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Mechanical standardization of semiconductor devices –
Part 6-20: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of small outline J-lead packages (SOJ)

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Normalisation mécanique des dispositifs à semiconducteurs –
Partie 6-20: Règles générales pour la préparation des dessins d'encombrement des boîtiers pour dispositifs à semiconducteurs pour montage en surface – Méthodes de mesure pour les dimensions des boîtiers à sortie en J (SOJ) de faible encombrement

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MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-20: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of small outline J-lead packages (SOJ)

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International Standard IEC 60191-6-20 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/771/FDIS	47D/775/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 Directive, Part 2.

A list of all the parts in the IEC 60191 series, under the general title *Mechanical standardization of semiconductor devices*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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

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MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-20: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of small outline J-lead packages (SOJ)

1 Scope

This part of IEC 60191 specifies methods to measure package dimensions of small outline J-lead-packages (SOJ), package outline form E in accordance with IEC 60191-4.

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

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

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60191-6 apply.

4 Measuring methods

4.1 Description of measuring methods

The measuring methods described in this standard are for dimension values guaranteed to users on the basis of the following items.

a) In general, measuring the dimensions shall be made with the semiconductor packages mounted on a printed circuit board as the guarantee is made to user.

b) In general, measurement may be made either by hand or automatically.

c) Even if a measuring method deviates from the original definition of dimensions, it is defined as an alternative measuring method as long as it is equivalent in view of accuracy and can be used easily. See 4.6.3b.

d) The dimensions that cannot be measured unless the package is destroyed may be calculated from other dimensions or replaced by representative values.

4.2 Reference characters and outline drawings

An outline drawing is given in Figure 1.

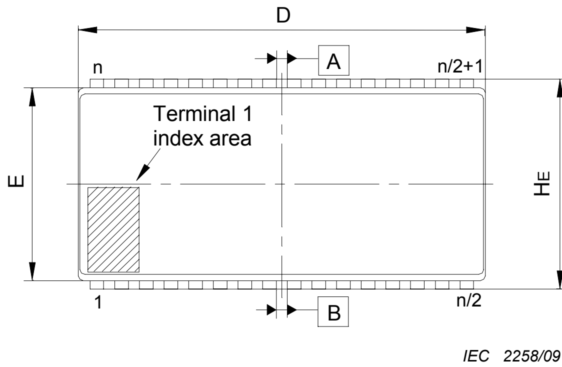

Figure 1a – Top view

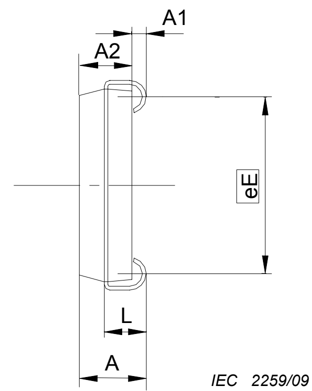

Figure 1b – Side view

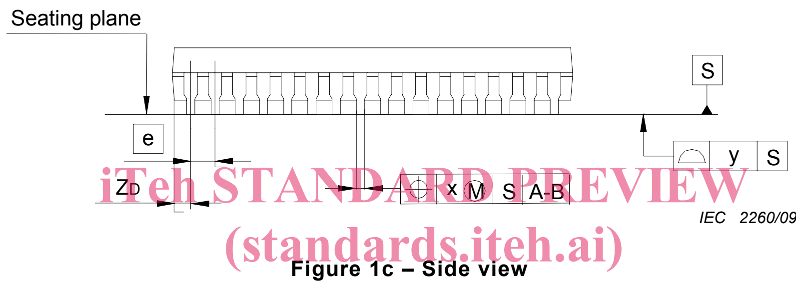

Figure 1c – Side view

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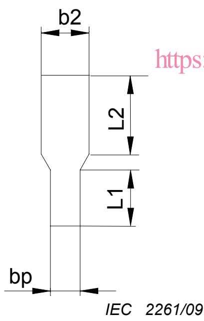

Figure 1d – Lead shape

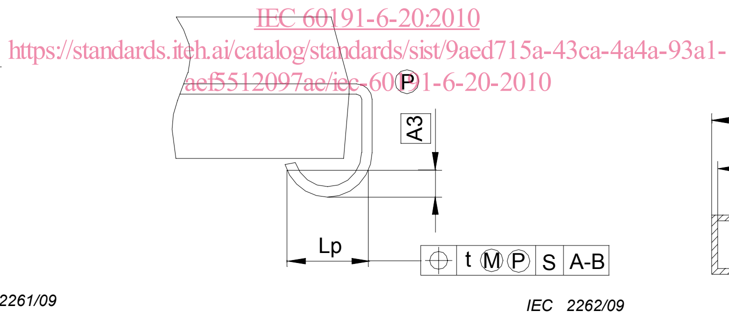

Figure 1e – Lead side view

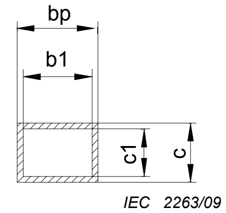

Figure 1f – Lead section

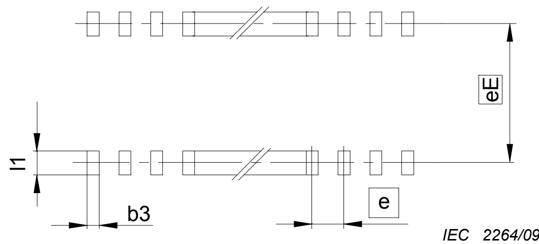

Figure 1g – Pattern of terminal position areas

Figure 1 – SOJ outline drawings

4.3 Mounting height A

4.3.1 Description

Let the height of a package from the seating plane to the top of the package be denoted as the mounting height **A**. See Figure 2.

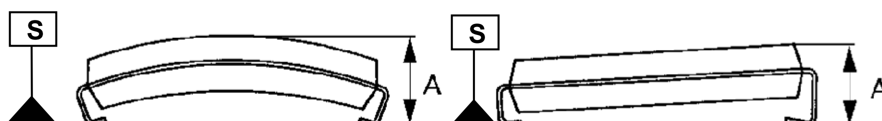

Figure 2 – Mounting height

4.3.2 Measuring method

The measuring method shall be as follows.

a) Put the package on the surface plate to establish the seating plane.

b) From the seating plane, measure the distance to a highest point. Let the distance be denoted as the mounting height **A**.

4.4 Stand-off A1

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4.4.1 Description

Let a distance from the seating plane to the lowest point of a package be denoted as the stand-off **A1**. See Figure 3.

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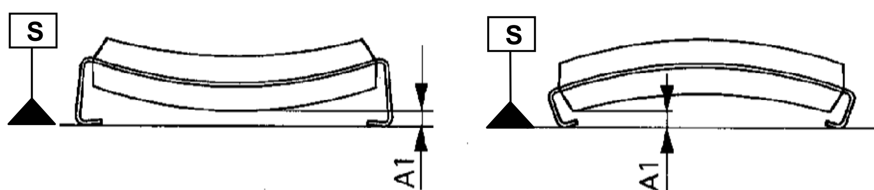

Figure 3 – Stand-off

4.4.2 Measuring method

The measuring method shall be as follows.

a) Put the package on the surface plate to establish the reference surface (seating plane).

b) Measure the distance from the reference surface (surface plate) to the lowest point of the package. Let the distance be denoted as the stand-off **A1**.

4.5 Body thickness A2

4.5.1 Description

The body thickness is defined as a distance between two parallel planes. It is tangent to the highest and lowest points of the body. Let the distance be denoted as the body thickness **A2**. See Figure 4.

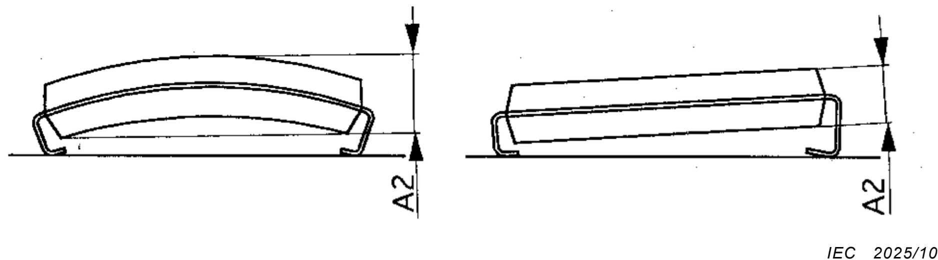

Figure 4 – Body thickness A2

4.5.2 Measuring method

The measuring method shall be as follows.

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a) Put the package between vertically parallel surface plates. Never touch the leads.

b) Measure the total thickness including the surface plates with a micrometer and subtract the thickness of surface plates from the total thickness so as to obtain the thickness of package.

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4.5.3 Quick measuring method

Measure the thickness of the package with a slide calipers along each diagonal line. Let the maximum value be denoted as the body thickness **A2.**

4.6 Lead widths bp and b1, lead thickness c and c1

4.6.1 Description

a) The outmost width **bp** in the range of gage height **A3** from seating plane. The outmost width before surface plating shall be defined as **b1**. See Figures 5 and 6.

b) The outmost width shall be defined as **b2** except the range of **L2** and number remaining. See Figure 6.

c) The outmost thickness **c** in the range of gage height **A3** from the seating plane. The outmost thickness before surface plating shall be defined as **c1**. The lead width and lead thickness, as shown in Figure 6, include burrs, crushing, and sagging.

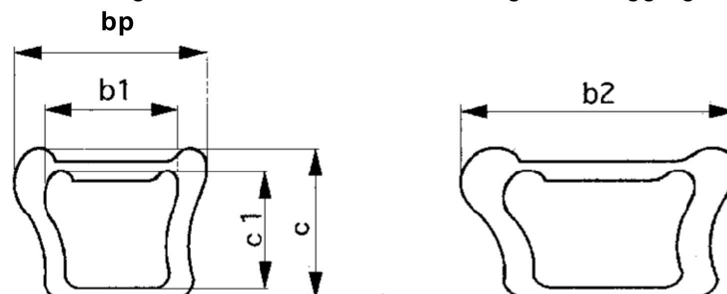

Figure 5 – Lead width and thickness

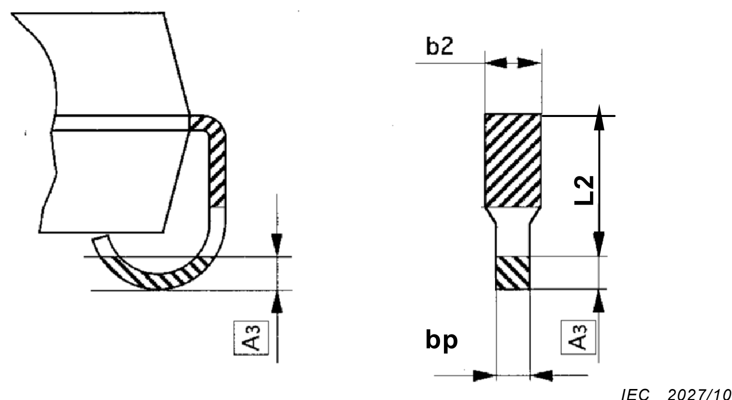

Figure 6 – Measuring points of lead width and thickness

4.6.2 Measuring method

The measuring method shall be as follows.

a) Put the package on the surface plate to establish the reference surface (seating plane).

b) Measure the lead width and thickness in Figure 5.

4.6.3 Remarks

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Remarks are as follows.

a) b1 and c1 may be measured before lead forming. In this case, measure b1 and c1 at the specified area in Figure 5 after lead forming.

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b) The lead thickness may be measured at 4 points on the four corners of the package as representative values.

4.7 Soldered portion length Lp

4.7.1 Description

The distance between point **a** and point **b** which are crossing points of outer surface of lead and gage plane **A3.** See Figure 7.

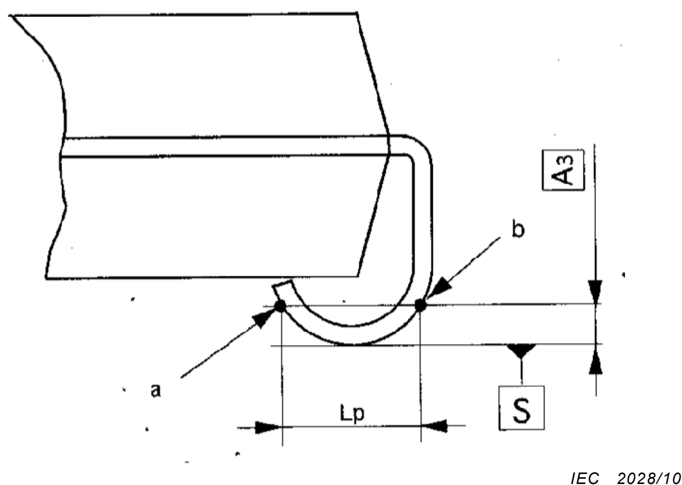

Figure 7 – Soldered portion length Lp

4.7.2 Measuring method

The measuring method shall be as follows.

a) Put the package on the surface plate.

b) Make the datum parallel with the measuring reference.

c) Observe the lead toward the package side (in the seating plane direction). Measure positions of points **a** and **b** as the soldered position length.

4.7.3 Remarks

As this measuring method can be done from the side, the values of the leads observable from the side are allowed as representative values.

4.8 The allowable value t of the center of the soldered portion length Lp

4.8.1 Description

The center of the soldered portion length Lp shall be located within the range **t** centering on the position that is at a theoretically correct distance of **e1**/2 from the body center. See Figure 8.

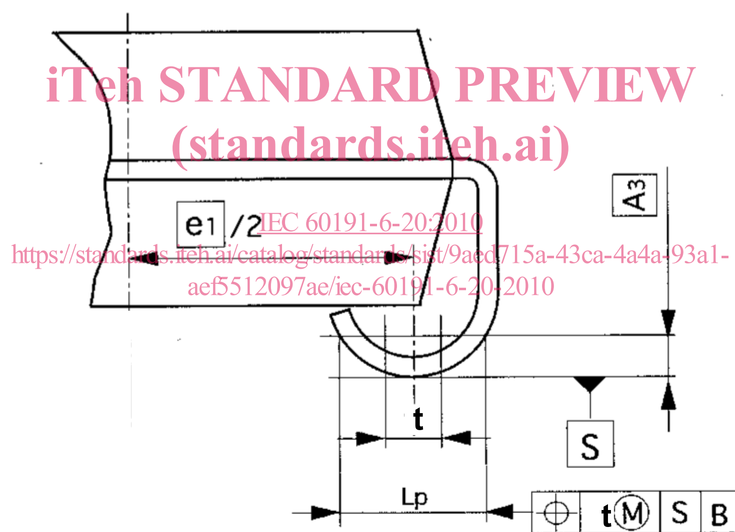

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Figure 8 – The allowable value t of Lp center

4.8.2 Measuring method

The measuring method shall be as follows.

a) Put the package on the surface plane to establish the reference surface (seating plane).

b) Find the theoretically precise distance **e1**/2 from the body center. Then, check if the center of the soldered portion length Lp is within the tolerance **t** (range) specified as the center.

4.8.3 Remarks

As this measuring method can only be done from the side, the values of the leads observable from the side are allowed as representative values.