SLOVENSKI STANDARD
SIST ETS 300 577 E8:2003

01-december-2003

Digitalni celiļ ni telekomunikacijski sistem (faza 2) ï Radijsko oddajanje in sprejemanje (GSM 05.05)

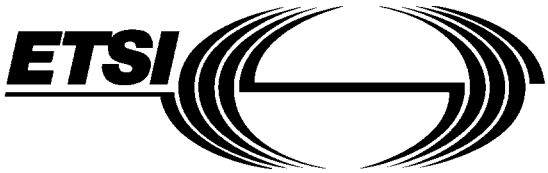
Digital cellular telecommunications system (Phase 2) (GSM); Radio transmission and reception (GSM 05.05)

Ta slovenski standard je istoveten z: ETS 300 577 Edition 8

ICS:

33.060.20	Sprejemna in oddajna oprema	Receiving and transmitting equipment
33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)

SIST ETS 300 577 E8:2003 **en**



EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 577

January 1997

Eighth Edition

Source: ETSI TC-SMG

Reference: RE/SMG-020505PR7

ICS: 33.020

Key words: Digital cellular telecommunications system, Global System for Mobile communications (GSM)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Digital cellular telecommunications system (Phase 2); Radio transmission and reception (GSM 05.05)

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This ETS defines the requirements for transceivers operating in the 900 MHz and 1 800 MHz bands within the digital cellular telecommunications system (Phase 2).

This ETS correspond to GSM technical specification, GSM 05.05 version 4.16.1.

The specification from which this ETS has been derived was originally based on CEPT documentation, hence the presentation of this ETS is not in accordance with the ETSI/PNE rules.

Reference is made within this ETS to GSM Technical Specifications (GSM-TSs) (see note).

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs (Phase 2), whilst others may become ETSI Technical Reports (ETRs). GSM-TSs are, for editorial reasons, still referred to in GSM ETSs.

Transposition dates	
Date of adoption	20 December 1996
Date of latest announcement of this ETS (doa):	30 April 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 October 1997
Date of withdrawal of any conflicting National Standard (dow):	31 October 1997

Blank page

1 Scope

This European Telecommunications Standard (ETS) defines the requirements for the transceiver of the pan-european digital mobile cellular and personal communication systems operating in the 900 MHz and 1 800 MHz band (GSM 900 and DCS 1 800).

Requirements are defined for two categories of parameters:

- Those that are required to provide compatibility between the radio channels, connected either to separate or common antennas, that are used in the system. This category also includes parameters providing compatibility with existing systems in the same or adjacent frequency bands.

- Those that define the transmission quality of the system.

This ETS defines RF characteristics for the Mobile Station (MS) and Base Station System (BSS). The BSS will contain either Base Transceiver Stations (BTS) or microcell base transceiver stations (micro-BTS). The precise measurement methods are specified in GSM 11.10 and 11.20.

Unless otherwise stated, the requirements defined in this ETS apply to the full range of environmental conditions specified for the equipment (see annex D).

In this ETS, some relaxation are introduced for GSM 900 mobile stations which fulfil the following conditions:

- pertain to power class 4 or 5 (see section 4.1.1);

- not designed to be vehicle mounted (see GSM 02.06).

In this ETS, these mobile stations are referred to as "small MS".

NOTE: In this ETS, a handhold which can be connected to a car kit is not considered to be vehicle mounted.

Mobile stations may operate on more than one of the frequency bands specified in section 2. These mobile stations, defined in GSM 02.06, are referred to as "Multi band mobile stations" in this ETS. Multi band mobile stations shall meet all requirements for each of the bands supported. The relaxation on GSM 900 for a "small MS" are also valid for a multi band MS if it complies with the definition of a small MS.

The RF characteristics of repeaters are defined in annex E of this ETS. Annexes D and E are the only sections of this ETS applicable to repeaters. Annex E does not apply to the MS or BSS.

1.1 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 100): "Digital cellular telecommunications system (Phase 2); Abbreviations and acronyms".

[2] GSM 02.06 (ETS 300 504): "Digital cellular telecommunications system (Phase 2); Types of Mobile Stations (MS)".

[3] GSM 05.01 (ETS 300 573): "Digital cellular telecommunications system (Phase 2); Physical layer on the radio path; General description".

[4] GSM 05.04 (ETS 300 576): "Digital cellular telecommunications system (Phase 2); Modulation".

[5] GSM 05.08 (ETS 300 578): "Digital cellular telecommunications system (Phase 2); Radio subsystem link control".

[6] GSM 05.10 (ETS 300 579): "Digital cellular telecommunications system (Phase 2); Radio subsystem synchronization".

[7] GSM 11.10 (ETS 300 607): "Digital cellular telecommunications system (Phase 2); Mobile Station (MS) conformity specification".

[8] GSM 11.11 (ETS 300 608): "Digital cellular telecommunications system (Phase 2); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[9] CCITT Recommendation O.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[10] ETS 300 019-1-3: "Equipment engineering; Environmental conditions and Environmental tests for telecommunications equipment Part 1-3: Classification of Environmental conditions Stationary use at weather protected locations".

[11] ETS 300 019-1-4: "Equipment engineering; Environmental conditions and Environmental tests for telecommunications equipment Part 1-4: Classification of Environmental conditions Stationary use at non-weather protected locations".

1.2 Abbreviations

Abbreviations used in this ETS are listed in GSM 01.04.

2 Frequency bands and channel arrangement

i) Standard or primary GSM 900 Band, P-GSM;

For Standard GSM 900 Band, the system is required to operate in the following frequency band:

890 - 915 MHz: mobile transmit, base receive;
935 - 960 MHz: base transmit, mobile receive.

ii) Extended GSM 900 Band, E-GSM (includes Standard GSM 900 band):

For Extended GSM 900 band, the system is required to operate in the following frequency band:

880 - 915 MHz: mobile transmit, base receive;
925 - 960 MHz: base transmit, mobile receive.

iii) DCS1 800 Band:

For DCS 1 800, the system is required to operate in the following band:

1 710 - 1785 MHz: mobile transmit, base receive;
1 805 - 1880 MHz: base transmit, mobile receive.

NOTE: The term GSM 900 is used for any GSM system which operates in any 900 MHz band.

Operators may implement networks which operates on a combination of the frequency bands above to support multi band mobile terminals which are defined in GSM 02.06.

The carrier spacing is 200 kHz.

The carrier frequency is designated by the absolute radio frequency channel number (ARFCN). If we call Fl(n) the frequency value of the carrier ARFCN n in the lower band, and Fu(n) the corresponding frequency value in the upper band, we have:

P-GSM 900	Fl(n) = 890 + 0.2*n	$1 \le n \le 124$	Fu(n) = Fl(n) + 45
E-GSM 900	Fl(n) = 890 + 0.2*n Fl(n) = 890 + 0.2*(n-1024)	$0 \le n \le 124$ $975 \le n \le 1\,023$	Fu(n) = Fl(n) + 45
DCS 1 800	Fl(n) = 1 710.2 + 0.2*(n-512)	$512 \le n \le 885$	Fu(n) = Fl(n) + 95

Frequencies are in MHz

3 Reference configuration

The reference configuration for the radio subsystem is described in GSM 05.01.

The micro-BTS is different from a normal BTS in two ways. Firstly, the range requirements are much reduced whilst the close proximity requirements are more stringent. Secondly, the micro-BTS is required to be small and cheap to allow external street deployment in large numbers. Because of these differences the micro-BTS needs a different set of RF parameters to be specified. Where the RF parameters are not different for the micro-BTS the normal BTS parameters shall apply.

4 Transmitter characteristics

Throughout this section, unless otherwise stated, requirements are given in terms of power levels at the antenna connector of the equipment. For equipment with integral antenna only, a reference antenna with 0 dBi gain shall be assumed.

The term output power refers to the measure of the power when averaged over the useful part of the burst (see annex B).

The term peak hold refers to a measurement where the maximum is taken over a sufficient time that the level would not significantly increase if the holding time were longer.

4.1 Output power

4.1.1 Mobile station

The mobile station maximum output power and lowest power control level shall be, according to its class, as defined in the following table (see also GSM 02.06).

Power class	GSM 900 Maximum output power	DCS 1 800 Maximum output power	Tolerance (dB) for conditions normal	extreme
1	- - - - - -	1 W (30 dBm)	± 2	± 2.5
2	8 W (39 dBm)	0.25 W (24 dBm)	± 2	± 2.5
3	5 W (37 dBm)	4 W (36 dBm)	± 2	± 2.5
4	2 W (33 dBm)		± 2	± 2.5
5	0.8 W (29 dBm)		± 2	± 2.5
NOTE: The lowest power level for all classes of GSM 900 MS is 5 dBmand for all classes of DCS 1 800 MS is 0 dBm.				

A multi band MS has a combination of the power class in each band of operation from the table above. Any combination may be used.

The different power levels needed for adaptive power control (see GSM 05.08) shall have the nominal output power as defined in the table below, starting from the lowest power control level up to the maximum output power corresponding to the class of the particular mobile station. Whenever a power control level corresponds to the power class of the MS, the tolerance of ± 2 or 2.5 dB (see above) shall apply.

GSM 900

Power control level	Output power (dBm)	Tolerance (dB) for conditions	
		normal	extreme
0-2	39	± 2	± 2.5
3	37	± 3	± 4
4	35	± 3	± 4
5	33	± 3	± 4
6	31	± 3	± 4
7	29	± 3	± 4
8	27	± 3	± 4
9	25	± 3	± 4
10	23	± 3	± 4
11	21	± 3	± 4
12	19	± 3	± 4
13	17	± 3	± 4
14	15	± 3	± 4
15	13	± 3	± 4
16	11	± 5	± 6
17	9	± 5	± 6
18	7	± 5	± 6
19-31	5	± 5	± 6

DCS 1 800

Power control level	Output power (dBm)	Tolerance (dB) for conditions	
		normal	extreme
29	36	± 2	± 2.5
30	34	± 3	± 4
31	32	± 3	± 4
0	30	± 3	± 4
1	28	± 3	± 4
2	26	± 3	± 4
3	24	± 3	± 4
4	22	± 3	± 4
5	20	± 3	± 4
6	18	± 3	± 4
7	16	± 3	± 4
8	14	± 3	± 4
9	12	± 4	± 5
10	10	± 4	± 5
11	8	± 4	± 5
12	6	± 4	± 5
13	4	± 4	± 5
14	2	± 5	± 6
15-28	0	± 5	± 6

NOTE: For DCS 1 800, the power control levels 29, 30 and 31 are only used "in call" for power control purposes. These levels are not used when transmitting the parameter TX PWR MAX CCH, for cross phase compatibility reasons. If levels greater than 30 dBm are required from the MS during a random access attempt, then these shall be decoded from parameters broadcast on the BCCH as described in GSM 05.08.

Furthermore, the output power actually transmitted by the MS at each of the power control levels shall form a monatomic sequence, and the interval between power steps shall be 2 ± 1.5 dB.

A change from any power control level to any power control level may be required by the base transmitter. The maximum time to execute this change is specified in GSM 05.08.

4.1.2 Base station

The base station transmitter maximum output power, measured at the input of the BSS Tx combiner, shall be, according to its class, as defined in the following table:

GSM 900

TRX power class	Maximum output power
1	320 - (< 640) W
2	160 - (< 320) W
3	80 - (< 160) W
4	40 - (< 80) W
5	20 - (< 40) W
6	10 - (< 20) W
7	5 - (< 10) W
8	2.5 - (< 5) W

DCS 1 800

TRX power class	Maximum output power
1	20 - (< 40) W
2	10 - (< 20) W
3	5 - (< 10) W
4	2.5 - (< 5) W

The micro-BTS maximum output power per carrier measured at the antenna connector after all stages of combining shall be, according to its class, defined in the following table.

GSM 900 micro-BTS		DCS 1 800 micro-BTS	
TRX power class	**Maximum output power**	**TRX power class**	**Maximum output power**
M1	(> 19) - 24 dBm ((> 0.08) - 0.25 W)	M1	(> 27) - 32 dBm ((> 0.5) - 1.6 W)
M2	(> 14) - 19 dBm ((> 0.03) - 0.08 W)	M2	(> 22) - 27 dBm ((> 0.16) - 0.5 W)
M3	(> 9) - 14 dBm ((> 0.01) - 0.03 W)	M3	(> 17) - 22 dBm ((> 0.05) - 0.16 W)

The tolerance of the actual maximum output power of the BTS shall be ± 2 dB under normal conditions and ± 2.5 dB under extreme conditions. Settings shall be provided to allow the output power to be reduced from its maximum level in at least six steps of nominally 2 dB with an accuracy of ± 1 dB to allow a fine adjustment of the coverage by the network operator. In addition, the actual absolute output power at each static RF power step (N) shall be 2*N dB below the absolute output power at static RF power step 0 with a tolerance of ± 3 dB under normal conditions and ± 4dB under extreme conditions. The static RF power step 0 shall be the actual output power according to the TRX power class.

As an option the BSS can utilize downlink RF power control. In addition to the static RF power steps described above, the BSS may then utilize up to 15 steps of power control levels with a step size of 2 dB ± 1.5 dB, in addition the actual absolute output power at each power control level (N) shall be 2*N dB below the absolute output power at power control level 0 with a tolerance of ± 3 dB under normal conditions and ± 4 dB under extreme conditions. The power control level 0 shall be the set output power according to the TRX power class and the six power settings defined above.

Network operators may also specify the BTS output power including any Tx combiner, according to their needs.

4.2 Output RF spectrum

The specifications contained in this section apply to both BTS and MS, in frequency hopping as well as in non frequency hopping mode, except that beyond 1 800 kHz offset from the carrier the BTS is not tested in frequency hopping mode.

Due to the bursty nature of the signal, the output RF spectrum results from two effects:

- the modulation process;

- the power ramping up and down (switching transients).