

R&S® ETH Handheld TV Analyzer Specifications



75 Years of
Driving
Innovation


ROHDE & SCHWARZ

CONTENTS

DVB-T/DVB-H test receiver (R&S®ETH-K140 option)	3
Frequency	3
Level	3
Bandwidths	4
Demodulation	4
Measurements	5
Spectrum analysis	6
Frequency	6
Sweep time	6
Bandwidths	6
Level	7
Trigger functions	8
Scalar network analysis	8
Inputs and outputs	9
General data	10
Accessories	11
R&S®FSH-Z1 and R&S®FSH-Z18 power sensors	11
R&S®FSH-Z14 directional power sensor	11
R&S®FSH-Z44 directional power sensor	13
Ordering information	15
Options	15
Recommended extras	15

Specifications apply under the following conditions:

15 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to.

Data without tolerances: typical values only. Data designated as 'nominal' applies to design parameters and is not tested. Data without tolerance limits is not binding.

DVB-T/DVB-H test receiver (R&S®ETH-K140 option)

Frequency

Frequency range	R&S®ETH model .04, model .14	4 MHz to 3.6 GHz
	R&S®ETH model .08, model .18	4 MHz to 8 GHz
Frequency resolution		1 Hz
Reference frequency, internal		
Aging per year		1×10^{-6}
Temperature drift	0 °C to +30 °C	1×10^{-6}
	+30 °C to +50 °C	3×10^{-6}
Achievable initial calibration accuracy		5×10^{-7}
Total reference uncertainty	0 °C to +30 °C	(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Spectral purity of SSB phase noise		
Carrier offset	RF = 500 MHz	
	30 kHz	<-98 dBc (1 Hz), typ. -102 dBc (1 Hz)
	100 kHz	<-100 dBc (1 Hz), typ. -106 dBc (1 Hz)
	1 MHz	<-125 dBc (1 Hz), typ. -131 dBc (1 Hz)

Level

Minimum RF power for quasi-error-free transport stream data	RF = 500 MHz, RF attenuation = 0 dB, BER before RS < 2.0×10^{-4} , 64QAM non-hierarchical modulation, guard interval = 1/32, code rate = 3/4	
	RF preselection = OFF	<-64 dBm, typ. -69 dBm
	RF preselection = ON ¹	<-72 dBm, typ. -76 dBm
Maximum RF power for quasi-error-free transport stream data, nominal values	RF = 500 MHz, BER before RS < 2.0×10^{-4} , 64QAM non-hierarchical modulation, guard interval = 1/32, code rate = 3/4	
	RF attenuation = 40 dB, RF preselection = OFF	10 dBm
	RF attenuation = 50 dB, RF preselection = ON ¹	10 dBm
Noise figure	RF = 500 MHz, RF attenuation = 0 dB	
	RF preselection = OFF	<22 dB, typ. 18 dB
	RF preselection = ON ¹	<14 dB, typ. 11 dB
Third-order intermodulation (TOI), nominal values	RF attenuation = 0 dB, RF preselection = OFF	
	50 MHz to 2 GHz	7 dBm
	2 GHz to 8 GHz	10 dBm
	RF attenuation = 0 dB, RF preselection = ON ¹	
	50 MHz to 200 MHz	-8 dBm
	200 MHz to 3.6 GHz	-6 dBm
Second-order intermodulation (SOI), nominal values	RF = 500 MHz, RF attenuation = 0 dB	
	RF preselection = OFF	30 dBm
	RF preselection = ON ¹	60 dBm
Immunity to interference, nominal values		
Image frequencies, referenced to signal level	$f_{in} - 2 \times 20.8$ MHz	-70 dB
	$f_{in} - 2 \times 829.8$ MHz	-80 dB
	$f_{in} - 2 \times 4874.8$ MHz	-90 dB
Intermediate frequencies referenced to signal level	20.8 MHz	-60 dB
Other interfering signals referenced to signal level	829.8 MHz, 4874.8 MHz, 8919.8 MHz	-80 dB
	signal level – RF attenuation < -30 dBm, RF preselection = OFF	
	10.4 MHz	-60 dB
	2437.4 MHz	-60 dB
	signal level – RF attenuation < -30 dBm, RF preselection = OFF, RF ≤ 3.6 GHz	
	spurious at $f_{in} - 2437.4$ MHz	-80 dB
	signal level – RF attenuation < -40 dBm, RF preselection = OFF, RF ≥ 3.6 GHz	
	4459.9 MHz	-40 dB
Spurious response, inherent	input matched with 50 Ω, without input signal, RF attenuation = 0 dB	
	RF preselection = OFF	<-90 dBm
	RF preselection = ON ¹	<-100 dBm

¹ R&S®ETH-K1 option required.

Maximum rated input level, nominal values		
DC voltage		80 V
DVB-T/DVB-H RF power		27 dBm (= 0.5 W)
CW RF power		30 dBm (= 1 W)
Peak RF power	duration < 3 s	33 dBm (= 2 W)
Max. pulse voltage		100 V
Max. pulse energy	pulse width 10 μ s	10 mWs

Bandwidths

OFDM signal bandwidth range		1 MHz to 8 MHz
OFDM signal bandwidth resolution		0.1 Hz
Predefined channel filter bandwidths		5 MHz, 6 MHz, 7 MHz, 8 MHz
Channel filter shape factor 80 dB : 0.1 dB		nominal ≤ 1.09
RF preselection (R&S®ETH-K1 option)		
Lower 3 dB cutoff frequency	RF up to 80 MHz	500 kHz
	80 MHz to 200 MHz	RF – 15 MHz
	0.2 GHz to 1.5 GHz	0.9 x RF
	1.5 GHz to 3.6 GHz	1.3 GHz
	3.6 GHz to 8 GHz	3.2 GHz
Upper 3 dB cutoff frequency	RF up to 80 MHz	80 MHz
	80 MHz to 200 MHz	RF + 15 MHz
	0.2 GHz to 1.5 GHz	1.1 x RF
	1.5 GHz to 3.6 GHz	3.7 GHz
	3.6 GHz to 8 GHz	8 GHz

Demodulation

Standard	terrestrial TV in line with ETSI EN 300 744	DVB-T, DVB-H
FFT mode	automatic detection	2K, 4K, 8K
QAM order	automatic detection	4QAM, 16QAM, 64QAM
QAM hierarchy	automatic detection	none, alpha = 1, 2, 4
Guard interval	automatic detection	1/4, 1/8, 1/16, 1/32
Code rate	automatic detection	1/2, 2/3, 3/4, 5/6, 7/8
Interleaver mode	automatic detection	native, in-depth
Inherent modulation error ratio	RF = 500 MHz, RF attenuation = 0 dB, 64QAM non-hierarchical modulation, channel adaptation medium or slow	
	level = –30 dBm, RF preselection = OFF	>43 dB, typ. 46 dB
	level = –45 dBm, RF preselection = ON ²	>41 dB, typ. 44 dB

² R&S®ETH-K1 option required.

Measurements

Measurement parameter		
Signal level	units	dBm, dBmV, dBμV, V, W
	units with transducer data	dBμV/m, dBμA/m, V/m, W/m ²
Carrier frequency offset	unit	Hz
Symbol rate offset	unit	ppm
Modulation error ratio (MER)	unit	dB
Error vector magnitude (EVM)	unit	%
Bit error ratio before Viterbi decoder	resolution	depending on measurement time
Bit error ratio before Reed-Solomon decoder	resolution	depending on measurement time
Packet error ratio	resolution	depending on measurement time
Packet errors per second	unit	1/s
MPEG transport stream rate	unit	bit/s
Transmission parameter signaling (TPS) information		FFT, guard interval, QAM, hierarchy, code rate, cell ID, TPS reserved (frames 1 to 4), interleaver mode, MPE FEC, time slicing, length indicator
Lower and upper shoulder attenuations in line with ETSI TR 101 290	unit	dB
In-channel amplitude frequency response, peak-peak	unit	dB

Measurement uncertainty		
Signal level	95 % confidence level, +20 °C to +30 °C, C/N > 16 dB, RF attenuation auto	
	10 MHz to 3.6 GHz	<1 dB, typ. 0.5 dB
	3.6 GHz to 8 GHz	<1.5 dB, typ. 1 dB
Carrier frequency offset	referenced to carrier frequency, internal reference, 0 °C to +30 °C	1 ppm
Symbol rate offset	internal reference, 0 °C to +30 °C	1 ppm
MPEG transport stream rate	internal reference, 0 °C to +30 °C	1 ppm
Modulation error ratio (MER)	RF = 500 MHz, 64QAM, channel adaptation medium or slow	
	range: 20 dB to 30 dB	typ. <1.0 dB
	range: 30 dB to 35 dB	typ. <1.5 dB
	range: 35 dB to 40 dB	typ. <2.0 dB
Error vector magnitude (EVM)	64QAM, referenced to measured value	
	range: 0.65 % to 1.2 %	<25 %
	range: 1.2 % to 2 %	<20 %
	range: 2 % to 7 %	<12 %
BER before Viterbi	range: 1.0×10^{-3} to 0.1×10^{-15}	$0.1 \times 10^{-\text{exponent}}$
BER before Reed-Solomon	range: 1.0×10^{-3} to 0.1×10^{-15}	$0.1 \times 10^{-\text{exponent}}$
Packet error ratio	range: 1.0×10^{-1} to 0.1×10^{-12}	$0.1 \times 10^{-\text{exponent}}$

Spectrum analysis

Frequency

Frequency range	R&S®ETH model .04, model .14	100 kHz to 3.6 GHz
	R&S®ETH model .08, model .18	100 kHz to 8 GHz
Frequency resolution		1 Hz
Reference frequency, internal		
Aging per year		1×10^{-6}
Temperature drift	0 °C to +30 °C	1×10^{-6}
	+30 °C to +50 °C	3×10^{-6}
Achievable initial calibration accuracy		5×10^{-7}
Total reference uncertainty	0 °C to +30 °C	(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Frequency readout		
Marker resolution		0.1 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference uncertainty} + 10\% \times \text{resolution bandwidth} + \frac{1}{2}(\text{span} / (\text{sweep points} - 1)) + 1 \text{ Hz})$
Number of sweep (trace) points	default value	631
Marker tuning frequency step size		span/630
Frequency counter resolution		0.1 Hz
Count uncertainty	S/N > 25 dB	$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2}(\text{last digit}))$
Frequency span		0 Hz, 10 Hz to 3.6 / 8 GHz
Span uncertainty		nominal 1 %
Spectral purity of SSB phase noise		
Carrier offset	RF = 500 MHz	
	30 kHz	<-98 dBc (1 Hz), typ. -102 dBc (1 Hz)
	100 kHz	<-100 dBc (1 Hz), typ. -106 dBc (1 Hz)
	1 MHz	<-125 dBc (1 Hz), typ. -131 dBc (1 Hz)

Sweep time

Sweep time	span = 0 Hz	200 µs to 100 s
	10 Hz ≤ span ≤ 600 MHz	20 ms to 1000 s
	span > 600 MHz	20 ms × span / 600 MHz to 1000 s
Uncertainty	span = 0 Hz	nominal 1 %
	span ≥ 10 Hz	nominal 3 %

Bandwidths

Resolution bandwidths		
Range	-3 dB bandwidth	100 Hz to 3 MHz in 1, 3 sequence
Bandwidth accuracy	100 Hz ≤ RBW ≤ 300 kHz	nominal <5 %
	RBW > 300 kHz	nominal <10 %
Selectivity 60 dB / 3 dB		nominal <5 (Gaussian type filters)
Video filters		
Range	-3 dB bandwidth	1 Hz to 3 MHz in 1, 3 sequence
RF preselection (R&S®ETH-K1 option)		
Lower 3 dB cutoff frequency	RF up to 80 MHz	500 kHz
	80 MHz to 200 MHz	RF - 15 MHz
	0.2 GHz to 1.5 GHz	0.9 × RF
	1.5 GHz to 3.6 GHz	1.3 GHz
	3.6 GHz to 8 GHz	3.2 GHz
Upper 3 dB cutoff frequency	RF up to 80 MHz	80 MHz
	80 MHz to 200 MHz	RF + 15 MHz
	0.2 GHz to 1.5 GHz	1.1 × RF
	1.5 GHz to 3.6 GHz	3.7 GHz
	3.6 GHz to 8 GHz	8 GHz

Level

Display range		displayed noise floor to +20 dBm
Maximum rated input level, nominal values		
DC voltage		80 V
DVB-T/DVB-H RF power		27 dBm (= 0.5 W)
CW RF power		30 dBm (= 1 W)
Peak RF power	duration < 3 s	33 dBm (= 2 W)
Max. pulse voltage		100 V
Max. pulse energy	pulse width 10 μ s	10 mWs
Intermodulation		
Third-order intermodulation (TOI), nominal values	intermodulation-free dynamic range, signal level 2 x -20 dBm, RF attenuation = 0 dB, RF preselection = OFF	
	50 MHz to 2 GHz	54 dBc (TOI +7 dBm)
	2 GHz to 3.6 GHz	60 dBc (TOI +10 dBm)
	3.6 GHz to 8 GHz	60 dBc (TOI +10 dBm)
	intermodulation-free dynamic range, signal level 2 x -35 dBm, RF attenuation = 0 dB, RF preselection = ON ³	
	50 MHz to 200 MHz	54 dBc (TOI -8 dBm)
	200 MHz to 3.6 GHz	60 dBc (TOI -6 dBm)
Second harmonic intercept point, nominal values	RF attenuation = 0 dB, RF preselection = OFF	
	50 MHz to 1.5 GHz	30 dBm
	RF attenuation 0 dB, RF preselection = ON ³	
Displayed average noise level	0 dB RF attenuation, termination 50 Ω , RBW = 1 kHz, VBW = 10 Hz, sample detector, trace average 10, log scaling, tracking generator OFF, normalized to 1 Hz	
	RF preselection = OFF	
	100 kHz to 1 MHz	<-125 dBm, typ. -130 dBm
	1 MHz to 2 GHz	<-150 dBm, typ. -156 dBm
	2 GHz to 3.6 GHz	<-147 dBm, typ. -153 dBm
	3.6 GHz to 6 GHz	<-145 dBm, typ. -152 dBm
	6 GHz to 7.5 GHz	<-142 dBm, typ. -148 dBm
	7.5 GHz to 8 GHz	<-135 dBm, typ. -142 dBm
	RF preselection = ON ³	
	1 MHz to 10 MHz	<-155 dBm, typ. -160 dBm
	10 MHz to 3 GHz	<-161 dBm, typ. -165 dBm
	3 GHz to 3.6 GHz	<-158 dBm, typ. -162 dBm
	3.6 GHz to 6 GHz	<-154 dBm, typ. -158 dBm
	6 GHz to 8 GHz	<-150 dBm, typ. -156 dBm
	Immunity to interference, nominal values	
Image frequencies	$f_{in} - 2 \times 21.4$ MHz	-70 dBc
	$f_{in} - 2 \times 830.4$ MHz	-80 dBc
	$f_{in} - 2 \times 4875.4$ MHz	-90 dBc
Intermediate frequencies	21.4 MHz	-60 dBc
	830.4 MHz, 4875.4 MHz, 8920.4 MHz	-80 dBc
Spurious response, inherent	input matched with 50 Ω , without input signal, RBW \leq 30 kHz, RF attenuation = 0 dB	
	RF preselection = OFF	<-90 dBm
	RF preselection = ON ³	<-100 dBm
Other interfering signals	signal level - RF attenuation < -30 dBm, RF preselection = OFF	
	10.7 MHz	-60 dBc
	2437.7 MHz	-60 dBc
	signal level - RF attenuation < -30 dBm, RF preselection = OFF, RF \leq 3.6 GHz	
	spurious at $f_{in} - 2437.7$ MHz	-80 dBc
	signal level - RF attenuation < -40 dBm, RF preselection = OFF, RF \geq 3.6 GHz	
	4460.2 MHz	-40 dBc
Spurious response, related to local oscillators	$f_{in} \leq 3.6$ GHz	
	$\Delta f < 300$ kHz	-60 dBc
	$\Delta f \geq 300$ kHz	<-60 dBc
	$f_{in} > 3.6$ GHz	
	$\Delta f < 300$ kHz	-54 dBc
	$\Delta f \geq 300$ kHz	<-54 dBc

³ R&S®ETH-K1 option required.

Level display		
Logarithmic level axis		1 dB, 2 dB, 5 dB, 10 dB, 20 dB, 50 dB or 100 dB, 10 divisions
Linear level axis		0 % to 100 %, 10 divisions
Number of traces		2
Trace detectors		max peak, min peak, auto peak, sample, RMS
Trace functions		clear/write, max hold, min hold, average, view
Setting range of reference level		-80 dBm to +20 dBm
Units of level axis		dBm, dBmV, dBμV, V, W
Level measurement uncertainty		
Total measurement uncertainty	95 % confidence level, +20 °C to +30 °C, S/N > 16 dB, 0 dB to -50 dB below reference level, RF attenuation auto, RF preselection = OFF	
	10 MHz < f ≤ 3.6 GHz	<1 dB, typ. 0.5 dB
	3.6 GHz < f ≤ 8 GHz	<1.5 dB, typ. 1 dB
Absolute level uncertainty at 100 MHz	+20 °C to +30 °C	<0.3 dB
Frequency response (+20 °C to +30 °C)	1 MHz ≤ f ≤ 10 MHz	nominal <1.5 dB
	10 MHz ≤ f ≤ 3.6 GHz	<1 dB
	3.6 GHz < f ≤ 8 GHz	<1.5 dB
Attenuator uncertainty		<0.3 dB
Uncertainty of reference level setting		nominal <0.1 dB
Display nonlinearity		
Logarithmic level display	S/N > 16 dB, 0 dB to -50 dB	<0.2 dB
Bandwidth switching uncertainty	reference: RBW = 10 kHz	nominal <0.1 dB

Trigger functions

Trigger		
Trigger source		free run, video, external
External trigger level threshold	low → high transition	2.4 V
	high → low transition	0.7 V

Scalar network analysis

Models .14 and .18 only.

Frequency range	R&S®ETH model .14	100 kHz to 3.6 GHz
	R&S®ETH model .18	100 kHz to 8 GHz
Frequency resolution		1 Hz
Data points		631
Tracking generator output power	tracking generator attenuation = 0 dB	nominal 0 dBm
Tracking generator attenuator		0 dB to 40 dB in 1 dB steps
Dynamic range for transmission measurements	RF attenuation = 10 dB, TG attenuation = 10 dB, RBW = 1 kHz, RF preselection = OFF	
	100 kHz ≤ f < 300 kHz	nominal >60 dB, typ. 80 dB
	300 kHz ≤ f < 3.6 GHz	nominal >70 dB, typ. 90 dB
	3.6 GHz ≤ f < 6 GHz	nominal >60 dB, typ. 80 dB

Inputs and outputs

RF input		
Impedance		50 Ω
Connector		N female
VSWR, nominal values	RF input attenuation ≥ 10 dB	
	20 MHz < f \leq 1.5 GHz	typ. <1.5
	1.5 GHz < f \leq 6 GHz	typ. <2
RF input attenuator	6 GHz < f \leq 8 GHz	typ. <3
	RF preselection OFF	0 dB to 40 dB in 5 dB steps
	RF preselection ON ⁴	0 dB to 50 dB in 5 dB steps
Tracking generator output (models .14 and .18 only)		
Frequency range	model .14	100 kHz to 3.6 GHz
	model .18	100 kHz to 8 GHz
Connector		N female, 50 Ω
VSWR, nominal values	100 kHz \leq f \leq 3 GHz	typ. <1.5
	3 MHz \leq f \leq 6 GHz	typ. <2
Tracking generator attenuator		0 dB to 40 dB in 1 dB steps
Maximum rated reverse power		
DC voltage		50 V
CW RF power		+20 dBm (= 0.1 W)
Max. pulse voltage		50 V
Max. pulse energy (10 μ s)		1 mWs
External reference input, external trigger input		
Connector		BNC female, 50 Ω
Mode	selectable	ext. reference, ext. trigger
Ext. reference	required level	0 dBm
	frequency	10 MHz
Ext. trigger threshold	low \rightarrow high transition	2.4 V
	high \rightarrow low transition	0.7 V
TS ASI output		
	available in measurement modes DVB-T/DVB-H receiver measurement list and DVB-T/DVB-H receiver constellation diagram	
Connector		BNC female, 50 Ω
Output impedance		75 Ω
Output level, peak-peak	on 75 Ω load	0.8 V
Data rate		270 Mbit/s
Accessories interface		
Connector		7-contact female (type Binder 712)
Accessories supported		see accessories
AUX interface		
Connector		7-contact female (type Binder 712)
LAN interface		
		10/100BaseT, RJ-45
USB interface		
		mini B plug, version 1.1
SD card interface		

⁴ R&S®ETH-K1 option required.

General data

Remote control (R&S®ETH-K40 option)		
Command set		SCPI 1997.0
Display		
Resolution		640 pixels x 480 pixels
Audio		
Speaker		internal
Mass memory		
Mass memory		flash memory (internal), SD card (not supplied)
Data storage	internal	>256 instrument settings and traces
	on 2 Gbyte SD card	>10000 instrument settings and traces
Temperature		
	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
	battery charging mode	0 °C to +40 °C
Climatic loading	relative humidity	+25 °C/+40 °C at 85 % relative humidity (IEC 60068-2-30)
	IP class of protection	51
Mechanical resistance		
Vibration	sinusoidal	IEC 60068-2-6
	random	IEC 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4, procedure 1, IEC 60068-2-27
Power supply		
R&S®HA-Z201 plug-in AC power supply	input specifications	100 V AC to 240 V AC, 50 Hz to 60 Hz, 700 mA
	output specifications	15 V DC, 2 A
	operating temperature range	0 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
	test mark	VDE, CE, UL, PSE
External DC voltage		14 V to 16 V
Internal battery		
Capacity	R&S®HA-Z206	6.75 Ah
Voltage		nominal 7.2 V
Operating time with new, fully charged battery	DVB-T/DVB-H receiver mode	2.5 h
	spectrum analyzer mode	4.5 h
Charging time	instrument switched OFF or R&S®HA-Z203 battery charger	3.5 h
	instrument switched ON	
	DVB-T/DVB-H receiver mode	7.5 h
	spectrum analyzer mode	4.5 h
Life time	charging cycles	>500
Power consumption	DVB-T/DVB-H receiver mode	19.5 W
	spectrum analyzer mode	12 W
Safety		IEC 61010-1, EN 61010-1, UL 61010B-1, CSA C22.2 No. 1010-1
Test mark		VDE, GS, CSA, CSA-NRTL
EMC		
		in line with European EMC Directive 2004/108/EC including <ul style="list-style-type: none"> • IEC/EN 61326 class B (emission) • CISPR 11/EN 55011/group 1 class B (emission) • IEC/EN 61326 Table A.1 (immunity, industrial)
Dimensions (W x H x D)	with handle	192 mm x 145 mm x 300 mm (76 in x 57 in x 118 in)
	without handle	192 mm x 70 mm x 300 mm (76 in x 28 in x 118 in)
Weight		<3.3 kg (<6.6 lb)
Recommended calibration interval		1 year

Accessories

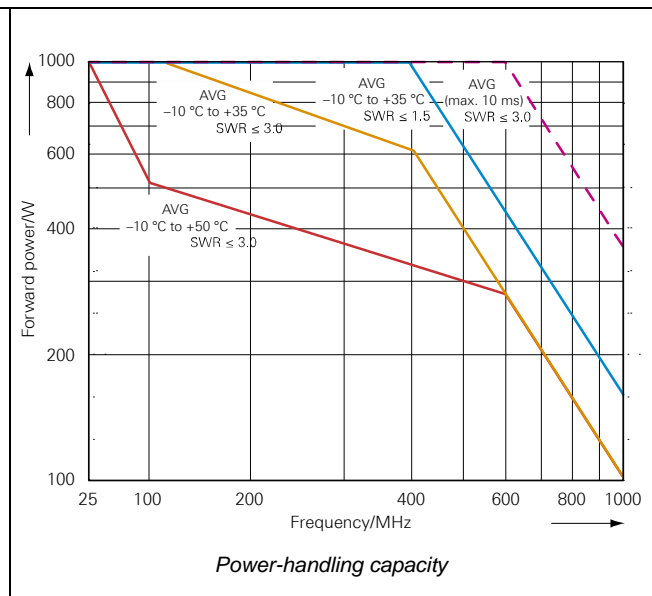
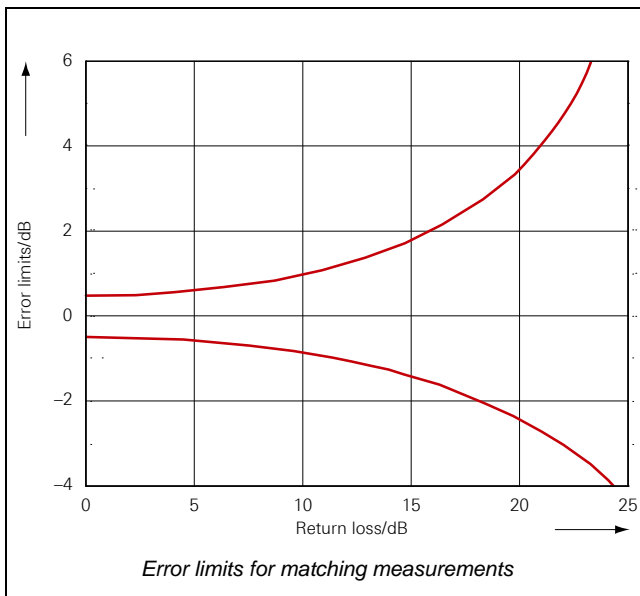
R&S® FSH-Z1 and R&S® FSH-Z18 power sensors

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	400 mW (+26 dBm)
	peak power (<10 µs, 1 % duty cycle)	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 dB
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	<2.3 % (0.10 dB)
	0 °C to +50 °C	<4.2 % (0.18 dB)
8 GHz to 18 GHz	+15 °C to +35 °C	<3.5 % (0.15 dB)
	0 °C to +50 °C	<5.0 % (0.21 dB)
Zero offset after zeroing		<110 pW
Dimensions		48 mm × 31 mm × 170 mm (1.9 in × 1.22 in × 6.7 in)
	connecting cable	1.5 m (59 in)
Weight		<0.3 kg (0.66 lb)

R&S® FSH-Z14 directional power sensor

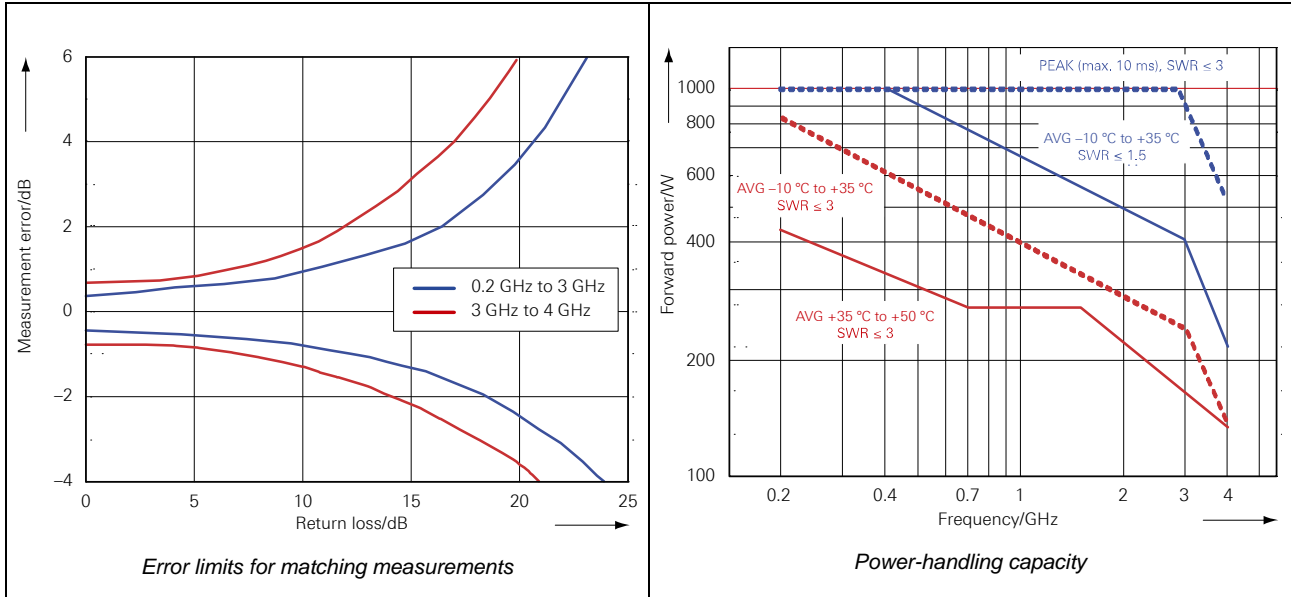
Frequency range		25 MHz to 1 GHz
Power measurement range		30 mW to 300 W
VSWR referenced to 50 Ω		<1.06
Power-handling capacity	depending on temperature and matching	100 W to 1000 W
Insertion loss		<0.06 dB
Directivity		>30 dB
Average power		
Power measurement range	CF: ratio of peak envelope power to average power	
	CW, FM, PM, FSK, GMSK	30 mW to 300 W
	other modulated signals	30 mW to 300 W/CF
Measurement uncertainty		
25 MHz to 40 MHz	sine signal	4.0 % of measured value (0.17 dB)
40 MHz to 1 GHz	+18 °C to +28 °C, no zero offset	3.2 % of measured value (0.14 dB)
Zero offset	after zeroing	±4 mW
Range of typical measurement error with modulation	FM, PM, FSK, GMSK	0 % of measured value (0 dB)
	AM (80 %)	±3 % of measured value (±0.13 dB)
	2 CW carriers with identical power	±2 % of measured value (±0.09 dB)
Temperature coefficient	25 MHz to 40 MHz	0.40 %/K (0.017 dB/K)
	40 MHz to 1 GHz	0.25 %/K (0.011 dB/K)

Max. peak envelope power		
Power measurement range		
Video bandwidth	4 kHz	0.4 W to 300 W
	200 kHz	1 W to 300 W
	600 kHz	2 W to 300 W
Measurement uncertainty	same as for average power plus effect of peak hold circuit	+18 °C to +28 °C
Error limits of peak hold circuit for burst signals	duty cycle ≥ 0.1 and repetition rate $\geq 100/s$	
	video bandwidth 4 kHz	$\pm(3\%$ of measured value + 0.05 W) starting from a burst width of 200 μs
	video bandwidth 200 kHz	$\pm(3\%$ of measured value + 0.20 W) starting from a burst width of 4 μs
	video bandwidth 600 kHz	$\pm(7\%$ of measured value + 0.40 W) starting from a burst width of 2 μs
	20/s \leq repetition rate < 100/s 0.001 \leq duty cycle < 0.1	plus $\pm(1.6\%$ of measured value + 0.15 W) plus ± 0.10 W
Temperature coefficient	25 MHz to 40 MHz	0.50 %/K (0.022 dB/K)
	40 MHz to 1 GHz	0.35 %/K (0.015 dB/K)
Load matching		
Matching measurement range		
Return loss		0 dB to 23 dB
VSWR		>1.15
Minimum forward power	specs met from 0.4 W	0.06 W
Dimensions		120 mm \times 95 mm \times 39 mm (5.9 in \times 3.74 in \times 1.53 in)
	connecting cable	1.5 m (59 in)
Weight		0.65 kg (1.43 lb)



R&S® FSH-Z44 directional power sensor

Frequency range		200 MHz to 4 GHz
Power measurement range		30 mW to 300 W
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	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
Average power		
Power measurement range	CF: ratio of peak envelope power to average power	
	CW, FM, PM, FSK, GMSK	30 mW to 300 W
	other modulated signals	30 mW to 300 W/CF
Measurement uncertainty	sine signal, +18 °C to +28 °C, no zero offset	
	200 MHz to 300 MHz	4.0 % of measured value (0.17 dB)
	300 MHz to 4 GHz	3.2 % of measured value (0.14 dB)
Zero offset	after zeroing	±4 mW
Range of typical measurement error with modulation	FM, PM, FSK, GMSK	0 % of measured value (0 dB)
	AM (80 %)	±3 % of measured value (±0.13 dB)
	2 CW carriers with identical power	±2 % of measured value (±0.09 dB)
	π/4-DQPSK	±2 % of measured value (±0.09 dB)
Temperature coefficient	200 MHz to 300 MHz	0.40 %/K (0.017 dB/K)
	300 MHz to 4 GHz	0.25 %/K (0.011 dB/K)
Max. peak envelope power		
Power measurement range	modulated carriers	
	video bandwidth 4 kHz	0.4 W to 300 W
	video bandwidth 200 kHz	1 W to 300 W
	video bandwidth 4 MHz	2 W to 300 W
Measurement uncertainty	+18 °C to +28 °C	same as for average power plus effect of peak hold circuit
Error limits of peak hold circuit for burst signals	duty cycle ≥ 0.1 and repetition rate ≥ 100/s	
	video bandwidth 4 kHz	±(3 % of measured value + 0.05 W) starting from a burst width of 100 μs
	video bandwidth 200 kHz	±(3 % of measured value + 0.20 W) starting from a burst width of 4 μs
	video bandwidth 4 MHz	±(7 % of measured value + 0.40 W) starting from a burst width of 1 μs
	20/s ≤ repetition rate < 100/s	plus ±(1.6 % of measured value + 0.15 W)
	0.001 ≤ duty cycle < 0.1	plus ±0.10 W
	burst width ≥ 0.5 μs	plus ±5 % of measured value
burst width ≥ 0.2 μs	plus ±10 % of measured value	
Temperature coefficient	200 MHz to 300 MHz	0.50 %/K (0.022 dB/K)
	300 MHz to 4 GHz	0.35 %/K (0.015 dB/K)
Load matching		
Matching measurement range		
Return loss	200 MHz to 3 GHz	0 dB to +23 dB
VSWR	3 GHz to 4 GHz	0 dB to +20 dB
VSWR	200 MHz to 3 GHz	>1.15
	3 GHz to 4 GHz	>1.22
Minimum forward power	specs met from 0.2 W	0.03 W
Dimensions		120 mm × 95 mm × 39 mm (5.9 in × 3.74 in × 1.53 in)
	connecting cable	1.5 m (59 in)
Weight		0.65 kg (1.43 lb)



Ordering information

Designation	Type	Order No.
Handheld TV Analyzer up to 3.6 GHz	R&S®ETH	2114.1508.04
Handheld TV Analyzer up to 3.6 GHz, with tracking generator	R&S®ETH	2114.1508.14
Handheld TV Analyzer up to 8 GHz	R&S®ETH	2114.1508.08
Handheld TV Analyzer up to 8 GHz, with tracking generator	R&S®ETH	2114.1508.18
Accessories supplied		
Battery pack, AC power supply, USB adapter, USB cable, LAN cable, quick reference guide and CD-ROM with R&S®ETH View PC software and documentation		

Options

Designation	Type	Order No.
RF Preselection up to 3.6 GHz	R&S®ETH-K1	2114.1608.04
RF Preselection up to 8 GHz	R&S®ETH-K1	2114.1608.08
Remote Control	R&S®ETH-K40	2114.1814.02
DVB-T/DVB-H Test Receiver	R&S®ETH-K140	2114.1708.02

Recommended extras

Designation	Type	Order No.
Power Sensor 10 MHz to 8 GHz	R&S®FSH-Z1	1155.4505.02
Power Sensor 10 MHz to 18 GHz	R&S®FSH-Z18	1165.1909.02
Directional Power Sensor 25 MHz to 1 GHz	R&S®FSH-Z14	1120.6001.02
Directional Power Sensor 200 MHz to 4 GHz	R&S®FSH-Z44	1165.2305.02
Matching Pad 75 Ω, L section	R&S®RAM	0358.5414.02
Matching Pad 75 Ω, L section, N to BNC	R&S®FSH-Z38	1300.7740.02
Matching Pad 75 Ω, series resistor 25 Ω	R&S®RAZ	0358.5714.02
Spare Power Supply, incl. mains plug for EU, GB, US	R&S®HA-Z201	1309.6100.00
12 V Car Adapter for cigarette lighter	R&S®HA-Z202	1309.6117.00
Battery Charger for Li-Ion battery pack	R&S®HA-Z203	1309.6123.00
Li-Ion Battery Pack 6 Ah	R&S®HA-Z206	1309.6146.00
Ethernet Cable 1.5 m	R&S®HA-Z210	1309.6152.00
USB Cable 1.5 m, connector type A/mini B	R&S®HA-Z211	1309.6169.00
Soft Carrying Bag	R&S®HA-Z220	1309.6175.00
Hard Case	R&S®HA-Z221	1309.6181.00
Carrying Holster with rain cap	R&S®HA-Z222	1309.6198.00
SD Memory Card, 2 Gbyte	R&S®HA-Z231	1309.6217.00
Active Directional Antenna, 20 MHz to 7.5 GHz	R&S®HE-300	4067.5900.02
Near-Field Probe Set	R&S®HZ-15	1147.2736.02
Preamplifier for R&S®HZ-15	R&S®HZ-16	1147.2720.02

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