scale type. – Linear – Log

Plot settings

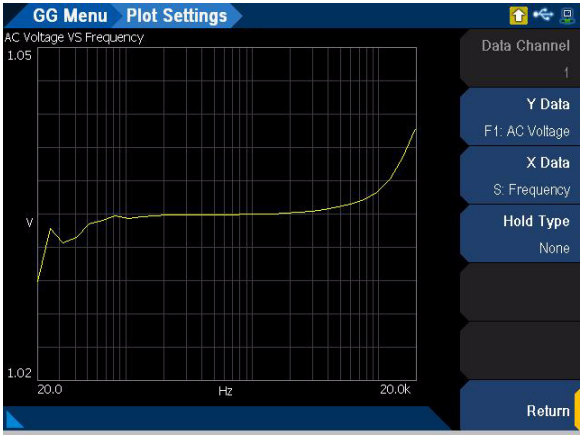

Figure 6-7 Sweep > Plot View > Plot Settings menu page

Table 6-6 Sweep > Plot View > Plot Settings menu description

Menu	Description
Data Channel	Press the **Data Channel** softkey to select the trace data channel number to be plotted. This setting is only available when the measured channels are more than one channel.
Y Data	Press the **Y Data** softkey to select the Y-axis trace data source. – S: <sweep parameter> – F1: <measurement function 1> – F2: <measurement function 2> – F3: <measurement function 3> – F4: <measurement function 4>
X Data	Press the **X Data** softkey to select the X-axis trace data source. – S: <sweep parameter> – F1: <measurement function 1> – F2: <measurement function 2> – F3: <measurement function 3> – F4: <measurement function 4>
Hold Type	Press the **Hold Type** softkey to select the data type to be plotted in the graph. – None Initial sweep data. – Average Each point is averaged with the corresponding point from the previous result. – Max Always keep the maximum value of each point. – Min Always plot the minimum value of each point.

Edit Points

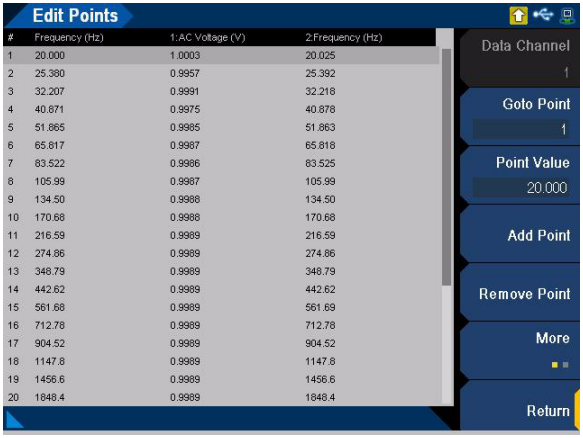

Figure 6-8 Sweep > Edit Points menu page 1

Table 6-7 Sweep > Edit Points menu description

Menu	Description
Data Channel	Press the **Data Channel** softkey to select the trace data channel number to be plotted. This setting is only available when the measured channels are more than one channel.
Goto Point	Press the **Goto Point** softkey to set the sweep point number to go to. The sweep point number will be highlighted. You can also use the arrow keys to select the desired sweep point.
Point Value	Press the **Point Value** softkey to set the currently selected sweep point value.
Add Point	Press the **Add Point** softkey to add a sweep point.
Remove Point	Press the **Remove Point** softkey to remove the selected sweep point.
Load Points	Press the **Load Points** softkey to load the sweep points from a file. Refer to "**Recall**" on page 87 for the Recall menu page.
Save Points	Press the **Save Points** softkey to save the sweep points to a file. Refer to "**Save**" on page 86 for the Save menu page.

NOTE If the sweep points are changed, the sweep spacing mode will be set to Custom. Refer to **Table 6-2** for more information.

7 Test Sequence Application

This chapter describes the various configurations for the U8903B test sequence application.

Test Sequence Application

The U8903B test sequence application (Test Seq App) mode allows you to create a series of automated measurements on a DUT. You can customize the order in which the measurements are performed, edit the pass or fail limits, add sub steps, and create a detailed report of the measurements.

There are two main tabs in the test sequence application mode: Project tab and Report tab.

The Project tab allows you to add up to 20 test sequence and configure the measurements in each test sequence. The Report tab allows you to display all the measurements results and generate a report.

Use the left and right arrow keys to switch between the Project tab or Report tab. Refer to "**Project**" on page 251 and "**Report**" on page 356 for more information.

An example of the Project tab menu page is displayed as shown in **Figure 7-1**.

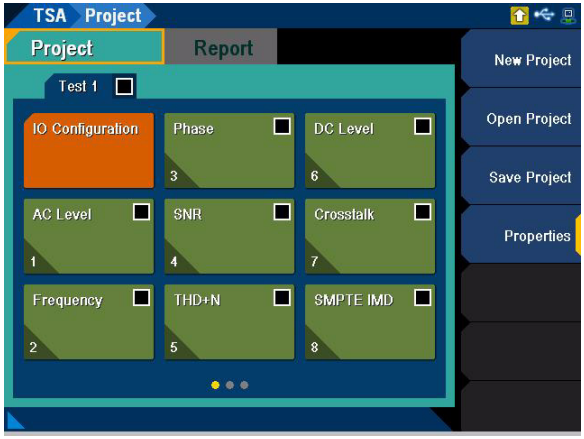

Figure 7-1 TSA > Project menu page

Press 

to start or stop the test sequence. The Test Application menu page will be displayed as shown in **Figure 7-2**.

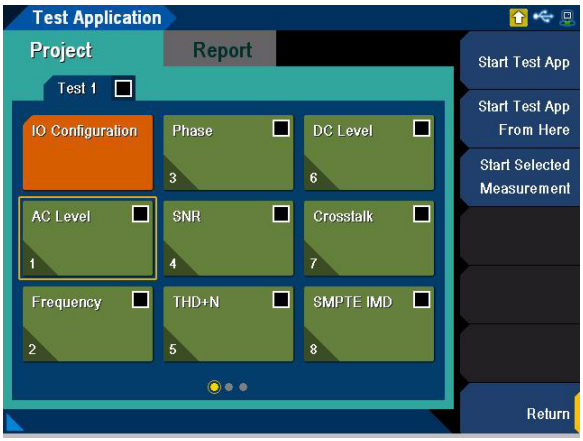

Figure 7-2 Test Application menu page

Table 7-1 Test Application menu description

Menu	Description
Start Test App	Press the **Start Test App** softkey to start the test application project.
Start Test App From Here	Press the **Start Test App From Here** softkey to start the test application from the selected test or measurement tab. This setting is only available when the On/Off key is pressed with the test or measurement tab selected.
Start Selected Measurement	Press the **Start Selected Measurement** softkey to start the test for the selected measurement. This setting is only available when the On/Off key is pressed with the measurement tab selected.

Project

The TSA > Project menu page is displayed as shown in **Figure 7-3**.

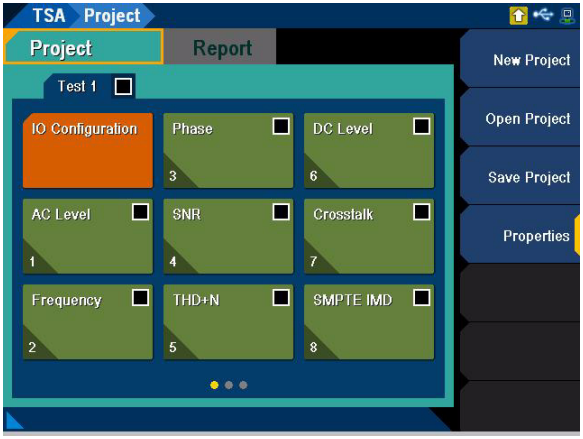

Figure 7-3 TSA > Project menu page

Table 7-2 TSA > Project menu description

Menu	Description
New Project	Press the **New Project** softkey to create a new project.
Open Project	Press the **Open Project** softkey to load a project from a file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Save Project	Press the **Save Project** softkey to save the project to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Properties	Press the **Properties** softkey to configure the project properties. Refer to "**Properties**" on page 252 for more information on the Properties menu page.

Press the up or down arrow key to select the test sequence, IO configuration, or measurements tabs. The respective menu page will be displayed. Refer to "**Test Sequence**" on page 253, "**IO Configuration**" on page 254, and "**Measurements**" on page 263 for more information.

Properties

The TSA > Project > Properties menu page is displayed as shown in **Figure 7-4**.

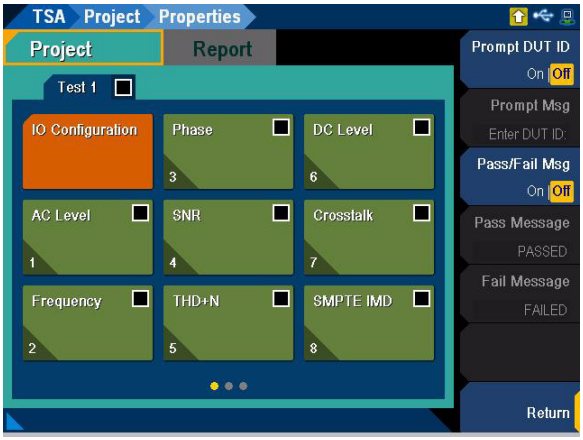

Figure 7-4 TSA > Project > Properties menu page

Table 7-3 TSA > Project > Properties menu description

Menu	Description
Prompt DUT ID	Press the **Prompt DUT ID** softkey to enable or disable the prompt for device ID (device serial number) at the start of a test sequence.
Prompt Msg	Press the **Prompt Msg** softkey to set the prompt message. This setting is only available when **Prompt DUT ID** is enabled.
Pass/Fail Msg	Press the **Pass/Fail Msg** softkey to enable or disable the on-screen message dialog box that can be displayed at the end of a test sequence. Press Enter to close the dialog box.
Pass Message	Press the **Pass Message** softkey to edit the pass message. If all the measurements in the test sequence pass, the pass message is displayed. The default message is “Passed”. This setting is only available when **Pass/Fail Msg** is enabled.
Fail Message	Press the **Fail Message** softkey to edit the fail message. If one or more measurements in the test sequence fails, the fail message is displayed. The default message is “Failed” This setting is only available when **Pass/Fail Msg** is enabled.

Test Sequence

The TSA > Project > Test menu page is displayed as shown in **Figure 7-5**.

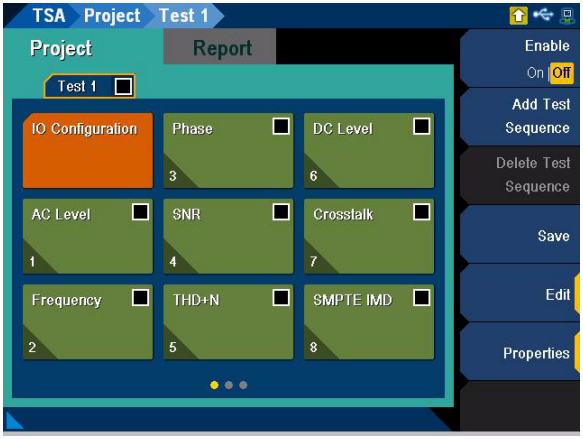

Figure 7-5 TSA > Project > Test menu page

Table 7-4 TSA > Project > Test menu description

Menu	Description
Enable	Press the **Enable** softkey to enable or disable the selected test sequence. The check boxes for the test and all the measurements in the test will be selected when enabled.
Add Test Sequence	Press the **Add Test Sequence** softkey to add a test sequence. – New Add a new test sequence. – Saved Load a saved test sequence file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Delete Test Sequence	Press the **Delete Test Sequence** softkey to delete the selected test sequence.
Save	Press the **Save** softkey to save the test sequence to a file. Refer to "**Save**" on page 86 for more information on the Save menu page.
Edit	Press the **Edit** softkey to move or copy the selected test sequence, or paste a copied test sequence after the selected test sequence.
Properties	Press the **Properties** softkey to set the test sequence name.

IO Configuration

The IO Configuration tab allows you to configure the output and input settings. There will be one IO Configuration tab in each test sequence. The settings configured in the IO configuration will be applied to all the measurements in the test sequence. The TSA > Project > Test > IO Configuration menu page is displayed as shown in **Figure 7-6**.

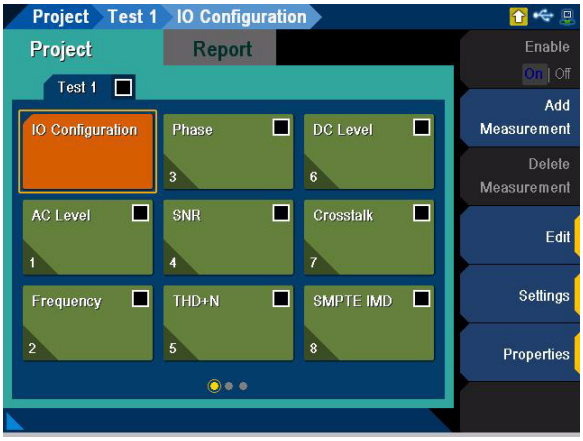

Figure 7-6 TSA > Project > Test > IO Configuration menu page

Table 7-5 TSA > Project > Test > IO Configuration menu description

Menu	Description
Add Measurement	Press the **Add Measurement** softkey to add measurements to the selected test sequence. Refer to "**Measurements**" on page 263 for more information.
Edit	Press the **Edit** softkey to paste a copied measurement after the IO configuration. The IO Configuration cannot be moved or copied.
Settings	Press the **Settings** softkey to configure the IO settings. Refer to "**Settings**" on page 255 for more information.
Properties	Press the **Properties** softkey to configure the IO configuration properties. Refer to "**Properties**" on page 259 for more information.

Settings

Press the up or down arrow key to select between output configuration or input configuration.

Output configuration

The TSA > Project > Test > IO Configuration > Output Configuration menu page is displayed as shown in **Figure 7-7**.

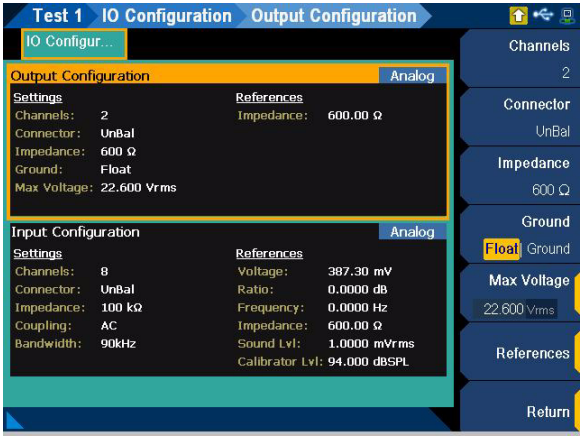

Figure 7-7 TSA > Project > Test > IO Configuration > Output Configuration menu page

Table 7-6 TSA > Project > Test > IO Configuration > Output Configuration menu description

Menu	Description
Channels	Press the **Channels** softkey to select the number of output channels in use. – None (External) Disable the generator outputs and configure the analyzer for external source (open-loop) measurements. – 1 – 2
Connector	Press the **Connector** softkey to select the output connector type. – Bal Balanced mode outputs a pair of differential signals which are equal in amplitude but 180 degrees out of phase on the XLR positive and negative pins. – UnBal Unbalanced mode outputs a signal referenced to ground on the BNC output connector. – Com Common mode outputs a pair of equal amplitude and in-phase signals on the XLR positive and negative pins. The common mode test signal is applied to both pins 2 and 3 or the XLR connector, while pin 1 is connected to the return signal. – IEC60268 The common mode test signal is applied to both pins 2 and 3 or the XLR connector, while pin 1 is connected to the return signal. An additional 10 Ω output series resistance is added to pin 2 or 3.

Table 7-6 TSA > Project > Test > IO Configuration > Output Configuration menu description (continued)

Menu	Description
Impedance	Press the **Impedance** softkey to select the output impedance value. For Bal, Com, and IEC60268 – 600 Ω – 100 Ω – 40 Ω For UnBal – 600 Ω – 50 Ω – 20 Ω
IEC60268 10 Ω	Press the **IEC60268 10 Ω** softkey to select the additional 10 Ω output series resistance for pin 2 or 3 of the XLR connector in the common IEC60268 configuration. This setting is only available when the output connector type is set to IEC60268. – Pin2 Additional 10 Ω is added to pin 2. – Pin3 Additional 10 Ω is added to pin 3.
Ground	Press the **Ground** softkey to select the grounding type. – Float In the floating grounding type, the signal return line (XLR pin 1 for balanced output or BNC return for unbalanced output) is not grounded to the chassis earth and is “floating”. – Ground In the ground grounding type, the signal return line (XLR pin 1 for balanced output or BNC return for unbalanced output) is connected to the chassis earth.
Max Voltage	Press the **Max Voltage** softkey to set the maximum voltage. The maximum voltage value set will limit the maximum amplitude output from the generator and prevent any excessive high voltage values from damaging the DUT.
Reference	Press the **Reference** softkey to set the output references for generator. – Impedance Set the reference impedance for the unit conversion of dBm measurements.

Input configuration

The TSA > Project > Test > IO Configuration > Input Configuration menu page is displayed as shown in **Figure 7-8**.

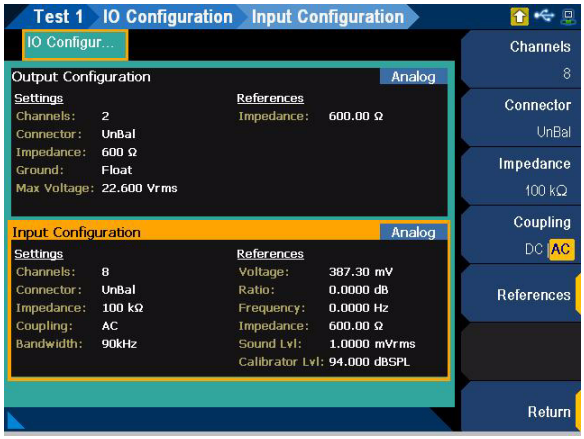

Figure 7-8 TSA > Project > Test > IO Configuration > Input Configuration menu page

Table 7-7 TSA > Project > Test > IO Configuration > Input Configuration menu description

Menu	Description
Channels	Press the **Channels** softkey to select the number of input channels in use.
Connector	Press the **Connector** softkey to select the input connector type. – UnBal Unbalanced connector type routes the signal from the BNC input connector. The signal in the inner conductor of the coaxial connector is referenced to the ground for measurement. – Bal Balanced connector type routes the signal from the XLR input connectors in the front panel to the analog analyzer. The signals on the positive and negative pins of the XLR connector enter a differential amplifier where they are subtracted before passing on to the detector. – Loopback Loopback connector type routes the signal from the generator to the analyzer internally. The generator channel 1 signal will be routed to the analyzer odd channels (1, 3, 5, and 7), and the generator channel 2 signal will be routed to the analyzer even channels (2, 4, 6, and 8). For example, if you select Loopback in any of the analyzer odd channels, the output connector type of the generator channel 1 will automatically be set to Loopback.
Impedance	Press the **Impedance** softkey to select the input impedance value. This setting is only available when **Connector** is set to UnBal or Bal. – 100 kΩ (for Unbalanced) – 200 kΩ (for Balanced) – 600 Ω – 300 Ω

Table 7-7 TSA > Project > Test > IO Configuration > Input Configuration menu description (continued)

Menu	Description
Coupling	Press the **Coupling** softkey to select the input coupling type. – DC DC coupling allows both the AC and DC analog input signals to pass through to the analog analyzer and to be measured down to 0 Hz. This setting should be selected when making DC voltage measurements. – AC AC coupling blocks the DC component of the analog input signal by switching a capacitor in series to the input path. This setting should be selected when you need to measure only the AC component of a signal. For example, use AC coupling when you are making an rms or peak-to-peak voltage measurement.
Bandwidth	Press the **Bandwidth** softkey to select the input bandwidth value. – 90 kHz (This is the default setting with sampling rate of 192 kHz) – 1.5 MHz – This setting is only available with Option N3431A. Refer to "**U8903B Options**" on page 33 for more information.
Reference	Press the **Reference** softkey to set the input references for analyzer. – Voltage – Ratio – Frequency – Impedance – Sound level – Calibrator level

Properties

The TSA > Project > Test > IO Configuration > Properties menu page is displayed as shown in **Figure 7-9**.

Figure 7-9 Test > IO Configuration > Properties menu page

Table 7-8 TSA > Project > Test > IO Configuration > Properties menu description

Menu	Description
Name	Press the **Name** softkey to rename the IO configuration.
Sub-Steps	Press the **Sub-Steps** softkey to configure the sub-steps settings. Refer to "**Sub-steps**" on page 260 for more information on the sub-steps settings.

Sub-steps

You can add any number of sub-steps to the measurement. The sub-steps can be enabled, disabled, or deleted and moved into any order. You can add delay, prompts, and send SCPI commands to the sub-steps. Press the **Add Sub-Step** softkey to add sub-step and press the up and down arrow keys to select the desired sub-step.

The delay sub-step menu page is displayed as shown in **Figure 7-10**.

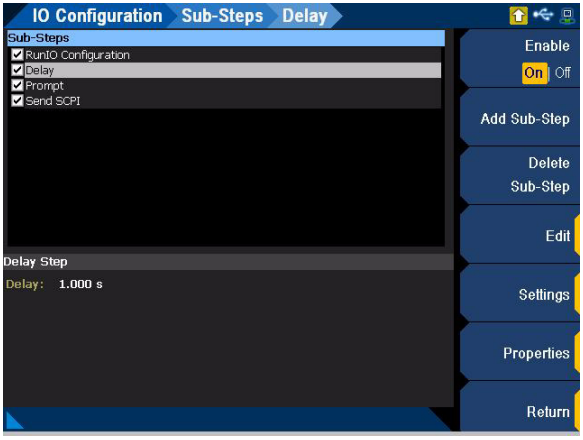

Figure 7-10 Delay sub-step menu page

Table 7-9 Sub-step menu description

Menu	Description
Enable	Press the **Enable** softkey to enable or disable the selected sub-step. The check box of the sub-step will be selected when enabled.
Add Sub-Step	Press the **Add Sub-Step** softkey to add sub-step to the list. – Delay – Prompt – Send SCPI
Delete Sub-Step	Press the **Delete Sub-Step** softkey to delete the selected sub-step.
Edit	Press the **Edit** softkey to move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.
Settings	Press the **Settings** softkey to configure the sub-step settings. – **Delay** Set the delay time in seconds. Minimum: 0 s Maximum: 3600 s (1 hour) – **Prompt** Refer to "**Prompt sub-step settings**" on page 261 for more information. – **Send SCPI** Refer to "**Send SCPI sub-step settings**" on page 262 for more information.
Properties	Press the **Properties** softkey to rename the sub-step.

Prompt sub-step settings

The prompt sub-step inserts a prompt message with reply option to the measurement. This provides you the information and opportunity to interact with the sequence. Press OK to close the prompt window and continue the test sequence. The prompt sub-step settings menu page is displayed as shown in **Figure 7-11**.

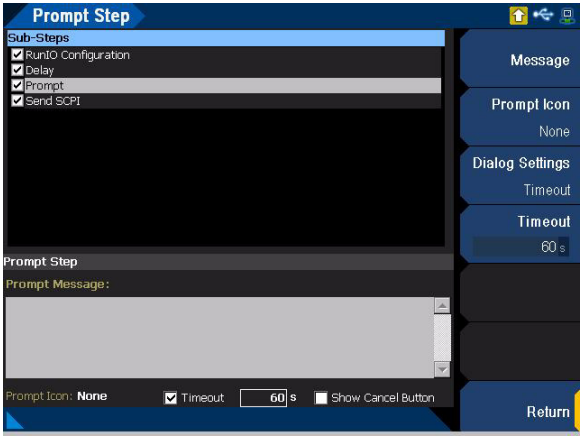

Figure 7-11 Prompt sub-step settings menu page

Table 7-10 Prompt sub-step settings menu description

Menu	Description
Message	Press the **Message** softkey to set the prompt message at the lower half of the main display.
Prompt Icon	Press the **Prompt Icon** softkey to select the prompt icon to be displayed. – None – Hand – Question – Exclamation – Asterisk
Dialog Settings	Press the **Dialog Settings** softkey to add additional settings to the prompt window. – Timeout When selected, the timeout value sets the maximum prompt window display time, in seconds. If the timeout is reached, the current measurement fails. When unselected, the prompt window will remain open until user closes it. – Cancel When selected, a Cancel button will be added to the prompt window. Press the Cancel button to close the prompt window and stop the test sequence.
Timeout	Press the **Timeout** softkey to set the prompt timeout value in seconds. This setting is only available if Timeout is selected in the dialog settings. Minimum: 1 s Maximum: 3600 s (1 hour)

Send SCPI sub-step settings

The send SCPI sub-step can be inserted into any measurement in the test sequence to issue SCPI command(s) to a connected external instrument and to pause for a specified delay time after the command(s) is issued. This sub-step is useful for setting up an external instrument connected through a USB/GPIB interface before a measurement is performed. The send SCPI sub-step settings menu page is displayed as shown in **Figure 7-12**.

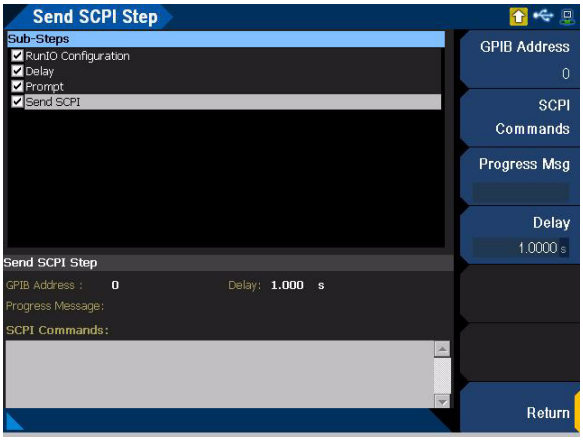

Figure 7-12 Send SCPI sub-step settings menu page

Table 7-11 Send SCPI sub-step settings menu description

Menu	Description
GPIB Address	Press the **GPIB Address** softkey to select the desired GPIB address.
SCPI Commands	Press the **SCPI Commands** softkey to configure the SCPI commands. – Edit Set the SCPI commands at the lower half of the main display. – Import Load the SCPI commands from a file. Refer to "**Recall**" on page 87 for more information on the Recall menu page.
Progress Msg	Press the **Progress Msg** softkey to set the optional text message that will be displayed on a dialog box for the time length set in **Delay**.
Delay	Press the **Delay** softkey to set the delay time length after the SCPI command(s) is issued. The SCPI command(s) may start an external event that takes some time to complete. An optional delay time can be set to wait for completion. The next sub-step in the test sequence will not be executed until the delay time has passed.

Measurements

The U8903B allows up to 20 results in a single measurement. You can move a selected measurement within the same test sequence. An example of the measurement menu page is displayed as shown in **Figure 7-13**.

Figure 7-13 TSA > Project > Test > AC Level menu page

Table 7-12 TSA > Project > Test > Measurement menu description

Menu	Description
Enable	Press the **Enable** softkey to enable or disable the selected measurement. The check box for the measurement will be selected when enabled.
Add Measurement	Press the **Add Measurement** softkey to add measurements.
Delete Measurement	Press the **Delete Measurement** softkey to delete the selected measurement.
Edit	Press the **Edit** softkey to move or copy the selected measurement, or paste a copied measurement after the selected measurement.

Table 7-12 TSA > Project > Test > Measurement menu description (continued)

Menu	Description
Settings	Press the **Settings** softkey to configure the selected measurement. Refer to the respective measurement settings for more information. – **AC level** – **Frequency** – **Phase** – **SNR** – **THD+N** – **DC level** – **Crosstalk** – **SMPTE IMD** – **DFD IMD** – **Multitone analyzer** – **Stepped frequency sweep** – **SMPTE frequency sweep** – **DFD frequency sweep** – **Stepped level sweep** – **SMPTE level sweep** – **DFD level sweep** – **DC level sweep** – **Receiver sensitivity** – **Measurement recorder** – **Voice quality**
Properties	Press the **Properties** softkey to configure the measurement properties. Refer to "**Properties**" on page 265 for more information.

Properties

An example of the measurement properties menu page is displayed as shown in **Figure 7-14**.

Figure 7-14 TSA > Project > Test > AC Level > Properties menu page

Table 7-13 TSA > Project > Test > Measurement > Properties menu description

Menu	Description
Name	Press the **Name** softkey to rename the selected measurement.
Sub-Steps	Press the **Sub-Steps** softkey to configure the sub-steps settings. Refer to "**Sub-steps**" on page 260 for more information on the sub-steps settings.
Failure Handling	Press the **Failure Handling** softkey to select the failure handling type for the selected measurement. When a measurement exceeded its preset limit or faced failure due to improper configuration (for example, calling for a file that does not exist or sending a SCPI sub-step to an unconnected devices), you can direct the application to the following: – Cancel Seq. Stop the test sequence. – Allow Retry Display a prompt window with Abort, Retry, and Ignore commands. Abort will immediately stop the test sequence. Retry will rerun the selected measurements. Ignore will flag the measurement as failed and continue with the test sequence. – Continue Seq. Flag the measurement as failed and continue with the test sequence.

AC level

AC level measurement provides a single value measurement of the output level from each DUT channel, as measured at each of the analyzer input. The AC level measurement settings allows you to configure the signal generation and signal analysis settings. The result for the AC level measurement for all the selected channels are displayed in a bar chart (AC Level and Gain). The gain result is not available if None is selected for the output configuration channels. Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page.

Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The AC level signal generation settings menu page is displayed as shown in **Figure 7-15**.

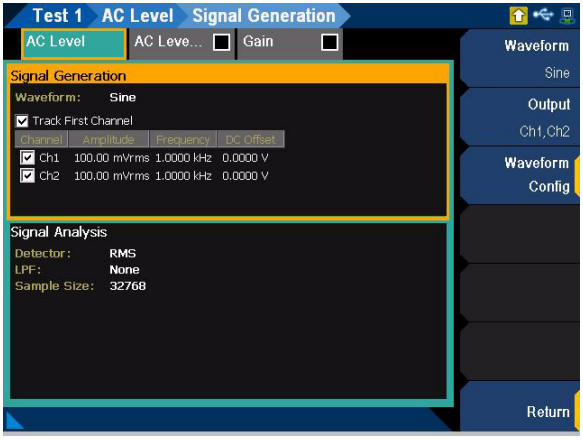

Figure 7-15 TSA > Project > Test > AC Level > Settings > Signal Generation menu page

Table 7-14 TSA > Project > Test > AC Level > Settings > Signal Generation menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable Phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value. – Phase->1st Ch Set the phase value. This setting is only available when channel 2 is selected.

Signal analysis

The AC level signal analysis settings menu page is displayed as shown in **Figure 7-16**.

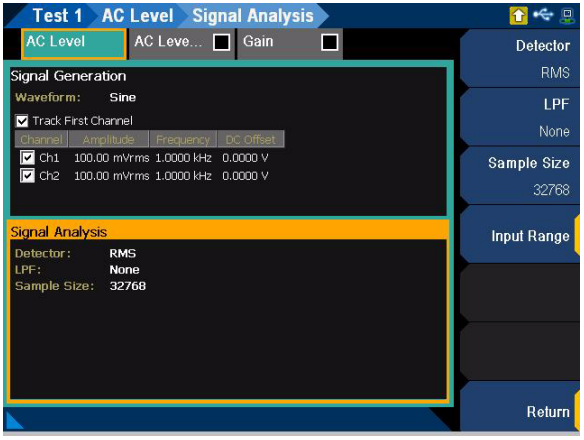

Figure 7-16 TSA > Project > Test > AC Level > Settings > Signal Analysis menu page

Table 7-15 TSA > Project > Test > AC Level > Settings > Signal Analysis menu description

Menu	Description
Detector	Press the **Detector** softkey to select the AC level detector type. – RMS AC level measurement is expressed in an rms value. – Pk-Pk AC level measurement is expressed in a Vpp value.
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Frequency

Frequency measurement provides a single value frequency measurement of the strongest component in the output signal of each DUT channel. The frequency measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the frequency measurement for all the selected channels are displayed in a bar chart (Frequency). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The frequency signal generation settings menu page is displayed as shown in **Figure 7-17**.

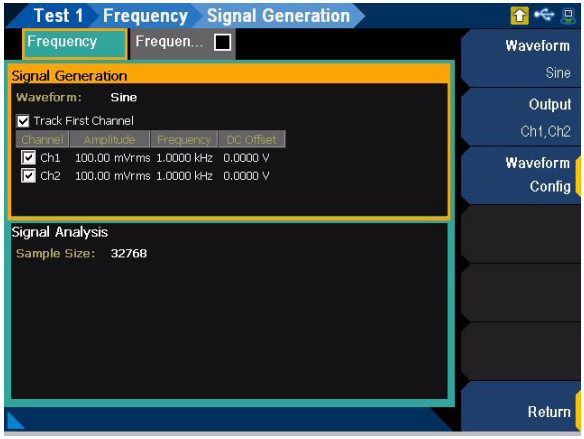

Figure 7-17 Frequency > Signal Generation settings menu page

Table 7-16 Frequency > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable Phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value. – Phase->1st Ch Set the phase value. This setting is only available when channel 2 is selected.

Signal analysis

The frequency signal analysis settings menu page is displayed as shown in **Figure 7-18**.

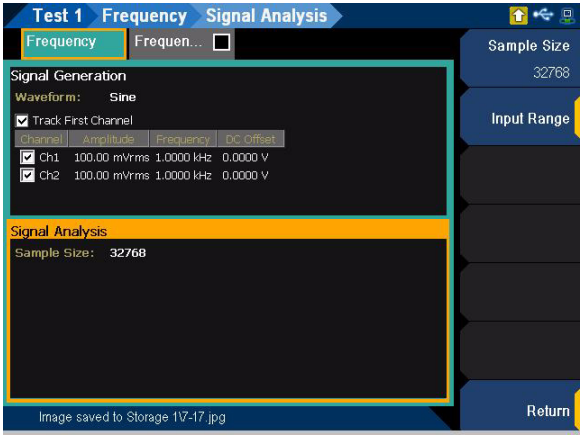

Figure 7-18 Frequency > Signal Analysis settings menu page

Table 7-17 Frequency > Signal Analysis settings menu description

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Phase

Phase measurement provides a single value measurement of the relative phase of the DUT channels. One channel is chosen as the phase reference channel and the remaining channels are measured against it. The phase measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the phase measurement for all the selected channels are displayed in a bar chart (Phase). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The phase signal generation settings menu page is displayed as shown in **Figure 7-19**.

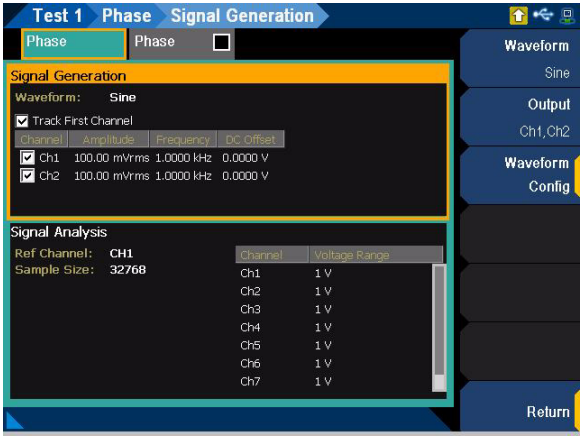

Figure 7-19 Phase > Signal Generation settings menu page

Table 7-18 Phase > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable Phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value. – Phase->1st Ch Set the phase value. This setting is only available when channel 2 is selected.

Signal analysis

The phase signal analysis settings menu page is displayed as shown in **Figure 7-20**.

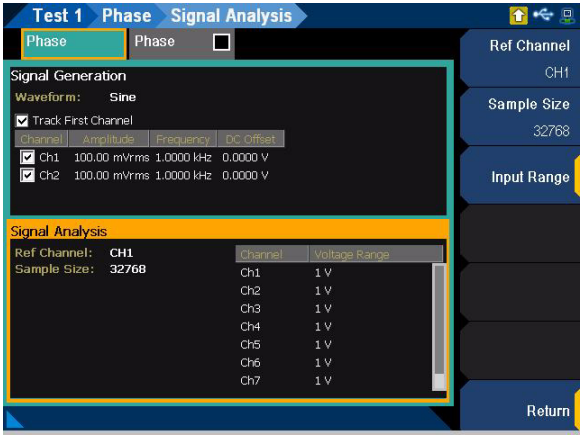

Figure 7-20 Phase > Signal Analysis settings menu page

Table 7-19 Phase > Signal Analysis settings menu description

Menu	Description
Ref Channel	Press the **Ref Channel** softkey to set the reference channel number. The phase of each channel is measured against the reference channel. The phase result for the reference channel should always be displayed zero.
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

SNR

SNR measurement provides a single value measurement of the signal to noise ratio of the output signal from each DUT channel. SNR is used to evaluate the intelligibility of a signal by expressing the difference between the nominal signal level and the noise. SNR is formed by two measurements where the first measurement is the signal level and the second measurement is the noise level with the signal turned off. These two measurements are expressed as ratio and displayed in decibels. The SNR measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the SNR measurement for all the selected channels are displayed in a bar chart (SNR). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The SNR signal generation settings menu page is displayed as shown in **Figure 7-21**.

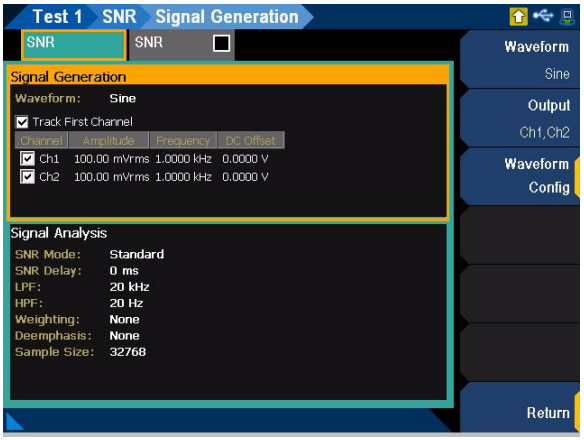

Figure 7-21 SNR > Signal Generation settings menu page

Table 7-20 SNR > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value. – Phase->1st Ch Set the phase value. This setting is only available when channel 2 is selected.

Signal analysis

The SNR signal analysis settings menu page is displayed as shown in **Figure 7-22**.

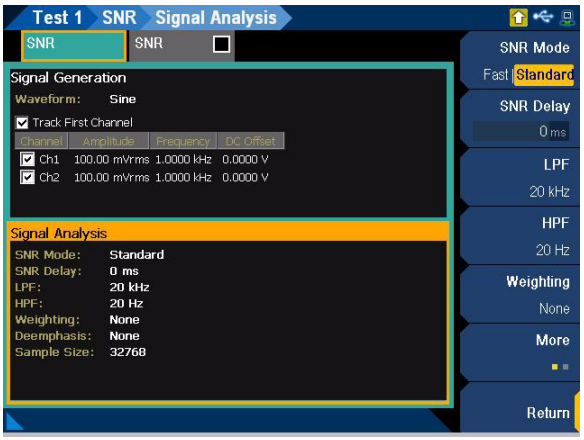

Figure 7-22 SNR > Signal Analysis settings menu page

Table 7-21 SNR > Signal Analysis settings menu description

Menu	Description
SNR Mode	Press the **SNR Mode** softkey to select the SNR measurement mode. – Fast The SNR measurement is based on the frequency domain computation method. – Standard The SNR measurement is measured by an internal routine that alternatively switches the U8903B generator output on and off. This mode is a closed-loop configuration which requires both the generator and analyzer in the test setup.
SNR Delay	Press the **SNR Delay** softkey to set the SNR delay. This setting is only available when **SNR Mode** is set to Standard.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. This setting is only available when **SNR Mode** is set to Fast. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **SNR Mode** is set to Fast and **Freq Lock** is set to Custom.
Harmonic Cnt	Press the **Harmonic Cnt** softkey to set the number of harmonic order to be removed. This setting is ony available when **SNR Mode** is set to Fast.

Table 7-21 SNR > Signal Analysis settings menu description (continued)

Menu	Description
LPF	Press the **Filtering** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom

Table 7-21 SNR > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

THD+N

THD+N measurement provides a single value measurement of the THD+N (Total Harmonic Distortion with Noise) in the output signal from each DUT channel, as measured at each of the analyzer input. The THD+N measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the THD+N measurement for all the selected channels are displayed in a bar chart (SINAD, THD Level, THD Ratio, THD+N Level, and THD+N Ratio). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The THD+N signal generation settings menu page is displayed as shown in **Figure 7-23**.

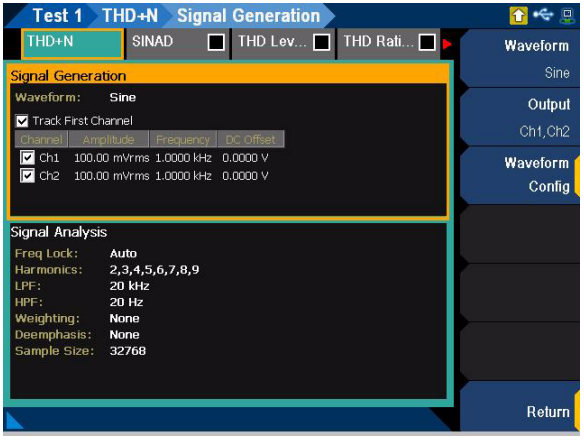

Figure 7-23 THD+N > Signal Generation settings menu page

Table 7-22 THD+N > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value. – Phase->1st Ch Set the phase value. This setting is only available when channel 2 is selected.

Signal analysis

The THD+N signal analysis settings menu page is displayed as shown in **Figure 7-24**.

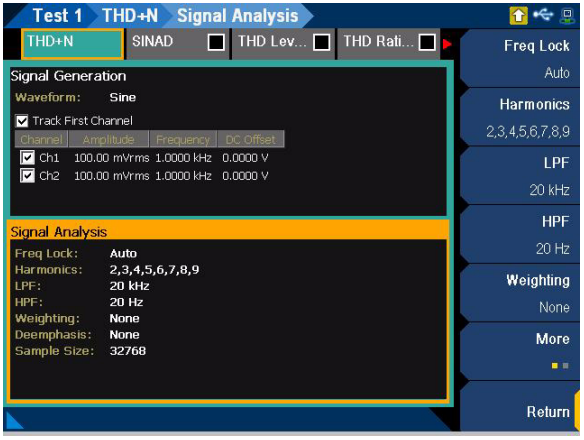

Figure 7-24 THD+N > Signal Analysis settings menu page

Table 7-23 THD+N > Signal Analysis settings menu description

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Harmonics	Press the **Harmonics** softkey to select the harmonics count to be used in the THD ratio and THD level results. – All – 2 to 9
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom

Table 7-23 THD+N > Signal Analysis settings menu description (continued)

Menu	Description
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

DC level

DC level measurement provides a single value measurement of the DC voltage present at the output of each DUT channel. If AC coupling is selected in the input configuration settings, it will change to DC coupling when the DC level measurement is being performed. The DC level measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the DC level measurement for all the selected channels are displayed in a bar chart (DC Level). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The DC level signal generation settings menu page is displayed as shown in **Figure 7-25**.

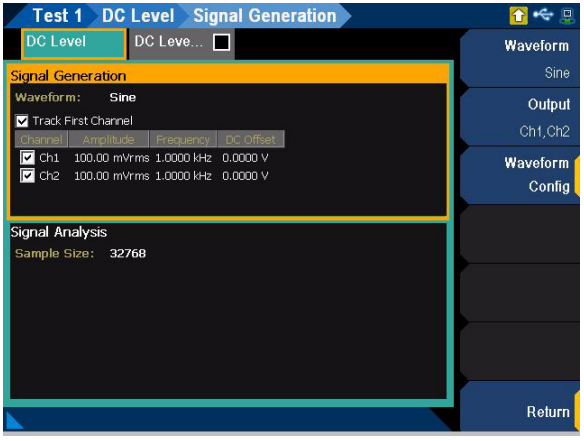

Figure 7-25 DC Level > Signal Generation settings menu page

Table 7-24 DC Level > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The DC level signal analysis settings menu page is displayed as shown in **Figure 7-26**.

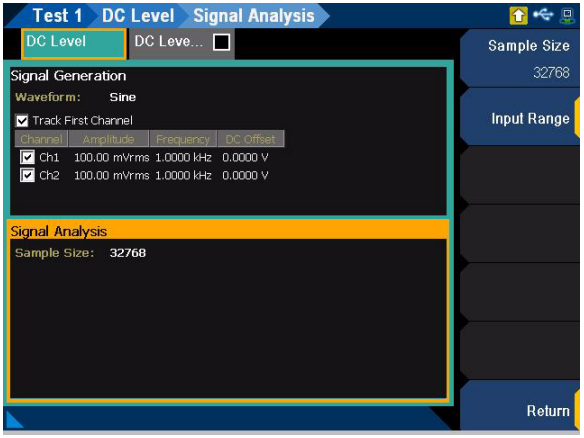

Figure 7-26 DC Level > Signal Analysis settings menu page

Table 7-25 DC Level > Signal Analysis settings menu description

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Crosstalk

Crosstalk is the unwanted leakage or bleed of a signal from one or more channels to other channels in a DUT. Crosstalk measurement provides the measurement of the crosstalk into the unstimulated DUT channel(s) when one channel is stimulated.

The generator will output the test signal to the DUT on the selected driven channel. The crosstalk in each of the remaining channels is then measured. The crosstalk measurement settings allows you to configure the signal generation settings and signal analysis settings.

The crosstalk measured in each channels are displayed in a bar chart (Crosstalk). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The crosstalk signal generation settings menu page is displayed as shown in **Figure 7-27**.

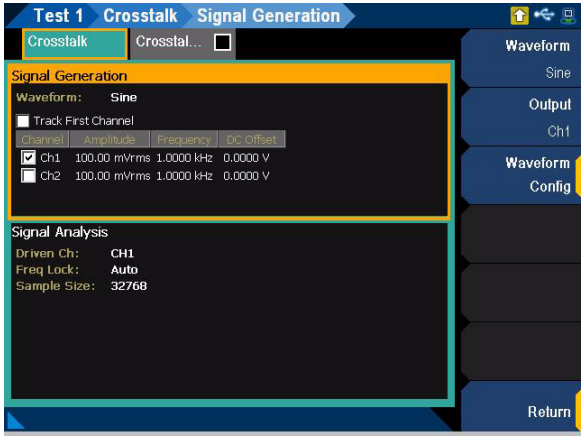

Figure 7-27 Crosstalk > Signal Generation settings menu page

Table 7-26 Crosstalk > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The crosstalk signal analysis settings menu page is displayed as shown in **Figure 7-28**.

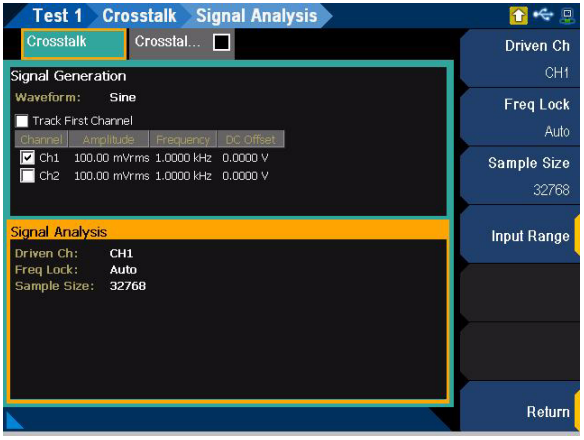

Figure 7-28 Crosstalk > Signal Analysis settings menu page

Table 7-27 Crosstalk > Signal Analysis settings menu description

Menu	Description
Driven Ch	Press the **Driven Ch** softkey to select the driven channel number from the generator.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to use the driven channel frequency value. You can select the generator channel by setting the **Driven Ch**. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

SMPTE IMD

SMPTE IMD measurement provides a single value measurement of the IMD ratio in the output signal from each DUT channel using the SMPTE method. The SMPTE IMD measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the SMPTE ratio measurement for all the selected channels are displayed in a bar chart (SMPTE Ratio). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The SMPTE IMD signal generation settings menu page is displayed as shown in **Figure 7-29**.

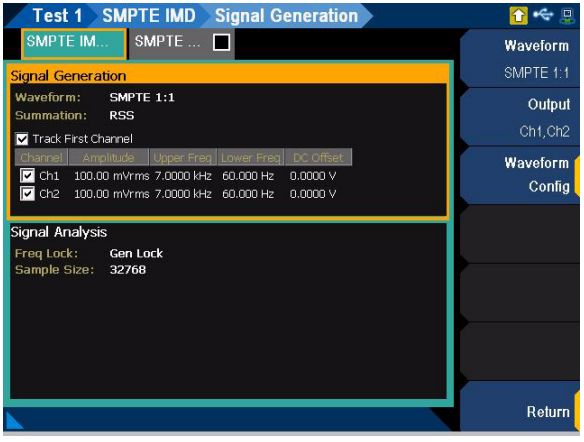

Figure 7-29 SMPTE IMD > Signal Generation settings menu page

Table 7-28 SMPTE IMD > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. – Lower Freq Set the lower frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The SMPTE IMD signal analysis settings menu page is displayed as shown in **Figure 7-30**.

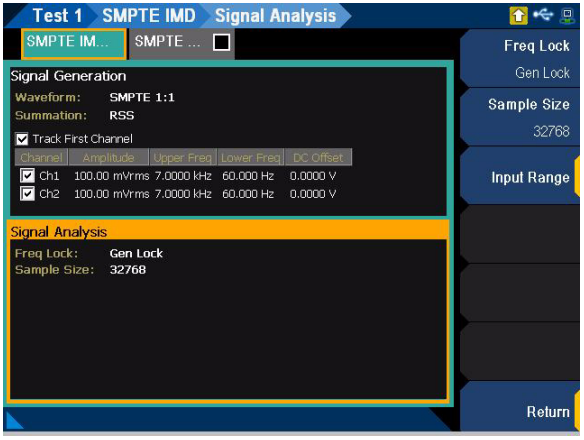

Figure 7-30 SMPTE IMD > Signal Analysis settings menu page

Table 7-29 SMPTE IMD > Signal Analysis settings menu description

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the upper and lower frequencies. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the upper and lower frequencies of the input signal based on the upper and lower frequencies of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the upper and lower frequency values by setting the searching method to Custom and setting the frequency value in **Upper Freq** and **Lower Freq**.
Upper Freq	Press the **Upper Freq** softkey to set the upper fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Lower Freq	Press the **Lower Freq** softkey to set the lower fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

DFD IMD

DFD IMD measurement provides a single value measurement of the IMD ratio in the output signal from each DUT channel using the DFD method. The DFD measurement settings allows you to configure the signal generation settings and signal analysis settings.

The result for the DFD ratio measurement for all the selected channels are displayed in a bar chart (DFD Ratio). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The DFD IMD signal generation settings menu page is displayed as shown in **Figure 7-31**.

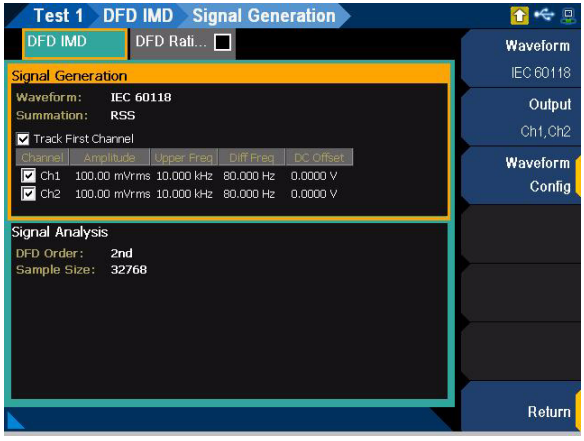

Figure 7-31 DFD IMD > Signal Generation settings menu page

Table 7-30 DFD IMD > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – IEC60118 – IEC60268
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. The available settings depend on the waveform type. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. – Center Freq Set the center frequency value. – Diff Freq Set the difference frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The DFD IMD signal analysis settings menu page is displayed as shown in **Figure 7-32**.

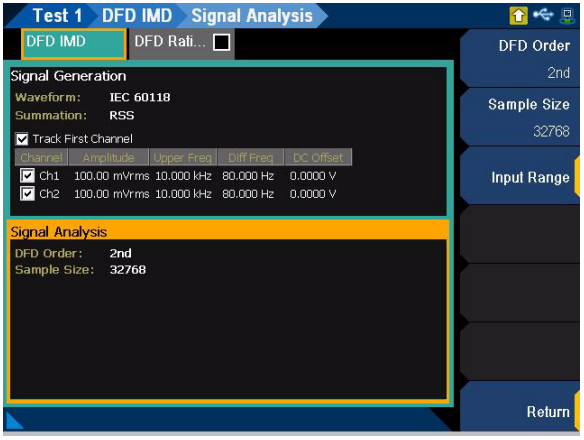

Figure 7-32 DFD IMD > Signal Analysis settings menu page

Table 7-31 DFD IMD > Signal Analysis settings menu description

Menu	Description
DFD order	Press the **DFD order** softkey to select the distortion order to be measured. – 2nd – 3rd
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Multitone analyzer

Multitone analyzer measurement uses the FFT analysis with a multitone stimulus waveform. The multitone stimulus signal is the combination of two or more sine waveforms. The multitone signal is applied to the DUT, and the DUT output is acquired for measurement. You can create a multitone from the Tones Config menu page in the signal generation settings.

The result for the multitone analyzer measurement for all the selected channels are displayed in a graph (Spectrum, Waveform, Level, and Gain) and in a bar chart (Max Tone Level, Min Tone Level, TD+N Level, TD+N Ratio, and Tone Level). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The multitone analyzer signal generation settings menu page is displayed as shown in **Figure 7-33**.

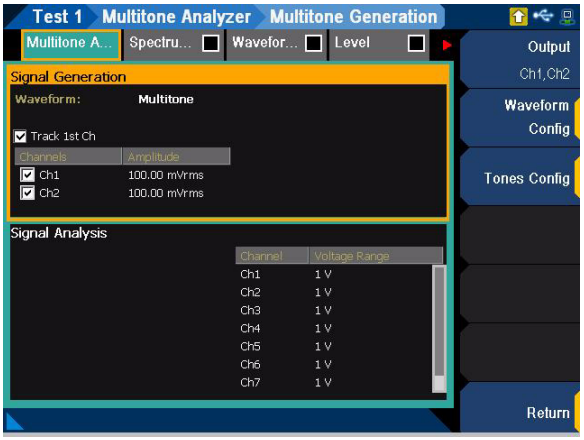

Figure 7-33 Multitone Analyzer > Signal Generation settings menu page

Table 7-32 Multitone Analyzer > Signal Generation settings menu description

Menu	Description
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Amplitude Set the amplitude value.
Tones Config	Press the **Tones Config** softkey to set the tones. – Start freq The lowest frequency in the multitone waveform which is usually the frequency of the first tone. – Stop freq The highest frequency in the multitone waveform which is usually the frequency for the last tone. – Spacing The frequency spacing between the tones. – Tones The number of signal frequency components. The maximum number of tones that can be generated is 60. – Length The waveform length that determines the number of samples used to create one iteration of the multitone waveform. Longer waveform length provides higher frequency resolution but will take more time to generate and process. – Phase Dist The phase distribution of each tone. – Ampl. Mode The amplitude ratio of each tone. Select Zero to set the amplitude of all tones to 0 dB. – Optimization Enable or disable the crest factor optimization. – Edit tones Edit the individual tones frequency, amplitude, and phase. – Apply Settings Apply the settings to calculate the crest factor of the multitone signal each time you change the settings in the Tones Config menu. – Active Channel The active channel for the absolute amplitude for each tone to be displayed in a table.

Signal analysis

The multitone analyzer signal analysis settings menu page is displayed as shown in **Figure 7-34**.

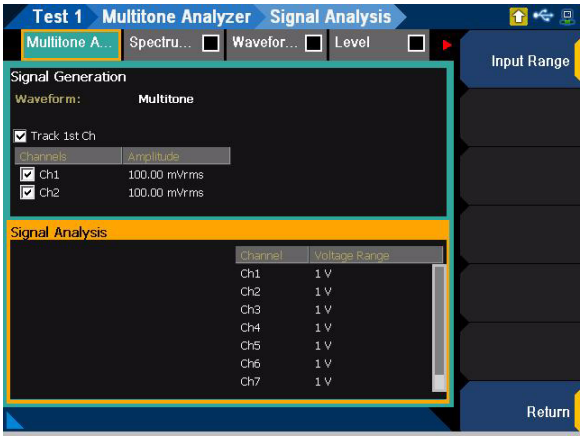

Figure 7-34 Multitone Analyzer > Signal Analysis settings menu page

Table 7-33 Multitone Analyzer > Signal Analysis settings menu description

Menu	Description
Input Range	Press the **Input Range** softkey to configure the input range settings. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Stepped frequency sweep

Stepped sweep is an audio testing method where one parameter is swept across a range of values while one or more other parameters are measured. The stepped frequency sweep measurement provides a sine wave stimulus signal that is moved across a range of frequencies in a specified number of points. The DUT output is acquired by the analyzer and the results are displayed on an X-Y graph, with the generator frequency on the X-axis and the measured results from the DUT on the Y-axis (AC Level, Gain, Phase, THD Ratio, THD Level, THD+N Ratio, THD+N Level, and SINAD).

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Auto ranging is not supported for the phase result. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The stepped frequency sweep signal generation settings menu page is displayed as shown in **Figure 7-35**.

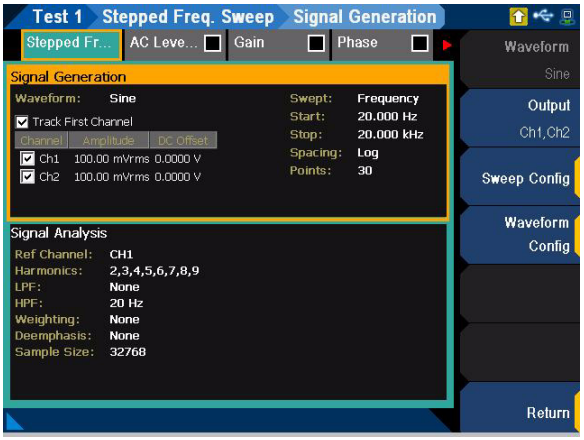

Figure 7-35 Stepped Frequency Sweep > Signal Generation settings menu page

Table 7-34 Stepped Frequency Sweep > Signal Generation settings menu description

Menu	Description
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The stepped frequency sweep signal analysis settings menu page is displayed as shown in **Figure 7-36**.

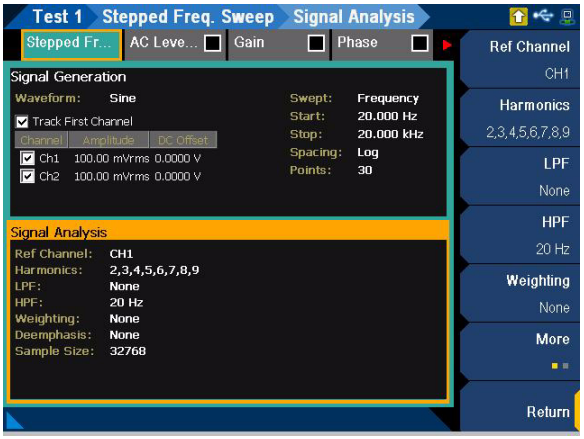

Figure 7-36 Stepped Frequency Sweep > Signal Analysis settings menu page

Table 7-35 Stepped Frequency Sweep > Signal Analysis settings menu description

Menu	Description
Ref Channel	Press the **Ref Channel** softkey to set the reference channel number. The phase of each channel is measured against the reference channel. The phase result for the reference channel should always be displayed zero.
Harmonics	Press the **Harmonics** softkey to select the harmonics count to be used in the THD ratio and THD level results. – All – 2 to 9
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom

Table 7-35 Stepped Frequency Sweep > Signal Analysis settings menu description (continued)

Menu	Description
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M

Table 7-35 Stepped Frequency Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

SMPTE frequency sweep

SMPTE frequency sweep measurement will hold one of the two tones at a fixed frequency while the other is swept through a range of frequencies. The results are displayed on an X-Y graph, with the swept frequency on the X-axis and the measured SMPTE ratio on the Y-axis.

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The SMPTE frequency sweep signal generation settings menu page is displayed as shown in **Figure 7-37**.

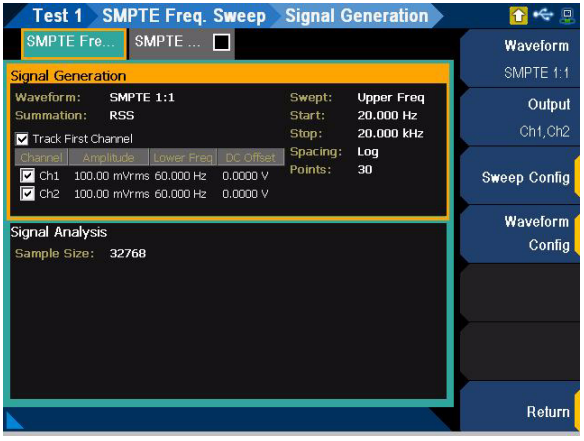

Figure 7-37 SMPTE Frequency Sweep > Signal Generation settings menu page

Table 7-36 SMPTE Frequency Sweep > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Swept Select Upper Freq or Lower Freq as the sweep parameter. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. This setting is only available if **Swept** is set to Lower Freq. – Lower Freq Set the lower frequency value. This setting is only available if **Swept** is set to Upper Freq. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The SMPTE frequency sweep signal analysis settings menu page is displayed as shown in **Figure 7-38**.

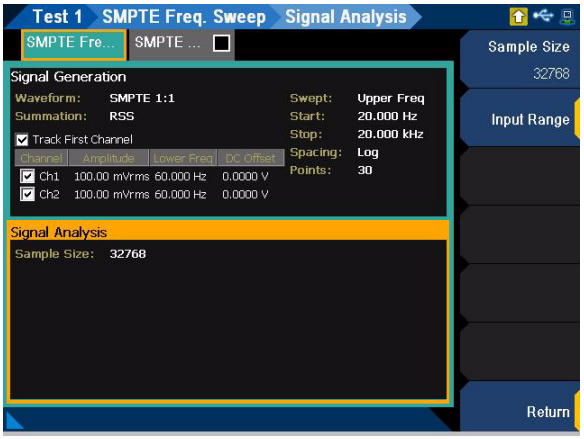

Figure 7-38 SMPTE Frequency Sweep > Signal Analysis settings menu page

Table 7-37 SMPTE Frequency Sweep > Signal Analysis settings menu description

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

DFD frequency sweep

DFD frequency sweep measurement will hold one of the two frequencies (IEC60118 upper or difference frequency and IEC60268 center or difference frequency) at a fixed frequency while the other is swept through a range of frequencies. The results are displayed on an X-Y graph, with the swept frequency on the X-axis and the measured DFD ratio on the Y-axis.

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The DFD frequency sweep signal generation settings menu page is displayed as shown in **Figure 7-39**.

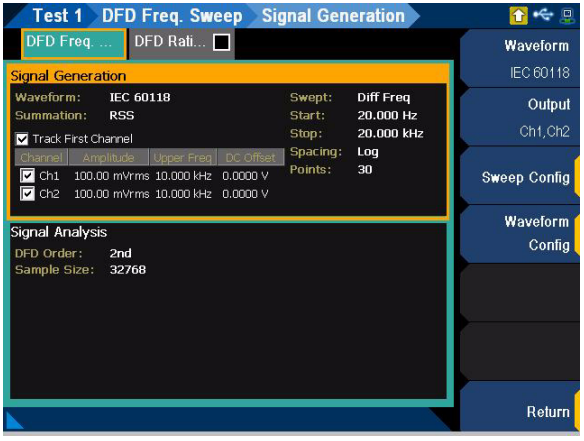

Figure 7-39 DFD Frequency Sweep > Signal Generation settings menu page

Table 7-38 DFD Frequency Sweep > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – IEC60118 – IEC60268
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Swept Select Upper Freq or Diff Freq as the sweep parameter. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. This setting is only available if **Swept** is set to Diff Freq. – Diff Freq Set the difference frequency value. This setting is only available if **Swept** is set to Upper Freq. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The DFD frequency sweep signal analysis settings menu page is displayed as shown in **Figure 7-40**.

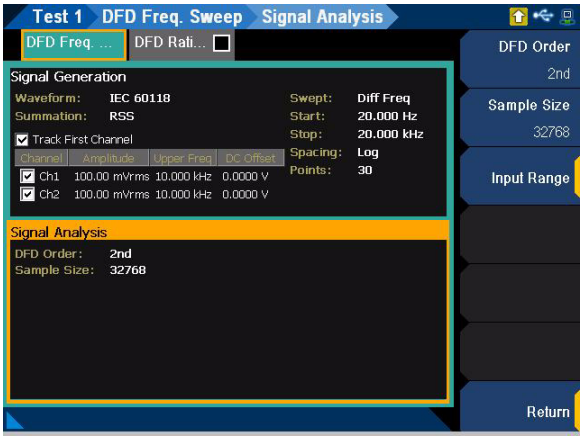

Figure 7-40 DFD Frequency Sweep > Signal Analysis settings menu page

Table 7-39 DFD Frequency Sweep > Signal Analysis settings menu description

Menu	Description
DFD order	Press the **DFD order** softkey to select the distortion product order to be measured. – 2nd – 3rd
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M

Table 7-39 DFD Frequency Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

External frequency sweep

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

The external frequency sweep signal generation settings menu page is displayed as shown in **Figure 7-41**.

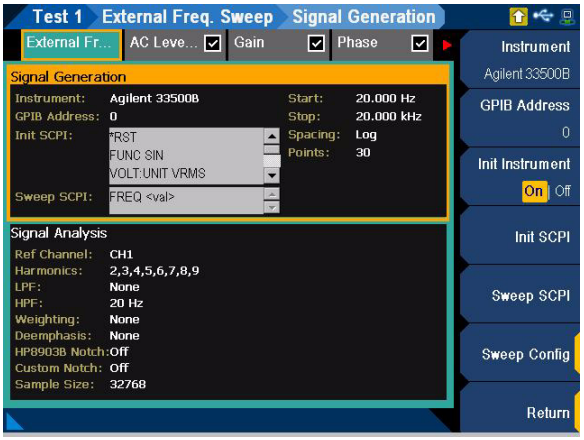

Figure 7-41 External Frequency Sweep > Signal Generation settings menu page

Table 7-40 External Frequency Sweep > Signal Generation settings menu description

Menu	Description
Instrument	Press the **Instrument** softkey to select the instrument model. – Keysight 33220A – Keysight 33250A – Keysight 33500A – Keysight 33600A – Other
GPIB Address	Press the **GPIB Address** softkey to select the GPIB address. – 0 to 30
Init Instrument	Press the **Init Instrument** softkey to enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
Init SCPI	Press the **Init SCPI** softkey to set the SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file. – Edit – Import (Refer to "**Recall**" on page 87 for more information on the Recall menu page.)

Table 7-40 External Frequency Sweep > Signal Generation settings menu description (continued)

Menu	Description
Sweep SCPI	Press the **Sweep SCPI** softkey to set the sweep SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file. – Edit – Import (Refer to "**Recall**" on page 87 for more information on the Recall menu page.)
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.

Signal analysis

The external frequency sweep signal analysis settings menu page is displayed as shown in **Figure 7-42**.

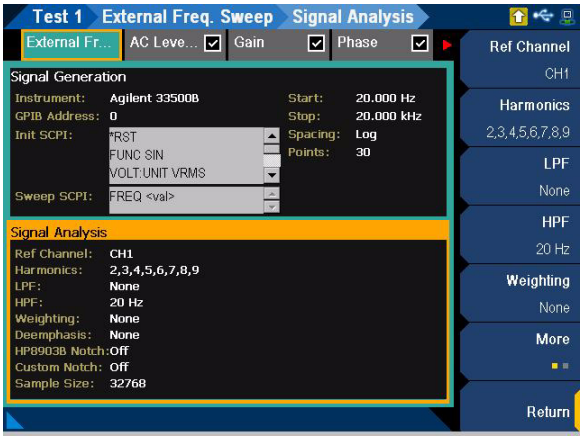

Figure 7-42 External Frequency Sweep > Signal Analysis settings menu page

Table 7-41 External Frequency Sweep > Signal Analysis settings menu description

Menu	Description
Ref Channel	Press the **Ref Channel** softkey to select the reference channel number. The phase of each channel is measured against the reference channel. The phase result for the reference channel should always be displayed zero.
Harmonics	Press the **Harmonics** softkey to select the harmonics count to be used in the THD ratio and THD level results. – All – 2 to 9
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom

Table 7-41 External Frequency Sweep > Signal Analysis settings menu description (continued)

Menu	Description
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom
Notch Filter	Press the **Notch Filter** softkey to configure the notch filter settings. – HP8903B Enable or disable the HP8903B mode. – Custom Notch Enable or disable the custom notch. – Center Freq Set the center frequency value. This is only applicable when custom notch is enabled. – Bandwidth Set the bandwidth value. This is only applicable when custom notch is enabled.

Table 7-41 External Frequency Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Stepped level sweep

Stepped sweep is an audio testing method where one parameter is swept across a range of values while one or more other parameters are measured. The stepped level sweep measurement provides a sine wave stimulus signal that is moved across a range of levels in a specified number of points. The DUT output is acquired by the analyzer and the results are displayed on an X-Y graph, with the generator level on the X-axis and the measured results from the DUT on the Y-axis (AC Level, Gain, THD Ratio, THD Level, THD Ratio Vs Measured Amplitude, THD Level Vs Measured Amplitude, THD+N ratio, THD+N Level, THD+N Ratio Vs Measured Amplitude, THD+N Level Vs Measured Amplitude, and SINAD).

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The stepped level sweep signal generation settings menu page is displayed as shown in **Figure 7-43**.

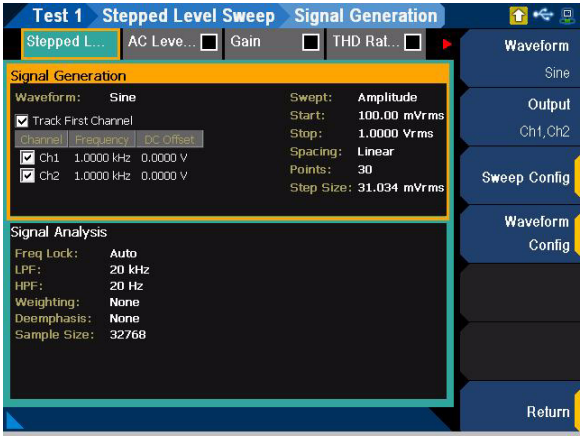

Figure 7-43 Stepped Level Sweep > Signal Generation settings menu page

Table 7-42 Stepped Level Sweep > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – DC Offset Set the DC offset value.

Signal analysis

The stepped level sweep signal analysis settings menu page is displayed as shown in **Figure 7-44**.

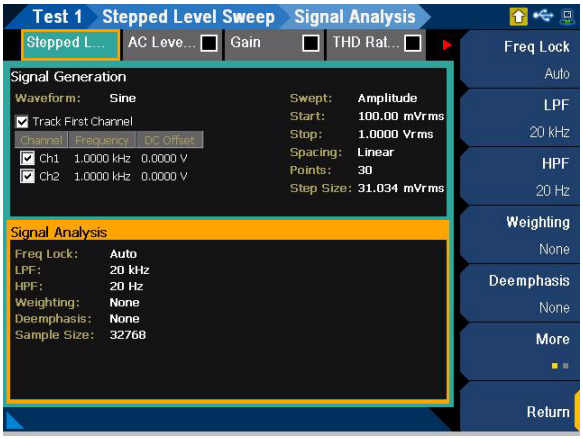

Figure 7-44 Stepped Level Sweep > Signal Analysis settings menu page

Table 7-43 Stepped Level Sweep > Signal Analysis settings menu description

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Table 7-43 Stepped Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom

Table 7-43 Stepped Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

SMPTE level sweep

SMPTE level sweep measurement will add two tones of different frequencies into a stimulus signal to sweep through a range of levels. The results are displayed on an X-Y graph, with the swept generator level or measured DUT level on the X-axis and the measured SMPTE ratio on the Y-axis.

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The SMPTE level sweep signal generation settings menu page is displayed as shown in **Figure 7-45**.

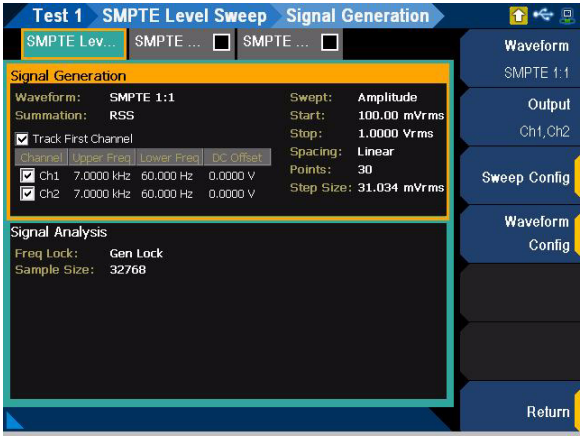

Figure 7-45 SMPTE Level Sweep > Signal Generation settings menu page

Table 7-44 SMPTE Level Sweep > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. – Lower Freq Set the lower frequency value. – DC Offset Set the DC offset value.

Signal analysis

The SMPTE level sweep signal analysis settings menu page is displayed as shown in **Figure 7-46**.

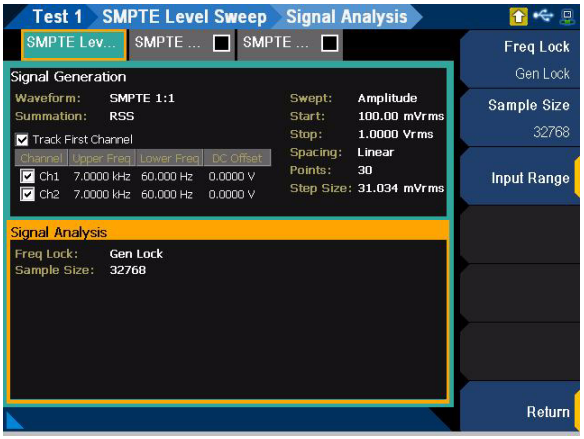

Figure 7-46 SMPTE Level Sweep > Signal Analysis settings menu page

Table 7-45 SMPTE Level Sweep > Signal Analysis settings menu description

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the upper and lower frequencies. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the upper and lower frequencies of the input signal based on the upper and lower frequencies of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the upper and lower frequency values by setting the searching method to Custom and setting the frequency value in **Upper Freq** and **Lower Freq**.
Upper Freq	Press the **Upper Freq** softkey to set the upper fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
Lower Freq	Press the **Lower Freq** softkey to set the lower fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Table 7-45 SMPTE Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

DFD level sweep

DFD level sweep measurement will add up two tones of different frequencies into a stimulus signal to sweep through a range of levels. The results are displayed on an X-Y graph, with the swept generator level or measured DUT level on the X-axis and the measured DFD ratio on the Y-axis.

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The DFD level sweep signal generation settings menu page is displayed as shown in **Figure 7-47**.

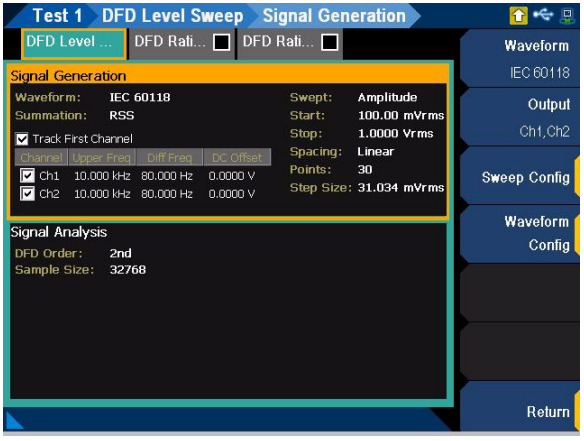

Figure 7-47 DFD Level Sweep > Signal Generation settings menu page

Table 7-46 DFD Level Sweep > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – IEC60118 – IEC60268
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Upper Freq Set the upper frequency value. – Diff Freq Set the difference frequency value. – DC Offset Set the DC offset value.

Signal analysis

The DFD level sweep signal analysis settings menu page is displayed as shown in **Figure 7-48**.

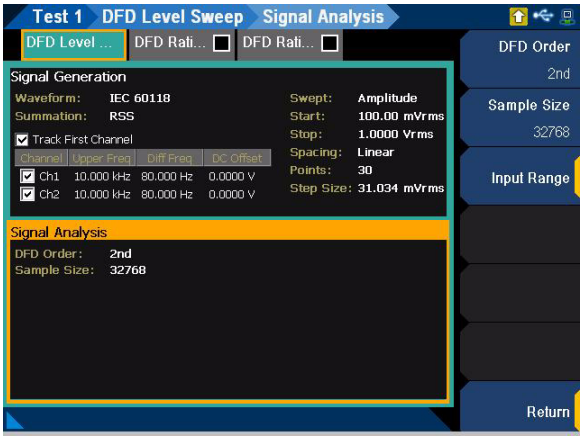

Figure 7-48 DFD Level Sweep > Signal Analysis settings menu page

Table 7-47 DFD Level Sweep > Signal Analysis settings menu description

Menu	Description
DFD order	Press the **DFD order** softkey to select the distortion product order to be measured. – 2nd – 3rd
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M

Table 7-47 DFD Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

DC level sweep

DC level sweep measurement sweeps a DC signal across a range of values in a series of points and the DUT output is acquired by the analyzer. The results are displayed on an X-Y graph, with the generator DC level on the X-axis and the measured result on the Y-axis. If AC coupling is selected in the input configuration settings, it will temporary be set to DC coupling while the DC level sweep measurement is performed.

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE This measurement requires a closed-loop configuration in which both the generator and the analyzer are used in the test setup. If None is selected for the output configuration channel, this measurement is unavailable.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The DC level sweep signal generation settings menu page is displayed as shown in **Figure 7-49**.

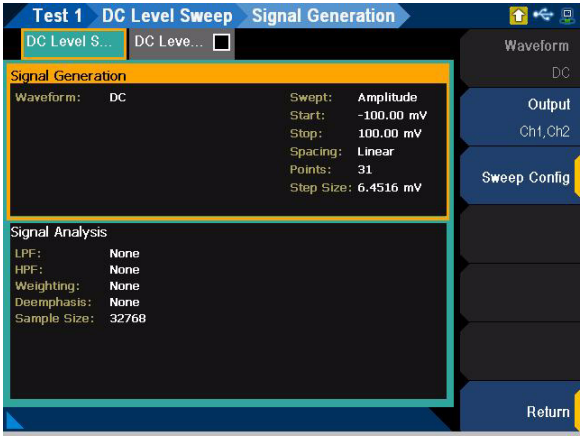

Figure 7-49 DC Level Sweep > Signal Generation settings menu page

Table 7-48 DC Level Sweep > Signal Generation settings menu description

Menu	Description
Output	Press the **Output** softkey to select the output channel.
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.

Signal analysis

The DC level sweep signal analysis settings menu page is displayed as shown in **Figure 7-50**.

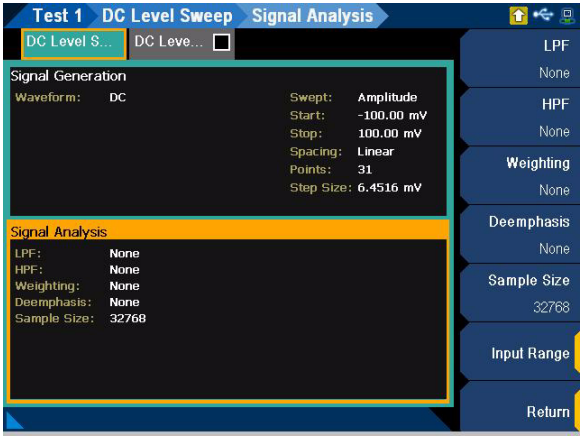

Figure 7-50 DC Level Sweep > Signal Analysis settings menu page

Table 7-49 DC Level Sweep > Signal Analysis settings menu description

Menu	Description
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom

Table 7-49 DC Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Receiver sensitivity

Receiver sensitivity measurement uses an external RF (radio frequency) signal generator to create a RF stimulus signal that is moved across a range of powers in a specified number of points. The DUT output which is in analog audio is acquired by the analyzer and processed for display.

The receiver sensitivity measurement is typically used for characterizing radio sensitivity by measuring SINAD. SINAD is an audio quality value that is used to specify the RF sensitivity of radio receivers. A higher SINAD value indicates higher quality audio.

Figure 7-51 shows a general setup for the receiver sensitivity measurement. A signal generator provides its own modulation and the U8903B controls the signal generator through Keysight 82357B USB/GPIB interface. A receiver such as a two-way radio is connected to the U8903B either by a direct connection or through an acoustic coupler.

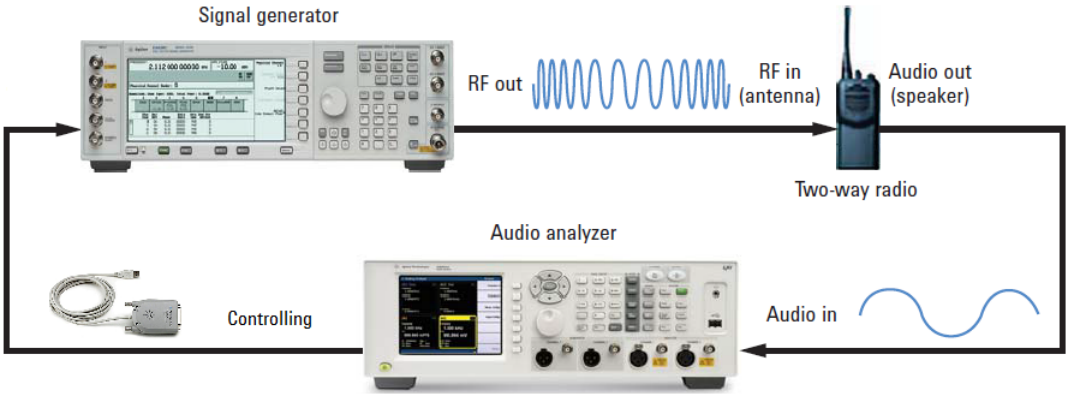

Figure 7-51 General setup for the receiver sensitivity measurement

Set the audio output level of the receiver as required and the signal generator settings to the desired value. The U8903B will automatically adjust the RF power output from the signal generator so that the targeted SINAD is produced at the receiver output. The targeted SINAD value is generally 12 dB for a communications receiver and 23 dB (mono) or 26 dB (stereo) for a broadcast receiver such as a car radio or Hi-Fi tuner.

The results are displayed on an X-Y graph, with the RF power parameter on the X-axis and the measured SINAD results on the Y-axis. Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

The receiver sensitivity signal generation settings menu page is displayed as shown in **Figure 7-52**.

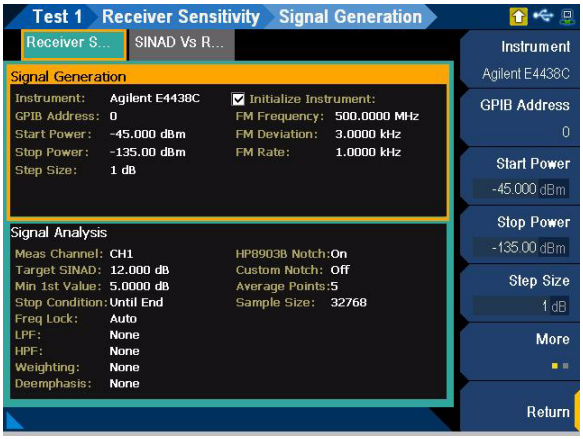

Figure 7-52 Receiver Sensitivity > Signal Generation settings menu page

Table 7-50 Receiver Sensitivity > Signal Generation settings menu description

Menu	Description
Instrument	Press the **Instrument** softkey to select the signal generator model. – Keysight E4438C – Other
GPIB address	Press the **GPIB address** softkey to set the GPIB address for the connected signal generator.
Start Power	Press the **Start Power** softkey to set the sweep start RF power.
Stop Power	Press the **Stop Power** softkey to set the sweep stop RF power.
Step Size	Press the **Step Size** softkey to set the step size.
Dwell Time	Press the **Dwell Time** softkey to set the delay between each measured SINAD in seconds.
Init Instrument	Press the **Init Instrument** softkey to enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
FM Frequency	Press the **FM Frequency** softkey to set the RF signal output frequency. This setting is only available if **Instrument** is set to Keysight E4438C and the **Init Instrument** is enabled.
FM Deviation	Press the **FM Deviation** softkey to set the RF signal frequency modulation deviation. This setting is only available if **Instrument** is set to Keysight E4438C and the **Init Instrument** is enabled.
FM Rate	Press the **FM Rate** softkey to set the RF signal internal frequency modulation rate. This setting is only available if **Instrument** is set to Keysight E4438C and the **Init Instrument** is enabled.

Table 7-50 Receiver Sensitivity > Signal Generation settings menu description (continued)

Menu	Description
Init SCPI	Press the **Init SCPI** softkey to set the SCPI commands that initialize the connected signal generator. You can set the SCPI command directly or load from a file. This setting is only available if **Instrument** is set to Other and the **Init Instrument** is enabled.
Output Power SCPI	Press the **Output Power SCPI** softkey to edit the SCPI command that adjusts the RF power of the connected signal generator. The command must be in the following pattern. `Cmds <val>` `Cmds` is the SCPI command and `<val>` is the value that will be filled up by the measurement to perform sweep. For example, `:POW <val>DBM`. This setting is only available if **Instrument** is set to Other.

Signal analysis

The receiver sensitivity signal analysis settings menu page is displayed as shown in **Figure 7-53**.

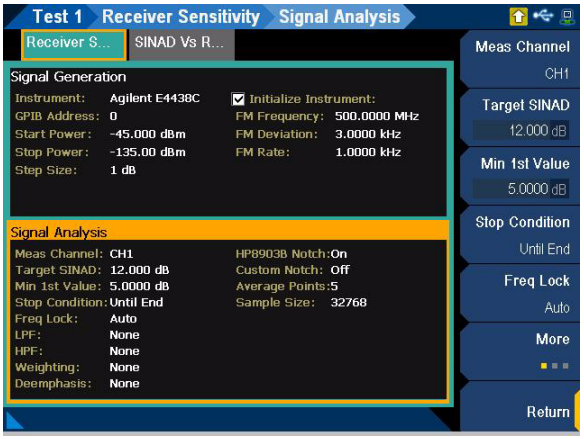

Figure 7-53 Receiver Sensitivity > Signal Analysis settings menu page

Table 7-51 Receiver Sensitivity > Signal Analysis settings menu description

Menu	Description
Meas Channel	Press the **Meas Channel** softkey to set the measured channel number.
Target SINAD	Press the **Target SINAD** softkey to set the target SINAD value measured from the Meas Channel.
Min 1st Value	Press the **Min 1st Value** softkey to set the minimum first value.
Stop Condition	Press the **Stop Condition** softkey to select the stop condition. – Until End – On Target

Table 7-51 Receiver Sensitivity > Signal Analysis settings menu description (continued)

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom

Table 7-51 Receiver Sensitivity > Signal Analysis settings menu description (continued)

Menu	Description
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom
Notch Filter	Press the **Notch Filter** softkey to configure the notch filter settings. – HP8903B Enable or disable the HP8903B notch filter mode. – Custom Notch Enable or disable custom notch filter. – Center Freq Set the center frequency value. This is only available when the Custom Notch is enabled. – Bandwidth Set the bandwidth value. This is only available when the Custom Notch is enabled.
Average Points	Press the **Average Points** softkey to set the number of measurement readings to be used for the average calculation. This is useful for noisy signals. Applying the average points will smooth out the fluctuations introduced by the noise that causes the inconsistencies in the measurement reading.
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

External level sweep

Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation

The external level sweep signal generation settings menu page is displayed as shown in **Figure 7-54**.

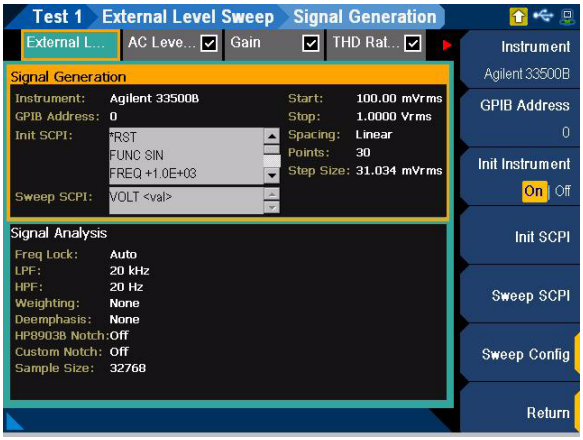

Figure 7-54 External Level Sweep > Signal Generation settings menu page

Table 7-52 External Level Sweep > Signal Generation settings menu description

Menu	Description
Instrument	Press the **Instrument** softkey to select the instrument model. – Keysight 33220A – Keysight 33250A – Keysight 33500A – Keysight 33600A – Other
GPIB Address	Press the **GPIB Address** softkey to select the GPIB address. – 0 to 30
Init Instrument	Press the **Init Instrument** softkey to enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
Init SCPI	Press the **Init SCPI** softkey to set the SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file. – Edit – Import (Refer to "**Recall**" on page 87 for more information on the Recall menu page.)

Table 7-52 External Level Sweep > Signal Generation settings menu description (continued)

Menu	Description
Sweep SCPI	Press the **Sweep SCPI** softkey to set the sweep SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file. – Edit – Import (Refer to "**Recall**" on page 87 for more information on the Recall menu page.)
Sweep Config	Press the **Sweep Config** softkey to set the sweep configuration. – Start Set the start value for the sweep parameter. – Stop Set the stop value for the sweep parameter. – Spacing Select Log, Linear, or Custom for the sweep spacing. – Points Set the number of sweep points. – Step Size Set the step size for linear spacing. This setting is only available when spacing is set to Linear. – Dwell Time Set the delay between the sweep points. – Edit Points Edit the individual points value, insert or remove points, load points, and save the points.

Signal analysis

The external frequency sweep signal analysis settings menu page is displayed as shown in **Figure 7-55**.

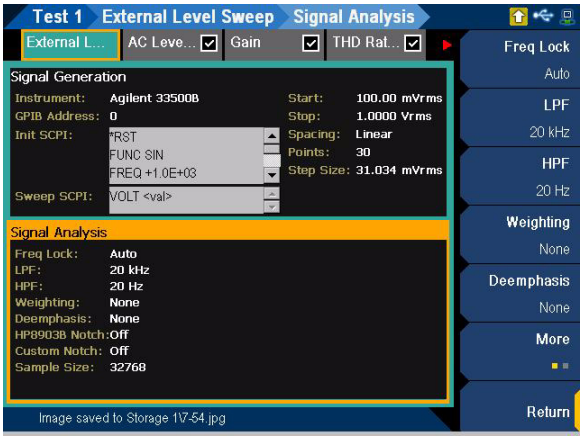

Figure 7-55 External Level Sweep > Signal Analysis settings menu page

Table 7-53 Stepped Level Sweep > Signal Analysis settings menu description

Menu	Description
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Table 7-53 Stepped Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom

Table 7-53 Stepped Level Sweep > Signal Analysis settings menu description (continued)

Menu	Description
Notch Filter	Press the **Notch Filter** softkey to configure the notch filter settings. – HP8903B Enable or disable the HP8903B mode. – Custom Notch Enable or disable the custom notch. – Center Freq Set the center frequency value. – Bandwidth Set the bandwidth value.
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Measurement recorder

Measurement recorder is a tool that provides a record of a number of measurements versus elapsed time. It is useful to monitor the output of a DUT over an extended period of time. The measurement recorder does not require a specific test signal. It can be used with any audio signal within the input range of the analyzer or with no signal.

The reading rate of the measurement recorder is dependent on the channel count, sample size, and result type. A reading is obtained at the beginning of the measurement and throughout the duration set until the elapsed time.

The results are displayed on an X-Y graph, with the time parameter on the X-axis and the measured results on the Y-axis (AC Level, Gain, Phase, THD+N Ratio, THD+N Level, DC Level, Frequency, and SINAD). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

NOTE

- Auto ranging is not supported for the phase result.
- DC level result is not available if AC coupling is selected in the output configuration settings.

Signal generation

NOTE The signal generation is disabled if None is selected for the output configuration channel.

The measurement recorder signal generation settings menu page is displayed as shown in **Figure 7-56**.

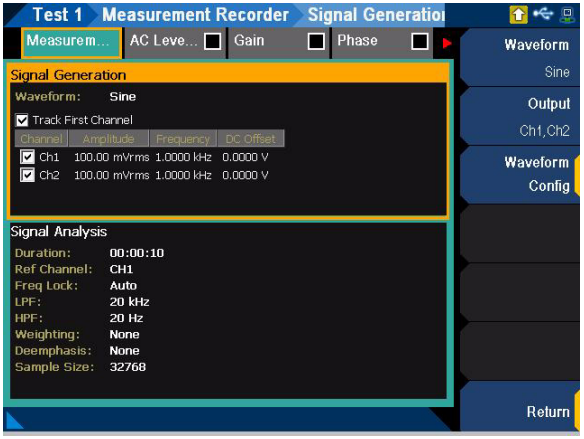

Figure 7-56 Measurement Recorder > Signal Generation settings menu page

Table 7-54 Measurement Recorder > Signal Generation settings menu description

Menu	Description
Waveform	Press the **Waveform** softkey to select the waveform type. – Sine – Variable Phase – Square – Arbitrary
Output	Press the **Output** softkey to select the output channel.
Waveform Config	Press the **Waveform Config** softkey to set the waveform configuration. – Track 1st Ch If Track 1st Ch is enabled, the generator channel 1 waveform configuration settings will be copied to the other channels and the waveform configuration settings for the other channels cannot be edited. Any changes made to channel 1 waveform configuration settings will be reproduced in the other channels waveform configuration settings. Disable the Track 1st Ch to set the individual channels. – Frequency Set the frequency value. – Amplitude Set the amplitude value. – DC Offset Set the DC offset value.

Signal analysis

The measurement recorder signal analysis settings menu page is displayed as shown in **Figure 7-57**.

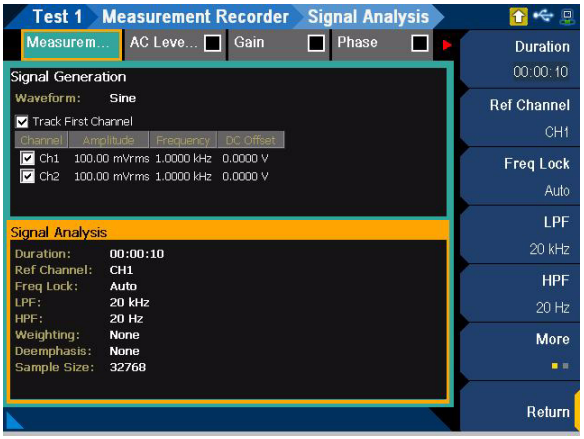

Figure 7-57 Measurement Recorder > Signal Analysis settings menu page

Table 7-55 Measurement Recorder > Signal Analysis settings menu description

Menu	Description
Duration	Press the **Duration** softkey to set the length of the measurement record. The duration is in the following pattern. `hh:mm:ss` `hh` is the hours, `mm` is the minutes, and `ss` is the seconds. The minimum duration is 0 s, and the maximum duration is 3 days `(71:59:59)`. When the duration is set to 0 s, a single measurement will be made.
Ref Channel	Press the **Ref Channel** softkey to set the reference channel number. The phase of each channel is measured against the reference channel. The phase result for the reference channel should always be displayed zero.
Freq Lock	Press the **Freq Lock** softkey to select the searching method for the fundamental frequency. – Auto Selecting Auto will allow the U8903B to search for the fundamental frequency automatically. – Gen Lock Selecting Gen Lock will allow the U8903B to search for the fundamental frequency based on the generator frequency value of the respective generator channel. This Gen Lock method is only useful if you use the internal audio generator. – Custom If you have a known input signal, you can define the fundamental frequency value by setting the searching method to Custom and setting the frequency value in **Fund Freq**.
Fund Freq	Press the **Fund Freq** softkey to set the fundamental frequency value. This setting is only available when **Freq Lock** is set to Custom.

Table 7-55 Measurement Recorder > Signal Analysis settings menu description (continued)

Menu	Description
LPF	Press the **LPF** softkey to select the low-pass filter. – None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom
HPF	Press the **HPF** softkey to select the high-pass filter. – None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom
Weighting	Press the **Weighting** softkey to select the weighting filter. – None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom
Deemphasis	Press the **Deemphasis** softkey to select the de-emphasis filter. – None – 50 µs – 75 µs – Custom

Table 7-55 Measurement Recorder > Signal Analysis settings menu description (continued)

Menu	Description
Sample Size	Press the **Sample Size** softkey to select the number of samples to be acquired for the measurement. – 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
Input Range	Press the **Input Range** softkey to configure the input range settings. – Auto Range Enable or disable the auto input range. If auto range is enabled, each analog channel input range is determined automatically, based on the level of the input signal. If the input signal level changes beyond the ranging threshold, auto range will cause the input ranging circuits to move up or down for a proper ranging. If auto range is disabled, you can set a fixed input voltage range for each analog input channel. – Track 1st Ch If Track 1st Ch is enabled, all the other channels will be set to follow the channel 1 range setting. Any changes made to channel 1 range setting will be reproduced in the other channels. Disable the Track 1st Ch to set the individual channels. – Voltage Range Set the input voltage range.

Voice quality

NOTE POLQA and PESQ measurements are only available with N3432A and N3433A. Refer to "**U8903B Options**" on page 33 for more information.

Perceptual Objective Listening Quality Assessment (POLQA) is the next-generation voice quality testing technology for fixed, mobile, and IP-based networks. POLQA was standardized by the ITU-T (International Telecommunication Union) as the new Recommendation P.863 and can be applied for voice quality analysis of high definition voice, 3G, and 4G/LTE networks. POLQA is licensed by OPTICOM GmbH.

NOTE Perceptual Objective Listening Quality Analysis (POLQA) according to ITU-T Recommendation P. 863 included in this product is protected by copyright and by European, US and other International patents and patent applications and is provided under license from OPTICOM Dipl.-Ing. M. Keyhl GmbH, Erlangen, Germany, 2011 - www.opticom.de.

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For further information please refer to www.polqa.info.

POLQA provides significantly improved benchmark accuracy for 3G and strong support for testing of most recent technologies such as Unified Communications, Next Gen Networks, and 4G/LTE compared to PESQ/P8.862 that was originally released in the year 2001.

POLQA measurement working model is to predict speech quality by analysing digital speech signal. The objective measures should be as close as possible to the subjective quality scores as if it would be obtained from subjective listening tests. Typically, POLQA measurement uses real speech as a test stimulus to assess the quality and performance of telephony networks. POLQA measurement is the successor to PESQ/P8.862 measurement.

The result for the voice quality measurement for all the selected channels are displayed in a bar chart (MOS-LQO and Levels). Refer to "**Measurement Results**" on page 352 for more information on the respective result menu page. Use the arrow keys to navigate through the respective tabs and to display the menu page.

Signal generation and analysis

The voicequality signal generation and analysis settings menu page is displayed as shown in **Figure 7-58**.

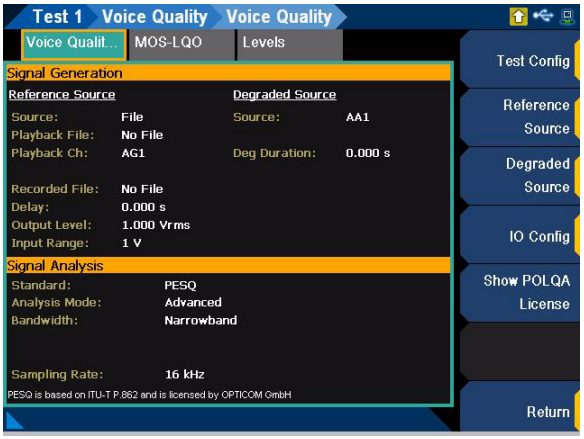


Figure 7-58 Voice Quality > Signal Generation and Analysis settings menu page

Table 7-56 Voice Quality > Signal Generation and Analysis settings menu description

Menu	Description
Test Config (POLQA)	Press the **Test Config** softkey to set the test configurations. – Test Standard Select POLQA or PESQ as the test standard. – Analysis Mode Select Basic or Advanced as the POLQA analysis mode. Basic mode will load the reference and degraded wave files, and perform analysis automatically. Advanced mode will perform wave file playback and recording, and analysis automatically. – Bandwidth Select Narrowband or Super Wideband as the bandwidth type. – Auto Lvl Align Enable or disable the automatic level alignment. – Auto Fs Enable or disable the resampling of the input signals to a suitable sample rate. The sample rates for all narrow band mode and super wideband input files will be resampled to 8 kHz and 48 kHz respectively. – Target Fs Select the sample rate for narrowband (8 kHz, 16 kHz, and 48 kHz). This setting is only applicable when the Bandwidth is Narrowband.

Table 7-56 Voice Quality > Signal Generation and Analysis settings menu description (continued)

Menu	Description
Test Config (PESQ)	Press the **Test Config** softkey to set the test configurations. – Test Standard Select POLQA or PESQ as the test standard – Analysis Mode Select Basic or Advanced as the PESQ analysis mode. Basic mode will load the reference and degraded wave files, and perform analysis automatically. Advanced mode will perform wave file playback and recording, and analysis automatically. – Bandwidth Select Narrowband or Wideband as the bandwidth type. – Target Fs Select the sample rate for narrowband (8 kHz and 16 kHz). This setting is only applicable when the Bandwidth is Narrowband.
Playback File Path	Press the **Playback File Path** softkey to select the playback wave file source to be used. Refer to "**Recall**" on page 87 for more information on the Recall menu page. This setting is only available when **Analysis Mode** in Test Config is set to Basic.
Degraded File Path	Press the **Degraded File Path** softkey to select the degraded wave file source to be used. Refer to "**Recall**" on page 87 for more information on the Recall menu page. This setting is only available when **Analysis Mode** in Test Config is set to Basic.
Reference Source	Press the **Reference Source** softkey to set the reference source configuration. This setting is only available when **Analysis Mode** in Test Config is set to Advanced. – Source Select file or a generator channel as the reference source. – Playback File Select the playback wave file source to be used. This setting is only available when **Source** is set to File. – Playback Ch Select the generator channel to play the reference file or waveform. – Use PB as Ref Enable or disable playback as the reference file. – Ref File from AA Enable or disable reference file from analog analyzer. – Ref File Select the reference file. – Save Rec File Enable or disable to save the recording file. This setting is only available when **Ref File from AA** is enabled. – Record File Select the record file. This setting is only available when **Save Rec File** is enabled. – Recording Ch Select the an analyzer channel as the reference file. This setting is only available when **Save Rec File** is enabled. – Rec Duration Set the recording duration used to record from an analyzer channel. This setting is only available when **Save Rec File** is enabled. – Auto Start Rec Enable or disable automatically start recording. This setting is only available when **Save Rec File** is enabled. – Delay Set the delay in seconds before a recording is performed after the generator is turned on. This setting is only available when **Recording Ch** is set to analyzer channel. – Save to File Enable or disable automatically save the reference file. This setting is only available when Recording Ch is set to an analyzer channel. – Save File Path Set the location to save the reference file. This setting is only available when Save to File is enabled.

Table 7-56 Voice Quality > Signal Generation and Analysis settings menu description (continued)

Menu	Description
Degraded Source	Press the **Degraded Source** softkey to set the degraded source configuration. This setting is only available when **Analysis Mode** in Test Config is set to Advanced. – Source Select file or an analyzer channel as the degraded source. – Save Rec File Enable or disable to save the recording file. This setting is only available when **Source** is set to an analyzer channel. – Rec Duration Set the recording duration used to record the degraded wave file. This setting is only available when **Source** is set to an analyzer channel. – Auto Start Rec Enable or disable automatically start recording.This setting is only available when **Source** is set to an analyzer channel. – Delay Set the delay in seconds before a recording is performed after the generator is turned on. This setting is only available when **Source** is set to an analyzer channel. – Degraded File Select the degraded wave file source to be used. This setting is only available when **Source** is set to File.
IO Config	Press the **IO Config** softkey to set the IO configuration. – Output Level Set the output level value. – Input Range Select the input range value.
Show/Hide POLQA License	Press the **Show/Hide POLQA License** softkey to show or hide the POLQA license information.

Measurement Results

The test sequence application allows you to display the measurement results in a bar chart or graph.

Bar chart

An example of the bar chart result menu page is displayed as shown in **Figure 7-59**.

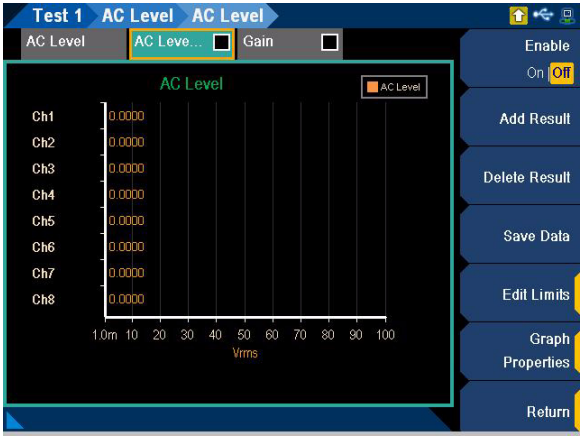


Figure 7-59 AC Level > Settings > Result (AC level) menu page

Table 7-57 TSA > Project > Test > Measurement > Settings > Result (bar chart) menu description

Menu	Description
Enable	Press the **Enable** softkey to enable or disable the selected result tab.
Add Result	Press the **Add Result** softkey to add a new result tab to the measurement.
Delete Result	Press the **Delete Result** softkey to delete the selected result tab from the measurement.
Save Data	Press the **Save Data** softkey to save the selected result data to a CSV file format in the internal storage or external USB flash storage. Refer to "**Save**" on page 86 for the Save menu page.

Table 7-57 TSA > Project > Test > Measurement > Settings > Result (bar chart) menu description (continued)

Menu	Description
Edit Limits	Press the **Edit Limits** softkey to configure the limits settings. – Track 1st If Track 1st trace is enabled, the channel 1 limits settings will be copied to the other channels and the limits settings for the other channels cannot be edited. Any changes made to the channel 1 limits settings will be reproduced in the other channels limits settings. Disable the Track 1st trace to set the individual channels limits. – Lower Limit Enable or disable the lower limit. – Upper Limit Enable or disable the upper limit. – Lower Limit Set the lower limit value. – Upper Limit Set the upper limit value.
Graph Properties	Press the **Graph Properties** softkey to set the graph properties. – Title Edit the bar chart title. – X-axis – Auto Scale Enable or disable the X-axis autoscale. – Unit Select the X-axis unit type. – Left Set the X-axis left edge value. This setting is only available when **Auto Scale** is disabled. – Right Set the X-axis right edge value. This setting is only available when **Auto Scale** is disabled.

Graph

An example of the graph result menu page is displayed as shown in **Figure 7-60**.

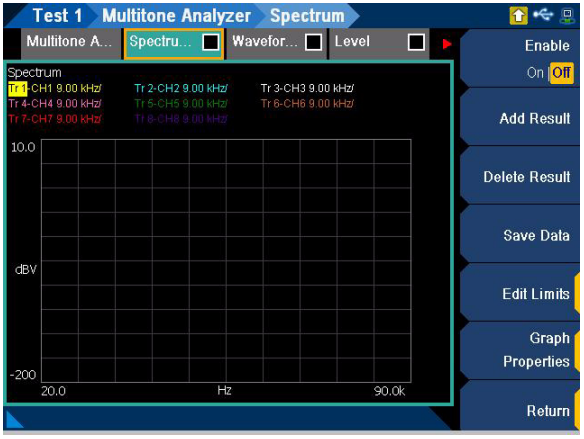


Figure 7-60 Multitone Analyzer > Settings > Result (Spectrum) menu page

Table 7-58 TSA > Project > Test > Measurement > Settings > Result (graph) menu description

Menu	Description
Enable	Press the **Enable** softkey to enable or disable the selected result tab.
Add Result	Press the **Add Result** softkey to add a new result tab to the measurement.
Delete Result	Press the **Delete Result** softkey to delete the selected result tab from the measurement.
Save Data	Press the **Save Data** softkey to save the selected result data to a CSV file format in the internal storage or external USB flash storage. Refer to "**Save**" on page 86 for the Save menu page.
Edit Limits	Press the **Edit Limits** softkey to configure the limits settings. – Trace Select the trace channel number or the trace type (POLQA measurement) – Limit Type Select Upper or Lower as the limit type. – Track 1st If Track 1st trace is enabled, the channel 1 limits settings will be copied to the other channels and the limits settings for the other channels cannot be edited. Any changes made to the channel 1 limits settings will be reproduced in the other channels limits settings. Disable the Track 1st trace to set the individual channels limits. – Limit Enable or disable the limit. – Points – Point No Set the point number. – X Set the X-axis value for the selected point number. – Y Set the Y-axis value for the selected point number. – Add Point Add a limit point. – Remove Point Remove the selected limit point. – Clear Points Clear all the limit points. – Load Points Load limit points from a file. Refer to "**Recall**" on page 87 for the Recall menu page. – Save Points Save the selected limit points to a file. Refer to "**Save**" on page 86 for the Save menu page.

Table 7-58 TSA > Project > Test > Measurement > Settings > Result (graph) menu description (continued)

Menu	Description
Graph Properties	Press the **Graph Properties** softkey to set the graph properties. – Title Edit the graph title. – X-axis – Auto Scale Enable or disable the X-axis autoscale. – Spacing Select Linear or Log for the spacing. – Unit Select the X-axis unit type. – Left Set the X-axis left edge value. This setting is only available when **Auto Scale** is disabled. – Right Set the X-axis right edge value. This setting is only available when **Auto Scale** is disabled. – Center Set the X-axis center value. This setting is only available when **Auto Scale** is disabled. – Span Set the X-axis span value. This setting is only available when **Auto Scale** is disabled. – Y-axis – Auto Scale Enable or disable the Y-axis autoscale. – Spacing Select Linear or Log for the spacing. – Unit Select the Y-axis unit type. – Top Set the Y-axis top value. This setting is only available when **Auto Scale** is disabled. – Bottom Set the Y-axis bottom value. This setting is only available when **Auto Scale** is disabled. – Traces – Trace Select the analyzer trace channel. – State Enable or disable the trace. – Color Set the trace color.
Graph Properties (This is only applicable for POLQA measurement MOS-LQO and Delay results)	Press the **Graph Properties** softkey to set the graph properties. – Title Set the bar chart title. – Auto Scale Enable or disable autoscale. – Left Set the X-axis left edge value. This setting is only available when **Auto Scale** is disabled. – Right Set the X-axis right edge value. This setting is only available when **Auto Scale** is disabled. – Top Set the Y-axis top edge value. This setting is only available when **Auto Scale** is disabled. – Bottom Set the Y-axis bottom edge value. This setting is only available when **Auto Scale** is disabled.

Report

The U8903B allows you to generate a report of the test sequence results. The TSA > Report menu page is displayed as shown in **Figure 7-61**.

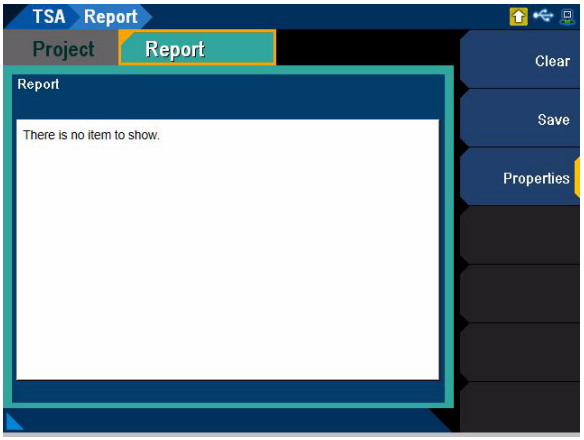


Figure 7-61 TSA > Report menu page

Table 7-59 TSA > Report menu description

Menu	Description
Clear	Press the **Clear** softkey to clear all the report data.
Save	Press the **Save** softkey to save the report to a DOCX file format. Refer to "**Save**" on page 86 for more information on the Save menu page.
Properties	Press the **Properties** softkey to configure the auto save settings. Refer to "**Properties**" on page 357 for more information.

Properties

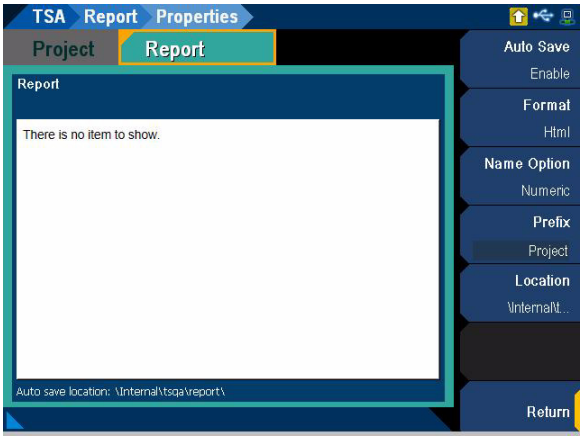


Figure 7-62 TSA > Report > Properties menu page

Table 7-60 TSA > Report > Properties menu description

Menu	Description
Auto Save	Press the **Auto Save** softkey to enable or disable saving the report automatically at the end of a test sequence.
Format	Press the **Format** softkey to select the report file format to be saved. – Docx – Html
Name Option	Press the **Name Option** softkey to select the naming convention of the file name for the automatically saved report. – Timestamp Save the report in a time stamp suffix file name. – Numeric Save the report in a numerical suffix file name that increments with each save. – Prompt Prompts for the file name at the end of a test sequence.
Prefix	Press the **Prefix** softkey to set the prefix for the file name.
Location	Press the **Location** softkey to select the folder for the automatically saved report. Refer to "**Location**" on page 358 for more information.

Location

Select the '...' item at the list and press 

to move up a level from the current folder or to another directory. Use the arrow keys to navigate through the files or select the desired folder or file.

Press the **Select** softkey to select the current folder as the location to be saved to. Press the **New Folder** softkey to create a new folder at the current directory or folder.

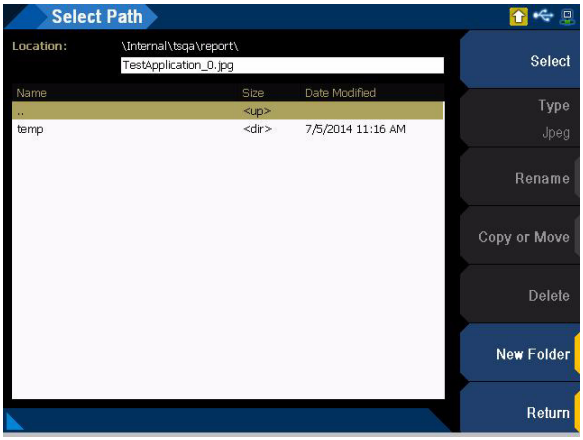


Figure 7-63 Select Path menu page

8 HP8903B

This chapter describes the various configurations for the HP8903B mode..

NOTE The HP8903B mode is only available when GPIB is initialized successfully. Entering or exiting the HP8903B mode will cause the system to reset. Some of the SCPI commands for the active channel of the analog analyzer and analog generator that work in the standard view mode will not work in the HP8903B mode.

HP8903B

Press Menu and select **HP8903B** to access the HP8903B menu page. The U8903B allows you to emulate the HP8903B audio analyzer behavior in the HP8903B mode.

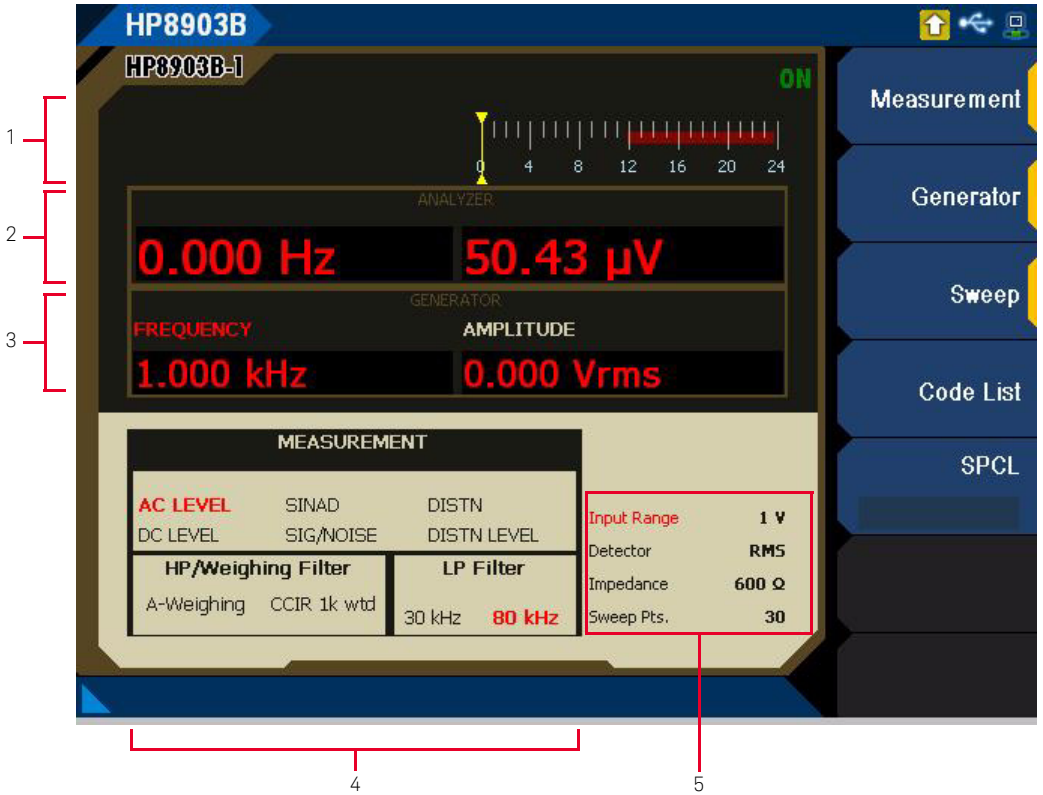


Figure 8-1 HP8903B menu page

Table 8-1 U8903B LCD display description

	Item	Description
1	SINAD meter	Display the SINAD measurement mode readings.
2	Analyzer panel	Display the measurement results. The left panel reading shows the frequency result while the right panel reading shows the result of the selected measurement modes. Refer to "**Measurement**" on page 362 for the available measurement modes.
3	Generator panel	Display the frequency and amplitude values of the sine waveform. The highlighted generator parameter label in red indicates the current increment parameter. You can use the up or down arrow keys to increment/decrement the current parameter value according to the parameter step value. Refer to "**Generator**" on page 364 for more information.
4	Measurement setting panel	Display the current measurement settings in red.
5	HP8903B settings panel	Display the current setting for input range, detector, impedance, and sweep points. If the auto range is selected, the input range parameter will be highlighted in red.

Measurement

Select **Measurement** in the HP8903B menu page to configure the HP8903B measurement settings.

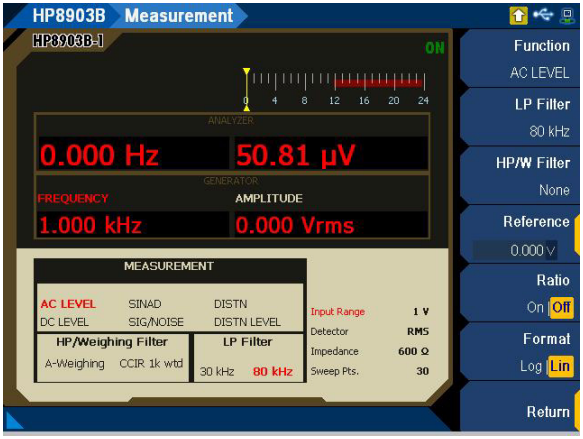


Figure 8-2 HP8903B > Measurement menu page

Table 8-2 HP8903B > Measurement menu description

Menu	Description
Function	Press the **Function** softkey to select the HP8903B measurement mode. – AC LEVEL – SINAD – DISTN – DC LEVEL – SIG / NOISE – DISTN LEVEL
LP Filter	Press the **LP Filter** softkey to select the HP8903B measurement low-pass filter value. The default low-pass filter can be set at "**HP8903B Config**" on page 81. – None – 30 kHz – 80 kHz
HP/W Filter	Press the **HP/W Filter** softkey to select the HP8903B high-pass or weighting filter value. The filter selection depends on the left and right filters set at "**HP8903B Config**" on page 81.
Reference	Press the **Reference** softkey to set the reference value to be compared with the measured value in ratio mode. Changing the reference value will enable the measurement ratio mode.
Ratio	Press the **Ratio** softkey to enable or disable the HP8903B measurement ratio mode.
Format	Press the **Format** softkey to select the HP8903B measurement format type. – Log – Lin

Table 8-3 shows the measurement units that are applicable for the individual HP8903B measurement modes.

Table 8-3 HP8903B unit charts

Measurement	Ratio On		Ratio Off	
	LOG	LIN	LOG	LIN
AC LEVEL	dB	%	dBm into 600 Ω	V
DC LEVEL	dB	%	dBm into 600 Ω	V
SINAD	dB	%	dB	%
SIG/NOISE	dB	%	dB	%
DSTN	dB	%	dB	%
DSTN LEVEL	dB	%	dBm into 600 Ω	V

Generator

Select **Generator** in the HP8903B menu page to configure the HP8903B generator settings.

NOTE The generator in the HP8903B generates sine waveform.

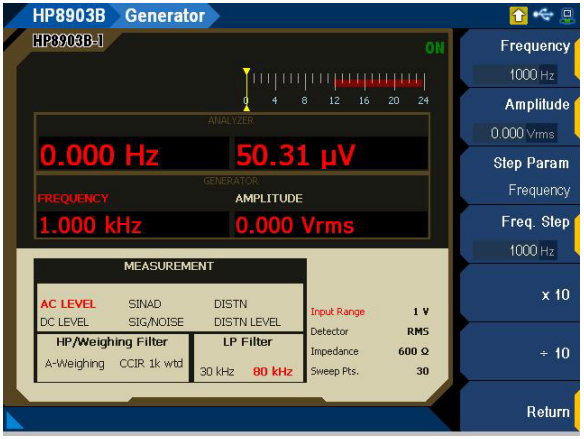


Figure 8-3 HP8903B > Generator menu page

Table 8-4 HP8903B > Generator menu description

Menu	Description
Frequency	Press the **Frequency** softkey to set the HP8903B generator frequency value. Changing the frequency value will also set the step parameter to frequency.
Amplitude	Press the **Amplitude** softkey to set the HP8903B generator amplitude value. Changing the amplitude value will also set the step parameter to amplitude.
Step Param	Press the **Step Param** softkey to select the HP8903B generator step parameter type. – Frequency – Amplitude
Freq. Step	Press the **Freq. Step** softkey to set the HP8903B generator frequency step value. This setting is only available when the step parameter is set to frequency.
Amp. Step	Press the **Amp. Step** softkey to set the HP8903B generator amplitude step value. This setting is only available when the step parameter is set to amplitude.
x 10	Press the **x 10** softkey to multiply the current parameter step value by 10.
÷ 10	Press the **÷ 10** softkey to divide the current parameter step value by 10.

Sweep

In HP8903B mode, the source frequency is logarithmically swept. The number of frequency points in a sweep is determined by the sweep width (ratio of the stop and start frequencies) and the selected sweep resolution. The maximum number of points allowable in a sweep is 255. The frequency points in a sweep can be computed by using the following formulas:

$$\text{Frequency} = \text{Start frequency} \times 10^{\left(\frac{n}{k}\right)}$$

Where n is the frequency point number (0 is the start frequency) and k is the number of points per decade. Refer to the HP8903B special function codes, 17.0 to 17.9 as listed in **Table 8-6**. The frequency point formula for reverse sweep is as follows:

$$\text{Frequency} = \text{Start frequency} \times 10^{\left(\frac{-n}{k}\right)}$$

Select **Sweep** in the HP8903B menu page to configure the HP8903B sweep settings.

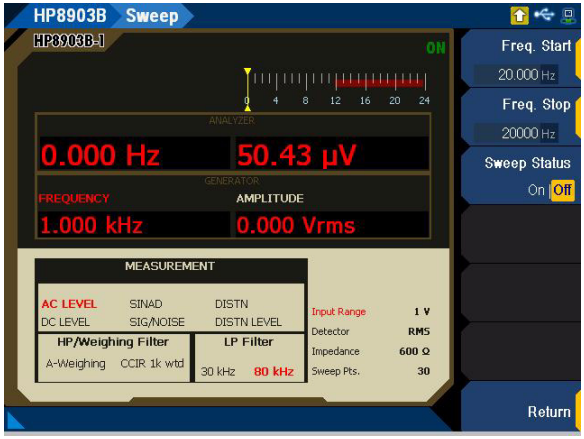


Figure 8-4 HP8903B > Sweep menu page

Table 8-5 HP8903B > Sweep menu description

Menu	Description
Freq. Start	Press the **Freq. Start** softkey to set the HP8903B sweep frequency start value.
Freq. Stop	Press the **Freq. Stop** softkey to set the HP8903B sweep frequency stop value.
Sweep Status	Press the **Sweep Status** softkey to start or abort sweeping in the HP8903B mode.

Special function code list

Select **Code List** in the HP8903B menu page to display the list of supported HP8903B special function codes. The special function codes will be displayed in the lower main display as shown in **Figure 8-5**. Press the up or down arrow keys to scroll up or down the selected special function code list respectively. The HP8903B special function code are as listed in **Table 8-6**.

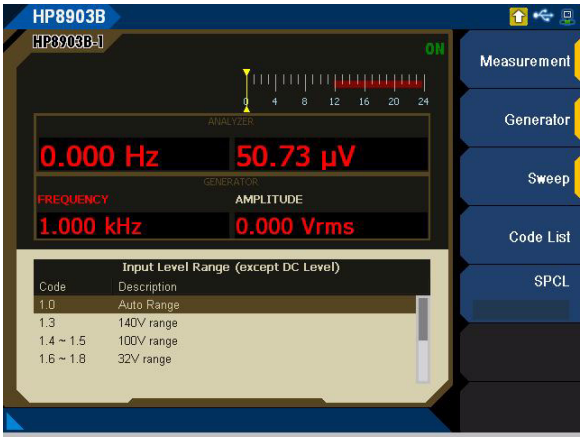


Figure 8-5 HP8903B > Code List menu page (Input Level Range (except DC Level))

Table 8-6 HP8903B special function code list description

Special function	Code	Description
Input Level Range (except DC Level)	1.0	Auto range
	1.3	140 V range
	1.4 ~ 1.5	100 V range
	1.6 ~ 1.8	32 V range
	1.9 ~ 1.10	10 V range
	1.11 ~ 1.13	3.2 V range
	1.14 ~ 1.15	1 V range
	1.16 ~ 1.19	0.32 V range
Input Level Range (DC Level only)	2.0	Auto Range
	2.2	100 V range
	2.3	32 V range
	2,4	10 V range
Post Notch Detector Response (except in SINAD)	5.0 ~ 5.1	RMS Detector
Display Source Settings	10.0	Activate the generator menu.
Re-enter Ratio Mode	11.0	Restore last RATIO reference and enter RATIO mode if allowed
	11.1	Display RATIO reference (measurement menu will be activated)

Table 8-6 HP8903B special function code list description (continued)

Special function	Code	Description
Signal-to-Noise Measurement Delay	12.0	No delay
	12.1	200 ms delay
	12.2	400 ms delay
	12.3	600 ms delay
	12.4	800 ms delay
	12.5	1.0 s delay
	12.6	1.2 s delay
	12.7	1.4 s delay
	12.8	1.6 s delay
	12.9	1.8 s delay
SINAD and Signal-to-Noise Display Resolution	16.0	0.01 dB above 25 dB 0.5 dB below 25 dB
	16.1	0.01 dB all ranges
Sweep Resolution (maximum 255 points/sweep)	17.0	10 points/decade
	17.1	1 point/decade
	17.2	2 points/decade
	17.3	5 points/decade
	17.4	10 points/decade
	17.5	20 points/decade
	17.6	50 points/decade
	17.7	100 points/decade
	17.8	200 points/decade
	17.9	500 points/decade
Display Level in Watts	19.0	Display level as watts into 8 Ω
	19.NNN	Display level as watts into NNN Ω
Read Display to SCPI	20.0	Read right display
	20.1	Read left display (Frequency)
GPIB Address (SCPI Only)	21.1	Displays GPIB address in decimal
GPIB Service Request Condition (SCPI Only)	22.N	Enable a Condition to cause a service request. N is the sum of any combination of the weighted conditions below: 1 - Data Ready 2 - GPIB error 4 - Instrument Error The instrument powers up in the 22.2 state.
Source Output Impedance (Instrument powers up at 600 Ω)	47.0	600 Ω
	47.1	50 Ω

SPCL

Press the **SPCL** softkey to set the HP8903B special function code except those indicated as SCPI only, and execute the special function. The HP8903B special function code are as listed in **Table 8-6**.

9 Characteristics and Specifications

This chapter specifies the characteristics and specifications of the U8903B.

Product Characteristics

POWER CONSUMPTION

≤250 VA

POWER REQUIREMENTS

- 100 VAC to 240 VAC
- 47 Hz to 63 Hz
- 250 W
- MAINS supply voltage fluctuations not to exceed ±10% of the nominal voltage

OPERATING ENVIRONMENT

Refer to "**Environmental Conditions**" on page 5

STORAGE COMPLIANCE

Refer to "**Environmental Conditions**" on page 5

SAFETY AND EMC COMPLIANCE

Refer to "**Regulatory Information**" on page 5

DIMENSIONS (W × D × H)

425.60 mm (16.76 in) × 430.00 mm (16.73 in) × 133.60 mm (5.25 in)

WEIGHT

8.5 kg

WARRANTY

- Please refer to http://www.keysight.com/go/warranty_terms
  - 3 years for the product
  - 3 months for the standard accessories unless otherwise specified

Specifications

The following specifications are based on performance with 30 minutes warm-up time and at a temperature of 0 °C to 55 °C unless stated otherwise.

Analog generator specifications

OUTPUT SPECIFICATIONS	
GENERATED WAVEFORMS	– Sine – Variable phase – Dual sine – SMPTE IMD (1:1/4:1/10:1) – DFD IEC (IEC 60118/IEC 60268) – Square – Noise (Gaussian/Rectangular/Pink) – DC signal – Multitone – Arbitrary (.arb and .wav files) – Wave file playback – DTMF
CONNECTION TYPE	
Balanced	– XLR
Unbalanced	– BNC
Common mode	– XLR
IMPEDANCE	
Balanced	– 40 Ω – 100 Ω – 600 Ω
Unbalanced	– 20 Ω – 50 Ω – 600 Ω
Common mode	– 40 Ω – 100 Ω – 600 Ω – 10 Ω Unbalanced as per IEC 60268
GROUNDING	– True floating – Grounded
MAXIMUM OUTPUT POWER INTO 600 Ω	
Balanced (600 Ω)	20 dBm
Unbalanced (600 Ω)	14 dBm

SINE, DUAL SINE, AND VARIABLE PHASE	
DUAL SINE RATIO RANGE	0 to 100%
PHASE	–180° to 179.99°
SWEEP	– Frequency – Amplitude – Phase
FREQUENCY	
Range	5 Hz to 80 kHz
Accuracy	2 ppm + 100 µHz
Resolution	0.1 Hz
OUTPUT	
Range (balanced)	0 to 16 Vrms
Range (unbalanced/common)	0 to 8 Vrms
Current limit (typical)	50 mA
Amplitude accuracy at 1 kHz	±0.09 dB (±1%) (from 0 °C to 55 °C)
Amplitude resolution	1 µVrms (limited to five digits of the resolution)
Flatness reference 1 kHz	
5 Hz to 20 kHz	±0.008 dB typically <±0.003 dB
5 Hz to 80 kHz	±0.08 dB
THD AND THD+N	
Residual THD+N at 1 kHz, 1 Vrms (20 Hz to 20 kHz bandwidth)	≤–108 dB, typically <–110 dB (at 23 °C ±5 °C)[a] ≤–100 dB (from 0 °C to 55 °C)[a]
Residual THD	≤–87 dB
CROSSTALK	
≤20 kHz	≤–130 dB + 0.1 µV

SQUARE	
FREQUENCY RANGE	5 Hz to 30 kHz
RISE TIME	<2 µs
OUTPUT	
Range (balanced)	0 to 45.2 Vpp
Range (unbalanced/common)	0 to 22.6 Vpp
Amplitude accuracy at 1 kHz	±1%

SMPTE IMD (1:1/4:1/10:1)	
MIXED RATIO (LF:HF)	– 10:1 – 4:1 – 1:1
RESIDUAL IMD (20 Hz to 20 kHz)	– ≤–95 dB (at 23 °C ±5 °C) – ≤–90 dB (0 °C to 55 °C)
SWEEP	– Upper frequency – Lower frequency – Amplitude

FREQUENCY	
Low-frequency (LF) tone	40 Hz to 500 Hz
High-frequency (HF) tone	2 kHz to 60 kHz
OUTPUT	
Range (balanced)	0 to 16 Vrms
Range (unbalanced/common)	0 to 8 Vrms
DFD (IEC 60118/IEC 60268)	
INHERENT DISTORTION (20 Hz TO 20 kHz)	≤–106 dB at 1 Vrms
SWEEP	– Upper frequency – Center frequency – Amplitude
FREQUENCY	
Difference frequency	80 Hz to 2 kHz
Upper frequency	3 kHz to 80 kHz
Center frequency	3 kHz to 79 kHz
OUTPUT	
Range (balanced)	0 to 16 Vrms
Range (unbalanced/common)	0 to 8 Vrms
NOISE	
TYPE	– Gaussian – Rectangular – Pink
OUTPUT	
Range (balanced)	– 0 to 7.2 Vrms (Gaussian) – 0 to 10 Vrms (Rectangular) – 0 to 7.2 Vrms (Pink)
Range (unbalanced/common)	– 0 to 3.6 Vrms (Gaussian) – 0 to 5 Vrms (Rectangular) – 0 to 3.6 Vrms (Pink)
ARBITRARY	
SIGNAL	Determined by the user selected file
SAMPLE RATE	192 kHz
SAMPLE SIZE	Up to 8 million points
MULTITONE	
SIGNAL	Determined by the user specified frequency, amplitude, and phase data
SAMPLE RATE	192 kHz
LENGTH	1024 to 65536 points/channel
MAXIMUM NUMBER OF TONES	60

WAVE FILE PLAYBACK	
TYPE OF FILE	.WAV file
SAMPLE RATE	192 kHz
LENGTH	Up to 5 minutes
DC	
OUTPUT	
Range (balanced)	–22.6 V to 22.6 V
Range (unbalanced/common)	–11.3 V to 11.3 V
Amplitude accuracy	±1%
DC OFFSET	
Applicable for all waveform types except variable phase, DC, and square waveforms.	
OUTPUT LEVEL	
Range	–11.3 V to 11.3 V
Amplitude accuracy[b]	±1.5% (±250 mV to ±11.3 V)

[a] Includes contributions from generator and analyzer. Individual contributions are typically less than the values stated.

[b] DC output and DC offset output are functional from 0 to ±250 mV. The amplitude accuracy for this range is not warranted.

Analog analyzer specifications

INPUT SPECIFICATIONS	
FREQUENCY RANGE	10 Hz to 96 kHz
COUPLING	– DC – AC
INPUT RANGES	– 320 mV to 140 Vrms[a] (unbalanced) – 320 mV to 300 Vrms[a] (balanced)
MEASUREMENT RANGE	<1 μV[b] to 300 Vrms
MAXIMUM RATED INPUT	200 Vp for altitude up to 3000 m
INPUT PROTECTION	Overload protection for all ranges; onscreen warning message on the front panel
CONNECTION TYPE	
Balanced	XLR
Unbalanced	BNC
MEASUREMENT BANDWIDTH	
Bandwidth	96 kHz
IMPEDANCE	
Balanced	– 300 Ω (3 W maximum) – 600 Ω (1.5 W maximum) – 200 kΩ
Unbalanced	– 300 Ω (3 W maximum) – 600 Ω (1.5 W maximum) – 100 kΩ
CMRR	
≤20 kHz (input range ≤3.2 V)	≥80 dB[c]
≤20 kHz (input range >3.2 V)	≥50 dB[c]
CROSSTALK	
≤20 kHz	≤–140 dB + 0.1 μV

THD+N AND SINAD	
DISPLAY RANGE	–999.999 dB to 0 dB
ACCURACY	
<20 kHz	±0.5 dB
<100 kHz	±0.7 dB
INPUT VOLTAGE RANGE	<1 μV to 140 Vrms
3 dB MEASUREMENT BANDWIDTH	96 kHz
DETECTION	RMS
DISPLAY RESOLUTION	% up to 3 decimal places (dB up to 2 decimal places)

RESIDUAL THD+N at 1 kHz, 1 Vrms (20 Hz TO 20 kHz BANDWIDTH)	≤–108 dB, typically <–110 dB (at 23 °C ±5 °C)[d] ≤–100 dB (from 0 °C to 55 °C)[d]
RESIDUAL NOISE (20 Hz TO 20 kHz BANDWIDTH)	≤1.3 μVrms
SNR	
DISPLAY RANGE	–999.999 dB to 0 dB
ACtCURACY	
<20 kHz	±0.5 dB
<100 kHz	±0.7 dB
INPUT VOLTAGE RANGE	<1 μV to 140 Vrms
TRIGGERING	
TYPE	– Free run – External
LEVEL	5 V
MINIMUM TRIGGER HIGH VOLTAGE	1.25 V
MAXIMUM TRIGGER LOW VOTAGE	0.5 V
INPUT IMPEDANCE	>10 kΩ
AMPLITUDE	
DC MEASUREMENT RANGE	0 V to ±200 V
DC ACCURACY	±1%
AC ACCURACY AT 1 kHz	0.03 dB (0.35%) (at 23 °C ±5 °C) 0.05 dB (0.58%) (from 0 °C to 55 °C)
FLATNESS REFERENCE 1 kHz	
≤20 kHz	±0.008 dB, typically <±0.003 dB
≤80 kHz	±0.08 dB
≤96 kHz	±0.1 dB
AC LEVEL DETECTION	– RMS – Peak-to-peak
FREQUENCY	
RANGE	10 Hz to 96 kHz
MINIMUM INPUT	1 mV (S/N > 40 dB)
ACCURACY	– 2 ppm + 100 μHz (≤50 kHz) – <5 ppm (>50 kHz)
RESOLUTION	6 digits

PHASE	
ACCURACY	
<20 kHz	±2°
<96 kHz	±4°
MINIMUM INPUT	1 mV (S/N > 40 dB)
RESOLUTION	0.01°
SMPTE IMD	
RESIDUAL IMD	≤0.0025% (–92 dB)

[a] For the available input ranges, refer to "**Measurement Configuration (Analog Analyzer)**" on page 202.

[b] Defined by the 24-bit measurement.

[c] When AC coupled, CMRR will deteriorate at low frequencies.

[d] Includes contributions from generator and analyzer. Individual contributions are typically less than the values stated.

Digital generator specifications[1]

SINE, DUAL SINE, AND VARIABLE PHASE	
FREQUENCY	
Range	5 Hz to 0.45 sampling rate (Fs)
Accuracy	±10 ppm
FLATNESS	±0.001 dB
RESIDUAL THD+N	≤–140 dB
SQUARE	
FREQUENCY RANGE	5 Hz to 0.45 Fs
SMPTE IMD (1:1/4:1/10:1)	
FREQUENCY	
Low frequency (LF) tone	40 Hz to 500 Hz
High frequency (HF) tone	2 kHz to 60 kHz, or 0.45 Fs (whichever is lower)
MIXED RATIO (LF:HF)	– 10:1 – 4:1 – 1:1
SWEEP	– Upper frequency – Lower frequency – Amplitude
DFD (IEC 60118/IEC 60268)	
FREQUENCY	
Difference frequency	80 Hz to 2 kHz
Upper frequency	3 kHz to 80 kHz, or 0.45 Fs (whichever is lower)
Center frequency	3 kHz to 79 kHz, or 0.45 Fs (whichever is lower)
SWEEP	– Upper frequency – Center frequency – Amplitude
NOISE	
TYPE	– Rectangular – Gaussian – Triangular – Pink
AMPLITUDE	0 to 1 FFS
WAVE FILE PLAYBACK	
SIGNAL	Determined by the user selected file
FILE FORMAT	WAVE (.wav)
LENGTH	Up to 5 minutes

[1] Digital generator specifications refer to 24-bit FFS.

FILE RESOLUTION	– 8 bits – 16 bits – 24 bits
FREQUENCY RANGE	2 Hz to 0.45 Fs
MULTITONE	
SIGNAL	Determined by the user specified frequency, amplitude, and phase data
FREQUENCY RANGE	2 Hz to 0.45 Fs
MAXIMUM NUMBER OF TONES	64
SINE BURST	
PERIOD	2 cycles to 65535 cycles
BURST ON	1 cycles to (65534 or period – 1, whichever is lower)
BURST ON TO BURST OFF RATIO	0 to 100%
MONOTONICITY	
SAMPLES/STEP	1 to 32768
WALKING ONE AND WALKING ZERO	
SAMPLES/STEP	1 to 65535
CONSTANT VALUE	
AMPLITUDE	–1 FFS to 1 FFS
DC OFFSET	
DC OFFSET	–1 FFS to 1 FFS
DITHER	
DISTRIBUTION	– None – Triangular – Rectangular
LEVEL	0.5 LSB

Digital analyzer specifications

AMPLITUDE	
AC LEVEL RANGE	<–120 dBFS to 0 dBFS
DC LEVEL RANGE	±1 FFS
AC ACCURACY	±0.001 dB (at 1 kHz)
DC ACCURACY	±0.001 dB
AC FLATNESS	±0.001 dB (10 Hz to 0.45 Fs)
UNIT (REFERENCE)	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL
FREQUENCY	
RANGE	5 Hz to 0.45 Fs
ACCURACY	±5 ppm (10 Hz to 0.45 Fs)
PHASE	
ACCURACY	±0.005°
RESOLUTION	±0.001°
THD+N	
RANGE	10 Hz to 0.45 Fs
ACCURACY	±0.3 dB
RESIDUAL DISTORTION	≤–140 dB
IMD	
SMPTE IMD	– 1:1 – 4:1 – 10:1
HIGH FREQUENCY	2 kHz to 60 kHz, or 0.45 Fs (whichever is lower)
LOW FREQUENCY	40 Hz to 500 Hz
ACCURACY	±0.5 dB

DFD	
FREQUENCY DIFFERENCE	80 Hz to 2 kHz
CENTER FREQUENCY	3 kHz to 79 kHz, or 0.45 Fs (whichever is lower)
ACCURACY	±0.5 dB

AES3/SPDIF interface output specifications

OUTPUT SPECIFICATIONS	
OUTPUT CONNECTOR TYPE	
Balanced	XLR (transformer coupling)
Unbalanced	BNC (grounded)
Optical	TOSLINK connector
OUTPUT IMPEDANCE	
Balanced	110 Ω
Unbalanced	75 Ω
OUTPUT LEVEL	
Balanced	0.3 Vpp to 5.1 Vpp
Unbalanced	0.3 Vpp to 2.5 Vpp
SAMPLING RATE	28 kHz to 192 kHz
SAMPLING RATE ACCURACY	±5 ppm
OUTPUT LEVEL ACCURACY	±1 dB (typical), ±1.5 dB
AUDIO BIT	8 bits to 24 bits
INHERENT JITTER (TYPICAL)	
Balanced	≤1.5 ns
Unbalanced	≤1.5 ns
Optical	≤5 ns
CLOCK AND SYNC	
INTERNAL MASTER CLOCK	
Maximum clock rate	192 kHz
Accuracy	±5 ppm
Inherent jitter	≤1 ns
SYNC CLOCK OUTPUT	
Connector type	25-pin female D-SUB connector pin-1
Impedance	50 Ω
Output level	3.3 V (LVCMOS IO standard)
Polarity	– Normal – Invert
Output type	Bit clock (128 Fs)

PROTOCOL	
CHANNEL STATUS BITS	– Professional – Consumer (all applicable bits are editable for advanced settings)
FORMAT	– Professional – Consumer
USER BITS	– Set – Cleared
VALIDITY FLAG	– Set – Cleared

AES3/SPDIF interface input specifications

INPUT SPECIFICATIONS	
INPUT CONNECTOR TYPE	
Balanced	XLR (transformer coupling)
Unbalanced	BNC (grounded)
Optical	TOSLINK connector
INPUT IMPEDANCE	
Balanced	110 Ω or high impedance (>2 kΩ)
Unbalanced	75 Ω or high impedance (20 kΩ typical)
INPUT LEVEL	
Balanced	0.3 Vpp to 5.1 Vpp
Unbalanced	0.3 Vpp to 2.5 Vpp
SAMPLING RATE	28 kHz to 192 kHz
SAMPLING RATE ACCURACY	±5 ppm
INPUT LEVEL ACCURACY	±1 dB (typical), ±1.5 dB
AUDIO BIT	8 bits to 24 bits
INHERENT JITTER (TYPICAL)	
Balanced	≤1.5 ns
Unbalanced	≤1.5 ns
Optical	≤5 ns
CLOCK AND SYNC	
INTERNAL MASTER CLOCK	
Maximum clock rate	192 kHz
Accuracy	±5 ppm
Inherent jitter	≤1 ns
SYNC CLOCK INPUT	
Connector type	BNC (SYNC IN on the rear panel)
Impedance	10 kΩ
Polarity	– Normal – Invert
PROTOCOL	
CHANNEL STATUS BITS	– Professional – Consumer (all applicable bits are editable for advanced settings)
FORMAT	– Professional – Consumer
USER BITS	– Set – Cleared
VALIDITY FLAG	– Set – Cleared

DSI output specifications

OUTPUT SPECIFICATIONS	
CONNECTOR TYPE	– 25-pin female D-SUB connector – 25-pin female D-SUB to BNC connector (optional accessories)
IMPEDANCE	50 Ω
LOGIC LEVEL	– 1.2 V – 1.5 V – 1.8 V – 2.5 V – 3.3 V – User-defined (LVCMOS standard)
SAMPLING RATE	6.75 kHz to 400 kHz
SAMPLING RATE ACCURACY	±5 ppm
MASTER-CLOCK	
Multiplier	64 to 1024 (depends on the Word Length)
Maximum frequency	51.2 MHz
Maximum bit clock	51.2 MHz
Maximum sampling rate	400 kHz
DATA FORMAT	– Left Justified – Right Justified – I2S – DSP
WORD LENGTH	8 bits to 32 bits per channel
AUDIO BIT	8 bits to 24 bits (step by 1 bit)
WORD CLOCK RATE	6.75 kHz to 400 kHz
CLOCK AND SYNC	
INTERNAL MASTER CLOCK	
Maximum clock rate	10 MHz
Stability	±5 ppm
Inherent jitter	≤1 ns
CLOCK SOURCE SETTING (ANALYZER AND GENERATOR)	– Incoming bit clock from DUT – Internal clock – External clock from external sync clock input
DSI CLOCK OUTPUT	
Impedance	10 kΩ typical
Output level	1.2 Vpp to 3.3 Vpp
Polarity	Normal or Invert
WORD CLOCK POLARITY	– Leading edge – Falling edge (with respect to bit clock)

DSI input specifications

INPUT SPECIFICATIONS	
CONNECTOR TYPE	– 25-pin female D-SUB connector – 25-pin female D-SUB to BNC connector (optional accessories)
IMPEDANCE	≥10 kΩ
LOGIC LEVEL	– 1.2 V – 1.5 V – 1.8 V – 2.5 V – 3.3 V – User-defined (LVCMOS standard)
SAMPLING RATE	6.75 kHz to 400 kHz
SAMPLING RATE ACCURACY	±5 ppm
MASTER-CLOCK	
Multiplier	64 to 1024 (depends on the Word Length)
Maximum frequency	51.2 MHz
Maximum bit clock	51.2 MHz
Maximum sampling rate	400 kHz
DATA FORMAT	– Left Justified – Right Justified – I2S – DSP
WORD LENGTH	8 bits to 32 bits per channel
AUDIO BIT	8 bits to 24 bits (step by 1 bit)
WORD CLOCK RATE	6.75 kHz to 400 kHz
CLOCK AND SYNC	
INTERNAL MASTER CLOCK	
Maximum clock rate	10 MHz
Stability	±5 ppm
Inherent jitter	≤1 ns
CLOCK SOURCE SETTING (ANALYZER AND GENERATOR)	– Incoming bit clock from DUT – Internal clock – External clock from external sync clock input
DSI CLOCK INPUT	
Impedance	10 kΩ typical
Input level	1.2 Vpp to 3.3 Vpp
Polarity	– Normal – Invert
WORD CLOCK POLARITY	– Leading edge – Falling edge (with respect to bit clock)

Analog audio filters

LOW-PASS FILTER	– 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – User-defined[a]
HIGH-PASS FILTER	– 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – User-defined[a]
WEIGHT FILTER	– A-Weighting (ANSI-IEC “A” weighted, per IEC Rec 179) – CCIR 1K weighted (CCIR Rec. 468) – CCIR 2K weighted (Dolby 2K) – C-Message (C-Message per IEEE 743) – CCITT (ITU-T Rec. O.41, ITU-T Rec. P.53) – User-defined[a]
DE-EMPHASIS	– 50 µs – 75 µs – User-defined[a]

[a] User-defined filters can be uploaded through standard I/O connections.

Digital audio filters

LOW PASS FILTER	– 15 kHz low pass – 20 kHz low pass – 22 kHz low pass – 30 kHz low pass – User-defined[a][b]
HIGH PASS FILTER	– 20 Hz high pass – 100 Hz high pass – 400 Hz high pass – User-defined[a][b]
WEIGHTING FILTER	– A-Weighting (ANSI-IEC “A” weighted, per IEC Rec 179) – CCIR 1K weighted (CCIR Rec. 468) – CCIR 2K weighted (Dolby 2K) – C-Message (C-Message per IEEE 743) – CCITT (ITU-T Rec. O.41, ITU-T Rec. P.53) – User-defined[a][b]
DE-EMPHASIS	– 50 µs – 75 µs – User-defined[a][b]
SAMPLE RATE SUPPORT	– 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz (subject to filter cut-off)

[a] User-defined filters can be uploaded through standard I/O connections.

[b] User-defined filter with coefficients limit of up to 252.

Graph specifications

FFT ANALYZER	
SAMPLE SIZE	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M
WINDOW	– Rectangular – Hanning – Blackman – Rife-Vincent – Rife-Vincent 3 – Hamming – Flat top – Kaiser
AMPLITUDE ACCURACY (FLAT TOP WINDOW)	±0.1 dB (±1.2%)

Sweep specifications

GENERATOR SWEEP	
PARAMETERS	– Frequency – Amplitude – Phase
SWEEP SPACING	– Linear – Logarithmic
SWEEP MODE	– Auto sweep – Auto list
HOLD	– None – Maximum – Minimum

Audio monitor specifications

U8903B-AUX	
MONITOR OUTPUT	Scaled to give 1 Vrms at the top of each analyzer input range
AUX OUTPUT	0.5 VDC to 5.1 VDC ±5% current limited to 100 mA
HEADPHONE CONNECTOR	
RECOMMENDED HEADPHONE	Headphone with 3.5 mm connector

1.5 MHz bandwidth (option N3431A) specifications[1]

INPUT SPECIFICATIONS	
FUNDAMENTAL FREQUENCY RANGE	10 Hz to 1.5 MHz
FREQUENCY ACCURACY	2 ppm (>50 kHz)
MEASUREMENT BANDWIDTH	
Bandwidth	1.5 MHz
FLATNESS REFERENCE 1 kHz	
≤200 kHz	±0.1 dB
≤1 MHz	±0.5 dB
≤1.5 MHz	±1.0 dB

[1] Specifications in addition to standard bandwidth.

POLQA measurement (option N3432A) specifications[1]

PERCEPTIUAL OBJECTIVE LISTENING QUALITY ASSESSMENT (IN LINE WITH ITU-T Rec. P.863)	
NUMERIC RESULTS	– POLQA score – MOS-LQO narrowband and wideband average only
GRAPHIC DISPLAY (VERSUS TIME)	– POLQA score – MOS-LQO – Delay – Dropouts – Reference signal – Degraded signal

PESQ measurement (option N3433A) specifications[1]

PERCEPTIUAL EVALUATION OF SPEECH QUALITY (IN LINE WITH ITU-T Rec. P.862, 862.1, AND 862.2)	
NUMERIC RESULTS	– PESQ score – MOS-LQO narrowband and wideband average only
GRAPHIC DISPLAY (VERSUS TIME)	– PESQ score – MOS-LQO – Delay – Dropouts – Reference signal – Degraded signal

[1] Licensed by OPTICOM Gmbh.

Measurement Category

The U8903B is intended to be used for measurement under Measurement Category I, 200 Vp for altitude up to 3000 m.

Measurement category definitions

Table 9-1 Measurement category definitions

Measurement CAT I	Measurements performed on circuits that are not directly connected to mains. For example, measurements on circuits that are not derived from mains, and specially protected (internal) mains- derived circuits.
Measurement CAT II	Measurements performed on circuits which are directly connected to the low voltage installation. For example, measurements on household appliances, portable tools, and similar equipment.
Measurement CAT III	Measurements performed in fixed building installation. For example, measurements on distribution boards, circuit breakers, wiring (including cables), bus bars, junction boxes, switches, socket outlets in fixed installation, equipment for industrial use, and stationary motors with permanent connections to fixed installation.
Measurement CAT IV	Measurements performed at the source of the low voltage installation. For example, electricity meters, measurements on primary overcurrent protection devices, and ripple control units.

Appendixes

KEYSIGHT TECHNOLOGIES

Appendix A: FUNCTION panel

Table A-1 FUNCTION panel description

Key	Description
Interface	Switch between the analog or digital interface.
Generator|Analyzer	Switch between the generator or analyzer mode. Refer to "**Appendix D: Analog Generator Menu Tree**" on page 402 and "**Appendix F: Analog Analyzer Menu Tree**" on page 417 for the analog generator and analog analyzer menu trees.
Graph	Access the graph analysis mode. Refer to "**Appendix H: Graph Analysis Menu Tree**" on page 440 for the graph analysis menu tree.
Sweep	Access the sweep function mode. Refer to "**Appendix I: Sweep Function Menu Tree**" on page 444 for the sweep function menu tree.
Full Screen	Maximize the graph view to the full display size. This function is only applicable in the graph analysis mode.
Display	Switch among the 2-panel view, 4-panel view, or 10-panel view in the analyzer and generator mode. Switch between single panel view and 2-panel view in the graph analysis mode.
Shortcut 1	Customizable shortcut key. Refer to "**Appendix C: System Panel Menu Tree**" on page 398 for more information.
Shortcut 2	Customizable shortcut key. Refer to "**Appendix C: System Panel Menu Tree**" on page 398 for more information.

Appendix B: Graph Panel Menu Tree

Table A-2 GRAPH panel menu tree description

Key	Level 1	Level 2	Description
Peak Search	Max Peak		Search and move the active marker to the highest peak which is higher than the peak threshold value.
	Next Peak		Search and move the active marker to the next peak which is higher than the peak threshold value.
	Prev Peak		Search and move the active marker to the previous peak which is higher than the peak threshold value.
	Next Min		Search and move the active marker to the previous peak which is lower than the minimum threshold value.
	Prev Min		Search and move the active marker to the next peak which is lower than the minimum threshold value.
	Threshold	Line Visible	Enable or disable the threshold line in the graph. – On – Off
		Peak Thres	Set the peak threshold value.
		Min Thres	Set the minimum threshold value.
Marker	Active Marker	M1 to M8	Select the active marker number.
	State	– On – Off	Enable or disable the active marker.
	Trace	1 to 8	Select the trace number for the active marker.
	Ref Mkr	– OFF – M1 to M8	Select the reference marker number.
	Movement	– Single – Pair – Bin – Peak – Harmonic	Select the marker movement type.
	Function	– None – Slope – PSD	Select the marker function type.
	Marker ->	-> Start	Set the left value of the graph to the current marker location.
		-> Stop	Set the right value of the graph to the current marker location.
		-> Center	Set the center value of the graph to the current marker location.
		-> Delta	Set the left and right values of the graph to the current marker and the reference marker location.
		Move to 3 dB	Place the marker on the nearest –3 dB value data point.
		Move to 6 dB	Place the marker on the nearest –6 dB value data point.

Table A-2 GRAPH panel menu tree description (continued)

Key	Level 1	Level 2	Description
Marker	Harmonics	Trace	Set the trace number to place the marker.
		Enabled	Show or hide the markers. – On – Off
	Rdg at Mkr	– On – Off	Enable or disable the readings at the marker.
Print (**Shift** + **Marker**)			Print the current display to a file.
Scale	AutoScale		Perform autoscaling on the X-axis and Y-axis.
	AutoScale X		Perform autoscaling on the X-axis by searching for the most optimum scale (left and right values) for the X-axis based on the data being displayed in the graph.
	AutoScale Y		Perform autoscaling on the Y-axis by searching for the most optimum scale (top and bottom values) for the Y-axis based on the data being displayed in the graph.
Zoom			Magnify a section of the graph.

Appendix C: System Panel Menu Tree

Table A-3 SYSTEM panel menu tree description

Key	Level 1	Level 2	Level 3	Description
Preset	(Current mode)			Reset the current mode to its default settings.
	Save User State			Save the current user state.
	Mode			Reset all modes to the default settings without deleting the user-defined files.
	To Factory Settings			Reset the U8903B to the factory default settings, delete all the files saved in the internal flash memory (for example, state file, arbitrary waveform, test sequence project files, and so on), and reset the GUI state to the Standard View mode. If the HP8903B mode is turned on, the GUI state will remain at the HP8903B mode.
	User State			Reset the U8903B to the previously saved user state.
Utility (if the mode is in the Analyzer or Generator mode)	Save Channel (x) (x) = current channel number			Save the current channel state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Save (x) (x) = current mode			Save the current mode state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Recall			Recall a saved U8903B state from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Copy To			Copy the current channel state to other channel(s).
	Copy From			Select a channel number to copy the state to the current channel.
Utility (if the mode is in Graph Analysis mode)	Save Graph			Save the current graph state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Save Channels Settings	Channel (x) (x) = current channel		Save the current channel graph state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
		All Channels Settings		Save all channels graph state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.

Table A-3 SYSTEM panel menu tree description

Key	Level 1	Level 2	Level 3	Description
Utility (if the mode is in Graph Analysis mode)	Save Traces	Trace (x) (x) = current trace number		Save the active trace to a CSV file format. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
		All Traces		Save all traces state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
		Axis Settings		Save the axis settings state to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
		Traces + Axis		Save all traces and axis settings states. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
		Save Trace (x) Data (x) = current channel		Save the active trace data to a CSV file format. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Recall			Load a trace from a CSV file into the active trace. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Copy To			Copy the current channel graph state to other channel(s).
	Copy Graph From			Select a channel number to copy the graph state to the current channel.
Help (**Shift** + **Utility**)				Display the help mode. Press **Shift** + **Utility** to close the help mode.
System	Error Info	Load File		Select the log file to be loaded in the error log viewing panel. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	I/O	LAN Settings	Reset	Reset the LAN settings.
			Hostname	Set the LAN hostname.
			Config Mode	Select the LAN configuration mode. – Auto – Manual
			IP Address	Set the LAN IP address.
			Subnet mask	Set the LAN subnet mask address.
			Gateway	Set the LAN gateway address.
			DNS 1	Set the LAN DNS 1 address.
			DNS 2	Set the LAN DNS 2 address.
		GPIB	0 to 30	Set the desired GPIB address.
		FTP	– Enabled – Disabled	Enable or disable the FTP control.

Table A-3 SYSTEM panel menu tree description

Key	Level 1	Level 2	Level 3	Description
System	Update	Load File		Load the update files. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
		EULA		Display the Keysight EULA page.
	Service	Self-Test	Customize Test	Select all or deselect the desired tests. LAN Test Card Self Test
			Run Test	Run the selected tests.
			Clear Result	Clear the previous self-test results.
		Diagnostic	Front Panel	Perform the front panel diagnostics.
			Display	Perform the display diagnostics.
		Secure Erase		Securely erase all the files saved in the internal flash memory (for example, state file, arbitrary waveform, test sequence project files, and so on), It does not affect the U8903B settings and license information.
		Options	Add Option	Add a new U8903B option. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Remove Option	Remove the selected U8903B option.
	Settings	Date		Edit the date in dd/mm/yyyy format.
		Time		Edit the current time in 24-hour format.
		Brightness	0 to 6	Adjust the LCD display brightness value.
		Key Sound	– On – Off	Enable or disable the front panel key sound.
		Help Language	– English (US) – Simp. Chinese – Japanese	Select the U8903B help language.
		Power Up State	– Last – Default	Select the power up state.
		Shortcut 1	– Error List – Auto-Scale	Select a specific function to map the shortcut 1 key.
		Shortcut 2	– Error List – Auto-Scale	Select a specific function to map the shortcut 2 key.

Table A-3 SYSTEM panel menu tree description

Key	Level 1	Level 2	Level 3	Description
System	HP8903B Config	Active Channel	– 1 – 2	Select the HP8903B active channel.
		Left Filter	– None – A-Weighting – CCIR 1k wtd – CCIR 2k wtd – C-Message – CCITT – 400 Hz	Select the left filter type.
		Right Filter	– None – A-Weighting – CCIR 1k wtd – CCIR 2k wtd – C-Message – CCITT – 400 Hz	Select the right filter value.
		Default LPF	– None – 30 kHz – 80 kHz	Select the default filter for the HP8903B mode.
	Fan & Temperature			Display the temperatures of the available cards and the speed of the three 80 mm fans in the U8903B.
	Aux Output	Audio Monitor	– On – Off	Enable or disable the aux audio monitor.
		Audio Output	– Speaker – Phone	Select the aux audio output type.
		Audio Mode	– Stereo – Mono	This is only available when audio output is Phone. Select the aux audio mode type.
		Volume	0 to 100	Select the aux audio volume.
		DC Output		Set the aux DC output value.
	Board Info			Display the U8903B available cards information.
	Legacy Status	– On – Off		Enable or disable the legacy sweep.
Macro (**Shift** + **System**)				Reserved for future expansion.
Local				Switch from remote control mode to local mode. The front panel keys are locked in the remote mode.
Lock/Unlock				Lock or unlock the front panel keys in the local mode. A dialog box will pop-up for confirmation.

Appendix D: Analog Generator Menu Tree

Table A-4 Analog generator menu tree description

Level 1	Level 2	Level 3	Description
Waveform	– Sine – V. Phase – Dual – SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1 – IEC 60118 – IEC 60268 – Gaus. Noise – Rect. Noise – Pink Noise – Square – DC – Arbitrary – Multitone – DTMF		Select the waveform type.
Waveform Config (Sine)	Amplitude		Set the signal amplitude value.
	Frequency		Set the signal frequency value.
	DC Offset		Set the signal DC offset value.
Waveform Config (V. Phase)	Amplitude		Set the signal amplitude value.
	Frequency		Set the signal frequency value.
	Phase -> 1		This is only available when the analog generator is in channel 2. Set the phase of the channel 2 sine waveform with reference to channel 1.
Waveform Config (Dual)	Amplitude		Set the signal amplitude value.
	Frequency		Set the signal frequency value.
	Frequency 2		Set the second sine wave signal frequency value. This setting is only applicable for the dual waveform.
	DC Offset		Set the signal DC offset value.
	Ratio		Set the ratio of the amplitude of the second sine wave over the first sine wave.
	Summation	– RSS – Linear	Summation refers to the method to sum up two levels.

Table A-4 Analog generator menu tree description (continued)

Level 1	Level 2	Level 3	Description
Waveform Config (SMPTE 1:1/4:1/10:1)	Amplitude		Set the signal amplitude value.
	Lower Freq		Set the lower frequency value.
	Upper Freq		Set the higher frequency value.
	DC Offset		Set the signal DC offset value.
	Summation	– RSS – Linear	Summation refers to the method to sum up two levels.
Waveform Config (IEC 60118)	Amplitude		Set the signal amplitude value.
	Upper Freq		Set the higher frequency value.
	Diff Freq		Set the difference frequency of the waveform.
	DC Offset		Set the signal DC offset value.
	Summation	– RSS – Linear	Summation refers to the method to sum up two levels.
Waveform Config (IEC 60268)	Amplitude		Set the signal amplitude value.
	Center Freq		Set the center frequency of the waveform.
	Diff Freq		Set the difference frequency of the waveform.
	DC Offset		Set the signal DC offset value.
	Summation	– RSS – Linear	Summation refers to the method to sum up two levels.
Waveform Config (Gaus. Noise)	Amplitude		Set the signal amplitude value.
	DC Offset		Set the signal DC offset value.
Waveform Config (Rect. Noise)	Amplitude		Set the signal amplitude value.
	DC Offset		Set the signal DC offset value.
Waveform Config (Pink Noise)	Amplitude		Set the signal amplitude value.
	DC Offset		Set the signal DC offset value.
Waveform Config (Square)	Amplitude		Set the signal amplitude value.
	Frequency		Set the signal frequency value.
Waveform Config (DC)	Voltage		Set the signal voltage value.
Waveform Config (Abitrary)	Amplitude		Set the signal amplitude value.
	DC Offset		Set the signal DC offset value.
	Load File		Load a waveform from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Info		Display the loaded waveform information.

Table A-4 Analog generator menu tree description (continued)

Level 1	Level 2	Level 3	Description
Waveform Config (Multitone)	Amplitude		Set the signal amplitude value.
	DC Offset		Set the signal DC offset value.
	Start Freq		Set the lowest frequency in the multitone waveform which is usually the frequency for the first tone.
	Stop Freq		Set the highest frequency in the multitone waveform which is usually the frequency for the last tone.
	Freq Spacing	– Linear – Log – Custom	Select frequency spacing between the tones. Custom is selected when the custom multitone waveform is set.
	Tones		Set the number of signal frequency components.
	Length	– 1024 – 2048 – 4096 – 8192 – 16384 – 32768 – 65536	Select the waveform length that determines the number of samples used to create one iteration of the multitone waveform.
	Custom	Apply	Apply the current setting on the selected tone for the custom multitone waveform.
		Optimize	Optimize the crest factor for the custom multitone waveform.
		Frequency	Set the frequency value for the custom multitone waveform.
		Amplitude	Set the amplitude value for the custom multitone waveform.
		Phase	Set the phase value for the custom multitone waveform.
		Add Above	Add the tone above the selected tone for the custom multitone waveform.
		Add Below	Add the tone below the selected tone for the custom multitone waveform.
		Remove	Remove the selected tone for the custom multitone waveform.
		Clear	Clear all the tones in the custom multitone waveform list.
Waveform Config (DTMF)	Dial	Mode	Select the mode of operation for the dial mode. Single Sequence
		A B C D	Single dial mode – Press and hold the A, B, C, or D softkey to dial the A, B, C, or D tone respectively. Sequence dial mode – Press the A, B, C, or D softkey to add the A tone to the DTMF sequence.
		Pause	Add a pause to the DTMF sequence in the form of a comma.
	Amplitude		Set the amplitude level of the DTMF signal.
	Ratio		Set the level difference between the high-frequency tone and low-frequency tone.

Table A-4 Analog generator menu tree description (continued)

Level 1	Level 2	Level 3	Description
Waveform Config (DTMF)	Tone Duration		Set the DTMF signal duration.
	Tone Delay		Set the delay between two DTMF tones.
	Pause Time		Set the interval time for the DTMF sequence.
	Repeat		Enable or disable repeating the DTMF sequence.
	Summation	– RSS – Linear	Summation refers to the method to sum up two levels.
Output Config	Connector	– Bal – UnBal – Com – IEC60268	Select the output connector type.
	Impedance	For Bal, Com, and IEC60268 – 600 Ω – 100 Ω – 40 Ω For UnBal – 600 Ω – 50 Ω – 20 Ω	Select the output impedance value.
	IEC60268 10 Ω	– Pin 2 – Pin 3	Select the additional 10 Ω output series resistance for pin 2 or 3 of the XLR connector in the common IECIEC 6026860268 configuration. This setting is only available when the output connector type is set to IEC 60268.
	Ground	– Float – Ground	Select the grounding type.
	Max Voltage		Set the maximum voltage value.
References	Ref Impedance		Set the reference impedance for the unit conversion of dBm measurements.

Appendix E: Digital Generator Menu Tree

Table A-5 Digital generator menu tree description

Level 1	Level 2	Level 3	Level 4	Description
Waveform	– Sine – V. Phase – Dual – SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1 – IEC 60118 – IEC 60268 – Gaus. Noise – Rect. Noise – Tri. Noise – Pink Noise – Square – Sine Burst – Stereo – Monotonicity – Constant – Walking Zero – Walking One – Multitone – Arbitrary			Select the waveform type.
Waveform Config (Sine)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	DC Offset			Set the signal DC offset value.
Waveform Config (V. Phase)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	Phase -> 1			This is only available when the digital generator is in channel 2. Set the phase of the channel 2 sine waveform with reference to channel 1.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Waveform Config (Dual)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	Frequency 2			Set the second sine wave signal frequency value. This setting is only applicable for the dual waveform.
	DC Offset			Set the signal DC offset value.
	Ratio			Set the ratio of the amplitude of the second sine wave over the first sine wave.
	Summation	– RSS – Linear	.	Summation refers to the method to sum up two levels.
Waveform Config (SMPTE 1:1/4:1/10:1)	Amplitude			Set the signal amplitude value.
	Lower Freq			Set the lower frequency value.
	Upper Freq			Set the higher frequency value.
	DC Offset			Set the signal DC offset value.
	Summation	– RSS – Linear		Summation refers to the method to sum up two levels.
Waveform Config (IEC 60118)	Amplitude			Set the signal amplitude value.
	Upper Freq			Set the higher frequency value.
	Diff Freq			Set the difference frequency of the waveform.
	DC Offset			Set the signal DC offset value.
	Summation	– RSS – Linear		Summation refers to the method to sum up two levels.
Waveform Config (IEC 60268)	Amplitude			Set the signal amplitude value.
	Center Freq			Set the center frequency of the waveform.
	Diff Freq			Set the difference frequency of the waveform.
	DC Offset			Set the signal DC offset value.
	Summation	– RSS – Linear		Summation refers to the method to sum up two levels.
Waveform Config (Gaus. Noise)	Amplitude			Set the signal amplitude value.
	DC Offset			Set the signal DC offset value.
Waveform Config (Rect. Noise)	Amplitude			Set the signal amplitude value.
	DC Offset			Set the signal DC offset value.
Waveform Config (Triangular Noise)	Amplitude			Set the signal amplitude value.
	DC Offset			Set the signal DC offset value.
Waveform Config (Pink Noise)	Amplitude			Set the signal amplitude value.
	DC Offset			Set the signal DC offset value.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Waveform Config (Square)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	DC Offset			Set the signal DC offset value.
Waveform Config (Sine Burst)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	Burst On			Set the number of cycles at which the signal amplitude will be at the higher level.
	Period			Set the the number of cycles from the beginning of one burst to the beginning of the next burst.
	Low Level			Set the the amplitude ratio of Burst On over Burst Off.
Waveform Config (Stereo)	Amplitude			Set the signal amplitude value.
	Frequency			Set the signal frequency value.
	DC Offset			Set the signal DC offset value.
Waveform Config (Monotonicity)	Samples/Step			Set the duration for each half cycle of the square wave.
Waveform Config (Constant)	Amplitude			Set the signal amplitude value.
Waveform Config (Walking Zero)	Samples/Step			Set the speed the single bit 0 is incremented.
Waveform Config (Walking One)	Samples/Step			Set the speed the single bit 1 is incremented.
Waveform Config (Multitone)	Amplitude			Set the signal amplitude value.
	Start Freq			Set the lowest frequency in the multitone waveform which is usually the frequency for the first tone.
	Stop Freq			Set the highest frequency in the multitone waveform which is usually the frequency for the last tone.
	Freq Spacing	– Linear – Log – Custom		Select frequency spacing between the tones. Custom is selected when the custom multitone waveform is set.
	Tones			Set the number of signal frequency components.
	Length	– 1024 – 2048 – 4096 – 8192 – 16384 – 32768 – 65536		Select the waveform length that determines the number of samples used to create one iteration of the multitone waveform.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Waveform Config (Multitone)	Custom	Apply		Apply the current setting on the selected tone for the custom multitone waveform.
		Optimize		Optimize the crest factor for the custom multitone waveform.
		Frequency		Set the frequency value for the custom multitone waveform.
		Amplitude		Set the amplitude value for the custom multitone waveform.
		Phase		Set the phase value for the custom multitone waveform.
		Add Above		Add the tone above the selected tone for the custom multitone waveform.
		Add Below		Add the tone below the selected tone for the custom multitone waveform.
		Remove		Remove the selected tone for the custom multitone waveform.
		Clear		Clear all the tones in the custom multitone waveform list.
Waveform Config (Abitrary)	Amplitude			Set the signal amplitude value.
	DC Offset			Set the signal DC offset value.
	Load File			Load a waveform from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Info			Display the loaded waveform information.
Output Config	Connector	– Bal – UnBal		Select the output connector type.
	AES Output	– On – Off		Enable or disable the AES output.
	Optical Output	– On – Off		Enable or disable the optical output.
	Sample Rate			Set the sample rate value.
	Audio Format	– Linear PCM – A-Law – μ-Law		Select the encoding audio format.
	Dither	– Off – Rectangular – Triangular – Shaped		Select the dither type.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Output Config	Ref Clock	Source	– Internal – AES RCLK – External	Select the reference clock source.
		Type	– MCLK – FSYNC	Select the external reference clock source.
	Ref Clock	Word Length	8 to 32	Set the external reference clock word length value.
		Multiplier		Set the external reference clock multiplier value. The selection available in the external reference clock multiplier depends on the external reference clock word length.
	Sync Clock	Output	– On – Off	Enable or disable the synchronous clock output.
		Source	– Internal – AES RCLK – External	Select the synchronous clock source.
		Divider	– 1 – 128	Select the synchronous clock divider value.
DSI Config	Voltage	– 1.2 Vpp – 1.5 Vpp – 1.8 Vpp – 2.5 Vpp – 3 Vpp – 3.3 Vpp		Select the output voltage or set your desired output voltage.
	Channels	– 2 – 4 – 6 – 8 – 10 – 12 – 14 – 16		Select the number of channels.
	Format	– Left – Right – I2S – DSP		Select the DSI output format.
	Resolution		8 to 24	Set the audio resolution.
	BClk Edge	– Rising – Falling		Select the clock edge type.
	Fsync Polarity	– Rising – Falling		Select the sync polarity.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
DSI Config	Fsync Width	– One Bit Clock – One Subframe – 50% Duty Cycle		Select the sync width.
	Data Shift Cnt			Set the data shift count value.
	Data Shift Dir	– Left – Right		Select the data shift direction.
	Mclk Output	– On – Off		Enable or disable the master clock output.
	Word Length			Set the master clock word length value. The word length cannot be less than the audio resolution. – 8 to 32
	Multiplier			Set the multiplier value.
	Sample Rate			Set the sample rate value.
AES3/SPDIF	Level			Set the output voltage level.
	Resolution		8 to 24	Set the audio resolution value.
	Validity Bit	– Set – Clear		Select the vailidity bit.
	Format	– Consumer – Professional		Select the AES3/SPDIF format.
	Status Bits	– Channel – User		Select the status bits type.
	Edit Bits (Consumer)	Select Byte		Select the byte and edit the byte.
		Audio Mode	– Non-Linear PCM – Linear PCM	Select the audio mode.
		Copyright	– Copyright – Non-copyright	Select the copyright type.
		Emphasis	– No pre-emphasis – 50/15 ìs – Reserved 1 – Reserved 2	Select the emphasis type.
		Channel Mode	0 to 3	Set the channel mode value.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES3/SPDIF	Edit Bits (Consumer)	Category	– General – Laser Optical – D/D Converter – Magnetic – Digital Broadcast 1 – Digital Broadcast 2 – Musical Instrument – ADC Non Copyright – Solid State Memory – ADC Copyright – Experimental – Reserved 1 – Reserved 2	Select the category code type.
		Source Num	0 to 15	Set the source number.
		Channel Num	0 to 15	Set the channel number.
		Sample Freq	– Not indicated – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz – 768 kHz	Select the sample frequency value.
		Clk Accuracy	– Level 1 – Level 2 – Level 3 – Reserved	Select the clock accuracy type.
		Max Word Len	– 24 bits – 20 bits	Select the maximum word length.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES3/SPDIF	Edit Bits (Consumer)	Word Length	24 bits maximum word length – Not indicated – 20 bits – 21 bits – 22 bits – 23 bits – 24 bits 20 bits maximum word length – Not indicated – 16 bits – 17 bits – 18 bits – 19 bits – 20 bits	Select the word length.
		Orig Samp	– Not indicated – 8 kHz – 11.025 kHz – 12 kHz – 16 kHz – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz – Reserved 1 – Reserved 2	Select the original sample frequency value.
		CGMA-A	– Copying Permitted – Condition Not Used – One Generation Copy – Copying Denied	Select the CGMA-A type.
	Edit Bits (Professional)	Select Byte		Select the byte and edit the byte.
		Audio Mode	– Non-Linear PCM – Linear PCM	Select the audio mode.
		Emphasis	– Not indicated – No pre-emphasis – 50/15 µs – CCITT J.17	Select the emphasis type.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES3/SPDIF	Edit Bits (Professional)	Freq Mode	– Locked – Unlocked	Select the frequency mode.
		Sample Freq	– Not indicated – 22.05 kHz – 24 kHz – 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz	Select the sample frequency value.
		Freq Scaling	– On – Off	Enable or disable frequency scaling.
		Chan Mode	– Not indicated – 2-channel – Single channel – Primary-Secondary – Stereo – Reserved 1 – Reserved 2 – Mono Double Rate – Left Double Rate – Right Double Rate – Multichannel	Select the channel mode.
		User Bits	– Not indicated – 192-bit block – Reserved for AES18 – User defined – Reserved for Metadata – As in IEC60958-3	Select the user bits type.
		Aux Bits	– 20-bit not defined – 24-bit main audio – 20-bit single – Reserved	Select the auxiliary bits.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES3/SPDIF	Edit Bits (Professional)	Word Length	24 bits maximum word length – Not indicated – 20 bits – 21 bits – 22 bits – 23 bits – 24 bits 20 bits maximum word length – Not indicated – 16 bits – 17 bits – 18 bits – 19 bits – 20 bits	Select the word length.
		Alignment	– Not Indicated – –18.06 dBFS – –20 dBFS – Reserved	Select the alignment level.
		Multi-Channel	– Defined – Undefined	Select the multi-channel status.
		Multi-Ch Mode	– Mode 0 – Mode 1 – Mode 2 – Mode 3 – User Defined	This is only available when the multi-channel status is set to Defined. Select the multi-channel mode.
		Channel Num	– 1 to 16 (Defined multi-channel status) – 1 to 128 (Undefined multi-channel status)	Set the channel number.
		Ref Signal	– Not a ref. signal – Grade 1 – Grade 2 – Reserved	Select the reference signal type.
		Channel Origin		Set the channel origin value (4 alphanumeric digit).
		Channel Dest		Set the channel destination value (4 alphanumeric digit).
		Local Addr	0 to 2^{32}–1	Set the local address value.
		Time of Day	0 to 2^{32}–1	Set the time of day.

Table A-5 Digital generator menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES3/SPDIF	Edit Bits (Professional)	Rel Flags	– 0-5 – 6-13 – 14-17 – 18-21	Select the reliability flags.
	Clear Bits			Clear all the bits.
	Save File			Save the bits to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Load File			Load the bits from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
References	Volts/FS			Set the volts/FS reference for the analog output voltage (in Volts) of the DAC used when converted to digital full scale (1 FS).

Appendix F: Analog Analyzer Menu Tree

Table A-6 Analog analyzer menu tree description

Level 1	Level 2	Level 3	Description
Functions	Multi-Chn	– Off – Phase – X-Talk	Select the multichannel mode.
	Function No.	– 1 – 2 – 3 – 4	Select the active function number to configure the settings.
	Meas. Func.	– None – Frequency – AC Voltage – DC Voltage – THD+N Ratio – THD+N Level – SINAD – THD Ratio – THD Level – SMPTE IMD – DFD60268 2nd – DFD 60268 3rd – DFD 60118 2nd – DFD 60118 3rd – SNR – SNR (Fast) – J-Test	Select the measurement function. This setting is only available when the multichannel mode is set to Off.
Functions (Frequency)	Unit	– Hz – ΔHz	Select the unit type.
	Format	– Off – Delta	Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Freq		Set the reference frequency value.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (AC Voltage)	Unit	– dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x	Select the unit type.
Functions (AC Voltage)	Format	– Off – Logarithmic – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured level as the reference level, and set the measurement reading format to Logarithmic.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Level		Set the reference level value. There is only one reference level for each channel.
	Ref. Imp		Set the reference impedance value. This setting is only available when the unit is set to W.
	Cal SPL		Set the calibration level value. This setting is only available when the unit is set to dBSPL.
	Detector	– RMS – Pk-Pk	Select the AC level detection type.
Functions (DC Voltage)	Unit	– V – ΔV – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Level		Set the reference level value. There is only one reference level for each channel.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (THD+N Ratio)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (THD+N Level)	Unit	– dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x	Select the unit type.
	Format	– Off – Logarithmic – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured level as the reference level, and set the measurement reading format to Logarithmic.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Level		Set the reference level value. There is only one reference level for each channel.
	Ref. Imp		Set the reference impedance value. This setting is only available when the unit is set to W.
	Cal SPL		Set the calibration level value. This setting is only available when the unit is set to dBSPL.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (THD+N Level)	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (SINAD)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (THD Ratio)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	Even Harmonic	– ALL – 2 – 4 – 6 – 8	Display the even harmonics order selection.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (THD Ratio)	Odd Harmonic	– ALL – 3 – 5 – 7 – 9	Display the odd harmonics order selection.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (THD Level)	Unit	– dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x	Select the unit type.
	Format	– Off – Logarithmic – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured level as the reference level, and set the measurement reading format to Logarithmic.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Level		Set the reference level value. There is only one reference level for each channel.
	Ref. Imp		Set the reference impedance value. This setting is only available when the unit is set to W.
	Cal SPL		Set the calibration level value. This setting is only available when the unit is set to dBSPL.
	Even Harmonic	– ALL – 2 – 4 – 6 – 8	Select the even harmonics values.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (THD Level)	Odd Harmonic	– ALL – 3 – 5 – 7 – 9	Select the odd harmonics values.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (SMPTE IMD)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	Freq Lock	– Gen Lock – Custom	Select the searching method for the upper and lower frequencies.
	Upper Freq		Set the upper frequency value. This setting is only available when the frequency lock is set to Custom.
	Lower Freq		Set the lower frequency value. This setting is only available when the frequency lock is set to Custom.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (DFD60268 2nd/ DFD 60268 3rd/ DFD 60118 2nd/ DFD 60118 3rd)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
Functions (SNR)	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	SNR Delay		Set the SNR delay value.
Functions (SNR (Fast))	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference frequency.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Functions (SNR (Fast))	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
	Harmonics		Set the number of harmonics order to be removed.
Functions (Phase)	Ref. Channel		Set the reference channel number.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (X-Talk)	Ref. Channel		Set the driven channel.
	Unit	– dB – ΔdB – % – x	Select the unit type.
	Format	– Off – Linear – Delta	Select the reading format of the returned measurement reading.
	Set to 0dB		Store the measured ratio as the reference ratio, and set the measurement reading format to Delta.
	Set result as ref. from	Channels 1 to 8	Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio		Set the reference ratio value. There is only one reference ratio for each channel.
	Freq Lock	– Auto – Gen Lock – Custom	Select the searching method for the fundamental frequency.
	Fund Freq		Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Filters Config	Clear Filters		Clear all the filter settings.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom	Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom	Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – C-Message – CCITT – Custom	Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom	Select the filter de-emphasis value.
	Notch Filter	State	Enable or disable the notch filter. – Enable – Disable
		Center Freq	Set the frequency of the component to be removed from the input signal.
		Bandwidth	Set the bandwidth of the signal component to be removed.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Meas Config	Auto Range	– On – Off	Enable or disable the auto range.
	Range	– 140 V – 100 V – 32 V – 10 V – 3.2 V – 1 V – 320 mV	Select the input voltage range value. This setting is only available when the auto range is disabled.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M	Select the sample size.
	Average Points	1 to 50	Set the number of measurement readings to be used for the moving average calculation.
	Src Channel		Select the internal generator channel as the reference channel used in the following situations. For the result calculation in unit dBg. For the frequencies searching algorithm when the frequency lock is set to Gen Lock.
	Trigger Source	– Free Run – External	Select the trigger source
	Trigger Edge	– Rising – Falling	Select the trigger edge type.
Input Config	Connector	– UnBal – Bal – Loopback	Select the input connector type.
	Impedance	– 100 kΩ (for UnBal) – 200 kΩ (for Bal) – 600 Ω – 300 Ω	Select the input impedance value. This setting is only available when the input connector is set to UnBal or Bal.
	Coupling	– DC – AC	Select the input coupling type.

Table A-6 Analog analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Description
Input Config	Bandwidth	– 90 kHz – 1.5 MHz	Select the input bandwidth value. This setting is only available with Option N3431A. Refer to "**U8903B Options**" on page 33 for more information.
	Ext. Gain		Set the input external gain value.
Wave File	Channel	– Left – Right – Stereo	Select the wave file channel type.
	Bits/Sample	– 8 – 16 – 24	Select the wave file number of bits per sample.
	Duration	1 s to 600 s	Set the recording duration of the wave file.
	Record		Start recording and save the measurement into a wave file.
Statistics	Show Stats	– On – Off	Enable or disable the statistics calculation.
	No. of Reading	2 to 20	Set the number of readings used for the statistics calculation.
	Stat 1 Stat2 Stat3	– Min – Max – Average – Std Dev – ΔMinMax	Select the statistics calculation type.
	Clear		Reset the statistics results of the current analog analyzer.

Appendix G: Digital Analyzer Menu Tree

Table A-7 Digital analyzer menu tree description

Level 1	Level 2	Level 3	Level 4	Description
Meas Mode	– Standard – Process Delay – BERT			Select the analysis mode.
Unit	– Hex – Dec			This is only available when the analysis mode is BERT. Select the unit for the BERT analysis mode.
Functions	Multi-Chn	– Off – Phase – X-Talk		Select the multichannel mode.
	Function No.	– 1 – 2 – 3 – 4		Select the active function number to configure the settings.
	Meas Func	– None – Frequency – AC Voltage – DC Voltage – THD+N Ratio – THD+N Level – SINAD – THD Ratio – THD Level – SMPTE IMD – DFD60268 2nd – DFD 60268 3rd – DFD 60118 2nd – DFD 60118 3rd – Positive Peak – Negative Peak		Select the measurement function. This setting is only available when the multichannel mode is set to Off.
Functions (Frequency)	Unit	– Hz – ΔHz		Select the unit type.
	Format	– Off – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Freq			Set the reference frequency value.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (AC Voltage)	Unit	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL		Select the unit type.
	Format	– Off – Logarithmic – Linear		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Level			Set the reference level value. There is only one reference level for each channel.
	Volt/FS			Set the volts/FS reference value.
	Detector	– RMS – Pk-Pk		Select the AC level detection type.
Functions (DC Voltage)	Unit	– FFS – V – Hex – x		Select the unit type.
	Format	– Off – Linear		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Voltage			Set the reference voltage value. There is only one reference level for each channel.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (THD+N Ratio)	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio			Set the reference ratio value. There is only one reference ratio for each channel.
	Precision	– On – Off		Enable or disable the precision mode.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (THD+N Level)	Unit	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL		Select the unit type.
	Format	– Off – Logarithmic – Linear		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Level			Set the reference level value. There is only one reference level for each channel.
	Volt/FS			Set the volts/FS reference value.
	Precision	– On – Off		Enable or disable the precision mode.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (THD+N Level)	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (SINAD)	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio			Set the reference ratio value. There is only one reference ratio for each channel.
	Precision	– On – Off		Enable or disable the precision mode.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.
Functions (THD Ratio)	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio			Set the reference ratio value. There is only one reference ratio for each channel.
	Even Harmonic	– ALL – 2 – 4 – 6 – 8		Display the even harmonics order selection.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (THD Ratio)	Odd Harmonic	– ALL – 3 – 5 – 7 – 9		Display the odd harmonics order selection.
Functions (THD Level)	Unit	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL		Select the unit type.
	Format	– Off – Logarithmic – Linear		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Level			Set the reference level value. There is only one reference level for each channel.
	Volt/FS			Set the volts/FS reference value.
	Even Harmonic	– ALL – 2 – 4 – 6 – 8		Select the even harmonics values.
	Odd Harmonic	– ALL – 3 – 5 – 7 – 9		Select the odd harmonics values.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (SMPTE IMD)	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio			Set the reference ratio value.
Functions (DFD60268 2nd/ DFD 60268 3rd/ DFD 60118 2nd/ DFD 60118 3rd)	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
	Ref. Ratio			Set the reference ratio value. There is only one reference ratio for each channel.
Functions (Positive peak)	Unit	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL		Select the measurement unit type.
	Format	– Off – Logarithmic – Linear		Select the reading format of the returned measurement reading.
Functions (Positive peak)	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Level			Set the reference level value. There is only one reference level for each channel.
	Volt/FS			Set the volts/FS reference value.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Functions (Negative peak)	Unit	– FFS – dBFS – %FS – V – dB – dBV – dBr – x – LSB – Hex – Dec – dBSPL		Select the measurement unit type.
	Format	– Off – Logarithmic – Linear		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference frequency.
	Ref. Level			Set the reference level value. There is only one reference level for each channel.
	Volt/FS			Set the volts/FS reference value.
Functions (Phase)	Ref. Channel			Set the reference channel number.
Functions (X-Talk)	Ref. Channel			Set the driven channel.
	Unit	– dB – ΔdB – % – x		Select the unit type.
	Format	– Off – Linear – Delta		Select the reading format of the returned measurement reading.
	Set result as ref. from	Channels 1 to 8		Store the measurement result from the selected channel as the reference ratio.
Functions (X-Talk)	Ref. Ratio			Set the reference ratio value. There is only one reference ratio for each channel.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when the frequency lock is set to Custom.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Filters Config	Clear Filters			Clear all the filter settings.
	LPF	– None – 15 kHz – 20 kHz – 22 kHz – 30 kHz – Custom		Select the low-pass filter.
	HPF	– None – 20 Hz – 100 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – C-Message – CCITT – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the filter de-emphasis value.
	Sample Rate	– 32 kHz – 44.1 kHz – 48 kHz – 88.2 kHz – 96 kHz – 176.4 kHz – 192 kHz		Select the sample rate.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Meas Config	Coupling	– DC – AC		Select the coupling type.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the sample size.
	Average Points	1 to 20		Set the number of measurement readings to be used for the moving average calculation.
	Trigger	Trigger Source	– Free Run – External – Channel	Select the trigger source.
		Trigger Edge	– Rising – Falling	This is only available when the trigger source is External or Channel. Select the trigger edge type.
		Interface	– Analog – Digital	This is only available when the trigger source is Channel. Select the trigger interface.
		Channel		This is only available when the trigger source is Channel. Set the channel number.
		Trigger Level		This is only available when the trigger source is Channel. Set the trigger level.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Input Config	Connector	– UnBal – Bal – Optical – DSI		Select the input connector type.
	Impedance	Unbalanced connector type – 75 Ω – HiZ Balanced connector type – 110 Ω – HiZ		Select the input impedance value.
	Freq Scaling	– MISR – Custom		Select the frequency scaling type.
	Ref SR			This is only available when frequency scaling is Custom. Set the reference sample rate value.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
DSI Config	Format	– Left – Right – I2S – DSP		Select the data format
	Fsync Polarity	– Rising – Falling		This is only available when the format is Left or Right. Select the frame clock edge synchronization.
	Fsync Width	– One Bit Clock – One Subframe – 50% Duty Cycle		This is only available when the format is Left or Right. Select the frame clock synchronization width.
	Data Shift Cnt			This is only available when the format is Left or Right. Set the data shift count value.
	Data Shift Dir	– Left – Right		This is only available when the format is Left or Right. Select the data shift direction.
	Word Length	8 to 32		Set the word length value. The word length value must be greater than or equal to the audio resolution.
	Resolution	8 to 24		Set the audio resolution value.
	Decoding	– Linear PCM – A-Law – μ-Law		Select the decoding format.
	W/Bclk Dir	– In – Out		Select the word/bit clock direction.
	Bit Clk Edge	– Rising – Falling		Select the bit clock edge.
	Voltage	– 1.2 Vpp – 1.5 Vpp – 1.8 Vpp – 2.5 Vpp – 3 Vpp – 3.3 Vpp – Custom		Select the input voltage value.

Table A-7 Digital analyzer menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
AES Config	Decoding	– Linear PCM – A- Law – µ- Law		Select the decoding format.
	Resolution	8 to 24		Set the audio resolution value.
	Status Bits	– Channel – User		Select the status bits type.
	Save in Hex			Save the status bits to a HEX file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Save in Xml			Save the status bits to an XML file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
Bits Analysis	Refresh Rate			Set the refresh rate.
	Bit Types	– Data – Active		Select the bit type.
Statistics	Show Stats	– On – Off		Enable or disable the statistics calculation.
	No. of Reading	2 to 20		Set the number of readings used for the statistics calculation.
	Stat 1 Stat2 Stat3	– Min – Max – Average – Std Dev – ΔMinMax		Select the statistics calculation type.
	Clear			Reset the statistics results of the current analog analyzer.

Appendix H: Graph Analysis Menu Tree

Table A-8 Graph analysis menu tree description

Level 1	Level 2	Level 3	Description
Analysis Mode	– Frequency – Phase – Time – PSD		Select the graph analysis mode to be plotted on the current graph panel. This setting is not available when the graph analysis display option is Harmonics.
Harm Settings	Active Channel	AA1 to AA8	Select the active channel. This setting is only available when the graph analysis display option is Harmonics. AA2: Analog Analyzer channel 2
	Odd Harmonic	– ALL – 3 – 5 – 7 – 9	Select the odd harmonics values. This setting is only available when the graph analysis display option is Harmonics.
	Even Harmonic	– ALL – 2 – 4 – 6 – 8	Select the even harmonics values. This setting is only available when the graph analysis display option is Harmonics.
	Display	– Harmonics – THD	Select the harmonics display option. This setting is only available when the graph analysis display option is Harmonics.
	THD Unit	– dB – %	Select the unit for THD measurements. This setting is only available when the graph analysis display option is Harmonics.
Graph Settings	Active Channel	AA1 to AA8	Select the available active channel. AA2: Analog Analyzer channel 2
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M	Select the graph sample size value.

Table A-8 Graph analysis menu tree description (continued)

Level 1	Level 2	Level 3	Description
Graph Settings	Window	– Rectangular – Hanning – Blackman – Rife-Vincent – Rife-Vincent 3 – Hamming – Flat Top – Kaiser	Select the window function to be applied to the data before the FFT process.
	Sync Avg	1 to 64	Set the number of samples to be acquired and averaged before the FFT process is performed.
	Hold	– None – Average – Min – Max	Select the type of hold to be performed after the FFT process.
Axis Settings	Axis	– Primary – Secondary	Select the active axis to be configured.
	Enabled	– On – Off	Enable or disable the axis settings. This setting is only available when the axis type is secondary. If the axis type is primary, this setting is always set to On.
	Left		Set the left axis limit value.
	Right		Set the right axis limit value.
	Span		Set the total X-axis span or total range to be monitored in the graph.
	Center		Set the X-axis center point in the graph.
	Top		Set the top axis limit value.
	Bottom		Set the bottom axis limit value.
	X-Scale	– Linear – Log	Select the X-axis scale type.
	Y-Scale	– Linear – Log	Select the Y-axis scale type.
Trace Settings	Active Trace	1 to 8	Select the active trace channel.
	Source		Select data source of the active trace from the available channels, traces, files, and memory.
	Enabled	– On – Off	Enable or disable the active trace data.
	Memory	Save To Memory	Save the active trace to the memory buffer.
		Load From Memory	Load a trace from the memory buffer into the active trace.
		Clear Memory	Clear the trace from the memory buffer.

Table A-8 Graph analysis menu tree description (continued)

Level 1	Level 2	Level 3	Description
Trace Settings	Math	Apply Math	Apply the corresponding math function to the trace data or turn off the math function. – On – Off
		Function	Select the math function to be applied on the active trace. – f(Source) – f(Source) + x – f(Source) - x – f(Source) * x – f(Source) / x
		Variable	Set the x value in the selected math function.
	Unit	– V – dBV – dBu – W – dBm – dBSPL	Select the trace unit type.
	Persistence	Persist	Enable or disable the persistence on the active trace.
		Persist Count	Set the number of previous sets of trace data to be displayed in the graph before they are removed. This setting is only available when persistence is enabled.
	Axis	– Primary – Secondary	Attach the active trace to the primary or secondary axis.
	Color	– Yellow – Cyan – White – Pink – Green – Orange – Red – Purple	Select the color of the active trace.
Display Option	– Graph – Data Table – Marker Table – Statistics – Harmonics – Signal Analysis		Select the graph analysis display option.
Running mode	Continuous Single		Select the graph analysis running mode.

Table A-8 Graph analysis menu tree description (continued)

Level 1	Level 2	Level 3	Description
Measurement	Enabled	– On – Off	Enable or disable the measurements in the graph.
	Measurement 1	Interface	Select the measurement interface type.
		Channel	Select the desired channel to perform the measurement.
		Function No	Select the function to be displayed based on the function number (1 to 4).
	Measurement 2	Interface	Select the measurement interface type.
		Channel	Select the desired channel to perform the measurement.
		Function No	Select the function to be displayed based on the function number (1 to 4).

Appendix I: Sweep Function Menu Tree

Table A-9 Sweep function menu tree description

Level 1	Level 2	Level 3	Level 4	Description
App.Type	– Sweep – Group Delay			Select the sweep application type.
Parameter				This is only available when the sweep application type is Sweep. Select the sweep parameter type. The parameter selection depends on the waveform type set at the analog generator.
Points Settings	Spacing	– Log – Linear – Custom		Select the spacing type.
	Unit	– Vrms – dBV – Vp – Vpp – dBm – dBu – dBSPL		Select the sweep unit. This setting is only available when the sweep parameter is amplitude.
	Start			Set the sweep start value. This setting is only available when the sweep spacing is Log or Linear.
	Stop			Set the sweep stop value. This setting is only available when the sweep spacing is Log or Linear.
	Step			Set the sweep step value. This setting is only available when the sweep spacing is Log or Linear.
	Points			Set the sweep points value. This setting is only available when the sweep spacing is Log or Linear.
	Edit Points			Refer to "**Edit points**" on page 445 for the edit points menu tree.
Dwell Time				Set the delay in ms for the generator to output the signal.
Sweep Mode	Continuous Single			Select the sweep mode.
Channels	Source	1 to 2		Select the source channel(s).
	Measure	1 to 8		Select the measure channel(s). The available selection depends on the number of installed analog analyzer cards.

Table A-9 Sweep function menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Plot View	Axis Settings	Left		Set the left axis value.
		Right		Set the right axis value.
		Top		Set the top axis value.
		Bottom		Set the bottom axis value.
		X-Scale	– Linear – Log	Select the X-axis scale type.
		Y-Scale	– Linear – Log	Select the Y-axis scale type.
	Plot Settings	Data Channel		Select the trace data channel number to be plotted.
		Y Data	– S: <sweep parameter> – F1: <measurement function 1> – F2: <measurement function 2> – F3: <measurement function 3> – F4: <measurement function 4>	Select the Y-axis trace data source.
		X Data	– S: <sweep parameter> – F1: <measurement function 1> – F2: <measurement function 2> – F3: <measurement function 3> – F4: <measurement function 4>	Select the X-axis trace data source.
		Hold Type	– None – Average – Max – Min	Select the data type to be plotted in the graph.
	Edit points	Data Channel		Select the trace data channel number to be plotted.
		Goto Point		Set the sweep point number to go to.
		Point Value		Set the currently selected sweep point value.
		Add Point		Add a sweep point.
		Remove Point		Remove the selected sweep point.
		Load Points		Load the sweep points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.

Table A-9 Sweep function menu tree description (continued)

Level 1	Level 2	Level 3	Level 4	Description
Plot View	Edit points	Save Points		Save the sweep points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Save Pts			Save the sweep points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.

Appendix J: Save Menu Tree

Table A-10 Save menu tree description

Level 1	Level 2	Description
Save		Save to a file.
Type		Select the file type to be displayed on the current directory.
Rename	OK	Set the file name and select OK to rename the file name.
Copy or Move	Mark	Mark the selected file.
	Copy Marked To Folder	Copy the marked file to the selected folder.
	Move Marked To Folder	Move the marked file to the selected folder.
Delete		Delete the selected file.
New Folder	OK	Set the new folder name and select OK to create a new folder.

Appendix K: Recall Menu Tree

Table A-11 Recall menu tree description

Level 1	Level 2	Description
Recall		Recall a saved file.
Type		Select the file type to be displayed on the current directory.
Rename	OK	Set the file name and select OK to rename the file name.
Copy or Move	Mark	Mark the selected file.
	Copy Marked To Folder	Copy the marked file to the selected folder.
	Move Marked To Folder	Move the marked file to the selected folder.
Delete		Delete the selected file.
New Folder	OK	Set the new folder name and select OK to create a new folder.

Appendix L: Test Sequence Menu Tree

Table A-12 Test sequence menu tree description

Tab	Level 1	Level 2	Level 3	Description
Project	New Project			Create a new project.
	Open Project			Load a project from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Save Project			Save the project to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Properties	Prompt DUT ID	– On – Off	Enable or disable the prompt for device ID (device serial number) at the start of a test sequence.
		Prompt Msg		Set the prompt message. This setting is only available when Prompt DUT ID is enabled.
		Pass/Fail Msg	– On – Off	Enable or disable the on-screen message dialog box that can be displayed at the end of a test sequence. Press Enter to close the dialog box.
		Pass Message		Edit the pass message. This setting is only available when Pass/Fail Msg is enabled.
		Fail Message		Edit the fail message. This setting is only available when Pass/Fail Msg is enabled.
Report	Clear			Clear all the report data.
	Save			Save the report to a DOCX file format. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Properties	Auto Save	– Enable – Disable	Enable or disable saving the report automatically at the end of a test sequence.
		Format	– Docx – Html	Select the report file format to be saved.
		Name Option	– Timestamp – Numeric – Prompt	Select the naming convention of the file name for the automatically saved report.
		Prefix		Set the prefix for the file name.
		Location	Select	Select the folder for the automatically saved report.
			New Folder	Create a new folder at the current directory or folder.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Test	Enable		– On – Off	Enable or disable the selected test sequence.
	Add Test Sequence	New Saved		Add a new test sequence.
	Delete Test Sequence			Delete the selected test sequence.
	Save			Save the test sequence to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Edit	Move		Move the selected test sequence.
		Copy		Copy the selected test sequence.
		Paste		Paste a copied test sequence after the selected test sequence.
	Properties	Name		Set the test sequence name.
IO Configuration	Add Measurement			Add measurements to the selected test sequence. Refer to "**Add Measurement**" on page 453 for the list of test measurements.
	Edit	Paste		Paste a copied measurement after the IO configuration. The IO Configuration cannot be moved or copied.
	Settings: Output Configuration	Channels	– None (External) – 1 – 2	Select the number of output channels in use.
		Connector	– Bal – UnBal – Com – IEC60268	Select the output connector type.
		Impedance	– For Bal, Com, and IEC60268 – 600 Ω – 100 Ω – 40 Ω – For UnBal – 600 Ω – 50 Ω – 20 Ω	Select the output impedance value.
		IEC60268	– Pin 2 – Pin 3	Select the additional 10 Ω output series resistance for pin 2 or 3 of the XLR connector in the common IEC 60268 configuration. This setting is only available when the output connector type is set to IEC 60268.
		Ground	– Float – Ground	Select the grounding type.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
IO Configuration	Settings: Output Configuration	Max Voltage		Set the maximum voltage.
		Reference	Impedance	Set the reference impedance for the unit conversion of dBm measurements.
	Settings: Input Configuration	Channels		Select the number of input channels in use.
		Connector	– UnBal – Bal – Loopback	Select the input connector type.
		Impedance	– 100 kΩ (for Unbalanced) – 200 kΩ (for Balanced) – 600 Ω – 300 Ω	Select the input impedance value. This setting is only available when Connector is set to UnBal or Bal.
		Coupling	– DC – AC	Select the input coupling type.
		Bandwidth	– 90 kHz – 1.5 MHz	Select the input bandwidth value. This setting is only available with Option N3431A.
		Reference	Voltage	Set the input voltage value.
			Ratio	Set the input ratio value.
			Frequency	Set the input frequency value.
			Impedance	Set the input impedance value.
			Sound level	Set the input sound level value.
			Calibrator level	Set the input calibrator level value.
	Properties	Name		Rename the IO configuration.
		Sub-Steps: RunIO Configuration	Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Edit	Move the RunIO Configuration sub-step in the list.
		Sub-Steps: Delay	Enable	Enable or disable the delay sub-step. – On – Off
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
IO Configuration	Properties	Sub-Steps: Delay	Settings	Configure the delay sub-step settings. – Delay Set the delay time in seconds.
			Properties	Rename the delay sub-step name.
		Sub-Steps: Prompt	Enable	Enable or disable the prompt sub-step.
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.
			Settings	– Message Set the prompt message at the lower half of the main display. – Prompt Icon Select the prompt icon to be displayed. – None – Hand – Question – Exclamation – Asterisk – Dialog Settings Add additional settings to the prompt window. – Timeout – Cancel Button – Timeout Set the prompt timeout value in seconds.
			Properties	Set the prompt sub-step name.
		Sub-Steps: Send SCPI	Enable	Enable or disable the send SCPI sub-step.
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
IO Configuration	Properties	Sub-Steps: Send SCPI	Settings	– GPIB Address Select the desired GPIB address. – SCPI Commands – Edit Set the SCPI commands at the lower half of the main display. – Import Load the SCPI commands from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree. – Progress Msg Set the optional text message that will be displayed on a dialog box for the time length set in Delay. – Delay Set the delay time length after the SCPI command(s) is issued.
			Properties	Set the prompt sub-step name.
Measurement	Enable			Enable or disable the selected measurement.
	Add Measurement	– AC level – Frequency – Phase – SNR – THD+N – DC level – Crosstalk – SMPTE IMD – DFD IMD – Multitone analyzer – POLQA – Stepped frequency sweep – SMPTE frequency sweep – DFD frequency sweep – Stepped level sweep – SMPTE level sweep – DFD level sweep – DC level sweep – Receiver Sensitivity – Measurement recorder		Add measurements.
	Delete Measurement			Delete the selected test measurement.
	Edit			Move or copy the selected measurement, or paste a copied measurement after the selected measurement.
	Settings			Configure the selected test measurement. Refer to "**Measurement settings**" on page 456 for the respective test measurement settings.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Measurement	Properties	Name		Rename the selected measurement.
		Sub-Steps: RunIO Configuration	Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Edit	Move the RunIO Configuration sub-step in the list.
		Sub-Steps: Delay	Enable	Enable or disable the delay sub-step.
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.
			Settings	Configure the delay sub-step settings. – Delay Set the delay time in seconds.
			Properties	Rename the delay sub-step name.
		Sub-Steps: Prompt	Enable	Enable or disable the prompt sub-step.
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.
			Settings	– Message Set the prompt message at the lower half of the main display. – Prompt Icon Select the prompt icon to be displayed. – None – Hand – Question – Exclamation – Asterisk – Dialog Settings Add additional settings to the prompt window. – Timeout – Cancel Button – Timeout Set the prompt timeout value in seconds.

Table A-12 Test sequence menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Measurement	Properties	Sub-Steps: Prompt	Properties	Set the prompt sub-step name.
		Sub-Steps: Send SCPI	Enable	Enable or disable the send SCPI sub-step.
			Add Sub-Step	Add sub-step to the list. – Delay – Prompt – Sent SCPI
			Delete Sub-Step	Delete the selected sub-step.
			Edit	Move or copy the selected sub-step, or paste a copied sub-step after the selected sub-step.
			Settings	– GPIB Address Select the desired GPIB address. – SCPI Commands – Edit Set the SCPI commands at the lower half of the main display. – Import Load the SCPI commands from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree. – Progress Msg Set the optional text message that will be displayed on a dialog box for the time length set in Delay. – Delay Set the delay time length after the SCPI command(s) is executed.
			Properties	Set the prompt sub-step name.
		Failure Handling	– Cancel Seq. – Allow Retry – Continue Seq.	Select the failure handling type for the selected measurement.

Measurement settings

AC level

Table A-13 Measurement settings > AC Level menu tree description

Tab	Level 1	Level 2	Level 3	Description
AC Level (Signal Generation)	Waveform	Sine Variable Phase Square Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
		Phase->1st Ch		Set the phase value. This setting is only available when channel 2 is selected.
AC Level (Signal Analysis)	Detector	– RMS – Pk-Pk		Select the AC level detector type.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.

Table A-13 Measurement settings > AC Level menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
AC Level (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
AC Level Gain				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

Frequency

Table A-14 Measurement settings > Frequency menu tree description

Tab	Level 1	Level 2	Level 3	Description
Frequency (Signal Generation)	Waveform	– Sine – Variable Phase – Square – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	Enable Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
	Waveform Config	DC Offset		Set the DC offset value.
		Phase->1st Ch		Set the phase value. This setting is only available when channel 2 is selected.
Frequency (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
Frequency				Refer to “**Bar chart**” on page 502 for the bar chart menu tree.

Phase

Table A-15 Measurement settings > Phase menu tree description

Tab	Level 1	Level 2	Level 3	Description
Phase (Signal Generation)	Waveform	– Sine – Variable Phase – Square – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
	Waveform Config	Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
		Phase->1st Ch		Set the phase value. This setting is only available when channel 2 is selected.
Phase (Signal Analysis)	Ref Channel			Set the reference channel number.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
Phase				Refer to “**Bar chart**” on page 502 for the bar chart menu tree.

SNR

Table A-16 Measurement settings > SNR menu tree description

Tab	Level 1	Level 2	Level 3	Description
SNR (Signal Generation)	Waveform	– Sine – Variable phase – Square – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
		Phase->1st Ch		Set the phase value. This setting is only available when channel 2 is selected.
SNR (Signal Analysis)	SNR Mode	– Fast – Standard		Select the SNR measurement mode.
	SNR Delay			Set the SNR delay. This setting is only available when SNR Mode is set to Standard.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency. This setting is only available when SNR Mode is set to Fast.
	Fund Freq			Set the fundamental frequency value. This setting is only available when SNR Mode is set to Fast and Freq Lock is set to Custom.
	Harmonic Cnt			Set the number of harmonics order to be removed. This setting is ony available when SNR Mode is set to Fast.

Table A-16 Measurement settings > SNR menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
SNR (Signal Analysis)	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-16 Measurement settings > SNR menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
SNR (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
SNR				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

THD+N

Table A-17 Measurement settings > THD+N menu tree description

Tab	Level 1	Level 2	Level 3	Description
THD+N (Signal Generation)	Waveform	– Sine – Variable phase – Square – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
	Waveform Config	DC Offset		Set the DC offset value.
		Phase->1st Ch		Set the phase value. This setting is only available when channel 2 is selected.
THD+N (Signal Analysis)	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Harmonics	– All – 2 to 9		Select the harmonics count to be used in the THD ratio and THD level results.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.

Table A-17 Measurement settings > THD+N menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
THD+N (Signal Analysis)	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
SINAD THD Level THD Ratio THD+N Level THD+N Ratio				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

DC level

Table A-18 Measurement settings > DC Level menu tree description

Tab	Level 1	Level 2	Level 3	Description
DC Level (Signal Generation)	Waveform	– Sine – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
DC Level (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
DC Level				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

Crosstalk

Table A-19 Measurement settings > Crosstalk menu tree description

Tab	Level 1	Level 2	Level 3	Description
Crosstalk (Signal Generation)	Waveform	– Sine – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
Crosstalk (Signal Analysis)	Driven Ch			Select the driven channel number from the generator.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
Crosstalk				Refer to “**Bar chart**” on page 502 for the bar chart menu tree.

SMPTE IMD

Table A-20 Measurement settings > SMPTE IMD menu tree description

Tab	Level 1	Level 2	Level 3	Description
SMPTE IMD (Signal Generation)	Waveform	– SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Lower Freq		Set the lower frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
SMPTE IMD (Signal Analysis)	Freq Lock	Gen Lock Custom		Select the searching method for the upper and lower frequencies.
	Upper Freq			Set the upper fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Lower Freq			Set the lower fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
SMPTE Ratio				Refer to “**Bar chart**” on page 502 for the bar chart menu tree.

DFD IMD

Table A-21 Measurement settings > DFD IMD menu tree description

Tab	Level 1	Level 2	Level 3	Description
DFD IMD (Signal Generation)	Waveform	– IEC60118 – IEC60268		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Center Freq		Set the center frequency value.
		Diff Freq		Set the difference frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
DFD IMD (Signal Analysis)	DFD order	– 2nd – 3rd		Select the distortion order to be measured.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
DFD Ratio				Refer to “**Bar chart**” on page 502 for the bar chart menu tree.

Multitone analyzer

Table A-22 Measurement settings > Multitone Analyzer menu tree description

Tab	Level 1	Level 2	Level 3	Description
Multitone (Signal Generation)	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Amplitude		Set the total amplitude value.
	Tones Config	Start Freq		Set the lowest frequency in the multitone waveform which is usually the frequency of the first tone.
		Stop Freq		Set the highest frequency in the multitone waveform which is usually the frequency for the last tone.
		Spacing	– Linear – Log – Custom	Select the frequency spacing between the tones.
		Tones		Set the number of signal frequency components.
		Length	– 1024 – 2048 – 4096 – 8192 – 16384 – 32768 – 65536	Select the waveform length value.
		Phase Dist	– Zero – Random – Custom	Select the phase distribution of each tone.
		Ampl. Mode	– Zero – Custom	Select the amplitude ratio of each tone.
		Optimization	– On – Off	Enable or disable the crest factor optimization.
		Edit Tones	Frequency	Set the frequency value.
			Amplitude	Set the amplitude value.
			Phase	Set the phase value.
			Add Above	Add a tone above the selected tone.
			Add Below	Add a tone below the selected tone.
			Remove	Remove the selected tone.
			Clear All	Remove all the tones in the list.
		Apply Settings		Apply the settings to calculate the crest factor of the multitone signal each time you change the settings in the Tones Config menu.

Table A-22 Measurement settings > Multitone Analyzer menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Multitone (Signal Generation)	Tones Config	Active Channel		Set the active channel for the absolute amplitude for each tone to be displayed in a table.
Multitone (Signal Analysis)	Input Range	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– Spectrum – Waveform – Level – Gain				Refer to "**Graph**" on page 503 for the graph menu tree.
– Max Tone Level – Min Tone Level – TD+N Level – TD+N Ratio – Tone Level				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

Stepped frequency sweep

Table A-23 Measurement settings > Stepped Frequency Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
Stepped Frequency Sweep (Signal Generation)	Output			Select the output channel.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
	Ref Channel			Set the reference channel number.
	Harmonics	– All – 2 to 9		Select the harmonics count to be used in the THD ratio and THD level results.

Table A-23 Measurement settings > Stepped Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Frequency Sweep (Signal Analysis)	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-23 Measurement settings > Stepped Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Frequency Sweep (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– AC Level – Gain – Phase – THD Ratio – THD Level – THD+N Ratio – THD+N Level – SINAD				Refer to "**Graph**" on page 503 for the graph menu tree.

SMPTE frequency sweep

Table A-24 Measurement settings > SMPTE Frequency Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
SMPTE Frequency Sweep (Signal Generation)	Waveform	– SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1		Select the waveform type.
	Output			Select the output channel.
	Sweep Config	Swept	– Upper Freq – Lowe Freq	Select the sweep parameter.
		Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
		Edit Points	Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Lower Freq		Set the lower frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.

Table A-24 Measurement settings > SMPTE Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
SMPTE Frequency Sweep (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
SMPTE Ratio				Refer to "**Graph**" on page 503 for the graph menu tree.

DFD frequency sweep

Table A-25 Measurement settings > DFD Frequency Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
DFD Frequency Sweep (Signal Generation)	Waveform	– IEC60118 – IEC60268		Select the waveform type.
	Output			Select the output channel.
	Sweep Config	Swept	– Upper Freq – Lowe Freq	Select the sweep parameter.
		Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Sweep Config	Edit Points	Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Diff Freq		Set the difference frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.

Table A-25 Measurement settings > DFD Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
DFD Frequency Sweep (Signal Analysis)	DFD order	– 2nd – 3rd		Select the distortion product order to be measured.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
DFD Ratio				Refer to "**Graph**" on page 503 for the graph menu tree.

External frequency sweep

Table A-26 Measurement settings > External Frequency Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
External Frequency Sweep (Signal Generation)	Instrument	– Keysight 33220A – Keysight 33250A – Keysight 33500A – Keysight 33600A – Other		Select the instrument model.
	GPIB Address	– 0 to 30		Select the GPIB address.
	Init Instrument	– On – Off		Enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
	Init SCPI	– Edit – Import		Set the SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file.
	Sweep SCPI	– Edit – Import		Set the sweep SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.

Table A-26 Measurement settings > External Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
External Frequency Sweep (Signal Analysis)	Ref Channel	– CH1 to CH8		Select the reference channel number. The phase of each channel is measured against the reference channel. The phase result for the reference channel should always be displayed zero.
	Harmonics	– All – 2 to 9		Select the harmonics count to be used in the THD ratio and THD level results.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-26 Measurement settings > External Frequency Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Frequency Sweep (Signal Analysis)	Notch Filter	HP8903B	– On – Off	Enable or disable the HP8903B mode.
		Custom Notch	– On – Off	Enable or disable the custom notch.
		Center Freq		Set the center frequency value. This is only applicable when custom notch is enabled.
		Bandwidth		Set the bandwidth value. This is only applicable when custom notch is enabled.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– AC Level – Gain – Phase – THD Ratio – THD Level – THD+N Ratio – THD+N Level – SINAD				Refer to "**Graph**" on page 503 for the graph menu tree.

Stepped level sweep

Table A-27 Measurement settings > Stepped Level Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Generation)	Waveform	– Sine – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
	Sweep Config	Edit Points	Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		DC Offset		Set the DC offset value.

Table A-27 Measurement settings > Stepped Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Analysis)	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-27 Measurement settings > Stepped Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Analysis)	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– AC Level – Gain – THD Ratio – THD Level – THD Ratio Vs Measured Amplitude – THD Level Vs Measured Amplitude – THD+N ratio – THD+N Level – THD+N Ratio Vs Measured Amplitude – THD+N Level Vs Measured Amplitude – SINAD				Refer to "**Graph**" on page 503 for the graph menu tree.

SMPTE level sweep

Table A-28 Measurement settings > SMPTE Level Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
SMPTE Level Sweep (Signal Generation)	Waveform	– SMPTE 1:1 – SMPTE 4:1 – SMPTE 10:1		Select the waveform type.
	Output			Select the output channel.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
	Sweep Config	Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Lower Freq		Set the lower frequency value.
		DC Offset		Set the DC offset value.

Table A-28 Measurement settings > SMPTE Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
SMPTE Level Sweep (Signal Analysis)	Freq Lock	– Gen Lock – Custom		Select the searching method for the upper and lower frequencies.
	Upper Freq			Set the upper fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Lower Freq			Set the lower fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– SMPTE Ratio – SMPTE Ratio Vs Measured Amplitude				Refer to "**Graph**" on page 503 for the graph menu tree.

DFD level sweep

Table A-29 Measurement settings > DFD Level Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
DFD Level Sweep (Signal Generation)	Waveform	– IEC60118 – IEC60268		Select the waveform type.
	Output			Select the output channel.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Upper Freq		Set the upper frequency value.
		Diff Freq		Set the difference frequency value.
		DC Offset		Set the DC offset value.

Table A-29 Measurement settings > DFD Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
DFD Level Sweep (Signal Analysis)	DFD order	– 2nd – 3rd		Select the distortion product order to be measured.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– DFD Ratio – DFD Ratio Vs Measured Amplitude				Refer to "**Graph**" on page 503 for the graph menu tree.

DC level sweep

Table A-30 Measurement settings > DC Level Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
DC Level Sweep (Signal Generation)	Output			Select the output channel.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
	Sweep Config	Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
			Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
DC Level Sweep (Signal Analysis)	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.

Table A-30 Measurement settings > DC Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
DC Level Sweep (Signal Analysis)	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
DC Level				Refer to "**Graph**" on page 503 for the graph menu tree.

Receiver sensitivity

Table A-31 Measurement settings > Receiver Sensitivity menu tree description

Tab	Level 1	Level 2	Level 3	Description
Receiver Sensitivity (Signal Generation)	Instrument	– Keysight E4438C – Other		Select the signal generator model.
	GPIB address			Set the GPIB address for the connected signal generator.
	Start Power			Set the sweep start RF power.
	Stop Power			Set the sweep stop RF power.
	Step Size			Set the step size.
	Dwell Time			Set the delay between each measured SINAD in seconds.
	Init Instrument	– On – Off		Enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
	FM Frequency			Set the RF signal output frequency. This setting is only available if Instrument is set to Keysight E4438C and the Init Instrument is enabled.
	FM Deviation			Set the RF signal frequency modulation deviation. This setting is only available if Instrument is set to Keysight E4438C and the Init Instrument is enabled.
	FM Rate			Set the RF signal internal frequency modulation rate. This setting is only available if Instrument is set to Keysight E4438C and the Init Instrument is enabled
	Init SCPI	– Edit – Import		Set the SCPI commands that initialize the connected signal generator. You can set the SCPI command directly or load from a file. This setting is only available if Instrument is set to Other and the Init Instrument is enabled.
	Output Power SCPI			Set the SCPI command that adjusts the RF power of the connected signal generator.
Receiver Sensitivity (Signal Analysis)	Meas Channel			Set the measured channel number.
	Target SINAD			Set the target SINAD value measured from the Meas Channel.
	Min 1st Value			Set the minimum first value.
	Stop Condition	– Until End – On Target		Select the stop condition.
	Freq Lock	– Auto – Custom		Select the searching method for the fundamental frequency.

Table A-31 Measurement settings > Receiver Sensitivity menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Receiver Sensitivity (Signal Analysis)	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-31 Measurement settings > Receiver Sensitivity menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Receiver Sensitivity (Signal Analysis)	Notch Filter	HP8903B	– On – Off	Enable or disable the HP8903B notch filter mode.
		Custom Notch	– On – Off	Enable or disable custom notch filter.
		Center Freq		Set the center frequency value. This is only available when the Custom Notch is enabled.
		Bandwidth		Set the bandwidth value. This is only available when the Custom Notch is enabled.
	Average Points			Set the number of measurement readings to be used for the average calculation.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
SINAD Vs RF Power				Refer to “**Graph**” on page 503 for the graph menu tree.

External level sweep

Table A-32 Measurement settings > External Level Sweep menu tree description

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Generation)	Instrument	– Keysight 33220A – Keysight 33250A – Keysight 33500A – Keysight 33600A – Other		Select the instrument model.
	GPIB Address	– 0 to 30		Select the GPIB address.
	Init Instrument	– On – Off		Enable or disable the U8903B to send SCPI commands to initialize the connected signal generator.
	Init SCPI	– Edit – Import		Set the SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file.
	Sweep SCPI	– Edit – Import		Set the sweep SCPI commands that initialize the connected instrument. You can set the SCPI command directly or load from a file.
	Sweep Config	Start		Set the start value for the sweep parameter.
		Stop		Set the stop value for the sweep parameter.
		Spacing		Select Log, Linear, or Custom for the sweep spacing.
		Points		Set the number of sweep points.
		Step Size		Set the step size for linear spacing. This setting is only available when spacing is set to Linear.
		Dwell Time		Set the delay between the sweep points.
		Edit Points	Point No	Set the point number.
			Point Value	Set the point value.
			Insert Point Above	Insert a point above the selected point.
			Insert Point Below	Insert a point below the selected point.
			Remove Point	Remove the selected point.
			Clear	Clear all points.
			Reverse Order	Reverse the order of the points.
			Sort	Sort the points in ascending order.
			Load Points	Load points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
		Edit Points	Save Points	Save the points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.

Table A-32 Measurement settings > External Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Analysis)	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.
	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.

Table A-32 Measurement settings > External Level Sweep menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Stepped Level Sweep (Signal Analysis)	Notch Filter	HP8903B	– On – Off	Enable or disable the HP8903B mode.
		Custom Notch	– On – Off	Enable or disable the custom notch.
		Center Freq		Set the center frequency value. This is only applicable when custom notch is enabled.
		Bandwidth		Set the bandwidth value. This is only applicable when custom notch is enabled.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.
– AC Level – Gain – THD Ratio – THD Level – THD Ratio Vs Measured Amplitude – THD Level Vs Measured Amplitude – THD+N ratio – THD+N Level – THD+N Ratio Vs Measured Amplitude – THD+N Level Vs Measured Amplitude – SINAD				Refer to “**Graph**” on page 503 for the graph menu tree.

Measurement recorder

Table A-33 Measurement settings > Measurement Recorder menu tree description

Tab	Level 1	Level 2	Level 3	Description
Measurement Recorder (Signal Generation)	Waveform	– Sine – Variable Phase – Square – Arbitrary		Select the waveform type.
	Output			Select the output channel.
	Waveform Config	Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Frequency		Set the frequency value.
		Amplitude		Set the amplitude value.
		DC Offset		Set the DC offset value.
Measurement Recorder (Signal Analysis)	Duration			Set the length of the measurement record,
	Ref Channel			Set the reference channel number.
	Freq Lock	– Auto – Gen Lock – Custom		Select the searching method for the fundamental frequency.
	Fund Freq			Set the fundamental frequency value. This setting is only available when Freq Lock is set to Custom.
	LPF	– None – 2 kHz – 3 kHz – 5 kHz – 8 kHz – 10 kHz – 15 kHz – 20 kHz – 22 kHz – 30 kHz – 40 kHz – 50 kHz – 80 kHz – Custom		Select the low-pass filter.

Table A-33 Measurement settings > Measurement Recorder menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Measurement Recorder (Signal Analysis)	HPF	– None – 15 Hz – 20 Hz – 22 Hz – 30 Hz – 50 Hz – 70 Hz – 100 Hz – 200 Hz – 300 Hz – 400 Hz – Custom		Select the high-pass filter.
	Weighting	– None – A – CCIR 1k – CCIR 2k – CCITT – C-Message – Custom		Select the weighting filter.
	Deemphasis	– None – 50 µs – 75 µs – Custom		Select the de-emphasis filter.
	Sample Size	– 2048 – 4096 – 8192 – 16384 – 32768 – 65536 – 131072 – 262144 – 524288 – 1M – 2M		Select the number of samples to be acquired for the measurement.
	Input Range	Auto Range	– On – Off	Enable or disable the auto input range.
		Track 1st Ch	– Enable – Disable	Enable or disable the tracking of the first channel.
		Voltage Range		Set the input voltage range.

Table A-33 Measurement settings > Measurement Recorder menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
– AC Level – Gain, Phase – THD+N Ratio – THD+N Level – DC Level – Frequency – SINAD				Refer to "**Graph**" on page 503 for the graph menu tree.

Voice Quality

Table A-34 Measurement settings > Voice Quality menu tree description

Tab	Level 1	Level 2	Level 3	Description
Voice Quality	Test Config (POLQA)	Test Standard	– POLQA – PESQ	Select the test standard.
		Analysis Mode	– Basic – Advanced	Select the POLQA analysis mode. Basic mode will load the reference and degraded wave files, and perform analysis automatically. Advanced mode will perform wave file playback and recording, and analysis automatically.
		Bandwidth	– Narrowband – Super WIdeband	Select the bandwidth type.
		Auto Lvl Align		Enable or disable the automatic level alignment.
		Auto Fs		Enable or disable the resampling of the input signals to a suitable sample rate. The sample rates for all narrow band mode and super wideband input files will be resampled to 8 kHz and 48 kHz respectively.
		Target Fs	– 8 kHz – 16 kHz – 48 kHz	Select the sample rate for narrowband. This setting is only applicable when the Bandwidth is Narrowband.
	Test Config (PESQ)	Test Standard	– POLQA – PESQ	Select the test standard.
		Analysis Mode	– Basic – Advanced	Select the PESQ analysis mode. Basic mode will load the reference and degraded wave files, and perform analysis automatically. Advanced mode will perform wave file playback and recording, and analysis automatically.
		Bandwidth	– Narrowband – WIdeband	Select the bandwidth type.
		Target Fs	– 8 kHz – 16 kHz	Select the sample rate for narrowband. This setting is only applicable when the Bandwidth is Narrowband.
	Playback File Path			Select the playback wave file source to be used. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree. This setting is only available when Analysis Mode is set to Basic.
	Degraded File Path			Select the degraded wave file source to be used. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree. This setting is only available when Analysis Mode is set to Basic.

Table A-34 Measurement settings > Voice Quality menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Voice Quality	Reference Source (This setting is only available when Analysis Mode is set to Advanced)	Source	– File – Generator	Select file or generator as the reference source.
		Playback File		Select the wave file source to be used. This setting is only available when Source is set to File.
		Playback Ch		Select the generator channel to play the reference file or waveform.
		Use PB as Ref	– Yes – No	Enable or disable playback as the reference file.
		Ref File from AA		Enable or disable reference file from analog analyzer.
		Ref File		Select the reference file.
		Save Rec File	– Yes – No	Enable or disable to save the recording file. This setting is only available when Ref File from AA is enabled.
		Record File		Select the record file. This setting is only available when Save Rec File is enabled.
		Recording Ch		Select the playback file or the recorded wave file from an analyzer channel as the reference file.
		Rec Duration		Set the recording duration used to record the playback wave file from an analyzer channel. This setting is only available when Recording Ch is set to analyzer channel.
		Auto Start Rec	– Yes – No	Enable or disable automatically start recording. This setting is only available when Save Rec File is enabled.
		Delay		Set the delay in seconds before a recording is performed after the generator is turned on. This setting is only available when Recording Ch is set to analyzer channel.
		Save to File	– Yes – No	Enable or disable automatically save the reference file. This setting is only available when Recording Ch is set to an analyzer channel.
		Save File Path		Set the location to save the reference file. This setting is only available when Save to File is enabled.

Table A-34 Measurement settings > Voice Quality menu tree description (continued)

Tab	Level 1	Level 2	Level 3	Description
Voice Quality	Degraded Source (This setting is only available when Analysis Mode is set to Advanced)	Source	– File – AA1 to AA8	Select the degraded wave file or an existing file to be recorded.
		Save Rec File	– Yes – No	Enable or disable to save the recording file. This setting is only available when Source is set to an analyzer channel.
		Rec Duration		Set the recording duration used to record the degraded wave file. This setting is only available when Source is set to an analyzer channel.
		Auto Start Rec	– Yes – No	Enable or disable automatically start recording. This setting is only available when Source is set to an analyzer channel.
		Delay		Set the delay in seconds before a recording is performed after the generator is turned on. This setting is only available when Source is set to an analyzer channel.
		Degraded File		Select the degraded wave file source to be used. This setting is only available when Source is set to File.
	IO Config	Output Level		Set the output level value.
		Input Range		Select the input range value.
Show/Hide POLQA License				Show or hide the POLQA license information.
– MOS- LQO – Levels				Refer to "**Bar chart**" on page 502 for the bar chart menu tree.

Measurement results

Bar chart

Table A-35 Measurement Results > Bar chart menu tree description

Level 1	Level 2	Level 3	Description
Enable			Enable or disable the selected result tab.
Add Result			Add a new result tab to the measurement.
Delete Result			Delete the selected result tab from the measurement.
Save Data			Save the selected result data to a CSV file format in the internal storage or external USB flash storage. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
Edit Limits	Track 1st	– Enable – Disable	Enable or disable the tracking of the first trace.
	Lower limit	– Enable – Disable	Enable or disable the lower limit.
	Upper limit	– Enable – Disable	Enable or disable the upper limit.
	Lower limit		Set the lower limit value.
	Upper limit		Set the upper limit value.
Graph Properties	Title		Edit the bar chart title.
	X-axis	Auto Scale	Enable or disable the X-axis autoscale. On Off
		Unit	Select the X-axis unit type.
		Left	Set the X-axis left value. This setting is only available when the Autoscale is disabled.
		Right	Set the X-axis right value. This setting is only available when the Autoscale is disabled.

Graph

Table A-36 Measurement results > Graph menu tree description

Level 1	Level 2	Level 3	Description
Enable			Enable or disable the selected result tab.
Add Result			Add a new result tab to the measurement.
Delete Result			Delete the selected result tab from the measurement.
Save Data			Save the selected result data to a CSV file format in the internal storage or external USB flash storage. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.
Edit Limits	Trace	– CH1 to CH8 – POLQA – Reference – Degraded – Error	Select the trace channel number or the trace type (POLQA)
	Limit Type	– Upper – Lower	Select the limit type.
	Track 1st	– Enable – Disable	Enable or disable the tracking of the first trace.
	Limit	– Enable – Disable	Enable or disable the limit.
	Points	Point No	Set the point number.
		X	Set the X-axis value for the selected point number.
		Y	Set the Y-axis value for the selected point number.
		Add Point	Add a limit point.
		Remove Point	Remove the selected limit point.
		Clear Points	Clear all the limit points.
		Load Points	Load limit points from a file. Refer to "**Appendix K: Recall Menu Tree**" on page 448 for the recall menu tree.
Edit Limits	Points	Save Points	Save the selected limit points to a file. Refer to "**Appendix J: Save Menu Tree**" on page 447 for the save menu tree.

Table A-36 Measurement results > Graph menu tree description (continued)

Level 1	Level 2	Level 3	Description
Graph Properties	Title		Edit the graph title.
	X-axis	Auto Scale	Enable or disable the X-axis autoscale. – On – Off
		Spacing	Select the X-axis spacing type. – Log – Linear
		Unit	Select the X-axis unit type.
		Left	Set the X-axis left value. This setting is only available when the X-axis autoscale is disabled.
		Right	Set the X-axis right value. This setting is only available when the X-axis autoscale is disabled.
		Center	Set the X-axis center value. This setting is only available when the X-axis autoscale is disabled.
		Span	Set the X-axis span value. This setting is only available when the X-axis autoscale is disabled.
	Y-axis	Auto Scale	Enable or disable the Y-axis autoscale. – On – Off
		Spacing	Select the Y-axis spacing type. – Log – Linear
		Unit	Select the Y-axis unit type.
	Y-axis	Top	Set the Y-axis bottom value. This setting is only available when the Y-axis autoscale is disabled.
		Bottom	Set the Y-axis top value. This setting is only available when the Y-axis autoscale is disabled.
	Trace	Trace	Select the analyzer trace channel. – CH1 to CH8
		State	Enable or disable the trace. – On – Off
		Color	Select the trace color. – Yellow – Cyan – White – Pink – Green – Orange – Red – Purple

Table A-36 Measurement results > Graph menu tree description (continued)

Level 1	Level 2	Level 3	Description
Graph Properties (This is only applicable for POLQA measurement MOS-LQO and Delay results)	Title		Edit the graph title.
	Auto Scale	– On – Off	Enable or disable the X-axis autoscale.
	Left		Set the X-axis left edge value. This setting is only available when the Autoscale is disabled.
	Right		Set the X-axis right edge value. This setting is only available when the Autoscale is disabled.
	Top		Set the X-axis top edge value. This setting is only available when the Autoscale is disabled.
	Bottom		Set the Y-axis bottom edge value. This setting is only available when the Autoscale is disabled.

Appendix M: HP8903B Menu Tree

Table A-37 HP8903B menu tree description

Level 1	Level 2	Level 3	Description
Measurement	Function	– AC LEVEL – SINAD – DISTN – DC LEVEL – SIG / NOISE – DISTN LEVEL	Select the HP8903B measurement mode.
	LP Filter	– None – 30 kHz – 80 kHz	Select the HP8903B measurement low-pass filter value.
	HP/W Filter		Select the HP8903B high-pass or weighting filter value. The filter selection depends on the left and right filters set at **HP8903B Config**.
	Reference		Set the reference value to be compared with the measured value in ratio mode. Changing the reference value will enable the measurement ratio mode.
	Ratio	– On – Off	Enable or disable the HP8903B measurement ratio mode.
	Format	– Log – Lin	Select the HP8903B measurement format type.
Generator	Frequency		Set the HP8903B generator frequency value. Changing the frequency value will also set the step parameter to frequency.
	Amplitude		Set the HP8903B generator amplitude value. Changing the amplitude value will also set the step parameter to amplitude.
	Step Param	– Frequency – Amplitude	Select the HP8903B generator step parameter type.
Generator	Freq. Step		Set the HP8903B generator frequency step value. This setting is only available when the step parameter is set to frequency.
	Amp. Step		Set the HP8903B generator amplitude step value. This setting is only available when the step parameter is set to amplitude.
	x 10		Multiply the current parameter step value by 10.
	÷ 10		Divide the current parameter step value by 10.
Sweep	Freq. Start		Set the HP8903B sweep frequency start value.
	Freq. Stop		Set the HP8903B sweep frequency stop value.
	Sweep Status	– On – Off	Start or abort sweeping in the HP8903B mode.

Table A-37 HP8903B menu tree description (continued)

Level 1	Level 2	Level 3	Description
Code List	– None – Input Level Range (except DC Level) – Input Level Range (DC Level only) – Post Notch Detector Response (except in SINAD) – Display Source Settings – Re-enter Ratio Mode – Signal-to-Noise Measurement Delay – SINAD and Signal-to-Noise Display Resolution – Sweep Resolution (maximum 255 points/ sweep) – Display Level in Watts – Read Display to SCPI – GPIB Address (SCPI only) – GPIB Service Request Condition (SCPI only) – Source Output Impedance (Instrument powers up at 600 Ω)		Select the HP8903B special function codes list to be displayed.
SPCL			Set the HP8903B special function code except those indicated as SCPI only and execute the special function.

Appendix N: Units of the Measurement Function Returned Values

Analog analyzer

Table A-38 Analog analyzer units of the meaurement function returned values

Measurement function	Unit	Default
Frequency	– Hz – ΔHz	Hz
AC voltage THD+N level THD level	– dBg – dBm – dBr – dBu – dBV – W – V – ΔV – dBSPL – x	V
DC voltage	– V – ΔV – x	V
THD+N ratio SINAD THD ratio SMPTE IMD DFD IEC 60118 (2nd order) DFD IEC 60118 (3rd order) DFD IEC 60268 (2nd order) DFD IEC 60268 (3rd order) SNR SNR (Fast) Crosstalk	– dB – ΔdB – % – x	dB
Phase	°	°

Digital analyzer

Table A-39 Digital analyzer units of the meaurement function returned values

Measurement function	Unit	Default
Frequency	– Hz – ΔHz	Hz
AC voltage Max peak value Min peak value	– V – dBFS – dBr – dBu – dBV – FFS – x – pctFS – LSB – Hex – Dec	FFS
DC voltage	– FFS – V – Hex – x	FFS
THD+N level THD level	– V – dBFS – dBr – dBu – dBV – FFS – x – pctFS – LSB – Hex – Dec	dBFS
THD+N ratio SINAD SMPTE IMD DFD IEC 60118 (2nd order) DFD IEC 60118 (3rd order) DFD IEC 60268 (2nd order) DFD IEC 60268 (3rd order) Crosstalk (channel driven)	– dB – ΔdB – % – x	dB
Phase	°	°

The units can be computed using the following formulas.

Table A-40 Unit conversion formula

Unit	Formula	Description
ΔHz	$f - f_{ref}$	f_{ref} = Reference frequency
dB	$20 \times \log_{10}$ (ratio)	-
ΔdB	(ratio) – R_{ref}	R_{ref} = Reference ratio
dBg	$20 \times \log_{10}\left(\frac{V_{rms}^{2}}{V_{gen}}\right)$	V_{gen} = Amplitude of the generator signal for a corresponding channel
dBm	$10 \times \log_{10}\left(\frac{1000\ V_{rms}^{2}}{Z_{ref}}\right)$	Z_{ref} = Reference impedance
dBr	$20 \times \log_{10}\left(\frac{V_{rms}^{2}}{V_{ref}}\right)$	V_{ref} = Reference level
dBu	$20 \times \log_{10}\left(\frac{V_{rms}}{\sqrt{0.6}}\right)$	-
dBv	$20 \times \log_{10}(V_{rms})$	-
W	$\frac{V}{Z_{ref}}$	Z_{ref} = Reference impedance[a]
ΔV	$V - V_{ref}$	V_{ref} = Reference level[b]
x	$\frac{V}{V_{ref}}$ or $\frac{Ratio\ (in\ \%)}{R_{ref}\ (in\ \%)}$	V_{ref} = Reference level[b] R_{ref} = Reference ratio
%	$100 \times$ (ratio)	-

[a] When the Vrms measurement unit is changed to Watt or dBm, the reference impedance setting will be used for the power level calculation. The reference impedance refers to the circuitry impedance or load impedance connected to the analyzer when calculating power level. Note that in a loopback test with no load impedance, the measured voltage value will be twice the expected value as there is no voltage divider present. This will return a power measurement greater than 6.02 dB if a load is present.

[b] Reference level is defined as a user-entered or a captured value from the current reading as a relative level for the subsequent measurement reading. It can be set to delta, linear, or log scale.

Units for digital audio measurements

Table A-41 Units for digital audio measurements

Unit	Description
FFS	Fractional of Full Scale
%FS	Percent of Full Scale
dBFS	Decibels relative to Full Scale
LSB	Least Significant Bit
FS/Vrms	Ratio between cross-domain input and output levels measurements (analog input and digital output)
Vrms/FS	Ratio between cross-domain input and output levels measurements (digital input and analog output)

Appendix O: Arbitrary File Format

The U8903B arbitrary waveform mode allows you to load an arbitrary file or a wave file. To load waveform file for the analog arbitrary waveform, press the **Waveform Config** > **Recall** softkeys. The Recall menu page will be displayed to allow you to select the file to be loaded. Once you load the waveform file, press the **Info** softkey in the Waveform Config menu page to display the arbitrary waveform information as shown in **Figure A-1**.

Figure A-1 Analog Generator > Waveform Config > Info menu page (arbitrary waveform)

You may configure the arbitrary file format (*.arb) with the parameters as shown below.

```
#Vpeak: 2
#DC Offset: 0
#Points:
0
-0.2
-0.4
...
```

The allowable range of values for each arbitrary file parameters are as shown in **Table A-42**.

Table A-42 Allowable range for arbitrary file parameters

Parameter	Range
Vpeak	– 0 to 22.6 Vp (Balanced output connection) – 0 to 11.3 Vp (Unbalanced or common output connection)
DC Offset	–11.3 V to 11.3 V
Points	32 to 32768 points

NOTE

When the DC offset and amplitude are added together, it must not exceed the maximum voltage for the current output connection type:

- For the balanced output connection, (Vpeak + |DC offset|) must be within 0 V and 22.6 V.
- For the unbalanced and common mode output connections, (Vpeak + |DC offset|) must be within 0 V and 11.3 V.

The sampling rate for the arbitrary waveform is fixed at 312.5 kHz. Thus, the interval between samples is 3.2 μs (1/312.5).

For the following arbitrary file example, the highest numerical number of the sample points, which is 6, is output with the Vpeak. The other samples are level-controlled according to their ratio to the maximum.

```
#Vpeak: 2
#DC offset: -3
#Points:
0
-1
-1.5
-1
0
2
4
6
4
2
...
```

Any of the following conditions may cause an error or warning message to appear.

- Unable to load the sample points, as the points may not be a valid float.
- Summation of the Vpeak and DC offset exceeds the maximum voltage for the current output connection type.
- Invalid Vpeak and DC offset values.
- Total of sample points less than 32.
- The arbitrary file does not exist.

Appendix P: User-defined Filter File Format

Selecting Custom in either the low-pass, high-pass, or weighting filters menu enables you to load a user-defined filter file.

The available user-defined filter types are IIR (Infinite Impulse Response) and FIR (Finite Impulse Response). You need to specify the coefficients or sections as well as group delay for the respective filter type. Use the following examples to configure the filter file format. The file is saved in the *.juf format.

Example of an FIR filter file format is as follows.

```
#Type: FIR
#Delay: 250
#Coefficients:
0.00023394
-1.69E-05
-1.61E-05
-1.57E-05
…
```

The coefficients of the FIR filter are described as follows.

```
0.00023394      //A[0]
-1.69E-05       //A[1]
-1.61E-05       //A[2]
-1.57E-05       //A[3]
```

NOTE

The FIR filter transfer function, H(z), is defined as:

$H(z) = A[0] + A[1]z^{-1} + A[2]z^{-2} + A[3]z^{-3} + ...$

where z = complex variable

Example of an IIR filter file format is as follows.

```
#Type: IIR
#Delay: 250
#Sections:
0.02188812
1
-1.852219
0.9397715
1
2
1
0.02067037
1
-1.749171
0.8318526
1
2
1
…
```

The coefficients of the IIR filter are described as follows.

```
0.02188812      //Section 1: Gain1
1               //Section 1: A1[0]
-1.852219       //Section 1: A1[1]
0.9397715       //Section 1: A1[2]
1               //Section 1: B1[0]
2               //Section 1: B1[1]
1               //Section 1: B1[2]


[0.02067037     //Section 2: Gain2
1               //Section 2: A2[0]
-1.749171       //Section 2: A2[1]
0.8318526       //Section 2: A2[2]
1               //Section 2: B2[0]
2               //Section 2: B2[1]
1               //Section 2: B2[2]
```

where Ax = Denominator and Bx = Numerator

NOTE

The IIR filter transfer function, H(z), is defined as:

$$H(z) = \prod_{x=1}^{N} Gain_x \left(\frac{B_x[0] + B_x[1]z^{-1} + B_x[2]z^{-1}}{A_x[0] + A_x[1]z^{-1} + A_x[2]z^{-1}} \right)$$

where z = complex variable, N = number of sections, x = section number

You may set up to 256 coefficients for the FIR filter type, and up to 36 sections for the IIR filter. The number of FIR coefficients must not be less than four, while the minimum number of sections allowed for IIR is one (seven coefficients). The delay is specified in the form of samples and within the range of 0 to 65535.

Appendix Q: DSI Input and Output Interface

The DSI input and output interface uses the 25-pin female D-SUB connector. The pins assignment for the connector are shown in **Figure A-2** and **Table A-43**.

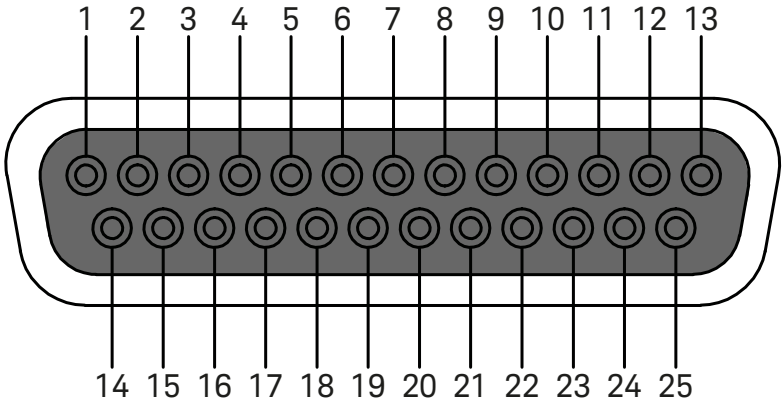


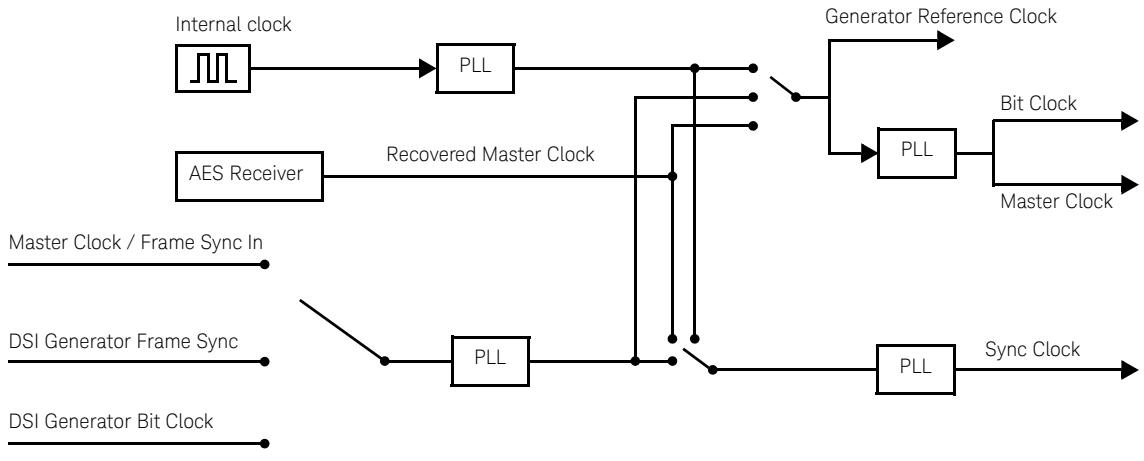
Figure A-2 25-pin female D-SUB connector

Table A-43 25-pin female D-SUB connector pins assignment

Pin no.	Label	Direction	Description
1	Master Clk Out	Out	Master clock out for digital audio
2	GND	–	Digital ground
3	DSI Gen Data-Out	Out	Digital generator DSI data output
4	DSI Gen FS-InOut	In/Out	DSI generator DSI frame sync
5	DSI Gen CLK-InOut	In/Out	DSI generator DSI bit clock
6	–	–	Unused
7	+5.0 V	–	+5.0 V supply with over-current protection
8	+3.3 V	–	+3.3 V supply with over-current protection
9	DSI Ana Data-In	In	Digital analyzer DSI data input
10	DSI Ana FS-InOut	In/Out	Digital analyzer DSI frame sync
11	DSI Ana Clk-InOut	In/Out	Digital analyzer DSI bit clock
12	GND	–	Digital ground
13	Sync Clock Out	Out	Sync clock output for AES3/SPDIF and DSI
14 – 25	GND	–	Digital ground

Appendix R: Digital System Clock Distribution Block Diagram

The digital system clock distribution block diagram is shown in **Figure A-3**.



PLL = Phase-Locked Loop

Figure A-3 Digital system clock distribution block diagram

Appendix S: Typical DSI Test Configurations

The following sections describe the possible serial audio input and output configurations.

NOTE Refer to "**Appendix Q: DSI Input and Output Interface**" on page 517 for more information on the pins assignment.

Configuration 1

In this configuration, the DUT uses the U8903B internal reference clock source as the reference clock. The DUT receives the clock references and data from the U8903B.

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode, and press Interface on the FUNCTION panel to switch to digital interface.

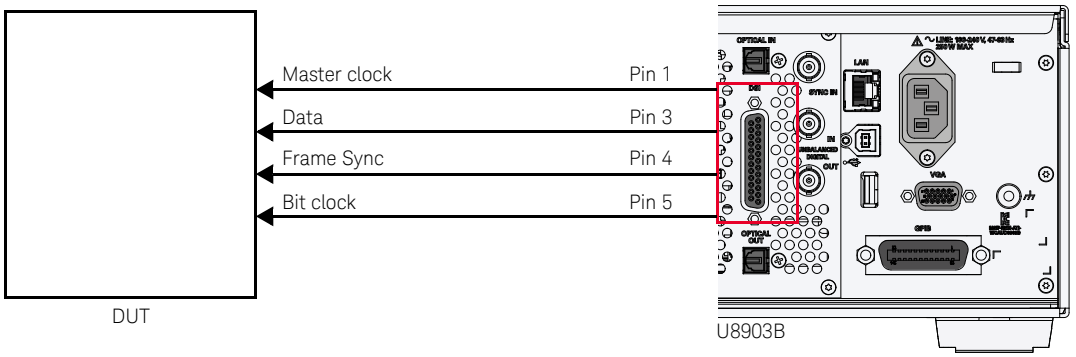


Figure A-4 DSI test configuration 1

1. At the digital generator, press **DSI Config** > **Master Clock**, and select **On** to enable the master clock.
2. At the digital generator, press **DSI Config** > **Sample Rate**, and set the sample rate.
3. At the digital generator, press **DSI Config** > **Word Length**, and set the word length. The bit clock rate is determined by the multiplication of the sample rate, word length, and number of channels.
4. At the digital generator, press **DSI Config** > **Multiplier**, and select the multiplier. The master clock rate is determined by the multiplication of the sample rate and multiplier.
5. At the digital generator, press **DSI Config** > **Fsync Polarity**, and select either **Rising** or **Falling** as the edge synchronization to the leading edge of the frame clock.

Configuration 2

In this configuration, the DUT uses an external master clock as the reference clock. The U8903B receives the data, frame sync, and bit clock from the DUT. A typical application for this configuration is analog to digital converter (ADC) evaluation.

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode, and press Interface on the FUNCTION panel to switch to digital interface.

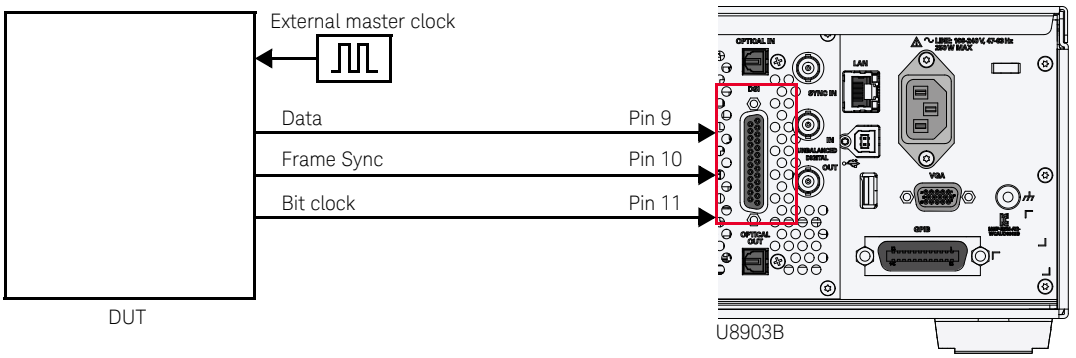


Figure A-5 DSI test configuration 2

1. At the digital analyzer, press **Input Config > Connector**, and select **DSI** as the digital analyzer input type.
2. At the digital generator, press **DSI Config > Master Clock**, and select **Off** to turn off the master clock.
3. At the digital analyzer, press **DSI Config > W/Bclk Dir**, and select **In** as the word and bit clock direction.

Configuration 3

In this configuration, an external master clock is used to synchronize the DUT and U8903B. A phase-locked loop (PLL) is used in the U8903B to lock the incoming master clock and regenerate the frame sync and bit clock. Data will be clocked in on each bit clock.

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode, and press Interface on the FUNCTION panel to switch to digital interface.

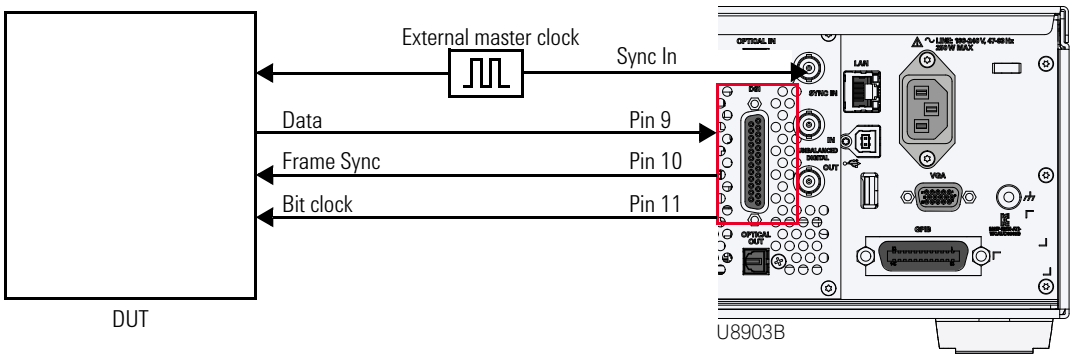


Figure A-6 DSI test configuration 3

1. At the digital analyzer, press **Input Config > Connector**, and select **DSI** as the digital analyzer input type.
2. At the digital generator, press **DSI Config > Master Clock**, and select **Off** to turn off the master clock.
3. At the digital analyzer, press **DSI Config > W/Bclk Dir**, and select **Out** as the word and bit clock direction.
4. At the digital generator, press **DSI Config > Multiplier**, and set the multiplier to determine the sampling rate.

Configuration 4

This configuration is similar to configuration 2, except that the DUT uses the U8903B internal reference clock source as the reference clock.

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode, and press Interface on the FUNCTION panel to switch to digital interface.

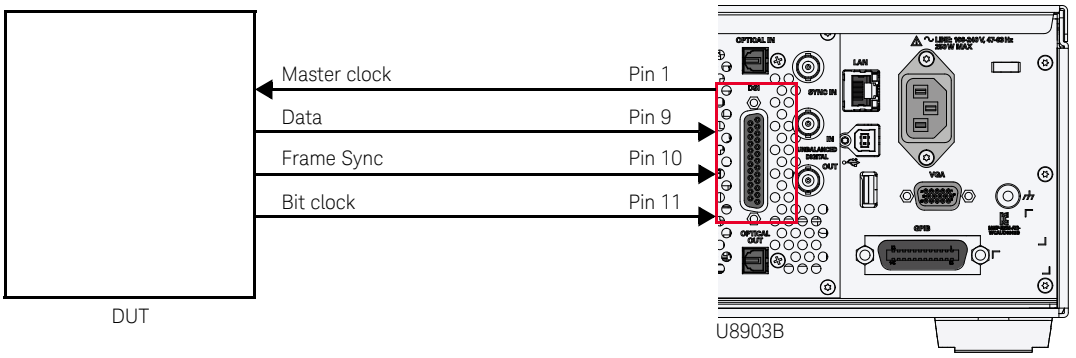


Figure A-7 DSI test configuration 4

1. At the digital analyzer, press **Input Config > Connector**, and select **DSI** as the digital analyzer input type.
2. At the digital generator, press **DSI Config > Master Clock**, and select **On** to turn on the master clock.
3. At the digital analyzer, press **DSI Config > W/Bclk Dir**, and select **In** as the word and bit clock direction.
4. At the digital generator, press **DSI Config > Sample Rate**, and set the sample rate.
5. At the digital generator, press **DSI Config > Multiplier**, and set the multiplier to determine the master clock rate.

Configuration 5

This configuration is similar to configuration 3, except that the DUT uses the U8903B internal reference clock source as the reference clock.

Press Generator Analyzer on the FUNCTION panel to switch between audio generator or audio analyzer mode, and press Interface on the FUNCTION panel to switch to digital interface.

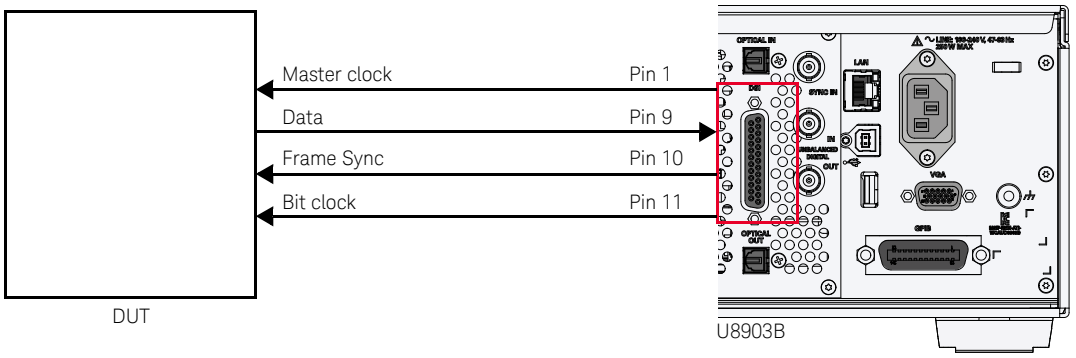


Figure A-8 DSI test configuration 5

1. Press **Input Config > Connector**, and select **DSI** as the digital analyzer input type.
2. At the digital generator, press **DSI Config > Master Clock**, and select **On** to turn on the master clock.
3. Press **DSI Config > W/Bclk Dir**, and select **Out** as the word and bit clock direction.

Appendix T: U8903B Configuration Examples

Example 1: Generating a sine waveform with the digital generator and measuring its voltage with the digital analyzer

In this example, you will learn how to generate a simple sine waveform from the U8903B digital generator and measure its voltage using the U8903B digital analyzer.

To generate a sine waveform from the digital unbalanced output with a frequency of 1 kHz and amplitude of 1 FFS, perform the following steps.

1 Connect the digital generator unbalanced output to the digital analyzer unbalanced input channel in the rear panel using a BNC cable.

2 Press 

on the FUNCTION panel to switch to audio generator mode, and press 

on the FUNCTION panel to switch to digital interface.

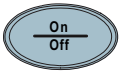
3 Press **Waveform**, and select **Sine** as the waveform type.

4 Press the **Output Config > Connector**, and select **Unbalanced** as the digital generator output type.

5 Press the **Output Config > AES Output**, and enable the AES output.

6 Press **Waveform Config > Frequency**, and set the frequency to 1 kHz.

7 Press **Waveform Config > Amplitude**, and set the amplitude to 1 FFS.

8 Press 

to start the signal generation on the digital generator channel 1.

9 After you have completed the steps above, the U8903B display should look as follows.

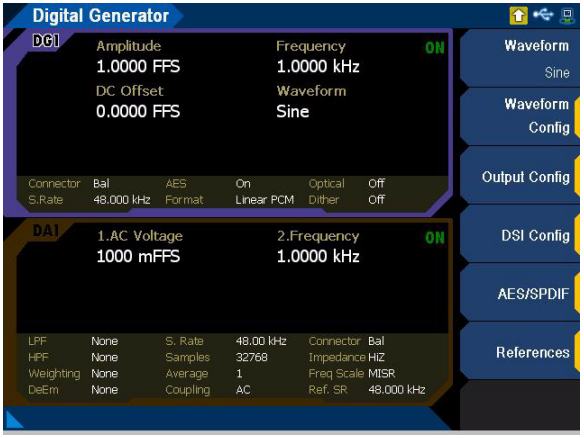


Figure A-9 Digital generator sine waveform generation

To measure the voltage of the sine waveform, perform the following steps.

1 Press 

on the FUNCTION panel to switch to audio analyzer mode, and press 

on the FUNCTION panel to switch to digital interface.

2 Press **Analysis Mode**, and select **Standard** as the digital analyzer analysis mode.

3 Press **Input Config > Connector**, and select **Unbalanced** as the digital analyzer input type.

4 Press **Functions > Function No.**, and select **1**.

5 Press **Functions > Function 1**, and select **Frequency** as the first measurement function.

6 Press **Functions> Function No.**, and select **2**.

7 Press **Functions > Function 2**, and select **AC Voltage** as the second measurement function.

8 Press 

to start the signal measurement on the digital analyzer channel 1.

You should now obtain an AC voltage reading of 1 FFS for the generated sine waveform, within the tolerance as stated in "**Specifications**" on page 371. The U8903B display should look as follows.

Figure A-10 Digital analyzer voltage measurement

Example 2: Configuring the System Clock Reference Settings

In this example, you will learn how to configure the U8903B system clock reference settings.

To configure the system clock reference source to external Master clock in with word length of 24 and multiplier of 192, perform the following steps.

1 Connect the external Master clock signal to the Sync In connector in the rear panel using a BNC cable.

2 Press 

on the FUNCTION panel to switch to audio generator mode, and press 

on the FUNCTION panel to switch to digital interface.

3 Press **Output Config > Ref Clock > Source**, and select **External** as the reference clock source.

4 Press **Output Config > Ref Clock > Type**, and select **MCLK** to set the external clock source type as Master clock.

5 Press **Output Config > Ref Clock > Word Length**, and set the Master clock word length to **24**.[1][2]

6 Press **Output Config > Ref Clock > Multiplier**, and set the Master clock multiplier to **192**.[3]

[1] Sampling rate constrains the master clock in word length values. Refer to "**Appendix W: Word Length, Sampling Rate, and Multiplier for Master Clock In**" on page 536 for the range of word length that can be set with different sampling rate.

[2] When setting the word length, the error message, –221,"Settings conflict..." may be generated. This error message can be ignored as this is to notify that the word length or multiplier is auto adjusted to the nearest allowable value due to the settings conflict.

[3] Sampling rate and word length constrain the multiplier values. Refer to "**Appendix W: Word Length, Sampling Rate, and Multiplier for Master Clock In**" on page 536 for the range of multiplier that can be set with different master clock in word length and sampling rate.

Example 3: Configuring the Digital Generator DSI Output Settings

In this example, you will learn how to configure the U8903B digital generator DSI output settings.

To configure the digital generator DSI output settings to DSP format, sampling rate of 192 kHz, word length of 24, and multiplier of 192, perform the following steps.

1 Press 

on the FUNCTION panel to switch to audio generator mode, and press 

on the FUNCTION panel to switch to digital interface.

2 Press **DSI Config > Format**, and select **DSP** as the DSI output format.

3 Press **DSI Config > Sample Rate**, and set the sampling rate to **192 kHz**.

4 Press **DSI Config > Word Length**, and set the DSI word length to **24**.[1][2]

5 Press **DSI Config > Multiplier**, and set the DSI multiplier to **192**.[3]

[1] Sampling rate constrains the DSI word length values. Refer to "**Appendix V: Word Length, Sampling Rate, and Multiplier for DSI**" on page 530 for the range of word length that can be set with different sampling rate.

[2] When setting the word length, the error message, –221,"Settings conflict..." may be generated. This error message can be ignored as this is to notify that the word length or multiplier is auto adjusted to the nearest allowable value due to the settings conflict.

[3] Sampling rate and word length constrain the multiplier values. Refer to "**Appendix V: Word Length, Sampling Rate, and Multiplier for DSI**" on page 530 for the range of multiplier that can be set with different DSI word length and sampling rate.

Appendix U: Relationship between Digital Waveform Parameters and Channels

Table A-44 Relationship between digital waveform parameters and channels

Waveform	Parameter	Channel
Sine	Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 can be different
	DC Offset	Channel 1 and Channel 2 are the same
Stereo	Frequency	Channel 1 and Channel 2 can be different
	Amplitude	Channel 1 and Channel 2 can be different
	DC Offset	Channel 1 and Channel 2 are the same
Square	Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 can be different
	DC Offset	Channel 1 and Channel 2 are the same
Sine burst	Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 can be different
	Burst On	Channel 1 and Channel 2 are the same
	Period	Channel 1 and Channel 2 are the same
	Low Level	Channel 1 and Channel 2 are the same
Variable phase	Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 can be different
	Phase ⟶ 1	Channel 1 and Channel 2 are the same
Dual	Frequency 1	Channel 1 and Channel 2 are the same
	Frequency 2	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 are the same
	Ratio	Channel 1 and Channel 2 are the same
	DC Offset	Channel 1 and Channel 2 are the same
SMPTE IMD 1:1/ 4:1/ 10:1	Lower Frequency	Channel 1 and Channel 2 are the same
	Upper Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 are the same
	DC Offset	Channel 1 and Channel 2 are the same
DFD IEC 60118	Difference Frequency	Channel 1 and Channel 2 are the same
	Upper Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 are the same
	DC Offset	Channel 1 and Channel 2 are the same
DFD IEC 60268	Difference Frequency	Channel 1 and Channel 2 are the same
	Center Frequency	Channel 1 and Channel 2 are the same
	Amplitude	Channel 1 and Channel 2 are the same
	DC Offset	Channel 1 and Channel 2 are the same
Gaussian/Rectangular/ Triangular/Pink	Amplitude	Channel 1 and Channel 2 can be different
	DC Offset	Channel 1 and Channel 2 are the same
Constant	Amplitude	Channel 1 and Channel 2 are the same

Table A-44 Relationship between digital waveform parameters and channels (continued)

Waveform	Parameter	Channel
Multitone	Amplitude	Channel 1 and Channel 2 can be different
	Start Frequency	Channel 1 and Channel 2 are the same
	Stop Frequency	Channel 1 and Channel 2 are the same
	Frequency Spacing	Channel 1 and Channel 2 are the same
	Count	Channel 1 and Channel 2 are the same
	Crest Factor	Channel 1 and Channel 2 can be different
	Tone Frequency	Channel 1 and Channel 2 are the same
	Tone Amplitude	Channel 1 and Channel 2 are the same
	Tone Phase	Channel 1 and Channel 2 are the same
Arbitrary	Amplitude	Channel 1 and Channel 2 can be different
	DC Offset	Channel 1 and Channel 2 are the same

Appendix V: Word Length, Sampling Rate, and Multiplier for DSI

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI

≤ Sampling rate (kHz)[a]	Word length	Multiplier
400	8	128
400	9	72, 144
400	10	80, 160
400	11	88, 176
400	12	96, 192
400	13	104, 208
400	14	112, 224
400	15	120, 240
400	16	64, 128
400	17	68, 136
400	18	72, 144
400	19	76, 152
400	20	80, 160
400	21	84, 168
400	22	88, 176
400	23	92, 184
400	24	96, 192
400	25	100, 200
400	26	104, 208
400	27	108, 216
400	28	112, 224
400	29	116, 232
400	30	120, 240
400	31	124, 248
400	32	128
200	8	128, 256
200	9	72, 144, 288
200	10	80, 160, 320
200	11	88, 176, 352
200	12	96, 192, 384
200	13	104, 208, 416

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
200	14	112, 224, 448
200	15	120, 240, 480
200	16	64, 128, 256
200	17	68, 136, 272
200	18	72, 144, 288
200	19	76, 152, 304
200	20	80, 160, 320
200	21	84, 168, 336
200	22	88, 176, 352
200	23	92, 184, 368
200	24	96, 192, 384
200	25	100, 200, 400
200	26	104, 208, 416
200	27	108, 216, 432
200	28	112, 224, 448
200	29	116, 232, 464
200	30	120, 240, 480
200	31	124, 248, 496
200	32	128, 256
100	8	128, 256, 512
100	9	72, 144, 288, 576
100	10	80, 160, 320, 640
100	11	88, 176, 352, 704
100	12	96, 192, 384, 768
100	13	104, 208, 416, 832
100	14	112, 224, 448, 896
100	15	120, 240, 480, 960
100	16	64, 128, 256, 512
100	17	68, 136, 272, 544
100	18	72, 144, 288, 576
100	19	76, 152, 304, 608
100	20	80, 160, 320, 640
100	21	84, 168, 336, 672

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
100	22	88, 176, 352, 704
100	23	92, 184, 368, 736
100	24	96, 192, 384, 768
100	25	100, 200, 400, 800
100	26	104, 208, 416, 832
100	27	108, 216, 432, 864
100	28	112, 224, 448, 896
100	29	116, 232, 464, 928
100	30	120, 240, 480, 960
100	31	124, 248, 496, 992
100	32	128, 256, 512
50	8	128, 256, 512, 1024
50	9	72, 144, 288, 576
50	10	80, 160, 320, 640
50	11	88, 176, 352, 704
50	12	96, 192, 384, 768
50	13	104, 208, 416, 832
50	14	112, 224, 448, 896
50	15	120, 240, 480, 960
50	16	64, 128, 256, 512
50	17	68, 136, 272, 544
50	18	72, 144, 288, 576
50	19	76, 152, 304, 608
50	20	80, 160, 320, 640
50	21	84, 168, 336, 672
50	22	88, 176, 352, 704
50	23	92, 184, 368, 736
50	24	96, 192, 384, 768
50	25	100, 200, 400, 800
50	26	104, 208, 416, 832
50	27	108, 216, 432, 864
50	28	112, 224, 448, 896
50	29	116, 232, 464, 928

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
50	30	120, 240, 480, 960
50	31	124, 248, 496, 992
50	32	128, 256, 512, 1024
25	8	128, 256, 512, 1024
25	9	72, 144, 288, 576
25	10	80, 160, 320, 640
25	11	88, 176, 352, 704
25	12	96, 192, 384, 768
25	13	104, 208, 416, 832
25	14	112, 224, 448, 896
25	15	120, 240, 480, 960
25	16	64, 128, 256, 512
25	17	68, 136, 272, 544
25	18	72, 144, 288, 576
25	19	76, 152, 304, 608
25	20	80, 160, 320, 640
25	21	84, 168, 336, 672
25	22	88, 176, 352, 704
25	23	92, 184, 368, 736
25	24	96, 192, 384, 768
25	25	100, 200, 400, 800
25	26	104, 208, 416, 832
25	27	108, 216, 432, 864
25	28	112, 224, 448, 896
25	29	116, 232, 464, 928
25	30	120, 240, 480, 960
25	31	124, 248, 496, 992
25	32	128, 256, 512, 1024
12.5	8	128, 256, 512, 1024
12.5	9	72, 144, 288, 576
12.5	10	80, 160, 320, 640
12.5	11	88, 176, 352, 704
12.5	12	96, 192, 384, 768

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
12.5	13	104, 208, 416, 832
12.5	14	112, 224, 448, 896
12.5	15	120, 240, 480, 960
12.5	16	64, 128, 256, 512
12.5	17	68, 136, 272, 544
12.5	18	72, 144, 288, 576
12.5	19	76, 152, 304, 608
12.5	20	80, 160, 320, 640
12.5	21	84, 168, 336, 672
12.5	22	88, 176, 352, 704
12.5	23	92, 184, 368, 736
12.5	24	96, 192, 384, 768
12.5	25	100, 200, 400, 800
12.5	26	104, 208, 416, 832
12.5	27	108, 216, 432, 864
12.5	28	112, 224, 448, 896
12.5	29	116, 232, 464, 928
12.5	30	120, 240, 480, 960
12.5	31	124, 248, 496, 992
12.5	32	128, 256, 512, 1024
6.75	8	128, 256, 512, 1024
6.75	9	72, 144, 288, 576
6.75	10	80, 160, 320, 640
6.75	11	88, 176, 352, 704
6.75	12	96, 192, 384, 768
6.75	13	104, 208, 416, 832
6.75	14	112, 224, 448, 896
6.75	15	120, 240, 480, 960
6.75	16	128, 256, 512
6.75	17	136, 272, 544
6.75	18	144, 288, 576
6.75	19	152, 304, 608
6.75	20	160, 320, 640

Table A-45 Word Length, Sampling Rate, and Multiplier for DSI (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
6.75	21	168, 336, 672
6.75	22	176, 352, 704
6.75	23	184, 368, 736
6.75	24	192, 384, 768
6.75	25	200, 400, 800
6.75	26	208, 416, 832
6.75	27	216, 432, 864
6.75	28	224, 448, 896
6.75	29	116, 232, 464, 928
6.75	30	120, 240, 480, 960
6.75	31	124, 248, 496, 992
6.75	32	128, 256, 512, 1024

[a] For sampling rate less than or equal to.

Appendix W: Word Length, Sampling Rate, and Multiplier for Master Clock In

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In

≤ Sampling rate (kHz)[a]	Word length	Multiplier
400	8	64, 128
400	9	72, 144
400	10	80, 160
400	11	88
400	12	96
400	13	104
400	14	112
400	15	120
400	16	64, 128
400	17	68, 136
400	18	72, 144
400	19	76
400	20	80
400	21	84
400	22	88
400	23	92
400	24	96, 192
400	25	100
400	26	104
400	27	108
400	28	112
400	29	116
400	30	120
400	31	124
400	32	128
200	8	64, 128, 256
200	9	72, 144, 288
200	10	80, 160
200	11	88, 176
200	12	96, 192

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
200	13	104, 208
200	14	112, 224
200	15	120, 240
200	16	64, 128, 256
200	17	68, 136, 272
200	18	72, 144, 288
200	19	76, 152
200	20	80, 160
200	21	84, 168
200	22	88, 176
200	23	92, 184
200	24	96, 192
200	25	100, 200
200	26	104, 208
200	27	108, 216
200	28	112, 224
200	29	116, 232
200	30	120, 240
200	31	124, 248
200	32	128, 256
100	8	64, 128, 256, 512
100	9	72, 144, 288, 576
100	10	80, 160, 320
100	11	88, 176, 352
100	12	96, 192, 384
100	13	104, 208, 416
100	14	112, 224, 448
100	15	120, 240, 480
100	16	64, 128, 256, 512
100	17	68, 136, 272, 544
100	18	72, 144, 288, 576
100	19	76, 152, 304
100	20	80, 160, 320

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
100	21	84, 168, 336
100	22	88, 176, 352
100	23	92, 184, 368
100	24	96, 192, 384
100	25	100, 200, 400
100	26	104, 208, 416
100	27	108, 216, 432
100	28	112, 224, 448
100	29	116, 232, 464
100	30	120, 240, 480
100	31	124, 248, 496
100	32	128, 256, 512
50	8	64, 128, 256, 512
50	9	72, 144, 288, 576
50	10	80, 160, 320, 640
50	11	88, 176, 352, 704
50	12	95, 192, 384, 768
50	13	104, 208, 416, 832
50	14	112, 224, 448, 896
50	15	120, 240, 480, 960
50	16	64, 128, 256, 512
50	17	68, 136, 272, 544
50	18	72, 144, 288, 576
50	19	76, 152, 304, 608
50	20	80, 160, 320, 640
50	21	84, 168, 336, 672
50	22	88, 176, 352, 704
50	23	92, 184, 368, 736
50	24	96, 192, 384, 768
50	25	100, 200, 400, 800
50	26	104, 208, 416, 832
50	27	108, 216, 432, 864
50	28	112, 224, 448, 896

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
50	29	116, 232, 464, 928
50	30	120, 240, 480, 960
50	31	124, 248, 496, 992
50	32	128, 256, 512
25	8	64, 128, 256, 512
25	9	72, 144, 288, 576
25	10	80, 160, 320, 640
25	11	88, 176, 352, 704
25	12	96, 192, 384, 768
25	13	104, 208, 416, 832
25	14	112, 224, 448, 896
25	15	120, 240, 480, 960
25	16	64, 128, 256, 512
25	17	136, 272, 544
25	18	72, 144, 288, 576
25	19	152, 304, 608
25	20	80, 160, 320, 640
25	21	168, 336, 672
25	22	88, 176, 352, 704
25	23	184, 368, 736
25	24	96, 192, 384, 768
25	25	200, 400, 800
25	26	104, 208, 416, 832
25	27	216, 432, 864
25	28	112, 224, 448, 896
25	29	232, 464, 928
25	30	120, 240, 480, 960
25	31	248, 496, 992
25	32	128, 256, 512
12.5	8	64, 128, 256, 512
12.5	9	144, 288, 576
12.5	10	80, 160, 320, 640
12.5	11	176, 352, 704

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
12.5	12	96, 192, 384, 768
12.5	13	208, 416, 832
12.5	14	112, 224, 448, 896
12.5	15	240, 480, 960
12.5	16	64, 128, 256, 512
12.5	17	272, 544
12.5	18	144, 288, 576
12.5	19	304, 608
12.5	20	160, 320, 640
12.5	21	336, 672
12.5	22	176, 352, 704
12.5	23	368, 736
12.5	24	192, 384, 768
12.5	25	400, 800
12.5	26	208, 416, 832
12.5	27	432, 864
12.5	28	224, 448, 896
12.5	29	464, 928
12.5	30	240, 480, 960
12.5	31	496, 992
12.5	32	128, 256, 512
6.75	8	64, 128, 256, 512
6.75	9	288, 576
6.75	10	160, 320, 640
6.75	11	352, 704
6.75	12	192, 384, 768
6.75	13	416, 832
6.75	14	224, 448, 896
6.75	15	480, 960
6.75	16	64, 128, 256, 512
6.75	17	544
6.75	18	288, 576
6.75	19	608

Table A-46 Word Length, Sampling Rate, and Multiplier for Master Clock In (continued)

≤ Sampling rate (kHz)[a]	Word length	Multiplier
6.75	20	320, 640
6.75	21	672
6.75	22	352, 704
6.75	23	736
6.75	24	384, 768
6.75	25	800
6.75	26	416, 832
6.75	27	864
6.75	28	448, 896
6.75	29	928
6.75	30	480, 960
6.75	31	992
6.75	32	128, 256, 512

[a] For sampling rate less than or equal to.

Appendix X: U8903B Default Settings

Analog generator

Table A-47 Analog generator default settings

Level 1	Level 2	Level 3	Default
Waveform			Sine
Waveform Config	Amplitude		0 Vrms
	Frequency		1 kHz
	DC Offset		0 V
	Phase -> 1		0°
	Frequency 2		2 kHz
	Ratio		100%
	Lower Feq		60 Hz
	Upper Freq (SMPTE 1:1/4:1/10:1)		7 kHz
	Upper Freq (IEC 60118)		10 kHz
	Diff Freq		80 Hz
	Center Freq		10 kHz
	Voltage		0 V
	Start Freq		1001.35803222656
	Stop Freq		4997.25341796875
	Freq Spacing		Linear
	Tones		2
	Length		1024
	Dial (DTMF)	Mode	Single
	Amplitude (DTMF)		–4.5 dBu
	Ratio (DTMF)		2 dB
	Tone Duration (DTMF)		90 ms
	Tone Delay (DTMF)		90 ms
	Pause Time (DTMF)		90 ms
	Repeat (DTMF)		Off

Table A-47 Analog generator default settings (continued)

Level 1	Level 2	Level 3	Default
Output Config	Connector		UnBal
	Impedance		600 Ω
	IEC60268 10 Ω		Pin 2
	Ground		Float
	Max Voltage		22.6 Vrms
References	Ref Impedance		600 Ω

Analog analyzer

Table A-48 Analog analyzer default settings

Level 1	Level 2	Level 3	Default
Functions	Multi-Chn Mode		Off
	Function No.		1
	Meas. Func. (Function 1)		AC Voltage
	Meas. Func. (Function 2)		Frequency
	Meas. Func. (Function 3)		None
	Meas. Func. (Function 4)		None
Functions (Frequency)	Unit		Hz
	Format		Off
Functions (AC Voltage)	Unit		V
	Format		Off
	Detector		RMS
Functions (DC Voltage)	Unit		V
	Format		Off
Functions (THD+N Ratio/SINAD)	Unit		dB
	Format		Off
	Freq Lock		Auto
	Fund Freq		1000
Functions (THD+N Level)	Unit		V
	Format		Off
	Freq Lock		Auto
	Fund Freq		1000

Table A-48 Analog analyzer default settings (continued)

Level 1	Level 2	Level 3	Default
Functions (THD Ratio)	Unit		dB
	Format		Off
	Even Harmonic		2, 4, 6, 8
	Odd Harmonic		3, 5, 7, 9
	Freq Lock		Auto
	Fund Freq		1000
Functions (THD Level)	Unit		V
	Format		Off
	Even Harmonic		2, 4, 6, 8
	Odd Harmonic		3, 5, 7, 9
	Freq Lock		Auto
	Fund Freq		1000
Functions (DFD60268 2nd/ DFD 60268 3rd/ DFD 60118 2nd/ DFD 60118 3rd)	Unit		dB
	Format		Off
Functions (SMPTE IMD)	Unit		dB
	Format		Off
	Freq Lock		Gen Lock
	Upper Freq		60
	Lower Freq		7000
Functions (SNR)	Unit		dB
	Format		Off
	SNR Delay		0 ms
Functions (SNR (Fast))	Unit		dB
	Format		Off
	Freq Lock		Auto
	Fund Freq		1000
	Harmonics		5
Functions (Phase)	Ref. Channel		1
	Freq Lock		Auto
	Fund Freq		1000

Table A-48 Analog analyzer default settings (continued)

Level 1	Level 2	Level 3	Default
Functions (X-Talk)	Ref. Channel		1
	Unit		dB
	Format		Off
	Freq Lock		Auto
	Fund Freq		1000
Filters Config	LPF		None
	HPF		None
	Weighting		None
	Deemphasis		None
	Notch Filter	State	Disabled
		Center Freq	1000 Hz
		Bandwidth	500 Hz
Meas Config	Auto Range		On
	Range		1 V
	Sample Size		32768
	Average Points		1
	Src Channel		1
	Trigger Source		Free Run
	Trigger Edge		Rising
Input Config	Connector		UnBal
	Impedance		100 kΩ (Unbal) 200 kΩ (Bal)
	Coupling		AC
	Bandwidth		90 kHz
	Ext. Gain		0 dB
Wave File	Channel		Left
	Bits/Sample		8
	Duration		10 s
Statistics	Show Stats		Off
	No. of Reading		10
	Stat 1		Min
	Stat 2		Max
	Stat 3		Average

Sweep

Table A-49 Sweep default settings

Level 1	Level 2	Default
Legacy Status		Off
Parameter		Frequency
Points Settings	Spacing	Log
	Unit	Hz
	Start	20
	Stop	2000
	Step	1.268961003
	Points	30
Points Settings (Parameter = Amplitude)	Spacing	Linear
	Unit	Vrms
	Start	0.1
	Stop	1
	Step	0.031034483
	Points	30
Points Settings (Parameter = Phase)	Spacing	Linear
	Unit	°
	Start	0
	Stop	90
	Step	3.103448276
	Points	30
Dwell Time		0
Sweep Mode		Continuous
Channels	Source	1
	Measure	1

HP8903B

Table A-50 HP8903B default settings

Level 1	Level 2	Default
Measurement	Function	AC level
	LP Filter	80 kHz
	HP/W Filter	None
	Ratio	Off
	Format	Lin
Generator	Frequency	1 kHz
	Amplitude	0 V
	Step Param	Frequency
	Freq. Step	1 kHz
	Amp. Step	100 mVrms
Sweep	Freq. Start	20 Hz
	Freq. Stop	20 kHz

System

Table A-51 System default settings

Key	Level 1	Level 2	Default
System	HP8903B Config	Active Channel	1
		Left Filter	None
		Right Filter	None
		Default LPF	80 kHz

Appendix Y: Procedure to Rename, Copy, Move, and Delete Files

Renaming a file

1. In the file view, select the file to rename.
2. Press the **Rename** softkey.
3. Enter the new file name in the **New name** text box.
4. Press the **OK** softkey when done.
5. The selected file is renamed.

Copying a file

1. In the file view, navigate to the folder that contains the file to copy.
2. Press the **Copy or Move** softkey.
3. Press the **Mark** softkey to mark the file or multiple files to copy.
4. Navigate to the folder where the file is to be copied.
5. Press the **Copy Marked To Folder** softkey.
6. The marked file will be copied to the specified folder. Press the **Return** softkey when done.
7. If the file name to be copied already exists in the destination folder, the copied file name will be renamed to **Copy of [file name]**.

Moving a file

1. In the file view, navigate to the folder that contains the file to to move.
2. Press the **Copy or Move** softkey.
3. Press the **Mark** softkey to mark the file or multiple files to move.
4. Navigate to the folder where the file is to be moved.
5. Press the **Move Marked To Folder** softkey.
6. The marked file will be moved to the specified folder. Press the **Return** softkey when done.

Deleting a file

1. In the file view, select the file to delete.
2. Press the **Delete** softkey.
3. A dialog box will pop up prompting confirmation to delete the file. To delete the file, select **Yes** and press **Enter**. To abort, select **No** and press **Enter**.

Edition 1, November 2014

U8903-90045
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