Digital Radiocommunication Testers CMD 50/52, CMD 53/55, CMD 65

Multimode compact testers for digital mobile phones to GSM900/1800/1900 and **DECT** standard



CMD65 (photo 40882-1)

Brief description

CMD 50/52 is a compact unit for testing GSM mobiles. CMD 53/55 is furthermore capable of testing GSM1800 mobile phones. The CMD65 combines the functionality of CMD55 and that of CMD60 (see page 36). CMD53/55 can optional be extended to include the DECT standard. All models can optionally be extended to include the GSM1900 standard.

All models combine small dimensions with high measurement accuracy and speed. The testers' range of capabilities includes all signalling, generator and measurement functions required for verifying the correct operation of the DUT. Thanks to their fast go/nogo tests and accurate analysis using optional extensions, CMD52 and 55 are equally suited for use in service and production.

For use in service and maintenance, models CMD50 and CMD53, which are based on CMD52 and CMD55 but have a reduced number of facilities, are available.

Main differences of CMD52/53 to CMD52/55

- Remote control via RS-232 only (no IEC/IEEE bus)
- No multifunction connector on front panel
- Speech coder/decoder cannot be integrated
- Optional ammeter and voltmeter
- High-sensitivity 2nd RF input available as an option

Operation

Operation of the CMD is extremely user-friendly and requires no detailed GSM knowledge. The high-contrast, backlit LCD provided with softkeys on both sides allows convenient callup of test routines under menu control.

Remote control

- CMD controlled via RS-232 or IEC/ IEEE-bus interface uses SCPI-compatible commands
- Designed for fast speed to yield high throughputs in production

Autotest

The autotest function enables complete measurement routines to be started at a keystroke.

Test capabilities

To test mobile phones, the CMD simulates a GSM base station. Two RF synthesizers, one of which delivers a continuous BCCH signal, are available for this purpose. The major test functions

- mobile-to-base station synchroniza-
- location update
- incoming call setup
- outgoing call setup
- mobile power level control
- handover (channel change, timeslot change)
- dual-band handover
- peak power measurement
- SACCH measurement (eg RxLev, RxQual, power level)
- echo test
- call clearing by mobile
- call clearing by network
- DC current/voltage measurement
- phase and frequency error measurement (option CMD-B4)
- measurement of power ramp as a function of time (option CMD-B4)
- bit-error rate (BER) measurement (option CMD-B4)



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Echo test

The echo test allows very rapid go/nogo analysis covering all essential parts of the mobile including microphone and loudspeaker.

Voltage and power measurements

The DC ammeter/voltmeter designed for pulsed signals allows correct meas-

urement of the power consumption of the mobile phone.

Module test

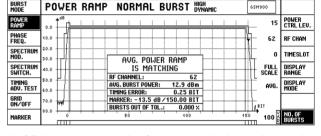
Fault localization in mobile telephones requires various measurement functions that can also be used without signalling so that defective units can be tested down to module level. The basic

model of CMD already provides some of these functions, other functions are available as optional extensions:

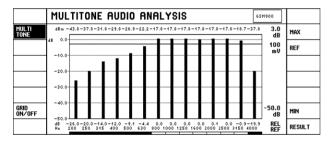
- power measurement
- signal generation
- phase and frequency error measurement
- measurement of power ramp

SINGLE BER MEAS.	CONTINUOUS BIT ERROR	RATE	GSM900	
RESTART	CLASS RBER II 5.192 %	TRAFFIC CHAN. LEVEL:	-108.5 dBm	USED TIMESLOT
	й оторогия и при	(relative to USED TS)	0.0 dB	UNUSED TIMESLOT
	CLASS FER ERASED FRAMES 0.000 %			
	MS RECEIVER REPORTS RxLev 2 (-109 to -108 dBm) RxQual 5 (3.2 to 6.4%)			
	RxQual 5 (3.2 to 6.4 %) CRC ERRORS: 0			
MEAS. MODE	BER RBER FAST	BER SEARCH:	5.0 %	CLASS II VALUE
AVERAGE	20 Frame INDICATOR			SEARCH

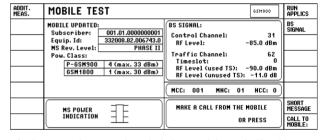
The BER search function allows the absolute sensitivity of a mobile to be determined



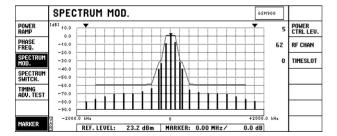
The full dynamic range (>72 dB) of a GSM normal and access burst can be verified with the CMD-B42 option



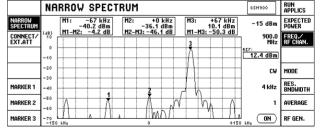
The audio measurement option CMD-B44 is capable of generating and analyzing up to 14 freely configurable tones in about 1 second. Measurements in absolute and relative mode are possible



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



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

Mobile Radio Measurements

Digital Radiocommunication Testers CMD 50/52, CMD 53/55, CMD 65

Overview of applications and options

	GSM900	GSM1800	GSM1900	DECT	RS232	IEEE-bus	V/I meas.	Service	Production
CMD50	•	CMD-U1	CMD-U1 CMD-B19	CMD-U1 CMD-U56	•	-	CMD-B20	•	-
CMD52	•	CMD-U1	CMD-U1 CMD-B19	CMD-U1 CMD-U56	•	•	•	•	•
CMD53	•	•	CMD-B19	CMD-U56	•	-	CMD-B20	•	-
CMD55	•	•	CMD-B19	CMD-U56	•	•	•	•	•
CMD65	•	•	CMD-B19	•	•	•	•	•	•

Designation, functions	Option	Order No.
GSM 1900 mobile station test (for CMD53/55 and CMD65 only)	CMD-B19	1059.6201.02
OCXO Reference Oscillator: frequency drift ≤1 × 10 ⁻⁷	CMD-B1	1059.6002.02
Reference Frequency Inputs/Outputs: synchronization to internal or external frequency (2.048, 10, 13.26, 52 MHz) or GSM bit clock (270.8 kHz) 1 to 13 MHz, input signal min. 0 dBm, max. TTL signal	CMD-B3	1051.6202.02
Fast Power Ramp, Phase/Frequency Error and BER Measurement: numeric/graphic display, various BER, RBER, FER test routines; required for fitting CMD-B41 and CMD-B42	CMD-B4	1051.6654.02
AF Measurement Unit with Frequency Counter: comprises AF generator, voltmeter, distortion meter and frequency counter, measurements up to 60 MHz	CMD-B41	1051.6902.02
High-Dynamic Burst Analysis: dynamic range >72 dB (CMD-B4 required)	CMD-B42	1051.7150.02
GSM900/1800/1900-Specific Measurement of spectra due to switching/modulation (CMD-B4 and CMD-B42 required)	CMD-B43	1059.6001.02
Multitone Generator and Analyzer for CMD5x and CMD6x: comprehensive audio tests up to 8460 Hz (CMD-B4 and CMD-B41 required)	CMD-B44	1099.3203.02
Realtime Speech Encoder/Decoder	CMD-B5	1051.8657.02
TDMA Signals ans Adapter for CMD-B6x Options: required for fitting CMD-B61 and CMD-B62	CMD-B6	1051.7409.02
IEC/IEEE-Bus Interface: alternative for RS-232 interface (standard, CMD-B6 required)	CMD-B61	1051.7609.02
Memory Card Interface: archiving of results, etc. (CMD-B6 required)	CMD-B62	1051.8205.02
I/Q Demodulator Output and Trigger Input (BNC connector on the rear panel)	CMD-U5	1059.6901.02
I/Q Demodulator Output and Trigger Input for Fading Simulation	CMD-B17	1099.3003.02
Modification Kit for upgrading CMD 50/52 to CMD 53/55	CMD-U1	1051.8957.02
DECT Extension for CMD53/55	CMD-U56	1051.8004.02
Narrowband RF Spectrum Analyzer (CMD-B4 required)	CMD-K43	1082.4830.02
Extra Frequency Range for R-GSM, International Railway System (UIC)	CMD-K80	1082.4930.02
Modification Kit for CMD53/65: dual-band handover with BCCH present; for CMD53 only with CMD-U10	CMD-U20	1099.5606.02

Specifications in brief

For CMD65 see also CMD60, page 36

Timebase TCXO standard, 10 MHz Frequency drift (0 to +35°C) Aging

Timebase OCXO
Nominal frequency

≤1.5x10⁻⁶ ≤0.5x10⁻⁶/year (at 35 °C)

with option CMD-B1, 10 MHz

Frequency drift (0 to +50°C) Aging

DC voltmeter Resolution/accuracy

DC ammeter

Measurement range Resolution/accuracy $\leq 1 \times 10^{-7}$ $\leq 2 \times 10^{-7} / \text{year}$

0 to ±30 V 10 mV/2%

current averaging with GSM-adapted time constant, current peak measurement (positive and negative) 0 to $\pm 10~\text{A}$ 10 mA/2%

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Specific data of CMD 52

RF generator 1

Frequency range

Frequency settling time Output level (RF IN/OUT) Output level (RF OUT 2) Resolution Harmonics (RF IN/OUT)

Modulation RF generator 2

Output level (RF IN/OUT)

Peak power meter (RF IN/OUT)

Frequency range Measurement range/resolution **VSWR**

GSM phase and frequency

error measurement Frequency range

Level range (RF IN/OUT

GSM burst power measurement

Frequency range

Reference level range (RF IN/OUT

High-dynamic burst analysis Relative error of individual

test sample Dynamic range

Measurement limit (RF IN/OUT)

935.2 to 959.8 MHz (GSM channel

spacing)

≤3 ms for phase error <2° -33 to -120 dBm +13 to -77 dBm 0.1 dB< -30 dBc

GMSK, $B \times T = 0.3$

10 to 47 dBm/0.1 dB

10 to 47 dBm (RF IN 2: -37 to 0 dBm)

with option CMD-B42

same as CMD52, but

935.2 to 959.8 MHz

-35 to -120 dBm

800 to 1000 MHz

1700 to 1900 MHz

with option CMD-B4

890.2 to 914.8 MHz

0 to 47 dBm

-60 to 0 dBm

with option CMD-B4

890.2 to 914.8 MHz

1717.2 to 1784.8 MHz

1850.2 to 1909.8 MHz

1710.2 to 1784.8 MHz

1850.2 to 1909.8 MHz

+11 to -77 dBm

1805.2 to 1879.8 MHz

1930.2 to 1989.8 MHz

same as RF generator 1, but -37 dBm (RF OUT 2: +9 dBm)

≤1.5 dB to 72 dB below peak power

<-36 dBm (RF IN 2: <-83 dBm)

Specific data of CMD 55

RF generator 1

GSM900 band Frequency range

GSM1800 band GSM1900 band

RF IN/OUT Output level

RF generator 2

Max. output level (RF IN/OUT)

Peak power meter (RF IN/OUT)

Frequency range

Measurement range/resolution

GSM900 band

VSWR

0 to 47 dBm/0.1 dB GSM 1800/1900 0 to 33 dBm/0.1 dB

Phase and frequency error

measurement

Level range

Frequency range GSM900 band GSM1800 band GSM1900 band

GSM900 band

RF IN/OUT GSM 1800/1900 0 to 33 dBm RF IN 2

Burst power measurement

GSM900 band Frequency range GSM1800 band Frequency range GSM1900 band

Reference level range RF IN/OUT

ĞSM900 band RF IN 2

10 to 47 dBm GSM1800/1900 0 to 33 dBm -37 to 0 dBm

High-dynamic burst analysis

Dynamic range Measurement limit

RF IN/OUT) GSM900 band

AF Measurement Unit

same as RF generator 1, but -35 dBm (RF OUT 2: +11 dBm)

800 to 1000 MHz

<1.3

with option CMD-B4

890.2 to 914.8 MHz (GSM900

10 to 47 dBm (RF IN 2: -60 to 0 dBm)

with option CMD-B4

890.2 to 914.8 MHz (GSM900

RF IN 2

GSM1800/1900 <-48 dBm GSM900 band <-83 dBm GSM1800/1900 <-85 dBm

option CMD-B41

>72 dB

<-36 dBm

with option CMD-B42

50 Hz to 10 kHz/0.1 Hz

 $10 \,\mu\text{V}$ to $5 \,\text{V}/10 \,\mu\text{V}$ (1%)

0.1 mV to $30 \text{ V}/100 \,\mu\text{V}$ (1%)

50 Hz to 10 kHz

300 Hz to 3 kHz

< 0.5%

100~mV to 30~V/0.1%

20 Hz to 10 kHz/≤1 Hz

10 kHz to 60 MHz/1 Hz

min.: 100 mV; max.: TTL signal

same as timebase + half resolution

AF generator Frequency range/resolution

Frequency drift Voltage range/resolution Distortion

AF voltmeter

Frequency range Measurement range/resolution

Distortion meter

Frequency range Input voltage range/resolution

Inherent distortion

AF counter Frequency range/resolution Input voltage range

10 mV to 30 V

IF counter Frequency range/resolution

Input signal Interfaces

option CMD-B61

IEC625-1 (IEEE 488), SCPI-compatible

Other interfaces

IEC/IEEE-Bus Interface

Reference Frequency Inputs/Outputs option CMD-B3

Synchronization input

Frequency (selectable)

Input signal Synchronization output 1

Frequency

Input signal Synchronization output 2

Frequency (selectable)

Input signal

RS-232-C, Centronics

GSM bit clock (270.8 kHz), 2xGSM bit clock, 4xGSM bit clock, 16xGSM bit clock, 1 to 13 MHz in 1 MHz steps, 2.048 MHz, 26, 39, 52 MHz min.: O dBm; max.: TTL signal

10 MHz with internal reference or frequency at synchronization input with external frequency

TTL signal, $Z_{out} = 50 \Omega$ GSM bit clock, 2x, 4x, 16x GSM bit

clock, 1, 2, 4 or 13 MHz TTL signal, $Z_{out} = 50 \Omega$

Ordering information

Mobile Station Tester

GSM900 CMD 50 GSM900 CMD 52 GSM900 and GSM1800 CMD 53 GSM900 and GSM1800 CMD 55 GSM900, GSM1800 and DECT CMD65 For all models GSM 1900 optional CMD-B19

Телефон: +7 (499) 685-7744

1050.9008.50

1050.9008.52

1050.9008.53

1050.9008.55

1050.9008.65

1059.6201.02