

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Mechanical standardization of semiconductor devices –
Part 6-22: General rules for the preparation of outline drawings of surface
mounted semiconductor device packages – Design guide for semiconductor
packages Silicon Fine-pitch Ball Grid Array and Silicon Fine-pitch Land Grid
Array (S-FBGA and S-FLGA)**

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**Normalisation mécanique des dispositifs à semiconducteurs –
Partie 6-22: Règles générales pour la préparation des dessins d'encombrement
des dispositifs à semiconducteurs à montage en surface – Guide de conception
pour les boîtiers matriciels à billes et à pas fins en silicium et boîtiers matriciels
à zone de contact plate et à pas fins en silicium (S-FBGA et S-FLGA)**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –**Part 6-22: General rules for the preparation of outline drawings
of surface mounted semiconductor device packages –
Design guide for semiconductor packages Silicon Fine-pitch Ball Grid
Array and Silicon Fine-pitch Land Grid Array (S-FBGA and S-FLGA)**

FOREWORD

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International Standard IEC 60191-6-22 has been prepared by subcommittee 47D: Semiconductor packaging, of IEC technical committee 47: Semiconductor devices.

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

CDV	Report on voting
47D/812/CDV	47D/820/RVC

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- withdrawn,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
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Part 6-22: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for semiconductor packages Silicon Fine-pitch Ball Grid Array and Silicon Fine-pitch Land Grid Array (S-FBGA and S-FLGA)

1 Scope

This part of IEC 60191 provides the outline drawings and dimensions common to silicon-based package structures and materials of ball grid array packages (BGA) and land grid array packages (LGA).

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.

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3 Terms and definitions

[IEC 60191-6-22:2012](#)

<https://standards.iteh.ai/catalog/standards/sist/c829413c-c3da-4884-80c8->

For the purpose of this document, the following terms and definitions apply.

3.1

S-FBGA

FBGA composed of silicon die, dielectric layer(s) on the die, rerouting wires from the die pads to outer balls on the dielectric layer(s), and outer balls with heights more than 0,1 mm

3.2

S-FLGA

FLGA composed of silicon die, dielectric layer(s) on the die, rerouting wires from the die pads to outer lands on the dielectric layer(s), and outer lands with heights of 0,1 mm or less

4 Terminal position numbering

When a package is viewed from the terminal side with the index corner in the bottom left corner position, terminal rows are lettered from bottom to top starting with A, then B, C..., AA, AB, etc., whereas terminal columns are numbered from left to right starting with 1. Terminal positions are designated by a row-column grid system and shown as alphanumeric identification, e.g., A1, B1.

The letters I, O, Q, S, X and Z shall not be used for naming the terminal rows.

5 Code of package nominal dimensions

A code of package nominal dimensions is defined as the combination of package width E and length D which are shown in the second decimal place in millimeter.

6 Symbols and drawings

Symbols and drawings are shown in Figures 1, 2, 3 and 4.

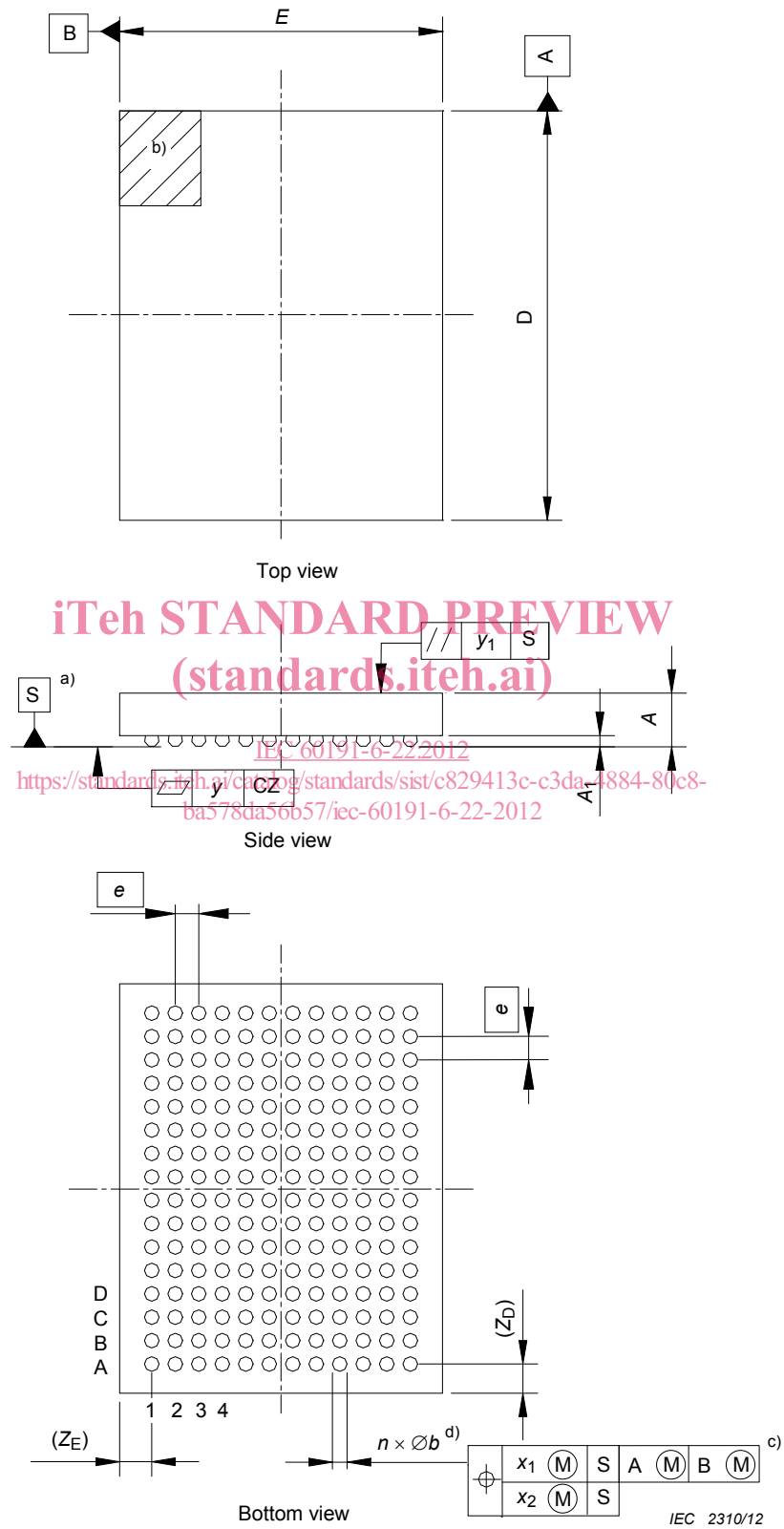


Figure 1 – S-FBGA outline

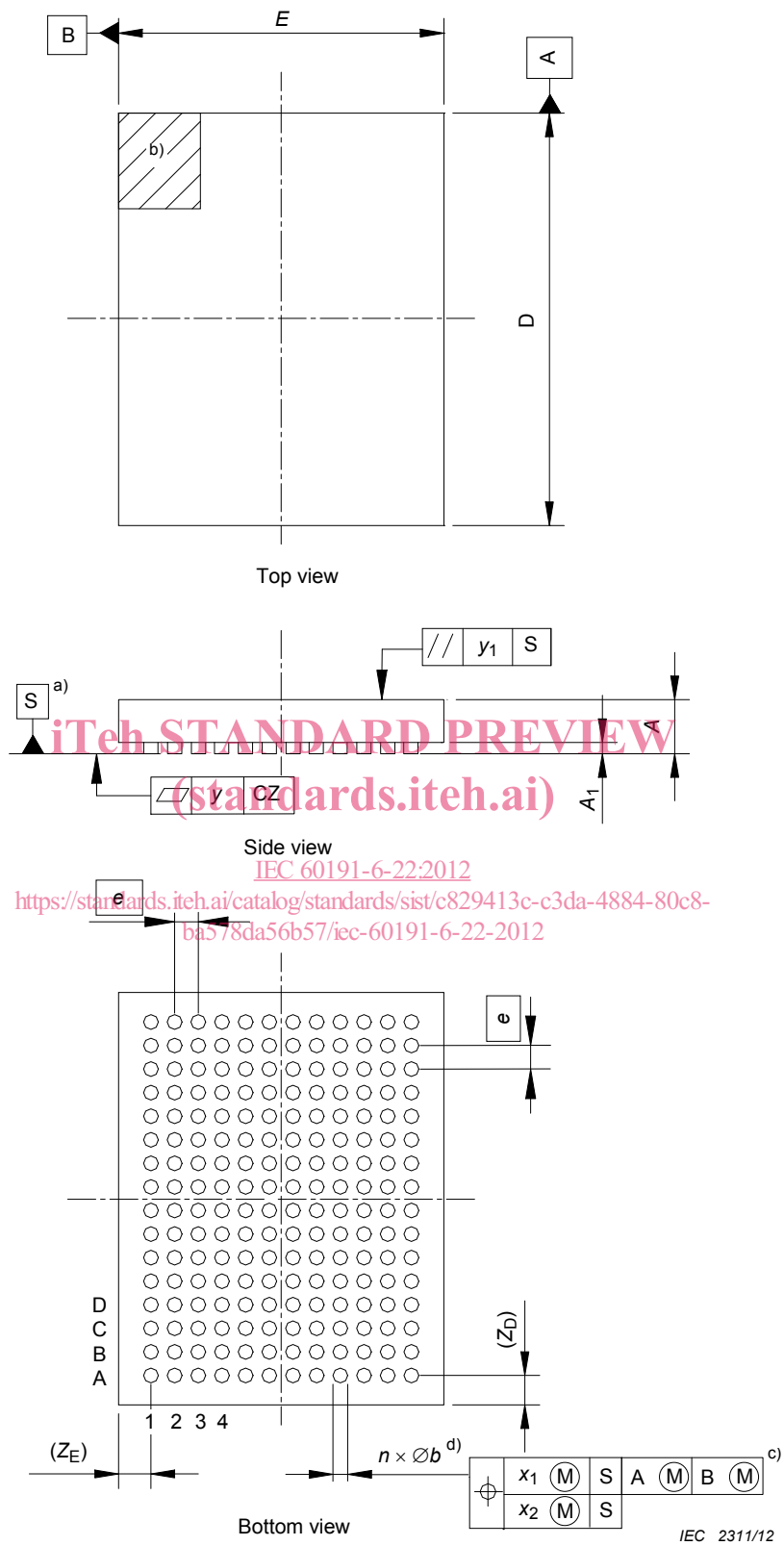


Figure 2 – S-FLGA outline

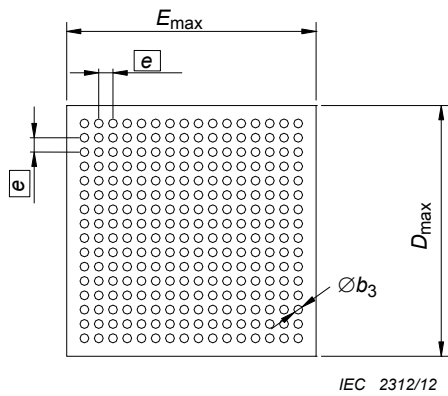


Figure 3 – Mechanical gauge drawing^{e)}

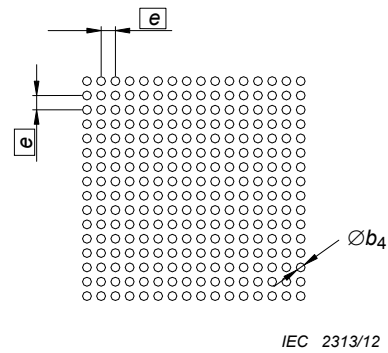


Figure 4 – Array of terminal-existence areas^{f)}

Footnotes relating to Figures 1 to 4

- a) Datum [S] is the seating plane on which a package stays.
- b) The hatched zone is an index-marking area indicating A1 corner.
- c) True positional tolerances of terminals, x_1 and x_2 , are applied to all terminals.
- d) The terminal diameter b is the maximum diameter of the ball as measured in a plane parallel to the seating plane.
- e) An array of terminal-existence areas with regard to the datum [S], [A], and [B] is shown in the mechanical gauge drawing in Figure 3.
- f) The array of terminal-existence areas with regard to the datum [S] is shown in Figure 4.

7 Dimensions

7.1 Group 1

Group 1 dimensions are shown in Table 1.

Table 1 – Dimensions and tolerances in Group 1

Dimensions in millimeters

Term	Symbol	Specification	Recommended value	Notes																																			
Code of package nominal dimensions	$E \times D$	Code of package nominal dimension is defined as the combination of package width E and length D , which are shown in the second decimal place in millimeter.	–	–																																			
Package length	D	Package length is shown in the second decimal place in millimeter. Package length D_{nom} Minimum 0,50 Maximum 10,00 Tolerance v_D $\pm 0,05$	–	v_D denotes tolerance.																																			
Package width	E	Package width is shown in the second decimal place in millimeter. Package width E_{nom} Minimum 0,50 Maximum 10,00 Tolerance v_E $\pm 0,05$	$-M_D, M_E$	v_E denotes tolerance.																																			
Profile height	A	When $A \leq 0,65$, the tolerance of nominal height is $\pm 0,07$. When $0,80 \leq A \leq 1,0$, the tolerance of nominal height is $\pm 0,10$. A shall not exceed 1,0.	–	A includes package warpage and tilt allowances.																																			
Stand-off height	A_1	1) For S-FBGA: <table border="1"> <thead> <tr> <th>e</th> <th>b_{nom}</th> <th>min</th> <th>nom</th> <th>max</th> </tr> </thead> <tbody> <tr> <td>0,80</td> <td>0,50</td> <td>0,35</td> <td>0,40</td> <td>0,45</td> </tr> <tr> <td>0,80</td> <td>0,45</td> <td>0,30</td> <td>0,35</td> <td>0,40</td> </tr> <tr> <td>0,65</td> <td>0,40</td> <td>0,28</td> <td>0,33□</td> <td>0,38</td> </tr> <tr> <td>0,50</td> <td>0,30</td> <td>0,20</td> <td>0,25</td> <td>0,30</td> </tr> <tr> <td>0,40</td> <td>0,25</td> <td>0,15</td> <td>0,20</td> <td>0,25</td> </tr> <tr> <td>0,30</td> <td>0,20</td> <td>0,10</td> <td>0,15</td> <td>0,20</td> </tr> </tbody> </table> For low stand-off S-FBGA: $A_1 \leq 0,20$ 2) For S-FLGA: $A_1 \leq 0,10$	e	b_{nom}	min	nom	max	0,80	0,50	0,35	0,40	0,45	0,80	0,45	0,30	0,35	0,40	0,65	0,40	0,28	0,33□	0,38	0,50	0,30	0,20	0,25	0,30	0,40	0,25	0,15	0,20	0,25	0,30	0,20	0,10	0,15	0,20	–	–
e	b_{nom}	min	nom	max																																			
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Table 1 (Continued)

Dimensions in millimeters

Term	Symbol	Specification	Recommended value	Notes																																																																																				
Terminal pitch	e	$\boxed{e} = 0,80$ 0,65 0,50 0,40 0,30 0,25	-	-																																																																																				
Terminal diameter	b	1) For S-FBGA: <table border="1"> <thead> <tr> <th>\boxed{e}</th> <th>min</th> <th>nom</th> <th>max</th> <th>\boxed{e}</th> <th>nom</th> </tr> </thead> <tbody> <tr> <td>0,80</td> <td>0,45</td> <td>0,50</td> <td>0,55</td> <td>0,80</td> <td>0,50</td> </tr> <tr> <td>0,80</td> <td>0,40</td> <td>0,45</td> <td>0,50</td> <td>0,65</td> <td>0,40</td> </tr> <tr> <td>0,65 \square</td> <td>0,35</td> <td>0,40</td> <td>0,45</td> <td>0,50</td> <td>0,30</td> </tr> <tr> <td>0,50</td> <td>0,25</td> <td>0,30</td> <td>0,35</td> <td>0,40</td> <td>0,25</td> </tr> <tr> <td>0,40</td> <td>0,20</td> <td>0,25</td> <td>0,30</td> <td>0,30</td> <td>0,20</td> </tr> <tr> <td>0,30</td> <td>0,17</td> <td>0,20</td> <td>0,23</td> <td></td> <td></td> </tr> </tbody> </table> 2) For S-FLGA: <table border="1"> <thead> <tr> <th>\boxed{e}</th> <th>min</th> <th>nom</th> <th>max</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>0,80</td> <td>0,35</td> <td>0,40</td> <td>0,45</td> <td></td> <td></td> </tr> <tr> <td>0,65</td> <td>0,28</td> <td>0,33</td> <td>0,38</td> <td></td> <td></td> </tr> <tr> <td>0,50 \square</td> <td>0,20</td> <td>0,25</td> <td>0,30</td> <td>-</td> <td>-</td> </tr> <tr> <td>0,40</td> <td>0,15</td> <td>0,20</td> <td>0,25</td> <td></td> <td></td> </tr> <tr> <td>0,30</td> <td>0,12</td> <td>0,15</td> <td>0,18</td> <td></td> <td></td> </tr> <tr> <td>0,25</td> <td>0,10</td> <td>0,13</td> <td>0,16</td> <td></td> <td></td> </tr> </tbody> </table>	\boxed{e}	min	nom	max	\boxed{e}	nom	0,80	0,45	0,50	0,55	0,80	0,50	0,80	0,40	0,45	0,50	0,65	0,40	0,65 \square	0,35	0,40	0,45	0,50	0,30	0,50	0,25	0,30	0,35	0,40	0,25	0,40	0,20	0,25	0,30	0,30	0,20	0,30	0,17	0,20	0,23			\boxed{e}	min	nom	max			0,80	0,35	0,40	0,45			0,65	0,28	0,33	0,38			0,50 \square	0,20	0,25	0,30	-	-	0,40	0,15	0,20	0,25			0,30	0,12	0,15	0,18			0,25	0,10	0,13	0,16			-	-
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