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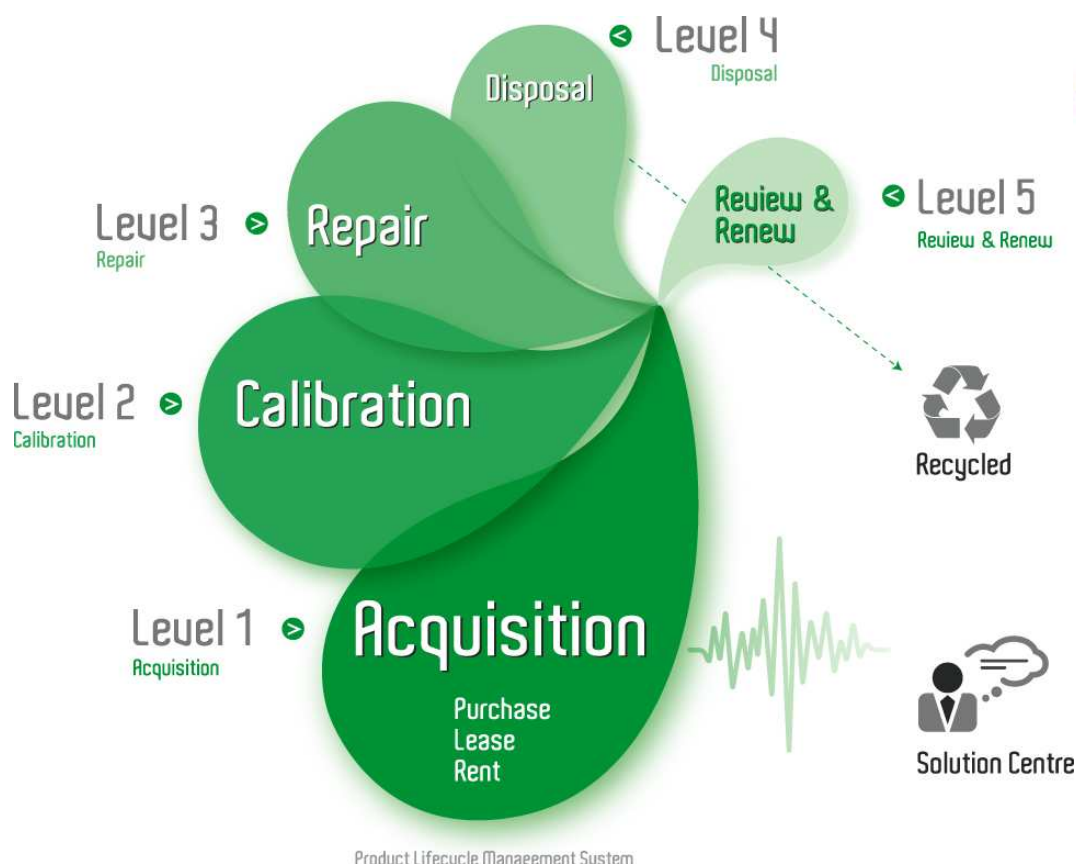
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Audio Analyzer R&S[®]UPV

Preliminary Specifications



ROHDE & SCHWARZ

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Analog analyzers

Analog measurements are available with four different bandwidths, specifications and measurement functions.

Analyzer	Frequency range
Bandwidth 22 kHz	DC/10 Hz to 21.76 kHz ¹
Bandwidth 40/80 kHz	DC/10 Hz to 40/80 kHz ¹
Bandwidth 250 kHz	DC/10 Hz to 250 kHz ¹

Level measurements (rms)		
Accuracy	at 1 kHz	±0.05 dB, typ. ±0.025 dB
Frequency response (ref. to 1 kHz)	20 Hz to 20 kHz	±0.01 dB, typ. 0.003 dB ($V_{in} < 3$ V) ² 20 Hz to 50 Hz: add -0.06 dB
	20 kHz to 50 kHz	±0.03 dB ($V_{in} < 3$ V) ²
	50 kHz to 100 kHz	±0.1 dB
	100 kHz to 250 kHz	±0.3 dB

Inputs

XLR connectors	2 channels, balanced (unbalanced measurements possible with XLR/BNC Adapter R&S UPL-Z1), floating/grounded and AC/DC coupling switchable	
Voltage range	0.1 µV to 110 V (rms, sine)	
Measurement ranges	18 mV to 100 V, in steps of 5 dB	
Input impedance	100 kΩ ±1 % shunted by 120 pF (230 pF for ≥ 6 V ranges), each pin against ground. 300 Ω ±0.5 %, P_{max} 2 W 600 Ω ±0.5 %, P_{max} 1 W	
Crosstalk attenuation	frequency <22 kHz, 600 Ω	>120 dB
Common-mode rejection ($V_{in} < 3$ V)	at 50 Hz at 1 kHz at 20 kHz	>90 dB >86 dB >80 dB
Generator output	each input channel switchable to any output channel, input impedance: balanced 200 kΩ, unbalanced 100 kΩ	

Measurement functions

RMS value, wideband		
Accuracy	Measurement speed AUTO	±0.05 dB, typ. ±0.025 dB, at 1 kHz, sine
	Measurement speed AUTO FAST	±0.1 dB additional error
Integration time	AUTO FAST/AUTO GEN TRACK VALUE	200/4000 samples min., at least 1 cycle 100 samples min., at least 1 cycle 0.1 ms to 10 s
Noise (input shorted)	22/40/80 kHz bandwidth A weighted CCIR unweighted 80 kHz bandwidth 250 kHz bandwidth	<1 μV, 0.7 μV typ. <1.4 μV, 1 μV typ. <2.8 μV <7 μV
Spectrum	post-FFT	
DC voltage		
Voltage range	0 V to ±110 V	
Accuracy	±(1% of measured value + 0.1% of measurement range)	
Measurement ranges	100 mV to 100 V, in steps of 10 dB	
FFT analysis	see FFT analyzer section	

¹ DC/AC coupling

² $V_{in} \geq 3$ V additional ±0.02 dB from 5 kHz to 50 kHz

Total harmonic distortion (THD)		
Fundamental	10 Hz to 110 kHz	
Frequency tuning	automatic to input or generator signal or fixed through entered value	
Weighted harmonics	any combination of d_2 to d_9 , up to 250 kHz	
Accuracy	Harmonics <50 kHz Harmonics <100 kHz Harmonics <250 kHz	± 0.5 dB ± 0.7 dB ± 1 dB
Inherent distortion	Fundamental 20 Hz to 10.95 kHz	< -110 dB, typ. -115 dB
Bandwidth 22 kHz ^{3 4}	Fundamental 10 Hz to 20 Hz	< -100 dB
Inherent distortion	Fundamental 50 Hz to 20 kHz	< -100 dB, typ. -105 dB
Bandwidth 40/80/250 kHz ^{3 4}	Fundamental 20 kHz to 110 kHz	< -90 dB, typ. -95 dB
Spectrum	bar chart showing signal and distortion	

THD+N and SINAD		
Fundamental	10 Hz to 110 kHz	
Frequency tuning	automatic to input or generator signal or fixed through entered value	
Input voltage	typ. > 100 μ V with automatic tuning	
Bandwidth	upper and lower frequency limit selectable, one weighting filter in addition	
Accuracy	Bandwidth < 50 kHz < 100 kHz ≤ 250 kHz	± 0.5 dB (Demo units $+0.5/-1.3$ dB) ± 0.7 dB (Demo units $+0.7/-1.5$ dB) ± 1 dB (Demo units $+1/-1.8$ dB)
Inherent distortion analyzer bandwidth 22 kHz ⁵	Bandwidth 20 Hz to 22 kHz	typ. -110 dB at 1 kHz, 2.5 V < -105 dB $+2$ μ V ⁶ typ. -108 dB $+1.5$ μ V
Inherent distortion analyzer bandwidth 40/80 kHz ⁵	Bandwidth 20 Hz to 22 kHz 20 Hz to 80 kHz	< -95 dB $+2.5$ μ V, typ. -100 dB $+1.75$ μ V < -88 dB $+5$ μ V, typ. -95 dB $+3.5$ μ V
Inherent distortion analyzer bandwidth 250 kHz ⁵	Bandwidth 20 Hz to 22 kHz 20 Hz to 110 kHz	< -95 dB $+2.5$ μ V, typ. -100 dB $+1.75$ μ V < -88 dB $+5$ μ V, typ. -95 dB $+3.5$ μ V
Spectrum	post-FFT	

Time domain display (WAVEFORM)	
Standard mode	
Trace length	512 kS per channel max.

Frequency	
Frequency range	20 Hz to 250 kHz
Accuracy	± 10 ppm

Phase		
Frequency range	20 Hz to 250 kHz	
Accuracy	20 Hz to 22 kHz 22 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 250 kHz	± 0.4 ° ± 0.6 ° ± 1.0 ° ± 1.5 °

³ Total inherent distortion of analyzer and generator (with option R&S UPV-B1), analyzer with dynamic mode precision.

⁴ > 3.5 V: typ. 3 dB less; < 0.5 V: sensitivity reduced by inherent noise.

⁵ Total inherent distortion of analyzer and generator (with option R&S UPV-B1), analyzer with dynamic mode precision.

⁶ At full-scale level of measurement range (< -100 dB $+2$ μ V with auto range), < -100 dB for input voltage > 3.5 V.

Analog generators

24-bit $\Delta\Sigma$ -D/A converters are used for analog signal generation. The characteristics of the basic generator can be improved and extended with a low-distortion RC oscillator (Low Distortion Generator R&S UPV-B1):

- sine with reduced distortion
- frequency range up to 200 kHz

Outputs

XLR connectors, 2 channels, floating/grounded switchable, balanced/unbalanced switchable, short-circuit-proof; max. current <120 mA with external feed

Balanced		
Voltage	0.1 mV to 20 V (rms, sine, open-circuit)	
Crosstalk attenuation	frequency <20 kHz	>115 dB
Source impedance	typ. 10 Ω , 200 Ω (150 Ω with R&S UPV-U1) $\pm 0.5\%$, 600 $\Omega \pm 0.5\%$	
Load impedance	>400 Ω (incl. source impedance)	
Output balance	at 1 kHz	>75 dB
	at 20 kHz	>60 dB

Unbalanced		
Voltage	0.1 mV to 10 V (rms, sine, open-circuit)	
Crosstalk attenuation	frequency <20 kHz	>115 dB
Source impedance	5 Ω	
Load impedance	>200 Ω	

Signals

Sine		
Frequency range	0.1 Hz to 80 kHz	
Frequency accuracy	± 10 ppm	
Level accuracy	at 1 kHz	± 0.05 dB
Frequency response (ref. to 1 kHz)	20 Hz to 20 kHz / 70 kHz / 80 kHz	± 0.01 dB / ± 0.05 dB / ± 0.1 dB
Inherent distortion THD+N	Measurement bandwidth	
	20 Hz to 22 kHz	<–103 dB, typ. –107 dB
	20 Hz to 80 kHz	<–90 dB
Sweep parameters	frequency, level	

Sine (with low distortion generator option)		
Frequency range	10 Hz to 200 kHz	
Frequency accuracy	10 Hz to 100 kHz	± 0.5 %
	100 kHz to 200 kHz	± 0.75 %
Level accuracy	at 1 kHz	± 0.05 dB
Frequency response (ref. to 1 kHz)	10 Hz to 20 kHz	± 0.01 dB
	20 kHz to 100 kHz	± 0.05 dB
	100 kHz to 150 kHz	± 0.15 dB
	150 kHz to 200 kHz	± 0.25 dB
Harmonics	measurement bandwidth 20 Hz to 20 kHz, voltage 1 V to 5 V	typ. <–115 dB (<–120 dB at 1 kHz)
Inherent distortion (THD)	Fundamental	
	1 kHz, 1 V to 10 V	<–120 dB typ.
	20 Hz to 7 kHz	<–105 dB
	7 kHz to 20 kHz	<–100 dB
	20 kHz to 50 kHz	<–90 dB
	50 kHz to 100 kHz	<–80 dB
Inherent distortion (THD+N) ⁷	Fundamental	
	1 kHz, 2.5 V	–110 dB typ.
	20 Hz to 20 kHz	<–100 dB +2 μ V
	20 Hz to 20 kHz	<–88 dB +5 μ V
Sweep parameter	Meas. Bandwidth	
	22 kHz	
	22 kHz	
	100 kHz	
Sweep parameter	frequency, level	

⁷ Total inherent distortion of analyzer and generator, analyzer with dynamic mode precision.

Stereo sine	only with Second Analog Generator, Option R&S UPV-B3	
Frequency range	0.1 Hz to 80 kHz	
Frequency	adjustable for each channel	
Phase	-360° to 360° (same frequency in both channels)	
Level	adjustable for each channel or channel ratio 2/1	
Sweep parameters	frequency and level of channel 1	

MOD DIST	for measuring the modulation distortion	
Frequency range	Lower Frequency Upper Frequency	30 Hz to 2700 Hz 8 x LF to 21.75 kHz
Level ratio (LF:UF)	selectable from 10:1 to 1:1	
Level accuracy	±0.5 dB	
Inherent distortion (level ratio LF:UF = 4:1)	at 7 kHz, 60 Hz	-108 dB typ. -103 dB typ.
Sweep parameters	upper frequency, level	

DFD	for measuring the difference tone	
Frequency range	difference frequency center frequency	80 Hz to 2 kHz 200 Hz to 20.75 kHz
Level accuracy	±0.5 dB	
Inherent distortion ⁸	DFD d ₂ DFD d ₃	-120 dB typ. -103 dB typ.
Sweep parameters	center frequency, level	

DIM (only with Second Analog Generator, Option R&S UPV-B3)	for DIM measurements to DIN-IEC 268-3 (dynamic intermodulation distortion)	
Waveform	square/sine 3.15/15 kHz or 2.96/14 kHz square/sine amplitude ratio 4:1 bandwidth (3 dB) 30/100 kHz selectable	
Max. level (V _{pp})	50 V (25 V unbalanced)	
Level accuracy	±0.5 dB	
Inherent distortion ⁹	-105 dB typ.	
Sweep parameters	level	

Sine burst, Sine² burst		
Burst time	1 sample up to 60 s, 1-sample resolution	
Interval	burst time up to 60 s, 1-sample resolution	
Low level	0 to burst level, absolute or relative to burst level (0 with sine ² burst)	
Bandwidth	80 kHz	
Sweep parameters	burst frequency, level, time, interval	

Noise		
Distribution	Gaussian, triangular, rectangular	

Arbitrary Waveform	loaded from file	
File format	*.arb	memory depth max. 16 k
Clock rate	48/96/192 kHz with bandwidth setting to 22/40/80 kHz	

Polarity test signal	Sinus2 burst with following characteristics:	
Frequency	1.2 kHz	
ON time	1 cycle (0.8333 ms)	
Interval	2 cycles (1.6667 ms)	

⁸ Center frequency >5 kHz, difference frequency <1 kHz; DFD d₂-100 dB (typ.) with DC offset.

⁹ Input voltage >200 mV, typ. values apply from 0.5 to 5 V.

FM signal	
Carrier frequency	2 Hz to 21.75 kHz
Modulation frequency	1 mHz to 21.75 kHz
Modulation	0 % to 100 %

AM signal	
Carrier frequency	2 Hz to 21.75 kHz
Modulation frequency	1 mHz to 21.75 kHz
Modulation	0 % to 100 %

DC voltage	
Level range	0 V to ± 10 V (± 5 V unbalanced), sweep possible
Accuracy	± 2 %

DC offset¹⁰	0 V to ± 10.0 V (± 5 V unbalanced)
Accuracy	± 2 %
Residual offset	± 1 % of rms value of AC signal

Digital Analyzers

Frequency limits specified for measurement functions apply to a sampling rate of 48 kHz. For other sampling rates limits are calculated according to the formula: $f_{\text{new}} = f_{48 \text{ kHz}} \times \text{sampling rate} / 48 \text{ kHz}$.

Digital Audio Inputs (Option R&S UPV-B2)

Balanced input	XLR connector, transformer coupling	
Impedance	110 Ω	
Level (V_{pp})	min. 200 mV, max. 12 V	
Unbalanced input	BNC, grounded	
Impedance	75 Ω	
Level (V_{pp})	min. 100 mV, max. 5 V	
Optical input	TOSLINK	
Channels	1, 2 or both	
Audio bits	8 to 24	
Clock rate	30 kHz to 200 kHz	
Format	professional and consumer format to AES3 or IEC-958 as well as user-defin-able formats at all inputs	

I2S Input (Option R&S UPV-B41)

Input	25-contact DSUB connector (male)	
Level	Low < 0.8 V (-5 V min) High > 2 V (10 V max)	
Impedance	10 k Ω at V_{in} -0.5 V to 5.5 V 100 Ω at V_{in} -5 V to -0.5 V and 5 V to 10 V	
Channels	1, 2 or both multiplexed	
Word Length	16/24/32 bits per channel	
Audio bits	8 to 32	
Word clock rate	6.75 kHz to 400 kHz	

¹⁰ No DC offset for signal generation with Low Dist ON. With DC offset the AC voltage swing will be reduced; specified inherent distortion values apply to DC offset = 0.

Measurement functions

All measurements at 24 bit, full scale

RMS value, wideband		
Measurement bandwidth	up to 0.5 times the clock rate	
Accuracy	AUTO FAST AUTO FIX	±0.1dB ±0.01 dB ±0.001 dB
Integration time	AUTO FAST/AUTO GEN TRACK VALUE	200/4000 samples min., at least 1 cycle 100 samples min., at least 1 cycle 0.1 ms to 10 s
Filter	weighting filters and user-definable filters, up to 3 filters can be combined	
Spectrum	post-FFT of filtered signal	

DC voltage	
Measurement range	0 to ±FS
Accuracy	±1%

FFT analysis	see FFT analyzer section
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Total harmonic distortion (THD)		
Fundamental	10 Hz to 21.90 kHz	
Frequency tuning	automatic to input or generator signal or fixed through entered value	
Weighted harmonics	any combination of d ₂ to d ₉ , up to 21.90 kHz	
Accuracy	±0.3 dB	
Inherent distortion ¹¹	< -155 dB	
Spectrum	bar chart showing signal and distortion	

THD+N and SINAD		
Fundamental	10 Hz to 21.90 kHz	
Frequency tuning	automatic to input or generator signal or fixed through entered value	
Stopband range	fundamental ±28 Hz, max. up to 2nd harmonic	
Bandwidth	upper and lower frequency limit selectable, one weighting filter in addition	
Accuracy	±0.3 dB	
Inherent distortion ¹¹	Bandwidth 20 Hz to 21.90 kHz	< -142 dB
Spectrum	post-FFT of filtered signal	

Time domain display (WAVEFORM)	
Standard mode	
Trace length	512 kS per channel max.

Frequency ¹²	
Frequency range	20 Hz to 20 kHz
Accuracy	±10 ppm

Phase ¹²	
Frequency range	20 Hz to 20 kHz
Accuracy	±0.4°

¹¹ Total inherent distortion of analyzer and generator.

¹² Only for measurement functions RMS, FFT and THD+N, accuracy applies to 8k FFT with zoom factor 2, Rife-Vincent-2 window; S/N ratio >70 dB. Phase and group delay in high rate mode only with RMS without filter.

Digital Generators

Frequency limits specified for the signals apply to a sampling rate of 48 kHz. For other sampling rates limits are calculated according to the formula: $f_{\text{new}} = f_{48 \text{ kHz}} \times \text{sampling rate} / 48 \text{ kHz}$.

Digital Audio Outputs (Option R&S UPV-B2)

Balanced output	XLR connector, transformer coupling	
Impedance	110 Ω , short-circuit-proof	
Level (V_{pp} into 110 Ω)	0 V to 8 V, in 240 steps	
Accuracy	± 1 dB (rms)	
Unbalanced output	BNC, transformer coupling	
Impedance	75 Ω , short-circuit-proof	
Level (V_{pp} into 75 Ω)	0 V to 2 V, in 240 steps	
Accuracy	± 1 dB (rms)	
Optical output	TOSLINK	
Channels	1, 2 or both	
Audio bits	8 to 24	
Clock rate	30 kHz to 200 kHz	internal: generator clock or synchronization to analyzer external: synchronization to word clock input, DARS
Format	professional and consumer format to AES3 or IEC-958 as well as user-definable formats at all outputs	

I2S Output (Option R&S UPV-B41)

Output	25-contact DSUB connector (male)	
Impedance	50 Ω , short-circuit-proof	
Level	LVTTTL	
Channels	1, 2 or both multiplexed	
Word length	16/24/32 bits per channel	
Audio bits	8 to 32	
Word clock rate	word length 16/32 bit word length 24 bit	6.75 kHz to 400 kHz 6.75 kHz to 200 kHz
Synchronisation	Internal Clock External Wordclock or Masterclock	
Master/Word clock ratio *)	Sync to Internal Clock, External Wordclock word length 16 bit word length 24 bit word length 32 bit	64, 128, 256, 512 96, 192, 384 128, 256, 512
	Sync to External Masterclock word length 16/32 bit word length 24 bit	128, 256, 512 192, 384
Master clock rate	432 kHz to 51.2 MHz	
Clock Input (TX CLK IN)	BNC	
Level	< 0.8 V low (min -5 V) > 2 V high (max 10 V)	
Impedance	10 k Ω at V_{in} -0.5 V to 5.5 V 100 Ω at V_{in} -5 V to -0.5 V or 5 V to 10 V	

*) Master clock 51.2 MHz max.

Signals

All signals with 24 bit, full scale

General characteristics		
Dither	for sine, stereo sine, DFD and MOD DIST Distribution: Gaussian, triangular, rectangular Level: 0.5 LSB to 1 FS	
Frequency accuracy	internal clock relative to clock rate	± 10 ppm ± 1 ppm
DC offset	0 to ± 1 FS adjustable	

Sine	
Frequency range	2 Hz ¹³ to 21.90 kHz
Total harmonic distortion (THD)	< -155 dB
Sweep parameters	frequency, level

Stereo sine	
Frequency range	2 Hz ¹³ to 21.9 kHz
Frequency	adjustable for each channel
Phase	-360° to 360° (same frequency in both channels)
Level	adjustable for each channel or channel ratio 2/1
Sweep parameters	frequency and level of channel 1

MOD DIST		
for measuring the modulation distortion		
Frequency range	Lower frequency Upper frequency	30 ¹³ to 2700 Hz ¹³ 8 x LF ¹³ to 21.90 kHz
Level ratio (LF:UF)	selectable from 10:1 to 1:1	
Inherent distortion ¹¹	Level LF:UF 1:1 4:1 10:1	Tbd Tbd Tbd
Sweep parameters	upper frequency, level	

DFD		
for measuring the difference tone		
Frequency range	Difference frequency Center frequency	80 Hz to 2 kHz ¹³ 200 Hz ¹³ to 20,90 kHz
Inherent distortion ¹¹	DFD d ₂ DFD d ₃	Tbd Tbd
Sweep parameters	Center frequency, level	

Sine burst, Sine ² burst	
Burst time	1 sample to 60 s, 1 sample resolution
Interval	burst time up to 60 s, 1-sample resolution
Low level	0 to burst level, absolute or referred to burst level (0 for sine ² burst)
Sweep parameters	burst frequency, level time, interval

Noise	
Distribution	Gaussian, triangular, rectangular

Arbitrary waveform		
loaded from file		
File format	*.arb	memory depth max. 16 k
Clock rate	sampling rate of generator	

¹³ Fixed frequency independent of clock rate.

Polarity test signal Sine2 burst with following characteristics:	
Frequency	1.2 kHz ¹³
ON time	1 cycle
Interval	2 cycles

FM signal	
Carrier frequency	2 Hz ¹³ to 21.9 kHz
Modulation frequency	1 mHz ¹³ to 21.9 kHz
Modulation	0 % to 100 %

AM signal	
Carrier frequency	2 Hz ¹³ to 21.9 kHz
Modulation frequency	1 mHz ¹³ to 21.9 kHz
Modulation	0 % to 100 %

DC voltage	
Level range	0 to ± 1 FS, can be swept

FFT analyzer

Frequency range	Digital Analog Bandwidth 22/40/80/250 kHz	DC to 0.5 * Sample Rate DC to 22,5/43,5/87/250 kHz
Dynamic range	Digital Analog bandwidth 22/40/80 kHz Analog bandwidth 250 kHz	170 dB 120 dB 100 (120) dB
Noise floor	Digital Analog bandwidth 22/40/80 kHz Analog bandwidth 250 kHz	-170 dB -140 dB -120 (-140) dB
FFT size	512, 1k, 2k, 4k, 8k, 16k, 32k, 64k, 128k, 256k points	
Window functions	Rectangular, Hann, Blackman-Harris, Rife-Vincent 1-3, Hamming, Flat Top	

Filter

For all analog and digital analyzers and generators. All filters are digital filters.

Analyzer	Pre-Filter 1 weighting or user-definable filter Function Filter up to 3 weighting or user-definable filters
Generator	1 weighting or user-definable filter

Weighting filters	- A weighting - CCIR 1k weighted - CCIR 2k weighted - CCIR unweighted - CCITT - C Message - DC noise highpass - Deemphasis J.17, 50/15, 50, 75 - IEC Tuner - Jitter weighted - Rumble weighted, unweighted
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User-definable filters	
Design parameters	8th order elliptical, type C (for highpass and lowpass filters also 4th order), passband ripple +0/−0.1 dB, stopband attenuation approx. 20 dB to 120 dB selectable in steps of approx. 10 dB (highpass and lowpass filters: stopband attenuation 40 to 120 dB)
Highpass, lowpass filters	limit frequencies (−0.1 dB) selectable, stopband indicated
Bandpass, bandstop filters	passband (−0.1 dB) selectable, stopband indicated
Notch	center frequency and width (−0.1 dB) selectable, stopband indicated
Third octave and octave filters	center frequency selectable, bandwidth (−0.1 dB) indicated
File-defined filters	any 8th order filter cascaded from 4 biquads, defined in the z plane by poles/zeros or coefficients

Analog notch filter	For measurements on signals with high S/N ratio, this filter improves the dynamic range of the analyzer by up to 30 dB to 140 dB for analyzer bandwidth 22/40/80 kHz, or 120 dB for analyzer bandwidth 250 kHz (typical noise floor of FFT). The filter is also used for measuring THD, THD+N and MOD DIST with dynamic mode precision.
Characteristics	available in analog analyzers with measurement functions: – rms, wideband – rms, selective – quasi-peak – FFT analysis
Frequency range	10 Hz to 110 kHz center frequency (f_c)
Frequency tuning	– automatic to input signal – coupled to generator – fixed through entered value
Stopband	typ. >30 dB, $f_c \pm 0.5\%$
Passband	typ. −3 dB at $0.77 \times f_c$ and $1.3 \times f_c$, typ. +0/−1 dB outside $0.5 \times f_c$ to $2 \times f_c$

Sweep

Generator sweep	
Parameters	frequency, level, with bursts also interval and duration, one- or two-dimensional
Sweep	linear, logarithmic, single, continuous
Stepping	– automatic after end of measurement

Sweep speed		
Two-channel rms measurement 20 Hz to 20 kHz, 30-point generator sweep logarithmic (frequency measurement switched off, Low Dist off).	with GEN TRACK AUTO FAST AUTO	0.5 s 1 s 2.5 s

Display of results

Units	
Level (analog)	V, dBu, dBV, W, dBm, difference (Δ), deviation ($\Delta\%$) and ratio (without dimension, %, dBr) to reference value
Level (digital)	FS, %FS, dBFS, LSBs deviation ($\Delta\%$) or ratio (dBr) to reference value
Distortion	% or dB, referenced to signal amplitude, THD and THD+N in all available level units (absolute or relative to selectable reference value)
Frequency	Hz, difference (Δ), deviation ($\Delta\%$) and ratio (as quotient f/f_{ref} , 1/3 octave, octave or decade) to reference value (entered or stored, current generator frequency)
Phase	°, rad, difference (Δ) to reference value (entered or stored)
Reference value (level)	Fixed value (entered or stored).

Graphical display of results	
Monitor	8,4" LCD, colour
Display of results	- numeric display - combi display with numeric value, bargraph, min./max. and limits (for each numeric result) - sweep trace - spectrum - waveform - list of results - bar graph for THD and intermodulation measurements
Display functions	- autoscale - X- and Y-axis zoom - 2 vertical and 2 horizontal cursor lines - search function for max. values - marker for harmonics (spectrum) - change of unit and scale also possible for loaded traces

Test reports	
Functions	- screen copy to printer

Remote control	(option R&S UPV-K4)	via IEC 625-2 (IEEE 488) and LAN; commands largely to SCPI
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Audio monitor

Loudspeaker	Built in
Headphone connector	6.3 mm jack
Output voltage (V_p)	7 V max.
Source impedance	100 Ω , short-circuit-proof
Recommended headphone impedance	600 Ω

Modification R&S UPV-U1

Change of source impedance of analog generator to 150 Ω (instead of 200 Ω set as standard) at the factory

General data

Operating temperature range	5 °C to +45 °C meets EN 60068 2-1, EN 60068 2-2
Storage temperature range	-20 °C to +60 °C
Humidity	Max 80% at +45 °C (no condensation)
EMC	Meets EN 55011/22
Vibration, sinusoidal	5 Hz to 55 Hz, max. 1.8 g at 55 Hz; 55 Hz to 150 Hz, 0.5 g const. Meets EN 60068-2-6, EN 61010-1
Vibration, random	10 Hz to 300 Hz, acceleration 1.2 g (rms), meets EN 60068-2-64
Shock	40 g shock spectrum, meets EN 60068-2-27, MIL-STD 810 E
Power supply	100/120/220/230 V $\pm$ 10%, 50 Hz to 60 Hz, 300 VA
Safety	Meets EN 61010-1, CAN/CSA-C22.2 No. 1010.1, UL Std. No. 61010B-1
Conformity marks	VDE-GS, cCSAus
Dimensions (W x H x D)	465 mm x 197 mm x 495 mm
Weight	15.0 kg when fully equipped

Ordering information

Order designation	Type	Order No.
Audio Analyzer	R&S UPV	1146.2003.02
Accessories supplied		Power cable, Quick Start Guide and CD-ROM (with operating manual)
Options		
Low Distortion Generator	R&S UPV-B1	1146.5202.02
Digital Audio I/O 192 kHz	R&S UPV-B2	1146.4306.02
Second Analog Generator	R&S UPV-B3	1146.4806.02
Remote Control	R&S UPV-K4	1401.9001.02
I ² S Interface	R&S UPV-B41	1146.5402.02
XLR/BNC Adapter Set	R&S UPL-Z1	1078.3704.02
150 Ohm Modification	R&S UPV-U1	1146.1507.02
Recommended extras		
19" Rack Adapter	ZZA-411	1096.3283.00
Betriebshandbuch (deutsch)		1146.2084.31
Operating Manual (englisch, UK)		1146.2084.32
Operating Manual (englisch, US)		1146.2084.39
USB Keyboard	PSL-Z2	1157.6870.03
USB Mouse	PSL-Z10	1157.7060.02

Product brochure see PD 0758.1306.12
and at www.rohde-schwarz.com
(search term: UPV)



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