

Mechanical standardization of semiconductor devices —

**Part 6: Specification for the
preparation of outline drawings of
surface mounted semiconductor device
packages**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Components Standards Policy Committee (ECL/-) to Technical Committee ECL/24, upon which the following bodies were represented:

- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electronic Components Industry Federation
- GAMBICA (BEAMA Ltd.)
- Ministry of Defence
- National Supervising Inspectorate
- Society of British Aerospace Companies Limited

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National foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Policy Committee. It is identical with IEC 191-6:1990 “*Mechanical standardization of semiconductor devices, Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages*” published by the International Electrotechnical Commission (IEC). For the purposes of this British Standard, any references to IEC page numbers in the text should be ignored.

This British Standard is Part of a series of standards corresponding to the Parts of the IEC publication on “Mechanical standardization of semiconductor devices”. The other Parts of BS 3934 are as follows.

- *Part 1: Recommendations for the preparation of drawings of semiconductor devices*; (Technically equivalent to IEC 191-1)
- *Part 2: Schedule of international drawings giving dimensions*; (Identical with IEC 191-2)
- *Part 3: Recommendations for the preparation of outline drawings of integrated circuits*; (Technically equivalent to IEC 191-3)
- *Part 4: Recommendations for a coding system and classification into forms of package outlines for semiconductor devices*; (Identical with IEC 191-4)
- *Part 5: Recommendations for tape automated bonding (TAB) of integrated circuits*; (Identical with IEC 191-5)
- *Part 10: Schedule of UK national drawings giving dimensions.*

All purely national work in this area is issued in BS 3934-10.
BS 3934-1 to BS 3934-6 and BS 3934-10 supersede BS 3934:1965, which is withdrawn.

Cross-references

International Standard ^a	Corresponding British Standard
	BS 3934 <i>Mechanical standardization of semiconductor devices</i>
IEC 191-1:1966	Part 1:1992 <i>Recommendations for the preparation of drawings of semiconductor devices</i> (Technically equivalent)
IEC 191-2:1966	Part 2:1992 <i>Schedule of international drawings giving dimensions</i> (Identical)
IEC 191-3:1974	Part 3:1992 <i>Recommendations for the preparation of outline drawings of integrated circuits</i> (Technically equivalent)
IEC 191-4:1987	Part 4:1992 <i>Recommendations for a coding system and classification into forms of package outlines for semiconductor devices</i> (Identical)

^a Undated in the text.

A related British Standard to ISO 1101 is BS 308 “*Engineering drawing practice*” — Part 3:1990 “*Recommendations for geometrical tolerancing*”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This standard on mechanical standardization gives general rules for the preparation of outlines drawings of surface-mounted semiconductor devices. It supplements IEC Publications 191-1 and 191-3. It covers all surface-mounted devices — discrete semiconductors as well as integrated circuits — classified as Form E in IEC Publication 191-4.

2 Definitions

2.1

Setting plane

the seating plane is defined as that plane on which:

- leaded packages and folded lead packages freely rest on their terminals,
- leadless packages freely rest on their mounting base plane or on their terminals.

2.2

reference plane

plan parallel to the seating plane at a distance A_3 above the seating plane (does not apply to leadless package)

the distance A_3 is known as the reference plane distance

it determines the terminal projection zone (see Figure 1, on page 5)

NOTE This distance is a theoretical dimension which is not related to any feature of the package. Its value is chosen for each package so that the length of terminal projection zone L_p is a good approximation of the terminal length used for mounting, e.g. the length of the part of the terminal that is soldered to the substrate.

2.3

terminal land area

the maximum area on the seating plane within which the terminal projection zone is located, taking into account the maximum values of L_p and b_p , the positional tolerances v and w applying to these dimensions and the reference datums

the surface of the terminal land area is equal to $l_2 \times b_2$ with, generally:

$$l_2 = L_p \text{ max.} + v \text{ and } b_2 = b_p \text{ max.} + w$$

checking can be carried out by means of an appropriate gauge (see Figure 2, page 6)

2.4

pattern of terminal land areas

the group of all terminal land areas of a leaded package or folded lead package in the seating plane

for a leadless package, it is the projection of its metallized pads or terminals on the seating plane

the true positions of the centers of the terminal land areas are located on a grid with as modulus

$$e / e_1 \text{ or } e / e_D, e_E$$

the pattern of terminal land areas does not include tolerances stemming from mounting substrates (printed board) design and placement machine accuracies

2.5

coplanarity of terminals

the requirement for coplanarity of terminals is given in a tolerance frame showing the ISO symbol for flatness, the tolerance value y and the reference to the seating plane

where the part of the terminal intended for soldering is a flat zone of defined dimensions $b \times l$, with nominal position on the seating plane — e.g. pads of leadless packages — then the requirement for coplanarity of terminals is strictly the ISO requirement for flatness applied to these zones

in all the other cases, the requirement for coplanarity of terminals is clarified by a note (see page 12)

3 Design rules

The outline drawing of a surface-mounted semiconductor device package shall comprise, in the given sequence:

- the drawing (strictly speaking),
- the tables of dimensions,
- the notes to the tables and the drawings,
- the indication of supporting countries,
- the codification.

The drawing shall conform with the general rules for drawings laid down in IEC Publication 191-11 and 191-12, as well as with the specific definitions of clause 2 above.

Sub-clauses 3.1 and 3.2 hereafter give, respectively, the tables of dimensions to be specified and the notes to be called, where relevant. Supplementary dimensions and notes may be added when required.

Indication of the supporting countries shall be in accordance with IEC Publication 191-2, chapter 00, clause 1 and national codes shall be given when different from IEC codes.

The codification of package outlines shall be in accordance with IEC Publication 191-4.

3.1 Dimensions to be specified

Crosses in the tables on page 11 indicate where values have to be specified. In the auxiliary right-hand column, a code indicates for which outline families each dimension is generally relevant, as follows:

- L: leaded packages
- F: folded lead packages
- P: leadless packages.

3.2 Notes

Notes to be called in the tables and on the drawing are listed on page 12; in the auxiliary right-hand column, a code indicates for which outline families each note is generally relevant (with the same code as in 3.1 above).

For each particular outline package or package family, the applicable notes shall be numbered sequentially from 1 in the order they appear in the tables and then on the drawing.

Tables

Dimensions to be specified

Millimètres/inches — NOTE 1

Group 1 — Dimensions appropriate to mounting and interchangeability.

Réf.	Min.	Nom.	Max.	Degrees	Notes	Concerned Family
n	—	X	—		2	LFP
n _D	—	X	—		3	LFP
n _E	—	X	—		3	LFP
A	[X]	—	X			LFP
A ₁	X	—	X			LF
A ₂	X	—	[X]			LF
A ₃	—	X(*)	—			LF
b _P	X	—	X		4	LFP
b ₁	X	—	X			F
D	—	X	—			LFP
E	—	X	—			LFP
e	—	X(*)	—		4	LFP
H _D	X	—	X			LF
H _E	X	—	X			LF
Øj	X	—	X			F
L	—	—	[X]			L
L _P	X	—	X		4	LFP
v	—	—	X			LFP
w	—	—	X			LFP
y	—	—	X			LFP
Z	—	—	X			LFP
θ				Min. Max.		L

Group 2 — Dimensions appropriate to mounting and gauging.

b ₂	—	—	X		4	LFP
e	—	X(*)	—		4	LFP
e _D	—	X(*)	—		4	LFP
e _E	—	X(*)	—		4	LFP
l ₂	—	—	X		4	LFP

Group 3 — Dimensions appropriate to automated handling.

A ₂	X	—	[X]			F
D	X	—	X			LFP
E	X	—	X			LFP
k	X	—	—			FP
Q				Nom.		LF
β				Nom.		LF

Group 4 — Dimensions for information only.

c	X	—	X			L
k ₁	—	—	X			FP
Z _D	—	—	X			LFP
Z _E	—	—	X			LFP
α				Nom.		L