

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Rohde & Schwarz CMD55* at our website: *Click HERE*



Digital Radiocommunication Testers CMD

Multiband, multimode tests for all GSM mobiles and DECT devices

The solution for

- Production
- Quality assurance
- Service
- Development

ROHDE&SCHWARZ

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

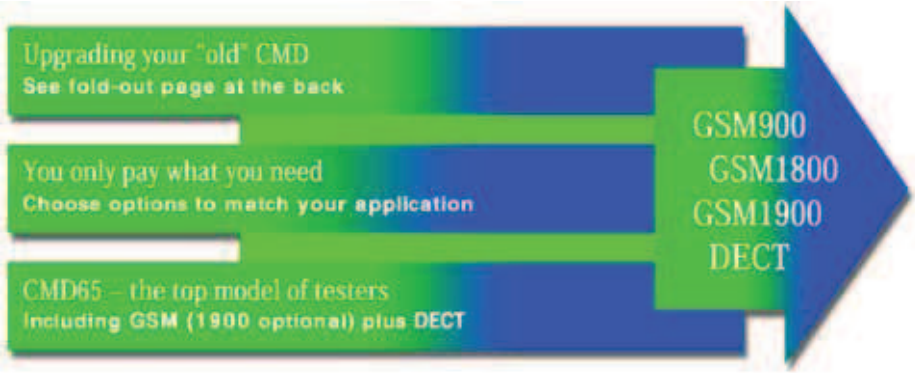
Staying in the lead ...

The Digital Radiocommunication Testers CMD have evolved from GSM900 mobile station testers to a fully equipped test and measurement solution for mobiles and handhelds for all GSM-based systems as well as DECT.

.... thanks to
continuous innovation

The CMD is the industry standard in mobile radio testing and defines the levels that others are judged by. With extremely high market acceptance worldwide, the family will stay in the lead thanks to constant innovation, a well-chosen modularity through different models and optional extension.

The CMD addresses all aspects of test and measurement applications from production and service to development and quality assurance.



Rohde&Schwarz milestones in digital testing

- **1990:** CMTA94 – the first test set for GSM transmitter and receiver testing
- **1991:** CRTS02/04 – signalling tester for GSM mobile and base stations
- **1992:** FTA – sole supplier of the GSM900 system simulator for type-approval testing of mobiles
- **1993:** TA – sole supplier of GSM900 interim type-approval system, upgradable to GSM1800
- **1996:** CRTP/C02 – approved as stand-alone tester for type approval of phase II GSM900/1800 mobiles
- **1997:** supplier of the first type-approval system for GSM1900

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The family members at a glance

CMD50 – the service tester to suit every budget



- All signalling required for GSM900 testing
- High measurement accuracy and speed
- Autotest and remote control via RS-232-C
- Basic module test features included
- Go/nogo test as well as service mode for exact fault location

CMD53 – service testing for the whole GSM world



- GSM900, GSM1800 and GSM1900
- Testing of handover from GSM900 and back
- Other features as CMD50

CMD52 - the leading GSM900 production tester



- All signalling required for GSM900 testing
- Highest measurement accuracy and speed
- Remote control via IEEE488/IEC625 bus
- Autotest and remote control via RS-232-C
- Go/nogo test as well as service mode for exact fault location

CMD55 – the multiband GSM production tester



- GSM900, GSM1800 and GSM1900
- Testing of handover from GSM 900 and back
- Other features as CMD52

CMD60 – pure DECT dedication



- Compact, lightweight and extremely fast
- Suitable for service, production and development
- Remote control via IEEE488/IEC625 bus + RS-232-C
- Automated regression and stress testing of DUT
- Automatic go/nogo testing of fixed and portable part

CMD65 – the most versatile production tester



- GSM plus DECT in a single box
- Features equal the combination of CMD55 and CMD60 in almost all respects

The range continues! Please see data sheets for CMD80 series.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

development

quality assurance

... meeting the challenges of modern communications

- **Go/nogo tests and comprehensive testing of mobiles**
- **Powerful signalling capabilities**
- **Short measurement time ensuring high throughput**
- **High measurement accuracy**
- **Simple interactive operation**
- **No specialized GSM knowledge required**
- **Service mode for exact fault location**
- **Autotest – complete mobile testing at a keystroke**
- **Very fast remote control operation**
- **Compact and lightweight**
- **Excellent price/performance ratio**

Manual operation philosophy
Research and development engineers have found the CMD's large clear LC display and user interface with logically structured menus unsurpassed when measuring RF parameters. This is true both in the manual test mode and in the flexible module test with system-specific signal generator and burst analyzer. During call setup the network and system-specific signalling parameters allow the R&D engineers to control the influence of signalling parameters on the mobile´s behaviour in the network.

User-definable autotest
The user-friendly display and operation of the CMD is a main requirement when testing manually, but for automated testing, the engineer wants a quick and easy way to a ready-made autotest or if he has to create his own test script for the specific task to be performed. The CMD family of testers offers different ways of creating such autotests and test scripts, depending on the CMD model and the test requirements.

The mobile communications market is growing beyond anybody's imagination and the need for testing has therefore become equally demanding.

As the leading manufacturer of type-approval test systems for several worldwide digital wireless standards, Rohde&Schwarz has succeeded in combining these standards in one family of instruments, aimed at users in production, service and development.

This data sheet covers the testers for GSM mobiles as well as for DECT fixed and portable parts (FP and PP).

The CMD65 – our top model of mobile testers – combines a number of well-known key features of the CMD family. The four most common digital systems in one instrument, ready at a keystroke, provide the user with ultimate flexibility.

From the main menu, the CMD65 offers very easy access for up to four digital networks and their configuration menus, measurements and tests as well as autotest function.

The CMD53 and the CMD55 offer full GSM functionality including the handover between GSM bands.

To start out with a single standard, the Testers CMD50, CMD52 (GSM900) and CMD60 for DECT applications are the right choice.

Adding another standard later is no problem, as the clearly laid-out upgrade path depicted on the back cover fold-out will demonstrate.

ETSI MEMBER
...making the right connections.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A sophisticated product from the market leader

production

service

Fast IEEE-bus
In a production line, there are two main factors that contribute to high throughput and product quality: IEEE-bus speed and measurement repeatability. The high speed is obtained by parallel measurements and the possibility to issue multiple commands in a single IEEE string. With combined measurements and measurements like RF peak power which takes only milliseconds, time-consuming power level adjustments where multiple measurements are required are completed in seconds. The level of measurement repeatability offered ensures the highest possible quality of the end product leaving the factory.

Covering any need for test modes
Service and repair of digital mobiles and cordless phones call for a variety of tests, ranging from simple go/nogo tests to complete factory-like production tests and calibration of the phone. The CMD range offers cost-effective solutions for manual testing, stand-alone autotest, as well as remote RS-232-C operation solutions covering any need for testing. Every CMD comes, of course, with the same large display and user interface for manual test of phones and/or modules and RS-232-C interface for remote operation.

Base station survey measurements
These are often performed on real base stations or by using analog signal generators with power amplifiers. The CMD is able to simulate any GSM base station BCCH, including parameters like MCC, MNC, NCC, BA list, DTX and DRX information. These and the "cell barred" feature enable close-to-life conditions without having to use a real BTS.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Tailored to your application

Options



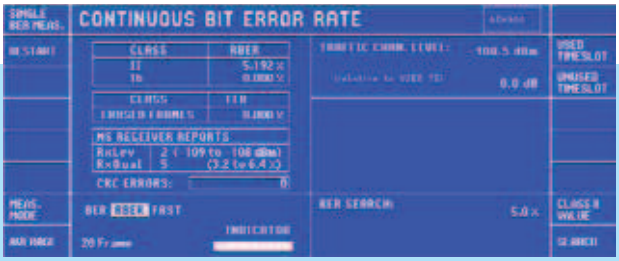
Through careful design of models and options, Rohde&Schwarz has devised a way to ensure you only pay for what you need. Nearly all the options for the models offered (see front cover fold-out) are retrofittable.

The well-defined upgrade path allows to expand the scope of a new CMD when you need it (see back cover fold-out). Should you already own one – even first generation CMDs are taken care of.

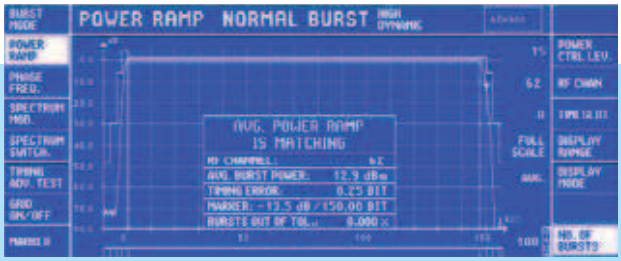
The options in detail (see also fold-out page on the back)

Name	Description	Notes	Order No.
CMD-B1	OCXO reference oscillator, aging ±1 x 10^{-7}. Ensures high absolute accuracy, minimum temperature-dependent drift and especially high long-term stability. Used for measurements with exacting requirements on frequency stability.	Cannot be ordered with CMD-B2	1051.6002.02
CMD-B17	I/Q signals from the CMD modulator and burst trigger signals are provided for the Rohde&Schwarz Signal Generator SMIQ for GSM conformity tests under fading conditions.	–	1099.3003.02
CMD-B19	GSM1900 mobile and base station test. Provides the capability to test GSM1900 mobiles used on the North American market. Includes factory recalibration of unit .	For CMD53, 55 as of serial No. 837176 and CMD65 only	1059.6201.02
CMD-B2	High-stability OCXO, aging 3.5 x 10^{-8}. Oven crystal with highest long-term stability. Ensures compliance with tolerances specified by GSM. Used for highly demanding requirements on frequency stability to GSM 11.20.	Cannot be ordered with CMD-B1	1059.8604.02
CMD-B20	GSM-specific voltage and current measurement. Allows readings to be taken in synchronicity with the GSM pulsed mode.	Comes as standard in all models exept CMD50 and CMD53	1059.6401.02
CMD-B3	Multifrequency reference input/output. For synchronizing DUT and measuring instrument with internal or external frequencies. Allows synchronization of the CMD to an internal or external frequency of 2.048, 10, 13, 26, 39, 52 MHz, or to the GSM bit clock.	–	1051.6202.02
CMD-B30	High-level RF output/sensitive RF input. In addition to the normal RF I/O, the CMD has optionally a high-sensitivity input and a high-level output which enable over-the-air tests on modules or handhelds by means of couplers like the CTD-Z10.	Comes as standard in all models exept CMD50 and CMD53	1059.7308.02

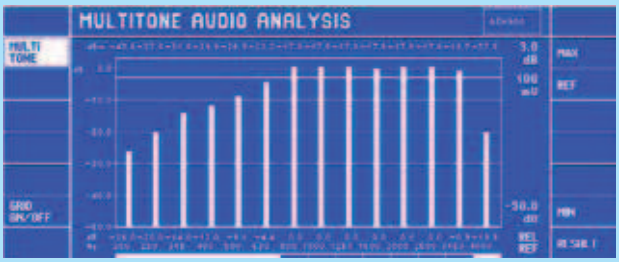
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



The BER search function allows the absolute sensitivity of a mobile to be determined



The full dynamic range (>72 dB) of a GSM normal and access burst can be verified with the CMD-B42 option



The audio measurement option CMD-B44 is capable of generating and analyzing up to 14 freely configurable tones in about 1 second. Measurements in absolute and relative mode are possible

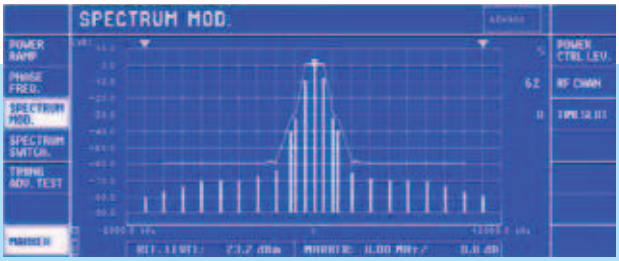


After location update, it is indicated whether a mobile is a dual-band version. For realistic simulation of the real networks, the CMD-U20 offers the option to have the BCCH present in either band during dual-band simulation

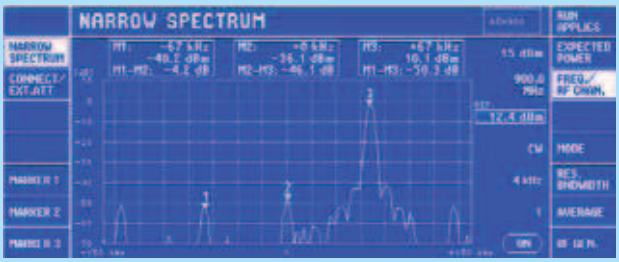
Name	Description	Notes	Order No.
CMD-B4	Fast power ramp, phase/frequency error & BER measurement. Provides fast testing and numeric/graphic display of power bursts and phase / frequency error as well as various BER, RBER and FER test routines (necessary for Autotest).	Required for options CMD-B41, CMD-B42, CMD-B43, CMD-B44 and CMD-K43	1051.6654.02
CMD-B41	Includes audio frequency (AF) generator, voltmeter, distortion meter and frequency counter. Allows measurements on the audio interface or on modules. Enables frequency measurements up to 60 MHz which is required for LO alignment.	Requires CMD-B4	1051.6902.02
CMD-B42	High dynamic range burst analyzer. Enhances the dynamic range to more than 72 dB and allows the power ramp to be measured in the entire GSM, GSM1800 and GSM1900 range specified. Determines whether transmitter blanking in inactive timeslots is correct.	Requires CMD-B4	1051.7150.02
CMD-B43	Carries out GSM measurements of spectrum due to switching and modulation according to the GSM, GSM1800 and GSM1900 recommendations faster than any spectrum analyzer.	Requires CMD-B4 and CMD-B42	1059.6001.02
CMD-B44	Audio multitone option based on DSP techniques. Makes it possible to generate and measure up to 14 tones in about one second. Useful for loudness rating, frequency response and intermodulation analysis.	Requires CMD-B4 and CMD-B41	1099.3203.02
CMD-B52	Internal GSM full rate (FR), enhanced full rate (EFR) and half rate (HR) speech coder/decoder. This option converts digital speech signals into analog signals and vice versa, allowing separate uplink and downlink audio measurements.	–	1115.8800.02
CMD-B6	Adapters for B6x options. Provides GSM-specific signals and trigger signals for CMD52/55/65 on the multifunction connector at the front of the instrument.	Required for options CMD-B61 and CMD-B62	1051.7409.02

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Options (continued)



The option CMD-B43 provides measurements of spectrum due to modulation and switching according to GSM recommendations



The narrowband spectrum analyzer option CMD-K43 is used to determine the I/Q modulator balance by measuring the suppressed carrier and sidebands

Front view of the CMD50/CMD53, the economy CMD52/55 equivalents for use in service



Name	Description	Notes	Order No.
CMD-B61	IEEE 488 bus interface. Remote control alternative to the RS-232-C interface fitted as standard. Used for fast remote control of the CMD.	Requires CMD-B6	1051.7609.02
CMD-B62	Memory card interface. Allows storage of instrument setups and fast and easy upgrade to new software features. Highly recommended.	Requires CMD-B6	1051.8205.04
CMD-K43	Narrowband spectrum analyzer. This option is used for narrowband spectrum analysis (i.e. adjustments of I/Q modulators). Analysis of constant envelope and burst signals is possible.	Requires CMD-B4	1082.4830.02
CMD-K61	Frequency extension option covering "DECT Latin America". For CMD60 and CMD65.	Requires DECT hardware version E or later	1082.3840.02
CMD-K80	Frequency extension option. For CMD5x and CMD65. Additional frequency range R-GSM.	Requires CMD-U10	1082.4930.02
CMD-U1	Upgrade to GSM multiband functionality. Allows GSM dual-band handover with CMD53 and CMD55. Conversion of CMD50 into CMD53 and of CMD52 into CMD55.	Some mobiles require the option CMD-U20 to ensure correct dual-band handover operation	1051.8957.02
CMD-U10	8 MByte memory extension for CPU1 or CPU2. This update allows the use of several advanced software features such as GSM dual-band handover, fast BER measurement (burst-by-burst) and R-GSM band.	Only applicable to older versions of CMD50, CMD52 and CMD53, CMD55	1059.7908.02
CMD-U11	High-speed processor including 8MB RAM. Allows the use of the latest software versions with the functionality as mentioned in this data sheet and ensures future updates.	For older versions of CMD52 and CMD55 only	1059.7950.02

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

... you only pay what you need



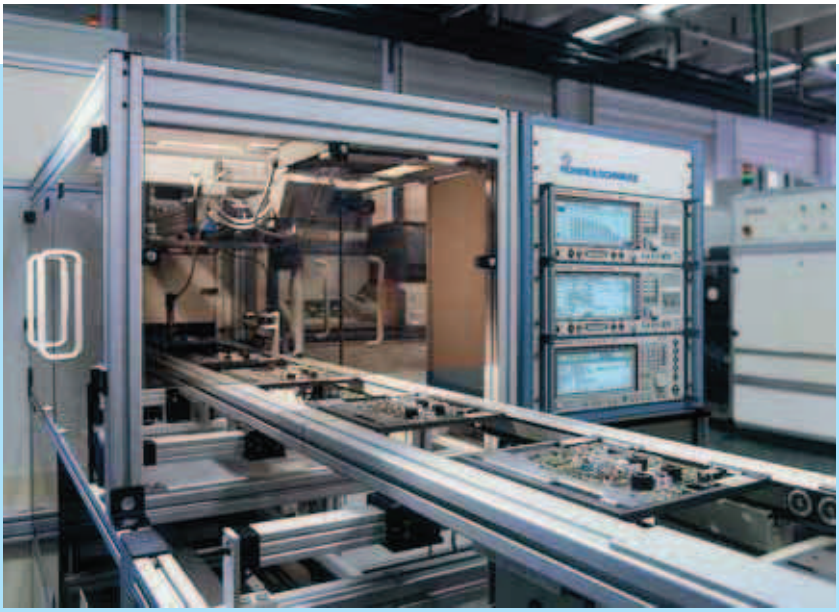
A member of the CMD family used in an audio application with the Rohde&Schwarz Audio Analyzer UPL and artificial ear

Name	Description	Notes	Order No.
CMD-U12	Modification for fast BER (burst-by-burst) capability.	For older versions of CMD52 and 55 only	1059.4150.02
CMD-U13	10 dB higher sensivity at RF input/output N connector. RF input level range –10 dBm to +37 dBm instead of 0 dBm to +47 dBm	Only for GSM signals	1059.4009.02
CMD-U18	Output level of –15 dBm for RF input/output N connector. RF out 2 becomes non-functional, RF in/out 6 dB more sensitive (max. +40 dBm).	Only for GSM signals	1099.5358.02
CMD-U19	GSM1900 mobile test. Provides the capability to test GSM1900 mobiles used on the North American market. Same as CMD-B19 if installation and recalibration can be done at the local Rohde&Schwarz service center.	For CMD53, 55 as of serial No. 837176 and CMD65 only	1099.5458.02
CMD-U20	A special RF converter for the CMD53/55 enables handover between GSM900 and GSM1800/1900 while maintaining the BCCH in the band (lower/upper) in which the handover was initiated. Standard in the current version of the CMD55.	For older CMD53 in conjunction with CMD-U10 only.	1099.5606.02
CMD-U5	GSM time synchronization signal and demodulated I and Q signals are copied from the multifunction connector to three BNC connectors at the rear panel.	Not compatible with CMD60/65 and instruments with upgrades CMD-U56 and CMD-U65. Factory installation.	1059.6901.02
CMD-U56	Upgrade to support DECT in CMD53/55 multiband testers. Functionality comparable to that of CMD65.	See under CMD-U5. Factory installation.	1059.8004.02
CMD-U61	Frequency extension upgrade covering “DECT Latin America“. For CMD60 and CMD65.	For D version hardware only. Factory installation.	1099.5258.02
CMD-U65	GSM multiband upgrade for CMD60. Functionality comparable to that of CMD65.	Factory installation.	1059.8104.02

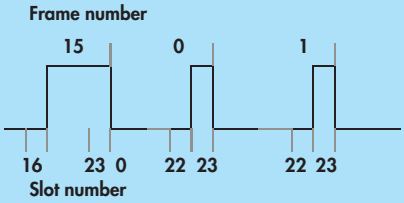
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

DECT measurements

CMD60
CMD65



The CMD60 is *the* Rohde&Schwarz one-box DECT tester, whereas the CMD65 offers GSM functionality alongside DECT



Interface description

CMD 60/65 transmitter part
In a very busy DECT environment, most DECT frequencies may be in use for communication and therefore influence the measurement in production and development. Besides the channels 0 to 9 the CMD enables the use of an extended frequency range for testing. The channels –3, –2, –1 and 10, 11, 12 are outside the normal DECT specification and therefore free for testing. Up to 35 channels are available with options CMD-U61 and CMD-K61 (channels +12 to –22).

The wide amplitude range of the RF level provides a comfortable compensation for attenuation in external coupling devices.

The CMD enables the use of up to 6 TDMA slots for rapid BER measurements for PP test (2 slots for FP test). A very short measuring time for production can be achieved with the use of more than one timeslot for BER measurements if supported by the unit under test.

The modulation is GFSK with B x T = 0.5 according to DECT specifications. In addition, constant envelope, signals with or without modulation or DECT bursts with various bit patterns for module testing are possible. These bit patterns can easily be recognized while testing receiver and demodulator modules.

CMD 60/65 receiver part
It is similar to the transmitter part above. There are 10 DECT frequencies, 0 to 9. Additionally, the 6 extended DECT frequencies –3, –2, –1 and +10, 11, 12 in half DECT channel spacing are provided. Up to 35 channels are available with the options CMD-U61 and CMD-K61 (channels +12 to –22).

The modular concept of the CMD also allows the Latin American frequency extension to be added (see CMD-K61 and CMD-U61 in the options section).

The sensitivity of the CMD60 ensures valid measurement results even with compensation for attenuation in external coupling devices.

There are two independent receive paths: For DECT signalling and BER, a signalling path is provided. For TX tests, the CMD60 provides a measurement path. The signals from the FM and envelope detector are taken to external connectors and post-processed for power ramp and modulation measurements. The FM and envelope detector output permits monitoring of the DUT transmit signal.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Benefits in ...

... production

- The CMD60/65 is remote-controllable via RS-232-C or IEC/IEEE-bus interface using the SCPI-compatible commands. In the remote-control mode, the CMD is designed for fast speed to yield high throughputs in production
- High production output versus low investment for test equipment
- Comprehensive flexible autotest capabilities make the CMD60/65 a one-box DECT solution

... development

- Comprehensive in-depth measurements of specifications via a convenient manual user interface
- A lot of complex test setups required with conventional equipment become redundant thanks to this special DECT tester
- Automated regression tests and stress tests
- The tester supplies a large number of DECT-specific signals for the control of the module under test

... servicing

- Rapid go/nogo results using the autorun function
- Relaxed manual operation due to a large bright LCD in conjunction with an extremely simple user interface (requires no DECT-specific knowledge) strictly separated from the expert user interface for configurations
- Integrated tools such as a scope display for power versus time and FM demodulation versus time ease troubleshooting

RF in/out configuration
Transmitter and receiver are connected to a bidirectional N connector (RF in/out). All specifications mentioned are valid for this connector. Moreover, there is a high-level output for the CMD transmitter and also a sensitive input for the CMD receiver on the front panel. These connectors together with an external power splitter/combiner can be used to shift the level range of the N connector (for details on differences between the CMD60 and CMD65 see specifications).

Demodulation interface
The CMD 60/65 provides a linear analog FM demodulator output (DC coupled) and a logarithmic analog RF envelope demodulator output.

Wideband in/out
The secondary wideband input/output is at the rear panel. The input signal from the front connector is available at this connector with an attenuation of 18 dB. It can be monitored with a spectrum analyzer for spurious measurements. Furthermore, this connector can be utilized to introduce an interferer into the RF connection without reconnecting the test setup for the in-channel tests. This input/output can be used from 100 MHz to 2.5 GHz.

Audio part
In addition to the DECT RF interface on the CMD60 front panel, there is an analog DECT speech interface for speaker and appropriate microphone on the rear panel (analog ADPCM interface). Alternatively, it can be internally connected to the AF measurement port.

Trigger
DECT measurements are alternatively triggered under the following conditions:
– RF rising slope
– External trigger event
– Internal trigger, time reference is bit P0 (standard)

Time synchronization
The CMD60 provides DECT-specific timing signals (frame clock, RS485) which can be routed to other CMDs if the CMD is the master. If the CMD is declared slave, it will synchronize to this signal. This way several PPs, e.g. on a production line, can be tested at several CMDs in parallel without any mutual interference.

Additional DECT-specific signals
1152 kHz bit clock output, alternatively multiples: 3,456, 6,912 and 13,824 MHz and fractions: 576, 288, 144 kHz.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Up to date by simply upgrading

Early-stage CMD52 with CPU1 or CPU2 and 4 MByte internal RAM.



CMD-U11

From early-stage to state-of-the-art performance

The CMD-U11 upgrade includes our currently fastest processor CPU3a and 8 Mbyte internal RAM. This ensures future software updates and the possibility to use all the latest test and measurement features and provide the fastest IEC/IEEE bus on the market.

The early-stage CMD52 is thus comparable to today´s state-of-the-art GSM900 tester, with test and measurement specifications as stated in this data sheet.



CMD-U1

From single band to multiband

The CMD-U1 hardware upgrade will convert the CMD52 into a CMD55, with the possibility to test GSM1800, GSM1900 (with CMD-U19) as well as GSM900 mobiles.

This CMD is now equivalent to the standard CMD55 mentioned in this data sheet, newly calibrated and able to be customized with options as listed.



CMD-U56

From multiband to multimode

The CMD-U56 hardware upgrade enhances the functionality of the CMD55 to the functionality of a CMD65. The CMD55M (multimode) is now able to cover all official GSM systems as well as all official DECT bands. *)

Unsurpassed test capabilities and measurement speed. All this at incredibly low weight and without any bulk.



Since the development of the first CMD5x, it has been the philosophy of Rohde&Schwarz to ensure that all CMD5x users can upgrade their instruments to the current state of the art.

Any CMD5x mobile tester can be upgraded to a full-blown CMD with four digital networks in one instrument, ready at a keystroke. The chart above shows how to upgrade from an early-stage CMD5x mobile tester to the present level of performance and functionality. It also shows that acquisition of a single-network CMD tester today does not restrict the user to the original application – thanks to the unique Rohde&Schwarz upgrade path!

*) Likewise, the CMD-U65 allows the CMD 60 to be enhanced to CMD 65 functionality.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Models and options

1

	Service	High-end service	Production	Development & QA
CMD50	☺	✘	–	✘
CMD53	☺	✘	–	✘
CMD52	✘	☺	☺	☺
CMD55	✘	☺	☺	☺
CMD60	✘	☺	☺	☺
CMD65	✘	☺	☺	☺

2

	Develop-ment & QA	Production	High-end service	Service
CMD50	✘	–	✘	☺
CMD53	✘	–	✘	☺
CMD52	☺	☺	☺	✘
CMD55	☺	☺	☺	✘
CMD60	☺	☺	☺	✘
CMD65	☺	☺	☺	✘
CMD-B1 [2]	✘	✘	✘	☺
CMD-B2 [2]	☺	✘	☺	✘
CMD-B3	☺	☺	✘[1]	✘[1]
CMD-B4	☺	☺	☺	☺
CMD-B51	☺	☺	☺	✘
CMD-B6	☺	☺	☺	✘
CMD-B17	☺	✘	✘	✘
CMD-B41	☺	☺	☺	✘
CMD-B42	☺	☺	☺	✘
CMD-B43	☺	☺	☺	✘
CMD-B44	☺	☺	☺	✘
CMD-B61	☺	☺	–	–
CMD-B62	☺	☺	☺	☺
CMD-K43	☺	☺	☺	✘
CMD-U5	☺	–	✘	✘
CMD-U10	–	–	✘	✘
CMD-U11	☺	☺	☺	☺
CMD-U13	✘	☺	✘	✘
CMD-U18	✘	☺	✘	✘
CMD-U20	☺	☺	☺	✘
CMD-Z1	☺	☺	☺	☺

3

	CMD65	CMD60	CMD55	CMD52	CMD53	CMD50
CMD-B1 [2]	+	+	+	+	+	+
CMD-B2 [2]	–	–	+	+	+	+
CMD-B3	+	+	+	+	+	+
CMD-B4	+	+	+	+	+	+
CMD-B52	+	–	+	+	–	–
CMD-B6	+	+	+	+	+[5]	+[5]
CMD-B17	+[1]	–	+	+	–	–
CMD-B19	+	–	+	–	+	–
CMD-B20	●	●	●	●	+	+
CMD-B30	●	●	●	●	+	+
CMD-B41	+	+	+	+	+	+
CMD-B42	+[1]	–	+	+	+	+
CMD-B43	+[1][7]	–	+[7]	+[7]	+[7]	+[7]
CMD-B44 [8]	+	+	+	+	+	+
CMD-K43	+[1][9]	–	+[9]	+[9]	+[9]	+[9]
CMD-B61	+	+	+	+	–	–
CMD-B62	+	+	+	+	+	+
CMD-K61	+[3]	+[3]	–	–	–	–
CMD-K80	+	–	+	+	+	+
CMD-U1	–	–	–	+	–	+
CMD-U5	–	–	+	+	+	+
CMD-U10	–	–	–	–	●	●
CMD-U11	●	●	●	●	–	–
CMD-U12	●	–	●	●	–	–
CMD-U13 [6]	+	–	+	–	+	–
CMD-U18 [6]	+	–	+	–	+	–
CMD-U19	+	–	+	–	+	–
CMD-U20	+	–	●	–	+[10]	–
CMD-U56	●	–	+	–	+	–
CMD-U61	+[4]	+[4]	–	–	–	–
CMD-U65	●	+	–	–	–	–
CMD-Z1	+	+	+	+	+	+

Table 1

Applications and instruments

Table 2

Recommended instruments and options

Table 3

Combinations of instruments and options

Comments on Table 2:

☺ highly recommended
✘ recommended
– not recommended

[1] External frequency reference may be used, if available.
[2] One of two OCXOs should be installed to ensure high frequency accuracy.

Comments on Table 3:

+ possible
– not possible
● standard

[1] Only for GSM applications.
[2] CMD-B1 or CMD-B2 possible.
[3] Only with DECT module version E.
[4] Only with DECT module version D.
[5] Multifunction connector not available on CMD50/53.
[6] CMD-U13 or CMD-U18 possible.
[7] CMD-B4 and CMD-B42 required.
[8] CMD-B4 and CMD-B41 required.
[9] CMD-B4 required.
[10] CMD-U10 required (previous models).

Note:
The CMD-B4 option is a prerequisite for all CMD-B4x and CMD-K4x options.
The CMD-B6 option is a prerequisite for all CMD-B6x options.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications of CMD50/52

RF generator 1

Frequency range	GSM900 band: 935.2 MHz to 959.8 MHz
Frequency error	same as time base
Resolution	GSM channel spacing: 200 kHz
Frequency setting time	≤3 ms for phase error <2°
Output level (RF IN/OUT)	–33 dBm to –120 dBm
(RF OUT 2)	+13 dBm to –77 dBm
Resolution	0.1 dB
Level error (RF IN/OUT)	≤1.5 dB (≤1 dB at –104 dBm)
(RF OUT 2)	≤2 dB
Harmonics (RF IN/OUT)	<–30 dBc
Modulation	GMSK, B x T = 0.3
Phase error	≤4° rms, ≤10° peak

RF generator 2

Frequency range, frequency error, resolution, setting time, level resolution, harmonics, modulation and phase error	see RF generator 1
Maximum output level	
RF IN/OUT	–35 dBm
RF OUT 2	+11 dBm
Level error	
RF IN/OUT	≤1.5 dB
RF OUT 2	≤2 dB

Peak power meter (RF IN/OUT)

Frequency range	800 MHz to 1000 MHz
Measurement range	10 dBm to 47 dBm
Resolution	0.1 dB
Error in GSM band 890.2 MHz to 914.8 MHz	≤0.5 dB + resolution (P >13 dBm)
VSWR	≤1.3

GSM phase and frequency error measurement	**with option CMD-B4**
Frequency range	GSM900 band: 890.2 MHz to 914.8 MHz
Level range	
RF IN/OUT	10 dBm to 47 dBm
RF IN 2	–60 dBm to 0 dBm
Inherent phase error	<1.5° rms, <5° peak
Frequency measurement error	<5 Hz + time base

GSM burst power measurement	**with option CMD-B4**
Frequency range	GSM900 band: 890.2 MHz to 914.8 MHz
Reference level for full dynamic range	
RF IN/OUT	10 dBm to 47 dBm
RF IN 2	–37 dBm to 0 dBm
Absolute measurement error of peak power	
RF IN/OUT	see peak power meter
RF IN 2	≤1 dB
Resolution in active part of timeslot	0.1 dB

Burst analysis	**with option CMD-B42**
with wide dynamic range	
Relative error of individual test sample	≤1.5 dB to 72 dB below peak power
Dynamic range	>72 dB
Measurement limit RF IN/OUT	<–36 dBm
RF IN 2	<–83 dBm

[1] The maximum RF output level of the CMD65 in the GSM900/1800/1900 band is 2 dB lower than in the CMD5x basic unit

[2] In GSM1900 mode with option CMD-B19/-U19 fitted.

[3] The sensitivity of the CMD65 in the GSM900/1800/1900 band is 2 dB lower than in the CMD5x basic unit.

GSM specifications of CMD53/55/65

RF generator 1

Frequency range	
GSM900	935.2 MHz to 959.8 MHz
GSM1800	1805.2 MHz to 1879.8 MHz
GSM1900[2]	1930.2 MHz to 1989.8 MHz
Frequency error	same as time base
Resolution	GSM channel spacing: 200 kHz
Frequency setting time	≤3 ms for phase error <2°
Output level	
RF IN/OUT	–35/–37[2] dBm to –120 dBm
RF OUT 2[1]	+11/+9[2] dBm to –77 dBm
Resolution	0.1 dB
Level error RF IN/OUT	≤1.5 dB (≤1 dB at –104 dBm)
RF OUT 2	≤2 dB
Harmonics (RF IN/OUT)	<–30 dBc
Modulation	GMSK, B x T = 0.3
Phase error	≤4° rms, ≤10° peak

RF generator 2

Frequency range, frequency error, resolution, setting time, level resolution, harmonics, modulation and phase error	see RF generator 1
Maximum output level	
RF IN/OUT	–37/–39[2] dBm
RF OUT 2[1]	+9/+7[2] dBm
Level error	
RF IN/OUT	≤1.5 dB
RF OUT 2	≤2 dB

Peak power meter (RF IN/OUT)

Frequency range	800 MHz to 1000 MHz, 1700 MHz to 2000 MHz
Measurement range	
GSM900 band	0 dBm to 47 dBm
GSM1800/1900 band	0 dBm to 33 dBm
Resolution	0.1 dB
Error in GSM900 band	≤0.5 dB + resolution (P >10 dBm)
GSM1800/1900 band	≤0.8 dB + resolution (P >4 dBm)
VSWR	≤1.3

Phase/frequency error measurement	**with option CMD-B4**
Frequency range	
GSM900	890.2 MHz to 914.8 MHz
GSM1800	1710.2 MHz to 1784.8 MHz
GSM1900[2]	1850.2 MHz to 1909.8 MHz
Level range	
RF IN/OUT	GSM900: 0 dBm to 47 dBm GSM1800/1900: 0 dBm to 33 dBm
RF IN 2[3]	–60/–54[2] dBm to 0 dBm
Inherent phase error	<1.5° rms, <5° peak
Frequency measurement error	<5 Hz + time base

Burst power measurement	**with option CMD-B4**
Frequency range	
GSM900	890.2 MHz to 914.8 MHz
GSM1800	1717.2 MHz to 1784.8 MHz
GSM1900[2]	1850.2 MHz to 1909.8 MHz
Reference level for full dynamic range	
RF IN/OUT	GSM900: 10 dBm to 47 dBm GSM1800/1900: 0 dBm to 33 dBm
RF IN 2[3]	–37/–31[2] dBm to 0 dBm
Absolute measurement error of peak power	
RF IN/OUT	GSM900: ≤0.5 dB + resolution (P>10 dBm) GSM1800/1900: ≤0.8 dB + resolution (P >4 dBm)
RF IN 2	GSM900: ≤1.3 dB GSM1800/1900: ≤1.5 dB
Resolution in active part of timeslot	0.1 dB

Burst analysis with high dynamic range	**with option CMD-B42**
Relative error of individual test samples	≤1.5 dB to 72 dB below peak power
Dynamic range	>72 dB
Measurement limit RF IN/OUT	GSM900: <–36 dBm GSM1800: <–48 dBm GSM1900[2]: <–42 dBm
Measurement limit RF IN 2[3]	GSM900: <–83 dBm GSM1800: <–85 dBm GSM1900 [2]: <–79 dBm

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GSM specifications of CMD50/52/53/55/65

GSM-specific spectrum measurements

with option CMD-B43

Spectrum due to modulation

Test method	relative measurement, averaging
Filter bandwidth	30 kHz resolution filter
Measurement at an offset of	100, 200, 250, 400, 600, 800, 1000, 1200, 1400, 1600 and 1800 kHz
Dynamic range	better than required by GSM specification
with offset >400 kHz	max. 80 dB
Error	≤1.5 dB

Spectrum due to switching

Test method	absolute measurement, Max Hold over several measurements
Filter bandwidth	30 kHz resolution filter
Measurement at an offset of	400, 600, 1200, 1800 kHz
Dynamic range	better than required by GSM specification
for offset >400 kHz	80 dB max. with SW correction, 76 dB max. without SW correction
Error	≤1.5 dB (dynamic range <50 dBc) ≤2.5 dB (dynamic range 50 to 80 dBc)

DECT specifications of CMD60/65

DECT signal generator

Frequency	1876.608 MHz to 1935.360 MHz, half channel spacing
Error	same as reference
Level range	
RF IN/OUT	–100 dBm to –40 dBm
RF OUT2	–40 dBm to +5 dBm (–20 dBm to +5 dBm when RFIN2 is active) usable up to 7.5 dBm
Burst switch-off	>30 dB
Resolution	0.1 dB
Error	
RF IN/OUT[4]	<1.5 dB
RF OUT2 [5]	<2.0 dB
Modulation	GFSK (B x T=0.5)
Error	<5% (at 288 kHz deviation)

DECT analyzer

specifications are valid for N connector

Frequency	same as signal generator
Level (matching setting for external attenuation and expected power)	
RFIN/OUT	30 dBm to –65 dBm (for level meter), 30 dBm to –30 dBm (for broadband FM demodulator and signalling)
RFIN2	–35 dBm to –85 dBm (for level meter) –11 dBm to –55 dBm (for broadband FM, demodulator and signalling)
FM demodulator	for TX postprocessing and analog output
Range	0 kHz to 450 kHz deviation
Resolution	1 kHz
DC offset	<2 kHz
Residual deviation	
RF IN/OUT	<15 kHz PK, 95% confidence (+30 to –30 dBm), <5 kHz PK, 95% confidence (+30 to –10 dBm)
RF IN2	<15 kHz PK, 95% confidence (–11 dBm to –55 dBm), <5 kHz PK, 95% confidence (–11 dBm to –40 dBm)
Analog output	1 V p for 500 kHz deviation (linear)
Level meter (transient response)	for TX postprocessing and analog output
Range	
RF IN/OUT	+30 dBm to –65 dBm
RF IN2	–35 dBm to –85 dBm
Dynamic	70 dB (24 dBm at RFIN/OUT)
Resolution	0.5 dB
Error	
RF IN/OUT [6]	≤1.5 dB + resolution (+30 dBm to +15dBm) ≤2 dB + resolution in rest of range
RF IN2 [7]	≤2 dB + resolution (–35 dBm to –51dBm) ≤2.5 dB + resolution in rest of range
Analog output	28.3 mV/1 dB, 2.5 V at +30 dBm (standard internal attenuator setting), logarithmic

Analog DECT ADPCM interface

Output	balanced
Range	558 mV with 0 dBm0 on the PCM interface, 300 Hz to 3 kHz
Impedance	10 Ω typ.
S/N + THD	35 dB at full-range level
Passband ripple	0.5 dB
Input	balanced
Range	40 mV for 0 dBm0 on the PCM interface, 300 Hz to 3 kHz
Impedance	125 kΩ typ.
S/N + THD	35 dB at full-range level
Passband ripple	0.5 dB

DECT applications

averaging 10,
specs are valid for RFIN/OUT

Accuracy and stability of RF carrier	
Error	<2 kHz + reference
Accuracy and stability of timing	
Error	<0.075 µs + reference
Modulation part 1, 2, 4	
Error	approx. 11 kHz at minimum (202 kHz) approx. 13 kHz at maximum (403 kHz) permitted deviation
Frequency drift	
Error	approx. 1 kHz/ms
Normal transmit power	
Error	≤1.5 dB
Power versus time	
Error power	≤1.5 dB, 30 dBm to 5 dBm, ≤2 dB in rest of range
time	<0.075 µs + reference

---

4)

Frequency response	±0.2 dB typ.
Linearity	±0.3 dB typ.
Drift	±0.3 dB typ.

5)

Frequency response	±0.5 dB typ.
Linearity	±0.4 dB typ.
Drift	±0.5 dB typ.

6)

Frequency response	typ. ±0.5 dB typ.
Linearity	typ. ±0.3 dB typ.
Drift	typ. ±0.5 dB typ.

7)

Frequency response	typ. ±0.5 dB typ.
Linearity	typ. ±0.5 dB typ.
Drift	typ. ±0.5 dB typ.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Common specifications

DC voltmeter	**for CMD50/53 as an option (CMD-B20)**
Measurement range	0 V to ±30 V
Resolution	10 mV
Error	≤2% + resolution
DC ammeter	**for CMD50/53 as an option (CMD-B20)**
Operating modes	current averaging with GSM-adapted time constant, current peak measurement (maximum and minimum)
Measurement range	0 A to ±10 A
Common-mode rejection	±30 V
Resistance	50 mΩ
Resolution for current averaging	1 mA/10 mA
Resolution for peak measurement	10 mA
Residual indication (no current at input)	≤10 mA (at room temperature, common mode rejection voltage ±10 V)
Error	≤2% + residual indication + resolution

AF Measurement Unit

option CMD-B41

AF generator	
Frequency range	50 Hz to 10 kHz
Frequency resolution	0.1 Hz
Frequency error	same as time base + half resolution
Level range	10 µV to 5 V
Level resolution	10 µV at <1 mV 1% at ≥1 mV
Level error	≤5% at ≥1 mV
Distortion	≤0.5%
Max. output current	20 mA
Output impedance	<5 Ω
AF voltmeter	
Frequency range	50 Hz to 10 kHz
Measurement range	0.1 mV to 30 V
Resolution	100 µV at <10 mV 1% at ≥10 mV
Error	≤5% + resolution
Input impedance	1 MΩ
Distortion meter	
Frequency range	300 Hz to 3 kHz
Input level range	100 mV to 30 V
Resolution	0.1% distortion
Inherent distortion	≤0.5%
Error	≤5% + inherent distortion
Measurement bandwidth	10 kHz
AF counter	
Frequency range	20 Hz to 10 kHz
Input level range	10 mV to 30 V
Resolution	≤1 Hz
Error	same as reference + resolution
Input impedance	1 MΩ
IF counter	
Frequency range	10 kHz to 60 MHz
Input level range	100 mV (rms) to TTL
Resolution	1 Hz
Error	same as reference + resolution
Input impedace	approx. 1 MΩ ||100 pF

Time and frequency reference

Time base TCXO	**standard**
Nominal frequency	10 MHz
Max. frequency drift in temperature range 5°C to 35°C	$\leq 1.5 \times 10^{-6}$
Deviation due to aging	$\leq 0.5 \times 10^{-6}$ per year (at 35°C)
Time base OCXO, version 1	**option CMD-B1**
Nominal frequency	10 MHz
Max. frequency uncertainty in temperature range 5°C to 45°C	$\pm 1 \times 10^{-7}$
Deviation due to aging (after 30 days of operation and under constant operating conditions)	$\leq 5 \times 10^{-9}$ per day or $\leq 2 \times 10^{-7}$ per year
Warm up time	approx. 5 min at room temperature
Time base OCXO, version 2	**option CMD-B2**
Nominal frequency	10 MHz
Max. frequency uncertainty in temperature rannge 5°C to 45°C (referred to 25°C)	$\leq 5 \times 10^{-9}$
Deviation due to aging (after 30 days of operation and under constant operating conditions)	$\leq 3.5 \times 10^{-8}$ per year $\leq 5 \times 10^{-10}$ per day
Warmup time (at 25°C)	approx. 10 min
Reference frequency inputs/outputs	**option CMD-B3**
Synchronization input:	
Frequency (selectable)	GSM bit clock (270.8 kHz), 2/4/16 times GSM bit clock, 1 MHz to 13 MHz in 1 MHz steps, 2.048, 26, 39, 52 MHz
External reference, nominal	
Frequency (CMD60)	10 MHz
Input impedance	100 Ω
Input voltage range	632 mV (pp) to 5 V (pp)
Synchronization output 1:	
Frequency	10 MHz with internal reference or frequency at synchronization input with external reference
Voltage	5 V (pp), R_{out} = 50 Ω (10 MHz signal)
Synchronization output 2:	
Frequency (selectable)	GSM bit clock, 2/4/16 times GSM bit clock, 1, 2, 4 or 13 MHz
Voltage	5 V (pp), R_{out} = 50 Ω
Interfaces	
IEEE/IEC-bus interface	**option CMD-B61** interface to IEC 625-1/IEEE 488, SCPI-compatible command set
Other interfaces	RS-232-C (9-contact) Centronics (25-contact)
General data	
Operating temperature range	5°C to 45°C to DIN IEC 68-2-1/2
Storage temperature range	–40°C to +60°C
Electromagnetic compatibility	meets European EMC directive (89/336/EEC)
Mechanical resistance	
Sinusoidal vibration	to DIN IEC 68-2-6, 5 Hz to 55 Hz, amplitude 0.15 mm, two cycles
Random vibration	to DIN 40046, part 24, 10 Hz to 300 Hz, 10 m/s^2 rms, 5 min/axis
Shock	to MIL-STD-810 D, 400 m/s^2, shock spectrum in 6 main axes
Power supply	90 V to 265 V, 45 Hz to 440 Hz
Power consumption	CMD 55: approx. 95 W CMD 60: approx. 60 W CMD 65: approx. 100 W
Electrical safety	VDE 0411, class 1
Dimensions (W x H x D)	435 mm x 192 mm x 363 mm
Weight (without options)	CMD 55: approx. 14 kg CMD 60: approx. 12 kg CMD 65: approx. 17 kg

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering information

Digital Radiocommunication Tester	CMD 50	1050.9008.50
	CMD 53	1050.9008.53
	CMD 52	1050.9008.52
	CMD 55	1050.9008.05
	CMD 60	1050.9008.60
	CMD 65	1050.9008.65
Accessories supplied	power cord, operating manual, fuses	
Calibration with Certificate	CMD-DCV2	0240.2193.08
Recommended extras		
GSM GPRS Test SIM Card (essential for BER measurements)	CRT-Z2	1039.9005.02
Formatted Memory Card (CMD-B62 required)	CMD-Z1	1059.5305.02
Handset	CMD-Z50	1059.4250.02
Antenna Coupler	CMU-Z10	1150.0801.02
Shielded Chamber for CMU-Z10	CMU-Z11	1150.1008.02
Rackmount Adapter	ZZA-94	0396.4905.00

For further CMD models ask your local representative

Different specifications for CMD53/55/65 with CMD-U13

The RF input 1 of the CMD53/55/65 with CMD-U13 is 10 dB more sensitive. Therefore the following specifications differ from those of an unmodified CMD

Peak power meter (RF IN/OUT)

Measurement range	–10 dBm to +37 dBm
Maximum RF power	+37 dBm
Error in GSM900 band	≤0.5 dB + resolution (P >–6 dBm)
Error in GSM1800/1900 band	≤0.8 dB + resolution (P >–6 dBm)

Phase and frequency error measurement

Level range (RF IN/OUT)	–10 dBm to +37 dBm

Burst power measurement

Reference level range for full dynamic range (RF IN/OUT)	
GSM900:	0 dBm to +37 dBm
GSM1800/1900:	–10 dBm to +37 dBm

The CMD53/55/65 with CMD-U13 have a different output level range at RF OUT 2

RF generator 1

Output level range (RF OUT 2)	–35 (–37[8]) dBm to –120 dBm

RF generator 2

Output level range (RF OUT 2)	–37 (–39[8]) dBm to –120 dBm

Certified Environmental System ISO 14001 REG. NO 1954

Certified Quality System ISO 9001 DQS REG. NO 1954

Different specifications for CMD53/55/65 with CMD-U18

RF generator 1 (TCH)

Output level range (RF IN/OUT)	–120 dBm to –15/–17[8] dBm
Level error (RF IN/OUT)	≤2 dB (–15/–17[2] dBm to –35/–37[8] dBm)
	≤1.5 dB (–35/–37[2] dBm to –120 dBm)
	≤1.0 dB (at –104 dBm)
RF OUT 2	not available

RF generator 2 (BCCH)

Output level range (RF IN/OUT)	–120 dBm to –17/–19[8] dBm
Level error (RF IN/OUT)	≤2 dB
RF OUT 2	not available

Analyzer

Level range (RF IN/OUT)	0 dBm to 40 dBm
Error peak power meter	GSM900: ≤0.5 dB + resolution
	GSM1800/1900: ≤0.8 dB + resolution

Different specifications for CMD53/65 with CMD-U20

Combined mode (BCCH and TCH in different GSM bands)

Level error of synthesizer 1	
RF IN/OUT	<3 dB
RF OUT 2	<3 dB
Level error of synthesizer 2	
RF IN/OUT	<3 dB
RF OUT 2	<3 dB

[8] In GSM1900 mode with option CMD-B19/-U19 fitted.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed in Germany 1201 (Bi as)

PD 0757.2596.23 · Digital Radiocommunication Testers CMD · Trade names are trademarks of the owners · Subject to change · Data without tolerances: typical values



ROHDE&SCHWARZ GmbH & Co. KG · Mühldorfstraße 15 · 81671 München · Germany · P.O.B. 80 14 69 · 81614 München · Germany · Telephone +49 89 4129-0
www.rohde-schwarz.com · Customer Support: Tel. +49 1805124242, Fax +49 89 4129-13777, E-mail: CustomerSupport@rohde-schwarz.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications of CMD50/52

RF generator 1

Frequency range	GSM900 band: 935.2 MHz to 959.8 MHz
Frequency error	same as time base
Resolution	GSM channel spacing: 200 kHz
Frequency setting time	≤3 ms for phase error <2°
Output level (RF IN/OUT)	–33 dBm to –120 dBm
(RF OUT 2)	+13 dBm to –77 dBm
Resolution	0.1 dB
Level error (RF IN/OUT)	≤1.5 dB (≤1 dB at –104 dBm)
(RF OUT 2)	≤2 dB
Harmonics (RF IN/OUT)	<–30 dBc
Modulation	GMSK, B x T = 0.3
Phase error	≤4° rms, ≤10° peak

RF generator 2

Frequency range, frequency error, resolution, setting time, level resolution, harmonics, modulation and phase error	see RF generator 1
Maximum output level	
RF IN/OUT	–35 dBm
RF OUT 2	+11 dBm
Level error	
RF IN/OUT	≤1.5 dB
RF OUT 2	≤2 dB

Peak power meter (RF IN/OUT)

Frequency range	800 MHz to 1000 MHz
Measurement range	10 dBm to 47 dBm
Resolution	0.1 dB
Error in GSM band 890.2 MHz to 914.8 MHz	≤0.5 dB + resolution (P >13 dBm)
VSWR	≤1.3

GSM phase and frequency error measurement	**with option CMD-B4**
Frequency range	GSM900 band: 890.2 MHz to 914.8 MHz
Level range	
RF IN/OUT	10 dBm to 47 dBm
RF IN 2	–60 dBm to 0 dBm
Inherent phase error	<1.5° rms, <5° peak
Frequency measurement error	<5 Hz + time base

GSM burst power measurement	**with option CMD-B4**
Frequency range	GSM900 band: 890.2 MHz to 914.8 MHz
Reference level for full dynamic range	
RF IN/OUT	10 dBm to 47 dBm
RF IN 2	–37 dBm to 0 dBm
Absolute measurement error of peak power	
RF IN/OUT	see peak power meter
RF IN 2	≤1 dB
Resolution in active part of timeslot	0.1 dB

Burst analysis	**with option CMD-B42**
with wide dynamic range	
Relative error of individual test sample	≤1.5 dB to 72 dB below peak power
Dynamic range	>72 dB
Measurement limit RF IN/OUT	<–36 dBm
RF IN 2	<–83 dBm

[1] The maximum RF output level of the CMD65 in the GSM900/1800/1900 band is 2 dB lower than in the CMD5x basic unit

[2] In GSM1900 mode with option CMD-B19/-U19 fitted.

[3] The sensitivity of the CMD65 in the GSM900/1800/1900 band is 2 dB lower than in the CMD5x basic unit.

GSM specifications of CMD53/55/65

RF generator 1

Frequency range	
GSM900	935.2 MHz to 959.8 MHz
GSM1800	1805.2 MHz to 1879.8 MHz
GSM1900[2]	1930.2 MHz to 1989.8 MHz
Frequency error	same as time base
Resolution	GSM channel spacing: 200 kHz
Frequency setting time	≤3 ms for phase error <2°
Output level	
RF IN/OUT	–35/–37[2] dBm to –120 dBm
RF OUT 2[1]	+11/+9[2] dBm to –77 dBm
Resolution	0.1 dB
Level error RF IN/OUT	≤1.5 dB (≤1 dB at –104 dBm)
RF OUT 2	≤2 dB
Harmonics (RF IN/OUT)	<–30 dBc
Modulation	GMSK, B x T = 0.3
Phase error	≤4° rms, ≤10° peak

RF generator 2

Frequency range, frequency error, resolution, setting time, level resolution, harmonics, modulation and phase error	see RF generator 1
Maximum output level	
RF IN/OUT	–37/–39[2] dBm
RF OUT 2[1]	+9/+7[2] dBm
Level error	
RF IN/OUT	≤1.5 dB
RF OUT 2	≤2 dB

Peak power meter (RF IN/OUT)

Frequency range	800 MHz to 1000 MHz, 1700 MHz to 2000 MHz
Measurement range	
GSM900 band	0 dBm to 47 dBm
GSM1800/1900 band	0 dBm to 33 dBm
Resolution	0.1 dB
Error in GSM900 band	≤0.5 dB + resolution (P >10 dBm)
GSM1800/1900 band	≤0.8 dB + resolution (P >4 dBm)
VSWR	≤1.3

Phase/frequency error measurement	**with option CMD-B4**
Frequency range	
GSM900	890.2 MHz to 914.8 MHz
GSM1800	1710.2 MHz to 1784.8 MHz
GSM1900[2]	1850.2 MHz to 1909.8 MHz
Level range	
RF IN/OUT	GSM900: 0 dBm to 47 dBm GSM1800/1900: 0 dBm to 33 dBm
RF IN 2[3]	–60/–54[2] dBm to 0 dBm
Inherent phase error	<1.5° rms, <5° peak
Frequency measurement error	<5 Hz + time base

Burst power measurement	**with option CMD-B4**
Frequency range	
GSM900	890.2 MHz to 914.8 MHz
GSM1800	1717.2 MHz to 1784.8 MHz
GSM1900[2]	1850.2 MHz to 1909.8 MHz
Reference level for full dynamic range	
RF IN/OUT	GSM900: 10 dBm to 47 dBm GSM1800/1900: 0 dBm to 33 dBm
RF IN 2[3]	–37/–31[2] dBm to 0 dBm
Absolute measurement error of peak power	
RF IN/OUT	GSM900: ≤0.5 dB + resolution (P>10 dBm) GSM1800/1900: ≤0.8 dB + resolution (P >4 dBm)
RF IN 2	GSM900: ≤1.3 dB GSM1800/1900: ≤1.5 dB
Resolution in active part of timeslot	0.1 dB

Burst analysis with high dynamic range	**with option CMD-B42**
Relative error of individual test samples	≤1.5 dB to 72 dB below peak power
Dynamic range	>72 dB
Measurement limit RF IN/OUT	GSM900: <–36 dBm GSM1800: <–48 dBm GSM1900[2]: <–42 dBm
Measurement limit RF IN 2[3]	GSM900: <–83 dBm GSM1800: <–85 dBm GSM1900 [2]: <–79 dBm

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GSM specifications of CMD50/52/53/55/65

GSM-specific spectrum measurements

with option CMD-B43

Spectrum due to modulation

Test method	relative measurement, averaging
Filter bandwidth	30 kHz resolution filter
Measurement at an offset of	100, 200, 250, 400, 600, 800, 1000, 1200, 1400, 1600 and 1800 kHz
Dynamic range	better than required by GSM specification
with offset >400 kHz	max. 80 dB
Error	≤1.5 dB

Spectrum due to switching

Test method	absolute measurement, Max Hold over several measurements
Filter bandwidth	30 kHz resolution filter
Measurement at an offset of	400, 600, 1200, 1800 kHz
Dynamic range	better than required by GSM specification
for offset >400 kHz	80 dB max. with SW correction, 76 dB max. without SW correction
Error	≤1.5 dB (dynamic range <50 dBc) ≤2.5 dB (dynamic range 50 to 80 dBc)

DECT specifications of CMD60/65

DECT signal generator

Frequency	1876.608 MHz to 1935.360 MHz, half channel spacing
Error	same as reference
Level range	
RF IN/OUT	–100 dBm to –40 dBm
RF OUT2	–40 dBm to +5 dBm (–20 dBm to +5 dBm when RFIN2 is active) usable up to 7.5 dBm
Burst switch-off	>30 dB
Resolution	0.1 dB
Error	
RF IN/OUT[4]	<1.5 dB
RF OUT2 [5]	<2.0 dB
Modulation	GFSK (B x T=0.5)
Error	<5% (at 288 kHz deviation)

DECT analyzer

specifications are valid for N connector

Frequency	same as signal generator
Level (matching setting for external attenuation and expected power)	
RFIN/OUT	30 dBm to –65 dBm (for level meter), 30 dBm to –30 dBm (for broadband FM demodulator and signalling)
RFIN2	–35 dBm to –85 dBm (for level meter) –11 dBm to –55 dBm (for broadband FM, demodulator and signalling)
FM demodulator	for TX postprocessing and analog output
Range	0 kHz to 450 kHz deviation
Resolution	1 kHz
DC offset	<2 kHz
Residual deviation	
RF IN/OUT	<15 kHz PK, 95% confidence (+30 to –30 dBm), <5 kHz PK, 95% confidence (+30 to –10 dBm)
RF IN2	<15 kHz PK, 95% confidence (–11 dBm to –55 dBm), <5 kHz PK, 95% confidence (–11 dBm to –40 dBm)
Analog output	1 V p for 500 kHz deviation (linear)
Level meter (transient response)	for TX postprocessing and analog output
Range	
RF IN/OUT	+30 dBm to –65 dBm
RF IN2	–35 dBm to –85 dBm
Dynamic	70 dB (24 dBm at RFIN/OUT)
Resolution	0.5 dB
Error	
RF IN/OUT [6]	≤1.5 dB + resolution (+30 dBm to +15dBm) ≤2 dB + resolution in rest of range
RF IN2 [7]	≤2 dB + resolution (–35 dBm to –51dBm) ≤2.5 dB + resolution in rest of range
Analog output	28.3 mV/1 dB, 2.5 V at +30 dBm (standard internal attenuator setting), logarithmic

Analog DECT ADPCM interface

Output	balanced
Range	558 mV with 0 dBm0 on the PCM interface, 300 Hz to 3 kHz
Impedance	10 Ω typ.
S/N + THD	35 dB at full-range level
Passband ripple	0.5 dB
Input	balanced
Range	40 mV for 0 dBm0 on the PCM interface, 300 Hz to 3 kHz
Impedance	125 kΩ typ.
S/N + THD	35 dB at full-range level
Passband ripple	0.5 dB

DECT applications

averaging 10,
specs are valid for RFIN/OUT

Accuracy and stability of RF carrier	
Error	<2 kHz + reference
Accuracy and stability of timing	
Error	<0.075 µs + reference
Modulation part 1, 2, 4	
Error	approx. 11 kHz at minimum (202 kHz) approx. 13 kHz at maximum (403 kHz) permitted deviation
Frequency drift	
Error	approx. 1 kHz/ms
Normal transmit power	
Error	≤1.5 dB
Power versus time	
Error power	≤1.5 dB, 30 dBm to 5 dBm, ≤2 dB in rest of range
time	<0.075 µs + reference

---

4)

Frequency response	±0.2 dB typ.
Linearity	±0.3 dB typ.
Drift	±0.3 dB typ.

5)

Frequency response	±0.5 dB typ.
Linearity	±0.4 dB typ.
Drift	±0.5 dB typ.

6)

Frequency response	typ. ±0.5 dB typ.
Linearity	typ. ±0.3 dB typ.
Drift	typ. ±0.5 dB typ.

7)

Frequency response	typ. ±0.5 dB typ.
Linearity	typ. ±0.5 dB typ.
Drift	typ. ±0.5 dB typ.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Common specifications

DC voltmeter	**for CMD50/53 as an option (CMD-B20)**
Measurement range	0 V to ±30 V
Resolution	10 mV
Error	≤2% + resolution
DC ammeter	**for CMD50/53 as an option (CMD-B20)**
Operating modes	current averaging with GSM-adapted time constant, current peak measurement (maximum and minimum)
Measurement range	0 A to ±10 A
Common-mode rejection	±30 V
Resistance	50 mΩ
Resolution for current averaging	1 mA/10 mA
Resolution for peak measurement	10 mA
Residual indication (no current at input)	≤10 mA (at room temperature, common mode rejection voltage ±10 V)
Error	≤2% + residual indication + resolution

AF Measurement Unit

option CMD-B41

AF generator	
Frequency range	50 Hz to 10 kHz
Frequency resolution	0.1 Hz
Frequency error	same as time base + half resolution
Level range	10 µV to 5 V
Level resolution	10 µV at <1 mV 1% at ≥1 mV
Level error	≤5% at ≥1 mV
Distortion	≤0.5%
Max. output current	20 mA
Output impedance	<5 Ω
AF voltmeter	
Frequency range	50 Hz to 10 kHz
Measurement range	0.1 mV to 30 V
Resolution	100 µV at <10 mV 1% at ≥10 mV
Error	≤5% + resolution
Input impedance	1 MΩ
Distortion meter	
Frequency range	300 Hz to 3 kHz
Input level range	100 mV to 30 V
Resolution	0.1% distortion
Inherent distortion	≤0.5%
Error	≤5% + inherent distortion
Measurement bandwidth	10 kHz
AF counter	
Frequency range	20 Hz to 10 kHz
Input level range	10 mV to 30 V
Resolution	≤1 Hz
Error	same as reference + resolution
Input impedance	1 MΩ
IF counter	
Frequency range	10 kHz to 60 MHz
Input level range	100 mV (rms) to TTL
Resolution	1 Hz
Error	same as reference + resolution
Input impedace	approx. 1 MΩ ||100 pF

Time and frequency reference

Time base TCXO	**standard**
Nominal frequency	10 MHz
Max. frequency drift in temperature range 5°C to 35°C	$\leq 1.5 \times 10^{-6}$
Deviation due to aging	$\leq 0.5 \times 10^{-6}$ per year (at 35°C)
Time base OCXO, version 1	**option CMD-B1**
Nominal frequency	10 MHz
Max. frequency uncertainty in temperature range 5°C to 45°C	$\pm 1 \times 10^{-7}$
Deviation due to aging (after 30 days of operation and under constant operating conditions)	$\leq 5 \times 10^{-9}$ per day or $\leq 2 \times 10^{-7}$ per year
Warm up time	approx. 5 min at room temperature
Time base OCXO, version 2	**option CMD-B2**
Nominal frequency	10 MHz
Max. frequency uncertainty in temperature rannge 5°C to 45°C (referred to 25°C)	$\leq 5 \times 10^{-9}$
Deviation due to aging (after 30 days of operation and under constant operating conditions)	$\leq 3.5 \times 10^{-8}$ per year $\leq 5 \times 10^{-10}$ per day
Warmup time (at 25°C)	approx. 10 min
Reference frequency inputs/outputs	**option CMD-B3**
Synchronization input:	
Frequency (selectable)	GSM bit clock (270.8 kHz), 2/4/16 times GSM bit clock, 1 MHz to 13 MHz in 1 MHz steps, 2.048, 26, 39, 52 MHz
External reference, nominal	
Frequency (CMD60)	10 MHz
Input impedance	100 Ω
Input voltage range	632 mV (pp) to 5 V (pp)
Synchronization output 1:	
Frequency	10 MHz with internal reference or frequency at synchronization input with external reference
Voltage	5 V (pp), R_{out} = 50 Ω (10 MHz signal)
Synchronization output 2:	
Frequency (selectable)	GSM bit clock, 2/4/16 times GSM bit clock, 1, 2, 4 or 13 MHz
Voltage	5 V (pp), R_{out} = 50 Ω
Interfaces	
IEEE/IEC-bus interface	**option CMD-B61** interface to IEC 625-1/IEEE 488, SCPI-compatible command set
Other interfaces	RS-232-C (9-contact) Centronics (25-contact)
General data	
Operating temperature range	5°C to 45°C to DIN IEC 68-2-1/2
Storage temperature range	–40°C to +60°C
Electromagnetic compatibility	meets European EMC directive (89/336/EEC)
Mechanical resistance	
Sinusoidal vibration	to DIN IEC 68-2-6, 5 Hz to 55 Hz, amplitude 0.15 mm, two cycles
Random vibration	to DIN 40046, part 24, 10 Hz to 300 Hz, 10 m/s^2 rms, 5 min/axis
Shock	to MIL-STD-810 D, 400 m/s^2, shock spectrum in 6 main axes
Power supply	90 V to 265 V, 45 Hz to 440 Hz
Power consumption	CMD 55: approx. 95 W CMD 60: approx. 60 W CMD 65: approx. 100 W
Electrical safety	VDE 0411, class 1
Dimensions (W x H x D)	435 mm x 192 mm x 363 mm
Weight (without options)	CMD 55: approx. 14 kg CMD 60: approx. 12 kg CMD 65: approx. 17 kg

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering information

Digital Radiocommunication Tester	CMD 50	1050.9008.50
	CMD 53	1050.9008.53
	CMD 52	1050.9008.52
	CMD 55	1050.9008.05
	CMD 60	1050.9008.60
	CMD 65	1050.9008.65
Accessories supplied	power cord, operating manual, fuses	
Calibration with Certificate	CMD-DCV2	0240.2193.08
Recommended extras		
GSM GPRS Test SIM Card (essential for BER measurements)	CRT-Z2	1039.9005.02
Formatted Memory Card (CMD-B62 required)	CMD-Z1	1059.5305.02
Handset	CMD-Z50	1059.4250.02
Antenna Coupler	CMU-Z10	1150.0801.02
Shielded Chamber for CMU-Z10	CMU-Z11	1150.1008.02
Rackmount Adapter	ZZA-94	0396.4905.00

For further CMD models ask your local representative

Different specifications for CMD53/55/65 with CMD-U13

The RF input 1 of the CMD53/55/65 with CMD-U13 is 10 dB more sensitive. Therefore the following specifications differ from those of an unmodified CMD

Peak power meter (RF IN/OUT)

Measurement range	–10 dBm to +37 dBm
Maximum RF power	+37 dBm
Error in GSM900 band	≤0.5 dB + resolution (P >–6 dBm)
Error in GSM1800/1900 band	≤0.8 dB + resolution (P >–6 dBm)

Phase and frequency error measurement

Level range (RF IN/OUT)	–10 dBm to +37 dBm

Burst power measurement

Reference level range for full dynamic range (RF IN/OUT)	
GSM900:	0 dBm to +37 dBm
GSM1800/1900:	–10 dBm to +37 dBm

The CMD53/55/65 with CMD-U13 have a different output level range at RF OUT 2

RF generator 1

Output level range (RF OUT 2)	–35 (–37[8]) dBm to –120 dBm

RF generator 2

Output level range (RF OUT 2)	–37 (–39[8]) dBm to –120 dBm

Certified Environmental System ISO 14001 REG. NO 1954

Certified Quality System ISO 9001 DQS REG. NO 1954

Different specifications for CMD53/55/65 with CMD-U18

RF generator 1 (TCH)

Output level range (RF IN/OUT)	–120 dBm to –15/–17[8] dBm
Level error (RF IN/OUT)	≤2 dB (–15/–17[2] dBm to –35/–37[8] dBm)
	≤1.5 dB (–35/–37[2] dBm to –120 dBm)
	≤1.0 dB (at –104 dBm)
RF OUT 2	not available

RF generator 2 (BCCH)

Output level range (RF IN/OUT)	–120 dBm to –17/–19[8] dBm
Level error (RF IN/OUT)	≤2 dB
RF OUT 2	not available

Analyzer

Level range (RF IN/OUT)	0 dBm to 40 dBm
Error peak power meter	GSM900: ≤0.5 dB + resolution
	GSM1800/1900: ≤0.8 dB + resolution

Different specifications for CMD53/65 with CMD-U20

Combined mode (BCCH and TCH in different GSM bands)

Level error of synthesizer 1	
RF IN/OUT	<3 dB
RF OUT 2	<3 dB
Level error of synthesizer 2	
RF IN/OUT	<3 dB
RF OUT 2	<3 dB

[8] In GSM1900 mode with option CMD-B19/-U19 fitted.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP