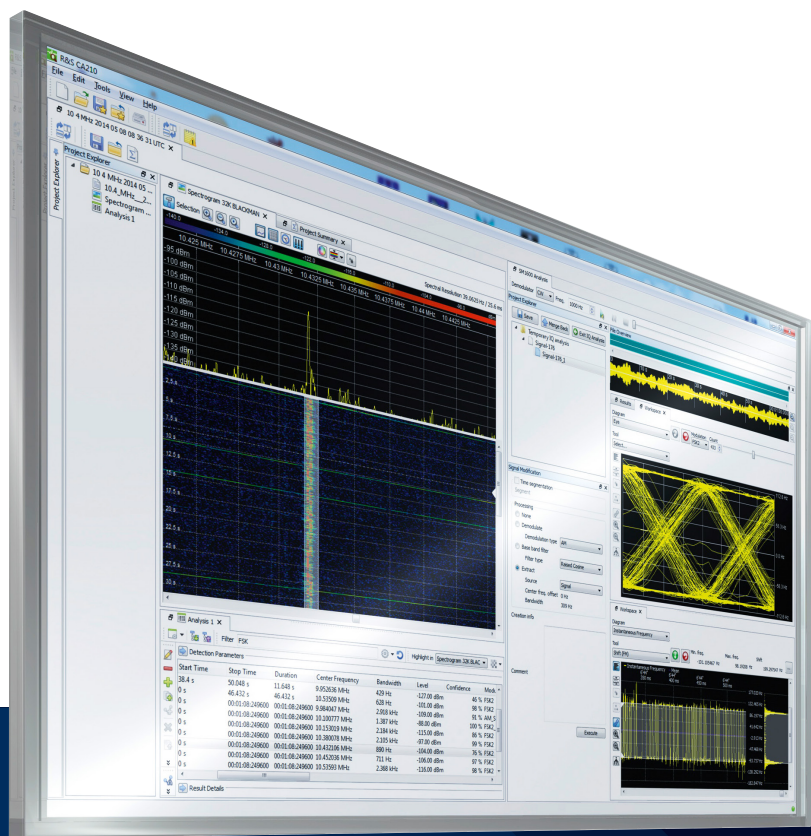# R&S®CA210
SIGNAL ANALYSIS SOFTWARE

Offline analysis of recorded signals and
wideband signal scenarios

Product Brochure
Version 06.00

ROHDE&SCHWARZ

Make ideas real

AT A GLANCE

R&S®CA210 software analyzes recorded signals and wideband signal scenarios offline with manual and automated analysis functions for fixed frequency emissions, complex multichannel OFDM signals and overlapping frequency hoppers.
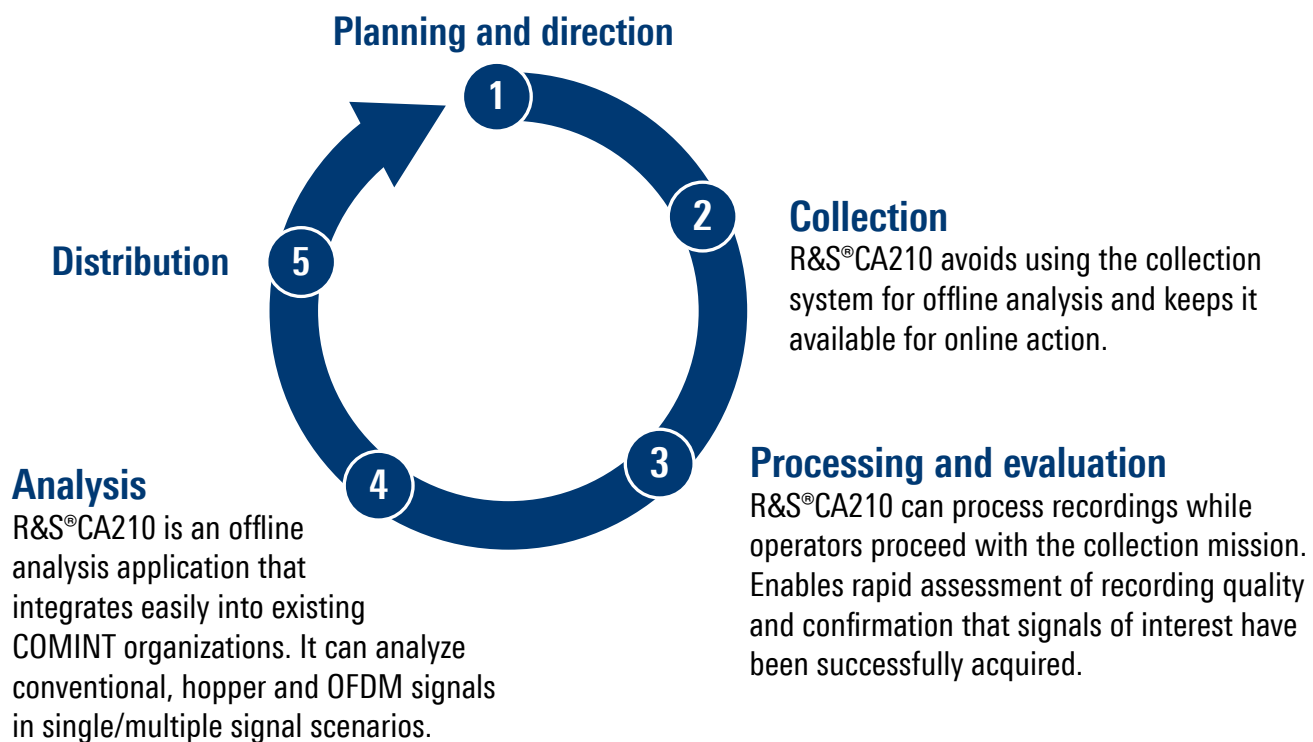
Organizations that collect and analyze radio signals typically use some form of the intelligence cycle. Spectrum monitoring, law enforcement, security agencies and the military commonly utilize a five-step intelligence cycle for:
► Planning collection tasks
► Collecting specific signals/scenarios
► Evaluating recordings
► Analyzing signals of interest
► Distributing useful analyses

R&S®CA210 gives signal analysts and COMINT operators a powerful tool for frequency domain analysis, time domain analysis and modulation parameter measurement. The signal analysis results can be distributed as parametric data or reports.

Many organizations use a single system for online collection and offline analysis (e.g. R&S®CA100 and R&S®CA120). Instead, blocking online monitoring and collection resources is avoided using an offline analysis solution in parallel. Rohde & Schwarz developed the R&S®CA210 as a dedicated offline analysis application that integrates easily into existing COMINT organizations.

How R&S®CA210 fits into the intelligence cycle

Planning and direction

1

2 Collection
R&S®CA210 avoids using the collection system for offline analysis and keeps it available for online action.

Distribution

5

3 Processing and evaluation
R&S®CA210 can process recordings while operators proceed with the collection mission. Enables rapid assessment of recording quality and confirmation that signals of interest have been successfully acquired.

4

Analysis
R&S®CA210 is an offline analysis application that integrates easily into existing COMINT organizations. It can analyze conventional, hopper and OFDM signals in single/multiple signal scenarios.

KEY FACTS

▶ R&S®CA210 is a standalone offline processing application that reduces the need for collection and analysis teams to share existing systems

▶ R&S®CA210 supports collection by processing recordings while operators focus on their main mission. Results indicate whether collection goals have been met or further recordings are needed

▶ Automatic wideband recording processing gives analysts more time to focus on critical tasks such as analyzing unknown signals and known signals of interest

▶ The classifier can automatically recognize a large number of modulation types, channel codes and transmission systems. Unrecognized signals are categorized as unknown

▶ In very dense HF signal scenarios, an artificial intelligence deep learning detector provides high detection quality

▶ Frequency agile hopper signals can be detected, separated and recombined into individual data streams for further analysis

▶ When detailed manual analysis is necessary, R&S®CA210 has an extensive set of tools in line with the ITU-R SM.1600 recommendation. Operators can measure signal parameters and configure demodulators

▶ Scripts help R&S®CA210 automatically select specific signal types for demodulation and decoding. The operator has immediate access to saved content

▶ The revolutionary graphical approach of R&S®CA210 supports the challenging analysis of OFDM signals and provides a fast, effective analysis workflow to determine the OFDM signal characteristics and modulation parameters

▶ An extensive range of demodulators and decoders is available to extract content from the signals with R&S®CA100 PC based signal analysis and signal processing software or R&S®CA120 multichannel signal analysis software

OPERATIONAL BENEFITS

ANALYSIS BENEFITS

OPERATIONAL BENEFITS

Resolve operational conflicts

The standalone offline processing application in R&S®CA210 means collection and analysis teams can work efficiently in parallel.

Collection teams can focus on their main mission and analysis teams no longer have to wait for equipment to become available.

The clear separation simplifies planning, since dedicated resources are available for collection and analysis.
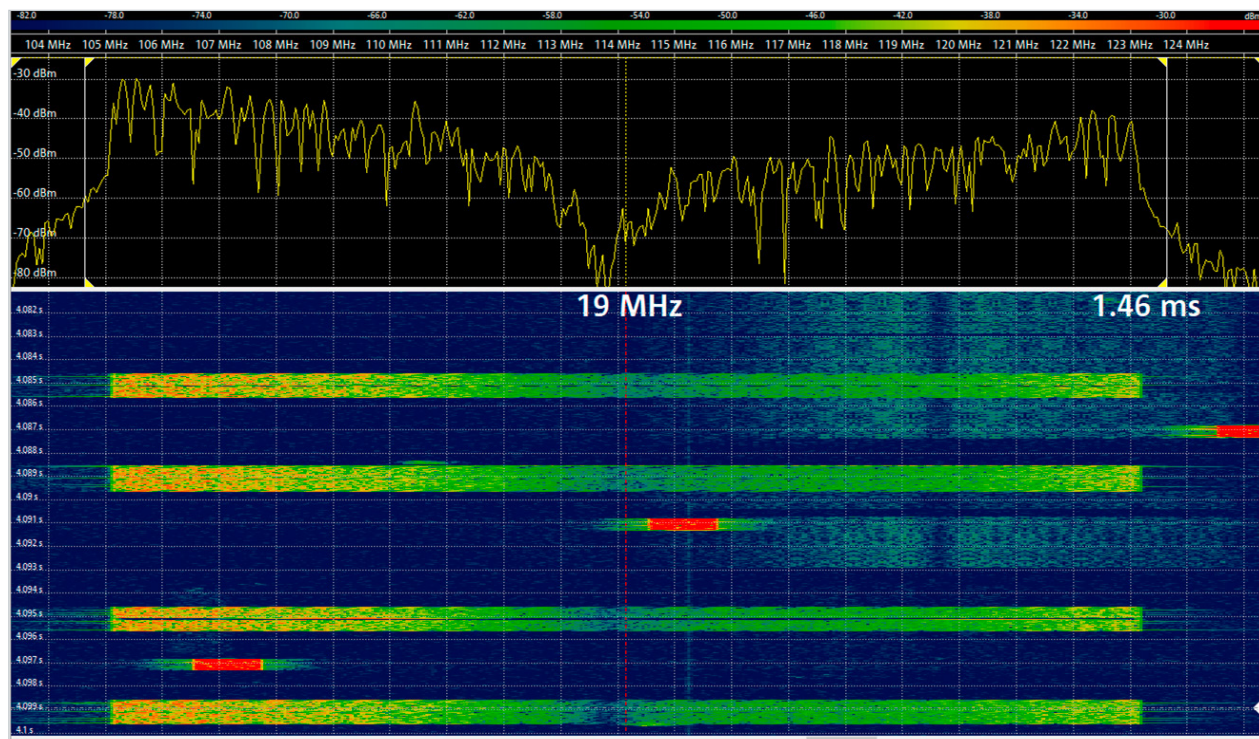
Improve collection quality

R&S®CA210 supports collection by processing recordings while operators can focus on their main mission.

R&S®CA210 collection platforms enable immediate evaluation of signal recordings.

Results indicate whether collection goals have been met or if more recordings are needed. If a recording has a low SNR, poor quality or no signal of interest, a new collection may be possible, ensuring analysts receive the best possible recordings and reducing the need to collect further signals of interest.

Spectrogram view of recorded signal showing interfering signals and fading effects

Quality control ensures best recordings for analysts

Operator's quality checklist:

► Signal of interest collected?

► Acceptable SNR?

► Interference?

► Fading?

Artificial intelligence improves HF detection quality

In very dense HF signal scenarios, an artificial intelligence (AI) deep learning detector provides high detection quality.

In HF, neighboring signals are often very close or even overlap, presenting a major challenge for conventional detectors. Fading often causes sidebands to be detected as separate signals. AI can better recognize individual signals, even when there is overlapping or fading.

The neural network comes pretrained and ready to use.

Reduces analysis workload

Automatic processing of wideband recordings leaves analysts with more time for critical tasks, such as analyzing known signals of interest and unknown signals.

Recordings of wideband scenarios, especially if they are long and with many active emitters, typically create a heavy work load for analysis teams.

R&S®CA210 is ideal for processing such recordings and can significantly reduce the workload for your analysis team.

Classifier helps focus on unknowns

The classifier automatically recognizes a large number of modulation types, channel codes and transmission systems. Unrecognized signals are categorized as unknown.

If your signals of interest are active in a dense signal scenario, a reliable classifier can greatly simplify matters. A large number of active signals quickly becomes a short list of unknowns.

Less effort is wasted on irrelevant emissions, more time is spent on detailed analysis and clearer focus is placed on the main task.

Integration into existing systems

R&S®CA210 can use your previously purchased Rohde & Schwarz signal analysis products for demodulation and decoding.

At startup, R&S®CA210 automatically detects installed R&S®CA100 software. If a demodulator/decoder is available for a signal of interest, R&S®CA210 can use the R&S®CA100 signal processor for symbols or content. Alternatively, an available R&S®CA120 multichannel signal analysis subsystem can share its demodulator/decoder resources with R&S®CA210.

Additionally, R&S®CA210 can access shared storage devices and process any recording that has a suitable format, such as R&S®AMMOS I/Q or WAV files from other manufacturers.

Automatic analysis of all signals in wideband scenarios
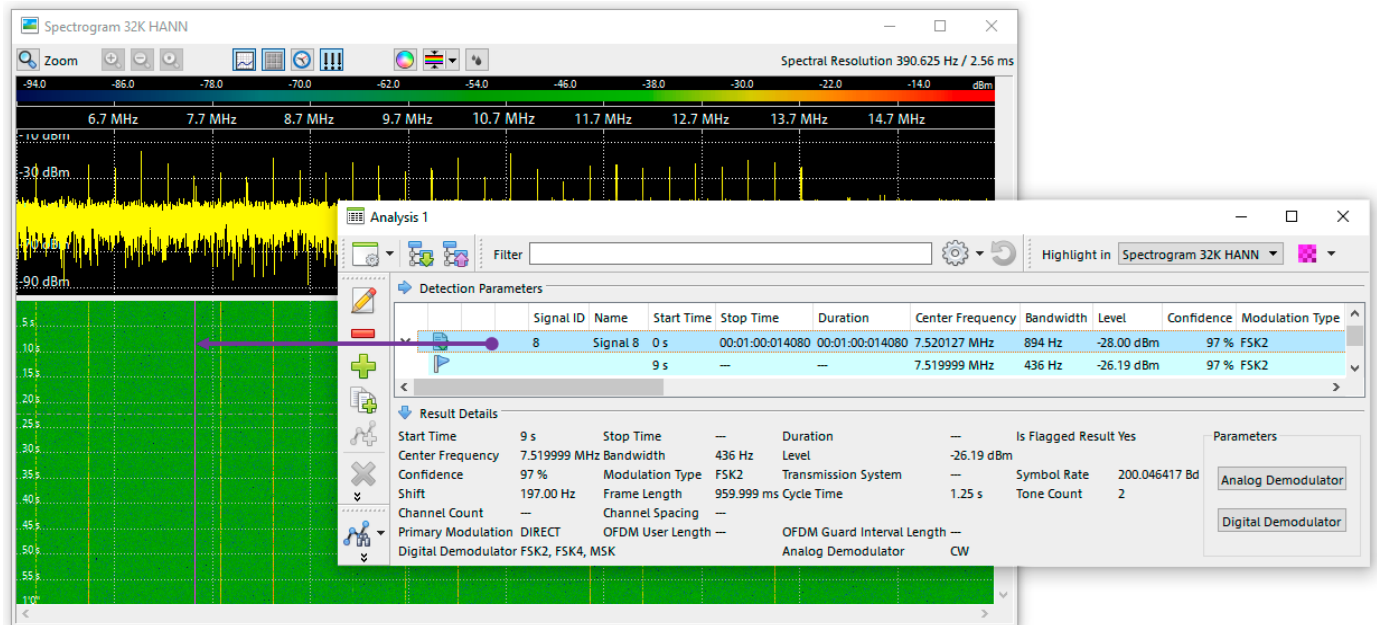
ANALYSIS BENEFITS

Variety of signal sources

R&S®CA210 processes recorded digital signal data from various sources:

▶ Digital I/Q data recordings from Rohde & Schwarz receivers and direction finders
▶ Digital I/Q from Rohde & Schwarz storage devices, such as the R&S®DWR150
▶ Digital I/Q data recordings from other receiver manufacturers (after conversion to the open R&S®AMMOS I/Q format)
▶ WAV files imported from a file server (with the file converter)

R&S®CA210 calculates a spectrogram of the entire recording for a complete overview of signal behavior. Operators can calculate spectrograms with different FFT lengths, window types and overlap factors.

Using a mouse to zoom, scroll and mark a time-frequency range, a signal can be selected in any part of a spectrogram and processed via the classifier or with manual analysis.

Separate analysis of overlapping hoppers

Frequency agile hopper signals can be detected, separated and recombined into individual data streams for further analysis.

Overlapping hoppers can be detected and separated automatically using filters. R&S®CA210 continually recalculates the time base of detected hoppers for auto-separation. A precise differential analysis can show the number of hopper radios in a scenario.

R&S®CA210 typically processes hopper signals from drones (UAVs) and digital radios, such as walkie-talkies.

Separation of multiple hoppers in the same frequency range
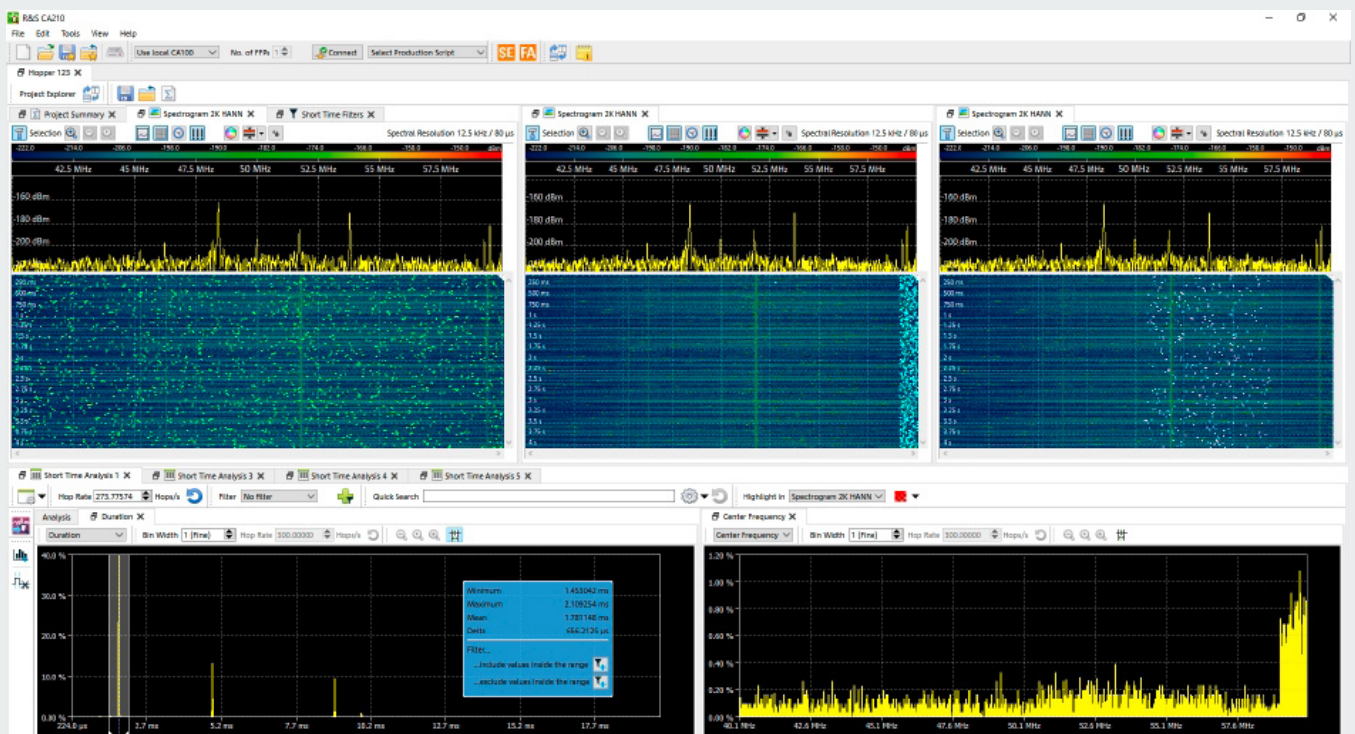
Java scripts extract specific signals

Scripts enable R&S®CA210 to select specific signal types for demodulation and decoding. Saved content is immediately accessible to the operator.

Selected signals can also be extracted and saved separately for further analysis or distribution.

Java scripts help implement powerful decision making capabilities with an accessible and well-known programming language.

Every new classification triggers scripts. Decision-making can use any parameters within the classification results.

Extensive ITU-conform manual analysis

When detailed manual analysis is required, R&S®CA210 has an extensive tool set in line with the ITU-R SM.1600 recommendation.

Operators have a wide range of visualizations and tools to measure signal parameters and configure demodulators.

Visualizations include:
▶ Spectrum and spectrogram
▶ Autocorrelation
▶ Signal attributes over time (frequency, phase, I/Q and envelope)
▶ Constellation and eye diagrams
▶ Multiple coupled views

Views and tools in line with ITU-R SM.1600 recommendation for modulation analysis

Rapid in-depth OFDM analysis

OFDM analysis used to be very challenging. A revolutionary graphical approach lets R&S®CA210 provide a fast, effective analysis workflow to determine the OFDM signal characteristics and modulation parameters.

Autocorrelation establishes the symbol parameters that demodulate a signal. The demodulated signal is visualized as a constellation diagram and a correlated symbol diagram.

Selecting symbols in one diagram automatically selects them in the other, revealing the relationships between the symbols.

Physical and virtual pilot symbols, synchronization sequences and payload symbols can easily be differentiated in the graphics by allocating a specific color to each symbol type.

Optimal re-use of existing Rohde & Schwarz products

An extensive range of demodulators and decoders is available to extract signal content with R&S®CA100 PC based signal analysis and signal processing software or R&S®CA120 multichannel signal analysis software.

OFDM analysis: Relationships between constellation and symbols are revealed via color allocations
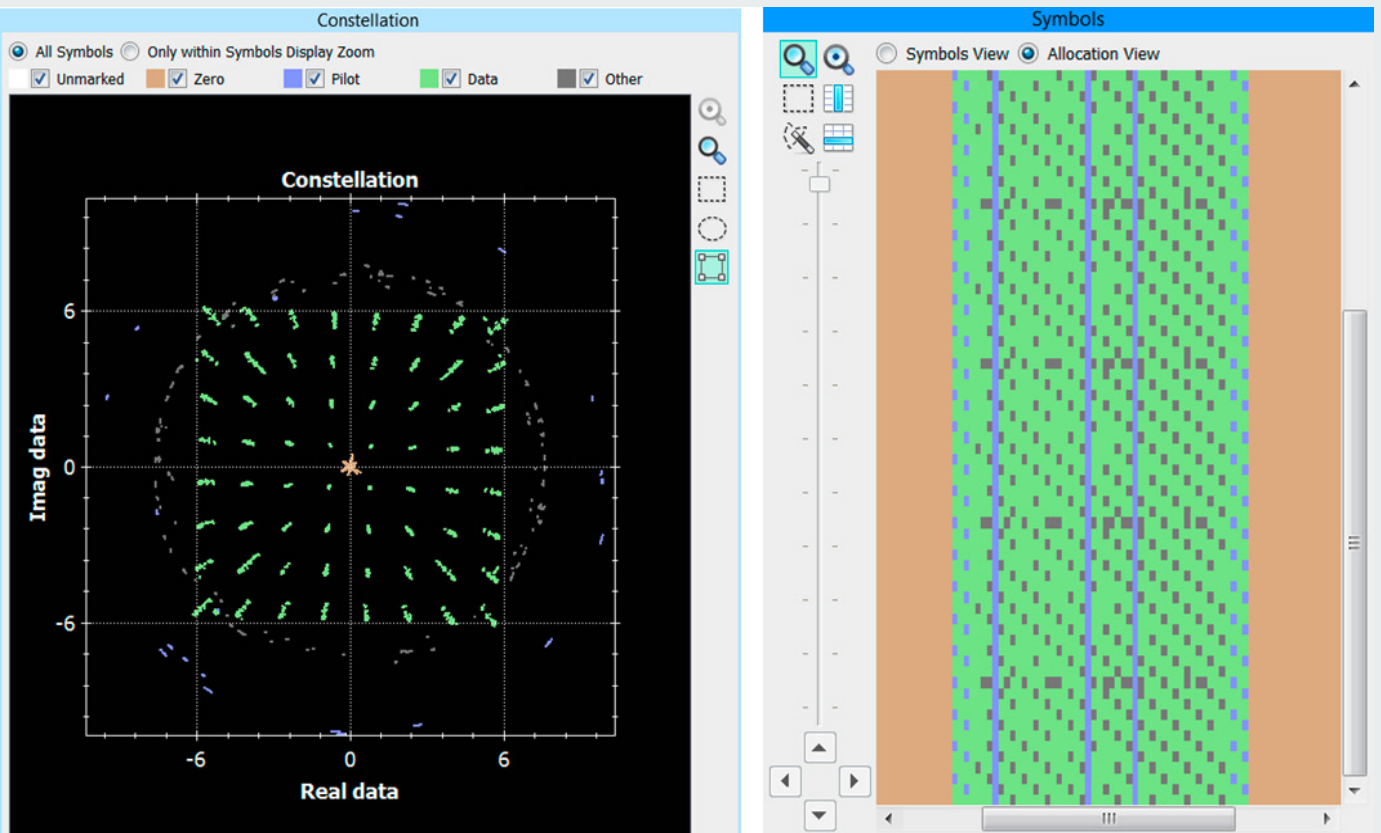
TRAINING COURSES

R&S®CA210 training courses combine classroom-based theory lessons and practical exercises. They cover the most important topics so that analysts can effectively use the R&S®CA210 for signal analysis.

All courses are instructor-led with an interactive approach. The instructor uses a mixture of question and answer sessions, continuous assessment and a final exam to ensure effective knowledge transfer.

The courses provide participants with the necessary knowledge to understand the workflow concept of R&S®CA210 to analyze recorded signals and wideband signal scenarios.

Course overview

Course title	Target audience	Aim	Duration
R&S®CA210 introduction	Decision-makers for technical offline analysis products	Attain basic product familiarity	1 day (5 hours)
R&S®CA210 operator training	Technical analysts, especially modulation type analysts	Operational familiarity with all product functions	5 days

ORDERING INFORMATION

Designation	Type	Order No.
Signal analysis software	R&S®CA210	4098.5001.02
Recommended extras		
OFDM signal analysis	R&S®CA210OFDM	4098.5301.02
Classification	R&S®CA210CL	4098.5124.02
Detection, search and classification of fixed frequency signals [1]	R&S®CA210DSC	4098.5182.02
Automatic processing of detected signals [2]	R&S®CA210AP	4098.5201.02
Detection, AI based next generation detector of HF fixed frequency signals [3]	R&S®CA210DNG	4098.5347.02
Short-time signal analysis	R&S®CA210ST	4098.5199.02
Service option		
Service package, for R&S®CA210, software update (1 year)	R&S®CA210-SP	3639.0964.02
Related products		
To use R&S®CA100 in combination with R&S®CA210 for demodulation of signals, the following R&S®CA100 options are mandatory.		
PC based signal analysis and signal processing software (requires one of the following licensing options)	R&S®CA100	4102.0004.02
Selectable licensing options		
Licensing of R&S®CA100 with USB dongle	R&S®CA100-U	4102.0062.02
Licensing of R&S®CA100 with SD card dongle	R&S®CA100-S	4102.0079.02
Licensing of R&S®CA100 with mini USB dongle	R&S®CA100-M	4102.0085.02
Options for single-channel processing		
Processing of digital signals	R&S®CA100DM	4102.0091.02
Training courses		
R&S®CA210 introduction	R&S®CA210-TI	3639.1048.02
R&S®CA210 operator training	R&S®CA210-TO	3639.1083.02

[1] Classification capability requires R&S®CA210CL.
[2] Requires R&S®CA210DSC and R&S®CA210CL.
[3] Requires R&S®CA210DSC. Graphics processing unit (GPU) is mandatory to run the AI neural network. See R&S®CA210 data sheet (PD 3607.3600.22) for details.

For demodulation/decoding with an additional R&S®CA100 (not in scope of R&S®CA210 delivery), see the R&S®CA100 product brochure (PD 3606.9340.12) and data sheet (PD 3606.9340.22).

For demodulation/decoding with an additional R&S®CA120 for automatic production of fixed frequency signals (not in scope of R&S®CA210 delivery), see the R&S®CA120 product brochure (PD 3606.9327.12) and data sheet (PD 3606.9327.22).

Rohde & Schwarz

The Rohde & Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

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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