

# Real-Time Spectrum Analyzer and Measurement Application Specifications

R&S®FSW-B512R real-time spectrum analyzer 512 MHz

R&S®FSW-B800R real-time spectrum analyzer 800 MHz

R&S®FSW-K161R real-time spectrum measurement application 160 MHz

R&S®FSW-K512RE real-time spectrum measurement application 512 MHz

R&S®FSW-K800RE real-time spectrum measurement application 800 MHz



**ROHDE & SCHWARZ**

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# Definitions

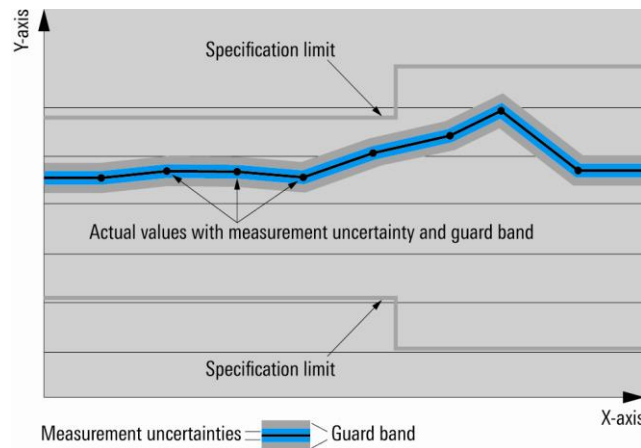
## General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

## Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



## Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

## Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with  $<$ ,  $>$  or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

## Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

## Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

## Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

# Specifications

The specifications of the R&S®FSW-B512R, R&S®FSW-B800R, R&S®FSW-K161R, R&S®FSW-K512RE and the R&S®FSW-K800RE options are based on the specifications in the data sheet for the R&S®FSW signal and spectrum analyzer. For frequencies > 8 GHz, the specifications for YIG preselector = off apply.

The R&S®FSW-K161R 160 MHz real-time measurement application requires:

- R&S®FSW-B160 160 MHz analysis bandwidth option or
- R&S®FSW-B320 320 MHz analysis bandwidth option

The R&S®FSW-K512RE 512 MHz real-time measurement application requires:

- R&S®FSW-B512 512 MHz analysis bandwidth option

The R&S®FSW-K800RE 800 MHz real-time measurement application requires:

- R&S®FSW-B1200 1200 MHz analysis bandwidth option or
- R&S®FSW-B2001 2000 MHz analysis bandwidth option

Span		
Range	R&S®FSW-K161R	
	high resolution operating mode	1 kHz to 160 MHz
	multi-domain operating mode	1 kHz to 100 MHz
	R&S®FSW-B512R, R&S®FSW-K512RE	1 kHz to 512 MHz
	R&S®FSW-B800R, R&S®FSW-K800RE	1 kHz to 800 MHz
Resolution		1 Hz

Frequency readout		
Number of sweep (trace) points		1001
Marker resolution		0.01 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference uncertainty} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} (\text{span}/(\text{sweep points} - 1)) + 1 \text{ Hz})$
Marker tuning frequency step size		span/1000

Sweep time		
Blackman-Harris window		
Range	R&S®FSW-K161R	
	span/RBW ratio $\leq 200$	
	real-time spectrum, real-time spectrogram, max. span	
	high resolution operating mode	51.3 $\mu\text{s}$ to 1 s <sup>1</sup>
	multi-domain operating mode	53.3 $\mu\text{s}$ to 1 s <sup>1</sup>
	R&S®FSW-B512R	
	span/RBW ratio $\leq 200$	
	real-time spectrum, real-time spectrogram, 512 MHz span	51.2 $\mu\text{s}$ to 334 ms <sup>1</sup>
	R&S®FSW-B800R	
	span/RBW ratio $\leq 100$	
	real-time spectrum, real-time spectrogram, 800 MHz span	51.3 $\mu\text{s}$ to 200 ms <sup>1</sup>
	R&S®FSW-K512RE	
	span/RBW ratio $\leq 200$	
	real-time spectrum, real-time spectrogram, 512 MHz span	64 $\mu\text{s}$ to 334 ms <sup>1</sup>
	R&S®FSW-K800RE	
	span/RBW ratio $\leq 100$	
	real-time spectrum, real-time spectrogram, 800 MHz span	64 $\mu\text{s}$ to 200 ms <sup>1</sup>

<sup>1</sup> Time period during which individual FFTs contribute to the results of the selected trace detector.

Resolution <sup>2</sup>	R&S®FSW-K161R	
	high resolution operating mode	5.2 µs
	multi-domain operating mode	4.1 µs
	R&S®FSW-B512R	3.42 µs
	R&S®FSW-B800R	3.42 µs
	R&S®FSW-K512RE	64 µs
	R&S®FSW-K800RE	64 µs
<b>Data acquisition</b>		
Input	standard	RF
	with R&S®FSW-B21 option	external mixer
Output	with R&S®FSW-B17 option	digital baseband <sup>3</sup>
A/D converter		
Sampling rate	R&S®FSW-B512R	
	span ≤ 80 MHz	200 Msample/s
	span > 80 MHz	1 Gsample/s
	R&S®FSW-B800R	
	span ≤ 80 MHz	200 Msample/s
	span > 80 MHz	2.4 Gsample/s
Resolution	R&S®FSW-B512R	
	span ≤ 80 MHz	16 bit
	span > 80 MHz	14 bit
	R&S®FSW-B800R	
	span ≤ 80 MHz	16 bit
	span > 80 MHz	14 bit
FFT length	R&S®FSW-K161R	
	high resolution operating mode	1024/2048/4096/8192/16384
	multi-domain operating mode	1024/2048/4096
	R&S®FSW-512R/R&S®FSW-K512RE	1024/2048/4096/8192/16384/32768
	R&S®FSW-B800R/R&S®FSW-K800RE	512/1024/2048/4096/8192/16384/32768
FFT window		Blackman-Harris, Flatop, Gaussian, Rectangular, Hanning, Hamming
FFT overlap	R&S®FSW-K161R	
	high resolution operating mode	≥ 66.7 %
	multi-domain operating mode	≥ 50 %
	R&S®FSW-B512R	≥ 50 %
	R&S®FSW-B800R	≥ 16.7 %
	R&S®FSW-K512RE	n/a
	R&S®FSW-K800RE	n/a
Max. spectrum (FFT) processing rate	R&S®FSW-K161R	
	high resolution operating mode	585 938/s
	multi-domain operating mode	244 141/s
	R&S®FSW-B512R	1 171 875/s
	R&S®FSW-B800R	2 343 750/s
	R&S®FSW-K512RE	58 824/s
	R&S®FSW-K800RE	58 824/s
Minimum detectable signal duration	R&S®FSW-K161R	
	span = 160 MHz, SNR > 60 dB	5 ns (nom.)
	R&S®FSW-B512R	
	span = 512 MHz, SNR > 60 dB	1.67 ns (nom.)
	R&S®FSW-B800R	
	span = 800 MHz, SNR > 60 dB	1 ns (nom.)
	R&S®FSW-K512RE	
	span = 512 MHz, SNR > 60 dB	17 µs (nom.)
	R&S®FSW-K800RE	
	span = 800 MHz, SNR > 60 dB	17 µs (nom.)

<sup>2</sup> The same span and span/RBW ratio apply as for the sweep time range.

<sup>3</sup> Only available for a frequency span ≤ 160 MHz.

<b>Resolution bandwidths</b>		
Range <sup>4</sup> with Blackman-Harris window	R&S®FSW-K161R	0.3 Hz to 10 MHz
	with R&S®FSW-B8 option	10 MHz to 25.6 MHz additionally
	R&S®FSW-B512R	0.3 Hz to 10 MHz
	with R&S®FSW-B8 option	10 MHz to 81.9 MHz additionally
	R&S®FSW-B800R	0.5 Hz to 10 MHz
	with R&S®FSW-B8 option	10 MHz to 128 MHz additionally
	R&S®FSW-K512RE	0.3 Hz to 10 MHz
	with R&S®FSW-B8 option	10 MHz to 81.9 MHz additionally
	R&S®FSW-K800RE	0.3 Hz to 10 MHz
	with R&S®FSW-B8 option	10 MHz to 128 MHz additionally
Span/RBW ratio with Blackman-Harris window	R&S®FSW-K161R	
	high resolution operating mode	6.25 to 3200
	multi-domain operating mode	6.25 to 800
	R&S®FSW-B512R	6.25 to 6400
	R&S®FSW-B800R	6.25 to 6400
	R&S®FSW-K512RE	6.25 to 6400
	R&S®FSW-K800RE	6.25 to 6400
Bandwidth uncertainty		< 3 % (nom.)

<sup>4</sup> The min. (max.) resolution bandwidth is defined with respect to the min. (max.) span only.

## Level

Span ≤ 80 MHz		
Amplitude flatness	see R&S®FSW data sheet, section I/Q data – Amplitude flatness <sup>5</sup>	
Nonlinearity of displayed level	see R&S®FSW data sheet, section I/Q data – Nonlinearity of displayed level <sup>5</sup>	
Level measurement uncertainty	see R&S®FSW data sheet, section I/Q data – Level measurement uncertainty <sup>5</sup>	
Third-order intermodulation distortion	see R&S®FSW data sheet, section I/Q data – Third-order intermodulation distortion <sup>5</sup>	
ADC related spurious response	see R&S®FSW data sheet, section I/Q data – ADC related spurious response <sup>5</sup>	
Other spurious responses	see R&S®FSW data sheet, section I/Q data – Other spurious responses <sup>5</sup>	
Span > 80 MHz		
Amplitude flatness	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Amplitude flatness <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Amplitude flatness <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Amplitude flatness <sup>8</sup>
Nonlinearity of displayed level	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Nonlinearity of displayed level <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Nonlinearity of displayed level <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Nonlinearity of displayed level <sup>8</sup>
Level measurement uncertainty at center frequency	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Level measurement uncertainty at center frequency <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Level measurement uncertainty at center frequency <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Level measurement uncertainty at center frequency <sup>8</sup>
Third-order intermodulation distortion	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Third-order intermodulation distortion <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Third-order intermodulation distortion <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Third-order intermodulation distortion <sup>8</sup>

<sup>5</sup> Span in the R&S®FSW-B512R/-B800R/-K161R/-K512RE/-K800RE is referred to as “signal analysis bandwidth” in the R&S®FSW data sheet, here for analysis bandwidth ≤ 80 MHz.

<sup>6</sup> Span in the R&S®FSW-K161R is referred to as “signal analysis bandwidth” in the R&S®FSW data sheet, here for analysis bandwidth > 80 MHz.

<sup>7</sup> Span in the R&S®FSW-B512R/-K512RE is referred to as “signal analysis bandwidth” in the R&S®FSW data sheet, here for a signal analysis bandwidth from 80 MHz to 512 MHz.

<sup>8</sup> Span in the R&S®FSW-B800R/-K800RE is referred to as “signal analysis bandwidth” in the R&S®FSW data sheet, here for a signal analysis bandwidth from 80 MHz to 800 MHz.

Residual spurious response	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Residual spurious response <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Residual spurious response <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Residual spurious response <sup>8</sup>
ADC related spurious response	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – ADC related spurious response <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – ADC related spurious response <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – ADC related spurious response <sup>8</sup>
Other spurious responses	R&S®FSW-K161R	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 160 MHz – Other spurious responses <sup>6</sup>
	R&S®FSW-B512R, R&S®FSW-K512RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 512 MHz – Other spurious responses <sup>7</sup>
	R&S®FSW-B800R, R&S®FSW-K800RE	see R&S®FSW data sheet, section I/Q data – Signal analysis bandwidth 80 MHz to 1200 MHz – Other spurious responses <sup>8</sup>

Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-K161R</b>						
	high resolution operating mode						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	Span/RBW ratio = 3200	–
	160 MHz	1.87 µs	2.99 µs	6.83 µs	27.3 µs	109 µs	–
	100 MHz	1.96 µs	3.75 µs	9.9 µs	39.6 µs	158 µs	–
	80 MHz	2.03 µs	4.27 µs	12 µs	47.8 µs	191 µs	–
	40 MHz	2.35 µs	6.83 µs	22.2 µs	88.8 µs	355 µs	–
	20 MHz	2.99 µs	11.9 µs	42.7 µs	171 µs	683 µs	–
	10 MHz	4.27 µs	22.2 µs	83.6 µs	335 µs	1.34 ms	–
	1 MHz	27.3 µs	206 µs	820 µs	3.28 ms	13.1 ms	–
Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-K161R</b>						
	multi-domain operating mode						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	–	–
	100 MHz	4.35 µs	6.14 µs	12.3 µs	49.2 µs	–	–
	80 MHz	4.42 µs	6.66 µs	14.3 µs	57.3 µs	–	–
	40 MHz	4.74 µs	9.22 µs	24.6 µs	98.3 µs	–	–
	20 MHz	5.38 µs	14.3 µs	45.1 µs	180 µs	–	–
	10 MHz	6.66 µs	24.6 µs	86 µs	344 µs	–	–
	1 MHz	29.7 µs	209 µs	823 µs	3.29 ms	–	–

<sup>9</sup> Events lasting shorter than the minimum signal duration specification will result in degraded level accuracy.

Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-B512R</b>						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	Span/RBW ratio = 3200	Span/RBW ratio = 6400
	512 MHz	0.91 µs	1.28 µs	2.56 µs	10.2 µs	41 µs	81.9 µs
	160 MHz	1.02 µs	2.14 µs	5.98 µs	23.9 µs	95.6 µs	191 µs
	100 MHz	1.11 µs	2.9 µs	9.05 µs	36.2 µs	145 µs	289 µs
	80 MHz	1.18 µs	3.42 µs	11.1 µs	44.4 µs	178 µs	355 µs
	40 MHz	1.5 µs	5.98 µs	21.3 µs	85.3 µs	341 µs	683 µs
	20 MHz	2.16 µs	11.1 µs	41.8 µs	167 µs	669 µs	1.34 ms
	10 MHz	3.44 µs	21.4 µs	82.8 µs	331 µs	1.32 ms	2.65 ms
	1 MHz	27.2 µs	206 µs	821 µs	3.28 ms	13.12 ms	26.24 ms
Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-B800R</b>						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	Span/RBW ratio = 3200	Span/RBW ratio = 6400
	800 MHz	0.46 µs	0.68 µs	1.88 µs	7.51 µs	30 µs	60.1 µs
	512 MHz	0.48 µs	0.83 µs	2.46 µs	9.82 µs	39.3 µs	78.6 µs
	160 MHz	0.59 µs	1.71 µs	5.98 µs	23.9 µs	95.6 µs	191 µs
	100 MHz	0.69 µs	2.48 µs	9.05 µs	36.2 µs	145 µs	289 µs
	80 MHz	0.75 µs	2.99 µs	11.1 µs	44.4 µs	178 µs	355 µs
	40 MHz	1.08 µs	5.56 µs	21.3 µs	85.3 µs	341 µs	683 µs
	20 MHz	1.72 µs	10.68 µs	41.8 µs	167 µs	669 µs	1.34 ms
	10 MHz	3.04 µs	20.96 µs	82.8 µs	331 µs	1.32 ms	2.65 ms
	1 MHz	26.4 µs	205.6 µs	821 µs	3.28 ms	13.12 ms	26.24 ms
Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-K512RE</b>						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	Span/RBW ratio = 3200	Span/RBW ratio = 6400
	512 MHz	17 µs	17 µs	17 µs	17 µs	41 µs	81.9 µs
	160 MHz	17 µs	17 µs	17 µs	23.9 µs	95.6 µs	191 µs
	100 MHz	17 µs	17 µs	17 µs	36.2 µs	145 µs	289 µs
	80 MHz	17 µs	17 µs	17 µs	44.4 µs	178 µs	355 µs
	40 MHz	17 µs	17 µs	21.3 µs	85.3 µs	341 µs	683 µs
	20 MHz	17 µs	17 µs	41.8 µs	167 µs	669 µs	1.34 ms
	10 MHz	17 µs	21.4 µs	82.8 µs	331 µs	1.32 ms	2.65 ms
	1 MHz	27.2 µs	206 µs	821 µs	3.28 ms	13.12 ms	26.24 ms
Minimum signal duration for 100 % probability of intercept with full amplitude accuracy <sup>9</sup>	<b>R&amp;S®FSW-K800RE</b>						
	Blackman-Harris window, trace detector = max. peak						
	Span	Span/RBW ratio = 6.25	Span/RBW ratio = 50	Span/RBW ratio = 200	Span/RBW ratio = 800	Span/RBW ratio = 3200	Span/RBW ratio = 6400
	800 MHz	17 µs	17 µs	17 µs	17 µs	30 µs	60.1 µs
	512 MHz	17 µs	17 µs	17 µs	17 µs	39.3 µs	78.6 µs
	160 MHz	17 µs	17 µs	17 µs	23.9 µs	95.6 µs	191 µs
	100 MHz	17 µs	17 µs	17 µs	36.2 µs	145 µs	289 µs
	80 MHz	17 µs	17 µs	17 µs	44.4 µs	178 µs	355 µs
	40 MHz	17 µs	17 µs	21.3 µs	85.3 µs	341 µs	683 µs
	20 MHz	17 µs	17 µs	41.8 µs	167 µs	669 µs	1.34 ms
	10 MHz	17 µs	20.96 µs	82.8 µs	331 µs	1.32 ms	2.65 ms
	1 MHz	26.4 µs	205.6 µs	821 µs	3.28 ms	13.12 ms	26.24 ms

## Result display

Result display types with or without active frequency mask trigger, or in any combination	R&S®FSW-K161R	
	high resolution operating mode	real-time spectrum, persistence spectrum, real-time spectrogram
	multi-domain operating mode	real-time spectrum, persistence spectrum, real-time spectrogram, power versus time, power versus time waterfall
	R&S®FSW-B512R , R&S®FSW-B800R, R&S®FSW-K512RE, R&S®FSW-K800RE	real-time spectrum, persistence spectrum, real-time spectrogram, power versus time, power versus time waterfall

<b>Real-time spectrum</b>		
Number of traces		4
Trace detector		max. peak, min. peak, average, sample
Trace functions		clear/write, max. hold, min. hold, view
Number of markers		16
Marker readout		frequency, level

<b>Persistence spectrum</b>		
Persistence bitmap resolution		1001 × 600 points
Persistence bitmap color depth		256 colors
Probability range covered by bitmap colors		selectable, 0 % to 100 %
Persistence duration		0 s to 8 s
Number of markers		16
Marker readout		frequency, level, hit probability
Number of real-time traces	in addition to persistence spectrum display	1
Real-time trace detector		max. peak, min. peak, sample, average
Real-time trace functions		clear/write, max. hold, min. hold

<b>Spectrogram</b>		
Result display		color-graded bitmap
Spectrogram bitmap color depth		240 colors
Dynamic range covered by bitmap colors		selectable, up to 200 dB (nom.)
History depth		max. 100 000 frames <sup>10</sup>
Recording mode		single trace, continuous, frame count
Trace detector		max. peak, min. peak, sample
Number of markers		16
Marker readout		frequency, time/frame number, level

<b>Power versus time</b>		
Number of traces		4
Trace detector		max. peak, min. peak, average, sample
Trace functions		clear/write, view
Number of markers		16
Marker readout		time, level

<b>Power versus time waterfall</b>		
Result display		color-graded bitmap
Spectrogram bitmap color depth		240 colors
Dynamic range covered by bitmap colors		selectable, up to 200 dB (nom.)
History depth		max. 100 000 frames <sup>10</sup>
Recording mode		single trace, continuous, frame count
Trace detector		max. peak, min. peak, sample
Number of markers		16
Marker readout		time, time/frame number, level

<sup>10</sup> A frame is the measurement result displayed in one row of the spectrogram. It may consist of one or more traces, depending on the set sweep count. For example, a sweep count of 2 means that two traces will be combined to one row in the spectrogram using the set trace detector.

## Trigger

Trigger source	R&S®FSW-K161R	
	high resolution operating mode	free run, frequency mask, external
	multi-domain operating mode	free run, frequency mask, external, time domain
	R&S®FSW-B512R, R&S®FSW-B800R, R&S®FSW-K512RE, R&S®FSW-K800RE	free run, frequency mask, external, time domain

<b>Frequency mask trigger</b>		
Trigger level resolution		0.5 dB
Minimum required mask distance to noise floor		30 dB (nom.)
Dynamic range	frequency mask – reference level	0 dB to –80 dB (nom.)
Trigger level accuracy	frequency mask > reference level – 50 dB	±(frequency response + 1.0 dB) (nom.)
	frequency mask > reference level – 70 dB	±(frequency response + 2.5 dB) (nom.)
Trigger uncertainty	R&S®FSW-K161R	
	high resolution operating mode, span = 160 MHz, span/RBW ratio = 6.25	±2.8 µs (nom.)
	multi-domain operating mode, span = 100 MHz, span/RBW ratio = 6.25	±4.2 µs (nom.)
	R&S®FSW-B512R	
	span = 512 MHz, span/RBW = 6.25	±0.85 µs (nom.)
	R&S®FSW-B800R	
	span = 800 MHz, span/RBW = 6.25	±0.85 µs (nom.)
	R&S®FSW-K512RE	
	span = 512 MHz, span/RBW = 6.25	±25 µs (nom.)
	R&S®FSW-K800RE	
	span = 800 MHz, span/RBW = 6.25	±25 µs (nom.)
Trigger conditions		enter mask area, leave mask area
Trigger modes		auto rearm trigger, stop on trigger
Trigger mask		
Mask length		3 to 1001 frequency points
Mask frequency resolution		span/1001
Mask shape generation		manual, auto set (mask derived from the measured spectrum)

<b>Trigger out</b>		
Connector		BNC female
Output		TTL-compatible, 0 V/5 V (nom.)

## Ordering information

Designation	Type	Order No.
Signal and spectrum analyzer, 2 Hz to 8 GHz	R&S®FSW8	1331.5003.08
Signal and spectrum analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1331.5003.13
Signal and spectrum analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1331.5003.26
Signal and spectrum analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1331.5003.43
Signal and spectrum analyzer, 2 Hz to 50 GHz	R&S®FSW50	1331.5003.50
Signal and spectrum analyzer, 2 Hz to 67 GHz	R&S®FSW67	1331.5003.67
Signal and spectrum analyzer, 2 Hz to 85 GHz <sup>11</sup>	R&S®FSW85	1331.5003.85

### Options for R&S®FSW with order no. 1331.5003.xx

Designation	Type	Order No.	Retrofittable	Remarks
Real-time spectrum analyzer 512 MHz, POI ≤ 15 µs	R&S®FSW-B512R	1331.7106.16	yes	contact service center; includes 512 MHz analysis bandwidth and 200 MHz IF filter; export license required
Real-time spectrum analyzer 800 MHz, POI ≤ 15 µs	R&S®FSW-B800R	1331.6400.16	yes	contact service center; includes 2000 MHz analysis bandwidth; not available in combination with R&S®FSW-B2000; export license required
Real-time measurement application, 160 MHz, POI ≤ 15 µs	R&S®FSW-K161R	1338.2700.02	yes	one of the R&S®FSW-B160/ -B320 options is needed; not available for R&S®FSW-B512/ -B512R/-B1200/-B2001/-B800R; no export license required
Real-time measurement application, 512 MHz, POI > 15 µs	R&S®FSW-K512RE	1338.4731.02	yes	R&S®FSW-B512 required; not available for R&S®FSW-B160/ -B320/-B512R/-B1200/-B2001/ -B800R; no export license required
Real-time measurement application, 800 MHz, POI > 15 µs	R&S®FSW-K800RE	1338.7801.02	yes	one of the R&S®FSW-B1200/ -B2001 options is needed; not available for R&S®FSW-B160/ -B320/-B512/-B512R/-B800R; no export license required
Resolution bandwidth > 10 MHz	R&S®FSW-B8	1313.2464.26	yes	contact service center; for R&S®FSW8/13/26; the signal analysis bandwidth is defined by the R&S®FSW-B28/ -B40/-B80/-B160/-B320/-B512/ -B512R/-B1200/-B2001/-B800R/ -B5000 options, not defined by the R&S®FSW-B8 option

<sup>11</sup> Frequency range for R&S®FSW85 with R&S®FSW-B90G option: 2 Hz to 90 GHz (YIG preselector off).

Designation	Type	Order No.	Retrofittable	Remarks
Resolution bandwidth > 10 MHz	R&S®FSW-B8	1313.2464.02	yes	contact service center; for R&S®FSW43/50/67/85; the signal analysis bandwidth is defined by the R&S®FSW-B28/ -B40/-B80/-B160/-B320/-B512/ -B512R/-B1200/-B2001/-B5000/ -B800R options, not defined by the R&S®FSW-B8 option; export license required
Highpass filter for harmonic measurements	R&S®FSW-B13	1313.0761.02	yes	user-retrofittable
Digital baseband interface	R&S®FSW-B17	1313.0784.02	yes	user-retrofittable
LO/IF Connections for external mixers	R&S®FSW-B21	1313.1100.28	yes	contact service center; for R&S®FSW26/43/50/67
LO/IF Connections for external mixers	R&S®FSW-B21	1313.1100.86	yes	contact service center; for R&S®FSW85
Analysis bandwidth, 160 MHz	R&S®FSW-B160	1325.4850.14	yes	contact service center
Analysis bandwidth, 320 MHz	R&S®FSW-B320	1325.4867.14	yes	contact service center; includes 200 MHz IF filter
Analysis bandwidth, 512 MHz	R&S®FSW-B512	1331.7106.14	yes	contact service center; includes 200 MHz IF filter
Analysis bandwidth, 1200 MHz	R&S®FSW-B1200	1331.6400.14	yes	contact service center; for R&S®FSW26/-43/-50/-67/-85 ex-factory; for later upgrade of R&S®FSW instruments use R&S®FSW-U1200; not available in combination with R&S®FSW-B2000
Analysis bandwidth, 2000 MHz	R&S®FSW-B2001	1331.6916.14	yes	contact service center; for R&S®FSW26/-43/-50/-67/-85 ex-factory; for later upgrade of R&S®FSW instruments use R&S®FSW-U2001; not available in combination with R&S®FSW-B2000

## Upgrades

Designation	Type	Order No.	Retrofittable	Remarks
Real-time spectrum analyzer upgrade, from 80 MHz to 512 MHz, POI ≤ 15 µs	R&S®FSW-U512R	1321.6320.26	yes	contact service center; includes 512 MHz analysis bandwidth; R&S®FSW-B80 or R&S®FSW-U80 required; export license required
Analysis bandwidth upgrade, from 28 MHz to 40 MHz	R&S®FSW-U40	1313.5205.02	yes	user-retrofittable; R&S®FSW-B28 required
Analysis bandwidth upgrade, from 40 MHz to 80 MHz	R&S®FSW-U80	1313.5211.02	yes	user-retrofittable; R&S®FSW-B40 or R&S®FSW-U40 required
Analysis bandwidth upgrade, from 80 MHz to 160 MHz	R&S®FSW-U160	1325.5357.14	yes	contact service center; R&S®FSW-B80 or R&S®FSW-U80 required
Analysis bandwidth upgrade, from 160 MHz to 320 MHz	R&S®FSW-U320	1313.7189.02	yes	user-retrofittable; R&S®FSW-B160/-U160 required
Analysis bandwidth upgrade, from 80 MHz to 512 MHz	R&S®FSW-U512	1321.6320.24	yes	contact service center; R&S®FSW-B80 or R&S®FSW-U80 required; excludes R&S®FSW-B160/-U160/ -B320
Analysis bandwidth upgrade, from 80 MHz, 160 MHz, 320 MHz, 512 MHz to 1200 MHz	R&S®FSW-U1200	1331.7006.14	yes	contact service center; for R&S®FSW26/-43/-50/-67/-85; R&S®FSW-B80 or R&S®FSW-B160/-U160 or R&S®FSW-B320/-U320 or R&S®FSW-B512/-U512 required not available for instruments with R&S®FSW-B512R, R&S®FSW-U512R, R&S®FSW-B2000, R&S®FSW-U2000
Analysis bandwidth upgrade, from 1200 MHz to 2000 MHz	R&S®FSW-U2001	1331.7070.02	yes	user-retrofittable; R&S®FSW-B1200 or R&S®FSW-U1200 required

## Recommended extras

Designation	Type	Order No.
<b>External harmonic mixers from RPG <sup>12</sup></b>		
<b>(for R&amp;S®FSW26, R&amp;S®FSW43, R&amp;S®FSW50, R&amp;S®FSW67 and R&amp;S®FSW85 with R&amp;S®FSW-B21 option)</b>		
Harmonic mixer, 40 GHz to 60 GHz	RPG FS-Z60	1048.0171.02
Harmonic mixer, 50 GHz to 75 GHz	RPG FS-Z75	3638.2240.02
Harmonic mixer, 60 GHz to 90 GHz	RPG FS-Z90	3638.2270.02
Harmonic mixer, 75 GHz to 110 GHz	RPG FS-Z110	3638.2292.02
Harmonic mixer, 90 GHz to 140 GHz	RPG FS-Z140	3622.0708.02
Harmonic mixer, 110 GHz to 170 GHz	RPG FS-Z170	3622.0714.02
Harmonic mixer, 140 GHz to 220 GHz	RPG FS-Z220	3593.3250.02
Harmonic mixer, 220 GHz to 325 GHz	RPG FS-Z325	3593.3267.02
Harmonic mixer, 325 GHz to 500 GHz	RPG FS-Z500	3593.3273.02

For R&S®FSW data sheet see PD 5215.6749.22,  
for R&S®FSW product brochure, see PD 5215.6749.12 and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

<sup>12</sup> RPG is the abbreviation of Radiometer Physics GmbH, a Rohde & Schwarz company.

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Real-Time Spectrum Analyzer and Measurement Application

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