

KEYSIGHT TEST-AS-A-SERVICE

EMC, Radio, Wireless, Environmental, and Safety Testing



REGULATORY TEST LAB — PENANG, MALAYSIA



Simulate, Debug, Comply, and Certify to Global Standards and Regulations

Do you face these electromagnetic compatibilities (EMC) test challenges?

- lack of test capacity or facility
- risk of redesign and product recall
- increasing test complexity
- staying current on standards and regulations
- shortage of budget and technical resources

We have four offerings to help you test components, assemblies, vehicles, and other electronic products with:

- pre-compliance testing
- compliance testing and certifications
- simulation and design testing
- custom testing

Keysight also offers safety testing and certification through our partners.



Key test capabilities

- state-of-the-art 10 m chamber
- latest EMI receiver (PXE) for quick emissions testing
- EMC
- automotive
- IoT
- RF and wireless
- radiated emissions
- conducted emissions
- harmonics and flicker
- immunity standards
- radio standards
- land mobile service
- land mobile radios



PRE-COMPLIANCE TESTING

Validate your EUT to standards and regulations



COMPLIANCE TESTING AND CERTIFICATIONS

Certify your EUT to standards and regulations



SIMULATION AND DESIGN TESTING

Simulate and debug your EUT



CUSTOM TESTING

Validate your EUT to internal requirements

Test Your Vehicle Inside a 10-Meter Chamber

As the world becomes more electronically connected, testing is getting more complex. The number of potential emitters of electromagnetic interference (EMI) in autonomous cars, Internet of Things (IoT) devices, and 5G phones require new tests to new standards. The pressure to pass compliance testing and receive certification has never been greater. Faster testing and faster troubleshooting are in high demand.

Accelerate testing and improve trouble shooting

Engineers need to manage the complexities of EMC requirements because of the issues of closely spaced electronic devices. They must evaluate their designs for quality and functional safety by meeting or exceeding regulations.

Global EMC regulations and standards serve two purposes:

- regulating the number of electromagnetic emissions from the equipment
- ensuring the immunity of the equipment to electromagnetic interference

The Keysight Regulatory Test Lab can help you implement EMC regulations for your products. Our modern 10-meter (33 ft) semi-anechoic chamber provides an ambient-free measurement environment with a dual-antenna system. The fully automated door allows easy access to bring large products, including vehicles inside the chamber.

The Keysight Test Laboratory uses CISPR compliant high-speed PXE with time domain scan functionality and state-of-the-art software that gives you access to fast and accurate testing. Reports are automatically generated so you have quick access to the results.



10 m semi-anechoic EMC chamber performance

- EMI testing range up to 40 GHz
- radiated emissions at 10 m distance in full compliance with ANSI
- C63.4, CISPR 16, CISPR
- 11, CISPR 32, and more
- radiated immunity in full compliance with
- IEC 1000-4-3 standard in the EMS frequency
- range from 26 MHz to 18 GHz
- automotive transient testing
- radio standards testing

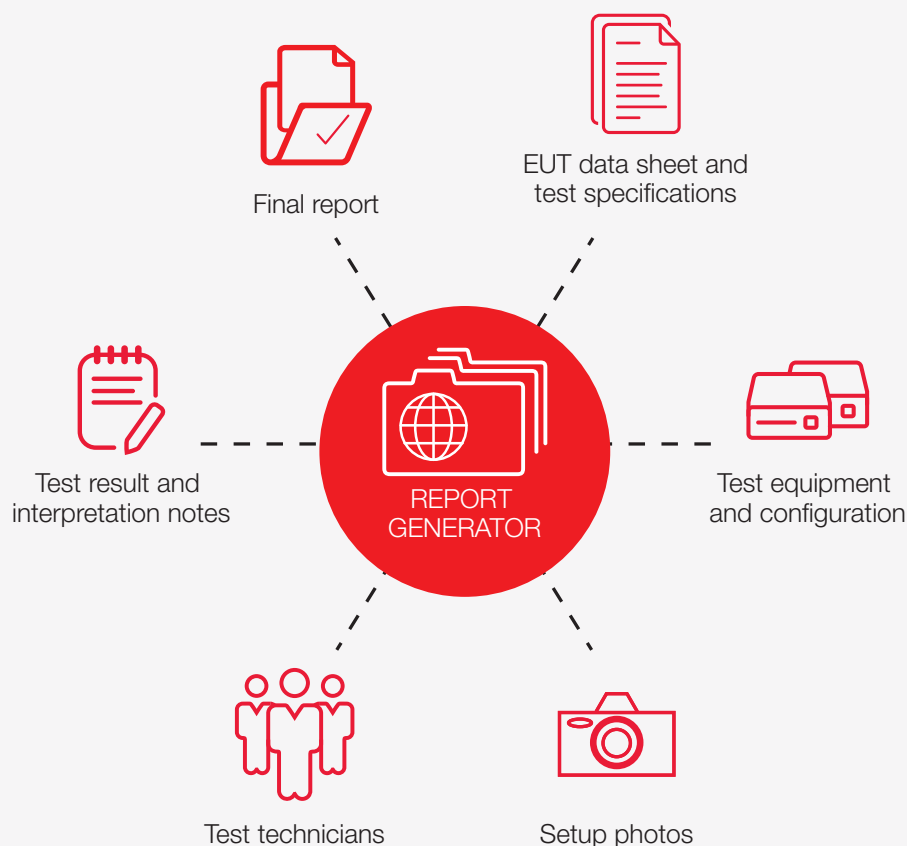


Automated Test Reports

Ninety percent of test houses struggle to generate accurate test reports. Engineers often spend up to two months finalizing the report after completing a test to verify results and correct errors.

Get accurate test results at the push of a button

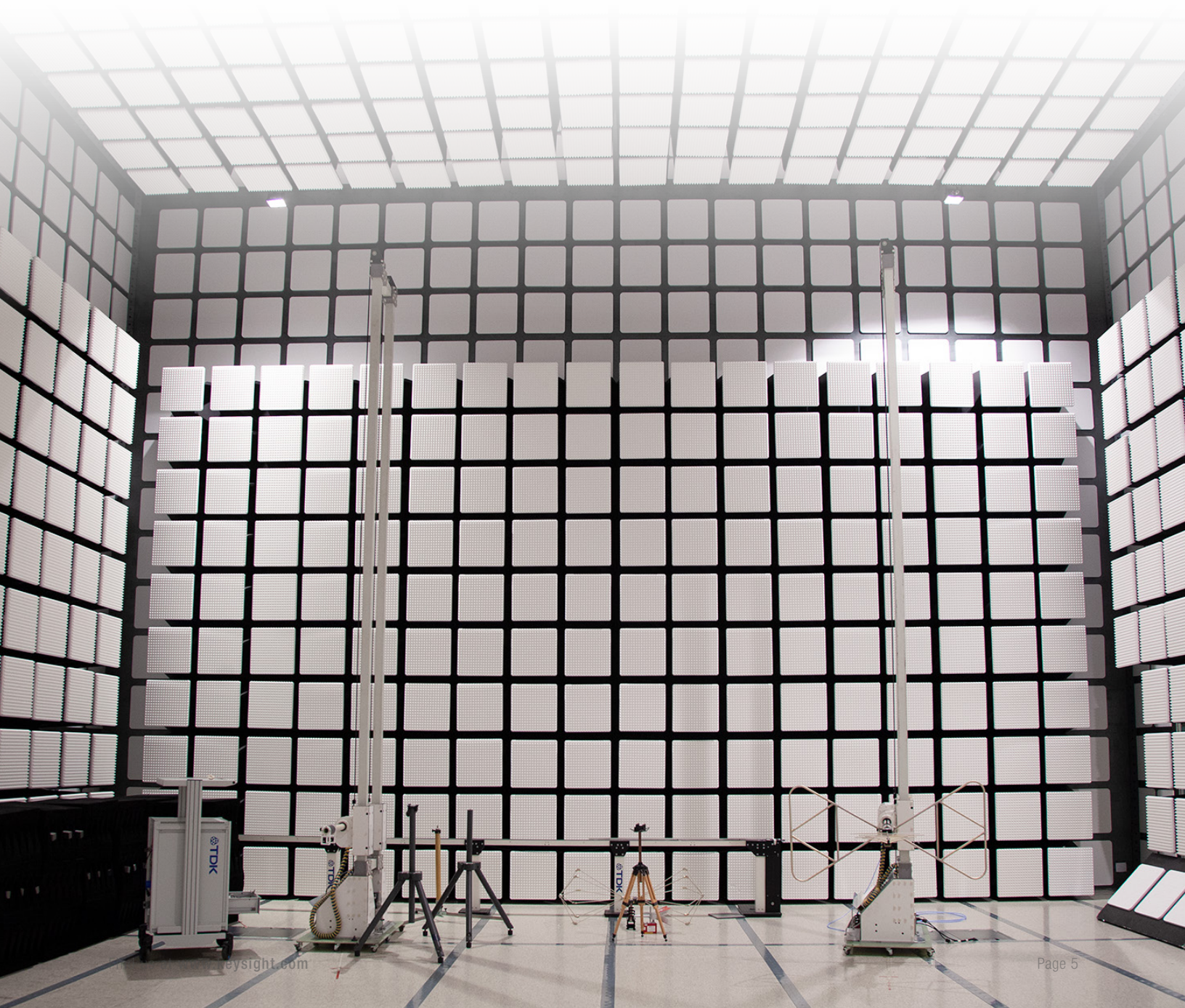
Keysight's automated test report begins on day one. First, the request for quote (RFQ) electronically captures important scope details, such as the equipment under test (EUT) description, testing requirements, and standards. Customers sign off on the RFQ to ensure that the process meets their test needs. Then the test setup is captured electronically by recording the precise configuration, including photographs; a list of all support equipment; interface/telecom ports; and more. Again, Keysight reviews and confirms this with the customer to remove ambiguity on specification requirements and test configurations. Before the testing begins, we store this key data in a predetermined location using a predefined process.



After each test, the data flows automatically with no manual transcribing. This process ensures speed, accuracy, and repeatability.

The report generator uses an engineered naming convention for test data in a predefined directory structure. If specific test methods require opinions or interpretations, there is a process to capture and report this information.

After the last test, the engineer or technician selects the report template and selects the “go” button for the report generator. In five minutes, the final and accurate test report is available. This process frees up valuable time for the engineer to focus on the design.



Pre-compliance Testing

Keysight provides the following:

- access to an accredited lab with the latest equipment
- tests that follow existing and emerging standards
- experienced test engineers to make measurements on your safeguarded EUT
- secure test reports and measurement data within two business days of test completion
- convenient location in Malaysia's high-tech industry center

Benefits

- Increase confidence to pass future compliance tests.
- Get accurate and repeatable results for the first time.
- Reduce test cost with pay-per-use pricing.

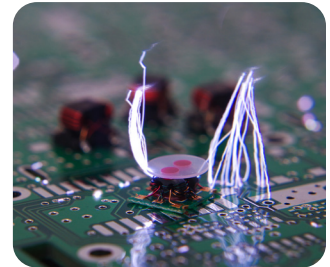
On average, 40% of first-time compliance tests fail. The failure to pass a compliance test causes a minimum delay of three to four weeks. With Keysight's state-of-the-art EMC Test Lab and EMC test experts, you can jump-start your schedule by validating your EUT to standards and regulations earlier in the design process. Our experts know why and how to make measurements.

They apply measurement principles and use established test processes with test automation. This process eliminates testing errors and provides accurate results the first time, and it helps you avoid the risk of redesign later in the product life cycle.

Reduce your test costs by not outfitting your lab with equipment and resources, saving on both capital and operating expenses. It eliminates the hassle of renting equipment, assigning resources, and setting up a test lab, so you can focus on the design of your product. Pre-compliance testing will give you the confidence to pass compliance tests the first time.



Validate your EUT to standards and regulations to have greater confidence of passing future compliance tests.



Compliance Testing and Certifications

Keysight offers EMC and safety testing, including certification.

EMC Testing and Certification

- access to an accredited lab with the latest equipment
- tests that follow existing and emerging standards
- experienced EMC engineers to make measurements on your safeguarded EUT
- detailed and secure compliance test reports, certification, and measurement data within two business days of test completion
- convenient location in Malaysia's high-tech industry center

Benefits

- Retain your strong quality reputation.
- Speed time to market and reduce costs.
- Reduce redesign and product recall liability.

Ensure that your EUT conforms to regulations and standards with our experienced EMC test engineers at our accredited, state-of-the-art test lab. Forty percent of compliance testing fails the first time. Avoid becoming an industry statistic. Our Keysight experts have deep knowledge of test equipment, software, standards, and regulations. They use automated tests and established processes to reduce testing errors. Keysight's metrologists and engineers participate with governing bodies to set emerging standards and regulations. This combination gives us key insights into test requirements to ensure that your EUT passes compliance testing. You will save time by not having to learn all the intricacies of standards and regulations.

EMC testing helps reduce interference. Testing increases product reliability and helps you retain your reputation for quality by reducing the risk of redesign and product recall liability.

Our compliance testing helps you speed time to market and reduce costs. In addition to our EMC test experts, our lab covers multiple technologies and global standards, regulations, and certifications. This extensive portfolio of solutions at our one-stop accredited test lab limits the number of vendors, reduces logistical complexity, and saves time. This unifies your test needs at one lab and helps avoid errors that can occur between different lab facilities. The Keysight Test Laboratory at our accredited EMC Test Lab is conveniently located in Malaysia's high-tech industry center.



Ensure that your EUT is safe to operate by testing against the applicable safety standard



Safety Testing and Certification

Experience one-stop safety testing and certification to reduce business risk. Focus on your designs and let Keysight manage the interdependencies of additional test needs with our third-party test partners.

Increase access to global markets for your products — our service includes testing, inspection, and certification to ensure your EUT complies with global safety standards.

Test processes include:

- Product construction analysis
- Testing
- Documentation review

Certification process includes:

- Utilizing test reports issued under CB Scheme helps ensure product safety conformity to local and international law.
- Partnering with authorized CB Test Lab (CBTL) saves time and cost by reducing test duplication.

Our services provides safety testing² for many industries such as:

- electrical test and measurement equipment
- consumer electronics
- information technology equipment
- audio and video equipment
- household appliances
- mechanical and industrial equipment
- lighting equipment
- healthcare equipment



What is the IECEE CB Scheme?

“Operated by the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE), the IECEE CB Scheme is an international system for mutual acceptance of test reports and certificates dealing with the safety of electrical and electronic components, equipment and products.”¹



1. IECEE (<https://www.iecee.org/about/cb-scheme/> ; accessed 20 January 2021).
2. Safety testing and certification services offered through 3rd party partners.

Simulation and Design Testing

Keysight provides the following:

- EMC design and 3D simulation software
- customized support to aid in the simulation setup
- test strategies to achieve compliance
- EMC consultants to troubleshoot the root cause of problems
- regression testing
- access to an accredited lab with the latest equipment
- convenient location in Malaysia's high-tech industry center

Benefits

- Minimize design iterations with simulations.
- Gain better insight into EMC performance.
- Solve design roadblocks with Keysight EMC consultants.

Uncover compliance challenges before they occur with our simulation software and experts. You will gain better insights into your EMC performance by evaluating designs with our PathWave three-dimensional design simulation software. Simulating various aspects of your design allows you to see possible weak spots before you build a prototype. By partnering with us, your engineers can simulate circuits, block diagrams, and the entire radio-frequency path. Our experts will help you set up, debug, and simulate faster. The result is fewer prototypes and faster time to market. We help you shorten design time with our expert assistance and integrated software across design and test.

Our EMC test experts are available to develop test strategies, perform tests, and run regression testing in our accredited, state-of-the-art EMC Test Lab. If your engineers run into design challenges, our engineers are ready to debug and help solve your design roadblocks faster. Keysight EMC experts understand why and how to make measurements. They possess in-depth knowledge of equipment, software, standards, and regulations, so they can quickly troubleshoot the root cause of problems. Their expertise is backed by our hardware and software designers and our three automotive research labs. Guidance and support are available to help you achieve compliance from the start of your design.



Accurately simulate and debug your EUT.



Custom Testing

Keysight provides the following:

- experienced test engineers
- access to an accredited lab with the latest equipment
- tests that follow existing and emerging standards
- detailed and secure measurement data within two business days of test completion
- convenient location in Malaysia's high-tech industry center

Benefits

- Validate your EUT without learning the intricacies of standards and regulations.
- Speed time to market and reduce costs.
- Reduce the risk of redesign and product recall.

Validate your EUT to internal test requirements without having to learn all the intricacies of standards and regulations. Your designers will often specify the performance of the EUT to even more stringent tolerances than those found in the standards and regulations. This provides a greater test margin and reduces the risk of product failure and product recall liability. Our experienced EMC test experts will create a custom test plan to meet your internal test requirements so that you can gain greater measurement insights.

Partner with Keysight and use our Test Plan Execution Service to reduce the risk of redesign and product recall. Our EMC test experts have deep measurement knowledge in test procedures and test techniques to help you speed your product schedule and reduce costs. If your engineers are forging new ground, Keysight's EMC test experts can reach out to automotive researchers at our three research and development centers to gain new knowledge and skills. They can even connect to the designers of our hardware and software solutions to meet your unique test needs.



Validate your EUT to internal test requirements that go beyond standards requirements.



Simulate, Debug, Comply, and Certify to Global Standards and Regulations

EMC test methods

Emissions

- radiated emissions
- conducted emissions
- conducted emissions (telecom port)
- harmonics and flicker

Immunity

- ESD
- radiated immunity
- EFT / B
- surge
- conducted immunity
- magnetic immunity
- voltage dips and interrupts

Automotive

- radiated, conducted, transient emissions
- transient and radiated immunity
- bulk current injection



Partner with Keysight to simulate, debug, and certify your EUT to comply with global standards and regulations



Simulate, Debug, and Comply with Global Standards, Regulations, and Certifications

Test standards

EMC test standards

- IEC / EN 61326
- IEC / EN 60601-1-2 (Edition 4 only)
- IEC 61000-6-1, -2, -3, -4
- IEC 61000-4-X, -2, -3, -4, -5, -6, -8, -9, -11
- EN 55011
- EN 55022 / 32 / CISPR 32
- EN 55024 / 35 / CISPR 35
- FCC Part 15, Subpart B, ICES-003, CISPR 14-1

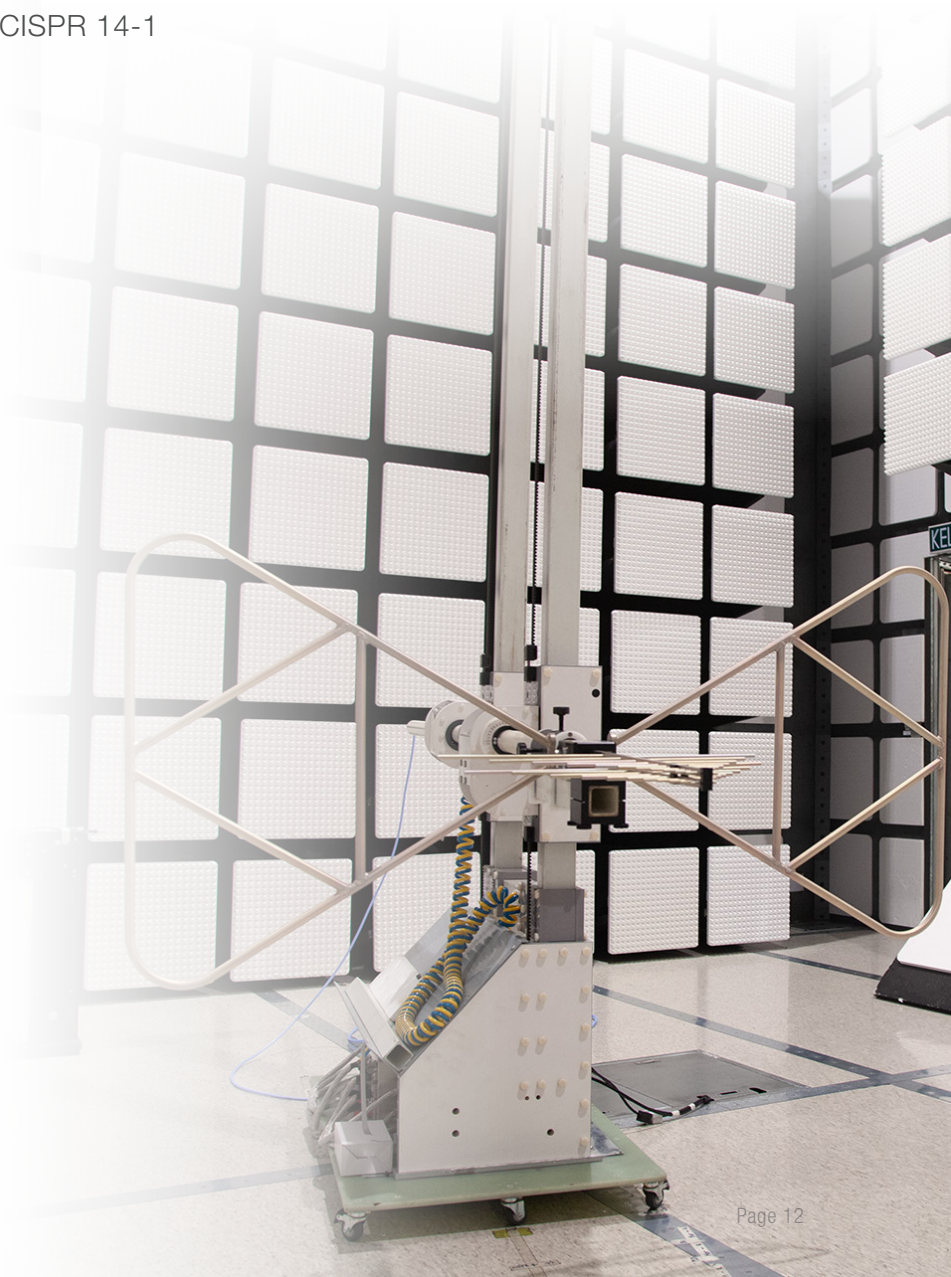
Automotive EMC test standards

- CISPR 25 / EN 55025
- ISO 7637-2
- ISO 7637-3
- ISO 11452-2
- ISO 11452-4
- ISO 10605:2008
- UN ECE R10.5
- ISO 16750-2
- Aftermarket ESA: EN 50498



**Accreditations for
the EMC Test Lab in
Penang, Malaysia**

- ISO 17025 (A2LA)
accredited



Land mobile service

- EN 300 086 v2.1.2 (clauses 7.3, 7.6, 8.8)
- EN 300 394-1 v2.3.1 (clauses 7.1.6, 7.2.9, 8.6, 9.9)
- EN 300 219 v2.1.1 (clauses 8.5.3, 9.9.3)
- EN 300 113 v2.2.1 (clauses 7.5.3, 8.10.3)
- EN 300 296 v2.1.1 (clauses 7.5, 8.2)
- EN 302 561 v2.1.1 (clauses 7.4.2.3, 7.4.2.4, 8.5.2.2,8.5.2.3)
- EN 303 035-1 v1.2.1
- EN 303 035-2 v1.2.2

Land mobile radios

- EN 301 489-5 v1.3.1
- EN 301 489-5
- EN 301 489-18 v1.3.1

Radio transmitter standards

- EN 300 328 v2.1.1 (limited to clauses 5.4.9, 5.4.10)
- EN 301 893 v2.1.1 (limited to clauses 5.3.5, 5.3.7)
- EN 301 489-1 v1.9.2
- EN 301 489-1



Partnership: You Know your EUT. We Know Test.

Keysight is a leading technology company that helps engineering companies, enterprises, mobile network operators, and governments accelerate innovation to connect and secure the world. All 25 of the top technology companies use Keysight solutions. In wireless, we were the first to market 5G solutions, demonstrate 5G data rates greater than 4 Gbps over the air, offer narrowband IoT test solutions, and enable International Mobile Telecommunications-2020 progression.

For our cloud and data center customers, we developed the most comprehensive public and private cloud visibility solutions. Keysight is a leader in the areas of automotive and IoT, with more than 88 solutions launched since 2015 including e-Call, C-V2X, RTS, cell formation, and charge and discharge. Our automotive R&D centers in the United States, Germany, Malaysia, Japan, and China serve customers around the globe.

Our engineers have contributed to more than 3,000 issued and pending US and foreign patents ³. Also, our metrologists have helped develop standards and regulations by participating in multiple governing bodies around the world. We do more than just keep abreast of existing and emerging standards; we contribute to the standardization efforts that drive the industry forward. In 2019, Keysight engineers participated in many standards bodies, regulatory bodies, and consortiums, including the 3rd Generation Partnership Project, the 5G Automotive Association, American National Standards Institute (ANSI), CISPR, the Global Certification Forum, OmniAir, and PTCRB to name a few. Partnering with us gives you access to our deep knowledge of test, including access to the hardware and software engineers who design our test solutions.



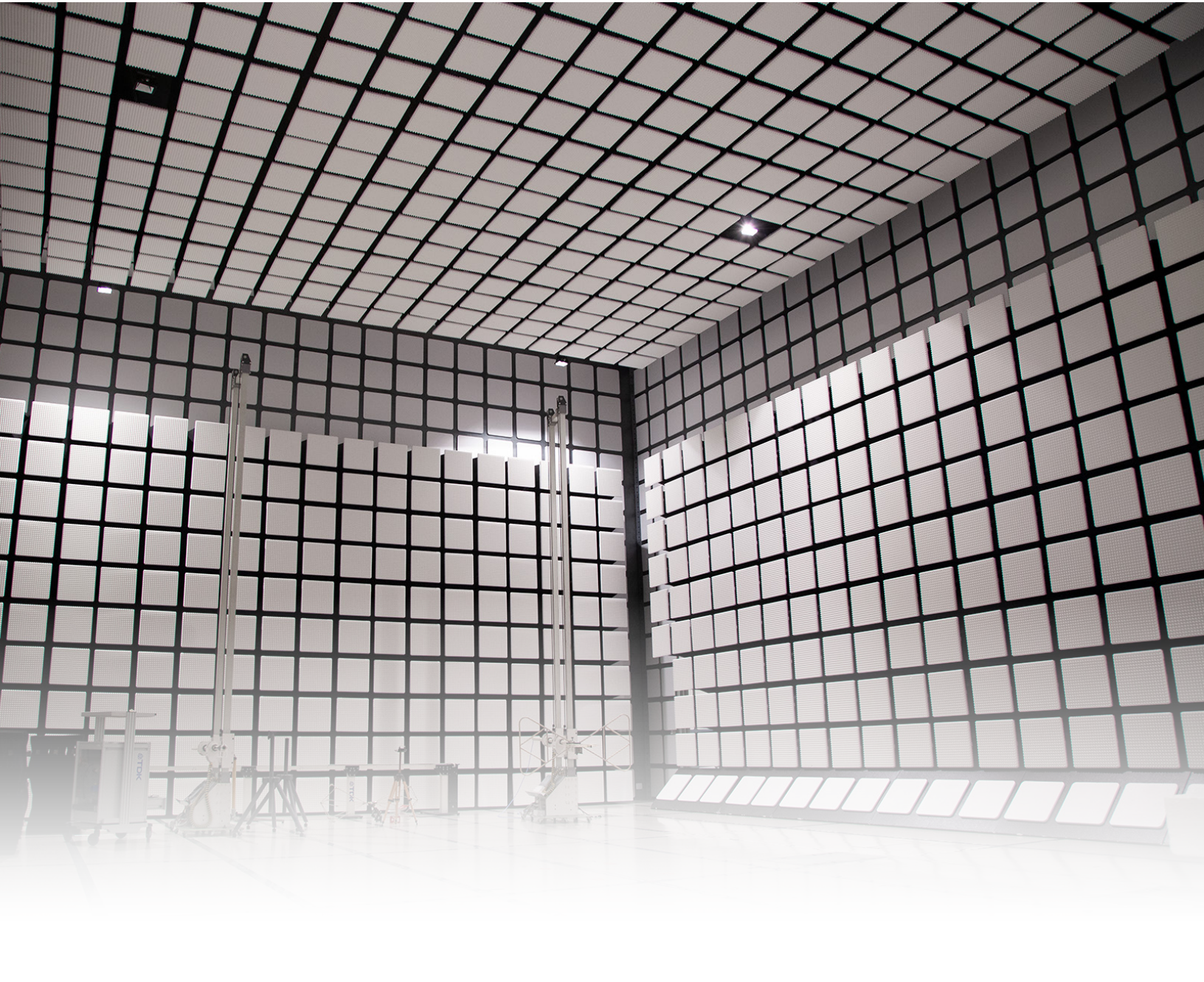
Keysight is the market leader ¹

- 80+ years of expertise
- 25 of 25 top technology companies 25 of 25 top auto electronics suppliers
- 10 of 10 top telecom equipment companies
- 25 of 25 top semiconductor suppliers
- 24 of 25 top telecom operators ²
- 25 of 25 top aerospace defense contractors
- 20 of 20 top engineering and tech universities
- Metrologists codevelop global standards and regulations.

1. Sources: Forbes, IHS Technology, Statista, Defense News, IHS Markit, Times Higher Education.

2. Including partially owned subsidiaries. Vivendi owns 24% of Telecom Italia. The one with no orders in FY19 is China Unicom.

3. Patents awarded to Keysight and Keysight's business under Agilent and HP.



Conclusion

Partner with us today at our accredited EMC Test Lab in Penang, Malaysia, to simulate and debug your products and comply with global standards, regulations, and certifications. For more information, visit www.keysight.com/find/TestasaService.

