INTERNATIONAL STANDARD

IEC 61182-2

First edition
2006-09

Printed board assembly products – Manufacturing description data and transfer methodology –

Part 2: Generic requirements

Reference number
IEC 61182-2:2006(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)**

- **Catalogue of IEC publications**

  The on-line catalogue on the IEC web site (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 On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.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) 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
  Tel: +41 22 919 02 11
  Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC 61182-2

First edition
2006-09

Printed board assembly products – Manufacturing description data and transfer methodology –

Part 2: Generic requirements

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 Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE XH

For price, see current catalogue

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRINTED BOARD ASSEMBLY PRODUCTS – MANUFACTURING DESCRIPTION DATA AND TRANSFER METHODOLOGY –

Part 2: Generic requirements

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 61182-2 has been prepared by IEC technical committee 93: Design automation.

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

CDV	Report on voting
93/211/CDV	93/231/RVC

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 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.

PRINTED BOARD ASSEMBLY PRODUCTS – MANUFACTURING DESCRIPTION DATA AND TRANSFER METHODOLOGY –

Part 2: Generic requirements

1 Scope and object

This part of IEC 61182 specifies the XML Schema that represents the intelligent data file format used to describe printed board and printed board assembly products with details sufficient for tooling, manufacturing, assembly, and inspection requirements. This format may be used for transmitting information between a printed board designer and a manufacturing or assembly facility. The data is most useful when the manufacturing cycle includes computer-aided processes and numerical control machines.

The data can be defined in either English or International System of Units (SI) units.

1.1 Focus and intent

The generic format requirements are provided in a series of standards focused on printed board manufacturing, assembly, and inspection testing. This standard series consists of a generic standard (IEC 61182-2) that contains all the general requirements. There are four sectional standards that are focused on the XML details necessary to accumulate information in the single file, that addresses the needs of the design, fabrication, assembly and test disciplines producing a particular product.

The sectional standards (IEC 61182-2-1 through IEC 61182-2-4) paraphrase the important requirements and provide suggested usage and examples for the topic covered by the sectional standard.

1.2 Notation

Although the data would be contained in a single file, the file can have different purposes as described in Clause 4. The XML Schema used for this standard follows the notations set forth by the W3C and is as follows:

element – Element appears exactly one time

element? – element may appear 0 or 1 times

element* – element may appear 0 or more times

element+ – element may appear 1 or more times

Any IEC 61182-2 file is composed of a high level element IEC 61182-2 that contains up to six sub-elements:

Content – information about the contents of the 258X file

LogisticHeader – information pertaining to the order and supply data

HistoryRec – change information of the file

Bom – Bill of Materials (Material List) information

Ecad – Computer Aided Design (engineering) information

Avl – Approved Vendors List information

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 60194, *Printed board design, manufacture and assembly – Terms and definitions*

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

IEC 61188-5-2, *Printed boards and printed board assemblies – Design and use – Part 5-2: Attachment (land/joint) considerations – Discrete components*

IEC 61188-5-3, *Printed boards and printed board assemblies – Part 5-3: Sectional design and use requirements – Attachment (land/joint) considerations – Components with Gull-wing leads on two sides*[1]

IEC 61188-5-4, *Printed boards and printed board assemblies – Design and use – Part 5-4: Sectional requirements – Attachment (land/joint) consideration – Components with J leads on two sides*[2]

IEC 61188-5-5, *Printed boards and printed board assemblies – Design and use – Part 5-5: Sectional requirements – Attachment (land/joint) considerations – Components with Gull-wing leads on four sides*[2]

IEC 61188-5-6, *Printed boards and printed board assemblies – Design and use – Part 5-6: Attachment (land/joint) considerations – Chip carriers with J-leads on four sides*

IEC 61188-5-8, *Printed boards and printed board assemblies – Design and use – Part 5-8 : Sectional Requirement – Attachment (land/joint) considerations – Area array components (BGA, FBGA, CGA, LGA)*[2]

3 Documentation conventions

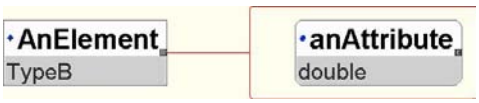
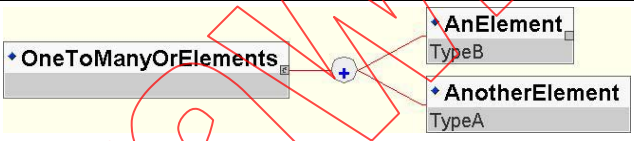
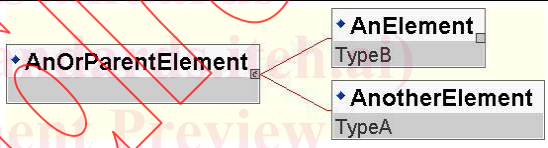
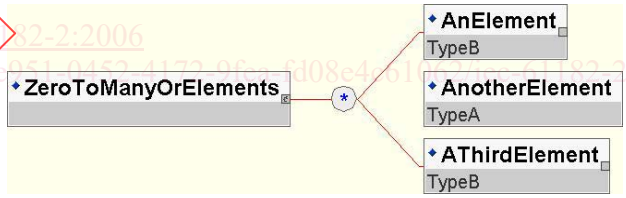
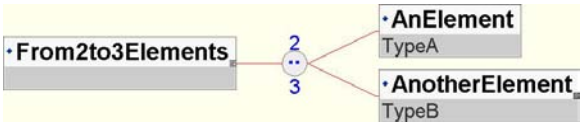
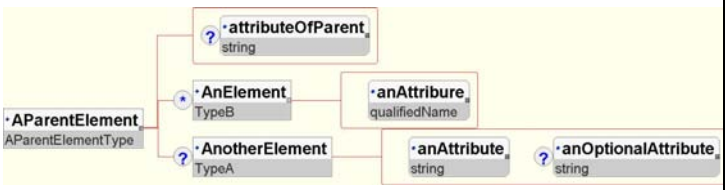
The XML file format standard and the XML Schema definition language standard, as defined by the World Wide Web Consortium (W3C), have been adopted by IEC for use in the IEC 61182 series of standards.

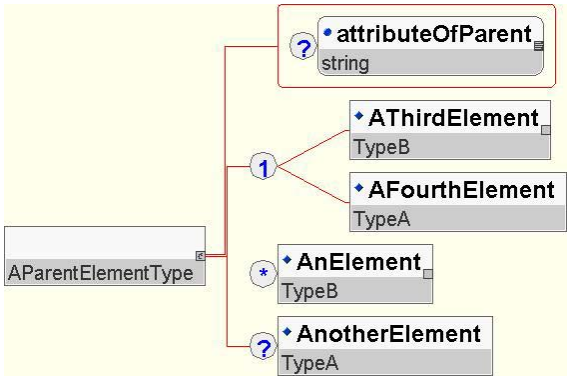
In addition to the text based schema notation, this document provides graphical representation of the structure of the file format. The XML diagrams are designed to effectively illustrate the structure and cardinality of elements and attributes that make up any IEC 61182-2 file. The notation in the graphics does not provide a complete visualization of the schema definition for the file format, but it does provide a good top down overview. Should there be any conflict between the graphical notation and the schema notation, the authoritative definition is the schema notation.

Table 1 provides an overview of the graphical notation used in the document.

[1] To be published.

Table 1– Graphical notation overview

This diagram depicts an element named AnElement that is of type TypeB. There is one attribute, named anAttribute, that is of type double. The attribute is required.	
Example: <AnElement anAttribute="14.44e-3"/> Note that all attribute values must be enclosed in quotes, regardless of type.	
This diagram depicts an element with two attributes. The attribute anAttribute is required. The "?" in the circle indicates that the second attribute, anOptionalAttribute, is optional. Both attributes are of type string.	
Examples: <AnotherElement anAttribute="red" anOptionalAttribute="a string" /> <AnotherElement anAttribute="blue" />	
The element OneToManyOrElements is the parent of an unordered list of one or more instances of the elements AnElement and AnothertElement. The "+" indicates the occurrence is one to many and the angled lines indicate this is a choice relationship ("|") between the children elements.	
< OneToManyOrParentElement>…	
The absence of an occurrence bubble declares that one and only one occurrence are allowed. The AnOrParentElement can have one of AnElement or AnotherElement as a child element.	
The '*' in the occurrence bubble indicates the choice is from 0 to many.	
This diagram depicts an element, From2to3Elements. The element has no type and no attributes. It can have from 2 to 3 sub-elements of either AnElement or AnotherElement.	
This diagram depicts an element, AParentElement, of type AParentElementType. This element has one attribute, attributeOfParent, which is optional. The lines with square corners indicate that occurrences of AnElement and AnotherElement must appear in the order by the illustration on the right where the top element is addressed first and AnotherElement is addressed secondly.	

This diagram depicts a type, AParentElementType, that contains a sequence starting with one of AThirdElement or AFourth element followed by 0-n AnElement and an optional final AnotherElement.	

4 Requirements

The XML Schema contained in this document describes the structure of a generic computer-aided manufacturing IEC 61182-2 exchange format. The document specifies data elements specifically designed to establish the information exchange related to the data needed by printed board manufacturing, and assembly including inspection of those products.

The XML Schema defines the configuration of mandatory and optional elements, as well as mandatory and optional attributes. The Top Level (TopElement) of the schema contains six major elements. The schema notation specifies that the 6 top-level elements are required to appear in the order shown in Figure 1. The order of appearance in the file is significant. For instance, the appearance of graphics on a layer is dependent on the order of appearance in the file. The order is also important because elements often reference information that is defined elsewhere in the file in order to eliminate redundancy within the file. The file is structured to allow all references to be resolved in one pass.

An implementation of the XML Schema must be able to facilitate the reading and/or writing of all characteristics defined within the requirements stated in the Mode function of this standard. Some tools may have only read capability; some may have only write capability. Some tools may have both read/write capability. All schema defined in the standard as mandatory (1-1, 1-n occurrences) **shall** be executed as appropriate. Tool providers **shall** identify their capability by Mode Level (Full, Design 1, 2 or 3, Fabrication 1, 2, or 3, etc.) plus 2581R (read-only); 2581W (write-only); or 2581RW (read and write).

Each element has a specific function or task. Accordingly, the information interchange for a specific purpose is possible only if that element is populated. The ability to select those characteristics that are appropriate for a given task makes the schema a robust methodology for defining only those areas and characteristics that are necessary to produce a given product. Figure 1 shows the children elements of the Top Element IEC 61182-2.