



Version
01.00

February
2007

R&S® TSMQ Radio Network Analyzer

Just one drive test covers all standards

- ◆ Simultaneous multitechnology measurements in a single drive test
- ◆ WCDMA, GSM, CDMA2000® and CW
- ◆ Fastest scanner worldwide
- ◆ 3G multicarrier use for demodulating broadcast information
- ◆ Low weight and low power consumption: ultra-portable backpack
- ◆ Perfect for indoor use



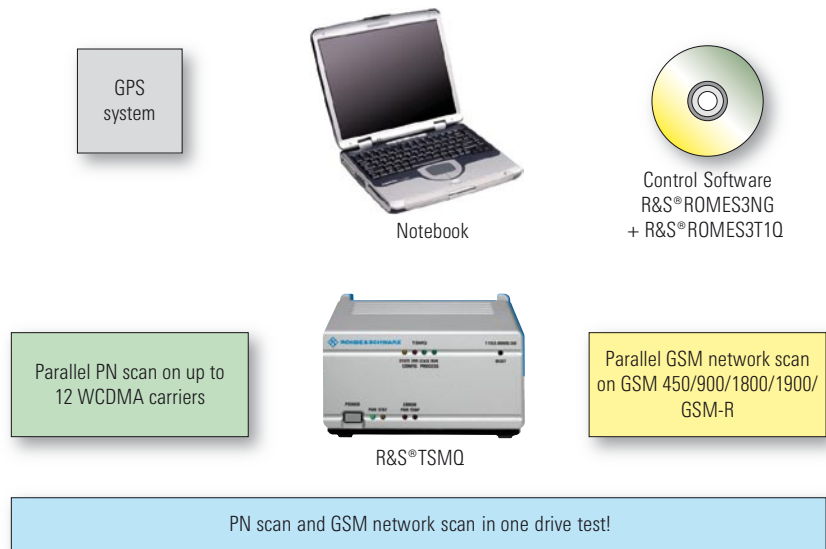
ROHDE & SCHWARZ

Unmatched capabilities for network analysis

Radio Network Analyzer	R&S®TSMU-W/-G/-C/-CW	R&S®TSMU	R&S®TSMQ
Technologies (WCDMA, GSM, CDMA, CW)	dedicated single technology	one at a time	several in parallel (except CW, which is separate)
VICOM interface for customer-specific software	yes	no	no
Performance	basic	fast	very fast

The R&S®TSMQ provides unmatched capabilities for cellular network analysis and optimization. The distinctive, compact-sized R&S®TSMQ allows WCDMA PN scanning, GSM network scanning, and CDMA2000® PN scanning simultaneously and with unsurpassed performance. In addition, analog RF power level measurements (CW) are supported. The wideband RF frontend offers maximum measuring flexibility in all frequency bands irrespective of the standard involved. Less common technology/frequency combinations such as UMTS900 are no problem for the R&S®TSMQ RF frontend architecture.

In combination with the R&S®ROMES software, the R&S®TSMQ is a powerful instrument for cellular network optimization. Neighborhood analysis is performed with just one receiver. Plus, the R&S®TSMQ can measure two or three technologies in parallel and monitor other networks during a single drive test. Network operators monitor not just the quality of their own networks, but also the quality of competitor networks.



R&S® TSMQ radio network analyzer for benchmark applications

The analyzer's low weight and low power consumption allow easy indoor use as a backpack system with a battery power supply. The mobile network characteristics of pedestrian malls, train stations, or shopping centers can be detected at the same quality as with drive-test vehicles.

Features

Fastest scanner on the market

- ◆ WCDMA PN scanning with up to 20 ms per measurement (50 Hz) in high speed mode
- ◆ GSM network scanning with up to 10 ms per channel (100 Hz)
- ◆ CDMA PN scanning with up to 100 ms per measurement (10 Hz)
- ◆ Analog CW power measurements with up to 1.6 ms per measurement (fulfilling Lee criterion even at high speeds)

Multitechnology measurements in a single drive test

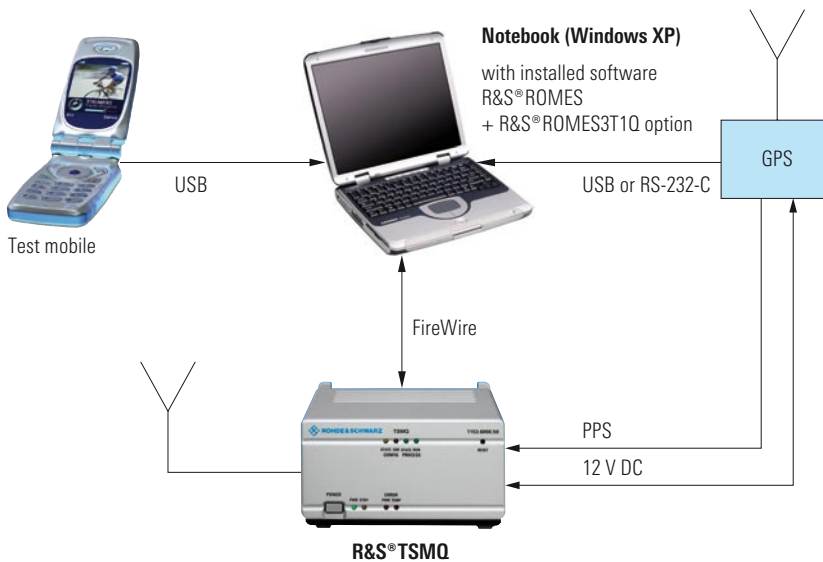
- ◆ Parallel operation of WCDMA PN scan, CDMA2000® PN scan, and GSM network scan
- ◆ Wideband RF frontend covering all bands for every R&S®TSMQ type
- ◆ WCDMA PN scanner for bands I to IX with user-defined 200 kHz resolution
- ◆ GSM network scanner for GSM 450/850/900/1700/1800/1900, GSM-E, GSM-R
- ◆ CDMA2000®1x PN scanner (SR1 band classes 1 to 10, including US Cellular, PCS 1900, European 450)
- ◆ RF receiver for power measurements from 80 MHz to 3 GHz

Multicarrier use and broadcast information demodulation

- ◆ 12 carriers in parallel in WCDMA/CDMA2000®
- ◆ Broadcast information decoding included (SIB 1-18 for WCDMA, MCC/MNC/LAC/CI/BSIC for GSM)
- ◆ Measurement of GSM and WCDMA neighborhoods in parallel
- ◆ Neighborhood analysis with just one receiver

Low weight and low power consumption

- ◆ Solid, RF-shielded case
- ◆ Low power consumption: 8 W
- ◆ Compact: 150 mm × 80 mm × 170 mm (5.51 in × 3.15 in × 6.69 in)
- ◆ Low weight: 1.5 kg (3.31 lb)
- ◆ Ideal as backpack system and for indoor applications



In combination with the R&S®ROMES software, the R&S®TSMQ is a powerful instrument for cellular network optimization

Benefits

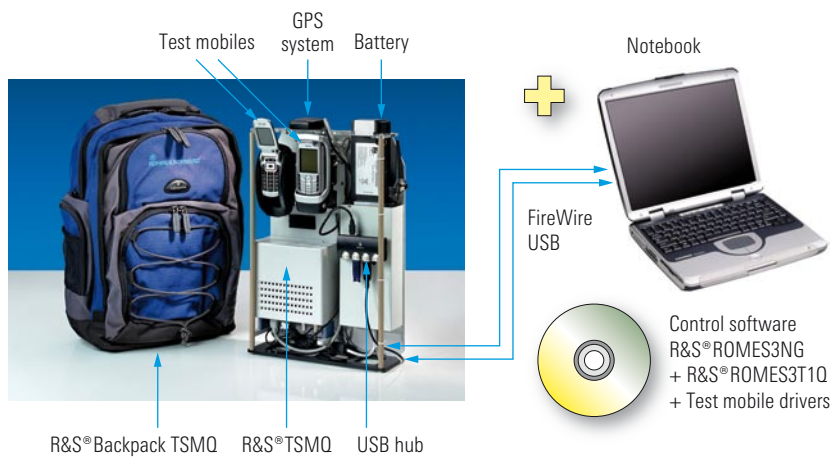
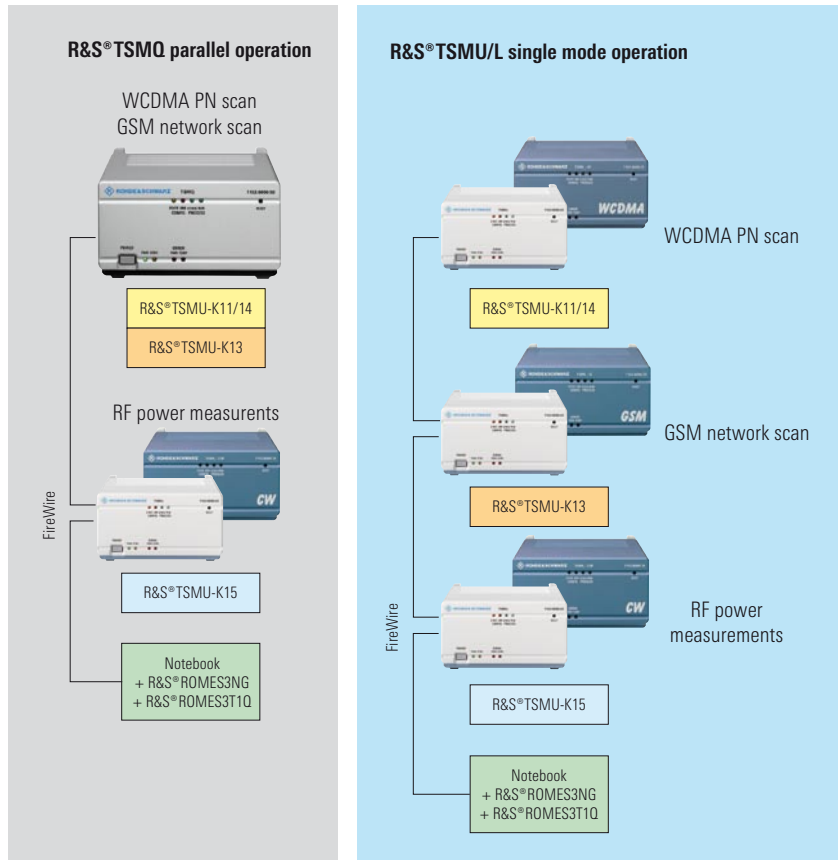
- ◆ Multiple technologies in parallel
 - Neighborhood analysis in one unit
 - Benchmarking competitor analysis for free
 - Reduced measurement time and costs
- ◆ Unsurpassed performance
 - Best accuracy even at high driving speed
 - Time-saving tests
- ◆ All-in-one solution
 - All options included
 - No further investments needed
- ◆ Wideband receiver
 - One unit covers all bands
- ◆ R&S®ROMES software featuring reduced startup time, powerful optimization applications
- ◆ Modular hardware and software requirements-specific purchase
 - Buy only what you need
- ◆ Backpack concept
 - Unrestricted performance
 - Easy indoor measurements

Simultaneous multitechnology measurements

All major mobile network technologies, WCDMA, GSM, and CDMA2000®1x, are supported in parallel. CW measurements can be done separately.

The R&S®TSMQ can deliver measurement results for up to three different technologies. For network optimization, you measure interference, coverage, and carrier-to-noise ratio in one technology while scanning another technology for survey purposes. You analyze a UMTS network during a drive test while simultaneously monitoring a GSM network for offline analysis or post-processing. You even analyze a competitor's network during a major measurement within a single trip. As a mobile network operator, you always stay informed about competitor networks without incurring any additional costs.

The R&S®TSMQ's compact design and low weight make for simple integration into a backpack for indoor measurements. This enables you to analyze exhibitions, train stations, shopping malls, or public buildings at an unsurpassed level of performance and with maximum accuracy, just like when using drive-test tools installed in a vehicle. Moreover, the instrument's low power consumption supports battery operation for up to four hours.



Specifications

General RF data		
RF range		80 MHz to 3 GHz
Noise figure	f ≤ 2.2 GHz, preamplifier on	typ. 10 dB
Reference frequency accuracy	GPS pulse per second (PPS) synchronization	±0.01 ppm
Reference frequency aging		1 ppm/year
Reference frequency temperature drift	0 °C to +30 °C	2 ppm
	+30 °C to +40 °C	additional 2 ppm/10 °C
IP3	PreAmp On	typ. -9 dBm
	PreAmp Off	typ. +3 dBm
1dB compression point		-15 dBm
WCDMA		
Bands	200 kHz resolution	WCDMA bands I to IX and user-defined
Pilot scan		up to 512 pilot channels
Multifrequency scan		max. 12 carriers
IF bandwidth		4.12 MHz
Measurement rate	single mode, HS / HD / UHS	variable 1 Hz to 50 Hz / 8 Hz / 333 Hz
	dual mode, HS / HD	variable 1 Hz to 18 Hz / 6 Hz
	triple mode, HS / HD	variable 1 Hz to 8 Hz / 3 Hz
Power measurement dynamic range		-114 dBm to -20 dBm
Power measurement accuracy E_c/I_0	$E_c/I_0 > -12$ dB	typ. <1.5 dB
	RSCP	typ. <1 dB
Sync. acquisition time	5 pilots, HS / HD	typ. 10 ms / 24 ms
Sync. level E_c/I_0	HS / HD	<-14.5 dB / <-25 dB
Dynamic range E_c/I_0	HS / HD	20 dB / 29 dB
BCH demodulation E_c/I_0	HS / HD	≥-14 dB / ≥-25 dB
Adjacent channel rejection		typ. >70 dB
Number of rake fingers	5000 multipath measurement	max. 2500
Ghost code rate		<10 ⁻⁹
Time base for synchronization	internal	GPS PPS/GSM, WCDMA network
GSM		
Bands		GSM 420/450/750/850/900/1700/1800/1900, GSM-E, GSM-R
Measurement modes		SCH code power measurement TCH total in-band power measurement demodulation of BCCH system information type 3
Measurement rate	single mode	up to 100 channels/s with SCH demodulation typ. 1.2 s; max. 1.9 s for GSM 900 band typ. 3.8 s; max. 5.3 s for GSM 1800 band
	dual mode	up to 50 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
	triple mode	up to 25 channels/s with SCH demodulation typ. 5.2 s; max. 6.5 s for GSM 900 band typ. 16 s; max. 22 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	vs. co-channel C/I	98% for C/I > +2 dB

BSIC detection after first decoding	vs. 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
Time base for synchronization	internal	GPS pulse per second (PPS) signal GSM (sync. channel)
CDMA2000®1x		
Bands		SR1 band classes (1 to 10), including US Cellular, PCS 1900, European 450
Pilot scan		up to 512 pilot channels
Input bandwidth		1.22 MHz
Scan length		12288 chips (10 ms)
Measurement rate	single mode (512 pilot channels, F-PICH – single channel)	10 Hz
	dual mode	10 Hz
	triple mode	5 Hz
Power measurement dynamic range	P total F-PICH	-12 dBm to -131 dBm
Measurement accuracy	without fading	$E_c/I_0 > -10$ dB, typ. ± 0.4 dB
	with fading	$E_c/I_0 > -10$ dB, typ. ± 0.7 dB
Sync. level E_c/I_0	CDMA2000® interference, fast mode	typ. < -16.5 dB (F-PICH) typ. < -25.5 dB (F-SYNC)
	white Gaussian noise, fast mode	typ. < -20.2 dB (F-PICH) typ. < -29.2 dB (F-SYNC)
Synchronization speed	single mode, $E_c/I_0 > -15$ dB	100 ms
	single mode, $E_c/I_0 \leq -15$ dB	200 ms
	dual mode, $E_c/I_0 > -15$ dB	200 ms
	dual mode, $E_c/I_0 \leq -15$ dB	400 ms
	triple mode, $E_c/I_0 > -15$ dB	240 ms
	triple mode, $E_c/I_0 \leq -15$ dB	480 ms
Demodulation	synchronous channel demodulation	<0.5 s
	fast synchronous channel demodulation	<0.1 s
Dynamic range E_c/I_0		typ. 30 dB
Ghost code rate		$< 10^{-9}$
Number of rake fingers	5000 multi-path measurement	max. 2500
Time base for synchronization	internal	GPS PPS/GSM, CDMA network
RF power		
Measurement modes		single frequency, multi-channel
Frequency entry		single frequency, frequency list, frequency band
Level uncertainty	≤ 3 GHz	typ. ± 1.0 dB
Bandwidth (3 dB)	single frequency mode	12.5 kHz to 4000 kHz
	multi-channel mode	200 kHz to 4000 kHz
Channel power measurement dynamic range	GSM	-110 dBm to -20 dBm
	WCDMA	-95 dBm to -20 dBm
Sample acquisition time	multi-channel 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	multi-channel 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	GSM	30 dB
	WCDMA	60 dB

Detectors		peak, average, RMS
Trigger modes	internal time base	time-triggered
	external trigger event	distance-triggered
IF attenuation		0 dB, 10 dB, 15 dB
Preamplifier		10 dB automatic/manual
Time base for synchronization		GPS pulse per second (PPS) signal
Rear-panel interfaces	FireWire I + II	IEEE 1394 female, 6-pin
	RF input (RF IN)	N female, input impedance 50 Ω , VSWR typ. 2.0
	power supply input (DC IN)	snap and lock jack, 3-pin, 9 V to 18 V DC
	PPS IN	BNC female, 3 V to -5 V TTL input for GPS pulse per second (PPS, falling edge with high precision)
	PULSE IN	BNC female, multifunctional (e.g. distance-triggered input), valid input range: 3 V to 15 V
General data		
Operating temperature range		0 °C to +45 °C
Storage temperature range		-20 °C to +70 °C
Humidity	relative humidity at +40 °C	95 %
Sinusoidal vibration	5 Hz to 150 Hz	max. 2 g at 55 Hz
Random vibration		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 to 18 V DC
Power consumption		650 mA at 12 V DC
Dimensions (W x H x D)		150 mm x 80 mm x 170 mm (5.9 in x 3.15 in x 6.69 in)
Weight		1.5 kg (3.31 lb)

Ordering information

Designation	Type	Order No.
Radio Network Analyzer	R&S®TSMQ	1153.6000.50
Firmware/Software		
Drive Test Software Platform	R&S®ROMES3NG	1143.7991.40
Replay Software	R&S®ROMES3REP	1143.7991.42
3NG TSMx Options	R&S®ROMES3T1Q	1508.1588.02
Accessories		
Power Supply 230 V AC / 12 V DC / 6 A	R&S®TSMU-Z1	1166.3786.02
Rack Adapter 19" for max. 2 x R&S®TSMQ	R&S®TSMU-Z2	1153.6700.02
Indoor Backpack System	R&S®TSMU-Z3	1153.6900.02

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



Rear view of the R&S® TSMQ



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



ROHDE & SCHWARZ

www.rohde-schwarz.com

Europe: +49 1805 12 4242, customersupport@rohde-schwarz.com
USA and Canada: +1-888-837-8772, customer.support@rsa.rohde-schwarz.com
Asia: +65 65 130 488, customersupport.asia@rohde-schwarz.com