Тестовые ЭМИ приемники ESW8/26/44

AT A GLANCE

The R&S®ESW is the best EMI test receiver for compliance testing. With its outstanding RF characteristics, high dynamic range and measurement accuracy, the R&S®ESW is the best choice for fast and reliable certification measurements. It meets the most stringent requirements in line with CISPR, EN, MIL-STD-461, DO-160 and FCC. With its FFT based time domain scan, the R&S®ESW captures and weights disturbance spectra very quickly. The real-time spectrum analysis with spectrogram function permits detailed analysis of even the shortest disturbance signals. MultiView mode displays results from multiple operating modes simultaneously for optimum instrument usability.

The R&S®ESW EMI test receiver meets the highest requirements for EMI compliance testing with its wide dynamic range and high sensitivity resulting from its low noise and built-in preselection with 21 filters.

The instrument features highpass filters at 150 kHz and 2 MHz as well as notch filters for the ISM bands at 2.4 GHz and 5.8 GHz. These filters prevent high carrier signals in these bands, e.g. Bluetooth® and WLAN, from affecting the instrument's dynamic range. Even small disturbance signals outside these bands are detected.

Every R&S®ESW comes with an FFT based time domain scan. Measurements that took minutes or hours in sweep mode now take just seconds. The instrument combines the functions of an EMI test receiver and a full-featured spectrum analyzer in a single device.

Real-time spectrum analysis with 80 MHz bandwidth reveals hidden or superimposed disturbances (even rapidly changing disturbance signals) and analyzes their causes.

Key facts

- Frequency ranges from 1 Hz to 8 GHz, 1 Hz to 26.5 GHz and 1 Hz to 44 GHz
- In line with CISPR 16-1-1, ANSI C63.2, MIL-STD-461 and FCC
- Extremely high dynamic range and ultra high accuracy for demanding certification measurements
- Ultrafast measurements with FFT based time domain scan (TDS)
- Three TDS optimization modes maximize measurement speed or pulse resolution, covering all testing needs
- Preselection with selectable highpass filters and notch filters for the ISM bands
- EMI test receiver and signal and spectrum analyzer in a single instrument
- Real-time spectrum analysis (R&S®ESW-K55 option) with 80 MHz bandwidth and spectrogram function
- MultiView function for multiple operating modes on a single screen

BENEFITS AND KEY FEATURES

Standard-compliant EMI measurements
- Certification measurements
- Standard-compliant EMI measurements in spectrum analyzer mode

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FFT based time domain scan for ultrafast measurements
- Gapless conducted disturbance measurements with CISPR detectors
- The right strategy for all EMI testing needs

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RF performance that meets exacting demands
- Exceptionally wide dynamic range
- Low DANL (typ. –168 dBm for f ≤ 1 GHz)
- High 1 dB compression point (+15 dBm) for RF frontend
- High third order intercept (TOI) (typ. +25 dBm)
- Superior measurement uncertainty (±0.37 dB for f ≤ 8 GHz)

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Preselection filters and preamplifier
- Integrated preselection filters (21 filters) as standard
- Highpass filter at 2 MHz for suppressing data carriers and disturbance signals on AC supply lines
- Notch filters for suppressing strong carrier signals in the license-free 2.4 GHz and 5.8 GHz ISM bands

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Multichannel APD measurements for fast interference signal analysis
- Microwave oven testing in line with CISPR 11

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Real-time spectrum analysis for detailed investigation of disturbances
- Real-time measurement with up to 80 MHz bandwidth
- Spectrogram for seamless spectrum display
- Persistence mode (spectral histogram) for clear identification of pulsed and continuous disturbances
- Frequency mask trigger for precise and reliable detection of sporadic spectral events

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IF analysis function for displaying the spectrum around disturbance signals

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Automated testing
- Preview measurement – data reduction – final measurement
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- R&S®ELEKTRA EMC measurement software for remote control and automation

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Report generator
- Documentation of all settings and results

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Convenient operation, straightforward result display
- Scan table
- MultiView: simultaneous display of multiple results
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- Save results and instrument setups

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- Click rate analysis in line with CISPR 14-1
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Data protection and remote control
- Removable hard disk drive (HDD) to keep test data confidential and secure
- Remote control via GPIB or LAN
- Drivers for LabVIEW, LabWindows/CVI, VXI plug&play
- Free firmware updates – always in step with new developments

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STANDARD-COMPLIANT EMI MEASUREMENTS

Certification measurements

The R&S®ESW is primarily intended for certification measurements in line with EMC standards. These place the highest demands on test equipment since it must correctly detect, measure and weight all disturbance signals, including pulsed, sinusoidal, modulated and intermittent signals.

With its integrated preselection, 20 dB preamplifier and highly linear frontend, the R&S®ESW meets the requirements of commercial and military standards, including CISPR, EN, ETS, ANSI, FCC, VCCI, MIL-STD-461 and DO-160.

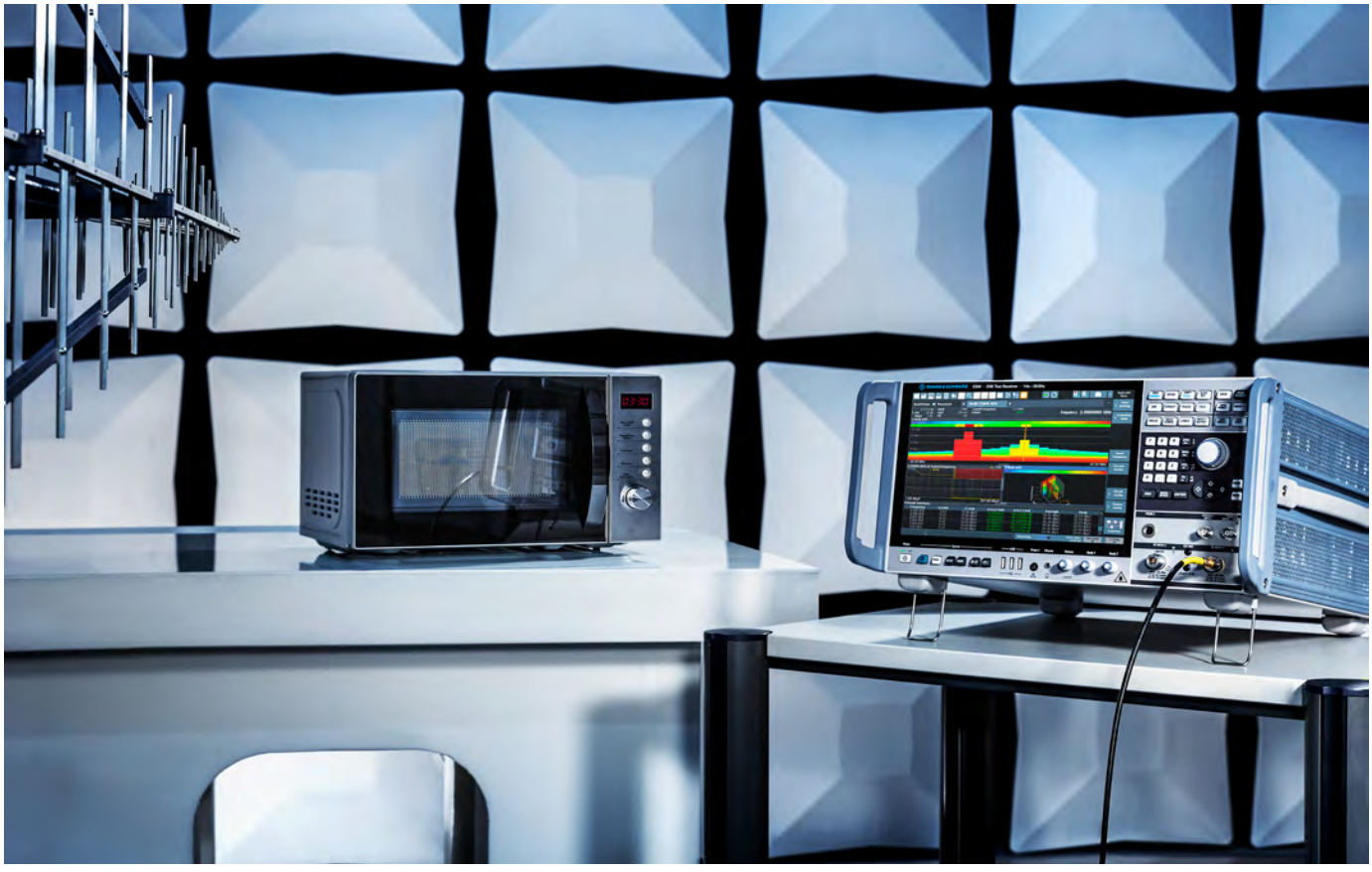
The instrument's weighting detectors, such as quasi-peak, CISPR-average and RMS-average, and the amplitude probability distribution (APD) measurement function comply with the CISPR 16-1-1 basic standard, including edition 5. The same holds for the required 6 dB resolution bandwidths of 200 Hz, 9 kHz, 120 kHz and the 1 MHz pulse bandwidth. For MIL-STD-461, DO-160 and ICNIRP standards, the R&S®ESW comes with resolution bandwidths in decade steps from 1 Hz to 10 MHz.

Standard-compliant EMI measurements in spectrum analyzer mode

The R&S®ESW is not just an EMI test receiver. It is also a full-featured spectrum analyzer. With preselection activated, the R&S®ESW can perform standard-compliant EMI measurements in spectrum analyzer mode – in addition to EMI analysis during development.

Configurable markers can be placed on the frequencies of EMI signals to carry out targeted analysis. Markers can be coupled with CISPR weighting detectors to enable direct comparison with limit values. The spectrum can also be displayed along a logarithmic frequency axis, which simplifies result analysis across a wide frequency range and displays limit lines in compliance with relevant standards. Critical frequencies are presented in a peak list and are used for fast, standard-compliant comparison of EMI signals with limits.

EMI testing of a microwave oven in an anechoic chamber in line with CISPR 11.



FFT BASED TIME DOMAIN SCAN FOR ULTRAFAST MEASUREMENTS

The R&S®ESW offers the FFT based time domain scan (TDS) besides the conventional stepped scan mode. During time domain scans, the receiver performs measurements in milliseconds while it measures conducted disturbances up to 30 MHz gapless in one segment. Speed is a crucial factor, especially when testing devices with a short operating time such as a car window lift or a blender. With a virtual step size of a quarter of the resolution bandwidth and FFT windows overlapping by > 90 %, the R&S®ESW achieves significantly better frequency resolution and level measurement accuracy than required by CISPR 16-1-1.

In spectrum analyzer mode, the R&S®ESW resolves up to 200 001 spectral points. In test receiver mode with user-defined step width, the instrument captures and saves up to 10 million points per trace.

The R&S®ESW allows seamless measurements for a period of up to 100 s for each frequency segment. This ensures the reliable detection of narrowband, intermittent disturbance signals and isolated pulses. Pulsed signals play a key role in EMI testing with their extensive dynamic range requirements.

Gapless conducted disturbance measurements with CISPR detectors

The R&S®ESW captures the entire band for conducted disturbance measurements from 150 kHz to 30 MHz in one segment. In this band, the time domain scan enables gapless processing in line with CISPR/EN product standards. The instrument performs the required quasi-peak and CISPR-average (CAV) weighting in parallel. This eliminates the need for a preview scan (with subsequent data reduction) and cuts measurement time in half.

The right strategy for all EMI testing needs

The three time domain scan optimization modes of the R&S®ESW – dynamic, fast and automatic – offer the right choice for every EMI testing requirement. The dynamic mode has the highest dynamic range for pulses. Fast mode maximizes speed and is still fully compliant with CISPR 16-1-1 for frequencies above 300 MHz. Even in the most demanding frequency range from 30 MHz to 300 MHz, it will display the correct quasi-peak value down to a pulse repetition frequency (PRF) of 10 Hz. The automatic mode offers the best of both worlds and maintains full compliance with the highest possible measurement speed.

Time domain scan table with total measurement times for various standards

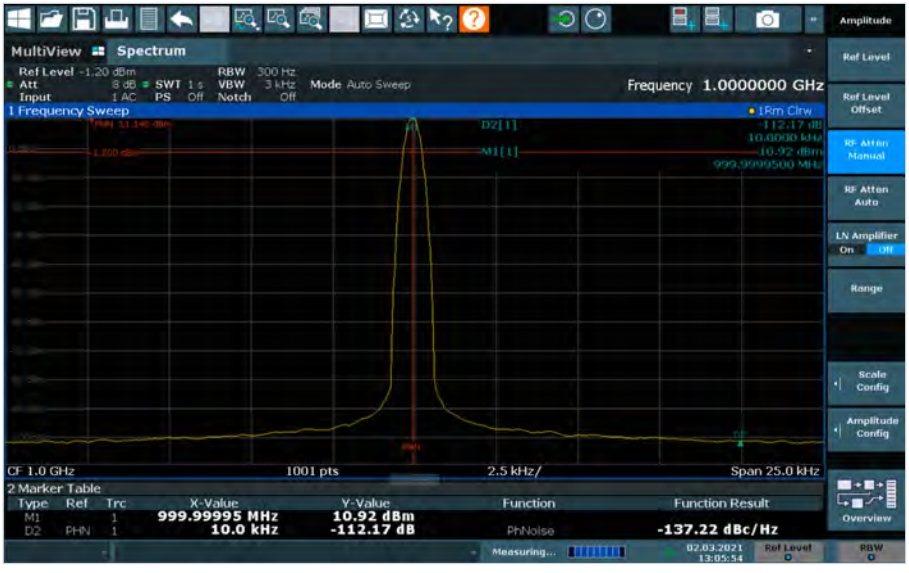
Standard	Frequency range	Resolution bandwidth	Measurement time	Detector	Total measurement time (automatic TDS)	Total measurement time (fast TDS)
CISPR band B	150 kHz to 30 MHz	9 kHz	100 ms	peak	110 ms	110 ms
CISPR band B	150 kHz to 30 MHz	9 kHz	1 s	quasi-peak and CISPR-average	2 s	2 s
CISPR band C/D	30 MHz to 1000 MHz	120 kHz	10 ms	peak	380 ms	380 ms
CISPR band C/D	30 MHz to 1000 MHz	120 kHz	1 s	quasi-peak and CISPR-average	50 s	40 s
CISPR band C/D (automotive)	30 MHz to 1000 MHz	9 kHz	1 s	quasi-peak and CISPR-average	64 s	40 s
MIL-STD	1 GHz to 18 GHz	1 MHz	15 ms	peak	11.7 s	11.7 s
MIL-STD	18 GHz to 40 GHz	1 MHz	15 ms	peak	17.5 s	17.5 s

RF PERFORMANCE THAT MEETS EXACTING DEMANDS

With a displayed average noise level (DANL) of –168 dBm (1 Hz) and a 1 dB compression point of +15 dBm, the R&S®ESW features an exceptionally wide dynamic range that can handle even the most challenging tasks. The R&S®ESW delivers reproducible and reliable results with a measurement uncertainty of ±0.37 dB (for f ≤ 8 GHz).

The instrument's wide dynamic range and very low phase noise make it possible to detect small signals in the vicinity of large carrier signals. The R&S®ESW phase noise is –137 dBc (1 Hz) at 10 kHz offset from a 1 GHz carrier signal, and –128 dBc (1 Hz) at 10 kHz offset from a 10 GHz carrier signal. Close to the carrier, at 100 Hz offset, the phase noise is –110 dBc (1 Hz).

Displayed average noise level (DANL) up to 1 GHz. The noise figure with the preamplifier switched on is approx. 8.5 dB.

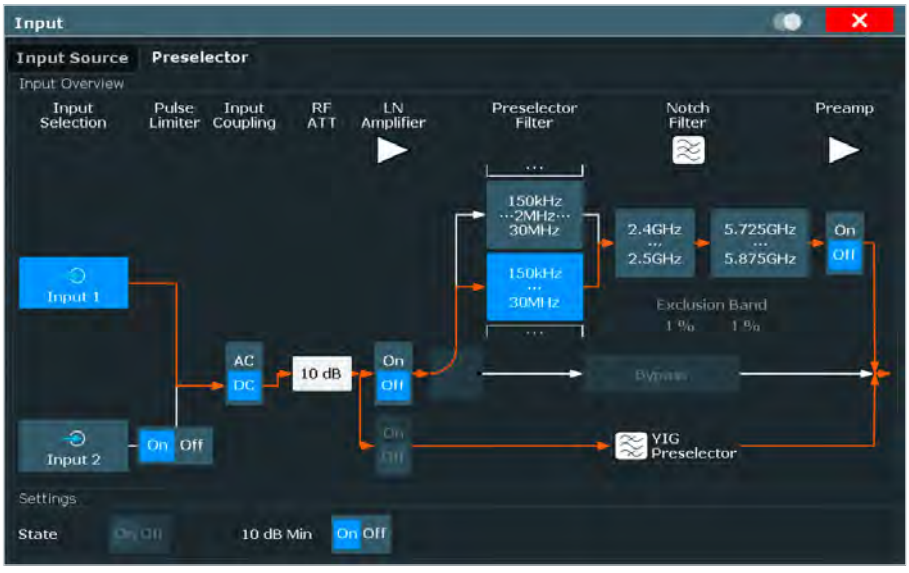


Phase noise at 10 kHz from the carrier: –137 dBc (1 Hz).

PRESELECTION FILTERS AND PREAMPLIFIER

During EMI measurements, preselection filters are essential for test equipment such as test receivers and spectrum analyzers since wideband disturbance spectra can overload test equipment frontends. Preselection filters suppress strong out-of-band signals so that high-sensitivity measurements can be performed within the passband. The built-in preamplifier can be activated to further enhance sensitivity.

The R&S®ESW offers 21 preselection filters for the range up to 8 GHz, plus a highpass filter at 2 MHz, e.g. to suppress data carriers on AC supply lines in compliance with CISPR 16-1-1. In addition, the R&S®ESW offers notch filters specifically for the license-free ISM bands at 2.4 GHz and 5.8 GHz that are used by wireless transmission technologies such as Bluetooth® and WLAN. A switchable pulse limiter additionally protects the second, pulse-resistant, RF input against high-energy signals.



Configurable preselection filters.

Display of trace and active preselection filter.

MULTICHANNEL APD MEASUREMENTS FOR FAST INTERFERENCE SIGNAL ANALYSIS

The amplitude probability distribution (APD) provides insight into amplitudes and their probability of occurrence within a defined bandwidth and time window. For each amplitude on the x-axis, the APD shows the probability of smaller or equal amplitudes occurring. The APD is ideal for evaluating the impact of interferers on digital communications systems.

The R&S®ESW-K58 APD multichannel measurement function performs APD measurements on microwave ovens or IT equipment above 1 GHz on multiple channels in parallel. The application fulfills all requirements of CISPR 16-1-1. With parallel measurements, the multi CISPR APD always captures drifting interferers with at least one channel.

The application allows testing of up to 67 channels at 120 kHz analysis bandwidth (ABW) or up to 21 channels at 1 MHz ABW. It shows all channels simultaneously with individual limit checking. In the same display, 2D and 3D plots combine the visualization of disturbances and corresponding limits in an intuitive way. In 3D display, pan functions are available to select analysis regions of interest using touch gestures. The result table presents margins or exceeded limits for every evaluated channel.

Use the single-channel APD display at a variable tuned frequency to investigate an individual channel in detail. Thanks to the APD multichannel measurement function, the R&S®ESW is ready and able to handle upcoming standards.

APD multichannel measurement display.

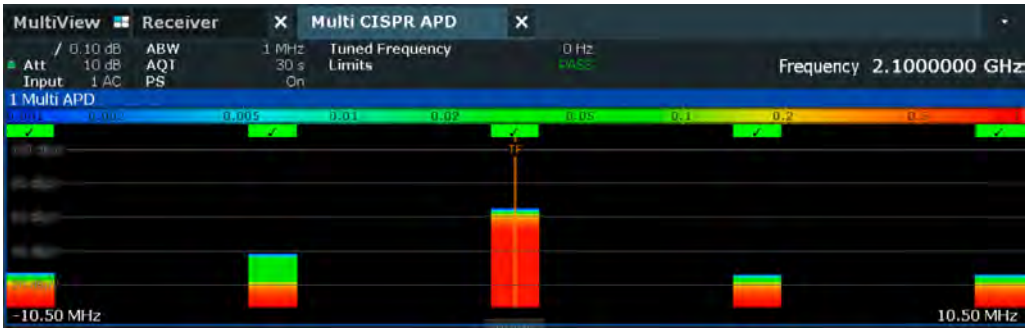
Microwave oven testing in line with CISPR 11

The CISPR 11 product standard defines the procedures and limits for emission testing of microwave ovens. Such products cause fluctuating interference above 1 GHz, which can be captured with peak detection.

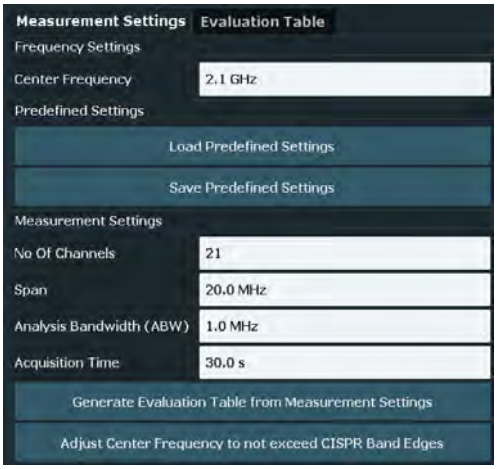
The repeatability of peak measurements on microwave ovens is poor. Moreover, the sheer amplitude of the highest peak emission, without information on its duration and repetition rate, provides very limited information on the real disturbance potential. Therefore, CISPR 11 requires weighted measurements on peaks that exceed the peak limit. The most advanced measurement function for this is APD, which delivers insights into both the duration and level of an interference signal.

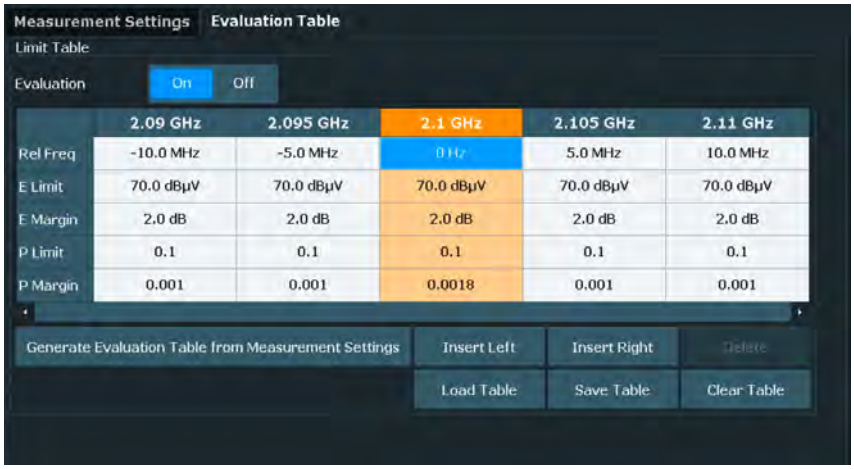
CISPR 11 is the first standard to introduce multichannel APD testing. The 2019 edition defines five measurement points, the critical interference frequency itself and ±5 MHz and ±10 MHz offsets. APD measurements are to be performed in the frequency range from 1 GHz to 18 GHz with an analysis bandwidth of 1 MHz. An amplitude probability limit of 10^{-1} has been defined. This means that the amplitude of the interference exceeds the specified field strength level during the defined acquisition time (AQT) of 30 s with a probability of 10 %. If the equipment passes the measurement with the APD weighting function, the final test result is PASS.

2D probability plot for easy PASS/FAIL visualization for all measurement channels.



Measurement and evaluation settings for testing microwave ovens against CISPR 11.





REAL-TIME SPECTRUM ANALYSIS FOR DETAILED INVESTIGATION OF DISTURBANCES

Real-time measurement with up to 80 MHz bandwidth

The real-time spectrum analysis function of the R&S®ESW facilitates rapid detection of EMI signals. Measuring disturbances caused by sporadic and brief events or determining the spectral behavior of devices under test during switching operations, for example, are difficult and time-consuming tasks.

With the R&S®ESW-K55 real-time spectrum analysis option, the R&S®ESW seamlessly measures these signals in the frequency domain for any length of time. As a result, it detects even sporadic disturbance signals reliably with a bandwidth of up to 80 MHz. Real-time spectrum analysis makes final product certification easier, shortens test times and prevents costly redesigns.

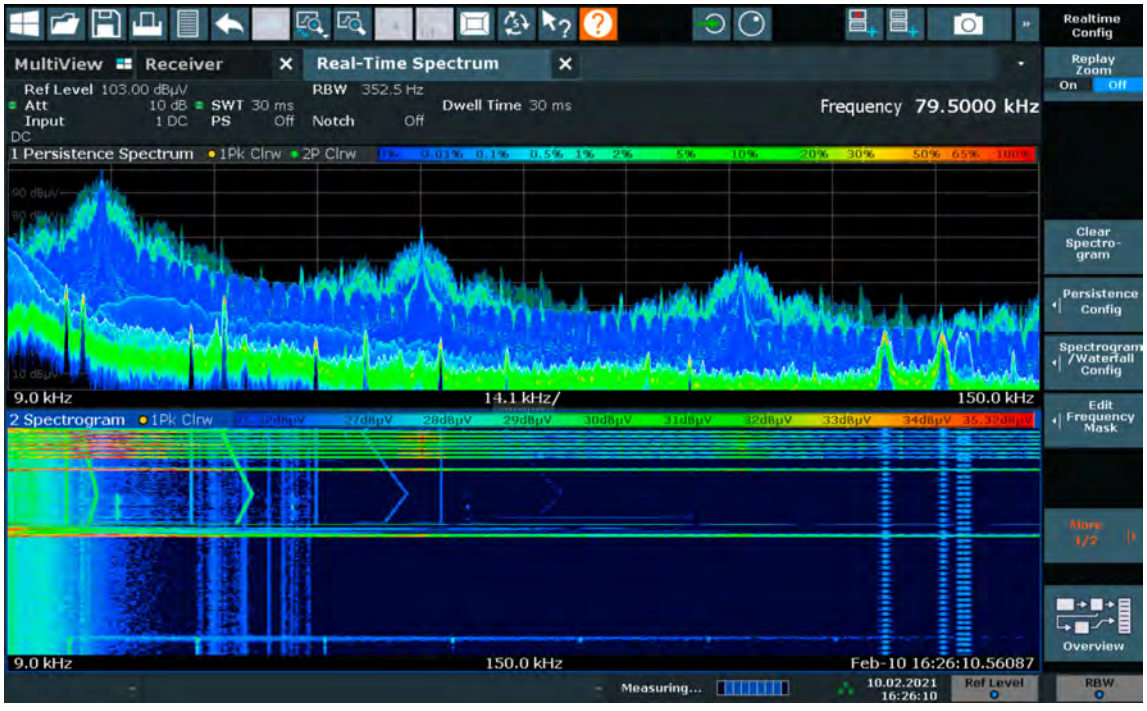
Spectrogram for seamless spectrum display

The R&S®ESW offers a spectrogram function that allows users to analyze the behavior of disturbance signals in the time domain in all operating modes. Each spectrum is presented as a horizontal line, with different levels assigned different colors. The individual spectra are displayed as continuous lines. Recording is seamless with an acquisition memory depth of up to 100 000 frames.

Persistence mode (spectral histogram) for clear identification of pulsed and continuous disturbances

Frequently occurring signals are shown in red and sporadic signals in blue. If signals no longer occur at a specific frequency with a specific amplitude, the corresponding pixel disappears after a user-definable persistence period. This allows users to clearly distinguish between pulsed disturbances, which occur only for very brief periods, and continuous disturbances. In addition, different pulsed disturbances can easily be distinguished from one another.

Real-time spectrum in persistence mode (top) and spectrogram of fast changing emissions (bottom).



IF ANALYSIS FUNCTION FOR DISPLAYING THE SPECTRUM AROUND DISTURBANCE SIGNALS

The IF analysis function of the R&S®ESW provides a spectral display of an RF input signal of interest in a selectable range around the EMI receive frequency. The IF spectrum display can be coupled to the bargraph display for the current receive frequency. Alternatively, the IF spectrum can be displayed together with the stored results of the preview measurement. The marker in the preview diagram can be used to control the center frequency of the IF spectrum (marker track function).

The center frequency of the IF spectrum always corresponds to the current receive frequency. The test receiver can therefore be tuned to the signal of interest quickly and accurately. In addition, the IF spectrum provides a detailed overview of the spectrum occupancy around the measurement channel. Any signals received can be quickly classified as disturbance signals or useful signals. AM and FM audio demodulation can be activated in parallel, making it easier to identify detected signals, for example in order to identify and exclude ambient interferers in open-area measurements.

IF analysis (middle) and scanned RF spectrum (bottom).

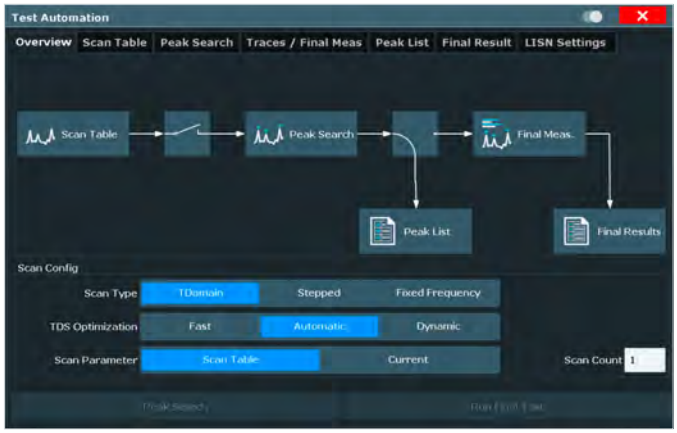
AUTOMATED TESTING

Preview measurement – data reduction – final measurement

A fast pretest with peak and average detectors followed by a final test on the critical frequencies with the required CISPR weighting detectors is the common and well accepted approach for disturbance measurements. The R&S®ESW EMI test receiver performs this procedure fully automated.

The instrument offers preconfigured limit lines defined in commercial product emission standards. From the preview measurements, the test receiver identifies critical frequencies based on user-defined criteria and presents them in a peak list. Users can edit the peak list by adding or deleting frequencies. In the last step, the receiver performs the final test with CISPR-compliant measurement time and detectors.

Test automation configuration menu.



Immediate final testing for conducted disturbances

The R&S®ESW eliminates the need for pretesting in the CISPR bands A and B. The instrument simultaneously and seamlessly measures spans up to 30 MHz using the time domain scan with quasi-peak and CISPR-average detector. It achieves the compliance test results very quickly.

Conducted tests require switching over multiple phases. The R&S®ESW remotely controls line impedance stabilization networks (LISN) via its AUX port and automatically measures on all phases.

Fully automated testing of conducted disturbances with CISPR detectors without prescan.

R&S®ELEKTRA EMC measurement software for remote control and automation

The R&S®ELEKTRA EMC measurement software ideally supplements every EMI test receiver. It not only features remote control of manual measurements, but also performs fully automated tests, including control of accessories.

The modular test software package supports manual, partially and fully automated interference (EMI) and immunity (EMS) measurements in line with commercial and military standards. It provides reliable acquisition, analysis and documentation of measurement results and offers remote control of accessories such as mast and turntable systems.

R&S®ELEKTRA remote control and automation software.

REPORT GENERATOR

The report generator integrated in the R&S®ESW provides all the necessary capabilities for documenting EMI measurements. Reports contain a task description, the applicable standards, the test procedures used, specific user-defined procedures, any applied transducers and limit lines, plus result graphs from the preview measurement (with varying DUT load states if applicable), final measurement results in tabular form, and a graph of the final measurement. Sufficient space is provided for individual interpretations and comments.

Reports can be saved as templates for easy reuse. Different templates can be defined with individual layouts and parameter lists. Reports are created, saved and exported in PDF or DOC format.

Comprehensive reports in PDF or DOC format.

CONVENIENT OPERATION, STRAIGHTFORWARD RESULT DISPLAY

The R&S®ESW features a touchscreen GUI for convenient, intuitive operation. The straightforward, menu-driven design lets users quickly find their way around the instrument. All functions and measurement parameters can be configured using either keys and knobs on the instrument, or a mouse and keyboard. The large WXGA color display (30.7 cm/12.1") with high resolution (1280 × 800 pixel) provides good readability. The large rotary knob controls the receive frequency as long as no data input field is open. Another, smaller knob controls the volume of the integrated speaker or connected earphones.

Two additional small knobs can be customized by the user by assigning functions such as resolution bandwidth, RF attenuation and measurement time. A signal of interest can immediately be analyzed by varying the selected parameters and comparing the effects. Each knob can be assigned up to five parameters.

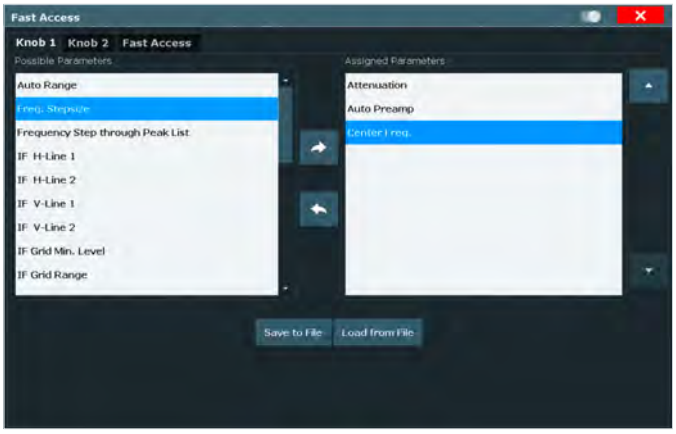
Scan table

In receiver mode, disturbance measurements in the frequency domain are controlled by the settings in the scan table. The scan parameters are presented in an easy-to-read manner and can be individually configured for each task and DUT with up to 10 independently defined subranges.

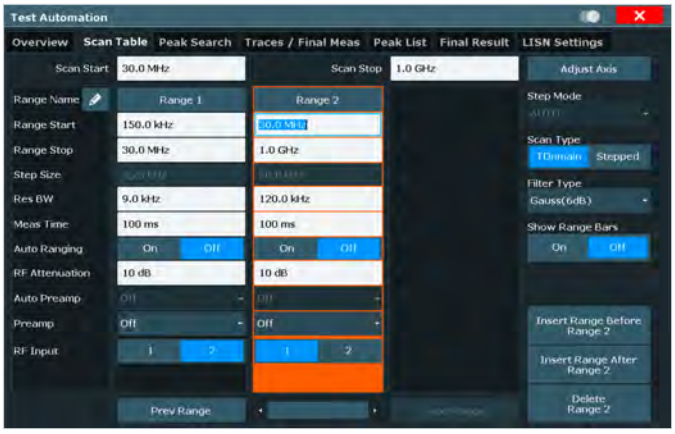
The same scan table is used for the time domain scan function, where the step size is set to a quarter of the resolution bandwidth by internal coupling.

Two rotary knobs with user-assignable functions.

Parameter selection for rotary knobs.



Scan table.



MultiView: simultaneous display of multiple results

With the MultiView function, results from different operating modes are clearly displayed on the 12.1" screen. For example, the R&S®ESW can display the frequency spectrum in sweep or scan mode in one window, while using the IF analysis function to present a single-frequency measurement – including spectrogram – in another window. Up to four different single-frequency measurements can be displayed at a time.

The individual measurements using different modes and/or coupled parameters are performed completely independently of each other. The MultiView display shows all active measurement modes, facilitating the comparison of results.

Touchscreen user interface

Block diagrams showing the signal flow can be edited right on the screen. The user touches a desired element and modifies the corresponding parameter(s). This provides direct and easy access to all functions. The logical, consistently flat menu structure makes it very easy to define setups and configurations. For example, the preselector/preamplifier stage can be completely configured in a single dialog window.

The dialog windows are transparent so that the signal remains visible in the background. All regularly used functions are assigned hardkeys.

The toolbar provides quick access to general instrument functions such as zooming or saving the screen content.

Save results and instrument setups

Measurement data and instrument setups can be saved to the instrument's internal hard disk or an external storage medium. The R&S®ESW accesses external media via USB or LAN. Users can store results as ASCII files for further processing. These files contain the trace data together with the most important instrument setups.

MultiView display with four operation modes shown simultaneously.

Parameter coupling between receiver and spectrum analyzer mode.

FOUR-CHANNEL CLICK RATE MEASUREMENT

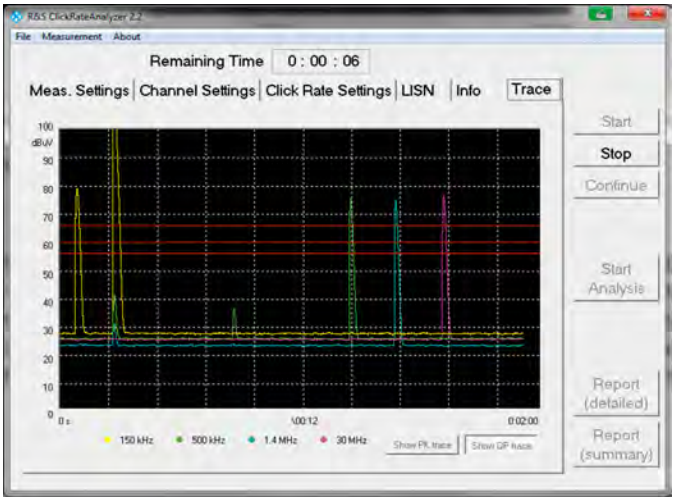
Click rate analysis in line with CISPR 14-1

The R&S®ESW supports measurements in line with CISPR 14-1 and EN 55014-1. Thermostatic or program-controlled electrical appliances such as washing machines and air conditioners generate discontinuous disturbances. Due to the aperiodic nature of click-type disturbances, the limit values they need to comply with are not as low as those for continuous disturbances. In order to apply these less stringent limit values, users need to measure the duration, repetition rate (click rate) and amplitudes of clicks.

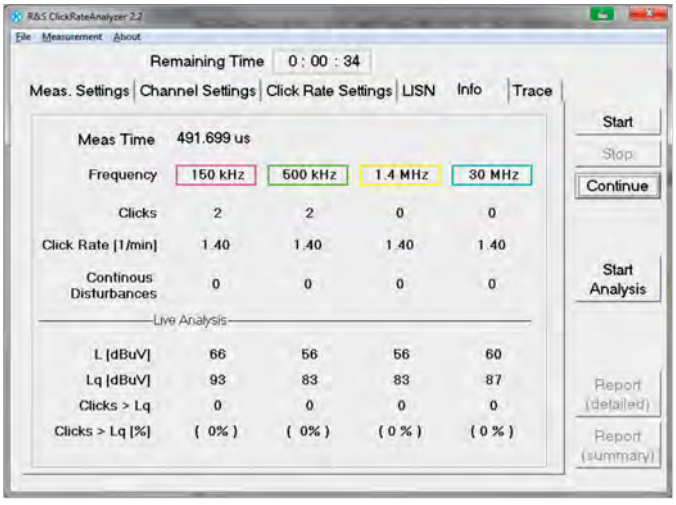
The R&S®ESW measures the pulse amplitude and duration automatically and in parallel on the frequencies specified by the CISPR/EN standard (150 kHz, 500 kHz, 1.4 MHz, 30 MHz), effectively providing the functionality of a click rate analyzer.

To carry out standard-compliant analysis, sufficient memory space must be available in order to seamlessly record peak values and quasi-peak values for a period of at least two hours. With a memory depth of up to four million values per trace, the R&S®ESW is ideal for this task. Its click rate analysis application documents results in a detailed report, providing statistics and documenting any clicks that do not conform to the standard (exceptions). Finally, the R&S®ESW click rate analyzer outputs a PASS/FAIL statement to indicate whether the DUT meets the requirements of the standard.

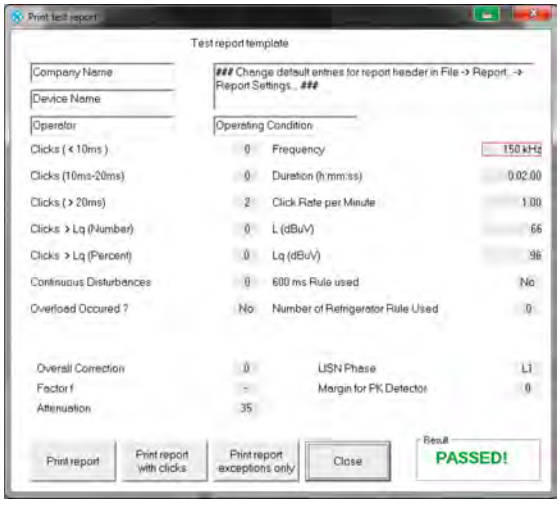
Click rate analysis – graphical display.



Click rate analysis – numerical results.



Click rate analysis – report.



DATA PROTECTION AND REMOTE CONTROL

Keeping test data confidential

To keep their test data confidential and secure, users can exchange the R&S®ESW standard hard disk drive for an optional solid-state drive (SSD) (R&S®ESW-B18) that contains only the operating system and the instrument firmware. The R&S®ESW can then be sent in for calibration or repair without any confidential data leaving the lab. Device-specific setups and parameter settings remain in the test receiver, where they are stored separately and independently from the user data and measurement results. Exchanging the internal hard disk drive is a simple matter of removing two screws on the back of the instrument.

To meet the most stringent security requirements, write protection (R&S®ESW-K33 option) is available for the internal hard disk drive. All data entered is written to SDRAM and deleted when the instrument is switched off.

USB write protection (R&S®FSW-B33 option) blocks the USB 2.0 interface and prevents data from being written to an external mass storage device. Read access is retained.

Remote control via GPIB or LAN

The R&S®ESW can be remotely controlled via its standard IEC 625-2 (IEEE 488.2) interface or a LAN interface (10/100/1000BASE-T).

Drivers for LabVIEW, LabWindows/CVI, VXI plug & play

For software integration of the R&S®ESW, drivers for LabVIEW, LabWindows/CVI and VXI plug & play are available free of charge.

Rear view of R&S®ESW with removable hard disk drive.

SPECIFICATIONS IN BRIEF

Specifications in brief		
Frequency		
Frequency range	R&S®ESW8	1 Hz to 8 GHz
	R&S®ESW26	1 Hz to 26.5 GHz
	R&S®ESW44	1 Hz to 44 GHz
Aging per year	with R&S®ESW-B4 OCXO precision frequency reference option	$\pm 3 \times 10^{-8}$ (standard value: $\pm 1 \times 10^{-7}$)
Bandwidths		
Resolution bandwidth	standard filters (–3 dB)	1 Hz to 10 MHz
	EMI filters (–6 dB)	1 Hz, 10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz, 10 MHz
Detectors	receiver mode	max. peak, min. peak, quasi-peak, RMS, average, average with meter time constant (CISPR-average), RMS-average (CISPR RMS)
APD measurement function		
Minimum amplitude probability		10^{-7}
Maximum acquisition time		120 s
Analysis bandwidth (–6 dB)		200 Hz, 9 kHz, 120 kHz, 1 MHz
APD multichannel measurement function (R&S®ESW-K58 option)		
Analysis bandwidth (–6 dB)		1 Hz ≤ ABW ≤ 1 MHz
Maximum number of channels	ABW ≤ 300 kHz	67
	ABW = 1 MHz	21
Third order intercept (TOI)	R&S®ESW8, R&S®ESW26, R&S®ESW44, 10 MHz ≤ f_{in} < 1 GHz, $\Delta f > 5 \times$ RBW, RF attenuation = 0 dB, level 2 × –15 dBm, preselection off, preamplifier off	> +20 dBm, typ. +25 dBm
1 dB compression	f_{in} ≤ 3 GHz, RF attenuation = 0 dB, preselection off, preamplifier off	+15 dBm (nom.)
Preselection filters		
Status	receiver mode	always on
	analyzer mode	on/off (selectable)
Number of preselection filters		21
Preamplifier (switchable)	1 kHz to 8 GHz	20 dB (nom.)
Displayed average noise level (DANL)	R&S®ESW8 (receiver mode, RF attenuation = 0 dB, termination = 50 Ω, logarithmic scaling normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, preselection on, preamplifier on)	
	1 MHz ≤ f < 1 GHz	< –165 dBm, typ. –168 dBm
Receiver mode total measurement times		
Time domain scan (TDS) [1]	CISPR band B, 150 kHz to 30 MHz, RBW = 9 kHz, measurement time = 100 ms, peak detector	
	TDS (dynamic, automatic, fast)	110 ms
	CISPR band B, 150 kHz to 30 MHz, RBW = 9 kHz, measurement time = 1 s, quasi-peak detector and CISPR-average detector	
	TDS (dynamic, automatic, fast)	2 s
	CISPR band C/D, 30 MHz to 1000 MHz, RBW = 120 kHz, measurement time = 10 ms, peak detector	
	TDS (dynamic, automatic, fast)	380 ms
	CISPR band C/D, 30 MHz to 1000 MHz, RBW = 120 kHz, measurement time = 1 s, quasi-peak detector and CISPR-average detector	
	TDS (dynamic)	80 s
	TDS (automatic)	50 s
	TDS (fast)	40 s
	CISPR band C/D, 30 MHz to 1000 MHz, RBW = 9 kHz, measurement time = 1 s, quasi-peak detector and CISPR-average detector	
	TDS (dynamic)	67 s
	TDS (automatic)	64 s
	TDS (fast)	40 s
	CISPR band E, 1 GHz to 18 GHz, RBW = 1 MHz, measurement time = 10 ms, peak detector	
	TDS (dynamic, automatic, fast)	8 s

[1] Refer to section "The right strategy for all EMI testing needs" on page 5 for use of the dynamic, automatic and fast TDS optimization modes.

Specifications in brief		
Total measurement uncertainty		
Preselection off	10 MHz < f ≤ 3.6 GHz	±0.27 dB
Dimensions (nom.)	W × H × D, including front handles and rear feet	462 mm × 240 mm × 504 mm (18.19 in × 9.45 in × 19.84 in)
Net weight, without options (nom.)	R&S®ESW8	20.6 kg (45.42 lb)
	R&S®ESW26	22.1 kg (48.72 lb)
	R&S®ESW44	25.2 kg (55.56 lb)

ORDERING INFORMATION

Designation	Type	Order No.
Base units		
EMI test receiver, 1 Hz to 8 GHz	R&S®ESW8	1328.4100.09
EMI test receiver, 1 Hz to 26.5 GHz	R&S®ESW26	1328.4100.27
EMI test receiver, 1 Hz to 44 GHz	R&S®ESW44	1328.4100.45
Hardware options		
OCXO precision frequency reference	R&S®ESW-B4	1328.5012.02
Resolution bandwidths up to 40 MHz	R&S®ESW-B8E	1345.0167.02
Resolution bandwidths up to 80 MHz (for R&S®ESW8/R&S®ESW26)	R&S®ESW-B8	1345.1474.26
Resolution bandwidths up to 80 MHz (for R&S®ESW44)	R&S®ESW-B8	1325.1474.02
External generator control	R&S®ESW-B10	1328.5006.02
Spare solid state drive (removable hard drive)	R&S®ESW-B18	1328.4997.02
LO/IF connections for external mixers (for R&S®ESW26)	R&S®ESW-B21	1331.6945.26
LO/IF connections for external mixers (for R&S®ESW44)	R&S®ESW-B21	1331.6945.44
Low-noise amplifier, 150 kHz to 8 GHz	R&S®ESW-B24	1328.4980.08
Low-noise amplifier, 150 kHz to 26.5 GHz	R&S®ESW-B24	1328.4980.26
Low-noise amplifier, 150 kHz to 44 GHz	R&S®ESW-B24	1328.4980.44
USB mass memory write protection	R&S®FSW-B33	1313.3602.02
Firmware options		
AM/FM/PM modulation analysis	R&S®ESW-K7	1331.6216.02
Security write protection of solid state drive	R&S®ESW-K33	1328.4916.02
80 MHz real-time measurement application, POI > 15 µs	R&S®ESW-K55	1328.4968.02
APD multichannel measurement function	R&S®ESW-K58	1345.0150.02
PC software		
R&S®ELEKTRA EMI test software, for emissions	R&S®ELEMI-E	5601.0030.02
R&S®ELEKTRA EMI advanced test software, for emissions	R&S®ELEMI-EA	5601.0424.02
R&S®ELEKTRA EMI system test software, for emissions	R&S®ELEMI-EAS	5601.0382.02