INTERNATIONAL STANDARD

IEC 60191-6-2

First edition
2001-12

Mechanical standardization of semiconductor devices –

Part 6-2:
General rules for the preparation of outline drawings of surface mounted semiconductor device packages –
Design guide for 1,50 mm, 1,27 mm and 1,00 mm pitch ball and column terminal packages

Normalisation mécanique des dispositifs à semiconducteurs –

Partie 6-2:
Règles générales pour la préparation des dessins d'encombrement des dispositifs à semiconducteurs pour montage en surface –
Guide de conception pour les boîtiers à broches en forme de billes et de colonnes, avec des pas de 1,50 mm, 1,27 mm et 1,00 mm

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International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http://www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-2: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for 1,50 mm, 1,27 mm and 1,00 mm pitch ball and column terminal packages

FOREWORD

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International Standard IEC 60191-6-2 has been prepared by subcommittee SC 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/460//FDIS	47D/471/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 3.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

The contents of the corrigendum of October 2002 have been included in this copy.

INTRODUCTION

This design guide is intended to standardize the requirements for all ball and column terminal packages in order to establish common rules for terminal shapes, irrespective of device and package types.

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 6-2: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Design guide for 1,50 mm, 1,27 mm and 1,00 mm pitch ball and column terminal packages

1 Scope

This part of IEC 60191 covers the requirements for the preparation of drawings of integrated circuit outlines for the various ball terminal packages, e.g. ceramic ball grid array (C-BGA), plastic ball grid array (P-BGA), tape ball grid array (T-BGA) and others as well as column terminal packages, e.g. ceramic column grid array (C-CGA).

2 Normative references

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of IEC 60191. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60191 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60191 (all parts), *Mechanical standardization of semiconductor devices*

3 Definitions

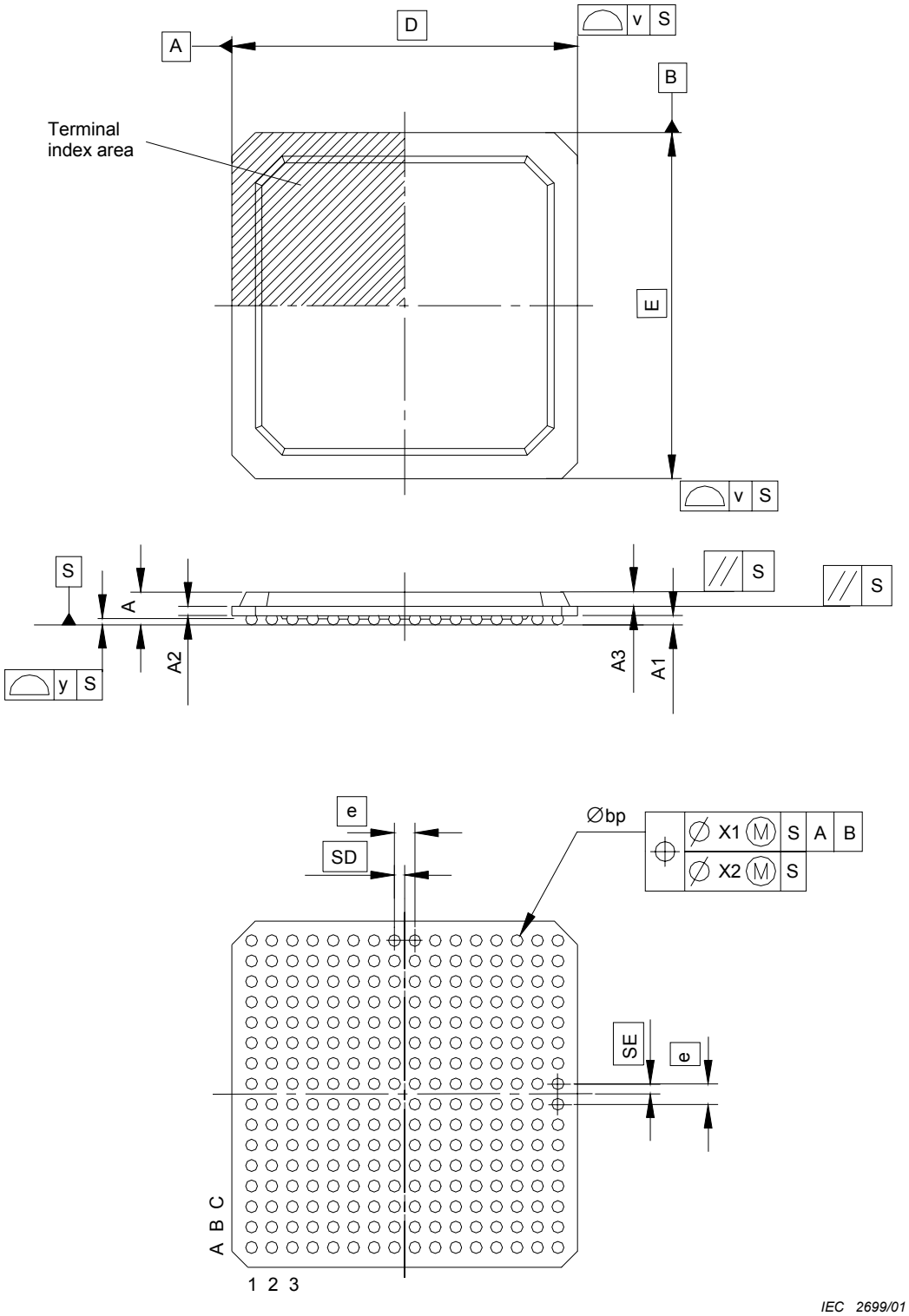
For the purpose of this part of IEC 60191, the following definitions apply.

3.1
ball terminal packages
packages that have solder balls attached to a ceramic/laminate/tape substrate for mounting on a PCB surface, e.g. C-BGA, P-BGA and T-BGA

3.2
column terminal packages
packages that have solder columns attached to a ceramic/laminate/tape substrate for mounting on a PCB surface, e.g. C-CGA

4 Ball terminal packages, 1,50 mm, 1,27 mm and 1,00 mm pitch

Reference characters and drawings



IEC 2699/01

4.1 Outline dimensions

The ball terminal dimensions are shown in the tables below.

4.2 Package height

The package height (A) is the thickness of the package body, including the lid and ball heights. For all BGA packages, the package body thickness (A2) is considered to be design specific.

4.3 Ball terminal diameter

Table 1 – Solder terminal

Terminal pitch e	Ball diameter b_p nominal					
	C-BGA		P-BGA		T-BGA	
	LMP [a]	HMP [b]	LMP	HMP	LMP	HMP
1,00	0,60	0,70	0,60	–	0,60	0,63
1,27	0,75	0,89	0,75	–	0,75	0,63
1,50	0,75	0,89	0,75	–	0,75	0,63

[a] LMP = Low melting point.

[b] HMP = High melting point.

4.4 Tolerance of ball centre position

Table 2 – Tolerance of ball centre position

Terminal pitch e	Tolerance of solder ball centre position		Coplanarity	
	X1	X2	y	
			LMP [a]	HMP [b]
1,00	0,25	0,10	0,15	0,15
1,27	0,30	0,15	0,20	0,15
1,50	0,30	0,15	0,20	0,15

[a] LMP = Low melting point.

[b] HMP = High melting point.

4.5 Package body thickness and stand-off heights

The relationship between the package body thickness and stand-off heights for each package is shown in the table below.

Table 3 – Package body thickness and stand-off heights

Package type	Package body thickness A2 nominal	Stand-off height A1 nominal		Terminal pitch e
		LMP [a]	HMP [b]	
C-BGA	Design specific	0,50	0,70	1,00
		0,60	0,90	1,27
		0,60	0,90	1,50
P-BGA	Design specific	0,50	–	1,00
		0,60	–	1,27
		0,60	–	1,50
T-BGA	Design specific	0,50	0,55	1,00
		0,60	0,55	1,27
		0,60	0,55	1,50
[a] LMP = Low melting point.				
[b] HMP = High melting point.				

4.6 Tolerance of terminal centre position and coplanarity

Table 4 – Tolerance of terminal centre position and coplanarity

Package type	Terminal pitch e	Tolerance of solder ball Centre position		Coplanarity	
		X1	X2	y	
				LMP [a]	HMP [b]
C-BGA, P-BGA, T-BGA	1,00	0,25	0,10	0,15	0,15
C-BGA, P-BGA, T-BGA	1,27	0,30	0,15	0,20	0,15
C-BGA, P-BGA, T-BGA	1,50	0,30	0,15	0,20	0,15
[a] LMP = Low melting point.					
[b] HMP = High melting point.					

4.7 Explanatory notes

4.7.1 Objective of establishment

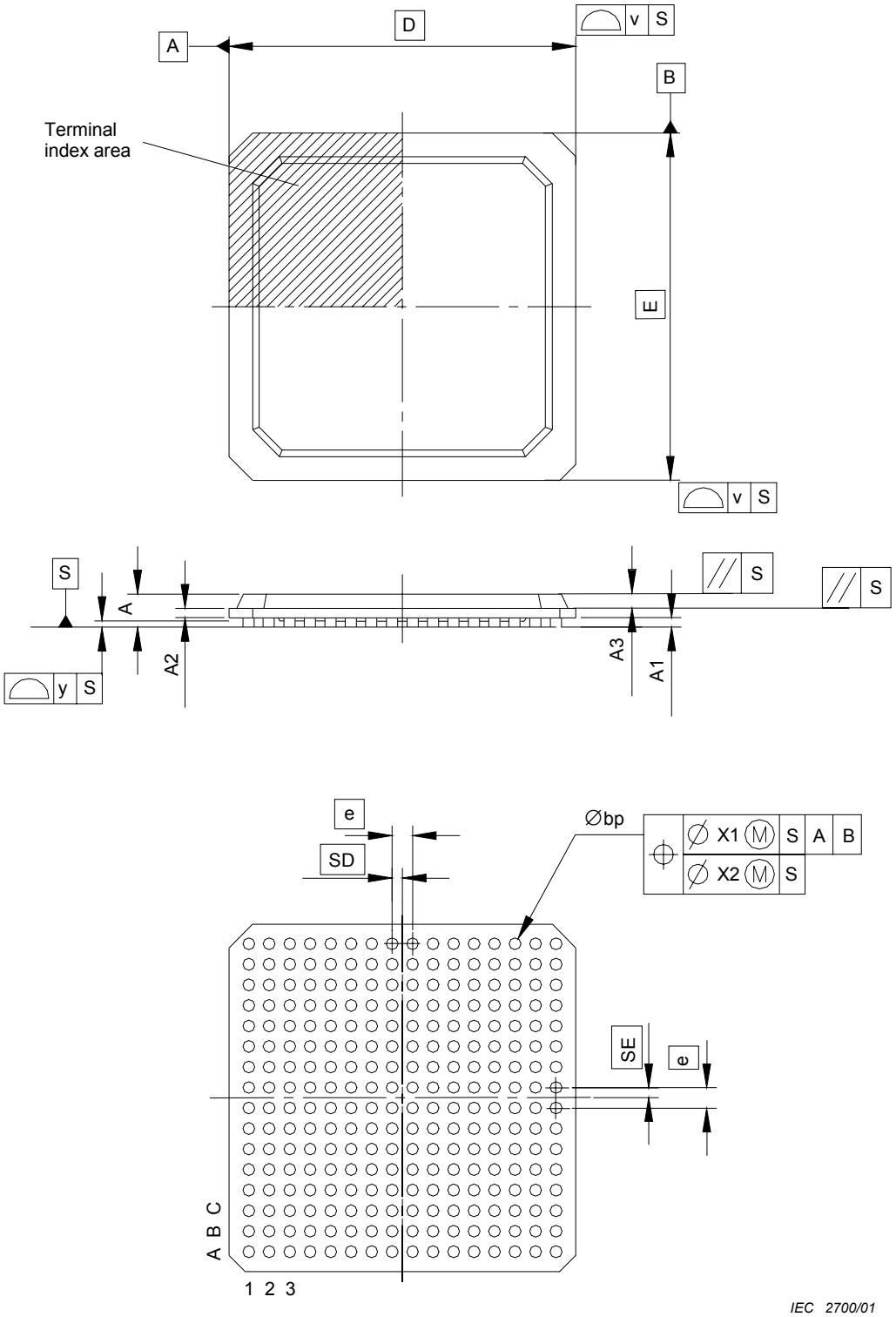
This part of IEC 60191 is intended to standardize the requirements of all types of ball terminal packages and to establish common rules, regardless of package type.

4.7.2 Conventional design rules for ball terminal packages

Dimensions for the packages with solder ball are listed in tables 1, 2, 3, and 4.

5 Column terminal packages, 1,50 mm, 1,27 mm and 1,00 mm pitch

Reference characters and drawings



5.1 Outline dimensions

The column terminal dimensions are shown in the tables below.

5.2 Package height

The package height (A) is the thickness of the package body, including the lid and column heights. For all C-CGA packages, the package body thickness (A2) is considered to be design specific.

5.3 Column terminal diameter

Table 5 – Solder terminal

Terminal pitch e	Column diameter b_p nominal	
	C-CGA	
	LMP [a]	HMP [b]
1,00	0,50	0,50
1,27	0,50	0,50
1,50	0,50	0,50
[a] LMP = Low melting point. [b] HMP = High melting point.		

5.4 Tolerance of column centre position

Table 6 – Tolerance of column centre position

Terminal pitch e	Tolerance of solder column centre position		Coplanarity	
	X1	X2	y	
			LMP [a]	HMP [b]
1,00	0,30	0,10	0,15	0,15
1,27	0,30	0,10	0,20	0,15
1,50	0,30	0,10	0,20	0,15
[a] LMP = Low melting point. [b] HMP = High melting point.				

5.5 Package body thickness and stand-off heights

The relationship between the package body thickness and stand-off heights for each package is shown in the table below.

Table 7 – Package body thickness and stand-off heights

Package type	Package body thickness A2 nominal	Stand-off height A1 nominal		Terminal pitch [e]
		LMP [a]	HMP [b]	
C-CGA	Design specific	2,20	2,20	1,00
		2,20	2,20	1,27
		2,20	2,20	1,50
[a] LMP = Low melting point.				
[b] HMP = High melting point.				

5.6 Tolerance of terminal centre position and coplanarity

Table 8 – Tolerance of terminal centre position and coplanarity

Package type	Terminal pitch [e]	Tolerance of solder column Centre position		Coplanarity	
		X1	X2	y	
				LMP [a]	HMP [b]
C-CGA	1,00	0,25	0,10	0,15	0,15
C-CGA	1,27	0,30	0,15	0,20	0,15
C-CGA	1,50	0,30	0,15	0,20	0,15
[a] LMP = Low melting point.					
[b] HMP = High melting point.					

5.7 Explanatory notes

5.7.1 Objective of establishment

This part of IEC 60191 is intended to standardize the requirements of all types of column terminal packages and to establish common rules, regardless of package type.

5.7.2 Conventional design rule for column terminal packages

Dimensions for the packages with columns are listed in tables 5, 6, 7, and 8.

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