SLOVENSKI STANDARD
SIST-TS ES 59008-5-3:2007
01-januar-2007

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Data requirements for semiconductor die -- Part 5-3: Particular requirements and recommendations for die types - Minimally-packaged die

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Ta slovenski standard je istoveten z: ES 59008-5-3:2001

ICS:
31.080.01

SIST-TS ES 59008-5-3:2007 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN SPECIFICATION

SPÉCIFICATION EUROPÉENNE

EUROPÄISCHE SPEZIFIKATION

ES 59008-5-3

November 2001

English version

Data requirements for semiconductor die Part 5-3: Particular requirements and recommendations for die types - Minimally-packaged die

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This European Specification was approved by CENELEC on 2001-08-21.

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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

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Ref. No. ES 59008-5-3:2001 E

Foreword

This European Specification has been prepared by the CENELEC BTTF 97-1, Known Good Die.

It was submitted to the National Committees for comments and was agreed at the CENELEC BTTF 97-1 meeting on 2001-08-21.

The following date was fixed:

- latest date by which the existence of the ES has to be announced at national level (doa) 2002-02-01

The structure of this European Specification is as follows:

ES 59008 Data requirements for semiconductor die

- Part 1 General requirements
- Part 2 Vocabulary
- Part 3 Mechanical, material and connectivity requirements
- Part 4 Specific requirements and recommendations
  - Part 4-1 Test and quality
  - Part 4-2 Handling and storage
  - Part 4-3 Thermal
  - Part 4-4 Electrical simulation
- Part 5 Particular requirements and recommendations for die types
  - Part 5-1 Bare die
  - Part 5-2 Bare die with added connection structures
  - Part 5-3 Minimally packaged die
- Part 6 Exchange data formats and data dictionary
  - Part 6-1 Data exchange - DDX
  - Part 6-2 Data dictionary

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Introduction

This European Specification has been developed to facilitate the selection of unpackaged and minimally packaged semiconductor die, with or without connection structures in order to save both design and procurement time.

It is a data specification which defines the requirements of

- product identity,
- product data,
- die mechanical information,
- test, quality and reliability information,
- handling, storage and mounting information,
- thermal data and electrical simulation data.

This document was prepared by CENELEC Task Force CLC/BTTF 97-1 Known Good Die.

Other organisations that helped prepare it were: the ESPRIT GOOD-DIE projects, EECA, Sematech, DPC and EIAJ.

This specification was derived from the work carried out in the ESPRIT 4th Framework project GOOD-DIE. This project was set up to develop a database for the selection of unpackaged and minimally packaged semiconductor die, with or without connection structures, and for the downloading of information to CAD design stations to facilitate the layout and simulation of MCMs and hybrid circuits. During the early part of the GOOD-DIE project the need was identified for a standard way of presenting information for the selection and procurement of these components.

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1 Scope

This European Specification specifies requirements for the exchange of data pertaining to bare semiconductor die with or without connection structures, and minimally-packaged semiconductor die.

This specification also gives recommendations for general industry good practice for handling bare die, with or without connection structures and minimally-packaged die.

ES 59008-5-3 specifies particular requirements and recommendations for minimally-packaged die (MPD) that are not contained elsewhere in this series of specifications.

This specification is for use by semiconductor manufacturers, suppliers, die processors and users of semiconductor die.

ES 59008-5-3 is to be read in conjunction with ES 59008-1, General requirements, with and ES 59008-3, Mechanical, material and connectivity requirements, and, where relevant, with ES 59008-4-1, ES 59008-4-2, ES 59008-4-3 and ES 59008-4-4.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of ES 59008-5-3.

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ES 59008	Data requirements for semiconductor die
ES 59008-1	Part 1: General requirements
ES 59008-2	Part 2: Vocabulary
ES 59008-3	Part 3: Mechanical, material and connectivity requirements
ES 59008-4-1	Part 4-1: Specific requirements and recommendations - Test and quality
ES 59008-4-2	Part 4-2: Specific requirements and recommendations - Handling and storage
ES 59008-4-3	Part 4-3: Specific requirements and recommendations - Thermal
ES 59008-4-4	Part 4-4: Specific requirements and recommendations - Electrical simulation
IPC/JEDEC J-STD-033	Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices"

3 Definitions

For the purposes of this European Specification, the definitions given in ES 59008-2, Vocabulary, and the following shall apply.

3.1
interposer
a material placed between two surfaces, giving electrical insulation, mechanical strength, and/or controlled mechanical separation. It may be used as a mechanism for redistributing electrical connections and/or allowing for differing thermal expansions between adjacent surfaces

4 Conformity levels

Conformity levels do not apply to this part of ES 59008 except where any item in this part of the standard is already covered by ES 59008-3, ES 59008-4-1, ES 59008-4-2, ES 59008-4-3 or ES 59008-4-4. This part provides recommendations for good industry practice when exchanging information about minimally-packaged die (MPD). All information specific to MPD is included in this part and may be used as a basis for a detailed supplier or user specification.

5 Specific recommendations – Design, selection, test and quality

This clause covers classes of information specifically related to the testing performed on the MPD by the supplier or related to the quality of the device supplied.

It should be assumed that the specification for the MPD will be treated as that usually given for a packaged product, and that standard test and quality routines, as for packaged product, will apply. As such, only details specific to MPD are covered here.

5.1 Encapsulation material

Information should be given on the nature of the material used for encapsulating the MPD and details of the encapsulation coverage and/or areas of coverage if the die is not fully or uniformly encapsulated.

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5.2 Distortion or dimensional tolerance of connections

Information should be given about dimensional tolerance and co-planarity of the connection structures that may affect mounting of the MPD.

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6 Specific recommendations - User or assembler related issues, techniques, best practice and material selection

This clause covers classes of information specifically of use to the user or assembler of MPDs including recommended assembly techniques, best practice for assembly and information on material selection for assembly.

6.1 Peak temperature and duration

Information should be given on the maximum recommended allowable peak assembly process temperature and time e.g. certain FLASH technologies may lose data when subjected to excessive temperature, and the glass transition temperature of any interposer material must not be exceeded during assembly.

6.2 Solder types and fluxing requirements

Information should be given on suggested solder types used to mount the MPD, especially any specific recommendations to enable lead-free soldering. Suggestions on flux material, on techniques for mounting using solder and for flux removal should also be given for MPDs.

6.3 Adhesive, underfill and attach limitations

Information should be given on adhesives and underfill that should either be used or avoided when mounting the MPD. Suggested limits on attach pressures, temperature and duration should also be given.

6.4 Chemical resistance

Advice should be given if the MPD is specifically known to be affected by any particular chemical reagent, especially those in common use within the fluxing and subsequent cleaning processes associated with electronic manufacture. Specific problems may occur with the encapsulation material, with reliability of the device or with device markings on the package.

6.5 Preconditioning prior to assembly

Information and advice should be given regarding any preconditioning required by the MPD prior to its assembly, and information as to the longevity and life-time of any preconditioning process should be made available. This should include such information as bake temperature, duration and cooling delays to prevent package “pop-corning”. The Moisture Sensitivity Level as defined by JEDEC J-STD-033 should be specified. Special requirements over and above those specified should also be given.

7 Specific recommendations – Identification, handling, including pick & place issues, and storage

This clause covers classes of information specifically related to the identification, handling and storage of MPD’s.

7.1 Fiducials and MPD identity marking

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Information should be provided on specific features or alignment marks provided on the MPD to enable pattern-recognition systems to orient the device and to provide for accurate placement of the device during assembly. Information on any mark or feature on the device that enables identity of the MPD including, if provided, lot traceability information.

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7.2 Unusual handling limitations

Details should be given of any abnormal maximum or minimum temperature, pressure, or acceleration excursions that should not be exceeded during handling or shipping the device.

7.3 Specific handling precautions when opening primary packing containing MPD

Details should be given of any specific precautions or environment that are required when opening primary packing containing product. This could be important where the product has been “dry-packed”, (generally involving a desiccant,) or vacuum packed, as usually there is a requirement to assemble within a specific time from opening the primary packing. Indications to this effect, and whether a desiccant is present, should appear on both the primary and secondary packing.

7.4 Orientation within primary packing

Information should be given regarding the orientation of the MPD in the primary packing.

7.5 Storage and acclimatisation

Information should be given on the recommended storage conditions or on the storage conditions to which the device has already been subjected. This is particularly important where the device should only be subjected to certain conditions for a limited period of time; either temperature, humidity, pressure or atmosphere. Information on storage, acclimatisation requirements or any other process needed immediately prior to assembly should be given

(refer to clause 6.5). The Moisture Sensitivity Level as defined by JEDEC J-STD-033 should be specified. Special requirements over and above those specified shall also be given.

8 Specific recommendations – Thermal, including modelling

This clause covers classes of information related to the intrinsic thermal characteristics of an MPD and the thermal performance of the device including any specific thermal modelling information specific to the use of the device type. Refer also to ES 59008-4-3.

8.1 TCE considerations

Information should be given on or related to the thermal co-efficient of expansion (TCE) of the package/encapsulation material where the mounting method or substrate material selection may affect the performance of the device.

8.2 Package dissipation and derating

Information should be given on the MPD package thermal power dissipation and any electrical derating required when operating at elevated temperatures.

9 Specific recommendations – Electrical, including simulation

This clause covers classes of information related to the intrinsic electrical characteristics of an MPD and the electrical performance of the device including any specific electrical simulation information. Refer also to ES 59008-4-4.

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9.1 Interconnect methods and dimensions

Recommendations should be made on the method of electrical and mechanical connection where interconnect length, resistance, capacitance or inductance may affect the device or system performance. In this case, the method of MPD attach and connection dimensions may also be detailed.

10 Specific recommendations - Application environment

This clause covers classes of information that should be given relating to the application environment to which the MPD may be subjected.

10.1 Radiation tolerance

Information and details should be given relating to the amount of radiation that the MPD may tolerate under specific conditions of use.

10.2 Upscreening concerns (exceeding manufacturer guidelines)

Information and details should be given relating to manufacturer's warranty where the device is upscreened or used beyond the guaranteed operating limits.

10.3 Extended temperature

Information and details should be given relating to extended temperature use of the MPD e.g. specialist devices designed to work at the extreme temperatures present at the head of an oil well.