

# R&S® ETH Handheld TV Analyzer Specifications



**ROHDE & SCHWARZ**

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# Definitions

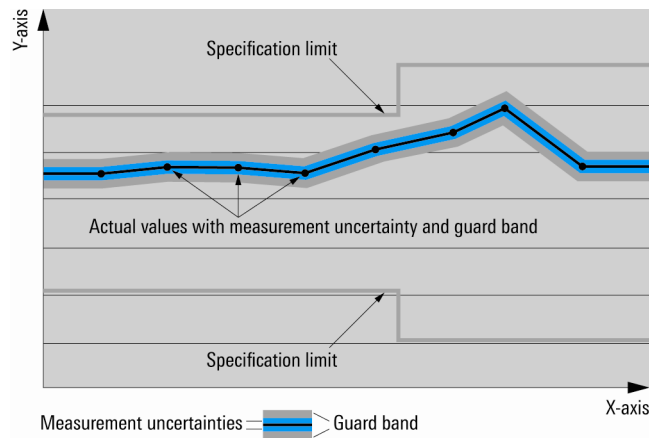
## General

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.



## 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.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

# Specifications

## TV Analyzer

### Frequency

<b>Frequency range</b>	model .04, .14 model .08, .18	4.5 MHz to 3.6 GHz 4.5 MHz to 8 GHz
Resolution		1 Hz
<b>Reference frequency, internal</b>		
Aging per year		$1 \times 10^{-6}$
Temperature drift	0 °C to +30 °C	$1 \times 10^{-6}$
	+30 °C to +50 °C	$3 \times 10^{-6}$
Achievable initial calibration accuracy		$5 \times 10^{-7}$
Total reference uncertainty	0 °C to +30 °C	(time since last adjustment × aging rate) + temperature drift + calibration accuracy
<b>Reference frequency, with R&amp;S® HA-Z240 GPS receiver option</b>		
Frequency uncertainty	GPS ON, ≥ 1 minute after satellite lock	$2.5 \times 10^{-8}$
	up to 30 minutes after losing satellite lock	$5 \times 10^{-8}$
<b>Spectral purity of SSB phase noise</b>		
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

<b>Noise figure</b>	RF = 500 MHz, RF attenuation = 0 dB	
	RF preselection = OFF	< 22 dB, typ. 18 dB
	RF preselection = ON <sup>1</sup>	< 14 dB, typ. 11 dB
<b>Third-order intermodulation (TOI)</b> (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 <sup>1</sup>	
	50 MHz to 200 MHz	-8 dBm
	200 MHz to 3.6 GHz	-6 dBm
	3.6 GHz to 8 GHz	-2 dBm
<b>Second-order intermodulation (SOI)</b> , nominal values	RF = 500 MHz, RF attenuation = 0 dB	
	RF preselection = OFF	30 dBm
	RF preselection = ON <sup>1</sup>	60 dBm
<b>Immunity to interference</b> (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
	829.8 MHz, 4874.8 MHz, 8919.8 MHz	-80 dB
Other interfering signals, referenced to signal level	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 to 50 Ω, without input signal, RF attenuation = 0 dB	
	RF preselection = OFF	< -90 dBm
	RF preselection = ON <sup>1</sup>	< -100 dBm

<b>Maximum rated input level</b> (nominal values)		
DC voltage		80 V
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 μs	10 mWs

## RF preselection (R&S<sup>®</sup>ETH-K1 option)

Lower 3 dB cut-off 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 cut-off 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

## DVB-T/H analysis (R&S<sup>®</sup>ETH-K140 option)

### Level

<b>Minimum RF power for quasi-error-free transport stream data</b>	RF = 500 MHz, RF attenuation = 0 dB, BER before RS < $2.0 \times 10^{-4}$ , 64QAM non-hierarchical modulation, guard interval = 1/32, code rate = 3/4	
	RF preselection = OFF	< –64 dBm, typ. –69 dBm
	RF preselection = ON <sup>1</sup>	< –72 dBm, typ. –76 dBm
<b>Maximum RF power for quasi-error-free transport stream data, nominal values</b>	RF = 500 MHz, BER before RS < $2.0 \times 10^{-4}$	
	RF attenuation = 40 dB, RF preselection = OFF	10 dBm
	RF attenuation = 50 dB, RF preselection = ON <sup>1</sup>	10 dBm

### Bandwidths

OFDM signal bandwidth range		1 MHz to 8 MHz
Resolution		0.1 Hz
Predefined channel filter bandwidths		5/6/7/8 MHz
Channel filter shape factor 80 dB:0.1 dB		nominal ≤ 1.09

### Demodulation

<b>Standard</b>	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, guard interval 1/32, slow channel adaptation	
	level = –30 dBm, RF preselection = OFF	> 43 dB, typ. 46 dB
	level = –45 dBm, RF preselection = ON <sup>1</sup>	> 41 dB, typ. 44 dB

<sup>1</sup> R&S<sup>®</sup>ETH-K1 option required.

## Measurements

<b>Measurement parameter list</b>	signal level, crest factor, carrier frequency offset, symbol rate offset, modulation error ratio (MER RMS), modulation error ratio (MER peak), error vector magnitude (EVM RMS), error vector magnitude (EVM peak), bit error ratio before Viterbi decoder, bit error ratio before Reed-Solomon decoder, packet error ratio, packet errors per second, MPEG transport stream rate	
<b>Transmission parameter signaling (TPS)</b>	FFT, guard interval, QAM, hierarchy, code rate, cell ID, TPS reserved (frames 1 to 4), interleaver mode, MPE FEC, time slicing, length indicator	
<b>Constellation diagram</b>	QAM order	4QAM, 16QAM, 64QAM
	QAM hierarchy	none, $\alpha = 1, 2, 4$
<b>Echo pattern</b> (channel impulse response)	level range	50 dB
	time range, extended span OFF	$T_{\text{symbol}}/3$
	time range, extended span ON	$T_{\text{symbol}}$
	span units	$\mu\text{s}$ , km, miles
	marker level resolution	0.1 dB
	marker type	relative level, absolute level
	marker functions	set to peak, set to next peak, center = marker
	echo pattern peak list	13 highest peaks with relative and absolute level and time or distance
<b>MER(k)</b> (modulation error ratio versus OFDM carriers)	MER range	10/20/50 dB
	carrier range	all modulated OFDM carriers
	marker position units	carrier number, relative frequency, absolute frequency
	marker MER resolution	0.1 dB
	marker functions	set to peak, set to next peak
	trace detectors	RMS, Auto Peak, Min. Peak, Max. Peak
<b>TV spectrum</b>	lower and upper shoulder attenuations in line with ETSI TR 101 290	
	in-channel amplitude frequency response, peak-to-peak	
	carrier to noise	
	occupied bandwidth	
<b>Spectrum emission mask</b>	spectrum emissions test against emission mask	

<b>Measurement uncertainty</b>		
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
Crest factor		typ. < 0.5 dB
Carrier frequency offset		RF x reference uncertainty
Symbol rate offset		reference uncertainty
MPEG TS bitrate		MPEG TS bit rate x reference uncertainty
Modulation error ratio (MER)	RF = 500 MHz, 64QAM, slow channel adaptation	
	20 dB to 30 dB	typ. < 1.0 dB
	30 dB to 35 dB	typ. < 1.5 dB
	35 dB to 40 dB	typ. < 2.0 dB
Error vector magnitude (EVM)	RF = 500 MHz, 64QAM, slow channel adaptation, referenced to measured value	
	0.65 % to 1.2 %	< 25 %
	1.2 % to 2 %	< 20 %
	2 % to 7 %	< 12 %
BER before Viterbi decoder	$1.0 \times 10^{-3}$ to $0.1 \times 10^{-15}$ , 0,0	$0.1 \times 10^{-\text{exponent}}$
BER before Reed-Solomon decoder	$1.0 \times 10^{-3}$ to $0.1 \times 10^{-15}$ , 0,0	$0.1 \times 10^{-\text{exponent}}$
Packet error ratio	$1.0 \times 10^{-1}$ to $0.1 \times 10^{-12}$ , 0,0	$0.1 \times 10^{-\text{exponent}}$
Echo pattern peak level	within guard interval	typ. < 0.5 dB

## ISDB-T analysis (R&S® ETH-K160 option)

### Level

<b>Minimum RF power for quasi-error-free transport stream data</b> (nominal values)	RF = 500 MHz, RF attenuation = 0 dB, BER before RS < $2.0 \times 10^{-4}$ , QPSK modulation, guard interval = 1/8, code rate = 2/3	
	RF preselection = OFF	typ. -80 dBm
	RF preselection = ON <sup>2</sup>	typ. -88 dBm
<b>Maximum RF power for quasi-error-free transport stream data</b> (nominal values)	RF = 500 MHz, RF attenuation = 0 dB, BER before RS < $2.0 \times 10^{-4}$	
	RF attenuation = 40 dB, RF preselection = OFF	10 dBm
	RF attenuation = 50 dB, RF preselection = ON <sup>2</sup>	10 dBm

### Bandwidth

Channel filter bandwidth	6 MHz
Channel filter shape factor 75 dB:0.12 dB	nominal $\leq 1.10$

### Demodulation

<b>Standard</b>	terrestrial TV in line with ARIB STD-B31	ISDB-T
ISDB-T mode	automatic detection	Mode 1 (2K), Mode 2 (4K), Mode 3 (8K)
Modulation	automatic detection	DQPSK, QPSK, 16QAM, 64QAM
Layer	automatic detection	A, B, C
Partial reception	automatic detection	
Segments per layer	automatic detection	13 in total (layer A + layer B + layer C)
Guard interval	automatic detection	1/4, 1/8, 1/16, 1/32
Code rate (all layers)	automatic detection	1/2, 2/3, 3/4, 5/6, 7/8
Interleaver mode	mode 1 (2K FFT)	0, 4, 8, 16
	mode 2 (4K FFT)	0, 2, 4, 8
	mode 3 (8K FFT)	0, 1, 2, 4
Inherent modulation error ratio (MER total, RMS)	RF 500 MHz, RF attenuation 0 dB, slow channel adaptation	
	level = -30 dBm, RF preselection = OFF	> 43 dB, typ. 45 dB
	level = -45 dBm, RF preselection = ON <sup>2</sup>	> 41 dB, typ. 44 dB

<sup>2</sup> R&S®ETH-K1 option required.

## Measurements

<b>Measurement parameter list</b>	signal level, crest factor, RF offset, symbol rate offset, total modulation error ratio (MER total, RMS), total modulation error ratio (MER total, peak), modulation error ratio of each layer (MER layer, RMS), modulation error ratio of TMCC (MER TMCC, RMS), modulation error ratio of AC (MER AC, RMS), sideband position, bit error ratio before Viterbi decoder, bit error ratio before Reed-Solomon decoder, bit error ratio after Reed-Solomon decoder, packet errors per second, MPEG transport stream rate	
<b>Transmission and multiplexing configuration control (TMCC)</b>	ISDB-T mode, Parameter switching indicator, Emergency alarm broadcasting, Partial reception, Phase shift correction, Reserved bits, Modulation, Code rate, Time interleaving, Number of segments	
<b>Constellation diagram</b>	QAM order	DQPSK, QPSK, 16QAM, 64QAM
<b>Echo pattern (channel impulse response)</b>	level range	50 dB
	time range, extended span OFF	$T_{\text{symbol}}/3$
	time range, extended span ON	$T_{\text{symbol}}$
	span units	µs, km, miles
	marker level resolution	0.1 dB
	marker type	relative level, absolute level
	marker functions	set to peak, set to next peak, center = marker
	echo pattern peak list	12 highest peaks with relative and absolute level and time or distance
<b>MER(k)</b> (modulation error ratio versus OFDM carriers)	MER range	10/20/50 dB
	carrier range	all modulated OFDM carriers
	marker position units	carrier number, relative frequency, absolute frequency
	marker MER resolution	0.1 dB
	marker functions	set to peak, set to next peak
	trace detectors	RMS, Auto Peak, Min Peak, Max Peak
<b>TV spectrum</b>	lower and upper shoulder attenuations in line with ETSI TR 101 290	
	in-channel amplitude frequency response, peak-to-peak	
	carrier to noise	
	occupied bandwidth	
<b>Spectrum emission mask</b>	spectrum emissions test against emission mask	

<b>Measurement uncertainty</b>		
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
Crest factor		typ. < 0.5 dB
RF offset		RF x reference uncertainty
Symbol rate offset		reference uncertainty
MPEG TS bitrate		MPEG TS bit rate x reference uncertainty
Modulation error ratio	RF = 500 MHz, slow channel adaptation	
	20 dB to 30 dB	typ. < 1.0 dB
	30 dB to 35 dB	typ. < 1.5 dB
	35 dB to 40 dB	typ. < 2.0 dB
BER before Viterbi decoder	$1.0 \times 10^{-3}$ to $0.1 \times 10^{-15}$ , 0.0	$0.1 \times 10^{-\text{exponent}}$
BER before Reed-Solomon decoder	$1.0 \times 10^{-3}$ to $0.1 \times 10^{-15}$ , 0.0	$0.1 \times 10^{-\text{exponent}}$
BER after Reed-Solomon decoder	$1.0 \times 10^{-3}$ to $0.1 \times 10^{-15}$ , 0.0	$0.1 \times 10^{-\text{exponent}}$
Echo pattern peak level	within guard interval	typ. < 0.5 dB



# Spectrum analysis

## Frequency

Frequency range	model .04, .14	100 kHz to 3.6 GHz
	model .08, .18	100 kHz to 8 GHz
Resolution		1 Hz
<b>Reference frequency, internal</b>		
Aging per year		$1 \times 10^{-6}$
Temperature drift	0 °C to +30 °C	$1 \times 10^{-6}$
	+30 °C to +50 °C	$3 \times 10^{-6}$
Achievable initial calibration accuracy		$5 \times 10^{-7}$
Total reference uncertainty	0 °C to +30 °C	(time since last adjustment × aging rate) + temperature drift + calibration accuracy
<b>Reference frequency, with R&amp;S®HA-Z240 GPS receiver option</b>		
Frequency uncertainty	GPS ON, ≥ 1 minute after satellite lock	$2.5 \times 10^{-8}$
	up to 30 minutes after losing satellite lock	$5 \times 10^{-8}$
<b>Frequency readout</b>		
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
Frequency counter uncertainty	S/N > 25 dB	$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2} (\text{last digit}))$
	with R&S®HAZ240 GPS receiver option	
	GPS ON, ≥ 1 minute after satellite lock	$2.5 \times 10^{-8}$
	up to 30 minutes after losing satellite lock	$5 \times 10^{-8}$
Frequency span		0 Hz, 10 Hz to 3.6/8 GHz
Frequency span uncertainty		nominal 1 %
<b>Spectral purity of SSB phase noise</b>		
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

<b>Resolution bandwidths</b>		
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)
<b>Video filters</b>		
Range	-3 dB bandwidth	10 Hz to 3 MHz in 1, 3 sequence
<b>RF preselection (R&amp;S®ETH-K1 option)</b>		
Lower 3 dB cut-off 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 cut-off 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

<b>Display range</b>		displayed noise floor to +20 dBm
<b>Maximum rated input level</b> (nominal values)		
DC voltage		80 V
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 $\mu$ s	10 mWs
<b>Intermodulation</b>		
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 <sup>3</sup>	
	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 (SHI), nominal values	RF attenuation = 0 dB, RF preselection = OFF	
	50 MHz to 1.5 GHz	30 dBm
	RF attenuation = 0 dB, RF preselection = ON <sup>3</sup>	
<b>Displayed average noise level</b>	0 dB RF attenuation, 50 $\Omega$ termination, 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 GHz	< -147 dBm, typ. -153 dBm
	3 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 <sup>3</sup>	
	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
<b>Immunity to interference</b> (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 to 50 $\Omega$ , without input signal, RBW $\leq$ 30 kHz, RF attenuation = 0 dB	
	RF preselection = OFF	< -90 dBm
	RF preselection = ON <sup>3</sup>	< -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	
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

<sup>3</sup> R&S®ETH-K1 option required.

<b>Level display</b>		
Logarithmic level axis		1/2/5/10/20/50/100/120/150 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
<b>Level measurement uncertainty</b>		
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	S/N > 16 dB, 0 dB to -50 dB, logarithmic level display	< 0.2 dB
Bandwidth switching uncertainty	reference: RBW = 10 kHz	nominal < 0.1 dB

## Trigger functions

<b>Trigger</b>		
Trigger source		free run, video, external
External trigger level threshold	low → high transition	
	high → low transition	

## Scalar network analysis

Models .14 and .18 only.

Frequency range	model .14	100 kHz to 3.6 GHz
	model .18	100 kHz to 8 GHz
Resolution		1 Hz
Data points		631
Tracking generator (TG) output power	tracking generator attenuation = 0 dB	nominal 0 dBm
Tracking generator attenuator		0 dB to 40 dB in 1 dB steps
<b>Transmission measurement</b>		
Magnitude	range	1/2/5/10/20/50/100/120/150 dB, linear 100 %, selectable
	resolution	0.01 dB
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
<b>Reflection measurement</b>		
with external R&S®FSH-Z3 or R&S®FSH-Z2 VSWR bridge		
Return loss	range	1/2/5/10/20/50/100/120/150 dB, linear 100 %, selectable
	resolution	0.01 dB
VSWR	range	1 to 1.1/1.5/2/6/11/21/71
Reflection coefficient	range	1 mp to 1000 mp in 1, 2, 5 steps
Directivity of R&S®FSH-Z3	30 MHz to 3 GHz	28 dB
	3 GHz to 6 GHz	25 dB
Return loss at R&S®FSH-Z3 test port	50 MHz to 6 GHz	22 dB
Directivity of R&S®FSH-Z2	10 MHz to 1 GHz	30 dB
	1 GHz to 3 GHz	25 dB
Return loss at R&S®FSH-Z2 test port	10 MHz to 3 GHz	20 dB

## Vector network analysis

Models .14 and .18 only with R&S®FSH-K42 vector reflection and transmission measurement option installed.

Frequency range	model .14 model .18	100 kHz to 3.6 GHz 100 kHz to 8 GHz
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
<b>Transmission measurement</b>		
Magnitude	range	1/2/5/10/20/50/100/120/150 dB, linear 100 %, selectable
	resolution	0.01 dB
Phase	range	80/180/360/1000° to 10000° in 1/2/5 steps
	resolution	0.01°
Group delay	range	10 ns to 1000 ns in 1/2/5 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
<b>Reflection measurement</b>		
	with external R&S®FSH-Z3 or R&S®FSH-Z2 VSWR bridge	
Return loss	range	1/2/5/10/20/50/100/120/150 dB, linear 100 %, selectable
	resolution	0.01 dB
One-port phase	range	80/180/360/1000° to 10000° in 1/2/5 steps
	resolution	0.01 °
Group delay	range	10 ns to 1000 ns in 1/2/5 steps
VSWR	range	1 to 1.1/1.5/2/6/11/21/71
Reflection coefficient	range	1 mp to 1000 mp in 1/2/5 steps
Smith chart	range	1, zoom x2, x4, x8
Cable loss	range	1 dB to 100 dB in 1/2/5 steps
Directivity of R&S®FSH-Z3, corrected	2 MHz to 3 GHz	40 dB
	3 GHz to 6 GHz	37 dB
Return loss at R&S®FSH-Z3 test port, corrected	2 MHz to 3 GHz	40 dB
	3 GHz to 6 GHz	37 dB
Directivity of R&S®FSH-Z2, corrected	2 MHz to 10 MHz	40 dB
	10 MHz to 3 GHz	43 dB
Return loss at R&S®FSH-Z2 test port, corrected	2 MHz to 3 GHz	35 dB

## Distance-to-fault measurement

Models .14 and .18 only with R&S®FSH-K41 option installed.

Return loss	range	1/2/5/10/20/50/100/120/150 dB, linear 100 %
	resolution	0.01 dB
VSWR	range	1 to 1.1, 1.5, 2, 6, 11, 21 or 71
	resolution	0.01
Reflection coefficient	range	1 to 1000 mp in 1, 2, 5 steps
Distance-to-fault resolution		(1.5 × velocity factor/span) m
Maximum permissible spurious signal		nominal 0 dBm

## Inputs and outputs

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

<sup>4</sup> R&S®ETH-K1 option required.

## General data

<b>Operating languages</b>	English, Russian, Spanish, Portuguese, Japanese	
<b>Remote control (R&amp;S®ETH-K40 option)</b>		
Command set		SCPI 1997.0
LAN interface		10/100BaseT, RJ-45
USB		mini B plug, version 1.1
<b>Display</b>		
Resolution		640 x 480 pixel
<b>Audio</b>		
Speaker		internal
<b>Mass memory</b>		
Mass memory		flash memory (internal) SD card (not supplied) USB memory stick (not supplied)
Data storage	internal	> 256 instrument settings and traces
	on 2 Gbyte SD card or USB memory stick	> 10000 instrument settings and traces
<b>Temperature</b>	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
	battery charging mode	0 °C to +40 °C
<b>Climatic loading</b>	relative humidity	+25 °C/+40 °C at 95 % relative humidity IEC 60068-2-30, MIL-PRF-28800
	IP class of protection	51
	with R&S®HA-Z222 carrying holster and rain cap	54
<b>Mechanical resistance</b>		
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
<b>Power supply</b>		
R&S®HA-Z201 plug-in AC power supply	input specifications	100 V 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		Li-ion battery
Capacity	R&S®HA-Z206	6.75 Ah
Voltage		nominal 7.2 V
Operating time with new, fully charged battery	TV analyzer 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	
	TV analyzer mode	7.5 h
	spectrum analyzer mode	4.5 h
Life time	charging cycles	> 500
<b>Power consumption</b>	TV analyzer mode	19.5 W
	spectrum analyzer mode	12 W
<b>Safety</b>		IEC 61010-1, EN 61010-1, UL 61010B-1, CSA C22.2 No. 61010-1
<b>Test mark</b>		VDE, GS, CSA, CSA-NRTL
<b>EMC</b>		in line with European EMC Directive 2004/108/EC, including IEC/EN 61326 class B (emission), CISPR 11/EN 55011/group 1 class B (emission), IEC/EN 61326 Table A.1 (immunity, industrial)
<b>Dimensions (W x H x D)</b>	with handle	194 mm x 300 mm x 144 mm (7.6 in x 11.8 in x 5.7 in)
	without handle	194 mm x 300 mm x 69 mm (7.6 in x 11.8 in x 2.8 in)
<b>Weight</b>		3.3 kg (6.6 lb)
<b>Recommended calibration interval</b>		1 year

## Accessories

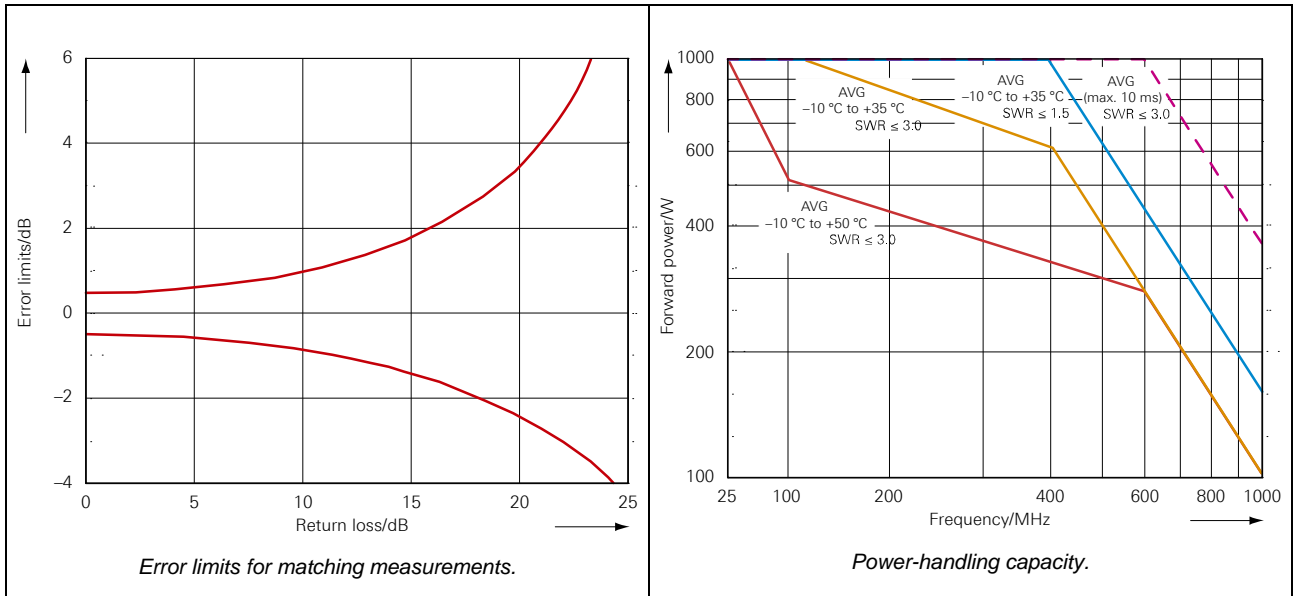
### R&S® FSH-Z1 and R&S® FSH-Z18 power sensors

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 $\mu$ s, 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
<b>General data</b>		
Dimensions	W x H x D	48 mm x 31 mm x 170 mm (1.9 in x 1.22 in x 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 $\Omega$		< 1.06
Power-handling capacity	depending on temperature and matching	100 W to 1000 W
Insertion loss		< 0.06 dB
Directivity		> 30 dB
<b>Average power</b>		
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
<b>Measurement uncertainty</b>		
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	$\pm$ 4 mW
Range of typical measurement error with modulation	FM, PM, FSK, GMSK	0 % of measured value (0 dB)
	AM (80 %)	$\pm$ 3 % of measured value ( $\pm$ 0.13 dB)
	2 CW carriers with identical power	$\pm$ 2 % of measured value ( $\pm$ 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)

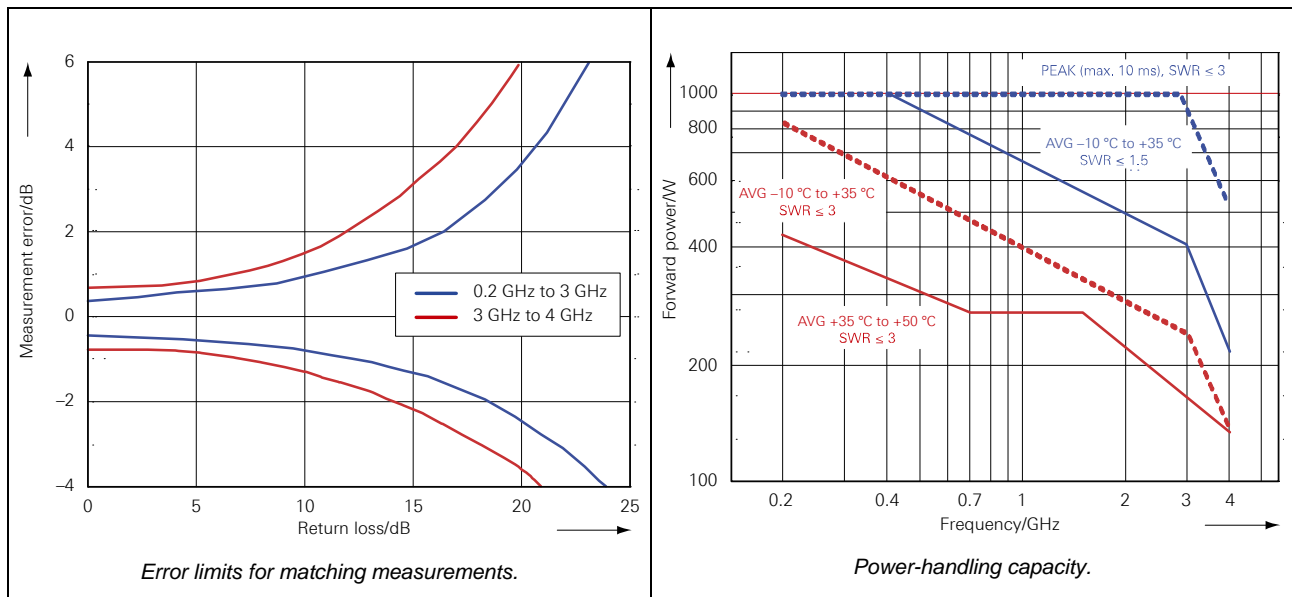
<b>Max. peak envelope power</b>		
Power measurement range		
Video bandwidth	4 kHz	0.4 W to 300 W
	200 kHz	1 W to 300 W
	600 kHz	2 W to 300 W
Measurement uncertainty	same as for average power plus effect of peak hold circuit	+18 °C to +28 °C
Error limits of peak hold circuit for burst signals	duty cycle $\geq 0.1$ 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 $\mu s$
	video bandwidth 200 kHz	$\pm(3\%$ of measured value + 0.20 W) starting from a burst width of 4 $\mu s$
	video bandwidth 600 kHz	$\pm(7\%$ of measured value + 0.40 W) starting from a burst width of 2 $\mu s$
	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 $\pm 0.10$ 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)
<b>Load matching</b>		
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
<b>General data</b>		
Dimensions	W x H x D	120 mm x 95 mm x 39 mm (5.9 in x 3.74 in x 1.53 in)
	length of 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
<b>Average power</b>		
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)
	two 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)
<b>Max. peak envelope power</b>		
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)
<b>Load matching</b>		
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
<b>General data</b>		
Dimensions	W x H x D	120 mm x 95 mm x 39 mm (5.9 in x 3.74 in x 1.53 in)
	length of connecting cable	1.5 m (59 in)
Weight		0.65 kg (1.43 lb)



## R&S®FSH-Z3 VSWR bridge

Frequency range		10 MHz to 6 GHz
Impedance		50 Ω
<b>VSWR bridge</b>		
Directivity	10 MHz to 30 MHz	typ. 16 dB
	30 MHz to 3 GHz	> 20 dB, typ. 28 dB
	3 GHz to 6 GHz	> 16 dB, typ. 25 dB
Directivity, corrected (R&S®FSH-K42 option)	2 MHz to 3 GHz	typ. 40 dB
	3 GHz to 6 GHz	typ. 37 dB
Return loss at test port	10 MHz to 50 MHz	> 12 dB, typ. 18 dB
	50 MHz to 6 GHz	> 16 dB, typ. 22 dB
Return loss at test port, corrected (R&S®FSH-K42 option)	2 MHz to 3 GHz	typ. 40 dB
	3 GHz to 6 GHz	typ. 37 dB
Insertion loss at test port		typ. 9 dB
Insertion loss of bypass		typ. 4 dB
<b>Connectors</b>		
Generator input/RF output		N male
Test port		N female
Control interface		7-contact connector (type Binder)
<b>Calibration standards</b>	R&S®FSH-Z28	short/open, 50 Ω load
Connector		N male
Impedance		50 Ω
Return loss	DC to 3 GHz	> 40 dB, typ. 43 dB
	3 GHz to 6 GHz	> 37 dB, typ. 43 dB
Power-handling capacity		1 W
<b>General data</b>		
Power consumption		500 mW
Dimensions	W × H × D	169 mm × 116 mm × 30 mm (6.7 in × 4.6 in × 1.2 in)
Weight		485 g (1.1 lb)

## R&S® FSH-Z2 VSWR bridge

Frequency range		10 MHz to 3 GHz
Impedance		50 Ω
<b>VSWR bridge</b>		
Directivity	10 MHz to 1 GHz	typ. 30 dB
	1 GHz to 3 GHz	typ. 25 dB
Directivity, corrected (R&S®FSH-K42 option)	2 MHz to 10 MHz	typ. 40 dB
	10 MHz to 3 GHz	typ. 43 dB
Return loss at test port	10 MHz to 3 GHz	typ. 20 dB
Return loss at test port, corrected (R&S®FSH-K42 option)	2 MHz to 3 GHz	typ. 35 dB
<b>Power divider</b>		
Insertion loss	10 MHz to 3 GHz	typ. 10 dB
Return loss at test port	10 MHz to 3 GHz	typ. 20 dB
<b>Connectors</b>		
Generator input/RF output		N male
Test port		N female
Control interface		7-contact connector (type Binder)
<b>Calibration standards</b>	R&S®FSH-Z29/-Z30/-Z31	short/open, 50 Ω load
Connector		N male
Impedance		50 Ω
Return loss	DC to 3 GHz	> 43 dB
Power-handling capacity		1 W
<b>General data</b>		
Dimensions	W x H x D	169 mm x 116 mm x 30 mm (6.7 in x 4.6 in x 1.2 in)
Weight		485 g (1.1 lb)

**R&S® HA-Z240 GPS receiver**

GPS location indication		latitude, longitude
Frequency counter uncertainty	GPS ON, $\geq 1$ minute after satellite lock	$2.5 \times 10^{-8}$
	up to 30 minutes after losing satellite lock	$5 \times 10^{-8}$
Operating temperature range		-20 °C to +55 °C
Storage temperature range		-40 °C to +70 °C
Climatic loading	GPS receiver module	IEC 60529 IPX7 level
Dimensions	$\varnothing \times H$	61 mm $\times$ 19.5 mm (2.4 in $\times$ 0.8 in)
Weight		200 g (0.4 lb)
Cable length		5 m (16.4 ft)
Connector		7-contact male (type Binder 712)
Power consumption		0.45 W
Test marks		FCC, CE

## 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
<b>Accessories supplied</b>		
Battery pack, AC power supply, USB adapter, USB cable, LAN cable, quick reference guide and CD-ROM with R&S®ETHView PC software and documentation		

## Options

Designation	Type	Order No.
DVB-T/H Analysis	R&S®ETH-K140	2114.1708.02
ISDB-T Analysis	R&S®ETH-K160	2114.1743.02
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 via LAN or USB	R&S®ETH-K40	2114.1814.02
Distance-to-Fault Measurement	R&S®FSH-K41	1304.5612.02
Vector Reflection and Transmission Measurement	R&S®FSH-K42	1304.5629.02

## Service options

Designation	Type	Order No.
Two-Year Calibration Service	R&S®CO2ETH	Please contact your local Rohde & Schwarz sales office.
Three-Year Calibration Service	R&S®CO3ETH	
Five-Year Calibration Service	R&S®CO5ETH	
One-Year Repair Service, following the warranty period	R&S®RO2ETH	
Two-Year Repair Service, following the warranty period	R&S®RO3ETH	
Four-Year Repair Service, following the warranty period	R&S®RO5ETH	

## Accessories

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
VSWR Bridge and Power Divider, 10 MHz to 3 GHz	R&S®FSH-Z2	1145.5767.02
VSWR Bridge with DC Bias and Bypass Switch, 10 MHz to 6 GHz	R&S®FSH-Z3	1300.7756.02
Combined Open/Short/50 Ω Load Calibration Standard, DC to 8 GHz	R&S®FSH-Z28	1300.7810.03
Combined Open/Short/50 Ω Load Calibration Standard, DC to 3.6 GHz	R&S®FSH-Z29	1300.7510.03
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, 6.75 Ah	R&S®HA-Z206	1309.6146.00
Spare Ethernet Cable, length 1.5 m	R&S®HA-Z210	1309.6152.00
Spare USB Cable, length 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-Z232	1309.6223.00
GPS Receiver	R&S®HA-Z240	1309.6700.02
Isotropic Antenna, 30 MHz to 3 GHz	R&S®TS-EMF	1158.9295.13
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

For product brochure, see PD 5213.9592.12 and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)



## Service you can rely on

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

## About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

## Environmental commitment

- | Energy-efficient products
- | Continuous improvement in environmental sustainability
- | ISO 14001-certified environmental management system

Certified Quality System  
**ISO 9001**

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