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Semiconductor devices – Mechanical and climatic test methods – Part 44: Neutron beam irradiated single event effect (SEE) test method for semiconductor devices

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 44: Méthode d'essai des effets d'un événement isolé (SEE) irradié par un faisceau de neutrons pour des dispositifs à semiconducteurs



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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 44: Neutron beam irradiated single event effect (SEE) test method for semiconductor devices

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International Standard IEC 60749-44 has been prepared by IEC technical committee 47: Semiconductor devices.

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

FDIS	Report on voting
47/2303/FDIS	47/2312/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.

A list of all the parts in the IEC 60749 series, published under the general title *Semiconductor devices – Mechanical and climatic test methods*, can be found on the IEC website.

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 44: Neutron beam irradiated single event effect (SEE) test method for semiconductor devices

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1 Scope

This part of IEC 60749 establishes a procedure for measuring the single event effects (SEEs) on high density integrated circuit semiconductor devices including data retention capability of semiconductor devices with memory when subjected to atmospheric neutron radiation produced by cosmic rays. The single event effects sensitivity is measured while the device is irradiated in a neutron beam of known flux. This test method can be applied to any type of integrated circuit.

NOTE 1 Semiconductor devices under high voltage stress can be subject to single event effects including SEB, single event burnout and SEGR single event gate rupture, for this subject which is not covered in this document, please refer to IEC 62396-4 [2].

NOTE 2 In addition to the high energy neutrons some devices can have a soft error rate due to low energy (<1 eV) thermal neutrons. For this subject which is not covered in this document, please refer to IEC 62396-5 [3].

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

None.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
critical charge
Qcrit
smallest charge that will cause a SEE if injected or deposited in the sensitive volume

3.2
single-event upset
SEU
in a semiconductor device when the radiation absorbed by the device is sufficient to change a cell's logic state

Note 1 to entry: After a new write cycle, the original state can be recovered.

3.3
multiple bit upset
MBU
energy deposited in the silicon of an electronic component by a single ionising particle causing more than one bit in the same word to be upset

Note 1 to entry: The definition of MBU has been updated due to the introduction of the definition of MCU.