



**NSAI**  
Standards

Irish Standard  
I.S. EN 61188-7:2017

# Printed boards and printed board assemblies - Design and use - Part 7: Electronic component zero orientation for CAD library construction

**I.S. EN 61188-7:2017**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN 61188-7:2017

*Published:*

2017-06-30

*This document was published  
under the authority of the NSAI  
and comes into effect on:*

2017-07-18

ICS number:

31.180

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN 61188-7:2017 is the adopted Irish version of the European Document EN 61188-7:2017, Printed boards and printed board assemblies - Design and use - Part 7: Electronic component zero orientation for CAD library construction

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

**EUROPEAN STANDARD**

**EN 61188-7**

**NORME EUROPÉENNE**

**EUROPÄISCHE NORM**

June 2017

ICS 31.180

Supersedes EN 61188-7:2009

English Version

**Printed boards and printed board assemblies - Design and use -  
Part 7: Electronic component zero orientation for CAD library  
construction  
(IEC 61188-7:2017)**

Cartes imprimées et cartes imprimées équipées -  
Conception et utilisation - Partie 7: Orientation nulle des  
composants électroniques pour l'élaboration de la  
bibliothèque CAO  
(IEC 61188-7:2017)

Leiterplatten und Flachbaugruppen - Konstruktion und  
Anwendung - Teil 7: Nullorientierung elektronischer  
Bauelemente für CAD-Bibliotheksaufbau  
(IEC 61188-7:2017)

This European Standard was approved by CENELEC on 2017-05-15. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**EN 61188-7:2017**

**European foreword**

The text of document 91/1382/CDV, future edition 2 of IEC 61188-7, prepared by IEC/TC 91 "Electronics assembly technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61188-7:2017.

The following dates are fixed:

- latest date by which the document has to be (dop) 2018-02-15  
implemented at national level by  
publication of an identical national  
standard or by endorsement
- latest date by which the national (dow) 2020-05-15  
standards conflicting with the  
document have to be withdrawn

This document supersedes EN 61188-7:2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

**Endorsement notice**

The text of the International Standard IEC 61188-7:2017 was approved by CENELEC as a European Standard without any modification.

**Annex ZA**

(normative)

**Normative references to international publications  
with their corresponding European publications**

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

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here:  
[www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61188-5	series	Printed boards and printed board assemblies - Design and use	EN 61188-5	series

This page is intentionally left blank





**IEC 61188-7**

Edition 2.0 2017-04

# INTERNATIONAL STANDARD



---

**Printed boards and printed board assemblies – Design and use –  
Part 7: Electronic component zero orientation for CAD library construction**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**

**Copyright © 2017 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

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

**IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)**

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

**IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)**

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

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

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

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

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)**

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).



**IEC 61188-7**

Edition 2.0 2017-04

# INTERNATIONAL STANDARD



---

**Printed boards and printed board assemblies – Design and use –  
Part 7: Electronic component zero orientation for CAD library construction**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 31.180

ISBN 978-2-8322-4165-3

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Basic rules .....	6
4.1 Common rules.....	6
4.2 General basic rules .....	6
4.3 Level A basic rule .....	7
4.4 Level B basic rule .....	7
4.5 File description definition .....	7
4.6 Component orientations .....	8
5 Origin point of land pattern .....	18
5.1 General.....	18
5.2 Surface mount components.....	18
5.3 Through-hole leaded components .....	19
6 Land pattern to footprint comparison .....	19
7 Components with one terminal.....	20
7.1 Surface mount components.....	20
7.2 Through-hole leaded components .....	20
Figure 1 – Example of level A orientation concepts .....	8
Figure 2 – Connector and switch library symbol examples .....	19
Figure 3 – Through-hole components with terminal point of origin orientation .....	19
Figure 4 – Circular or square one-terminal component .....	20
Figure 5 – Rectangular or oval one-terminal component .....	20
Figure 6 – Surface mount components with one lead offset.....	20
Table 1 – Discrete component land pattern conventions .....	9
Table 2 – Diode and transistor land pattern conventions .....	10
Table 3 – Transistor and IC land pattern conventions .....	11
Table 4 – Integrated circuit packages land pattern conventions .....	12
Table 5 – Integrated circuit packages land pattern conventions .....	14
Table 6 – BGA land pattern conventions .....	15
Table 7 – Resistor array and connector land pattern conventions.....	16
Table 8 – Level A land pattern convention summary .....	17
Table 9 – Level B land pattern convention summary .....	18

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

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

#### **Part 7: Electronic component zero orientation for CAD library construction**

#### **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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 61188-7 has been prepared by IEC technical committee 91: Electronics assembly technology.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

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

- a) Figure 1 has been corrected;
- b) the term "rectangle" has generally been replaced by "polygon";
- c) level B has been indicated as preferred level for new libraries.

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

CDV	Report on voting
91/1382/CDV	91/1428/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 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 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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

One of the factors of establishing a CAD library component description and land pattern standard is to adopt a fixed zero component orientation so that all CAD images are built with the same rotation for the purpose of assembly machine automation.

The land pattern standards clearly define all the properties necessary for standardization and acceptability of a one world CAD library. The main objective in defining a one world CAD library is to achieve the highest level of electronic product development automation. This encompasses all the processes involved from engineering to PCB layout to fabrication, assembly and test. The data format standards need this type of consistency in order to meet the efficiency that electronic data transfer can bring to the industry.

Many large firms have spent millions of dollars creating and implementing their own unique standards for their own electronic product development automation. These standards are proprietary to each firm and are not openly shared with the rest of the industry. This has resulted in massive duplication of effort, costing the industry millions of man hours in waste and creating industry chaos and global non-standardization.

The main purpose of creating the land pattern standards is to achieve reliable solder joint formation platforms; the reason for developing the data transfer structure is to improve the efficiency with which engineering intelligence is converted into manufacturing reality. Even if the neutral CAD format can drive all the manufacturing machines, it would be meaningless unless the component description standard for CAD land patterns were implemented with some consistency. Zero component orientation has a key role in machine automation.

The obvious choice for global standardization for EE hardware engineering, PCB design layout, manufacturing, assembly and testing processes is to incorporate the standard land pattern conventions. Any other option continues the confusion and additional manual hours of intervention in order to achieve the goals of automation. In addition, the ease of having one system export a file so that another system can accomplish the work can require unnecessary manipulation of the neutral format in order to meet the object of clear, unambiguous software code.

The design of any assembly will continue to permit arrangement and orientation of components at any orientation consistent with design standards. Starting from a commonly understood data capture concept will benefit the entire supply chain.

This standard defines angle and origin point of land patterns for land pattern designing.

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

### Part 7: Electronic component zero orientation for CAD library construction

#### 1 Scope

This part of IEC 61188 establishes a consistent technique for the description of electronic component orientation, and their land pattern geometries. This facilitates and encourages a common data capture and transfer methodology amongst and between global trading partners.

#### 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 61188-5 (all parts), *Printed boards and printed board assemblies – Design and use – Part 5-x: Attachment (land/joint) considerations*

#### 3 Terms and definitions

No terms and definitions are listed in this document.

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 Basic rules

##### 4.1 Common rules

Common rules are divided into two groups: level A and level B. The main difference between the rules is the original orientation within the CAD system library. This orientation may be any version that the designer finds useful including his own version; however, when the information is transferred to an assembler, the orientation shall be properly defined without ambiguity or shall be corrected in order that any variation between the different systems are properly matched. This conversion of the CAD data to manufacturing information may include the datum of the board, fabrication panel or assembly array panel and shall have the proper orientation of all components on the board no matter what library was used as the original input.

##### 4.2 General basic rules

The following basic rules apply.

- Components and land patterns are drawn in top view.
- The component point of origin is shown by "+" or "x".



This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-