

Integrated circuits — Measurement of electromagnetic emissions, 150 kHz to 1 GHz —

Part 5: Measurement of conducted emissions — Workbench Faraday Cage method

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British Standard

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National foreword

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**Integrated circuits –
Measurement of electromagnetic emissions, 150 kHz to 1 GHz
Part 5: Measurement of conducted emissions –
Workbench Faraday Cage method
(IEC 61967-5:2003)**

Circuits intégrés -
Mesure des émissions électromagnétiques,
150 kHz à 1 GHz
Partie 5: Mesure des émissions conduites -
Méthode de la cage de Faraday
sur banc de travail
(CEI 61967-5:2003)

Integrierte Schaltungen –
Messung von elektromagnetischen
Aussendungen im Frequenzbereich
von 150 kHz bis 1 GHz
Teil 5: Messung der leitungsgeführten
Aussendungen –
Verfahren mit Faradayschem Käfig
für Messtische
(IEC 61967-5:2003)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 47A/661/FDIS, future edition 1 of IEC 61967-5, prepared by SC 47A, Integrated circuits, of IEC TC 47, Semiconductor devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61967-5 on 2003-04-01.

This part of EN 61967 is to be read in conjunction with EN 61967-1:2002.

The following dates were fixed:

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at national level by publication of an identical
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- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-04-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A and ZA are normative and annexes B, C and D are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61967-5:2003 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61967-4	NOTE	Harmonized as EN 61967-4:2002 (not modified).
IEC 61967-6	NOTE	Harmonized as EN 61967-6:2002 (not modified).

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INTRODUCTION

IEC 61967-1 provides general information and definitions on measurement of conducted and radiated electromagnetic emissions from integrated circuits. It also provides a description of measurement conditions, test equipment and set-up as well as the test procedures and content of the test reports.

**INTEGRATED CIRCUITS –
MEASUREMENT OF ELECTROMAGNETIC EMISSIONS,
150 kHz TO 1 GHz –**

**Part 5: Measurement of conducted emissions –
Workbench Faraday Cage method**

1 Scope

This part of IEC 61967 describes a method to measure the conducted electromagnetic emission of integrated circuits either applied on the standardised test-board or on a final printed circuit board (PCB). Furthermore, this standard defines measures to maintain uniform requirements, describes the measurement method and gives guidance for the Workbench Faraday Cage measurement method.

As the measurements take place on a table with the usage of a small Faraday cage, this method is called the Workbench Faraday Cage method or the Workbench method.

The method has a high repeatability and a good relationship to the measured RF emission of final applications with the integrated circuits used.

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(131):2002, *International Electrotechnical Vocabulary (IEV) – Part 131: Circuit theory*

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

IEC 61967-1:2002, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 1: General conditions and definitions*

IEC 61000-4-6:1996, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

3 Definitions

For the purposes of this document, the definitions in IEC 61967-1, IEC 60050(131) and IEC 60050(161) apply.

4 General

This part of IEC 61967 applies to integrated circuits (ICs) which can perform “stand-alone” functions when applied on a physically small printed circuit board (PCB).

The RF emission from these ICs can be measured under pre-defined conditions. In addition, the method allows measurements on PCBs that are equal to or closely related to realistic applications. This gives the user an indication of the expected emission once the IC(s) is used in an application.

This method makes it possible to classify ICs for dedicated functions where EMC constraints are applicable.

4.1 Measurement philosophy

The Workbench method is derived from IEC 61000-4-6; see Figure 1. The method described in IEC 61000-4-6 assumes that supply and signal cable(s) are attached to an electrically small PCB, with dimensions $\leq \lambda/2$, i.e. 0,15 m at 1 GHz. The connected cables become the dominant antennas, so RF emission takes place via these “antennas”.

The connected cables will have functions such as supply, communication and other signal interfaces and these cables are commonly not geometrically oriented in the same plane as the other cables.

The antenna's (common-mode) impedance per port has been normalised to $150\ \Omega$ with tolerances in the various frequency bands, see Annex B. By measuring either the voltage across or the current through these common-mode impedances, the RF emission is characterised.

Direct radiation from the IC package can be small – see also IEC 61967-2 as an additional measurement method – and often negligible compared to the radiation caused by the cable(s) connected to the IC in its application. Because the supply and signal currents will flow through the reference layer(s) of the PCB, indirect coupling between the voltages and currents through the IC package and PCB are also established.

Because of the concept chosen, the Workbench method shows the effect of the PCB layout, the IC supply decoupling, the RF performance of the used discrete components (capacitors, inductors) as well as the measures taken on the IC (e.g. on-chip decoupling, slope controlled output buffers, etc.). In addition, similar modes of operation (by software or function) shall be used between the various ICs to be tested to allow comparison. Additionally, various modes of operation with one IC allow comparison, i.e. determination of contribution of individual blocks within the IC.