

Draft **ETSI EN 301 489-28** V2.1.0 (2022-11)



**HARMONISED EUROPEAN STANDARD**

**ElectroMagnetic Compatibility (EMC)  
standard for radio equipment and services;  
Part 28: Specific conditions for wireless digital video links;  
Harmonised Standard for ElectroMagnetic Compatibility**

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## 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.3] 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 28 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

<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

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## 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).

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# 1 Scope

The present document specifies the applicable test conditions, performance assessment and performance criteria for wireless digital video links and the associated ancillary equipment, in respect of electromagnetic compatibility.

Technical specifications related to the antenna port and emissions from the enclosure port of the radio equipment are not included in the present document. Such technical specifications are found in the relevant product standard for the effective use of the radio spectrum, see table 1.

**Table 1: Radio Technologies in scope of the present document**

Technology	ETSI Standard
Wireless Video Links operating in the 1,3 GHz to 50 GHz frequency band	ETSI EN 302 064 [i.2]

The environmental classification and the emission and immunity requirements used in the present document are as stated in ETSI EN 301 489-1 [1], except for any special conditions included in the present document.

Emissions requirements in the present document are only specified for frequencies above 9 kHz.

NOTE: The relationship between the present document and essential requirements of article 3.1(b) of Directive 2014/53/EU [i.1] is given in annex A.

## 2 References

### 2.1 Normative references

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The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 301 489-1 (V2.2.3) (11-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

### 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/53/EU of the European Parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

- [i.2] ETSI EN 302 064: "Wireless Video Links operating in the 1,3 GHz to 50 GHz frequency band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
- [i.3] 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 Definition of terms, symbols and abbreviations

### 3.1 Terms

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

**ancillary equipment:** electrical or electronic equipment, that is intended to be used with a receiver or transmitter

NOTE 1: It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver or transmitter to provide additional operational and/or control features to the radio equipment (e.g. to extend control to another position or location);
- the ancillary equipment cannot be used without being connected to radio equipment to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

NOTE 2: An example of ancillary equipment would be a docking station for radio equipment whose interface is dedicated to a particular product or range of products.

**integral antenna:** antenna designed to be connected to the equipment without the use of a 50  $\Omega$  external connector and considered to be part of the equipment

NOTE: An integral antenna may be fitted internally or externally to the equipment.

**quasi-error-free:** transmission error rate less than one uncorrected event per hour

**switching range:** maximum frequency range over which the receiver or transmitter can be operated without reprogramming or realignment

### 3.2 Symbols

Void.

### 3.3 Abbreviations

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

AC	Alternating Current
BER	Bit Error Rate
C/N	Carrier to Noise ratio
DC	Direct Current
DVB-S2	Digital Video Broadcast - Satellite (second generation)
DVB-T	Digital Video Broadcast - Terrestrial
DVB-T2	Digital Video Broadcast - Terrestrial (second generation)

EFTA	European Free Trade Association
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
FEC	Forward Error Correction
LDPC	Low Density Parity Check
LONM	Loss Of Noise Margin
QEF	Quasi-Error-Free
RF	Radio Frequency
TS	Transport Stream

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## 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 product related test conditions for wideband data communications systems are specified in clauses 4.2 to 4.3.

Whenever the EUT is provided with a detachable antenna, it shall be tested with the antenna fitted in a manner typical of normal intended use.

For immunity tests, if the equipment is of a category which permits it, a communications link shall be established at the start of the test and maintained during the test.

The test conditions shall be as follows:

- the transmitter shall be operated at its normal maximum RF output power modulated with a test signal which represents the normal operation of the equipment for its intended use (see clause 4.2.1);
- for standalone receivers or receivers of transceivers operating in simplex mode, the wanted RF input signal, coupled to the receiver, shall be modulated with a test signal which represents the normal operation of the equipment for its intended use (see clause 4.2.3);
- for duplex transceivers, the wanted RF input signal, coupled to the receiver, shall be modulated with a test signal which represents the normal operation of the equipment for its intended use (see clause 4.2.3). The transmitter shall be operated at its normal maximum output power, modulated with the test modulation signal, coupled to the transmitter from the output of the receiver (repeater mode).

### 4.2 Arrangements for test signals

#### 4.2.1 Arrangements for test signals at the input of transmitters

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

#### 4.2.2 Arrangements for test signals at the output of transmitters

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

#### 4.2.3 Arrangements for test signals at the input of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.3 shall apply.



#### 4.2.4 Arrangements for test signals at the output of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.4 shall apply.

#### 4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of ETSI EN 301 489-1 [1], clause 4.2.0 shall apply.

### 4.3 Exclusion bands

#### 4.3.1 General

For EUT that operate above 6 GHz there is no exclusion band specified as test ranges stop at 6 GHz.

#### 4.3.2 Receiver and receivers of transceivers Exclusion band

The exclusion band for receivers and receiver sections of transceivers is the band of frequencies over which no immunity tests with radiated RF are made as defined in clause 4.3.3 of ETSI EN 301 489-1 [1].

#### 4.3.3 Transmitter and transmitters of transceivers Exclusion band

The exclusion band for transmitters and transmitter sections of transceivers is the band of frequencies over which no immunity tests with radiated RF are made.

The exclusion band for transmitters is as defined in clause 4.3.2 of ETSI EN 301 489-1 [1].

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## 5 Performance assessment

### 5.1 General

At the time of submission of the equipment for test, the following parameters of the intended use should be supplied to be recorded in the test report:

- the coupling means to be used for the application of the modulation signal to the EUT and for monitoring the output of the EUT; and
- level and description of the RF test signal for the establishment of the communications link;
- description of test fixtures;
- the type of the equipment, for example: stand-alone or plug-in radio device;
- Any host equipment to be combined with the radio equipment for testing;
- the minimum performance level under the application of EMC stress (see clause 6).

### 5.2 Ancillary equipment

The provision of ETSI EN 301 489-1 [1], clause 5 shall apply.

## 5.3 Assessment procedures

The performance assessment shall be based upon:

- maintenance of function(s);
- the way the eventual loss of function(s) can be recovered;
- unintentional behaviour of the EUT.

The test system shall set up a communications link in the same manner as the Equipment Under Test's (EUT) intended use.

Any user defined data fields in the memory or storage of the EUT shall be filled in a way representative of intended use.

The assessment procedure shall verify that the communications link is maintained and that there is no loss of user control functions or loss of critical stored data.

Where the EUT is capable of operation in multiple frequency bands, each band shall be subject to assessment.

Where the EUT is capable of operating in multiple radio technologies, the operation of each technology shall be assessed.

For radio technologies within the scope of the present document that are intended to be permanently operational, assessing the radio in idle mode is not considered necessary.

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## 6 Performance criteria

### 6.1 General performance criteria

#### 6.1.1 General

The equipment shall meet the performance criteria specified in the present clause and clauses 6.2 and 6.3 as appropriate.

The establishment and maintenance of a communications link and the assessment of loss of noise margin at the Quasi-Error-Free (QEF) point are used as performance criteria to ensure that all primary functions of the transmitter and receiver are evaluated during the immunity tests. In addition, the test shall also be performed in idle mode to ensure the transmitter does not unintentionally operate. The maintenance of a communications link shall be assessed using an indicator which may be part of the test system or the EUT.

#### 6.1.2 Choice of measurement device and QEF methods

There are three methods that can be used to determine the QEF threshold, each of these are suited to a different type of measurement device. The choice of method depends the interfaces accessible on the receiver:

- 1) Direct method:
  - For receivers where the received TS data is available, the packets are compared to those transmitted from the signal generator and the TS BER will be computed. When this method is used the QEF condition corresponds to TS BER of  $1 \times 10^{-11}$ . The measurement device for this method may be a Transport Stream Analyser or a BER test mode of the "wanted" signal generator using a "loop back" cable from the EUT.