DVB-T/DVB-H handheld TV analyzer for mobile use

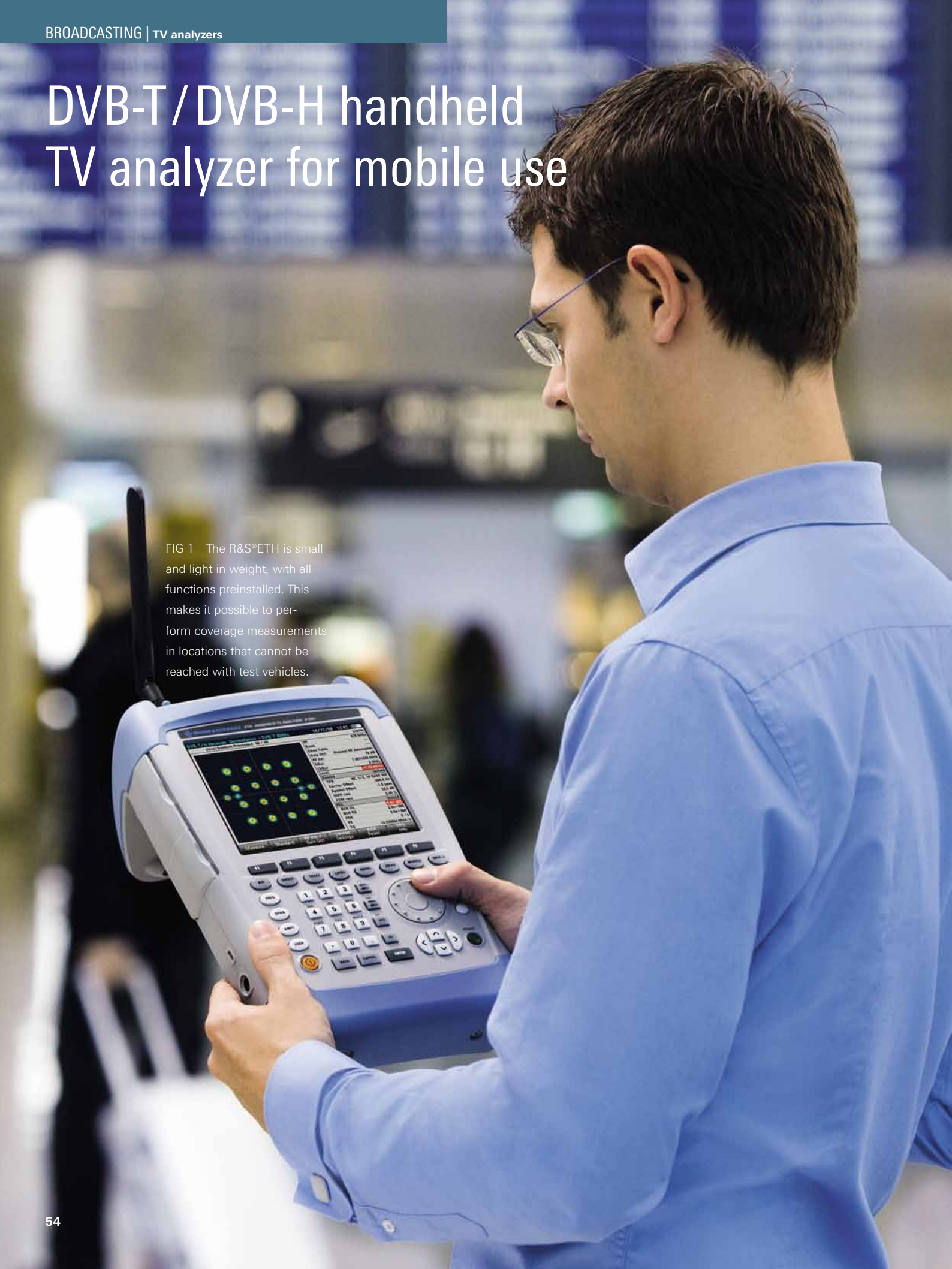

FIG 1 The R&S®ETH is small and light in weight, with all functions preinstalled. This makes it possible to perform coverage measurements in locations that cannot be reached with test vehicles.

Small, light in weight, and extraordinarily versatile – that's how the new R&S®ETH can be characterized. For example, it offers all measurements needed to detect coverage gaps in DVB-T and DVB-H networks, as well as those needed to install and maintain low-power transmitters or transposers. All these are tasks that many network operators face when filling coverage gaps or optimizing network coverage.

Versatility in a compact package – for measurements on low-power transmitters, for example

Especially when working in the field, it is important to carry along all necessary measurement instruments; as a result, each instrument should be as light, robust, and space-saving as possible. Qualifications that the new R&S®ETH handheld TV analyzer (FIG 1) is custom-tailored to. It combines the functions of a TV analyzer, a spectrum analyzer, and a vector network analyzer in a compact housing that is specially designed for demanding day-to-day work in the field.

Relatively few parameters are measured on low-power transmitters as compared to high-power transmitters, but there is no difference in the demands placed on the measuring instruments with respect to measurement tolerances and limits. For example, to measure the lower/upper shoulder attenuation, the "DVB Spectrum" measurement function in the R&S®ETH *DVB-T/H Receiver* mode performs the measurements exactly in line with the criteria defined in the ETSI TR 101290 DVB measurement guidelines (FIG 2). Predefined settings make these measurements equally reproducible for less experienced users. And the powerful spectrum analyzer in the R&S®ETH – which is based on the R&S®FSH4/8* family of spectrum analyzers – additionally allows users to determine the shoulder attenuation via markers as well as to test them using self-defined limit lines.

Various methods are available for measuring the transmitter output power using the R&S®ETH. The "DVB Spectrum" function measures not only the shoulder attenuations, but also the channel power and the amplitude frequency response. The R&S®ETH measures the spectrum within the channel with a relatively small resolution bandwidth – as compared to the channel bandwidth – and then integrates the measured values to obtain the channel power. The channel power can also be measured in demodulation mode (using the "Measurement List" and "Constellation Diagram" measurement functions). In this case, the transmit power is measured together with several basic parameters, including modulation error ratio (MER), carrier frequency offset, symbol rate offset, various bit error ratios (BER), and others, and then output in a clearly organized list (FIG 3).

The R&S®ETH is characterized by a very high degree of measurement accuracy for its instrument class. Users who need more accuracy for power measurements can connect the (directional) power sensors of the R&S®FSH family. The frequency measurement accuracy can be improved by applying an external 10 MHz reference signal via the built-in port.

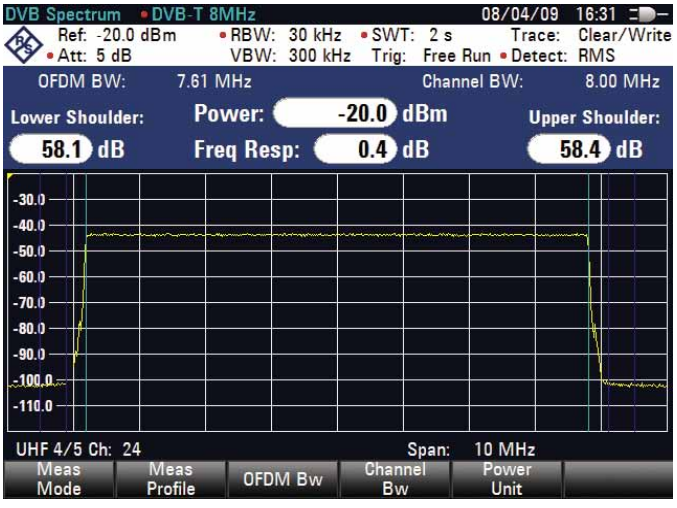

FIG 2 Shoulder attenuation measurement in line with ETSI TR 101290.

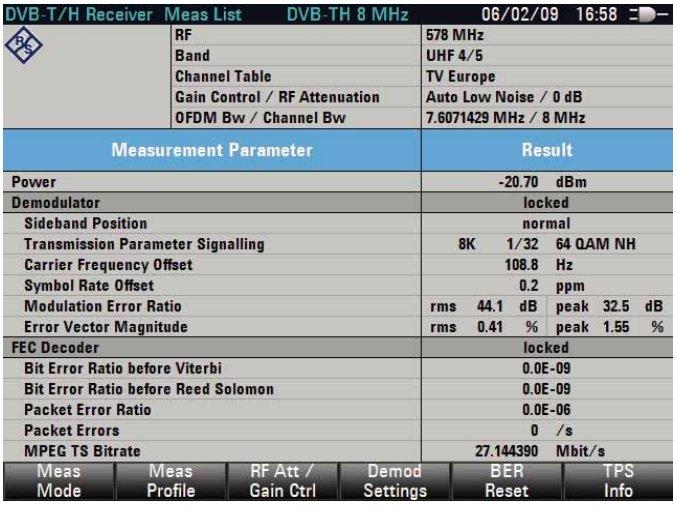

FIG 3 Overview of the main signal parameters.

* R&S®FHS4/FSH8: Next generation of handheld spectrum analyzers. NEWS from Rohde&Schwarz (2008) No. 198, pp. 30–35.

Many negative influences on the signal quality can be expressed numerically, but their origins are not always immediately obvious. In these cases, it helps to display the measurements as a constellation diagram because this provides a quick visual impression of both the quality of the transmit signal and the modulation of the OFDM carrier (FIG 4).

Low-power transmitters, in particular, are set up in locations where installed components such as antennas, channel filters, and the associated cabling are exposed to extraordinary stress. This is why it is advisable to check the system components not only immediately after installation, but also from time to time during normal operation. The R&S®ETH is especially suited for this purpose because it offers an optional tracking generator that converts it into a vector network analyzer. This makes it possible to check filters, amplifiers, and antennas quickly and easily.

The R&S®ETH at a glance

- DVB-T/DVB-H test receiver from 4.5 MHz to 3.6 GHz or 8 GHz
- Spectrum analyzer from 100 kHz to 3.6 GHz or 8 GHz
- Vector network analyzer (model with built-in tracking generator)
- FPGA-based DVB-T/DVB-H demodulator in realtime with TS-ASI output
- Internal RF preselection (optional)
- Receiver noise factor with RF preselection 11 dB (RF < 3 GHz)
- High level measurement accuracy (measurement uncertainty < 1 dB)
- MER performance > 40 dB (RF < 1 GHz)
- Anti-glare color display (6.5")
- LAN and USB ports
- SD card port
- USB memory stick port
- Replaceable lithium-ion battery
- Splash-proof housing
- Low weight (3.3 kg)
- Extensive accessories

Coverage gaps detected under real-world conditions

Test vehicles are usually employed when determining the quality of coverage within a transmission area. However, these are not easily driven into pedestrian zones, train stations, or airports – areas where today's users demand reliable coverage. This is where the R&S®ETH comes in, as it is designed for portable use (FIG 1) and can easily be brought into all environments where terminal equipment for receiving DVB-H can be used. Its low weight, compact dimensions, anti-glare color display, and replacement batteries for up to four hours of operation make it perfect for these applications.

To suppress interfering receive signals, the R&S®ETH offers an internal RF preselection. When activated, it allows a higher level of the useful RF signal, thereby increasing the dynamic range. To increase receiver sensitivity, signals are passed through a low-noise amplifier after preselection.

To ensure that the field strength of transmitter signals can be determined correctly at the site of reception, the R&S®ETH takes the characteristics of the connected antenna into consideration. The antenna factors for Rohde&Schwarz measurement antennas are stored on CD, but antenna factor tables for other antennas can also be generated using R&S®ETH View and then saved in the instrument.

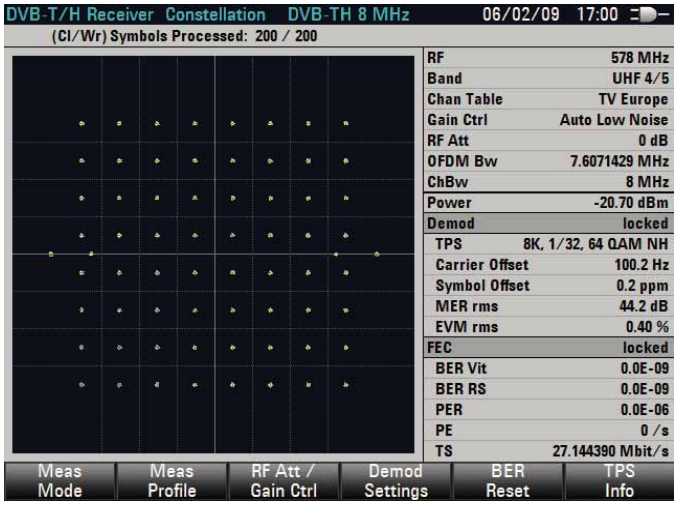

FIG 4 Constellation diagram of a DVB-T/DVB-H signal.

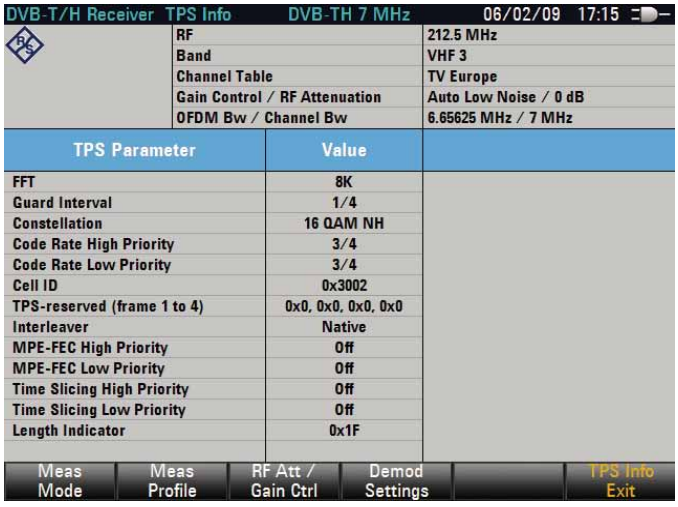

FIG 5 Transmission parameter signaling (TPS) in detail.

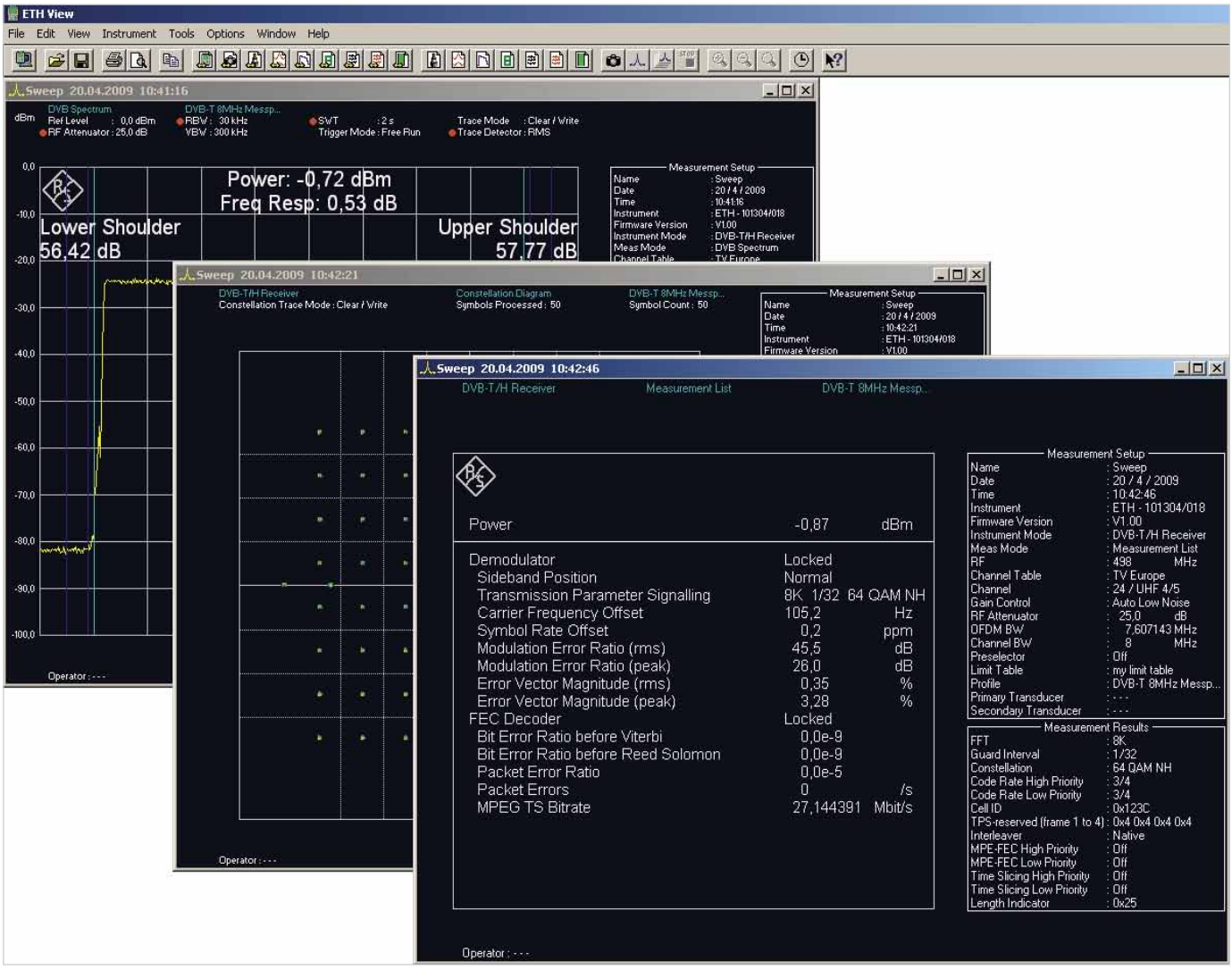

FIG 6 The R&S®ETH View PC software can be used to manage measurement results and device setups conveniently.

In addition to the essential measurements characterizing the signal quality, the R&S®ETH also offers a detailed listing of the TPS information (FIG 5). Important information, such as cell ID or modulation parameters of the received signal, can be derived from this list. By using an R&S®ETH, users can thus determine the causes of coverage gaps and take the appropriate actions to fill them.

Convenient documentation and configuration

Regardless of where measurements are taken, at the transmitter or in the field, readings should be quick and easy to document. With the R&S®ETH, a simple press of the screen capture button stores the screen contents as a graphics file. Alternatively, the measurement results can be saved together with the device setup, which comes in handy when measurements need to be reproduced at a later time.

The R&S®ETH handheld TV analyzer includes the R&S®ETH View PC software, which can be used to configure the TV analyzer perfectly (FIG 6). R&S®ETH View can be used to generate information regarding antennas, limit lines, channel tables, or predefined device settings and measurement profiles, which are then transmitted to the analyzer. Saved measurement results or screen captures can be accessed via the LAN or the USB port in the R&S®ETH for further processing.

Werner Dürport