

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Transmitting equipment for the  
analogue television broadcasting service;  
Harmonized EN under article 3.2  
of the R&TTE Directive**

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**Reference**

DEN/ERM-TG17-002

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## 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 Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [1] (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 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"[2]).

<b>Proposed national transposition dates</b>	
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 [2]. Each standard is a module in the structure. The modular structure is shown in figure 1.

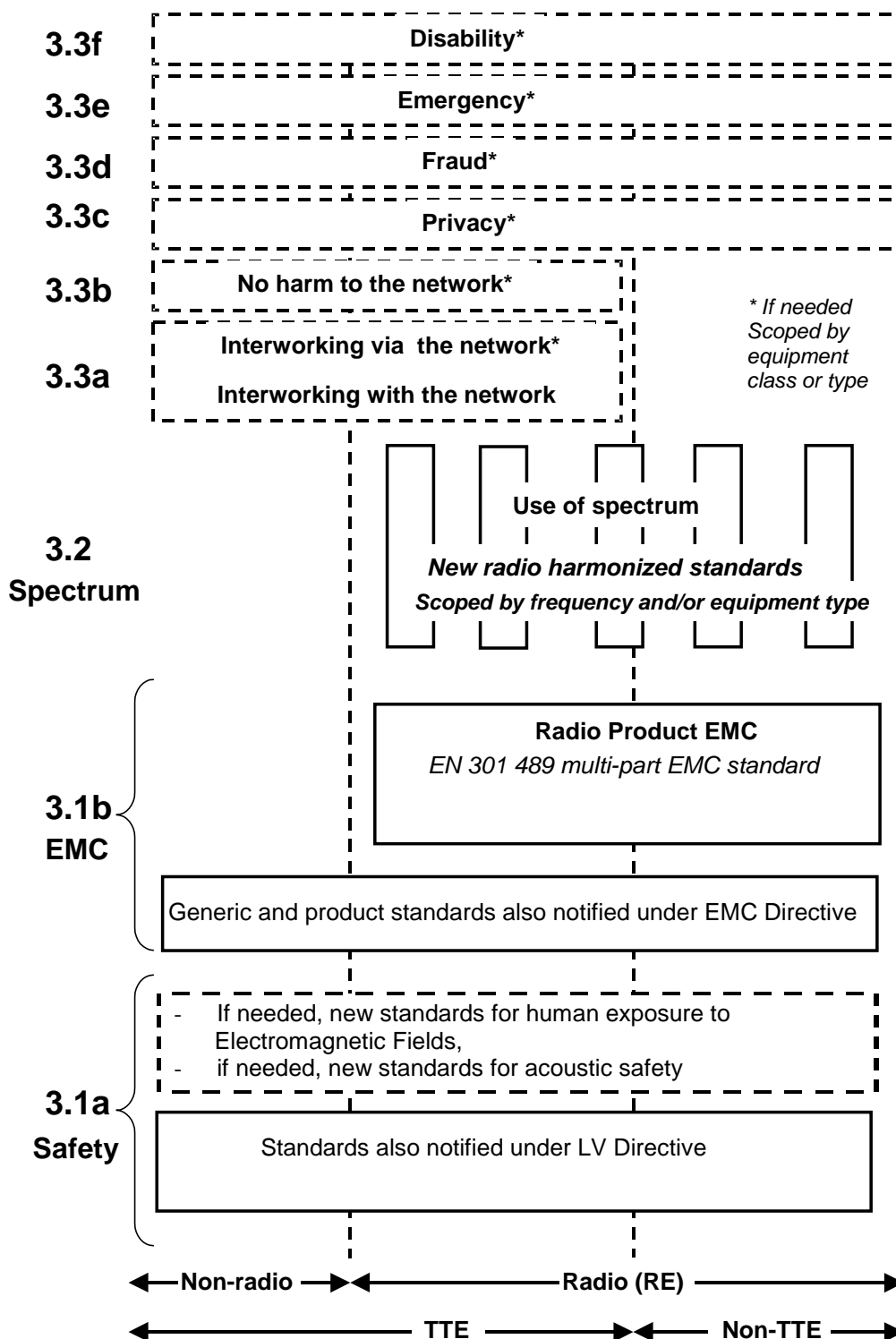


Figure 1: Modular structure for the various standards used under the R&TTE Directive [2]

The left hand edge of the figure 1 shows the different clauses of Article 3 of the R&TTE Directive [2].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document 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 vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. 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 3.1b the diagram shows EN 301 489, the multi-part product EMC standard for radio used under the EMC Directive [3].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [4] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. 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 under the R&TTE Directive [2] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [2] may be covered in a set of standards.

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 to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisionswithout 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.

Other documents directly associated with the present document:

- EN 301 489-14 [5].

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# 1 Scope

The present document applies to transmitting equipment for the analogue television broadcasting service.

The types of equipment covered by the present document are as follows:

- Television transmitter equipment for analogue television broadcasting service, with 7 MHz and 8 MHz RF channel bandwidths, operating in the CEPT frequency bands. These frequencies are currently within the television Bands I, III, IV and V.

The present document is intended to cover the provisions of article 3.2 of Directive 1999/5/EC [2] (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 [2] may apply to equipment within the scope of the present document.

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

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# 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] | Council 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.  |
| [2] | 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).  |
| [3] | Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).   |
| [4] | Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).   |
| [5] | ETSI EN 301 489-14 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 14: Specific conditions for analogue and digital terrestrial TV broadcasting service transmitters". |
| [6] | CENELEC EN 55022 (1998): "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".  |
| [7] | CENELEC EN 55011 (1998): "Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement.   |



- [8] IEC 60489-1 + Am1 (1996) + Am2 (1999): "Methods of measurement for radio equipment used in the mobile services. Part 1: General definitions and standard conditions of measurement".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

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

**analogue signal:** signal in which the characteristic quantity representing information may at any instant assume any value within a continuous interval

**analogue television:** television in which picture information is represented by an analogue signal

NOTE: Sound information can be represented by an analogue and/or digital signal

**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

**cabinet radiation:** radiation from an enclosure containing equipment, excluding radiation from connected antennas or cables

**carrier power:** average power supplied to the antenna port by a transmitter during one radio frequency cycle taken under the condition of no modulation

**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.

**digital signal:** discretely timed signal in which information is represented by a finite number of well defined discrete values that its characteristic quantities may take in time

**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:** range of environmental conditions under which equipment within the scope of EN 302 297 is required to comply with the provisions of EN 302 297

**exclusion band:** band of radio frequencies where no measurements are made

**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

EXAMPLE: (2<sup>nd</sup> harmonic = 2 x 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 port by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions

NOTE: For analogue television transmissions, the mean power level is defined with a specified video signal modulation. This video signal has to be chosen in such a way that the maximum mean power level (e.g. at the video signal blanking level for PAL) is provided to the antenna transmission line.

**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

**rated output power:** rated output power is the power that the transmitter or transposer shall deliver at its output under specified conditions of operation

**reference bandwidth:** bandwidth in which the 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. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions

**television transmitter:** used in EN 302 297 to refer to that equipment with a video input and one or more audio inputs and a combined vision and sound radio frequency output

**unwanted emissions:** consist of spurious emissions and out-of-band emissions

**letterbox operation:** transmission of a picture format with an aspect ratio greater than 1,33, in such a way that empty (black) lines are added to conform to a 4:3 transmission format

## 3.2 Symbols

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

μ                      Micro

## 3.3 Abbreviations

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

DQPSK	Differential Quadrature Phase Shift Keying
EMC	Electro Magnetic Compatibility
EUT	Equipment Under Test
FM	Frequency Modulation
LV	Low Voltage
NICAM	Near Instantaneous Companded Audio Multiplex
PAL	Phase Alternating on the Line
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
TV	TeleVision
VSB	Vestigial Side Band
W	Watt

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## 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.

##### 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):

- a) connect the Test Signal Generator to the EUT;
- b) connect the EUT to the Test Load, via the Coupling Device;
- c) connect the Spectrum Analyser to the Coupling Device.

The test signal shall be as defined in clause A.1.3.1.

###### 4.2.1.2.2 Procedure

- a) set the Test Signal Generator to deliver a test signal;
- b) operate the EUT at each of the test frequencies as defined in clause 4.2.1.2.1;
- c) measure the results on the Spectrum Analyser.

###### 4.2.1.2.3 Test requirements

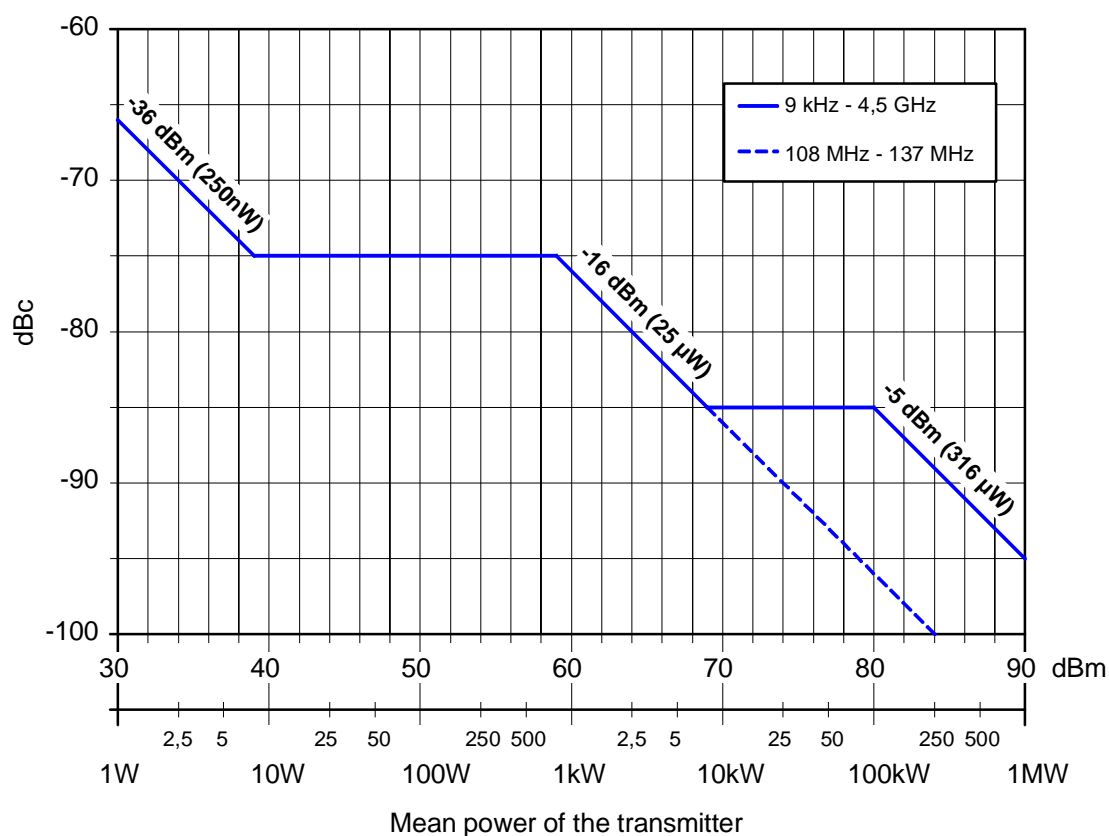
The results obtained shall be compared to the limits in clause 4.2.1.3 in order to demonstrate compliance.

### 4.2.1.3 Limit

Spurious emissions shall not exceed the values set out in table 4.1, shown additionally in figure 4.1 for the frequency range 9 kHz to 4,5 GHz.

**Table 4.1: Spurious emission limits for analogue television broadcast transmitters**

Mean power of the transmitter	Limits mean power absolute levels (dBm) or relative levels (dBc) below the power supplied to the antenna port in the reference bandwidth (see annex A)
$P < 9 \text{ dBW}$	-36 dBm
$9 \text{ dBW} < P < 29 \text{ dBW}$	75 dBc
$29 \text{ dBW} < P < 39 \text{ dBW}$	-16 dBm
$39 \text{ dBW} < P < 50 \text{ dBW}$	85 dBc
$50 \text{ dBW} < P$	-5 dBm
NOTE: Within the band 108 MHz to 137 MHz the limits above shall apply without exceeding the absolute limit of 25 $\mu\text{W}$ (-16 dBm).	



**Figure 4.1: Spurious emission limits for analogue television broadcast transmitters**

## 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.

NOTE: All the spectrum masks presented are overall emission masks inclusive of out-of band emission limits.

#### 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.1):

- a) connect the Test Signal Generator to the EUT;
- b) connect the EUT to the Test Load, via the Coupling Device;
- c) connect the Spectrum Analyser to the Coupling Device.

The test signal shall be as defined in clause A.1.3.2.

##### 4.2.2.2.2 Procedure

- a) set the Test Signal Generator to deliver a test signal;
- b) operate the EUT at each of the test frequencies as defined in clause 4.2.2.2.1;
- c) 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

Out-of-band emissions shall not exceed the values set out in tables 4.2, 4.4 and 4.6, shown additionally in figures 4.2 to 4.4.

##### 4.2.2.3.1 Spectrum masks for 7 MHz and 8 MHz analogue television systems

Spectrum limit masks for analogue television are shown in figures 4.2 to 4.4. A generic approach is used to cover the following types of system:

- 7 MHz analogue television, negative modulation, 0,75 MHz VSB;
- 8 MHz analogue television, negative modulation, 0,75 MHz and 1,25 MHz VSB;
- 8 MHz analogue television, positive modulation, 0,75 MHz and 1,25 MHz VSB.

Each graph is drawn to represent the spectrum limits for transmitters in the output power range 39 dBW to 50 dBW. Associated with each graph is a table of break points and a table of end point values, together with the corresponding spurious levels, for a range of transmitter output powers.

For 7 MHz analogue television, the Out-Of-Band domain extends from  $\pm 3,5$  MHz (i.e.  $\pm 0,5 \times 7$  MHz) to  $\pm 17,5$  MHz (i.e.  $\pm 2,5 \times 7$  MHz).

For 8 MHz analogue television, the Out-Of-Band domain extends from  $\pm 4$  MHz (i.e.  $\pm 0,5 \times 8$  MHz) to  $\pm 20$  MHz (i.e.  $\pm 2,5 \times 8$  MHz).

For both 7 MHz and 8 MHz analogue television, a 50 kHz measurement bandwidth is used. The 0 dB reference level corresponds to the peak sync power for negative modulation television systems, or the peak white power for positive modulation television systems. The highest mean power for negative modulation is assumed to be 2,5 dB below peak sync power, and for positive modulation it is assumed to be 1,2 dB below peak white power.

Table 4.2 provides break points corresponding to the graph shown in figure 4.2 for 7 MHz analogue television, negative modulation, 0,75 MHz VSB.

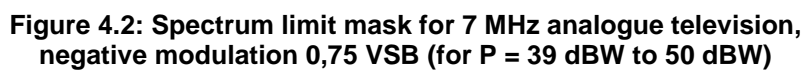
**Table 4.2: Break points for 7 MHz analogue television, negative modulation, 0,75 MHz VSB**

Frequency relative to the vision carrier frequency	7 MHz channel Frequency relative to the channel centre frequency	0,75 MHz VSB Relative level in 50 kHz reference bandwidth
-15,25 MHz	-17,5 MHz	-90,5 dB
-8,25 MHz	-10,5 MHz	-65,5 dB
-5,5 MHz	-7,75 MHz	-56 dB
-5 MHz	-7,25 MHz	-36 dB
-1,25 MHz	-3,5 MHz	-36 dB
-0,75 MHz	-3 MHz	-16 dB
-0,18 MHz	-2,43 MHz	-16 dB
0 MHz	-2,25 MHz	0 dB
0,18 MHz	-2,07 MHz	-16 dB
5 MHz	2,75 MHz	-16 dB
5,435 MHz	3,185 MHz	-10 dB
5,565 MHz	3,315 MHz	-10 dB
6,1 MHz	3,85 MHz	-20 dB
6,28 MHz	4,03 MHz	-50 dB
11 MHz	8,75 MHz	-56 dB
12,75 MHz	10,5 MHz	-65,5 dB
19,75 MHz	17,5 MHz	-90,5 dB

Table 4.3 provides end point values to be used in conjunction with table 4.2 and figure 4.2, applicable to a range of transmitter output powers, for 7 MHz analogue television, negative modulation, 0,75 MHz VSB.

**Table 4.3: End point values for 7 MHz analogue television, negative modulation, 0,75 MHz VSB**

End point value (see note) (50 kHz measurement bandwidth) (dB)	Power range (dBW)	Corresponding spurious level (in 100 kHz measurement bandwidth)
-80,5 - ( $P - 9$ )	$P \leq 9$	-36 dBm
-80,5	$9 < P \leq 29$	75 dBc
-80,5 - ( $P - 29$ )	$29 < P \leq 39$	-16 dBm
-90,5	$39 < P \leq 50$	85 dBc
-90,5 - ( $P - 50$ )	$50 < P$	-5 dBm
NOTE: The end point value is subject to an upper limit of -65,5 dB.		



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**Table 4.4: Break points for 8 MHz analogue television, negative modulation, 0,75 MHz and 1,25 MHz VSB**

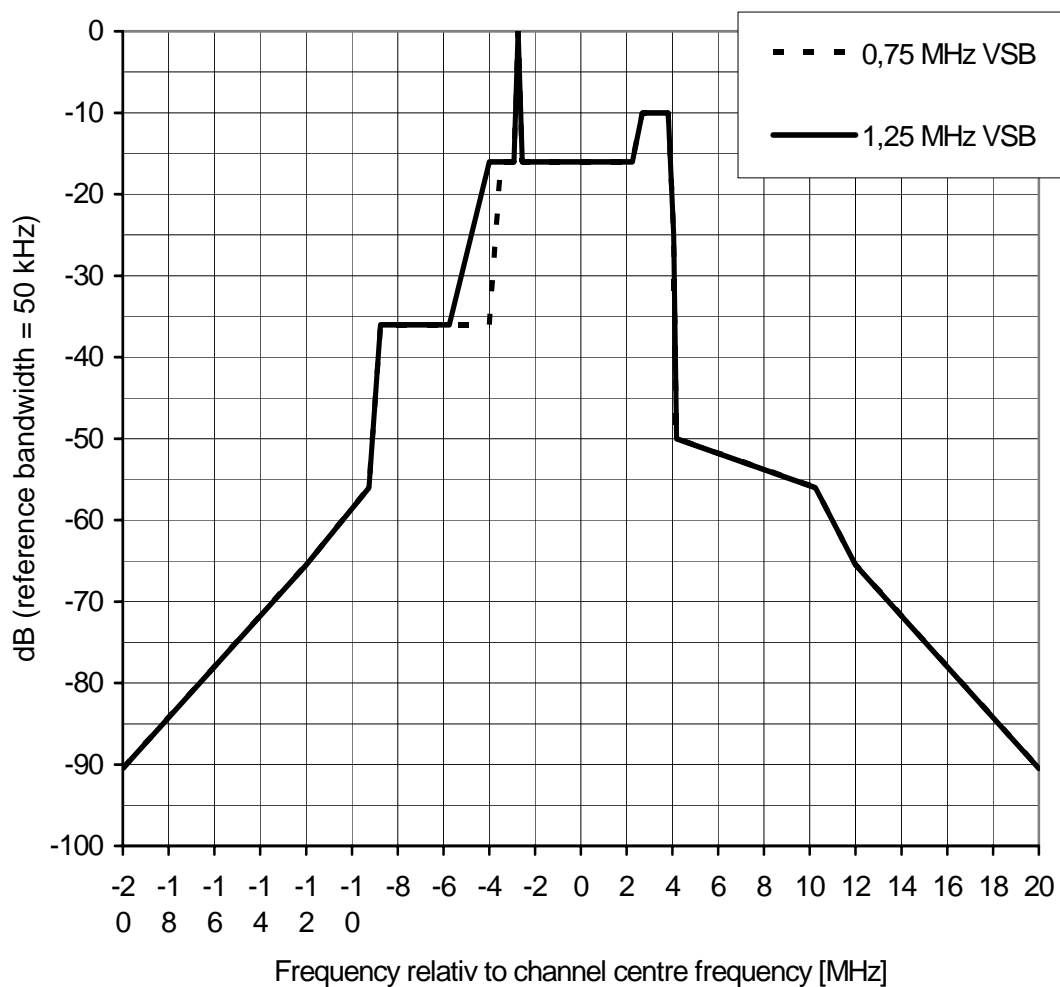
Frequency relative to the vision carrier frequency	8MHz channel, Frequency relative to the channel centre frequency	0,75 MHz VSB, Relative level in 50 kHz reference bandwidth	1,25 MHz VSB, Relative level in 50 kHz reference bandwidth
-17,25 MHz	-20 MHz	-90,5 dB	-90,5 dB
-9,25 MHz	-12 MHz	-65,5 dB	-65,5 dB
-6,5 MHz	-9,25 MHz	-56 dB	-56 dB
-6 MHz	-8,75 MHz	-36 dB	-36 dB
-3 MHz	-5,75 MHz	-36 dB	-36 dB
-1,25 MHz	-4 MHz	-36 dB	-16 dB
-0,75 MHz	-3,5 MHz	-16 dB	-16 dB
-0,18 MHz	-2,93 MHz	-16 dB	-16 dB
0 MHz	-2,75 MHz	0 dB	0 dB
0,18 MHz	-2,57 MHz	-16 dB	-16 dB
5 MHz	2,25 MHz	-16 dB	-16 dB
5,435 MHz	2,685 MHz	-10 dB	-10 dB
6,565 MHz	3,815 MHz	-10 dB	-10 dB
6,802 MHz	4,052 MHz	-25 dB	-25 dB
6,94 MHz	4,19 MHz	-50 dB	-50 dB
13 MHz	10,25 MHz	-56 dB	-56 dB
14,75 MHz	12 MHz	-65,5 dB	-65,5 dB
22,75 MHz	20 MHz	-90,5 dB	-90,5 dB

Table 4.5 provides end point values to be used in conjunction with table 4.4 and figure 4.3, applicable to a range of transmitter output powers, for 8 MHz analogue television, negative modulation.

**Table 4.5: End point values for 8 MHz analogue television, negative modulation**

End point value (see note) (50 kHz measurement bandwidth) (dB)	Power range (dBW)	Corresponding spurious level (in 100 kHz measurement bandwidth)
-80,5 - ( $P - 9$ )	$P \leq 9$	-36 dBm
-80,5	$9 < P \leq 29$	75 dBc
-80,5 - ( $P - 29$ )	$29 < P \leq 39$	-16 dBm
-90,5	$39 < P \leq 50$	85 dBc
-90,5 - ( $P - 50$ )	$50 < P$	-5 dBm
NOTE: The end point value is subject to an upper limit of -65,5 dB.		





**Figure 4.3: Spectrum limit mask for 8 MHz analogue television, negative modulation (for  $P = 39$  dBW to 50 dBW)**

Table 4.6 provides break points corresponding to the graph shown in figure 4.4, for 8 MHz analogue television, positive modulation, 0,75 MHz and 1,25 MHz VSB.

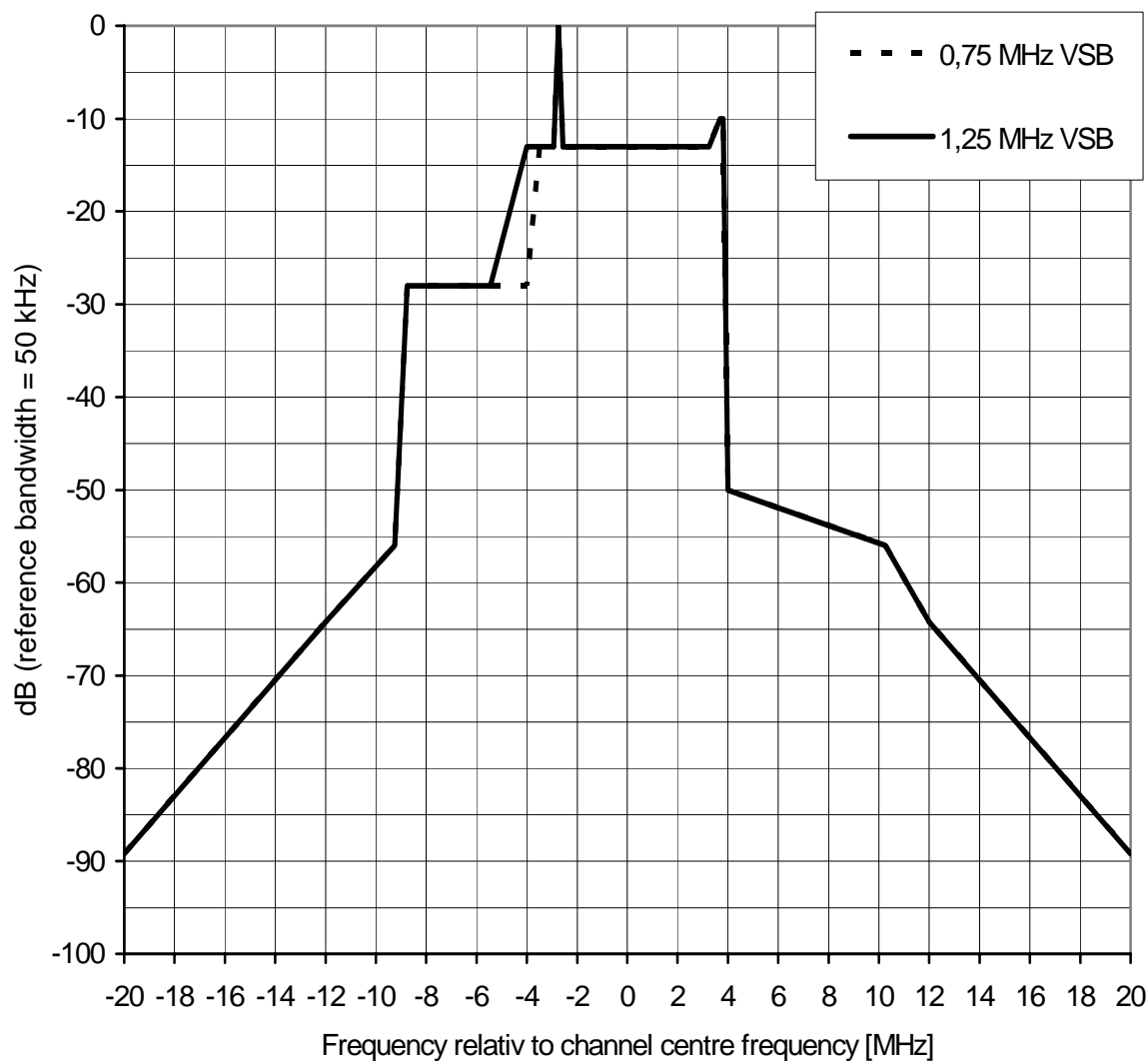
**Table 4.6: Break points for 8 MHz analogue television, positive modulation, 0,75 MHz and 1,25 MHz VSB**

Frequency relative to the vision carrier frequency	8 MHz channel Frequency relative to the channel centre frequency	0,75 MHz VSB, Relative level in 50 kHz reference bandwidth	1,25 MHz VSB, Relative level in 50 kHz reference bandwidth
-17,25 MHz	-20 MHz	-89,2 dB	-89,2 dB
-9,25 MHz	-12 MHz	-64,2 dB	-64,2 dB
-6,5 MHz	-9,25 MHz	-56 dB	-56 dB
-6 MHz	-8,75 MHz	-28 dB	-28 dB
-2,7 MHz	-5,45 MHz	-28 dB	-28 dB
-1,25 MHz	-4 MHz	-28 dB	-13 dB
-0,75 MHz	-3,5 MHz	-13 dB	-13 dB
-0,18 MHz	-2,93 MHz	-13 dB	-13 dB
0 MHz	-2,75 MHz	0 dB	0 dB
0,18 MHz	-2,57 MHz	-13 dB	-13 dB
6 MHz	3,25 MHz	-13 dB	-13 dB
6,435 MHz	3,685 MHz	-10 dB	-10 dB
6,565 MHz	3,815 MHz	-10 dB	-10 dB
6,75 MHz	4 MHz	-50 dB	-50 dB
13 MHz	10,25 MHz	-56 dB	-56 dB
14,75 MHz	12 MHz	-64,2 dB	-64,2 dB
22,75 MHz	20 MHz	-89,2 dB	-89,2 dB

Table 4.7 provides end point values to be used in conjunction with table 4.6 and figure 4.4, applicable to a range of transmitter output powers, for 8 MHz analogue television, positive modulation.

**Table 4.7: End point values for 8 MHz analogue television, positive modulation**

End point value (see note) (50 kHz measurement bandwidth) (dB)	Power range (dBW)	Corresponding spurious level (in 100 kHz measurement bandwidth)
-79,2 - ( $P - 9$ )	$P \leq 9$	-36 dBm
-79,2	$9 < P \leq 29$	75 dBc
-79,2 - ( $P - 29$ )	$29 < P \leq 39$	-16 dBm
-89,2	$39 < P \leq 50$	85 dBc
-89,2 - ( $P - 50$ )	$50 < P$	- 5 dBm
NOTE: The end point value is subject to an upper limit of -64,2 dB.		



**Figure 4.4: Spectrum limit mask for 8 MHz analogue television, positive modulation (for P = 39 dBW to 50 dBW)**

### 4.2.3 Transmitter muting during frequency shift

#### 4.2.3.1 Definition

The suppression of emissions during the retuning of transmitters, or the loss of carrier frequency control. This is particularly relevant to frequency agile transmitters incorporating frequency control loops.

#### 4.2.3.2 Method of measurement (essential test suite)

##### 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):

- a) connect the EUT to the Test Load, via the Coupling Device;
- b) connect the Spectrum Analyser to the Coupling Device.

NOTE: Test Signal Generator and Voltage measuring equipment are not required for this test.

#### 4.2.3.2.2 Procedure

- a) operate the EUT at the present frequency as defined in clause 4.2.3.2.1;
- b) initiate frequency change;
- c) measure the results on the Spectrum Analyser.

#### 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 figure 4.1.

### 4.3 Enclosure port measurements (radiated emissions)

#### 4.3.1 Cabinet radiation

##### 4.3.1.1 Definition

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

##### 4.3.1.2 Method of measurement (essential test suite)

###### 4.3.1.2.1 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.2)

- a) connect the Test Signal Generator to the EUT;
- b) connect the EUT to the Test Load;
- c) connect the Spectrum Analyser to the measuring antenna.

#### 4.3.1.2.2 Procedure

The test method shall be in accordance with EN 55022 [6], unless physical size is a restriction, in which case the test method shall be in accordance with EN 55011 [7]:

- Measurements shall be made outside exclusion band (see table 4.8) of the necessary bandwidth of the transmission.
- 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.

#### 4.3.1.2.3 Test requirements

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

#### 4.3.1.3 Limit

Radiated emissions shall not exceed the values set out in table 4.8, shown additionally in figure 4.5, for the frequency range 30 MHz to 4,5 GHz.

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 2 and 3 in table 4.8).

**Table 4.8: Cabinet radiation limits**

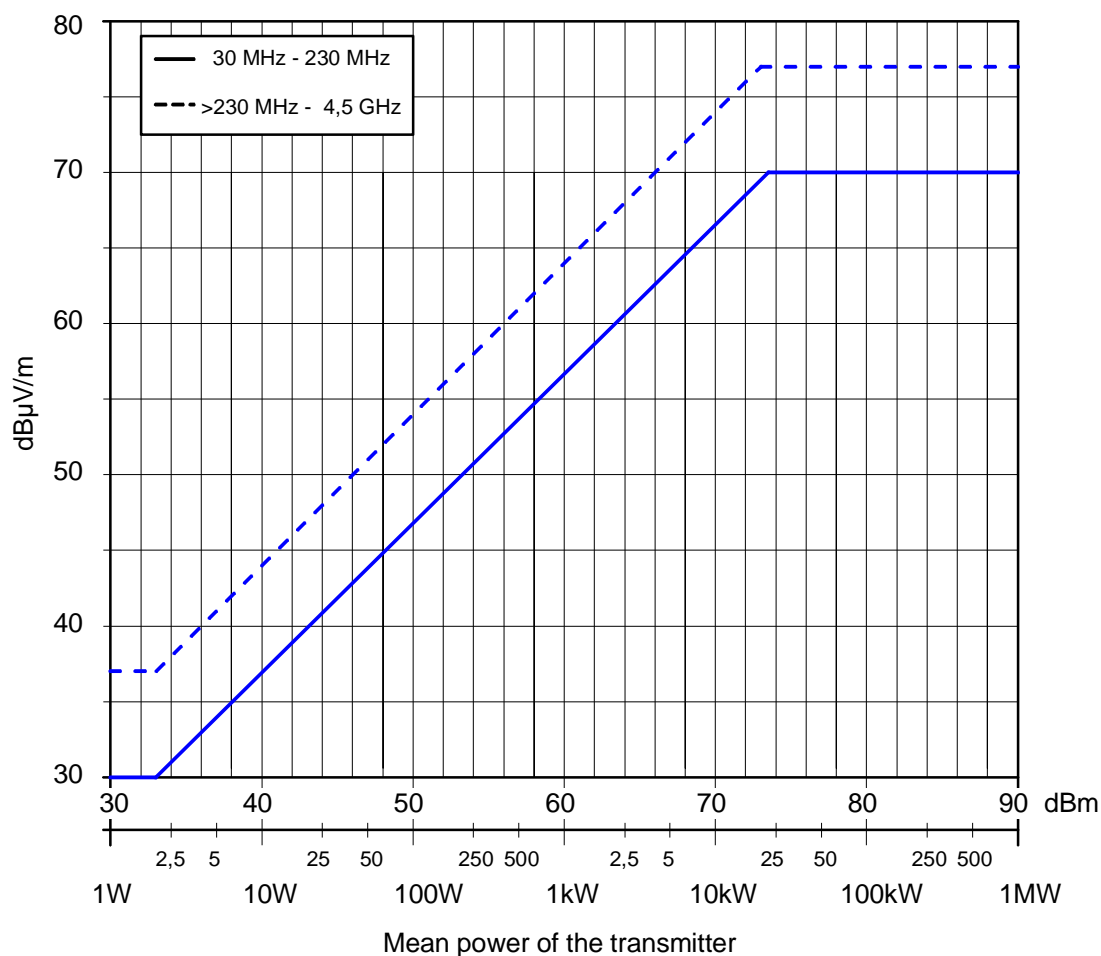
Quasi-peak limits (dB $\mu$ V/m) at 10 m (see notes 1 and 2)	Frequency range
$30 \text{ dB}\mu\text{V/m} \leq 60 + 10 \log_{10} (P_0/2\ 000) \leq 70 \text{ dB}\mu\text{V/m}$	30 MHz to 230 MHz
$37 \text{ dB}\mu\text{V/m} \leq 67 + 10 \log_{10} (P_0/2\ 000) \leq 77 \text{ dB}\mu\text{V/m}$	> 230 MHz to 4,5 GHz
NOTE 1: $P_0$ = RF output power in W. NOTE 2: The exclusion band for the transmitter extends from $F_c - 24$ MHz to $F_c + 24$ MHz, where $F_c$ is the channel centre frequency in MHz.	

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

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

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.



**Figure 4.5: Cabinet radiation limits for analogue television transmitter**

## 4.4 Measurement uncertainties

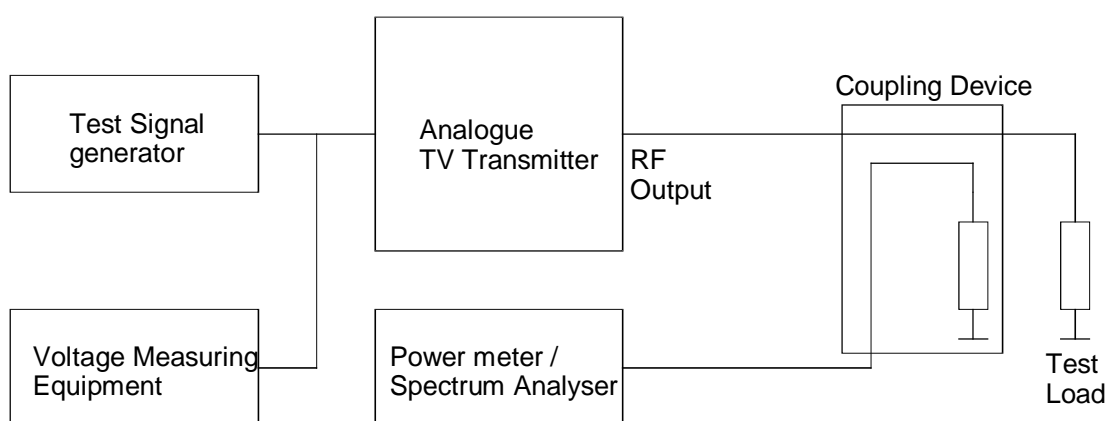
Measurement uncertainty should be calculated and techniques employed to minimize its range. This uncertainty should be applied to the limit and any measurement falling below the range is deemed acceptable.

## Annex A (normative): General measuring arrangements

### A.1 Testing arrangements for antenna port measurements

For test arrangements for unwanted emissions see figure A.1.

#### A.1.1 Spurious and out-of-band emissions



**Figure A.1: Testing arrangement for unwanted emissions**

#### A.1.2 Test frequency range

Limits on unwanted emissions for radio equipments 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 A.1 are recommended.

**Table A.1: Test frequency range**

Transmitter fundamental frequency range	Unwanted emission frequency measurement range	
	lower frequency	upper frequency
47 MHz to 862 MHz	9 kHz	4,5 GHz

The following reference bandwidths are to be used:

For spurious emissions:

- 1 kHz between 9 kHz and 150 kHz;
- 10 kHz between 150 kHz and 30 MHz;
- 100 kHz between 30 MHz and 1 GHz;
- 1 MHz above 1 GHz.

For out-of-band emissions:

- 50 kHz.

## A.1.3 Test modulating signal

### A.1.3.1 Spurious emissions

The Vision carrier shall be amplitude modulated with composite sync pulses with black level (negative modulation systems) or with white level (positive modulation systems), the Sound 1 ( mono ) carrier shall be frequency modulated with a 1 kHz sinusoidal signal at a level to cause a frequency deviation of 50 kHz and the sound 2 (NICAM or 2<sup>nd</sup> FM carrier) carrier shall be modulated as follows:

- NICAM: DQPSK with a pseudo random bit sequence;
- IRT System: 1kHz sinusoidal signal at 50 kHz frequency deviation.

### A.1.3.2 Out-of-band emissions

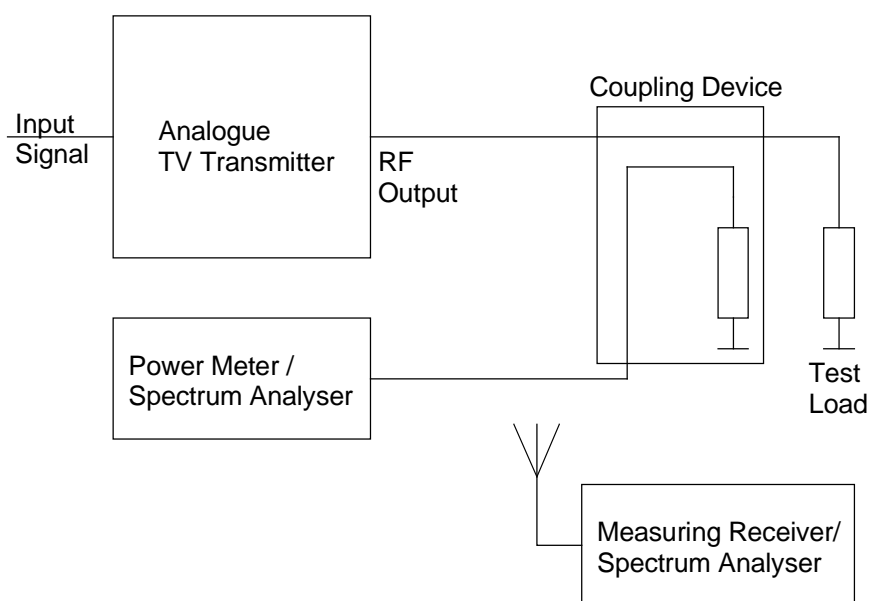
The Vision carrier shall be amplitude modulated with composite sync pulses and a 350 mV luminance bar with a superimposed, full amplitude, signal swept in frequency between 0,2 MHz and 5,2 MHz (B,G) and 5,5 MHz (I), the Sound 1 (mono) carrier shall be frequency modulated with a 1 kHz sinusoidal signal at a level to cause a frequency deviation of 50 kHz and the sound 2 ( NICAM or 2<sup>nd</sup> FM carrier) carrier shall be modulated as follows:

- NICAM: DQPSK with a pseudo random bit sequence;
- IRT System: 1 kHz sinusoidal signal at 50 kHz frequency deviation.

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

Guidance of methods of measurement can be found in IEC 60489-1 amendment 2 [8].



**Figure A.2: Testing arrangement for cabinet radiation**



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## Annex B (informative): Bibliography

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- ITU-Recommendation BT.470-6 (1998): "Conventional television systems".
- ITU-R Recommendation SM.329-10: "Unwanted emissions in the spurious domain".
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- ITU-R Recommendation SM.1541-1: "Unwanted emissions in the out-of-band domain".
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- IEC 60244-1: "Methods of measurement for radio transmitters - Part 1: General characteristics for broadcast transmitters".
- IEC 60244-5: "Methods of measurement for radio transmitters - Part 5: Performance characteristics of television transmitters".
- IEC 60244-6: "Methods of measurement for radio transmitters - Part 6: Cabinet radiation at frequencies between 130 kHz and 1 GHz".
- IEC 60244-8: "Methods of measurement for radio transmitters - Part 8: Performance characteristics of vestigial sideband demodulators used for testing television transmitters and transposers".
- IEC 60244-9: "Methods of measurement for radio transmitters - Part 9: Performance characteristics for television transposers".
- IEC 60244-10: "Methods of measurement for radio transmitters - Part 10: Methods of measurement for television transmitters and transposers employing insertion test signals".
- IEC 60244-12-1: "Methods of measurement for radio transmitters - Part 12: Guideline for drawing up descriptive leaflets for transmitters and transposers for sound and television broadcasting - Characteristics to be specified".
- IEC 60244-12-2: "Methods of measurement for radio transmitters - Part 12: Guideline for drawing up descriptive leaflets for transmitters and transposers for sound and television broadcasting - Specification sheets".
- IEC 61000-4-3/A1 (1998/12): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio frequency, electromagnetic field immunity test".

## 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 analogue television broadcast service; Harmonized EN under article 3.2 of the R&TTE Directive
Estonian	
Finnish	
French	CEM et spectre radioélectrique (ERM) * Équipements de transmission pour la diffusion du service de télévision analogique; EN harmonisée couvrant l'article 3.2 de la Directive R&TTE
German	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Sendertechnische Einrichtungen für den analogen Fernseh-Rundfunkdienst; Harmonisierte EN nach Artikel 3.2 der R&TTE Richtlinie
Greek	
Hungarian	
Icelandic	
Italian	
Latvian	
Lithuanian	
Maltese	
Polish	Kompatybilność Elektromagnetyczna i Zagadnienia Widma Radiowego (ERM) - Urządzenia nadawcze telewizji analogowej - Zharmonizowana EN zgodna z artykułem 3.2 dyrektywy R&TTE
Portuguese	
Slovak	
Slovenian	
Spanish	
Swedish	

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## History

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