

INTERNATIONAL STANDARD



Printed board assemblies –
Part 2: Sectional specification – Requirements for surface mount soldered
assemblies

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRINTED BOARD ASSEMBLIES –**Part 2: Sectional specification –
Requirements for surface mount soldered assemblies**

FOREWORD

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International Standard IEC 61191-2 has been prepared by IEC technical committee 91: Electronics assembly technology.

This third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the requirements have been updated to be compliant with the acceptance criteria in IPC-A-610F;
- b) some of the terminology used in the document has been updated;
- c) references to IEC standards have been corrected;
- d) five termination styles have been added.

The text of this International Standard is based on the following documents:

CDV	Report on voting
91/1386/CDV	91/1429/RVC

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

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

A list of all parts of IEC 61191 under the general title *Printed board assemblies* can be found in the IEC website.

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

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- withdrawn,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

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

The contents of the corrigendum of September 2019 have been included in this copy.

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PRINTED BOARD ASSEMBLIES –

Part 2: Sectional specification – Requirements for surface mount soldered assemblies

1 Scope

This part of IEC 61191 gives the requirements for surface mount solder connections. The requirements pertain to those assemblies that are totally surface mounted or to the surface mounted portions of those assemblies that include other related technologies (e.g. through-hole, chip mounting, terminal mounting, etc.).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60194, *Printed board design, manufacture and assembly – Terms and definitions*

IEC 61191-1, *Printed board assemblies – Part 1: Generic specification – Requirements for soldered electrical and electronic assemblies using surface mount and related assembly technologies*

IPC-A-610, *Acceptability of Electronic Assemblies*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 General requirements

The requirements of IEC 61191-1 are a mandatory part of this specification.

Workmanship shall meet the requirements of IPC-A-610 in accordance with the classification requirements of this document.

5 Surface mounting of components

5.1 General

This clause covers assembly of components that are placed on the surface to be manually or machine soldered and includes components designed for surface mounting as well as through-hole components that have been adapted for surface mounting technology.

5.2 Alignment requirements

Sufficient process control at all stages of design and assembly shall be in place to enable the post-soldering alignments and solder joint fillet controls specified in 6.3 to be achieved.

Relevant factors affecting the requirements include land and conductor design, component proximities, component and land solderability, solder paste/adhesive quantity and alignment and component placement accuracy.

5.3 Process control

If suitable process controls are not in place to ensure compliance with 5.2 and the intent of Annex A, the detailed requirements of Annex A shall be mandatory.

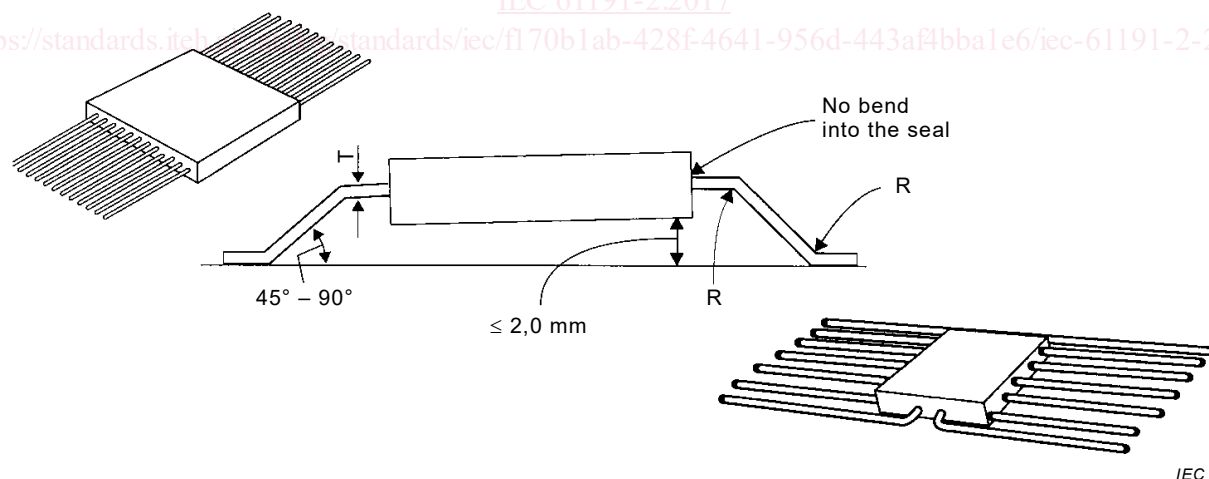
5.4 Surface mounted component requirements

The leads of lead surface mounted components shall be formed to their final configuration prior to mounting. Leads shall be formed in such a manner that the lead-to-body seal is not damaged or degraded and that they may be soldered into place by subsequent processes which do not result in residual stresses decreasing reliability. When the leads of dual-in-line packages, flatpacks, and other multilead devices become misaligned during processing or handling, they may be straightened to ensure parallelism and alignment prior to mounting, while maintaining the lead-to-body seal integrity.

5.5 Flatpack lead forming

5.5.1 General

Leads on opposite sides of surface mounted flatpacks shall be formed such that the non-parallelism between the base surface of the component and the surface of the printed board (i.e. component cant) is minimal. Component cant is permissible provided the final configuration does not exceed the maximum spacing limit of 2,0 mm (see Figure 1).



Key

- R lead-bend radius
- T nominal lead thickness

Figure 1 – Lead formation for surface mounted device

5.5.2 Surface mounted device lead bends

Leads shall be supported during forming to protect the lead-to-body seal. Bends shall not extend into the seal (see Figure 1). The lead-bend radius (R) shall be $> 1 T$ (T = nominal lead

thickness). The angle of that part of the lead between the upper and lower bends in relation to the mounting land shall be 45° minimum and 90° maximum.

5.5.3 Surface mounted device lead deformation

Lead deformation (unintentional bending) may be allowed when

- a) no evidence of a short circuit or potential short circuit exists,
- b) lead-to-body seal or weld is not damaged by the deformation,
- c) does not violate minimum electrical spacing requirement,
- d) top of lead does not extend beyond the top of body; preformed stress loops may extend above the top of the body; however, stand-off height limit shall not be exceeded,
- e) toe curl, if present on bends, shall not exceed two times the thickness of the lead (2 T),
- f) coplanarity limits are not exceeded.

5.5.4 Flattened leads

Components with axial leads of round cross-section may be flattened (coined) for positive seating in surface mounting. If flattening is used, the flattened thickness shall be not less than 40 % of the original diameter. Flattened areas of leads shall be excluded from the 10 % deformation requirement in 6.5.3 of IEC 61191-1:2013.

Flattened leads on opposite sides of a surface mount part shall be formed such that the non-parallelism between the base surface of the component and the surface of the printed board (e.g. component cant) is minimal.

5.5.5 Dual-in-line packages (DIPs)

Dual-in-line packages may be surface mounted provided the leads are configured to meet the mounting requirements for surface mounted loaded parts. The lead preparation operation shall be performed using die forming/cutting systems. Hand forming and trimming of leads are prohibited.

5.5.6 Parts not configured for surface mounting

Flatpacks of the through-hole configuration, transistors, metal power packages, and other non-axial lead components shall not be surface mounted unless the leads are formed to meet the surface mounted device lead forming requirements. Such applications shall be agreed on between user and manufacturer.

5.6 Small devices with two terminations

5.6.1 General

The detailed requirements for mounting of small devices with two lead terminations are defined in 5.6.2 and 5.6.3.

5.6.2 Stack mounting

When part stacking is permitted by the assembly drawing, parts shall not bridge spacing between other parts or components such as terminals or other chip components.

5.6.3 Devices with external deposited elements

Components with electrical elements deposited on an external surface (such as chip resistors) shall be mounted with that surface facing away from the printed board or substrate.