ETSI EG 203 336 V1.2.1 (2020-05)

Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU

Reference
REG/ERM-587

Keywords
harmonised standard, radio, receiver, regulation, transmitter

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

Modal verbs terminology

In the present document "**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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Introduction

The present document reflects current understanding of this highly technical subject matter and is subject to change. Therefore, it should be treated as guidance rather than a formal reference for judging the content of Harmonised Standards.

It should be noted that this is not a mandatory document, transmitters and receivers should be assessed on their expected use and appropriate parameters selected by the Technical Body.

1 Scope

The present document has been produced to help a Technical Body (TB) to produce a Harmonised Standard (HS) covering the conformity of radio equipment with the essential requirements in articles 3.1(b) and 3.2 of the Radio Equipment Directive (Directive 2014/53/EU [i.1]).

NOTE 1: Article 3.1(b) of Directive 2014/53/EU [i.1] states:

"Radio equipment shall be constructed so as to ensure….an adequate level of electromagnetic compatibility as set out in Directive 2014/30/EU."

NOTE 2: Article 3.2 of Directive 2014/53/EU [i.1] states:

"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."

The present document does not cover the production of HSs covering article 3.1(a) of Directive 2014/53/EU [i.1] which is the responsibility of CENELEC and article 3.3 which requires delegated acts by the European Commission (EC).

2 References

2.1 Normative references

Normative references are not applicable in the present document.

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] 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 (OJ L153, 22.5.2014, p62).

[i.2] CEPT/ERC/Recommendation 74-01E: "Unwanted emissions in the spurious domain".

[i.3] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (OJ L96 29.3.2014, p96).

[i.4] Void.

[i.5] Void.

[i.6] CEPT/ECC/Recommendation (02)05: "Unwanted emissions".

[i.7] Void.

[i.8] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (OJ L91, 7.4.1999).

[i.9] ETSI EN 300 676-1: "Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Part 1: Technical characteristics and methods of measurement".

[i.10] ETSI EN 301 489-1: "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

[i.11] ETSI EG 203 367: "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".

[i.12] RSPG 19-031: "RSPG Report on European Spectrum Strategy".

[i.13] ETSI TS 103 567 (V1.1.1): "Requirements on signal interferer handling".

[i.14] ETSI EN 301 489 (all parts): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in article 2 of Directive 2014/53/EU [i.1] and the following apply:

adaptive frequency agility: technique used by some radio transmitters to avoid transmission in channels that are already occupied by other spectrum users

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

NOTE: See figure 1.

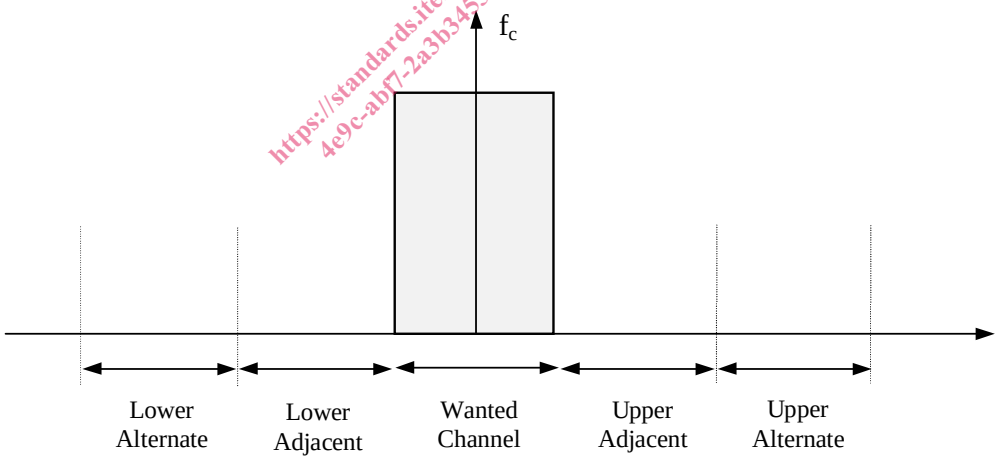

Figure 1: Adjacent and alternate channel/signal definitions

adjacent band: frequency band adjacent to the operating band

adjacent signal: signal adjacent to the wanted signal

alternate channels: channel(s) offset from the wanted channel by twice the channel spacing

NOTE: See figure 1.

cabinet radiation: emissions from the equipment, radiated from the enclosure port, other than those present at the antenna port

detect and avoid: mechanism which mitigates interference potential by avoiding use of frequencies upon detection of other transmissions on those frequencies

jitter (phase noise): short term variations of the significant instants of a digital signal from their reference positions in time

operating band: frequency band in which the EUT is intended to transmit and/or receive

transmitter spectrum mask: maximum allowed power emitted by the transmitter as a function of frequency, either expressed in power density versus frequency, or in total power within defined frequency band

3.2 Symbols

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

f_c	Carrier frequency
F_{rx}	Nominal frequency of the receiver
F_{if}	Intermediate frequency of the receiver

3.3 Abbreviations

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

ADC	Analogue to Digital Converter
ADCO	ADministrative COoperation groups
AFA	Adaptive Frequency Agility
AM	Amplitude Modulation
CENELEC	European Committee for Electrotechnical Standardization
CEPT	European Conference of Postal and Telecommunications Administrations
CISPR	International Special Committee on Radio Interference (a subcommittee of IEC)
DAA	Detect And Avoid
DDC	Digital Down Conversion
DFS	Dynamic Frequency Selection
EC	European Commission
ECC	Electronic Communications Committee
EIRP	Effective Isotropic Radiated Power
EMC	ElectroMagnetic Compatibility
ERP	Effective Radiated Power
ESO	European Standards Organization
EU	European Union
EUT	Equipment Under Test
HS	Harmonised Standard
IEC	International Electrotechnical Commission
LBT	Listen Before Talk
LO	Local Oscillator
OCG	Operational Co-ordination Group
OOB	Out Of Band
PPDR	Public Protection and Disaster Relief
QoS	Quality of Service
RED	Radio Equipment Directive (2014/53/EU [i.1])
RF	Radio Frequency
RIS	Radio Interface Specifications
RLAN	Radio Local Area Network
RX	Receiver
SRD	Short Range Device
TB	Technical Body
TPC	Transmitter Power Control
UWB	Ultra WideBand
VHF	Very High Frequency
WAS	Wireless Access Systems

4 Applicability of Radio Parameters

4.1 General

The essential requirements of the Radio Equipment Directive are general and do not identify specific design criteria. ETSI HSs define criteria for fulfilling the essential requirements by providing applicable radio parameters for the development and manufacturing of radio equipment.

The TB should identify the parameters and/or tests necessary to be specified in an HS for the radio system under consideration to fulfil the essential requirements in article 3.2 of Directive 2014/53/EU [i.1] by considering the radio parameters in the following clauses of the present document.

The parameters in clause 5 of the present document are the minimal set TBs should consider including in HSs. These parameters are relevant for most equipment, but TBs may consider including additional parameters where relevant. The order of the parameters is not significant.

TBs not including one or more of the parameters in clause 5, or including additional parameters, should include a technical justification of such deviation from the present document in the HS or in a referenced separate ETSI deliverable.

The guidance in clause 6 applies when producing an HS under article 3.1(b) of Directive 2014/53/EU [i.1] covering the ElectroMagnetic Compatibility (EMC) aspects of radio equipment.

Any differences from terminology used in the present document should be clarified in the HS or in a separate ETSI deliverable.

When drafting HSs, relevant ETSI TBs should take into consideration all applicable CEPT/ECC deliverables.

4.2 Additional Information required

4.2.1 Operating frequency range

The operating frequency range consists of the radio frequency band(s) over which the transmitter and receiver operate in accordance with the intended use of the equipment, as referred to in Article 10(8) of the Radio Equipment Directive [i.1]:

> *"Manufacturers shall ensure that the radio equipment is accompanied by instructions and safety information in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned. Instructions shall include the information required to use radio equipment in accordance with its intended use. …*
>
> *The following information shall also be included in the case of radio equipment intentionally emitting radio waves:*
>
> *(a) frequency band(s) in which the radio equipment operates;*
>
> *(b) maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates."*

However, this type of information is not part of the normative requirements included in the HSs covering article 3.1(b) and article 3.2 of Directive 2014/53/EU, which are within the scope of the present document.

4.2.2 Other information

At the discretion of the TB, other information may be required, for example to facilitate testing. Informative annexes may be included where appropriate.

TBs should not include requirements for manufacturers declarations within the normative part of HSs.

5 Technical parameters for article 3.2 of Directive 2014/53/EU

5.1 General

Harmonised Standards (HSs) are not intended to specify how products are designed but how they respond in the presence of various external stimuli (simulating other spectrum users and interference). An EUT in an HS should be regarded as a "black box".

Some equipment may implement features relevant to article 3.2 using embedded software. Where appropriate, TBs should include provisions in an HS that prevent unintended configurations potentially leading to non-conformity with article 3.2.

An "Environmental Profile" clause should be included which indicates that technical requirements should be met throughout the environmental conditions indicated in the HS. Example text is provided in the skeleton document for HSs available from the ETSI web site.

The Radio Equipment Directive (RED) does not contain an equivalent of "Essential Radio Test Suites" from annex III of Directive 1999/5/EC [i.8]. Nevertheless, in order to ensure repeatability, HSs should specify, when necessary, test procedures and corresponding test conditions.

5.2 Transmitter parameters under article 3.2 of Directive 2014/53/EU

5.2.1 General

The essential requirement in article 3.2 of Directive 2014/53/EU [i.1] states:

"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."

When deciding which transmitter parameters to include in the HS, TBs should consider both in-band and adjacent-band. Relevant Electronic Communications Committee (ECC) and/or European Union (EU) deliverables may provide useful information.

In order to facilitate the application of HSs, the technical conditions attached to spectrum regulations (including conditions to support a general licence) should be taken into consideration when drafting the HS compliance conditions.

Justification for the requirements in relation to transmitters is given by recital 10 of the Directive which states:

"…when the transmitter is properly installed, maintained and used for its intended purpose it generates radio waves emissions that do not create harmful interference, while unwanted radio waves emissions generated by the transmitter (e.g. in adjacent channels) with a potential negative impact on the goals of radio spectrum policy should be limited to such a level that, according to the state of the art, harmful interference is avoided;"

Some equipment types may have a number of different operational transmission modes with different spectrum usages. The HS should be developed such that compliance with the essential requirements is ensured when operating in any operational mode.

5.2.2 Transmitter power limits

HSs may include transmitter power limits. However, TBs should note that these are defined in national Radio Interface Specifications (RIS) and also in individual or general licence authorizations. Furthermore, TBs should be aware that there may be relevant ECC and EU deliverables.

The transmitter power limits may include a minimum range of Transmitter Power Control (TPC) (see clause 5.4 on interference mitigation techniques).