AM/FM/PM MODULATION ANALYSIS

Specifications

R&S®FSW-K7 AM/FM/PM Modulation Analysis
R&S®ESW-K7 AM/FM/PM Modulation Analysis
R&S®FSWP-K7 AM/FM/PM Modulation Analysis
R&S®FSMR3-K7 AM/FM/PM Modulation Analysis
R&S®FSV3-K7 AM/FM/PM Modulation Analysis
R&S®FSV-K7 FM Stereo Measurement Application
R&S®FPS-K7 AM/FM/PM Modulation Analysis
R&S®FPL1-K7 AM/FM/PM Modulation Analysis
R&S®FSL-K7 AM/FM/PM Measurement Demodulator
R&S®VSE-K7 AM/FM/PM Modulation Analysis

Data Sheet
Version 09.00

ROHDE&SCHWARZ
Make ideas real

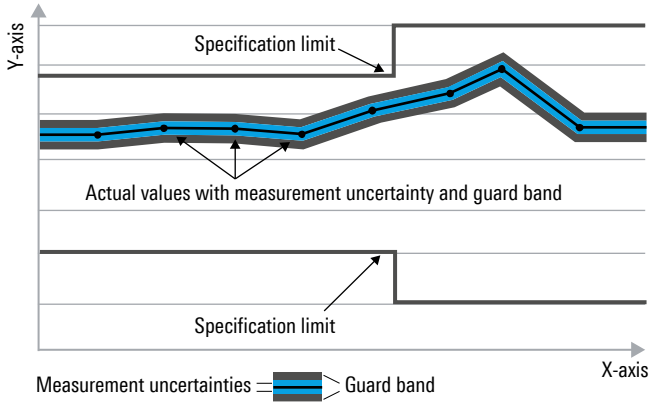
CONTENTS

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 <, ≤, >, ≥, ±, 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”.

Non-traceable specifications with limits, 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 million bits per second (Mbps), thousand bits per second (kbps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Mcps, kbps, ksps and Msample/s are not SI units.

Specifications

The specifications of the R&S®Fxx-K7 and R&S®VSE-K7 analog demodulation application are based on the data sheet specifications of the corresponding instruments and are not verified during instrument calibration. Measurement uncertainties are given as 95 % confidence intervals. The specified level measurement errors do not take into account systematic errors due to reduced signal to noise ratio (S/N).

General remarks

This data sheet covers the R&S®FSW-K7, the R&S®ESW-K7, the R&S®FSWP-K7 [1], the R&S®FSMR3-K7 [2], the R&S®FSV3-K7, the R&S®FSV-K7, the R&S®FPS-K7, the R&S®FPL1-K7, the R&S®FSL-K7 options and the R&S®VSE-K7 software.

The R&S®FSW-K7, R&S®ESW-K7, R&S®FSWP-K7, R&S®FSMR3-K7, R&S®FSV3-K7, R&S®FSV-K7, R&S®FPS-K7, R&S®FPL1-K7 and the R&S®FSL-K7 options are summarized with the term R&S®Fxx-K7. The R&S®Fxx-K7 runs on the analyzer.

The R&S®VSE-K7 runs on a PC that can be connected to the analyzers and oscilloscopes.

If not stated otherwise, the data sheet values are device-specific, e.g. the same value applies to the R&S®FSW-K7 and the R&S®VSE-K7 with a connected R&S®FSW.

Overview

R&S®	FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000 [3]	FSL	RTO
R&S®Fxx-K7 software that runs on device	● FSW-K7	● ESW-K7/ FSMR3-K7 [2]	● FSWP-K7 [1]	● FSV3-K7	● FSV-K7	● FPS-K7	● FPL1-K7	● FSL-K7	–
R&S®VSE-K7 PC software that can be connected to device	●	–	●	●	●	●	–	● [4]	●

[1] Requires R&S®FSWP-B1 option.

[2] Requires R&S®FSMR3-B1 option.

[3] For the R&S®FPL1000, all limits are only valid for RF frequencies of at least 12 MHz.

[4] Only R&S®FSL with motherboard order number 2112.1800.xx supported.

AM/FM/PM modulation analysis [5]

Measurement of analog modulation signals										
	R&S®	FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000 [6]	FSL	RTO
Demodulation bandwidth	100 Hz to 6.4 kHz	●	●	●	●	●	●	●	●	●
	12.5 kHz to 1.6 MHz (binary steps)	●	●	●	●	●	●	●	●	●
	3 MHz	●	●	●	●	●	●	●	●	●
	5 MHz	●	●	●	●	●	●	●	●	●
	8 MHz	●	●	●	●	●	●	●	●	●
	10 MHz	●	●	●	●	●	●	●	●	●
	18 MHz	●	●	●	●	●	●	●	●	●
	28 MHz	●	●	●	●	●	●	●	–	●
	40 MHz	●	●	●	●	●	●	●	–	●
	80 MHz	●	●	●	●	●	●	–	–	●
	160 MHz	●	–	●	●	●	●	–	–	●
	320 MHz	●	–	●	–	–	–	–	–	●
	500 MHz	●	–	–	–	–	–	–	–	●
	1 GHz	●	–	–	–	–	–	–	–	●
	2 GHz	●	–	–	–	–	–	–	–	●
Recording length	maximum	24000001 sample	24000001 sample	24000001 sample	24000001 sample	1600001 sample [7]	24000001 sample	1600001 sample [7]	512000 sample	9999900 sample
Recording time	100 Hz	196608 s	196608 s	196608 s	196608 s	13107.2 s [7]	196608 s	83184 s [7]	3276.8 s [8]	9999 s
	6.4 kHz	3072 s	3072 s	3072 s	3072 s	204.8 s [7]	3072 s	1299 s [7]	51.2 s [9]	639 s
	12.5 kHz	1536 s	1536 s	1536 s	1536 s	102.4 s [7]	1536 s	649 s [7]	26.6 s	639 s
	1.6 MHz	12 s	12 s	12 s	12 s	800 ms [7]	12 s	5 s [7]	200 ms	4.9 s
	3 MHz	6 s	6 s	6 s	6 s	400 ms [7]	6 s	2.5 s [7]	100 ms	2.6 s
	5 MHz	3 s	3 s	3 s	3 s	200 ms [7]	3 s	1.2 s [7]	50 ms	1.5 s
	8 MHz	1.5 s	1.5 s	1.5 s	1.5 s	100 ms [7]	1.5 s	634 ms [7]	25 ms	990 ms
	10 MHz	750 ms	750 ms	750 ms	750 ms	50 ms [7]	750 ms	317 ms [7]	12.5 ms	750 ms
	18 MHz	750 ms	750 ms	750 ms	750 ms	50 ms [7]	750 ms	317 ms [6, 7]	12.5 ms	440 ms
	28 MHz	375 ms	375 ms	375 ms	375 ms	25 ms [7]	375 ms	158 ms [6, 7]	–	280 ms
	40 MHz	375 ms	375 ms	375 ms	375 ms	25 ms [7]	375 ms	158 ms [6, 7]	–	190 ms
	80 MHz	187.5 ms	187.5 ms	187.5 ms	187.5 ms	12.5 ms [7]	187.5 ms	–	–	90 ms
	160 MHz	120 ms	–	120 ms	120 ms	8 ms [7]	120 ms	–	–	45 ms
	320 MHz	60 ms	–	60 ms	–	–	–	–	–	24 ms
	500 MHz	40 ms	–	–	–	–	–	–	–	8.3 ms
	1 GHz	19.2 ms	–	–	–	–	–	–	–	7.9 ms
	2 GHz	9.6 ms	–	–	–	–	–	–	–	3.9 ms

[5] Depends on the hardware configuration. For details, see R&S®FSW/ESW/FSWP/FSMR3000/FSVA3000/FSV3000/FSVA/FSV/FPS/FPL1000/FSL and R&S®RTO data sheets.

[6] R&S®FPL1-B40 option required for 18/28/40 MHz.

[7] For R&S®FSVA/FSV/FPL1000 with R&S®VSE-K7 option the values as for R&S®FSV3-K7 option apply.

[8] Limited to 32.98 s with R&S®VSE-K7.

[9] Limited to 33.51 s with R&S®VSE-K7.

R&S®		FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000	FSL	RTO
Display	frequency versus time (FM)	●	●	●	●	●	●	●	●	●
	amplitude versus time (AM)	●	●	●	●	●	●	●	●	●
	phase versus time (PM)	●	●	●	●	●	●	●	●	●
	RF power versus time	●	●	●	●	●	●	●	●	●
	RF spectrum (FFT)	●	●	●	●	●	●	●	●	●
	AF spectrum (FFT)	●	●	●	●	●	●	●	●	●
	modulation deviation (peak, RMS)	●	●	●	●	●	●	●	●	●
	modulation frequency	●	●	●	●	●	●	●	●	●
	carrier offset	●	●	●	●	●	●	●	●	●
	carrier power (power of unmodulated carrier)	●	●	●	●	●	●	●	●	●
	THD	●	●	●	●	●	●	●	●	●
	SINAD	●	●	●	●	●	●	●	●	●

AF (modulation frequency)	
Range	max. 0.5 × demodulation bandwidth
Resolution	5 digits
Measurement uncertainty	0.1 %

AF filters										
	R&S®	FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000	FSL	RTO
Lowpass	demodulation bandwidth ≤ 3 MHz									
	3 kHz	●	●	●	●	●	●	●	●	●
	demodulation bandwidth ≤ 8 MHz									
	15 kHz	●	●	●	●	●	●	●	●	●
	23 kHz	●	●	●	●	●	●	●	– [10]	●
	150 kHz	●	●	●	●	●	●	●	●	
	5/10/25 % of demodulation bandwidth	●	●	●	●	●	●	●	●	●
Highpass	demodulation bandwidth ≤ 1.6 MHz									
	20 Hz	●	●	●	●	●	●	●	– [10]	●
	demodulation bandwidth ≤ 3 MHz									
	50 Hz	●	●	●	●	●	●	●	●	●
	demodulation bandwidth ≤ 8 MHz									
	300 Hz	●	●	●	●	●	●	●	●	●
Deemphasis	demodulation bandwidth ≤ 40 MHz									
	25 µs	●	●	●	●	●	●	●	●	●
	demodulation bandwidth ≤ 18 MHz									
	50/75 µs	●	●	●	●	●	●	●	●	●
	demodulation bandwidth ≤ 3 MHz									
	750 µs	●	●	●	●	●	●	●	●	●
Weighting filters	demodulation bandwidth ≤ 3 MHz									
	ITU-T P.53	●	●	●	●	●	●	●	– [10]	●
	demodulation bandwidth ≤ 1.6 MHz									
	ITU-R unweighted	●	●	●	●	●	●	●	– [10]	●
	demodulation bandwidth ≤ 3 MHz									
	ITU-R weighted	●	●	●	●	●	●	●	– [10]	●
	demodulation bandwidth ≤ 800 kHz									
	A weighted	●	●	●	●	●	●	●	– [10]	●

[10] Available when using R&S®VSE with the R&S®FSL.

AM demodulation										
R&S®		FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000	FSL	RTO
Measurement range	modulation depth	0 % to 100 %								
Modulation depth uncertainty	AF ≤ 1 MHz	±(0.2 % + 0.001 × measured value) [11, 12]						±(0.2 % + 1 % of reading)	≤ 3 % of reading + residual AM	1 % of reading + residual AM
Residual AM	demodulation bandwidth ≤ 200 kHz, RMS, RF input level ≥ (RF attenuation/dB – 30) dBm R&S®RTO: RF input level ≥ –30 dBm	RF ≤ 8 GHz	RF ≤ 8 GHz	RF ≤ 8 GHz	RF ≤ 4 GHz	RF ≤ 4 GHz	RF ≤ 4 GHz	RF ≤ 7.5 GHz	RF ≤ 3 GHz	RF ≤ 4 GHz
		0.03 % [11]	0.03 % [11]	0.03 % [11]	0.1 %	0.1 %	0.1 %	0.1 %	0.2 %	0.2 %
Harmonic distortion		10 Hz ≤ AF ≤ 1 MHz			10 Hz ≤ AF ≤ 100 kHz					10 Hz ≤ AF ≤ 1 MHz
		0.05 % [11]			0.3 %					0.4 %
FM rejection	AF ≤ 1 MHz, deviation ≤ 1 MHz	AF + deviation ≤ 0.3 × demodulation bandwidth							AF + deviation ≤ 0.5 × demodulation bandwidth	AF + deviation ≤ 0.3 × demodulation bandwidth
		1 % + residual AM								

[11] Please refer to R&S®RTO column in case the R&S®FSW-B2000 is activated.

[12] With R&S®VSE and I/Q files the value increases to ±(0.2 % + 0.003 × measured value).

FM demodulation										
	R&S®	**FSW**	**ESW/ FSMR3000**	**FSWP**	**FSVA3000/ FSV3000**	**FSVA/ FSV**	**FPS**	**FPL1000**	**FSL**	**RTO**
Measurement range	frequency deviation									
	max. 0.5 × demodulation bandwidth									
Deviation uncertainty	AF ≤ 1 MHz	demodulation bandwidth ≥ 3.3 × (AF + deviation), demodulation bandwidth ≤ 10 × (AF + deviation)						demodulation bandwidth ≥ 3.3 × (AF + deviation), demodulation bandwidth ≤ 10 × (AF + deviation)	demodulation bandwidth ≥ 2 × (AF + deviation)	demodulation bandwidth ≥ 3.3 × (AF + deviation)
		±(0.003 × (AF + deviation) + 2 Hz) [11, 13]			±(0.01 × (AF + deviation) + 20 Hz)			±(0.01 × (AF + deviation) + 20 Hz)	< 3 % of reading + residual FM	0.2 % of reading + residual FM
Residual FM	demodulation bandwidth ≤ 100 kHz, RMS									
	RF input level ≥ (RF attenuation/dB – 30) dBm									RF input level ≥ –30 dBm
	RF ≤ 1 GHz	–	–	–	–	–	–	–	150 Hz	30 Hz
	RF ≤ 3 GHz	–	–	–	–	–	–	–	200 Hz	100 Hz
	RF ≤ 7 GHz	–	–	–	65 Hz	130 Hz	130 Hz	130 Hz	–	–
	RF ≤ 8 GHz	10 Hz	10 Hz	10 Hz	–	–	–	–	–	–
Harmonic distortion	10 Hz ≤ AF ≤ 100 kHz, deviation < 400 kHz	–	–	–	0.3 %	0.3 %	0.3 %	0.3 % [14]	0.3 %	–
	10 Hz ≤ AF ≤ 1 MHz, deviation < 500 kHz	0.1 %	0.1 %	0.1 %	–	–	–	–	–	0.1 %
AM rejection	100 Hz ≤ AF ≤ 1 kHz, modulation depth 50 %	30 Hz + residual FM								

[13] With R&S®VSE and I/Q files the value increases to ±(0.005 × (AF + deviation) + 2 Hz).

[14] With demodulation bandwidth > 5 MHz.

PM demodulation										
R&S®		FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000	FSL	RTO
Measurement range	phase deviation	5000 rad, max. 0.5 × demodulation bandwidth/AF						5000 rad, max. 0.5 × demodulation bandwidth/AF	< 1000 rad	max. 0.5 × demodulation bandwidth/AF
Phase deviation uncertainty	AF ≤ 1 MHz	AF × (phase deviation +1) ≤ 0.3 × demodulation bandwidth						AF × (phase deviation + 1) ≤ 0.3 × demodulation bandwidth	AF x (phase deviation +1) ≤ 0.5 × demodulation bandwidth	AF × (phase deviation + 1) ≤ 0.3 × demodulation bandwidth
		±(0.002 rad + 0.002 × measured value) [11, 15]			±(0.02 rad + 0.002 × measured value) [16]			±(0.02 rad + 0.002 × measured value)	3 % of reading + residual PM	0.2 % of reading + residual PM
Residual PM	demodulation bandwidth ≤ 100 kHz, RMS, RF ≤ 1 GHz, highpass 300 Hz									
	RF input level ≥ (RF attenuation/dB – 30) dBm									
		0.3 mrad [11]			1 mrad	5 mrad				2 mrad

Carrier power versus time										
R&S®		FSW	ESW/ FSMR3000	FSWP	FSVA3000/ FSV3000	FSVA/ FSV	FPS	FPL1000	FSL	RTO
Display range		noise floor to +30 dBm						noise floor to +30 dBm	noise floor to +20 dBm	noise floor to +24 dBm
Measurement uncertainty		unmodulated carrier, S/N > 16 dB								
	RF: 50 kHz to 3 GHz	–	–	–	1 dB	1 dB	1 dB	1 dB	1 dB	–
	RF: 9 kHz to 8 GHz	1 dB	1 dB	1 dB	–	–	–	–	–	–
	< 0.75 × bandwidth of R&S®RTO	–	–	–	–	–	–	–	–	1 dB
Maximum dynamic range	demodulation bandwidth 200 kHz									
	RF input level ≥ (RF attenuation/dB – 10) dBm							RF input level ≥ (RF att./dB – 13) dBm	RF input level ≥ (RF att./dB – 10) dBm	
		90 dB [11]			75 dB			75 dB	75 dB	80 dB
Nonlinearity of displayed level	S/N > 16 dB	0.1 dB [11]			0.2 dB			0.2 dB	0.2 dB	1 dB

[15] With R&S®VSE and I/Q files the value increases to ±(0.002 rad + 0.004 × measured value).

[16] With R&S®VSE and I/Q files the value increases to ±(0.02 rad + 0.004 × measured value).

AF spectrum		
Span		max. 0.5 × demodulation bandwidth
Resolution bandwidth		1 Hz to 10 MHz

RF spectrum		
Span		max. demodulation bandwidth
Resolution bandwidth		1 Hz to 10 MHz
Shape factor	60 dB:3 dB	nom. 2.5

Modulation distortion		
Measurement functions		THD, SINAD
Measurement range		–100 dB to 0 dB
Resolution		0.01 dB
Measurement uncertainty		0.5 dB
AF frequency range		10 Hz to 5 MHz

Trigger		
Trigger functions [17]		RF level [18], AM, FM, PM demodulation

R&S®FSV-K7S FM stereo measurement application (not supported by R&S®VSE)

Frequency

Frequency range	FM stereo mode	
	specified frequency range	85 MHz to 110 MHz
	usable frequency range	same as instrument frequency range
Frequency tuning		automatic, manual

Frequency counter

Frequency counter resolution		1 Hz
Count accuracy	S/N > 25 dB	±1 Hz + R&S®FSV frequency uncertainty (see R&S®FSV reference frequency)

Level

Input level range		–60 dBm to +30 dBm
Level resolution		0.01 dB
Level setting		autorange, manual
Level measurement uncertainty		see R&S®FSV total measurement uncertainty

[17] Not available with R&S®VSE.

[18] Not available with R&S®FPL1000.

Signal acquisition

Measurement bandwidth		400 kHz
Measurement time		2 ms to 3.2 s
Trigger		free run, external, IF power, time, demodulated signals: left, right, MPX, mono, stereo, RDS, pilot, RF power

Result display

Result summary table		carrier power
		carrier frequency
		reference deviation
	left/right/MPX/mono/stereo/RDS/pilot signal	deviation
		relative result
		modulation frequency
		SINAD
		THD (total harmonic distortion)
Demodulated AF signal	left/right/MPX/mono/stereo/RDS/pilot signal	AF signal versus time
		AF spectrum
RF signal		RF power versus time
		RF spectrum

AF spectrum		
Span		500 Hz to 200 kHz
Resolution bandwidth		1.2 Hz to 1.9 kHz

RF spectrum		
Span		500 Hz to 400 kHz
Resolution bandwidth		1.2 Hz to 1.9 kHz
Shape factor	60 dB:3 dB	nom. 2.5

Detection, audio filter, weighting

Detection	numerical results	+peak, –peak, ±peak/2, RMS, ITU-R quasi peak
	trace detector	max. peak, min. peak, sample, average
Lowpass		3 kHz, 15 kHz, 23 kHz, 150 kHz
		5 %, 10 %, 25 % of demodulation bandwidth
Highpass		20 Hz, 50 Hz, 300 Hz
Deemphasis		25 µs, 50 µs, 75 µs, 750 µs
Weighting filters		CCITT P.53, equal to ITU-T rec. O.41
		CCIR unweighted, equal to ITU-R 468-4, CCIR weighted

Measurement uncertainty

Frequency modulation measurement		
Maximum deviation range	frequency deviation	200 kHz
Resolution		1 Hz
Deviation uncertainty	AF ≤ 15 kHz and deviation ≤ 40 kHz	1 % of reading
Residual FM	RMS, RF input level ≥ (RF attenuation/dB – 30) dBm	130 Hz
Harmonic distortion	10 Hz ≤ AF ≤ 100 kHz, deviation < 400 kHz	0.3 %

Audio frequency counter (modulation frequency)		
Range		20 Hz to 200 kHz
Resolution		0.1 %
Measurement uncertainty		0.1 %

Stereo S/N ratio	weighted to ITU-R, 40 kHz deviation	60 dB

Stereo crosstalk	AF 30 Hz to 15 kHz	–50 dB

Intermodulation distortion analysis

Measurement functions		intermodulation and differential frequency distortion
Measurement range		–80 dB to 0 dB, 0.01 % to 100 %
Readout unit		dB, %
Resolution		0.01 dB
Measurement uncertainty		0.5 dB
AF frequency range		10 Hz to 15 kHz

Ordering information

Designation	Type	Order No.
Analog demodulator options		
AM/FM/PM modulation analysis	R&S®FSW-K7	1313.1339.02
AM/FM/PM modulation analysis [1]	R&S®FSWP-K7	1325.4238.02
AM/FM/PM modulation analysis [2]	R&S®FSMR3-K7	1345.3389.02
AM/FM/PM modulation analysis	R&S®FSV3-K7	1330.5022.02
AM/FM/PM modulation analysis	R&S®FSV-K7	1310.8103.02
FM stereo measurement application (requires R&S®FSV-K7)	R&S®FSV-K7S	1310.8126.02
AM/FM/PM modulation analysis	R&S®FPS-K7	1321.4079.02
AM/FM/PM modulation analysis	R&S®FPL1-K7	1323.1731.02
AM/FM/PM measurement demodulator	R&S®FSL-K7	1301.9246.02
AM/FM/PM modulation analysis	R&S®ESW-K7	1331.6216.02
AM/FM/PM modulation analysis	R&S®VSE-K7	1320.7539.06
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®FSWP		
Phase noise analyzer and VCO tester, 1 MHz to 8 GHz	R&S®FSWP8	1322.8003.08
Phase noise analyzer and VCO tester, 1 MHz to 26.5 GHz	R&S®FSWP26	1322.8003.26
Phase noise analyzer and VCO tester, 1 MHz to 50 GHz	R&S®FSWP50	1322.8003.50
R&S®FSMR3000		
Measuring receiver, 100 kHz to 8 GHz	R&S®FSMR3008	1345.4004.08
Measuring receiver, 100 kHz to 26.5 GHz	R&S®FSMR3026	1345.4004.26
Measuring receiver, 100 kHz to 50 GHz	R&S®FSMR3050	1345.4004.50
R&S®FSVA3000		
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
R&S®FSV3000		
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

Designation	Type	Order No.
R&S®FSVA		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA4	1321.3008.05
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSVA7	1321.3008.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA13	1321.3008.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA30	1321.3008.31
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSVA40	1321.3008.41
R&S®FSV		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV4	1321.3008.04
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSV7	1321.3008.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV13	1321.3008.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV30	1321.3008.30
Signal and spectrum analyzer, 10 Hz to 40 GHz [19]	R&S®FSV40	1321.3008.39
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSV40	1321.3008.40
R&S®FPS		
Signal analyzer, 9 kHz to 4 GHz	R&S®FPS4	1319.2008.04
Signal analyzer, 9 kHz to 7 GHz	R&S®FPS7	1319.2008.07
Signal analyzer, 9 kHz to 13.6 GHz	R&S®FPS13	1319.2008.13
Signal analyzer, 9 kHz to 30 GHz	R&S®FPS30	1319.2008.30
Signal analyzer, 9 kHz to 40 GHz	R&S®FPS40	1319.2008.40
R&S®FPL1000		
Signal and spectrum analyzer, 5 kHz to 3 GHz	R&S®FPL1003	1304.0004.03
Signal and spectrum analyzer, 5 kHz to 7.5 GHz	R&S®FPL1007	1304.0004.07
Signal and spectrum analyzer, 5 kHz to 14 GHz	R&S®FPL1014	1304.0004.14
Signal and spectrum analyzer, 5 kHz to 26.5 GHz	R&S®FPL1026	1304.0004.26
R&S®FSL		
Spectrum analyzer, 9 kHz to 3 GHz	R&S®FSL3	1300.2502.03
Spectrum analyzer, 9 kHz to 3 GHz, with tracking generator	R&S®FSL3	1300.2502.13
Spectrum analyzer, 9 kHz to 6 GHz	R&S®FSL6	1300.2502.06
Spectrum analyzer, 9 kHz to 6 GHz, with tracking generator	R&S®FSL6	1300.2502.16
Spectrum analyzer, 9 kHz to 18 GHz	R&S®FSL18	1300.2502.18
Spectrum analyzer, 9 kHz to 18 GHz, with tracking generator	R&S®FSL18	1300.2502.28
EMI test receiver		
EMI test receiver, 2 Hz to 8 GHz	R&S®ESW8	1328.4100.08
EMI test receiver, 2 Hz to 26.5 GHz	R&S®ESW26	1328.4100.26
EMI test receiver, 2 Hz to 44 GHz	R&S®ESW44	1328.4100.44
Oscilloscopes		
Oscilloscope, 600 MHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1002	1316.1000.02
Oscilloscope, 600 MHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1004	1316.1000.04
Oscilloscope, 1 GHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1012	1316.1000.12
Oscilloscope, 1 GHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1014	1316.1000.14
Oscilloscope, 2 GHz, 10 Gsample/s, 20/40 Msample, 2 channels	R&S®RTO1022	1316.1000.22
Oscilloscope, 2 GHz, 10 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1024	1316.1000.24
Oscilloscope, 4 GHz, 20 Gsample/s, 20/80 Msample, 4 channels	R&S®RTO1044	1316.1000.44

[19] Maximum bandwidth 10 MHz.

Designation	Type	Order No.
Vector signal explorer		
R&S®VSE basic edition	R&S®VSE	1345.1011.06
R&S®VSE enterprise edition	R&S®VSE Enterprise Edition	1345.1105.06
Software maintenance	R&S®VSE-SWM	1320.7622.81

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- ► Local and personalized
- ► Customized and flexible
- ► Uncompromising quality
- ► Long-term dependability

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- ► Energy efficiency and low emissions
- ► Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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AM/FM/PM Modulation Analysis
Data without tolerance limits is not binding | Subject to change

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