

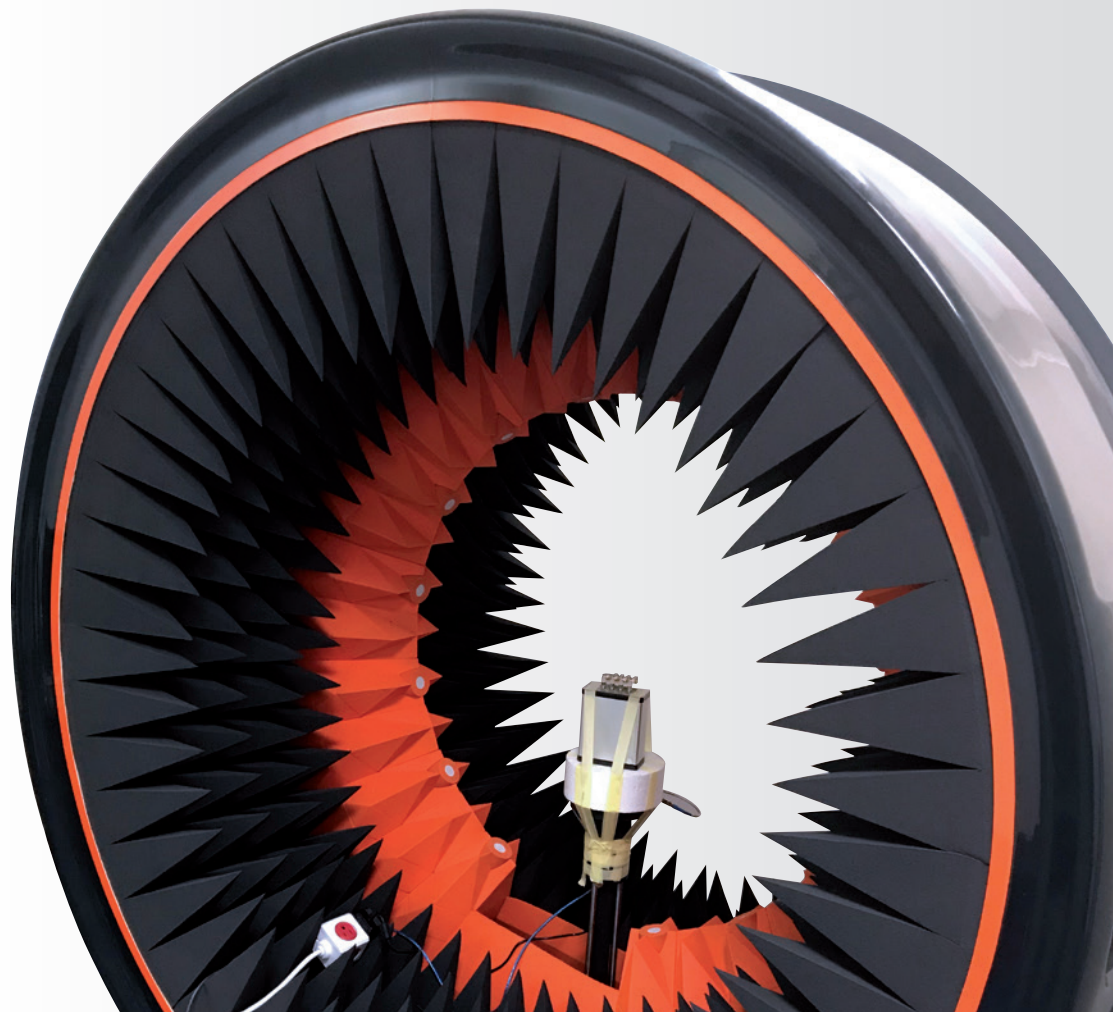
Millimeter Wave OTA Testing Gives Proof of Concept for 5G Beamforming Solution



As a research and development test tool, BBox needs to be calibrated precisely and carefully for both conducted and Over-The-Air (OTA) testing. MVG has been a leading company in OTA testing for a number of years now and StarLab 50 GHz proved the perfect technology for our needs.



Ethan Lin,
Vice President
and Project Lead
at TMYTEK



The challenge

For system level architects and industry test engineers, the availability of 5G has been long awaited, allowing more data to be transferred at faster speeds. Unlike previous generations of telecommunications standards, 5G NR mmWave uses dynamically-steerable beams which maximise connectivity by directing as much of the signal toward the device as possible.

These steerable beams are created by phased array antennas and their associated electronics which need to be

calibrated and measured in a large number of configurations through advanced OTA tests to ensure connectivity is optimized.

Taiwanese technology business TMYTEK had this exact testing requirement for «BBox», their new Beamformer Box. It is a development kit built for 5G NR mmWave antenna designers and protocol/algorithm developers, it saves time for research groups and product developers who would otherwise need to build up complex circuit systems to achieve the same result.

Our solution

Following a six-month development process that included various testing at academic institutes around the world, Ethan Lin, Vice President at TMYTEK and project lead, was introduced to the Microwave Vision Group's (MVG) StarLab 50 GHz test system by Dr Sidina Wane, CEO & Founder of eV-Technologies.

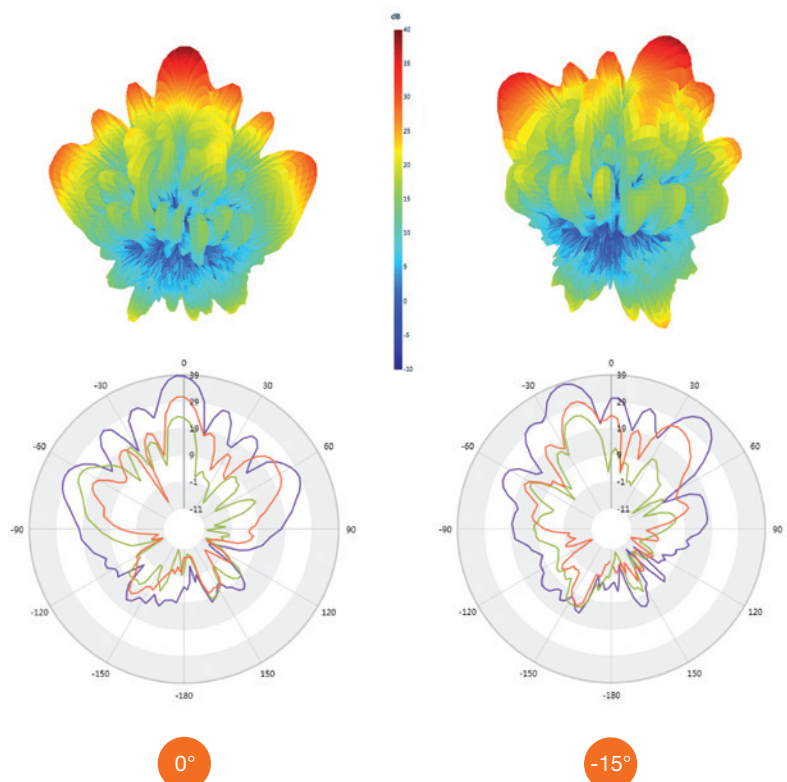
Dr Wane discusses the importance of the technology and why he directed the team towards the StarLab 50 GHz testing solution: "BBox is set to be a highly valued asset for designers, 5G system-level architects and industry test engineers, saving time and speeding up product development. Because of the crucial nature of its role in the development process we needed to ensure that it was as robust and effective as possible. Having worked with MVG on similar projects in the past I knew that through StarLab, TMYTEK could not only ensure highly credible results, but that they could be delivered in a timely and effective manner."

For Mr Lin, the speed and professionalism offered by MVG was key to his decision to make use of StarLab 50 GHz. He says: "By the time Dr Wane had introduced us to MVG we had already done some simulation testing as well as a number of collaborations with various universities and research organisations. This was incredibly useful at those early stages but in order to meet the commercial requirement of a faster development cycle we needed a more efficient and stringent testing regime to provide proof of concept."

Mr Lin continues: "While the self-built chambers of universities and research institutes do provide an effective testbed, equipment setup and measurement can often be laborious and time intensive, taking anywhere up to hours per test. In the case of the MVG's StarLab 50 GHz, the speed of testing, flexibility and easy-to-use post-processing software makes it one of the most attractive OTA testing options on the market. Tests that were taking us up to 45 minutes to 1 hour to complete at research institutes were completed in 15 minutes or less. As a result, we completed 12 different phase and amplitude configurations of our BBox within four hours, a feat that would be near impossible to achieve elsewhere."

The measurement operation took place in Paris, where a set of measurements were performed to obtain the radiation pattern of a 5G NR mmWave phased array under pre-defined configurations. The DUT (device under test) was a model "BBox Lite" from TMYTEK. It consisted of a 4 channel Front-end system in the 28 GHz band, including Phase Shifters, Amplifiers (Tx/Rx), and a 4x1 patch antenna.

The beam forming capabilities were verified by performing radiation pattern measurements for different presets ($0^\circ / \pm 10^\circ / \pm 15^\circ / \pm 25^\circ$). Pointing directions and gain were processed using the MVG WaveStudio software bench and the results confirmed the performances of the BBox.



The benefits



The results revealed valuable insights into the BBox product and sped up the development process significantly, to the point where TMYTEK is now confirming orders with potential customers, something that they claim would not have been possible for a further three months if were it not for StarLab 50 GHz.

“The results revealed valuable insights into our product and sped up the development process significantly.”

Ethan Lin, Vice President and Project Lead at TMYTEK

BBOX – BUILT FOR ALL 5G DEVELOPERS

Built for mmWave and Antenna Designers

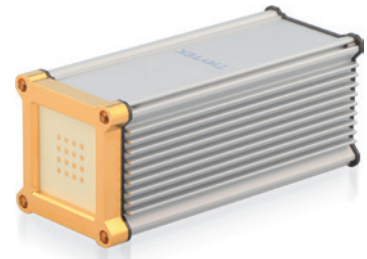
TMYTEK's BBox antenna can be easily detached and replaced. This design is made to satisfy antenna designers for beamforming tests with various antennas.

Built for Baseband Researchers

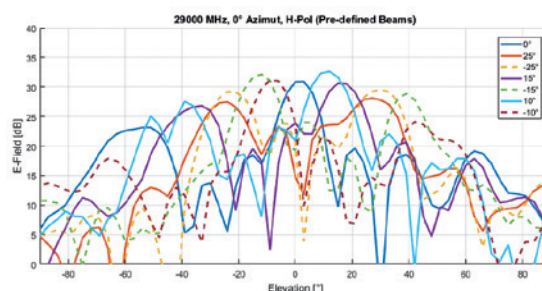
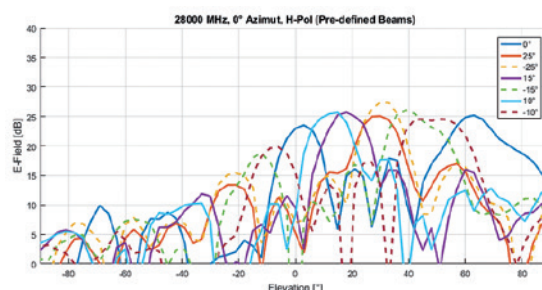
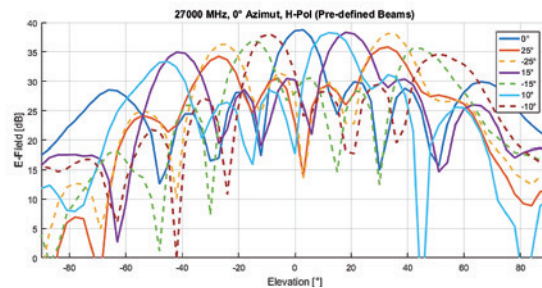
TMYTEK's BBox and UD Box complete the RF front end, providing IF frequency port for baseband researchers.

Built for OTA Test Production Line

TMYTEK's BBox can also play an important role in production line testing such as beam profiling and beam direction testing.



Given the volume of the data generated during the measurements, three frequencies were selected to evaluate the performances. This corresponds to the centre frequency, and the lower/upper limits of a 2 GHz band. It was also verified that measured beams correspond to the presets for the lower/upper limit frequencies within a 3° error range.



Nicolas Gross,
Application Director at MVG,
worked closely with Dr Wane
and Mr Lin on the project.

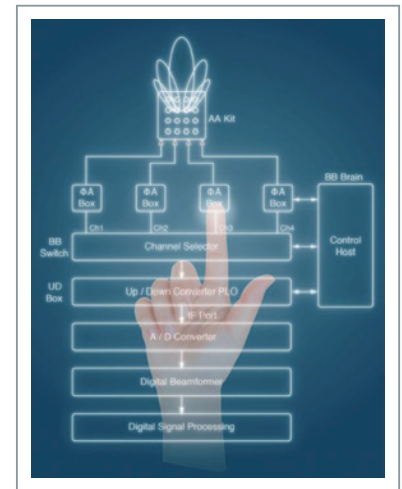
“For MVG, testing innovative products like the BBox is what we love the most. Both of our organisations have a strong belief in the ability of 5G to transform the world around us and for those developing 5G, having both an effective beamforming option and the ability to perform credible and effective testing is essential. We wish both Dr Wane and Mr Lin success with their new venture and look forward to helping them test more 5G solutions in the coming months and years.”

What's Next?

The BBox 28 GHz has proved itself an excellent tool for 5G NR mmWave research and development as well as production line applications.

Phase array and beamforming technology are essential in 5G NR communication, and TMYTEK will bring to market a BBox 39 GHz to meet the requirements of more advanced bandwidths.

TMYTEK is so encouraged by the testing capabilities of MVG and the results garnered to date, the team is moving towards commercialization of the BBox. They plan to use StarLab technology for the development of the BBox 39 GHz.



STARLAB TECHNOLOGY



Part of MVG's 'Little Big Lab' range of compact and portable testing equipment, StarLab is one of the most comprehensively designed products of its kind having undergone over 15 years of proactive regeneration in order to continually meet the antenna testing and measurement requirements. Capable of performing both passive antenna and OTA measurements to class-leading standards, its measurement speed has improved with every new model and its typical dynamic range has evolved to fully support Wi-Fi, LTE and upcoming protocols.

Designed specifically for the Telecom, Aerospace and Defense markets, StarLab 50 GHz, released in 2017, superseded its predecessor in order to meet the measurement requirements of 5G high-frequency and mmWave antenna testing.



Contact your local sales representative for more information



www.mvg-world.com
salesteam@mvg-world.com