

Draft **ETSI EN 303 345-2** V1.2.0 (2021-09)



**Broadcast Sound Receivers;
Part 2: AM broadcast sound service;
Harmonised Standard for access to radio spectrum**

[ETSI EN 303 345-2 V1.2.0 \(2021-09\)](https://standards.iteh.ai/catalog/standards/sist/e09616fd-b044-4825-9d48-f5668530fc60/etsi-en-303-345-2-v1-2-0-2021-09)

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ReferenceREN/ERM-TG17-156

Keywordsanalogue, broadcast, harmonised standard, radio,
receiver

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Foreword

ETSI EN 303 345-2 V1.2.0 (2021-09)

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] 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.

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

The present document has a number of test data files that are contained in archive en_30334501v010101p0.zip which accompanies ETSI EN 303 345-1 [1].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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 provides the necessary limits and conformance requirements for radio receivers to meet the essential requirements of article 3.2 of Directive 2014/53/EU [i.1] for the AM sound broadcast service and is used with reference to ETSI EN 303 345-1 [1], which describes the generic requirements and test methods.

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1 Scope

The present document specifies technical characteristics and methods of measurements for broadcast sound receivers with AM demodulation.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

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 <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.

- [1] ETSI EN 303 345-1 (V1.1.1) (06-2019): "Broadcast Sound Receivers; Part 1: Generic requirements and measuring methods"
- [2] Recommendation ITU-R BS.468-4 (07-1986): "Measurement of audio-frequency noise voltage level in sound broadcasting"
- [3] Recommendation ITU-R BS.559-2 (06-1990): "Objective measurement of radio-frequency protection ratios in LF, MF and HF broadcasting"
- [4] EN 55032:2015: "Electromagnetic compatibility of multimedia equipment - Emission Requirements", produced by CENELEC.

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] 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] 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.3] Void.
- [i.4] Void.

- [i.5] Recommendation ITU-R BS.1615-1: "Planning parameters for digital sound broadcasting at frequencies below 30 MHz".
- [i.6] AES17: "AES standard method for digital audio engineering - Measurement of digital audio equipment".
- [i.7] ETSI EG 203 336 (V1.1.1) (08-2015): "Electromagnetic compatibility and Radio spectrum Matters (ERM); 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".
- [i.8] ITU GE75: "Final Acts of the Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3)".
- [i.9] Recommendation ITU-R BS.560-4 (10-1997): "Radio-frequency protection ratios in LF, MF and HF broadcasting".
- [i.10] Recommendation ITU-R SM.332-4 (07-1978): "Selectivity of Receivers".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

built-in antenna: antenna that cannot be detached from the equipment

crest factor: peak to rms voltage ratio

external antenna: antenna designed to be connected to the equipment with the use of a 50 Ω or 75 Ω external connector

integral antenna: antenna which is detachable from the equipment without the use of any tools, and not using a 50 Ω or 75 Ω external connector

NOTE: A device that uses a supplied earphone as the antenna has an integral antenna.

3.2 Symbols

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

dBFS	decibels relative to Full Scale in accordance with AES17 [i.6]
dBm	decibels relative to 1 mW of power
dBQ	audio decibels after Recommendation ITU-R BS.468-4 [2] noise weighting and a quasi-peak detector have been applied
dB μ V/m	decibels relative to 1 μ V/m

3.3 Abbreviations

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

ACS	Adjacent Channel Selectivity
ADC	Analogue to Digital Converter
AM	Amplitude Modulation
BS	Broadcast Sound
BW	BandWidth
DDC	Direct Digital Conversion
EFTA	European Free Trade Association
EU	European Union
HF	High Frequency

IQ	In-phase and Quadrature
ITU-R	International Telecommunications Union - Radiocommunications sector
LF	Low Frequency
LO	Local Oscillator
MF	Medium Frequency
NZIF	Near-Zero Intermediate Frequency
PC	Personal Computer
RED	Radio Equipment Directive
RF	Radio Frequency
RMS	Root Mean Square
SNR	Signal to Noise Ratio
USB	Universal Serial Bus

4 Technical requirements specifications

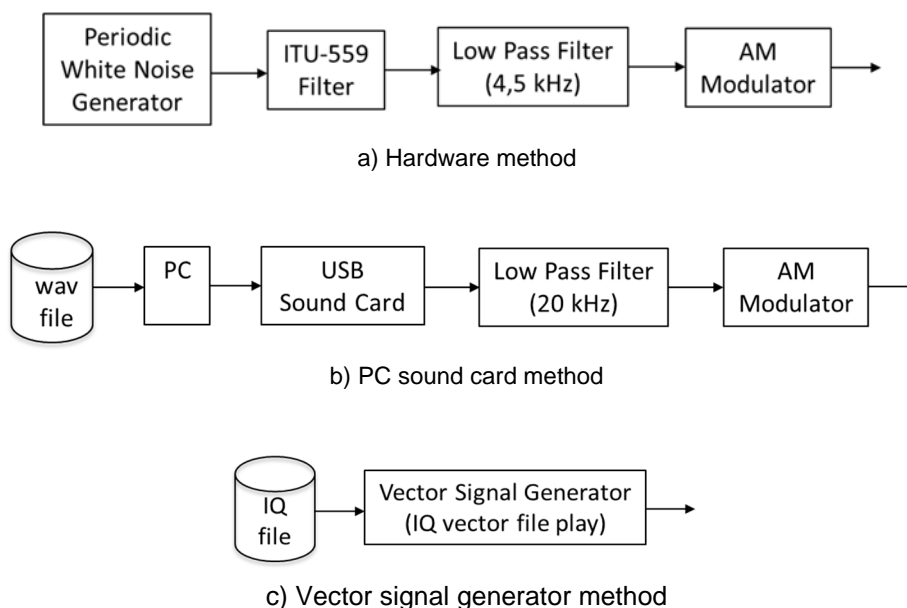
4.1 Test signal configurations

The generated AM signals (wanted, unwanted and blocking) shall be in accordance with table 1. The configuration is based on Recommendation ITU-R BS.1615-1 [i.5].

Table 1: AM configuration

Parameter	AM signals		
	Wanted	Unwanted	Blocking
Audio modulation	1 kHz tone	Weighted noise Recommendation ITU-R BS.559-2 [3], clause 1, band-limited to 4,5 kHz (see note 1)	1 kHz tone
Other modulation parameters	40 % depth	22,8 % RMS depth (see note 2)	80 % depth
NOTE 1: The filter shall have a cut-off frequency of 4,5 kHz and a minimum roll-off of 60 dB/octave.			
NOTE 2: This is equivalent to a quasi-peak modulation depth of 50 %. The demodulated audio level will have the same quasi-peak value as that of a carrier with 50 % AM modulation depth modulated with a 1 kHz sinusoid.			

The means of generating the noise modulation for the "unwanted" signal is shown in figure 1.



NOTE: In a), the low pass filter has a cut-off frequency of 4,5 kHz and a minimum roll-off of 60 dB/octave; in b), the low pass filter has a cut-off frequency of 20 kHz and a minimum roll-off of 40 dB/octave.

Figure 1: Example arrangements for generating the unwanted signal

Waveform files to produce the signals using either the PC sound card method or the vector signal generator method are contained in archive en_30334501v010101p0.zip which accompanies ETSI EN 303 345-1 [1]. For further details see annex B.

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4.2 Sensitivity

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4.2.1 Definition

The receiver sensitivity is the minimum wanted signal level required to provide a given level of audio quality.

4.2.2 Limits

The limits for sensitivity specified in table 2 shall apply. Each figure quoted is the required level of wanted signal which provides a given level of audio quality. The audio impairment criterion relevant for these tests is that the audio SNR ≥ 22 dBQ ref 40 % AM.

Table 2: AM sensitivity requirements

De-modulation	Tuned frequency band	Wanted signal centre frequency (MHz) (see note)	Required sensitivity limit	
			Conducted (dBm)	Radiated (dB μ V/m)
AM	LF	0,216	-65	74
	MF	0,999	-65	66
	HF	9,650	-65	60
NOTE:	If the receiver cannot be tuned to 9,650 MHz, the wanted signal centre frequency shall be set to the closest alternate from the following list: 3,980 MHz, 6,050 MHz, 7,330 MHz, 11,850 MHz, 13,720 MHz, 15,450 MHz, 17,690 MHz, 18,960 MHz, 21,650 MHz, 25,890 MHz.			

4.2.3 Conformance

Conformance testing as defined in ETSI EN 303 345-1 [1], clause 5.3.4.1 shall be carried out for each frequency band provided by the receiver. The wanted signal generator shall be set to produce a signal according to table 1 at the centre frequency according to table 2. The required sensitivity level shall be as indicated in table 2. If the impairment criterion given in clause 4.2.2 is met for all provided bands then the receiver has passed the sensitivity requirement.

NOTE: When measuring the AM power level, the carrier is unmodulated.

4.3 Adjacent channel selectivity and blocking

4.3.1 Definition

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal which differs in frequency from the wanted signal by an amount equal to a small multiple of the adjacent channel spacing. The wanted and unwanted signals are of the same modulation type.

The blocking ratio is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at a given frequency separation. The wanted and unwanted signals are of the same modulation type.

In order to provide effective use of spectrum, devices shall be able to demodulate the tuned signal in the presence of similar signals in adjacent channels. In addition, testing shall also be performed to check the ability of the receiver to work effectively with interfering signals at a greater separation from the wanted signal (blocking).

The channel spacings specified in table 3 shall apply.

Table 3: Channel spacing for adjacent channel selectivity and blocking

Demodulation	Tuned frequency band	Unwanted frequency (N = 1, 2, 3)	Unwanted frequency (blocking)
AM	LF	$\pm N \times 9$ kHz	± 90 kHz
	MF	$\pm N \times 9$ kHz	± 90 kHz
	HF	$\pm N \times 10$ kHz	± 100 kHz

4.3.2 Limits

The limits for selectivity and blocking specified in table 4 shall apply with the channel spacings given in table 3. Each figure quoted is the minimum acceptable level of unwanted signal, relative to that of the wanted signal, which provides a given level of audio quality. The audio impairment criteria relevant for these tests is that the audio SNR ≥ 22 dBQ ref 40 % AM.