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

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Titre :

Title :

IEC 61760-1, Ed.2: Surface mounting technology - Part 1: Standard method for the specification of surface mounting components (SMDs)

Note d'introduction

Introductory note

La version française sera diffusée ultérieurement.

**French version will be circulated later**

ATTENTION	ATTENTION
CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)	Parallel IEC CDV/CENELEC Enquiry

## SURFACE MOUNTING TECHNOLOGY –

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

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**INTERNATIONAL ELECTRO-TECHNICAL COMMISSION**

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**SURFACE MOUNTING TECHNOLOGY –****Part 1: Standard method for the specification  
of surface mounting components (SMDs)****FOREWORD**

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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International Standard IEC 61760-1 has been prepared by IEC technical committee 91: Surface mounting technology.

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

FDIS	Report on voting
91/134/FDIS	91/145/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.

(IEC 61760-1: 1998  
Revision: 2003)

## 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 Section 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 (chapter 4). In the second step the definition of reference process conditions as representative of a group of assembly conditions are given (Section 5 and 6).

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

In the revised edition of 2002 besides maintenance editing following changes have been implemented:

- 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.
- The classification in categories based on the components ability to withstand resistance to soldering heat has been deleted.

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.

## 1 Scope of the present standard

### Scope

The scope of this standard is all specifications of electronic components that are intended for usage in surface mount technology.

### Purpose

The purpose 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. Hereto this standard defines test and requirements that need to be part of any SMD component general, sectional or detail specification. Further 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 normative documents contain provisions that, through references contained in this text, constitute an integral part of IEC 61760-1. The versions indicated below were valid at the time of publication of this standard. All standards are subject to revision, and parties to agreements based on this section of IEC 61760-1 are therefore requested to verify whether it is possible to apply the most recent versions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60062, *Marking codes for resistors and capacitors*

IEC 60068 (all parts), *Environmental testing* 61760-1:2006

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-20, *Environmental testing – Part 2: Tests – Test T: Soldering*

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

IEC 60068-2-45, *Environmental testing – Part 2: Tests – Test XA and guidance: Immersion in cleaning solvents*

IEC 60068-2-77, *Resistance to body impact force*

IEC 60068-2-58, *FDIS 2003 Environmental testing – Part 2: Tests – Test Td: Solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMDs)*

IEC 60068-2-69, *Environmental testing – Part 2: Tests – Test Te: Solderability testing of electronic components for surface mounting technology by the wetting balance method*

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

IEC 60194, *Terms and definitions for printed circuits*

IEC 60286-3, *Packaging of components for automatic handling – Part 3: Packaging of leadless 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 packages intended for electrostatic discharge sensitive devices*

IEC 61760-2, *Application guide for transportation and storage conditions of surface mounting devices*

IEC 62090, *Product Package Labels For Electronic Components Using Bar Code and Two Dimensional Symbolologies*

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

### 3 Definitions

For the purpose of this standard, the following definitions apply, as also 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

A substance such as glue or cement used to bond objects together. 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

The force required by the pick-up tooling to center a surface mounting device in its proper location on a substrate.

#### 3.3 Coplanarity

The distance in height between the lowest and highest leads when the component is in its seating plane.

### 3.4 Dewetting

A 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

The 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

The positioning of an object when immersed in a solder bath.

### 3.7 Leadfree component

A component is defined as leadfree, when the lead content in the materials is equal or less than 0,1 % by weight per material used..

### 3.8 Montreal Protocol

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

### 3.9 Pick-up force

A 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

A dynamic force exerted on the body of a component body – generally from above – and its seating plane. 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

The ability of a component to withstand the effects of the heat generated by the soldering process.

### 3.12 Seating plane

The surface on which a component rests.

### 3.13 Solderability

The ability of a metal to be wetted by molten solder.

### 3.14 Solder meniscus

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

### 3.15 Stand off

The distance between seating plane of the component and the seating plane of the terminations.

### 3.16 Substrate

The basic material, forming the support structure of an electronic circuit.

### 3.17 Surface mounting component

An electronic component designed for mounting on to terminal pads or conducting tracks on the surface of substrate.