

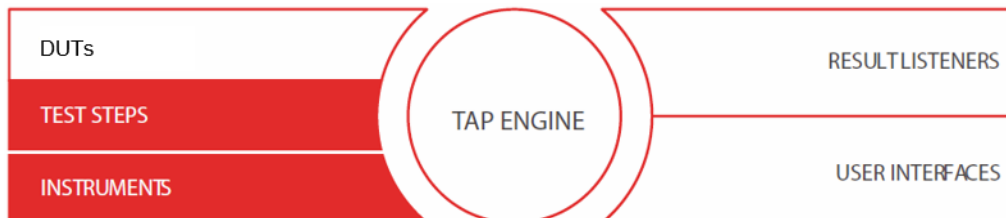
# KS8312xA Radio Test Plugins

Easily add the Analog, Digital, and Tracking Generator Plugins to TAP

The Keysight Test Automation on PathWave (TAP) software provides powerful, flexible and extensible test sequence and test plan creation with additional capabilities that optimize your test software development and overall performance. Keysight TAP is a modern Microsoft .NET-based application that can be used stand-alone or in combination with higher-level test executive software environments. Leveraging C# and the power of Microsoft Visual Studio, TAP is not just another programming language. It is a modular infrastructure upon which you can build your test solutions, maximizing your team's productivity by using your existing software development tools and infrastructure

## Architecture

Included with Keysight TAP is the core sequencing engine, tools and plugins to minimize your test system development time and test execution speed. The Radio Test Plugins allow users to add the M8920A Radio Test Set as an instrument and select test steps from the TAP plugin.



## KS83120A Analog Radio Test Plugin Overview

The Analog Land Mobile Radio Plugin makes it possible for TAP users with no programming knowledge to automate M8920A Radio Test Sets. Test automation is done seamlessly without worrying about which specific SCPI commands need to be used. TAP users will simply focus on manipulating test parameters and test flow control for intended tests. The test results are automatically stored in any Result Listener configured in TAP for further analysis.

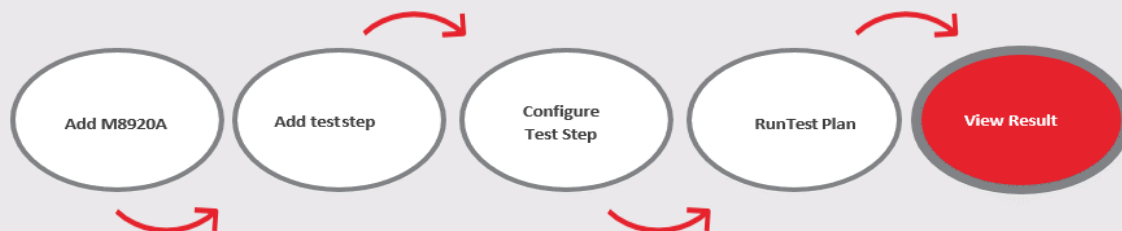
## KS83122A Digital Radio Test Plugin Overview

The Digital Land Mobile Radio Plugin makes it possible to generate and analyze Land Mobile Radio (LMR) formats: APCO25 P1/P2, DMR, TETRA I, and dPMR signals with N9093EM1E Software application on the M8920A.

## KS83123A Tracking Generator Plugin Overview

Use Keysight Tracking Generator Test Automation on PathWave Test (TAP) software plugins to build test sequences to characterize and evaluate the performance and integrity of your DUT RF cables and characterize RF paths through your test fixture. Sweep frequencies from 100 kHz to 3.8/6 GHz with a generator output level of up to +3 dBm, +13 dBm with M8920A-1EA option.

### Plugin Workflow



1. Select the M8920A that is connected to the controller PC and add the M8920A to the TAP profile.
2. Add the available Radio test steps into the test plan.
3. Configure the settings and parameters related to the test step.
4. Run your Test Plan.
5. View result using the result viewer or results in corresponding formats can be retrieved.

## Key Features

The M8920A Radio Test Set is supported by the Radio Test plugins. Using the M8920A with the Radio Test Plug-ins and the predefined test setups enables easy test selection, flexible configuration, Generic radio DUT control, connection prompts, execution, and modern test results reporting.

- Perform many required tests of analog and digital radios per EIA/TIA Standards requirements
- Predefined test setup enables easy test selection, flexible configuration, Generic radio DUT control, connection prompts, execution, and modern test results reporting
- Report test results which documents test configuration, bench setup, measurements made, pass/fail status
- No programming needed, yet with the capability to create fully automated tests.

## Analog Tests performed

M8920A Radio Test Set	Analog Measurements Supported
Radio Transmitter Tests	TX Audio Distortion
	TX Audio Frequency Response
	TX FM Hum and Noise
	TX Frequency Error
	TX Modulation Limiting
	TX Output Power
	TX Residual AM Hum and Noise
	TX Frequency Deviation
Radio Receiver Tests	RX Audio Distortion
	RX Audio Frequency Response
	RX Audio Output Power
	RX Audio Sensitivity
	RX Hum and Noise
	RX SINAD
	RX Reference Sensitivity
	RX Audio Metrics (Overall Audio Quality)

## Digital Tests performed

M8920A Radio Test Set	Digital Measurements Supported
Digital Radio Transmitter Tests	TX Frequency Error
	TX Output Power
	TX FSK Modulation Quality measurements
	TX Modulation Fidelity
	TX I/Q Modulation Measurements (EVM, Symbol Deviation)
	TX Demod Bits
Digital Radio Receiver Tests	Pre-generated waveforms for DMR and APCO-25 P1/P2 and user custom waveforms can be loaded for use.
	RX Audio Distortion
	RX Audio Metrics (Overall Audio Quality)
	RX Audio Output Power
	RX SINAD

## KS8312xA User Flexibility

For TAP users with programming background, they can further extend the plugin library to customize for specific purpose.

The screenshot displays the Keysight Test Automation software interface. The main window shows a test plan titled "Analog Radio Transmit & Receive Test" with a completion time of 25.7 s. The test plan is organized into steps, each with a name, verdict, duration, and flow indicator. The steps include:

- Key the Radio (4.68 ms)
- Wait for Radio to Settle (250 ms)
- Adjust Rated System Deviation to 40 % (Pass, 2.83 s)
- Tx Audio Distortion (Pass, 4.77 s)
- Adjust Rated System Deviation to 20 % (Pass, 1.23 s)
- Tx Audio Frequency Response (Pass, 3.87 s)
- DeKey the Radio (4.83 ms)
- Rx Audio Output Power (Pass, 1.56 s)
- RX Hum and Noise (Pass, 1.19 s)
- Rx Audio Sensitivity (Pass, 9.90 s)

The right-hand pane shows the "Step Settings" for the selected step, including:

- Instrument Connectivity: M8920A (M8920A Radio Test Set (TCPIP0::localhost::hislip2::INSTR))
- RF Settings: RF Output Port (Transmit/Receive), RF Frequency (452.125 MHz), RF Power Level (-47 dBm), Enable RF Output (checked), Modulation Type (FM)
- Modulation Settings: Modulation Rate (1 kHz), FM Deviation (3 kHz), Enable Modulation (checked)
- Audio Analysis Settings: Average (OFF)
- Limits Settings: Check for Limit (checked), Upper Limit (-51 dB)

The bottom status bar shows 0 Errors, 0 Warnings, 679 Information messages, and 3514 Debug messages. The interface also includes a Log window and various utility buttons like Break at Line, Sources, Search, Filter, and Auto Scroll.

## KS83120A Analog Radio Test Plan

KEYSIGHT Test Automation

File Settings Tools View Help

Test Plan *Digital Radio Transmit & Receive Test*

Step: + - Test Plan: [Icons] Repeat [Dropdown] Completed in 32.1 s (239% slower than average)

Step Name	Verdict	Duration	Step Type
<input checked="" type="checkbox"/> Key The Radio		500 ms	Radio Test Generic DUT Control \ Specific USB relay for key line PTT
<input checked="" type="checkbox"/> TX FSK Error (DMR)	Pass	185 ms	Radio Test Digital \ Transmitter Test \ TX FSK Error (DMR)
<input checked="" type="checkbox"/> TX Modulation Fidelity (APCO P25)	Pass	91.3 ms	Radio Test Digital \ Transmitter Test \ TX Modulation Fidelity (APCO P25)
<input checked="" type="checkbox"/> TX Output Power	Pass	310 ms	Radio Test Digital \ Transmitter Test \ TX Output Power
<input checked="" type="checkbox"/> TX Symbol Deviation	Pass	191 ms	Radio Test Digital \ Transmitter Test \ TX Symbol Deviation
<input checked="" type="checkbox"/> DeKey The Radio		500 ms	Radio Test Generic DUT Control \ Specific USB relay for key line PTT
<input checked="" type="checkbox"/> Play ARB Waveform		1.36 s	Radio Test Digital \ Receiver Test \ Play ARB Waveform
<input checked="" type="checkbox"/> RX Audio Metrics	Pass	647 ms	Radio Test Digital \ Receiver Test \ RX Audio Metrics
<input checked="" type="checkbox"/> Play LMR Waveform	Pass	13.1 ms	Radio Test Digital \ Receiver Test \ Play LMR Waveform
<input checked="" type="checkbox"/> RX Audio Distortion	Pass	23.3 s	Radio Test Digital \ Receiver Test \ RX Audio Distortion
<input checked="" type="checkbox"/> Rx Audio Output Power	Pass	697 ms	Radio Test Digital \ Receiver Test \ Rx Audio Output Power
<input checked="" type="checkbox"/> RX SINAD	Pass	678 ms	Radio Test Digital \ Receiver Test \ RX SINAD

**Step Settings**

Instrument Connectivity: M8920A My Radio Test Set (TCPIP0::localhost::hislip)

RF Settings

RF Input Port: TR

RF Frequency: 851.0125 MHz

Modulation Type: APCO25\_C4FM

Expected Power: 36 dBm

Amplitude Power Offset: 0 dB

Average: OFF

Limits Settings

Check for Limit:

Upper Limit: 5%

Log

Errors 0  Warnings 0  Information 0  Debug 0

Sources Search Filter Auto Scroll

KS83122A Digital Land Mobile Radio Test Plan

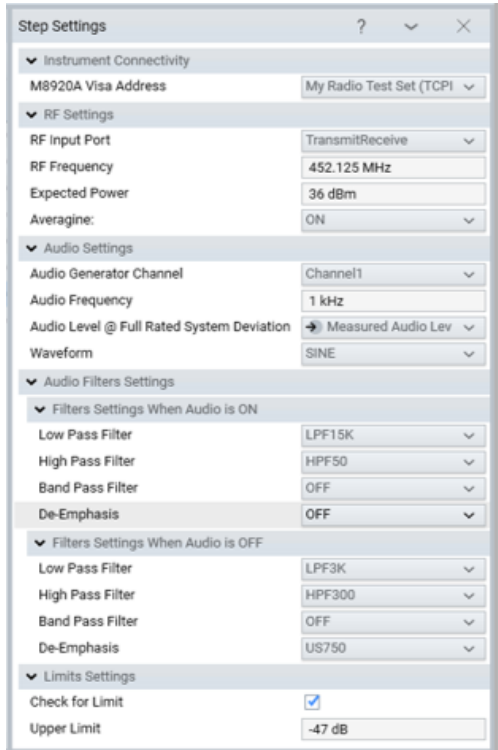
The M8920A Radio Test Set has a corresponding list of available test step configurations available as shown. Unrelated parameters can be hidden to avoid confusion.

The image displays two overlapping windows from a Keysight software interface. The left window, titled 'Steps', contains a search bar and a tree view of test configurations. Under 'Analog Radio Test', the 'Receiver Test' section is expanded, showing several options with 'Add' and 'Add Child' buttons. 'RX Hum and Noise' is highlighted. Below this, the 'Transmitter Test' section is also expanded. At the bottom of the 'Steps' window, there is a text box explaining the 'RX Hum and Noise' ratio.

The right window, titled 'Step Settings', shows the configuration for the selected 'RX Hum and Noise' step. It is divided into several sections: 'Instrument Connectivity' (M8920A Visa Address: My Radio Test Set (TCP)), 'RF Settings' (RF Input Port: TransmitReceive, RF Frequency: 452.125 MHz, Expected Power: 36 dBm, Averagine: ON), 'Audio Settings' (Audio Generator Channel: Channel1, Audio Frequency: 1 kHz, Audio Level @ Full Rated System Deviation: Measured Audio Lev, Waveform: SINE), 'Audio Filters Settings' (Filters Settings When Audio is ON: Low Pass Filter: LPF15K, High Pass Filter: HPF50, Band Pass Filter: OFF, De-Emphasis: OFF; Filters Settings When Audio is OFF: Low Pass Filter: LPF3K, High Pass Filter: HPF300, Band Pass Filter: OFF, De-Emphasis: US750), and 'Limits Settings' (Check for Limit: checked, Upper Limit: -47 dB).

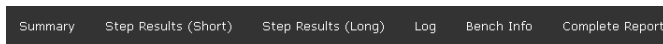
**The hum and noise ratio is the ratio of the rated output power to the residual output power in the absence of modulation, both measured at standard input signal level. Please NOTE: Make sure to Operate the receiver at rated output power**

Users can conveniently modify test parameters and operating conditions to match radio performance operating parameters. An example use case is when user is defining multiple test conditions for a specific radio.



## Test Results

Once the testing is completed users can generate a report with optional KS8104A HTML5 Results Listener Plugin:



**Test Report**      Analog Radio Transmit & Receive Test  
**Report generated**    2018-11-09T00:01:37Z  
**Operator**            Radio Technician 01  
**Station**             Test Station 3

Test Step Name	Verdict	Duration
Key the Radio	NotSet	00:00:00.0046876
Wait for Radio to Settle	NotSet	00:00:00.2501193
Adjust Rated System Deviation to 40 %	Pass	00:00:02.8336672
Tx Audio Distortion	Pass	00:00:04.7765338
Adjust Rated System Deviation to 20 %	Pass	00:00:01.2330587
Tx Audio Frequency Response	Pass	00:00:03.8764549
DeKey the Radio	NotSet	00:00:00.0048379
Rx Audio Output Power	Pass	00:00:01.5672211
RX Hum and Noise	Pass	00:00:01.1930469
Rx Audio Sensitivity	Pass	00:00:09.9014075

## KS8400A Test Automation Platform

The KS8400A Test Automation Platform (TAP) is the base software which manages and executes test sequences of the M8920A Radio Test Set. The TAP's modular architecture allows you to flexibly create and customize test sequences. You can easily construct and modify test sequences in the TAP editor, by adding the setup and measurement steps provided by the KS83120A plugins. Most of the M8920A measurement items are available as TAP test steps and editable.

## PathWave Test Software Ordering Information

Product Number	Description
KS8400A	Test Automation Platform (TAP) Development Software
KS83120A	Analog Radio Test Software Plug-In (Optional)
KS83122A	Digital Radio Test Software Plug-In (Optional)
KS83123A	Tracking Generator Radio Test Software Plug-In (Optional)
KS8104A	Results Listener Plug-In (Optional)
KS8000A	Deployment System Software (Optional)

## Supported Hardware

Model Number	Description
<b>M8920A</b>	<b>PXIe Radio Test Set</b>

## Installation Requirements

### System and Installation Requirements

- Microsoft Windows 10: Home, Professional, Enterprise or Education (32- or 64-bit)
- At least 1 GB free disk space
- Minimum 1024x768 video monitor

### Prerequisite drivers and software

- KS84XXA, KS8000A (version 8.3 or higher)
- Keysight IO Libraries Suite Version 15.0 or above
- For software development: Microsoft Visual Studio 2015 or 2017 Professional or Enterprise editions recommended
- Microsoft .net v3.5 or 4.6.2 or later.



## Related Literature

For more detailed product and specification information refer to the following literature and web pages:

Publication title	Publication number
KS8400A Test Automation on PathWave Technical Overview	5992-1909EN
KS8000A Test Automation on PathWave Deployment System Software Technical Overview	5992-2658EN
KS8104A HTML 5 Results Listener Plugin Technical Overview	5992-3016EN
M8920A PXIe Radio Test Set Technical Overview	5992-2821EN
M8920A PXIe Radio Test Set Data Sheet	5992-2802EN
M8920A PXIe Radio Test Set Getting Started Guide	M8920-90001
M9470A PXIe 50W Interface Module Data Sheet	5992-3140EN

## Additional Information

Product webpages:

[www.keysight.com/find/KS83120A](http://www.keysight.com/find/KS83120A)  
[www.keysight.com/find/KS83122A](http://www.keysight.com/find/KS83122A)  
[www.keysight.com/find/KS83123A](http://www.keysight.com/find/KS83123A)  
[www.keysight.com/find/PathWave](http://www.keysight.com/find/PathWave)  
[www.keysight.com/find/pathwavetest](http://www.keysight.com/find/pathwavetest)  
[www.keysight.com/find/M8920A](http://www.keysight.com/find/M8920A)  
[www.keysight.com/find/N9093](http://www.keysight.com/find/N9093)  
[www.keysight.com/find/PXI](http://www.keysight.com/find/PXI)

Keysight I/O Libraries:

[www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite)

Signal Studio Software:

[www.keysight.com/find/signalstudio](http://www.keysight.com/find/signalstudio)

89600 VSA Software:

[www.keysight.com/find/89600](http://www.keysight.com/find/89600)

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

