MVG Multi-Probe Technology Supports Taoglas Product Development and Drives Customer Success

TAOGLAS®

Baha Badran
Global Head of Engineering, Taoglas

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Antenna Engineer, Taoglas

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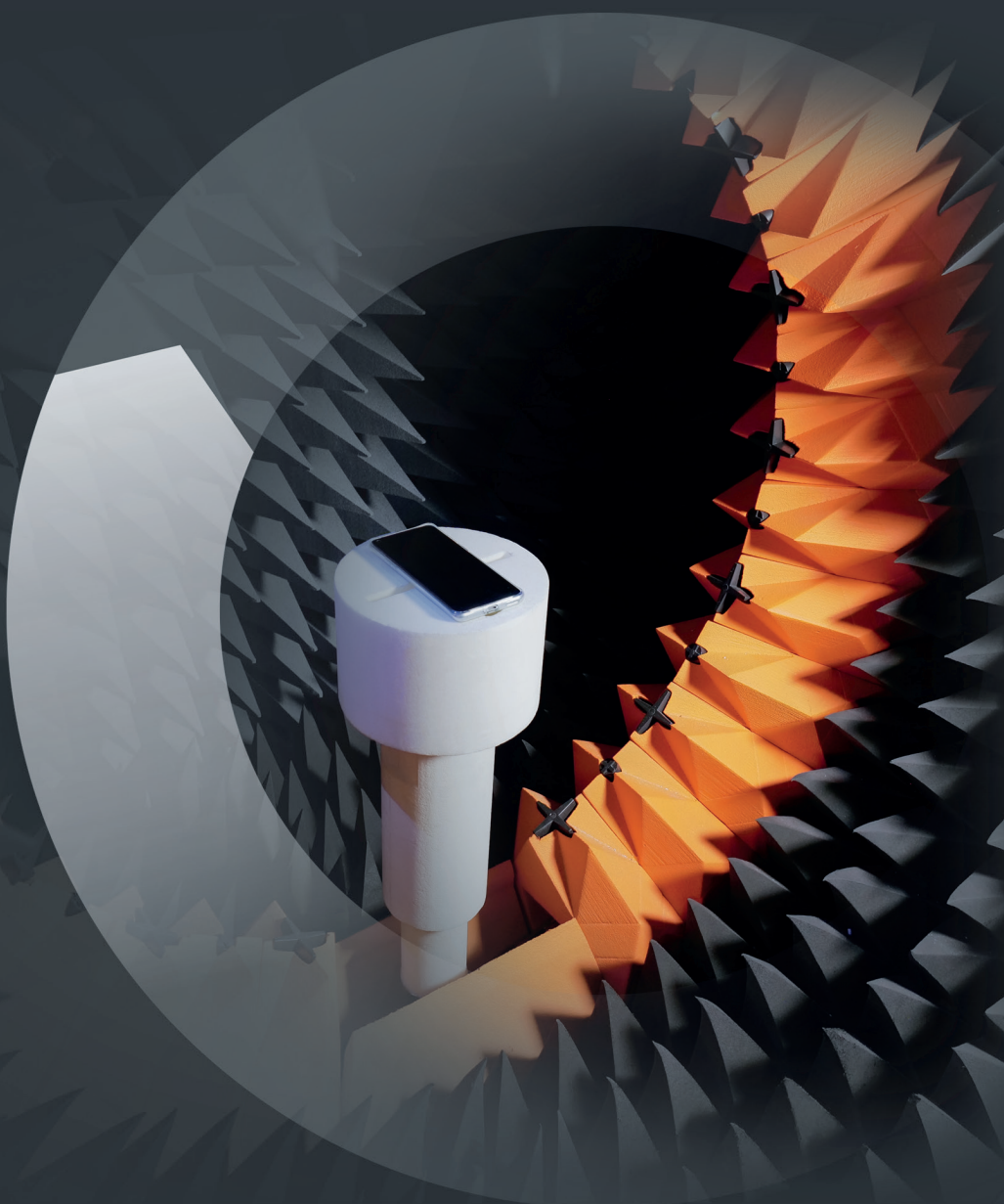
+ INTRODUCTION

There is a growing trend toward electrifying, integrating electronic sensors/actuators, processing, and connecting these new electronic systems to the internet. This proliferation of the Internet of Things (IoT) impacts and benefits nearly every industry and application around the world.

One of the primary methods of connecting IoT devices to the internet/cloud and other networks is through wireless communications and wireless networking technology. Designing and developing IoT devices for new applications and industries is a challenge for many organizations which may not have personnel with substantial experience in wireless technologies and the rigorous testing and certification processes necessary to legally market and sell wireless devices under the diverse guidelines of the many regions that strictly regulate wireless technology use. A key component of wireless IoT devices is the IoT antenna, which is also a critical aspect of the certification testing and is different for each of the various wireless protocols.

This paradigm has resulted in a necessity for companies developing IoT technology to seek out IoT antenna solution providers and wireless testing facilities with the appropriate test equipment and expertise to perform pre-certification testing on IoT devices; an invaluable resource for companies integrating IoT technologies into their solutions or startups launching new IoT devices and systems. Outside of the experienced
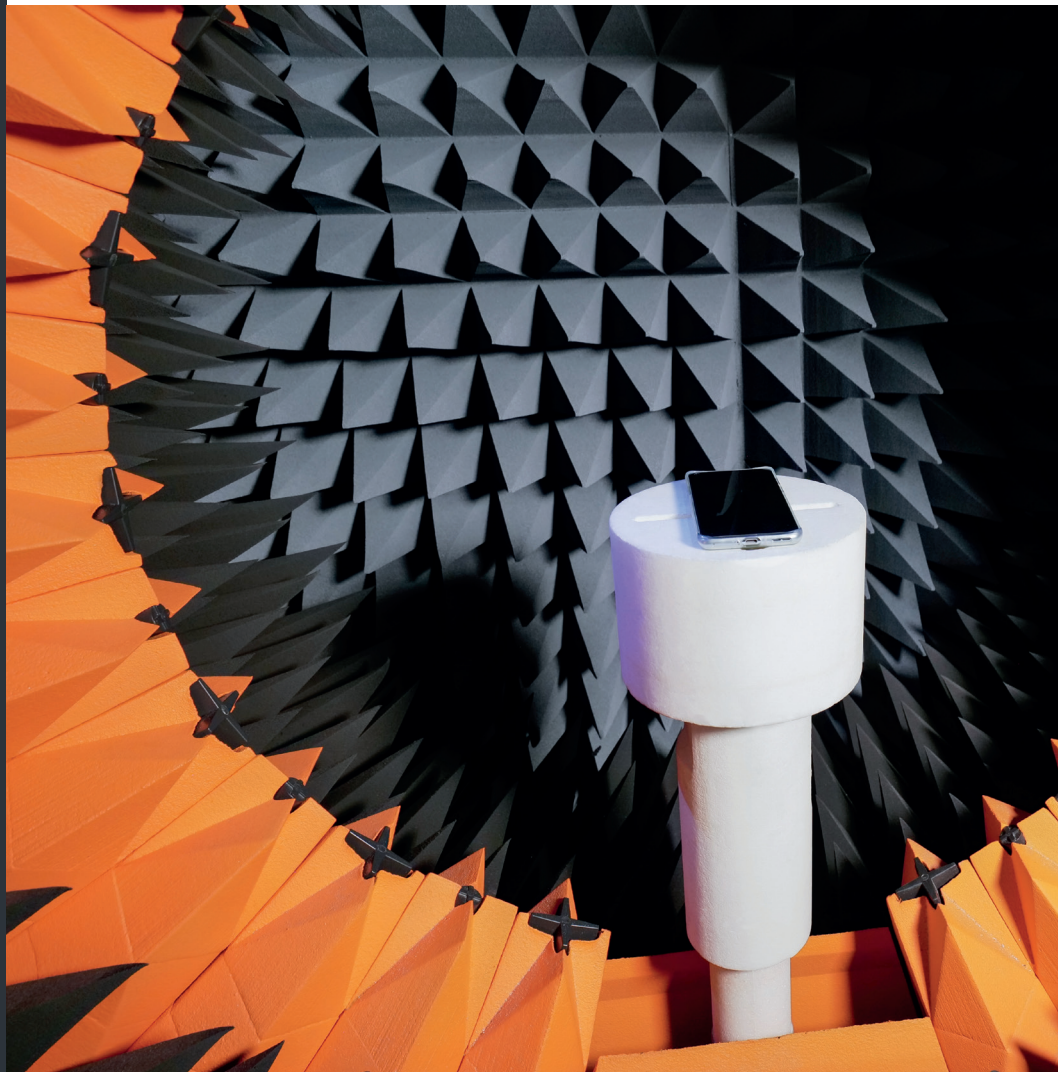
personnel, an IoT antenna solution provider dedicated to customer success needs wireless test chambers and systems in place to rapidly and efficiently perform a variety of tests on the IoT antenna-under-test (AUT) and devices-under-test (DUTs) to a high degree of accuracy. Faith in the results and the quality of test chambers is a nonnegotiable for these organizations, as well as the support and test system software/automation solutions at play.

For these reasons and more, Taoglas, a trusted provider of antennas and IoT components that helps solve complex engineering problems, has repeatedly chosen MVG's antenna test chambers as their wireless test chamber supplier of choice in their locations around the globe. This case study explores IoT trends, Taoglas' business, and why MVG's test chambers remain their first choice in wireless test chambers for IoT antennas, devices, and solutions.

TAOGLAS: A PARTNER FOR IOT DEVICE DEVELOPMENT

Founded in 2004, Taoglas has grown from its heritage in antennas to providing engineering resources, state-of-the-art test chambers, and pre-certification centers worldwide. Its global team works diligently to deliver an uninterrupted supply chain for rapid local delivery and seamless international support. Taoglas' commitment to continuous innovation, proactive customer service, and trusted quality provides long-term peace of mind to its customers.

Taoglas boasts the industry's most comprehensive range of high-performance embedded and external antennas, covering Cellular, GNSS, Wi-Fi/Bluetooth, UWB, NFC and ISM/LoRa band applications. Furthermore, Taoglas' extensive portfolio of advanced components includes a wide range of industry-leading magnetics, RF connectors, cable assemblies, brackets, and accessories designed by a global team of experts. With proficiency in custom antenna design, off-the-shelf antenna selection, optimization, and pre-certification, Taoglas has the expertise and proprietary designs to simplify complex and customized device requirements.

Taoglas' support includes ensuring their customer's fully integrated IoT solutions receive certification success. This is where highly efficient and accurate antenna test chambers are essential.

"We continue to innovate at Taoglas," said Baha Badran, Global Head of Engineering at Taoglas. "Our focus is innovation in product development and how we can better facilitate our customer's needs and make our business activities simpler and more efficient."

"For example, in some regions, we give customers access to our labs to work up test scenarios so that their engineers can come to us," said Badran.

"We aren't a test house. We sell a product. But we try to be as close to our customers as possible while helping them get to market as smoothly as possible," continued Badran.

IOT ANTENNA & DEVICE TESTING CHALLENGES

Organizations like Taoglas often need to test multitudes of antennas and devices while providing a fast turnaround on results to minimize the development time for integrating IoT antenna modules into an IoT device and for characterizing antennas in the antenna design process. Thorough IoT antenna characterization is necessary in the development of any antenna solution and must be done to a very high degree of accuracy, reliability, and repeatability in order to provide antenna specifications to customers. Though there aren't strict certifications for antenna testing, once integrated into an IoT device or system, that IoT device will need to be stringently tested and certified in order to be sold in a given market. The various regions around the world that regulate the RF spectrum have different electromagnetic compatibility/electromagnetic interference (EMC/EMI) certifications and requirements that must be met, as well as various wireless standards also requiring certification, such as WiFi, Bluetooth, Zigbee, cellular, etc.

With many organizations and companies moving to develop IoT solutions in order to stay competitive, provide new data-driven services, or offer entirely new IoT technologies and services, there is an even greater burden on IoT antenna providers to support these customers. These main areas of support include meeting the necessary certifications, such as compliance with the various wireless standards requirements.

As many organizations fail their initial certification testing on a first round and certification test labs often provide scant details surrounding the failed testing, pre-certification and certification troubleshooting support can be a pivotal resource to avoid failures in the first place and also to rapidly recover from certification failures. Another advantage of expert support is the minimization of any delays to reaching the market with a given IoT solution after a failed test. This is an area where Taoglas shines. Taoglas provides unparalleled support and expert guidance for their customers every step of the way – from the design concept, validation stage, RF simulation, and production through to pre-certification testing.

NAVIGATING WIRELESS TEST CHAMBER PERFORMANCE & FEATURES FOR IOT TESTING

In order for Taoglas engineers and technicians to perform antenna characterization, IoT device pre-certification, and troubleshooting testing for IoT applications, they require precision wireless test chambers that are suitable for both IoT antenna and pre-certification testing. Many of Taoglas' customers require custom antenna designs, and need rapid turnaround on these designs. Some of this time pressure comes from typical market forces, and on some occasions a customer may need an antenna redesign for an IoT module that has failed prior testing. In either of these cases, rapid internal testing that is both repeatable and reliable across locations is essential for Taoglas to develop products, deliver custom solutions, and support customer success.

Another aspect of high traffic test chambers is the stability of the calibration. Higher quality test chambers can maintain greater calibration stability over a longer period of time, which directly impacts the consistency of results on the downtime associated with chamber calibration and verification. For Taoglas, any downtime of a chamber directly impacts their bottom line. This includes any errors, maintenance, or other issues that can occur during high throughput chamber use. Another critical feature of a test chamber is if the chamber can be purchased with manufacturer support, even if the chamber may be a previously used chamber. Manufacturer support in troubleshooting and servicing a test chamber can be the difference between days to weeks of downtime, which can equate from thousands to millions in lost revenue.

## THE CHOICE BETWEEN MOVING OLD CHAMBERS OR BUYING A NEW MVG CHAMBER

A key aspect of Taoglas' business is remaining agile. This can mean acquiring and transferring assets and personnel to different facilities/locations as the need arises. An example of this is a recent move Taoglas made between locations within San Diego. Taoglas management was faced with the decision of attempting to disassemble and relocate two existing test chambers or the option of purchasing a new MVG SG 24. After carefully analyzing all of these factors, the Taoglas management determined that the MVG SG 24 would be the preferred option for Taoglas' business productivity and ability to fulfill customer needs going forward. "The most pivotal factor in our decision to go with the MVG chamber, and why we keep choosing MVG, is that the measurement time is an important factor to us," claimed Badran, "What we experience with MVG chambers is a test time of around 3-5 minutes compared with the legacy chambers which was closer to 30-40 minutes." This speed gain is made possible by using advanced electronically scanned multiprobe technology in MVG test chambers, in contrast to the testing in traditional single probe chambers.

This also isn't the first time that Taoglas has chosen an MVG test chamber over the competition. Lukas Van Vuuren adds, "Among my many interactions with test chambers, MVG multi-probe technology do offer more in terms of efficiency with the workflow." Van Vuuren further explains,"With MVG chambers, the software is much easier to use, the measurement time is faster, the raw data from the chamber very easily integrates with our automated reporting system, and the data is much easier to use than what we get from other chambers." Taoglas personnel have also found that with using MVG chambers in different locations it is much easier for engineers to compare data and harmonize results and analysis with the chambers from the same manufacturer using the same software than having a mix of different chambers from different manufacturing. For a global company like Taoglas, having a single software system that is readily compatible with their automated reporting system is extremely powerful. "We started with using different software for controlling the mechanical elements and handling chamber data," Badran shared,"With the introduction of MVG WaveStudio, we put all of those functions into a single package which is intuitive to use and eases the training of new engineers." With these factors in mind, it was an easy decision to set aside the capital needed to purchase the MVG SG 24 for the new Taoglas San Diego facility.
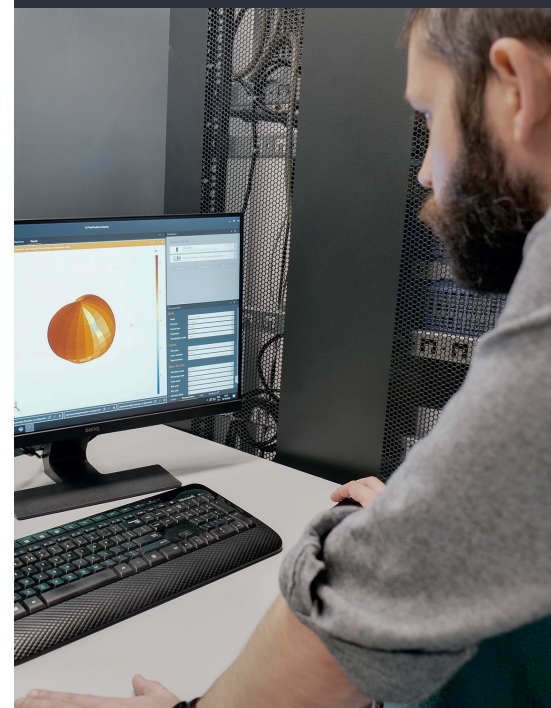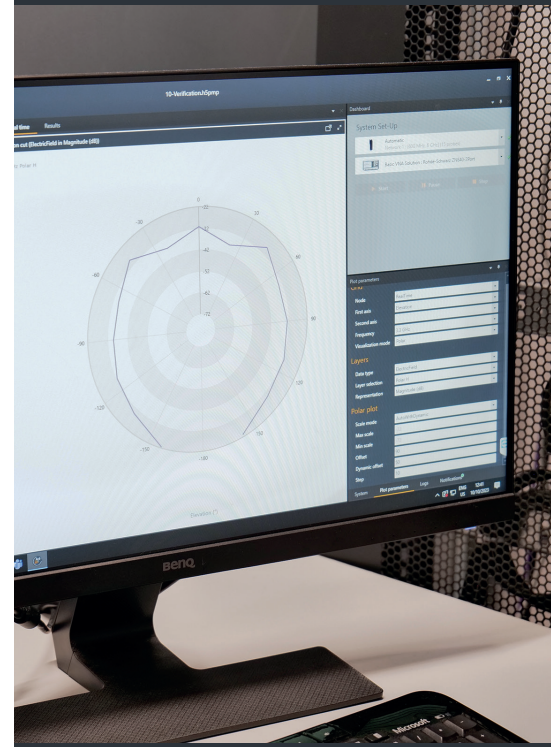
MVG SG AND STARLAB TEST CHAMBERS TACKLE IOT TEST CHALLENGES

Though the MVG SG24 is the preferred chamber of Taoglas' engineers, several Taoglas facilities are space constrained. In these locations, Taoglas has opted for the MVG StarLab. "StarLab systems are very small and compact solutions," Badran shared, "Their compact size makes them ideal for moving around and transporting, though these systems have some limitations due to their size, they more than get the job done."

Both the SG 24 and the StarLab systems are multi-probe near-field (spherical) capable test chambers. Where the StarLab system is also near-field (cylindrical) capable, the SG 24 is also far-field capable, according to the frequency and the size of the DUT. Due to the larger size of the SG 24, this chamber can be configured to test down to 400 MHz compared to the lower frequency limit of 650 MHz of the StarLab system. Testing antenna and IoT systems to that lower frequency regime can be advantageous for a wider frequency antenna characterization or for troubleshooting lower frequency content from pre-certification testing. "The size limitation is one of the reasons we have different chambers," Badran detailed, "For most of the product testing we do, the StarLab is good enough. Other considerations in favor of StarLab over SG are the cost, complexity, and flexibility when moving". Badran further shared, "However, the main reasons we have an SG is to test lower frequencies, to accommodate larger DUTs, and when higher accuracy is needed."

StarLab & SG Multi-probe System Measurement Capabilities

① **Gain**

② **Directivity**

③ **Beamwidth**

④ **Cross-polar discrimination**

⑤ **Sidelobe levels**

⑥ **Front-to-back ratio (SG 24-L only)**

⑦ **1D, 2D, 3D radiation patterns**

⑧ **Radiation pattern in any polarization (linear or circular)**

⑨ **Antenna efficiency**

⑩ **TRP, TIS, EIRP and EIS**

Both the StarLabs and the SG 24 systems feature integration with MVG's Wavestudio software and rapid testing capability. "This is how we can justify the cost of the equipment," stated Badran. "Throughput in testing is critical, along with the ability to rapidly compare simulation and real measurements and have the stability and reliability of the test/automation software to allow for that."

+ LOOKING TO THE FUTURE

As the number of wireless devices continues to boom and more testing is needed, there is an expanding need for more reliability, integration, speed, and accuracy in wireless antenna and device testing. This trend is also leading organizations without a background in RF technology being compelled by market forces to embrace wireless technologies and integrate these into their product lines. "We try to educate customers with our engineering team and help to equip our customers with the right tools," Badran shared, "One of the things we focus on is trying to simplify the complex for our customers." Badran further explained, "The last thing Taoglas wants is to spend a lot of time debugging and troubleshooting our internal systems, this is why MVG's solutions and support are key for us and will continue to be in the future."

MVG - Testing Connectivity for a Wireless World

The Microwave Vision Group offers cutting-edge technologies for the visualization of electromagnetic waves. With advanced test solutions for antenna characterization, radar signature evaluation and electromagnetic measurements, we support company R&D teams in their drive to innovate and boost product development.

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MUNICH

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PHILADELPHIA

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