

Draft **ETSI EN 302 077-2** V1.1.1 (2004-04)

Candidate Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Transmitting equipment for the
Terrestrial - Digital Audio Broadcasting (T-DAB) service;
Part 2: Harmonized EN under article 3.2
of the R&TTE Directive**



Reference

DEN/ERM-TG17WG2-002-2

Keywords

audio, broadcasting, DAB, digital, radio,
regulation, terrestrial

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

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the 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

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, send your comment to:

editor@etsi.org

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2004.
All rights reserved.

DECT™, **PLUGTESTS™** and **UMTS™** are Trade Marks of ETSI registered for the benefit of its Members.
TIPHON™ and the **TIPHON logo** are Trade Marks currently being registered by ETSI for the benefit of its Members.
3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

Contents

| | |
|---|-----------|
| Intellectual Property Rights | 5 |
| Foreword..... | 5 |
| Introduction | 6 |
| 1 Scope | 8 |
| 2 References | 8 |
| 3 Definitions, symbols and abbreviations | 9 |
| 3.1 Definitions | 9 |
| 3.2 Symbols..... | 10 |
| 3.3 Abbreviations | 10 |
| 4 Technical requirements specifications | 10 |
| 4.1 Environmental profile..... | 10 |
| 4.2 Antenna port measurements | 10 |
| 4.2.1 Spurious emissions | 10 |
| 4.2.1.1 Definition | 10 |
| 4.2.1.2 Method of measurement (essential test suite) | 10 |
| 4.2.1.2.1 Initial conditions..... | 10 |
| 4.2.1.2.2 Procedure..... | 11 |
| 4.2.1.2.3 Test requirements | 11 |
| 4.2.1.3 Limit..... | 11 |
| 4.2.2 Out-of-band emissions..... | 12 |
| 4.2.2.1 Definition | 12 |
| 4.2.2.2 Method of measurement (essential test suite) | 13 |
| 4.2.2.2.1 Initial conditions | 13 |
| 4.2.2.2.2 Procedure..... | 13 |
| 4.2.2.2.3 Test requirements | 13 |
| 4.2.2.3 Limit..... | 13 |
| 4.2.3 Transmitter muting during frequency shift | 16 |
| 4.2.3.1 Definition | 16 |
| 4.2.3.2 Method of measurement..... | 16 |
| 4.2.3.2.1 Initial Conditions | 16 |
| 4.2.3.2.2 Procedure..... | 17 |
| 4.2.3.2.3 Test requirements | 17 |
| 4.2.3.3 Limit..... | 17 |
| 4.2.4 Enclosure port measurements (radiated emissions) | 17 |
| 4.2.5 Cabinet radiation..... | 17 |
| 4.2.5.1 Definition | 17 |
| 4.2.5.2 Method of test (essential test suite) | 17 |
| 4.2.5.2.1 Initial conditions | 17 |
| 4.2.5.2.2 Procedure..... | 17 |
| 4.2.5.2.3 Test requirements | 18 |
| 4.2.5.3 Limits | 18 |
| 4.3 Measurement uncertainties..... | 19 |
| Annex A (normative): General measuring arrangements | 20 |
| A.1 Testing arrangements for antenna port measurements | 20 |
| A.1.1 Spurious emissions | 20 |
| A.1.2 Out-of-band emissions | 21 |
| A.1.3 Test frequency range | 21 |
| A.1.4 Test modulating signal | 22 |
| A.2 Testing arrangements for enclosure port (radiated emissions) measurements | 22 |
| Annex B (informative): Bibliography..... | 23 |

| | | |
|-------------------------------|---|-----------|
| Annex C (informative): | The EN title in the official languages | 24 |
| History | | 25 |

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 (<http://webapp.etsi.org/IPR/home.asp>).

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 Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 2 of a multi-part deliverable covering the Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the Terrestrial - Digital Audio Broadcasting (T-DAB) service, as identified below:

Part 1: "Technical characteristics and test methods";

Part 2: "Harmonized EN under article 3.2 of R&TTE Directive".

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [8] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] 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 ("the R&TTE Directive").

| 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 |

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

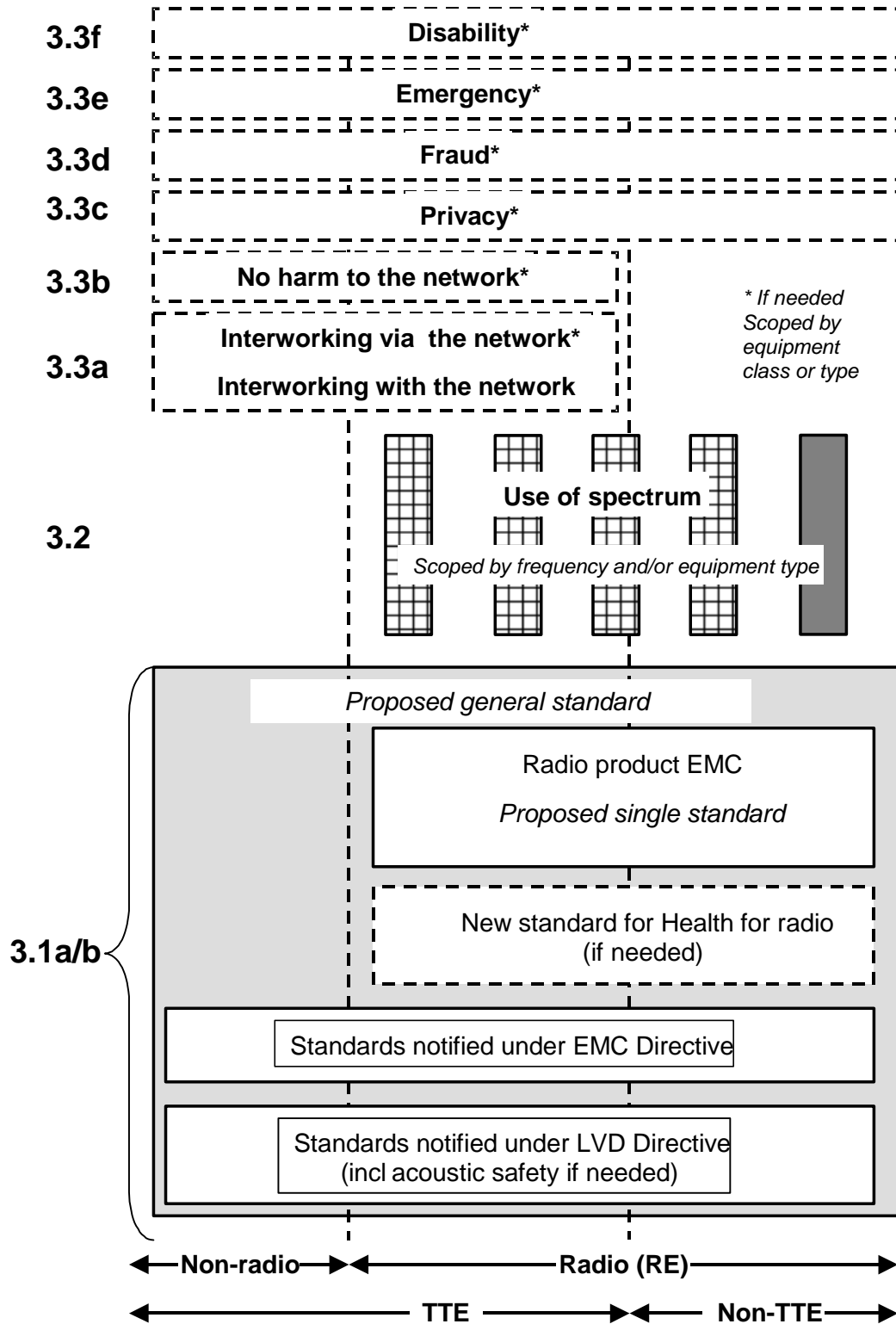


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure shows the different clauses of article 3 of the Directive. The essential requirements under article 3.1a (safety, etc.) and 3.1b (EMC) are addressed by a proposed single General Standard that applies to all equipment. The proposed General Standard makes general cross references to those standards already notified under the LVD and EMC Directives that are appropriate for radio equipment and telecommunications terminal equipment and so provides a link to the arrangements under those directives thus avoiding duplication of notifications with potential problems of notifications not being synchronized.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.3 various horizontal boxes are shown. Their dotted lines indicate that essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The bottom of figure 1 shows the relationship of the standards to radio equipment and telecommunications terminal equipment. Particular equipment may be radio equipment, telecommunications terminal equipment or both. The General Standard will always apply to it, and a radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement is adopted by the Commission and if the equipment in question lies within the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the Directive may be covered in just the General Standard or in a set of standards that includes the General Standard.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards under articles 3.2 and 3.3 to be added when new frequency bands are agreed or when the Commission takes decisions under article 3 without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

1 Scope

The present document applies to the following radio telecommunications terminal equipment types:

- Terrestrial - Digital Audio Broadcast equipment used in the sound broadcasting service.

NOTE 1: At the time the present document was drafted the following bands were allocated to T-DAB (Wiesbaden agreement [6] Maastricht agreement [8]);

- 47 MHz to 68 MHz;
- 174 MHz to 240 MHz;
- 1 452 MHz to 1 492 MHz.

The present document is a centralized didactic collaboration intended to cover the provisions of article 3.2 of Directive 1999/5/EC [1] (R&TTE Directive), which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

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 R&TTE Directive [1] may apply to equipment within the scope of the present document.

NOTE 2: A list of such ENs is included on the ETSI web site at <http://www.etsi.org>.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] 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 (R&TTE Directive).
- [2] CENELEC EN 55011: "Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement".
- [3] ETSI EN 301 489-11: " Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 11: Specific conditions for terrestrial sound broadcasting service transmitters".
- [4] CENELEC EN 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".
- [5] IEC 60489-1 amendment 2: "Methods of measurement for radio equipment used in the mobile services - Part 1: General definitions and standard conditions of measurement".
- [6] The CEPT T-DAB planning meeting, Wiesbaden, 3rd to 21st July 1995; final acts of the CEPT T-DAB planning meeting.

- [7] T-DAB Planning meeting Maastricht 2002: "Final acts of the CEPT T-DAB planning meeting (4); Special arrangement of the European Conference of Postal and Telecommunications Administrations (CEPT) relating to the use of the band 1 452 - 1 479,5 MHz for Terrestrial Digital Audio Broadcasting (T-DAB).
- [8] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1] and the following apply:

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.

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.

environmental profile: the range of environmental conditions under which equipment within the scope of EN 302 077-2 is required to comply with the provisions of EN 302 077-2

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, the 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 and out-of-band emission levels are 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: consist of spurious emissions and out-of-band emissions

3.2 Symbols

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

| | |
|-------|------------|
| kHz | kilo Hertz |
| m | metre |
| MHz | Mega Hertz |
| μ | micro |
| W | Watt |

3.3 Abbreviations

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

| | |
|-------|---|
| dB | Logarithmic ratio (tenths of a "Bel") |
| dBm | dB relative to one milliwatt |
| EUT | Equipment Under Test |
| GHz | Giga Hertz |
| IEC | International Electrotechnical Commission |
| R&TTE | Radio and Telecommunications Terminal Equipment |
| RF | Radio Frequency |
| T-DAB | Terrestrial - Digital Audio Broadcast |
| VHF | Very High Frequency |

4 Technical requirements specifications

4.1 Environmental profile

The environmental profile for operation of the equipment shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the required operational environmental profile.

4.2 Antenna port measurements

4.2.1 Spurious emissions

4.2.1.1 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.

For the purposes of the present document spurious emissions are emissions at frequencies outside the frequency range $f_0 \pm 3$ MHz.

4.2.1.2 Method of measurement (essential test suite)

4.2.1.2.1 Initial conditions

Test environment:

The normal operating environment, as declared by the equipment manufacturer.

Test frequencies:

- a) the lowest operating frequency of the EUT;
- b) the highest operating frequency of the EUT;
- c) a frequency mid-way between a) and b) above.

Test arrangement: (see figure A.1)

- 1) all ports unused at the time of testing shall be correctly terminated;
- 2) connect the EUT to the Test Load, via the Coupling Device or via the attenuator;
- 3) connect the measuring device to the Coupling Device or attenuator.

4.2.1.2.2 Procedure

- 1) operate the EUT at each of the test frequencies as defined in clause 4.2.1.2.1;
- 2) measure the results on the Spectrum Analyser.

4.2.1.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.2.1.3 in order to demonstrate compliance.

4.2.1.3 Limit

Spurious emissions shall not exceed the values set out in table 4.1, shown additionally in figures 4.1 and 4.2.

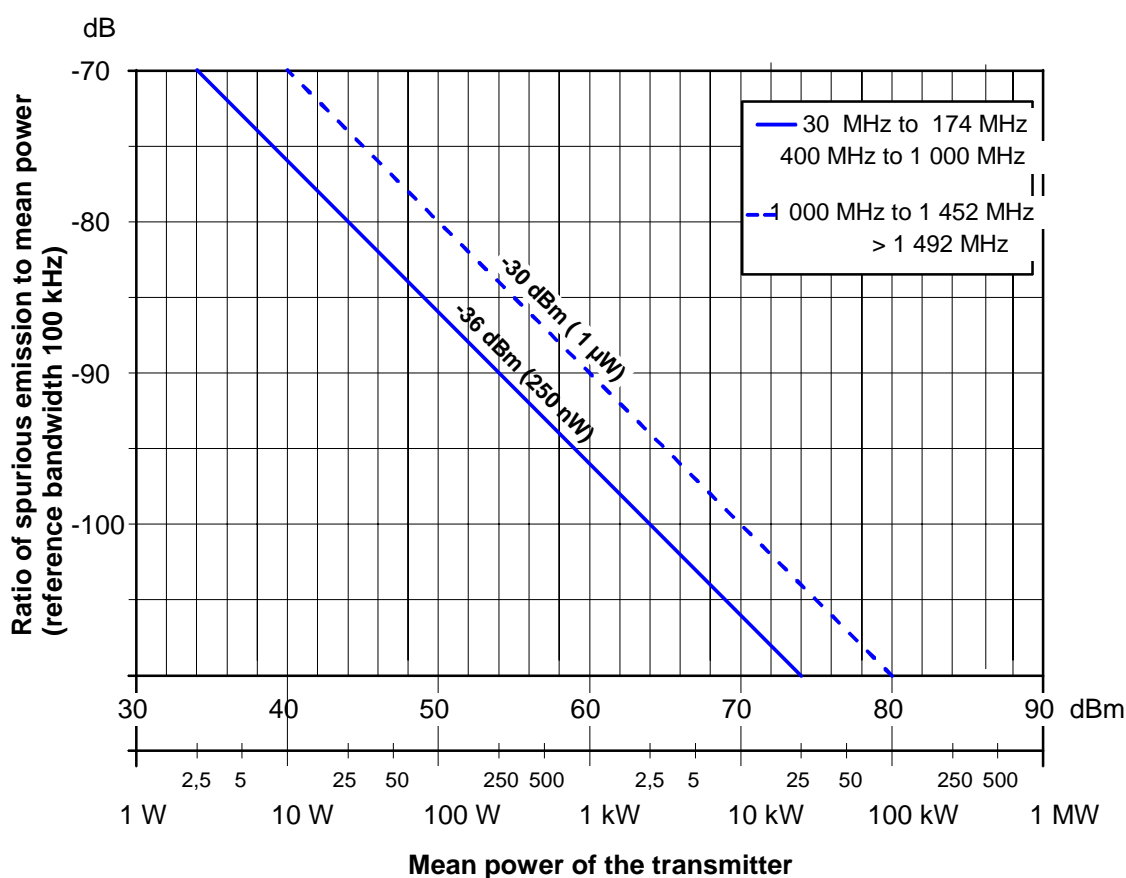


Figure 4.1: Spurious emissions

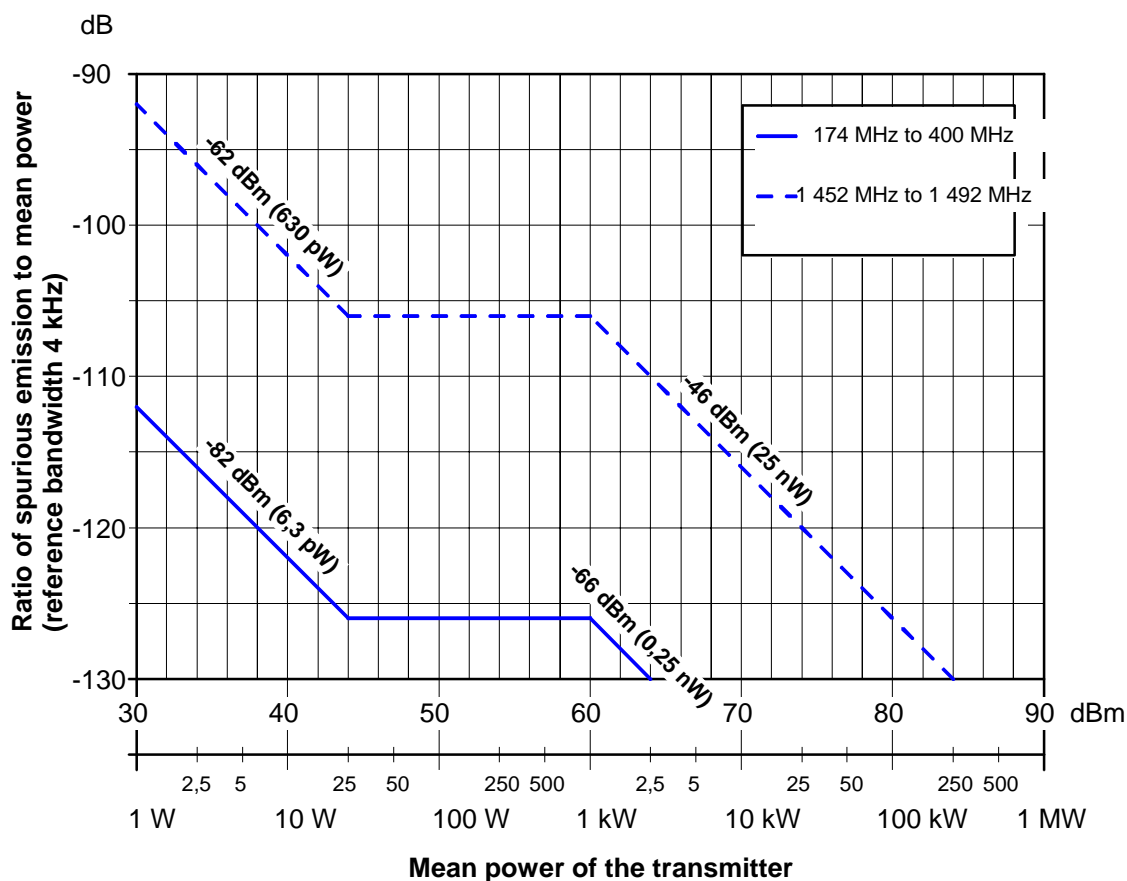


Figure 4.2: Spurious emissions

Table 4.1: Spurious emissions

| Frequency range of the spurious emission | Limits of the spurious emission | Reference bandwidth | Figure |
|--|---|---------------------|--------|
| 30 MHz to 174 MHz | -36 dBm (250 nW) | 100 kHz | 4.1 |
| 174 MHz to 400 MHz | - 82 dBm for $P \leq 25$ W -126 dBc for 25 W < $P \leq 1\ 000$ W -66 dBm for $1\ 000$ W < P | 4 kHz | 4.2 |
| 400 MHz to 1 000 MHz | -36 dBm (250 nW) | 100 kHz | 4.1 |
| 1 000 MHz to 1 452 MHz | -30 dBm (1 µW) | 100 kHz | 4.1 |
| 1 452 MHz to 1 492 MHz | - 62 dBm for $P \leq 25$ W -106 dBc for 25 W < $P \leq 1\ 000$ W -46 dBm for $1\ 000$ W < P | 4 kHz | 4.2 |
| > 1 492 MHz | -30 dBm (1 µW) | 100 kHz | 4.1 |

4.2.2 Out-of-band emissions

4.2.2.1 Definition

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

For the purposes of the present document out-of-band emissions are emissions at frequencies outside the necessary bandwidth and within the frequency range $f_0 \pm 3$ MHz, where f_0 is the centre frequency of the transmission.

4.2.2.2 Method of measurement (essential test suite)

4.2.2.2.1 Initial conditions

Test environment:

The normal operating environment, as declared by the equipment manufacturer.

Test frequencies:

- a) the lowest operating frequency of the EUT;
- b) the highest operating frequency of the EUT;
- c) a frequency mid-way between a) and b) above.

Test arrangement: (see figure A.2)

- 1) all ports unused at the time of testing shall be correctly terminated.

4.2.2.2.2 Procedure

- 1) all ports unused at the time of testing shall be correctly terminated;
- 2) operate the EUT at each of the test frequencies as defined in clause 4.2.2.2.1;
- 3) measure the results on the Spectrum Analyser.

4.2.2.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.2.2.3 in order to demonstrate compliance.

4.2.2.3 Limit

The out-of-band radiated signal in any 4 kHz band shall be constrained by one of the masks defined in figure 4.3 (case 1 and 2) and figure 4.4 (case 3 and 4). Additionally the limits are contained in tables 4.2 and 4.3.

NOTE: Unless specifically declared by the manufacturer it shall be assumed that case 2 (uncritical mask) applies.

- Case 1: The solid line mask shall apply to VHF T-DAB transmitters operating in areas critical for adjacent channel T-DAB to T-DAB interference, and in any case when it is necessary to protect other services operating on adjacent frequencies on a primary basis.
- Case 2: The dashed line mask shall apply to VHF T-DAB transmitters in other cases and to 1,5 GHz T-DAB transmitters.
- Case 3: The solid line mask shall apply to VHF T-DAB transmitters in exceptional circumstances to protect safety services.
- Case 4: The chain dotted line mask shall apply to VHF T-DAB transmitters operating in channel 12D and on a case by case basis in certain areas.

Table 4.2: Transmitters operating with output power between 25 W and 1 000 W

| Classification accordingly the frequency assignment | Frequency relative to the centre of the 1,54 MHz channel [MHz] | Relative level [dB] |
|---|--|---------------------|
| | | |
| VHF T-DAB transmitters operating in uncritical cases or in the L-band (case 2) | $\pm 0,97$ | -26 |
| | $\pm 0,97$ | -56 |
| | $\pm 3,0$ | -106 |
| VHF T-DAB transmitters operating in critical cases (case 1) | $\pm 0,77$ | -26 |
| | $\pm 0,97$ | -71 |
| | $\pm 1,75$ | -106 |
| | $\pm 3,0$ | -106 |
| VHF T-DAB transmitters operating in exceptional circumstances to protect safety services (case 3) | $\pm 0,77$ | -26 |
| | $\pm 0,97$ | -71 |
| | $\pm 2,2$ | -126 |
| | $\pm 3,0$ | -126 |
| VHF T-DAB transmitters operating in the channel 12D and certain areas (case 4) | $\pm 0,77$ | -26 |
| | $\pm 0,97$ | -78 |
| | $\pm 2,2$ | -126 |
| | $\pm 3,0$ | -126 |

Table 4.3: Transmitters operating with output power < 25W and > 1 000 W

| Classification accordingly the frequency assignment | Frequency relative to the centre of the 1,54 MHz channel [MHz] | Absolute level [dBm] for transmitter with output power | |
|---|--|--|-----------|
| | | < 25 W | > 1 000 W |
| VHF T-DAB transmitters operating in uncritical cases or in the L- band (case 2) | +0,97 | 18 | 34 |
| | +0,97 | -12 | 4 |
| | +3,0 | -62 | -46 |
| VHF T-DAB transmitters operating in critical cases (case 1) | +0,77 | 18 | 34 |
| | +0,97 | -27 | -11 |
| | +1,75 | -62 | -46 |
| | +3,0 | -62 | -46 |
| VHF T-DAB transmitters operating in exceptional circumstances to protect safety services (case 3) | +0,77 | 18 | -34 |
| | +0,97 | -27 | -11 |
| | +2,2 | -82 | -66 |
| | +3,0 | -82 | -66 |
| VHF T-DAB transmitters operating in the channel 12D and certain areas (case 4) | +0,77 | 18 | -34 |
| | +0,97 | -34 | -18 |
| | +2,2 | -82 | -66 |
| | +3,0 | -82 | -66 |

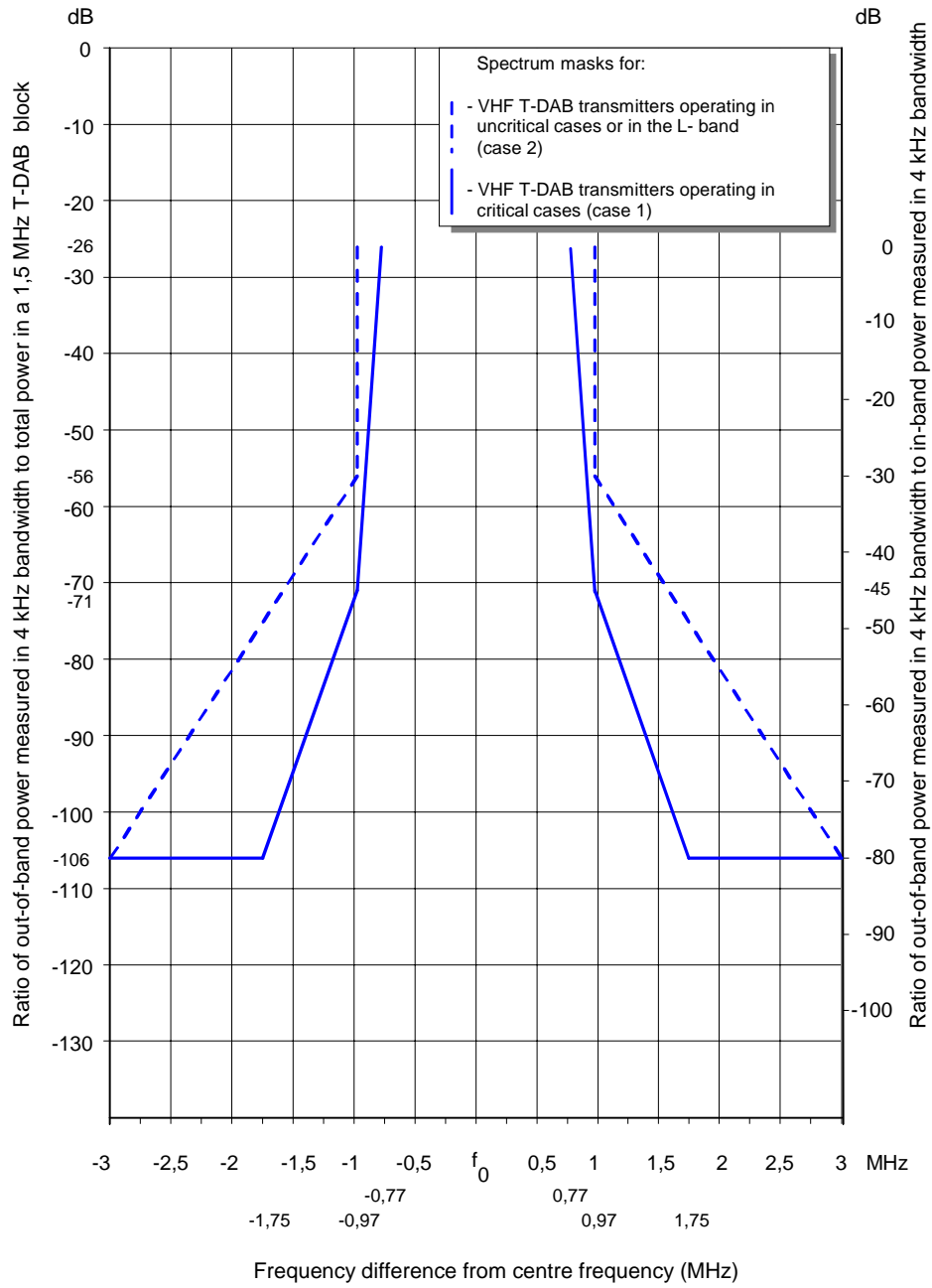


Figure 4.3: Spectrum masks for T-DAB out-of-band emissions (case 1 and case 2)

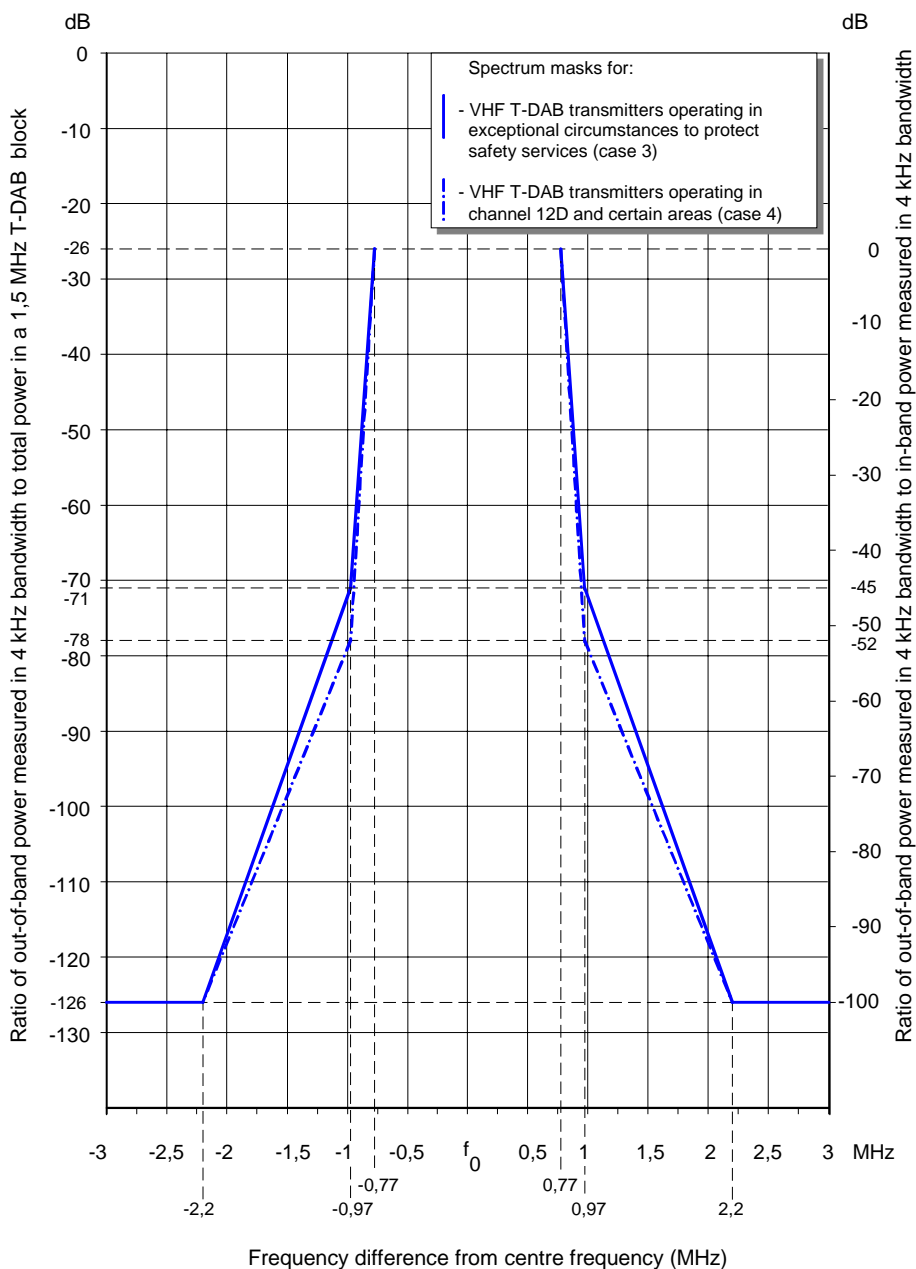


Figure 4.4: Spectrum masks for T-DAB out-of-band emissions (case 3 and case 4)

4.2.3 Transmitter muting during frequency shift

4.2.3.1 Definition

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

4.2.3.2 Method of measurement

4.2.3.2.1 Initial Conditions

Test environment:

The normal operating environment, as declared by the equipment manufacturer.

Test frequencies:

Present frequency to desired frequency.

Test arrangement: (see figure A.1)

- 1) all ports unused at the time of testing shall be correctly terminated;
- 2) connect the EUT to the Test Load, via the Coupling Device;
- 3) connect the measuring device to the Coupling Device.

4.2.3.2.2 Procedure

- 1) operate the EUT at the present frequency;
- 2) initiate frequency change;
- 3) observe the output signal on an oscilloscope.

4.2.3.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.2.3.3 in order to demonstrate compliance.

4.2.3.3 Limit

The muting shall be as defined in table 4.1 and additionally shown in figures 4.1 and 4.2.

4.2.4 Enclosure port measurements (radiated emissions)**4.2.5 Cabinet radiation****4.2.5.1 Definition**

Emissions from the equipment, radiated from the enclosure port, other than those present at the antenna port.

4.2.5.2 Method of test (essential test suite)**4.2.5.2.1 Initial conditions****Test environment:**

The normal operating environment, as declared by the equipment manufacturer.

Test frequencies:

- a) the lowest operating frequency of the EUT;
- b) the highest operating frequency of the EUT;
- c) a frequency mid-way between a) and b) above.

Test arrangement: (see figure A.3)

4.2.5.2.2 Procedure

The test method shall be in accordance with EN 55022 [4], unless physical size is a restriction, in which case the test method shall be in accordance with EN 55011 [2].

Measurements shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications.

The equipment shall be configured in a manner which is representative of a normal/typical operation, where practical.

An attempt shall be made to maximize the detected radiated emission, e.g. by moving the cables of the equipment.

The configuration and mode of operation during measurements shall be precisely noted in the test report.

RF input/output ports shall be correctly terminated.

The tests shall be carried out at a point within the specified normal operating environmental range and at the rated supply voltage for the equipment.

If applicable, the test shall be repeated with the EUT in standby mode.

4.2.5.2.3 Test requirements

The results obtained shall be compared to the limits in clause 4.3.1.3 in order to demonstrate compliance.

4.2.5.3 Limits

Cabinet radiation shall not exceed the values set out in table 4.4, shown additionally in figure 4.5.

This test shall be performed at a distance of 10 m, where feasible. When size and/or power requirements necessitate testing in a manufacturing facility, other distances may be used (see notes 1 to 3). Tests shall not be carried out in the exclusion band (see note 2).

Table 4.4: Limits for radiated emissions

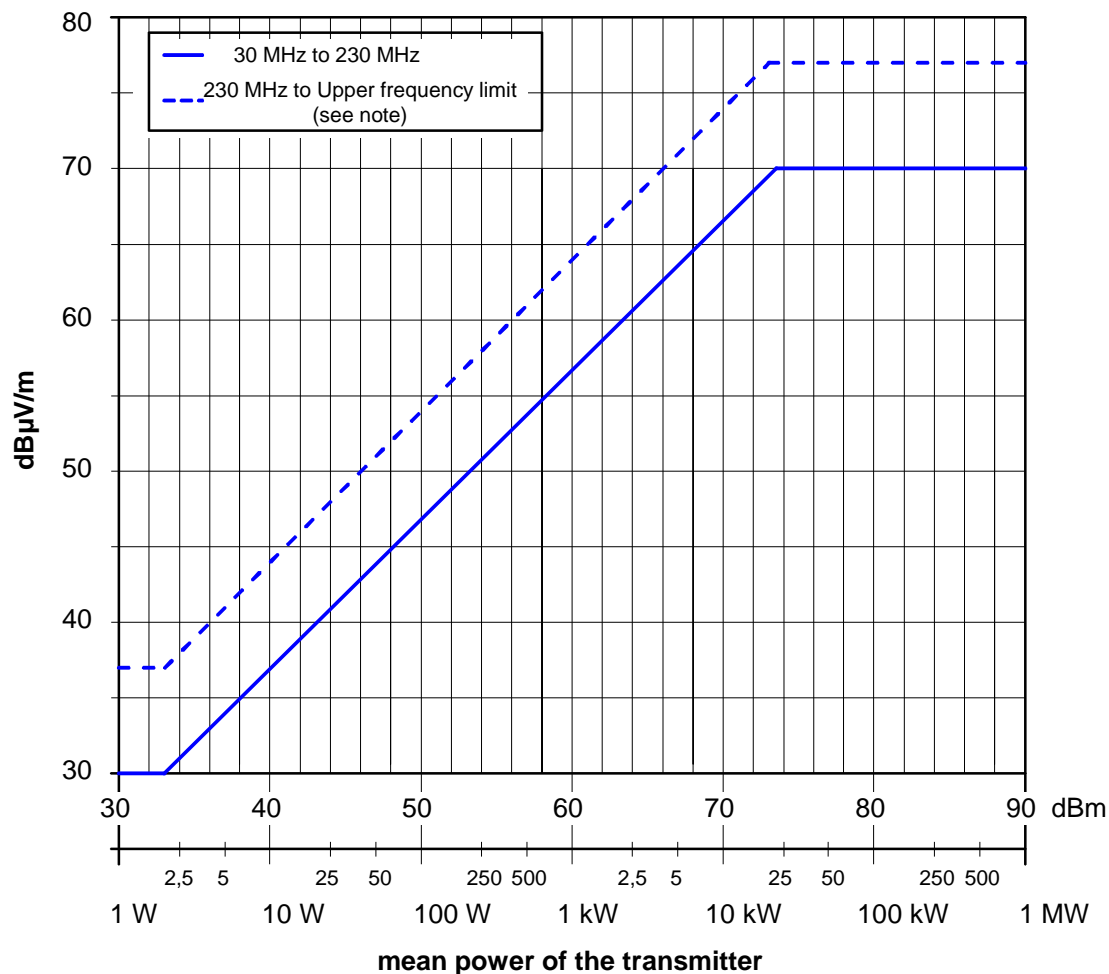
| Quasi-peak limits (dB μ V/m) at 10 m (see notes 1 and 2) | Frequency range |
|---|--------------------------|
| $30 \text{ dB}\mu\text{V/m} \leq 60 + 10 \log_{10} (P_0/2\ 000) \leq 70 \text{ dB}\mu\text{V/m}$ | 30 MHz to 230 MHz |
| $37 \text{ dB}\mu\text{V/m} \leq 67 + 10 \log_{10} (P_0/2\ 000) \leq 77 \text{ dB}\mu\text{V/m}$ | > 230 MHz to Upper limit |
| NOTE 1: P_0 = RF output power in watts. | |
| NOTE 2: The exclusion band for the transmitter extends from $F_c - 3 \text{ MHz}$ to $F_c + 3 \text{ MHz}$, where F_c is the operating frequency in MHz. | |

NOTE 1: The measurements can be carried out at other distances. In that case limits are modified according to the relation:

$$L(x\text{m}) = L(10\text{m}) + 20 \log (10/x) \quad \text{where } x = \text{distance.}$$

NOTE 2: Care should be taken if measuring at test distances below 10 m as this may be in the near field.

NOTE 3: In cases of dispute the measurement distance of 10 m shall take precedence.



NOTE: Upper frequency limit = 1 GHz or 3rd Harmonic, whichever is higher.

Figure 4.5: Cabinet radiation limits for T-DAB transmitters

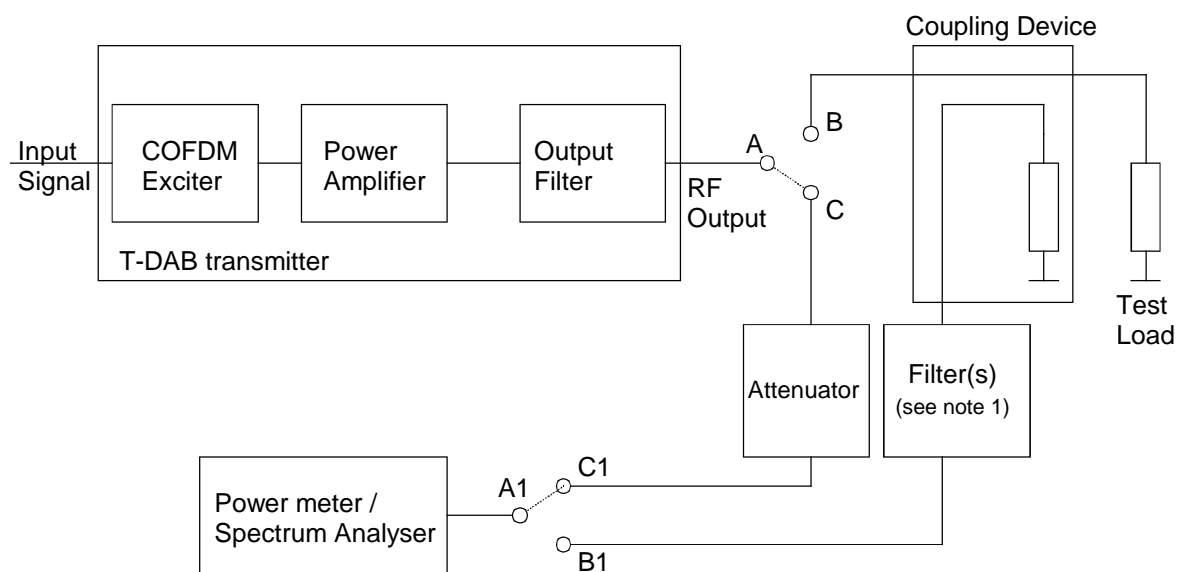
4.3 Measurement uncertainties

Measurement uncertainty should be calculated and techniques employed to minimize its range. This uncertainty should be applied to the limit and any measurement falling below the range is deemed acceptable.

Annex A (normative): General measuring arrangements

A.1 Testing arrangements for antenna port measurements

A.1.1 Spurious emissions

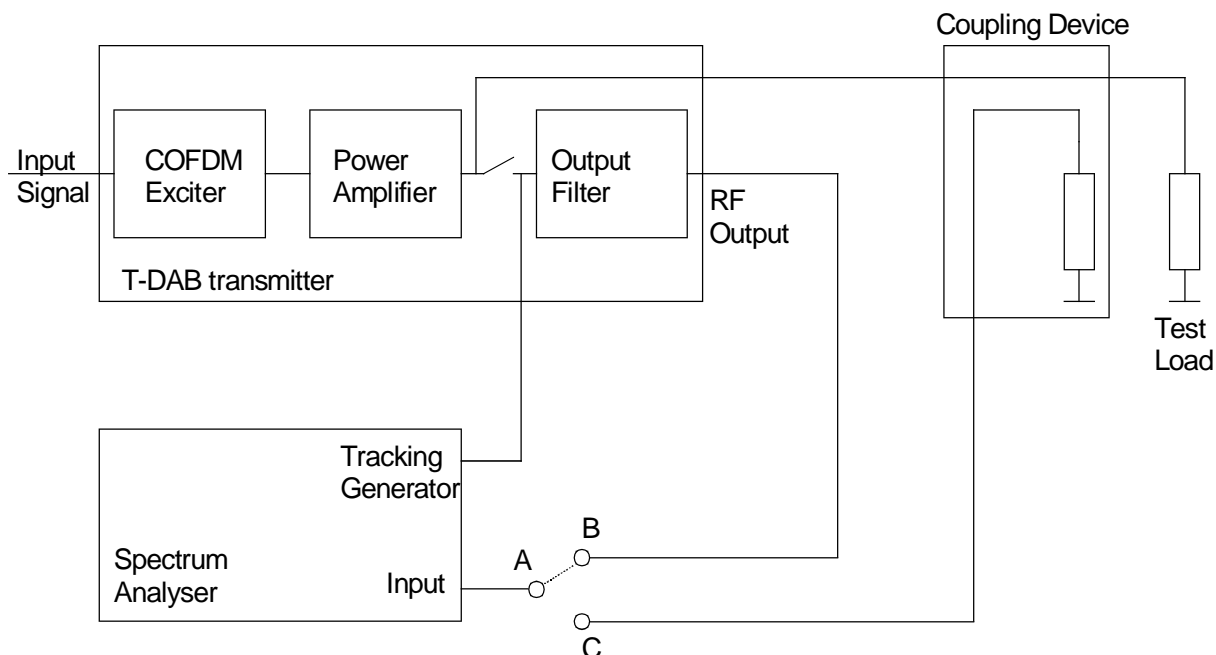


NOTE 1: The optional filter should suppress the output signal so that no intermodulation products are generated by the spectrum analyser. The insertion loss throughout the measuring range should be known.

NOTE 2: For high power transmitters the preferred set up would require A to be connected to B and A1 to be connected to B1.
For low power transmitters the preferred set up would require A to be connected to C and A1 to be connected to C1.

Figure A.1: Spurious emissions

A.1.2 Out-of-band emissions



NOTE 1: Disconnect the power amplifier from the output filter.

NOTE 2: The frequency response of the output filter must be measured and recorded (connection A-B).

NOTE 3: The spectrum of the T-DAB signal at the output of the power amplifier must be measured and recorded (connection A-C).

NOTE 4: The out-of-band spectrum of the T-DAB signal shall be calculated by applying the recorded frequency response of the output filter to the recorded spectrum of the T-DAB signal.

Figure A.2: Out-of-band emissions

A.1.3 Test frequency range

Limits on unwanted emissions for radio equipment are considered to be applicable to the range 9 kHz to 300 GHz. However, for practical measurement purposes, the frequency range of spurious emissions may be restricted. As guidance for practical purposes, the following measurement parameters in table A1 are recommended:

Table A.1

| Transmitter fundamental frequency range | Unwanted emission frequency measurement range | |
|---|---|---|
| | lower frequency | upper frequency |
| 47,936 MHz to 1 492 MHz | 30 MHz | 1 GHz or 3 rd Harmonic whichever is higher |

The following reference bandwidths are to be used:

For Spurious Emissions:

- 100 kHz between 30 MHz and 174 MHz;
- 4 kHz between 174 MHz and 400 MHz;
- 100 kHz between 400 MHz and 1 452 MHz;
- 4 kHz between 1 452 MHz and 1 492 MHz;

- 100 kHz above 1 492 MHz.

For Out-of-band Emissions:

- 4 kHz.

A.1.4 Test modulating signal

No test signal is required, however all input ports should be correctly terminated.

A.2 Testing arrangements for enclosure port (radiated emissions) measurements

Further guidance can be found in IEC 60489-1 amendment 2 [5].

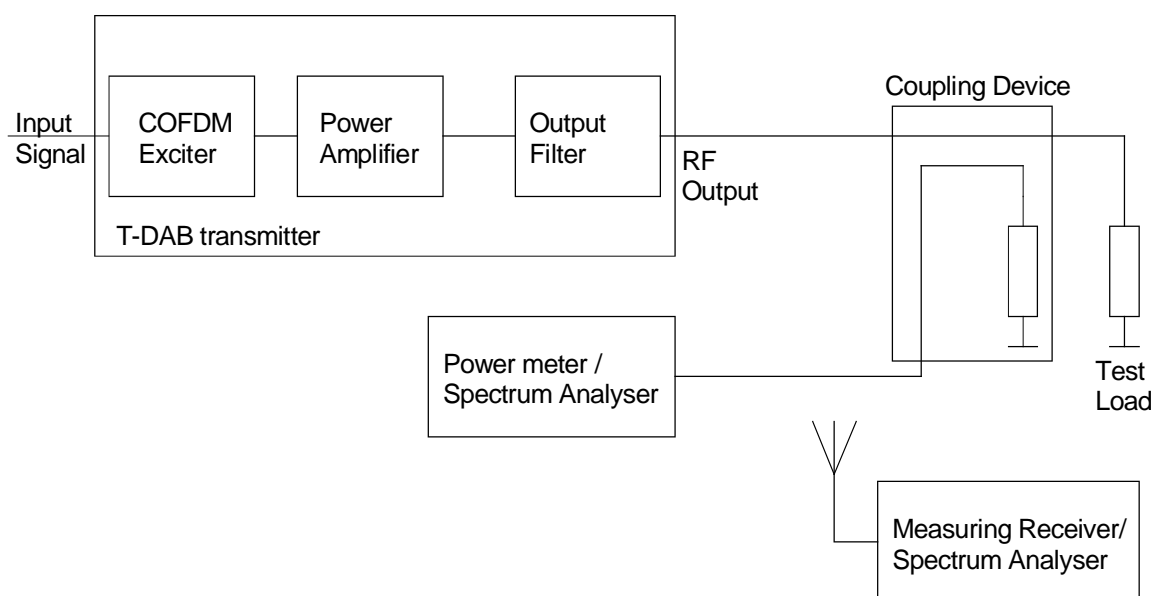


Figure A.3: Radiated emissions

Annex B (informative): Bibliography

- ETSI EN 300 401: "Radio broadcasting systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".
- ETSI EN 302 077-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the Terrestrial - Digital Audio Broadcasting (T-DAB) service; Part 1: Technical characteristics and test methods".

Annex C (informative): The EN title in the official languages

| Language | EN title |
|------------|---|
| Czech | |
| Danish | |
| Dutch | |
| English | Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the Terrestrial - Digital Audio Broadcasting (T-DAB) service; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive |
| Estonian | |
| Finnish | |
| French | |
| German | |
| Greek | |
| Hungarian | |
| Icelandic | |
| Italian | |
| Latvian | |
| Lithuanian | |
| Maltese | |
| Polish | |
| Portuguese | |
| Slovak | |
| Slovenian | |
| Spanish | |
| Swedish | |

History

| Document history | | | |
|------------------|------------|----------------|---------------------------------------|
| V1.1.1 | April 2004 | Public Enquiry | PE 20040827: 2004-04-28 to 2004-08-27 |
| | | | |
| | | | |
| | | | |
| | | | |