



# SLOVENSKI STANDARD

## SIST EN 301 489-4 V1.3.1:2003

01-marec-2003

---

**Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Standard elektromagnetne združljivosti (EMC) za radijsko opremo in storitve - 4. del: Posebni pogoji za fiksne radijske povezave, pomožno opremo in storitve**

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 4: Specific conditions for fixed radio links and ancillary equipment and services

**(standards.iteh.ai)**

[SIST EN 301 489-4 V1.3.1:2003](https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003)

<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003>

**Ta slovenski standard je istoveten z: EN 301 489-4 Version 1.3.1**

---

**ICS:**

33.060.20	Sprejemna in oddajna oprema	Receiving and transmitting equipment
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

**SIST EN 301 489-4 V1.3.1:2003** en

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 301 489-4 V1.3.1:2003

<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003>

# ETSI EN 301 489-4 V1.3.1 (2002-08)

---

*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
ElectroMagnetic Compatibility (EMC)  
standard for radio equipment and services;  
Part 4: Specific conditions for fixed radio links  
and ancillary equipment and services**

---

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 301 489-4 V1.3.1:2003](https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003)

<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003>



---

Reference

REN/ERM-EMC-230-4

---

KeywordsEMC, FWA, point-to-point, radio, regulation, RLL,  
WLL**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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 301 489-4 V1.3.1:2003<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545d1b/etsi-en-301-489-4-v1-3-1-2003>**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.fr](mailto:editor@etsi.fr)

---

**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 2002.  
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
1 Scope .....	6
2 References .....	6
3 Definitions and abbreviations.....	7
3.1 Definitions .....	7
3.2 Abbreviations .....	7
4 Test conditions .....	7
4.1 General .....	7
4.1.1 Test conditions and configurations .....	7
4.1.2 Emission tests .....	8
4.1.3 Immunity tests .....	9
4.2 Arrangements for test signals .....	10
4.2.1 Arrangements for test signals at the input of the transmitter .....	10
4.2.2 Arrangements for test signals at the output of the transmitter .....	10
4.2.3 Arrangements for test signals at the input of the receiver .....	10
4.2.4 Arrangements for test signals at the output of the receiver .....	11
4.3 Exclusion bands.....	11
4.3.1 Exclusion bands for receivers .....	11
4.3.2 Exclusion bands for transmitters .....	11
5 Performance assessment.....	11
5.1 General .....	11
5.2 Equipment which can provide a communications link .....	11
5.3 Equipment which does not provide a communications link .....	11
5.4 Ancillary equipment .....	11
5.5 Equipment classification .....	12
6 Performance criteria .....	12
6.1 Performance criterion for Continuous phenomena applied to Transmitters (CT) and Receivers (CR) .....	12
6.2 Performance criterion for Transient phenomena applied to Transmitters (TT) and Receivers (RT).....	12
6.3 Specific performance criteria .....	12
6.3.1 Digital signal ports .....	12
6.3.1.1 Performance criterion for continuous phenomena .....	12
6.3.1.2 Performance criterion for transient phenomena .....	13
6.3.2 Analogue voice frequency signal ports .....	13
6.3.2.1 Performance criterion for continuous phenomena .....	13
6.3.2.2 Performance criterion for transient phenomena .....	13
6.3.3 Ethernet and packet-data interfaces .....	13
6.3.3.1 Performance criterion for continuous phenomena .....	13
6.3.3.2 Performance criterion for transient phenomena .....	13
6.3.4 Service and maintenance interfaces .....	13
6.3.5 Synchronization interfaces.....	13
6.3.5.1 Performance criterion for continuous phenomena .....	13
6.3.5.2 Performance criteria for transient phenomena .....	14
6.3.6 Remote alarm interfaces .....	14
6.3.6.1 Performance criterion for continuous phenomena .....	14
6.3.6.2 Performance criterion for transient phenomena .....	14
6.4 Performance criteria for ancillary equipment tested on a stand alone basis .....	14
7 Applicability overview tables.....	14
7.1 Emission .....	14
7.1.1 General.....	14
7.1.2 Special conditions .....	14
7.2 Immunity .....	15

7.2.1	General.....	15
7.2.2	Special conditions.....	15
<b>Annex A (informative):</b>	<b>Examples of Fixed Radio Link equipment within in the scope of the present document.....</b>	<b>16</b>
A.1	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 1,4 GHz frequency band.....	16
A.2	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 2,1 to 2,6 GHz frequency band.....	16
A.3	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 3 to 11 GHz frequency band.....	16
A.4	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 13 to 18 GHz frequency band.....	17
A.5	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 23 GHz frequency band.....	17
A.6	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 26 and 28 GHz frequency band.....	18
A.7	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 32 GHz and 38 GHz frequency band.....	18
A.8	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 50 GHz frequency band.....	18
A.9	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 52 GHz frequency band.....	18
A.10	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 55 GHz frequency band.....	18
A.11	Fixed Radio Systems; Point-to-point equipment; intended for operation in the 58 GHz frequency band.....	19
A.12	Fixed Radio Systems; Point-to-point equipment; with packet data interface intended for operation in the 7 to 55 GHz frequency band.....	19
A.13	Fixed Radio Systems; Point-to-Multipoint equipment; intended for operation in the frequency band below 1 GHz.....	19
A.14	Fixed Radio Systems; Point-to-Multipoint equipment; intended for operation in the 1 to 3 GHz frequency band.....	20
A.15	Fixed Radio Systems; Point-to-Multipoint equipment; intended for operation in the 3 to 11 GHz frequency band.....	20
A.16	Fixed Radio Systems; Point-to-Multipoint equipment; intended for operation in the 11 to 60 GHz frequency band.....	21
A.17	Fixed Radio Systems; Point-to-Multipoint equipment; intended for operation in the 26 and 28 GHz frequency band.....	21
<b>Annex B (informative):</b>	<b>Point-to-Multipoint fixed radio links; General system architecture.....</b>	<b>22</b>
<b>Annex C (informative):</b>	<b>Bibliography.....</b>	<b>23</b>
History	.....	26

iTeH STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 301 489-4 V1.3.1:2003

<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-6009545a9444/sist-en-301-489-4-v1-3-1-2003>

---

## 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).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [4] (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 Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [3] as amended) and 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]).

The present document is part 4 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

[SIST EN 301 489-4 V1.3.1:2003](https://standards.iteh.ai/catalog/standards/sist/0f9e8d86-16f7-469d-ac64-e60f7541db84/item/301-489-4-v1-3-1-2003)

[https://standards.iteh.ai/catalog/standards/sist/0f9e8d86-16f7-469d-ac64-](https://standards.iteh.ai/catalog/standards/sist/0f9e8d86-16f7-469d-ac64-e60f7541db84/item/301-489-4-v1-3-1-2003)

[e60f7541db84/item/301-489-4-v1-3-1-2003](https://standards.iteh.ai/catalog/standards/sist/0f9e8d86-16f7-469d-ac64-e60f7541db84/item/301-489-4-v1-3-1-2003)

### National transposition dates

Date of adoption of this EN:	9 August 2002
Date of latest announcement of this EN (doa):	30 November 2002
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 May 2003
Date of withdrawal of any conflicting National Standard (dow):	31 May 2004

---

## 1 Scope

The present document, together with EN 301 489-1 [1], covers the assessment of Fixed Radio Links and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

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

The present document specifies the applicable test conditions, performance assessment and performance criteria for Analogue and Digital Fixed Radio Links operating as fixed Point-to-Point, and Point-to-Multipoint systems as defined in annex B, including the associated ancillary equipment.

Examples of Fixed Radio Links equipment are given in annex A.

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

The processing and protection switch, (de)modulator, transmitter, receiver, RF filters, branching networks, feeders are covered by the present document. The multiplexing and/or de-multiplexing elements are covered if they form part of the transmitter, receiver and/or transceiver.

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

---

## 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.

- [1] ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".
- [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] 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.
- [5] ITU-R Recommendation F.1191-1: "Bandwidths and unwanted emissions of digital radio-relay systems".
- [6] ITU-R Recommendation F.746-3: "Radio-frequency channel arrangements for radio-relay systems".



## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in the EN 301 489-1 [1], clause 3 and the following apply:

**CHannel Separation (CHS):** According to ITU-R Recommendation F.1191-1 [5], the CHannel Separation (CHS) is taken as  $XS/2$  for alternated frequency channel arrangements and  $XS$  for co-channel and interleaved frequency channel arrangements as defined by ITU-R Recommendation F.746-3 [6],  $XS$  is the radio-frequency separation between the centre frequencies of adjacent radio-frequency channels on the same polarization and in the same direction of transmission.

**operating frequency range:** range(s) of radio frequencies covered by the Equipment Under Test (EUT) without any change of units

### 3.2 Abbreviations

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

BER	Bit Error Ratio
CCS	Central Controller station
CHS	Channel Separation
CRS	Central Radio Station
EM	Electromagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
RF	Radio Frequency
RS	Repeater Stations
TS	Terminal Stations

  
 (standards.iteh.ai)  
 SIST EN 301 489-4 V1.3.1:2003  
<https://standards.iteh.ai/catalog/standards/sist/09e8d86-16f7-469d-ac64-e60f56545db8/sist-en-301-489-4-v1-3-1-2003>

## 4 Test conditions

For the purposes of the present document, the test conditions of EN 301 489-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for fixed radio links are specified in the present document.

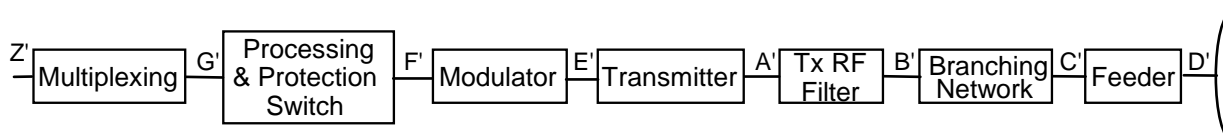
### 4.1 General

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1.1 to 4.3.2, shall apply.

#### 4.1.1 Test conditions and configurations

This clause defines the test conditions and configurations for the emission and immunity tests as follows:

- a transmitter shall, as a minimum, comprise the element between E' and A' of figure 1. Additionally the transmitter may comprise any of the other elements from the transmitter chain shown in figure 1. If these additional elements are part of the transmitter or system they shall also meet the requirements of the present document;

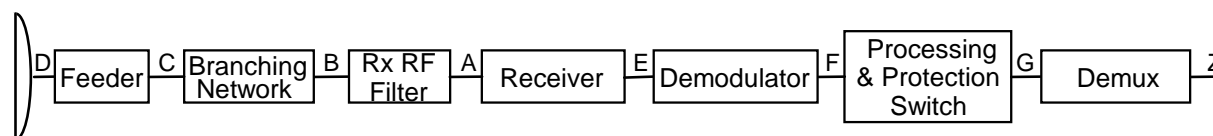


NOTE 1: For the purposes of defining the reference points, the branching network (B' to C') does not include a hybrid.

NOTE 2: Points B' and C' may coincide, dependent on the equipment configuration.

**Figure 1: Elements of a transmitter**

- a receiver shall, as a minimum, comprise the element between A and E of figure 2. Additionally the receiver may comprise any of the other elements from the receiver chain shown in figure 2. If these additional elements are part of the receiver or system they shall also meet the requirements of the present document;



NOTE 1: For the purposes of defining the reference points, the branching network (B to C) does not include a hybrid.

NOTE 2: Points B and C may coincide, dependent on the equipment configuration.

**Figure 2: Elements of a receiver**

- a transceiver shall comprise as a minimum the elements E' to A' and A to E shown in figures 1 and 2, and additionally it may comprise any combinations of the other elements. If these additional elements are part of the transceiver they shall also meet the requirements of the present document;
- the equipment shall be tested under conditions which are within the manufacturer's declared range of humidity, temperature and supply voltage;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- ports which in normal operation are connected to ancillary or other equipment shall be either connected to such equipment, or to a representative termination to simulate the input/output characteristics of the ancillary or other equipment. Radio Frequency (RF) input/output ports shall be correctly terminated;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- ports which are not connected to cables during normal intended operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of Electromagnetic Compatibility (EMC) testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;
- the test conditions, test configuration and mode of operation shall be recorded in the test report.

## 4.1.2 Emission tests

The provisions EN 301 489-1 [1], clause 8 shall apply with the following modification.

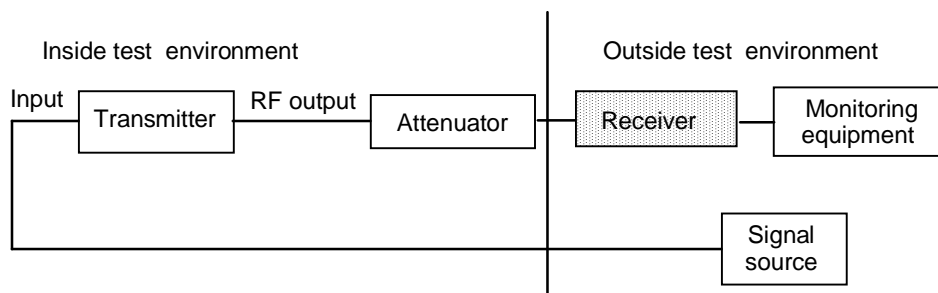
For Point-to-Multipoint systems a communications link shall be established, which shall comprise of the Central Station and a minimum of one Terminal Station. These stations are tested separately. See annex B for definition of Central Station and Terminal Station.

### 4.1.3 Immunity tests

The provisions of EN 301 489-1 [1], clause 9.1 shall apply with the following modifications.

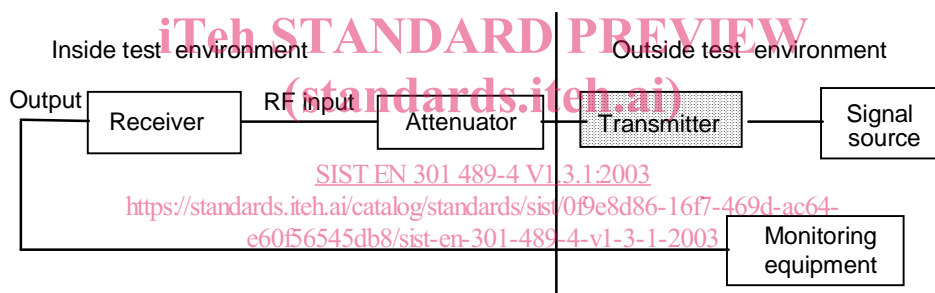
The test configuration shall for transmitters be in accordance with the principle of figure 3, and for receivers it shall be in accordance with the principle of figure 4, and for transceiver shall be in accordance with the principle of figure 5.

The measuring equipment shall be located outside the test environment. Adequate measures shall be taken to avoid any effects of the unwanted signals on the measuring equipment.



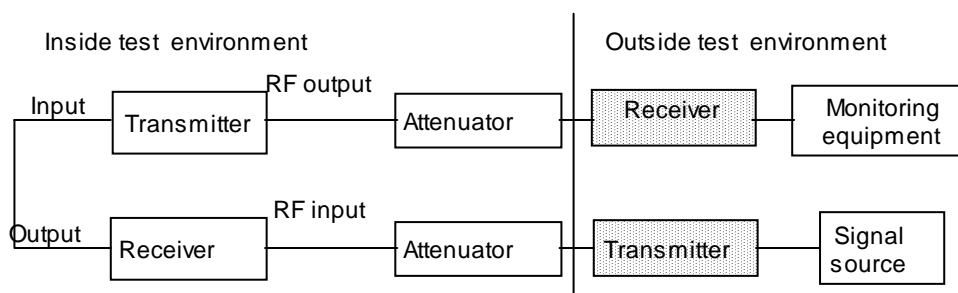
**Figure 3: Test configuration for transmitters**

During immunity tests the transmitter shall be operated at its rated output power. The input to the transmitter shall be in accordance with clause 4.2.1 (see figure 3). A communication link shall be established at the start of the test and be maintained during the test.



**Figure 4: Test configuration for receivers**

During immunity tests for receivers, the wanted RF input signal, coupled to the receiver, shall be in accordance with clause 4.2.3 (see figure 4). A communication link shall be established at the start of the test and be maintained during the test.



**Figure 5: Test configuration of transceivers**

In the case of duplex transceivers where the transmitter and receiver cannot operate at the same radio frequency, the wanted input signal, coupled to the receiver, shall be in accordance clause 4.2.3. The transmitter shall be operated at its rated output power, and with its input coupled to the output of the receiver (repeater mode) (see figure 5).

The same test configuration also applies where the transmitters and receivers operate at the same radio frequency.

The measurement shall be made in the mode of operation as required in this clause.