

Surface mounting technology —

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

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National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 22 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

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

(IEC 61760-1:1998)

Technique du montage en surface
Partie 1: Méthode de normalisation pour
la spécification des composants montés
en surface (CMS)
(CEI 61760-1:1998)

Oberflächenmontagetechnik
Teil 1: Genormtes Verfahren zur
Spezifizierung oberflächenmontierbarer
Bauelemente (SMD)
(IEC 61760-1:1998)

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CENELEC

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

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Foreword

The text of document 91/134/FDIS, future edition 1 of IEC 61760-1, prepared by IEC TC 91, Surface mounting technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61760-1 on 1998-10-01.

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) 1999-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-07-01

Annexes designated “normative” are part of the body of the standard.

In this standard, Annex A and Annex ZA are normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61760-1:1998 was approved by CENELEC as a European Standard without any modification.

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Introduction

Traditionally, specifications for electronic components have been developed within each component family, with environmental tests being selected from IEC 60068 and other IEC and ISO publications in an acknowledgement that all components, once in an equipment, satisfy certain criteria.

The introduction and increasing use of surface mounting techniques make it necessary to extend the traditional requirements to those arising from the assembly processing.

Irrespective of component family, all components on the same side of a substrate are likely to be submitted to the same initial soldering process (see flow chart in 5.1).

It is the purpose of this standard to give the requirements of the assembly processes. This is achieved in two steps.

The first step is the definition of reference process conditions as representative of a group of assembly processes.

In the second step, the additional requirements arising from these reference process conditions are given. There is a need to include the ability of a component to withstand a particular assembly process in the IEC quality assessment system. Such a target can only be achieved by defining appropriate tests relevant to the various assembly processes. This calls for a classification of components according to their suitability for a particular assembly process.

The classification of surface mounting components is based on assembly processes according to the reference process conditions defined in this standard. For each class the appropriate tests and requirements are given.

It is the responsibility of the manufacturer to state whether a component is a surface mounting component and to give its class, which is given in the detail specification together with the appropriate test procedures selected from this standard.

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 submitted to the same process conditions as the SMDs, and specifications writers wishing to include in detail specifications an assessment of the ability of non-surface mounting components to withstand surface mounting conditions should use the classifications and tests of this standard.

1 Scope

This International Standard gives a reference set of process conditions and related test conditions to be used when compiling component specifications.

The objective is that SMDs of different natures (passive, active), conforming to this standard and to the appropriate component standard, can be assembled and mounted on a substrate by the use of a common soldering process. To this end, the components should be classified according to the severities of the process for which they are designed.

This standard applies to all electronic components covered by the IEC system which require an assessment with respect to their application to surface mounting.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60062:1992, *Marking codes for resistors and capacitors*.

IEC 60068 (all parts), *Environmental testing*.

IEC 60068-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 60068-2-20:1979, *Environmental testing — Part 2: Tests — Test T: Soldering*.

IEC 60068-2-21:1983, *Environmental testing — Part 2: Tests — Test U: Robustness of terminations and integral mounting devices*

Amendment 2 (1991).

IEC 60068-2-45:1980, *Environmental testing — Part 2: Tests — Test XA and guidance: Immersion in cleaning solvents*

Amendment 1 (1993).

IEC 60068-2-58:1989, *Environmental testing — Part 2: Tests — Test Td: Solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMDs).*

IEC 60068-2-69:1995, *Environmental testing — Part 2: Tests — Test Te: Solderability testing of electronic components for surface mounting technology by the wetting balance method.*

IEC 60191-6:1990, *Mechanical standardization of semiconductor devices — Part 6: General rules for the preparation of outline drawings of surface mounted semiconductor device packages.*

IEC 60194:1988, *Terms and definitions for printed circuits.*

IEC 60249-2 (all specifications), *Base materials for printed circuits — Part 2: Specifications.*

IEC 60249-2-4:1987, *Base materials for printed circuits — Part 2: Specifications — Specification No. 4: Epoxide woven glass fabric copper-clad laminated sheet, general purpose grade.*

IEC 60249-2-5:1987, *Base materials for printed circuits — Part 2: Specifications — Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test).*

IEC 60286 (all parts), *Packaging of components for automatic handling.*

IEC 60286-3:1991, *Packaging of components for automatic handling — Part 3: Packaging of leadless components on continuous tapes.*

IEC 60286-4:1997, *Packaging of components for automatic handling — Part 4: Stick magazines for electronic components encapsulated in packages of form E and G.*

IEC 60286-5:1995, *Packaging of components for automatic handling — Part 5: Matrix trays.*

3 Definitions

For the purpose of this International Standard, the following definitions apply as do those of IEC 61194.

NOTE Use of the term “chip” is deprecated as a surface mounting term. The IEC should use either “SMD” or “surface mounting component”.

3.1

adhesive

a substance such as glue or cement used to stick objects together. In surface mounting an epoxy adhesive is used to stick SMDs to the substrate

3.2

centering force

dynamic force exerted on the side faces of the component body and/or the terminations of a component during its mechanical alignment in a placement equipment. Normally, the maximum value is considered

3.3

coplanarity

the difference 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, then recedes, to leave irregularly shaped mounds of solder that are separated by areas covered with a thin film of solder

3.5

dissolution of metallization

the loss or removal of metal or metal alloy coating during exposure to molten solder

3.6

immersion attitude

the geometrical positioning of an object when immersed in a solder bath

3.7**montreal protocol**

an agreement signed by governments of nations, at a meeting held in Montreal, Canada, to minimize the use of ozone-depleting chemicals

3.8**pick-up force**

dynamic force exerted on the component body — generally the top face — and seating plane of the component body during the pick-up of the component from its packaging medium (such as tape or tray). Normally, the maximum value is considered

3.9**placement force**

dynamic force exerted on the component body — generally the top face — and seating plane of the component body. This occurs in the period between the moment of first contact of the component with the substrate (or paste or adhesive, etc.) and the moment at which the component has come to rest. Normally, the maximum value is considered

3.10**seating plane**

the surface on which a component rests

3.11**solder meniscus**

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

3.12**solderability**

a quantitative measure of the ability of a surface to wet with a solder alloy

3.13**soldering heat, resistance to**

the ability of a component to withstand the heat transferred to it by the soldering process

3.14**substrate**

the basic material which forms the support structure of an electronic circuit

3.15**surface mounting device**

an electronic component designed for mounting onto pads or tracks on the surface of a conductive pattern of a substrate

3.16**wetting**

a physical phenomenon of liquids, usually in contact with solids, wherein the surface tension of the liquid has been reduced so that the liquid flows and makes intimate contact in a very thin layer over the entire substrate surface

4 General requirements**4.1 Contents of specifications**

When a generic or sectional specification covers SMD types, it should contain requirements as given in 4.2 to 4.8 below, together with the appropriate tests and requirements selected from clause 7.

4.2 Declaration of soldering process suitability

A sectional or detail specification for components intended for surface mounting applications shall state the component classification according to 6.2.