SLOVENSKI STANDARD
SIST ETS 300 328:1998

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Radijska oprema in sistemi (RES) - Tehniļne karakteristike in preskusni pogoji opreme za prenos podatkov v 2,4 GHz ISM frekvenļnem pasu, ki uporablja modulacijsko tehniko z razprģenim spektrom

Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques

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Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Annex A provides additional requirements concerning radiated measurements.

Annex B contains normative specifications for the adjustment of the measurement equipment and of the equipment to be measured in order to achieve correct results.

Annex C provides a Bibliography.

Transposition dates	
Date of adoption of this ETS:	8 November 1996
Date of latest announcement of this ETS (doa):	28 February 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 August 1997
Date of withdrawal of any conflicting National Standard (dow):	31 August 1997

Introduction

Wideband radio data transmission systems are rapidly being introduced into a variety of commercial and industrial applications and the technology employed by these systems is still developing.

This ETS may be used by accredited test laboratories for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing should be representative for the performance of the corresponding production model. In order to avoid any ambiguity in that assessment, this ETS contains instructions for the presentation of equipment for type testing purposes (clause 4), testing conditions (clause 6) and methods of measurement (clause 7).

This ETS assumes that:

- the type test measurements performed in an accredited test laboratory in one CEPT country would be accepted by the Type Approval Authority in another country provided that the national regulatory requirements are met (see CEPT Recommendation T/R 71-03 [3]);

- if equipment available on the market is required to be checked it would be tested in accordance with the methods of measurement specified in this ETS.

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1 Scope

This European Telecommunication Standard (ETS) covers equipment referred to in CEPT Recommendation T/R 10-01 [1]. This ETS covers the minimum technical characteristics for radio data transmission equipment having the following technical parameters:

- wideband radio modulation techniques;
- aggregate bit rates in excess of 250 kbits/s;
- operation in the 2,4 to 2,483 5 GHz Industrial, Scientific and Medical (ISM) band;
- effective radiated power of up to -10 dBW (100 mW);
- power density of up to -10 dBW (100 mW) per 100 kHz for frequency hopping modulation;
- power density of up to -20 dBW (10 mW) per 1 MHz for other forms of spread spectrum modulation.

This ETS only addresses the transceivers, transmitters and receivers of equipment offered for testing.

The equipment offered for testing may be used in fixed, mobile or portable applications, e.g.:

- stand-alone radio equipment with or without their own control provisions;
- plug-in radio devices intended for use with or within a variety of host systems, e.g. personal computers, hand-held terminals, etc.

The equipment may be fitted with integral antennae and/or antenna connectors.

CEPT Recommendation T/R 10-01 [1] defines the total power and power density limits for systems using spread spectrum modulation together with a minimum aggregate bit rate of 250 kbits/s. The Recommendation does not address the details of these modulation techniques. Therefore, this ETS does not cover the design or operation of the equipment being tested but describes a common set of measurements to be applied to various types of such equipment, including those employing Frequency Hopping Spread Spectrum (FHSS) modulation and Direct Sequence Spread Spectrum (DSSS) modulation.

CEPT Recommendation T/R 10-01 [1] specifies that spread spectrum modulation be used and it gives power density values for FHSS and DSSS modulation. This ETS specifies the minimum technical parameters of FHSS modulation such that it can be clearly differentiated from other types of modulation, including DSSS modulation.

CEPT Recommendation T/R 01-04 [2] defines limits of spurious emissions for a variety of radio equipment; these limits are used in this ETS as appropriate.

This ETS describes measurements for operating frequency range(s), effective radiated power and power density as well as spurious emissions for transmitters and receivers.

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

This ETS specifies test site characteristics, test conditions, equipment calibration and methods of measurement.

This ETS is a general standard which may be superseded by specific standards covering specific applications.

Additional standards or specifications may be required for equipment such as that intended for connection to the Public Switched Telephone Network (PSTN) and/or other Public Data Networks (PDN).

2 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] CEPT Recommendation T/R 10-01: "Wideband Data Transmission in the 2,4 GHz to 2,5 GHz ISM band".

[2] CEPT Recommendation T/R 01-04: "Low Power Devices".

[3] CEPT Recommendation T/R 71-03: "Procedures for Type Testing and Approval for Radio Equipment intended for non-public systems".

[4] ETR 027: "Radio Equipment and Systems; Methods of measurement for mobile radio equipment".

[5] ETR 028: "Radio Equipment and Systems; Uncertainties in the measurement of mobile radio equipment characteristics".

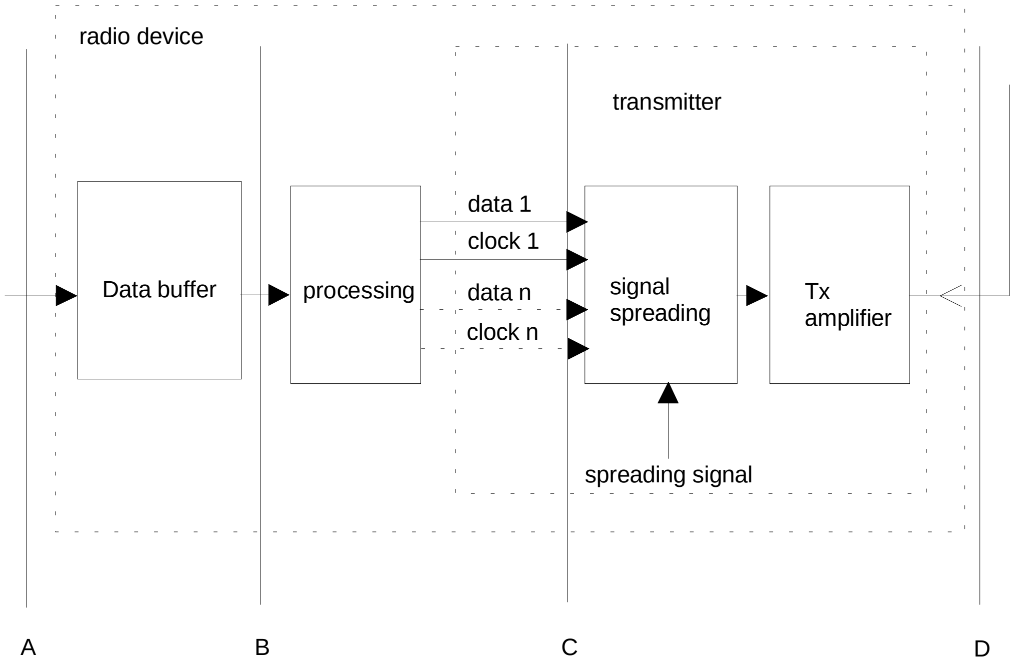
[6] EN 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

aggregate bit rate: The bit rate at the air interface (see point D in figure 1) including protocol overhead where applicable and excluding the effects of signal spreading.



A: Interface
B: Input into processing logic
C: Input into the modulator
D: Air Interface

Figure 1: Parameters related to the aggregate bit rate

chip: A unit of modulation used in direct sequence spread spectrum modulation.

chip rate: The number of chips per second.

chip sequence: A sequence of chips with defined length and defined chip polarities.

direct sequence spread spectrum modulation: A form of modulation where a combination of data to be transmitted and a known code sequence (chip sequence) is used to directly modulate a carrier, e.g. by phase shift keying. The transmitted bandwidth is determined by the chip rate and the modulation scheme.

fixed station: Equipment intended for use in a fixed location and fitted with one or more antennae. The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

frequency hopping spread spectrum modulation: A spread spectrum technique in which the transmitter signal occupies a number of frequencies in time, each for some period of time, referred to as the dwell time. Transmitter and receiver follow the same frequency hop pattern. The frequency range is determined by the lowest and highest hop positions and the bandwidth per hop position (see subclause 5.2.3).

frequency range: The range of operating frequencies over which the equipment can be adjusted.

hand-portable station: Equipment normally used on a stand-alone basis and to be carried by a person or held in the hand. The equipment may be fitted with one or more antennae. The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

host: Host equipment is any equipment which has complete user functionality when not connected to the radio equipment part and to which the radio equipment part provides additional functionality and to which connection is necessary for the radio equipment part to offer functionality.

integral antenna: An antenna designed to be connected to the equipment without the use of a standard connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

manufacturer: For the purposes of this ETS "manufacturer" is understood to refer to the manufacturer or applicant of equipment offered for testing.

mobile station: Equipment normally used in a vehicle or as a transportable station. The equipment may be fitted with one or more antennae. The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

operating frequency: The nominal frequency at which the equipment can be operated; this is also referred to as the operating centre frequency. Equipment may be adjustable for operation at more than one operating frequency.

plug-in radio device: Equipment intended to be used with or within variety of host systems, using their control functions and power supply.

power envelope: The frequency/power contour within which the useful RF power is generated.

spread spectrum modulation: A modulation technique in which the energy of a transmitted signal is spread throughout a relatively large portion of the frequency spectrum.

stand-alone radio equipment: Equipment that is intended primarily as communications equipment and that is normally used on a stand-alone basis.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

dBW	dB relative to 1 watt power
dBm	dB relative to 1 milliwatt power
DSSS	Direct Sequence Spread Spectrum
e.i.r.p.	equivalent isotropically radiated power
FHSS	Frequency Hopping Spread Spectrum
ISM	Industrial, Scientific and Medical
ITE	Information Technology Equipment
RF	Radio Frequency
Rx	Receiver
Tx	Transmitter

4 General

4.1 Manufacturer declarations

The manufacturer shall declare the following specific characteristics of the equipment:

a) the aggregate bit rate (see subclause 3.1 for the definition);

b) the type of modulation used: FHSS modulation, DSSS modulation or any other type of spread spectrum modulation (see subclause 5.1);

c) where FHSS modulation is used: the number of hopping channels, the dwell time per channel and the maximum time between two instances of use of the same channel; these values shall fall within the specifications given in subclause 5.1.1;

d) the operating frequency range(s) of the equipment and, where applicable, band(s) of operation (see subclause 5.2.3);

e) the type of the equipment, for example: stand-alone equipment or plug-in radio devices (see also subclause 3.1). In case of combined equipment using a plug-in radio device, and more than one combination is intended, each combination should be declared as well (see also subclause 6.5.1);

f) the extreme operating conditions that apply to the equipment offered for testing;