



**SLOVENSKI STANDARD**  
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UbhYbcž`\_]cXXU`Ug][ bUY`nUj`nVi X]h`j`gdYW`Z bY[ UcXn]j Uj`gdfY`Ya b]\_i `È`%`rXY.  
HY b] bY`\_UfU`h`f]g`h`\_Y]b`a Yf]bY`a YtcXY

ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Land Mobile Service (RP 02); Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Part 1: Technical characteristics and methods of measurement

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# ETSI EN 300 341-1 V1.3.1 (2000-12)

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*European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Land Mobile service (RP 02);  
Radio equipment using an integral antenna transmitting signals  
to initiate a specific response in the receiver;  
Part 1: Technical characteristics and  
methods of measurement**

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650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

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

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
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## Foreword

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

The present document is part 1 of a multi-part standard covering Land Mobile service (RP 02); Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver, as identified below:

**Part 1: "Technical characteristics and methods of measurement";**

Part 2: "Harmonized EN under article 3.2 of the R&TTE Directive".

Annex A provides additional information concerning radiated measurements.

Annex B contains specifications for adjacent channel power measurement arrangements.

Annex C is a graphic representation of subclause 4.1, referring to the presentation of equipment for testing purposes.

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## Introduction

The present document is intended to specify the minimum performance and the methods of measurement of radio equipment for use in the land mobile service as specified in the scope.

Clause 5 provides the corresponding limits. These limits have been chosen to ensure an acceptable grade of service and to minimize harmful interference to other equipment and services. They are based on the interpretation of the measurement results described in subclause 4.3.

The measurement methods have been adapted from TR 100 027 [4] where possible.

Channel separations, maximum transmitter effective radiated power, the type and characteristics of modulation and the inclusion of automatic transmitter shut-off facility may be conditions required for the issue of a licence by the appropriate administration.

The present document may be used, in particular, by accredited test laboratories for the assessment of the performance of the equipment. In this case, the performance of the equipment submitted for testing should be representative for the performance of the corresponding production model. In order to avoid any ambiguity in that assessment, the present document contains instructions for the presentation of equipment for testing purposes (clause 4), conditions (clause 6) and measurement methods (clauses 8 and 9).

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# 1 Scope

The present document covers the minimum characteristics considered necessary in order to make the best use of the available frequencies. It does not necessarily include all the characteristics, which may be required by a user, nor does it necessarily represent the optimum performance achievable.

It applies to non-speech and to the non-speech part of combined speech/non-speech equipment with integral antennas, used in constant envelope angle modulation systems in the land mobile service, operating on radio frequencies between 30 MHz and 1 000 MHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz.

In the present document, a non-speech radio equipment is defined as a radio equipment transmitting a signal to initiate a specific response in the receiver. The equipment comprises a transmitter and associated encoder and/or a receiver and associated decoder. The encoder and/or decoder may be a separate piece of equipment, in which case compliance to the present document covers the combination of encoder and/or decoder and transmitter and/or receiver equipment.

In the present document different requirements are given for the different radio frequency bands, channel separations, environmental conditions and types of equipment, where appropriate.

The type of equipment covered by the present document is handportable stations with integral antennas.

The present document is complementary to EN 300 219-1 [1] which covers radio equipment with an internal or external RF connector transmitting signals to initiate a specific response in the receiver, for use in the land mobile service. It is primarily intended for omnidirectional applications.

For combined speech/non speech equipment the present document is complementary to EN 300 296-1 [7] which covers radio equipment using integral antennas for use in the land mobile service intended primarily for analogue speech.

Radio equipment for data is covered by EN 300 113-1 [3] and EN 300 390-1 [8].

Requirements to be fulfilled by equipment designed to meet the requirements of several ENs can be found in clause 4.

---

# 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETSI EN 300 219 (V1.2): "Land mobile service; Technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver".
- [2] ETSI EN 300 086 (V1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 1: Technical characteristics and test conditions".
- [3] ETSI EN 300 113 (V1.3): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment intended for the transmission of data (and speech) and having an antenna connector; Part 1: Technical characteristics and methods of measurement".
- [4] ETSI TR 100 027: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Methods of measurement for private mobile radio equipment".

- [5] ETSI TR 100 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [6] CCITT Recommendation O.41: "Psophometer for use on telephone-type circuits".
- [7] ETSI EN 300 296-1 (V1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".
- [8] ETSI EN 300 390-1 (V1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Part 1: Technical characteristics and test conditions".
- [9] ETSI EN 300 793 (V1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Presentation of equipment for type testing".
- [10] ETSI ETR 273: "Electromagnetic compatibility and Radio Spectrum Matters (ERM): Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties".
- [11] ANSI C63.5 (1988): "Electromagnetic Compatibility-Radiated Emission Measurements in Electromagnetic Interference (EMI) Control - Calibration of Antennas".
- [12] Council Directive of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations (98/34/EC).
- [13] IEC Publication 489-3 Second edition (1988): "Methods of measurement for radio equipment used in the mobile services. Part 3: Receivers for A3E or F3E emissions". Appendix F pages 130 to 133.

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## 3 Definitions, symbols and abbreviations

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### 3.1 Definitions

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

**angle modulation:** either phase modulation (G3) or frequency modulation (F3).

**audio frequency load:** normally a resistor of sufficient power rating to accept the maximum audio output power from the equipment under test. The value of the resistor is that stated by the manufacturer and equal to the impedance of the audio transducer at 1 000 Hz. In some cases it may be necessary to place an isolating transformer between the output terminals of the receiver under test and the load.

**audio frequency termination:** any connection other than the audio frequency load which may be required for the purpose of testing the receiver. The termination device is agreed between the manufacturer and the testing authority and details included in the test report. If special equipment is required then it is provided by the manufacturer.

**band-stop filter (for the SINAD meter):** the characteristics of the band-stop filter used in the audio distortion factor meter and SINAD meter are such that, at the output, a 1 000 Hz tone will be attenuated by at least 40 dB, and at 2 000 Hz the attenuation will not exceed 0,6 dB. The filter characteristic is flat within 0,6 dB over the ranges 20 Hz to 500 Hz and 2 000 Hz to 4 000 Hz. In the absence of modulation the filter should not cause more than 1 dB attenuation of the total noise power of the audio frequency output of the receiver under test.

**integral antenna:** antenna designed to be connected to the equipment without the use of a 50  $\Omega$  external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

**psophometric weighting network:** described in CCITT Recommendation O.41 [6].

**Types of measurements:**

**conducted measurements:** measurements which are made using a direct connection to the equipment under test.

**radiated measurements:** measurements which involve the absolute measurement of a radiated field.

**Types of station:**

**base station:** equipment fitted with an antenna socket, for use with an external antenna and intended for use in a fixed location.

**handportable station:** equipment either fitted with an antenna socket or an integral antenna, or both, normally used on a stand-alone basis, to be carried on a person or held in the hand.

**mobile station:** mobile equipment fitted with an antenna socket, for use with an external antenna, normally used in a vehicle or as a transportable station.

**Types of tests:**

**full tests:** in all cases except where qualified as "limited", tests are performed according to the present document.

**limited tests:** the limited tests, subclause 4.1, are as follows:

- receiver average usable sensitivity (field strength), subclause 9.1;
- receiver adjacent channel selectivity, subclause 9.3;
- transmitter frequency error, subclause 8.1;
- transmitter effective radiated power, subclause 8.2;
- transmitter adjacent channel power, subclause 8.3.

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## 3.2 Symbols

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

E <sub>o</sub>	Reference field strength (see annex A)
R <sub>o</sub>	Reference distance (see annex A)
r.m.s	root mean square

## 3.3 Abbreviations

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

AR1	(see subclause 4.1)
AR2	(see subclause 4.1)
dBc	dB relative to the carrier power
emf	electro-motive force
IF	Intermediate Frequency
RF	Radio Frequency
Rx	Receiver
SINAD	Signal, Noise And Distortion (to noise and distortion ratio)
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio

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## 4 General

Equipment which also includes an external or internal RF connector can be type tested either to the requirements of the present document and/or EN 300 296-1 [7] or to the requirements of EN 300 086-1 [2] and/or EN 300 219-1 [1] using this connector.

In the case of combined speech/non-speech equipment the speech part should be tested to the requirements of EN 300 296-1 [7] and additionally the tests described in the following subclauses of the present document should be carried out:

- subclause 8.3: adjacent channel power;
- subclause 9.1: average usable sensitivity (responses).

These requirements also apply for equipment with an analogue output facility provided for test purposes only.

Where an equipment has already been type approved to EN 300 296-1 [7], and is resubmitted for testing to the present document, additionally the tests described in the following subclauses of the present document should be carried out:

- subclause 8.3: adjacent channel power;
- subclause 8.4: radiated spurious emissions;
- subclause 9.1: average usable sensitivity (responses).

### 4.1 Presentation of equipment for testing purposes

For information regarding the presentation of equipment for testing purposes, refer to EN 300 793 [9].

### 4.2 Mechanical and electrical design

#### 4.2.1 General

The equipment submitted for testing by the manufacturer, or his representative, shall be designed, constructed and manufactured in accordance with sound engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

#### 4.2.2 Controls

Those controls which, if maladjusted, might increase the interfering potentialities of the equipment shall not be easily accessible to the user.

#### 4.2.3 Transmitter shut-off facility

When a timer for an automatic shut-off facility is operative, at the moment of the time-out the transmitter shall automatically be switched off. The activation of the transmitter key shall reset the timer. A shut-off facility shall be inoperative for the duration of the measurements unless it has to remain operative to protect the equipment.

#### 4.2.4 Marking

The equipment shall be marked in a visible place. This marking shall be legible, tamperproof and durable.

The marking shall be in accordance with EC Directives and/or CEPT decisions or recommendations as appropriate.

## 4.3 Interpretation of the measurement results

The interpretation of the results (e.g. results recorded in a test report) for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the values of the actual measurement uncertainty shall be, for each measurement, equal to or lower than the figures in clause 10 (maximum acceptable value of measurement uncertainties);
- the actual measurement uncertainty of the laboratory carrying out the measurements, for each particular measurement, shall be included in the corresponding test report (if any).

## 5 Technical characteristics

This clause contains the limit values of the parameters defined in clauses 8 and 9.

### 5.1 Transmitter parameter limits

#### 5.1.1 Frequency error

For the definition and the method of measurement see subclause 8.1.

The frequency error shall not exceed the values given in table 1 under normal, extreme or any intermediate set of conditions.

For practical reasons the measurements shall be performed only under normal and extreme test conditions as stated in subclause 8.1.

**Table 1: Frequency error**

Channel separation (kHz)	Frequency error limit (kHz)				
	below 47 MHz	47 to 137 MHz	above 137 to 300 MHz	above 300 to 500 MHz	above 500 to 1 000 MHz
20 and 25	±0,60	±1,35	±2,00	±2,00	±2,50 (a)
12,5	±0,60	±1,00	±1,50	±1,50 (a)	No value specified

NOTE: For handportable stations having integral power supplies, the figures given in the table with the suffix (a) only apply to the limited temperature range 0°C to +30°C. However, for the full extreme temperature conditions (subclause 6.4.1) exceeding the limited temperature range above, the following frequency error limits apply: ±2,50 kHz between 300 MHz and 500 MHz; ±3,00 kHz between 500 MHz and 1 000 MHz.

#### 5.1.2 Effective radiated power

For the definition and the method of measurement see subclause 8.2.

##### 5.1.2.1 Effective radiated power under normal test conditions

The maximum effective radiated power under normal test conditions shall be within df from the rated maximum effective radiated power.

The average effective radiated power under normal test conditions shall be within df from the rated average effective radiated power.