

<b>STN</b>	<b>Pozemná pohyblivá služba. Rádiové zariadenia určené na prenos dát (a hovoru) používajúce integrálnu anténu. Harmonizovaná norma vzťahujúca sa na základné požiadavky podľa článku 3.2 smernice 2014/53/EÚ.</b>	<b>STN EN 300 390 V2.1.1</b>  87 0390
------------	---	---

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

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/17

Obsahuje: EN 300 390 V2.1.1:2016

**124148**

---

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2017  
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

# ETSI EN 300 390 V2.1.1 (2016-03)



HARMONISED EUROPEAN STANDARD

**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**

---

**Reference**

REN/ERM-TGDMMR-347

---

**Keywords**antenna, data, mobile, PMR, radio, speech,  
transmission**ETSI**650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**The present document can be downloaded from:  
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at  
<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:  
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.  
All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.  
**3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.  
**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	7
Foreword.....	7
Modal verbs terminology.....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	8
2.2 Informative references.....	9
3 Definitions, symbols and abbreviations .....	9
3.1 Definitions.....	9
3.2 Symbols.....	11
3.3 Abbreviations .....	11
4 General and operational requirements.....	11
4.1 General .....	11
4.1.1 Environmental profile .....	11
4.1.2 Choice of model for testing .....	11
4.1.2.0 General .....	11
4.1.2.1 Auxiliary test equipment .....	12
4.1.2.2 Declarations by the supplier.....	12
4.2 Mechanical and electrical design.....	12
4.2.1 General.....	12
4.2.2 Controls .....	12
4.2.3 Transmitter shut-off facility.....	12
4.3 Marking.....	12
4.4 Testing using bit streams or messages.....	12
4.5 Measuring continuous mode equipment.....	12
4.6 Measuring discontinuous mode equipment .....	12
4.7 Constant and non-constant envelope modulation .....	13
4.8 Combined full bandwidth analogue speech/full bandwidth digital equipment.....	13
5 Test conditions, power sources and ambient temperatures .....	14
5.1 Normal and extreme test conditions .....	14
5.2 Test power source.....	14
5.3 Normal test conditions.....	14
5.3.1 Normal temperature and humidity .....	14
5.3.2 Normal test power source .....	14
5.3.2.1 Mains voltage.....	14
5.3.2.2 Regulated lead-acid battery power sources used on vehicles.....	15
5.3.2.3 Other power sources.....	15
5.4 Extreme test conditions .....	15
5.4.1 Extreme temperatures .....	15
5.4.2 Extreme test source voltages.....	15
5.4.2.1 Mains voltage.....	15
5.4.2.2 Regulated lead-acid battery power sources used on vehicles.....	15
5.4.2.3 Power sources using other types of batteries.....	15
5.4.2.4 Other power sources.....	15
5.5 Procedure for tests at extreme temperatures.....	16
5.5.0 Thermal balance.....	16
5.5.1 Procedure for equipment designed for continuous transmission.....	16
5.5.2 Procedure for equipment designed for intermittent transmission .....	16
6 General conditions of measurement .....	16
6.1 Normal test signals (wanted and unwanted signals).....	16
6.1.0 General.....	16
6.1.1 Signals for bit stream measurements .....	16
6.1.2 Signals for messages.....	17
6.2 Artificial antenna.....	17

6.3	Test sites and general arrangements for radiated measurements .....	17
6.4	Transmitter automatic shut-off facility .....	17
6.5	Modes of operation of the transmitter .....	18
6.6	Encoder for receiver measurements .....	18
6.7	Transceiver data interface.....	18
6.8	Arrangements for test signals at the input of the receiver via a test fixture or a test antenna .....	18
6.9	Facilities for access .....	18
6.9.1	Analogue access.....	18
6.9.2	Points for bit stream measurement.....	18
6.9.3	Coupling arrangements .....	19
6.9.3.0	General .....	19
6.9.3.1	Arrangements for measurements with continuous bit streams .....	19
6.9.3.2	Arrangements for measurements with messages.....	19
6.10	Receiver mute or squelch facility .....	19
7	Technical characteristics of the transmitter .....	19
7.0	General .....	19
7.1	Frequency error .....	19
7.1.0	General.....	19
7.1.1	Definition.....	20
7.1.2	Method of measurement .....	20
7.1.3	Limits.....	20
7.2	Effective radiated power .....	20
7.2.0	General.....	20
7.2.1	Definition.....	21
7.2.2	Method of measurement .....	21
7.2.2.0	General .....	21
7.2.2.1	Maximum effective radiated power under normal test conditions .....	21
7.2.2.2	Average effective radiated power under normal test conditions .....	23
7.2.2.3	Method of measurements of maximum and average effective radiated power under extreme test conditions .....	23
7.2.3	Limits.....	23
7.2.3.1	Effective radiated power under normal test conditions .....	23
7.2.3.2	Effective radiated power under extreme test conditions .....	24
7.3	Adjacent and alternate channel power .....	24
7.3.0	General.....	24
7.3.1	Definition.....	24
7.3.2	Method of measurement .....	24
7.3.3	Limits.....	26
7.4	Radiated unwanted emissions in the spurious domain .....	26
7.4.0	General.....	26
7.4.1	Definition.....	26
7.4.2	Method of measurement .....	27
7.4.3	Limits.....	29
7.5	Transmitter attack time.....	29
7.5.0	General.....	29
7.5.1	Definition.....	29
7.5.2	Method of measurement .....	29
7.5.3	Limits.....	30
7.6	Transmitter release time .....	30
7.6.0	General.....	30
7.6.1	Definition.....	30
7.6.2	Method of measurement .....	30
7.6.3	Limits.....	31
7.7	Transient behaviour of the transmitter.....	31
7.7.0	General.....	31
7.7.1	Definitions .....	31
7.7.2	Timings, frequencies and powers .....	32
7.7.3	Methods of measurement.....	36
7.7.3.0	General .....	36
7.7.3.1	Time and frequency domain analysis measurements .....	36
7.7.3.2	Test arrangement and characteristics of the test discriminator.....	37

7.7.3.3	Adjacent channel transient power measurements.....	37
7.7.3.4	Characteristics of the adjacent channel transient power measuring device.....	38
7.7.4	Limits.....	38
7.7.4.1	Time domain analysis of power and frequency.....	38
7.7.4.2	Adjacent channel transient power .....	39
8	Technical characteristics of the receiver .....	39
8.1	Average usable sensitivity (field strength, data or messages) .....	39
8.1.1	Definition.....	39
8.1.2	Method of measurement with continuous bit streams under normal test conditions .....	39
8.1.3	Method of measurement with continuous bits streams under extreme test conditions .....	41
8.1.4	Method of measurement with messages under normal test conditions .....	41
8.1.5	Method of measurement with messages under extreme test conditions.....	43
8.1.6	Reference for degradation measurements .....	44
8.1.6.1	Definition .....	44
8.1.6.2	Procedures for measurements using the test fixture .....	44
8.1.6.3	Procedures for measurements on a test site.....	44
8.1.7	Limits.....	44
8.2	Error behaviour at high input levels .....	45
8.2.1	Definition.....	45
8.2.2	Method of measurement with continuous bit streams.....	46
8.2.3	Method of measurement with messages .....	46
8.2.4	Limits.....	46
8.3	Co-channel rejection.....	47
8.3.1	Definition.....	47
8.3.2	Method of measurement with continuous bit streams.....	47
8.3.3	Method of measurement with messages .....	48
8.3.4	Limits.....	49
8.4	Adjacent channel selectivity.....	49
8.4.1	Definition.....	49
8.4.2	Method of measurement with continuous bit streams.....	49
8.4.3	Method of measurement with messages .....	50
8.4.4	Limits.....	51
8.5	Spurious response rejection.....	51
8.5.0	General.....	51
8.5.1	Definition.....	52
8.5.2	Introduction to the method of measurement .....	52
8.5.3	Measurement arrangement.....	53
8.5.4	Method of the search over the limited frequency range with continuous bit streams .....	54
8.5.5	Method of the search over the limited frequency range with messages.....	54
8.5.6	Method of measurement with continuous bit streams.....	55
8.5.7	Method of measurement with messages .....	56
8.5.8	Limits.....	57
8.6	Intermodulation response rejection .....	57
8.6.0	General.....	57
8.6.1	Definition.....	57
8.6.2	Method of measurement with continuous bit streams.....	57
8.6.3	Method of measurement with messages .....	58
8.6.4	Limits.....	59
8.7	Blocking or desensitization .....	59
8.7.0	General.....	59
8.7.1	Definition.....	59
8.7.2	Method of measurement with continuous bit streams.....	60
8.7.3	Method of measurement with messages .....	61
8.7.4	Limits.....	62
8.8	Spurious radiations .....	62
8.8.0	General.....	62
8.8.1	Definition.....	62
8.8.2	Method of measurement .....	63
8.8.3	Limits.....	64
9	Testing for compliance with technical requirements.....	64

9.1	Test conditions, power supply and ambient temperatures .....	64
9.2	Interpretation of the measurement results .....	65
<b>Annex A (normative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>66</b>
<b>Annex B (normative):</b>	<b>Radiated measurement.....</b>	<b>68</b>
B.1	Test sites and general arrangements for measurements involving the use of radiated fields .....	68
B.1.0	General .....	68
B.1.1	Anechoic chamber .....	68
B.1.2	Anechoic chamber with a conductive ground plane .....	69
B.1.3	Open Area Test Site (OATS) .....	70
B.1.4	Test antenna.....	71
B.1.5	Substitution antenna .....	71
B.1.6	Measuring antenna .....	72
B.2	Guidance on the use of radiation test sites .....	72
B.2.0	General .....	72
B.2.1	Verification of the test site .....	72
B.2.2	Preparation of the EUT.....	72
B.2.3	Power supplies to the EUT .....	72
B.2.4	Volume control setting for analogue speech tests .....	72
B.2.5	Range length.....	73
B.2.6	Site preparation .....	73
B.3	Coupling of signals.....	74
B.3.0	General .....	74
B.3.1	Data signals .....	74
B.4	Test fixture .....	74
B.4.1	Description .....	74
B.4.2	Calibration.....	75
B.4.3	Mode of use.....	75
<b>Annex C (normative):</b>	<b>Specification for some particular measurement arrangements.....</b>	<b>76</b>
C.1	Power measuring receiver specification.....	76
C.1.0	General .....	76
C.1.1	IF filter .....	76
C.1.2	Attenuation indicator.....	77
C.1.3	RMS value indicator.....	77
C.1.4	Oscillator and amplifier.....	77
C.2	Spectrum analyser specification.....	78
C.2.1	Adjacent and alternate channel power measurement.....	78
C.2.2	Unwanted emissions measurement.....	78
C.3	Integrating and power summing device .....	78
History	.....	79

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This Harmonised 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.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.2].

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.

National transposition dates	
Date of adoption of this EN:	21 March 2016
Date of latest announcement of this EN (doa):	30 June 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 December 2016
Date of withdrawal of any conflicting National Standard (dow):	31 December 2017

---

## 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 covers the technical requirements for radio transmitters and receivers used in stations in the Private Mobile Radio (PMR) service.

It applies to use in the land mobile service, operating on radio frequencies between 30 MHz and 1 GHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, intended for data or speech and data.

**Table 1: Radiocommunications service frequency bands**

	<b>Radiocommunications service frequency bands</b>
Transmit	30 MHz to 1 000 MHz
Receive	30 MHz to 1 000 MHz

It applies to equipment for continuous and/or discontinuous transmission.

The equipment comprises a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder.

The present document also applies to combined analogue and digital radio equipment using an integral antenna and intended for the transmission of data and/or speech.

The present document is complementary to ETSI EN 300 113 [i.5], which covers radio equipment with an internal or external RF connector.

In the cases of:

- combined full bandwidth analogue/full bandwidth digital equipment, if the analogue part of the equipment has already been measured according to ETSI EN 300 296 [6];
- equipment which has already been measured according to the present document, and is remeasured with an add-on device, using another type of modulation without affecting any other characteristics of the equipment;

only some of the requirements of the present document apply. These requirements are given in clause 4.8.

## 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 <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.

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

- [1] Void.
- [2] Void.
- [3] ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".
- [4] ETSI TR 100 028 (V1.4.1) (12-2001) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

- [5] Recommendation ITU-T O.153 (10-1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [6] ETSI EN 300 296 (V2.1.1) (03-2016): "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".
- [7] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".

## 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 TR 102 273 (V1.2.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties".
- [i.2] 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.

NOTE: Article 3.2 and article 10.8.

- [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 300 793 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Presentation of equipment for type testing".
- [i.5] ETSI EN 300 113 (V2.1.0): "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".

---

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**