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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Mechanical standardization of semiconductor devices – Part 6-13: Design guideline of open-top-type sockets for Fine-pitch Ball Grid Array and Fine-pitch Land Grid Array (FBGA/FLGA)

Normalisation mécanique des dispositifs à semiconducteurs – Partie 6-13: Guide de conception pour les supports sans couvercle pour les boîtiers matriciels à billes et à pas fins et les boîtiers matriciels à zone de contact plate et à pas fins (FBGA/FLGA)

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FOREWORD

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International Standard IEC 60191-6-13 has been prepared by subcommittee 47D: Mechanical standardization for semiconductor devices, of IEC technical committee 47: Semiconductor devices.

This bilingual version, published in 2008-09, corresponds to the English version.

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

FDIS	Report on voting
47D/681/FDIS	47D/692/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.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, 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 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- withdrawn,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.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-13: Design guideline of open-top-type sockets for Fine-pitch Ball Grid Array and Fine-pitch Land Grid Array (FBGA/FLGA)

1 Scope

This part of IEC 60191 gives a design guideline of open-top-type semiconductor sockets for Fine-pitch Ball Grid Array ("FBGA" hereafter) and Fine-pitch Land Grid Array ("FLGA" hereafter). This standard is intended to establish the outline drawings and dimensions of the open-top-type socket out of the test and burn-in sockets applied to FBGA and FLGA.

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, *Mechanical standardization of semiconductor devices – Part 2: Dimensions*

IEC 60191-6:2004, *Mechanical standardization of semiconductor devices – Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages*

3 Terms and definitions

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

4 Socket code

4.1 Construction of socket code

A socket code is constructed as follows.

[Symbol of socket 4.2 a)]	[Symbol of socket type 4.2 b)]	[Symbol of nominal dimension 4.2 c)]	[Number of terminal arrays 4.2 d)]	[Terminal pitch 4.2 e)]
Example **SFB**	**TX**	**2120AB**	**1616**	**080**

4.2 Symbols

a) Semiconductor sockets symbol

The symbol for socket shall be expressed in 3 characters. The first character, "**S**", refers to socket and the rest to the package code. FBGA shall be expressed as "**FB**", FLGA shall be expressed as "**FL**".

b) Socket type symbol

The symbol for socket type shall be expressed in 2 characters. The first character "**T**" refers to open top type and the rest remains option "**X**". Clamshell type socket is referred to as "**C**".

c) Socket nominal dimension symbol

The symbol for nominal dimension shall be expressed in 6 characters, which are 4 numeric characters and 2 alphabetical characters. The first 4 numeric characters comply with nominal dimension E x D which refers to applicable maximum width and length of FBGA/FLGA package.

The last 2 alphabetical characters refer to socket base matrix size either an even or an odd.

It refers to an odd contact row by "**A**" and an even contact row by "**B**" in order socket width direction and next socket length direction.

Namely, it refers to "**AA**" in case row number is an odd both for width and length direction, "**BB**" in case row number is an even both for width and length direction, "**AB**" in case row number is an odd at width direction and an even at length direction and "**BA**" in case row number is an even at width direction and an odd at length direction.

d) Number of terminal arrays

The symbol for number of terminal arrays shall be expressed by 4 numeric characters applying applicable package matrix size in E direction and D direction.

e) Terminal pitch

The symbol for terminal pitch of applicable package shall be expressed in 3 numeric characters. A decimal [.] is omitted.

5 Terminal number

The terminal number is provided in the following manner when the socket is viewed with the angle from topside. The horizontal row nearest to the index corner when the index is placed on the left topside is referred to as A.

As the row moves down, the number changes in the order of B, C, ... AA, AB.

1 is defined for the vertical row nearest to the index corner. As the row moves rightward, the number is increased 2, 3, ... The terminal number is combined with these alphabets and numbers and expressed as A1 or B1. I, O, Q, S, X and Z are not used as symbols for a horizontal row.

6 Socket nominal dimension

The applicable package length and width which extend from 1,50 mm to 21,0 mm by 0,50 mm increments are divided into 4 package groups. The socket nominal dimension is defined by the largest value of the package length or width in each socket group.

In consideration of a specific need for minimum socket outline size, the socket nominal dimension with 1,0 mm increments can be specified as an exception. Package length and width of 5,00 mm or less is unified in one socket nominal dimension.

7 Socket length and width

Socket length and width are categorized into 4 groups, from group 1 to group 4, to cover the difference of its terminal count and mechanism.

In socket group 1, 2 and 3, only square socket outline is allowed. Socket length and width are determined by the nominal dimension value plus 36,0 mm, 24,0 mm and 12,0 mm respectively.

In socket group 4, square and rectangular socket outlines are allowed. Socket length and width are determined by the nominal dimension value plus 8,0 mm independently in each sides.

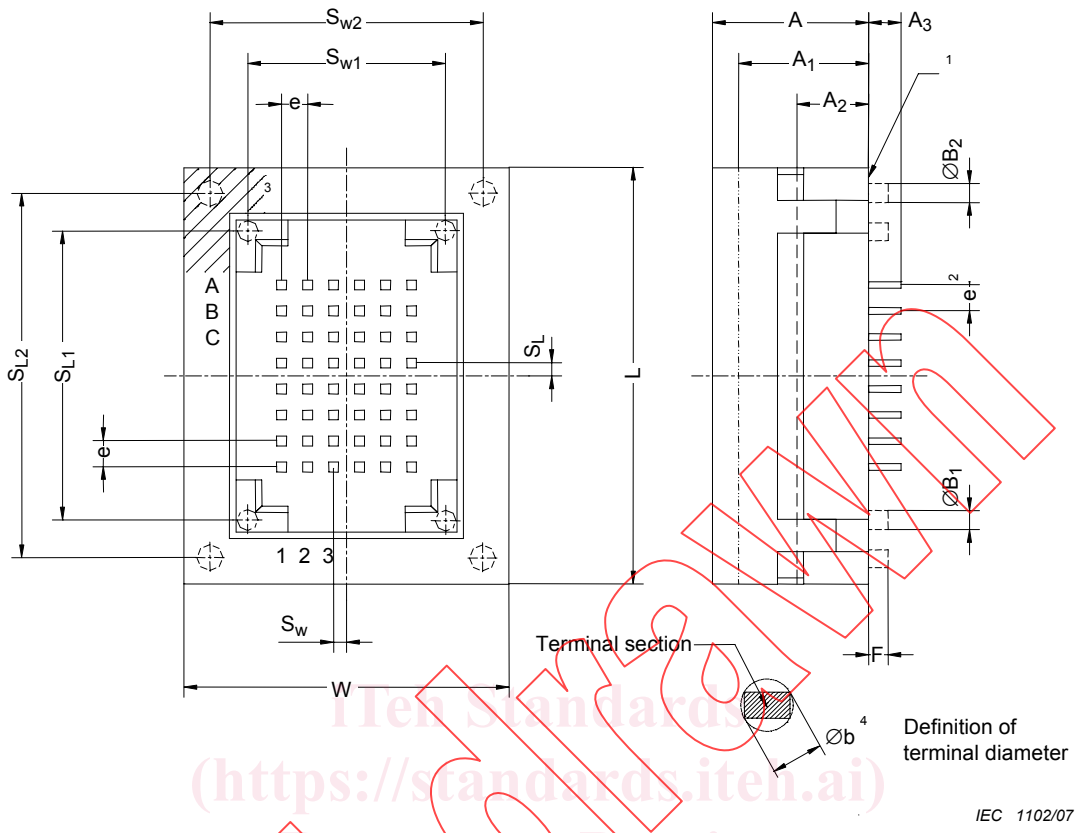
Socket group 1 aims for high terminal count package or FLGA socket which requires complicated socket structure. Socket group 2 and 3 are for the socket currently available. Socket group 4 is for the socket which is required to have the smallest possible outline such as for Memory IC.

Socket group number	Allowed socket outline	To determine socket length and width, the following values are added to the socket nominal dimension
Group 1	Square	36 mm
Group 2	Square	24 mm
Group 3	Square	12 mm
Group 4	Square or rectangular	8 mm

8 Reference symbols and schematics

8.1 Outline drawings

Outline drawings of the socket are shown in Figure 1 and the applicable package outline is in Figure 2. The overall dimensions are in Table 1. Socket dimensions are given in Table 2.



(1) Indicates mounting plane. Mounting plane is defined by the plane where the socket contacts its mounting surface.

(2) Stipulates true geometric position of the terminals.

(3) Indicates positional tolerance of the index mark. Index mark should be completely within the shaded area.

(4) Terminal diameter is defined as the maximum diameter of a circle circumscribed about a vertical projection of the terminal from the mounting plane.

Figure 1 – Outline drawings of the socket

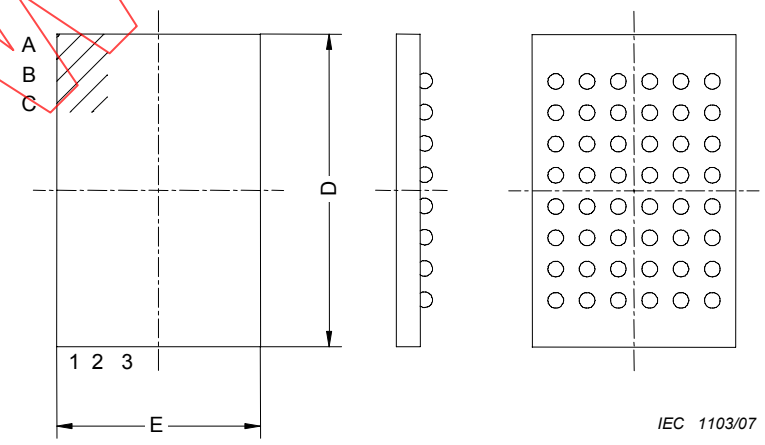


Figure 2 – Applicable package outline

8.2 Reference symbols and schematics of recommended socket mounting pattern on printed circuit board

The drawing of the recommended socket mounting pattern on a printed circuit board is shown in Figure 3 for reference in printed circuit board designing. See Table 3 for recommended dimensions.

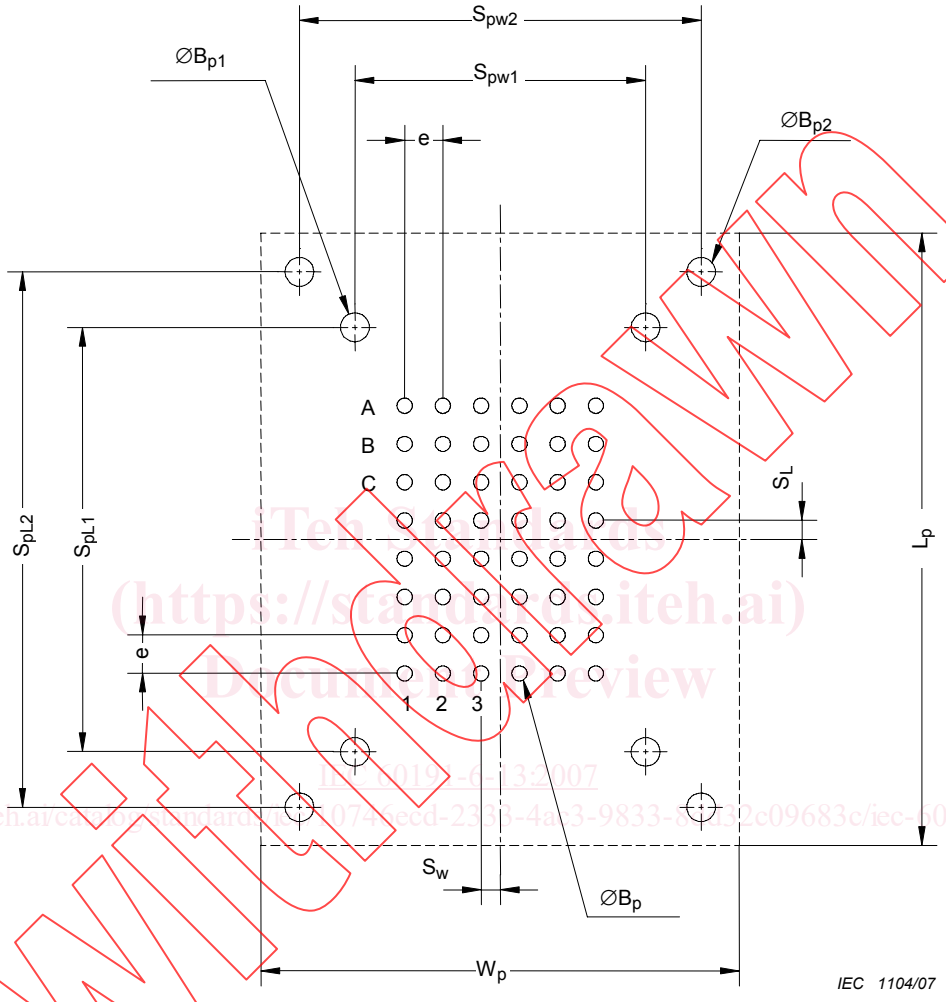


Figure 3 – Socket mounting pattern