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Semiconductor die products –

Part 6: Requirements for information concerning thermal simulation

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DIE PRODUCTS –

Part 6: Requirements for information concerning thermal simulation

FOREWORD

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International Standard IEC 62258-6 has been prepared by IEC technical committee 47: Semiconductor devices.

This standard should be read in conjunction with IEC 62258-1 and IEC 62258-2.

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

FDIS	Report on voting
47/1870/FDIS	47/1883/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The structure of IEC 62258, as currently conceived, consists of the following parts under the general title *Semiconductor die products*:

Part 1: Requirements for procurement and use

Part 2: Exchange data formats

Part 3: Recommendations for good practice in handling, packing and storage (Technical Report)

Part 4: Questionnaire for die users and suppliers (Technical Report) (in preparation)

Part 5: Requirements for information concerning electrical simulation

Part 6: Requirements for information concerning thermal simulation

Part 7: XML schema for data exchange (Technical Report) (in preparation)

Further parts may be added as required.

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- withdrawn;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.

INTRODUCTION

This standard is based on the work carried out in the ESPRIT 4th Framework project GOODDIE which resulted in the publication of the ES 59008 series of European specifications. Organisations that helped prepare this part to IEC 62258 included the ESPRIT ENCAST project, the Die Products Consortium, JEITA, JEDEC and ZVEI.

SEMICONDUCTOR DIE PRODUCTS –

Part 6: Requirements for information concerning thermal simulation

1 Scope

This part of IEC 62258 has been developed to facilitate the production, supply and use of semiconductor die products, including:

- wafers;
- singulated bare die;
- die and wafers with attached connection structures;
- minimally or partially encapsulated die and wafers.

This part of IEC 62258 determines the information required to facilitate the use of thermal data and models for simulation of the thermal behaviour and verification of the correct functionality of electronic systems that include bare semiconductor die, with or without connection structures, and/or minimally packaged semiconductor die. It is intended to assist all those involved in the supply chain for die devices to comply with the requirements of IEC 62258-1 and IEC 62258-2.

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 62258-1: *Semiconductor die products – Part 1: Requirements for procurement and use*

IEC 62258-2: *Semiconductor die products – Part 2: Exchange data formats*

3 Terms and definitions

For the purposes of this document, the terms, definitions and acronyms as given in IEC 62258-1 apply.

4 General

To comply with IEC 62258-1, suppliers of die devices shall furnish information, which is necessary and sufficient for users of the devices at all stages of design, procurement, manufacture and test of products containing them..

It is expected that much of the information supplied will be in the public domain and available from such sources as manufacturers' data sheets. However, this standard does not place an obligation on a supplier to make information public. Any information that a supplier considers to be proprietary or commercially sensitive may be supplied under the terms of a non-disclosure agreement.

Requirements and recommendations provided in this standard apply to thermal simulation models used to perform an analysis on how the thermal excursions within the die affect the electrical performance of the die and system.

5 Requirements for information for thermal simulation

5.1 Requirements for bare die with or without added connection structures

5.1.1 General

This clause covers the requirements for bare die with or without added connection structures. The following information shall be given as a minimum together with any information needed to satisfy a specific thermal simulation model.

5.1.2 Operating temperature conditions

The range of temperature under which the device operates shall be stated.

5.1.3 Maximum junction temperature

The maximum allowable junction temperature shall be stated.

5.1.4 Extended junction temperature range

Further allowed junction temperatures exceeding the maximum junction temperatures with reduced lifetimes for the conditions in 5.1.2 should be stated where appropriate.

5.1.5 Power dissipation

Maximum power dissipation values under specified conditions shall be stated. Minimum and typical power dissipation values should also be given.

5.1.6 Distribution of heat sources

When possible, a plot of the die surface indicating the position and area of heat sources should be given.

5.1.7 Type and power of each heat source

The type and power of each heat source when possible, should be described, including whether the heat is generated in the die surface or the bulk substrate.

5.1.8 Thermal conductivity

The thermal conductivity of all materials should be given.

5.1.9 Specific thermal capacity

If a transient simulation is required, then the specific thermal capacity of all materials should be given.

5.2 Requirements for minimally-packaged die

5.2.1 General

Information as described in the following subclauses should be supplied in addition to any relevant information as defined in 5.1

Modelling methods for packaged devices may be appropriate for this type of die device.