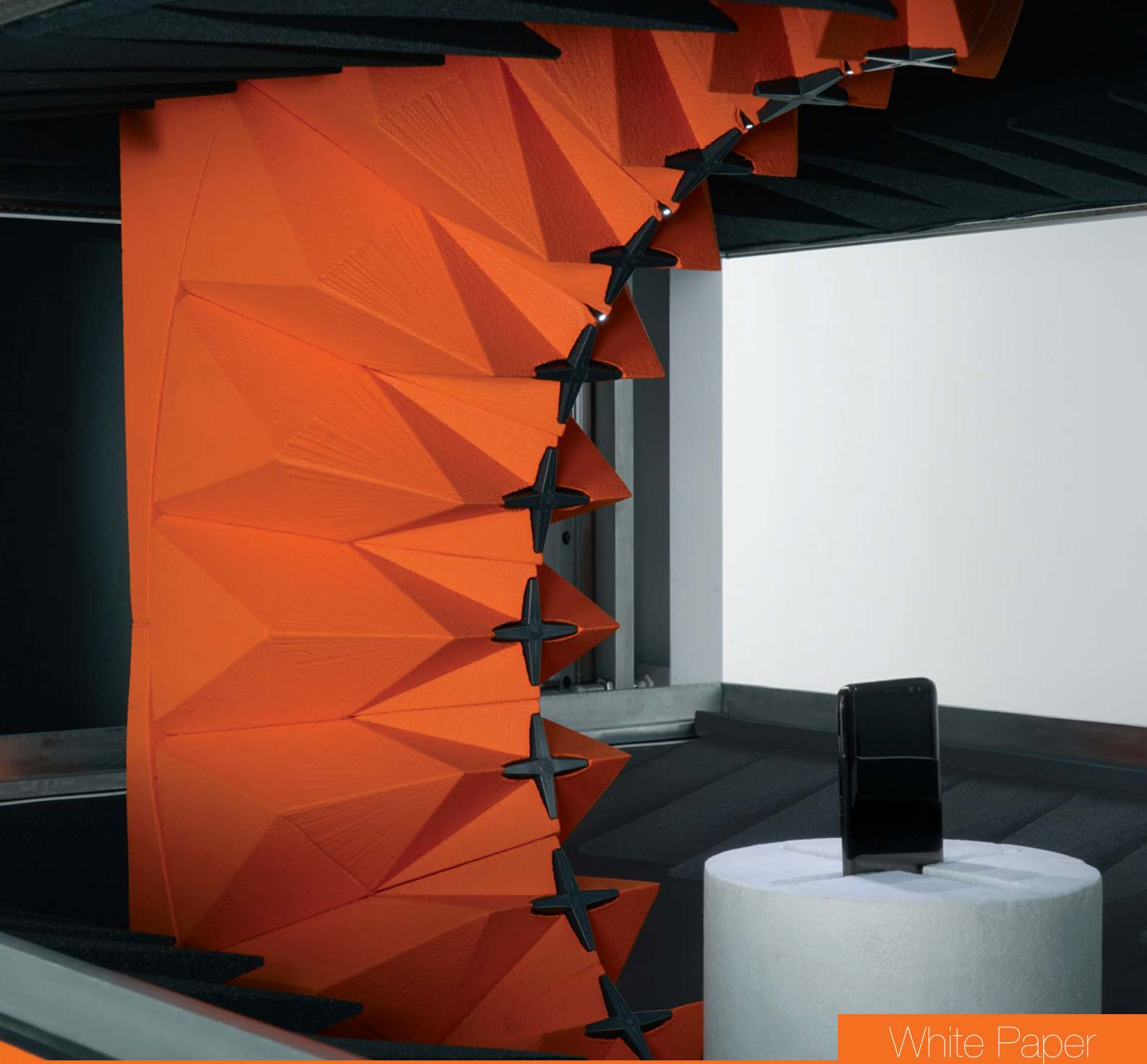


White Paper

On the way to fast RSE testing and measurement

With critical time-to-market demands and faster product life cycles, we must make testing spurious emissions more cost and space-effective for tech innovators.

Learn how, today.

mvg
Microwave Vision Group

Contents:

Evolving RSE testing in line with future time-to-market demands.

The world around us is becoming ever more connected. From the smart home, wearable tech and connected cars, to the evolution of connected infrastructure and commercial or even industrial environments.

With more than 35 billion connected devices predicted to be in use by 2035*, ensuring that the emissions radiating from each of them does not interfere with our usage of other nearby devices has become a major concern for the industry.

The testing and measurement of Radiated Spurious Emissions (RSE) has long been a pre-requisite for product development and is commonly the sticking point for many newly developed wireless innovations. More devices are failing to meet RSE certification standards than ever before.

Often RSE testing and measurement is cost-prohibitive and requires considerable space, which means it is simply not feasible for many innovators. Attention is now turning to how we - as an industry - can evolve this process in line with critical time-to-market demands and the rapid development of next-generation products.

Microwave Vision Group (MVG) has produced this whitepaper to support best practice RSE testing and measurement. It has been designed to support those involved with the design and performance testing of both domestic and commercial connected devices and outlines what our specialists consider to be the future of rapid, accurate, cost-and-space effective RSE measurement.

* ABI research, 2018 study

Radiated Spurious Emissions: The current landscape.

What are Radiated Spurious Emissions?

RSE are named as such because they are uncontained (radiated) electromagnetic waves, which fall outside of the useful or specified frequency range. They often appear as signals in frequency, on a spectrum analyser for example, when in fact they are just noise.

Where do Radiated Spurious Emissions come from?

There are two types of RSE, categorized as intentional and unintentional. Spurious emissions which are emitted from a component intended to radiate, such as a transmitter, are classified as 'intended RSE'. Those emitted from non-transmitter electrical sources such as microcontrollers, display and memory interfaces, switching power supplies, and oscillators or clocks are unintentional.

Why are spurious emissions so tightly regulated?

Guaranteeing the performance of a new device, free from self-interference, is crucial for market success. Furthermore, holding the correct certification to prove that said device does not radiate spurious electromagnetic emissions capable of interrupting the receiving capacity of nearby connected devices or radios, can add value to enable penetration of all key global markets.

What are the main regulating bodies for RSE testing and certification?

When it comes to the testing and certification of RSE in Europe, the European Telecommunications Standards Institute (ETSI) outlines test parameters for devices using band frequencies of up to 40 GHz and emitting RSE up to 100 GHz across recognized standards EN 301511, EN 301908-2 and EN 301908-13.

For the US, equivalent reference standards FCC/IC Part 22, Part 24, Part 27 and Part 90 are governed by the Federal Communications Commission (FCC). In China, the Standardization Administration of the People's Republic of China (SAC) offer similar guidelines.

Many other national and regional organizations have globally developed relevant standards to define testing methods and threshold requirements, using the ETSI and FCC standards as a baseline. For regions with specific standards, proof of compliance is essential and relevant certificates must be obtained to gain access to those markets.

The limitations of current RSE test methods.

Current wireless standards from the ETSI in Europe and the FCC in the US stipulate that RSEs should be measured in a full EMC 3m anechoic chamber*, in other words, a chamber with three meters between the DUT and the receiving antenna. To measure RSE in this way takes hours, even days, and requires a considerable test space which is not always financially or logistically possible for up-and-coming tech companies.

MVG EMC 3m anechoic chamber

* Depending on the size of DUT

This method is time consuming too, employing the use of mechanical movements to vertically scan the device as it rotates in azimuth. Technicians then need to analyse data before any tangible results are made evident.

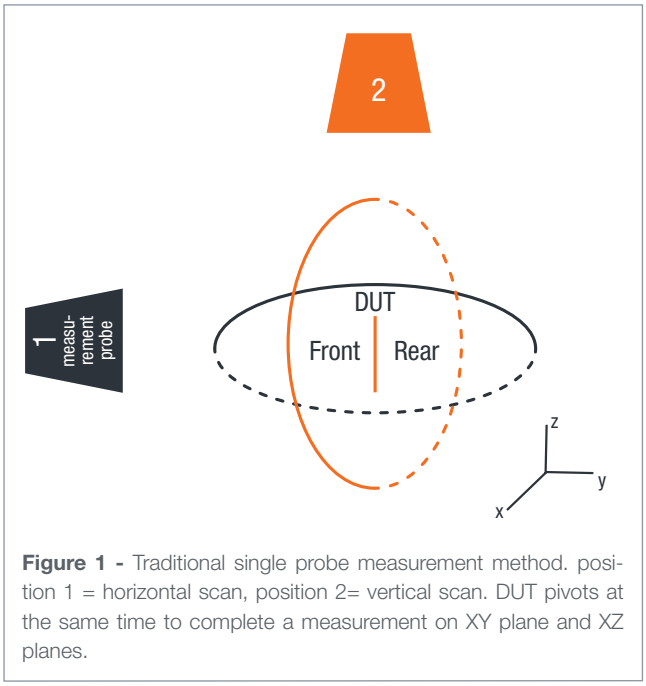


Figure 1 - Traditional single probe measurement method. position 1 = horizontal scan, position 2= vertical scan. DUT pivots at the same time to complete a measurement on XY plane and XZ planes.

NOW IS THE TIME TO EVOLVE

"It is no secret that time and space equal cost, especially for industries moving at the pace of the evolution of 5G connectivity. For us here at MVG, the realisation that our sector is not exempt from the trends of miniaturisation and lean efficiency is a critical one, with manufacturers demanding faster, smarter, smaller, leaner ways of getting their innovations to market.

"It is vital that we do not become solely focused on connectivity performance, when RSE standards certification is often the sticking point in bringing a connected product to market. We believe in making all electromagnetic testing, measurement and certification quick, accurate and as cost-and-space effective as possible."

YANG Zheng,
Managing Director, MVG

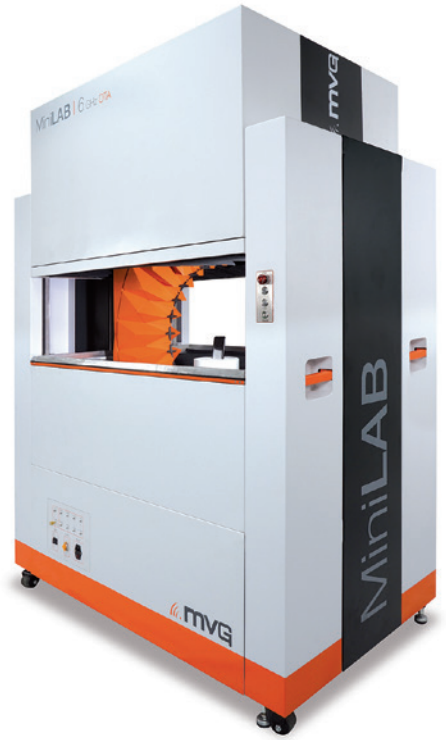
Introducing the MiniLAB: The future of RSE measurement functionality

With more smart devices, including wearable tech, being developed in line with the rapid digitisation of society, our team of innovators identified an opportunity to better support those responsible for bringing such products to market.

"By integrating RSE measurement functionality plus the ability to conduct passive measurements, into our existing MiniLAB OTA testing system, we are able to assist manufacturers and designers in saving money and delivering products to market quicker.

"Building an EMC chamber can be cost prohibitive for new companies or for those only wishing to conduct certain tests such as RSE. Our compact MiniLAB system, with multi-probe array technology solves these issues.

YANG Zheng,
Managing Director, MVG



Tackling the evolutionary challenges of connectivity testing and measurement head on, MVG has integrated Radiated Spurious Emissions and passive antenna measurement capabilities into its compact and highly accurate lab-based **pre-compliance** test system, MiniLAB.

Dramatically reducing measurement time, compared to the more traditional, time-consuming method of using vertically scanned mechanical movement to monitor the device as it rotates in azimuth, MiniLAB employs multi-probe technology to measure RSEs **in an isolated chamber, making even the lowest level spurious emissions obtainable for recording**.

Figure 2 - Multi-probe measurement method effective for RSE testing. The probes electronically scan the DUT as it pivots in azimuth. Results in full spherical measurement.

As an all-in-one system, MiniLAB not only delivers a faster design and production process for applications in which time-to-market is critical but also allows engineers to perform quality, repeatable OTA testing, as well as passive measurements and class-leading methods for measuring pre-compliance RSE on LTE devices.

PRECISE DATA

Generated within 20 seconds of measurement completion.

INTEGRATED PROBE-ARRAY ARCH

Measures RSEs in the presence of LTE frequency bands up to 6 GHz using electronic scans (see figure 3 and 4).

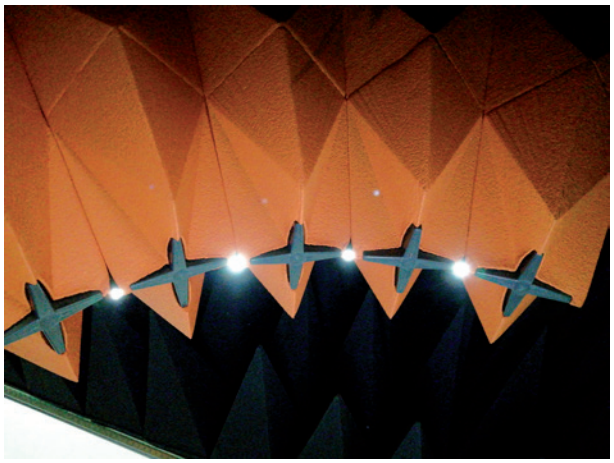


Figure 3

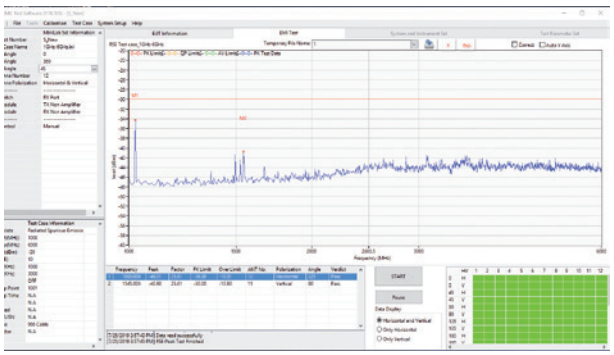


Figure 4

HIGH DYNAMIC RANGE

Anechoic shielded chamber with >100 db RF attenuation and fully shielding door, to measure peak levels of transmitted wireless signals and surrounding emissions without distortion.

Figure 5 - Door closed view of MiniLAB I 6 GHz OTA

DEVICES UP TO 40 CM IN DIAMETER

Measure radiation patterns and optimize the antenna performance of a range of devices (see figure 6).

Figure 6 - Doors fully automatic at the press of a button

SUPPORTED PROTOCOLS

All major protocols supported including Bluetooth, Bluetooth Low Energy, Zigbee, LTE Cat-M, NB-IoT, Wi-Fi 802.11 a/b/g/n/ac, GPS, A-GPS, GNSS, A-GNSS and many more

> We are continually asking ourselves the bigger questions, like how can we make testing low level spurious signals easier for our clients when an isolated chamber is essential? The answer lies in our already popular, compact, pre-compliance testing solution, MiniLAB.
>
> "Of course, subsequent questions then come to the fore, such as can we use multi-probe arrays to test RSE? MVG employ, train and retain the right engineers to ask and resolve these customer-centric challenges. And in this instance, the result was yes, we can evolve this technology to provide a convenient way to test RSE, using a fully-shielded door which enables testing as low as 100 dB .
>
> YANG Zheng,
> *Managing Director, MVG*

Discover more

When space is at a premium and the cost of a full-size anechoic chamber is a barrier to product development, think MiniLAB.

Enjoy leaner, quicker, accurate and repeatable pre-compliance RSE test results, using the same compact lab-based test system designed for OTA and passive measurements.

Download the technical **datasheet**

Call our dedicated team today to discuss your requirements in more detail

MVG - Testing Connectivity for a Wireless World

The Microwave Vision Group offers cutting-edge technologies for the visualisation of electromagnetic waves. Enhancing the speed and accuracy of wireless connectivity testing, as well as the performance and reliability of anechoic and EMC technologies, our systems are integral to meeting the testing challenges of a fully connected world.

WORLDWIDE GROUP, LOCAL SUPPORT

Our teams, in offices around the world, guide and support you from purchase, through design, to delivery and installation. Because we are local, we can assure speed and attention in project follow through. This includes customer support and maintenance once the system is in place. For the exact addresses and up-to-date contact information: **https://www.mvg-world.com/contact**

For more information about MiniLAB, please visit our website:
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