Measurements on FM sound broadcasting signals with the R&S®ETL TV analyzer

Analyzing FM sound broadcasting signals with a TV analyzer – a contradiction? Not with the R&S®ETL as it is now equipped with suitable options. This versatile instrument also covers DAB(+) as well as analog and digital television – all in a single compact instrument.

Despite digitization, FM sound broadcasting remains the leading radio standard worldwide

Digitization of TV and sound broadcasting transmission paths shows no signs of slowing down worldwide. This is seen in the rapid development of DVB-T2 transmitter networks and the increasing prevalence of DAB(+) sound broadcasting networks. But despite this development, analog FM sound broadcasting is still the leading radio standard. The main reason is probably the large number of receivers used in vehicles and homes and integrated in the popular smartphones.

Broadcasting network operators often need extensive T&M equipment to install, service and repair analog and digital sound broadcasting and TV transmitters at one and the same site. The R&S®ETL TV analyzer is ideal for such environments. With its new options for FM sound broadcasting and its flexible scalability, the R&S®ETL covers all T&M requirements – in a single, efficient, multifunctional instrument.

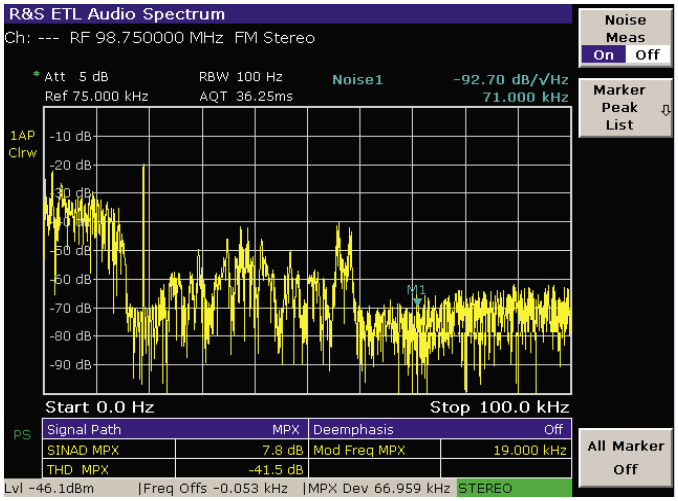
High-quality FM sound broadcasting signal analysis

The R&S®ETL-K110 option was specifically designed for analyzing and demodulating FM sound broadcasting signals. An overview window shows the most important parameters such as level, frequency offset, information about pilots and radio data systems (RDS) and frequency deviations (FIG 1). In addition, the audio spectrum display (FIG 2) and an audio oscilloscope offer a quick overview of the basic properties of an FM sound broadcasting signal.

Transmission of FM sound broadcasting signals should not interfere with adjacent channels. Accurate MPX power and MPX peak deviation measurements (FIG 3) help determine compliance with the legal and regulatory requirements in accordance with the ITU-R SM.1268-1 standard.

FIG 1 Overview of the most important FM sound broadcasting signal parameters.

FIG 2 Audio spectrum.



Optional input section for high S/N

High-quality transmission of an FM sound broadcasting signal places high demands on a transmitter's signal-to-noise ratio (S/N). The same applies to the T&M instrument used to measure if the S/N is sufficient. The R&S®ETL can be equipped with the R&S®ETL-B110 high SNR FM frontend which, when used together with the optional audio analysis, increases the measurement range to an S/N of ≥ 80 dB.

Integrated audio analysis

Information about MPX power, frequency deviations and pilots alone is not sufficient to comprehensively evaluate the signal quality of an FM sound broadcasting signal. Further measurements need to be performed on demodulated audio signals. The R&S®ETL-K111 FM (radio) audio analysis / generator option offers elementary measurements for the detection of crosstalk, audio frequency response, harmonics (FIG 4) and mixed products that result from non-linear components in the signal path. The integrated audio analysis option is easy to use and it eliminates the need for a separate audio analyzer.

Integrated audio generator

The user-installable R&S®ETL-B201 universal interface extends the functionality of the R&S®ETL-K111 FM (radio) audio analysis / generator option to include an audio generator function. This option generates signals tailored to the measurements needed for audio analysis. These signals can be fed directly into the exciter to be tested. For every audio measurement, the signal parameters can be adjusted individually according to the requirements and measurement specifications (FIG 5). This increases the ease of use and decreases the risk of operator errors. A separate audio generator is no longer required. The audio generator in the R&S®ETL can generate both normal audio signals and complete MPX signals to stimulate the transmitter that is to be tested.

Summary

Equipped with the new FM sound broadcasting options, the R&S®ETL TV analyzer offers all the functions needed to test and document the quality of FM sound broadcast transmitters. Its integrated audio analysis function, integrated audio generator, outstanding measurement accuracy and its ability to combine analysis functions for DAB(+), analog and digital TV in a single instrument assure high flexibility and economic efficiency in everyday use.

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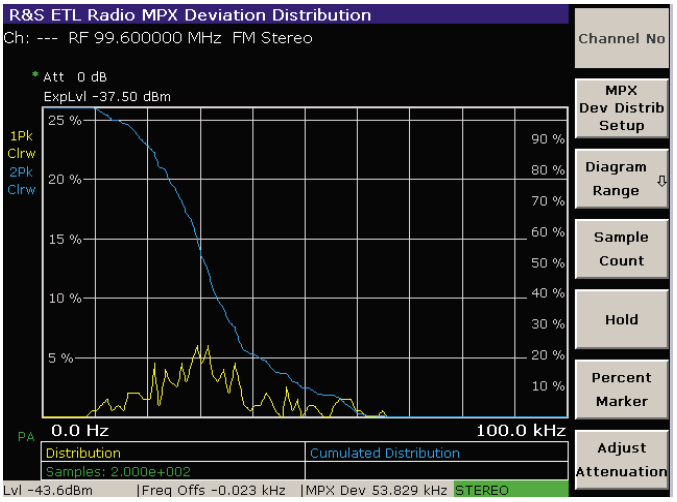

FIG 3 Cumulated MPX distribution.

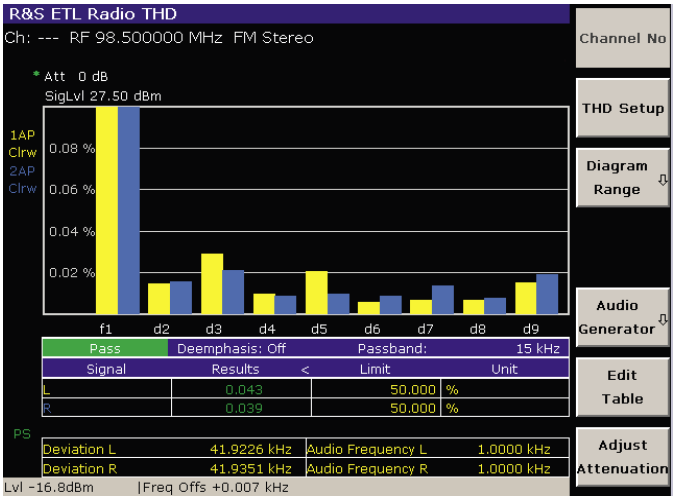

FIG 4 Total harmonic distortion (THD) measurement.

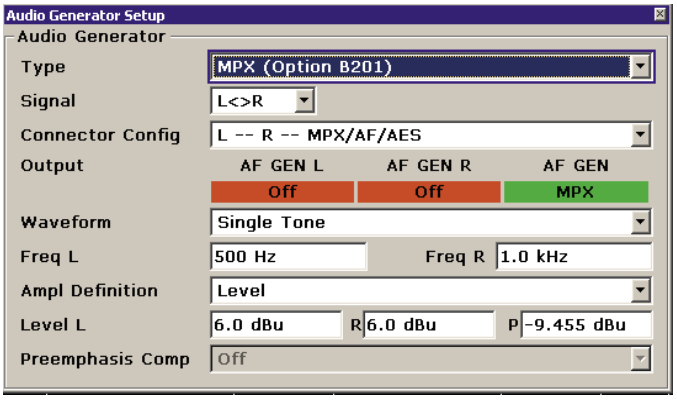

FIG 5 Audio generator settings.