

## Universal Radio Communication Tester CMU200

### On the fast lane into the mobile radio future

Maximum production throughput, extremely high measuring accuracy and speed, multistandard/multiband, future-proofness – these and other similarly exacting demands are familiar in the design and manufacture of radiotelephones. Rohde & Schwarz, world market leader in mobile radio testers, has responded to the challenge by developing an innovative and unique test platform: Universal Radio Communication Tester CMU200 (FIG 1). The company's decades of experience were a vital prerequisite for tackling such a project in the first place, but many new approaches had to be taken at the same time.

#### Modular concept guarantees future-proofness

The rigid demands can only be met by combining state-of-the-art hardware and software in a highly modular and thus flexible concept. The result is CMU200, a radiocommunication tester that not only guarantees utmost measuring accuracy and speed but also maximum future-proofness. The latter is a must for modern testers, given

FIG 1 Universal Radio Communication Tester CMU200 is way ahead of conventional testers: total measuring accuracy is better by a factor of 3, one-shot measurements are up to ten times faster

further development of existing standards like GSM into multi-slot and EDGE, and the possibility of today's mobile radio standards like GSM and IS136 merging. CMU200 is so fit for the future that it not only supports current standards such as GSM, AMPS, D-AMPS and CDMA but is also ready to integrate upcoming mobile radio standards of the third generation such as W-CDMA and CDMA2000.

Plus, the extendable, mainly digital hardware platform (FIG 2) can accommodate an extra transceiver unit for future multimode applications. That makes simultaneous measurement to two different mobile radio standards a straightforward implementation.

The modular structure is maintained throughout CMU200 software. Each functional group is implemented in dynamic link libraries (DLLs), software libraries that are loaded in real-time when required. Intelligent control ensures that realtime conditions required for measurement and signalling are not violated by loading. The DLL structure makes for scalability of CMU200 software, so there is no loss of time even if a large number of network standards are implemented.



Photo 43238/2

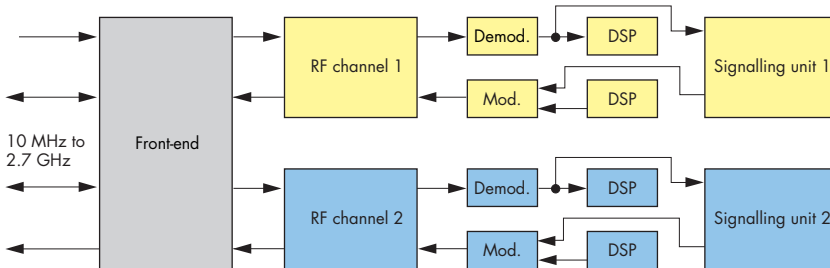


#### CMU200 – versatile in application

- Production
  - module tests
  - final tests
- Quality management
- Development
  - module design
  - RF development
  - function tests
- High-end service
- Basic platform for test systems
- BTS simulation

common standards – will cut down on setup times in production for example. CMU200 is a multistandard test platform that, thanks to its pronounced modularity, is optimally prepared for today's and tomorrow's needs and offers maximum safety of investment. The tester allows measurements in the GSM900, GSM1800/1900 bands and is easily extended to other mobile radio standards like IS95 (CDMA), IS136 (US cellular), AMPS, or to future technologies like Bluetooth or W-CDMA. The result is that mobile phones to different standards can be

FIG 2 Block diagram of CMU200 (blue: optional extensions)



#### Multistandard capability safeguards investment

For rapid response to the continuously changing requirements of the mobile radio market, test equipment must have multistandard capability. Only highly versatile testers – supporting all

manufactured on one and the same production line.

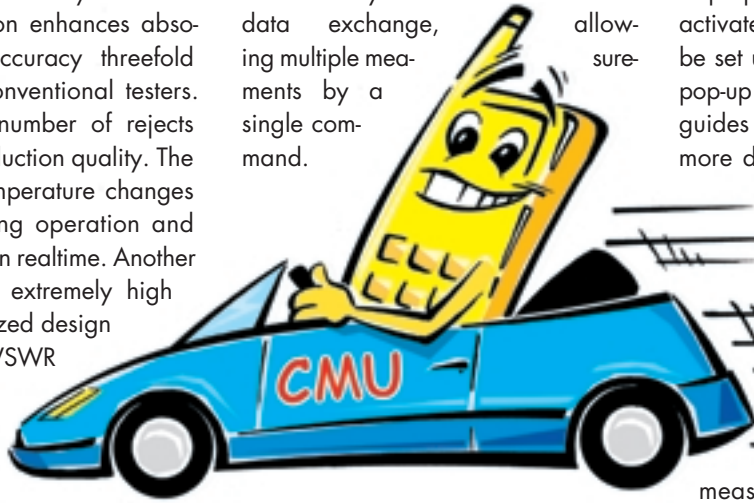
The RF modules of CMU200 cover the entire frequency range from 10 MHz through 2.7 GHz, which is important for simple software upgrades to future standards like GSM400.

**Fast**  
**Accurate**  
**Future-  
proof**

**GSM**  
**IS 136**  
**AMPS**  
**CDMA**  
**Bluetooth**  
**W-CDMA**

**Extremely accurate, incredibly fast measurement**

CMU200 is a clear front-runner in terms of measuring accuracy. Its innovative error correction enhances absolute measuring accuracy threefold compared with conventional testers. This reduces the number of rejects and improves production quality. The secret: internal temperature changes are detected during operation and corrected virtually in realtime. Another factor making for extremely high accuracy is optimized design of the RF modules. VSWR at the RF input/output is <1.2. This yields an extremely high total accuracy of 0.5 dB in power measurements, and an output level accuracy of 0.6 dB.



of measurements minimize test times, speed up adjustments and thus considerably boost production throughput. Optimized IEC/IEEE-bus drivers make for extremely fast and smooth data exchange, allowing multiple measurements by a single command.

**High reliability for uninterrupted production**

CMU200 is a reliable partner in production: a new hardware concept with power consumption well below 200 W guarantees low generation of heat and thus failsafe operation.

**Exemplary operating concept**

A model user prompting concept ensures that all menus are accessi-

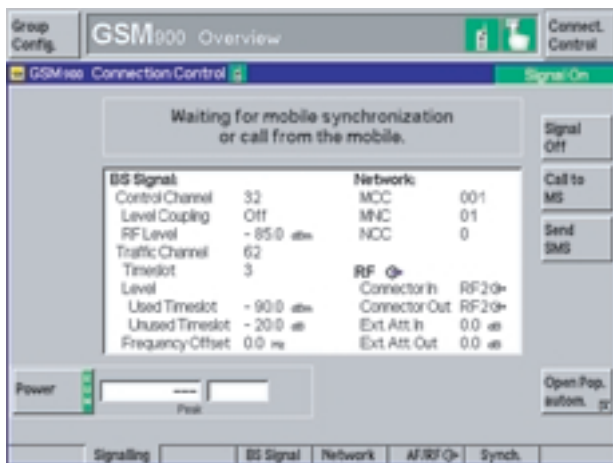
ble at any time, ie independently of signalling status. For example, in a GSM900 call setup you can change to the GSM1800 functional group to prepare for handover. When you activate menus that require a call to be set up before outputting results, a pop-up menu opens automatically and guides you through to call setup. For more detailed configurations, further pop-up menus are available, split into signalling and functional groups and measurement settings (FIG 3). A hotkey bar at the bottom enables switch-over between measurement menus (FIG 4). The menus can easily be redefined, allowing for fast switchover between the major applications.

The complex procedures involved in testing modern dual- and triple-band mobiles have nearly doubled the time taken by conventional testers. This presents no problem for CMU200. It handles one-shot measurements up to ten times faster. The use of advanced, high-performance digital signal processors – with special processors assigned to different measurements – and optimized parallelizing

The colour display makes for transparent presentation of the wealth of information. For example, results exceeding tolerances are highlighted in colour. Two display modes are available for remote control of CMU200: the display is switched off for maximum measuring speed, and in the text mode commands and acknowledgments can be analyzed.

FIG 3 Pop-up menus guide the user simply and speedily through call setup and clear-down procedures

FIG 4 GSM Overview menu shows all important GSM parameters and results. Hotkeys (bottom) enable fast changing to special menus





## Optimally equipped for general-purpose measurements

The basic unit itself offers ample, non-standard-specific general-purpose measurement functions. In addition to an RF generator, CMU200 incorporates a spectrum analyzer with a continuous frequency range, numerous resolution bandwidths and convenient operation (FIG 5). In the zero span mode (FIG 6), which is of major importance in digital network standards (TDMA systems), CMU200 features a special operating mode offering comprehensive trigger and time functions (pre-trigger, delay, timebase, slope). This basic configuration enables a variety of measurements on production lines, in development labs, and in high-end servicing.

Featuring such excellent characteristics, it is not surprising that CMU200 leaves other testers far behind. A CD-ROM demonstrating the wealth of functions of CMU200 by numerous examples and animations is available from your local Rohde & Schwarz representative.

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Walter Schmitz

### REFERENCES

- [1] Mittermaier, Werner: Digital Radiocommunication Testers CMD65 and CMD80 – Multiband and multimode testers for mobile-radio telephones. News from Rohde & Schwarz (1997) No. 155, pp 6–8
- [2] Gresser, Klaus; Holzmann, Gottfried: Digital Radio Testers CTS65 and CTS60 – All-rounders in servicing GSM and DECT mobile phones. News from Rohde & Schwarz (1998) No. 158, pp 7–9

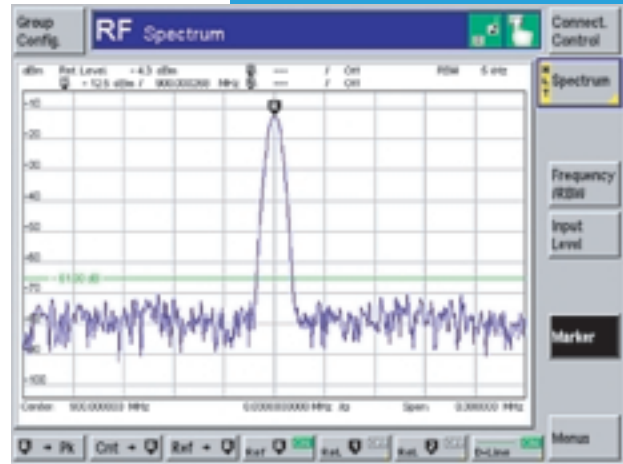


FIG 5  
Functions such as markers and display lines are valuable tools in result analysis

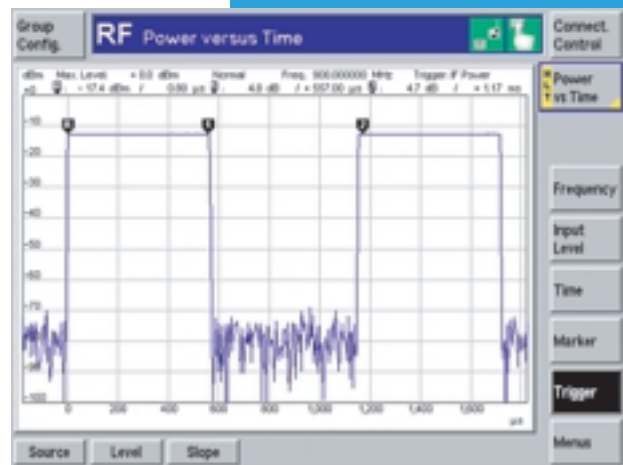


FIG 6  
Convenient analysis of TDMA signals in zero span mode

### Condensed data of CMU200

Frequency range	10 MHz to 2.7 GHz
Accuracy of power meter	0.5 dB
Accuracy of RF generator	0.6 dB
VSWR of RF inputs/outputs 1 and 2	better than 1:1.2
Frequency-selective power measurement	bandwidth 10 Hz to 1 MHz
Spectrum analyzer	10 MHz to 2.7 GHz

### Measurements at a glance

Network-independent measurements	generator power measurement (narrowband/ broadband) spectrum power versus time power measurement power versus time power versus PCL phase/frequency error spectrum due to modulation/switching bit error rates (BER, RBER, FER, fast BER) timing error
GSM: measurements with signalling	power measurement power versus time phase/frequency error spectrum due to modulation/switching
GSM: measurements without signalling	

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