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TECHNICAL REPORT

Semiconductor die products – Part 8: EXPRESS model schema for data exchange

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FOREWORD

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IEC 62258-8, which is a technical report, has been prepared by subcommittee 47: Semiconductor devices.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
47/1927/DTR	47/1952/RVC

Full information on the voting for the approval of this technical report 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.

A list of all parts in the IEC 62258 series, under the general title *Semiconductor die products,* can be found on the IEC website. 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- withdrawn,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 technical report 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 document included the ESPRIT ENCAST project, the Die Products Consortium, JEITA, JEDEC and ZVEI.

SEMICONDUCTOR DIE PRODUCTS –

Part 8: EXPRESS model schema for data exchange

1 Scope

This part of IEC 62258, which is a technical report, 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 Technical Report contains an EXPRESS model schema that describes the elements needed for data exchange and that will allow the implementation of the requirements of the IEC 62258-1, IEC 62258-5 and IEC 62258-6 standards, as well as providing an exchange structure that is complementary to those defined in IEC 62258-2. It is also complementary to and compatible with the questionnaire in IEC 62258-4.

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 60050 (all parts), *International Electrotechnical Vocabulary*

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

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

IEC/TR 62258-4, *Semiconductor die products – Part 4: Questionnaire for die users and suppliers*

IEC 62258-5, *Semiconductor die products – Part 5: Requirements for information concerning electrical simulation*

IEC 62258-6, *Semiconductor die products – Part 6: Requirements for information concerning thermal simulation*

ISO 10303-11:2004, *Industrial automation systems and integration – Product data representation and exchange – Part 11: Description methods: The EXPRESS language reference manual*

ISO 10303-21:2002, *Industrial automation systems and integration – Product data representation and exchange – Part 21: Implementation methods: Clear text encoding of the exchange structure*

3 Terms and definitions

For the purposes of this document, relevant terms, which are defined in IEC 60050 together with additional terms and acronyms as given in IEC 62258-1 apply.

4 General

The EXPRESS model schema given in this Technical Report complies with ISO 10303-11 and allows for exchange of data on die devices using the STEP Physical File format (SPF) as defined in ISO 10303-21.

To comply with IEC 62258-1, that standard requires that suppliers of die devices shall furnish information that is necessary and sufficient for users of die devices at all stages of design, procurement, manufacture and test of products containing them. The EXPRESS model schema at Annex A defines an exchange mechanism for structuring such information using a representation that complies with the schema and as such is intended as an aid to compliance with the standard.

Whilst it is expected that much of the information supplied will be in the public domain and available from such sources as manufacturers' data sheets, neither the standard nor the schema places 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.

5 Data exchange

The EXPRESS model schema at Annex A implements all the entities as defined by IEC 62258-2 for the DDX format. In addition, it includes additional entities extending the range of that data as follows:

- Expansion of data on organisations (manufacturer, supplier etc.) to include addresses and contacts
- Sub-division of some entities to make their values clearer.

Annex B contains an example of a STEP Physical File based on the model schema using a fictitious example similar to that employed in IEC 62258-2, extended to cover additional data requirements. It is possible that software may be available for conversion of data produced using the spreadsheet associated with IEC 62258-4 into this format. In any case, a wide range of tools is available commercially for handling and processing STEP files.

The electronic form of the schema contained in this Technical Report may be downloaded from the IEC website. The copyright conditions applying to the use of the electronic file are those that apply to IEC database standards, which permit the use of such information in electronic form for bona-fide e-commerce but do not permit its sale to third parties or other commercial use.

Annex A
(normative)

EXPRESS model schema

A.1 General

This Annex contains the full EXPRESS listing of the schema, annotated with comments and explanatory text. The order of text in this clause is determined primarily by the order imposed by the EXPRESS language, secondarily by importance.

```
*)
SCHEMA ddx_schema_version_2_0;
(*
```

A.2 Type definitions

This clause contains definitions for the types used within this EXPRESS model.

```
*)
TYPE date_type = STRING(10) FIXED;
END_TYPE;

TYPE text_type = STRING(255);
END_TYPE;

TYPE geometric_unit_type
= ENUMERATION OF (micron, metre, millimetre, inch, mil);
END_TYPE;

TYPE geometric_view_value
= ENUMERATION OF (top,bottom);
END_TYPE;

(*
**    A    distance    in    the    corresponding    "geometric_unit".
*)
TYPE geometric_value = REAL;
END_TYPE;

TYPE integer_value = INTEGER;
WHERE
  non_negative: SELF >= 0;
END_TYPE;
(*
```


Formal propositions:

non_negative: The integer is non-negative..

```
*)
TYPE angle_value
= INTEGER;
WHERE
  valid_value: {0 <= SELF <= 359};
END_TYPE;
(*
```

Formal propositions:

valid_value: The angle can take values from 0 to 359 degrees..

```
*)
TYPE celsius_value
= REAL;
END_TYPE;

TYPE time_value
= REAL;
END_TYPE;

TYPE watt_value
= REAL;
END_TYPE;

TYPE device_name_type
= TEXT_TYPE;
END_TYPE;

TYPE standards_compliance_type
= text_type;
END_TYPE;

TYPE additional_screening_type
= text_type;
END_TYPE;

TYPE reliability_calculation_type
= text_type;
END_TYPE;

TYPE product_status_type
= text_type;
END_TYPE;

TYPE testability_features_type
= text_type;
END_TYPE;

TYPE additional_test_type
= text_type;
END_TYPE;

TYPE form_of_supply_type
= text_type;
END_TYPE;

TYPE packing_code_type
= text_type;
END_TYPE;

TYPE wafer_die_step_size_type
= size_value;
END_TYPE;

TYPE wafer_gross_die_count_type
= integer_value;
END_TYPE;

TYPE wafer_index_type
= ENUMERATION OF (flat, notch);
END_TYPE;

TYPE wafer_index_orientation_type
= angle_value;
END_TYPE;

TYPE wafer_reticule_step_size_type
= size_value;
```

```
END_TYPE;

TYPE wafer_reticule_gross_die_count_type
= integer_value;
END_TYPE;

TYPE ic_technology_type
= text_type;
END_TYPE;

TYPE data_source_type
= text_type;
END_TYPE;

TYPE data_version_type
= text_type;
END_TYPE;

TYPE block_version_type
= text_type;
END_TYPE;

TYPE function_type
= text_type;
END_TYPE;

TYPE manufacturer_type
= text_type;
END_TYPE;

TYPE pad_metallisation_type
= text_type;
END_TYPE;

TYPE die_passivation_material_type
= text_type;
END_TYPE;

TYPE terminal_material_type
= text_type;
END_TYPE;

TYPE terminal_structure_type
= text_type;
END_TYPE;

TYPE type_number_type
= text_type;
END_TYPE;

TYPE die_name_type
= text_type;
END_TYPE;

TYPE die_semiconductor_material_type
= text_type;
END_TYPE;

TYPE die_back_detail_type
= text_type;
END_TYPE;

TYPE die_substrate_material_type
= text_type;
END_TYPE;

TYPE die_mask_revision_type
```