

Version
03.00May
2004

Radio Network Analyzer R&S® TSMU

UMTS PN Scanner Compact System (R&S® TSMU + R&S® TSMU-K1)

- ◆ Easy, time-saving and high-precision UMTS coverage measurements and network optimization
- ◆ Handy, portable and compact solution (150 mm × 80 mm × 170 mm, 1.5 kg)
- ◆ Indoor/outdoor solutions
- ◆ Multiband measurement up to 12 frequencies in parallel
- ◆ GPS system with mapped measured values
- ◆ IEEE 1394 (FireWire) high-speed data interface to PC
- ◆ Low power consumption (typ. 8 W)
- ◆ 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®TSMU-K1, 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 R&S®TSMU-K1 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 selectively receives up to 12 UMTS channels, converts them continuously to digital I/Q signals, prepares them independently of GPS position data and delivers the temporary stored data to a FireWire interface.

RF frontend

High quality parts as well as decades of experience in development and production of measuring receivers and spectrum analyzers ensure 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

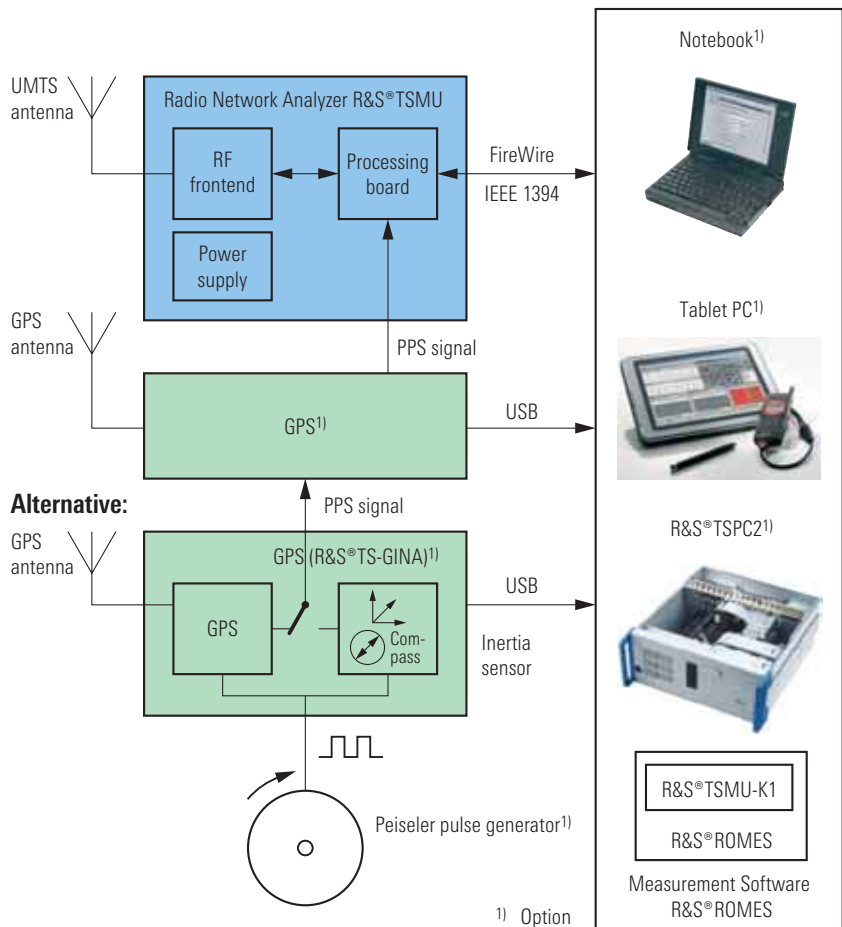
Processing board

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 Mbyte 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 front-end (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 system R&S®TSMU



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

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 system¹⁾

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 distance¹⁾



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

GPS R&S®TS-GINA for highest precise measurements¹⁾

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

¹⁾ Option

Application R&S®TSMU-K1¹⁾

The final finish and presentation of the measurement data is performed by the Network Optimization Software R&S®ROMES. The software R&S®TSMU-K1 is a full application package. It supports indoor and outdoor applications, network quality tests and data export for external evaluation tools.

The R&S®ROMES bundles run on a powerful PC, e.g. R&S®TSPC2, a notebook or for very compact solutions also on a tablet PC. An operating system Windows2000/XP and a Firewire or an USB interface are recommended.

Specifications

Frequency	
Frequency range	80 MHz to 3 GHz
Frequency accuracy	2 ppm
Frequency accuracy with PPS	0.005 ppm
Aging	2 ppm/year
Temperature drift	2 ppm (0°C to +30°C)
Bandwidths	
Resolution bandwidths (–3 dB)	15 kHz to 4 MHz
Tolerance	±5%
Amplitude	
Maximum permitted DC voltage at RF input	3 V
Maximum power	
R&S®TSMU	10 dBm
R&S®TSMU-H	20 dBm
RF input range	
R&S®TSMU	–120 dBm to –20 dBm
R&S®TSMU-H	–105 dBm to 15 dBm
RF attenuation (only R&S®TSMU-H)	0 dB to 30 dB in 10 dB steps
Noise figure	
R&S®TSMU	10 dB
R&S®TSMU-H	25 dB
Level accuracy (+20°C to +30°C)	
R&S®TSMU, input power ≥–80 dBm	
f≤2.5 GHz	<±1.5 dB
f>2.5 GHz	<±1.9 dB
R&S®TSMU-H, input power ≥–70 dBm	
f≤2.5 GHz	<±1.5 dB
f>2.5 GHz	<±1.9 dB
1 dB compression point	
R&S®TSMU	typ. –15 dBm
R&S®TSMU-H	typ. 0 dBm
Interfaces front panel	
Monitoring LEDs for displaying status information of the unit	
Error in power supply	ERROR PWR
Over-temperature	ERROR TEMP
Power-on, standby	PWR/STB
Configuration status	CONFIG STATE/ERROR
Status of the application program	FPGA BOOT/RUN
Main switch, button	POWER
Reboot of the R&S®TSMU unit, button	RESET
Interfaces rear panel	
FIREWIRE I + II	IEEE 1394 6-pin female
High-speed data connection to PC	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 diagnostics	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, 32 Mbyte

General data	
Temperature	
Operating temperature range	+5°C to +45°C
Storage temperature range	–20°C to +70°C
Relative humidity	95% at +40°C (IEC 60068)
Mechanical resistance	
Sinusoidal vibration	to EN 60068-2-1, EN 61010-1 5 Hz to 55 Hz: max. 2 g 55 Hz to 150 Hz: 0.5 g constant, 12 minutes per axis to EN 60068-2-64 10 Hz to 500 Hz, 1.9 g, 30 minutes per axis to EN 60068-2-27 40 g shock spectrum
Random vibration	
Shock	
Electromagnetic compatibility	to EMC directive of EU (89/336/EEC) to EMC directive of EU (95/94/EG) to EMC directive of UNO (ECE R10)
Electrical safety	to EN 61010-1
Quality standard DC	developed and manufactured in compliance with ISO 9000
Power supply	
External DC voltage	9 V to 18 V
Power consumption	typ. 650 mA at 13.5 V DC
Dimensions (W × H × D)	150 mm × 80 mm × 170 mm
Weight (basic version)	1.5 kg

Ordering information

Order designation	Type	Order No.
Radio Network Analyzer	R&S®TSMU R&S®TSMU-H	1153.6000.02 1153.6000.03
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)		
Options		
PN Scanner Software Package (includes R&S®ROMES Basic, GPS driver, export filter, indoor, NQA and R&S®TSMU PN Scanner Driver)	R&S®TSMU-K1	1163.3010.02
CW Software Package (includes R&S®ROMES Basic, GPS driver, export filter, indoor, NQA and R&S®TSMU CW driver)	R&S®TSMU-K2	1163.3010.04
CW Measurement Software Upgrade Package for R&S®ROMES R&S®TSMU-K1	R&S®TSMU-KU2	1163.3010.06
Nokia 6650 UMTS Test Mobile Ext. (option for R&S®TSMU-K1: includes Nokia 6650 test mobile, test firmware, Nokia driver, car kit)	R&S®TSMU-Z10	1163.2995.02
Tablet PC for Drive Tests	R&S®TS-TB1	1070.5872.13
GPS (Garmin) with PPS Pulse	R&S®TS95GPS	1090.8348.04
Software Update Contract (for R&S®TSMU-K1 and R&S®TSMU-Z10, valid 1 year)	R&S®TSMU-ZU5	1163.3004.02
230 V AC/12 V DC Power supply	R&S®TSMU-Z1	1166.3786.02
19" Rack Adapter, 2 HU	R&S®TSMU-Z2	1153.6700.02
Extended Documentation of Calibration Values	R&S®DCV-2	0240.2193.15

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



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