

# R&S® FSVA3000 SIGNAL AND SPECTRUM ANALYZER

## Specifications

3  
year  
warranty



Data Sheet  
Version 03.00

**ROHDE & SCHWARZ**

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# CONTENTS

<b>Definitions .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
Frequency .....	4
Sweep time.....	6
Resolution bandwidths.....	6
Signal analysis bandwidths.....	6
Level.....	7
Sensitivity .....	8
Spurious responses.....	10
Level measurement uncertainty.....	11
Trigger functions.....	12
I/Q data .....	13
Inputs and outputs .....	15
General data.....	17
<b>Options .....</b>	<b>18</b>
R&S®FSV3-B3 audio demodulator.....	18
R&S®FSV3-B5 additional interfaces.....	18
R&S®FSV3-B10 external generator control.....	19
R&S®FSV3-B24 RF preamplifier.....	19
R&S®FSV3-B25 electronic attenuator .....	19
<b>Ordering information .....</b>	<b>20</b>
Options.....	20
<i>Hardware</i> .....	20
<i>Firmware</i> .....	21
<i>PC software</i> .....	21
Recommended extras.....	22
Power sensors supported by the R&S®FSV3-K9 option .....	23
Service options.....	24

# Definitions

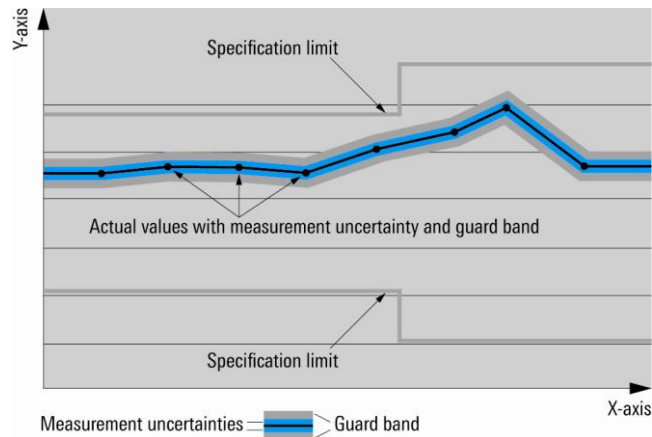
## General

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

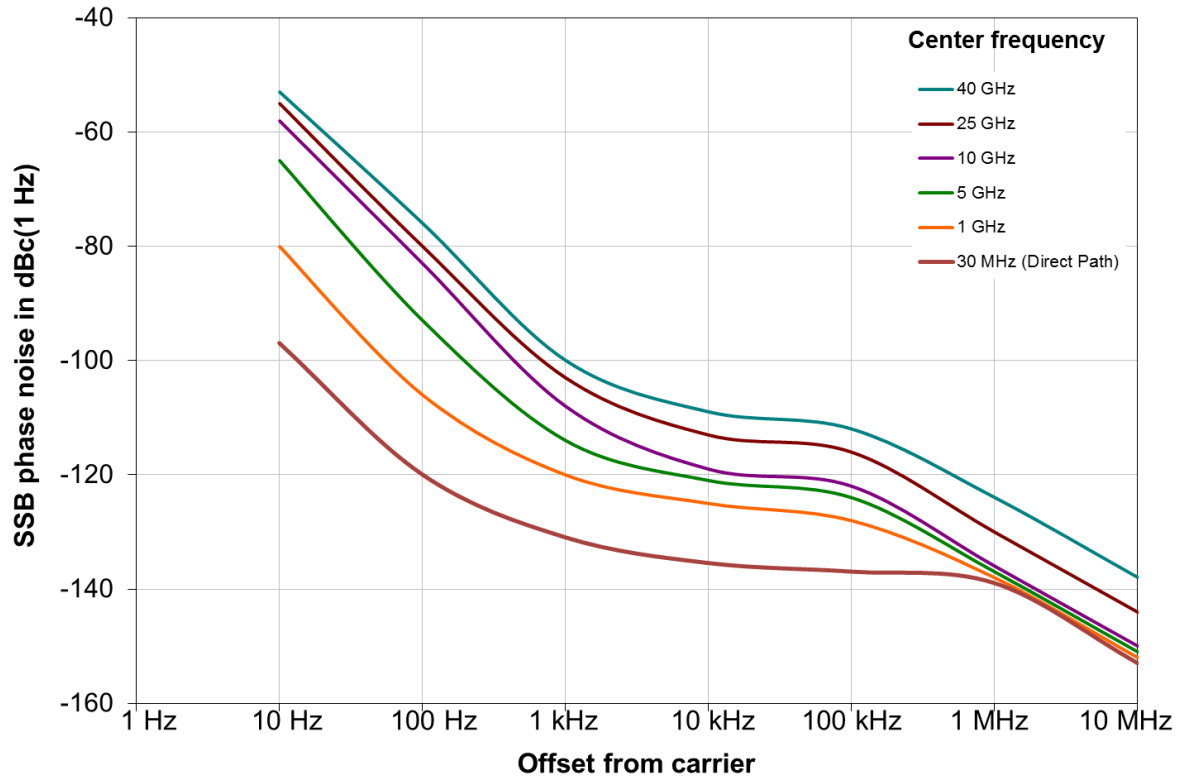
## Frequency

<b>Frequency range</b>	R&S®FSVA3004	
	DC coupled	10 Hz to 4 GHz
	AC coupled	10 MHz to 4 GHz
	R&S®FSVA3007	
	DC coupled	10 Hz to 7.5 GHz
	AC coupled	10 MHz to 7.5 GHz
	R&S®FSVA3013	
	DC coupled	10 Hz to 13.6 GHz
	AC coupled	10 MHz to 13.6 GHz
	R&S®FSVA3030	
	DC coupled	10 Hz to 30 GHz
	AC coupled	10 MHz to 30 GHz
R&S®FSVA3044		
DC coupled	10 Hz to 44 GHz	
AC coupled	10 MHz to 44 GHz	
<b>Frequency resolution</b>		0.01 Hz

<b>Reference frequency, internal</b>		
Accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	$1 \times 10^{-6}$
	with R&S®FSV3-B4 OCXO reference frequency option	$1 \times 10^{-7}$
Temperature drift (0 °C to +50 °C)	standard	$1 \times 10^{-6}$
	with R&S®FSV3-B4 OCXO reference frequency option	$1 \times 10^{-8}$
Achievable initial calibration accuracy	standard	$5 \times 10^{-7}$
	with R&S®FSV3-B4 OCXO reference frequency option	$5 \times 10^{-8}$

<b>Frequency readout</b>		
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	1001
	range	101 to 100001
Marker tuning frequency step size	marker step size = sweep points	$\text{span} / (\text{sweep points} - 1)$
	marker step size = standard	$\text{span} / (\text{default sweep points} - 1)$
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 to max. frequency
Resolution		0.1 Hz

<b>Spectral purity</b>		
SSB phase noise (1 Hz)	frequency = 1 GHz, carrier offset	
	100 Hz	< -95 dBc
	1 kHz	< -115 dBc
	10 kHz	< -120 dBc
	100 kHz	< -125 dBc
	1 MHz	< -137 dBc
Residual FM	10 MHz	-152 dBc (nom.)
	frequency = 1000 MHz, demodulation bandwidth = 25 kHz, AF highpass filter 50 Hz, AF lowpass filter 3 kHz	
< 0.1 Hz (RMS) (nom.)		



Typical phase noise at different center frequencies

## Sweep time

Sweep time range	span = 0 Hz	1 $\mu$ s to 16000 s
	span $\geq$ 10 Hz, swept	1.01 ms to 16000 s <sup>1</sup>
	span $\geq$ 10 Hz, FFT	0.7 $\mu$ s to 16000 s <sup>2</sup>
Sweep time accuracy	span = 0 Hz	$\pm$ 0.1 % (nom.)
	span $\geq$ 10 Hz, swept	$\pm$ 3 % (nom.)

## Resolution bandwidths

<b>Sweep filters and FFT filters</b>		
Resolution bandwidths (-3 dB)		1 Hz to 10 MHz in 1/2/3/5 sequence
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 5 (nom.)

<b>Channel filters</b>		
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
Bandwidth uncertainty		< 2 % (nom.)
Shape factor 60 dB:3 dB		< 2 (nom.)

<b>Video bandwidths</b>		1 Hz to 10 MHz in 1/2/3/5 sequence
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## Signal analysis bandwidths

<b>Max. signal analysis bandwidth</b>	f $\leq$ 7.5 GHz	
	standard	28 MHz (nom.)
	with R&S®FSV3-B40 option	40 MHz (nom.)
	with R&S®FSV3-B200 option	200 MHz (nom.)
	with R&S®FSV3-B400 option	400 MHz (nom.)
	f > 7.5 GHz, with R&S®FSV3-B11 option and YIG preselector off	
	standard	28 MHz (nom.)
	with R&S®FSV3-B40 option	40 MHz (nom.)
	with R&S®FSV3-B200 option	200 MHz (nom.)
	with R&S®FSV3-B400 option	400 MHz (nom.)

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

<sup>2</sup> Time for data acquisition for FFT calculation.

## Level

<b>Level display</b>		
Display range		displayed noise floor up to +30 dBm
Logarithmic level axis		1 dB to 200 dB
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
Trace functions		clear/write, max. hold, min. hold, average, view, spectrogram
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, dB $\mu$ V, dBmV, dB $\mu$ A, dBpW
	linear level display	$\mu$ V, mV, $\mu$ A, mA, pW, nW

<b>Max. input level</b>		
DC voltage	AC coupled	50 V
	DC coupled	0 V
CW RF power	RF attenuation = 0 dB	
	RF preamplifier = off	20 dBm (= 0.1 W)
	with R&S®FSV3-B24 option, RF preamplifier = on	13 dBm (= 0.02 W)
	RF attenuation $\geq$ 10 dB	
	RF preamplifier = off	30 dBm (= 1 W)
	with R&S®FSV3-B24 option, RF preamplifier = on	23 dBm (= 0.2 W)
Max. pulse power, pulse duration $\tau = 3 \mu$ s	RF attenuation $\geq$ 10 dB	100 W
Max. pulse voltage	RF attenuation $\geq$ 10 dB	50 V

<b>Intermodulation</b>		
1 dB compression of input mixer	RF attenuation = 0 dB, RF preamplifier = off	
	$f \leq 7.5$ GHz	+10 dBm (nom.)
	$f > 7.5$ GHz	+5 dBm (nom.)
	with R&S®FSV3-B24 option, RF preamplifier = 30 dB, RF attenuation = 0 dB	
	$f \leq 7.5$ GHz	-20 dBm (nom.)
	$f > 7.5$ GHz	-23 dBm (nom.)
Third-order intercept point (TOI)	RF attenuation = 0 dB, RF preamplifier = off, YIG preselector on for $f \geq 7.5$ GHz, level $2 \times -15$ dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger	
	R&S®FSVA3004, R&S®FSVA3007	
	$10 \text{ MHz} \leq f_{in} < 3.6 \text{ GHz}$	> 17 dBm, typ. 20 dBm
	$3.6 \text{ GHz} \leq f_{in} \leq 7.5 \text{ GHz}$	> 16 dBm, typ. 19 dBm
	R&S®FSVA3013, R&S®FSVA3030, YIG preselector on for $f \geq 7.5$ GHz	
	$10 \text{ MHz} \leq f_{in} \leq 26.5 \text{ GHz}$	> 17 dBm, typ. 20 dBm
	$26.5 \text{ GHz} < f_{in} \leq 30 \text{ GHz}$	> 15 dBm, typ. 21 dBm
	R&S®FSVA3044, YIG preselector on for $f \geq 7.5$ GHz	
	$10 \text{ MHz} \leq f_{in} < 3.6 \text{ GHz}$	> 17 dBm, typ. 20 dBm
	$3.6 \text{ GHz} \leq f_{in} \leq 7.5 \text{ GHz}$	> 16 dBm, typ. 19 dBm
	$7.5 \text{ GHz} < f_{in} \leq 40 \text{ GHz}$	> 15 dBm, typ. 21 dBm
	$40 \text{ GHz} < f_{in} \leq 44 \text{ GHz}$	> 12 dBm, typ. 20 dBm
	with R&S®FSV3-B24 option, RF attenuation = 0 dB, RF preamplifier = 30 dB, YIG preselector on for $f \geq 7.5$ GHz, level $2 \times -45$ dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger	
	$10 \text{ MHz} \leq f_{in} \leq 43.5 \text{ GHz}$	-20 dBm (nom.)
Second harmonic intercept (SHI)	RF attenuation = 0 dB, RF preamplifier = off, YIG preselector on for $f_{in} \geq 3.75$ GHz, level -10 dBm	
	$100 \text{ MHz} < f_{in} \leq 1.75 \text{ GHz}$	45 dBm (nom.)
	$1.75 \text{ GHz} < f_{in} \leq 22 \text{ GHz}$	80 dBm (nom.)
	with R&S®FSV3-B24 option, RF preamplifier = 30 dB, RF attenuation = 0 dB, YIG preselector on for $f_{in} \geq 3.75$ GHz, level -40 dBm	
	$100 \text{ MHz} < f_{in} \leq 21.75 \text{ GHz}$	10 dBm (nom.)

## 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.

<b>Displayed average noise level without R&amp;S®FSV3-B24 preamplifier option</b>		
	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode = log, sample detector, +20 °C to +30 °C	
	10 Hz	-90 dBm (nom.)
	20 Hz	-100 dBm, typ. -110 dBm
	100 Hz	-110 dBm, typ. -120 dBm
	1 kHz	-120 dBm, typ. -130 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +20 °C to +30 °C	
	R&S®FSVA3004, R&S®FSVA3007	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-152 dBm, typ. -155 dBm
	1 GHz ≤ f < 3 GHz	-151 dBm, typ. -153 dBm
	3 GHz ≤ f < 6 GHz	-150 dBm, typ. -152 dBm
	6 GHz ≤ f ≤ 7.5 GHz	-149 dBm, typ. -151 dBm
	R&S®FSVA3013, R&S®FSVA3030	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-151 dBm, typ. -154 dBm
	1 GHz ≤ f < 3 GHz	-149 dBm, typ. -152 dBm
	3 GHz ≤ f < 6 GHz	-147 dBm, typ. -150 dBm
	6 GHz ≤ f ≤ 7.5 GHz	-145 dBm, typ. -147 dBm
	7.5 GHz < f ≤ 15 GHz	-148 dBm, typ. -151 dBm
	15 GHz < f ≤ 26.5 GHz	-145 dBm, typ. -148 dBm
	26.5 GHz < f ≤ 30 GHz	-144 dBm, typ. -147 dBm
	R&S®FSVA3044	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-151 dBm, typ. -154 dBm
	1 GHz ≤ f < 3 GHz	-149 dBm, typ. -152 dBm
	3 GHz ≤ f < 6 GHz	-147 dBm, typ. -150 dBm
	6 GHz ≤ f ≤ 7.5 GHz	-145 dBm, typ. -147 dBm
	7.5 GHz < f ≤ 15 GHz	-148 dBm, typ. -151 dBm
	15 GHz < f ≤ 34 GHz	-145 dBm, typ. -148 dBm
	34 GHz < f ≤ 40 GHz	-139 dBm, typ. -142 dBm
	40 GHz < f ≤ 44 GHz	-136 dBm, typ. -139 dBm
Improvement with noise cancellation	for noise-like signals	
	10 MHz < f ≤ 43.5 GHz	13 dB (nom.)
	f > 43.5 GHz	0 dB (nom.)



<b>Displayed average noise level with R&amp;S®FSV3-B24 preamplifier option</b>		
RF preamplifier = off	RF attenuation = 0 dB, termination = 50 Ω, normalized to 1 Hz RBW, trace average, average mode = log, sample detector, +20 °C to +30 °C	
	10 Hz	-90 dBm (nom.)
	20 Hz	-100 dBm, typ. -110 dBm
	100 Hz	-110 dBm, typ. -120 dBm
	1 kHz	-120 dBm, typ. -130 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 1 Hz, +20 °C to +30 °C	
	R&S®FSVA3004, R&S®FSVA3007	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-151 dBm, typ. -154 dBm
	1 GHz ≤ f < 3 GHz	-150 dBm, typ. -154 dBm
	3 GHz ≤ f < 6 GHz	-147 dBm, typ. -150 dBm
	6 GHz ≤ f ≤ 7.5 GHz	-146 dBm, typ. -148 dBm
	R&S®FSVA3013, R&S®FSVA3030	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-150 dBm, typ. -153 dBm
	1 GHz ≤ f < 3 GHz	-148 dBm, typ. -151 dBm
	3 GHz ≤ f < 6 GHz	-145 dBm, typ. -148 dBm
	6 GHz ≤ f ≤ 7.5 GHz	-142 dBm, typ. -144 dBm
	7.5 GHz < f ≤ 15 GHz	-145 dBm, typ. -148 dBm
	15 GHz < f ≤ 30 GHz	-141 dBm, typ. -144 dBm
	R&S®FSVA3044	
	9 kHz ≤ f < 100 kHz	-140 dBm, typ. -146 dBm
	100 kHz ≤ f < 1 MHz	-145 dBm, typ. -150 dBm
	1 MHz ≤ f < 1 GHz	-150 dBm, typ. -153 dBm
	1 GHz ≤ f < 3 GHz	-148 dBm, typ. -151 dBm
3 GHz ≤ f < 6 GHz	-145 dBm, typ. -148 dBm	
6 GHz ≤ f ≤ 7.5 GHz	-142 dBm, typ. -144 dBm	
7.5 GHz < f ≤ 15 GHz	-146 dBm, typ. -149 dBm	
15 GHz < f ≤ 34 GHz	-143 dBm, typ. -146 dBm	
34 GHz < f ≤ 40 GHz	-137 dBm, typ. -140 dBm	
40 GHz < f ≤ 44 GHz	-133 dBm, typ. -136 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, +20 °C to +30 °C	
	R&S®FSVA3004, R&S®FSVA3007, R&S®FSVA3013, R&S®FSVA3030	
	10 MHz ≤ f < 50 MHz	-158 dBm, typ. -162 dBm
	50 MHz ≤ f ≤ 7.5 GHz	-164 dBm, typ. -167 dBm
	7.5 GHz < f ≤ 13.6 GHz	-162 dBm, typ. -165 dBm
	13.6 GHz < f ≤ 22 GHz	-160 dBm, typ. -163 dBm
	22 GHz < f ≤ 26.5 GHz	-157 dBm, typ. -160 dBm
	26.5 GHz < f ≤ 30 GHz	-155 dBm, typ. -158 dBm
	R&S®FSVA3044 <sup>3</sup>	
	10 MHz ≤ f < 3 GHz	-164 dBm
	3 GHz ≤ f ≤ 7.5 GHz	-161 dBm
	7.5 GHz < f ≤ 26.5 GHz	-160 dBm
	26.5 GHz < f ≤ 40 GHz	-158 dBm
	40 GHz < f ≤ 43.5 GHz	-149 dBm
	Improvement with noise cancellation	for noise-like signals
10 MHz < f ≤ 43.5 GHz		13 dB (nom.)
f > 43.5 GHz		0 dB (nom.)

<sup>3</sup> The frequency range of the RF preamplifier for the R&S®FSVA3044 is limited to 43.5 GHz.

## Spurious responses

Image response	YIG preselector on for $f \geq 7.5$ GHz, mixer level $\leq -10$ dBm <sup>4</sup> , sweep optimization: auto or dynamic	
	20 MHz $\leq f \leq 7.5$ GHz	
	$f_{in} - 2 \times 8796$ MHz (1st IF)	< -80 dBc (nom.)
	$f_{in} - 2 \times 732$ MHz (2nd IF)	< -80 dBc
	$f_{in} - 2 \times 92$ MHz (3rd IF)	< -80 dBc
	7.5 GHz $< f \leq 30$ GHz	
	$f_{in} \pm 2 \times 732$ MHz (1st IF)	< -80 dBc
	$f_{in} - 2 \times 92$ MHz (2nd IF)	< -80 dBc
	30 GHz $< f \leq 44$ GHz	
	$f_{in} \pm 2 \times 732$ MHz (1st IF)	< -70 dBc
$f_{in} - 2 \times 92$ MHz (2nd IF)	< -80 dBc	
Intermediate frequency response	1st IF (8796 MHz)	< -80 dBc
	2nd IF (732 MHz)	< -80 dBc
	3rd IF (92 MHz)	< -80 dBc
Residual spurious response	RF attenuation = 0 dB	
	$f \leq 1$ MHz	< -90 dBm
	1 MHz $< f \leq 7.5$ GHz	< -103 dBm
	7.5 GHz $< f \leq 44$ GHz	< -100 dBm
Local oscillator related spurious	$f < 15$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -70 dBc
	carrier offset $> 10$ MHz	< -80 dBc
	15 GHz $\leq f \leq 30$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -64 dBc
	carrier offset $> 10$ MHz	< -74 dBc
	30 GHz $< f \leq 44$ GHz	
	1 kHz $\leq$ carrier offset $\leq 10$ MHz	< -58 dBc
carrier offset $> 10$ MHz	< -68 dBc	
Vibrational environmental stimuli	max. 0.21 g (RMS)	
	< -60 dBc + 20 log( $f_{in}/$ GHz) (nom.)	

<sup>4</sup> 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	
	+20 °C to +30 °C	< 0.2 dB ( $\sigma = 0.07$ dB)
	0 °C to +50 °C	< 0.35 dB ( $\sigma = 0.12$ dB)
Frequency response referenced to 64 MHz	RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, electronic attenuator off, +20 °C to +30 °C	
	9 kHz $\leq f < 10$ MHz	< 0.5 dB ( $\sigma = 0.17$ dB)
	10 MHz $\leq f < 3.6$ GHz	< 0.3 dB ( $\sigma = 0.10$ dB)
	3.6 GHz $\leq f \leq 7.5$ GHz	< 0.5 dB ( $\sigma = 0.17$ dB)
	7.5 GHz $< f \leq 13.6$ GHz, span < 1 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	13.6 GHz $< f \leq 30$ GHz, span < 1 GHz	< 2.0 dB ( $\sigma = 0.66$ dB)
	30 GHz $< f \leq 43.5$ GHz, span < 1 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	43.5 GHz $< f \leq 44$ GHz, span < 1 GHz	< 3 dB (nom.)
	any setting of RF attenuation, RF preamplifier = off, 0 °C to +50 °C	
	9 kHz $\leq f < 3.6$ GHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	3.6 GHz $\leq f \leq 7.5$ GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	7.5 GHz $< f \leq 13.6$ GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	13.6 GHz $< f \leq 30$ GHz	< 3.0 dB ( $\sigma = 1.0$ dB)
	30 GHz $< f \leq 43.5$ GHz	< 3.5 dB ( $\sigma = 1.17$ dB)
	43.5 GHz $< f \leq 44$ GHz	< 4 dB (nom.)
	RF attenuation $\leq 10$ dB, RF preamplifier = on <sup>3</sup> , 0 °C to +50 °C	
	10 MHz $\leq f < 3.6$ GHz	< 1.0 dB ( $\sigma = 0.33$ dB)
	3.6 GHz $\leq f \leq 7.5$ GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	7.5 GHz $< f \leq 13.6$ GHz	< 3.0 dB ( $\sigma = 1.0$ dB)
	13.6 GHz $< f \leq 30$ GHz	< 3.5 dB ( $\sigma = 1.17$ dB)
30 GHz $< f \leq 43.5$ GHz	< 4.0 dB ( $\sigma = 1.17$ dB)	
DC coupling, RF preamplifier = off, 0 °C to +50 °C		
10 Hz $\leq f < 20$ Hz	< 1.5 dB (nom.)	
20 Hz $\leq f < 9$ kHz	< 1.0 dB ( $\sigma = 0.33$ dB)	
Attenuator switching uncertainty	f = 64 MHz, 0 dB to 70 dB, referenced to RF attenuation = 10 dB	< 0.2 dB ( $\sigma = 0.07$ dB)
Uncertainty of reference level setting		0 dB <sup>5</sup>
Bandwidth switching uncertainty at center frequency	referenced to RBW = 10 kHz	< 0.1 dB ( $\sigma = 0.04$ dB)
<b>Nonlinearity of displayed level</b>		
Logarithmic level display	S/N > 16 dB, 0 dB $\leq$ level $\leq$ -70 dB	< 0.1 dB ( $\sigma = 0.033$ dB)
	S/N > 16 dB, -70 dB < level $\leq$ -80 dB	< 0.2 dB ( $\sigma = 0.067$ dB)
Linear level display	S/N > 16 dB, 0 dB to -70 dB	5 % of reference level
<b>Total measurement uncertainty</b>		
signal level 0 dB to -70 dB below reference level, S/N > 20 dB, sweep time auto, sweep type = sweep, RF attenuation = 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, span/RBW < 100, 95 % confidence level, +20 °C to +30 °C		
	9 kHz $\leq f < 10$ MHz	0.39 dB
	10 MHz $\leq f < 3.6$ GHz	0.29 dB
	3.6 GHz $\leq f \leq 7.5$ GHz	0.39 dB
	7.5 GHz $< f \leq 13.6$ GHz	1.00 dB
	13.6 GHz $< f \leq 30$ GHz	1.32 dB
	30 GHz $< f \leq 43.5$ GHz	1.65 dB
	43.5 GHz $< f \leq 44$ GHz	1.97 dB

<sup>5</sup> The setting of the reference level affects only the graphical representation of the measurement result on the display, not the measurement itself. Therefore, the reference level setting causes no additional uncertainty in measurement results.

## Trigger functions

<b>Trigger</b>		
Trigger source	spectrum analysis	free run, external, IF power, video
	I/Q analysis or modulation analysis	free run, external, IF power, I/Q power
Trigger offset	spectrum analysis	
	span $\geq$ 10 Hz	0 s to 30 s
	span = 0 Hz	(–sweep time) to 30 s
	I/Q analysis or modulation analysis	–16 s to 16 s, limited by maximum number of pre-trigger samples
Trigger resolution	spectrum analysis, trigger source external or IF power	
	span $\geq$ 10 Hz	7.81 ns (nom.)
	span = 0 Hz, trigger offset $\geq$ 0	7.81 ns (nom.)
	span = 0 Hz, trigger offset < 0	sweep time / number of sweep points
	I/Q analysis or modulation analysis: see section I/Q data	
Max. deviation of trigger offset		7.81 ns (nom.)
<b>IF power trigger</b>		
Sensitivity	min. signal power	–60 dBm + RF attenuation – RF preamplifier gain (nom.)
	max. signal power	0 dBm + RF attenuation – RF preamplifier gain (nom.)
IF power trigger bandwidth	spectrum analysis	
	RBW > 1 kHz	40 MHz (nom.)
	RBW $\leq$ 1 kHz	6 MHz (nom.)
	I/Q analysis or modulation analysis: see section I/Q data	
<b>Gated sweep</b>		
Gate source		external, IF power, video
Gate delay		7.81 ns to 30 s (nom.)
Gate length		7.81 ns to 30 s (nom.)
Max. deviation of gate length		7.81 ns (nom.)

**I/Q data**

Record length	standard	max. 100 Msample I and Q
	with R&S®FSV3-B114 option	max. 800 Msample I and Q
Maximum number of pre-trigger samples	standard	100 Msample I and Q
	with R&S®FSV3-B114 option	200 Msample I and Q
Word length of I/Q samples		32 bit for I and 32 bit for Q
Sampling rate	standard	100 Hz to 128 MHz
	with R&S®FSV3-B40 option	100 Hz to 128 MHz
	with R&S®FSV3-B200, R&S®FSV3-B400 option	100 Hz to 512 MHz
Max. signal analysis bandwidth (equalized)	standard	28 MHz <sup>6</sup>
	with R&S®FSV3-B40 option	40 MHz <sup>6</sup>
	with R&S®FSV3-B200 option	200 MHz <sup>6</sup>
	with R&S®FSV3-B400 option	400 MHz <sup>6</sup>

<b>Signal analysis bandwidth ≤ 40 MHz <sup>6</sup></b>		
Amplitude flatness	$(1.25 \times \text{signal analysis bandwidth}) \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	±0.3 dB (nom.)
	$f_{\text{center}} > 7.5 \text{ GHz}$ , YIG preselector off	±0.5 dB (nom.)
Deviation from linear phase	$(1.25 \times \text{signal analysis bandwidth}) \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	±1° (nom.)
	$f_{\text{center}} > 7.5 \text{ GHz}$ , YIG preselector off	±2° (nom.)
Nonlinearity of displayed level		see section Nonlinearity of displayed level
Level measurement uncertainty at center frequency		see section Total measurement uncertainty
Displayed average noise level at center frequency		see section Displayed average noise level
ADC related third-order intermodulation distortion	$f_{\text{center}} \geq 100 \text{ MHz}$ , two -30 dBm tones at input mixer within analysis bandwidth	-80 dBc (nom.)
Residual spurious response	RF attenuation = 0 dB, $f_{\text{center}} \geq 100 \text{ MHz}$	-90 dBm (nom.)
Other spurious responses		see section Spurious responses
IF power trigger bandwidth		40 MHz (nom.)
Trigger resolution	trigger source extern or IF power	7.81 ns (nom.)

<sup>6</sup> For  $f > 7.5 \text{ GHz}$ , R&S®FSV3-B11 option is required and YIG preselector = off must be set.

<b>Signal analysis bandwidth 40 MHz to 200 MHz</b> <sup>6, 7, 8</sup>		
Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off, YIG preselector off for $f > 7.5$ GHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.5 \text{ dB (nom.)}^9$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}^9$
	$7.5 \text{ GHz} < f_{\text{center}} \leq 26.5 \text{ GHz}$	$\pm 1.0 \text{ dB (nom.)}^9$
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off, YIG preselector off for $f > 7.5$ GHz	
	$150 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 2^\circ \text{ (nom.)}^{10}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	$\pm 2.5^\circ \text{ (nom.)}^{10}$
	$7.5 \text{ GHz} < f_{\text{center}} \leq 26.5 \text{ GHz}$	$\pm 3^\circ \text{ (nom.)}^{10}$
Nonlinearity of displayed level	0 dB to $-70$ dB	
		$< 0.15 \text{ dB (nom.)}$
	Level measurement uncertainty at center frequency	add 0.2 dB (nom.) to the values in section Total measurement uncertainty
	Displayed average noise level at center frequency	add 5 dB (nom.) to the values in section Displayed average noise level
ADC related third-order intermodulation distortion	$f_{\text{center}} \geq 150 \text{ MHz}$ two $-25 \text{ dBm}$ tones at input mixer within analysis bandwidth	$-75 \text{ dBc (nom.)}$
Residual spurious response	RF attenuation = 0 dB, $f_{\text{center}} \geq 150 \text{ MHz}$	$-90 \text{ dBm (nom.)}$
ADC related spurious response	single tone within analysis bandwidth mixer level = $-10 \text{ dBm}^4$ reference level = signal level $f_{\text{center}} \geq 150 \text{ MHz}$	$-75 \text{ dBc (nom.)}$
Other spurious responses		see section Spurious responses
IF power trigger bandwidth		200 MHz (nom.)
Trigger resolution	trigger source extern	3.91 ns (nom.)
	trigger source IF power	0.997 ns (nom.)

<b>Signal analysis bandwidth 200 MHz to 400 MHz</b> <sup>6, 8, 11</sup>		
Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off, YIG preselector off for $f > 7.5$ GHz	
	$300 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 0.7 \text{ dB (nom.)}^9$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	$\pm 1.2 \text{ dB (nom.)}^9$
	$7.5 \text{ GHz} < f_{\text{center}} \leq 22 \text{ GHz}$	$\pm 1.6 \text{ dB (nom.)}^9$
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off, YIG preselector off for $f > 7.5$ GHz	
	$300 \text{ MHz} \leq f_{\text{center}} < 4 \text{ GHz}$	$\pm 4^\circ \text{ (nom.)}^{10}$
	$4 \text{ GHz} \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	$\pm 6^\circ \text{ (nom.)}^{10}$
	$7.5 \text{ GHz} < f_{\text{center}} \leq 22 \text{ GHz}$	$\pm 4^\circ \text{ (nom.)}^{10}$
Nonlinearity of displayed level	0 dB to $-70$ dB	
		$< 0.15 \text{ dB (nom.)}$
	Level measurement uncertainty at center frequency	add 0.2 dB (nom.) to the values in section Total measurement uncertainty
	Displayed average noise level at center frequency	add 5 dB (nom.) to the values in section Displayed average noise level
ADC related third-order intermodulation distortion	$f_{\text{center}} \geq 300 \text{ MHz}$ two $-25 \text{ dBm}$ tones at input mixer within analysis bandwidth	$-75 \text{ dBc (nom.)}$
Residual spurious response	RF attenuation = 0 dB, $f_{\text{center}} \geq 300 \text{ MHz}$	$-90 \text{ dBm (nom.)}$
ADC related spurious response	single tone within analysis bandwidth, mixer level = $-10 \text{ dBm}^4$ , reference level = signal level	
	$300 \text{ MHz} \leq f_{\text{center}} \leq 7.5 \text{ GHz}$	
	analysis bandwidth $\leq 300 \text{ MHz}$	$-72 \text{ dBc (nom.)}$
	analysis bandwidth $> 300 \text{ MHz}$	$-60 \text{ dBc (nom.)}$
	$f_{\text{center}} > 7.5 \text{ GHz}$	$-72 \text{ dBc (nom.)}$
Other spurious responses		see section Spurious responses
IF power trigger bandwidth		400 MHz (nom.)
Trigger resolution	trigger source extern	3.91 ns (nom.)
	trigger source IF power	0.997 ns (nom.)

<sup>7</sup> The specifications in this section apply for the R&S®FSV3-B200 and R&S®FSV3-B400 options and for the temperature range from  $+20 \text{ }^\circ\text{C}$  to  $+30 \text{ }^\circ\text{C}$ .

<sup>8</sup> To obtain the set analysis bandwidth,  $(f_{\text{center}} + \frac{1}{2} \text{ analysis bandwidth}) \leq f_{\text{max}}$  must be met;  $f_{\text{max}}$ : maximum frequency of the instrument.

<sup>9</sup> With R&S®FSV3-B24 option installed, add 0.2 dB to the specifications.

<sup>10</sup> With R&S®FSV3-B24 option installed, add  $1^\circ$  to the specifications.

<sup>11</sup> The specifications in this section apply for the R&S®FSV3-B400 option and for the temperature range from  $+20 \text{ }^\circ\text{C}$  to  $+30 \text{ }^\circ\text{C}$ .

## Inputs and outputs

<b>RF input</b>		
Impedance		50 $\Omega$
Connector	R&S®FSVA3004, R&S®FSVA3007, R&S®FSVA3013	N female
	R&S®FSVA3030	APC 3.5 mm male (compatible with SMA)
	R&S®FSVA3044	2.92 mm male (compatible with SMA)
VSWR of R&S®FSVA3004, R&S®FSVA3007	RF attenuation $\geq 10$ dB	
	10 MHz $\leq f < 1$ GHz	$< 1.2$ , typ. 1.09 <sup>12</sup>
	1 GHz $\leq f < 3.6$ GHz	$< 1.5$ , typ. 1.19 <sup>12</sup>
	3.6 GHz $\leq f \leq 7.5$ GHz	$< 2.0$ , typ. 1.42 <sup>12</sup>
	5 dB $\leq$ RF attenuation $\leq 9$ dB	
	10 MHz $\leq f < 3.6$ GHz	$< 1.5$ , typ. 1.31 <sup>12</sup>
	3.6 GHz $\leq f \leq 7.5$ GHz	$< 2.0$ , typ. 1.51 <sup>12</sup>
VSWR of R&S®FSVA3013, R&S®FSVA3030	RF attenuation $\geq 10$ dB	
	10 MHz $\leq f < 3.5$ GHz	$< 1.2$ , typ. 1.12 <sup>12</sup>
	3.5 GHz $\leq f \leq 18$ GHz	$< 1.6$ , typ. 1.22 <sup>12</sup>
	18 GHz $< f \leq 26.5$ GHz	$< 2.0$ , typ. 1.37 <sup>12</sup>
	26.5 GHz $< f \leq 30$ GHz	$< 2.5$ , typ. 1.70 <sup>12</sup>
	5 dB $\leq$ RF attenuation $\leq 9$ dB	
	10 MHz $\leq f < 3.5$ GHz	$< 1.5$ , typ. 1.24 <sup>12</sup>
VSWR of R&S®FSVA3044	RF attenuation $\geq 10$ dB	
	10 MHz $\leq f < 3.5$ GHz	$< 1.5$ , typ. 1.24 <sup>12</sup>
	3.5 GHz $\leq f \leq 18$ GHz	$< 1.8$ , typ. 1.39 <sup>12</sup>
	18 GHz $< f \leq 26.5$ GHz	$< 2.2$ , typ. 1.43 <sup>12</sup>
	26.5 GHz $< f \leq 30$ GHz	$< 2.5$ , typ. 1.80 <sup>12</sup>
	5 dB $\leq$ RF attenuation $\leq 9$ dB	
	10 MHz $\leq f < 3.5$ GHz	$< 1.5$ , typ. 1.24 <sup>12</sup>
RF attenuation $\leq 4$ dB, DC coupled		
10 MHz $\leq f \leq 7.5$ GHz	typ. 2.0 <sup>12</sup>	
7.5 GHz $< f \leq 26.5$ GHz	typ. 2.5 <sup>12</sup>	
26.5 GHz $< f \leq 30$ GHz	typ. 3.0 <sup>12</sup>	
Setting range of RF attenuator	RF attenuation $\geq 5$ dB	
	10 MHz $\leq f \leq 3.5$ GHz	$< 1.5$ , typ. 1.3 <sup>12</sup>
	3.5 GHz $\leq f \leq 18$ GHz	$< 2.0$ , typ. 1.8 <sup>12</sup>
	18 GHz $< f \leq 26.5$ GHz	$< 2.2$ , typ. 2.0 <sup>12</sup>
	26.5 GHz $< f \leq 40$ GHz	$< 2.5$ , typ. 2.2 <sup>12</sup>
	40 GHz $< f \leq 44$ GHz	$< 2.5$ (nom.)
	RF attenuation $\leq 4$ dB, DC coupled	
	10 MHz $\leq f \leq 7.5$ GHz	typ. 2.0 <sup>12</sup>
	7.5 GHz $< f \leq 26.5$ GHz	typ. 2.5 <sup>12</sup>
	26.5 GHz $< f \leq 40$ GHz	typ. 3.0 <sup>12</sup>
40 GHz $< f \leq 44$ GHz	3.0 (nom.)	
Setting range of electronic RF attenuator	with R&S®FSV3-B25 option, $f \leq 7.5$ GHz	0 dB to 75 dB, in 1 dB steps <sup>13</sup> 0 dB to 25 dB, in 1 dB steps

### Probe power supply

Supply voltages		+15 V DC, -12.6 V DC and ground, max. 150 mA (nom.)
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### Noise source control and power sensor

Connector		7-pin LEMOSA female for R&S®FS-SNSxx smart noise sources and R&S®NRP-Zxx power sensors
	with R&S®FSV3-B28V option	BNC female for noise source control additionally
Noise source control output voltage		0 V/28 V, switchable, max. 100 mA (nom.)

<sup>12</sup> Typical VSWR performance: performance expected to be met in 95 % of the cases with a confidence level of 95 %, temperature range from +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.

<sup>13</sup> Mechanical RF attenuator with 5 dB steps and electronic attenuator with 1 dB steps. The electronic attenuator is located in the signal path behind the mechanical attenuator and the RF preamplifier (R&S®FSV3-B24 option) on the RF for  $f \leq 7.5$  GHz, on the IF for  $f > 7.5$  GHz.

<b>USB interface</b>	standard CPU board	5 ports, type A plug, version 2.0, 2 ports, type A plug, version 3.0
	with R&S®FSV3-B114 option	5 ports, type A plug, version 2.0, 2 ports, type A plug, version 3.0, 1 port, type B plug, version 3.0
	output current	0.5 A (nom.) version 2.0, 0.9 A (nom.) version 3.0
	max. sum of output current via USB ports	2 A (nom.)

<b>Reference input 1</b>		
Connector		BNC female
Impedance		50 Ω
Input frequency range		1 MHz ≤ $f_{in}$ ≤ 100 MHz, in 1 ppm steps
Required level		> 0 dBm, < 15 dBm into 50 Ω

<b>Reference input 2</b>		
Connector		SMA
Impedance		50 Ω
Input frequencies	with R&S®FSV3-K703 option	10 MHz, 100 MHz, 128 MHz, 640 MHz, 1000 MHz, 1280 MHz
Required level		> 3 dBm, < 13 dBm into 50 Ω

<b>Reference output 1</b>		
Connector		BNC female
Impedance		50 Ω
Output frequency	internal reference	10 MHz
	external reference	same as reference input 1 / 2 signal
Level		> 0 dBm (nom.)

<b>Reference output 2</b>		
Connector		SMA female
Impedance		50 Ω
Output frequency	with R&S®FSV3-K703 option	640 MHz
Level		10 dBm (nom.)

<b>External trigger/gate input</b>		
Number of ports		2 × input/output, selectable
	with R&S®FSV3-B5 option	1 × output additionally
Connector		BNC female
Trigger input voltage		0.5 V to 3.5 V (nom.)
Trigger output voltage		TTL-compatible, 0 V/5 V (nom.)
Input impedance		10 kΩ (nom.)

<b>IEC/IEEE bus control</b>		
Command set		interface in line with IEC 625-2 (IEEE 488.2)
Connector	with R&S®FSV3-B5 option	SCPI 1997.0
Interface functions		24-pin Amphenol female (GPIB) SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

<b>LAN interface</b>	standard	10/100/1000BASE-T
	with R&S®FSV3-B6 option	10GBASE-T
Connector		RJ-45

<b>External monitor</b>		
Connector	standard	DVI-D
	with R&S®FSV3-B114 option	DVI-D, display port rev 1.1



## General data

<b>Display</b>		LCD TFT color display (10.1")
Resolution		1280 × 800 pixel (WXGA resolution)
Pixel failure rate		$< 1 \times 10^{-5}$
<b>Data storage</b>		
Internal		solid state drive $\geq 50$ Gbyte (nom.)
External		support of USB 2.0 and USB 3.0 compatible memory devices
<b>Environmental conditions</b>		
Temperature	operating temperature range	+0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+40 °C at 90 % rel. humidity, without condensation, in line with EN 60068-2-30
<b>Altitude</b>		
Max. operating altitude	above sea level	4600 m (approx. 15100 ft)
<b>Mechanical resistance</b>		
Vibration	sinusoidal	5 Hz to 55 Hz 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
<b>EMC</b>		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 <sup>14</sup> , <sup>15</sup> CISPR 11/EN 55011 <sup>15</sup>
<b>Recommended calibration interval</b>		1 year
<b>Warranty</b>	instrument and hardware options	3 years
	accessories	1 year
<b>Power supply</b>		
AC supply		100 V to 240 V, 3 A to 1.25 A; 50 Hz to 400 Hz, protection class I in line with VDE 411
Power consumption	R&S®FSVA3004, R&S®FSVA3007	120 W (nom.), max. 250 W with all options
	R&S®FSVA3013, R&S®FSVA3030, R&S®FSVA3044	170 W (nom.), max. 300 W with all options
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1
Test mark		VDE, cCSA <sub>US</sub> , KC
<b>Dimensions and weight</b>		
Dimensions (nom.)	W × H × D	462 mm × 197 mm × 417 mm (18.15 in × 7.76 in × 16.42 in)
Net weight without options (nom.)	R&S®FSVA3004, R&S®FSVA3007	12.2 kg (26.9 lb)
	R&S®FSVA3013	13.6 kg (30 lb)
	R&S®FSVA3030	13.8 kg (30.44 lb)
	R&S®FSVA3044	14.6 kg (32.2 lb)

<sup>14</sup> Immunity test requirement for industrial environment (EN 61326 table 2).

<sup>15</sup> Emission limits for class A equipment apply.

## Options

### R&S®FSV3-B3 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

AF output		
Connector		3.5 mm mini jack
Output impedance		32 $\Omega$
Open-circuit voltage		up to 1.5 V, adjustable

### R&S®FSV3-B5 additional interfaces

IF output		
Connector		BNC female, 50 $\Omega$
Bandwidth		equal to bandwidth setting
IF frequency		(50 kHz + $\frac{1}{2}$ RBW) to (53 MHz – $\frac{1}{2}$ RBW), selectable
Output level (gain versus RF input)	RF attenuation = 0 dB, RF preamplifier = off, span = 0 Hz	0 dB (nom.)

Video output		
Connector		BNC female, 50 $\Omega$
Bandwidth		equal to bandwidth setting
Output scaling	log. display scale lin. display scale	logarithmic linear
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	1 V at 50 $\Omega$ load (nom.)

Trigger out		
Connector		BNC female
Output		TTL-compatible, 0 V/5 V

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.)

Aux control (for external generator control)		
Aux control		9-pin D-Sub female

GPIB interface		
IEC/IEEE bus control		24-pin Amphenol female

## R&S®FSV3-B10 external generator control

<b>Supported signal generators</b>		R&S®SGS100A, R&S®SGT100A, R&S®SMA100A, R&S®SMA100B, R&S®SMB100A, R&S®SMB100B, R&S®SMBV100A, R&S®SMBV100B, R&S®SMC100A, R&S®SMC100B, 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
<b>Synchronization handshake interface</b>	standard	LAN
	with R&S®FSV3-B5 option	LAN, TTL

## R&S®FSV3-B24 RF preamplifier

<b>Frequency</b>		
Frequency range	R&S®FSVA3004	10 MHz to 4 GHz
	R&S®FSVA3007	10 MHz to 7.5 GHz
	R&S®FSVA3013	10 MHz to 13.6 GHz
	R&S®FSVA3030	10 MHz to 30 GHz
	R&S®FSVA3044	10 MHz to 43.5 GHz

<b>Setting range</b>		
RF preamplifier gain	R&S®FSVA3004, R&S®FSVA3007, R&S®FSVA3013, R&S®FSVA3030	15 dB/30 dB (nom.) (selectable)
	R&S®FSVA3044	30 dB (nom.)

<b>Other specifications</b>		
Level measurement uncertainty		see base unit specification
Displayed average noise level		
Intermodulation		
Measurement uncertainty		

## R&S®FSV3-B25 electronic attenuator

Frequency range		10 Hz to 7.5 GHz
Setting range		0 dB to 25 dB, in 1 dB steps
Level measurement uncertainty		see base unit specification
Displayed average noise level		see base unit specification

<b>Intermodulation</b>		
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 7.5 GHz	40 dBm (nom.)

## Ordering information

Designation	Type	Order No.
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA3004	1330.5000.05
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSVA3007	1330.5000.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA3013	1330.5000.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA3030	1330.5000.31
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSVA3044	1330.5000.44
<b>Accessories supplied</b>		
Power cable, quick start guide		
R&S®FSVA3030: adapter 3.5 mm (APC3.5-compatible) female/female		
R&S®FSVA3044: adapter 2.92 mm female/female		

## Options

### Hardware <sup>16</sup>

Designation	Type	Order No.	Remarks
Side carry handles	R&S®FSV3-B1	1330.5700.02	user-retrofitable
Audio demodulator	R&S®FSV3-B3	1330.3765.02	
OCXO frequency reference	R&S®FSV3-B4	1330.3794.02	
Additional interfaces	R&S®FSV3-B5	1330.3820.02	IF out, video out (2 × BNC), trigger out, aux port, aux control, GPIB
10 Gbit/s LAN interface	R&S®FSV3-B6	1330.3913.02	for fast remote control and fast I/Q data transfer
External generator control	R&S®FSV3-B10	1330.3859.02	LAN based, user-retrofitable (license key), R&S®FSV3-B5 is recommended for high sweep speed
YIG preselector bypass	R&S®FSV3-B11	1330.3865.02	for R&S®FSVA3013, R&S®FSVA3030 and R&S®FSVA3044, user-retrofitable (license key)
40 MHz analysis bandwidth	R&S®FSV3-B40	1330.4103.02	user-retrofitable (license key)
200 MHz analysis bandwidth	R&S®FSV3-B200	1330.4132.02	R&S®FSV3-B11 option is required for frequencies > 7.5 GHz
400 MHz analysis bandwidth	R&S®FSV3-B400	1330.7154.02	R&S®FSV3-B11 option is required for frequencies > 7.5 GHz
Upgrade from 200 MHz to 400 MHz analysis bandwidth	R&S®FSV3-U400	1330.7183.02	R&S®FSV3-B200 option is required, user-retrofitable (license key)
Spare hard drive	R&S®FSV3-B18	1330.4003.02	requires R&S®FSV3-B20, user-retrofitable
Removable hard drive	R&S®FSV3-B20	1330.3971.02	at front panel
RF preamplifier for R&S®FSVA3004 and R&S®FSVA3007	R&S®FSV3-B24	1330.4049.07	
RF preamplifier for R&S®FSVA3013	R&S®FSV3-B24	1330.4049.13	
RF preamplifier for R&S®FSVA3030	R&S®FSV3-B24	1330.4049.30	
RF preamplifier for R&S®FSVA3044	R&S®FSV3-B24	1330.4049.44	
Electronic attenuator, 1 dB steps	R&S®FSV3-B25	1330.4078.02	user-retrofitable (license key)
USB mass memory write protection	R&S®FSV3-B33	1330.4861.02	pre-installation ex-factory, for later retrofit see instrument security manuals
Enhanced computing power	R&S®FSV3-B114	1330.4910.02	
Noise source control via BNC	R&S®FSV3-B28V	1330.6664.02	
1 GHz reference	R&S®FSV3-K703	1330.7502.02	user-retrofitable (license key)

<sup>16</sup> The hardware options can be retrofitted in service center unless otherwise noted.

Firmware <sup>17</sup>

Designation	Type	Order No.	Remarks
Pulse measurements	R&S®FSV3-K6	1346.3330.02	
Analog modulation analysis for AM/FM/φM	R&S®FSV3-K7	1330.5022.02	
Power sensor support	R&S®FSV3-K9	1346.3676.02	
GSM/EDGE/EDGE evolution/ VAMOS measurements	R&S®FSV3-K10	1330.5039.02	
Amplifier measurements	R&S®FSV3-K18	1346.3347.02	
Direct DPD measurements	R&S®FSV3-K18D	1346.3353.02	R&S®FSV3-K18 option required
Frequency response and group delay measurements	R&S®FSV3-K18F	1346.4408.02	R&S®FSV3-K18 option required
Noise figure measurements	R&S®FSV3-K30	1330.5045.02	for legacy noise sources R&S®FSV3-B28V option is required
Security write protection of solid state drive	R&S®FSV3-K33	1346.3360.02	
Phase noise measurements	R&S®FSV3-K40	1330.5051.02	
Vector signal analysis	R&S®FSV3-K70	1330.5074.02	
Multi-modulation analysis	R&S®FSV3-K70M	1346.3376.02	R&S®FSV3-K70 option required
BER PRBS measurements	R&S®FSV3-K70P	1346.3382.02	R&S®FSV3-K70 option required
3GPP FDD (WCDMA) BS measurements (incl. HSDPA and HSDPA+)	R&S®FSV3-K72	1330.5080.02	
3GPP FDD (WCDMA) MS measurements (incl. HSUPA and HSUPA+)	R&S®FSV3-K73	1330.5097.02	
WLAN 802.11a/b/g measurements	R&S®FSV3-K91	1330.5100.02	
WLAN 802.11n measurements	R&S®FSV3-K91N	1330.5139.02	R&S®FSV3-K91 option required
WLAN 802.11ac measurements	R&S®FSV3-K91AC	1330.5116.02	
WLAN 802.11ax measurements	R&S®FSV3-K91AX	1346.3399.02	
WLAN 802.11p measurements	R&S®FSV3-K91P	1330.5122.02	
EUTRA/LTE FDD BS measurements	R&S®FSV3-K100	1330.5145.02	
EUTRA/LTE FDD UE measurements	R&S®FSV3-K101	1330.5151.02	
EUTRA/LTE BS MIMO measurements	R&S®FSV3-K102	1330.5168.02	R&S®FSV3-K100 or R&S®FSV3-K104 option required
EUTRA/LTE UL advanced UL measurements	R&S®FSV3-K103	1330.7231.02	R&S®FSV3-K101 or R&S®FSV3-K105 option required
EUTRA/LTE TDD BS measurements	R&S®FSV3-K104	1330.5174.02	
EUTRA/LTE TDD uplink measurements	R&S®FSV3-K105	1330.5180.02	
EUTRA/LTE NB-IoT downlink measurements	R&S®FSV3-K106	1346.3418.02	
3GPP 5G-NR DL measurements	R&S®FSV3-K144	1330.7219.02	
3GPP 5G-NR UL measurements	R&S®FSV3-K145	1330.7225.02	
User defined frequency correction by SnP file	R&S®FSV3-K544	1346.3630.02	corrects frequency response (amplitude and phase) of measurement setup

## PC software

Designation	Type	Order No.
R&S®VSE basic edition <sup>18, 19</sup>	R&S®VSE	1345.1011.06 <sup>20</sup>
R&S®VSE enterprise edition <sup>21</sup>	R&S®VSE	1345.1105.06 <sup>20</sup>
<b>License dongle</b>		
License dongle	R&S®FSPC	1310.0002.03
Floating license dongle	R&S®FSPC-FL	1310.0002.04
<b>Service option</b>		
R&S®VSE software maintenance	R&S®VSE-SWM	1320.7622.81

For further information on the R&S®VSE vector signal explorer software, please refer to document PD 3607.1371.22 (specifications) and PD 3607.1371.12 (product brochure).

<sup>17</sup> For measurements with analysis bandwidths > 28 MHz an appropriate bandwidth option is required.

<sup>18</sup> Requires R&S®FSPC.

<sup>19</sup> Not available for R&S®FSPC-FL.

<sup>20</sup> To obtain the floating license of the product, R&S®FSPC-FL is needed and order number xxxx.xxxx.51 must be used instead of xxxx.xxxx.06.

<sup>21</sup> Requires R&S®FSPC or R&S®FSPC-FL.

## 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, 4 HU 1/1	R&S®ZZA-KN4	1175.3033.00
<b>Noise sources</b>		
Smart noise sources for noise figure and gain measurements up to 55 GHz (requires R&S®FSV3-K30)	R&S®FS-SNS26/40/55	1338.8008.xx (xx = 26/40/55)
<b>Matching pads, 50/75 Ω</b>		
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
<b>High-power attenuators</b>		
1000 W, 40 dB, 400 (1000) MHz	R&S®RBS1000	0207.4010.55
100 W, 3/6/10/20/30 dB, 2 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
<b>RF adapters and cables</b>		
Coaxial adapter 2.92 mm (f) - 2.92 mm (f)		3588.8664.00
Coaxial adapter 3.5 mm (f) - 3.5 mm (f), APC3.5-compatible		3587.7793.00
Coaxial adapter 3.5 mm (m) - 3.5 mm (m), APC3.5-compatible		3587.7770.00
Coaxial adapter N (f) - 3.5 mm (m), APC3.5-compatible		3587.7806.00
Coaxial adapter N (f) - 3.5 mm (f), APC3.5-compatible		3587.7829.00
Coaxial cable SMA (m) - SMA (m), length: 1 m		3586.9970.00
<b>Connectors and cables</b>		
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 high speed digital baseband interfaces of Rohde & Schwarz instruments	R&S®DIGIQ-HS	3641.2948.03
<b>DC block</b>		
DC block, 10 kHz to 18 GHz (N type)	R&S®FSE-Z4	1084.7443.02
<b>Tools</b>		
Torque wrench for type N connectors, 1.5 Nm coupling torque (for R&S®FSV3004/3007/3013)	R&S®ZN-ZTW	1328.8534.71
Torque wrench for 3.5/2.92/2.4/1.85 mm connectors, 0.9 Nm coupling torque (for R&S® FSV3030/3044)	R&S®ZN-ZTW	1328.8534.35

## Power sensors supported by the R&S®FSV3-K9 option <sup>22</sup>

Designation	Type	Order No.
<b>Universal power sensors</b>		
10 MHz to 8 GHz, 100 mW, two-path	R&S®NRP-Z211	1417.0409.02
10 MHz to 8 GHz, 200 mW <sup>23</sup>	R&S®NRP-Z11	1138.3004.02
10 MHz to 18 GHz, 100 mW, two-path <sup>23</sup>	R&S®NRP-Z221	1417.0309.02
10 MHz to 18 GHz, 200 mW <sup>23</sup>	R&S®NRP-Z21	1137.6000.02
10 MHz to 18 GHz, 2 W <sup>23</sup>	R&S®NRP-Z22	1137.7506.02
10 MHz to 18 GHz, 15 W <sup>23</sup>	R&S®NRP-Z23	1137.8002.02
10 MHz to 18 GHz, 30 W <sup>23</sup>	R&S®NRP-Z24	1137.8502.02
<b>Power sensor modules with power splitter</b>		
DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
<b>Thermal power sensors <sup>24</sup></b>		
0 Hz to 18 GHz, 100 mW	R&S®NRP18T	1424.6115.02
0 Hz to 18 GHz, 100 mW	R&S®NRP18TN	1424.6121.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33T	1424.6138.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33TN	1424.6144.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40T	1424.6150.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40TN	1424.6167.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50T	1424.6173.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50TN	1424.6180.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67T	1424.6196.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67TN	1424.6209.02
0 Hz to 110 GHz, 100 mW	R&S®NRP110T	1424.6215.02
<b>Thermal waveguide power sensors</b>		
50 GHz to 75 GHz, 100 mW	R&S®NRP75TWG	1700.2529.02
60 GHz to 90 GHz, 100 mW	R&S®NRP90TWG	1700.2312.02
75 GHz to 110 GHz, 100 mW	R&S®NRP110TWG	1173.8709.02
<b>Average power sensors <sup>24</sup></b>		
8 kHz to 6 GHz, 200 mW	R&S®NRP6A	1424.6796.02
8 kHz to 6 GHz, 200 mW	R&S®NRP6AN	1424.6809.02
9 kHz to 6 GHz, 200 mW <sup>23</sup>	R&S®NRP-Z91	1168.8004.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18A	1424.6815.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18AN	1424.6821.02
<b>Three path diode power sensors <sup>24</sup></b>		
100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
100 pW to 200 mW, 10 MHz to 8 GHz, LAN version	R&S®NRP8SN	1419.0012.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 18 GHz, LAN version	R&S®NRP18SN	1419.0035.02
1 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP18S-10	1424.6721.02
10 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP18S-20	1424.6738.02
30 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP18S-25	1424.6744.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version	R&S®NRP33SN	1419.0070.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version, TVAC-compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
100 pW to 100 mW, 50 MHz to 40 GHz, LAN version	R&S®NRP40SN	1419.0058.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
100 pW to 100 mW, 50 MHz to 50 GHz, LAN version	R&S®NRP50SN	1419.0093.02
<b>Wideband power sensors <sup>24</sup></b>		
50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
50 MHz to 40 GHz, 100 mW (2.92 mm)	R&S®NRP-Z85	1411.7501.02
50 MHz to 40 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.40
50 MHz to 44 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.44

<sup>22</sup> For average power measurement only.

<sup>23</sup> Product discontinued.

<sup>24</sup> In addition to RF power measurements the R&S®NRP-Z8x, R&S®NRPxxT/TN, R&S®NRPxxA/AN and R&S®NRPxxS/SN power sensors can be used as wideband RF power trigger sources.

## Service options

Warranty		
Standard		3 years <sup>25</sup>
Extended warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	
DAkkS calibration (ISO 17025, ISO 9000)	R&S®FSV3000ACA	

### Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge <sup>26</sup>. Necessary calibration and adjustments carried out during repairs are also covered.

### Extended warranty with calibration coverage (CW1 and CW2)

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 repairs <sup>26</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

### Extended warranty with accredited calibration (AW1 and AW2)

Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs <sup>26</sup> and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

<sup>25</sup> For instrument and hardware options. For accessories 1 year applies.

<sup>26</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.









## Service that adds value

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

## Rohde & Schwarz

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