

# INTERNATIONAL STANDARD

**IEC**  
**60191-6-10**

First edition  
2003-11

---

---

**Mechanical standardization of semiconductor devices –**  
**Part 6-10:**  
**General rules for the preparation of outline drawings of**  
**surface mounted semiconductor device packages –**  
**Dimensions of P-VSON**

*Normalisation mécanique des dispositifs à semiconducteurs –*  
*Partie 6-10:*  
*Règles générales pour la préparation des dessins*  
*d'encombrement des dispositifs à semiconducteurs*  
*pour montage en surface –*  
*Dimensions des boîtiers P-VSON*



Reference number  
IEC 60191-6-10:2003(E)

## Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

## Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

## Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site ([www.iec.ch](http://www.iec.ch))**
- **Catalogue of IEC publications**  
The on-line catalogue on the IEC web site ([www.iec.ch/searchpub](http://www.iec.ch/searchpub)) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.
- **IEC Just Published**  
This summary of recently issued publications ([www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)) is also available by email. Please contact the Customer Service Centre (see below) for further information.
- **Customer Service Centre**  
If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: [custserv@iec.ch](mailto:custserv@iec.ch)  
Tel: +41 22 919 02 11  
Fax: +41 22 919 03 00

# INTERNATIONAL STANDARD

# IEC 60191-6-10

First edition  
2003-11

---

---

**Mechanical standardization of semiconductor devices –**  
**Part 6-10:**  
**General rules for the preparation of outline drawings of**  
**surface mounted semiconductor device packages –**  
**Dimensions of P-VSON**

*Normalisation mécanique des dispositifs à semiconducteurs –*  
*Partie 6-10:*  
*Règles générales pour la préparation des dessins*  
*d'encombrement des dispositifs à semiconducteurs*  
*pour montage en surface –*  
*Dimensions des boîtiers P-VSON*

© IEC 2003 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

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](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**M**

*For price, see current catalogue*

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES -

Part 6-10: General rules for the preparation of outline drawings of surface mounted semiconductor device packages - Dimensions of P-VSON

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60191-6-10 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:

Table with 2 columns: FDIS, Report on voting. Row 1: 47D/551/FDIS, 47D565/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

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

## MECHANICAL STANDARDIZATION OF SEMICONDUCTOR DEVICES –

### Part 6-10: General rules for the preparation of outline drawings of surface mounted semiconductor device packages – Dimensions of P-VSON

#### 1 Scope

This part of IEC 60191 provides the common outline drawings and dimensions for all types of structures and composed materials of plastic very thin small outline non-lead package (hereinafter called P-VSON).

#### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO/DIS 2692: *Geometrical Product Specification (GPS) – Geometrical tolerancing – Maximum material requirement (MMR) and least material requirement (LMR)*.

#### 3 Terms and definitions

For the purposes of this document, the following definition, as well as those given in other parts of the IEC 60191 series, apply.

##### 3.1 P-VSON

plastic very thin-profile small outline, flat package with no leads

NOTE The package leads (terminals) are on opposite sides of the bottom of the package body and do not extend beyond the package body.

Drawing of Plastic non-lead packages with two parallel rows of terminals

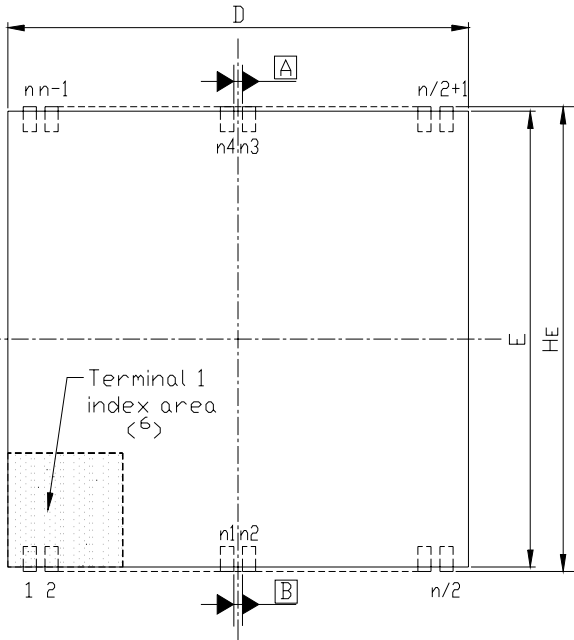


Figure 1a

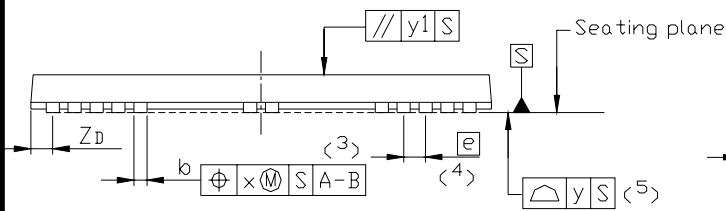


Figure 1b

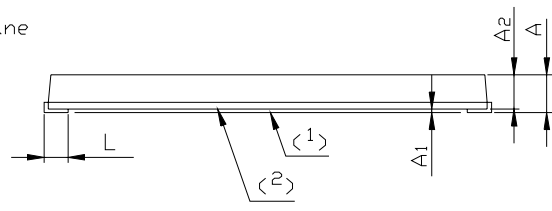
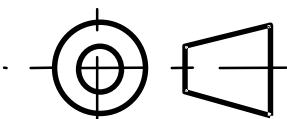


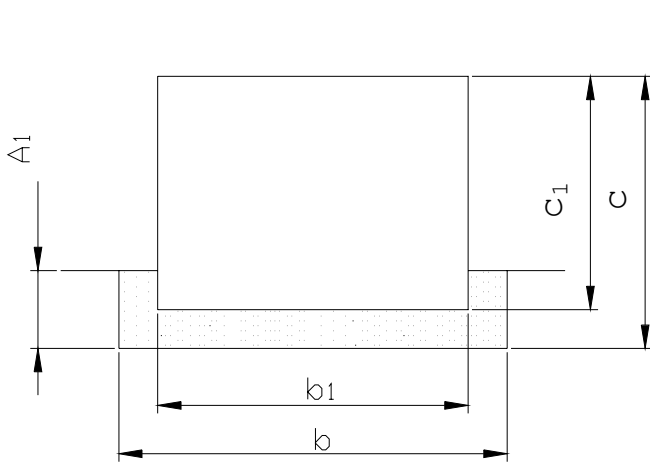
Figure 1c



GENERAL RULES  
P-VSON

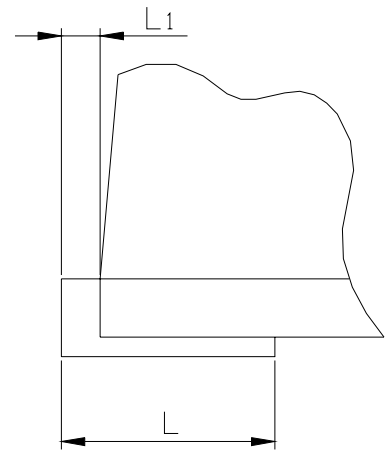
Date: 2003

Drawing of Plastic non-lead packages with two parallel rows of terminals



Terminal cross section<sup>(7)</sup>

Figure 1d



Terminal to be soldered

Figure 1e

Definition of the datum

(a) For even number of leads on a package side.

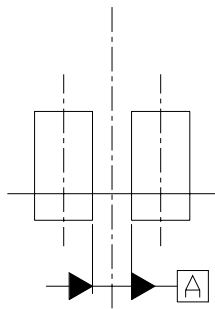


Figure 1f

(b) For odd number of leads on a package side.

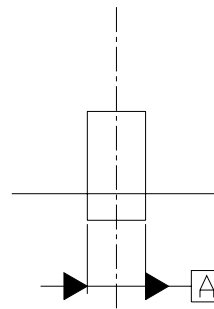
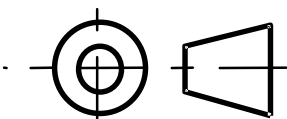


Figure 1g

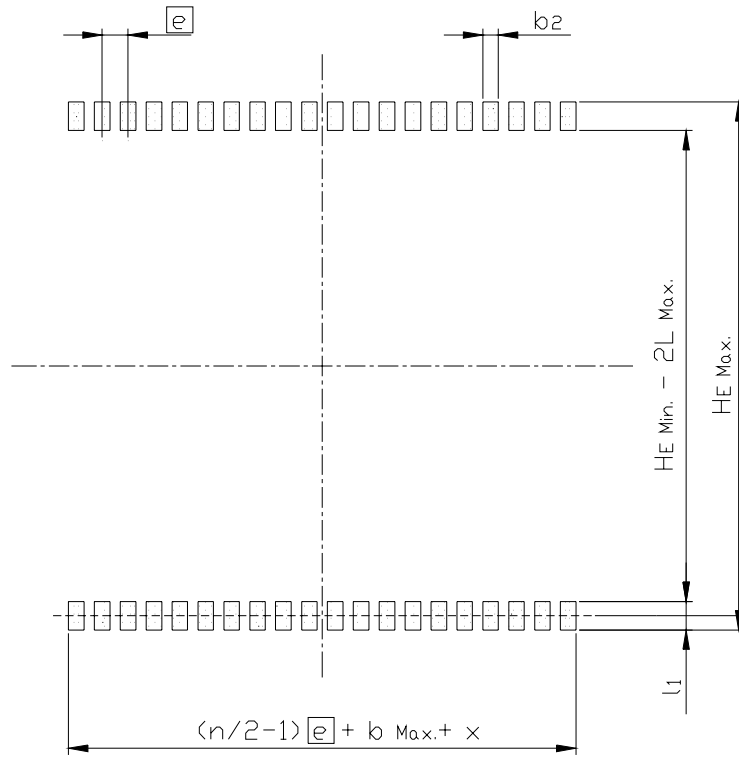
The definition of datum B is the same as the definition of datum A.



GENERAL RULES  
P-VSON

Date: 2003

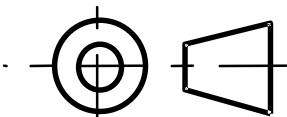
Drawing of Plastic non-lead packages with two parallel rows of terminals



Pattern of terminal position areas

Figure 2

LICENSED TO MECON Limited. - RANCHI/BANGALORE  
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU.



GENERAL RULES  
P-VSON

Date: 2003

**Table 1 – Dimensions to be specified for Group 1**

**Group 1** – Group 1 includes dimensions and numerals associated with mounting of packages and different kinds of packages. The dimensions and numerals belonging to the group mean values is guaranteed to users and imply that mechanical compatibility of mounting of packages can be recognized.

Name	Ref.	Limits to be observed			Recommended values for the dimension mm	Note																					
		Min.	Nom.	Max.																							
Standard number of terminals	n	-	X	-	See Table 3	9																					
Seated height	A	-	-	X	$A_{max} = 1,0$																						
Stand-off height	A <sub>1</sub>	X	-	X	<table border="1"> <tr> <td>A<sub>1 min.</sub></td> <td>A<sub>1 max.</sub></td> </tr> <tr> <td>0,00</td> <td>0,05</td> </tr> </table>	A <sub>1 min.</sub>	A <sub>1 max.</sub>	0,00	0,05	7																	
A <sub>1 min.</sub>	A <sub>1 max.</sub>																										
0,00	0,05																										
Body height	A <sub>2</sub>	-	X	-	$A_{2 nom.} = 0,75$																						
Terminal width plated	b	X	-	X	<table border="1"> <tr> <td><math>\overline{e}</math></td> <td>b min.</td> <td>b max.</td> </tr> <tr> <td>1,25</td> <td>0,55</td> <td>0,70</td> </tr> <tr> <td>1,00</td> <td>0,55</td> <td>0,70</td> </tr> <tr> <td>0,80</td> <td>0,35</td> <td>0,50</td> </tr> <tr> <td>0,65</td> <td>0,30</td> <td>0,45</td> </tr> <tr> <td>0,50</td> <td>0,25</td> <td>0,40</td> </tr> <tr> <td>0,40</td> <td>0,15</td> <td>0,25</td> </tr> </table>	$\overline{e}$	b min.	b max.	1,25	0,55	0,70	1,00	0,55	0,70	0,80	0,35	0,50	0,65	0,30	0,45	0,50	0,25	0,40	0,40	0,15	0,25	7
$\overline{e}$	b min.	b max.																									
1,25	0,55	0,70																									
1,00	0,55	0,70																									
0,80	0,35	0,50																									
0,65	0,30	0,45																									
0,50	0,25	0,40																									
0,40	0,15	0,25																									
Terminal thickness plated	c	X	-	X	<table border="1"> <tr> <td>C min.</td> <td>C max.</td> </tr> <tr> <td>0,09</td> <td>0,25</td> </tr> </table>	C min.	C max.	0,09	0,25																		
C min.	C max.																										
0,09	0,25																										
Package length	D	X	X	X	From 7,00 to 26,00 increment 1,00 $D_{max.} = D_{nom.} + 0,20$ $D_{min.} = D_{nom.} - 0,20$																						
Package width	E	X	X	X	$E_{nom.}$ From 5,00 to 13,00 increment 1,00 $E_{max.} = E_{nom.} + 0,20$ $E_{min.} = E_{nom.} - 0,20$																						
Terminal pitch	$\overline{e}$	-	X(*)	-	$\overline{e}_{nom.} = 1,25; 1,00; 0,80; 0,65; 0,50; 0,40$	4																					
Overall width	H <sub>E</sub>	X	X	X	$H_E = E + 2L_{1 nom.}$																						

**Table 1** (continued)

Name	Ref.	Limits to be observed			Recommended values for the dimension mm	Note																					
		Min.	Nom.	Max.																							
Length of solder part	L	X	-	X	<table border="1"> <thead> <tr> <th>e</th> <th>L<sub>min.</sub></th> <th>L<sub>max.</sub></th> </tr> </thead> <tbody> <tr> <td>1,25</td> <td>0,70</td> <td>1,30</td> </tr> <tr> <td>1,00</td> <td>0,70</td> <td>1,20</td> </tr> <tr> <td>0,80</td> <td>0,50</td> <td>0,90</td> </tr> <tr> <td>0,65</td> <td>0,40</td> <td>0,80</td> </tr> <tr> <td>0,50</td> <td>0,35</td> <td>0,75</td> </tr> <tr> <td>0,40</td> <td>0,35</td> <td>0,75</td> </tr> </tbody> </table>	e	L <sub>min.</sub>	L <sub>max.</sub>	1,25	0,70	1,30	1,00	0,70	1,20	0,80	0,50	0,90	0,65	0,40	0,80	0,50	0,35	0,75	0,40	0,35	0,75	
					e	L <sub>min.</sub>	L <sub>max.</sub>																				
					1,25	0,70	1,30																				
					1,00	0,70	1,20																				
					0,80	0,50	0,90																				
					0,65	0,40	0,80																				
					0,50	0,35	0,75																				
0,40	0,35	0,75																									
Terminal position tolerance	x	-	-	X	$X_{\max.} = 0,05$	3																					
Coplanarity	y	-	-	X	$y_{\max.} = 0,05$	5																					
Flatness	y <sub>1</sub>	-	-	X	$y_{1 \max.} = 0,10$																						

**Table 2 – Dimensions to be specified for Group 2**

**Group 2** – Group 2 includes dimensions that do not belong to Group 1, but are associated with fabrication of packages and dimensions of terminal position areas. The group is to achieve its own original purpose as an industry standard. The group belongs to the dimensions and numerals of external shapes of packages useful for designers and manufacturers and the dimensions of terminal position areas that can be referenced in nominal design values specified thereto.

Name	Ref.	Limits to be observed			Recommended values for the dimension mm	Note																					
		Min.	Nom.	Max.																							
Terminal width unplated	b <sub>1</sub>	X	-	X	<table border="1"> <thead> <tr> <th>e</th> <th>b<sub>1</sub> min.</th> <th>b<sub>1</sub> max.</th> </tr> </thead> <tbody> <tr> <td>1,25</td> <td>0,55</td> <td>0,65</td> </tr> <tr> <td>1,00</td> <td>0,55</td> <td>0,65</td> </tr> <tr> <td>0,80</td> <td>0,35</td> <td>0,45</td> </tr> <tr> <td>0,65</td> <td>0,30</td> <td>0,40</td> </tr> <tr> <td>0,50</td> <td>0,25</td> <td>0,35</td> </tr> <tr> <td>0,40</td> <td>0,15</td> <td>0,20</td> </tr> </tbody> </table>	e	b <sub>1</sub> min.	b <sub>1</sub> max.	1,25	0,55	0,65	1,00	0,55	0,65	0,80	0,35	0,45	0,65	0,30	0,40	0,50	0,25	0,35	0,40	0,15	0,20	7
e	b <sub>1</sub> min.	b <sub>1</sub> max.																									
1,25	0,55	0,65																									
1,00	0,55	0,65																									
0,80	0,35	0,45																									
0,65	0,30	0,40																									
0,50	0,25	0,35																									
0,40	0,15	0,20																									
Terminal position area in width	b <sub>2</sub>	-	-	X	$b_{2 \text{ max.}} = b_{\text{ max.}} + x$																						
Terminal thickness unplated	c <sub>1</sub>	X	-	X	<table border="1"> <thead> <tr> <th>c<sub>1</sub> min.</th> <th>c<sub>1</sub> max.</th> </tr> </thead> <tbody> <tr> <td>0,09</td> <td>0,21</td> </tr> </tbody> </table>	c <sub>1</sub> min.	c <sub>1</sub> max.	0,09	0,21																		
c <sub>1</sub> min.	c <sub>1</sub> max.																										
0,09	0,21																										
Terminal length	L <sub>1</sub>	-	X	-	$L_{1 \text{ nom.}} = 0,10$																						
Terminal position area in length	l <sub>1</sub>	-	-	X	$l_{1 \text{ max.}} = L_{\text{ max.}} + (H_{E \text{ max.}} - H_{E \text{ min.}})/2$																						
Package overhang	(Z <sub>D</sub> )	-	X	-	$Z_{D \text{ nom.}} \geq b_{1 \text{ nom.}} \times 1,5$																						

**Table 3 – Standard number of terminals**

D	e											
	0,40		0,50		0,65		0,80		1,00		1,25	
	n	Z <sub>D</sub>	n	Z <sub>D</sub>	n	Z <sub>D</sub>	n	Z <sub>D</sub>	n	Z <sub>D</sub>	n	Z <sub>D</sub>
7,0	34	0,30	26	0,50	20	0,575	16	0,70	12	1,00	-	-
8,0	38	0,40	30	0,50	22	0,75	18	0,80	14	1,00	10	1,50
9,0	42	0,30	34	0,50	26	0,60	20	0,90	16	1,00	12	1,375
10,0	46	0,40	38	0,50	28	0,775	24	0,60	18	1,00	14	1,25
11,0	50	0,30	42	0,50	32	0,625	26	0,70	20	1,00	-	-
12,0	54	0,40	46	0,50	34	0,80	28	0,80	22	1,00	-	-
13,0	58	0,30	50	0,50	38	0,65	30	0,90	24	1,00	18	1,50
14,0	62	0,40	54	0,50	40	0,825	34	0,60	26	1,00	20	1,375
15,0	66	0,30	58	0,50	44	0,675	36	0,70	28	1,00	22	1,25
16,0	70	0,40	62	0,50	48	0,525	38	0,80	30	1,00	24	1,125
17,0	74	0,30	66	0,50	50	0,70	40	0,90	32	1,00	-	-
18,0	78	0,40	70	0,50	54	0,55	44	0,60	34	1,00	26	1,50
19,0	82	0,30	74	0,50	56	0,725	46	0,70	36	1,00	28	1,375
20,0	86	0,40	78	0,50	60	0,575	48	0,80	38	1,00	30	1,25
21,0	90	0,30	82	0,50	62	0,75	50	0,90	40	1,00	32	1,125
22,0	94	0,40	86	0,50	66	0,60	54	0,60	42	1,00	-	-
23,0	98	0,30	90	0,50	68	0,775	56	0,70	44	1,00	34	1,50
24,0	102	0,40	94	0,50	72	0,625	58	0,80	46	1,00	36	1,375
25,0	106	0,30	98	0,50	74	0,80	60	0,90	48	1,00	38	1,25
26,0	110	0,40	102	0,50	78	0,65	64	0,60	50	1,00	40	1,125

Notes

- (1) A plane which designates the plane of contact of the package, including any stand-off, with the surface on which it will be mounted.
  - (2) A plane drawn parallel to the seating plane through the lowest point of the package, excluding any stand-off.
  - (3) The maximum mounting conditions apply to the positional tolerance of the terminals.  
(For the maximum body conditions, refer to ISO 2692).
  - (4) Specifies the true geometric position of the terminal axis.
  - (\*) Means true geometrical position.
  - (5) Specifies the vertical shift of the flat part of each terminal from the seating plane.
  - (6) Shows the allowable position of the Index mark area, which is basically 1/16 with package body size, however in case of small package body size, it is less than 1/4 with package body size, it must be included in the shaded area entirely.
  - (7) The dimensions of the terminal section apply to the ranges 0,1 mm and 0,25mm from the end of a terminal.
  - (8) The millimeter dimensions of this package are original dimensions.
  - (9) n refers to the total number of terminal positions.
-



**Standards Survey**

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

**International Electrotechnical Commission**

3, rue de Varembé  
1211 Genève 20  
Switzerland

or

Fax to: **IEC/CSC** at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

**A Prioritaire**

Nicht frankieren  
Ne pas affranchir



Non affrancare  
No stamp required

**RÉPONSE PAYÉE**

**SUISSE**

Customer Service Centre (CSC)  
**International Electrotechnical Commission**  
3, rue de Varembé  
1211 GENEVA 20  
Switzerland



**Q1** Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: (e.g. 60601-1-1)

.....

**Q2** Please tell us in what capacity(ies) you bought the standard (tick all that apply). I am the/a:

- purchasing agent
- librarian
- researcher
- design engineer
- safety engineer
- testing engineer
- marketing specialist
- other.....

**Q3** I work for/in/as a: (tick all that apply)

- manufacturing
- consultant
- government
- test/certification facility
- public utility
- education
- military
- other.....

**Q4** This standard will be used for: (tick all that apply)

- general reference
- product research
- product design/development
- specifications
- tenders
- quality assessment
- certification
- technical documentation
- thesis
- manufacturing
- other.....

**Q5** This standard meets my needs: (tick one)

- not at all
- nearly
- fairly well
- exactly

**Q6** If you ticked NOT AT ALL in Question 5 the reason is: (tick all that apply)

- standard is out of date
- standard is incomplete
- standard is too academic
- standard is too superficial
- title is misleading
- I made the wrong choice
- other .....

**Q7** Please assess the standard in the following categories, using the numbers:

- (1) unacceptable,
- (2) below average,
- (3) average,
- (4) above average,
- (5) exceptional,
- (6) not applicable

- timeliness.....
- quality of writing.....
- technical contents.....
- logic of arrangement of contents .....
- tables, charts, graphs, figures.....
- other .....

**Q8** I read/use the: (tick one)

- French text only
- English text only
- both English and French texts

**Q9** Please share any comment on any aspect of the IEC that you would like us to know:

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....



LICENSED TO MECON Limited. - RANCHI/BANGALORE  
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU.

ISBN 2-8318-7283-9



9 782831 872834

---

ICS 31.080.01

---