

Keysight Technologies

5G Millimeter Wave Non-Signaling Over-the-Air Test
Solution:

Accelerate 5G Design by Quickly Verifying Multiple Devices

Solution Brief

5G Devices Operating at Millimeter Wave Frequencies Require Verification Over the Air

The need for more efficient networks with lower latencies and faster data is driving the wireless communications industry to adopt 5G very quickly. Wider bandwidths provide an advantage, but also require more spectrum. Many operators are planning to use millimeter wave (mmW) frequencies above 25 GHz to launch 5G.

Design and test at mmW frequencies presents new challenges. Direct connections (like those used for testing devices today) do not provide an accurate representation of real-world conditions. Over-the-air (OTA) testing is required to verify devices with integrated mmW antennas and ensure acceptance of designs. OTA testing can be expensive and time consuming, especially with the number of mmW bands each design is expected to support. Accurate and repeatable measurements are more challenging when performed over the air. To accurately verify broadband device performance, some measurements may need to be performed at intermediate frequencies (IF) in addition to RF.

Keysight has developed a simple solution to address these challenges. Multiple devices can be verified across multiple mmW bands over the air using a compact solution employing familiar Keysight waveforms and measurements. Automation based on a universal Keysight platform provides chipset control and fast, reliable test results. A non-signaling test approach further speeds device verification. This 5G mmW test solution accelerates device verification and reduces cost of test.

Solution Components

- Keysight wideband transceiver
- Keysight Test Automation Platform (TAP)
- Keysight Signal Studio and X-Series Measurement Application software
- Keysight mmW transceiver



Figure 1: 5G mmW non-signaling solution

Benefits

- Accelerate 5G design by verifying multiple devices at IF and RF with a compact, integrated wideband source and receiver
- Extend device verification to multiple mmW bands with a tunable, bi-directional mmW transceiver
- Reduce cost of test with fast, automated, non-signaling measurements based on familiar Keysight platforms

Solution Overview

The Keysight 5G mmW non-signaling test solution accelerates 5G device verification.

A wideband transceiver provides access to IF and serves as the foundation for a flexible mmW test solution. Test up to three device transmitters and receivers simultaneously with multiple RF and IF ports. The addition of one mmW transceiver provides tunable access to the 28 GHz and 39 GHz bands defined by 3GPP. Add a chamber for testing over the air.

Verify device performance reliably using familiar Keysight waveforms and measurements. Flexibly create signals for custom and standards-based waveforms with Keysight Signal Studio software for 5G TF and 5G NR. Repeatably analyze device transmitters with Keysight X-Series Measurement applications for vector modulation analysis and 5G NR. Quickly verify RF performance with error vector magnitude (EVM), adjacent channel power (ACP), spectrum emission mask (SEM), power and occupied bandwidth (OBW) measurements along with IQ and spectrum analysis.

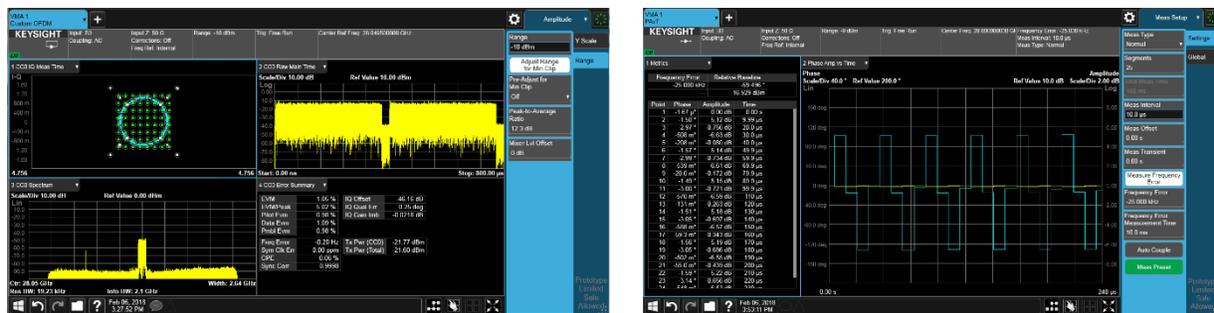


Figure 2: EVM and PAVT measurements

Test devices faster with automation based on Keysight TAP providing powerful, flexible and extensible test sequence and test plan creation and optimizing software development and test performance. For faster characterization of mmW antennas, Keysight has developed a measurement that captures and analyzes phase and amplitude components simultaneously (PAVT). Save even more time by testing without signaling.

With an OTA chamber, the solution provides a complete measurement environment for verifying mmW devices with integrated components and antennas. Performing typical OTA measurements such as total radiated power (TRP) and equivalent isotropically radiated power (EIRP) along with more typical RF measurements like EVM, power and ACP ensure mmW devices are behaving as expected when used by consumers.

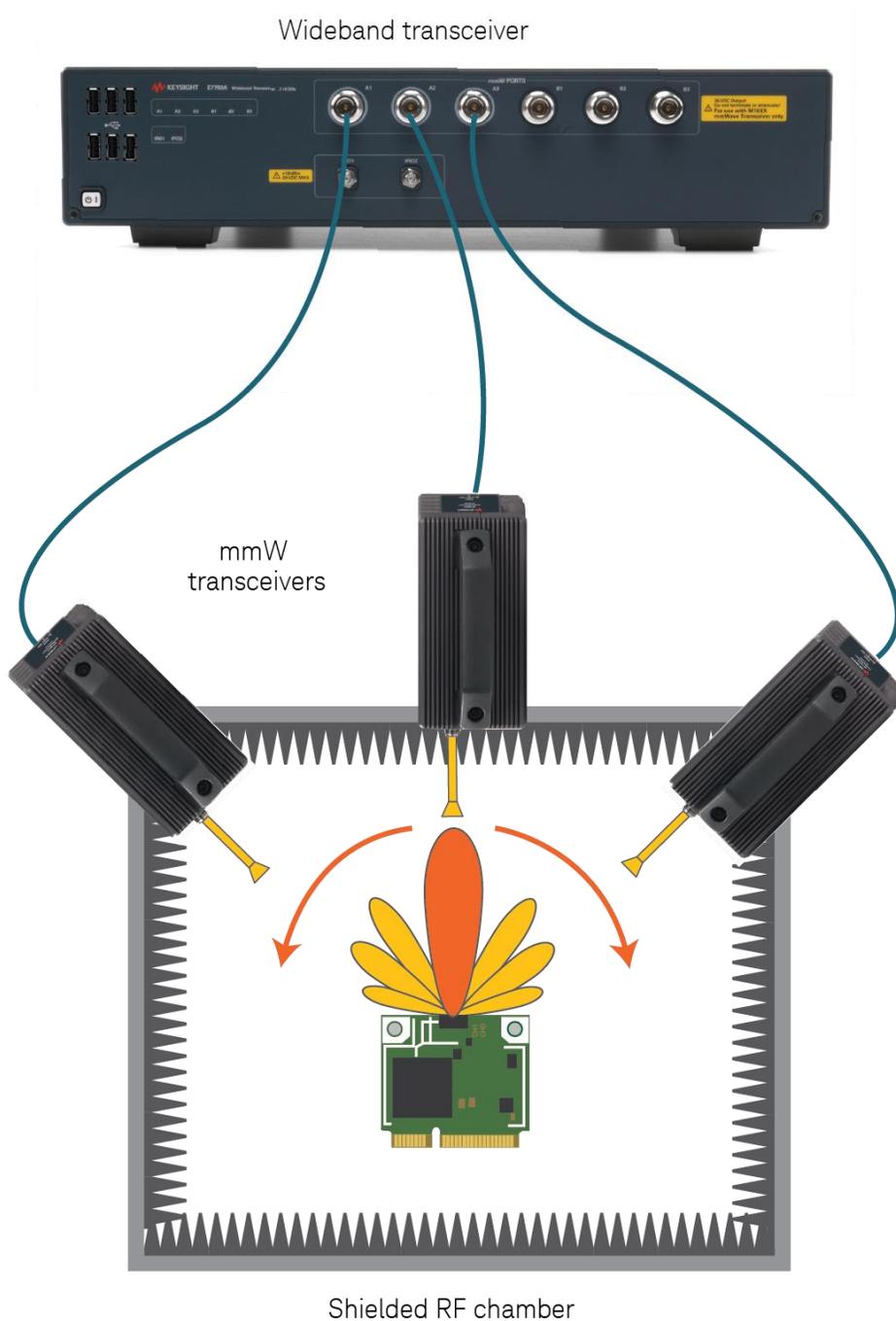


Figure 3: Verify device over the air

Summary

The Keysight 5G mmW non-signaling test solution verifies multiple devices over the air quickly and repeatably. The compact, automated solution uses reliable Keysight measurement science to accelerate 5G device verification and reduce cost of test.