

# TECHNICAL SPECIFICATION

## ROHDE AND SCHWARZ FSP38

### SPECTRUM ANALYZER

Specifications	FSP-38
----------------	--------

Specifications are guaranteed under the following conditions:

30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed.

Data without tolerances: typical values only. Data designated "nominal" apply to design parameters and are not tested.

<b>Frequency</b>	
<b>Frequency range</b>	9 kHz to 40 GHz
Frequency resolution	0.01 Hz
<b>Reference frequency, internal nominal</b>	
Aging per year (After 30 days of operation)	$1 \times 10^{-7}$
Temperature drift (0 to 50°C)	$1 \times 10^{-8}$
<b>External reference frequency</b>	10 MHz
<b>Frequency display</b>	with marker or frequency counter
Marker resolution	span / 500
Max deviation (sweep time > 3-x auto sweep time)	$\pm$ ( frequency x reference accuracy + 0.5% x span + 10% x RBW + 1/2 LSD )
Frequency counter resolution	0.1 Hz to 10 kHz (selectable)
Count accuracy (S/N >25 dB)	$\pm$ (frequency x reference error + 1/2 (last digit))
<b>Frequency span</b>	0 Hz, 10 Hz to 40 GHz
Max span deviation	0.1%
<b>Spectral purity (dBc/(1Hz))</b> SSB phase noise, $f \leq 500$ MHz, for $f > 500$ MHz see table below	

Specifications	FSP-38
carrier offset    100 Hz 1 kHz 10 kHz 100 kHz (span >100 kHz) 1 MHz (span >100 kHz) 10 MHz	<-84, typ -90 <-100, typ. -108 <-106, typ. -113 <-110, typ. -113 <-120, typ. -125 typ. -145
<b>Residual FM</b> f ≤ 500 MHz, RBW 1kHz, SWT 100ms	typ. 3 Hz
<b>Sweep time</b>	
Span ≥ 10 Hz	2.5 ms to 16000 s
Max deviation	1 %
Span 0 Hz	1 us to 16000 s
resolution	125 ns
<b>Resolution bandwidths</b>	
Bandwidths	10 Hz to 10 MHz (-3 dB) in 1-, 3- steps
EMI-Bandwidths	200 Hz, 9 kHz, 120 kHz (-6 dB)
<b>Bandwidth accuracy</b> ≤ 100 kHz 300 kHz to 3 MHz 10 MHz	< 3 % < 10 % +10 %, -30 %
<b>Shape factor –60dB / -3 dB</b> ≤ 100 kHz 300 kHz to 3 MHz 10 MHz	≤ 5 :1 (gaussian filters) < 15 :1 (4-pole synchronous tuned filters) < 7 : 1
<b>Shape factor –60dB /-6 dB</b> EMI bandwidths	≤ 5 : 1
Video bandwidths	1 Hz to 10 MHz in 1-, 3-steps
<b>FFT filter</b>	
Bandwidths	1 Hz to 30 kHz (- 3 dB) in 1-, 3-steps
Bandwidth accuracy	5 %, nominal

Specifications	FSP-38
Shape factor –60dB /-3 dB	2.5 : 1 nominal
<b>Level</b>	
<b>Display range</b>	displayed average noise level to 30 dBm
<b>Maximum input level</b>	
DC voltage	0 V
RF attenuation 0 dB	
CW RF power	20 dBm
Pulse spectral density	97 dB $\mu$ V (1MHz)
RF attenuation $\geq$ 10 dB	
CW RF power	30 dBm
Max. pulse voltage	50 V
Max. pulse energy (10 $\mu$ s)	0.5 mWs
<b>1-dB compression of input mixer</b>	
0-dB RF Attenuation, f>200 MHz	0 dBm nominal
<b>Intermodulation</b>	
3rd-order intermodulation Intermodulation free dynamic range, level 2 x -30 dBm, $\Delta f > 5 \cdot$ RBW or 10 kHz, whichever is larger	
Frequency      20 to 200 MHz	>70 dBc, T.O.I. >5 dBm
200 MHz to 3 GHz	>74 dBc, T.O.I. >7 dBm
3 GHz to 40 GHz	>70 dBc, T.O.I. >5 dBm
Second harmonic Intercept point (S.H.I)	
Frequency      < 100 MHz	25 dBm
100 MHz to 3 GHz	35 dBm
3 GHz to 40 GHz	45 dBm
<b>Displayed average noise level</b>	

(0-dB RF attenuation, RBW 100 Hz, VBW 1 Hz, 20 averages, trace average, span 0 Hz, termination 50 Ohm)

Specifications	FSP-38
Frequency: 9 kHz 100 kHz 1 MHz 10 MHz to 7 GHz 7 GHz to 13 GHz 13 to 26.5 GHz 26.5 to 40 GHz	Typ -90 dBm <-90 dBm <-100, typ. -125 dBm <-120, typ. -143 dBm <-115, typ. -138 dBm <-100, typ. -110 dBm <-95, typ. -100 dBm
<b>Immunity to interference</b>	
Image frequency	> 70 dB
Intermediate frequency f < 3 GHz	> 70 dB
Spurious response (f > 200 kHz, without input signal, 0-dB attenuation)	< -100 dBm
Spurious response (with input signal, f < 7 GHz (mixer level <-10 dBm, Δf > 100 kHz)	< -70 dBc
<b>Level display</b>	
Screen	501 × 400 pixel (one diagram), max. 2 diagrams with independent settings
Log level axis	10 dB to 200 dB, in steps of 10 dB
Linear level axis	10% of reference level per level division, 10 divisions or logarithmic scaling
Trace	max. 3, with two diagrams on screen max 3 per diagram
Trace Detector	Max. Peak, Min. Peak, Auto Peak, Sample, Quasi-Peak, Average, RMS
Trace Functions	Clear/Write, Max. Hold, Min. Hold, Average
<b>Setting range of reference level</b>	
Logarithmic level display	-130 to 30 dBm, in steps of 0.1 dB
Linear level display	70.71 nV to 7.07 V in steps of 1%
Units of level axis	dBm, dBmV, dBμV, dBμA, dBpW (log level display) mV, μV, mA, μA, pW, nW (linear level display)
<b>Max uncertainty of Level measurement</b>	

Specifications	FSP-38
Absolute level at 128 MHz, -30dBm (RF attenuation 10 dB, RBW 10 kHz Ref. level -20 dBm, room temperature)	< 0.2 dB
Frequency response 9 kHz to 3 GHz 3 to 26.5 GHz	< 0.5 dB < 2 dB
Attenuator	< 0.2 dB
Reference level setting	< 0.2 dB
<b>Display nonlinearity Log/Lin (S/N &gt;16 dB)</b>	
RBW ≤ 100 kHz 0 to -70 dB -70 to -90 dB	< 0.2 dB < 0.5 dB
RBW ≥ 300 kHz 0 to -50 dB -50 to -70 dB	< 0.2 dB < 0.5 dB
<b>Bandwidth switching (ref.: RBW = 10 kHz)</b> 10 Hz to 100 kHz 300 kHz to 10 MHz	< 0.1 dB < 0.2 dB
<b>Trigger functions</b>	
<b>Trigger</b>	
<b>Span ≥ 10 Hz</b>	
Trigger source	free run, video, external, IF-level
Trigger offset	125 ns to 100 s, resolution 125 ns min. (or 1% of offset)
<b>Span = 0 Hz</b>	
Trigger source	free run, video, external, IF-level
Trigger offset	± 125 ns to 100 s, resolution 125 ns min., dependent on sweep time
Delay time accuracy	± (125 ns + (0.1% x delay time))
<b>Gated sweep</b>	
Trigger source	external, IF-level, Video

Specifications	FSP-38
Gate delay	1 us to 100 s
Gate length	125 ns to 100 s, resolution min. 125 ns or 1% of gate length
Gate length accuracy	$\pm (125 \text{ ns} + (0.05\% \times \text{gate length}))$
<b>Inputs &amp; outputs (front panel)</b>	
<b>RF input</b>	Testportsystem, N female and K female, 50 Ohm
<b>VSWR (RF attenuation &gt;0 dB)</b>	Max .
f < 3 GHz	1.5 : 1
f < 7 GHz	2.0 : 1
f < 26.5 GHz	2.3 : 1
Input attenuator	0 to 70 dB in 10-dB steps
Probe power supply	+15 V DC, -12.6 V DC and ground, max. 150 mA
Keyboard Connector	PS/2 female for MF-2 keyboard
AF output (only with option R&S FSP-B3)	3.5 mm mini jack
Output impedance	10 Ohm
Open-circuit voltage	Adjustable, up to 1.5 V
<b>Inputs &amp; outputs (rear panel)</b>	
IF 20.4 MHz	Z out = 50 Ohm, BNC female
<b>Level</b> RBW $\leq$ 30 kHz, FFT RBW $\geq$ 100 kHz	-10 dBm at reference level, mixer level > -60 dBm 0 dBm at reference level, mixer level > -60 dBm
<b>Reference frequency</b>	
<b>Output</b>	<b>BNC female</b>
Output frequency	10 MHz
Level	0 dBm nominal
Input	10 MHz
Required level	0 dBm into 50 Ohm
<b>Others</b>	

Specifications	FSP-38
Power supply for noise source	BNC female, 0 and 28 V, switchable
External trigger/gate input	BNC female, >10 kOhm
Trigger Voltage	1.4 volts, TTL
<b>IEC/IEEE-bus control</b>	<b>interface to IEC-625-2 (IEEE 488.2)</b>
Command set	SCPI 1997.0
Connector	24-pin Amphenol female
Interface functions	SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0
Serial interface	RS-232-C (COM), 9-pin D-SUB connector
Printer interface	parallel (Centronics compatible)
Mouse connector	PS/2 female
Connector f. external monitor (VGA)	15-pin D-SUB connector
<b>General data</b>	
Display	21-cm TFT color display (8.4")
Resolution	640 x 480 pixels (VGA resolution)
Pixel failure rate	$<2 \times 10^{-5}$
Mass memory	1.44-Mbyte 3 1/2" diskette (built-in disk drive), harddisk
Data storage	>500 instrument settings and traces
<b>Temperature range</b>	
Nominal temperature range	+ 0 to +50°C
Storage temperature range	- 40 to +70°C
Damp heat	+40°C at 95% relative humidity (EN 60068-2-30)
<b>Mechanical stress</b>	
Sinusoidal vibration	5 to 150 Hz, max. 2 g at 55 Hz; 0.5 g from 55 to 150 Hz; to EN 60068-2-6, EN 60068-2-30, EN 61010-1, MIL-T-28800D, class 5

Specifications	FSP-38
Random vibration	10 to 300 Hz, acceleration 1.9 g rms
Shock	40 g shock spectrum, to MIL-STD-810C and MIL-T-28800D, classes 3 and 5
Recommended calibration interval	2 years for operation with external reference, internal reference 1 year
<b>Power supply</b>	
AC supply	100 V to 240 V AC, 50 Hz to 400 Hz, 3.1 A – 1.3 A, Protection class I
typical power consumption	150 VA
Safety	to EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1, IEC 1010-1
Test mark	VDE, GS, CSA, CSA-NRTL/C
RFI suppression	complies to the EMC rules of the EU (89/336/EWG)
Dimensions in mm (W x H x D)	412 x 197 x 417
Weight (w/o options)	14 kg