Bluetooth® LE devices – complete RF characterization

The R&S®CMW wireless communication tester offers an elaborate parametric test concept, including all RF test cases up to Bluetooth®5, that makes this flexible test platform ideal for designing and verifying Bluetooth® Low Energy (LE) circuits and modules.

Your task
Short time to market, cost reduction and high performance are the perpetual goals for developers of Bluetooth® enabled products. The individual product requirements are typically the basis for the decision of whether to integrate a ready-to-use module or a chip and an appropriate antenna.

Bluetooth® enabled products need to comply with the standards and regulatory requirements in order to ensure compatibility with other Bluetooth® devices. Bluetooth® SIG and national certification bodies demand official certification from a test laboratory, accredited by Bluetooth SIG (BOTF) and the respective country, before a new product can be put on the market.

T&M solution
The R&S®CMW radio communication testers from Rohde & Schwarz are one-box instruments that support all the different stages – from development and precertification to production. Bluetooth® SIG has listed the R&S®CMW as a qualified product for RF testing.

The test setup is easy and straightforward. Using the direct test mode of Bluetooth® LE, the R&S®CMW simply configures the device to transmit and receive test packets. The multi-evaluation mode significantly reduces test time by using an identical sampling data set for parallel transmitter measurements such as power, modulation, spectrum and others. This provides a more detailed overview of the transmitter functions since all measured parameters are correlated. For even more detailed analysis, it is possible to zoom into one of these measurements. The R&S®CMW tester’s very fast spectrum measurements help optimize development time.

The R&S®CMW wireless communication tester offers an elaborate parametric test concept, including all RF test cases up to Bluetooth®5, that makes this flexible test platform ideal for designing and verifying Bluetooth® Low Energy (LE) circuits and modules.

The R&S®CMW also performs the BT RF test cases for prequalification purposes, including the in-band emissions test. Some test cases require an additional signal generator such as the R&S®SGS100A RF source. The R&S®CMW run sequencer software tool can be used to fully automate the Bluetooth® LE prequalification tests.

The user-friendly R&S®CMW test setup efficiently performs all Bluetooth® measurements, from complex lab tests and prequalification tests to fast production line testing.
The R&S®CMW500/290/270 and R&S®CMWrun support all Bluetooth® RF test cases

<table>
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<th>Bluetooth LE test cases</th>
<th>LE 1M 1 Ms/s</th>
<th>LE 2M 2 Ms/s</th>
<th>LE 1M 1 Ms/s SMI</th>
<th>LE 2M 2 Ms/s SMI</th>
<th>Coded 1 Ms/s S=2</th>
<th>Coded 1 Ms/s S=8</th>
<th>Coded 1 Ms/s S=2</th>
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<td>In-band emission</td>
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1) Requires an additional signal generator.

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Typical test setup for Bluetooth® LE enabled devices

R&D and production test setup for Bluetooth® LE direct test mode

Setup for RF prequalification testing

R&S®CMW radio communication tester with R&S®CMWrun sequencer software tool

R&S®SG100A SGMA RF source

RS232/USB/two-wire interface/HCI control for LE direct test mode

Typical test setup for Bluetooth® LE direct test mode

R&S®CMW radio communication tester with R&S®CMWrun sequencer software tool

RS232/USB/two-wire interface/HCI control for LE direct test mode

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R&S®CMW R&S®CMWrun; Bluetooth® LE

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Application Notes

Advanced Bluetooth® RF Tests with R&S®CMWrun
www.rohde-schwarz.com/appnote/TMA261

See also

www.rohde-schwarz.com/Bluetooth
www.rohde-schwarz.com/product/CMW500
www.rohde-schwarz.com/product/SGS100A

Its flexible and wide variety of hardware and software options ensure the best fit for every test and measurement requirement, for example additional testing of Bluetooth® classic signaling and non-signaling, WLAN and cellular standards such as LTE/LTE-A, WCDMA and GSM with one instrument.

Key features of R&S®CMW and R&S®CMWrun

- Qualified by Bluetooth® SIG for RF measurements
- Very fast spectrum measurements
- Bluetooth® 5 (PHY: LE 1M, LE 2M and LE coded), stable modulation index (SMI) support
- Support of all test cases of RF PHY Bluetooth® test specification, even the in-band emissions test
- Future-ready platform solution