

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

Part 3: Bulk current injection (BCI) method

The European Standard EN 62132-3:2007 has the status of a
British Standard

ICS 31.200

National foreword

This British Standard is the UK implementation of EN 62132-3:2007. It is identical to IEC 62132-3:2007.

The UK participation in its preparation was entrusted to Technical Committee EPL/47, Semiconductors.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Measurement of electromagnetic immunity, 150 kHz to 1 GHz -
Part 3: Bulk current injection (BCI) method
(IEC 62132-3:2007)**

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Mesure de l'immunité électromagnétique,
150 kHz à 1 GHz -
Partie 3: Méthode d'injection
de courant (BCI)
(CEI 62132-3:2007)

Integrierte Schaltungen -
Messung der elektromagnetischen
Störfestigkeit im Frequenzbereich
von 150 kHz bis 1 GHz -
Teil 3: Stromeinspeisungs-
(BCI-)Verfahren
(IEC 62132-3:2007)

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

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Foreword

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Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62132-3:2007 was approved by CENELEC as a European Standard without any modification.

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

Part 3: Bulk current injection (BCI) method

1 Scope and object

This part of IEC 62132 describes a bulk current injection (BCI) test method to measure the immunity of integrated circuits (IC) in the presence of conducted RF disturbances, e.g. resulting from radiated RF disturbances. This method only applies to ICs that have off-board wire connections e.g. into a cable harness. This test method is used to inject RF current on one or a combination of wires.

This standard establishes a common base for the evaluation of semiconductor devices to be applied in equipment used in environments that are subject to unwanted radio frequency electromagnetic signals.

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 62132-1:2006, *Integrated circuits – Measurement of electromagnetic immunity, 150 kHz to 1 GHz – Part 1: General conditions and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62132-1 apply.

4 General

The characterization of RF immunity (or susceptibility) of an integrated circuit (IC) is essential to define the optimum design of a printed circuit board, filter concepts and for further integration into an electronic system. This document defines a method for measuring the immunity of ICs to RF current induced by electromagnetic disturbance.

This method is based on the bulk current injection (BCI) method used for equipment and systems [1, 2, 3]. The BCI method simulates the induced current as a result of direct radiated RF signals coupled onto the wires and cables of equipment and systems.

In general, in electronic systems, off-board wire connections or traces on the printed circuit board act as antennas for electromagnetic fields. Via this coupling path, these electromagnetic fields will induce voltages and currents at the pins of the IC and may cause interference. ICs are often used in various configurations dependent on their application. In this case, immunity levels of electronic equipment are closely linked to the ability of an IC to withstand the effects of an electromagnetic field represented.

To characterize the RF immunity of an IC, the induced current level necessary to cause the IC's malfunction is measured. The malfunction may be classified from A to E according to the performance classes defined in IEC 62132-1.

A principal set-up for the bulk current injection method is presented in Figure 1.

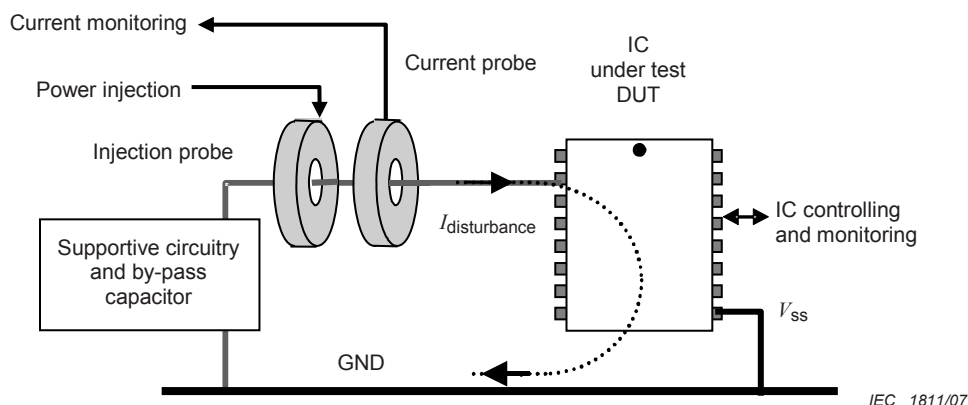


Figure 1 – Principal current path when using BCI

Two electrically shielded magnetic probes are clamped on one wire(s) or a combination of wires that is/are connected to the device under test. The first probe is for the injection of RF power that induces $I_{\text{disturbance}}$ onto the wires. The second probe is used for monitoring the induced current on those wires.

The disturbance current flows in a loop comprising: wire(s), the selected IC's pin(s), V_{ss} terminal, ground path and supportive circuitry. This supportive circuit provides the IC functional elements as source and/or load(s). The supportive circuitry is directly connected to the IC. When the equivalent RF impedance of the supportive circuitry is larger than $50\ \Omega$, then a by-pass capacitor is recommended. The by-pass capacitor, to be used at the supportive circuitry side, may also be needed to confine the loop area in which the induced current will be flowing. By default, the lumped by-pass capacitor of 1 nF shall be used. It represents the capacitance from the wire onto a cable harness or chassis. Deviation from using this bypass capacitor (e.g. as functional performance becomes affected) shall be given in the test report.

The by-pass capacitor may be supplemented with optional decoupling network, see Figure 3, to achieve the required attenuation towards the supportive circuitry. The decoupling impedance is determined by the RF immunity of the supportive circuitry. It shall not adversely affect the response of the device under test, i.e. the result of the test.

The disturbance current $I_{\text{disturbance}}$ induced into the wire(s) flows through the IC and may create a failure in the device's operation. This failure is defined by parameters called the immunity acceptance criteria, which are checked by a controlling and monitoring system.

5 Test conditions

5.1 General

The general test conditions are described in the IEC 62132-1.

During the immunity tests, either a continuous wave (CW) or an amplitude modulated (AM) RF signal shall be used as the disturbance signal. The device under test (DUT) shall be exposed at each frequency for sufficient dwell time. By default, an amplitude modulated RF signal using 1 kHz sinusoidal signal with a modulation index of 80 % is recommended for testing.

When an AM signal is used, the peak power shall be the same as for CW, see IEC 62132-1. When other modulation schemes are used, they shall be noted in the EMC IC test report.