Keysight Technologies
U8903B
Performance Audio Analyzer

Data Sheet

KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Introduction

Make multi-function, high performance audio measurements with the new U8903B audio analyzer. The U8903B comes with a residual distortion of < –110 dB, allowing you to measure the most demanding devices. The wide analysis bandwidth of 1.5 MHz offers the highest resolution 2-channel measurements available, and an in-built test sequencer offers pre-configured measurements, including the latest voice quality analysis. With the U8903B audio analyzer, you get a test solution that is configurable to meet your specific application needs for audio and beyond.

Key Features

- Low residual distortion of < –110 dB to measure low distortion devices
- Wide measurement bandwidth; measure DC or from 10 Hz to 96 kHz or 1.5 MHz (with wide bandwidth option N3431A)
- Flexible configuration with an array of options, including up to 8 analog analyzer and digital options
- Test sequence function to implement automatic test
- Speech and audio quality measurements with Perceptual Objective Listening Quality Assessment (POLQA) and Perceptual Evaluation of Speech Quality (PESQ)
- Characterize Signal-to-Noise Ratios, SINAD, IMD, DFD, TND+N ratio, THD+N level, crosstalk and more
- Apply weighing functions, standard filters and custom filters, including notch filter features
- Customize your unit with flexible digital audio interface options, offering AES3/SPDIF or DSI standard digital audio format
- Test a variety of current components and applications with a logic level input range of 1.2 V to 3.3 V (DSI)
- Eliminate the need to rewrite programs into SCPI command with the built-in HP 8903B code compatibility mode

Expand Your Options to Meet Your Application Needs

Configurable measurement channels

The U8903B audio analyzer can be configured to 4, 6 or 8 analog analyzer channels. The instrument is capable of simultaneous measurement, on all channels, making the U8903B the ideal choice for multichannel systems such as 5.1 or 7.1 surround sound.

Figure 1. The U8903B's GUI, showing 8 analyzer channel measurements.

1.5 MHz wide bandwidth

The U8903B's wide bandwidth option (N3431A) offers two measurement channels, each with 1.5 MHz bandwidth and 24 bit resolution. No other test instrument can match this bandwidth and resolution. The one million point FFT then releases unprecedented measurement capability. This option is ideal for looking at the spectrum from Class D amplifiers or switching supplies where frequency components or noise well above the audio band can have a detrimental effect on audio quality. This option is also suited to applications where low frequency spectrum analyzers were previously used.

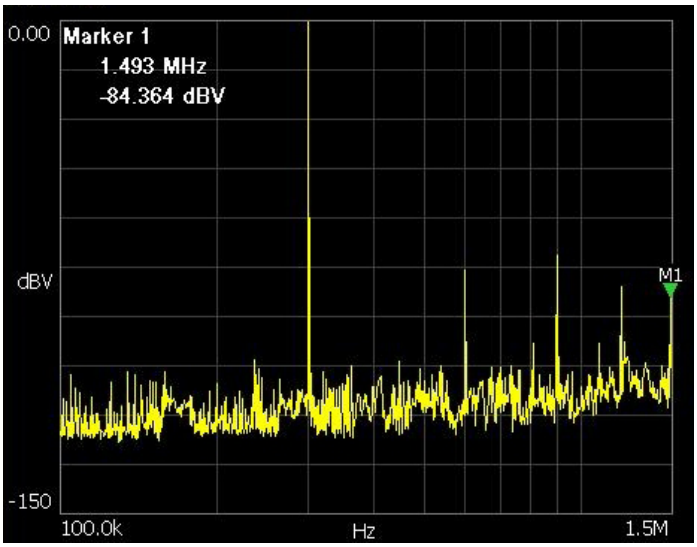

Figure 2. This screenshot shows an FFT plot of a 300 kHz source and the U8903B's unique ability to measure up the 5th harmonic with unprecedented resolution.

Voice quality with PESQ and POLQA

The U8903B audio analyzer now offers the ITU-T standard perceptual objective listening quality assessment (POLQA), which is also known as ITU-T P.862, as well as perceptual evaluation of speech quality (PESQ) as recommended in ITU-T P.862.

POLQA and PESQ works by comparing a degraded (usually by typical network transmission interferences) or processed signal to the original reference signal. The perceptual differences between the two signals are then rated based on the mean opinion score (MOS) test, which uses a scale from 1 (bad) to 5 (excellent).

POLQA comes with improvements over its predecessor, PESQ (ITU-T P.862), and has been extended to handle higher bandwidth audio signals, supporting measurements in the common audio bandwidth carried by telephone networks (300 – 3400 Hz) as well as wideband and super-wideband speech signals (up to 14000 Hz) needed to assess HD voice quality. With POLQA, the U8903B is suited to testing 3G and 4G/LTE mobile phone network equipment, VOIP phone and network equipment and HD voice test applications.

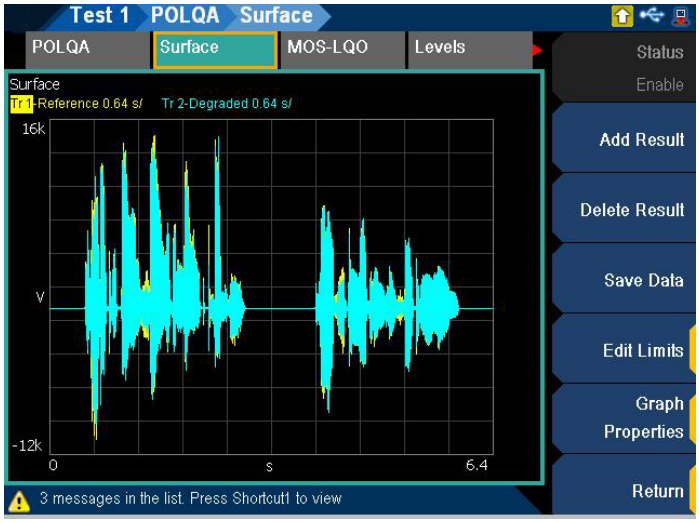

Figure 3. A graph comparison view between the Reference source file and Degraded file.

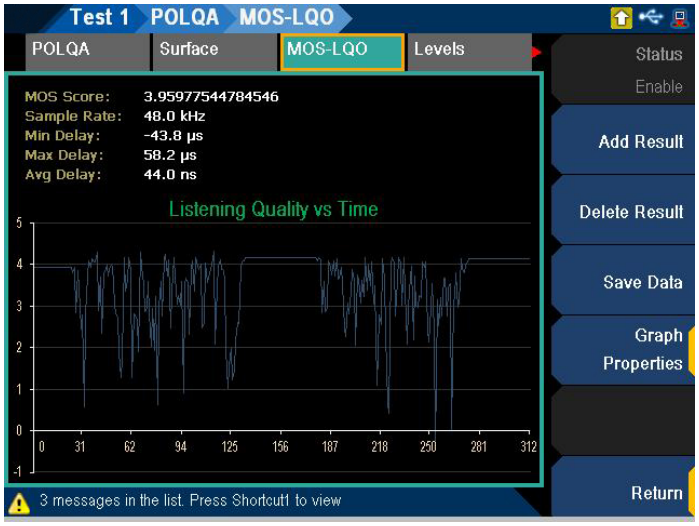

Figure 4. The MOS (Mean Opinion Score) scoring, indicating the rating of the DUT's voice quality.

Advance Measurement Testing

Low residual distortion

The U8903B comes with extremely low residual distortion and noise. The residual distortion is < –110 dB , enabling the measurement of the most demanding devices. This performance is available for up to 8 channels simultaneously.

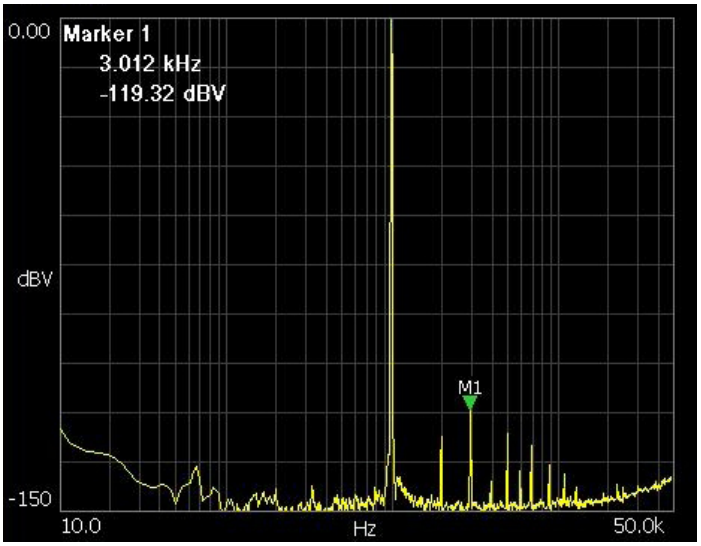

Figure 5. An FFT plot showing the residual distortion

Test sequence control

The in-built test sequencer allows users to create flexible and easy-to-use test sequences that automates testing and provides test reports. This function removes the need to write complicated programming code or to purchase an additional external controller. Users can setup and define the types of measurements as well as define Pass/Fail decisions, reducing test development time as well as test time for the device-under-test (DUT).

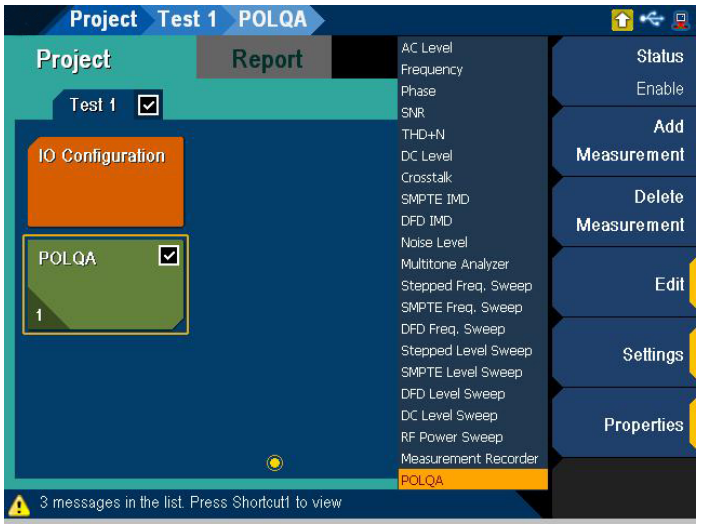

Figure 6. The test sequence control function comes with a selection of preconfigured measurements and allows users to select the most frequently used test sequences for their daily measurement.

Expand Your Digital Audio Test Capabilities

Cover your application needs with multiple digital audio interface options

Test a wide range of digital audio applications with the industry's standard interfaces: AES3/SPDIF and Digital Serial Interface (DSI). Used in the testing and validation of consumer electronics and digital audio related ICs, both digital audio interfaces are available with the U8903B Option 113, with further options (Option 114 and 115) giving you the flexibility to choose either interface. The U8903B also supports multiple DSI formats, such as I^2S, Left Justified, Right Justified and DSP. These formats are suitable for most digital audio design and verification applications.

Measure more applications with a wide logic level input range

The U8903B comes with completely variable logic I/O levels between 1.2 V and 3.3 V, offering the ultimate in compatibility with current and future devices. In addition, the U8903B-105 DSI cable (optional accessories) is designed to make connections between the audio analyzer and the DUT extremely simple. The cable provides convenient connection to the 25-way DSI connector on the rear of the instrument. The other end of the cable offers all the data and clock lines on individual BNC connectors for quick and easy connection to the DUT.

HP 8903B mode

The U8903B comes with HP 8903B mode to help HP 8903B customers transition to the new generation of audio analyzers. This mode allows the new U8903B to mimic the HP 8903B, performing measurements and even displaying the same GUI measurement screen as the legacy audio analyzer. For customers currently using the HP 8903B in their test rack, the U8903B also comes with a built-in code emulator that automatically converts HP 8903B R2D2 code directly into SCPI commands, the language used by the U8903B.

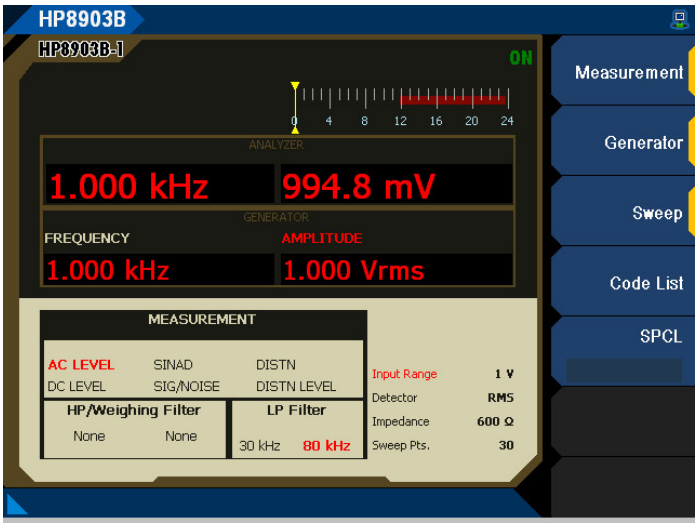

Figure 7. The HP 8903B graphical user interface

Product Characteristics

Description	
Power consumption	≤ 250 VA
Power requirements	100 V_{ac} to 240 V_{ac}
	47 Hz to 63 Hz
Operating environment	Operating temperature from 0 °C to 55 °C
	Relative humidity at 20% to 80% RH (non-condensing)
	Altitude up to 3000 m
	Pollution Degree 2
	Installation Category II
Storage compliance	–40 °C to 70 °C
Safety compliance :	IEC 61010-1:2010/EN61010-1:2010
	Canada: CAN/CSA-C22.2 No. 61010-1-12
	USA: ANSI/UL Std. No. 61010-1 (3rd Edition)
EMC compliance	IEC 61326-1:2005/EN 61326-1:2006
	Canada: ICES-001:2004
	Australia/New Zealand: AS/NZS CISPR11:2004
Instrument dimensions (W x D x H)	425.60 mm (16.76 in) x 425.00 mm (16.73 in) x 133.60 mm (5.25 in)
Weight	8.5 kg
Warranty	Three year for product
	Three months for product accessories

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, dual sine, variable phase, square, noise (Gaussian and rectangular), arbitrary, DC, multitone, SMPTE IMD (1:1, 4:1, and 10:1), DFD (IEC 60118/IEC 60268), WAV file playback
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 or 10 Ω unbalanced as per IEC-60268
Grounding	
True floating or 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 V_{rms}
Range (unbalanced/common)	0 to 8 V_{rms}
Current limit (typical)	50 mA
Amplitude accuracy at 1 kHz	± 0.09 dB (± 1%) (from 0 °C to 55 °C)
Amplitude resolution	1 µ V_{rms} (limited to five digits of resolution)
Flatness Ref 1 kHz	
5 Hz to 20 kHz	± 0.008 dB
5 Hz to 80 kHz	± 0.08 dB
THD and THD+N	
Residual THD + N at 1 kHz, 1 V_{rms} (20 Hz to 20 kHz bandwidth)	≤ –108 dB, typically < –110 dB (at 23 °C ± 5 °C) [1] ≤ –100 dB (from 0 °C to 55 °C) [1]
Residual THD	< –87 dB
Crosstalk	
≤ 20 kHz	≤ –130 dB + 0.1 µV

1. Includes contributions from Generator and Analyzer. Individual contributions are typically less than the values stated.

Specifications, continued

Square	
Frequency range	5 Hz to 30 kHz
Rise time	< 2 µs
Output	
Range (balanced)	0 to 45.2 V_{pp}
Range (unbalanced/common)	0 to 22.6 V_{pp}
Amplitude accuracy at 1 kHz	± 1%
SMPTE IMD (1:1/4:1/10:1)	
Mixed ratio (LF:HF)	10:1, 4:1, or 1:1
Residual IMD (20 Hz to 20 kHz)	≤ –95 dB (at 23 °C ±5 °C), ≤ –90 dB (from 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 V_{rms}
Range (unbalanced/common)	0 to 8 V_{rms}
DFD (IEC 60118/IEC 60268)	
Inherent distortion (20 Hz to 20 kHz)	≤ –106 dB at 1 V_{rms}
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 V_{rms}
Range (unbalanced/common)	0 to 8 V_{rms}
Noise	
Type	Gaussian, rectangular, pink
Output	
Range (balanced)	0 to 7.2 V_{rms} (Gaussian), 0 to 10 V_{rms} (Rectangular), 0 to 7.2 V_{rms} (Pink)
Range (unbalanced/common)	0 to 3.6 V_{rms} (Gaussian), 0 to 5 V_{rms} (Rectangular), 0 to 3.6 V_{rms} (Pink)
Arbitrary	
Signal	Determined by the user selected file
Sample rate	192 kHz
Length	Up to 5 minutes, depending on waveform file
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	64
WAV file playback	
Type of file	.WAV file
Sample rate	192 kHz
Length	Up to 5 minutes, depending on waveform file

Specifications, continued

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	
Output level	
Range	–11.3 V to 11.3 V
Amplitude accuracy [1]	± 1.5% (± 250 mV to ± 11.3 V)

1. 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_{rms} to 140 V_{rms} [1] (unbalanced)
	320 mV_{rms} to 300 V_{rms} [1] (balanced)
Measurement range	< 1 μV_{rms} [2] to 300 V_{rms}
Maximum rated input	200 V_p 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 max), 600 Ω (1.5 W max), 200 kΩ
Unbalanced	300 Ω (3 W max), 600 Ω (1.5 W max), 100 kΩ
CMRR	
≤ 20 kHz (input range ≤ 3.2 V)	≥ 80 dB [3]
≤ 20 kHz (input range > 3.2 V)	≥ 50 dB [3]
Crosstalk	
≤ 20 kHz	≤ –140 dB + 0.1 µV

2. For the available input ranges, refer to the U8903B User Guide.
3. Defined by the 24-bit measurement.
4. When AC coupled, CMRR will deteriorate at low frequencies.

Specifications, continued

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_{rms} to 140 V_{rms}
3 dB measurement bandwidth	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 V_{rms} (20 Hz to 20 kHz bandwidth)	≤ –108 dB, typically <–110 dB (at 23 °C ± 5 °C) [4] ≤ –100 dB (from 0 °C to 55 °C)
Residual noise 20 Hz to 20 kHz bandwidth	≤ 1.3 μV_{rms}
SNR	
Display range	0 dB to 999.999 dB
Accuracy	
< 20 kHz	± 0.5 dB
< 100 kHz	± 0.7 dB
Input voltage range	< 1 μV_{rms} to 140 V_{rms}
Triggering	
Type	Free Run, External
Level	5 V
Minimum trigger high voltage	1.25 V
Maximum trigger low voltage	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 Ref 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, Quasi 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 °
< 100 kHz	± 4 °
Minimum input	1 mV (S/N > 40 dB)
Resolution	0.01 °
SMPTE IMD	
Residual IMD	≤ 0.0018% (≤ –95 dB)

4. Includes contributions from generator and analyzer. Individual contributions are typically less than the values stated.

Specifications, continued

Analog audio filters

Low pass filter	
	2 kHz, 3 kHz, 5 kHz, 8 kHz, 10 kHz, 10 kHz, 20 kHz, 22 kHz, 30 kHz, 40 kHz, 50 kHz, 80 kHz
High pass filter	
	15 Hz, 20 Hz, 22 Hz, 30 Hz, 50 Hz, 70 Hz, 100 Hz, 200 Hz, 300 Hz, 400 Hz
Weight filter	
	A weighting (ANSI-IEC "A" weighted, per IEC Rec 179)
	CCIR 1 K weighted (CCIR Rec 468)
	CCIR 2 K weighted (Dolby 2 K)
	C-Message (C-Message per IEEE743)
	De-emphasis (50 µs, 75 µs)
	CCITT (ITU-T Rec. 041, ITU-T Rec. P.53)
	User-defined [5]

5. User-defined filters can be uploaded through standard I/O connections.

Sweep

Generator sweep	
Parameters	Frequency, amplitude, phase
Sweep spacing	Linear, logarithmic
Sweep mode	Auto sweep, auto list
Hold	None, max, min

Audio monitor

U8903A-AUX	
Monitor output	Scaled to give 1 V_{rms} at the top of each analyzer input range
Aux output	0.5 V_{DC} to 5.1 V_{DC} ± 5% current limited to 100 mA
Headphone connector	
Recommended headphone	Headphone with 3.5 mm connector

Graph specs

FFT analyzer	
Size/acquisition length	256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072, 262144, 524288, 1M, 2M
Window	Rectangular, Hanning, Hamming, Blackman-Harris, Rife-Vincent 1 and 3, flat top, Kaiser
Amplitude accuracy (flat top window)	± 0.1 dB (± 1.2%)

Specifications, continued

1.5 MHz bandwidth (Option N3431A)

Input specifications	
Fundamental frequency range	10 Hz to 1.5 MHz
Frequency accuracy	± 2 ppm (> 50 kHz)
Measurement bandwidth	
Bandwidth	1.5 MHz
Flatness Ref 1 kHz	
≤ 200 kHz	± 0.1 dB
≤ 1 MHz	± 0.5 dB
≤ 1.5 MHz	± 1.0 dB

POLQA measurement (Option N3432A), licensed by OPTICOM GmbH

Perceptual 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 and degraded signal

PESQ measurement (option N3433A), licensed by OPTICOM GmbH

Perceptual Objective Listening Quality Assessment (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 and degraded signal

Specifications, continued

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, or 1:1
Sweep	Upper frequency, lower frequency, and 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, lower frequency, and amplitude
Noise	
Type	Rectangular, Gaussian, Triangular, and Pink
Amplitude	0 to 1 FFS
Arbitrary	
Signal	Determined by the user selected file
File format	WAVE (.wav)
Maximum file size	5.0 MB
File resolution	8, 16, or 24 bits
Frequency range	2 Hz to 0.45 Fs
Multitone	
Signal	Determined by the user specified frequency, amplitude, and phase data
Frequency rate	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, or rectangular
Level	0.5 LSB

1. Digital generator specifications refer to 24 bits FFS.

Specifications, continued

AES3/SPDIF interface 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 V_{pp} to 5.1 V_{pp}
Unbalanced	0.3 V_{pp} to 2.5 V_{pp}
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 male D-SUB connector pin-1
Impedance	50 Ω
Output level	3.3 V (LVCMOS IO standard)
Polarity	Normal or invert
Output type	Bit clock (128 Fs)
Protocol	
Channel status bits	Professional or consumer (all applicable bits are editable for advanced settings)
Format	Professional or consumer
User bits	Set or cleared
Validity flag	Set or cleared

Specifications, continued

DSI specifications

Output specifications	
Output connector type	25-pin male D-SUB connector
	25-pin female D-SUB to BNC connector (optional accessories)
Output impedance	50 Ω
Logic level	1.2 V, 1.5 V, 1.8 V, 2.5 V, 3.3 V, or 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, I^2S, or 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
Accuracy	± 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 V_{pp} to 3.3 V_{pp}
Polarity	Normal or invert
Word clock polarity	Leading edge or falling edge (with respect to bit clock)

Specifications, continued

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, %FS, V, dBFS, LSB, dBr, dBu, dBV, Hex, Dec, and x
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

Specifications, continued

AES3/SPDIF interface 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 V_{pp} to 5.1 V_{pp}
Unbalanced	0.3 V_{pp} to 2.5 V_{pp}
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 input	
Connector type	BNC (SYNC IN on the rear panel)
Impedance	10 kΩ
Polarity	Normal or invert
Protocol	
Channel status bits	Professional or consumer (all applicable bits are editable for advanced settings)
Format	Professional or consumer
User bits	Set or cleared
Validity flag	Set or cleared

Specifications, continued

DSI specifications

Input specifications	
Input connector type	25-pin male D-SUB connector
	25-pin female D-SUB to BNC connector (optional accessories)
Input impedance	≥ 10 kΩ
Logic level	1.2 V, 1.5 V, 1.8 V, 2.5 V, 3.3 V, or 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, I^2S, or 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
Accuracy	± 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
Output level	1.2 V_{pp} to 3.3 V_{pp}
Polarity	Normal or invert
Word clock polarity	Leading edge or falling edge (with respect to bit clock)

Ordering Information

Product model	Description
U8903B-STD	Performance audio analyzer, 2 channels
Standard shipped accessories	USB cables
	Power cord
	Keysight U8903B audio analyzer product reference CD-ROM
	Certificate of calibration
Measurement channel options	
U8903B-AN4	Analog analyzer, 4 channels
U8903B-AN8	Analog analyzer, 8 channels
U8903B-DGT	Digital audio card
Bundling options	
U8903B-201	Performance audio analyzer with 4 analog analyzer channel, digital audio (AES3/SPDIF and DSI digital audio)
Optional hardware	
U8903B-AUX	Two monitor outputs and one auxiliary output (DC)
Optional software	
N3431A	Wide bandwidth option –1.5 MHz (fixed perpetual license)
N3432A	POLQA measurement software (fixed perpetual license)
N3433A	POLQA and PESQ measurement software (fixed perpetual license)
N3434A	AES3/SPDIF and DSI digital audio (fixed perpetual license)
N3435A	AES3/SPDIF digital audio (fixed perpetual license)
N3436A	DSI digital audio (fixed perpetual license)
Optional accessories	
U8903A-101	Male BNC to male BNC cable; 1.2 m
U8903A-102	Male BNC to male RCA cable, 2 m
U8903A-103	Male XLR to female XLR cable; 2 m
U8903A-908	Rackmount kit
U8903B-105	Cable, digital serial interface
U8903A-107	Cable, accessory – Male XLR-2 male BNC analyzer, 0.26 m
U8903A-108	Cable, accessory – Female XLR-2 male BNC generator, 0.26 m
U8903A-109	BNC accessory kit
Warranty and services	
U8903B-1A7	ISO17025 compliant calibration with test data
U8903B-A6J	ANSI Z540 compliant calibration with test data
U8903B-UK6	Commercial calibration with test result data

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