

INTERNATIONAL STANDARD

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BASIC EMC PUBLICATION
PUBLICATION FONDAMENTALE EN CEM

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

**Compatibilité électromagnétique (CEM) –
Partie 4-3: Techniques d'essai et de mesure – Essai d'immunité aux champs
électromagnétiques rayonnés aux fréquences radioélectriques**



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE **CM**
CODE PRIX

ICS 33.100.20

ISBN 978-2-88910-374-4

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 1,5 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 $E_C / 1,8$);*

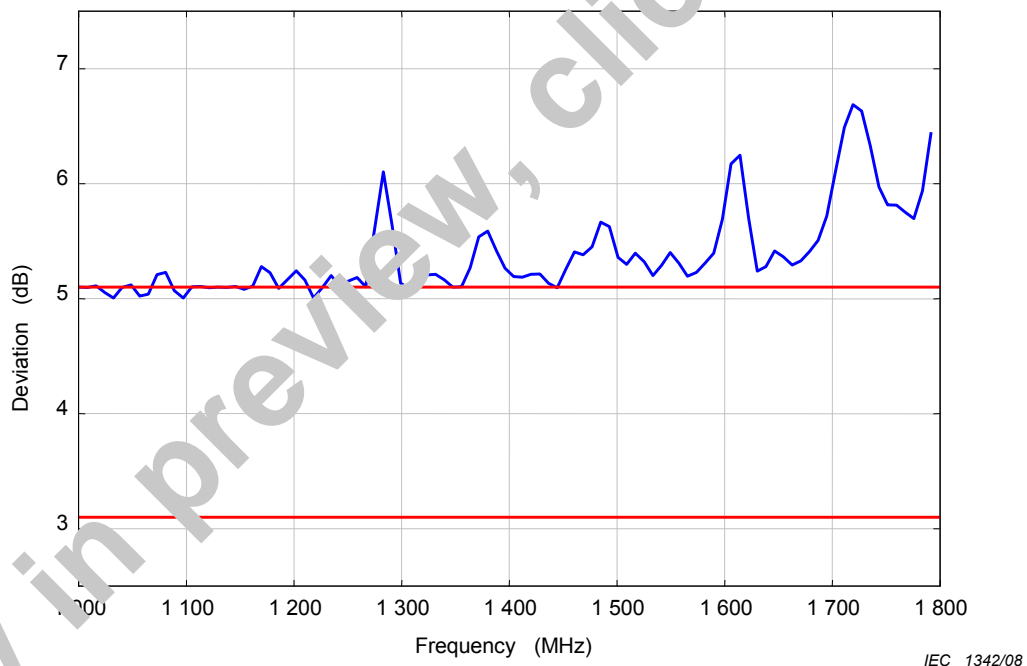
m-2) Record the new forward power delivered to the antenna;

m-3) Subtract the forward power measured in step m-2 from P_C . 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 20th 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 1 – Deviation as defined in step j-3 for a 200 W TWT-amplifier

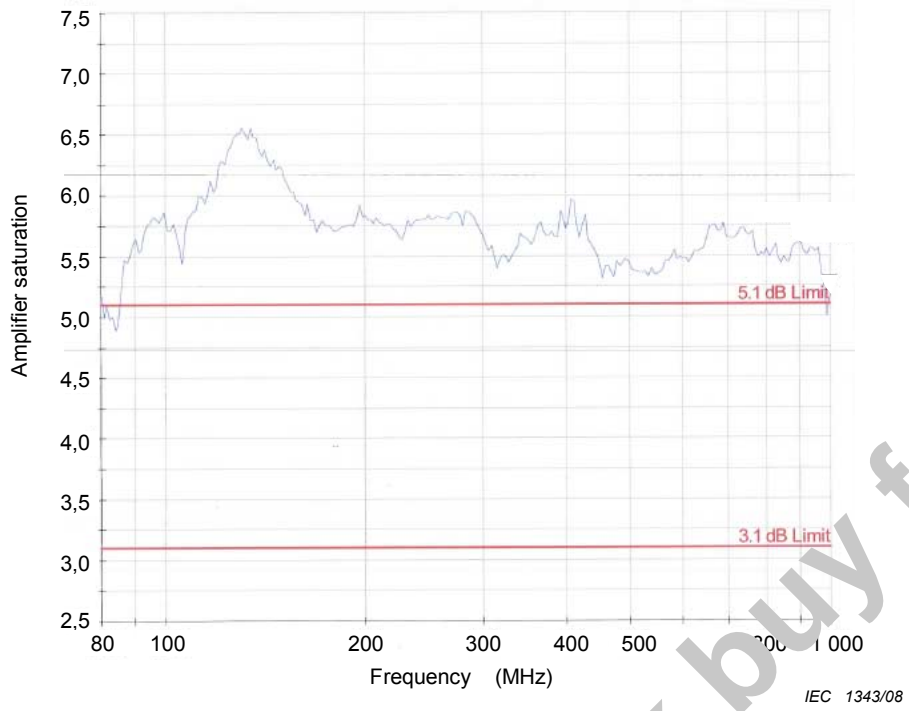


Figure 2 – Deviation as defined in step j-3 for a semiconductor amplifier

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope and object.....	7
2 Normative references	7
3 Terms and definitions	8
4 General	11
5 Test levels.....	11
5.1 Test levels related to general purposes	12
5.2 Test levels related to the protection against RF emissions from digital radio telephones and other RF emitting devices	12
6 Test equipment.....	13
6.1 Description of the test facility	13
6.2 Calibration of field	14
7 Test setup	19
7.1 Arrangement of table-top equipment.....	19
7.2 Arrangement of floor-standing equipment	19
7.3 Arrangement of wiring	20
7.4 Arrangement of human body-mounted equipment	20
8 Test procedure	20
8.1 Laboratory reference conditions	20
8.2 Execution of the test.....	21
9 Evaluation of test results	22
10 Test report.....	22
Annex A (informative) Rationale for the choice of modulation for tests related to the protection against RF emissions from digital radio telephones	31
Annex B (informative) Field generating antennas	36
Annex C (informative) Use of anechoic chambers	37
Annex D (informative) Amplifier non-linearity and example for the calibration procedure according to C.2	40
Annex E (informative) Guidance for product committees on the selection of test levels	45
Annex F (informative) Selection of test methods	48
Annex G (informative) Description of the environment.....	49
Annex H (normative) Alternative illumination method for frequencies above 1 GHz (“independent windows method”)	54
Annex I (informative) Calibration method for E-field probes.....	57
Annex J (informative) Measurement uncertainty due to test instrumentation	72
Figure 1 – Definition of the test level and the waveshapes occurring at the output of the signal generator.....	24
Figure 2 – Example of suitable test facility	25
Figure 3 – Calibration of field.....	26
Figure 4 – Calibration of field, dimensions of the uniform field area	27
Figure 5 – Example of test setup for floor-standing equipment	28
Figure 6 – Example of test setup for table-top equipment.....	29

Figure 7 – Measuring setup	30
Figure C.1 – Multiple reflections in an existing small anechoic chamber.....	38
Figure C.2 – Most of the reflected waves are eliminated	39
Figure D.1 – Measuring positions of the uniform field area.....	42
Figure H.1 – Examples of division of the calibration area into 0,5 m × 0,5 m windows	55
Figure H.2 – Example of illumination of successive windows	56
Figure I.1 – Example of linearity for probe	60
Figure I.2 – Setup for measuring net power to a transmitting device	62
Figure I.3 – Test setup for chamber validation test.....	64
Figure I.4 – Detail for measurement position ΔL	64
Figure I.5 – Example of data adjustment	65
Figure I.6 – Example of the test layout for antenna and probe.....	66
Figure I.7 – Test setup for chamber validation test.....	67
Figure I.8 – Example alternative chamber validation data	67
Figure I.9 – Field probe calibration layout	68
Figure I.10 – Field probe calibration layout (Top view)	68
Figure I.11 – Cross-sectional view of a waveguide chamber	70
Figure J.1 – Example of influences upon level setting	73
Table 1 – Test levels related to general purpose, digital radio telephones and other RF emitting devices.....	11
Table 2 – Requirements for uniform field area for application of full illumination, partial illumination and independent windows method.....	15
Table A.1 – Comparison of modulation methods	32
Table A.2 – Relative interference level	33
Table A.3 – Relative immunity level	34
Table D.1 – Forward power values measured according to the constant field strength calibration method	43
Table D.2 – Forward power values sorted according to rising value and evaluation of the measuring result	43
Table D.3 – Forward power and field strength values measured according to the constant power calibration method.....	44
Table D.4 – Field strength values sorted according to rising value and evaluation of the measuring result	44
Table E.1 – Examples of test levels, associated protection distances and suggested performance criteria.....	47
Table G.1 – Mobile and portable units.....	51
Table G.2 – Base stations.....	52
Table G.3 – Other RF devices.....	53
Table I.1 – Calibration field strength level	58
Table I.2 – Example for the probe linearity check.....	59
Table J.1 – Calibration process.....	74
Table J.2 – Level setting.....	74

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.

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

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- amended.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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.

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*