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Electromagnetic compatibility (EMC) –

Part 2-13:

Environment –

High-power electromagnetic (HPEM) environments –

Radiated and conducted

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope	7
2 Normative references	8
3 Terms and definitions	8
4 General	11
5 Description of radiated environments	13
6 Description of conducted HPEM environments	23
Annex A (informative) Four types of intentional electromagnetic environment interactions	27
Annex B (informative) Examples of low, medium and high-tech generators of HPEM	28
Annex C (informative) Examples of typical HPEM waveforms (conducted and radiated).....	31
Annex D (informative) Determination of the bandwidth of typical HPEM waveforms	35
Bibliography	39
Figure 1 – Several types of HPEM environments compared with the IEC HEMP waveform.....	12
Figure 2 – A damped sinusoidal waveform for hypoband and mesoband HPEM environments.....	18
Figure 3 – The spectral magnitude of the time waveform in Figure 2	19
Figure 4 – Hyperband HPEM environment waveforms for variations in range in metres	21
Figure 5 – Hyperband spectral magnitude of HPEM environments from Figure 4	21
Figure 6 – Effective coupling length for a 1 m metallic cable	22
Figure 7 – Building used for HPEM conducted propagation experiments	24
Figure 8 – Examples of briefcase generators for producing conducted environments: CW generator (left) and impulse generator (right) [15]	26
Figure B.1 – Line schematic of a reflector type of an impulse radiating antenna (IRA)	30
Figure C.1 – Half-sinusoid at $f_0 = 1$ GHz	31
Figure C.2 – Full sinusoid at $f = 1$ GHz	32
Figure C.3 – 20 cycles of sinusoid at $f = 1$ GHz ($N = 20$)	32
Figure C.4 – Difference of exponential waveform	33
Figure C.5 – Gaussian waveform	33
Figure C.6 – Sinusoidal waveform with a Gaussian-amplitude modulation	34
Figure D.1 – A waveform spectrum with a large dc content (e.g. the early-time HEMP from IEC 61000–2-9)	36
Figure D.2 – A waveform with a multi peaked spectral magnitude in units of 1/Hz.....	36
Figure D.3 – Spectral magnitude of a damped sinusoidal waveform with a low Q and a bandratio value computed using the 3 dB frequency points	37
Figure D.4 – Spectral magnitude of a damped sinusoidal waveform with a high Q and a bandratio value computed using the 3 dB frequency points	38

Table 1 – Definitions for bandwidth classification	14
Table 2 – Range of radiated electric field at various frequencies and power levels	15
Table 3 – Typical HPEM standard environments in the hypoband (or narrowband) and mesoband regimes	20
Table B.1 – Radiated fields from a microwave oven magnetron fitted with different antennas	28
Table B.2 – Radiated peak electric fields from a commercial HPEM generator.....	29
Table B.3 – Examples of reflector types of impulse radiating antennas.....	30

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –**Part 2-13: Environment –
High-power electromagnetic (HPEM) environments –
Radiated and conducted**

FOREWORD

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International Standard IEC 61000-2-13 has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It has the status of a basic EMC publication in accordance with IEC Guide 107.

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

FDIS	Report on voting
77C/153/FDIS	77C/155/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.

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

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).

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 2-13: Environment –

High-power electromagnetic (HPEM) environments –

Radiated and conducted

1 Scope

This part of IEC 61000 defines a set of typical radiated and conducted HPEM environment waveforms that may be encountered in civil facilities. Such threat environments can produce damaging effects on electrical and electronic equipment in the civilian sector, as described in IEC 61000-1-5. It is necessary to define the radiated and conducted environments, in order to develop protection methods.

For the purposes of this standard, high-power conditions are achieved when the peak electric field exceeds 100 V/m, corresponding to a plane-wave free-space power density of 26,5 W/m². This criterion is intended to define the application of this standard to EM radiated and conducted environments that are substantially higher than those considered for "normal" EMC applications, which are covered by the standards produced by IEC SC 77B.

The HPEM environment can be:

- radiated or conducted;
- a single pulse envelope with many cycles of a single frequency (an intense narrowband signal that may have some frequency agility and the pulse envelope may be modulated);
- a burst containing many pulses, with each pulse envelope containing many cycles of a single frequency;
- an ultrawideband transient pulse (spectral content from tens of MHz to several GHz);
- a burst of many ultrawideband transient pulses.

The HPEM signal could be from sources such as radar or other transmitters in the vicinity of an installation or from an intentional generator system targeting a civilian facility. Radiated signals can also induce conducted voltages and currents through the coupling process. In addition, conducted HPEM environments may also be directly injected into the wiring of an installation.

There is a critical distinction between the HEMP (high-altitude electromagnetic pulse) environment and the HPEM environment, in terms of the range or the distance of the affected electrical or electronic components from the source. In the context of HEMP, the range is immaterial, as the HEMP environment propagates downward from space to the earth's surface and is therefore relatively uniform over distances of 1 000 km. On the other hand, in the HPEM context the environment and its effects decrease strongly with range. In addition, the HEMP waveshape is a series of time domain pulses while the HPEM environment may have a wide variety of waveshapes.

Consequently, the standardization process for HPEM environments is more difficult. The recommended approach is to investigate the various types of HPEM environments that have been produced to date and are likely to be feasible in the near future, and then to develop suitable HPEM standard waveforms from such a study. Such HPEM environment standard waveforms can be amended in due course, depending on emerging technologies that make it possible to produce them.

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

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

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

IEC 61000-2-11, *Electromagnetic compatibility (EMC) – Part 2-11: Environment – Classification of HEMP environments*

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

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test.*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

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

IEC 61000-4-12, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 12: Oscillatory waves immunity test*