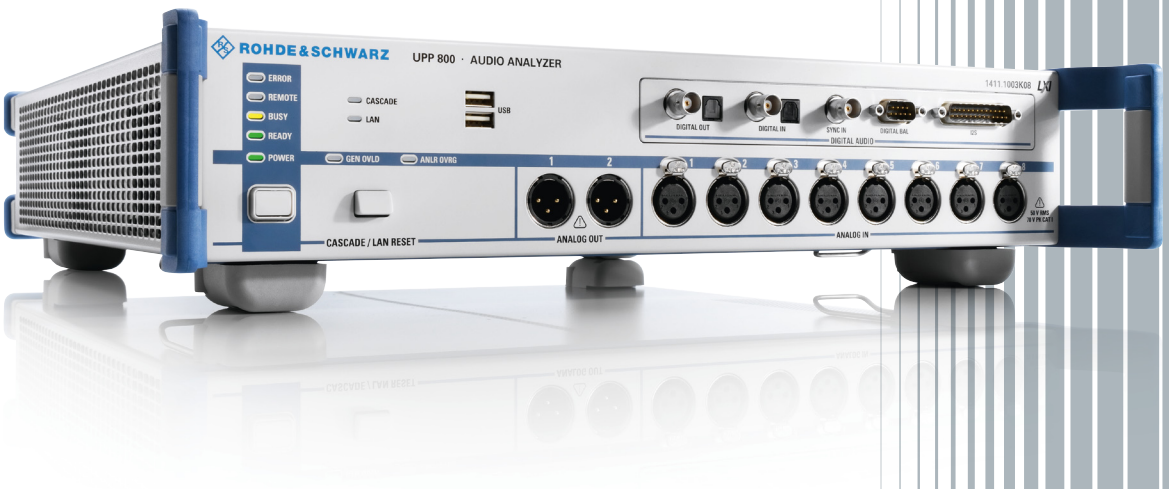
R&S®UPP200/
R&S®UPP400/
R&S®UPP800
Audio Analyzer
For use in production



ROHDE&SCHWARZ

Test&Measurement

Product Brochure | 01.00

R&S®UPP200/ R&S®UPP400/ R&S®UPP800 Audio Analyzer

At a glance

High measurement speed, parallel signal processing in multichannel applications, and high reliability in continuous operation are vital requirements to be met by audio analyzers for use in production. If, on top of that, a cost-efficient instrument for system use is what you need, the solution is the R&S®UPP200/400/800 audio analyzer.

The R&S®UPV audio analyzer – the high-end instrument from Rohde&Schwarz – has held a solid position in all audio T&M applications for years. Measurement accuracy and dynamic range at the limits of what is possible, combined with unique measurement capabilities, make the R&S®UPV ideal primarily for work in research, development and quality assurance.

Such versatility is often not needed for production applications. Usually fewer parameters are measured, while the emphasis is on high throughput. The costs for production test stations play a major role. This is where the R&S®UPP200/400/800 audio analyzer family comes into its own. Depending on the model, two, four or eight channels are processed in parallel; and by cascading multiple instruments, users can simultaneously trigger up to 48 measurement channels, which cuts down on measurement time.

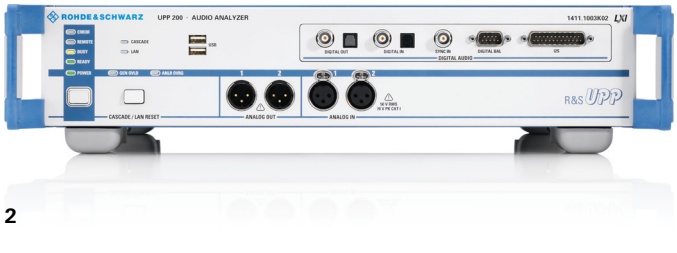
The R&S®UPP200/400/800 audio analyzer is cost-efficient, compact and designed for system applications. It features low height, and comes without front-panel control elements or integrated display. The instrument can be remote-controlled via LAN, USB or IEC/IEEE bus. In combination with an external monitor, mouse and keyboard, it becomes a manually operable measuring instrument for a lab bench. It has an integrated control PC, and the required software is already installed. Users can start taking measurements right away.

Featuring the same operating philosophy and remote control, the R&S®UPV and R&S®UPP200/400/800 audio analyzers are a strong team: They provide the optimal solution for R&D and production, respectively, and harmonize well together, for example when instrument settings or measurement routines have to be exchanged.

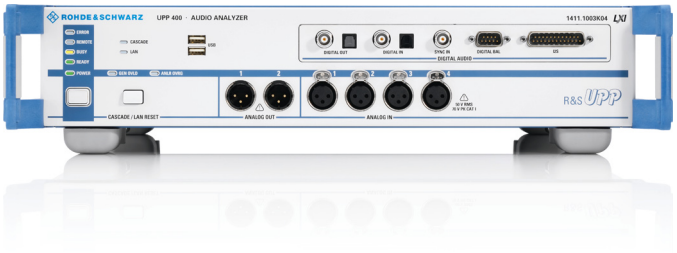
Key facts

- Suitable for all interfaces: analog, digital and combined
- Parallel measurements on up to eight channels
- Up to 80 kHz bandwidth and 200 kHz sampling rate
- User-programmable filters for analyzer and generator
- Compact instrument with integrated PC and low height

R&S®UPP200.



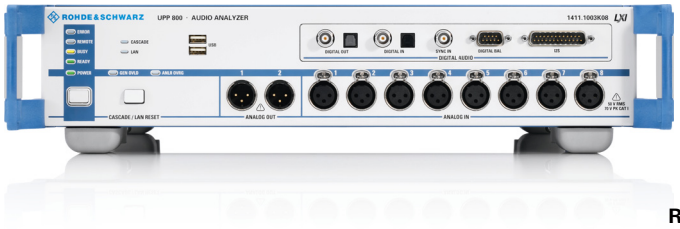
R&S®UPP400.



R&S®UPP200/ R&S®UPP400/ R&S®UPP800 Audio Analyzer

Benefits and key features

R&S®UPP800.



Powerful and fast

- Parallel measurements for high throughput
- High measurement speed throughout the system
- Ideal for use in production
- Multichannel measurements by means of cascading

▷ page 4

All test signals and measurement functions in a single box

- Generation of a wide variety of analog and – with the R&S®UPP-B2 option – also digital test signals
- Broad scope of measurements on both analog and – with the R&S®UPP-B2 option – digital interfaces
- Powerful and even multichannel FFT analysis with resolution down to the mHz range
- User-programmable filters that can be adapted in seconds to the individual measurement task
- Integrated control PC; manual operation requires only an external monitor and a mouse and keyboard

▷ page 6

Large variety of interfaces offered in a single instrument

- Two-, four- or eight-channel analyzer with analog inputs
- Analog generator outputs (two-channel)
- AES/EBU and S/P DIF interfaces for measuring digital audio components (R&S®UPP-B2 option)
- I²S interfaces for testing audio ICs (R&S®UPP-B2 option)
- Interfaces for the generator and analyzer can be set independently of one another and used together in any combination

▷ page 10

Convenient operation throughout

- State-of-the-art and intuitive user interface makes operation quick and easy to learn
- All measurement results at a glance
- Effective online help functions

▷ page 12

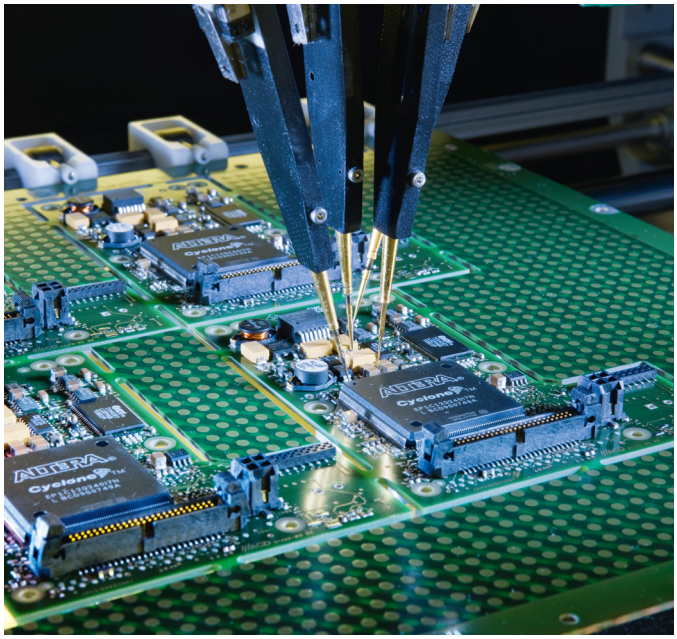
Options for further applications

- R&S®UPP-B2 option providing digital audio interfaces in line with AES/EBU and S/P DIF as well as I²S interfaces
- R&S®UPP-K800 cascading software for combining multiple R&S®UPP200/400/800 audio analyzers for parallel measurement of more than eight channels
- XLR/BNC adapter sets
- Connecting cables for digital interfaces
- R&S®UPZ audio switcher for switching input and output channels

▷ page 14

Powerful and fast

High measurement speed, multichannel measurements and remote control capability are indispensable in production lines. The long calibration intervals of the R&S®UPP200/400/800 ensure high availability and reduce operating costs.



Parallel measurements for high throughput

The R&S®UPP200/400/800 performs all measurements, including FFT analyses with maximum resolution, on all channels simultaneously. With multichannel measurements, this considerably reduces the overall measurement time compared with instruments that can only process two channels at a time by using an audio switcher, for example.

By cascading multiple R&S®UPP200/400/800 audio analyzers, simultaneous measurements can be expanded to cover up to 48 channels (see following page). Since each instrument has its own integrated PC, there is sufficient computing power available so that no time is lost even when analyzing a large number of parallel channels.

High measurement speed throughout the system

The R&S®UPP200/400/800 audio analyzer was designed with a focus on maximizing the speed of the overall measurement system:

- Time-critical and computation-intensive process steps are carried out directly in the R&S®UPP200/400/800 audio analyzer by digital signal processors and the integrated PC. Raw data does not have to be exported to the test system's controller for analysis, so no additional computing time accumulates there and unnecessary transmission time is avoided
- The measurements are digitally implemented and optimally adapt the measurement time to the measurement task. For example, the measurement time is adjusted to the frequency of the test signal – not only with level measurements but also with complex analyses such as the THD+N measurement – in order to minimize the measurement time
- The internal setting and settling times in the generator and the analyzer are optimized using digital signal processing; they are also taken into account in the measurement routines, thereby yielding stable results without the need to activate a settling function, which means repeating the measurement until a result within a tolerance band is obtained
- The fast frequency response measurement implemented by means of a fast Fourier transform (FFT) provides a critical edge particularly during this highly time-critical measurement (example: measurement of a frequency response with approx. 900 frequency values in 150 ms)

Ideal for use in production

Test equipment for use in production must also meet further requirements:

- Long-life components designed for continuous operation keep the failure rate low in everyday production. Thousands of Rohde&Schwarz audio analyzers have already proven their reliability in this regard
- Long calibration intervals due to the largely digital implementation of measurement functions also contribute to high instrument availability
- Remote-control capability is indispensable in large production facilities. In the R&S®UPP200/400/800 audio analyzer, special attention was also paid to maximizing the speed of data transfer via all supported interfaces (IEC/IEEE bus, USB, LAN)
- Easy, efficient creation of remote-control routines was also a major consideration. Using the SCPI recording function eliminates the need to look up remote-control commands and, in turn, avoids errors in programming. Measurement routines can be simplified by using limit-check or S/N measurement functions in the audio analyzer, so that no effort has to be put into programming such routines in the controller

Multichannel measurements by means of cascading

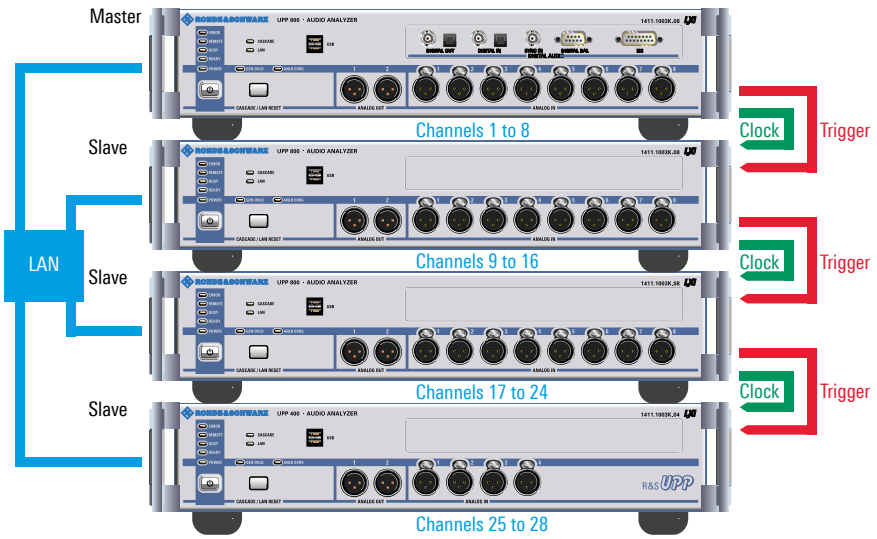
Elaborate sound systems in motor vehicles use amplifiers with 16 or more channels to transmit surround-sound in the best possible quality via numerous loudspeakers. For applications of this kind, in which the R&S®UPP800's eight measurement channels do not suffice, several audio analyzers can be cascaded to measure all channels simultaneously, which saves time.

The R&S®UPP-K800 control software turns one of the R&S®UPP800 audio analyzers into the master of the cascade. Up to five other R&S®UPP200/400/800 analyzers can be combined with this instrument as slaves. In remote-control mode, for example in a production system, the entire cascade acts as a single measuring instrument with the required number of measurement channels. Therefore, only the master unit is remote-controlled; it triggers all participating measurement channels simultaneously, controls the measurement sequence in all participating slave units of the cascade and returns all the results to the controller.

For this purpose, the individual audio analyzers are interconnected via a control line (LAN), and the system clock and the trigger signals are transmitted from the master to the slaves via BNC cables (see figure).

Up to 48 analog channels can be measured in parallel in this way. Since all measurement channels operate synchronously, phase measurements between all participating channels are also possible. The greatest advantage of a cascade is that it saves a significant amount of time when measuring multichannel DUTs and simplifies programming within the system.

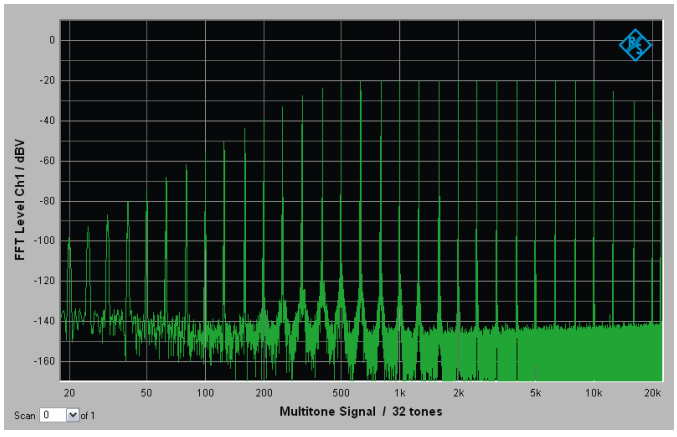
Cascading



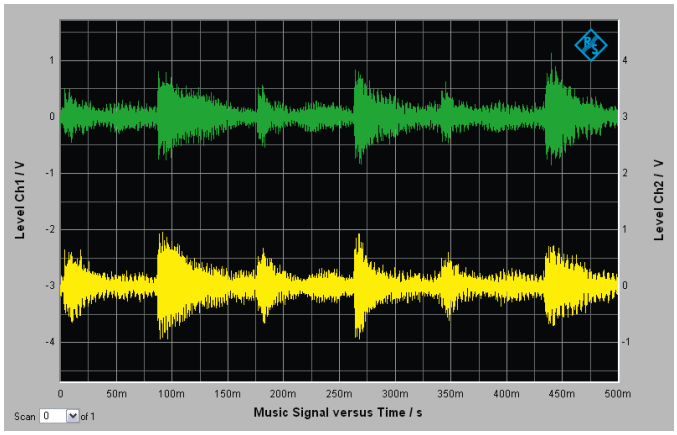
If more than eight channels have to be measured in parallel, several R&S®UPP200/400/800 audio analyzers can be cascaded. The master, an R&S®UPP800, controls the other audio analyzers, so the entire cascade acts like a single measuring instrument.

All test signals and measurement functions in a single box

The generator of the R&S®UPP200/400/800 audio analyzer delivers a variety of signals; an insertable filter and/or equalizer allows even multitone signals with user-selectable nominal frequency response to be output.



Complex test signals from WAV files can be output at all interfaces; in this example, the waveform function shows the time characteristic of a dual-channel music signal.



The generators of the R&S®UPP200/400/800 can generate a variety of analog and – optionally – also digital test signals

Single- or dual-channel sinewave signals…
…for level and distortion measurements

Two-tone signal…
…for modulation distortion analysis; various amplitude ratios can be selected; continuous frequency adjustment is possible

Difference-frequency distortion…
...for intermodulation measurements with continuous adjustment of both frequencies

Multitone signals…
…from up to 7400 frequencies with either identical or user-selectable amplitudes; the frequency spacing can be coupled to the resolution used for the fast Fourier transform, which allows the frequency response of a DUT to be determined quickly and precisely in one shot

Sine burst signal…
…with adjustable "on" time as well as user-programmable high level, e.g. for testing automatic gain control (AGC) devices

Noise…
...with various amplitude distribution functions, e.g. for acoustic measurements

Arbitrary signals…
...can be generated as any voltage characteristics of up to 256k points

With the play function…
...any test signals can be output from the hard disk, e.g. voice or music signals provided as a WAV file

DC voltage…
…also with level-sweep function

A user-programmable filter and/or equalizer with user-selectable nominal frequency response can be inserted with most signals in order to compensate for the frequency response of the test setup, for example.

A level offset can also be added to the signals; plus, a dither with an adjustable level can be added to the digital audio signals.

The R&S®UPP200/400/800 can perform a broad scope of measurements on both analog and – optionally – digital interfaces

Level or S/N measurement…
…with RMS or peak weighting; integration times are automatically adapted to the input signal to yield high measurement speeds

Selective level measurement
The center frequency of the bandpass filter can be swept or coupled to the generator frequency or to the input signal

SINAD or THD+N measurement
Measurement of the sum of all harmonics, including noise

Measurement of total harmonic distortion (THD)
Analysis of the harmonics, either individual ones, all of them, or any combination of them

Modulation distortion analysis in line with IEC 60268-3
Second- and third-order intermodulations are measured

Intermodulation measurement…
…in line with the difference-frequency distortion method with measurement of the second- or third-order intermodulations

DC voltage measurement

Frequency, phase and group delay measurement

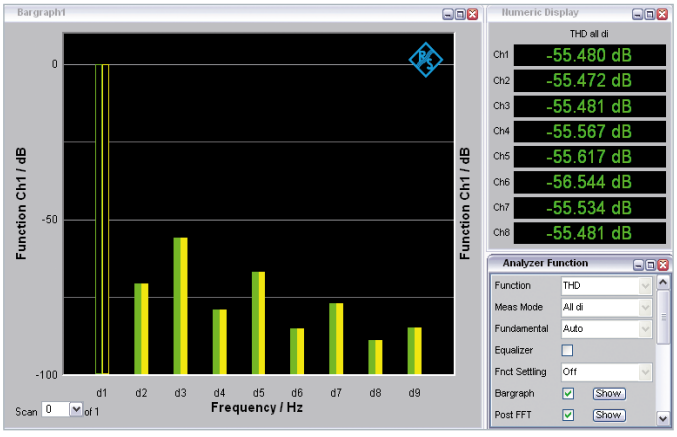
Polarity test…
…to check for any polarity reversal of a signal path

Crosstalk measurement

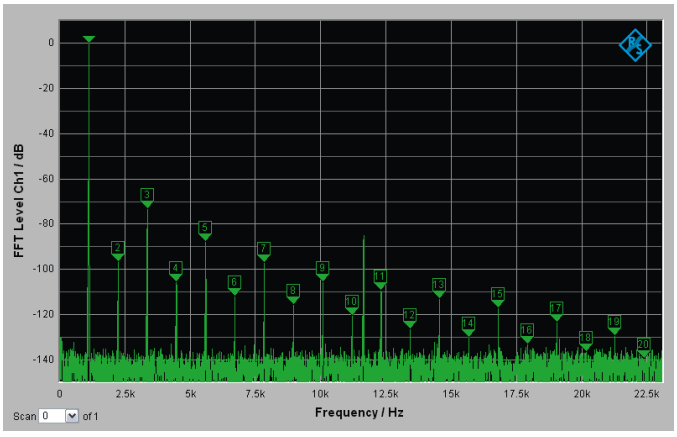
Waveform function…
…for displaying the measurement signal in the time domain, displays of slow time sequences can be compressed, e.g. to analyze the settling of compander or AGC circuits

FFT analysis
…with a wide variety of capabilities
(described in detail on page 8)

The THD measurement can be used to analyze all, individual or any combination of harmonics.



Here, the THD+N measurement is complemented by an FFT analysis; the automatic labeling of the harmonics makes nonharmonic parts visible at a glance.



Powerful and even multichannel FFT analysis with resolution down to the mHz range

The R&S®UPP200/400/800 offers two FFT functionalities, where each can be applied to the filtered or unfiltered input signal:

- The FFT measurement function is used when high requirements are placed on the dynamic range. Up to 256k points can be selected in binary steps and evaluated in double precision mode
- The post FFT is a spectrum analysis that follows the other measurement functions. It can be used, for example, in THD and intermodulation measurements to analyze the distortion products in detail

Like with all measurement functions, the FFT analysis can also be used to take measurements on all input channels in parallel.

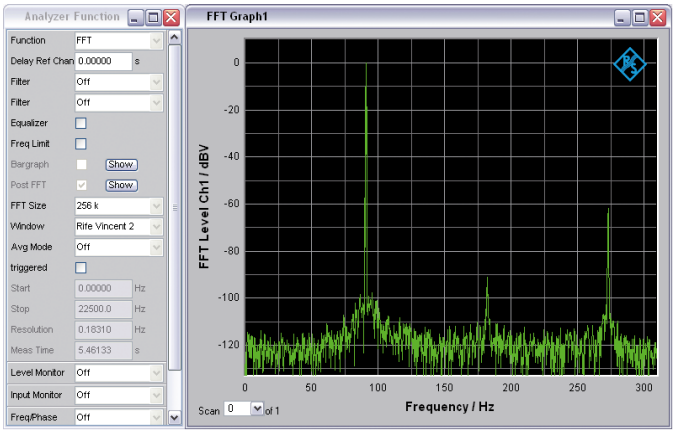
User-programmable filters

The filters of the R&S®UPP200/400/800 are implemented as software. This enables the user to define as many as necessary, also for analog applications. The most common weighting filters are included as standard. Additional filters can be programmed in only a few seconds after the type (lowpass, highpass, bandpass, bandstop, notch, third-octave, or octave filter), frequency and attenuation have been entered.

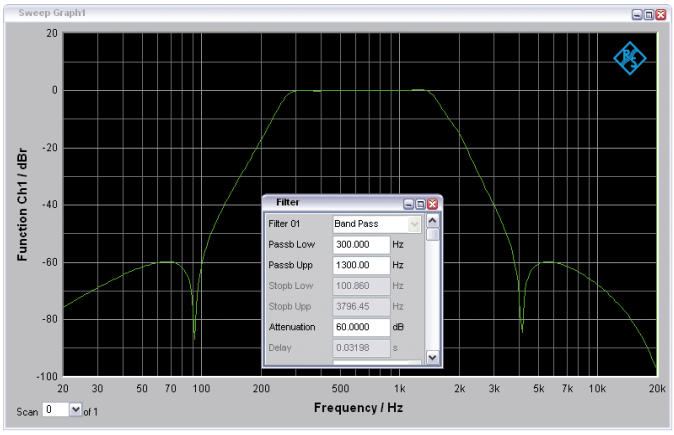
Particularly in the case of special requests, the strengths of the instrument concept become readily apparent: Special filters can be calculated using commercially available filter design programs. The data record generated is transferred to the R&S®UPP200/400/800 and the required filter can be looped into the signal path.

As many as three filters can be combined.

Up to 256k points can be evaluated with the FFT analysis function.



Filters can be programmed in a few seconds simply by entering a few parameters; they can be used both in the analyzer and the generator.



Integrated control PC

The R&S®UPP200/400/800 audio analyzer is a compact instrument that already contains an integrated PC. This yields a number of advantages, both in remote-controlled system operation and in manual operation on the lab bench.

For example, limit checks or S/N measurements can be performed in the audio analyzer, eliminating the need to program such routines in the controller.

Since all measurements, including multichannel FFT analyses, are performed by the measuring instrument, the test system's controller does not have to provide any additional performance. This means that the system controller does not have to perform any measurement tasks, and that data transfer is limited to measurement results without large amounts of raw data having to be transmitted, as is the case with other audio measuring instruments.

The R&S®UPP200/400/800 audio analyzer also shows its strengths in standalone operation, for example in service applications or quality assurance. Manual operation requires only an external monitor, mouse and keyboard.

The software of the R&S®UPP200/400/800 is already completely installed. Just unpack the analyzer, connect the peripherals, switch the analyzer on and start taking measurements.

The control PC has the following features:

- Integrated hard disk
- Monitor connector
- Four USB ports, e.g. for keyboard and mouse
- LAN interface for connecting to networks
- Remote control via IEC/IEEE bus, USB or LAN
- Measurement data can be further processed using standard software (Windows)
- All measurement results are available in conventional data formats, making it easy to insert e.g. graphics into documents
- Easy addition of functions and software expansions

R&S®UPP800 with monitor, keyboard and mouse.

Large variety of interfaces offered in a single instrument

Two-, four- or eight-channel analyzer with analog inputs

- Balanced inputs with high common-mode rejection; lines with phantom powering can be measured
- For parallel measurement of more than eight channels, up to six R&S®UPP200/400/800 analyzers can be cascaded (see page 5)
- The analyzer's wide dynamic range and powerful auto-range function make it possible to test even class-D amplifiers without inserting expensive external filters, as is necessary with conventional audio analyzers

Analog generator outputs (two-channel)

- Balanced floating outputs (e.g. for avoiding hum loops)

AES/EBU and S/P DIF interfaces for measuring digital audio components (R&S®UPP-B2 option)

- Digital audio equipment can be interconnected via standardized interfaces. The R&S®UPP-B2 option supports both the AES/EBU and S/P DIF format
- Balanced (D-Sub), unbalanced (BNC) and optical (TOSLINK) inputs and outputs for connecting consumer electronics equipment and professional studio equipment
- The level of the balanced and the unbalanced output can be adjusted in order to determine the sensitivity of digital audio inputs
- The format of the channel status data generated can be chosen independently of the selected interface, where the choices are "professional" and "consumer". A matching protocol (consisting of channel status, user, validity and parity bits) is generated automatically
- Synchronization input (BNC) at the front of the instrument; this allows the generator to be synchronized with the digital audio reference signal (DARS) in line with AES11, or with a word clock
- The generator and the analyzer can be operated with clock rates of 30 kHz to 200 kHz; the generator can generate these clocks internally
- The clock rates of the analyzer and the generator are independent of each other, which allows sampling rate converters to be analyzed
- Audio words of 8 bit to 24 bit can be selected independently for the generator and the analyzer

R&S®UPP800 rear panel.

I²S interfaces for testing audio ICs (R&S®UPP-B2 option)

A close look at how the various modules and ICs are interconnected inside audio equipment reveals primarily serial digital data interfaces. For several years now, the inter-IC sound bus (I²S bus) has found widespread use.

It is used throughout the world for dual-channel audio data transmission inside devices; numerous audio A/D and D/A converters support this format.

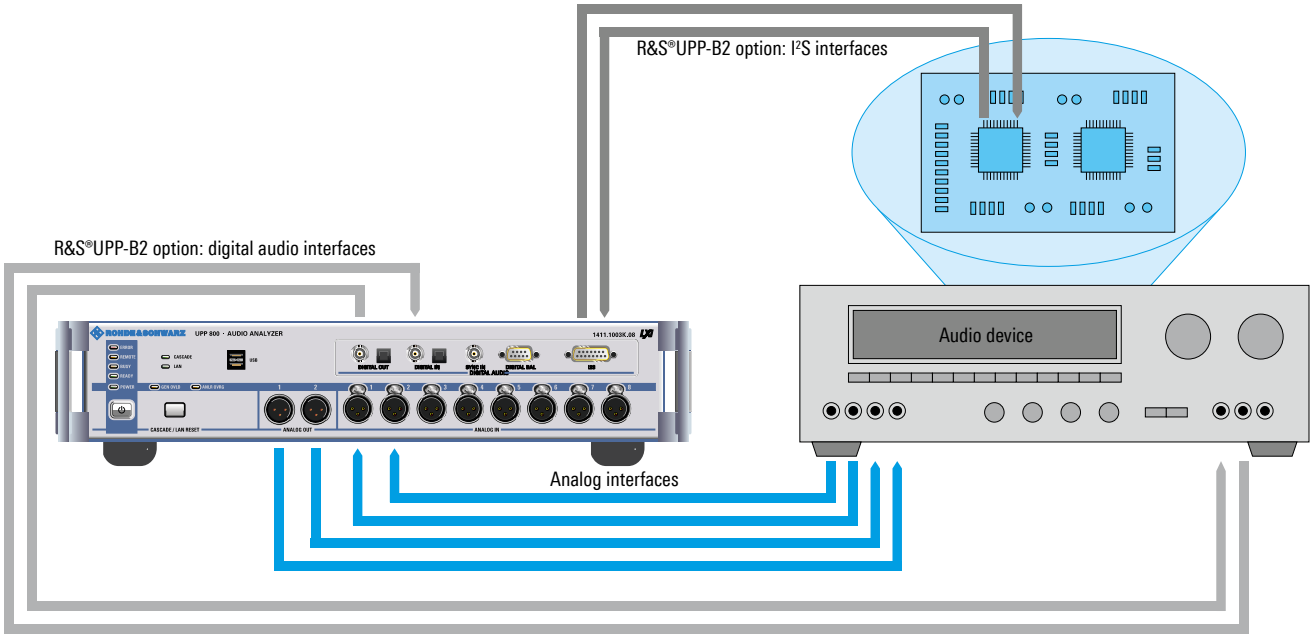
The R&S®UPP-B2 option, which can be installed at the front of the base unit, provides the R&S®UPP200/400/800 audio analyzer with I²S interfaces for the generator and the analyzer. The transmit IC uses either internal (master) or external (slave) synchronization. This is important because in more complex systems containing multiple transmitters and receivers, it must be possible to centrally generate the system clock to ensure interference-free data transmission.

Depending on the application, I²S formats with different word lengths are used. The R&S®UPP-B2 can be set to all common word lengths of 16 bit, 24 bit and 32 bit, where the number of audio bits used can be selected independently of the word length. In addition to the standard I²S format, special formats are supported, for example, for allowing the word offset or Fsync polarity to be set.

Interfaces for the generator and analyzer can be set independently of one another and used together in any combination

The interfaces for the R&S®UPP200/400/800 generator and analyzer can be selected and configured independently of one another. This allows DUTs with different interface combinations to be tested. A/D and D/A converters can be directly connected. This is also true for sophisticated DSPs or format converters which, for example, require a 192 kHz clocked I²S format at the input and supply an AES/EBU signal with a sampling rate of 96 kHz to the analyzer.

Measurement on digital ICs



Convenient operation throughout

Operation is quick and easy to learn

The R&S®UPP200/400/800 can be operated in different ways:

- As a standalone instrument via an external keyboard, mouse and monitor (see page 9)
- In remote operation from an external PC via the Remote Desktop Connection program, which is included in the Windows operating system
- By remote control via a web browser, utilizing the instrument's LXI compatibility (class C)

The R&S®UPV and R&S®UPP200/400/800 audio analyzers use the same Windows user interface. Instrument settings for the same functions can be exchanged between the two analyzer types. This makes it easier to operate these instruments in parallel. Plus, solutions to problems can be found quickly if, for example, measurement tasks in production have to be coordinated with the R&D department.

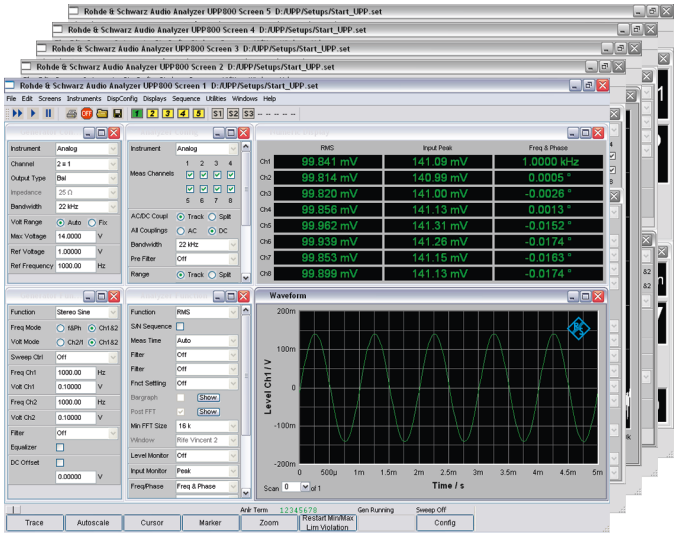
When the audio analyzer is used in standalone operation, a monitor, mouse and keyboard (not included in the equipment supplied) must be connected to the instrument.

The R&S®UPP200/400/800 can be operated via the display using a mouse and/or an external keyboard. All settings are made in panels that contain all interrelated functions and settings.

To organize the many different settings in a clear-cut manner and to provide a straightforward display of the measurement diagrams, the panels and display windows can be spread across five virtual screens in any desired arrangement. The user can switch between these screens merely by clicking the mouse.

Basic instrument settings, such as the configuration of the audio interfaces, are grouped in separate panels; once the settings are made, they can be hidden for the remaining measurement. Function blocks that are currently not needed remain in the background, while important parameter fields are immediately accessible. Analog and digital measurements are configured and controlled in the same way. This makes operation straightforward, helping users to quickly familiarize themselves with the instrument.

All important settings and states of the R&S®UPP200/400/800 audio analyzer are displayed in a straightforward manner on the external monitor. Five virtual screens are available, allowing the user to arrange the large number of panels and display windows in a clear-cut fashion.



All measurement results at a glance

The results for all channels and multiple measurement functions are displayed in realtime.

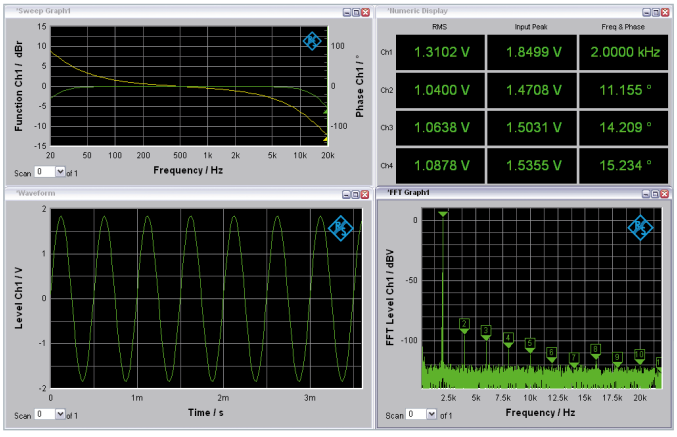
Scalable graphics windows can be arranged anywhere on the screen. When their size is changed, the labels, font sizes, grid lines, etc., are automatically adapted.

Multiple measurement diagrams are simultaneously available so that analyses in the frequency and the time domain can be displayed simultaneously, for example.

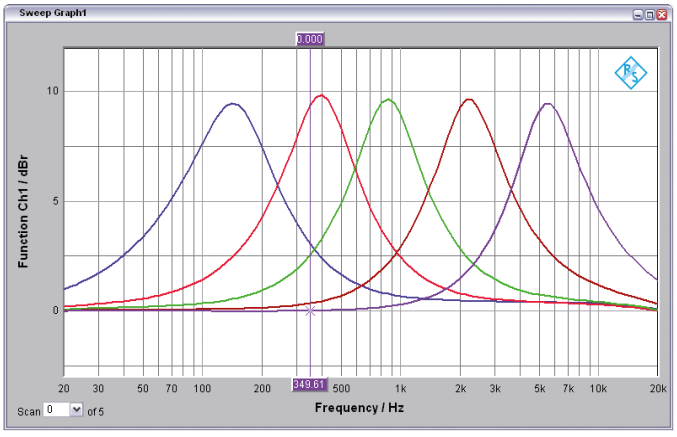
With graphical representations, results can be read off using vertical and horizontal cursors, and limit lines or stored results can be superimposed and compared with current results. The graphical capabilities range from trace displays and bargraphs up to spectral displays.

By using color profiles, the user can determine the look of the measurement diagrams. Different settings can be designed for screen, printer and file output so that, for example, a black-and-white printer can be used alongside a color display.

Everything at a glance: Multiple measurement diagrams can be arranged in any desired configuration on the screen; analyses in the frequency and the time domain can be displayed simultaneously.



With graphical representations, results can be read off using vertical and horizontal cursors; markers and limit traces make evaluation easier. Multiple traces can be superimposed in user-defined colors.



Effective online help functions

The R&S®UPP200/400/800 offers various help functions:

- Context-sensitive help
  Help information can be called up for any entry field by pressing a key
- Detailed information about a function can be found in the integrated user manual. The user can quickly navigate to a term of interest by using the mouse
- Warning boxes
  These boxes, which are clearly marked, alert the user to settings that may be incorrect
- Entry help
  The permissible value range is displayed for every menu item that requires the entry of numerical values, taking into account all higher-level parameters, e.g. the sampling rate for measurements on digital interfaces
- Protection against incorrect entries
  Entries outside the permissible value range are not accepted; such entries are automatically changed to their permissible minimum or maximum value

Options for further applications

R&S®UPP-B2 option providing digital audio interfaces in line with AES/EBU and S/P DIF as well as I²S interfaces

This option provides the digital audio interfaces (balanced, unbalanced and optical) for measurements on digital audio devices as well as I²S interfaces for measurements on integrated circuits. The interfaces are available for the generator and analyzer; sampling rates up to 200 kHz can be processed.

The option is described in greater detail on pages 10 and 11.

R&S®UPP-K800 cascading software

The R&S®UPP-K800 control software turns an R&S®UPP800 audio analyzer into the master of a cascade. Up to five additional R&S®UPP200/400/800 can be combined with this instrument as slaves for parallel measurement of up to 48 channels.

The application is described on page 5.

XLR/BNC adapter sets

The XLR/BNC adapter sets make the use of unbalanced cables easier.

The R&S®UP-Z1MF set contains two XLR male to BNC and two XLR female to BNC adapters; in the R&S®UP-Z1M adapter set, there are four XLR male to BNC adapters.

R&S®UP-Z2 AES/EBU cable.

R&S®UP-Z1MF XLR/BNC adapter set.

Connecting cables

The balanced ports for the digital audio interfaces of the R&S®UPP-B2 option as well as the ports for the I²S interfaces are designed as D-Sub male connectors. The following cables make connection to the DUTs easier:

- The R&S®UP-Z2 AES/EBU cable feeds generator and analyzer signals from a 9-contact D-Sub port to an XLR male and an XLR female connector, respectively
- The R&S®UP-Z3 I²S cable feeds the RX Data, RX BitClk, RX FSync, TX Data, TX BitClk, TX FSync and TX MasterClk lines from the 25-contact D-Sub port to one BNC male connector each

R&S®UP-Z3 I²S cable.

R&S®UPZ audio switcher for switching input and output channels

The R&S®UPZ audio switcher can be used for cabling and switching DUTs/channels. It can be connected to the R&S®UPP200/400/800 audio analyzer via a commercially available USB/RS-232-C adapter and is controlled directly from the analyzer's panel. The audio switcher makes it possible, for example, to apply test signals to a large number of DUTs in parallel.

Further information is provided in the R&S®UPZ Audio Switcher data sheet, PD 0758.1170.32.

The R&S®UPZ audio switcher can be controlled from the R&S®UPP200/400/800.

Specifications in brief

Specifications in brief		
Analog analyzer		
Inputs		XLR female, balanced (unbalanced measurements possible with XLR/BNC adapter), AC/DC coupling selectable
Frequency range	bandwidth 22 kHz/40 kHz/80 kHz	DC/20 Hz to 21.76 kHz/40 kHz/80 kHz
Voltage range	RMS, sine	1 µV to 50 V
Input impedance	each pin to ground	100 kΩ ± 1 % || 220 pF
Crosstalk attenuation	< 20 kHz	> 100 dB
Measurement functions		RMS wideband, RMS selective, peak, S/N, DC, FFT, THD, THD+N, SINAD, Mod Dist, DFD, polarity, waveform, frequency, phase, group delay
Analog generator		
Outputs		XLR male, balanced/unbalanced selectable, short-circuit-proof
Source impedance		25 Ω
Voltage range	balanced, RMS, sine, open circuit	0.2 mV to 14 V
	unbalanced, RMS, sine, open circuit	0.1 mV to 7 V
Frequency range		0.1 Hz to 80 kHz
Output signals		sine, stereo sine, multisine, sine burst, Mod Dist, DFD, noise, arbitrary waveform, polarity, DC, play WAV files
Digital analyzer/generator (R&S®UPP-B2 option)		
Digital audio interfaces		
Connectors	balanced	9-contact D-Sub male, transformer coupling, 110 Ω
	unbalanced	BNC, grounded, 75 Ω
	optical	TOSLINK
Channels		1, 2 or both
Audio bits		8 bit to 24 bit
Clock rate		30 kHz to 200 kHz
Format		professional and consumer format in line with AES3 or IEC 60958
Output signals/measurement functions		same as with analog device
I²S interfaces		
Connectors		25-contact D-Sub male
Channels		1, 2 or both
Word length		16 bit/24 bit/32 bit per channel
Audio bits		8 bit to 32 bit
Clock rate		6.75 kHz to 200 kHz
Output signals/measurement functions		same as with analog device
FFT analysis		
Frequency range	digital	DC to 50 % of sampling rate
	analog, bandwidth 22 kHz/40 kHz/80 kHz	DC to 22.5 kHz/43.5 kHz/87 kHz
FFT length		512, 1k, 2k, 4k, 8k, 16k, 32k, 64k, 128k, 256k points
Window functions		rectangle, Hann, Blackman-Harris, Rife-Vincent 1 to 3, Hamming, flat-top

Specifications in brief

Filters		
Weighting filters		A weighting, C weighting, CCIR 1k weighted, CCIR 2k weighted, CCIR unweighted, CCITT, C message, DC noise highpass, deemphasis J.17, 50/15, 50, 75, preemphasis 50/15, 50, 75, IEC tuner, jitter weighted, rumble weighted, rumble unweighted,
Highpass and lowpass filters		highpass 22 Hz, 400 Hz, lowpass 22 kHz, 30 kHz, 80 kHz, AES 17
User-definable filters	design parameters	8th order elliptical type C (for highpass and lowpass filters also 4th order selectable), stop-band attenuation selectable up to approx. 120 dB
	filter types	highpass, lowpass, bandpass, bandstop, notch, third octave and octave
	file-defined filters	any 8th order filter cascaded from 4 biquads, defined in the z plane by poles/zeroes or coefficients
General data		
Power supply	AC voltage range	110 V to 240 V ± 10 %
	AC frequency range	50 Hz to 60 Hz
	power consumption	80 VA
Dimensions	W × H × D	465 mm × 96 mm × 460 mm (18.31 in × 3.78 in × 18.11 in)
Weight	with options	6.7 kg (14.8 lb)

Ordering information

Designation	Type	Order No.
Base unit		
Audio Analyzer, Two Channels	R&S®UPP200	1411.1003.02
Audio Analyzer, Four Channels	R&S®UPP400	1411.1003.04
Audio Analyzer, Eight Channels	R&S®UPP800	1411.1003.08
Accessories supplied		
Power cable		
Quick start guide		
CD with operating and service manual		
Hardware options		
Digital Audio I/O	R&S®UPP-B2	1411.2300.02
Software options		
Cascading Software for R&S®UPP800	R&S®UPP-K800	1411.0759.02
System components		
XLR/BNC Adapter Set, Male	R&S®UP-Z1M	1411.3358.02
XLR/BNC Adapter Set, Male/Female	R&S®UP-Z1MF	1411.3306.02
AES/EBU Cable for R&S®UPP-B2	R&S®UP-Z2	1411.3406.02
I²S Cable for R&S®UPP-B2/R&S®UPV-B41	R&S®UP-Z3	1411.3458.02
19“ Rack Adapter	R&S®ZZA-211	1096.3260.00
Operating and service manual		1411.1055.32
Audio Switcher (Input)	R&S®UPZ	1120.8004.02
Audio Switcher (Output)	R&S®UPZ	1120.8004.03

The data sheet with the complete specifications (PD 5214.3846.22) is available at

www.rohde-schwarz.com

Your Rohde&Schwarz sales partner will be glad to help you find the optimum configuration.
You can find your local contact at

www.sales.rohde-schwarz.com

From pre-sale to service. At your doorstep.

The Rohde&Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts. The user risks are reduced to a minimum at all stages of the project:

- Solution finding/purchase
- Technical start-up/application development/integration
- Training
- Operation/calibration/repair

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

Rohde&Schwarz GmbH&Co. KG
www.rohde-schwarz.com

Regional contact

- Europe, Africa, Middle East
  +49 89 4129 137 74
  customersupport@rohde-schwarz.com
- North America
  1 888 TEST RSA (1 888 837 87 72)
  customer.support@rsa.rohde-schwarz.com
- Latin America
  +1 410 910 79 88
  customersupport.la@rohde-schwarz.com
- Asia/Pacific
  +65 65 13 04 88
  customersupport.asia@rohde-schwarz.com

PD 5214.3846.12 | Version 01.00 | April 2010 | R&S®UPP200/400/800