# Keysight Technologies
# Migrating from the U8903A to the New U8903B Performance Audio Analyzer

Selection Guide

U8903A audio analyzer

U8903B performance audio analyzer

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## Introduction

The Keysight Technologies, Inc. U8903B performance audio analyzer was introduced in 2014 as the successor model of the U8903A audio analyzer. Besides providing analog and digital audio generation and analysis functions, the U8903B has been enhanced with a new graphical user interface (GUI), features and improved measurement performance. This migration guide will compare these two audio analyzers and also explain the U8903B's added features and performance.

## Physical Appearance and Dimension

Both the U8903A and U8903B are equipped with generator and analyzer channels. The standard configuration instrument comes with two generator channels and two analyzer channels at the front panel, as shown in Figure 1. On the physical dimension, both models have the same width and height, so the U8903B can replace the U8903A on a test rack system. However, the new U8903B is 20 mm longer in depth.

| Model | Dimensions (W x D x H) |
|---|---|
| U8903A | 425.60 mm (16.76 in) × 405.00 mm (15.94 in) × 133.60 mm (5.25 in) |
| U8903B | 425.60 mm (16.76 in) × 425.00 mm (16.73 in) × 133.60 mm (5.25 in) |

U8903B- Front

U8903A - Front

U8903B - Back

U8903A - Back

Figure 1: U8903B and U8903A's physical outlooks

The look and feel of the U8903B and U8903A's front panels are very similar, as illustrated in Figure 2. The display, numerical keypad and function keys positions are the same for both models. However in the new U803B, there are slight layout changes on the Function/Mode, Graph and Systems keys.

As for the rear panel (Figure 3), the U8903B has new features such as optional analog analyzers which can be configured up to maximum of six additional channels. The U8903B's rear panel also contains the new and optional AUX and monitor channels. Lastly, the 25-pin D-SUB connectors for the U8903B have been changed to the female-type, whereas the connector in the U8903A remains as male-type.

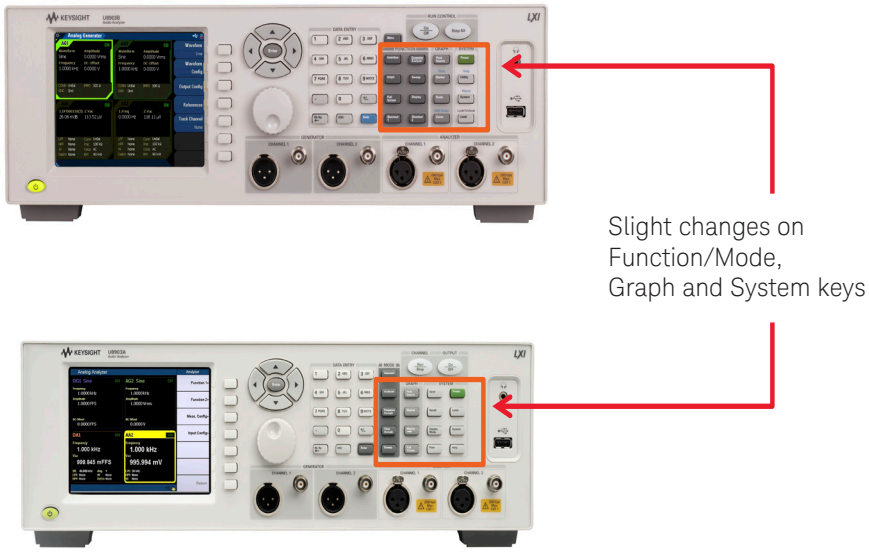


Figure 2: U8903A and U8903B front panel comparison

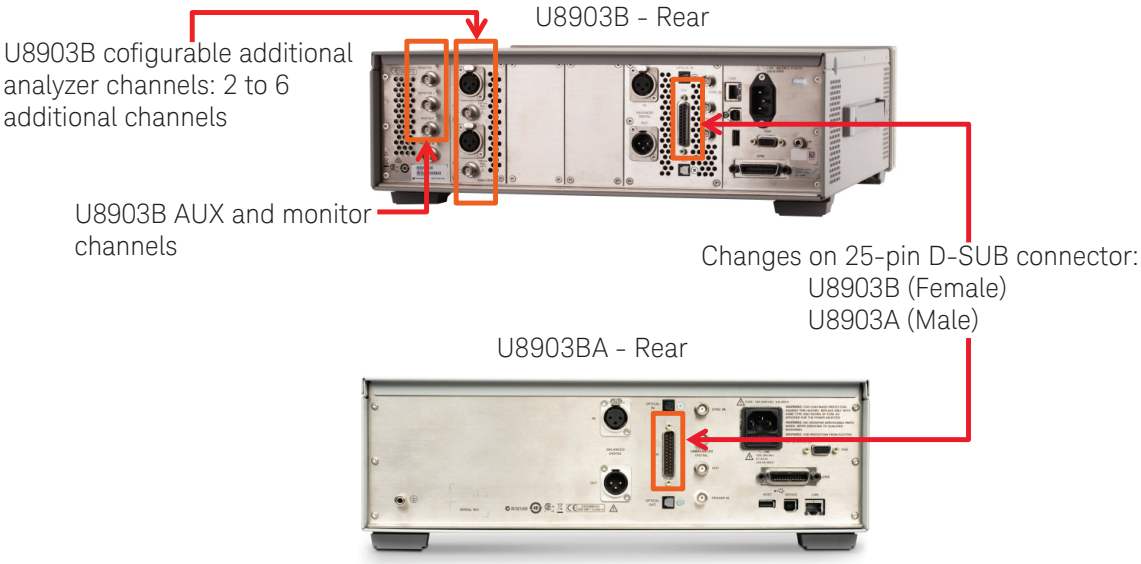


Figure 3: U8903A and U8903B rear panel comparison

There are also changes to the U8903B's graphic user interface (GUI), as illustrated in Figure 4. The U8903B audio analyzer is able to perform and display four real time measurement functions on its display. The U8903A, in comparison, only displays two measurement functions at a time. Both audio analyzers display the generator and analyzer channel settings at bottom of the GUI display.

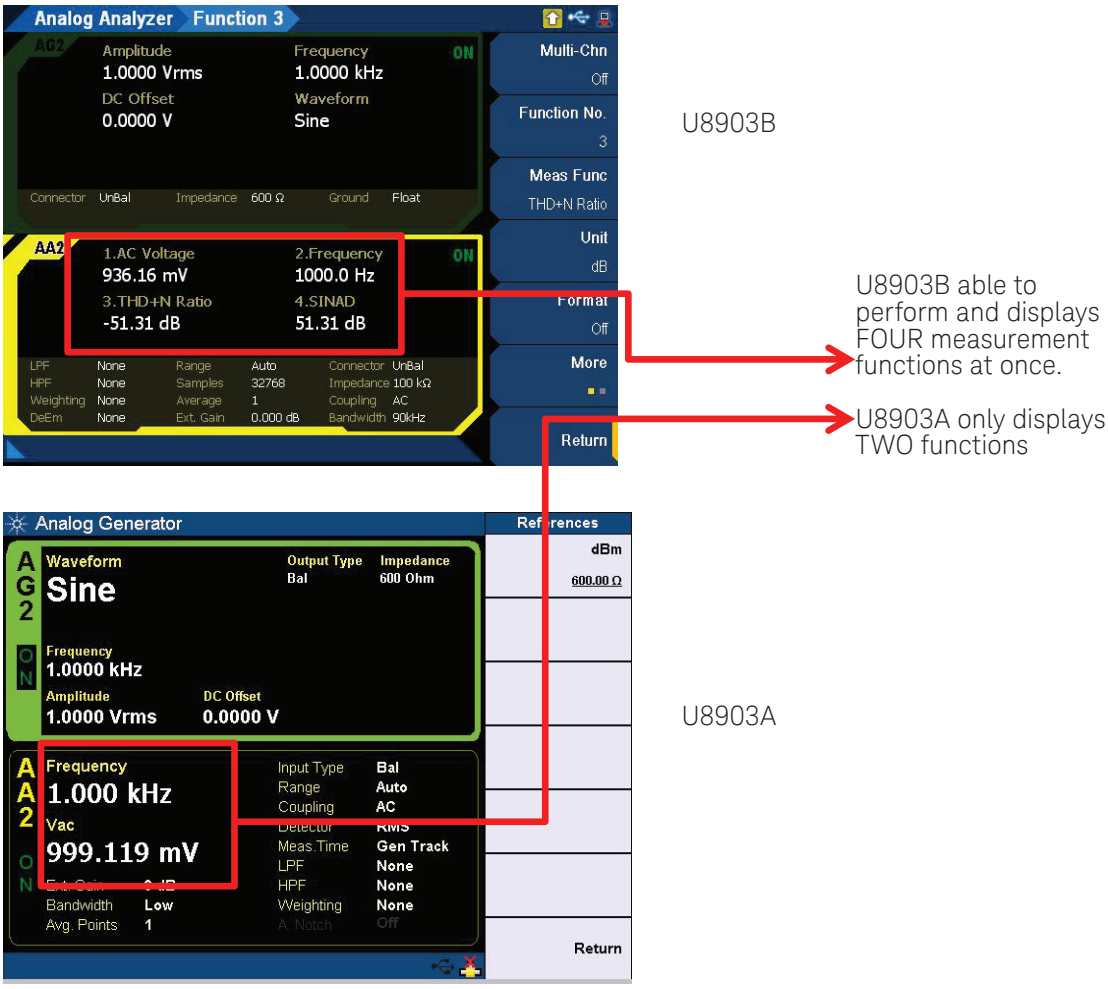


Figure 4: GUI display comparison

## New Features and Functions in the U8903B Performance Audio Analyzer

As mentioned earlier, the U8903B has new features and improved measurement performance. The features and performance comparison between the U8903A and the U8903B are shown in the table below.

| | **U8903A** | | **U8903B** | |
|---|---|---|---|---|
| Residual THD+N/ distortion (1 kHz, 1 Vrms) | Analog Generator: ≤ -95 dB | Analog Analyzer: ≤-101 dB | Analog Generator: ≤ -108 dB | Analog Analyzer: ≤ -108 dB |
| Analog audio generator | 5 Hz to 80 kHz | | 5 Hz to 80 kHz | |
| Analog audio analyzer input frequency range | 10 Hz to 100 kHz | | 10 Hz to 96 kHz; 1.5 MHz (option N3431A) | |
| Analog audio channels | 2 generator + 2 analyzer | | 2 generator + 2 analyzer (option STD)<br>2 generator + 4 analyzer (option AN4)<br>2 generator + 8 analyzer (option AN8) | |
| Digital audio (generator and analyzer) | AES/SPDIF, TOSLINK, DSI/I2C | | AES/SPDIF, TOSLINK, DSI/I2C | |
| Remote connectivity | USB, LAN (LXI C), GPIB | | USB, LAN (LXI C), GPIB | |
| Voice quality test | NA | | POLQA (Option N3433A)<br>PESQ (Option N3432A) | |
| Test sequence application | NA | | Yes | |
| Recording and playback | Playback Only | | Recording and Playback | |

## Superb low residual distortion on eight channels

The new design architecture of the U8903B has reduced the residual distortion significantly to < -108 dB (< -110 dB typical), compared to only < -101 dB for the U8903A. The low residual distortion specification enables engineers and technicians to measure and analyze performance audio devices.

Unlike the U8903A, which only has two analog analyzer channels, the U8903B can be configured with up to eight analog analyzer channels. The additional channels are located at the rear panel, as shown in Figure 3. The < -108 dB residual distortion performance is available for up to eight channels simultaneously (see Figure 5).

Figure 5: The U8903B's GUI, showing eight analyzer channel measurements

## Expanded 1.5 MHz analysis bandwidth

The U8903B has a slightly reduced analog input bandwidth compared to the U8903A. The U8903A analog analyzer frequency range starts from 10 Hz to 100 kHz, whereas the U8903B can only measure up 96 kHz due to the internal design architecture. However, the U8903B has a purchasable wide bandwidth option which expands the bandwidth to 1.5 MHz. This option is only available for the two front panel analog analyzer channels.

## Voice quality with PESQ and POLQA

Another new feature in the U8903B is the voice quality test. There are two test configurations available in the U8903B. First is the perceptual evaluation of speech quality (PESQ) as recommended in ITU-T P.862. There is also the perceptual objective listening quality assessment (POLQA), according to ITU-T Rec. P.863 [2011]. POLQA is the next-generation mobile voice quality testing standard for HD-Voice, VoIP, 3G and 4G/LTE. By comparing the reference signal with a degraded signal, the PESQ and POLQA tests will provide a mean opinion score (MOS) measurement result, from a scale of 1 to 5. Figure 6 provides an overview of a VOIP voice quality test set up using the U8903B.

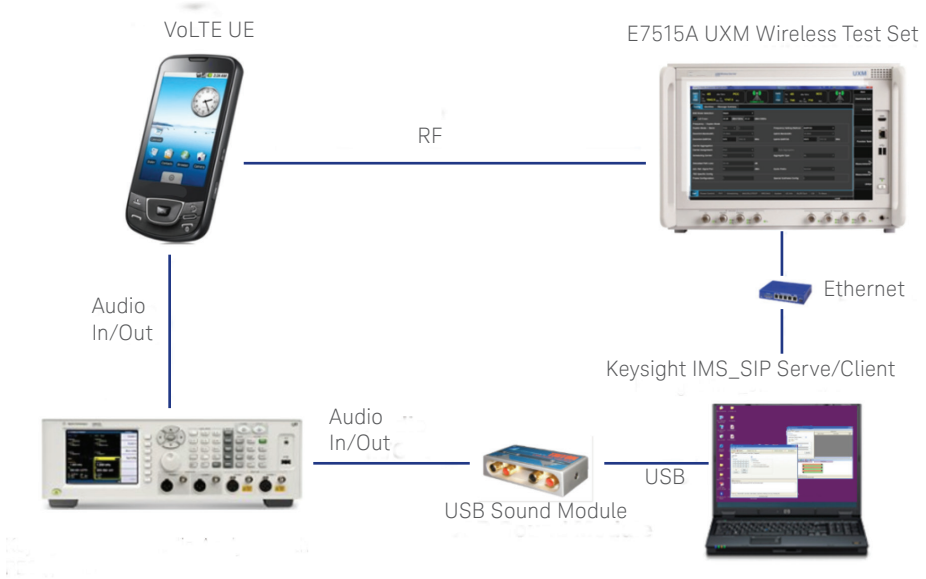


Figure 6: VOIP PESQ/POLQA test setup using the U8903B

## Test sequence function

The main objective of test sequence function is to allow users to automate testing without the need of external programming. The test sequence function provides a flexible and easy-to-use interface to add or delete measurements according to the user's test requirement. This enables users to set limits for Pass/Fail tests, which are typically used in manufacturing test environments.

Using the test sequence function, the U8903B is able to control other instruments such as Keysight RF signal generators and function generators. Figure 7 shows how the U8903B is able to perform a frequency sweep function by using this feature to control an external 33622A waveform/function generator.

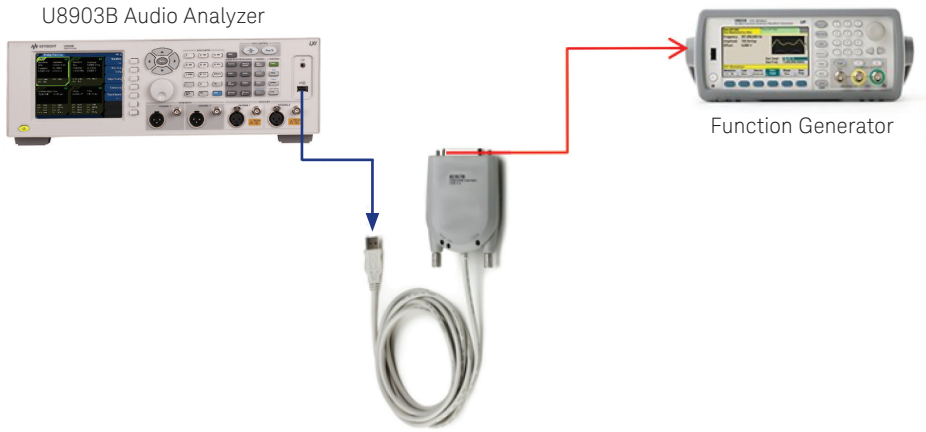


Figure 7: External (function generator) frequency sweep using the U8903B's test sequence function.

## Recording and playback

The new U8903B is able to record the signal at its analyzer channels as a Wave file (.wav), allowing users to use the recorded file as reference for future testing. The recording function is also available in the PESQ/POLQA feature, where the degraded source file can be recorded during testing.

Figure 8: U8903B recording function

## SCPI programming commands comparison

The U8903B is code compatible with the U8903A. However, there are some deprecated and obsoleted SCPI commands that do not function in the U8903B. Please refer to the U8903B programmer's reference for examples and detailed information.

| Obsoleted SCPI commands | U8903A | U8903B | Remarks |
|---|---|---|---|
| DATA:FILE? | YES | NA | U8903B does not support Binary file format |
| SENSe[:ANALog]:THDN:NOTCh:BANDwidth | YES | NA | U8903B allows Notch bandwidth to be set up to 1 kHz, as opposed to only either Auto or Custom (500 Hz) in the U8903A |
| SOURce[:ANALog]:MULtitone:RLEN | YES | NA | U8903B does not support Record Length for Multitone |
| SYSTem:UPDate:HELP? | YES | NA | There is no separate HELP file installer for the U8903B |
| SYSTem:DIGital:CTYPe? | YES | NA | Check the Digital option using *OPC instead |
| INPut:DIGital:DSI:DATA:MSB:PADDing | YES | NA | U8903B digital audio analyzer design system change |
| INPut:DIGital:DSI:MCLK:SOURce | YES | NA | |
| INPut:DIGital:DSI:MCLK:MULTiplier | YES | NA | |
| INITiate[:IMMediate]:DIGital:BERT | YES | NA | BERT measurement is still available in U8903B. However, there are changes in the U8903B user interface BERT function and measurement. Please refer to the U8903B user guide and programmer's reference for more information. |
| SOURce:DIGital:BERT[:MODE] | YES | NA | |
| SOURce:DIGital:BERT:PATTern:CATegory | YES | NA | |
| SOURce:DIGital:BERT:WCONstant:TYPE | YES | NA | |
| SOURce:DIGital:BERT:PSEudorandom:SEED | YES | NA | |
| SOURce:DIGital:BERT:WCONstant[:VALue] | YES | NA | |
| SOURce:DIGital:BERT:DURation | YES | NA | |
| SOURce:DIGital:BERT:BWIDth | YES | NA | |
| SOURce:DIGital:BERT[:MODE] | YES | NA | |
| SOURce:DIGital:BERT:PATTern:CATegory | YES | NA | |
| SOURce:DIGital:BERT:WCONstant:TYPE | YES | NA | |
| SOURce:DIGital:BERT:PSEudorandom:SEED | YES | NA | |
| SOURce:DIGital:BERT:WCONstant[:VALue] | YES | NA | |
| SOURce:DIGital:BERT:DURation | YES | NA | |
| SOURce:DIGital:BERT:BWIDth | YES | NA | |
| SENSe:DIGital:BERT:INTerval | YES | NA | |
| SENSe:DIGital:FUNDamental:FREQuency:LOCK:THD | YES | NA | Improvements in the U8903B THD and SINAD measurement functions (by not limiting the frequency lock to GLOCK and Custom only) mean that there is no need to use SCPI command to set the frequency; the U8903B can automatically detect the frequency. |
| SENSe:DIGital:FUNDamental:FREQuency:LOCK[:SINad] | YES | NA | |
| SENSe:DIGital:THD:HARMonic:COUNt | YES | NA | Improvements in the U8903B's THD and SINAD measurement functions mean that there is no need to use SCPI command to carry out these measurements. |
| CALCulate:DIGital:HARMonic:COUNt | YES | NA | |
| SENSe:DIGital:SNR:DELay | YES | NA | Will be make available in the U8903B SCPI list in upcoming releases |
| SENSe:DIGital:SOURce:INTerface | YES | NA | |
| SENSe:DIGital:SOURce:CHANnel | YES | NA | |

## Conclusion

The U8903B is a compatible replacement audio analyzer for the U8903A with significant performance enhancements and new features. A similar form factor, measurement functions and SCPI command supportability make migrating from the U8903A to the new U8903B easy and effortless.

## References:

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

Keysight U8903B Audio Analyzer, programmer's reference
http://literature.cdn.keysight.com/litweb/pdf/U8903-90052.pdf

Keysight Audio Analyzer video playlist
http://www.keysight.com/find/audio-video

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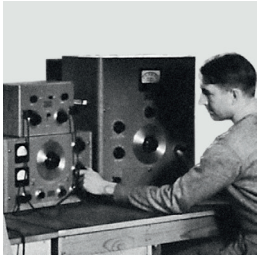

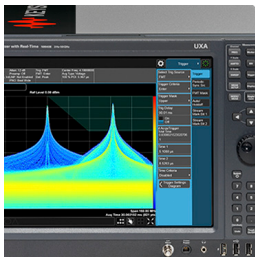

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