



## Radio Network Analyzer R&S®TSMU/TSMU-H

Universal platform for coverage measurements

- ◆ UMTS PN scanning (bands I to VI) with BCH (SIB) decoder (R&S®TSMU)
- ◆ GSM network scanning (bands 850, 900 public/extended/rail, 1800, 1900) with system type info decoder (R&S®TSMU)
- ◆ Power measurement from 80 MHz to 3 GHz (R&S®TSMU)
- ◆ EMF applications (R&S®TSMU-H)



**ROHDE & SCHWARZ**

## At a glance

Never before has so much performance been available in such a small package. The Radio Network Analyzer R&S®TSMU is a uniquely compact solution for coverage testing of UMTS, GSM and other networks. All expertise in receiver and signal-processing technology has been combined in a unit that offers amazing capabilities.

## Benefits

- ◆ Wideband receiver → applications possible with the same hardware for different technologies (GSM, UMTS, CDMA2000®, RF power, etc) → **universal usage, reduces investment costs**
- ◆ Modular concept → different applications covered by same basic hardware (indoor, outdoor, interference, QoS, etc) → **future-proof, easy upgrade to new technologies**
- ◆ Operation of several R&S®TSMU analyzers in parallel → for example, parallel UMTS 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 measurement software → flexible and powerful user interface → **reduces startup time and also offers powerful applications for post-processing**
- ◆ Easy system extensions with other sensors, e.g. test mobile phones, GPS, receivers, etc → **cost-effective upgrade to new applications**

# UMTS PN scanner application

with the R&S®TSMU plus R&S®TSMU-K11/K14 and R&S®ROMES

The PN scanner system measures basic RF parameters of the UMTS network. The actual carriers of the UMTS signal, the pseudo-random noise (PN) codes, are detected and determined along with their power, scrambling code, and quality parameters or with their S/N ratios and timing. All data can be immediately analyzed or stored for subsequent processing. A wide variety of display modes ensures that UMTS parameters and network coverage quality are easy to examine.

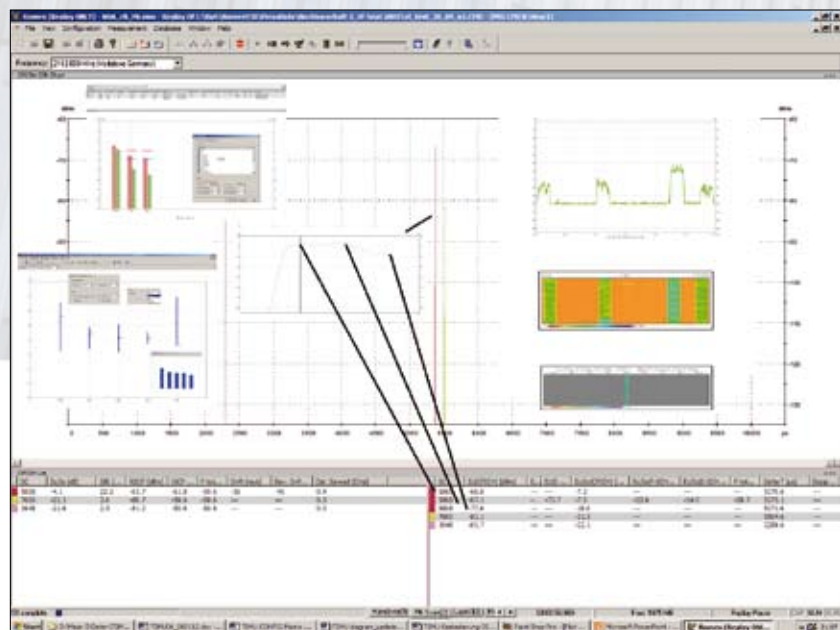
Three basic test modes for the UMTS PN scanner are available:

- ◆ High-speed mode: standard test mode
  - Measurement on 12 channels (carriers) in parallel
  - 20 measurements per second
  - 2500 dynamic rake receivers

- Timing parameter analysis: drift, deviation, delay spread, delta time, Doppler frequency shift
- ◆ High-dynamic mode: highly sensitive mode for small signal analysis
- ◆ Ultra-high-speed mode: scientific mode for fading effect analysis and EMF tests on one scrambling code, tracer view for one scrambling code

What you can see on the display:

- ◆ CPICH view with analysis of scrambling codes, timing parameter and zoom on multipath signal
- ◆ Tracer view for one scrambling code
- ◆ Spectrum view for uplink and downlink bands in parallel
- ◆ Waterfall diagram for analysis of outband interferers, for example
- ◆ Top N view with SIB decoder and hard and soft pilot pollution
- ◆ Pilot view with measured scrambling codes





# GSM network scanner application / C/I analysis

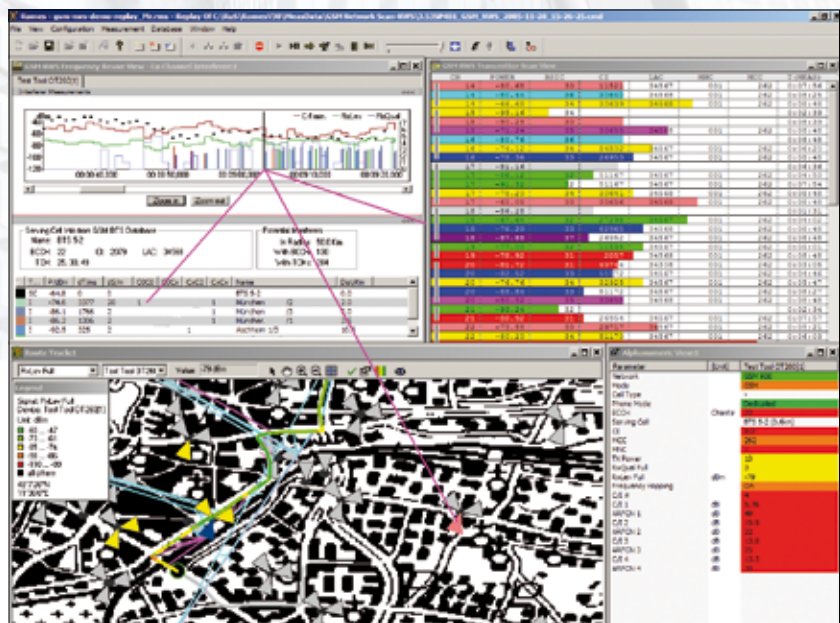
with the R&S®TSMU plus R&S®TSMU-K13 and R&S®ROMES

The R&S®TSMU is the high-performance hardware platform for a GSM network scanner. Coverage Measurement Software R&S®ROMES in combination with the R&S®TSMU-K13 GSM network scan driver and an optional GPS system are needed for a basic GSM network scan configuration. The application software runs on a standard PC or notebook with the Windows operating system.

GSM interference analysis is available as an extension to the basic system. A base station list and a GSM test mobile phone are needed in this case. The R&S®ROMES software combines all the information coming from the R&S®TSMU network scanner, the test mobile phone, the GPS system and the base station list for a complex analysis process. Special windows enable easy interpretation of the results.

Features:

- ◆ Highly effective, time-saving GSM/GPRS/EDGE network optimization, independent from infrastructure
- ◆ All-band (GSM 450/850/900/1800/1900 + GSM-E + GSM-R), multi-channel capability within one 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 by operators in neighboring countries
- ◆ Automatic measurement and demodulation of all GSM channels off-the-air – decodes system information types 1 to 4, including ARFCN, RF level, NCC, BCC, CI, LAC, MNC, MCC, base station name and position (if included in database)
- ◆ Delivers area coverage data, i.e. one measurement value for one time stamp and one position
- ◆ Integral part of the R&S®ROMES network optimization system software platform
- ◆ Measurement rate: 80 channels/s





# RF power measurement

with the R&S®TSMU plus R&S®TSMU-K15 and R&S®ROMES

Combining R&S®ROMES with the R&S®TSMU RF power measurement driver is an extremely flexible approach for drive tests. Multiple technologies such as GSM (all-band), UMTS/WCDMA or TETRA can be measured with a single R&S®TSMU RF receiver.

The RF power measurement can be performed either on one specific frequency, on a frequency band (or parts of it), and on a random list of frequencies, all between 80 MHz and 3 GHz.

The trigger for the measurement is delivered either internally or externally (distance pulse input). The driver automatically calculates the distance pulses to the trigger rate for the required distance (e.g. Lee criterion).

The R&S®TSMU is the high-performance hardware platform for the RF power measurement (CW application).

Coverage Measurement Software R&S®ROMES in combination with the R&S®TSMU-K15 RF power measurement driver and an optional GPS system are needed for a basic RF measurement configuration. The application software runs on a standard PC or notebook with the Windows operating system.

The main advantage of the R&S®TSMU RF measurement compared to dedicated solutions (restricted to one band, e.g. GSM 900 or GSM 1800) is the broad RF frequency range, from 80 MHz to 3 GHz. This makes universal application possible.

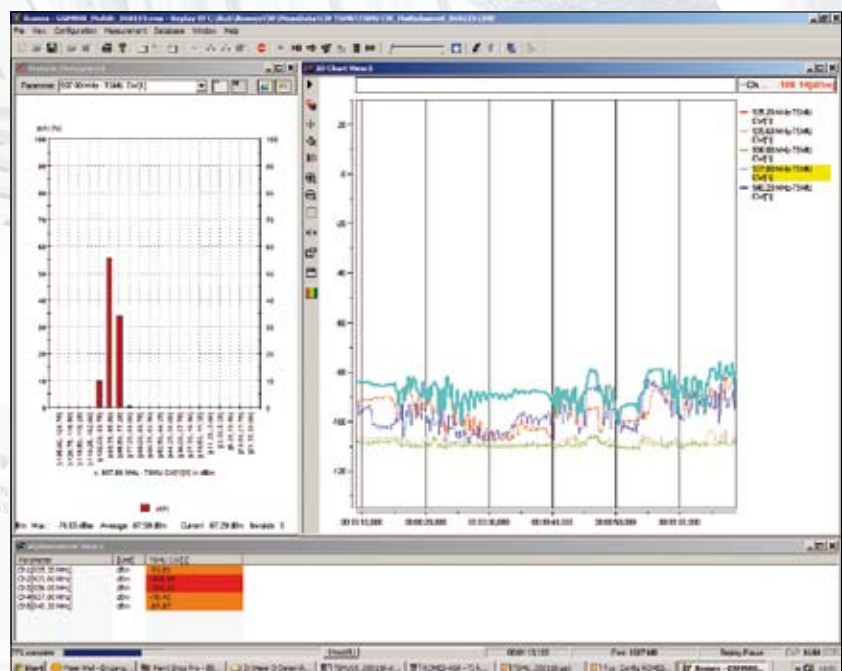
The R&S®TSMU RF measurement can be applied to:

- ◆ Broadcast bands
- ◆ TV bands
- ◆ TETRA

- ◆ All GSM bands (450/850/900/1800/1900 MHz)
- ◆ UMTS bands I to VI
- ◆ All other frequencies in the range 80 MHz to 3 GHz

Features:

- ◆ Multitechnology and multiband
- ◆ User-configurable frequency range 80 MHz to 3 GHz
- ◆ Optimized for fast and accurate power measurement (e.g. 20 GSM channels with 1.6 ms cycle time)
- ◆ Single-frequency, frequency-list, frequency-band measurements
- ◆ Time- and distance-triggered measurements (distance under development)
- ◆ Generation of data in accordance with Lee criterion (with external distance trigger, under development)
- ◆ Automatic and manual tracking (test mobile phone reports, RF to be set)





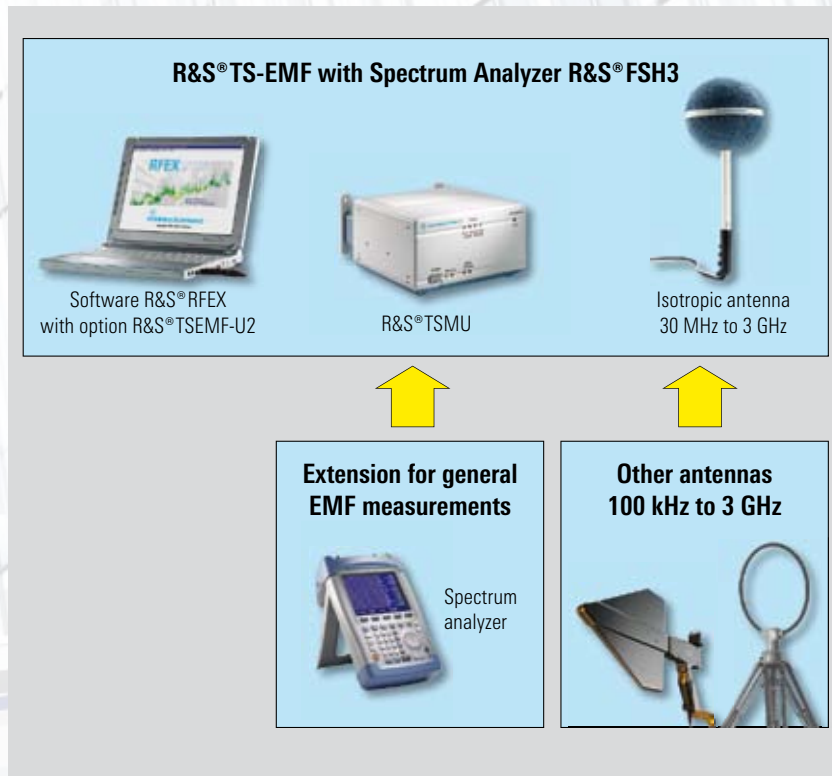
# EMF measurements

with R&S®TSMU-H and R&S®RFEX software

For electromagnetic field (EMF) measurements, the R&S®TSMU-H is used in combination with the EMF Measurement System R&S®TS-EMF, implementing the R&S®RFEX software. R&S®RFEX is a special software application designed for EMF tests. Whereas field-strength measurements with a spectrum analyzer are sufficient for most other services, CPICH decoding is necessary for UMTS in order to extrapolate to maximum traffic and to allocate an emission to a base station.

Important features of R&S®TS-EMF with R&S®TSMU:

- ◆ High measurement accuracy
- ◆ High measurement speed allowing the stirring method (maximum search by moving the antenna during the measurement)
- ◆ Bargraph display of actual and maximum values, acoustic signal for new maximum
- ◆ Easy configuration and use
- ◆ Easy extrapolation by report in Excel





More information at  
[www.tsmu.rohde-schwarz.com](http://www.tsmu.rohde-schwarz.com)



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