

ETSI EN 302 017 V2.1.1 (2017-04)



**Transmitting equipment for the
Amplitude Modulated (AM) sound broadcasting service;
Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU**

Standard for Public Review
Full name: ETSI EN 302 017 V2.1.1 (2017-04)
https://standards.iteh.ai/catalog/standards/sis/49be-bbba-be590f6dd185/etsi-en-302-017-v2.1.1-2017-04

Reference

REN/ERM-TG17-14

Keywords

AM, audio, broadcasting, harmonised standard,
radio, regulation, terrestrial, transmitter

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/CommitteeSupportStaff.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 2017.

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	5
Foreword.....	5
Modal verbs terminology.....	5
Introduction	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definitions, symbols and abbreviations	7
3.1 Definitions	7
3.2 Symbols.....	8
3.3 Abbreviations	8
4 Technical requirements specifications	8
4.1 Environmental profile.....	8
4.2 Conformance requirements	8
4.2.1 Rated output power	8
4.2.1.1 Definition	8
4.2.1.2 Limit.....	8
4.2.1.3 Conformance.....	8
4.2.2 Frequency drift.....	8
4.2.2.1 Definition	8
4.2.2.2 Limit.....	9
4.2.2.3 Conformance.....	9
4.2.3 Spurious emissions	9
4.2.3.1 Definition	9
4.2.3.2 Limit.....	9
4.2.3.3 Conformance.....	10
4.2.4 Transmitter muting during frequency shift	10
4.2.4.1 Definition	10
4.2.4.2 Limits	10
4.2.4.3 Conformance.....	10
4.2.5 Out-of-band emissions	10
4.2.5.1 Definition	10
4.2.5.2 Limit.....	10
4.2.5.3 Conformance.....	12
5 Testing for compliance with technical requirements.....	12
5.1 Environmental conditions for testing	12
5.2 Interpretation of the measurement results	12
5.3 Methods of measurement	13
5.3.1 Rated output power	13
5.3.1.1 Initial conditions	13
5.3.1.2 Procedure	13
5.3.1.3 Test requirements.....	13
5.3.2 Frequency drift.....	14
5.3.2.1 Initial conditions	14
5.3.2.2 Procedure	14
5.3.2.3 Test requirements.....	14
5.3.3 Spurious emissions	14
5.3.3.1 Initial conditions	14
5.3.3.2 Procedure	14
5.3.3.3 Test requirements.....	15
5.3.4 Transmitter muting during frequency shift	15
5.3.4.1 Initial conditions	15

5.3.4.2	Procedure	15
5.3.4.3	Test requirements	15
5.3.5	Out-of-band emissions	15
5.3.5.1	Initial conditions	15
5.3.5.2	Procedure	16
5.3.5.3	Test requirements	16
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	17
Annex B (normative):	General measuring arrangements	18
B.1	Testing arrangements for antenna port measurements	18
B.2	Test frequency range	18
B.3	Test modulating signal	19
B.4	Test load characteristics	20
Annex C (informative):	Change History	21
History		22

iTeh STANDARD PREVIEW
 (standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/38478d71-92f9-49be-bbba-be590f6dd185/etsi-en-302-017-v2.1.1-2017-04>

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.4] 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.1].

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:	27 March 2017
Date of latest announcement of this EN (doa):	30 June 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 December 2017
Date of withdrawal of any conflicting National Standard (dow):	31 December 2018

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.

Introduction

The present document describes the requirements for the design and operation of an AM sound broadcasting service transmitter to meet the essential requirements of article 3.2 of Directive 2014/53/EU [i.1].

1 Scope

The present document specifies technical characteristics and methods of measurements for transmitter equipment for broadcast sound services using the Double Side Band amplitude modulated sound broadcasting service operating in the LF, MF and HF bands.

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.1] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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.

Not applicable.

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.
- [i.2] ETSI TR 100 028-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [i.3] ETSI TR 100 028-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.4] 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 terms and definitions given in Directive 2014/53/EU [i.1] and the following apply:

antenna port: port of an apparatus which is designed, in normal operation, to be connected to an antenna using coaxial cable

broadcasting service: radiocommunication service in which the transmissions are intended for direct reception by the general public

NOTE: This service may include sound transmissions, television transmissions or other types of transmission.

carrier power: average power supplied to the antenna transmission line by a transmitter during one cycle taken under the condition of no modulation

channel bandwidth: frequency band of defined width (as a multiple of the carrier grid) including safety margin for operation on adjacent channels, located symmetrically around a carrier frequency in the carrier grid

class of emission: set of characteristics of an emission, designated by standard symbols, e.g. type of modulation of the main carrier, modulating signal, type of information to be transmitted, and also, if appropriate, any additional signal characteristics

dBc: decibels relative to the unmodulated carrier power of the emission

NOTE: In the cases which do not have a carrier, for example in some digital modulation schemes where the carrier is not accessible for measurement, the reference level equivalent to dBc is decibels relative to the mean power P.

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

harmonic: component of order greater than 1 of the Fourier series of a periodic quantity

harmonic number: integral number given by the ratio of the frequency of a harmonic to the fundamental frequency (second harmonic = $2 \times$ fundamental frequency)

intermodulation products: unwanted frequencies resulting from intermodulation between carriers or harmonics of emission, or between any oscillations generated to produce the carrier

mean power: average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation envelope taken under normal operating conditions

necessary bandwidth: for a given class of emission, width of the frequency band which is sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

out-of-band emissions: emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

reference bandwidth: bandwidth in which the spurious emission level is specified

spurious emissions: emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out of band emissions.

unwanted emissions: spurious emissions and out of band emissions

3.2 Symbols

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

Ω	ohms (unit of resistance)
μ	micro, 10^{-6}

3.3 Abbreviations

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

AF	Audio Frequency
AM	Amplitude Modulation
dB	decibel, logarithmic ratio (tenths of a "Bel")
dBm	dB relative to one milliwatt
EUT	Equipment Under Test
HF	High Frequency
LF	Low Frequency
MF	Medium Frequency
RF	Radio Frequency
V	Volt

4 Technical requirements specifications

4.1 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. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile.

4.2 Conformance requirements

4.2.1 Rated output power

4.2.1.1 Definition

The rated output power is the carrier power that the transmitter or transposer shall deliver at its antenna port under manufacturers specified conditions of operation.

4.2.1.2 Limit

The carrier output power shall be the rated output power under normal operating conditions as defined by the manufacturer.

4.2.1.3 Conformance

Conformance tests as defined in clause 5.3.1 shall be carried out.

4.2.2 Frequency drift

4.2.2.1 Definition

The uncontrolled continuous and irreversible variation of frequency against a predetermined time scale.

4.2.2.2 Limit

For a period of not less than ninety days, the frequency of the transmitter shall stay within the tolerance of ± 10 Hz.

4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

4.2.3 Spurious emissions

4.2.3.1 Definition

Emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out of band emissions.

4.2.3.2 Limit

Spurious emissions shall not exceed the values set out in table 4.1, additionally shown in figure 4.1, for the frequency range 9 kHz to 1 GHz.

Table 4.1: Spurious emission limits

Mean power of the transmitter	Limits Mean power absolute levels (dBm) or relative levels (dBc) below the mean power supplied to the antenna port in the reference bandwidth (see annex B)
All power ranges	-50 dBc, without exceeding the absolute mean power of 50 mW (17 dBm)

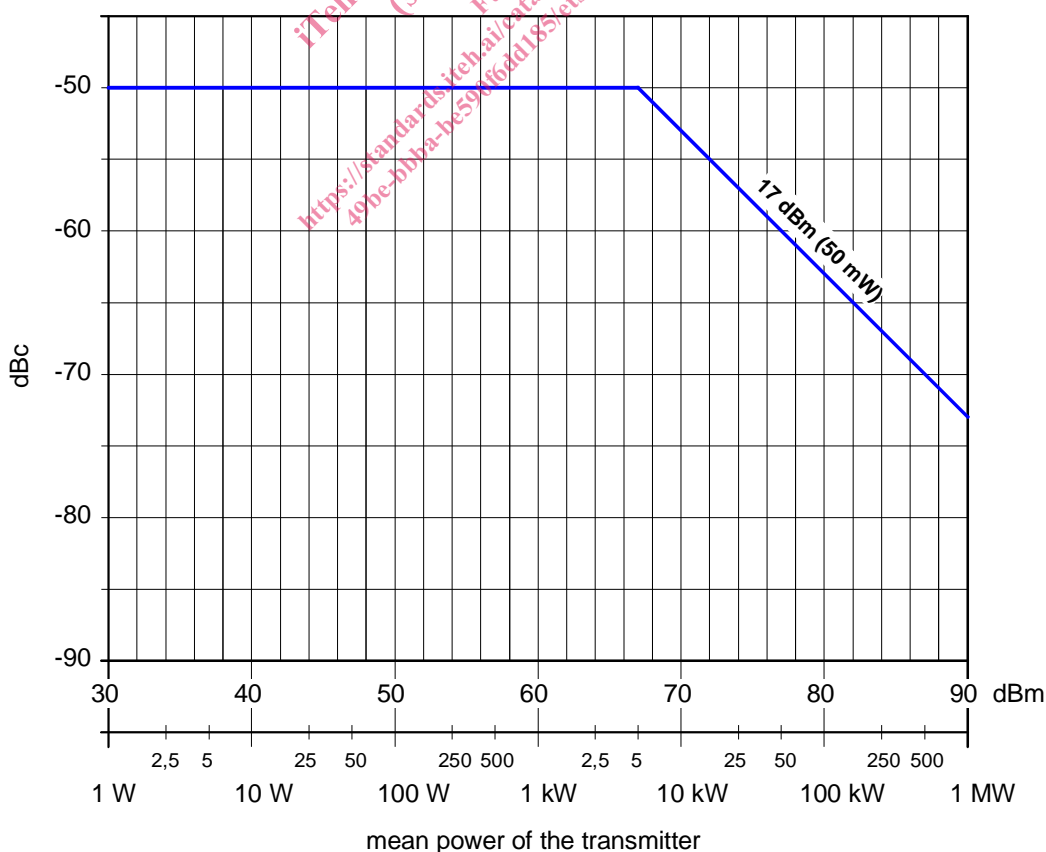


Figure 4.1: Spurious emission limits

4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

4.2.4 Transmitter muting during frequency shift

4.2.4.1 Definition

The suppression of emissions during the re-tuning of transmitters.

4.2.4.2 Limits

The muting shall be as defined in clause 4.2.3.2.

4.2.4.3 Conformance

Conformance tests as defined in clause 5.3.4 shall be carried out.

4.2.5 Out-of-band emissions

4.2.5.1 Definition

Emission on a frequency or frequencies immediately outside the necessary bandwidth, which results from the modulation process, but excludes spurious emissions.

4.2.5.2 Limit

Out of band emissions shall not exceed the values set out in table 4.2. Additionally, the limits are shown in figure 4.2 on a logarithmic frequency axis and in figure 4.3 on a linear axis.

Relationship between the 0 dB reference level and the carrier level:

- The reference level 0 dB corresponds to power density that would exist if the total RF power, excluding the power of the carrier, were distributed uniformly over the necessary bandwidth.

The ratio α_B (dB) of 0 dB reference level to the carrier is given by the equation:

$$\alpha_B = 10 \log \frac{m_{rms}^2 B_{eff}}{2 F} \quad \text{where:} \quad m_{rms} = \text{r.m.s modulation factor of the transmitter}$$

B_{eff} = effective noise bandwidth of the analyser

F = necessary bandwidth for the emission

Hence the reference level depends on the power of the sideband P_s , given by the formula:

$$P_s = \frac{m_{rms}^2}{2} P_c \quad \text{where:} \quad P_c = \text{carrier power}$$

If frequency is plotted as the abscissa in logarithmic units and if the power densities are plotted as ordinates (dB) the curve representing the out-of-band spectrum should lie below two straight lines starting at point $(0,5 F; 0 \text{ dB})$ or at point $(-0,5 F; 0 \text{ dB})$ and finishing at point $(0,7 F; -35 \text{ dB})$ or $(-0,7 F; -35 \text{ dB})$ respectively. Beyond these points and down to the level of -60 dB, this curve should lie below two straight lines starting from the latter points and having a slope of 12 dB/octave. Thereafter, the same curve should lie below the level -60 dB. The ordinate of the curve so defined represents the average power intercepted by an analyser with an rms noise bandwidth of 100 Hz, the frequency of which is tuned to the frequency plotted on the abscissa.