

## Digital Radiocommunication Test Set CRTx-DUO

# Test platform for HSCSD and multicarrier applications

Mobile radio manufacturers frequently have to perform critical four-channel handover or cell selection/reselection tests during the development of a new model. They also require measurement equipment for testing new data services such as high-speed circuit-switched data (HSCSD) and general packet radio services (GPRS), which make use of more than one active timeslot at a time. CRTx-DUO, a combination of two Radio Test Sets CRTS, CRTP or CRTC, which can be operated as stand-alones again at any time, is a fully fledged four-channel tester ideal for these testing scenarios.

Test specification GSM Rec. 11.10 prescribes all test cases to be performed for the type approval of mobile radios. The vast majority of them are signalling tests and can be performed with two RF channels. The stand-alone testers offered for these applications by Rohde & Schwarz come from the CRTx family of Digital Radiocommunication Test Sets: CRTS (GSM900), CRTP (GSM900 and GSM1800) and CRTC (GSM900, GSM1800 and GSM1900) [1]. They are available with numerous software options covering all specified tests.

The type approval tests supported by the stand-alone units have without exception been accredited by test houses, thus making their use for type approval testing official. One reason why test houses are glad to resort to these Rohde & Schwarz solutions is that in this way they can keep their highly complex TS89xx systems [2] – exclusively supplied by Rohde & Schwarz worldwide – free for elaborate RF tests.

However, more than one channel is required for **cell selection/reselection** and **handover tests** when examining the behaviour of mobile phones under typical conditions. For intercell handover tests, for instance, two network cells each with a C0 carrier (BCCH)

and at least one traffic channel (TCH or data) have to be emulated, thus making four channels. New **services like HSCSD and GPRS** require several timeslots simultaneously for correct data transmission. A CRTx can emulate one timeslot per channel. This allows two

separate physical channels with one timeslot each or a combined channel of two timeslots to be configured with a CRTx and its two RF channels. CRTx-DUO, a combination of two units, offers four channels and is therefore ideal for this application (FIG 1). For multislot applications, up to three channels can be grouped to form a channel of three timeslots. One possible configuration is a C0 carrier (BCCH) and a traffic channel (uplink and downlink) of three timeslots. This combination also supports frequency hopping of course.

For **multislot layer 1 module tests** it is even possible to emulate a channel of four timeslots, because in this case no C0 carrier is required. A typical example is the bit rate test that is performed in the initial development stage of data services. This verifies whether the data received in a particular timeslot by the mobile phone are looped back in the correct timeslot.



FIG 1  
Multislot channel  
measurement  
of GSM mobile  
with DUO consisting  
of two Digital Radio-  
communication Test  
Sets CRTC  
Photo 43 250

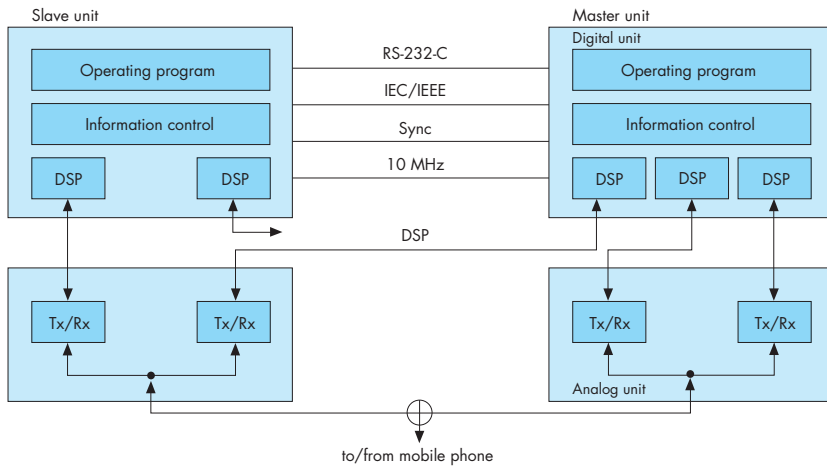


FIG 2 Block diagram of Digital Radiocommunication Test Set DUO with two CRTx

CRTx-DUO may consist of any **combination of CRTx units** (FIG 2). The operating software of the DUO automatically recognizes the models used and addresses them accordingly. The largest number of possibilities is offered by a combination of two CRTC models. This dual setup even supports full multiband handover functions, for instance handover from a GSM900 to a GSM1900 traffic channel. What makes CRTx-DUO particularly attractive for the user is that it can easily be split up into two stand-alones whenever required. Like Type-Approval Test Systems TS89xx, CRTx-DUO is based on CRTx units, so it can be upgraded later to form a complete system. This may become necessary if requirements for RF accuracy are more stringent than those for the signalling tests normally carried out with CRTx-DUO. The DUO is thus an ideal upgrade or downgrade for the Rohde & Schwarz selection of GSM testers.

Operating the DUO is almost the same as operating a single CRTx. Test scenarios written by the user can be programmed on the same, slightly expanded **application platform** that was recently added to the stand-alone tester. This platform is standard for all new applications and test cases for

CRTx and TS89xx systems. This means that customers familiar with the individual units will not require extra training. Applications and test cases written for the DUO platform will also run on a TS89xx system without modifications.

Every **test application** or test case consists of a **master program** running on the master digital unit and a **slave program** on the slave digital unit. Both programs can exchange data via a communication link. This also gives the master program full remote control capability for the slave CRTx. The master therefore provides the user interface for the whole system. Normally the slave program only needs to perform the call establishment procedure with assignment to the master traffic channel. This allows it to be used for various tests without modifications, provided it is sufficiently configurable with parameters. A slave program of this kind is included in the master application of the DUO operating software

CRO2DUO. This means that no programming is required apart from modifying the master program for a new test. The actual programming is therefore very much the same as for a test with a single unit. Besides the functions mentioned above, the master-slave communication link is also capable of transmitting files in both directions. An intercell handover application and a simple program for configuring a CO carrier channel and a channel of three timeslots are also supplied. They can serve as a basis for the user's own programs. The package also includes a selftest that, together with a mobile phone, verifies the functioning of all essential signalling routines of the DUO. The software for the DUO platform is continuously being added to and updates are quite straightforward.

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#### REFERENCES

- [1] Körber, F.; Steffen, R.: Digital Radiocommunication Test Set CRTC02 growing with standard GSM. News from Rohde & Schwarz (1997) No. 155, pp 30–31
- [2] Mellein, H.: Type approval of GSM900/GSM1800 multiband mobiles using System Simulator TS8915. News from Rohde & Schwarz (1998) No. 157, pp 28–29

#### Condensed data of Digital Radiocommunication Test Set CRTx-DUO

(functions not included in stand-alone CRTx)

RF channels	four fully synchronized channels to GSM Rec. 5.xx, three of which can be grouped to form a channel of three timeslots; the fourth channel emulates the CO carrier (BCCH)
Test cases	HSCSD, intercell handover, intracell handover, cell selection/reselection
Application	four-channel layer 1 module test

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