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**Semiconductor devices – Generic semiconductor qualification guidelines –
Part 1: Guidelines for IC reliability qualification**

**Dispositifs à semiconducteurs – Lignes directrices génériques concernant la
qualification des semiconducteurs –
Partie 1: Lignes directrices concernant la qualification de la fiabilité des circuits
intégrés**



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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Product categories and applications	8
5 Failure.....	9
5.1 Failure distribution	9
5.2 Early failure	10
5.2.1 Description	10
5.2.2 Early failure rate	11
5.2.3 Screening	15
5.3 Random failure	17
5.3.1 Description	17
5.3.2 Mean failure rate	18
5.4 Wear-out failure	21
5.4.1 Description	21
5.4.2 Wear-out failure rate.....	21
6 Reliability test.....	24
6.1 Reliability test description	24
6.2 Reliability test plan	24
6.2.1 Procedures for creating a reliability test plan	24
6.2.2 Estimation of the test time required to confirm the TDDB from the number of test samples	27
6.2.3 Estimation of the number of samples required to confirm the TDDB from the test time.....	28
6.3 Reliability test methods.....	29
6.4 Acceleration models for reliability tests	33
6.4.1 Arrhenius model	33
6.4.2 V-model.....	33
6.4.3 Absolute water vapor pressure model	33
6.4.4 Coffin-Manson model.....	33
6.5 Concept of family	34
6.5.1 General	34
6.5.2 Conducting life test using family	34
6.5.3 Verification of early failure rate using family	37
7 Stress test methods.....	39
8 Supplementary tests	40
9 Summary table of assumptions	40
10 Summary	42
Bibliography.....	43
Figure 1 – Bathtub curve.....	10
Figure 2 – Failure process of IC manufacturing lots during the early failure period.....	11
Figure 3 – Weibull conceptual diagram of the early failure rate	12

Figure 4 – Example of a failure ratio: α (in hundreds) and the number of failures for CL of 60 %	14
Figure 5 – Screening and estimated early fail rate in Weibull diagram.....	16
Figure 6 – Bathtub curve setting the point immediately after production as the origin.....	17
Figure 7 – Bathtub curve setting the point after screening as the origin.....	17
Figure 8 – Conceptual diagram of calculation method for the mean failure rate from the exponential distribution	18
Figure 9 – Conceptual diagram of calculation method for the mean failure rate as an extension of early failure	19
Figure 10 – Conceptual diagram of the wear-out failure	21
Figure 11 – Conceptual diagram describing the concept of the acceleration test.....	22
Figure 12 – Concept of the reliability test in a Weibull diagram (based on sample size)	26
Figure 13 – Concept of the reliability test in a Weibull diagram (based on test time)	29
Figure 14 – Difference in sampling sizes according to the m value (image)	30
Figure 15 – How the screening defect rate is seen depending on the difference of chip size (example)	37
Table 1 – Examples of product categories.....	9
Table 2 – Cumulative failure probability 0,1 % over 10 years [$\times 10^{-6}$] for the third, fifth and seventh years	26
Table 3 – Major reliability (life) test methods and purposes.....	31
Table 4 – Examples of the number of test samples and the test time in typical reliability (life) test methods	32
Table 5 – Concept of family (example).....	34
Table 6 – Concept of difference/failure mechanism/corresponding test item (examples).....	36
Table 7 – Factors for calculation examples of early failure rate using family data.....	38
Table 8 – LTPD sampling table for acceptance number $A_c = 0$	39
Table 9 – Major reliability (strength) test methods and purposes.....	39
Table 10 – Supplementary tests.....	40
Table 11 – Accelerating factors, calculation formulae and numerical values ^a	41

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES – GENERIC SEMICONDUCTOR QUALIFICATION GUIDELINES –

Part 1: Guidelines for IC reliability qualification

FOREWORD

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International Standard IEC 63287-1 has been prepared by IEC technical committee 47: Semiconductor devices.

This first edition of IEC 63287-1 cancels and replaces the first edition of IEC 60749-43 published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the document has been renamed and renumbered to distinguish it from the IEC 60749 (all parts);
- b) a new section concerning the concept of "family" has been added with appropriate renumbering of the existing text.

The text of this International Standard is based on the following documents:

DRAFT	Report on voting
47/2703/FDIS	47/2720/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 63287 series, published under the general title *Semiconductor, devices – Generic semiconductor qualification guidelines*, can be found on the IEC website.

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- reconfirmed,
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INTRODUCTION

This document provides guidelines for semiconductor IC vendors in the preparation of detailed reliability test plans for device qualification. Such plans are intended to be prepared before commencing qualification tests and after consultation with the user of their semiconductor integrated circuit product.

The guideline gives some examples for creating reliability qualification test plans to determine appropriate reliability test conditions based on the use conditions and requirements for each application of semiconductor integrated circuits. Categories are set for automotive applications and for general applications as a target of reliability. The grade for automotive use is further classified into two grades according to applications. The guideline assumes annual operating hours, useful life, etc. for each grade, and defines the verification methods for early failure rate and wear-out failure to propose appropriate reliability tests, and at the same time, presents concepts to properly ensure the quality of semiconductor integrated circuits using screening techniques which are designed to reduce the early failure rate.

The test conditions and the values of acceleration factors presented in this guideline are shown to provide examples of calculations for obtaining reliability test conditions in order to verify the required quality standards and are not designed to define the standards to ensure reliability of semiconductor integrated circuits.

NOTE Qualification tests are tests in which the semiconductor vendor takes account of the reliability required by its product users.

SEMICONDUCTOR DEVICES – GENERIC SEMICONDUCTOR QUALIFICATION GUIDELINES –

Part 1: Guidelines for IC reliability qualification

1 Scope

This part of IEC 63287 gives guidelines for reliability qualification plans of semiconductor integrated circuit products. This document is not intended for military- and space-related applications.

NOTE 1 The manufacturer can use flexible sample sizes to reduce cost and maintain reasonable reliability by this guideline adaptation based on EDR-4708, AEC Q100, JESD47 or other relevant document can also be applicable if it is specified.

NOTE 2 The Weibull distribution method used in this document is one of several methods to calculate the appropriate sample size and test conditions of a given reliability project.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60749-5, *Semiconductor devices – Mechanical and climatic test methods – Part 5: Steady-state temperature humidity bias life test*

IEC 60749-6, *Semiconductor devices – Mechanical and climatic test methods – Part 6: Storage at high temperature*

IEC 60749-15, *Semiconductor devices – Mechanical and climatic test methods – Part 15: Resistance to soldering temperature for through-hole mounted devices*

IEC 60749-20, *Semiconductor devices – Mechanical and climatic test methods – Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 60749-21, *Semiconductor devices – Mechanical and climatic test methods – Part 21: Solderability*

IEC 60749-23, *Semiconductor devices – Mechanical and climatic test methods – Part 23: High temperature operating life*

IEC 60749-25, *Semiconductor devices – Mechanical and climatic test methods – Part 25: Temperature cycling*

IEC 60749-26, *Semiconductor devices – Mechanical and climatic test methods – Part 26: Electrostatic discharge (ESD) sensitivity testing – Human body model (HBM)*

IEC 60749-28, *Semiconductor devices – Mechanical and climatic test methods – Part 28: Electrostatic discharge (ESD) sensitivity testing – Charged device model (CDM) – Device level*