

Speedy and cost-effective measurements on DECT communications devices; can be retrofitted for GSM (CMD65 standard), GSM1800 and GSM1900 measurements



Photo 42198

Brief description

Reliability, measurement speed and cost effectiveness are the characteristics a test equipment must have to succeed in the field of the widely used DECT communication devices.

In a radiocommunication network such as DECT (Digital European Cordless Telephone) numerous cordless telephones and fixed stations have to share the scarce resources of frequency, time and space. This can only be done by observing stringent rules and specifications.

On the other hand, the DECT system in particular and associated phones are expected to be low-cost units whose complexity and precision are limited. Given these conflicting requirements, it is measurement engineering which has to ensure that the specifications for smoothly working communication are

met in spite of less sophisticated technology (compared with other digital cellular systems). The great experience gained with preceding DECT measurement instruments such as signal generators, analyzers, communication testers and DECT type-approval systems as well as cooperative development work with several key end-users have contributed towards creating a well-balanced tester for production and service according to all aspects.

Benefits at a glance

Production

- The CMD60 can be remote controlled via the RS-232 or IEC/IEEE-bus interface using SCPI-compatible commands. In the remote-control mode CMD60 is designed for fast speed to yield high throughputs in production
- High production output at low

investment for test equipment

- Comprehensive test capabilities implemented in one single unit

Development

- Comprehensive in-depth measurements under a convenient user interface
- A lot of complex test setups with conventional equipment become redundant with the use of this special DECT tester
- Automatic regression and stress tests
- The tester supplies a great number of DECT-specific signals such as bit clock, TX/RX enable, to control the module under test

Servicing

- 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

Application overview

	GSM900	GSM1800	GSM1900	DECT	RS232	IEEE-bus	V/I meas.	Service	Production
CMD60	CMD-U65	CMD-U65	CMD-U65 CMD-B19	•	•	•	•	•	•
CMD65	•	•	CMD-B19	•	•	•	•	•	•



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expert user interface for configurations

- Integrated tools such as a scope display for power and FM demodulation versus time ease troubleshooting

Main features

- For production, service and development
- RF measurements to CTR06
- Comprehensive audio tests
- Extremely fast measurements for high production throughput
- Ergonomic user interface for service applications
- Selfcontained, lightweight, compact tester
- Can be retrofitted for GSM, GSM1800 and GSM1900 measurements

Menu structure

The power ramp measurement permits in-depth analysis of the burst power transmitted by the FP or PP. The measurement is synchronized to bit PO, thus giving precise information not only about the power transmitted but also about timing parameters.

The RF modulation measurement menu presents the demodulated signal in a scope display for easy and quick recognition of typical data forms, and accurate measurement results as numbers and bargraphs for further analysis.

Timing parameters such as the absolute timing accuracy as well as the jitter between two bursts are measured and displayed in an easy-to-read format.

User-defined tolerances for parameters like BER, modulation, timing, power and

power ramp (burst) as are shown here can easily be entered via the configuration menu. If any of the set limits are exceeded, the measurement will be shown in inverse video for easy identification.

The module test offers RF signal generator and RF burst analyzer features for testing DECT modules without signalling, ie when troubleshooting or adjustments are required.

Interface description

CMD 60 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 CMD60 enables the use of an extended frequency range for testing. Channels -3, -2, -1 and 10, 11, 12 are outside the normal DECT specification and therefore free for testing.

The DECT standard requires two levels: -83 and -73 dBm. The CMD60 provides an extra level range of up to 30 dB to overcome external coupler and cable attenuation.

The CMD60 provides 1 up to 12 consecutive TDMA slots for rapid BER measurements for PP tests (2 slots for FP test). The measuring time in production can be considerably cut down if more than one timeslot is used for BER measurements.

Modulation is GFSK with $B \times T = 0.5$ according to DECT specifications. In addition, constant envelope, signals with or without modulation or DECT

bursts with various bit patterns for module test are possible.

These bit patterns can easily be recognized while testing receiver and demodulator modules.

CMD 60 receiver part

It is similar to the transmitter part above: there are 10 DECT frequency channels No. 0 to 9. Additionally, 6 extended DECT frequency channels No. -3, -2, -1 and 10, 11, 12 in DECT channel spacing are provided.

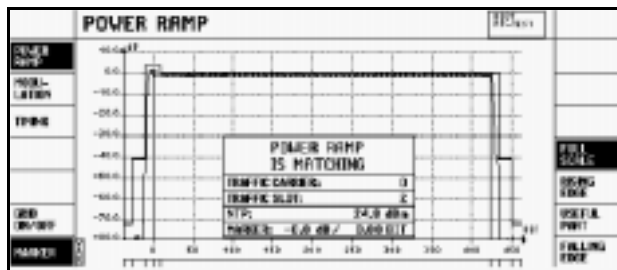
Should the standard DECT output level of 24 dBm be attenuated due to couplers and cable attenuation, the CMD60 provides more than 30 dB measurement range.

There are two independent receive paths: For DECT signalling and BER a signalling path is incorporated in the CMD60. For TX tests the CMD60 provides a measurement path. The FM and envelope detector are both 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.

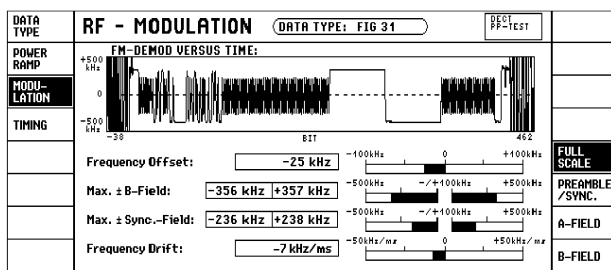
RF input/output

The CMD60 transmitter and receiver are connected to a bidirectional N connector (RF in/out). All mentioned specifications are valid for this connector. Moreover, there is a high-level output for the CMD transmitter (level range like N connector + approx. 40 dB) as well as a high-sensitivity input for the CMD receiver on the front panel.





Power ramp measurement



RF modulation measurement

Demodulator interface

CMD60 provides a linear, analog FM demodulator output (DC-coupled) and a logarithmic analog RF envelope demodulator output (DC-coupled).

Wideband input/output

The second wideband input/output (100 MHz to 2.5 GHz) is on the rear panel. The input signal from the front connector is provided at this connector with an attenuation of 12 dB. It can be monitored with a spectrum analyzer for spurious measurements. Further-

more, this connector can be used to introduce an interferer into the RF connection without reconnecting the test setup for the in-channel tests.

CMD60 audio part

In addition to the DECT RF interface on the CMD60 front panel, there is an analog DECT voice interface for a speaker and the appropriate microphone (analog ADPCM interface). Alternatively it can be connected to the AF Measurement Unit CMD-B41.

Overview of options

Designation, functions	Option	Order No.
AF Measurement Unit with Frequency Counter (CMD-B4 needed): this option provides an audio measurement unit with AF generator and AF analyzer. The parameters measured are level (peak and rms), frequency, and distortion on selectable frequencies. In addition, the option CMD-B41 incorporates a 60-MHz TTL counter to verify the DUT's reference frequency	CMD-B41	1051.6902.02
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
Reference Frequency Input/Output, Frequency Synchronization: CMD provides a 10 MHz interface as a common frequency reference.	CMD-B3	1051.6202.02
OCXO Reference Oscillator: this option improves aging and frequency drift of the internal reference source	CMD-B1	1051.6002.02
DSP/Adapter for CMD-B4x options: DSP system carrying out applications for GSM RF and audio tests as well as DECT audio tests. In contrast to GSM, this option is not required for DECT BER measurements	CMD-B4	1051.6654.02
IEC/IEEE-Bus Interface: in addition to the standard RS-232-C interface, the CMD can be fitted with this remote-control interface (CMD-B6 required)	CMD-B61	1051.7609.02
Adapter for CMD-B6x options	CMD-B6	1051.7409.02
Frequency Extension DECT CH +12 to -22 (option only for new instruments) for Latin America and other countries	CMD-K61	1082.3840.02
Same as CMD-K61 , but upgrade for instruments with HW version "D"	CMD-U61	1099.5258.02
Extension for GSM900 and GSM1800	CMD-U65	1059.8104.02

Specifications in brief

For CMD60/65 see also CMD52/55 on page 26

Time and frequency reference

TCXO	standard
Nominal frequency	10 MHz
Temperature effect (0 to 35°C)	$<1.5 \times 10^{-6}$
Aging	$<0.5 \times 10^{-6}/\text{year}$

OCXO	option CMD-B1
Nominal frequency	10 MHz
Temperature effect (0 to 50°C)	1×10^{-7}
Aging	$<5 \times 10^{-9}/\text{day}$ or $<2 \times 10^{-7}/\text{year}$

DECT signal generator

Frequency	specifications valid for N connector
Additional DECT channels	10 DECT channels 0 to 9
Level range	-3 to -1, 10 to 12 and half channels
Burst switch-off	-100 to -40 dBm
Modulation	>30 dB
	GFSK (B x T = 0.5)

DECT analyzer

Frequency	specifications valid for N connector
Level (setting for external attenuation and expected power shall be matching; -10 to +30 to dBm)	same as signal generator

	-65 to +30 dBm (for level meter)
	-30 to +30 dBm (for broadband FM demodulator and signalling), values shifted by about -40 dB for input 2

FM demodulator	for TX postprocessing and analog output
Range	0 to 450 kHz deviation
Resolution	1 kHz
Level meter (transient response)	for TX postprocessing and analog output
Range	-65 to 30 to dBm
Dynamic	70 dB

Analog DECT ADPCM interface

Output	balanced
Range	1 V, 300 Hz to 3 kHz
S/N + THD	50 dB at full-range level
Input	balanced
Range	50 mV, 300 Hz to 3 kHz
S/N + THD	50 dB at full-range level

DC measurements

DC voltmeter	0 to ± 30 V
DC ammeter	0 to ± 10 A

Option CMD-B4 with CMD-B41

AF meter

Frequency range	50 Hz to 10 kHz
Input voltage	0.1 mV to 30 V
Load impedance	1 M Ω

AF distortion meter

Frequency range	300 Hz to 3 kHz
Input voltage	100 mV to 30 V
Load impedance	1 M Ω

AF counter

Frequency range	20 Hz to 10 kHz
Input voltage	10 mV to 30 V
Resolution	1 Hz
Load impedance	1 M Ω

60 MHz counter

Frequency range	10 kHz to 60 MHz
Input signal	min.: 100 mV; max.: TTL signal
Resolution	1 Hz
Load impedance	1 M Ω 100 pF

AF generator

Frequency range	50 Hz to 10 kHz
Resolution	0.1 Hz
Accuracy	0.05 Hz
Output voltage	10 μ V to 5 V
Max. current	20 mA
Source impedance	$<5 \Omega$

General data

Power supply, AC	100 to 120 V $\pm 10\%$, 200 to 240 V $\pm 10\%$, 50 to 400 Hz $\pm 5\%$
Power consumption	approx. 60 VA
Dimensions (W x H x D)	435 mm x 192 mm x 363 mm
Weight (without options)	approx. 12 kg

Ordering information

Digital Radiocommunication Tester	CMD60	1050.9008.60
GSM900, GSM1800, DECT	CMD65	1050.9008.65
GSM900 and GSM1800 Extension	CMD-U65	1059.8104.02

Options	see overview of options
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