



**ElectroMagnetic Compatibility (EMC)
standard for radio equipment and services;
Part 53: Specific conditions for terrestrial sound broadcasting
and digital TV broadcasting service transmitters and
associated ancillary equipment
Harmonised Standard covering the essential requirements of
article 3.1(b) of Directive 2014/53/EU**

ReferenceDEN/ERM-EMC-358

Keywords

broadcasting, EMC, harmonised standard

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
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references	7
3 Definitions, symbols and abbreviations	7
3.1 Definitions	7
3.2 Symbols	8
3.3 Abbreviations	8
4 Test conditions	9
4.1 General	9
4.2 Arrangements for test signals	9
4.2.0 General.....	9
4.2.1 Arrangements for test signals at the input of the broadcast service transmitter	10
4.2.2 Arrangements for test signals at the output of broadcast service transmitters	10
4.3 RF exclusion bands	11
4.3.1 Introduction.....	11
4.3.2 Broadcast service transmitter exclusion bands	11
4.4 Narrow band responses of receivers	11
4.5 Normal test modulation	11
5 Performance assessment.....	12
5.1 General	12
5.2 Equipment which can provide a continuous communication link as a broadcasting transmission.....	12
5.3 Equipment which does not provide a continuous communication link as a broadcasting transmission.....	12
5.4 Ancillary equipment	13
5.5 Equipment classification	13
6 Performance criteria	13
6.0 Introduction	13
6.1 Performance criteria for continuous phenomena applied to transmitters (CT).....	13
6.2 Performance criteria for transient phenomena applied to Transmitters (TT)	14
7 Applicability overview	15
7.1 Emission	15
7.1.1 General.....	15
7.1.2 Special conditions	15
7.1.3 Enclosure Port (Cabinet Radiation)	15
7.1.3.1 Radiated emissions below 1 GHz.....	15
7.1.3.2 Radiated emissions above 1 GHz.....	16
7.2 Immunity	16
7.2.1 General.....	16
7.2.2 Special conditions	17
Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU	18
Annex B (informative): Types of broadcasting service equipment covered by the present document	20
B.1 AM sound broadcasting transmitters.....	20
B.2 FM sound broadcasting transmitters and power amplifiers.....	20
B.3 DRM sound broadcasting transmitters	20

B.4	T-DAB/T-DMB sound broadcasting transmitters, power amplifiers, and On-Channel repeaters	20
B.5	Digital television transmitters, power amplifiers, active deflectors, transposers, and on-channel repeaters	20
Annex C (informative):	Bibliography	22
Annex D (informative):	Change history	23
History		24

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/6fe63eee-a3b2-42c8-90ec-d436c92d23e6/etsi-en-301-489-53-v1.1.1-2019-04>

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 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.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.

The present document is part 53 of a multi-part deliverable. Full details of the entire series can be found in part 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.

1 Scope

The present document specifies technical characteristic and methods of measurements for terrestrial sound broadcasting and digital TV broadcasting service transmitters, exciters, repeaters, active deflectors, On-Channel repeaters and any associated ancillary equipment.

The present document covers the essential requirements of article 3.1(b) of Directive 2014/53/EU [i.1] under the conditions identified in annex A.

Technical specifications related to the antenna port emissions are not included in the present document. Such technical specifications are found in the relevant product standards of ETSI for the effective use of the radio spectrum.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and ETSI EN 301 489-1 [1], the provisions of the present document take precedence.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or continuous phenomena is permanently present, e.g. a radar site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

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.

- [1] ETSI EN 301 489-1 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".
- [2] CENELEC EN 55011 (2007): "Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement".
- [3] CENELEC EN 55016-1-1 (2010): "Specification for radio disturbance and immunity measuring apparatus and methods. Radio disturbance and immunity measuring apparatus.
- [4] ETSI TS 102 820 (V4.1.1) (03-2016): "Digital Radio Mondiale (DRM); Multiplex Distribution Interface (MDI)".
- [5] ETSI EN 300 799 (edition 1) (09-1997): "Digital Audio Broadcasting (DAB); Distribution interfaces; Ensemble Transport Interface (ETI)".
- [6] ETSI EN 300 744 (V1.6.2) (10-2015): "Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television".

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] Recommendation ITU-R SM.329-10: "Unwanted emissions in the spurious domain".
- [i.3] Recommendation ITU-R BT.500-13 (01/2012): "Methodology for the subjective assessment of the quality of television pictures".
- [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 definitions given in ETSI EN 301 489-1 [1] and the following apply:

active deflector: simple low power RF amplifier which receives an input signal off-air, and then directly amplifies and re-broadcasts the same signal on the same frequency

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

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

broadcast service transmitter: device used to transmit the broadcast service

NOTE: It may or may not be fitted with an integral band pass filter.

enclosure port: also known as cabinet radiation

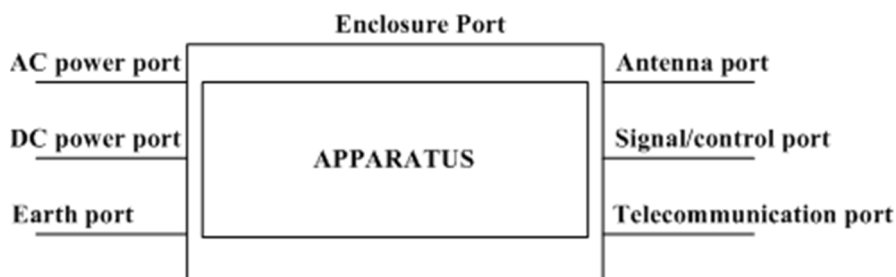


Figure 3.1

exciter/modulator: low level encoding and RF power stage of a broadcasting transmitter

modulation error ratio: single "figure of merit" analysis of the transmitted signal

Multi-channel COFDM (MCOFDM): transmission system that generates more than one OFDM block with an overall system filter spanning all blocks

necessary bandwidth: As defined in Recommendation ITU-R SM.329-10 [i.2].

on-channel repeater: complex low to medium power transmitter which receives an input signal off-air, then using echo-cancellation techniques (designed to minimize parasitic feedback between the input and output), amplifies and re-broadcasts the reconstructed signal on the same frequency

rated output power: conducted power that the broadcast service transmitter delivers at its final output under specific conditions of operation into the antenna

re-transmitter: transmitter which receives an input signal off air, demodulates the signal into baseband, re encodes the signal, then re-broadcasts the signal on another channel

RF power amplifier: transmitter which comprises an amplifier, declared by the manufacturer to be capable of being connected to a terrestrial broadcasting antenna system via a RF band pass filter

transmitter: device which comprises an integral RF exciter and RF amplifier stage. It may or may not be fitted with an integral band pass filter

transposer: Tx/Rx which receives an broadcast signal off-air, and re-broadcast on a different frequency

NOTE: The incoming off-air signal is not decoded or regenerated in this system.

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 301 489-1 [1] and the following apply:

%	percent
μ	micro, 10 ⁻⁶
A	Ampere
Hz	Hertz (cycles per second)
M	Mega (i.e. 10 ⁶)
m	metre
W	Watt

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1] and the following apply:

AC	Alternating Current
AM	Amplitude Modulation
BER	Bit Error Ratio
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee On Radio Interference)
COFDM	Coded Orthogonal Frequency Division Multiplex
CT	Continuous phenomena applied to Transmitters
DC	Direct Current
DRM	Digital Radio Mondiale
DVB	Digital Video Broadcasting
DVB-T2	Second generation Digital Video Broadcasting
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
ETI	Ensemble Transport Interface
FM	Frequency Modulation
HF	High Frequency
IF	Intermediate Frequency
LF	Low Frequency
MCOFDM	Multi-channel Coded Orthogonal Frequency Division Multiplex
MER	Modulation Error Ratio
MF	Medium Frequency

OFDM	Orthogonal Frequency Division Multiplex
QAM	Quadrature Amplitude Modulation
RDS	Radio Data System
RF	Radio Frequency
rms	root mean square
Rx	Receiver
SNR	Signal to Noise Ratio
T-DAB	Terrestrial-Digital Audio Broadcast
TS	Transport Stream
TT	Transient phenomena applied to Transmitters
TV	Television
Tx	Transmitter
UHF	Ultra High Frequency
VA	Volt Amperes
VHF	Very High Frequency

4 Test conditions

4.1 General

For the purposes of the present document, the test conditions of ETSI EN 301 489-1 [1], clause 4, shall apply as appropriate. Further provisions related to test conditions for broadcasting service transmitters are specified in the present document.

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

For immunity tests, the output of the broadcast service transmitter shall be monitored as specified in the present document, clause 4.2.2.

4.2 Arrangements for test signals

4.2.0 General

The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply with the following modifications.

Typical test arrangements to assess the performance of the broadcast service transmitter are shown in figure 4.1 for all transmitter equipment types.

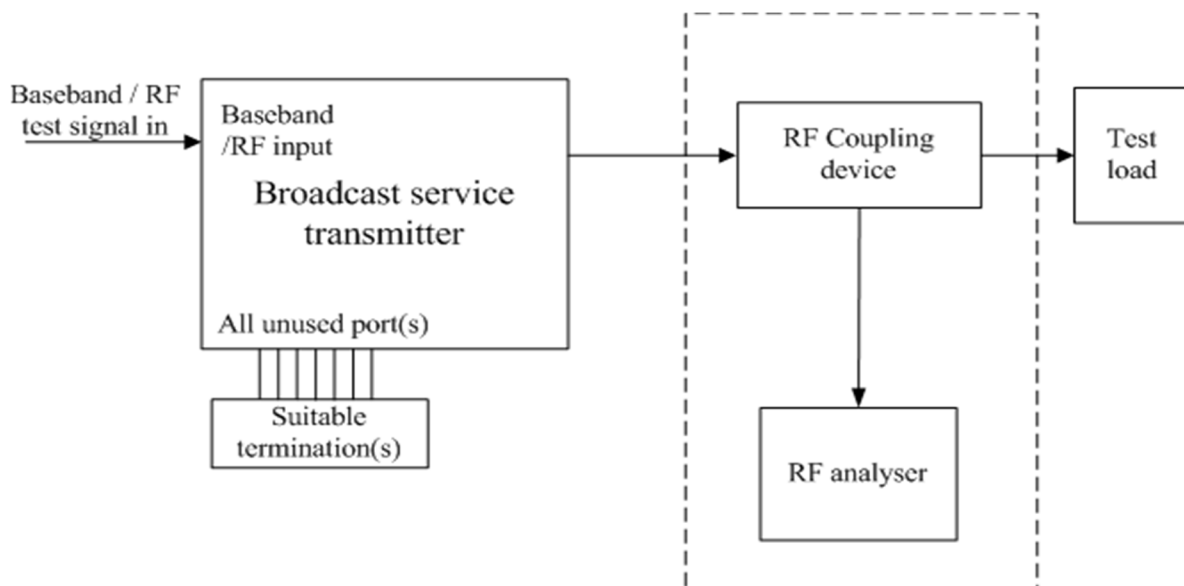


Figure 4.1: Typical test arrangement for the performance assessment of broadcast service transmitters

4.2.1 Arrangements for test signals at the input of the broadcast service transmitter

The provisions of ETSI EN 301 489-1 [1], clause 4.2.1 shall apply, with the following modifications.

If the EUT incorporates base-band processing and/or coding equipment (e.g. a RDS encoder for a FM transmitter, or a COFDM encoder for a digital television transmitter), then this equipment shall be active as in normal operation. The manufacturer shall provide reference encoders and the tests shall be carried out with these in operational mode.

If the EUT does not include integrated base-band processing and/or coding equipment, the manufacturer shall declare whether the transmitter is designed for operation with or without encoder(s). The manufacturer shall clearly state this in the product documentation.

If the EUT is designed for operation with externally fitted encoder(s), then it is left to the decision of the manufacturer whether the transmitter shall be tested with such encoder(s). Depending on the manufacturer's decision, the manufacturer may have to provide reference encoders and the tests shall be carried out with these in operational mode.

In case of transposers, re-transmitters, on-channel repeaters and active deflectors, the wanted RF input signal, at a frequency determined from the manufacturer's specification, shall be set to 3 dB above the EUT minimum input signal level, as declared by the manufacturer.

In case of RF amplifiers, the wanted RF input signal at a level equal to the mid-point of the range declared by the manufacturer shall be delivered from an adequate external modulator provided by the manufacturer. The modulator shall be placed outside the test environment or be included in the system under test, whichever is applicable

A broadcasting transmission shall be established at the start of the test and maintained during the test.

Any unused port of the EUT shall be terminated according to the manufacturer's instructions.

4.2.2 Arrangements for test signals at the output of broadcast service transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.2 shall apply.

Suitable precautions should be taken to ensure test equipment input levels are not exceeded (e.g. transmitters with high conducted powers may use a suitable coupler to assess the output of the EUT).