R&S®CMA180 RADIO TEST SET

The reference in radio testing

Product Brochure
Version 05.00

ROHDE&SCHWARZ

Make ideas real

AT A GLANCE

The R&S®CMA180 is a radiocommunications tester for radio systems that operate in the 100 kHz to 3 GHz range. Its technology is based fully on digital signal processing and advanced computing. Intuitive operation and efficient measurement capabilities make the R&S®CMA180 an indispensable tool for performing radio measurements.

The R&S®CMA180 demodulates and modulates all common 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 audio signals demodulated by the device under test (DUT) are 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 measures the demodulated audio signal and the RF signal.

In addition to the analysis of analog signals, the R&S®CMA180 supports digital modulations such as DMR, APCO P25, dPMR, NXDN and TETRA. Apart from these narrowband radio standards, the test set also supports LTE. This means that the R&S®CMA180 is also able to test state-of-the-art multimode radios. The test set also incorporates a digital signal generator and analyzer for digital receiver and transmitter measurements.

Using the ARB generator, users can play back nearly any type of signal. These signals can be generated with MATLAB® or R&S®WinIQSIM2™, including proprietary waveforms from software defined radios (SDR), and then loaded into the R&S®CMA180 and replayed. The advanced and efficient user interface makes it easy to use the R&S®CMA180. Users can quickly access all settings and easily perform measurements. Measurement results are clearly and conveniently displayed.

The R&S®CMA-XRT100 setup – a combination of the R&S®CMA180 and R&S®CMW100 communications manufacturing test set – can extend the bandwidth to 160 MHz and the frequency range up to 6 GHz. This makes the R&S®CMA180 ideal for broadband applications.

The optional ILS, VOR and marker beacon generator as well as VoIP support in line with EUROCAE ED-137B/C make the R&S®CMA180 invaluable for air traffic control (ATC) and radio navigation. The R&S®CMA180 can be powered by batteries, making it independent and portable. Results are displayed in a straightforward manner and the graphical user interface is easy to operate.

The R&S®CMA180 with a DUT.
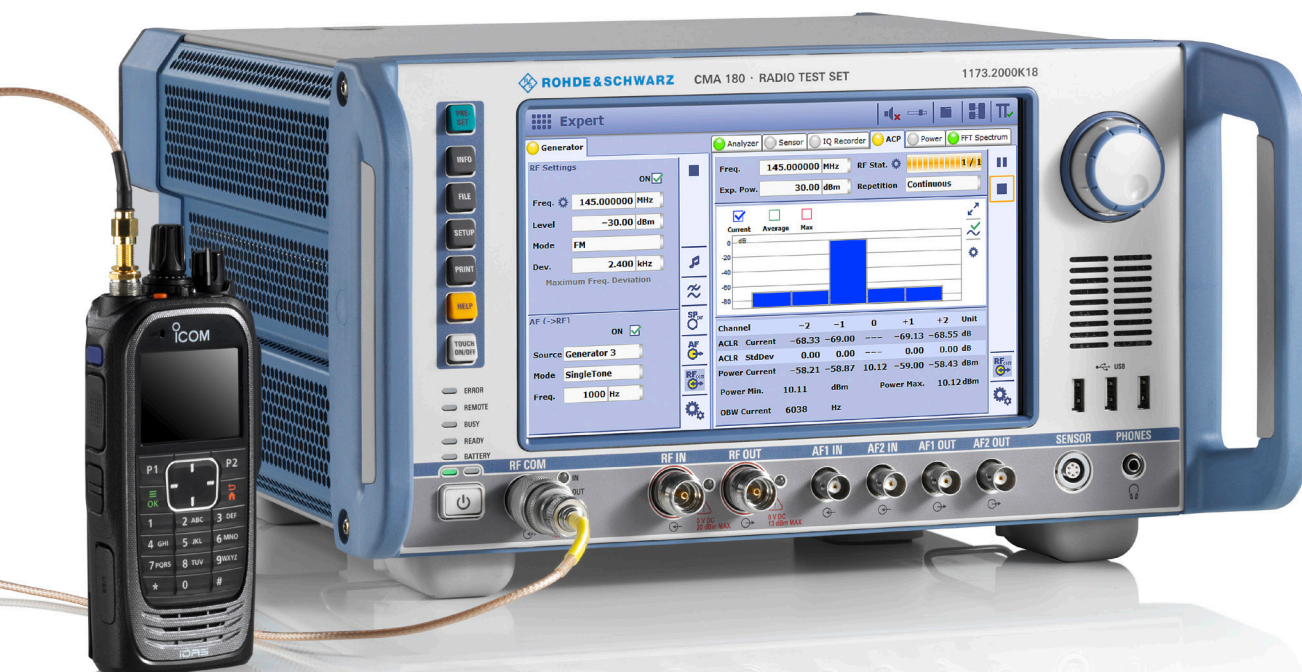
KEY FACTS

- ▶ Frequency range from 100 kHz to 3 GHz

- ▶ Analog modulation and demodulation (CW, AM, FM, PM, SSB)

- ▶ Up to 150 W peak input power and up to 100 W continuous input power

- ▶ Signal level for receiver measurements can be lowered to −140 dBm

- ▶ Integrated audio generators

- ▶ Audio quality tests (SINAD, THD, SNR)

- ▶ Integrated sweeping spectrum analyzer, tracking generator and oscilloscope

- ▶ Use of R&S®NRP and R&S®NRT power sensors – no configuration required

- ▶ I/Q recorder and ARB generator

- ▶ Digital signal analysis of proprietary waveforms

- ▶ ILS, VOR and marker beacon generator

- ▶ VoIP in line with EUROCAE ED-137B/C for ATC radios

- ▶ Digital receiver and transmitter measurements (DMR, APCO P25, dPMR, NXDN, TETRA)

- ▶ POCSAG and Zigbee receiver measurements

BENEFITS

ALL-PURPOSE DEVICE

Diverse, future-ready configuration options

The R&S®CMA180 has a frequency range from 100 kHz to 3 GHz, making it ideal for testing all common analog radio systems. Input levels up to 150 W are no problem for the test set. The flexible internal switching capabilities for the audio and RF paths make the R&S®CMA180 suitable for a wide range of test requirements.

Users can configure the internal generators, external audio sources, filters and measurements depending on the application. In the predefined test scenarios for receiver, transmitter and duplex tests, the RF and audio paths are preconfigured. This saves time and eliminates configuration errors for standard test cases. If the R&S®CMA180 is to be used for applications other than these standard test configurations, the expert mode allows users to access all configuration options.

Mobility

The R&S®CMA180 can be equipped with an AC power supply for operation at 110 V to 250 V or a DC power supply for operation at 10 V to 30 V. Equipped with a DC power supply, the R&S®CMA180 can also be powered via a vehicle's power supply. The DC power supply can be connected to an external AC/DC converter for AC operation at 110 V to 250 V.

An optional battery pack ensures maximum mobility and turns the R&S®CMA180 with DC power supply into a portable tester that can be brought directly to the DUT. Equipped with the battery pack, the portable, multifunctional radio test set is ideal for measurements in vehicles and aircrafts.

An optional display protective cover that can be easily attached to the front of the instrument reliably protects the R&S®CMA180 display and front panel.

The display protective cover protects the R&S®CMA180 for mobile applications.

Applications in the R&S®CMA180 frequency range

30 MHz		300 MHz		3000 MHz
VHF		UHF		

| 30 | 145 | 443 | 868 | 2400 MHz |
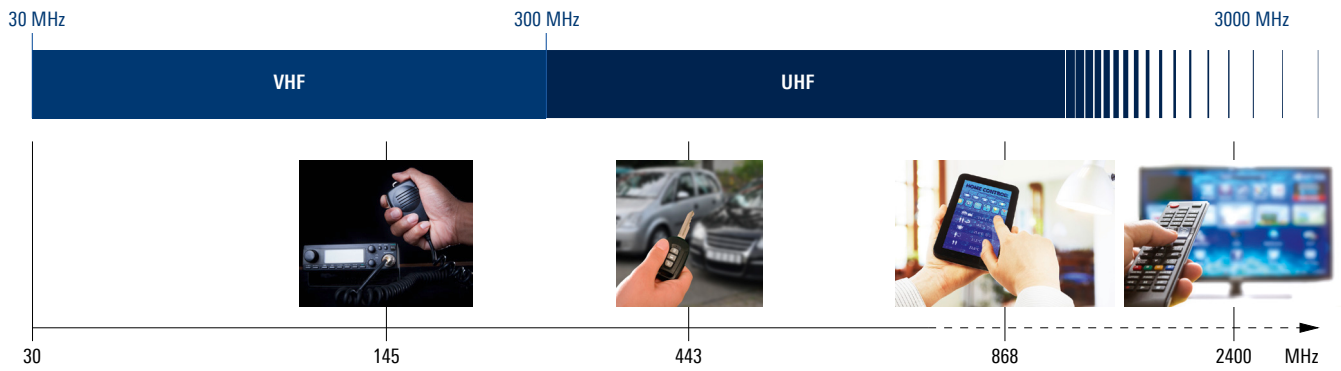
The R&S®CMA180 with optional
battery pack for mobile applications.

ACCURATE AND FLEXIBLE

Top RF performance for transmitter and receiver tests

For RF transmitter tests, all relevant parameters are measured, including transmit power, transmit frequency, frequency error and modulation parameters. The transmit power can be as high as 150 W. A spectrum analyzer is available for examining the signals in the frequency domain. Harmonics and the adjacent channel power can also be measured.

To investigate the receiver's sensitivity, RF signals are generated at very low powers. The signal power can be reduced to as low as −140 dBm. To analyze the audio signal, the audio signal demodulated by the DUT can be played back to the R&S®CMA180 via BNC or SPDIF.

Many different connectivity options

The R&S®CMA180 offers many connectivity options that make it possible to realize almost any type of application. For computer accessories such as a mouse and keyboard, there are USB ports on the front and rear panels. The front panel includes two additional analog audio outputs, two audio inputs and three RF connectors.

The R&S®CMA180 can be integrated into a LAN via the Gigabit Ethernet port on the rear panel, providing a convenient way to perform software updates over the network. The R&S®CMA180 can also be remote controlled. Trigger, clock, SPDIF, TTL inputs/outputs and relay ports are located on the rear panel.

External connection via relays and TTL inputs/outputs.
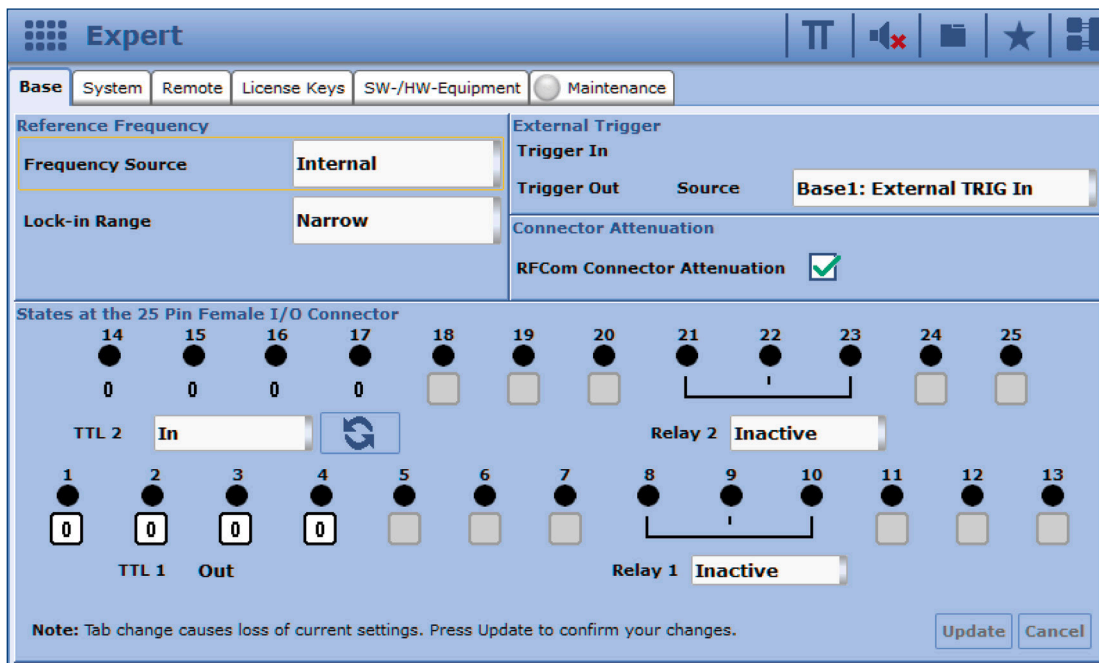
Switching and controlling external equipment

The rear panel includes a D-Sub connector for controlling external equipment or DUTs. Two relays, four TTL outputs and four switchable TTL inputs/outputs are available.

Remote control commands can be used to address and evaluate relays and TTL inputs/outputs in order to switch instruments or query their status. The R&S®CMA180 performs both measurement and control tasks. Proprietary interfaces can also be addressed. These features make the R&S®CMA180 a key element in any radiocommunications test system.
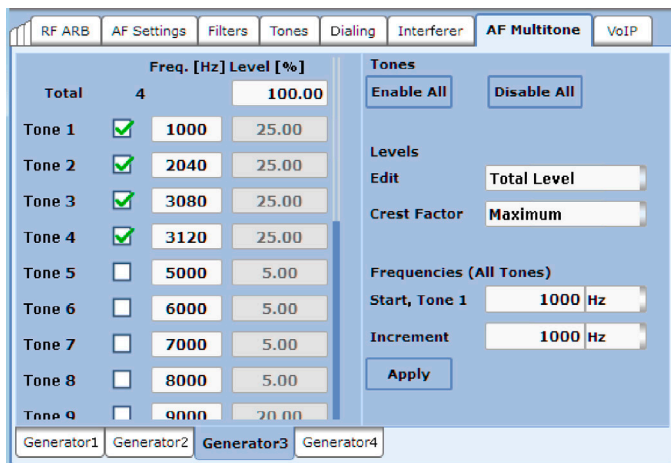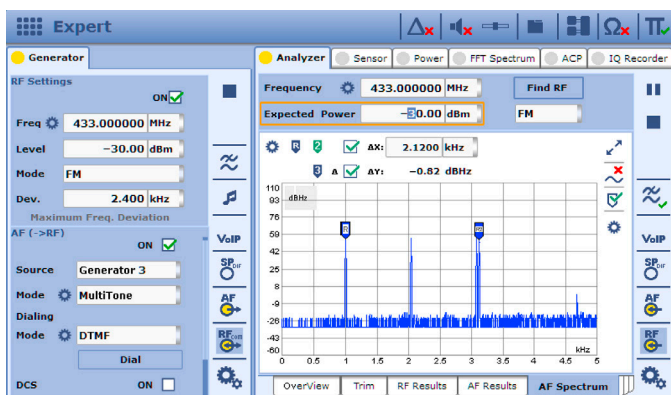
Rear view of the R&S®CMA180.

EXTENSIVE MEASUREMENT FUNCTIONALITY
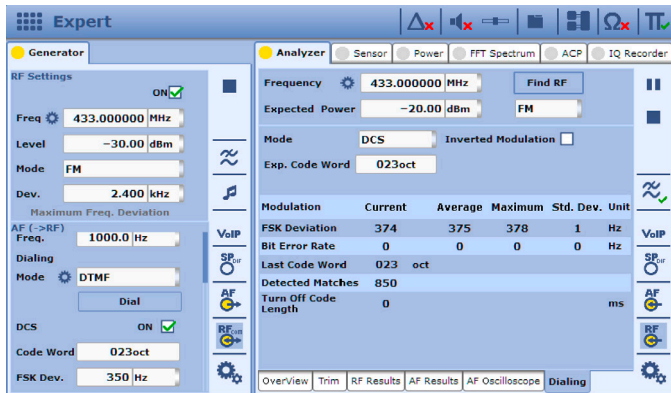
Working with DCS.

The multitone generator offers versatile settings.

The multitone generator generates up to 20 tones.

Analog modulation and demodulation

The R&S®CMA180 supports CW, AM, FM, PM and SSB modulation and demodulation methods. For receiver measurements, external signals that are fed in via the analog or digital audio inputs, as well as internally generated signals and audio files, can be modulated onto an RF carrier.

For transmitter measurements, the transmitter signals are demodulated and analyzed. The spectrum analyzer is used to display demodulated audio signals. Depending on the type of modulation, either the modulation deviation or modulation depth is measured and displayed. For receiver tests, the RF generator can produce signaling tones and bit sequences in addition to the wanted signal. The user has access to a CTCSS and configurable subaudio tones. DTMF, five-tone sequences and the digital CDS technique are all supported.

The test set also provides the necessary measurements to analyze the frequency, duration, frequency deviation and bit errors of the generated signals.

Audio generators

The R&S®CMA180 is equipped with four internal audio generators that can generate two tones simultaneously and modulate them onto the RF carrier. Depending on the generator used, the signal is available to the internal RF modulator or at the audio ports. If the signal is generated for an external application, the user has a choice of analog or digital output (SPDIF). The levels can be set as required. If the signal is to be modulated onto the RF carrier, the modulation characteristics can be configured.

Multitone

In addition to single sine tones, the audio generators can generate up to 20 tones simultaneously that can be fed to the AF connectors or used as a modulation source for FM, AM, PM and SSB. The frequency and level of each tone can be tuned individually.

Two tone

Two-tone measurements such as SSB linearity measurements can be performed using the two-tone measurement function.

Audio quality tests

All audio signals – both externally fed signals and demodulated audio signals – can be analyzed. Highpass, lowpass and weighting filters can be applied to the audio signals. The quality of the audio signal is determined with SINAD, SNR and THD. Users can select any frequency to be the test frequency. SINAD, SNR and THD are determined and displayed simultaneously. There is no need to switch between SNR and SINAD measurements. The spectrum analyzer is used to examine the signals in the frequency domain.

Automatic measurement routines

The R&S®CMA180 can automatically perform measurements that normally require extensive manual setup. It provides automatic measurement routines for

▶ TX modulation sensitivity
▶ RX sensitivity
▶ RX squelch
▶ RX IF bandwidth

During the RX sensitivity measurement, for example, the RF level is reduced until a predefined SINAD value is reached. The measurement then ends and the RF level is displayed as the measured value.

FFT spectrum application

The integrated FFT spectrum application is used to observe the test signal in the frequency domain. Users can set markers and insert minimum, maximum and average curves. Both the span and the assessment bandwidths are configurable. In the zero span mode, triggers help users optimally display and investigate transients. The transient signals to be analyzed can be broken down into I and Q components and displayed graphically, significantly simplifying analysis of radio transients.
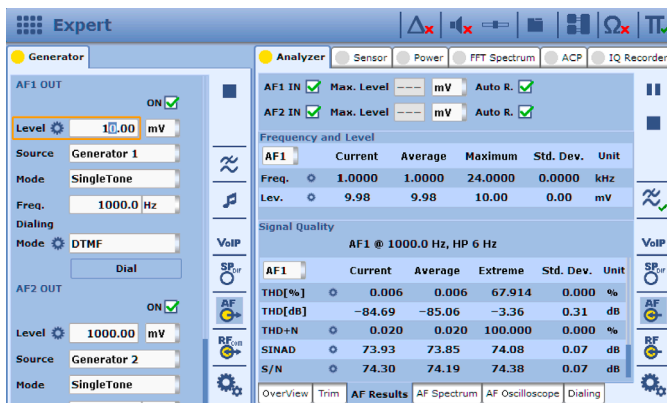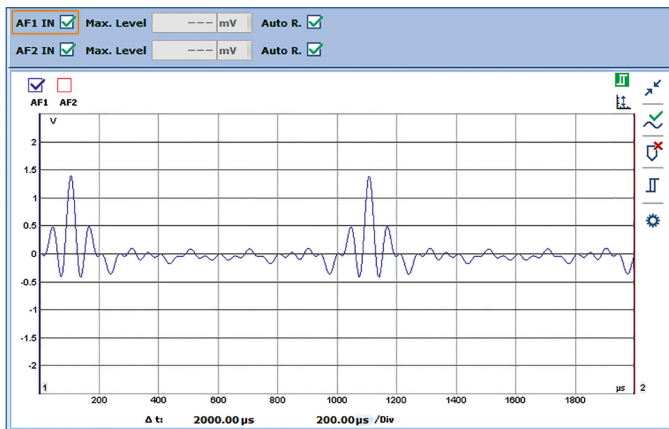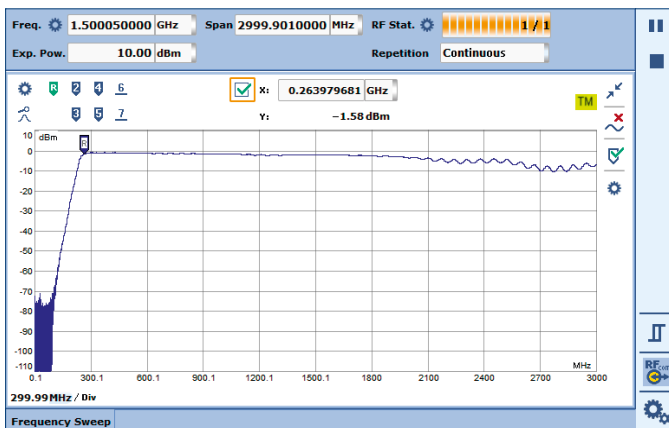

Detailed analysis of audio quality.
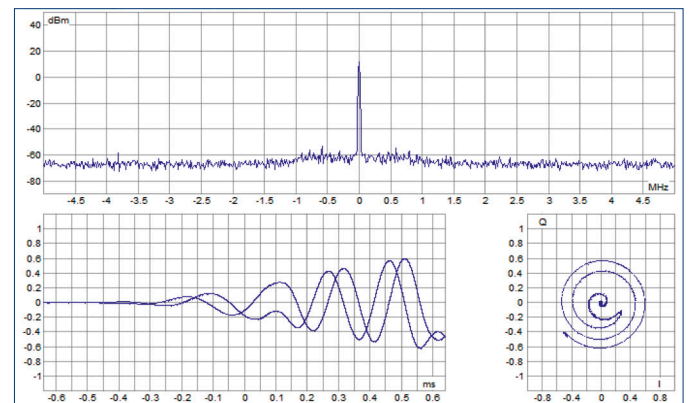
I/Q view of FFT spectrum.
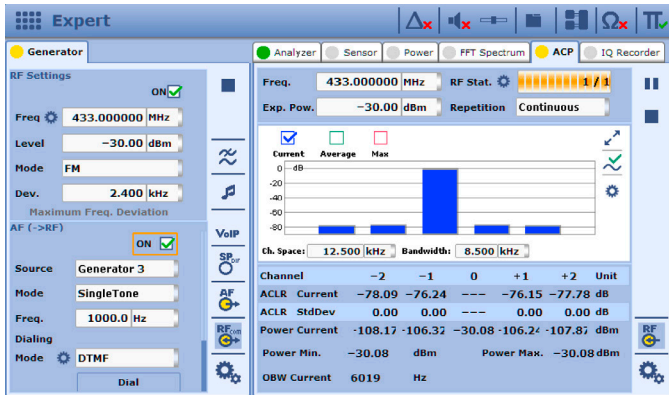
Adjacent channel power measurement with adjustable channel and measurement bandwidths.

Audio signal analysis with built-in oscilloscope.

Highpass filter measurement with the built-in tracking generator.

Adjacent channel power (ACP) and occupied bandwidth

The ACP measurement determines the power that a transmitter emits into adjacent channels. This key measurement for channel based radiocommunications helps to minimize interference in adjacent channels. Channel and measurement bandwidth settings can be adjusted as needed. Results are presented in graphical and tabular form. The occupied bandwidth can be measured to determine the bandwidths occupied by an adjustable percentage of the power.

Oscilloscope

The integrated oscilloscope shows the audio signals that are fed into the audio ports, including the demodulated audio signals for transmitter tests. Marker functions simplify analysis of these audio signals. Audio signals can be viewed in both the time domain and in the frequency domain thanks to FFT, allowing easy and comprehensive analysis of all audio signals.

Built-in sweeping spectrum analyzer with time domain analysis (zero span)

The R&S®CMA180 features a built-in sweeping spectrum analyzer. Extensive configuration options make this analyzer a universal tool for testing all types of DUTs. The spectrum analyzer has two operating modes: full span and user-defined spans. The zero span mode enables analysis in the time domain. In combination with the triggers, it is possible, for instance, to display transients.

Burst signals can also be analyzed in the spectrum analyzer's time domain. Depending on the sweep time setting, the video trigger allows users to display one or more bursts. The burst duration is determined in the time domain view.

The signal edges of burst signals can also be analyzed. Using the video trigger and the configurable trigger offset, acquisition begins with the rising edge. By setting the sweep time accordingly, it is possible to display exactly one burst. Setting markers makes signal analysis easier and quickly delivers precise measurement results.
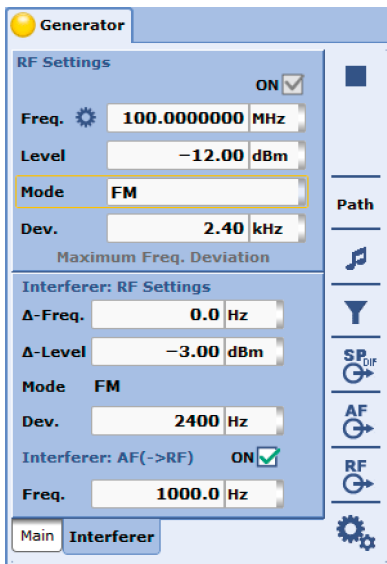
Frequency modulation with an integrated interfering signal.

Intermodulation with integrated interfering signal

The spectrum analyzer's max function is used to examine the hopping range when analyzing hopping radio systems. Even when the hopping sequence is unknown, it is possible to gain information about the frequency range. Gaps indicate unused frequencies. Each burst can also be analyzed in the time domain.
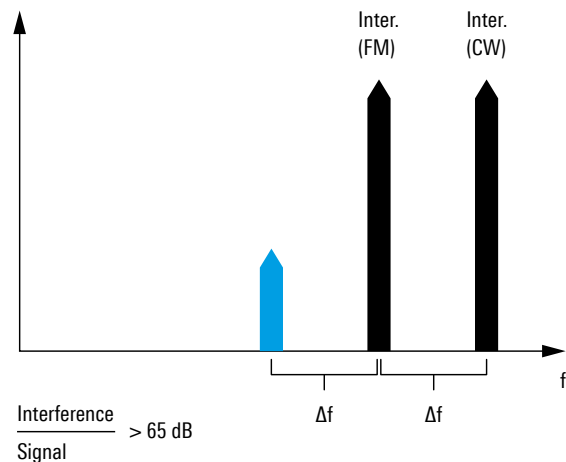
Tracking generator
The built-in tracking generator makes it easy to determine the frequency response of passive and active RF components. With an external VSWR bridge, the tracking generator can also be used for VSWR measurements. This extends the range of applications to include antenna measurements.

Built-in interferer
The R&S®CMA180 can generate two RF signals. If these signals are positioned outside of the DUT's receive window in such a way that at least one intermodulation product lies within the receive window, it is possible to assess the receiver quality. The built-in interferer allows users to

measure co-channel rejection and adjacent channel suppression, eliminating the need to employ an additional generator to generate the interfering signal.

The R&S®CMA180 simplifies intermodulation measurements since the user can generate the two RF signals at different levels within the available 20 MHz bandwidth. Both signals – the wanted signal and the interferer – can be modulated independently of one another. The levels of the two signals can also be set independently of one another. No additional equipment is needed to perform complex measurements.

Location services – GPS, Galileo, GLONASS, Beidu
Many of today's radios have GPS, Galileo, GLONASS or Beidu receivers. These can be easily tested using the R&S®CMA180. The test set outputs a position signal that is received and analyzed by the DUT. The position on the DUT can then be compared to the position sent by the R&S®CMA180.
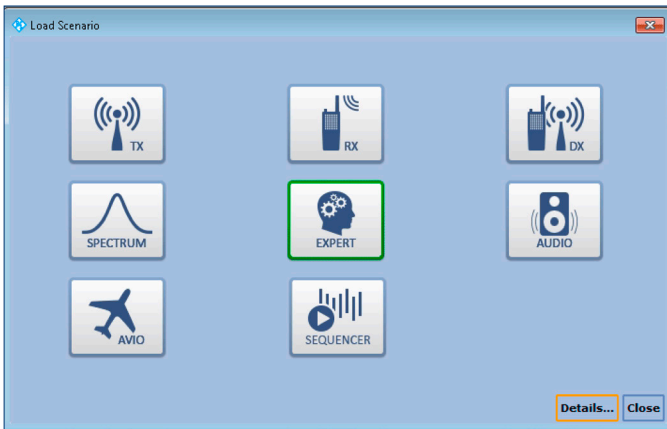
CONVENIENT OPERATION

Advanced touchscreen plus rotary knob

Users can operate the R&S®CMA180 completely via the touchscreen. All functions can be quickly accessed. Measurement results are clearly and conveniently displayed. Users can also use the rotary knob to change settings, an especially useful feature that allows them to scroll through the frequencies and levels and immediately see the impact on the measurement results.
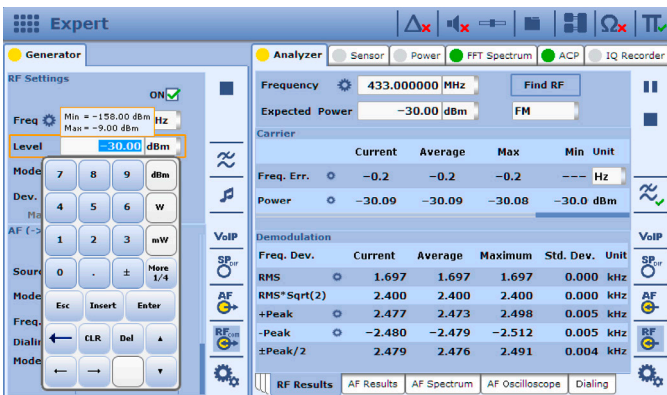
Predefined test scenarios for minimal configuration effort or expert mode for maximum freedom

Predefined scenarios for standard measurement tasks enable users to configure the R&S®CMA180 software and hardware with a finger tap. Predefined scenarios are provided for TX measurements, RF measurements, spectrum analysis, etc. In expert mode, users can configure the R&S®CMA180 as required. Audio and RF paths can be switched as needed. All generators and analyzers are accessible and configurable. In this mode, the R&S®CMA180 can perform tasks that go far beyond standard analog measurements.

Various ways of displaying parameters and measurement results

Users have a choice of two modes for displaying parameters and measurement results. The tab mode is best for displaying the values in detail. All generator and analyzer values are displayed in separate full-screen tabs.

The split-screen mode offers a complete overview, where the generator and analyzer values are displayed simultaneously. Generator settings are changed on the left side of the screen and the results are instantly displayed on the right side. The operating controls for the spectrum analyzer can be hidden, and the results displayed across the entire screen for optimum viewing.

Special trim view

The trim view graphically displays selected measurement values and their limits. In contrast to scalar displays, this view makes it easier to recognize when the values fall below or exceed limits and facilitates comparison of transmitters and receivers.

Remote control for easy integration into automated test environments via LAN or GPIB

When remotely controlled via Ethernet or an optional GPIB interface, the R&S®CMA180 can be seamlessly integrated into automated test environments and used for round-the-clock testing.

Select predefined test scenarios or switch to expert mode.

Clearly organized touchscreen.

Special trim view.
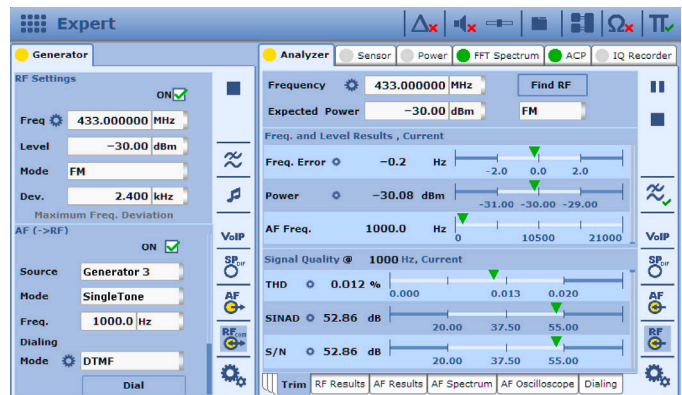
DIGITAL RECEIVER AND TRANSMITTER MEASUREMENTS

Digital receiver measurements

The R&S®CMA180 can generate test signals for digital radio standards. Signal content can be configured to match test requirements. Signals can carry audio test tones or pseudo random bit sequences (PRBS), for example. Signaling parameters such as DMR color code can be configured on the instrument's intuitive GUI, making it easy to perform receiver tests for digital standards such as DMR, NXDN, APCO P25 and dPMR.

The digital signal generator can be used for testing digital communications systems, and also supports POCSAG and Zigbee. For TETRA and LTE, signals generated with the R&S®WinIQSIM2™ simulation software can be played back.

Digital transmitter measurements

The integrated vector signal analyzer demodulates digital signals and delivers results, including eye diagrams, symbol distribution and scalar values such as frequency deviation and EVM.

This allows the R&S®CMA180 to analyze a wide range of digital signals. The user simply selects the standard to be tested, and the test set automatically sets the required analyzer parameters. The R&S®CMA180 supports DMR, dPMR, NXDN, APCO P25, TETRA and LTE. Digital and analog measurements are started at the push of a button. Results are displayed in an overview and in detailed graphs and diagrams.

Custom mode

In custom mode, users can define and measure their own signals. Signals are defined with the signal analyzer. The R&S®CMA180 then tests the signals. This is particularly important in the case of tactical radios, where the waveform is often classified.

Digital signal generator for receiver tests (left) and overview of digital measurements (right).
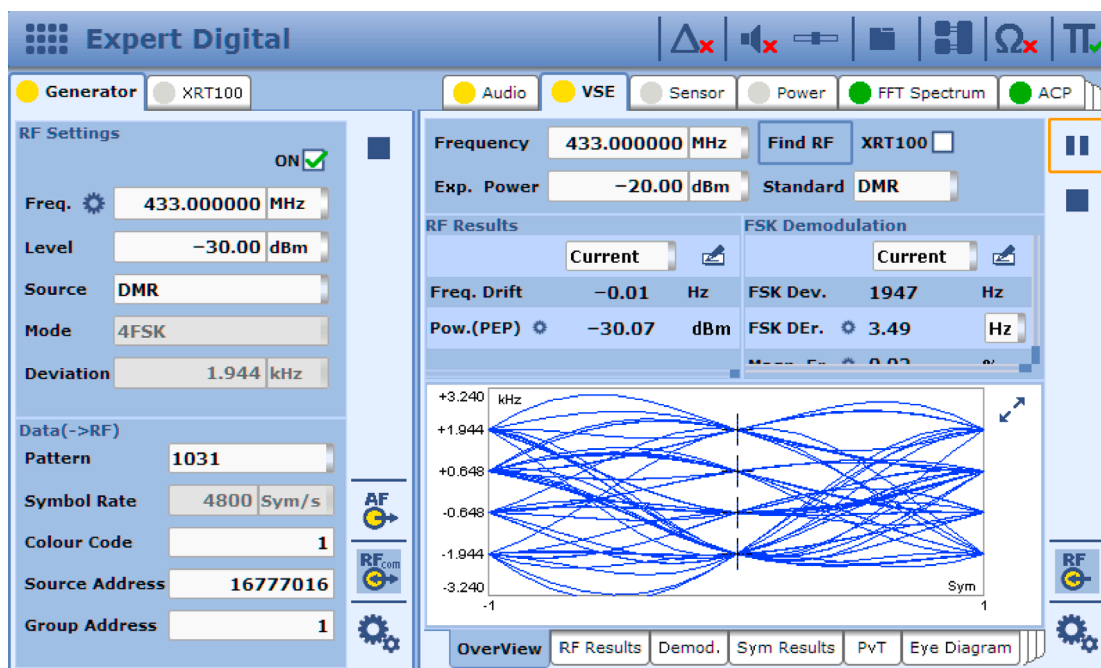
TESTING MULTIMODE RADIOS

Modern public safety radios support LTE, Wi-Fi and Bluetooth® in addition to the classic trunked radio standards, e.g. TETRA, APCO and DMR. This means that the scope of tests also needs to include these technologies. The R&S®CMA180 supports the measurement of classic analog and digital radio signals through to LTE.

LTE transmitter measurement

The R&S®CMA180 uses an integrated vector signal analyzer to measure transmitters. This signal analyzer is set up for LTE by selecting the required standard and is then configured automatically. If the LTE test object is set to transmit mode, the R&S®CMA180 displays the measured power and EVM values. Other measurement images such as the constellation diagram are also shown.

LTE receiver measurement

The LTE receivers are measured using the ARB generator. This generator supports LTE waveforms that can be generated with R&S®WinIQSIM2™ or MATLAB®, for example. The LTE receiver can evaluate these signals and thus determine the sensitivity.

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LTE transmitter measurement.
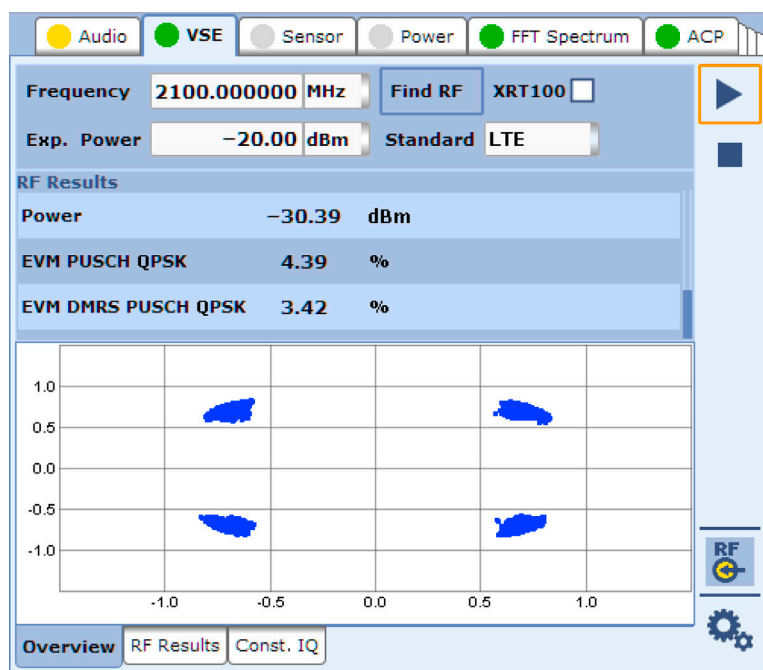
HIGH-PERFORMANCE EXTENSION

With its frequency range of 100 kHz to 3 GHz and measurement bandwidth of 20 MHz, the R&S®CMA180 covers all common analog and digital standards. For applications that go beyond this, the R&S®CMA180 can be fitted with a high-performance frontend (R&S®CMA-XRT100 setup). The instrument has integrated operation and is controlled fully via the R&S®CMA180.

Parallel testing with the R&S®CMA-XRT100
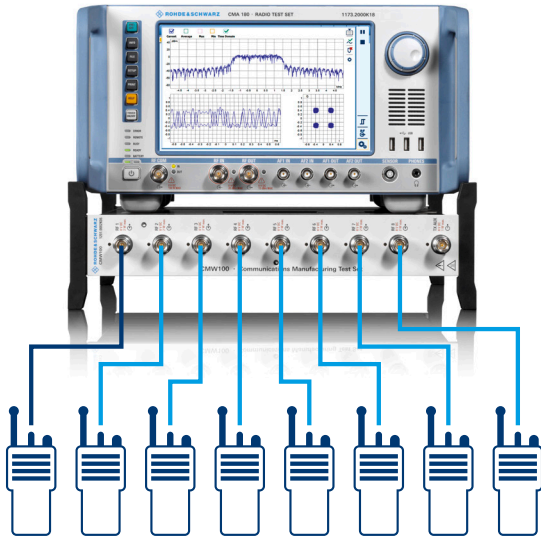
Frequency range and bandwidth extension

Waveforms that operate at a bandwidth of up to 160 MHz and in a frequency range up to 6 GHz can be measured using the R&S®CMA-XRT100 solution. A standalone ARB generator is available for receiver tests. For the transmitter tests, the RF information is sent to the integrated vector signal analyzer, where it is evaluated. The integrated operation enables seamless work on the R&S®CMA180 and R&S®CMA-XRT100.

Increase in throughput thanks to parallel testing

If multiple radios need to be measured, the parallel test approach offers an efficient solution: up to eight radios are connected to the R&S®CMA-XRT100 at the same time and measured simultaneously. This saves a considerable amount of time, particularly in the case of receiver measurements, as they take much longer than the transmitter tests.


R&S®CMA-XRT100 setup.

TEST FEATURES FOR SPECIAL APPLICATIONS

Avionics generator for ILS, VOR and marker beacon signals

The outstanding signal quality of the R&S®CMA180 makes it an extremely versatile radio tester for aircraft. The test set can analyze ILS, VOR and marker beacon signals for aircraft landing systems as well as airborne radio signals. Equipped with a battery pack and antenna, the R&S®CMA180 is a standalone instrument that is ideal for aircraft maintenance.

Both a glide slope and localizer are available for ILSs. The signal parameters can be modified to meet test require-ments. DDM, SDM, modulation frequencies, etc., can be set. The settings are displayed on simulated on-board instruments, making it easy to compare target and actual values.
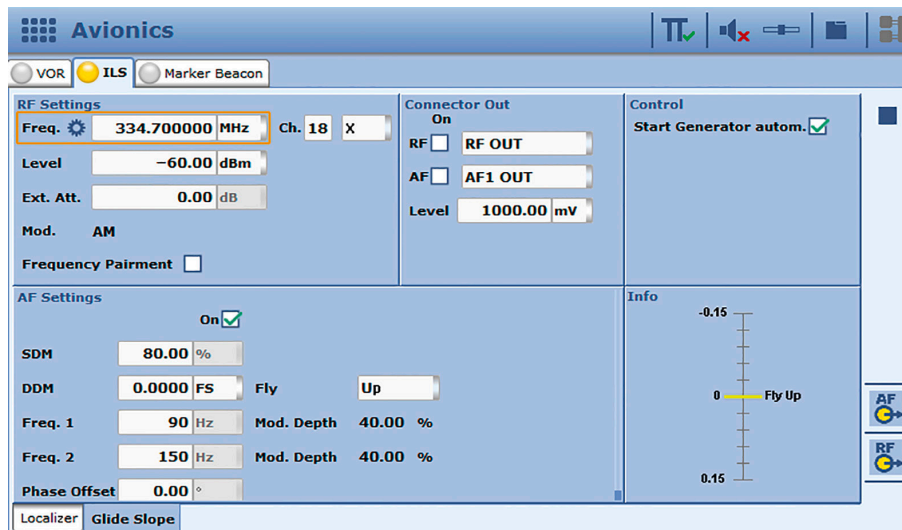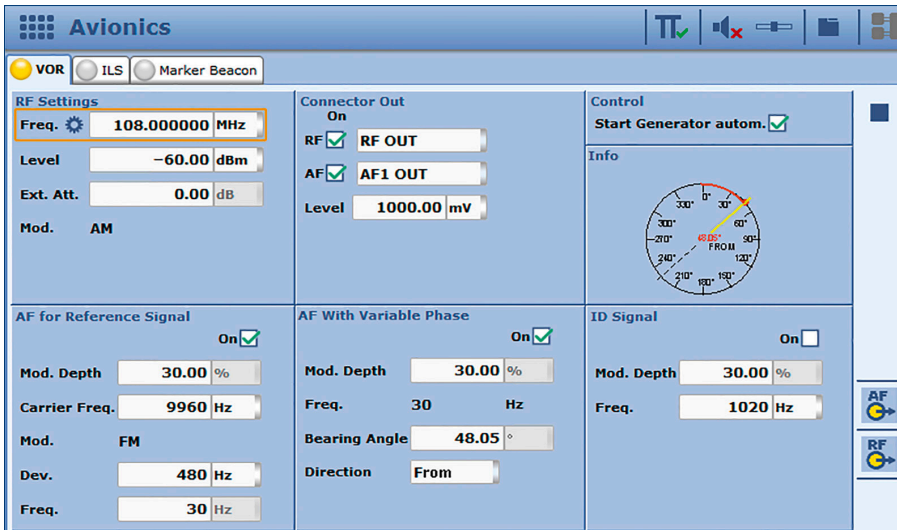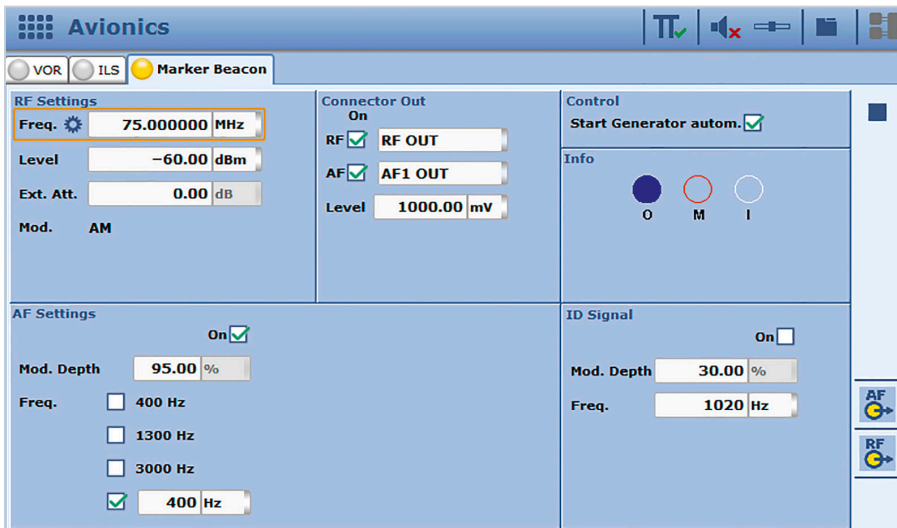
ILS glide slope generator.
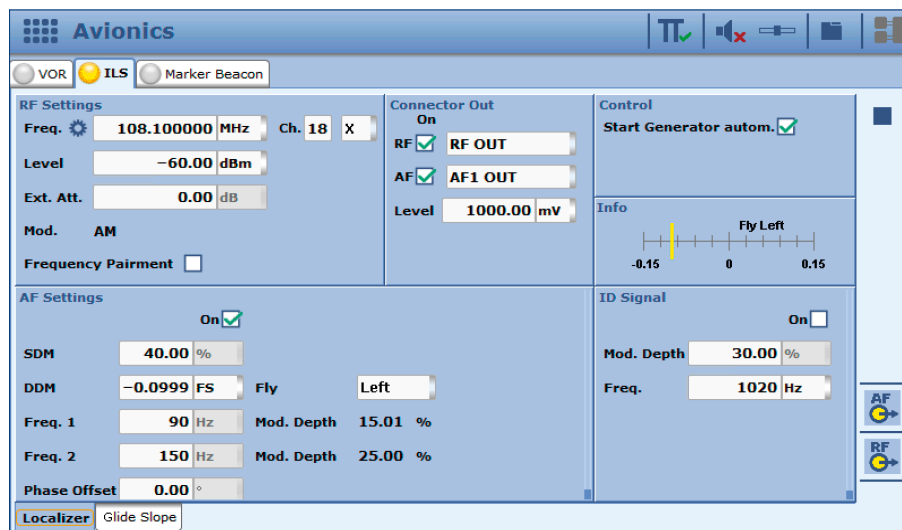
Generator settings for ILS localizer.

Numerous signal parameters are also available for VOR and marker beacon signals. ID signaling can be activated for all avionics signals. For avionics signals, the audio signal can be fed to the audio ports to generate the signal with an external signal generator.
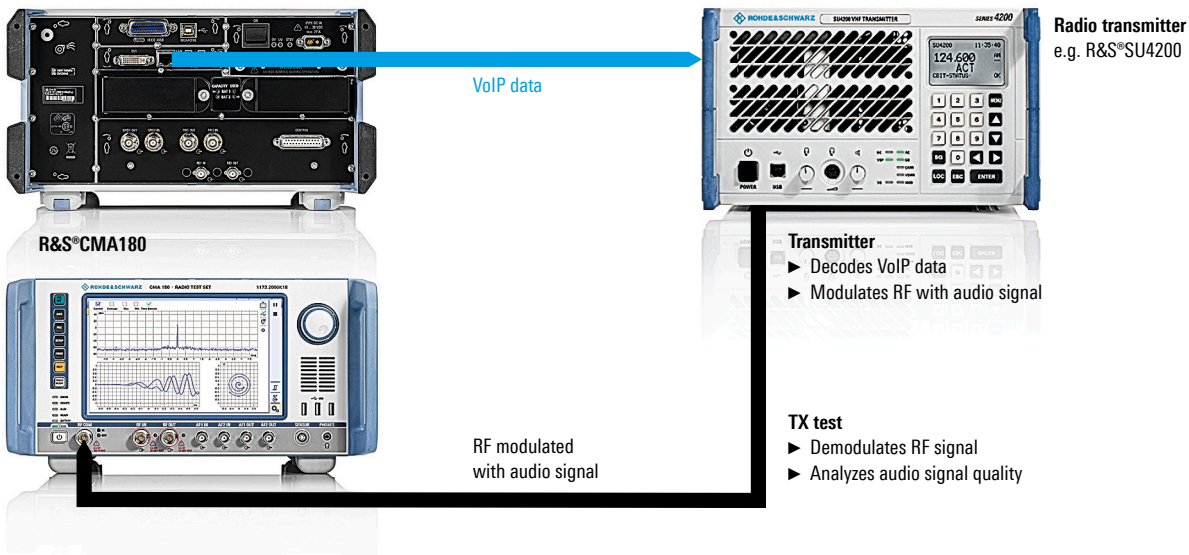

Configuration of VOR generator.

Marker beacon settings.
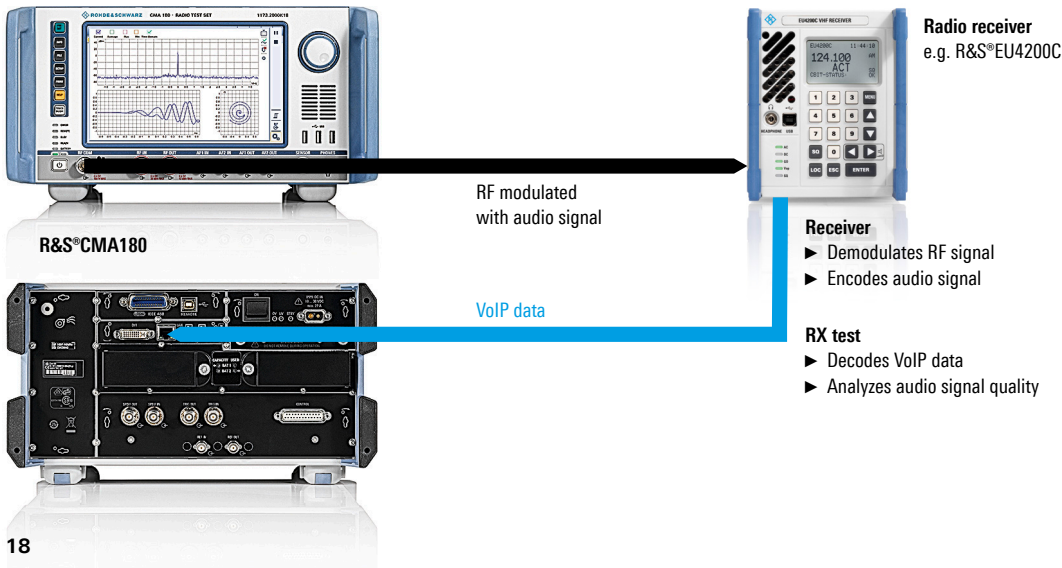
Avionics VoIP generator and analyzer

The R&S®CMA180 incorporates a VoIP generator and analyzer in line with EUROCAE ED-137B/C. The VoIP interface is fully integrated in the R&S®CMA180, and users can switch between analog audio and VoIP testing at the push of a button. This allows easy and extensive testing of airborne radios via both the VoIP (LAN) interface and the analog audio (RF COM) interface.

Configuration of the VoIP connection is straightforward and intuitive, and the status displays for the connection provide an excellent overview. The radio to be tested is connected to the test set via the integrated LAN interface. It is also possible to connect multiple transmitters or receivers via an optional LAN switch that is powered via a USB cable, meaning that the R&S®CMA180 can be operated independently of the mains supply.

VoIP generator test setup

VoIP data

R&S®CMA180

Radio transmitter
e.g. R&S®SU4200

Transmitter
► Decodes VoIP data
► Modulates RF with audio signal

RF modulated
with audio signal

TX test
► Demodulates RF signal
► Analyzes audio signal quality

VoIP analyzer test setup

R&S®CMA180

RF modulated
with audio signal

Radio receiver
e.g. R&S®EU4200C

Receiver
► Demodulates RF signal
► Encodes audio signal

VoIP data

RX test
► Decodes VoIP data
► Analyzes audio signal quality

Waveforms (ARB)

In the ARB waveform mode, the R&S®CMA180 processes I/Q data that is available as waveform files, making it possible to generate any application-specific modulation signals. The R&S®WinIQSIM2™ waveform creation tool allows users to create waveform files directly and conveniently. I/Q data can also be generated using commercial software tools such as MATLAB®, Mathcad® and ADS®. This data must then be converted into the waveform file format using the Rohde&Schwarz Matlab transfer toolbox or the Rohde&Schwarz I/Q wizard.
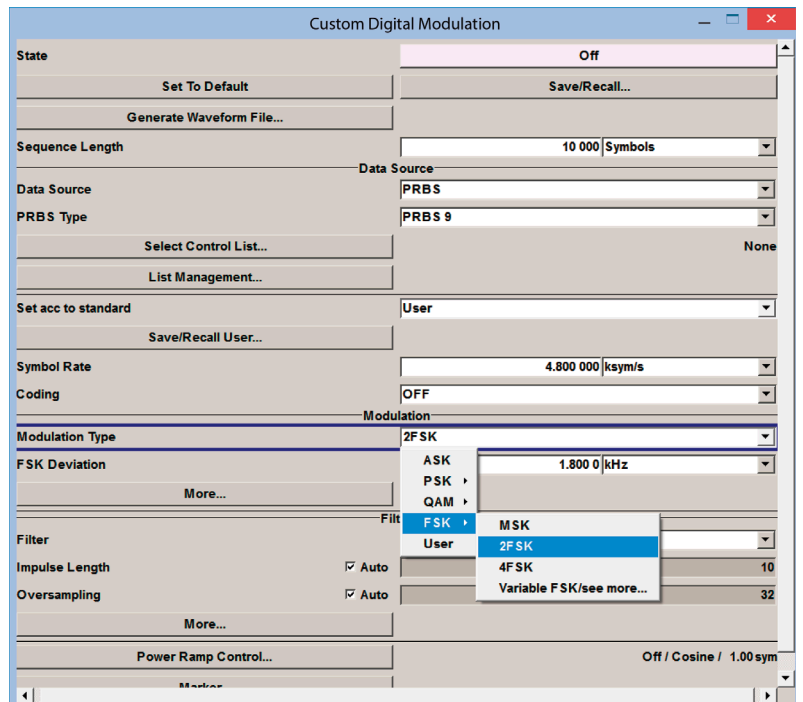
The R&S®WinIQSIM2™ graphical user interface also makes it possible to very quickly create digital waveforms. FSK, PSK and QAM modulated test signals can be generated and then replayed using the R&S®CMA180.

GPS, Galileo and GLONASS satellite navigation signals can also be generated with R&S®WinIQSIM2™ and then loaded into the R&S®CMA180 and replayed.

ARB file generation with R&S®WinIQSIM2™.

Field to lab

The I/Q recorder makes it possible to record RF signals via the RF ports. Signals can be recorded over a wired line or via an antenna thanks to the wide dynamic range of the R&S®CMA180. The signals are recorded and stored as I/Q data. The recorded data can be replayed on the ARB generator or analyzed with the R&S®VSE vector signal explorer software.

Triggers and settable sample rates turn the I/Q recorder into a universal tool to simulate real-life scenarios in the lab or to generate reference signals.

Recording RF signals for playback in the lab.

TEST AUTOMATION WITH R&S®CMArun SOFTWARE

Ready-to-use solution for configuring application test sequences

R&S®CMArun is available for test sequence control. It provides a graphical user interface for programming a test sequence. Individual settings and measurement tasks can be configured and arranged in a specific sequence. Sequences, loops and conditional queries help users easily create and execute complex test sequences. Each setting and measurement value is logged and then summarized and stored in a report. For measurements with limit values, pass or fail indicators can be displayed for each measurement. The R&S®CMA180 can also be controlled using VISA drivers and SCPI commands.

R&S®CMArun offers a separate run environment in which test sequences are created and executed using a mouse and keyboard. Additionally, an R&S®CMArun component has been integrated into the R&S®CMA180 touchscreen, mainly to execute previously created test sequences.

Extensive function library

The R&S®CMArun function library contains numerous test functions that range from analog and digital receiver and transmitter tests to sensitivity measurements and loading and starting waveforms in the ARB generator.

Control via SNMP, serial interfaces and SCPI

Radios with an SNMP interface can also be controlled by R&S®CMArun and are handled like DUTs that have a serial interface. Entire test environments can be automated since other equipment such as power supplies can also be integrated via SCPI.

R&S®CMArun running on the R&S®CMA180.
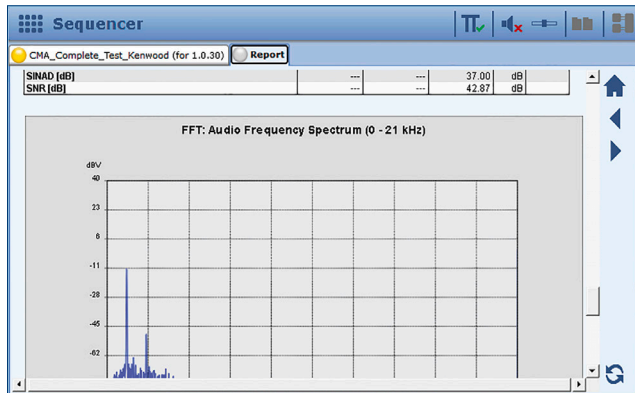
Configuration of R&S®CMArun test items.

Automatically generated test report from R&S®CMArun.

Battery life testing

Battery life is crucial for all handheld radios and rescue beacons. To ensure a specific battery life, the radio's battery size, components and software must be devised accordingly.

Battery life measurements allow users to keep an eye on the radio's current, voltage and power. The R&S®CMA180 provides a detailed overview of the power consumed for transmission and standby, making it possible to optimize operations. This application requires the battery life test (R&S®CMA-KT061) and R&S®CMArun analog radio tests (R&S®CMA-KT051) options.

Battery life testing with R&S®RT-ZVC02/R&S®RT-ZVC04 multi-channel power probe

Battery life measurements require monitoring both the current and the voltage over time, as well as calculating the instantaneous power at high sampling rates. To meet these requirements, it is necessary to measure the power a device consumes based on a real use case, i.e. the device must be powered by a real battery, or via the USB interface, or from the mains via an AC/DC power supply.

The R&S®RT-ZVC02 and R&S®RT-ZVC04 multi-channel power probes are designed to cover precisely such uses cases, offering two (R&S®RT-ZVC02) and four (R&S®RT-ZVC04) voltage channels plus two/four current channels.
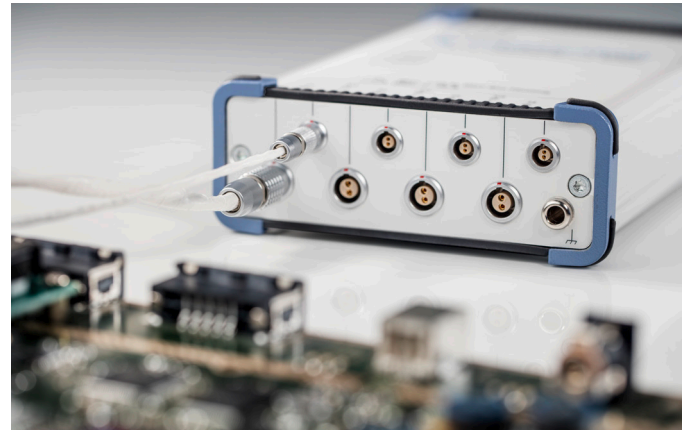
The R&S®RT-ZVC04 multi-channel power probe.

Fully automated test solution for R&S®Series4200 radios

A fully automated test solution based on R&S®CMArun is available for R&S®Series4200 radios with an SNMP interface and R&S®Series4100 radios with an SNMP or serial interface. The specially developed radio test and remote control options (R&S®CMA-KT420, R&S®CMA-KT410 and R&S®CMA-KT440) together with the radio adapter (R&S®CMA-Z421A), which is used to physically connect the radio to the R&S®CMA180, make it possible to instantly test R&S®Series4200, R&S®Series4100 and R&S®Series4400 radios without any hardware modifications or programming.

The test plans created in R&S®CMArun can be executed via a LAN-connected PC or loaded and run directly on the test set. The latter option is particularly advantageous for mobile use. The created test reports can be stored on the R&S®CMA180 or exported via USB or LAN.

The R&S®Series4200 radios.

WIDE RANGE OF OPTIONS AND ADD-ONS

The R&S®CMA180 comes with a wide range of options and add-ons. Below you will find an overview of the most important products. Our sales engineers will be happy to provide you with details and answer your questions.

SOFT CASE AND TRANSIT CASE

A soft case and a transit case are available for the R&S®CMA180. The transit case features wheels and a foam insert that accommodates the test set and accessories. It has an integrated pressure equalizing valve, is waterproof and complies with MIL-STD-810F. The soft case protects the R&S®CMA180 during transport. The R&S®CMA180 can be operated from inside the case since the front panel remains accessible. Air compartments next to the R&S®CMA180 protect it from overheating. The test set is portable and instantly ready to use.

Transit case.

Soft case.
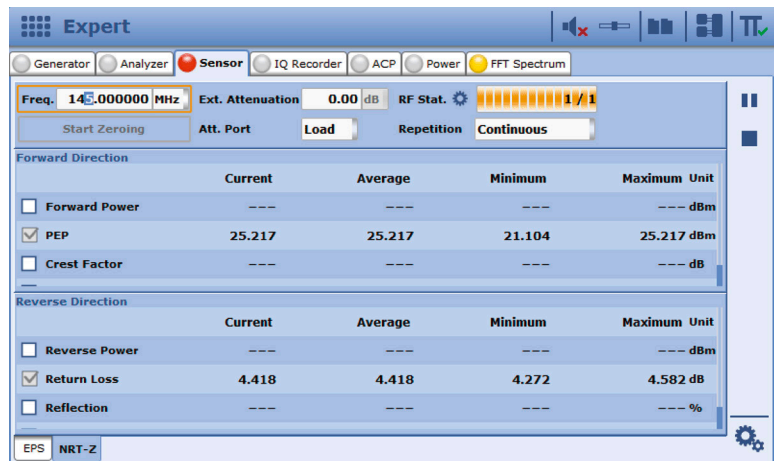
R&S®NRP AND R&S®NRT POWER SENSORS

The high-precision R&S®NRP power sensors can be connected directly to the dedicated sensor input and used immediately without any additional configuration. The R&S®NRT directional power sensors can also be connected. These sensors can be used to measure VSWR.

R&S®NRP power sensors.

Measurements with R&S®NRT power sensor connected to the R&S®CMA180.

SHIELD BOX, ANTENNA COUPLER AND AUDIO ACCESSORIES

The R&S®CMW-Z10 RF shield box together with the R&S®CMW-Z11 antenna coupler are an excellent combination for wireless testing of analog radios. The R&S®CMW-Z10 RF shield box features outstanding characteristics for protection against ambient emissions. With its numerous shielded connector feedthroughs, it is ideal for all types of applications. The R&S®CMW-Z15 audio measurement option provides a loudspeaker and a microphone for the shield box, enabling wireless testing of radio systems including loudspeakers and microphones.
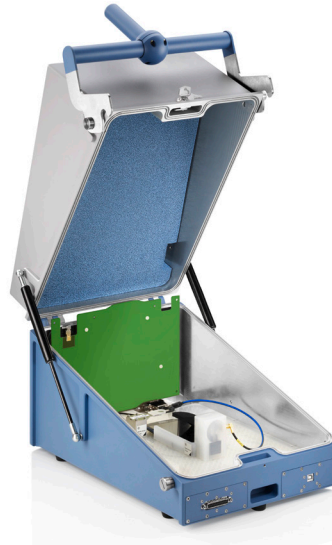
The R&S®CMW-Z10 RF shield box with the R&S®CMW-Z11 antenna coupler and the R&S®CMW-Z15 audio measurement option.

RADIO TEST SET

The R&S®CTH200A portable radio test set reliably tests analog FM radio systems under harsh environmental conditions. Specially designed for outdoor use, it measures power, frequency, receiver sensitivity and VSWR and helps find cable faults. This portable radio test set is an ideal tool for service and maintenance work.

R&S®CTH200A portable analog radio test set.

HANDLING OF EXTERNAL AUDIO IMPEDANCES

The R&S®CMA180 supports all external audio impedances. The external circuitry and the impedances of the radio under test can be configured in a menu. Individual values can be set for each audio input and output.

The audio ports on the R&S®CMA180 can be adapted using external BNC feedthroughs with an integrated 600 Ω impedance (R&S®CMA-Z651A). The settings and configurations made are taken into account in the measurements.
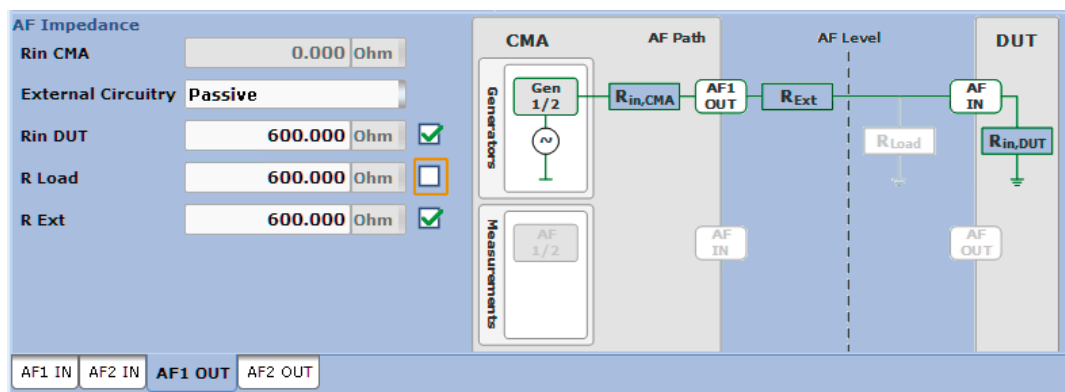
Configuring external audio impedances.

SPECIFICATIONS IN BRIEF

Specifications in brief			
RF frequency range			0.1 MHz to 3000 MHz
Output level range	RF generator		up to +16 dBm (max.)
Maximum allowed input power	RF input		up to 150 W
Modulation			CW, AM, FM, PM, SSB
Arbitrary waveform generator (ARB)	R&S®CMA-B110D		RF bandwidth up to 20 MHz
	R&S®CMA-B110D		4 Gbyte memory
Spectrum analyzer	R&S®CMA-K120		0.1 MHz to 3000 MHz
FFT spectrum analyzer	span		10 kHz to 20 MHz
Audio signals			analog inputs/outputs, SPDIF, internal AF generators/analyzers
Power supply	AC		100 V to 240 V
	DC		10 V to 30 V or battery
			85 W
Connectivity			RF, AF, LAN, USB, DVI, Rohde&Schwarz power meters, reference frequency in/out, trigger in/out, TTL in/out, GPIB (R&S®CMA-B612A)
Dimensions	W × H × D		¾ 19", 4 RU, 360.5 mm × 195.4 mm × 351 mm (14.2 in × 7.7 in × 13.8 in)
Weight	fully equipped		13 kg (28.7 lb)
	base unit without options		10.9 kg (24 lb)

R&S®CMA180 ports			
Connector	**Type**	**Position**	**Use**
3 × USB	USB port, type A	front	mouse, keyboard, USB flash drive for software updates and screenshots
1 × power sensor	Rohde&Schwarz sensor	front	power measurement with high-precision R&S®NRP/R&S®NRT power sensors
2 × audio in	BNC	front	analog audio, e.g. receiver measurements
2 × audio out	BNC	front	analog audio, e.g. transmitter measurements
1 × bidirectional RF	N female	front	standard RF port for the DUT
1 × RF out	N female	front	RF port for high output power
1 × RF in	N female	front	sensitive RF input
2 × USB 3.0	USB port, type A	rear	mouse, keyboard, USB flash drive for software updates and screenshots
1 × Gigabit LAN	RJ-45 port	rear	integration into a network, e.g. for software updates; remote control of the R&S®CMA180; remote desktop operation
1 × SPDIF in	BNC	rear	digital audio, e.g. receiver measurements
1 × SPDIF out	BNC	rear	digital audio, e.g. transmitter measurements
1 × trigger in	BNC	rear	for external triggers
1 × trigger out	BNC	rear	trigger for external equipment
1 × parallel port	D-Sub	rear	TTL in/out and relays for custom applications

ORDERING INFORMATION

Designation	Type	Order No.
Base unit		
Radio test set	R&S®CMA180	1173.2000K18
Selections		
Solid-state disk	R&S®CMA-S052P	1173.5100.14
AC power supply	R&S®CMA-S054B	1173.5151.03
DC power supply	R&S®CMA-S054M	1173.5151.14
Options and extras		
Hardware options		
Baseband generator, 4 Gbyte memory	R&S®CMA-B110D	1173.5751.05
IEC/IEEE bus interface	R&S®CMA-B612A	1173.5800.02
OCXO reference oscillator	R&S®CMA-B690A	1173.5851.02
OCXO reference oscillator, high-performance	R&S®CMA-B690M	1173.5851.14
Battery compartment	R&S®CMA-B060A	1209.5003.02
Software options, general purpose		
Signal analyzer (SA), tracking generator (TG), oscilloscope (scope)	R&S®CMA-K120	1173.6206.02
ILS/VOR generator	R&S®CMA-K130	1209.5703.02
I/Q recorder	R&S®CMA-K220	1209.6200.02
VoIP support in line with ED-137B/C	R&S®CMA-K610	1209.7058.02
Software options, R&S®CMArun		
Analog radio tests	R&S®CMA-KT051	1209.5603.02
Analog radio tests, advanced	R&S®CMA-KT052	1209.7412.02
Battery life test	R&S®CMA-KT061	1209.6300.02
VOR/ILS tests	R&S®CMA-KT130	1209.7393.02
Digital tests (DMR/APCO/NXDN)	R&S®CMA-KT200	1209.8619.02
R&S®Series4100 radio test	R&S®CMA-KT410	1209.7764.02
R&S®Series4200 radio test	R&S®CMA-KT420	1209.6422.02
R&S®Series4400 radio test	R&S®CMA-KT440	1209.7358.02
VoIP support	R&S®CMA-KT610	1209.7335.02
Software options, waveforms		
Waveform library, GPS tests	R&S®CMA-KV140	1209.5855.02
Waveform library, GLONASS tests	R&S®CMA-KV141	1209.7206.02
Waveform library, Galileo tests	R&S®CMA-KV142	1209.7229.02
Waveform library, Beidou tests	R&S®CMA-KV143	1209.7241.02
Waveform library, APCO fading tests	R&S®CMA-KV240	1209.7087.02
Software options, waveforms, with R&S®WinIQSIM2™		
LTE tests	R&S®CMA-KW500	1209.8677.02
Bluetooth® tests	R&S®CMA-KW610	1209.8925.02
GPS tests	R&S®CMA-KW620	1209.6222.02
GLONASS tests	R&S®CMA-KW621	1209.6245.02
Galileo tests	R&S®CMA-KW622	1209.6268.02
WLAN tests	R&S®CMA-KW656	1209.8919.02
TETRA Rel. 2 tests	R&S®CMA-KW668	1209.6874.02
Software options, digital		
Signal analyzer, base	R&S®CMA-K300	1209.8990.02
Signal analyzer, digital (APCO, DMR, NXDN, dPMR, TETRA)	R&S®CMA-K305	1209.9009.02
Signal analyzer, LTE FDD	R&S®CMA-K320	1209.8877.02
POCSAG generator	R&S®CMA-KG260	1209.7487.02
Zigbee generator	R&S®CMA-KG250	1209.7506.02
FSK generator	R&S®CMA-K210	1209.8654.02

Designation	Type	Order No.
MMI		
MMI language Russian	R&S®CMA-KL007	1209.6468.02
MMI language French	R&S®CMA-KL033	1209.6480.02
MMI language Chinese	R&S®CMA-KL086	1209.6500.02
Extras		
Transit case	R&S®CMA-Z020A	1209.5555.02
Soft case	R&S®CMA-Z025A	1209.5510.02
Display protective cover	R&S®CMA-Z030A	1209.9796.00
External power supply	R&S®CMA-Z053A	1173.6058K00
Protective caps	R&S®CMA-Z059	1209.6445.02
Lithium-ion battery pack (two batteries)	R&S®CMA-Z061A	1209.5303.02
Lithium-ion battery charger	R&S®CMA-Z062A	1209.5355K02
Radio adapter (box and cables) for R&S®Series4100, R&S®Series4200, R&S®Series4400 and R&S®Series5200 radios	R&S®CMA-Z421A	1209.6522.02
AF impedance matching unit	R&S®CMA-Z600A	1173.6406.02
VoIP kit, ED-137	R&S®CMA-Z610A	1209.7293.02
Feedthrough termination, BNC, 600 Ω (2 × parallel)	R&S®CMA-Z650A	1209.6700.02
Feedthrough, BNC, 600 Ω (1 × serial, 1 × parallel)	R&S®CMA-Z651A	1209.7170.02
DC block, N type, 10 MHz to 6 GHz	R&S®CMA-Z670A	1209.6780.02
Antenna set	R&S®CMA-Z680A	1209.6745.02
Accredited calibration (DKD)	R&S®CMA-ACA	1209.6368.02

Designation	Type	Order No.
Recommended extras		
19" rack adapter, 4 RU, ¾, T350	R&S®ZZA-KN10	1175.3091.00
Power sensors	R&S®NRPxxx, R&S®NRT-Z14/-Z44	Please contact your local Rohde & Schwarz sales office.
Directional power sensors	R&S®FSH-Z14/-Z44	Please contact your local Rohde & Schwarz sales office.
RF shield box	R&S®CMW-Z10	1204.7008.02
Antenna coupler, up to 6 GHz	R&S®CMW-Z11	1204.7108.02
Audio accessory	R&S®CMW-Z15	1204.7508.02
RF cable, up to 6 GHz, N to N	R&S®CMW-Z110	1204.7608.02
Attenuator, 3/6/10/20/30 dB, 100 W, 50 Ω	R&S®RBU100	1073.8495.xx (xx = 03/06/10/20/30)
50 W load	R&S®CTH-Z30	1207.1700.02
Handset	R&S®CMW-Z50	1208.7602.02
Headphones	–	0708.9010.00
XLR/BNC adapter set m/f	R&S®UP-Z1MF	1411.3306.02
IEC/IEEE bus cable, length: 1 m	R&S®PCK	0292.2013.10
IEC/IEEE bus cable, length: 2 m	R&S®PCK	0292.2013.20
Supplementary products		
Radio test set		
Portable radio test set for analog transceivers, including OTA measurements and cable fault finder, with operating manual	R&S®CTH200A	1207.1000.02
Accessories for the R&S®CTH200A		
Transit case for portable radio test set and accessories	R&S®CTH-Z20	1207.1900.02
50 Ω load, BNC adapter and cables	R&S®CTH-Z30	1207.1700.02
Multi-channel power probes		
Multi-channel power probe with autoranging, 2 × voltage and 2 × current channels	R&S®RT-ZVC02A	1326.0259.32
Multi-channel power probe with autoranging, 4 × voltage and 4 × current channels	R&S®RT-ZVC04A	1326.0259.34
Accessories for multi-channel power probes		
Extended cable set, PCB, length: 32 cm	R&S®RT-ZA30	1333.1686.02
Extended cable set, 4 mm, length: 32 cm	R&S®RT-ZA31	1333.1692.02
Extended cable set, 4 mm, length: 100 cm	R&S®RT-ZA34	1333.1892.02
Extended cable set, PCB, length: 100 cm	R&S®RT-ZA35	1333.1905.02
Solder-in cable set	R&S®RT-ZA36	1333.1911.02

Service options		
Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	
Extended warranty, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	
Extended warranty, nine years	R&S®WE9	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	Please contact your local Rohde & Schwarz sales office.
Extended warranty with calibration coverage, three years	R&S®CW3	
Extended warranty with calibration coverage, four years	R&S®CW4	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	
Extended warranty with accredited calibration coverage, three years	R&S®AW3	
Extended warranty with accredited calibration coverage, four years	R&S®AW4	

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.
To find your nearest Rohde & Schwarz representative, visit www.sales.rohde-schwarz.com

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

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Sustainable product design

► Environmental compatibility and eco-footprint
► Energy efficiency and low emissions
► Longevity and optimized total cost of ownership

Certified Quality Management	Certified Environmental Management
ISO 9001	ISO 14001

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