

# INTERNATIONAL STANDARD

**Printed boards and printed board assemblies – Design and use –  
Part 5-3: Attachment (land/joint) considerations – Components with gull-wing  
leads on two sides**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2007 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

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

Document generated by EVS



IEC 61188-5-3

Edition 1.0 2007-10

# INTERNATIONAL STANDARD

---

**Printed boards and printed board assemblies – Design and use –  
Part 5-3: Attachment (land/joint) considerations – Components with gull-wing  
leads on two sides**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

U

---

ICS 31.180

ISBN 2-8318-9340-2

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 General information.....	7
3.1 General component description.....	7
3.2 Marking.....	7
3.3 Carrier packaging format.....	7
3.4 Process considerations.....	7
4 TSOP (Type 1).....	8
4.1 Field of application.....	8
4.2 Component description.....	8
4.3 Component dimensions.....	8
4.4 Solder joint fillet design.....	9
4.5 Land pattern dimensions.....	11
5 TSOP (Type 2).....	13
5.1 Field of application.....	13
5.2 Component description.....	13
5.3 Component dimensions.....	13
5.4 Solder joint fillet design.....	14
5.5 Land pattern dimensions.....	16
6 SOP.....	18
6.1 Field of application.....	18
6.2 Component description.....	18
6.3 Component dimensions.....	18
6.4 Solder joint fillet design.....	19
6.5 Land pattern dimensions.....	21
7 SSOP.....	23
7.1 Field of application.....	23
7.2 Component description.....	23
7.3 Component dimensions.....	24
7.4 Solder joint fillet design.....	24
7.5 Land pattern dimensions.....	26
Bibliography.....	29
Figure 1 – TSOP (Type 1) construction.....	8
Figure 2 – TSOP (Type 1) – Component dimensions.....	9
Figure 3 – Solder joint fillet design (see IEC 61188-5-1, Tables 2 and 3).....	11
Figure 4 – TSOP (Type 1) – Land pattern dimensions.....	13
Figure 5 – TSOP (Type 2) construction.....	13
Figure 6 – TSOP (Type 2) – Component dimensions.....	14
Figure 7 – Solder joint fillet design (see IEC 61188-5-1, Tables 2 and 3).....	16
Figure 8 – TSOP (Type 2) – Land pattern dimensions.....	18

Figure 9 – SOPIC construction..... 18

Figure 10 – SOP component dimensions ..... 19

Figure 11 – Solder joint fillet design (see IEC 61188-5-1, Table 2)..... 21

Figure 12 – SOP Land pattern dimensions ..... 23

Figure 13 – SSOP construction ..... 23

Figure 14 – Component dimensions ..... 24

Figure 15 – Solder joint fillet design (see IEC 61188-5-1, Table 2)..... 26

Figure 16 – Land pattern dimensions ..... 28

This document is a preview generated by EVS

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**PRINTED BOARDS AND PRINTED BOARD ASSEMBLIES –  
DESIGN AND USE –**
**Part 5-3: Attachment (land/joint) considerations –  
Components with gull-wing leads on two sides**

## 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 61188-5-3 has been prepared by IEC technical committee 91: Electronics assembly technology.

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

FDIS	Report on voting
91/702/FDIS	91/734/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.

IEC 61188-5-3 is to be read in conjunction with IEC 61188-5-1.

A list of all parts of the IEC 61188 series, under the general title *Printed boards and printed board assemblies – Design and use*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

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

This document is a preview generated by EVS

## INTRODUCTION

This part of IEC 61188 covers land patterns for components with gull-wing leads on two sides. Each clause contains information in accordance with the following format:

The proposed land pattern dimensions in this standard are based upon the fundamental tolerance calculation combined with the given land protrusions and courtyard excesses (see IEC 61188-5-1, Generic requirements). The courtyard includes all issues of the normal manufacturing necessities.

The unaltered land pattern dimensions of this part are generally applicable for the solder paste application plus reflow soldering process. For application of the wave soldering process, the land pattern dimensions normally have to be modified. Orientation parallel to the wave direction is preferable and special, suitably dimensioned solder thieves should be added.

This standard offers a threefold land pattern dimensioning (levels 1, 2, and 3) on the basis of a threefold set of land protrusions and courtyard excesses: maximum (max.); median (mdn) and minimum (min.). Each land pattern has been assigned an identification number to indicate the characteristics of the specific robustness of the land patterns. Users also have the opportunity to organize the information so that it is most useful for their particular design.

If a user has good reason to use a concept different from that of IEC 61188-5-1 or if the user prefers unusual land protrusions, this standard should be used for checking the resulting solder fillet size.

It is the responsibility of the user to verify the SMD land patterns used for achieving an undisturbed mounting process including testing and an ensured reliability for the product stress conditions in use.

Component dimensions listed in this standard are those available on the market and regarded as for reference only.

## PRINTED BOARDS AND PRINTED BOARD ASSEMBLIES – DESIGN AND USE –

### Part 5-3: Attachment (land/joint) considerations – Components with gull-wing leads on two sides

#### 1 Scope

This part of IEC 61188 provides information on land pattern geometries used for the surface attachment of electronic components with gull-wing leads on two sides. The intent of the information presented herein is to provide the appropriate size, shape and tolerances of surface mount land patterns to ensure sufficient area for the appropriate solder fillet, and also allow for inspection, testing and reworking of those solder joints.

Each clause contains a specific set of criteria such that the information presented is consistent, providing information on the component, the component dimensions, the solder joint design, and the land pattern dimensions.

#### 2 Normative references

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

IEC 61188-5-1, *Printed boards and printed board assemblies – Design and use – Part 5-1: Attachment (land/joint) considerations – Generic requirements*

#### 3 General information

##### 3.1 General component description

The acronyms TSOP (thin small outline package), SOP (small outline package) and SSOP (shrink small outline package) are also used to describe the family.

##### 3.2 Marking

The TSOP, SOP and SSOP families of parts are generally marked with the manufacturer's part numbers, manufacturer's name or symbol, and a pin 1 indicator. Some parts may have a pin 1 feature in the case shape instead of pin 1 marking. Additional markings may include date-code manufacturing lot and/or manufacturing location.

##### 3.3 Carrier packaging format

Carrier packaging format may be provided in a tray carrier, but tape and reel carriers are preferred for best handling and high volume applications. Bulk packaging is not acceptable because of lead co-planarity required for placement and soldering.

##### 3.4 Process considerations

TSOP, SOP and SSOP packages are normally processed by reflow solder operations.

The land pattern dimensions are based on a mathematical model that establishes a platform for a solder joint attachment to the printed board. The existing models create a platform that is