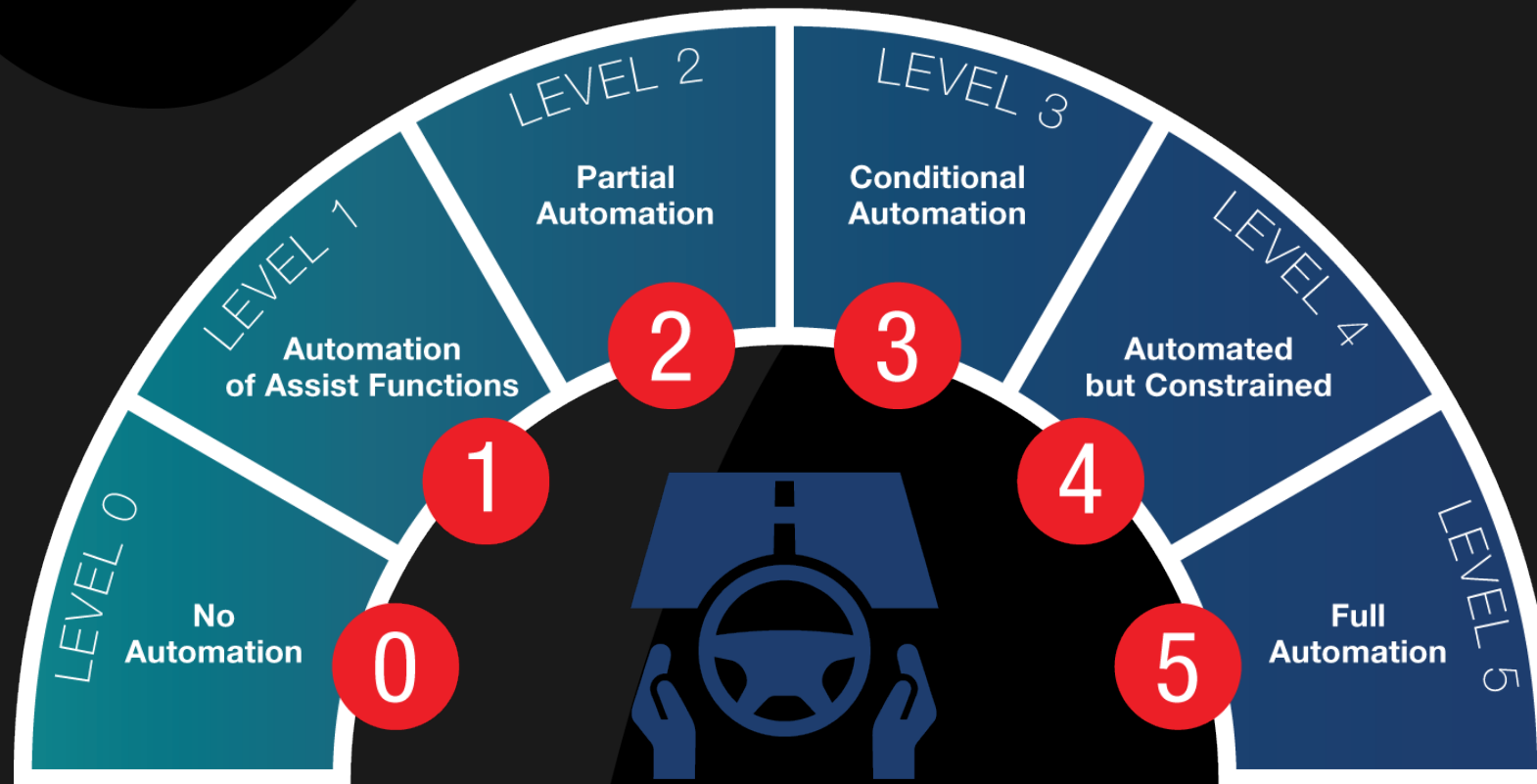




Advancing Autonomous Driving

- Designing autonomous vehicles demands rigorous testing of sensor-fusion and communication technologies.



ADAS / AV Overview



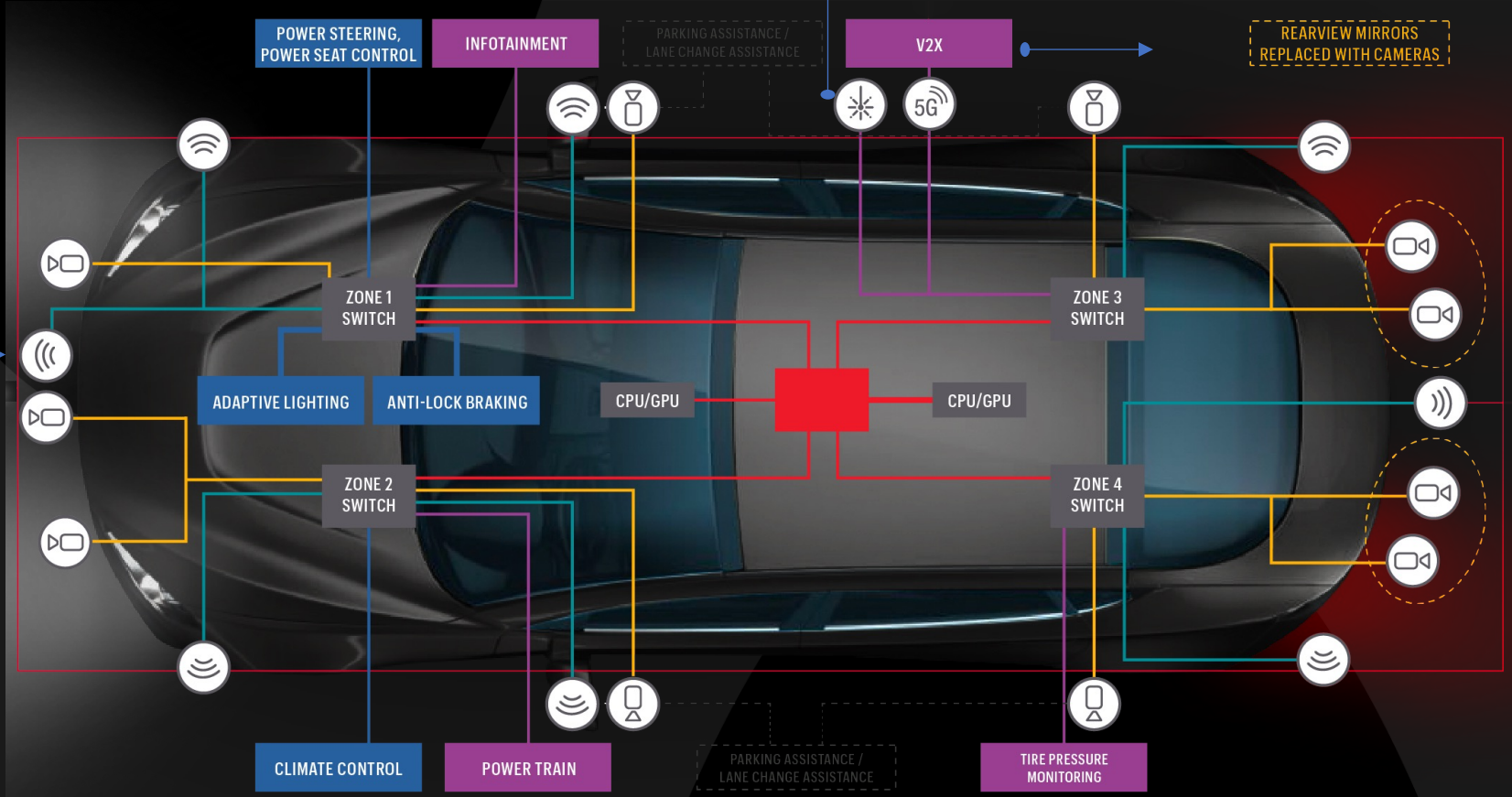
- Automotive Connectivity Test
- 2G → 5G
 - eCall, NG eCall
 - CV2X incl. CV2X Hi
 - lab-to-field and ITS test tools – WaveBee portfolio
 - GNSS emulation
 - WLAN, Bluetooth, UWB



- Automotive Radar Test:
- RF Tx/Rx characterization
 - Radar target simulation
 - Radar scene emulation



- In-Vehicle Networking - PHY Test:
- Compliance
 - Protocol verification
 - Protocol trigger



REARVIEW MIRRORS REPLACED WITH CAMERAS



Automotive Cybersecurity Penetration Test

LEGEND

CAN-FD OR 10 MBPS AUTOMOTIVE ETHERNET	100 MBPS AUTOMOTIVE ETHERNET	1 GBPS AUTOMOTIVE ETHERNET	10 GBPS AUTOMOTIVE ETHERNET	> 10 GBPS SERDES	RADAR	LIDAR
					CAMERA	

General purpose: Test equipment to perform OTA/spectrum measurements on all the wireless technologies

Automotive Radar

Use advanced mmWave technology for your automotive radar design verification and performance tests.



Radar Scene Emulation

Achieve full-scene emulation in the lab; emulate objects with up to 512-pixel resolution, and at distances as close as 1.5 meters.



Automotive Radar Module Testing

Signal generation and analysis across the full frequency range for 24 GHz, 77 GHz and 79 GHz.

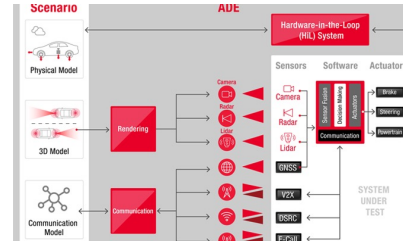


Radar Target Simulation

Interference, multi-target, multi-angle testing for automotive radars operating between 76 GHz to 81 GHz.

Automotive Communications

Vehicle-to-everything (V2X) technology provides non-line-of-sight communications to complement sensor fusion applications for robust ADAS and automated driving use cases.



C-V2X Autonomous Drive Emulation

Enhance validation of your cellular-V2X applications with synchronous testing of communication-based systems.

C-V2X Testing for Evolving 5G Standards

Enables RF, protocol, and application-layer testing, as well as future releases of 5G NR C-V2X.

802.11p, DSRC and ITS-G5 Testing

Dedicated short-range communications OmniAir certification test, with complete RF measurements and protocol testing.

Lab-to-Field - WaveBee V2X Eco System

Testing & Verification Systems



WaveBee Hive
V2X HiL Test System
(AV1000A)



WaveBee Togo
Mobile V2X Simulator
(AV1024A)



WaveBee Touch
Mobile V2X Analysis and
Validation System (AV1021A)

Development Systems

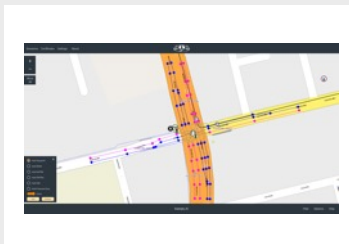


WaveBee Plus
V2X Development and
Streaming Platform (AV1022A)

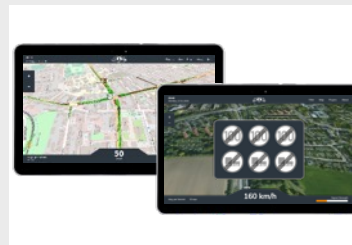


WaveBee Road
V2X Roadside Unit
(AV1023A)

Testing & Verification Software

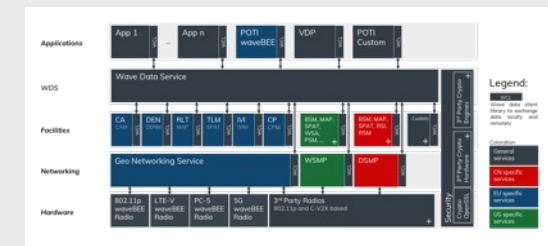


WaveBee Creator
V2X Test Scenario Editor
(AV1025A)



WaveBee CarKit
HMI Framework and SDK for
V2X Applications (AV1026A)

Core Software



WaveBee Stack
Full featured V2X Stack

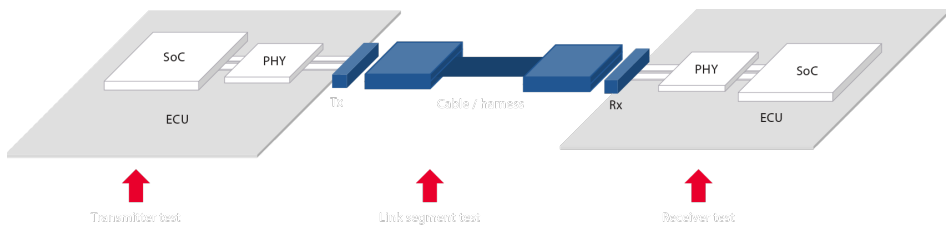
In-Vehicle Network

The modern in-vehicle network (IVN) must have low-latency, high bandwidth, and reliability to support mission-critical tasks of relaying information between sensors, ECUs, and mechatronic systems.



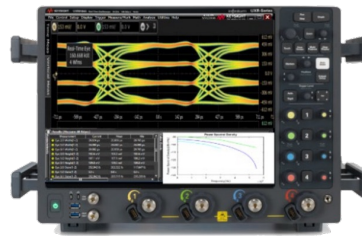
IVN PHY-Layer Test

Ensure all transmitters, receivers, and channels perform to required standards.



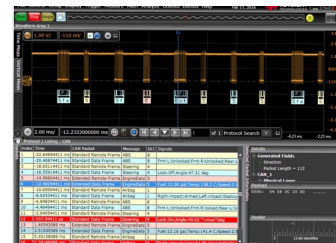
Automotive Ethernet Compliance

Enhance automated testing and validation across Tx, Rx and channel testing from 10 Mb/s to 10Gb/s.



SerDes Protocol Verification

Ensure interoperability, data and network integrity for automotive SerDes protocols such as MIPI A-PHY and ASA.



Protocol Decode / Trigger

Enable CAN, CAN FD, CAN XL, LIN, FlexRay, and SENT protocol decode / trigger with your oscilloscope.

Automotive Cybersecurity

- Readiness is the best defense, and Keysight offers up-to-date penetration test libraries to test against potential vulnerabilities.

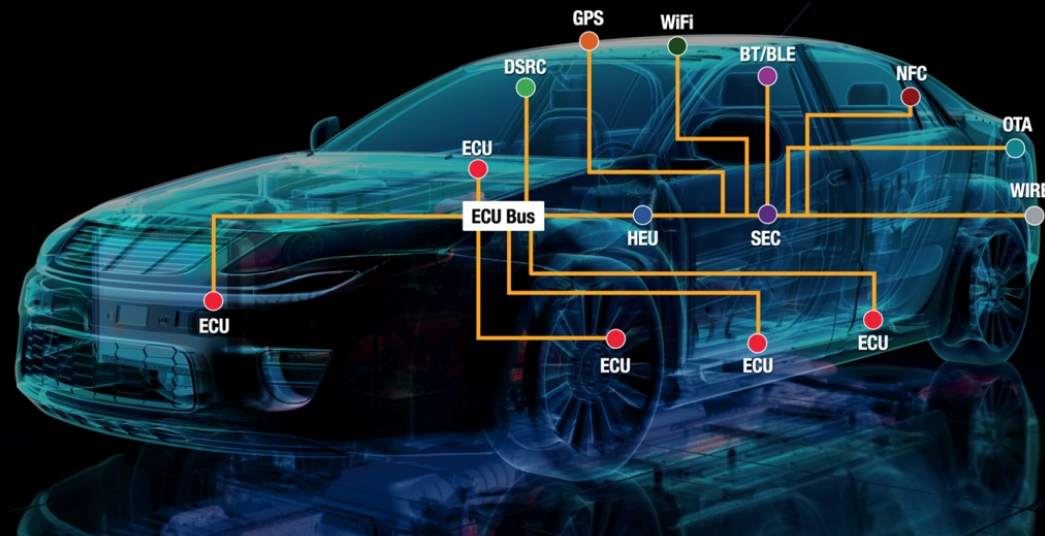


[SA8710A Automotive Cybersecurity Penetration Test Platform](#)

WIRED



- OBD-II Port
- Network harness connectors
- Diagnostic ports
- USB ports
- Onboard vehicle networks (CAN, LIN, FlexRay, Ethernet, MOST, etc)
- CD / DVD player
- Vehicle charging port



- **ECU** Electronic control unit
- **BT/BLE** Bluetooth / Bluetooth low energy
- **DSRC** Dedicated short range communication
- **GPS** GPS receiver
- **HEU** Head end unit to which ECU bus connects
- **NFC** Near field communication
- **OTA** Over-the-air in-car 4G/LTE connectivity
- **SEC** Vehicle security module
- **WiFi** WiFi