

INTERNATIONAL STANDARD

IEC 61000-4-4

Second edition
2004-07

BASIC EMC PUBLICATION

Electromagnetic compatibility (EMC) –

Part 4-4:

Testing and measurement techniques – Electrical fast transient/burst immunity test

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CONTENTS

FOREWORD.....	7
INTRODUCTION.....	11
1 Scope.....	13
2 Normative references	13
3 Terms and definitions	15
4 General	19
5 Test levels.....	19
6 Test equipment.....	19
6.1 Burst generator	21
6.2 Coupling/decoupling network for a.c./d.c. mains supply port.....	23
6.3 Capacitive coupling clamp.....	27
7 Test set-up.....	27
7.1 Test equipment	29
7.2 Test set-up for type tests performed in laboratories.....	29
7.3 Test set-up for post-installation tests.....	33
8 Test procedure	35
8.1 Laboratory reference conditions.....	35
8.2 Execution of the test.....	37
9 Evaluation of test results	37
10 Test report.....	39
Annex A (informative) Information on the electrical fast transients.....	55
Annex B (informative) Selection of the test levels.....	59
Bibliography.....	63
Figure 1 – Simplified circuit diagram of a fast transient/burst generator	41
Figure 2 – General graph of a fast transient/burst	41
Figure 3 – Waveshape of a single pulse into a 50 Ω load.....	43
Figure 4 – Coupling/decoupling network for a.c./d.c. power mains supply ports/terminals.....	43
Figure 5 – Construction of the capacitive coupling clamp	45
Figure 6 – Block diagram for electrical fast transient/burst immunity test	45
Figure 7 – General test set-up for laboratory type tests.....	47
Figure 8 – Example of a test set-up for rack mounted equipment	47
Figure 9 – Example of a test set-up for direct coupling of the test voltage to a a.c./d.c. power supply ports/terminal for laboratory purposes	49
Figure 10 – Example of test set-up for application of the test voltage by the capacitive coupling clamp for laboratory test purposes	49

Figure 11 – Example for post-installation test on a.c./d.c. power supply ports and protective earth terminals for stationary, floor-mounted EUT	51
Figure 12 – Example for post-installation test on a.c. mains supply port and protective earth terminals for non-stationary mounted EUT	53
Figure 13 – Example of post-installation test on communications and I/O ports without the capacitive coupling clamp	53
Figure 14 – Verification of the waveform at the common mode output of the coupling/decoupling network	25
Table 1 – Test levels	19
Table 2 – Output voltage peak values and repetition rates	23

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Withstand

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –**Part 4-4: Testing and measurement techniques –
Electrical fast transient/burst immunity test**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61000-4-4 has been prepared by sub-committee 77B: High frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms Part 4-4 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*.

This second edition cancels and replaces the first edition published in 1995 and its amendments 1 (2000) and 2 (2001) and constitutes a technical revision.

This second edition improves and clarifies simulator specifications, test criteria and test set-ups. Only common mode injection is required.

The text of this standard is based on the following documents:

FDIS	Report on voting
77B/419/FDIS	77B/424/RVD

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

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

The committee has decided that the contents of this publication 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.

The contents of the corrigendum of August 2006 and June 2007 have been included in this copy.

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WITHDRAWN

INTRODUCTION

IEC 61000 is published in separate parts, 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 electrical fast transients/bursts.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-4: Testing and measurement techniques –

Electrical fast transient/burst immunity test

1 Scope

This part of IEC 61000-4 relates to the immunity of electrical and electronic equipment to repetitive electrical fast transients. It gives immunity requirements and test procedures related to electrical fast transients/bursts. It additionally defines ranges of test levels and establishes test procedures.

The object of this standard is to establish a common and reproducible reference for evaluating the immunity of electrical and electronic equipment when subjected to electrical fast transient/bursts on supply, signal, control and earth ports. The test method documented in this part of IEC 61000-4 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.

NOTE 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.

The standard defines:

- test voltage waveform;
- range of test levels;
- test equipment;
- verification procedures of test equipment;
- test set-up;
- test procedure.

The standard gives specifications for laboratory and post-installation tests.

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 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, together with those in IEC 60050-161 apply.

NOTE Several of the most relevant terms and definitions from IEC 60050-161 are presented among the definitions below.

3.1

burst

sequence of a limited number of distinct pulses or an oscillation of limited duration

[IEV 161-02-07]

3.2

calibration

set of operations which establishes, by reference to standards, the relationship which exists, under specified conditions, between an indication and a result of a measurement

NOTE 1 This term is based on the "uncertainty" approach.

NOTE 2 The relationship between the indications and the results of measurement can be expressed, in principle, by a calibration diagram.

[IEV 311-01-09]

3.3

coupling

interaction between circuits, transferring energy from one circuit to another

3.4

common mode (coupling)

simultaneous coupling to all lines versus the ground reference plane

3.5

coupling clamp

device of defined dimensions and characteristics for common mode coupling of the disturbance signal to the circuit under test without any galvanic connection to it

3.6

coupling network

electrical circuit for the purpose of transferring energy from one circuit to another

3.7

decoupling network

electrical circuit for the purpose of preventing EFT voltage applied to the EUT from affecting other devices, equipment or systems which are not under test

3.8

degradation (of performance)

undesired departure in the operational performance of any device, equipment or system from its intended performance

NOTE The term "degradation" can apply to temporary or permanent failure.

[IEV 161-01-19]

3.9**EFT/B**

electrical fast transient/burst

3.10**electromagnetic compatibility (EMC)**

ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

[IEV 161-01-07]

3.11**EUT**

equipment under test

3.12**ground reference plane**

flat conductive surface whose potential is used as a common reference

[IEV 161-04-36]

3.13**immunity (to a disturbance)**

ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

[IEV 161-01-20]

3.14**port**

particular interface of the EUT with the external electromagnetic environment

3.15**rise time**

interval of time between the instants at which the instantaneous value of a pulse first reaches 10 % value and then the 90 % value

[IEV 161-02-05, modified]

3.16**transient**

pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval which is short compared with the time-scale of interest

[IEV 161-02-01]

3.17**verification**

set of operations which is used to check the test equipment system (e.g. the test generator and the interconnecting cables) and to demonstrate that the test system is functioning within the specifications given in Clause 6

NOTE 1 The methods used for verification may be different from those used for calibration.

NOTE 2 The procedure of 6.1.2 and 6.2.2 is meant as a guide to insure the correct operation of the test generator, and other items making up the test set-up so that the intended waveform is delivered to the EUT.

NOTE 3 For the purpose of this basic EMC standard this definition is different from the definition given in IEC 311-01-13.