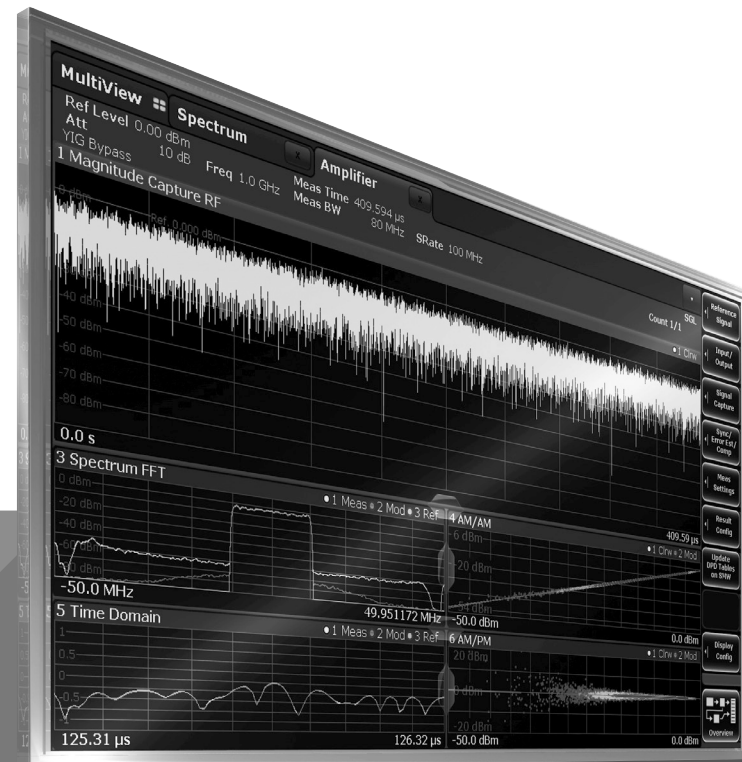


AMPLIFIER MEASUREMENTS

Specifications

R&S®FSW/FSV3/FPS/VSE-K18 Amplifier Measurements
R&S®FSW/FSV3/FPS/VSE-K18D Direct DPD Measurements
R&S®FSW/FSV3/VSE-K18F Frequency Response Measurements
R&S®FSW/FSV3/VSE-K18M Memory Polynomial DPD



Data Sheet
Version 07.00

ROHDE & SCHWARZ

Make ideas real



CONTENTS

Definitions	3
Specifications.....	5
General remarks.....	5
Inputs	5
Signal acquisition.....	5
Generator control.....	6
<i>Generator models</i>	6
<i>Generator control user interface</i>	6
Power sensor support.....	6
Reference signal.....	6
Amplifier modeling and digital predistortion (DPD)	7
Synchronization	7
Error compensation	7
Equalizer	8
2D/3D parameter sweep measurement	8
Envelope tracking/supply voltage specific parameters	8
Ordering information	9

Definitions

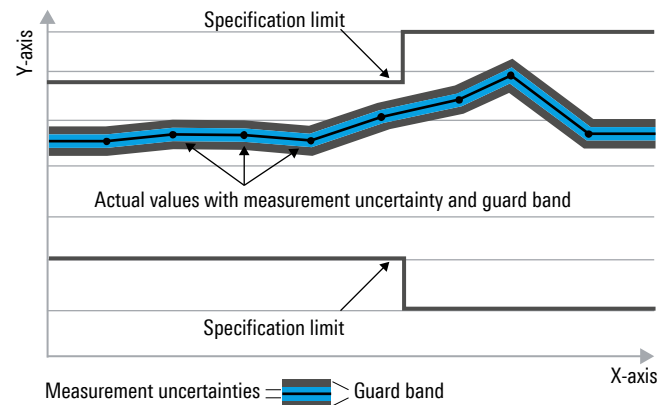
General

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.



Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under "Specifications with limits" above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

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.

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bits per second (Gbps), million bits per second (Mbps), thousand bits per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Specifications

The specifications of the R&S®FSV3/R&S®FSW/R&S®FPS-K18/ R&S®VSE-K18 amplifier measurements are based on the data sheet of the R&S®VSE vector signal explorer base software, the R&S®FSW, R&S®FSVA3000, R&S®FSV3000 and R&S®FPS signal and spectrum analyzers. They have not been checked separately and are not verified during instrument calibration. Measurement uncertainties are given as 95 % confidence intervals and apply at a center frequency of 1 GHz. The specified level measurement errors do not take into account systematic errors due to reduced signal-to-noise ratio (SNR).

General remarks

The abbreviation FSx-K18(x) is used in this document for all versions of the option K18, i.e.

- R&S®FSW-K18/K18D/K18F/K18M
- R&S®FSV3-K18/K18D/K18F/K18M
- R&S®VSE-K18/K18D/K18F/K18M

Inputs

	R&S®FSW-K18	R&S®FSV3-K18	R&S®FPS-K18	R&S®VSE-K18
RF input	•	•	•	•
Parallel baseband capture	•	–	–	–
File	•	•	•	•

Signal acquisition

		R&S®FSW-K18	R&S®FSV3-K18	R&S®FPS-K18	R&S®VSE-K18
Capture length	maximum	≥ 5 000 000 sample ¹	≥ 5 000 000 sample ¹	5 000 000 sample	≥ 5 000 000 sample ¹
Trigger modes	free run	free run, external, IF power ² , I/Q power, RF power, periodic time trigger	free run, external, IF power ² , I/Q power, periodic time trigger	free run, external, IF power ² , RF power	³
	external	•	•	•	3
	IF power	•	•	•	3
	I/Q power	•	•	–	3
	RF power	•	–	–	3
Maximum usable I/Q bandwidth	analysis	⁴	⁴	⁴	³
	digital predistortion (DPD)	⁵	⁵	⁵	⁵
I/Q averaging		•	•	•	•

¹ Depends on the measurement configuration and system memory.

² Restricted IF overload and IF power trigger functionality depending on carrier frequency and bandwidth at carrier frequencies < 50 MHz.

³ Depends on the connected instrument. For details, see R&S®VSE data sheet (PD 3607.1371.22).

⁴ Depends on the hardware configuration. For details, see R&S®FSW data sheet (PD 5215.6749.22), R&S®FSV3000 data sheet (PD 5216.1334.22), R&S®FSVA3000 data sheet (PD 5216.1211.22) and R&S®FPS data sheet (PD 3606.9433.22).

⁵ Depends on the signal generation hardware. For details, see R&S®SMW200A (PD 3606.8037.22), R&S®SMBV100B (PD 3607.8201.22) or R&S®SMM100A (PD 3608.7680.22) data sheets.

Generator control

Generator models

Supported generator models	R&S®FSW-K18	R&S®FSV3-K18	R&S®FPS-K18	R&S®VSE-K18
R&S®SMW200A	•	•	–	•
R&S®SGT100A	•	•	•	•
R&S®SMBV100B	•	•	–	•
R&S®SMM100A	•	•	–	•

Generator control user interface

Generator settings included in the R&S®FSx-K18 user interface	RMS level	same range as the connected Rohde & Schwarz generator
	generator level offset	same range as the connected Rohde & Schwarz generator
	attach to analyzer frequency	on/off
	center frequency	same range as the connected Rohde & Schwarz generator
	reference frequency	internal or external
	paths	A and B if available on a connected Rohde & Schwarz generator
	segment	the range depends on the number of segments available in the used waveform file
	digital attenuation	same range as the connected Rohde & Schwarz generator
generator RF output	on/off	

Power sensor support

	R&S®FSW-K18	R&S®FSV3-K18	R&S®FPS-K18	R&S®VSE-K18
Support of input power sensor (DUT input power)	•	• ⁶	–	•
Support of output power sensor (DUT output power)	•	• ⁶	–	•
Automatic correction of input/output levels to power sensor values	•	• ⁶	–	•
Supported sensor types	4	4	–	3

Reference signal

Supported reference signal sources	file-based	binary WV (*.wv) and iq-tar (*.iq.tar) file format
	running on ARB	Rohde & Schwarz generator ARB-based standard ⁷
	built-in waveform generator	generates a waveform file with configurable parameters (inside FSx-K18)
Parameters for built-in waveform generator		clock rate, signal bandwidth, signal length, signal crest factor, duty cycle for pulsed signals, ramp length for ramped signals, notch width, notch position filename of the generated waveform

⁶ Only available with the R&S®FSV3-K9 power sensor support option (order no. 1346.3676.02).

⁷ See section generator control for supported generator models.

Amplifier modeling and digital predistortion (DPD)

Modeling settings for polynomial DPD	polynomial order for AM/AM-based model	0 to 18
	polynomial order for AM/PM-based model	0 to 18
	level range used for modeling	0 dB to 99 dB
	number of modeling points	1 to 1000
Digital predistortion settings for polynomial DPD	shaping type	based on a numerical table or on a polynomial
	modeling order	AM/AM first and then AM/PM or AM/PM first and then AM/AM
	AM/AM and AM/PM states	can be switched on and off separately
	DPD power/linearity tradeoff	0 % to 100 %
	DPD file name on generator	string value
	DPD sequence	AM/AM first or AM/PM first (only available for table-based shaping)
	AM/AM	on/off
	AM/PM	on/off
Digital predistortion settings for direct DPD (R&S®FSx-K18D required)	iterations	1 to 1000
	DPD power/linearity tradeoff	0 % to 100 %
	DPD file name on generator	string value
	apply direct DPD	on/off
Digital predistortion settings for memory polynomial DPD (R&S®FSx-K18M required)	iteration step	1 to number of iterations configured in the last FSx-K18D run
	polynomial order	1 to 20
	memory order	0 to 20

Synchronization

Signal synchronization	synchronization	on/off
	synchronization mode	I/Q direct, I/Q phase difference, I/Q magnitude, trigger
	synchronization confidence	0 % to 100 %
	estimation range (relative to reference signal)	0 s to length of current reference signal
Signal evaluation	evaluation range (relative to reference signal)	0 s to length of current reference signal

Error compensation

Signal estimation	I/Q imbalance	on/off
	I/Q offset	on/off
	frequency error	on/off
	amplitude droop	on/off
	sample rate error	on/off
Signal compensation	I/Q imbalance	on/off
	I/Q offset	on/off
	frequency error	on/off
	sample rate error	on/off

Equalizer

Equalizer filter settings	equalizer filter length for training	1 sample to 300 sample
	load equalizer filter coefficients	ASCII text file
	save equalizer filter coefficients	ASCII text file
Apply equalizer filter		on/off

2D/3D parameter sweep measurement

X and Y axis setting parameters (when using 2D mode, only the X axis is available)	center frequency	same range as connected Rohde & Schwarz generator and Rohde & Schwarz signal analyzer
	generator power	same range as connected Rohde & Schwarz generator and Rohde & Schwarz signal analyzer
	envelope to RF delay (only for R&S®FSW-K18 in combination with R&S®SMW-K540 or R&S®SMBVB-K540)	same range as connected Rohde & Schwarz generator and Rohde & Schwarz signal analyzer
	envelope bias (only for R&S®FSW in combination with R&S®SMW-K540 or R&S®SMBVB-K540)	same range as connected Rohde & Schwarz generator and Rohde & Schwarz signal analyzer
Stepsize for X and Y parameters		0.1 x parameter range to 0.95 x parameter range
Enable Y axis		on/off

Envelope tracking/supply voltage specific parameters

(only available for R&S®FSW-K18 in combination with R&S®FSW-B71)

Baseband input I	multiplier	-1 000 000 to +1 000 000
	resistance R	> 0 Ω to 10 000 Ω
	offset	0 A to 10 000 A
Baseband input Q	multiplier	-1 000 000 to +1 000 000
	offset	0 V to 10 000 V

Ordering information

Designation	Type	Order No.
Amplifier measurements		
Amplifier measurements	R&S®FSW-K18	1325.2170.02
Direct DPD measurements	R&S®FSW-K18D	1331.6845.02
Frequency response measurements	R&S®FSW-K18F	1338.7230.02
Memory polynomial DPD	R&S®FSW-K18M	1345.1470.02
Amplifier measurements	R&S®FPS-K18	1321.4662.02
Direct DPD measurements	R&S®FPS-K18D	1321.4956.02
Amplifier measurements	R&S®FSV3-K18	1346.3347.02
Direct DPD measurements	R&S®FSV3-K18D	1346.3353.02
Frequency response measurements	R&S®FSV3-K18F	1346.4408.02
Memory polynomial DPD	R&S®FSV3-K18M	1345.1486.02
Amplifier measurements	R&S®VSE-K18	1345.1434.02
Direct DPD measurements	R&S®VSE-K18D	1345.1440.02
Frequency response measurements	R&S®VSE-K18F	1345.1457.02
Memory polynomial DPD	R&S®VSE-K18M	1345.1492.02
Vector signal explorer		
Base software	R&S®VSE	1320.7500.06
Signal and spectrum analyzers		
R&S®FSW		
Signal and spectrum analyzer, 2 Hz to 8 GHz	R&S®FSW8	1331.5003.08
Signal and spectrum analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1331.5003.13
Signal and spectrum analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1331.5003.26
Signal and spectrum analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1331.5003.43
Signal and spectrum analyzer, 2 Hz to 50 GHz	R&S®FSW50	1331.5003.50
Signal and spectrum analyzer, 2 Hz to 67 GHz	R&S®FSW67	1331.5003.67
Signal and spectrum analyzer, 2 Hz to 85 GHz	R&S®FSW85	1331.5003.85
R&S®FPS		
Signal and spectrum analyzer, 9 kHz to 4 GHz	R&S®FPS4	1319.2008.04
Signal and spectrum analyzer, 9 kHz to 7 GHz	R&S®FPS7	1319.2008.07
Signal and spectrum analyzer, 9 kHz to 13.6 GHz	R&S®FPS13	1319.2008.13
Signal and spectrum analyzer, 9 kHz to 30 GHz	R&S®FPS30	1319.2008.30
Signal and spectrum analyzer, 9 kHz to 40 GHz	R&S®FPS40	1319.2008.40
R&S®FSVA3000, R&S®FSV3000		
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
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV3004	1330.5000.04
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSV3007	1330.5000.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV3013	1330.5000.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV3030	1330.5000.30
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSV3044	1330.5000.43

Vector signal generators		
Vector signal generator	R&S®SMW200A	1412.0000.02
Vector RF source	R&S®SGT100A	1419.4501.02
Vector signal generator	R&S®SMBV100B	1423.1003.02
Vector signal generator	R&S®SMM100A	1440.8002.02

Service that adds value

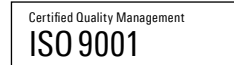
- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

Rohde & Schwarz

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Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership



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