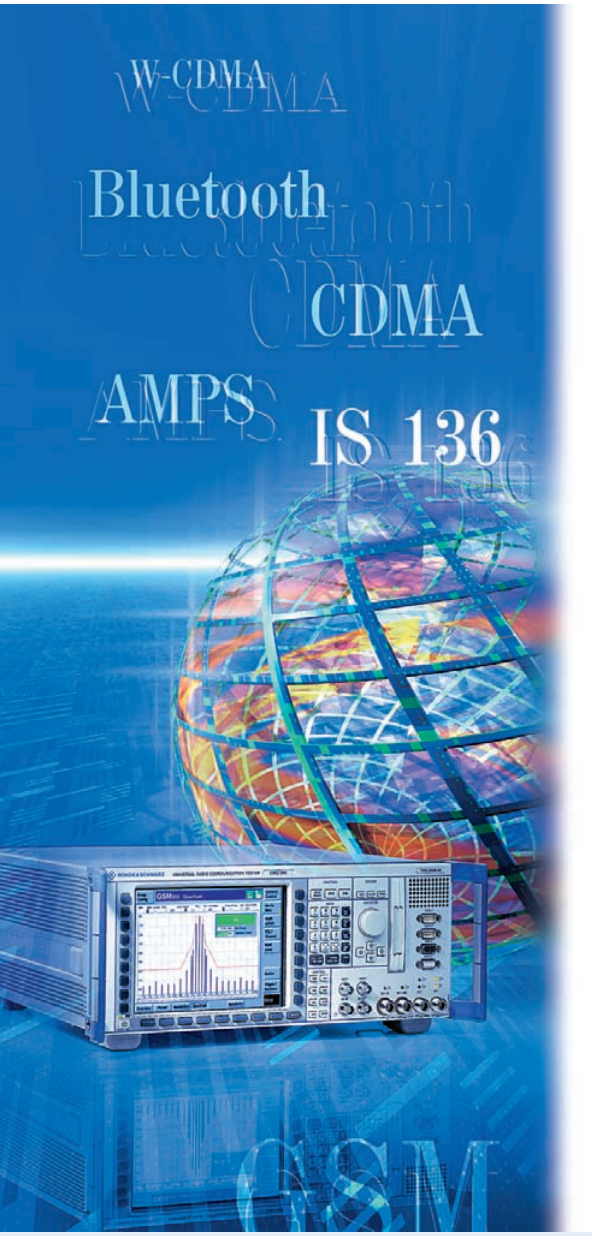

Photo 43238/11

Universal Radio Communication Tester CMU200

Speeded-up test of GSM mobiles without signalling

Searching for ways to improve throughput in the production of mobile phones seems to be heading for complete avoidance of signalling in the production test. In pursuit of this trend, Universal Radio Communication Tester CMU200 (photo left) provides comprehensive options in two operating modes for GSM measurements without signalling: unsynchronized measurement in the functional group "GSM non-signalling" and synchronized measurement with disabled signalling in the functional group "GSM signalling".

Unsynchronized measurement

This operating mode is especially useful for measurements and adjustments on GSM modules and GSM mobiles. CMU200 performs all transmitter measurements that are also possible in signalling mode:

- Power
- Power versus time
- Modulation
- Spectrum due to switching
- Spectrum due to modulation

In non-signalling mode (FIG 1) – and in signalling mode too – CMU200 checks tolerances and templates. Any missing signalling information on the transmit level selected by the mobile is provided either by the user or determined from the power measured.

Measurement can be triggered by the RF power of the burst transmitted by the mobile, by an external hardware trigger signal, or in a free-running mode. It is also possible to synchronize to the training sequence in the burst.

In both power-versus-slot and power-versus-frame measurement, CMU200 allows easy observation of power as a function of time over several slots or frames. Here the test set determines in realtime the average power in up to 512 consecutive timeslots or in up to 128 consecutive frames (FIG 2). The result is available in tabular form. Since neither GSM-conformant power measurements nor template checks can be performed in realtime, the test set evaluates only part of the power ramp and then on this basis calculates the average power. Determination of the training sequence and checking the power-versus-time template are omitted. Such measurements show whether the mobile ensures correct timing of the idle burst.

The CMU200's GSM generator is used for receiver measurements. Besides the usual GSM sequences (0 to 7 and dummy burst), all bits in the training sequence can be set to zero too. For bit modulation the GSM generator provides a large variety of options ranging from "unmodulated" through "all bits to 0" and "pseudo-random" to a complete GSM dummy burst. Plus, it is possible to send either just one or all bursts within a GSM frame.

CMU200 will also soon offer a solution on the subject of "edge": edge measurements will be possible in non-signalling mode. Of course, when verifying power ramping within an edge burst, CMU200 considers the power/time template modified for edge signals.

Synchronized measurement

The big drawback of unsynchronized measurement is the inability to carry out BER measurements on GSM mobiles. CMU200 neatly circumvents this problem: all signalling units necessary for setup and cleardown procedures or for a channel change are skipped in signalling mode. The mobile synchro-

nizes to the control channel and then CMU200 and the mobile change to the required RF channel without any signalling exchange between the two. Since the test setup cannot tell the mobile to which channel and timeslot it should change and what power to transmit, it has to receive this information from the user – eg via a mobile interface. The additional effort in the test setup is well worth its while: the test time is considerably reduced thanks to omitting the signalling.

In this operating mode the mobile remains synchronized, since a GSM-conformant control and traffic channel is present at all times, unlike in non-signalling mode. Even a BER measurement can be performed. The user only has to activate the appropriate test loop via the interface on the mobile.

In transmitter measurements, CMU200 provides the same functionality as in signalling mode. Only the power-versus-PCL measurement is not available since in this case all power steps of a mobile are measured on several channels. This requires the test setup to communicate with the mobile, an unrealizable demand since signalling is omitted in this operating mode of course. A similar function can easily be simulated with the aid of the power-versus-frame measurement by using a remote-control program to drive the mobile interface and an appropriate analysis routine.

Flexible adaptation

The example of GSM measurements without signalling shows how Universal Radio Communication Tester CMU200 is permanently matched to changing requirements and conditions in production. It is the first test system to support signalling in the GSM 400 band for instance.

Rudolf Schindlmeier

Further articles on CMU200
Schindlmeier, Rudolf: Universal Radio Communication Tester CMU200: GSM power measurement – versatile, fast and accurate. News from Rohde&Schwarz (2000) No. 167, pp 24–25

Reader service card 168/04

FIG 1 The universality of GSM analyzer and GSM generator in CMU200 are the basis for a multitude of measurements on GSM modules and GSM mobiles in non-signalling mode

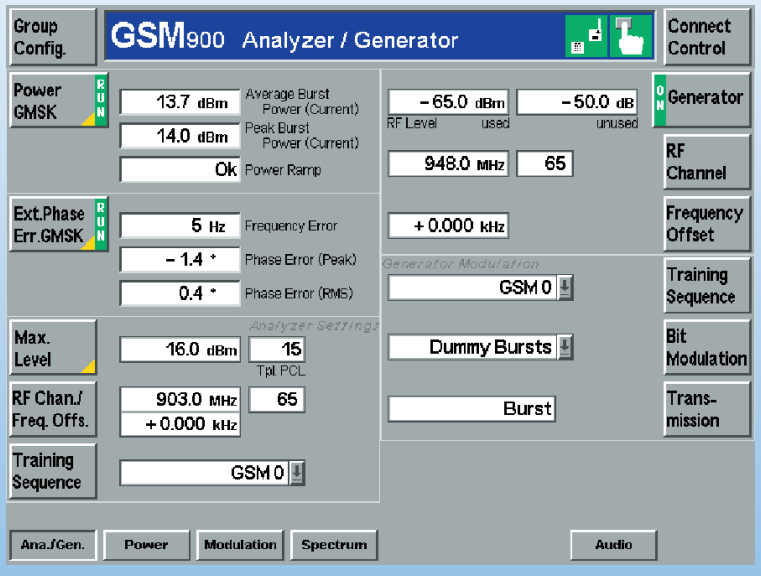

FIG 2 In power-versus-frame measurement CMU200 detects the power in up to 128 consecutive frames, allowing the mobile power ramp to be checked over several frames. The example shows the mobile performing a power change. Clearly visible is the position of the idle burst in every 26th frame