R&S®CMA180
Radio Test Set
The new reference in radio testing

ROHDE&SCHWARZ

Product Brochure | Version 04.00

R&S®CMA180 Radio Test Set

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.

The test set now also incorporates a digital signal generator and analyzer that can be used to carry out 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 learn to use the R&S®CMA180. Users can quickly reach all settings and easily perform measurements. Measurement results are clearly and conveniently displayed.

The R&S®CMA180 with a DUT

The optional ILS, VOR and marker beacon generator as well as VoIP support in line with EUROCAE ED-137B 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.

Key facts

- Frequency range from 100 kHz to 3 GHz
- Analog modulation and demodulation (CW, AM, FM)
- 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 scope
- Use of R&S®NRP and R&S®NRT power sensors, no configuration required
- I/Q recorder and ARB generator
- Digital signal analysis
- ILS, VOR and marker beacon generator
- VoIP in line with EUROCAE ED-137B for ATC radios
- Digital receiver and transmitter measurements

Benefits

Rear view of the R&S®CMA180

All-purpose device

Diverse, future-ready configuration options

With its frequency range from 100 kHz to 3 GHz, the R&S®CMA180 is ideal for testing all common analog radio systems. Input levels up to 150 W are no problem for the R&S®CMA180. 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 according to the given 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.

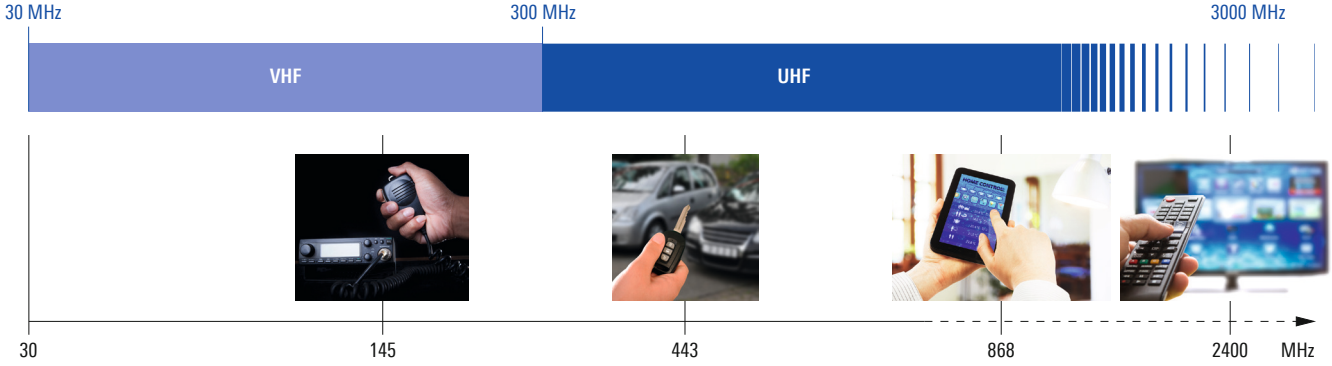
An optional battery pack ensures maximum mobility and turns the R&S®CMA180 with DC power supply into a portable tester that can be brought directly to the DUT. Equipped with the battery pack, the portable, multifunctional radio test set is ideal for measurements in vehicles and aircraft.

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 in mobile applications.

The R&S®CMA180 with battery option for use in mobile applications

Applications in the R&S®CMA180 frequency range



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.

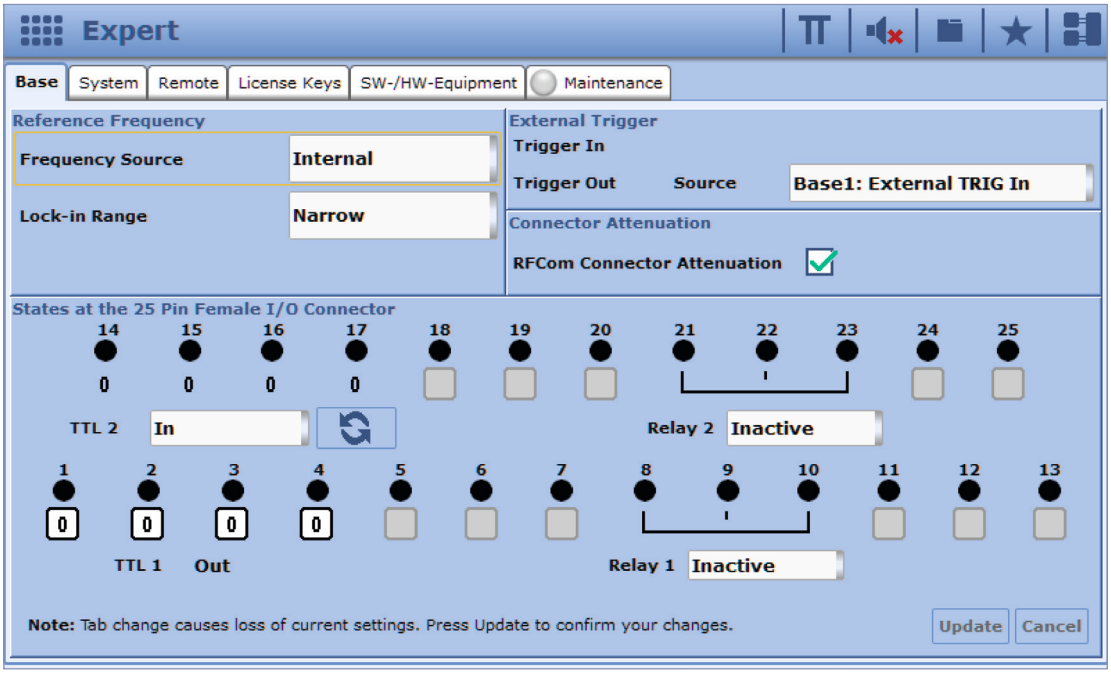
The R&S®CMA180 can be integrated into a LAN via the gigabit Ethernet port on the rear panel, providing a convenient way to perform software updates over the network. The R&S®CMA180 can also be remote controlled. Trigger, clock, SPDIF, TTL in/out and relay ports are located on the rear panel.

Switching and controlling external equipment

The rear panel includes a D-Sub port 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 I/Os 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.

External connection via relays and TTL I/Os



Extensive measurement functionality

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

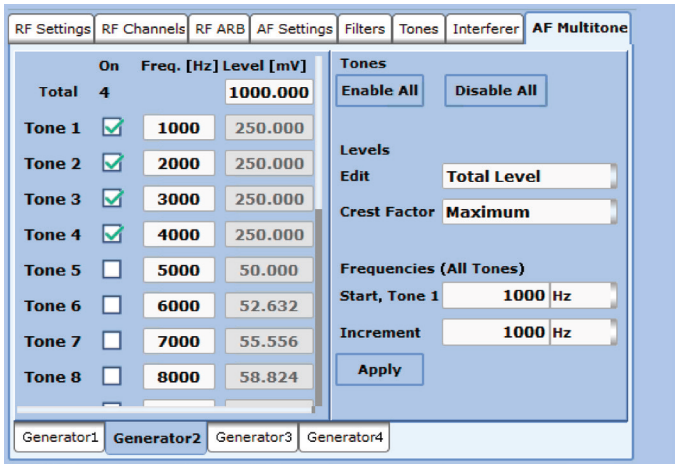
The R&S®CMA180 is equipped with four internal audio generators that can generate two tones simultaneously and modulate them onto the RF carrier. Depending on the generator used, the signal is available to the internal RF modulator or at the audio ports.

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.

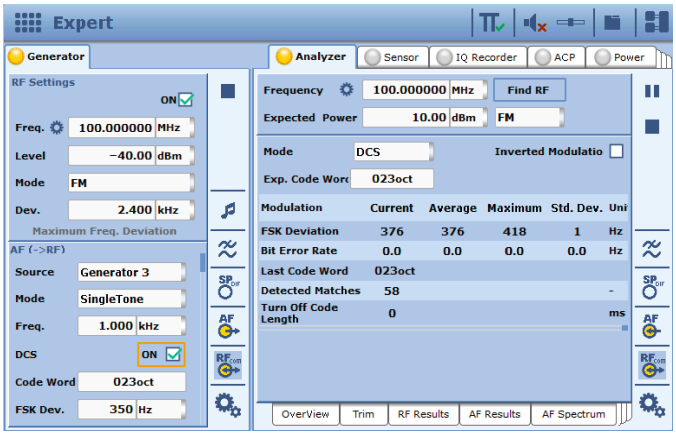
Multitone

The audio generators not only generate a single sine tone, but up to twenty 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. Thanks to the multitone function, two-tone measurements such as SSB linearity measurements can be performed using just two of 20 available tones.

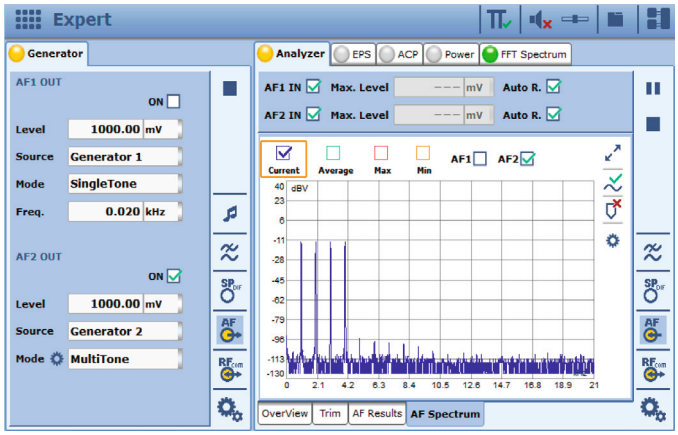
The multitone generator offers versatile setting options.



Working with DCS



The multitone generator generates up to 20 tones.



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.

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.

Adjacent channel power (ACP) and occupied bandwidth

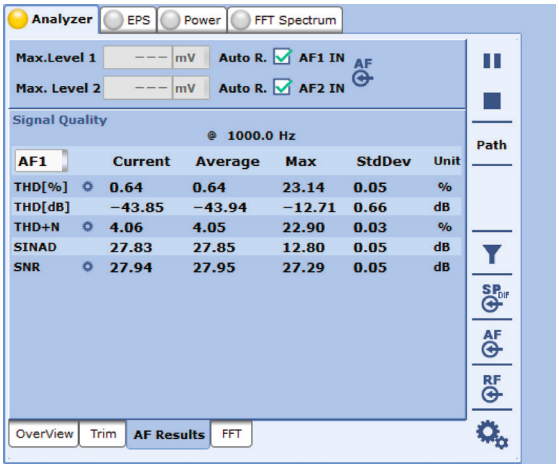
The ACP measurement determines the power that a transmitter emits into adjacent channels. This key measurement for channel-based radiocommunications helps to minimize interference in adjacent channels.

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 a settable percentage of the power.

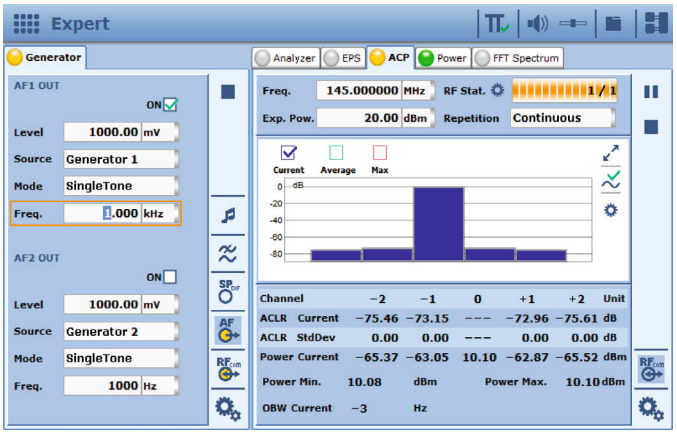
Oscilloscope

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, for easy and comprehensive analysis of all audio signals.

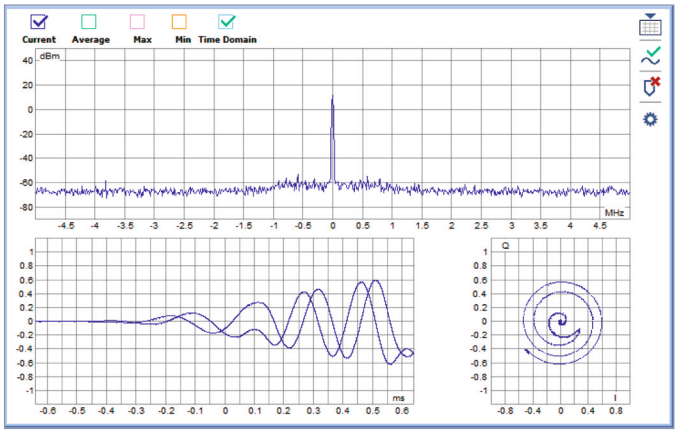
Detailed analysis of audio quality



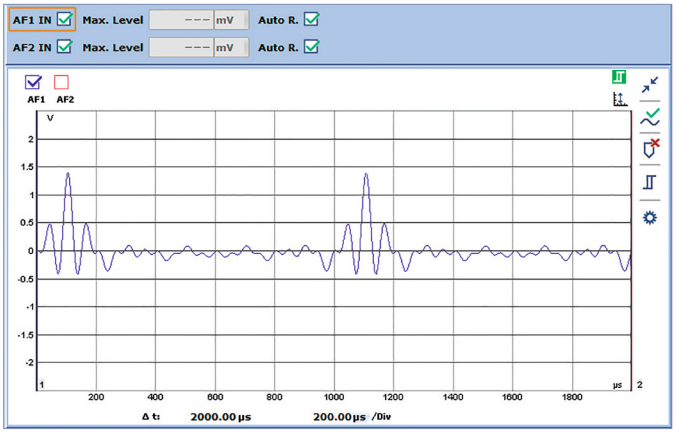
Adjacent channel power measurement with settable channel and measurement bandwidths



I/Q view of FFT spectrum



Audio signal analysis with built-in oscilloscope



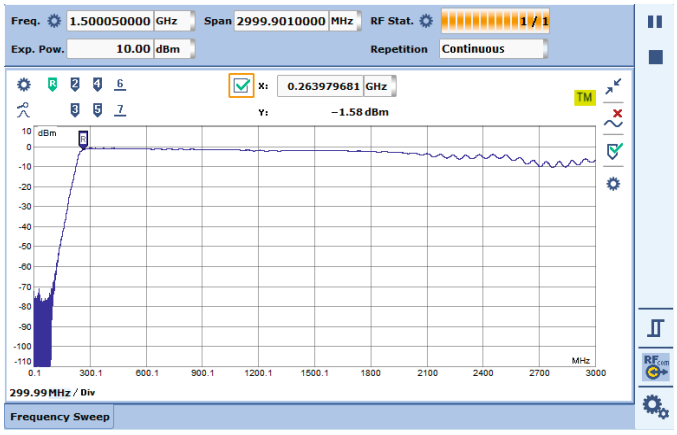
Built-in sweeping spectrum analyzer with time domain analysis (zero span)

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.

Bursted 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.

Highpass filter measurement with the built-in tracking generator



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.

Built-in interferer

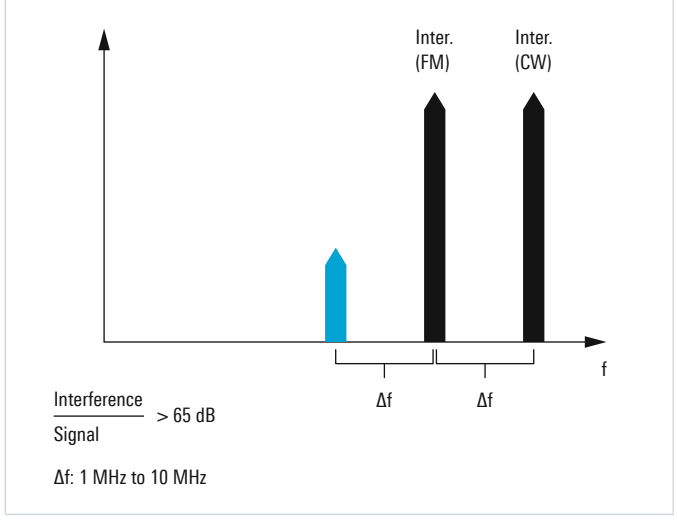
The R&S®CMA180 can generate two RF signals. If these signals are positioned outside of the DUT's receive window in such a way that at least one intermodulation product lies within the receive window, it is possible to assess the receiver quality. The built-in interferer allows users to measure co-channel rejection and adjacent channel suppression, eliminating the need to employ an additional generator to generate the interfering signal.

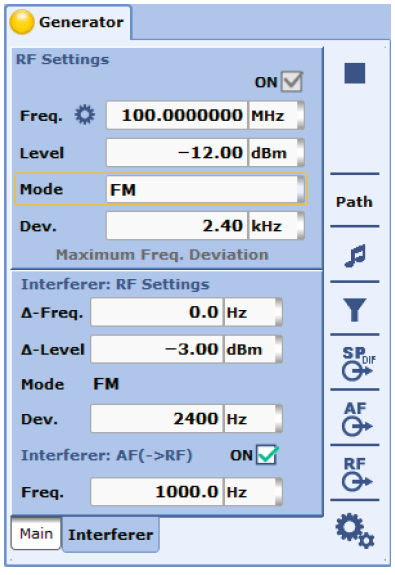
The R&S®CMA180 makes intermodulation measurements easy since the user can generate the two RF signals at different levels within the available 20 MHz bandwidth. Both signals – the wanted signal and the interferer – can be modulated independently of one another. The levels of the two signals can also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

GPS

Many of today's radios have a GPS receiver, which can be easily tested using the R&S®CMA180. The R&S®CMA180 outputs a GPS 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.

Intermodulation with integrated interfering signal





Frequency modulation with an integrated interfering signal

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, RX 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 usual analog measurements.

Different possibilities for 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

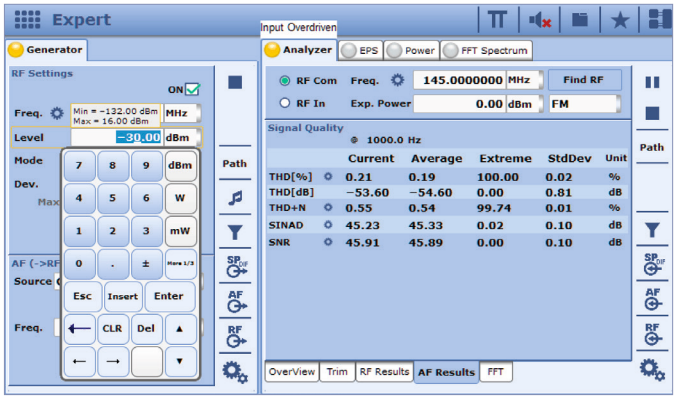
The trim view graphically displays selected measurement values and their limits. In contrast to scalar displays, this view makes it easier to recognize when the values fall below or exceed limits and facilitates comparison of transmitters and receivers.

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

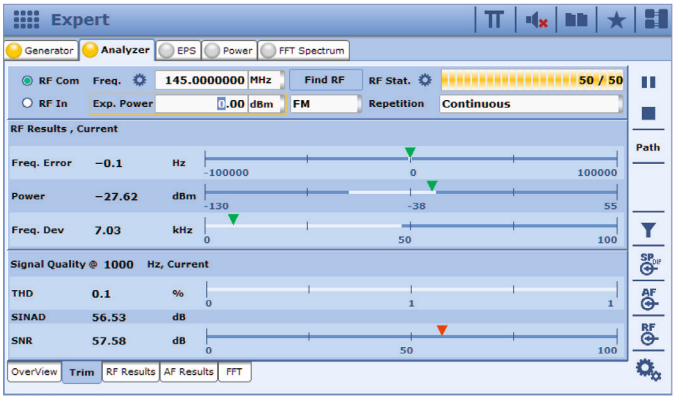
Remote controlled via Ethernet or an optional GPIB interface, the R&S®CMA180 can be seamlessly integrated into automated test environments and used for round-the-clock testing.

Select predefined test scenarios or switch to expert mode.

Clearly organized touchscreen



Special trim view



Digital receiver and transmitter measurements

Digital receiver measurements

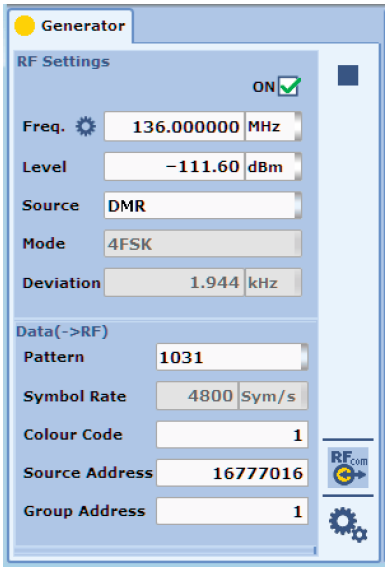
The R&S®CMA180 can generate test signals for digital radio standards. Signal content can be configured to match test requirements. Signals can carry audio test tones or pseudo random bit sequences (PRBS), for example. Signaling parameters such as DMR color code can be configured on the instrument's intuitive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

The digital signal generator can be used for testing digital communications systems; plus it supports POCSAG.

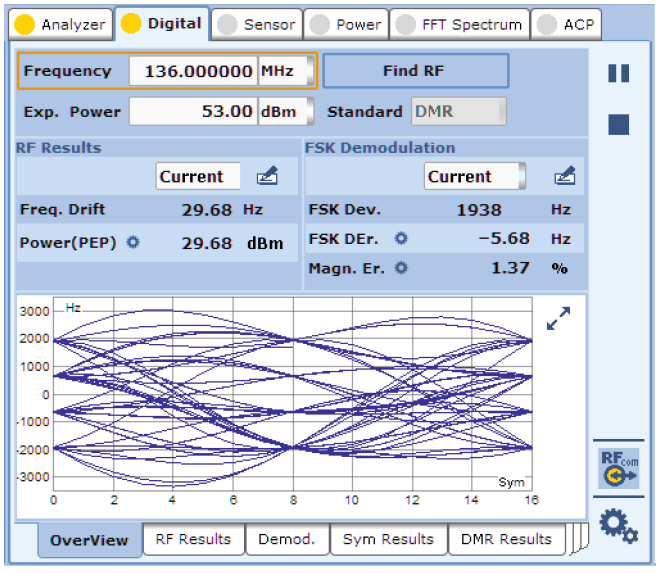
Digital transmitter measurements

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, e.g. DMR, and the R&S®CMA180 automatically sets the required analyzer parameters. Digital and analog measurements are started at the push of a button. Results are displayed in an overview and in detailed graphs and diagrams.



Digital signal generator for receiver tests



Overview of digital measurements

Alternative: Analysis of digital signals using R&S®VSE vector signal explorer software

The R&S®CMA180 can analyze digital signals with its integrated vector signal analyzer. Alternatively, the R&S®VSE vector signal explorer software can be used. R&S®VSE is a powerful software analysis tool that can be used to analyze almost any digital signal. The R&S®VSE software is operated in vector signal analyzer mode and configured for the relevant signals.

It is possible to measure and display typical digital transmitter parameters such as frequency deviation, demodulated symbols, I/Q diagram and eye diagram. Many other measurements can also be performed.

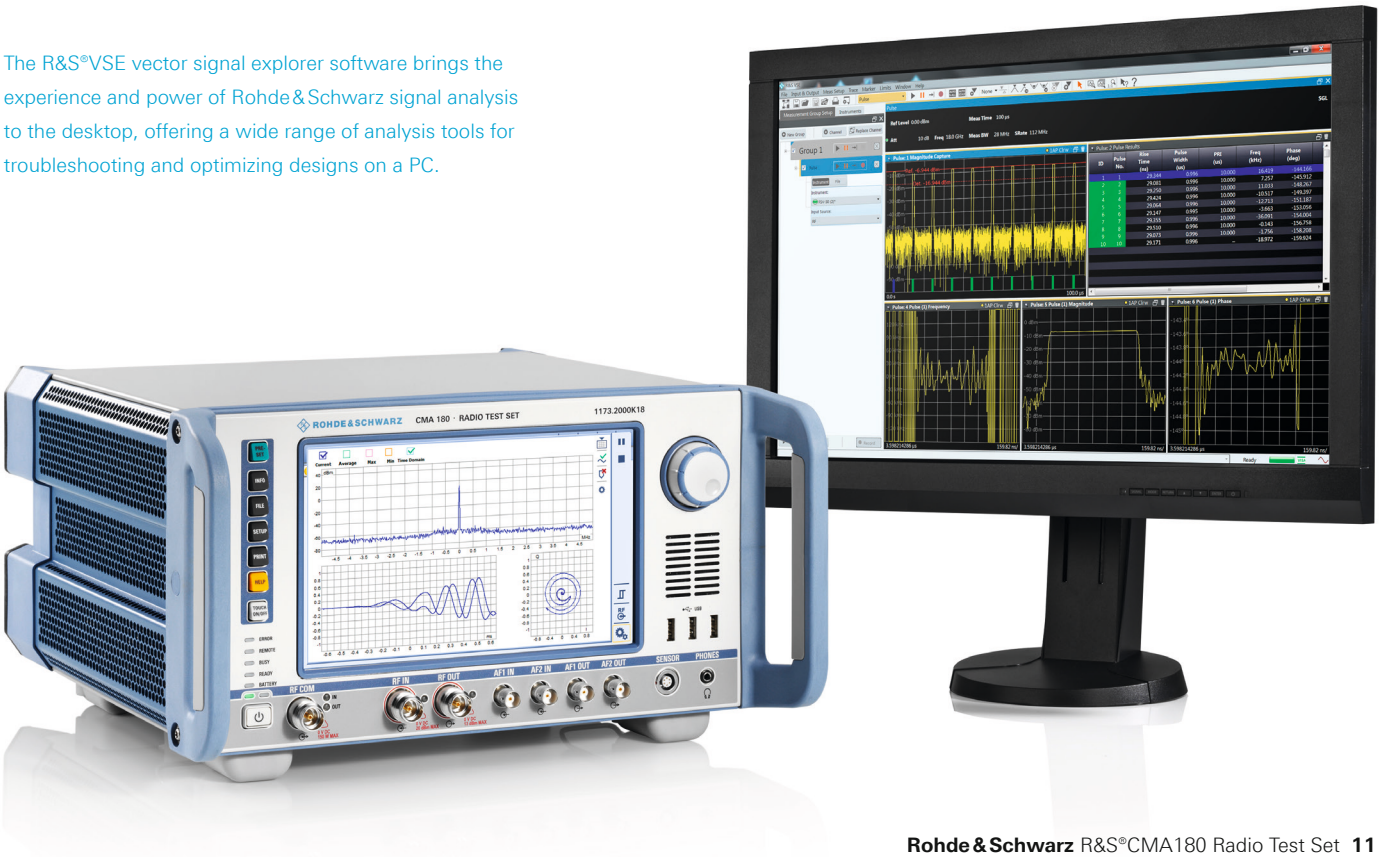
To configure R&S®VSE for the wanted digital radio technology, users either load a predefined configuration or create their own configuration. R&S®VSE can be used for standard radio technologies such as APCO, DMR, NXDN, dPMR and TETRA, and also for proprietary radio technologies.

Analysis is possible both offline and online. For offline analysis, R&S®VSE reads and processes I/Q data from a file. The R&S®CMA180 test set's I/Q recorder can also easily generate such files.

For online analysis, the R&S®CMA180 continually delivers data to the R&S®VSE software, which directly analyzes the data and displays the associated measurement images.

R&S®VSE can be fully remotely controlled and therefore completely integrated into the R&S®CMArun environment. R&S®VSE turns the R&S®CMA180 into a universal instrument for digital modulation schemes that is not limited to specific standards.

The R&S®VSE vector signal explorer software brings the experience and power of Rohde&Schwarz signal analysis to the desktop, offering a wide range of analysis tools for troubleshooting and optimizing designs on a PC.



Test features for special applications

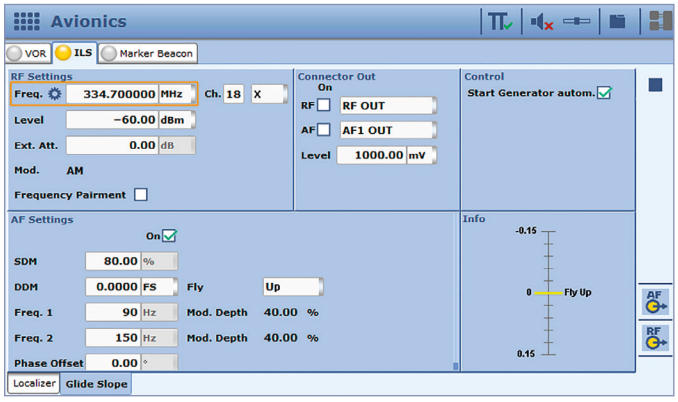
Avionics

Avionics generator for ILS, VOR and marker beacon signals

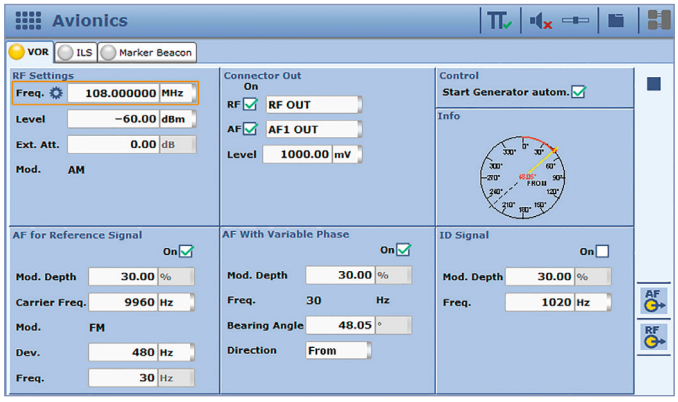
Its outstanding signal quality makes the R&S®CMA180 an extremely versatile radio tester for aircraft. The R&S®CMA180 can analyze ILS, VOR and marker beacon signals for aircraft landing systems as well as airborne radio signals. Equipped with a battery and antenna, the R&S®CMA180 is a standalone instrument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

Both a glide slope and localizer are available for ILS. The signal parameters can be modified to meet test requirements. 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.

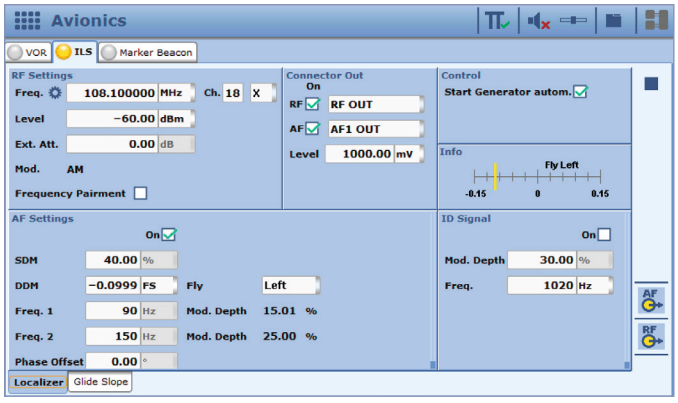
Numerous signal parameters are also available for VOR and marker beacon signals. ID signaling can be activated for all avionics signals. For avionics signals, the audio signal can be fed to the audio ports in order to generate the signal with an external signal generator.



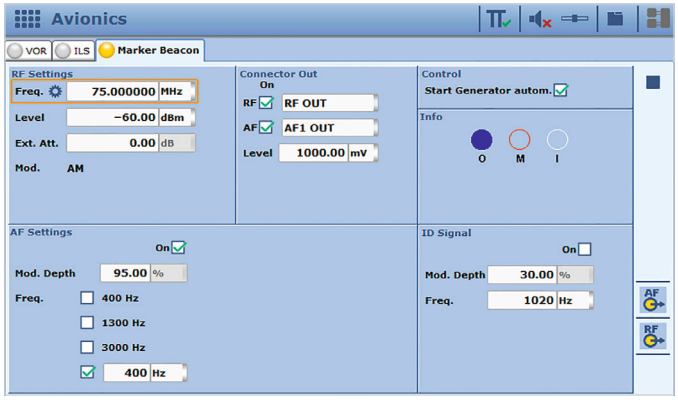
ILS glide slope generator



Configuration of VOR generator



Generator setting for ILS localizer



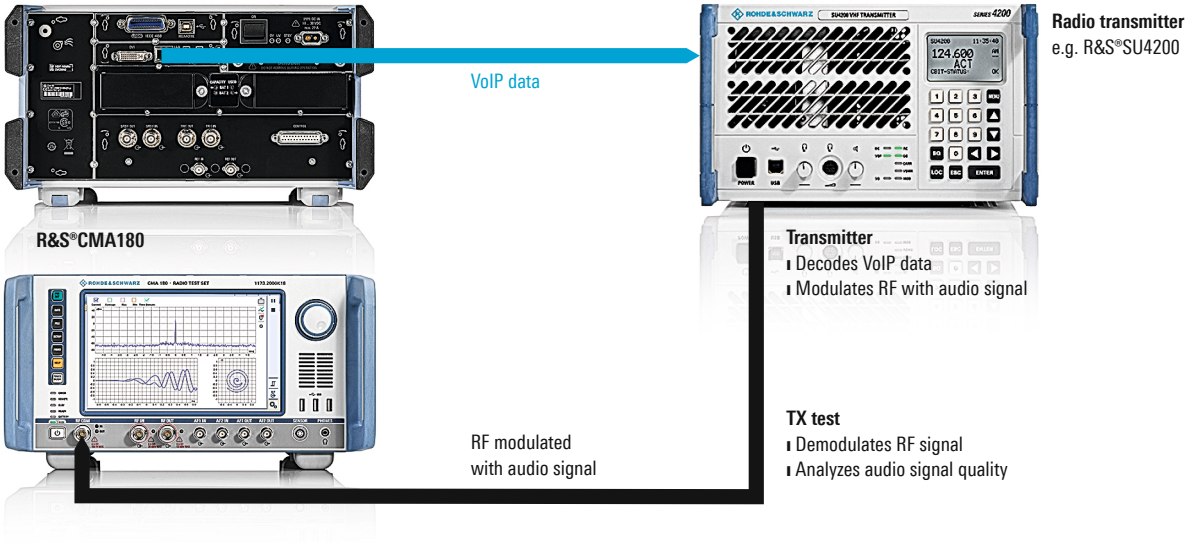
Marker beacon settings

VoIP generator and analyzer

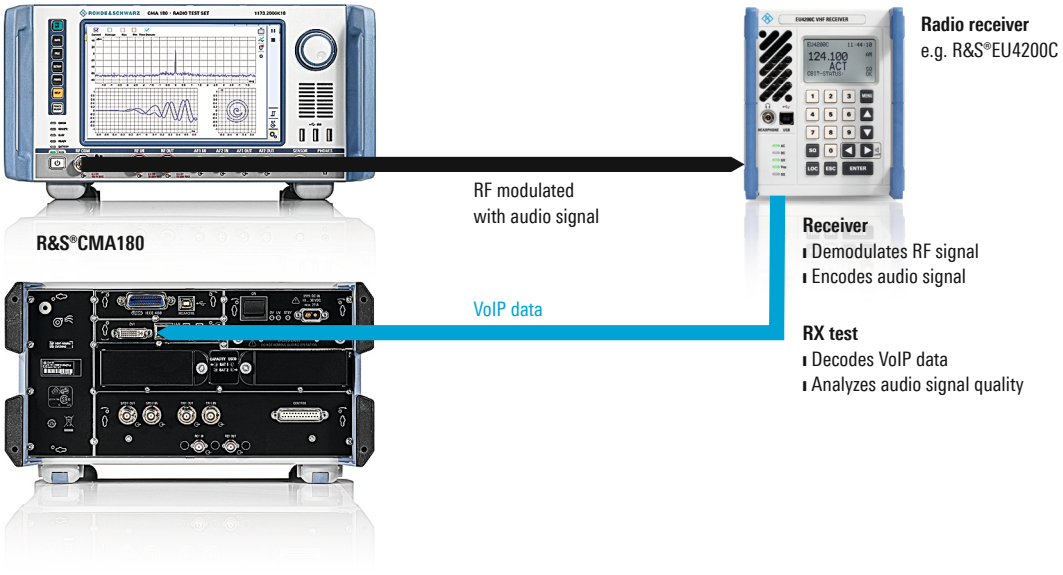
The R&S®CMA180 incorporates a VoIP generator and analyzer in line with EUROCAE ED-137B. The VoIP interface is fully integrated in the R&S®CMA180, and users can switch between analog audio and VoIP testing at the push of a button. This allows easy and extensive testing of airborne radios via both the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

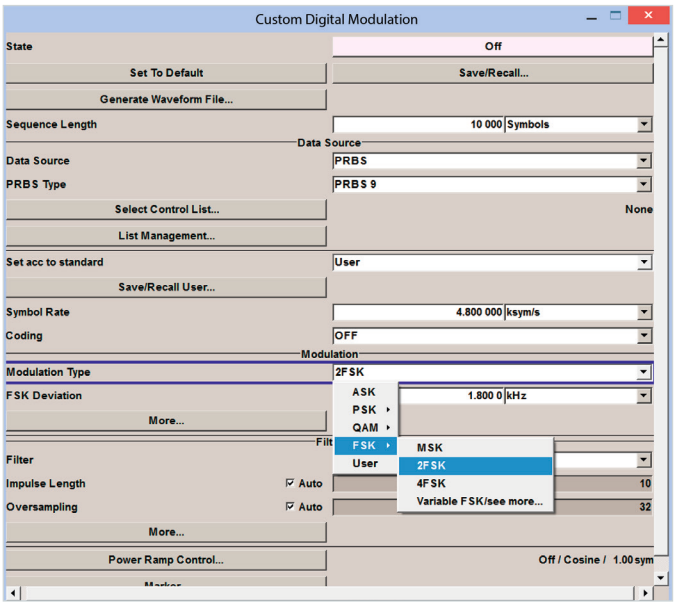
Configuration of the VoIP connection is straightforward and intuitive, and the status displays for the connection provide an excellent overview. The radio to be tested is connected to the test set via the integrated LAN interface. It is also possible to connect multiple transmitters or receivers via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

VoIP generator test setup

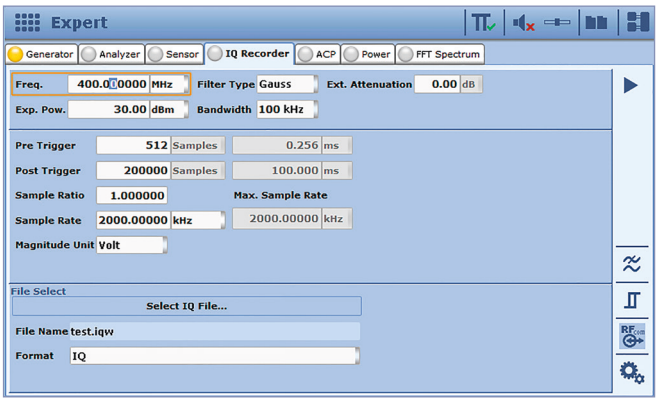


VoIP analyzer test setup





ARB file generation with R&S®WINIQSIM2™



Recording RF signals for playback in the lab

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® or ADS®. This data must then be converted into the waveform file format using the R&S®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.

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.

Test automation with R&S®CMArun software

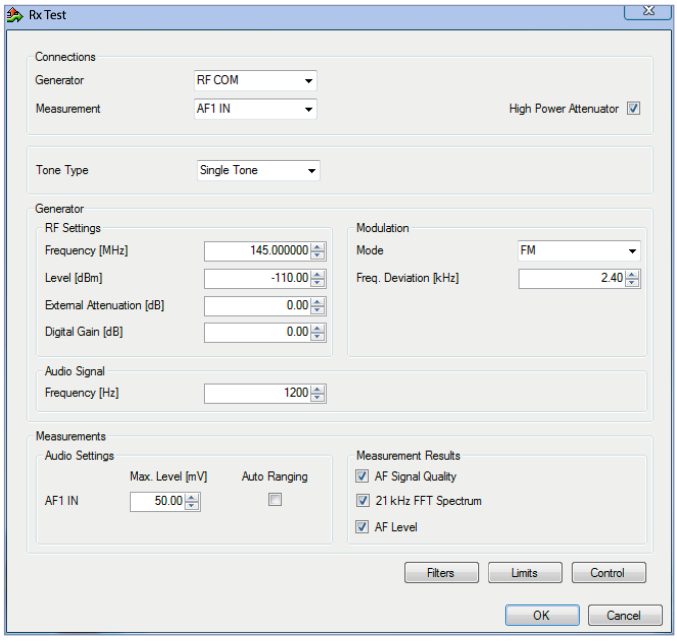
Ready-to-use solution for configuring application test sequences

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.

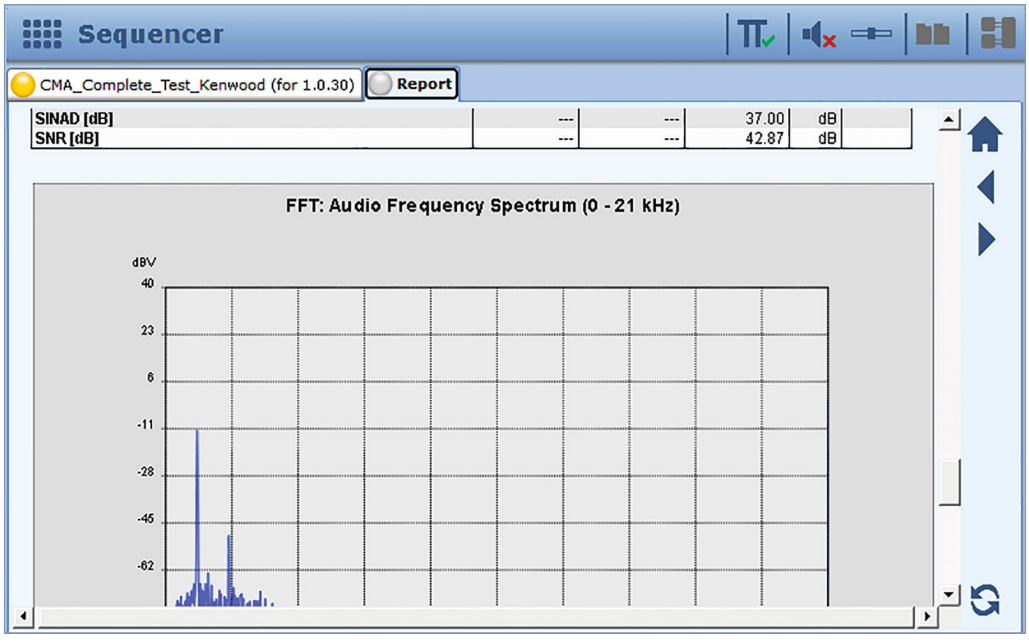
R&S®CMArun offers a separate run environment in which test sequences are created and executed using a mouse and keyboard. Additionally, an R&S®CMArun component has been integrated into the R&S®CMA180 touchscreen, mainly to execute previously created test sequences.

Extensive function library

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



Configuration of R&S®CMArun test items



R&S®CMArun running on the R&S®CMA180

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.

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 lifetime test (R&S®CMA-KT061) and analog radio tests, R&S®CMArun (R&S®CMA-KT051) options.

CMA Complete Test 2/12/2014 11:10:22 AM

Generator Settings:
AF Connector = AF1 OUT
AF Frequency = 1000.0 Hz
AF Level = 10.00 mV

Measurement Settings:
RF Connector = RF COM
RF Frequency = 145.000000 MHz
RF Expected Power = 30.00 dBm
RF External Attenuation = 0.00 dB

Demodulation = FM

Filter Settings :
LP Filter[kHz] : OFF
HP Filter[Hz] : OFF
Weighting Filter : OFF
Deemphasis Filter: OFF

CMA used: Rohde&Schwarz,CMA,1173.2000k18/000000,1.0.10.20 beta

RF Scalar Results	Lower Limit	Upper Limit	Measured	Unit	Status
Frequency: 145.0000000 MHz, Expected Power: 30.00 dBm					
Frequency Error	-1000.0	1000.0	-412.3	Hz	Passed
Power RMS	-5.00	65.00	25.92	dBm	Passed
Power PEP	---	---	NAV	dBm	

Demodulation Results	Lower Limit	Upper Limit	Measured	Unit	Status
Demodulation: FM					
Frequency Deviation, RMS	---	40.00	0.66	kHz	Passed
Frequency Deviation, RMS * Sqrt(2)	---	---	0.93	kHz	
Frequency Deviation, + Peak	---	48.00	0.44	kHz	Passed
Frequency Error, - Peak	-48.00	---	-1.27	kHz	Passed
Frequency Error, ± Peak/2	---	---	0.85	kHz	

Automatically generated test report from R&S®CMArun

The R&S®RT-ZVC02 (top) and the R&S®RT-ZVC04 (bottom) multi-channel power probe

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.

Fully automated test solution for R&S®Series4200 software defined radios

A fully automated test solution based on R&S®CMArun is available for R&S®Series4200 radios with SNMP interface and R&S®Series4100 radios with SNMP or serial interface. The specially developed radio test and remote control options (R&S®CMA-KT420 and R&S®CMA-KT440) together with the radio adapter (R&S®CMA-Z420A), 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 software defined 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 rollable transit case features a foam insert that accommodates the R&S®CMA180 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.

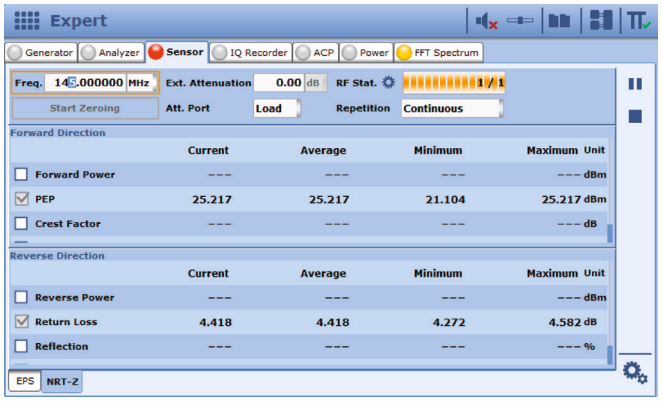
Transit case

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 configurations. The R&S®NRT directional power sensors can also be connected. These sensors can be used to measure VSWR.

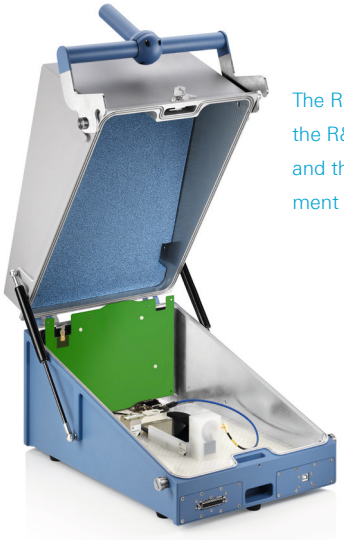
R&S®NRP power sensors



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

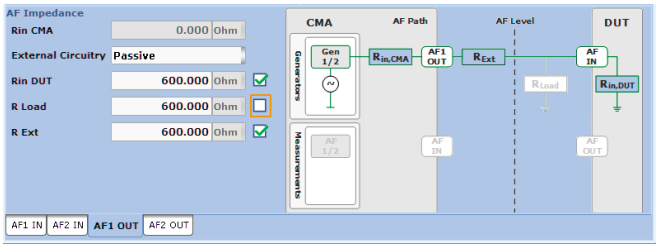
Radio test sets

The R&S®CTH100A and R&S®CTH200A portable radio test sets reliably test analog FM radio systems under harsh environmental conditions. Specially designed for outdoor use, they measure power, frequency, receiver sensitivity and VSWR and help find cable faults. These portable radio test sets are an ideal tool for service and maintenance work.

R&S®CTH100A/R&S®CTH200A portable analog radio test set

Handling of external audio impedances

The R&S®CMA180 supports any 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.)
Max. allowed input power	RF input	up to 150 W
Modulation		CW, AM, FM, SSB
Arbitrary waveform generator (ARB)	R&S®CMA-B110B/R&S®CMA-B110D	RF bandwidth up to 20 MHz
	R&S®CMA-B110B	1 Gbyte memory
	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, memory stick 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
1 × USB	USB port, type A	rear	mouse, keyboard, memory stick 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 I/O and relays for custom applications

Ordering information

Designation	Type	Order No.
Base unit		
Radio test set	R&S®CMA180	1173.2000K18
Selections		
Hard disk	R&S®CMA-S052C	1173.5100.02
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
Hardware options		
Baseband generator, 1 Gbyte memory	R&S®CMA-B110B	1173.5751.03
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		
SA, TG, scope, trans-rec	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
POCSAG generator	R&S®CMA-KG260	1209.7487.02
Analog radio tests, R&S®CMArun	R&S®CMA-KT051	1209.5603.02
Battery lifetime test	R&S®CMA-KT061	1209.6300.02
VOR/ILS tests, R&S®CMArun	R&S®CMA-KT130	1209.7393.02
R&S®Series4100 radio test, R&S®CMArun	R&S®CMA-KT410	1209.7764.02
R&S®Series4200 radio test, R&S®CMArun	R&S®CMA-KT420	1209.6422.02
R&S®Series4400 radio test, R&S®CMArun	R&S®CMA-KT440	1209.7358.02
VoIP support, R&S®CMArun	R&S®CMA-KT610	1209.7335.02
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
GPS tests, R&S®WinIQSIM2™	R&S®CMA-KW620	1209.6222.02
GLONASS tests, R&S®WinIQSIM2™	R&S®CMA-KW621	1209.6245.02
Galileo tests, R&S®WinIQSIM2™	R&S®CMA-KW622	1209.6268.02
License dongle	R&S®FSPC	1310.0002K02
R&S®VSE vector signal explorer software options for the R&S®CMA180 radio test set		
Signal analyzer, base	R&S®CMA-K300	1320.7951.06
Signal analyzer, analog	R&S®CMA-K310	1320.7945.06
Signal analyzer, digital	R&S®CMA-K305	1320.7939.06
Accessories		
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
Protection caps	R&S®CMA-Z059	1209.6445.02
Li-ion battery (two batteries)	R&S®CMA-Z061A	1209.5303.02
Li-ion battery charger	R&S®CMA-Z062A	1209.5355K02
R&S®Series4200 radio adapter	R&S®CMA-Z420A	1209.6522.02
AF impedance matching unit	R&S®CMA-Z600A	1173.6406.02
Feedtrough, BNC, 600 Ω, serial and parallel	R&S®CMA-Z651A	1209.7170.02

Designation	Type	Order No.
DC block, N type, > 10 MHz	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
Recommended extras		
19" rack adapter, 4 RU, ¾, T350	R&S®ZZA-KN10	1175.3091.00
R&S®NRP power sensors		
Three-path diode power sensor, 200 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP-Z11	1138.3004.02
Three-path diode power sensor, 60 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP-Z24	1137.8502.02
Thermal power sensor, 300 nW to 100 mW, DC to 18 GHz	R&S®NRP-Z51	1138.0005.03
R&S®NRT power sensors		
Directional power sensor, 120 (300) W, 25 MHz to 1 GHz	R&S®NRT-Z14	1120.5505.02
Directional power sensor, 30 (75) W, 0.4 GHz to 4 GHz	R&S®NRT-Z43	1081.2905.02
Directional power sensor, 120 (300) W, 0.2 GHz to 4 GHz	R&S®NRT-Z44	1081.1309.02
RF shield box	R&S®CMW-Z10	1204.7008.02
Antenna coupler, up to 6 GHz	R&S®CMW-Z11	1204.7108.02
Audio measurement	R&S®CMW-Z15	1204.7508.02
RF cable, up to 6 GHz, N-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)
Handset	R&S®CMW-Z50	1208.7602.02
Headphones	–	0708.9010.00
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 sets		
Portable radio test set for analog transceivers, with operating manual	R&S®CTH100A	1207.1000.04
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®CTH100A and 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	Please contact your local Rohde&Schwarz sales office.
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	
Extended warranty with calibration coverage, three years	R&S®CW3	
Extended warranty with calibration coverage, four years	R&S®CW4	

The R&S®CMA180 with a software defined radio from Rohde&Schwarz.