

Audio analysis in production: saving time with 16 measurement channels

The compact R&S®UPV audio analyzer masters all measurements that crop up in the audio world. Two plugins on the rear panel allow the instrument to be adapted to meet new requirements. The R&S®UPV-B48 analog multichannel interface card, two of which can be accommodated on the instrument, is a new option that turns the R&S®UPV into an analyzer with 8 or 16 channels. Parallel processing of all channels makes it possible to save a lot of time in the production of surround-sound equipment, for example, and in particular with multichannel amplifiers for the automotive sector.

Stereo becomes surround sound – and the number of channels increases

Surround-sound technology is becoming more and more popular in homes. In home living rooms there used to be two loudspeakers, but now there are often six to eight, depending on whether you are satisfied with the conventional 5.1 technology or have already invested in the future of 7.1 systems.

In addition, your favorite music should also have the perfect sound in your car. The difficult acoustic conditions in an automobile and the little space available for accommodating the sound transducers prompted manufacturers of modern car hi-fi systems already some time ago not only to split up the audio frequency range among several loudspeakers but also to control the speakers via separate amplifier branches. The use of DSP-controlled sound-optimization circuits further

FIG 1 Speedy production: The new multichannel interface card enables the R&S®UPV audio analyzer to process up to 16 channels simultaneously.



perfected this technology, so that, even for stereo transmission split between the front and rear, up to eight amplifier channels are installed. Switching to surround-sound technology in vehicles can result in as many as 10 channels, while 7.1 surround-sound systems require up to 16 loudspeakers and amplifier channels.

In the production of music systems of this type, it has been customary up to now to measure two channels at a time and then to switch to the other channels one after the other. The R&S®UPV audio analyzer together with the R&S®UPZ audio switcher performed this task quickly and reliably. However, shorter turnaround times are required, above all in the automotive sector.

R&S®UPV – always up-to-date with plug-ins

In the design of the R&S®UPV audio analyzer, importance was placed right from the start on being able to meet future requirements by simply expanding the hardware. Therefore, the rear panel of the instrument has two slots for accommodating expansion cards. To follow up the R&S®UPV-B41* I²S interface option for direct measurements on integrated components, Rohde&Schwarz has developed the R&S®UPV-B48 multichannel interface card, which can measure up to eight analog signals simultaneously (FIG 1). And since the audio analyzer has two slots, the new option can also be used two at a time. Every R&S®UPV is thus upgradeable – also by retrofitting – to a 16-channel measuring instrument.

Specialist for requirements in the automotive sector and surround-sound technology

The multichannel interface card was specially developed to meet the requirements of surround-sound technology and the needs of the automotive sector. Complex signal preprocessing as is implemented for dual-channel mode to fulfill extreme dynamic range requirements was deliberately omitted. Using high-grade A/D converters, the new interface card immediately digitizes the eight analog audio input signals after appropriate amplification or attenuation and passes them on to the instrument's analysis unit. The input voltage range extends up to 50 V, which means that this option is already designed for the 42 V on-board supply systems of future vehicle generations. The analysis bandwidth is 40 kHz – which is another step into the future of broadband audio systems.

Condensed data of the R&S®UPV-B48

Inputs	8 × analog, 25-pin D-Sub (Tascam pin allocation), balanced
Bandwidth	DC / 20 Hz to 40 kHz
Level range	0.1 μV to 50 V (rms, sine); automatic or fixed measurement range, selectable for each channel or coupled
Level error	±0.05 dB at 1 kHz
Frequency response (referenced to 1 kHz)	±0.1 dB (20 Hz to 20 kHz)
THD+N	typ. –100 dB (20 Hz to 20 kHz)
Crosstalk attenuation	> 100 dB (10 Ω), up to 20 kHz
Measurement functions	rms wideband/selective, peak, S/N, DC, FFT, THD, THD+N, Mod Dist, DFD, DIM, polarity

Of course, the input circuits of this new card retain the familiar R&S®UPV features; they too automatically set the measurement range – separately for each channel. An important characteristic, for depending on the applied frequency, the output voltages of the surround-sound main channels and the subwoofer channel may be quite different. Each measurement channel can be set individually to AC or DC coupling; for relative measurements or for phase- and group-delay measurements, each channel can be selected as reference channel.

When equipped with the new multichannel interface card, the audio analyzer also handles all standard measurements from frequency response through S/N ratio and distortion measurements to FFT analysis (FIG 2). Since the new option is primarily designed for use in production, great importance was placed on remote control ability. All functions are remote-controllable, and all measurement results are remote-retrievable. If two cards are inserted in the instrument, it is even possible to read out the results of up to 16 complete FFT analyses, e.g. via the IEC/IEEE bus.

Class-D amplifiers – a new technology is gaining ground

Use of the new class-D amplifiers is increasingly spreading, primarily in surround-sound applications and the automotive sector. The large interfering power of these amplifiers above the audio bandwidth, caused by switching pulses and noise

References

- * R&S®UPV Audio Analyzer: Interface for the I²S serial data bus. News from Rohde&Schwarz No. 185 (2005), pp 22–24.

up into the range of several hundred kilohertz, is too much for the input circuits of many analysis instruments to cope with. Measurements on these amplifiers with traditional audio measuring instruments can only be performed using expensive and complex external filter circuits.

This is not the case with the R&S®UPV audio analyzer. Its input circuits easily master the challenges presented by class-D amplifiers. Expensive external filters such as those in other audio measuring equipment are not necessary; class-D power amplifiers can be directly connected and measured. And, of course, the new eight-channel card also employs this technology. Here, too, all you need to do is simply connect and measure. After all, no one wants to have to invest in 8, 12 or even more expensive filter circuits, particularly in the case of multi-channel applications.

Summary

The new R&S®UPV-B48 multichannel interface card can pick up eight analog signals simultaneously and measure them in parallel. Users can easily retrofit the option themselves and thus turn a dual-channel audio analyzer into one with eight channels. It can also be operated together with the R&S®UPV-B41 I²S interface option. If two multichannel interface cards are fitted, 16 parallel analog measurement channels are available.

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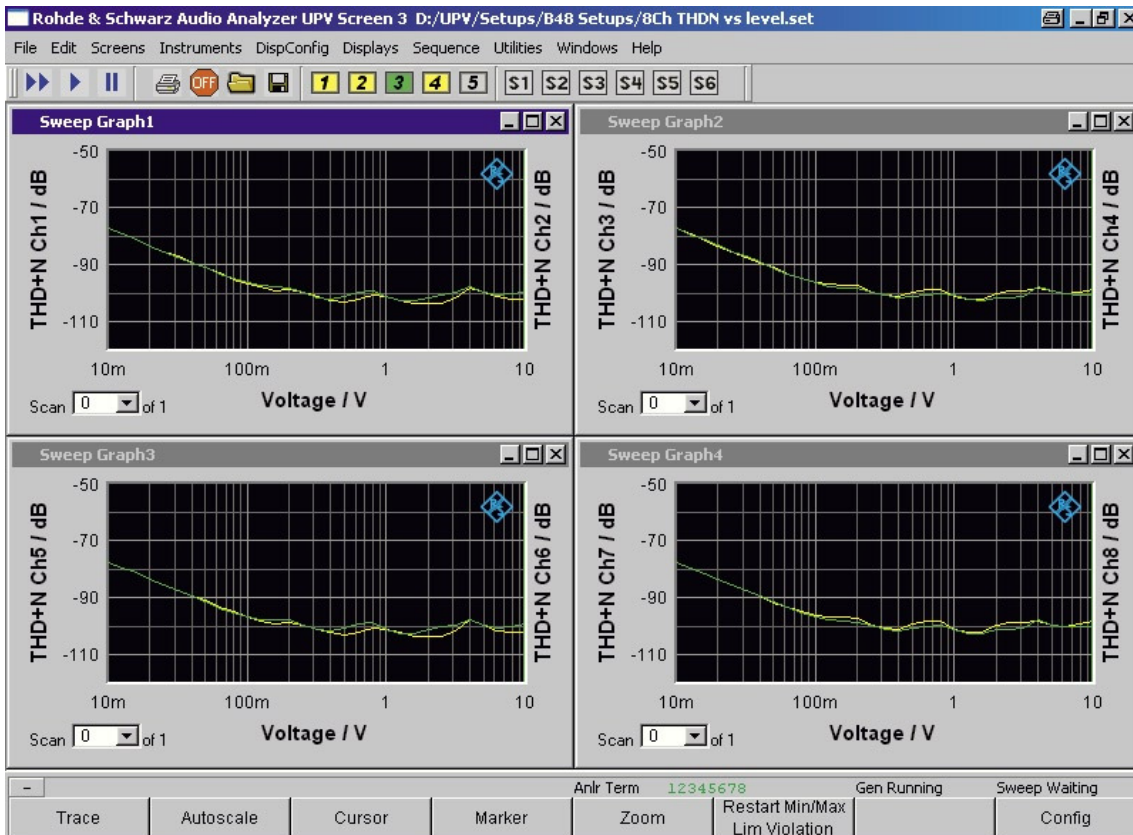


FIG 2 Graphical display of an eight-channel THD+N measurement.