

# Electromagnetic Compatibility (EMC) In Europe

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## 1. Introduction

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The aim of the EMC directives is to avoid unwanted interaction between two devices, equipment or system. To this end methods of test and measurement along with limits and levels of immunity and emission are detailed in a large number of EMC publications.

## 2. Types of EMC Publication

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There are four types of EMC Publication.

- Product
- Product Family
- Generic
- Basic

Product and Product Family Standards take precedence over Generic Standards and Product Standards take precedence over Product Family Standards.

## 3. Generic EMC Standards

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Generic EMC standards are used when there are no dedicated product standards or family standards in publication. Examples of these include:

EN50081-1  
Electromagnetic compatibility – Generic standards – Emission standard for residential, commercial and light-industrial environments

EN50081-2  
Electromagnetic compatibility – Generic standards – Emission standard for industrial environments

EN50082-1  
Electromagnetic compatibility – Generic standards – Immunity standard for residential, commercial and light industrial environments

EN50082-2  
Electromagnetic compatibility – Generic standards – Immunity standard for industrial environments

These generic EMC standards reference basic EMC standards.



## 4. Basic EMC Publications

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Basic emission standards specify the general and fundamental conditions and rules as well as the measurement and testing techniques for the verification of EMC and serve as reference documents for the product committees of the standardisation bodies. Basic EMC publications relate to general information, to the disturbing phenomena and to the measurement or testing techniques.

Basic standards are technical reports or general standards and are not dedicated to specific products or product families. They could include limits or related performances. These would be covered by the Generic, Product Family or Product standards.

## 5. Basic Emission Standards

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Electromagnetic emission is the phenomenon by which electromagnetic energy emanates from a source.

### Radio Frequency Emission

Radio frequency emission, also known as radio frequency interference (RFI) is an electromagnetic disturbance which is generated by electrical equipment and can be received (intentionally or otherwise) by another.

In power supplies, the RFI is generated by the internal circuitry, predominantly the switching devices. The higher

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the frequency and steeper the steps in voltage, the greater the high frequency content of generated disturbances. These devices coupled with the other components within the power supply produce noise over a very broad frequency spectrum.

International basic emission standards are prepared by CISPR (Comite International Special des Perturbations Radioelectriques – International Special Committee on Radio Interference) and adopted by national or multi national authorities.

The most common tests perform the measurements between 150 KHz and 30 MHz for conducted disturbances (those passed back down the mains) and between 30 MHz and 1 GHz for radiated disturbances.

## CISPR 11 / EN 55011:

Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement

## CISPR 22 / EN 55022:

Limits and methods of measurement of radio disturbance characteristics of information technology (IT) equipment

## MIL-STD-461C:

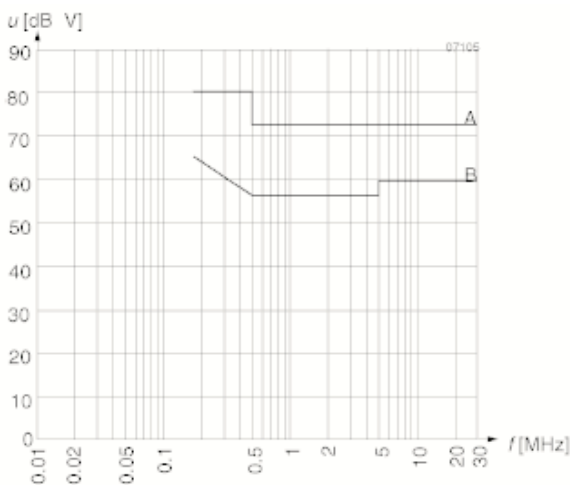


Fig. 1 - Disturbance voltage limits (quasi-peak) according to CISPR/EN55011 and CISPR22/EN55022

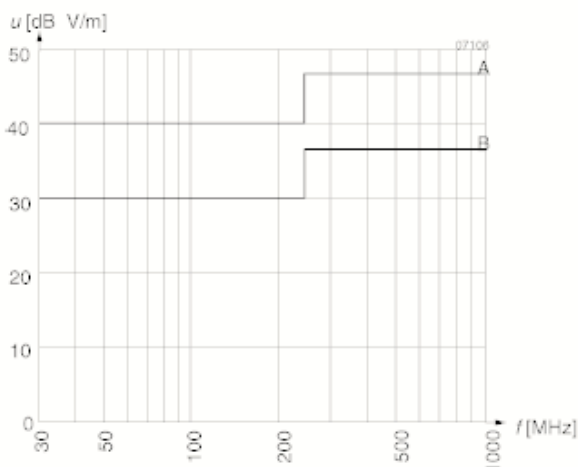


Fig. 2 - Disturbance field strength limits (quasi-peak) according to CISPR11/EN55011 and CISPR22/EN55022, normalised to a distance of 10 metres

## 6. Basic Immunity Standards

Electromagnetic immunity is the ability of a piece of apparatus to perform without degradation in performance in the presence of electromagnetic disturbances. The aim of basic immunity standards is to provide both test procedures and levels in order to verify electromagnetic immunity. Electromagnetic disturbances are considered to be both conducted and radiated. The results of these tests are classified in terms of degradation of performance.

### Performance Criteria

- A Normal performance with no degradation or degradation within limits specified by the customer.
- B Temporary degradation or loss of function which does not require manual intervention to aid recovery.
- C Temporary degradation or loss of function which does require manual intervention to help recovery.
- D Total loss of function which cannot be recovered due to hardware or software failure.

### EN61000-4-2:

#### Electrostatic Discharge (ESD) Immunity Test

This standard provides the immunity requirements and test methods for electrical and electronic equipment subjected to static electricity discharges. These may be direct contact and air borne discharges from either operators or adjacent objects.

### EN61000-4-4:

#### Electrical Fast Transient / Burst Immunity Test

This standard provides the immunity requirements and test methods for electrical and electronic equipment subjected to transient disturbances. It is intended for systems which are connected to AC or DC power sources and is intended to demonstrate immunity from such transients as switching of inductive loads or relay contact bounce.

### EN61000-4-5:

#### Surge Immunity Test

This standard provides the immunity requirements, test methods, and range of recommended test levels for equipment to unidirectional surges caused by overvoltages from switching and lightning transients.

## 7. Product Family EMC Standards

A product family is a group of similar products for which the same standard can be applied. Product Family EMC Standards define exact electromagnetic requirements and test procedures, they also give precise performance criteria with reference to the equipment where possible.

### EN50091-2

Specification for uninterruptible power systems (UPS) - EMC requirements

### EN55103-2:

Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use

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## 8. Product EMC Standards

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As the title suggests Product EMC Standards relate to a particular type of product for which specific requirements should be considered. Product EMC Standards take precedence over all others.

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Cool Power has staff able to provide advice on EMC and related issues. Call your local application engineers on:

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