R&S®TSMS8
SUPERWIDEBAND MOBILE NETWORK SCANNER

High-speed multi-technology scanning from 10 MHz to 8.5 GHz

Product Brochure
Version 03.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®TSMS8 is the next generation of ultracompact, superwideband RF scanning receivers for the wide frequency range from 10 MHz to 8.5 GHz. The innovative design and compact form factor mean the receiver is very flexible and can be easily upgraded for 6G technology. The ultracompact design and ultra-wide receiver bandwidth of up to 400 MHz, along with support for all major technologies, mean the R&S®TSMS8 can perform simultaneous measurements at unmatched speeds for efficient mobile network testing and network analysis for governments and regulators.

R&S®TSMS8 superwideband mobile network scanner

KEY FEATURES

- Frequency range from 10 MHz to 8.5 GHz
- Superwideband frontend with up to 400 MHz
- Unmatched scanning speed
- Modular upgradability and FR2 mmWave support (up to 53 GHz)
- Parallel support for all cellular technologies
- Compact and lightweight with customized mechanical cascading concept
- Future proof platform, ready for 6G

BENEFITS

Future-proof platform

- Simultaneous measurements up to 8.5 GHz with no limits
- Advanced measurements in all major technologies
- Ultracompact design

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Various software solutions for a wide range of use cases

- Cellular network analysis
- Mobile network testing

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Open application programming interface (API) interface

- Open programming interface ideal for OEMs
- Easy-to-use API

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Wide range of accessories

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- 19" rack adapter

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FUTURE-PROOF PLATFORM

Simultaneous measurements up to 8.5 GHz with no limits

Fast signal processing and a superwideband receiver frontend are at the heart of the R&S®TSMS8, which supports an extensive frequency range from 10 MHz to 8.5 GHz. The R&S®TSMS8-KOR overrange scanner option enables measurements up to 10 GHz. All supported technologies can be measured in parallel with the same scanner, where the advanced integrated scheduler makes sure available processing resources are used in the best possible sequence.

Compared to previous scanners, the R&S®TSMS8 frontend can capture more for faster measurement speeds. Up to 400 MHz frontend bandwidth is now available, compared to 20 MHz in previous scanners. Customers can make more measurements and need fewer redrives compared to campaigns with previous scanners, lowering operating expenses.

The R&S®TSMS8 provides in-depth RF and network insight with SIB/layer 3 (SIB/L3) decoding. Users can determine the network configuration in detail and easily detect network misconfigurations. The solution supports broadcast information decoding (MIB, SIB) for all major 3GPP technologies.

The scarcity of current frequency resources make balancing coverage and 6G capacity challenging, so higher potential frequency bands are being examined. The ITU is responsible for global frequency allocation and has set up a study group for the 6G range from 7.125 GHz to 8.5 GHz for the future ITU World Radiocommunication Conference (WRC). The R&S®TSMS8 is a future-proof product that can support future frequency bands up to 8.5 GHz. When combined with an existing downconverter, the setup can be used for FR1 and FR2 measurements up to 53 GHz.

Technology support at a glance

	Technologies supported	MIB, SIB decoding
5G NR (FR1, FR2 with downconverter)	• (incl. RedCap, FRMCS and NTN-unmodified)	operation mode detection (NSA, SA), MIB, SIB1, OSI (SIB2 to SIB21, posSIBs); if broadcast
TD-LTE	•	• (Release 17, up to SIB32)
LTE-FDD	•	• (Release 17, up to SIB32)
LTE-NTN	• (incl. NB-NTN)	
LTE-M	•	•
NB-IoT/Cat NB1	•	•
NB-NTN (GEO)	•	•
WCDMA	•	•
GSM	•	•
CDMA2000	•	•
1xEV-DO (Rel. 0/Rev. A/Rev. B)	•	•
WiMAX IEEE 802.16e	•	•
C-V2X LTE	•	•
TETRA, TETRA DMO	•	•
Project 25 (P25)	• (phase 1, phase 2)	– (not yet)
CW channel power RSSI scan	•	–

Advanced measurements in all major technologies

R&S®TSMS8 automatic channel detection reduces costs and setup times. The feature is available with the R&S®TSMS8-K40 option. All supported technologies can be automatically detected or manually configured. The supported technologies include 5G NR (including RedCap and FrMCS), NB-IoT (including NB-NTN GEO), LTE (including LTE-NTN), LTE-M, WCDMA (including HSPA/+), C-V2X, TETRA, P25, GSM and CDMA2000/1xEV-DO. The R&S®TSMS8 scanner can perform essential 5G NR synchronization signal blocks (SSB) measurements crucial for verifying 5G NR coverage and beamforming. Users can measure 5G NR synchronization signal blocks on both FR1 and FR2 spectra.

RF power spectrum measurements up to 8.5 GHz for spectrum clearance are another important feature. During the early commercial network rollout engineering phase, the measurements ensure that new spectra are free of interference for the best possible quality of service.

5G NR in TDD mode has made network synchronization in the time domain even more important. The R&S®TSMS8 measures the time of arrival offset between PPS pulses (or the internal receiver clock) and the received 5G NR and LTE SSB to determine network synchronization quality. The absolute time of arrival for 5G NR SSB can also be measured (mandatory for measuring time alignment errors for specific sites).

The R&S®TSMS8 can also measure uplink and downlink spectra with a time gate. The time gate can be automatically configured if the uplink/downlink configuration is available in 5G NR broadcasting messages. Users can also manually configure uplink and downlink slots of interest for the real-time spectra of configured time gates and provide a panoramic view across the entire spectrum or focus on interference to quickly locate its sources.

Ultracompact design

Investment in measurement tools should be long-term and protect your assets. The R&S®TSMS8 is a future-proof receiver with a maximum degree of freedom. The small dimensions and low weight make the R&S®TSMS8 the most compact and lightweight scanner in its class.

The customized mechanical scanner concept includes bolts to help conveniently cascade multiple units when adding downconverters for FR2 measurements. The click-in mechanism provides a vibration-proof stack of seamlessly and mechanically connected scanners, which can also be used to connect a downconverter to a R&S®TSMS8. The modular approach lets customers invest in phases, based on their roll-out cycles for the FR1 and FR2 frequency ranges.

The R&S®TSMS8 scanner is fully compatible with existing downconverter products and lets customers easily extend measurement setups up to 53 GHz. See the R&S®TSME44DC/R&S®TSMS53DC product brochure (PD 3607.9608.12) for more details.

The R&S®TSMS8 includes a multi-GNSS receiver with exceptional sensitivity for precise and uninterrupted location tracking, even in critical dense urban and in-vehicle environments. The receiver supports all major satellite navigation systems and features a high GPS update rate (in line with specifications) for very precise position accuracy and high sampling rates for high-speed measurements in rapidly moving vehicles (such as high-speed trains).

VARIOUS SOFTWARE SOLUTIONS FOR A WIDE RANGE OF USE CASES

Cellular network analysis

Use cases

- Knowing the network environment
- Protecting sensitive areas
- Spectrum intelligence
- Gathering and presenting evidence
- Locating a mobile phone based on its network trace

When the R&S®TSMS8 scanner is combined with R&S®NESTOR software from Rohde&Schwarz, the solution can support all the use cases listed above. R&S®NESTOR is Windows based software that analyzes cellular networks over the air interface. The software is popular with law enforcement agencies, intelligence services, armed forces and regulatory authorities. R&S®NESTOR is used with Rohde&Schwarz mobile network scanners and QualiPoc smartphones for the most advanced technology in the world. The software supports all the applications that public authorities and security organizations need to gather information about cellular networks. R&S®NESTOR can be used in vehicles, trains, aircraft, drones, on ships and on foot.

R&S®NESTOR combines cutting-edge touchscreen software architecture with top-of-the-line mobile radio acquisition equipment from Rohde&Schwarz. Along with direct acquisition, visualization and real-time analysis of all measurement data (online), the software lets users carry out in-depth postprocessing and long-term analysis offline.

Mobile network testing

Use cases

- Engineering
- Quality monitoring
- Network audit and benchmarking
- Optimization and troubleshooting
- Verification and acceptance
- Interference hunting

Together with scanners and test user equipment (UE), ROMES software provides a comprehensive solution for engineering, optimization and troubleshooting. ROMES is a universal software platform designed for parallel measurements with scanners and up to eight test UE units for QoS and user experience analysis. ROMES drive test software collects, visualizes and stores data from Rohde&Schwarz scanners and mobile devices. Both the scanners and mobile devices can be controlled and configured via software, which runs various user-configurable measurement routines and supports all major 3GPP technologies. The approach combines a perfect set of capabilities with scanner and UE data in one software solution for a unified view of network performance.

SmartBenchmarker systems are modular and rugged drive test systems designed to support a high number of QualiPoc test devices in benchmarking campaigns. The high-productivity measurement system provides efficient and error-free operation in large-scale deployments. Rohde&Schwarz has various data management tools with scalable data analysis, flexible interfaces and reporting for the data captured during benchmarking campaigns.

ROMES software on PC controlling the R&S®TSMS8 mobile network scanner

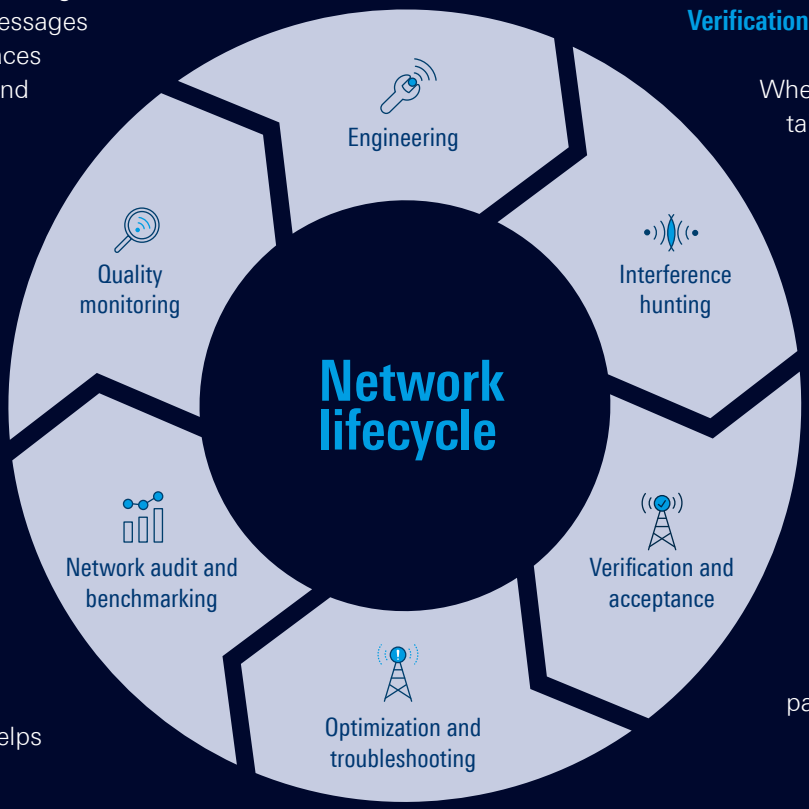
MOBILE NETWORK TESTING USE CASES

Engineering

New technology propagation models are often tuned with scanner data in the engineering phase. Any technology or feature that affects the RF interface can be tested and validated in early lab or field trials with the scanner. Examples include new network components such as MIMO antennas and 5G beamforming, coverage of new spectra including new bands, new network synchronization capabilities, TDD UL/DL configuration, layer 3 (L3) broadcast messages as well as new air interfaces such as NB-IoT, LTE-M and C-V2X.

Optimization and troubleshooting

Increased network loads or environmental changes mean the RF environment is also constantly changing. Scanners help detect network degradations from interference, spectrum usage violations, TDD synchronization problems, country border regulation violations etc.



Verification and acceptance

When installing and maintaining base stations, users need a quick overview of site configurations to verify proper installation. Scanners need to check the deployed technologies, bands, channels, physical cell identities (PCI), beam and L3 information, network synchronization verification (TDD pattern), EMF measurements and spectrum occupancy verification.

Quality monitoring

Interference that might threaten network performance and operators must be constantly monitored. An autonomous scanner monitors the spectrum over longer periods of time to identify the correct day and time when an interferer is active and helps shut it down.

Interference hunting

The scanner collects spectrum data for analysis in the office with a postprocessing solution to identify interference spots. Interference hunting is needed to locate interferers and switch them off.

Network audit and benchmarking

The scanner provides valuable measurements to verify coverage requirements in audits. Benchmarking focuses on comparing multiple networks and scanners to provide vital insights for technology rollouts and usage, network density or estimating BTS positions.

OPEN APPLICATION PROGRAMMING INTERFACE (API) INTERFACE

Open programming interface ideal for OEMs

Many manufacturers have successfully integrated Rohde&Schwarz scanners permanently into their drive test toolchain. The R&S®TSMx-API for R&S®TSMx mobile network scanners simplifies integration, enabling the creation of individual solutions for mobile network testing, cellular network analysis and other applications.

The native Windows based ViCom API supports all technologies provided by the mobile network scanner. R&S®ViComWeb also streamlines integration by running an API server on Windows that can be queried via the web to simplify integration with the native Windows API.

For more information about R&S®ViComWeb, see the R&S®TSMx-API for R&S®TSMx Mobile Network Scanners product brochure (PD 3684.1366.12).

Easy-to-use API

R&S®ViComWeb has an easy-to-use GraphQL API to unlock the full potential of R&S®TSMx mobile network scanners. The API supports all technologies and scanner features for the use cases described in this product brochure. The interface is web based for easy integration into any R&S®TSMx mobile network scanner applications.

R&S®ViComWeb uses the commonly available GraphQL query language. Various clients can request scanner data from the R&S®ViComWeb server. The data is structured in a schema and type system. Data can be retrieved based with the client query. The query language is self-documenting, widely supported and optimized for performance. Some sample queries based on the Banana Cake Pop open source GraphQL development tool can be seen below. The queries can be easily implemented on various platforms with different programming languages.

Sample query for LTE

This query returns a list of all RF measurements of detected LTE channels and cells.

```
# give me all RF measurements of all detected LTE cells query
subscription
{
  lteChannelMeasurements {
    cellMeasurements {
      cell {
        identifiers {
          frequency
          pci
          globalCellId
        }
      }
      referenceSignals {
        txPort
        rsrp
        rsrq
        sinr
      }
    }
  }
}
```

WIDE RANGE OF ACCESSORIES

Antennas

Rohde&Schwarz offers a range of wideband omnidirectional antennas for various applications and frequency ranges. The new R&S®TSMS-OMN8 antenna is ideal for the R&S®TSMS8 in the FR1 frequency range from 350 MHz to 8.5 GHz. The antenna can be mounted on a low-profile R&S®TSMS-LMAGM antenna mount, available in two versions – with a magnetic plate for drive testing and without for stationary measurements. The antenna can also be easily carried in a bag or backpack for walk testing campaigns and cellular network analysis (CNA).

R&S®TSMS8 mobile network scanner with the R&S®TSMS-OMN8 antenna

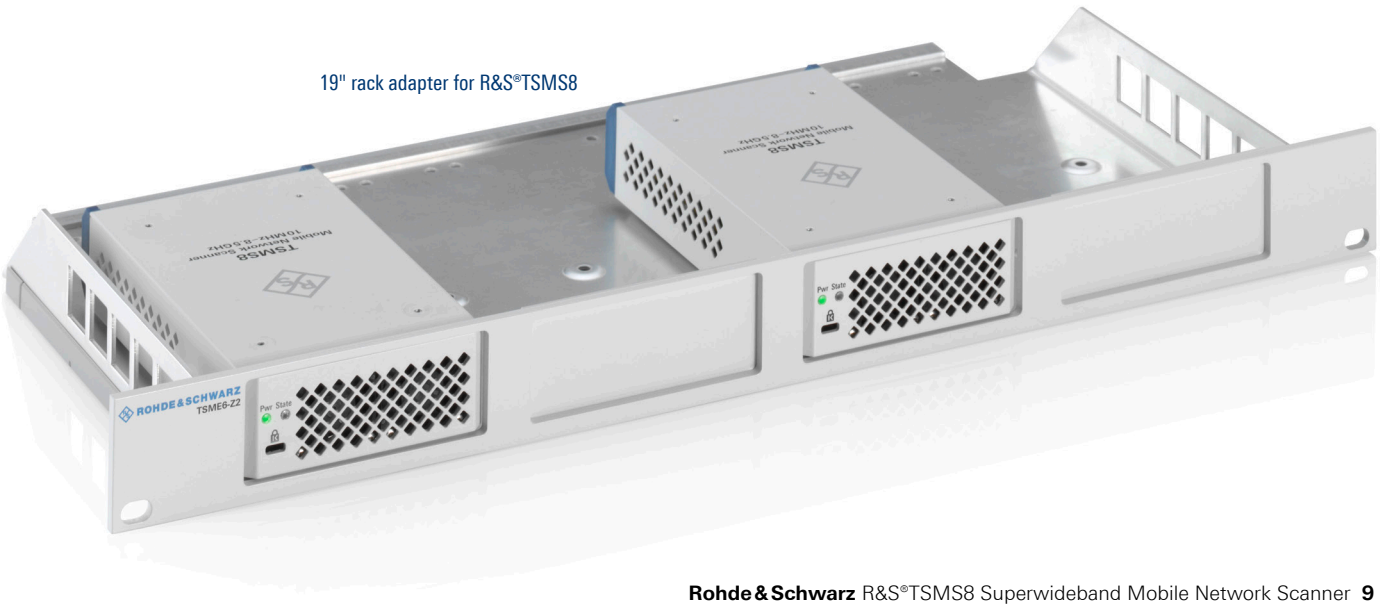
High-precision timing and interference measurements typically require site-specific testing. Accurate timing measurements demand good RF conditions (power level, signal-to-noise ratio and interference), since they directly impact measurement accuracy. Directional antennas from Rohde&Schwarz (such as the R&S®HE400LP for FR1 and the R&S®HE800-PA for FR2) are ideal.

Testing in the FR2 frequency range (currently 17 GHz to 53 GHz) requires detecting and measuring signals with high path loss. Our high-performance component portfolio for mmWave frequency range measurements (from 17 GHz) includes the R&S®TSMS53DC downconverter and the R&S®TSMS-OMN70 omnidirectional mmWave antenna. The magnetic mount (R&S®TSMS-LMAGM) for the R&S®TSMS-OMN70 can be used to attach the antenna to a vehicle roof. The R&S®FR4 5G A3 antenna holder attaches the R&S®TSMS OMN70 antenna to our R&S®FR4 Freerider 4 backpack system and the R&S®TSMA6 ZCB2 carrying bag for walk testing.

See the Receive Antennas flyer (PD 3684.0176.32) for more details.

19" rack adapter

The R&S®TSMS8 19" rack adapter can be used for easy side-by-side mounting of up to four scanners. This solution is a stable and space-efficient mounting platform for various applications, such as fix mounted solutions in cars, R&D laboratories or research facilities.



19" rack adapter for R&S®TSMS8

SPECIFICATIONS IN BRIEF

Base unit		
Requirements or external PC		
Operating system		Windows 10 or higher
Hardware requirements	minimum	CPU with at least 15 W TDP and at least 8 threads supported and CPU not older than 2023, or CPU with at least 28 W TDP and at least 8 threads supported and CPU not older than 2020; 8 Gbyte RAM, 2.5 Gigabit Ethernet, 9014 bytes jumbo frame
	recommended	CPU with 28 W TDP and at least 12 threads supported and CPU not older than 2020; 16 Gbyte RAM or more, 2.5 Gigabit Ethernet, 9014 bytes jumbo frame
	full performance	CPU with at least 45 W TDP and at least 16 threads supported; 32 Gbyte RAM or more, 10 Gigabit Ethernet, 9014 bytes jumbo frame
RF characteristics		
Frequency range		10 MHz to 8.5 GHz
	with R&S®TSMS8-KOR overrange scanner option	up to 10 GHz
Instantaneous bandwidth	10 MHz ≤ f ≤ 8.5 (10) GHz	100 MHz
	10 MHz ≤ f ≤ 480 MHz and 1.65 GHz ≤ f ≤ 8.5 (10) GHz	400 MHz
Level measurement uncertainty	10 MHz to 3 GHz	
	+20 °C to +30 °C	±1.0 dB
	–10 °C to +20 °C, +30 °C to +55 °C	±1.25 dB
	3 GHz to 8.5 GHz	
	+20 °C to +30 °C	±1.5 dB
	–10 °C to +20 °C, +30 °C to +55 °C	±1.75 dB
Maximum operating measurement range input level		+10 dBm (nom.)
Maximum safe permissible input level		+15 dBm/16 V (DC)
Noise figure [1]	10 MHz to 400 MHz	< 5.5 dB (meas.)
	400 MHz to 3 GHz	< 4 dB (meas.)
	3 GHz to 5.5 GHz	< 5 dB (meas.)
	5.5 GHz to 8.5 GHz	< 6.5 dB (meas.)
Intermodulation-free dynamic range [2]	10 MHz to 400 MHz	> 5 dBm (meas.)
	400 MHz to 3 GHz	6 dBm (meas.)
	3 GHz to 5.5 GHz	8 dBm (meas.)
	5.5 GHz to 8.5 GHz	8 dBm (meas.)
RF receive paths		1
VSWR (preselection on/off)	10 MHz to 400 MHz	n.a./< 1.7 (meas.)
	400 MHz to 3 GHz	< 2.4/< 2.2 (meas.)
	3 GHz to 5.5 GHz	< 2.4/< 2.3 (meas.)
	5.5 GHz to 8.5 GHz	< 3.1/< 3.2 (meas.)
Frequency accuracy	GNSS locked	0.03 ppm (nom.)
	GNSS unlocked	< 1 ppm (nom.)
LTE/LTE-M characteristics		
Number of channels		192
Frequency bands supported		no restrictions
Measurement modes	automatic detection of carrier bandwidth: 1.4/3/5/10/15/20 MHz	LTE-FDD, LTE-TDD, LTE-M
Measurement speed (LTE/LTE-M)	automatic detection of all 504 physical cell IDs with SIB decoding active	
	LTE standard speed measurement mode	▶ 200 Hz (meas.) sync signals, single channel ▶ 399 Hz (meas.) sync signals, two adjacent channels ▶ 10 Hz (meas.) NB reference signal ▶ 50 Hz (meas.) WB reference signals

[1] Measured with activated preamplifier and 0 dB attenuation.
[2] Measured with deactivated preamplifier and 0 dB attenuation.

Base unit		
	LTE high speed measurement mode	▶ 200 Hz (meas.) sync signals, single channel ▶ 399 Hz (meas.) sync signals, two adjacent channels ▶ 50 Hz (meas.) NB reference signal ▶ 50 Hz (meas.) WB reference signals
	LTE-M	25 Hz (meas.) reference signals
Physical decoding accuracy		
Sensitivity for initial physical cell ID decoding	sync signal power (LTE)	–126 dBm (meas.)
	RSRP (LTE/LTE-M)	–145 dBm/–132 dBm (meas.)
PCI false detection (ghost code)		$< 10^{-8}$
LTE C-V2X characteristics		
Measurements supported	PSCCH and PSSCH	RS-RSRP, RS-CINR, RSSI
Regions supported		EU, NA, CN
Transmission mode supported		TM4 (GNSS reception required)
Sensitivity		–110 dBm
Measurement speed		2 Hz to 4 Hz
CINR dynamic range		–5 dB to +30 dB
NB-IoT/Cat NB1 characteristics		
Frequency bands supported		no restrictions
NB-IoT/Cat NB1 measurement modes		▶ standalone ▶ guard band ▶ in-band
Sensitivity for physical cell ID decoding (initial decoding)	sync signal power (NSSS power)	–132 dBm (meas.)
	reference signal power (NRSRP)	–143 dBm (meas.)
Sensitivity for physical cell ID decoding (after successful decoding)	sync signal power (NSSS power)	–135 dBm (meas.)
	reference signal power (NRSRP)	–146 dBm (meas.)
Measurement speed		5 Hz (single channel) (meas.)
Demodulation threshold	sync signal power (NSSS power)	–120 dBm (meas.)
PCI false detection (ghost code)		$< 10^{-8}$
5G NR characteristics		
Number of channels		128
Frequency bands supported		FR1 (sub6 GHz), FR2 (24 GHz to 53 GHz), FDD/TDD up to Release 17
SSB subcarrier spacings supported		15 kHz, 30 kHz, 120 kHz, 240 kHz
SSB periodicities supported		5/10/20/40/80/160 ms
SSB index detection threshold (single PCI)	SS-RSRP (10 ms periodicity, 30 kHz subcarrier spacing)	–146 dBm (meas.)
	SS-RSRP (40 ms periodicity, 30 kHz subcarrier spacing)	–140 dBm (meas.)
	SS-RSRP (5 ms periodicity, 15 kHz subcarrier spacing)	–151 dBm (meas.)
	SS-RSRP (20 ms periodicity, 15 kHz subcarrier spacing)	–150 dBm (meas.)
	SS-RSRP (20 ms periodicity, 120 kHz subcarrier spacing)	–140 dBm (meas.)
	SS-RSRP (20 ms periodicity, 240 kHz subcarrier spacing)	–135 dBm (meas.)
Measurement speed (single PCI)	20 ms periodicity, 30 kHz subcarrier spacing	49 Hz (meas.)
	40 ms periodicity, 30 kHz subcarrier spacing	49 Hz (meas.)
	20 ms periodicity, 120 kHz subcarrier spacing	50 Hz (meas.)
	80 ms periodicity, 120 kHz subcarrier spacing	48 Hz (meas.)
Minimum MIB demodulation threshold	SS-RSRP (30 kHz subcarrier spacing)	–144 dBm (meas.)
	SS-SINR (30 kHz subcarrier spacing)	–21 dB (meas.)
Minimum SIB demodulation threshold	SS-RSRP (30 kHz subcarrier spacing)	–123 dBm (meas.)
	SS-SINR (30 kHz subcarrier spacing)	–5 dB (meas.)
Timebase accuracy (for time alignment measurements)	depending on GNSS signal quality	5 ns to 30 ns (meas.)

Base unit		
WCDMA characteristics		
Frequency bands supported		no restrictions
Number of RF carrier frequencies		max. 32
Measurement speed	high speed/high dynamic mode, automatic detection of all 512 scrambling codes	100 Hz/50 Hz (meas.) single channel, with BCH demodulation
Scrambling code detection sensitivity (RSCP)		
Sensitivity for initial SC detection	high speed/high dynamic mode	–116 dBm/–127 dBm (meas.)
Sensitivity after successful SC detection	high speed/high dynamic mode	–122 dBm/–132 dBm (meas.)
Scrambling code false detection (ghost code)		$< 10^{-9}$
Dynamic range E_c/I_0 for initial detection	high speed/high dynamic mode	–19 dB/–28 dB (meas.)
Dynamic range E_c/I_0 after successful detection	high speed/high dynamic mode	–23 dB/–30 dB (meas.)
Minimum BCH demodulation threshold E_c/I_0	high speed/high dynamic mode	> –14 dB/–20 dB (meas.)
GSM characteristics		
Frequency bands supported		no restrictions
Measurement modes	in parallel	DB/TCH/SCH code power, TCH total in-band power, TCH timeslot power, GSM spectrum, BCH demodulation for all system information types
Measurement speed	with SI decoding active	1000 channels/s (meas.)
Sensitivity	detection/BSIC decoding/BCH decoding	–122 dBm/–120 dBm/–119 dBm (meas.)
BSIC decoding dynamic range		
Sensitivity for initial BSIC detection		C/I > –2 dB (meas.)
Sensitivity after successful BSIC detection		C/I > –24 dB (meas.)
BCCH decoding dynamic range		C/I > 0 dB (meas.)
CDMA2000 characteristics		
Frequency bands supported		no restrictions
Number of RF carrier frequencies		max. 32
Measurement speed	automatic detection of all 512 PN codes	80 Hz (meas.), with BCH demodulation
PN detection sensitivity (initial decoding)	RSCP without/with demodulation	–130 dBm/–125 dBm (meas.)
1xEV-DO characteristics (Rel. 0/Rev. A/Rev. B)		
Frequency bands supported		no restrictions
Number of RF carrier frequencies		max. 32
Measurement speed		30 Hz (meas.), with BCH demodulation
PN detection sensitivity (initial decoding)	RSCP without/with demodulation	–130 dBm/–125 dBm (meas.)
TETRA characteristics		
Measurement type		RF parameters, constellation diagram/EVM measurements
TETRA bands supported		no restrictions
Number of RF carrier frequencies	within a 10 MHz downlink band	max. 400
Channel resolution		25 kHz (QPSK)
Measurement speed		max. 8000 channels/s, 18 measurements/s for a 10 MHz block
Sensitivity (RSSI)	RSSI measurements	–128 dBm (meas.)
	TETRA BSCH decoding (BSCH decoding for channels with SNR > 8 dB)	–121 dBm (meas.)
	BER measurements	–121 dBm (meas.)
Project 25 (P25) characteristics		
Sensitivity (RSSI)		–124 dBm to +25 dBm (meas.)
Dynamic range (SNR)		3 dB to 50 dB (meas.)
Measurement rate		max. 5 Hz (meas.)
WiMAX characteristics		
Frequency bands supported		no restrictions
Measurement speed	automatic detection of all 114 preamble indices	9 channels/s (meas.)
Preamble decoding accuracy	frame duration: 5 ms; FFT size: 1024, bandwidth: 10 MHz/2.657 GHz	±1 dB (–20 dBm to –110 dBm) (meas.)
Sensitivity for initial preamble decoding	RSSI, bandwidth: 10 MHz	–105 dBm (meas.)
Sensitivity after successful preamble decoding	RSSI, bandwidth: 10 MHz	–129 dBm (meas.)
SINR dynamic range		–22 dB to +26 dB (meas.)

Base unit		
RF power scan		
Frequency resolution		140 Hz to 1.438 MHz
Sensitivity	22.46 kHz resolution bandwidth, RMS, at 900 MHz	–126 dBm (meas.)
	140 Hz resolution bandwidth, RMS, at 900 MHz	–148 dBm (meas.)
Scan rate	180 kHz resolution, 100 MHz span, 20 MHz bandwidth, FFT size: 128	4000 Hz (meas.)
	11.23 kHz resolution, 10 MHz span, 10 MHz bandwidth, FFT size: 1024	7470 Hz (meas.)
	140 Hz resolution, 1 MHz span, 1 MHz bandwidth, FFT size: 8192	138 Hz (meas.)
Scan speed	10 MHz to 8.5 GHz, 25 kHz resolution bandwidth	444 GHz/s
	10 MHz to 8.5 GHz, 100 kHz resolution bandwidth	463.5 GHz/s
	10 MHz to 8.5 GHz, 1 MHz resolution bandwidth	462 GHz/s
Maximum number of frequency ranges		20
Detectors		max., min., RMS, auto
CW scanning		
Sensitivity channel power RSSI scan	200 kHz channel (GSM)	–117.5 dBm (meas.)
	5 MHz channel (UMTS)	–103 dBm (meas.)
	20 MHz channel (LTE)	–97.5 dBm (meas.)
Scan rate	200 kHz channel (GSM)	1900 Hz (190 000 channels/s) (meas.)
	5 MHz channel (UMTS)	12 995 Hz (51 980 channels/s) (meas.)
	20 MHz channel (LTE)	13 000 Hz (13 000 channels/s) (meas.)
I/Q streaming		
Bandwidth	continuous	1 kHz to 100 MHz
	I/Q block, frequency dependent	1 kHz to 400 MHz
Sample rate	continuous: sample rate > bandwidth/0.9	5.8 ksample/s to 128 Msample/s
	I/Q block: sample rate > bandwidth/0.9	5.8 ksample/s to 600 Msample/s
I/Q sample resolution	user selectable	8 bit, 12 bit, 16 bit or 20 bit
Gain control	automatic gain control	preamplifier on/off, attenuation: 0 dB to 31 dB
	manual gain control	preamplifier on/off, attenuation: 0 dB to 31 dB (in 1 dB attenuation steps)
Interfaces		
LAN		10 Gigabit Ethernet (SFP+ interface)
$GNSS_{Ant}$		SMA female
RF_{In}		SMA female
AUX	synchronization and control interface for additional hardware	6-pin connector
DC_{In}	input for DC power supply	4-pin connector
Multi-GNSS receiver		
Supported navigation systems	max. four in parallel, combinations depend on software implementation	multi-GNSS: GPS, GLONASS, BeiDou, Galileo
Sensitivity (GPS, Galileo, GLONASS)	cold start	–148 dBm
	tracking/reacquisition	–160 dBm
Acquisition (GPS, Galileo, GLONASS)	cold start	26 s
	hot start	1 s
Channels		50
GNSS update rate		10 Hz
General data		
Environmental conditions		
Temperature range	operating	–10 °C to +55 °C
	storage	–40 °C to +70 °C
Damp heat		+25 °C/+55 °C, 95 % relative humidity, cyclic, in line with EN 60069-2-30
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude constant, 55 Hz to 150 Hz, 0.5 g constant, in line with EN 60068-2-6
	random	8 Hz to 650 Hz, acceleration 1.9 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810G, method 516.4, procedure I

Base unit		
EU legislation	EU: in line with Data Act – Regulation (EU) 2023/2854	for details, see user documentation
Power rating		
Rated voltage	DC	9 V to 28 V
Rated current		2.5 A
Rated power		25 W
Product conformity		
EU	in line with Radio Equipment Directive 2014/53/EU	applied standards: ▶ EN 61010-1 ▶ ETSI EN 301 489-1 ▶ ETSI EN 301 489-19 ▶ EN 55032 ▶ EN 50498 ▶ ETSI EN 303 413
	in line with RoHS (restriction of the use of certain hazardous substances) 2011/65/EU	EN IEC 63000
International	safety	IEC 61010-1
Korea		RnS-TSMS8
Calibration interval		24 months
Dimensions	W × H × D	155 mm × 36 mm × 85 mm (6.10 in × 1.42 in × 3.35 in)
Weight		550 g (1.21 lb)

R&S®TSMS-Z1 AC power supply		
Environmental conditions		
Temperature range	operating	0 °C to +70 °C
	derating	derated linearly from +40 °C at 100 % load to +70 °C at 50 % load
Power rating		
Output voltage		15 V
Output current		4.34 A
Power rating		65 W
Rated voltage		90 V to 240 V (AC) (± 10 %)
Rated frequency		50 Hz to 60 Hz (± 5 %)
Rated current		0.8 A to 1.5 A
Energy efficiency		level VI
Output cable length		1.5 m
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EU	applied harmonized standards: ▶ EN 61000 (industrial environment) ▶ EN 55032 (class A)
	international	applied harmonized standard: CISPR 32 (class A)
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU	applied harmonized standard: EN 62368-1
	international	applied harmonized standard: IEC 62368-1
RoHS	EU: in line with Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment	applied harmonized standard: IEC EN 63000
Dimensions	W × H × D	62 mm × 30 mm × 65 mm (2.44 in × 1.18 in × 2.65 in)
Weight	with EU mains plug	250 g (0.55 lb)

R&S®TSMA6-Z1 AC power supply (with R&S®TSMA6-Z174 adapter cable)		
Environmental conditions		
Temperature range	operating	–10 °C to +70 °C
	derating 230 V (AC)	derated linearly from +45 °C at 100 % load to +70 °C at 50 % load
	derating 110 V (AC)	derated linearly from +40 °C at 100 % load to +60 °C at 50 % load
Power rating		
Input voltage	at +25 °C (1.6 A charge/1.6 A discharge)	100 V to 240 V (AC) ± 10 %
Input frequency		50 Hz/60 Hz ± 5 %
Input current	230 V to 115 V (AC)	0.7 A to 1.4 A
Efficiency		CEC VI
Output voltage		15 V (DC)
Output current		7.0 A
Power rating		105 W
Output cable length		120 cm (3.9 ft)
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EU	applied harmonized standards: ▶ EN 55032 (class B) ▶ EN 61000 42 ▶ EN 61000 43 ▶ EN 61000 44 ▶ EN 61000 45 ▶ EN 61000 46 ▶ EN 61000 48 ▶ EN 61000 411
	international	CISPR 32
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU	applied harmonized standard: EN 60950
	international	applied harmonized standard: IEC 62368-1
RoHS	EU: in line with Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment	applied harmonized standard: EN 50581
Dimensions	W × H × D	67 mm × 35 mm × 167 mm (2.64 in × 1.38 in × 6.57 in)
Weight		583 g (1.29 lb)

ORDERING INFORMATION

Designation	Type	Order No.
Base unit (includes accessories such as power cable, manual)		
Superwideband mobile network scanner	R&S®TSMS8	4901.7002.02
Scope of delivery: R&S®TSMS8, LAN cable, GNSS antenna, 12 V DC power supply cable (cigarette lighter cable), 4 mounting pins, getting started manual (printed version), SFP+ to RJ-45 transceiver		
Software options (firmware)		
P25 scanning	R&S®TSMS8-K19	4901.9611.02
WCDMA scanning	R&S®TSMS8-K21	4901.9770.02
CDMA2000 scanning	R&S®TSMS8-K22	4901.9786.02
GSM scanning	R&S®TSMS8-K23	4901.9528.02
1xEV-DO Rev. A scanning	R&S®TSMS8-K24	4901.9792.02
CW scanning	R&S®TSMS8-K25	4901.9534.02
TETRA scanning	R&S®TSMS8-K26	4901.9805.02
RF power scan	R&S®TSMS8-K27	4901.9511.02
WiMAX scanning	R&S®TSMS8-K28	4901.9811.02
LTE scanning	R&S®TSMS8-K29	4901.9505.02
LTE 2x2, 4x2, 4x4 MIMO	R&S®TSMS8-K30	4901.9757.02
LTE eMBMS scanning	R&S®TSMS8-K32	4901.9586.02
NB-IoT/Cat NB1 scanning	R&S®TSMS8-K34	4901.9605.02
LTE-M scanning	R&S®TSMS8-K35	4901.9628.02
C-V2X LTE scanning	R&S®TSMS8-K36	4901.9634.02
Automatic channel detection	R&S®TSMS8-K40	4901.9557.02
5G NR scanning	R&S®TSMS8-K50	4901.9486.02
5G NR scanning add-ons	R&S®TSMS8-K51	4901.9492.02
5G RedCap scanning	R&S®TSMS8-K52	4901.9640.02
Overrange scanner option	R&S®TSMS8-KOR	4901.9834.02
I/Q streaming [1]	R&S®TSMS8-K1	4901.9463.02
Additional software		
ROMES drive test software	ROMES	4900.5558.02
R&S®TSMS8 driver, for ROMES drive test software	R&S®ROMES4T1S	4900.6590.02
ROMES option, base station position estimation	R&S®ROMES4LOC	4900.5541.02
Extras		
SFP+ to RJ-45 transceiver	R&S®TSMS-SFPRJ	3724.5989.00
SFP+ cable	R&S®TSMS-SFPC	3741.6444.02
Downconverter (24 GHz to 44 GHz)	R&S®TSME44DC	4901.2600.02
Downconverter (17 GHz to 53 GHz)	R&S®TSMS53DC	4902.0001.02
AC power supply	R&S®TSMS-Z1	4901.9870.02
19" rack adapter, for four R&S®TSMS8 scanners	R&S®TSME6-Z2	4900.1030.02
Mounting kit	R&S®TSME6-Z4	4900.1100.02
Carrying box	R&S®TSME6-Z5	4900.1875.02
Cigarette lighter cable	R&S®TSME6-ZCC	4900.1900.02
Synchronization cable, for two R&S®TSMS8 scanners	R&S®TSME6-ZC2	4900.1800.02
R&S®TSMS8 DC Y-cable	R&S®TSME-ZYC	1514.7290.02
R&S®TSMS8 4 × DC Y-cable	R&S®TSME6-ZYC4	4900.1846.02
Synchronization cable, for up to four R&S®TSMS8 scanners	R&S®TSME6-ZC4	4900.1817.02
Synchronization port to BNC port cable	R&S®TSME6-ZCS	4901.1540.02
Synchronization port to BNC and SMA cable	R&S®TSME6-ZCS2	4901.1704.02

[1] Requires full performance PC for optimal operation.

Designation	Type	Order No.
Antennas		
Ultrawideband antenna with magnetic mount, 600 MHz to 10 GHz	R&S®TSMX-ANT1	3740.4025.02
Omnidirectional antenna, 300 MHz to 8.5 GHz	R&S®TSMS-OMN8	4902.6700.02
Antenna mount without magnetic plate, low-profile design, for R&S®TSMS-OMN8/OMN18	R&S®TSMS-LMAGM	4902.6900.05
Antenna mount with magnetic plate, low-profile design, for R&S®TSMS-OMN8/-OMN18	R&S®TSMS-LMAGM	4902.6900.03
Antenna mount, magnetic	R&S®TSME-ZA1	1506.9817.02
Antenna mount, fixed	R&S®TSME-ZA2	1506.9823.02
Antenna mount, magnetic, with integrated GPS antenna	R&S®TSME-ZA3	1506.9830.02
Antenna mount, fixed, with integrated GPS antenna	R&S®TSME-ZA4	1506.9846.02
Antenna emitter, 406 MHz to 440 MHz [2)]	R&S®TSMW-ZE2	1117.8165.00
Antenna emitter, 380 MHz to 430 MHz [2)]	R&S®TSMW-ZE7	1519.5709.02
Antenna emitter, 698 MHz to 2700 MHz [2)]	R&S®TSMW-ZE8	1506.9852.02
Antenna emitter, 430 MHz to 470 MHz [2)]	R&S®TSMW-ZE9	1519.5709.03
Antenna emitter, 600 MHz to 6000 MHz [2)]	R&S®TSME-ZE17	3666.1574.02
Ultrawideband antenna, 350 MHz to 6000 MHz	R&S®TSME-Z9	3590.8039.02
Single-port ultrawideband antenna, 698 MHz to 6000 MHz	R&S®TSME-Z10	4900.1917.02
3-port antenna, 698 MHz to 2690 MHz (MIMO) and GPS	R&S®TSME-Z11	4900.1923.02
2-port MIMO reference antenna, 698 MHz to 2700 MHz	R&S®TSME-Z12	4900.1930.02
4-port MIMO antenna, 698 MHz to 3500 MHz (2x2 MIMO) and 5150 MHz to 5850 MHz (2x2 MIMO), for drive testing	R&S®TSME-Z14	4900.1952.02
2-port antenna, 698 MHz to 3800 MHz, with magnetic mount	R&S®TSME-Z15P2	3657.5770.02
Ultra-wideband antenna, 615 MHz to 6000 MHz, for walk testing	R&S®TSME-Z17	4900.1969.02
Basic handheld directional antenna (antenna handle)	R&S®HE400BC	4104.6000.04
Log-periodic antenna module, 450 MHz to 8 GHz	R&S®HE400LP	4104.8402.02
N (m) to SMA (m) coaxial adapter	R&S®TSMA6-ZHE4	4900.9660.02
PC accessories		
USB 3.0/USB-C to 2.5 Gbit LAN (RJ-45) adapter	R&S®TSMS-U2L	3710.3108.02
USB-C to 4 × Gbit LAN (RJ-45) adapter (2 ports usable)	R&S®TSPC-U2L4	3718.2423.02
5-port USB or AC-powered LAN switch	R&S®TSPC-LS	3624.8364.02
Backpack system		
Backpack system	Contact your local Rohde&Schwarz sales office	

[2)] Requires an R&S®TSME-ZAx antenna mount.

Warranty		
Base unit		3 years
All other items [1)]		1 year
Service options		Contact your local Rohde&Schwarz sales office
Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

[1)] For options installed, the remaining base unit warranty applies if longer than one year. Exception: all batteries have a one-year warranty.

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