SLOVENSKI STANDARD
SIST EN 302 561 V2.1.1:2016

01-junij-2016

Storitev kopenskih mobilnih komunikacij - Radijska oprema, ki uporablja modulacijo s konstantno ali nekonstantno ovojnico in deluje na kanalu s pasovno širino 25 kHz, 50 kHz, 100 kHz ali 150 kHz - Harmonizirani standard, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU

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

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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

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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
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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.9] 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.3].

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).

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1 Scope

The present document covers the technical requirements for radio transmitters and receivers used in stations and technical requirements for TMO repeater in the Private Mobile Radio (PMR) service.

It applies to use in the land mobile service, operating on radio frequencies between 30 MHz and 3 GHz, with channel separations of 25 kHz, 50 kHz, 100 kHz and 150 kHz.

Table 1: Radiocommunications service frequency bands

	Radiocommunications service frequency bands
Transmit	30 MHz to 3 000 MHz
Receive	30 MHz to 3 000 MHz

It applies to equipment for continuous and/or discontinuous transmission of data and/or digital speech.

The equipment (base station and mobile station) comprises a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder.

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

- base station (equipment fitted with an antenna connector, intended for use in a fixed location);
- mobile station (equipment fitted with an antenna connector, normally used in a vehicle or as a transportable);
- TMO Repeater; and
- those hand portable stations:

  a) fitted with an antenna connector; or

  b) without an external antenna connector (integral antenna equipment), but fitted with a permanent internal or a temporary internal 50 Ω Radio Frequency (RF) connector which allows access to the transmitter output and the receiver input.

Hand portable equipment without an external or internal RF connector and without the possibility of having a temporary internal 50 Ω RF connector is not covered by the present document.

These specifications do not necessarily include all the characteristics which may be required by a user of equipment, nor do they necessarily represent the optimum performance achievable.

The present document contains requirements to demonstrate that "... *Radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*" and that *"....radio equipment supports certain features ensuring access to emergency services*" [i.3].

In addition to the present document, other ENs (e.g. ETSI EN 301 489-1 [i.7] and ETSI EN 301 489-5 [i.8]) that specify technical requirements in respect of essential requirements under the Radio Equipment Directive [i.3], may apply to equipment within the scope of the present document.

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] Recommendation ITU-T O.153 (10-1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[2] 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".

[3] ETSI TR 102 273 (V1.2.1) (12-2001) (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".

[4] ANSI C63.5 (2006): "Electromagnetic Compatibility - Radiated Emission Measurements in Electromagnetic Interference (EMI) Control - Calibration and Qualification of Antennas (9 kHz to 40 GHz)".

[5] ETSI EN 300 392-2 (V3.4.1) (08-2010): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

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] Recommendation ITU-R SM.329-12 (2012): "Unwanted emissions in the spurious domain".

[i.2] CEPT/ERC/REC 74-01 (2005): "Unwanted Emissions in the Spurious domain".

[i.3] 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.4] ETSI TS 101 789-1 (V1.1.2): "Terrestrial Trunked Radio (TETRA); TMO Repeaters; Part 1: Requirements, test methods and limits".

[i.5] ETSI EN 300 394-1 (V3.2.1) (10-2012): "Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 1: Radio".

[i.6] ETSI EN 303 035-1 (V1.2.1) (12-2001): "Terrestrial Trunked Radio (TETRA); Harmonized EN for TETRA equipment covering essential requirements under article 3.2 of the R&TTE Directive; Part 1: Voice plus Data (V+D)".

[i.7] ETSI EN 301 489-1 (V1.9.2) (09-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

[i.8] ETSI EN 301 489-5 (V1.4.1): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Harmonized Standard covering the essential requirements of article 3.1b of the Directive 2014/53/EU; Part 5: Specific conditions for Private land Mobile Radio (PMR) and Terrestrial Trunked Radio (TETRA) equipment and ancillary equipment (speech and non-speech)".

[i.9] 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.10] ETSI EN 300 793 (V1.1.1) (02-1998): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Presentation of equipment for type testing".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

base station: equipment fitted with an antenna connector, for use with an external antenna, and intended for use in a fixed location

bit: binary digit

block: smallest quantity of information that is sent over the radio channel

NOTE: A constant number of useful bits are always sent together with the corresponding redundancy bits.

broadband repeater: repeater which is designed for operation on any combination of carriers (up to a specified maximum number) within the operating band of the repeater

burst or transmission (physical): one or several packets transmitted between power on and power off of a particular transmitter

channelized repeater: repeater which is designed for operation on a specified subset of carriers within the operating band of the repeater

NOTE: The subset of the channels may be determined during the manufacture of the repeater, or may be programmable.

conducted measurements: measurements which are made using direct 50 Ω connection to the equipment under test

data transmission systems: systems which transmit and/or receive data and/or digitized voice

downlink: signal path where base station transmits and mobile or hand portable station receives

hand portable station: equipment either fitted with an antenna connector or integral antenna, or both, normally used on a stand-alone basis, to be carried on a person or held in the hand

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.

Listen Before Transmit mode (LBT): monitoring mode in which the RF channel is checked for activity before transmitting

NOTE: Examples for LBT are transceivers or systems implementing squelch or RSSI (Receiver Signal Strength Indicator) algorithms for evaluating the status of the channel.

message: user data to be transferred in one or more packets in a session

mobile station: mobile equipment fitted with an antenna connector, for use with an external antenna, normally used in a vehicle or as a transportable station

packet: one block or a contiguous stream of blocks sent by one (logical) transmitter to one particular receiver or one particular group of receivers

radiated measurements: measurements which involve the absolute measurement of a radiated field

receive band of the equipment: maximum frequency range (declared by the supplier) over which the receiver can be operated without reprogramming or realignment

session: set of inter-related exchange of packets occupying one or several windows or part thereof (if applicable)

NOTE: It corresponds to a complete interactive procedure for interchanging data between users, comprising initiation, data transmission and termination procedures. The session can be short (e.g. 2 packets), or long (e.g. one full page of text).

spurious emissions: unwanted emissions in the spurious domain

testing laboratory: laboratory that performs tests

TMO Repeater: bi-directional Radio Frequency (RF) amplifier which can amplify and transmit a received Mobile Station (MS) signal in the MS transmit band, simultaneously it can amplify and transmit a received Base Station (BS) RF signal in the BS transmit band

transmit band of the equipment: maximum frequency range (declared by the supplier) over which the transmitter can be operated without reprogramming or realignment

Trunked Mode Operation (TMO): mode of operation where a network is used for communication

uplink: signal path where mobile or hand portable station transmits and base station receives

window: set of inter-related transmissions which may be limited in time by an appropriate access protocol and corresponding occupation rules

3.2 Symbols

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

α	Filter roll-off factor
dB	decibel
dBm	dB relative to 1 mW
dBµV	dB relative to 1 µV
f_c	channel centre frequency
f_{LO}	Local Oscillator frequency
f_{rb}	the frequency offset corresponding to the near edge of the receive band
M1, M2, etc.	names of test signals defined in clause 6.3
PR	rms power
PX	maximum Power (Peak Envelope Power)
V_{min}	minimum extreme test Voltage
V_{max}	maximum extreme test Voltage
T_{min}	minimum extreme test Temperature
T_{max}	maximum extreme test Temperature
λ	wavelength

3.3 Abbreviations

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

ac	alternating current
ACP	Adjacent Channel Power
ARQ	Automatic Repeat reQuest
BS	Base Station
BW	BandWidth
CBW	Channel BandWidth
CEPT	European Conference of Postal and Telecommunications Administrations
CSP	Channel SeParation
CW	Continuous Wave
dBc	decibels relative to the transmitter power
dc	direct current

EC	European Community
EFTA	European Free Trade Association
EUT	Equipment Under Test
GMSK	Gaussian Minimum Shift Keying
IF	Intermediate Frequency
ITU-R	International Telecommunication Union - Radiocommunication Standardisation Sector
ITU-T	International Telecommunication Union - Telecommunication Standardisation Sector
LBT	Listen Before Transmit
MBW	Measurement BandWidth
MS	Mobile Station
OATS	Open Area Test Site
PEP	Peak Envelope Power
PMR	Private Mobile Radio
ppm	parts per million
RF	Radio Frequency
rms	root mean square
RSSI	Received Signal Strength Indicator
Rx	Receiver
TETRA	TErrestrial Trunked RAdio
TMO	Trunked Mode Operation
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio
π/4-DQPSK	π/4-shifted Differential Quaternary Phase Shift Keying

4 General

4.1 Testing

4.1.1 Choice of model for testing

4.1.1.0 General

The supplier shall provide one or more samples of the equipment, as appropriate for testing. Stand-alone equipment shall be complete with any ancillary equipment needed for testing.

If an equipment has several optional features, considered not to affect the RF parameters, then the tests need only be performed on the equipment configured with the combination of features considered to be the most complex. Where practicable, equipment to be tested shall provide a 50 Ω connector for conducted RF power level measurements.

In the case of integral antenna equipment, if the equipment does not have an internal permanent 50 Ω connector then it is permissible to use a second sample of the equipment with a temporary antenna connector fitted to facilitate testing. Any such modified sample shall not be used for any radiated measurements, except as noted in clause 5.5.3.

The performance of the equipment to be tested shall be representative of the performance of the corresponding production model.

4.1.1.1 Auxiliary test equipment

All necessary test signal sources, setting up instructions and other product information shall be made available with the equipment to be tested.

4.1.1.2 Declarations by the supplier

The supplier shall declare the necessary information about the equipment with respect to all technical requirements set by the present document.

4.1.2 Presentation of equipment for testing purposes

The radio tests shall be performed on the lowest, the highest and the middle radio frequency channels of either the transmit or receive band of the equipment, whichever is appropriate.

The supplier shall declare the frequency ranges, the range of operating conditions and power requirements as applicable, to establish the appropriate test conditions. For non TMO repeater equipment information related to radio sub-system of equipment includes the transmit and receive frequency bands, first local oscillator frequency and intermediate frequencies of the receiver.

Additionally, technical documentation and operating manuals, sufficient to make the test, shall be supplied. All necessary setting up instructions and other product information shall be made available with the equipment to be tested, in accordance with article 10.8 of Directive 2014/53/EU [i.3].

For TMO Repeater Equipment supplier declarations shall include:

a) the operating band or bands of the repeater;

b) the maximum rated output power per channel;

c) the number of channels supported by the repeater.

Guidance on the presentation of equipment is also given in ETSI EN 300 793 [i.10].

4.2 Mechanical and electrical design

4.2.1 General

The equipment should be designed, constructed and manufactured in accordance with good engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

4.2.2 Controls

Those controls, which if maladjusted, might increase the interfering potentialities of the equipment shall not be accessible for adjustment by the user.

4.2.3 Transmitter shut-off facility

When a timer for an automatic shut-off facility is operative, at the moment of the time-out the transmitter shall automatically be switched off (the re-activation of the transmitter shall reset the timer).

A shut-off facility shall be inoperative for the duration of the measurements unless it has to remain operative to protect the equipment. If the shut-off facility is left operative the status of the equipment shall be indicated.

4.3 Marking

The equipment shall be marked in a visible place. This marking should be legible, tamperproof and durable.

The marking shall be in accordance with EC Directives and/or CEPT decisions or recommendations as appropriate.

4.4 Testing using bit streams or messages

The supplier may elect to have the equipment tested using bit streams or messages. It should be noted that the methods of measurement using messages are usually more time consuming.

4.5 Measuring continuous mode equipment

In the case of measurements performed on equipment designed to operate only in continuous mode, requirements such as "equipment shall be set in continuous mode" shall be interpreted as "equipment shall be used in its normal transmission mode (in this case, the continuous mode)".