



**ElectroMagnetic Compatibility (EMC)  
standard for radio equipment and services;  
Part 5: Specific conditions for  
Private land Mobile Radio (PMR) and  
ancillary equipment (speech and non-speech) and  
Terrestrial Trunked Radio (TETRA);  
Harmonised Standard covering the essential requirements of  
article 3.1(b) of the Directive 2014/53/EU**

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# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope .....	6
2 References .....	6
2.1 Normative references .....	6
2.2 Informative references.....	6
3 Definitions and abbreviations.....	7
3.1 Definitions.....	7
3.2 Abbreviations .....	7
4 Test conditions .....	8
4.1 General .....	8
4.2 Arrangements for test signals .....	8
4.2.0 General.....	8
4.2.1 Arrangements for test signals at the input of transmitters.....	8
4.2.2 Arrangements for test signals at the output of transmitters.....	8
4.2.3 Arrangements for test signals at the input of receivers.....	8
4.2.4 Arrangements for test signals at the output of receivers .....	8
4.2.5 Arrangements for testing transmitter and receiver together (as a system) .....	8
4.3 Exclusion bands.....	8
4.3.0 General.....	8
4.3.1 Receiver and receivers of transceivers exclusion band.....	9
4.3.2 Transmitter exclusion band.....	9
4.4 Narrow band responses of receivers.....	9
4.5 Normal test modulation .....	9
4.5.1 General.....	9
4.5.2 Analogue speech equipment .....	9
4.5.2.1 Angle modulated equipment .....	9
4.5.2.2 Non-angle modulated equipment.....	9
4.5.3 Digital speech equipment.....	9
4.5.4 Non-speech equipment (data, specific response, etc.) .....	10
4.5.5 TETRA equipment.....	10
5 Performance assessment.....	10
5.1 General .....	10
5.2 Equipment which can provide a continuous communications link .....	10
5.3 Equipment which does not provide a continuous communications link.....	10
5.4 Ancillary equipment .....	10
5.5 Equipment classification .....	11
5.6 Performance assessment of equipment providing an audio path .....	11
5.6.1 Introduction.....	11
5.6.2 Assessment of audio path using the audio breakthrough method .....	11
5.6.3 Assessment of audio path using the audio distortion method .....	12
6 Performance criteria .....	12
6.0 General .....	12
6.1 Performance criteria for Continuous phenomena applied to Transmitters (CT) .....	13
6.2 Performance criteria for Transient phenomena applied to Transmitters (TT).....	13
6.3 Performance criteria for Continuous phenomena applied to Receivers (CR).....	13
6.4 Performance criteria for Transient phenomena applied to Receivers (TR).....	13
6.5 Performance criteria for ancillary equipment tested on a stand alone basis .....	14
7 Applicability overview .....	14
7.1 Emission.....	14
7.1.1 General.....	14
7.1.2 Special conditions.....	14

7.2	Immunity .....	14
7.2.1	General.....	14
7.2.2	Special conditions .....	14
<b>Annex A (normative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>15</b>
<b>Annex B (informative):</b>	<b>Examples of PMR equipment in the scope of the present document .....</b>	<b>17</b>
B.1	Introduction .....	17
B.2	Non-integral antenna PMR equipment.....	17
B.3	Integral antenna PMR equipment.....	17
B.4	Narrowband channel non-integral PMR equipment.....	17
B.5	Mobile, base station, and portable equipment of TERrestrial Trunked Radio (TETRA) equipment .....	18
<b>Annex C (informative):</b>	<b>Bibliography.....</b>	<b>19</b>
History .....		20

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## Foreword

This 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 combined Public Enquiry and 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 5 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

### National transposition dates

Date of adoption of this EN:	3 months after ETSI publication
Date of latest announcement of this EN (doa):	
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## 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).

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# 1 Scope

The present document, together with ETSI EN 301 489-1 [1], covers the assessment of Private land Mobile Radio (PMR) and associated ancillary equipment, in respect of ElectroMagnetic Compatibility (EMC).

The present document covers both analogue and digital Private land Mobile Radio (PMR) equipment.

Technical specifications related to the antenna port and emissions from the enclosure port of Private land Mobile Radio (PMR) equipment 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 test conditions, performance assessment and performance criteria for Private land Mobile Radio (PMR) equipment and associated ancillary equipment.

Examples of Private Mobile Radio equipment are given in annex B.

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.

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## 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.

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

- [1] ETSI EN 301 489-1 (2.1.0) (04-2016): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of the Directive 2014/30/EU; Part 1: Common technical requirements".
- [2] ETSI EN 300 394-1 (V3.3.1) (04-2015): "Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 1: Radio".
- [3] ETSI EN 300 395-2 (V1.3.1) (01-2005): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 2: TETRA codec".
- [4] ETSI EN 300 392-2 (V3.4.1) (08-2010): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [5] ETSI EN 300 396-2 (V1.4.1) (11-2011): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 2: Radio aspects".

### 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] ETSI EN 302 561: "Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [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 ETS 300 086: "Radio Equipment and Systems (RES); Land mobile group; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [i.5] ETSI I-ETS 300 219: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver".
- [i.6] ETSI EN 300 113: "Land Mobile Service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.7] ETSI EN 300 296: "Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.8] ETSI EN 300 341: "Land Mobile Service; Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.9] ETSI EN 300 390: "Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [i.10] ETSI EN 301 166: "Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

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## 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], clause 3, apply.

### 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1], clause 3 and the following apply:

BER	Bit Error Ratio
CR	Continuous phenomena applied to Receivers
CT	Continuous phenomena applied to Transmitters
EUT	Equipment Under Test

PMR	Private land Mobile Radio
TR	Transient phenomena applied to Receivers
TT	Transient phenomena applied to Transmitters

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## 4 Test conditions

### 4.1 General

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 PMR equipment are specified in the present document.

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

### 4.2 Arrangements for test signals

#### 4.2.0 General

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

#### 4.2.1 Arrangements for test signals at the input of transmitters

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

#### 4.2.2 Arrangements for test signals at the output of transmitters

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

The transmitter shall be operated at its maximum rated RF output power, modulated with normal test modulation (see clause 4.5).

#### 4.2.3 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 modification.

A communication link shall be established at the start of the test and maintained during the test.

#### 4.2.4 Arrangements for test signals at the output of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.4 shall apply.

#### 4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of ETSI EN 301 489-1 [1], clause 4.2.5 shall apply with the following modification.

For the immunity tests of duplex transceivers, the EUT may be configured in the repeater mode, consistent with the conditions given above.

### 4.3 Exclusion bands

#### 4.3.0 General

The provisions of ETSI EN 301 489-1 [1], clause 4.3 shall apply.



### 4.3.1 Receiver and receivers of transceivers exclusion band

The exclusion band for receivers and receivers of transceivers is the frequency range determined by the switching range, as declared by the manufacturer, extended as follows:

- the lower frequency of the exclusion band is the lower frequency of the switching range, minus 5 % of the centre frequency of the switching range, or minus 10 MHz, whichever will result in the lowest frequency;
- the upper frequency of the exclusion band is the upper frequency of the switching range, plus 5 % of the centre frequency of the switching range, or plus 10 MHz, which ever will result in the highest frequency.

The switching range is the maximum frequency range over which the receiver can be operated without reprogramming or realignment.

NOTE: The receiver exclusion band range aligns with the blocking test range.

### 4.3.2 Transmitter exclusion band

The exclusion band for transmitters extends  $\pm 25$  kHz from the nominal operating frequency of the transmitter.

However for TETRA equipment, the exclusion band for transmitters extends  $\pm 50$  kHz from the nominal operating frequency of the transmitter.

## 4.4 Narrow band responses of receivers

The provision of ETSI EN 301 489-1 [1], clause 4.4 shall apply.

## 4.5 Normal test modulation

### 4.5.1 General

The manufacturer may have to supply the test modulation/demodulation equipment.

The test signal generator (modulation) shall be able to produce a continuous stream of data or a repetitive message.

The test signal receiver (de-modulator) shall be, where appropriate, able to produce a readout of Bit Error Ratio (BER) of a continuous data stream or a repetitive readout of message acceptance.

### 4.5.2 Analogue speech equipment

#### 4.5.2.1 Angle modulated equipment

- the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a sinusoidal audio frequency of 1 000 Hz to a deviation of 60 % peak system;
- the transmitter of the EUT shall be modulated with a sinusoidal audio frequency of 1 000 Hz at a deviation of 60 % peak system deviation.

#### 4.5.2.2 Non-angle modulated equipment

- the receiver wanted input signal shall be set to the nominal frequency of the receiver suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation;
- the transmitter of the EUT shall be suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation;
- details concerning the modulation used shall be recorded in the test report.

### 4.5.3 Digital speech equipment

- the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard;
- the transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard;

- the manufacturer may have to supply the test modulation/de-modulation equipment;
- details concerning the modulation used shall be recorded in the test report.

#### 4.5.4 Non-speech equipment (data, specific response, etc.)

- the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard;
- the transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard;
- the manufacturer may have to supply the test modulation/de-modulation equipment;
- details concerning the modulation used shall be recorded in the test report.

#### 4.5.5 TETRA equipment

The receiver wanted input signal shall be set to a frequency near to the middle of the operating band of the receiver modulated with one of the test signals listed below, the transmitter shall be set to a frequency near to the middle of the operating band of the transmitter modulated with one of the test signals listed below:

- for equipment capable of speech operation, a speech traffic channel (TETRA TCH/S) in accordance with ETSI EN 300 395-2 [3] representing a 1 020 Hz tone at a level of 17 dB below peak level;
- for non-speech V+D or DMO equipment, a TCH/7.2 test signal in accordance with ETSI EN 300 392-2 [4] or ETSI EN 300 396-2 [5] or ETSI EN 300 394-1 [2];
- for non-speech V+D or DMO equipment, a SCH/F test signal in accordance with ETSI EN 300 392-2 [4] or ETSI EN 300 396-2 [5] or ETSI EN 300 394-1 [2];
- for non-speech PDO equipment, a NBCH test signal in accordance with ETSI EN 300 394-1 [2];
- for equipment capable of speech operation speech traffic channel (TETRA TCH/S) in accordance with ETSI EN 300 395-2 [3] representing silence;
- for speech and/or data equipment connected to ancillary equipment intended for data operation, or connected to ancillary equipment which can be directly connected to a data application, the method of BER or MER measurement shall be agreed between the test house and the manufacturer.

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## 5 Performance assessment

### 5.1 General

The provision of ETSI EN 301 489-1 [1], clause 5.1 shall apply.

### 5.2 Equipment which can provide a continuous communications link

The provision of ETSI EN 301 489-1 [1], clause 5.2 shall apply.

### 5.3 Equipment which does not provide a continuous communications link

The provision of ETSI EN 301 489-1 [1], clause 5.3 shall apply.

### 5.4 Ancillary equipment

The provision of ETSI EN 301 489-1 [1], clause 5.4 shall apply.