

9`Y\_fca U[ bYfbUnXfi y`^j cghfØ A 7 L]b`nUXYj Yj`nj Ynj`n`fUX]`g\_ ja`gdY\_fca`fØ FA L!  
GHUbXUfX`YY\_fca U[ bYfbY`nXfi y`^j cgh]`fØ A 7 L`nUfUX]`g\_c`cdfYa c`]b`ghcf]`j Y!`+`  
XY.`DcgYVb]`dc[ c`^]`nUa cV]`bcždfYbcgbc`fUX]`g\_c`]b`dca cybc`cdfYa c`X][`]HUb]  
W`] b]`fUX]`chY`Y\_ca i b]`UV]`g\_]`g]ghYa cj`f] GA`]b`8 7 GŁ

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
ElectroMagnetic Compatibility (EMC)  
standard for radio equipment and services;  
Part 7: Specific conditions for mobile and portable radio  
and ancillary equipment of digital cellular radio  
telecommunications systems (GSM and DCS)**

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## Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [9] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [3] as amended) and Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive" [2]).

The present document is part 7 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

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# 1 Scope

The present document, together with EN 301 489-1 [1], covers the assessment of radio equipment meeting Phase 1, Phase 2, and Phase 2+ GSM and DCS digital cellular mobile and portable radio equipment transmitting and receiving speech and/or data, and operating in digital cellular radio telecommunications systems, and associated ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of radio equipment are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum.

The present document specifies the applicable test conditions, performance assessment and performance criteria for Phase 1, Phase 2, and Phase 2+ GSM and DCS digital cellular mobile and portable radio equipment, transmitting and receiving speech and/or data, and associated ancillary equipment.

Examples of digital cellular mobile and portable radio equipment covered by the present document are given in annex A.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and EN 301 489-1 [1], the provisions of the present document take precedence.

Base station equipment (BTS and BSS) operating within network infrastructure is outside the scope of the present document. However, the present document does cover mobile and portable equipment that is intended to be operated in a fixed location while connected to the AC mains (see clause 5.5).

The environment classification and the emission and immunity requirements used in the present document are as stated in EN 301 489-1 [1], except for any special conditions included in the present document.

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# 2 References

SIST EN 301 489-7 V1.2.1:2003

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

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- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
  - For a specific reference, subsequent revisions do not apply.
  - For a non-specific reference, the latest version applies.
- [1] ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".
  - [2] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
  - [3] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).
  - [4] ETSI I-ETS 300 034-1: "European digital cellular telecommunications system (Phase 1); Radio subsystem link control (GSM 05.08)".
  - [5] ETSI I-ETS 300 034-2: "European digital cellular telecommunications system (Phase 1); Radio subsystem link control; Part 2: DCS extension (GSM 05.08-DCS)".
  - [6] ETSI ETS 300 578: "Digital cellular telecommunications system (Phase 2); Radio subsystem link control (GSM 05.08)".
  - [7] ETSI TS 100 911: "Digital cellular telecommunications system (Phase 2+) (GSM); Radio subsystem link control (GSM 05.08)".



- [8] ITU-T Recommendation P.64: "Determination of sensitivity/frequency characteristics of local telephone systems".
- [9] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 489-1 [1], clause 3 and the following apply:

**idle mode:** mode of operation of a receiver or a transceiver, where the Equipment Under Test (EUT) is powered, available for service and available to respond to a request to set up a call

**RXQUAL:** measure of the received signal quality, which is generated by the mobile or portable equipment, for use as a criterion in the Radio Frequency (RF) power control and handover processes

NOTE: For more information see:

- I-ETS 300 034-1 [4] clause 8.2 for Phase 1 GSM 900 equipment;
- I-ETS 300 034-2 [5] clause 8.2 for Phase 1 DCS 1800 equipment; or
- ETS 300 578 [6] clause 8.2 for Phase 2 GSM 900 or Phase 2 DCS 1800 equipment;
- TS 100 911 [7] clause 8.2 for Phase 2+ GSM 900 or Phase 2+ DCS 1800 equipment.

### 3.2 Abbreviations

SIST EN 301 489-7 V1.2.1:2003

For the purposes of the present document, the following abbreviations apply:

AC	Alternating Current
ARFCN	Absolute Radio Frequency Channel Number (see note)
BCCH	Broadcast Control Channel (see note)
BS	Base Station
BSS	Base Station System
BTS	Base Transceiver Station
CCCH	Common Control Channel (see note)
CR	Continuous phenomena applied to Receivers (see clause 6.3)
CT	Continuous phenomena applied to Transmitters (see clause 6.1)
DC	Direct Current
DTX	Discontinuous Transmission (see note)
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
MRP	Mouth Reference Point (artificial head)
RF	Radio Frequency
RXQUAL	Receiver Quality (see note)
SPL	Sound Pressure Level
TR	Transient phenomena applied to Receivers (see clause 6.4)
TT	Transient phenomena applied to Transmitters (see clause 6.2)

NOTE: Refer to (GSM) functional radio standards for further details.

## 4 Test conditions

For the purpose of the present document, the test conditions of EN 301 489-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for digital cellular mobile and portable radio equipment are specified in the present document.

### 4.1 General

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

Whenever the Equipment Under Test (EUT) is provided with a detachable antenna, the EUT shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise.

### 4.2 Arrangements for test signals

The provisions of EN 301 489-1 [1], clause 4.2 shall apply.

#### 4.2.1 Arrangements for establishing a communications link

The nominal frequency of the wanted RF input signal (for the receivers) shall be selected by setting the Absolute Radio Frequency Channel Number (ARFCN) to an appropriate number (e.g. in case of GSM 900 MHz this is 60 to 65, and in case of GSM 1 800 MHz this is 690 to 706).

A communication link shall be set up with a suitable base station simulator (hereafter called "the test system").

When the EUT is required to be in the transmit/receive mode, the following conditions shall be met:

- the EUT shall be commanded to operate at maximum transmit power;
- the downlink RXQUAL shall be monitored.

##### 4.2.1.1 Calibration of the overall audio link performance

Prior to the test sequence, the reference level of the speech output signal on both the downlink and uplink shall be recorded on the test instrumentation, as shown in figure 1.

If the equipment does not include acoustical transducers (e.g. a microphone or loudspeaker) the equivalent electrical reference levels shall be specified by the manufacturer.

The voice processor may often apply noise and echo cancellation algorithms which attempt to eliminate or reduce steady state audio signals as e.g. the 1 kHz calibration signals.

The calibration should be carried out with the noise and echo cancellation algorithms disabled. (Specific test software may be required).

If the noise and echo cancellation algorithms cannot be disabled then the reference level of the speech output signal should be measured using a max-hold detection on the audio level meter in order to determine the level before the noise and echo cancellation algorithms become effective.

### Calibration of the downlink:

The EUT is not used for the calibration of the downlink. Adjust the output of the audio test source to achieve a reference level equivalent to a SPL of 0 dBPa at 1 kHz at the input of the acoustic coupler (tube in figure 1) for the downlink. Record the reading of the audio level meter as the reference level.

If in handsfree applications an external loudspeaker is used, the SPL from the external loudspeaker is higher than that from the earpiece of the portable by a certain amount in order overcome a high ambient noise level. Two methods can be used to achieve the required SPL:

- the downlink reference level shall be increased by the same amount in order to compensate for the difference in SPL; or
- the distance between the loudspeaker and the measuring microphone shall be adjusted during the measurement procedure resulting in the required SPL.

It is important that the dynamic range of the test instrumentation is not exceeded.

### Calibration of the uplink:

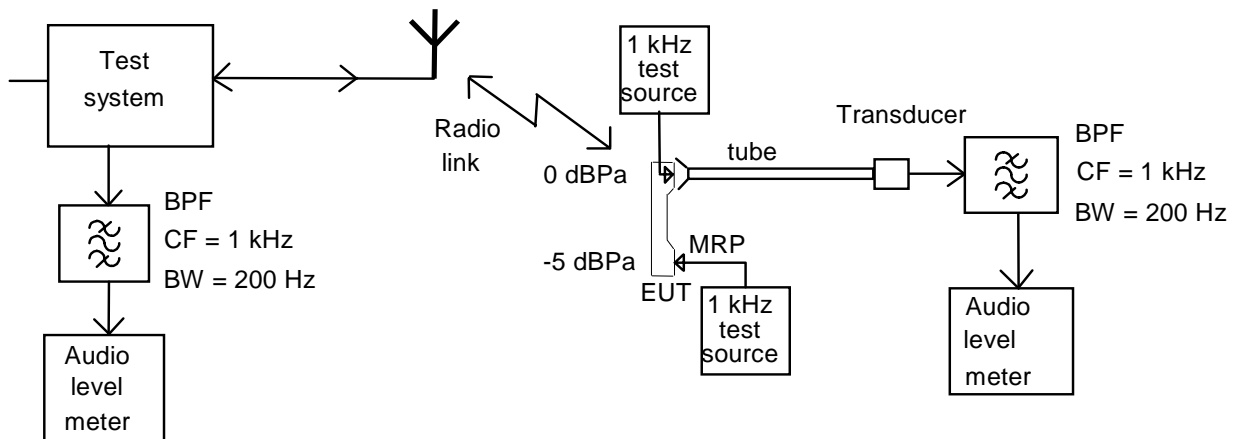
For the calibration of the uplink the EUT is used. Adjust the output of the audio test source to achieve a reference level equivalent to a SPL of -5 dBPa at 1 kHz at the Mouth Reference Point (MRP) defined in ITU-T Recommendation P.64 [8]. Record the reading of the audio level meter, which is connected to the output of the test system, as the reference level.

For handsfree applications, normally no corrections are made to the uplink reference level. If it is not possible to perform the above calibration (e.g. a PC card with headset) the manufacturer shall specify the distance between the MRP and the microphone.

It is important that the dynamic range of the test instrumentation is not exceeded.

NOTE: The MRP is defined with respect to an artificial head defined in ITU-T Recommendation P.64 [8]). The handset shall be mounted on the artificial head such that the ear piece is centred at the artificial ear.

Both recorded levels (downlink and uplink) are used as reference levels for the performance assessment (see clauses 6.1 and 6.3).



NOTE: The EUT is in position during calibration of the uplink, but not during calibration of the downlink where the EUT is replaced by the 1 kHz test audio source. During calibration of the uplink the mouthpiece shall be placed with respect to the MRP in a way representing intended use.

**Figure 1: Audio breakthrough measurement, calibration set-up for portable equipment**