

# Conformance test system for WCDMA

WCDMA Test System R&S® TS8950W



**ROHDE & SCHWARZ**

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### The WCDMA Test System

**R&S®TS 8950 W expands the Rohde & Schwarz portfolio of RF conformance test systems and provides an all-in-one solution suitable for development tests as well as for the certification of terminal equipment. The new test system for manufacturers and independent test laboratories performs all transmitter, receiver and performance tests according to the 3GPP test specification TS34.121 fully automatically.**

### All tests for certification

The new test system performs not only tests in line with R&TTE (Europe) and FCC (USA) but also all RF tests prescribed by the GCF (Global Certification Forum) for the certification of terminal equipment. A unit will not be approved for use on the market until all these tests have been passed. The test system is based on the hardware and software platform of the well-known GSM Test System R&S®TS 8950 G [1], which can also be upgraded to the R&S®TS 8950 W. The fully configured Test System R&S®TS 8950 G/W makes it possible to test 2G (GSM), 2.5G (GPRS) and 3G mobile phones.

### Configuration and characteristics

The 3GPP standard TS34.121, which describes the conformance tests, divides the tests into transmitter, receiver, performance and radio-resource-management (RRM) tests. The Test System R&S®TS 8950 W supports transmitter, receiver and performance tests; for RRM test cases Rohde & Schwarz offers a separate test system.

FIG 1 shows the block diagram of the R&S®TS 8950 W. For testing terminal equipment, the test system simulates a WCDMA base station and a number of interference signal sources. The WCDMA base station is simulated by the WCDMA Protocol Tester R&S®CRTU-W [2], whose two independent RF channels ensure that even complex test cases such as diversity tests can be performed. The analyzer sets up a connection to the DUT and switches

it to the loopback mode, in which all data received from the protocol tester is returned to the test system. The data is then available in the test system for the different measurements. Among other measurements, the Spectrum Analyzer R&S®FSU determines the output power and the modulation characteristics.

The system includes a Vector Signal Generator R&S®SMIQ03 B, which generates the WCDMA-modulated interference signal, and by a Microwave Generator R&S®SMP02, which generates the unmodulated interference signal for the blocking and the intermodulation test.

The Baseband Fading Simulator R&S®ABFS simulates signal fading that results from multipath propagation and Doppler shift. Like the protocol tester, it is equipped with two channels, so that fading characteristics can be added to two signals independently of each other.

The signal switching and conditioning unit (SSCU) and the advanced signal conditioning unit (ASCU) – two modules containing relays, directional couplers, combiners, amplifiers and several filters – amplify and filter all signals. The SSCU is independent of the standard, whereas the ASCU contains standard-specific components.

The test system is rounded out by a Rubidium frequency standard used as a time reference and a power meter with two probes for path calibration. A system controller controls all test units via diverse interfaces.

**The new test system is based on the Test System R&S®TS 8950 G introduced in News from Rohde & Schwarz 174. Both have virtually the same appearance.**



## Key features of the new test system

- ◆ Existing Test Systems R&S®TS8950 G can be upgraded to a combined GSM/WCDMA Test System R&S®TS8950 G/W
- ◆ High measurement accuracy for conformance test cases and other test cases as well
- ◆ Calculation of measurement accuracy for every test case in realtime
- ◆ Flexible, convenient user interface
- ◆ Generation of user-defined test cases without additional programming
- ◆ Wide range of logging and analysis tools

## Cost-efficient modular design

The Test System R&S®TS8950 W is based on the hardware and software platform of the GSM Test System R&S®TS8950 G, which has been used in a wide range of applications. The main difference in the hardware of the two systems lies in the different protocol testers and in the ASCUs. By adding a WCDMA protocol tester and one or more ASCUs, a GSM Test System R&S®TS8950 G can be upgraded to a full-compliance Test System R&S®TS8950 G/W for 2G (GSM), 2.5G (GPRS) and 3G tests. When fully configured, a test system of this kind supports four GSM bands (850, 900, 1800 and 1900 MHz) and three WCDMA bands (FDD I, FDD II and FDD III).

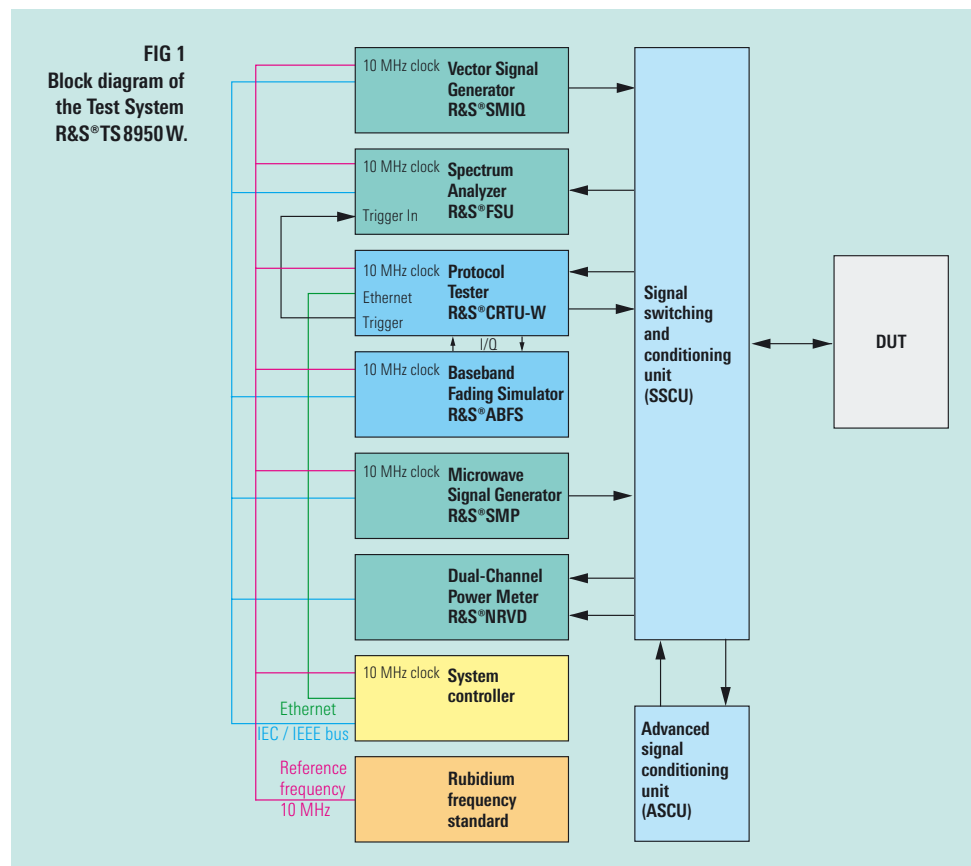
Of course, it is also possible the other way around: an R&S®TS8950 W can be expanded into a combined GSM and WCDMA Test System R&S®TS8950 G/W by adding on a protocol tester and appropriate ASCUs.

## High measurement accuracy

An outstanding feature of the R&S®TS8950 W is its high measurement accuracy. Through the use of complex mathematical operations and a sophisticated calibration concept based on Rohde & Schwarz's many years of experience in the development of conformance test systems, the measurement uncertainties are well below the maximum permissible limit specified by the 3GPP standard TS34.121. Accuracy is maintained not only in conformance tests but also when the user has changed the tests. This is ensured by a special algorithm that – depending on the actual measurement parameters, such as frequency, level, etc – automatically finds the most favourable path through the SSCU and subsequently calculates the measurement uncertainty for the selected path by taking the instrument settings into account.

## GCF test cases and user-specific adaptation

Besides the fully automatic tests according to GCF test specification and requirements, test cases can be adapted and modified to suit the user's specific needs. Using the PASS software (parametric application software for test systems) from Rohde & Schwarz, all test cases are based on a few test methods. The nearly 40 WCDMA test cases are mapped onto just eight test methods. Receiver tests, for example, are covered by only one test method with some 50 parameters. Test cases are defined by means of parameter sets. Besides the frequency and level of payload and interfering signals, channel configurations, fading profiles or the number of measured samples are available as parameters. FIG 2 shows the parameter list for the Spectrum Emission Mask test case. The parameter sets can be modified, expanded or completely



- ▶ redefined at any time on a user-friendly interface. In addition to a comprehensive test report, there is also a wide range of logging and analysis tools available for quickly localizing faults on the DUT. Users can thus develop their own test scenarios and perform fast, accurate analyses of problems that may occur during the development of mobile phones.

### Analysis – online and offline

The user interface of the PASS software runs as a separate process and is thus independent of the test application. During a test run it is therefore possible to compose the next sequence, analyze earlier results or define new tests without interfering with the ongoing test. FIG 3 shows the result of the Spectrum Emission Mask measurement. The specified limit lines are shown in red, the measurement result in blue. Via the LAN interface, the measurement results can be transferred from the measurement system to the company network, for example. A copy of the analyzer tool then makes it possible to analyze the measurement results on any workstation PC.

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More information and data sheet at [www.rohde-schwarz.com](http://www.rohde-schwarz.com) (search term: TS 8950 W)

#### REFERENCES

- [1] RF Test Systems R&S®TS 8950 G / TS 8955 G – Reliable RF testing of GSM, GPRS and EDGE mobile phones. News from Rohde & Schwarz (2002) No. 174, pp 4–7
- [2] Protocol Tester R&S®CRTU-W – Future-proof tool for testing WCDMA terminals. News from Rohde & Schwarz (2002) No. 175, pp 4–7

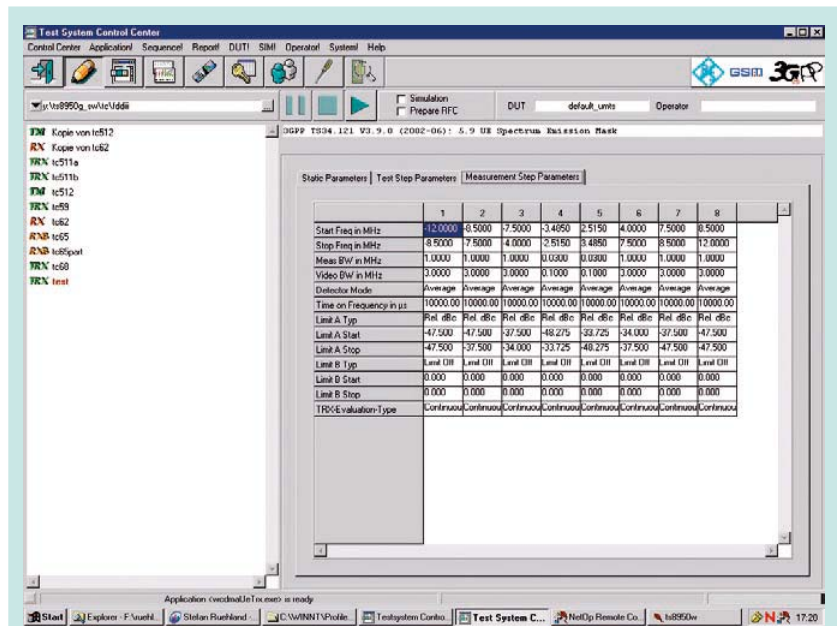


FIG 2 Parameters of the Spectrum Emission Mask test case.

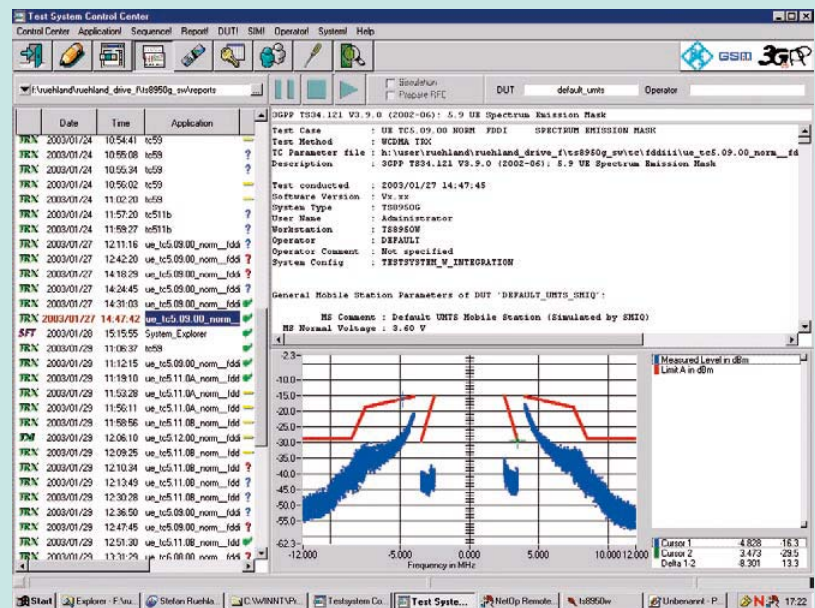


FIG 3 Results of the Spectrum Emission Mask measurement.

