SLOVENSKI STANDARD
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Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) - Brezžični mikrofoni v frekvenčnem območju od 25 MHz do 3 GHz - 1. del: Tehnične karakteristike in merilne metode

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Wireless microphones in the 25 MHz to 3 GHz frequency range - Part 1: Technical characteristics and methods of measurement

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Foreword

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

The present document has been updated in line with the advances in radio microphone technology in the digital field and the increased use of wireless applications for Assistive listening Devices, also with changes generated within CEPT and the EC in the former ERMES band for aids for the handicapped.

The present document is part 1 of a multi-part deliverable covering the Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range, as identified below:

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

Part 2: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	8 August 2011
Date of latest announcement of this EN (doa):	30 November 2011
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 May 2012
Date of withdrawal of any conflicting National Standard (dow):	31 May 2012

Introduction

EN 300 422 was originated in 1991 when Assistive Listening Devices (ALD) where a very small part of the Radio Microphone Industry, in recent years major advances in both the volume and functionality of ALDs has caused a rethink in how to best present the testing regime in a clear and concise manor. After a number of discussions the present document has been split into Part I for Radio Microphone and Part II for ALDs.

The present document is a testing standard based on spectrum utilization parameters and does not include performance characteristics that may be required by the user nor requirements for interfacing equipment.

Systems including assistive listening devices (Aids for the handicapped) with digital modulations and operating in the range 863 MHz to 865 MHz may be tested to either the present document (< 600 kHz maximum occupied bandwidth) or to EN 301 357-1 [i.2] (< 300 kHz maximum occupied bandwidth) with due consideration of power and operating frequency.

Ear worn hearing assistance devices may in some cases require stereo transmission to present both left and right audio information to the wearer. For that reason, devices that transmit information to the hearing impaired may require two channel operation. It is expected that two or more channels will be tested separately when determining bandwidth and associated measurements. Channels maybe two separate frequencies or wider bandwidth.

Since the initial adoption of I-ETS 300 422 [i.3] there has been the introduction of further types of equipment into the market - cordless headphones/loudspeakers, Low power Band II and consumer in-ear monitoring. These are low power wideband systems that have some characteristics in common with radio microphones but are not compatible with multichannel radio microphones. This equipment is covered by EN 301 357-1 [i.2] and Annex 13 of CEPT/ERC/REC 70-03 [i.9].

Additional standards or specifications may be required for equipment intended to interface to the Public Switched Telephone Network (PSTN). This facility may be subjected to regulatory conditions.

1 Scope

The present document covers the minimum characteristics considered necessary in order to make the best use of the available frequency spectrum for wireless microphones and Aids for the hearing impaired.

The present document specifies the minimum performance requirements and the methods of measurement of Assistive Listening Devices, radio microphones and in-ear monitoring systems. It does not necessarily include all the characteristics that may be required by a user, nor does it necessarily represent the optimum performance achievable.

The present document applies to equipment operating on radio frequencies between 25 MHz and 3 GHz (as shown in table 1) using analogue, digital and hybrid (using both analogue and digital) modulation.

The maximum power recommended for equipment covered by the present document is 250 mW for radio microphones and 10 mW for ALDs.

An exception to this are the Public Hearing Aids defined in the CEPT Report 004 [i.10] and subsequent ECC [i.12] and EC Decisions [i.11] on the ex ERMES band [169,4 MHz to 169,8125 MHz] where 500 mW is defined.

The present document also covers radio microphones used in the 863 MHz to 865 MHz band, with a maximum power of 10 mW.

Electromagnetic Compatibility (EMC) requirements are covered by EN 301 489-9 [i.5].

National regulations on:

1) maximum power output;

2) licensing status.

will apply or those detailed in the latest version of:

- EC Decision 2005/928/EC [i.12];
- ECC/DEC/(05)02 [i.13];
- the EC SRD Decision [i.11]; or
- CEPT/ERC/REC 70-03 [i.9], annex 10 (see http://www.erodocdb.dk/).

Unless otherwise stated in the EC SRD Decision, ECC Decision or National Interfaces, Radio Microphones can be subject to individual licence.

The types of equipment covered by the present document are as follows:

- Professional Wireless Microphone Systems (PWMS) [i.1];
- in ear monitoring systems;
- consumer radio microphones;
- tour guide systems; and
- Assistive Listening Devices (Aids for the handicapped) comprising personal and public hearing aid systems.

Table 1: Radiocommunications service frequency bands

	Radiocommunications service frequency bands
Transmit	25 MHz to 3 000 MHz
Receive	25 MHz to 3 000 MHz

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

[1] ITU-R Recommendation BS.559-2: "Objective measurement of radio-frequency protection ratios in LF, MF and HF broadcasting".

[2] IEC 60244-13: "Methods of measurement for radio transmitters; Part 13: Performance characteristics for FM sound broadcasting".

[3] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.2] ETSI EN 301 357-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Cordless audio devices in the range 25 MHz to 2 000 MHz; Part 1: Technical characteristics and test methods".

[i.3] ETSI I-ETS 300 422: "Radio Equipment and Systems (RES); Technical characteristics and test methods for wireless microphones in the 25 MHz to 3 GHz frequency range".

[i.4] ETSI EN 300 454-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Wide band audio links; Part 1: Technical characteristics and test methods".

[i.5] ETSI EN 301 489-9: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 9: Specific conditions for wireless microphones, similar Radio Frequency (RF) audio link equipment, cordless audio and in-ear monitoring devices".

[i.6] 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).

[i.7] ETSI TR 102 273: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties".

[i.8] ANSI C63.5: "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".

[i.9] CEPT/ERC/REC 70-03: "Relating to the use of Short Range Devices (SRD)".

[i.10] CEPT Report 004: "Report from CEPT to the European Commission in response to the Mandate to: REVIEW THE FREQUENCY BAND 169.4 - 169.8 MHz".

[i.11] Commission Decision 2006/771/EC of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices.

[i.12] EC Decision 2005/928/EC: "Commission Decision of 20 December 2005 on the harmonisation of the 169,4-169,8125 MHz frequency band in the Community", OJ L 344, 27.12.2005, p. 47-51.

[i.13] ECC/DEC/(05)02: "ECC Decision of 18 March 2005 on the use of the Frequency Band 169.4-169.8125 MHz".

[i.14] ETSI TR 102 546: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics for professional wireless microphone systems (PWMS); System reference document".

[i.15] CENELEC EN 62209-1: "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)".

[i.16] CENELEC EN 62209-2: "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

aids for hearing impaired: all types of hearing aids and their accessories as well as all types of assistive listening systems for hearing impaired people

alignment range: See clause 5.1.2.

antenna port: port, where a radio frequency antenna is connected to equipment

Assistive Listening System (ALS) for hearing impaired: systems utilizing electromagnetic, radio or light waves, or a combination of these, to transmit the acoustic signal from the source (e.g. a loudspeaker or a person talking) directly to the hearing impaired person

NOTE: Both aids for the hearing impaired and Assistive Listening devices would normally be prescribed by a hearing professional.

audio limiting threshold: audio input or output level at which the transmitter audio limiter action may be said to commence

NOTE: It is specified with any accessible variable gain controls set according to the manufacturer's instructions, with a sinusoidal input signal of 500 Hz.

base station equipment: radio and/or ancillary equipment intended for operation at a fixed location and powered directly or indirectly

EXAMPLE: Via an ac/dc converter or power supply by the ac mains network, or an extended local dc mains network.

class of emission: set of characteristics of an emission, designated by standard symbols, e.g. type of modulation of the main carrier, modulating signal, type of information to be transmitted, and also, if appropriate, any additional signal characteristics

conducted measurements: measurements that are made using a direct connection to the EUT

confidence level: probability of the accumulated error of a measurement being within the stated range of uncertainty of measurement

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

frequency stability: spontaneous and/or environmentally caused frequency change within a given time interval

integral antenna: antenna, with or without a connector, designed as, and declared as by the manufacturer, an indispensable part of the equipment

integral microphone: microphone, designed as, and declared as by the manufacturer, an indispensable fixed part of the equipment

mean power (of a radio transmitter): average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions

mobile equipment: receiver, transmitter or transmitter/receiver (transceiver) intended for installation and use in a vehicle, and powered by the main battery of the vehicle

modulation schemes:

- analogue modulation: any modulation scheme without discrete constellation points (e.g. FM);
- digital modulation: any modulation scheme with discrete constellation points (e.g. FSK, PSK);
- hybrid systems: will be classified as analogue or digital device depending on the RF- modulation scheme e.g. analogue modulation with digital pre-processing.

necessary bandwidth: for a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

out-of-band emission: emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

port: any connection point on or within the Equipment Under Test (EUT) intended for the connection of cables to or from that equipment

portable equipment: radio and/or ancillary equipment intended for portable (e.g. handheld) operation, powered by its own integral battery

personal hearing aid system: radio communication system comprising of a transmitter, which can be handheld, on a table or around the neck of a hearing impaired person and one or more receivers, where each receiver can have wired or inductive connection to a hearing aid

public hearing aid system: broadcast radio communication system comprising one transmitter (up to 500 mW in the band 169,4 MHz to 169,8125 MHz), which is installed at a fixed location in a large auditorium, e.g. in a church or theatre and one or more receivers, where each receiver can have wired or inductive connection to a hearing aid

NOTE: May be subject to an individual licence.

radiated measurements: measurements that involve the absolute measurement of a radiated electromagnetic field

Radio Frequency (RF) port: any connection point on or within the EUT intended for the connection of RF cables

NOTE: RF ports are treated as 50 Ω connection points unless otherwise specified by the manufacturer.

radio receiver: item of electronic equipment designed to receive electromagnetic radio frequency emissions

rated output power: mean power which the transmitter delivers at its antenna port under the manufacturer's specified conditions of operation

NOTE: For the purposes of the present document this is quoted as erp below 1 GHz and eirp above 1 GHz.

spurious emissions: emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

EXAMPLE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out of band emissions.

switching range: See clause 5.1.2.

3.2 Symbols

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

λ	wavelength in metres
Ω	ohm
µF	microFarad
µW	microWatt
dBc	dB relative to the carrier level
GHz	GigaHertz
kHz	kiloHertz
MHz	MegaHertz
mW	milliWatt

3.3 Abbreviations

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

ac	alternating current
AF	Audio Frequency
ALD	Assistive Listening Device
ALS	Assistive Listening System
B	declared channel Bandwidth

NOTE: See table 2.

BN	Necessary Bandwidth
dc	direct current
eirp	equivalent isotropically radiated power
EMC	Electromagnetic Compatibility
emf	electromagnetic field
erp	effective radiated power
EUT	Equipment Under Test
fc	centre frequency
LF	Low Frequency
lim	limiting
OATS	Open Area Test Site
PSTN	Public Switched Telephone Network
PWMS	Professional Wireless Microphone Systems
R	distance
RBW	Resolution BandWidth
RF	Radio Frequency
SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
TR	Transient phenomena applied to Receivers
Tx	Transmitter
VBW	Video BandWidth
VSWR	Voltage Standing Wave Ratio