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Wireless Microphones - Audio PMSE up to 3 GHz - Part 1: Class A Receivers - Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

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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 prepared under the Commission's standardisation request C(2015) 5376 final [i.18] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.14].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

The present document is part 1 of a multi-part deliverable covering Wireless Microphones, Audio PMSE, and ALDs up to 3 GHz, as identified below:

Part 1: "Class A Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU";

Part 2: "Class B Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU";

Part 3: "Class C Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU";

Part 4: "Wireless Microphones; Audio PMSE up to 3 GHz; Part 4: Assistive Listening Devices including personal sound amplifiers and inductive systems up to 3 GHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

National transposition dates	
Date of latest announcement of this EN (doa):	30 April 2017
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Date of withdrawal of any conflicting National Standard (dow):	31 October 2018

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

With the introduction of Directive 2014/53/EU [i.14], the present multi-part deliverable has been reformatted into multiple parts to accommodate the different types of equipment represented, i.e. different receivers for audio Programme Making and Special Events (PMSE) and Assistive Listening Devices (ALD). Part 1 covers Class A receivers.

The present document seeks to improve spectrum efficiency and has introduced new technology to assist in maximizing the use of available spectrum.

The present document seeks to provide a platform for Wideband Multichannel Audio Systems (WMAS).

Although the present document covers spectrum up to 3 GHz, it should be emphasized that multi-channel audio PMSE systems used in professional productions are best suited to spectrum under 2 GHz for reasons of propagation and body interaction. Further information on audio PMSE is available in ECC Report 204 [i.15].

Introduction

With the introduction of Directive 2014/53/EU [i.14], receiver parameters are now included and the removal of the 9 kHz lower limit has brought inductive loop systems and receivers into the present document. Inductive loop transmitters are covered within ETSI EN 303 340 [i.19] along with test receivers; hearing aids containing inductive loop receivers (often referred to as T coil) are now covered in the present document. The frequency range of the present document has been reduced to accommodate inductive loop receivers.

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.

ETSI EN 300 422 was originated in 1991 when Assistive Listening Devices (ALD) were 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 manner. After a number of discussions the present document covers audio PMSE as Parts 2 [i.20], and 3 [i.21], and ALDs as Part 4 [i.22].

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 or to ETSI EN 301 357 [i.1] 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 channel devices will be tested separately when determining bandwidth and associated measurements. Channels may involve the use of two separate frequencies or wider bandwidth.

Since the initial adoption of ETSI I-ETS 300 422 [i.2] 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 ETSI EN 301 357 [i.1] and annex 10 of CEPT/ERC/REC 70-03 [i.7].

Additional standards or specifications may be required for equipment:

1) intended to interface to Public Networks, e.g. PSTN. This facility may be subjected to regulatory conditions; or

2) other relevant radio standards.

1 Scope

The present document covers the minimum characteristics considered necessary in order to make the best use of the available frequency spectrum for audio PMSE and ALDs.

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 up to 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.8] and subsequent ECC [i.10] and EC Decisions [i.9] 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 ETSI EN 301 489-9 [i.4].

National regulations on:

1) maximum power output;

2) licensing status;

will take precedence or those detailed in the latest version of:

- EC Decision 2005/928/EC [i.10];
- ECC/DEC/(05)02 [i.11];
- the EC SRD Decision [i.9]; or
- CEPT/ERC/REC 70-03 [i.7], annex 10 (see http://www.erodocdb.dk/);
- EC Decision 2014/641/EU [i.13].

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:

- in ear monitoring systems;
- radio microphones;
- WMAS (Wireless Multichannel Audio Systems);
- tour guide systems.

Table 1: Radiocommunications service frequency bands

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

2 References

2.1 Normative 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 referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://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.

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

[1] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[2] IEC 60244-13:1991: "Methods of measurement for radio transmitters - Part 13: Performance characteristics for FM sound broadcasting".

2.2 Informative 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 referenced document (including any amendments) applies.

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

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.1] ETSI EN 301 357: "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Technical characteristics and test methods for analogue cordless wideband audio devices using integral antennas operating in the CEPT recommended 863 MHz to 865 MHz frequency range".

[i.2] 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.3] Recommendation ITU-R BS.559-2: "Objective measurement of radio-frequency protection ratios in LF, MF, and HF broadcasting".

[i.4] 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.5] 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.6] ANSI C63.5: "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".

[i.7] CEPT/ERC/REC 70-03: "Relating to the use of Short Range Devices (SRD)".

[i.8] 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.9] Commission Decision 2006/771/EC of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices.

[i.10] 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.11] ECC/DEC/(05)02: "ECC Decision of 18 March 2005 on the use of the Frequency Band 169,4-169,8125 MHz".

[i.12] Void.

[i.13] Commission Implementing Decision 2014/641/EU of 01/09/2014 on harmonised technical conditions of radio spectrum use by wireless audio programme making and special events equipment in the Union (notified under document C(2014) 6011) (Text with EEA relevance).

[i.14] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.15] ECC Report 204: "Spectrum Use and future requirements for PMSE".

[i.16] Recommendation ITU-R SM.2152, (09/2009): "Definitions of Software Defined Radio (SDR) and Cognitive Radio System (CRS)".

[i.17] ETSI EG 203 336: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.18] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.19] ETSI EN 303 340: "Digital Terrestrial TV Broadcast Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.20] ETSI EN 300 422-2: "Wireless Microphones; Audio PMSE up to 3 GHz; Part 2: Class B Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.21] ETSI EN 300 422-3: "Wireless Microphones; Audio PMSE up to 3 GHz; Part 3: Class C Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.22] ETSI EN 300 422-4: "Wireless Microphones; Audio PMSE up to 3 GHz; Part 4: Assistive Listening Devices including personal sound amplifiers and inductive systems up to 3 GHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

[i.23] Void.

[i.24] Void.

[i.25] Void.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in Directive 2014/53/EU [i.14] and the following apply:

alignment range: frequency range over which the receiver and the transmitter can be programmed and/or re-aligned to operate without any physical change of components other than programmable read only memories supplied by the manufacturer or the manufacturer's nominee, crystals, and frequency setting elements

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

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.

audio PMSE: inclusive description consisting of radio microphones, in ear monitoring systems, audio links

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

body worn transmitter: radio microphone that can be attached to the human body

NOTE: The microphone is attached to the transmitter via cable; the antenna radiation characteristics are affected by the human body.

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 device under test (DUT)

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

C-PMSE: cognitive PMSE is built of a Cognitive Radio System (CRS) based on Recommendation ITU-R SM.2152 [i.16] and designed for the purpose and the specific requirements of PSME applications

C-PMSE system: constituted out of information acquisition and C-PMSE

digital modulation: any modulation scheme with discrete constellation points (e.g. FSK, PSK)

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

hand held microphone: radio microphone which can be held and operated in the human hand

NOTE: The microphone is directly attached to the transmitter; the antenna radiation characteristics are less affected by the human body than body worn equipment.

hybrid systems: combination of analogue and digital processing and modulation techniques

In Ear Monitor (IEM): body worn miniature receiver with earpieces for personal monitoring of single- or dual-channel sound

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