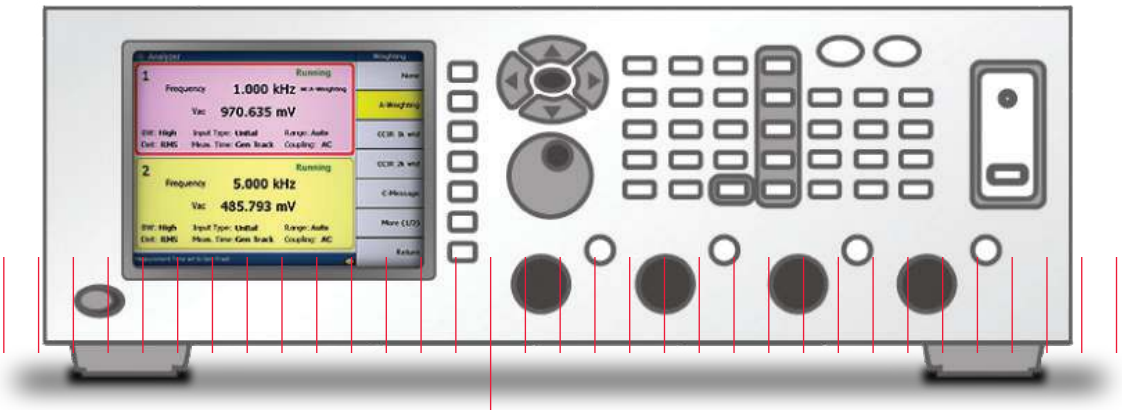
Keysight Technologies
Audio Test Solutions



U8903A Audio Analyzer

KEYSIGHT TECHNOLOGIES

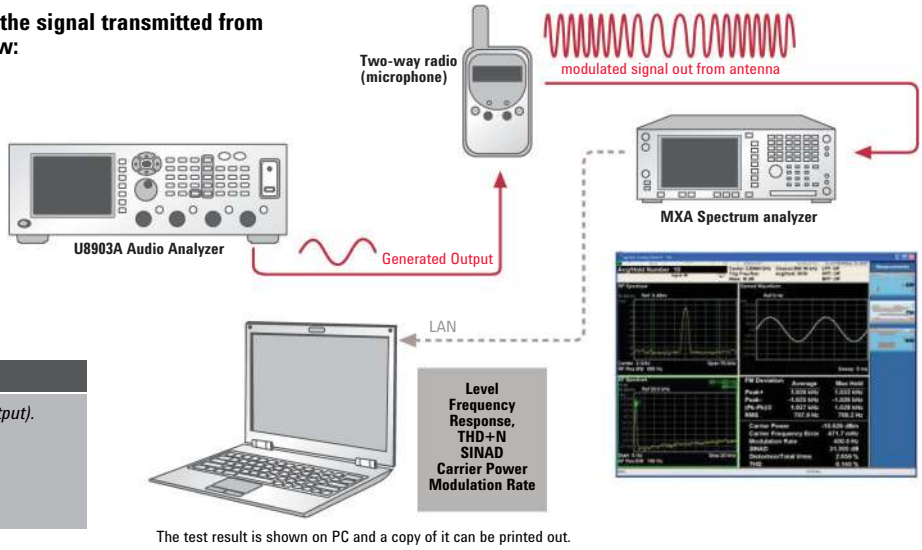

Car Audio
2-way Radio
Cell Phone
U8903A Audio Analyzer
Audio Amplifier
TV & DVD Audio Testing

For 2-way Radio Transceiver Testing

Solution # 1 *Radio Transmitter Hardware Test*

This solution is to observe the quality of the signal transmitted from radio by measuring the parameters below:

- Amplitude Level (Signal Analyzer)
- Frequency Response (Signal Analyzer)
- THD+N (Signal Analyzer)
- SINAD (Signal Analyzer)
- Carrier Power (Signal Analyzer)
- Modulation Rate (Signal Analyzer)



Keysight Technologies, Inc. Solution:

- U8903A Audio Analyzer
- N9020A MXA Signal Analyzer

Test Procedure

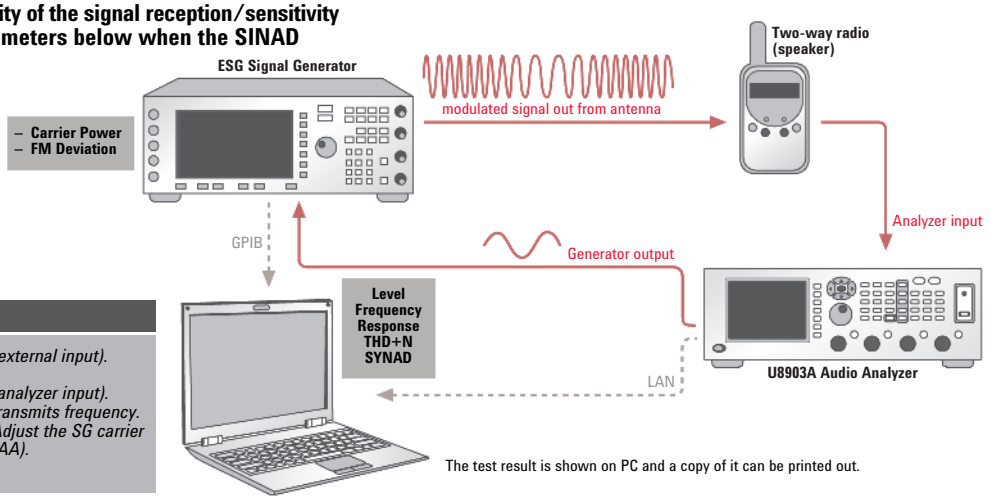
1. *Connect DUT (microphone) to AA (generator output).*
2. *Connect DUT (antenna) to SA (input).*
3. *Set the SA frequency same as DUT's transmits frequency.*
4. *Start the test, acquire the test result.*
5. *Generate print-ready reports from PC.*

The test result is shown on PC and a copy of it can be printed out.

Solution # 2 *Radio Receiver Hardware Test or Radio Sensitivity Test*

This solution is to observe the quality of the signal reception/sensitivity from radio by measuring the parameters below when the SINAD reading is about 12 dB.

- Amplitude Level (Audio Analyzer)
- Frequency Response (Audio Analyzer)
- SINAD (Audio Analyzer)
- Carrier Power (Signal Generator)
- FM Deviation (Signal Generator)



Keysight Solution:

- U8903A Audio Analyzer
- E4438C ESG Analog Signal Generator

Test Procedure

1. *Connect AA (generator output) to SG (external input).*
2. *Connect SG (output) to DUT (antenna).*
3. *Connect DUT's speaker output to AA (analyzer input).*
4. *Set the SG frequency same as DUT's transmits frequency.*
5. *Start the test, acquire the test result. Adjust the SG carrier power to achieve the SINAD = 12 dB (AA).*
6. *Generate print-ready reports from PC.*

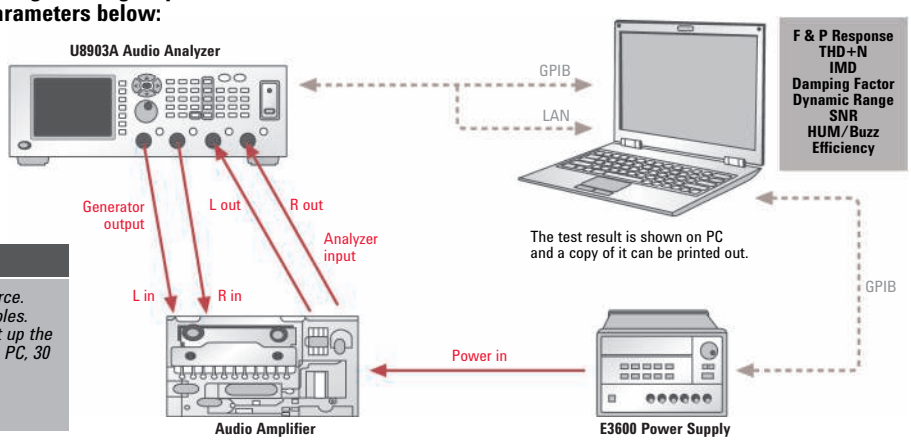
The test result is shown on PC and a copy of it can be printed out.

For Audio Amplifier Testing

Solution # 3 *Amplifier Module Board Test*

This solution is to observe the quality of the signal being amplified by the audio amplifier by measuring the parameters below:

- Amplitude Level (Audio Analyzer)
- Frequency Response (Audio Analyzer)
- Phase (Audio Analyzer)
- THD+N (Audio Analyzer)
- SNR (Audio Analyzer)
- Dynamic Range (Audio Analyzer)



Keysight Solution:

- U8903A Audio Analyzer
- E3600 Bench Power Supply

Test Procedure

1. *Connect the Fixture input with Audio Analyzer source.*
2. *Connect the Power supply wire, GPIB and LAN cables.*
3. *Turn the Audio Analyzer and PC, power supply (set up the voltage and current protection) on. Run the SW on PC, 30 minute warm-up.*
4. *Run the test.*
5. *Generate print-ready reports from PC.*

For Car Audio Testing

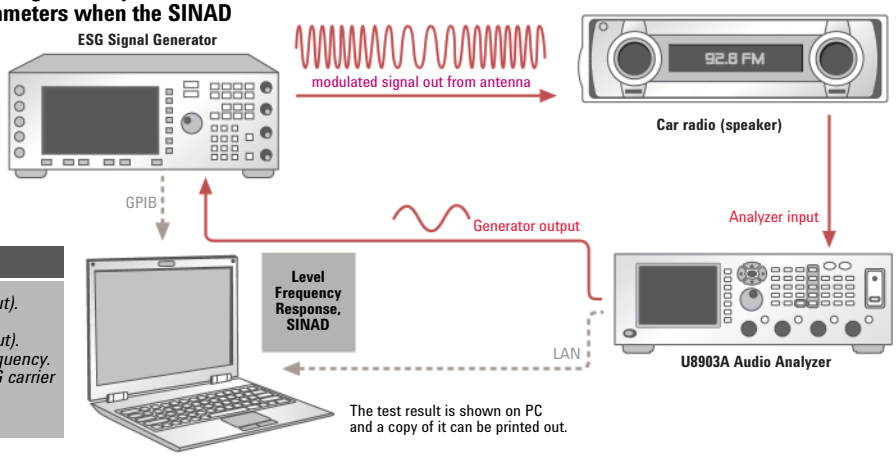
Solution # 4 *Car Radio Sensitivity Test (In Lab)*

This solution is to observe the quality of the signal reception/ sensitivity from radio by measuring the parameters when the SINAD reading is about 12 dB.

- Amplitude Level (Audio Analyzer)
- Frequency Response (Audio Analyzer)
- SINAD (Audio Analyzer)
- Carrier Power (Signal Generator)
- FM Deviation (Signal Generator)

Keysight Solution:

- U8903A Audio Analyzer
- E4438C ESG Analog Signal Generator



Test Procedure

1. *Connect AA (generator output) to SG (external input).*
2. *Connect SG (output) to DUT (antenna).*
3. *Connect DUT's speaker output to AA (analyzer input).*
4. *Set the SG frequency same as DUT's transmits frequency.*
5. *Start the test, acquire the test result. Adjust the SG carrier power to achieve the SINAD = 12 dB (AA).*
6. *Generate print-ready reports from PC.*

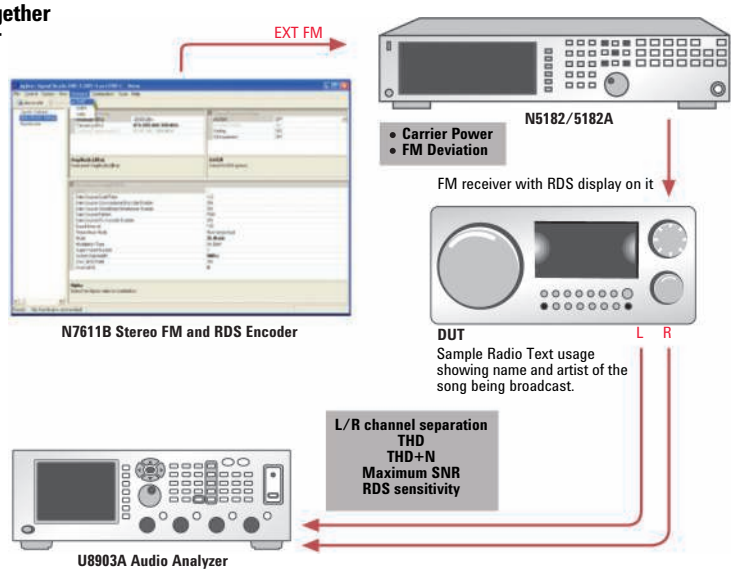
Solution # 5 *Stereo/Mono FM and RDS Receiver Test (In Lab)*

This solution is to observe the transmitted signal (transmitted together with RDS signal) received by the car radio including the other functionality test parameter as listed below:

- Amplitude Level (Audio Analyzer)
- Frequency Response (Audio Analyzer)
- THD+N (Audio Analyzer)
- THD (Audio Analyzer)
- L/R channel separation (Audio Analyzer)
- Maximum SNR (Audio Analyzer)
- RDS Sensitivity

Keysight Solution:

- U8903A Audio Analyzer
- N5181A MXG RF Analog Signal Generator with N7611B-3FP Signal Studio



Test Procedure

1. *Connect SG (output) to DUT. Output FM and RDS signal.*
2. *Connect DUT to AA (analyzer input).*
3. *Measure L/R channel separation: measure L ch. power and R ch. power from DUT. Calculate P_L/P_R .*
4. *Measure THD and THD+N: measure L ch. then follow by R ch.*
5. *Measure SNR: measure L ch. power and R ch. power from DUT. Turn off L and R ch. Measure L ch. noise power. Calculate P_S/P_N.*
6. *Measure RDS sensitivity: Detect RDS indicator flag. Record the power from SG until the RDS flag disappear from the radio display.*

For Cell Phone Testing

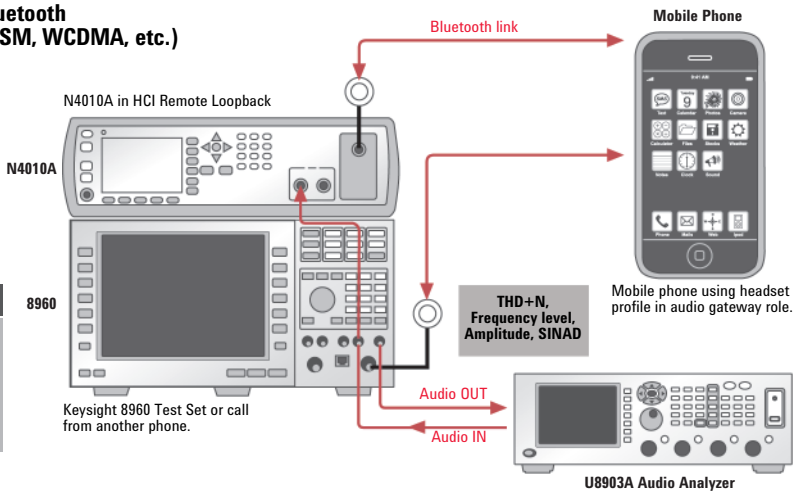
Solution # 6 *Cell Phone Audio Testing*

This solution is to observe the receiving signal via Bluetooth (transmitted with other cell phone protocol signal e.g. GSM, WCDMA, etc.) with audio signal. Test parameters include:

- Amplitude Level (Audio Analyzer)
- Frequency Response (Audio Analyzer)
- THD+N (Audio Analyzer)
- SINAD (Audio Analyzer)

Keysight Solution:

- U8903A Audio Analyzer
- 8960 Series 10 for Wireless Manufacturing
- N4010A Wireless Connectivity Test Set



Test Procedure

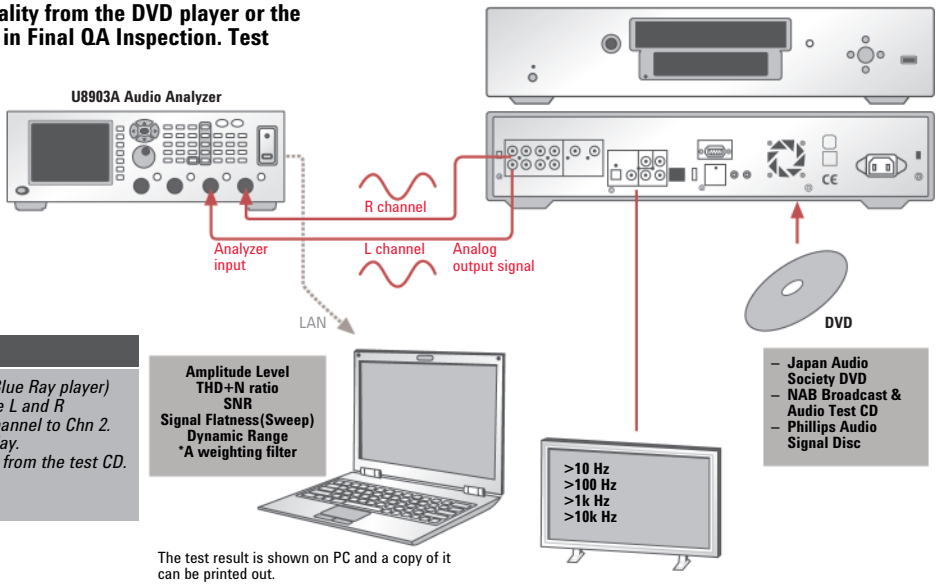
1. *AA (generator) output 1k Hz tone to the N4010A (audio input).*
2. *Bluetooth signal + audio signal output from N4010A antenna.*
3. *The bluetooth signal detected and received by DUT (cell phone).*
4. *Connect DUT (cell phone) to 8960 for GSM connection.*
5. *Tap the audio 1kHz tone from 8960 back to AA (analyzer input).*
6. *Measure THD+N, frequency level, amplitude and SINAD.*

For TV & DVD Testing

Solution # 7 *DVD/Blu Ray Audio Testing*

This solution is to check the audio quality from the DVD player or the Blu Ray player. This is a testing done in Final QA Inspection. Test parameter includes:

- Amplitude Level (Audio Analyzer)
- THD+N ratio(Audio Analyzer)
- SNR (Audio Analyzer)
- Signal Flatness (Audio Analyzer – Sweep Function)
- Dynamic Range (Calculation)
- *Need to apply A weighting filters in the measurement.



The test result is shown on PC and a copy of it can be printed out.

Keysight Solution:

- U8903A Audio Analyzer

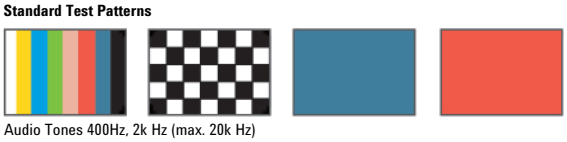
Test Procedure

1. *Connect AA (analyzer input) to DUT (DVD/Blue Ray player) audio output using SPDIF cable. Each for the L and R channel. L channel to Chn 1 (Analyzer). R channel to Chn 2.*
2. *Connect DUT video output to the TV or display.*
3. *DUT: Play the tracks contain standard tones from the test CD.*
4. *Measure the analog signal (sinewave).*
5. *Generate print-ready reports from PC.*

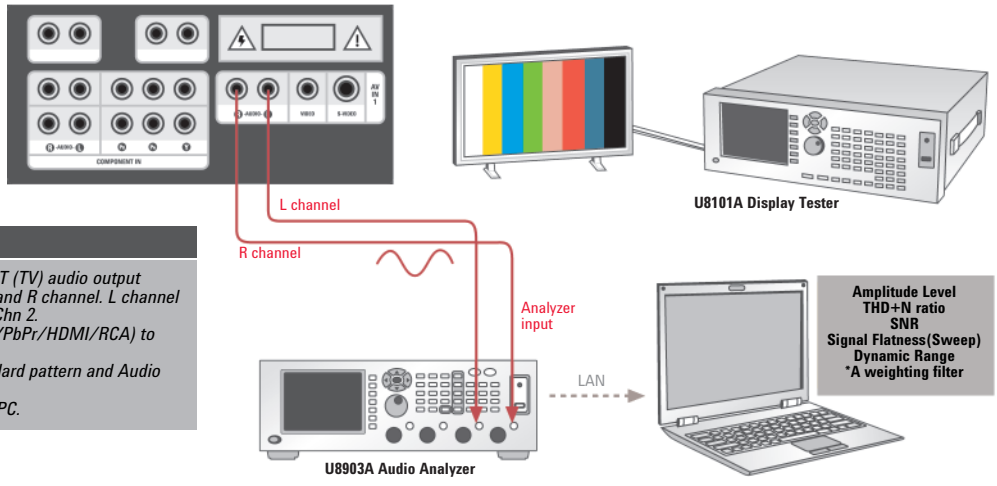
Solution # 8 *TV Audio Video Testing*

This solution is to check the audio quality and video quality for TV. This is a testing done in Final QA Inspection. Test parameter includes:

- Amplitude Level (Audio Analyzer)
- THD+N ratio (Audio Analyzer)
- SNR (Audio Analyzer)
- Signal Flatness (Audio Analyzer – Sweep Function)
- Defects on the display (Display Tester):
  - **a.** Dead Pixels
  - **b.** Misalignment
  - **c.** Color



Audio Tones 400Hz, 2k Hz (max. 20k Hz)



The test result is shown on PC and a copy of it can be printed out.

Keysight Solution:

- U8903A Audio Analyzer
- U8101A Display Tester

Test Procedure

1. *Connect AA (analyzer input) to DUT (TV) audio output using SPDIF cable. Each for the L and R channel. L channel to Chn 1 (Analyzer). R channel to Chn 2.*
2. *Connect TV video input (S-Video/YPbPr/HDMI/RCA) to the U8101A Display Tester.*
3. *Display Tester generates the standard pattern and Audio Tones to the TV.*
4. *Generate print-ready reports from PC.*

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Published in USA, July 31, 2014
5990-4918EN
www.keysight.com