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# TECHNICAL SPECIFICATION

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## Electromagnetic compatibility (EMC) – Part 5-9: Installation and mitigation guidelines – System-level susceptibility assessments for HEMP and HPEM

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# ELECTROMAGNETIC COMPATIBILITY (EMC) –

# Part 5-9: Installation and mitigation guidelines – System-level susceptibility assessments for HEMP and HPEM

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC/TS 61000-5-9, which is a technical specification, has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This Technical Specification forms Part 5-9 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107 [1][1].

The text of this technical specification is based on the following documents:

| Enquiry draft | Report on voting |
|---|---|
| 77C/190/DTS | 77C/194/RVC |

Full information on the voting for the approval of this technical specification 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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

1 Figures in square brackets refer to the Bibliography.

# 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 and 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: IEC 61000-6-1).

# ELECTROMAGNETIC COMPATIBILITY (EMC) –

# Part 5-9: Installation and mitigation guidelines – System-level susceptibility assessments for HEMP and HPEM

## 1 Scope

The aim of this part of IEC 61000 is to present a methodology to assess the impact of High-altitude Electromagnetic Pulse (HEMP) and High Power Electromagnetic (HPEM) environments on electronic systems. In this context a system refers to a collection of sub-systems, equipment and components brought together to perform a function. (A more complete definition is given in 3.20.) The techniques associated with this methodology and their advantages and disadvantages will be presented along with examples of how the techniques can be applied to evaluate the susceptibility of electronic systems such as those found in installations. This work is closely related to the evaluation of EMC system level susceptibility.

The purpose of this Technical Specification is to provide information on available methods for the assessment of system-level susceptibility as a result of HEMP and HPEM environments. The advantages and disadvantages of the methods will be discussed along with examples of how the techniques should be employed.

Typical systems have external connections, wired or wireless, and the assessment of these are included within this specification.

This specification gives general guidance. It does not cover safety issues nor does it conflict with ITU-T efforts concerning the protection of telecommunications equipment [2][2].

## 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 – Chapter 161: Electromagnetic compatibility*

IEC/TR 61000-1-5:2004, *Electromagnetic compatibility (EMC) – Part 1-5: General – High power electromagnetic (HPEM) effects on civil systems*

IEC 61000-2-9:1996, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 9: Description of HEMP environment – Radiated disturbance. Basic EMC publication*

IEC 61000-2-10:1998, *Electromagnetic compatibility (EMC) – Part 2-10: Environment – Description of HEMP environment – Conducted disturbance*

IEC 61000-2-13:2005, *Electromagnetic compatibility (EMC) – Part 2-13: Environment – High-power electromagnetic (HPEM) environments – Radiated and conducted*

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2 Figures in square brackets refer to the Bibliography.

IEC/TR 61000-4-32:2002, *Electromagnetic compatibility (EMC) – Part 4-32: Testing and measurement techniques – High-altitude electromagnetic pulse (HEMP) simulator compendium*

IEC 61000-4-33:2005, *Electromagnetic compatibility (EMC) – Part 4-33: Testing and measurement techniques – Measurement methods for high-power transient parameters*

IEC 61000-4-35:2009, *Electromagnetic compatibility (EMC) – Part 4-35: Testing and measurement techniques – HPEM simulator compendium*

IEC/TR 61000-5-3:1999, *Electromagnetic compatibility (EMC) – Part 5-3: Installation and mitigation guidelines – HEMP protection concepts*

IEC/TS 61000-5-4:1996, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 4: Immunity to HEMP – Specifications for protective devices against HEMP radiated disturbance. Basic EMC Publication*

IEC 61000-5-5:1996, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 5: Specification of protective devices for HEMP conducted disturbance. Basic EMC Publication*

IEC/TR 61000-5-6:2002, *Electromagnetic compatibility (EMC) – Part 5-6: Installation and mitigation guidelines – Mitigation of external EM influences*

IEC 61000-5-7:2001, *Electromagnetic compatibility (EMC) – Part 5-7: Installation and mitigation guidelines – Degrees of protection provided by enclosures against electromagnetic disturbances (EM code)*