

# R&S® FSV-K91/-K91n

## WLAN IEEE 802.11a/b/g/j/n

### Analysis

# Specifications



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# CONTENTS

<b>OFDM analysis (IEEE 802.11a, IEEE 802.11g OFDM, IEEE 802.11j, IEEE 802.11n)</b> .....	<b>3</b>
Frequency .....	3
Level .....	3
Signal acquisition .....	3
Result display.....	4
Adjustable parameters .....	4
Measurement uncertainty (nominal) .....	4
<b>DSSS/CCK analysis (IEEE 802.11b)</b> .....	<b>5</b>
Frequency .....	5
Level .....	5
Signal acquisition .....	5
Result display.....	5
Adjustable parameters .....	6
Measurement uncertainty (nominal) .....	6
<b>Ordering information</b> .....	<b>7</b>
Recommended options and extras .....	7

The specifications of the R&S®FSV-K91 are based on the data sheet of the R&S®FSV signal analyzer.

Specifications apply under the following conditions: 30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal automatic adjustments performed. "Typical values" are designated with the abbreviation "typ." These values are verified during the final test but are not assured by Rohde & Schwarz. "Nominal values" are design parameters that are not assured by Rohde & Schwarz. These values are verified during product development but are not specifically tested during production.

# OFDM analysis (IEEE 802.11a, IEEE 802.11g OFDM, IEEE 802.11j, IEEE 802.11n)

Support of IEEE 802.11n modulation analysis requires the following:

- Upgrade to R&S®FSV-K91n (R&S®FSV-K91 upgrade to IEEE 802.11n) and
- User-retrofittable hardware option “40 MHz Analysis Bandwidth” (R&S®FSV-B70)

## Frequency

Frequency range	RF input	
	R&S®FSV3	50 MHz <sup>1</sup> to 3.6 GHz
	R&S®FSV7	50 MHz <sup>1</sup> to 7 GHz
Frequency setting		frequency and channel number

## Level

Level range	RF input	up to +30 dBm
Level setting		autorange
		manual

## Signal acquisition

Supported standards		IEEE 802.11a, IEEE 802.11g (OFDM), IEEE 802.11n, IEEE 802.11j (10 MHz), IEEE 802.11j (20 MHz)
Modulation format		BPSK, QPSK, 16QAM, 64QAM
Demodulator setting		auto
		manual with/without test of signal field
Capture length	continuous	IEEE 802.11a, j, g: 24 µs to 50 ms IEEE 802.11n: 24 µs to 40 ms
Number of bursts that can be analyzed	continuous	1 to 10922
Result length	PVT, spectrum FFT, CCDF	capture length, 1 to 10922 bursts or gate length
	EVM versus symbol and versus carrier, constellation versus symbol/versus carrier, spectrum flatness, bit stream, signal field	capture length, 1 to 10922 bursts
Burst length	automatic detection of number of data symbols manual	1 to 1366 data symbols
Triggering	RF input	free run, power, external

<sup>1</sup> 1 MHz to 50 MHz with restricted functionality depending on bandwidth (power trigger, auto level, IF overload).

## Result display

Result list	min./mean/max.	EVM all carriers
	min./mean/max.	EVM pilots
	min./mean/max.	EVM payload
		I/Q offset
		gain imbalance
		quadrature error
		center frequency error
		symbol clock error
Power versus time		mean burst power
		crest factor
EVM		full burst
		rising/falling edge
Spectrum		EVM versus symbol
		EVM versus carrier
		spectrum mask (IEEE and ETSI)
		ACP (IEEE 802.11j: absolute/relative)
		spectrum FFT
		spectrum flatness

Constellation		constellation diagram
Statistics		constellation versus carrier
		bit stream
		signal field
Limit check	values in line with standard	CCDF
		result list
		EVM
		spectrum mask
		ACP

## Adjustable parameters

Pilot tracking		phase ON/OFF
		timing ON/OFF
		level ON/OFF
Channel estimation		preamble and data
		preamble

## Measurement uncertainty (nominal)

Residual EVM	level -23 dBm to +30 dBm average of 20 bursts	IEEE 802.11a/g/j signal	IEEE 802.11n signal 20 MHz	40 MHz
	input = RF (f = 2.4 GHz or 5 GHz)			
	channel estimation = preamble and data	-45 dB	-45 dB	-41 dB
	channel estimation = preamble	-43.5 dB	-43 dB	-40 dB
Frequency error				
Lock range		40 ppm		
Uncertainty		1 Hz + R&S <sup>®</sup> F <sub>SV</sub> frequency uncertainty (see R&S <sup>®</sup> F <sub>SV</sub> reference frequency)		
Level uncertainty	test of spectrum mask	like R&S <sup>®</sup> F <sub>SV</sub> (see R&S <sup>®</sup> F <sub>SV</sub> total measurement uncertainty)		
	output power	like R&S <sup>®</sup> F <sub>SV</sub> (see R&S <sup>®</sup> F <sub>SV</sub> total measurement uncertainty)		
	ACPR	like R&S <sup>®</sup> F <sub>SV</sub> (see R&S <sup>®</sup> F <sub>SV</sub> total measurement uncertainty)		
Spectrum flatness		like R&S <sup>®</sup> F <sub>SV</sub> + 0.1 dB (see R&S <sup>®</sup> F <sub>SV</sub> total measurement uncertainty)		

# DSSS/CCK analysis (IEEE 802.11b)

## Frequency

Frequency range	RF input	
	R&S®FSV3	50 MHz <sup>2</sup> to 3.6 GHz
	R&S®FSV7	50 MHz <sup>2</sup> to 7 GHz
Frequency setting		frequency and channel number

## Level

Level range	RF input	up to +30 dBm
Level setting		autorange
		manual

## Signal acquisition

Supported standards		IEEE 802.11b
Modulation format		DBPSK, DQPSK, CCK, short PLCP, long PLCP
Demodulator setting		auto
		manual with/without test of signal field
Capture length	continuous	24 µs to 50 ms
Number of bursts that can be analyzed	manual	1 to 10922
Result length	PVT, spectrum FFT, CCDF	capture length, 1 to 10922 bursts or gate length
	EVM versus symbol and versus carrier constellation versus symbol bit stream PLCP header	capture length, 1 to 10922 bursts
Burst length	automatic detection of number of data symbols manual	1 byte to 4095 bytes
Triggering	RF input	free run, power, external

## Result display

Result list	min./mean/max.	peak vector error
	min./mean/max.	burst EVM
		I/Q offset
		gain imbalance
		quadrature error
		center frequency error
		chip clock error
		rise time
		fall time
		mean burst power
		peak burst power
		crest factor
	Power versus time	
EVM		EVM versus symbol
Spectrum		spectrum mask, ACPR, spectrum FFT
Constellation		constellation diagram
Statistics		bit stream
		PLCP header
		CCDF
Limit check	values in line with standard	result list, power versus time, EVM, spectrum mask, ACP

<sup>2</sup> 1 MHz to 50 MHz with restricted functionality depending on bandwidth (power trigger, auto level, IF overload).

## Adjustable parameters

Tracking		phase ON/OFF
		timing ON/OFF
		level ON/OFF

## Measurement uncertainty (nominal)

Residual EVM	level -23 dBm to +30 dBm average of 20 bursts, 11 Mbps CCK with short PLCP, burst EVM	
	input = RF (f = 2.442 GHz)	0.9 %
Frequency error		
Lock range		1.3 MHz
Uncertainty		1 Hz + R&S®FSV frequency uncertainty (see R&S®FSV reference frequency)
Level uncertainty	test of spectrum mask	like R&S®FSV (see R&S®FSV total measurement uncertainty)
	output power	like R&S®FSV (see R&S®FSV total measurement uncertainty)
	ACPR	like R&S®FSV (see R&S®FSV total measurement uncertainty)

## Ordering information

Designation	Type	Order No.
WLAN IEEE 802.11a/b/g/j Analysis	R&S®FSV-K91	1310.8903.02
WLAN IEEE 802.11n Analysis <sup>3</sup>	R&S®FSV-K91n	1310.9468.02
Signal Analyzer	R&S®FSV3	1307.9002.03
Signal Analyzer	R&S®FSV7	1307.9002.07

## Recommended options and extras

Designation	Type	Order No.	Retrofittable	Remarks
OCXO Reference Frequency	R&S®FSV-B4	1310.9522.02	yes	user-retrofittable
RF Preampifier (9 kHz to 7 GHz)	R&S®FSV-B22	1310.9600.02	yes	user-retrofittable
Electronic Attenuator, 1 dB steps	R&S®FSV-B25	1310.9622.02	yes	user-retrofittable
40 MHz Analysis Bandwidth	R&S®FSV-B70	1310.9645.02	yes	user-retrofittable

See also the specifications for the R&S®FSV signal analyzer (PD 5214.0499.22).

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<sup>3</sup> Requires R&S®FSV-B70.

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For product brochure,  
see PD 5214.0499.12  
and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

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