

State-of-the-art testing for all types of radios

Alongside the billions of mobile radio users, there still exists a large community of users of classic radio applications. The new R&S®CMA180 radio test set is specially designed to meet the requirements of these (typically professional) users.

Analog radio and proprietary digital radio – a broad field for professionals

According to an ITU forecast, the number of mobile phones across the world will equal the global population sometime in 2014. However, such dominance on the part of mobile radio is not so

apparent from a typical frequency allocation table. Here it becomes obvious that many other radio applications exist besides mobile radio. This includes aeronautical radio, military radiocommunications services, public safety and security (PSS) applications and a wide range of activities in the unlicensed ISM

frequency bands. In the case of ordinary voice communications services, analog techniques are typically still used, i.e. the audio signal is directly modulated onto the RF carrier based on amplitude, frequency or phase modulation. Data transmitting systems use proprietary transmission formats, such

Clear, ergonomic touch menus instead of a collection of buttons: With the R&S®CMA180, Rohde & Schwarz has once again set a new standard in state-of-the-art T&M design.



as automotive remote control keys in civil applications and military software defined radio systems. All of these applications require T&M instruments that are able to perform in-depth testing and analysis of these radio components during development, production and servicing. The new R&S®CMA180 from Rohde&Schwarz was specially designed for such applications.

A digital tester looks deep into the analog world

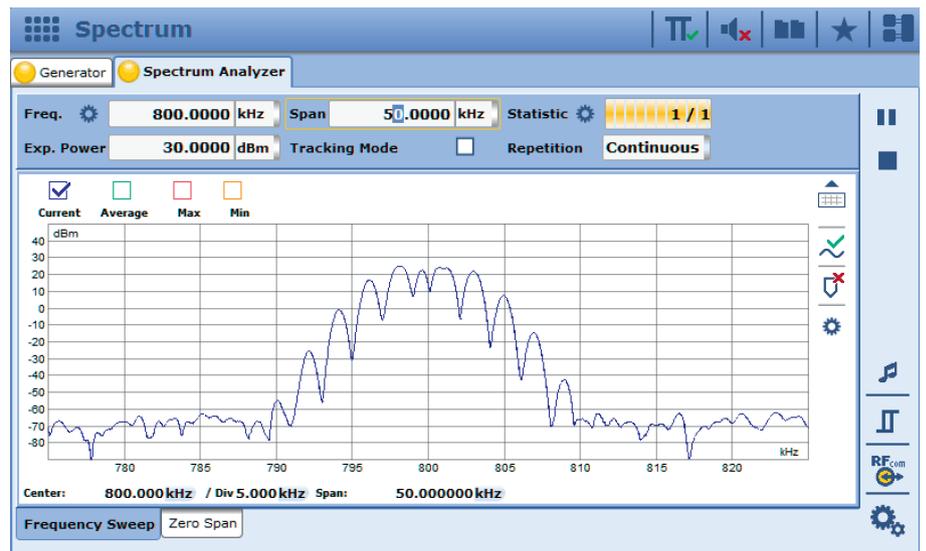
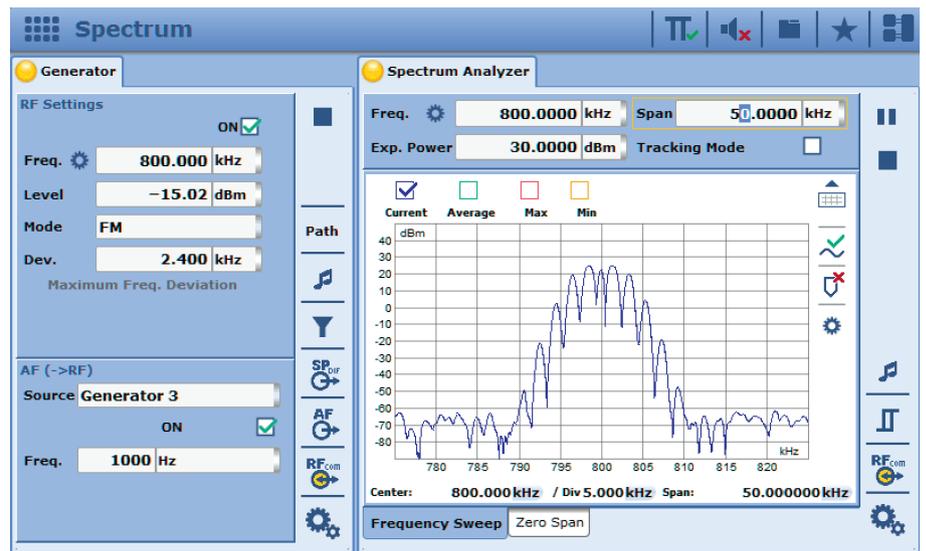
The R&S®CMA180 makes extensive use of digital signal processing and advanced computer technology. The instrument is very easy to use with its large touchscreen while also supporting sophisticated test and measurement. The high level of digitization reduces the number of hardware components, making the instrument more compact and boosting its MTBF.

The R&S®CMA180 is a standalone instrument that can perform all relevant measurements without any additional equipment. It demodulates and modulates analog RF signals, making it ideal for testing transmitters and receivers.

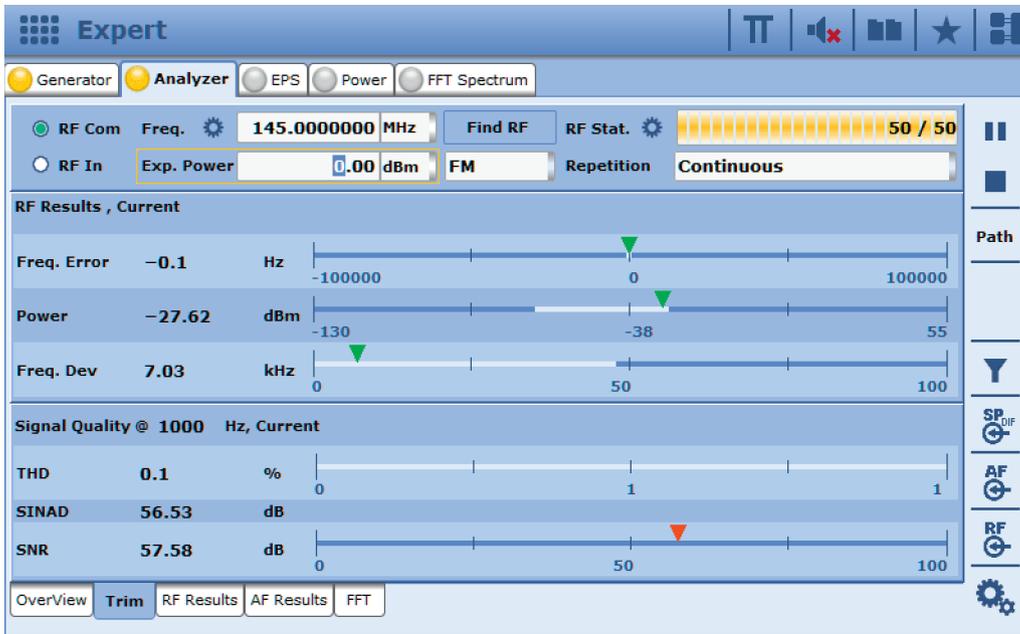
For receiver tests, audio signals from the internal generators or from external sources can be modulated onto the RF carrier. The signal demodulated by the device under test (DUT) is fed into the R&S®CMA180 via analog or digital

inputs and then analyzed. For transmitter tests, the R&S®CMA180 demodulates the received signal and accurately measures the audio signal and the RF signal. The R&S®CMA180 exactly suits the requirement profile for instruments of this type. However, a closer look immediately reveals some very impressive features. Audio analysis example: The R&S®CMA180 analyzes demodulated signals from radios based on SINAD, THD and SNR as well as signals from any other source that is connected via an analog or digital interface. Internally generated audio signals can be user-configured and output for external applications. Special

capabilities of this type also exist at the RF end. For example, two independent RF signals can be generated for receiver measurements and parameterized to introduce intermodulation products into the receive channel. This makes it possible to analyze the receiver's response to interference signals – without requiring an additional generator. For evaluation, the R&S®CMA180 features two spectrum analyzers (FFT and swept), which can also be used in zero span mode to display transients or pulsed signals in the time domain, for example. Just like the audio analyzer, these two spectrum analyzers are also available for general lab applications.



Two alternate views of the same measurement: In split screen mode (top), the generator and analyzer values are displayed simultaneously so the DUT's response to changes in the settings can be tracked without delay. In tab mode, the entire screen is devoted to a single presentation.



The trim view provides an overview of important measurement values and their position within the tolerance windows.

With analog radios, high transmit power is typically required to cover large distances when no repeater network is available to rebroadcast the signals. The R&S®CMA180 handles up to 150 W peak input power and is capable of working with “heavy artillery” if necessary.

Custom signals – with built-in ARB

The built-in ARB generator is ideal for generating complex analog or digital RF signals (including customer-specific RF signals). With a bandwidth of up to 20 MHz and a memory depth of 256 Msample, the R&S®CMA180 can even generate broadband and frequency hopping signals. Signals are saved in I/Q waveform format while tools such as R&S®WinIQSIM2™, MATLAB® and Mathcad® can be used for signal calculations.

Test automation ensures reproducible results and high throughput

The R&S®CMA180 is also ideal for carrying out maintenance work. One challenge for large service centers or organizations involves performing identical test sequences on distributed radio stations using different personnel. R&S®CMArun allows easy implementation of test sequence control. Users can apply predefined test sequences for certain radio types or create custom test sequences. The R&S®CMArun graphical user interface makes it easy to program these test sequences. For each test run, a test report is automatically generated to display the measurement results in tabular or graphical format including limit evaluation (pass/fail). Reports can be stored and statistically evaluated as required. Besides the R&S®CMA180, R&S®CMArun allows integration of the DUT and additional equipment into the test sequence via relays and TTL inputs / outputs. R&S®CMArun is therefore an ideal tool for final testing in radio production.

Ready for the future with optional software for special requirements

Users who have to frequently perform tests on custom-built radio systems typically want good software support that eliminates the need to set up the test instrument for each specific task. The R&S®CMA180 can be easily extended with appropriate software modules. The first options are in preparation and will allow GPS receiver tests and measurements on VOR/ILS radio navigation equipment. The instrument’s digital signal processing and impressive specifications provide a solid foundation for additional software solutions – such as testing of SDR radios and digital PSS standards. With the R&S®CMA180, Rohde&Schwarz offers its customers a future-ready instrument that is revolutionizing the testing of radios of every generation, configuration and size.

Gottfried Holzmann; Markus Hendeli;
Rainer Winkler



The app version of this article contains a video about the R&S®CMA180.