Surface mounting technology Part 1: Standard method for the specification of surface mounting components (SMDs)

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EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 61760-1:2006 sisaldab Euroopa standardi EN 61760-1:2006 ingliskeelset teksti. Käesolev dokument on jõustatud 22.09.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 61760-1:2006 consists of the English text of the European standard EN 61760-1:2006. This document is endorsed on 22.09.2006 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This International Standard gives a reference set of process conditions and related test conditions to be used when compiling component specifications of electronic components that are intended for usage in surface mount technology.	**Scope:** This International Standard gives a reference set of process conditions and related test conditions to be used when compiling component specifications of electronic components that are intended for usage in surface mount technology.

ICS 31.240

Võtmesõnad: specification, surface mounting component, surface mounting technology

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61760-1

July 2006

ICS 31.240

Supersedes EN 61760-1:1998

English version

Surface mounting technology
Part 1: Standard method for the specification of surface mounting components (SMDs)
(IEC 61760-1:2006)

Technique du montage en surface
Partie 1: Méthode de normalisation pour la spécification des composants montés en surface (CMS)
(CEI 61760-1:2006)

Oberflächenmontagetechnik
Teil 1: Genormtes Verfahren zur Spezifizierung oberflächenmontierbarer Bauelemente (SMDs)
(IEC 61760-1:2006)

This European Standard was approved by CENELEC on 2006-06-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 61760-1:2006 E

Foreword

The text of document 91/577/FDIS, future edition 2 of IEC 61760-1, prepared by IEC TC 91, Electronics assembly technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61760-1 on 2006-06-01.

This European Standard supersedes EN 61760-1:1998.

The main changes with regard to EN 61760-1:1998 concern:

- requirements related to leadfree soldering;
- extension of the scope to include also components mounted by gluing;
- direct reference to EN 60068-2-58 for requirements on solderability and resistance to soldering heat;
- classification into categories based on the component's ability to withstand resistance to soldering heat has been deleted.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2007-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-06-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61760-1:2006 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-1	NOTE	Harmonized as EN 60068-1:1994 (not modified).
IEC 60068-2-69	NOTE	Harmonized as EN 60068-2-69:1996 (not modified).

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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

Publication	Year	Title	EN/HD	Year
IEC 60062 (mod)	-[1)]	Marking codes for resistors and capacitors	EN 60062	2005[2)]
IEC 60068	Series	Environmental testing	EN 60068	Series
IEC 60068-2-21	-[1)]	Environmental testing Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	1999[2)]
IEC 60068-2-45 + A1	1980 1993	Environmental testing Part 2: Tests - Test Xa and guidance: Immersion in cleaning solvents	EN 60068-2-45 + A1	1992 1993
IEC 60068-2-58	-[1)]	Environmental testing Part 2-58: Tests - Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)	EN 60068-2-58	2004[2)]
IEC 60068-2-77	-[1)]	Environmental testing Part 2-77: Tests - Test 77: Body strength and impact shock	EN 60068-2-77	1999[2)]
IEC 60191-6	2004	Mechanical standardization of semiconductor devices Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages	EN 60191-6	2004
IEC 60194	-[1)]	Printed board design, manufacture and assembly - Terms and definitions	EN 60194	2006[2)]
IEC 60286-3	-[1)]	Packaging of components for automatic handling Part 3: Packaging of surface mount components on continuous tapes	EN 60286-3	1998[2)]
IEC 60286-4	-[1)]	Packaging of components for automatic handling Part 4: Stick magazines for electronic components encapsulated in packages of form E and G	EN 60286-4	1998[2)]

[1)] Undated reference.

[2)] Valid edition at date of issue.

Publication	Year	Title	EN/HD	Year
IEC 60286-5	-[1)]	Packaging of components for automatic handling Part 5: Matrix trays	EN 60286-5	2004[2)]
IEC 60286-6	-[1)]	Packaging of components for automatic handling Part 6: Bulk case packaging for surface mounting components	EN 60286-6	2004[2)]
IEC 60749	Series	Semiconductor devices - Mechanical and climatic test methods	EN 60749	Series
IEC 61340-5-1	-[1)]	Electrostatics Part 5-1: Protection of electronic devices from electrostatic phenomena - General requirements	EN 61340-5-1	2001[2)]
IEC 61760-2	-[1)]	Surface mounting technology Part 2: Transportation and storage conditions of surface mounting devices (SMD) - Application guide	EN 61760-2	1998[2)]
IEC 62090	-[1)]	Product package labels for electronic components using bar code and two-dimensional symbologies	EN 62090	2003[2)]
ISO 8601	-[1)]	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-

INTERNATIONAL STANDARD

IEC 61760-1

Second edition
2006-04

Surface mounting technology –

Part 1:
Standard method for the specification of surface mounting components (SMDs)

Reference number
IEC 61760-1:2006(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.

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INTERNATIONAL STANDARD

IEC 61760-1

Second edition
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Surface mounting technology –

Part 1:
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International Electrotechnical Commission
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PRICE CODE U

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SURFACE MOUNTING TECHNOLOGY –

Part 1: Standard method for the specification of surface mounting components (SMDs)

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.
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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 61760-1 has been prepared by IEC technical committee 91: Surface mounting technology.

This second edition cancels and replaces the first edition, published in 1998, and constitutes a technical revision.

The main changes with regard to the previous edition concern:

– requirements related to leadfree soldering;
– extension of the scope to include also components mounted by gluing;
– direct reference to IEC 60068-2-58 for requirements on solderability and resistance to soldering heat;
– classification into categories based on the component's ability to withstand resistance to soldering heat has been deleted.

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

FDIS	Report on voting
91/577/FDIS	91/588/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.

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 publication may be issued at a later date.

INTRODUCTION

Specifications for electronic components have in the past been formulated for each component family. The regulations for environmental tests have been selected from IEC 60068 and other IEC and ISO publications. The overriding condition for this procedure was that all components, once installed in a piece of equipment, had to satisfy certain criteria.

The introduction and increasing use of surface mounting components make it necessary to extend the existing requirements to include those arising from processing during assembly.

Irrespective of the component family involved, all components on one and the same side of a printed circuit board are exposed to the same mounting process (see flow charts in Clause 5).

Nevertheless there exists no harmonized standard that prescribes the content of a component specification. It is the purpose of this standard to define the general requirements for component specifications derived from the assembly processes. This is done in three steps.

In the first step general requirements for component specifications and component design related to the handling and placement of the component on the substrate are given (Clause 4). In the second step the definition of reference process conditions as representative of a group of assembly conditions are given (Clauses 5 and 6).

In the third step the additional requirements resulting from these reference process conditions are given (Clause 7).

Mixed technology boards, i.e. boards containing through-hole components and SMDs, require additional consideration with respect to the through-hole components. These may be subject to the same requirements as the SMDs. Persons responsible for drafting specifications for “non-surface mounting components” wishing to include a statement on their ability to withstand surface mounting conditions should use the classifications and tests set out in the present standard.

SURFACE MOUNTING TECHNOLOGY –

Part 1: Standard method for the specification of surface mounting components (SMDs)

1 Scope and object

1.1 Scope

This International Standard gives a reference set of process conditions and related test conditions to be used when compiling component specifications of electronic components that are intended for usage in surface mount technology.

1.2 Object

The object of this standard is to ensure that a wide variety of SMDs (passive and active) can be subjected to the same placement and mounting processes during assembly. This standard defines tests and requirements that need to be part of any SMD component general, sectional or detail specification. In addition, this standard provides component users and manufacturers with a reference set of typical process conditions used in surface mount technology.

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 60062, *Marking codes for resistors and capacitors*

IEC 60068 (all parts), *Environmental testing*

IEC 60068-2-21, *Environmental testing – Part 2: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-45:1980, *Environmental testing – Part 2: Tests – Test XA and guidance: Immersion in cleaning solvents*
Amendment 1 (1993)

IEC 60068-2-58, *Environmental testing – Part 2: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMDs)*

IEC 60068-2-77, *Environmental testing – Part 2: Tests – Test 77: Body strength and impact shock*

IEC 60191-6:2004, *Mechanical standardization of semiconductor devices – Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages*

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

IEC 60286-3, *Packaging of components for automatic handling – Part 3: Packaging of surface mount components on continuous tapes*

IEC 60286-4, *Packaging of components for automatic handling – Part 4: Stick magazines for electronic components encapsulated in packages of form E and G*

IEC 60286-5, *Packaging of components for automatic handling – Part 5: Matrix trays*

IEC 60286-6, *Packaging of components for automatic handling – Part 6: Bulk case packaging for surface mounting components*

IEC 60749 (all parts), *Semiconductor devices – Mechanical and climatic test methods*

IEC 61340-5-1, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

IEC 61340-5-3, *Electrostatics – Protection of electronic devices from electrostatic phenomena – Test methods for packagings intended for electrostatic discharge sensitive devices*

IEC 61760-2, *Surface mount technology – Part 2: Transportation and storage conditions of surface mounting devices (SMD) – Application guide*

IEC 62090, *Product package labels for electronic components using bar code and two dimensional symbologies*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

3 Terms and definitions

For the purposes of this document, the following definitions apply, as do those of IEC 60194.

NOTE Use of the term “chip” as for a surface mounting component is deprecated. Only the terms "SMD" or "surface mounting component" should be used within IEC.

3.1
adhesive
substance such as glue or cement used to bond objects together

NOTE In surface mounting technology different gluing systems are used.

– Non conductive adhesive (only for mechanical connection)
– Electrical conductive adhesive (for electrical and mechanical connection)
– Thermal conductive adhesive (for thermal and mechanical connection)
– Combination of electrical and thermal conductive adhesive.

Most used adhesives are thermal curing systems but there are also UV-curing systems in use.

3.2
centring force
force required by the pick-up tooling to centre a surface mounting device in its proper location on a substrate

3.3
coplanarity
distance in height between the lowest and highest leads when the component is in its seating plane