

9`Y_fca U[bYfbUnXfi y`fj cghfØA7L]b`nUXYj Yj`nj Yn]`n`fUX]`g_`ja`gdY_fca`fØFAŁ!
BUdfUj Y`fUh_Y[UXcgY[UfGF8 gŁ!`HY\ b] bY`UfU`hf]gh_Y]b`dfYg_i`yYj UbY
a YfcXY`nUfUX]`g_c`cdfYa c`j`ZY_j Yb bYa`cVa c`f`cX`&`A<n`Xc`%\$\$\$`A<n`n
a c`c`Xc`) \$\$`a K`!`%`XY.`DUfUa Yf]`nUfY[i`UfcfbY`bUa YbY

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices;
Technical characteristics and test methods for radio equipment to be used in the 25 MHz
to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1:
Parameters intended for regulatory purposes

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European Standard (Telecommunications series)

**Electromagnetic compatibility and
Radio spectrum Matters (ERM);
Short range devices;
Technical characteristics and test methods for radio
equipment to be used in the 25 MHz to 1 000 MHz frequency
range with power levels ranging up to 500 mW;
Part 1: Parameters intended for regulatory purposes**

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European Telecommunications Standards Institute

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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, together with ETS 300 683, is intended to become a Harmonized EMC Standard which is intended to be published in the Official Journal of the European Communities referencing Council Directive 89/336/EEC "Council Directive on the approximation of the laws of the member States relating to electromagnetic compatibility ("the EMC Directive").

The technical parameters which are relevant to the EMC Directive are listed in annex E.

The present document consists of two parts as follows:

Part 1: "Parameters intended for regulatory purposes";

Part 2: "Supplementary parameters not intended for regulatory purposes"

Clauses 1 and 3 provide a general description on the types of equipment covered by the present document and the definitions and abbreviations used. Clause 4 provides a guide as to the number of samples required in order that type tests may be carried out, and any markings on the equipment which the applicant should provide.

Clause 7 gives the maximum measurement uncertainty values.

Clauses 8 and 9 specify the spectrum utilization parameters which are required to be measured. These are the maximum limits which have been chosen to minimize harmful interference to other equipment and services. The clauses provide details on how the equipment should be tested and the conditions which should be applied.

Annex A provides specifications concerning radiated measurements.

Annex B contains specifications for adjacent channel power measurement arrangements.

Annex C provides information on the spectrum analyser specification.

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

Annex E provides information on the parameters relevant to the EMC Directive.

National transposition dates

Date of adoption of this EN:	24 October 1997
Date of latest announcement of this EN (doa):	28 February 1998
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 1998
Date of withdrawal of any conflicting National Standard (dow):	31 August 1998

1 Scope

The present document covers the minimum characteristics considered necessary for Short Range Devices (SRD) in order to make the best use of the available frequencies. The term "The present document" refers to EN 300 220-1 only.

The present document contains the technical characteristics for radio equipment referencing CEPT/ERC Decisions and Recommendation CEPT ERC/Recommendation 70-03 [1].

The present document does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable. It is a product family standard which may be completely or partially superseded by specific standards covering specific applications.

The present document applies to short range devices:

- either with a Radio Frequency (RF) output connection and/or with an integral antenna;
- for alarms, identification, telecommand, telemetry, etc., applications;
- with or without speech;
- operating on radio frequencies between 25 MHz and 1 000 MHz, with power levels up to 500 mW, radiated or conducted.

The parameters in clauses 8 and 9 of the present document are considered as spectrum utilization parameters. It is intended that these parameters will be measured by an accredited test laboratory for the purpose of type testing and approval.

The present document covers fixed stations, mobile stations and portable stations. In the present document basic requirements are given for the different frequency bands, channel separations etc., where appropriate.

All types of modulation are covered, in the present document, provided the requirements of subclauses 8.5 or 8.6, whichever is applicable, are met.

The radio equipment, covered by the classification SRD is divided into several classes based on maximum output power (see table 1). The class designation is based on CEPT/ERC Recommendation 70-03 [1].

Table 1

Class	Power level (conducted or radiated) mW
7a	5
8	10
9	25
11	100
12	500

For non-harmonized parameters, national regulatory conditions can apply regarding the type of modulation, channel/frequency separations, maximum transmitter output power/effective radiated power, duty cycle, equipment marking and the inclusion of an automatic transmitter shut-off facility as a condition of the issue of an individual or general licence, or, as a condition of use under licence exemption. The extreme temperature ranges are fixed and are given in subclause 5.4.1.2.

The present document does not require measurements for radiated emissions below 25 MHz.

Additional standards or specifications can be required for equipment such as that intended for connection to the Public Switched Telephone Network (PSTN).

2 Normative references

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case 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] draft CEPT/ERC Recommendation 70-03 (1997): "Relating to the use of Short Range Devices (SRD)".
- [2] ITU-T Recommendation 0.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [3] CISPR 16: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus"
- [4] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] ETS 300 113 (1996): "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and having an antenna connector".
- [6] ETS 300 390 (1996): "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and using an integral antenna".
- [7] ETS 300 683 (1997): "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for Short Range Devices (SRD) operating on frequencies between 9 kHz and 25 GHz".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

alarm: The use of radio communication for indicating an alarm condition at a distant location.

assigned frequency band: The frequency band within which the device is authorized to operate.

conducted measurements: Measurements which are made using a direct 50 Ω connection to the equipment under test.

dedicated antenna: A removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment.

fixed station: Equipment intended for use in a fixed location.

full tests: All tests specified in the present document.

integral antenna: A permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment.

limited tests: The limited tests (see subclauses 4.1.1 to 4.1.10) are as follows:

- transmitter frequency error, see subclause 8.1;
- transmitter carrier power conducted, see subclause 8.2;
- transmitter effective radiated power, see subclause 8.3;
- transmitter adjacent channel power, see subclause 8.5.

mobile station: Equipment normally fixed in a vehicle.

portable station: Equipment intended to be carried, attached or implanted.

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

telecommand: The use of radio communication for the transmission of signals to initiate, modify or terminate functions of equipment at a distance.

telemetry: The use of radio communication for indicating or recording data at a distance.

wideband: Equipment to be used in a non-channelized continuous frequency band covering more than 25 kHz, or to be used in a channelized frequency band with a channel spacing greater than 25 kHz.

3.2 Symbols iTeH STANDARD PREVIEW

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

AR0, AR1, ...	categories of Alignment Range (see subclause 4.1.3)
dB	decibel SIST EN 300 220-1:2000
E	field strength standards.iteh.ai/catalog/standards/sist/a9ca8d6b-87fb-4285-a4ad-bc/sist-en-300-220-1-2000
FR _L	Lower end of Frequency Range
FR _C	Centre of Frequency Range
FR _H	Higher end of Frequency Range
FT	Full Test (see subclause 3.1)
LT	Limited Tests (see subclause 3.1)
NaCl	sodium chloride
E _o	reference field strength
R	distance
R _o	reference distance
SND/ND	Signal + Noise + Distortion / Noise + Distortion
λ	wavelength

3.3 Abbreviations

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

ac/AC	alternating current
EMC	ElectroMagnetic Compatibility
emf	electromotive force
ERP	Effective Radiated Power
IF	Intermediate Frequency
ISM	Industrial, Scientific and Medical
ITE	Information Technology Equipment
MPAD	Maximum Permissible Amplitude modulation Depth
MPFD	Maximum Permissible Frequency Deviation
OFR	Operating Frequency Range
PSTN	Public Switched Telephone Network

RF	Radio Frequency
rms	root-mean-square
SR	Switching Range
SRD	Short Range Device
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio

4 General

4.1 Presentation of equipment for testing purposes

Each equipment submitted for type testing shall fulfil the requirements of the present document on all frequencies over which it is intended to operate.

The applicant should choose the appropriate frequencies for testing in consultation with the Administration(s) from whom type approval is sought and in accordance with subclauses 4.1.4 to 4.1.12 (see annex D).

If an equipment is designed to operate with different carrier powers, measurement of each transmitter parameter shall be performed at the lowest and highest power level at which the transmitter is intended to operate.

To simplify and harmonize the type testing procedures between the different testing laboratories, measurements shall be performed, according to the present document, on samples of equipment defined in subclauses 4.1.1 to 4.1.12 (see also annex D).

These subclauses are intended to give confidence that the requirements set out in the present document have been met without the necessity of performing measurements on all frequencies.

4.1.1 Choice of model for type testing

The applicant shall provide one or more samples of the equipment, as appropriate, for type testing.

If an equipment has several optional features, considered not to affect the RF parameters then tests need only be performed on the equipment configured with that combination of features considered to be the most complex, as proposed by the applicant and agreed by the test laboratory.

In the case of hand portable equipment without a 50 Ω external antenna connector, see subclause 4.1.12.

4.1.2 Definitions of Switching Range (SR), alignment range and operational frequency range

4.1.2.1 Definition of SR

The applicant shall state the SR of the receiver and the transmitter (which may differ).

The SR is the maximum frequency range, as specified by the applicant, over which the receiver or the transmitter can be operated within the alignment range without reprogramming or realignment.

4.1.2.2 Definition of alignment range

The applicant shall also, when submitting equipment for type testing, state the alignment ranges for the receiver and the transmitter.

The alignment range is defined as the frequency range over which the receiver and/or the transmitter can be programmed and/or aligned to operate, without any change to the circuit other than the substitution of programmable read only memories or crystals (for the receiver and transmitter) and the trimming of discrete components.

Trimming is an act by which the value (in this case relating to frequency) of a component is changed within the circuit. This act may include the physical alteration, substitution (by components of similar size and type) or activation/de-activation (via the setting of soldered bridges) of components.

For the purpose of all measurements, the receiver and transmitter shall be considered separately.

4.1.2.3 Definition of operating frequency range

The Operating Frequency Range (OFR) is the total range of frequencies covered either by one type, or by a family of equipment.

It is noted that a family of equipment may be capable of covering a wider frequency range than the alignment frequency range of one type of equipment.

4.1.3 Definition of the categories of the alignment range (AR0, AR1, AR2 and AR3)

The alignment range falls into one of four categories:

The first category, defined as AR0, corresponds to equipment having an alignment range of less than or equal to 5 MHz.

The second category, defined as AR1, corresponds to an alignment range greater than 5 MHz but less than or equal to 30 MHz.

The third category, defined as AR2, corresponds to an alignment range greater than 30 MHz, but less than or equal to 60 MHz.

The fourth category, defined as AR3, corresponds to an alignment range greater than 60 MHz.

4.1.4 Testing of equipment of category AR0

Full tests (see subclause 3.1) shall be carried out on a frequency within 50 kHz of the centre frequency of the alignment range, category AR0.

4.1.5 Testing of equipment of category AR1

Full tests (see subclause 3.1) shall be carried out on a frequency within 50 kHz of the highest frequency of the alignment range, and full tests (see subclause 3.1) on a frequency within 50 kHz of the lowest frequency of the alignment range.

4.1.6 Testing of equipment of category AR2

Full tests (see subclause 3.1) shall be carried on a frequency within 50 kHz of the highest frequency of the alignment range and full tests on a frequency within 50 kHz of the lowest frequency of the alignment range.

Limited tests (see subclause 3.1) shall be carried out on a frequency within 50 kHz of the centre frequency of the alignment range.

4.1.7 Testing of equipment of category AR3

Full test (see subclause 3.1) shall be carried out on 2 frequencies, one within 50 kHz of the highest, and one within 50 kHz of the lowest frequency of the alignment range.

Limited tests (see subclause 3.1) shall be carried out on intermediate test frequencies, equally spaced (± 50 kHz) over the alignment range and chosen such that the gaps between the test frequencies do not exceed 30 MHz.

4.1.8 Testing of equipment capable of being aligned to operate with more than one frequency separation

If an equipment can be programmed and/or aligned to operate without any physical change of components other than programmable read only memories or crystals, with more than one frequency separation, the measurements shall be made in accordance with subclauses 4.1.4, 4.1.5, 4.1.6, and 4.1.7, for frequency separations of 10 kHz, 12,5 kHz, 20 kHz or 25 kHz as indicated in table 2.

4.1.9 Number of samples for testing

If the SR of each equipment corresponds to its alignment range category (AR0, AR1, AR2, or AR3), then only one sample shall be tested (see figure D.1).

If the SR of the equipment is a subset of the equipment's alignment range, then the following samples shall be tested in order to cover the whole of that assignment range:

- for category AR0, one sample shall be provided for testing on a frequency in the vicinity of the centre of the alignment range AR0, as specified in subclause 4.1.4;
- for category AR1, two samples shall be provided, one sample for testing at a frequency close to the upper edge and the other sample for testing close to the lower edge of the alignment range AR1, as specified in subclause 4.1.5;
- for category AR2, three samples shall be provided, one sample for testing at a frequency close to the upper edge, one sample for testing close to the lower edge and the other sample for testing in the vicinity of the centre of the alignment range AR2, as specified in subclause 4.1.6;
- for category AR3, four or more samples shall be provided, one sample for testing at a frequency close to the upper edge, one sample for testing close to the lower edge, and two or more samples for testing at a corresponding number of intermediate frequencies, as specified in subclause 4.1.7.

See clause D.2 for details of the number of samples and tests.

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Table 2: Measurements for equipment with more than one frequency separation

Alignment Range	10, 12,5, 20 or 25 kHz (see note 2)		
	FR _L	FR _C	FR _H
AR0	-	FT	-
AR1	FT	-	FT
AR2	FT	LT (see note 1)	FT
AR3	FT	LT (see note 3)	FT
FT	Full test (see subclause 3.1)		
LT	Limited tests (see subclause 3.1)		
FR _L	Lower end of frequency range		
FR _C	Centre of frequency range		
FR _H	Higher end of frequency range		
NOTE 1:	Limited tests for AR2 need only be performed on a frequency in the centre of the frequency range for either 10/12,5 kHz or 20/25 kHz frequency separation.		
NOTE 2:	If measurements are performed with a frequency separation of 10 kHz, there is no need to perform tests with a frequency separation of 12,5 kHz and vice-versa. Similarly, if measurements are performed with a frequency separation of 20 kHz, there is no need to perform tests with a frequency separation of 25 kHz and vice-versa.		
NOTE 3:	For equipment of category AR3, limited tests shall be performed on test frequencies at intermediate frequencies of the alignment range (see subclause 4.1.7). The alignment range and frequencies used for the measurements shall be noted in the test report.		