IEC 60191-6-13

Edition 2.0 2016-09

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 (FBGA) and Fine-pitch Land Grid Array (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 (FBGA) et les boîtiers matriciels à zone de contact plate et à pas fins (FLGA)

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MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

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

FOREWORD

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

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) BGA package nominal length and width have been newly expanded to 43 mm and 43 mm, respectively. Accordingly, six socket sizes have been added to the socket group numbers 1, 2 and 3, and twenty-two socket sizes have been added to the socket group number 4.

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

FDIS	Report on voting
47D/878/FDIS	47D/885/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.

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

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- withdrawn,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

INTRODUCTION

This part of IEC 60191 aims to standardize the outer dimensions of the sockets for FBGA and FLGA, where leading-edge developments are aggressively innovated, to establish their compatibility with the needs of the surface-mount industry that is globally expanding due to enhanced functions and performances of electrical devices.

For defining each dimension, the target was to indicate the standard design value which has the concept of the design centre as much as possible, aiming to enhance the function as a standardization index.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

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

1 Scope

This part of IEC 60191 specifies a design guideline of open-top-type semiconductor sockets for Fine-pitch Ball Grid Array (FBGA) and Fine-pitch Land Grid Array (FLGA). In particular, this part of IEC 60191 establishes the outline drawings and dimensions of the open-top-type test and burn-in sockets applied to FBGA and FLGA.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *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 given in IEC 60191-6 apply.

4 Socket code

4.1 Construction of socket code

A socket code is constructed as follows.

EXAMPLE

[Symbol of socket 4.2.1]	[Symbol of socket type 4.2.2]	[Symbol of nominal dimension 4.2.3]	[Number of terminal arrays 4.2.4]	[Terminal pitch 4.2.5]
SFB	TX	2120AB	1616	080

4.2 Symbols

4.2.1 Semiconductor sockets symbol

The symbol for socket shall be expressed in three 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”.

4.2.2 Socket type symbol

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

4.2.3 Socket nominal dimension symbol

The symbol for nominal dimension shall be expressed in six characters, which consist of four numeric characters and two alphabetical characters. The first four numeric characters comply with nominal dimension E × D, which refers to the applicable maximum width and length of FBGA/FLGA package.

The last two 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 the following order: socket width direction and then socket length direction.

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

4.2.4 Number of terminal arrays

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

4.2.5 Terminal pitch

The symbol for terminal pitch of applicable package shall be expressed in three numeric characters. The decimal sign 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.

The terminal number one (1) is defined for the vertical row nearest to the index corner. As the row moves rightward, the number is increased to two (2), three (3), etc. The terminal number is combined with these letters and numbers and expressed as A1 or B1. Six (6) alphabetical letters, “I”, “O”, “Q”, “S”, “X” and “Z”, shall not be used as symbols for a horizontal row.

6 Socket nominal dimension

The applicable package length and width which extend from 1,50 mm to 43,0 mm by 0,50 mm increments are divided into ten 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. The package length and width of 5,00 mm or less are unified in one socket nominal dimension.

7 Socket length and width

Socket length and width are categorized into four groups, from group one (1) to group four (4), to cover the difference of its terminal counts and mechanism (see Table 1).

In socket group one (1), two (2) and three (3), only the 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 four (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 side.

Socket group one (1) is intended for a high terminal counts package or a FLGA socket which is composed of a complicated socket structure. Socket groups two (2) and three (3) are for the socket currently available. Socket group four (4) is for the socket which is required to have the smallest possible outline, such as for Memory IC.

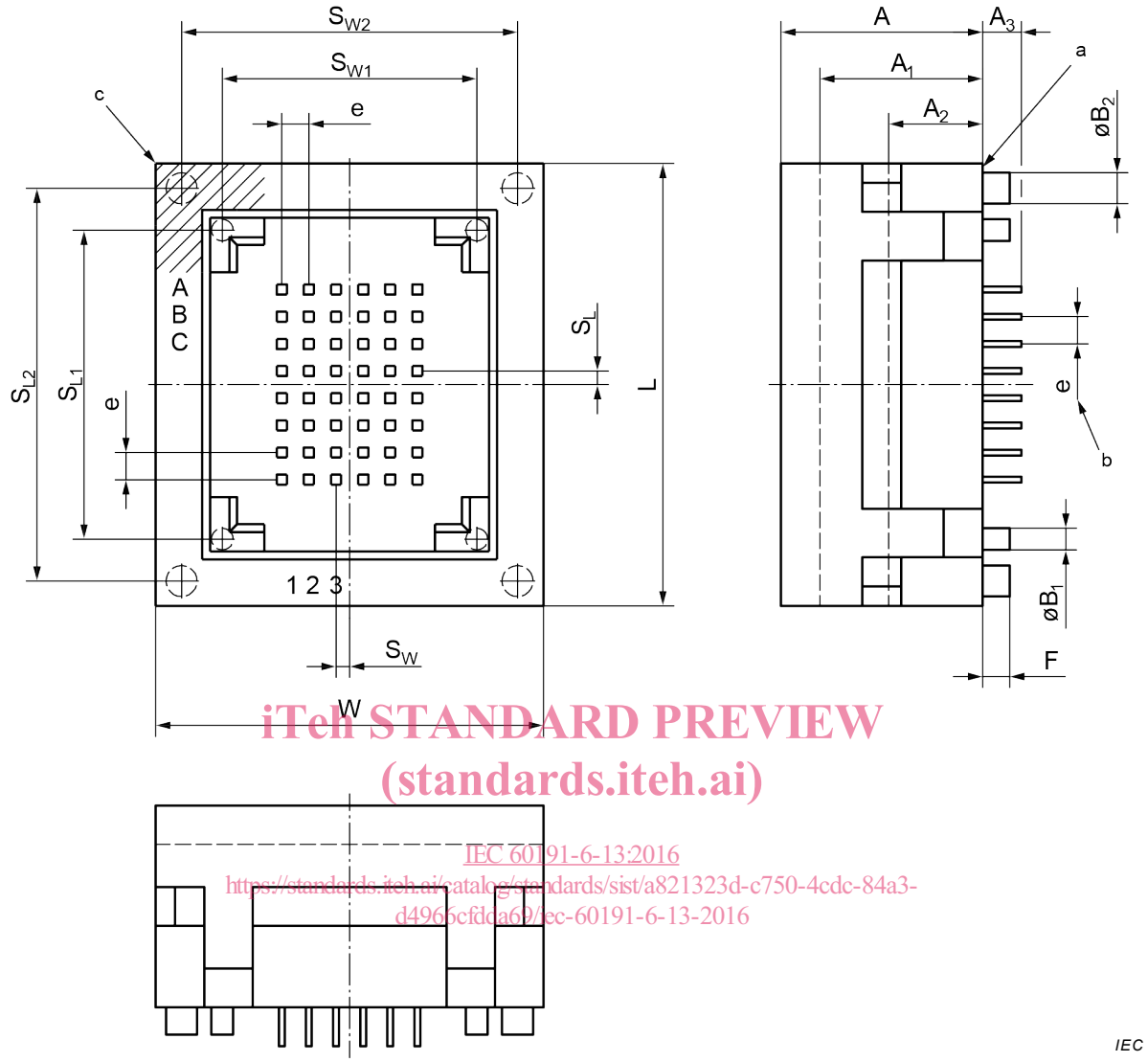
Table 1 – Overview of the different socket groups

Socket group number	Allowed socket outline	Value added to the socket nominal dimension to determine the socket length and width
Group 1	Square	36,0 mm
Group 2	Square	24,0 mm
Group 3	Square	12,0 mm
Group 4	Square or rectangular	8,0 mm

8 Reference symbols and schematics

8.1 Outline drawings

Outline drawings of the socket and the terminal diameter are shown in Figure 1 and Figure 2, respectively. The applicable package outline is presented in Figure 3. The overall dimensions are given in Table 2 and socket dimensions in Table 3 and Table 4.



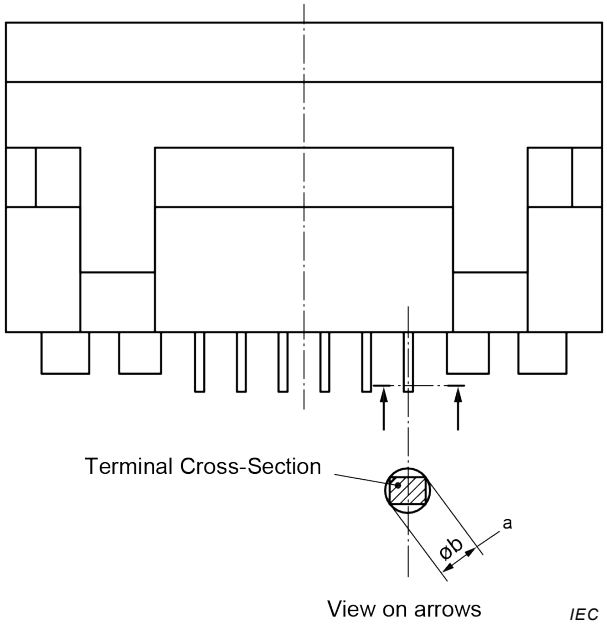
IEC

[a] Indicates the mounting plane. The mounting plane is defined by the plane where the socket contacts its mounting surface.

[b] Stipulates the true geometric position of the terminals.

[c] Indicates positional tolerance of the index mark. Index mark should be completely within the shaded area.

Figure 1 – Outline drawings of the socket



[a] Terminal diameter is defined as the maximum diameter of a circle circumscribed about a horizontal cross-section of the terminal from the mounting plane.

Figure 2 – Outline drawings for the definition of terminal diameter

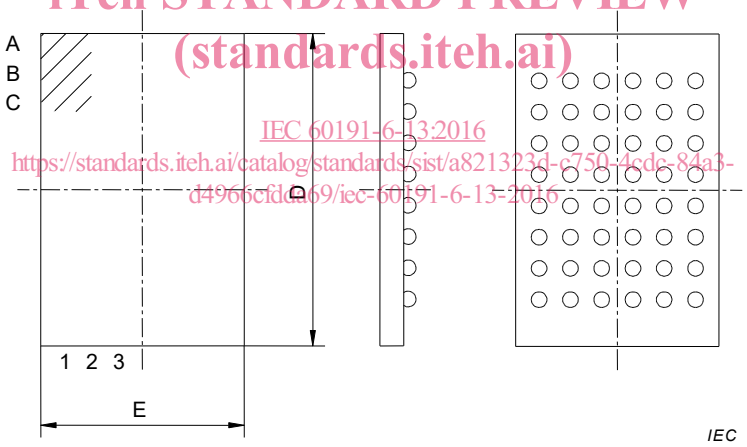
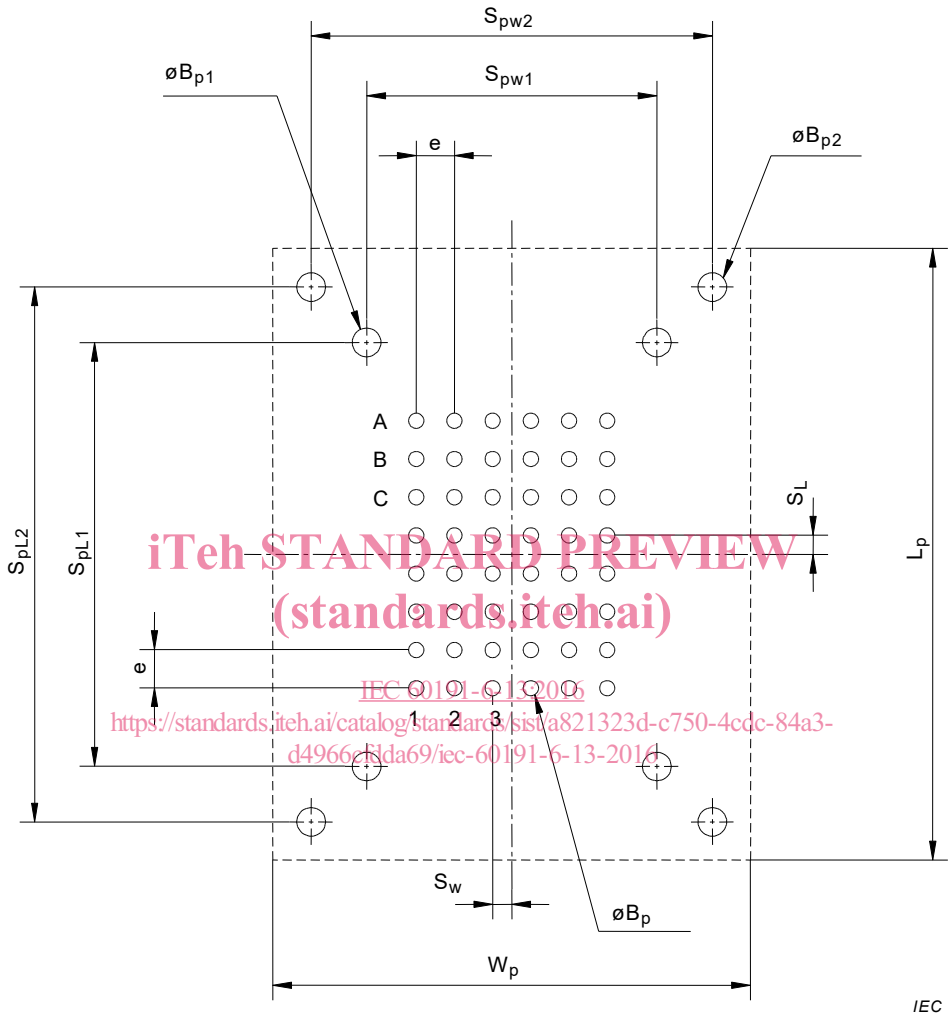


Figure 3 – Applicable package outline

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 4 for reference in designing printed circuit board. See Table 5 for recommended dimensions.



NOTE The subscript "p" indicates projected dimension. For example, L_p is recognized automatically as the projected dimension “L” to the base plane.

Figure 4 – Socket mounting pattern