Data sheet

Version 01.00

September 2003

Radio Network Analyzer R&S®TSMU

UMTS PN Scanner Compact System (R&S TSMU + R&S ROMES-US2)

- Easy, time-saving and high-precision UMTS coverage measurements and network optimization
- Handy, portable and compact solution
- Indoor/outdoor and autonomous solutions
- GPS system with mapped measured values
- IEEE 1394 (FireWire) high-speed data interface to PC
- Optional mass storage medium for measurement data with high capacity hard disk
- Low power consumption (approx. 15 W max)
- Wide-range power supply 9 V to 18 V DC
- Standard processor platform, PCs or notebooks with Windows 2000/XP can be used

ROHDE&SCHWARZ

Compact, powerful and bargain solution for

Introduction

Network installation and optimization work on 3GPP networks requires measurement tools that are increasingly smart, portable and powerful. The R&S TSMU provides unmatched capabilities for network analysis and optimization.

When used in combination with software option R&S ROMES-US2, the Radio Network Analyzer R&S TSMU is a powerful instrument for UMTS interference analysis and network scanning on 3GPP networks.

The unit is unmatched regard to price, performance and mechanical dimensions among analysis tools for network optimizations.

The system consists of:

- Radio Network Analyzer R&S TSMU
- Network Optimization Software R&S ROMES
- Software driver R&S ROMES-US2 for R&S TSMU
- GPS with PPS pulse and/or synchronization unit for triggering (option)
- PC or notebook/tablet PC with IEEE 1394 interface

The instrument comes in a robust aluminium case with an optional assembly unit for mounting in 19" racks. Space has been reserved inside the unit to accommodate future optional extensions.

Description

The Network Analyzer R&S TSMU receives selective one UMTS channel, converts it continously to a digital I/Q signal, prepares it independently of GPS position data and provides the temporary stored data to a FireWire interface.

RF front end

High quality parts as well as decades of experience in development and production of measuring receivers and spectrum analyzers guarantee highest sensitivity and signal quality.

Radio Network Analyzer R&S TSMU

The unit consists of three main components

- High-quality RF frontend
- Processing unit with a platform FPGA and an embedded Motorola Power PC
- DC power supply unit

The objective of the RF frontend is to provide frequency conversion from an RF input (UMTS: 2110 MHz to 2170 MHz, PCS: 1930 MHz to 1990 MHz) to an intermediate frequency (IF) of 31.25 MHz. The IF signal is down-sampled with 25 MHz/ 12 bit to a digital IF output.

Several interfaces at the rear panel

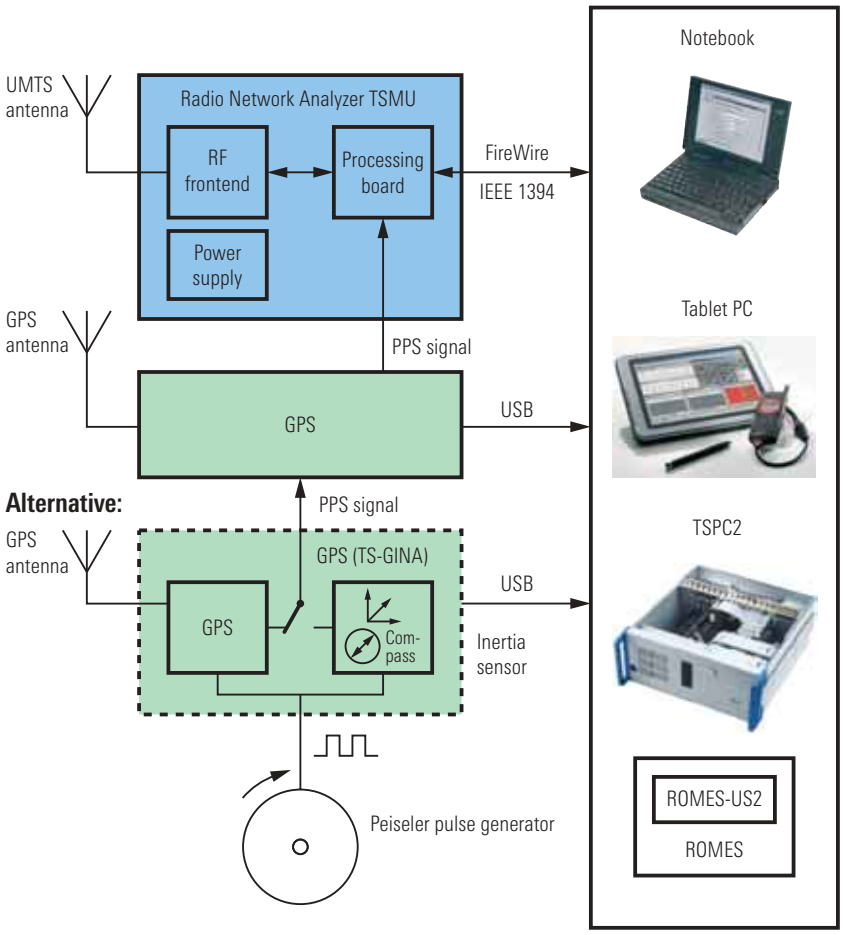
RF measurements and investigations on 3GPP networks

Processing board
Supplied with a latest-generation field programmable gate array (FPGA) with an integrated Power PC, the unit is highly flexible, compact and offers very low power consumption.

The digital IF data is transferred to the local 64 MB memory of the processing board. A separate and independent process transfers the digital IF data from the memory via an IEEE 1394 interface to the PC. Additional functions on the processor board control the settings of the RF frontend (RF attenuation, IF and RF amplification) evaluate the command frames from the PC and synchronize the time of the IF sampling data to the high precision pulse per second (PPS) signal of a global positioning system (GPS) receiver.

The configuration and boot process of the FPGA also represents a very flexible solution.

Every time the R&S TSMU is switched on, the FPGA and the processor read out the configuration and boot code from a flash memory card.



Block diagram of R&S TSMU

R&S TSMU with a powerful notebook, GPS and UMTS test mobile

Replacing the flash card or selecting another configuration file on the flash card enables the user to create different functionality for the analyzer. This makes the unit extremely flexible for future applications and updates.

The application firmware is to be loaded from R&S ROMES via FireWire interface into the R&S TSMU. To provide the R&S TSMU with a new firmware version, only a new software driver (R&S ROMES-US2) is required.

DC Supply Unit
The R&S TSMU also contains an internal DC power supply. The supply unit converts a wide input voltage of 9 V to 18 V and provides the various supply voltages for the different boards.

In addition, voltage level and temperature are monitored, and the equipment is switched to standby mode if a failure occurs.

Interfaces
The rear panel contains several interfaces:

- Two IEEE 1394 connectors for high-speed data transfer to the PC
- Wide-range DC power supply input
- N-type connector for UMTS antenna
- Universal TTL input BNC connector for use as a PPS input or another triggering signal
- Universal TTL output BNC connector for the internal 10 MHz reference signal or any other output trigger
- Serial interface for a GPS receiver and service

GPS system

A GPS system provides the position data for the measurement equipment or the measurement vehicle via GPS PPS signal. In case of small and portable solutions with notebook or tablet PC mostly a fully satellite supported GPS comes into operation.

If the satellite signal is missing, the system substitutes missing data dynamically by

- inertia sensor to recognize speed up, slow down and direction
- Peiseler pulse generator for the passed distance

Ultra portable solution with a tablet PC, GPS and UMTS test mobile

GPS R&S TS-GINA for highest precise measurements (option)
During the measurement tours, eg through tunnels, sometimes the satellite signal is not available. Therefore Rohde & Schwarz offers the GPS R&S TS-GINA for highest precise measurements.

Application R&S ROMES

The final finish and presentation of the measurement data is performed by the Network Optimization Software R&S ROMES. The software driver R&S ROMES-US2 is an interface between R&S TSMU and R&S ROMES.

The ROMES bundles run on a powerful PC, eg R&S TSPC2, a notebook or for very compact solutions also on a tablet PC. An operating system Windows 2000/XP and a Firewire or an USB interface are recommended.

Specifications

Frequency	
Frequency range	100 kHz to 3 GHz
Frequency accuracy	2 ppm
Frequency accuracy with PPS	0.05 ppm
Aging	2 ppm/year
Temperature drift	2 ppm (0 °C to +30 °C)
Spectral purity (SSB phase noise) f = 500 MHz, +20 °C to +30 °C 30 kHz from carrier 100 kHz from carrier 1 MHz from carrier	 <85 dBc (1 Hz) <100 dBc (1 Hz) <120 dBc (1 Hz)
Bandwiths Resolution bandwiths (–3 dB) Tolerance	 1 kHz to 1 MHz in 1, 3 steps ±5%
Amplitude	
Maximum permitted DC voltage at RF input Maximum power RF input range RF attenuation Noise figure Level acccuracy 1 dB compression point	50 V 20 dBm –130 dBm to 20 dBm 0 dB to 30 dB in 10 dB steps 10 <1.5 dB 0 dBm (RF attenuation 0 dB)
Interfaces front panel	
Monitoring LEDs for displaying status information of the unit Error in power supply Over-temperature Power-on, standby Configuration status Status of the application programm	 ERROR PWR ERROR TEMP PWR/STB CONFIG STATE/ERROR FPGA BOOT/RUN
Main switch, button	POWER
Reboot of the TSMU unit, button	RESET
Interfaces rear panel	
FIREWIRE I + II High-speed data connection to PC	IEEE 1394 6-pin female 400 Mbit/s
RF IN RF connection to the UMTS antenna	 N, female 50 Ω
RS-232-C Serial interface for GPS receiver, service purposes and dignostics	 9 pin D-Sub, male
DC IN Power supply input	 3 pin bayonet, 9 V to 18 V DC
PULSE IN GPS input	 BNC connector, female, TTL-pps
PULSE OUT 10 MHz reference signal output	 BNC connector, female, TTL
SMARTCARD	compact flash card, 256 MB
General data	
Operating temperature range Storage temperature range	+5 °C to +45 °C –20 °C to +70 °C
Relative humidity at +40 °C	95 %
Sinusoidal vibration 5 Hz to 150 Hz at 55 Hz Random vibration 10 Hz to 500 Hz Shock (shock spectrum)	max 2 g max 2 g 40 g
EMC EN61326-1 1997 1998 2001	 + A1 + A2 e1 95/54/EG E1 ECE-R10
Electrical safety EN61010-1	1993 + A2: 1005
Quality standard DC	developed and manufactured in compliance with ISO 9000
Power supply	9 V to 18 V
Dimensions (W × H × D)	150 mm × 80 mm × 170 mm
Weight (basic version)	1.5 kg

Certified Quality System ISO 9001 DQS REG. NO 1954 QM

Certified Environmental System ISO 14001 DQS REG. NO 1954 UM

Ordering information

Order designation	Type	Order No.
Radio Network Analyzer	TSMU	1153.6000.02
Accessories supplied Suitcase CD with handbook, application software Documentation „Getting Started" UMTS antenna with cable (1,5 m), adapter for UMTS antenna (SME to N, 1,5 m) Power supply cable with cigarette lighter connector IEEE 1394 cable (2 m)		
Extras		
PN Scanner Software Package (includes ROMES Basic, GPS driver, export filter, indoor, NQA and TSMU driver)	TSMU-K1	1163.3010.02
Nokia 6650 UMTS Test Mobile Ext. (option for TSMU-K1: includes Nokia 6650 test mobile, test firmware, Nokia driver, car kit)	TSMU-Z10	1163.2995.02
Software Update Contract (for TSMU-K1 and TSMU-Z10, valid 1 year)	TSMU-ZU5	1163.3004.02
230 V AC/12 V DC Power supply	TSMU-Z1	1166.3786.02
19" Rack Adapter, 2 HU	TSMU-Z2	1153.6700.02
Standard Documentation of Calibration Values	DCV-1	0240.2187.15
Extended Documentation of Calibration Values	DCV-2	0240.2193.15

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