

R&S® FSW

Signal and Spectrum Analyzer Specifications



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Definitions

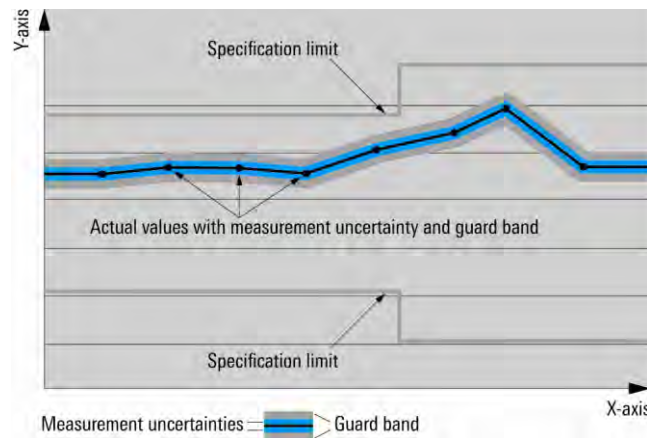
General

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

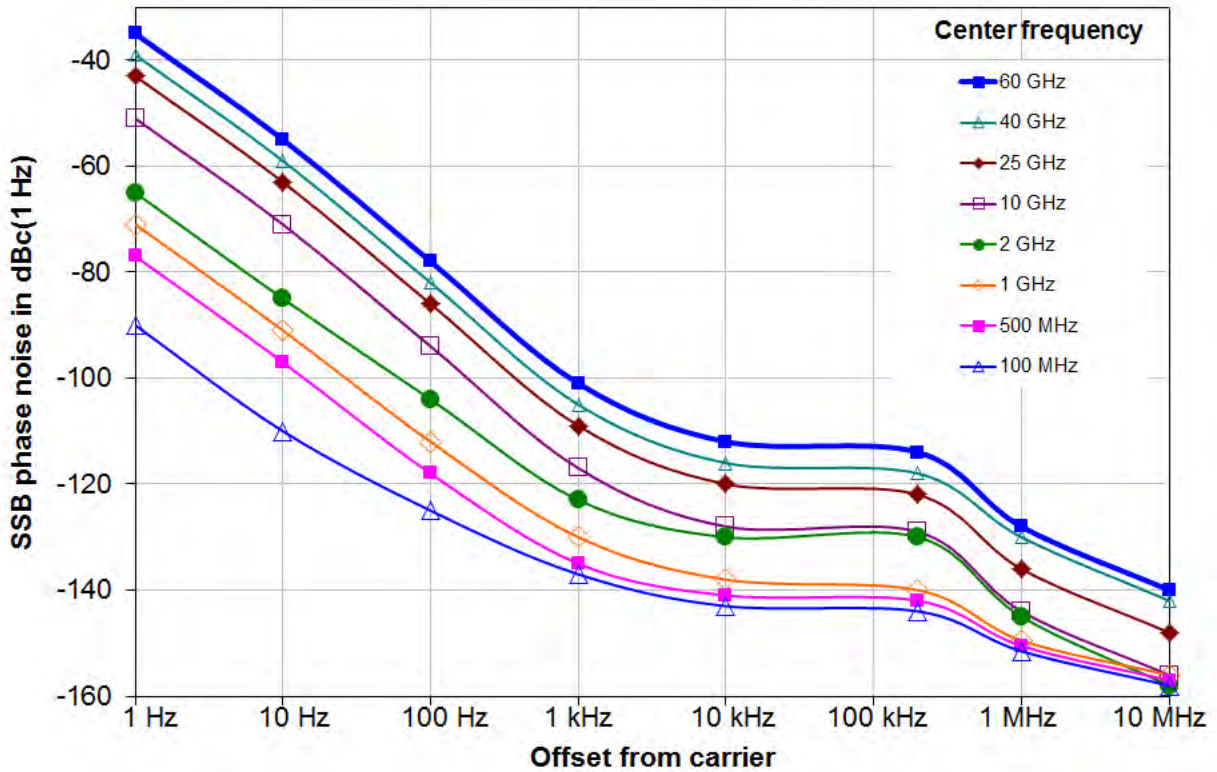
Frequency

Frequency range	R&S®FSW8	
	DC coupled	2 Hz to 8 GHz
	AC coupled	10 MHz to 8 GHz
	R&S®FSW13	
	DC coupled	2 Hz to 13.6 GHz
	AC coupled	10 MHz to 13.6 GHz
	R&S®FSW26	
	DC coupled	2 Hz to 26.5 GHz
	AC coupled	10 MHz to 26.5 GHz
	R&S®FSW43	
	DC coupled	2 Hz to 43.5 GHz
	AC coupled	10 MHz to 43.5 GHz
	R&S®FSW50	
	DC coupled	2 Hz to 50 GHz
AC coupled	10 MHz to 50 GHz	
R&S®FSW67		
DC coupled	2 Hz to 67 GHz	
AC coupled	10 MHz to 67 GHz	
Frequency resolution		0.01 Hz

Reference frequency, internal		
Accuracy		$\pm(\text{time since last adjustment} \times \text{aging rate} + \text{temperature drift} + \text{calibration accuracy})$
Aging per year	standard with R&S®FSW-B4 OCXO precision frequency reference option	$\pm 1 \times 10^{-7}$ $\pm 3 \times 10^{-8}$
Temperature drift (0 °C to +50 °C)	standard with R&S®FSW-B4 OCXO precision frequency reference option	$\pm 1 \times 10^{-7}$ $\pm 1 \times 10^{-9}$
Achievable initial calibration accuracy	standard with R&S®FSW-B4 OCXO precision frequency reference option	$\pm 1 \times 10^{-8}$ $\pm 5 \times 10^{-9}$

Frequency readout		
Marker resolution		1 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference accuracy} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2}(\text{span}/(\text{sweep points} - 1)) + 1 \text{ Hz})$
Number of sweep (trace) points	default value range	1001 101 to 100001
Marker tuning frequency step size	marker step size = sweep points marker step size = standard	$\text{span}/(\text{sweep points} - 1)$ $\text{span}/(\text{default sweep points} - 1)$
Frequency counter resolution		0.001 Hz
Count accuracy		$\pm(\text{frequency} \times \text{reference accuracy} + \frac{1}{2}(\text{last digit}))$
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		$\pm 0.1 \%$

Spectral purity		
SSB phase noise	frequency = 1000 MHz, carrier offset	
	10 Hz, without R&S®FSW-B4 option	-80 dBc (1 Hz) (nom.)
	10 Hz, with R&S®FSW-B4 option	-90 dBc (1 Hz) (nom.)
	100 Hz	-106 dBc (1 Hz), typ. -112 dBc (1 Hz)
	1 kHz	< -125 dBc (1 Hz), typ. -130 dBc (1 Hz)
	10 kHz	< -134 dBc (1 Hz), typ. -138 dBc (1 Hz)
	100 kHz	< -136 dBc (1 Hz), typ. -140 dBc (1 Hz)
	1 MHz	< -145 dBc (1 Hz), typ. -149 dBc (1 Hz)
	10 MHz	-156 dBc (1 Hz) (nom.)
Residual FM	frequency = 1000 MHz, RBW = 1 kHz, sweep time = 100 ms	< 0.1 Hz (nom.)



Typical phase noise at different center frequencies (with the R&S®FSW-B4 option for offsets ≤ 10 Hz).

Sweep time

Sweep time range	span = 0 Hz	1 μ s to 16000 s
	span ≥ 10 Hz	3 μ s to 16000 s ¹
Sweep time accuracy	span = 0 Hz	± 0.1 % (nom.)
	span ≥ 10 Hz	± 3 % (nom.)

Resolution bandwidths

Sweep filters and FFT filters		
Resolution bandwidths (-3 dB)		1 Hz to 10 MHz in 1/2/3/5 sequence
	with R&S®FSW-B8 option	20 MHz, 50 MHz, 80 MHz additionally ²
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 5 (nom.)

Channel filters		
Bandwidths (-3 dB)	standard (RRC = root raised cosine)	100 Hz, 200 Hz, 300 Hz, 500 Hz 1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/8.5/9/10/ 12.5/14/15/16/18 (RRC)/20/21/ 24.3 (RRC)/25/30/50/100/150/192/200/ 300/500 kHz 1/1.228/1.28 (RRC)/1.5/2/3/3.84 (RRC)/ 4.096 (RRC)/5/10 MHz
	with R&S®FSW-B8 option	20 MHz, 28 MHz, 40 MHz, 80 MHz additionally
Bandwidth accuracy		< 2 % (nom.)
Shape factor 60 dB:3 dB		< 2 (nom.)

¹ The selected sweep time is the net data acquisition time (without the extra time needed for hardware settling or FFT processing).

² The additional resolution bandwidths are available for span ≥ 0 Hz for instruments starting from the following serial numbers:
R&S®FSW8: 101580, R&S®FSW13: 101279, R&S®FSW26: 102000, R&S®FSW43: 100744, R&S®FSW50: 101024, R&S®FSW67: 101150.
For instruments with lower serial numbers the additional resolution bandwidths are available for span = 0 Hz only.

EMI filters (with R&S®FSW-K54 only)		
Bandwidths (–6 dB)		10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 6 (nom.)

Video bandwidths	standard	1 Hz to 10 MHz in 1/2/3/5 sequence
	with R&S®FSW-B8 option	20 MHz, 50 MHz, 80 MHz additionally

Signal analysis bandwidth	standard	10 MHz (nom.)
	with R&S®FSW-B28 option	20 MHz, 28 MHz (nom.) additionally
	with R&S®FSW-B40 option	20 MHz, 28 MHz, 40 MHz (nom.) additionally
	with R&S®FSW-B80 option	20 MHz, 28 MHz, 40 MHz, 80 MHz (nom.) additionally
	with R&S®FSW-B160 option	20 MHz, 28 MHz, 40 MHz, 80 MHz, 160 MHz (nom.) additionally
	with R&S®FSW-B320 option	20 MHz, 28 MHz, 40 MHz, 80 MHz, 160 MHz, 320 MHz (nom.) additionally
	with R&S®FSW-B500 option	20 MHz, 28 MHz, 40 MHz, 80 MHz, 160 MHz, 320 MHz, 500 MHz (nom.) additionally
	with R&S®FSW-B2000 option	8 kHz to 2 GHz ³

Level

Level display		
Display range		displayed noise floor up to +30 dBm
Logarithmic level axis		1 dB to 200 dB, in steps of 1/2/5
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces		6
Trace detector		max. peak, min. peak, auto peak (normal), sample, RMS, average
	with R&S®FSW-K54	quasi-peak additionally
Trace functions		clear/write, max. hold, min. hold, average, view
Setting range of reference level		–130 dBm to (–10 dBm + RF attenuation – RF preamplifier gain), in steps of 0.01 dB
Units of level axis	logarithmic level display	dBm, dBμV, dBmV, dBμA, dBpW
	linear level display	μV, mV, μA, mA, pW, nW

Max. input level		
DC voltage	AC coupled	50 V
	DC coupled	0 V
CW RF power	RF attenuation = 0 dB	20 dBm (= 0.1 W)
	RF attenuation ≥ 10 dB	
	without R&S®FSW-B25 option or with R&S®FSW-B25 option installed and mechanical attenuation ≥ 10 dB	30 dBm (= 1 W)
Pulse spectral density	RF attenuation = 0 dB, RF preamplifier off	97 dB μV/MHz
Max. pulse voltage	without R&S®FSW-B25 option or electronic attenuation off	
	RF attenuation ≥ 10 dB	150 V
	with R&S®FSW-B25 option installed, electronic attenuation on	
	mechanical attenuation = 0 dB	25 V
	mechanical attenuation ≥ 10 dB	75 V
Max. pulse energy	without R&S®FSW-B25 option or electronic attenuation off	
	RF attenuation ≥ 10 dB, 10 μs	1 mWs
	with R&S®FSW-B25 option installed, electronic attenuation on	
	mechanical attenuation ≥ 10 dB, 10 μs	1 mWs

³ The R&S®FSW-B2000 option can be combined with the basic instrument or any of other analysis bandwidth option. For detailed specifications see section R&S®FSW-B2000 2 GHz Analysis Bandwidth.

Intermodulation		
1 dB compression of input mixer (two-tone)	RF attenuation = 0 dB, RF preamplifier off	
	$f_{in} \leq 3$ GHz	+15 dBm (nom.)
	$3 \text{ GHz} < f_{in} \leq 8$ GHz	+10 dBm (nom.)
	$f_{in} > 8$ GHz	+7 dBm (nom.)
	with R&S®FSW-B24 option, RF attenuation = 0 dB, RF preamplifier on	
	$f_{in} \leq 3$ GHz	-13 dBm (nom.)
$3 \text{ GHz} < f_{in} \leq 8$ GHz	-20 dBm (nom.)	
$f_{in} > 8$ GHz	-23 dBm (nom.)	
Third-order intercept point (TOI)	R&S®FSW8, R&S®FSW13, R&S®FSW26, R&S®FSW43, R&S®FSW50, R&S®FSW67, RF attenuation = 0 dB, level 2×-15 dBm, $\Delta f > 5 \times$ RBW, YIG preselector on, RF preamplifier off	
	$f_{in} < 10$ MHz	28 dBm (nom.)
	$10 \text{ MHz} \leq f_{in} < 1$ GHz	> 25 dBm, typ. 30 dBm
	$1 \text{ GHz} \leq f_{in} < 3$ GHz	> 20 dBm, typ. 25 dBm ⁴
	$3 \text{ GHz} \leq f_{in} < 8$ GHz	> 17 dBm, typ. 20 dBm
	R&S®FSW13, R&S®FSW26, RF attenuation = 0 dB, level 2×-15 dBm, $\Delta f > 5 \times$ RBW, YIG preselector on, RF preamplifier off	
	$8 \text{ GHz} \leq f_{in} < 10$ GHz	> 14 dBm, typ. 17 dBm
	$10 \text{ GHz} \leq f_{in} < 12$ GHz	> 16 dBm, typ. 20 dBm
	$12 \text{ GHz} \leq f_{in} < 17$ GHz	> 18 dBm, typ. 23 dBm
	$17 \text{ GHz} \leq f_{in} < 19$ GHz	> 16 dBm, typ. 20 dBm
	$19 \text{ GHz} \leq f_{in} \leq 26.5$ GHz	> 18 dBm, typ. 23 dBm
	R&S®FSW43, R&S®FSW50, R&S®FSW67, RF attenuation = 0 dB, level 2×-20 dBm, $\Delta f > 5 \times$ RBW, YIG preselector on, RF preamplifier off	
	$8 \text{ GHz} \leq f_{in} \leq 13.6$ GHz	> 8 dBm, typ. 11 dBm
	$13.6 \text{ GHz} \leq f_{in} \leq 40$ GHz	> 10 dBm, typ. 15 dBm
	$f_{in} > 40$ GHz	12 dBm (nom.)
	R&S®FSW8, R&S®FSW13, R&S®FSW26 with R&S®FSW-B24 option, RF attenuation = 0 dB, level 2×-50 dBm, $\Delta f > 5 \times$ RBW, YIG preselector on, RF preamplifier on	
	$10 \text{ MHz} \leq f_{in} < 1$ GHz	-10 dBm (nom.)
	$1 \text{ GHz} \leq f_{in} < 8$ GHz	-13 dBm (nom.)
	$8 \text{ GHz} \leq f_{in} \leq 26.5$ GHz	-15 dBm (nom.)
	R&S®FSW43, R&S®FSW50, R&S®FSW67 with R&S®FSW-B24 option, RF attenuation = 0 dB, level 2×-55 dBm, $\Delta f > 5 \times$ RBW, YIG preselector on, RF preamplifier on	
	$10 \text{ MHz} \leq f_{in} < 1$ GHz	-5 dBm (nom.)
	$1 \text{ GHz} \leq f_{in} < 4$ GHz	-10 dBm (nom.)
	$f_{in} > 4$ GHz	-20 dBm (nom.)
	Second-harmonic intercept point (SHI)	R&S®FSW8, R&S®FSW13, R&S®FSW26, RF attenuation = 0 dB, level = -5 dBm, YIG preselector on, RF preamplifier off
$1 \text{ MHz} < f_{in} \leq 350$ MHz		> 50 dBm, typ. 62 dBm
$350 \text{ MHz} < f_{in} \leq 500$ MHz		> 70 dBm, typ. 80 dBm
$500 \text{ MHz} < f_{in} < 1.5$ GHz ⁵		> 47 dBm, typ. 52 dBm
$500 \text{ MHz} < f_{in} < 1.5$ GHz ⁶		> 62 dBm, typ. 70 dBm
$1.5 \text{ GHz} \leq f_{in} \leq 4$ GHz		> 62 dBm, typ. 70 dBm
$4 \text{ GHz} < f_{in} \leq 13.5$ GHz		65 dBm (nom.)
R&S®FSW43, R&S®FSW50, R&S®FSW67, RF attenuation = 0 dB, level = -5 dBm, YIG preselector on, RF preamplifier off		
$1 \text{ MHz} < f_{in} \leq 500$ MHz		> 45 dBm, typ. 55 dBm
$500 \text{ MHz} < f_{in} < 1.5$ GHz ³		> 47 dBm, typ. 56 dBm
$500 \text{ MHz} < f_{in} < 1.5$ GHz ⁴		> 52 dBm, typ. 60 dBm
$1.5 \text{ GHz} \leq f_{in} \leq 4$ GHz		> 62 dBm, typ. 70 dBm
$4 \text{ GHz} < f_{in} \leq 33.5$ GHz		65 dBm (nom.)
R&S®FSW8, R&S®FSW13, R&S®FSW26, R&S®FSW43, R&S®FSW50, R&S®FSW67, with R&S®FSW-B24 option, RF attenuation = 0 dB, level = -50 dBm, YIG preselector on, RF preamplifier on		
$50 \text{ MHz} < f_{in} \leq 21.75$ GHz		10 dBm (nom.)

⁴ With R&S®FSW-B13 highpass filter option, highpass off. With highpass on, the TOI degrades by 5 dB (nom.).

⁵ Without R&S®FSW-B13 highpass filter option or highpass off.

⁶ With R&S®FSW-B13 highpass filter option, highpass on.

Sensitivity

All noise level data in this section not marked as typical (typ.) or nominal (nom.) are specified values whose compliance is ensured by testing.

Displayed average noise level of the R&S®FSW8		
RF preamplifier off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, without R&S®FSW-B25 electronic attenuator option	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-150 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-152 dBm, typ. -156 dBm
	1 GHz < f < 3 GHz ⁴	-155 dBm, typ. -160 dBm
	3 GHz ≤ f ≤ 8 GHz	-152 dBm, typ. -156 dBm
add 1 dB to the above values if R&S®FSW-B25 option is installed		
RF preamplifier = 30 dB	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, with R&S®FSW-B24 option, without R&S®FSW-B25 electronic attenuator option	
	10 MHz < f ≤ 50 MHz	-154 dBm (nom.)
	50 MHz < f ≤ 150 MHz	-163 dBm, typ. -166 dBm
	150 MHz < f ≤ 8 GHz	-166 dBm, typ. -169 dBm
add 1 dB to the above values if R&S®FSW-B25 option is installed		
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

Displayed average noise level of the R&S®FSW13, R&S®FSW26, without R&S®FSW-B24 option			
	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C		
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm	
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm	
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm	
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on, without R&S®FSW-B25 electronic attenuator option		
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm	
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm	
	1 GHz < f < 3 GHz ³	-151 dBm, typ. -156 dBm	
	1 GHz < f < 3 GHz ⁴	-154 dBm, typ. -159 dBm	
	3 GHz ≤ f < 8 GHz	-151 dBm, typ. -156 dBm	
	8 GHz ≤ f < 13.6 GHz	-150 dBm, typ. -155 dBm	
	13.6 GHz ≤ f < 18 GHz	-149 dBm, typ. -153 dBm	
	18 GHz ≤ f < 25 GHz	-147 dBm, typ. -150 dBm	
	25 GHz ≤ f < 26.5 GHz	-143 dBm, typ. -146 dBm	
	add 1 dB to the above values for frequencies < 8 GHz, 2 dB for frequencies ≥ 8 GHz, if R&S®FSW-B25 option is installed		
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off, without R&S®FSW-B25 electronic attenuator option		
	8 GHz ≤ f < 13.6 GHz	-150 dBm, typ. -155 dBm	
	13.6 GHz ≤ f < 25 GHz	-149 dBm, typ. -153 dBm	
	25 GHz ≤ f < 26.5 GHz	-147 dBm, typ. -150 dBm	
	add 2 dB to the above values if R&S®FSW-B25 option is installed		
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)	

Displayed average noise level of the R&S®FSW13, R&S®FSW26, with R&S®FSW-B24 option			
RF preamplifier off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C		
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm	
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm	
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm	
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on, without R&S®FSW-B25 electronic attenuator option		
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm	
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm	
	1 GHz < f < 3 GHz ³	-151 dBm, typ. -156 dBm	
	1 GHz < f < 3 GHz ⁴	-154 dBm, typ. -159 dBm	
	3 GHz ≤ f < 8 GHz	-151 dBm, typ. -156 dBm	
	8 GHz ≤ f < 13.6 GHz	-149 dBm, typ. -154 dBm	
	13.6 GHz ≤ f < 18 GHz	-148 dBm, typ. -152 dBm	
	18 GHz ≤ f < 25 GHz	-145 dBm, typ. -149 dBm	
	25 GHz ≤ f < 26.5 GHz	-141 dBm, typ. -145 dBm	
	add 1 dB to the above values for frequencies < 8 GHz, 2 dB for frequencies ≥ 8 GHz, if R&S®FSW-B25 option is installed		
RF preamplifier = 30 dB	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off, without R&S®FSW-B25 electronic attenuator option		
	8 GHz ≤ f < 13.6 GHz	-149 dBm, typ. -154 dBm	
	13.6 GHz ≤ f < 25 GHz	-148 dBm, typ. -152 dBm	
	25 GHz ≤ f < 26.5 GHz	-145 dBm, typ. -149 dBm	
	add 2 dB to the above values if R&S®FSW-B25 option is installed		
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector on, without R&S®FSW-B25 electronic attenuator option		
	10 MHz < f ≤ 50 MHz	-154 dBm (nom.)	
	50 MHz < f ≤ 150 MHz	-163 dBm, typ. -166 dBm	
	150 MHz < f ≤ 8 GHz	-166 dBm, typ. -169 dBm	
	8 GHz < f ≤ 13.6 GHz	-164 dBm, typ. -168 dBm	
	13.6 GHz < f ≤ 22 GHz	-162 dBm, typ. -166 dBm	
	22 GHz < f ≤ 26.5 GHz	-157 dBm, typ. -161 dBm	
	add 1 dB to the above values for frequencies < 8 GHz, 2 dB for frequencies ≥ 8 GHz, if R&S®FSW-B25 option is installed		
	Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

Displayed average noise level of the R&S®FSW43 without R&S®FSW-B24 option		
	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-151 dBm, typ. -156 dBm
	1 GHz < f < 3 GHz ⁴	-154 dBm, typ. -159 dBm
	3 GHz ≤ f < 8 GHz	-151 dBm, typ. -156 dBm
	8 GHz ≤ f < 13.6 GHz	-150 dBm, typ. -154 dBm
	13.6 GHz ≤ f < 18 GHz	-149 dBm, typ. -153 dBm
	18 GHz ≤ f < 25 GHz	-147 dBm, typ. -151 dBm
	25 GHz ≤ f ≤ 34 GHz	-143 dBm, typ. -147 dBm
	34 GHz < f ≤ 40 GHz	-140 dBm, typ. -144 dBm
	40 GHz < f ≤ 43.5 GHz	-138 dBm, typ. -142 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-152 dBm, typ. -157 dBm
	13.6 GHz ≤ f < 18 GHz	-151 dBm, typ. -156 dBm
	18 GHz ≤ f < 25 GHz	-149 dBm, typ. -154 dBm
	25 GHz ≤ f ≤ 34 GHz	-147 dBm, typ. -151 dBm
	34 GHz < f ≤ 40 GHz	-144 dBm, typ. -148 dBm
	40 GHz < f ≤ 43.5 GHz	-142 dBm, typ. -146 dBm
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

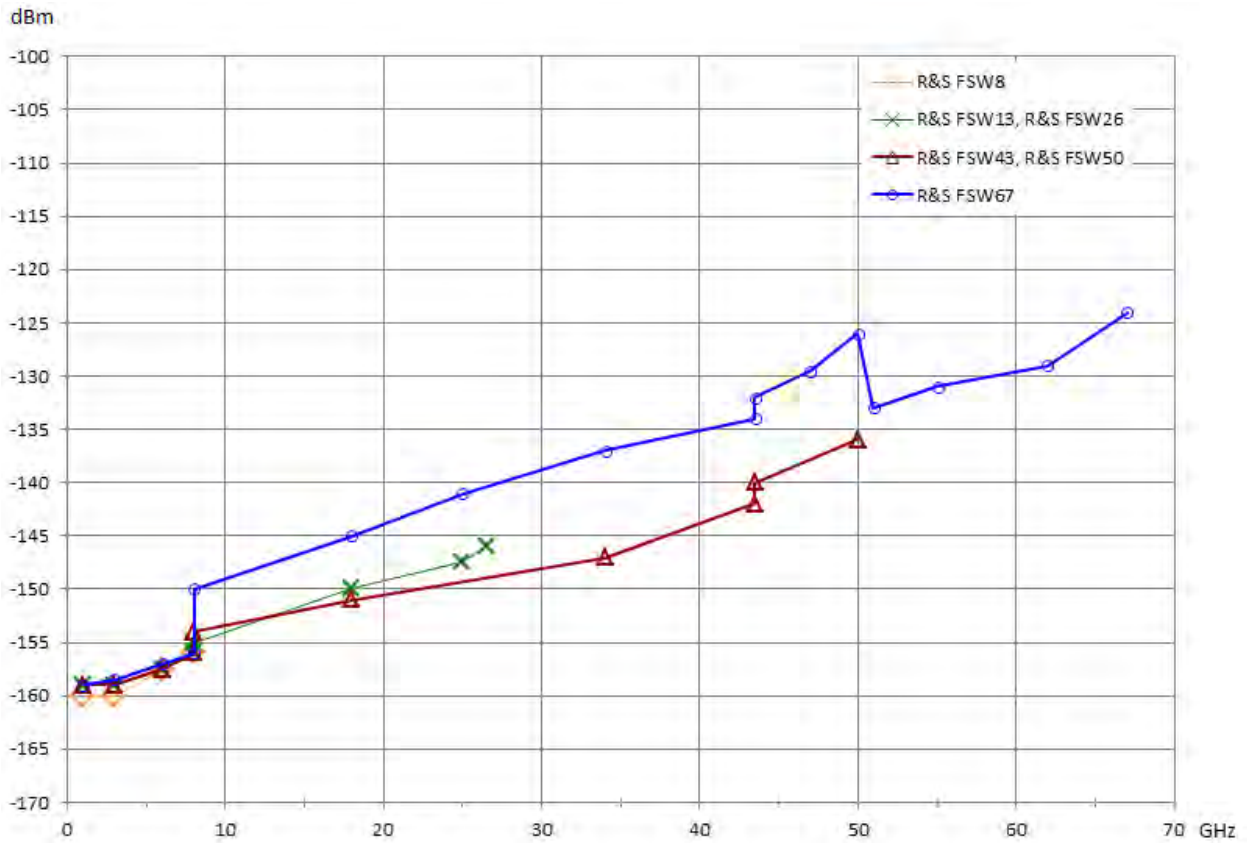
Displayed average noise level of the R&S®FSW43 with R&S®FSW-B24 option		
RF preamplifier off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-150 dBm, typ. -155 dBm
	1 GHz < f < 3 GHz ⁴	-153 dBm, typ. -158 dBm
	3 GHz ≤ f < 8 GHz	-150 dBm, typ. -155 dBm
	8 GHz ≤ f < 13.6 GHz	-148 dBm, typ. -152 dBm
	13.6 GHz ≤ f < 18 GHz	-147 dBm, typ. -151 dBm
	18 GHz ≤ f < 25 GHz	-145 dBm, typ. -149 dBm
	25 GHz ≤ f ≤ 34 GHz	-140 dBm, typ. -144 dBm
	34 GHz < f ≤ 40 GHz	-137 dBm, typ. -141 dBm
	40 GHz < f ≤ 43.5 GHz	-135 dBm, typ. -140 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-150 dBm, typ. -155 dBm
	13.6 GHz ≤ f < 18 GHz	-149 dBm, typ. -154 dBm
	18 GHz ≤ f < 25 GHz	-147 dBm, typ. -152 dBm
	25 GHz ≤ f ≤ 34 GHz	-144 dBm, typ. -149 dBm
	34 GHz < f ≤ 40 GHz	-141 dBm, typ. -145 dBm
	40 GHz < f ≤ 43.5 GHz	-139 dBm, typ. -144 dBm
RF preamplifier = 30 dB	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector on	
	100 kHz < f ≤ 1 MHz	-160 dBm, typ. -163 dBm
	1 MHz < f ≤ 3 GHz	-165 dBm, typ. -169 dBm
	3 GHz < f ≤ 8 GHz	-162 dBm, typ. -166 dBm
	8 GHz < f ≤ 18 GHz	-162 dBm, typ. -167 dBm
	18 GHz < f ≤ 26.5 GHz	-161 dBm, typ. -166 dBm
	26.5 GHz < f ≤ 40 GHz	-160 dBm, typ. -164 dBm
	40 GHz < f ≤ 43.5 GHz	-157 dBm, typ. -162 dBm
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

Displayed average noise level of the R&S®FSW50 without R&S®FSW-B24 option		
	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-151 dBm, typ. -156 dBm
	1 GHz < f < 3 GHz ⁴	-154 dBm, typ. -159 dBm
	3 GHz ≤ f < 8 GHz	-151 dBm, typ. -156 dBm
	8 GHz ≤ f < 13.6 GHz	-150 dBm, typ. -154 dBm
	13.6 GHz ≤ f < 18 GHz	-149 dBm, typ. -153 dBm
	18 GHz ≤ f < 25 GHz	-147 dBm, typ. -151 dBm
	25 GHz ≤ f ≤ 34 GHz	-143 dBm, typ. -147 dBm
	34 GHz < f ≤ 40 GHz	-140 dBm, typ. -144 dBm
	40 GHz < f ≤ 43.5 GHz	-138 dBm, typ. -142 dBm
	43.5 GHz < f ≤ 47 GHz	-136 dBm, typ. -140 dBm
	47 GHz < f ≤ 49 GHz	-134 dBm, typ. -138 dBm
	49 GHz < f ≤ 50 GHz	-132 dBm, typ. -136 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-152 dBm, typ. -157 dBm
	13.6 GHz ≤ f < 18 GHz	-151 dBm, typ. -156 dBm
	18 GHz ≤ f < 25 GHz	-149 dBm, typ. -154 dBm
	25 GHz ≤ f ≤ 34 GHz	-147 dBm, typ. -151 dBm
	34 GHz < f ≤ 40 GHz	-144 dBm, typ. -148 dBm
	40 GHz < f ≤ 43.5 GHz	-142 dBm, typ. -146 dBm
	43.5 GHz < f ≤ 47 GHz	-140 dBm, typ. -144 dBm
	47 GHz < f ≤ 49 GHz	-138 dBm, typ. -142 dBm
	49 GHz < f ≤ 50 GHz	-136 dBm, typ. -140 dBm
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

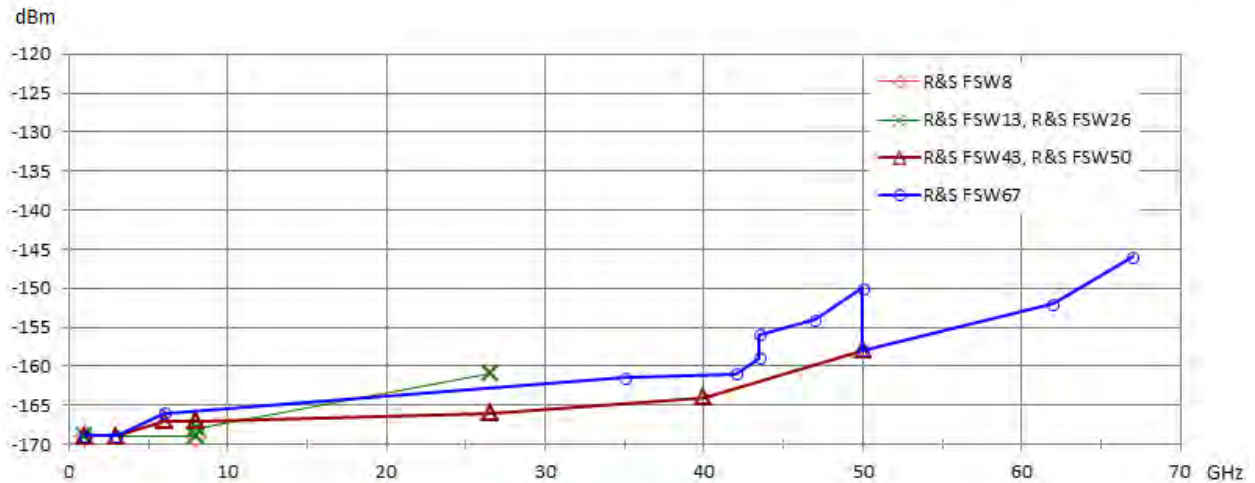
Displayed average noise level of the R&S®FSW50 with R&S®FSW-B24 option		
RF preamplifier off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm
	1 kHz < f < 9 kHz	-135 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm
	1 GHz < f < 3 GHz ³	-150 dBm
	1 GHz < f < 3 GHz ⁴	-153 dBm
	3 GHz ≤ f < 8 GHz	-150 dBm
	8 GHz ≤ f < 13.6 GHz	-148 dBm
	13.6 GHz ≤ f < 18 GHz	-147 dBm
	18 GHz ≤ f < 25 GHz	-145 dBm
	25 GHz ≤ f ≤ 34 GHz	-140 dBm
	34 GHz < f ≤ 40 GHz	-137 dBm
	40 GHz < f ≤ 43.5 GHz	-135 dBm
	43.5 GHz < f ≤ 47 GHz	-133 dBm
	47 GHz < f ≤ 49 GHz	-131 dBm
	49 GHz < f ≤ 50 GHz	-129 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-150 dBm
	13.6 GHz ≤ f < 18 GHz	-149 dBm
	18 GHz ≤ f < 25 GHz	-147 dBm
	25 GHz ≤ f ≤ 34 GHz	-144 dBm
	34 GHz < f ≤ 40 GHz	-141 dBm
	40 GHz < f ≤ 43.5 GHz	-139 dBm
	43.5 GHz < f ≤ 47 GHz	-137 dBm
47 GHz < f ≤ 49 GHz	-135 dBm	
49 GHz < f ≤ 50 GHz	-133 dBm	
RF preamplifier = 30 dB	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector on	
	100 kHz < f ≤ 1 MHz	-160 dBm
	1 MHz < f ≤ 3 GHz	-165 dBm
	3 GHz < f ≤ 8 GHz	-162 dBm
	8 GHz < f ≤ 18 GHz	-162 dBm
	18 GHz < f ≤ 26.5 GHz	-161 dBm
	26.5 GHz < f ≤ 40 GHz	-160 dBm
	R&S®FSW-B24 option, model .49	
	40 GHz < f ≤ 43 GHz	-157 dBm
	43 GHz < f ≤ 50 GHz	-149 dBm
	R&S®FSW-B24 option, model .51	
	40 GHz < f ≤ 43.5 GHz	-157 dBm
	43.5 GHz < f ≤ 47 GHz	-155 dBm
	47 GHz < f ≤ 50 GHz	-153 dBm
	Improvement with noise cancellation	for noise-like signals
R&S®FSW-B24 option, model .49		
100 kHz < f ≤ 43 GHz		13 dB (nom.)
43 GHz < f ≤ 50 GHz		0 dB (nom.)
R&S®FSW-B24 option, model .51		
100 kHz < f ≤ 50 GHz	13 dB (nom.)	

Displayed average noise level of the R&S®FSW67 without R&S®FSW-B24 option		
	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-151 dBm, typ. -156 dBm
	1 GHz < f < 3 GHz ⁴	-154 dBm, typ. -159 dBm
	3 GHz ≤ f < 8 GHz	-151 dBm, typ. -156 dBm
	8 GHz ≤ f < 13.6 GHz	-146 dBm, typ. -150 dBm
	13.6 GHz ≤ f < 18 GHz	-144 dBm, typ. -148 dBm
	18 GHz ≤ f < 23 GHz	-141 dBm, typ. -145 dBm
	23 GHz ≤ f < 30 GHz	-137 dBm, typ. -141 dBm
	30 GHz ≤ f ≤ 34 GHz	-135 dBm, typ. -139 dBm
	34 GHz < f ≤ 43.5 GHz	-131 dBm, typ. -135 dBm
	43.5 GHz < f ≤ 47 GHz	-127 dBm, typ. -131 dBm
	47 GHz < f ≤ 49 GHz	-124 dBm, typ. -128 dBm
	49 GHz < f ≤ 50 GHz	-122 dBm, typ. -126 dBm
	50 GHz < f ≤ 51 GHz	-128 dBm, typ. -130 dBm
	51 GHz < f ≤ 55 GHz	-131 dBm, typ. -133 dBm
	55 GHz < f ≤ 62 GHz	-127 dBm, typ. -129 dBm
	62 GHz < f ≤ 67 GHz	-122 dBm, typ. -124 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-148 dBm, typ. -152 dBm
	13.6 GHz ≤ f < 18 GHz	-146 dBm, typ. -150 dBm
	18 GHz ≤ f < 23 GHz	-143 dBm, typ. -147 dBm
	23 GHz ≤ f < 30 GHz	-139 dBm, typ. -142 dBm
	30 GHz ≤ f ≤ 34 GHz	-137 dBm, typ. -140 dBm
	34 GHz < f ≤ 43.5 GHz	-133 dBm, typ. -136 dBm
	43.5 GHz < f ≤ 47 GHz	-129 dBm, typ. -132 dBm
	47 GHz < f ≤ 49 GHz	-126 dBm, typ. -129 dBm
	49 GHz < f ≤ 50 GHz	-125 dBm, typ. -128 dBm
	50 GHz < f ≤ 51 GHz	-128 dBm, typ. -130 dBm
	51 GHz < f ≤ 55 GHz	-131 dBm, typ. -133 dBm
	55 GHz < f ≤ 62 GHz	-127 dBm, typ. -129 dBm
	62 GHz < f ≤ 67 GHz	-122 dBm, typ. -124 dBm
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)

Displayed average noise level of the R&S®FSW67 with R&S®FSW-B24 option		
RF preamplifier off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode log, sample detector, +5 °C to +40 °C	
	2 Hz ≤ f ≤ 100 Hz	-110 dBm, typ. -120 dBm
	100 Hz < f ≤ 1 kHz	-120 dBm, typ. -130 dBm
	1 kHz < f < 9 kHz	-135 dBm, typ. -147 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, f ≥ 8 GHz: YIG preselector on	
	9 kHz ≤ f ≤ 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz < f ≤ 1 GHz	-149 dBm, typ. -154 dBm
	1 GHz < f < 3 GHz ³	-150 dBm, typ. -155 dBm
	1 GHz < f < 3 GHz ⁴	-153 dBm, typ. -158 dBm
	3 GHz ≤ f < 8 GHz	-150 dBm, typ. -155 dBm
	8 GHz ≤ f < 13.6 GHz	-144 dBm, typ. -148 dBm
	13.6 GHz ≤ f ≤ 18 GHz	-142 dBm, typ. -146 dBm
	18 GHz ≤ f < 23 GHz	-139 dBm, typ. -143 dBm
	23 GHz ≤ f < 30 GHz	-135 dBm, typ. -139 dBm
	30 GHz ≤ f ≤ 34 GHz	-132 dBm, typ. -136 dBm
	34 GHz < f ≤ 43.5 GHz	-128 dBm, typ. -132 dBm
	43.5 GHz < f ≤ 47 GHz	-124 dBm, typ. -128 dBm
	47 GHz < f ≤ 49 GHz	-121 dBm, typ. -125 dBm
	49 GHz < f ≤ 50 GHz	-119 dBm, typ. -123 dBm
	50 GHz < f ≤ 51 GHz	-125 dBm, typ. -127 dBm
	51 GHz < f ≤ 55 GHz	-128 dBm, typ. -130 dBm
	55 GHz < f ≤ 62 GHz	-124 dBm, typ. -126 dBm
	62 GHz < f ≤ 67 GHz	-119 dBm, typ. -121 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector off	
	8 GHz ≤ f < 13.6 GHz	-146 dBm, typ. -150 dBm
	13.6 GHz ≤ f < 18 GHz	-144 dBm, typ. -148 dBm
	18 GHz ≤ f < 23 GHz	-141 dBm, typ. -145 dBm
	23 GHz ≤ f < 30 GHz	-137 dBm, typ. -141 dBm
	30 GHz ≤ f ≤ 34 GHz	-134 dBm, typ. -138 dBm
	34 GHz < f ≤ 43.5 GHz	-130 dBm, typ. -133 dBm
	43.5 GHz < f ≤ 47 GHz	-126 dBm, typ. -129 dBm
	47 GHz < f ≤ 49 GHz	-123 dBm, typ. -126 dBm
	49 GHz < f ≤ 50 GHz	-122 dBm, typ. -125 dBm
50 GHz < f ≤ 51 GHz	-125 dBm, typ. -127 dBm	
51 GHz < f ≤ 55 GHz	-128 dBm, typ. -130 dBm	
55 GHz < f ≤ 62 GHz	-124 dBm, typ. -126 dBm	
62 GHz < f ≤ 67 GHz	-119 dBm, typ. -121 dBm	
RF preamplifier = 30 dB	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +5 °C to +40 °C, YIG preselector on	
	100 kHz < f ≤ 1 MHz	-160 dBm, typ. -163 dBm
	1 MHz < f ≤ 3 GHz	-165 dBm, typ. -169 dBm
	3 GHz < f ≤ 8 GHz	-162 dBm, typ. -166 dBm
	8 GHz < f ≤ 18 GHz	-161 dBm, typ. -166 dBm
	18 GHz < f ≤ 26.5 GHz	-160 dBm, typ. -165 dBm
	26.5 GHz < f ≤ 35 GHz	-159 dBm, typ. -163 dBm
	35 GHz < f ≤ 42 GHz	-157 dBm, typ. -161 dBm
	42 GHz < f ≤ 47 GHz	-150 dBm, typ. -154 dBm
	47 GHz < f ≤ 50 GHz	-146 dBm, typ. -150 dBm
	50 GHz < f ≤ 52 GHz	-154 dBm, typ. -158 dBm
	52 GHz < f ≤ 54 GHz	-152 dBm, typ. -156 dBm
	54 GHz < f ≤ 62 GHz	-148 dBm, typ. -152 dBm
62 GHz < f ≤ 67 GHz	-142 dBm, typ. -146 dBm	
Improvement with noise cancellation	for noise-like signals	13 dB (nom.)



Typical displayed average noise level of the R&S®FSW models for $f > 1$ GHz without R&S®FSW-B24 RF preamplifier option installed.



Typical displayed average noise level of the R&S®FSW models for $f > 1$ GHz with R&S®FSW-B24⁷ RF preamplifier option, preamplifier gain = 30 dB.

⁷ For frequencies > 43 GHz, the curve shown for R&S®FSW50 applies for the R&S®FSW-B24 option (model .51).

Spurious responses

Spurious responses	YIG preselector on for $f \geq 8$ GHz, mixer level ≤ -10 dBm ⁸ , sweep optimization: auto or dynamic	
Image response	$f_{in} - 2 \times 8997$ MHz (1 st IF)	< -90 dBc
	$f_{in} - 2 \times 1317$ MHz (2 nd IF)	< -90 dBc
	$f_{in} - 2 \times 37$ MHz (3 rd IF)	< -90 dBc
Intermediate frequency response	1 st IF (8997 MHz)	< -90 dBc
	2 nd IF (1317 MHz)	< -90 dBc
	3 rd IF (37 MHz)	< -90 dBc
Residual spurious response	RF attenuation = 0 dB	
	$f \leq 1$ MHz	< -90 dBm
	$1 \text{ MHz} < f \leq 8900$ MHz	< -110 dBm
	$8900 \text{ MHz} < f \leq 26.5$ GHz	< -100 dBm
	$26.5 \text{ GHz} < f \leq 67$ GHz	< -100 dBm
	f = receive frequency	
Local oscillators related spurious	$f_{in} < 1$ GHz	
	$10 \text{ Hz} \leq \text{offset from carrier} < 200$ Hz	< -90 dBc
	offset from carrier > 200 Hz	< -100 dBc
	$f_{in} \geq 1$ GHz	
	$10 \text{ Hz} \leq \text{offset from carrier} < 200$ Hz	< -90 dBc + 20 log (f_{in}/GHz)
	offset from carrier > 200 Hz	
	$f \leq 50$ GHz	< -100 dBc + 20 log (f_{in}/GHz)
	$f > 50$ GHz, RBW ≤ 10 kHz	< -100 dBc + 20 log (f_{in}/GHz)
	$f > 50$ GHz, RBW > 10 kHz	< -80 dBc + 20 log (f_{in}/GHz)
	f = receive frequency	
Vibrational environmental stimuli	max. 0.21 g RMS	< -60 dBc + 20 log (f_{in}/GHz) (nom.)

⁸ Mixer level = signal level – RF attenuation + preamplifier gain.

Level measurement uncertainty

Absolute level uncertainty at 64 MHz	RBW = 10 kHz, level = -10 dBm, reference level = -10 dBm, RF attenuation = 10 dB without R&S®FSW-B25 option or electronic attenuator off	< 0.2 dB ($\sigma = 0.07$ dB)
	with R&S®FSW-B25 option, electronic attenuator on	< 0.4 dB ($\sigma = 0.14$ dB)
Frequency response, referenced to 64 MHz, YIG preselector on	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, +20 °C to +30 °C, electronic attenuator off	
	2 Hz \leq f < 9 kHz	< 1 dB (nom.)
	9 kHz \leq f < 10 MHz	< 0.45 dB ($\sigma = 0.17$ dB)
	10 MHz \leq f < 3.6 GHz	< 0.3 dB ($\sigma = 0.10$ dB)
	3.6 GHz \leq f \leq 8 GHz	< 0.5 dB ($\sigma = 0.17$ dB)
	8 GHz < f < 22 GHz, span < 1 GHz	< 1.5 dB ($\sigma = 0.50$ dB)
	22 GHz \leq f \leq 26.5 GHz, span < 1 GHz	< 2 dB ($\sigma = 0.67$ dB)
	26.5 GHz < f \leq 50 GHz, span < 1 GHz	< 2.5 dB ($\sigma = 0.83$ dB)
	50 GHz < f \leq 67 GHz, span < 1 GHz	< 3.0 dB ($\sigma = 1.0$ dB)
	any RF attenuation or electronic attenuator on, +15 °C to +40 °C	
	2 Hz \leq f < 9 kHz	< 1 dB (nom.)
	9 kHz \leq f < 3.6 GHz	< 0.6 dB ($\sigma = 0.20$ dB)
	3.6 GHz \leq f \leq 8 GHz	< 0.8 dB ($\sigma = 0.27$ dB)
	8 GHz < f < 22 GHz, span < 1 GHz	< 2 dB ($\sigma = 0.67$ dB)
	22 GHz \leq f \leq 26.5 GHz, span < 1 GHz	< 2.5 dB ($\sigma = 0.83$ dB)
	26.5 GHz < f \leq 50 GHz, span < 1 GHz	< 3 dB ($\sigma = 1.0$ dB)
	50 GHz < f \leq 67 GHz, span < 1 GHz	< 3.5 dB ($\sigma = 1.17$ dB)
	RF attenuation \leq 20 dB, RF preamplifier on, +20 °C to +30 °C	
	10 MHz \leq f < 3.6 GHz	< 0.6 dB ($\sigma = 0.2$ dB)
	3.6 GHz \leq f \leq 8 GHz	< 0.8 dB ($\sigma = 0.27$ dB)
8 GHz < f < 22 GHz, span < 1 GHz	< 2 dB ($\sigma = 0.67$ dB)	
22 GHz \leq f \leq 26.5 GHz, span < 1 GHz	< 2.5 dB ($\sigma = 0.83$ dB)	
26.5 GHz < f \leq 50 GHz, span < 1 GHz	< 3 dB ($\sigma = 1.0$ dB)	
50 GHz < f \leq 67 GHz, span < 1 GHz	< 3.5 dB ($\sigma = 1.17$ dB)	
Frequency response, referenced to 64 MHz, YIG preselector off	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, +20 °C to +30 °C, electronic attenuator off	
	f < 8 GHz	same values as with preselector on
	8 GHz \leq f < 22 GHz	< 1.5 dB ($\sigma = 0.5$ dB)
	22 GHz \leq f \leq 26.5 GHz	< 2 dB ($\sigma = 0.6$ dB)
	26.5 GHz < f \leq 67 GHz, span < 1 GHz	< 2.5 dB ($\sigma = 0.83$ dB)
	any RF attenuation or electronic attenuator on, +15 °C to +40 °C	
	f < 8 GHz	same values as with preselector on
	8 GHz \leq f < 22 GHz	< 2 dB ($\sigma = 0.6$ dB)
	22 GHz \leq f \leq 26.5 GHz	< 2.5 dB ($\sigma = 0.75$ dB)
	26.5 GHz < f \leq 67 GHz, span < 1 GHz	< 3 dB ($\sigma = 1.0$ dB)
	RF attenuation \leq 20 dB, RF preamplifier on, +20 °C to +30 °C	
	f < 8 GHz	same values as with preselector on
	8 GHz \leq f < 22 GHz	< 2 dB ($\sigma = 0.6$ dB)
	22 GHz \leq f \leq 26.5 GHz	< 2.5 dB ($\sigma = 0.75$ dB)
26.5 GHz < f \leq 67 GHz, span < 1 GHz	< 3 dB ($\sigma = 1.0$ dB)	
Attenuator switching uncertainty	f = 64 MHz, 0 dB to 70 dB, referenced to 10 dB attenuation	< 0.2 dB ($\sigma = 0.07$ dB)
Uncertainty of reference level setting	input mixer level \leq -15 dBm	0 dB ⁹
	input mixer level > -15 dBm	< 0.1 dB (nom.)
Bandwidth switching uncertainty	referenced to RBW = 10 kHz	< 0.1 dB ($\sigma = 0.04$ dB)

⁹ The reference level setting affects only the graphical representation of the measurement result on the display, not the measurement itself.
The reference level setting causes no additional uncertainty in measurement results.

Nonlinearity of displayed level		
Logarithmic level display	S/N > 16 dB, 0 dB ≤ level ≤ -70 dB	< 0.1 dB ($\sigma = 0.04$ dB)
	S/N > 16 dB, -70 dB < level ≤ -90 dB	< 0.2 dB ($\sigma = 0.08$ dB)
Linear level display	S/N > 16 dB, 0 dB to -70 dB	< 5 % of reference level (nom.)

Total measurement uncertainty		
YIG preselector on	signal level = 0 dB to -70 dB below reference level, S/N > 20 dB, sweep time = auto, RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, span/RBW < 100, 95 % confidence level, +20 °C to +30 °C	
	9 kHz ≤ f ≤ 10 MHz	±0.37 dB
	10 MHz < f ≤ 3.6 GHz	±0.27 dB
	3.6 GHz < f ≤ 8 GHz	±0.37 dB
	8 GHz < f ≤ 22 GHz	±1.4 dB
	22 GHz < f ≤ 26.5 GHz	±1.7 dB
	26.5 GHz < f ≤ 50 GHz	±2.5 dB
	50 GHz < f ≤ 67 GHz	±2.8 dB
YIG preselector off	signal level = 0 dB to -70 dB below reference level, S/N > 20 dB, sweep time = auto, RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, span/RBW < 100, 95 % confidence level, +20 °C to +30 °C	
	8 GHz ≤ f ≤ 22 GHz	±1.0 dB
	22 GHz < f ≤ 26.5 GHz	±1.2 dB
	26.5 GHz < f ≤ 67 GHz	±1.7 dB

Adjacent channel power dynamic range

Adjacent channel leakage ratio (ACLR)	3GPP WCDMA, single carrier, 1 DPCH, carrier frequency = 2 GHz	
	noise cancellation off ¹⁰	
	1st adjacent channel	-76 dB (nom.)
	2nd adjacent channel	-82 dB (nom.)
	noise cancellation on	
	1st adjacent channel	-88 dB (nom.)
	2nd adjacent channel	-90 dB (nom.)

Optimum mixer level	3GPP WCDMA, single carrier, 1 DPCH, carrier frequency = 2 GHz	
	noise cancellation off	
	1st adjacent channel	-5 dBm (nom.)
	2nd adjacent channel	0 dBm (nom.)
	noise cancellation on	
	1st adjacent channel	-12 dBm (nom.)
	2nd adjacent channel	-5 dBm (nom.)

Measurement speed ¹¹

Local measurement and display update rate	1001 sweep points	1.25 ms (800/s) (meas.)
Remote measurement, 1000 sweep averages ¹²	1001 sweep points	1.0 ms (1000/s) (meas.)
Remote measurement and LAN transfer ⁸		5 ms (200/s) (meas.)
Marker peak search		1.7 ms (meas.)
Center frequency tune and transfer ⁸	f ≤ 8 GHz	15 ms (meas.)
	f > 8 GHz	65 ms (meas.)

¹⁰ Noise cancellation off represents the raw performance of the R&S®FSW without numeric compensation for its inherent noise.

¹¹ Sweep points set to 1001 points (= default), sweep optimization set to "speed".

¹² Measured with PC equipped with Intel® Core™ i7 CPU 2.8 GHz and Gbit LAN interface.

Trigger functions

Trigger		
Trigger source	spectrum analysis	free run, video, external, IF power, RF power
	I/Q analyzer or modulation analysis	I/Q trigger additionally ¹³
Trigger offset	span \geq 10 Hz	5 ns to 20 s
	span = 0 Hz	(–sweep time) to 20 s
Min. trigger offset resolution	span > 0 Hz	5 ns
	span = 0 Hz, trigger offset > 0	5 ns
	span = 0 Hz, trigger offset < 0	sweep time/number of sweep points
Max. deviation of trigger offset		5 ns
IF power trigger		
Sensitivity	min. signal power	
	spectrum analysis	–60 dBm + RF attenuation – RF preamplifier gain (nom.)
	I/Q analyzer or modulation analysis	
	set analysis bandwidth \leq 80 MHz	–60 dBm + RF attenuation – RF preamplifier gain (nom.)
	set analysis bandwidth > 80 MHz	–30 dBm + RF attenuation – RF preamplifier gain (nom.)
max. signal power	–10 dBm + RF attenuation – RF preamplifier gain (nom.)	
IF power trigger bandwidth	RBW > 500 kHz	20 MHz (nom.) ¹⁴
	RBW \leq 500 kHz, FFT	20 MHz (nom.)
	RBW \leq 500 kHz, swept	6 MHz (nom.)
RF power trigger		
Sensitivity	min. signal power	–30 dBm + RF attenuation – RF preamplifier gain (nom.)
	max. signal power	+10 dBm + RF attenuation – RF preamplifier gain (nom.)
RF power trigger frequency range	f \leq 8 GHz	8 GHz (nom.)
	f > 8 GHz	center frequency \pm 250 MHz (nom.) ¹⁵
Gated sweep		
Gate source		video, external, IF power, RF power
Gate delay		5 ns to 20 s, min. resolution 5 ns
Gate length		5 ns to 20 s, min. resolution 5 ns
Max. deviation of gate length		\pm 5 ns

Audio demodulator

Demodulation		
AF demodulation types		AM and FM
Audio output		loudspeaker and phone jack
Marker stop time in spectrum mode		100 ms to 60 s

¹³ Not available for analysis bandwidth > 80 MHz if R&S®FSW-B500 is installed.

¹⁴ Sweep optimization = "auto".

¹⁵ YIG preselector off for f \geq 8 GHz.

I/Q data

The specifications in this section apply to the basic instrument and the R&S®FSW-B28/-B40/-B80/-B160/-B320/-B500 options. For specifications of the R&S®FSW-B2000 option please refer to section R&S®FSW-B2000 2 GHz analysis bandwidth.

Record length		max. 400 Msample I and Q
Word length of I/Q samples	sampling rate > 100 MHz or number of samples > 300 Msample	18 bit
	otherwise	24 bit
Sampling rate	standard	100 Hz to 200 MHz
	with R&S®FSW-B28/-B40/-B80 options	100 Hz to 200 MHz
	with R&S®FSW-B160/-B320 options	100 Hz to 1 GHz
	with R&S®FSW-B500 option	100 Hz to 1.2 GHz
Max. signal analysis bandwidth (equalized)	standard	10 MHz
	with R&S®FSW-B28 option	28 MHz (nom.) ¹⁵
	with R&S®FSW-B40 option	40 MHz (nom.) ¹⁵
	with R&S®FSW-B80 option	80 MHz (nom.) ¹⁵
	with R&S®FSW-B160 option	160 MHz (nom.) ¹⁵
	with R&S®FSW-B320 option	320 MHz (nom.) ¹⁵
with R&S®FSW-B500 option	500 MHz (nom.) ¹⁵	
Signal analysis bandwidth ≤ 80 MHz		
Amplitude flatness	$(1.25 \times \text{signal analysis bandwidth}) \leq$ $f_{\text{center}} < 8 \text{ GHz}$	±0.3 dB (nom.)
	$f_{\text{center}} \geq 8 \text{ GHz}$, YIG preselector off	±0.5 dB (nom.)
Deviation from linear phase	$(1.25 \times \text{signal analysis bandwidth}) \leq$ $f_{\text{center}} < 8 \text{ GHz}$	±1° (nom.)
	$f_{\text{center}} \geq 8 \text{ GHz}$, YIG preselector off	±2° (nom.)
Nonlinearity of displayed level		see section Level measurement uncertainty - Nonlinearity of displayed level
Level measurement uncertainty		see Total measurement uncertainty, YIG preselector off
Third-order intermodulation distortion		see Third-order intercept point (TOI)
ADC related spurious response	mixer level = -30 dBm ¹⁶	
	analysis bandwidth < 17 MHz	-100 dBc (nom.)
	17 MHz ≤ analysis bandwidth < 80 MHz	-80 dBc (nom.)
Other spurious responses		see Spurious responses

¹⁶ Level of a tone at the input mixer (also abbreviated as "mixer level") = signal level – RF attenuation + preamplifier gain.

Signal analysis bandwidth 80 MHz to 160 MHz ¹⁷		
Amplitude flatness	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.5 \text{ dB (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} < 8 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}$
	$8 \text{ GHz} \leq f_{\text{center}} < 26.5 \text{ GHz}$	$\pm 1 \text{ dB (nom.)}$
	$26.5 \text{ GHz} \leq f_{\text{center}} \leq 67 \text{ GHz}$	$\pm 2 \text{ dB (nom.)}$
Deviation from linear phase	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 1^\circ \text{ (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} < 8 \text{ GHz}$	$\pm 2^\circ \text{ (nom.)}$
	$8 \text{ GHz} \leq f_{\text{center}} < 26.5 \text{ GHz}$	$\pm 2.5^\circ \text{ (nom.)}$
	$26.5 \text{ GHz} \leq f_{\text{center}} < 43.5 \text{ GHz}$	$\pm 4^\circ \text{ (nom.)}$
Nonlinearity of displayed level	$43.5 \text{ GHz} \leq f_{\text{center}} \leq 67 \text{ GHz}$	$\pm 8^\circ \text{ (nom.)}$
	0 dB to -70 dB	< 0.15 dB (nom.)
Level measurement uncertainty at center frequency		add 0.2 dB (nom.) to the values in Total measurement uncertainty, YIG preselector off
Third-order intermodulation distortion	$150 \text{ MHz} \leq f_{\text{center}} < 8 \text{ GHz}$: two -20 dBm tones at input mixer within analysis bandwidth ¹⁶ , $f_{\text{center}} \geq 8 \text{ GHz}$: two -25 dBm tones at input mixer within analysis bandwidth ¹⁶ , reference level = signal level + 6 dB	-70 dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f_{\text{center}} \geq 150 \text{ MHz}$	-90 dBm (nom.)
ADC related spurious response	single tone within analysis bandwidth, mixer level = -10 dBm ¹⁶ , reference level = signal level, $f_{\text{center}} \geq 150 \text{ MHz}$	-70 dBc (nom.)
Other spurious responses		see Spurious responses

¹⁷ The R&S®FSW-B160 option is required for 80 MHz to 160 MHz analysis bandwidth.

Signal analysis bandwidth 160 MHz to 320 MHz ¹⁸		
Amplitude flatness	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	$460 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} < 7 \text{ GHz}$	$\pm 1.2 \text{ dB (nom.)}$
	$7 \text{ GHz} \leq f_{\text{center}} < 8 \text{ GHz}$ ¹⁹	$\pm 1.4 \text{ dB (nom.)}$
	$8 \text{ GHz} \leq f_{\text{center}} < 22 \text{ GHz}$	$\pm 1.6 \text{ dB (nom.)}$
	$22 \text{ GHz} \leq f_{\text{center}} \leq 43.5 \text{ GHz}$	$\pm 2 \text{ dB (nom.)}$
Deviation from linear phase	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	$460 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 2.5^\circ \text{ (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} < 8 \text{ GHz}$ ¹⁹	$\pm 4^\circ \text{ (nom.)}$
	$8 \text{ GHz} \leq f_{\text{center}} < 43.5 \text{ GHz}$	$\pm 5^\circ \text{ (nom.)}$
	$43.5 \text{ GHz} \leq f_{\text{center}} \leq 67 \text{ GHz}$	$\pm 8^\circ \text{ (nom.)}$
Nonlinearity of displayed level	0 dB to -70 dB	< 0.15 dB (nom.)
Level measurement uncertainty at center frequency		add 0.2 dB (nom.) to the values in Total measurement uncertainty, YIG preselector off
Third-order intermodulation distortion	$460 \text{ MHz} \leq f_{\text{center}} < 8 \text{ GHz}$: two -20 dBm tones at input mixer within analysis bandwidth ¹⁶ , $f_{\text{center}} \geq 8 \text{ GHz}$: two -25 dBm tones at input mixer within analysis bandwidth ¹⁶ , reference level = signal level + 6 dB	-65 dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f_{\text{center}} \geq 460 \text{ MHz}$	-90 dBm (nom.)
ADC related spurious response	single tone within analysis bandwidth, mixer level = -10 dBm ¹⁶ , reference level = signal level, $f_{\text{center}} \geq 460 \text{ MHz}$	-67 dBc (nom.)
Other spurious responses		see Spurious responses

¹⁸ The R&S®FSW-B320 option is required for 160 MHz to 320 MHz analysis bandwidth.

¹⁹ To obtain the set analysis bandwidth, $(f_{\text{center}} + \frac{1}{2} \text{ analysis bandwidth}) \leq 8 \text{ GHz}$ must be met.

Signal analysis bandwidth 80 MHz to 500 MHz with R&S®FSW-B500 option		
Amplitude flatness	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	analysis bandwidth ≤ 160 MHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.5 \text{ dB (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 8 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}$
	analysis bandwidth ≤ 500 MHz	
	$460 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 8 \text{ GHz}$	$\pm 1.0 \text{ dB (nom.)}$
	any analysis bandwidth	
	$8 \text{ GHz} < f_{\text{center}} \leq 26.5 \text{ GHz}$	$\pm 1.2 \text{ dB (nom.)}$
	$26.5 \text{ GHz} < f_{\text{center}} \leq 43.5 \text{ GHz}$	$\pm 1.5 \text{ dB (nom.)}$
$f_{\text{center}} > 43.5 \text{ GHz}$	$\pm 2 \text{ dB (nom.)}$	
Deviation from linear phase	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off for $f \geq 8$ GHz	
	analysis bandwidth ≤ 160 MHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 1^\circ \text{ (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 8 \text{ GHz}$	$\pm 2^\circ \text{ (nom.)}$
	$8 \text{ GHz} < f_{\text{center}} \leq 26.5 \text{ GHz}$	$\pm 2.5^\circ \text{ (nom.)}$
	$f_{\text{center}} > 26.5 \text{ GHz}$	$\pm 3^\circ \text{ (nom.)}$
	analysis bandwidth ≤ 320 MHz	
	$460 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 2.5^\circ \text{ (nom.)}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 8 \text{ GHz}$	$\pm 4^\circ \text{ (nom.)}$
	$f_{\text{center}} > 8 \text{ GHz}$	$\pm 5^\circ \text{ (nom.)}$
	analysis bandwidth ≤ 500 MHz	
	$460 \text{ MHz} \leq f_{\text{center}} \leq 26.5 \text{ GHz}$	$\pm 5^\circ \text{ (nom.)}$
	$f_{\text{center}} > 26.5 \text{ GHz}$	$\pm 7^\circ \text{ (nom.)}$
Nonlinearity of displayed level	0 dB to -70 dB	
Level measurement uncertainty at center frequency	$< 0.15 \text{ dB (nom.)}$	
	add 0.2 dB (nom.) to the values in Total measurement uncertainty, YIG preselector off	
Third-order intermodulation distortion	$f_{\text{center}} \leq 8 \text{ GHz}$: two -20 dBm tones at input mixer within analysis bandwidth ¹⁶ , $f_{\text{center}} > 8 \text{ GHz}$: two -25 dBm tones at input mixer within analysis bandwidth ¹⁶ , YIG preselector off, reference level = signal level + 6 dB	-65 dBc (nom.)
Residual spurious response	RF attenuation 0 dB, analysis bandwidth ≤ 160 MHz and $f_{\text{center}} \geq 150$ MHz, or analysis bandwidth ≤ 500 MHz and $f_{\text{center}} \geq 650$ MHz, YIG preselector off for $f \geq 8$ GHz	-90 dBm (nom.)
ADC related spurious response	single tone within analysis bandwidth, mixer level = -15 dBm ¹⁶ , reference level = signal level, analysis bandwidth ≤ 160 MHz and $f_{\text{center}} \geq 150$ MHz, or analysis bandwidth ≤ 500 MHz and $f_{\text{center}} \geq 460$ MHz, YIG preselector off for $f \geq 8$ GHz	-65 dBc (nom.)
Other spurious responses	see Spurious responses	

Inputs and outputs

RF input		
Impedance		50 Ω
Connector	R&S®FSW8, R&S®FSW13 R&S®FSW26 R&S®FSW43 R&S®FSW50, R&S®FSW67	N female APC 3.5 mm male (compatible with SMA) 2.92 mm male (compatible with SMA) 1.85 mm male (compatible with 2.4 mm)
VSWR of R&S®FSW8	RF attenuation ≤ 4 dB	
	10 MHz $\leq f \leq 8$ GHz	typ. 1.87 ²⁰
	5 dB \leq RF attenuation ≤ 9 dB	
	10 MHz $\leq f < 1$ GHz	< 1.5 , typ. 1.20 ²⁰
	10 MHz $\leq f < 3.6$ GHz	< 1.5 , typ. 1.31 ²⁰
	3.6 GHz $\leq f \leq 8$ GHz	< 2.0 , typ. 1.51 ²⁰
	RF attenuation ≥ 10 dB	
	10 MHz $\leq f < 1$ GHz	< 1.2 , typ. 1.09 ²⁰
	1 GHz $\leq f < 3.6$ GHz	< 1.5 , typ. 1.19 ²⁰
3.6 GHz $\leq f \leq 8$ GHz	< 2.0 , typ. 1.42 ²⁰	
VSWR of R&S®FSW13	RF attenuation ≤ 4 dB	
	10 MHz $\leq f \leq 13.6$ GHz	typ. 1.87 ²⁰
	5 dB \leq RF attenuation ≤ 9 dB	
	10 MHz $\leq f < 3.6$ GHz	< 1.5 , typ. 1.25 ²⁰
	3.6 GHz $\leq f \leq 13.6$ GHz	< 2.0 , typ. 1.29 ²⁰
	RF attenuation ≥ 10 dB	
	10 MHz $\leq f < 1$ GHz	< 1.2 , typ. 1.10 ²⁰
	1 GHz $\leq f < 3.6$ GHz	< 1.5 , typ. 1.14 ²⁰
	3.6 GHz $\leq f \leq 13.6$ GHz	< 2.0 , typ. 1.22 ²⁰
VSWR of R&S®FSW26, R&S®FSW43, R&S®FSW50, R&S®FSW67	RF attenuation ≤ 4 dB	
	10 MHz $\leq f \leq 26.5$ GHz	typ. 1.87 ²⁰
	26.5 GHz $< f \leq 40$ GHz	typ. 2.0 ²⁰
	40 GHz $< f \leq 67$ GHz	2.0 (nom.)
	5 dB \leq RF attenuation ≤ 9 dB	
	10 MHz $\leq f \leq 3.5$ GHz	< 1.5 , typ. 1.24 ²⁰
	3.5 GHz $< f \leq 8$ GHz	< 1.8 , typ. 1.26 ²⁰
	8 GHz $< f \leq 18$ GHz	< 1.8 , typ. 1.39 ²⁰
	18 GHz $< f \leq 26.5$ GHz	< 2.0 , typ. 1.43 ²⁰
	26.5 GHz $< f \leq 40$ GHz	< 2.5 , typ. 1.8 ²⁰
	40 GHz $< f \leq 67$ GHz	2.0 (nom.)
	RF attenuation ≥ 10 dB	
	10 MHz $\leq f \leq 3.5$ GHz	< 1.2 , typ. 1.12 ²⁰
	3.5 GHz $< f \leq 8$ GHz	< 1.5 , typ. 1.19 ²⁰
	8 GHz $< f \leq 18$ GHz	< 1.5 , typ. 1.25 ²⁰
	18 GHz $< f \leq 26.5$ GHz	< 2.0 , typ. 1.37 ²⁰
	26.5 GHz $< f \leq 40$ GHz	< 2.5 , typ. 1.7 ²⁰
40 GHz $< f \leq 67$ GHz	2.0 (nom.)	
Setting range of attenuator		0 dB to 79 dB, in 1 dB steps ²¹

Probe power supply		
Supply voltages		+15 V DC, -12.6 V DC and ground, max. 150 mA (nom.)

Noise source control		
Connector		BNC female
Output voltage		0 V/28 V, max. 100 mA, switchable (nom.)

Power sensor		
Connector		6-pin LEMOSA female for R&S®NRP-Zxx power sensors

²⁰ Typical VSWR performance: performance expected to be met in 95 % of the cases with a confidence level of 95 %, temperature +20 °C to +30 °C, input set to "DC coupling". These values are not warranted and are subject to modification if a significant change in the statistical behavior of production instruments is observed.

²¹ Mechanical RF attenuator: 5 dB steps. Electronic IF attenuator: 1 dB steps.

USB interface		7 ports, type A plug, version 2.0
		1 port, type B plug, version 2.0

AF output		
Connector		3.5 mm mini-jack
Output impedance		10 Ω (nom.)
Open-circuit voltage		up to 1.5 V, adjustable
External trigger/gate		
Number of ports		1 \times input, 2 \times input/output, selectable
Connector		BNC female
Trigger input voltage		0.5 V to 3.5 V (nom.)
Trigger output voltage		TTL-compatible, 0 V/5 V (nom.)
Impedance		10 k Ω (nom.)

Reference input 1 MHz to 20 MHz		
Connector		BNC female
Impedance		50 Ω (nom.)
Input frequency range		1 MHz $\leq f_{in} \leq$ 20 MHz, in 1 Hz steps
Required level		> 0 dBm

Reference input 100 MHz		
Connector		SMA female
Impedance		50 Ω (nom.)
Input frequency range		100 MHz
Required level		0 dBm to 10 dBm

Reference output 10 MHz		
Connector		BNC female
Impedance		50 Ω (nom.)
Output frequency		10 MHz
Level		10 dBm (nom.)

Reference output 1 MHz to 20 MHz		
Connector		BNC female
Impedance		50 Ω (nom.)
Output frequency	internal reference	not active
	external reference	same as reference input signal
Level		same as reference input signal

Reference output 100 MHz		
Connector		SMA female
Impedance		50 Ω (nom.)
Output frequency		100 MHz
Level		6 dBm (nom.)

Reference output 640 MHz		
Connector		SMA female
Impedance		50 Ω (nom.)
Output frequency		640 MHz
Level		16 dBm (nom.)

IF/video output		
Connector		BNC female, 50 Ω (nom.)
IF out		
Bandwidth		equal to RBW setting
IF frequency		(RBW/2) to (240 MHz – RBW/2)
Output level	center frequency > 10 MHz, span = 0 Hz or I/Q analyzer on, signal at reference level and center frequency	0 dBm (nom.)

Video out		
Bandwidth		equal to VBW setting
Output scaling	log. display scale	logarithmic
	lin. display scale	linear
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	1 V at 50 Ω load (nom.)

IF wide output (with R&S®FSW-B160, R&S®FSW-B320 or R&S®FSW-B500 option only)		
Connector	R&S®FSW-B160 or R&S®FSW-B320	BNC female, 50 Ω (nom.)
	R&S®FSW-B500	SMA female, 50 Ω (nom.)
IF frequency	center frequency ≥ 200 MHz	50 MHz to 550 MHz (nom.)
Max. bandwidth (6 dB)	YIG preselector off	500 MHz
Output level	RF attenuation auto, reference level ≥ -15 dBm, signal level = reference level	-20 dBm (nom.)
Aux port		
Connector		9-pin D-Sub male
Output		TTL-compatible, 0 V/5 V (nom.), max. 15 mA (nom.)
Input		TTL-compatible, max. 5 V (nom.)

IF output 2 GHz (R&S®FSW43, R&S®FSW50 and R&S®FSW67 only)		
Connector		SMA female, 50 Ω (nom.)
RF frequency range	span = 0 Hz	8 GHz to the maximum frequency of the instrument model
IF frequency	center	2 GHz
Output level	RF attenuation = 0 dB, signal level = 0 dBm	
	R&S®FSW43, R&S®FSW50	-20 dBm (nom.)
	R&S®FSW67	-30 dBm (nom.)
Amplitude flatness	within IF frequency ±1 GHz, peak to peak, RF attenuation = 10 dB, RF preamplifier off, electronic attenuator off, YIG preselector off	
	R&S®FSW43, R&S®FSW50	
	$f_{\text{center}} \geq 8 \text{ GHz}$	8 dB (nom.)
	R&S®FSW67	
	$8 \text{ GHz} \leq f_{\text{center}} < 49 \text{ GHz}$	8 dB (nom.)
	$49 \text{ GHz} \leq f_{\text{center}} < 51 \text{ GHz}$	16 dB (nom.)
	$51 \text{ GHz} \leq f_{\text{center}} < 57 \text{ GHz}$	8 dB (nom.)
	$57 \text{ GHz} \leq f_{\text{center}} < 59 \text{ GHz}$	16 dB (nom.)
$59 \text{ GHz} \leq f_{\text{center}} < 63 \text{ GHz}$	10 dB (nom.)	
$63 \text{ GHz} \leq f_{\text{center}} \leq 67 \text{ GHz}$	16 dB (nom.)	

IEC/IEEE bus control		
Command set		interface in line with IEC 625-2 (IEEE 488.2)
Connector		SCPI 1997.0
Interface functions		24-pin Amphenol female SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

LAN interface		
Connector		10/100/1000BaseT RJ-45

External monitor		
Connector		DVI-D, DisplayPort Rev 1.1

Synchronization input		
Connector		HDMI™

Synchronization output		
Connector		HDMI™

General data

Display		30.7 cm (12.1") WXGA color touchscreen
Resolution		1280 × 800 pixel (WXGA resolution)
Pixel failure rate		$< 1 \times 10^{-5}$

Data storage		
Internal	standard	solid state disk \geq 32 Gbyte
External		supports USB 2.0 compatible memory devices

Temperature		
Temperature	operating temperature range	+5 °C to +50 °C
	permissible temperature range	0 °C to +55 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+40 °C at 90 % rel. humidity, in line with EN 60068-2-30, without condensation

Altitude		
Max. operating altitude	above sea level	4600 m (approx. 15100 feet)

Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz displacement: 0.15 mm constant amplitude (1.8 g at 55 Hz); 55 Hz to 150 Hz acceleration: 0.5 g constant in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E method no. 516.4, procedure I, MIL-PRF-28800F, class 3

EMC		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 ^{22, 23} IEC/EN 61326-2-1 CISPR 11/EN 55011 ²² IEC/EN 61000-3-2 IEC/EN 61000-3-3
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Recommended calibration interval		1 year
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²² Emission limits for class B equipment apply for instruments without option R&S®FSW-B500.

With installed option R&S®FSW-B500, emission limits for class A equipment apply.

²³ Immunity test requirement for industrial environment (EN 61326 table 2).

Power supply		
AC input voltage range		100 V to 240 V
AC supply frequency		50 Hz to 60 Hz/400 Hz
Max. input current		7.3 A (100 V) to 4.6 A (240 V)
Power consumption	R&S®FSW8	150 W without options, 250 W with all options (meas.)
	R&S®FSW13, R&S®FSW26	175 W without options, 275 W with all options (meas.)
	R&S®FSW43, R&S®FSW50	200 W without options, 300 W with all options (meas.)
	R&S®FSW67	220 W without options, 320 W with all options (meas.)
Safety		in line with IEC 61010-1, EN 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1-04
Test mark		VDE-GS, cCSA _{US}

Dimensions and weight		
Dimensions (nom.)	W × H × D, including front handles and rear feet	462 mm × 240 mm × 504 mm (18.15 in × 9.44 in × 19.81 in)
Net weight without options (nom.)	R&S®FSW8	18.6 kg (41.01 lb)
	R&S®FSW13	20.2 kg (44.53 lb)
	R&S®FSW26	20.2 kg (44.53 lb)
	R&S®FSW43, R&S®FSW50	20.9 kg (46.07 lb)
	R&S®FSW67	23.6 kg (52.03 lb)

Options

R&S®FSW-B10 external generator control

Interface		
IEC/IEEE bus control		24-pin Amphenol female
Aux control		9-pin D-Sub female

Supported signal generators		R&S®SGS100A, R&S®SMA100A, R&S®SMB100A, R&S®SMBV100A, R&S®SMC100A, R&S®SME, R&S®SMF100A, R&S®SMG, R&S®SMGL, R&S®SMGU, R&S®SMH, R&S®SMHU, R&S®SMIQ, R&S®SMJ100A, R&S®SML, R&S®SMP, R&S®SMR, R&S®SMT, R&S®SMU200A, R&S®SMV03, R&S®SMW200A, R&S®SMX, R&S®SMY
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R&S®FSW-B13 highpass filters

Frequency		
Frequency range	filter 1	1 GHz to 1.75 GHz
	filter 2	1.75 GHz to 3 GHz

Stopband attenuation		
500 MHz to 875 MHz	filter 1	> 20 dB (nom.)
875 MHz to 1.5 GHz	filter 2	> 20 dB (nom.)

Other specifications		
Level measurement uncertainty		see base unit specification
Displayed average noise level		
Intermodulation		
Measurement uncertainty		

R&S®FSW-B17 digital baseband interface

I/Q data IN		
Interface		LVDS
	connector	26-pin female MDR (Mini D Ribbon)
Transfer protocol		Rohde & Schwarz digital I/Q Interface ²⁴
User data	sample rate	100 sample/s to 100 Msample/s (nom.)
	resolution	18 bit for I and 18 bit for Q
	general purpose signals	2 bit

I/Q data OUT		
Interface		LVDS
	connector	26-pin female MDR (Mini D Ribbon)
Transfer protocol		Rohde & Schwarz digital I/Q Interface ²⁴
User data	sample rate	100 sample/s to 200 Msample/s (nom.)
	resolution	18 bit for I and 18 bit for Q
	standard	10 MHz
Max. I/Q bandwidth	with R&S®FSW-B28 option	28 MHz
	with R&S®FSW-B40 option	40 MHz
	with R&S®FSW-B80 option	80 MHz
	with R&S®FSW-B160 option	160 MHz
	with R&S®FSW-B320 option	160 MHz
	with R&S®FSW-B500 option	160 MHz

R&S®FSW-B21 LO/IF connections for external mixers (for R&S®FSW26, R&S®FSW43, R&S®FSW50, and R&S®FSW67 only)

LO signal		
Frequency range		7.65 GHz to 17.45 GHz
Level	+20 °C to +30 °C	+15.5 dBm ±1 dB
	+5 °C to +40 °C	+15.5 dBm ±3 dB

IF input		
IF frequency	set signal analysis bandwidth	
	≤ 80 MHz, bandwidth dependent	1310 MHz to 1330 MHz
	80 MHz to 160 MHz/320 MHz with R&S®FSW-B160/-B320	1530 MHz
	80 MHz to 500 MHz with R&S®FSW-B500	1580 MHz
Full-scale level	compression < 1 dB	
	2-port mixer (LO output/IF input, front panel)	-20 dBm (nom.)
	3-port mixer (IF input, front panel)	-20 dBm (nom.)
Level uncertainty at IF frequency	IF input level = reference level = -25 dBm, RBW = 30 kHz, mixer conversion loss set to 0 dB, 2-port mixer, LO output/IF input connector (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB
	IF input level = reference level = -25 dBm, RBW = 30 kHz, mixer conversion loss set to 0 dB, 3-port mixer, IF input connector (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB

Inputs and outputs		
LO output/IF input		SMA female, 50 Ω
IF input		SMA female, 50 Ω

²⁴ Rohde & Schwarz digital I/Q Interface is a Rohde & Schwarz company standard for the transmission of digital I/Q data.

It is supported by a wide range of instruments (signal generators, signal analyzers and communications testers and the R&S®EX-IQ-BOX).

R&S®FSW-B24 RF preamplifier

Frequency		
Frequency range	R&S®FSW8	100 kHz to 8 GHz
	R&S®FSW13	100 kHz to 13.6 GHz
	R&S®FSW26	100 kHz to 26.5 GHz
	R&S®FSW43	100 kHz to 43.5 GHz
	R&S®FSW50	100 kHz to 50 GHz
	R&S®FSW67	100 kHz to 67 GHz

Setting range		
RF preamplifier gain	R&S®FSW8, R&S®FSW13	15 dB/30 dB (nom.) (selectable)
	R&S®FSW26, R&S®FSW43, R&S®FSW50, R&S®FSW67	30 dB (nom.)

Other specifications		
Level measurement uncertainty		see base unit specification
Displayed average noise level		
Intermodulation		
Measurement uncertainty		

R&S®FSW-B25 electronic attenuator

Frequency		
Frequency range	R&S®FSW8	10 MHz to 8 GHz
	R&S®FSW13, R&S®FSW26	10 MHz to 13.6 GHz

Setting range		
		0 dB to 30 dB, in 1 dB steps ²⁵

Level measurement uncertainty		
		see base unit specification

Displayed average noise level		
	electronic attenuator on	the specification of the base unit degrades by 3 dB + 0.25 dB × f / 1 GHz (nom.)

Intermodulation		
Third-order intercept point (TOI)	electronic attenuator off or electronic attenuator on and RF attenuation = 0 dB	see base unit specification
	electronic attenuator on, RF attenuation = 30 dB	
	10 MHz to 500 MHz	30 dBm (nom.)
	500 MHz to 13.6 GHz	40 dBm (nom.)

²⁵ Electronic RF attenuator: 5 dB steps.
Electronic IF attenuator: 1 dB steps.

R&S®FSW-B71 analog baseband inputs, R&S®FSW-B71E 80 MHz analysis bandwidth for analog baseband inputs

Frequency		
Frequency range (equalized)	R&S®FSW-B71	
	I only, Q only	DC to 40 MHz
	I + jQ	-40 MHz to +40 MHz
	R&S®FSW-B71E	
	I only, Q only	DC to 80 MHz
	I + jQ	-80 MHz to +80 MHz

Spectral purity		
Phase noise	offset 1 kHz	-134 dBc (1 Hz) (nom.)
	offset 10 kHz	-138 dBc (1 Hz) (nom.)
	offset ≥100 kHz	-144 dBc (1 Hz) (nom.)

Inputs		
Connectors	I, \bar{I} , Q, \bar{Q}	BNC female
Maximum safe input voltage	any input, sum of DC + AC	±4 V
Input voltage range (full scale)	peak voltage	±2 V, ±1 V, ±0.5 V, ±0.25 V
Max. common mode input range		-3 V to +3 V
Input impedance	single ended	50 Ω (nom.)
	differential	100 Ω (nom.)
	common mode at DC	20 kΩ (nom.)
Input return loss	0 Hz to 40 MHz	-35 dB (nom.)
	40 MHz to 80 MHz	-30 dB (nom.)
	(R&S®FSW-B71E only)	

Amplitude		
Absolute amplitude accuracy	$f_{\text{input}} = 1 \text{ MHz}$, input voltage = full scale -6 dB	±0.15 dB
Amplitude linearity	0 dB to -80 dB relative to full scale	±0.1 dB (nom.)
Frequency response		
Amplitude	relative to 1 MHz	
	0 Hz to 40 MHz	±0.15 dB
	40 MHz to 80 MHz (R&S®FSW-B71E only)	±0.25 dB
Deviation from linear phase	0 Hz to 40 MHz	±1 degree (nom.)
	40 MHz to 80 MHz	±2 degree (nom.)
	(R&S®FSW-B71E only)	
Channel match (I/Q imbalance)		
Amplitude match accuracy	0 Hz to 20 MHz	±0.06 dB (2σ)
	20 MHz to 40 MHz	±0.1 dB (2σ)
	40 MHz to 80 MHz	±0.15 dB (2σ)
	(R&S®FSW-B71E only)	
Phase match accuracy	0 Hz to 20 MHz	±0.3 degree (nom.)
	20 MHz to 40 MHz	±0.6 degree (nom.)
	40 MHz to 80 MHz	±1 degree (nom.)
	(R&S®FSW-B71E only)	

Dynamic range		
Crosstalk		-80 dB (nom.)
Signal to noise ratio	any input range, relative to full scale	145 dBc (1 Hz) (nom.)
Displayed average noise level (RMS)	2 MHz to 80 MHz	
	range	
	±2 V peak	-130 dBm (1 Hz) (72 nV ($\sqrt{1 \text{ Hz}}$)) (nom.)
	±1 V peak	-136 dBm (1 Hz) (36 nV ($\sqrt{1 \text{ Hz}}$)) (nom.)
	±0.5 V peak	-142 dBm (1 Hz) (18 nV ($\sqrt{1 \text{ Hz}}$)) (nom.)
	±0.25 V peak	-148 dBm (1 Hz) (9 nV ($\sqrt{1 \text{ Hz}}$)) (nom.)
Residual DC (I/Q offset)	relative to full scale	-54 dB (nom.)
Residual response	range ±0.25 V peak	-90 dBm (nom.)
Spurious response	with full scale input signal	
	0 Hz to 40 MHz	-75 dBc (nom.)
	40 MHz to 80 MHz (R&S®FSW-B71E only)	-70 dBc (nom.)
Third-order intermodulation distortion	two CW signals, voltage = full scale -6 dB (each signal)	
	0 Hz to 40 MHz	-80 dBc (nom.)
	40 MHz to 80 MHz (R&S®FSW-B71E only)	
	differential	-80 dBc (nom.)
	single ended	-74 dBc (nom.)

Probes		
Probes supported on connectors I and Q	active single ended probes	R&S®RT-ZS10E
		R&S®RT-ZS10
		R&S®RT-ZS20
		R&S®RT-ZS30
		R&S®RT-ZS60
	active differential probes	R&S®RT-ZD20
		R&S®RT-ZD30
R&S®RT-ZD40		
RF measurements using probes ²⁶		
Supported connector	Input source RF set to Baseband input I	I
Maximum input frequency		5 GHz ²⁷
Frequency response	see probe specification for frequency response of probe	add the probe frequency response to the R&S®FSW frequency response specified in section Total measurement uncertainty

²⁶ Feature not available for R&S®FSW67.

²⁷ Maximum frequency supported by the connector. To identify the maximum achievable input frequency when using a probe, the probe specification must be taken into account.

R&S®FSW-B2000 2 GHz analysis bandwidth (R&S®FSW43, R&S®FSW50 and R&S®FSW67 only)

The specifications in this section apply to I/Q data recorded using the R&S®FSW-B2000 option. "B2000" must be configured as data source in the INPUT menu. When using other input settings for I/Q data recording, i.e. in relation with the R&S®FSW-B28/-B40/-B80/-B160/-B320/-B500 options, please refer to section "I/Q data" in the basic instrument specification.

The R&S®FSW-B2000 option uses an oscilloscope as external digitizer. An R&S®RTO-1044 with option R&S®RTO-B4 is needed to obtain the specified performance. For ordering information see section Oscilloscope supported by R&S®FSW-B2000.

Frequency range	dependent on instrument model	8 GHz to 43/50/67 GHz
Record length	trigger free run, IF power	max. 200 Msample I and Q ²⁸
	trigger external	max. 100 Msample I and Q ²⁸
Sampling rate		10 kHz to 2.5 GHz
Signal analysis bandwidth (equalized)	dependent on sampling rate, YIG preselector off	8 kHz to 2 GHz
Amplitude flatness	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier off, electronic attenuator off, YIG preselector off, +20 °C to +30 °C analysis bandwidth ≤ 2 GHz	
	8 GHz ≤ f _{center} < 22 GHz	±1.2 dB
	22 GHz ≤ f _{center} ≤ 26.5 GHz	±1.4 dB
	26.5 GHz < f _{center} ≤ 43.5 GHz	±1.6 dB
	43.5 GHz < f _{center} ≤ 50.0 GHz	±1.7 dB
	50.0 GHz < f _{center} ≤ 67.0 GHz	±2.0 dB
	Deviation from linear phase	
8 GHz ≤ f _{center} < 13 GHz	±4° (nom.)	
13 GHz ≤ f _{center} ≤ 37 GHz	±2° (nom.)	
37 GHz < f _{center} ≤ 40 GHz	±4° (nom.)	
40.0 GHz < f _{center} ≤ 50.0 GHz	±6° (nom.)	
50.0 GHz < f _{center} ≤ 67.0 GHz	±4° (nom.)	
analysis bandwidth ≤ 1 GHz		
8 GHz ≤ f _{center} < 13 GHz	±6° (nom.)	
13 GHz ≤ f _{center} ≤ 37 GHz	±4° (nom.)	
37 GHz < f _{center} ≤ 40 GHz	±6° (nom.)	
40.0 GHz < f _{center} ≤ 50.0 GHz	±8° (nom.)	
50.0 GHz < f _{center} ≤ 67.0 GHz	±6° (nom.)	
analysis bandwidth ≤ 2 GHz		
8 GHz ≤ f _{center} < 13 GHz	±8° (nom.)	
13 GHz ≤ f _{center} ≤ 37 GHz	±6° (nom.)	
37 GHz < f _{center} ≤ 40 GHz	±8° (nom.)	
40.0 GHz < f _{center} ≤ 50.0 GHz	±10° (nom.)	
50.0 GHz < f _{center} ≤ 67.0 GHz	±8° (nom.)	
Level measurement uncertainty at center frequency		add 1 dB (nom.) to the values in Total measurement uncertainty, YIG preselector off

²⁸ The maximum record length with R&S®FSW-B2000 option depends on the R&S®RTO memory configuration. 200 Msample are available with option R&S®RTO-B104 with 2 GHz analysis bandwidth (2.5 GHz sample rate), trigger free run or IF power.

The following formula indicates the relation between record length (rounded to Msample), R&S®RTO memory size and set sampling rate:
record length in Msample = (R&S®RTO memory size per channel in Msample) * sample rate in GHz / 10.

This formula is valid for measurements with trigger free run or IF power. For use with external trigger please divide the above value by 2.

Ordering information

Designation	Type	Order No.
Signal and Spectrum Analyzer, 2 Hz to 8 GHz	R&S®FSW8	1312.8000.08
Signal and Spectrum Analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1312.8000.13
Signal and Spectrum Analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1312.8000.26
Signal and Spectrum Analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1312.8000.43
Signal and Spectrum Analyzer, 2 Hz to 50 GHz	R&S®FSW50	1312.8000.50
Signal and Spectrum Analyzer, 2 Hz to 67 GHz	R&S®FSW67	1312.8000.67
Accessories supplied		
Power cable, quick start guide and CD-ROM (with operating manual and service manual)		
R&S®FSW26: adapter 3.5 mm (APC3.5-compatible) female/female		
R&S®FSW43: adapter 2.92 mm female/female		
R&S®FSW50 and R&S®FSW67: adapter 1.85 mm female/female		

Options

Designation	Type	Order No.	Retro-fittable	Remarks
OCXO Precision Frequency Reference	R&S®FSW-B4	1313.0703.02	yes	user-retrofitable
Resolution Bandwidth > 10 MHz	R&S®FSW-B8	1313.2464.26	no	for R&S®FSW8/13/26, with span = 0 Hz; The signal analysis bandwidth is defined by the R&S®FSW-B28/-B40/-B80/-B160/-B160R/-B320/-B500/-B2000 options, not by the R&S®FSW-B8 option.
Resolution Bandwidth > 10 MHz	R&S®FSW-B8	1313.2464.02	no	for R&S®FSW43/50/67, with span = 0 Hz; The signal analysis bandwidth is defined by the R&S®FSW-B28/-B40/-B80/-B160/-B160R/-B320/-B500/-B2000 options, not by the R&S®FSW-B8 option. export license required
External Generator Control	R&S®FSW-B10	1313.1622.02	yes	contact service center
Highpass Filter for Harmonic Measurements	R&S®FSW-B13	1313.0761.02	yes	user-retrofitable
Digital Baseband Interface	R&S®FSW-B17	1313.0784.02	yes	user-retrofitable
Spare Solid State Drive (removable hard drive)	R&S®FSW-B18	1313.0790.02	yes	for R&S®FSW8/13/26/43/50; user-retrofitable
Spare Solid State Drive (removable hard drive)	R&S®FSW-B18	1313.0790.06	yes	for R&S®FSW67; user-retrofitable
LO/IF Connections for external mixers	R&S®FSW-B21	1313.1100.26	yes	for the R&S®FSW26; contact service center
LO/IF Connections for external mixers	R&S®FSW-B21	1313.1100.43	yes	for R&S®FSW43/50/67; contact service center
RF Preamplifier, 100 kHz to 13.6 GHz	R&S®FSW-B24	1313.0832.13	yes	for R&S®FSW8/13; contact service center
RF Preamplifier, 100 kHz to 26.5 GHz	R&S®FSW-B24	1313.0832.26	yes	for R&S®FSW26; contact service center
RF Preamplifier, 100 kHz to 43.5 GHz	R&S®FSW-B24	1313.0832.43	yes	for R&S®FSW43/67 no export license required; contact service center
RF Preamplifier, 100 kHz to 50 GHz	R&S®FSW-B24	1313.0832.49	yes	for R&S®FSW50 no export license required; contact service center
RF Preamplifier, 100 kHz to 50 GHz	R&S®FSW-B24	1313.0832.51	yes	for R&S®FSW50; export license required; contact service center
RF Preamplifier, 100 kHz to 67 GHz	R&S®FSW-B24	1313.0832.67	yes	for R&S®FSW67; export license required; contact service center
Electronic Attenuator, 1 dB steps	R&S®FSW-B25	1313.0990.02	yes	for R&S®FSW8/13/26; contact service center
USB Mass Memory Write Protection	R&S®FSW-B33	1313.3602.02	no	pre-installation ex factory

Designation	Type	Order No.	Retro-fittable	Remarks
28 MHz Analysis Bandwidth	R&S®FSW-B28	1313.1645.02	yes	user-retrofitable
40 MHz Analysis Bandwidth	R&S®FSW-B40	1313.0861.02	yes	user-retrofitable
80 MHz Analysis Bandwidth	R&S®FSW-B80	1313.0878.02	yes	user-retrofitable
160 MHz Analysis Bandwidth	R&S®FSW-B160	1313.1668.04	yes	contact service center
320 MHz Analysis Bandwidth	R&S®FSW-B320	1313.7172.04	yes	contact service center
500 MHz Analysis Bandwidth	R&S®FSW-B500	1313.4296.02	yes	contact service center
2 GHz Analysis Bandwidth	R&S®FSW-B2000	1325.4750.02	yes	for R&S®FSW43/50/67; contact service center
Analog Baseband Inputs, 40 MHz Analysis Bandwidth	R&S®FSW-B71	1313.1651.13	yes	for R&S®FSW8/13; contact service center
Analog Baseband Inputs, 40 MHz Analysis Bandwidth	R&S®FSW-B71	1313.1651.26	yes	for R&S®FSW26/43/50; contact service center
Analog Baseband Inputs, 40 MHz Analysis Bandwidth	R&S®FSW-B71	1313.1651.67	yes	for R&S®FSW67; contact service center
80 MHz Analysis Bandwidth for Analog Baseband Inputs	R&S®FSW-B71E	1313.6547.02	yes	R&S®FSW-B71 required; user-retrofitable
Real-Time Spectrum Analyzer 160 MHz, POI ≤ 15 μs	R&S®FSW-B160R	1313.1668.06	yes	contact service center; includes 160 MHz analysis bandwidth; export license required

Firmware

Designation	Type	Order No.	Retro-fittable	Remarks
Pulse Measurements	R&S®FSW-K6	1313.1322.02		
Time-sidelobe Measurements	R&S®FSW-K6S	1325.3738.02		R&S®FSW-K6 option is required
Analog Modulation Analysis for AM/FM/φM	R&S®FSW-K7	1313.1339.02		
GSM/EDGE/EDGE Evolution/ VAMOS Measurements	R&S®FSW-K10	1313.1368.02		
Multicarrier Group Delay Measurements	R&S®FSW-K17	1313.4150.02		
Amplifier Measurements	R&S®FSW-K18	1325.2170.02		
Noise Figure Measurements	R&S®FSW-K30	1313.1380.02		
Security Write Protection of solid state drive	R&S®FSW-K33	1322.7936.02		
Phase Noise Measurements	R&S®FSW-K40	1313.1397.02		
EMI Measurement Application	R&S®FSW-K54	1313.1400.02		
Transient Measurements	R&S®FSW-K60	1313.7495.02		
Transient Hop Measurements	R&S®FSW-K60H	1322.9916.02		R&S®FSW-K60 option is required
Transient Chirp Measurements	R&S®FSW-K60C	1322.9745.02		R&S®FSW-K60 option is required
Vector Signal Analysis	R&S®FSW-K70	1313.1416.02		
3GPP FDD (WCDMA) BS Measurements (incl. HSDPA and HSDPA+)	R&S®FSW-K72	1313.1422.02		
3GPP FDD (WCDMA) MS Measurements (incl. HSUPA and HSUPA+)	R&S®FSW-K73	1313.1439.02		
TD-SCDMA BS Measurements	R&S®FSW-K76	1313.1445.02		
TD-SCDMA UE Measurements	R&S®FSW-K77	1313.1451.02		
CDMA2000® BS Measurements	R&S®FSW-K82	1313.1468.02		
CDMA2000® MS Measurements	R&S®FSW-K83	1313.1474.02		
1xEV-DO BS Measurements	R&S®FSW-K84	1313.1480.02		
1xEV-DO MS Measurements	R&S®FSW-K85	1313.1497.02		
WLAN 802.11a/b/g Measurements	R&S®FSW-K91	1313.1500.02		To support signal analysis bandwidths > 10 MHz, one of the options R&S®FSW-B28/-B40/-B80/ -B160/-B320/-B500 is needed. ²⁹
WLAN 802.11n Measurements	R&S®FSW-K91N	1313.1516.02		requires R&S®FSW-K91;
WLAN 802.11ac Measurements	R&S®FSW-K91AC	1313.4209.02		to support signal analysis
WLAN 802.11p Measurements	R&S®FSW-K91P	1321.5646.02		bandwidths > 10 MHz, one of the options R&S®FSW-B28/-B40/-B80/ -B160/-B320/-B500 is required. ²⁹

²⁹ Signal analysis bandwidth is limited to 80 MHz, if R&S®FSW-B500 is installed.

Designation	Type	Order No.	Retro-fittable	Remarks
EUTRA/LTE FDD Downlink Measurements	R&S®FSW-K100	1313.1545.02		To support signal analysis bandwidths > 10 MHz, one of the options R&S®FSW-B28/-B40/-B80/-B160/-B320/-B500 is required.
EUTRA/LTE TDD Uplink Measurements	R&S®FSW-K101	1313.1551.02		
EUTRA/LTE Downlink MIMO Measurements	R&S®FSW-K102	1313.1568.02		
EUTRA/LTE Advanced Uplink Measurements	R&S®FSW-K103	1313.2478.02		
EUTRA/LTE TDD Downlink Measurements	R&S®FSW-K104	1313.1574.02		R&S®FSW-B320 option is required
DOCSIS 3.1 OFDM Downstream Measurements	R&S®FSW-K192	1325.4138.02		
160 MHz Real-Time Measurement Application, POI > 15 µs	R&S®FSW-K160RE	1313.7766.02		one of the R&S®FSW-B160/-B320 options is required, not available for R&S®FSW-B500, no export license required

PC software

Designation	Type	Order No.	Retro-fittable	Remarks
OFDM Vector Signal Analysis Software	R&S®FS-K96	1310.0202.02		spectrum analyzer required
OFDM Vector Signal Analysis Software	R&S®FS-K96PC	1310.0219.02		usable with or without spectrum analyzer
EUTRA/LTE FDD Downlink PC Software	R&S®FS-K100PC	1309.9916.02		
EUTRA/LTE Uplink FDD PC Software	R&S®FS-K101PC	1309.9922.02		
EUTRA/LTE Downlink MIMO PC Software (incl. LTE-Advanced)	R&S®FS-K102PC	1309.9939.02		
EUTRA/LTE Uplink MIMO PC Software (incl. LTE-Advanced)	R&S®FS-K103PC	1309.9945.02		
EUTRA/LTE TDD Downlink PC Software	R&S®FS-K104PC	1309.9951.02		
EUTRA/LTE TDD Uplink PC Software	R&S®FS-K105PC	1309.9968.02		
Distortion Analysis PC Software	R&S®FS-K130PC	1310.0090.02		

Upgrades

Designation	Type	Order No.	Retro-fittable	Remarks
LO/IF Connections for external mixers	R&S®FSW-U21	1313.6318.26	yes	for R&S®FSW26; contact service center
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	1313.3754.04	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 or R&S®FSW-U160 or R&S®FSW-B160R or R&S®FSW-U160R required
Analysis Bandwidth Upgrade from 80 MHz to 500 MHz	R&S®FSW-U500	1321.6320.02	yes	contact service center, R&S®FSW-B80 or R&S®FSW-U80 required
Real-Time Spectrum Analyzer 160 MHz, POI ≤ 15 µs	R&S®FSW-U160R	1313.3754.06	yes	contact service center, R&S®FSW-B80 or R&S®FSW-U80 required; includes analysis bandwidth upgrade from 80 MHz to 160 MHz, export license required
Upgrade to 2 GHz signal analysis bandwidth	R&S®FSW-U2000	1325.5405.50	yes	for R&S®FSW50 with serial number < 103080; contact service center
Upgrade to 2 GHz signal analysis bandwidth	R&S®FSW-U2000	1325.5405.67	yes	for R&S®FSW67 with serial number < 103205; contact service center

Recommended extras

Designation	Type	Order No.
Headphones		0708.9010.00
IEC/IEEE Bus Cable, length: 1 m	R&S®PCK	0292.2013.10
IEC/IEEE Bus Cable, length: 2 m	R&S®PCK	0292.2013.20
19" Rack Adapter	R&S®ZZA-KN5	1175.3040.00
Matching pads, 50/75 Ω		
L Section, matching at both ends	R&S®RAM	0358.5414.02
Series Resistor, 25 Ω, matching at one end (taken into account in instrument function RF INPUT 75 Ω)	R&S®RAZ	0358.5714.02
High-power attenuators		
100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.xx (xx = 03/06/10/20/30)
50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.xx (xx = 03/06/10/20/30)
50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52
Connectors and cables		
Probe power connector, 3-pin		1065.9480.00
N-Type Adapter for R&S®RT-Zxx oscilloscope probes	R&S®RT-ZA9	1417.0909.02
Cable for connecting digital baseband interfaces of Rohde & Schwarz instruments (accessory for R&S®FSW-B17)	R&S®SMU-Z6	1415.0201.02
DC blocks		
DC Block, 10 kHz to 18 GHz (N type)	R&S®FSE-Z4	1084.7443.02
External harmonic mixers (for R&S®FSW26, R&S®FSW43, R&S®FSW50 and R&S®FSW67 with R&S®FSW-B21 option)		
Harmonic Mixer, 40 GHz to 60 GHz	R&S®FS-Z60	1089.0799.02
Harmonic Mixer, 50 GHz to 75 GHz	R&S®FS-Z75	1048.0271.02
Harmonic Mixer, 60 GHz to 90 GHz	R&S®FS-Z90	1048.0371.02
Harmonic Mixer, 75 GHz to 110 GHz	R&S®FS-Z110	1048.0471.02

Power sensors supported ³⁰

Designation	Type	Order No.
Universal Power Sensor, 10 MHz to 8 GHz, 100 mW, 2-path	R&S®NRP-Z211	1417.0409.02
Universal Power Sensor, 10 MHz to 8 GHz, 200 mW	R&S®NRP-Z11	1138.3004.02
Universal Power Sensor, 10 MHz to 18 GHz, 100 mW, 2-path	R&S®NRP-Z221	1417.0309.02
Universal Power Sensor, 10 MHz to 18 GHz, 200 mW	R&S®NRP-Z21	1137.6000.02
Universal Power Sensor, 10 MHz to 18 GHz, 2 W	R&S®NRP-Z22	1137.7506.02
Universal Power Sensor, 10 MHz to 18 GHz, 15 W	R&S®NRP-Z23	1137.8002.02
Universal Power Sensor, 10 MHz to 18 GHz, 30 W	R&S®NRP-Z24	1137.8502.02
Power Sensor Module with power splitter, DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
Power Sensor Module with Power Splitter, DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
Thermal Power Sensor, 0 Hz to 18 GHz, 100 mW	R&S®NRP-Z51	1138.0005.02
Thermal Power Sensor, 0 Hz to 40 GHz, 100 mW	R&S®NRP-Z55	1138.2008.02
Thermal Power Sensor, 0 Hz to 50 GHz, 100 mW	R&S®NRP-Z56	1171.8201.02
Thermal Power Sensor, 0 Hz to 67 GHz, 100 mW	R&S®NRP-Z57	1171.8401.02
Thermal Power Sensor, 0 Hz to 110 GHz, 100 mW	R&S®NRP-Z58	1173.7031.02
Wideband Power Sensor, 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
Average Power Sensor, 9 kHz to 6 GHz, 200 mW	R&S®NRP-Z91	1168.8004.02
Average Power Sensor, 9 kHz to 6 GHz, 2 W	R&S®NRP-Z92	1171.7005.02

³⁰ For average power measurement only.

Probes supported by R&S®FSW-B71/-B71E option

Designation	Type	Order No.
1.0 GHz, active, 1 M Ω , 0.8 pF	R&S®RT-ZS10E	1418.7007.02
1.0 GHz, active, 1 M Ω , 0.8 pF, micro button	R&S®RT-ZS10	1410.4080.02
1.5 GHz, active, 1 M Ω , 0.8 pF, micro button	R&S®RT-ZS20	1410.3502.02
3.0 GHz, active, 1 M Ω , 0.8 pF, micro button	R&S®RT-ZS30	1410.4309.02
6.0 GHz, active, 1 M Ω , 0.3 pF, micro button	R&S®RT-ZS60	1418.7307.02
1.5 GHz, active, differential, 1 M Ω , 0.6 pF, micro button	R&S®RT-ZD20	1410.4409.02
3.0 GHz, active, differential, 1 M Ω , 0.6 pF, micro button	R&S®RT-ZD30	1410.4609.02
4.5 GHz, active, differential, 1 M Ω , 0.4 pF, micro button	R&S®RT-ZD40	1410.5205.02

Oscilloscope supported by R&S®FSW-B2000 option

Designation	Type	Order No.
Digital Oscilloscope, 4 GHz, 20 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1044	1316.1000.44
OCXO 10 MHz	R&S®RTO-B4	1304.8305.02
Memory Upgrade, 50 Msample per channel	R&S®RTO-B101	1304.8428.02
Memory Upgrade, 100 Msample per channel	R&S®RTO-B102	1304.8434.02
Memory Upgrade, 200 Msample per channel	R&S®RTO-B103	1304.8440.02
Memory Upgrade, 400 Msample per channel	R&S®RTO-B104	1304.8457.02

Service options

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	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

Extended warranty with a term of one to four years (WE1 to WE4)

Repairs carried out during the contract term are free of charge³¹. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 to CW4)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs³¹ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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For product brochure, see PD 5214.5984.12 and www.rohde-schwarz.com

³¹ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Service that adds value

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- | Local and personalized
- | Customized and flexible
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- | Long-term dependability

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R&S®FSW Signal and Spectrum Analyzer

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