



GSM Test Transmitter System TS9953

Ideal positioning of base transceiver stations in frequency and network planning

- ◆ Modular transmitter system
- ◆ RF amplifier, CW transmitter (generator, amplifier), GSM test transmitter (modulator, generator, amplifier)
- ◆ Three convenient RF power classes: 2 W, 20 W, 50 W (on request)
- ◆ 2 W GSM test transmitter as exciter for subsequent booster
- ◆ Extremely easy selection of frequency and output power
- ◆ Built-in display for forward and reflected power, and VSWR
- ◆ Rugged cabinet design suitable for transportation
- ◆ Comprehensive useful accessories (weather protection, tripods, antennas, cables, power meter, emergency power supply)



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Planning of base transceiver stations

Complex frequency planning tools are used to ensure optimum positioning of a base transceiver station (BTS).

Besides efficient frequency distribution, the main purpose of these tools is to determine optimum sites for BTS. Forecasts should also inform about the optimum radiation direction and determine suitable RF output power. This requires the databases used to be up to date with regard to topography, geomorphology and buildings.

The efforts involved, especially for tasks such as obtaining permissions, rental agreements etc, are very high. The GSM network operator therefore needs to be sure that the site calculated is suitable for the BTS installation.

Test Transmitter TS9953

The Test Transmitter System TS9953 fulfills all the requirements for two important applications:

- ◆ Unmodulated transmitter:
CW data obtained by means of a test receiver serve as a feedback and for the calibration of frequency planning systems
- ◆ Modulated transmitter:
For measurement tasks in network optimization, a BCCH bit sequence is transmitted by the system as a modulation signal for synchronization with a GSM test mobile. RxLev and RxQual are measured using suitable test mobiles (TS95XM0, TS95MMx).

A GSM antenna with appropriate alignment and downtilt is set up on a stable tripod (4 m) or a robust, small mast (5.4 m)

on the site determined for a BTS. The antenna is fed by a 20 W amplifier via an RF cable.

The amplifier is equipped with a GMSK modulator connected ahead of the built-in RF oscillator. The transmit channel can easily be set via decade switches; a BCCH test sequence stored in the transmitter supplies the modulation signal. The test transmitter simulates a BTS on the downlink.

If the theoretically determined site proves to be unsuitable for a BTS (e.g. shadowing from high-rise buildings, no possibility of installation, church), the test team can simply choose an alternative site since the TS9953 system is so easy to set up. The data measured on the new site can subsequently be confirmed by the frequency planning department.



TS-TX9 and TS-TX18

A test transmitter like the TS9953 is less suitable for handling measurement tasks within buildings or microcell structures. Therefore, Rohde & Schwarz has developed two very compact test transmitters with 2 W output power. They can be operated via built-in batteries or an external power supply unit.

These mini-transmitters are also fitted with a built-in GMSK modulator/oscillator. A suitable BCCH sequence can be loaded via the serial interface.



Mini-transmitter TS-TX



Settings of the basic parameters BCCH, timeslots and training sequence code (TSC)

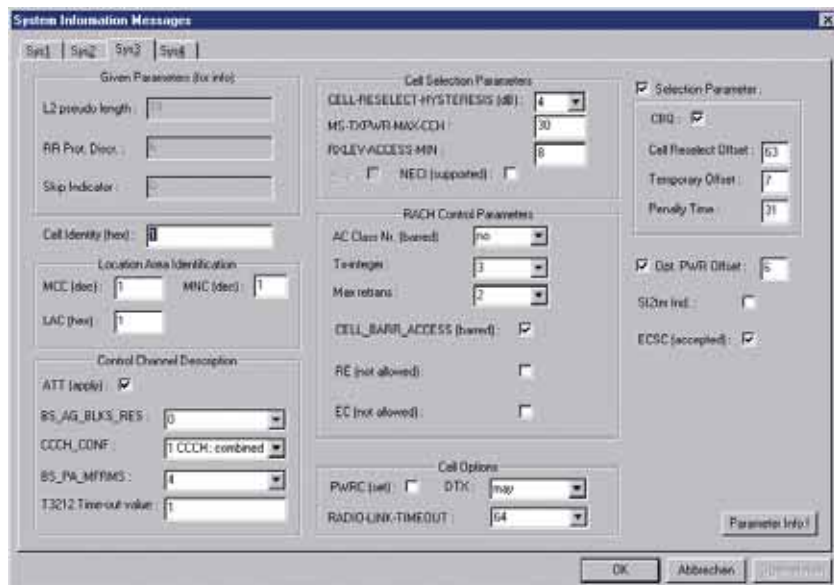
2 W GMSK transmitters come in two models:

- ◆ TS-TX9 for GSM 900, GSM-R, GSM-E
- ◆ TS-TX18 for GSM 1800
- ◆ A control circuit monitors the set RF power and battery voltage. If a constant RF level cannot be ensured by the supply voltage, the test transmitter is switched off to prevent erroneous measurements.
- ◆ The 2 W GMSK Transmitter TS-TX9/TS-TX18 can also be used as an exciter for subsequent RF boosters.

TS9953 for UMTS/WCDMA

To find out about the real propagation conditions in future UMTS/WCDMA networks, a 20 W RF amplifier is available that is ideally suited for the next generation of mobile radio networks because of its wide frequency band (800 MHz to 2700 MHz). This amplifier can be driven by a generator with WCDMA capability (e.g. SME03E, SMIQ from Rohde&Schwarz) and then supplies a signal that can be measured with conventional coverage measurement systems (e.g. TS9955 from Rohde&Schwarz).

A suitable converter for the frequency band expansion is available for the Rohde&Schwarz Test Receivers ESVD/ESVB.



Settings of system information types 1 to 4

TS53-K1 BCCH Editing Software

The TS53-K1 software allows easy generation of individual BCCH bit sequences. TS53-K1 runs under Windows 95, 98, NT or 2000 on a PC, laptop or notebook and can be used for all TS9953 systems.

The sequence is loaded to the modulators via a serial interface.

Specifications

Frequency range

TS-AMPG	935.2 MHz to 959.8 MHz / channels 1 to 124
TS-AMPD	1805.2 MHz to 1879.8 MHz / channels 512 to 885
TS-TX9	921 MHz to 959.8 MHz (incl. GSM-R and GSM-E)
TS-TX18	1805.2 MHz to 1879.8 MHz / channels 512 to 885
Channel spacing	200 kHz
CW mode	unmodulated carrier
GMSK modulation mode	BCCH sequence max. 8 Mbit

Frequency settings

TS-AMPG, TS-AMPD TS-TX9, TS-TX18	by means of decade switches via softkeys, indication on LCD
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Frequency stability

in operating temperature range	± 0.1 ppm
short-term	± 5.0 x 10 ⁻¹⁰ /sec
long-term	± 2.0 x 10 ⁻⁹ /day ± 0.5 x 10 ⁻⁶ /year after 30 days of operation

Output power

TS-AMPG, TS-AMPD	43 dBm; ± 1 dB (for 1 dB compression)
TS-TX9, TS-TX18	33 dBm; ± 1 dB (for 1 dB compression)
Harmonics suppression	>50 dBc
Nonharmonics suppression	>50 dBc
Overload switchoff	automatic
Service connector for data transfer	9-pin sub-D male

RF connector

TS-AMPG, TS-AMPD, TS-UMTS TS-TX9, TS-TX18	N female for input/output SMA connector
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UMTS amplifier

TS-UMTS	800 MHz to 2 700 MHz
Output power	20 W (typ. 25 W)
Gain	40 dB (min. ± 1.2 dB)
VSWR input	1.8 (max.)

General data

Cabinet

TS-UMTS	19" / 2 HU / 300 mm depth
TS-AMPG, TS-AMPD TS-TX9, TS-TX18	19" / 3 HU / 460 mm depth
Dimensions in mm (W x H x D)	84 x 260 x 35
Weight	approx. 700 g

Operating temperature range

TS-AMPG, TS-AMPD, TS-UMTS TS-TX9, TS-TX18	-10°C to +40°C +5°C to +45°C
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Power supply

TS-AMPG, TS-AMPD, TS-UMTS TS-TX9, TS-TX18	230 V AC (47 Hz to 63 Hz) or 110 V AC 7.2 V battery
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Ordering information

TS9953 System

GSM900 Generator Amplifier with internal GMSK Modulator	TS-AMPG	1070.5689.05
GSM1800 Generator Amplifier with internal GMSK Modulator	TS-AMPD	1072.1051.05
GSM900 Transmitter with internal GMSK Modulator	TS-TX9	1090.8460.02
GSM 1800 Transmitter with internal GMSK Modulator	TS-TX18	1090.8477.02
Editor Software for generation of BCCH bit sequences on a PC	TS53-K1	1117.5714.02
UMTS Amplifier	TS-UMTS	1148.1804.02

Recommended accessories

Transportation Case, plastic cover for weather protection	TS-SUIT	1070.5908.04
Transportation Case	TS-SUIT	1070.5908.02
Transmitting Antenna for GSM900	HF065D1	4044.1508.02
Transmitting Antenna for GSM1800	HF065E1	4043.8509.02
Tripod, 4 m	TS-MAST	1070.5708.02
Portable Mast, 5.4 m	TS-MAST	1070.5708.04
7 m Antenna Cable	TS-CABL	1070.5714.02
Emergency Power Supply	TS-AGGR	1070.5737.02



...making the right connections.



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