



Version
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R&S®TSML-CW Radio Network Analyzer

RF power measurements (CW application)

- ◆ Power measurements from 80 MHz to 6 GHz
- ◆ 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
- ◆ The R&S®TSML performs RF measurements on:
 - Broadcast bands
 - TV bands
 - TETRA
 - All GSM bands (450/850/900/1800/1900 MHz)
 - UMTS bands I to IX
 - WiMAX
 - All other frequencies in the range from 80 MHz to 6 GHz



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® 1X¹⁾, 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.

RF power measurements with the R&S®TSML-CW

The R&S®TSML-CW radio network analyzer is an extremely flexible solution for mobile RF power measurements. Multiple technologies such as GSM (all-band), UMTS/WCDMA, WiMAX, or TETRA are measured by means of a single RF receiver. RF power measurements can be performed either on a single frequency, a frequency band (or parts of it), or a random list of frequencies, all in the range from 80 MHz to 6 GHz. Measurements can be triggered either internally (at intervals of 1 ms to 1 s, settable in steps of 1/2/5; 1.6 ms free run, 2 ms distance trigger), or externally (via the distance pulse

input). The RF power measurement driver automatically calculates the number of distance pulses required to yield the correct trigger rate (depending on the drive speed) for the set distance (e.g. Lee criterion).

The main advantage of the R&S®TSML-CW RF measurement application over dedicated solutions (restricted to one band, e.g. GSM900 or GSM 1800) is its broad RF frequency range extending from 80 MHz to 6 GHz. This enables universal use of the application.

Features

- ◆ Multitechnology, multiband
- ◆ User-configurable frequency range from 80 MHz to 6 GHz
- ◆ Optimized for fast and accurate power measurements
- ◆ Single-frequency, frequency-band, frequency-list measurements
- ◆ Time and distance pulse triggered measurements
- ◆ Data generation in accordance with Lee criterion (with external distance pulse trigger)
- ◆ Automatic and manual tracking (test mobile phone signals RF frequency to be set)



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

Minimum configuration for RF power measurements

- ◆ R&S®TSML-CW radio network analyzer
- ◆ R&S®ROMES drive test software or customer-specific application software
- ◆ GPS receiver with USB or RS-232-C interface and NMEA standard protocol
- ◆ External distance pulse generator (optional)
- ◆ State-of-the-art PC or notebook with IEEE 1394 interface (internal or external)

Specifications

General RF data	
RF frequency range	80 MHz to 6 GHz
Noise figure	typ. 10 dB ($f \leq 2.2$ GHz, preamplifier ON)
Maximum input power	-10 dBm
IP3	
Preamplicifier ON	typ. -9 dBm
Preamplicifier 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)
RF power measurement	
Time base for synchronization	GPS pulse per second (PPS) signal
Measurement mode	single frequency, multichannel
Frequency entry	single frequency, frequency list, frequency band
Level uncertainty	± 1.0 dB, typ. ≤ 4 GHz ± 2.5 dB, typ. > 4 GHz
Bandwidth (3 dB)	12.5 kHz to 4000 kHz (single frequency mode) 200 kHz to 4000 kHz (multichannel mode)
Channel power measurement dynamic range	-110 dBm to -20 dBm (GSM) -95 dBm to -20 dBm (WCDMA)
Sample acquisition time (multichannel mode)	100 μ s to 650 μ s
Measurement time	0.1 ms to 1000 ms
Minimum cycle time	1.6 ms
Frequency setting time	9.3 ms to 25 ms
Typical measurement rate (multichannel mode)	1.6 ms for 19 GSM-R channels 76 ms for 124 GSM 900 channels 208 ms for 373 GSM 1800 channels
Adjacent channel rejection	30 dB (GSM), 60 dB (WCDMA)
Detectors	peak, average, RMS
Trigger modes	time triggered (internal timebase), distance triggered (external trigger event)
IF attenuation	0/10/15 dB
Preamplicifier	10 dB auto/manual

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 (80 MHz to 3000 MHz), typ. 2.5 (> 3000 MHz)
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, RF Power Measurements	R&S®TSML-CW	1153.6000.15
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®TSML-Z1	1166.3786.02
19" Rack Adapter for R&S®TSML; max. 2 × R&S®TSML	R&S®TSML-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®TSML-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
www.rohde-schwarz.com
(search term: TSML)



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