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

IEC 61188-5-3:2007(E)

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FOREWORD

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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- withdrawn;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.

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

capable of establishing a reliable solder joint no matter what solder alloy is used to make that joint (lead-free, tin lead, etc.)

Process requirements for solder reflow are different based on the solder alloy and should be analyzed in order that the process is above the liquidus temperature of the alloy, and remains above that temperature a sufficient time to form a reliable metallurgical bond.

4 TSOP (Type 1)

4.1 Field of application

This clause provides the component and land pattern dimensions for TSOP (Type 1) components. Basic construction is also covered. Subclause 4.4 lists the tolerances and target solder joint dimensions used to arrive at the land pattern dimensions.

4.2 Component description

Figure 1 shows a typical construction example.

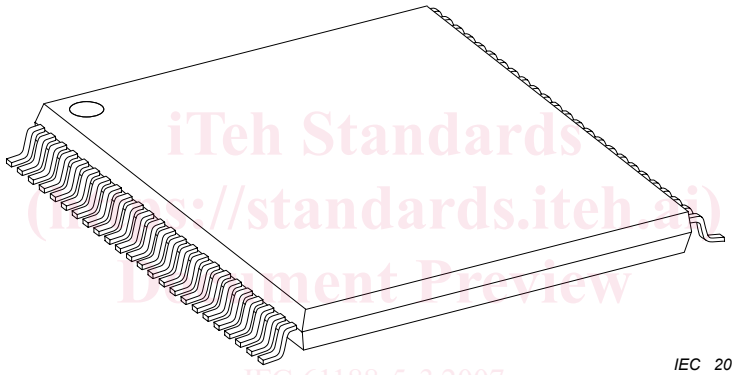
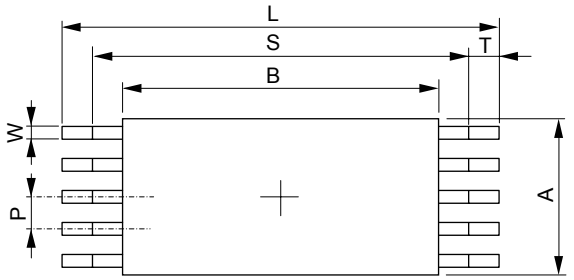


Figure 1 – TSOP (Type 1) construction

4.3 Component dimensions

Figure 2 shows the component dimensions for TSOP (Type 1) components.

Land pattern dimensional data may need to be adjusted if the component dimensional data does not match JEDEC and/or JEITA data sheets.



Dimensions in millimetres

Component identification	Pin count	L		W		T		S*		A		B		H	P
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Basic
TSOP 6x14	16	13,8	14,2	0,17	0,27	0,40	0,75	12,3	12,94	5,80	6,20	12,2	12,6	1,20	0,65
TSOP 6x16	24	15,8	16,2	0,17	0,23	0,40	0,75	14,3	14,94	5,80	6,20	14,2	14,6	1,20	0,5
TSOP 6x18	28	17,8	18,2	0,13	0,19	0,40	0,75	16,3	16,94	5,80	6,20	16,2	16,6	1,20	0,4
TSOP 6x20	36	19,8	20,2	0,09	0,15	0,40	0,75	18,3	18,94	5,80	6,20	18,2	18,6	1,20	0,3
TSOP 8x14	24	13,8	14,2	0,17	0,27	0,40	0,75	12,3	12,94	7,80	8,20	12,2	12,6	1,20	0,65
TSOP 8x16	32	15,8	16,2	0,17	0,23	0,40	0,75	14,3	14,94	7,80	8,20	14,2	14,6	1,20	0,5
TSOP 8x18	40	17,8	18,2	0,13	0,19	0,40	0,75	16,3	16,94	7,80	8,20	16,2	16,6	1,20	0,4
TSOP 8x20	52	19,8	20,2	0,09	0,15	0,40	0,75	18,3	18,94	7,80	8,20	18,2	18,6	1,20	0,3
TSOP 10x14	28	13,8	14,2	0,17	0,27	0,40	0,75	12,3	12,94	9,80	10,20	12,2	12,6	1,20	0,65
TSOP 10x16	40	15,8	16,2	0,17	0,23	0,40	0,75	14,3	14,94	9,80	10,20	14,2	14,6	1,20	0,5
TSOP 10x18	48	17,8	18,2	0,13	0,19	0,40	0,75	16,3	16,94	9,80	10,20	16,2	16,6	1,20	0,4
TSOP 10x20	64	19,8	20,2	0,09	0,15	0,40	0,75	18,3	18,94	9,80	10,20	18,2	18,6	1,20	0,3
TSOP 12x14	36	13,8	14,2	0,17	0,27	0,40	0,75	12,3	12,94	11,80	12,20	12,2	12,6	1,20	0,65
TSOP 12x16	48	15,8	16,2	0,17	0,23	0,40	0,75	14,3	14,94	11,80	12,20	14,2	14,6	1,20	0,5
TSOP 12x18	60	17,8	18,2	0,13	0,19	0,40	0,75	16,3	16,94	11,80	12,20	16,2	16,6	1,20	0,4
TSOP 12x20	76	19,8	20,2	0,09	0,15	0,40	0,75	18,3	18,94	11,80	12,20	18,2	18,6	1,20	0,3

* Calculated value.

Figure 2 – TSOP (Type 1) – Component dimensions

4.4 Solder joint fillet design

Figure 3 shows the dimensions of the solder fillet after the soldering process. The minimum, median and maximum dimensions of each of toe, heel and side fillet are determined by taking into consideration solder joint reliability and also quality and productivity in the mounting process of parts.

In designing land patterns, three accuracy factors need to be taken into consideration:

– parts dimensions accuracy (C);
– parts mount accuracy on PWBs (P);
– land shape accuracy of PWBs (F),

in addition to fillet dimensions. The formulae to obtain the tolerance resulting from these factors are basically as follows:

a) Design consideration when soldered without self-alignment effect (level 1)

In the flow soldering process, there is no self-alignment effect. Thus, the formulae cannot be simplified but remain the same, as follows: