



## RF Performance Test System TS9970

RF parameter measurements on communication equipment

- Determination of spatial radiation and receiving characteristics of EUT
- Especially suitable for EUTs with integrated antenna
- Measurement of main RF parameters via air interface
- Automatic measurements and analysis of results
- Also available as extension for EMC lab systems



**ROHDE & SCHWARZ**

## Uses

Test System TS9970 has been designed for measuring main RF parameters of wireless communication equipment under realistic operating conditions.

In addition to the spatial radiation characteristic of the communication antenna, receiver parameters such as signal-to-noise ratio and bit error rate as a function of EUT orientation can be determined.

TS9970 can be effectively used both in design and type approval testing.

## Configuration

As shown in FIG 1, TS9970 is made up of the following main components:

- The communication tester in conjunction with the communication antenna serves for establishing a radio link to the EUT.
- Depending on the type of measurement to be performed, the measurement antenna is connected via a switch matrix either to the spectrum analyzer, RF generator or communication tester.

- The EUT is mounted on a positioning device which is remote-controlled by a controller. An artificial head or body may be used to simulate the operator's influence (FIG 2).
- A central process controller including the appropriate software provides for automatic measurements with documentation of results.
- To simulate open area conditions, a shielded anechoic chamber or comparable test cell is required for testing.

## Test environment conditions

The attainable measurement accuracy is strongly influenced by the test environment. To obtain a measurement error of less than 1 dB, an interference-free environment is required with a reflection of better than 20 dB.

Suitable environments are:

- Shielded anechoic chambers with low-reflection absorber lining
- EMC cabins; with additional absorbers, where required, to improve reflection characteristics
- For measurements in the frequency range 0.8 GHz to 40 GHz, a compact anechoic test cell under the product name M-LINE is available from Rohde & Schwarz as an alternative to the relatively expensive anechoic chambers. M-LINE can optionally be fitted with a climatic chamber, so measurements under extreme temperature conditions (-25 °C to +50 °C) are also possible.

## Measurements

The following measurements can be performed with TS9970:

- Measurement of the directivity of equivalent isotropically radiated power (EIRP) or effective radiated power (ERP)
- Determination of the receive characteristics of the EUT as a function of its positioning by measuring the quality of the radio link. Typical quality parameters of modern radio systems are used for quality assessment (eg BER, RXQUAL, RXLEV, etc)

Alternatively, the following measurements can be carried out:

- Bit error rate (or RXQUAL, RXLEV, etc) with fixed signal level
- Transmit power required to achieve the defined bit error rate (or RXQUAL, RXLEV, etc)

### System layout

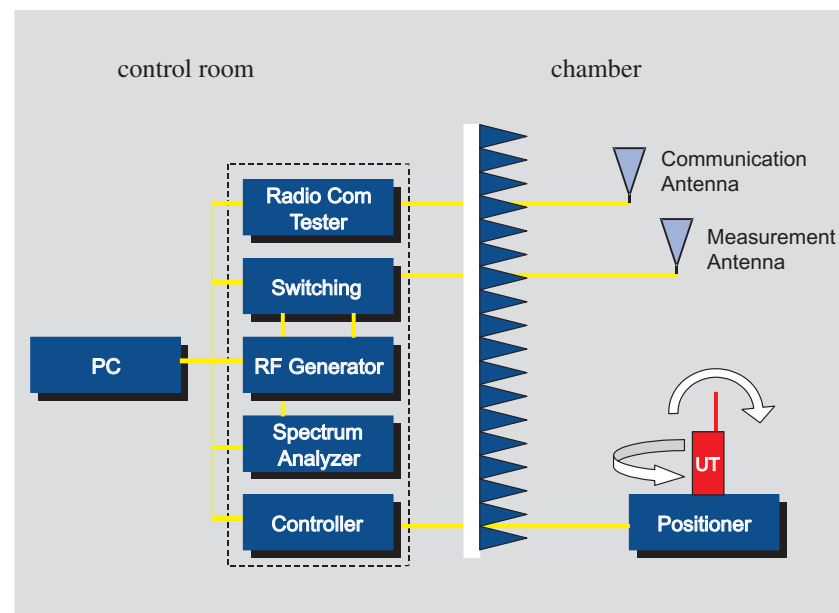


FIG 1: TS9970: Block diagram of TS9970

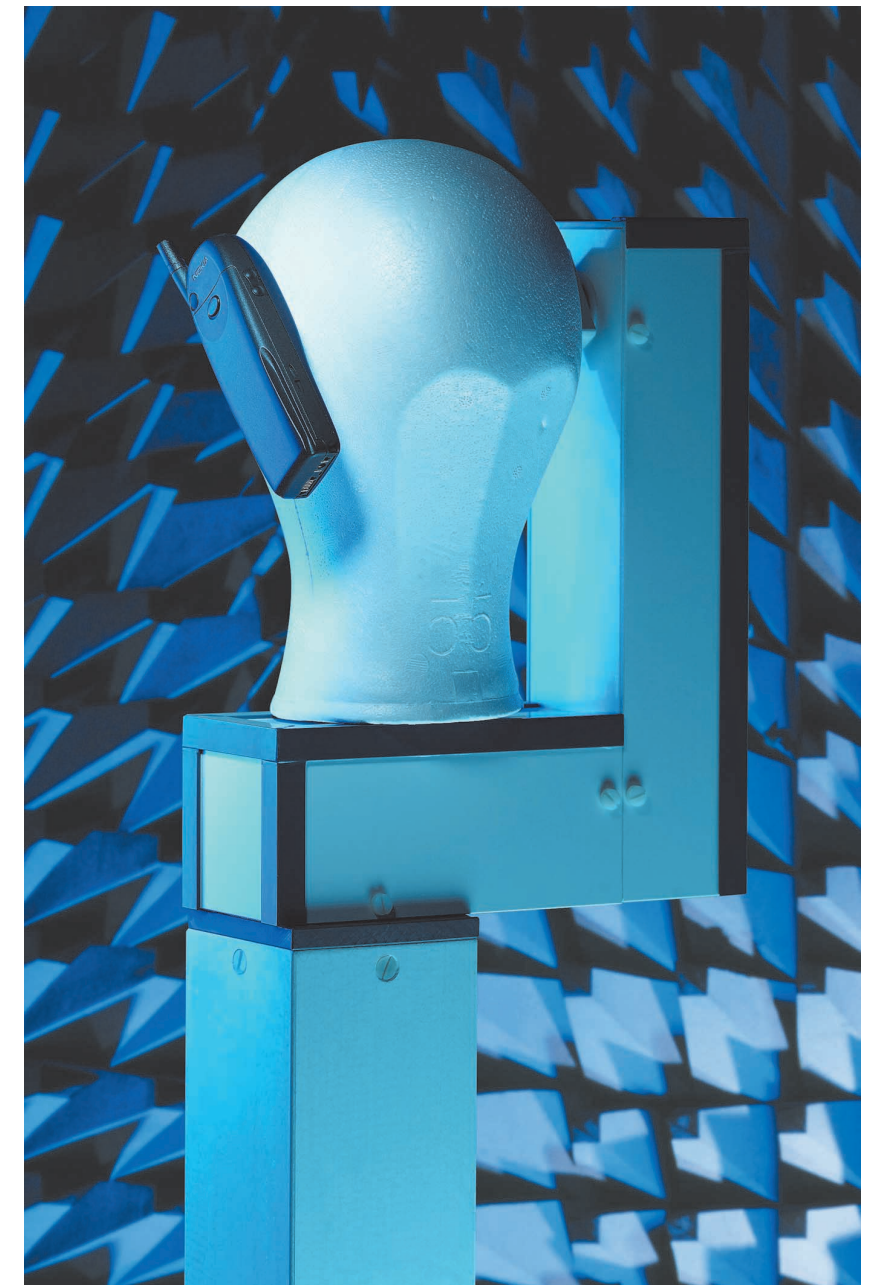


FIG 2: Positioning device with artificial head

## Software

The control software supplied with the system allows fully automatic and simple performance of the measurements. It features in particular:

- Fully automatic measurements
- Menu-guided control of all equipment involved and of the positioning device
- Standard procedures stored in scripts for the different types of measurements. No time-consuming system configuration required
- Software-controlled evaluation of test results
- Various display modes with integration of predefined tolerances. Indication of out-of-tolerance values (FIG 3)
- Automatic generation of test reports

## Specifications and system versions

### Standards

Almost any digital and analog radio standard can be implemented in the system. A suitable communication tester is the only prerequisite.

Rohde & Schwarz testers support the following standards:

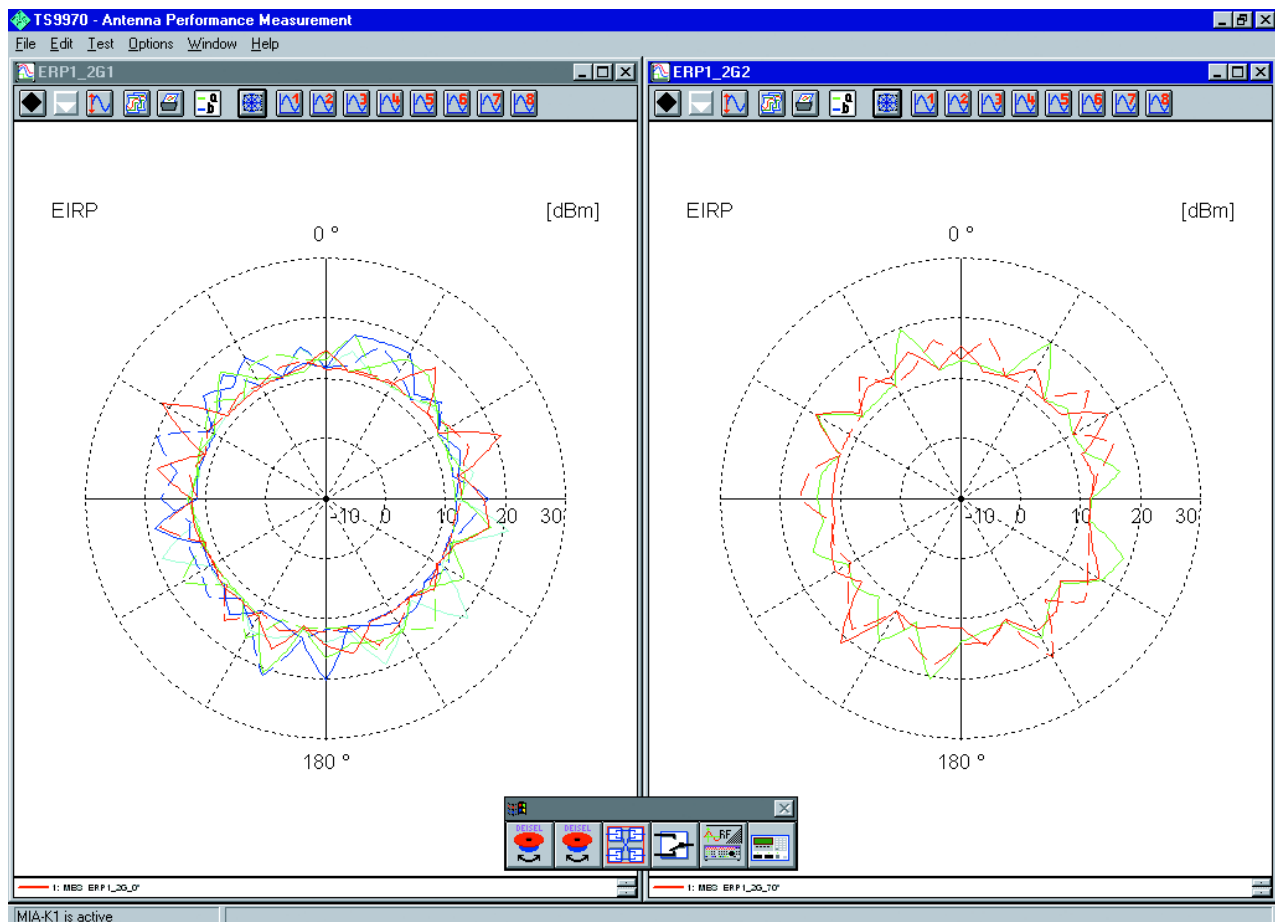
TACS, AMPS	CMS52/54	0840.0009.52/54
GSM900/1800/1900	CMD55/65	1050.9008.05/65
DECT	CMD60/65	1050.9008.60/65
CDMA, D-AMPS	CMD80	1050.9008.84
D-AMPS	CMD80	1050.9008.84

Configurations for other standards on request.

### Test parameters

- Bit error rate
- Effective radiated power (ERP) or equivalent isotropically radiated power (EIRP)
- Transmission parameters such as RXQUAL, RXLEV, etc
- S/N ratio at receiver input, etc.

FIG 3: Graphical display of results





## System software

### Main features:

- Standard test routines for measurement of 3D directional pattern in a spherical or semispherical volume
- Standard test routines for measurement of 2D directional pattern (azimuth pattern)
- Setting of all test parameters via the software user interface
- Automatic evaluation of results (referred to limit values, eg conforming to GSM, DECT, etc)
- Graphical and tabular display of results
- Automatic generation of test reports

FIG 4: Positioning device

TS9970 is available in the following versions:

### Version 01 – Basic system

#### Main components:

- Signal generator
- Spectrum analyzer
- Positioning device
- Communication tester
- Relay matrix
- RF attenuator
- Test and communication antennas
- System software

### Version 02 – Extension for EMV systems

Since existing EMC systems often contain most of the instruments used in the TS9970 basic system, version 02 is available for extending such systems. Rohde & Schwarz offers an upgrade package tailored to the specific needs.

## General data

Operating temperature range	+ 15 °C to + 40 °C
Relative humidity	95% at 40 °C
Power supply	110 V AC, 230 V AC
Certification	CE, VDE
The system comes in a 19" rack	

## Accessories

Test environment	M-LINE
Controller	TS-PCS
Controller integrated in rack	PSM 17
Artificial head	TS-HEA
Artificial body	TS-BOD

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