INTERNATIONAL STANDARD

IEC 61760-1

Second edition
2006-04

Surface mounting technology –

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

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SURFACE MOUNTING TECHNOLOGY –

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

FOREWORD

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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- withdrawn;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.

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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.

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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.

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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*

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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*

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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.

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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

3.4
dewetting
condition that results when molten solder coats a surface and then recedes to leave irregularly-shaped mounds of solder that are separated by areas that are covered with a thin film of solder and with the basis metal not exposed

3.5
dissolution of metallization
process of dissolving metal or a plated metal alloy, usually by introduction of chemicals. For the purpose of this document the dissolution of metallization also includes dissolution by exposure to molten solder

3.6
immersion attitude
positioning of an object when immersed in a solder bath

3.7
lead-free component
component where lead content in the materials is equal or less than 0,1 % by weight per material used

3.8
Montreal protocol
agreement by industrialized nations, at a meeting held in Montreal, Canada, to eliminate chlorofluorocarbons from all processes by 1995

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3.9
pick-up force
dynamic force exerted on the body of a component – generally from above – and its seating plane during the pick-up of the component (e.g. from a tape or tray); the maximum level is normally taken into account

3.10
placement force
dynamic force exerted on the component body – generally from above – and its seating plane

NOTE This occurs during the period between the component's first contact with the substrate (or the soldering paste or adhesive etc.) and its coming to rest. The maximum level is normally taken into account.

3.11
resistance to soldering heat
ability of a component to withstand the effects of the heat generated by the soldering process

3.12
seating plane
surface on which a component rests

3.13
solderability
ability of a metal to be wetted by molten solder

3.14
solder meniscus
contour of a solder shape that is the result of the surface tension forces that take place during wetting