



**SLOVENSKI STANDARD**  
**SIST-TS ES 59008-5-1:2007**  
**01-januar-2007**

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Data requirements for semiconductor die -- Part 5-1: Particular requirements and recommendations for die types - Bare die

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English version

**Data requirements for semiconductor die  
Part 5-1: Particular requirements and recommendations for die types -  
Bare die**

This European Specification was approved by CENELEC on 2001-02-05.

CENELEC members are required to announce the existence of this ES in the same way as for an EN and to make the ES available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

[SIST-TS ES 59008-5-1:2007](https://standards.iteh.ai/catalog/standards/sist/6000118/614018/59008-5-1-2001)

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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**

## Foreword

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

It was submitted to the vote during the meeting of BTTF 97-1 and approved by CENELEC as ES 59008-5-1 on 2001-02-05.

The following date was fixed:

- latest date by which the existence of the ES  
has to be announced at national level (doa) 2001-06-01

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 4<sup>th</sup> 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 59008-5-1 specifies particular requirements and recommendations for bare die and wafers 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 59008-5-1 is to be read in conjunction with ES 59008-1, General requirements, and ES 59008-3, Mechanical, material and connectivity requirements, and, where relevant, 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 59008-5-1.

ES 59008-1 *Data requirements for semiconductor die -- 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, assembly 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*

EIA/JESD49 *Procurement standard for Known Good Die (KGD) February 1996*

FED-STD-209 *Clean room and workstation requirements, controlled environments*

## 3 Definitions

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

## 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 die. All information specific to a bare die or wafer form is included in this part and should be used as a basis for a detailed supplier or user specification.

## 5 Specific recommendations – Test and quality

### 5.1 General

This clause contains classes of information specifically related to the testing performed on the die or wafer by the supplier or related to the quality of the die or wafer supplied.

### 5.2 Wafer map or binning information

Wafer map or other method of identifying good devices, except where method is simple inking of rejects using a single ink colour. If dual or multiple colour inking is used, the wafer map or binning information should show the meaning of the different ink colours.

### 5.3 Photo and thermal sensitive devices

Details about die that are sensitive to light or temperature and require testing in a controlled environment to obtain correct electrical test results.

### 5.4 Traceability

Information that links the individual die or batch to the manufacturer's traceability system. Traceability to an individual wafer within a wafer run may be necessary.

### 5.5 Wafer probing information

Information or recommendations with regard to wafer probing.

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

### 6.1 General

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

### 6.2 Die attach material

Suggested die attach material and properties for proper and effective mounting of the die. This may be important for die with high thermal dissipation or requiring a conductive connection. This should also mention if particular die attach methods are not recommended i.e. polymer die attach, silicon-gold eutectic or other specific die attach.

### 6.3 Bonding method

Any suggested bonding methods that should be used for proper and effective functioning of the die when assembled (e.g. thermo-compression bonding).

#### **6.4 Bond pad surface**

Information about the mechanical construction or surface metallisation of the bond pad which may affect the bonding or bump preparation of the die.

#### **6.5 Bond wire information**

Suggested bond wire type, size, bonding sequence and specific information for any down bonds required for proper functioning of the die.

#### **6.6 Power bonds**

Quantity of bond wires on power and ground pins, and stitch-bond (connection) requirements between ground pins for proper and effective bonding of the power connections.

#### **6.7 Die substrate (backside) connection**

Information on the electrical bias of the die substrate (or backside of die). This should always be detailed where a connection is required to enable proper functioning of the die.

#### **6.8 Peak temperature and duration**

Maximum recommended allowable peak die assembly process temperature and time e.g. certain FLASH technologies may lose data when subjected to excessive temperature.

#### **6.9 Unusual material**

Non-standard or unusual material properties (e.g. Silicon on Sapphire substrate), where special processing may be required.

#### **6.10 Die coat material, thickness and process**

Any die coat that is required for the proper functioning of the device when mounted. Recommendations should be advised as necessary on die coat material, thickness and process required. Special mention should be made of devices that are sensitive to photo or ionizing radiation which need a particular coating material to function correctly.

#### **6.11 Die attach limitations**

Suggested limits on die attach pressures, temperature and duration.

#### **6.12 Backside surface roughness**

The surface roughness of the back of the die or wafer. This may be important for an effective die mounting process.

### **7 Specific recommendations – Handling, including wafer saw and pick & place issues, and storage**

#### **7.1 General**

This clause contains classes of information specifically related to the handling and storage of die or wafers, in particular, issues related to wafer saw, pick & place and industry best practice on the handling and storage of die and wafers.



## 7.2 Saw kerf shape and saw line width

The width of the saw line and the resultant shape and dimensions of the saw kerf, e.g. a 25 micron saw blade giving a 40 micron kerf width.

## 7.3 Redundancy or programmable fuse areas

Any area of the die that has redundancy, repair or programmable control fuse features. This is important during inspection of the die since such areas may differ from die to die or exhibit apparent damage i.e. fuse links used to trim the offset of high accuracy operational amplifiers or voltage references.

## 7.4 Fiducials

Information on specific features or alignment marks provided on the die or wafer to enable vision systems to orient the die and to provide for accurate placement of the die during assembly or accurate stepping of the die during wafer probing or sawing.

## 7.5 Die identity marking

Information on any mark or feature on the die that enables identity of the die including, if provided, lot traceability information. This may be in the form of a code or 2D matrix as part of the metal mask of the die or by a laser mark on the reverse side of the die. In the case of programmable die, this information is sometimes held in the fuse or programmable array of the die. In this case, the method used to enable access to the area that contains this information should also be provided. The identity mark could also be a fiducial.

## 7.6 Wafer identity

Identity of the individual wafer, usually etched into or marked on the edge of the wafer, which is important to relate to a wafer map where the wafer is not inked.

## 7.7 Unusual handling limitations

Information detailing maximum or minimum temperature, pressure, or acceleration excursions that should not be exceeded during handling or shipping the device. This is particularly important for some sensor MEMS which could be damaged if the maximum conditions are exceeded. This information should appear on the secondary packing.

## 7.8 Specific handling precautions when opening primary packing containing die

Information detailing specific precautions or environment that should be used when opening primary packing containing product. This could be important where the die is a sensor or MEMS which is sensitive to a particular environment or where a particular method of shipment has been used e.g. a pressurised container for a pressure transducer containing a reference pressure within the device. This information should appear on both the primary and secondary packing.

## 7.9 Ionic contamination protection

Information relating to specific precautionary measures that should be taken to prevent ionic contamination of the die during handling due to e.g. spittle or human sweat.

## 7.10 Use of de-ionised water

Information detailing specific care to be taken in the use of de-ionised water where there is the possibility of creating voltaic cells and etching of metallised areas where different metals may be suspended in the water.