NSAI
Standards

Irish Standard
I.S. EN IEC 62435-9:2021

Electronic components - Long-term storage of electronic semiconductor devices - Part 9: Special cases

I.S. EN IEC 62435-9:2021

Incorporating amendments/corrigenda/National Annexes issued since publication:

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This document is based on:	*Published:*
EN IEC 62435-9:2021	2021-10-01

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2021-10-18	NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

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National Foreword

I.S. EN IEC 62435-9:2021 is the adopted Irish version of the European Document EN IEC 62435-9:2021, Electronic components - Long-term storage of electronic semiconductor devices - Part 9: Special cases

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In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62435-9

October 2021

ICS 31.020

English Version

Electronic components - Long-term storage of electronic semiconductor devices - Part 9: Special cases (IEC 62435-9:2021)

Composants électroniques - Stockage de longue durée des dispositifs électroniques à semiconducteurs - Partie 9: Cas particuliers
(IEC 62435-9:2021)

Elektronische Bauteile - Langzeitlagerung elektronischer Halbleiterbauteile - Teil 9: Sonderfälle
(IEC 62435-9:2021)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 47/2700/FDIS, future edition 1 of IEC 62435-9, prepared by IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62435-9:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-06-29
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Endorsement notice

The text of the International Standard IEC 62435-9:2021 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 60721 series	NOTE Harmonized as EN 60721 series
IEC 60721-3-1	NOTE Harmonized as EN IEC 60721-3-1
IEC 60812	NOTE Harmonized as EN IEC 60812
IEC 62435 series	NOTE Harmonized as EN IEC 62435 series
IEC 62435-1	NOTE Harmonized as EN 62435-1
IEC 62435-3	NOTE Harmonized as EN IEC 62435-3
IEC 62435-6	NOTE Harmonized as EN IEC 62435-6
IEC 62435-7	NOTE Harmonized as EN IEC 62435-7

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050-192	-	International electrotechnical vocabulary Part 192: Dependability	--	-

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IEC 62435-9

Edition 1.0 2021-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electronic components – Long-term storage of electronic semiconductor devices –
Part 9: Special cases

Composants électroniques – Stockage de longue durée des dispositifs électroniques à semiconducteurs –
Partie 9: Cas particuliers

IEC 62435-9:2021-08(en-fr)

IEC 62435-9

Edition 1.0 2021-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electronic components – Long-term storage of electronic semiconductor devices – Part 9: Special cases

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 31.020

ISBN 978-2-8322-1016-3

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRONIC COMPONENTS – LONG-TERM STORAGE OF ELECTRONIC SEMICONDUCTOR DEVICES –

Part 9: Special cases

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 62435-9 has been prepared by IEC technical committee 47: Semiconductor devices. It is an International Standard.

The text of this International Standard is based on the following documents:

DRAFT	Report on voting
47/2700/FDIS	47/2716/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 62435 series, published under the general title *Electronic components – Long-term storage of electronic semiconductor devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This document applies to the long-term storage of electronic components in special cases of configuration. The custom-client relationship for storage of all cases is also included.

This document deals with the long-term storage (LTS) of electronic devices drawing on the best long-term storage practices currently known. For the purposes of this document, LTS is defined as any device storage whose duration can be more than 12 months for product scheduled for long duration storage. While intended to address the storage of unpackaged semiconductors and packaged electronic devices, nothing in this document precludes the storage of other items under the storage levels defined herein.

Although it has always existed to some extent, obsolescence of electronic components and particularly of integrated circuits, has become increasingly intense over the last few years.

Indeed, with the existing technological boom, the commercial life of a component has become very short compared with the life of industrial equipment such as that encountered in the aeronautical field, the railway industry or the energy sector.

The many solutions enabling obsolescence to be resolved are now identified. However, selecting one of these solutions should be preceded by a case-by-case technical and economic feasibility study, depending on whether storage is envisaged for field service or production, for example:

- remedial storage as soon as components are no longer marketed;
- preventive storage anticipating declaration of obsolescence.

Taking into account the expected life of some installations, sometimes covering several decades, the qualification times, and the unavailability costs, which can also be very high, the solution to be adopted to resolve obsolescence should often be rapidly implemented. This is why the solution retained in most cases consists in systematically storing components which are in the process of becoming obsolescent.

The technical risks of this solution are, a priori, fairly low. However, it requires perfect mastery of the implemented process and especially of the storage environment, although this mastery becomes critical when it comes to long-term storage. All handling, protection, storage and test operations are recommended to be performed according to the state of the art.

The application of the approach proposed in this document in no way guarantees that the stored components are in perfect operating condition at the end of this storage. It only comprises a means of minimizing potential and probable degradation factors.

Some electronic device users have the need to store electronic devices for long periods of time. Lifetime buys are commonly made to support production runs of assemblies that well exceed the production timeframe of its individual parts. This puts the user in a situation requiring careful and adequate storage of such parts to maintain the as-received solderability and minimize any degradation effects to the part over time. Major degradation concerns are moisture, electrostatic fields, ultra-violet light, large variations in temperature, air-borne contaminants, and outgassing.

Warranties and sparing also present a challenge for the user or repair agency as some systems have been designated to be used for long periods of time, in some cases for up to 40 years or more. Some of the devices needed for repair of these systems will not be available from the original supplier for the lifetime of the system or the spare assembly may be built with the original production run but then require long-term storage. This document was developed to provide a standard for storing electronic devices for long periods of time.

The storage of devices that are moisture sensitive but that do not need to be stored for long periods of time is dealt with in IEC TR 62258-3.

Long-term storage assumes that the device is going to be placed in uninterrupted storage for a number of years. It is essential that it be useable after storage. It is important that storage media, the local environment and the associated part data be considered together.

Local environments for long term storage can be unique to the application or to the type of subassembly being stored for further assembly. Different device types that are integrated into a single package or module can have different storage requirements that should be considered during long term storage. A product can contain a single die or multiple dice (example: a CMOS processor, a GaN radio, sensors and a new type of memory). Each device technology can impose storage requirements. For example: the memory can be removed from x-ray or high magnetic field sources and the sensors can be stored in a dark environment or low-pressure environment.

Such practice requires good communication interactions and agreements for storage that should account for the possibility and complexity of intermediate assembly of heterogeneous devices. Successful customer supplier interaction involves clear expectations for device provenance, traceability and identification.

These guidelines do not imply any warranty of product or guarantee of operation beyond the storage time given by the manufacturer.

The IEC 62435 series is intended to ensure that adequate reliability is achieved for devices in user applications after long-term storage. Users are encouraged to request data from suppliers to applicable specifications to demonstrate a successful storage life as requested by the user. These standards are not intended to address built-in failure mechanisms that would take place regardless of storage conditions.

These standards are intended to give practical guide to methods of long-duration storage of electronic components where this is intentional or planned storage of product for a number of years. Storage regimes for work-in-progress production are managed according to company internal process requirements and are not detailed in IEC 62435 (all parts).

The overall standard is split into a number of parts. Parts 1 to 4 apply to any long-term storage and contain general requirements and guidance, whereas Parts 5 to 9 are specific to the type of product being stored.

The structure of the IEC 62435 series consists of the following:

– Part 1: General
– Part 2: Deterioration mechanisms
– Part 3: Data
– Part 4: Storage
– Part 5: Die and wafer devices
– Part 6: Packaged or finished devices
– Part 7: MEMS
– Part 8: Passive electronic devices
– Part 9: Special cases

ELECTRONIC COMPONENTS – LONG-TERM STORAGE OF ELECTRONIC SEMICONDUCTOR DEVICES –

Part 9: Special cases

1 Scope

This part of IEC 62435 specifies storage practices encompassing silicon and semiconductor device building blocks of all types that are integrated together to into products in the form of either packages or boards that can be stored as fully assembled units or partial assemblies. Special attention is given to memories as components and assemblies although methods also apply to heterogeneous components. Guidelines and requirements for customer-supplier interaction are provided to manage the complexity.

NOTE In IEC 62435 (all parts), the term "components" is used interchangeably with dice, wafers, passives and packaged devices.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-192, *International electrotechnical vocabulary – Part 192: Dependability*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
failure modes effects analysis
FMEA
quantitative method of analysis that involves the study of possible failure modes and faults in sub items, and their effects at various indenture levels

[SOURCE: IEC 60050-192:2015, 192-11-05, modified – The deprecated terms have been removed, "qualitative" has been changed to "quantitative" because formal methods call for quantitative ranking of defined risks and the note has been removed.]

3.2
magnetoresistive random access memory
MRAM
non-volatile memory technology that uses electron spin domains to store information