R&S®TSM-DVB DVB-T/H Diversity Test Receiver

Compact drive test receiver for DVB-T and DVB-H

- ◆ Fast DVB-T and DVB-H measurements for drive test applications
- ◆ Indoor and outdoor coverage measurements possible
- ◆ Fully software-supported application via R&S®ROMES

- ◆ VHF (channels 5 to 12; 177.5 MHz to 226.5 MHz)
- ◆ UHF (channels 21 to 69; 474 MHz to 858 MHz)
- ◆ User-selectable IF bandwidths of 5 MHz, 6 MHz, 7 MHz, and 8 MHz
- ◆ RS-232-C interface
- ◆ High-quality stable aluminum case, compact

- ◆ Low power consumption 12 V DC/12 W
- ◆ Secured measurements due to antenna diversity
- ◆ Two ASI outputs for two MPEG transport streams

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At a glance

For survey tests within DVB-T/H networks, operators usually perform measurements in line with the ETSI DVB-T and DVB-H standards:

◆ ETSI EN 50083-9
◆ ETSI EN 300 744 including annex F

Stationary measurements are performed with directional antennas raised to 10 m above the surface. These measurements require tremendous investments in specialized measurement vehicles. Furthermore, these kind of coverage measurements take a lot of time. Finally, the coverage information is collected only for smaller areas, not in the broad field.

Emerging technologies (such as DVB-T/H) are generating a demand for new coverage measurement methods that do more than the traditional procedure mentioned above. These new methods must work in mobile scenarios, i.e. during driving.

The R&S®TSM-DVB DVB-T/H diversity test receiver has been designed for mobile measurements in DVB-T/H networks, even at very high driving speed (up to 100 km/h). Its concept helps ensure reliable and fast measurements.

The R&S®TSM-DVB DVB-T/H diversity test receiver complies with the standard DVB-T/H receiver specifications. It also complies with the equipment environment at the following levels:

◆ Mechanical
◆ Electrical
◆ Control

The receiver supports all DVB-T/H modes (2K, 4K, 8K), including hierarchical modes, and does so in all available bandwidths (5 MHz, 6 MHz, 7 MHz, and 8 MHz) with the same hardware.

The receiver is equipped with two antenna inputs (for diversity reception) and two demodulation channels.

*Front view of the R&S®TSM-DVB*

Applications

The R&S®TSM-DVB DVB-T/H diversity test receiver can be used for mobile coverage measurements. The R&S®ROMES drive test measurement software provides an effective driver to support the DVB-T/H receiver.

The R&S®TSM-DVB DVB-T/H diversity test receiver together with the R&S®ROMES software make mobile measurements possible in a DVB-T/H network. The system performance allows driving speeds up to 100 km/h.

The R&S®TSM-DVB DVB-T/H diversity test receiver provides the following measurement parameters:

◆ RF level
◆ MER (modulation error ratio)
◆ PER (packet error ratio)
◆ BER (bit error ratio after Reed-Solomon)
◆ TPS bits b16 to b55
◆ DVB-H signaling performed/not performed
◆ Time slicing used/not used on HP/LP stream
◆ MPE FEC used/not used on HP/LP stream
◆ Constellation diagram view

The R&S®ROMES application software displays all of these parameters online and stores all data together with time and positioning information.
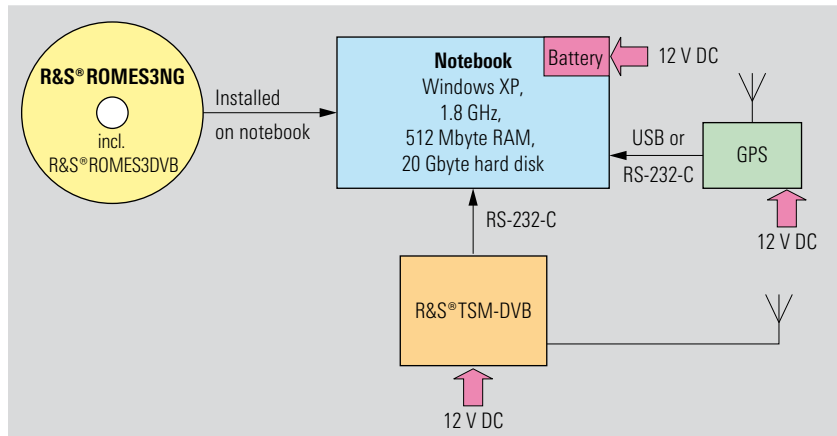
DVB-T/H drive test application: R&S®TSM-DVB test receiver, notebook, GPS, and R&S®ROMES drive test software
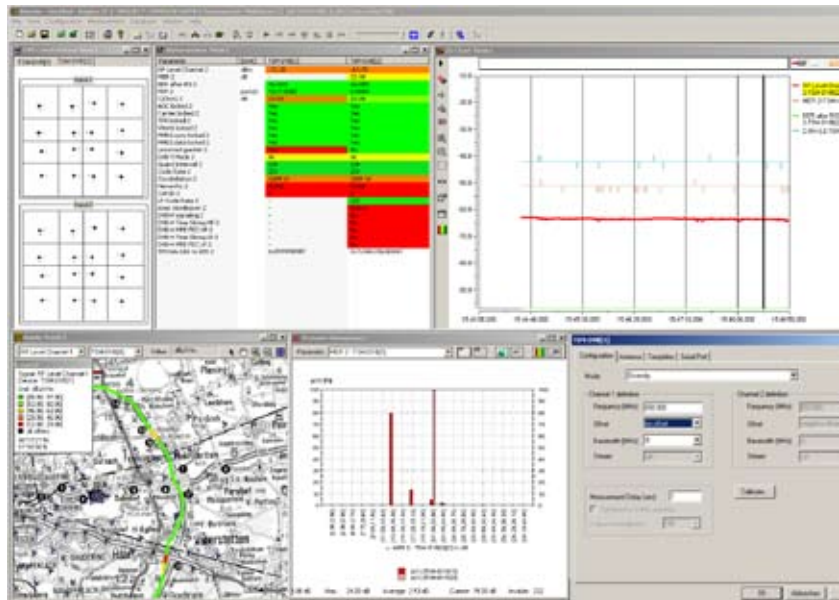
Screenshot of a typical measurement display used in R&S®ROMES coverage measurement software

Configuration examples

DVB-H test application
The R&S®ROMES drive test software controls the
R&S®TSM-DVB receiver and an optional GPS.
DVB-H mobile is used for visual picture quality control.

R&S®TSMU-Z3 backpack drive test system
The R&S®TSM-DVB receiver is used for parallel DVB-H
measurements, and GSM, WCDMA measurements are
performed with test mobile phones. Control via pen PC
(not shown) and R&S® ROMES drive test software
(indoor/outdoor application).

R&S®TS51GA drive test aluminum case
Fix mounted notebook (with R&S®ROMES drive test software
installed), R&S®TSM-DVB receiver, test mobile phones and GPS
for parallel coverage tests in radio networks
(outdoor application).

Technology

The R&S®TSM-DVB DVB-T/H diversity test receiver is equipped with two RF receivers, two DVB-T/H demodulators, and thus two ASI outputs, as well as a complex programmable logic device (CPLD). All are controlled by a state-of-the-art microcontroller.
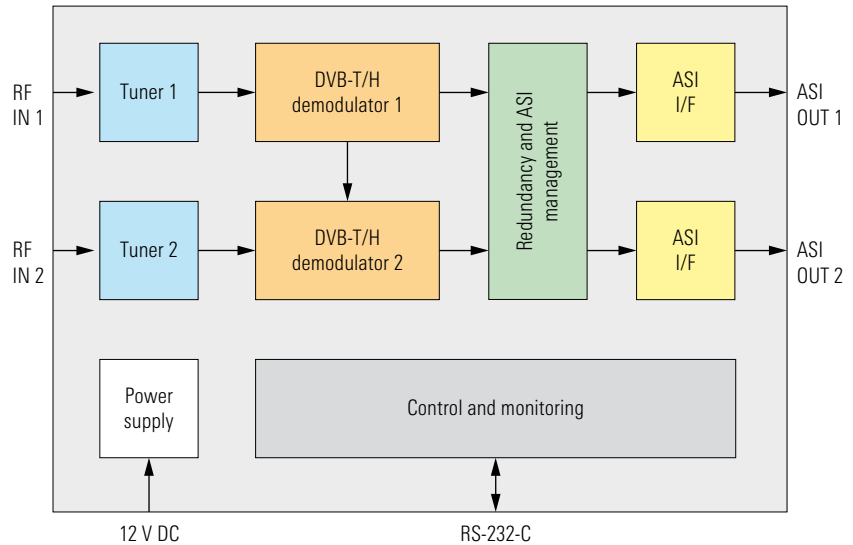
Functional block diagram

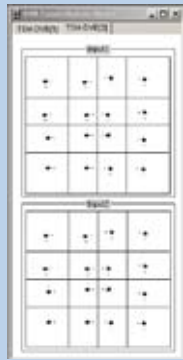| Mode of operation	ASI outputs		Active RF inputs
Dual input	ASI 1 ASI 2	↔ ↔	RF IN 1 RF IN 2
Redundant	ASI 1 = ASI 2		RF IN 1 or RF IN 2
Hierarchical	ASI 1 (HP) ASI 2 (LP)	↔ ↔	RF IN 1 RF IN 2
Diversity	ASI 1 = ASI 2		RF IN 1 = antenna 1 RF IN 2 = antenna 2

Operating modes

Features

◆ Modern chipset and microprocessor design
  → fast DVB-T/H measurements possible
◆ High-tech Rohde & Schwarz design and production process
  → stable aluminum case, compact size, low weight, low power consumption (12 V DC)
◆ Online display of all measurement data; data evaluation in replay mode; layer concept supports maps; more than 30 different drivers available (Rohde & Schwarz receivers, test mobile phones, GPS) → fully supported by the R&S®ROMES measurement software
◆ Double-receiver concept with four user-selectable modes: dual input, redundant, hierarchical, diversity → secured measurements due to antenna diversity, two ASI outputs for two MPEG transport streams
◆ Modular hardware and software concept → easy expandability with test mobile phones and R&S®TSMx radio network analyzer for mobile network application

Benefits

◆ Reduction of measurement time; cost-saving measurements
◆ Ideal for mobile applications (indoor and outdoor); easy integration into backpack or suitcase; low expenditure for system design
◆ High-performance R&S®ROMES drive test software with intuitive, easy-to-use user interface
◆ Very flexible applications due to diversity receiver concept
◆ Future-proof modular and expandable R&S®ROMES software; hardware add-ons for high-quality DVB-T tests (R&S®EFA, R&S®DVMD, R&S®DVQ) available

Specifications

RF inputs	
VHF	channels 5 to 12; 177.5 MHz to 226.5 MHz with IF bandwidth of 7 MHz
UHF	channels 21 to 69; 474 MHz to 858 MHz with IF bandwidth of 8 MHz
IF bandwidths	user-selectable IF bandwidths of 5 MHz, 6 MHz, 7 MHz, and 8 MHz for all VHF, UHF bands
Frequency step	166.667 kHz
Frequency offset	±167 kHz or ±125 kHz, supported without configuration
Input sensitivity	−92 dBm to −20 dBm (depends on DVB-T/-H mode, low values: QPSK only)
Level accuracy	±2 dB (level ≤−30 dBm, +15 °C to +50 °C) ±3 dB (level ≤−30 dBm, 0 °C to +15 °C)
Input impedance	75 Ω, on female N connector
DVB-T demodulation	fully compliant with ETS 300744; includes hierarchical modes (selection of stream priority) DVB-H signaling performed/not performed MPE FEC used/not used on HP/LP stream automatic mode detection from TPS information (even at 0 dB C/N), TPS bits b16 to b55 dual-stream demodulation in hierarchical mode in-depth deinterleaver dual-stream demodulation in redundant mode with automatic or manual switching diversity mode DVB-H signaling (time slicing and MPE FEC) in TPS field (no power reduction and no MPE FEC decoding) (time slicing used/not used on HP/LP stream)
Constellation diagram	
ASI output	fully compliant with EN 50083-9 188 bytes per packet in data burst format (continuous mode) dual outputs
Control of module	RS-232-C interface with standard ±12 V level in slave mode two 5 V TTL status lines
MPEG TS outputs	serial interfaces
Output impedance	75 Ω
Output format	ASI (HotLink drivers)
Output connector	BNC
General data	
Power supply	single +12 V power supply max. 1 A (12 W)
Dimensions (H × W × D)	83 mm × 154 mm × 224 mm (3.3 in × 6.1 in × 8.8 in)
Weight	approx. 1.4 kg (3.1 lb)

Ordering information

DVB-T/H Diversity Test Receiver	R&S®TSM-DVB	1503.7007.10
Options and accessories		
DVB-T/H Antenna Fixed Mount	R&S®TSMDVB-Z1	1503.4008.02
DVB-T/H Antenna Magnet Mount	R&S®TSMDVB-Z2	1503.4014.02
DVB-ASI Decoder (PCI) for R&S®TSM-DVB	R&S®TSMDVB-Z3	1503.4020.02
DVB-ASI Decoder (USB) for R&S®TSM-DVB	R&S®TSMDVB-Z4	1503.4037.02
Power Supply 230 V AC, 12 V DC/6 A	R&S®TSMU-Z1	1166.3786.02
19" Rack Adapter	R&S®TSMU-Z2	1153.6700.02
Indoor Backpack System	R&S®TSMU-Z3	1153.6900.02
Drive Test System Software	R&S®ROMES3NG	1143.7991.40
R&S®ROMES Driver for R&S®TSM-DVB	R&S®ROMES3DVB	1502.5652.40
DVB-T/H Drive Test Bundle 　consisting of: R&S®TSM-DVB Receiver, GPS, R&S®ROMES3NG Drive Test 　System Software, R&S®ROMES3DVB Driver Software for R&S®TSM-DVB, 　R&S®ROMES3IND Indoor Driver Software 　(Please note: The R&S®ROMES software is not upgradeable.)	R&S®TS-DVB-T/H	1508.1742.02

Rear view of the R&S®TSM-DVB

More information at
www.rohde-schwarz.com
(search term: TSM-DVB)

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