Electromagnetic compatibility (EMC) –

Part 4-5:
Testing and measurement techniques –
Surge immunity test

This English-language version is derived from the original bilingual publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.

Reference number
IEC 61000-4-5:2005(E)
Electromagnetic compatibility (EMC) –

Part 4-5: Testing and measurement techniques – Surge immunity test

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11  Telefax: +41 22 919 03 00  E-mail: inmail@iec.ch  Web: www.iec.ch
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FOREWORD

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International Standard IEC 61000-4-5 has been prepared by subcommittee 77B: High frequency phenomena, of IEC technical Committee 77: Electromagnetic compatibility.

It forms Part 4-5 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 amendment 1 (2000), and constitutes a technical revision. Particularly, the clauses dedicated to coupling/decoupling networks and to test setups are more detailed.
The text of this standard is based on the following documents:

<table>
<thead>
<tr>
<th>FDIS</th>
<th>Report on voting</th>
</tr>
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<tbody>
<tr>
<td>77B/467/FDIS</td>
<td>77B/486/RVD</td>
</tr>
</tbody>
</table>

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- withdrawn;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.
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 surge voltages and surge currents.
1 Scope and object

This part of IEC 61000 relates to the immunity requirements, test methods, and range of recommended test levels for equipment to unidirectional surges caused by overvoltages from switching and lightning transients. Several test levels are defined which relate to different environment and installation conditions. These requirements are developed for and are applicable to electrical and electronic equipment.

The object of this standard is to establish a common reference for evaluating the immunity of electrical and electronic equipment when subjected to surges. 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 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 standard defines:
- a range of test levels;
- test equipment;
- test setups;
- test procedures.

The task of the described laboratory test is to find the reaction of the EUT under specified operational conditions, to surge voltages caused by switching and lightning effects at certain threat levels.

It is not intended to test the capability of the EUT’s insulation to withstand high-voltage stress. Direct injections of lightning currents, i.e., direct lightning strikes, are not considered in 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
3 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 60050(161) and the following apply.

3.1 avalanche device
diode, gas tube arrestor, or other component that is designed to break down and conduct at a specified voltage

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

[IEV 311-01-09]

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.

3.3 clamping device
diode, varistor or other component that is designed to prevent an applied voltage from exceeding a specified value

3.4 combination wave generator
generator with 1,2/50 µs or 10/700 µs open-circuit voltage waveform and respectively 8/20 µs or 5/320 µs short-circuit current waveform

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

3.6 decoupling network
electrical circuit for the purpose of preventing surges applied to the EUT from affecting other devices, equipment or systems which are not under test

3.7 duration
absolute value of the interval during which a specified waveform or feature exists or continues

[IEC 60469-1]

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