

# R&S® CMA180

## Radio Test Set

### The new reference in radio testing



# R&S®CMA180 Radio Test Set At a glance

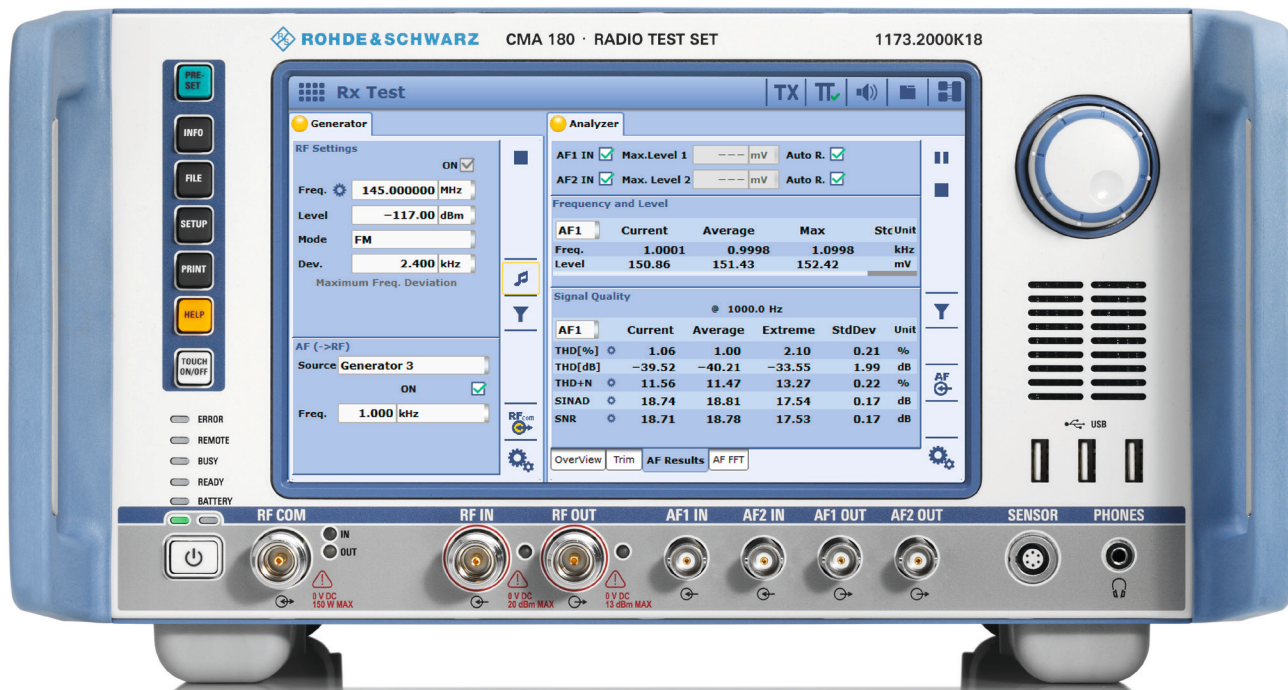
The R&S®CMA180 is a radiocommunications tester for radio systems that operate in the 100 kHz to 3 GHz range. Its technology is based fully on digital signal processing and advanced computing. Intuitive operation and efficient measurement capabilities make the R&S®CMA180 an indispensable tool for performing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

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.

## 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-Zxx and R&S®NRT-Z power sensors, no configuration required
- ▮ I/Q recorder and ARB generator
- ▮ Digital signal analysis



# R&S®CMA180

## Radio Test Set

### Benefits and key features

#### All-purpose

- ▮ Diverse, future-ready configuration options
  - ▮ Mobility
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#### Extensive measurement functionality

##### Basic features

- ▮ Analog modulation and demodulation
  - ▮ Audio generators
  - ▮ Multitone
  - ▮ Audio quality tests
  - ▮ FFT spectrum application
  - ▮ Adjacent channel power (ACP) and occupied bandwidth
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##### Advanced features

- ▮ Oscilloscope
  - ▮ Built-in sweeping spectrum analyzer with time domain analysis (zero span)
  - ▮ Tracking generator
  - ▮ Built-in interferer
  - ▮ GPS
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##### Digital measurements

- ▮ Analyse digitaler Signale
- ▷ [page 13](#)

##### Special applications

- ▮ Avionics generator for ILS/VOR and marker beacons
  - ▮ Waveforms (ARB)
  - ▮ Field to lab
- ▷ [page 14](#)

#### Convenient operation

- ▮ Advanced touchscreen plus rotary knob
- ▮ Predefined test scenarios for minimal configuration effort, or expert mode for maximum freedom
- ▮ Different possibilities for displaying parameters and measurement results
- ▮ Special trim view
- ▮ Remote control for easy integration into automated test environments via LAN or GPIB

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#### Automation with R&S®CMArun

- ▮ Ready-to-use solution for configuring application test sequences
- ▮ Extensive function library
- ▮ Control via SNMP, serial interfaces and SCPI
- ▮ Fully automated test solution for R&S®Series4200 software defined radios

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#### Accuracy and flexibility

- ▮ Top RF performance for transmitter and receiver tests
- ▮ Many different connectivity options
- ▮ Switching and controlling external equipment

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#### Extensive range of accessories

##### Soft case and transit case

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##### Use of R&S®NRP-Zxx and R&S®NRT-Z power sensors

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##### Shield box, antenna coupler and audio accessories

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##### Radio test sets

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## 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.

# Extensive measurement functionality

## Basic features

### 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.

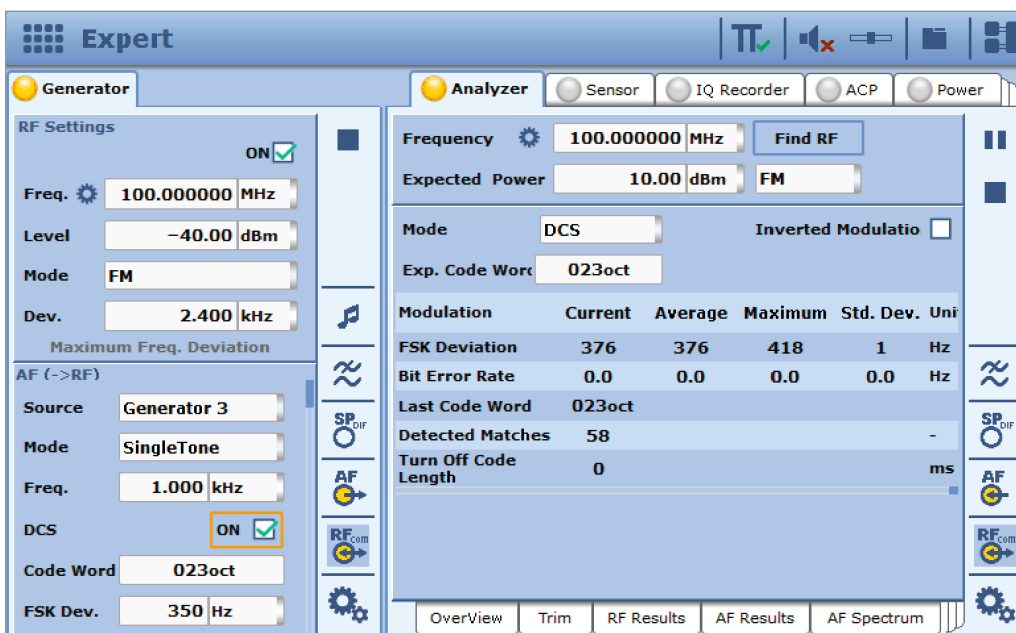
For transmitter measurements, the transmitter signals are demodulated and analyzed. The spectrum analyzer is used to display demodulated audio signals. Depending on the type of modulation, either the modulation deviation or modulation depth is measured and displayed.

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 sub-audio 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.



Frequency modulation with an internal audio source.



Working with DCS.

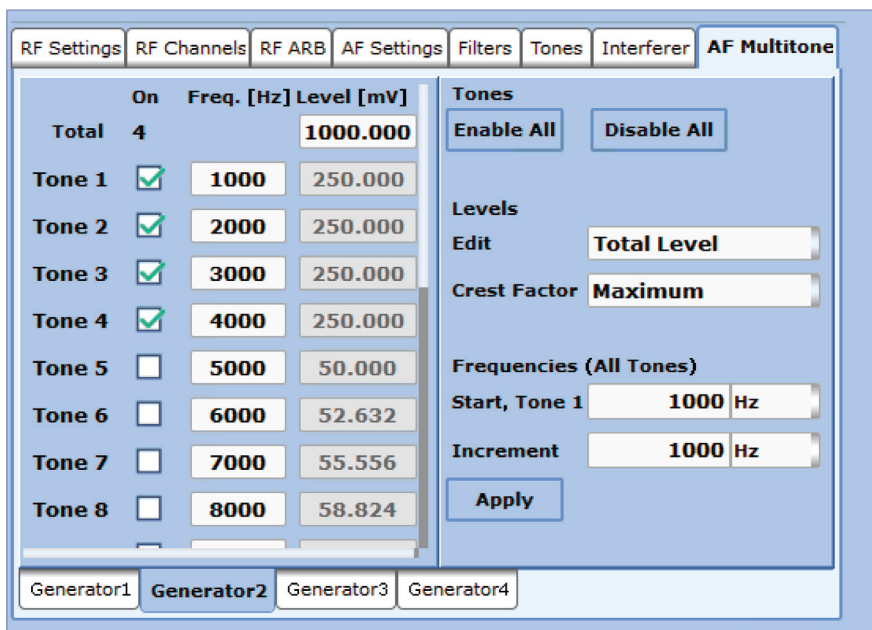
## Audio generators

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.

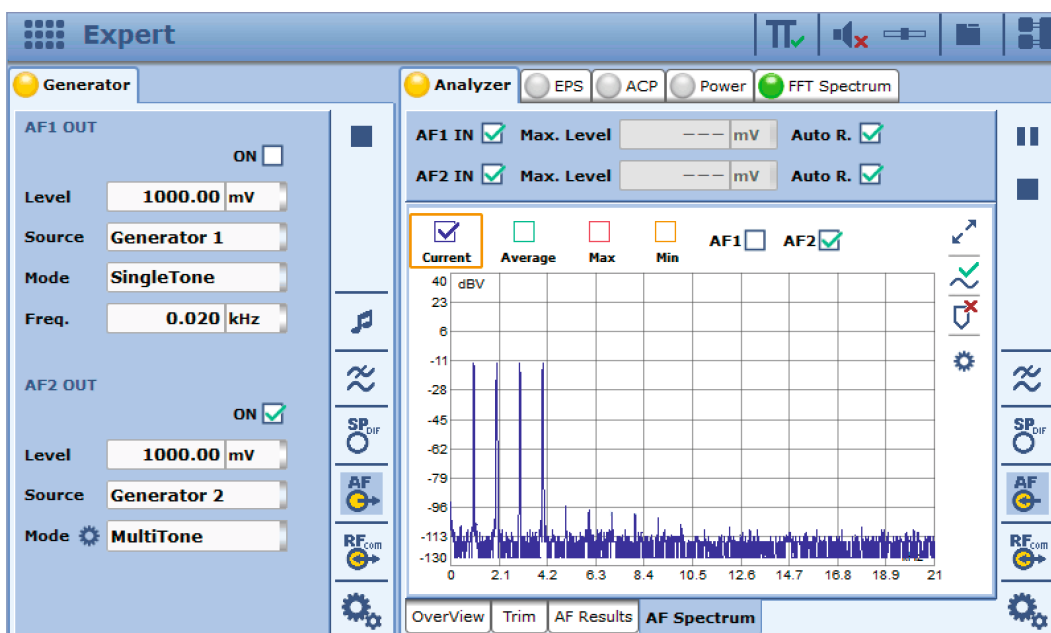
If the signal is generated for an external application, the user has a choice of analog or digital output (SPDIF). The levels can be set as required. If the signal is to be modulated onto the RF carrier, the modulation characteristics can be configured.

## 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.



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

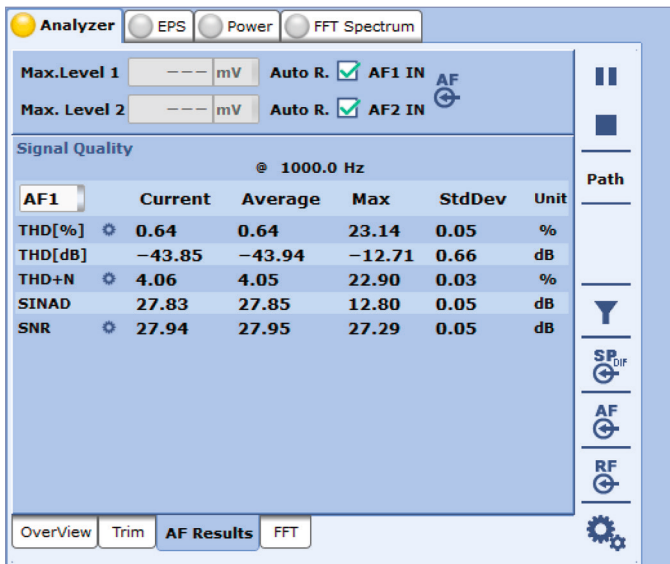
The integrated FFT spectrum application is used to observe the test signal in the frequency domain. Users can set markers and insert minimum, maximum and average curves. Both the span and the assessment bandwidths are configurable.

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.

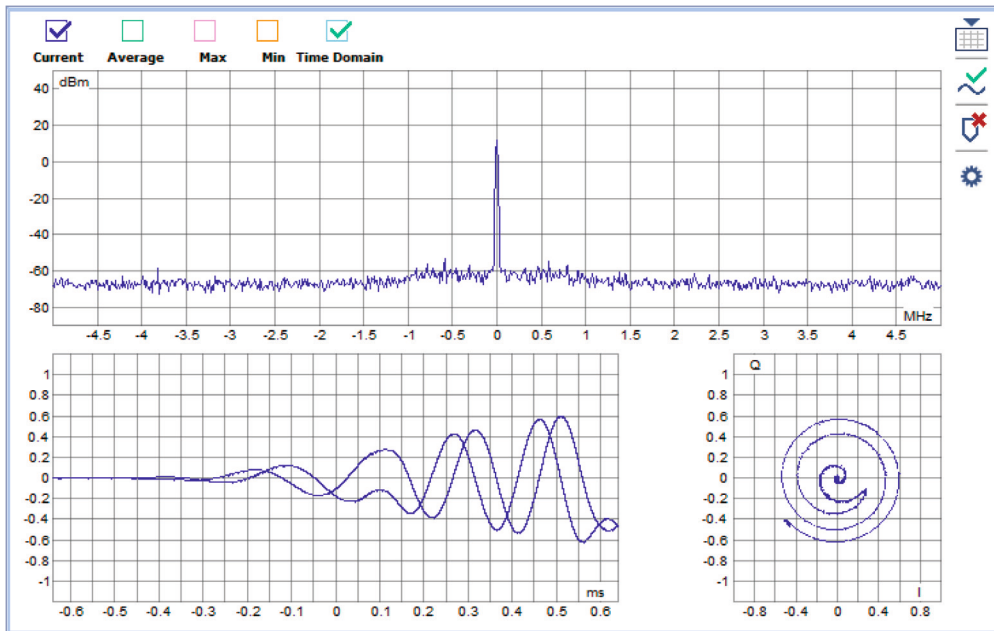
## Adjacent channel power (ACP) and occupied bandwidth

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.

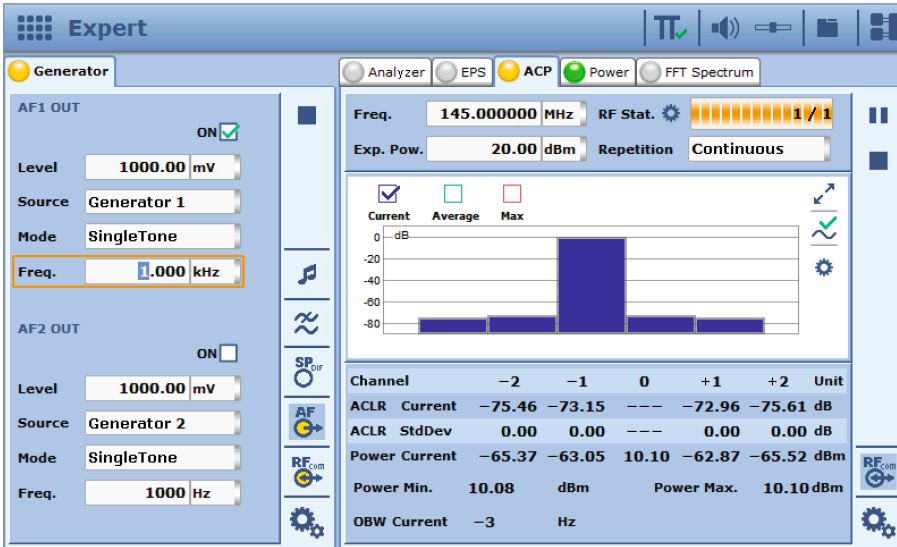


Detailed analysis of audio quality.

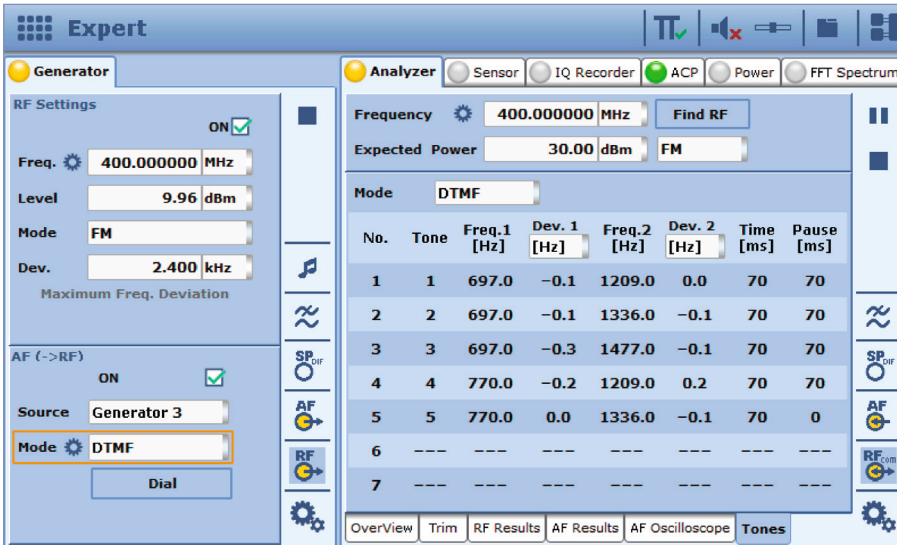


I/Q view of the FFT spectrum.

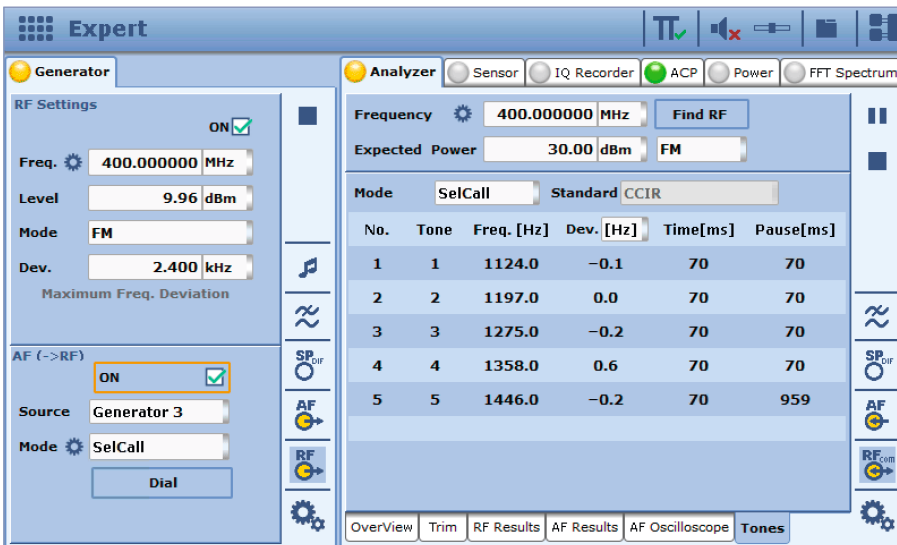




Adjacent channel power measurement with settable channel and measurement bandwidths.



DTMF generator and analyzer.



Five-tone application with analyzer and generator.

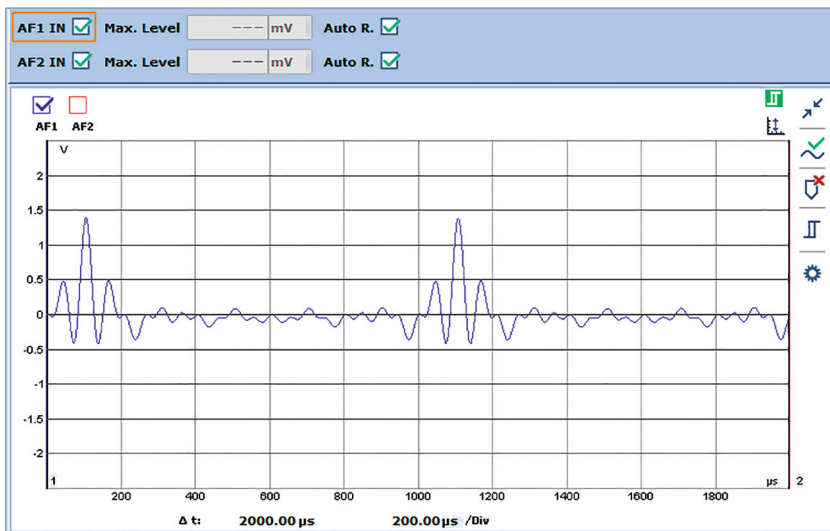
# Extensive measurement functionality Advanced features

## Oscilloscope

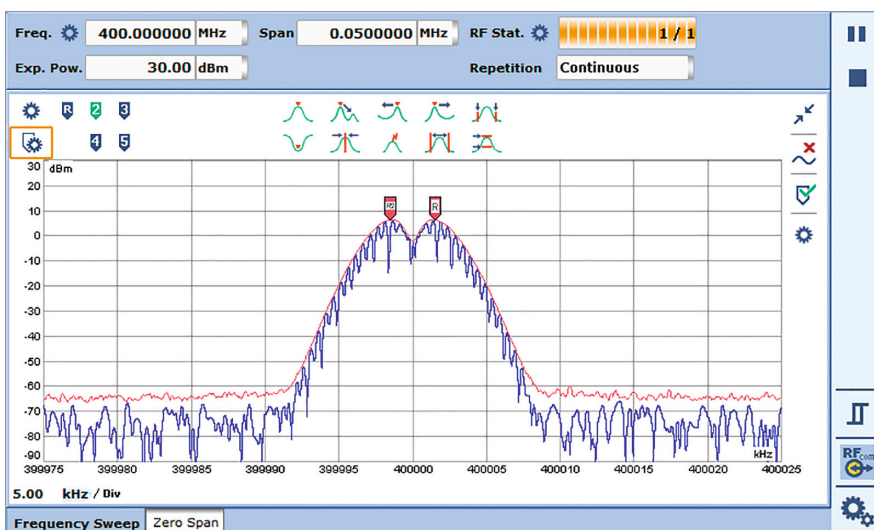
The integrated oscilloscope shows the audio signals that are fed into the audio ports, including the demodulated audio signals for transmitter tests. Marker functions simplify analysis of these audio signals. Audio signals can be viewed in both the time domain and in the frequency domain thanks to FFT,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

## 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.



Audio signal analysis with in-built oscilloscope.



Analysis of an FM signal with sweeping spectrum analyzer.

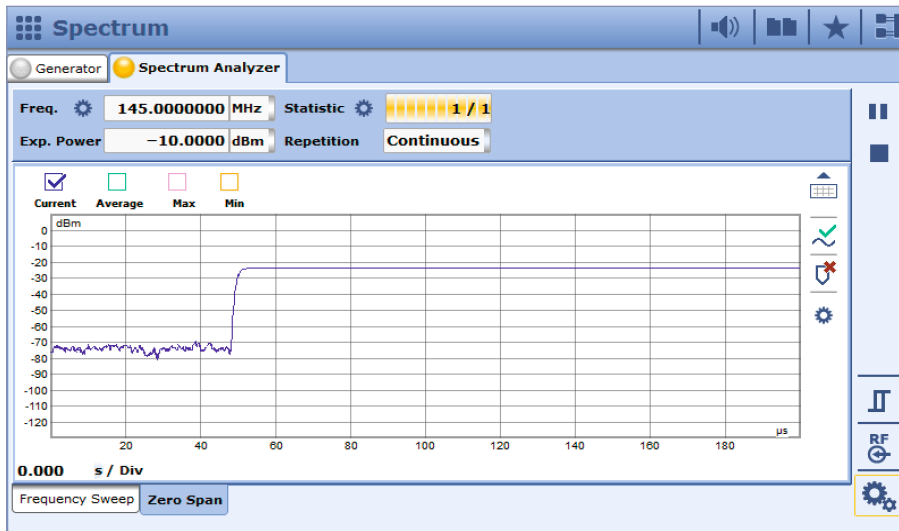
Busted signals can also be analyzed in the spectrum analyzer's time domain. Depending on the sweep time setting, the video trigger allows users to display one or more bursts. The burst duration is determined in the time domain view.

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.

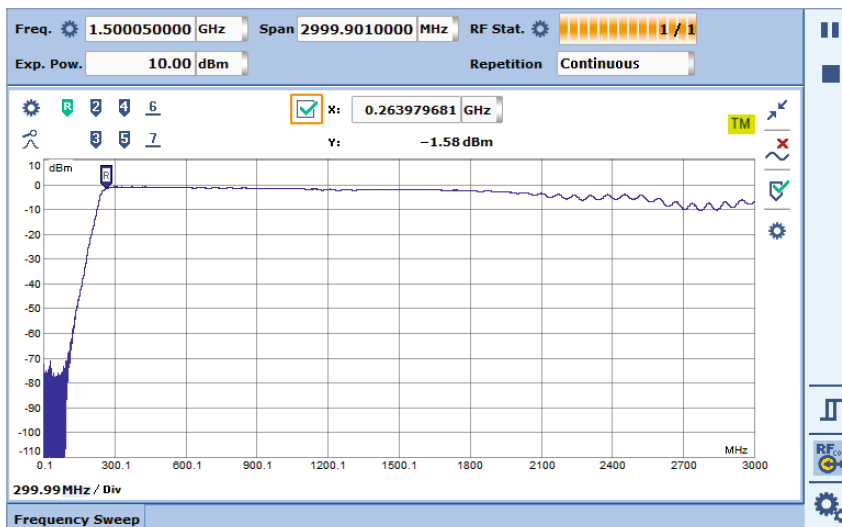
The spectrum analyzer's max function is used to examine the hopping range when analyzing hopping radio systems. Even when the hopping sequence is unknown, it is possible to gain information about the frequency range. Gaps indicate unused frequencies. Each burst can also be analyzed in the time domain.

### Tracking generator

The built-in tracking generator makes it easy to determine the frequency response of passive and active RF components.



Transient in the spectrum analyzer (zero span).



Highpass filter measurement with the built-in tracking generator.

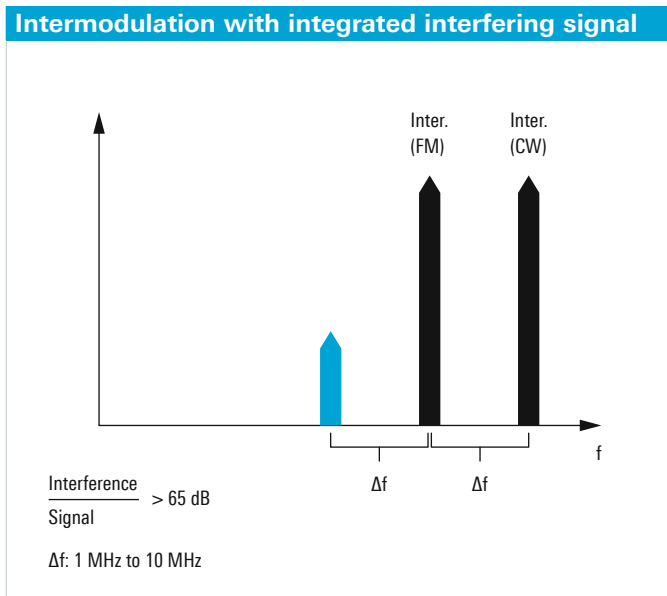
## Built-in interferer

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.



**Generator**

**RF Settings**  ON

Freq.  MHz

Level  dBm

Mode **FM**

Dev.  kHz

Maximum Freq. Deviation

**Interferer: RF Settings**

Δ-Freq.  Hz

Δ-Level  dBm

Mode **FM**

Dev.  Hz

Interferer: AF(->RF)  ON

Freq.  Hz

Main **Interferer**

Frequency modulation with an integrated interfering signal.



# Extensive measurement functionality

## Digital measurements

### Analysis of digital signals

The R&S®CMA180 is also an outstanding instrument for analyzing digital waveforms. 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.

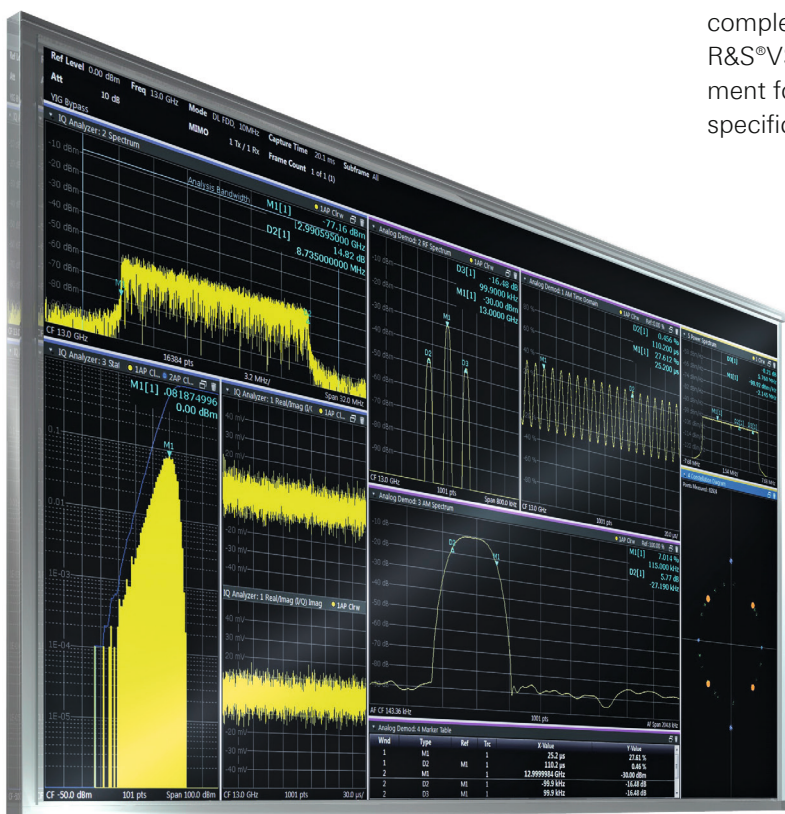
It is possible to measure and display typical digital transmitter parameters such as frequency deviation, demodulated symbols, I/Q diagram and eye diagram. Many other measurements can also be performed.

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®CMA test set's I/Q recorder can also easily generate such files.

For online analysis, the R&S®CMA 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.

# Extensive measurement functionality

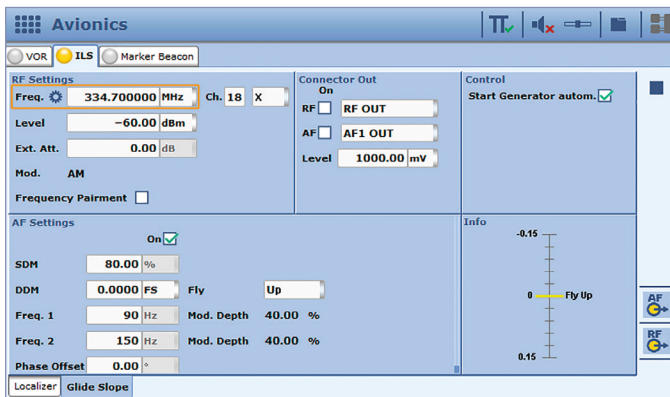
## Special applications

### Avionics generator for ILS/VOR and marker beacons

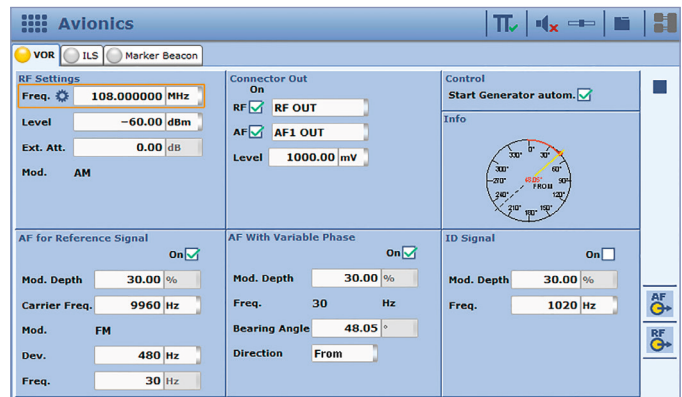
The avionics generator can generate ILS, VOR and marker beacon signals. Both a glide slope and localizer are available for ILS. The signal parameters can be modified to meet test requirements. DDM, SDM, modulation frequencies, etc. can be set. The settings are displayed on simulated on-board instruments, 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.

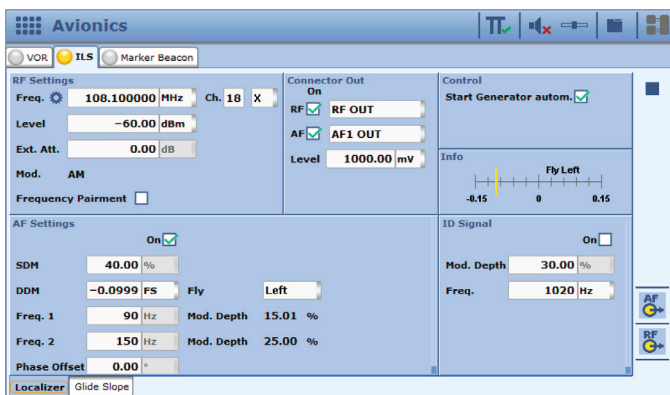
Its outstanding signal quality makes the R&S®CMA180 an extremely versatile radio tester for aircraft. The R&S®CMA180 can analyze ILS, VOR and marker beacon aircraft landing systems as well as airborne transceivers. Equipped with battery and antenna, the R&S®CMA180 is a standalone instrument that is ideal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



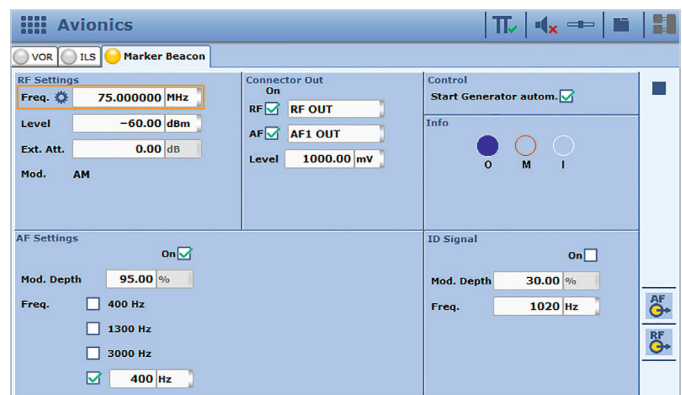
ILS glide slope generator.



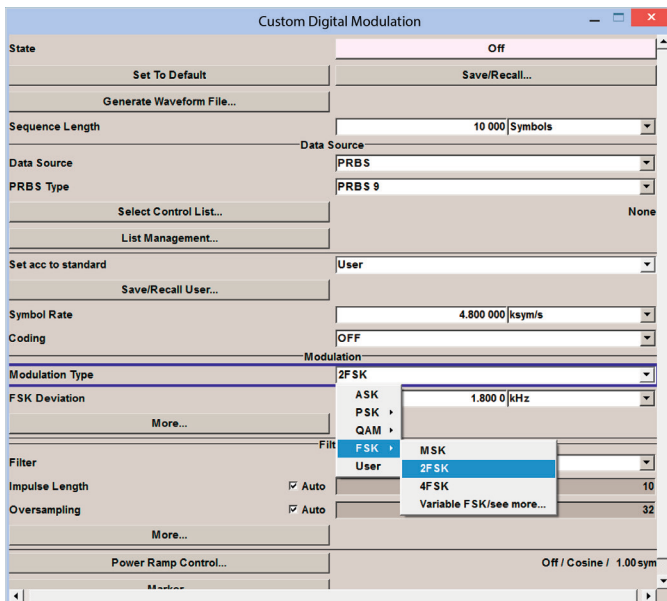
Configuration of VOR generator.



Generator setting for ILS localizer.



Marker beacon settings.



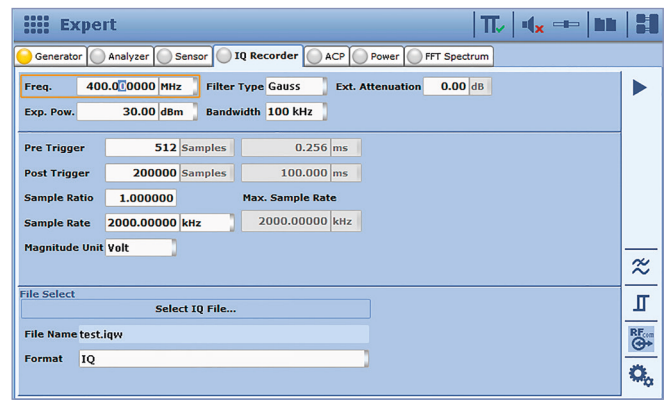
ARB file generation with R&S®WINIQSIM2™.

### 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.



Recording RF signals for playback in the lab.

### 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 over the air 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.

# Convenient operation

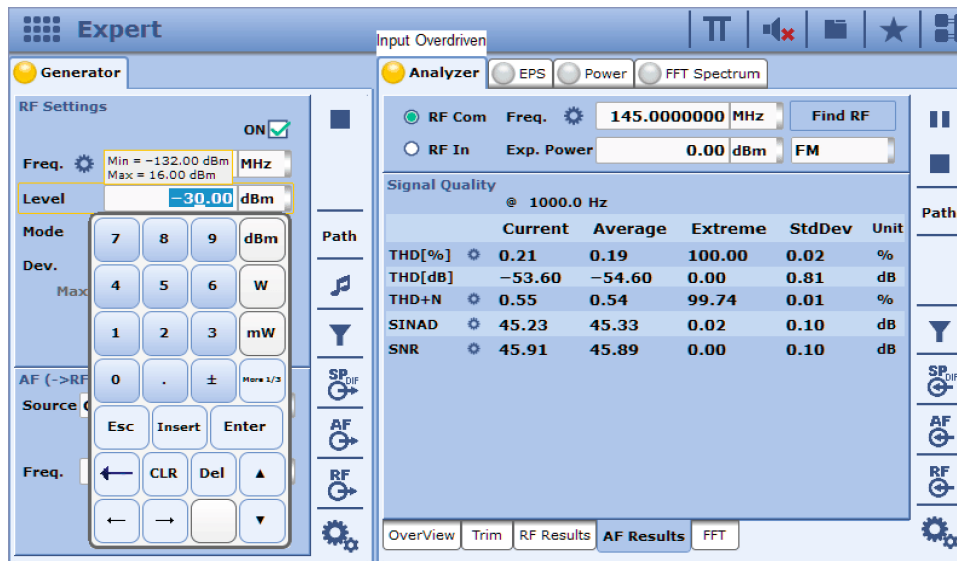
## Advanced touchscreen plus rotary knob

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.

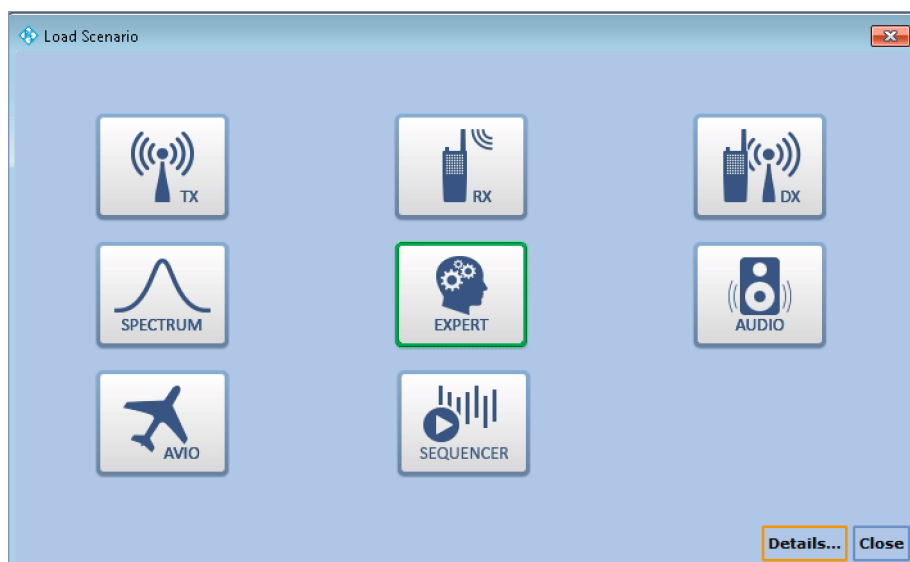
## Predefined test scenarios for minimal configuration effort, or expert mode for maximum freedom

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.



Clearly organized touchscreen.



Select predefined test scenarios or switch to expert mode.



## 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.

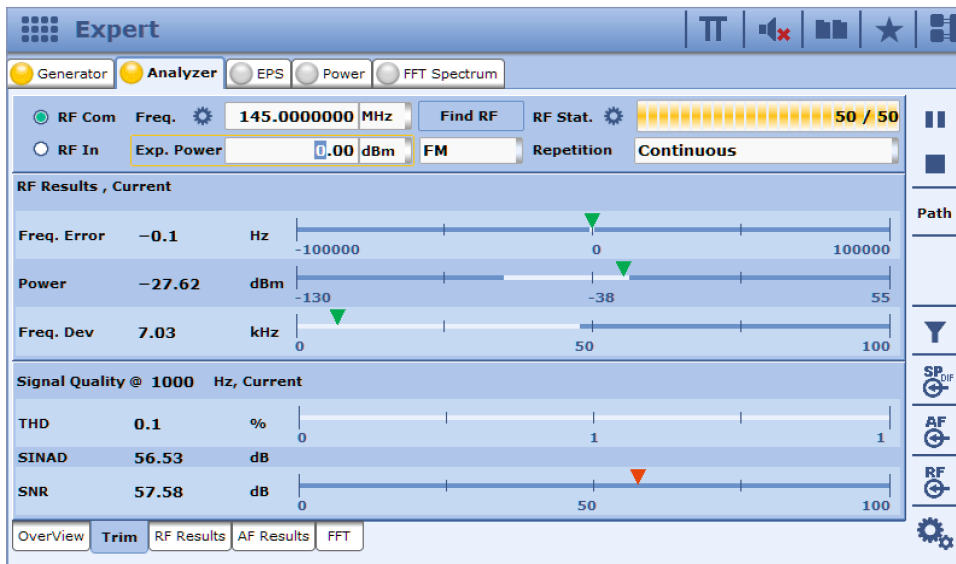
The split screen mode offers a complete overview, where the generator and analyzer values are displayed simultaneously. Generator settings are changed on the left side of the screen and the results are instantly displayed on the right side. The operating controls for the spectrum analyzer can be hidden,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

## Special trim view

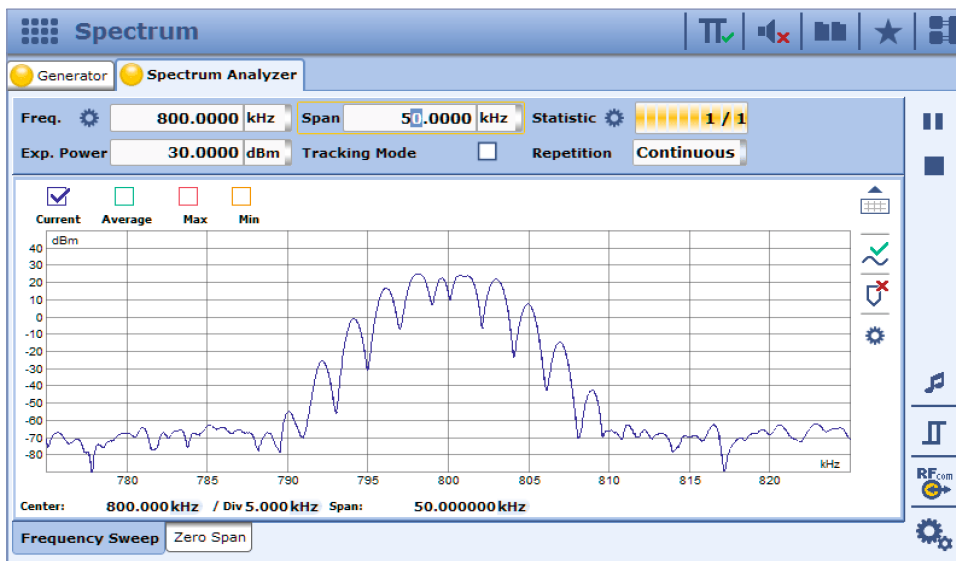
The trim view graphically displays selected measurement values and their limits. In contrast to scalar displays, this view makes it easier to recognize when the values fall below or exceed limits and facilitates comparison of transmitters and receivers.

## 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.



Special trim view.



Operating in tab mode.

# Automation with R&S®CMArun

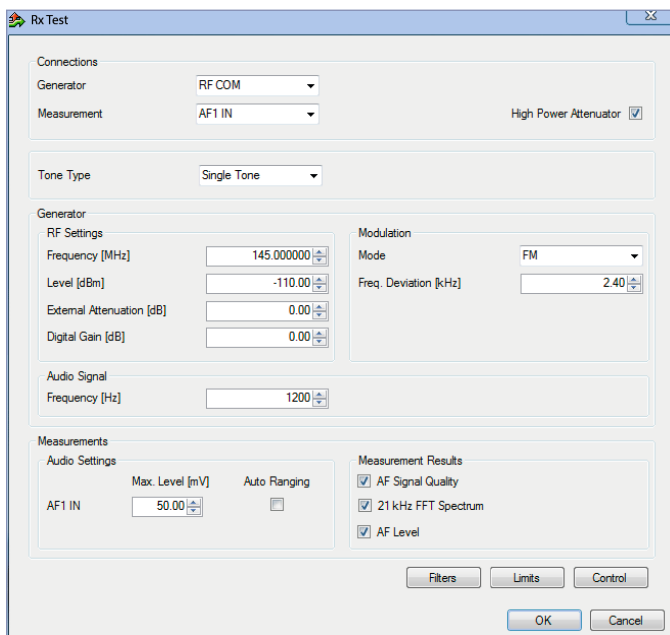
## Ready-to-use solution for configuring application test sequences

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.

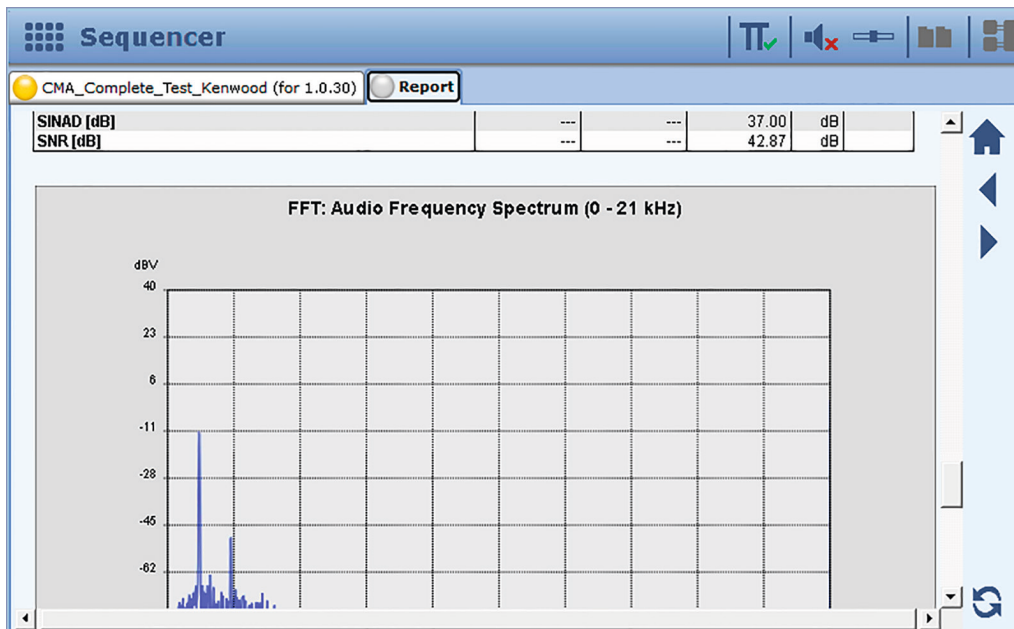
R&S®CMArun offers a separate run environment in which test sequences are created and executed using a mouse and keyboard. Additionally, an R&S®CMArun component has been integrated into the touchscreen, mainly to execute previously created test sequences.

## 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 serial interfaces. Entire test environments can be automated since other equipment such as power supplies can also be integrated via SCPI.

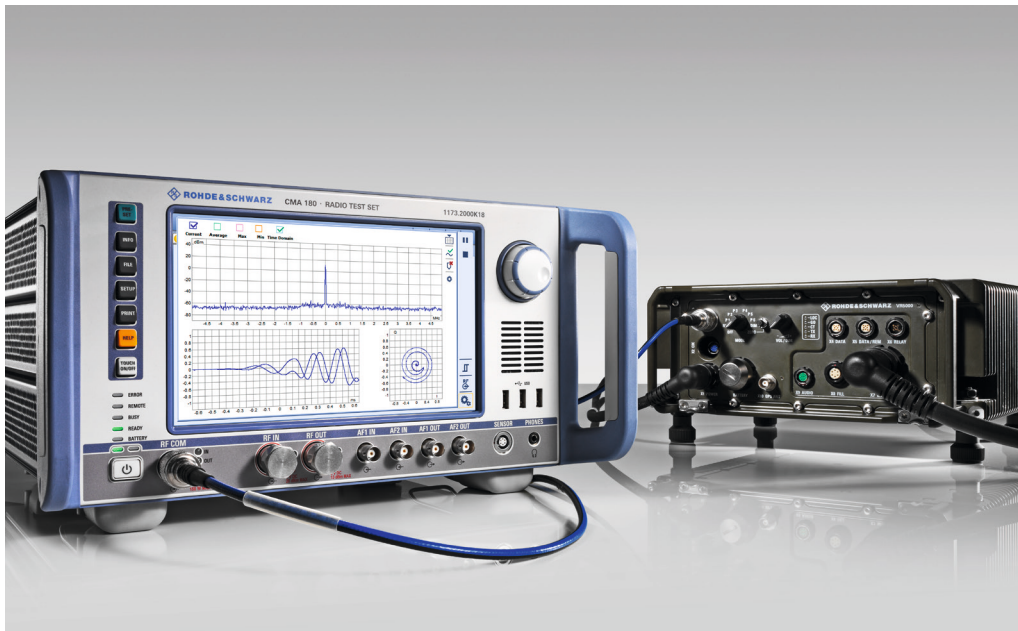
## Fully automated test solution for R&S®Series4200 software defined radios

A fully automated test solution based on R&S®CMArun is available for R&S®Series4200 radios with SNMP interface. The specially developed radio test and remote control option (R&S®CMA KT420) 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 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. This is particularly advantageous for mobile use. The created test reports can be stored on the R&S®CMA or exported via USB or LAN.

CMA Complete Test					
2/12/2014 11:10:22 AM					
<b>Generator Settings:</b> AF Connector = AF1 OUT AF Frequency = 1000.0 Hz AF Level = 10.00 mV					
<b>Measurement Settings:</b> RF Connector = RF.COM RF Frequency = 145.000000 MHz RF Expected Power = 30.00 dBm RF External Attenuation = 0.00 dB					
Demodulation = FM					
<b>Filter Settings :</b> 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: 145.000000 MHz, Expected Power: 30.00 dBm					
	-1000.0	1000.0	-412.3	Hz	Passed
	-5.00	65.00	25.92	dBm	Passed
	---	---	---	NAV	dBm
Demodulation Results					
Lower Limit	Upper Limit	Measured	Unit	Status	
Demodulation: FM					
	---	40.00	0.66	kHz	Passed
	---	---	0.93	kHz	
	---	48.00	0.44	kHz	Passed
	-48.00	---	-1.27	kHz	Passed
	---	---	0.85	kHz	

Automatically generated test report from R&S®CMArun.



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

# Accuracy and flexibility

## 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

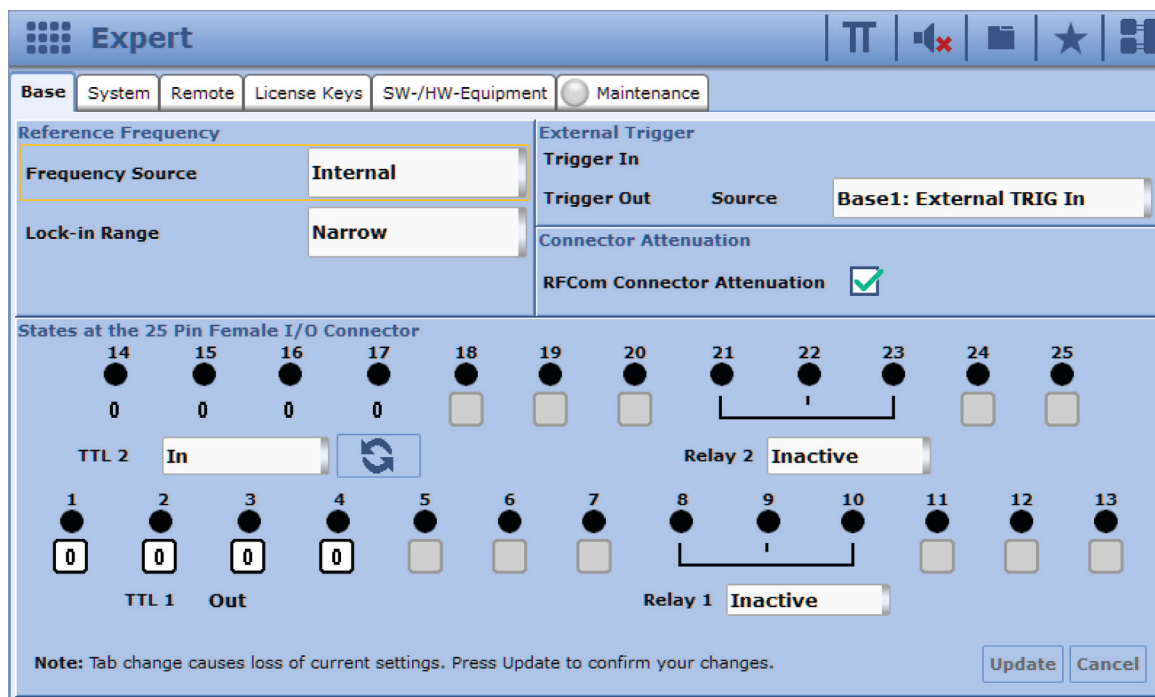
The R&S®CMA180 offers many connectivity options that make it possible to realize almost any type of application. For computer accessories such as a mouse and keyboard, there are USB ports on the front and rear panels. The front panel includes two additional analog audio outputs, two audio inputs and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



# Accessories

## 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.

Soft case.



Transit case.



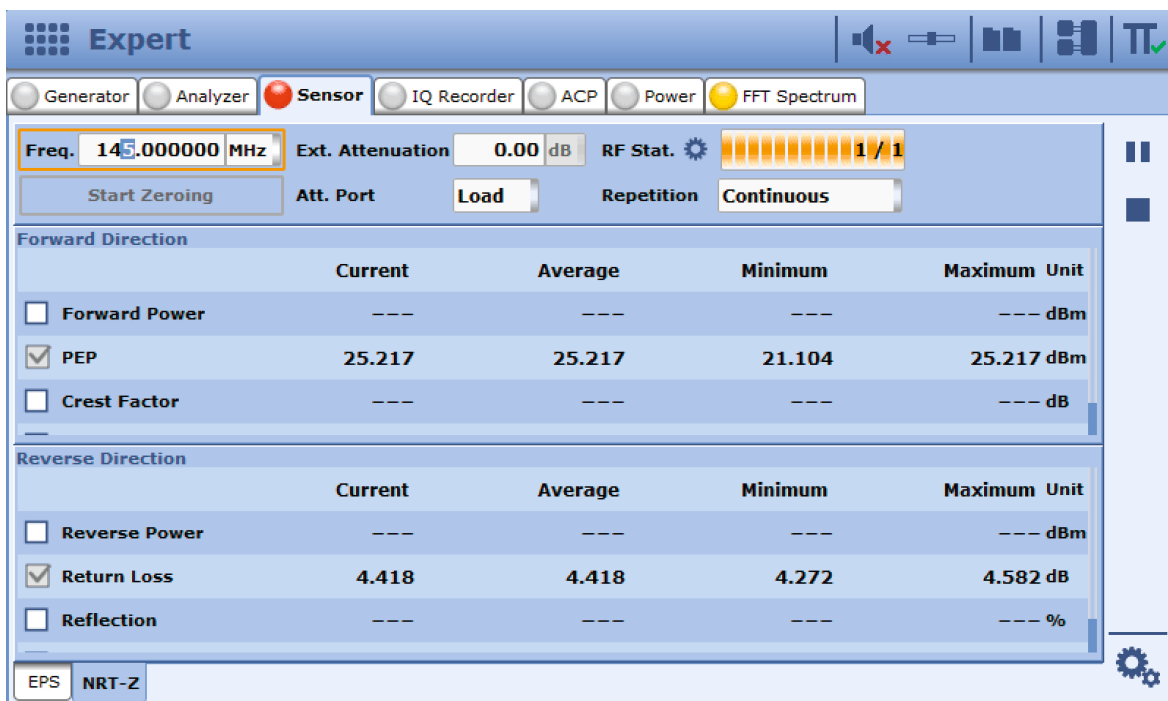
# Accessories

## Use of R&S®NRP-Zxx and R&S®NRT-Z power sensors

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



R&S®NRP-Zxx power sensors.



The screenshot shows the Expert software interface with the 'Sensor' tab selected. The frequency is set to 145.000000 MHz. The 'Forward Direction' section shows the following measurements:

	Current	Average	Minimum	Maximum	Unit
<input type="checkbox"/> Forward Power	---	---	---	---	dBm
<input checked="" type="checkbox"/> PEP	25.217	25.217	21.104	25.217	dBm
<input type="checkbox"/> Crest Factor	---	---	---	---	dB

The 'Reverse Direction' section shows the following measurements:

	Current	Average	Minimum	Maximum	Unit
<input type="checkbox"/> Reverse Power	---	---	---	---	dBm
<input checked="" type="checkbox"/> Return Loss	4.418	4.418	4.272	4.582	dB
<input type="checkbox"/> Reflection	---	---	---	---	%

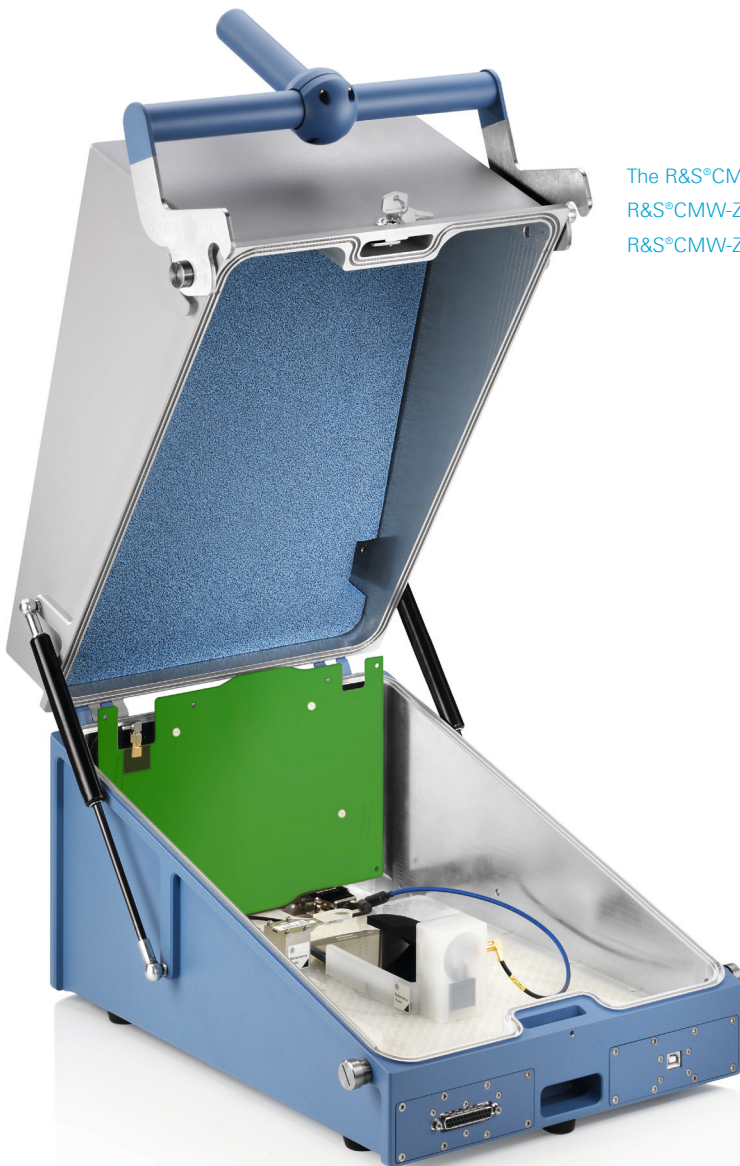
At the bottom left, there are buttons for 'EPS' and 'NRT-Z'. A gear icon is visible at the bottom right.

Measurements with R&S®NRT-Z connected to R&S®CMA180.

# Accessories

## Shield box, antenna coupler and audio accessories

The R&S®CMW-Z10 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 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 accessory 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 shield box with the R&S®CMW-Z11 antenna coupler and the R&S®CMW-Z15 audio accessory.

# Accessories

## 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®CTH100/R&S®CTH200A portable analog radio test set.

R&S®CTH100A and R&S®CTH200A measurement functions		
	R&S®CTH100A	R&S®CTH200A
<b>Transmitter test</b>		
Forward power	•	•
Reverse power	•	•
Frequency counter	•	•
VSWR calculation		•
<b>Receiver test</b>		
Squelch test	•	•
Demodulation test	•	•
Tunable frequency		•
Duplex spacing		•
<b>Supplementary test</b>		
Over the air		•
Cable fault		•
Voice reporting		•
<b>General</b>		
Frequency range	30 MHz to 512 MHz	25 MHz to 500 MHz
Improved power management		•

Ordering information for the R&S®CTH100A/R&S®CTH200A portable radio test set		
Designation	Type	Order No.
<b>Base unit</b>		
Portable Radio Test Set for analog transceivers, with operating manual	R&S®CTH100A	1207.1000.04
Portable Radio Test Set for analog transceivers, incl. OTA and cable fault finder, with operating manual	R&S®CTH200A	1207.1000.02
<b>Accessories for the R&amp;S®CTH200A</b>		
Transit Case for the 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

# 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
ARB generator	R&S®CMA-B110A	bandwidth up to 20 MHz, 1 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, ref freq in/out, trigger in/out, TTL in/out, GPIB (R&S®CMA-BB12A)
Dimensions	W × H × D	¾ 19", 4 HU, 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-Zxx 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; 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

For data sheet, see PD 3606.9404.22 and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)



# Ordering information

Designation	Type	Order No.
<b>Base unit</b>		
Radio Test Set	R&S®CMA180	1173.2000K18
<b>Selections</b>		
Hard Disk	R&S®CMA-S052A	1173.5100.02
Solid-State Disk	R&S®CMA-S052M	1173.5100.14
AC Power Supply	R&S®CMA-S054B	1173.5151.03
DC Power Supply	R&S®CMA-S054M	1173.5151.14
<b>Options</b>		
Baseband Generator	R&S®CMA-B110B	1173.5751.03
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
<b>Software options</b>		
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
Analog Radio Tests, R&S®CMArun	R&S®CMA-KT051	1209.5603.02
Battery Lifetime Test	R&S®CMA-KT061	1209.6300.02
R&S®Series4200 Radio Test, R&S®CMArun	R&S®CMA-KT420	1209.6422.02
Waveform Library, GPS Tests	R&S®CMA-KV140	1209.5855.02
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®CMA 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
<b>Hardware option</b>		
Battery Compartment	R&S®CMA-B060A	1209.5003.02
<b>Accessories</b>		
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
Feedthrough Term., BNC, 600 Ω	R&S®CMA-Z650A	1209.6700.02
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

Designation	Type	Order No.
<b>Recommended extras</b>		
19" Rack Adapter, 4 HU, ¾, T350	R&S®ZZA-KN10	1175.3091.00
R&S®NRP-Zxx 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
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-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

<b>Service options</b>		
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 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	

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](http://www.sales.rohde-schwarz.com)

## Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

## About Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. 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.

## Sustainable product design

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

Certified Quality Management

**ISO 9001**

Certified Environmental Management

**ISO 14001**

## Rohde & Schwarz GmbH & Co. KG

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Rohde & Schwarz training

[www.training.rohde-schwarz.com](http://www.training.rohde-schwarz.com)

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R&S®CMA180 Radio Test Set

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