

(Identical to IEC 747-1...1983)

2547.1.1

WITHDRAWN JANUARY TAS 1995

AS 2547.1.1—1986
UDC 621.382.2/.3:621.3.08

Australian Standard[®] 2547.1.1—1986

SEMICONDUCTOR DEVICES— Part 1.1—DISCRETE DEVICES— GENERAL



STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter



This Australian standard was prepared by Committee TE/12, Semiconductors and Devices. It was approved on behalf of the Council of the Standards Association of Australia on 24 April 1986 and published on 4 August 1986.

The following interests are represented on Committee TE/12:

Department of Defence

Department of Industry, Technology and Commerce

Confederation of Australian Industry

Institution of Radio and Electronics Engineers, Australia

Telecom Australia

Review of Australian Standards. To keep abreast of progress in industry, Australian standards are subject to periodic review and are kept up-to-date by the issue of amendments or new editions as necessary. It is important therefore that standards users ensure that they are in possession of the latest edition, and any amendment thereto.

Full details of all SAA publications will be found in the Catalogue of SAA Publications; this information is supplemented each month by SAA's journal 'The Australian Standard', which subscribing members receive, which gives details of new publications, new editions and amendments, and of withdrawn standards.

Suggestions for improvements to Australian standards, addressed to the head office of the Association, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian standard should be made without delay in order that the matter may be investigated and appropriate action taken.

AUSTRALIAN STANDARD

**SEMICONDUCTOR DEVICES—
Part 1.1
DISCRETE DEVICES—
GENERAL**

AS 2547.1.1—1986

First published 1986

*See also Preface (p.2) and
Cross references index (p.7)*

PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.

ISBN 0 7262 4239 X



PREFACE

This standard was prepared by the Association's Committee on Semiconductors and Devices. It is reproduced from IEC 747.1:1983 and is one of the standards prepared by IEC/TC 47, Semiconductor Devices.

This standard is one of a series of standards published under the generic specification AS 2547. This standard supersedes:

- the existing AS 2547 series (published in 1982 and 1983 and identical to equivalent parts of IEC 147 published between 1966 and 1981);
- AS C366, Part 4—1978 and Part 5—1978 (equivalent to IEC 147-4, IEC 147-5 and IEC 147-5A);
- AS C367. (endorsement of IEC 148—1969);
- AS 1967 (identical to IEC 147-1D and 1E).

The purpose of IEC 747 is to reorganize into a device oriented publication, the material originally presented in the IEC 147* series and IEC 148† on semiconductor devices and letter symbols representing them is now republished as follows:

- (a) Specific requirements for integrated circuits—now IEC 748.
- (b) Mechanical and climatic test methods—now IEC 749.

It was in view of the above reorganization that Committee TE/12 agreed to integrate the entire series into one series of Australian standards using the generic designation AS 2547. The relationship with the three IEC standards is as follows:

- (i) Part 1.1 onwards—identical with the IEC 747 series.
- (ii) Part 2.1 onwards—identical with the IEC 748 series.
- (iii) Part 3.1—identical with IEC 749.

For the purpose of this Australian standard and all other standards in this AS 2547 series, the text of the reproduced IEC Publications should be modified as follows:

- A. *Terminology.* The words 'Australian Standard' should replace the words 'IEC Publication' wherever they appear.
- B. *Cross-references.* The reference to IEC Publications should be replaced by references to the appropriate Australian Standards as follows:

| <i>Reference to IEC Publications</i> | | <i>Appropriate Australian Standard</i> | |
|--------------------------------------|---|--|---|
| IEC 27 | Letter symbols to be used in electrical technology | AS 1046 | Letter Symbols for Use in Electrotechnology |
| IEC 50 | International Electrotechnical Vocabulary | AS 1852 | International Electrotechnical Vocabulary |
| IEC 191 | Mechanical standardization of semiconductor devices | AS C379 | Mechanical Standardization of Semiconductor Devices |
| IEC 319 | Presentation of reliability data on electronic components | AS 2350 | Presentation of Reliability Data on Electronic and Similar Components |
| IEC 747 | Semiconductor devices. Discrete devices and integrated circuits | AS 2547 | Semiconductor Devices |
| 747.1 | Part 1—General | 1.1 | Discrete Devices—General |
| 747.2 | Part 2—Rectifier diodes | 1.2 | Discrete Devices—Rectifier Diodes |
| 747.3 | Signal (including switching) and regulator diodes | 1.3 | Discrete Devices—Signal (Including Switching) and Regulator Diodes |
| 747.4 | R.F. Diodes | 1.4 | Discrete Devices—R.F. Diodes |
| 747.5 | Optoelectronic devices | 1.5 | Discrete Devices—Optoelectronic Devices |
| 747.6 | Thyristors | 1.6 | Discrete Devices—Thyristors |

* IEC 147, Essential ratings and characteristics of semiconductor devices and general principles of measuring methods.

† IEC 148, Letter symbols for semiconductor devices and integrated microcircuits.

| | | | |
|-----------|---|---------|---|
| 747.7 | Bipolar transistors | 1.7 | Discrete Devices—Bipolar Transistors |
| 747.8 | Field-effect transistors | 1.8 | Discrete Devices—Field-effect Transistors |
| 747.9 | Miscellaneous devices | 1.9 | Discrete Devices—Miscellaneous Devices |
| 747.10 | Generic specification for discrete devices and integrated circuits (QC 700 000) | 1.10 | Generic Specification for Discrete Devices and Integrated Circuits (QC 700 000) |
| 747.11 | Sectional specification for discrete devices (QC 750 000) | 1.11 | Sectional Specification for Discrete Devices (QC 750 000) |
| IEC 748 | Semiconductor Devices. Integrated circuits | AS 2547 | Semiconductor Devices. |
| IEC 748.1 | General | 2.1 | Integrated Circuits—General |
| IEC 748.2 | Digital integrated circuits | 2.2 | Integrated Circuits—Digital |
| IEC 748.3 | Analogue integrated circuits | 2.3 | Integrated Circuits—Analogue |
| IEC 748.4 | Interface integrated circuits | 2.4 | Integrated Circuits—Interface |
| IEC 749 | Semiconductor devices. Mechanical and climatic test methods | 3.1 | Mechanical and Climatic Test Methods |

© Copyright — STANDARDS ASSOCIATION OF AUSTRALIA 1986

Users of standards are reminded that copyright subsists in all SAA publications. No part of this publication may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing of the Standards Association of Australia.

CONTENTS

| | Page |
|--|------|
| CROSS REFERENCE INDEX | 7 |
| CHAPTER I: SCOPE AND PRESENTATION OF IEC PUBLICATIONS 747 AND 748 | |
| Clause | |
| 1. Publications 747 | |
| 1.1 Scope | 8 |
| 1.2 Presentation | 8 |
| 2. Publications 748 | 8 |
| 2.1 Scope | 8 |
| 2.2 Presentation | 8 |
| CHAPTER II: PURPOSE AND PRESENTATION OF PUBLICATION 747 | |
| 1. Purpose | 9 |
| 2. Presentation | 9 |
| CHAPTER III: PURPOSE, PRESENTATION AND REQUIREMENTS ON THE CONTENTS OF PUBLICATIONS 747-1, 747-2, 747-3, ETC. | |
| 1. Purpose of each part | 10 |
| 2. Presentation of each part | 10 |
| 2.1 Subdivision into chapters | 10 |
| 2.2 Subdivision into device sub-categories | 10 |
| 3. Requirements on the different chapters of each part | 10 |
| 3.1 Requirements on Chapter I, General | 10 |
| 3.1.1 Purpose | 10 |
| 3.2 Requirements on Chapter II, Terminology and letter symbols | 10 |
| 3.2.1 Purpose | 10 |
| 3.2.2 Validity of terms, definitions and letter symbols | 10 |
| 3.2.3 Letter symbols | 11 |
| 3.3 Requirements on Chapter III, Essential ratings and characteristics | 11 |
| 3.3.1 Purpose | 11 |
| 3.4 Requirements on Chapter IV, Measuring methods | 11 |
| 3.4.1 Purpose | 11 |
| 3.5 Requirements on Chapter V, Acceptance and reliability | 11 |
| 3.5.1 Purpose | 11 |
| CHAPTER IV: TERMINOLOGY, GENERAL | |
| 1. Introduction | 12 |
| 2. Technical terms | 12 |
| 3. General terms | 15 |
| 4. Types of devices | 15 |
| 5. Terms related to ratings and characteristics | 19 |
| 5.1 Voltages | 19 |
| 5.2 Temperatures | 19 |
| 5.3 Thermal characteristics | 19 |
| 5.4 Noise | 21 |
| 5.5 Various terms | 22 |

| Clause | CHAPTER V: LETTER SYMBOLS, GENERAL | Page |
|---|---|------|
| 1. Introduction | | 23 |
| 2. Letter symbols for currents, voltages and powers | | 23 |
| 3. Letter symbols for electrical parameters | | 27 |
| 4. Letter symbols for other quantities | | 29 |

CHAPTER VI: ESSENTIAL RATINGS AND CHARACTERISTICS, GENERAL

| | |
|--|----|
| 1. Introduction | 31 |
| 2. Standard format for the presentation of published data | 31 |
| 3. Basic "rating" definitions | 31 |
| 4. Definitions of cooling conditions | 32 |
| 5. List of recommended temperatures | 32 |
| 6. List of recommended voltages and currents | 33 |
| 7. Mechanical ratings, characteristics and other data | 37 |
| 8. Standardization of the position of terminals on bases of semiconductor devices | 37 |
| 9. Colour coding of terminals for semiconductor devices | 38 |
| 10. General information applicable to multiple devices having a common encapsulation | 39 |
| 11. Production spread and compliance | 41 |
| 12. Printed wiring and printed circuits | 41 |

CHAPTER VII: GENERAL AND REFERENCE MEASURING METHODS, GENERAL

SECTION ONE — GENERAL MEASURING METHODS

| | |
|---|----|
| 1. Introduction | 42 |
| 2. General precautions | 42 |
| 2.1 Protection of devices and measuring equipment | 42 |
| 2.2 Accuracy of measurement | 43 |
| 2.3 Definitions | 44 |

SECTION TWO — REFERENCE MEASURING METHODS

| | |
|---|----|
| 1. Guide for reference measuring methods | 44 |
| 2. Thermal conditions for electrical reference measuring methods | 45 |
| 2.1 Introduction | 45 |
| 2.2 Conditions in case of negligible power dissipation in the device | 46 |
| 2.3 Conditions in case of significant power dissipation in the device | 46 |

CHAPTER VIII: ACCEPTANCE AND RELIABILITY OF DISCRETE DEVICES

SECTION ONE — GENERAL

SECTION TWO — GENERAL PRINCIPLES

(Under consideration)

SECTION THREE — ELECTRICAL ENDURANCE TESTS

| | |
|---|----|
| 1. Purpose and presentation | 49 |
| General requirements | 49 |
| 2.1 Conditions for endurance tests | 49 |
| 2.2 Duration of test | 51 |
| 2.3 Failure-defining characteristics and measurements | 52 |
| 2.4 Failure criteria | 52 |
| 2.5 Precautions | 52 |

| Clause | Page |
|---|-----------|
| 3. Specific requirements. General | 53 |
| 3.1 List of endurance tests | 53 |
| 3.2 Conditions for endurance tests | 53 |
| 3.3 Failure-defining characteristics and failure criteria for acceptance after endurance tests | 53 |
| 3.4 Failure-defining characteristics and failure criteria for reliability tests (under consideration) | 54 |
| 3.5 Procedure in case of a testing error | 54 |
| 3.6 Information to be given in Tables I and II | 54 |

CHAPTER IX: ELECTROSTATIC-SENSITIVE DEVICES

| | |
|---|----|
| 1. Handling precautions | 55 |
| 2. Label and symbol | 56 |
| 3. Test methods (under consideration) | 58 |

CROSS REFERENCES INDEX

| New clause number | Old clause number | Document or publication | New clause number | Old clause number | Document or publication |
|-------------------|-------------------|-------------------------|---------------------|----------------------|-------------------------|
| Chapter IV | | | 5.4.10 | 0-4.17 | 147-0E |
| 2.1 to 2.10 | 0-1.1 to 0-1.10 | 147-0 | 5.5.1 | 0-4.18 | 147-0E |
| 2.11 | 0-3.3 | 147-0 | 5.5.2 | 0-4.19 | 147-0E |
| 2.12 | 0-3.4 | 147-0 | 5.5.3 | 0-6.1 | 147-0 |
| 2.13 to 2.28 | 0-1.11 to 0-1.26 | 147-0 | Chapter V | | |
| 3.1 | 0-3.1 | 147-0 | 1 | I, 3/- | 148/- |
| 3.2 | 0-3.2 | 147-0 | 2 | I, 4 | 148 |
| 4.1 | 0-2.1 | 147-0 | 3 | I, 5 | 148 |
| 4.2 | 0-2.26 | 147-0F | 4 | I, 6 | 148/148B |
| 4.3 | 0-2.2 | 147-0 | Chapter VI | | |
| 4.4 | 0-2.5 | 147-0 | 1 | 3.1 | 147-0 |
| 4.5 | 0-2.6 | 147-0 | 2 | 3.6 | 147-0 |
| 4.6 | 0-2.16 | 147-0B | 3 | 3.3 | 147-0 |
| 4.7 | 0-2.17 | 147-0B | 4 | +3.0 | 147-0B |
| 4.8 | 0-2.14 | 147-0B | 5 | 3.2 | 147-0 |
| 4.9 | 0-2.20 | 147-0E | 6.1 to 6.3 | 3.4 | 147-0 |
| 4.10 | 0-2.3 | 147-0 | 6.4 | 3.5.1 to 3.5.2 | 147-0B |
| 4.11 | 0-2.4 | 147-0 | 7 | 3.7 | 147-0B/0C |
| 4.12 | 0-2.25 | 147-0E | 8.1 | 3.8 | 147-0B |
| 4.13 | 0-2.21 | 147-0E | 8.2 | 3.8.2 | 147-0C |
| 4.14 | 0-2.22 | 147-0E | 9.1 | 3.9.1 | 147-0B |
| 4.15 | 0-2.23 | 147-0E | 9.2 | 3.9.2 | 147-0B |
| 4.16 | 0-2.24 | 147-0E | 9.3 | 3.9.3 | 147-0C |
| 4.17 | 0-2.7 | 147-0 | 10 | 3.10 | 147-0B |
| 4.18 | 0-2.15 | 147-0B | 11 | 3.11 | 147-0C |
| 4.19 | 0-2.10 | 147-0 | 12 | 3.12 | 147-0C |
| 4.20 | 0-2.11 | 147-0 | Chapter VII | | |
| 4.21 | 0-2.12 | 147-0 | Section One | 1 and 2 | 47(CO)754 |
| 4.22 | 0-2.13 | 147-0 | Section Two | I, Sect. One and Two | 147-3 |
| 4.23 | 0-2.9 | 147-0A/47(CO)796 | Chapter VIII | | |
| 4.24 | 0-2.8 | 147-0 | Section One | Chapter 0 | 147-4 |
| 4.25 | 0-2.18 | 147-0C | Section Two | Chapter 1 | 147-4 |
| 4.26 | 0-2.19 | 147-0C | Section Three: | | |
| 5.1.1 | - |) | 1 | II, 1/- | 147-4/- |
| 5.1.2 | 0-4.1 | 147-0 | 2 | II, One, 2 | 147-4 |
| 5.1.3 | 0-4.2 | 147-0 | 3.1 | - | - |
| 5.1.4 | 0-4.3 | 147-0 | 3.2 | II, One, 3.2 | 147-4 |
| 5.2.1 | 0-5.1 | 147-0 | 3.3 | II, One, 3.3 | 147-4 |
| 5.2.2 | 0-5.2 | 147-0 | 3.4 | II, One, 3.4 | 147-4 |
| 5.2.3 | 0-5.4 | 147-0 | 3.5 | II, One, 3.5 | 147-4 |
| 5.3.1 | 0-4.4 | 147-0C | 3.6 | - | - |
| 5.3.2 | 0-5.3 | 147-0 | Chapter IX | | |
| 5.3.3 | 0-4.5 | 147-0E | 1 and 2 | 5 | 147-0F |
| 5.3.4 to 5.3.8 | 0-4.6 to 0-4.8 | 147-0C | | | |
| 5.4.1 | 0-4.20 | 147-0E | | | |
| 5.4.2 | 0-4.21 | 147-0E | | | |
| 5.4.3 | 0-4.1 | 147-0E | | | |
| 5.4.4 | 0-4.12 | 147-0E | | | |
| 5.4.5 | 0-4.13 | 147-0E | | | |
| 5.4.6 | 0-4.14 | 147-0E | | | |
| 5.4.7 | 0-4.14.1 | 147-0E | | | |
| 5.4.8 | 0-4.15 | 147-0E | | | |
| 5.4.9 | 0-4.16 | 147-0E | | | |

) Under consideration.