ETSI EN 300 219 V2.1.1 (2016-08)

Land Mobile Service;
Radio equipment 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

Reference

REN/ERM-TGDMR-349

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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.7] 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.5].

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.

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 applies to constant envelope angle modulation systems for use in the land mobile service, using the available bandwidth, operating on radio frequencies between 30 MHz and 1 GHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz intended for transmission and/or reception of signals used to initiate a specific response in the receiver.

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 present document applies to non-speech and to the non-speech part of combined speech/non-speech analogue equipment. In the present document, non-speech radio equipment is defined as a radio equipment transmitting a signal to initiate a specific response in the receiver. The equipment shall comprise a transmitter and associated encoder and/or a receiver and associated decoder. The encoder and/or decoder may be a separate piece of equipment, in which case compliance to the present document covers the encoder and/or decoder in connection with the transmitter and/or receiver equipment.

In the present document different requirements are given for the different radio frequency bands, channel separations, environmental conditions and types of equipment, where appropriate.

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

- Base Station: equipment fitted with an antenna socket;
- Mobile Station: equipment fitted with an antenna socket;
- Handportable stations:
  a) fitted with an antenna socket; or
  b) without an external antenna socket (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.

Handportable 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. Integral antenna equipment is covered by ETSI EN 300 341 [i.1] (see the corresponding scope).

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.5].

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.5] 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.41 (1994): "Psophometer for use on telephone-type circuits".

[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 EN 300 086 (V2.1.2) (08-2016): "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".

[4] IEC 60489-3 (1988): "Methods of measurement for radio equipment used in the mobile services. Part 3: Receivers for A3E or F3E emissions".

[5] 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.

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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] ETSI EN 300 341 (V1.4.1): "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.2] ETSI EN 300 793 (1998): "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)".

[i.5] 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.6] CEPT/ERC/REC 74-01E: "Unwanted emissions in the spurious domain" (Siófok 1998, Nice 1999, Sesimbra 2002; Hradec Kralove 2005).

[i.7] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

angle modulation: either phase modulation (G3) or frequency modulation (F3)

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

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

handportable station: equipment either fitted with an antenna socket 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 Ω external connector and considered to be part of the equipment

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

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

psophometric weighting network: psophometric weighting network is described in Recommendation ITU-T O.41 [1]

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

3.2 Symbols

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

t_a	transmitter attack time
P_c	transmitter steady state carrier power
F_c	transmitter steady state frequency
$t_{a m}$	transmitter measured attack time
$t_{a l}$	transmitter attack time limit
df_e	transmitter steady state frequency error
t_r	transmitter release time
$t_{r m}$	transmitter measured release time
$t_{r l}$	transmitter release time limit

3.3 Abbreviations

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

AC	Alternating Current
bit	binary digit
dB	decibel
dBμV	decibel relative to 1 μV
dBm	decibel relative to 1 mW
emf	electro-motive force
IF	Intermediate Frequency
OATS	Open Area Test Site
RF	Radio Frequency
rms	root mean square
Rx	Receiver
SINAD	(Signal + Noise + Distortion)/(Noise + Distortion)

SR Switching Range
Tx Transmitter

4 Speech equipment with signalling

4.1 Applicability

4.1.1 General

Where several harmonised standards are applicable to the equipment then the following shall be followed to avoid double testing of the same parameters.

4.1.2 Equipment with speech and signalling functions

In the case of combined speech/non-speech equipment the speech part shall be tested to ETSI EN 300 086 [3] and additionally the tests described in the following clauses of the present document shall be carried out:

clause 8.4: Adjacent channel power;

clause 9.2: Maximum usable sensitivity (responses, conducted);

clause 9.3: Average usable sensitivity (responses, field strength) in the case of equipment having an integral antenna.

These requirements also apply for equipment with an analogue output facility provided for test purposes only.

Additionally, the measurement of the spurious emissions (clause 8.5) shall be performed when an equipment, previously tested to ETSI EN 300 086 [3] is being tested to the present document with an add-on signalling unit. If the equipment has been originally combined for analogue and signalling operation, the measurement of the spurious emissions need not to be performed again if the signalling port(s) (and the signalling circuits/modules) were active while making this measurement for the test ETSI EN 300 086 [3].

4.1.3 Equipment with an add-on signalling unit

In the case where an equipment has already been tested according to the present document and is re-tested with an add-on-signalling unit using another type of modulation without affecting any other characteristic of the equipment, only some additional measurements shall be performed; they shall ensure that the equipment fulfils the requirements of the following clauses:

clause 8.4: adjacent channel power;

clause 8.5: spurious emissions;

clause 9.2: maximum usable sensitivity (responses, conducted);

clause 9.3: average usable sensitivity (responses, field strength).

In the case where signalling is transmitted simultaneously with analogue speech, the speech part of the equipment is tested according to ETSI EN 300 086 [3], and it shall also be checked that the signalling does not cause the adjacent channel power and spurious emissions to exceed the appropriate limits.

5 General and operational requirements

5.1 General

5.1.1 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.

5.1.2 Choice of model for testing

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.5].

NOTE: Guidance on the presentation of equipment is also given in ETSI EN 300 793 [i.2].

5.2 Mechanical and electrical design

5.2.1 General

Equipment shall be designed, constructed and manufactured in accordance with sound engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

5.2.2 Controls

Those controls which if maladjusted might increase the interfering potentialities of the equipment shall not be accessible to the user.

5.2.3 Transmitter shut-off facility (time-out)

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 activation of the transmitter key 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.

6 Test conditions, power sources and ambient temperatures

6.1 Normal and extreme test conditions

Measurements shall be made under normal test conditions and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in clauses 6.2 and 6.5.

6.2 Test power source

During measurements 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 6.3.2 and 6.4.2. 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.

If the equipment is provided with a permanently connected power cable, the test voltage shall be that measured at the point of connection of the power cable to the equipment.

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

During the tests the power source voltages shall be maintained within a tolerance of < ±1 % relative to the voltage at the beginning of each test. The value of this tolerance is critical to power measurements, using a smaller tolerance will provide better measurement uncertainty values.

6.3 Normal test conditions

6.3.1 Normal temperature and humidity

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

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

When it is impracticable to carry out the tests under these conditions, the ambient temperature and relative humidity during the tests shall be recorded.

6.3.2 Normal test power source

6.3.2.1 Mains voltage

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.

6.3.2.2 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 x 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).

6.3.2.3 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.

6.4 Extreme test conditions

6.4.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in clause 6.5, at the upper and lower temperatures of one of the following range:

- -20 ºC to +55 ºC:
  - all mobile and handportable equipment;
  - base stations for outdoor/uncontrolled climate conditions.