NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60191-2

AMENDEMENT 6
AMENDMENT 6
2002-04

Amendement 6

Normalisation mécanique des dispositifs à semiconducteurs –

Partie 2: Dimensions

Amendment 6

Mechanical standardization of semiconductor devices –

Part 2: Dimensions

Les feuilles de cet amendement sont à insérer dans la Publication 60191-2

The sheets contained in this amendment are to be inserted in Publication 60191-2

CODE PRIX
PRICE CODE S

Pour prix, voir catalogue en vigueur
For price, see current catalogue

INSTRUCTIONS POUR L'INSERTION DES NOUVELLES PAGES DANS LA CEI 60191-2

Remplacer la page de titre existante par la nouvelle page de titre.

Retirer la page 60191 IEC I existante contenant la préface et la remplacer par la nouvelle page 60191 IEC I contenant la préface à l'amendment 6 (2002).

Chapitre I:

Ajouter les nouvelles feuilles suivantes:

60191 IEC I-157E - a/b/c/d/e/f/g/h/i/j/k/l/m/n/o/p/q/r/s
60191 IEC I-158E - a/b/c/d/e/f/g/h/i/j/k/l/m/n/o/p
60191 IEC I-163E – a/b

INSTRUCTIONS FOR THE INSERTION OF NEW PAGES IN IEC 60191-2

Replace the existing title page with the new title page.

Remove the existing page 60191 IEC I containing the preface and insert in its place the new page 60191 IEC I containing the preface to Amendment 6 (2002).

Chapter I:

Add the following new sheets:

60191 IEC I-157E - a/b/c/d/e/f/g/h/i/j/k/l/m/n/o/p/q/r/s
60191 IEC I-158E - a/b/c/d/e/f/g/h/i/j/k/l/m/n/o/p
60191 IEC I-163E – a/b

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60191-2
Première édition
First edition
1966

Modifiée selon les Compléments:
Amended in accordance with Supplement:
A (1967), B (1969), C (1970), D (1971), E (1974), F (1976),
G (1978), H (1978), J (1980), K (1981), L (1982), M (1983),
N (1987), P (1988), Q (1990), R (1995), S (1995), T(1995),
U(1997), V(1998), W(1999), X(1999), Y(2000), Z(2000)
et/and Amendement/Amendment 1 (2001), 2(2001), 3(2001),
4(2001), 5(2002), 6(2002)

Normalisation mécanique des dispositifs à semiconducteurs –

Partie 2: Dimensions

Mechanical standardization of semiconductor devices –

Part 2: Dimensions

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

COMMISSION ÉLECTROTECHNIQUE
INTERNATIONALE

PUBLICATION 191-2

NORMALISATION MÉCANIQUE DES DISPOSITIFS À SEMICONDUCTEURS

DEUXIÈME PARTIE: DIMENSIONS

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INTERNATIONAL
ELECTROTECHNICAL COMMISSION

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Partie 2: Dimensions

AVANT-PROPOS

1) La CEI (Commission Électrotechnique Internationale) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de la CEI). La CEI a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, la CEI, entre autres activités, publie des Normes internationales. Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec la CEI, participent également aux travaux. La CEI collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de la CEI concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux intéressés sont représentés dans chaque comité d'études.
3) Les documents produits se présentent sous la forme de recommandations internationales. Ils sont publiés comme normes, spécifications techniques, rapports techniques ou guides et agréés comme tels par les Comités nationaux.
4) Dans le but d'encourager l'unification internationale, les Comités nationaux de la CEI s'engagent à appliquer de façon transparente, dans toute la mesure possible, les Normes internationales de la CEI dans leurs normes nationales et régionales. Toute divergence entre la norme de la CEI et la norme nationale ou régionale correspondante doit être indiquée en termes clairs dans cette dernière.
5) La CEI n'a fixé aucune procédure concernant le marquage comme indication d'approbation et sa responsabilité n'est pas engagée quand un matériel est déclaré conforme à l'une de ses normes.
6) L'attention est attirée sur le fait que certains des éléments de la présente Norme internationale peuvent faire l'objet de droits de propriété intellectuelle ou de droits analogues. La CEI ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de propriété et de ne pas avoir signalé leur existence.

PRÉFACE À L'AMENDEMENT 6 (2002)

Le présent amendement a été établi par le sous-comité 47D: Normalisation mécanique des dispositifs à semiconducteurs du comité d'études 47 de la CEI: Dispositifs à semiconducteurs.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
47D/480/FDIS 47D/481/FDIS	47D/491/RVD 47D/492/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Amendment 6 (2002) to IEC 60191-2 (1966)

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

Part 2: Dimensions

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

PREFACE TO AMENDMENT 6 (2002)

This amendment 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/480/FDIS 47D/481/FDIS	47D/491/RVD 47D/492/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.

CHAPITRE 00 – CONCEPTION DE LA NORMALISATION MÉCANIQUE

1. Règles fondamentales

Lors de la réunion tenue à Montreux (juin 1981), le Comité d'Etudes n° 47 adopta les règles fondamentales suivantes qui remplacent celles adoptées à Copenhague en octobre 1962:

A. Toute proposition nouvelle devra être soumise à l'étude préliminaire d'un groupe de travail convenablement qualifié (note 1) avant circulation dans un document Secrétariat.

B. Le groupe de travail qualifié devra étudier les nouvelles propositions avec les objectifs suivants:

   1. Aboutir à une normalisation active en n'acceptant que les boîtiers qui sont soutenus internationalement.
   2. Spécifier de façon précise les dimensions en vue d'assurer l'interchangeabilité et de faciliter les manipulations automatiques.
   3. Reconsidérer continuellement les dessins existants et proposer la suppression de ceux qui ne sont plus soutenus.

C. Il ne sera procédé à la discussion d'un dessin de boîtier que s'il a le soutien préalable d'au moins trois pays.

D. Un dessin ne sera introduit dans la Publication 191-2 de la CEI que si au moins trois des pays qui le soutiennent ont fourni leur numéro de code national (ou exprimé un soutien formel s'ils ne possèdent pas de numéro de code).

Notes *1.* – Lors de la réunion du Comité d'Etudes n° 47 à Orlando (février 1980), il a été admis d'étendre le domaine d'activité du GT7 de façon qu'il couvre aussi bien la normalisation mécanique des semiconducteurs discrets que celle des circuits intégrés.

Il a été également admis que, compte tenu de l'élargissement de son domaine d'activité, le GT7 serait le groupe de travail qualifié mentionné dans le paragraphe A.

En vue d'éviter que l'introduction du GT7 dans le processus suivi par le Comité d'Etudes n° 47 pour préparer des documents secrétariat sur la normalisation mécanique provoque des délais supplémentaires, le GT7 a été autorisé à obtenir de la part des trois pays concernés, ou plus, la confirmation directe du maintien de leur appui pour ces propositions.

2. – Lors de la réunion du Comité d'Etudes n° 47 à Montreux (juin 1981), il a été admis que les réunions du GT7 s'intégreraient dans les réunions du Comité d'Etudes n° 47.

Cependant, certaine propositions peuvent nécessiter un temps d'études dépassant la durée d'une réunion du Comité d'Etudes n° 47 et en conséquence requérir une ou plusieurs réunions du GT7 entre deux réunions consécutives du Comité d'Etudes n° 47.

Lors de la réunion tenue à Moscou (juin 1977), le Comité d'Etudes n° 47 adopta la règle suivante:

Lorsqu'un dessin de la Publication 191-2 de la CEI vient à ne plus être soutenu que par un seul pays, il sera retiré de la publication principale et transféré dans une section séparée intitulée «Dessins obsolètes» avec l'indication de la date de transfert sur la feuille particulière correspondante.

Un avertissement au début de la section dévolue aux dessins obsolètes stipulera qu'à l'expiration d'une période de deux ans à compter de sa date de transfert, le dessin sera supprimé, sauf s'il est soutenu par un autre pays dans l'intervalle.

CHAPITRE I – DESSINS D'ENCOMBREMENTS

Liste des dessins *(suite)*

Numéro de code CEI	Code du pays d'origine	Numéro de page et date	
116E01	SC-529-14BA	I-116E	1988
116E02	SC-530-16CA		
116E03	SC-531-20AA		
117E01	SC-530-16BA	I-117E	1988
117E02	SC-531-20BA		
117E03	SC-532-24AA		
117E04	SC-533-28AA		
117E05	SC-533-28BA		
118E01	SC-532-24BA	I-118E	1988
118E02	SC-533-28CA		
119E02	(Etats-Unis)	I-119E	1990
119E03			
120E	NT194	I-120E	1990
121E	NT213	I-121E	1994
122E	NT221	I-122E	1994
123E		I-123E	1997
129E	NT223	I-129E	1994
133E		I-133E	2000
134E		I-134E	2000
135E		I-135E	2000
136E		I-136E	2000
137E		I-137E	2000
138E		I-138E	
139E		I-139E	
140E		I-140E	1999
141E		I-141E	1999
142E		I-142E	1998
143E		I-143E	1998
7144E		I-144E	1999
147E		I-147E	1999
148E		I-148E	1999
149E		I-149E	2000
154E		I-154E	2001
155E		I-155E	2001
157E		I-157E	2001
158E		I-158E	2002
159E		I-159E	2002
160E		I-160E	2001
161E		I-161E	2001
162E		I-162E	2001
163E		I-163E	2002
164E		I-164E	2001
165E		I-165E	2002
Forme F			
084F		I-084F	1996
100F		I-100F	1990
101F01	101F01	I-101F	1998
101F01	101F01		
102F		I-102F	1998
102F0	102F01		
102F02	102F02		
102F033	102F03		

CHAPTER I – DEVICE OUTLINE DRAWINGS

List of drawings *(continued)*

IEC code number	Code of country of origin	Page number and date	
116E01	SC-529-14BA	I-116E	1988
116E02	SC-530-16CA		
116E03	SC-531-20AA		
117E01	SC-530-16BA	I-117E	1988
117E02	SC-531-20BA		
117E03	SC-532-24AA		
117E04	SC-533-28AA		
117E05	SC-533-28BA		
118E01	SC-532-24BA	I-118E	1988
118E02	SC-533-28CA		
119E02	(USA)	I-119E	1990
119E03			
120E	NT194	I-120E	1990
121E	NT213	I-121E	1994
122E	NT221	I-122E	1994
123E		I-123E	1997
129E	NT223	I-129E	1994
133E		I-133E	2000
134E		I-134E	2000
135E		I-135E	2000
136E		I-136E	2000
137E		I-137E	2000
138E		I-138E	
139E		I-139E	
140E		I-140E	1999
141E		I-141E	1999
142E		I-142E	1998
143E		I-143E	1998
144E		I-144E	1999
147E		I-147E	1999
148E		I-148E	1999
149E		I-149E	2000
154E		I-154E	2001
155E		I-155E	2001
157E		I-157E	2001
158E		I-158E	2002
159E		I-159E	2002
160E		I-160E	2001
161E		I-161E	2001
162E		I-162E	2001
163E		I-163E	2002
164E		I-164E	2001
165E		I-165E	2002
Form F			
084F		I-084F	1996
100F		I-100F	1990
101F01	101F01	I-101F	1998
101F01	101F01		
102F		I-102F	1998
102F0	102F01		
102F02	102F02		
102F033	102F03		

CHAPITRE I – DESSINS D'ENCOMBREMENTS

Liste des dessins *(suite)*

Numéro de code CEI	Code du pays d'origine	Numéro de page et date	
Forme G			
050G01	SO5-87D	I-50a/b/c/d	1985
050G02	SO-188D		
050G03	SO-87A		
050G04	SO-87B		
050G05	SO-188A		
050G06	SO-188B		
050G07	SO-188F		
050G08	SO-87C		
050G10	SO-188C		
050G11	SO505-18A		
050G12	SO-87G		
050G13	SO-188E		
050G14	(Suède)		
050G16	A1AA	I-50e	1990
050G17	A1AB		
050G18	A1BA		
050G19	A1BB		
050G20	A1CB		

CHAPTER I – DEVICE OUTLINE DRAWINGS

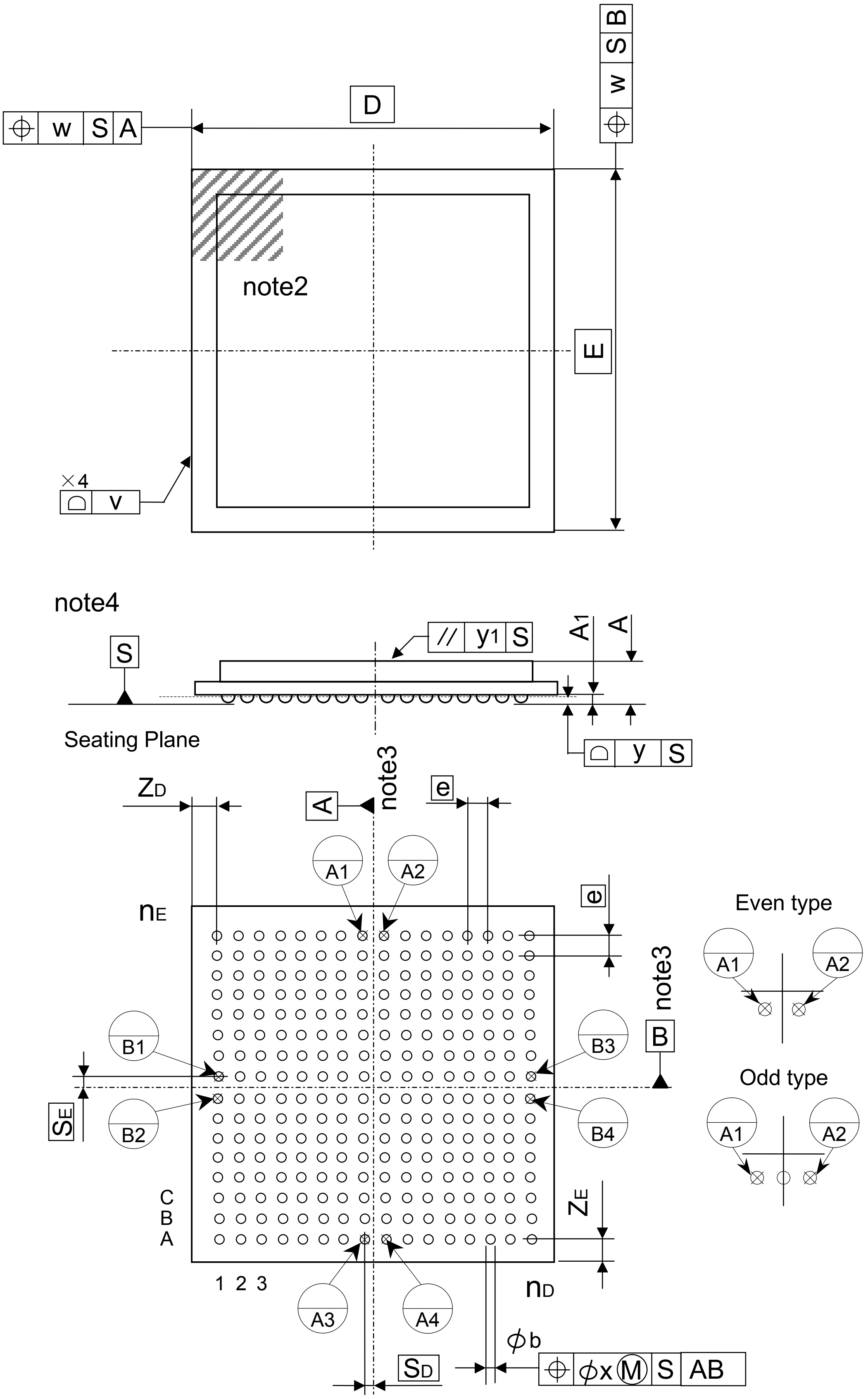
List of drawings *(continued)*

IEC code number	Code of country of origin	Page number and date	
Form G			
050G01	SO5-87D	I-50a/b/c/d	1985
050G02	SO-188D		
050G03	SO-87A		
050G04	SO-87B		
050G05	SO-188A		
050G06	SO-188B		
050G07	SO-188F		
050G08	SO-87C		
050G10	SO-188C		
050G11	SO505-18A		
050G12	SO-87G		
050G13	SO-188E		
050G14	(Sweden)		
050G16	A1AA	I-50e	1990
050G17	A1AB		
050G18	A1BA		
050G19	A1BB		
050G20	A1CB		

Types de dispositifs à semiconducteurs généralement montés dans les boîtiers du chapitre I de la CEI 60191-2

Types of semiconductor devices generally mounted in the packages of chapter I of IEC 60191-2

Type de dispositif Type of device	Numéro de code CEI du dessin du boîtier IEC code number of package drawing
Diodes de signal et diodes Zener de faible puissance Signal diodes and small-power Zener diodes	A1, A20, A24, A32, A54, A55, A58, A67, A69, A70, A71, 098H, 100H
Diodes hyperfréquences Microwave diodes	A18
Diodes de redressement de faible et moyenne puissance Rectifier diodes, small and medium power	A2, A3, A4, A6, A7, A19, A37, A44, A74, 077B, 100B
Diodes de redressement de forte puissance High-power rectifier diodes	A8, A9, A10, A15, A16, A17, A21, A22, A35, 083B, 103B
Thyristors de faible et moyenne puissance Thyristors, small and medium power	A11, A13, A14, A38, A43
Thyristors de forte puissance High-power thyristors	A12, A27, A28, A29, A34, A39, A47, 104B, 105B
Transistors de signal Signal transistors	A36, A40, A41, 068A, 046E, 114E
Transistors de puissance Power transistors	A23, A30, A31, A43, A48, A56, A57, A45, A73, 080B, 081B, 082B, 101B, 102B, 102F, 120E, 084F, P100F
Transistors hyperfréquences Microwave transistors	A26, A42, A43, A59, A66, A72, 100C
Dispositifs optoélectroniques Optoelectronic devices	A62, A64, A65, A63A, 100A, 101A, 106B, 107B
Circuits intégrés Integrated circuits	A52, A53, A61, 075E, 076E, 099E, 100E, 102E, 112E, 115E, 116E, 117E, 118E, 119E, 121E, 122E, 123E, 129E, 133E, 134E, 135E, 136E, 137E, 138E, 139E, 140E, 141E, 144E, 147E, 148E, 149E, 154E, 155E, 157E, 158E, 159E, 160E, 161E, 162E, 163E, 164E, 165E, 050G, 051G, 060G, 100G, 101G



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

Date: 2002

60191 IEC I – 157E-a

Notes : (1) “n” refers to the total number of terminal positions.

(2) Zone of a visible index on the top surface.

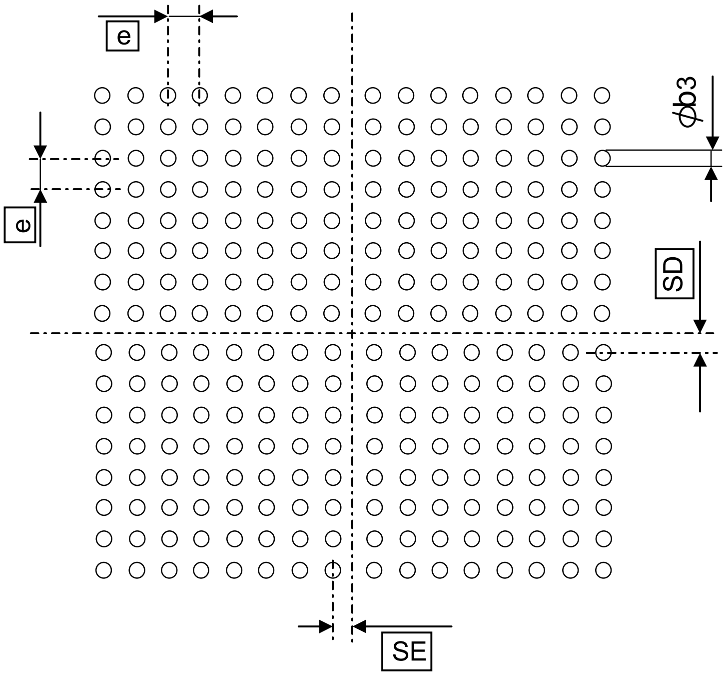
(3) Datum “A” and “B” are the axes defined by the terminal positions indicated with Datum targets.

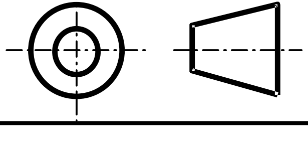
(4) Primary datum S and seating plane to be defined by the method of least squares of spherical crowns of land.

(5) This drawing is example for definition of the center of sides.

Appendix - Terminal Zones :

As foot circuit pattern design reference, the zone that the terminals can be positioned are shown in the following drawing.





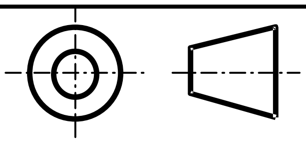
P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

Date: 2002

Registration Table

Package Name : P-FBGA (0.5mm pitch)

E X D	2 rows	3 rows	4 rows	5 rows	6 rows
5 X 5	157E 001 157E 002	157E 003 157E 004	157E 005 157E 006	157E 007 157E 008	
6 X 6	157E 009 157E 010	157E 011 157E 012	157E 013 157E 014	157E 015 157E 016	157E 017 157E 018
7 X 7	157E 019 157E 020	157E 021 157E 022	157E 023 157E 024	157E 025 157E 026	157E 027 157E 028
8 X 8	157E 029 157E 030	157E 031 157E 032	157E 033 157E 034	157E 035 157E 036	157E 037 157E 038
9 X 9	157E 039 157E 040	157E 041 157E 042	157E 043 157E 044	157E 045 157E 046	157E 047 157E 048
10 X 10	157E 049 157E 050	157E 051 157E 052	157E 053 157E 054	157E 055 157E 056	157E 057 157E 058
11 X 11	157E 059 157E 060	157E 061 157E 062	157E 063 157E 064	157E 065 157E 066	157E 067 157E 068
12 X 12	157E 069 157E 070	157E 071 157E 072	157E 073 157E 074	157E 075 157E 076	157E 077 157E 078
13 X 13	157E 079 157E 080	157E 081 157E 082	157E 083 157E 084	157E 085 157E 086	157E 087 157E 088
14 X 14	157E 089 157E 090	157E 091 157E 092	157E 093 157E 094	157E 095 157E 096	157E 097 157E 098
15 X 15	157E 099 157E 100	157E 101 157E 102	157E 103 157E 104	157E 105 157E 106	157E 107 157E 108
16 X 16	157E 109 157E 110	157E 111 157E 112	157E 113 157E 114	157E 115 157E 116	157E 117 157E 118
17 X 17	157E 119 157E 120	157E 121 157E 122	157E 123 157E 124	157E 125 157E 126	157E 127 157E 128
18 X 18	157E 129 157E 130	157E 131 157E 132	157E 133 157E 134	157E 135 157E 136	157E 137 157E 138



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

Date: 2002

60191 IEC I – 157E-c

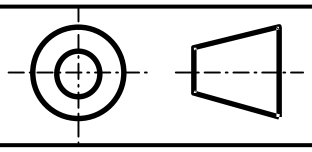
TABLE 1: SOLDER BALL DIMENSIONS AND PACKAGE COPLANARITY

DIMENSIONS	$\boxed{e}$ = 0.5		
	MIN	NOM	MAX
A1	0.2	0.25	0.3
b	0.25	0.3	0.35
v			0.15
w			0.2
x			0.05
y			0.1
y1			0.2

TABLE 2 : VARIATIONS - 0.5 PITCH

Serial Number		157E001			157E002			157E003			157E004		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		5.0			5.0			5.0			5.0	
	$\boxed{E}$		5.0			5.0			5.0			5.0	
	A			1.2			1.7			1.2			1.7
	n		56			56			72			72	
	nD		9			9			9			9	
	nE		9			9			9			9	
	Ball layout	Fig.1			Fig.1			Fig.2			Fig.2		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E005			157E006			157E007			157E008		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		5.0			5.0			5.0			5.0	
	$\boxed{E}$		5.0			5.0			5.0			5.0	
	A			1.2			1.7			1.2			1.7
	n		80			80			81			81	
	nD		9			9			9			9	
	nE		9			9			9			9	
	Ball layout	Fig.3			Fig.3			Fig.4			Fig.4		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

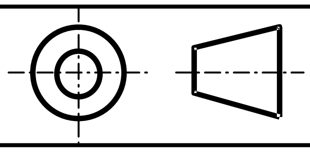
Date: 2002

60191 IEC I – 157E-d

Serial Number		157E009			157E010			157E011			157E012		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		6.0			6.0			6.0			6.0	
	$\boxed{E}$		6.0			6.0			6.0			6.0	
	A			1.2			1.7			1.2			1.7
	n		72			72			96			96	
	nD		11			11			11			11	
	nE		11			11			11			11	
	Ball layout	Fig.5			Fig.5			Fig.6			Fig.6		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E013			157E014			157E015			157E016		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		6.0			6.0			6.0			6.0	
	$\boxed{E}$		6.0			6.0			6.0			6.0	
	A			1.2			1.7			1.2			1.7
	n		112			112			120			120	
	nD		11			11			11			11	
	nE		11			11			11			11	
	Ball layout	Fig.7			Fig.7			Fig.8			Fig.8		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E017			157E018			157E019			157E020		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		6.0			6.0			7.0			7.0	
	$\boxed{E}$		6.0			6.0			7.0			7.0	
	A			1.2			1.7			1.2			1.7
	n		121			121			88			88	
	nD		11			11			13			13	
	nE		11			11			13			13	
	Ball layout	Fig.9			Fig.9			Fig.10			Fig.10		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

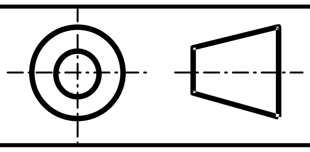
Date: 2002

60191 IEC I – 157E-e

Serial Number		157E021			157E022			157E023			157E024		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		7.0			7.0			7.0			7.0	
	$\boxed{E}$		7.0			7.0			7.0			7.0	
	A			1.2			1.7			1.2			1.7
	n		120			120			144			144	
	nD		13			13			13			13	
	nE		13			13			13			13	
	Ball layout	Fig.11			Fig.11			Fig.12			Fig.12		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E025			157E026			157E027			157E028		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		7.0			7.0			7.0			7.0	
	$\boxed{E}$		7.0			7.0			7.0			7.0	
	A			1.2			1.7			1.2			1.7
	n		160			160			168			168	
	nD		13			13			13			13	
	nE		13			13			13			13	
	Ball layout	Fig.13			Fig.13			Fig.14			Fig.14		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E029			157E030			157E031			157E032		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		8.0			8.0			8.0			8.0	
	$\boxed{E}$		8.0			8.0			8.0			8.0	
	A			1.2			1.7			1.2			1.7
	n		104			104			144			144	
	nD		15			15			15			15	
	nE		15			15			15			15	
	Ball layout	Fig.15			Fig.15			Fig.16			Fig.16		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

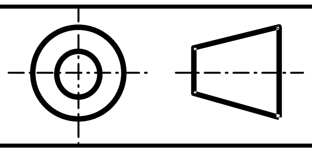
Date: 2002

60191 IEC I – 157E-f

Serial Number		157E033			157E034			157E035			157E036		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		8.0			8.0			8.0			8.0	
	$\boxed{E}$		8.0			8.0			8.0			8.0	
	A			1.2			1.7			1.2			1.7
	n		176			176			200			200	
	nD		15			15			15			15	
	nE		15			15			15			15	
	Ball layout	Fig.17			Fig.17			Fig.18			Fig.18		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E037			157E038			157E039			157E040		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		8.0			8.0			9.0			9.0	
	$\boxed{E}$		8.0			8.0			9.0			9.0	
	A			1.2			1.7			1.2			1.7
	n		216			216			120			120	
	nD		15			15			17			17	
	nE		15			15			17			17	
	Ball layout	Fig.19			Fig.19			Fig.20			Fig.20		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E041			157E042			157E043			157E044		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		9.0			9.0			9.0			9.0	
	$\boxed{E}$		9.0			9.0			9.0			9.0	
	A			1.2			1.7			1.2			1.7
	n		168			168			208			208	
	nD		17			17			17			17	
	nE		17			17			17			17	
	Ball layout	Fig.21			Fig.21			Fig.22			Fig.22		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

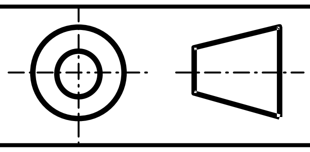
Date: 2002

60191 IEC I – 157E-g

Serial Number		157E045			157E046			157E047			157E048		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		9.0			9.0			9.0			9.0	
	$\boxed{E}$		9.0			9.0			9.0			9.0	
	A			1.2			1.7			1.2			1.7
	n		240			240			264			264	
	nD		17			17			17			17	
	nE		17			17			17			17	
	Ball layout	Fig.23			Fig.23			Fig.24			Fig.24		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E049			157E050			157E051			157E052		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		10.0			10.0			10.0			10.0	
	$\boxed{E}$		10.0			10.0			10.0			10.0	
	A			1.2			1.7			1.2			1.7
	n		136			136			192			192	
	nD		19			19			19			19	
	nE		19			19			19			19	
	Ball layout	Fig.25			Fig.25			Fig.26			Fig.26		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E053			157E054			157E055			157E056		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		10.0			10.0			10.0			10.0	
	$\boxed{E}$		10.0			10.0			10.0			10.0	
	A			1.2			1.7			1.2			1.7
	n		240			240			280			280	
	nD		19			19			19			19	
	nE		19			19			19			19	
	Ball layout	Fig.27			Fig.27			Fig.28			Fig.28		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

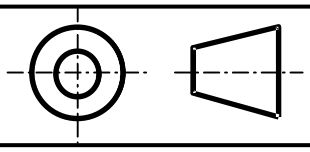
Date: 2002

60191 IEC I – 157E-h

Serial Number		157E057			157E058			157E059			157E060		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		10.0			10.0			11.0			11.0	
	$\boxed{E}$		10.0			10.0			11.0			11.0	
	A			1.2			1.7			1.2			1.7
	n		312			312			152			152	
	nD		19			19			21			21	
	nE		19			19			21			21	
	Ball layout	Fig.29			Fig.29			Fig.30			Fig.30		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E061			157E062			157E063			157E064		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		11.0			11.0			11.0			11.0	
	$\boxed{E}$		11.0			11.0			11.0			11.0	
	A			1.2			1.7			1.2			1.7
	n		216			216			272			272	
	nD		21			21			21			21	
	nE		21			21			21			21	
	Ball layout	Fig.31			Fig.31			Fig.32			Fig.32		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E065			157E066			157E067			157E068		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		11.0			11.0			11.0			11.0	
	$\boxed{E}$		11.0			11.0			11.0			11.0	
	A			1.2			1.7			1.2			1.7
	n		320			320			360			360	
	nD		21			21			21			21	
	nE		21			21			21			21	
	Ball layout	Fig.33			Fig.33			Fig.34			Fig.34		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

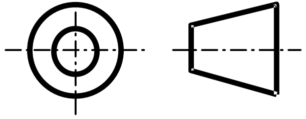
Date: 2002

60191 IEC I – 157E-i

Serial Number		157E069			157E070			157E071			157E072		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		12.0			12.0			12.0			12.0	
	$\boxed{E}$		12.0			12.0			12.0			12.0	
	A			1.2			1.7			1.2			1.7
	n		168			168			240			240	
	nD		23			23			23			23	
	nE		23			23			23			23	
	Ball layout	Fig.35			Fig.35			Fig.36			Fig.36		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E073			157E074			157E075			157E076		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		12.0			12.0			12.0			12.0	
	$\boxed{E}$		12.0			12.0			12.0			12.0	
	A			1.2			1.7			1.2			1.7
	n		304			304			360			360	
	nD		23			23			23			23	
	nE		23			23			23			23	
	Ball layout	Fig.37			Fig.37			Fig.38			Fig.38		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E077			157E078			157E079			157E080		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		12.0			12.0			13.0			13.0	
	$\boxed{E}$		12.0			12.0			13.0			13.0	
	A			1.2			1.7			1.2			1.7
	n		408			408			184			184	
	nD		23			23			25			25	
	nE		23			23			25			25	
	Ball layout	Fig.39			Fig.39			Fig.40			Fig.40		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

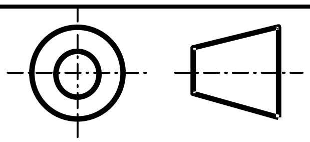
Date: 2002

60191 IEC I – 157E-j

Serial Number		157E081			157E082			157E083			157E084		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		13.0			13.0			13.0			13.0	
	$\boxed{E}$		13.0			13.0			13.0			13.0	
	A			1.2			1.7			1.2			1.7
	n		264			264			336			336	
	nD		25			25			25			25	
	nE		25			25			25			25	
	Ball layout	Fig.41			Fig.41			Fig.42			Fig.42		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E085			157E086			157E087			157E088		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		13.0			13.0			13.0			13.0	
	$\boxed{E}$		13.0			13.0			13.0			13.0	
	A			1.2			1.7			1.2			1.7
	n		400			400			456			456	
	nD		25			25			25			25	
	nE		25			25			25			25	
	Ball layout	Fig.43			Fig.43			Fig.44			Fig.44		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E089			157E090			157E091			157E092		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		14.0			14.0			14.0			14.0	
	$\boxed{E}$		14.0			14.0			14.0			14.0	
	A			1.2			1.7			1.2			1.7
	n		200			200			288			288	
	nD		27			27			27			27	
	nE		27			27			27			27	
	Ball layout	Fig.45			Fig.45			Fig.46			Fig.46		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



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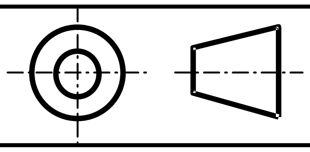
60191 IEC I – 157E-k

Serial Number		157E093			157E094			157E095			157E096		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		14.0			14.0			14.0			14.0	
	$\boxed{E}$		14.0			14.0			14.0			14.0	
	A			1.2			1.7			1.2			1.7
	n		368			368			440			440	
	nD		27			27			27			27	
	nE		27			27			27			27	
	Ball layout	Fig.47			Fig.47			Fig.48			Fig.48		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E097			157E098			157E099			157E100		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		14.0			14.0			15.0			15.0	
	$\boxed{E}$		14.0			14.0			15.0			15.0	
	A			1.2			1.7			1.2			1.7
	n		504			504			216			216	
	nD		27			27			29			29	
	nE		27			27			29			29	
	Ball layout	Fig.49			Fig.49			Fig.50			Fig.50		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E101			157E102			157E103			157E104		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		15.0			15.0			15.0			15.0	
	$\boxed{E}$		15.0			15.0			15.0			15.0	
	A			1.2			1.7			1.2			1.7
	n		312			312			400			400	
	nD		29			29			29			29	
	nE		29			29			29			29	
	Ball layout	Fig.51			Fig.51			Fig.52			Fig.52		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

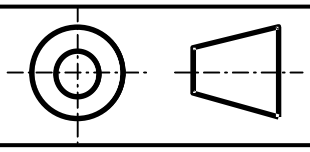
Date: 2002

60191 IEC I – 157E-I

Serial Number		157E105			157E106			157E107			157E108		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		15.0			15.0			15.0			15.0	
	$\boxed{E}$		15.0			15.0			15.0			15.0	
	A			1.2			1.7			1.2			1.7
	n		480			480			552			552	
	nD		29			29			29			29	
	nE		29			29			29			29	
	Ball layout	Fig.53			Fig.53			Fig.54			Fig.54		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E109			157E110			157E111			157E112		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		16.0			16.0			16.0			16.0	
	$\boxed{E}$		16.0			16.0			16.0			16.0	
	A			1.2			1.7			1.2			1.7
	n		232			232			336			336	
	nD		31			31			31			31	
	nE		31			31			31			31	
	Ball layout	Fig.55			Fig.55			Fig.56			Fig.56		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E113			157E114			157E115			157E116		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		16.0			16.0			16.0			16.0	
	$\boxed{E}$		16.0			16.0			16.0			16.0	
	A			1.2			1.7			1.2			1.7
	n		432			432			520			520	
	nD		31			31			31			31	
	nE		31			31			31			31	
	Ball layout	Fig.57			Fig.57			Fig.58			Fig.58		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



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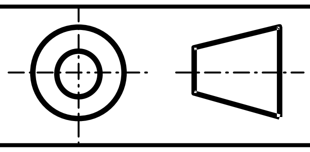
60191 IEC I – 157E-m

Serial Number		157E117			157E118			157E119			157E120		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		16.0			16.0			17.0			17.0	
	$\boxed{E}$		16.0			16.0			17.0			17.0	
	A			1.2			1.7			1.2			1.7
	n		600			600			248			248	
	nD		31			31			33			33	
	nE		31			31			33			33	
	Ball layout	Fig.59			Fig.59			Fig.60			Fig.60		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E121			157E122			157E123			157E124		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		17.0			17.0			17.0			17.0	
	$\boxed{E}$		17.0			17.0			17.0			17.0	
	A			1.2			1.7			1.2			1.7
	n		360			360			464			464	
	nD		33			33			33			33	
	nE		33			33			33			33	
	Ball layout	Fig.61			Fig.61			Fig.62			Fig.62		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E125			157E126			157E127			157E128		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		17.0			17.0			17.0			17.0	
	$\boxed{E}$		17.0			17.0			17.0			17.0	
	A			1.2			1.7			1.2			1.7
	n		560			560			648			648	
	nD		33			33			33			33	
	nE		33			33			33			33	
	Ball layout	Fig.63			Fig.63			Fig.64			Fig.64		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	



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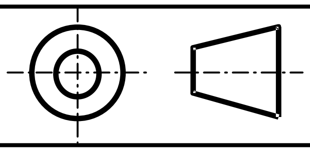
60191 IEC I – 157E-n

Serial Number		157E129			157E130			157E131			157E132		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		18.0			18.0			18.0			18.0	
	$\boxed{E}$		18.0			18.0			18.0			18.0	
	A			1.2			1.7			1.2			1.7
	n		264			264			384			384	
	nD		35			35			35			35	
	nE		35			35			35			35	
	Ball layout	Fig.65			Fig.65			Fig.66			Fig.66		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E133			157E134			157E135			157E136		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		18.0			18.0			18.0			18.0	
	$\boxed{E}$		18.0			18.0			18.0			18.0	
	A			1.2			1.7			1.2			1.7
	n		496			496			600			600	
	nD		35			35			35			35	
	nE		35			35			35			35	
	Ball layout	Fig.67			Fig.67			Fig.68			Fig.68		
Group 2	ZD		[0.5]			[0.5]			[0.5]			[0.5]	
	ZE		[0.5]			[0.5]			[0.5]			[0.5]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.40			0.40			0.40			0.40	

Serial Number		157E137			157E138		
Reference Symbol		min	nom	max	min	nom	max
Group 1	$\boxed{D}$		18.0			18.0	
	$\boxed{E}$		18.0			18.0	
	A			1.2			1.7
	n		696			696	
	nD		35			35	
	nE		35			35	
	Ball layout	Fig.69			Fig.69		
Group 2	ZD		[0.5]			[0.5]	
	ZE		[0.5]			[0.5]	
	$\boxed{SD}$		0			0	
	$\boxed{SE}$		0			0	
	b_3		0.40			0.40	



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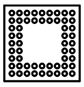
Fig.1

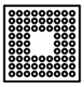
Fig.2

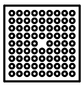
Fig.3

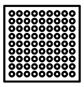
Fig.4

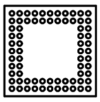
Fig.5

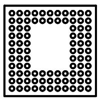
Fig.6

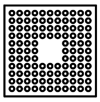
Fig.7

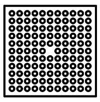
Fig.8

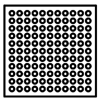
Fig.9

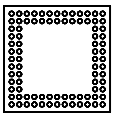
Fig.10

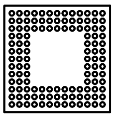
Fig.11

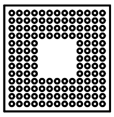
Fig.12

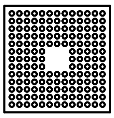
Fig.13

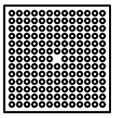
Fig.14

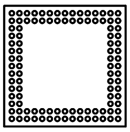
Fig.15

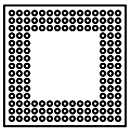
Fig.16

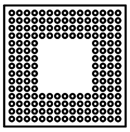
Fig.17

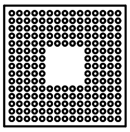
Fig.18

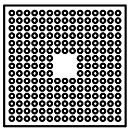
Fig.19

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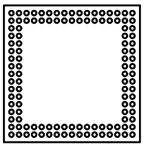

Fig.20

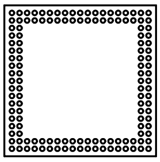

Fig.25

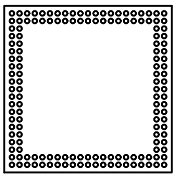

Fig.30

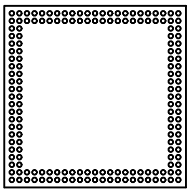

Fig.35

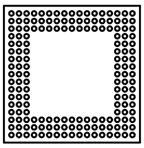

Fig.21

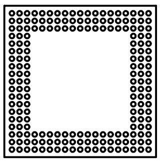

Fig.26

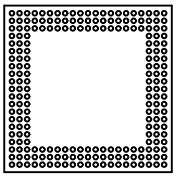

Fig.31

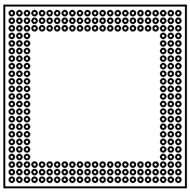

Fig.36

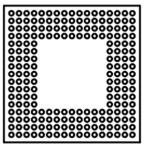

Fig.22

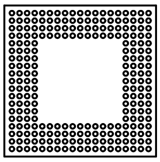

Fig.27

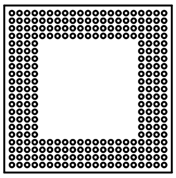

Fig.32

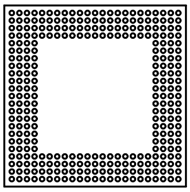

Fig.37

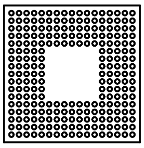

Fig.23

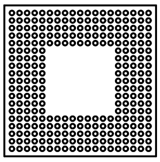

Fig.28

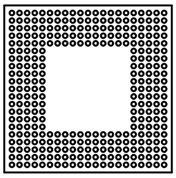

Fig.33

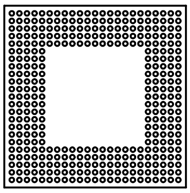

Fig.38

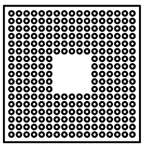

Fig.24

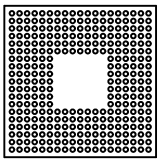

Fig.29

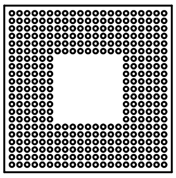

Fig.34

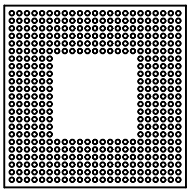

Fig.39

P-L&TFBGA 0.5 mm pitch
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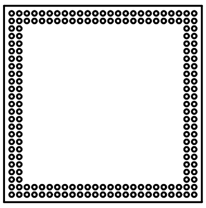
Fig.40

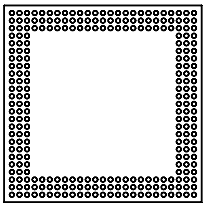
Fig.41

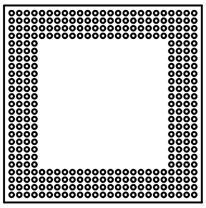
Fig.42

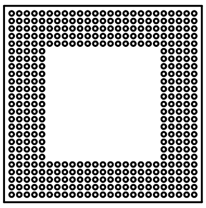
Fig.43

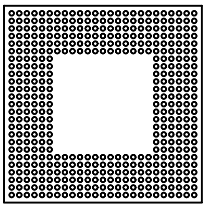
Fig.44

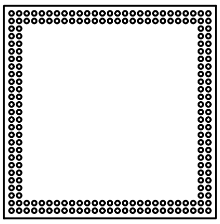
Fig.45

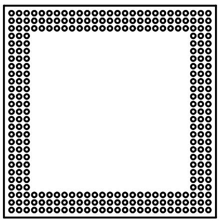
Fig.46

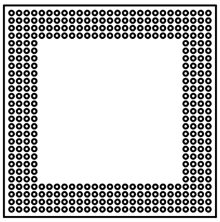
Fig.47

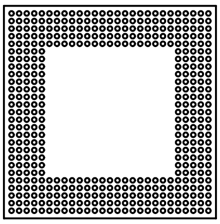
Fig.48

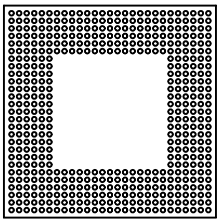
Fig.49

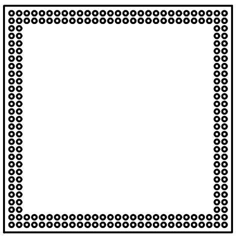
Fig.50

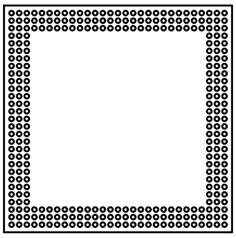
Fig.51

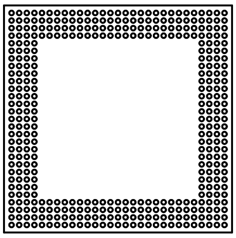
Fig.52

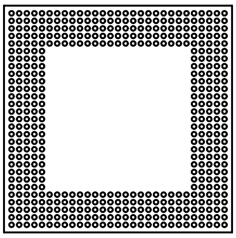
Fig.53

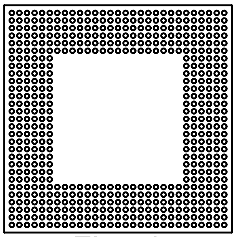
Fig.54

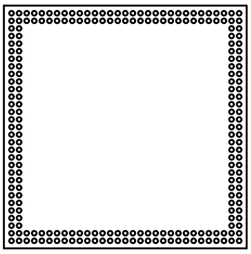
Fig.55

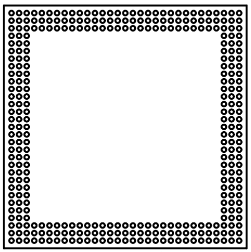
Fig.56

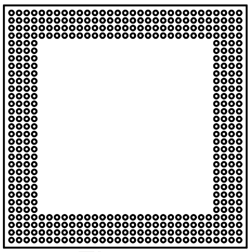
Fig.57

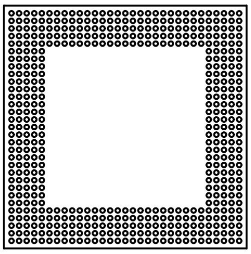
Fig.58

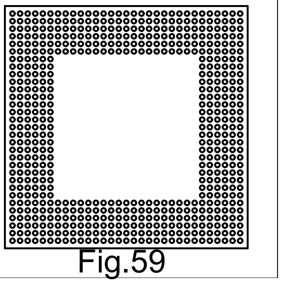
Fig.59

P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

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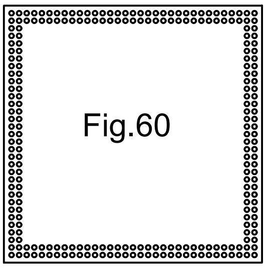


Fig.60

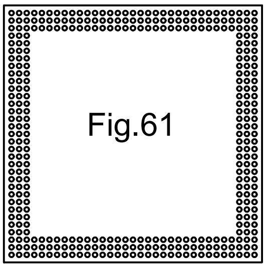


Fig.61

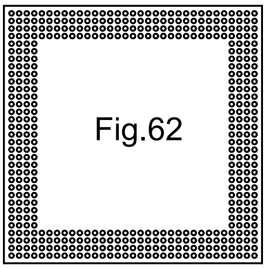


Fig.62

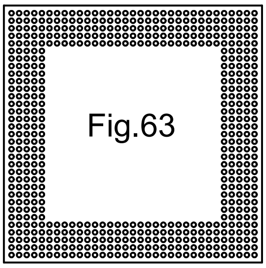


Fig.63

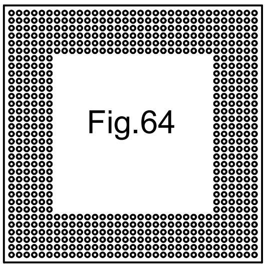


Fig.64

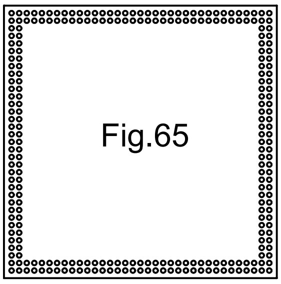


Fig.65

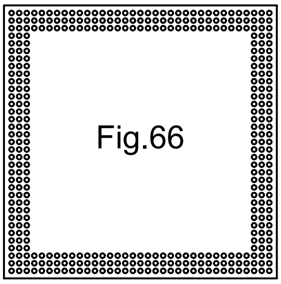


Fig.66

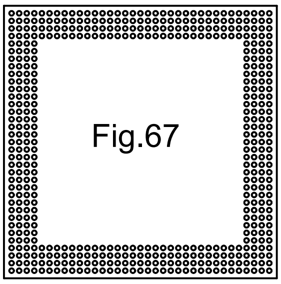


Fig.67

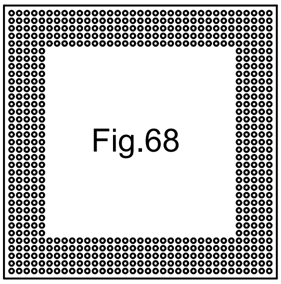


Fig.68

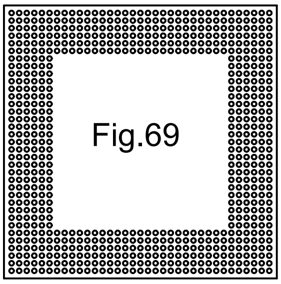
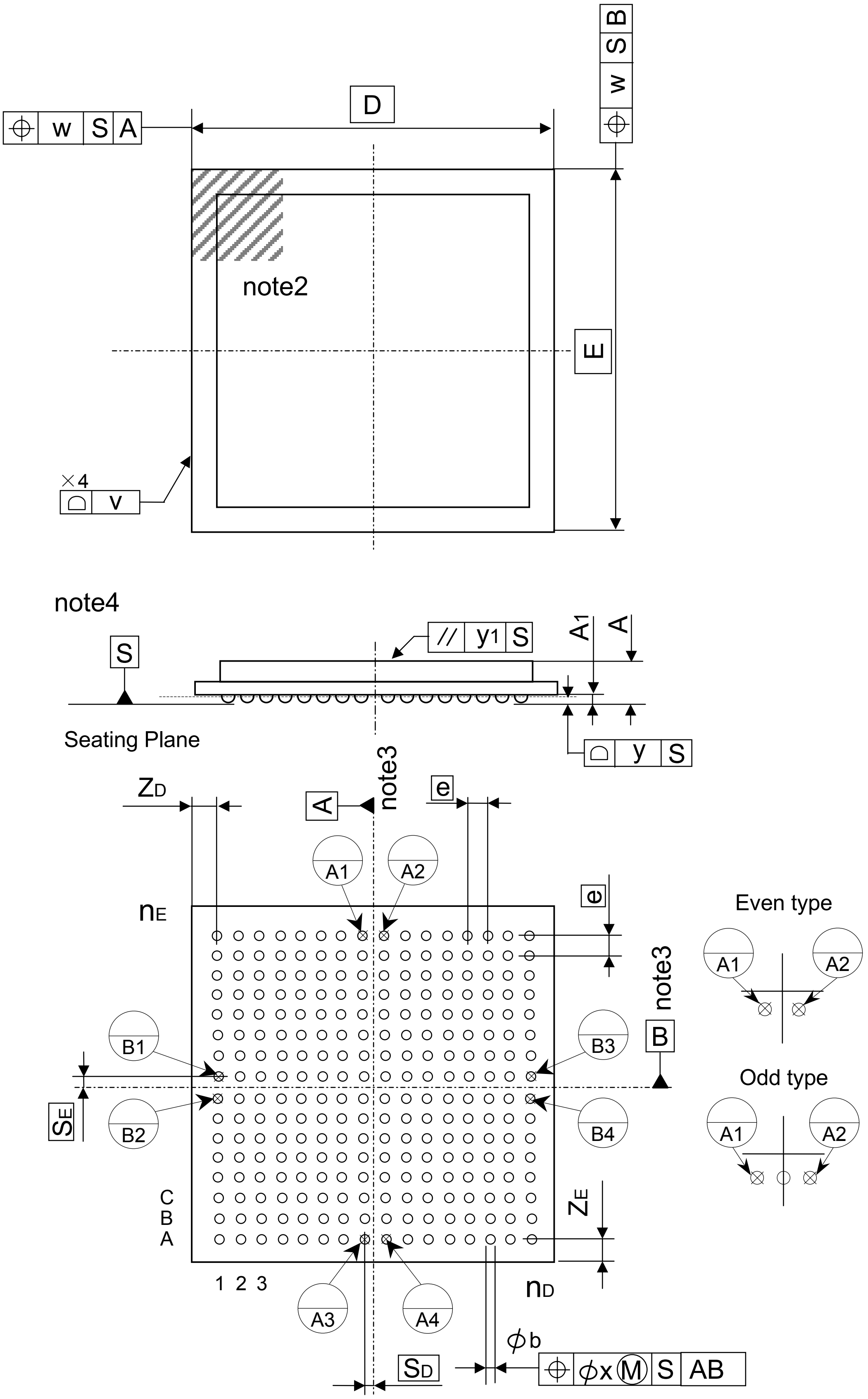


Fig.69

P-L&TFBGA 0.5 mm pitch
OUTLINE FAMILY

Date: 2002

60191 IEC I – 157E-s



P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

60191 IEC I – 158E-a

Notes : (1) “n” refers to the total number of terminal positions.

(2) Zone of a visible index on the top surface.

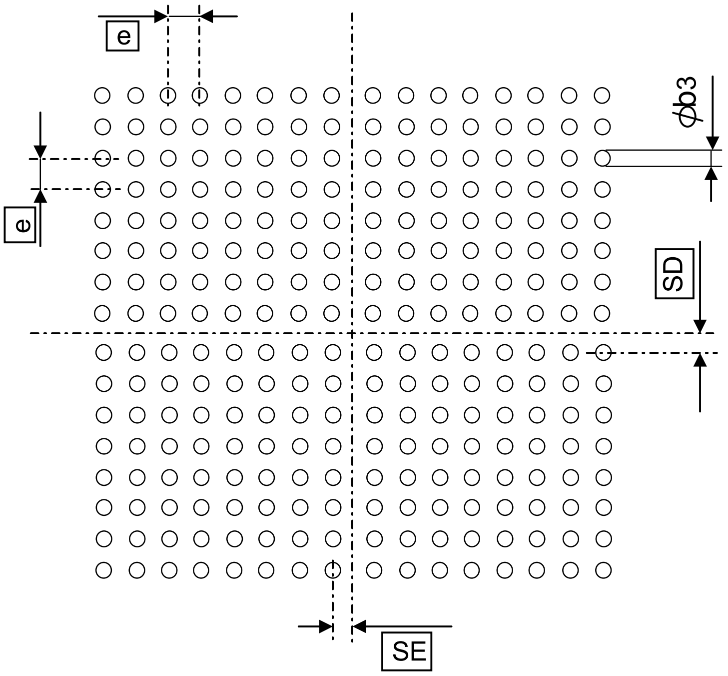
(3) Datum “A” and “B” are the axes defined by the terminal positions indicated with Datum targets.

(4) Primary datum S and seating plane to be defined by the method of least squares of spherical crowns of land.

(5) This drawing is example for definition of the center of sides.

Appendix - Terminal Zones :

As foot circuit pattern design reference, the zone that the terminals can be positioned are shown in the following drawing.



P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

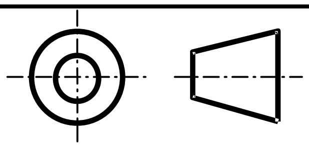
Date: 2002

60191 IEC I – 158E-b

Registration Table

Package Name : P-FBGA (0.8mm pitch)

Nominal Size	Perimeter matrix			
E X D	2 rows	3 rows	4 rows	5 rows
6 X 6	158E 001 158E 002	158E 003 158E 004		
7 X 7	158E 005 158E 006	158E 007 158E 008	158E 009 158E 010	
8 X 8	158E 011 158E 012	158E 013 158E 014	158E 015 158E 016	158E 017 158E 018
9 X 9	158E 019 158E 020	158E 021 158E 022	158E 023 158E 024	158E 025 158E 026
10 X 10	158E 027 158E 028	158E 029 158E 030	158E 031 158E 032	158E 033 158E 034
11 X 11	158E 035 158E 036	158E 037 158E 038	158E 039 158E 040	158E 041 158E 042
12 X 12	158E 043 158E 044	158E 045 158E 046	158E 047 158E 048	158E 049 158E 050
13 X 13	158E 051 158E 052	158E 053 158E 054	158E 055 158E 056	158E 057 158E 058
14 X 14	158E 059 158E 060	158E 061 158E 062	158E 063 158E 064	158E 065 158E 066
15 X 15	158E 067 158E 068	158E 069 158E 070	158E 071 158E 072	158E 073 158E 074
16 X 16	158E 075 158E 076	158E 077 158E 078	158E 079 158E 080	158E 081 158E 082
17 X 17	158E 083 158E 084	158E 085 158E 086	158E 087 158E 088	158E 089 158E 090
18 X 18	158E 091 158E 092	158E 093 158E 094	158E 095 158E 096	158E 097 158E 098



P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

60191 IEC I – 158E-c

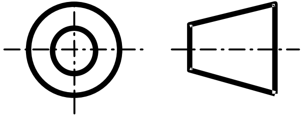
TABLE 1: SOLDER BALL DIMENSIONS AND PACKAGE COPLANARITY

DIMENSIONS	$\boxed{e}$ = 0.8		
	MIN	NOM	MAX
A1	0.35	0.4	0.45
b	0.45	0.5	0.55
v			0.15
w			0.2
x			0.08
y			0.1
y1			0.2

TABLE 2: VARIATIONS - 0.8 PITCH

Serial Number		158E001			158E002			158E003			158E004		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		6.0			6.0			6.0			6.0	
	$\boxed{E}$		6.0			6.0			6.0			6.0	
	A			1.2			1.7			1.2			1.7
	n		32			32			36			36	
	nD		6			6			6			6	
	nE		6			6			6			6	
	Ball layout	Fig.1			Fig.1			Fig.2			Fig.2		
Group 2	ZD		[1]			[1]			[1]			[1]	
	ZE		[1]			[1]			[1]			[1]	
	$\boxed{SD}$		0.4			0.4			0.4			0.4	
	$\boxed{SE}$		0.4			0.4			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E005			158E006			158E007			158E008		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		7.0			7.0			7.0			7.0	
	$\boxed{E}$		7.0			7.0			7.0			7.0	
	A			1.2			1.7			1.2			1.7
	n		40			40			48			48	
	nD		7			7			7			7	
	nE		7			7			7			7	
	Ball layout	Fig.3			Fig.3			Fig.4			Fig.4		
Group 2	ZD		[1.1]			[1.1]			[1.1]			[1.1]	
	ZE		[1.1]			[1.1]			[1.1]			[1.1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	



P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

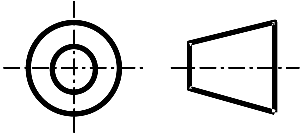
Date: 2002

60191 IEC I – 158E-d

Serial Number		158E009			158E010			158E011			158E012		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		7.0			7.0			8.0			8.0	
	$\boxed{E}$		7.0			7.0			8.0			8.0	
	A			1.2			1.7			1.2			1.7
	n		49			49			56			56	
	nD		7			7			9			9	
	nE		7			7			9			9	
	Ball layout	Fig.5			Fig.5			Fig.6			Fig,6		
Group 2	ZD		[1.1]			[1.1]			[0.8]			[0.8]	
	ZE		[1.1]			[1.1]			[0.8]			[0.8]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E013			158E014			158E015			158E016		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		8.0			8.0			8.0			8.0	
	$\boxed{E}$		8.0			8.0			8.0			8.0	
	A			1.2			1.7			1.2			1.7
	n		72			72			80			80	
	nD		9			9			9			9	
	nE		9			9			9			9	
	Ball layout	Fig.7			Fig.7			Fig.8			Fig.8		
Group 2	ZD		[0.8]			[0.8]			[0.8]			[0.8]	
	ZE		[0.8]			[0.8]			[0.8]			[0.8]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E017			158E018			158E019			158E020		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		8.0			8.0			9.0			9.0	
	$\boxed{E}$		8.0			8.0			9.0			9.0	
	A			1.2			1.7			1.2			1.7
	n		81			81			64			64	
	nD		9			9			10			10	
	nE		9			9			10			10	
	Ball layout	Fig.9			Fig.9			Fig.10			Fig.10		
Group 2	ZD		[0.8]			[0.8]			[0.9]			[0.9]	
	ZE		[0.8]			[0.8]			[0.9]			[0.9]	
	$\boxed{SD}$		0			0			0.4			0.4	
	$\boxed{SE}$		0			0			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	



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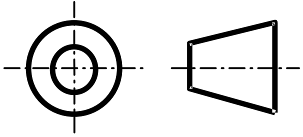
60191 IEC I – 158E-e

Serial Number		158E021			158E022			158E023			158E024		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		9.0			9.0			9.0			9.0	
	$\boxed{E}$		9.0			9.0			9.0			9.0	
	A			1.2			1.7			1.2			1.7
	n		84			84			96			96	
	nD		10			10			10			10	
	nE		10			10			10			10	
	Ball layout	Fig.11			Fig.11			Fig.12			Fig.12		
Group 2	ZD		[0.9]			[0.9]			[0.9]			[0.9]	
	ZE		[0.9]			[0.9]			[0.9]			[0.9]	
	$\boxed{SD}$		0.4			0.4			0.4			0.4	
	$\boxed{SE}$		0.4			0.4			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E025			158E026			158E027			158E028		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		9.0			9.0			10.0			10.0	
	$\boxed{E}$		9.0			9.0			10.0			10.0	
	A			1.2			1.7			1.2			1.7
	n		100			100			72			72	
	nD		10			10			11			11	
	nE		10			10			11			11	
	Ball layout	Fig.13			Fig.13			Fig.14			Fig.14		
Group 2	ZD		[0.9]			[0.9]			[1]			[1]	
	ZE		[0.9]			[0.9]			[1]			[1]	
	$\boxed{SD}$		0.4			0.4			0			0	
	$\boxed{SE}$		0.4			0.4			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E029			158E030			158E031			158E032		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		10.0			10.0			10.0			10.0	
	$\boxed{E}$		10.0			10.0			10.0			10.0	
	A			1.2			1.7			1.2			1.7
	n		96			96			112			112	
	nD		11			11			11			11	
	nE		11			11			11			11	
	Ball layout	Fig.15			Fig.15			Fig.16			Fig.16		
Group 2	ZD		[1]			[1]			[1]			[1]	
	ZE		[1]			[1]			[1]			[1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	



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60191 IEC I – 158E-f

Serial Number		158E033			158E034			158E035			158E036		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		10.0			10.0			11.0			11.0	
	$\boxed{E}$		10.0			10.0			11.0			11.0	
	A			1.2			1.7			1.2			1.7
	n		120			120			80			80	
	nD		11			11			12			12	
	nE		11			11			12			12	
	Ball layout	Fig.17			Fig.17			Fig.18			Fig.18		
Group 2	ZD		[1]			[1]			[1.1]			[1.1]	
	ZE		[1]			[1]			[1.1]			[1.1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E037			158E038			158E039			158E040		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		11.0			11.0			11.0			11.0	
	$\boxed{E}$		11.0			11.0			11.0			11.0	
	A			1.2			1.7			1.2			1.7
	n		108			108			128			128	
	nD		12			12			12			12	
	nE		12			12			12			12	
	Ball layout	Fig.19			Fig.19			Fig.20			Fig.20		
Group 2	ZD		[1.1]			[1.1]			[1.1]			[1.1]	
	ZE		[1.1]			[1.1]			[1.1]			[1.1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E041			158E042			158E043			158E044		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		11.0			11.0			12.0			12.0	
	$\boxed{E}$		11.0			11.0			12.0			12.0	
	A			1.2			1.7			1.2			1.7
	n		140			140			96			96	
	nD		12			12			14			14	
	nE		12			12			14			14	
	Ball layout	Fig.21			Fig.21			Fig.22			Fig.22		
Group 2	ZD		[1.1]			[1.1]			[0.8]			[0.8]	
	ZE		[1.1]			[1.1]			[0.8]			[0.8]	
	$\boxed{SD}$		0			0			0.4			0.4	
	$\boxed{SE}$		0			0			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

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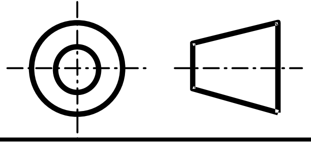
Serial Number		158E045			158E046			158E047			158E048		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		12.0			12.0			12.0			12.0	
	$\boxed{E}$		12.0			12.0			12.0			12.0	
	A			1.2			1.7			1.2			1.7
	n		132			132			160			160	
	nD		14			14			14			14	
	nE		14			14			14			14	
	Ball layout	Fig.23			Fig.23			Fig.24			Fig.24		
Group 2	ZD		[0.8]			[0.8]			[0.8]			[0.8]	
	ZE		[0.8]			[0.8]			[0.8]			[0.8]	
	$\boxed{SD}$		0.4			0.4			0.4			0.4	
	$\boxed{SE}$		0.4			0.4			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E049			158E050			158E051			158E052		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		12.0			12.0			13.0			13.0	
	$\boxed{E}$		12.0			12.0			13.0			13.0	
	A			1.2			1.7			1.2			1.7
	n		180			180			104			104	
	nD		14			14			15			15	
	nE		14			14			15			15	
	Ball layout	Fig.25			Fig.25			Fig.26			Fig.26		
Group 2	ZD		[0.8]			[0.8]			[0.9]			[0.9]	
	ZE		[0.8]			[0.8]			[0.9]			[0.9]	
	$\boxed{SD}$		0.4			0.4			0			0	
	$\boxed{SE}$		0.4			0.4			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E053			158E054			158E055			158E056		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		13.0			13.0			13.0			13.0	
	$\boxed{E}$		13.0			13.0			13.0			13.0	
	A			1.2			1.7			1.2			1.7
	n		144			144			176			176	
	nD		15			15			15			15	
	nE		15			15			15			15	
	Ball layout	Fig.27			Fig.27			Fig.28			Fig.28		
Group 2	ZD		[0.9]			[0.9]			[0.9]			[0.9]	
	ZE		[0.9]			[0.9]			[0.9]			[0.9]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	



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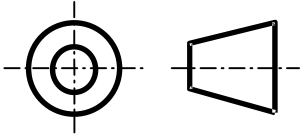
60191 IEC I – 158E-h

Serial Number		158E057			158E058			158E059			158E060		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		13.0			13.0			14.0			14.0	
	$\boxed{E}$		13.0			13.0			14.0			14.0	
	A			1.2			1.7			1.2			1.7
	n		200			200			112			112	
	nD		15			15			16			16	
	nE		15			15			16			16	
	Ball layout	Fig.29			Fig.29			Fig.30			Fig.30		
Group 2	ZD		[0.9]			[0.9]			[1]			[1]	
	ZE		[0.9]			[0.9]			[1]			[1]	
	$\boxed{SD}$		0			0			0.4			0.4	
	$\boxed{SE}$		0			0			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E061			158E062			158E063			158E064		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		14.0			14.0			14.0			14.0	
	$\boxed{E}$		14.0			14.0			14.0			14.0	
	A			1.2			1.7			1.2			1.7
	n		156			156			192			192	
	nD		16			16			16			16	
	nE		16			16			16			16	
	Ball layout	Fig.31			Fig.31			Fig.32			Fig.32		
Group 2	ZD		[1]			[1]			[1]			[1]	
	ZE		[1]			[1]			[1]			[1]	
	$\boxed{SD}$		0.4			0.4			0.4			0.4	
	$\boxed{SE}$		0.4			0.4			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E065			158E066			158E067			158E068		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		14.0			14.0			15.0			15.0	
	$\boxed{E}$		14.0			14.0			15.0			15.0	
	A			1.2			1.7			1.2			1.7
	n		220			220			120			120	
	nD		16			16			17			17	
	nE		16			16			17			17	
	Ball layout	Fig.33			Fig.33			Fig.34			Fig.34		
Group 2	ZD		[1]			[1]			[1.1]			[1.1]	
	ZE		[1]			[1]			[1.1]			[1.1]	
	$\boxed{SD}$		0.4			0.4			0			0	
	$\boxed{SE}$		0.4			0.4			0			0	
	b_3		0.63			0.63			0.63			0.63	



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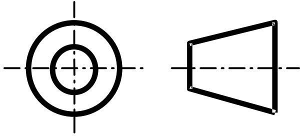
60191 IEC I – 158E-i

Serial Number		158E069			158E070			158E071			158E072		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		15.0			15.0			15.0			15.0	
	$\boxed{E}$		15.0			15.0			15.0			15.0	
	A			1.2			1.7			1.2			1.7
	n		168			168			208			208	
	nD		17			17			17			17	
	nE		17			17			17			17	
	Ball layout	Fig.35			Fig.35			Fig.36			Fig.36		
Group 2	ZD		[1.1]			[1.1]			[1.1]			[1.1]	
	ZE		[1.1]			[1.1]			[1.1]			[1.1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E073			158E074			158E075			158E076		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		15.0			15.0			16.0			16.0	
	$\boxed{E}$		15.0			15.0			16.0			16.0	
	A			1.2			1.7			1.2			1.7
	n		240			240			136			136	
	nD		17			17			19			19	
	nE		17			17			19			19	
	Ball layout	Fig.37			Fig.37			Fig.38			Fig.38		
Group 2	ZD		[1.1]			[1.1]			[1]			[1]	
	ZE		[1.1]			[1.1]			[1]			[1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E077			158E078			158E079			158E080		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		16.0			16.0			16.0			16.0	
	$\boxed{E}$		16.0			16.0			16.0			16.0	
	A			1.2			1.7			1.2			1.7
	n		192			192			240			240	
	nD		19			19			19			19	
	nE		19			19			19			19	
	Ball layout	Fig.39			Fig.39			Fig.40			Fig.40		
Group 2	ZD		[1]			[1]			[1]			[1]	
	ZE		[1]			[1]			[1]			[1]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	



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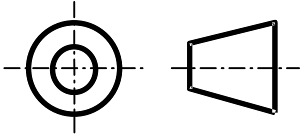
60191 IEC I – 158E-j

Serial Number		158E081			158E082			158E083			158E084		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		16.0			16.0			17.0			17.0	
	$\boxed{E}$		16.0			16.0			17.0			17.0	
	A			1.2			1.7			1.2			1.7
	n		280			280			144			144	
	nD		19			19			20			20	
	nE		19			19			20			20	
	Ball layout	Fig.41			Fig.41			Fig.42			Fig.42		
Group 2	ZD		[1]			[1]			[0.9]			[0.9]	
	ZE		[1]			[1]			[0.9]			[0.9]	
	$\boxed{SD}$		0			0			0.4			0.4	
	$\boxed{SE}$		0			0			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E085			158E086			158E087			158E088		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		17.0			17.0			17.0			17.0	
	$\boxed{E}$		17.0			17.0			17.0			17.0	
	A			1.2			1.7			1.2			1.7
	n		204			204			256			256	
	nD		20			20			20			20	
	nE		20			20			20			20	
	Ball layout	Fig.43			Fig.43			Fig.44			Fig.44		
Group 2	ZD		[0.9]			[0.9]			[0.9]			[0.9]	
	ZE		[0.9]			[0.9]			[0.9]			[0.9]	
	$\boxed{SD}$		0.4			0.4			0.4			0.4	
	$\boxed{SE}$		0.4			0.4			0.4			0.4	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E089			158E090			158E091			158E092		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		17.0			17.0			18.0			18.0	
	$\boxed{E}$		17.0			17.0			18.0			18.0	
	A			1.2			1.7			1.2			1.7
	n		300			300			152			152	
	nD		20			20			21			21	
	nE		20			20			21			21	
	Ball layout	Fig.45			Fig.45			Fig.46			Fig.46		
Group 2	ZD		[0.9]			[0.9]			[0.8]			[0.8]	
	ZE		[0.9]			[0.9]			[0.8]			[0.8]	
	$\boxed{SD}$		0.4			0.4			0			0	
	$\boxed{SE}$		0.4			0.4			0			0	
	b_3		0.63			0.63			0.63			0.63	



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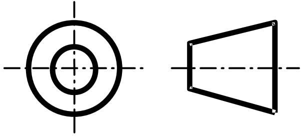
60191 IEC I – 158E-k

Serial Number		158E093			158E094			158E095			158E096		
Reference Symbol		min	nom	max	min	nom	max	min	nom	max	min	nom	max
Group 1	$\boxed{D}$		18.0			18.0			18.0			18.0	
	$\boxed{E}$		18.0			18.0			18.0			18.0	
	A			1.2			1.7			1.2			1.7
	n		216			216			272			272	
	nD		21			21			21			21	
	nE		21			21			21			21	
	Ball layout	Fig.47			Fig.47			Fig.48			Fig.48		
Group 2	ZD		[0.8]			[0.8]			[0.8]			[0.8]	
	ZE		[0.8]			[0.8]			[0.8]			[0.8]	
	$\boxed{SD}$		0			0			0			0	
	$\boxed{SE}$		0			0			0			0	
	b_3		0.63			0.63			0.63			0.63	

Serial Number		158E097			158E098		
Reference Symbol		min	nom	max	min	nom	max
Group 1	$\boxed{D}$		18.0			18.0	
	$\boxed{E}$		18.0			18.0	
	A			1.2			1.7
	n		320			320	
	nD		21			21	
	nE		21			21	
	Ball layout	Fig.49			Fig.49		
Group 2	ZD		[0.8]			[0.8]	
	ZE		[0.8]			[0.8]	
	$\boxed{SD}$		0			0	
	$\boxed{SE}$		0			0	
	b_3		0.63			0.63	



P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

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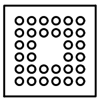


Fig.1

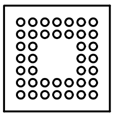


Fig.3

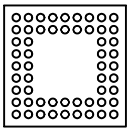


Fig. 6

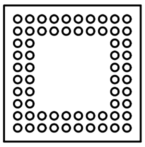


Fig.10

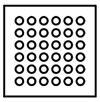


Fig.2

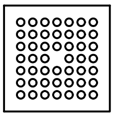


Fig. 4

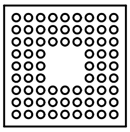


Fig.7

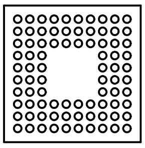


Fig.11

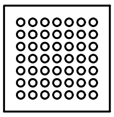


Fig. 5

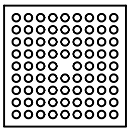
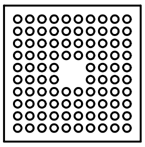


Fig.8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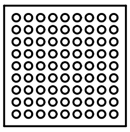
Fig.9

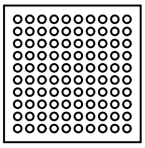
Fig.13

P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

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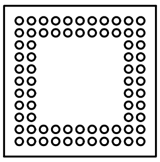
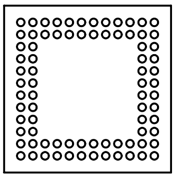
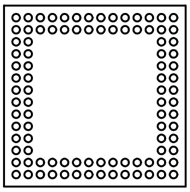
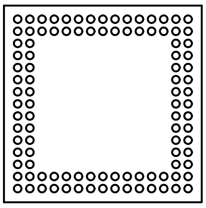
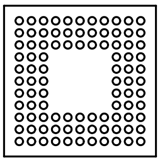
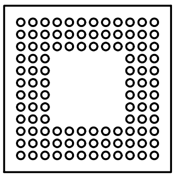
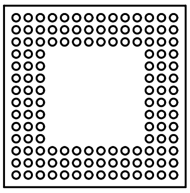
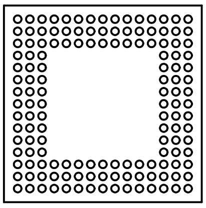
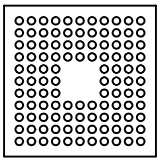
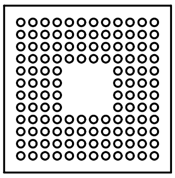
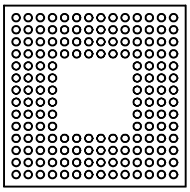
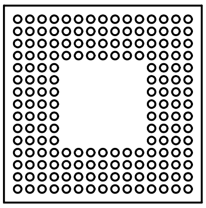
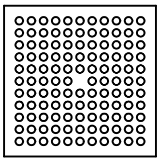
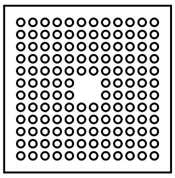
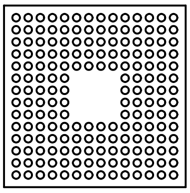
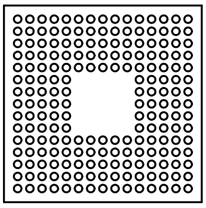
 Fig.14	 Fig.18	 Fig.22	 Fig.26
 Fig.15	 Fig.19	 Fig.23	 Fig.27
 Fig.16	 Fig.20	 Fig.24	 Fig.28
 Fig.17	 Fig.21	 Fig.25	 Fig.29

P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

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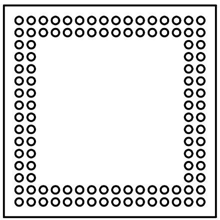


Fig.30

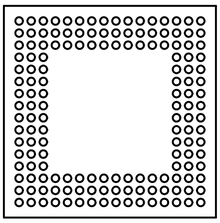


Fig.31

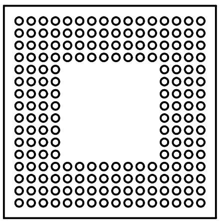


Fig.32

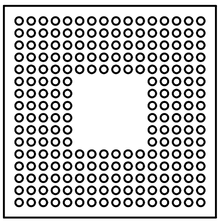


Fig.33

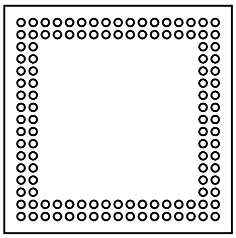


Fig.34

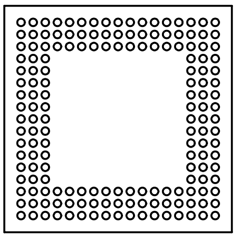


Fig.35

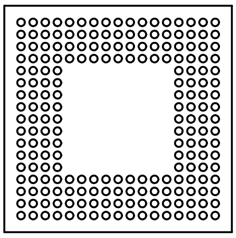


Fig.36

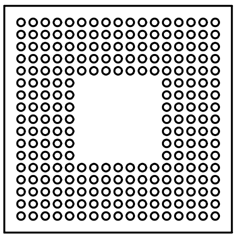
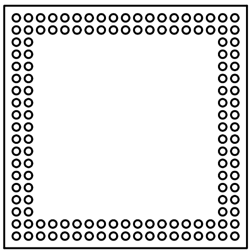


Fig.37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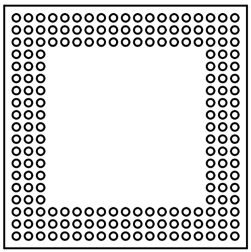
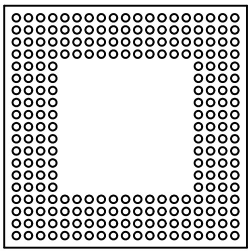


Fig.39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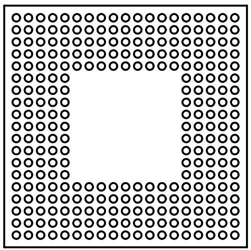
Fig.41

P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

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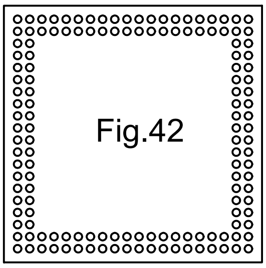


Fig.42

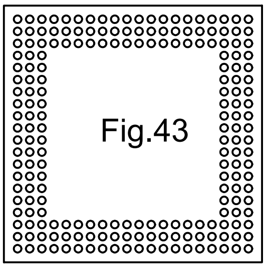


Fig.43

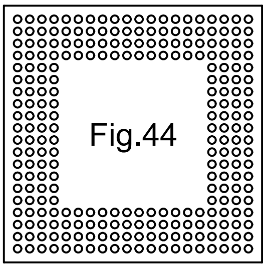


Fig.44

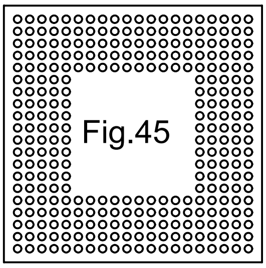
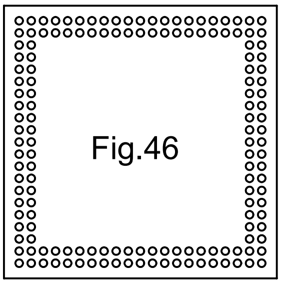


Fig.45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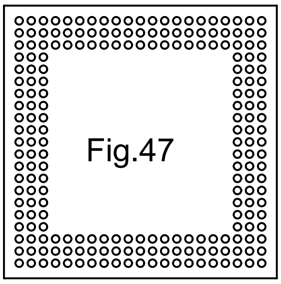
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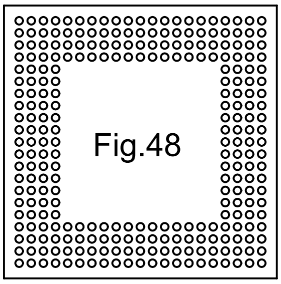
Fig.48

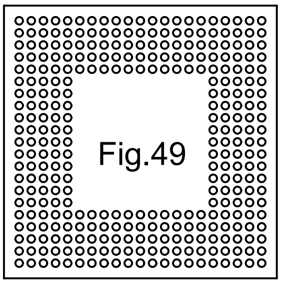
Fig.49

P-L&TFBGA 0.8mm pitch
OUTLINE FAMILY

Date: 2002

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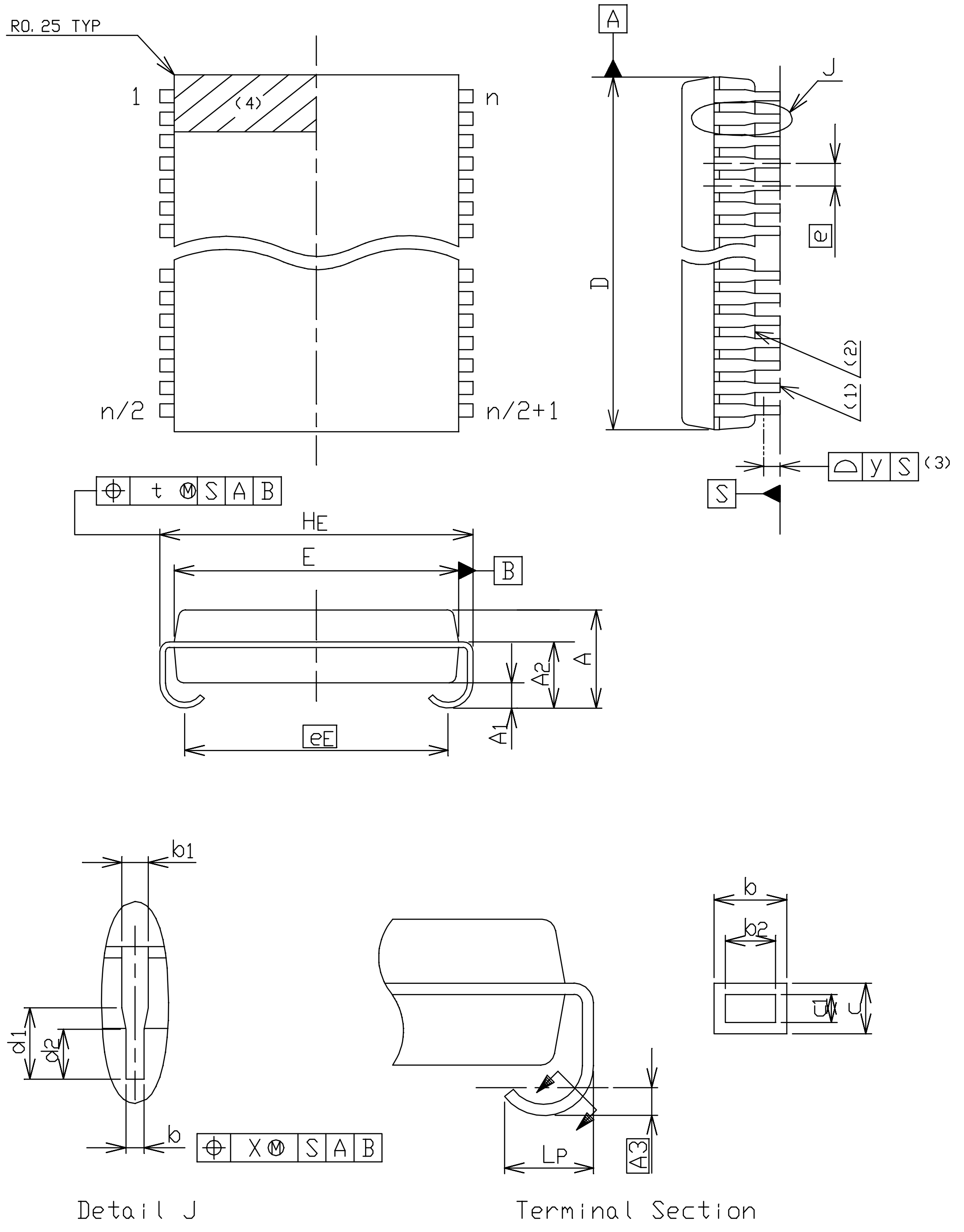

Note (1) (1) Seating plane.

(2) (2) Base plane.

(3) Specifies the vertical shift of the flat part of each terminal from the seating plane.

(4) Shows the allowable position of the index mark, which must be included in the shaded area entirely.

SOJ (Small Outline J-lead package)
0.80 mm pitch

Date: 2002

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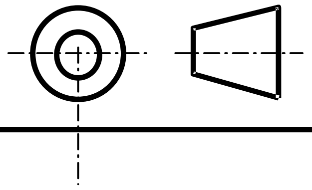
Ref.	163E01			163E02			163E03		
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
E	10.00	10.15	10.30	10.00	10.15	10.30	10.00	10.15	10.30
D	18.25		18.80	20.40		21.40	28.45		29.00
A	3.25	3.50	3.75	3.25	3.50	3.75	3.25	3.50	3.75
A1	0.64	0.90		0.64	0.90		0.64	0.90	
A2	2.05			2.05			2.05		
A3		0.50*			0.50*			0.50*	
e		0.80(*)			0.80(*)			0.80(*)	
d1			1.27			1.27			1.27
d2	0.89			0.89			0.89		
Lp	1.45		1.75	1.45		1.75	1.45		1.75
b	0.25		0.40	0.25		0.40	0.25		0.40
b1	0.43	0.47	0.51	0.43	0.47	0.51	0.43	0.47	0.51
b2	0.25	0.30	0.35	0.25	0.30	0.35	0.25	0.30	0.35
c	0.15		0.25	0.15		0.25	0.15		0.25
c1	0.15	0.20	0.22	0.15	0.20	0.22	0.15	0.20	0.22
t		0.17			0.17			0.17	
x			0.15			0.15			0.15
y			0.10			0.10			0.10
HE	11.05	11.20	11.30	11.05	11.20	11.30	11.05	11.20	11.30
eE		9.40*			9.40*			9.40*	
n		44			50			70	



SOJ (Small Outline J-lead package)
0.80 mm pitch

Date: 2002

60191 IEC I-163E-b

ISBN 2-8318-6101-2

9 782831 861012

ICS 31.080.01

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND