

R&S® IQW

Wideband I/Q Data Recorder

Bring real RF scenarios to your lab



R&S®IQW Wideband I/Q Data Recorder At a glance

The R&S®IQW wideband I/Q data recorder is a versatile instrument for fast and reliable realtime recording, storage and playback of wideband I/Q data streams. In contrast to field tests, recording of live RF scenarios allows users to perform tests in the lab under real-world conditions reproducibly and at lower cost.

The wide recording bandwidth and high sampling rate and bit depth of the R&S®IQW are ideally suited for deployment in areas such as aerospace and defense, and for R&D of wideband communications systems.

In combination with the R&S®FSW signal and spectrum analyzer and the R&S®SMW200A signal generator, the R&S®IQW can be used in a wide variety of situations for recording, archiving and playback of GNSS, communications and radar signals, as well as complex signal scenarios.

The smart GUI concept makes working with I/Q data quick and easy. Easily removable and lockable SSD memory packs provide the necessary flexibility and security. With its very short boot time, the Linux-based operating system ensures fast availability while reducing vulnerability to external malware attacks.

Along with wide bandwidth and high speed, the R&S®IQW features easy operation and a high level of security.

Key facts

- Realtime recording, storage and playback of digital I/Q data with bandwidths up to 512 MHz
- Accurate data acquisition with a sampling rate up to 640 Msample/s and 16-bit I/Q data (complex)
- Fast data provision and memory expansion with easily removable 6.4 Tbyte memory packs (SSD)
- Easy operation with the 5.7" TFT touchscreen user interface or by remote control with the SCPI command set and web-based responsive GUI
- Linux operating system for fast, stable operation and protection against malware
- Import and export of I/Q data via USB3.0
- Recording of GPS coordinates
- Graphical display of power spectrum



High-precision data acquisition

Data recording and playback with 512 MHz bandwidth and no sample loss

With the R&S®IQW, I/Q data with a bandwidth up to 512 MHz can be recorded, stored and played back without any sample loss. This allows users to capture wideband live RF scenarios. Unlike artificially generated signals, users can employ the signals for lab tests with realistic scenarios. These real-world scenarios include effects such as signal reflection, attenuation and scattering, which makes it possible to simulate true-to-life test environments in the lab at low cost.

Reflecting the real environment

The resolution of the measured signal depends on the number of bits used for recording and reproduction. In other words, the higher the bit count, the higher the achievable signal integrity. With 16-bit samples, the live RF signal can be reproduced more accurately. This 16-bit quantization ensures reliable reproduction of live RF scenarios. The greater bit depth also provides a larger dynamic range and improves the signal-to-noise ratio.

Precise timestamping

Timestamping at the frame level allows users to precisely evaluate the timing of the recorded I/Q data so that they can determine exactly which data was recorded at what time. This makes it possible to accurately correlate the captured I/Q data to events and ambient conditions during the recording session.

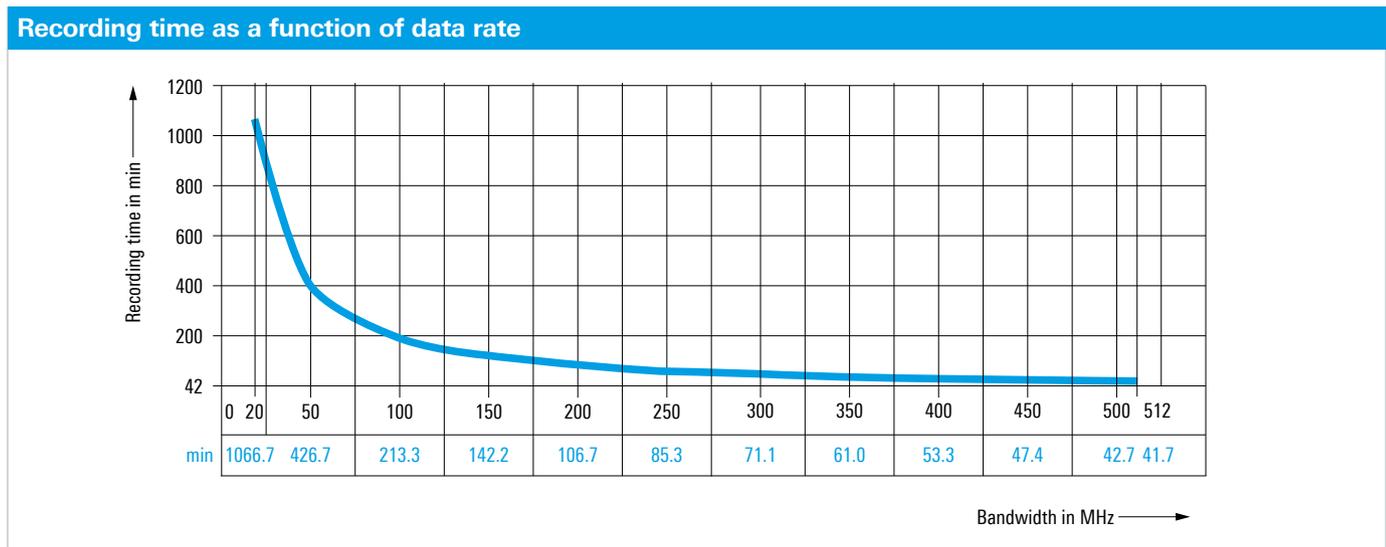
Removable memory packs for more flexibility

The R&S®IQW has a sturdy stainless steel case, and its 3 HU by 1/2 19" format is very compact, making it suitable for both stationary and mobile use. It contains a removable SSD memory pack that can easily be released by a lever mechanism. For users, this means fast data provision, allowing data to be exchanged easily and reliably between different users. In addition, memory expansion is possible by choosing memory packs with more capacity.



Removable SSD memory pack.

The R&S®IQW-BD106 option contains a 6.4 Tbyte SSD memory pack and supports a recording bandwidth of 512 MHz. This allows up to 42 minutes of realtime recording. Reducing the bandwidth increases the recording time. The relationship between bandwidth and recording time is shown in the chart below.



Smart operating concept

The operating concept of the R&S®IQW is based on a smart and intuitive user interface. This allows users to quickly make the desired settings and start recording.

The recorder can be operated in various ways. One way is direct operation using the touchscreen, with the option of connecting an accessory keyboard and mouse. However, the instrument can also be operated by remote control.

Convenient remote control

A web-based user interface enables direct control of the recorder via a web browser. The responsive GUI automatically adapts to the screen size, so a smartphone can also be used for remote control. This allows one or more users to operate the instrument conveniently via a LAN from their workstation or on the go with a smartphone.

Another option for remote control is the SCPI command set for automatic operation. Furthermore, context-sensitive online help provides detailed explanations of all parameters, such as specific default settings or associated SCPI commands.

Simplified data management

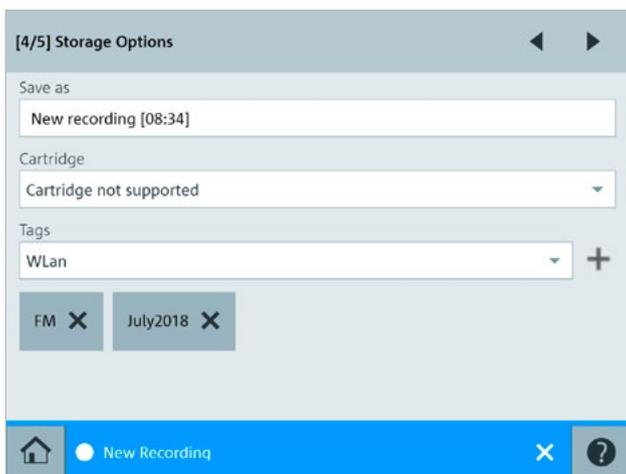
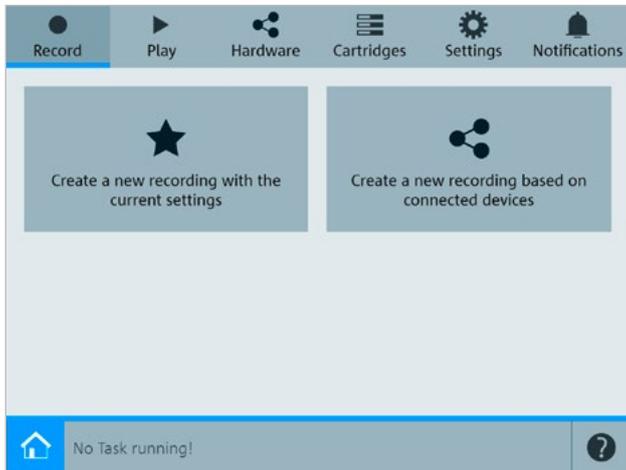
The R&S®IQW provides helpful functions to assist users in working with the acquired I/Q data. Display of GPS data makes it possible to accurately acquire the recording coordinates so that recordings can be better assigned and evaluated. Archiving and sorting of the recordings is supported by setting tags so that data can later be searched for, filtered and sorted according to user-defined criteria.

Trigger concept

The start and stop of the recording can either be done manually or by using a trigger signal. The start and stop triggering of the recording can be done by using a rising or falling edge of the triggering signal.

I/Q data import and export via USB 3.0

The R&S®IQW-K110 option makes it possible to import and export I/Q data. Selected files can be saved via USB 3.0 to an external disk drive. This facilitates downstream processing and analysis of exported I/Q data recordings.



Security first

Securing confidential measurement data

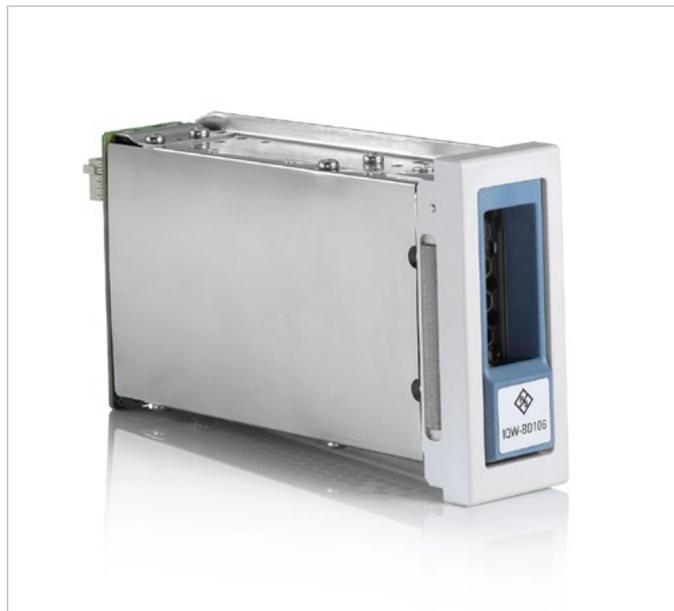
The removable memory packs ensure the confidentiality of individual measurements by preventing unauthorized access to the recorded data. Once the memory pack is removed, no measurement data remains in the instrument. The instrument's boot medium, which contains user data such as instrument settings, can also be removed. This way, the R&S®IQW can be sent in for calibration or handed over to other users without any security concerns, because confidential measurement data and settings always remain with the rightful user. The standardized Kensington lock fitting on the instrument and the memory pack locking mechanism make data theft difficult.

Protected against external malware

Susceptibility to external attacks is significantly reduced by the Linux-based operating system, resulting in higher security. Furthermore, Linux provides high system stability by protecting important system data and preventing it from being modified. Easily and quickly installable firmware updates ensure that the software is always up-to-date and secure, with the latest functions and improvements.

Always up-to-date with free firmware updates

The firmware of the R&S®IQW can be updated using a USB stick or a LAN-connected PC. Updates are available online free of charge at www.rohde-schwarz.com. Several different firmware versions can be installed concurrently on the R&S®IQW. This allows users to safely evaluate a new firmware version before using it.



The locking mechanism of the memory pack hinders potential data theft.

When speed counts

The R&S®IQW is designed for high data rates. This includes the HS Digital I/Q interface as well as the entire hardware architecture and data storage media.

HS Digital I/Q interface (Rohde & Schwarz proprietary)

The HS Digital I/Q interface enables fast data recording with a high sampling rate and wide bandwidth and 16-bit depth.

Consistent use of PCIe

The high system speed is based on the consistent use of PCIe.

High-quality SSD memory packs

The high-quality SSD memory packs, which are normally used in servers, combine high availability and reliability with short latencies.

Linux-based operating system

The operating system of the R&S®IQW has short boot times, so the recorder is very quickly ready for use at all times.

The system makes the difference

Numerous ports at the front and rear

The R&S®IQW has numerous interfaces for recording data and controlling the instrument. The arrangement of the interface ports ensures easy cabling to keep the workstation uncluttered.

Interfaces for data transfer

The two HS Digital I/Q ports are the key interfaces of the R&S®IQW for I/Q data recording and reproduction. These bidirectional interfaces can receive data from or send data to a device. This has the advantage of eliminating reconnection of cables when switching between recording and reproduction of I/Q data. The related BNC ports can be used for digital triggering or for reference clock signals for instrument synchronization. An antenna can be connected to the integrated GPS module. This makes it possible to record GPS data to assign the I/Q data to the exact location of the recorded I/Q data.

Universal interfaces for communications and control

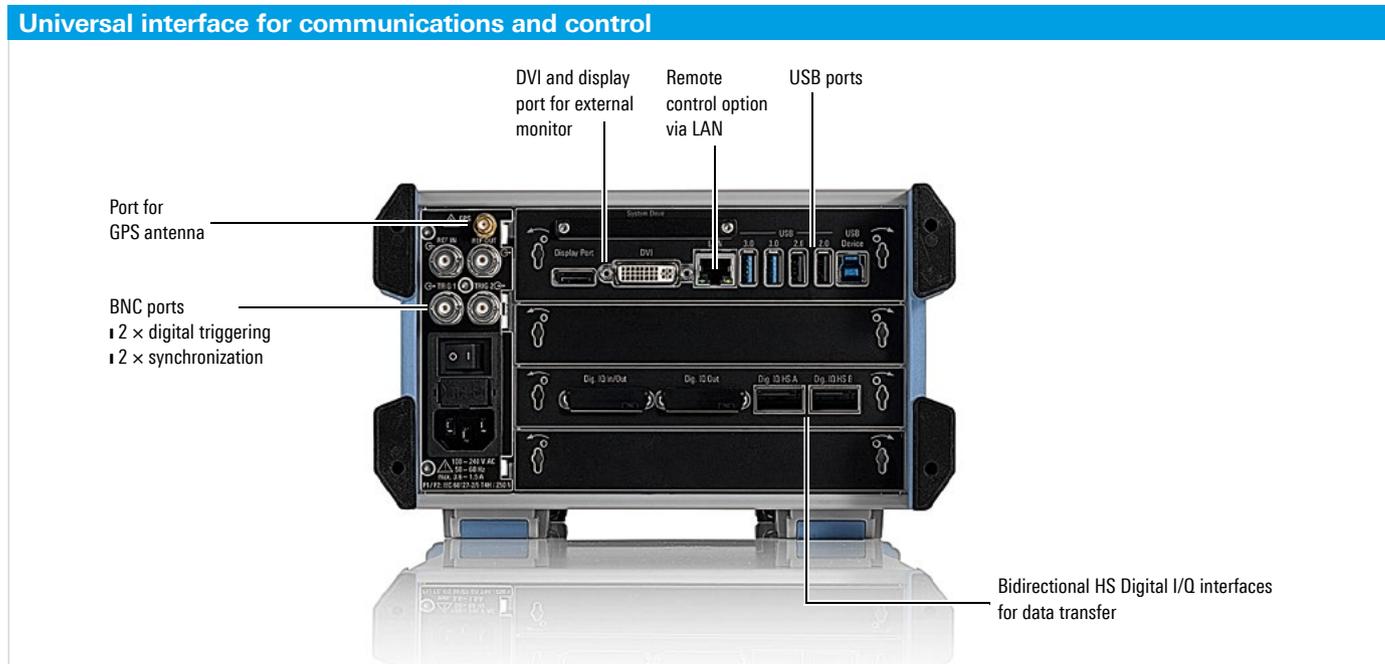
The Ethernet interface provides access to the recorder via a web-based GUI or through SCPI commands. The USB 3.0 interface enables the data import and export of I/Q files. Input devices such as a mouse and keyboard can be connected via USB to create a convenient workstation.

Signal and spectrum analyzer and signal generator as interfacing instruments

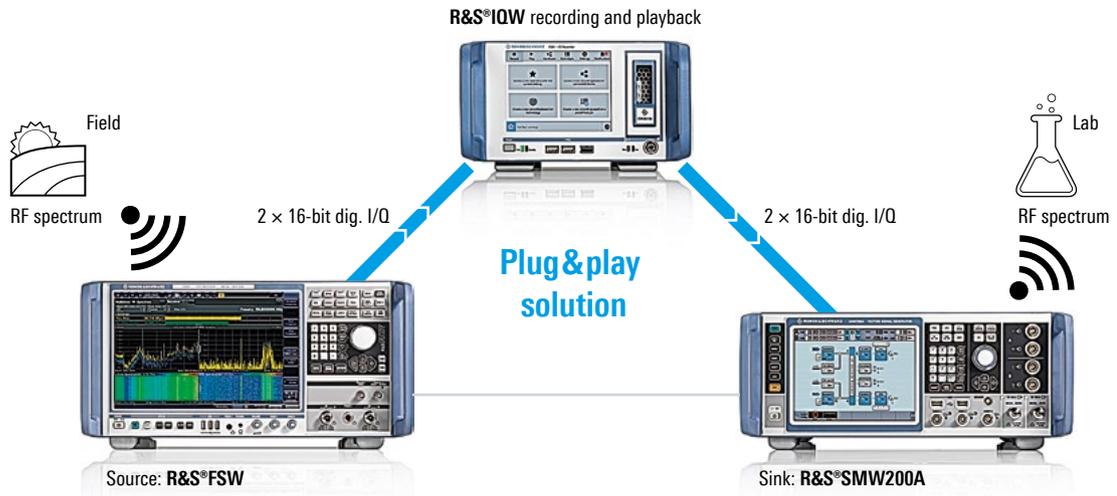
Spectrum analyzers for receiving live RF signals and signal generators for reconstructing and emitting RF signals can be connected to the R&S®IQW. The R&S®FSW and R&S®SMW200A communicate with the R&S®IQW via the HS Digital I/Q interface. With this combination, wideband RF scenarios received by the R&S®FSW can be stored in the R&S®IQW. Using the R&S®SMW200A, the recorded RF scenarios can be emitted as often as desired, for example for lab tests. This allows test runs to be carried out more efficiently and with lower resource usage, and therefore at lower cost, than field tests, which must be carried out on site by experts.

Testing of DUTs in the lab by using the R&S®FSW and R&S®SMW200A

By using the R&S®FSW, the real RF spectra can be captured. The R&S®FSW transforms the analog signal into digital I/Q data, which is then recorded and stored by the R&S®IQW. This record use case enables the user to test equipment under real conditions including signal effects like multipath, signal obstructions and diffractions or signal interference. With the R&S®IQW various RF scenarios can be captured for lab testing of DUTs. In this way different real world scenarios can be simulated in the lab, so the DUT can be tested under different RF conditions. With the R&S®SMW200A, the stored digital IQ data is transformed into a RF signal and can be replayed repeatable. Thus the same device test can be performed repeatable under identical real world conditions with minimal effort.



Recording, storage and playback of RF live signals



Reception of the live RF spectra, i.e. radar signals via the R&S FSW



Wideband signals or scenarios can be recorded using the R&S FSW signal and spectrum analyzer.

Playback of real RF spectra via the R&S SMW200A



Stored signals can be reproduced using the R&S SMW200A signal generator.

Training course

R&S®IQW training course is a combination of class-room-based theory lessons and practical exercises. It covers the most important topics that must be understood in order to effectively use R&S®IQW for recording and replaying of I/Q data.

The course provides operators with the necessary knowledge to understand the workflow and usage of R&S®IQW in a record and replay system setup together with other instruments for RF signal receiving and RF signal transmission. The course is 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.

Training course

Operator Training with R&S®FSW and R&S®SMW200A	R&S®IQW-T100	3638.8890.02
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Specifications in brief

Specifications in brief		
I/Q data transfer		
RF bandwidth	in combination with R&S®FSW and/or R&S®SMW200A	512 MHz
I/Q word size	per I/Q sample	16 bit for I and 16 bit for Q
Sampling rate	R&S®IQW	640 Msample/s (oversampling factor 1.25/Hz), complex
HS Digital I/Q interface		full duplex, QSFP+, 40 Gbit/s
Interfacing instruments	I/Q data source for recording	R&S®FSW
	I/Q data sink for playback	R&S®SMW200A
General data		
Display	with touchscreen	5.7" TFT color display, 640 × 480 pixel, LED backlighting
USB interfaces		4 × USB 2.0, 3 × USB 3.0
LAN interface	remote control	Ethernet 10/100/1000 Mbit/s
Power supply	AC power supply	100 V to 240 V AC (±10%), ≤ 150 VA, 50 Hz to 60 Hz/400 Hz (±5%), 1.5 A to 3.6 A
Overall dimensions	W × H × D	249 mm × 150 mm × 451 mm (9.80 in × 5.90 in × 17.76 in)
	for 19" rack mounting	½ 19", 3 HU
Weight		6.3 kg (25.4 lb)
Environmental conditions	operating temperature range	0°C to +50°C
	storage temperature range	-20°C to +70°C

Ordering information

Designation	Type	Order No.
Base unit (without memory pack)		
I/Q Wideband Data Recorder, with touchscreen, optimized for SSD memory packs	R&S®IQW	1525.7551K05
Memory packs		
6.4 Tbyte SSD Memory Pack, for maximum RF bandwidth of 512 MHz	R&S®IQW-BD106	1525.8293.06
Accessories		
Cable for HS Digital I/Q Interface, 3 m	R&S®DIGIQ-HS	3641.2948.03
Option		
I/Q Data Export/Import	R&S®IQW-K110	1525.8370.02
Recording of GPS Coordinates	R&S®IQW-K112	1525.8393.02
Training course		
Operator Training with R&S®FSW and R&S®SMW200A	R&S®IQW-T100	3638.8890.02

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	

Service that adds value

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

Rohde & Schwarz

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

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

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R&S®IQW Wideband I/Q Data Recorder

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