

# Keysight Technologies U8903B Analog Audio Analyzer

## Demo Guide



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## Demonstration Preparation

The following hardware and license configurations on the Keysight Technologies, Inc. U8903B audio analyzer are required in order to perform the demonstrations provided in this application note:

Item	Notes
U8903B-STD option	Two analog generator channels plus two analog analyzer channels
N3431A option	1.5 MHz wide bandwidth
U8903B firmware revision	3.2.3.0 and above (Press the [System] button to check Firmware revision)
BNC cable	Optional to connect from generator to analyzer

In the demonstration instructions, keystrokes surrounded by [ ] represent front panel keys of the instruments, while keystrokes surrounded by { } represent soft-keys (refer to Figures 1a and 1b). The use of > indicates a series of keystrokes.



Figure 1a. Front panel hardkeys



1b. Functional softkeys

## Demo 1. Performing Basic Audio Measurements

### Objective

- Perform the basic audio measurement functions such as frequency, Vac, THD+N ratio, and SINAD. (A maximum of four measurement functions can be turned on and viewed on the U8903B front panel.)

Instructions	Keystrokes
Set the U8903B to its default settings	Press [Preset] Select {To Factory Settings} Select "Yes" by pressing [Enter] Select {Return}
Select the generator	Select the generator window by pressing [▼] or [▲] Press [1] to select generator AG1
Generate 1 kHz, 1 Vrms tone (see Figure 2)	Select {Waveform Config} > {Amplitude} Press [1] > {Vrms} > {Return} Toggle the [ON/OFF] button to ON Set the frequency to 1 kHz if needed (the default is 1 kHz) Select {Return}



Figure 2. 1 kHz, 1 Vrms generation

Instructions	Keystrokes
Set the analyzer to perform the four measurements	Highlight the analyzer window by pressing [▼] or [▲] Press [1] to select analyzer AA1
Set up measurement function No. 3	Select {Function} > {Function No} Press [▼] to select {3} > [Enter] Select {Meas Func} Use [▼] and select {THD+N Ratio} Select {Unit} > {%} > [Enter]
Set up measurement function No. 4	Select {Function} > {Function No} Press [▼] to select {4} > [Enter] Select {Meas Func} Use [▼] and select {SINAD} Press [Enter] Select {Return}
Set analyzer input (There are two options to do this)	
Option 1. Use a BNC cable	Connect Channel 1 on the generator to Channel 1 on the analyzer
Option 2. Loopback internally	Select {Input Config} > {Connector} > {Loopback} > [Enter] > {Return}
Turn on the analyzer channel	Toggle [ON/OFF] to ON
Refer to Figure 3 for results	

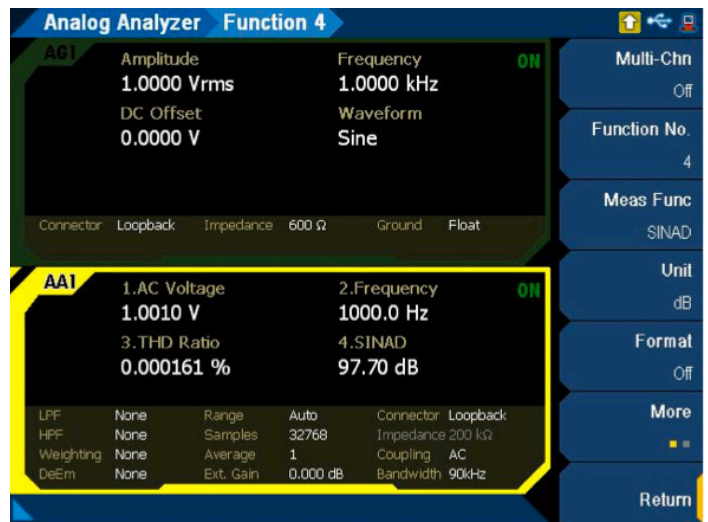


Figure 3. Analog analyzer measurement

## Demo 2. Generating a Frequency Response Plot Using the Sweep Function

### Objectives

- Plot a frequency response graph using the U8903B Sweep function.
- Use U8903B's capability to plot up to four different charts.

Instructions	Keystrokes
Go to the Sweep Function menu	Press [Sweep]
Set Channel setting	Use [▲] and select {Settings} Select {Channel} > {Source} > {1} > {Measure} > {1} > {Return}
Set the AG1	Use [▼] and select the AG window Ensure it is set to AG1, if not: Select {Waveform Config} > {Amplitude} > [1] > {Vrms} > {Return} Ensure the amplitude is set to 1 Vrms
Set the AA1	Use [▶] and select the AA window Ensure it is set to AA1, if not, press [1] Change Function 2 to THD level measurement Select {Function} > {Function No} Press [▼] and select 2 > [Enter] Select {Meas Func} Use [▼] and select {THD Level} Press [Enter] > {Return}
Start the sweep function	Toggle [ON/OFF] to ON
To view the various plot chart results	Select {Plot Settings} > {Y Data} Use [▼] or [▲] to select the required plot

### Notes

- Sweeping will start immediately and change to plot view when completed.
- Refer to Figures 4 to 7 for results.
- To get back to the plot view from the Sweep menu, select {Plot View}.

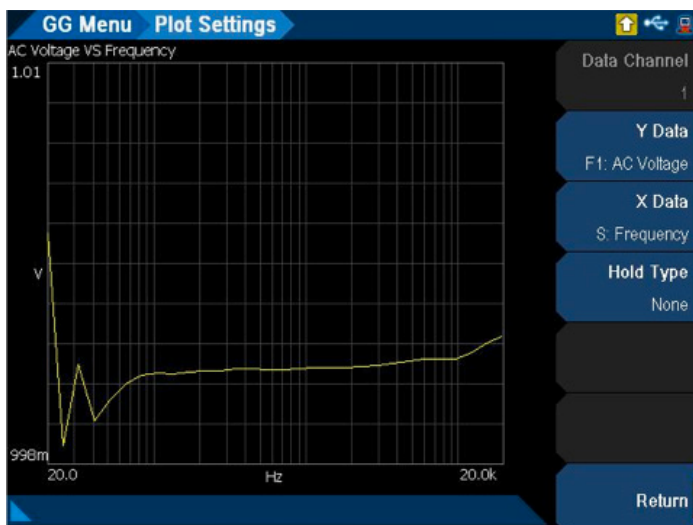


Figure 4. AC voltage vs. frequency

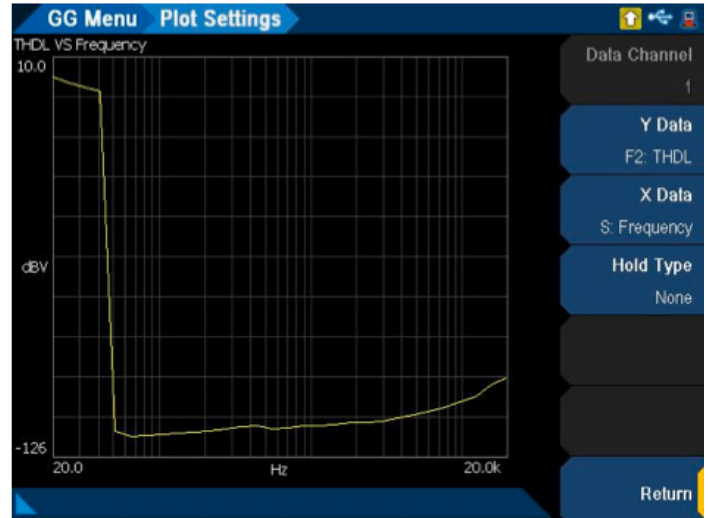


Figure 5. THD level vs. frequency

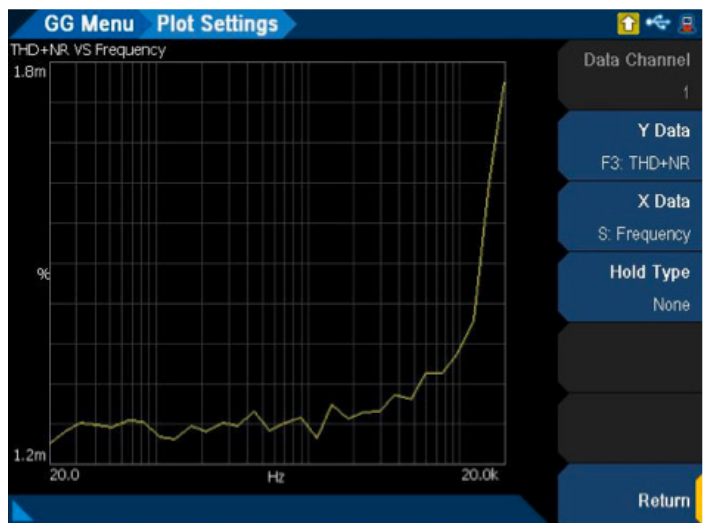


Figure 6. THD ratio (%) vs. frequency

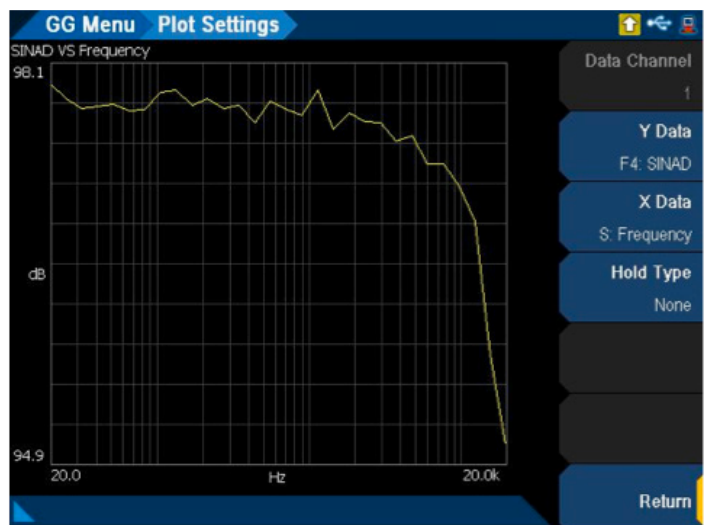


Figure 7. SINAD vs. frequency

## Demo 3. Performing Spectrum Analysis Using the FFT Graph Function and 1.5 MHz Bandwidth Option

### Objectives

- Use the FFT graph (frequency domain) functions and the 1.5 MHz analysis bandwidth option.
- Use the marker function to search to fundamental and harmonics.
- Use the zoom function.

Instructions	Keystrokes
Go back to the Standard View menu	Press [Menu] > {Standard View} or Press [Generator/Analyzer]
Turn on the AG1 and AA1	Select the AG1 window and toggle [ON/OFF] to ON Select the AA1 window and toggle [ON/OFF] to ON
Switch to Frequency Spectrum mode	Press [Graph] The FFT graph shown in Figure 8 should appear Toggle [On/Off] button to ON
Perform AutoScale (optional) to get the graph to properly fit into the display (Refer to Figures 8 and 9)	Press [Scale] > {AutoScale} > {Return}
Make peak measurement using the FFT graph	Press [Peak Search] > {Max Peak} Select {Return}

### Notes

- The M1 measurement result is shown in Figure 10.
- Trying to perform {Next Peak} might not yield result because the threshold upper limit setting is too high.

Instruction (optional)	Keystrokes
To reduce the upper threshold limit	Press [Peak Search] > {Threshold} Select {Peak Thes} > [+/-] > [1] > [3] > [0] > [Enter] Select {Return}

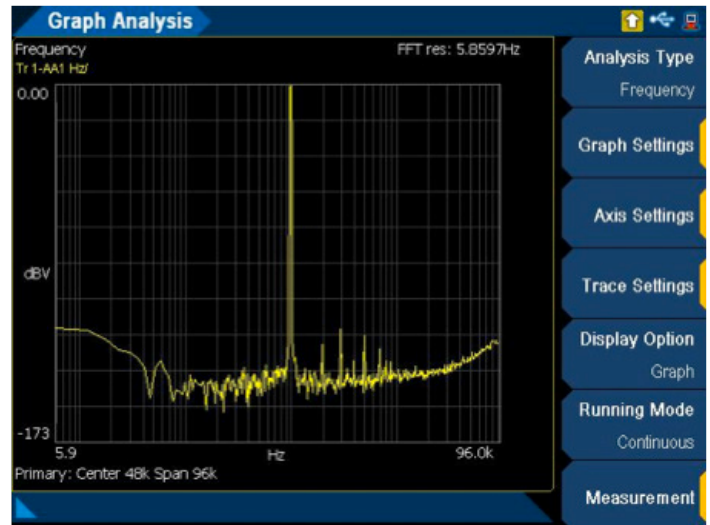


Figure 8. FFT plot (before AutoScale)

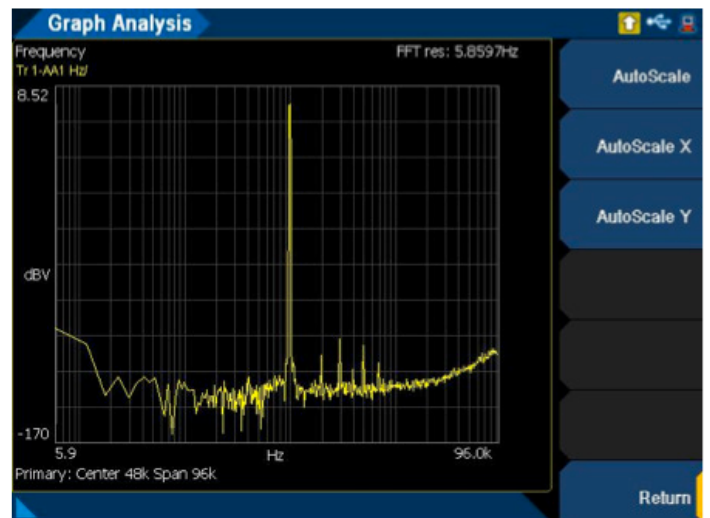


Figure 9. FFT plot (after AutoScale)

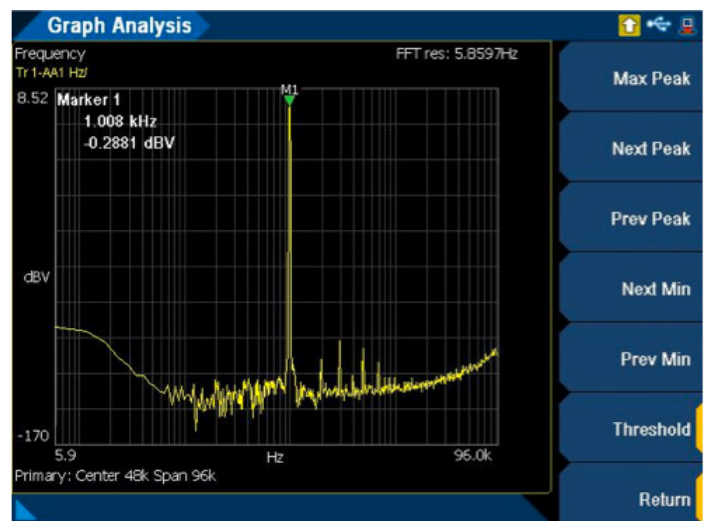


Figure 10. Peak search on FFT graph



Instructions	Keystrokes
Turn on the 1.5 MHz-wide analysis bandwidth to view more harmonics	Press [Generator/Analyzer] to go back to the Standard View menu Select the AA1 window > {Input Config} Select {Bandwidth} and change it to {1.5 MHz} (as shown in Figure 11)
Go back to FFT graph	Press [Graph]
Change the X axis (Frequency) to view	Select {Axis Settings} > {Right} > [1] > {MHz} > {Return}
Increase the FFT sample size for better resolution	Select {Graph Settings} > {Sample Size} > {524288} > {Return}

**Note**

- The acquisition rate will slow down after increasing the sample size (refer to Figures 12 and 13).

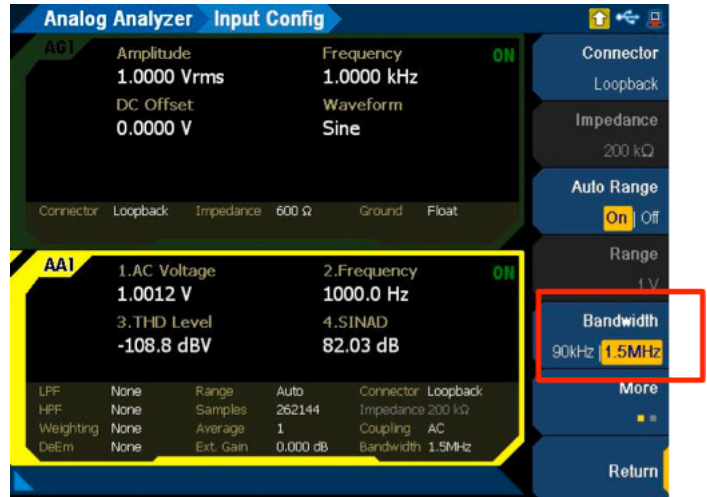


Figure 11. 1.5 MHz analysis bandwidth

Instructions	Keystrokes
Turn on the zoom function (shown in Figure 14)	Press [Zoom] Press [Shift] > [Zoom] to adjust the zoom window Turn the knob to adjust the zoom ratio (the size of the red square window) Use [▶] or [◀] to move the zoom window To go back to FFT graph press [Zoom]

**Note**

- 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.

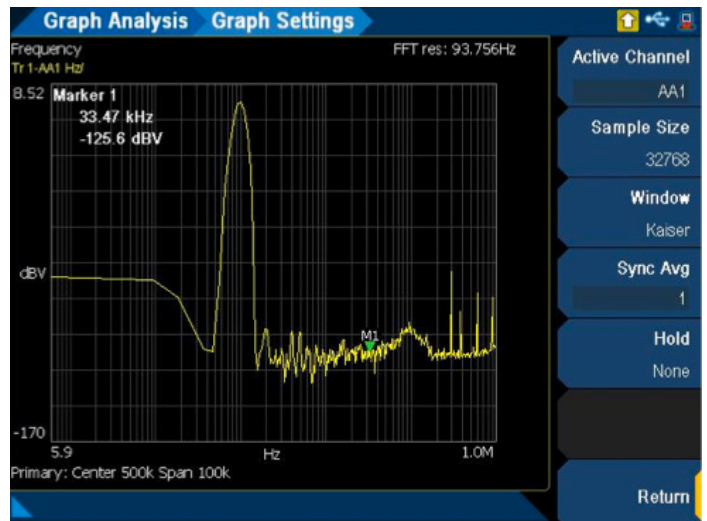


Figure 12. FFT with 32768 sample size



Figure 13. FFT with 524288 sample size

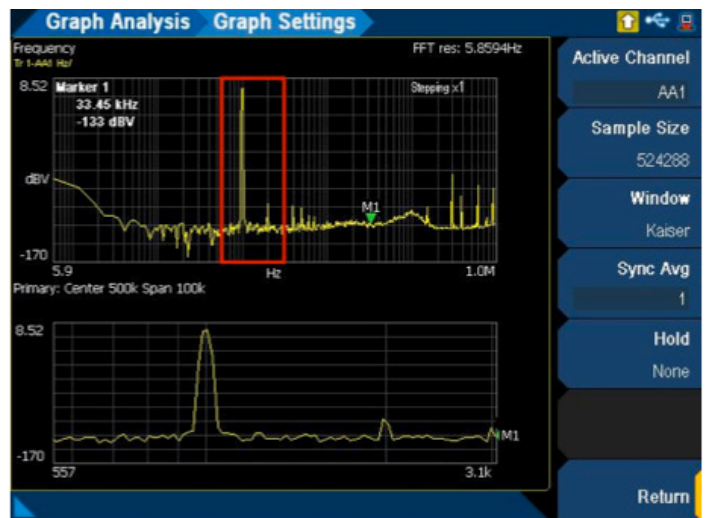


Figure 14. Zoom function and display

## Demo 4. Performing Combined Tests Using the Test Sequence Application (TSA)

### Objectives

- Use the TSA function to create a series (up to 20 test sequences) of automated audio measurements.
- Add and combine two tests and execute them in sequence without external programming scripts.
- Learn how to extract the test report and save it in a Microsoft Word file.

Instructions	Keystrokes
Go to the Test Sequence Application menu	Press [Menu] Use [▼] and select {Test Seq App}
Set the IO configuration	Use [▼] and select {IO Configuration} Press [Enter]
Set up Output configuration (Figure 15)	Use [▼] and select {Output Configuration} > {Channels} Use [▼] to select {1} > [Enter]
Set up Input configuration (Figure 15)	Use [▼] Select {Input Configuration} > {Channels} Use [▼] and select {1} Press [Enter] > {Connector} Use [▼] to change to {Loopback} Press [Enter] Select {Return} to go back to TSA main menu

Instructions	Keystrokes
Add frequency sweep measurement (shown in Figures 16 and 17)	Select {Return} to go to TSA main menu Select {Add Measurement} Use [▼] and select {Stepped Freq. Sweep} Press [Enter] or select {Settings} Select {Waveform Config} > {Amplitude} Press [1] > {Vrms} Press {Return} twice

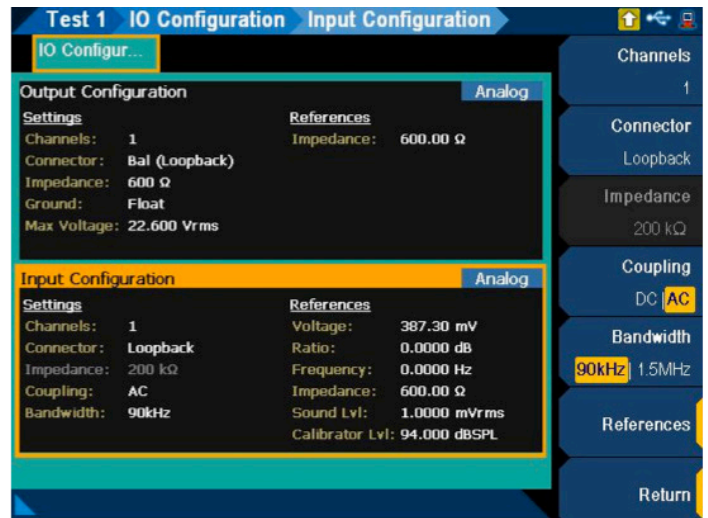


Figure 15. Output configuration (top) IO configuration (bottom)



Figure 16. Add stepped frequency sweep

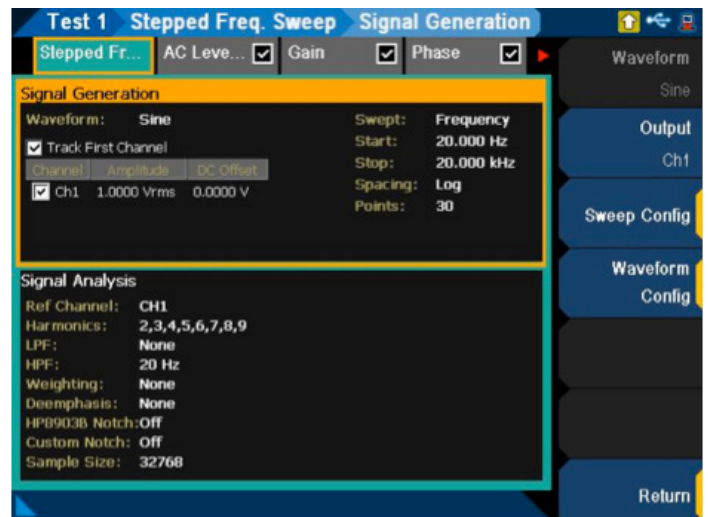


Figure 17. Stepped frequency sweep settings

Instructions	Keystrokes
Add stepped level sweep test sequence (shown in Figure 18)	Select {Return} to go to TSA main Select {Add Measurement} Use [▼] and select {Stepped Level Sweep} Select {Return} to go back to the TSA main

Instructions	Keystrokes
Start the TSA test sequence	Press the [ON/OFF] button Select the {Start Test App}

Instructions	Keystrokes
View the TSA test results	Select the required test item (Stepped Freq. Sweep) Press [Enter] Use [▶] or [◀] to scroll through the test results as shown in Figure 20

Instructions	Keystrokes
View the TSA test report summary	Select {Return} to go to TSA main Use [▲] or [▼] and select the {Report} tab Use [▶] or [◀] to scroll through the report pages as shown in Figure 21

Notes

- The TSA test report can be saved to an external data storage device such as a USB thumb drive.
- The TSA report can be saved in Microsoft Word format.



Figure 18. Add stepped level sweep

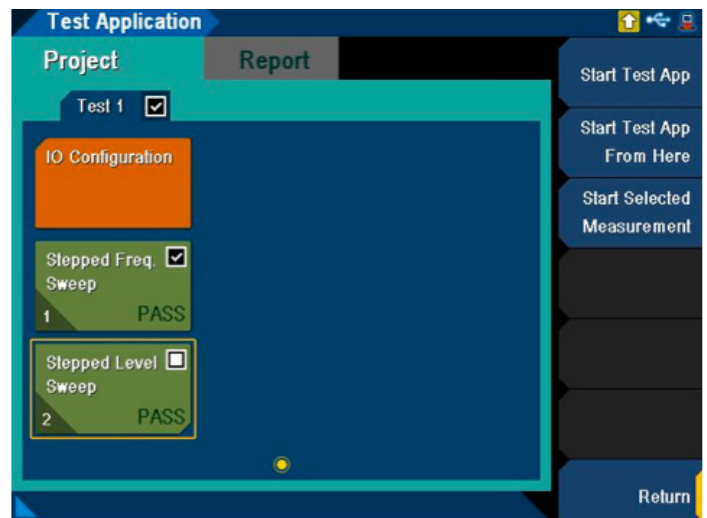


Figure 19. TSA test completed

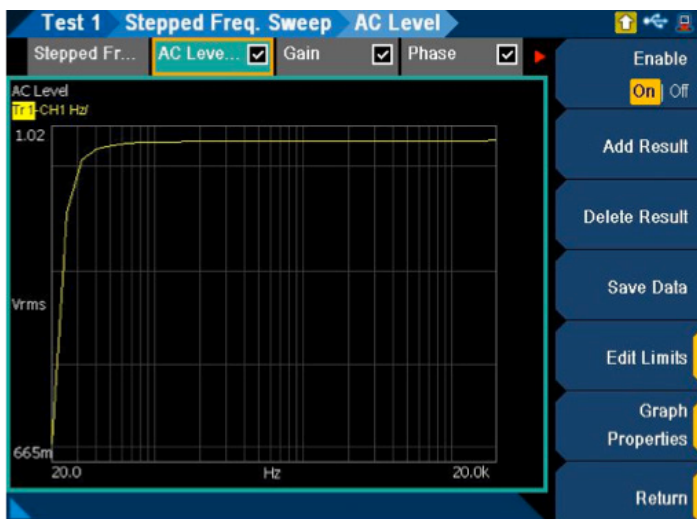


Figure 20. Stepped freq. sweep test results



Figure 22. TSA report



## Related Literature

*Keysight U8903B Performance Audio Analyzer*, configuration guide  
<http://literature.cdn.keysight.com/litweb/pdf/U8903-90055.pdf>

*Keysight U8903B Audio Analyzer*, user guide  
<http://literature.cdn.keysight.com/litweb/pdf/U8903-90045.pdf>

*Keysight U8903B Audio Analyzer*, data sheet  
<http://literature.cdn.keysight.com/litweb/pdf/5991-4551EN.pdf>

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