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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; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

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Foreword

This final draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] 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.1].

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 9 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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.

1 Scope

The present document, together with ETSI EN 301 489-1 [1], covers the assessment of wireless microphones, similar RF audio link equipment, cordless audio, including low power Band II transmitters and in-ear monitoring, intended for the transmission of music and speech, and associated ancillary equipment, in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of wireless microphones, similar RF audio link equipment, cordless audio and in-ear monitoring are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum.

The present document specifies the applicable EMC tests, the test methods, the limits and the performance criteria for wireless microphones, similar RF audio link equipment, cordless audio, in-ear monitoring and associated ancillary equipment. This equipment can use analogue or digital modulation techniques.

Examples of equipment types covered by the present document are given in annex C.

Other types of transmitters or receivers, which are intended for combined use, with either wireless radio microphones, RF audio link equipment, cordless audio and in-ear monitoring will be tested to their appropriate EMC standard.

Low quality speech applications as toy microphones, babyphones etc. operating at frequencies below 50 MHz, occupied bandwidth < 25 kHz and operating according CEPT/ERC/REC 70-03 [i.2], annex 1 are excluded from the present document and are considered in ETSI EN 301 489-3 [i.4].

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and ETSI EN 301 489-1 [1], the provisions of the present document take precedence.

The environmental classification and the emission and immunity requirements used in the present document are as stated in ETSI EN 301 489-1 [1], except for any special conditions included in the present document.

The present document is aimed to cover requirements to demonstrate an adequate level of electromagnetic compatibility.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version 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 EN 301 489-1 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".

[2] ETSI EN 300 422-1 (V2.1.2) (01-2017): "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".

[3] ETSI EN 300 454-1 (V1.1.2) (08-2000): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Wide band audio links; Part 1: Technical characteristics and test methods".

[4] ETSI EN 301 357-1 (V1.4.1) (11-2008): "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".

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.

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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] 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.2] CEPT/ERC/REC 70-03 (09-2015): "Relating to the use of Short Range Devices (SRD)".

[i.3] 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.4] ETSI EN 301 489-3 (V2.1.1) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 301 489-1 [1] and the following apply:

companding: method of audio processing that compresses the audio dynamic range before transmission and then provides matching expansion of the signal in the receiver

NOTE: The method is used to improve the audio performance in the RF link.

integral antenna: antenna designed to be connected to the equipment without the use of a 50 Ω external connector and considered to be part of the equipment

NOTE: An integral antenna may be fitted internally or externally to the equipment.

low power band 2 transmitters: Band II LPD (low power devices) up to 200 kHz bandwidth and analogue modulation

switching range: maximum frequency range over which the receiver or transmitter can be operated without reprogramming or realignment

vehicle power supply: battery used for the primary operation of the vehicle, i.e. the ignition or starting of the vehicle

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1] and the following apply:

CR	Continuous phenomena applied to Receivers
CT	Continuous phenomena applied to Transmitters
e.r.p.	effective radiated power
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
LPD	Low Power Device
PMR	Professional Mobile Radio
RF	Radio Frequency
SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
TR	Transient phenomena applied to Receivers
TT	Transient phenomena applied to Transmitters

4 Technical requirements specifications

4.1 Environmental Profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile.

4.2 Test conditions

4.2.1 Introduction

For the purposes of the present document, the test conditions of ETSI EN 301 489-1 [1], clause 4 shall apply as appropriate. Further product related test conditions for wireless microphones, similar RF audio link equipment, cordless audio, in-ear monitoring equipment and ancillary equipment are specified in the present document.

4.2.2 General

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.2 to 4.6 shall apply.

For the purpose of EMC tests, body worn or hand held transmitters shall be mounted on a non-conductive stand at least 0,8 m from any conducting surface. The EUT and any other equipment required for the performance assessment before, during, and after the conclusion of the tests, shall be connected in a manner typical of normal intended use.

Whenever the EUT is provided with a detachable antenna, it shall be tested with the antenna fitted in a manner typical of normal intended use.

For immunity tests, if the equipment is of a category which permits it, a communications link shall be established at the start of the test and maintained during the test.

The test conditions shall be as follows:

- the transmitter shall be operated at its normal maximum RF output power modulated with a suitable modulation signal (see clause 4.6.1);
- for stand alone receivers or receivers of transceivers operating in simplex mode, the wanted RF input signal, coupled to the receiver, shall be modulated with a suitable modulation signal (see clause 4.6.2);

- for duplex transceivers, the wanted RF input signal, coupled to the receiver, shall be modulated with a suitable modulation signal (see clause 4.6.2). The transmitter shall be operated at its normal maximum output power, modulated with the test modulation signal, coupled to the transmitter from the output of the receiver (repeater mode);
- digitally modulated systems shall use a defined interface to convert between analogue and digital domain (and vice versa).

4.3 Arrangements for test signals

4.3.1 General

The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply.

4.3.2 Arrangements for test signals at the input of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.1 shall apply with the following modifications.

For transmitters designed to operate from an integral or dedicated microphone (see figure 2) it shall be permissible to use an acoustic coupling device to inject the normal test modulation signal (see figure 3). The acoustic coupling device may be provided by the manufacturer.

For equipment which can use a variety of audio capsules, the manufacturer shall declare the type of capsule, e.g. dynamic, electret, or condenser, to be provided with the system. Only one type of capsule shall be tested. All other capsules shall be deemed as compliant. The transmitter shall be tested at its most sensitive input with the test capsule.

For equipment not designed to use an integral or dedicated microphone, the test signal shall be fed in electrical form to the most sensitive input socket (see figure 1) using maximum length cables as normally supplied by the manufacturer with the equipment.

The modulation signal used for the tests shall be a 1 kHz sine wave tone at a level declared by the manufacturer to obtain 100 % audio modulation.

The manufacturer may provide a suitable companion receiver that can be used to set up a communications link. In this case a suitable attenuator in the companion receiver input may be necessary, see annex B for further details.

In the case of systems with a digital audio input and outputs this test signal has to be presented via a suitable test fixture converting the analogue signal to the digital domain and vice-versa. The applicant shall provide details on the interface and test fixture used for the test.

4.3.3 Arrangements for test signals at the output of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.2 shall apply.

4.3.4 Arrangements for test signals at the input of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.3 shall apply with the following modifications.

The wanted RF input signal to the receiver should be modulated with a suitable signal corresponding to 100 % audio modulation (maximum channel loading). If it is not appropriate to provide a modulated RF signal to the receiver, the test may be performed using an unmodulated wanted RF input signal.

The level and make up of the wanted RF input signal shall be declared by the manufacturer. The level chosen shall be set to a value 60 dB above the threshold sensitivity of the receiver. Other systems than analogue radio microphones can define another level more in line with the application. The level used shall be recorded in the test report.

The manufacturer may provide a suitable companion transmitter that can be used to set up a communications link. In this case a suitable attenuator in the EUT input may be necessary.

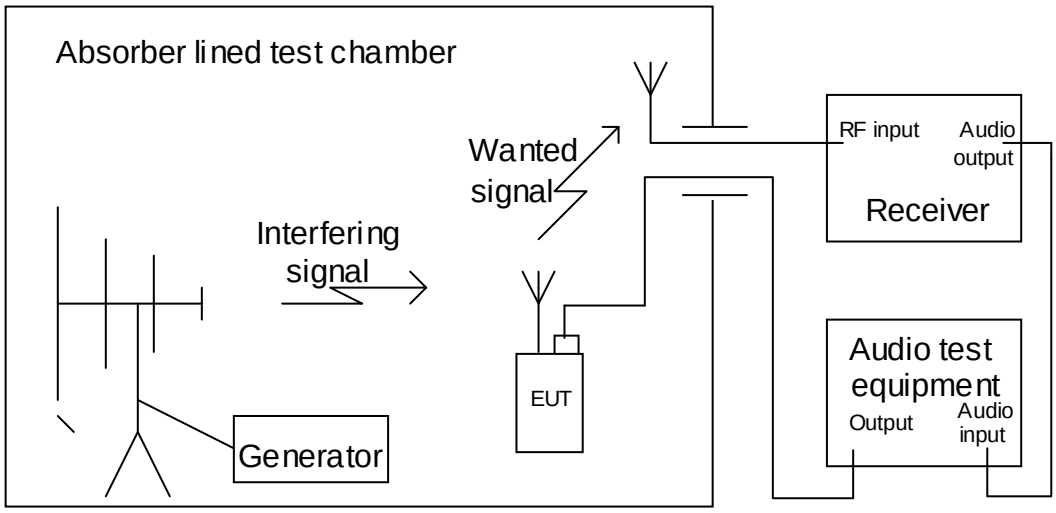

Figure 1: Test configuration for integral antenna; transmitter operation - electrical input

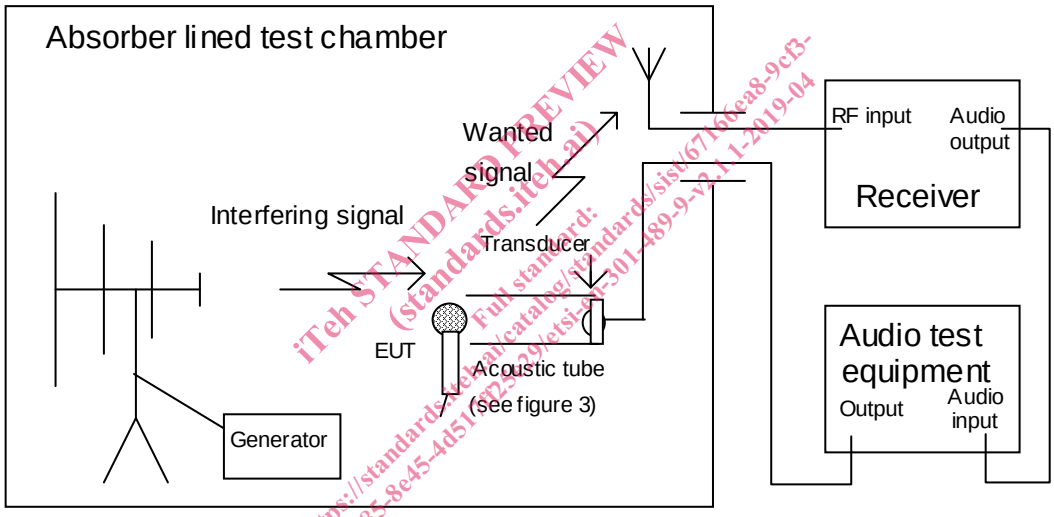

Figure 2: Test configuration for integral antenna; transmitter operation - acoustic input

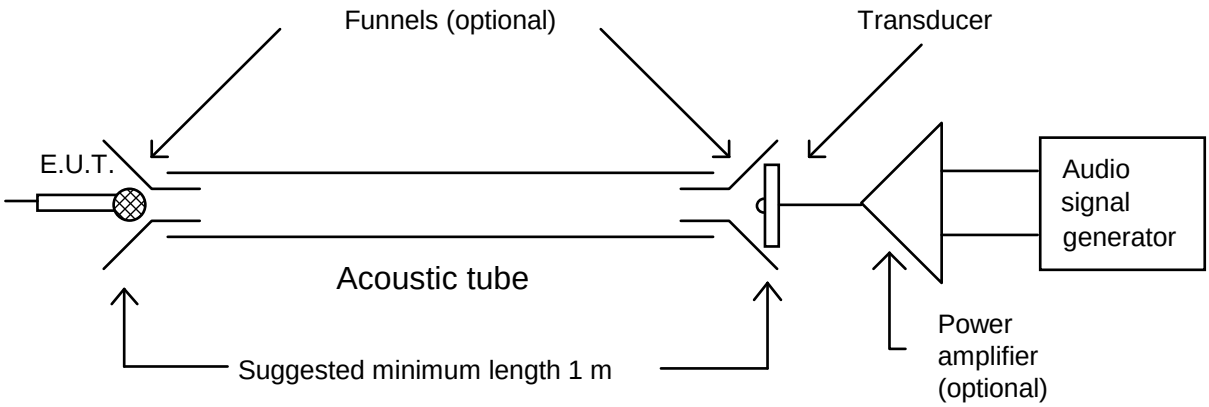

Figure 3: Example of acoustic coupling jig