



## Audio Analyzer R&S®UPL, Option R&S®UPL-B23 and Audio Switcher R&S®UPZ

Multichannel audio measurements on surround sound decoders

### Option R&S®UPL-B23

- ◆ Generation of coded test signals in AC-3 format (Dolby Digital) and DTS format
- ◆ User-selectable sweep parameters

### Audio Switcher R&S®UPZ

- ◆ Available as input and output switcher
- ◆ Cascading of up to 128 channels
- ◆ Direct operation via Audio Analyzer R&S®UPL
- ◆ Control via RS-232-C for universal applications

# Coded Audio Signal Generation (R&S®UPL-B23)

## Coded audio signals

It is hard to imagine the current audio world without keywords such as surround sound, 5.1 channels, etc. Originally designed for use in movie theaters, these multichannel transmission methods have in the meantime found their way into private households.

In all multichannel methods, the six channels generally used are data-reduced for transfer in the digital audio formats established for stereo transmission. In the home units, such as audio/video receivers, the data streams are decoded for analog and multichannel replay.

## Previous method

Up to now, measuring surround decoders necessarily involved defining and storing coded test sequences on a DVD or the PC hard disk. The DVD player/PC was connected to the DUT, where the test signals were decoded and finally measured by an audio analyzer at the analog outputs. Since the test files and the measurements ran on different instruments, synchronization was difficult, leading to extended measurement times.

## Modern solution: Audio Analyzer R&S®UPL plus R&S®UPL-B23

The R&S®UPL-B23 option enables the Audio Analyzer R&S®UPL to generate AC-3 and DTS coded test signals directly with the built-in generator. The measurements are synchronized automatically between the generator and the analyzer.

This has the following advantages:

- ◆ The internal synchronization considerably speeds up measurements
- ◆ Test sequences can be combined much more flexibly, since the number of channels, frequency or level sweep, start and stop frequency/level as well as the number of sweep points can be set directly; settings are made in a similar way to those for a standard analog sweep
- ◆ The test signals are no longer recorded on DVD/PC, thus saving time previously spent on combining and coding the test signals
- ◆ Additional hardware, such as a PC or DVD player, is not required

## Functional description

Several thousand AC-3 and DTS coded test files are stored on the hard disk of the Audio Analyzer R&S®UPL, with each individual file representing a defined frequency/level combination. The files required for a sweep are loaded into the

DSP and replayed until the analyzer yields a settled measurement result.

The analyzer then switches automatically to the next file (=next frequency/level point), and the next measurement is triggered until the complete sweep has been processed.

Each of the WAV files used contains one or more complete sine periods. The files can thus be combined to form a test sequence without interruption and artifacts. The DUT remains synchronized to the AC-3/DTS data stream.

## Test files available

In addition to the AC-3 format (Dolby Digital), the DTS format is now supported as well; further data formats are in progress. Test files are:

- ◆ Stereo signals and 5.1-channel signals, for frequency and level sweeps;

**GENERATOR**

■ <b>INSTRUMENT</b> DIGITAL	
- Src Mode	AUDIO DATA
- Channel(s)	2 ≡ 1
- Bal Upp	4.0000 U
■ <b>FUNCTION</b> - <b>CODED AUDIO</b>	
- Format	AC-3
- Chan Mode	5.1
- SWEEP CTRL	AUTO SWEEP
- Next Step	ANLR SYNC
- X Axis	FREQUENCY
<b>FREQUENCY</b>	
- Spacing	LOG POINTS
- Start	20.000 Hz
- Stop	20.000 kHz
- Points	50
- TOTAL VOLT	-20.00 dBFS

*Sweep generation – as easy as with analog applications*

- ◆ Select function
- ◆ Stereo, single channel or multichannel
- ◆ Frequency or level sweep
- ◆ Start and stop value
- ◆ Number of sweep points

# Audio Switcher R&S®UPZ

these signals allow the measurement of frequency response, linearity, S/N ratio and harmonic distortion

- ◆ Test signals for the individual channels to determine crosstalk attenuation
- ◆ Special signals, for example for checking the level settings of the dialog normalization with AC-3 signals

## Measuring surround decoders

Surround applications for use in the home generally have six channels. In order to test 5.1 decoders, the six channels are connected to the Audio Analyzer R&S®UPL via the Audio Switcher R&S®UPZ. The R&S®UPZ is controlled directly from the R&S®UPL panel via an RS-232-C interface.

For professional surround applications, the Audio Switcher R&S®UPZ comprises 8 channels, with two output channels to allow the two R&S®UPL measurement channels to be used simultaneously.

## Input/output model

Like the Audio Analyzer R&S®UPL, the Audio Switcher R&S®UPZ has XLR connectors. Since there is a difference between male and female connectors in the XLR system, the R&S®UPZ is available both as an input and an output model.

It is possible to cascade up to 16 input switchers plus 16 output switchers, allowing up to 128 input and output channels to be switched.

## Extended range of applications

The Audio Switcher R&S®UPZ can be operated not only via the R&S®UPL. Through its RS-232-C interface, it can also be controlled directly from other



*Multichannel measurements on audio/video receiver*



*With the Audio Switcher R&S®UPZ, up to 128 input and 128 output channels can be cascaded*

units or a controller. This opens up new possibilities; for instance, in broadcasting stations, where studio operations require the switching of several audio channels.

The R&S®UPZ may also be used in production; for instance, when car radios are tested, measurements can be performed at all loudspeaker outputs.

## Specifications

### Coded Audio Signal Generation R&S®UPL-B23

Format	AC-3 (IEC 61937)	DTS (IEC61937)
Coding		
Stereo signals	192 kbit/s	192 kbit/s
5.1-multichannel	448 kbit/s	754 kbit/s
Single channels	448 kbit/s	754 kbit/s
Frequency range	5.2083 Hz to 20 kHz	5.2083 Hz to 20 kHz
Level range	0 dBFS to –120 dBFS	0 dBFS to –120 dBFS
Sweep parameters	frequency, level	frequency, level
<b>Special signals</b>		
AC-3 dialog normalization	files with 997 Hz tones and –1 dB to –31 dB dialog normalization in 1 dB steps	
AC-3 full-scale value	80 Hz tone on LFE, 997 Hz tones on the other channels; –21 dB to –27 dB dialog normalization	
DTS full-scale value	80 Hz tone on LFE, 997 Hz tones on the other channels	
User-defined	user-defined special signals can be stored	

### Audio Switcher R&S®UPZ

Electrical data	
Signal amplitude <sup>1)</sup>	30 V (RMS)/2 A (42 V (peak))
Crosstalk (balanced 600 Ω load) <sup>2)</sup>	
20 kHz	typ. –140 dB
100 kHz	typ. –126 dB
Series resistance	typ. <0.3 Ω (per signal pin)
Shunt capacitance	typ. <90 pF (each signal pin to ground)

More information at  
[www.rohde-schwarz.com](http://www.rohde-schwarz.com)  
 (search term: UPL-B23)

General data	
Operating temperature range	0 °C to +50 °C
Storage temperature range	–40 °C to +70 °C
Humidity	95% relative humidity at +40 °C; meets IEC68-2-3, (no condensation)
EMI	EN 50081-1
EMS	EN 50082-2
Safety standards	DIN EN 61010-1, IEC 61010-1, UL 3111-1, CAN/CSA C 22.2 No. 1010-1
Test marks	VDE-GS, cCSAus
Power supply	100 V to 120 V AC (±10%), 220 V to 240 V AC (±10%) 50 Hz to 60 Hz (±5%)
Power consumption	
Input switcher	typ. 5 VA, 10 VA max.
Output switcher	typ. 5 VA, 12 VA typ. (all channels active), 15 VA max.
Remote control	via RS-232-C
Dimensions (W × H × D)	427 mm x 43 mm x 350 mm
Weight	3.7 kg

<sup>1)</sup> For maximum relay life: 5 W or 0.2 A max.

<sup>2)</sup> Between any two channels into 600 Ω.

## Ordering information

Order designation	Type	Order No.
Coded Audio Signal Generation	R&S®UPL-B23	1078.5188.02
Audio Switcher (Input, female)	R&S®UPZ	1120.8004.02
Audio Switcher (Output, male)	R&S®UPZ	1120.8004.03
<b>Accessories supplied for R&amp;S®UPZ</b>	power cable, operating manual, service manual, RS-232-C extension cable	
<b>Recommended extras for R&amp;S®UPZ</b>		
19" Rack Adapter	R&S®ZZA-111	1096.3254.00



[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG · Trade names are trademarks of the owners · Printed in Germany (Pe kr)

PD 0758.1170.32 · Audio Analyzer R&S®UPL, Option R&S®UPL-B23 and Audio Switcher R&S®UPZ · Version 02.00 · January 2004 · Data without tolerance limits is not binding · Subject to change