

Specifications

Specifications are valid under the following conditions: 15 minutes warm-up time at ambient temperature, specified environmental conditions met and calibration cycle adhered to. Data without tolerances: typical values. Data designated as "nominal": design parameters, i. e. not tested.

		R&S®FSH3	R&S®FSH6
Frequency			
Frequency range		100 kHz to 3 GHz	100 kHz to 6 GHz
Reference frequency			
Aging		1 ppm/year	
Temperature drift	0 °C to 30 °C 30 °C to 50 °C	2 ppm in addition 2 ppm/10 °C	
Frequency counter			
Resolution		1 Hz	
Counter accuracy	S/N > 25 dB	± (frequency × reference frequency error)	
Frequency span		0 Hz, 10 kHz to 3 GHz	0 Hz, 10 kHz to 6 GHz
Spectral purity			
SSB phase noise	f = 500 MHz, 20 °C to 30 °C		
30 kHz from carrier		<85 dBc (1 Hz)	
100 kHz from carrier		<100 dBc (1 Hz)	
1 MHz from carrier		<120 dBc (1 Hz)	
Sweep time			
	span = 0 Hz	1 ms to 100 s	
	span > 0 Hz	20 ms to 1000 s, min. 20 ms/600 MHz	
Bandwidths			
Resolution bandwidths (–3 dB)	1145.5850.13	1, 3, 10, 30, 100, 200, 300 kHz, 1 MHz	
	1145.5850.03/.23, 1145.5850.06/.26	in addition 100 Hz, 300 Hz	
Tolerance	≤300 kHz	±5 %, nominal	
	1 MHz	±10 %, nominal	
Resolution bandwidths (–6 dB)	with option R&S®FSH-K3 installed	in addition 200 Hz, 9 kHz, 120 kHz	
Video bandwidths		10 Hz to 1 MHz in 1, 3 steps	

		R&S®FSH3	R&S®FSH6
Amplitude			
Display range		average noise level displayed to +20 dBm	
Maximum permissible DC voltage at RF input		50 V/80 V ¹⁾	
Maximum power		20 dBm, 30 dBm (1 W) for max. 3 minutes	
Intermodulation-free dynamic range	third-order IM products, 2 × -20 dBm, reference level = -10 dBm	typ. 66 dB (typ. +13 dBm third-order intercept, IP3)	
Displayed average noise level	resolution bandwidth 1 kHz, video bandwidth 10 Hz, reference level ≤ -30 dBm		
10 MHz to 3 GHz		<-105 dBm, typ. -114 dBm	<-105 dBm, typ. -112 dBm
3 GHz to 5 GHz		-	<-103 dBm, typ. -108 dBm
5 GHz to 6 GHz		-	<-96 dBm, typ. -102 dBm
With preamplifier	only models 1145.5850.03 ²⁾ , 1145.5850.23, 1145.5850.06 and 1145.5850.26		
10 MHz to 2.5 GHz		<-120 dBm, typ. -125 dBm	<-120 dBm, typ. -125 dBm
2.5 GHz to 3 GHz		<-115 dBm, typ. -120 dBm	<-115 dBm, typ. -120 dBm
3 GHz to 5 GHz		-	<-115 dBm, typ. -120 dBm
5 GHz to 6 GHz		-	<-105 dBm, typ. -110 dBm
Inherent spurious	reference level ≤ -20 dBm, f > 30 MHz, RBW ≤ 100 kHz	<-80 dBm	<-80 dBm
Input related spurious	mixer level -40 dBm, carrier offset > 1 MHz		
Up to 3 GHz		<-70 dBc (nominal)	<-70 dBc (nominal)
3 GHz to 6 GHz		-	<-64 dBc (nominal)
Signal frequency minus -2.0156 GHz for signal frequencies 2 GHz to 3.2 GHz		typ. <-55 dBc	typ. <-55 dBc
2nd harmonic	mixer level -40 dBm	typ. <-60 dBc	typ. <-60 dBc
Level display			
Reference level		-80 dBm to +20 dBm in steps of 1 dB	
Display range		100 dB, 50 dB, 20 dB, 10 dB, linear	
Display units			
Logarithmic		dBm, dBμV, dBmV with transducer also dBμV/m and dBμA/m	
Linear		μV, mV, V, nW, μW, mW, W with transducer also V/m, mV/m and μV/m	
Traces		1 trace and 1 memory trace	
Detectors		auto peak, maximum peak, minimum peak, sample, RMS	
	with option R&S®FSH-K3 installed	in addition average and quasi-peak	
Level measurement error	frequency > 1 MHz, at reference level down to -50 dB, 20 °C to 30 °C	<1.5 dB, typ. 0.5 dB	

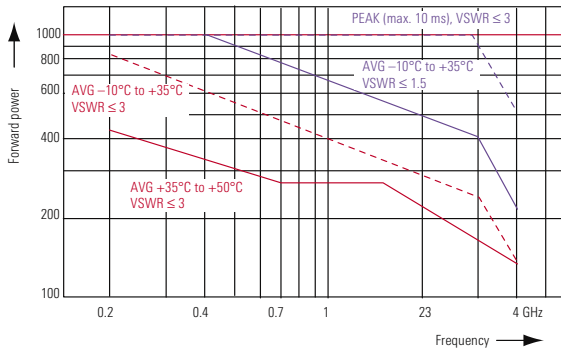
¹⁾ 80 V valid as of serial number 100900 (model 1145.5850.03) or 101600 (model 1145.5850.13); models 1145.5850.23, 1145.5850.06 and 1145.5850.26 all serial numbers.

²⁾ As of serial number 101362.

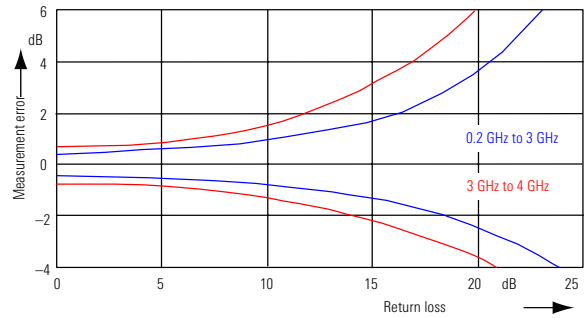
		R&S®FSH3	R&S®FSH6
Markers			
Number of markers or delta markers		max. 6	
Marker functions		peak, next peak, minimum, center = marker frequency, reference level = marker level, all markers to peak	
Marker displays		normal (level), noise marker, frequency counter (count)	
Trigger		free-running, video, external	
Audio demodulation		AM (video voltage without AGC) and FM	
Inputs			
RF input		N female	
Input impedance		50 Ω	
VSWR	10 MHz to 3 GHz 10 MHz to 6 GHz	typ. 1.5 –	– typ. 1.5
Trigger/external reference input		BNC female, selectable	
Trigger voltage		TTL	
Reference frequency		10 MHz	
Required level	from 50 Ω	10 dBm	
Outputs			
AF output		3.5 mm mini jack	
Output impedance Open-circuit voltage		100 Ω adjustable up to 1.5 V	
Tracking generator	only models 145.5850.13, 1145.5850.23 and 1145.5850.26		
Frequency range		5 MHz to 3 GHz	5 MHz to 6 GHz
Output level	model 1145.5850.13 model 1145.5850.23 model 1145.5850.26 f < 3 GHz f > 3 GHz	–20 dBm (nominal) 0 dBm/–20 dBm, selectable	–10 dBm (nominal) –20 dBm (nominal)
Output impedance		50 Ω, nominal	
Interfaces			
RS-232-C optical interface			
Baud rate		1200, 2400, 9600, 19200, 38400, 57600, 115200 baud	
Power sensor		7-contact female connector (type Binder 712)	

		R&S®FSH3	R&S®FSH6
Accessories			
Power Sensors R&S®FSH-Z1 and R&S®FSH-Z18			
Frequency range			
R&S®FSH-Z1		10 MHz to 8 GHz	
R&S®FSH-Z18		10 MHz to 18 GHz	
VSWR			
10 MHz to 30 MHz		<1.15	
30 MHz to 2.4 GHz		<1.13	
2.4 GHz to 8 GHz		<1.20	
8 GHz to 18 GHz		<1.25	
Maximum input power		average power peak power (<10 μs, 1 % duty cycle)	400 mW (+26 dBm) 1 W (+30 dBm)
Measurement range			200 pW to 200 mW (–67 dBm to +23 dBm)
Signal weighting			average power
Effect of harmonics			<0.5 % (0.02 dB) at harmonic ratio of 20 dBc
Effect of modulation			<1.5 % (0.07 dB) for continuous digital modulation
Absolute measurement uncertainty		sine signals, no zero offset	
10 MHz to 8 GHz	15 °C to 35 °C 0 °C to 50 °C		<2.5 % (0.11 dB) <4.5 % (0.19 dB)
8 GHz to 18 GHz	15 °C to 35 °C 0 °C to 50 °C		<3.5 % (0.15 dB) <5.2 % (0.22 dB)
Zero offset after zeroing			<150 pW
Dimensions			48 mm x 31 mm x 170 mm, connecting cable 1.5 m
Weight			<0.3 kg
Directional Power Sensor R&S®FSH-Z44			
Frequency range			200 MHz to 4 GHz
Power measurement range			30 mW to 120 W (300 W with unmodulated envelope)
VSWR referenced to 50 Ω			
200 MHz to 3 GHz			<1.07
3 GHz to 4 GHz			<1.12
Power-handling capacity		depending on temperature and matching (see diagram below)	120 W to 1000 W
Insertion loss			
200 MHz to 1.5 GHz			<0.06 dB
1.5 GHz to 4 GHz			<0.09 dB
Directivity			
200 MHz to 3 GHz			>30 dB
3 GHz to 4 GHz			>26 dB
Signal weighting			average power
Measurement uncertainty		sine signals, 18 °C to 28 °C, no zero offset	
200 MHz to 300 MHz			4 % of measured value (0.17 dB)
300 MHz to 4 GHz			3.2 % of measured value (0.14 dB)

		R&S®FSH3	R&S®FSH6
Zero offset	after zeroing	± 4 mW	
Range of typical measurement error with modulation FM, PM, FSK, GMSK AM (80 %) cdmaOne, DAB 3GPP WCDMA, cdma2000 DVB-T π/4-QPSK	if standard is selected on R&S®FSH	0 % of measured value (0 dB) ±3 % of measured value (±0.13 dB) ±1 % of measured value (±0.04 dB) ±2 % of measured value (±0.09 dB) ±2 % of measured value (±0.09 dB) ±2 % of measured value (±0.09 dB)	
Temperature coefficient 200 MHz to 300 MHz 300 MHz to 4 GHz		0.40 %/K (0.017 dB/K) 0.25 %/K (0.011 dB/K)	
Matching measurement range Return loss 200 MHz to 3 GHz 3 GHz to 4 GHz VSWR 200 MHz to 3 GHz 3 GHz to 4 GHz		0 dB to 23 dB 0 dB to 20 dB > 1.15 > 1.22	
Minimum forward power	specs met from 0.2 W	0.03 W	



Power-handling capacity

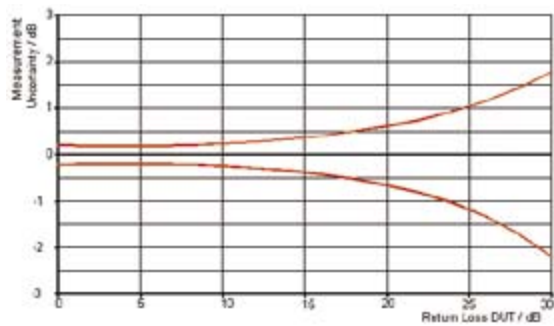


Limits of measurement error for matching measurements

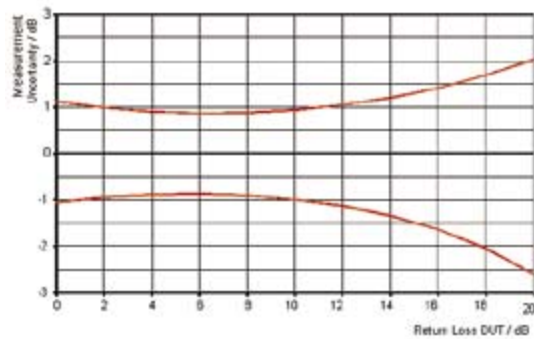
Dimensions	120 mm x 95 mm x 39 mm, connecting cable 1.5 m
Weight	0.65 kg

		R&S®FSH3	R&S®FSH6
VSWR Bridge and Power Divider R&S®FSH-Z2			
Frequency range		10 MHz to 3 GHz	
Impedance		50 Ω	
VSWR bridge			
Directivity 10 MHz to 1 GHz 1 GHz to 3 GHz		typ. 30 dB typ. 25 dB	
Directivity, corrected 10 MHz to 3 GHz	option R&S®FSH-K2	typ. 43 dB	
Return loss at test port		typ. 20 dB	
Return loss, corrected	option R&S®FSH-K2	typ. 35 dB	
Insertion loss		typ. 9 dB	
Power divider			
Return loss at test port		typ. 20 dB	
Connectors			
Generator input/RF output		N male	
Test port		N female	
Control interface		7-contact connector (type Binder)	
Calibration standards			
Short/open		N male	
50 Ω load		N male	
Impedance		50 Ω	
Return loss	up to 3 GHz	>43 dB	
Power-handling capacity		1 W	
General data			
Power consumption		500 mW (nominal)	
Dimensions (W x H x D)		169 mm x 116 mm x 30 mm	
Weight		485 g	
Distance-to-Fault Measurement R&S®FSH-B1 (only model 1145.5850.13, 1145.5850.23 or 1145.5850.26)			
Display		301 pixels	
Maximum resolution, distance to fault	maximum zoom	cable length/1023 pixels	
Display range Return loss VSWR	with option R&S®FSH-K2	10, 5, 2, 1 dB/div, linear 1 to 2 and 1 to 6 in addition 1 to 1.2 and 1 to 1.5	
Cable length	depending on cable loss	3 m to max. 1000 m	
Maximum permissible spurious signal		1st mixer 1 dB compression point typ. +10 dBm IF overload at reference level typ. +8 dB	

		R&S®FSH3	R&S®FSH6
Transmission measurements (only with R&S®FSH3 models 1145.5850.13, 1145.5850.23 and R&S®FSH6 model 1145.5850.26)			
Frequency range		5 MHz to 3 GHz	5 MHz to 6 GHz
Dynamic range			
10 MHz to 2.2 GHz	scalar mode vector mode, option R&S®FSH-K2	typ. 60 dB	typ. 80 dB
2.2 GHz to 3 GHz	scalar mode vector mode, option R&S FSH-K2	typ. 80 dB typ. 50 dB	typ. 90 dB typ. 70 dB
3 GHz to 5 GHz	scalar mode vector mode, option R&S®FSH-K2	typ. 65 dB –	typ. 85 dB typ. 40 dB
5 GHz to 6 GHz	scalar mode vector mode, option R&S®FSH-K2	– –	typ. 55 dB typ. 35 dB
		–	typ. 50 dB
Reflection measurements (only with R&S®FSH3 model 1145.5850.13 or 1145.5850.23, R&S®FSH6 model 1145.5850.26 and R&S®FSH-Z2)			
Frequency range		10 MHz to 3 GHz	10 MHz to 3 GHz
Display range of return loss		10, 20, 50, 100 dB, selectable	
VSWR display range		1 to 2 and 1 to 6, selectable, with option R&S®FSH-K2 also 1 to 1.2 and 1 to 1.5	
Measurement uncertainty		see diagrams	



*Measurement uncertainty with vector measurements,
(option R&S®FSH-K2)*



Measurement uncertainty with scalar measurements

General data	
Display	14 cm (5.7") LC colour display
Resolution	320 x 240 pixels
Memory Settings and traces	CMOS RAM 100
Environmental conditions	
Temperature	
Operating temperature range R&S®FSH powered from internal battery R&S®FSH powered from AC power supply	0 °C to 50 °C 0 °C to 40 °C
Storage temperature range	-20 °C to +60 °C
Battery charging mode	0 °C to 40 °C
Climatic conditions	
Relative humidity	95 % at 40 °C (EN 60068)
IP class of protection	51
Mechanical resistance	
Vibration, sinusoidal	complies with EN 60068-2-1, EN 61010-1 5 Hz to 55 Hz: max 2 g, 55 Hz to 150 Hz: 0.5 g constant, 12 minutes per axis
Vibration, random	complies with EN 60068-2-64, 10 Hz to 500 Hz, 1.9 g, 30 minutes per axis
Shock	complies with EN 60068-2-27, 40 g shock spectrum
RFI suppression	complies with EMC directive of EU (89/336/EEC) and German EMC legislation
Immunity to radiated interference Level display at 10 V/m (reference level ≤-10 dBm) Input frequency IF Other frequencies	10 V/m <-75 dBm (nominal) <-85 dBm (nominal) < displayed noise level
Power supply	
AC supply	plug-in AC power supply (R&S®FSH-Z33) 100 V AC to 240 V AC, 50 Hz to 60 Hz, 400 mA
External DC voltage	15 V to 20 V
Internal battery	NiMH battery, type Fluke BP190 (R&S®FSH-Z32)
Battery voltage	6 V to 9 V
Operating time with fully-charged battery	4 h with tracking generator off, 3 h with tracking generator on
Lifetime	300 to 500 charging cycles
Power consumption	typ. 7 W
Safety	complies with EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1
Test mark	VDE, GS, CSA, CSA-NRTL
Dimensions (W x H x D)	170 mm x 120 mm x 270 mm
Weight	2.5 kg