EMS Test System R&S®TS 9980

Tried-and-tested compliance test system expanded for DAB

The R&S®TS 9980 test system for determining electromagnetic susceptibility (EMS) of sound and TV broadcast receivers and associated consumer electronics equipment has established itself as a worldwide standard for compliance measurements [1]. The DAB system expansion now also allows DAB broadcast receivers to be tested for EMS.

Fully automated EMS tests

The methods for EMS measurements of digital sound broadcast receivers have been specified in amendment A1:2003 to the EN 55 020:2002 European standard [2]. This standard includes the useful signal definition, test methods, sound evaluation criteria and EMS requirements. These requirements largely correspond to the requirements of analog sound broadcast receivers, i.e. the limit values are identical to those of FM radio receivers with the exception of the input immunity test.

As with analog sound broadcast receivers, sound is evaluated by determining the audio-frequency ratio of useful signals to noise signals. However, with digital sound broadcast receivers, the effects linked to digital transmission such as clicking and disruption have to be determined as well. The Audio Analyzer R&S®UPL, which is integrated in the R&S®TS 9980 test system, can handle this task. A 1 kHz sinusoidal tone serves as the test signal. The DUT level is measured behind a 1 kHz notch filter, which can be set on the audio analyzer. All spectral components, with the exception of the test signal, are thus covered. The analysis is performed with the peak value measurement function, ensuring that each individual digitized measurement value is tested and every noise registered.

The COFDM-modulated (coded orthogonal frequency division multiplex) useful signal is generated in line with the DAB system standard ETS 300 401. To generate such a signal, you need an R&S®DSIP 020 ETI signal source and an R&S®SDB 601 DAB test transmitter. FIG 1 shows how both measuring instruments are integrated in the R&S®TS 9980 test system.

Since it is not possible to change the RF output level with the R&S®SDB 601 DAB test transmitter, it is used only as an I/Q modulator. Thus, the I/Q signal is applied to the digital TV Test Transmitter R&S®SFQ, which is integrated in the test system and which controls the RF frequency and the level.

Amendment A1:2003 does not yet contain any specific requirements for testing the input immunity of digital sound

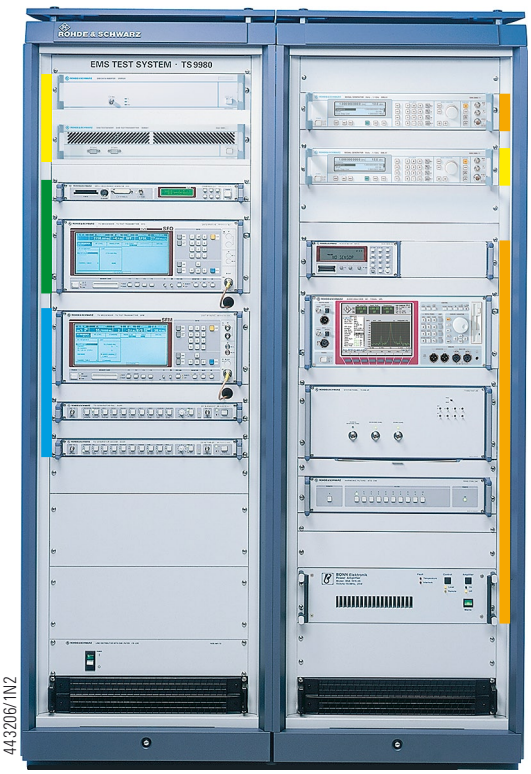

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FIG 1
EMS Test System R&S®TS 9980 expanded for DVB and DAB. The color bars match the colors in the block diagram on the opposite page.

More information on Rohde & Schwarz test systems at www.testsystems.rohde-schwarz.com

REFERENCES
[1] Test System R&S®TS 9980 measures electromagnetic immunity of radio and television receivers. News from Rohde & Schwarz (1990) No. 128, pp 32–33
[2] DIN EN 55 020:2002 + A1:2003 Sound and television broadcast receivers and associated equipment – Immunity characteristics – Limits and methods of measurement (Ton- und Fernseh-Rundfunkempfänger und verwandte Geräte der Unterhaltungselektronik – Störfestigkeitseigenschaften – Grenzwerte und Prüfverfahren); VDE Verlag, 10625 Berlin, October 2003
[3] DIN EN 50 048:2001 DAB characteristics (DAB-Eigenschaften); VDE Verlag, 10625 Berlin, April 2002

broadcast receivers. Therefore, the characteristics for DAB receivers specified in the EN 50 048:2001 European standard are applicable [3]. However, the sound evaluation criteria are applied in accordance with EN 55 020:2002 since a BER measurement is not possible due to the lack of an outer data interface for test house and lab operation.

Providing a DAB-modulated noise signal in the adjacent channel for measuring input immunity is another special feature. For this purpose, the Vector Signal Generator R&S®SMV is integrated in the test system. The digital TV Test Transmitter R&S®SFQ provides the required I/Q signal; using the R&S®SFQ-Z5 option, the R&S®SFQ splits the signal provided by the DAB test transmitter (FIG 2).

Summary

The DAB system expansion now also allows fully automated EMS tests on DAB broadcast receivers. This is a special advantage in the very time-consuming and repetitive procedures that are required for type-approval and quality acceptance testing.

Users will benefit in various ways:

- Fully automated test sequence
- Reproducible measurement results
- Fast training of system operators
- Measurements can be integrated into the production process
- Increased test throughput owing to optimized test sequences

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FIG 2 Block diagram of the EMS Test System R&S®TS 9980.