INTERNATIONAL STANDARD

IEC 60191-6-4

First edition
2003-06

Mechanical standardization of semiconductor devices –

Part 6-4: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of ball grid array (BGA)

Normalisation mécanique des dispositifs à semiconducteurs –

Partie 6-4:
Règles générales pour la préparation des dessins d'encombrement des dispositifs à semiconducteurs à montage en surface –
Méthodes de mesure pour les dimensions des boîtiers matriciels à billes

Reference number
IEC 60191-6-4:2003(E)

Publication numbering

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International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE P

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-4: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of ball grid array (BGA)

FOREWORD

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International Standard IEC 60191-6-4 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/531/FDIS	47D/546/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.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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- withdrawn;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

A bilingual version of this publication may be issued at a later date.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-4: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Measuring methods for package dimensions of ball grid array (BGA)

1 Scope

This part of IEC 60191 covers the requirements for the measuring methods of ball grid array (BGA) dimensions.

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 60191-6:1990, *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 definitions of IEC 60191-6 apply.

The measuring method in this standard is defined for dimension values guaranteed to users on the basis of the following items.

1) In general, measurement may be made either by hand or automatically.
2) If a dimension is difficult to measure, the best alternative measuring method will be defined as the preferred measuring method.

4 Reference character and drawings

4.1 Ball grid array package (BGA) Type 1 – Ball datum

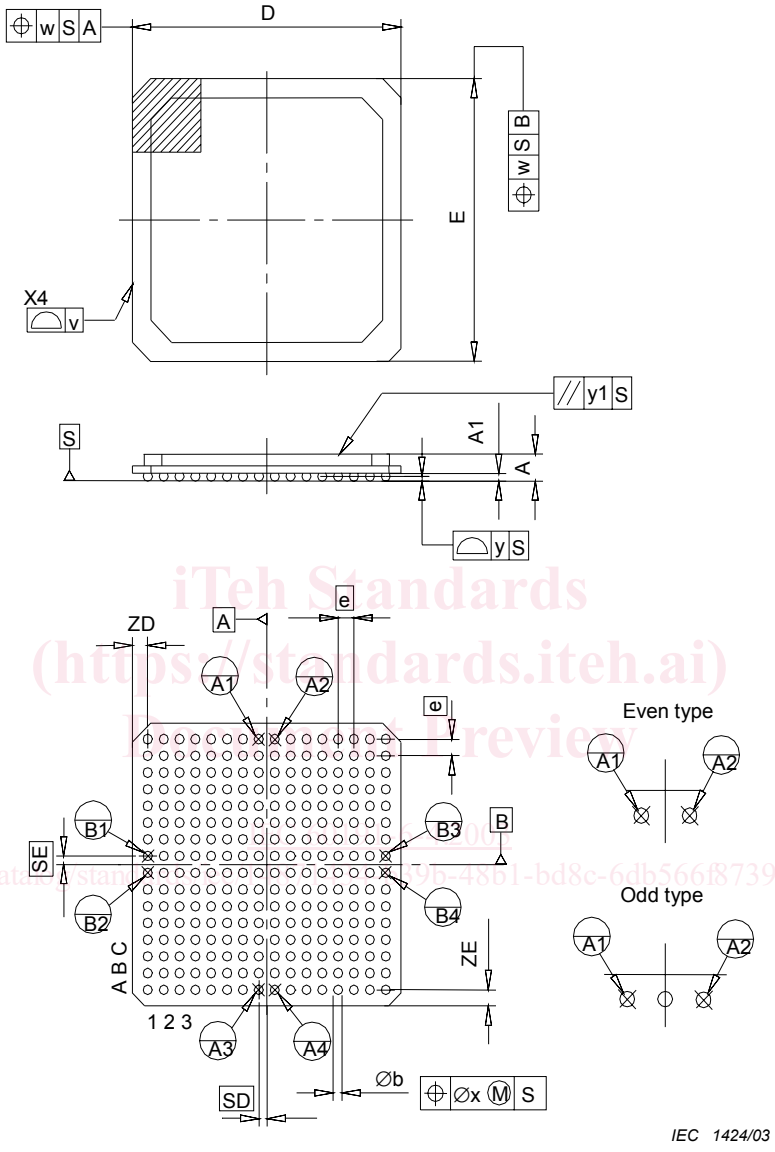


Figure 1 – BGA package Type 1 – Ball datum

4.2 Ball grid array package (BGA) Type 2 – Body datum

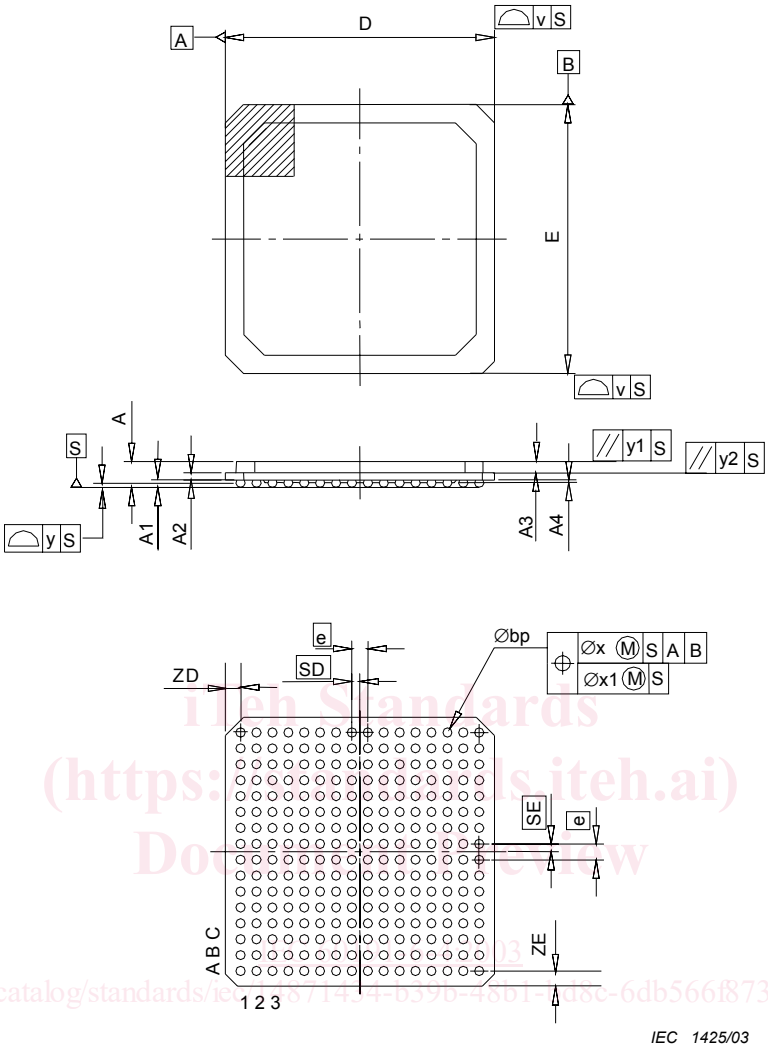


Figure 2 – BGA package Type 2 – Body datum

5 Measuring method

5.1 Datum S as pertaining to ball coplanarity

The datum S (seating plane) can be determined by either of the following:

a) Datum S formed from the triangulation of the tallest three balls.

The tallest three balls defining the seating plane must fully encompass the projection of the centre of gravity (COG) in order to constitute a valid seating plane.

b) Datum S calculated from the LSM (least squares method) plane applies to stand-off A2, stand-off A1, the ball centre point and coplanarity. Calculate a plane from each lowest point of all balls based on LSM. Datum S shall be the LSM plane shifted to bottom of the lowest ball.

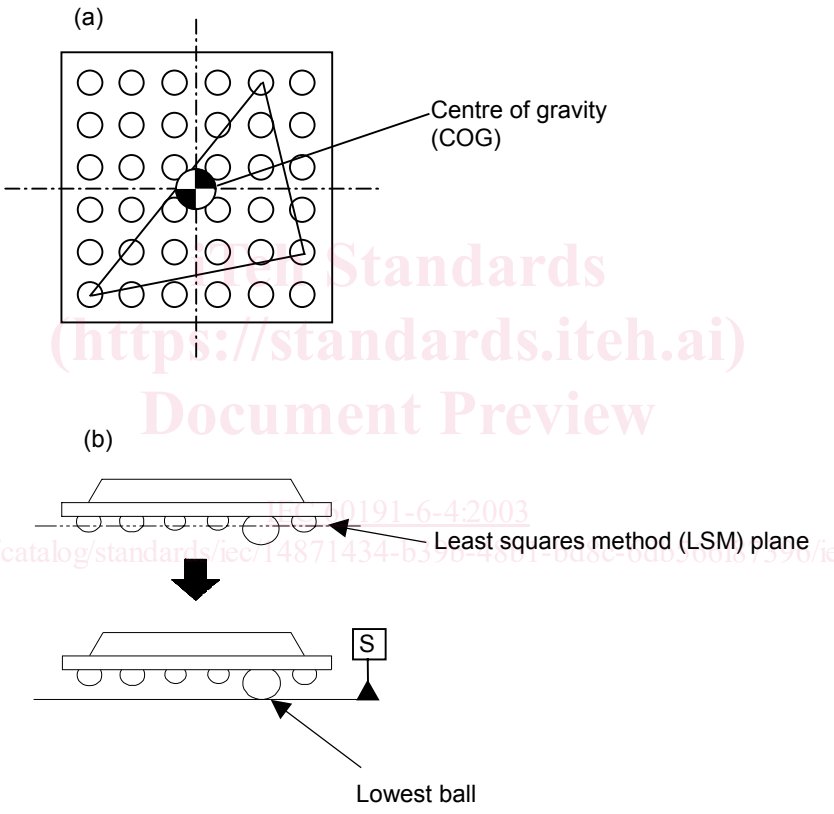


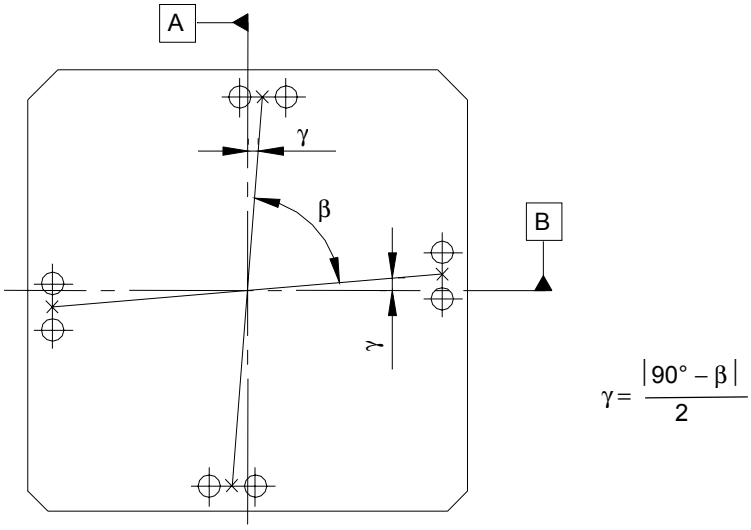
Figure 3 – Datum S

5.2 Datum A, B

a) Type 1

Centres of opposite sides of a package, which are defined below, shall be connected together.

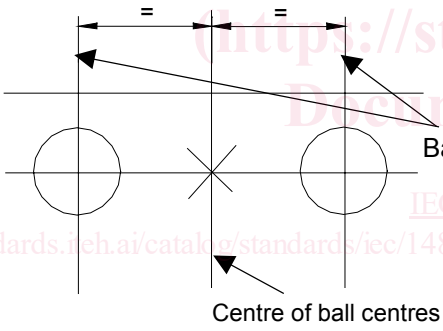
An angle subtended by the two crossing lines shall be obtained. A difference | 90° – β | of the angle from 90° shall be equally distributed to the sides to obtain orthogonal axes. These datum A and B should be the perpendicular planes to the datum S.



Definition of the centre of sides

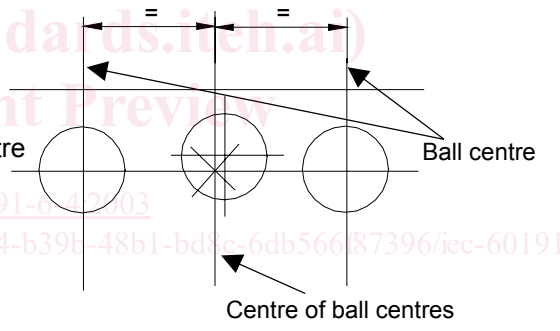
IEC 1427/03

Figure 4 – Datum A, B – Type 1



IEC 1428/03

Figure 5 – Centre of ball centres (for an even number)



IEC 1429/03

Figure 6 – Centre of ball centres (for an odd number)

b) Type 2

On the E sides of the package (see Figure 2), a minimum of 4 points shall be selected (points 1-4) (see Figure 7). The lines shall be drawn from these points (1-2 and 3-4).

The lines that pass through the midpoints of these two lines (5 and 6) will hereafter be referred to as datum A.

On the D sides of the package (see Figure 2) coinciding with datum A, 2 points shall be selected (7 and 8) (see Figure 8). The line perpendicular to datum A passing through the midpoint of this line (7-8) will hereafter be referred to as datum B.