

Automation Platform for Automotive Radar

Pre-defined setups and user interface for test configuration and sequencing of automotive radar analysis.

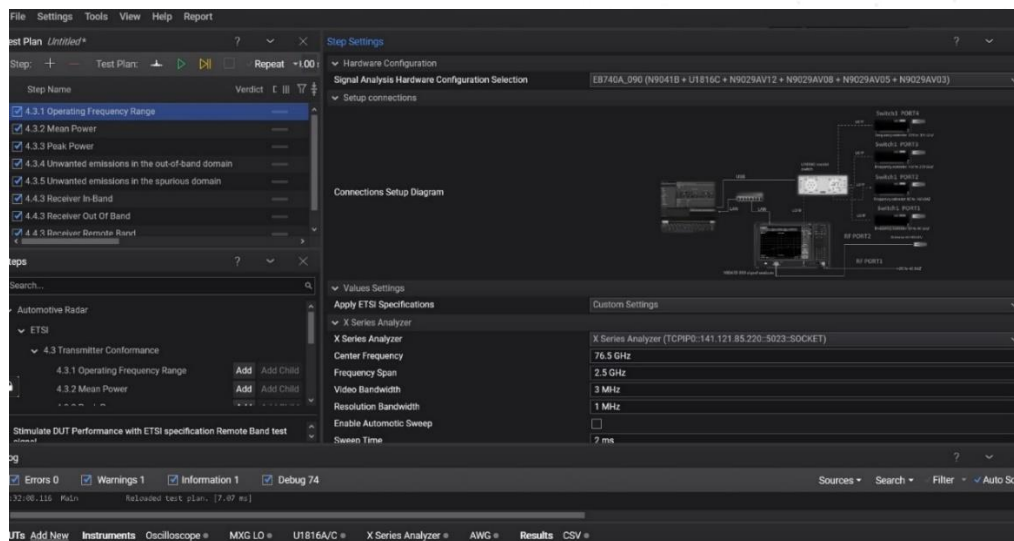


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Introduction

Keysight Automation Platform for Automotive Radar

It's exciting to see what's happening with automotive radar. What was once reserved for luxury vehicles has become a standard feature of mid-class cars. Today, as OEMs pursue the development of autonomous vehicles, radar technology is not standing still: higher frequencies, wider bandwidths, better resolution, and multiple targets. As a project manager, one key to success is helping your team stay current with the challenging technologies, evolving standards, and emerging test requirements related to automotive radar systems.

Setting up test systems and test scenarios for each new radar standard in each part of the world that you sell your radar modules can be time consuming and expensive. The test standards are dynamic and rewriting test software is impractical. In addition to that, there are new requirements coming online for interference testing. And, of course, there are the concerns of mmWave technologies where the adjustment of any part of the test can cause an error. Calibrating these high-end instruments can be time consuming and tricky. The Keysight KS83200A software can help with all these items.

The Keysight KS83200A automation platform for automotive radar has four crucial components:

- Preconfigured routines for system calibration and module testing
- Fast, efficient automation of complex test procedures
- Timely updates that track evolving standards
- A library of instrument drivers.

With proven automation applications, you can achieve maximum consistency in the setting, calibrating, running and reporting of tests versus the latest version of each relevant standard.

Keysight Automation Platform for Automotive Radar application license variations

- KS83200A Automation platform for automotive radar - enable basic features, test sequence with a loop/sweep
- KS83RT0A Automation platform for automotive radar - Rx and Interference test
- KS83ST0A Automation platform for automotive radar tests according to ETSI standards

Each of the above come with the following license types node-locked – to once computer or transportable (moveable between computers). Support and updates are included for the time you choose and can be renewed at 6-, 12-, 24- or 36-month intervals.

Note: This software is a plug in to Keysight TAP. Please see ordering details for more information.



Cover all the standards

Look for a software platform that provides immediate access to test routines and test cases that verify compliance with the latest radar test standards. Further enabling the ADAS of the module and ultimately the vehicle.

Features

Using the Keysight KS83200A automation platform for automotive radar greatly simplifies compliance testing. The software automatically connects to and configures all the required test equipment, reducing the overall test time.

The Keysight KS83200A automation platform for automotive radar software offers several features to simplify the validation of automotive radar designs:

- User interface for test configuration and sequencing
- Libraries of test cases for specific automotive radars
- Immediate access to test cases for the major standards including ETSI. Other standards will be added such as TELECOM, FCC, ARIB, KCC, and more
- Functional blocks for testing of transmitters (e.g., signal analysis) & receivers (e.g., signal generation)
- Automatic connection and configuration to all necessary instrumentation, including calibration information
- Provides detailed information of each test that has been run
- Automated reporting in a comprehensive pass/fail HTML format with margin analysis

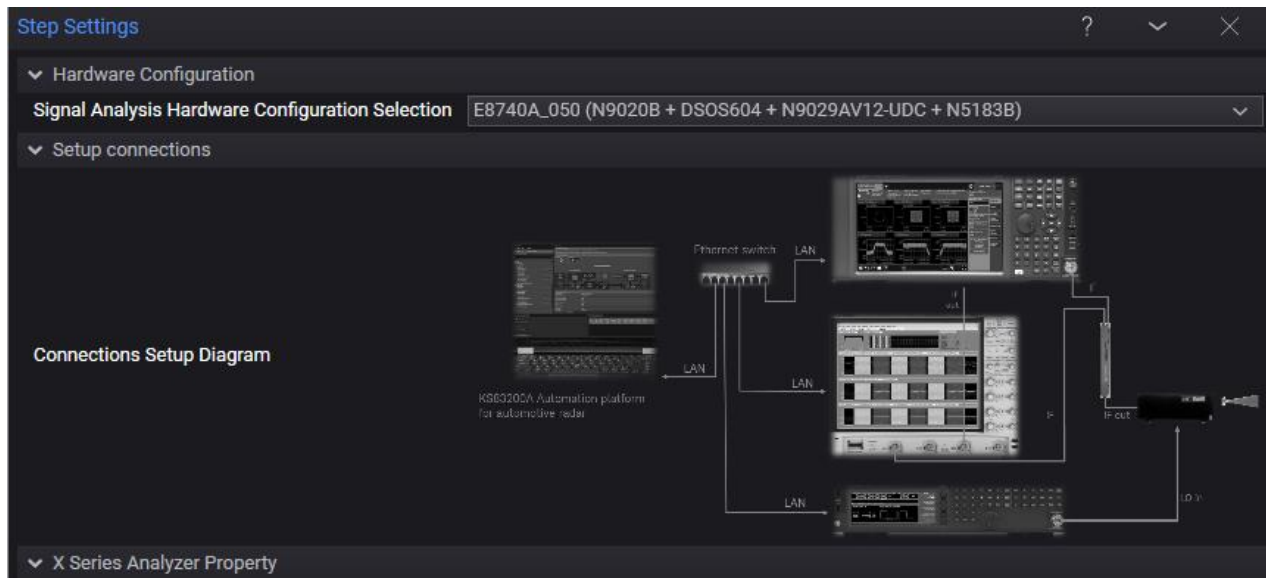
KS83200A software saves you time

The KS83200A automation test software saves you time by setting the stage for automatic execution of standard signal analysis and signal generation radar tests. Undoubtedly some of the difficulties of performing tests for transmission compliance of automotive radar are properly connecting to the high-frequency instrumentation that is required for mmWave standards. Connecting, configuration, loading the proper calibration files, and then analyzing the measured results by comparing them to limits published in the specifications. The KS83200A automation platform does much of this work for you.

The KS83200A software automatically configures the instruments for each test and provides an informative results report that includes margin analysis indicating how close your product is to passing or failing each specification.

Connection Diagram

To help ensure that you have each hardware configuration setup correctly there is a diagram that appears with the measurement values.



If you are in situation where you need to connect to an instrument that is not within the hardware configuration there is a simple setup wizard that will guide you through the steps.

 System Configuration Wizard

×

Step 3 of System Configuration Wizard:

Configure hardware address/IP

☒ Add this Instrument

Configure N9020B VISA Address

Enter the name of the Hardware

Test I/O

Instrument Information

#	Instrument	Model #	Serial #	Firmware

Back

Finish

Cancel

Libraries of Test Routines

Available immediately to pull from are a list of test routines that are common to all automotive radar transmit and receiver testing. Availability to these routines saves you time – because you don't have to go look them up or remember the thresholds required.

KS83200A Test Items Available

Each test case offers specific test items. The tests for the basic version KS83200A fall within three groups signal analysis, signal generation and signal quality measurements.

Signal Analysis

Signal analysis is all about testing to see if the transmitting portion of the DUT is functioning correctly, so we are receiving signals from the DUT and measuring those against certain criteria.

- Channel Power
- Occupied BW

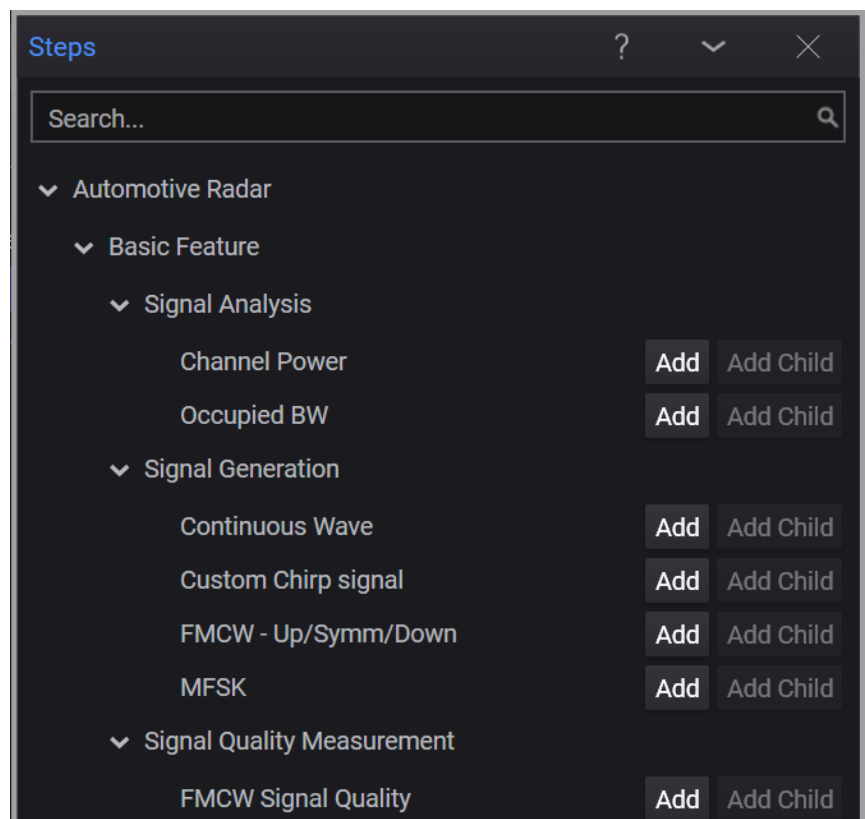
Signal Generation

Signal generation is looking to test the receiver of the DUT, so generating signals of a certain type, duration, modulation and then checking how the DUT handles each.

- Continuous Wave (CW)
- Custom FM Chirp signal
- FMCW Up/Symm/Down
- MFSK

Signal Quality Analysis

- FMCW Signal Quality



KS83200A test cases. Selectable from signal analysis, signal generation or signal quality analysis.

KS83ST0A Test Items Available

The KS83ST0A software adds the ETSI test cases to the selection options. The ETSI plug-ins are divided into Transmitter Conformance and Receiver Conformance sections.

Transmitter Conformance

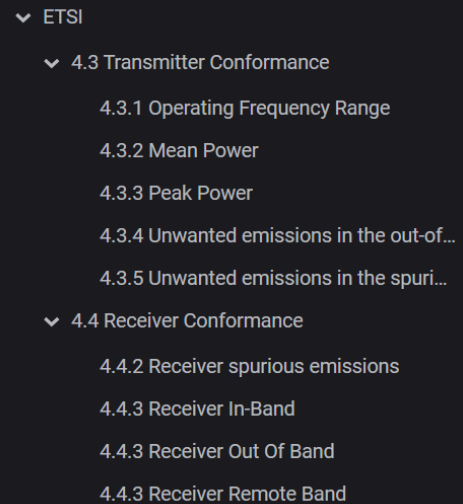
Signal analysis is all about testing to see if the transmitting portion of the DUT is functioning correctly, so we are receiving signals from the DUT and measuring those against certain criteria.

- Operating Frequency Range
- Mean Power
- Peak Power
- Unwanted emissions out-of-band
- Unwanted emissions in the spurious domain

Receiver Conformance

Signal generation is looking to test the receiver of the DUT, so generating signals of a certain type, duration, modulation and then checking how the DUT handles each.

- Receiver spurious emissions
- Receiver in-band
- Receiver out-of-band
- Receiver remote band



Standards Covered

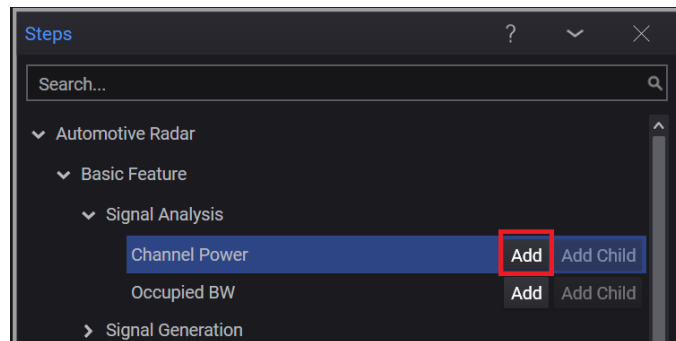
ETSI standard *	Description
EN 301 091	Radar equipment operating within 76 to 77 GHz Part 1: Ground based vehicular radar Part 2: Fixed infrastructure radar equipment Part 3: Railway/Road Crossings obstacle detection
EN 302 264	Short Range Radar equipment operating within 77 to 81 GHz
EN 302 858	Radar equipment operating within 24 GHz

*Short Range Devices. Transport and Traffic Telematics (TTT). Harmonized Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

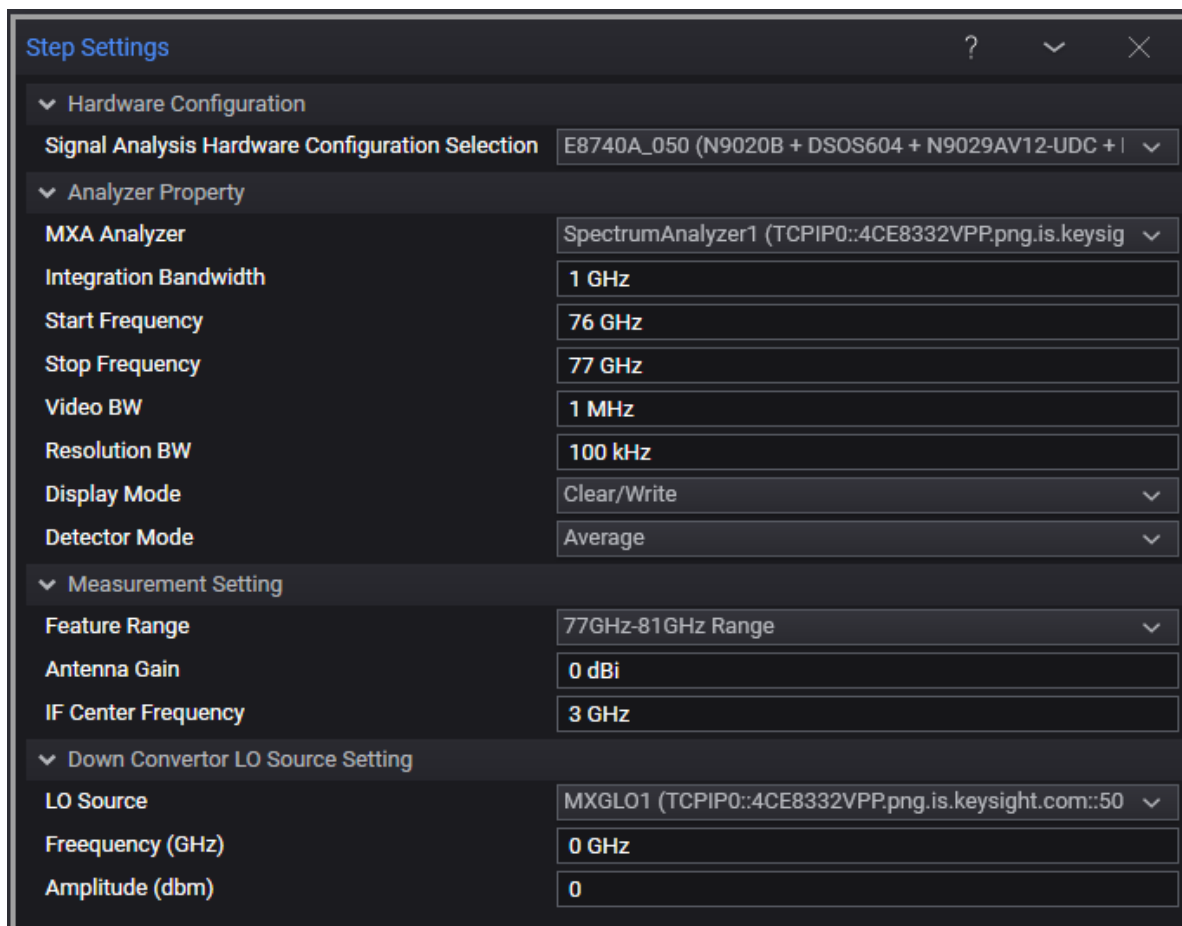
Easy Test Definition

The KS83200A test software enables an ease-of-use that you expect from a test and measurement company. Keysight's KS83200A automation platform for automotive radar walks you through the steps required to define the tests you want to make, set up the tests, perform the tests, and view the results. Straightforward menus let you perform tests with a minimum amount of mouse clicks.

Once a test is selected and added to the test the values that appear are the standard allowable values. The ranges can be changed but only within the conditions that makes sense for that test and hardware configuration.

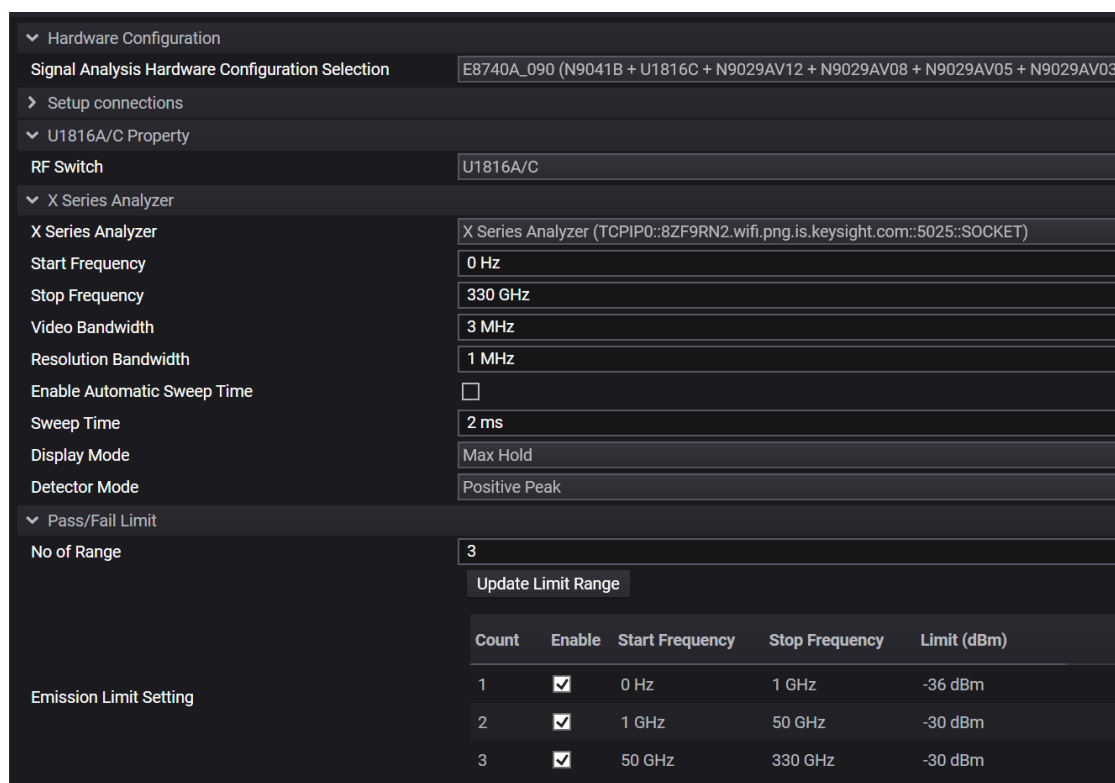
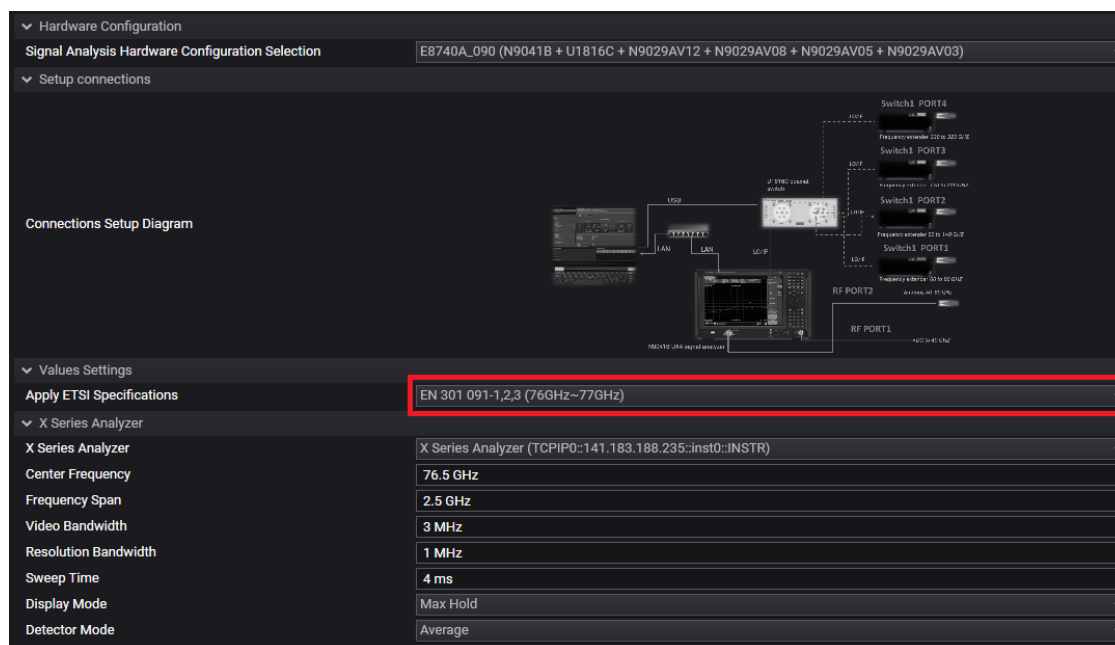


Selecting Channel power test to add.



Measurement values are presented within the ranges that are appropriate according the hardware configuration

For example, with ETSI test cases, after the test step is added, the options appear under the test step settings. You can then choose which hardware configuration, which ETSI specifications you will be testing as well as change the necessary parameters required for testing.



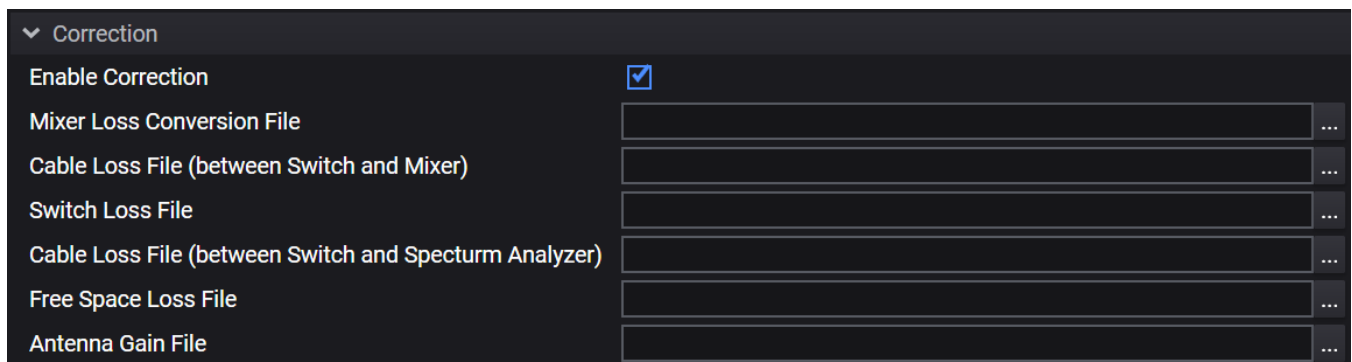
Receiver Spurious Emission test selection and setup

Correction and Calibrations

Corrections are available in ETSI transmitter and receiver test steps settings. The following corrections factors can be applied:

- Mixer Loss Conversion File
- Cable Loss File (between Switch and Mixer)
- Switch Loss File
- Cable Loss File (between Switch and Spectrum Analyzer)
- Free Space Loss File
- Antenna Gain File

Corrections help to compensate for loss. Losses that can be addressed are mixer loss, cable loss (from mixer and switch; switch and spectrum analyzer), free space loss and antenna gain. The correction is only as good as the accuracy of the signal, a calibrated measurement system is essential for this correction method to work.

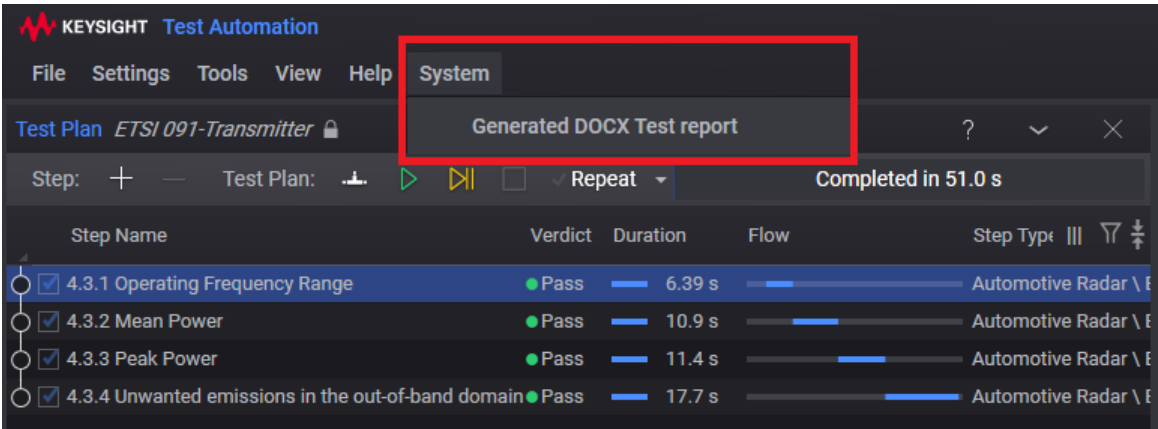


The screenshot shows a software interface for configuring correction factors. It features a dark-themed window with a title bar that says "Correction" with a dropdown arrow. Below the title bar, there is a section titled "Enable Correction" with a checked checkbox. Underneath, there are six rows, each representing a different correction factor. Each row has a text label on the left and a corresponding input field on the right. The input fields are currently empty and each has a small "..." button to its right, indicating a file selection dialog. The correction factors listed are: Mixer Loss Conversion File, Cable Loss File (between Switch and Mixer), Switch Loss File, Cable Loss File (between Switch and Spectrum Analyzer), Free Space Loss File, and Antenna Gain File.

Correction	
Enable Correction	☒
Mixer Loss Conversion File	...
Cable Loss File (between Switch and Mixer)	...
Switch Loss File	...
Cable Loss File (between Switch and Spectrum Analyzer)	...
Free Space Loss File	...
Antenna Gain File	...

Report Generation

The KS83200A automation platform for automotive radar test software documents your test and indicates the pass/fail status, test specification range, measured values, and margin within an exportable DOCX file. Each test includes the test limit, test description, and results including the waveform, if appropriate.



An example test report, is easy to understand with clearly labeled results and documented screen captures.

TEST CASE SUMMARY

Result: PASS

Test Cases Executed: 4 Test Cases Passed: 4 Test Cases Failed: 0

N	TEST CASE	RES
O	ULT	
1	4.3.1 Operating Frequency Range	PAS
2	4.3.2 Mean Power	S
3	4.3.3 Peak Power	PAS
4	4.3.4 Unwanted emissions in the out-of-band domain	S

TEST CASE: 4.3.1 Operating Frequency Range

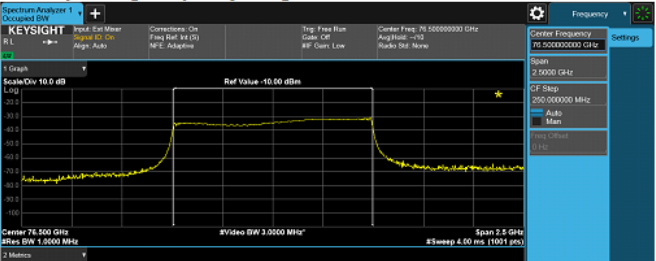
The Result: PASS

Test Data:

FREQUENC	LIMIT	MEASURED	RES
Y	(GHz)	VALUE (GHz)	ULT
Upper Band	7700000000	NA	Pass
Upper Band	NA	NA	Pass

Screen Capture:

4.3.1 Operating Frequency Range Measurement Screen Shot



TEST CASE SUMMARY

Result: PASS

Test Cases Executed: 1 Test Cases Passed: 1 Test Cases Failed: 0

NO	TEST CASE	RESULT
1	4.3.5 Unwanted emissions in the spurious domain	PASS

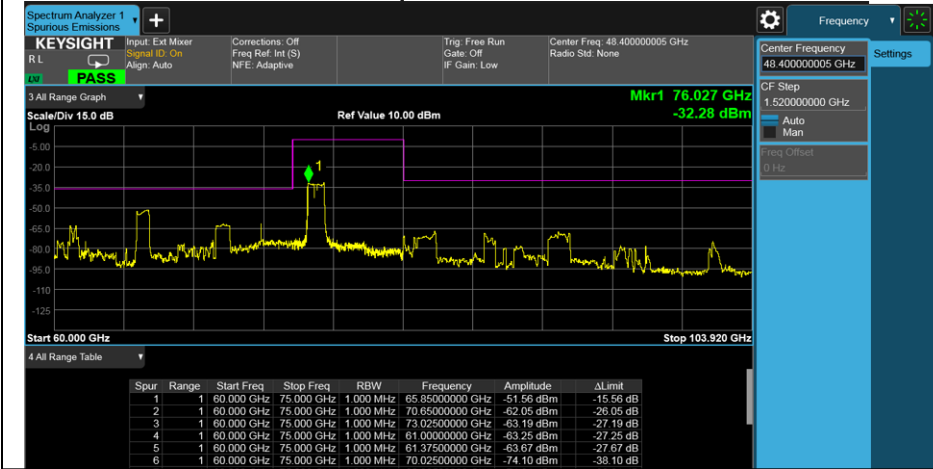
TEST CASE: 4.3.5 Unwanted emissions in the spurious domain

The Result: PASS

Test Data:

Screen Capture:

4.3.5 Unwanted emissions in the spurious domain Measurement Screen Shot



Ordering Details

This software is a plugin to Keysight Test Automation PathWave (TAP) and utilizes VSA software FMCW radar analysis to visualize results on an oscilloscope. Signal Studio is used to generate custom waveforms for the generation solutions.

There are 3 different plugins for automotive radar automation software. The basic version is required to use either of the other two.

Free 30-day Trial

Download the KS83200A, KS83ST0A and KS83RX0A automotive radar automation software and use it free for 30 days to make measurements with your analysis hardware.

Request your free trial license today:

www.keysight.com/find/KS83200A

Software Prerequisites

Model	Description	Comments
89601B-200	Basic VSA and hardware connectivity	VSA software is used to visualize FMCW analysis. Both options are required in configurations that includes an oscilloscope. www.keysight.com/find/vsa
89601B-BHP	FMCW radar analysis	
N7608A	Signal Studio	This is required for signal generation and is utilized in E8740A-070 and E8740A-080. There are a variety of licensing options available. www.keysight.com/find/ss-custom
KS8400A	Test Automation Platform (TAP) Developer's System	This is required software to run the automotive radar plugins below www.keysight.com/find/ks8400a-latest-downloads

Automation Platform for Automotive Radar

Model	Description	Comments
KS83200A	Automation platform for Automotive Radar – Basic	Applicable to all HW configurations; E8740A-010, E8740A-020, E8740A-030, E8740A-040, E8740A-050, E8740A-060, E8740A-070, E8740A-080, E8740A-090.
KS83RX0A	Automation platform for Automotive Radar – Receiver and Interference test	Applicable to E8740A-070, E8740A-080. KS83200A and N7608C are required.
KS83ST0A	Automation platform for Automotive Radar tests according to ETSI standards	Applicable to E8740A-010, E8740A-040, E8740A-050, E8740A-060, E8740A-070, E8740A-080. KS83200A required. Order E8740A-090 for spurious emission

www.keysight.com/find/KS83200A

www.keysight.com/find/KS83RX0A

www.keysight.com/find/KS83ST0A

Software License Types for Automation Software

Licenses are available either as node-locked or transportable and can be purchased with 6-, 12-, 24- or 36-months support.

License definitions

- **Node-Locked:** license is resident on one computer or instrument
- **Transportable:** License may be used on one instrument/computer at a time but may be transferred to another using Keysight's online tools (Keysight Software Manager)

Compatibility Matrix

Software component	E8740A 010	E8740A 020	E8740A 030	E8740A 040	E8740A 050	E8740A 060	E8740A 070	E8740A 080	E8740A 090
KS8400A TAP developer's system	✓	✓	✓	✓	✓	✓	✓	✓	✓
KS83200A Basic Automation platform for Automotive Radar	✓	✓	✓	✓	✓	✓	✓	✓	✓
89601 VSA (200 and BHP)		✓	✓	✓	✓	✓			
N7608A Signal Studio							✓	✓	
KS83RX0A Rx and Interference Automation platform for Automotive Radar							✓ optional	✓ optional	
KS83ST0A ETSI standards Automation platform for Automotive Radar	✓ optional			✓ optional	✓ optional	✓ optional	✓ optional	✓ optional	✓ optional

For more information, visit <http://www.keysight.com/find/KS83200A>.

Learn more at: 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

