

# INTERNATIONAL STANDARD

**IEC**  
**60191-6-1**

First edition  
2001-10

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## **Mechanical standardization of semiconductor devices –**

### **Part 6-1: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for gull-wing lead terminals**

[IEC 60191-6-1:2001](https://standards.iteh.ai/catalog/standards/sist/d3c0f2dd-3a3d-4ee8-976d-755c03b3517a/iec-60191-6-1-2001)

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**Normalisation mécanique des dispositifs à semi-conducteurs –**

*Partie 6-1:  
Règles générales pour la préparation des dessins  
d'encombrement des dispositifs à semi-conducteurs pour  
montage en surface –  
Guide de conception pour les boîtiers à broches  
en forme d'ailes de mouette*



Reference number  
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –**

**Part 6-1: General rules for the preparation of outline drawings  
of surface mounted semiconductor device packages –  
Design guide for gull-wing lead terminals**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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International Standard IEC 60191-6-1 has been prepared by subcommittee 47D: Mechanical standardization of semiconductor devices, of IEC technical committee 47: Semiconductor devices.

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

FDIS	Report on voting
47D/459/FDIS	47D/470/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 3.

The committee has decided that the contents of this publication will remain unchanged until 2003. 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 6-1: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for gull-wing lead terminals

#### 1 Scope

This part of IEC 60191 covers the requirements for the design rule of terminal shape plastic packages with gull-wing leads; e.g., QFP, SOP, SSOP, TSOP, etc. which are packages classified as Form E in IEC 60191-4<sup>1)</sup>. This publication is intended to establish common rules on terminal shapes irrespective of package types.

#### 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 60191-6:1990, *Mechanical standardization of semiconductor devices – Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages*

#### 3 Definitions

<https://standards.iteh.ai/catalog/standards/sist/d3c0f2dd-3a3d-4ee8-976d-735eb3b33f7a/iec-60191-6-1-2001>

For the purpose of this part of IEC 60191, the definitions of IEC 60191-6 apply as well as the following definition:

##### 3.1

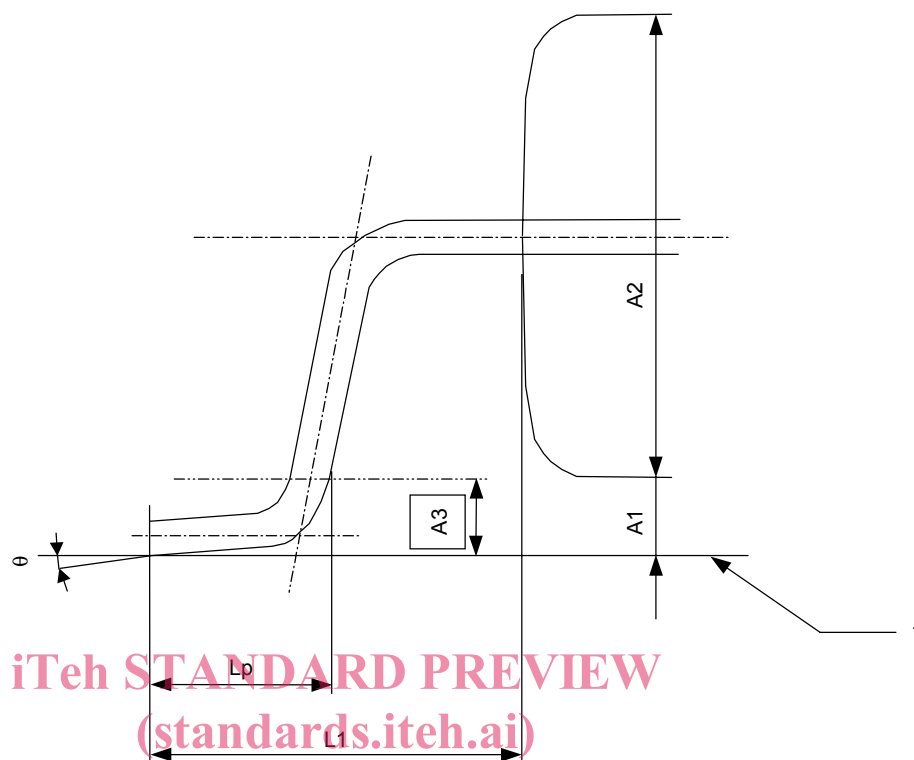
##### **gull-wing lead**

compliant lead bent down from the body of the package with a foot at the end pointing away from the package

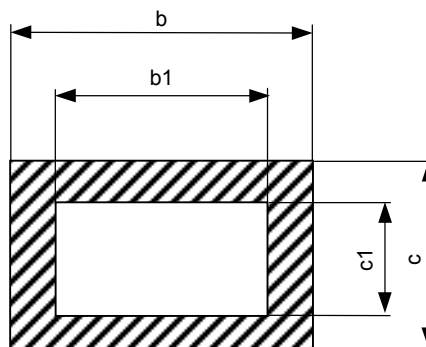
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<sup>1)</sup> IEC 60191-4:1999, *Mechanical standardization of semiconductor devices – Part 4: Coding system and classification into forms of package outlines for semiconductor device packages*

#### 4 References and drawings



IEC 60191-6-1:2001  
<https://standards.iteh.ai/catalog/standards/sist/d3c0f2dd-3a3d-4ee8-976d-735eb3b33f7a/iec-60191-6-1-2001>



Terminal cross-section <sup>1)</sup>

IEC 2161/01

1 Seating plane, with which a package is in contact

<sup>1)</sup> The dimensions of the terminal section apply to the ranges of 0,1 mm and 0,25 mm from the end of a terminal.

**Figure 1 – Gull-wing lead terminal**

## 5 Outline dimensions

The gull-wing lead design guides are shown in the tables below. The nominal value should be respected as the common value when developing packages with gull-wing leads thereby preventing proliferation of terminal shapes in the same package family. The range of values should be applied in usage on individual standards. The values are re-specified in the package design guide to reflect the specific requirement for each package type.

## 6 Package height and stand-off height

Table 1 below shows the relationship between the package height and the stand-off height.

**Table 1 – Package height and stand-off height**

*Dimensions in millimetres*

Package height A2 nom. (Range)	Stand-off height A1 nom. (Range)	
1,0 (0,95~1,05)	0,1	(0,00~0,15)
1,4 (1,35~1,55)	0,1	(0,00~0,15)
2,0 (1,80~2,20)	Low stand-off	0,1 (0,00~0,25)
	High stand-off	0,4 (0,25~0,50)
2,7 (2,50~2,90)	Low stand-off	0,1 (0,00~0,25)
	High stand-off	0,4 (0,25~0,50)
3,4 (3,20~3,60)	Low stand-off	0,1 (0,00~0,25)
	High stand-off	0,4 (0,25~0,50)
3,8 (3,60~4,00)	Low stand-off	0,1 (0,00~0,25)
	High stand-off	0,4 (0,25~0,50)

The package height and the stand-off height are defined regardless of the terminal pitch.

## 7 Terminal thickness and width

**Table 2 – Terminal width b1 and b**

*Dimensions in millimetres*

Terminal pitch e	Terminal width b1 nom. (Range)	Terminal width b (Range)	Note
1,27	0,40 (0,34~0,45)	(0,34~0,50)	
1,25	0,40 (0,34~0,45)	(0,34~0,50)	
1,0	0,40 (0,34~0,45)	(0,34~0,50)	
0,8	0,35 (0,29~0,41)	(0,29~0,45)	QFP only
	0,30 (0,25~0,35)	(0,25~0,40)	
0,65	0,30 (0,22~0,36)	(0,22~0,40)	QFP only
	0,22 (0,17~0,27)	(0,17~0,32)	
0,5	0,20 (0,17~0,23)	(0,17~0,27)	
0,4	0,16 (0,13~0,19)	(0,13~0,23)	
0,3	0,12 (0,09~0,15)	(0,09~0,18)	

**Table 3 – Terminal thickness c1 and c**  
*(standards.itech.ai)*

*Dimensions in millimetres*

Terminal pitch e	Terminal thickness c1 nom. (Range)	Terminal thickness c (Range)	Note
1,27	0,25 (0,23~0,27)	(0,23~0,32)	
	0,20 (0,19~0,21)	(0,19~0,25)	
	0,15 (0,14~0,16)	(0,14~0,20)	
	0,125 (0,115~0,135)	(0,115~0,175)	
	0,10 (0,09~0,11)	(0,09~0,15)	
1,25	0,15 (0,14~0,16) 0,125 (0,115~0,135) 0,10 (0,09~0,11)	(0,14~0,20) (0,115~0,175) (0,09~0,15)	
1,0			
0,8			
0,65			
0,5			
0,4			
0,3			



## 8 Terminal shape

**Table 4 – Terminal shape**

*Dimensions in millimetres*

Package height A2 nom.	Standard height of soldered part A3	Length of soldered part Lp nom. (Range)	Angle of terminal flat portions $\theta$ nom. (Range)	Terminal length L1 nom.	Notes
1,0	0,25	0,60 (0,45~0,75)	3° (0~8°)	1,0	
1,4		0,60 (0,45~0,75)		1,0	
2,0		0,60 (0,45~0,75)		1,0	e ≤ 0,50
		0,88 (0,73~1,03)		1,6	e ≤ 0,65
2,7		0,60 (0,45~0,75)		1,0	e ≤ 0,50
		0,88 (0,73~1,03)		1,6	e ≤ 0,65
3,4		0,60 (0,45~0,75)		1,3	e ≤ 0,50
		0,88 (0,73~1,03)		1,6	e ≤ 0,65
3,8		0,60 (0,45~0,75)		1,3	e ≤ 0,50
		0,88 (0,73~1,03)		1,6	e ≤ 0,65

## 9 Tolerance of terminal center position and coplanarity

<https://standards.iteh.ai/catalog/standards/sist/d3c0f2dd-3a3d-4ee8-976d-735c91b3357a/iec-60191-6-1-2001>

**Table 5 – Tolerance of terminal center position and coplanarity**

*Dimensions in millimetres*

Terminal pitch e	Tolerance of terminal centre position X	Coplanarity y	Note
1,27	0,25	0,10	
1,25	0,35		
1,0	0,20		
0,8	0,20		QFP only
	0,16		
0,65	0,13	0,08	
0,5	0,08		
0,4	0,07		
0,3	0,06		0,05