

INTERNATIONAL STANDARD

IEC
60191-1

Second edition
2007-04

Mechanical standardization of semiconductor devices –

Part 1: General rules for the preparation of outline drawings of discrete devices



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

W

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 Scope and object.....	6
2 Normative references	6
3 Terms and definitions	6
4 General rules for all drawings	8
4.1 Drawing layout	8
4.2 Dimensions and tolerances	8
4.3 Methods for locating the datum	10
4.4 Numbering of terminals	10
5 Additional rules	12
5.1 Rules for device and case outline drawings	12
5.2 Rules to specify the dimensions and positions of terminals.....	12
5.3 Rules for gauge drawings.....	13
6 Inter-conversion of inch and millimetre dimensions and rules for rounding off.....	13
7 Rules for coding	14
Annex A (informative) Reference letter symbols.....	15
Annex B (normative) Standardization philosophy	18
Annex C (informative) Rules to specify the dimensions and positions of terminals on a base drawing.....	23
Annex D (normative) General philosophy of flat base devices	30
Annex E (informative) Examples of semiconductor device drawing	32
Annex F (informative) Former rules for rounding off	36
Annex G (informative) Former rules for coding.....	38
Bibliography.....	39
Figure 1 – Numbering of terminals of lozenge – shaped bases.....	11
Figure 2 – System to indicate the dimensions of the terminals	13
Figure B.1 – Example of rigid lug device	21
Figure B.2 – Example of flexible terminal device	22
Figure C.1 – Circular base outline with no tab.....	27
Figure C.2 – Tolerances of terminals	27
Figure C.3 – Gauge for a circular base outline with no tab	28
Figure C.4 – Circular base outline with tab.....	29
Figure C.5 – Gauge for a circular base outline with tab.....	29
Figure D.1 – Example of flat base outline.....	31
Figure E.1 – Long form package	32
Figure E.2 – 3 types of post/stud mount packages	32
Figure E.3 – 2 types of cylindric packages	33
Figure E.4 – Oval package, terminals in line	34

Figure E.5 – Cylindric package with different terminations	34
Figure E.6 – Flange mount package.....	34
Figure E.7 – Disk button package with 3 terminations	35
Figure E.8 – Special shape for bolt-fixture	35
Table A.1 – Dimensions of reference letter symbols.....	15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 1: General rules for the preparation of outline drawings of discrete devices

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60191-1 has been prepared by subcommittee 47D: Mechanical standardization for semiconductor devices, of IEC technical committee 47: Semiconductor devices.

This second edition cancels and replaces the first edition published in 1966 together with supplements 60191-1A:1969, 60191-1B:1970 and 60191-1C:1974 and constitutes a technical revision. The main changes from the previous edition are as follows:

- requirement added for SI-dimensions for new drawings to be published;
- former rules concerning inch-dimensions are given in an informative annex;
- former rules for coding are given in an informative annex;
- incorporation of the supplements;
- updating of references;
- restructuring and renumbering.

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

FDIS	Report on voting
47D/678/FDIS	47D/682/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.

The IEC 60191 series, published under the general title *Mechanical standardization of semiconductor devices*, comprises the following parts:

- Part 1: General rules for the preparation of outline drawings of discrete devices
- Part 2: Dimensions
- Part 3: General rules for the preparation of outline drawings of integrated circuits
- Part 4: Coding system and classification into forms of package outlines for semiconductor device packages
- Part 5: Recommendations applying to integrated circuit packages using tape automated bonding (TAB)
- Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 1: General rules for the preparation of outline drawings of discrete devices

1 Scope and object

This part of IEC 60191 gives guidelines on the preparation of outline drawings of discrete devices.

NOTE For preparation of outline drawings of surface mounted discrete devices, IEC 60191-6 should be referred to as well.

The primary object of these drawings is to indicate the space which should be allowed for devices in an equipment, together with other dimensional characteristics required to ensure mechanical interchangeability.

It should be noted that complete interchangeability involves other considerations such as the electrical and thermal characteristics of the semiconductor devices concerned.

The international standardization represented by these drawings therefore encourages the manufacturers of devices to comply with the tolerances shown on the drawings in order to extend their range of customers internationally. It also gives equipment designers an assurance of mechanical interchangeability between the devices obtained from suppliers in different countries, provided they allow the space in their equipment that is indicated by the drawings and take note of the more precise information on bases, studs, etc.

NOTE Additional details on the standardization philosophy used in this standard are given in Annex B.

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 60191-2:1966, *Mechanical standardization of semiconductor devices – Part 2: Dimensions* (including all supplements and amendments)

IEC 60191-4, *Mechanical standardization of semiconductor devices – Part 4: Coding system and classification into forms of package outlines for semiconductor device packages*

ISO 370, *Toleranced dimensions – Conversion from inches to millimetres and vice versa (withdrawn 2000-05)*