



SLOVENSKI STANDARD
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Storitev kopenskih mobilnih komunikacij - Radijska oprema z notranjim ali zunanjim RF-konektorjem, namenjena predvsem za analogni govor - Harmonizirani standard, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU

Land Mobile Service - Radio equipment with an internal or external RF connector intended primarily for analogue speech- Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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ETSI EN 300 086 V2.1.2 (2016-08)



**Land Mobile Service;
Radio equipment with an internal or external RF
connector intended primarily for analogue speech;
Harmonised Standard covering the essential requirements
of article 3.2 of the Directive 2014/53/EU**

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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.....	10
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	12
4.1.3 Auxiliary test equipment.....	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
5 Test conditions, power sources and ambient temperatures	12
5.1 Normal and extreme test conditions	12
5.2 Test power source.....	13
5.3 Normal test conditions.....	13
5.3.1 Normal temperature and humidity	13
5.3.2 Normal test power source.....	13
5.3.2.1 Mains voltage.....	13
5.3.2.2 Regulated lead-acid battery power sources used on vehicles.....	13
5.3.2.3 Other power sources.....	13
5.4 Extreme test conditions	14
5.4.1 Extreme temperatures	14
5.4.2 Extreme test source voltages.....	14
5.4.2.1 Mains voltage.....	14
5.4.2.2 Regulated lead-acid battery power sources used on vehicles.....	14
5.4.2.3 Power sources using other types of batteries.....	14
5.4.2.4 Other power sources.....	14
5.5 Procedure for tests at extreme temperatures.....	15
5.5.0 Thermal balance.....	15
5.5.1 Procedure for equipment designed for continuous transmission.....	15
5.5.2 Procedure for equipment designed for intermittent transmission	15
5.5.3 Testing of equipment that does not have an external 50 Ω RF connector (integral antenna equipment).....	15
6 General conditions of measurement.....	16
6.1 Arrangements for test signals applied to the receiver input.....	16
6.2 Receiver mute or squelch facility	16
6.3 Artificial antenna.....	16
6.4 Test sites and general arrangements for radiated measurements	16
6.5 Arrangement for test signals at the input of the transmitter	16
6.6 Receiver rated audio output power.....	16
6.7 Tests of equipment with a duplex filter	16
7 Technical characteristics of the transmitter.....	17
7.1 Frequency error	17

7.1.1	Definition.....	17
7.1.2	Method of measurement	17
7.1.3	Limits.....	17
7.2	Transmitter power (conducted)	18
7.2.1	Definitions	18
7.2.2	Method of measurement	18
7.2.3	Limits.....	18
7.3	Maximum effective radiated power.....	18
7.3.1	Definition.....	18
7.3.2	Methods of measurement.....	19
7.3.3	Limits.....	21
7.4	Frequency deviation	22
7.4.1	Definition.....	22
7.4.2	Method of measurement	22
7.4.2.1	Maximum permissible frequency deviation.....	22
7.4.2.2	Response of the transmitter to modulation frequencies above 3 kHz	22
7.4.3	Limits.....	22
7.4.3.1	Maximum permissible frequency deviation.....	22
7.4.3.2	Response of the transmitter to modulation frequencies above 3 kHz	23
7.5	Adjacent and alternate channel power.....	23
7.5.1	Definition.....	23
7.5.2	Method of measurement	24
7.5.3	Limits.....	25
7.6	Unwanted emissions in the spurious domain.....	25
7.6.1	Definition.....	25
7.6.2	Method of measuring the power level	26
7.6.3	Method of measuring the effective radiated power.....	27
7.6.4	Limits.....	29
7.7	Intermodulation attenuation.....	30
7.7.1	Definition.....	30
7.7.2	Method of measurement	31
7.7.3	Limits.....	32
8	Technical characteristics of the receiver.....	32
8.1	Maximum usable sensitivity (conducted).....	32
8.1.1	Definition.....	32
8.1.2	Method of measurement	32
8.1.3	Limits.....	32
8.2	Maximum usable sensitivity (field strength)	33
8.2.1	Definition.....	33
8.2.2	Method of measurement	33
8.2.3	Limits.....	34
8.3	Co-channel rejection.....	34
8.3.1	Definition.....	34
8.3.2	Method of measurement	34
8.3.3	Limits.....	34
8.4	Adjacent channel selectivity.....	35
8.4.1	Definition.....	35
8.4.2	Method of measurement	35
8.4.3	Limits.....	35
8.5	Spurious response rejection.....	35
8.5.1	Definition.....	35
8.5.2	Introduction to the method of measurement	36
8.5.3	Method of measurement	36
8.5.3.1	Method of search over the "limited frequency range".....	36
8.5.3.2	Method of measurement - Step 2	37
8.5.4	Limits.....	37
8.6	Intermodulation response rejection	37
8.6.1	Definition.....	37
8.6.2	Method of measurement	37
8.6.3	Limits.....	38
8.7	Blocking or desensitization	38

8.7.1	Definition.....	38
8.7.2	Method of measurement	38
8.7.3	Limits.....	38
8.8	Spurious radiations	39
8.8.1	Definition.....	39
8.8.2	Method of measuring the power level	39
8.8.3	Method of measuring the effective radiated power.....	40
8.8.4	Limits.....	41
9	Duplex operation	42
9.1	Receiver desensitization (with simultaneous transmission and reception).....	42
9.1.1	Definition.....	42
9.1.2	Method of measurement when the equipment operates with a duplex filter.....	42
9.1.3	Measuring method when the equipment operates with two antennas	42
9.1.4	Limits.....	43
9.2	Receiver spurious response rejection (with simultaneous transmission and reception)	43
9.2.1	Definition.....	43
9.2.2	Method of measurement	43
9.2.3	Limits.....	44
10	Testing for compliance with technical requirements.....	44
10.1	Test conditions, power supply and ambient temperatures	44
10.2	Interpretation of the measurement results	44
Annex A (normative): Radiated measurement.....		46
A.1	Test sites and general arrangements for measurements involving the use of radiated fields	46
A.1.0	General	46
A.1.1	Anechoic chamber	46
A.1.2	Anechoic chamber with a conductive ground plane	47
A.1.3	Open Area Test Site (OATS)	48
A.1.4	Test antenna.....	49
A.1.5	Substitution antenna	49
A.1.6	Measuring antenna	50
A.2	Guidance on the use of radiation test sites	50
A.2.0	General	50
A.2.1	Verification of the test site	50
A.2.2	Preparation of the EUT.....	50
A.2.3	Power supplies to the EUT	50
A.2.4	Volume control setting for analogue speech tests	50
A.2.5	Range length.....	51
A.2.6	Site preparation	51
A.3	Coupling of signals.....	52
A.3.1	General	52
A.3.2	Data signals	52
A.3.3	Speech and analogue signals	52
A.3.3.0	General.....	52
A.3.3.1	Acoustic coupler description.....	52
A.3.3.2	Calibration	53
Annex B (normative): Specification for some particular measurement arrangements.....		54
B.1	Power measuring receiver specification.....	54
B.1.0	Description	54
B.1.1	IF filter	54
B.1.2	Attenuation indicator.....	55
B.1.3	RMS value indicator.....	55
B.1.4	Oscillator and amplifier.....	55
B.2	Spectrum analyser specification.....	56
B.2.1	Adjacent and alternate channel power measurement.....	56
B.2.2	Unwanted emissions measurement.....	56

B.3 Integrating and power summing device	56
Annex C (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU	57
History	59

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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.8] 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.7].

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 C.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.

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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 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, primarily intended for analogue speech.

Table 1: Radiocommunications service frequency bands

	Radiocommunications service frequency bands
Transmit	30 MHz to 1 000 MHz
Receive	30 MHz to 1 000 MHz

The equipment comprises a transmitter and associated modulator and/or a receiver and associated demodulator. 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); and
- those hand portable stations:
 - a) fitted with an antenna connector; or
 - b) without an external antenna connector, 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.

NOTE: Hand portable equipment without an external or internal RF connector is not covered by the present document (integral antenna equipment is covered by ETSI EN 300 296 [i.1]).

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.7].

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the Radio Equipment Directive [i.7] 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.

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

- [2] Recommendation ITU-T O.41 (1994): "Psophometer for use on telephone-type circuits".
- [3] 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

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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 300 296 (V2.1.1): "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.2] ETSI EN 300 793 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Presentation of equipment for type testing".
- [i.3] 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.4] ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electromagnetic Interference (EMI) Control-Calibration of Antennas (9 kHz to 40 GHz)". <https://standards.iteh.ai/catalog/standards/sist/055e6c08-1d26-45c7-b513-e2ec5574195/sist-en-300-086-v2-1-2-2016>
- [i.5] IEC 60489-3 (1988): "Methods of measurement for radio equipment used in the mobile services. Part 3: Receivers for A3E or F3E emissions". <https://standards.iteh.ai/catalog/standards/sist/055e6c08-1d26-45c7-b513-e2ec5574195/sist-en-300-086-v2-1-2-2016>
- [i.6] CEPT/ERC/REC 74-01E: "Unwanted emissions in the spurious domain" (Hradec Kralove 2005).
- [i.7] 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.8] Commission Implementing Decision C(2015) 5376 final of 04.08.2015 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

50 Ω : 50 ohm non-reactive impedance

adjacent channel: channel offset from the wanted channel by the channel spacing

NOTE: See figure 1.

alternate channels: two channels offset from the wanted channel by double the channel spacing

NOTE: See figure 1.

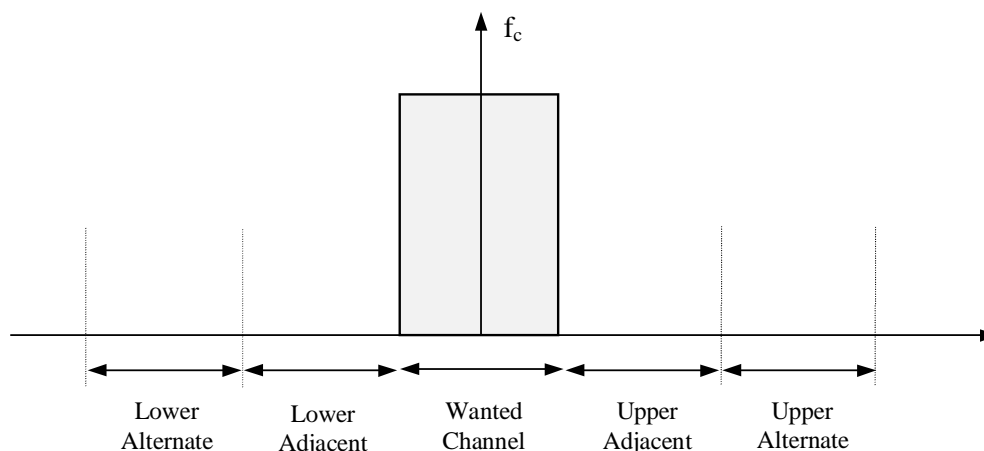


Figure 1: Adjacent and alternate channel definitions

angle modulation: either phase modulation or frequency modulation

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

conducted measurements: measurements which are made using a direct $50\ \Omega$ connection to the equipment under test

hand portable station: equipment either fitted with an antenna connector or an 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 $50\ \Omega$ 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 and equipment is designed to prevent transmission for interference reduction purposes if a signal is detected on the channel

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

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

SINAD meter: measurement instrument used to measure SND/ND

switching range (sr): maximum frequency range, as specified by the manufacturer, over which the receiver or the transmitter can be operated within the alignment range without reprogramming or realignment

3.2 Symbols

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

Ω	ohm
dB	decibel
dBm	dB relative to 1 mW
E_o	reference field strength

NOTE: See annex A.

F_{cs}	frequency equal to channel separation
f_{I1}	1 st intermediate frequency
f_{I2}	2 nd intermediate frequency
f_{In}	n th intermediate frequency
f_l	frequency of the limited frequency range
f_{LO}	local oscillator frequency
Ro	reference distance

NOTE: See annex A.

T_{max}	Maximum extreme test temperature
T_{min}	Minimum extreme test temperature
V_{max}	Maximum extreme test voltage
V_{min}	Minimum extreme test voltage

3.3 Abbreviations

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

CSP	Channel SeParation
CW	Continuous Wave
DC	Direct Current
EC	European Commission
emf	electromotive force
EU	European Union
EUT	Equipment Under Test
IEC	International Electrotechnical Committee
IF	Intermediate Frequency
ITU-T	International Telecommunications Union, Telecommunications Sector
LBT	Listen Before Transmit mode
MPFD	Maximum Permissible Frequency Deviation
OATS	Open Area Test Site
PMR	Private Mobile Radio
RBW	Resolution BandWidth
RF	Radio Frequency
rms	root mean squared
SINAD	received signal quality based on (SIGNAL + Noise + Distortion)/(Noise + Distortion)
SND/ND	(Signal + Noise + Distortion)/(Noise + Distortion)
sr	switching range
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio

4 General and operational requirements

4.1 General

4.1.1 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, but as a minimum, shall be that specified in the test conditions contained in the present document.

4.1.2 Choice of model for testing

Stand-alone equipment should 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 to be performed on the equipment configured with the combination of features considered to be the most complex.

Where practicable, equipment to be tested should 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 samples shall not be used for any radiated measurements.

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

NOTE: Guidance may be found in ETSI EN 300 793 [i.2].

4.1.3 Auxiliary test equipment

All necessary auxiliary test equipment, setting up instructions and other product information should be available.

4.2 Mechanical and electrical design

4.2.1 General iTeh STANDARD PREVIEW

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 <https://standards.iteh.ai/catalog/standards/sist/055e6c08-1d26-45c7-b513-ac2ee5d74105/sist-en-300-086-v2-1-2-2016>

Those controls, which if maladjusted, might increase the interfering potentialities of the equipment should 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 should automatically be switched off (the re-activation of the transmitter shall reset the timer).

A shut-off facility should 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 should be indicated.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Testing shall be performed under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in clauses 5.2 to 5.5.

5.2 Test power source

During testing the power source of the equipment shall be replaced by a test power source capable of producing normal and extreme test voltages as specified in clauses 5.3.2 and 5.4.2. The internal impedance of the test power source shall be low enough for its effect on the test results to be negligible. For the purpose of tests, the voltage of the power source shall be measured at the input terminals of the equipment.

For battery operated equipment the battery shall be removed and the test power source shall be applied as close to the battery terminals as practicable.

During tests of DC powered equipment the power source voltages shall be maintained within a tolerance of $< \pm 1\%$ relative to the voltage at the beginning of each test. The value of this tolerance is critical for power measurements. Using a smaller tolerance will provide better measurement uncertainty values.

5.3 Normal test conditions

5.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges:

- temperature: +15 °C to +35 °C;
- relative humidity: 20 % to 75 %.

When it is impracticable to carry out the tests under these conditions, a note to this effect, stating the ambient temperature and relative humidity during the tests, shall be added to the test report.

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5.3.2 Normal test power source

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5.3.2.1 Mains voltage

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed.

The frequency of the test power source corresponding to the ac mains shall be between 49 Hz and 51 Hz.

5.3.2.2 Regulated lead-acid battery power sources used on vehicles

When the radio equipment is intended for operation from the usual types of regulated lead-acid battery power source used on vehicles the normal test voltage shall be 1,1 times the nominal voltage of the battery (for nominal voltages of 6 V and 12 V, these are 6,6 V and 13,2 V respectively).

5.3.2.3 Other power sources

For operation from other power sources or types of battery (primary or secondary), the normal test voltage shall be that declared by the equipment manufacturer.