R&S®IQR
I/Q Data Recorder
Realtime recording and streaming of digital I/Q data
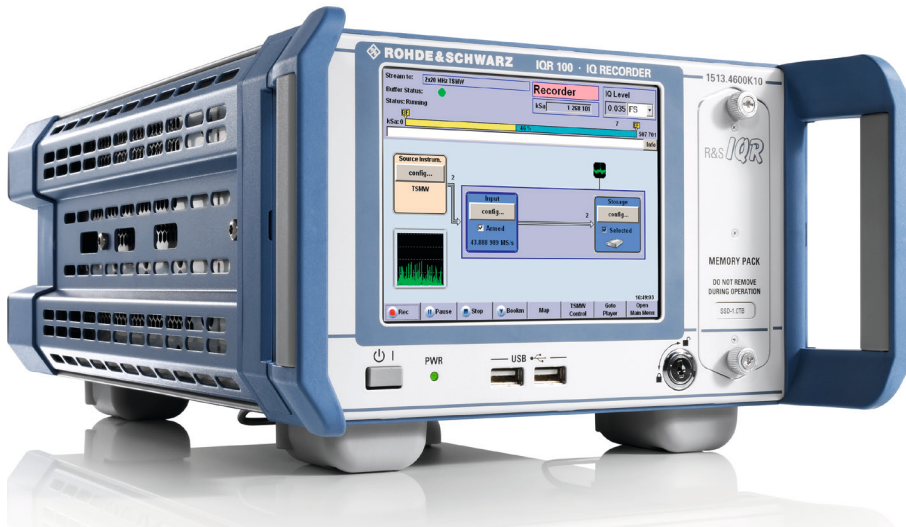
ROHDE & SCHWARZ

R&S®IQR
I/Q Data Recorder
At a glance

The R&S®IQR is a high-speed recorder for recording and playing digital I/Q data streams. When used in combination with one of the many Rohde & Schwarz instruments that have the R&S®Digital I/Q Interface, the R&S®IQR can store and play data in realtime.

The R&S®IQR I/Q data recorder is an ideal storage medium for I/Q data streams. It can be used, for example, for providing interference or test signals, for drive tests, for realtime storage of data when archiving RF signals, and for playing recorded I/Q signals. The I/Q data recorder is well suited for research and development applications, for drive tests when measuring GNSS signals, wireless communications and broadcast signals, and for military applications.

Key facts

❚ Realtime recording and playing of digital I/Q data with a sample rate of up to 99.5 Msample/s or up to 398 Mbyte/s
❚ Optional import and export of I/Q data via Ethernet or USB interface
❚ Support of automatic gain control (AGC)
❚ Optional recording and playing of two I/Q data streams
❚ Two models for various requirements
  ▪ R&S®IQR20 with up to 20 Msample/s
  ▪ R&S®IQR100 with up to 99.5 Msample/s depending on the memory packs used
❚ Easily removable memory packs with hard disk drives (HDD) for stationary use or with solid state drives (SSD) for higher data rates and mobile use
❚ Graphical display of power spectrum or I/Q level
❚ Optional recording of GPS coordinates
❚ Operation on 110 V to 220 V AC or optionally on 10 V to 30 V DC
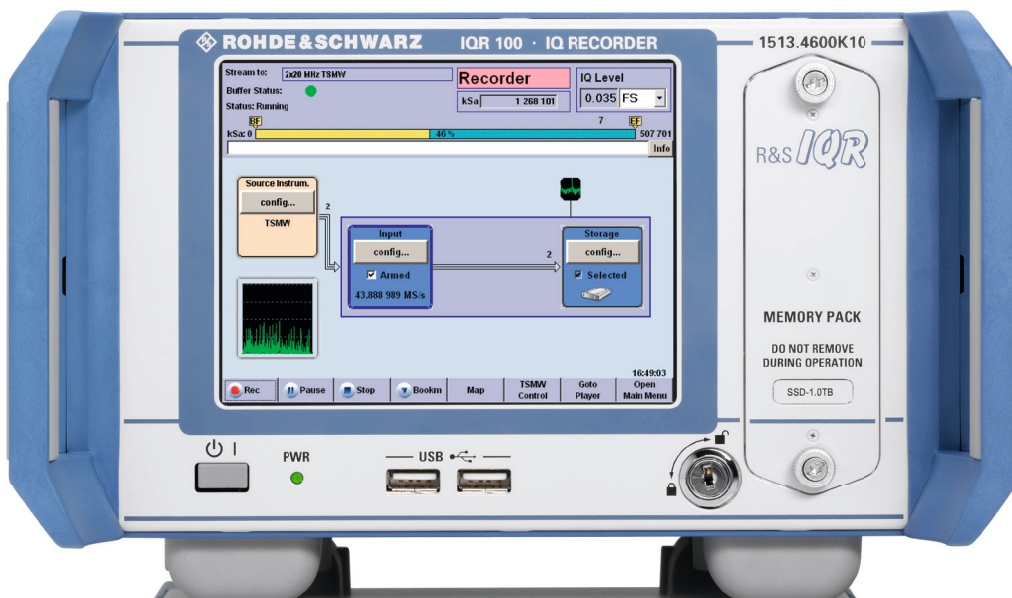
R&S®IQR
I/Q Data Recorder
Benefits and
key features

Fast storage and playing of digital I/Q data in realtime
❙ R&S®Digital I/Q Interface
❙ Optimum configuration for the required bandwidths
▷ page 4

Rugged, compact I/Q data recorder with removable memory pack
❙ Rugged, compact, 3 HU, ½ 19" format
❙ Support of various security concepts to keep data safe
▷ page 5

Comprehensive functionality and information directly accessible via touchscreen
❙ Easy manual operation directly on the instrument
❙ Graphical display of spectrum or I/Q level
▷ page 6

Numerous interfaces for data communications and control
❙ Fast R&S®Digital I/Q Interface with separate input and output
❙ Ethernet interfaces for communications and data exchange
❙ BNC sockets for trigger and synchronization signals
❙ Universal interfaces for PC peripherals
▷ page 7

Import and export of I/Q data via Ethernet or USB interface
❙ Backup of recorded I/Q data files
❙ Export and import of I/Q data
❙ Processing of I/Q data, e.g. with MATLAB®
▷ page 8

DC battery pack
❙ Independent power supply for recording of RF spectra
▷ page 8

Comprehensive trigger concept for event-based triggering
❙ Triggering on the I/Q level prevents recording of non-relevant data
❙ Triggering by external signals
❙ Optimum temporal control
❙ Remote control via Ethernet
❙ Manual operation
▷ page 9

Simultaneous recording and playing of several spectra
❙ Multiplexing and parallel output of I/Q data streams
❙ Synchronization of I/Q recorders
▷ page 10

Continuous recording of position data and reference levels
❙ Recording and graphical display of position data eliminates need for video recordings
  ▪ Recording of GPS coordinates
  ▪ Display of route
❙ Dynamic recording and replaying of reference levels for AGC
▷ page 11

Recorder menu.
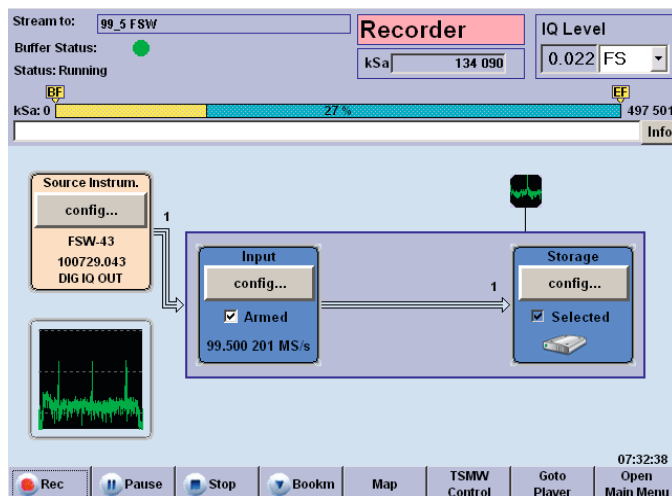
Fast storage and playing of digital I/Q data in realtime

R&S®Digital I/Q Interface

Many Rohde & Schwarz instruments have a digital I/Q interface. The combination of different measuring instruments via the digital I/Q interface makes it possible to implement a wide variety of applications, from simple data recordings to providing complex RF test signals. The Rohde & Schwarz instruments compatible with the R&S®IQR are listed in the data sheet (PD 5214.4394.22).

Digital I/Q data has real and imaginary parts, allowing the RF signal to be fully described. Key parameters are the sample rate and the data width of the I/Q signals.

The bandwidth that can be implemented is defined by the sampling criterion. Accordingly, and depending on subsequent processing requirements and the process, the sample rate of the complex digital signal is 1.1 to 1.6 times higher than the required bandwidth.

Optimum configuration for the required bandwidths

Different models of the R&S®IQR are available to fulfill different data rate and application requirements:
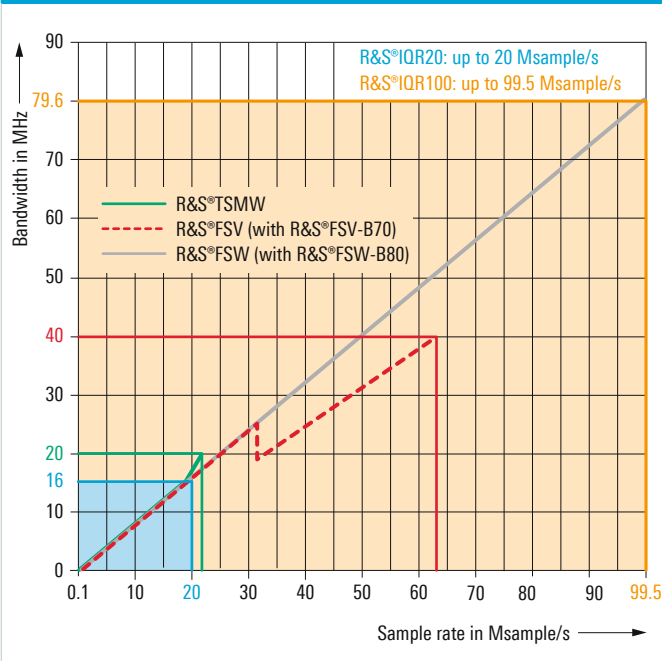❙ The R&S®IQR20 base unit has a sample rate of up to 20 Msample/s
❙ The R&S®IQR100 has a sample rate of up to 99.5 Msample/s

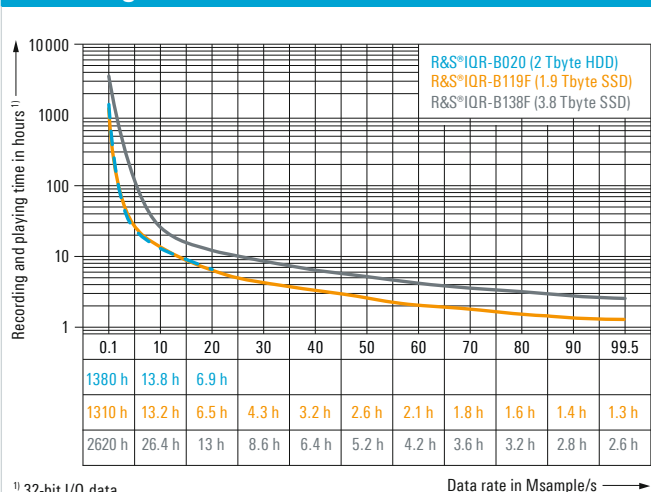Two types of memory packs are available for cost-efficient configuration of the R&S®IQR:
❙ Lower-priced R&S®IQR-B0xx hard disk memory packs for stationary use at low data rates up to 80 Mbyte/s; ideal for use with the R&S®IQR20
❙ Robust R&S®IQR-B1xx SSD memory packs for considerably higher data rates; necessary to fully exploit all of the R&S®IQR100 capabilities; especially suitable for applications with high mechanical requirements (e.g. drive tests)

The usable recording time is directly dependent on the sample rate. When two channels are recorded in parallel, the recording time corresponds to the sum of the data rates.

Correlation between bandwidth and sample rate

Recording time as a function of data rate

Data rate in Msample/s	0.1	10	20	30	40	50	60	70	80	90	99.5
R&S®IQR-B020 (2 Tbyte HDD)	1380 h	13.8 h	6.9 h								
R&S®IQR-B119F (1.9 Tbyte SSD)	1310 h	13.2 h	6.5 h	4.3 h	3.2 h	2.6 h	2.1 h	1.8 h	1.6 h	1.4 h	1.3 h
R&S®IQR-B138F (3.8 Tbyte SSD)	2620 h	26.4 h	13 h	8.6 h	6.4 h	5.2 h	4.2 h	3.6 h	3.2 h	2.8 h	2.6 h

[1] 32-bit I/Q data.

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Rugged, compact I/Q data recorder with removable memory pack
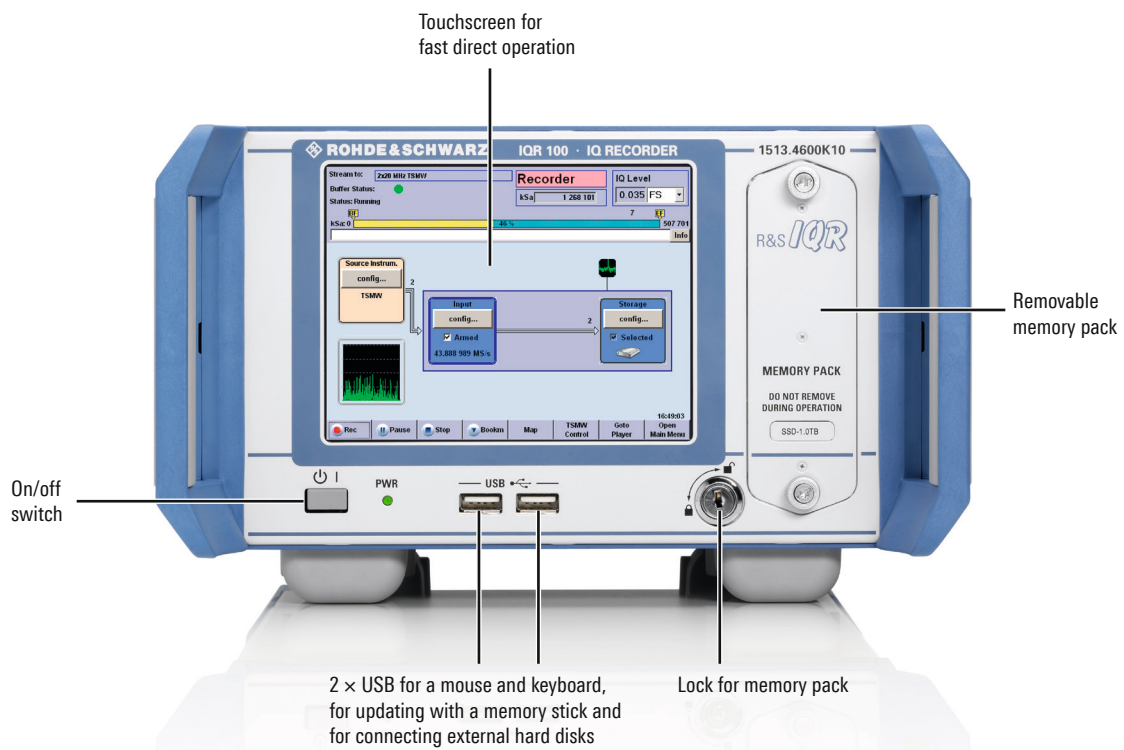
Rugged, compact, 3 HU, ½ 19" format
The very compact R&S®IQR I/Q data recorder has only 3 HU and a ½ 19" width, so it can be integrated in a 19" rack with other similarly compact instruments, such as the R&S®TSMW universal radio network analyzer or the R&S®SFE broadcast tester.

The design of the housing, such as the stainless steel frame, and the use of SSDs as the system memory make the R&S®IQR suitable for operation under extreme conditions as occur during drive tests, for example. The data memory packs are simple to remove and insert, making it easy to exchange data between mobile and stationary applications.

Support of various security concepts to keep data safe
The standardized Kensington lock on the rear of the instrument and the memory pack locking mechanism make data theft difficult. In addition, the measured data is encoded before being saved to the memory pack to prevent unauthorized, fast access to the data. When the memory pack is removed, no data remains in the instrument.

R&S®IQR front panel

Touchscreen for
fast direct operation

Removable
memory pack

On/off
switch

2 × USB for a mouse and keyboard,
for updating with a memory stick and
for connecting external hard disks

Lock for memory pack

Comprehensive functionality and information directly accessible via touchscreen

Easy manual operation directly on the instrument

In addition to a main settings menu, the instrument has a parameterization menu for recording and playing. The following functions can be parameterized:

❙ Trigger definition (trigger source, trigger type)
❙ Selection of file to be played or definition of filename
❙ Record and play parameters

Additional information such as the progress bar, sample rate, I/Q level, reference level and the names of the connected instruments is displayed to keep the user informed of the status before and during recording and playing.

Graphical display of spectrum or I/Q level

The display of the power spectrum or the I/Q level facilitates the assessment of the input signal before and during recording as well as the assessment of the output signal during playing.

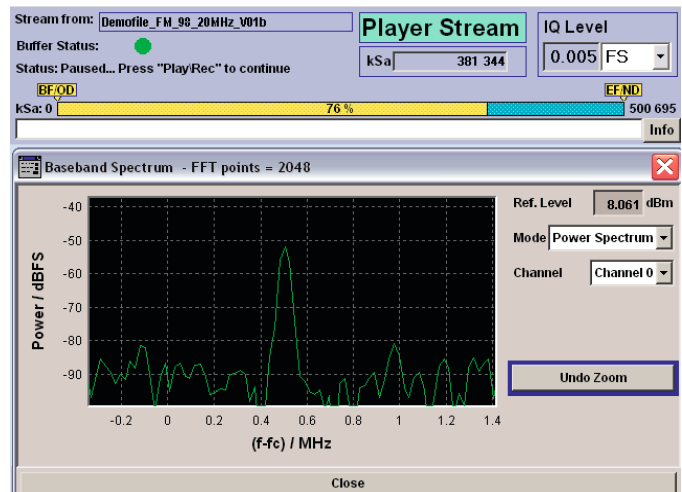The multiple zoom function allows the display of signal details.

Setting parameter limits makes it easy to enter information.
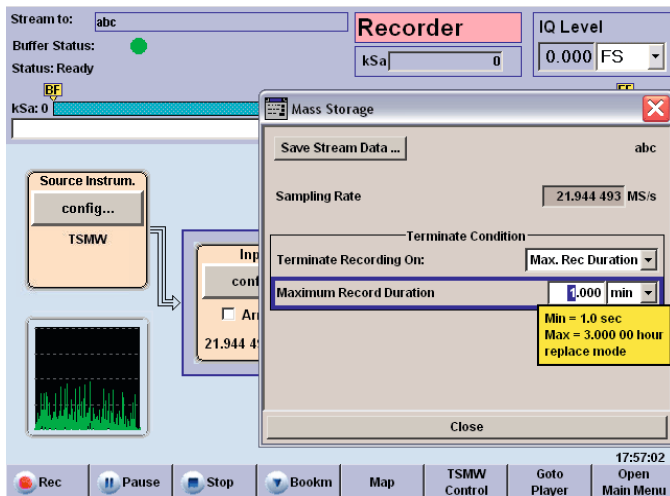
Zoomed spectrum display.
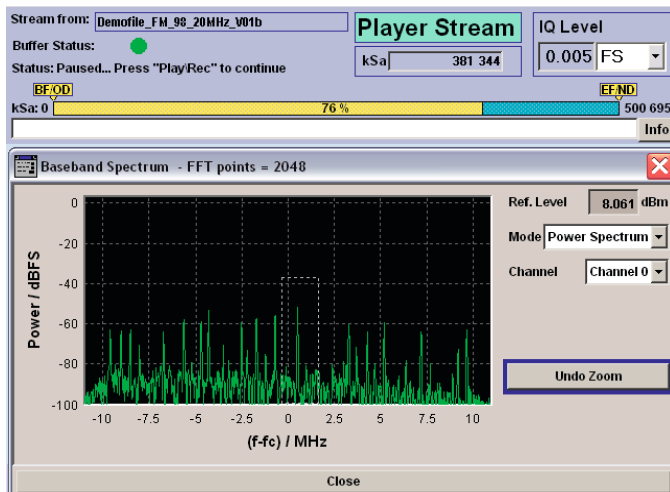
Section of the spectrum.

Numerous interfaces for data communications and control

Except for two USB interfaces on the front panel, all electrical interfaces are located on the rear panel of the R&S®IQR. This is in line with the general Rohde & Schwarz instrument concept and makes cabling of instruments easier.

Fast R&S®Digital I/Q Interface with separate input and output

The DIGITAL IQ IN/OUT connectors are the main R&S®IQR interfaces for recording and playing digital I/Q data. Separate I/Q input and output interfaces have the advantage that connection cables do not have to be disconnected and reconnected when switching between recording and playing of I/Q data.

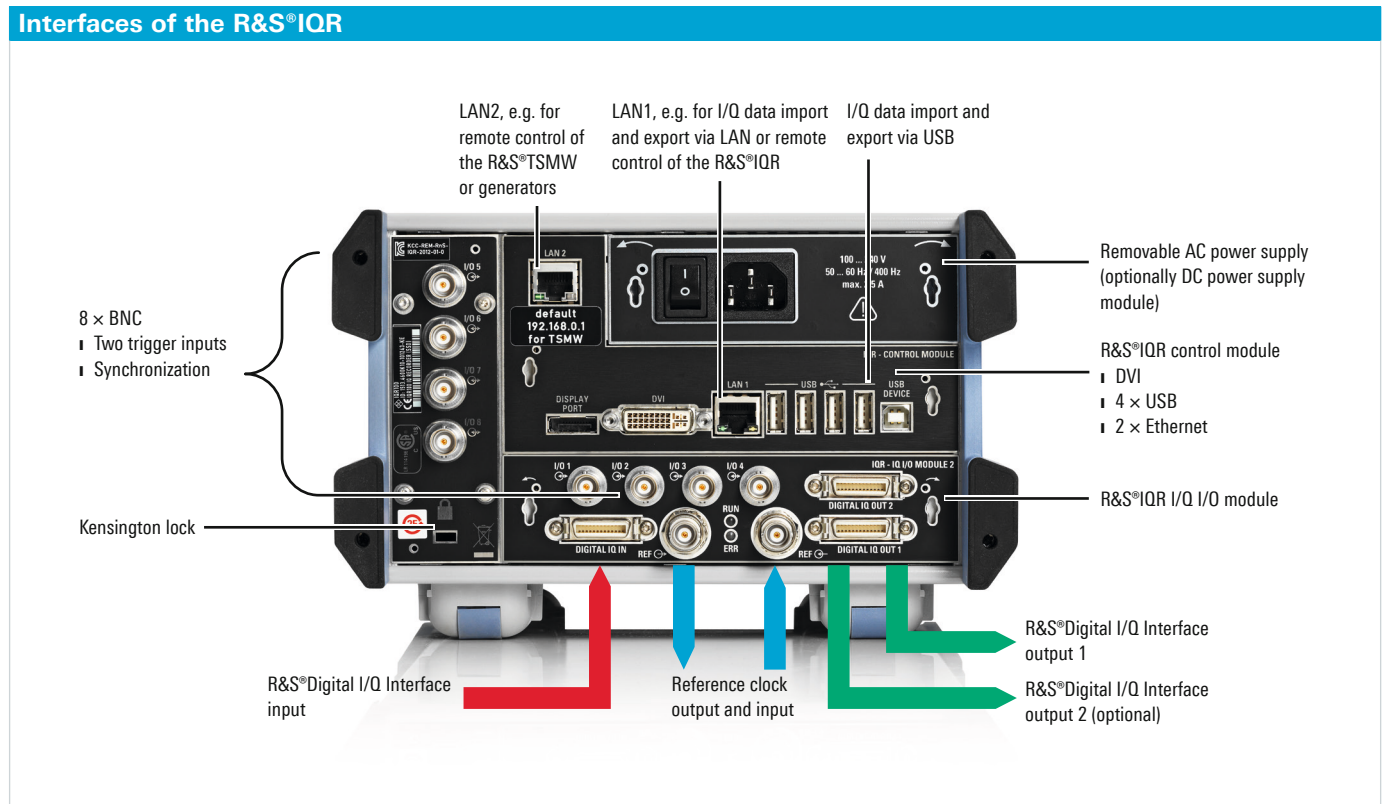## Ethernet interfaces for communications and data exchange

The two Ethernet interfaces are used for communications between the R&S®IQR and connected instruments. This includes external control of the R&S®IQR using remote desktop and SCPI commands and the ability to control connected instruments that do not have a built-in monitor, such as the R&S®TSMW or generators. In addition, I/Q data can be exported and imported via LAN.

BNC sockets for trigger and synchronization signals

Eight BNC sockets are available to be used for digital I/Q signals in the future. Up to two BNC sockets can be used for digitally triggering and synchronizing R&S®IQR data recorders. Two more BNC sockets are allocated to the reference clock input and output to synchronize connected instruments.

Universal interfaces for PC peripherals

The monitor interfaces of the R&S®IQR control module make it easy to work with a mouse and keyboard. The additional four USB ports on the rear of the instrument provide optimum room for expansion, i.e. for updates via USB stick or for transferring I/Q data to and from an external hard disk.

Interfaces of the R&S®IQR

LAN2, e.g. for remote control of the R&S®TSMW or generators

LAN1, e.g. for I/Q data import and export via LAN or remote control of the R&S®IQR

I/Q data import and export via USB

Removable AC power supply (optionally DC power supply module)

R&S®IQR control module
- DVI
- 4 × USB
- 2 × Ethernet

R&S®IQR I/Q I/O module

8 × BNC
- Two trigger inputs
- Synchronization

Kensington lock

R&S®Digital I/Q Interface input

Reference clock output and input

R&S®Digital I/Q Interface output 1

R&S®Digital I/Q Interface output 2 (optional)

Import and export of I/Q data via Ethernet or USB interface

Export of one or two I/Q data streams.
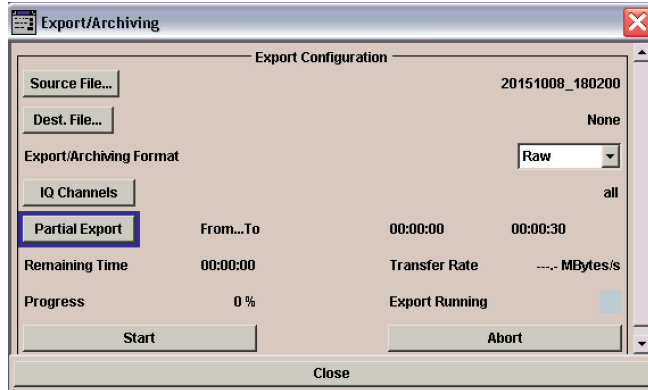
Backup of recorded I/Q data files
I/Q data recorded in realtime can be archived offline on cost-effective mass memories via the Ethernet and USB interfaces.

Export and import of I/Q data
The R&S®IQR-K101 option allows an R&S®IQR I/Q data file in binary file format to be output to an external USB storage device such as a USB hard disk drive. The file can also be output via Ethernet for storage on an external network drive. The partial export function makes it possible to export a selectable section of the I/Q data file, saving transmission time and memory space on the target system. The R&S®IQR-K101 option also makes it possible to import individual I/Q data files.

Processing of I/Q data, e.g. with MATLAB®
In addition to outputting the I/Q data to a binary file, a data file with the most important data stream information is generated. This file can be used for automatic processing with MATLAB®, for example. Additionally, generated I/Q files can be imported and then output in realtime via the I/Q interface (R&S®IQR-K101).

DC battery pack

Independent power supply for recording of RF spectra
The R&S®IQR-B32 external battery pack makes it possible to operate the RF recording configuration consisting of the R&S®TSMW and R&S®IQR independent of the AC supply. The four lithium-ion batteries that are included allow RF spectra to be recorded for two hours. They can be recharged with the R&S®CMA-Z062A charger. The lithium-ion batteries have their own charge status display and can be exchanged two at a time during operation (hot swappable). As a result, operating time can be considerably extended using additional batteries (R&S®CMA-Z061A) without interrupting the recording.
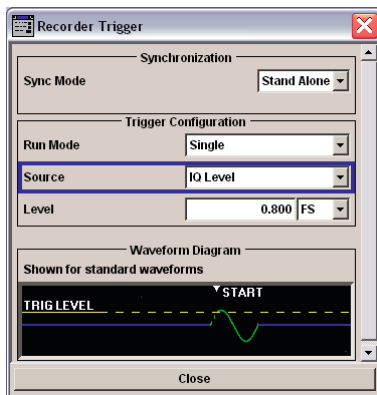

R&S®IQR-B32 DC battery pack.

R&S®IQR-CAS1 with integrated R&S®TSMW and R&S®IQR.

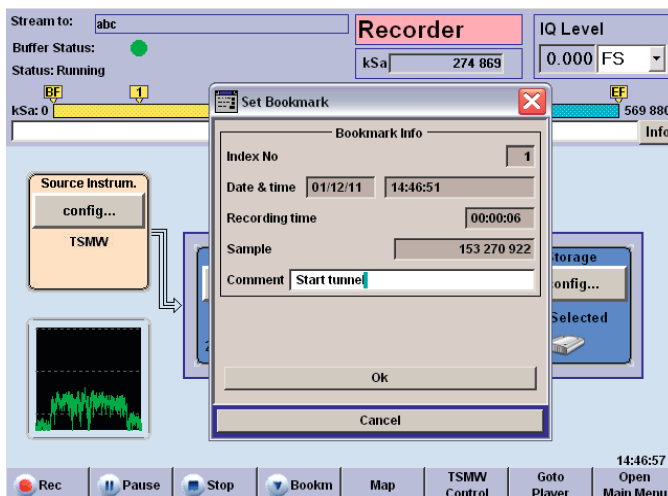# Comprehensive trigger concept for event-based triggering

The extensive trigger menu provides many control options to start and stop recording and playing. Depending on the trigger source, the following modes are available:
❙ Continuous
❙ Single

Triggering on the I/Q level prevents recording of non-relevant data
Triggering on the I/Q level optimizes the start of recording, providing a type of observation mode. In conjunction with a predefined recording time (record duration), the storage requirements can be limited to the data of interest.

Triggering by external signals
The rising or falling slope of external signals at a user-definable BNC socket can be used for triggering. A delay, the record duration and the maximum file size can also be defined.

Optimum temporal control
When recording environmental scenarios, programming of start and stop times is a practical way to eliminate the need for on-site personnel.

Remote control via Ethernet
For system integration or when recording environmental scenarios, the R&S®IQR can be remotely controlled via the Ethernet interface using SCPI commands and the remote desktop connection.

Manual operation
Similar to conventional recorders, virtual start, stop, go to and pause buttons are used for manual operation. While recording, bookmarks can be set for use as an orientation aid or as start and stop events during playback.

I/Q level trigger menu.

Setting bookmarks while recording.

Virtual start, stop, pause and go to buttons; go to buttons can be used to define sections to be played.
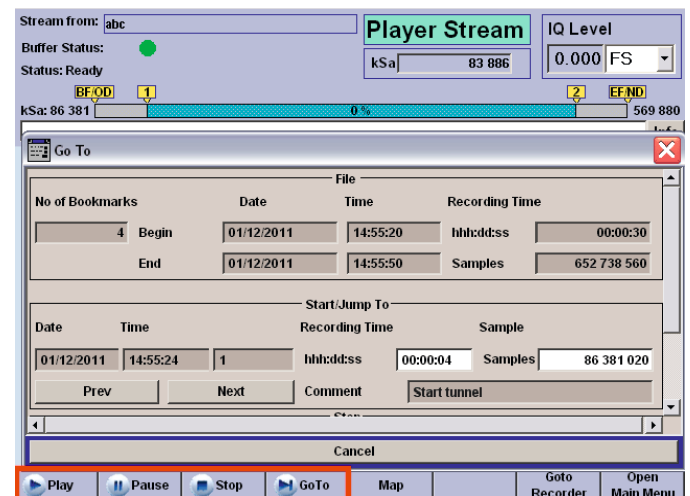
Simultaneous recording and playing of several spectra

Simultaneous recording and playing of multiple spectra makes it possible to test various radio services in parallel, such as DVB-T and radio or GPS and Glonass signals. In addition, the separate recording of non-adjacent, low bandwidth spectra significantly reduces the entire required bandwidth and resulting data rate.
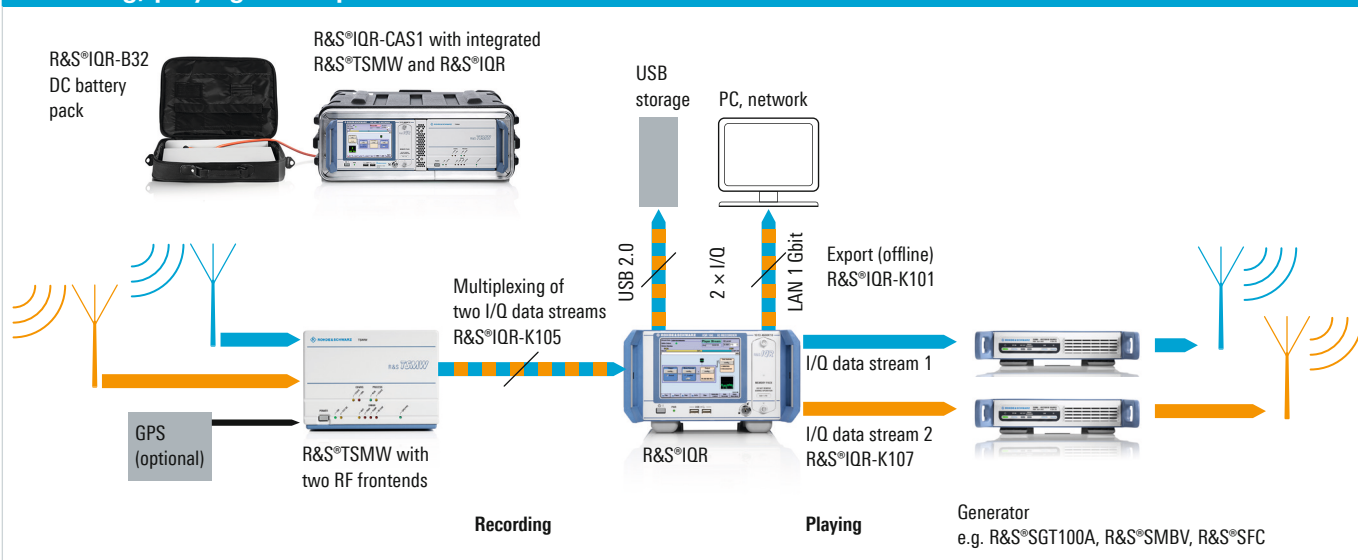
Multiplexing and parallel output of I/Q data streams

The R&S®IQR-K105 option supports the recording and playing of multiplexed I/Q data streams of the R&S®TSMW universal radio network analyzer. As a result, up to two spectra can be transferred simultaneously via the digital I/Q interface. The simultaneously stored spectra can be transferred to a PC for further processing (R&S®IQR-K101 option) or output to two generators equipped with the R&S®Digital I/Q Interface (R&S®IQR-K107 option).
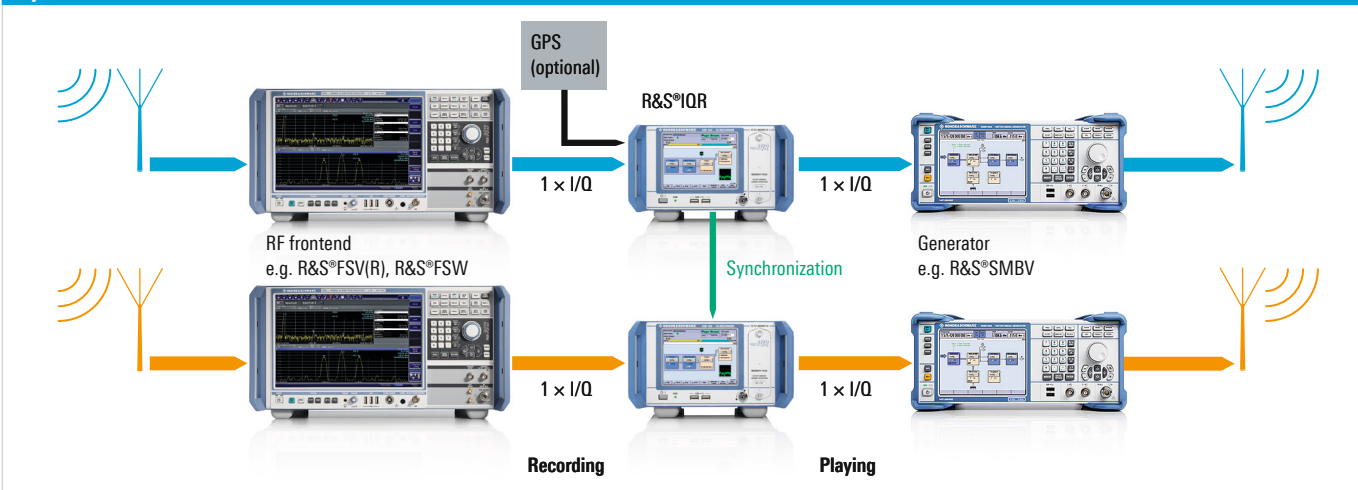
Synchronization of I/Q recorders

The synchronization of several R&S®IQR instruments permits simultaneous recording of multiple spectra that are not within the bandwidth of a receiver. In contrast to multiplexing, the parallelization of recording and playing makes it possible to maintain the recording time and playing time for each channel.
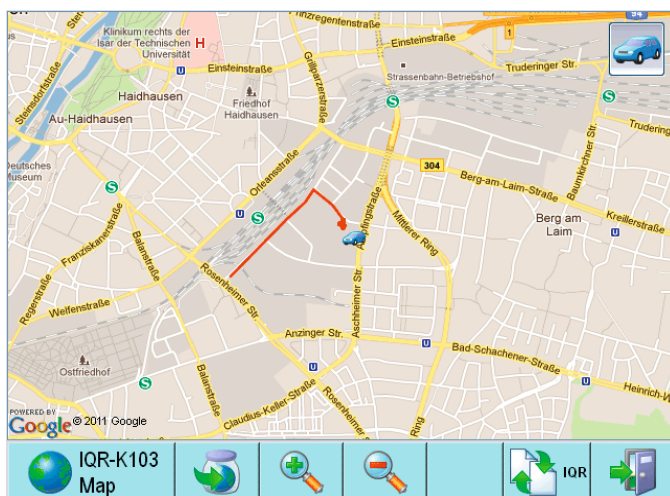
Recording, playing and export of two I/Q data streams

R&S®IQR-B32 DC battery pack

R&S®IQR-CAS1 with integrated R&S®TSMW and R&S®IQR

USB storage

PC, network

Multiplexing of two I/Q data streams R&S®IQR-K105

USB 2.0

2 × I/Q

LAN 1 Gbit

Export (offline) R&S®IQR-K101

I/Q data stream 1

I/Q data stream 2 R&S®IQR-K107

GPS (optional)

R&S®TSMW with two RF frontends

R&S®IQR

Generator e.g. R&S®SGT100A, R&S®SMBV, R&S®SFC

Recording

Playing

Synchronization of I/Q recorders

GPS (optional)

R&S®IQR

RF frontend e.g. R&S®FSV(R), R&S®FSW

1 × I/Q

Synchronization

1 × I/Q

1 × I/Q

1 × I/Q

Generator e.g. R&S®SMBV

Recording

Playing

Continuous recording of position data and reference levels
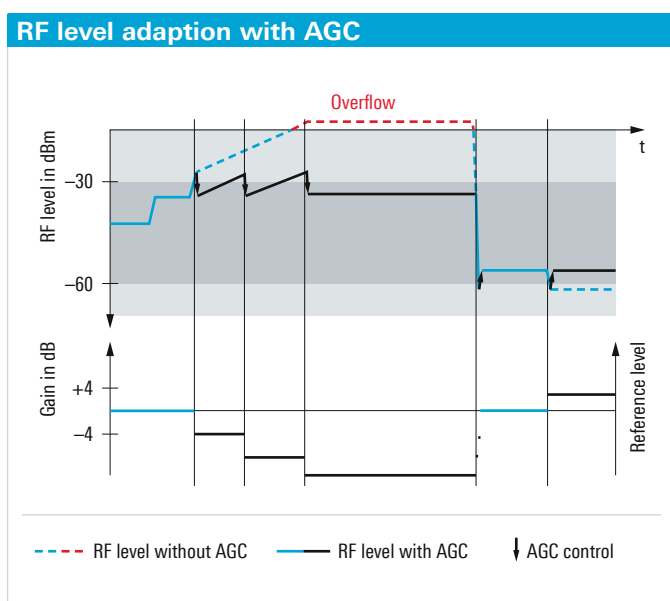
Recording and graphical display of position data eliminates need for video recordings

Recording of GPS coordinates

The ability to assign a location to the recorded spectrum is an important function for drive test applications. The R&S®IQR-K102 option allows GPS data to be transferred via USB from the R&S®TSMW GPS receiver or from the separate R&S®TSMX-PPS2 GPS receiver (see "Applications").

The time-synchronized GPS data is saved in a separate file together with the sample count, providing a clear allocation to the I/Q data stream.
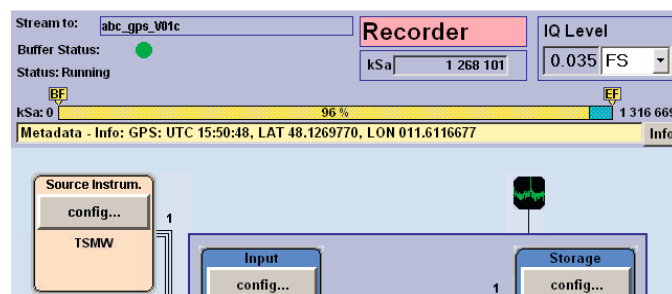
Displaying and recording GPS data (R&S®IQR-K102 option).

Display of route

The R&S®IQR-K103 option uses the recorded coordinates (R&S®IQR-K102 option) to additionally display the traveled route or the current position on a map section while recording/playing the spectrum.

Assigning the current spectrum to a position is a great help when analyzing critical situations and eliminates the need for additional video recordings. An included program allows free downloading of the required maps.

Dynamic recording and replaying of reference levels for AGC

During drive tests in particular, the RF signal can vary significantly. Tracking the reference signal, either manually or automatically, can help avoid clipping on a too low signal level. The R&S®IQR-K104 option allows users to dynamically record and replay changing reference levels as metadata.

The R&S®IQR-K2 option for controlling external generators is required to accurately replay I/Q signals with changing reference levels. The R&S®IQR-K1 option allows users to configure the R&S®TSMW and to activate the AGC function.

Displaying the route (R&S®IQR-K103 option).

Applications

Error analysis by recording and playing RF spectra

Rohde & Schwarz spectrum analyzers can also be used as an RF frontend for the R&S®IQR. They receive an RF signal and mix it down to an IF frequency and then digitize it. The R&S®IQR seamlessly records this digital data stream.

The signal can then be played by a signal generator. It is possible to change the frequency and manipulate the signal. As a result, DUTs can be tested to see how they respond to real signals from the field, such as DVB signals, signals from satellite navigation systems, mobile communications applications and WLAN, or how resistant they are to interference.

Via the digital interface, the signal can also be output directly to the analyzer and then be analyzed. This application is especially useful for finding sporadic errors or errors that occur after the DUT has been in operation for a long period of time. The source of errors cannot be fully detected unless recording is seamless. A few seconds

of recording time using the analyzer's internal memory is usually not sufficient to ensure that the problem is detected. The R&S®IQR extends the recording time by several orders of magnitude, creating new possibilities for detection and subsequent analysis.
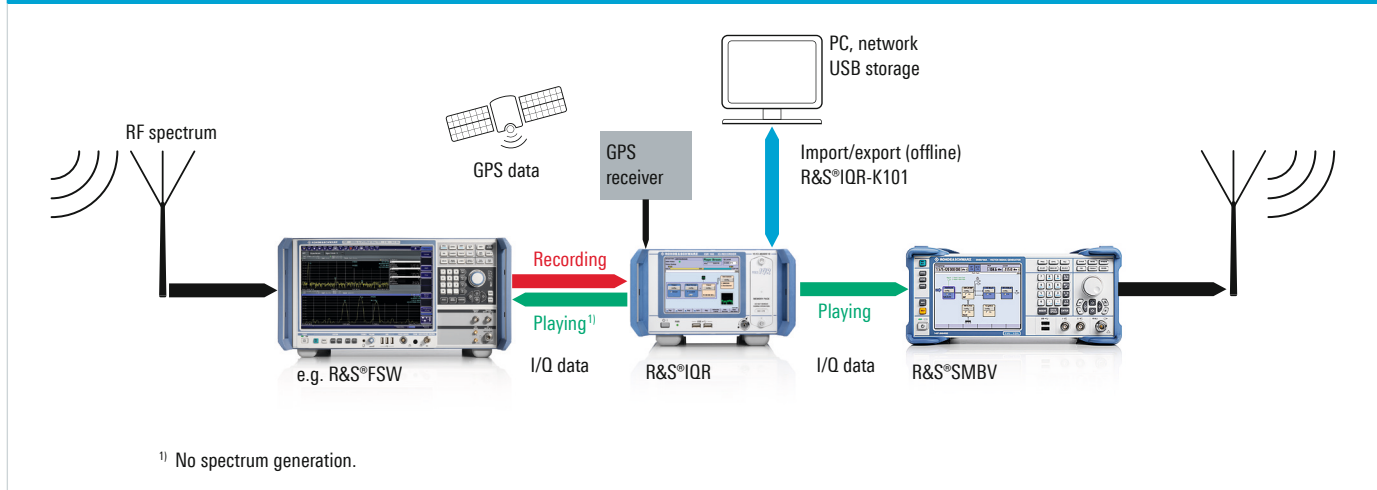
Using the R&S®TSMX-PPS2 GPS module and the R&S®IQR-K102 option, the R&S®IQR can simultaneously record I/Q data and the corresponding GPS coordinates.

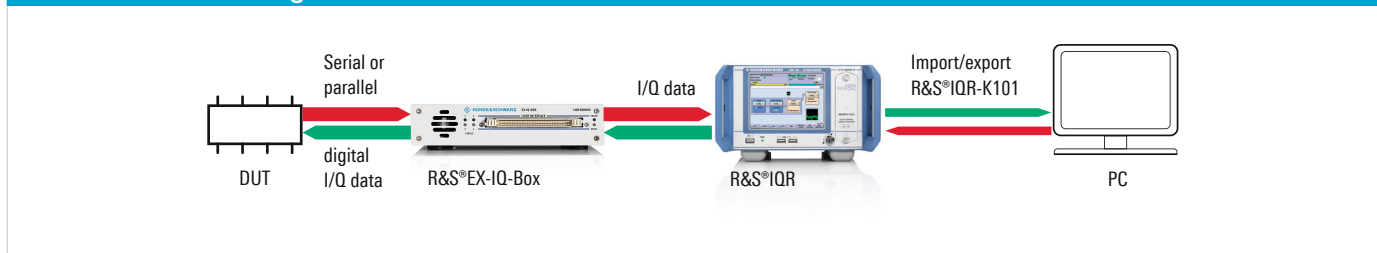## Error analysis and stimulation of DUTs using digital data

The R&S®EX-IQ-Box can be used to record or play I/Q data from the R&S®IQR in realtime. This digital data can be used for subsequent error analysis of modules or instruments, or to stimulate DUTs.

The R&S®EX-IQ-Box converts digital I/Q data into the Rohde & Schwarz I/Q data format and vice versa. This I/Q data stream can be recorded directly by the R&S®IQR and played later to be analyzed by other Rohde & Schwarz instruments that have an I/Q interface. Conversely, generated test signals can be sent to the DUT.

R&S®IQR with spectrum analyzer

RF spectrum · GPS data · GPS receiver · PC, network USB storage · Import/export (offline) R&S®IQR-K101 · Recording · Playing[1] · Playing · I/Q data · e.g. R&S®FSW · R&S®IQR · I/Q data · R&S®SMBV

[1] No spectrum generation.

R&S®IQR with R&S®Digital I/Q Interface

Serial or parallel · I/Q data · Import/export R&S®IQR-K101 · digital I/Q data · DUT · R&S®EX-IQ-Box · R&S®IQR · PC

Recording and playing of RF broadband spectra to parameterize broadcasting modules

When developing broadcast receivers, it is vital that they be tested under real conditions. To simulate real-life receive situations in the lab, the relevant broadcast signals have to be recorded on site. These recordings can be made from a stationary position over an extended period of time, or during a drive test.

The R&S®TSMW universal radio network analyzer is ideal as the RF frontend for mobile applications with a bandwidth of up to 2 × 20 MHz. The R&S®IQR I/Q data recorder, which is connected via the R&S®Digital I/Q Interface, stores the data in realtime. The R&S®IQR memory pack is used to transfer the real recorded signal spectrum to the development lab.

Using a broadcast signal generator such as the R&S®SFE broadcast tester or another generator, the data is modulated so that tuners, set-top boxes, TV sets and sound broadcast receivers can be tested and optimized.

Using the GPS module in the R&S®TSMW and the R&S®IQR-K102 option, the R&S®IQR can simultaneously record I/Q data and the corresponding GPS coordinates.

## Recording and playing of global satellite navigation system (GNSS) spectra

With the R&S®TSMW-Z20 option, the RF signal from the R&S®TSMW active GPS antenna can be used, for example, to simultaneously record the GPS coordinates and the corresponding spectrum.

## Options for controlling external instruments

The R&S®IQR-K1 and R&S®IQR-K2 software options allow users to configure Rohde&Schwarz instruments connected to the R&S®IQR in order to record or replay spectra on the I/Q data recorder. In addition, the settings and parameters of external instruments, e.g. the center frequency and sample rate, can be stored in the R&S®IQR, simplifying the configuration of external instruments [1] in the case of repetitive applications.

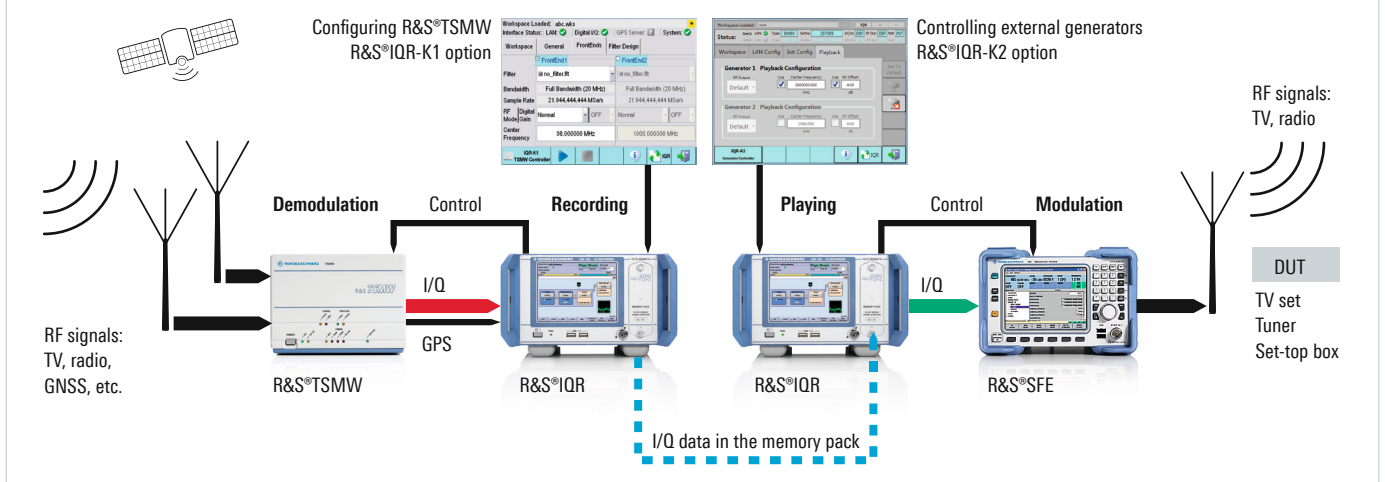[1] For supported instruments, see data sheet PD 5214.4394.22

The R&S®IQR-K1 option for controlling the R&S®TSMW universal radio network analyzer with the R&S®IQR, incl. AGC activation.
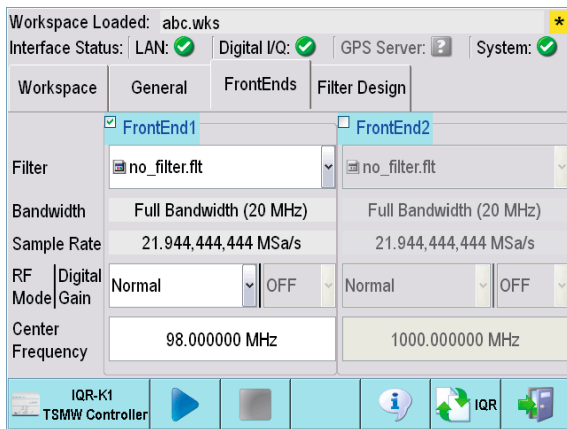
The R&S®IQR-K2 option for controlling external generators with the R&S®IQR, incl. output of reference levels.
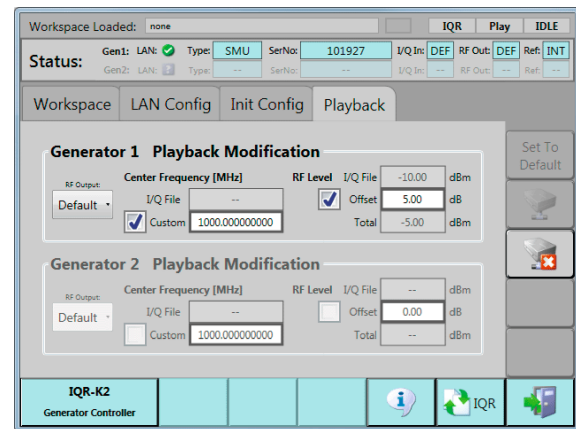
Example of separate recording and playing of broadcast signals using two R&S®IQR data recorders

Specifications in brief

Specifications in brief		
Data interfaces		
DIGITAL IQ IN/OUT (R&S®Digital I/Q Interface)	no simultaneous data transfer in both directions	1× I/Q input (multiplexing [1)]), 2 × I/Q outputs
	input clock rate	66 MHz to 100 MHz
	output clock rate	100 MHz
I/O 1 to I/O 8	trigger signals, synchronization signals	8 × BNC sockets for I/O signals (future release), including max. two trigger and synchronization signals
	programmable I/O signals (future release)	2 × 4 programmable I/O
Reference clock	BNC input socket	10 MHz
	BNC output socket	10 MHz
I/Q data		
I/Q word size		16 bit per channel
Sample rate	R&S®IQR20	1 ksample/s to 20 Msample/s
	R&S®IQR100	1 ksample/s to 99.5 Msample/s [2)]
Data rate	R&S®IQR20	up to 80 Mbyte/s
	R&S®IQR100	up to 398 Mbyte/s [2)]
General data		
Power supply	exchangeable	100 V to 240 V AC (± 10%), 160 VA, 50 Hz to 60 Hz/400 Hz (± 5%)
Mechanical resistance	vibration, random	
	R&S®IQR20, R&S®IQR100 in operating mode with integrated system memory and SSD memory pack (R&S®IQR-B1xx)	10 Hz to 300 Hz, acceleration 1.9 g (RMS), 300 Hz to 500 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
	R&S®IQR20, R&S®IQR100 in operating mode with HDD memory pack (R&S®IQR-B0xx)	limited by the HDD memory pack (ideal for stationary use) [3)]
Environmental conditions	operating temperature range	0°C to +50°C
	storage temperature range	−20°C to +70°C
	damp heat	+40°C, 85% rel. humidity, cyclic test, in line with EN 60068-2-30
Dimensions	W × H × D, overall	249 mm × 150 mm × 401 mm (9.82 in × 5.91 in × 15.79 in)
	for 19" rackmounting	½ 19", 3 HU, depth 350 mm (13.78 in)
Weight		approx. 6.6 kg (20.94 lb)

[1)] Can only be used with the R&S®TSMW.
[2)] Depending on the memory pack used.
[3)] No values specified by the manufacturer of the HDD.

For data sheet, see PD 5214.4394.22.

Ordering information

Designation	Type	Order No.
Base unit (without memory pack)		
I/Q Data Recorder, with touchscreen, basic (optimized for HDD memory packs) up to two I/Q channels; max. 20 Msample/s, 80 Mbyte/s	R&S®IQR20	1513.4600.02
I/Q Data Recorder, with touchscreen, high speed (optimized for SSD memory packs) up to two I/Q channels; max. 99.5 Msample/s, 398 Mbyte/s	R&S®IQR100	1513.4600.10
Memory packs		
2 Tbyte HDD Memory Pack, up to 80 Mbyte/s for the R&S®IQR20 (can also be used for the R&S®IQR100)	R&S®IQR-B020	1513.4700.20
1.9 Tbyte SSD Memory Pack, up to 400 Mbyte/s for the R&S®IQR100 (can also be used for the R&S®IQR20)	R&S®IQR-B119F	1513.4723.19
3.8 Tbyte SSD Memory Pack, up to 400 Mbyte/s, for the R&S®IQR100 (can also be used for the R&S®IQR20)	R&S®IQR-B138F	1513.4723.38
Accessories		
Additional Cable for connecting R&S®Digital I/Q Interfaces	R&S®SMU-Z6	1415.0201.02
Power Supply Module, 10 V to 30 V DC, 200 VA	R&S®PSDC-B200	1513.4617.02
Options		
Import/Export of I/Q and Metadata Files via Ethernet or USB Interface [1]	R&S®IQR-K101	1513.5001.02
Recording of GPS Data from the R&S®TSMW (up to 4 Hz) or R&S®TSMX-PPS2 (1 Hz) on the R&S®IQR, as metadata file	R&S®IQR-K102	1513.5018.02
Graphical Display of GPS Position and Route Data (R&S®IQR-K102 required)	R&S®IQR-K103	1517.5024.02
Ref. Level Controlled Recording and Replay of RF Signals for AGC [2]	R&S®IQR-K104	1517.5182.02
Multiplexing of Two I/Q Data Streams [3]	R&S®IQR-K105	1517.5047.02
Second I/Q Output Channel [3]	R&S®IQR-K107	1517.5060.02
Software for configuring the R&S®TSMW via LAN (R&S®TSMW-K1 and R&S®TSMW-B1 required) [3]	R&S®IQR-K1	1513.4730.02
Software for controlling external generators with the R&S®IQR	R&S®IQR-K2	1513.4752.02
Upgrade to I/Q Streaming Board 2 and Activation of Second Output [3]	R&S®IQR-U107	1517.5118.03
Options for the R&S®TSMW and R&S®IQR (drive test)		
19" Rack Adapter, 3 HU, for 1 × R&S®TSMW and 1 × R&S®IQR	R&S®IQR-Z19-T	1513.4623.30
19" Case, 3 HU, for 1 × R&S®TSMW and 1 × R&S®IQR, without integration	R&S®IQR-CAS1	1513.4652.02
Integration of devices and accessories in R&S®IQR-CAS1 housing	R&S®IQR-CAS-I1	1517.5218.02
External Li-Ion Battery Pack for R&S®IQR-CAS1, R&S®TSMW, R&S®IQR (includes 4 Li-ion batteries), external charger required	R&S®IQR-B32	1321.3750.10
Hardware Kit for RF frontend and GPS receiver of the R&S®TSMW	R&S®TSMW-Z20	1506.9775.02
Y Cable for two DC power supplies (R&S®IQR, R&S®TSMW)	R&S®IQR-Z101	1513.4630.10
Options for the R&S®FSV and R&S®IQR (drive test)		
GPS Module, u-blox, external antenna, PPS, USB, 4-pin serial, 1 Hz	R&S®TSMX-PPS2	1515.7120.02
For other options, see the data sheet (PD 5214.4394.22).		

[1] For the time being, only R&S®TSMW, R&S®FSV, R&S®FSVR, R&S®FSW, R&S®FSQ, R&S®FSG and R&S®FMU36 data can be exported.

[2] The frontend must support AGC to provide complete AGC functionality.

[3] Can only be used with the R&S®TSMW.

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	

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

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ı Energy efficiency and low emissions
ı Longevity and optimized total cost of ownership

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ISO 9001

Certified Environmental Management
ISO 14001

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