

Connected and Automated Driving Test Services



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Cars have become very sophisticated pieces of technology and all new cars are now including a myriad of mobile and wireless technologies enabling bidirectional communication with other cars, VRUs, traffic infrastructure and networks. Hence, they need to be tested not only to comply with standards or to perform, but also to guarantee the safety of people's safety.

DEKRA is a leading testing, inspection, and certification organization in the Automotive Market and one of the first companies in the world doing Periodical Vehicle Inspections. DEKRA has the most complete service offered in the market for the Automotive Industry including the needs of the Connected Car and Automated Driving.



DEKRA features a dedicated test area for Connected Driving at its Competence Center in Malaga, Spain. The facility includes an outdoor test track as well as a shielded lab environment, fully equipped to test the leading wireless technologies focused in V2X communications: DSRC, based on IEEE 802.11, and C-V2X, based on 3GPP 4G/5G specifications.

The Test track allows for testing in various traffic conditions, in urban areas, tunnels and highways. Road Side Units (RSUs) have been installed at various points. DEKRA has developed technology agnostic scenarios to simulate test cases for RSUs and OBUs. Both DSRC and C-V2X technologies are deployed throughout the track and 4G/5G cellular connectivity is available through a Telefonica's commercial network.

Shielded Lab environment. In collaboration with Telefonica, a dedicated 5G base station similar to their network has been installed at DEKRA's lab. The shielded environment is particularly interesting for customized connectivity testing, including frequency bands not available in local commercial networks, i.e China, US frequency bands.

Our testing services are able to evaluate the proper functioning of the following types of use cases:

- Connectivity and onboard services
- Advanced navigation
- Vehicle monitoring and maintenance
- Automated payments
- Vehicle safety and accident prevention
- Assisted and autonomous driving.



DEKRA offers a wide range of Connected Driving tests that can be grouped in the following section types:

1. Functional testing
2. Performance testing, in the lab, at the test track and in the field.
3. Interoperability among all elements in V2X communications
4. Regulatory and Conformance, per industry test standards and certification organizations
5. Cyber security testing

DEKRA Customers

DEKRA is working with leading customers in different sectors:

- Vehicle manufacturers
- OBU/RSU makers
- Wireless chipset and module manufacturers
- Safety applications developers
- Authorities and Regulators

DEKRA is uniquely positioned to support customer's needs

Well established know-how in automotive and connectivity testing.

Our experts are active participants of the major international industry and standard organizations, such as 5GAA, 3GPP, ETSI, Omnicar, SAE.

Availability of private 5G network.

The combination of live field testing in test track as well as controlled shielded lab environment, allows a wide range of conformance and application testing for V2X devices.

Large and diverse library of devices which can be used for interoperability and benchmarking.

Excellent relationship with key players in the industry (carriers, chipset makers, etc).

Custom Product Testing Program

The test plans are tailored to the specific characteristics and functionality of each device under test, and based on its supported features. Test plans can follow the international standards and certification agreements as well as proprietary tests developed by DEKRA. Additional tests can be customized to the requester's internal quality standards and needs. Our engineers consult OEMs, device manufacturers, service providers, etc., to devise test programs that meet their objectives.

Additional details on the various type of tests are described in the following:

Functional testing

Tests evaluate the supported functions and characteristics, according to the manufacturer's declaration. Common tests include: service registry, consumption, influence on the vehicle, connectors, connectivity interfaces (Wi-Fi, Bluetooth, Cellular, NFC, V2X, GPS, etc.), usability, accessories, implemented protocol(s), and all functions declared by the provider. These tests are conducted in defined conditions in the laboratory or in the field on a driving vehicle.

Performance testing

These type of tests quantify the level of service offered, measuring target KPIs.

The tests are performed both under tightly controlled scenarios in the lab and under changing conditions (speed, urban/highway, etc) on the field.

Typical KPIs are: Latency, Data Throughput (TCP, UDP, FTP, Browsing, Video streaming) in average as well as versus time, versus cell power, etc., Network connectivity: Percentage of service availability in various modes (idle, traffic, roaming), and time delays for voice and data under various scenarios related to service availability and positioning.

Regulatory testing

Tests required by governmental organizations, such as RED, FCC, ISSED testing and certification services, as well as International Type Approvals. Testing includes Radio/EMC, electrical safety, eCall and ERA-Glonass.

List of Supported Standards

DSRC-WAVE

- FCC Title 47, Part 95, Subpart L
- FCC Title 47, Part 90, Subpart M
- OmniAir WAVE-802.11-TSS&TP
- OmniAir WAVE-16092-TSS&TP
- OmniAir WAVE-16093-TSS&TP
- OmniAir WAVE-16094-TSS&TP
- OmniAir J-2945/1-TSS&TP

ITS-G5

- EN 302 571
- EN 302 663
- EN 302 636 / 637
- TS 102 859
- TS 102 868 / 869 / 870 / 871
- TS 103 096
- TS 103 191
- EU Delegated Act Pretesting and Priority Services

C-V2X

- 3GPP rel. 14
- 5GAA TS18014 Day 1 Safety U.C.

eCall

- EU 2015/758
- EU 2017/78
- EU 2017/79
- ERA-GLONASS
- UN-R 144 (ECE-TRANS-WP29-2017-132e)
- UAE.S 5019:2018
- EN 16454
- ETSI 103 412 / 428

Industry organizations conformance testing

Tests required by governmental organizations and by industry certification programs, such as GCF/PTCRB certification, Omniair, 5GAA and ITS-G5. They include the following: document and certificate verification and conformance tests to ensure they meet industry requirements, SIM/USIM verification, Multiple SIM functional tests, GPS function, SW updates/upgrades, eCall, ViLTE and VoLTE.

Interoperability testing

Verification of proper functioning with other devices in the ecosystem. For example, check proper functioning with different vehicle models, or under different bearer connectivity technologies, or in domestic locations versus internationally, congestion control scenarios and SOTA.

Cyber security testing

DEKRA counts with a number of teams highly specialized in this discipline as it relates to a wide range of industries and type of devices and services. With the comprehensive portfolio DEKRA offers in automotive, cyber security is a prime area where DEKRA is determined to support its devoted customers. The services range from standard practices, as Common Criteria and FIPS 140-2, to more specialized individualized approach to each customer based on their device or service functionalities and expectations of service: stress testing, fuzz testing, penetration testing, etc.

ITS V2X Safety Use Case testing

Against different standards and technologies, including the three majors protocol stacks: WAVE (US), ITS-G5 (EU), DSMP (China) and the two main access technologies, i.e. C-V2X and DSRC.

ITS Interoperability System Profile Assessment for Europe

Including Security, Positioning & Timing, Device Behaviour, Access layer, Network & Transport layer, Facility layer, Hardware, European Priority Services.



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