Version 02.00
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R&S®TSML-G Radio Network Analyzer

GSM network scanner

- GSM network scanner for all GSM bands (GSM 450/850/900/1800/1900 + GSM-E + GSM-R), with system information type decoder
- Low power consumption
- Attractive pricing
- Handy, portable, and compact solution
- RF-shielded, solid case
- Fast data transfer via IEEE 1394 (FireWire) interface
- Indoor/outdoor solutions
- Controlled via R&S®ROMES drive test software
- Open user interface based on C++

ROHDE&SCHWARZ

The R&S®TSML radio network analyzer family

At a glance

The radio network analyzers of the R&S®TSML family are the ideal choice if you want to carry out quick, efficient, precise, and cost-effective measurements in order to optimize your mobile radio network.

Do you need to cover only one specific application? Does your work focus on only one of the following: WCDMA, IS-95 and CDMA2000® 1X[1], GSM, or RF power measurements? Do you want to buy only what you truly need? Then the R&S®TSML radio network analyzers are the right choice for you.

Family concept

We offer five different radio network analyzers, allowing you to choose the instrument that optimally matches your specific requirements. The R&S®TSMU radio network analyzer from Rohde&Schwarz, which offers unparalleled functionality, is already firmly established on the market. It has now been joined by the R&S®TSML family of analyzers, which includes four different types. Each type has been designed to cover a specific application.

- R&S®TSML-W: WCDMA PN scanner
- R&S®TSML-C: IS-95 and CDMA2000® 1X PN scanner
- R&S®TSML-G: GSM network scanner
- R&S®TSML-CW: RF power measurements (CW application)

Benefits

- Wideband receivers (80 MHz to 6 GHz for the R&S®TSML-CW) → four different models covering all GSM, WCDMA, IS-95 and CDMA2000® 1X bands, and universal RF power → **universal usage of one technology reduces investment costs**
- Open user interface → allows customers to use the R&S®TSML-x in their own environment using dedicated or customized software as well as R&S®ROMES drive test software → **universal and customer-specific applications**
- Parallel operation of several R&S®TSML analyzers → for example, parallel WCDMA and GSM measurements for handover analysis → **reduces measurement time and costs**
- Light and compact design → ideal for drive test applications → **easy integration in vehicles and convenient use in a backpack**
- Software control via R&S®ROMES drive test software → flexible and powerful user interface → **reduces startup time and also offers powerful applications for post-processing**
- Easy system expansion by other data acquisition devices, e.g. test mobile phones, GPS, or other receivers, etc → **cost-effective upgrade to new applications**

Product	Technologies
R&S®TSMU	all[2]
R&S®TSML-W	WCDMA
R&S®TSML-C	IS-95 and CDMA2000® 1X
R&S®TSML-G	GSM
R&S®TSML-CW	CW

The various radio network analyzers and their areas of application

[1] CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

[2] Includes WCDMA, CDMA2000®, GSM, and CW.

R&S®TSML-G GSM network scanner

C/I analysis with R&S®TSML-G and R&S®ROMES

The R&S®TSML-G is the high-performance hardware platform for GSM network scanning. In addition, application software is needed, e.g. R&S®ROMES drive test software, and a GPS system. The R&S®ROMES application software runs on a standard Windows PC or notebook.

The R&S®ROMES software includes GSM interference analysis in addition to the basic functionality. This analysis requires a base station list and a GSM test mobile phone. R&S®ROMES combines all information received from the R&S®TSML-G network scanner, the test mobile phone, the GPS system and the base station list and uses it to perform a comprehensive analysis. This allows interference of C0/C0, C0Cx, Cx/C0 and Cx/Cx to be detected, the source of interference to be analyzed and finally eliminated. Special windows enable easy interpretation of results of co-channel, adjacent channel or traffic channel interference.

Open user interface

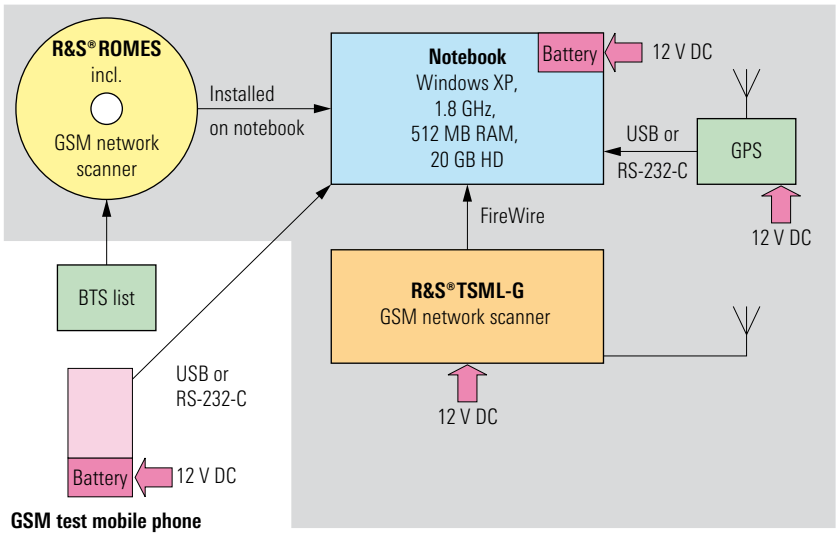
Experienced C++ developers are able to quickly integrate the R&S®TSML as a measurement device into their own application. This offers a wide range of dedicated customer-specific applications and allows the R&S®TSML to be used in existing standard drive test tools.

The R&S®TSML comes with a detailed description of the open user interface for controlling the R&S®TSML and forwarding measurement data to the PC. The equipment supplied includes C++ libraries and also a ready-made demo application.

Features

- Highly effective, time-saving GSM network optimization, independent of infrastructure
- All-band (GSM 450/850/900/1800/1900 + GSM-E + GSM-R), multi-channel capability from a single measurement setup
- Higher speed, higher accuracy compared to test mobile phones; no authentication necessary
- Combined operation with GSM/GPRS/EDGE test mobile phones for triggering and signaling
- Detection of roaming problems and interference caused by operators in neighboring countries
- Automatic off-the-air measurement, SCH code power measurement, and demodulation of all GSM channels – decoding of "System Information Type 3", including ARFCN, RF level, NCC, BCC, CI, LAC, MNC, MCC, base station name and position (if included in database)
- Delivery of area coverage data, i.e. one measurement value for one time stamp and one position

R&S®TSML-x and R&S®TSMU radio network analyzers



Block diagram of GSM network scanner with all components needed for GSM network scanning and interference analysis

Specifications

General RF data	
RF frequency range	80 MHz to 3 GHz
Noise figure	typ. 10 dB (f ≤ 2.2 GHz, preamplifier ON)
Maximum input power	–10 dBm
IP3	
Preamplifier ON	typ. –9 dBm
Preamplifier OFF	typ. +3 dBm
1 dB compression point	–15 dBm
Reference frequency aging	1 ppm/year
Reference frequency temperature drift	2 ppm (0 °C to +30 °C) additionally 2 ppm/10 °C (+30 °C to +40 °C)
Reference frequency accuracy	±0.01 ppm (GPS PPS synchronized)
GSM	
Time base for synchronization	internal GPS pulse per second (PPS) signal GSM (sync channel)
Bands	GSM 420/450/750/850/900/1700/1800/1900, GSM-E/-R

Measurement mode	SCH code power measurement TCH total in-band power measurement demodulation of BCCH "System Information Type 3"
Measurement rate	up to 40 channels/s with SCH demodulation typ. 3.2 s, max. 4 s for GSM 900 band typ. 10 s, max. 14 s for GSM 1800 band"
Power measurement dynamic range	–112 dBm to –20 dBm
Power measurement accuracy	typ. ±1 dB
Probability of first BSIC detection versus co-channel C/I	98 % for C/I >+2 dB
BSIC detection after first decoding versus co-channel C/I	C/I >–11 dB
Minimum C/I for SCH code power measurement after first BSIC decoding	C/I >–11 dB
Minimum C/I for first BCCH demodulation (CI, MNC, MCC, LAC)"	C/I >2.5 dB

Specifications cont.

Rear-panel interfaces	
FIREWIRE I + II	IEEE 1394 female, 6-pin, high-speed data connection to PC, 400 Mbit/s
RF IN	N female, input impedance 50 Ω, VSWR typ. 2.0
RS-232-C	D-Sub male, 9-pin, serial interface for servicing and diagnostics
DC IN	snap and lock jack, 3-pin, power supply input, 9 V to 18 V DC
PULSE IN	BNC female, 3 V to 5 V, TTL input for GPS pulse per second (PPS) pulse (falling edge with high precision)
PULSE IN/OUT	BNC female, multifunctional (e.g. distance trigger input), valid input range 3 V to 15 V
SMARTCARD	compact flash card, 512 Mbyte
Front-panel interfaces	
POWER	button, main switch
RESET	button, reboot of R&S®TSML
8 monitoring LEDs	for displaying analyzer status information

General data	
Operating temperature range	0 °C to +45 °C
Storage temperature range	–20 °C to +70 °C
Humidity	95 % relative humidity at +40 °C
Vibration	
Sinusoidal	5 Hz to 150 Hz, max. 2 g at 55 Hz
Random	10 Hz to 500 Hz
Shock	40 g shock spectrum
EMC	EN 61326-1: 1997 + A1: 1998 + A2: 2001 E1 95/54/EC E1 ECE-R10
Electrical safety	EN 61010-1: 1993 + A2: 1005
Quality standard	developed and manufactured in line with ISO 9000
Power supply	9 V DC to 18 V DC
Power consumption	650 mA at 12 V DC
Dimensions (W × H × D)	150 mm × 80 mm × 170 mm (5.9 in × 3.1 in × 6.7 in)
Weight	1.5 kg (3.3 lb)

Ordering information

Designation	Type	Order No.
Radio Network Analyzer, GSM Network scanner	R&S®TSML-G	1153.6000.13
Accessories supplied: CD including manual, R&S®TSML software and IEEE 1394 driver; Getting Started documentation; power supply cable with cigarette lighter connector 2 m; 2 × IEEE 1394 FireWire cables 1.5 m (1 × 4/6, 1 × 6/6)		
Recommended options and accessories		
Power Supply 230 V AC/12 V DC/6 A for R&S®TSML	R&S®TSMU-Z1	1166.3786.02
19" Rack Adapter for R&S®TSML; max. 2 × R&S®TSML	R&S®TSMU-Z2	1153.6700.02
Accessories: indoor backpack system; 2 × rechargeable battery, 3000 mAh; battery charger; universal fixture for two test mobile phones without external antenna connection; USB hub; interface cables	R&S®TSMU-Z3	1153.6900.02
Documentation of Calibration Values	R&S®DCV	0240.2193.15
Drive Test Software	R&S®ROMES	1143.7991.30
Replay Software	R&S®ROMES-R	1143.7991.03

More information at
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(search term: TSML)

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