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Irish Standard I.S. EN 61000-4-3:2006

Electromagnetic compatibility (EMC) --Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2006 (EQV))

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*Incorporating amendments/corrigenda issued since publication:* EN 61000-4-3:2006/A1:2008 EN 61000-4-3:2006/IS1:2009 EN 61000-4-3:2006/A2:2010

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<i>This document replaces:</i> EN 61000-4-3:2002 + A1:2002 + IS1:2004	<i>This document is L</i> EN 61000-4-3:200		<i>Publish</i> 19 May	
This document was published under the authority of the NSAI a comes into effect on: 6 June, 2006	nd			ICS number: 33.100.20
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# EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

# EN 61000-4-3/A2

July 2010

ICS 33.100.20

English version

# Electromagnetic compatibility (EMC) -Part 4-3: Testing and measurement techniques -Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2006/A2:2010)

Compatibilité électromagnétique (CEM) -
Partie 4-3: Techniques d'essai
et de mesure -
Essai d'immunité aux champs
électromagnétiques rayonnés
aux fréquences radioélectriques
(CEI 61000-4-3:2006/A2:2010)

Elektromagnetische Verträglichkeit (EMV) -Teil 4-3: Prüf- und Messverfahren -Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder (IEC 61000-4-3:2006/A2:2010)

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The text of document 77B/626/FDIS, future amendment 2 to IEC 61000-4-3:2006, prepared by SC 77B, High frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 61000-4-3:2006 on 2010-07-01.

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-	latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-04-01
_	latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2013-07-01

### **Endorsement notice**

The text of amendment 2:2010 to the International Standard IEC 61000-4-3:2006 was approved by CENELEC as an amendment to the European Standard without any modification.

# EUROPEAN STANDARD

# EN 61000-4-3/A1

# NORME EUROPEENNE EUROPÄISCHE NORM

February 2008

ICS 33.100.20

English version

# Electromagnetic compatibility (EMC) -Part 4-3: Testing and measurement techniques -Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2006/A1:2007)

Compatibilité électromagnétique (CEM) -Partie 4-3: Techniques d'essai et de mesure -Essai d'immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques (CEI 61000-4-3:2006/A1:2007) Elektromagnetische Verträglichkeit (EMV) -Teil 4-3: Prüf- und Messverfahren -Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder (IEC 61000-4-3:2006/A1:2007)

This amendment A1 modifies the European Standard EN 61000-4-3:2006; it was approved by CENELEC on 2008-02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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### Foreword

The text of document 77B/546/FDIS, future amendment 1 to IEC 61000-4-3:2006, prepared by SC 77B, High frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61000-4-3:2006 on 2008-02-01.

The following dates were fixed:

-	latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2008-11-01
_	latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2011-02-01

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# EUROPEAN STANDARD

# EN 61000-4-3

# NORME EUROPÉENNE EUROPÄISCHE NORM

May 2006

Supersedes EN 61000-4-3:2002 + A1:2002 + IS1:2004

ICS 33.100.20

English version

# Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques -Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2006)

Compatibilité électromagnétique (CEM) Partie 4-3: Techniques d'essai et de mesure -Essai d'immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques (CEI 61000-4-3:2006) Elektromagnetische Verträglichkeit (EMV) Teil 4-3: Prüf- und Messverfahren -Prüfung der Störfestigkeit gegen hochfrequente elektromagnetische Felder (IEC 61000-4-3:2006)

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### Foreword

The text of document 77B/485/FDIS, future edition 3 of IEC 61000-4-3, prepared by SC 77B, High frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-4-3 on 2006-03-01.

This European Standard supersedes EN 61000-4-3:2002 + A1:2002 + IS1:2004.

The test frequency range may be extended up to 6 GHz to take acount of new services. The calibration of the field as well as the checking of power amplifier linearity of the immunity chain are specified.

The following dates were fixed:

-	latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2006-12-01
-	latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-03-01

Annex ZA has been added by CENELEC.

# **Endorsement notice**

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EN 61000-4-3:2006

# Annex ZA

### (normative)

# Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-161	_ 1)	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility	-	-
IEC 61000-4-6	_ 1)	Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	-	-

<sup>&</sup>lt;sup>1)</sup> Undated reference.

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# Publication IEC 61000-4-3 (Edition 3.0 – 2008) I-SH 01

### Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test

# **INTERPRETATION SHEET 1**

This interpretation sheet has been prepared by SC 77B: High frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
77B/568/ISH	77B/573/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

IEC 61000-4-3 contains quick checks embedded in the field calibration process (subclause 6.2), in which the operator tests whether the amplifier is able to produce the desired RF power without saturation.

Step j) of the calibration process as per 6.2.1 describes this check for the constant field strength calibration method:

- *j)* Confirm that the test system (e.g. the power amplifier) is not in saturation. Assuming that  $E_c$  has been chosen as 1,8 times  $E_t$ , perform the following procedure at each calibration frequency:
- *j*-1) Decrease the output from the signal generator by 5,1 dB from the level needed to establish a forward power of  $P_c$ , as determined in the above steps (-5,1 dB is the same as  $E_c$  /1,8);
- *j-2)* Record the new forward power delivered to the antenna;
- *j*-3) Subtract the forward power measured in step *j*-2 from  $P_c$ . If the difference is between 3,1 and 5,1 dB, then the amplifier is not saturated and the test system sufficient for testing. If the difference is less than 3,1 dB, then the amplifier is saturated and is not suitable for testing.

The corresponding check within the constant power calibration method as per 6.2.2 is defined as step m):

- m) Confirm that the test system (e. g. the power amplifier) is not in saturation. Assuming that  $E_c$  has been chosen as 1,8 times  $E_t$ , perform the following procedure at each calibration frequency:
- *m*-1) Decrease the output from the signal generator by 5,1 dB from the level needed to establish a forward power of  $P_c$ , as determined in the above steps (-5,1 dB is the same as  $E_c$  /1,8);

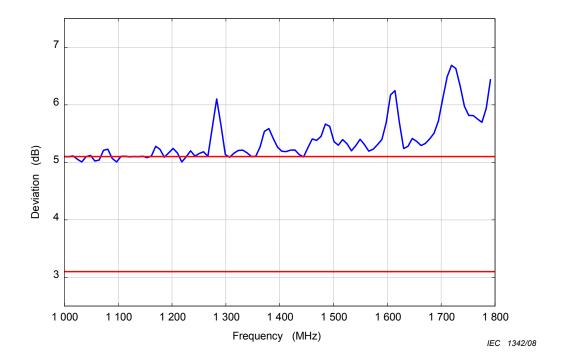
- 2 -

- *m-2)* Record the new forward power delivered to the antenna;
- *m*-3) Subtract the forward power measured in step *m*-2 from *P*<sub>C</sub>. If the difference is between 3,1 dB and 5,1 dB, then the amplifier is not saturated and the test system is sufficient for testing. If the difference is less than 3,1 dB, then the amplifier is saturated and is not suitable for testing.

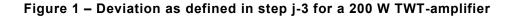
Some amplifiers show deviations of more than 5,1 dB without causing any problems during testing. That behaviour is caused by their special functional principle (above all travelling wave tube amplifiers). Figures 1 and 2 show some measurement results obtained from a semiconductor amplifier as well as from a TWT amplifier.

The text described in j-3, respectively m-3, unfortunately gives no clear answers on the usability of these amplifiers.

After discussion at the 20<sup>th</sup> meeting of SC 77B/WG 10 on October, 22 - 26, 2007, the experts of WG 10 unanimously expressed their opinion that j-3 and m-3 are to be interpreted such that amplifiers showing a deviation of more than 5,1 dB are suitable for testing. E.g. the amplifiers having a characteristic as shown in Figures 1 and 2 can be used to perform tests according to IEC 61000-4-3.



Target field strength is 30 V/m.



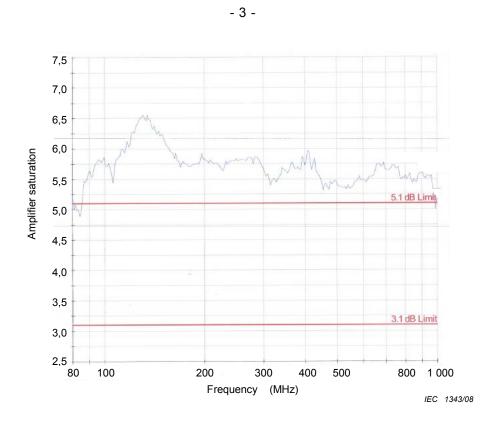


Figure 2 – Deviation as defined in step j-3 for a semiconductor amplifier

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+A2:2010	)

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### INTERNATIONAL ELECTROTECHNICAL COMMISSION

### ELECTROMAGNETIC COMPATIBILITY (EMC) -

# Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test

# FOREWORD

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International Standard IEC 61000-4-3 has been prepared by subcommittee 77B: High frequency phenomenon, of IEC technical committee 77: Electromagnetic compatibility.

It forms part 4-3 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications*.

The test frequency range may be extended up to 6 GHz to take account of new services. The calibration of the field as well as the checking of power amplifier linearity of the immunity chain are specified.

This consolidated version of IEC 61000-4-3 consists of the third edition (2006) [documents 77B/485/FDIS and 77B/500/RVD], its amendment 1 (2007) [documents 77B/546/FDIS and 77B/556/RVD], its amendment 2 (2010) [documents 77B/626/FDIS and 77B/629/RVD] and its interpretation sheet 1 of August 2008.

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The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 3.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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# INTRODUCTION

This standard is part of the IEC 61000 series, according to the following structure:

#### Part 1: General

General considerations (introduction, fundamental principles) Definitions, terminology

#### Part 2: Environment

Description of the environment Classification of the environment Compatibility levels

#### Part 3: Limits

Emission limits Immunity limits (in so far as they do not fall under the responsibility of the product committees)

#### Part 4: Testing and measurement techniques

Measurement techniques Testing techniques

#### Part 5: Installation and mitigation guidelines

Installation guidelines Mitigation methods and devices

#### Part 6: Generic standards

# Part 9: Miscellaneous

Each part is further subdivided into several parts, published either as international standards or as technical specifications or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and a second number identifying the subdivision (example: 61000-6-1).

This part is an International Standard which gives immunity requirements and test procedures related to radiated, radio-frequency, electromagnetic fields.

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# ELECTROMAGNETIC COMPATIBILITY (EMC) -

# Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test

#### 1 Scope and object

This part of IEC 61000 is applicable to the immunity requirements of electrical and electronic equipment to radiated electromagnetic energy. It establishes test levels and the required test procedures.

The object of this standard is to establish a common reference for evaluating the immunity of electrical and electronic equipment when subjected to radiated, radio-frequency electromagnetic fields. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.

NOTE 1 As described in IEC Guide 107, this is a basic EMC publication for use by product committees of the IEC. As also stated in Guide 107, the IEC product committees are responsible for determining whether this immunity test standard should be applied or not, and if applied, they are responsible for determining the appropriate test levels and performance criteria. TC 77 and its sub-committees are prepared to co-operate with product committees in the evaluation of the value of particular immunity tests for their products.

This part deals with immunity tests related to the protection against RF electromagnetic fields from any source.

Particular considerations are devoted to the protection against radio-frequency emissions from digital radiotelephones and other RF emitting devices.

NOTE 2 Test methods are defined in this part for evaluating the effect that electromagnetic radiation has on the equipment concerned. The simulation and measurement of electromagnetic radiation is not adequately exact for quantitative determination of effects. The test methods defined are structured for the primary objective of establishing adequate repeatability of results at various test facilities for qualitative analysis of effects.

This standard is an independent test method. Other test methods may not be used as substitutes for claiming compliance with this standard.

#### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050(161), International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields* 



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