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Test & Measurement

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Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

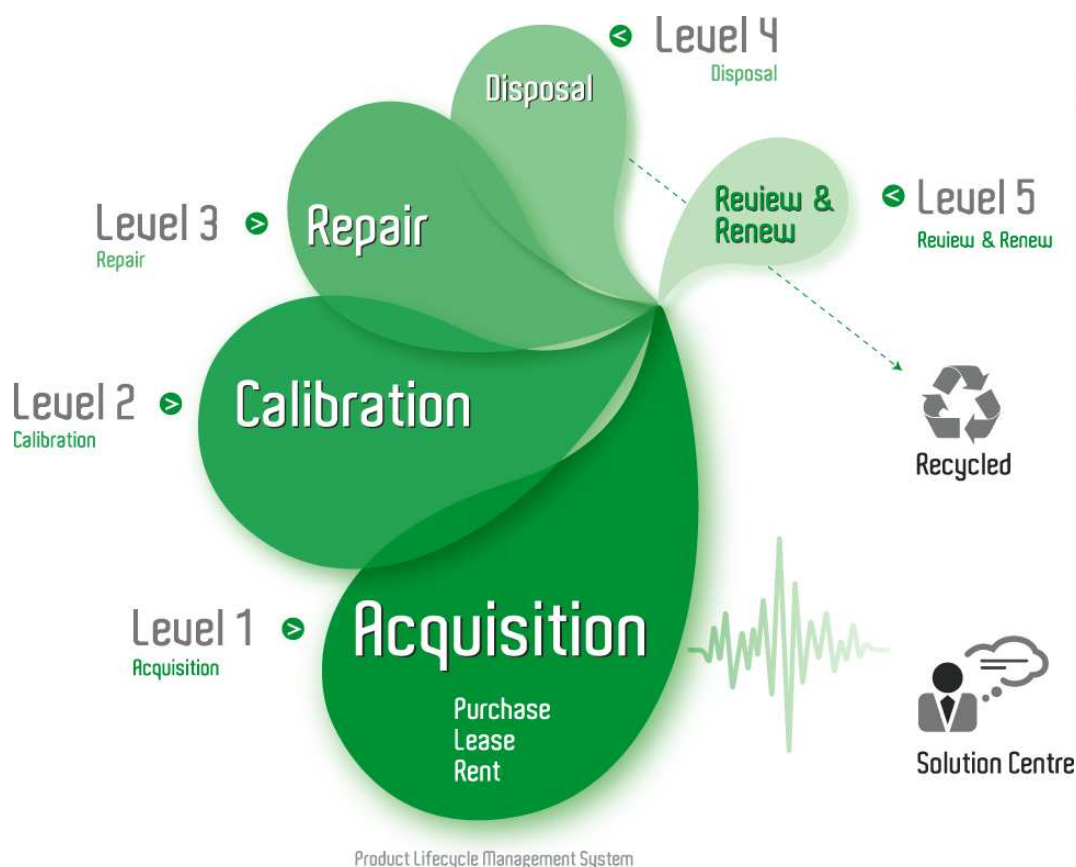
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Version
02.00

July
2007

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

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

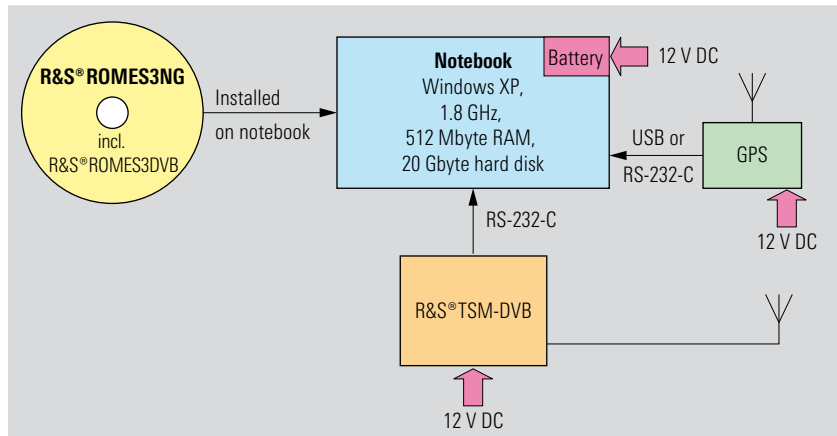
The R&S®TSM-DVB DVB-T/H diversity test receiver can be used for mobile coverage measurements. The R&S®ROMES drive test measurement software provides an effective driver to support the DVB-T/H receiver.

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.

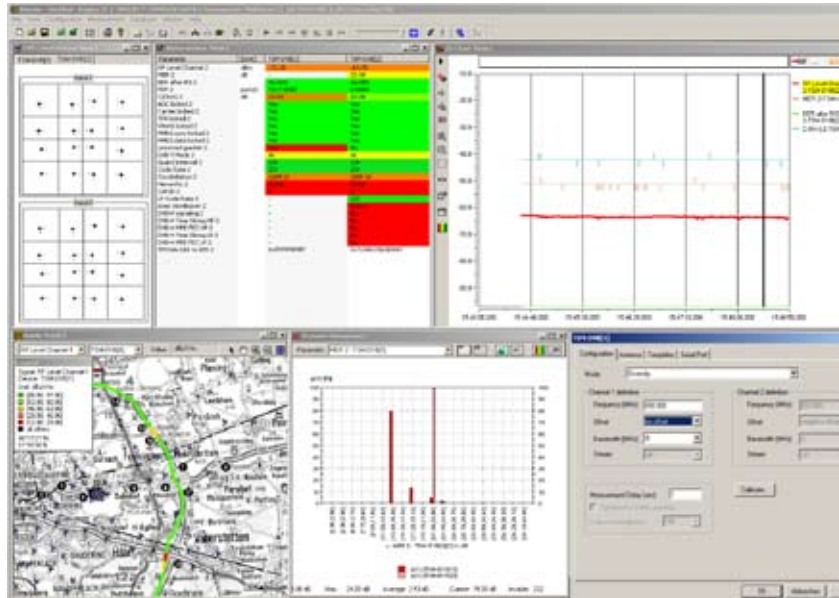
The R&S®TSM-DVB DVB-T/H diversity test receiver provides the following measurement parameters:

- ◆ 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).

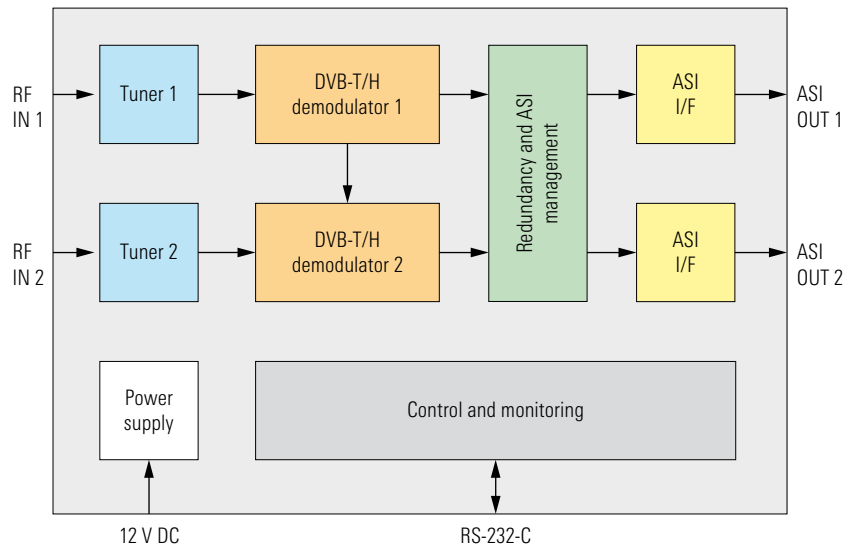


R&S® TS51GA drive test aluminum case

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

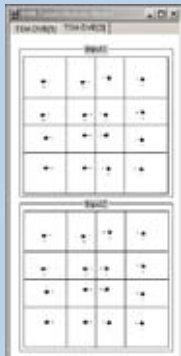
Features

- ◆ 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, $+15^{\circ}\text{C}$ to $+50^{\circ}\text{C}$) ± 3 dB (level ≤ -30 dBm, 0°C to $+15^{\circ}\text{C}$)
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 $\times$ W $\times$ D)	83 mm $\times$ 154 mm $\times$ 224 mm (3.3 in $\times$ 6.1 in $\times$ 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®TSM-DVB-Z1	1503.4008.02
DVB-T/H Antenna Magnet Mount	R&S®TSM-DVB-Z2	1503.4014.02
DVB-ASI Decoder (PCI) for R&S®TSM-DVB	R&S®TSM-DVB-Z3	1503.4020.02
DVB-ASI Decoder (USB) for R&S®TSM-DVB	R&S®TSM-DVB-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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