

Software for Automotive Applications Solutions

Take a test drive and harness the power of keysight software

CATALOG



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Automotive Software Solutions

The automotive industry is accelerating its electronic technology revolution and fusing with the clean energy ecosystem. With the rapid advances in e-mobility, autonomous driving, connected cars, and automotive electronics, the capabilities we marvel at today may seem basic in just a few years.

Learn how you can deliver innovations faster and better with high-performance automotive software solutions.

Autonomous driving

Keysight commissioned technology research house Dimensional Research to conduct an independent survey of automotive decision-makers. Below are the five focal areas they identified to bridge the gaps in connected autonomous vehicle developmental road maps:

- standardize the approach to testing autonomous vehicle systems
- improve testing technologies to ensure safe autonomous vehicle operation
- pre-empt multiple network connectivity issues
- circumvent automotive cybersecurity risks
- increase resources to mitigate integration challenges



W4525E PathWave Automotive Library

Simulate and verify automotive radar systems with pulse and modulation sources, target and channel models, and automotive signal-processing components.

The Keysight [PathWave Automotive Library](#) allows system designers to quickly analyze the impact of interfering signals on their radar products. The software is part of the PathWave System Design (SystemVue) platform. It includes comprehensive models for automotive radar development and verification, practical example workspaces such as linear frequency-modulated continuous wave, and hardware connectivity to Keysight test equipment to compare simulation and measured data.

- **Technical Overview:** [Ray Tracing in Radar System Simulation](#)
- **Try Before You Buy:** [Request Free Trial](#)



PathWave Automotive Library

KS83200A automation software for E8740A automotive radar signal analysis and generation solution

Test radar transmitters and receivers and validate them to major standards.

The Keysight E8740A automotive radar signal analysis and generation solution provides the hardware and software to analyze and generate automotive radar signals across the entire frequency range for 24 GHz, 77 GHz, and 79 GHz radar. It provides scalable analysis bandwidth from 2.5 GHz to > 5 GHz, depending on test requirements.

The KS83200A software is an automation platform for the E8740A solution, providing a suite of routines that simplify programming, customization, and testing. Timely updates keep you current with the latest standards.

- **Try Before You Buy:** [Request Free Trial](#)
- [Request Quote](#)

E8740A Automotive Radar Signal Analysis and Generation Solution



PathWave Signal Generation software

Create a wide range of general-purpose or standards-based signals such as those required in automotive applications.

PathWave Signal Generation is Keysight's next-generation signal-generation software, providing a consistent and optimized user experience from research and development through manufacturing. The integrated application supports multiple radio formats in a single application. It generates encrypted waveforms for downloading or playback.



PathWave Signal
Generation software

Connected car

The connected car combines the vehicle, communications system, and Internet of Things (IoT). Given the mission-critical safety requirements of modern vehicles and the need for interchangeable multivendor components to work together reliably, designers face more challenges than ever before.

The ability to thoroughly validate the performance of cellular vehicle-to-everything (C-V2X) designs requires radio-frequency, protocol, and application-layer testing against evolving C-V2X standards.

THE ROAD TO AUTONOMOUS DRIVING

SAFETY & CONVENIENCE WITH AUTOMOTIVE COMMUNICATION

Dedicated Short Range Communications (DSRC) or Cellular-Vehicle-to-Everything (C-V2X)

Seamless communication between the vehicle and the environment is crucial as vehicles achieve higher levels of automation. Whether you are working on C-V2X or DSRC/ITS-G5, our V2X solutions are accelerating the industry toward the goal of fully autonomous vehicles.

Radio Design	DSRC 802.11p	C-V2X Release 14/15
Synchronization	Asynchronous	Synchronous
Channel size	10/20 MHz	Rel. 14: 10/20 MHz Rel. 15: 10/20 MHz/50 MHz
Resource multiplexing across vehicles	Time division multiplexing (TDM) only	TDM & frequency-division multiple (FDM) access
Data channel coding	Circular	QPSK
Hybrid automatic repeat request (HARQ) retransmission	No	Rel. 14/15: No Rel. 15: Ultra-reliable communication possible
Waveform	Orthogonal frequency-division multiplexing (OFDM)	Single carrier FDM (SC-FDM)
Resource selection	Carrier sense multiple access with collision avoidance (CSMA-CA)	Carrier-sense multiple access with frequency division
MIMO support	No support standard	4x4 diversity for 2 antennas, beamforming 1x1 diversity for 2 antennas supported
Deployment	Since 2017, OEM rollout in 2018	2020/2021
Roadmap	802.11M/1601 Targets interoperability with 802.11p	C-V2X Rel. 16 based on 5G New Radio Rel. 16 will operate in different channel from Rel. 14/15

Source: AutoTech, IEEE, Qualcomm

Enabling the Road to Autonomous Driving

Leveraging decades of leadership in wireless communications technologies, Keysight brings cutting-edge test and measurement solutions to help you test various applications for connected cars and autonomous driving.

KEYSIGHT DSRC SOLUTIONS
Achieve OmniAir certification for your dedicated short-range communications (DSRC) applications.

KEYSIGHT C-V2X SOLUTIONS
Ensure interoperability and reliability for your C-V2X systems and applications.

KEYSIGHT AUTOMOTIVE ETHERNET COMPLIANCE SOLUTIONS
Perform in-vehicle backplane conformance tests to meet specifications for layers 1-7.

0

NO AUTOMATION
Zero autonomy. Driver performs all driving tasks.

01

DRIVER ASSISTANCE
Vehicle controlled by driver. May include some driving assist features.

02

PARTIAL AUTOMATION
Vehicle has combined automated functions, like acceleration and steering. Driver remains engaged with driving and environment monitoring at all times.

03

CONDITIONAL AUTOMATION
Driver is a necessity, but not required to monitor environment. Driver is ready to take control of the wheel with notice.

04

HIGH AUTOMATION
Vehicle performs all driving functions under certain conditions. Driver may opt to control the vehicle.

05

FULL AUTOMATION
Vehicle performs all driving functions under all conditions. Driver may opt to control the vehicle.

Source: Definitions of Levels 0-5: Society of Automotive Engineers

Get into the fast lane today with the latest technical resources on autonomous driving:
www.keysight.com/find/auto-tips

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AE6910T Automotive Ethernet Tx Compliance software

Verify and debug the physical layer of your automotive Ethernet designs.

Next-generation advanced driver-assistance systems require camera and radar systems with increasingly high resolution, which means new requirements for speed and bandwidth. Automotive Ethernet enables faster data communication and demands rigorous compliance verification using test cases that cover transmitters (Tx), receivers (Rx), and harness / connector assemblies.

Keysight solutions automate testing and validation across Tx, Rx, and the connections between automotive Ethernet devices. The Keysight **AE6910T Automotive Ethernet Tx Compliance software** covers two standards and six data rates:

- IEEE 10BASE-T1S, 100BASE-T1, 1000BASE-T1, 2.5GBASE-T1, and 5GBASE-T1
- OPEN Alliance TC14, TC1, TC8, TC12, TC15
- The Keysight **AE6900T Automotive Ethernet Tx Compliance solution** provides the hardware and accessories you need to get up and running quickly.
- **Video: Overview of Keysight Automotive Ethernet Transmit Solution**
- **Try Before You Buy: Request Free Trial**

AE6910T Automotive Ethernet
Tx Compliance software



D9020AUTP High-Speed Automotive Protocol Decode / Trigger software

Enable protocol-level trigger conditions for automotive Ethernet OABR (OPEN Alliance BroadR-Reach) and IEEE (Institute of Electrical and Electronics Engineers) standards.

Keysight's **High-Speed Automotive Protocol Decode / Trigger software** includes a suite of configurable protocol-level trigger conditions specific to automotive Ethernet OABR and IEEE standards. The multitab protocol viewer includes correlation between the waveforms and the selected packet, enabling you to quickly move between the physical and protocol layer information using the time-correlated tracking marker.

This application comes installed on Keysight Infiniium oscilloscopes, so there are no files to download and install.

- **Application Note:** [Latency in Automotive Ethernet Switches](#)
- **Try Before You Buy:** [Request Free Trial](#)

D9020AUTP High-Speed Automotive Protocol Decode / Trigger software



Battery test

EP1150A PathWave Lab Operations for Battery Test

Accelerate and optimize the planning and coordination of battery test operations.

Keysight's [PathWave Lab Operations for Battery Test](#) enables efficient planning and coordination of an entire battery test laboratory. It manages all resources, including test facilities, test systems, and test objects or devices under test.

This powerful software suite provides an integrated, web-based lab management platform that helps you modernize your test workflows, eliminating legacy paper-based processes and increasing data integrity and traceability. The tools help you improve test throughput for the battery cell, module, and pack tests you need to perform to fulfill testing requirements and optimize test asset utilization.

- **Video:** [Keysight PathWave Lab Operations for Automotive Test](#)
- **Data Sheet:** [PathWave Lab Operations for Battery Test](#)



BT2192A Self-Discharge Measurement System software

BT2192A Self-Discharge Measurement System software

Measure stable self-discharge current in as little as 30 minutes.

The Keysight **Self-Discharge Measurement System** software delivers a revolutionary reduction in the amount of time required to measure cell self-discharge current using a potentiostatic measurement method with the characteristics needed to accurately make the direct current measurement.

For smaller cells, such as cylindrical 18650 or 21700 cells, you can quickly measure stable self-discharge current in 30 minutes to two hours, depending on the cell characteristics. For larger-capacity pouch cells (10 to 60 Ah, for example), this process takes as little as one to four hours.

- **Application Note:** Evaluate Self-Discharge of Lithium-Ion Cells in a Fraction of the Time Traditionally Required
- **Try Before You Buy:** Request Free Trial

BT2155A Self-Discharge Analysis software

Measure and record lithium-ion cell self-discharge current and cell voltage.

Keysight's **Self-Discharge Analysis** software, controlling the **BT2152B** self-discharge analyzer, measures and records Li-Ion cell self-discharge current and cell voltage. The software configures the analyzer's channel settings, including initial voltage and current matching, channel limits, measurement intervals, and test duration.

The combination of the BT2155A software and the BT2152B delivers a revolutionary reduction in the amount of time required to measure cell self-discharge current.

- **Application Note:** **Removing Noise in Lithium-Ion Battery Cell Self-Discharge**
- **Try Before You Buy:** **Request Free Trial**

BT2155A Self-Discharge
Analysis software



E-Mobility

Better battery performance, improved electric drivetrains, availability of efficient charging stations, and better power conversion across the entire e-mobility ecosystem have increased the range of hybrid and electric vehicles (EVs).

Accurate design and test of EV powertrain components such as traction motors, converters, power converters, and batteries are critical to ensuring safe and reliable next-generation vehicles.

Scienlab Charging Discover Test software

Get visual measured values, record test sequences, and generate reports for greater insight.

Keysight's **Scienlab Charging Discover Test software** works with the **Scienlab Charging Discovery System** to provide a modular test environment for EV and electric vehicle supply equipment (EVSE) charging systems. Tailored to the requirements of the charging technology application, the software lets you significantly accelerate charging interface testing. It delivers better visualization of measured data, easily records test sequences, and generates reports.

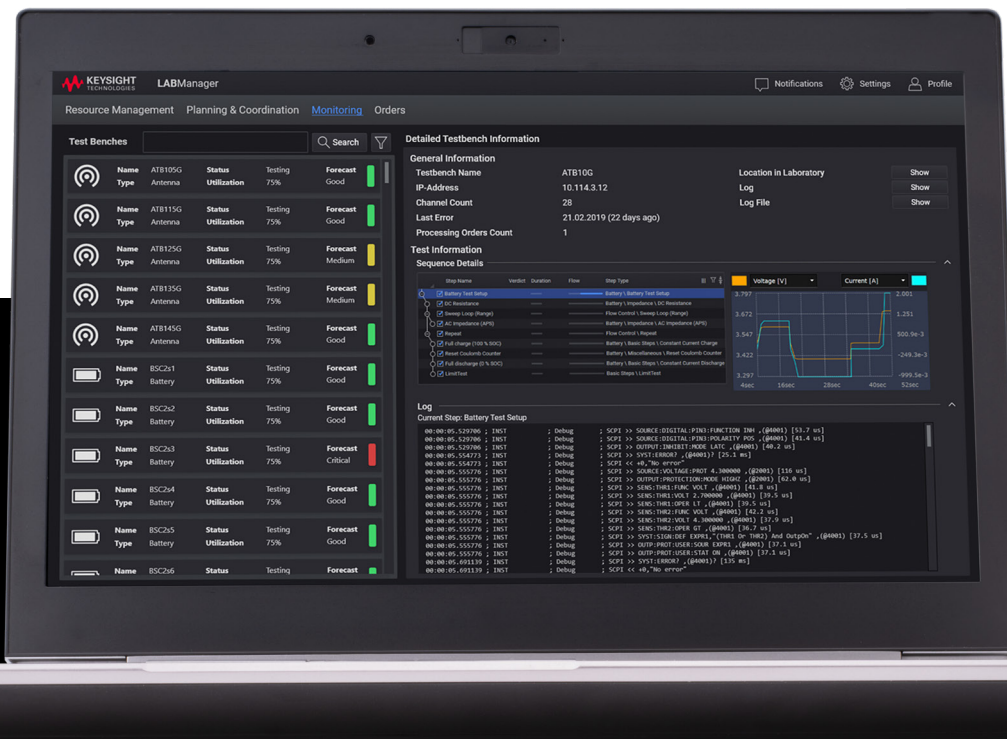


Lab management

PathWave Lab Operations for Connectivity

Get a full 360-degree view of your lab workflows.

With Keysight's **PathWave Lab Operations for Connectivity**, you have a 360-degree view of your lab's workflow. This solution allows full control of your lab, from test ordering to execution and tracking of tests and resources, through data analysis, storage, and report generation. Test and lab managers get deeper insights into the workings of their labs. The modularity of the platform allows you to choose the best options for managing your lab, giving you flexibility based on your requirements.



PathWave Lab Operations
for Connectivity

Manufacturing

For automotive manufacturers, maximizing the factory floor and lowering production costs are critical. Automation via Industry 4.0 holds the key.

PathWave Manufacturing Analytics software

Build it better with actionable insights with Industry 4.0 big data advanced analytics.

Combining test and measurement expertise with data science and big data engineering, Keysight's **PathWave Manufacturing Analytics** software provides actionable insights for every level in your organization. Improve yield, lower retest and handling, and reduce the costs associated with poor quality using big data advanced analytics. Accelerate return on investment and business outcomes with unique, innovative analytics.

- **Case Study:** **Reducing Time to Market with PathWave Manufacturing Analytics**

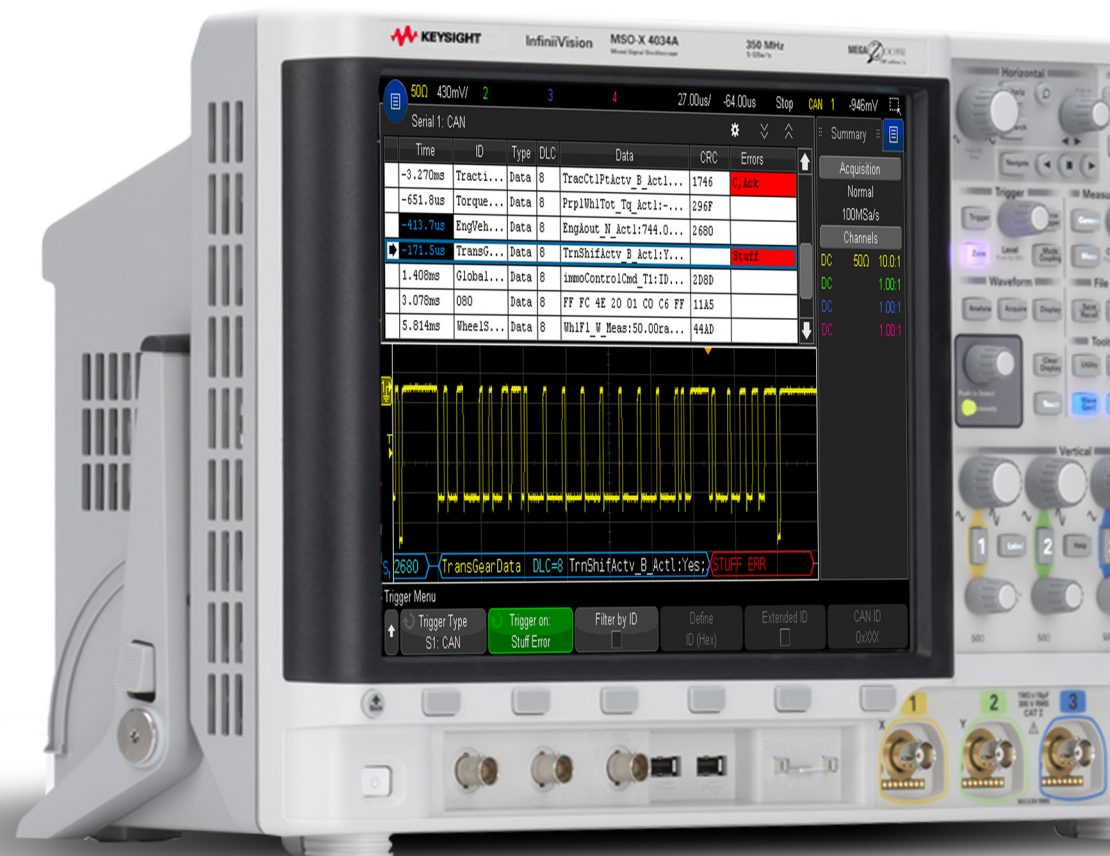


InfiniiVision Oscilloscope Automotive Software

Keysight's InfiniiVision digital oscilloscopes are the tool of choice for engineers worldwide, enabling them to make measurements they can trust, from basic debugging to deep analysis. InfiniiVision oscilloscopes provide the fastest waveform update rates, an intuitive user interface, and high-end software for automotive applications. Extending your oscilloscope's capabilities to cover automotive applications has never been easier with InfiniiVision's up to seven-in-one instrument integration and upgradeable bandwidth (50 MHz to 6 GHz), digital channels (MSO), WaveGen built-in function generator option, and application-specific software.

The Automotive Software Package for Keysight's InfiniiVision oscilloscopes enables protocol triggering and decode for a broad range of common automotive serial buses used for power train and body control and monitoring. This package enables other advanced analysis capabilities, including eye-diagram mask testing and frequency response analysis, to help test and debug automotive electronic systems.

InfiniiVision 4000 X-Series



If you already own an InfiniiVision oscilloscope, choose the following automotive software license that's right for you and buy it online or request a 30-day free trial.

InfiniiVision oscilloscope	License		Capabilities	
2000 X-Series	D2000AUTB	<ul style="list-style-type: none"> Try before you buy: Request free trial Buy today 	Test and debug CAN and LIN designs quickly and easily with triggering, decoding, and mask testing.	Learn more >
3000 X-Series	D3000AUTB	<ul style="list-style-type: none"> Try before you buy: Request free trial Buy today 	Get CAN, CAN FD, LIN, FlexRay, SENT, PS15, and CXPI triggering and decoding for the 3000 X-Series oscilloscopes, along with mask testing, advanced math, and more. Also available as part of the DSOX3054AUT bundle.	Learn more >
4000 X-Series	D4000AUTB	<ul style="list-style-type: none"> Try before you buy: Request free trial Buy today 	Get CAN, CAN FD, LIN, FlexRay, SENT, PS15, and user-definable NRZ trigger and decode, along with mask testing and frequency response analysis.	Learn more >
6000 X-Series	D6000AUTB	<ul style="list-style-type: none"> Try before you buy: Request free trial Buy today 	Get CAN, CAN FD, LIN, FlexRay, SENT, PS15, CXPI, and user-definable NRZ trigger and decode, along with mask testing and frequency response analysis.	Learn more >



If you don't already own an InfiniiVision oscilloscope, **save 25% on InfiniiVision automotive application bundles**. The bundles include an InfiniiVision oscilloscope plus curated hardware and software that enable you to quickly test and debug automotive systems.

Bundle Model Number

What's Included

DSOX3054AUT (better)	<ul style="list-style-type: none">• DSOX3054T: 4-channel, 500-MHz oscilloscope• D3000AUTB: Automotive software option• DSOX3WAVEGEN: Function / arbitrary waveform generator• N2818A: 200-MHz differential active probe• DSOXLAN: LAN/VGA module
MSOX4154AUT (best)	<ul style="list-style-type: none">• MSOX4154A: 4+16 channel, 1.5-GHz mixed-signal oscilloscope• D4000BDLB: Ultimate bundle software option• DSOX4WAVEGEN2: 2-channel function / arbitrary waveform generator• N2818A: 200-MHz differential active probe

Hardware Solutions for Automotive Test Solutions

Cellular V2X test solution

Meet evolving 5G test standards for autonomous driving applications with C-V2X tests

Automotive radar interference and receiver test

Accelerate automotive radar module testing

eCall / ERA-GLONASS conformance test

Get ready for next-generation eCall conformance requirements

Automotive Ethernet compliance solutions

Perform end-to-end functional and standards-compliance conformance testing of automotive Ethernet chipsets and devices

Scienlab battery test systems

Perform accurate tests for cells, modules, packs, and battery management systems

Scienlab charging discovery system

Test EV and EVSE charging interfaces

Other Resources



[Automotive Solutions Catalog](#)

[Basic Automotive Test Products Catalog](#)

[Design and Test Solutions for Automotive and Energy eBook](#)

[Online Learning: Automotive and Energy](#)



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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